SSC-352

MARINE STRUCTURAL STEEL TOUGHNESS DATA BANK

(Volume 3)



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SHIP STRUCTURE COMMITTEE

1991

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August 28, 1991

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MARINE STRUCTURAL STEEL TOUGHNESS DATA BANK

A substantial amount of toughness data for commonly used marine steels is available to ship designers. The information, however, did not exist in a comprehensive database that users could access. The Ship Structure Committee recognized the need for a convenient source of materials design data and sponsored the development of the Marine Structural Steel Toughness Data Bank.

This four volume report contains data records for 10,000 tests on eleven marine steels. An abridged edition containing data extracts from all principal sections is available from the National Technical Information Service. A computer based version of the data bank is available through the developers. We trust that this information will prove to be quite useful.

A. E. HENN
Rear Admiral, U.S. Coast Guard
Chairman, Ship Structure Committee

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16. Abstract

The *Ship Structures Committee* has sponsored the development of a data bank covering the toughness of steels for marine applications. Effort focused on the identification and procurement of sources of data containing quantitative toughness data, and the development from those data of a well-documented computerized data bank available to a wide range of engineers and material scientists. Included were raw data from material suppliers and data from papers and technical reports published by a variety of organizations.

The principal focus was on Tensile, Charpy V notched bar impact values, fracture toughness (JIc), NDTT, and DT energies; other toughness parameters were included if available for the same lots of material. The materials include steels identified by the Project Technical Committee representing the sponsoring agencies.

About 1000 records representing approximately 10,000 tests of eleven steels are included in this prototype version of the data bank. Standard procedures now exist for efficient addition of data for other alloys and properties.

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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

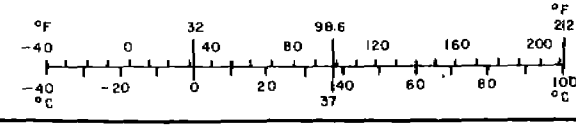
Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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Volume 1
ABS-B 1000
ABS-EH32 2000
ABS-EH36 2100
A36 3100

Volume 2
CG A537M 7100
A537 CL1 7300
A572 Gr50 7600
A588 8000
A710 9400

Volume 3
BS4360 Gr50D 13800

Volume 4
HY80 16500
HY100 19500

(5) 6X

A Marine Structural Toughness Data Bank
Ship Structures Committee
Final Report

1 Introduction

Despite the substantial number of data available on the toughness of a wide variety of steels which may be used for marine applications, including several important studies by the *Ship Structures Research Committee*, there has been no comprehensive source to which one might go to readily find well-documented numeric data for the full range of materials and types of data of interest. The *Ship Structures Committee* and the *U.S. Coast Guard* recently took the steps needed to begin the establishment of such a source, with first priority given to toughness data for high strength, low alloy steels.

This handbook provides the initial compilation for the Marine Structural Toughness Data Bank, a summary of data from about 10,000 tensile and toughness tests of hundreds of samples representing eleven steels of importance for marine applications.

The result of this program is not only a source of reliable and well-documented numeric data on the toughness of steels, but also the nucleus of a system which may be expanded to include other properties of these steels and other materials which might be considered for such applications. The source will be of value to all segments of the Marine Industry, commercial and military, and to a number of other industry groups which utilize these steels, as well as to the Steel Industry itself.

Also of significant consequence, the program has been carried out in a manner and with procedures and standards compatible with those in use in the development of machine-readable databases by groups such as the *National Materials Property Data Network, Inc.* (the *MPD Network*), a network of worldwide sources of data (Refs. 1,2). This assures the opportunity for easy and direct interface and interchange of data with many other sources of numeric materials data.

As an added advantage, new searchers who might be looking for the type of data contained herein but are unaware of the Marine Structural Toughness Data Bank will be directed to it via the online version being established under the name MARTUF on the *MPD Network*. Such users also have access to many other sources of materials data. For additional information on this mode of access to the Marine Structural Toughness Data Bank, please refer to Annex I to this document.

2 Scope

The scope of this program was the development of a data bank on the toughness of steels which may be considered for marine applications such as ship hulls and drilling structures. Eleven steels of importance to the member organizations of the *Ship Structures Committee* are included. Data from a variety of types of toughness tests were included in the database, including Charpy impact, fracture toughness, nil-ductility transition, and drop-weight tear tests. The emphasis of this project was on the collection of data, not its detailed analysis, though efforts were made to assure that problems with identity of individual lots or incomplete reporting of test data were dealt with.

The Marine Toughness Data Bank was developed both in hard copy, as summarized in this document, and in machine readable form. It is available in a searchable online version on the *MPD Network* (where it is referred to as MARTUF; see Annex II and Ref 1,2). It is also available on PC disks in the original Lotus 123 format in which it was assembled from the Ship Structures Committee. It is not searchable in this format.

3 Materials Included in Marine Toughness Data Bank

The scope of materials considered for inclusion in this data bank was established by the Technical Committee representing the *Ship Structures Committee*. The original list of materials with the priorities provided is shown in Table 1. The individual priorities for the materials within group 1 are those specifically provided by the Technical Committee; priority numbers within groups 2 and 3 were assigned arbitrarily for convenient reference.

Also shown in Table 1 are alternative designations by which these materials are often identified. Their detailed material property and chemical composition requirements are presented in Table 2, with the order in which the material are presented revised to group like alloys (based upon composition and properties) together. Together these two tables illustrate several important features which had a significant bearing upon the program, viz.:

1. The specifications and properties for these materials overlap to a great extent,
2. It is difficult to be certain which materials are completely equivalent and which are significantly different, and
3. A great amount of information is required in building a database for such materials to provide users with the background necessary to assure than useful and valid comparisons are being made.

This problem has been recognized previously, especially in regard to comparisons with steels covered by foreign specifications. Early and Himes (Refs 3, 4, 5) confronted the problem and determined that in comparing specifications and individual steels themselves it is necessary to consider the composition limits, material property limits, fabrication practices and resultant microstructures, specific quality assurance requirements before drawing conclusions on this matter. They further concluded that several U.S. and foreign steels widely considered to be equivalent were indeed not so when all of these factors were considered.

It was not possible within the constraints of this program to determine without question the relative equivalence of all of the lots of materials for which data were obtained and included in this reference source. Therefore in all cases the identities given individual lots of material in this data bank are those provided by the original investigators plus those from the Unified Numbering System Guide (Ref. 6).

However it is clear from Table 2 that there are several groups of similar materials included in the Marine Toughness Data Bank, notably:

- High strength, low alloy steels A514, HY80 and HY100 containing primarily Ni, Cr, Mn and Mo;
- High strength, low alloy steel A710 and HSLA 80 containing primarily Cu, Ni, Cr and Mo;
- Medium to high strength low alloy steels A537, CG-537, A656, A737, ABS-EH36, and API 5L containing primarily Mn; and
- Medium strength low alloy steels A36, A572, A588, A633, A678, BS4360 and ABS-B and E, also containing primarily Mn.

Within each of the groups the primary alloying elements largely overlap, and their distinctiveness arises from differences in minor alloying elements and mechanical property requirements.

In the course of this work it was determined that it is appropriate to include certain "equivalent" alloys in the high priority list (making due allowance for tensile strengths, overlapping compositions, etc.). This was based in part on commercial practices.

Priority Alloy	Equivalent
HY80	A543 GrC CL1
A710 GrA	A736
ABS EH36	A737 Gr B
A514E	A517E
HY100	A543 GrC CL2
API5LX60	A572

Given the conditions above and the sources and types of data included within the scope of the search, data were placed into the data bank for the following materials:

ABS-B	A36	A710/A710-A	BS4360 Gr 50D
ABS-EH32	A572 Gr 50	HY80	CG A537M (A537 Cl 1)
ABS-EH36	A588 Gr A	HY100	

These represent 10 of the top 15 priority alloys requested by the Technical Committee, and one (A572) within the second priority set.

Alloying Identification Scheme: It was found convenient when logging the data for inclusion in the data bank to use a three-part identification scheme, in which the first three digits identify the alloy (with a direct relationship to the priority listing provided by the technical Committee); the second set of three digits identifying the specific heat; and the final two digits identifying whether the test sample was parent (base) metal, weld metal or heat-affected zone (HAZ), plus in the latter case the approximate distance of the tested HAZ area from the weld fusion line, *i.e.*, where the base of the notch or precracked tip is positioned 1, 3, 5, etc. mm from the edge of weld deposit. Thus,

XXX.YYY.ZZ

where

XXX. -Alloy Identifier, from priority code (Table 1)

YYY. -Heat Number, sequential number

ZZ -Sample Descriptor, as follows:

.01 - Base Metal
.02 - On fusion line
.03 - 1 mm into HAZ
.04 - 3 mm into HAZ
.05 - 5 mm into HAZ
.06 - 7 mm into HAZ
.07 - 9 mm into HAZ
.08 - 11 mm into HAZ
.09 - All weld metal

In recording this data for retention on the computer, every effort was made to preserve as much detail as possible about the preparation of the specimens tested. It is hoped that this will permit studies to be made of the effects of compositional materials or process variables on performance. This is required recording ingot position, welding parameters, specimen location, information about prior staining and postwelding heat treatment.

In order to maintain the individuality of material information records which differed only slightly, letters or numbers were added to the Material Codes. For example, when the top and bottom of the ingot were studied T or B was added. If severail strain-aging conditions were examined, S1, S2, etc. were noted. Multiple welds were recorded as A, B, C, D, etc.

One should be alert to those variables which may distinguish among the property records. For example, one may wish to search for deposit properties, in which case only ".09" records are of interest, or seek information about the fusion line, in which case records including ".02" (and possibly .03) will be of interest. The database offers the potential for studying differences in performance of the root pass or the last pass, or at the mid thickness, distinguishing between when it is or is not the weld root. Thus one must be careful not to mix weld data indiscriminately.

It goes without saying that distinctions between LT and TL specimens of the base metal need to be preserved. This was required as well for the weld deposit. It should be noted that L for the deposit was defined as the direction of travel. Since specimens were usually oriented perpendicular to the weld, a toughness measurement was usually described as TL in the deposit. At the fusion line and in the heat affected zone, the base metal specimens would all be transverse to the weld, but the TL orientation designated for the deposit would be switched to LT in the HAZ if the rolling direction were perpendicular to the welding direction.

It must be recognized that all position indicators and other descriptors of location relative to the fusin line or root or surface of the specimen are approximate. Nevertheless, considering all the variables provided for in the database may offer an explanation for some of the scatter in weldment performance observed. The reader should be acquainted with the data recording format if an in-depth study of materials or processing variables is intended.

4 Types of Data (Properties) Covered in the Program

The types of data sought for the data bank included the following:

- Material characterization (including actual composition, fabrication information and weld procedures, where appropriate)
- Tensile properties
- Fracture toughness, from KIc and JIc tests
- Charpy V notched bar impact values
- Nil ductility transition temperature
- Dynamic tear energy

Other types of toughness data were also sought, providing test results for at least one of the types above were also presented, and provision for a wide variety of types was made in the schema for the basic structure of the database (Table 4, described in Section V) These additional types of data included:

- Precracked Charpy impact
- Precracked Charpy slow bend
- MRL crack arrest

- ESSO crack arrest
- Double TT crack arrest
- Wide plate tensile test
- Drop weight tear energy

Several other types of test data were also considered, including the Tearing Modulus, T, but the lack of standard test methods for such parameters led to their being dropped from further study. Interest was expressed in the inclusion of modulus of elasticity values at one point, but it was excluded because the types of tensile tests for which data were being input did not provide reliable measures of modulus in accordance with ASTM standards (ASTM Standard Method E 111).

In fact, during the collections of data, the vast majority of test results located and included within the data bank were from Charpy V notched bar impact tests; 643 of the 1017 records compiled contained Charpy data) Only relatively few fracture mechanics data (12 records, all JIc, and all representing HY80 and HY100) were found. The lack of fracture mechanics parameters found is undoubtedly related to the relatively tough nature of this general class of materials under conditions above their ductile-to- brittle transition temperature.

Table 3 is an "*occurrence table*" for the data bank, a matrix illustrating the various types of test records for the individual materials. The specific data associated with the various type of tests which were included in the database, and the meaning of the abbreviations are explained in Table 4, the data bank format (see Section V).

5 Format Development

The development of the overall format for the Marine Toughness Data Bank was an evolutionary process. A working format was established at the beginning of the program, covering the whole span of material characterization and test results sought, and the collection of data begun. Dr. Martin Prager, Executive Director of the *Materials Properties Council* (*MPC*), was responsible for locating, compiling and evaluating the data. Over the following six-to-twelve months, various examples arose in which more detailed description of the materials or of welding processes or of certain types of test results were required. The result was several iterations in format development, some changes involving only refinements, but others very substantive improvements in documentation of the materials or test data.

The final format established for the data bank is illustrated in Table 4; it is basically a very broad, very long spread sheet, with the material description/test data relationship being basically hierarchical in nature, and with the various segments held together in a relational fashion around the material identifier code discussed above.

Three specific things were considered in establishing the data format: (1) the description and characterization of the materials for which data are shown in the system, (2) the data elements for the individual tests, and (3) the styles of presentation of the data when accessed following its compilation and inclusion in the database.

Considerable attention was given to the need to have adequate background on the materials so that comparisons of performance characteristics may be made reliably. The impact of such considerations is the inclusion of much more information than is likely to be desired by most users most of the time. However the result is the ability to track down a great amount of additional detail

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for those situations where it may be necessary to ensure that comparisons are meaningful. Examples include the elemental composition of individual lots, the fabrication histories of the individual lots, and the procedures used in producing the welded samples.

A major advantage of the particular format in Table 5 is its essential consistency with those of other databases being built by *MPC* and *MPD Network* for steels for other applications, notably the STEELTUF database (7). Utilization of such a format, even with substantial modification, assures the ability to expand, combine and/or compare readily with these other sources.

Compilation of Data: In order to maximize the efficiency and consistency of compilation of data for this data bank, standard data collection formats were developed. The format used for this purpose in the current program is presented in Table 5.

6 Sources of Data

The sources of data used in building the data bank included:

- Raw test results from ABS
- Raw rest results from material suppliers
- Individual test results from papers and technical reports published by:
  - ASTM Special Technical Publications and Journals
  - Materials Properties Council
  - Naval Research laboratories
  - Welding Research Council
  - Electric Power Research Institute
  - Ship Structures Committees
  - American Welding Society
  - Nippon Kokan
  - United Kingdom Atomic Energy Association
  - American Society of Mechanical Engineers
  - Universities

7 Procedures Employed in Building the Data Bank

The following basic steps were employed in building the MARTUF database:

1. Identification and procurement of data sources.
2. Review of document and completion of data compilation formats.
3. Transcription of data from source to *LOTUS 1-2-3* tabular format from information on compilation formats.
4. Development of a mapping program, and loading of file from *LOTUS 1-2-3* tabular format to a main-frame machine-readable database.

5. Mapping of the machine-readable form to print hardcopy handbook quality compilations.

The machine-readable version of the data bank was built and maintained at Stanford University in the *SPIRES* database management system (dbms). This software was developed at Stanford for library management and bibliographic search and retrieval purposes.

Preparation of the hardcopy database was accomplished under subcontract to Mr. William L. Anderson, of Elements Research, Inc., 2850 Middlefield Rd. #126, Palo Alto, CA 94306. The document was typeset in TEX and PostScript.[1]

8 Summary

The *Ship Structures Committee* has sponsored the development of a data bank covering the toughness of steels for marine applications. Effort focused on the identification and procurement of sources of data containing quantitative toughness data, and the development from those data of a well-documented computerized data bank available to a wide range of engineers and material scientists. Included were raw data from material suppliers and data from papers and technical reports published by a variety of organizations.

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About 1000 records representing approximately 10,000 tests of eleven steels are included in this prototype version of the data bank. Standard procedures now exist for efficient addition of data for other alloys and properties.

9 References in the Report

1. J. G. Kaufman, "*Sources and Standards for Computerized Materials Property Data and Intelligent Knowledge Systems*", Engineering with Computers, ASME, Vol. 4, pp 75-85, 1988, New York, NY.

2. J. G. Kaufman, "*The National Materials Property Data Network, Inc. - A Cooperative Approach to a Critical National Resource*", Proceedings of the First International Symposium on Computerization of Material Property Data, November, 1987, Philadelphia, PA.

3. NBSIR 82-2481, "*Analysis of Foreign and Domestic Material Specifications for Ships Components*", U.S Dept. of Commerce, National Bureau of Standards, October 1981 (Issued April, 1982), Washington, DC.

4. NBSIR 83-2692, "*Evaluation Criteria for Comparing Domestic and Foreign Material Specifications*", U.S. Dept of Commerce, National Bureau of Standards, March, 1983 (issued May, 1983), Washington, DC.

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PostScript is a trademark of Adobe Systems Incorporation.

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5. H. Himes and J. G. Early, "*Evaluation Criteria for Comparison of Foreign and Domestic Material Specifications*", Journal of Testing and Evaluation, May, 1983, ASTM, Philadelphia, PA.

6. "*Metals and Alloys in the Unified Numbering System*", SAE HS J1086, ASTM DS-56C, Fourth Edition, April, 1986.

7. Grattidge *et al*, "*Materials Information for Science and Technology (MIST): Project Overview*", NBS Special Publication 726, U.S. Dept of Commerce, National Bureau of Standards, November, 1986.

TABLE 1

MARINE STRUCTURAL TOUGHNESS DATA BANK

COMMON NAME	ASTM SPEC	UNS NUMBER	PRIORITY
HY80	A543 Gr C(1)	K31820	1-1
A710-A	A710 Gr A	K20747	1-2
CG A537M	A537 Cl 1	K12437	1-3
ABS-B	A131 Gr B	K02102	1-4
API 5L Gr X70	-	-	1-5
HSLA 80	-	-	1-6
ABS-EH36	A131 Gr EH36	K11852	1-7
A514E	A514 Gr E	K21604	1-8
A36	A36	-	1-9
BS 4360 Gr 50D	-	-	1-10
HY100	-	K32045	1-11
A588-81 Gr A	A588 GR A	K11430	1-12
A588 Gr B	A588 Gr B	K12043	1-12
A588 Gr C	A588 Gr C	K11538	1-12
A537-A	A537 Gr A	K02400	1-13
API 5L Gr X60	-	-	1-14
A656-70	A656 Gr 70	K11804	1-15
A572 Gr 50	A572 Gr 50	-	2-1
A678 Gr D	A678 Gr D	-	2-2
DIN 17100 St 52.3	-	-	2-3
JIS G3016	-	-	2-4
ABS-E	A131 Gr E	K01801	2-5
ABS DH36	A131 Gr DH36	-	2-6
A514A	A514 Gr A	K11856	3-1
A514F	A514 Gr F	K11576	3-2
A514P	A514 Gr P	K21650	3-3
A537-1	A537 Cl 1	K12437	3-4
A537-2	A537 Cl 2	K12437	3-5
A588	A588	K12040	3-6
A588-71 Gr F	A588 Gr F	K11541	3-7
ABS-CS	A131 Gr CS	K01601	3-8
ABS-DS	A131 Gr DS	K01601	3-9
ABS-AH32	A131 Gr AH32	K11846	3-10
ABS-EH32	A131 Gr EH32	K11846	3-11

Priorities:
- 1-1,2 etc — Technical Committee Priority 1 List
- 2 — Technical Committee Priority 2 List
- 3 — Other Grades of Alloys in Priority 1 List

Table 2 - Comparisons of Tensile Property and Composition Limits For Some Steels of Interest For Marine Applications

ALLOY DESIGNATIONS	SPECIFIED MINIMUM UTS ksi	SPECIFIED MINIMUM YS or YP ksi	SPECIFIED COMPOSITION, element, per cent C Max.	C Min.	Mn Max.	Mn Min.	P Max.	S Max.	Si Max.	Si Min.	Ni Max.	Ni Min.	Cr Max.	Cr Min.	Mo Max.	Mo Min.
A514 Gr E	100	90	0.20	0.12	0.70	0.40	0.035	0.040	0.20	-	-	-	2.00	1.40	0.60	0.40
A517 Gr E	115	100	0.20	0.12	0.70	0.40	0.035	0.040	0.35	0.20			2.00	1.40	0.60	0.40
A543 Type C Class 2	115	100	0.23	-	0.40	-	0.020	0.020	0.40	0.20	3.25	2.25	1.80	1.20	0.60	0.45
HY-100		100	0.20	-	0.40	0.10	0.025	0.025	0.35	0.15	3.50	2.25	1.80	1.00	0.60	0.20
HY-80		80	0.18	-	0.40	0.10	0.025	0.025	0.35	0.15	3.25	2.00	1.50	1.00	0.60	0.20
A543 Type C Class 1	105	85	0.23	-	0.40	-	0.020	0.020	0.40	0.20	3.25	2.25	1.80	1.20	0.60	0.45
A710 Gr A Class 2	72	65	0.07	-	0.70	0.40	0.025	0.025	0.40	-	1.00	0.70	0.90	0.60	0.25	0.15
A710 Gr A Class 3	85	75	0.07	-	0.70	0.40	0.025	0.025	0.40	-	1.00	0.70	0.90	0.60	0.25	0.15
HSLA 80 (MIL-S-24645)		80	0.07	-	0.70	0.40	0.025	0.010	0.70	-	1.00	0.70	0.90	0.60	0.25	0.15
CG-537M			0.16	-	1.50	0.90	0.035	0.040	0.35	0.15	0.25	-	0.25	-	0.08	-
A537/A537M Class 1	70	50	0.24	-	1.35	0.70	0.035	0.040	0.50	0.15	0.25	-	0.25	-	0.08	-
A537/A537M Class 2	80	60	0.24	-	1.35	0.70	0.035	0.040	0.50	0.15	0.25	-	0.25	-	0.08	-
ABS EH36	71	51	0.18	-	1.60	0.90	0.040	0.040	0.50	0.10	0.40	-	0.25	-	0.08	-
A737 Gr C	80	60	0.22	-	1.50	1.15	0.035	0.030	0.50	0.15	-	-	-	-	-	-
A656 Gr 70	80	70	0.18	-	1.65	-	0.025	0.035	0.35	-	-	-	-	-	0.35	-
API 5L Gr X60					1.60	-	0.040	0.050			0.50	-				
API 5L Gr X70			0.15	-	1.60								-	-		
A36	58	36	0.25	-	1.20	0.80	0.040	0.050	-	-	-	-	-	-		
BS4360 Gr 50D			0.15	-	1.35	0.80	0.040	0.050	0.30	0.15	0.50	0.25	0.50	0.30	-	-
A588 Gr C	70	50	0.15	-	1.35	0.80	0.040	0.050	0.30	0.15	0.50	0.25	0.50	0.30	-	-
MS-B/ABS Gr B	58	34	0.21	-	1.10	0.80	0.040	0.040	0.35	-	-	-	-	-	-	-
A572 Gr 50 Type 1	65	50	0.23	-	1.65	-	0.040	0.050	0.40	-	-	-	-	-	-	-
A633 Gr A	63	42	0.18	-	1.35	1.00	0.040	0.050	0.50	0.15	-	-	-	-	-	-
A678 Gr C	90	70	0.22	-	1.60	1.00	0.040	0.050	0.50	0.20	-	-	-	-	-	-
ABS E	58	34	0.18	-	1.35	0.70	0.040	0.040	0.35	0.10	-	-	-	-	-	-

ALLOY DESIGNATIONS	SPECIFIED MINIMUM UTS ksi	SPECIFIED MINIMUM YS or YP ksi	SPECIFIED COMPOSITION, element, per cent Cu Max.	Cu Min.	V Max.	V Min.	Cb(Nb) Max.	Cb(Nb) Min.	Ti Max.	Ti Min.	B Max.	B Min.	Al Min.	N Max.	N Min.
A514 Gr E	100	90			-	-	-	-	0.10	0.04	0.005	0.0015	-	-	
A517 Gr E	115	100	0.40	0.20	-	-	-	-	0.10	0.04	0.01	0.00	-	-	
A543 Type C Class 2	115	100	-	-	0.03	-	-	-	-	-	-	-	-		
HY-100		100	0.25	-	-	-	-	-	-	-	-	-	-		
HY-80		80	0.25	-	-	-	-	-	-	-	-	-	-	-	
A543 Type C Class 1	105	85	-	-	0.03	-	-	-	-	-	-	-	-	-	
A710 Gr A Class 2	72	65	1.30	1.00	-	-	0.02	-	-	-	-	-	-	-	
A710 Gr A Class 3	85	75	1.30	1.00	-	-	0.02	-	-	-	-	-	-		
HSLA 80 (MIL-S-24645)		80	1.30	1.00											
CG-537M			0.35	-	-	-	-	-	-	-	-	-	-	-	
A537/A537M Class 1	70	50	0.35	-	-	-	-	-	-	-	-	-	-	-	
A537/A537M Class 2	80	60	0.35	-	-	-	-	-	-	-	-	-	-	-	
ABS EH36	71	51	0.35	-	0.10	-	0.05	-	-	-	-	-	-	-	
A737 Gr C	80	60	-	-	0.11	0.04	0.05	-	-	-	-	-	-	0.030	
A656 Gr 70	80	70	-	-	-	-	0.07	0.020	-	-	-	-	0.02	0.030	0.(
API 5L Gr X60					0.02	-	0.05	-	-	-	-	-	-	-	
API 5L Gr X70					0.10	-	0.05	-	-	-	-	-	-	-	
A36	58	36													
BS4360 Gr 50D			0.50	0.20	0.10	0.01	-	-	-	-	-	-	-	-	
A588 Gr C	70	50	0.50	0.20	0.10	0.01	-	-	-	-	-	-	-	-	
MS-B/ABS Gr B	58	34	-	-	-	-	-	-	-	-	-	-	-	-	
A572 Gr 50 Type 1	65	50	-	0.20	-	-	0.05	0.005	-	-	-	-	-	-	
A633 Gr A	63	42	-	-	-	-	0.05	-	-	-	-	-	-	-	
A678 Gr C	90	70	-	0.20	-	-	-	-	-	-	-	-	-	-	
ABS E	58	34	-	-	-	-	-	-	-	-	-	-	-	-	

Note: Where composition or tensile properties vary with thickness, values are for 1-in. plate

10 Annex I: Summary and Directory of Data Sheets

Summary and General Introduction

Table A - List of Alloys and Directory for Data Bank

Table B - Explanation of Material Codes

Table C - List of Abbreviations and Symbols in Data Tables

Table D - List Abbreviations for Data References

10.1 Summary and General Description of Marine Toughness Data Bank

The Marine Toughness Data Bank is a compilation of raw, individual test data for steels of interest to the marine industry. The data are organized in the attached pages by alloy and where possible by grade of the alloy. Data for individual lots of material are collected together, with a cover page providing the background identification, composition, fabricating history, and, in the case of welds, the weld procedures. Also included on the initial cover page for each individual lot are the tensile properties whenever those were available. Following the tensile properties are one or more of the following types of test results:

- Tensile tests per ASTM Method E 8
- Charpy V-notched bar impact (CVN) tests per ASTM Method E 23
- Fracture toughness (J-integral, JIc) tests per ASTM Method E 813
- Nil-ductility-transition temperature (NDTT) tests per ASTM Method E 208
- Dynamic tear (DT) tests per ASTM Method E 604
- Drop weight tear test per ASTM Method E 436

over a range (more than two) temperatures, the data are plotted as a function of temperature on uniform sized plots so that data from may be readily compared from lot to lot and alloy to alloy.

In general, the data are presented in the original units systems (SI - International Standard, or Engineering) in which they were reported. However, once again to facilitate comparisons, all plots are presented to uniform scales with both sets of units present. There were a few cases in which older metric unit systems were utilized, and in these cases, the values are converted to the SI system for presentation.

The information on the following pages will provide additional assistance in interpreting certain of the abbreviations and codes used in compiling the data.

10.2 Table A - List of Alloys and Directory for Data Bank

Alloy Designation	Material Code (See Table B)	Page Number
ABS-B	004	1000
ABS-EH32	032	2000
ABS-EH36	007	2100
A36	009	3100
CG A537M	003	7100
A537 CL1	003	7300
A572 Gr 50	016	7600
A588	012	8000
A710	002	9400
BS4360 Gr 50D	010	13800
HY80	001	16600
HY100	009	19500

10.3 Table B - Explanation of Material Codes

In logging the data for inclusion in the Marine Toughness Data Bank, a three-part identification scheme was used, in which:

- the first three digits identify the alloy;
- the second set of three digits identify the specific heat; and
- the final two digits identify whether the test sample was parent (base) metal, weld metal or heat-affected zone (HAZ), plus in the latter case the approximate distance of the HAZ from the weld line. In the case of welds, it was often useful to add one or more letters to document some other welding variable such as a postweld thermal treatment.

Thus, the complete material code for unwelded materials would be of the following form:

XXX.YYY.01

Where:

XXX. -Alloy Identifier, from priority code (Table 1)
YYY. -Heat Number, sequential number

And for a welded material it would be of this form:

XXX.YYY.ZZWWW

where

XXX. -Alloy Identifier, from priority code (Table 1)
YYY. -Heat Number, sequential number
ZZ -Sample Descriptor, as follows:
.01 - Base Metal
.02 - On fusion line
.03 - 1 mm into HAZ
.04 - 3 mm into HAZ
.05 - 5 mm into HAZ
.06 - 7 mm into HAZ
.07 - 9 mm into HAZ
.08 - 11 mm into HAZ
.09 - All weld metal

WWW -Weld descriptors
A - As welded
S - Stress relieved after welding

In either case (parent/base material or weld), one or more numbers may follow these codes (without any space) indicating different pieces or minor variations in treatments, which may be deduced by looking at the detailed composition, fabrication or welding history.

10.4 Table C - Symbols and Abbreviations Used in Data Bank

Abbreviations for Heat Treatment and Final Processing:

A	Austenitized
B	Brine quenched
C	Cold rolled
D	Double normalized
F	Hot rolled
G	Hot forged
K	Aged
N	Normalized
P	Thermo-mechanical process
R	Continuous rolled
Q	Quenched
S	Stress-relieved
T	Tempered
W	Welded

Abbreviations for Alloying Elements:

C	Carbon	Mn	Manganese
P	Phosphorus	S	Sulfur
Si	Silicon	Cr	Chromium
Ni	Nickel	Mo	Molybdenum
V	Vanadium	Cu	Copper
Cb	Columbium	Ti	Titanium
B	Boron	Al	Aluminum
N	Nitrogen		

Abbreviations for Welding Procedures:

Weld type:	SAW	Submerged arc weld
	SMAW	Shielded metal arc weld
	TSAW	Tandem shielded submerged arc weld
	ESW	Electroslag weld
	NGESW	Narrow gap electroslag weld
Weld position:	IG	Downhand
	1G	Downhand
	2G	Horizontal
	3G	Vertical
	4G	Overhead

Abbreviations for Location of Test Sample:

T	Top	B	Bottom

Abbreviations for Specimen Orientation:

For tensile specimens:

L	Longitudinal
T	Long Transverse
S	Short Transverse

For all other specimens: two letter codes are used, with the first letter indicating the direction normal to the fracture plane; and the second letter indicating the expected direction of crack growth on the fracture plane.

The letters are:

L	Longitudinal
T	Long transverse
S	Short transverse

The common combinations are:

L-T,	L-S
T-L,	T-S
S-L,	S-T

Abbreviations for Table Column Headings:

Break?	Did specimen fracture completely?
CODIc	Critical COD
CODi	Initial COD
CVN Energy	Charpy V Energy
Crack lgth	Crack Length
Curve	Curve Shape
DT Energy	Dynamic Tear Energy
E	Tensile Modulus
Filler	Filler Alloy
Frac Apear	Appearance
Fracture?	Did Specimen Fracture?
Gage Lngth	Gage Length
Inv Basis	Reason for Invalid
Is Valid?	Valid KIc?
JI	Initial JI
Jmax	Maximum J, Jmax
Lat Expans	Lateral Expansion
Load Rate	Loading Rate
Load Type	Loading Type
NDTT	Nil Ductility Transition Temperature
Notch Prep	Notch Preparation
Orien	Orientation
RA	Reduction in Area
Shear	Shear Fracture
Spec Thick	Specimen Thickness
Spec Type	Specimen Type
Split?	Did Specimen Split?
Std Method	Standard Method Designation
Std Year	Year Standard Issued
TYP	Tensile Yield Point
TYS	Tensile Yield Strength
TYS Offset	Tensile Strength Offset
Tear Mod	Tearing Modulus
Test Temp	Test Temperature
UTS	Tensile Strength
Uniform El	Uniform Elongation

10.5 Table D - List Abbreviations for Data Source References:

004-2 — "*Approval Testing of Ship Steel Grades A, B, D and E, Produced via the Continuous Slab Caster Process*," Australian Iron and Steel Property Ltd., 1980

007-1 — Kobe Steel Reports on "*Quantitative Examination for Approval of Higher Strength Hull Structural Steel Plate Quench and Temper Type*," to ABS, Kobe Steel Ltd., Kakogawa Plant, 1972

007-4 — Sumitomo Test Report on "*Approval of Higher Strength Hull Steel Plates Rolled from Contiguously Cast Slab*" to ABS, Sumitomo Metal Industries Ltd., Kashima Steel Works, November 1972

1010 — Lukens Steel Company, Data Report Project 1010

1211 — Lukens Steel Company, Data Report Project 1211

3200 — Lukens Steel Company, Data Report Project 3200

3201 — Lukens Steel Company, Data Report Project 3201

3202 — Lukens Steel Company, Data Report Project 3202

3400 — Lukens Steel Company, Data Report Project 3400

3530 — Lukens Steel Company, Data Report Project 3530

ARMCO-MPC — ARMCO Steel Data Submitted for MPC Survey

KONKOL-1 — Konkol, P. J., Effects of Long-Time Post Weld Heat Treatment on the Properties of Constructional Steels, WRC Bulletin 330, January 1988

METZ/MPC-13 — Metz, P. O., "*Toughness of C-Mn Structural Steels*," in Fracture Toughness of Wrought and Cast Steels, ASME Publication MPC-13, 1980

RP1120 — Lukens Steel Company, Data Report Project RP1120

S-1971 — "*Sumitomo Metal Industries Approval Test Report of Hull and Steel Plates Rolled from Continuously Cast Slab, Grades A, R, B, C, D and E*," Sumitomo Metal Industries Ltd., Wakayama Steel Works, April 15, 1971

SH-01 — Properties of Normalized Steel Plates (Equivalent to BS4360 Gr. 50D) with Z Properties, Sumitomo Heavy Industries

SSC276 — Francis, P. H., Cook, T. S. and Nagy, A., Fracture Behavior Characterization of Ship Steels and Weldments, SSC-276, Final Report on Project SR-1224 (Fracture Criteria), Ship Structures Committee, U. S. Coast Guard Headquarters, 1978

USN-1 — U. S. Navy First Article Qualification Processing Information for Indicated Heat

USN 4/7 — U. S. Navy Technical Report, MPC Archival Record 4/7

USN 5/7 — U. S. Navy Technical Report, MPC Archival Record 5/7

USN 5/9 — U. S. Navy Technical Report, MPC Archival Record 5/9

USN 6/9 — U. S. Navy Technical Report, MPC Archival Record 6/9

USN 7/9 — U. S. Navy Technical Report, MPC Archival Record 7/9

USN 8/9 — U. S. Navy Technical Report, MPC Archival Record 8/9

USN 9/9 — U. S. Navy Technical Report, MPC Archival Record 9/9

WELLMAN-WRC — Wellman, G. W. *et al*, "*Specimen Thickness Effects for Elastic Plastic CTOD Fracture Specimens of an A36 Steel*," WRC Bulletin 328, Nov. 1987

WJ 3/87 — "*Welded HY-80 Steel for Australian Warships*," Welding Journal 66(3), March 1987, pp. 33-44

WJ 7/87 — Rodgers, K. J. and Lochhead, J. C., "*Self-Shielded Flux Cored Arc Welding - The Route to Good Fracture Toughness*," Welding Journal 66(7), July 1987, pp. 49-59

11 Annex II: Martuf on MPD Network

As noted in the body of this document, a machine-readable and searchable version of the Marine Structural Toughness Data Bank, known as MARTUF, has been developed and is accessible via the National Materials Property Data Network (*MPD Network*) on *STN International*. For more information, contact:

J. G. Kaufman, President
National Materials Property Data Network, Inc.
2540 Olentangy River Road
Columbus, Ohio 43202

12 Annex III: Data Collection Formats

The following pages contain formats used during the collection of data for the Marine Toughness Data Bank.

FORMATS.TXT

For File Use only
Entered into _____.WK1
lines_____to_____
Date_____19____

Information included: Wld, Ten, FT, CV, NDT, DWT, DT, MRL
WORKSHEETS FOR U. S. COAST GUARD DATABASE (based on marindbs: 12/30/87)
FRACTURE PROPERTIES OF STEELS FOR MARINE APPLICATIONS
BACKGROUND

0-1 Material Code __ __ __ · __ __ __ · __ __
*0-1a Common material name _____
0-1b UNS desig. _____ ___n.r. ___n.a. ___n.y.
0-1c ASTM specification no. _____ ___n.r. ___n.a. ___n.y.
0-1d AISI desig. _____ ___n.r. ___n.a. ___n.y.
0-1e Military spec. _____ ___n.r. ___n.a. ___n.y.
0-1f Other designation _____ ___n.r. ___n.a. ___n.y.
0-2a Base Metal ___WM-Wrought metal ___CM-Cast metal ___WJ-Welded joint only
*0-2b Basic Form ___P-Plate ___A-Angle ___C-Channel ___W-Web of shape
___T-Pipe ___B-Bar ___S-Shape ___F-Flange of shape
___ n.r. ___ n.a. ___ n.y.
*0-3 Thickness _____mm _____in. ___See_____
___n.r. ___n.a. ___n.y.
0-4 Composition type ___ S-refer to specification
___ N-nominal (not measured)
___ A-actual;
0-4aa Composition Position __T-Top,__B-Bottom,__L-Ladle, __W-Weld
___ n.r. ___ n.a. ___ n.y.
0-4a-o Actual Composition ___ See _____
0-4p Composition Comments _____
0-5 Total Processing ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
(Choose letters to indicate steps and order of treatment)

___ A-austenitized	___ N-normalized
___ B-brine quenched from A	___ P-thermo-mechanical process
___ C-cold working	___ R-continuous rolled
___ D-double normalized	___ Q-quenched
___ F-hot rolled	___ S-stress relieved
___ G-hot forged	___ T-tempered
___ K-aged	___ W-welded

___n.r. ___n.a. ___n.y.
*0-6 Producer's Heat Lot Number _____
___n.r. ___n.a. ___n.y. ___See_____
0-7 Producer (name of producing company) ___n.r. ___n.a. ___n.y.
_____
0-7a Year of production _____ ___n.r. ___n.a. ___n.y.
0-8 Additional information ? _____
0-9 Source of data/laboratory _____
___n.r. ___n.a. ___n.y.
*0-10 Source of data/reference _____
___n.r. ___n.a. ___n.y.
0-11 Melting practice _____ ___n.r. ___n.a. ___n.y.
0-12 Ingot position ___top ___middle ___bottom ___cont. cast. ___n.r. ___n.a. ___n.y.
0-13 Killing _____ ___n.r. ___n.a. ___n.y.
0-14 Process temp. ____degC ____degF ____degK
___n.r. ___n.a. ___n.y. ___See_____
0-15 Process time ____hr ___n.r. ___n.a. ___n.y. ___See_____
0-16 Rolling conditions ____ % reduction, total ___n.r. ___n.a. ___n.y.
*0-17 Final processing steps (use one or two letters) _____

___ A-austenitized	___ N-normalized
___ B-brine quenched from A	___ P-thermo-mechanical process
___ C-cold working	___ R-continuous rolled
___ D-double normalized	___ Q-quenched
___ F-hot rolled	___ S-stress relieved
___ G-hot forged	___ T-tempered
___ K-aged	___ W-welded

0-18 Final heat treat temp. ___degC ___degF ___degK
___n.r. ___n.a. ___n.y. ___See_____
0-19 Final heat treat time ____hr ___n.r. ___n.a. ___n.y. ___See_____
0-20 Cold work strain _____% ___n.r. ___n.a. ___n.y. ___See_____
0-21 S/R or Aging temp. ____degC ____degF ____degK ___See_____
___n.r. ___n.a. ___n.y.
0-22 S/R or Aging time ___hr ___n.r. ___n.a. ___n.y. ___See_____
-0-23 · Location _____

(27)

W-0 Material Key _____

W-1 Weld Code __ __ __ . __ __ __ . ___

W-2 Welding Process

___SAW ___NGGMA ___GMA ___ESW

___SMA ___NGSAW ___GTA ___EBW

___FCA ___TSAW ___PAW ___n.r. ___n.y.

W-3 Base Metal Thickness ___mm ___in ___n.r. ___n.a. ___n.y.

W-4 Welding Position _____ ___n.r. ___n.a. ___n.y.

W-5 Preheat temp. ____degC ____degF ___degK __n.r. __n.a. __n.y.

W-6 Gap ___mm ___in __n.r. __n.a. __n.y.

W-7 Interpass temp. ____degC ____degF ___degK __n.r. __n.a. __n.y.

W-8 Number of passes _____ ___n.r. ___n.a. ___n.y.

W-9 Welding filler, Spec. and Grade _____

___n.r. ___n.a. ___n.y.

W-10 Welding Filler Trade Name _____

W-11 Carbon content _____ ___n.r. ___n.a. ___n.y.

W-12 Filler size ____mm ____in ___n.r. ___n.a. ___n.y.

W-13 Shielding Gas __A __He ___M-mixed ___n.r. ___n.a. ___n.y.

W-14 Voltage _____volts ___n.r. ___n.a. ___n.y.

W-15 Amperage_____amps ___n.r. ___n.a. ___n.y.

W-16 Polarity _____

W-17 Travel Speed _____in/min _____mm/min ___n.r. ___n.a. ___n.y.

W-18 Heat Input/pass ____KJoules/mm____KJoules/in ___n.r. ___n.a. ___n.y.

W-19 Joint Prep. __V __U __K ___S.B. __D.V. ___D.U. ___N.G.

___n.r. ___n.a. ___n.y.

W-20 Number of sides welded __1 __2 ___n.r. ___n.a. ___n.y.

W-21 Welded Specimen Codes

Location relative to weld: (See below)

___ 09-Weld Metal
___ 02-Fusion Line
___ 03-1mm HAZ
___ 04-3mm HAZ
___ 05-5mm HAZ
___ 06-7mm HAZ
___ 07-9mm HAZ
___ 08-11mm HAZ
___ 10-Transverse Section Test (All Zones)
___ 11-50%WM-50%HAZ

W-22 Location relative to surface: (See below)

___ F-Final surface
___ R-Back surface (root)
___ M-Mid thickness (not root)
___ C-Mid thickness (root)
___ B-Back surface (not root)
___ N-Full cross section
____n.r. ___n.a. ___n.y.

W-23 Postweld heat treat.temp (See below) ___degC ___degF ___degK

___n.r. __n.a. __n.y.

W-24 Post-weld heat treatment time ____hr (See below)

___n.r. __n.a. __n.y.

W-25 Flux type _____

W-26 Flux Trade Name _____

W-27 Is actual weld deposit reported in 0-4? ___Yes ___No ___n.y.

W-0 Material Key Code (See total number below)

W-0 MATERIAL KEY CODE	W-21 Loc/Weld	W-22 Location	W-23 PWHT Temp	W-24 PWHT Time
_ _ _.- _ _ _.____	_ _	_____	_____deg____	_____hr.
_ _ _.- _ _ _.____	_ _	_____	_____deg____	_____hr.
_ _ _.- _ _ _.____	_ _	_____	_____deg____	_____hr.
_ _ _.- _ _ _.____	_ _	_____	_____deg____	_____hr.
_ _ _.- _ _ _.____	_ _	_____	_____deg____	_____hr.
_ _ _.- _ _ _.____	_ _	_____	_____deg____	_____hr.
_ _ _.- _ _ _.____	_ _	_____	_____deg____	_____hr.
_ _ _.- _ _ _.____	_ _	_____	_____deg____	_____hr.
_ _ _.- _ _ _.____	_ _	_____	_____deg____	_____hr.
_ _ _.- _ _ _.____	_ _	_____	_____deg____	_____hr.
_ _ _.- _ _ _.____	_ _	_____	_____deg____	_____hr.
_ _ _.- _ _ _.____	_ _	_____	_____deg____	_____hr.
_ _ _.- _ _ _.____	_ _	_____	_____deg____	_____hr.
_ _ _.- _ _ _.____	_ _	_____	_____deg____	_____hr.
_ _ _.- _ _ _.____	_ _	_____	_____deg____	_____hr.

1-0 Material Key _____

1-1 Type of test-tension

1-2 Test sample position __n.r. __n.a. __n.y. __See_____
___Surface, 0/4T ___Quarter-thickness, 1/4T
___3/8 thickness ___Mid thickness,1/2T
___Opposite surface, 1T ___Third quarter thickness, 3/4T

*1-3 Orientation of specimen __n.r. __n.a. __n.y. __See_____
__L (longitudinal) __T (long transverse) __S (short transverse)

1-4 Type of specimen __n.r. __n.a. __n.y. __See_____
___Cylindrical ___Rectangular ___Full-section

1-5 Specimen diameter or thickness ____mm ____in __See_____
__n.r. __n.a. __n.y.

1-6 Gage length _____ mm ____in __See_____
__n.r. __n.a. __n.y.

1-7 Rate of application of stress __MPa/sec __Ksi/sec __in/in/sec
__n.r. __n.a. __n.y. __See_____

*1-8 Test temp. __degC __degF __degK __See_____
__n.r. __n.a. __n.y.

*1-9 Tensile strength __MPa __Ksi __See_____
__n.r. __n.a. __n.y.

1-10 Offset % for TYS measurement _____ % __See_____
__n.r. __n.a. __n.y.

*1-11 Tensile yield strength __MPa __Ksi __See_____
__n.r. __n.a. __n.y.

1-12 Tensile yield point __MPa __Ksi __See_____
__n.r. __n.a. __n.y.

1-13 Uniform elongation _____% __See_____
__n.r. __n.a. __n.y.

1-14 Total elongation _____% __See_____
__n.r. __n.a. __n.y.

1-15 Reduction of area _____% __See_____
__n.r. __n.a. __n.y.

1-16 Modulus of elasticity _____MPa*10**6 __Ksi, etc __See_____
__n.r. __n.a. __n.y.

1-17 Standard __ASTM_____ or __other standard_____
__n.r. __n.a. __n.y.

1-18 Year of issue of test standard 19____ __See_____
__n.r. __n.a. __n.y.

2-0 Material Key _____

*2-1 Type of test (fracture toughness)

2-2 Position of specimen __n.r. __n.a. __n.y. __See_____
____Full-thickness
____Surface, 0/4T ____Quarter-thickness, 1/4T
____3/8 thickness ____Mid thickness,1/2T
____Opposite surface, 1T ____Third quarter thickness, 3/4T

*2-3 Orientation of specimen ____See_____
___ L-T ___ L-S ___ L-C ___ L-R ___ T-L
___ T-S ___ S-L ___ S-T ___ C-L ___ C-R
___ R-C ___ n.r. ___ n.a. ___ n.y.

*2-4 Type of specimen __n.r. __n.a. __n.y. __See_____
___Compact ___Side-grooved compact ___Bend
___Deep notch bend ___DCB ___WOL

*2-5 Thickness of specimen ____mm ___in __See_____
__n.r. __n.a. __n.y.

2-6 Initial crack length, average ____mm ___in __See_____
__n.r. __n.a. __n.y.

2-6a a/W ____ __See_____ __n.r. __n.a. __n.y.

2-7 Type of loading __Slow __Intermediate __High Rate
__n.r. __n.a. __n.y. __See_____

2-8 (Kdot) Rate of loading _____ __See_____
__n.r. __n.a. __n.y.

*2-9 Test temperature ___degC ___degF __degK ___RT (20C)
__See_____ __n.r. __n.a. __n.y.

*2-10 KQ _____ __n.r. __n.a. __n.y. __See_____

2-11 KIc _____ __n.r. __n.a. __n.y. __See_____

*2-12 Valid measure of KIc? ___yes ___no __See_____
__n.r. __n.a. __n.y.

*2-13 If invalid, reason __See _____
___(T)thickness ____(CL)crack length ____(FP)fatigue precrack
__n.r. __n.a. __n.y.

2-14 JIC ___units_____ __See_____
__n.r. __n.a. __n.y.

2-15 Reported stress intensity factor from JIc __units_____MPa*m**0.5
__n.r. __n.a. __n.y. __See_____

2-16 Method of JIC Calculation __n.r. __n.a. __n.y. __See_____
___per Stand. __modified Stand. ___other:_____

2-17 Initiation crack opening displacement ___mm ___in __See_____
__n.r. __n.a. __n.y.

2-18 Critical CTOD ___mm ___in __See_____
__n.r. __n.a. __n.y.

2-18a Is Critical CTOD ___c-cleavage ___u-cleavage preceded by tearing ___m-fibrous

2-19 Initiation J value __units_____ __See_____
__n.r. __n.a. __n.y.

2-20 Maximum J value __units_____ ___See_____
__n.r. __n.a. __n.y.

2-20a No. of J specimens ____ __See _____ __n.r. __n.a. __n.y.

2-21 Tearing modulus __units_____ ___See_____
__n.r. __n.a. __n.y.

2-22 Standard __ASTM_____ or __other standard:_____
__n.r. __n.a. __n.y.

2-23 Year of issue of test standard 19____ __See_____
__n.r. __n.a. __n.y.

3-0 Material Key _____

*3-1 Type of test: ___CVN-Charpy V notched bar impact
___PCV-Precracked Charpy V notched bar impact

3-2 Position of specimen __n.r. __n.a. __n.y. __See_____
____Surface, 0/4T ____Quarter-thickness, 1/4T
____3/8 thickness,3/8T ____Mid thickness,1/2T
____Opposite surface,1T ____Third quarter thickness, 3/4T

*3-3 Type of specimen __See_____
__Full: full-width Charpy V ___1/2W: One-half width Charpy V
___2W: Twice-width Charpy V ___1/4W: One-quarter width Charpy V

*3-4 Orientation of specimen ___See_____
___ L-T ___ T-L ___ L-C ___ L-R ___ L-S
___ T-S ___ S-L ___ S-T ___ C-L ___ C-R
___ R-C ___ n.r. ___ n.a. ___ n.y.

*3-5 Test temperature ___degC ___degF ___degK ___RT(20C)
__n.r. __n.a. __n.y. __See_____

3-6 Total energy to fracture _____J _____Ft-Lb __See_____

3-7 Lateral expansion _____mm _____mils __See_____
__n.r. __n.a. __n.y.

3-8 Shear fracture ____% Brittle fracture ____% __See_____
__n.r. __n.a. __n.y.

3-9 Did specimen fracture completely ___yes ___no ___assumed
__n.r. __n.a. __n.y. __See_____

3-10 Did specimen exhibit splitting ___yes ___no __See_____
__n.r. __n.a. __n.y.

3-11 Standard __ASTM_____ or __other standard_____
__n.r. __n.a. __n.y.

3-12 Year of issue of test standard 19____ __See_____
__n.r. __n.a. __n.y.

4-0 Material Key _____

4-1 Type of test: MRL Crack arrest

4-2 Position of specimen __n.r. __n.a. __n.y. __See_____
____Surface, 0/4T ____Quarter-thickness, 1/4T
____3/8 thickness ____Mid thickness, 1/2T
____Opposite surface, 1T ____Third quarter thickness, 3/4T

4-3 Type of specimen ____ DCB
__n.r. __n.a. __n.y. __See_____

4-4 Thickness of specimen ____mm ___in __See_____
__n.r. __n.a. __n.y.

4-5 Orientation of specimen ____See_____
___ L-T ___ L-S ___ L-C ___ L-R ___ T-L
___ T-S ___ S-L ___ S-T ___ C-L ___ C-R
___ R-C ___ n.r. ___ n.a. ___ n.y.

4-6 Test temperature ___degC ___degF ___degK ___RT(20C)
__n.r. __n.a. __n.y. __See_____

4-7 Rate of loading __Slow __Intermediate __High __See_____
__n.r. __n.a. __n.y.

4-8 KQ __n.r. __n.a. __n.y. __See_____

4-9 Valid measure of KIC ___yes ___ no __See_____
__n.r. __n.a. __n.y.

4-10 Reason for invalidity __thickness __See_____
__n.r. __n.a. __n.y.

4-11 Crack arrest stress intensity _____ __See_____
__n.r. __n.a. __n.y.

4-12 Standard __ASTM_____ or __other standard_____
__n.r. __n.a. __n.y.

4-13 Year of issue of test standard 19____ __See_____
__n.r. __n.a. __n.y.

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13 Data Presentations for Marine Materials

Data presentations of all marine materials begin on page 1000. A brief table of contents is:

ABS-B 1000
ABS-EH32 2000
ABS-EH36 2100
A36 3100
CG A537M 7100
A537 CL1 7300
A572 Gr50 7600
A588 8000
A710 9400
BS4360 Gr50D 13800
HY80 16500
HY100 19500

On each report, background information and material properties are grouped into categories: *Description*, *Composition*, *Fabrication History*, *Weld*, and *Property Measurements*. Constant information is not repeated, but a note refers the reader to a previous page. Material property plots show both SI and traditional engineering units. A complete index appears at the end on page I (roman numerial). All nonnumeric values are indexed twice: as "*value variable*" and as "*variable, value*".

Material BS4360 Gr50D

Description

Material Code	010.001.010S	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

C	0.12 %	Mn	1.38 %
P	0.011 %	S	0.001 %
Si	0.38 %	Cr	0.02 %
Ni	0.15 %	Mo	0.01 %
V	0.006 %	Cu	0.18 %
Cb	0.024 %	Ti	0.015 %
B	<0.0001 %	Al	0.029 %
N	0.0057 %	Other Components	*

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N,A
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	600 degC
Aging Time	1 hr	Location	*

Property Measurements

Test Type	Tensile	Position	*
Specimen Type	Flat	Specimen Thickness	10 mm
Gage Length	200 mm	Loading Rate	*
Tensile Strength Offset	*	Tensile Yield Strength	*
Elongation	*	Reduction in Area	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYP kgf/mm2	Uniform El %
L	20	501	371	35.3
L	20	503	370	34.0
T	20	498	368	33.6
T	20	503	374	33.7

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.010A	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements

Test Type	Tensile	Position	*
Specimen Type	Flat	Specimen Thickness	10 mm
Gage Length	200 mm	Loading Rate	*
Tensile Strength Offset	*	Tensile Yield Strength	*
Elongation	*	Reduction in Area	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYP kgf/mm2	Uniform El %
L	20	514	378	33.4
L	20	514	381	35.1
T	20	508	383	31.7
T	20	511	382	31.9

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.010S	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N,A
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	600 degC
Aging Time	1 hr	Location	*

Property Measurements

Test Type	Charpy V Impact	Specimen Type	*
Lateral Expansion	*	Shear Fracture	*
Did Specimen Fracture?	*	Did Specimen Split?	*
Standard Method	*	Standard Year	*

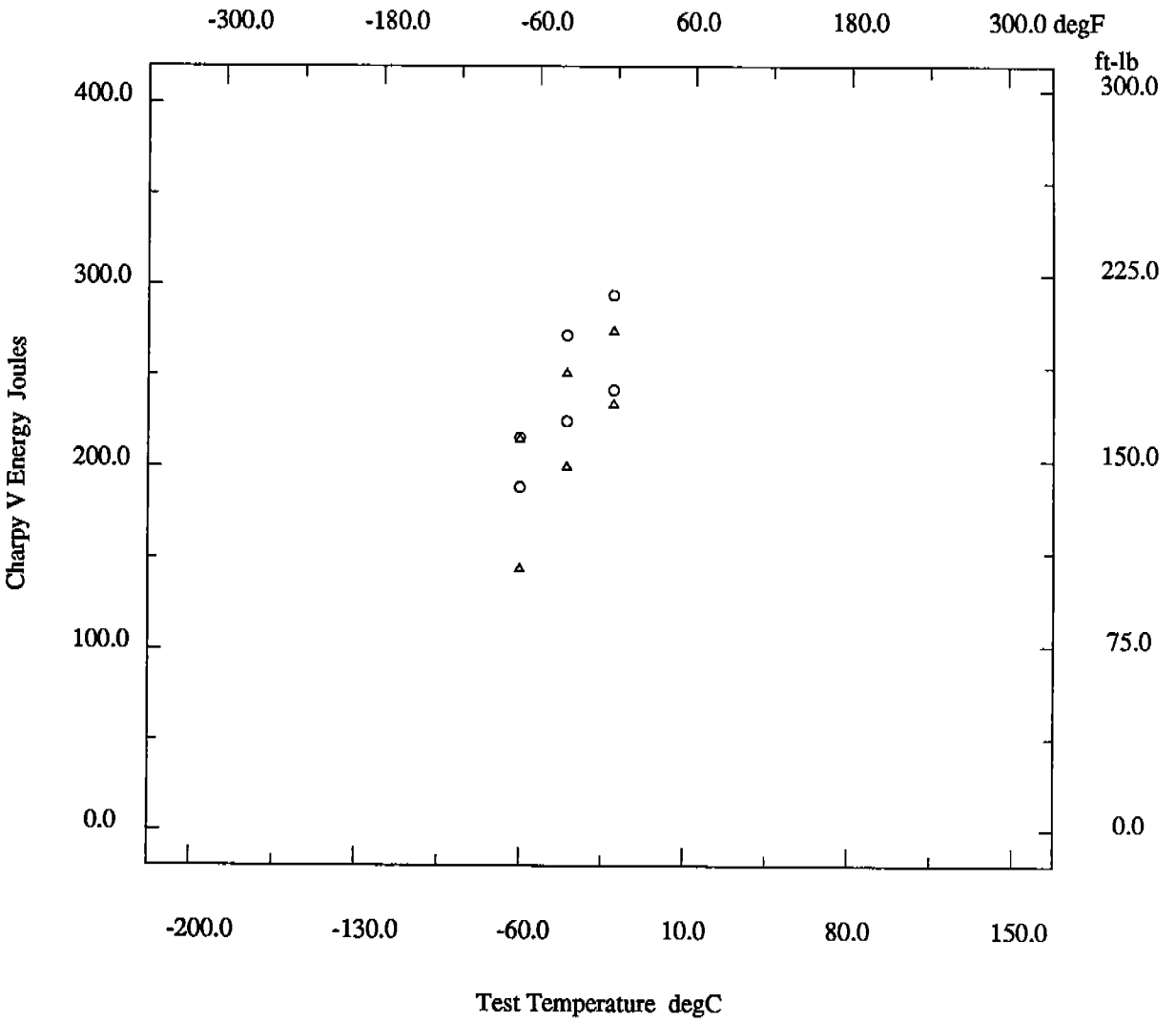
Position	Orien	Test Temp degC	CVN Energy Joules
1/2T	L-T ○	-60	189
1/4T	L-T ○	-60	216
1/2T	L-T ○	-40	225
1/4T	L-T ○	-40	272
1/2T	L-T ○	-20	242
1/4T	L-T ○	-20	294
1/2T	T-L △	-60	144
1/4T	T-L △	-60	215
1/2T	T-L △	-40	200
1/4T	T-L △	-40	251
1/2T	T-L △	-20	234
1/4T	T-L △	-20	274

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.010S	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.010A	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements

Test Type	Charpy V Impact	Specimen Type	*
Lateral Expansion	*	Shear Fracture	*
Did Specimen Fracture?	*	Did Specimen Split?	*
Standard Method	*	Standard Year	*

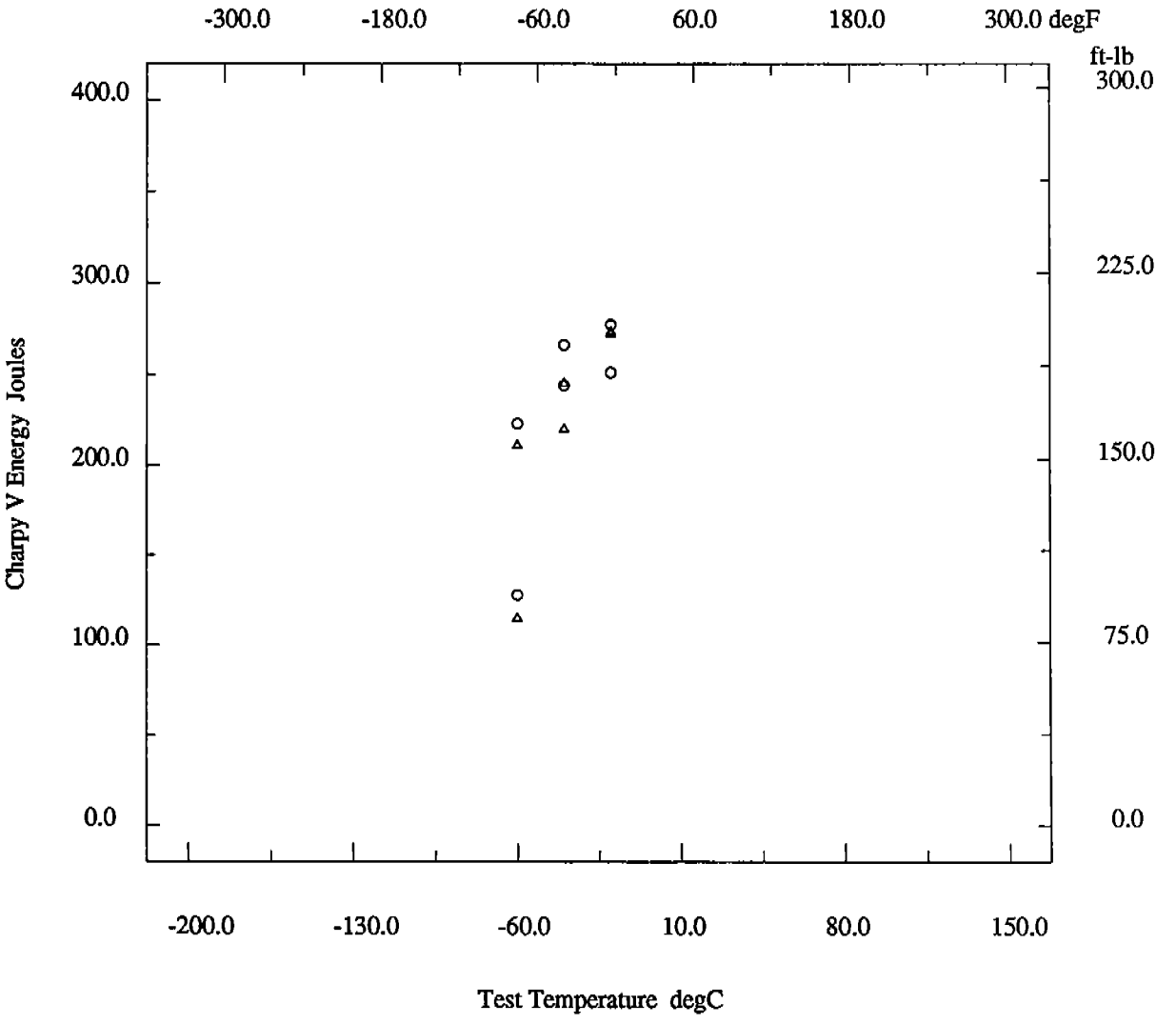
Position	Orien	Test Temp degC	CVN Energy Joules
1/2T	L-T ○	-60	128
1/4T	L-T ○	-60	223
1/2T	L-T ○	-40	266
1/4T	L-T ○	-40	244
1/2T	L-T ○	-20	277
1/4T	L-T ○	-20	251
1/2T	T-L △	-60	115
1/4T	T-L △	-60	211
1/2T	T-L △	-40	220
1/4T	T-L △	-40	245
1/2T	T-L △	-20	273
1/4T	T-L △	-20	272

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.010A	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.010A	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition See Page 13800.1

Fabrication History See Page 13800.5

Property Measurements

Test Type	Nil Ductilty Transition	Position	0/4T
Specimen Type	P-1	Filler Alloy	*
Passes	*	Orientation	*
Standard Method	E 208	Standard Year	*

Test Temp degC	Break?	NDTT
-65	Yes	No
-65	Yes	No
-65	Yes	No
-60	No	Yes
-60	Yes	Yes
-60	Yes	Yes
-55	No	No
-55	No	No
-55	No	No

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09AFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

See Page 13800.5

Weld

Weld Code	010.001.09AFA	Weld Type	SMA
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	3.2 mm
Shielding Gas	*	Voltage	24 volts
Amperage	100-140 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	12.5 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

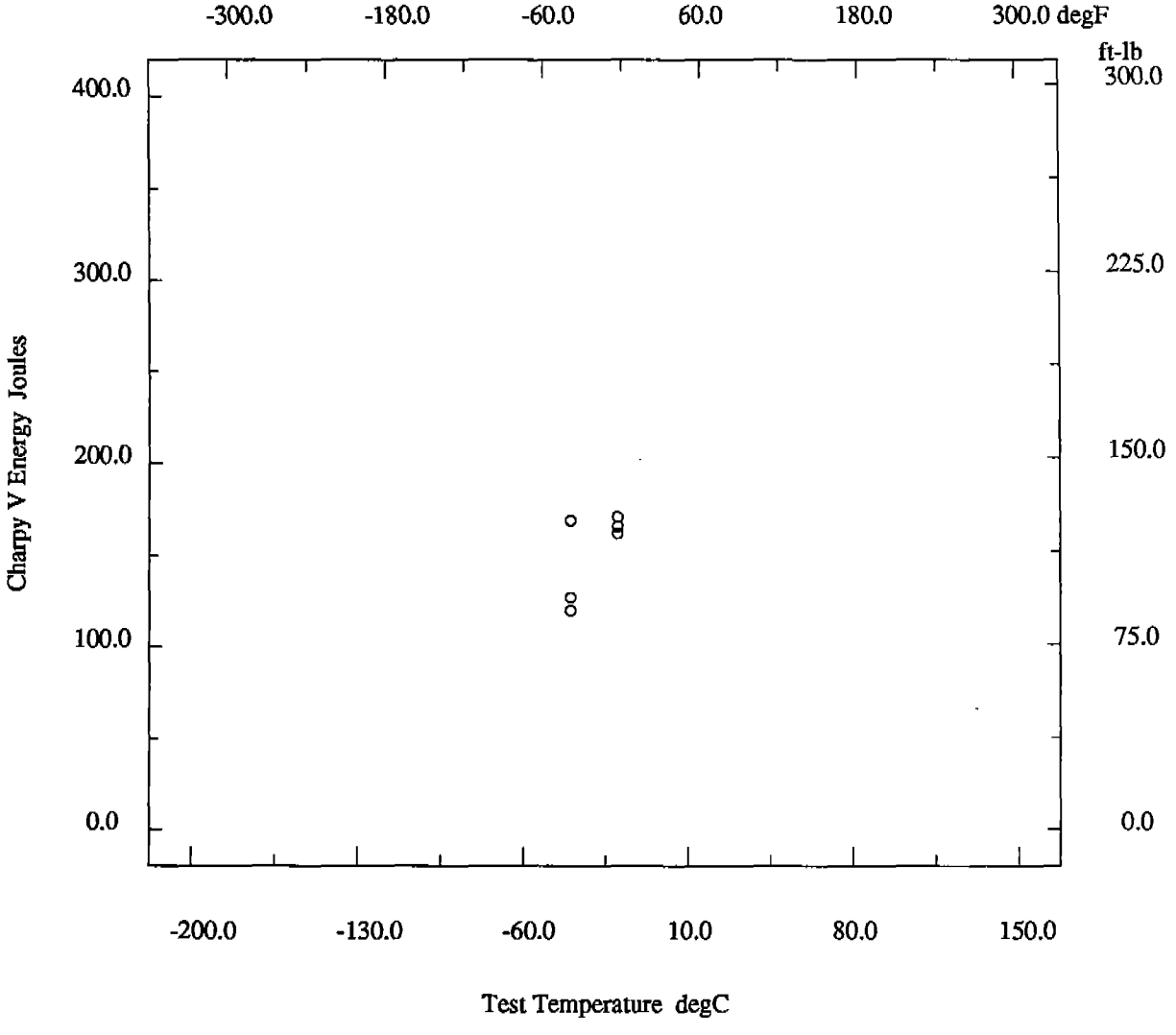
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	120
T-L °	-40	127
T-L °	-40	169
T-L °	-20	162
T-L °	-20	166
T-L °	-20	171

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09AFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02AFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

See Page 13800.5

Weld

Weld Code	010.001.02AFA	Weld Type	SMA
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	3.2 mm
Shielding Gas	*	Voltage	24 volts
Amperage	100-140 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	12.5 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

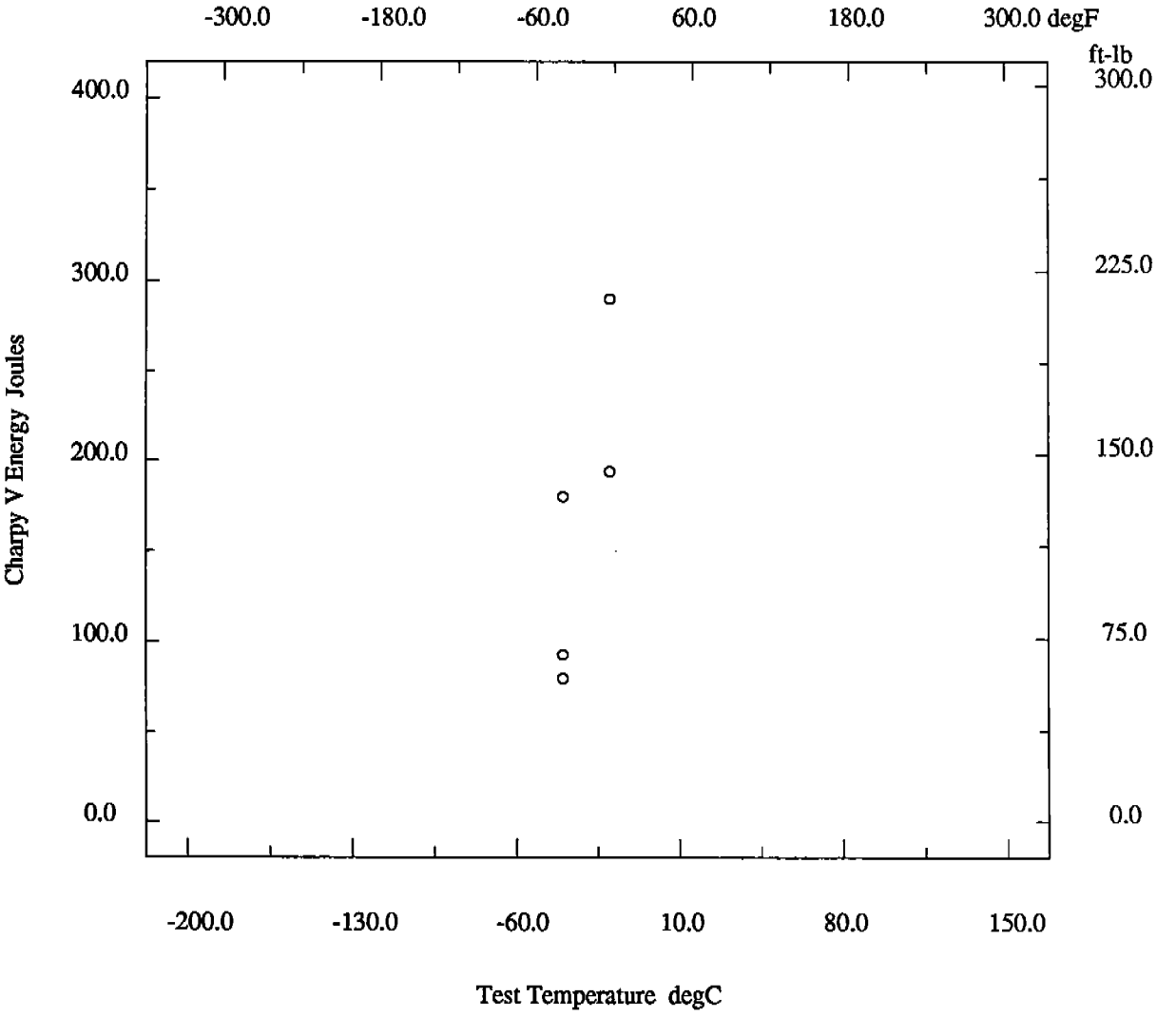
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-40	180
T-L ○	-40	80
T-L ○	-40	93
T-L ○	-20	194
T-L ○	-20	290
T-L ○	-20	290

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02AFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.03AFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

See Page 13800.5

Weld

Weld Code	010.001.03AFA	Weld Type	SMA
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	3.2 mm
Shielding Gas	*	Voltage	24 volts
Amperage	100-140 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	12.5 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

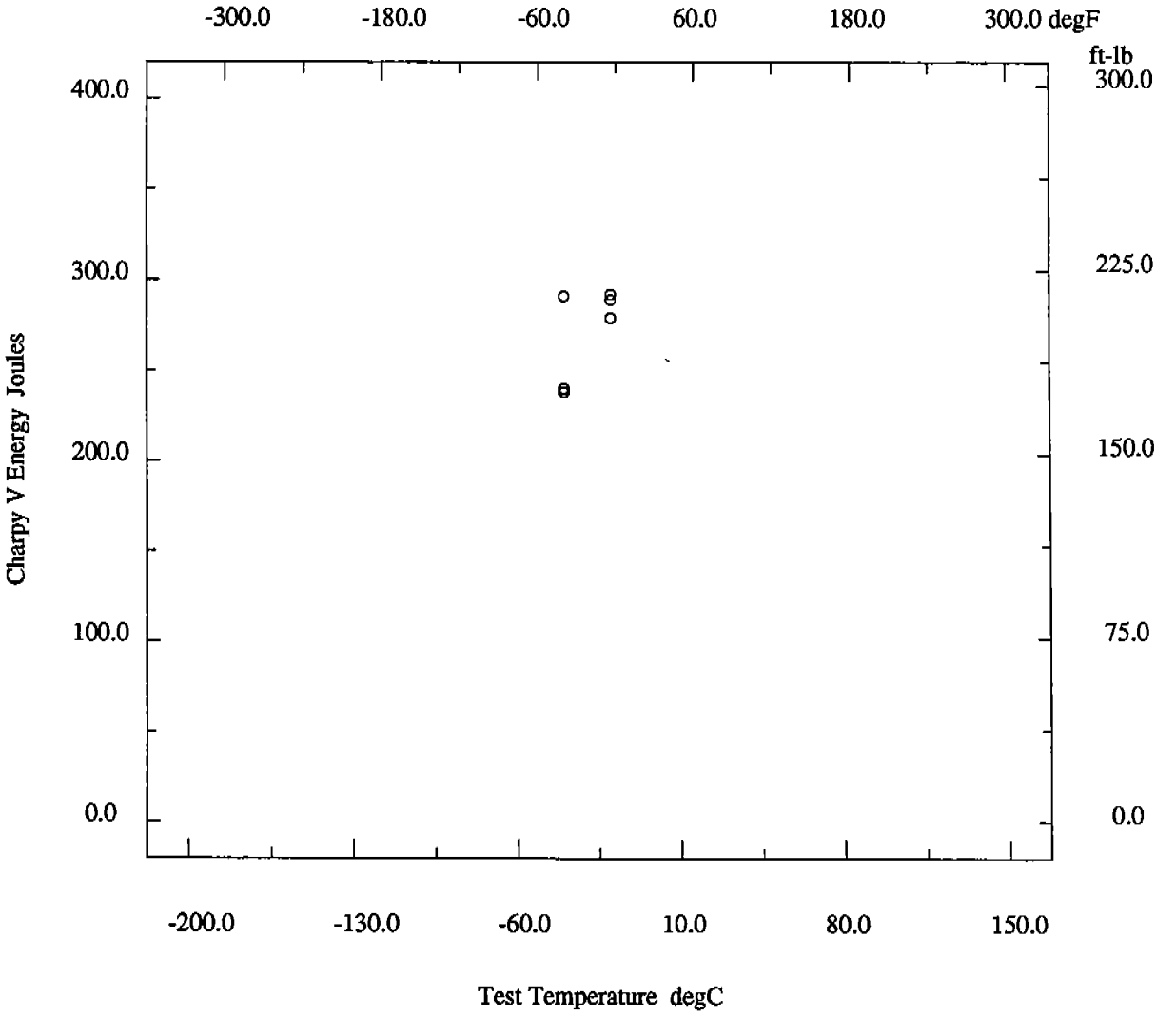
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	238
T-L °	-40	240
T-L °	-40	291
T-L °	-20	279
T-L °	-20	289
T-L °	-20	292

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.03AFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.04AFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

See Page 13800.5

Weld

Weld Code	010.001.04AFA	Weld Type	SMA
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	3.2 mm
Shielding Gas	*	Voltage	24 volts
Amperage	100-140 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	12.5 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

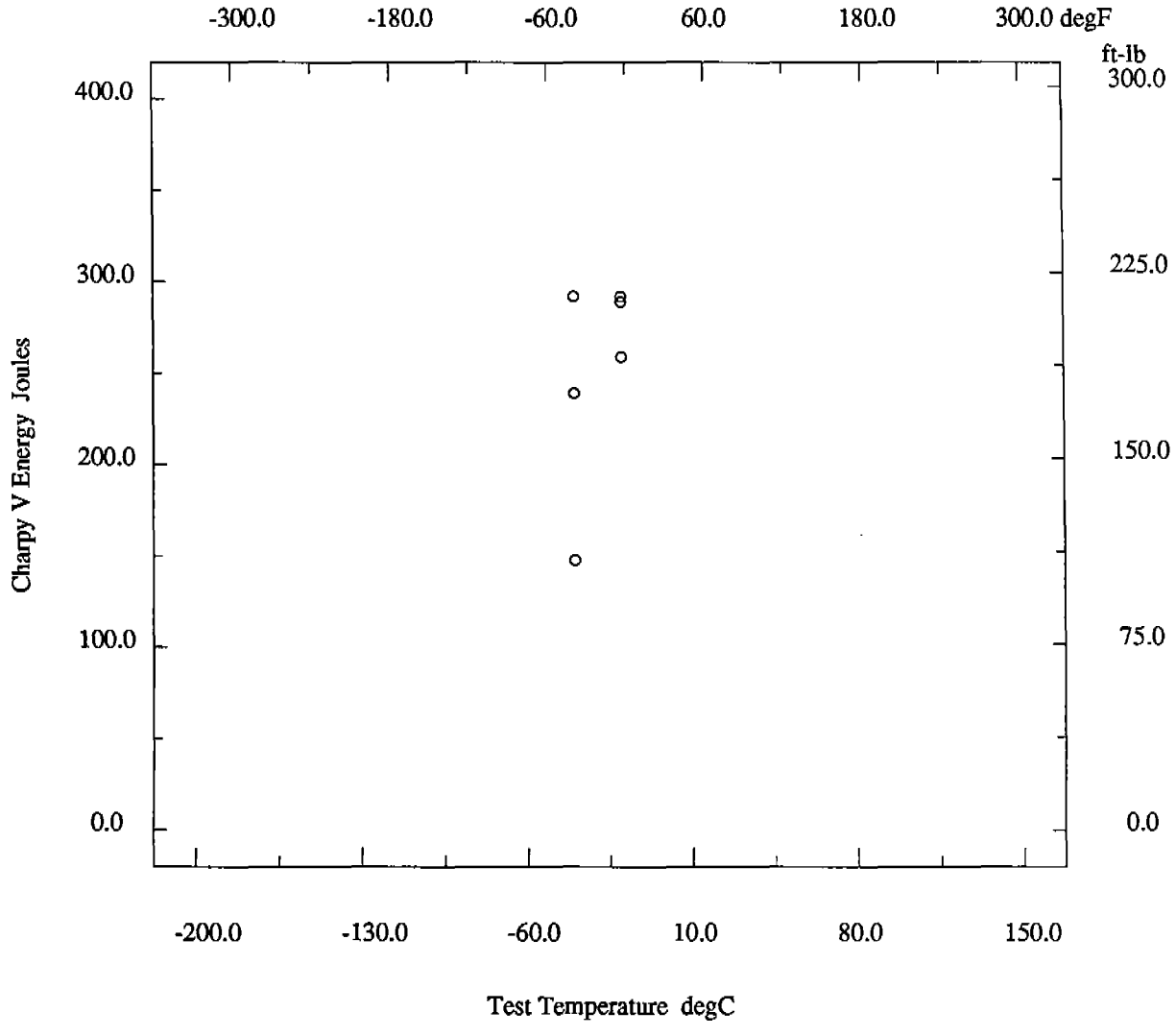
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	148
T-L °	-40	239
T-L °	-40	292
T-L °	-20	259
T-L °	-20	289
T-L °	-20	292

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.04AFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.05AFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

See Page 13800.5

Weld

Weld Code	010.001.05AFA	Weld Type	SMA
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	3.2 mm
Shielding Gas	*	Voltage	24 volts
Amperage	100-140 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	12.5 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

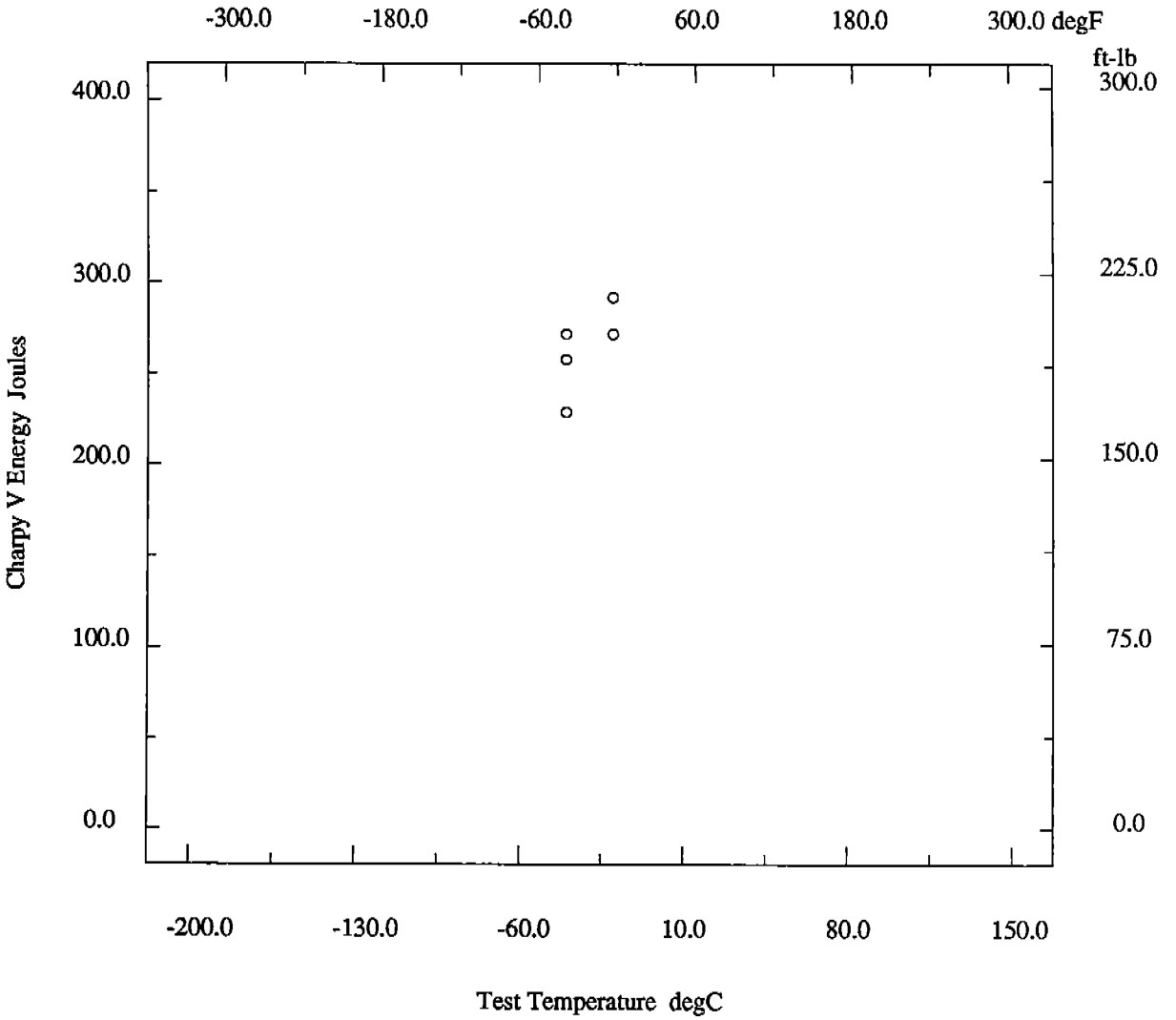
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	229
T-L °	-40	258
T-L °	-40	272
T-L °	-20	272
T-L °	-20	292
T-L °	-20	292

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.05AFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.11AFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

See Page 13800.5

Weld

Weld Code	010.001.11AFA	Weld Type	SMA
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	3.2 mm
Shielding Gas	*	Voltage	24 volts
Amperage	100-140 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	12.5 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	50% weld, 50% HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

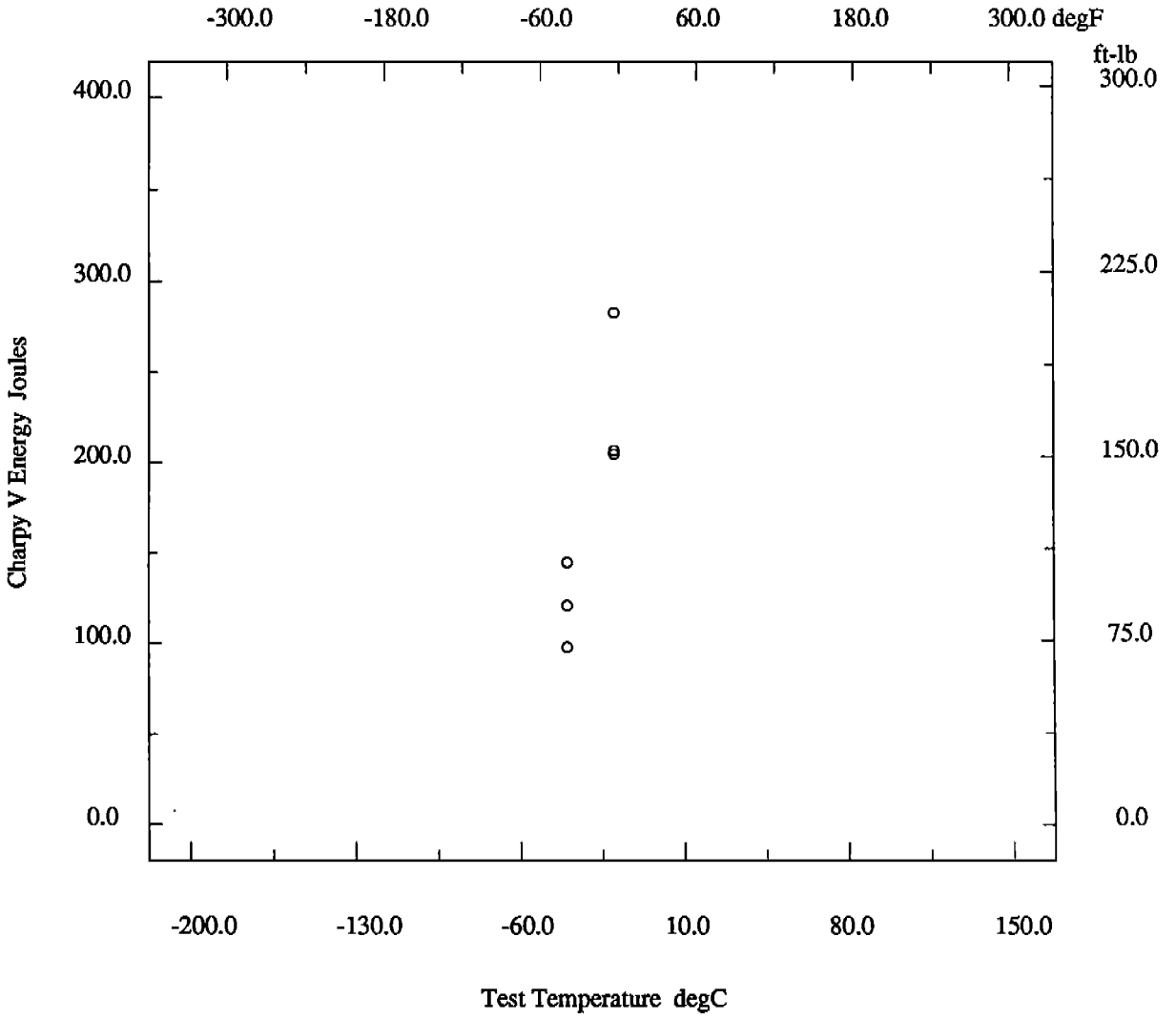
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	121
T-L °	-40	145
T-L °	-40	98
T-L °	-20	205
T-L °	-20	207
T-L °	-20	283

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.11AFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09ABA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

See Page 13800.5

Weld

Weld Code	010.001.09ABA	Weld Type	SMA
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	3.2 mm
Shielding Gas	*	Voltage	24 volts
Amperage	100-140 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	12.5 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	3/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

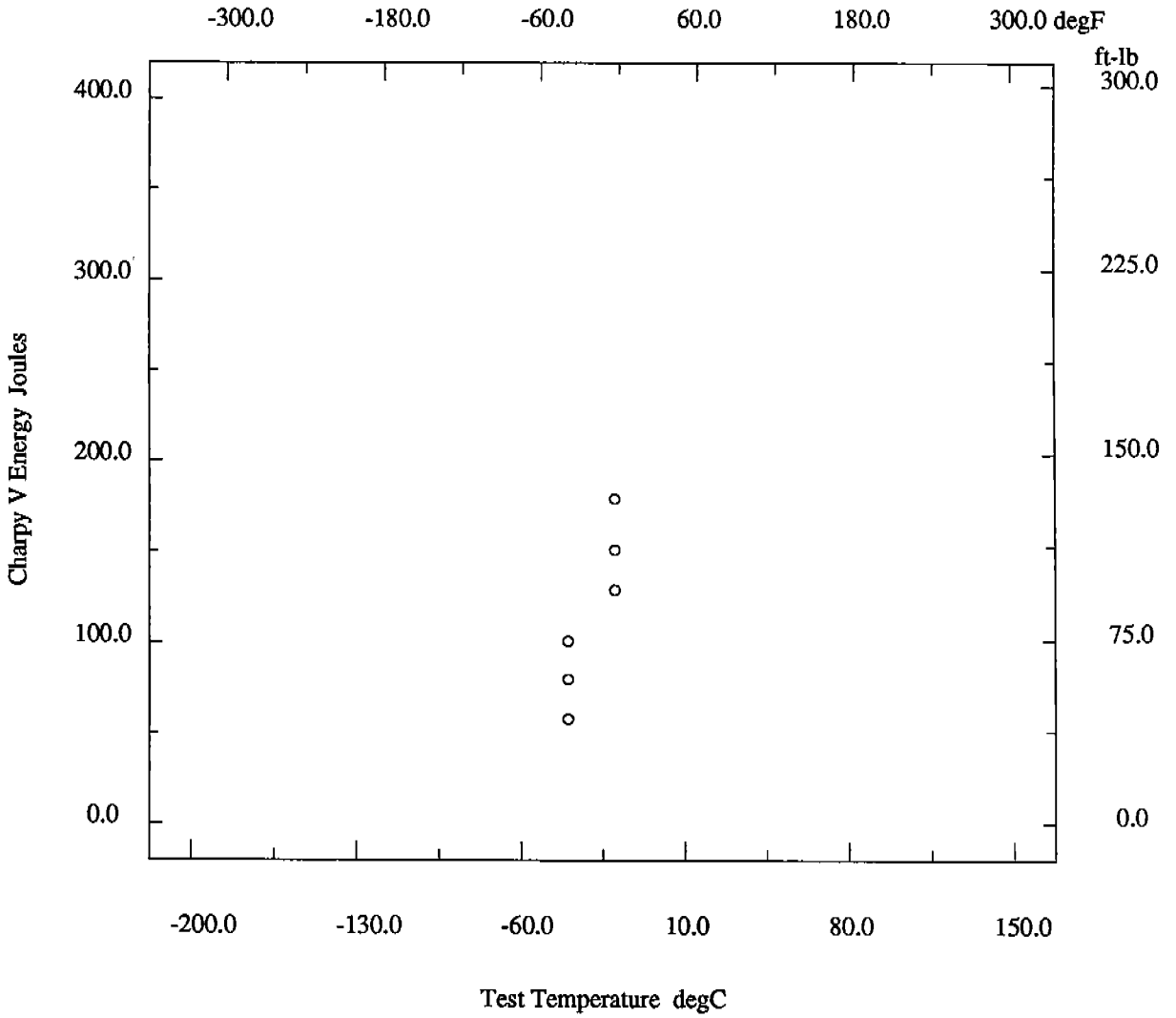
Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	101
T-L o	-40	58
T-L o	-40	80
T-L o	-20	129
T-L o	-20	151
T-L o	-20	179

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09ABA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02ABA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition See Page 13800.1

Fabrication History See Page 13800.5

Weld

Weld Code	010.001.02ABA	Weld Type	SMA
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	3.2 mm
Shielding Gas	*	Voltage	24 volts
Amperage	100-140 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	12.5 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	3/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

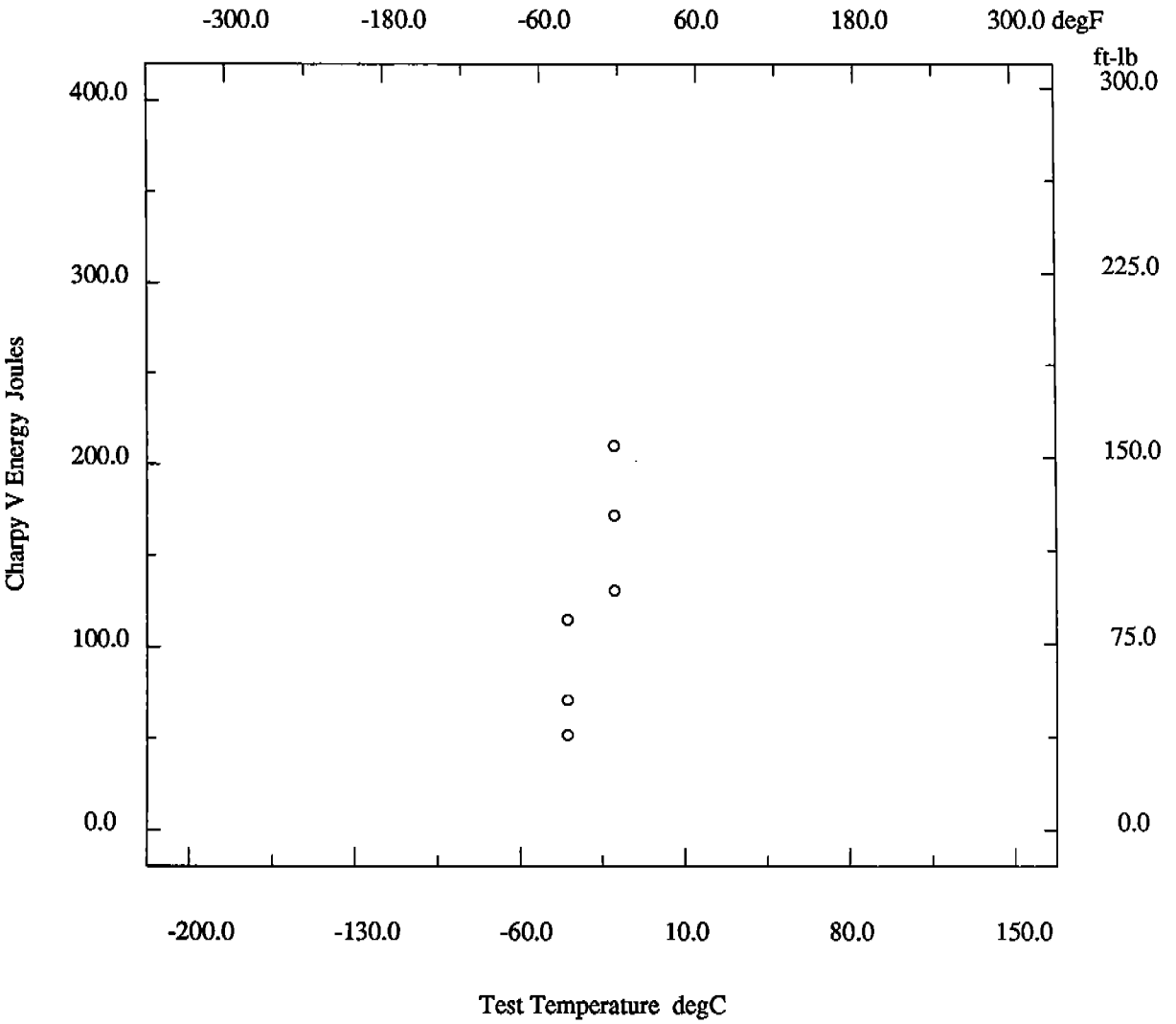
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	115
T-L °	-40	52
T-L °	-40	71
T-L °	-20	131
T-L °	-20	172
T-L °	-20	210

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02ABA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09AFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition See Page 13800.1

Fabrication History See Page 13800.5

Weld

Weld Code	010.001.09AFS	Weld Type	SMA
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	3.2 mm
Shielding Gas	*	Voltage	24 volts
Amperage	100-140 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	12.5 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	1 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

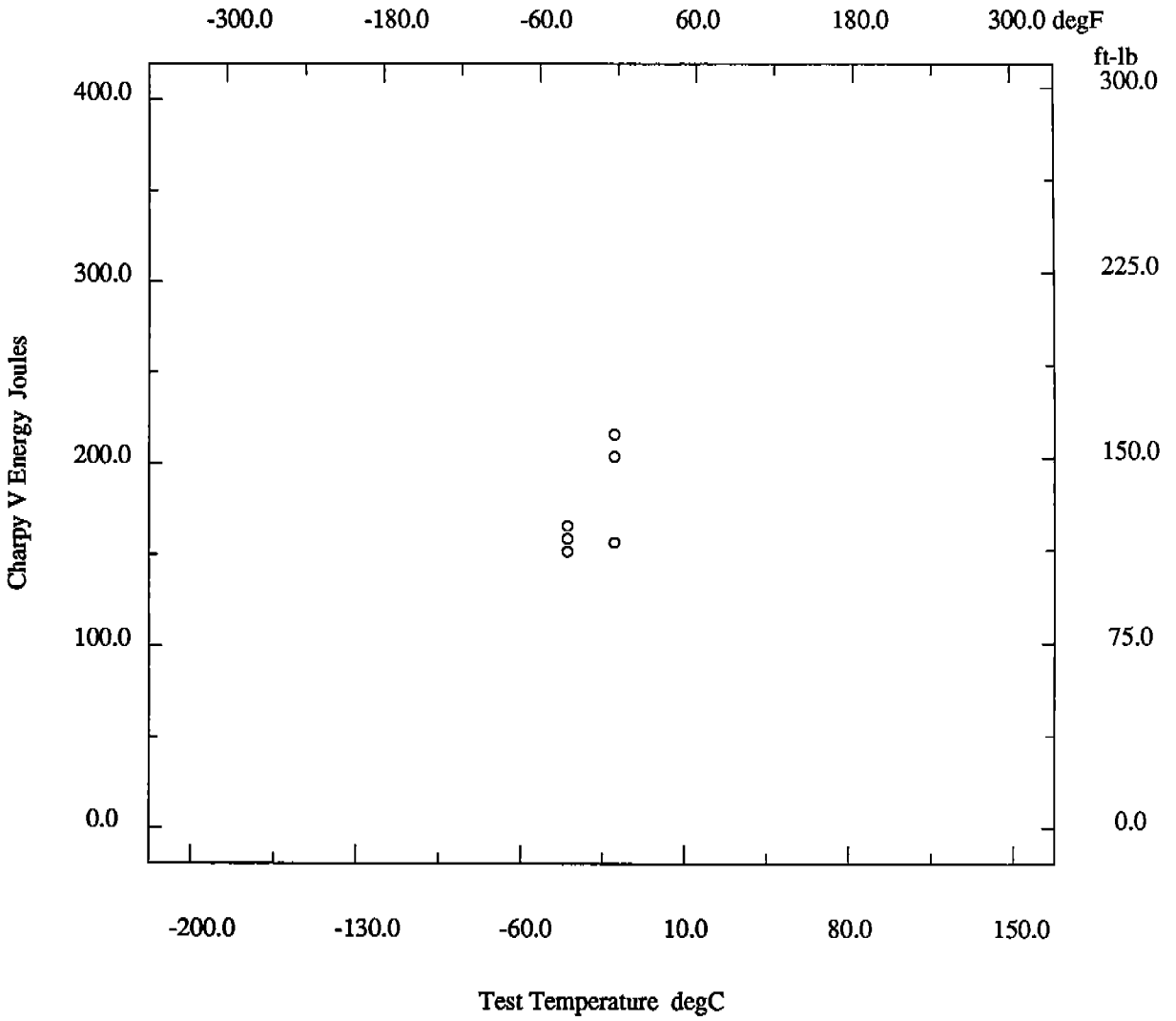
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	152
T-L °	-40	159
T-L °	-40	166
T-L °	-20	157
T-L °	-20	204
T-L °	-20	216

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09AFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02AFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition See Page 13800.1

Fabrication History See Page 13800.5

Weld

Weld Code	010.001.02AFS	Weld Type	SMA
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	3.2 mm
Shielding Gas	*	Voltage	24 volts
Amperage	100-140 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	12.5 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	1 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

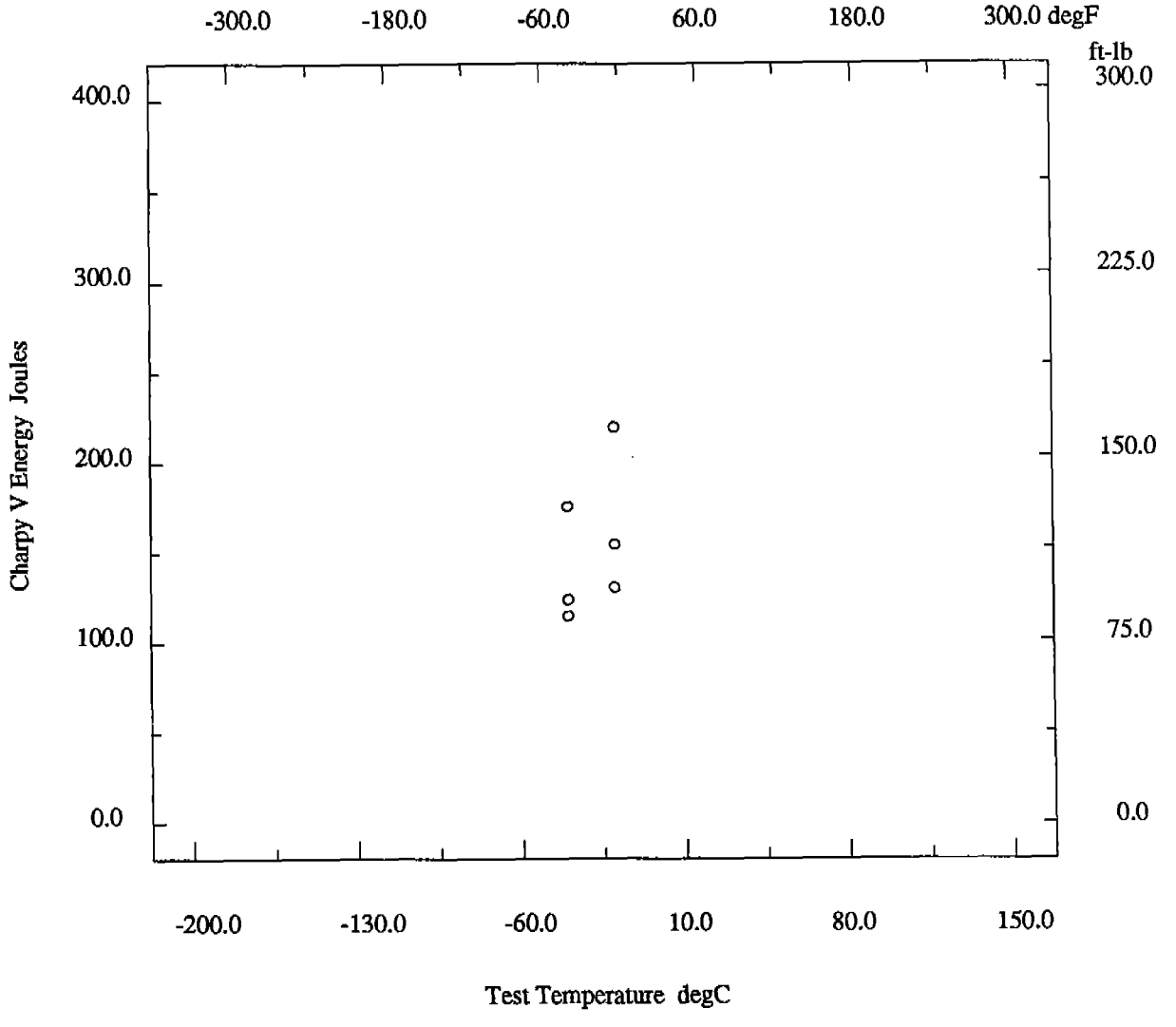
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	115
T-L °	-40	124
T-L °	-40	176
T-L °	-20	131
T-L °	-20	155
T-L °	-20	220

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02AFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.03AFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

See Page 13800.5

Weld

Weld Code	010.001.03AFS	Weld Type	SMA
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	3.2 mm
Shielding Gas	*	Voltage	24 volts
Amperage	100-140 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	12.5 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	1 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

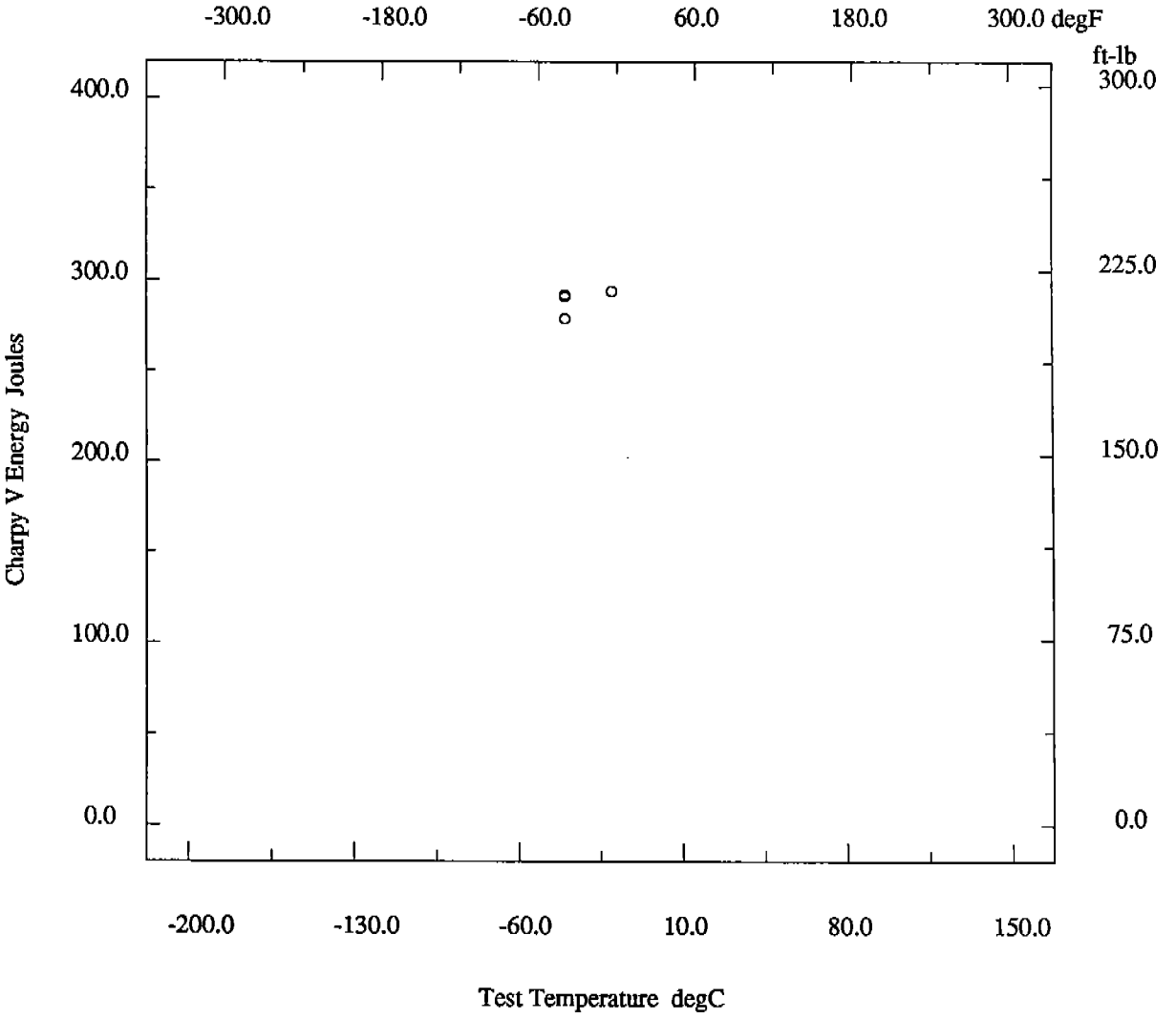
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	279
T-L °	-40	291
T-L °	-40	292
T-L °	-20	294
T-L °	-20	294
T-L °	-20	294

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.03AFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.04AFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

See Page 13800.5

Weld

Weld Code	010.001.04AFS	Weld Type	SMA
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	3.2 mm
Shielding Gas	*	Voltage	24 volts
Amperage	100-140 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	12.5 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	1 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

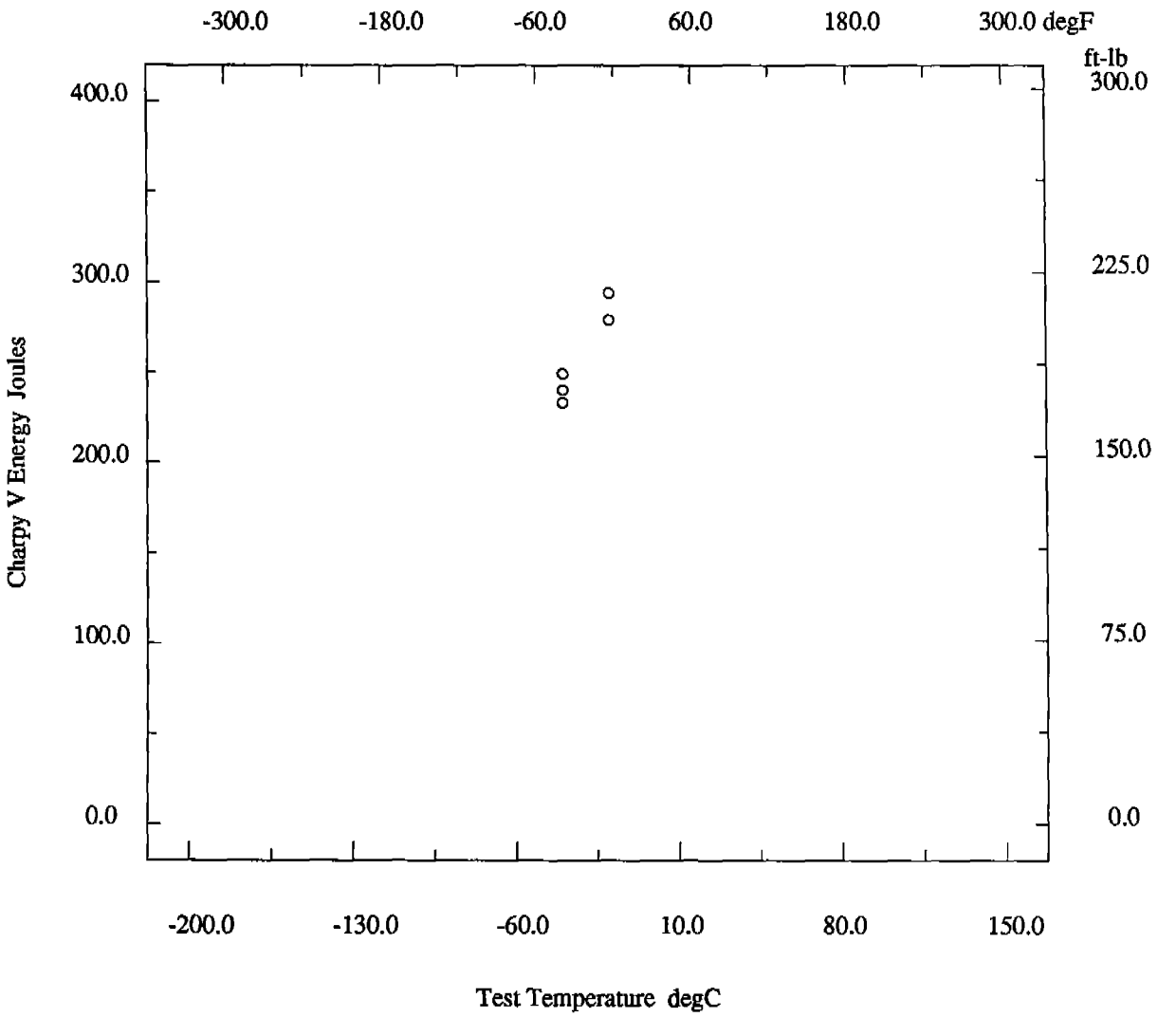
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	233
T-L °	-40	249
T-L °	-40	240
T-L °	-20	279
T-L °	-20	294
T-L °	-20	294

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.04AFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.05AFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

See Page 13800.5

Weld

Weld Code	010.001.05AFS	Weld Type	SMA
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	3.2 mm
Shielding Gas	*	Voltage	24 volts
Amperage	100-140 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	12.5 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	1 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

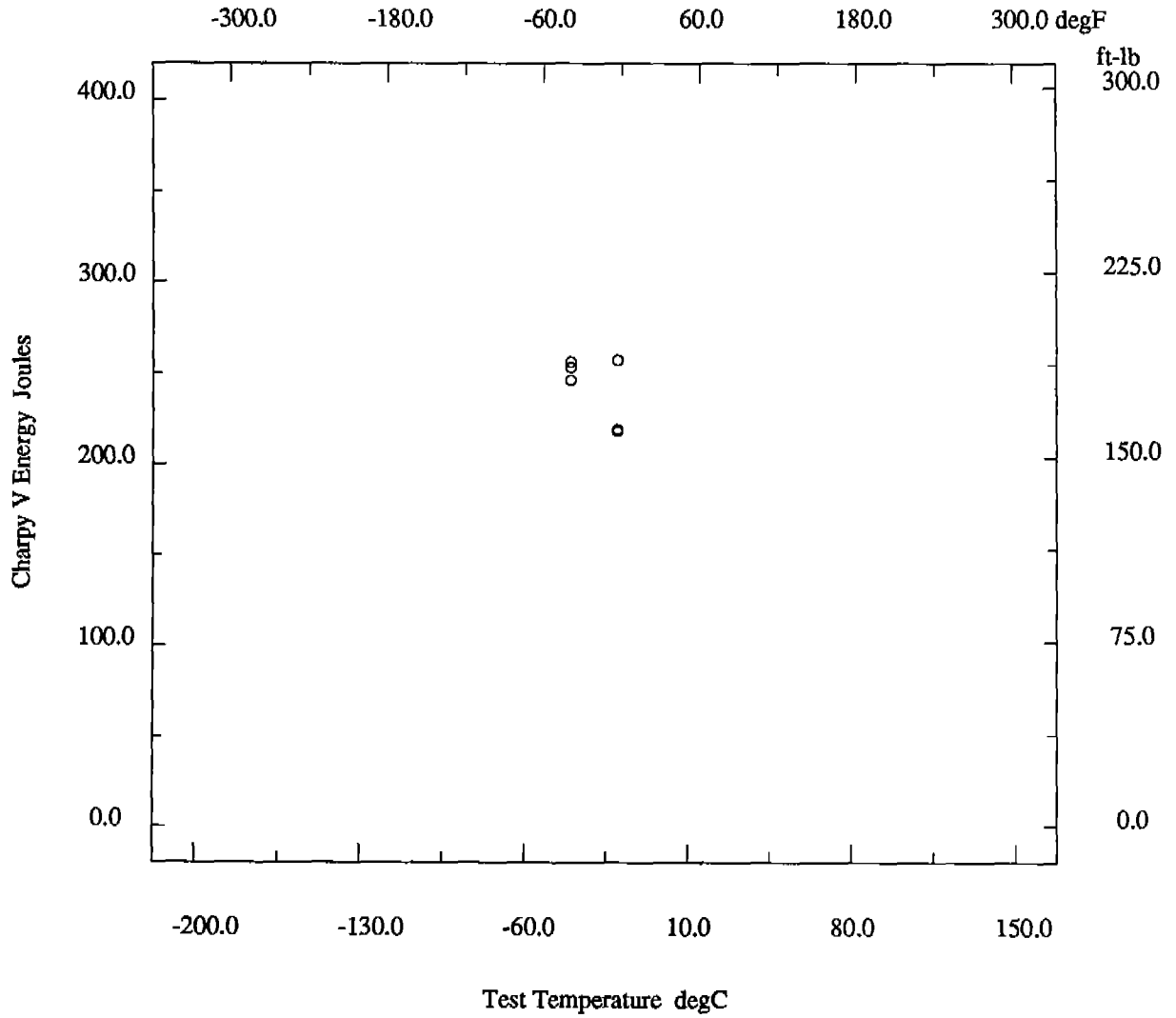
Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	246
T-L o	-40	253
T-L o	-40	256
T-L o	-20	218
T-L o	-20	219
T-L o	-20	257

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.05AFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09ANA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	*
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.001.09ANA	Weld Type	SMA
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	3.2 mm
Shielding Gas	*	Voltage	24 volts
Amperage	100-140 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	12.5 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	25 mm	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.57
-30	0.68
-30	1.26

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Test Temp degC	CODIc mm
-10	1.42
-10	1.50
-10	1.54

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02ANA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

See Page 13800.34

Weld

Weld Code	010.001.02ANA	Weld Type	SMA
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	3.2 mm
Shielding Gas	*	Voltage	24 volts
Amperage	100-140 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	12.5 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	25 mm	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.17
-30	0.29
-30	0.80
-10	0.49
-10	0.85
-10	1.31

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.010A	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13800.1

Fabrication History

See Page 13800.34

Weld

Weld Code	010.001.010A	Weld Type	*
Base Metal Thickness	*	Welding Position	*
Preheat Temperature	*	Metal Gap	*
Interpass Temperature	*	Passes	*
Filler Specification	*	Filler Name	*
Filler Carbon Content	*	Filler Metal Size	*
Shielding Gas	*	Voltage	*
Amperage	*	Polarity	*
Travel Speed	*	Heat Input/Pass	*
Joint Preparation	*	Number of Sides	*
Location wrt Weld	*	Location wrt Surface	*
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	*		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	25 mm	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	>4.03
-30	>4.04
-30	>4.15

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09BFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

C	0.12 %	Mn	1.38 %
P	0.011 %	S	0.001 %
Si	0.38 %	Cr	0.02 %
Ni	0.15 %	Mo	0.01 %
V	0.006 %	Cu	0.18 %
Cb	0.024 %	Ti	0.015 %
B	<0.0001 %	Al	0.029 %
N	0.0057 %	Other Components	*

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.001.09BFA	Weld Type	SAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	280 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

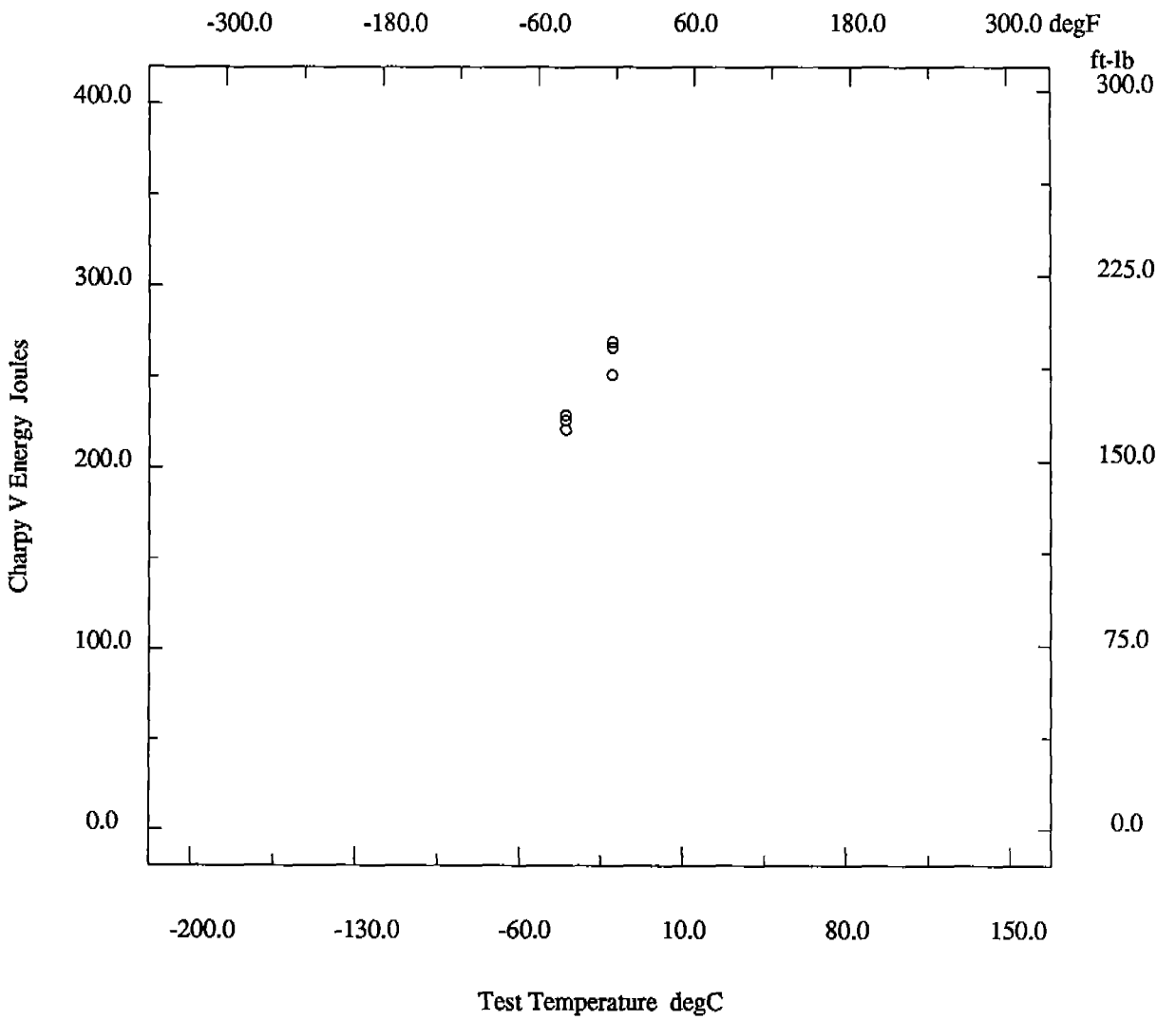
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	221
T-L °	-40	226
T-L °	-40	229
T-L °	-20	251
T-L °	-20	266
T-L °	-20	269

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09BFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02BFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13900.1

Fabrication History

See Page 13900.1

Weld

Weld Code	010.001.02BFA	Weld Type	SAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	280 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

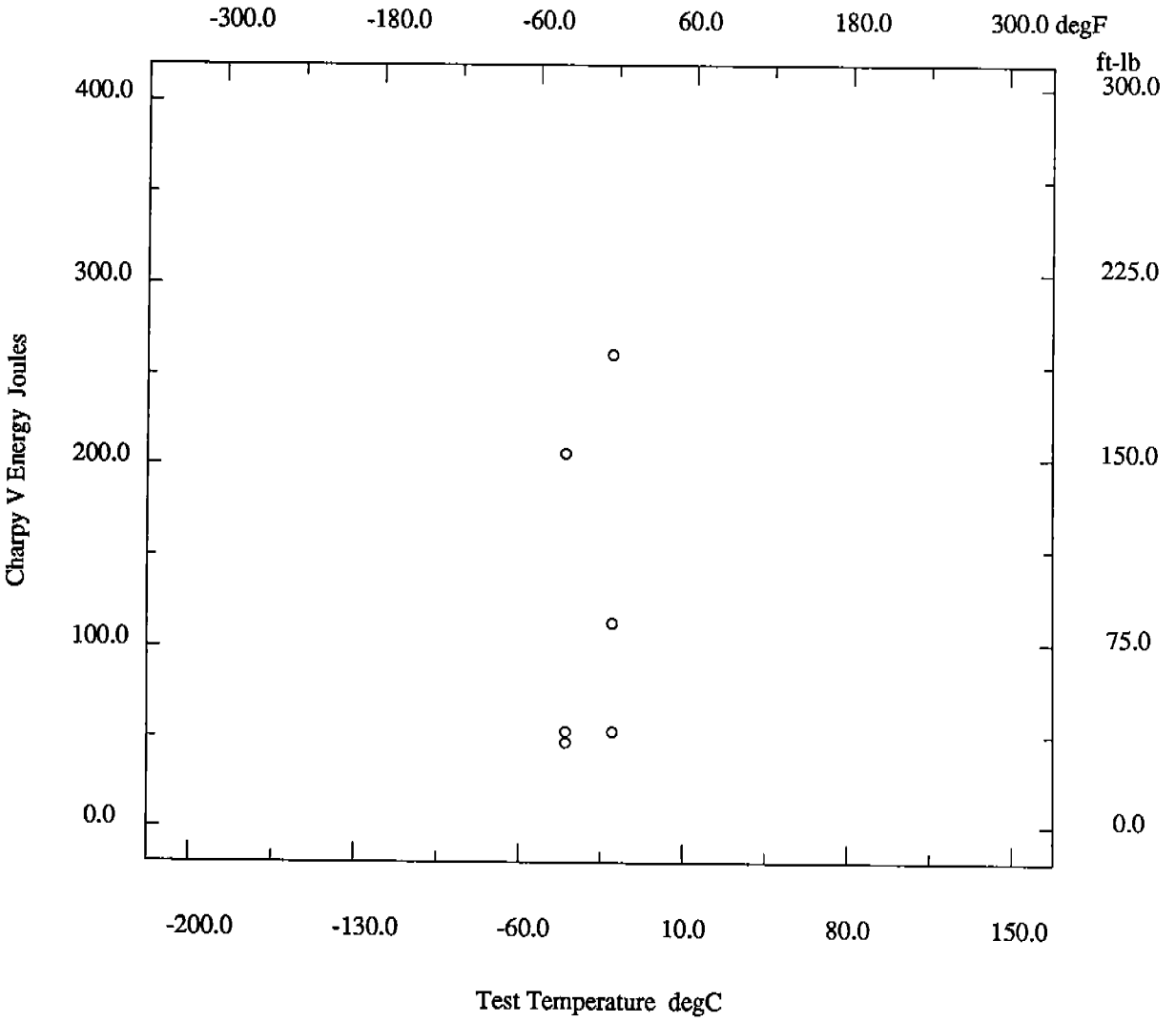
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	206
T-L °	-40	47
T-L °	-40	53
T-L °	-20	113
T-L °	-20	261
T-L °	-20	53

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02BFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.03BFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13900.1

Fabrication History

See Page 13900.1

Weld

Weld Code	010.001.03BFA	Weld Type	SAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	280 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

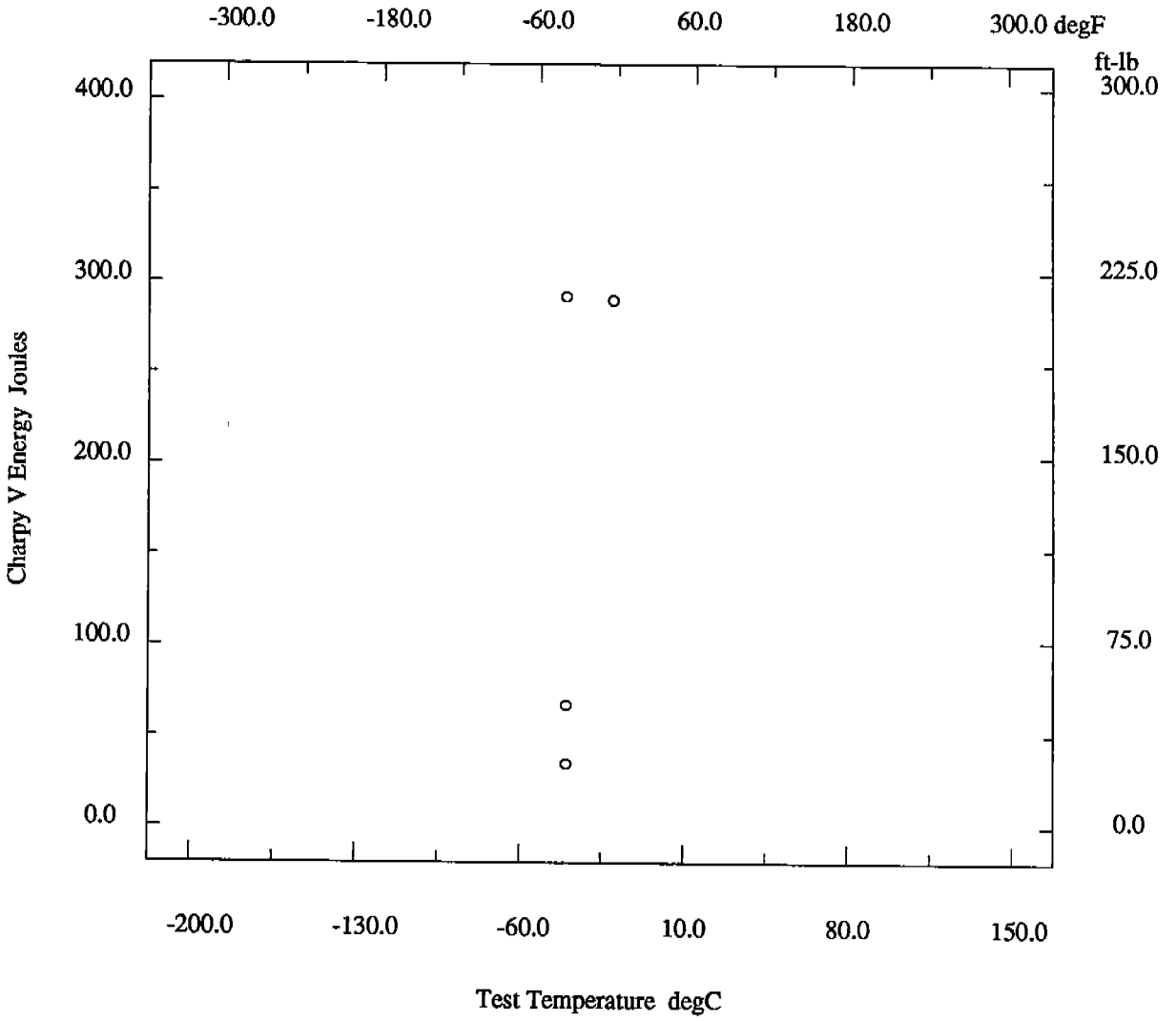
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-40	292
T-L ○	-40	35
T-L ○	-40	67
T-L ○	-20	290
T-L ○	-20	290
T-L ○	-20	290

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.03BFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.04BFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13900.1

Fabrication History

See Page 13900.1

Weld

Weld Code	010.001.04BFA	Weld Type	SAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	280 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

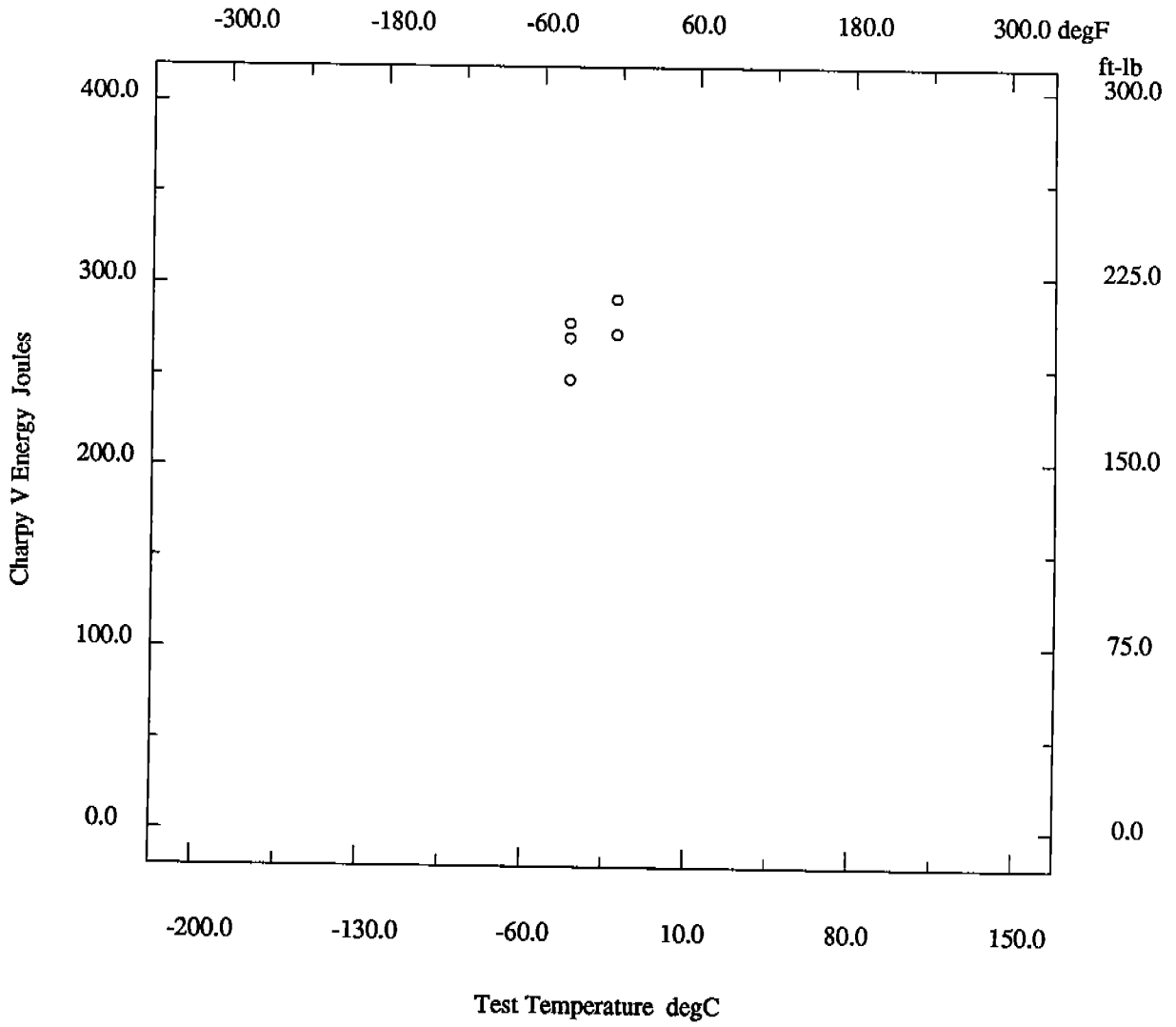
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	248
T-L °	-40	271
T-L °	-40	279
T-L °	-20	273
T-L °	-20	292
T-L °	-20	292

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.04BFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.05BFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition See Page 13900.1

Fabrication History See Page 13900.1

Weld

Weld Code	010.001.05BFA	Weld Type	SAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	280 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

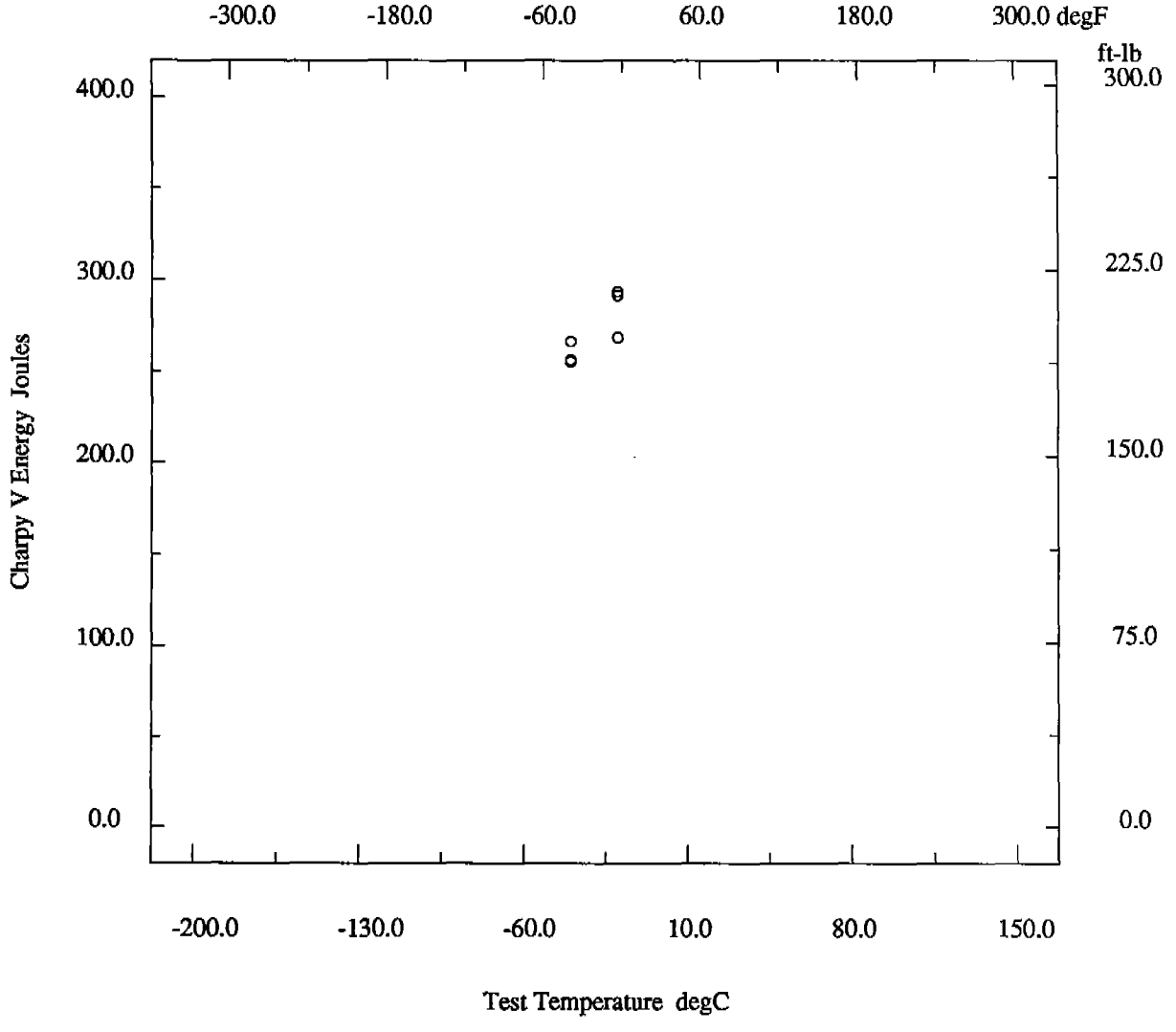
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	255
T-L °	-40	256
T-L °	-40	266
T-L °	-20	268
T-L °	-20	291
T-L °	-20	293

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.05BFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.11BFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13900.1

Fabrication History

See Page 13900.1

Weld

Weld Code	010.001.11BFA	Weld Type	SAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	280 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	50% weld, 50% HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

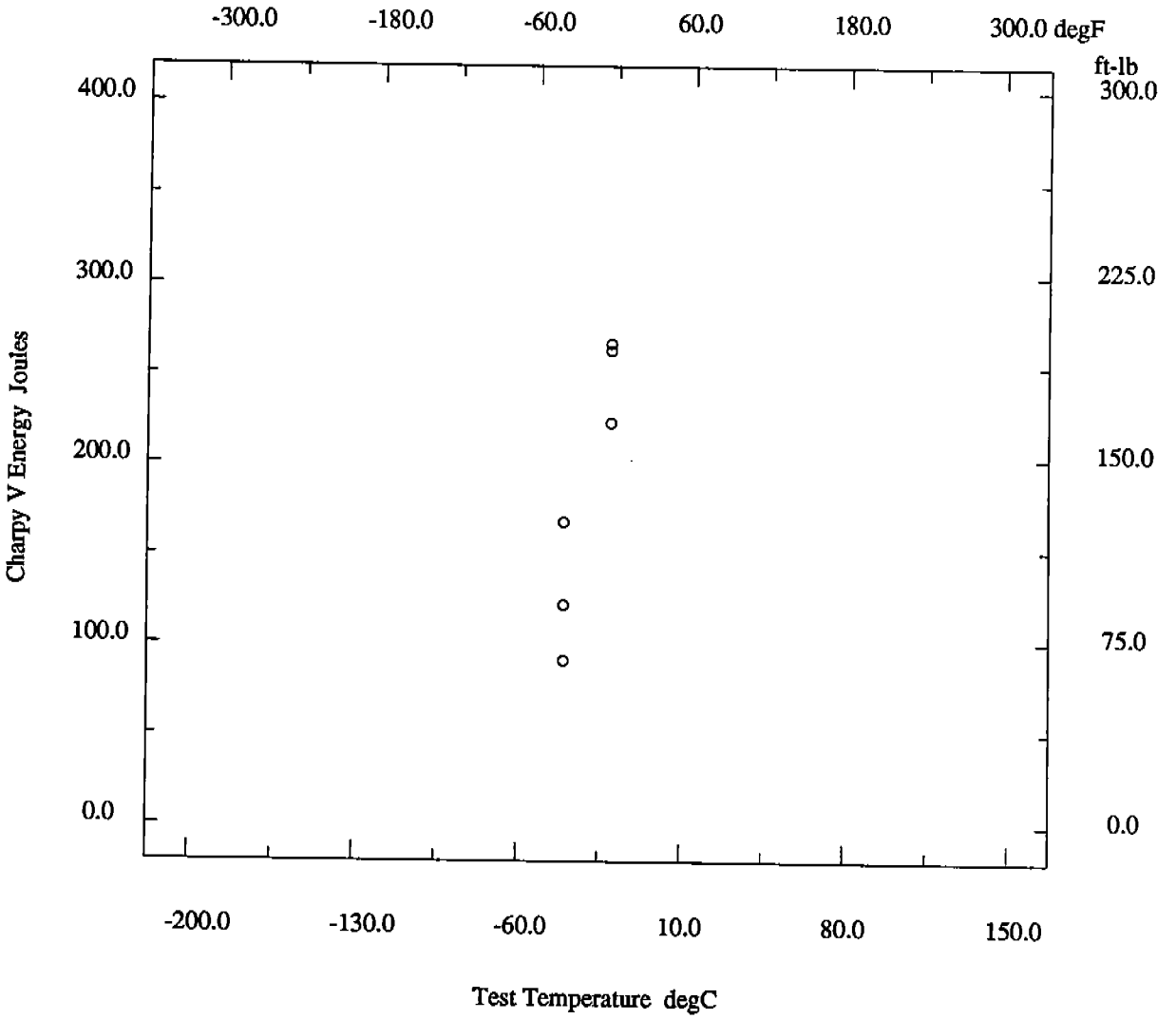
Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	122
T-L o	-40	168
T-L o	-40	91
T-L o	-20	223
T-L o	-20	263
T-L o	-20	267

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.11BFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09BFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13900.1

Fabrication History

See Page 13900.1

Weld

Weld Code	010.001.09BFS	Weld Type	SAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	280 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	1 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

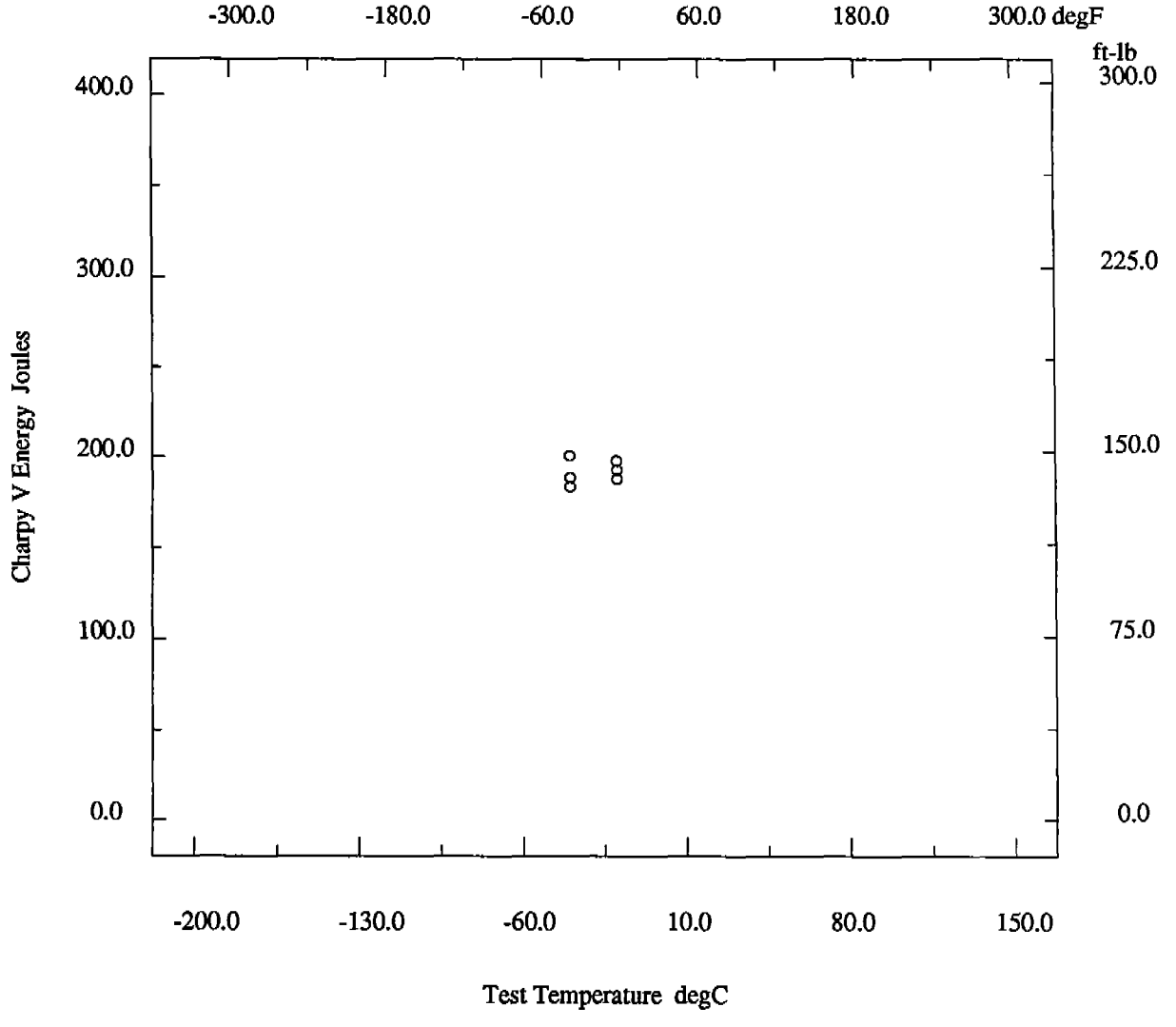
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	184
T-L °	-40	189
T-L °	-40	201
T-L °	-20	188
T-L °	-20	193
T-L °	-20	198

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09BFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02BFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13900.1

Fabrication History

See Page 13900.1

Weld

Weld Code	010.001.02BFS	Weld Type	SAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	280 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	1 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

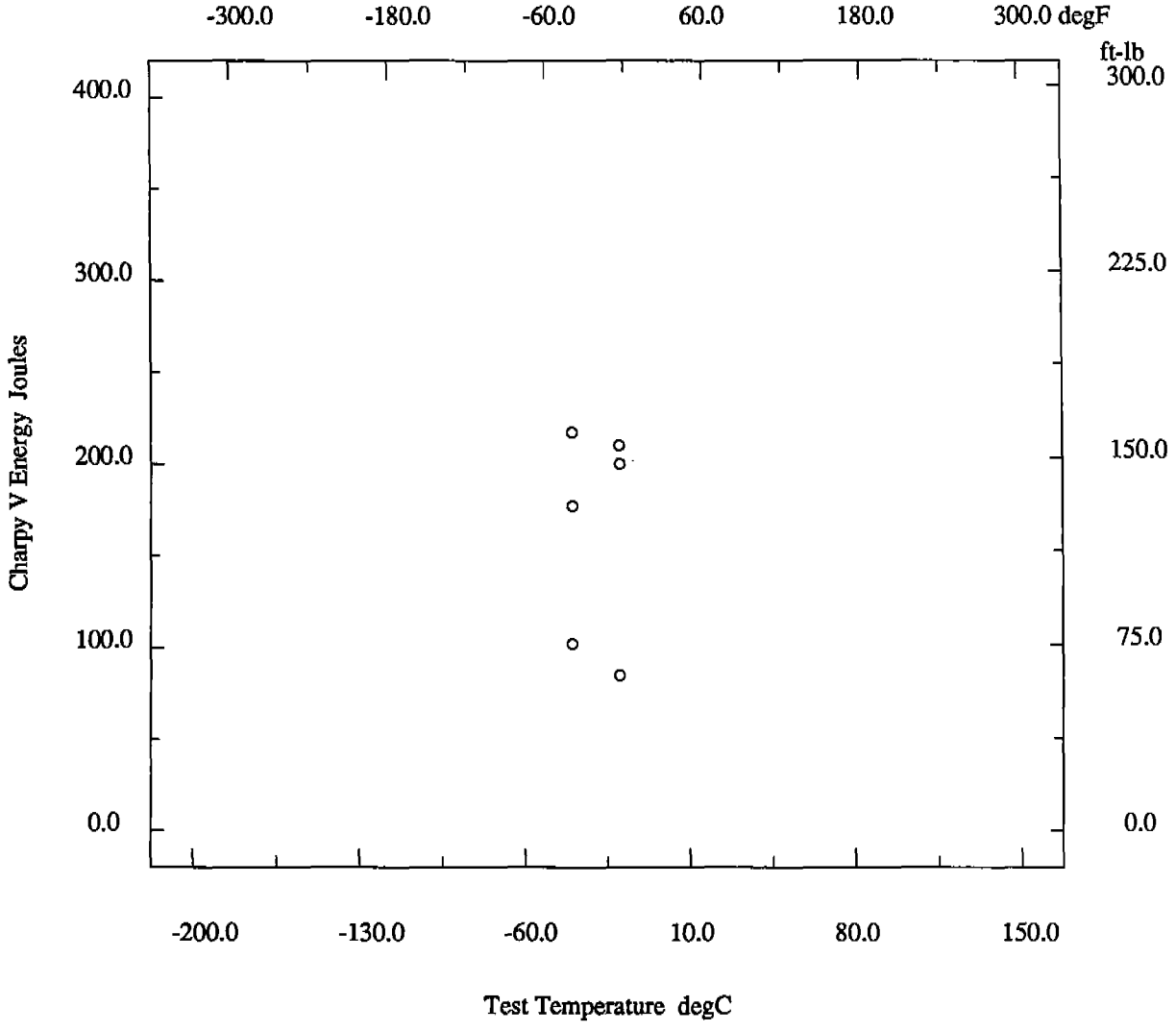
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-40	102
T-L ○	-40	177
T-L ○	-40	217
T-L ○	-20	200
T-L ○	-20	210
T-L ○	-20	85

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02BFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.03BFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13900.1

Fabrication History

See Page 13900.1

Weld

Weld Code	010.001.03BFS	Weld Type	SAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	280 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	1 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

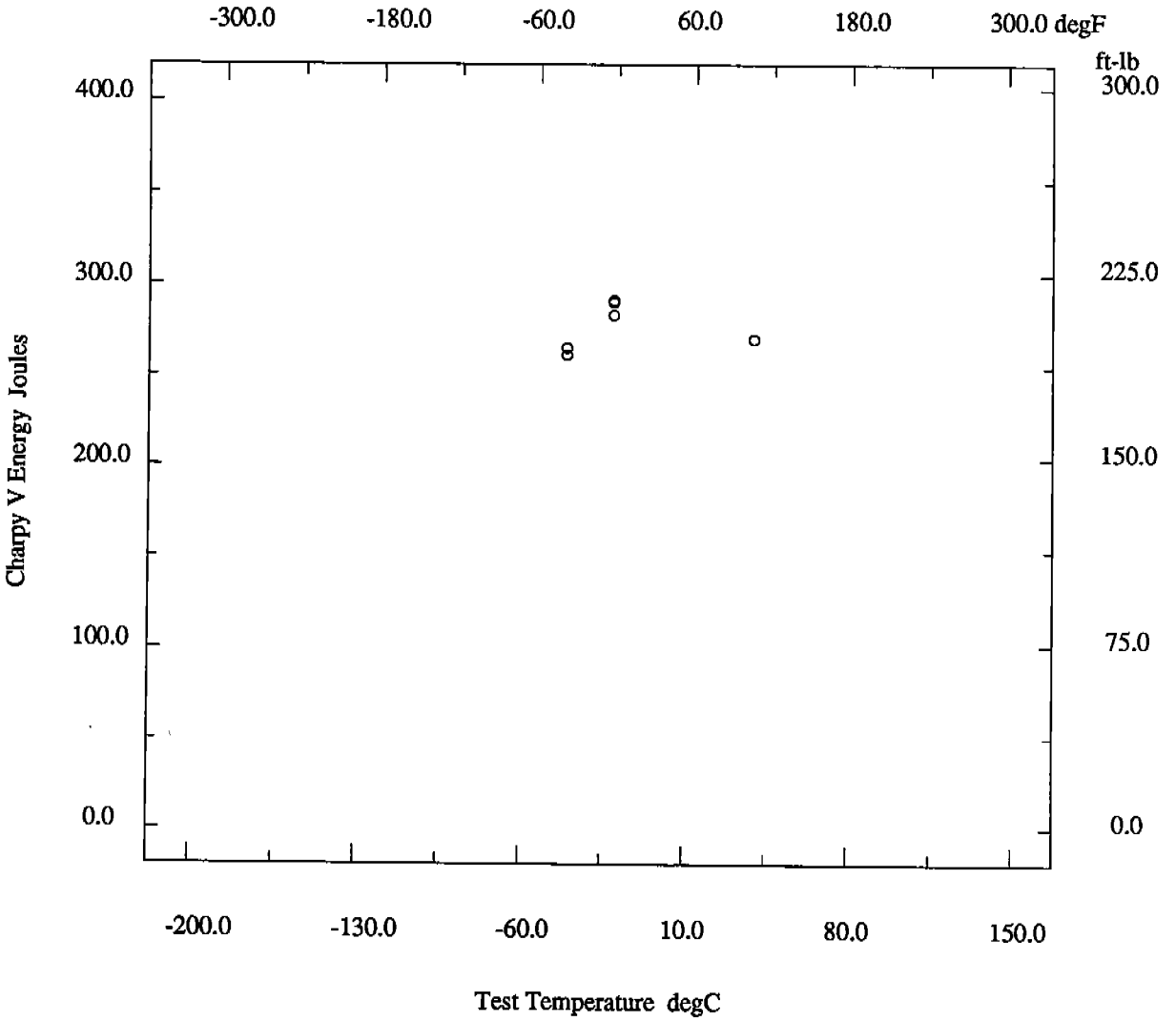
Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	261
T-L o	-40	265
T-L o	-20	283
T-L o	-20	290
T-L o	-20	291
T-L o	40	270

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.03BFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

2-05-12

(54)

Material BS4360 Gr50D

Description

Material Code	010.001.04BFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13900.1

Fabrication History

See Page 13900.1

Weld

Weld Code	010.001.04BFS	Weld Type	SAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	280 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	1 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

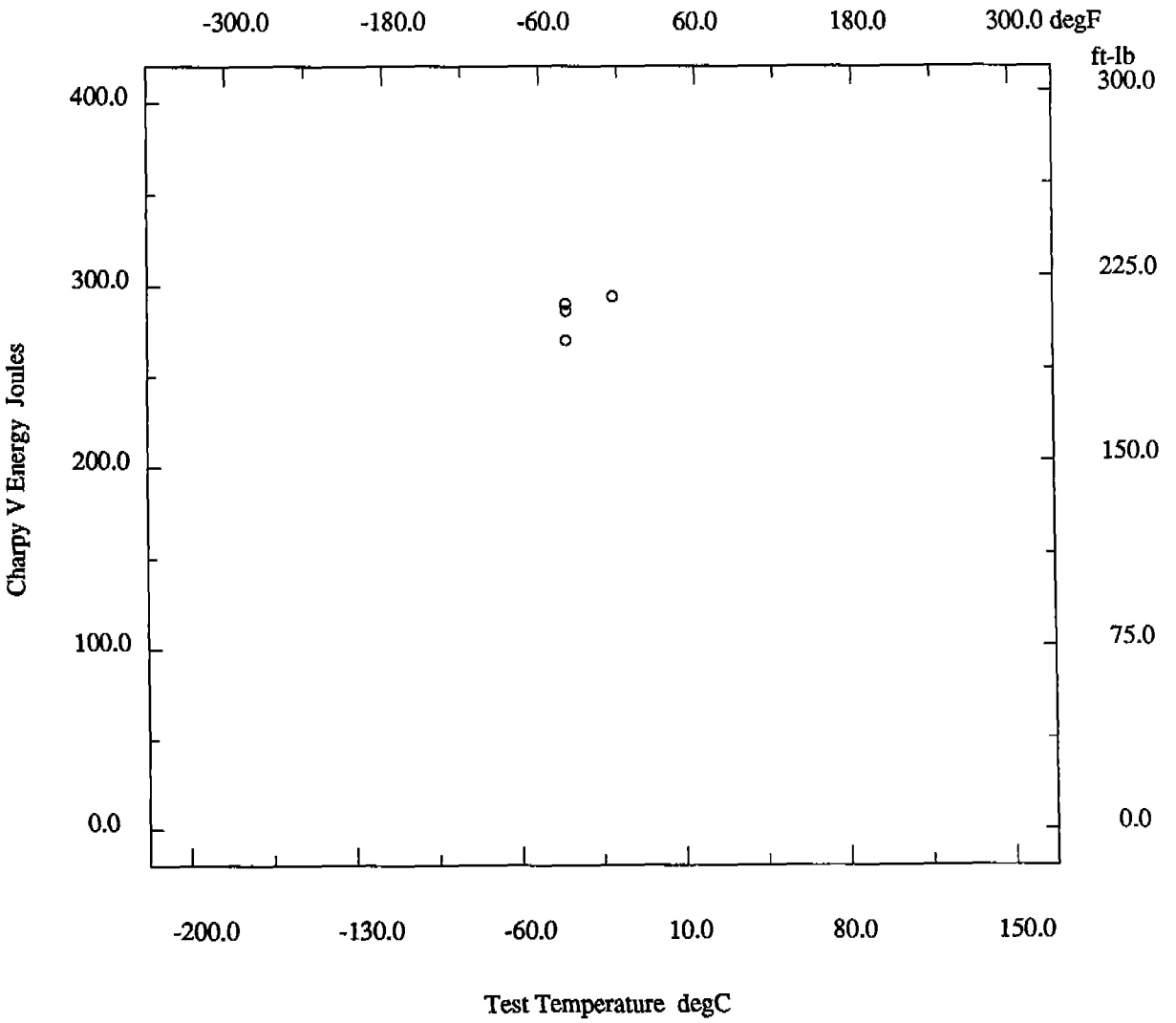
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	270
T-L °	-40	286
T-L °	-40	290
T-L °	-20	294
T-L °	-20	294
T-L °	-20	294

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.04BFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.05BFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition See Page 13900.1

Fabrication History See Page 13900.1

Weld

Weld Code	010.001.05BFS	Weld Type	SAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	280 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	1 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

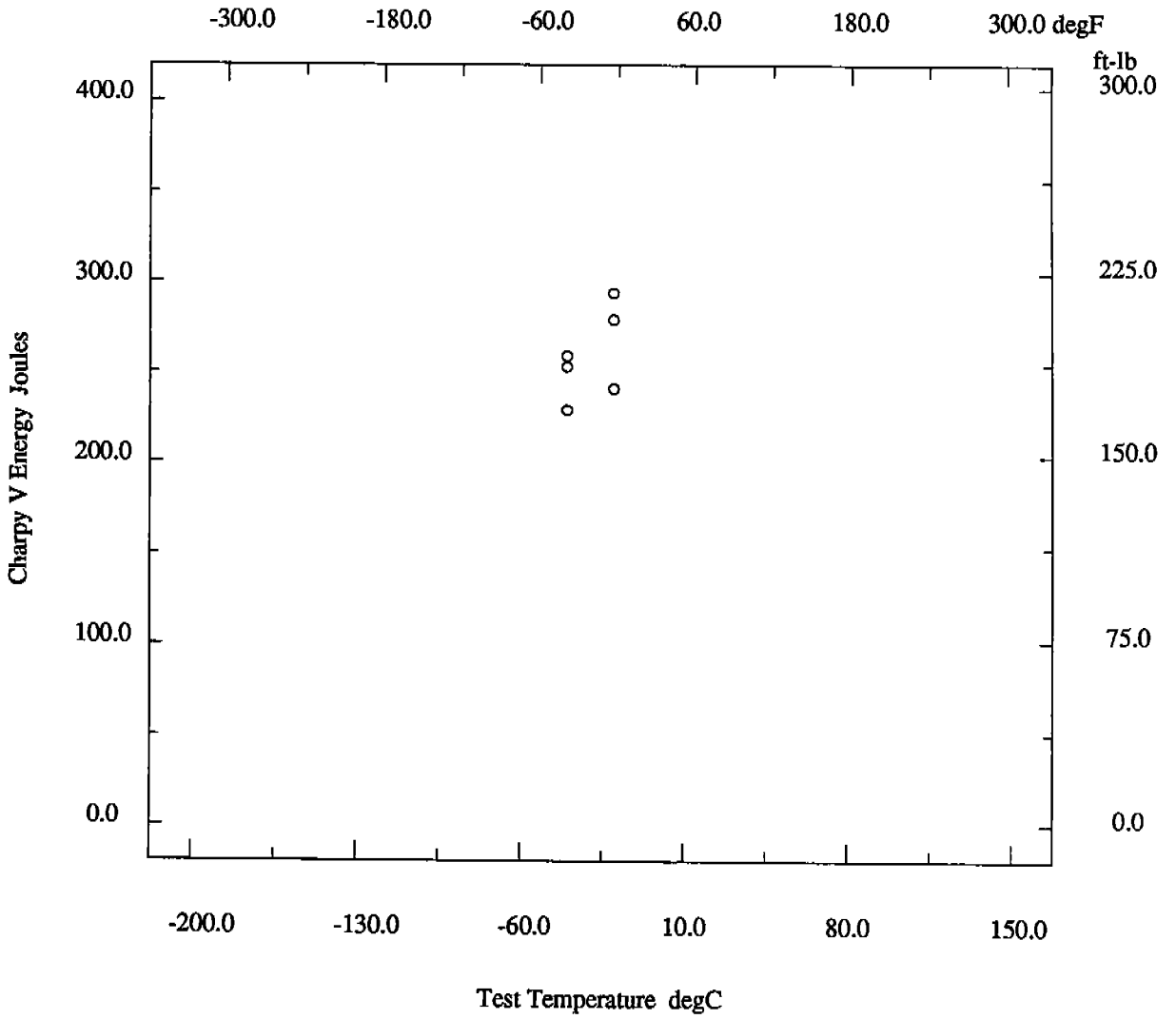
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	229
T-L °	-40	253
T-L °	-40	259
T-L °	-20	241
T-L °	-20	279
T-L °	-20	294

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.05BFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09BNA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13900.1

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	*
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.001.09BNA	Weld Type	SAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	280 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	1.66
-30	1.70
-30	1.81

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Test Temp degC	CODIc mm
-10	1.81
-10	1.84
-10	1.89

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02BNA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 13900.1

Fabrication History

See Page 13900.24

Weld

Weld Code	010.001.02BNA	Weld Type	SAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	280 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.18
-30	0.29
-30	0.86
-10	0.80
-10	0.85
-10	1.27

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09CNA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

C	0.12 %	Mn	1.38 %
P	0.011 %	S	0.001 %
Si	0.38 %	Cr	0.02 %
Ni	0.15 %	Mo	0.01 %
V	0.006 %	Cu	0.18 %
Cb	0.024 %	Ti	0.015 %
B	<0.0001 %	Al	0.029 %
N	0.0057 %	Other Components	*

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	*
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.001.09CNA	Weld Type	TSAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	58 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	*	Standard Year	*

Test Temp degC	CODIc mm
-30	1.50
-30	1.51
-30	1.68
-10	1.49
-10	1.51
-10	1.52

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02CNA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 14000.1

Fabrication History

See Page 14000.1

Weld

Weld Code	010.001.02CNA	Weld Type	TSAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	58 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	1
Location wrt Weld	Fusion line	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	*	Standard Year	*

Test Temp degC	CODIc mm
-30	0.21
-30	0.21
-30	0.60
-10	0.28
-10	0.34
-10	1.88

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09CFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 14000.1

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.001.09CFA	Weld Type	TSAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	58 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

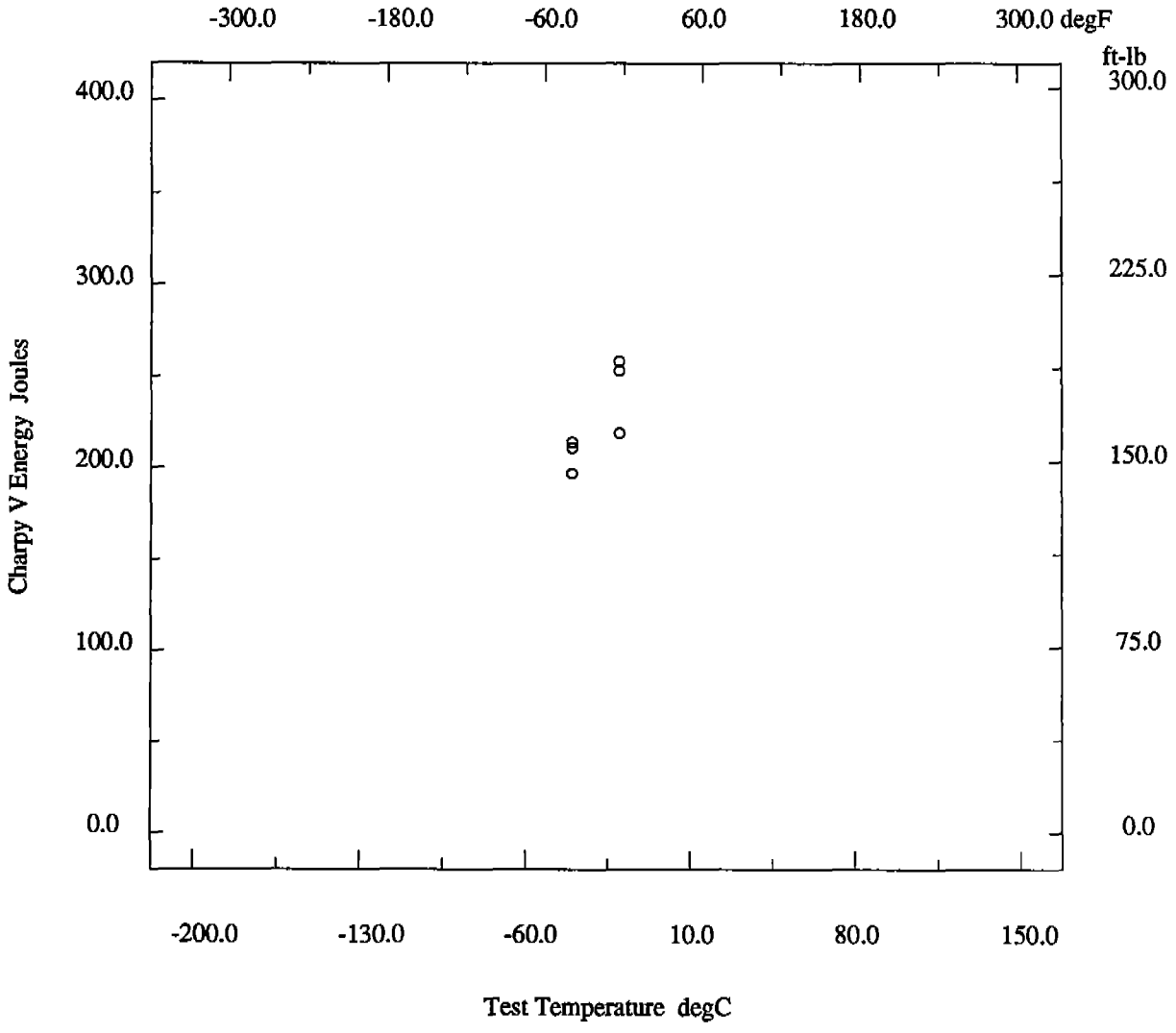
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	197
T-L °	-40	211
T-L °	-40	214
T-L °	-20	219
T-L °	-20	253
T-L °	-20	258

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09CFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02CFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition See Page 14000.1

Fabrication History See Page 14000.4

Weld

Weld Code	010.001.02CFA	Weld Type	TSAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	58 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	1
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

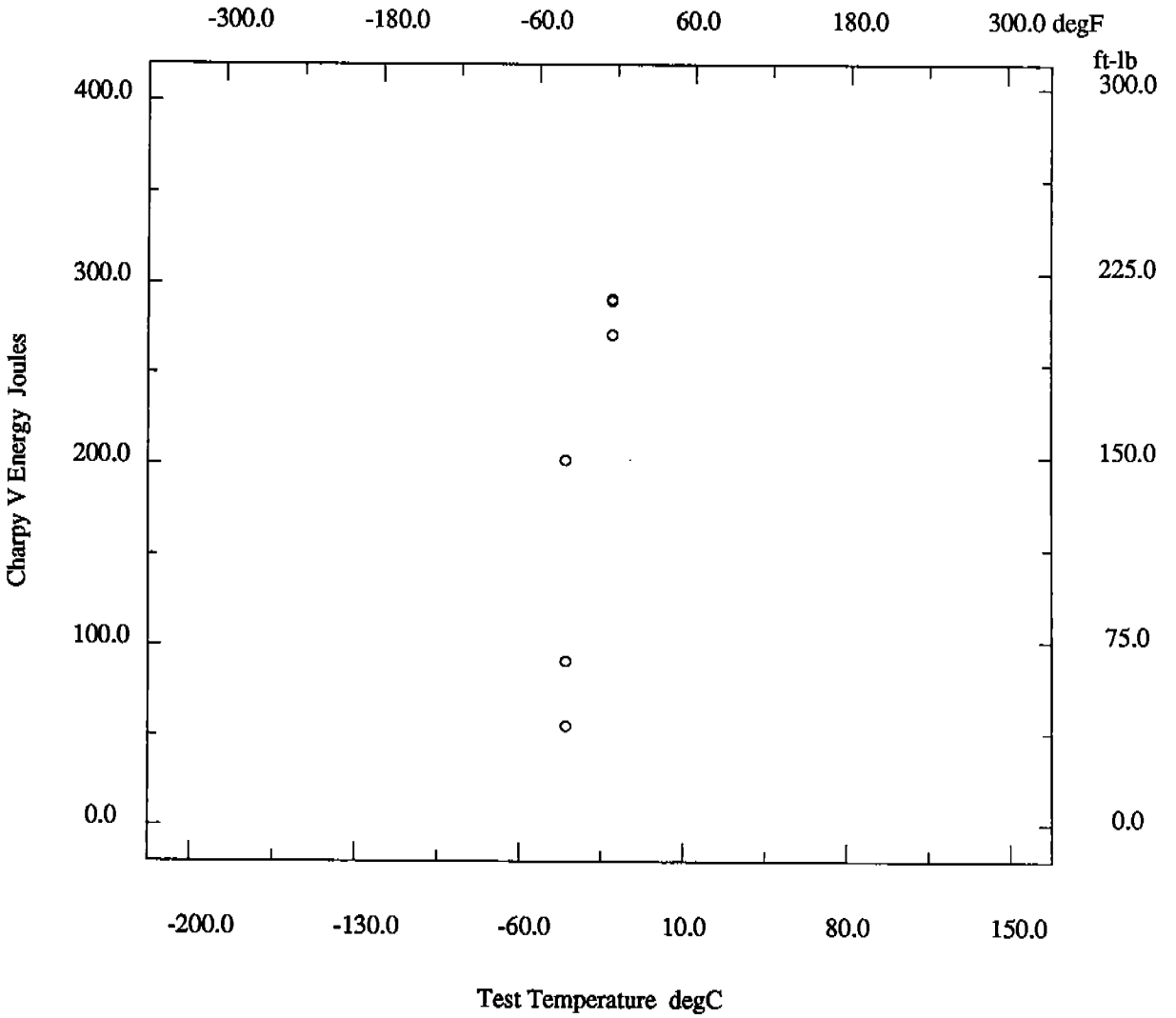
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	202
T-L °	-40	55
T-L °	-40	91
T-L °	-20	271
T-L °	-20	290
T-L °	-20	291

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02CFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.03CFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 14000.1

Fabrication History

See Page 14000.4

Weld

Weld Code	010.001.03CFA	Weld Type	TSAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	58 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	1
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

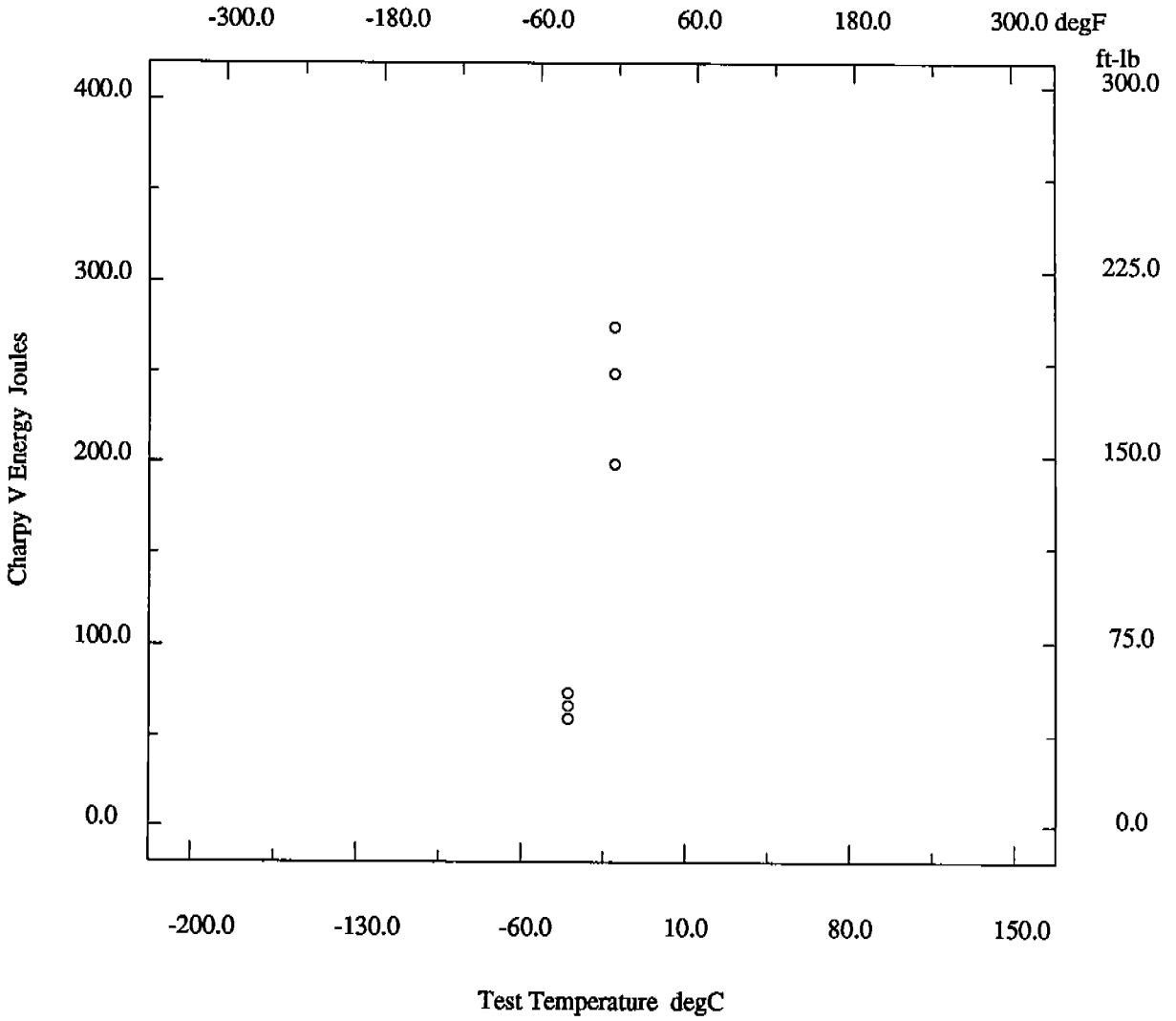
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	60
T-L °	-40	67
T-L °	-40	74
T-L °	-20	199
T-L °	-20	249
T-L °	-20	275

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.03CFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.04CFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 14000.1

Fabrication History

See Page 14000.4

Weld

Weld Code	010.001.04CFA	Weld Type	TSAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	58 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	1
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

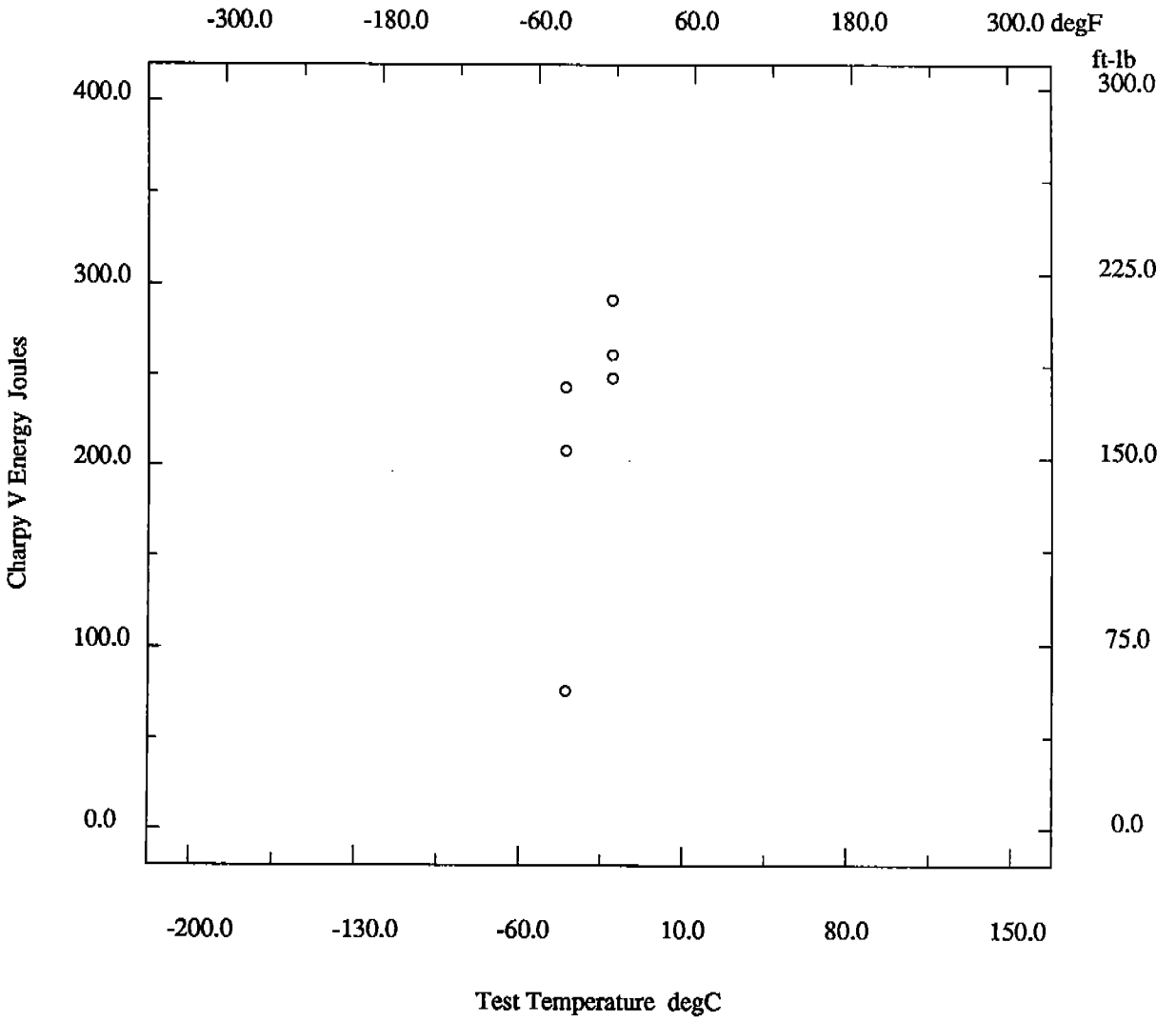
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	208
T-L °	-40	243
T-L °	-40	76
T-L °	-20	248
T-L °	-20	261
T-L °	-20	291

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.04CFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.05CFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 14000.1

Fabrication History

See Page 14000.4

Weld

Weld Code	010.001.05CFA	Weld Type	TSAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	58 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	1
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

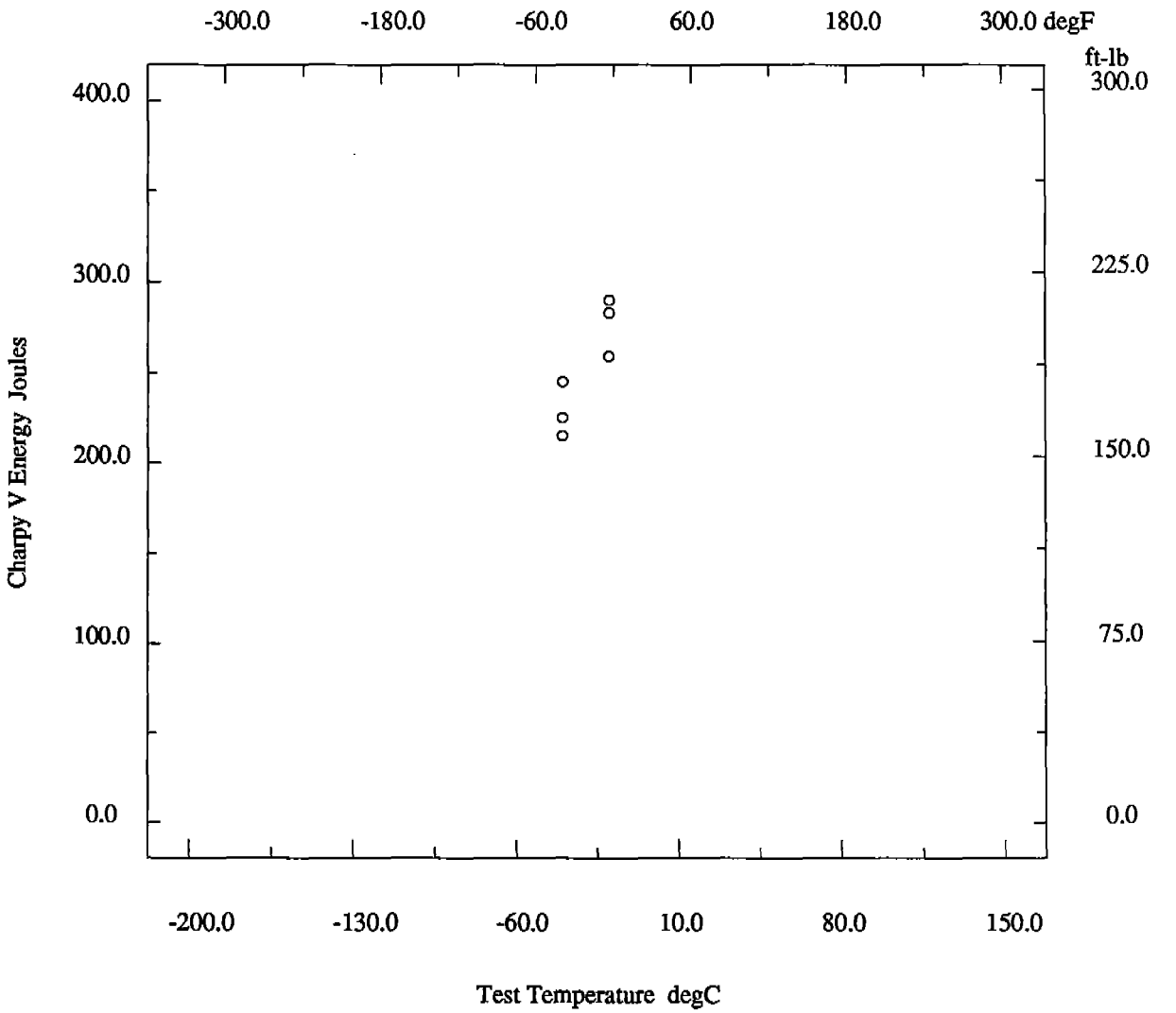
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	215
T-L °	-40	225
T-L °	-40	245
T-L °	-20	259
T-L °	-20	283
T-L °	-20	290

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.05CFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09CFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 14000.1

Fabrication History

See Page 14000.4

Weld

Weld Code	010.001.09CFS	Weld Type	TSAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	58 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	1 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

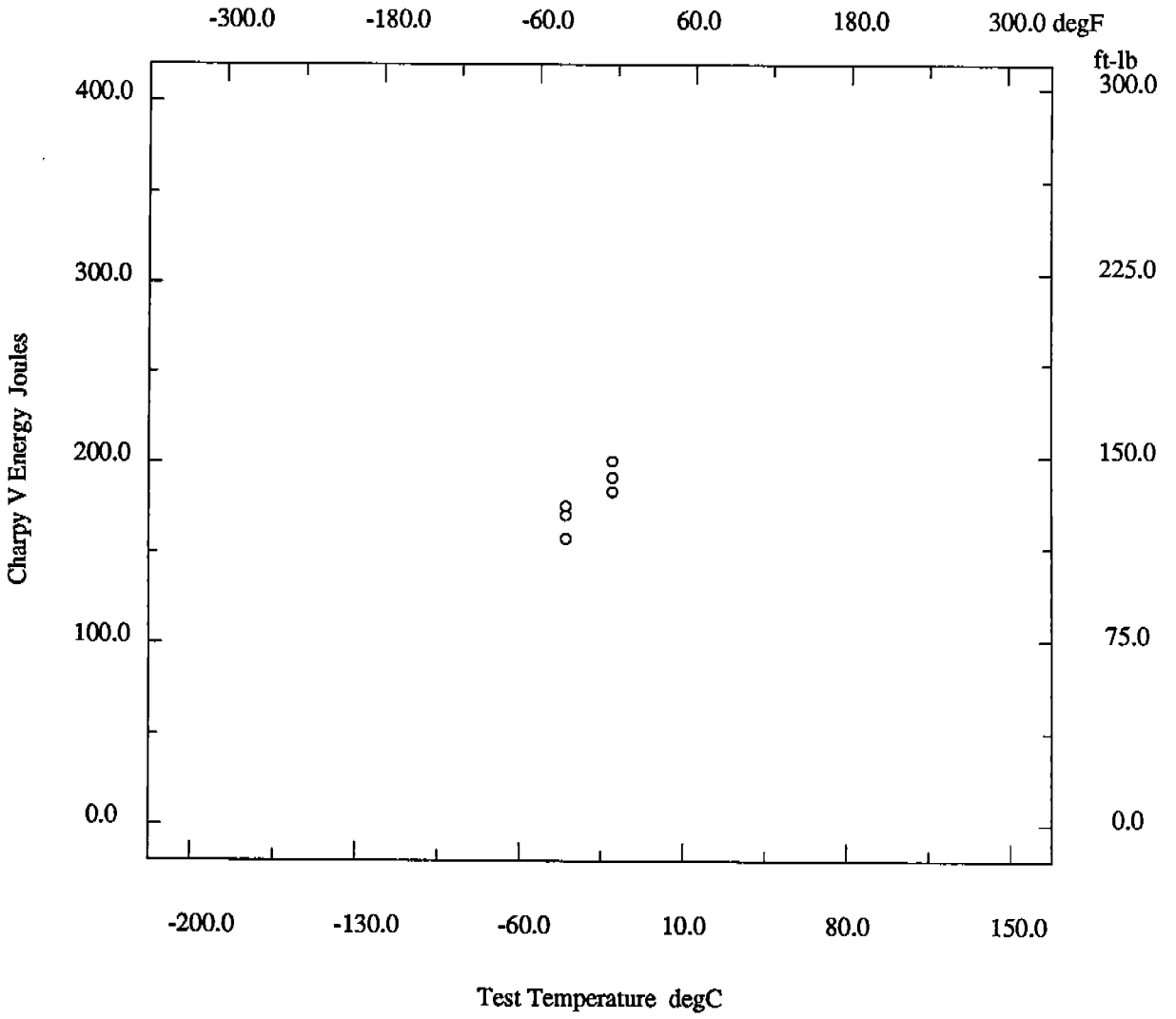
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	158
T-L °	-40	171
T-L °	-40	176
T-L °	-20	184
T-L °	-20	192
T-L °	-20	201

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.09CFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02CFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 14000.1

Fabrication History

See Page 14000.4

Weld

Weld Code	010.001.02CFS	Weld Type	TSAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	58 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	1
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	1 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

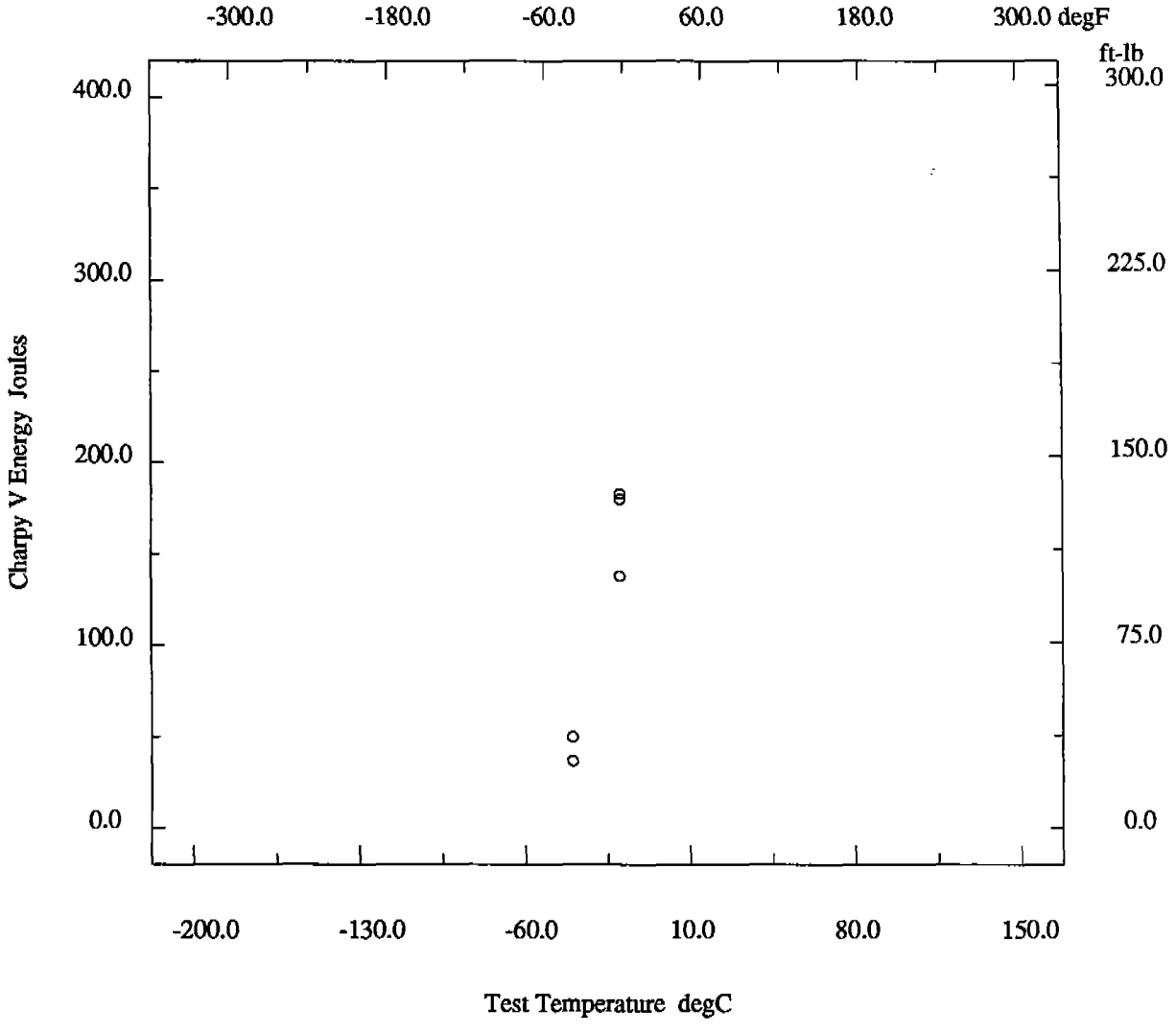
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-40	37
T-L ○	-40	37
T-L ○	-40	50
T-L ○	-20	138
T-L ○	-20	180
T-L ○	-20	183

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.02CFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.03CFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 14000.1

Fabrication History

See Page 14000.4

Weld

Weld Code	010.001.03CFS	Weld Type	TSAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	58 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	1
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	1 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

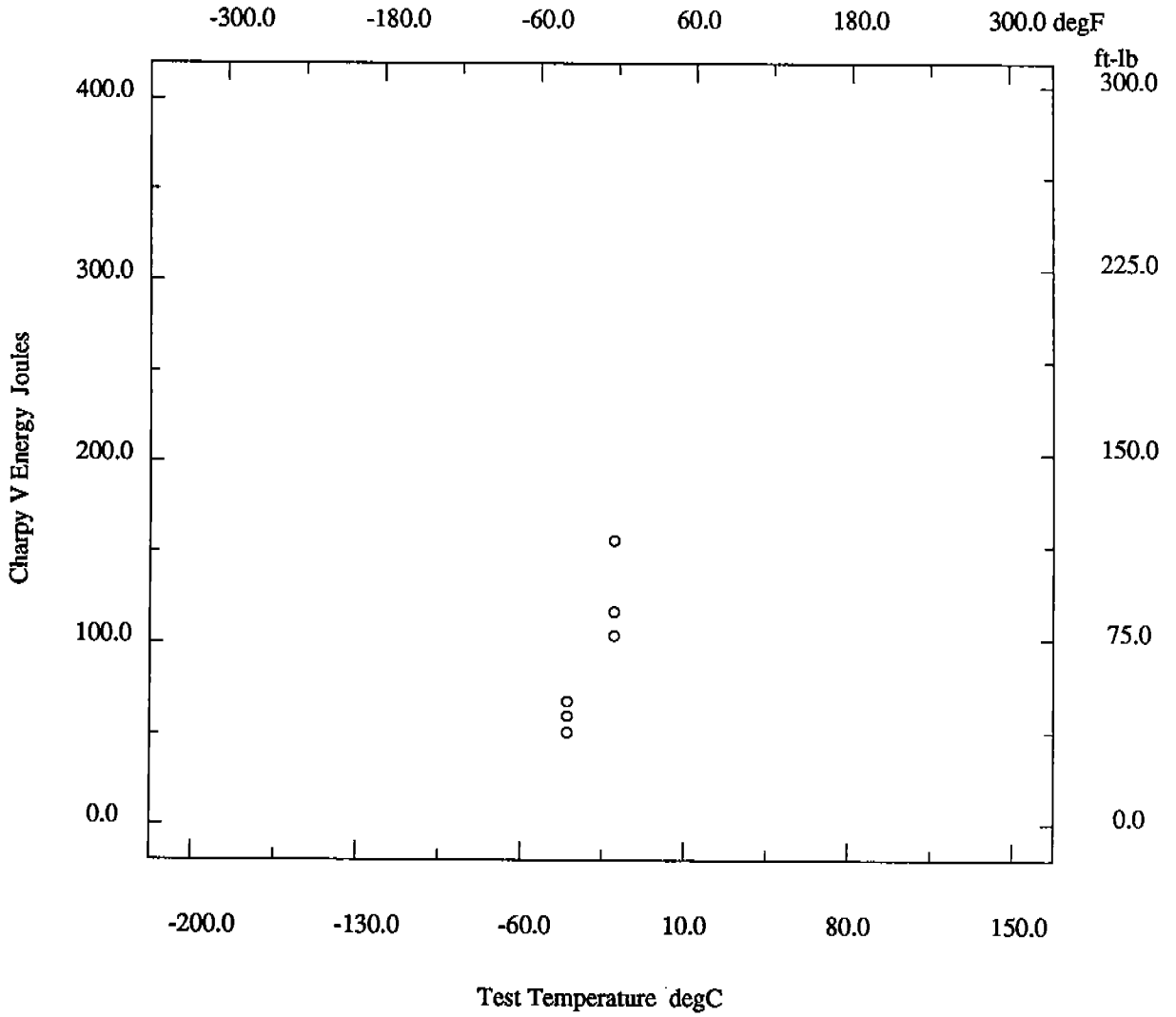
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	51
T-L °	-40	60
T-L °	-40	68
T-L °	-20	104
T-L °	-20	117
T-L °	-20	156

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.03CFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.04CFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition See Page 14000.1

Fabrication History See Page 14000.4

Weld

Weld Code	010.001.04CFS	Weld Type	TSAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	58 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	1
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	1 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

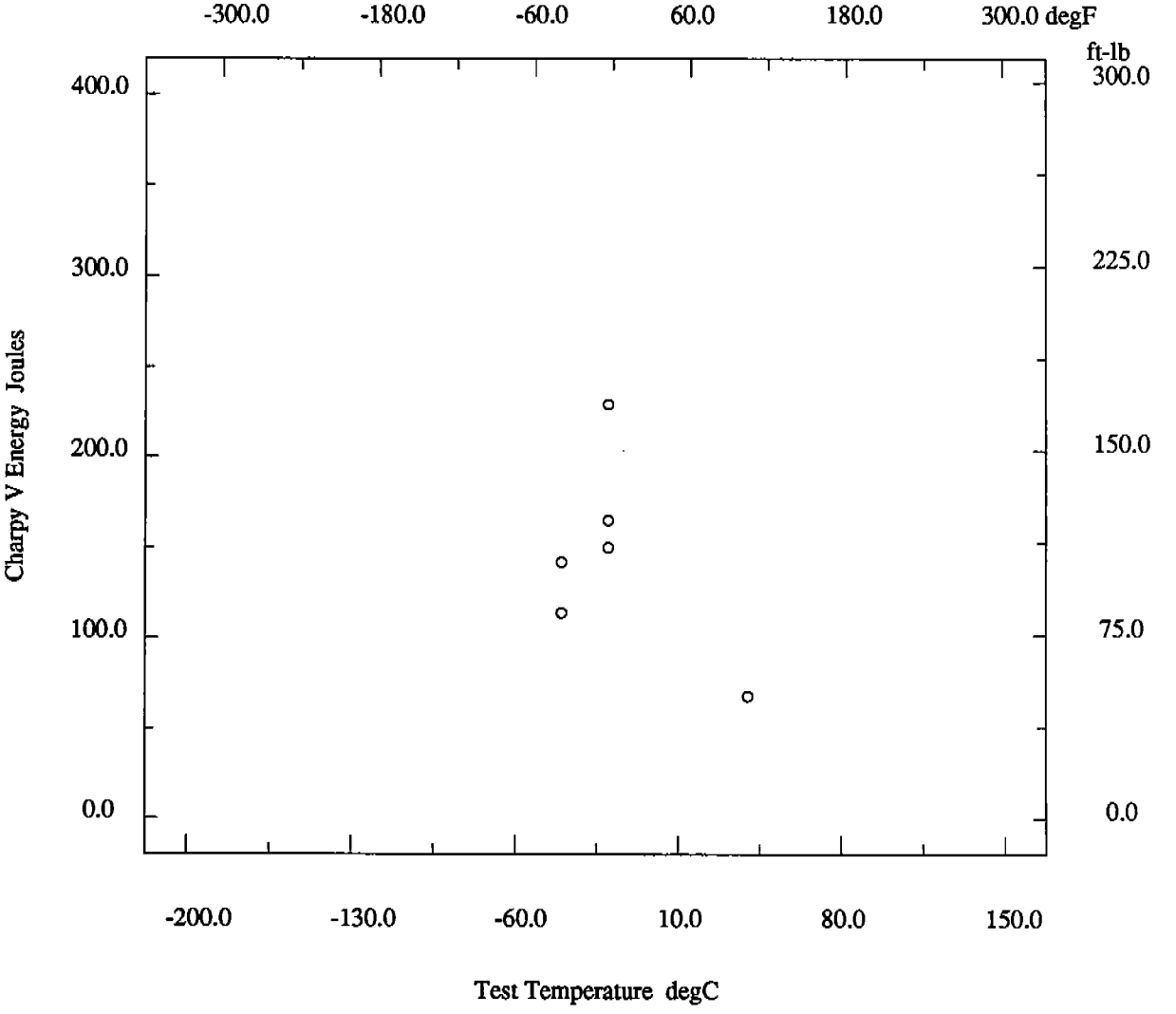
Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	114
T-L o	-40	142
T-L o	-20	150
T-L o	-20	165
T-L o	-20	229
T-L o	40	68

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.04CFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.05CFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		

Composition

See Page 14000.1

Fabrication History

See Page 14000.4

Weld

Weld Code	010.001.05CFS	Weld Type	TSAW
Base Metal Thickness	25 mm	Welding Position	Downhand
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	58 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	1/2 V-Groove	Number of Sides	1
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	1 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

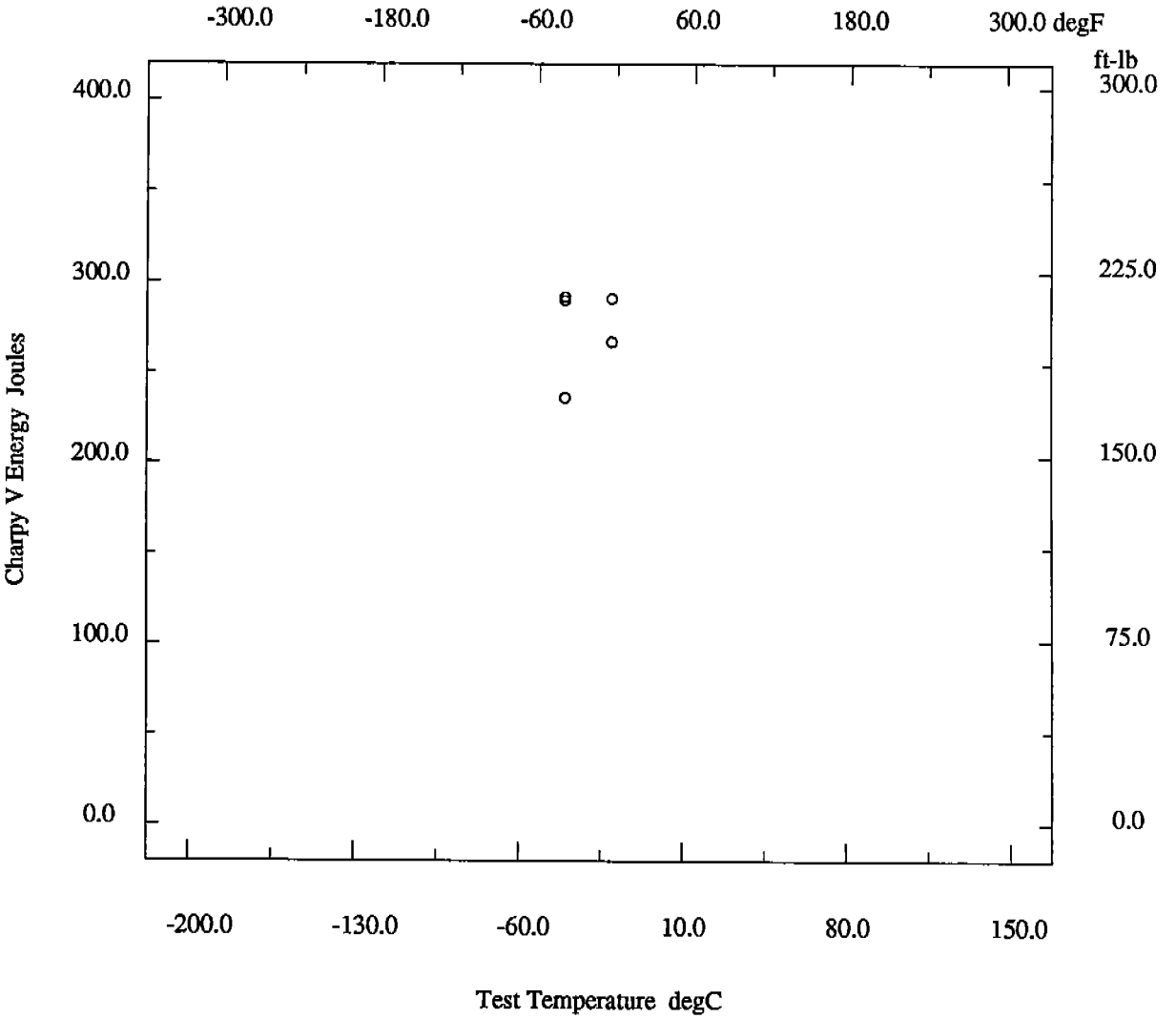
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	236
T-L °	-40	290
T-L °	-40	292
T-L °	-20	267
T-L °	-20	291
T-L °	-20	291

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.001.05CFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	25 mm	Composition Type	Yes
Composition Position	1/4T	Lot ID	*
Reference	SHI-01		



* - not reported

(114) 121K

Material BS4360 Gr50D

Description

Material Code	010.002.010A	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

C	0.13 %	Mn	1.41 %
P	0.013 %	S	0.001 %
Si	0.40 %	Cr	0.02 %
Ni	0.17 %	Mo	0.02 %
V	0.004 %	Cu	0.17 %
Cb	0.025 %	Ti	<0.003 %
B	<0.0001 %	Al	0.028 %
N	0.0072 %	Other Components	*

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements

Test Type	Tensile	Specimen Type	Round
Specimen Thickness	10 mm	Gage Length	50 mm
Loading Rate	*	Tensile Strength Offset	*
Tensile Yield Strength	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Position	Orient	Test Temp degC	UTS N/mm2	TYP kgf/mm2	Elongation %	RA %
1/2T	L	20	539	370	36.0	76.0
1/2T	L	20	542	368	34.0	74.0
1/4T	L	20	517	358	34.4	75.0
1/4T	L	20	519	352	36.8	77.0
1/2T	T	20	526	343	32.4	73.0
1/2T	T	20	541	347	34.0	71.9
1/4T	T	20	514	343	34.6	75.0
1/4T	T	20	517	352	34.0	73.0

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.010A	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14100.1

Fabrication History See Page 14100.1

Property Measurements

Test Type	Nil Ductilty Transition	Position	*
Specimen Type	P-1	Filler Alloy	*
Passes	*	Orientation	*
Standard Method	*	Standard Year	*

Test Temp degC	Break?	NDTT
-60	Yes	No
-60	Yes	No
-55	No	Yes
-55	No	Yes
-55	Yes	Yes
-50	No	No
-50	No	No
-50	No	No

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.010A	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14100.1

Fabrication History See Page 14100.1

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	*	Standard Year	*

Test Temp degC	CODIc mm
-30	>4.03
-30	>4.04
-30	>4.15

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.010S	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14100.1

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N,A
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	600 degC
Aging Time	2.4 hr	Location	*

Property Measurements

Test Type	Tensile	Specimen Type	Round
Specimen Thickness	10 mm	Gage Length	50 mm
Loading Rate	*	Tensile Strength Offset	*
Tensile Yield Strength	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Position	Orient	Test Temp degC	UTS N/mm2	TYP kgf/mm2	Elongation %	RA %
1/2T	L	20	522	350	36.0	76.0
1/2T	L	20	526	357	35.2	73.0
1/4T	L	20	494	341	37.2	75.0
1/4T	L	20	505	350	37.2	76.0
1/2T	T	20	501	341	33.8	74.0
1/2T	T	20	505	341	33.6	74.0
1/4T	T	20	493	339	33.6	74.0
1/4T	T	20	500	347	34.0	73.0

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.010C	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14100.1

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N,A
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	250 degC
Aging Time	1.0 hr	Location	*

Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Yes
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

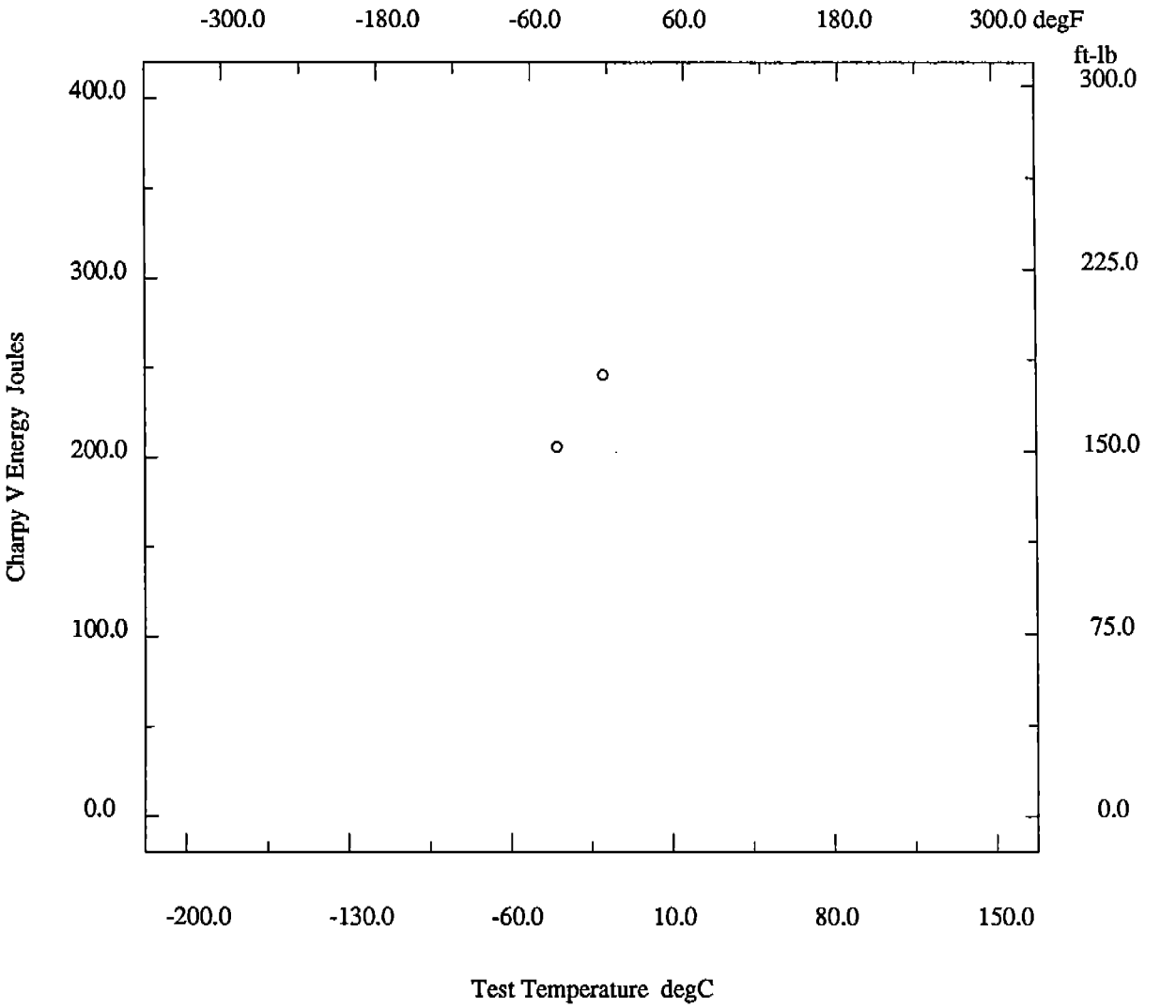
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	206
T-L °	-20	246

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.010C	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

(1246)

Material BS4360 Gr50D

Description

Material Code	010.002.010D	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14100.1

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N,C,A
Final Temperature	*	Final Time	*
Cold Work Strain	3 %	Aging Temperature	250 degC
Aging Time	1.0 hr	Location	*

Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Yes
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

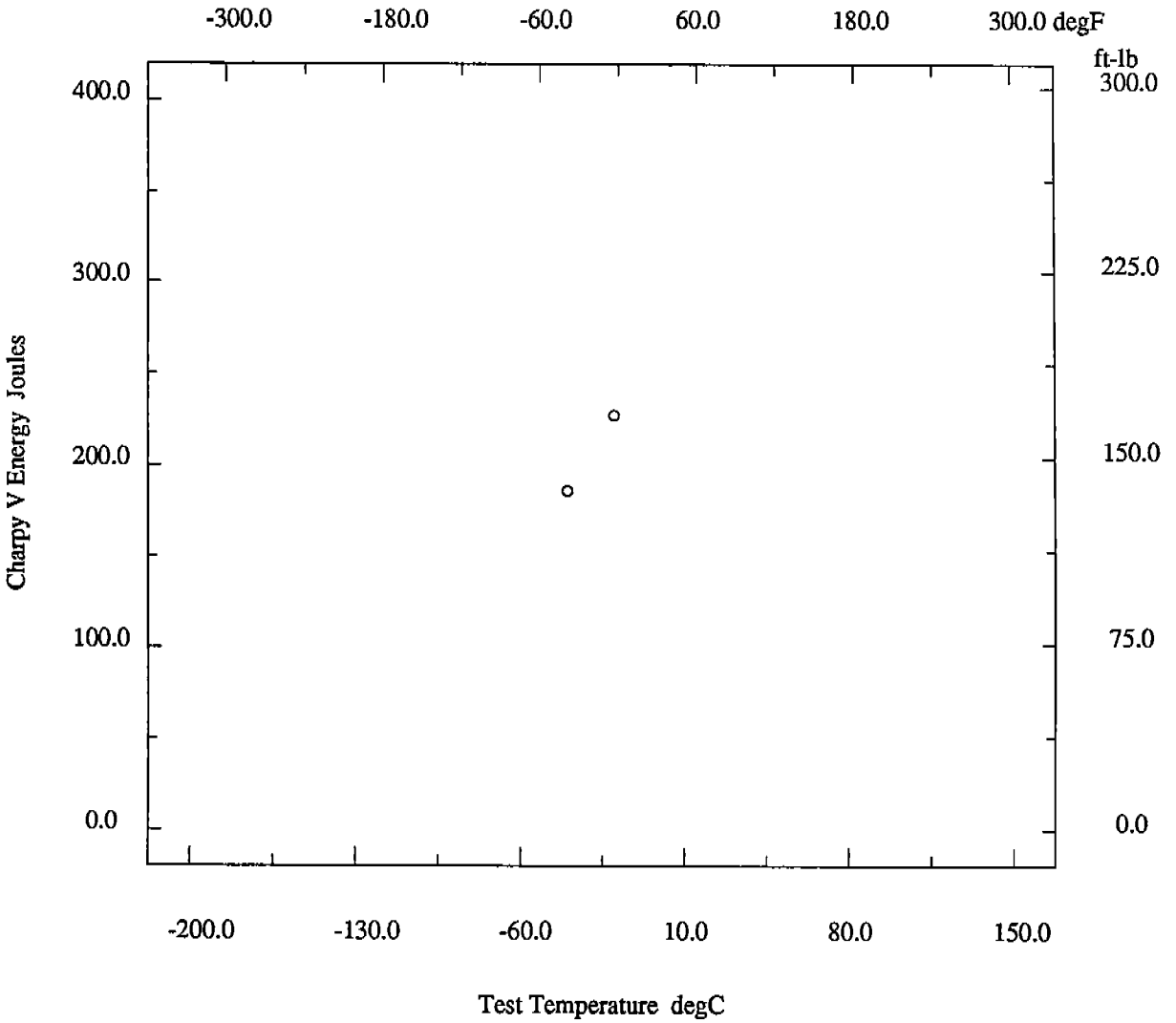
Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	186
T-L o	-20	227

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.010D	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.010E	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14100.1

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N,C,A
Final Temperature	*	Final Time	*
Cold Work Strain	5 %	Aging Temperature	250 degC
Aging Time	1.0 hr	Location	*

Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Yes
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

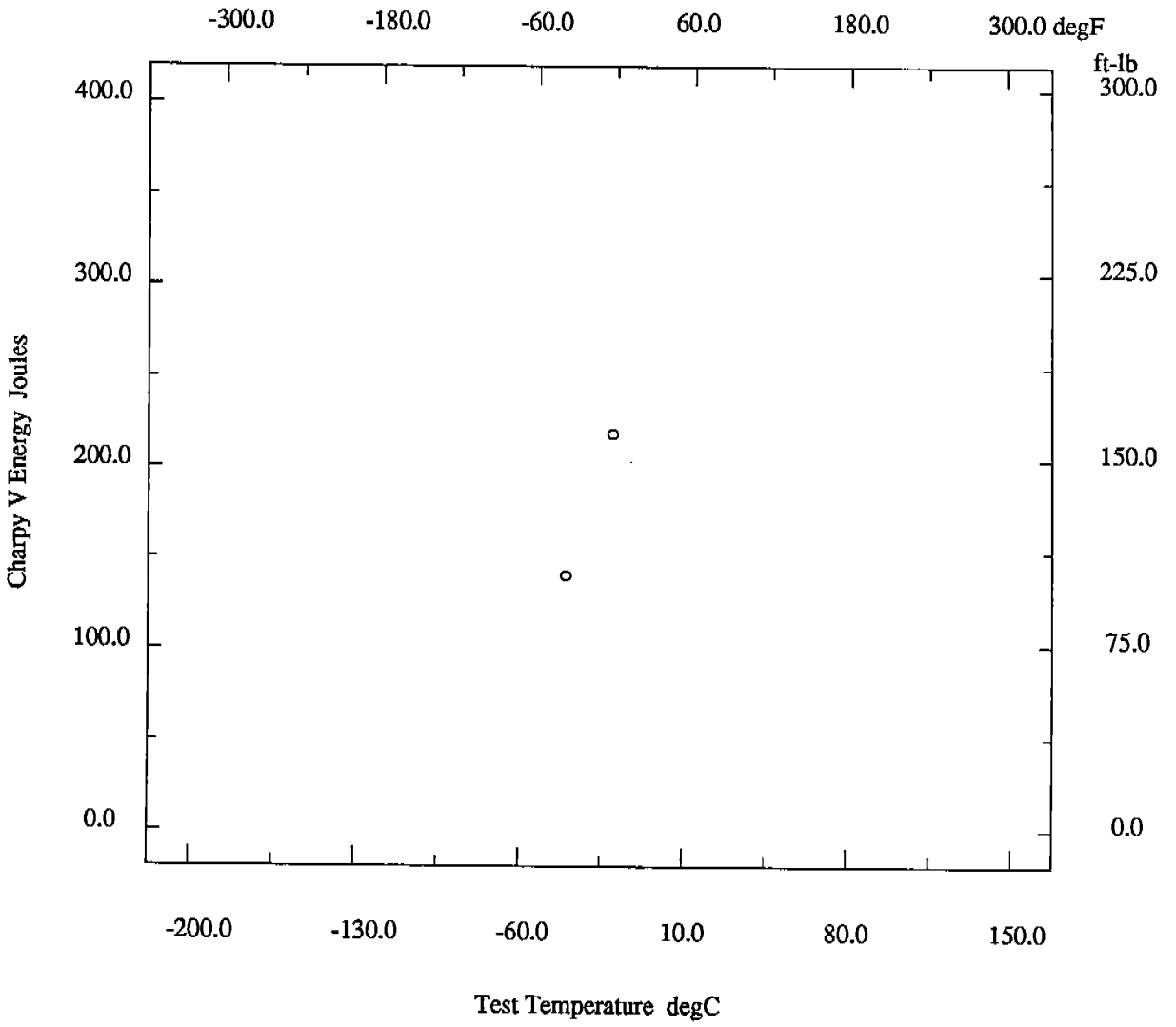
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-40	140
T-L ○	-20	218

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.010E	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Wrought Metal	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09DNA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

C	0.13 %	Mn	1.41 %
P	0.013 %	S	0.001 %
Si	0.40 %	Cr	0.02 %
Ni	0.17 %	Mo	0.02 %
V	0.004 %	Cu	0.17 %
Cb	0.025 %	Ti	<0.003 %
B	<0.0001 %	Al	0.028 %
N	0.0072 %	Other Components	*

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.002.09DNA	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.13
-30	0.49
-30	0.60
-10	0.20
-10	0.38
-10	0.94

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02DNA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.02DNA	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.16
-30	0.95
-30	1.36
-10	>1.68
-10	>1.69
-10	>1.73

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09DNS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.09DNS	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Full cross section
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.64
-30	1.20
-30	1.49
-10	1.03
-10	>1.80
-10	>1.81

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02DNS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.02DNS	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Full cross section
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.76
-30	1.33
-30	1.74
-10	1.50
-10	>1.83
-10	>1.83

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09DFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.09DFA	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	135
T-L o	-40	139
T-L o	-40	148

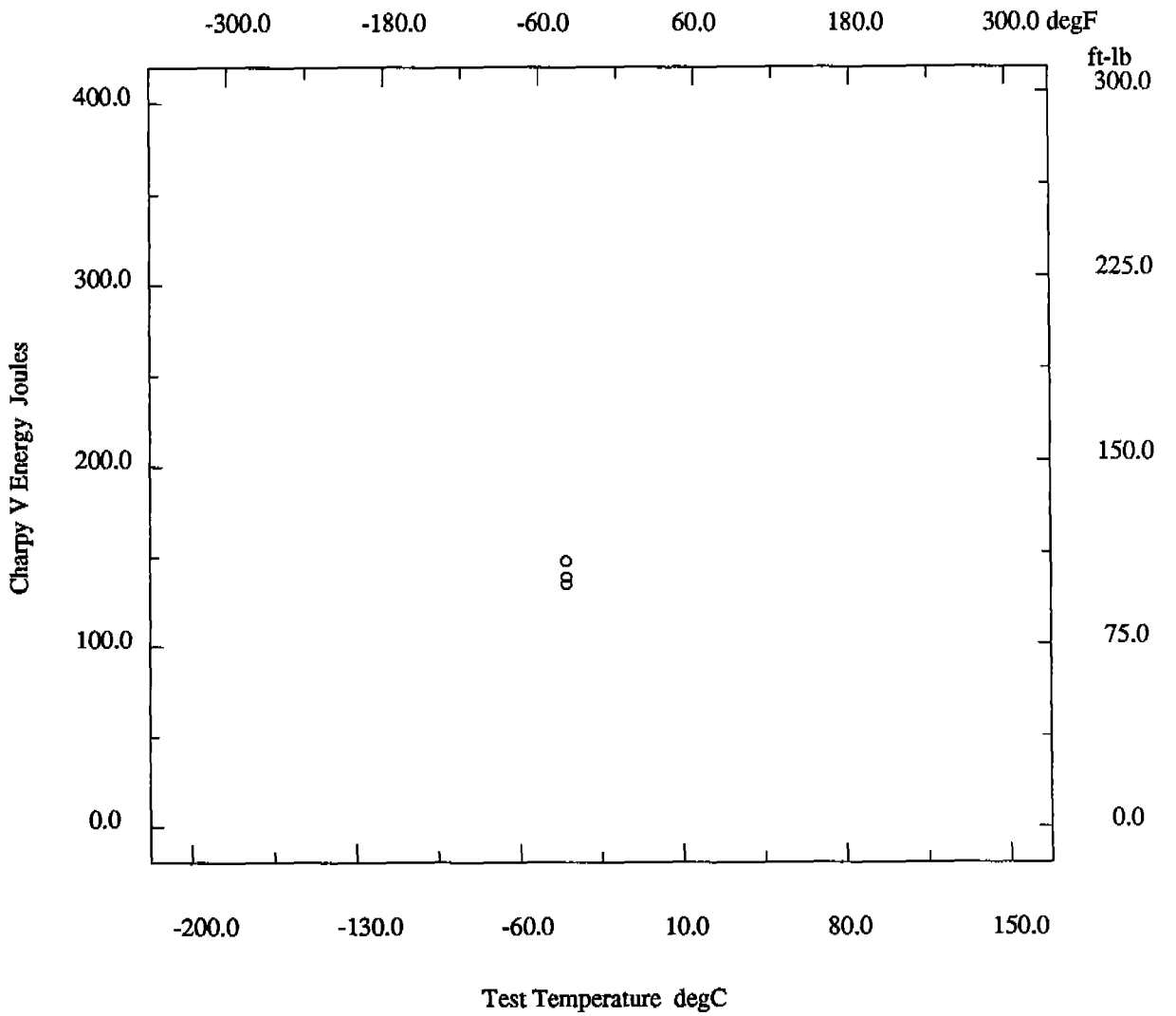
* - not reported

(136)

Material BS4360 Gr50D

Description

Material Code	010.002.09DFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02DFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14200.1

Fabrication History See Page 14200.1

Weld

Weld Code	010.002.02DFA	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

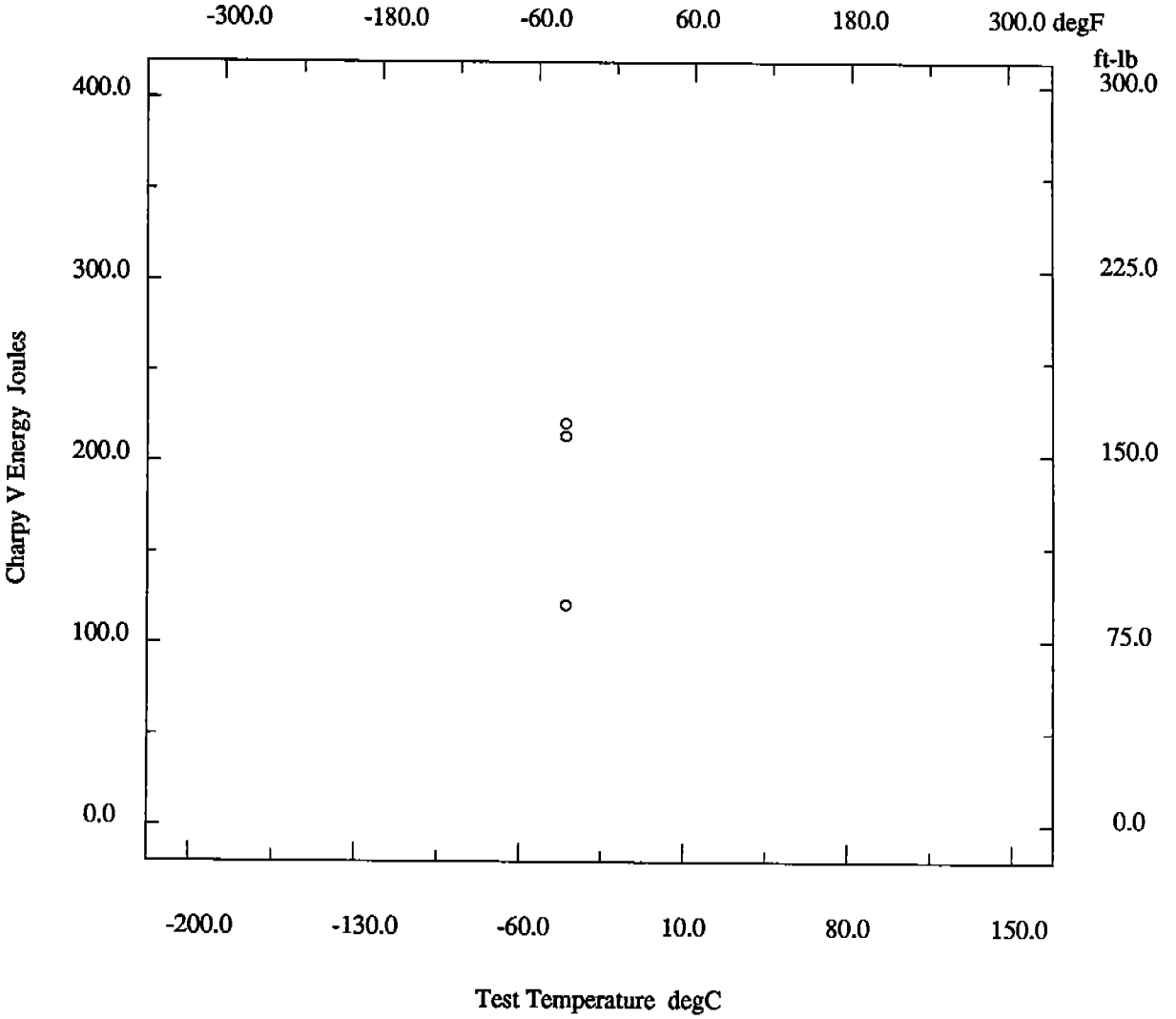
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	121
T-L °	-40	214
T-L °	-40	221

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02DFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03DFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.03DFA	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

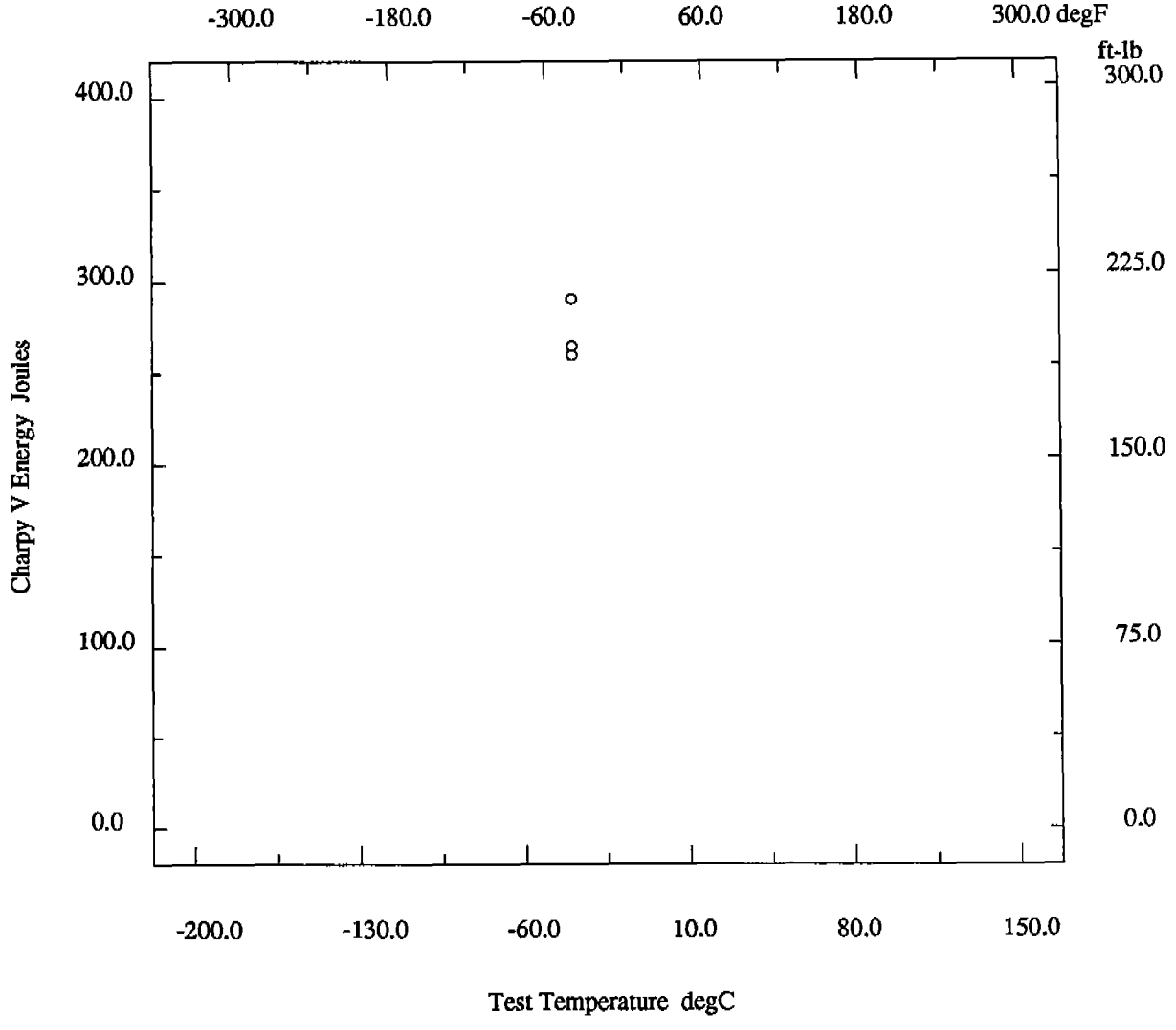
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	260
T-L °	-40	265
T-L °	-40	291

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03DFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04DFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.04DFA	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

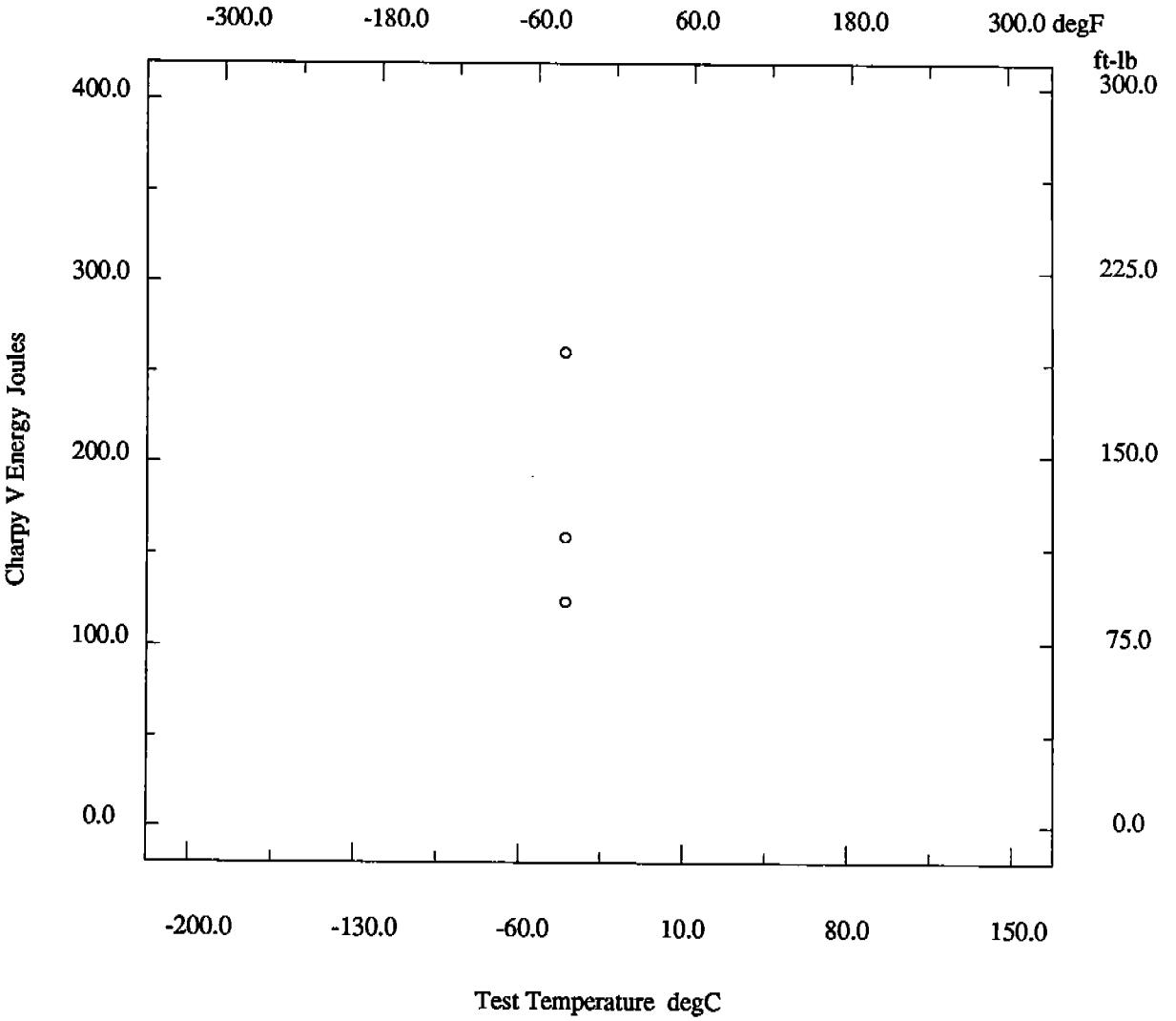
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	124
T-L °	-40	159
T-L °	-40	261

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04DFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05DFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.05DFA	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

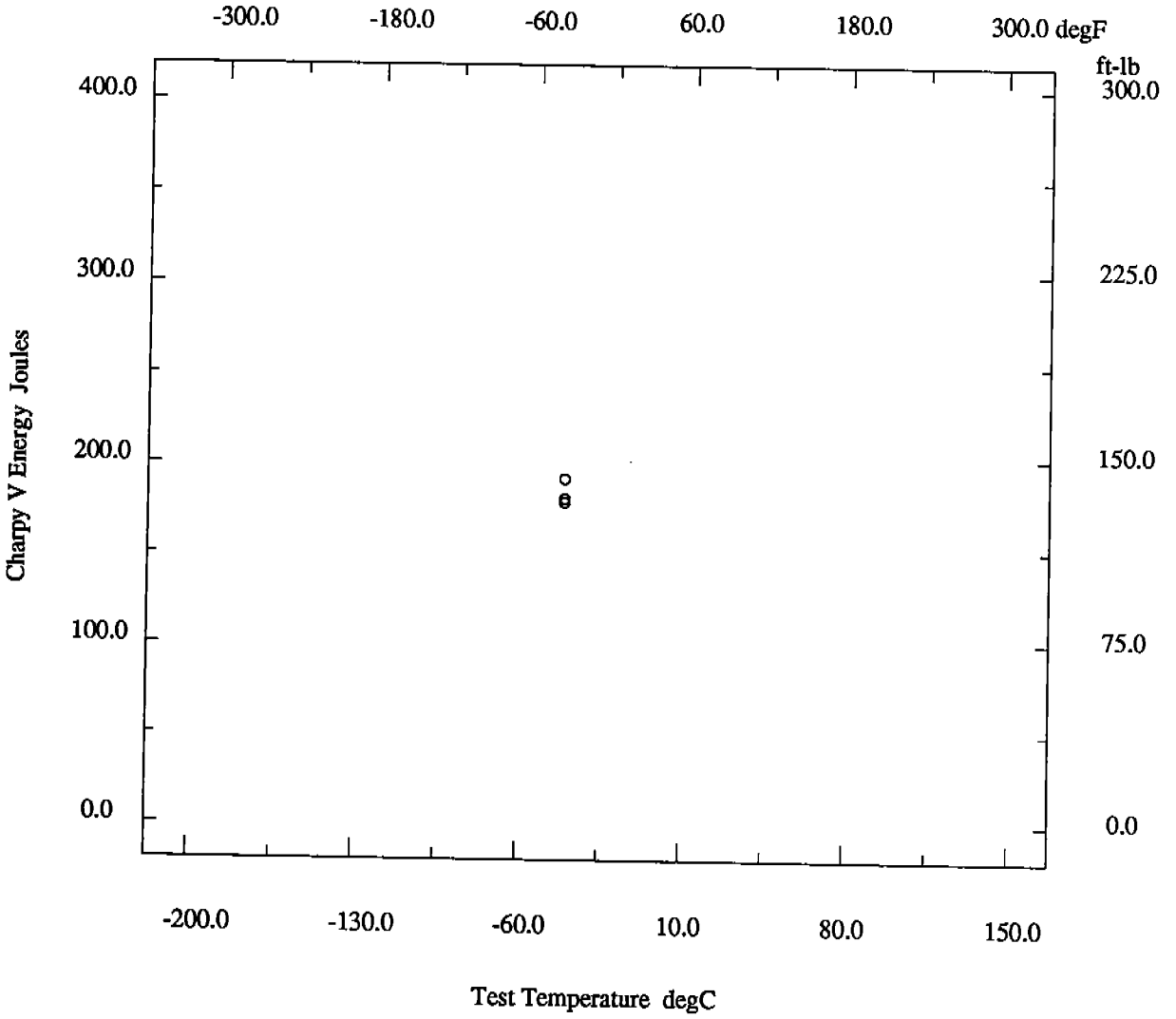
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	179
T-L °	-40	181
T-L °	-40	192

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05DFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09DRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.09DRA	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

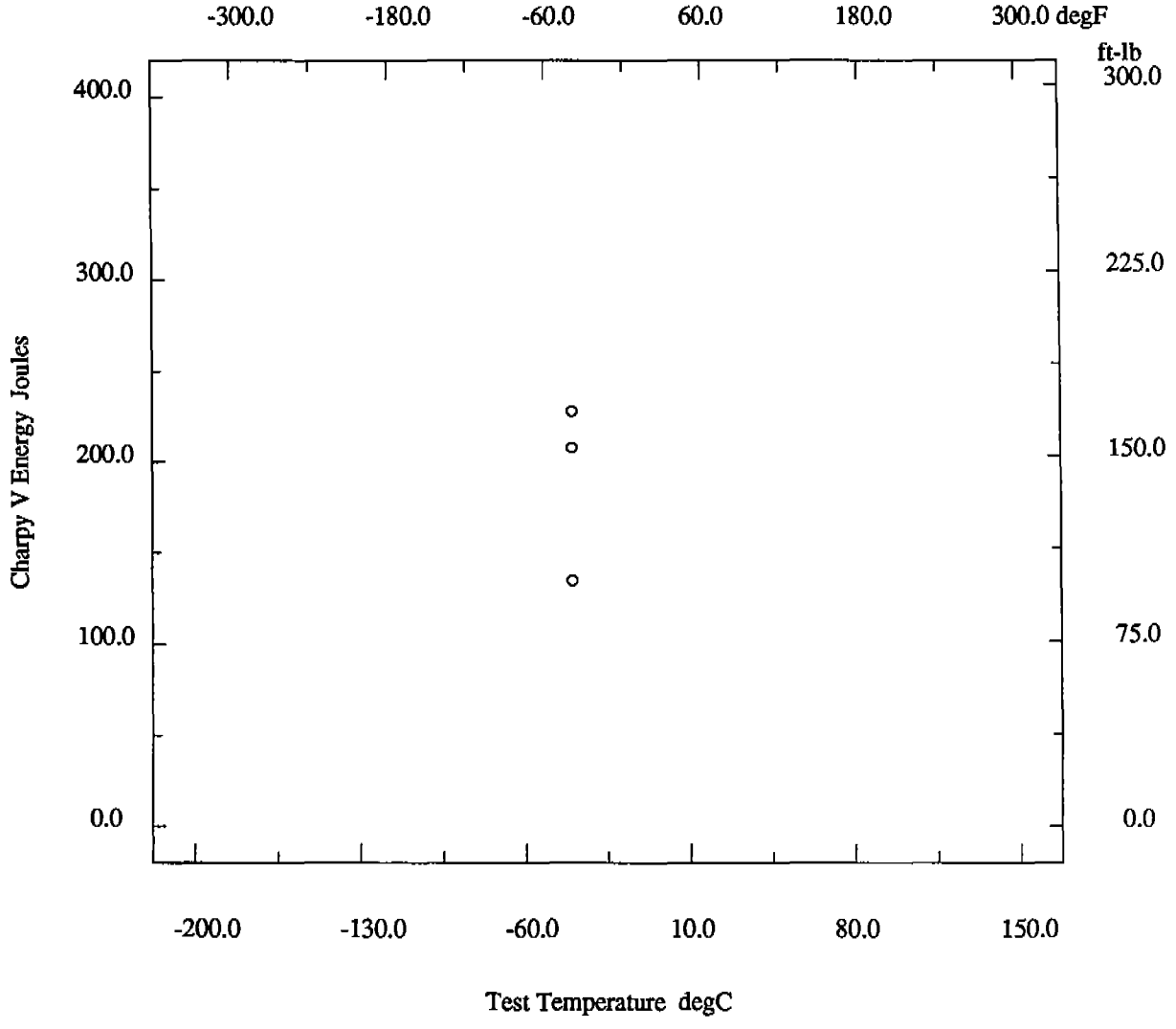
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	135
T-L °	-40	208
T-L °	-40	228

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09DRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09DBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.09DBA	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

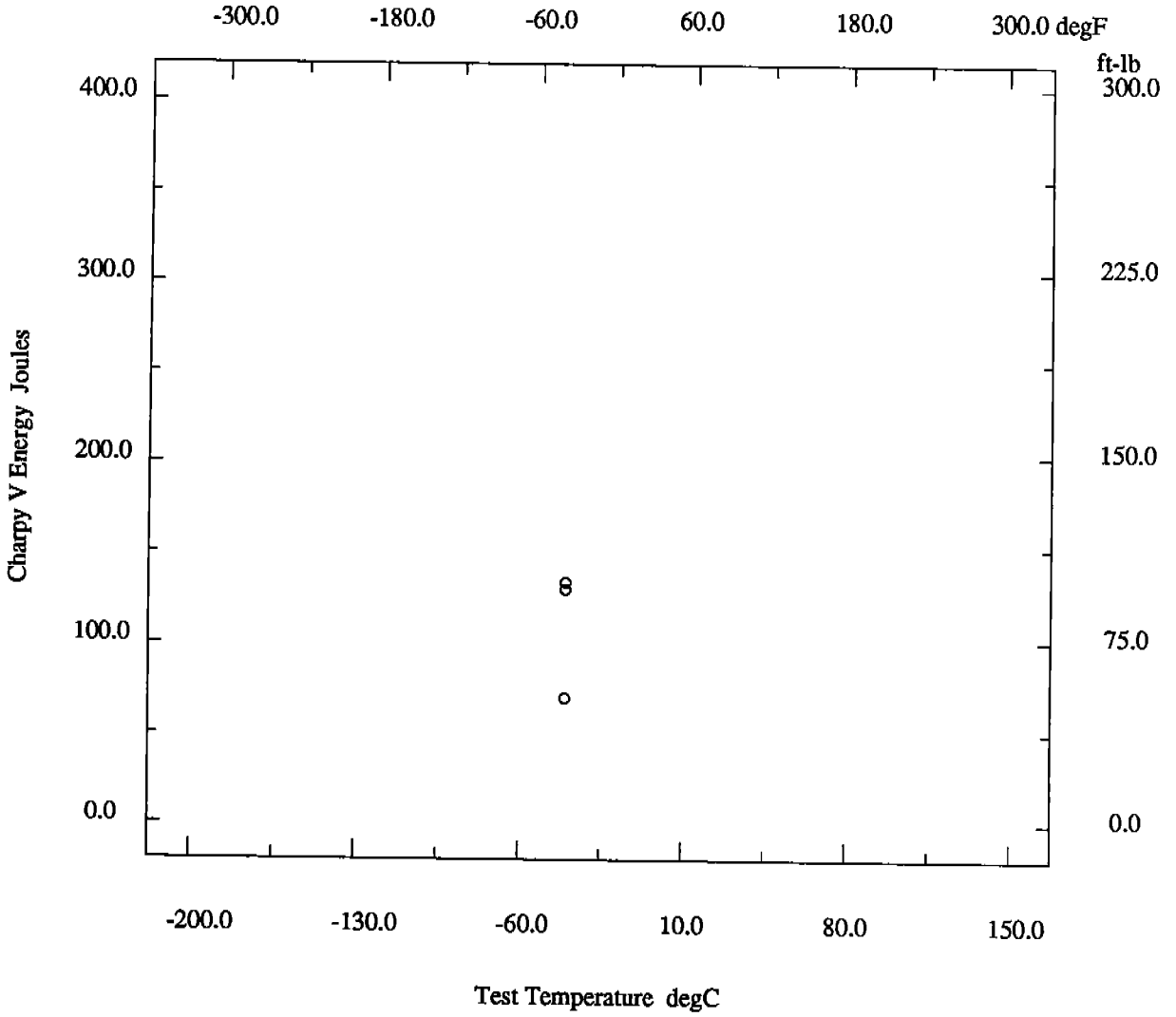
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	130
T-L °	-40	134
T-L °	-40	70

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09DBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02DBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.02DBA	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

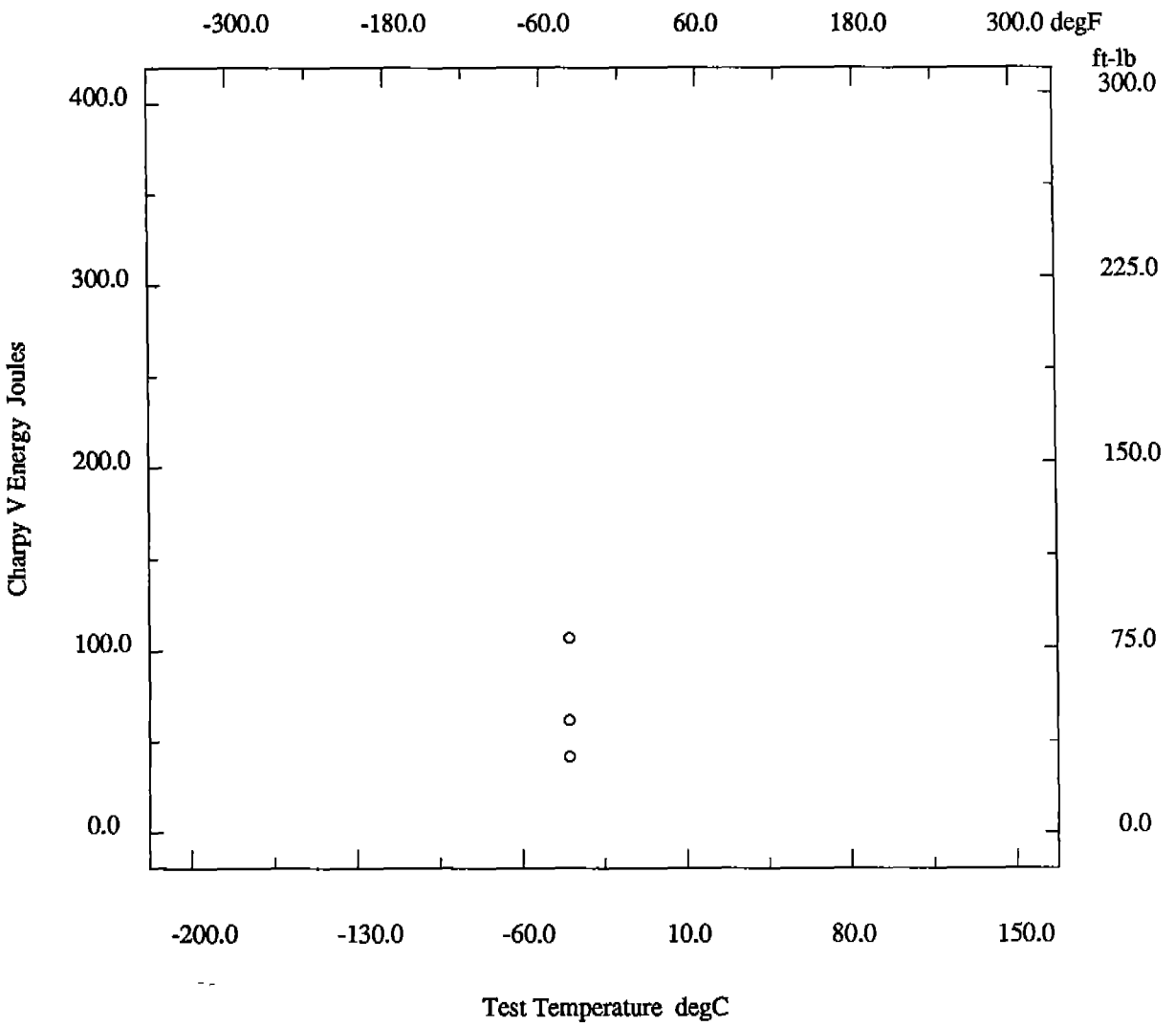
Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	107
T-L o	-40	42
T-L o	-40	62

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02DBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03DBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.03DBA	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

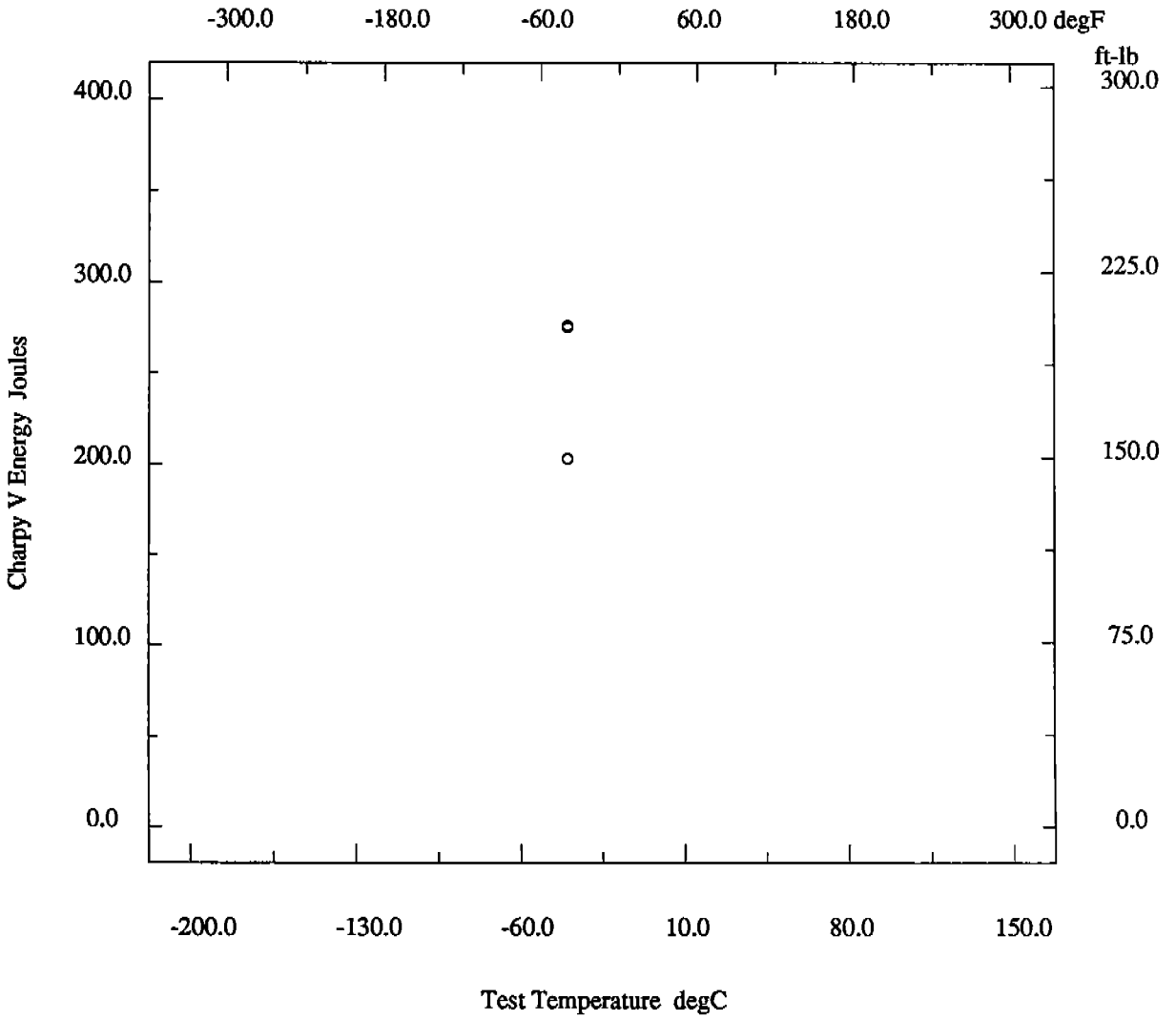
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	203
T-L °	-40	275
T-L °	-40	276

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03DBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04DBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.04DBA	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

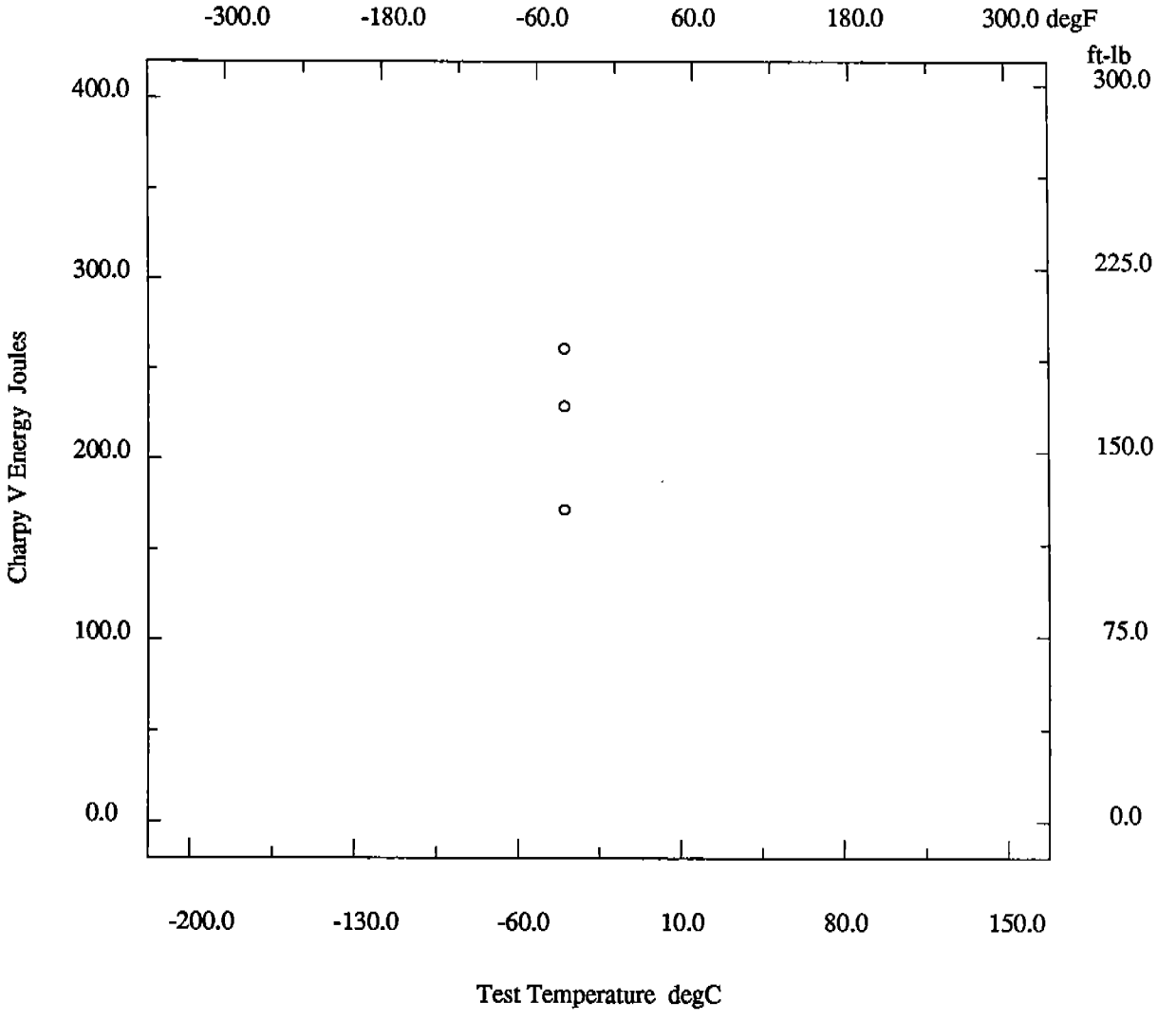
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	172
T-L °	-40	229
T-L °	-40	261

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04DBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05DBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.05DBA	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

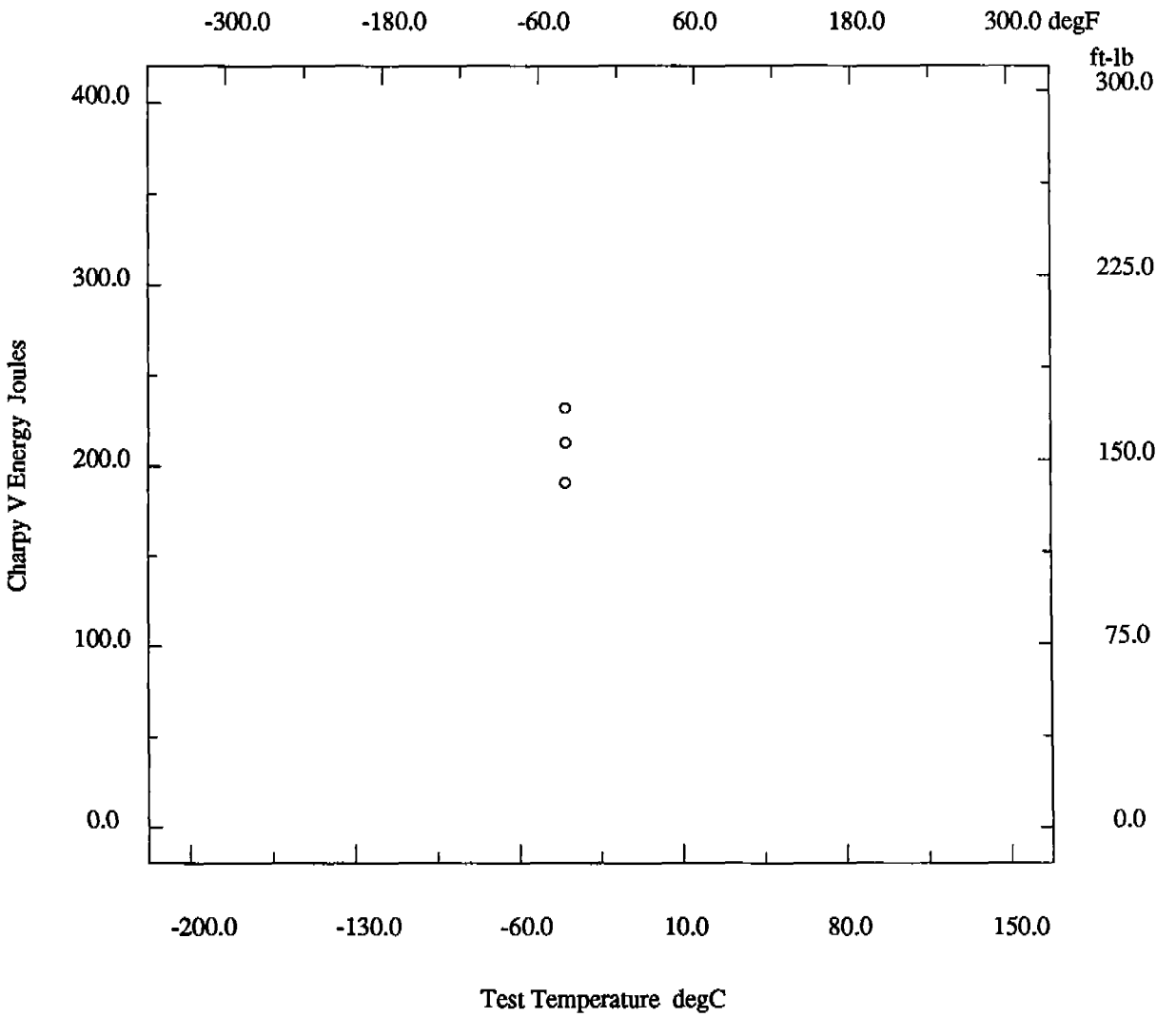
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	191
T-L °	-40	213
T-L °	-40	232

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05DBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09DFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.09DFS	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

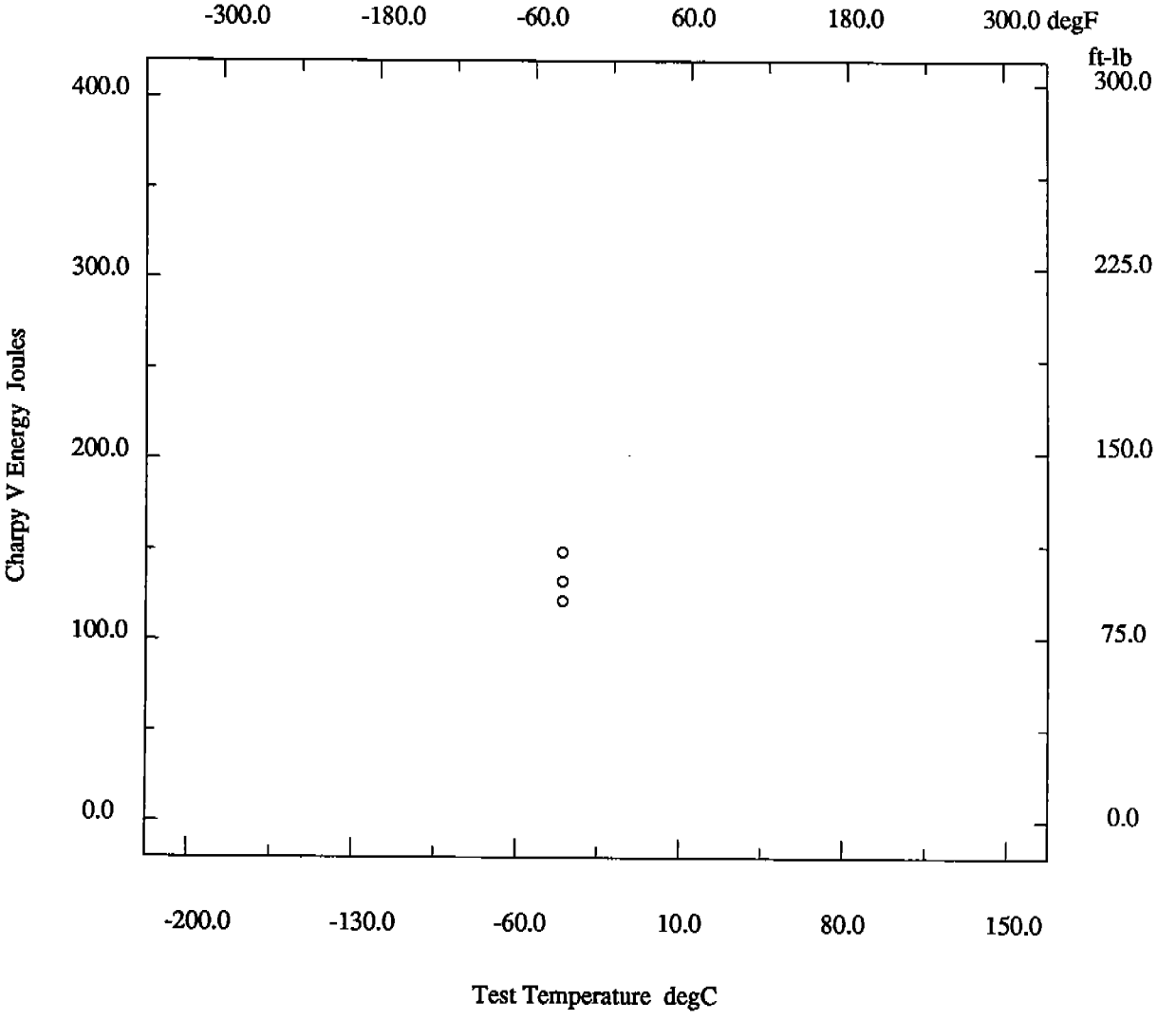
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	122
T-L °	-40	133
T-L °	-40	149

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09DFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02DFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.02DFS	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

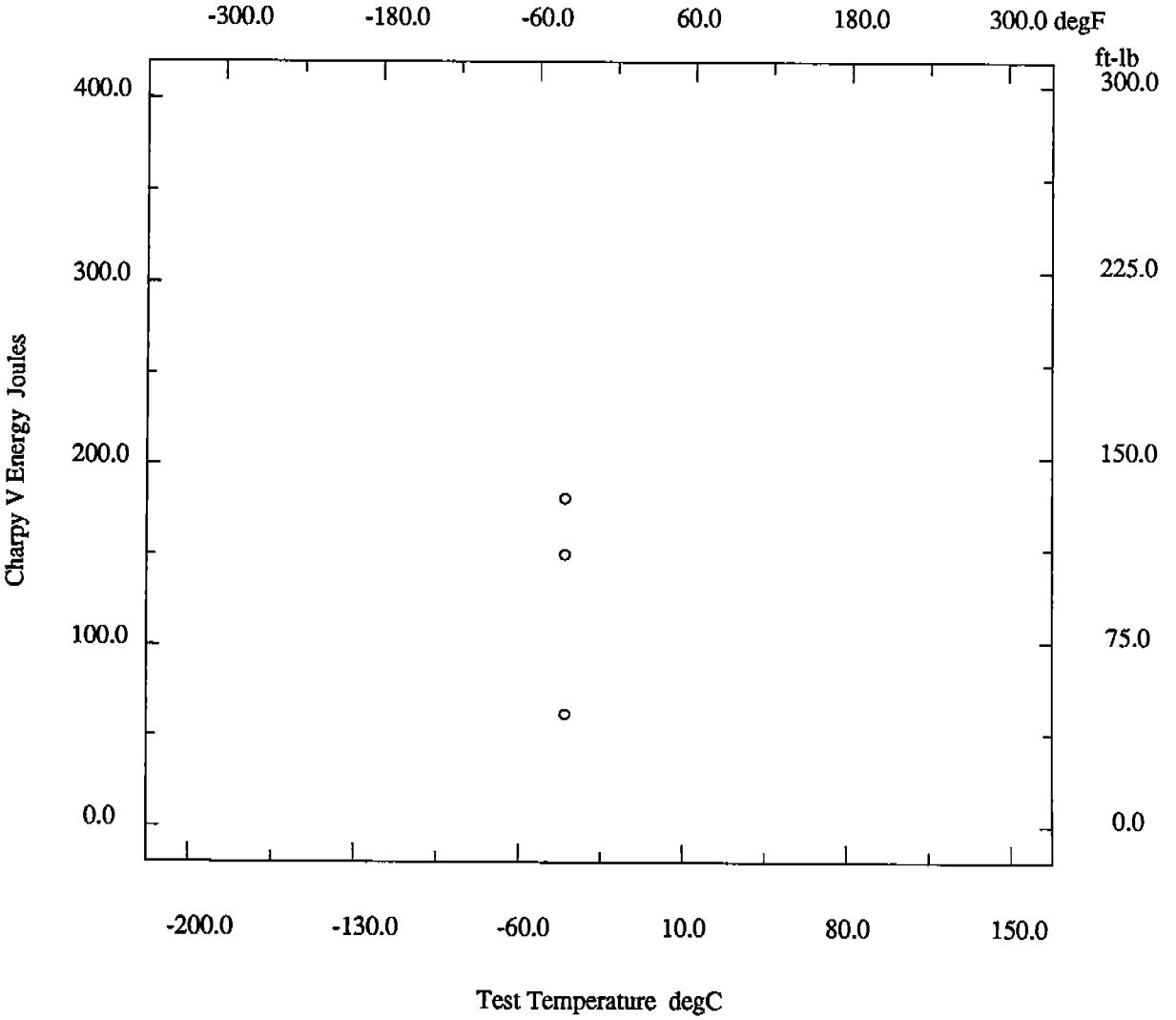
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	150
T-L °	-40	181
T-L °	-40	62

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02DFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03DFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.03DFS	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

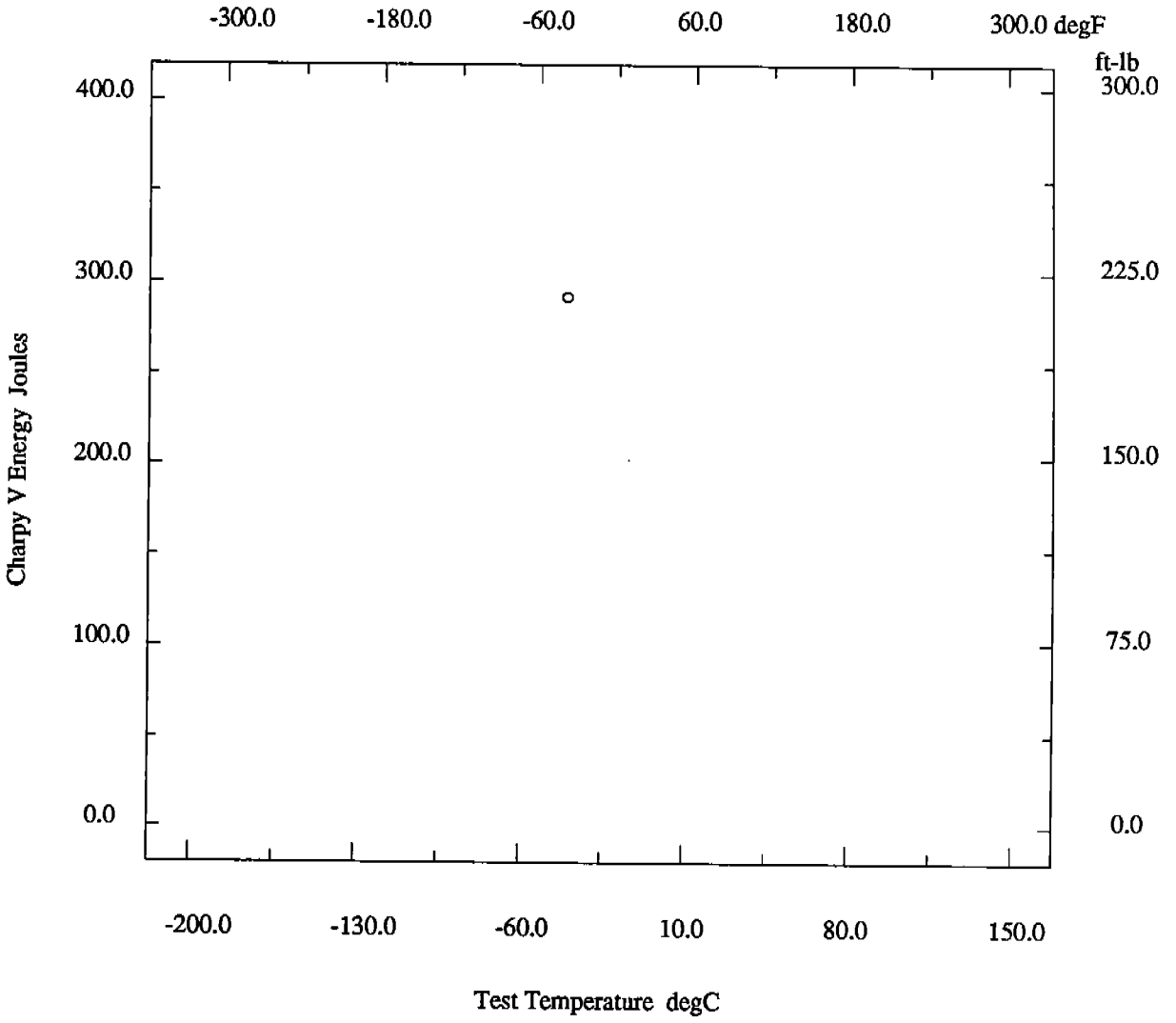
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-40	292

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03DFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04DFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.04DFS	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

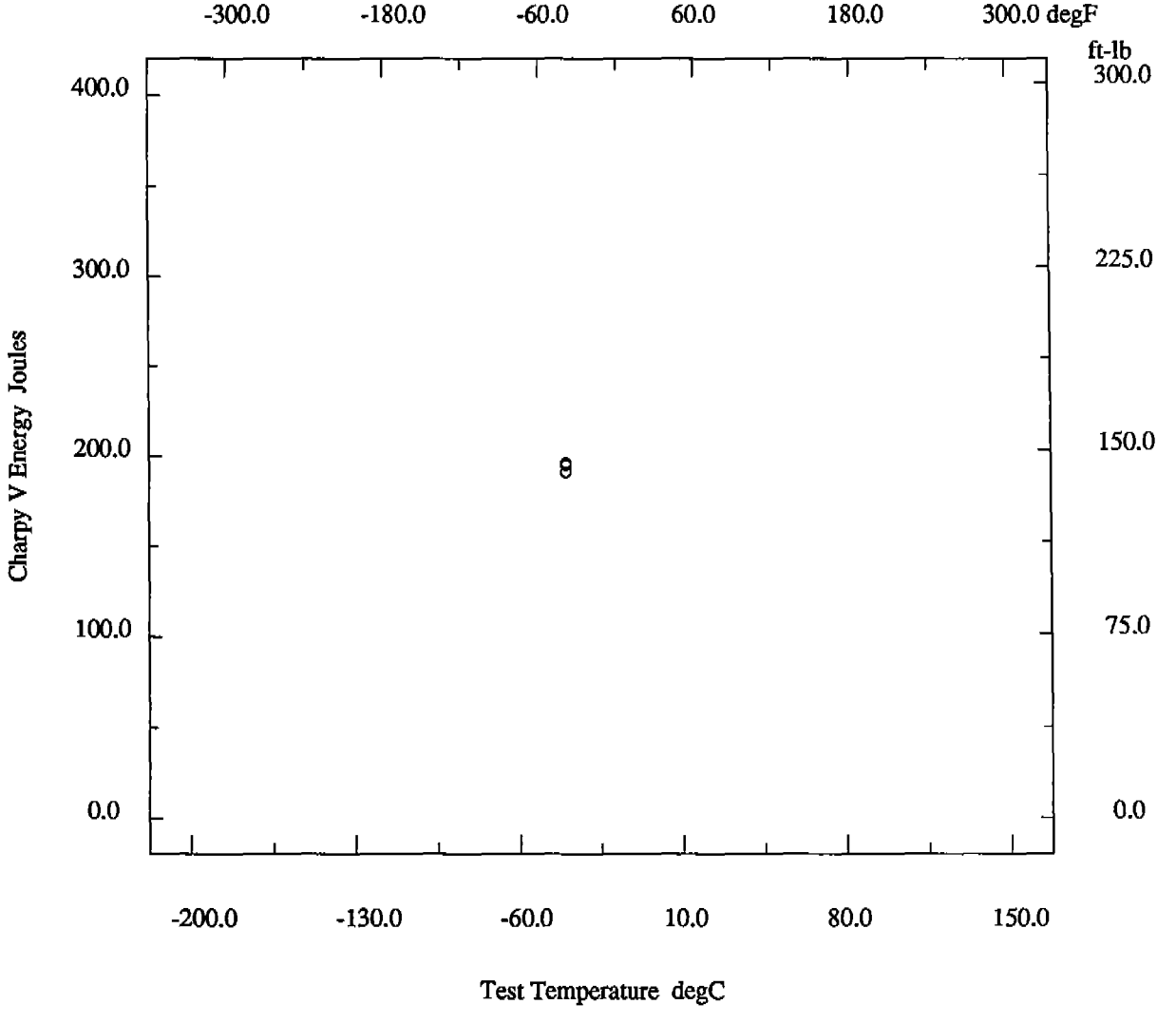
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	191
T-L °	-40	195
T-L °	-40	196

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04DFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05DFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14200.1

Fabrication History See Page 14200.1

Weld

Weld Code	010.002.05DFS	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

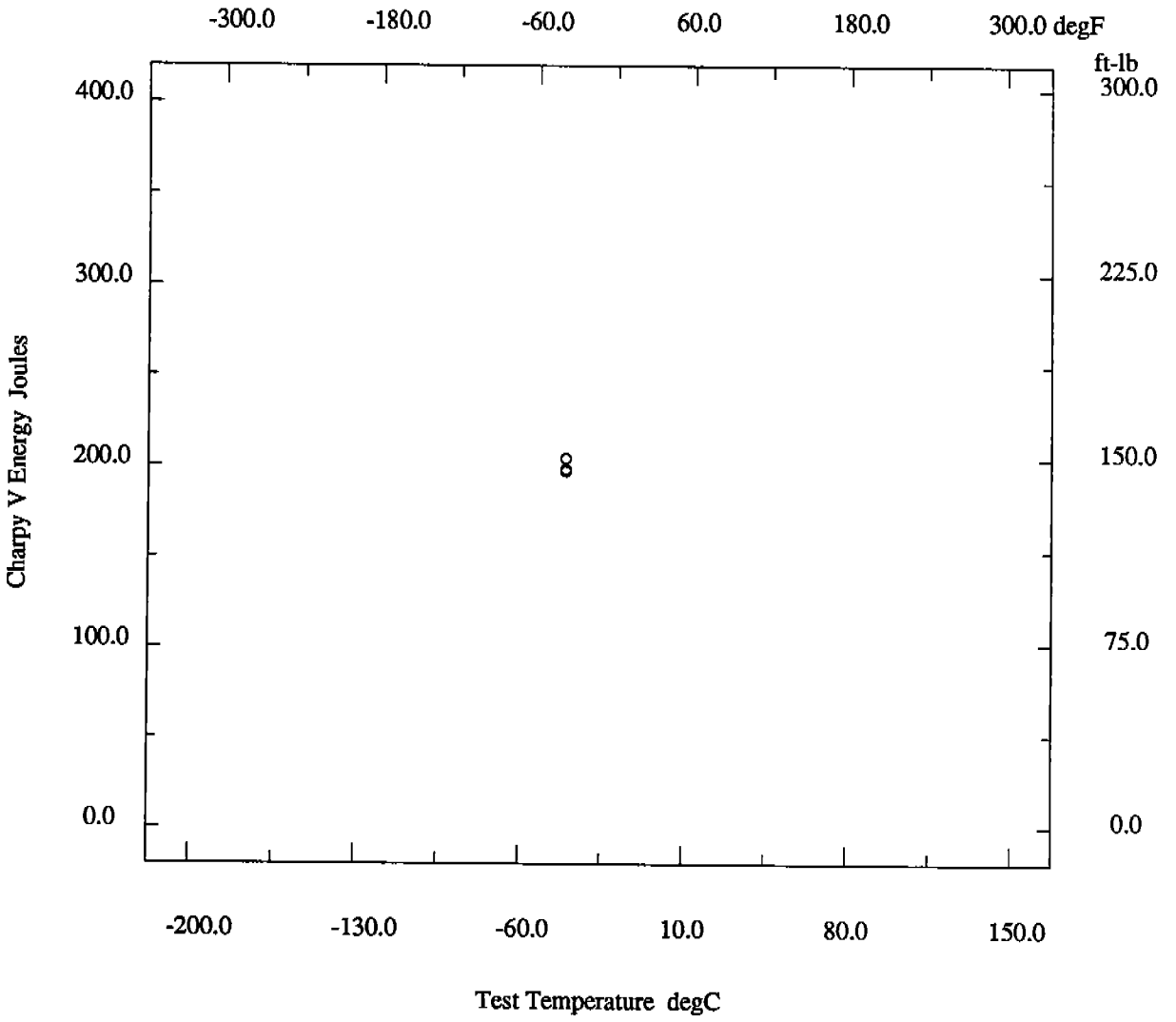
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	197
T-L °	-40	198
T-L °	-40	204

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05DFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09DRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.09DRS	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

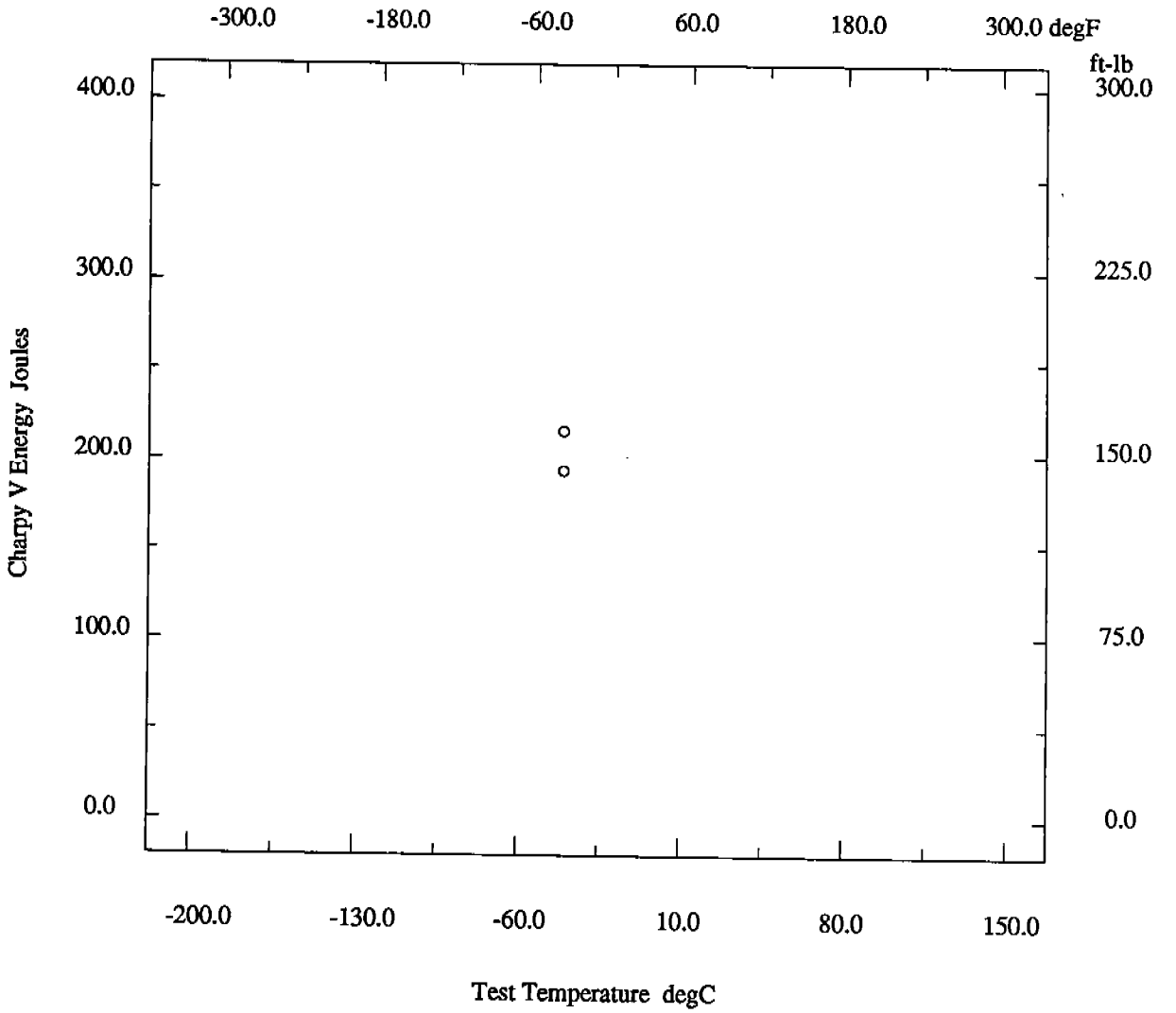
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	194
T-L °	-40	194
T-L °	-40	216

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09DRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09DBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.09DBS	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

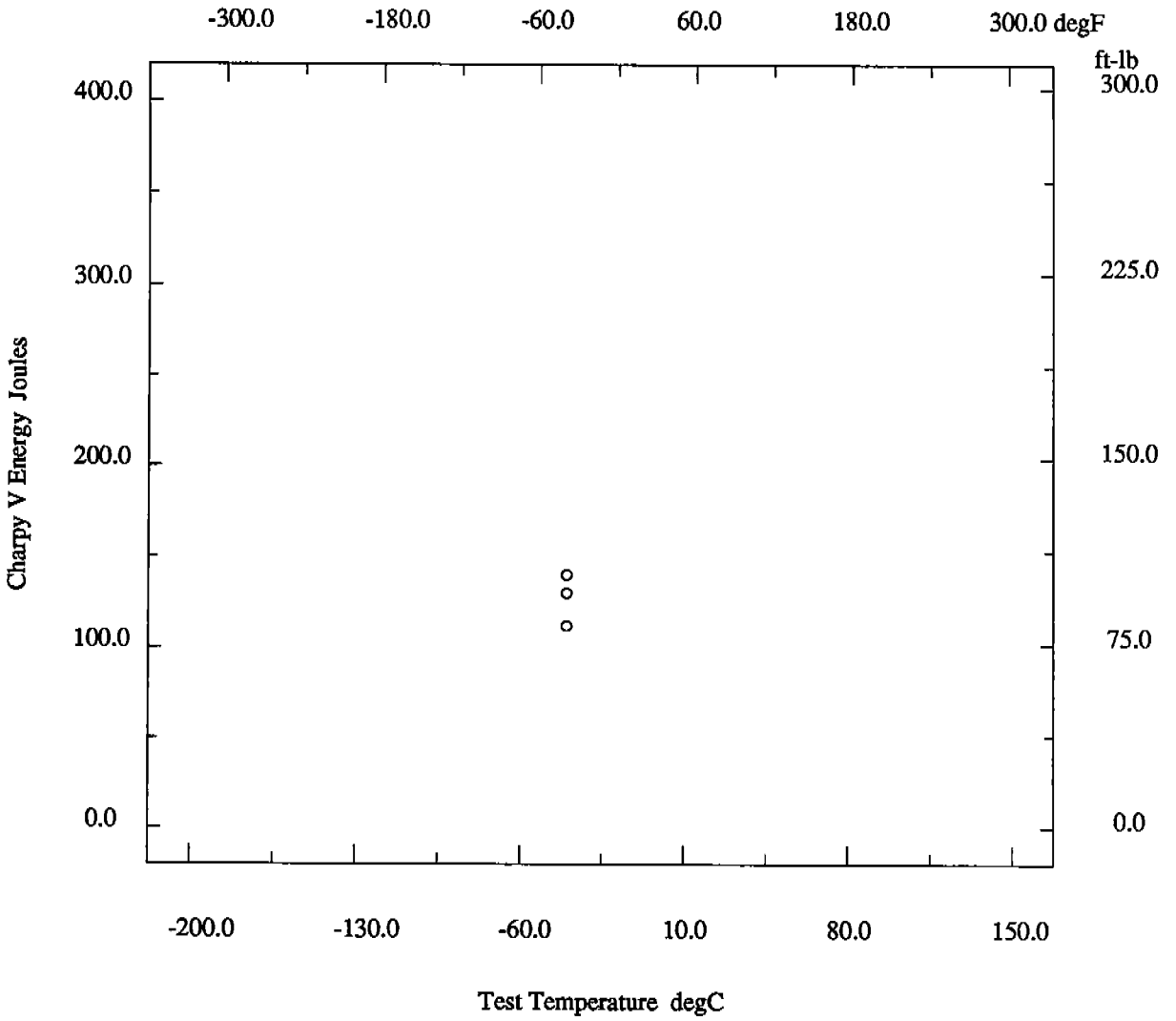
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	112
T-L °	-40	130
T-L °	-40	140

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09DBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02DBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.02DBS	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

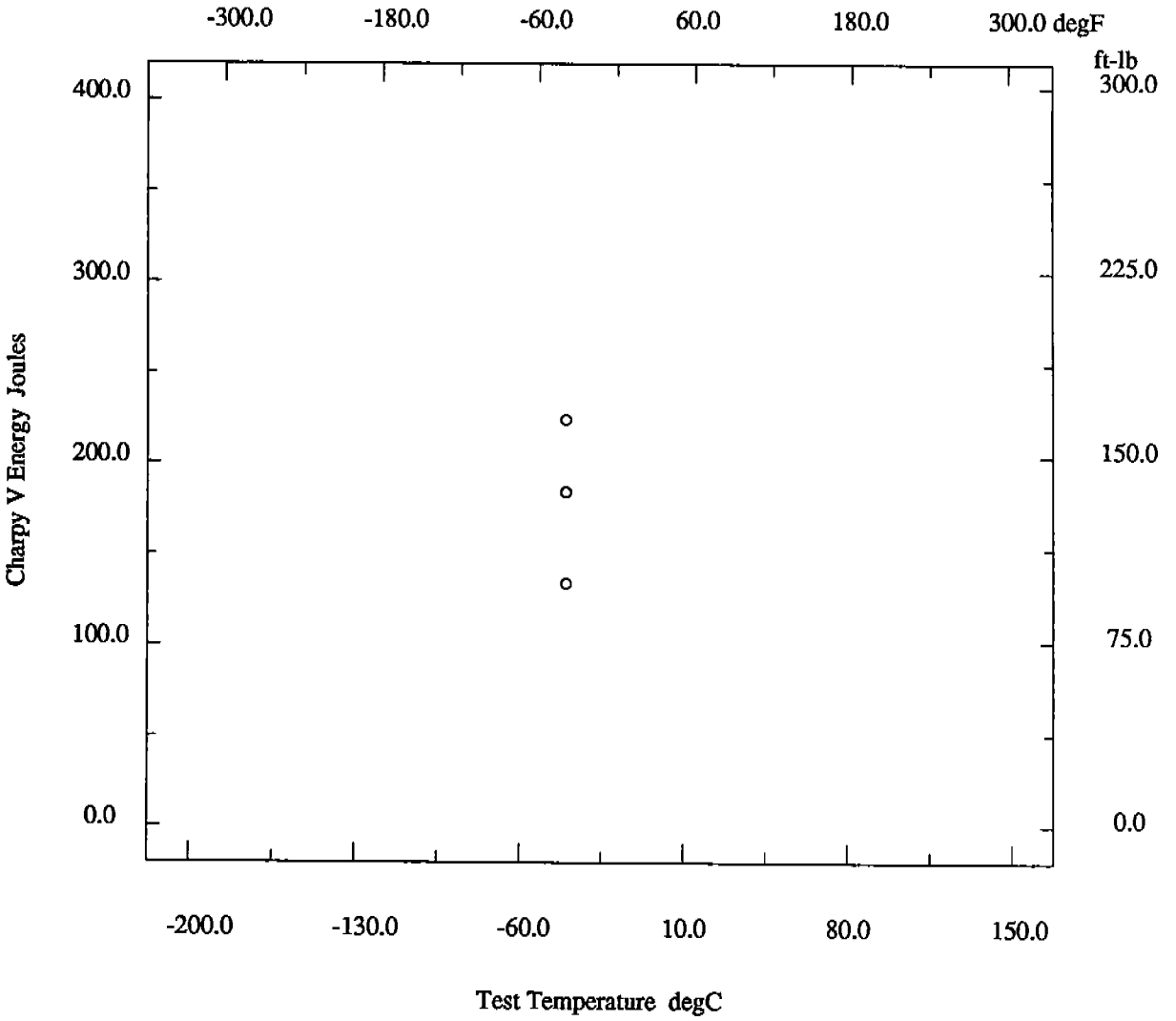
Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	134
T-L o	-40	184
T-L o	-40	224

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02DBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03DBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.03DBS	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

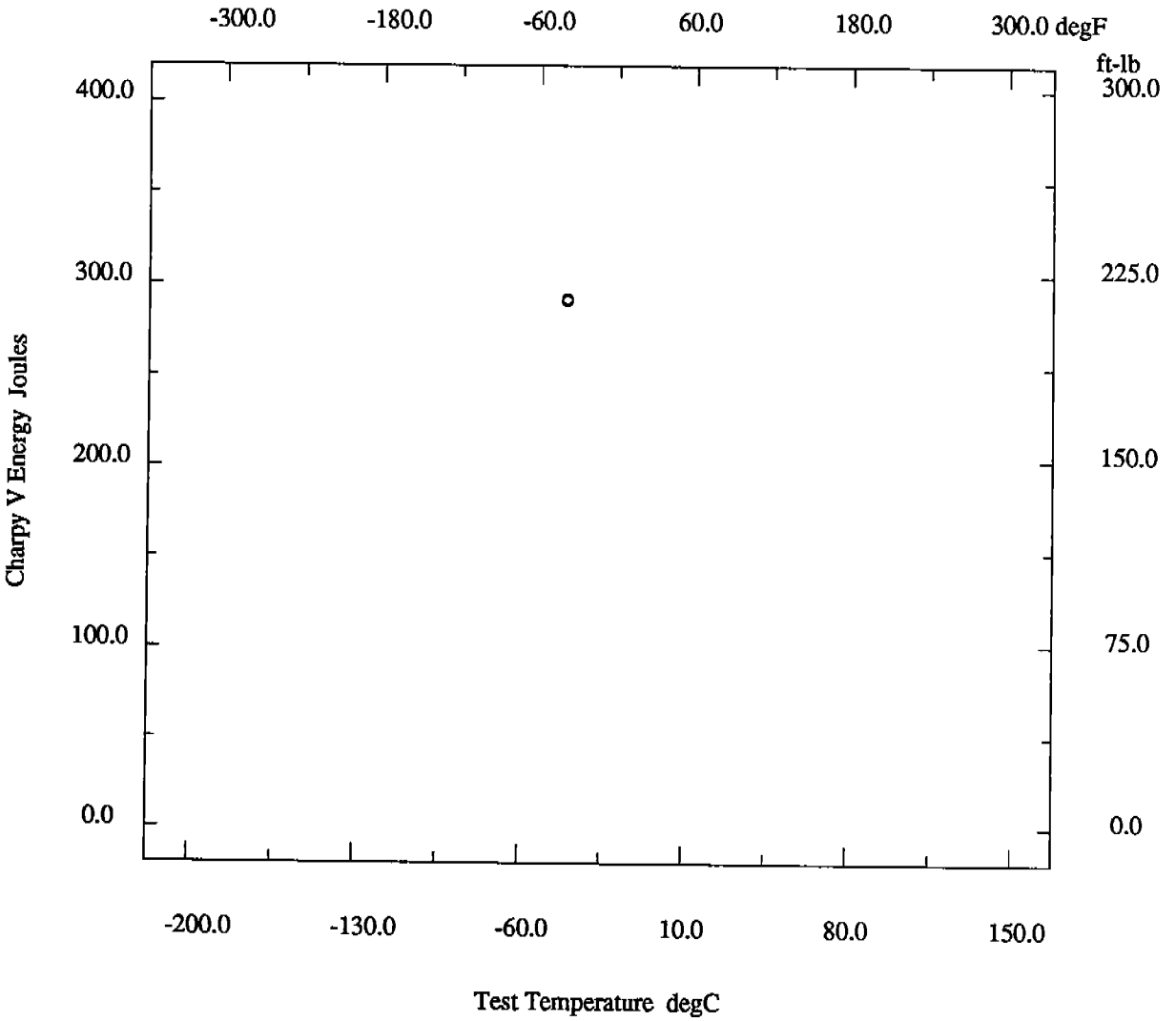
Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	291
T-L o	-40	291
T-L o	-40	292

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03DBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04DBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.04DBS	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

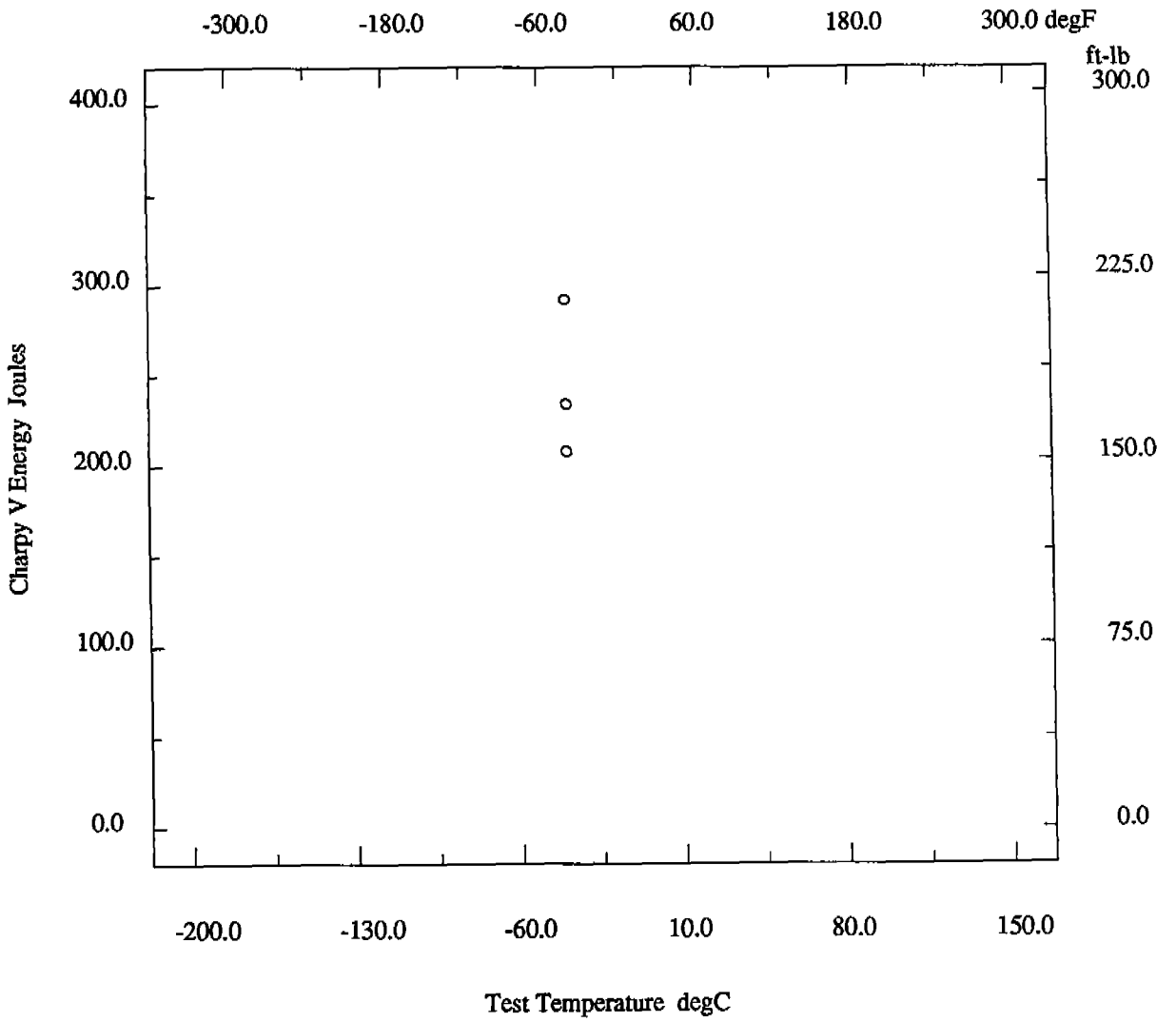
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	208
T-L °	-40	234
T-L °	-40	292

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04DBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05DBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14200.1

Fabrication History

See Page 14200.1

Weld

Weld Code	010.002.05DBS	Weld Type	SMA
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	L-50N
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	24 volts
Amperage	160-190 amps	Polarity	*
Travel Speed	15-20 cm/min	Heat Input/Pass	20 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

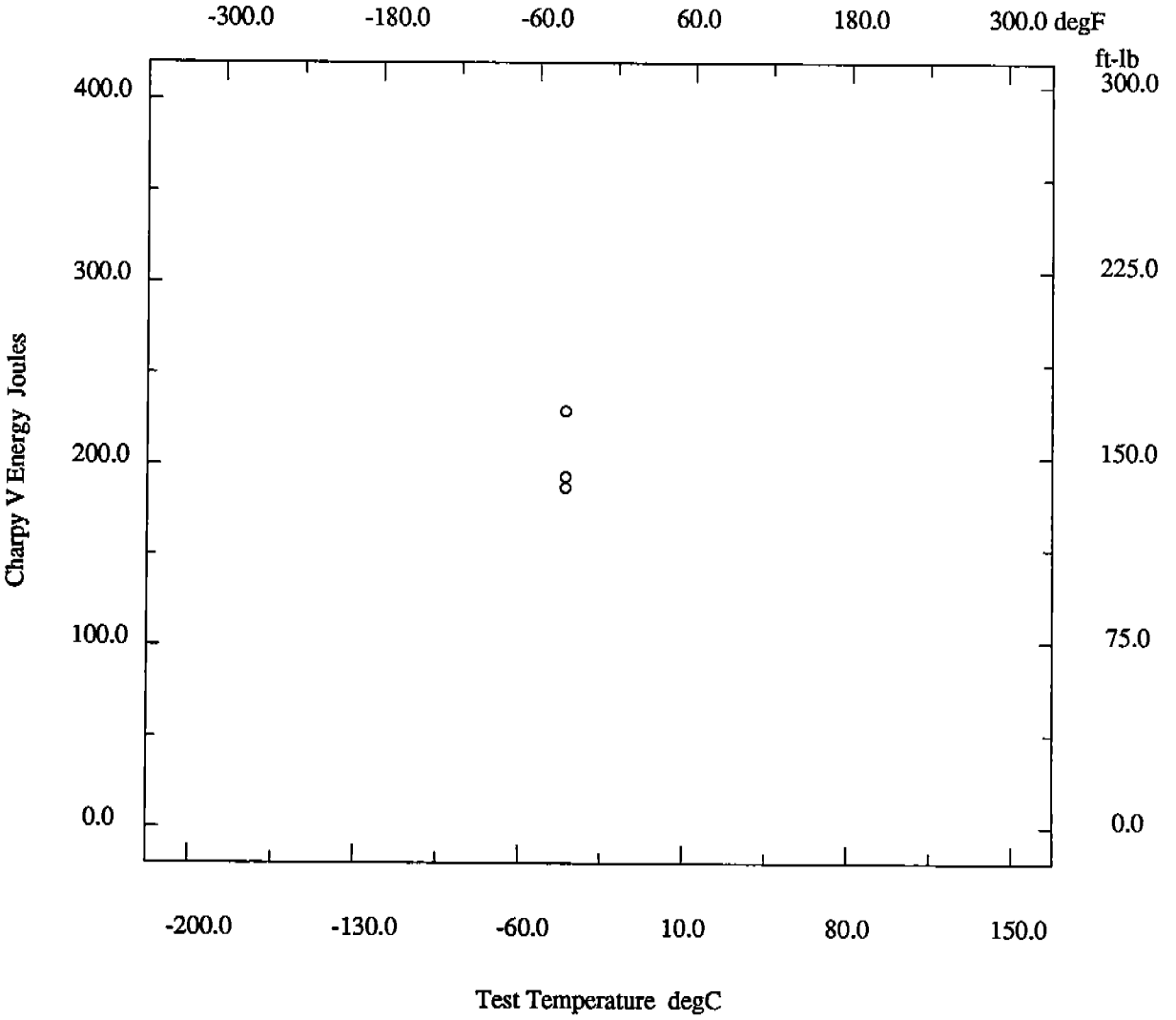
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	187
T-L °	-40	193
T-L °	-40	229

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05DBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09ENA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

C	0.13 %	Mn	1.41 %
P	0.013 %	S	0.001 %
Si	0.40 %	Cr	0.02 %
Ni	0.17 %	Mo	0.02 %
V	0.004 %	Cu	0.17 %
Cb	0.025 %	Ti	<0.003 %
B	<0.0001 %	Al	0.028 %
N	0.0072 %	Other Components	*

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.002.09ENA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.42
-30	>1.49
-30	>1.66
-10	>1.57
-10	>1.69
-10	>1.73

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02ENA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.02ENA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.13
-30	0.52
-30	0.78
-10	0.51
-10	0.83
-10	>1.72

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09ENS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.09ENS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Full cross section
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	1.39
-30	1.79
-30	>1.81
-10	>1.79
-10	>1.79
-10	>1.80

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02ENS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.02ENS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Full cross section
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.56
-30	0.70
-30	0.92
-10	1.22
-10	>1.78
-10	>1.79

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09EFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14300.1

Fabrication History See Page 14300.1

Weld

Weld Code	010.002.09EFA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

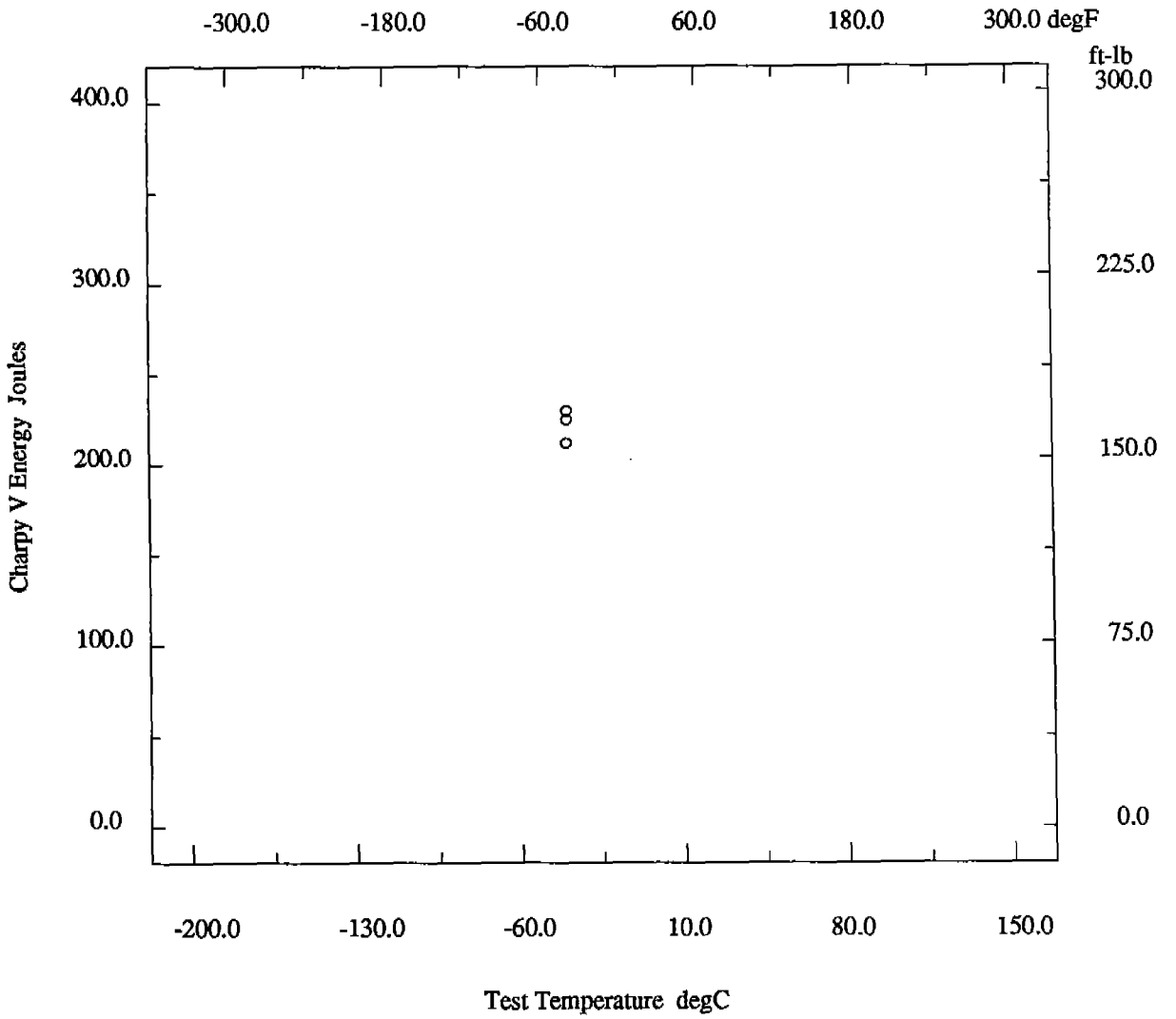
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	212
T-L °	-40	225
T-L °	-40	230

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09EFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02EFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.02EFA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

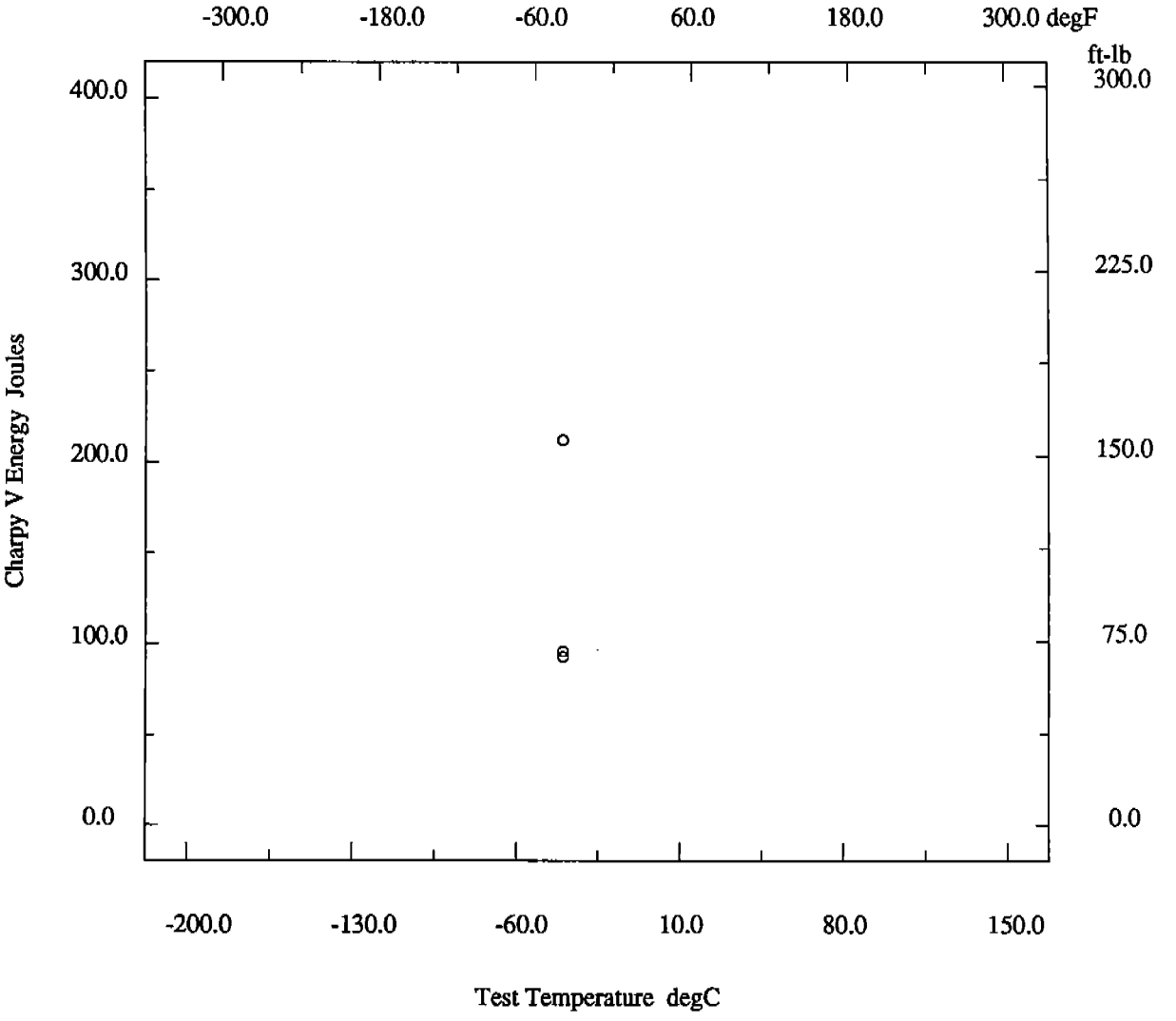
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	212
T-L °	-40	93
T-L °	-40	96

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02EFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03EFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.03EFA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

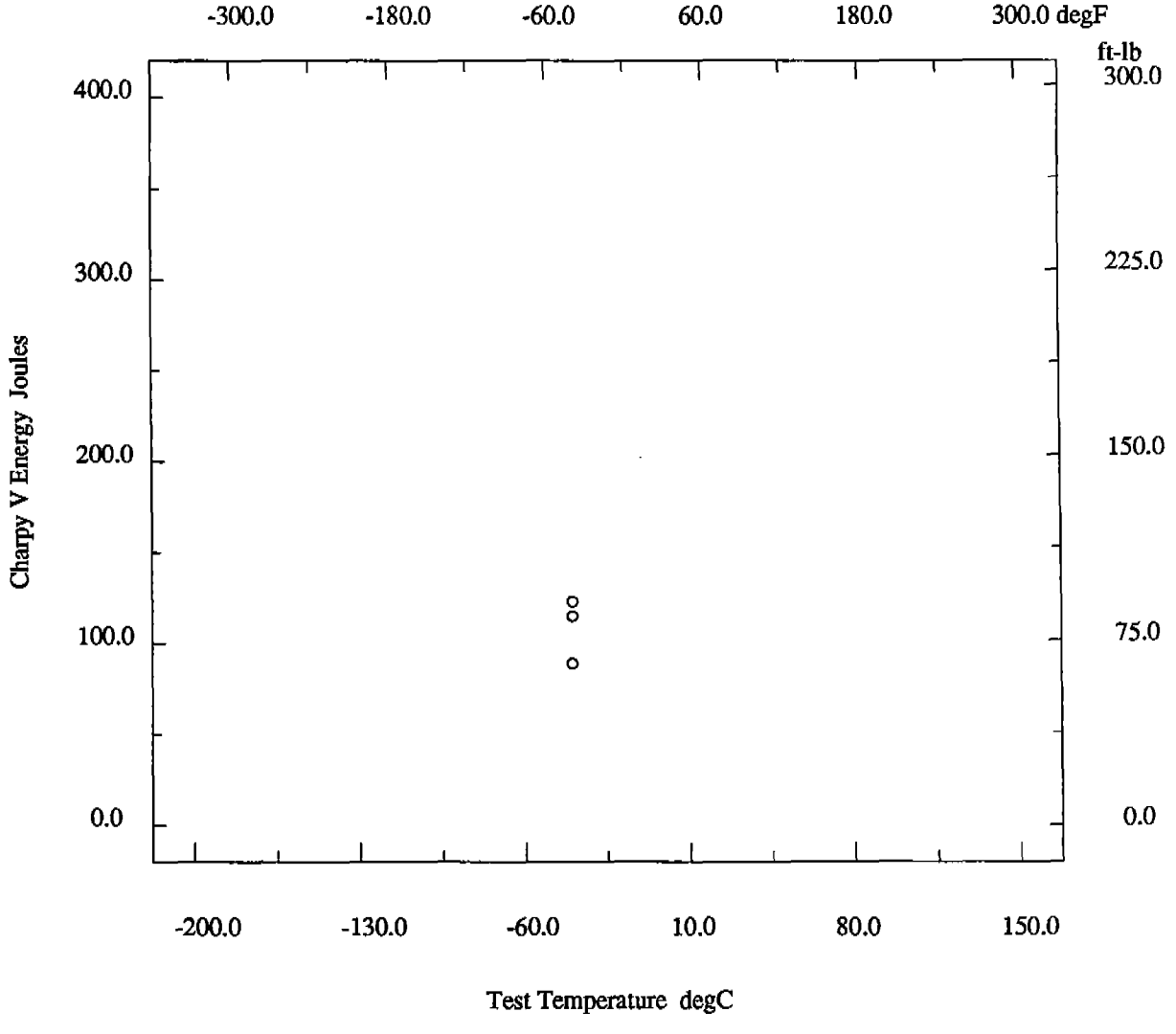
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-40	115
T-L ○	-40	123
T-L ○	-40	89

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03EFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04EFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.04EFA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

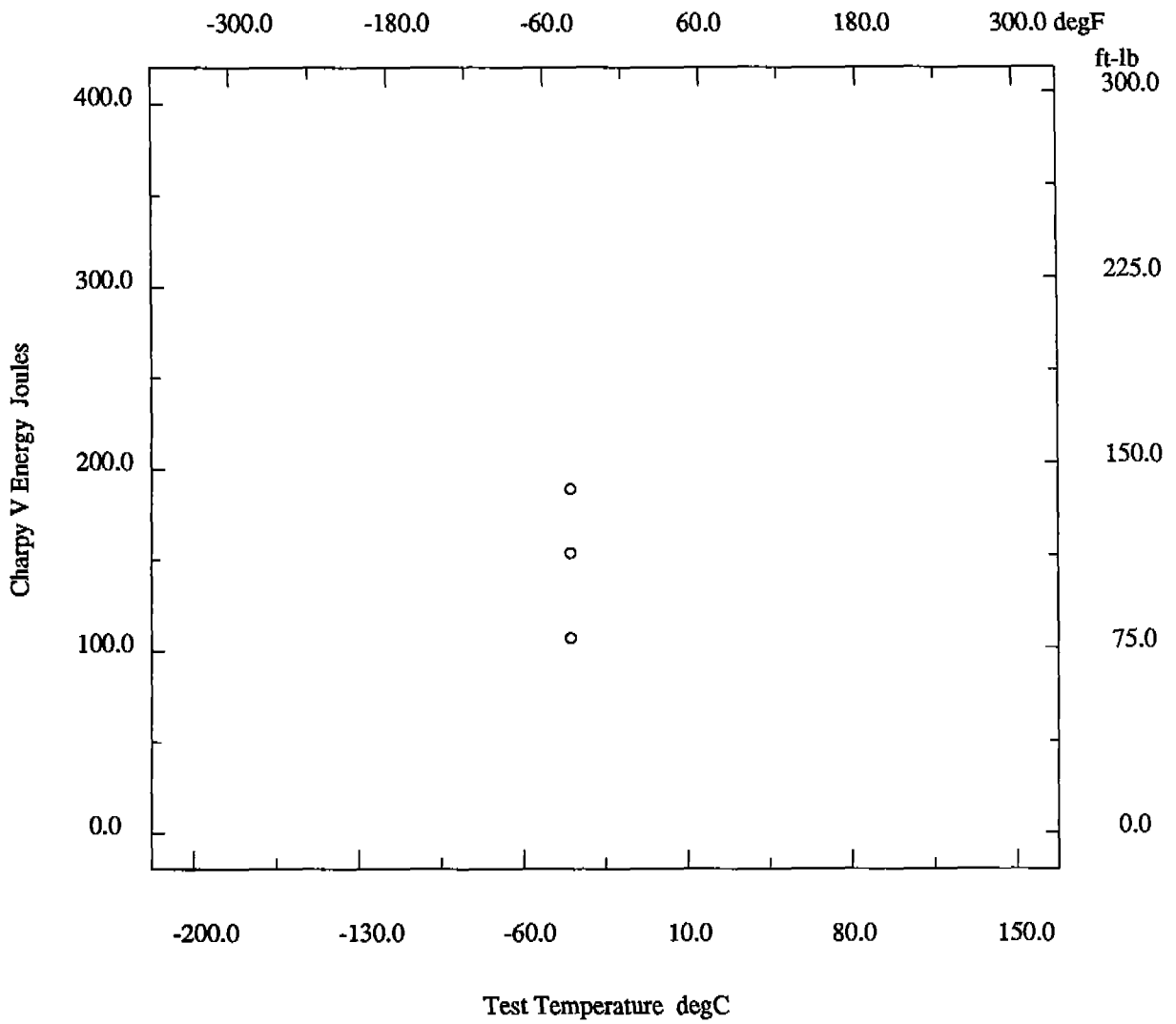
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	107
T-L °	-40	154
T-L °	-40	189

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04EFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05EFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14300.1

Fabrication History See Page 14300.1

Weld

Weld Code	010.002.05EFA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

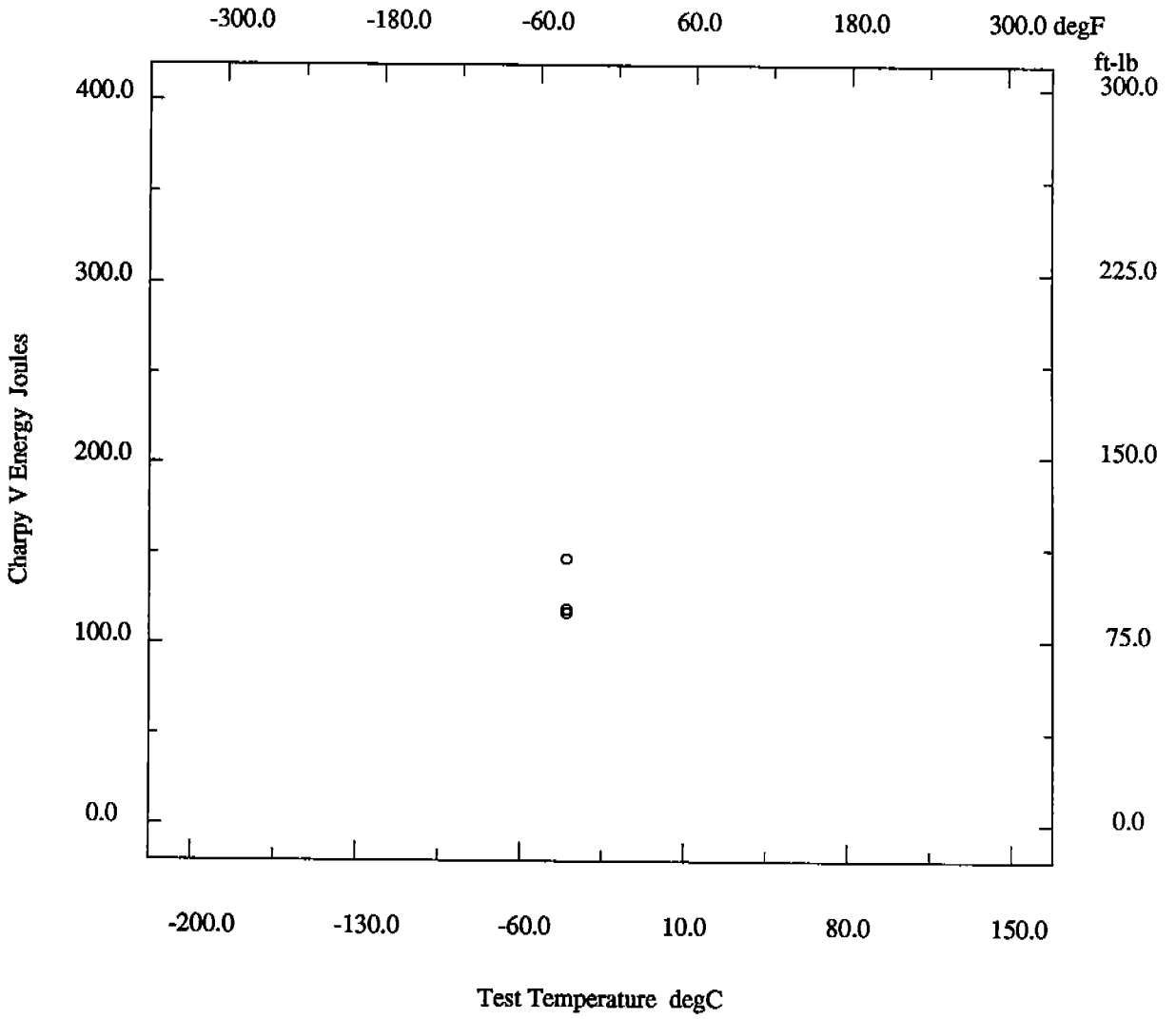
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	117
T-L °	-40	119
T-L °	-40	147

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05EFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09ERA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.09ERA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

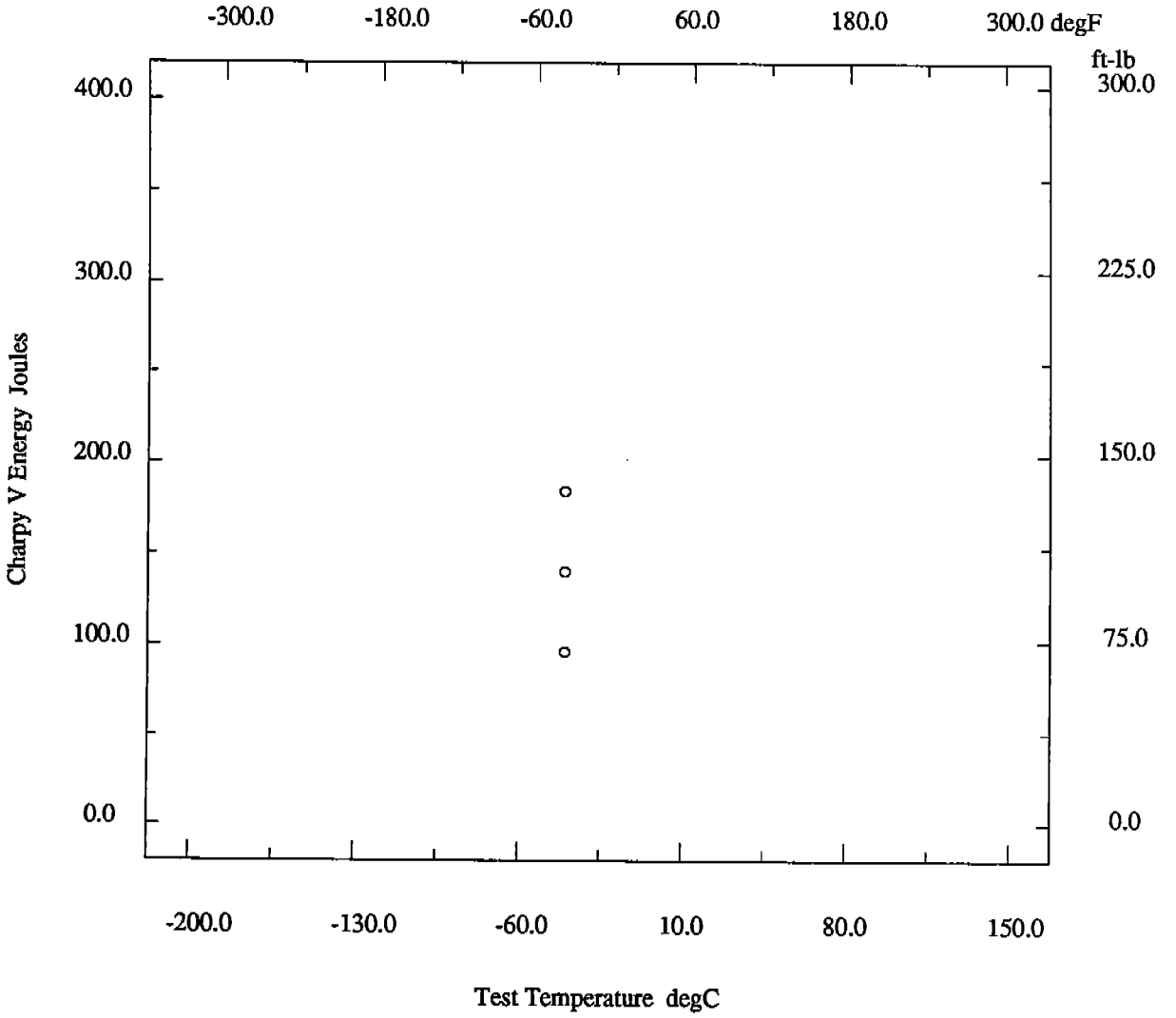
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	140
T-L °	-40	184
T-L °	-40	96

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09ERA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09EBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.09EBA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

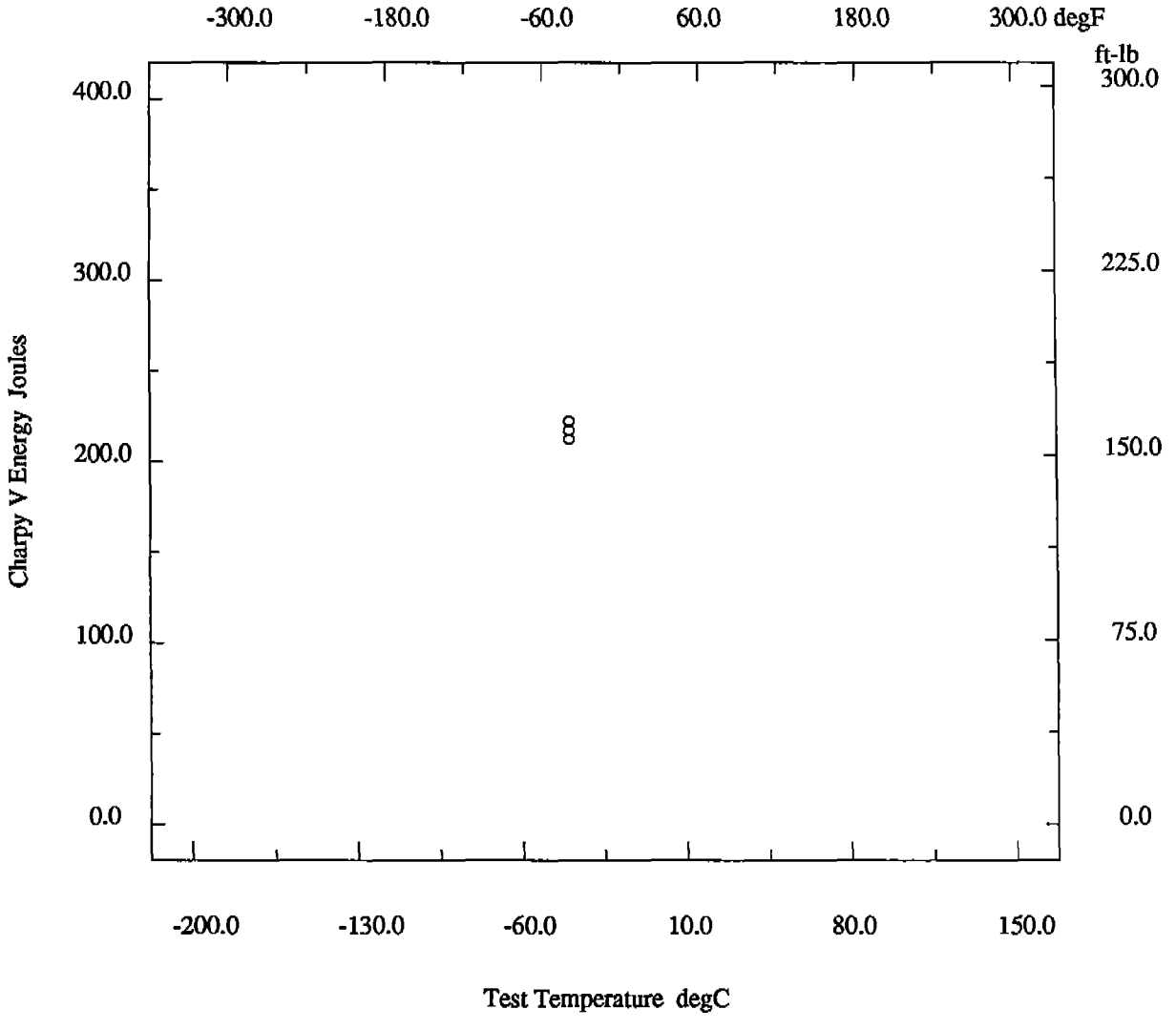
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	212
T-L °	-40	217
T-L °	-40	222

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09EBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02EBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.02EBA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

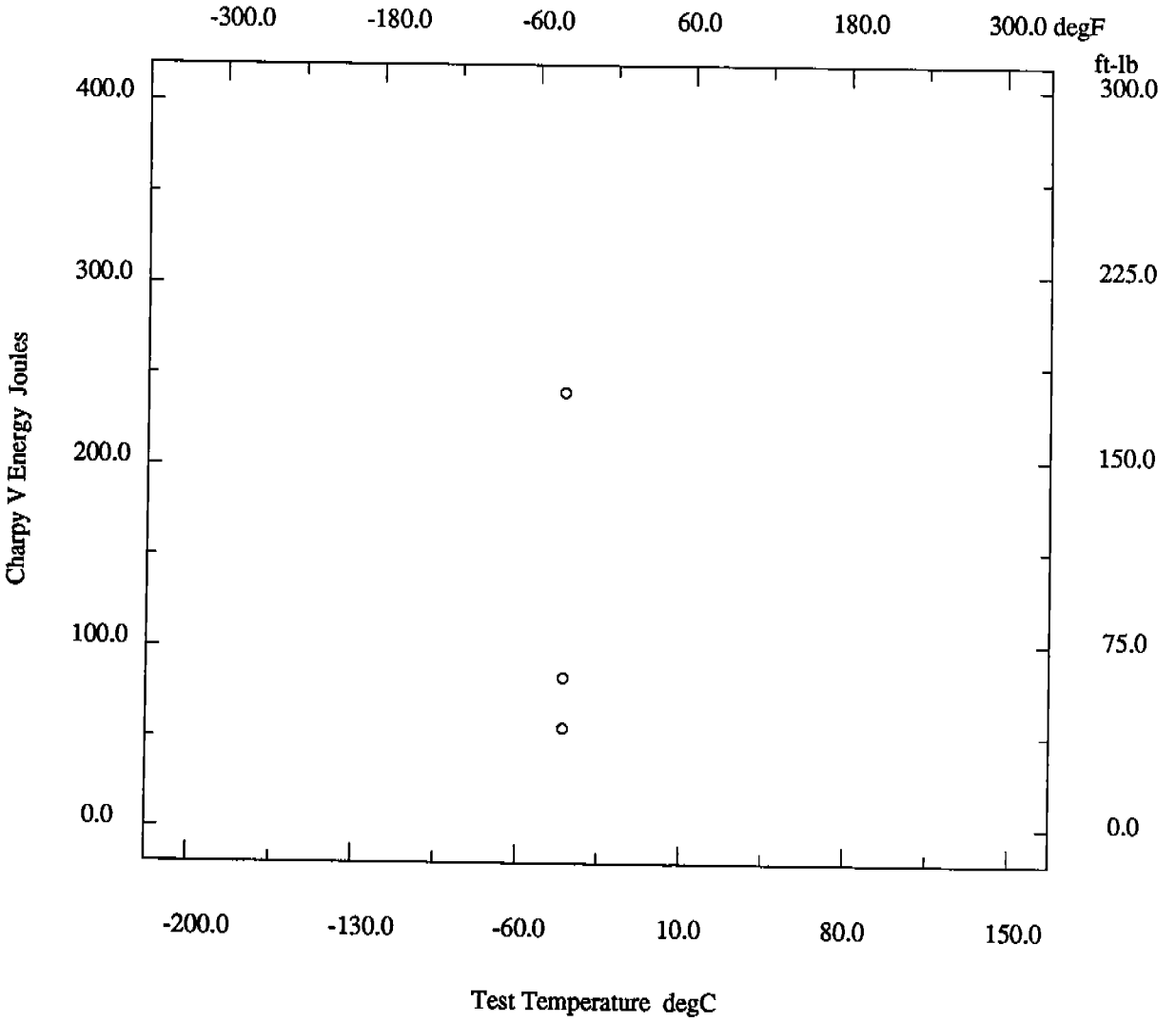
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	240
T-L °	-40	55
T-L °	-40	83

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02EBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03EBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.03EBA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

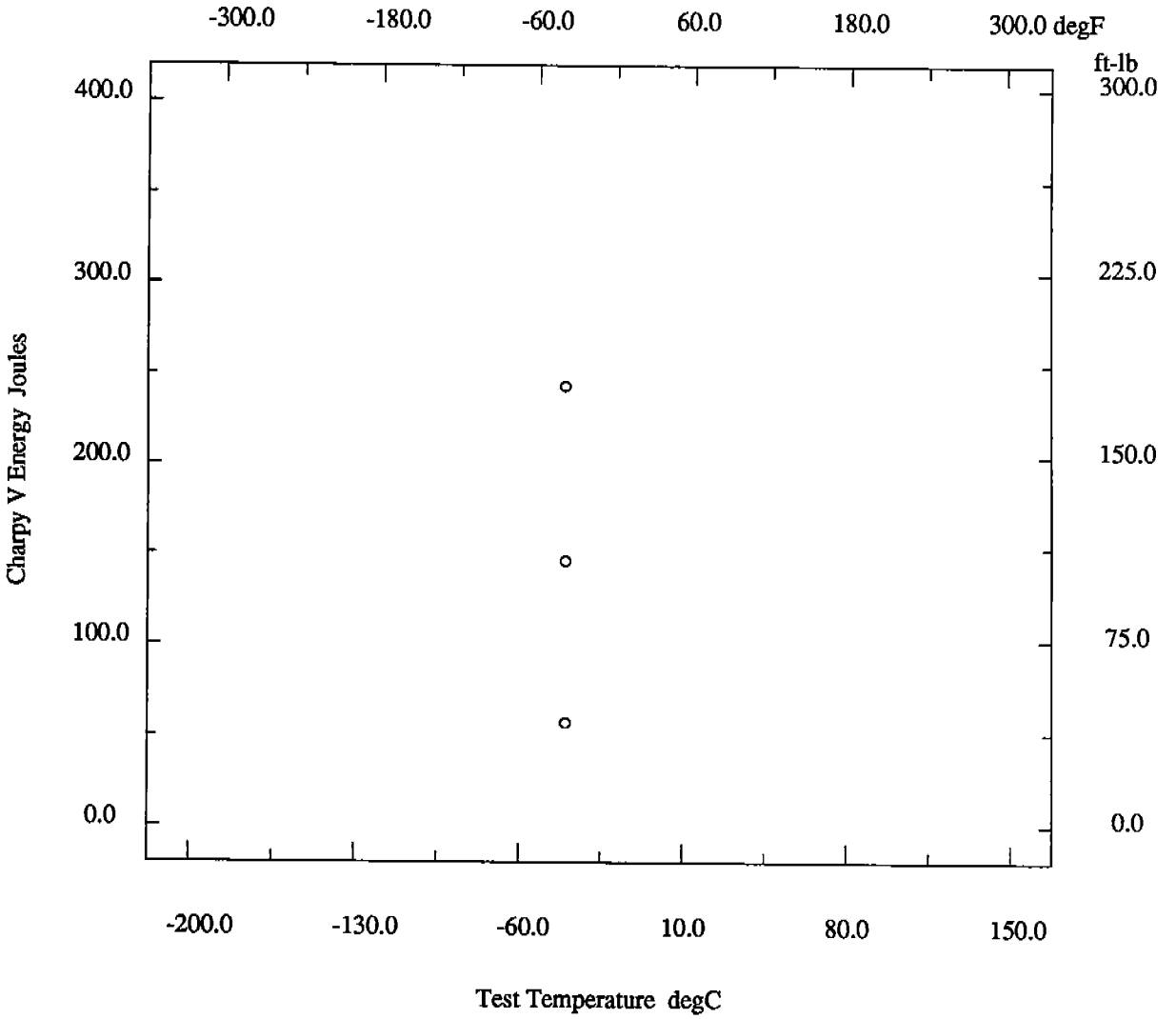
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	146
T-L °	-40	243
T-L °	-40	57

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03EBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04EBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.04EBA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

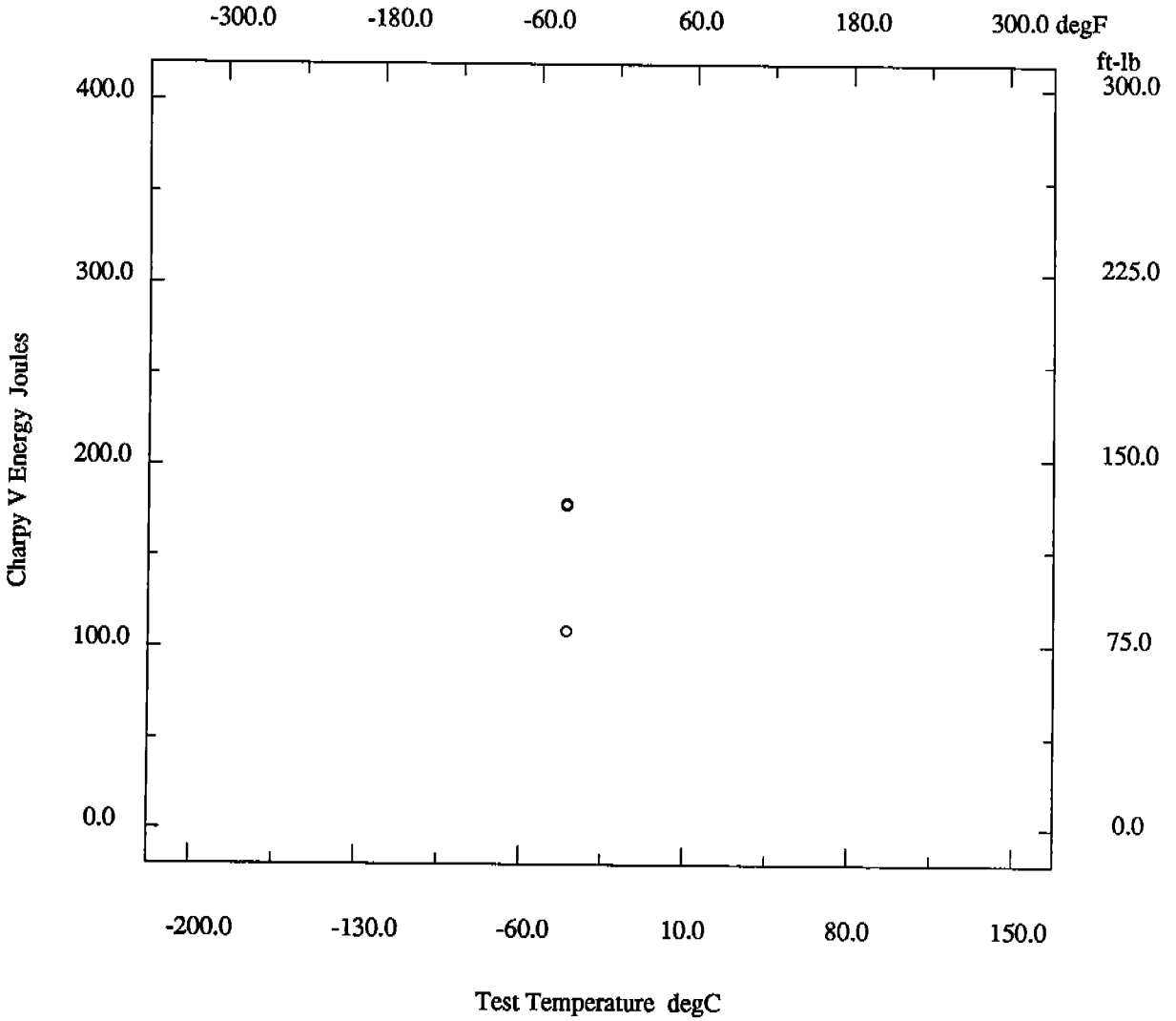
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	109
T-L °	-40	178
T-L °	-40	179

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04EBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05EBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.05EBA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

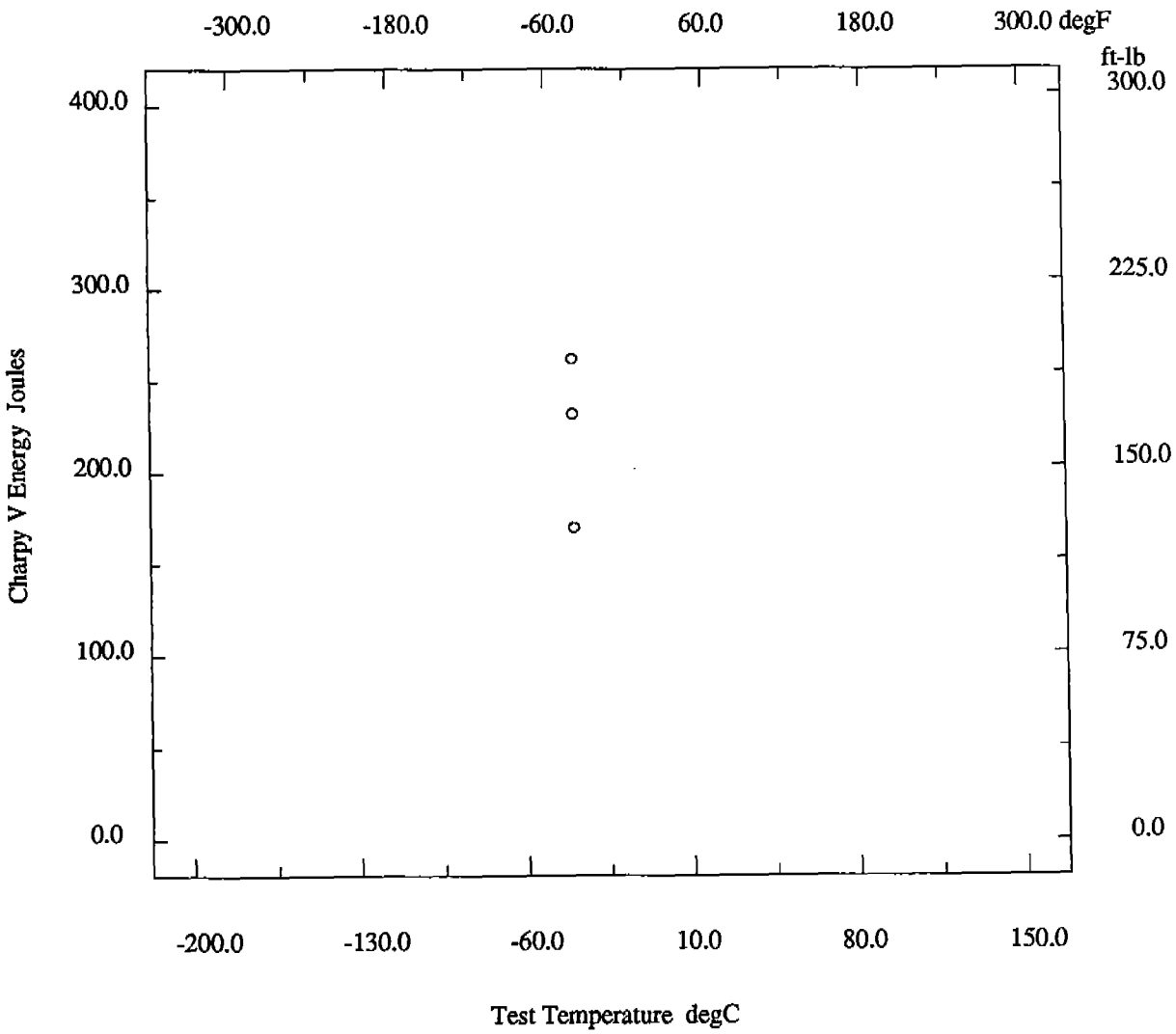
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	170
T-L °	-40	232
T-L °	-40	262

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05EBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09EFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14300.1

Fabrication History See Page 14300.1

Weld

Weld Code	010.002.09EFS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

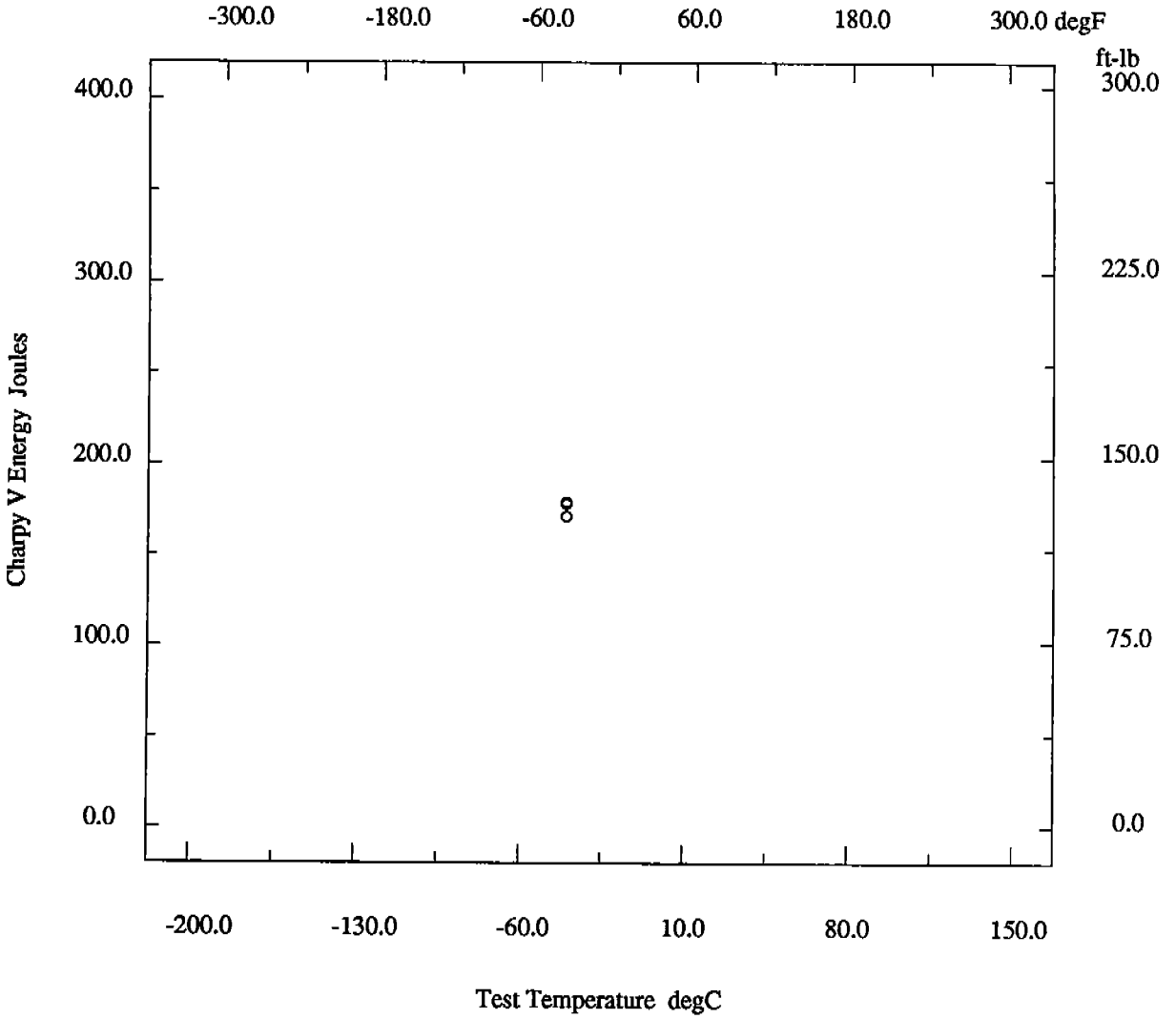
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	171
T-L °	-40	178
T-L °	-40	179

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09EFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02EFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14300.1

Fabrication History See Page 14300.1

Weld

Weld Code	010.002.02EFS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

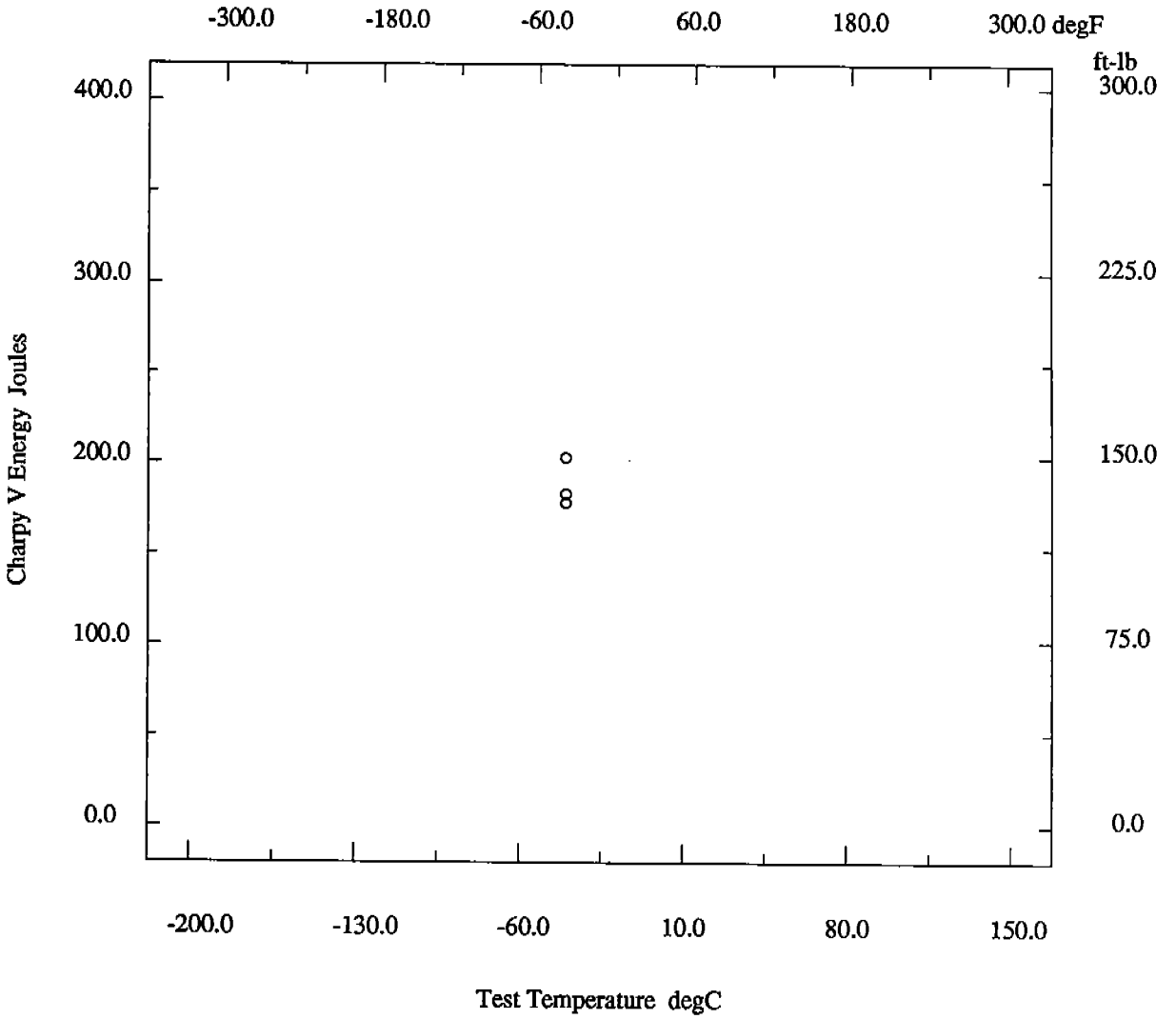
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	178
T-L °	-40	183
T-L °	-40	203

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02EFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03EFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.03EFS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

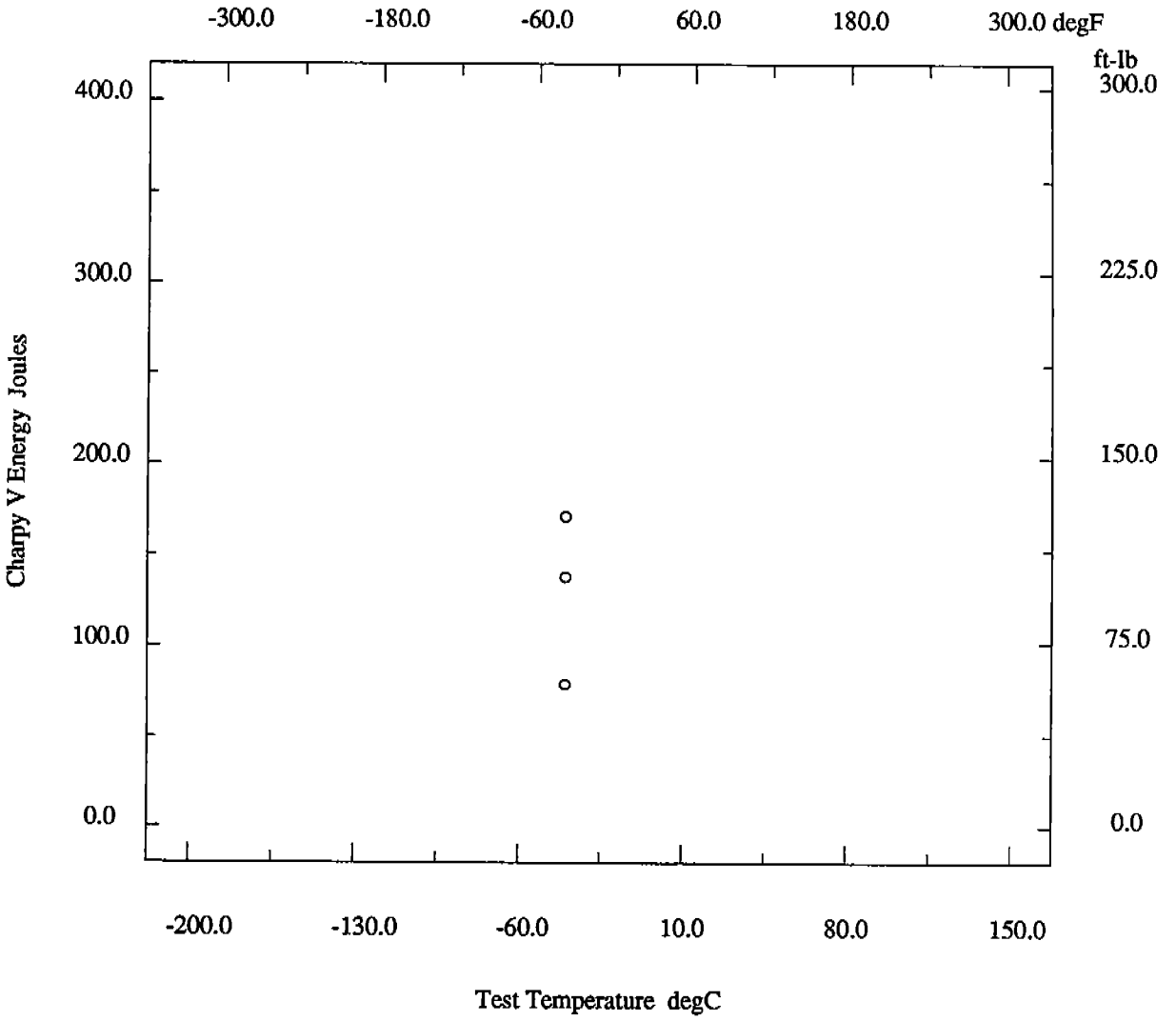
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	138
T-L °	-40	171
T-L °	-40	79

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03EFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04EFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.04EFS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

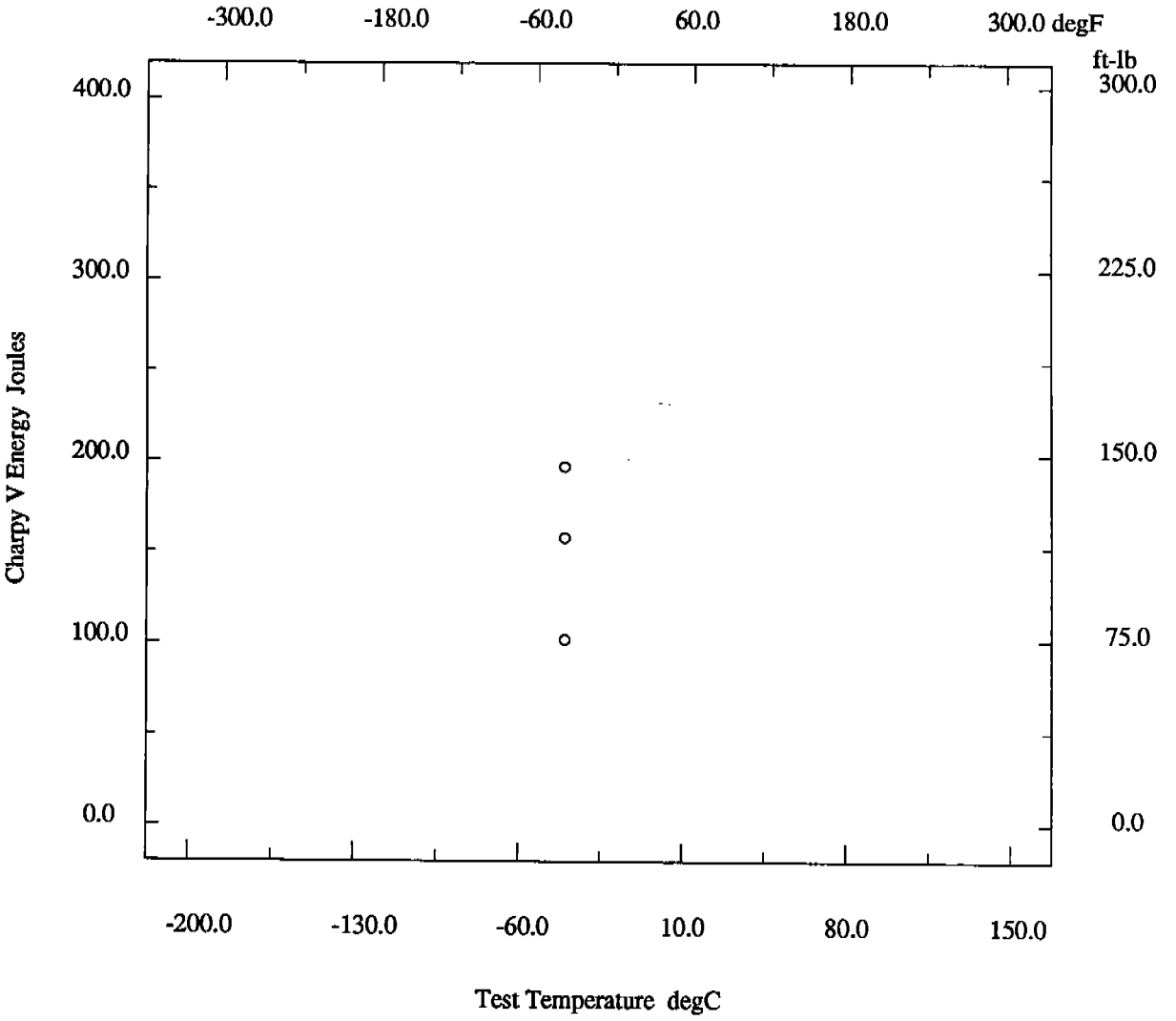
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	102
T-L °	-40	158
T-L °	-40	197

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04EFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05EFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.05EFS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

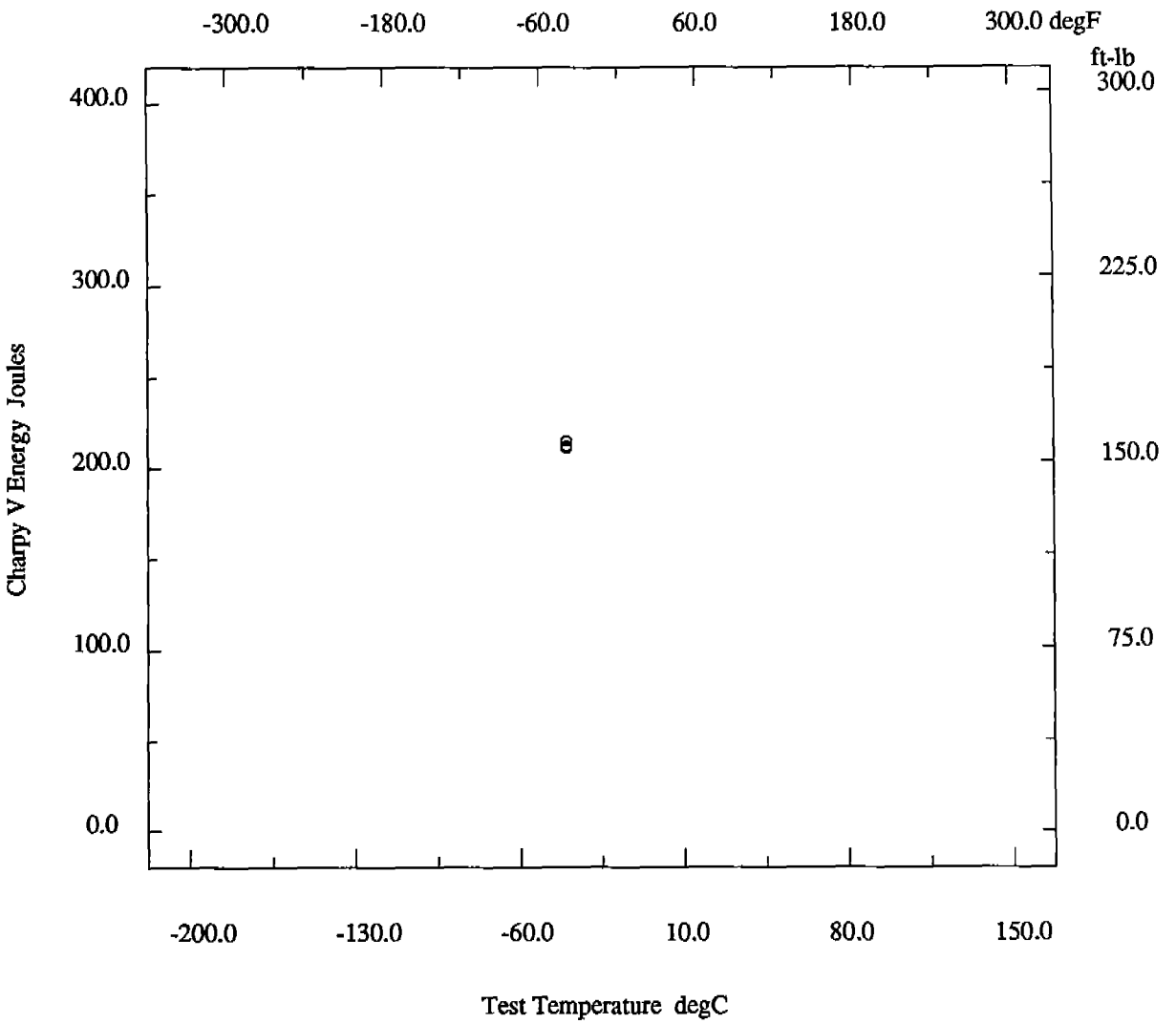
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	211
T-L °	-40	212
T-L °	-40	215

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05EFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09ERS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.09ERS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

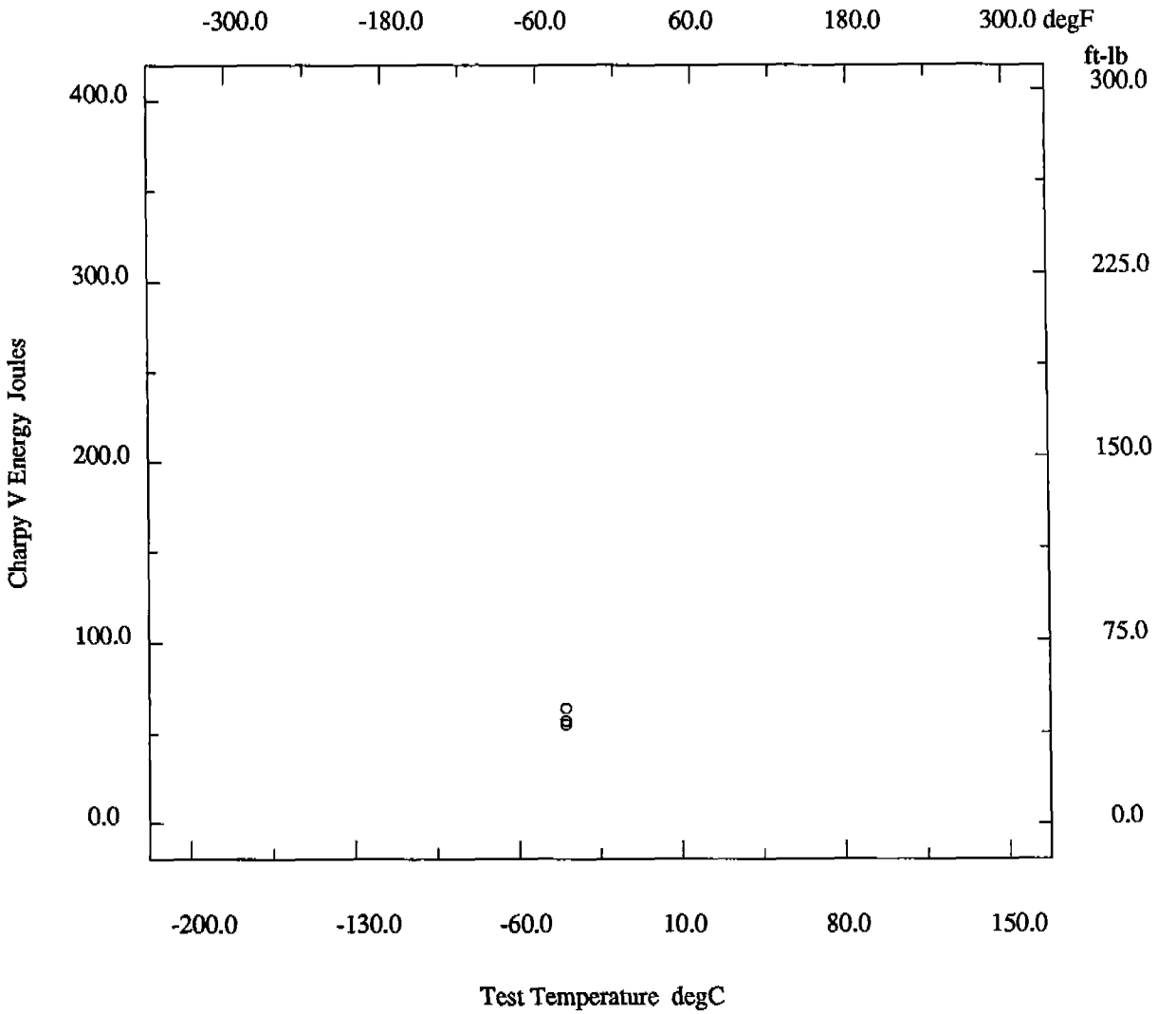
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	55
T-L °	-40	57
T-L °	-40	64

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09ERS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09EBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.09EBS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	179
T-L °	-40	186
T-L °	-40	194

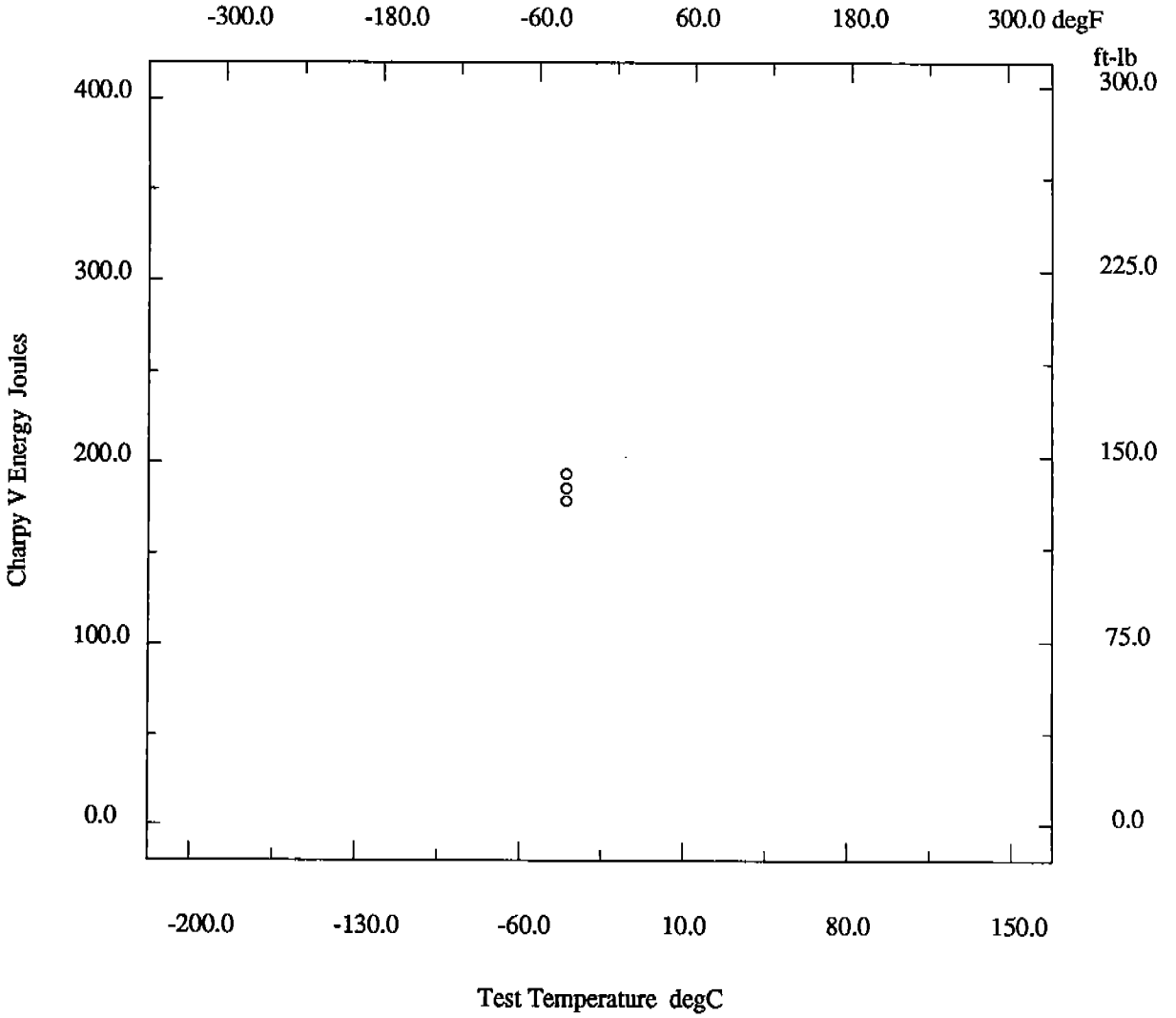
* - not reported

(22)

Material BS4360 Gr50D

Description

Material Code	010.002.09EBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02EBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.02EBS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

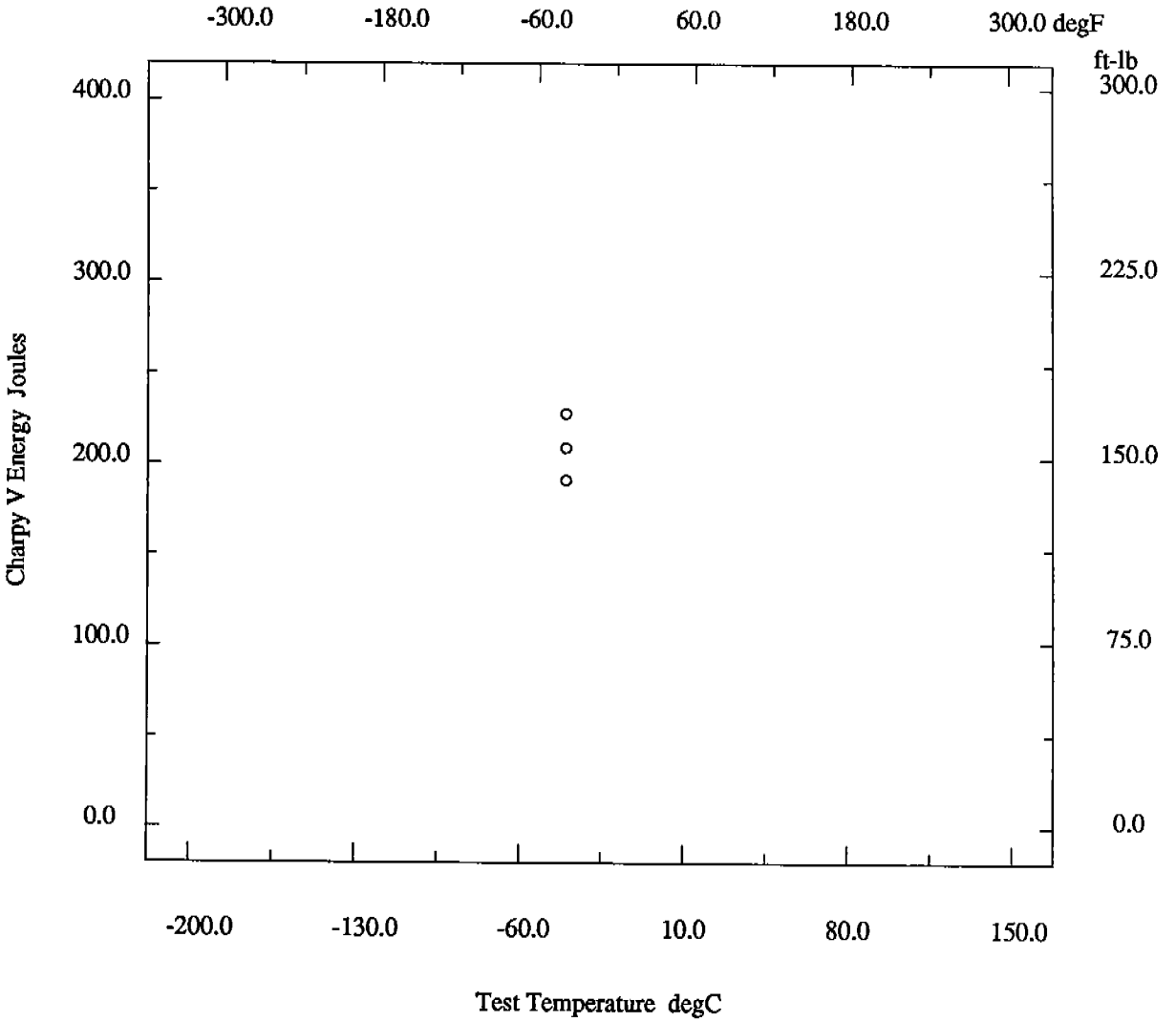
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-40	191
T-L ○	-40	209
T-L ○	-40	228

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02EBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03EBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.03EBS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

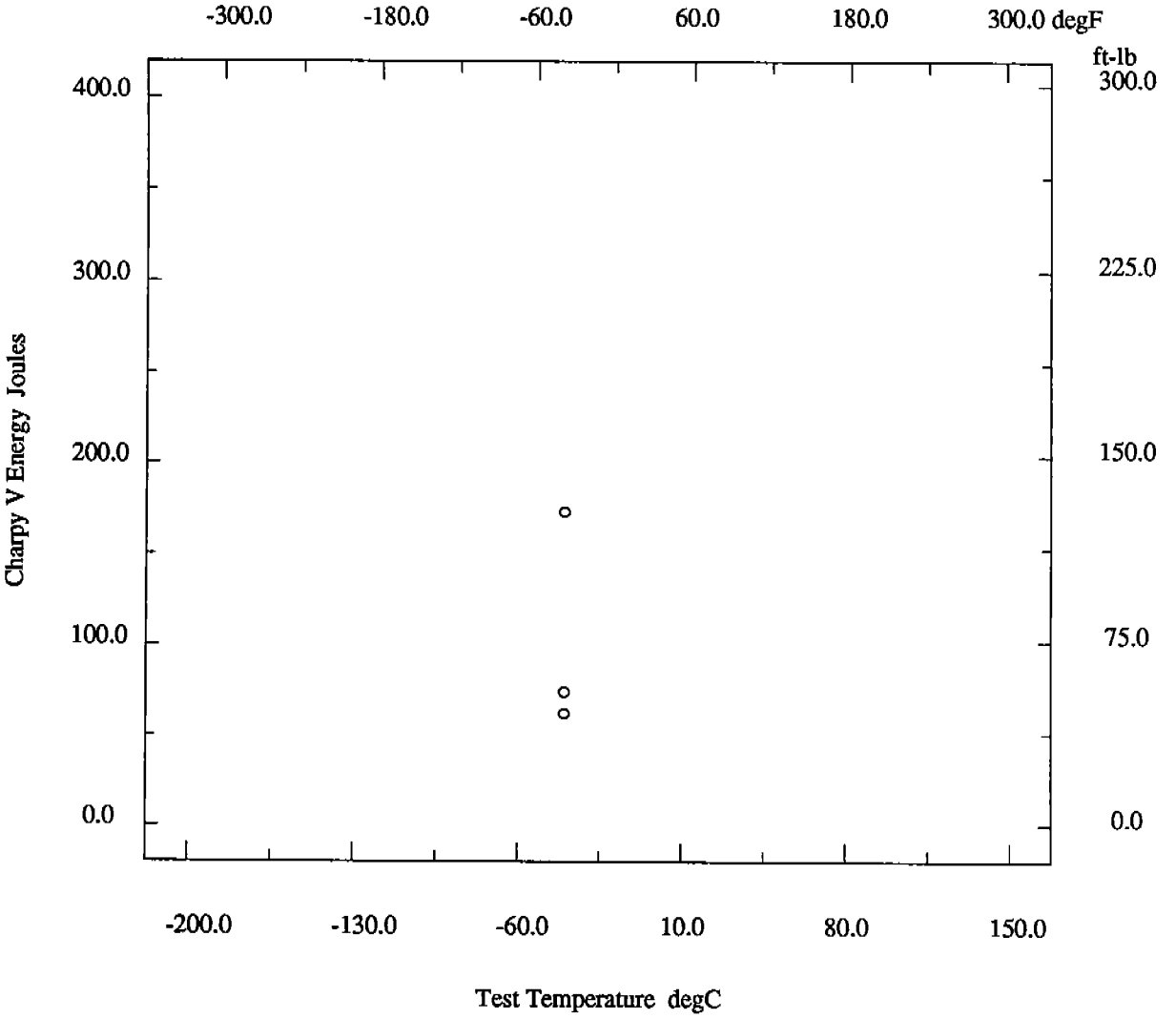
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	173
T-L °	-40	62
T-L °	-40	74

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03EBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04EBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.04EBS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

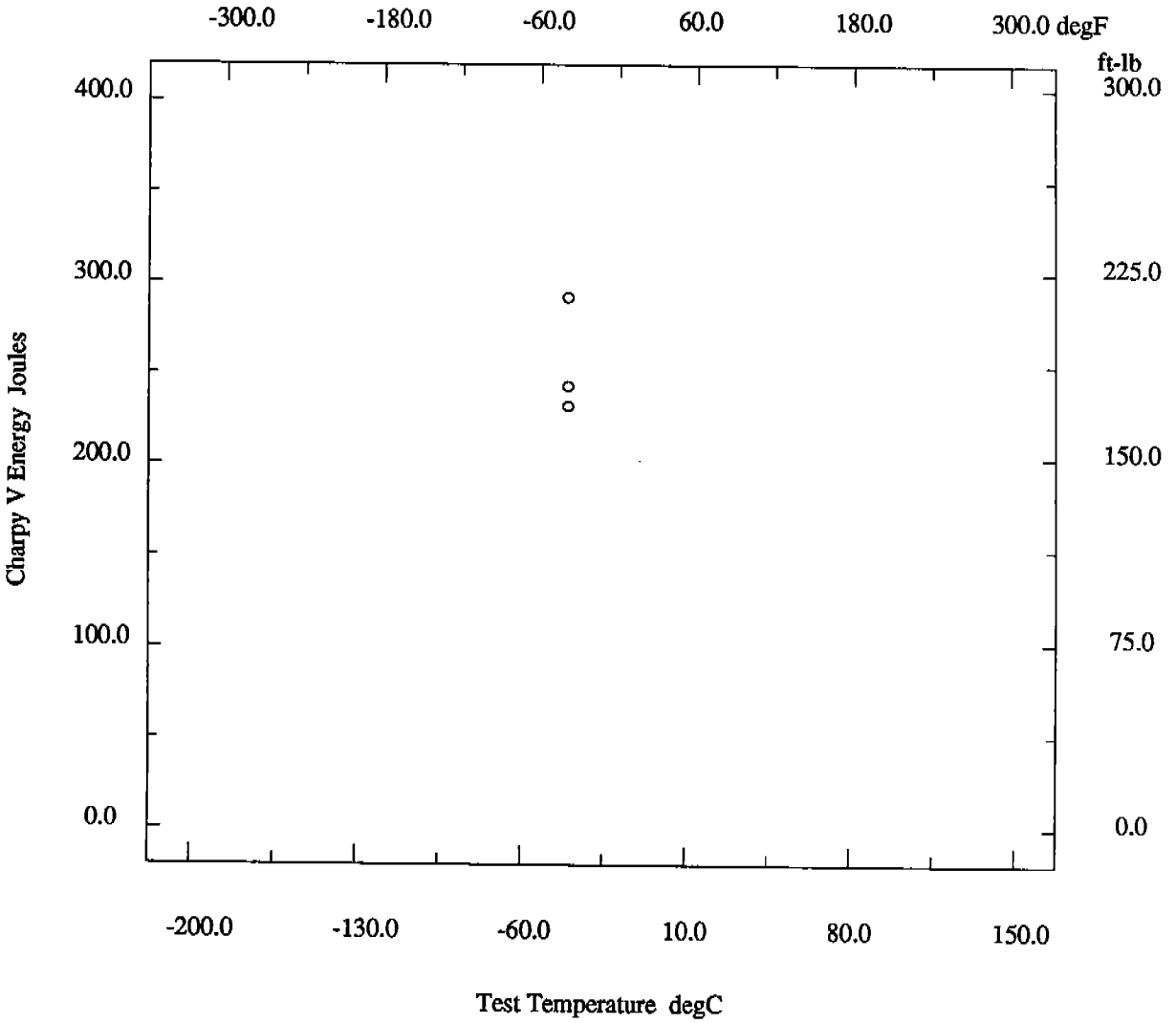
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	232
T-L °	-40	243
T-L °	-40	292

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04EBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05EBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14300.1

Fabrication History

See Page 14300.1

Weld

Weld Code	010.002.05EBS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

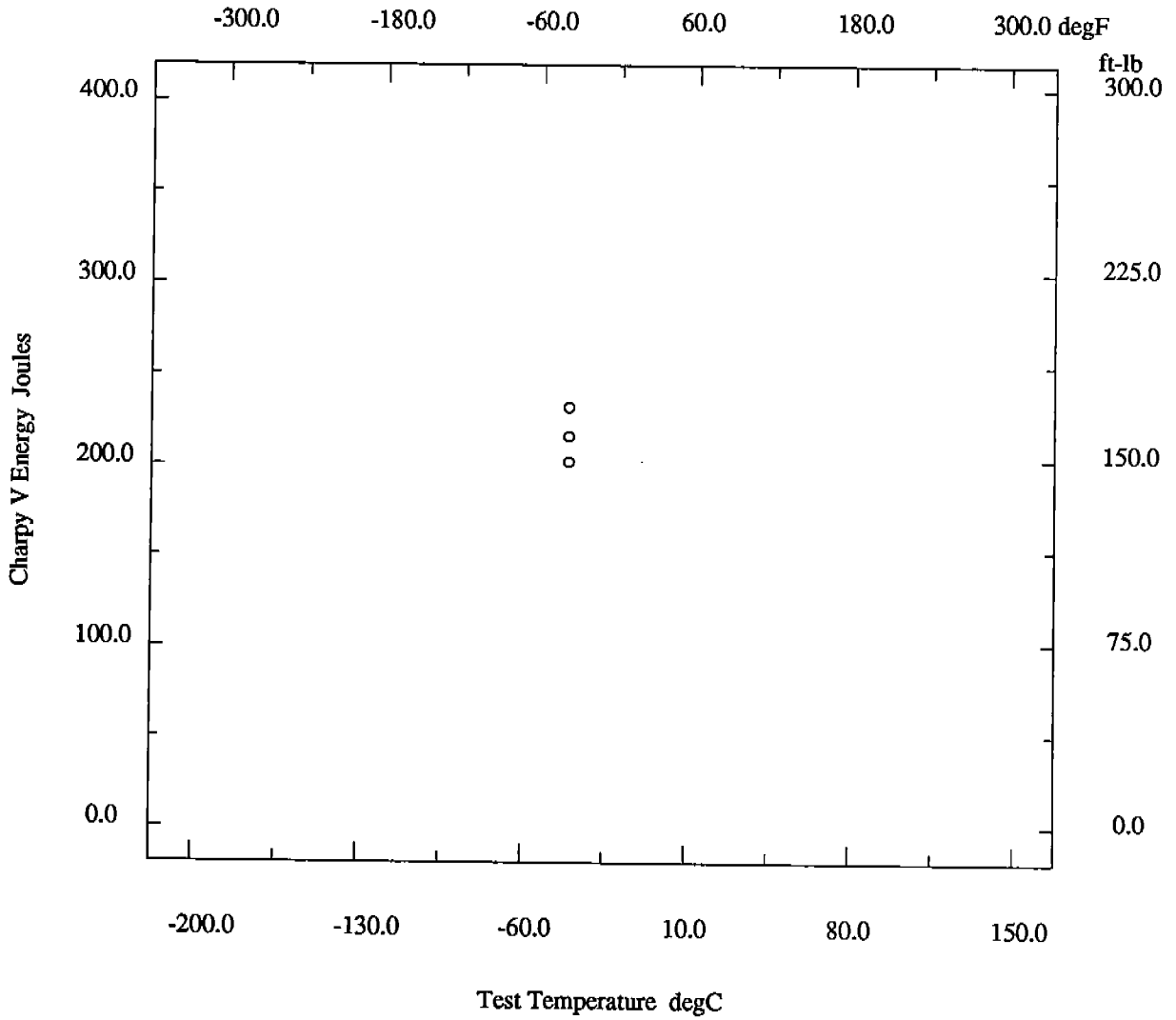
Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	202
T-L o	-40	216
T-L o	-40	232

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05EBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09FNA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

C	0.13 %	Mn	1.41 %
P	0.013 %	S	0.001 %
Si	0.40 %	Cr	0.02 %
Ni	0.17 %	Mo	0.02 %
V	0.004 %	Cu	0.17 %
Cb	0.025 %	Ti	<0.003 %
B	<0.0001 %	Al	0.028 %
N	0.0072 %	Other Components	*

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.002.09FNA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	>1.44
-30	>1.49
-30	>1.53
-10	>1.44
-10	>1.50
-10	>1.52

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02FNA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.02FNA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.14
-30	0.15
-30	0.46
-10	0.31
-10	0.79
-10	>1.52

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09FNS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.09FNS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Full cross section
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.49
-30	1.03
-30	>1.55
-10	>1.54
-10	>1.56
-10	>1.56

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02FNS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.02FNS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Full cross section
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.80
-30	1.17
-30	>1.47
-10	1.50
-10	1.54
-10	>1.53

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09FFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.09FFA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

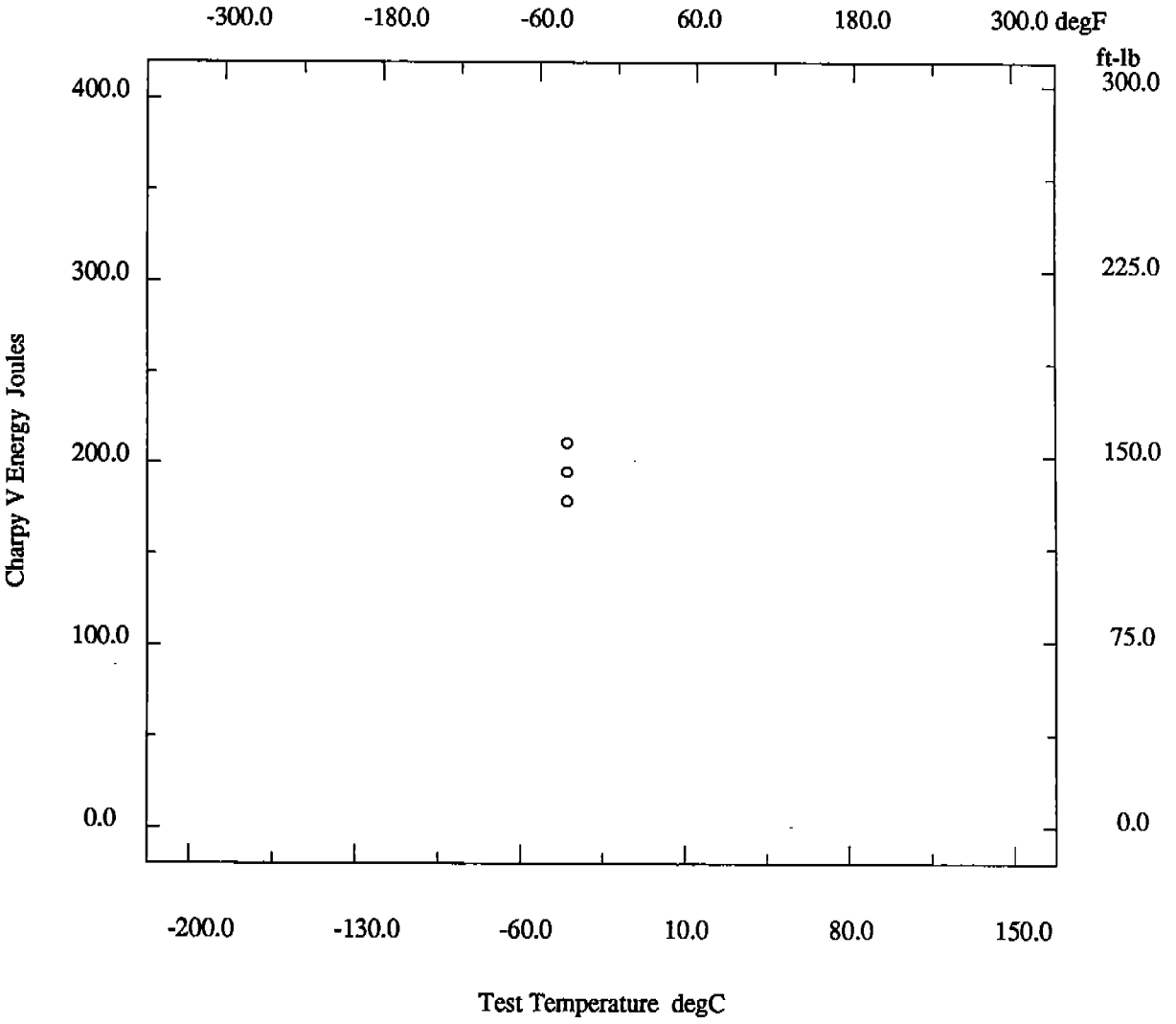
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-40	179
T-L ○	-40	195
T-L ○	-40	211

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09FFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02FFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14400.1

Fabrication History See Page 14400.1

Weld

Weld Code	010.002.02FFA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

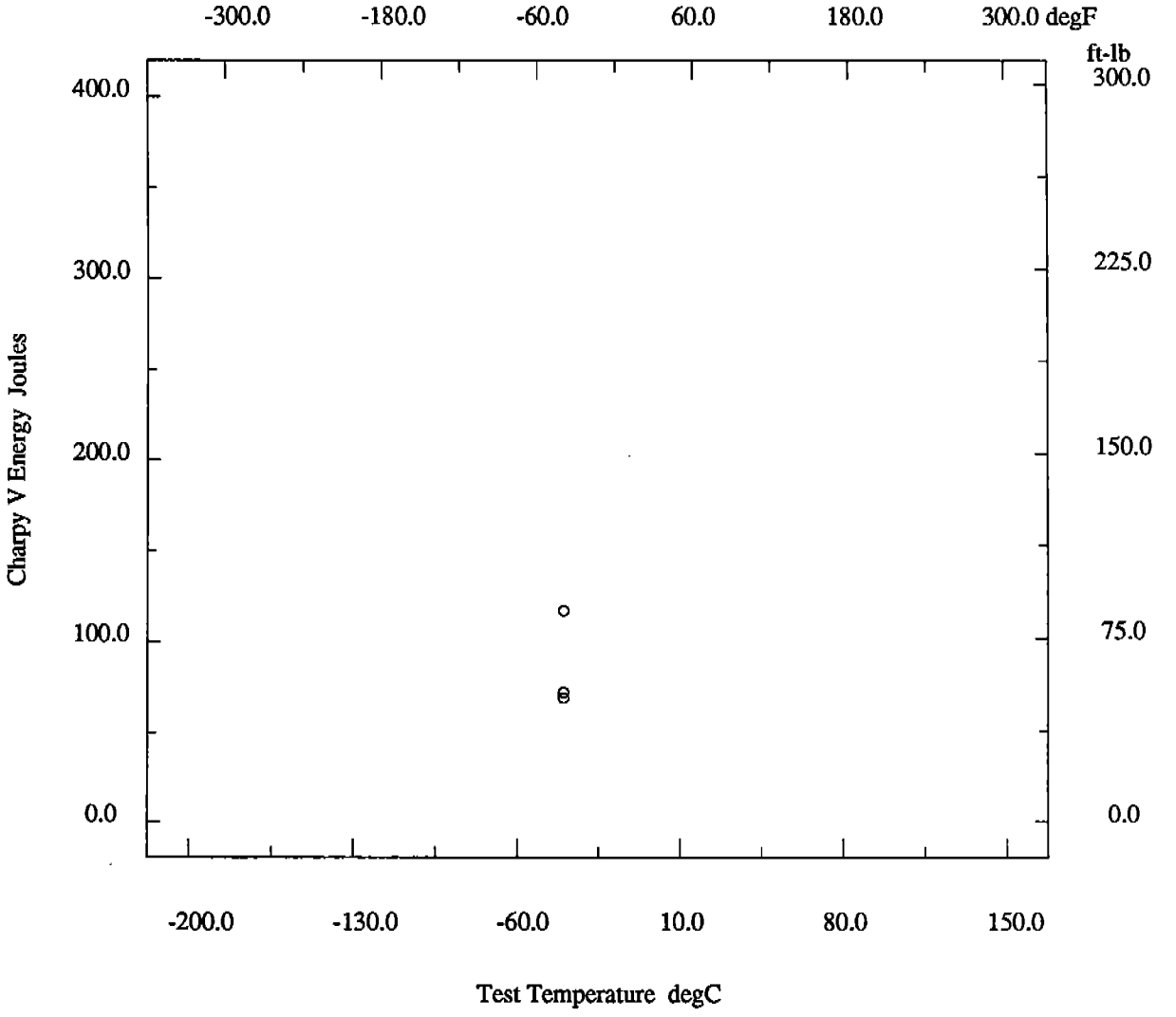
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	117
T-L °	-40	69
T-L °	-40	72

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02FFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03FFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.03FFA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

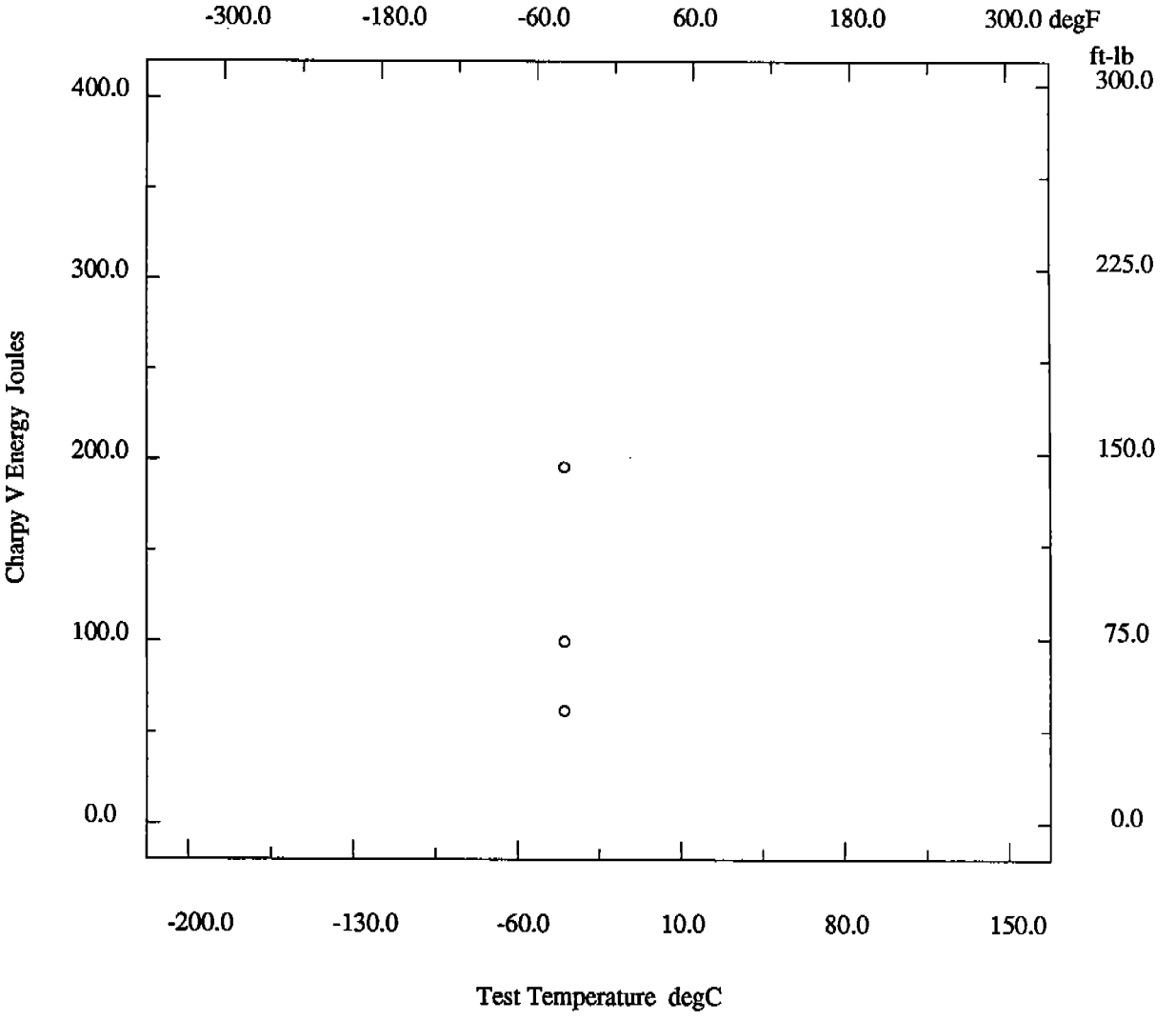
Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	100
T-L o	-40	196
T-L o	-40	62

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03FFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04FFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.04FFA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

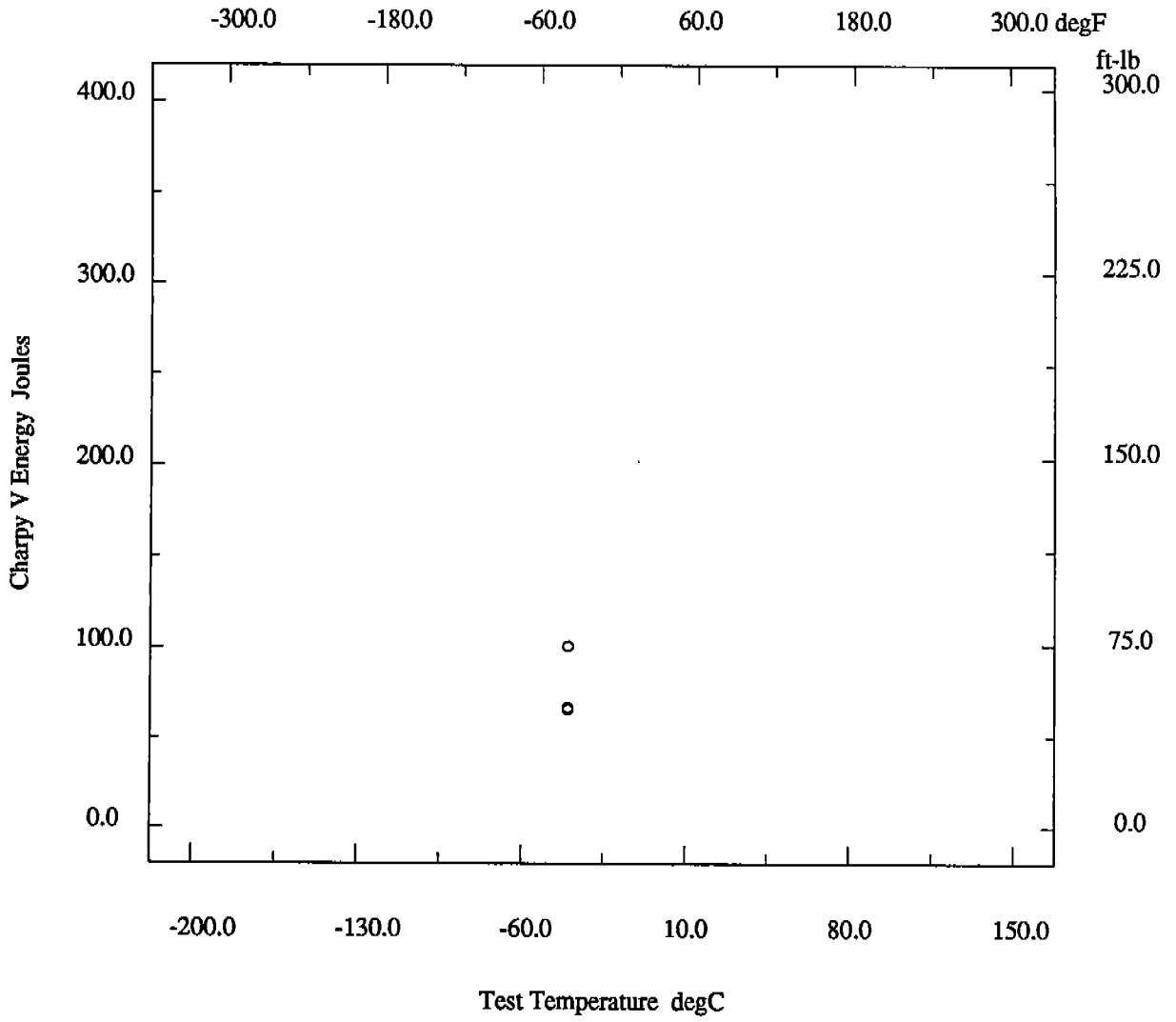
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	101
T-L °	-40	66
T-L °	-40	67

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04FFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05FFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.05FFA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

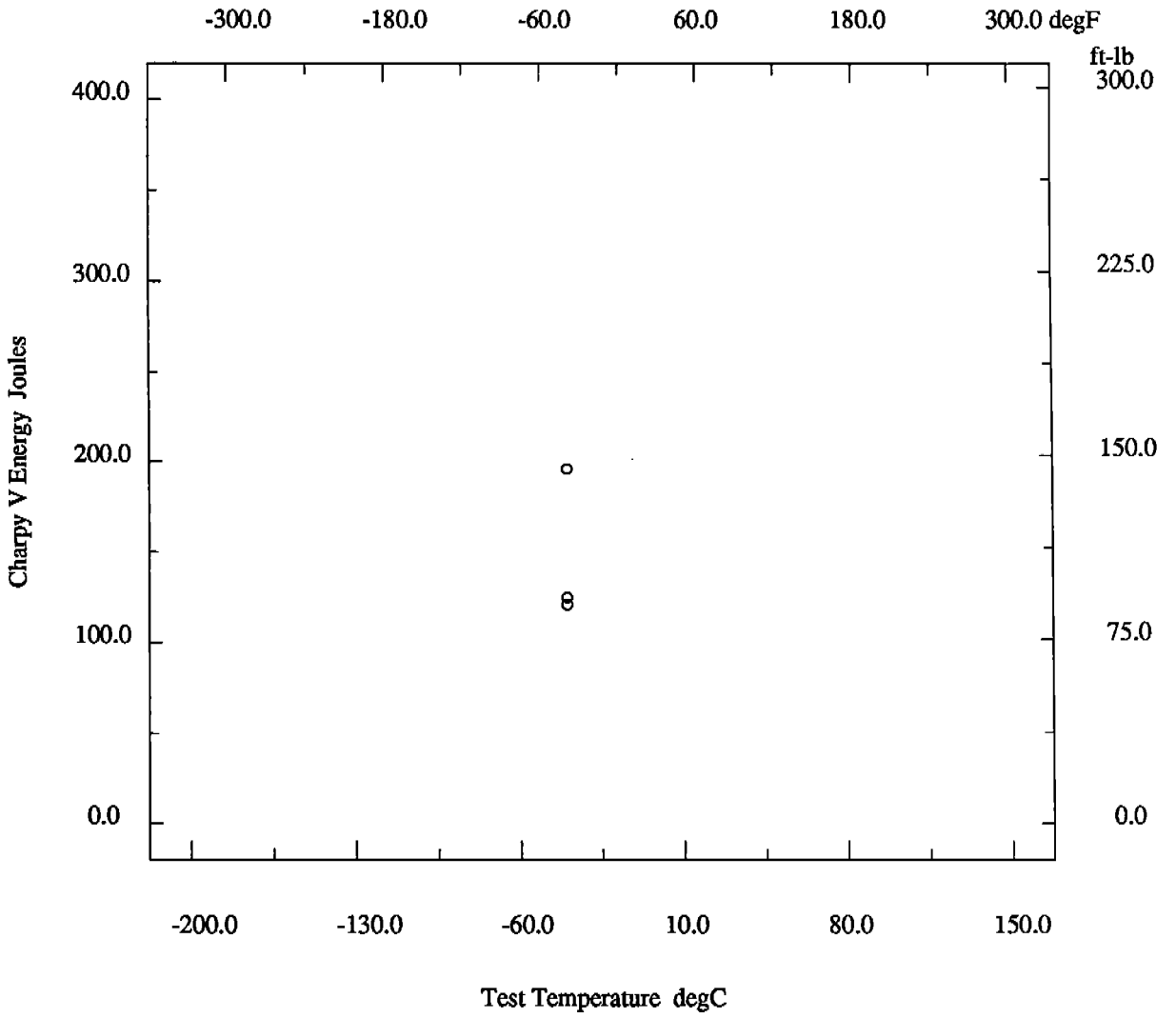
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	121
T-L °	-40	125
T-L °	-40	196

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05FFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09FRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.09FRA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

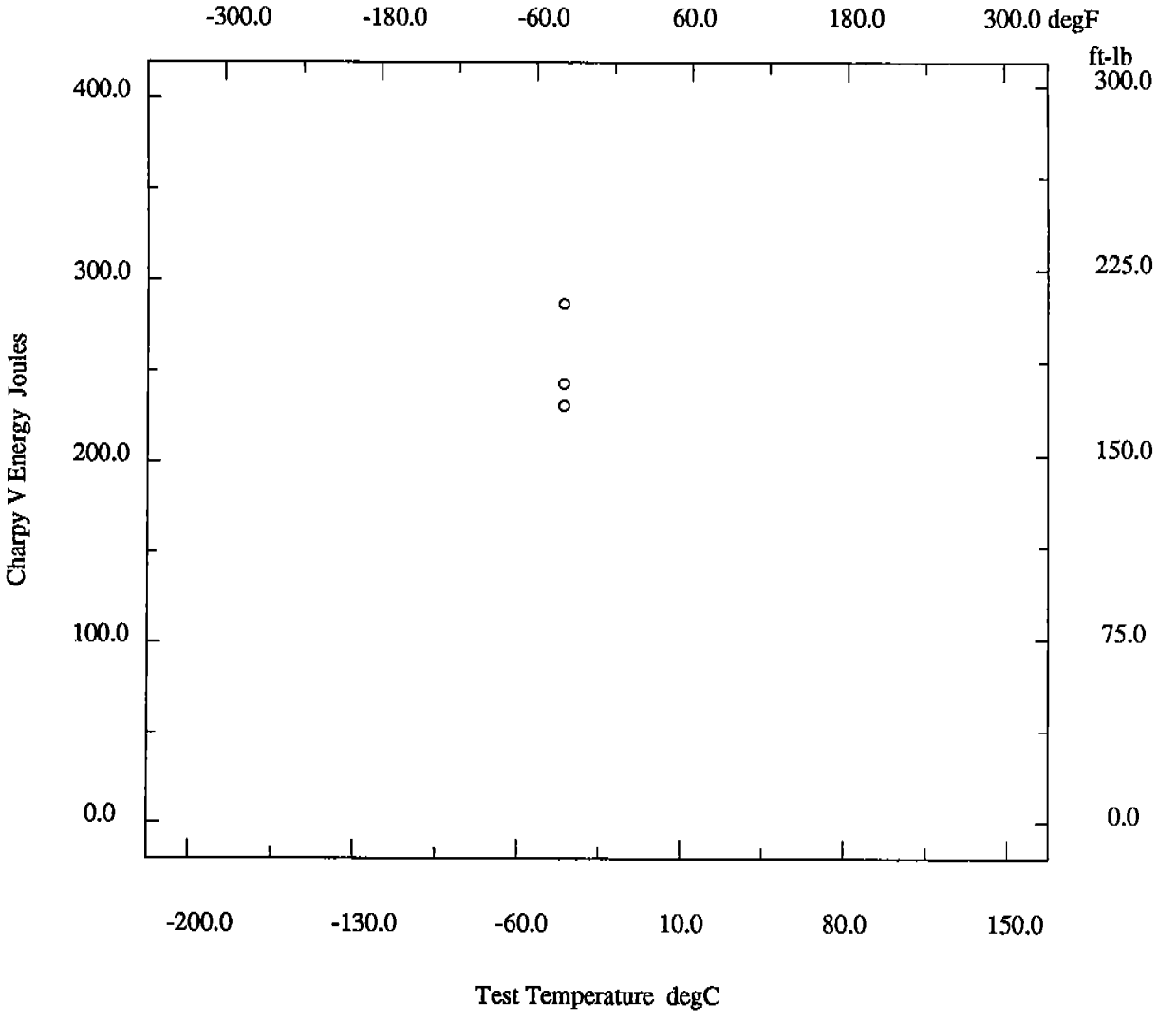
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	231
T-L °	-40	243
T-L °	-40	287

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09FRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09FBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.09FBA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

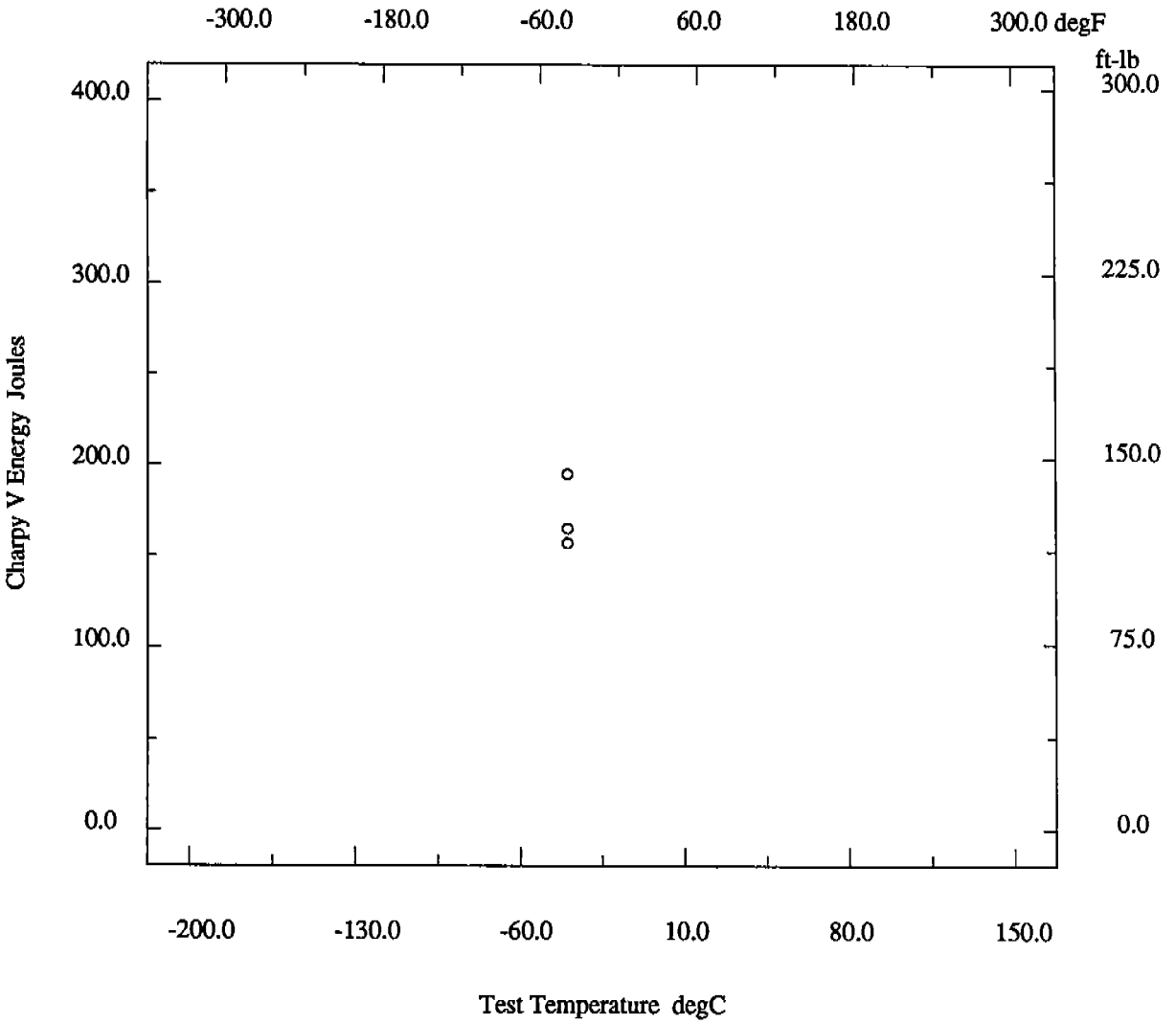
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	157
T-L °	-40	165
T-L °	-40	195

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09FBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02FBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.02FBA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

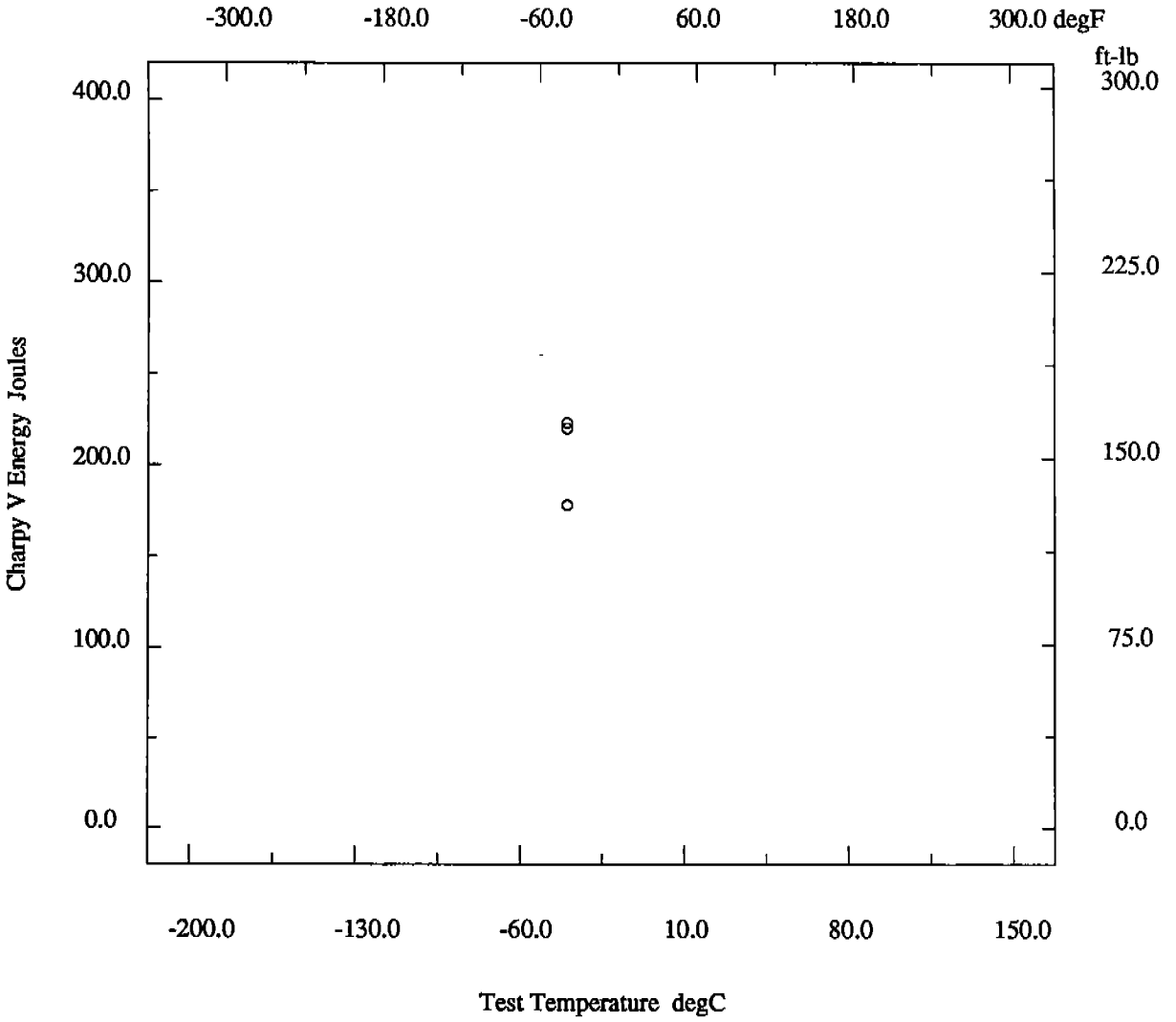
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	178
T-L °	-40	220
T-L °	-40	223

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02FBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03FBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.03FBA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

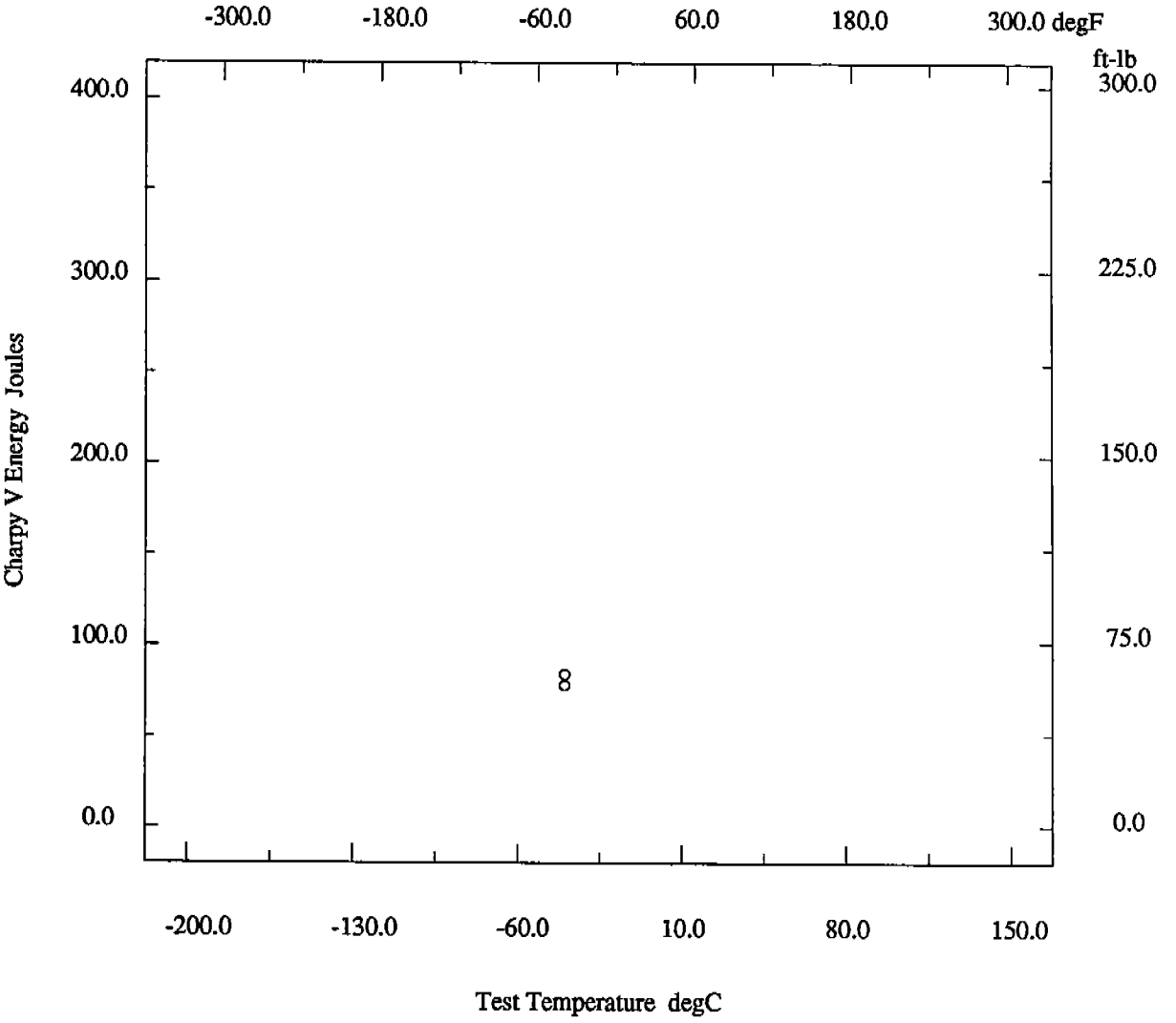
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	78
T-L °	-40	78
T-L °	-40	84

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03FBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04FBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.04FBA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

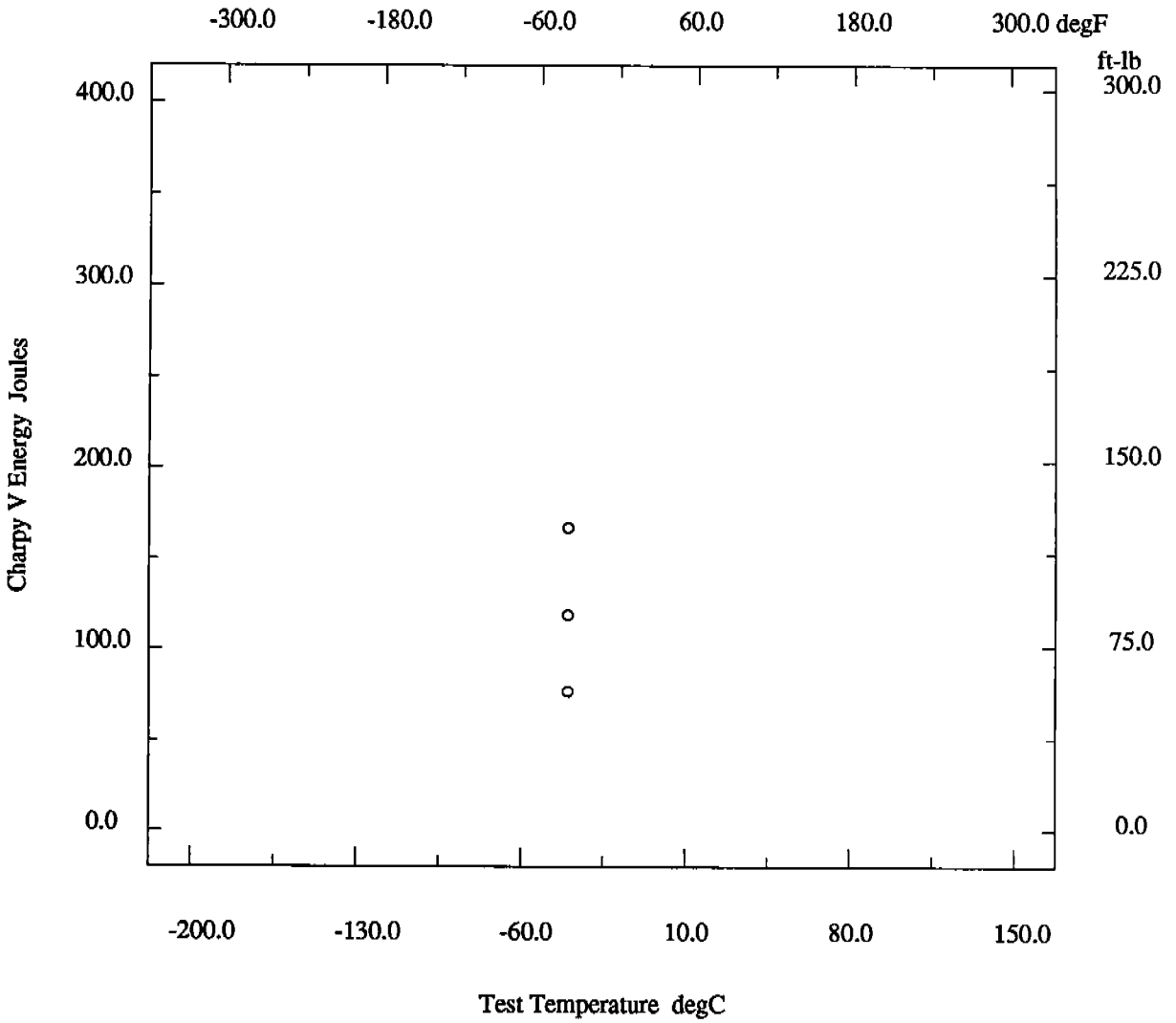
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	119
T-L °	-40	167
T-L °	-40	77

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04FBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05FBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.05FBA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

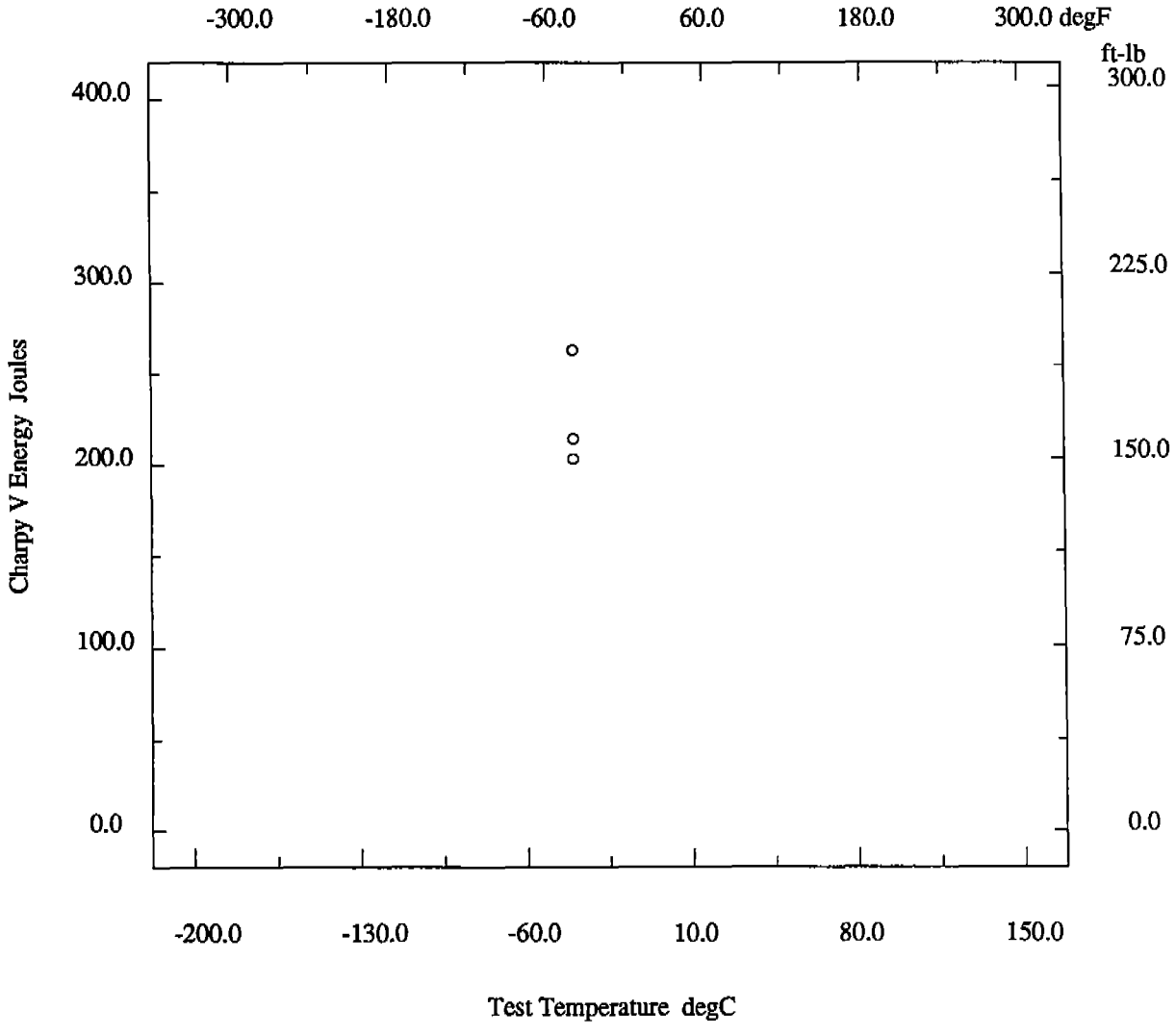
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	203
T-L °	-40	214
T-L °	-40	263

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05FBA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09FFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.09FFS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

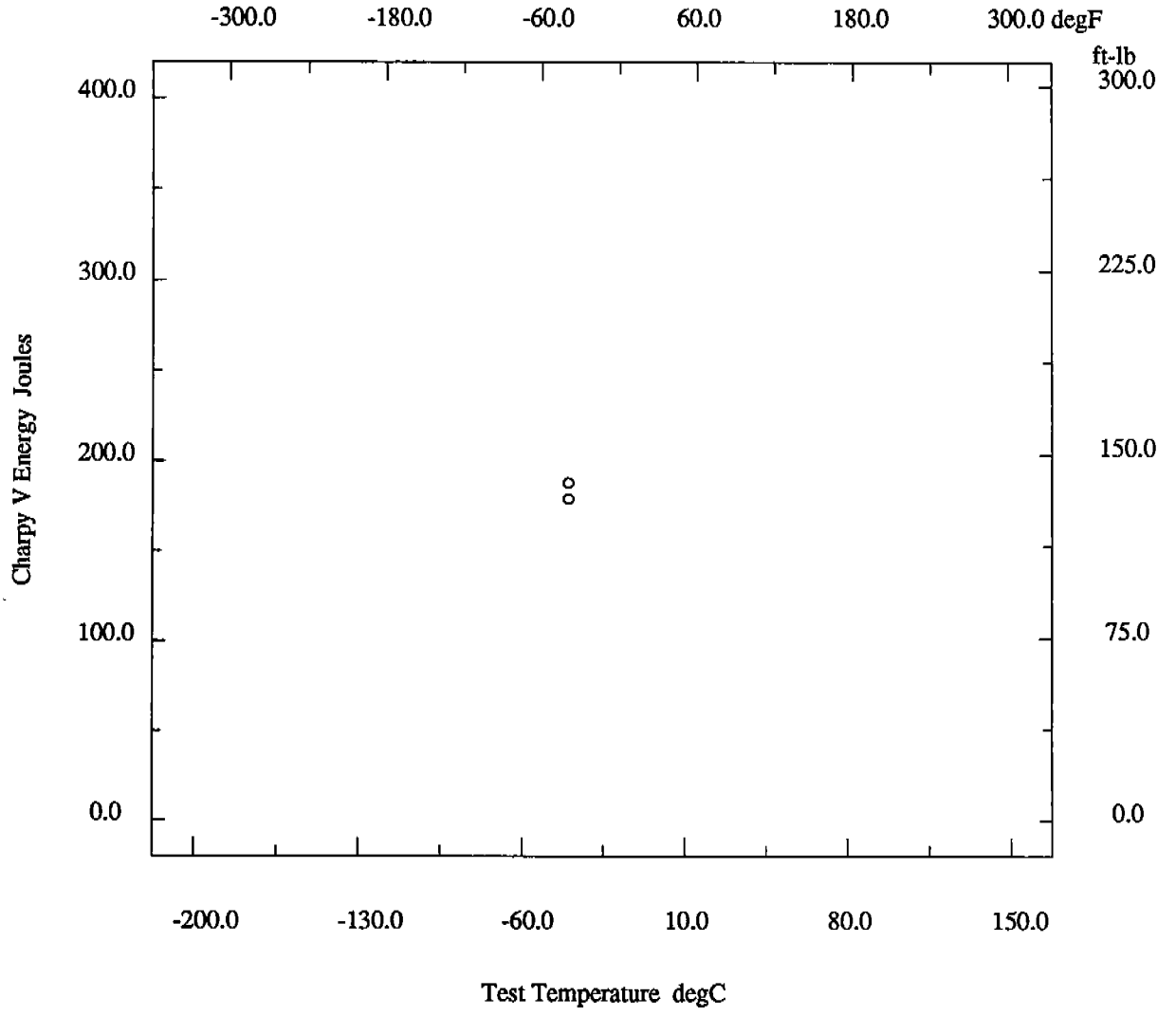
Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	179
T-L o	-40	179
T-L o	-40	188

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09FFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02FFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.02FFS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

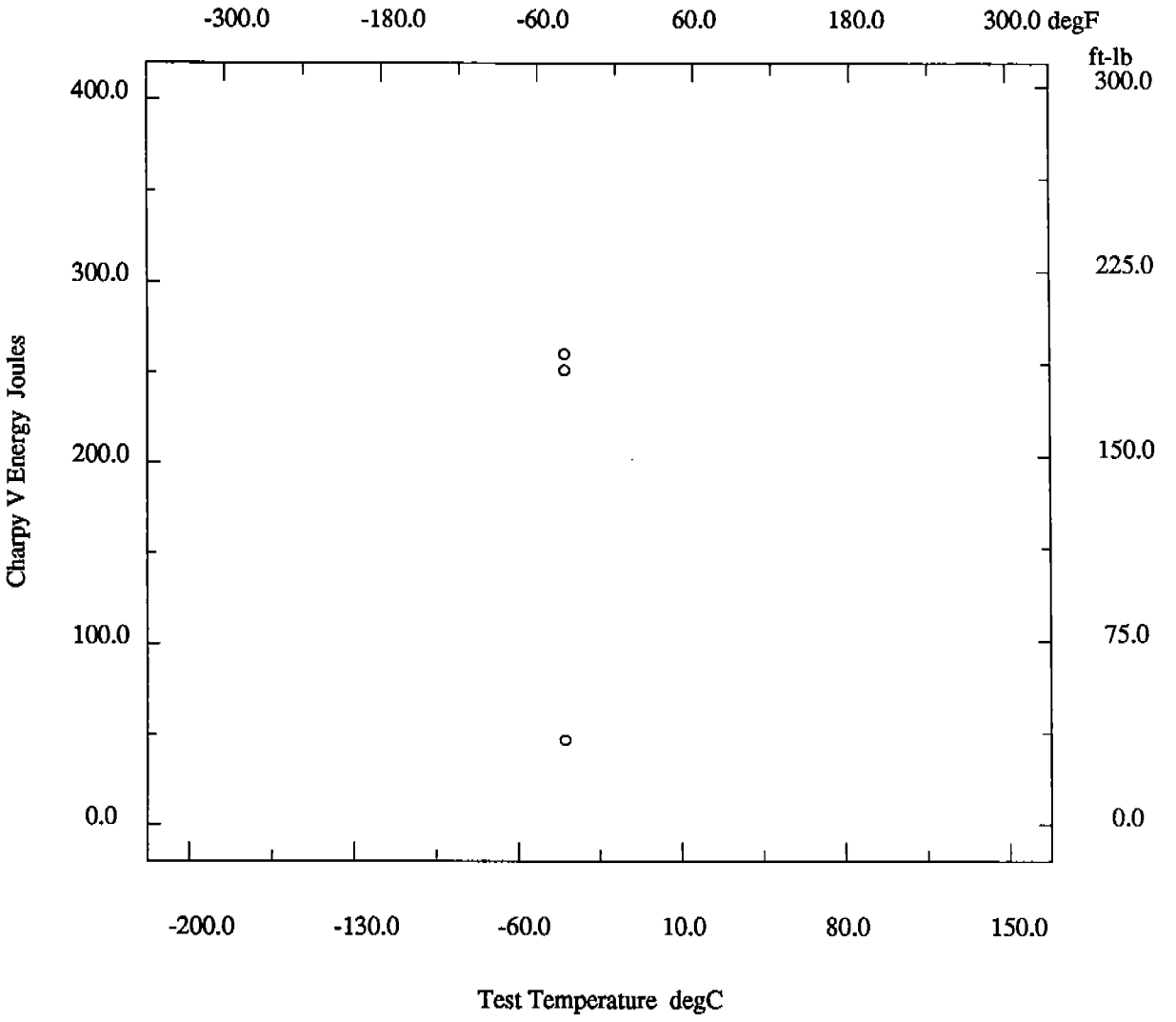
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	251
T-L °	-40	260
T-L °	-40	47

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02FFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03FFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.03FFS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

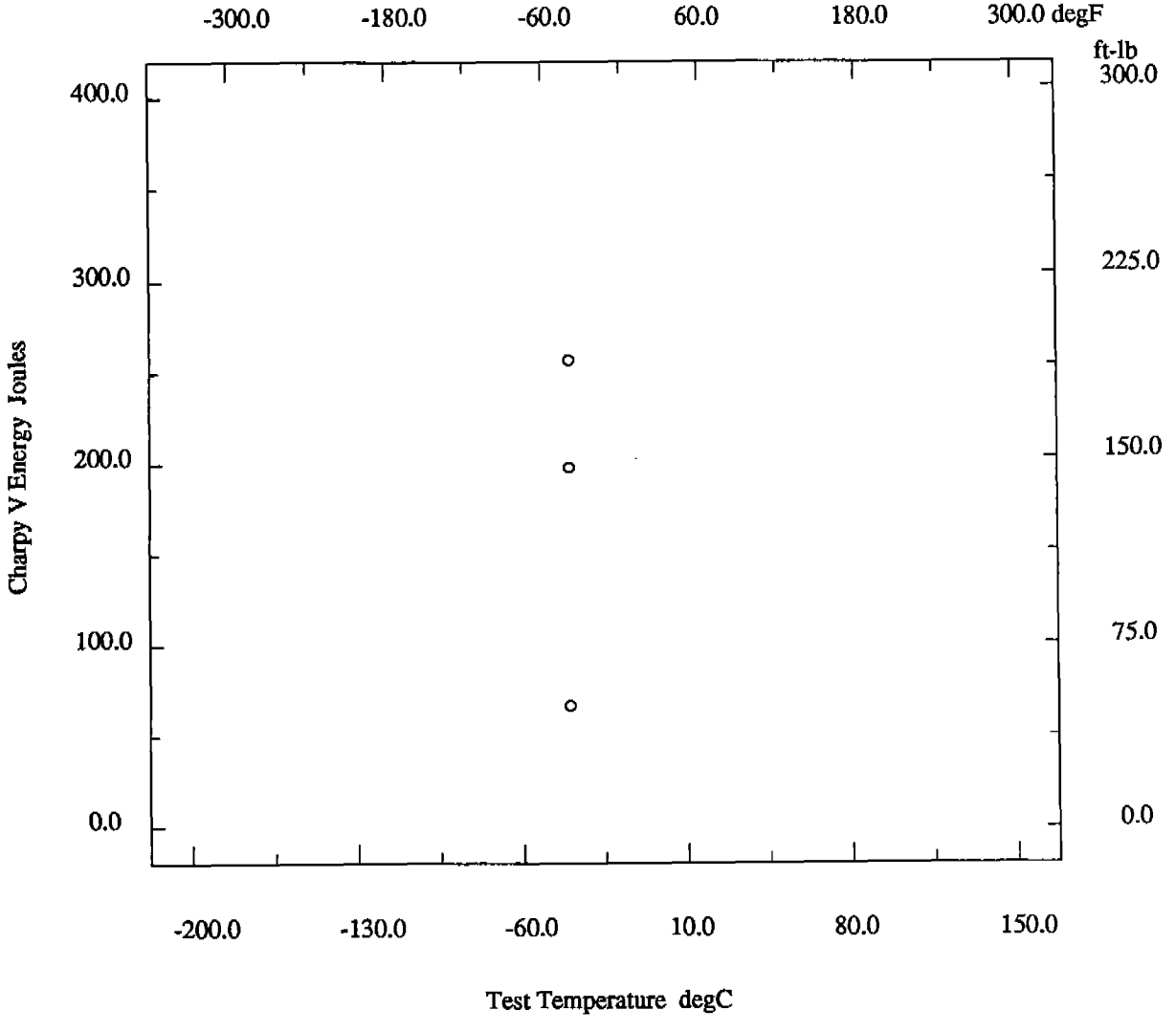
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	198
T-L °	-40	257
T-L °	-40	67

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03FFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04FFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.04FFS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

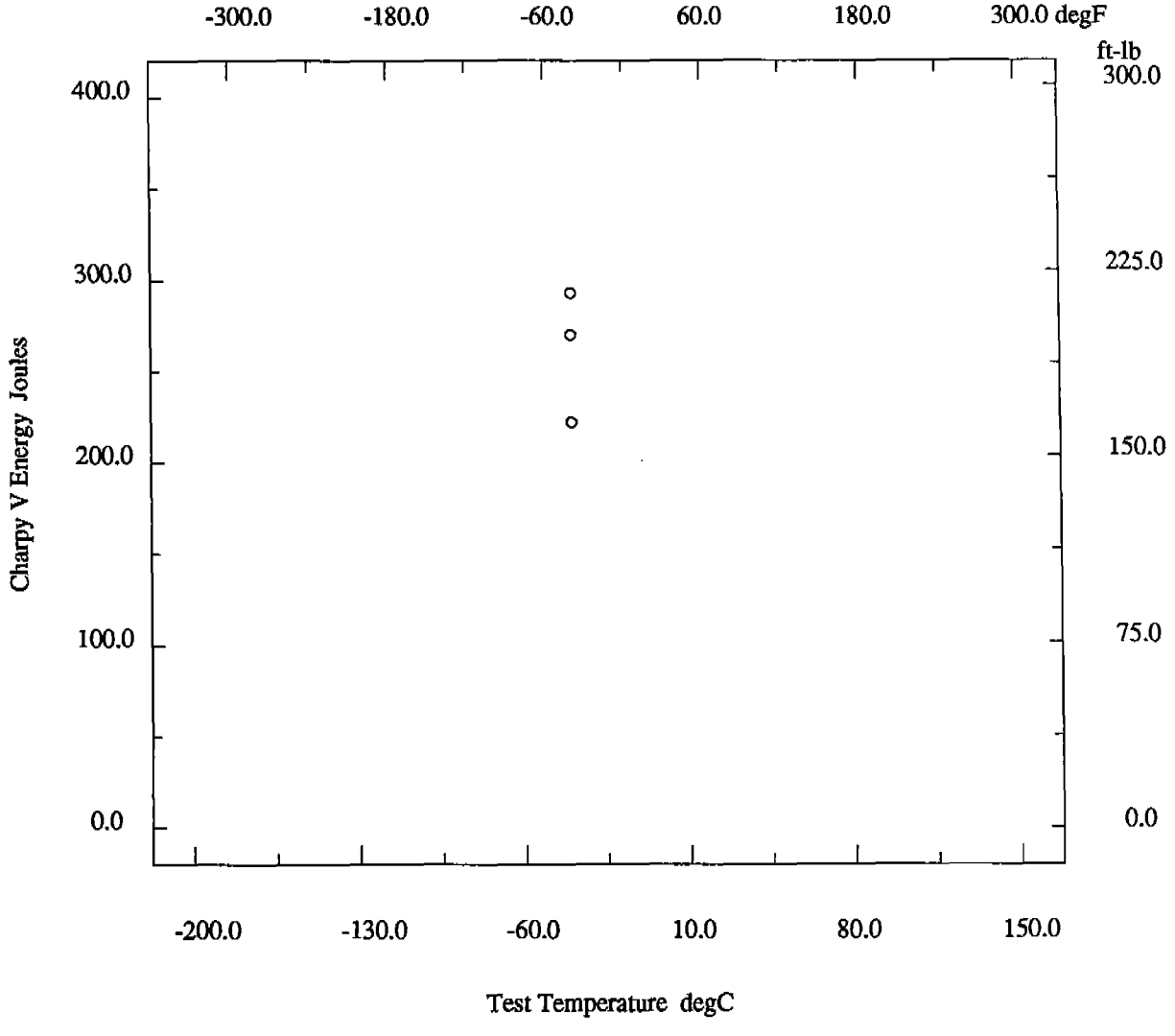
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	222
T-L °	-40	270
T-L °	-40	293

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04FFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05FFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.05FFS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

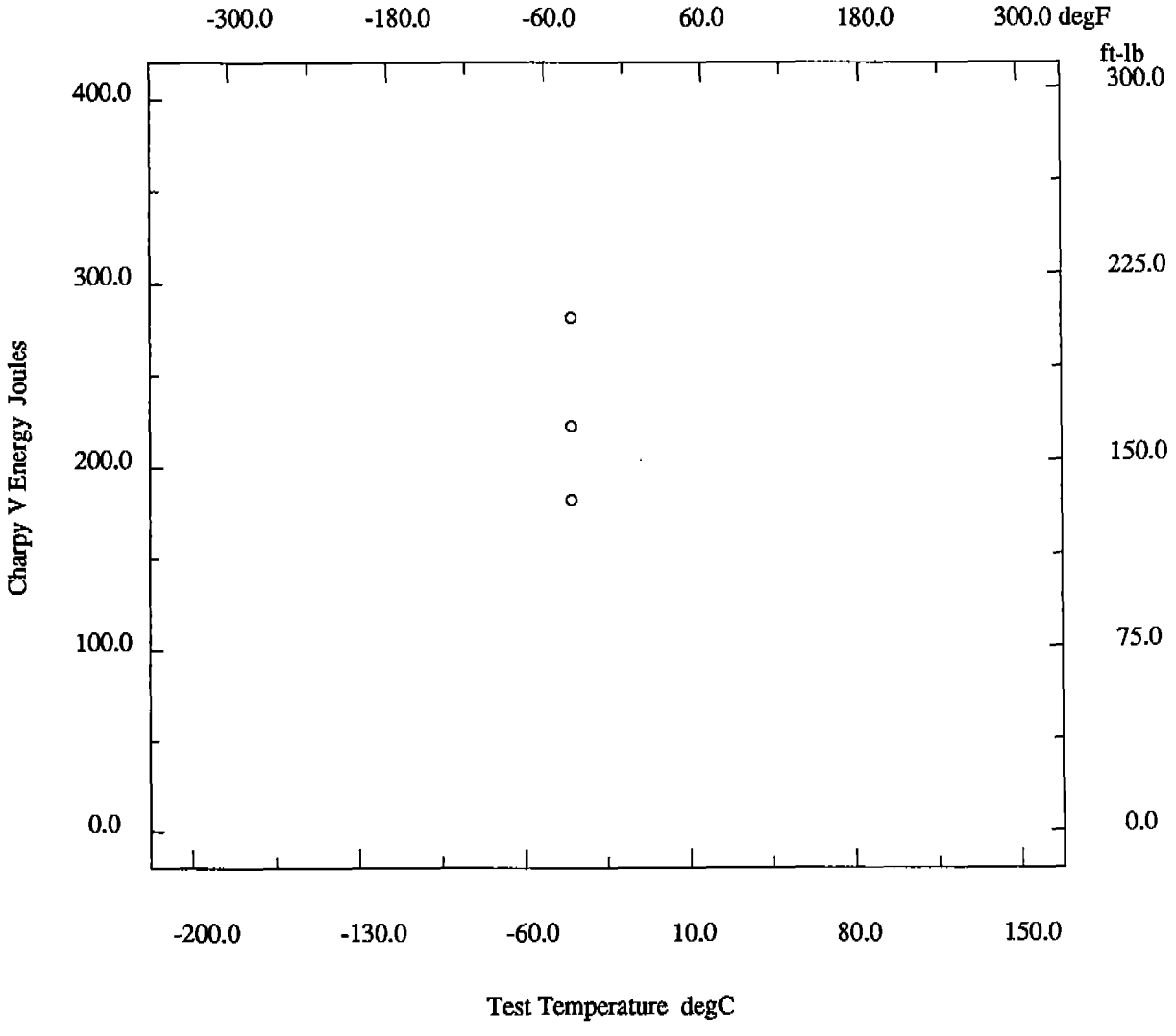
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	182
T-L °	-40	222
T-L °	-40	281

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05FFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09FRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.09FRS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

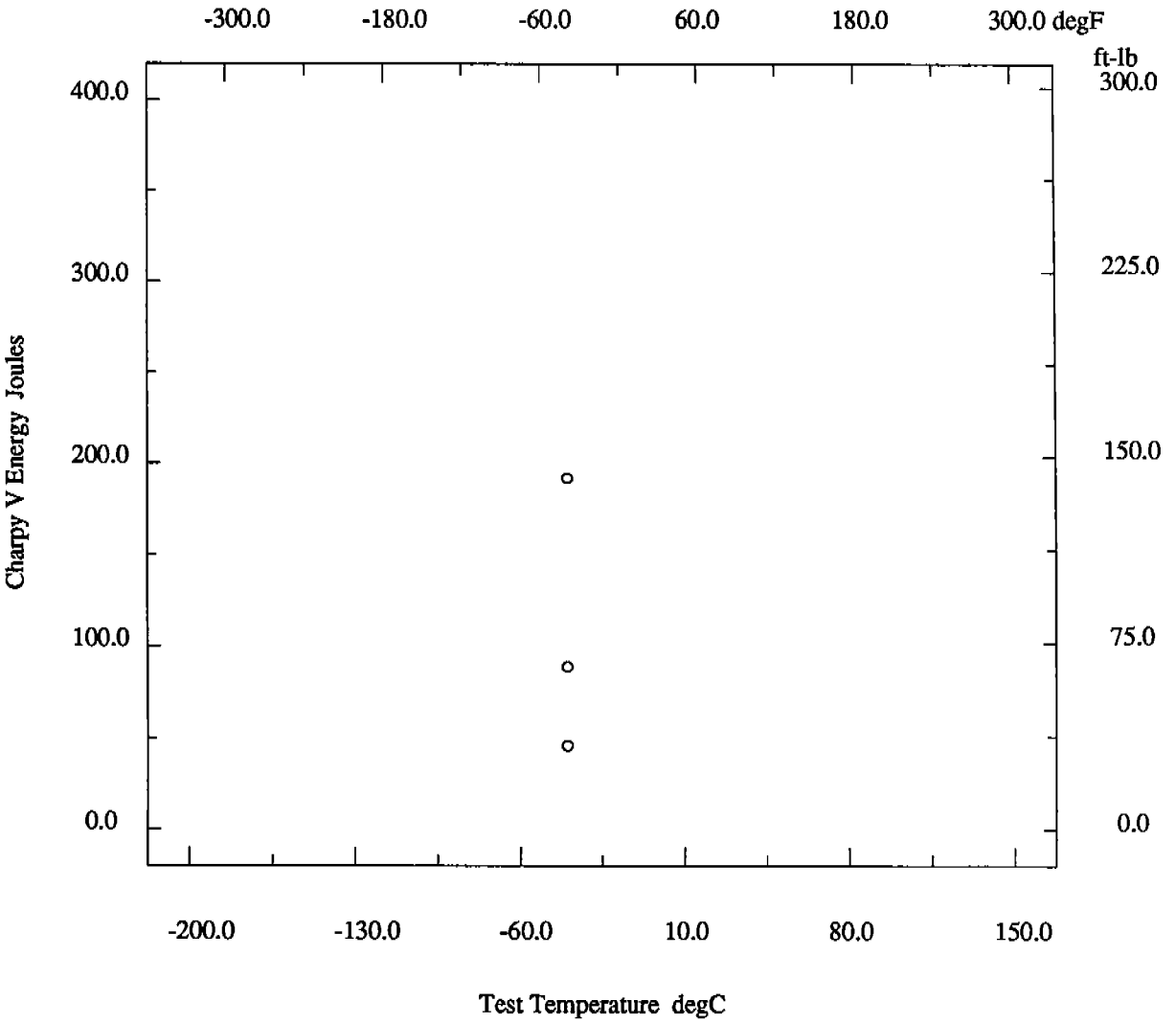
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	192
T-L °	-40	46
T-L °	-40	89

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09FRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09FBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.09FBS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

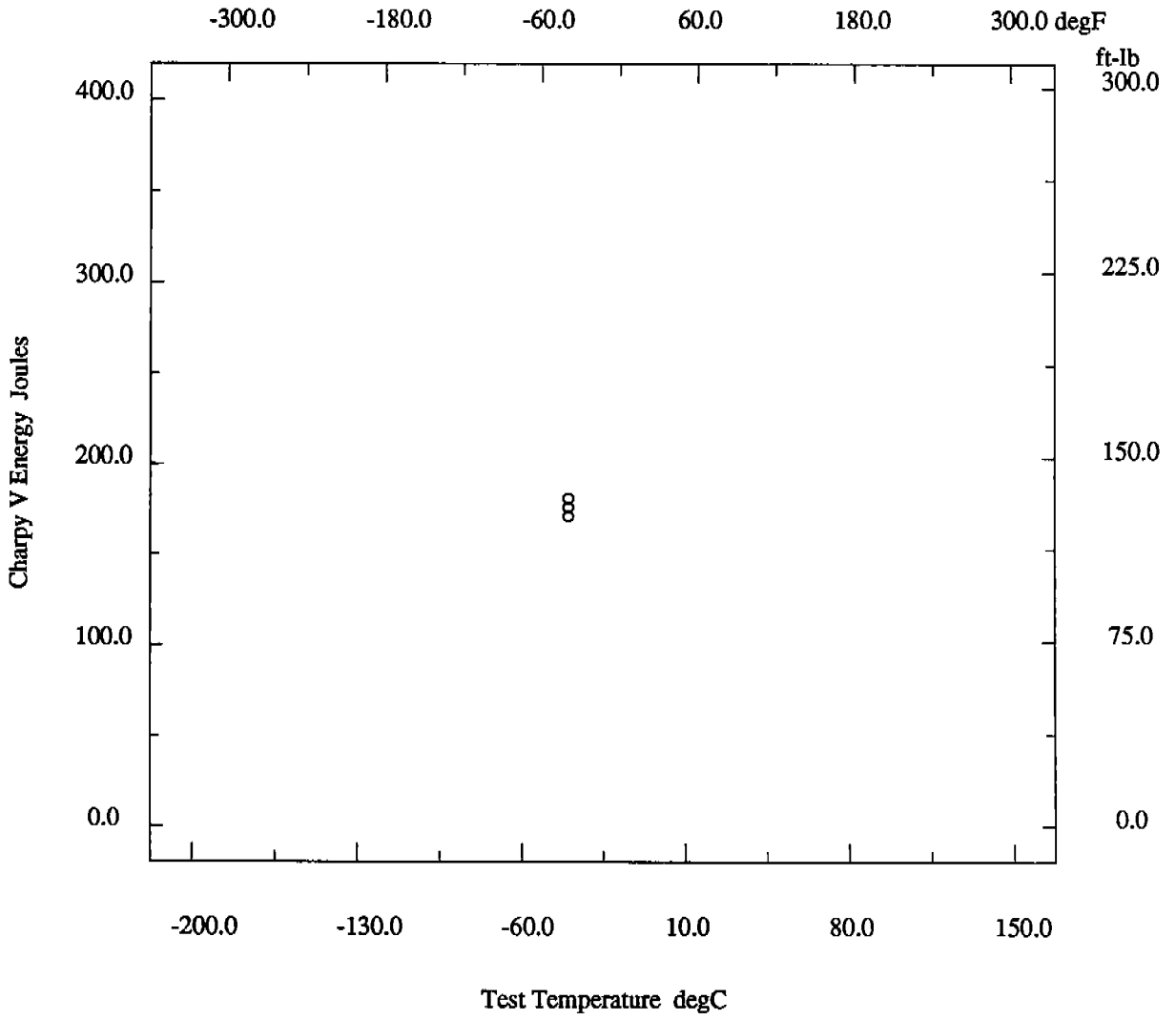
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	171
T-L °	-40	176
T-L °	-40	181

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09FBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02FBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.02FBS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

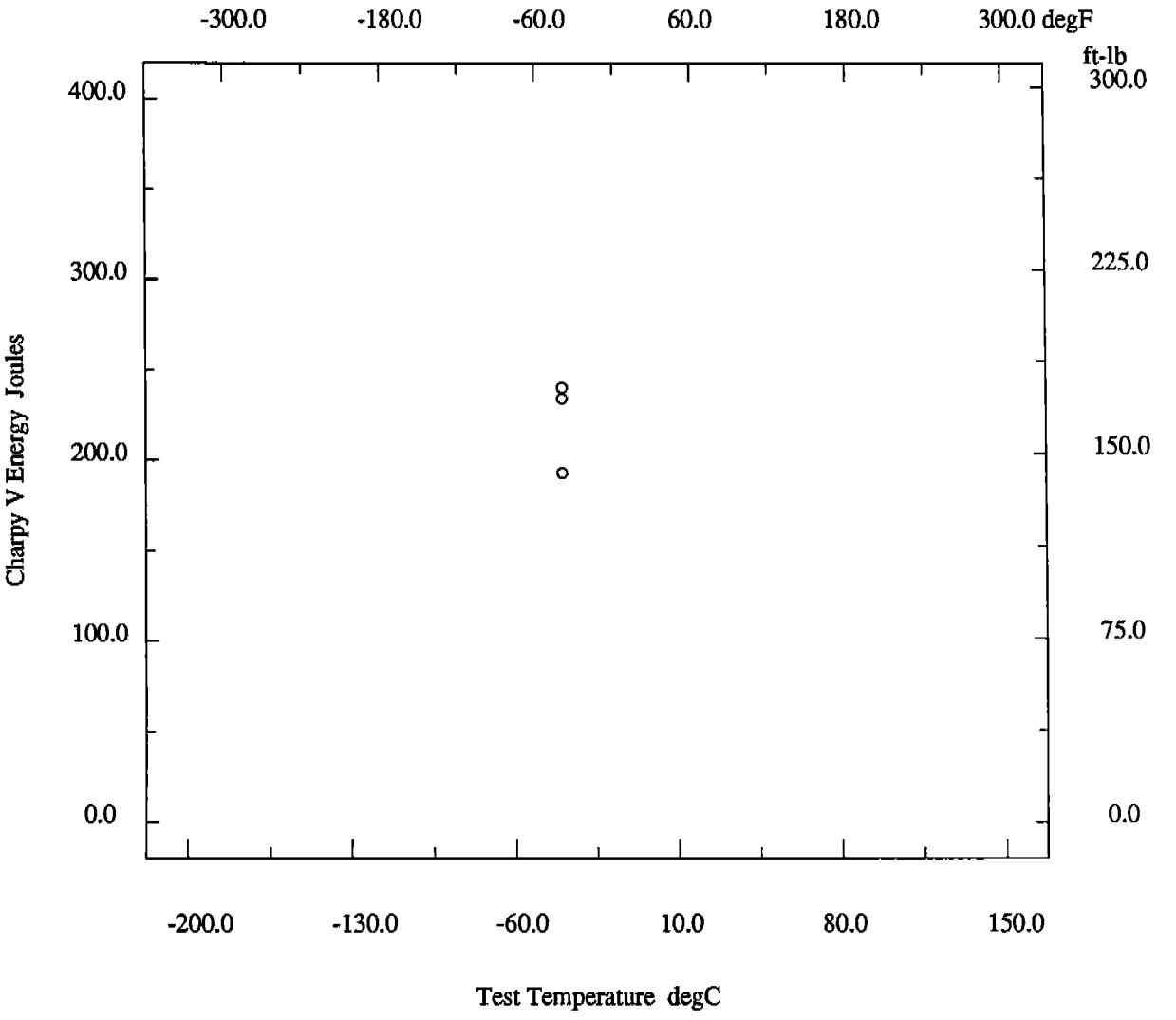
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	193
T-L °	-40	234
T-L °	-40	240

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02FBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03FBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.03FBS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

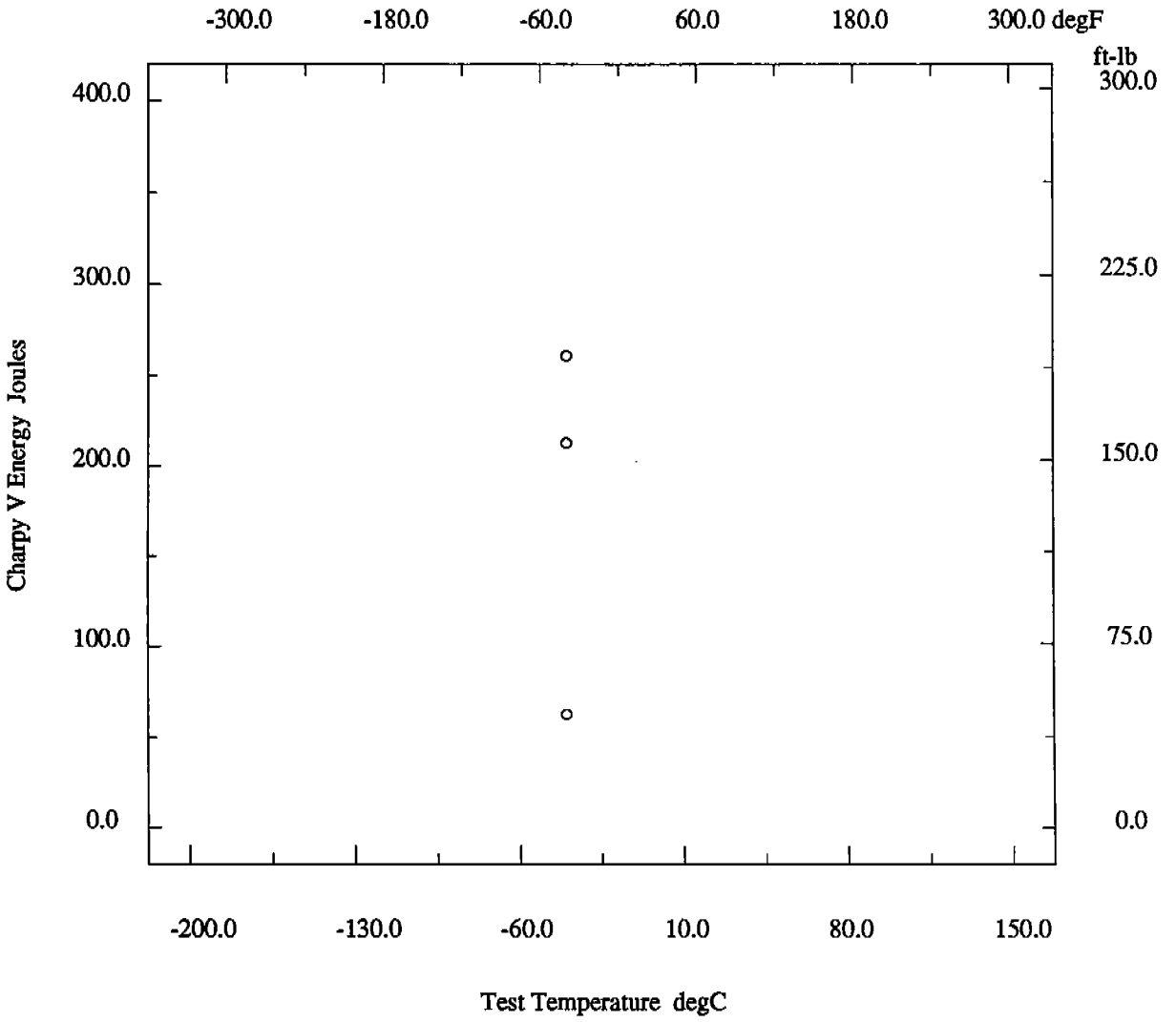
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	213
T-L °	-40	261
T-L °	-40	63

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03FBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04FBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.04FBS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

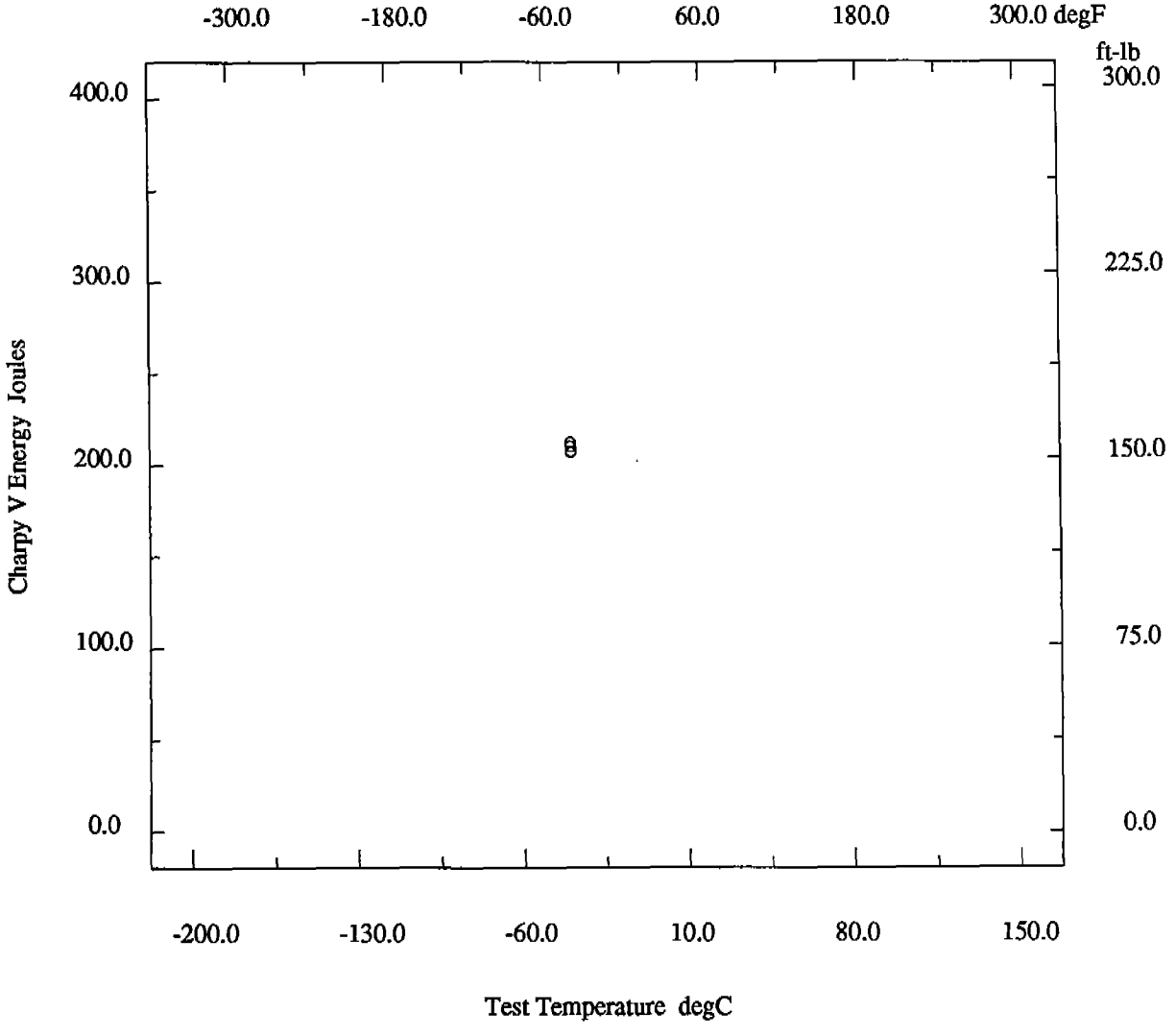
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	207
T-L °	-40	210
T-L °	-40	212

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04FBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05FBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14400.1

Fabrication History

See Page 14400.1

Weld

Weld Code	010.002.05FBS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	3 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	K-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Back surface not root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

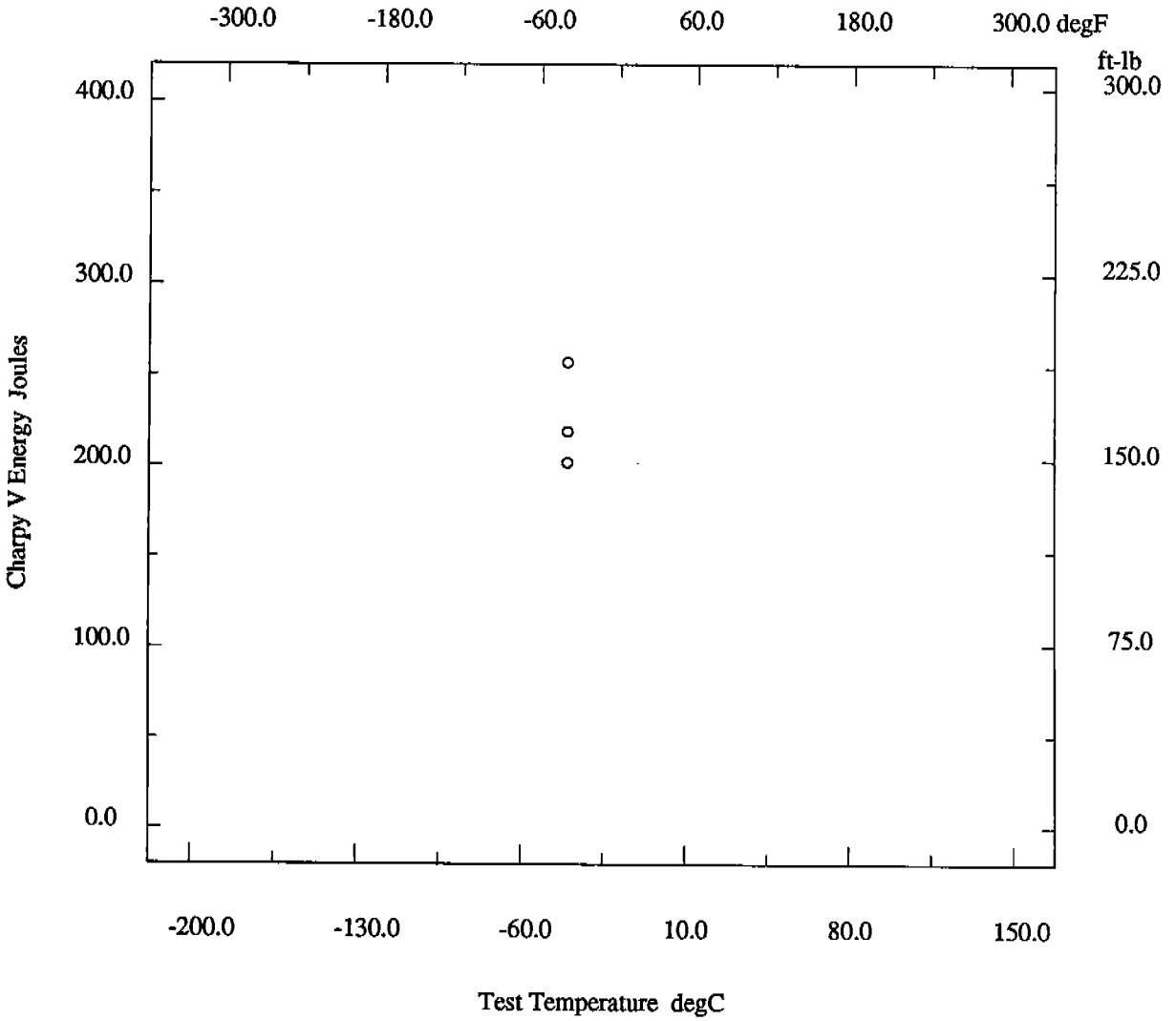
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	202
T-L °	-40	219
T-L °	-40	257

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05FBS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09GNA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

C	0.13 %	Mn	1.41 %
P	0.013 %	S	0.001 %
Si	0.40 %	Cr	0.02 %
Ni	0.17 %	Mo	0.02 %
V	0.004 %	Cu	0.17 %
Cb	0.025 %	Ti	<0.003 %
B	<0.0001 %	Al	0.028 %
N	0.0072 %	Other Components	*

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.002.09GNA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.62
-30	1.22
-30	>1.47
-10	>1.42
-10	>1.43
-10	>1.54

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02GNA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.02GNA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.17
-30	0.27
-30	0.95
-10	0.59
-10	1.28
-10	1.37

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09GNS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.09GNS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Full cross section
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	1.58
-30	>1.54
-30	>1.56
-10	>1.56
-10	>1.58
-10	>1.72

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02GNS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.02GNS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Full cross section
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.88
-30	1.26
-30	>1.52
-10	>1.54
-10	>1.55
-10	>1.55

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09GFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.09GFA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

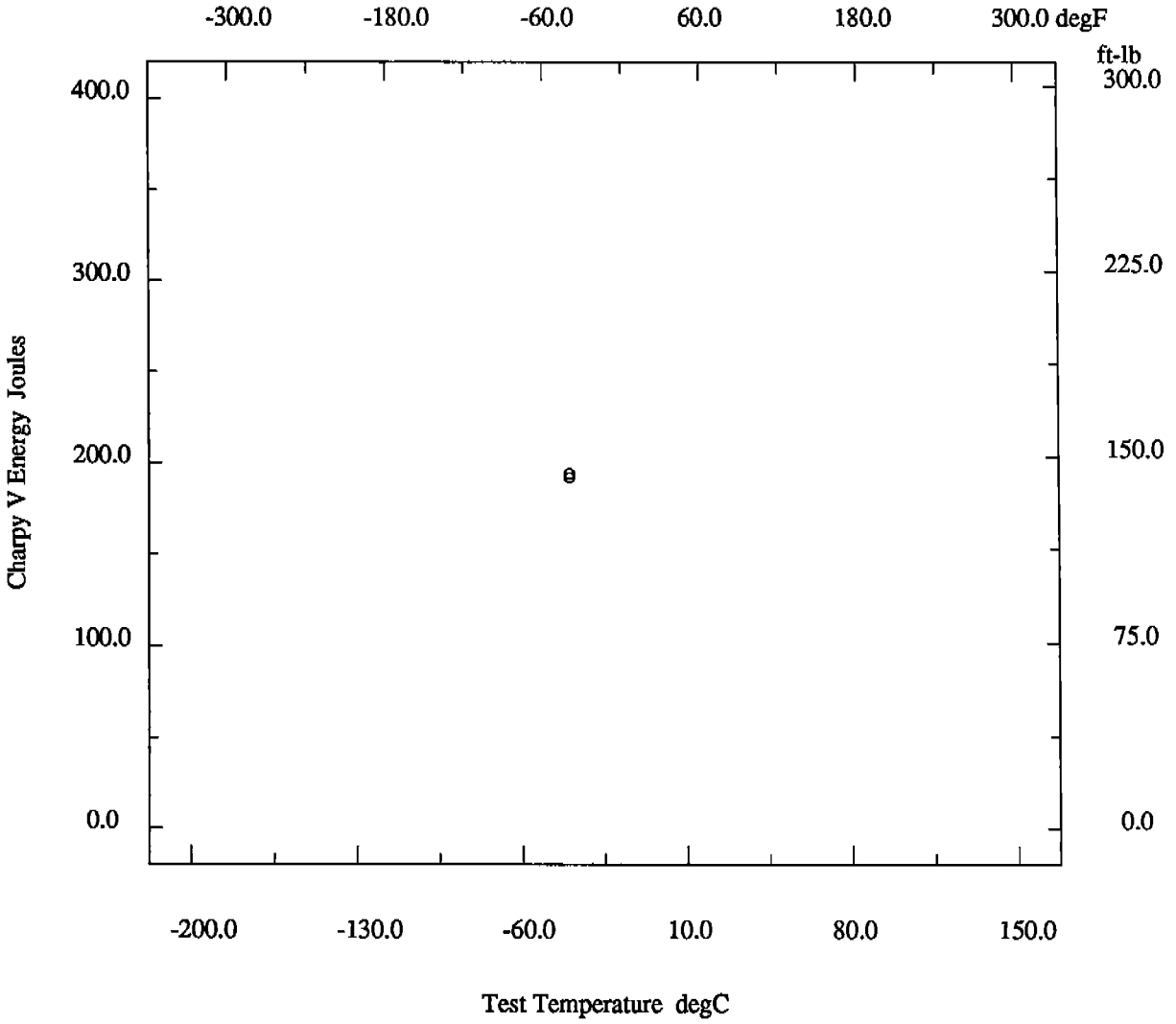
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	192
T-L °	-40	194
T-L °	-40	194

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09GFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02GFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14500.1

Fabrication History See Page 14500.1

Weld

Weld Code	010.002.02GFA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

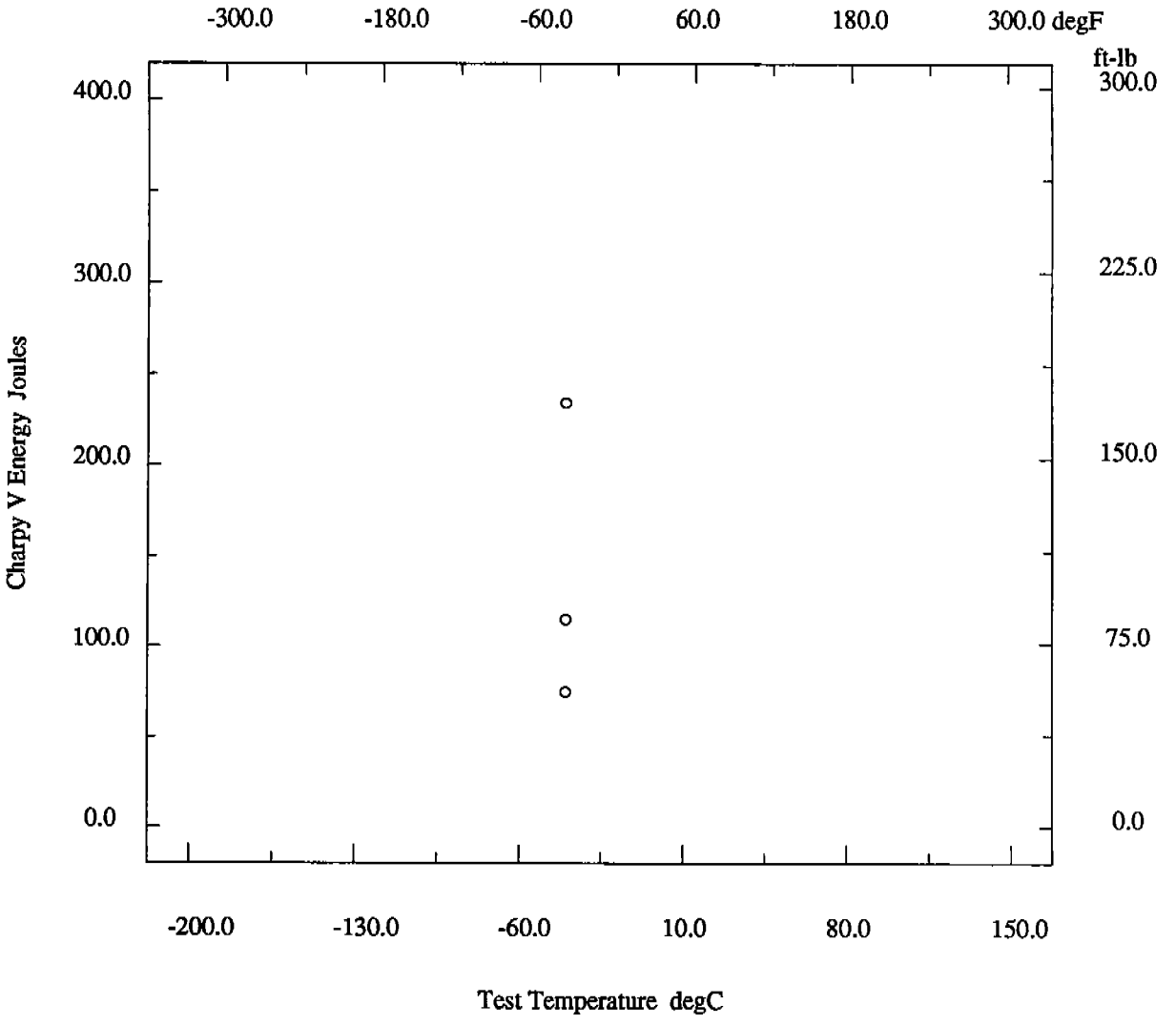
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	115
T-L °	-40	234
T-L °	-40	75

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02GFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03GFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.03GFA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

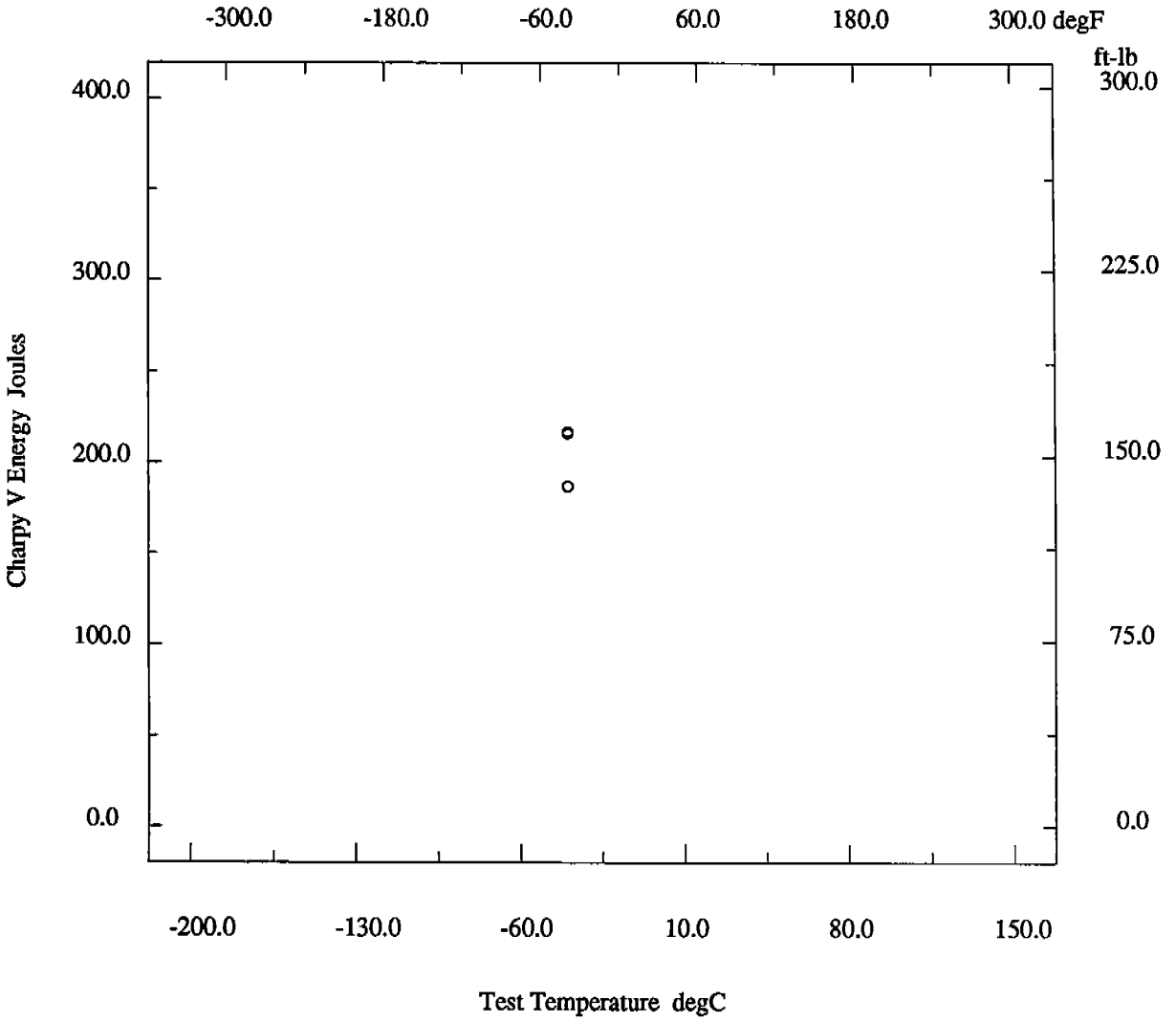
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	187
T-L °	-40	216
T-L °	-40	217

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03GFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04GFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.04GFA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

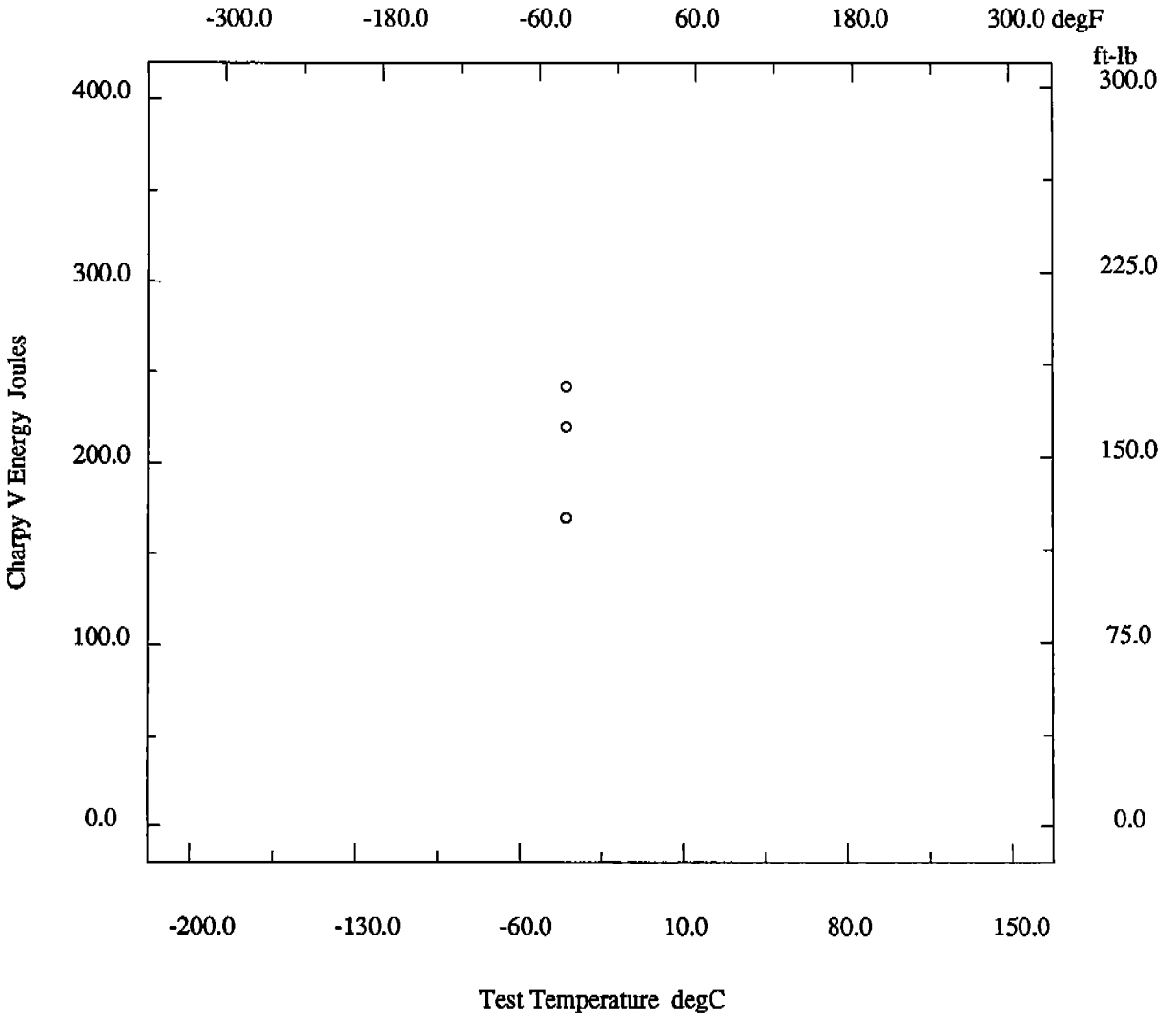
Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	170
T-L o	-40	220
T-L o	-40	242

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04GFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05GFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.05GFA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

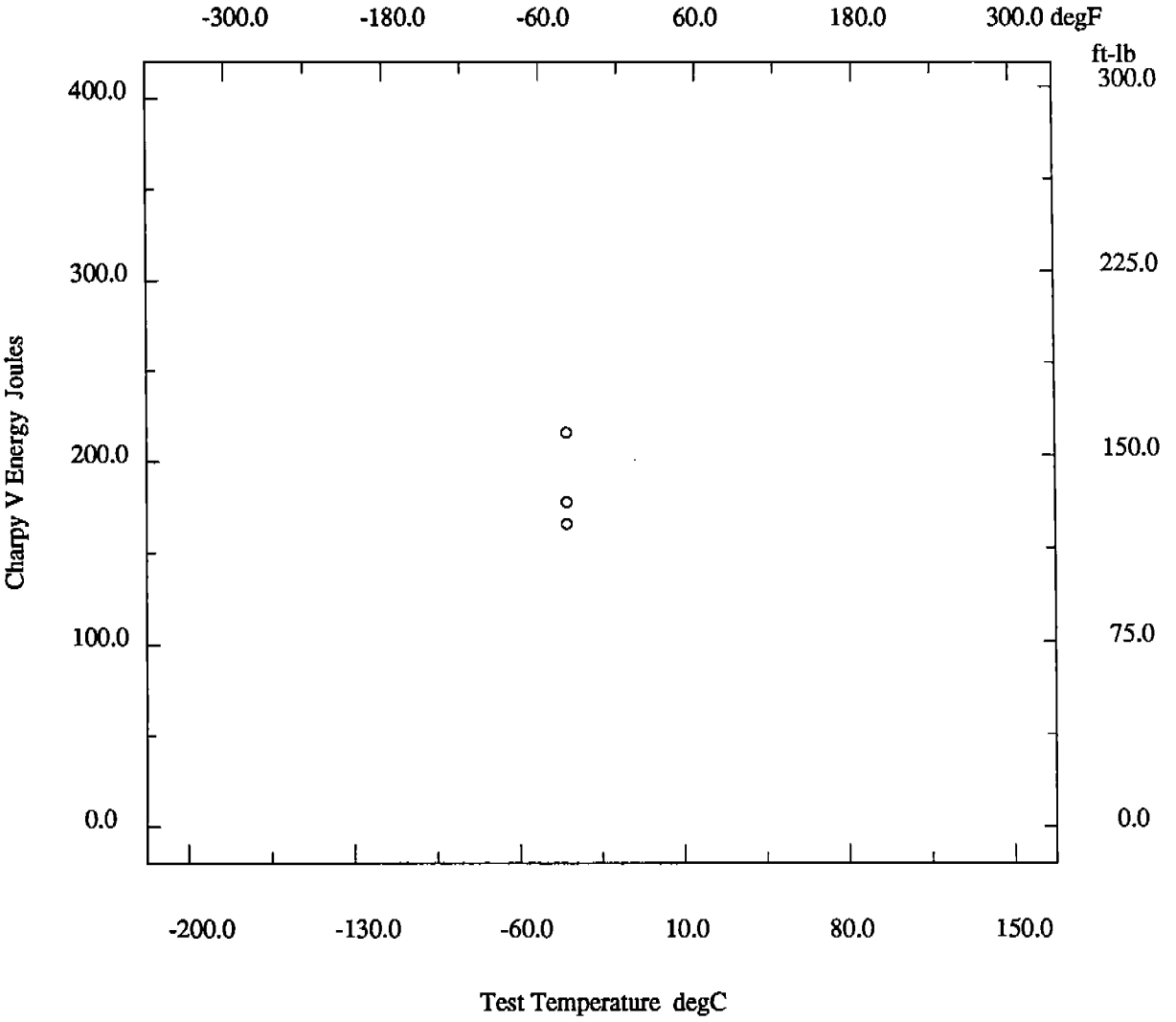
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	166
T-L °	-40	178
T-L °	-40	216

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05GFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09GRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.09GRA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

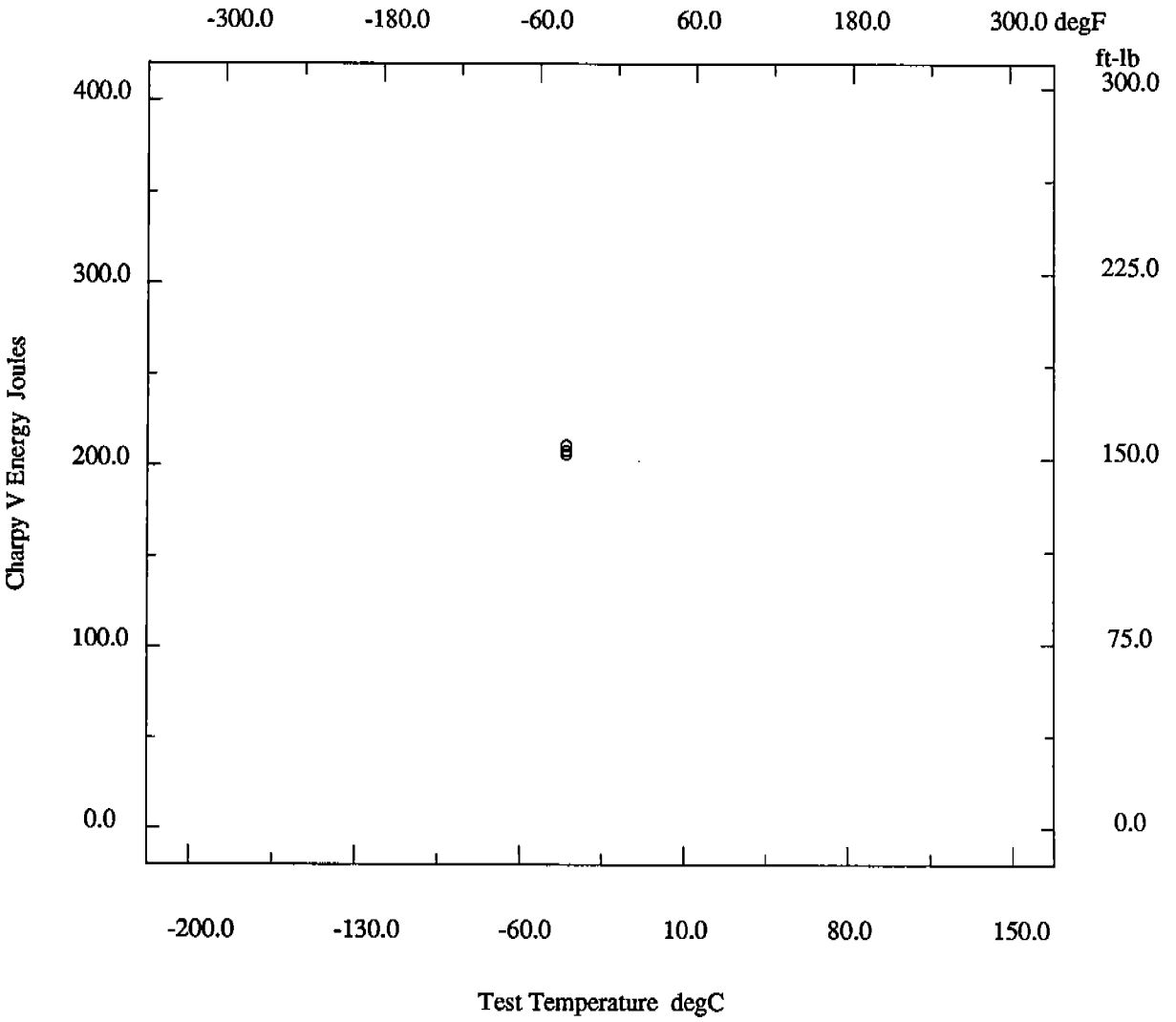
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	206
T-L °	-40	208
T-L °	-40	211

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09GRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02GRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.02GRA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

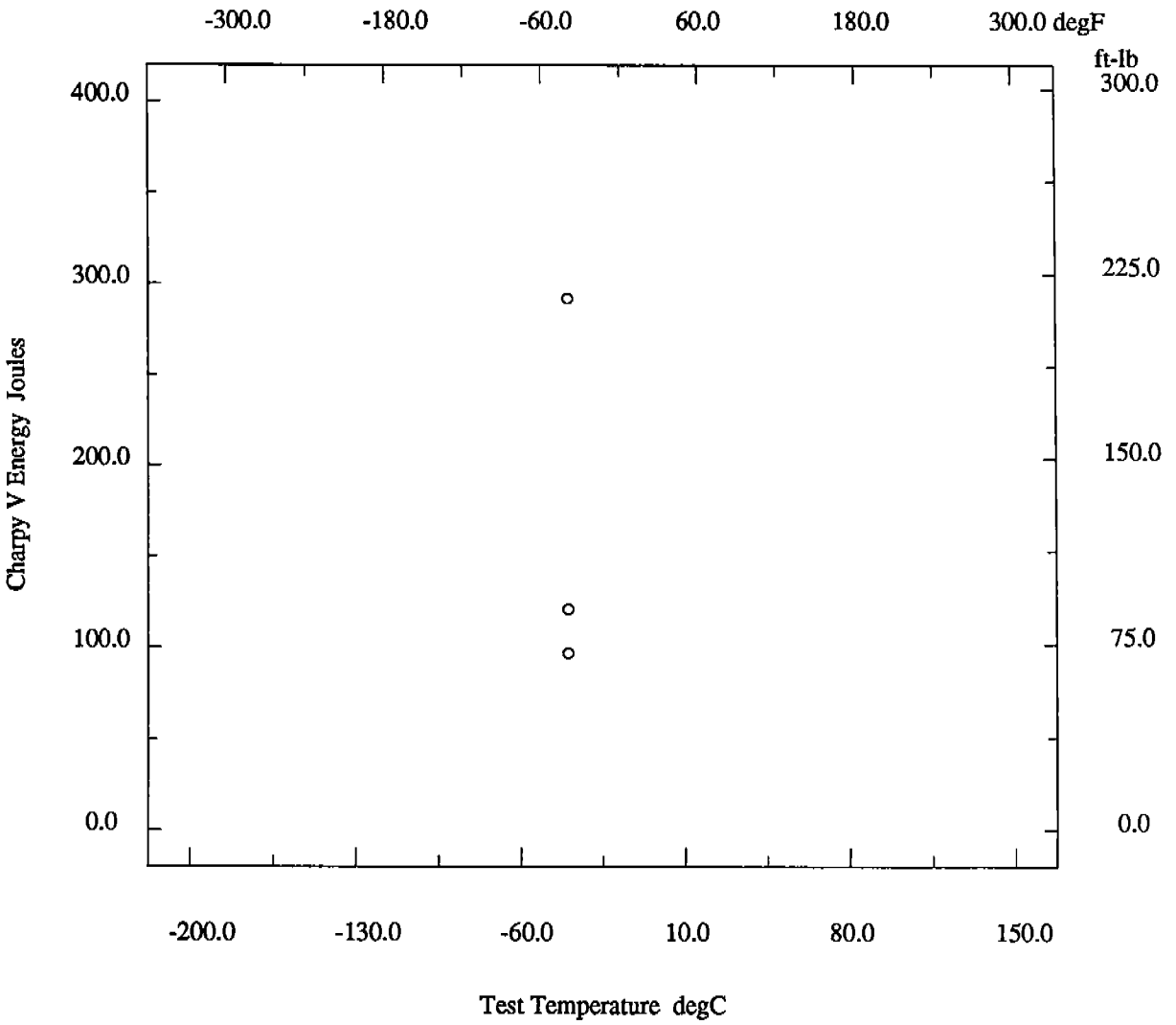
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	121
T-L °	-40	292
T-L °	-40	97

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02GRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03GRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14500.1

Fabrication History See Page 14500.1

Weld

Weld Code	010.002.03GRA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

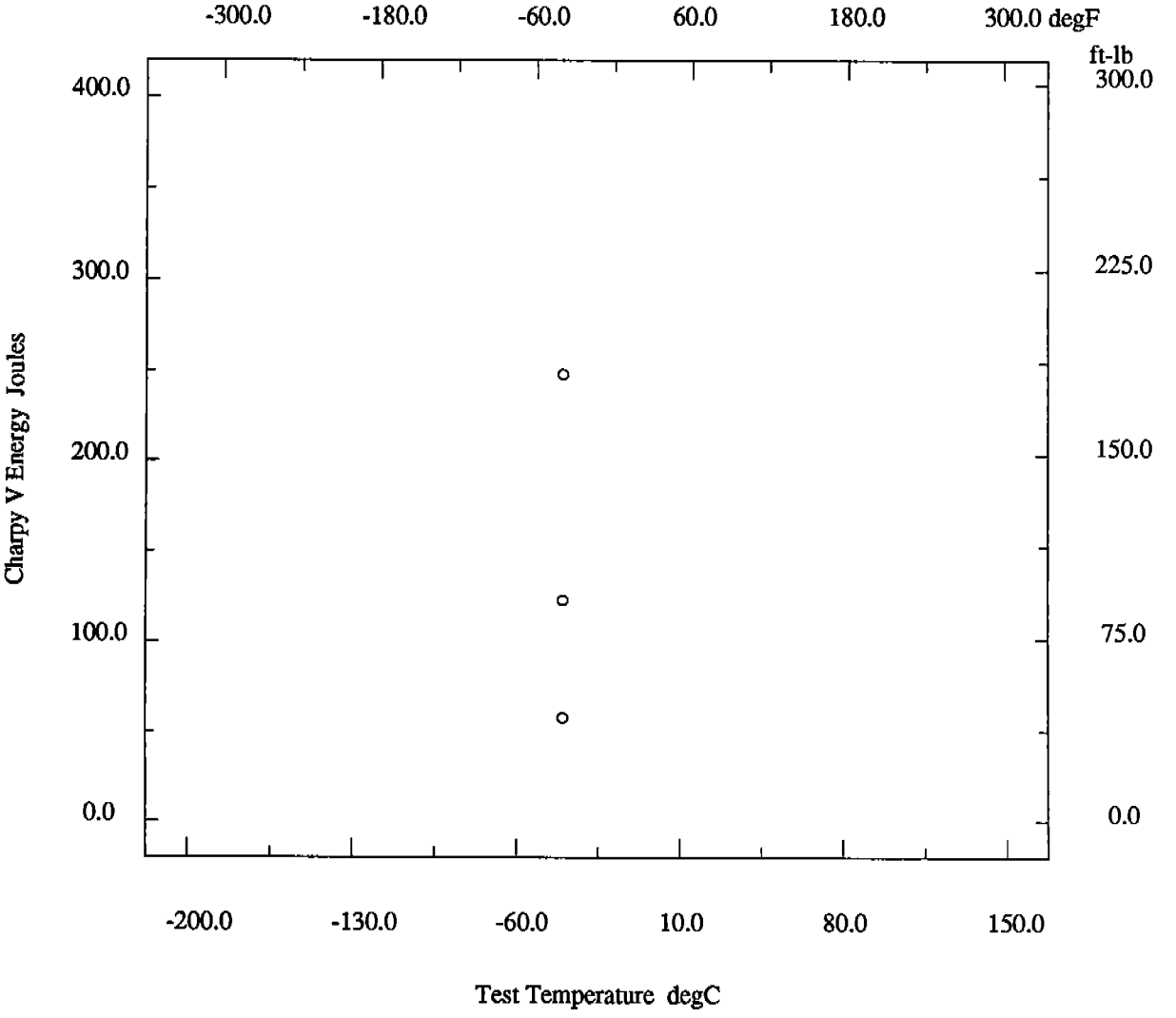
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-40	123
T-L ○	-40	248
T-L ○	-40	58

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03GRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04GRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.04GRA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

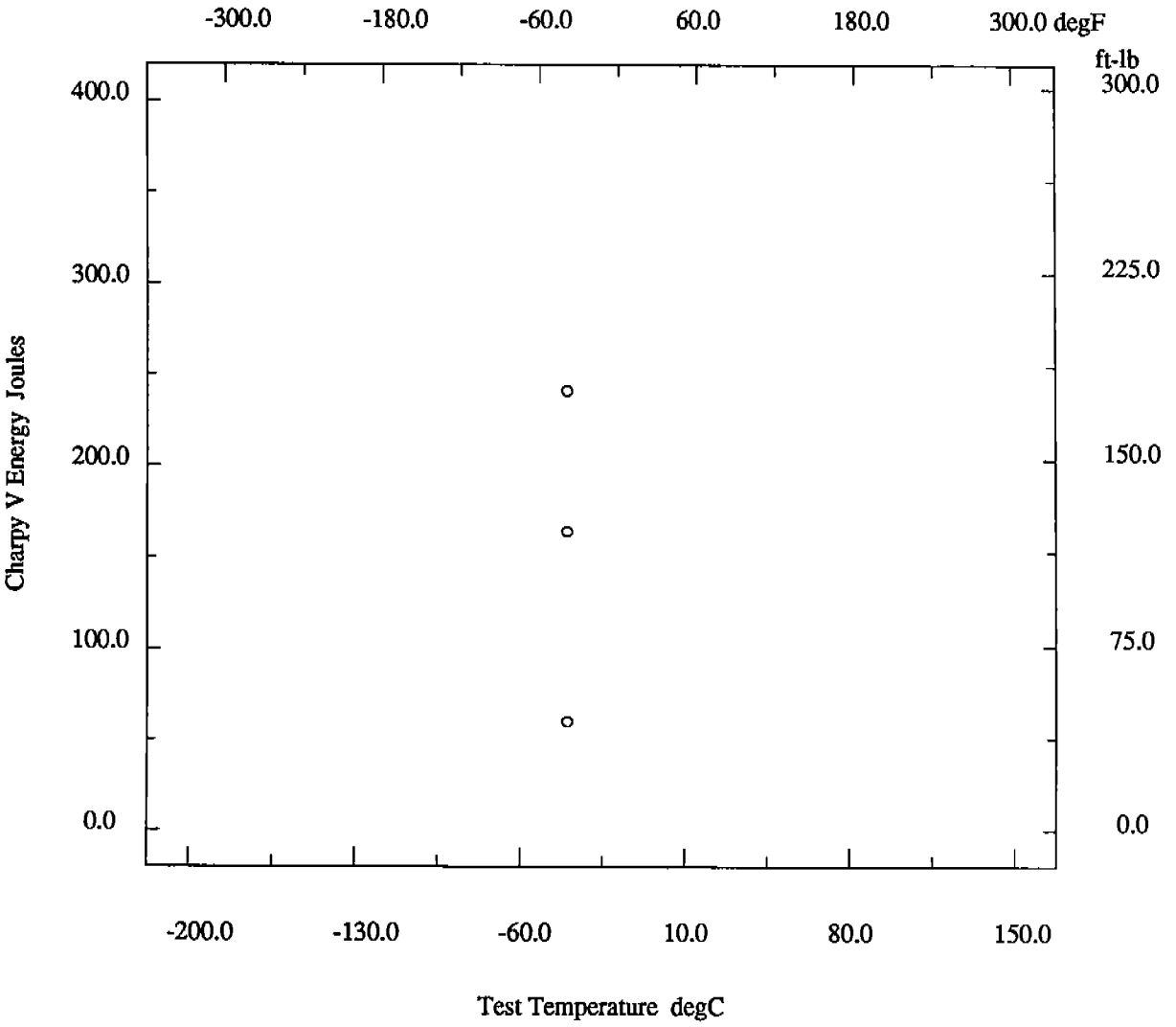
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	164
T-L °	-40	241
T-L °	-40	60

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04GRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05GRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.05GRA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

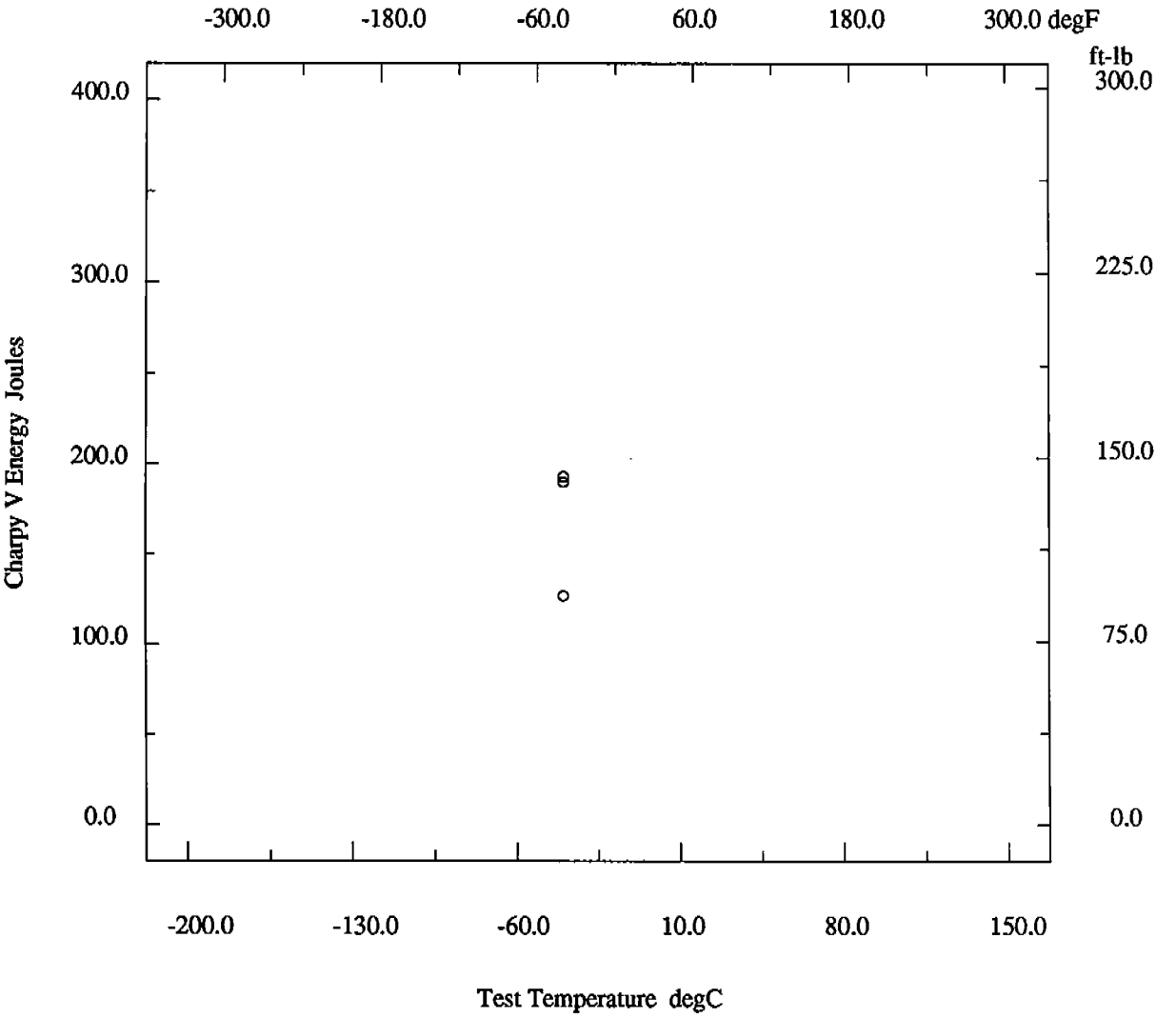
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-40	127
T-L ○	-40	190
T-L ○	-40	193

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05GRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09GFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.09GFS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

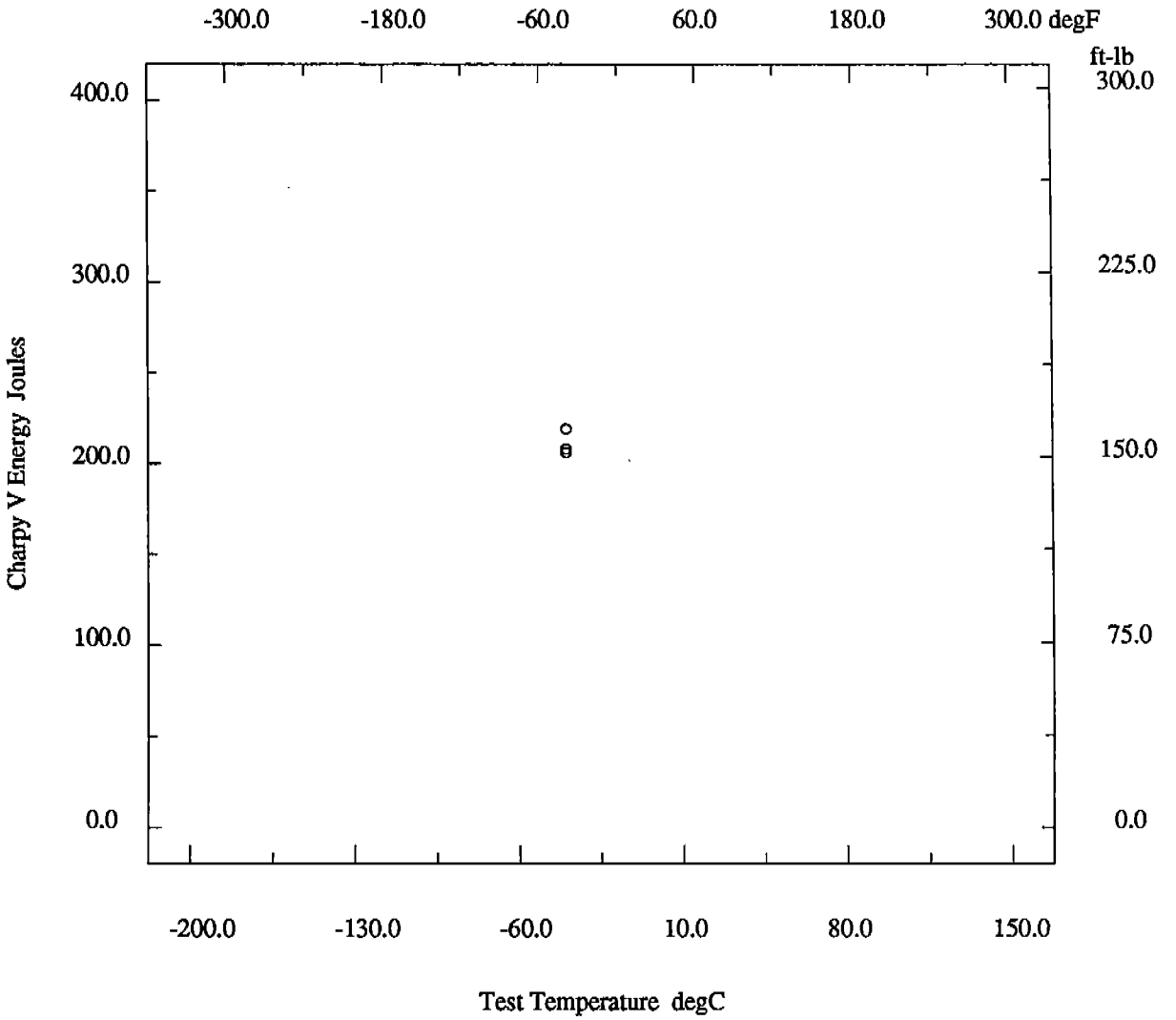
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	206
T-L °	-40	208
T-L °	-40	219

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09GFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02GFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.02GFS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

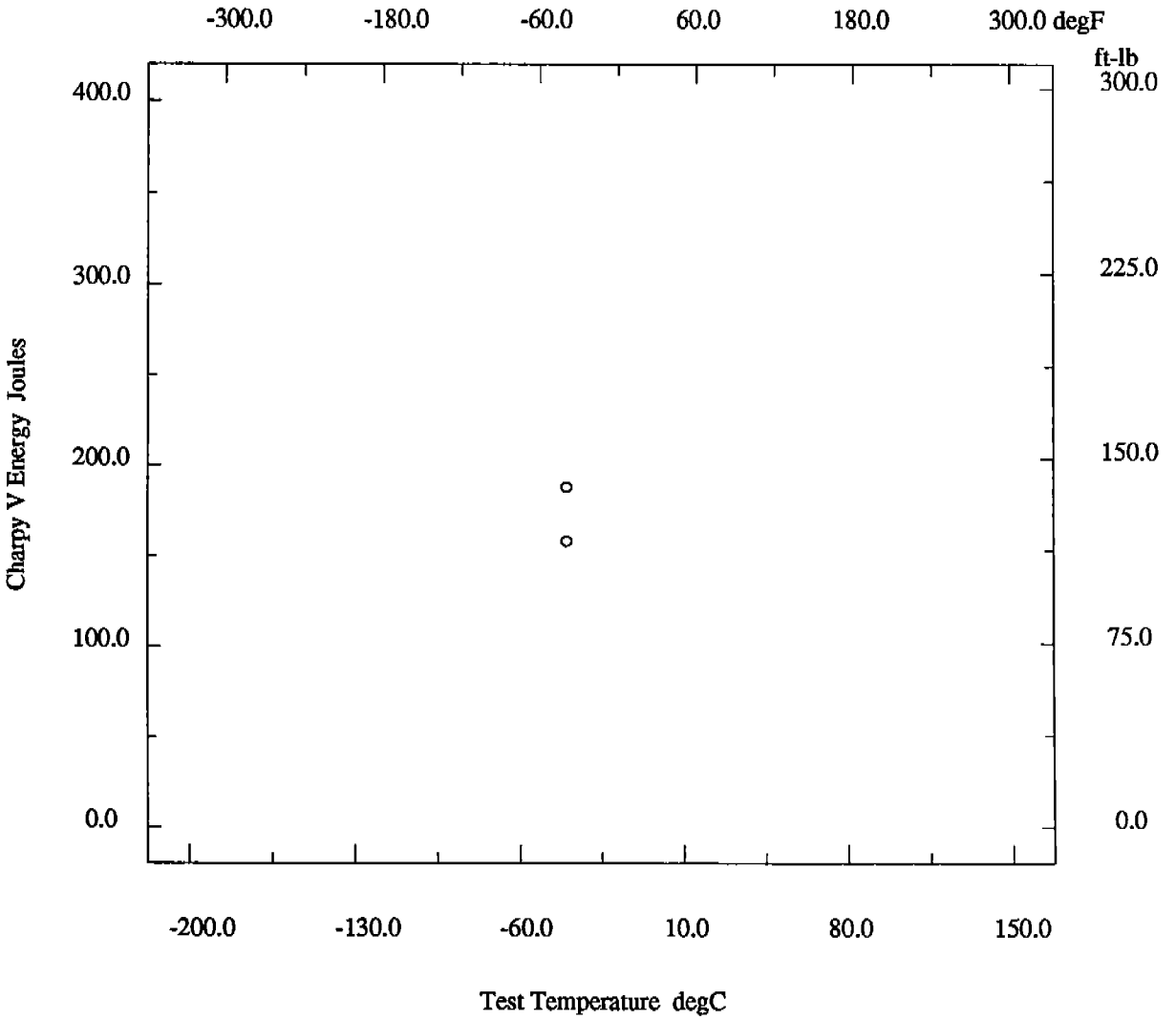
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	158
T-L °	-40	188
T-L °	-40	188

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02GFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03GFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.03GFS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

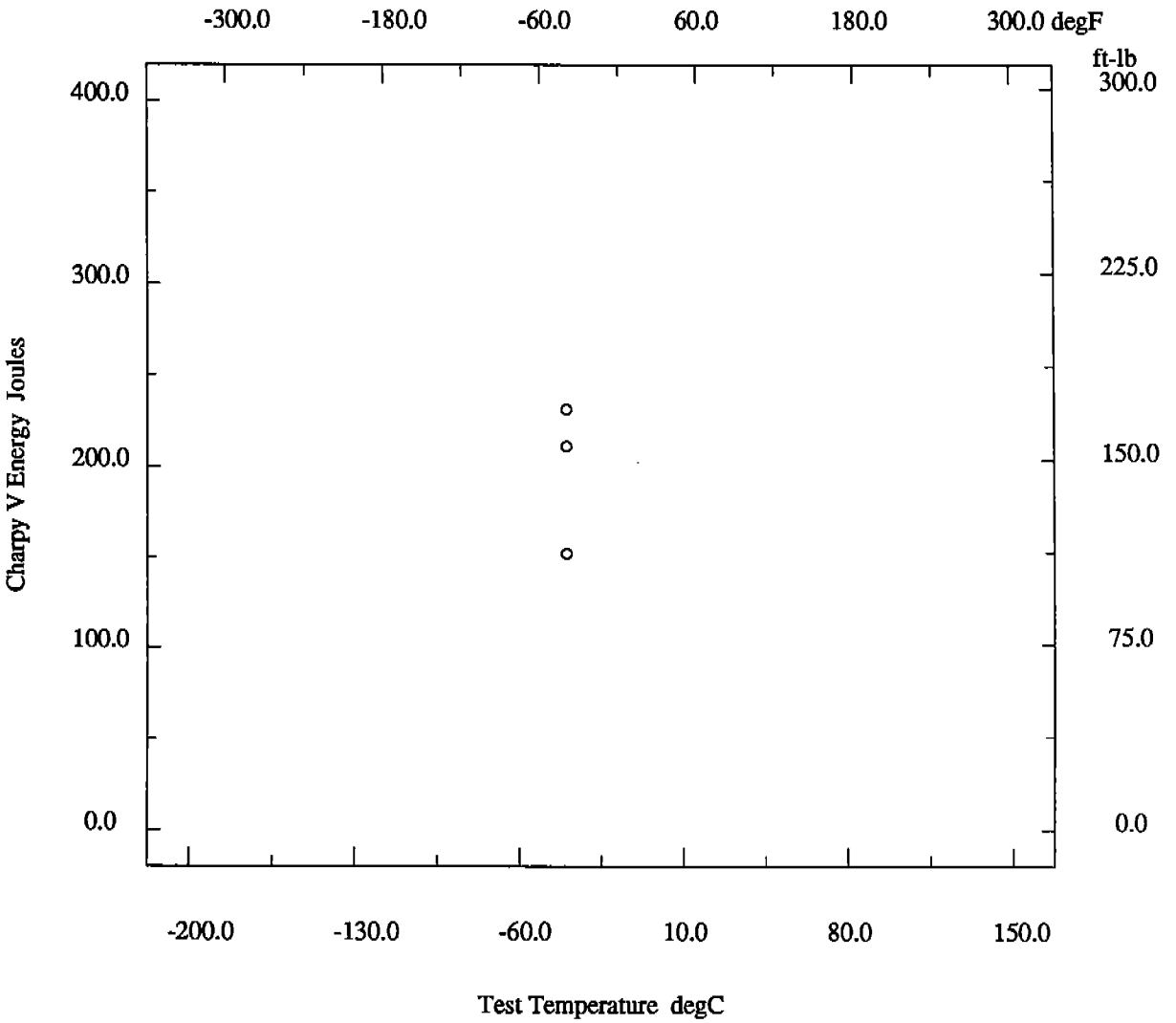
Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	152
T-L °	-40	211
T-L °	-40	231

* - not reported

Material BS4360 Gr50D

Description			
Material Code	010.002.03GFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04GFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.04GFS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

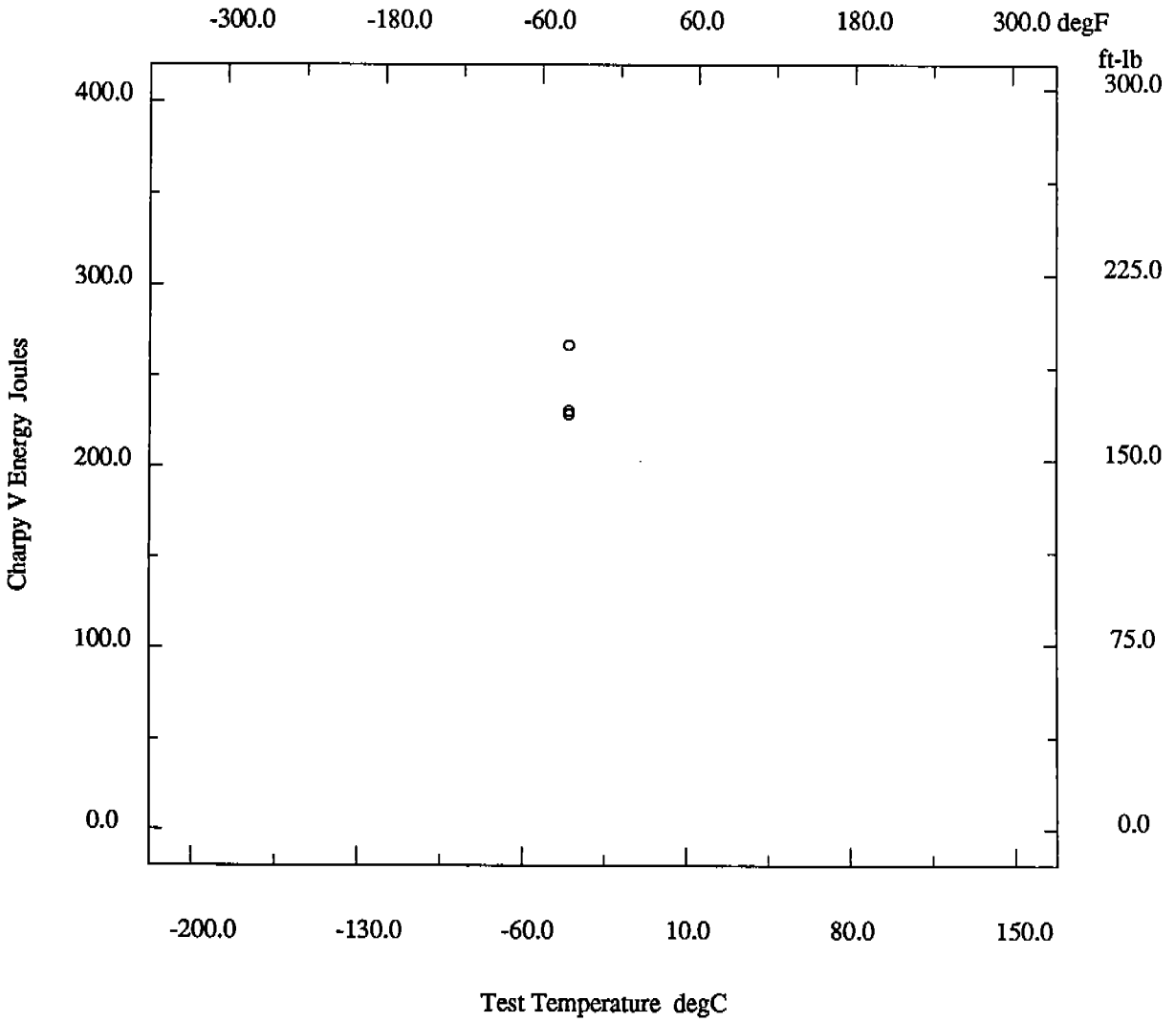
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-40	229
T-L ○	-40	231
T-L ○	-40	267

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04GFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05GFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.05GFS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

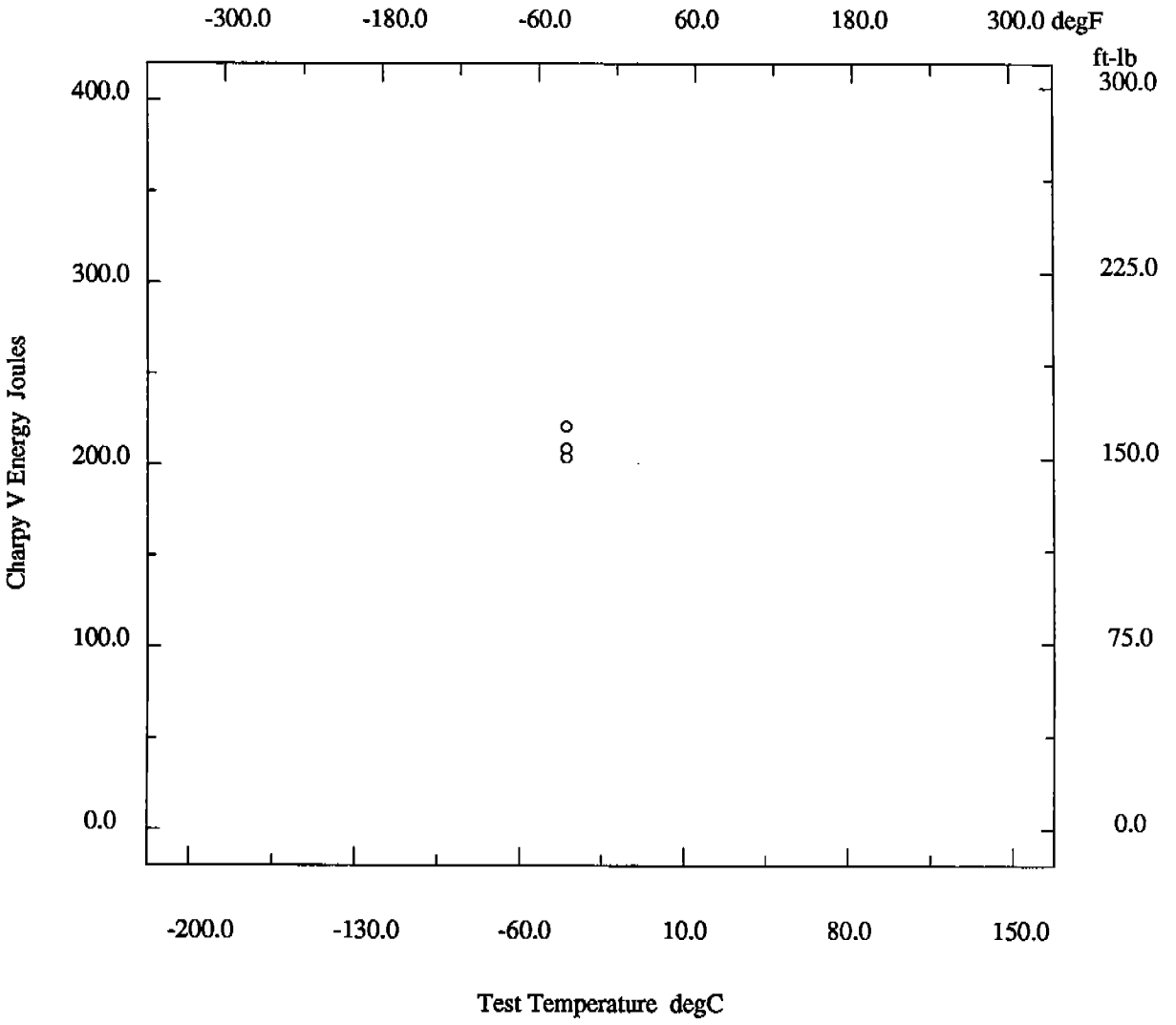
Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	204
T-L o	-40	209
T-L o	-40	221

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05GFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09GRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.09GRS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

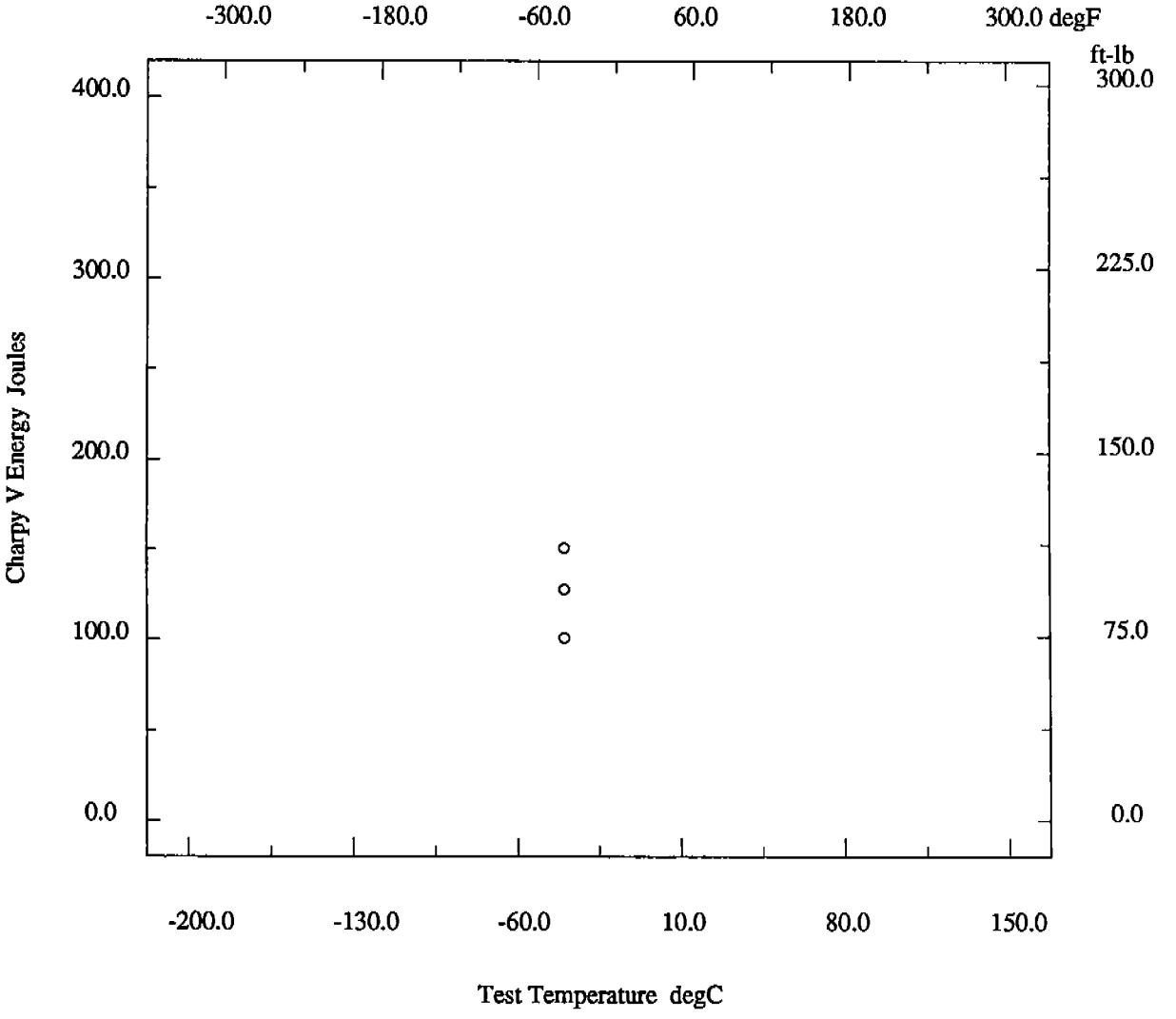
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	101
T-L °	-40	128
T-L °	-40	151

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09GRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02GRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14500.1

Fabrication History See Page 14500.1

Weld

Weld Code	010.002.02GRS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

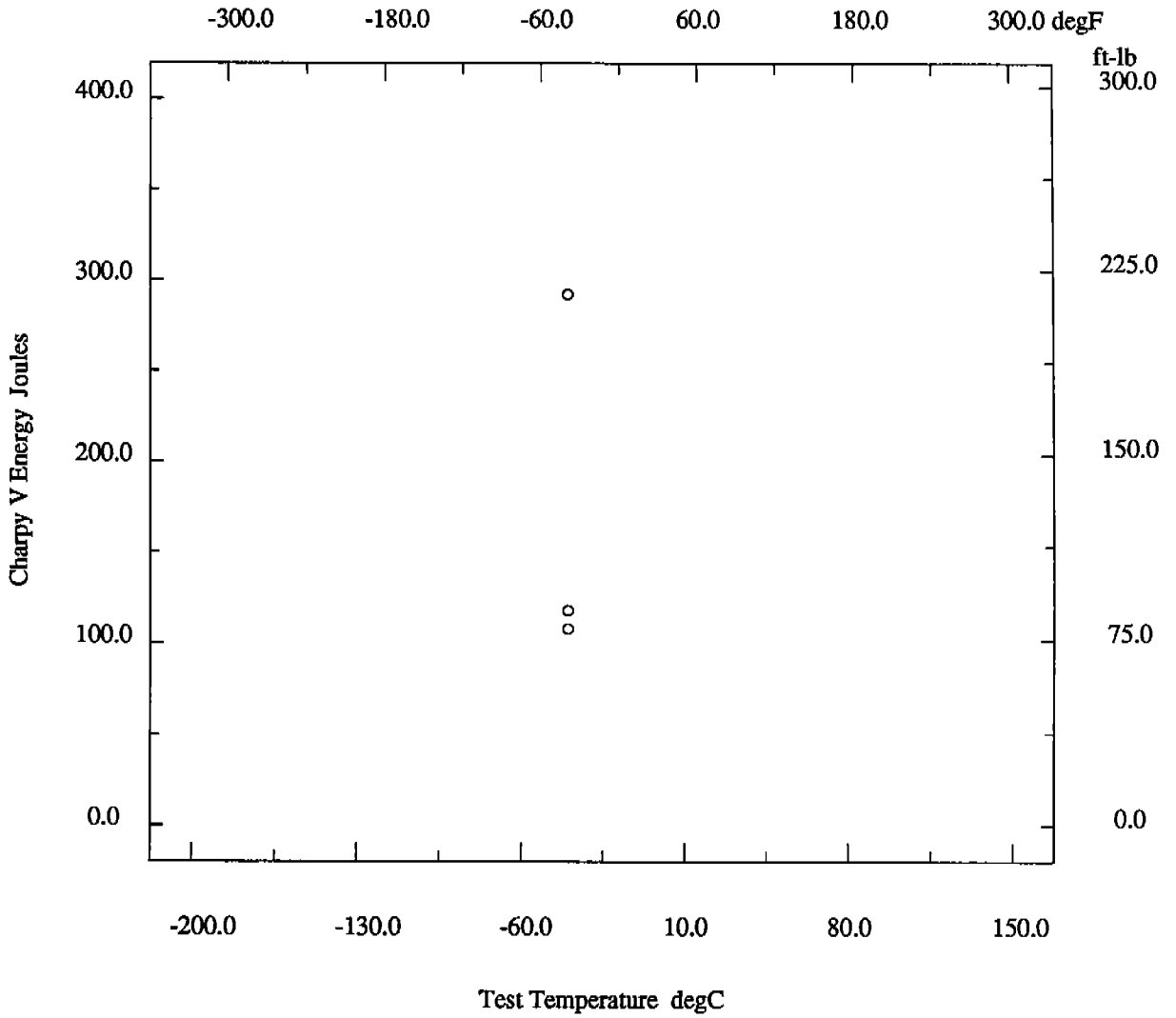
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	108
T-L °	-40	118
T-L °	-40	292

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02GRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03GRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.03GRS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

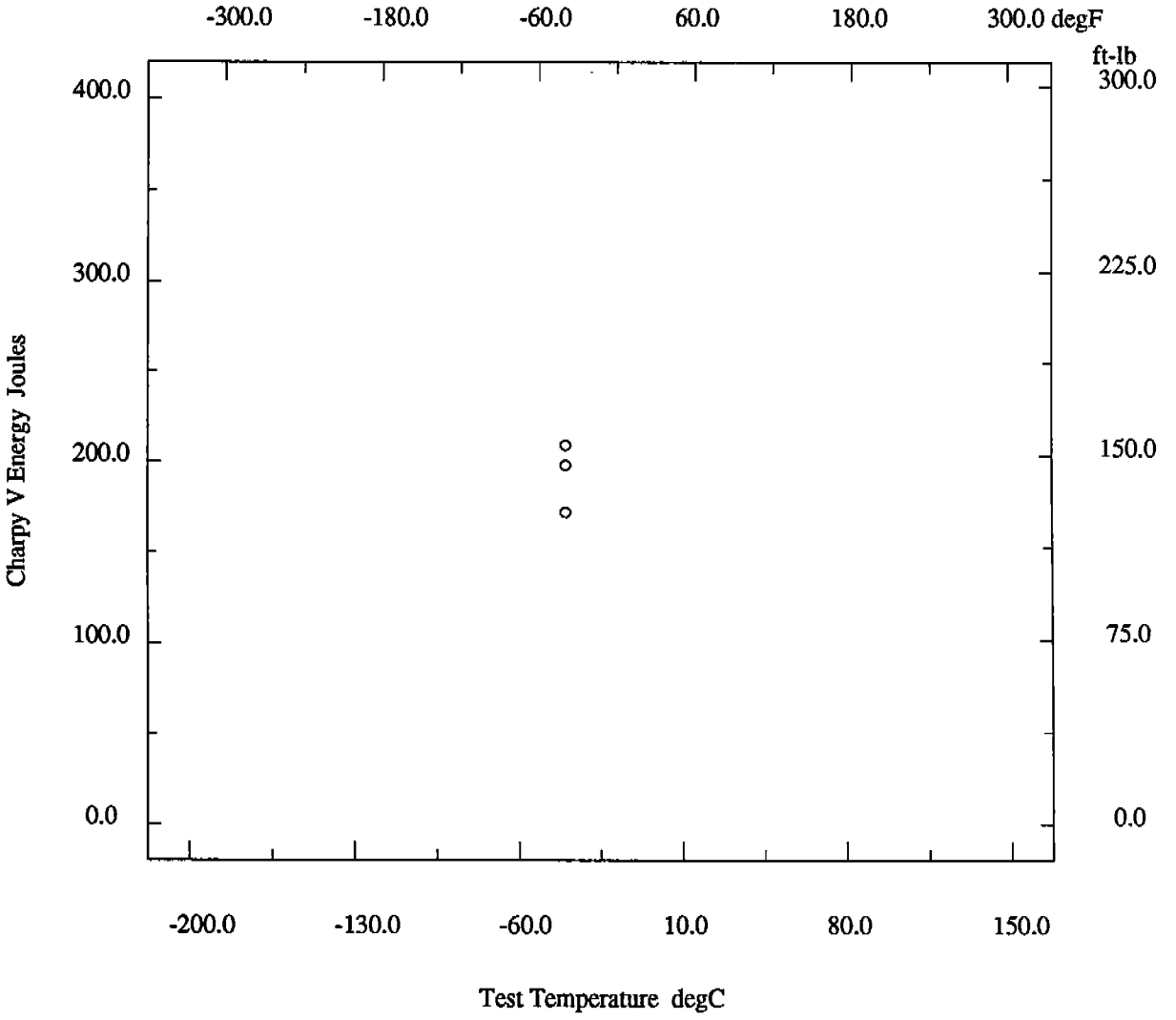
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	172
T-L °	-40	198
T-L °	-40	209

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03GRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04GRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.04GRS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

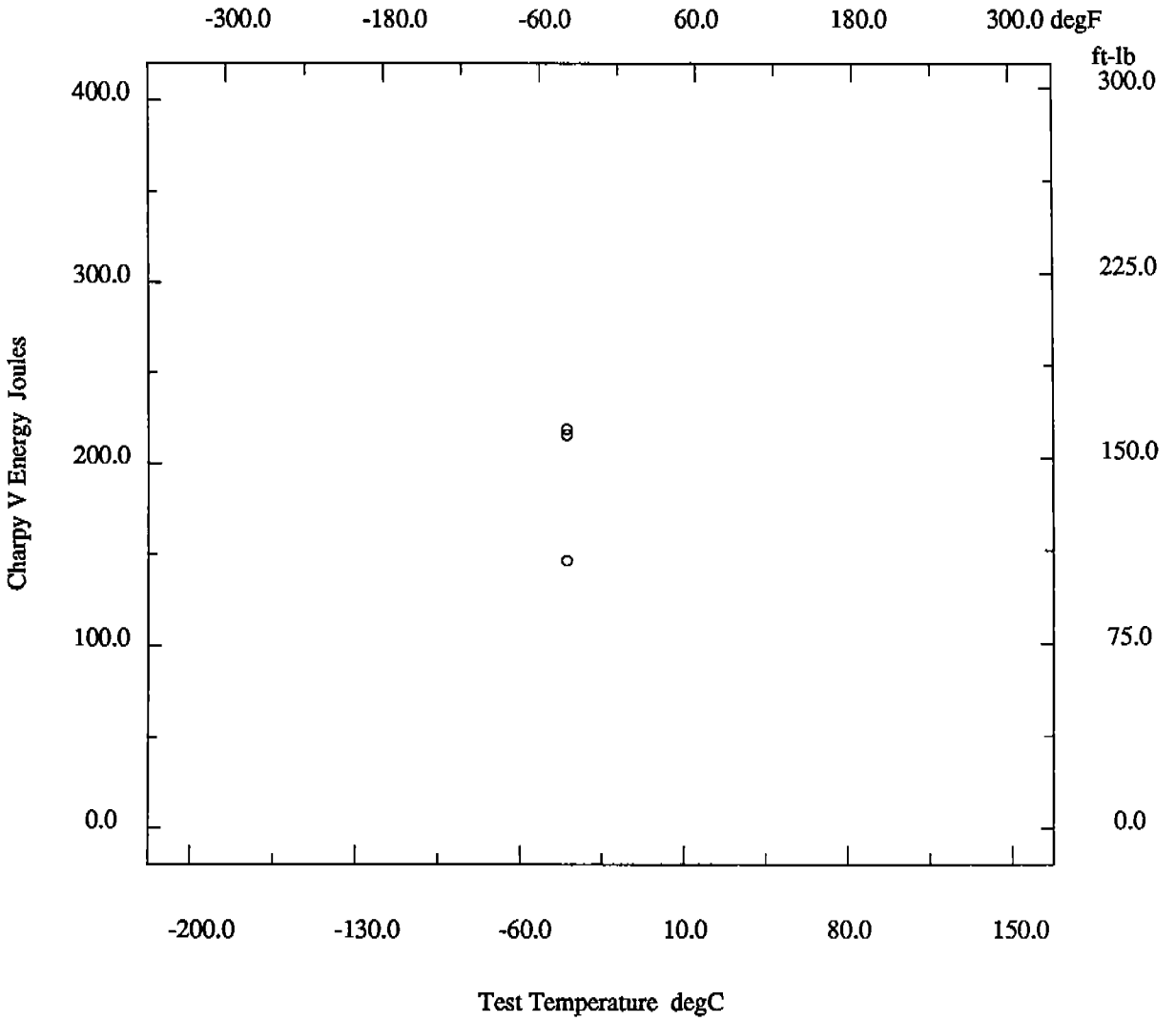
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	147
T-L °	-40	216
T-L °	-40	219

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04GRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05GRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.05GRS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

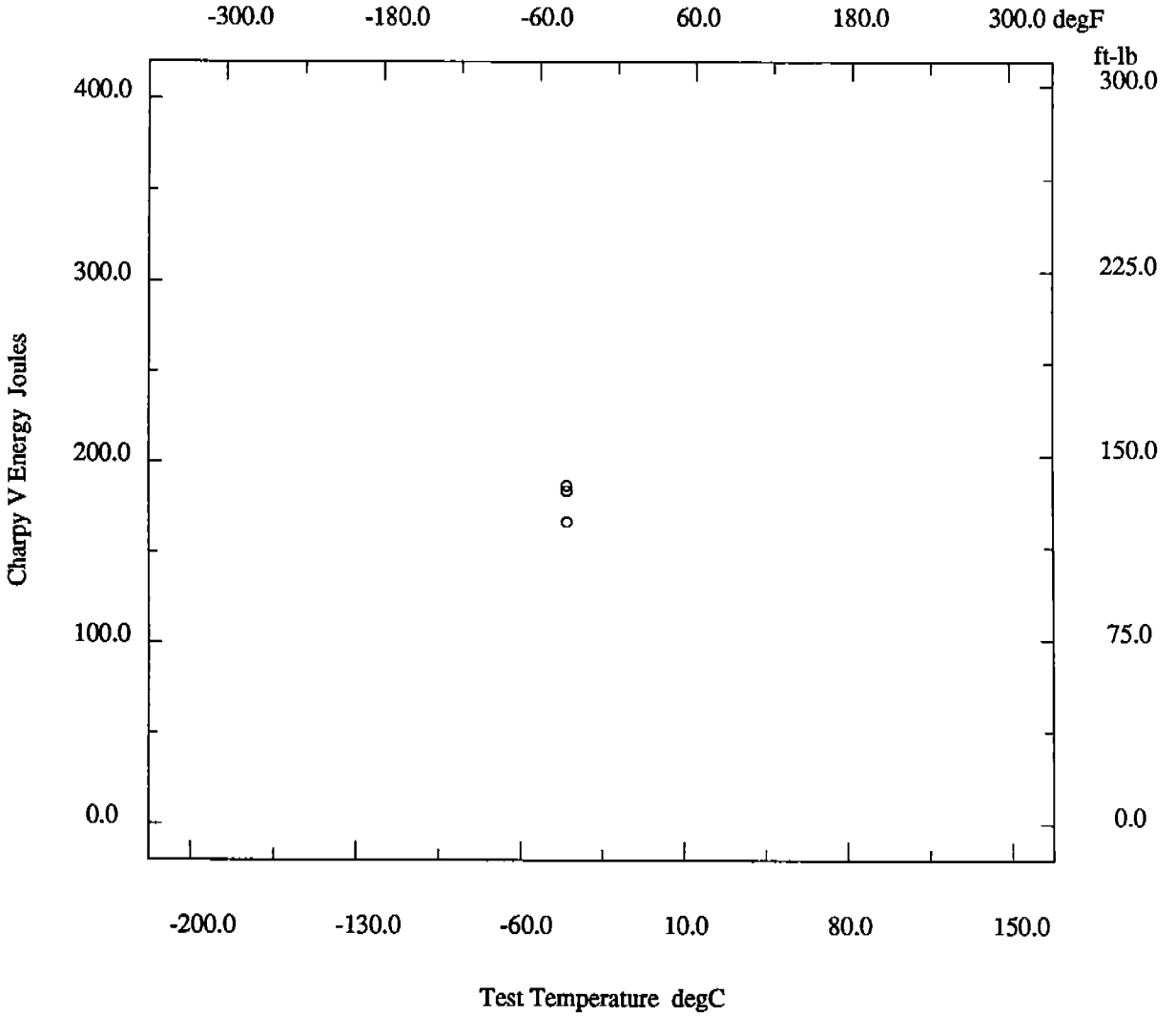
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	167
T-L °	-40	184
T-L °	-40	187

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05GRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.10GSA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.10GSA	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Transverse	Location wrt Surface	*
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Tensile	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	25 mm	Gage Length	*
Loading Rate	*	Tensile Strength Offset	*
Tensile Yield Strength	*	Tensile Yield Point	*
Uniform Elongation	*	Elongation	*
Reduction in Area	*	Tensile Modulus	*
Standard Method	*	Standard Year	*

Test Temp degC	UTS N/mm2
20	563
20	567

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.10GSS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14500.1

Fabrication History

See Page 14500.1

Weld

Weld Code	010.002.10GSS	Weld Type	SAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	36 volts
Amperage	580 amps	Polarity	*
Travel Speed	35 cm/min	Heat Input/Pass	35 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Transverse	Location wrt Surface	*
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Tensile	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	25 mm	Gage Length	*
Loading Rate	*	Tensile Strength Offset	*
Tensile Yield Strength	*	Tensile Yield Point	*
Uniform Elongation	*	Elongation	*
Reduction in Area	*	Tensile Modulus	*
Standard Method	*	Standard Year	*

Test Temp degC	UTS N/mm2
20	530
20	533

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09HNA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

C	0.13 %	Mn	1.41 %
P	0.013 %	S	0.001 %
Si	0.40 %	Cr	0.02 %
Ni	0.17 %	Mo	0.02 %
V	0.004 %	Cu	0.17 %
Cb	0.025 %	Ti	<0.003 %
B	<0.0001 %	Al	0.028 %
N	0.0072 %	Other Components	*

Fabrication History

Heat Treatment	*	Producer	Sumitomo
Year Produced	*	Addl Info	None
Source	Sumitomo	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.002.09HNA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	>1.49
-30	>1.50
-30	>1.52
-10	>1.46
-10	>1.48
-10	>1.48

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02HNA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.02HNA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.29
-30	0.72
-30	>1.48
-10	0.60
-10	0.66
-10	0.75

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09HNS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.09HNS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Full cross section
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	>1.55
-30	>1.56
-30	>1.57
-10	>1.53
-10	>1.54
-10	>1.55

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02HNS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.02HNS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Full cross section
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Fracture Toughness	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	*	Crack Length	*
Loading Type	*	Loading Rate	*
KQ	*	KIc	*
Valid KIc?	*	Reason for Invalid	*
JIc	*	KJc	*
JIcpr	*	Initial COD	*
Curve Shape	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	*

Test Temp degC	CODIc mm
-30	0.41
-30	0.63
-30	0.68
-10	>1.50
-10	>1.53
-10	>1.53

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09HFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.09HFA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

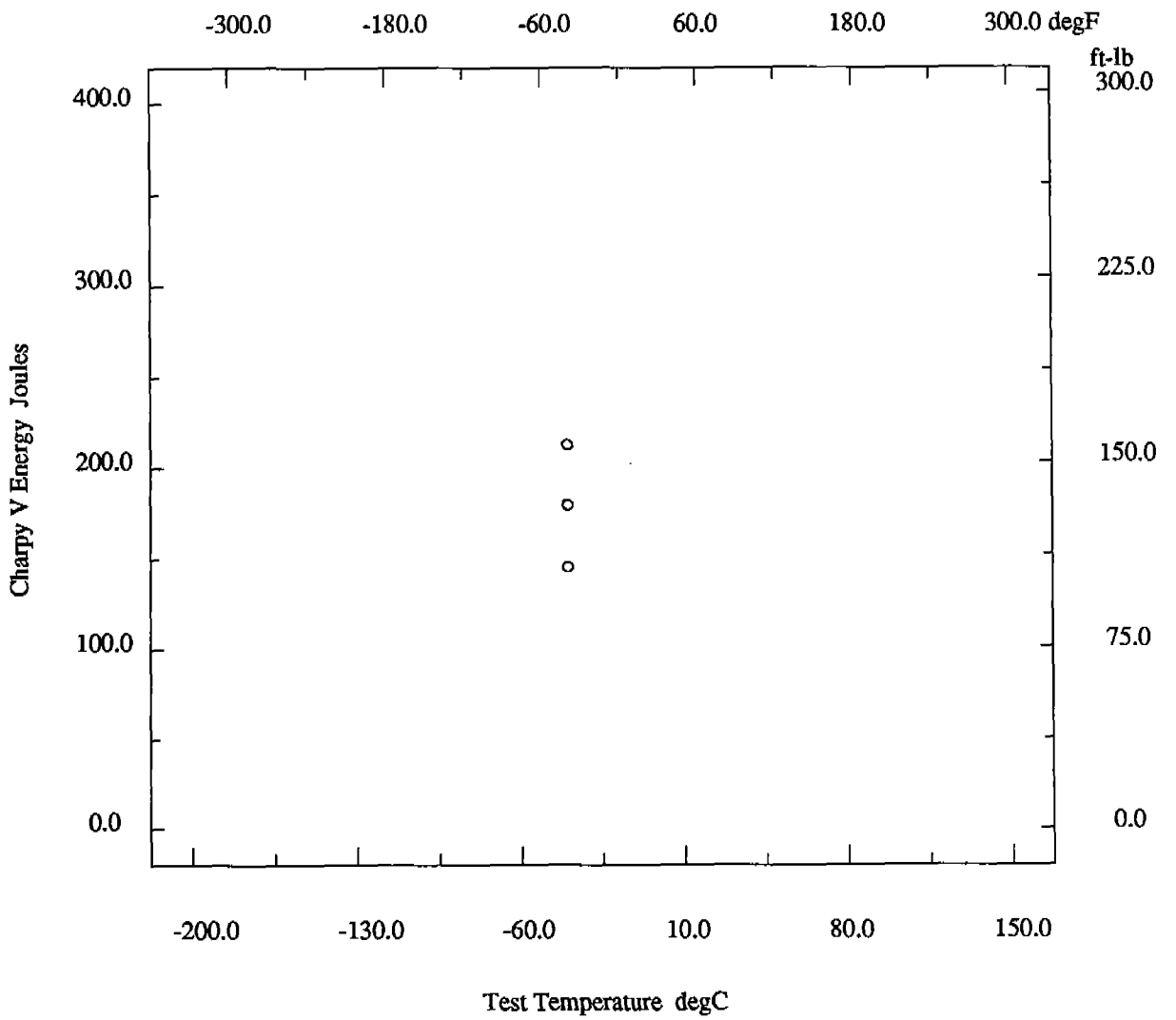
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	146
T-L °	-40	180
T-L °	-40	213

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09HFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02HFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14600.1

Fabrication History See Page 14600.1

Weld

Weld Code	010.002.02HFA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

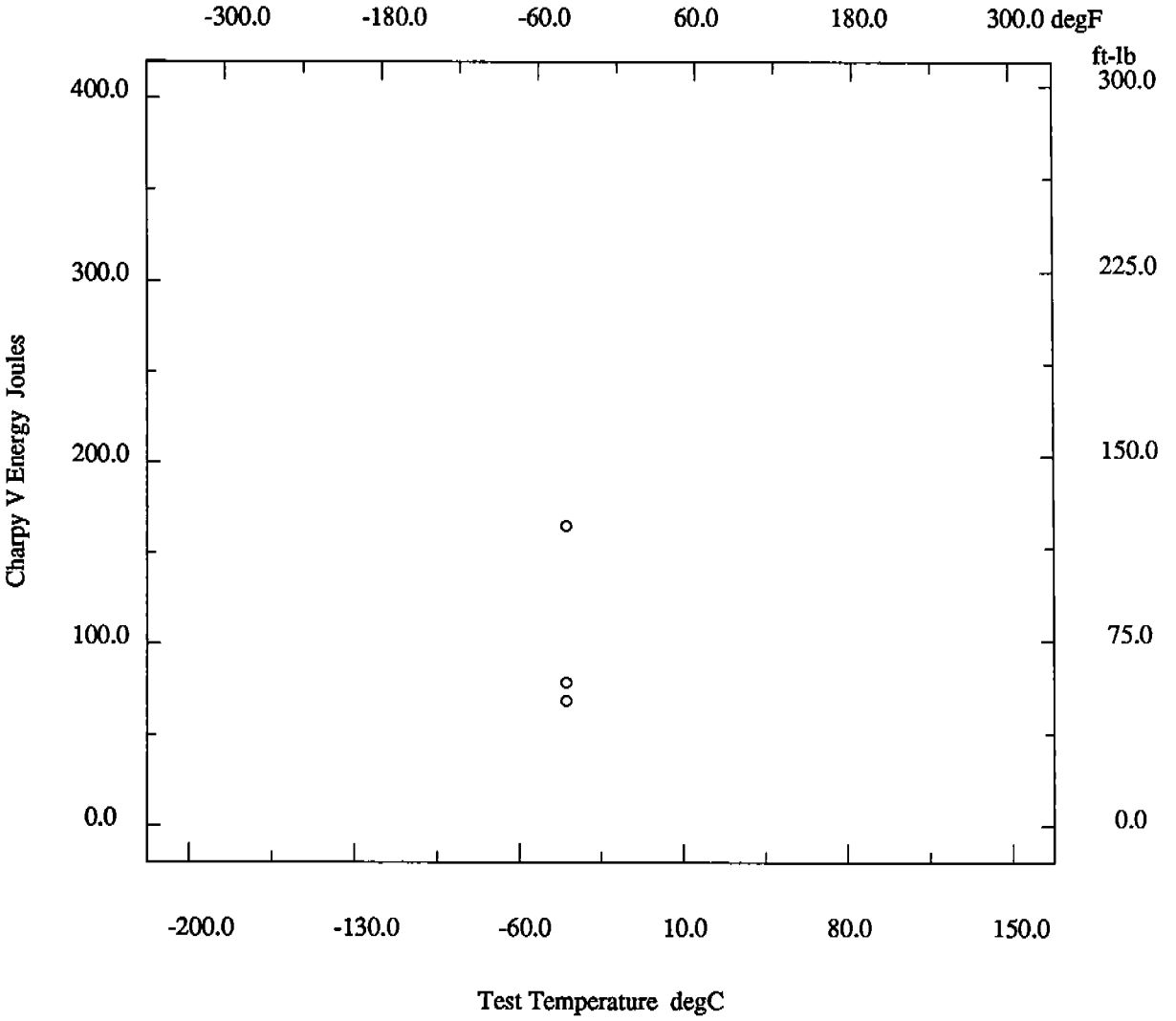
Orien	Test Temp degC	CVN Energy Joules
T-L o	-40	165
T-L o	-40	69
T-L o	-40	79

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02HFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03HFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.03HFA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

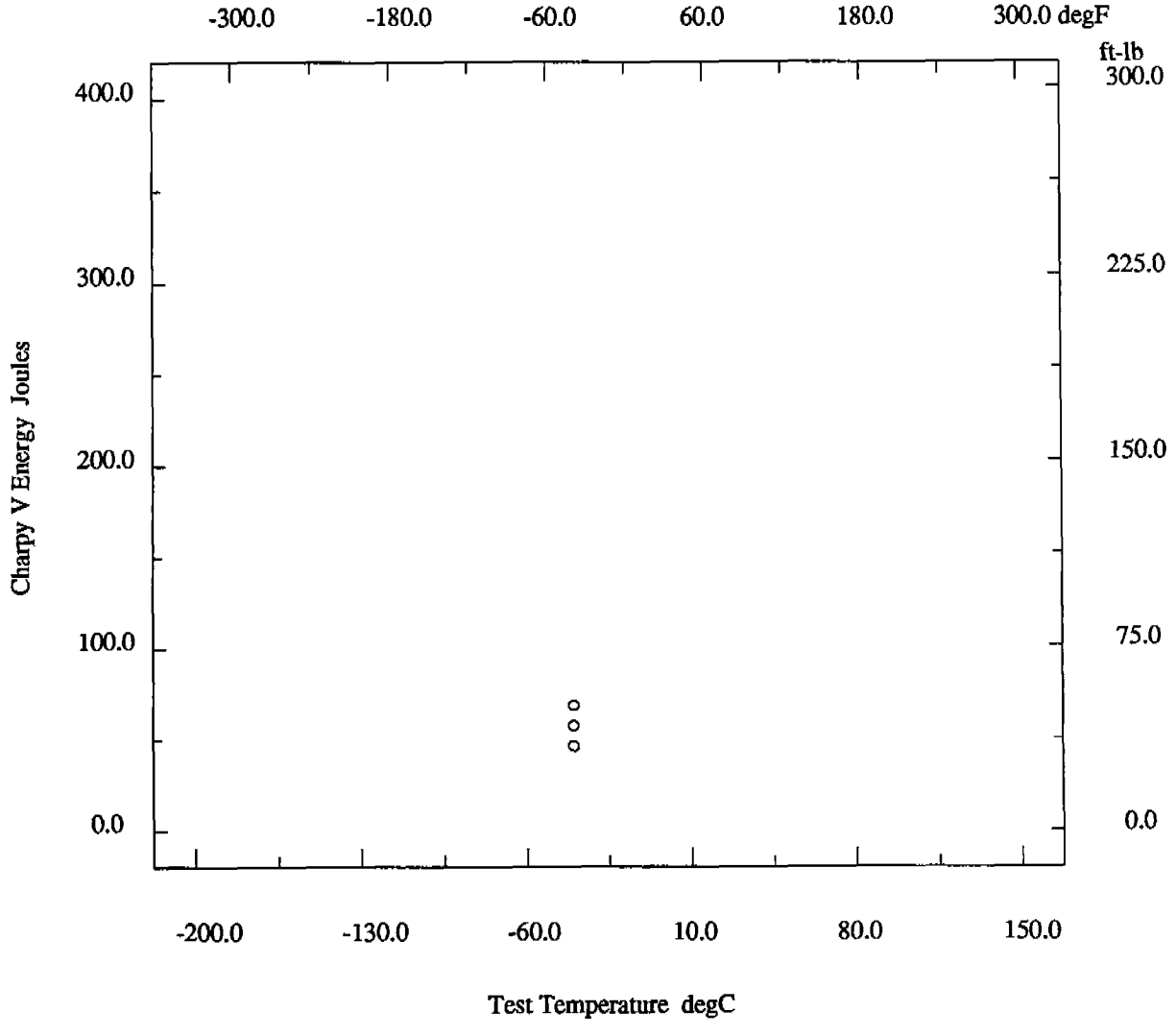
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	47
T-L °	-40	58
T-L °	-40	69

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03HFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04HFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.04HFA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

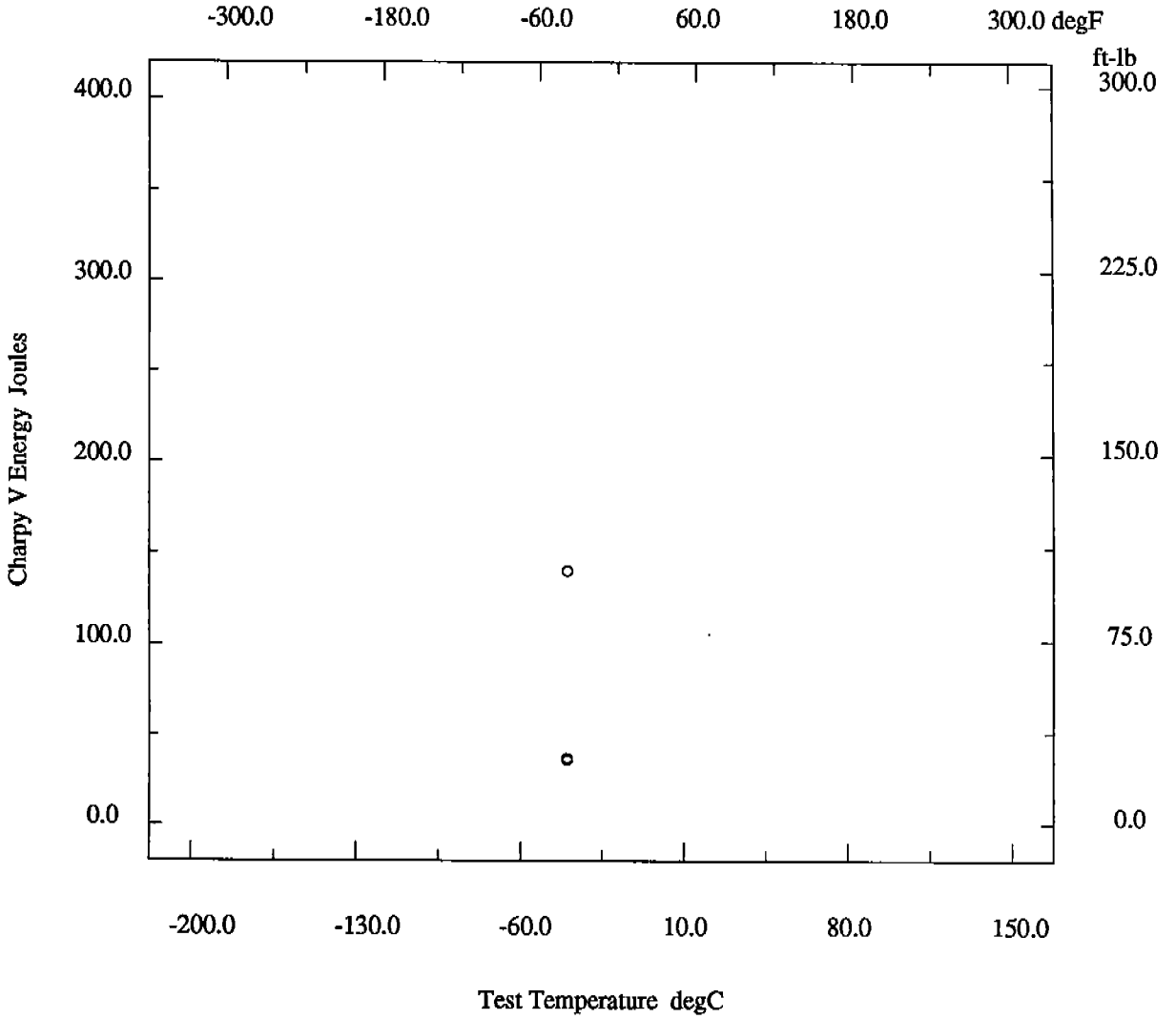
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	140
T-L °	-40	36
T-L °	-40	37

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04HFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05HFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14600.1

Fabrication History See Page 14600.1

Weld

Weld Code	010.002.05HFA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

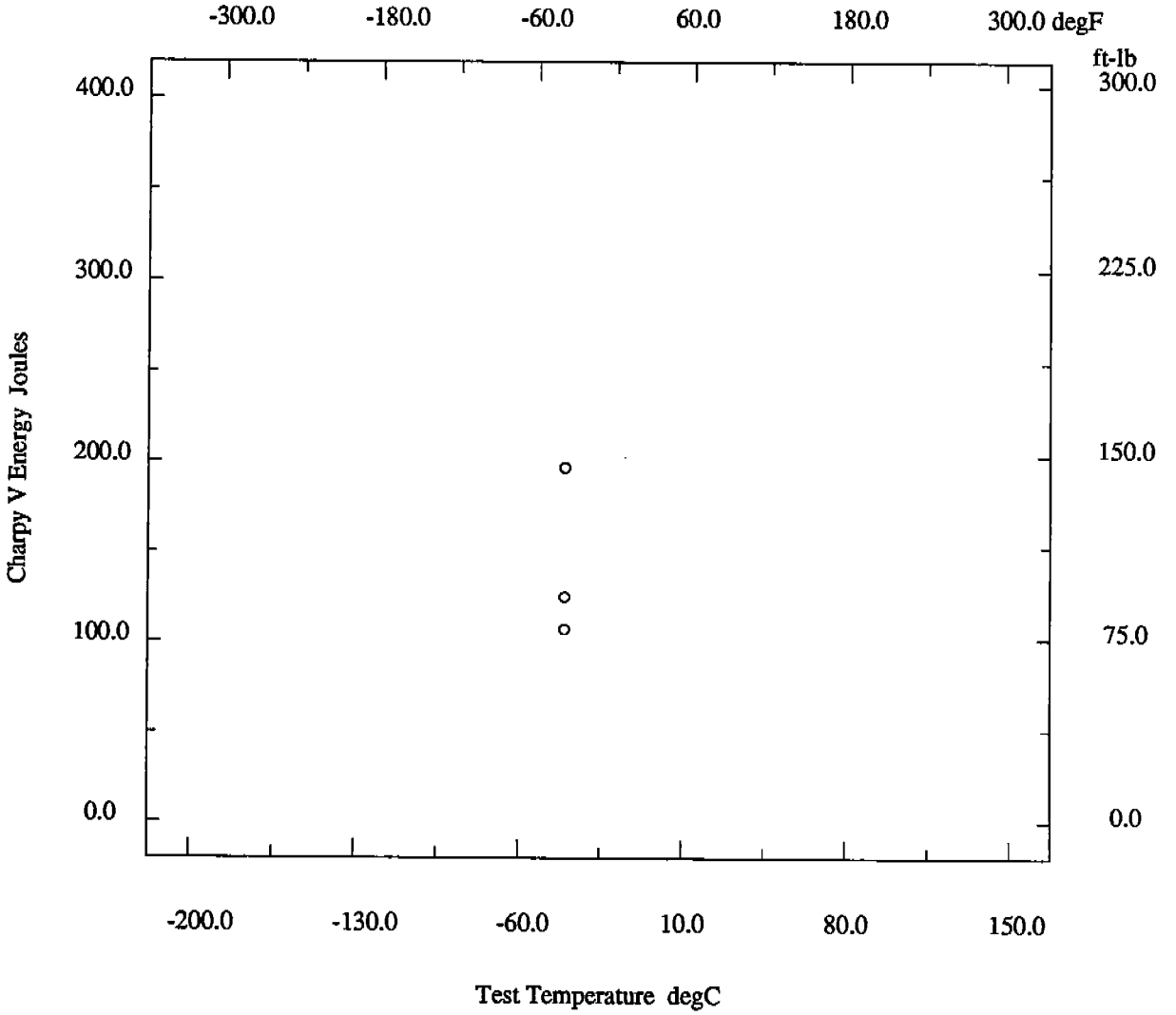
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	107
T-L °	-40	125
T-L °	-40	197

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05HFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09HRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.09HRA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

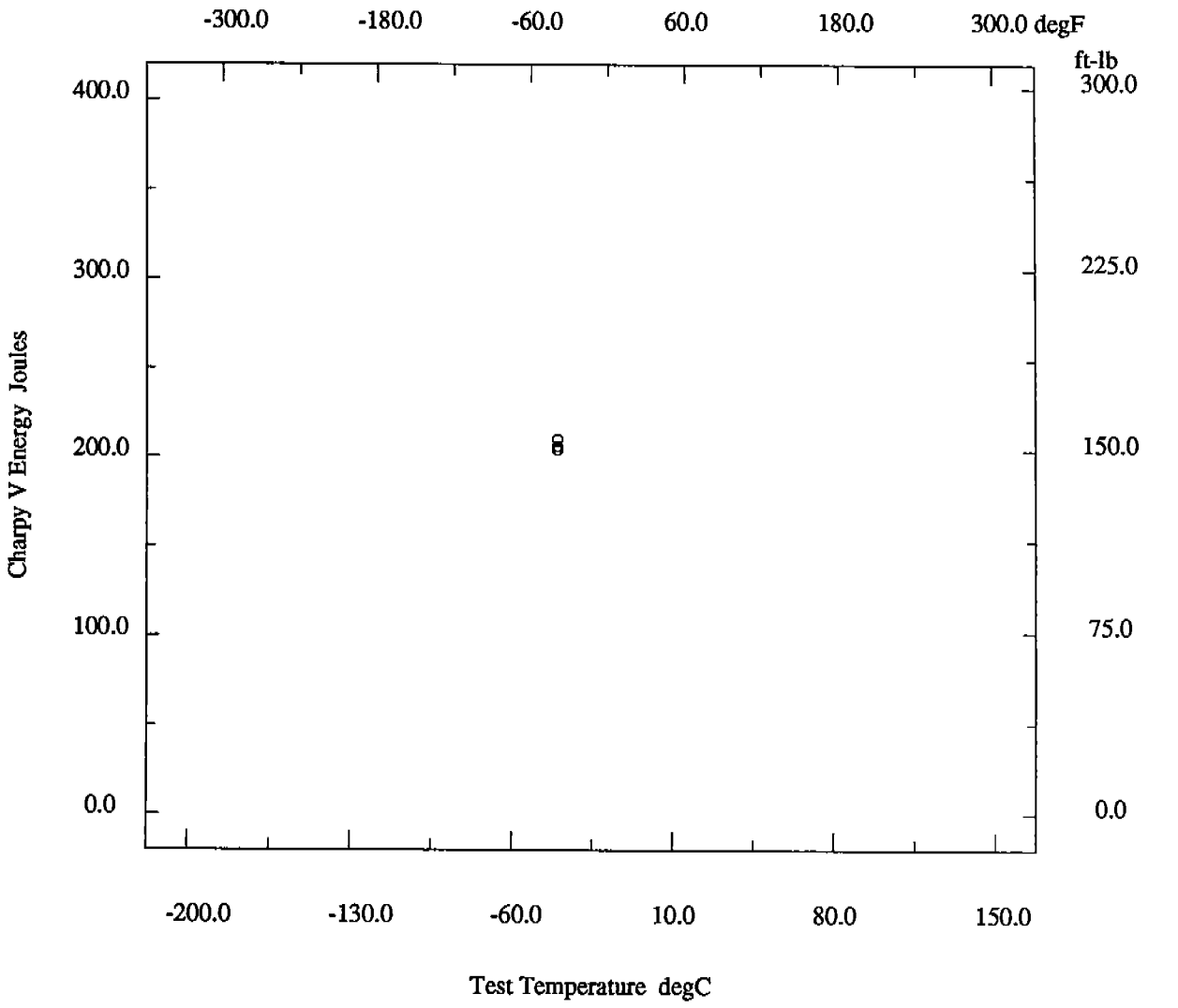
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	204
T-L °	-40	206
T-L °	-40	210

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09HRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02HRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.02HRA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

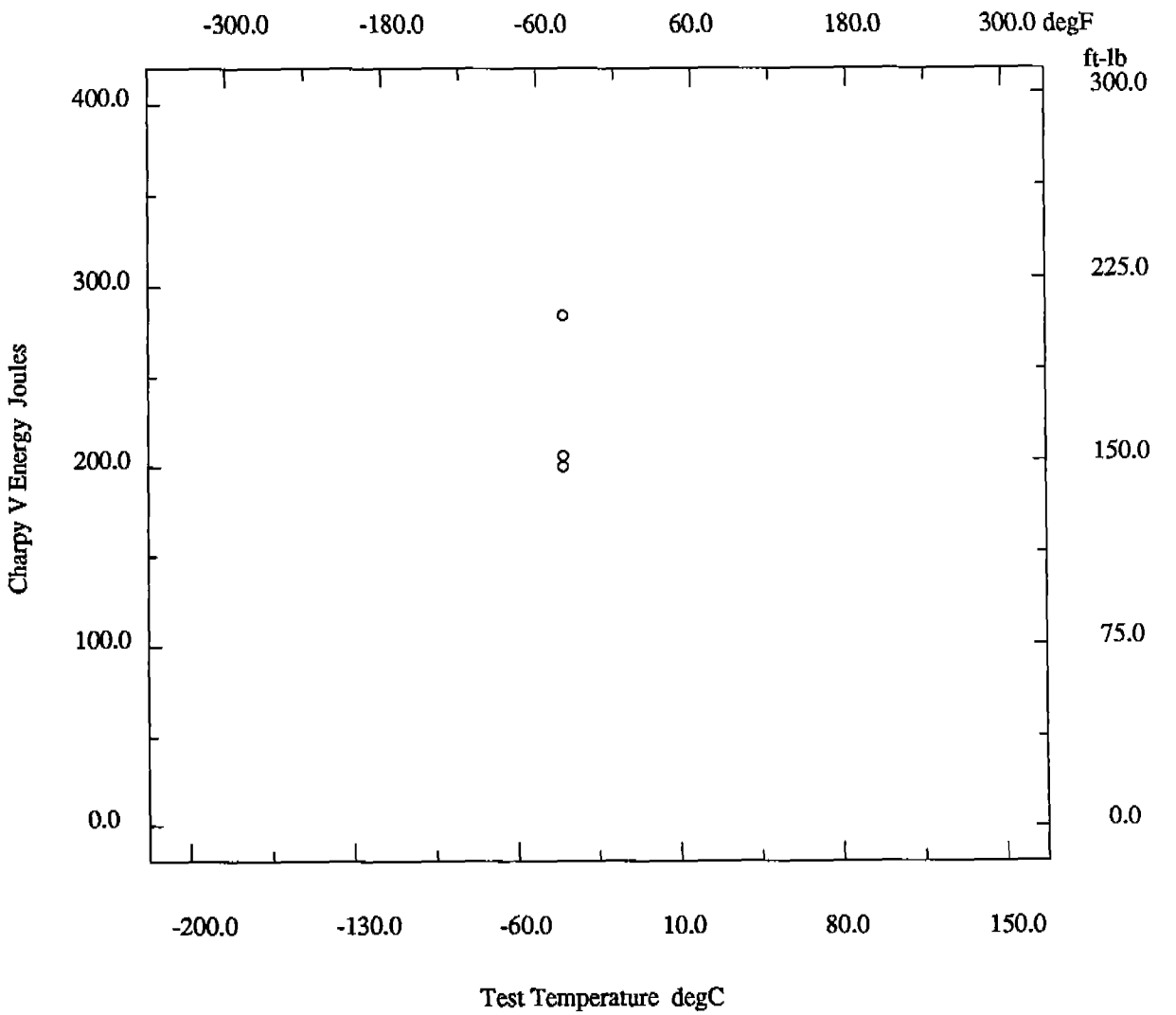
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	200
T-L °	-40	206
T-L °	-40	284

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02HRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03HRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14600.1

Fabrication History See Page 14600.1

Weld

Weld Code	010.002.03HRA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

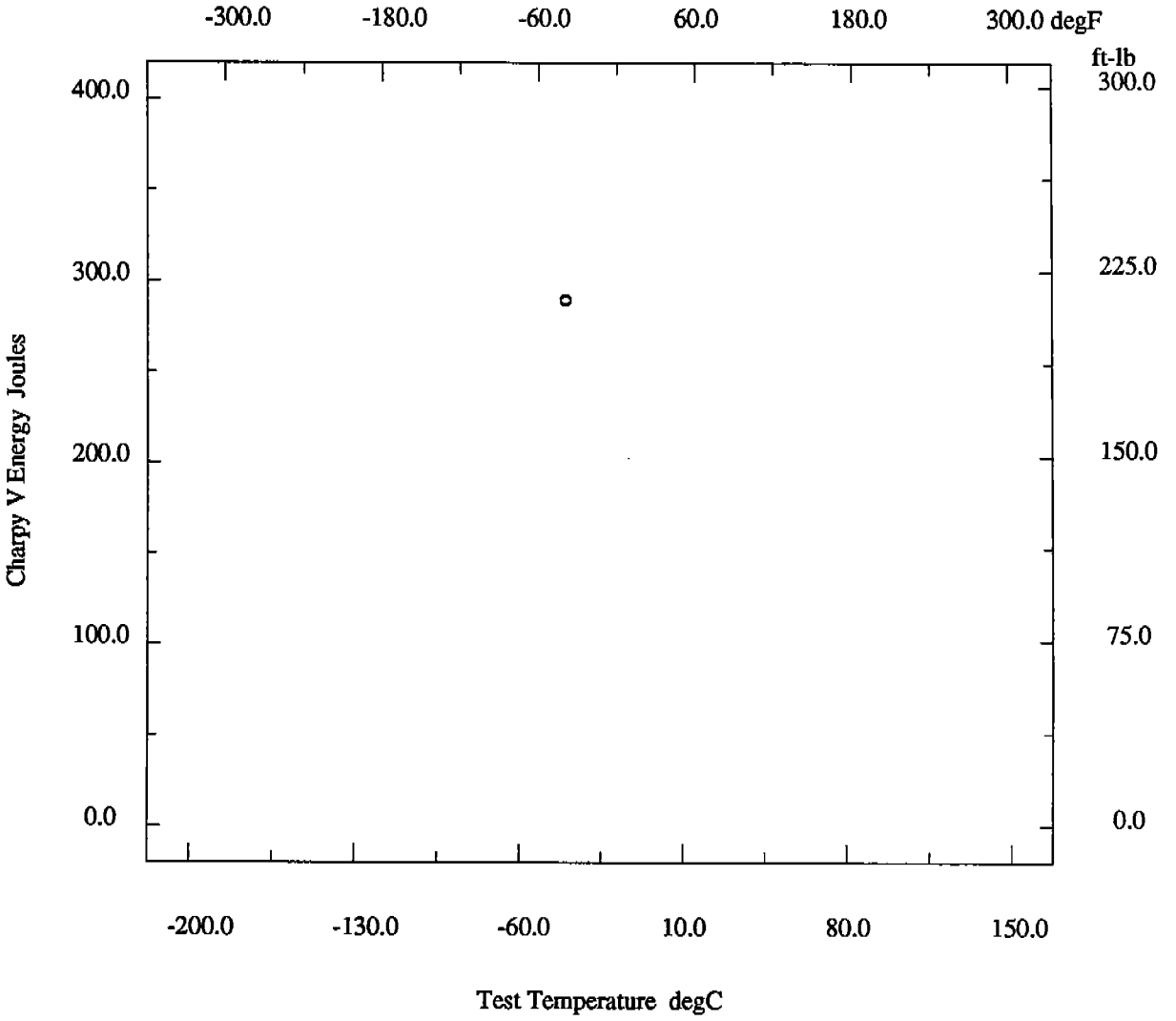
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	289
T-L °	-40	289
T-L °	-40	290

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03HRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04HRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.04HRA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

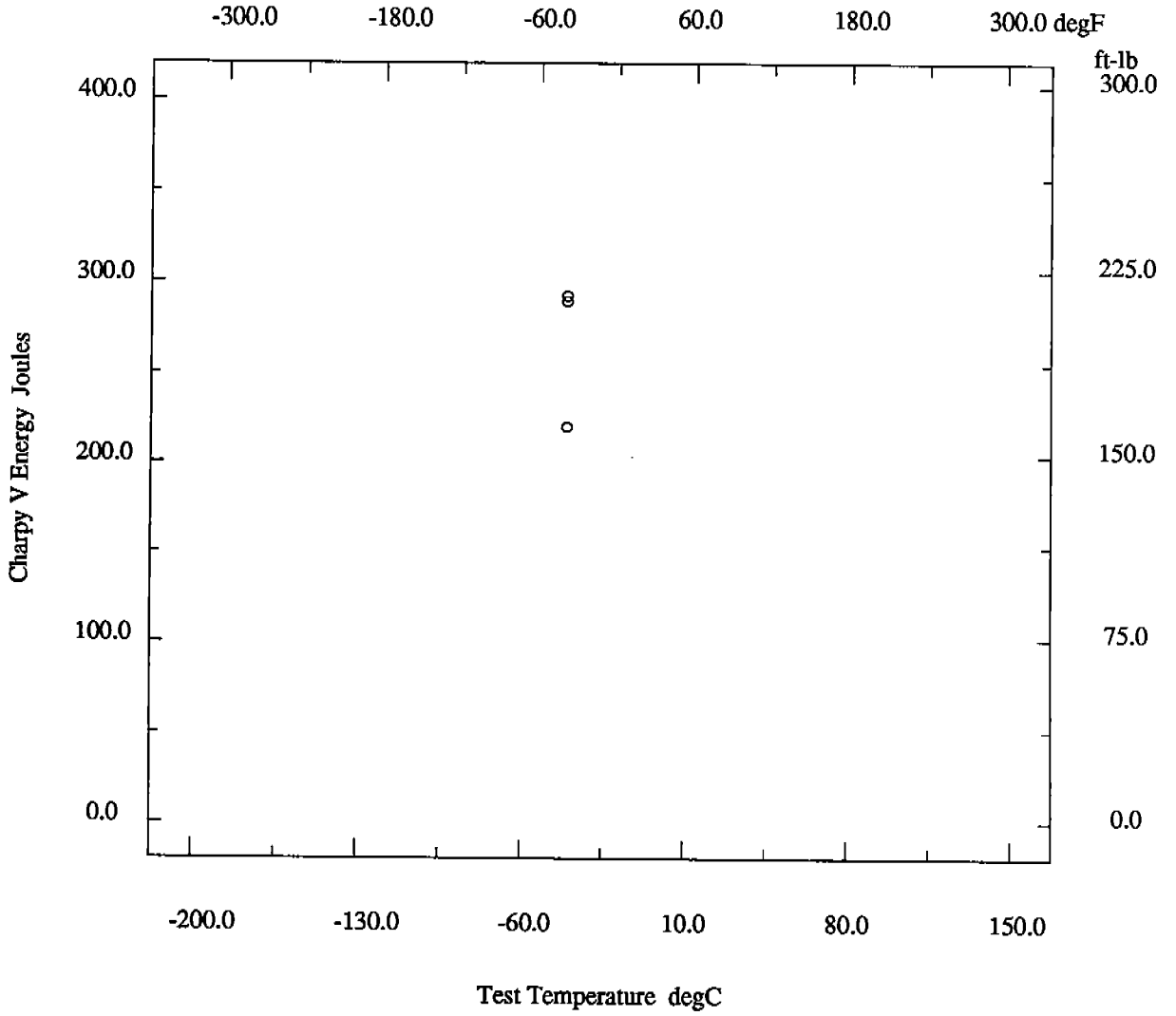
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	220
T-L °	-40	289
T-L °	-40	292

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04HRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05HRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.05HRA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

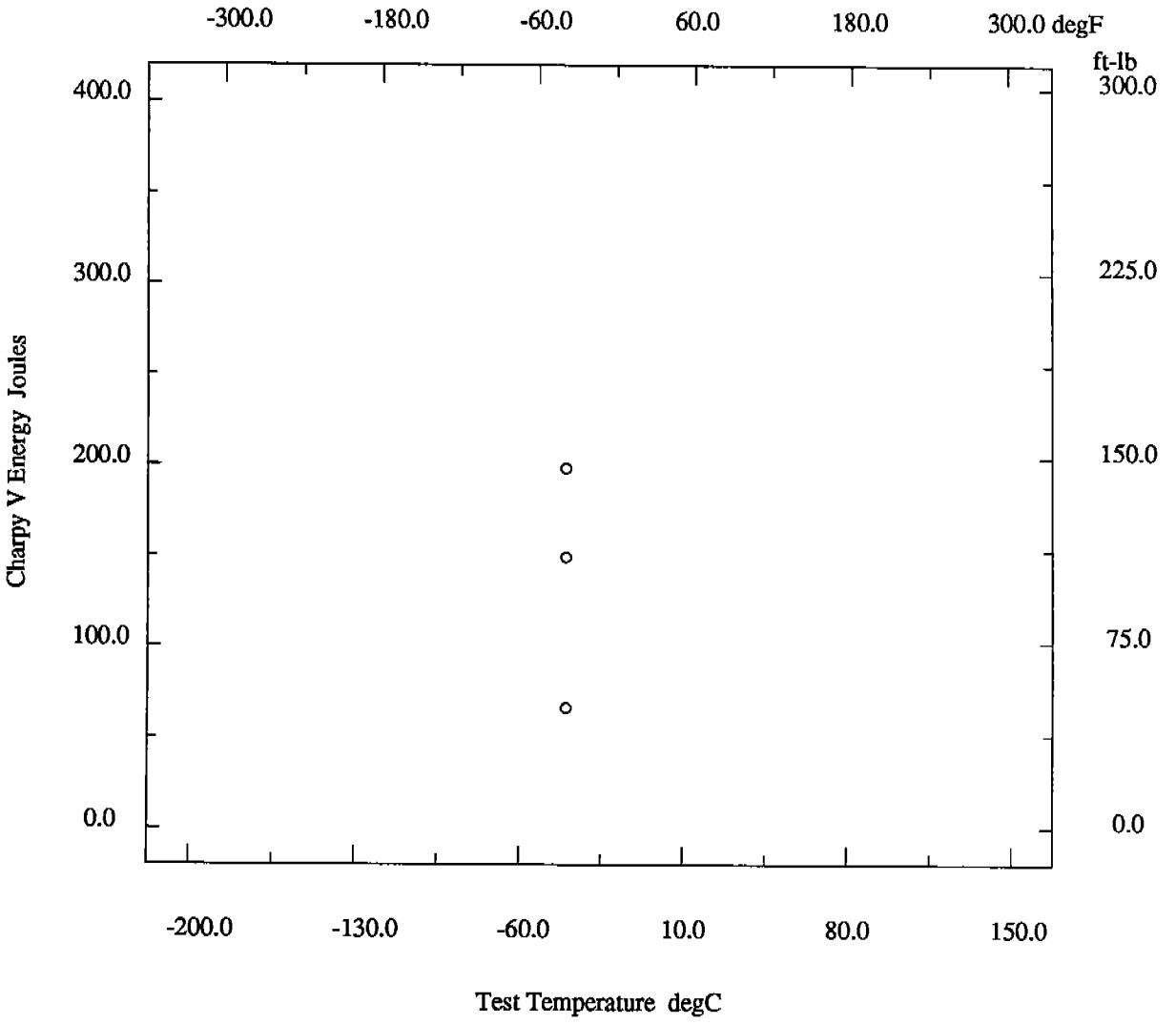
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	149
T-L °	-40	198
T-L °	-40	66

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05HRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09HFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.09HFS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

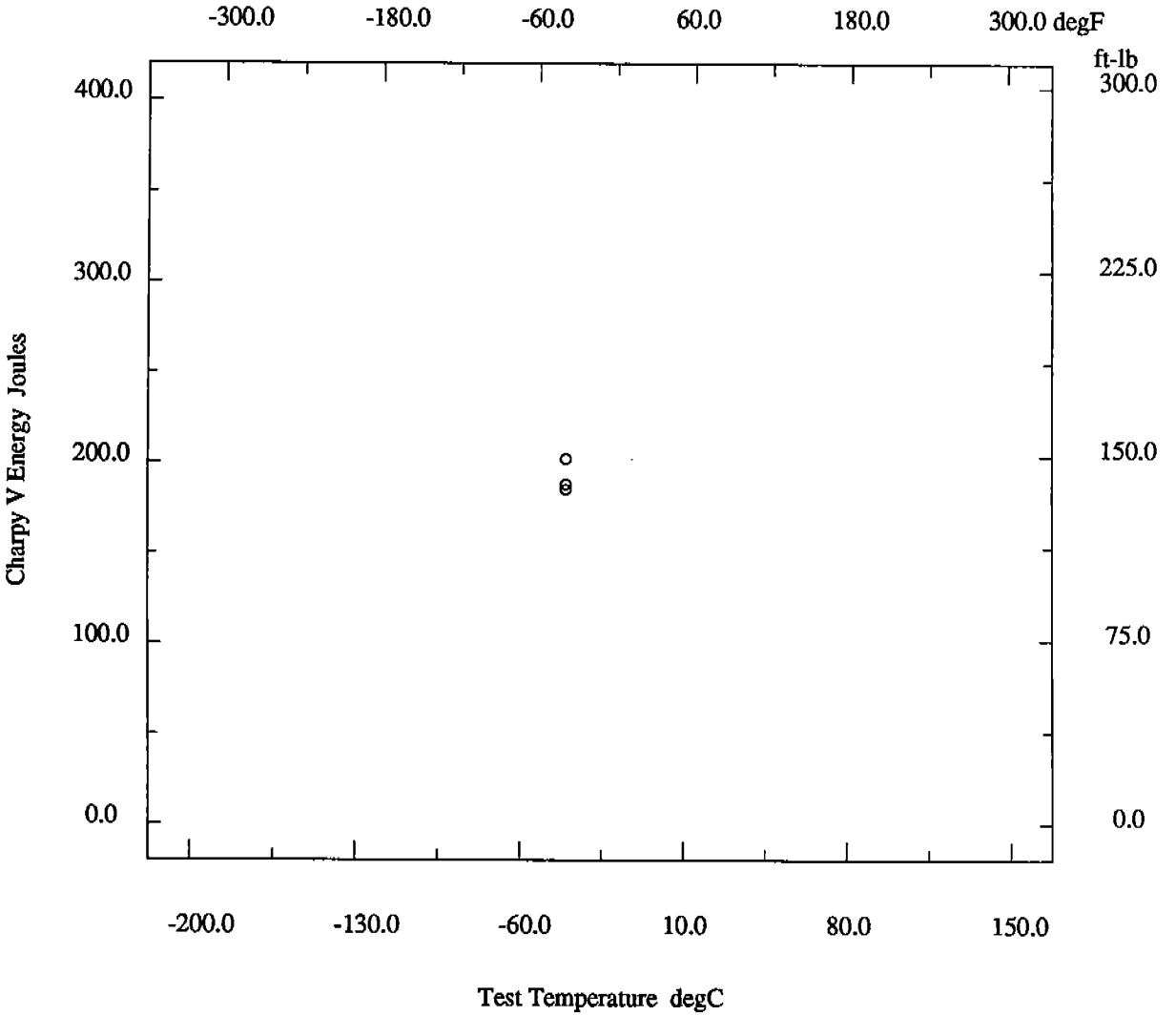
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	185
T-L °	-40	188
T-L °	-40	202

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09HFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02HFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.02HFS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

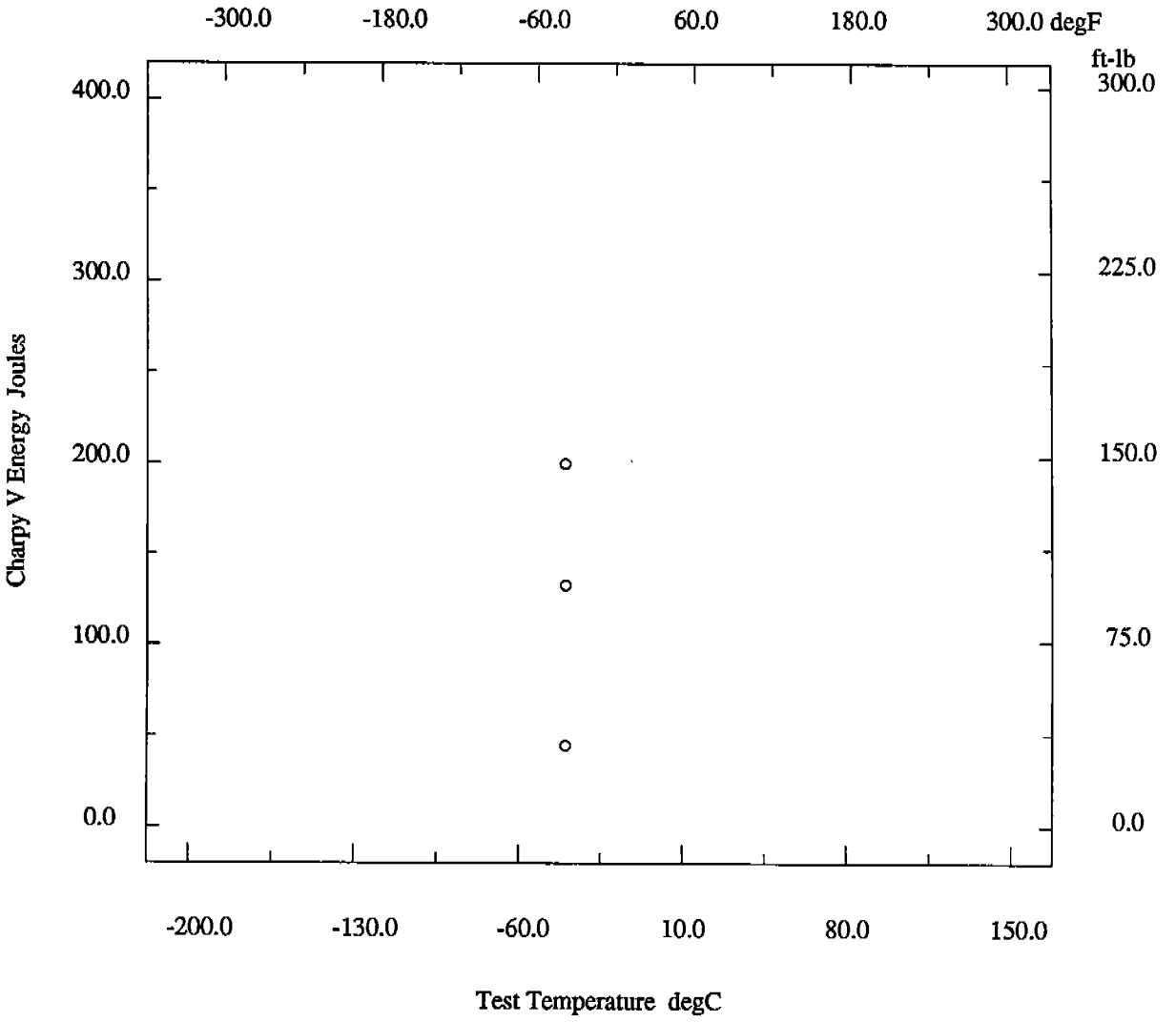
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	133
T-L °	-40	200
T-L °	-40	45

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02HFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03HFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.03HFS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

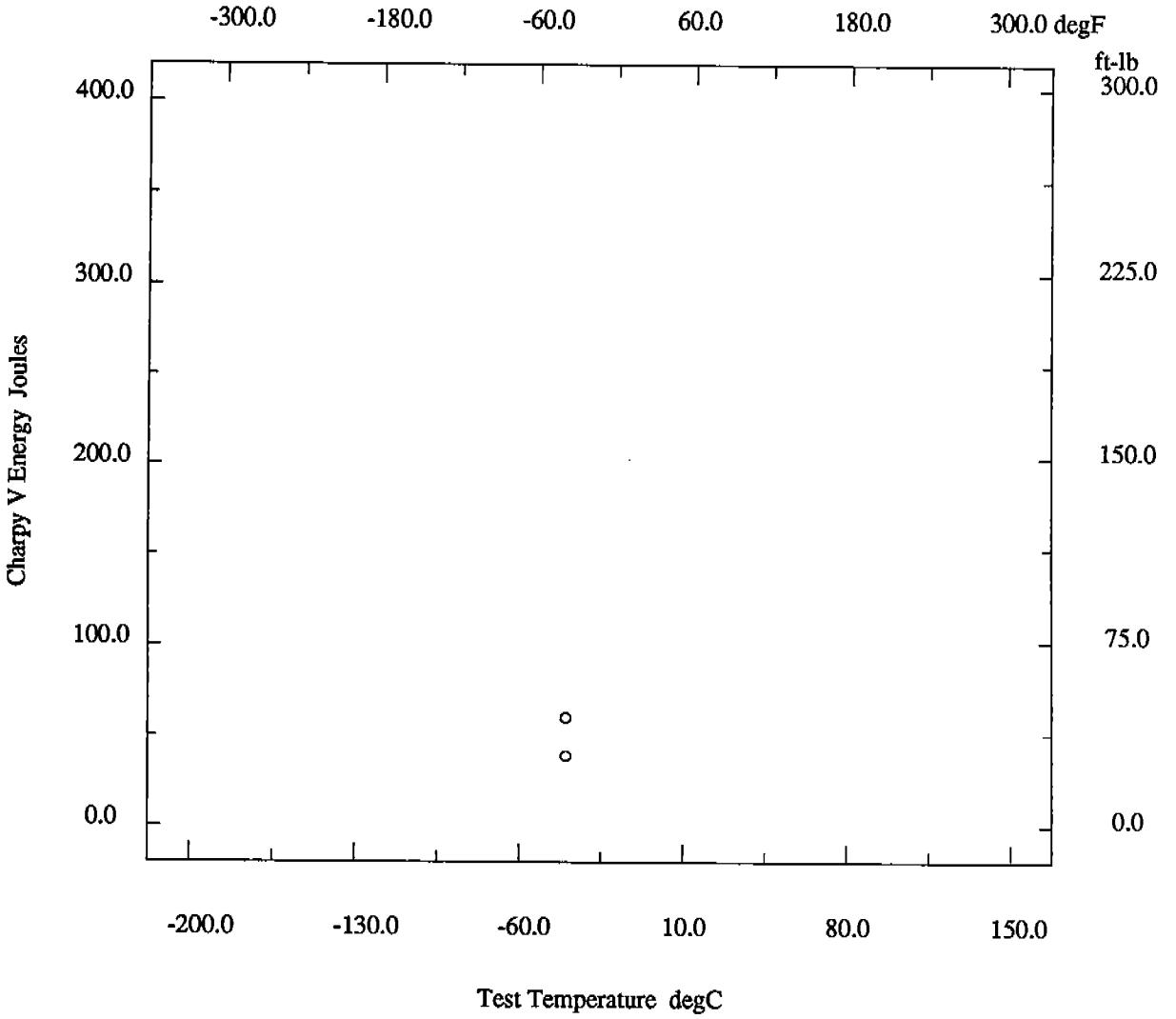
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	39
T-L °	-40	60
T-L °	-40	60

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03HFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04HFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.04HFS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

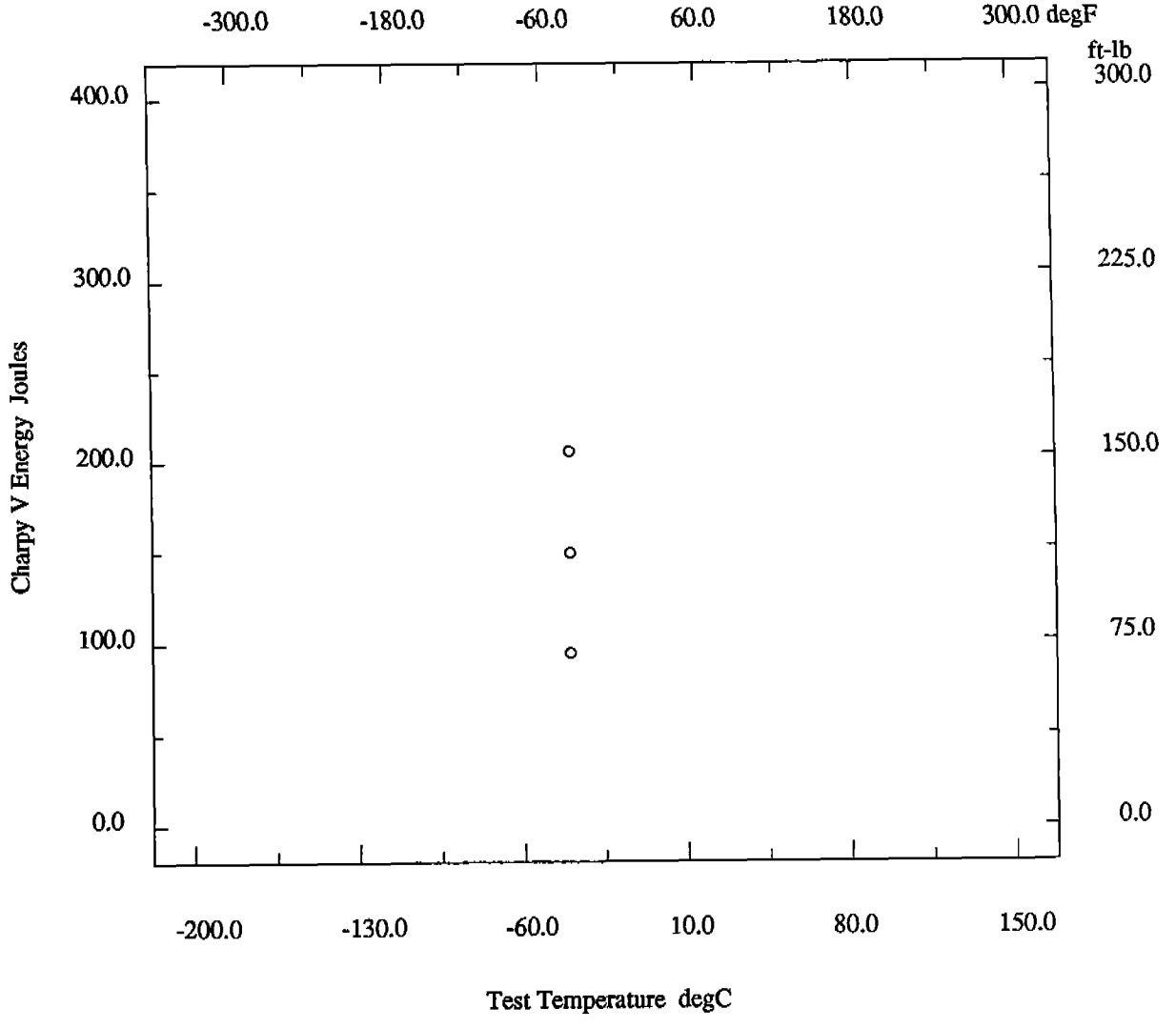
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	150
T-L °	-40	206
T-L °	-40	95

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04HFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05HFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.05HFS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

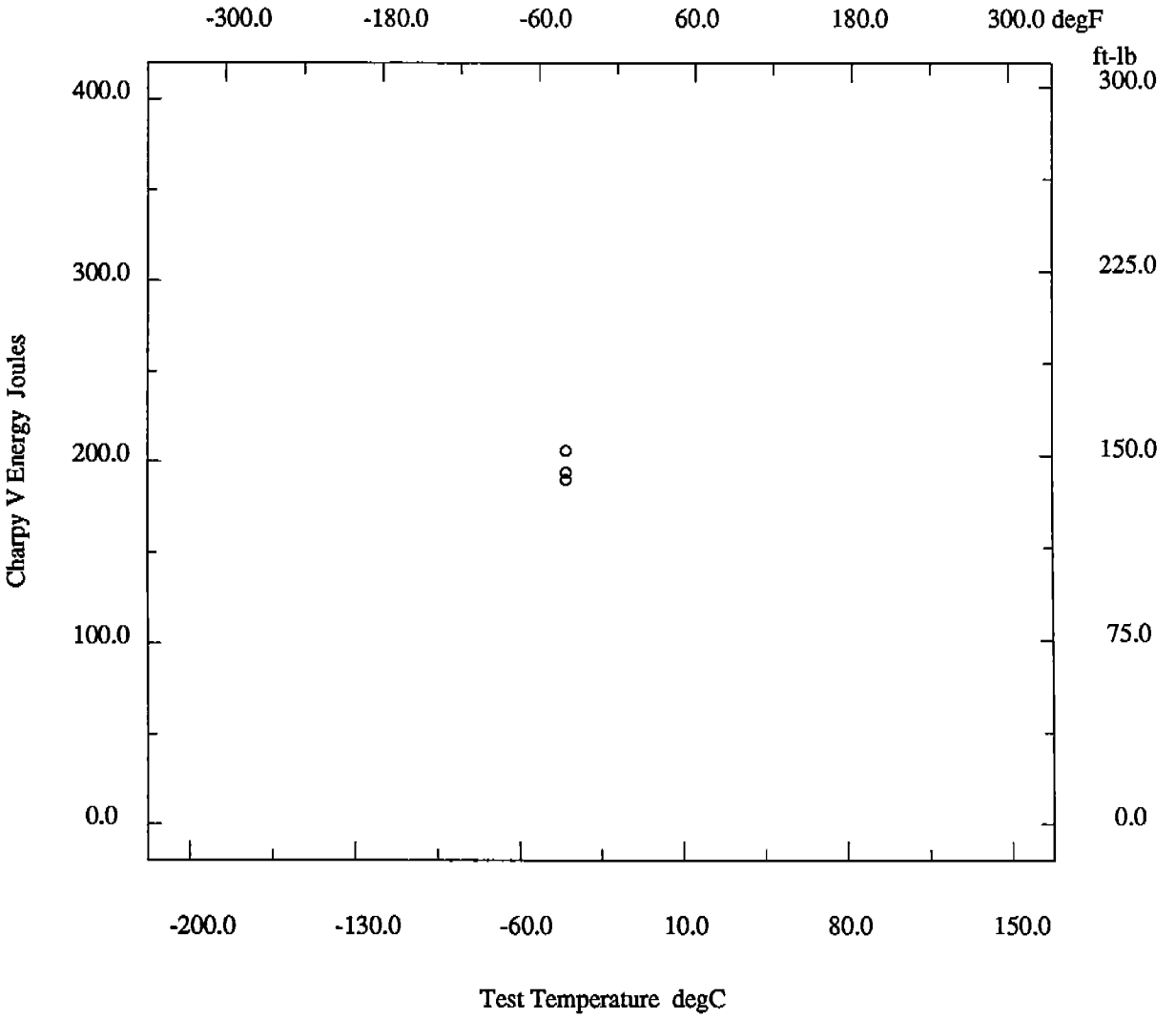
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	190
T-L °	-40	194
T-L °	-40	206

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05HFS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09HRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.09HRS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

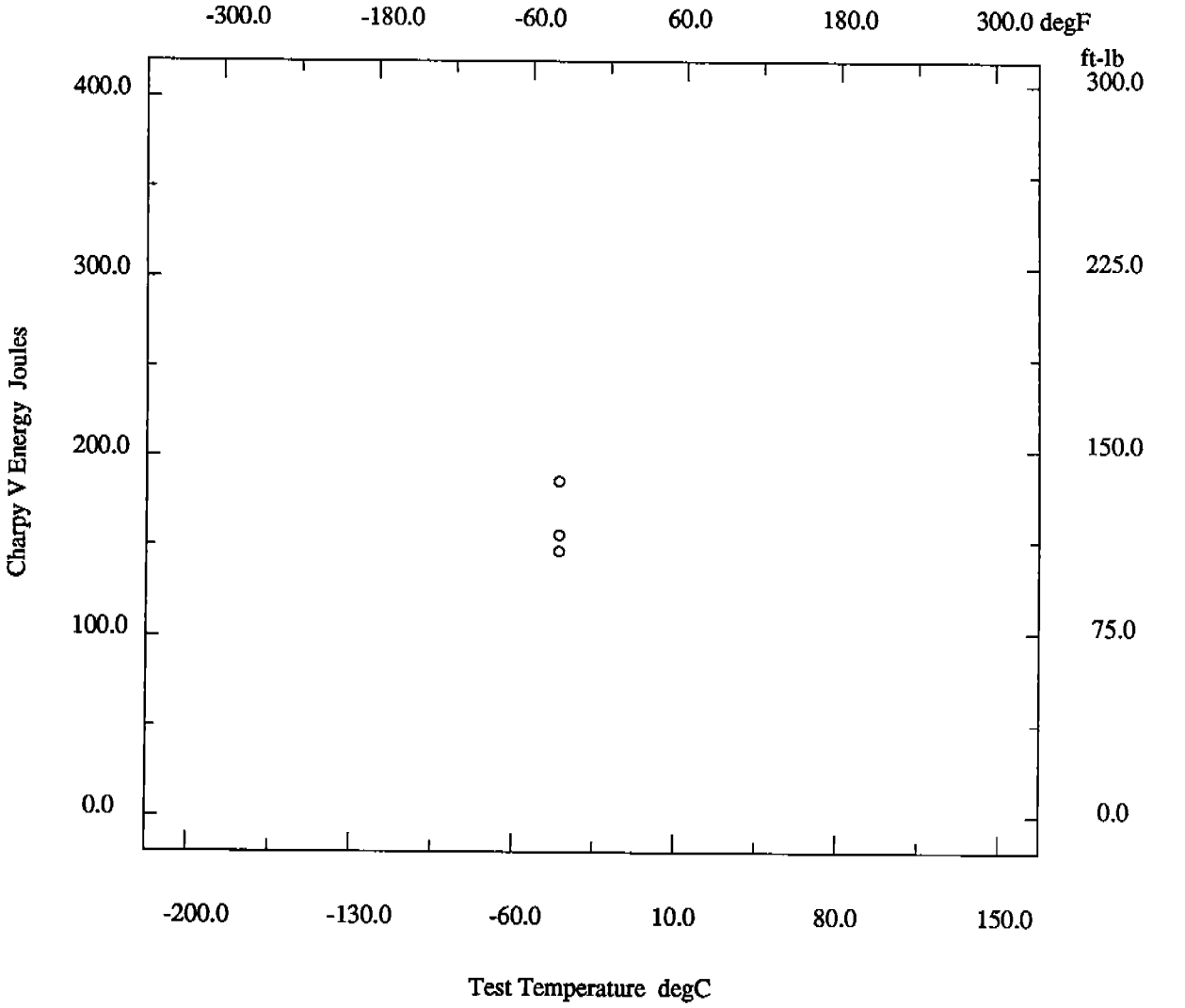
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-40	147
T-L ○	-40	156
T-L ○	-40	186

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.09HRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02HRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition See Page 14600.1

Fabrication History See Page 14600.1

Weld

Weld Code	010.002.02HRS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Fusion line	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

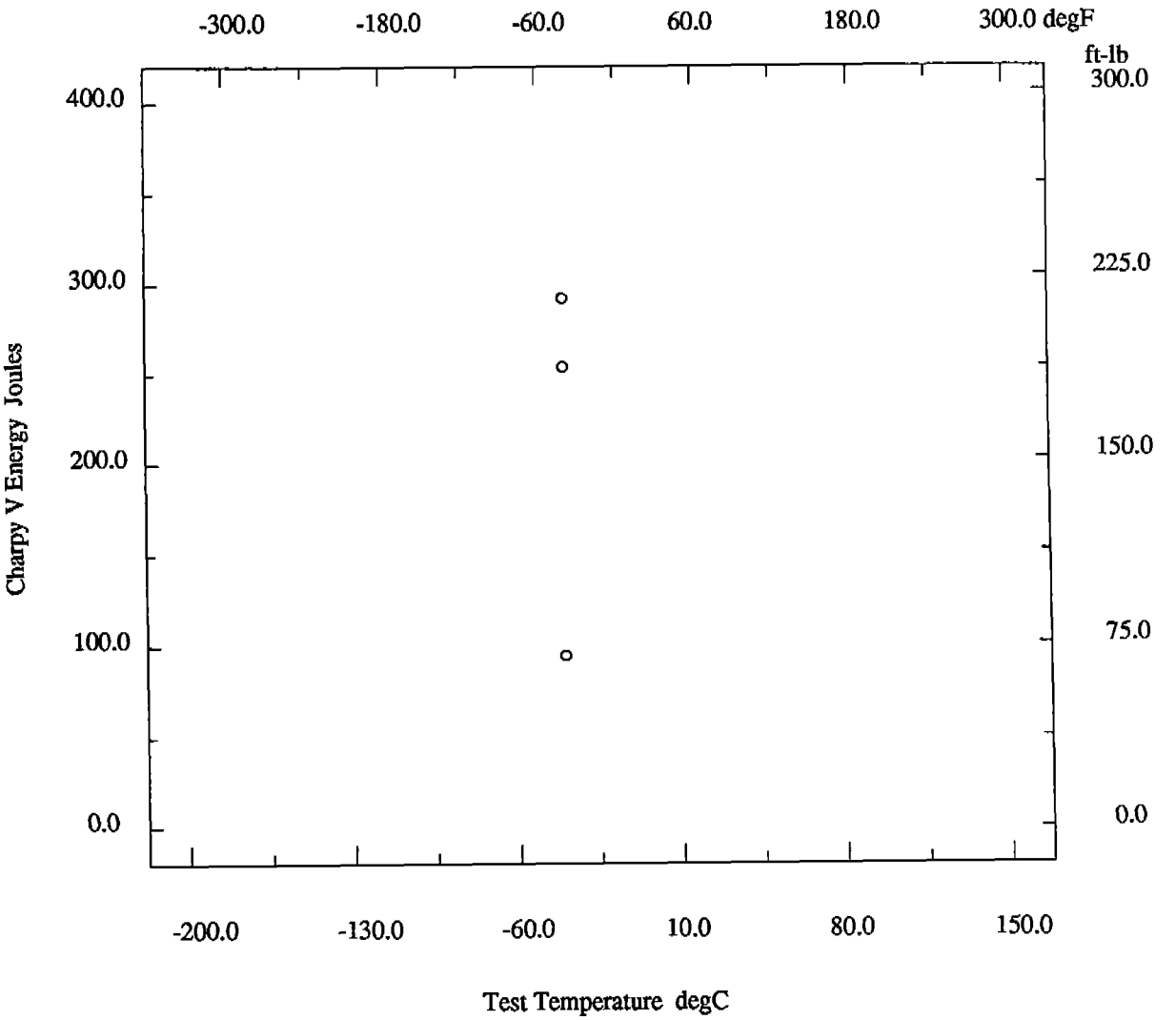
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-40	254
T-L ○	-40	292
T-L ○	-40	95

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.02HRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03HRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.03HRS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	1mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

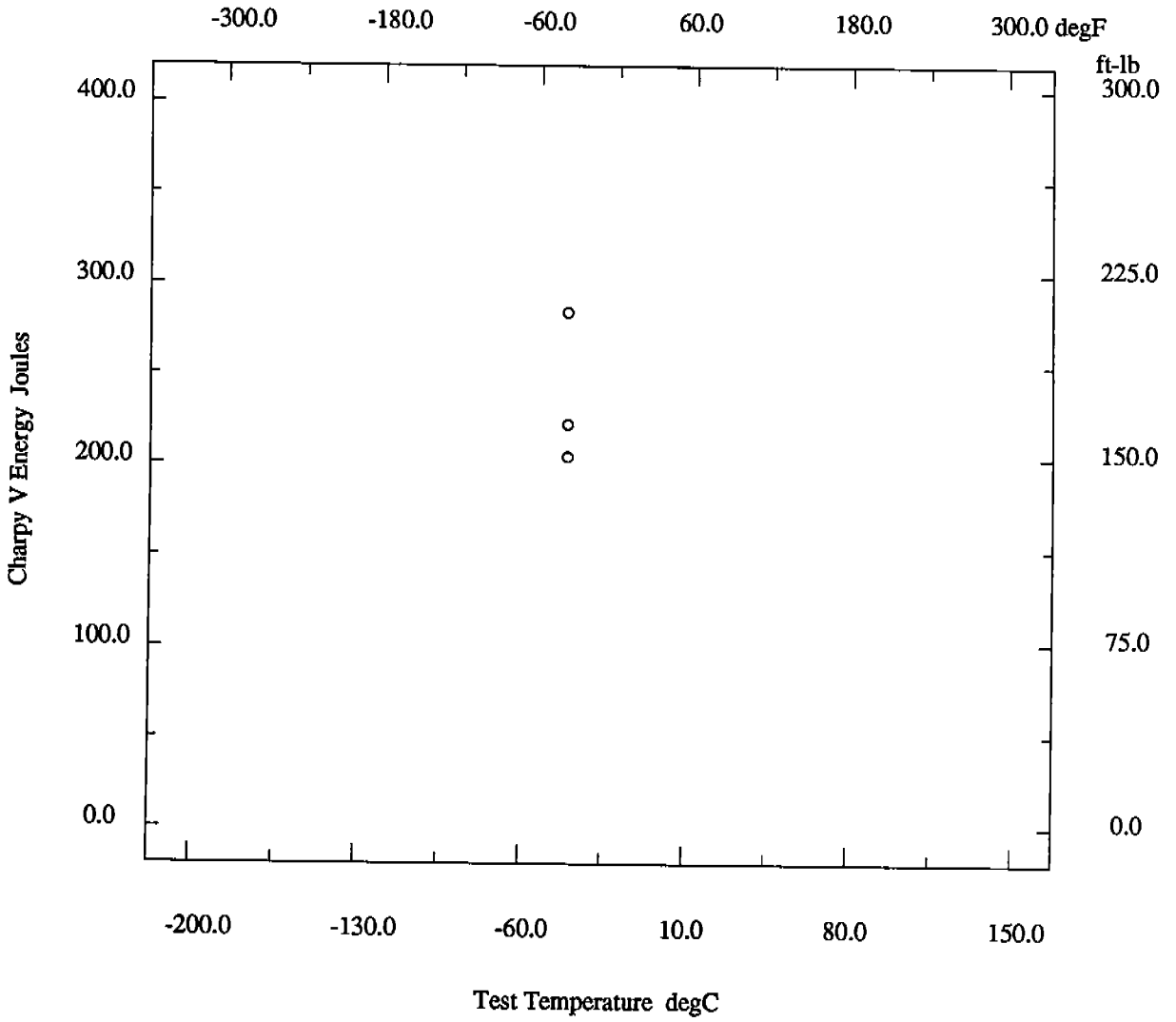
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	204
T-L °	-40	222
T-L °	-40	284

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.03HRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04HRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.04HRS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	3mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

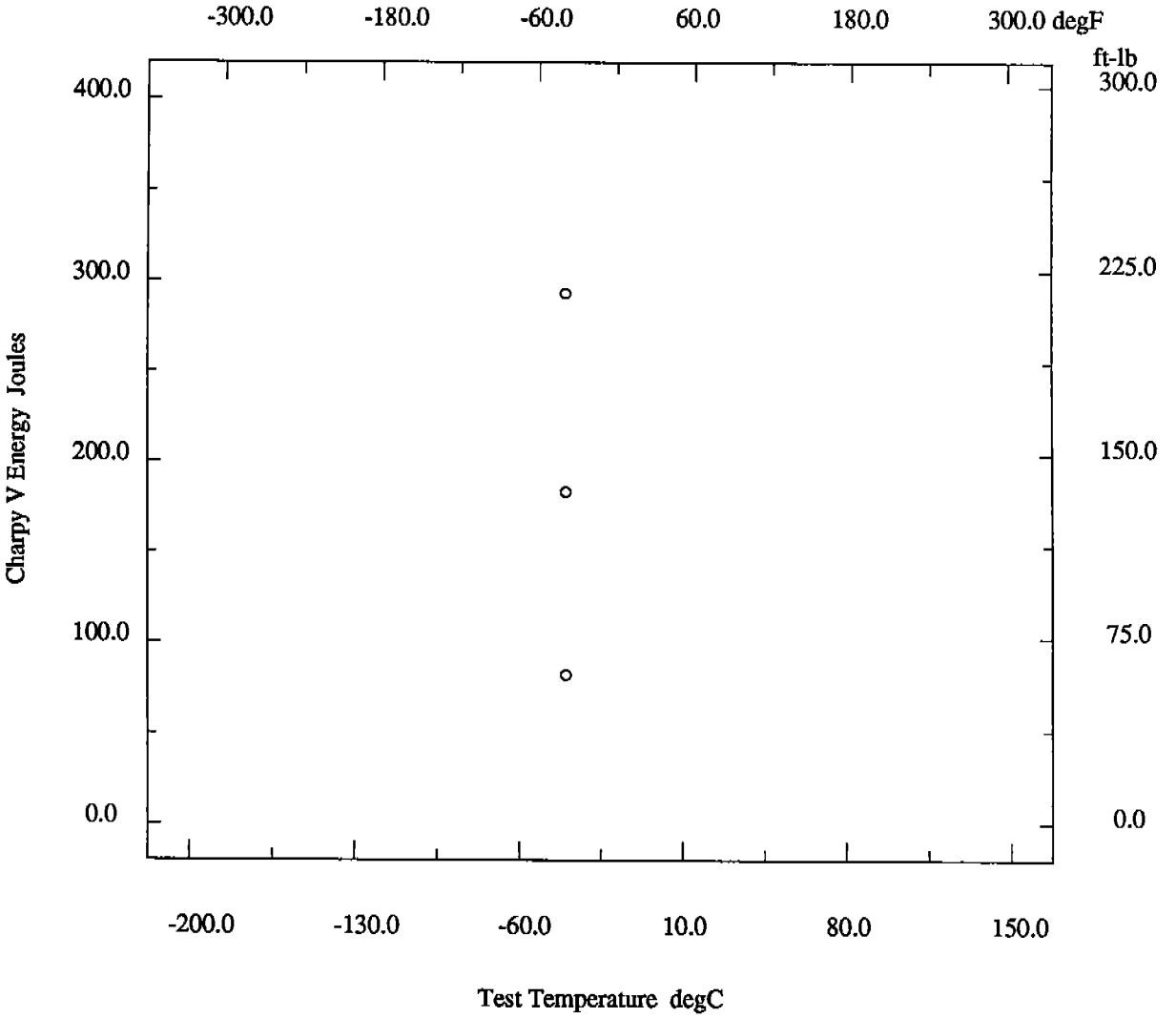
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	183
T-L °	-40	293
T-L °	-40	82

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.04HRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05HRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.05HRS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	5mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	*
Specimen Type	*	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

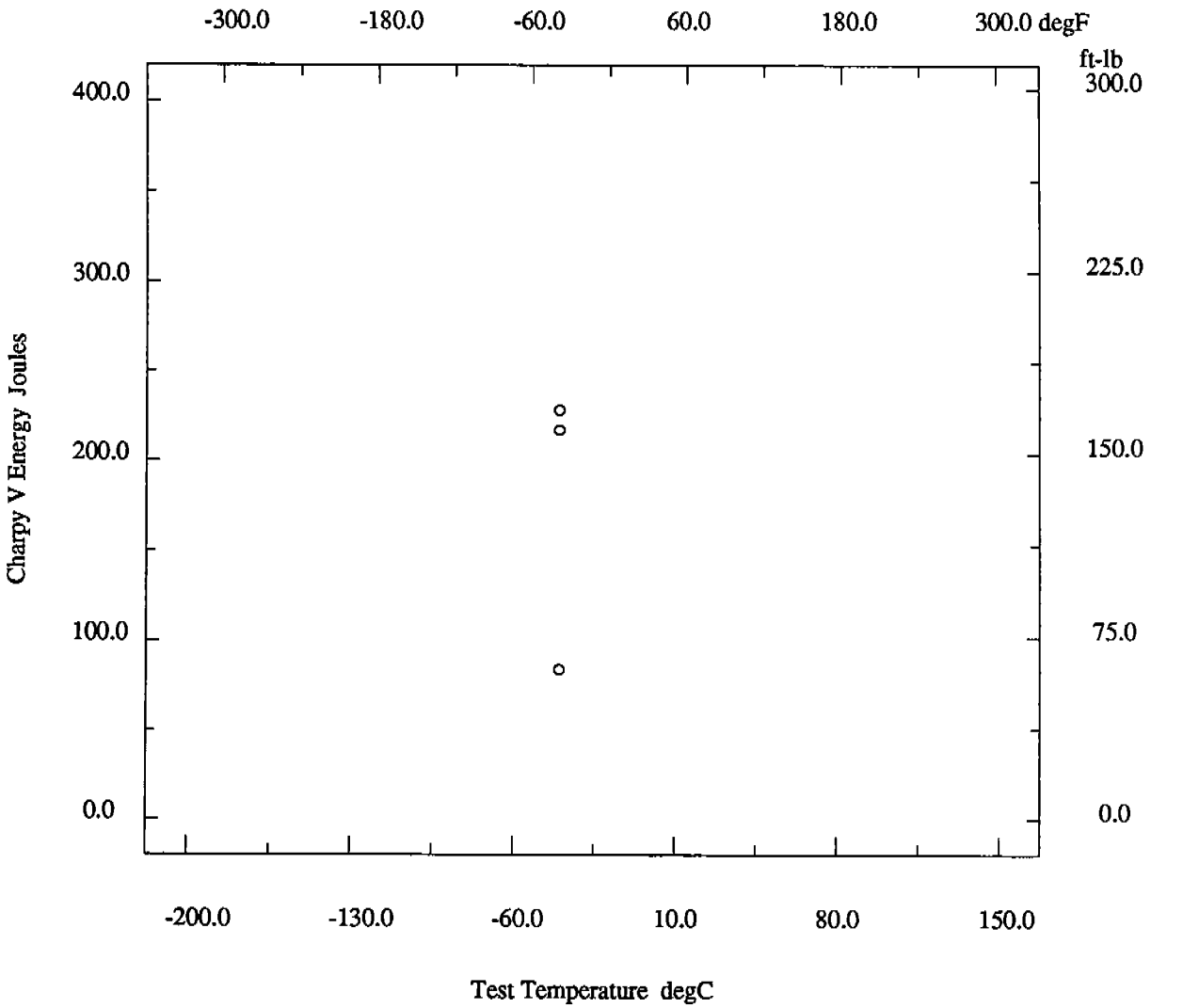
Orien	Test Temp degC	CVN Energy Joules
T-L °	-40	217
T-L °	-40	228
T-L °	-40	84

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.05HRS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.10HSA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.10HSA	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Transverse	Location wrt Surface	Full cross section
Post-Weld Heat Temp	*	Post-Weld Heat Time	*
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Tensile	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	25 mm	Gage Length	*
Loading Rate	*	Tensile Strength Offset	*
Tensile Yield Strength	*	Tensile Yield Point	*
Uniform Elongation	*	Elongation	*
Reduction in Area	*	Tensile Modulus	*
Standard Method	JISZ3121	Standard Year	*

Test Temp degC	UTS N/mm2
20	560
20	562

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.002.10HSS	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D
Type	Welded Joint	Form	Plate
Thickness	60 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	SHI-01		

Composition

See Page 14600.1

Fabrication History

See Page 14600.1

Weld

Weld Code	010.002.10HSS	Weld Type	TSAW
Base Metal Thickness	60 mm	Welding Position	Downhand IG
Preheat Temperature	100 degC	Metal Gap	1 mm
Interpass Temperature	250 degC	Passes	*
Filler Specification	*	Filler Name	W36
Filler Carbon Content	*	Filler Metal Size	4 mm
Shielding Gas	*	Voltage	34-38 volts
Amperage	580 amps	Polarity	*
Travel Speed	50 cm/min	Heat Input/Pass	50 KJ/cm
Joint Preparation	Double V-Groove	Number of Sides	2
Location wrt Weld	Transverse	Location wrt Surface	Full cross section
Post-Weld Heat Temp	600 degC	Post-Weld Heat Time	2.4 hr
Flux Type	*	Flux Name	BL55
Weld Composition Reported?	No		

Property Measurements

Test Type	Tensile	Position	*
Orientation	*	Specimen Type	*
Specimen Thickness	25 mm	Gage Length	*
Loading Rate	*	Tensile Strength Offset	*
Tensile Yield Strength	*	Tensile Yield Point	*
Uniform Elongation	*	Elongation	*
Reduction in Area	*	Tensile Modulus	*
Standard Method	JISZ3121	Standard Year	*

Test Temp degC	UTS N/mm2
20	534
20	537

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09ASA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.08 %	Mn	0.84 %
P	0.006 %	S	0.006 %
Si	0.04 %	Cr	0.07 %
Ni	0.61 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.013 %	Ti	0.004 %
B	*	Al	0.99 %
N	0.0201 %	Other Components	O=.0103 %

Fabrication History

Heat Treatment	*	Producer	*
Year Produced	*	Addl Info	None
Source	HIFAB	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	H
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.003.09AFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	1979

Orien	Test Temp degC	CODIc mm	Curve
T-L	-10	0.57	Cleavage
T-L	-10	2.08	Maximum
T-L	-10	>1.70	Unstable

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09AFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14700.1

Fabrication History See Page 14700.1

Weld

Weld Code	010.003.09AFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	504	426	*	32	73

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09AFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14700.1

Fabrication History See Page 14700.1

Weld See Page 14700.3

Property Measurements

Test Type	Charpy V Impact	Position	0/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

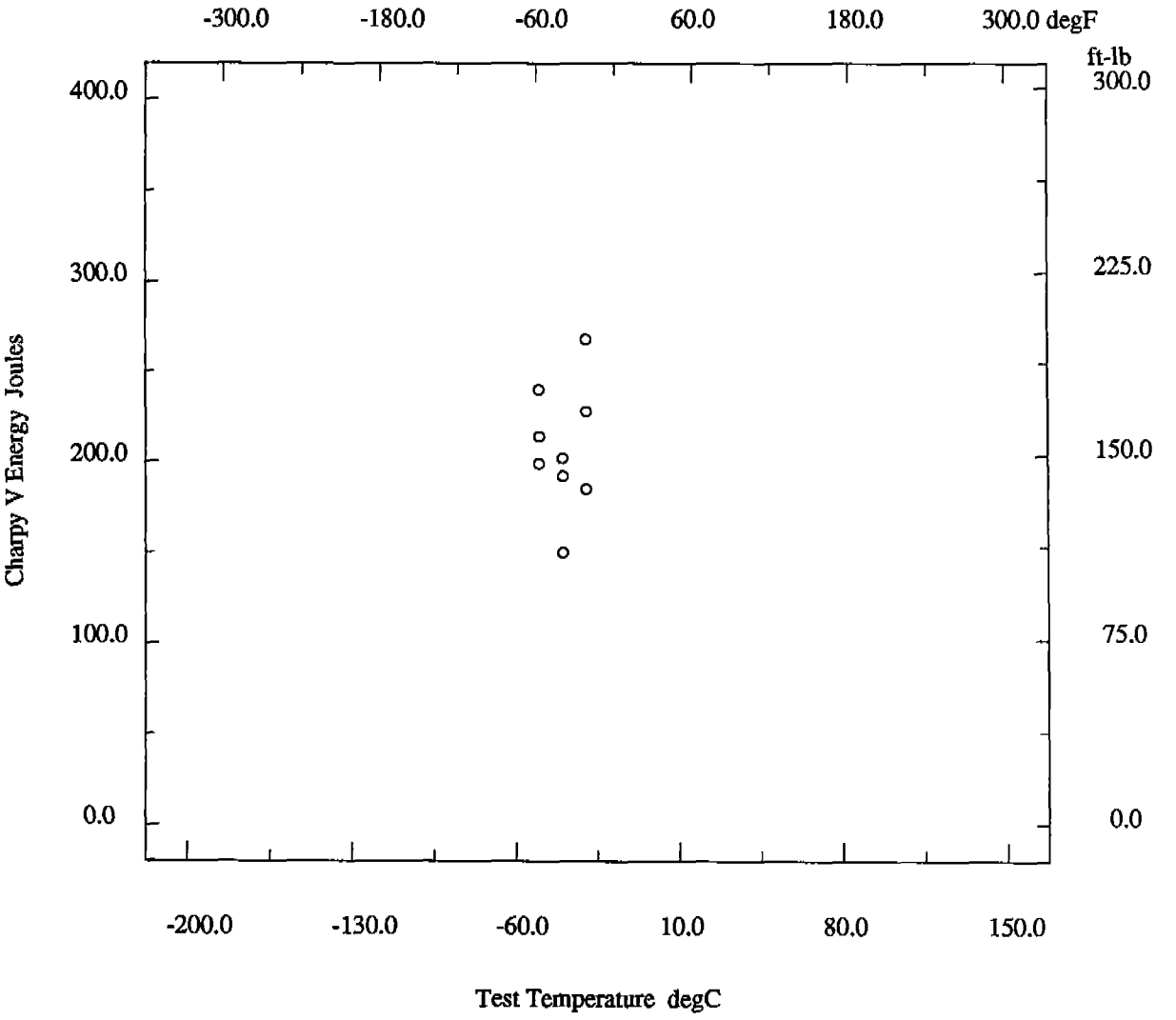
Orien	Test Temp degC	CVN Energy Joules
T-L o	-50	199
T-L o	-50	214
T-L o	-50	240
T-L o	-40	150
T-L o	-40	192
T-L o	-40	202
T-L o	-30	185
T-L o	-30	228
T-L o	-30	268

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09AFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09AMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 14700.1

Fabrication History

See Page 14700.1

Weld

Weld Code	010.003.09AMA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

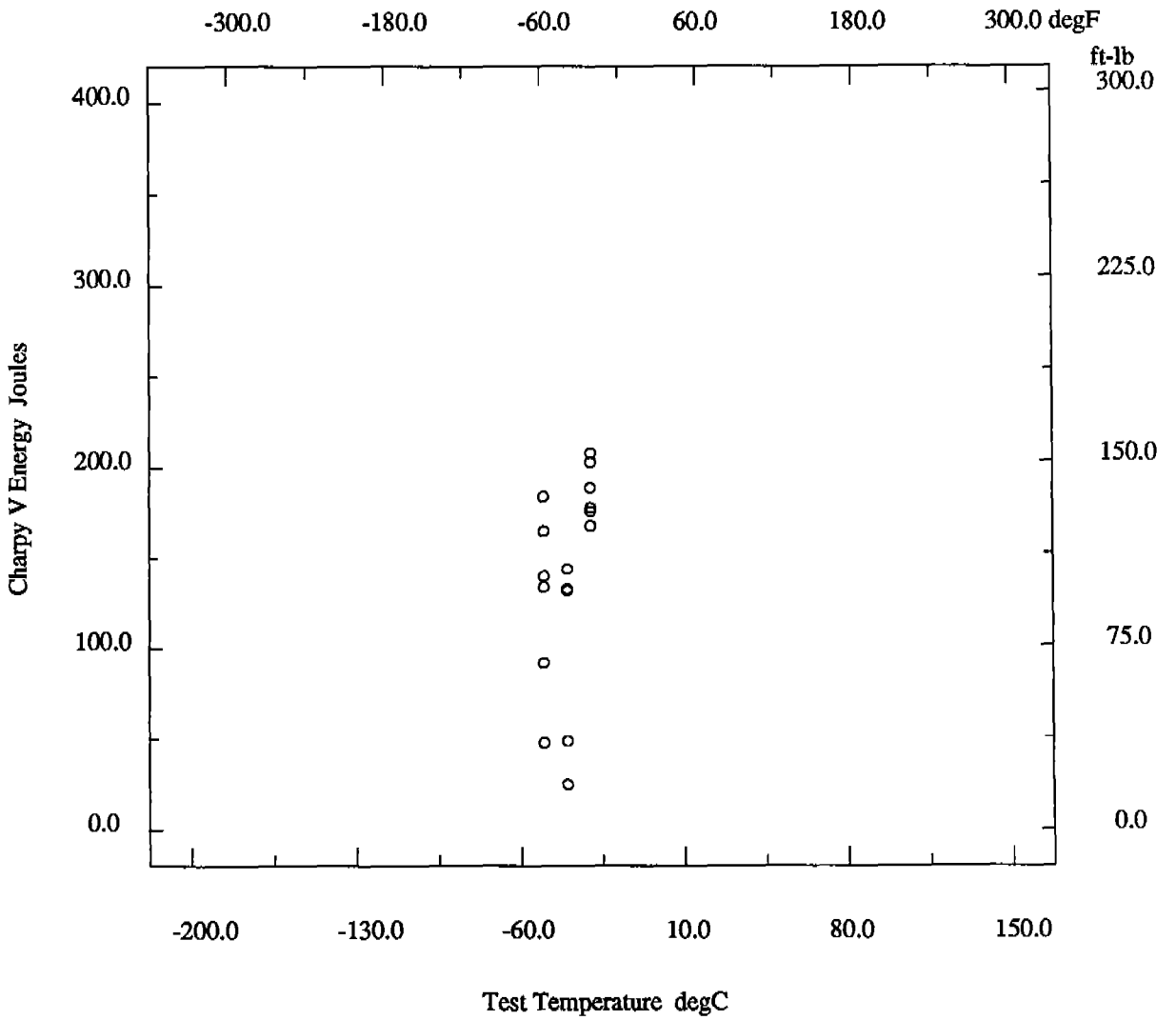
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	134
T-L °	-50	140
T-L °	-50	165
T-L °	-50	184
T-L °	-50	48
T-L °	-50	92
T-L °	-40	132
T-L °	-40	133
T-L °	-40	144
T-L °	-40	144
T-L °	-40	25
T-L °	-40	49
T-L °	-30	168
T-L °	-30	176
T-L °	-30	178
T-L °	-30	189
T-L °	-30	203
T-L °	-30	208

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09AMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09ABRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.91 %
P	0.005 %	S	0.005 %
Si	0.06 %	Cr	0.05 %
Ni	0.61 %	Mo	0.02 %
V	0.002 %	Cu	0.04 %
Cb	0.011 %	Ti	0.004 %
B	*	Al	0.93 %
N	0.0198 %	Other Components	O=.0105 %

Fabrication History

See Page 14700.1

Weld

Weld Code	010.003.09ABRA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	546	471	*	26	78

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09ABRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14700.8

Fabrication History See Page 14700.1

Weld See Page 14700.8

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

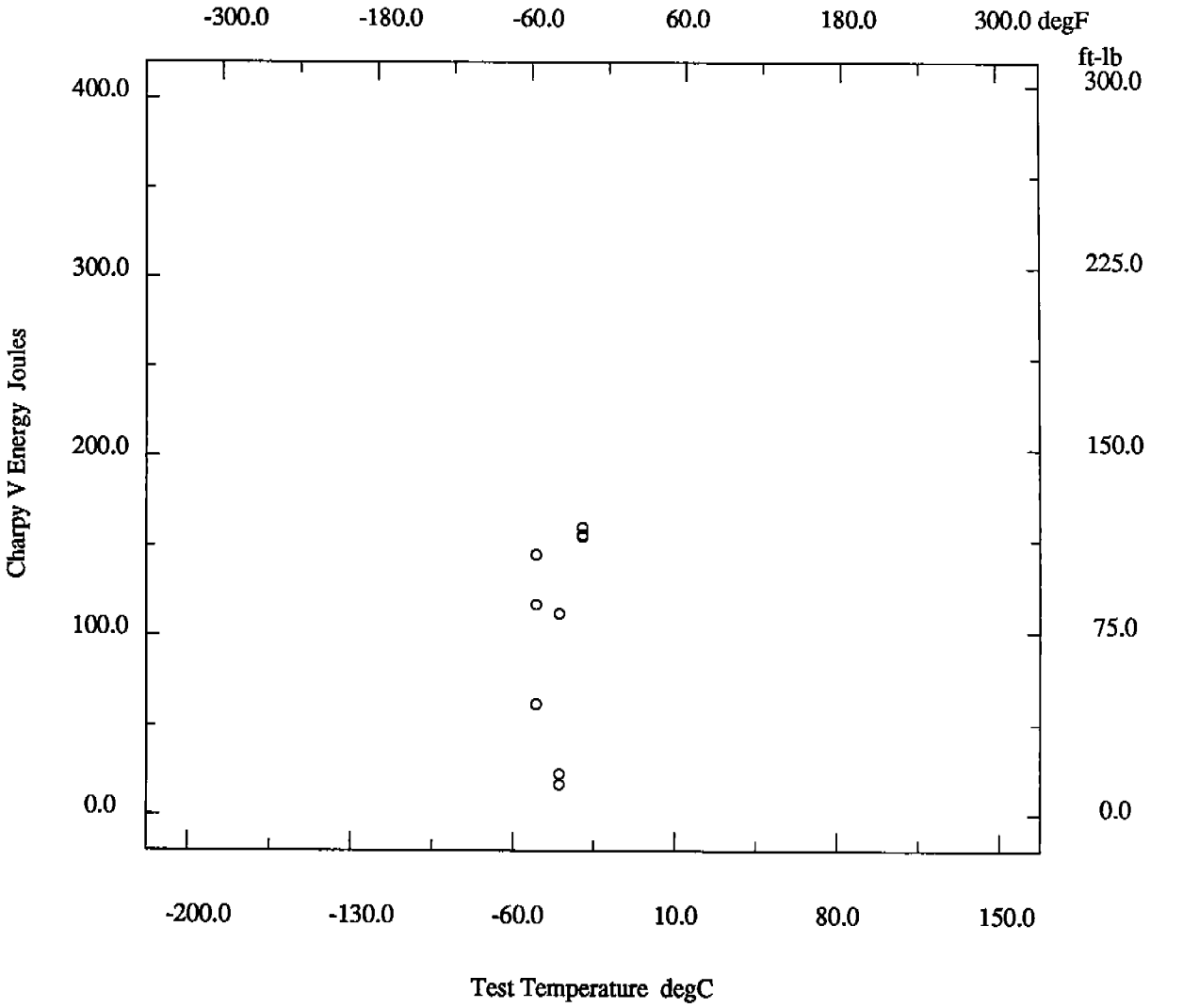
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	117
T-L °	-50	145
T-L °	-50	62
T-L °	-40	112
T-L °	-40	17
T-L °	-40	23
T-L °	-30	155
T-L °	-30	156
T-L °	-30	160

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09ABRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09BSA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.86 %
P	0.005 %	S	0.006 %
Si	0.04 %	Cr	0.06 %
Ni	0.64 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.014 %	Ti	0.004 %
B	*	Al	0.96 %
N	0.0225 %	Other Components	O=.0115 %

Fabrication History

See Page 14700.1

Weld

Weld Code	010.003.09BSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	2G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.0 volts
Amperage	210-220 amps	Polarity	DCRP
Travel Speed	20-30 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	1979

Orien	Test Temp degC	CODIc mm	Curve
T-L	-10	1.75	Unstable
T-L	-10	>1.98	Maximum
T-L	-10	>2.04	Maximum

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09BFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14700.11

Fabrication History See Page 14700.1

Weld

Weld Code	010.003.09BFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	2G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.0 volts
Amperage	210-220 amps	Polarity	DCRP
Travel Speed	20-30 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	555	438	*	29	78

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09BFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14700.11

Fabrication History See Page 14700.1

Weld See Page 14700.12

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

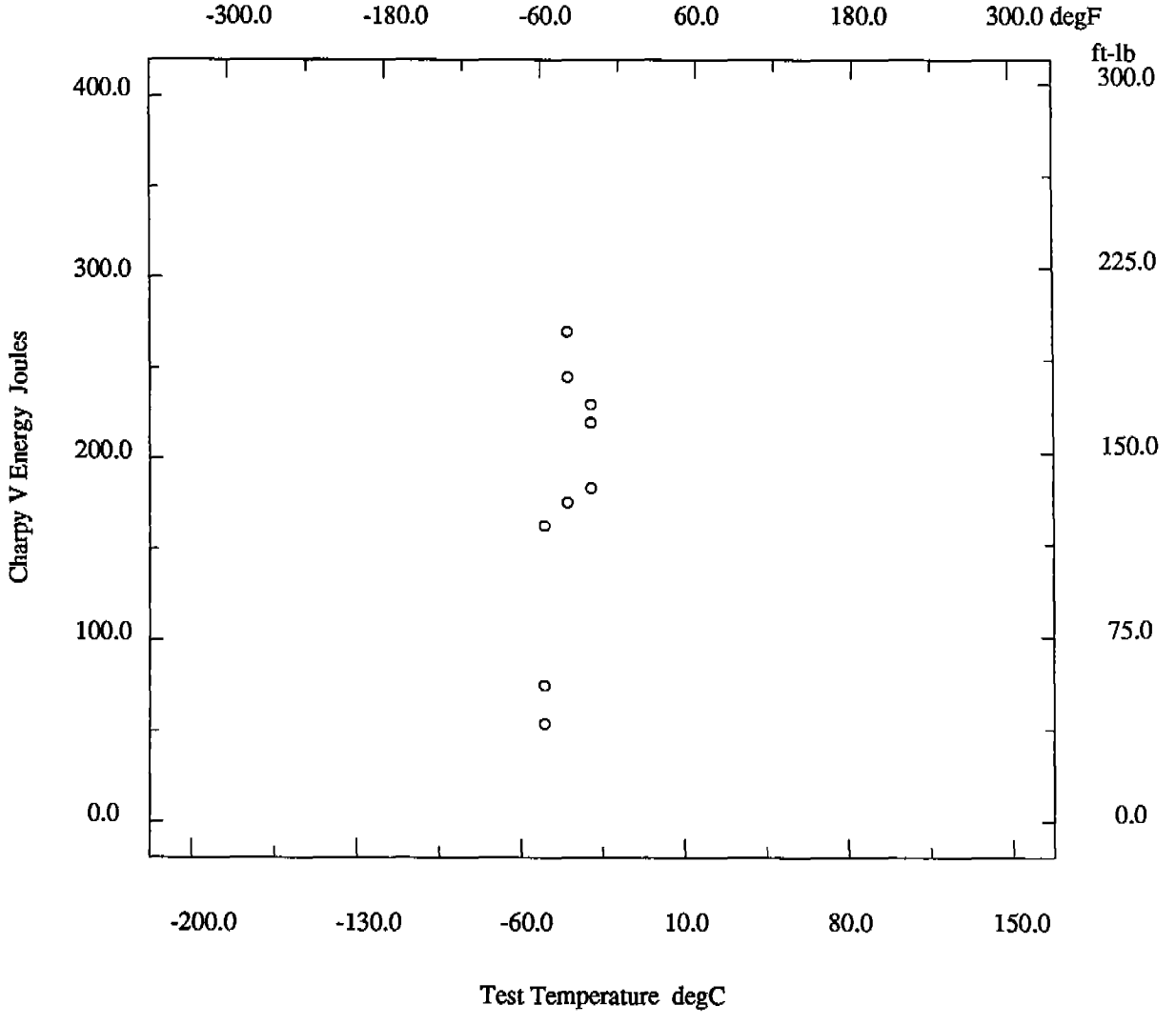
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	163
T-L °	-50	54
T-L °	-50	75
T-L °	-40	176
T-L °	-40	245
T-L °	-40	270
T-L °	-30	184
T-L °	-30	220
T-L °	-30	230

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09BFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09BMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 14700.11

Fabrication History

See Page 14700.1

Weld

Weld Code	010.003.09BMA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	2G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.0 volts
Amperage	210-220 amps	Polarity	DCRP
Travel Speed	20-30 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

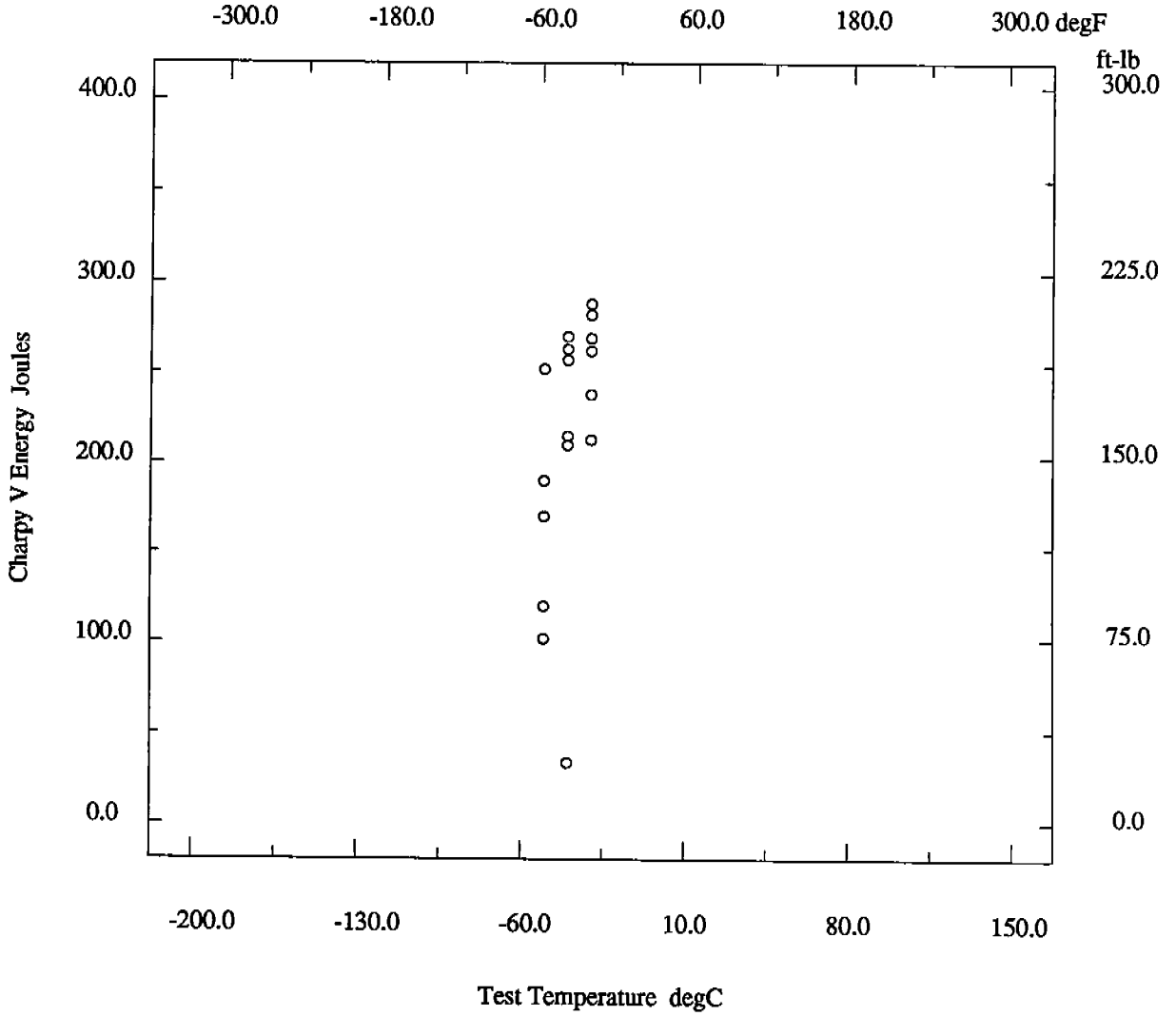
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	102
T-L °	-50	120
T-L °	-50	170
T-L °	-50	170
T-L °	-50	190
T-L °	-50	252
T-L °	-40	210
T-L °	-40	215
T-L °	-40	257
T-L °	-40	263
T-L °	-40	270
T-L °	-40	34
T-L °	-30	213
T-L °	-30	238
T-L °	-30	262
T-L °	-30	269
T-L °	-30	282
T-L °	-30	288

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09BMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09BBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.86 %
P	0.012 %	S	0.008 %
Si	0.07 %	Cr	0.03 %
Ni	0.54 %	Mo	0.03 %
V	0.002 %	Cu	0.01 %
Cb	0.012 %	Ti	0.003 %
B	*	Al	0.98 %
N	0.0180 %	Other Components	O=.0072 %

Fabrication History

See Page 14700.1

Weld

Weld Code	010.003.09BBRA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	2G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.0 volts
Amperage	210-220 amps	Polarity	DCRP
Travel Speed	20-30 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	539	472	*	24	71

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09BBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14700.17

Fabrication History See Page 14700.1

Weld See Page 14700.17

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

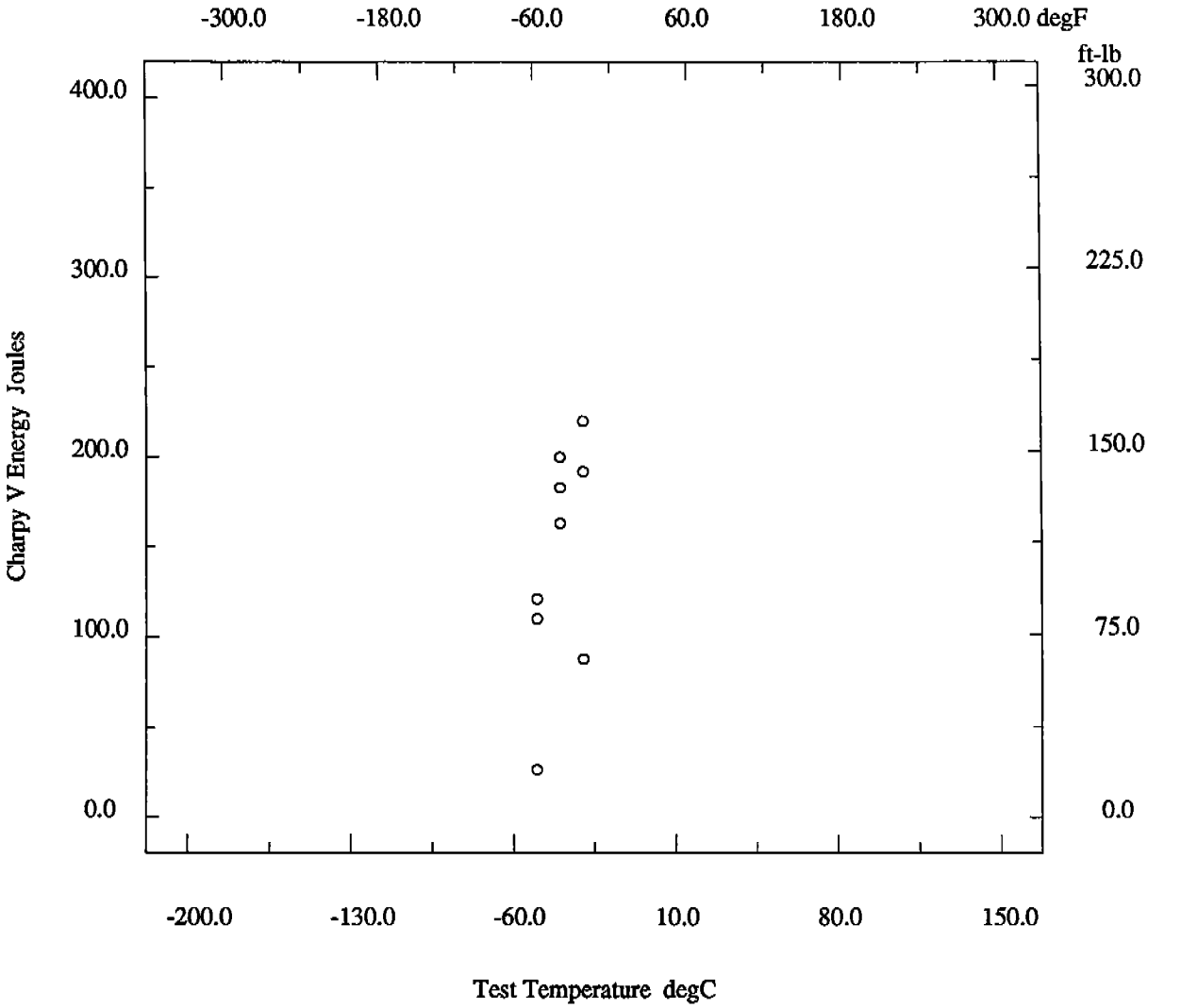
Orien	Test Temp degC	CVN Energy Joules
T-L o	-50	110
T-L o	-50	121
T-L o	-50	27
T-L o	-40	163
T-L o	-40	183
T-L o	-40	200
T-L o	-30	192
T-L o	-30	220
T-L o	-30	88

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09BBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09CSA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.08 %	Mn	0.85 %
P	0.005 %	S	0.006 %
Si	0.04 %	Cr	0.07 %
Ni	0.67 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.013 %	Ti	0.004 %
B	*	Al	0.94 %
N	0.0257 %	Other Components	O=.0116 %

Fabrication History

See Page 14700.1

Weld

Weld Code	010.003.09CSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	1979

Orien	Test Temp degC	CODIc mm	Curve
T-L	-10	1.21	Unstable
T-L	-10	>1.94	Unstable
T-L	-10	>1.96	Maximum

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09CFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 14700.20

Fabrication History

See Page 14700.1

Weld

Weld Code	010.003.09CFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	520	455	*	27	66

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09CFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14700.20

Fabrication History See Page 14700.1

Weld See Page 14700.21

Property Measurements

Test Type	Charpy V Impact	Position	0/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

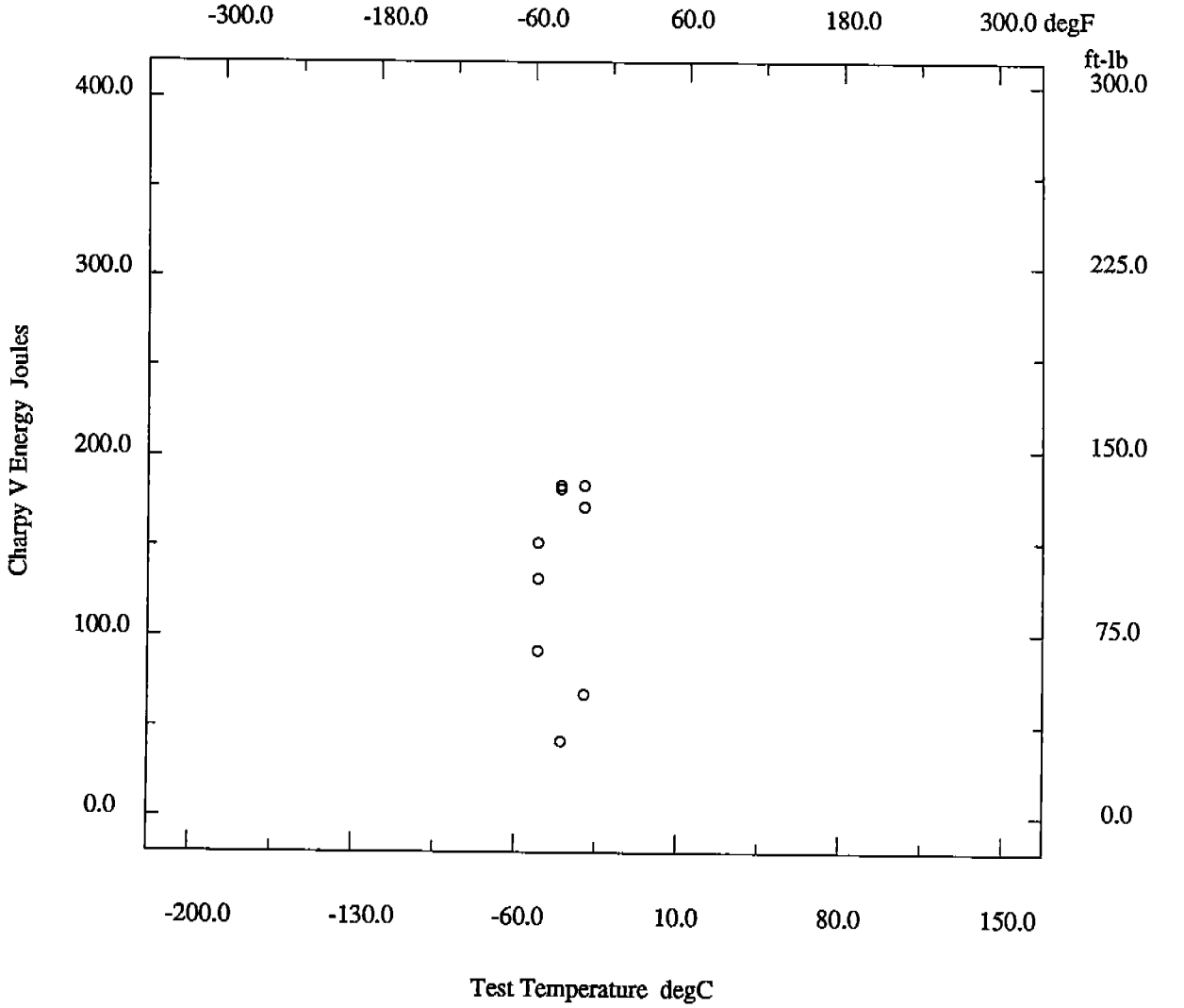
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	132
T-L °	-50	152
T-L °	-50	92
T-L °	-40	182
T-L °	-40	184
T-L °	-40	42
T-L °	-30	172
T-L °	-30	184
T-L °	-30	68

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09CFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09CMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14700.20

Fabrication History See Page 14700.1

Weld

Weld Code	010.003.09CMA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

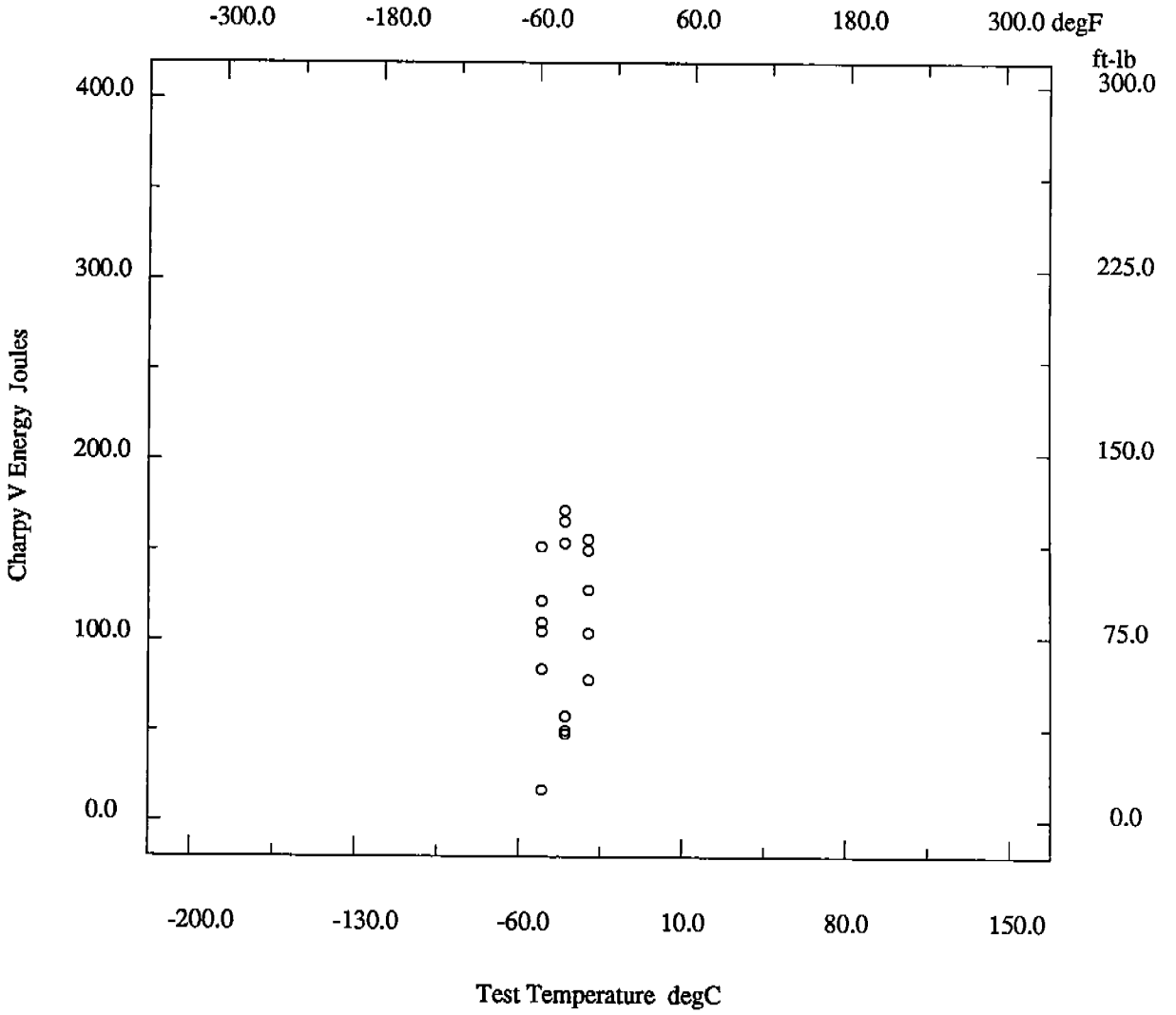
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	105
T-L °	-50	110
T-L °	-50	122
T-L °	-50	152
T-L °	-50	17
T-L °	-50	84
T-L °	-40	154
T-L °	-40	166
T-L °	-40	172
T-L °	-40	48
T-L °	-40	50
T-L °	-40	58
T-L °	-30	104
T-L °	-30	104
T-L °	-30	128
T-L °	-30	150
T-L °	-30	156
T-L °	-30	78

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09CMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09CBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.90 %
P	0.007 %	S	0.006 %
Si	0.06 %	Cr	0.09 %
Ni	0.64 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.016 %	Ti	0.004 %
B	*	Al	1.03 %
N	0.0221 %	Other Components	O=.0086 %

Fabrication History

See Page 14700.1

Weld

Weld Code	010.003.09CBRA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	551	485	*	26	62

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09CBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14700.26

Fabrication History See Page 14700.1

Weld See Page 14700.26

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

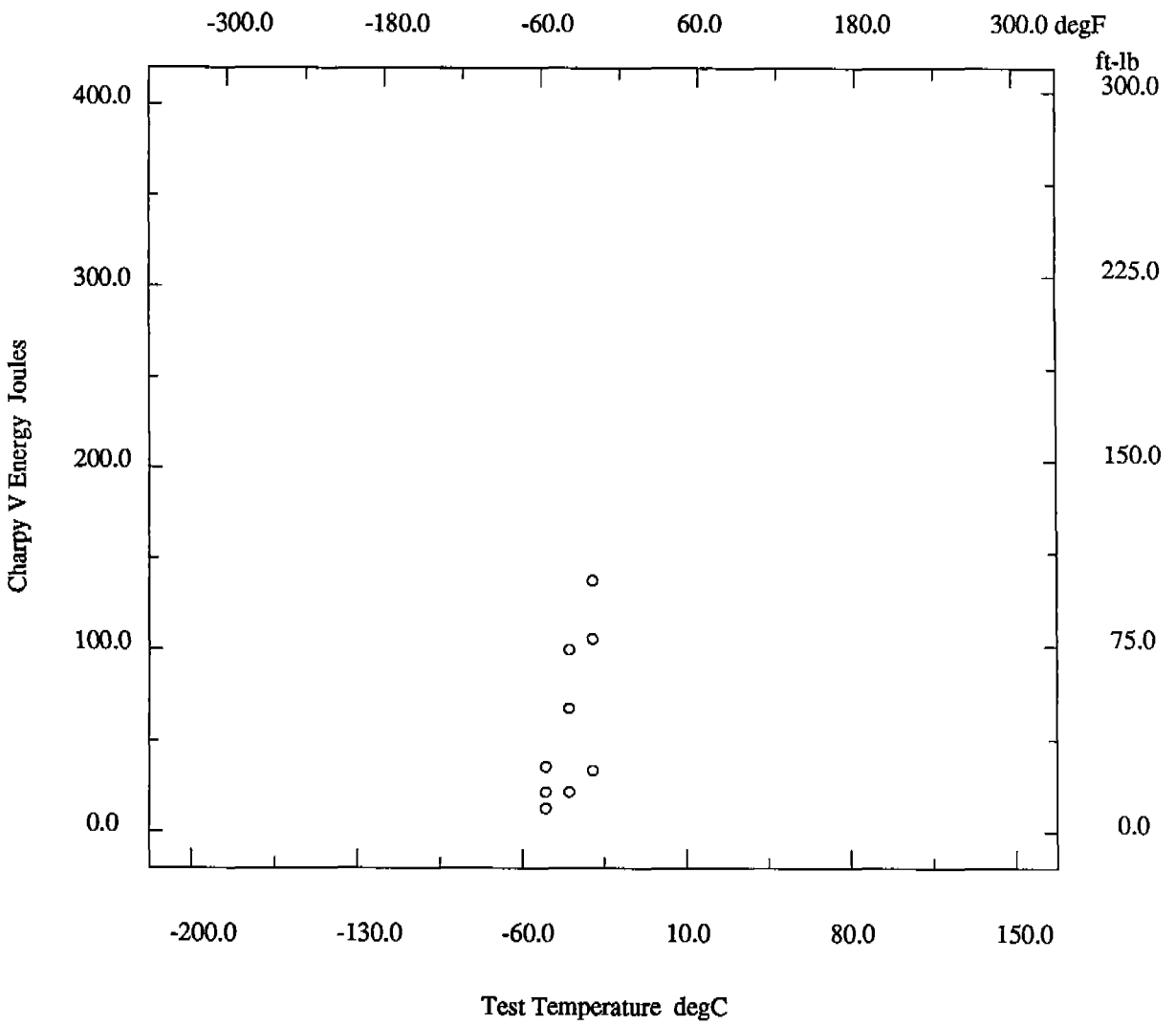
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-50	13
T-L ○	-50	22
T-L ○	-50	36
T-L ○	-40	100
T-L ○	-40	22
T-L ○	-40	68
T-L ○	-30	106
T-L ○	-30	138
T-L ○	-30	34

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09CBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09DSA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.90 %
P	0.006 %	S	0.006 %
Si	0.04 %	Cr	0.09 %
Ni	0.66 %	Mo	0.02 %
V	0.002 %	Cu	0.02 %
Cb	0.014 %	Ti	0.004 %
B	*	Al	1.09 %
N	0.0211 %	Other Components	O=.0100 %

Fabrication History

Heat Treatment	*	Producer	*
Year Produced	*	Addl Info	None
Source	HIFAB	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	H
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.003.09DSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	4G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	18 volts
Amperage	150-160 amps	Polarity	DCRP
Travel Speed	17-26 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	1979

Orien	Test Temp degC	CODIc mm	Curve
T-L	-10	0.26	Cleavage
T-L	-10	1.04	Unstable
T-L	-10	1.26	Unstable

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09DFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 14800.1

Fabrication History

See Page 14800.1

Weld

Weld Code	010.003.09DFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	4G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	18 volts
Amperage	150-160 amps	Polarity	DCRP
Travel Speed	17-26 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	515	436	*	27	78

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09DFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14800.1

Fabrication History See Page 14800.1

Weld See Page 14800.3

Property Measurements

Test Type	Charpy V Impact	Position	0/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

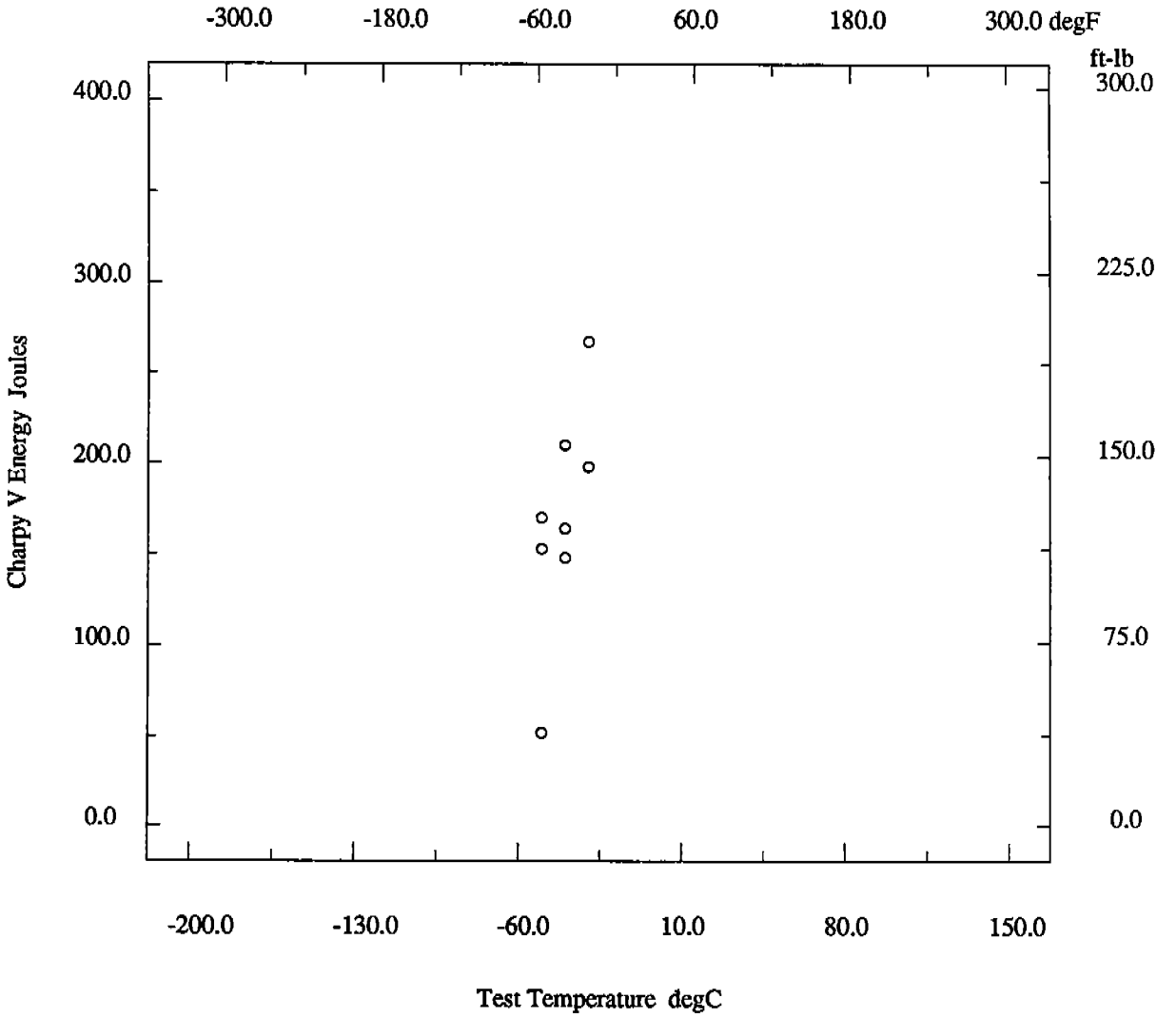
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	153
T-L °	-50	170
T-L °	-50	52
T-L °	-40	148
T-L °	-40	164
T-L °	-40	210
T-L °	-30	198
T-L °	-30	198
T-L °	-30	267

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09DFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09DMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 14800.1

Fabrication History

See Page 14800.1

Weld

Weld Code	010.003.09DMA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	4G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	18 volts
Amperage	150-160 amps	Polarity	DCRP
Travel Speed	17-26 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

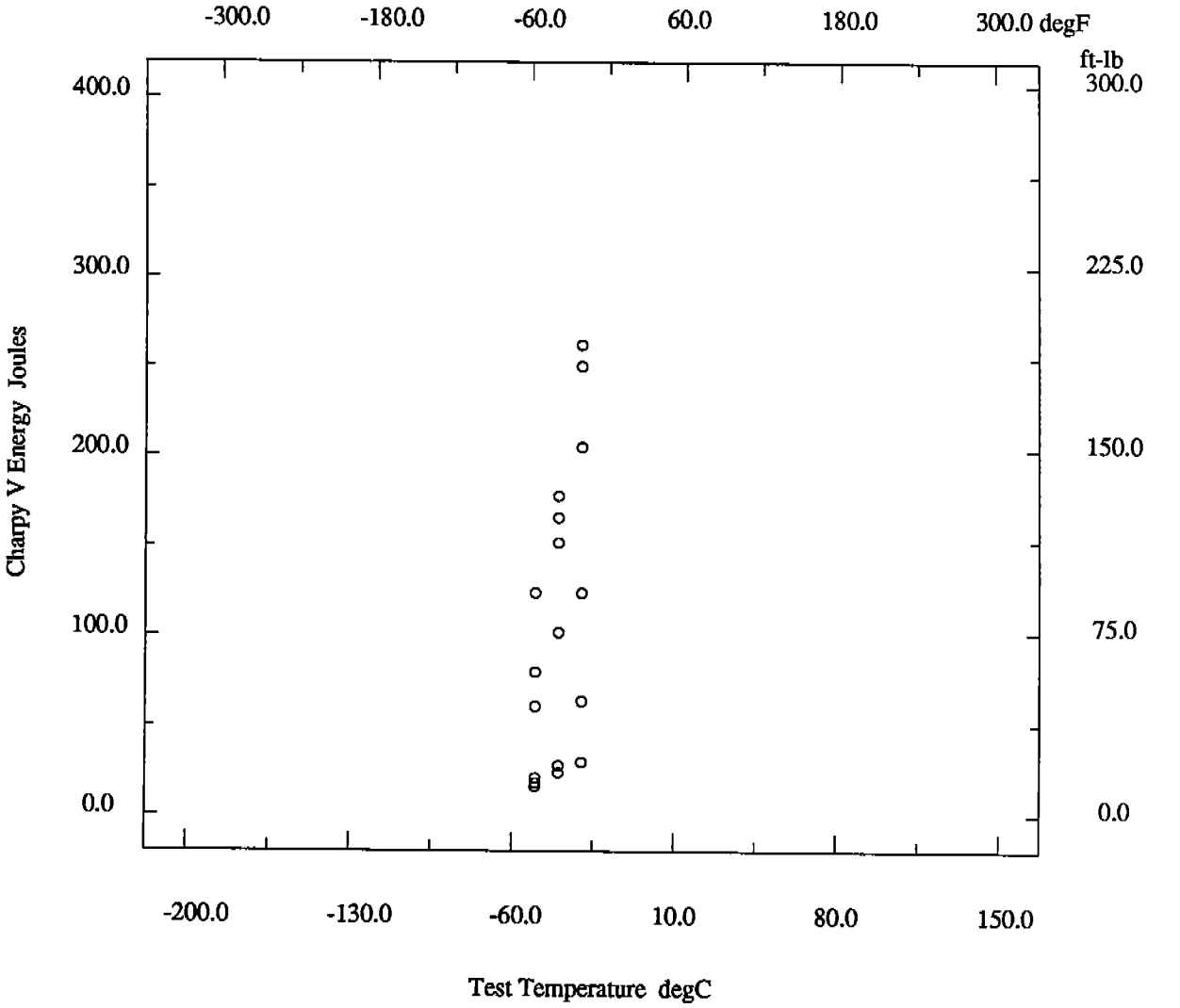
Orien	Test Temp degC	CVN Energy Joules
T-L o	-50	124
T-L o	-50	16
T-L o	-50	18
T-L o	-50	21
T-L o	-50	61
T-L o	-50	80
T-L o	-40	102
T-L o	-40	152
T-L o	-40	166
T-L o	-40	178
T-L o	-40	24
T-L o	-40	28
T-L o	-30	124
T-L o	-30	205
T-L o	-30	250
T-L o	-30	262
T-L o	-30	30
T-L o	-30	64

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09DMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09DBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.95 %
P	0.006 %	S	0.006 %
Si	0.09 %	Cr	0.06 %
Ni	0.54 %	Mo	0.02 %
V	0.002 %	Cu	0.03 %
Cb	0.014 %	Ti	0.004 %
B	*	Al	0.92 %
N	0.0220 %	Other Components	O=.0074 %

Fabrication History

See Page 14800.1

Weld

Weld Code	010.003.09DBRA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	4G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	18 volts
Amperage	150-160 amps	Polarity	DCRP
Travel Speed	17-26 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	520	471	*	*	*

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09DBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 14800.8

Fabrication History

See Page 14800.1

Weld

See Page 14800.8

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

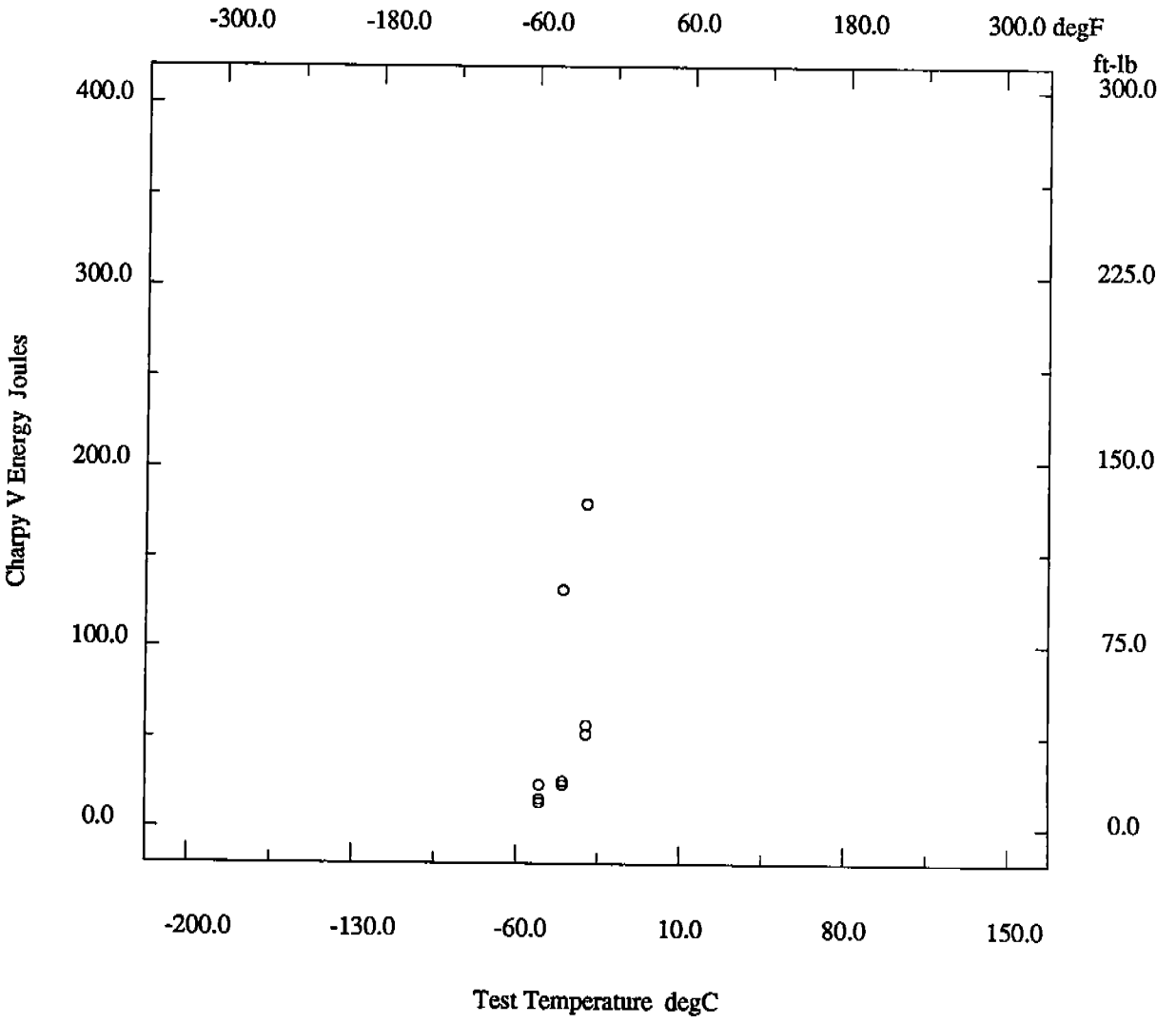
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	14
T-L °	-50	16
T-L °	-50	24
T-L °	-40	132
T-L °	-40	24
T-L °	-40	26
T-L °	-30	180
T-L °	-30	52
T-L °	-30	57

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09DBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09ESA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.82 %
P	0.007 %	S	0.004 %
Si	0.04 %	Cr	0.07 %
Ni	0.62 %	Mo	0.04 %
V	0.002 %	Cu	0.01 %
Cb	0.009 %	Ti	0.003 %
B	*	Al	0.96 %
N	0.0303 %	Other Components	O=.0107 %

Fabrication History

See Page 14800.1

Weld

Weld Code	010.003.09ESA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	1G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	19-20 volts
Amperage	190-210 amps	Polarity	DCRP
Travel Speed	20-25 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	1979

Orien	Test Temp degC	CODIc mm	Curve
T-L	-10	0.31	Cleavage
T-L	-10	0.95	Unstable
T-L	-10	1.92	Maximum

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09EFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 14800.11

Fabrication History

See Page 14800.1

Weld

Weld Code	010.003.09EFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	1G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	19-20 volts
Amperage	190-210 amps	Polarity	DCRP
Travel Speed	20-25 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	497	419	*	28	77

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09EFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 14800.11

Fabrication History

See Page 14800.1

Weld

See Page 14800.12

Property Measurements

Test Type	Charpy V Impact	Position	0/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

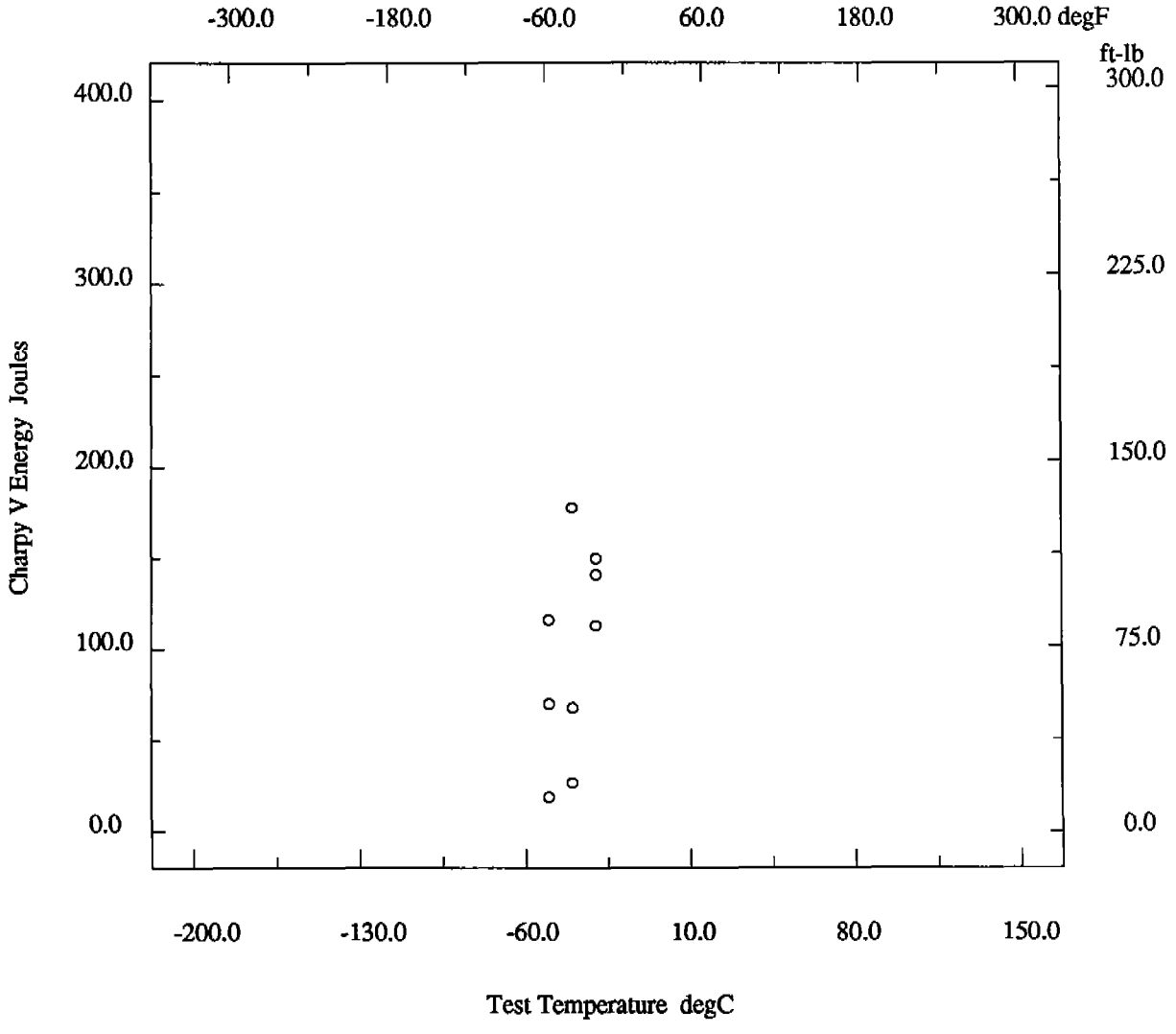
Orien	Test Temp degC	CVN Energy Joules
T-L o	-50	116
T-L o	-50	19
T-L o	-50	70
T-L o	-40	178
T-L o	-40	27
T-L o	-40	68
T-L o	-30	113
T-L o	-30	141
T-L o	-30	150

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09EFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09EMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 14800.11

Fabrication History

See Page 14800.1

Weld

Weld Code	010.003.09EMA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	1G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	19-20 volts
Amperage	190-210 amps	Polarity	DCRP
Travel Speed	20-25 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

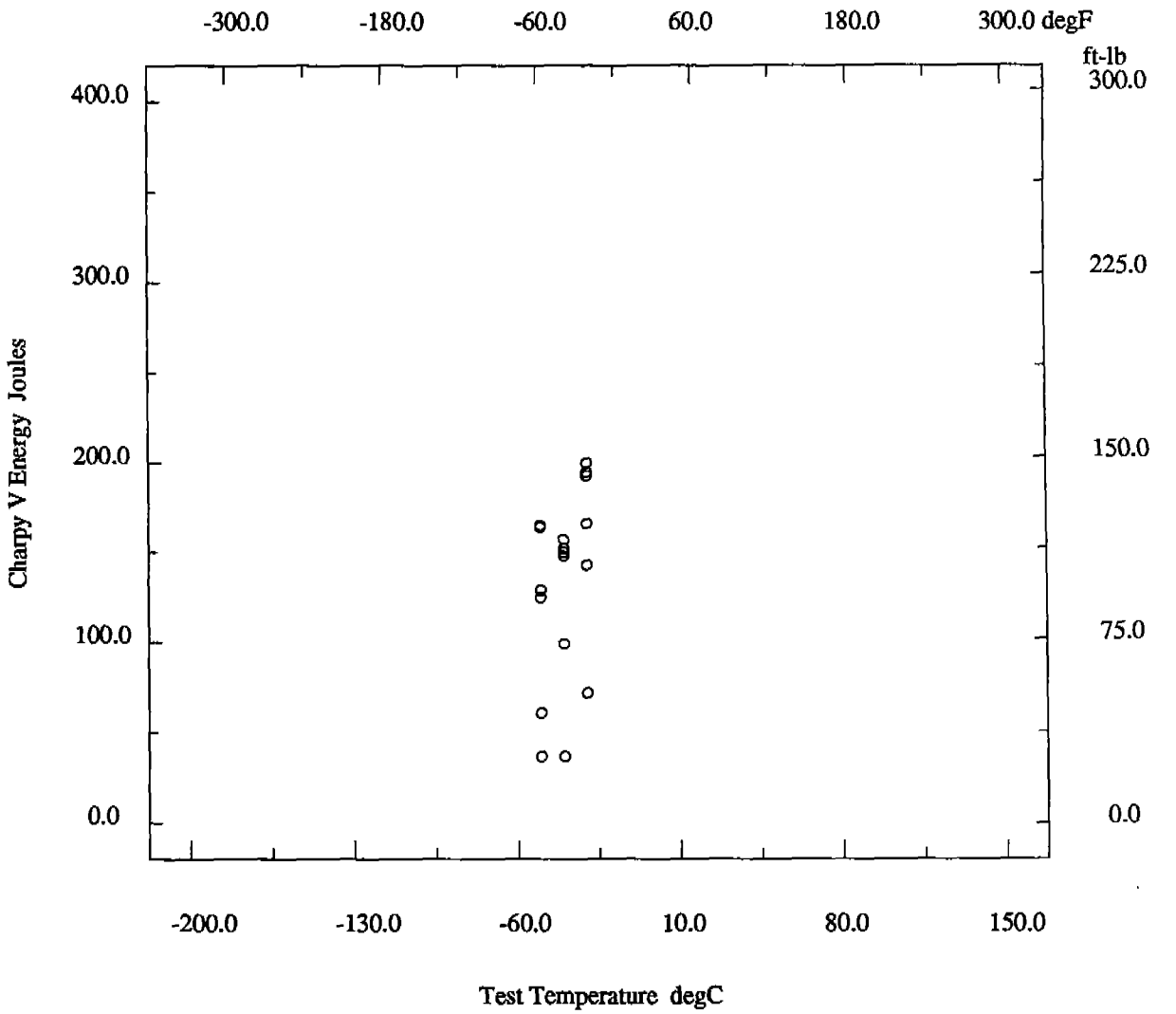
Orien	Test Temp degC	CVN Energy Joules
T-L o	-50	125
T-L o	-50	129
T-L o	-50	164
T-L o	-50	165
T-L o	-50	37
T-L o	-50	61
T-L o	-40	148
T-L o	-40	150
T-L o	-40	152
T-L o	-40	157
T-L o	-40	37
T-L o	-40	99
T-L o	-30	143
T-L o	-30	166
T-L o	-30	193
T-L o	-30	195
T-L o	-30	200
T-L o	-30	72

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09EMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09EBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.90 %
P	0.006 %	S	0.004 %
Si	0.07 %	Cr	0.04 %
Ni	0.59 %	Mo	0.04 %
V	0.002 %	Cu	0.01 %
Cb	0.010 %	Ti	0.003 %
B	*	Al	0.91 %
N	0.0239 %	Other Components	O=.0103 %

Fabrication History

See Page 14800.1

Weld

Weld Code	010.003.09EMA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	1G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	19-20 volts
Amperage	190-210 amps	Polarity	DCRP
Travel Speed	20-25 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	523	453	*	29	72

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09EBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ.7/87		

Composition See Page 14800.17

Fabrication History See Page 14800.1

Weld See Page 14800.17

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

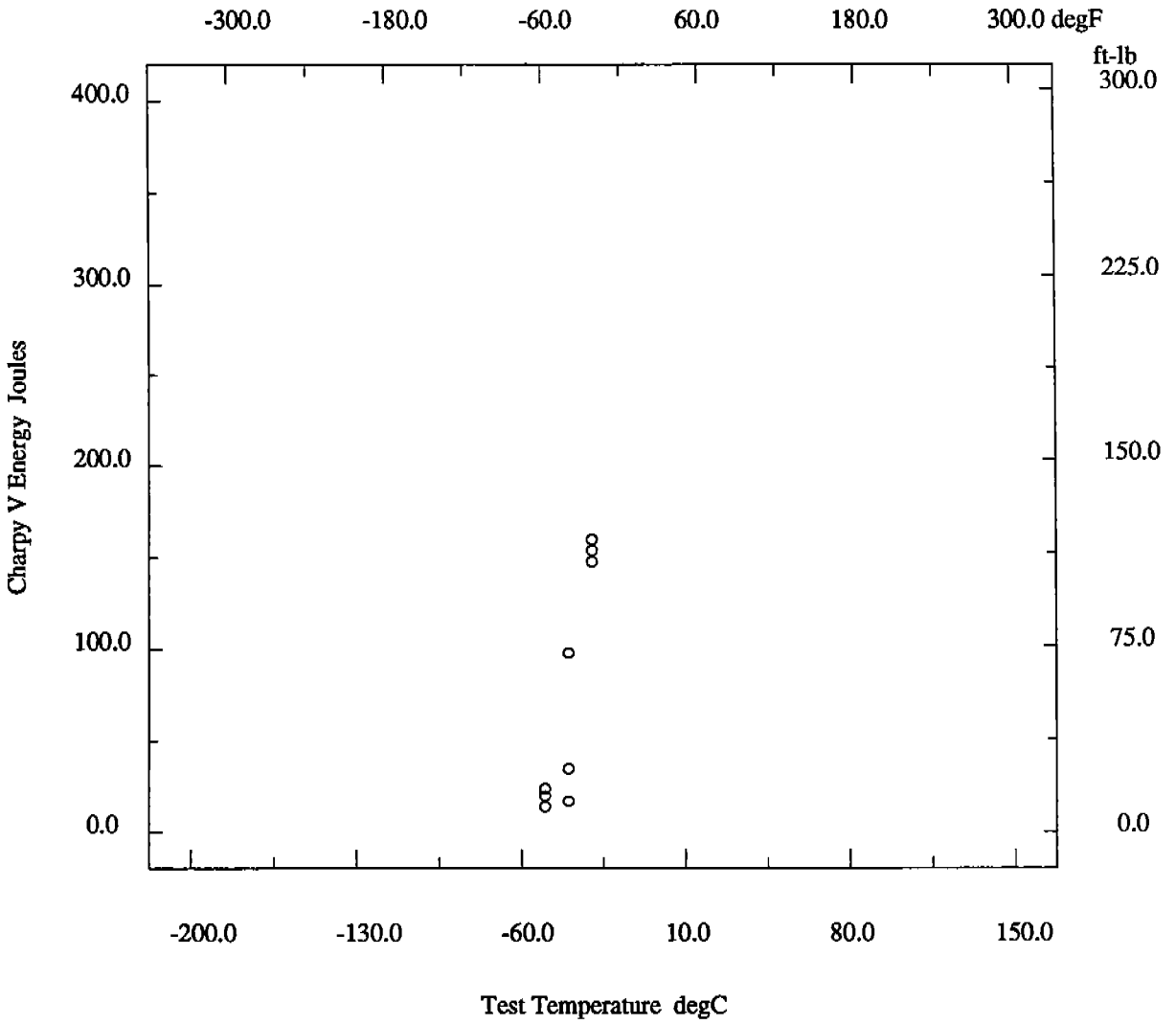
Orien	Test Temp degC	CVN Energy Joules
T-L ○	-50	14
T-L ○	-50	20
T-L ○	-50	24
T-L ○	-40	17
T-L ○	-40	35
T-L ○	-40	98
T-L ○	-30	148
T-L ○	-30	154
T-L ○	-30	160

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09EBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09FSA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.89 %
P	0.007 %	S	0.005 %
Si	0.05 %	Cr	0.07 %
Ni	0.64 %	Mo	0.03 %
V	0.002 %	Cu	0.01 %
Cb	0.010 %	Ti	0.004 %
B	*	Al	1.05 %
N	0.0366 %	Other Components	O=.0116 %

Fabrication History

See Page 14800.1

Weld

Weld Code	010.003.09FSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	2G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	19-20 volts
Amperage	190-210 amps	Polarity	DCRP
Travel Speed	18-22 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Curve Shape	Cleavage
Initial JI, JI	*	Maximum J, Jmax	*
Tearing Modulus	*	Standard Method	BS5762
Standard Year	1979		

Orien	Test Temp degC	CODIc mm
T-L	-10	0.37
T-L	-10	0.46
T-L	-10	0.84

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09FFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14800.20

Fabrication History See Page 14800.1

Weld

Weld Code	010.003.09FFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	2G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	19-20 volts
Amperage	190-210 amps	Polarity	DCRP
Travel Speed	18-22 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	500	442	*	27	75

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09FFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14800.20

Fabrication History See Page 14800.1

Weld See Page 14800.21

Property Measurements

Test Type	Charpy V Impact	Position	0/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

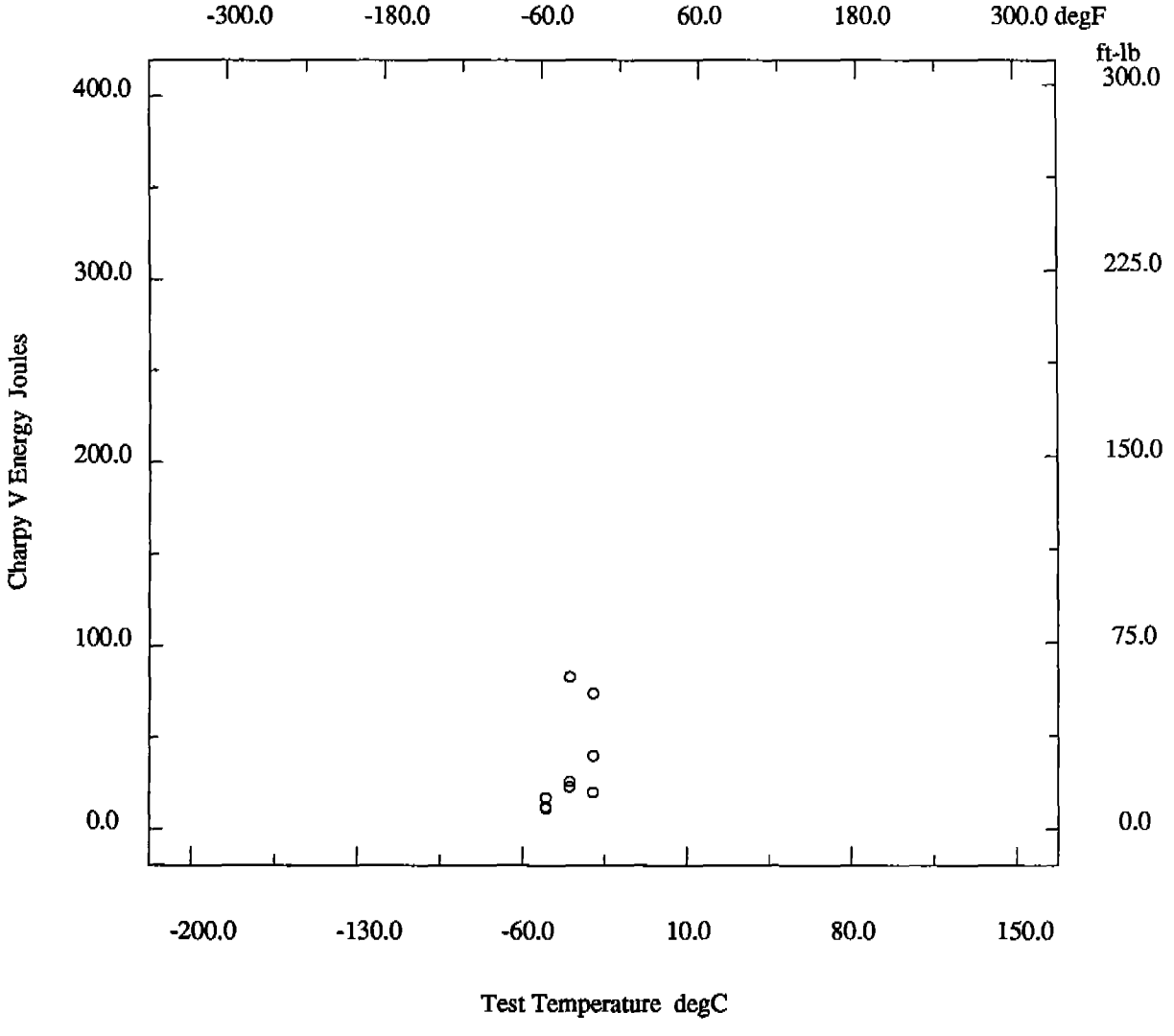
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	11
T-L °	-50	12
T-L °	-50	17
T-L °	-40	23
T-L °	-40	26
T-L °	-40	83
T-L °	-30	20
T-L °	-30	40
T-L °	-30	74

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09FFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09FMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 14800.20

Fabrication History

See Page 14800.1

Weld

Weld Code	010.003.09FMA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	2G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	19-20 volts
Amperage	190-210 amps	Polarity	DCRP
Travel Speed	18-22 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

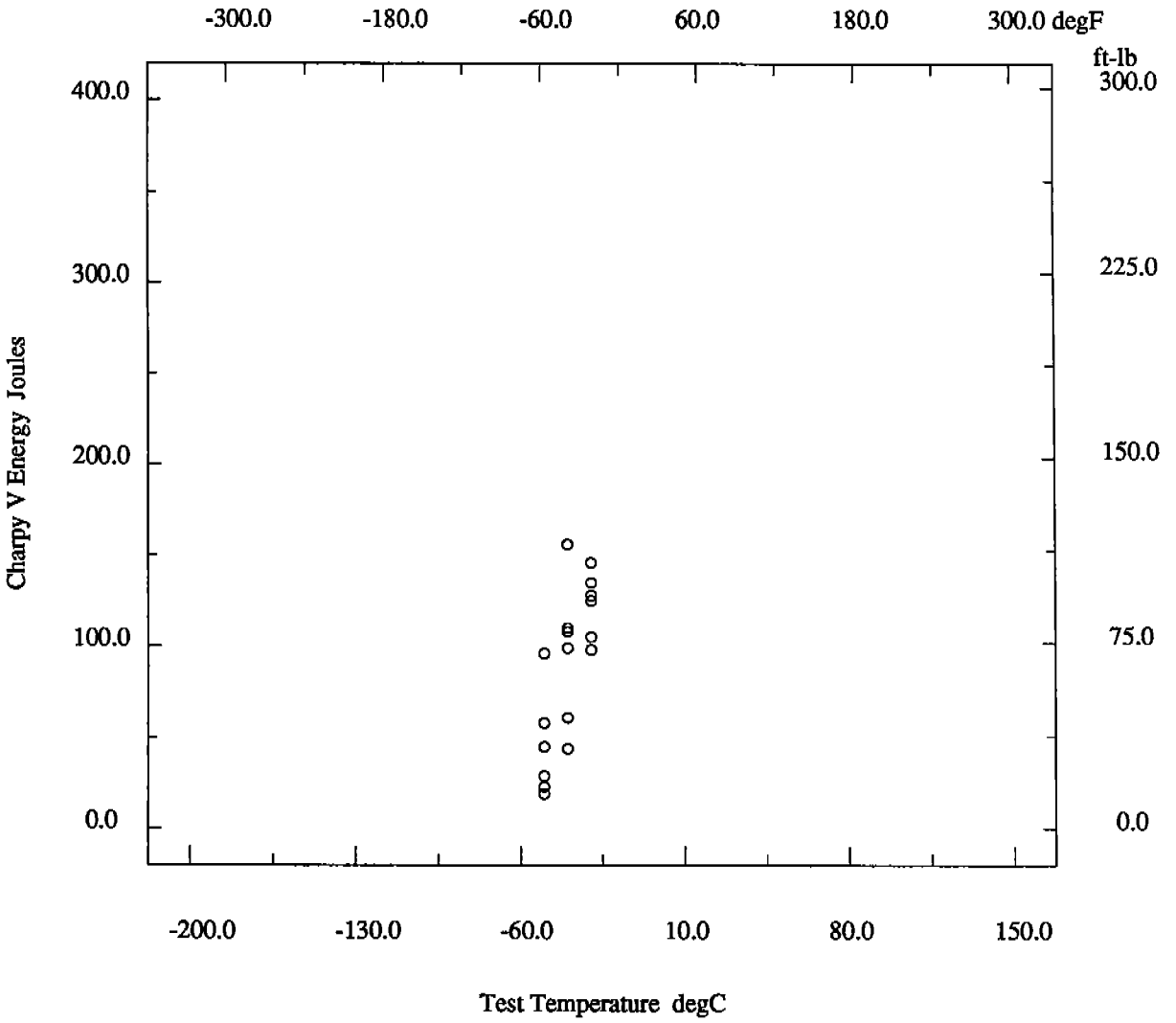
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	19
T-L °	-50	23
T-L °	-50	29
T-L °	-50	45
T-L °	-50	58
T-L °	-50	96
T-L °	-40	108
T-L °	-40	110
T-L °	-40	156
T-L °	-40	44
T-L °	-40	61
T-L °	-40	99
T-L °	-30	105
T-L °	-30	125
T-L °	-30	128
T-L °	-30	135
T-L °	-30	146
T-L °	-30	98

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09FMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09FBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.10 %	Mn	0.95 %
P	0.007 %	S	0.004 %
Si	0.10 %	Cr	0.05 %
Ni	0.50 %	Mo	0.02 %
V	0.002 %	Cu	0.01 %
Cb	0.110 %	Ti	0.003 %
B	*	Al	0.86 %
N	0.0258 %	Other Components	O=.0092 %

Fabrication History

See Page 14800.1

Weld

Weld Code	010.003.09FBRA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	2G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	19-20 volts
Amperage	190-210 amps	Polarity	DCRP
Travel Speed	18-22 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	526	460	*	29	75

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09FBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14800.26

Fabrication History See Page 14800.1

Weld See Page 14800.26

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

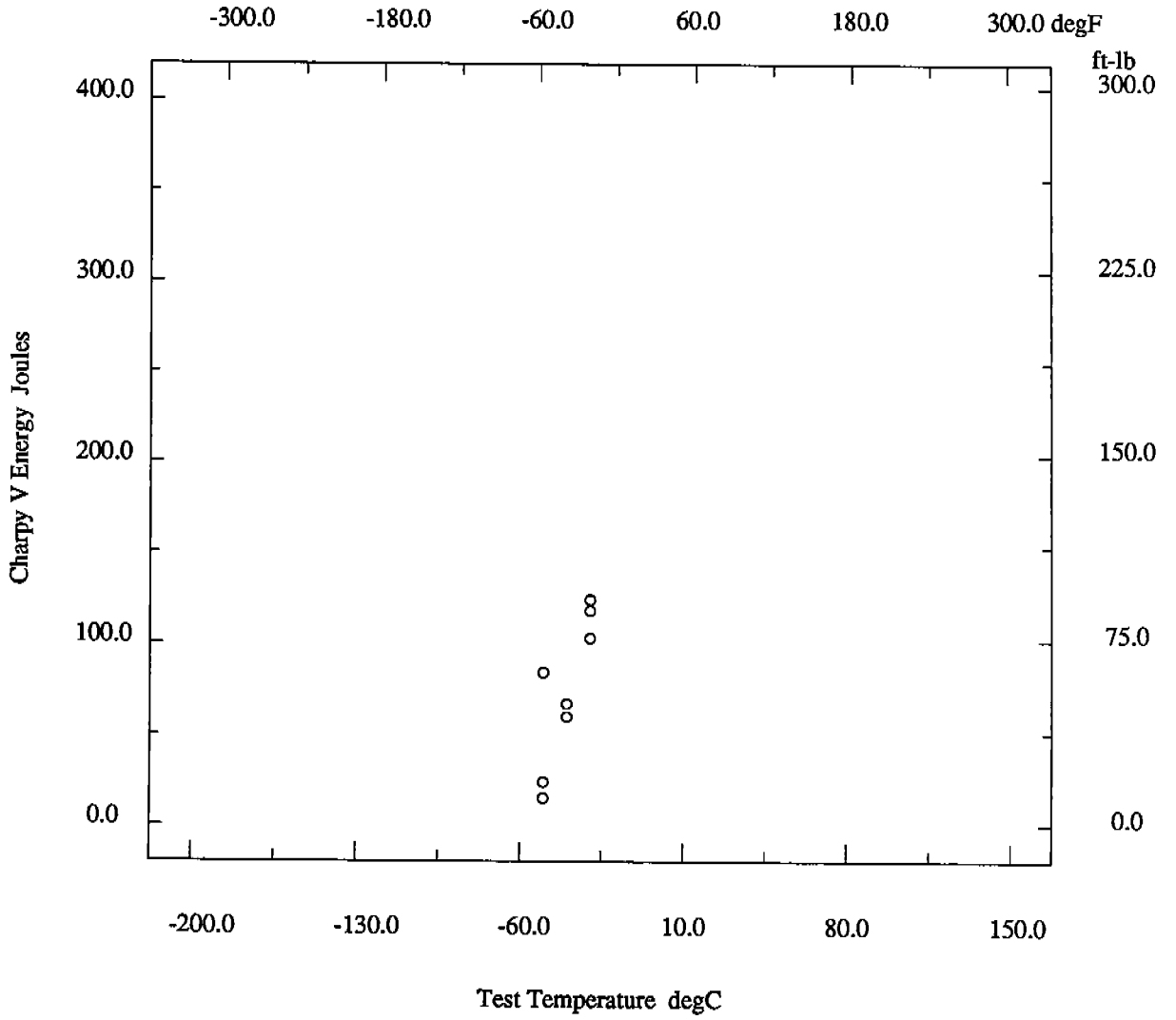
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	15
T-L °	-50	24
T-L °	-50	84
T-L °	-40	60
T-L °	-40	60
T-L °	-40	67
T-L °	-30	103
T-L °	-30	118
T-L °	-30	124

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09FBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09GSA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.87 %
P	0.006 %	S	0.004 %
Si	0.04 %	Cr	0.06 %
Ni	0.66 %	Mo	0.04 %
V	0.002 %	Cu	0.01 %
Cb	0.010 %	Ti	0.004 %
B	*	Al	0.90 %
N	0.0376 %	Other Components	O=.0104 %

Fabrication History

Heat Treatment	*	Producer	*
Year Produced	*	Addl Info	None
Source	HIFAB	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	H
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.003.09GSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	18-19 volts
Amperage	190-210 amps	Polarity	DCRP
Travel Speed	20-25 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	1979

Orien	Test Temp degC	CODIc mm	Curve
T-L	-10	0.13	Cleavage
T-L	-10	0.70	Cleavage
T-L	-10	1.62	Unstable

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09GFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 14900.1

Fabrication History

See Page 14900.1

Weld

Weld Code	010.003.09GFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	18-19 volts
Amperage	190-210 amps	Polarity	DCRP
Travel Speed	20-25 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	503	438	*	29	78

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09GFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14900.1

Fabrication History See Page 14900.1

Weld See Page 14900.3

Property Measurements

Test Type	Charpy V Impact	Position	0/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

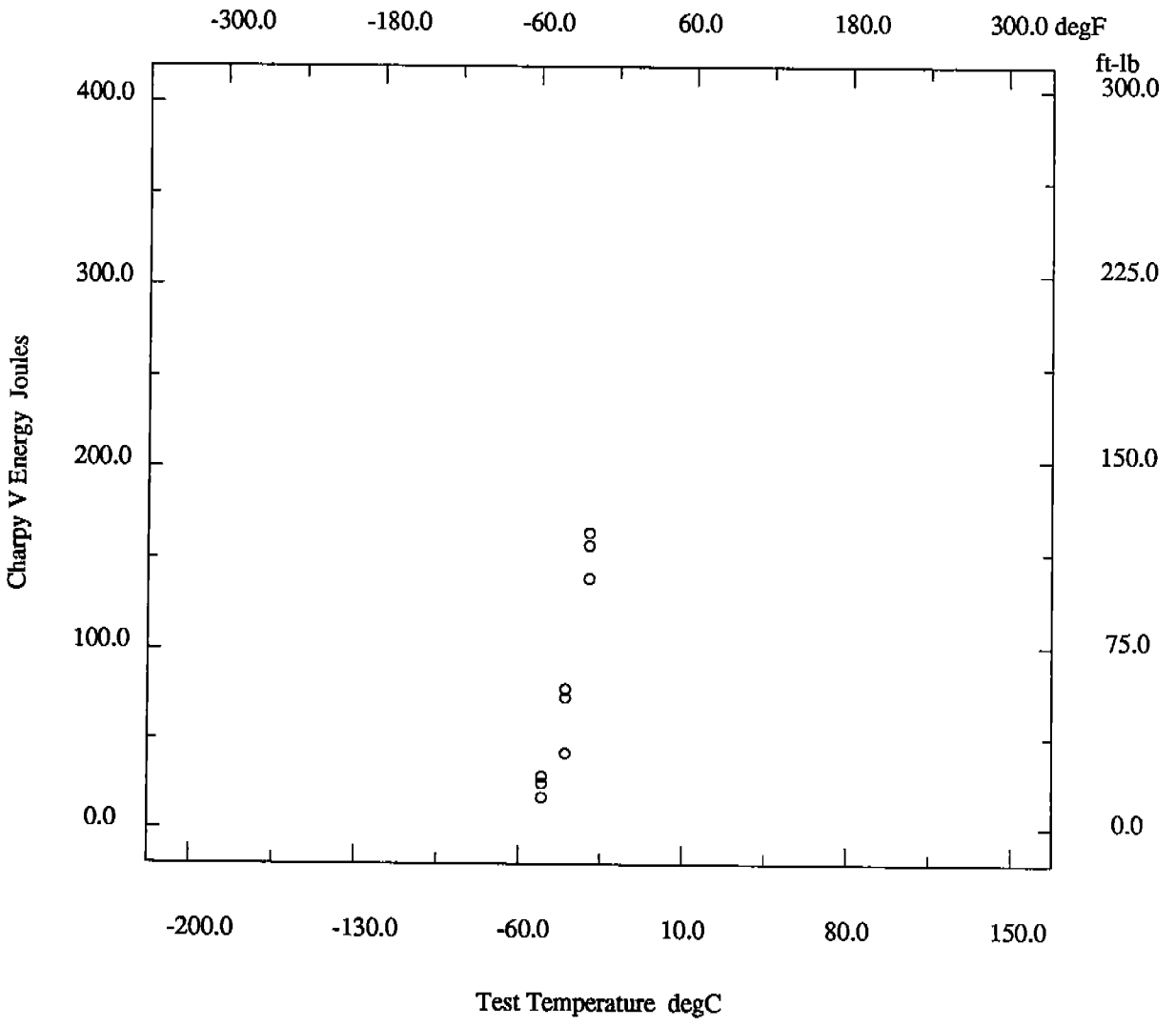
Orien	Test Temp degC	CVN Energy Joules
T-L o	-50	17
T-L o	-50	25
T-L o	-50	29
T-L o	-40	42
T-L o	-40	73
T-L o	-40	78
T-L o	-30	139
T-L o	-30	157
T-L o	-30	164

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09GFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09GMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 14900.1

Fabrication History

See Page 14900.1

Weld

Weld Code	010.003.09GMA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	18-19 volts
Amperage	190-210 amps	Polarity	DCRP
Travel Speed	20-25 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	No		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

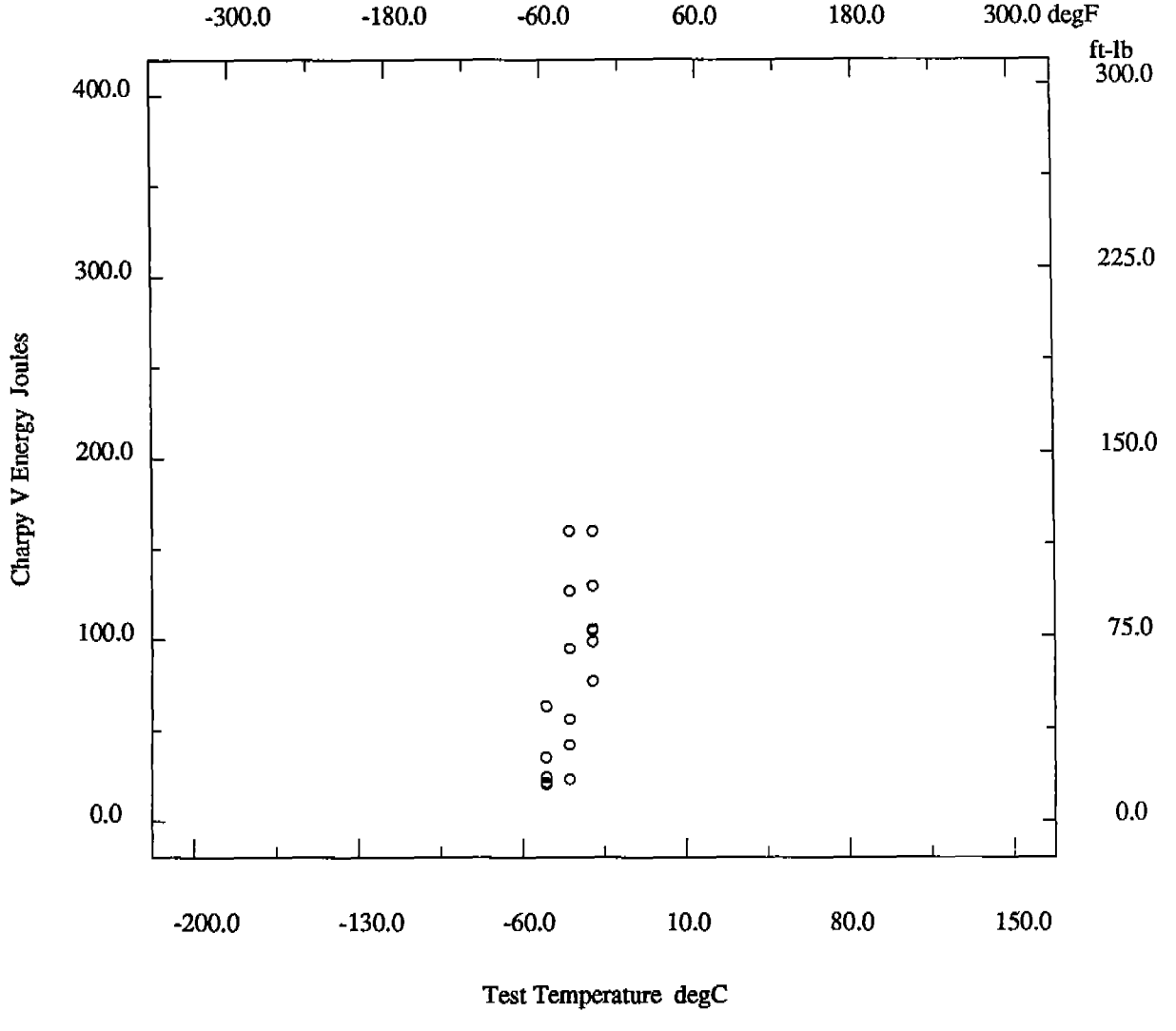
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	20
T-L °	-50	21
T-L °	-50	21
T-L °	-50	24
T-L °	-50	35
T-L °	-50	63
T-L °	-40	127
T-L °	-40	160
T-L °	-40	23
T-L °	-40	42
T-L °	-40	56
T-L °	-40	95
T-L °	-30	105
T-L °	-30	106
T-L °	-30	130
T-L °	-30	160
T-L °	-30	77
T-L °	-30	99

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09GMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09GBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.87 %
P	0.006 %	S	0.004 %
Si	0.06 %	Cr	0.04 %
Ni	0.59 %	Mo	0.03 %
V	0.002 %	Cu	0.01 %
Cb	0.010 %	Ti	0.003 %
B	*	Al	0.89 %
N	0.0263 %	Other Components	O=.0066 %

Fabrication History

See Page 14900.1

Weld

Weld Code	010.003.09GBRA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	18-19 volts
Amperage	190-210 amps	Polarity	DCRP
Travel Speed	20-25 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	528	476	*	27	75

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09GBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14900.8

Fabrication History See Page 14900.1

Weld See Page 14900.8

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

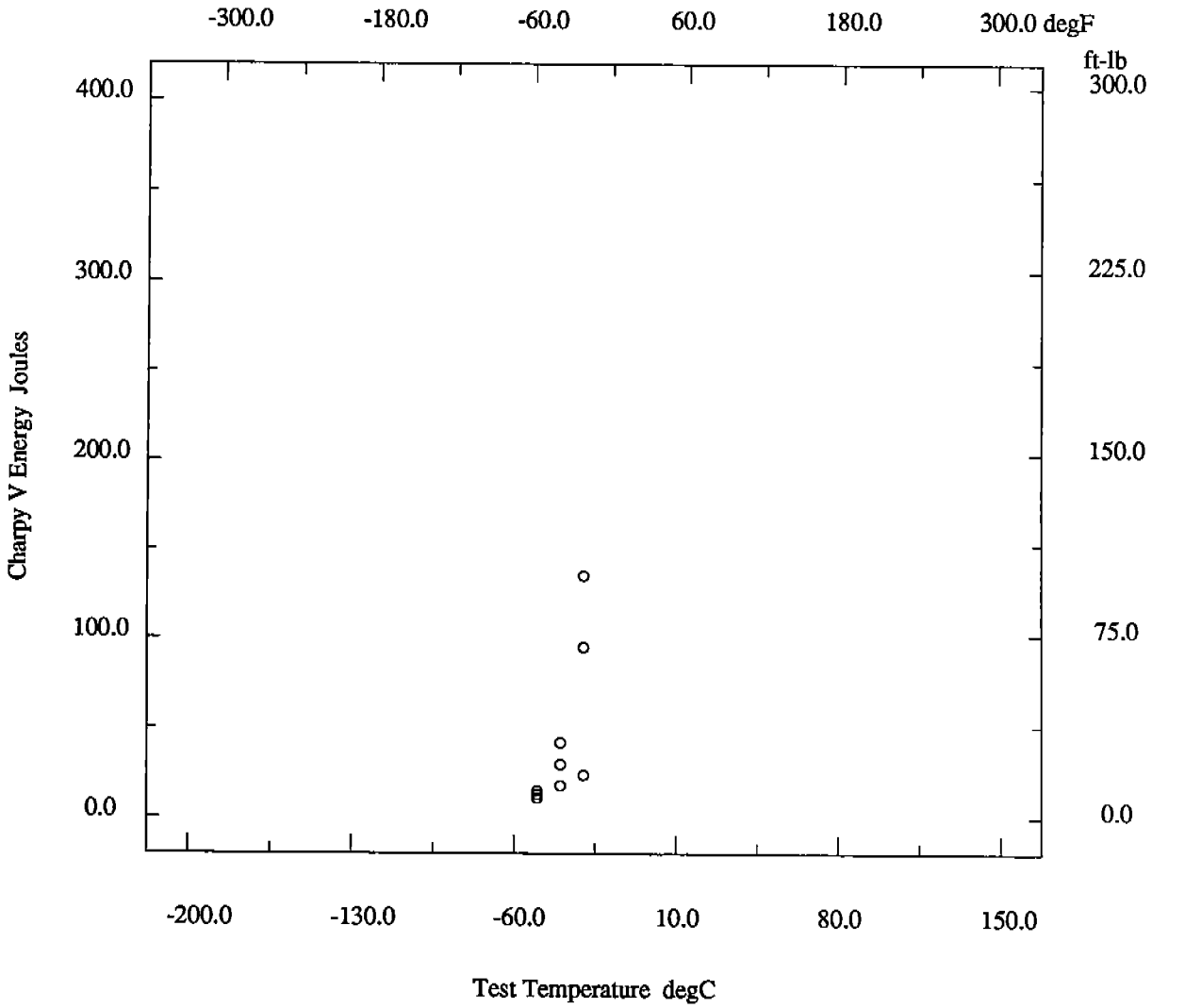
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	11
T-L °	-50	13
T-L °	-50	15
T-L °	-40	18
T-L °	-40	30
T-L °	-40	42
T-L °	-30	135
T-L °	-30	24
T-L °	-30	95

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09GBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09HSA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.86 %
P	0.006 %	S	0.004 %
Si	0.05 %	Cr	0.06 %
Ni	0.64 %	Mo	0.04 %
V	0.002 %	Cu	0.01 %
Cb	0.009 %	Ti	0.004 %
B	*	Al	1.02 %
N	0.0269 %	Other Components	O=.0097 %

Fabrication History

See Page 14900.1

Weld

Weld Code	010.003.09HSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	4G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17-18 volts
Amperage	160-180 amps	Polarity	DCRP
Travel Speed	15-20 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Curve Shape	Cleavage
Initial JI, JI	*	Maximum J, Jmax	*
Tearing Modulus	*	Standard Method	BS5762
Standard Year	1979		

Orien	Test Temp degC	CODIc mm
T-L	-10	0.16
T-L	-10	0.43
T-L	-10	0.92

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09HFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 14900.11

Fabrication History

See Page 14900.1

Weld

Weld Code	010.003.09HFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	4G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17-18 volts
Amperage	160-180 amps	Polarity	DCRP
Travel Speed	15-20 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	505	427	*	27	79

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09HFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14900.11

Fabrication History See Page 14900.1

Weld See Page 14900.12

Property Measurements

Test Type	Charpy V Impact	Position	0/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

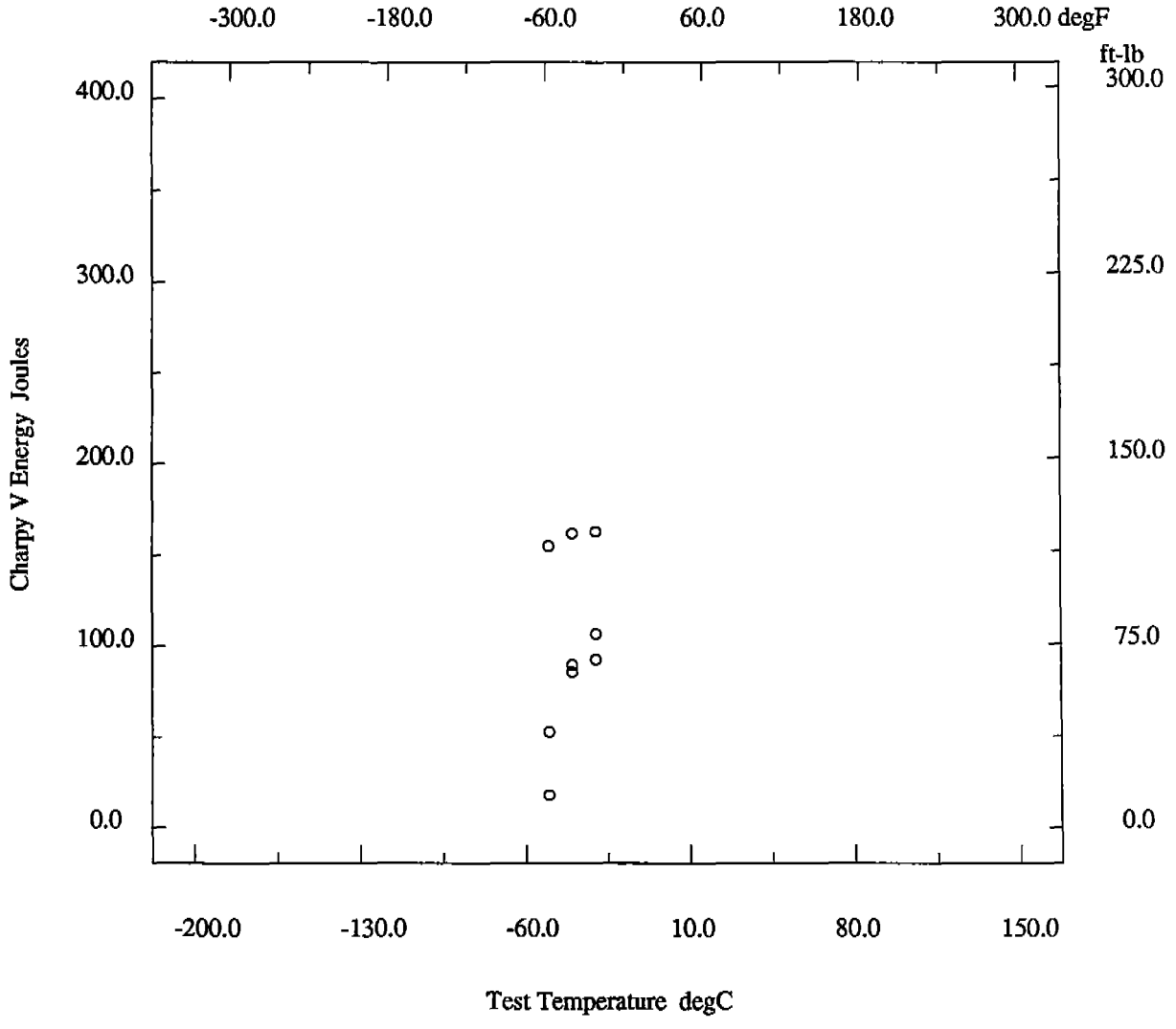
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	155
T-L °	-50	18
T-L °	-50	53
T-L °	-40	162
T-L °	-40	86
T-L °	-40	90
T-L °	-30	107
T-L °	-30	163
T-L °	-30	93

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09HFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09HMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 14900.11

Fabrication History

See Page 14900.1

Weld

Weld Code	010.003.09HMA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	4G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17-18 volts
Amperage	160-180 amps	Polarity	DCRP
Travel Speed	15-20 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	*		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

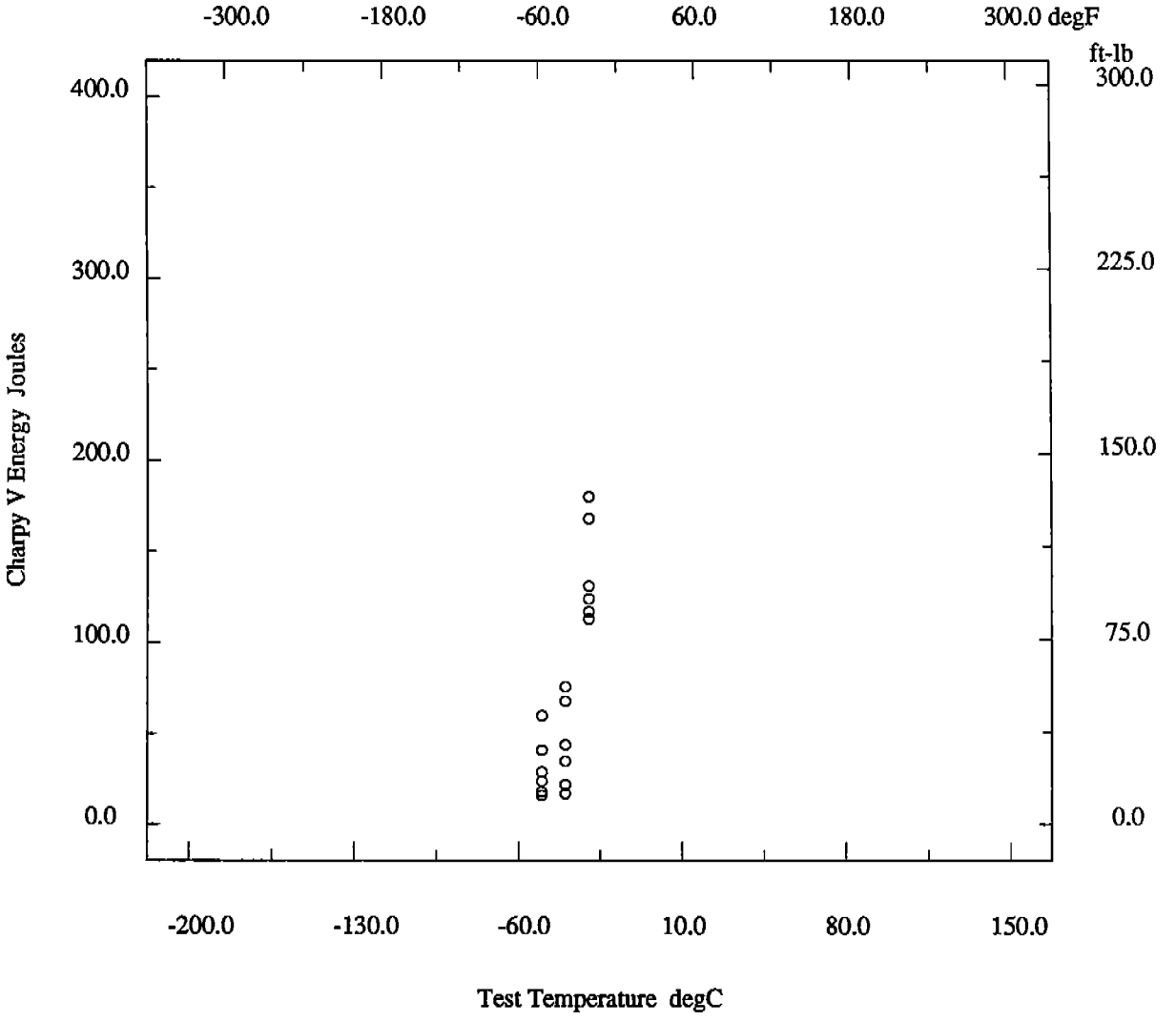
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	16
T-L °	-50	18
T-L °	-50	24
T-L °	-50	29
T-L °	-50	41
T-L °	-50	60
T-L °	-40	17
T-L °	-40	22
T-L °	-40	35
T-L °	-40	44
T-L °	-40	68
T-L °	-40	76
T-L °	-30	113
T-L °	-30	117
T-L °	-30	124
T-L °	-30	131
T-L °	-30	168
T-L °	-30	180

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09HMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09HBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.10 %	Mn	0.91 %
P	0.007 %	S	0.004 %
Si	0.08 %	Cr	0.05 %
Ni	0.59 %	Mo	0.03 %
V	0.002 %	Cu	0.01 %
Cb	0.012 %	Ti	0.003 %
B	*	Al	1.03 %
N	0.0239 %	Other Components	O=.0092 %

Fabrication History

See Page 14900.1

Weld

Weld Code	010.003.09HBRA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	4G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17-18 volts
Amperage	160-180 amps	Polarity	DCRP
Travel Speed	15-20 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	*		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	525	455	*	26	77

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09HBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 14900.17

Fabrication History See Page 14900.1

Weld See Page 14900.17

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

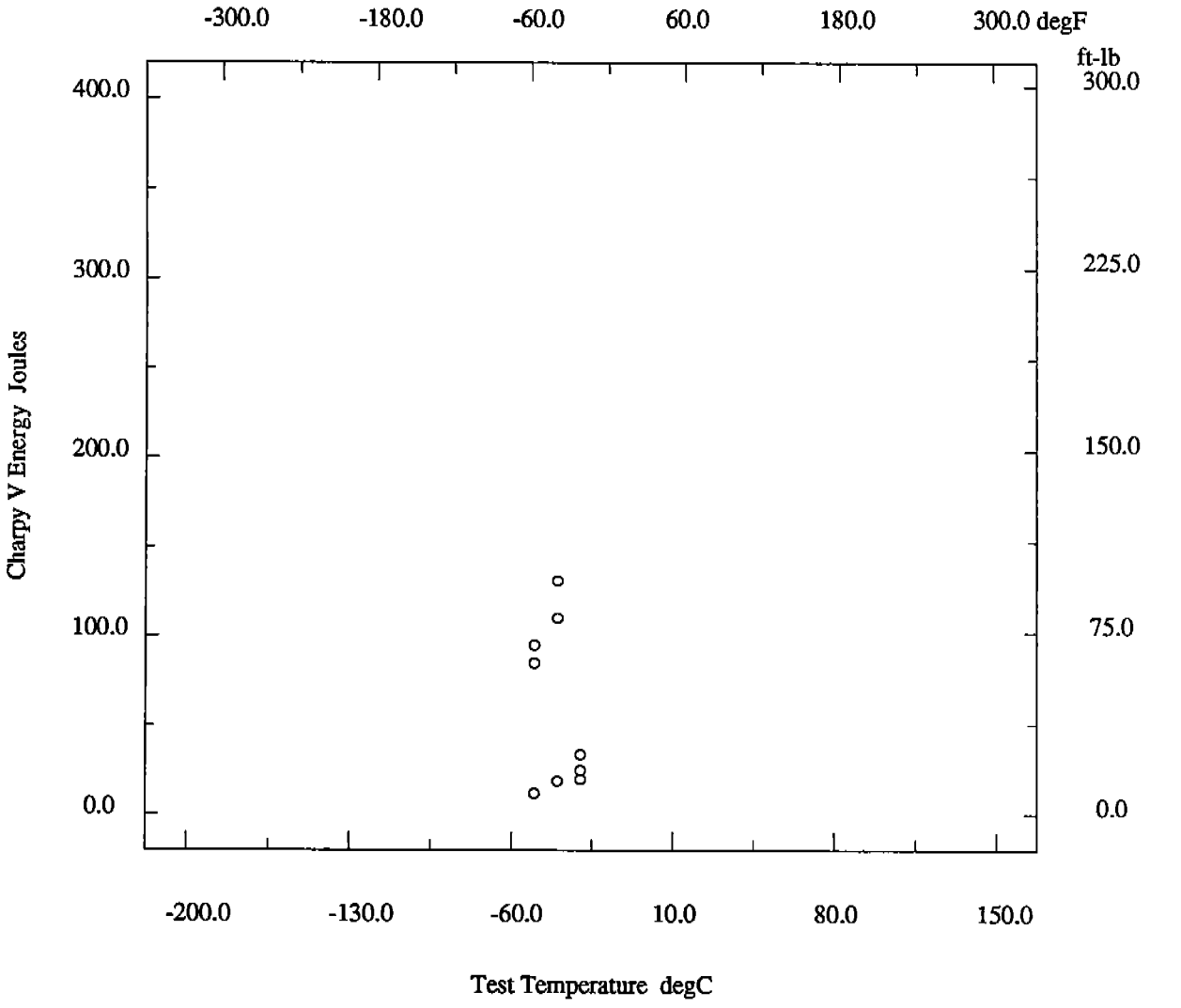
Orien	Test Temp degC	CVN Energy Joules
T-L o	-50	12
T-L o	-50	85
T-L o	-50	95
T-L o	-40	110
T-L o	-40	131
T-L o	-40	19
T-L o	-30	20
T-L o	-30	25
T-L o	-30	34

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09HBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09ISA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.08 %	Mn	0.84 %
P	0.006 %	S	0.006 %
Si	0.04 %	Cr	0.07 %
Ni	0.61 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.013 %	Ti	0.004 %
B	*	Al	0.99 %
N	0.0201 %	Other Components	O=.0103 %

Fabrication History

Heat Treatment	*	Producer	*
Year Produced	*	Addl Info	None
Source	HIFAB	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	H
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.003.09ISA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Curve Shape	Maximum
Initial JI, JI	*	Maximum J, Jmax	*
Tearing Modulus	*	Standard Method	BS5762
Standard Year	1979		

Orien	Test Temp degC	CODIc mm
T-L	-10	>1.62
T-L	-10	>1.64
T-L	-10	>1.77

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09IFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 15000.1

Fabrication History

See Page 15000.1

Weld

Weld Code	010.003.09IFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS kgf/mm2	TYS kgf/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	486	405	*	27	77

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09IFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15000.1

Fabrication History See Page 15000.1

Weld See Page 15000.3

Property Measurements

Test Type	Charpy V Impact	Position	0/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

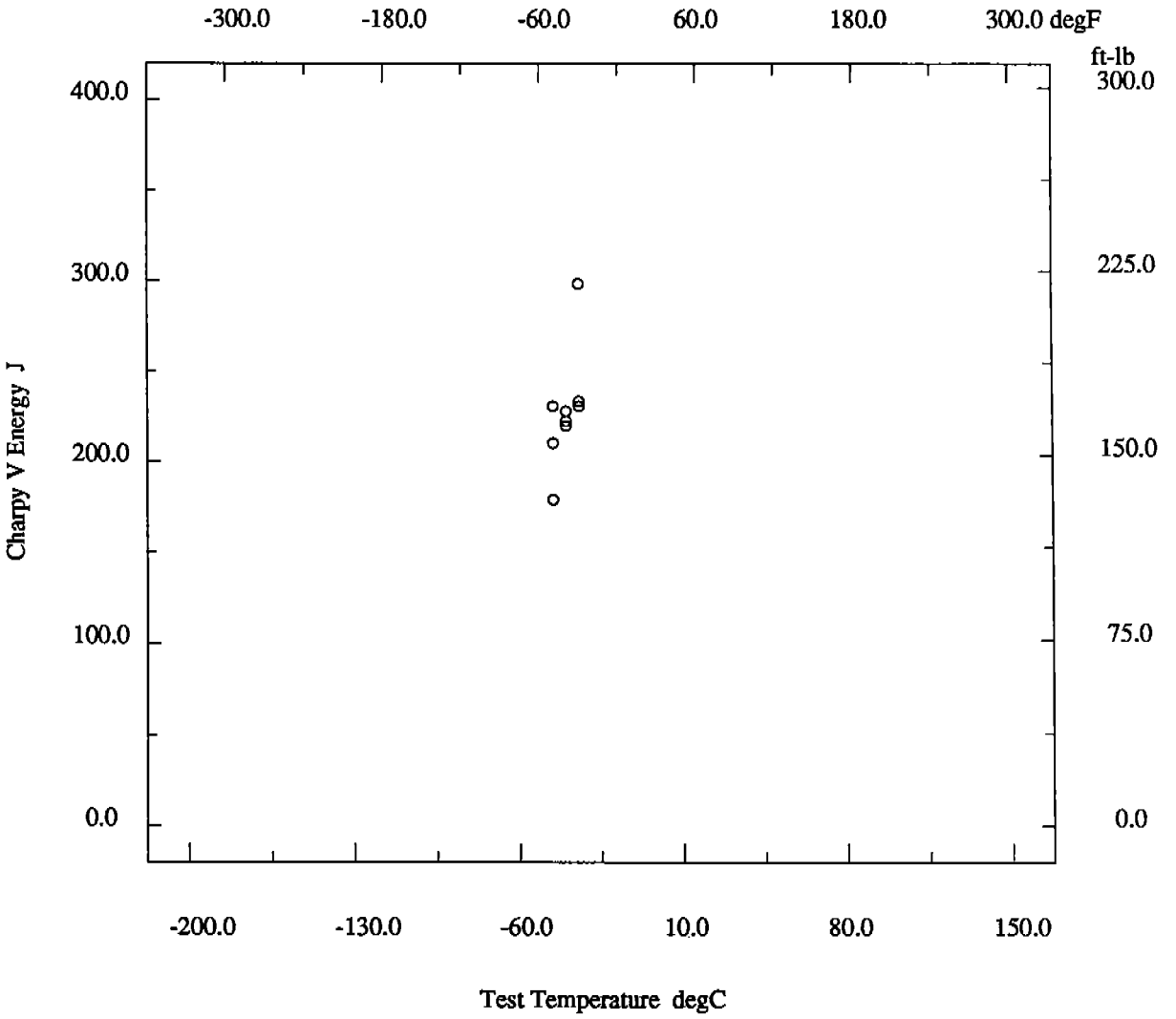
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-50	132
T-L °	-50	155
T-L °	-50	170
T-L °	-40	162
T-L °	-40	164
T-L °	-40	168
T-L °	-30	170
T-L °	-30	172
T-L °	-30	220

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09IFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09IMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 15000.1

Fabrication History

See Page 15000.1

Weld

Weld Code	010.003.09IMA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

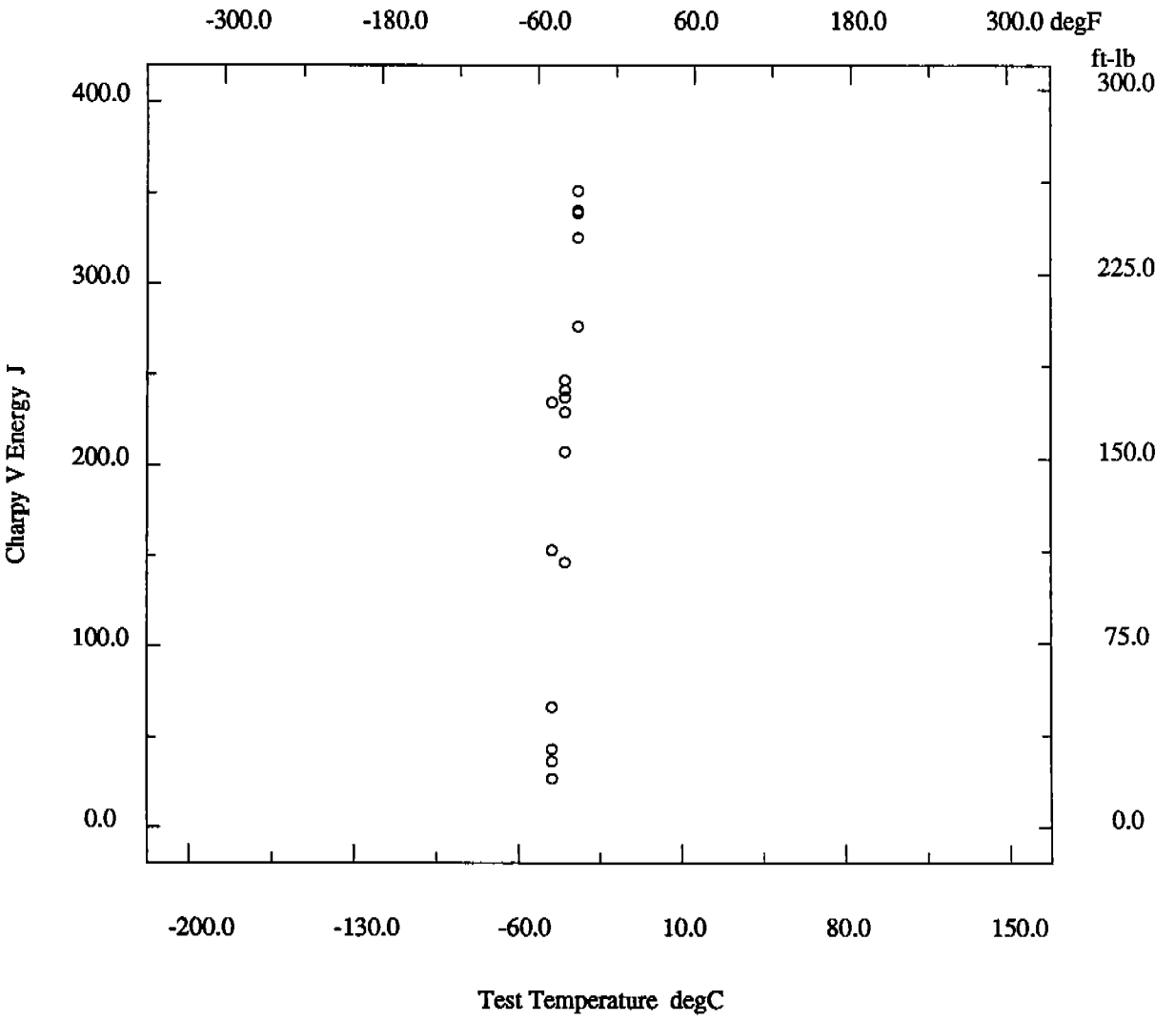
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-50	113
T-L °	-50	173
T-L °	-50	20
T-L °	-50	27
T-L °	-50	32
T-L °	-50	49
T-L °	-40	108
T-L °	-40	153
T-L °	-40	169
T-L °	-40	175
T-L °	-40	178
T-L °	-40	182
T-L °	-30	204
T-L °	-30	240
T-L °	-30	250
T-L °	-30	250
T-L °	-30	251
T-L °	-30	259

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09IMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09IBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.91 %
P	0.005 %	S	0.005 %
Si	0.06 %	Cr	0.05 %
Ni	0.61 %	Mo	0.02 %
V	0.002 %	Cu	0.04 %
Cb	0.011 %	Ti	0.004 %
B	*	Al	0.93 %
N	0.0198 %	Other Components	O=.0105 %

Fabrication History

See Page 15000.1

Weld

Weld Code	010.003.09IBRA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS kgf/mm2	TYS kgf/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	524	465	*	22	75

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09IBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15000.8

Fabrication History See Page 15000.1

Weld See Page 15000.8

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

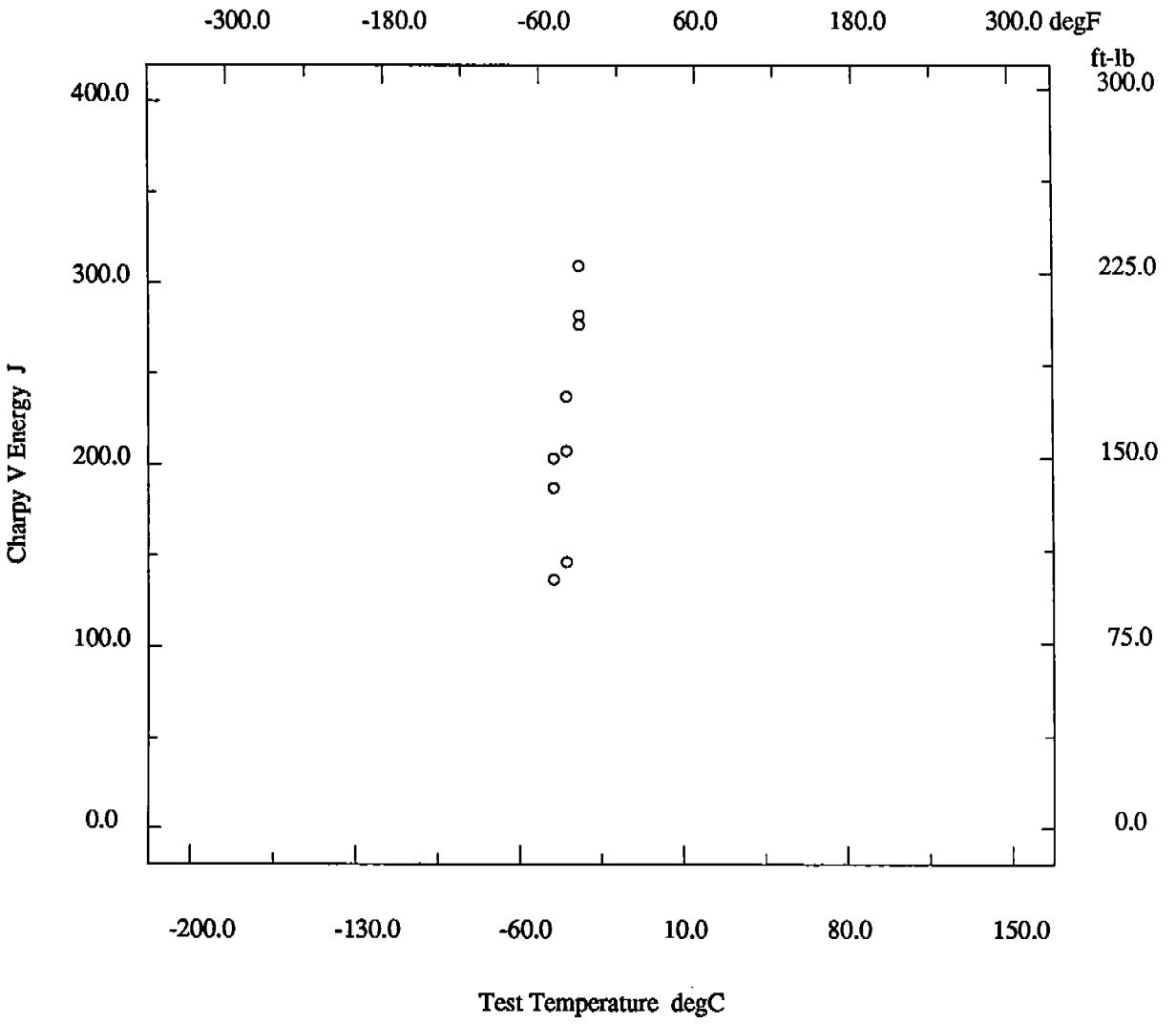
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-50	101
T-L °	-50	138
T-L °	-50	150
T-L °	-40	108
T-L °	-40	153
T-L °	-40	175
T-L °	-30	204
T-L °	-30	208
T-L °	-30	228

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09IBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09JSA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.08 %	Mn	0.84 %
P	0.006 %	S	0.006 %
Si	0.04 %	Cr	0.07 %
Ni	0.61 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.013 %	Ti	0.004 %
B	*	Al	0.99 %
N	0.0201 %	Other Components	O=.0103 %

Fabrication History

See Page 15000.1

Weld

Weld Code	010.003.09JSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	1979

Orien	Test Temp degC	CODIc mm	Curve
T-L	-10	0.06	Cleavage
T-L	-10	0.72	Cleavage
T-L	-10	>1.91	Maximum

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09JFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15000.11

Fabrication History See Page 15000.1

Weld

Weld Code	010.003.09JFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS kgf/mm2	TYS kgf/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	495	413	*	28	74

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09JFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15000.11

Fabrication History See Page 15000.1

Weld See Page 15000.12

Property Measurements

Test Type	Charpy V Impact	Position	0/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

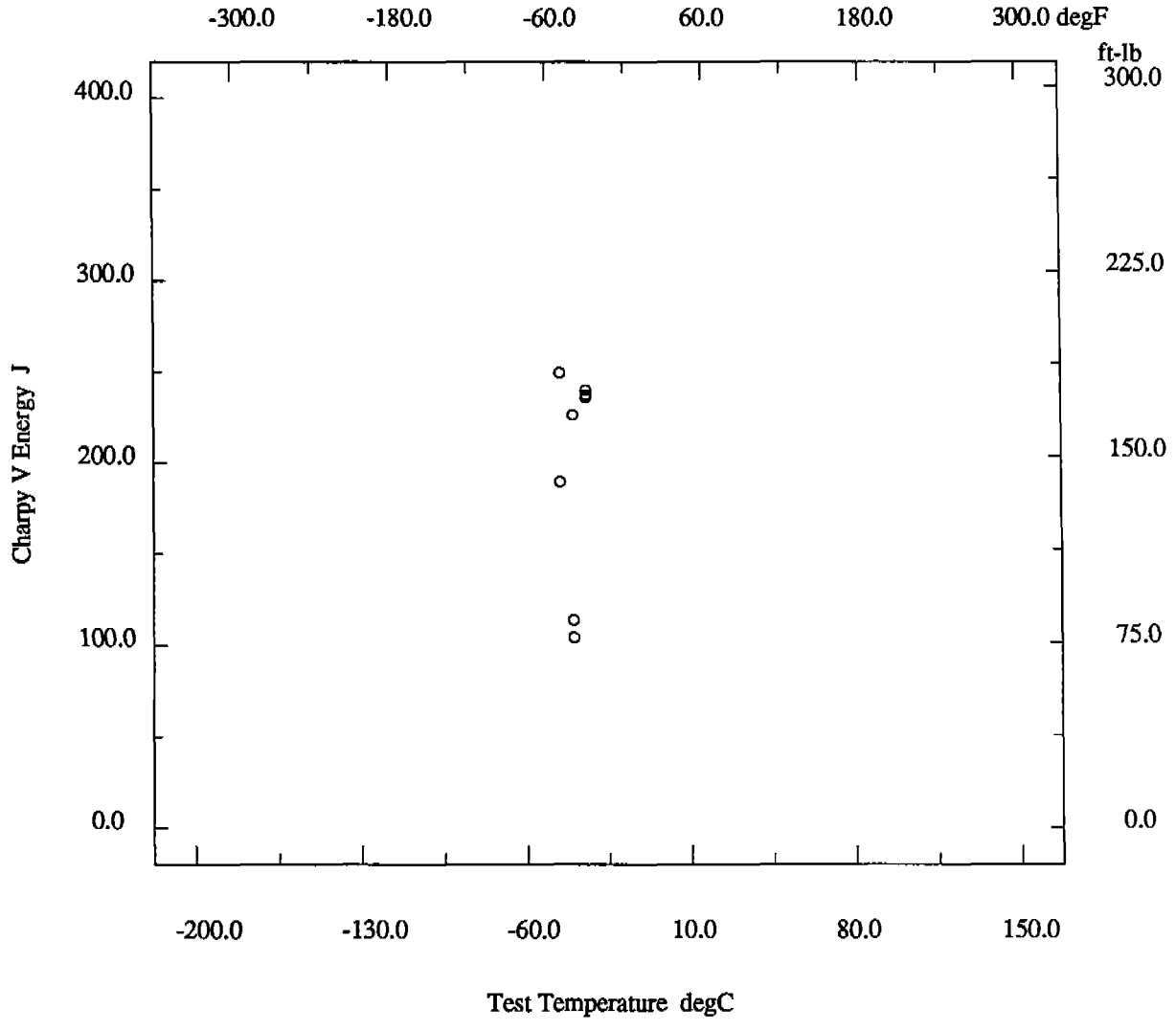
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-50	140
T-L °	-50	140
T-L °	-50	184
T-L °	-40	167
T-L °	-40	77
T-L °	-40	84
T-L °	-30	174
T-L °	-30	175
T-L °	-30	177

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09JFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09JMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15000.11

Fabrication History See Page 15000.1

Weld

Weld Code	010.003.09JFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

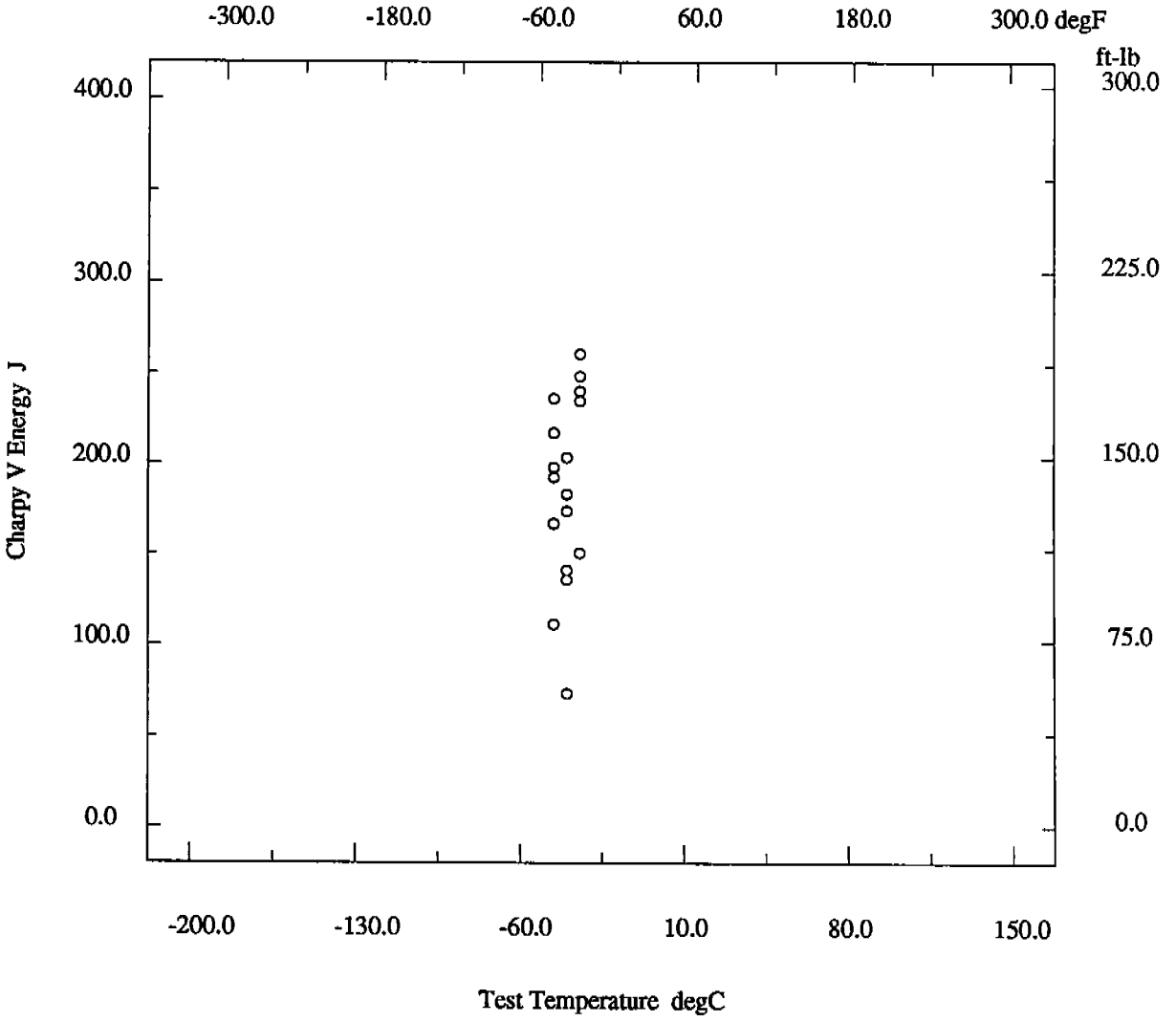
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-50	123
T-L °	-50	142
T-L °	-50	146
T-L °	-50	160
T-L °	-50	174
T-L °	-50	82
T-L °	-40	100
T-L °	-40	104
T-L °	-40	128
T-L °	-40	135
T-L °	-40	150
T-L °	-40	54
T-L °	-30	111
T-L °	-30	173
T-L °	-30	177
T-L °	-30	177
T-L °	-30	183
T-L °	-30	192

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09JMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09JBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.91 %
P	0.005 %	S	0.005 %
Si	0.06 %	Cr	0.05 %
Ni	0.61 %	Mo	0.02 %
V	0.002 %	Cu	0.04 %
Cb	0.011 %	Ti	0.004 %
B	*	Al	0.93 %
N	0.0198 %	Other Components	O=.0105 %

Fabrication History

See Page 15000.1

Weld

Weld Code	010.003.09JBRA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS kgf/mm2	TYS kgf/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	530	444	*	28	71

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09JBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15000.17

Fabrication History See Page 15000.1

Weld See Page 15000.17

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

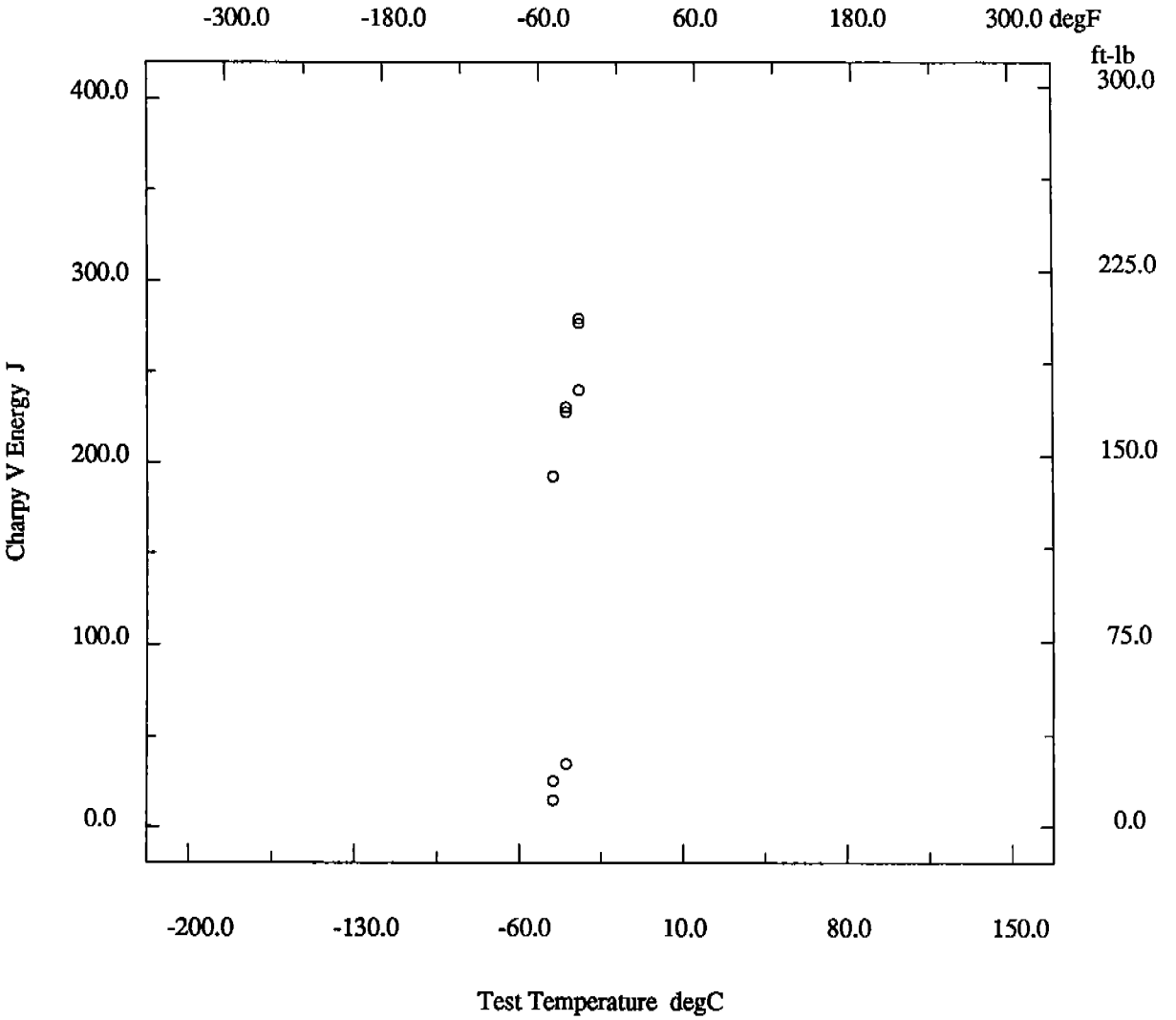
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-50	11
T-L °	-50	142
T-L °	-50	19
T-L °	-40	168
T-L °	-40	170
T-L °	-40	26
T-L °	-30	177
T-L °	-30	204
T-L °	-30	206

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09JBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09KSA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.08 %	Mn	0.85 %
P	0.005 %	S	0.006 %
Si	0.04 %	Cr	0.07 %
Ni	0.67 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.013 %	Ti	0.004 %
B	*	Al	0.94 %
N	0.0257 %	Other Components	O=.0116 %

Fabrication History

See Page 15000.1

Weld

Weld Code	010.003.09KSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Curve Shape	Maximum
Initial JI, JI	*	Maximum J, Jmax	*
Tearing Modulus	*	Standard Method	BS5762
Standard Year	1979		

Orien	Test Temp degC	CODIc mm
T-L	-10	>1.61
T-L	-10	>1.69
T-L	-10	>1.83

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09KFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 15000.20

Fabrication History

See Page 15000.1

Weld

Weld Code	010.003.09KFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS kgf/mm2	TYS kgf/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	503	436	*	29	77

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09KFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15000.20

Fabrication History See Page 15000.1

Weld See Page 15000.21

Property Measurements

Test Type	Charpy V Impact	Position	0/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

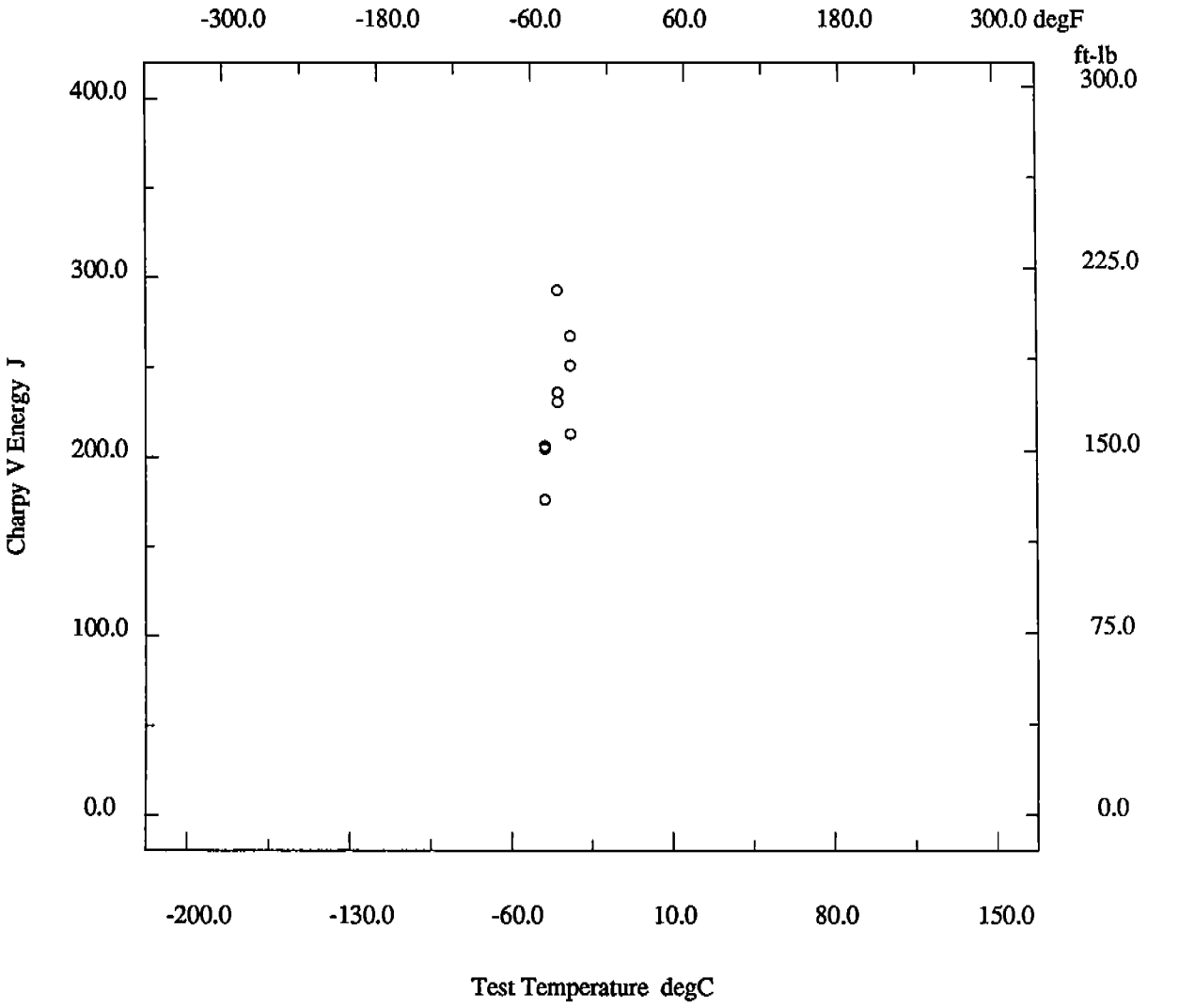
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-50	130
T-L °	-50	151
T-L °	-50	152
T-L °	-40	170
T-L °	-40	174
T-L °	-40	216
T-L °	-30	157
T-L °	-30	185
T-L °	-30	197

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09KFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09KMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15000.20

Fabrication History See Page 15000.1

Weld

Weld Code	010.003.09KMA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

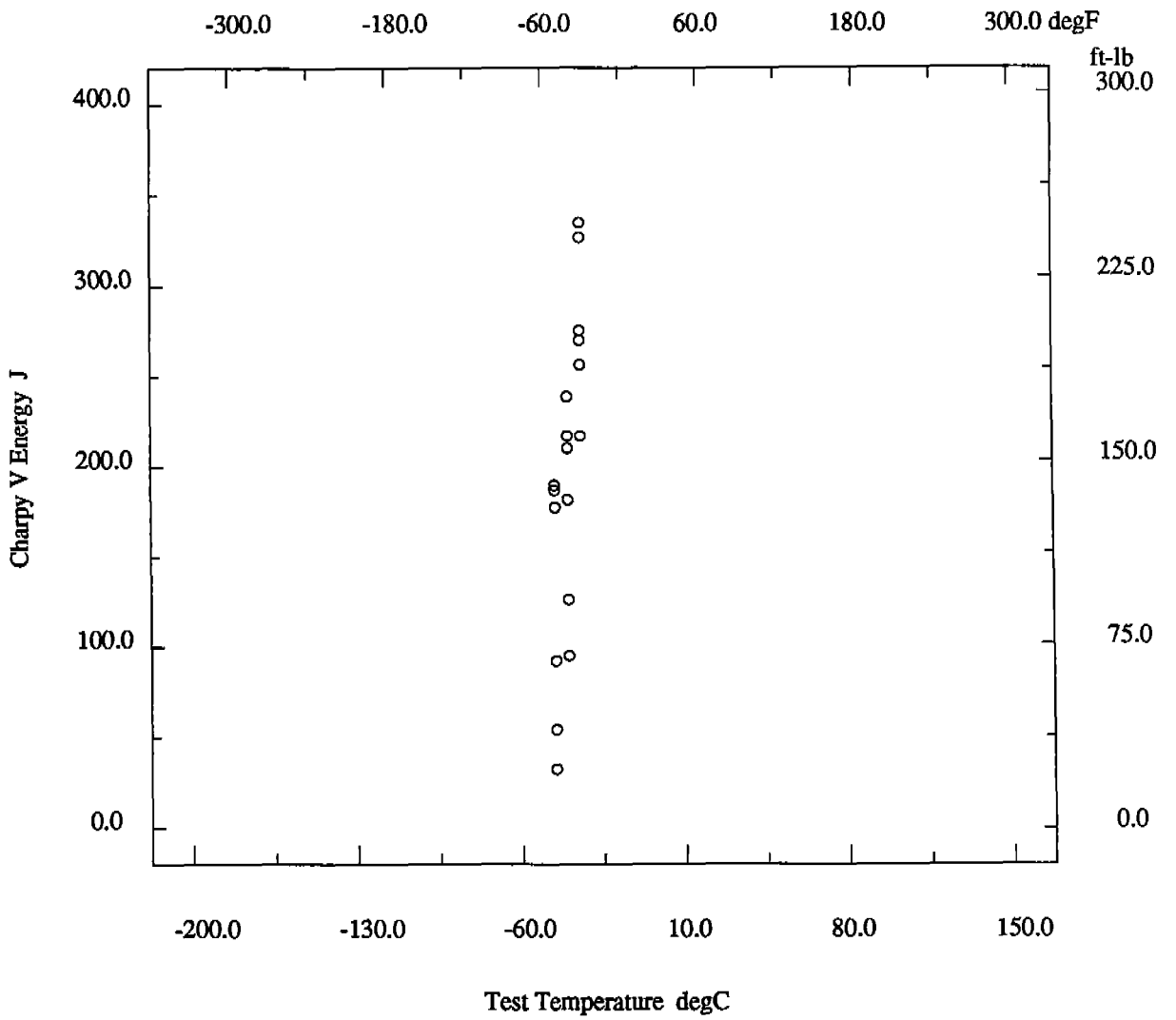
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-50	131
T-L °	-50	138
T-L °	-50	140
T-L °	-50	24
T-L °	-50	40
T-L °	-50	68
T-L °	-40	134
T-L °	-40	155
T-L °	-40	160
T-L °	-40	176
T-L °	-40	70
T-L °	-40	93
T-L °	-30	160
T-L °	-30	189
T-L °	-30	199
T-L °	-30	203
T-L °	-30	241
T-L °	-30	247

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09KMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09KBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.90 %
P	0.007 %	S	0.006 %
Si	0.06 %	Cr	0.09 %
Ni	0.64 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.016 %	Ti	0.004 %
B	*	Al	1.03 %
N	0.0221 %	Other Components	O=.0086 %

Fabrication History

See Page 15000.1

Weld

Weld Code	010.003.09KBRA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS kgf/mm2	TYS kgf/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	534	461	*	29	75

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09KBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15000.26

Fabrication History See Page 15000.1

Weld See Page 15000.26

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

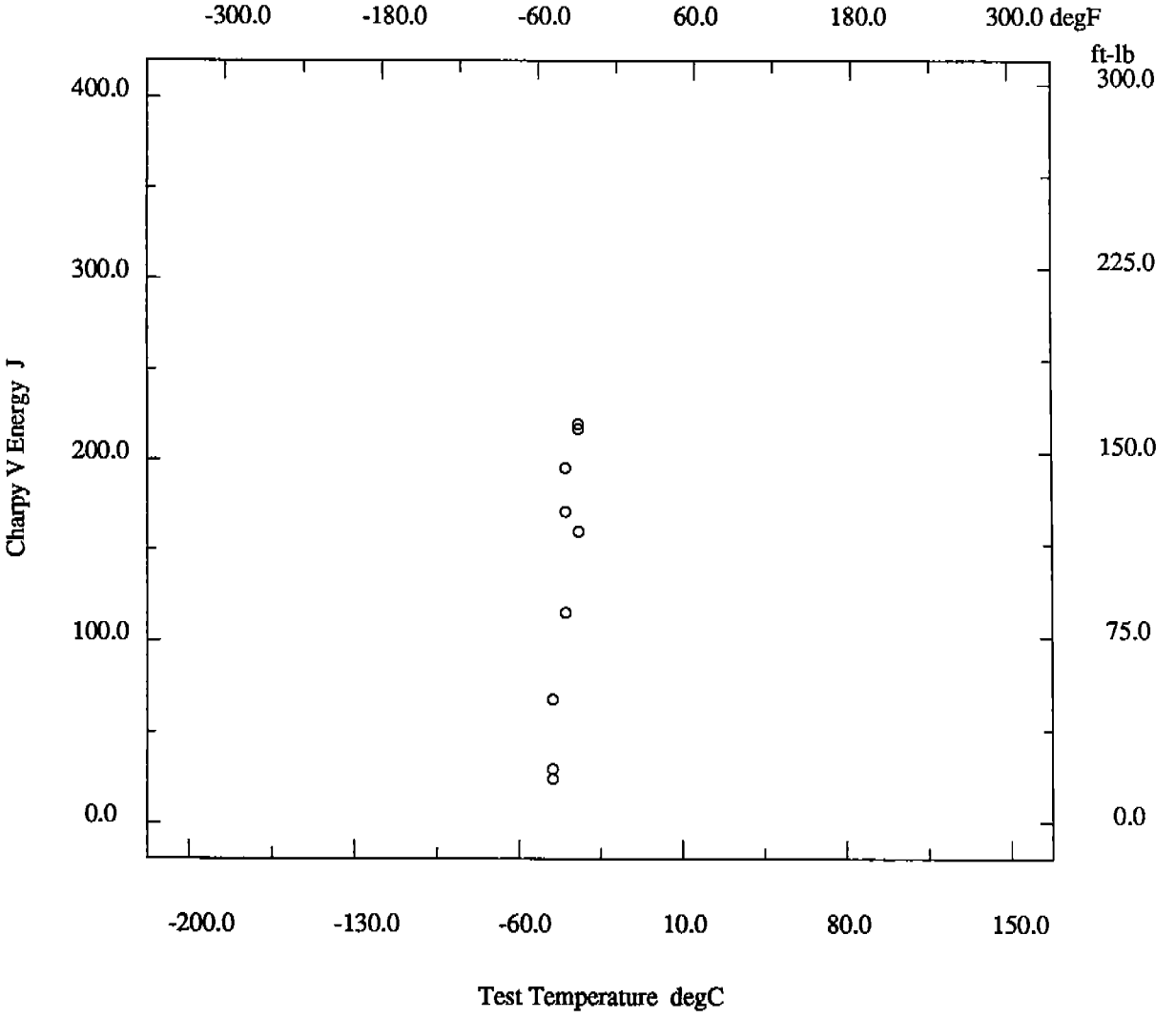
Orien	Test Temp degF	CVN Energy ft-lb
T-L °	-50	18
T-L °	-50	22
T-L °	-50	50
T-L °	-40	126
T-L °	-40	144
T-L °	-40	85
T-L °	-30	118
T-L °	-30	160
T-L °	-30	162

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09KBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09LSA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.08 %	Mn	0.85 %
P	0.005 %	S	0.006 %
Si	0.04 %	Cr	0.07 %
Ni	0.67 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.013 %	Ti	0.004 %
B	*	Al	0.94 %
N	0.0257 %	Other Components	O=.0116 %

Fabrication History

Heat Treatment	*	Producer	*
Year Produced	*	Addl Info	None
Source	HIFAB	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	H
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.003.09LSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

(continued)

* - not reported

2-03-1/13

Material BS4360 Gr50D

(continued)

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	1979

Orien	Test Temp degC	CODIc mm	Curve
T-L	-10	0.11	Cleavage
T-L	-10	>1.89	Maximum
T-L	-10	>1.97	Maximum

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09LFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15100.1

Fabrication History See Page 15100.1

Weld

Weld Code	010.003.09LFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	502	426	*	28	71

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09LFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15100.1

Fabrication History See Page 15100.1

Weld See Page 15100.3

Property Measurements

Test Type	Charpy V Impact	Position	0/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

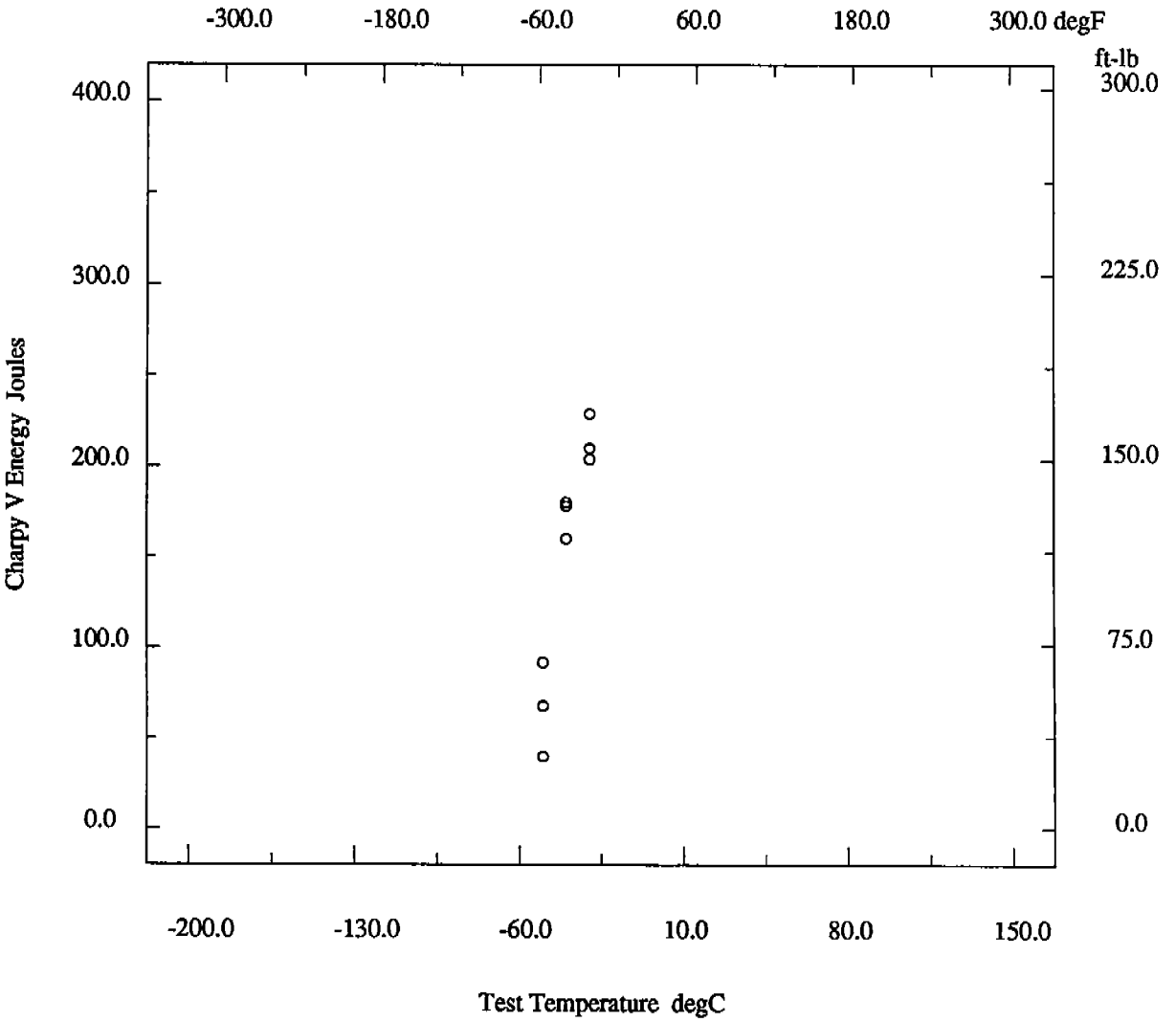
Orien	Test Temp degC	CVN Energy Joules
T-L o	-50	40
T-L o	-50	68
T-L o	-50	92
T-L o	-40	160
T-L o	-40	178
T-L o	-40	180
T-L o	-30	204
T-L o	-30	210
T-L o	-30	229

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09LFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09LMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 15100.1

Fabrication History

See Page 15100.1

Weld

Weld Code	010.003.09LMA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

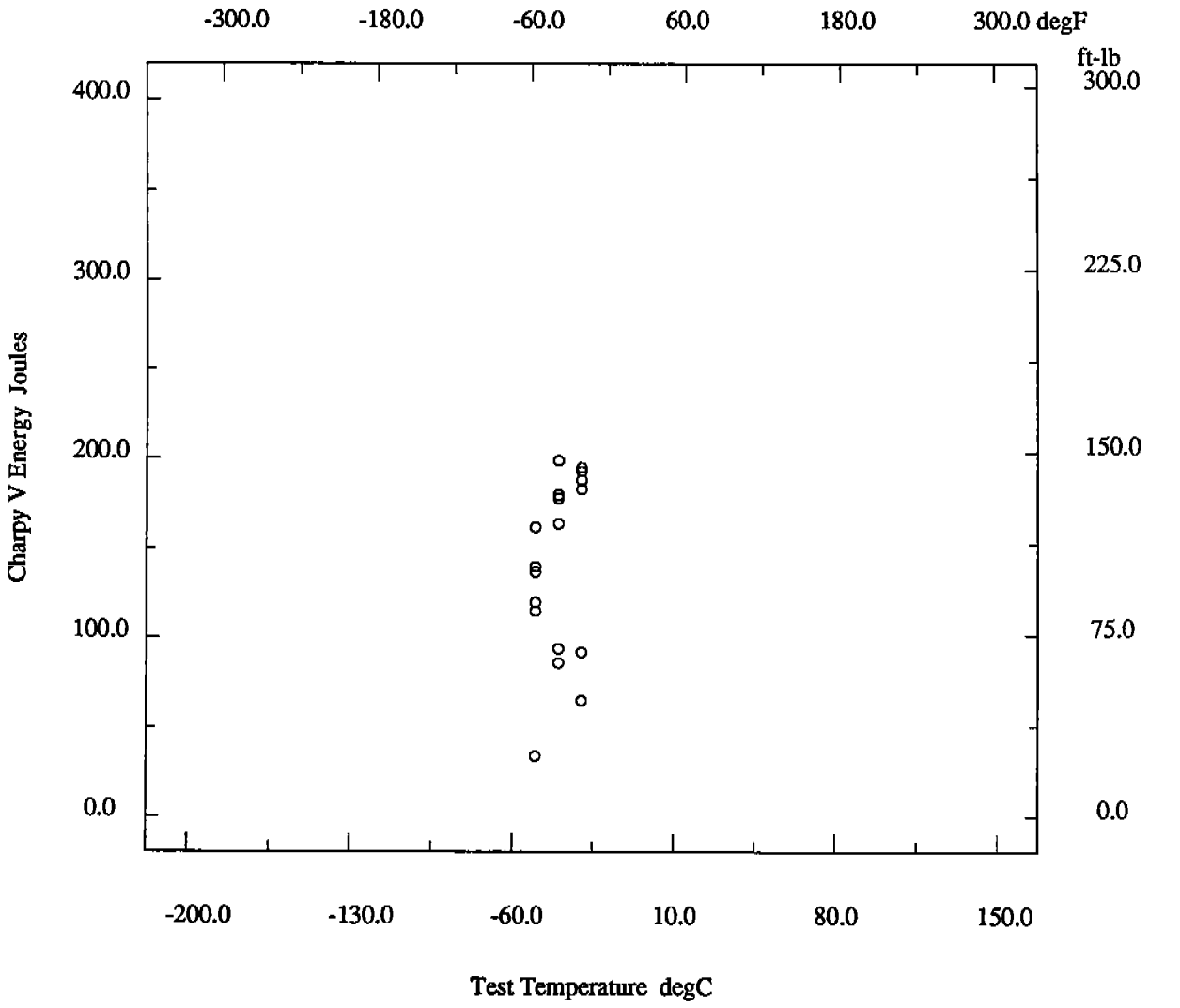
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	115
T-L °	-50	120
T-L °	-50	137
T-L °	-50	140
T-L °	-50	162
T-L °	-50	34
T-L °	-40	164
T-L °	-40	178
T-L °	-40	180
T-L °	-40	199
T-L °	-40	86
T-L °	-40	94
T-L °	-30	183
T-L °	-30	188
T-L °	-30	193
T-L °	-30	195
T-L °	-30	65
T-L °	-30	92

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09LMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09LBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 15100.1

Fabrication History

See Page 15100.1

Weld

Weld Code	010.003.09LBRA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	541	467	*	28	75

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09LBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.90 %
P	0.007 %	S	0.006 %
Si	0.06 %	Cr	0.09 %
Ni	0.64 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.016 %	Ti	0.004 %
B	*	Al	1.03 %
N	0.0221 %	Other Components	O=.0086 %

Fabrication History

See Page 15100.1

Weld

See Page 15100.8

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

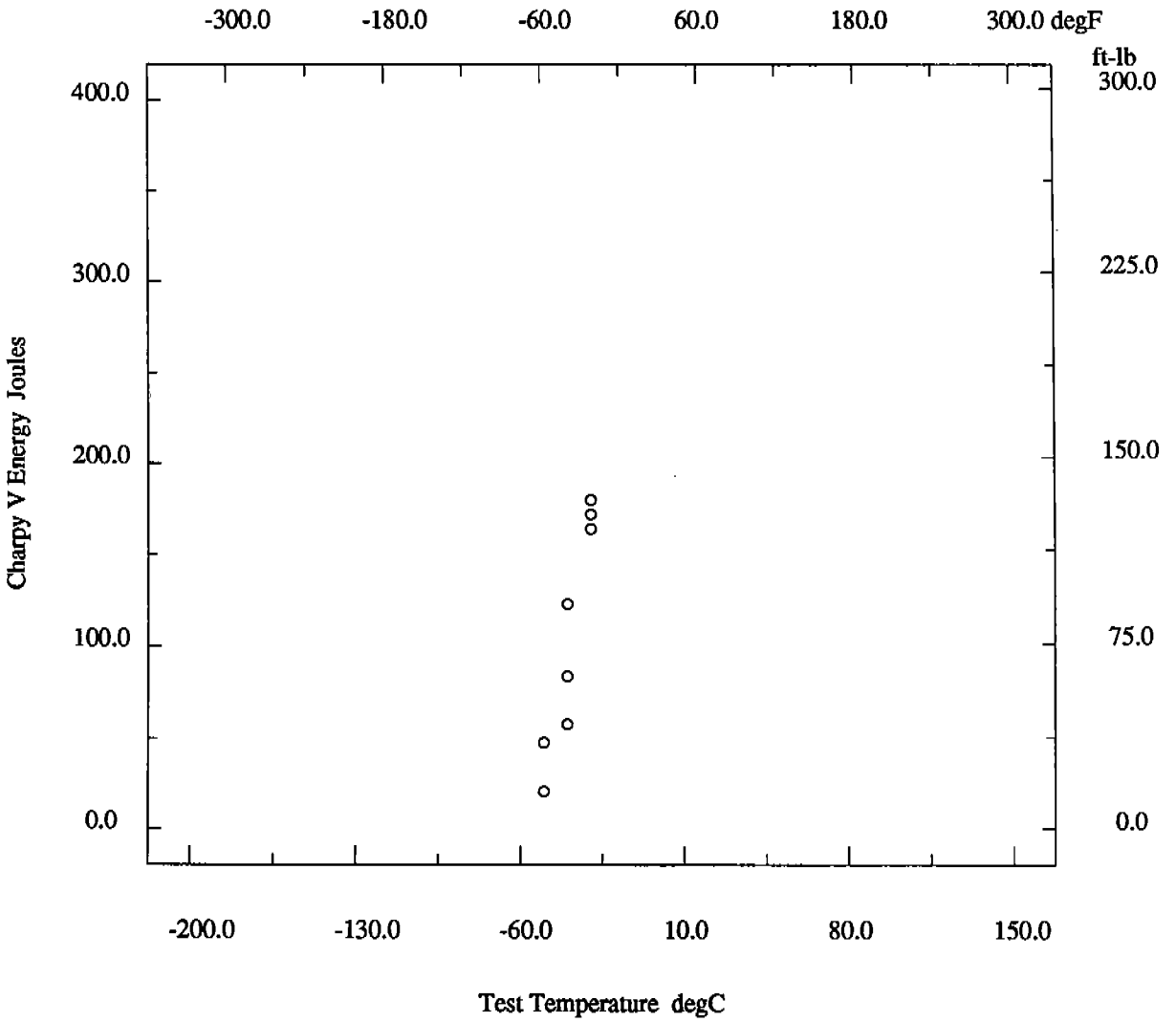
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	21
T-L °	-50	21
T-L °	-50	48
T-L °	-40	58
T-L °	-40	123
T-L °	-40	84
T-L °	-30	164
T-L °	-30	172
T-L °	-30	180

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09LBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09MSA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.08 %	Mn	0.84 %
P	0.006 %	S	0.006 %
Si	0.04 %	Cr	0.07 %
Ni	0.61 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.013 %	Ti	0.004 %
B	*	Al	0.99 %
N	0.0201 %	Other Components	O=.0103 %

Fabrication History

See Page 15100.1

Weld

Weld Code	010.003.09MSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	1979

Orien	Test Temp degC	CODIc mm	Curve
T-L	-10	0.71	Cleavage
T-L	-10	1.70	Maximum
T-L	-10	>1.98	Maximum

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09MFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15100.11

Fabrication History See Page 15100.1

Weld

Weld Code	010.003.09MFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	524	439	*	29	78

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09MFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15100.11

Fabrication History See Page 15100.1

Weld See Page 15100.12

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

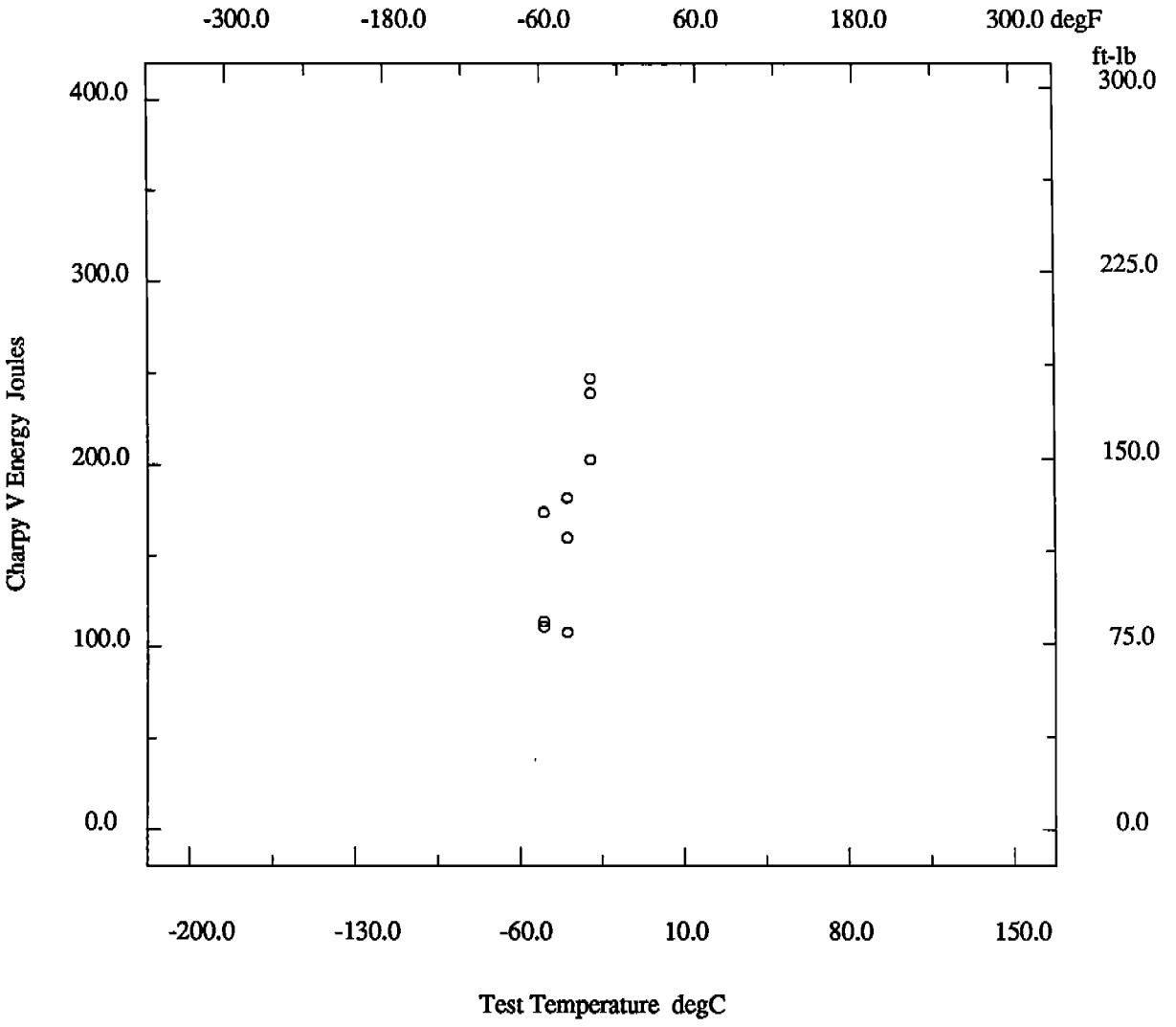
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	111
T-L °	-50	114
T-L °	-50	174
T-L °	-40	108
T-L °	-40	160
T-L °	-40	182
T-L °	-30	203
T-L °	-30	239
T-L °	-30	247

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09MFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09MMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15100.11

Fabrication History See Page 15100.1

Weld

Weld Code	010.003.09MMA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

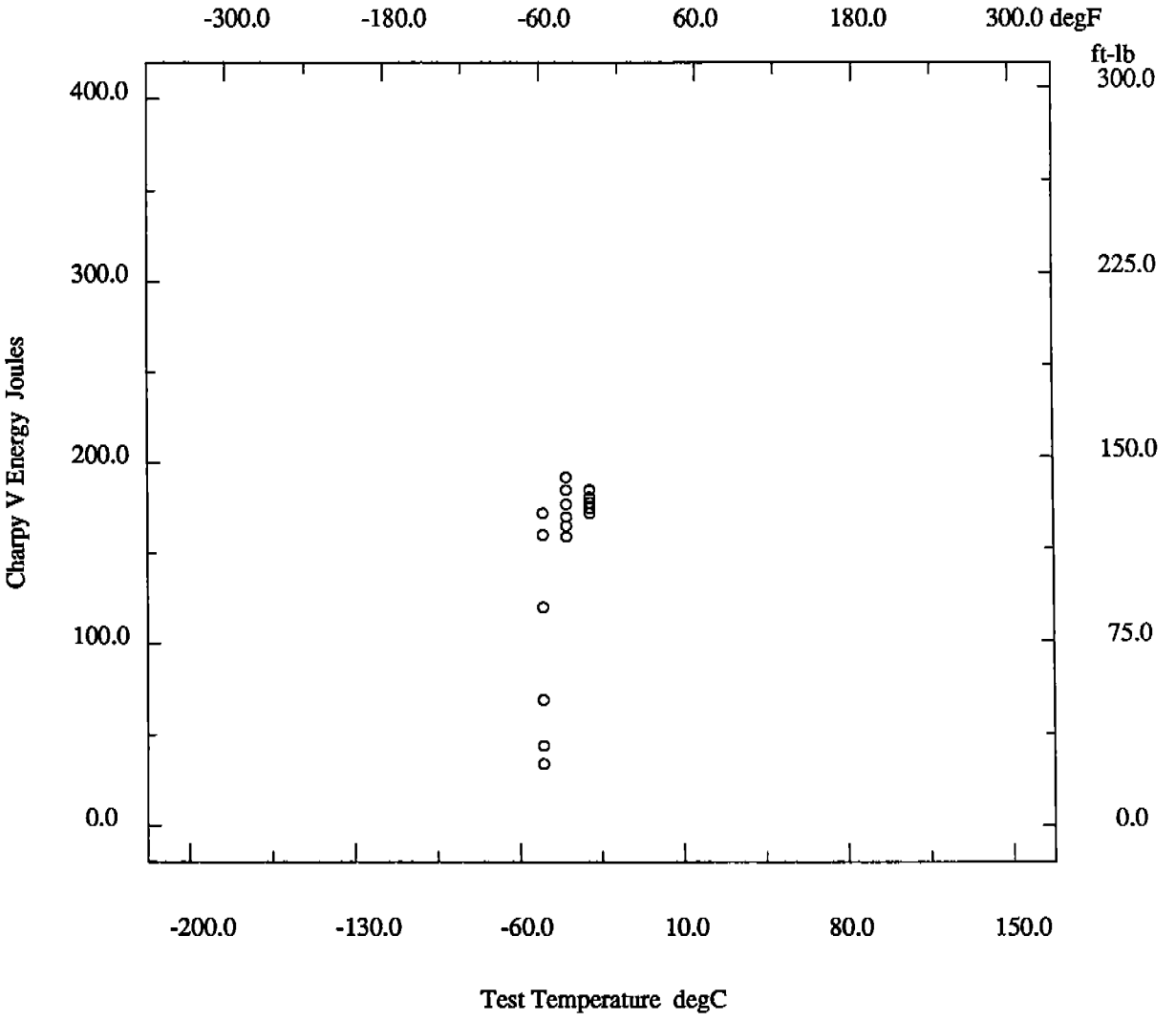
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	120
T-L °	-50	160
T-L °	-50	172
T-L °	-50	34
T-L °	-50	44
T-L °	-50	69
T-L °	-40	159
T-L °	-40	165
T-L °	-40	170
T-L °	-40	177
T-L °	-40	185
T-L °	-40	192
T-L °	-30	172
T-L °	-30	175
T-L °	-30	178
T-L °	-30	178
T-L °	-30	181
T-L °	-30	185

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09MMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09MBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.91 %
P	0.005 %	S	0.005 %
Si	0.06 %	Cr	0.05 %
Ni	0.61 %	Mo	0.02 %
V	0.002 %	Cu	0.04 %
Cb	0.011 %	Ti	0.004 %
B	*	Al	0.93 %
N	0.0198 %	Other Components	O=.0105 %

Fabrication History

See Page 15100.1

Weld

Weld Code	010.003.09MBRA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	545	466	*	28	74

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09MBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15100.17

Fabrication History See Page 15100.1

Weld See Page 15100.17

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

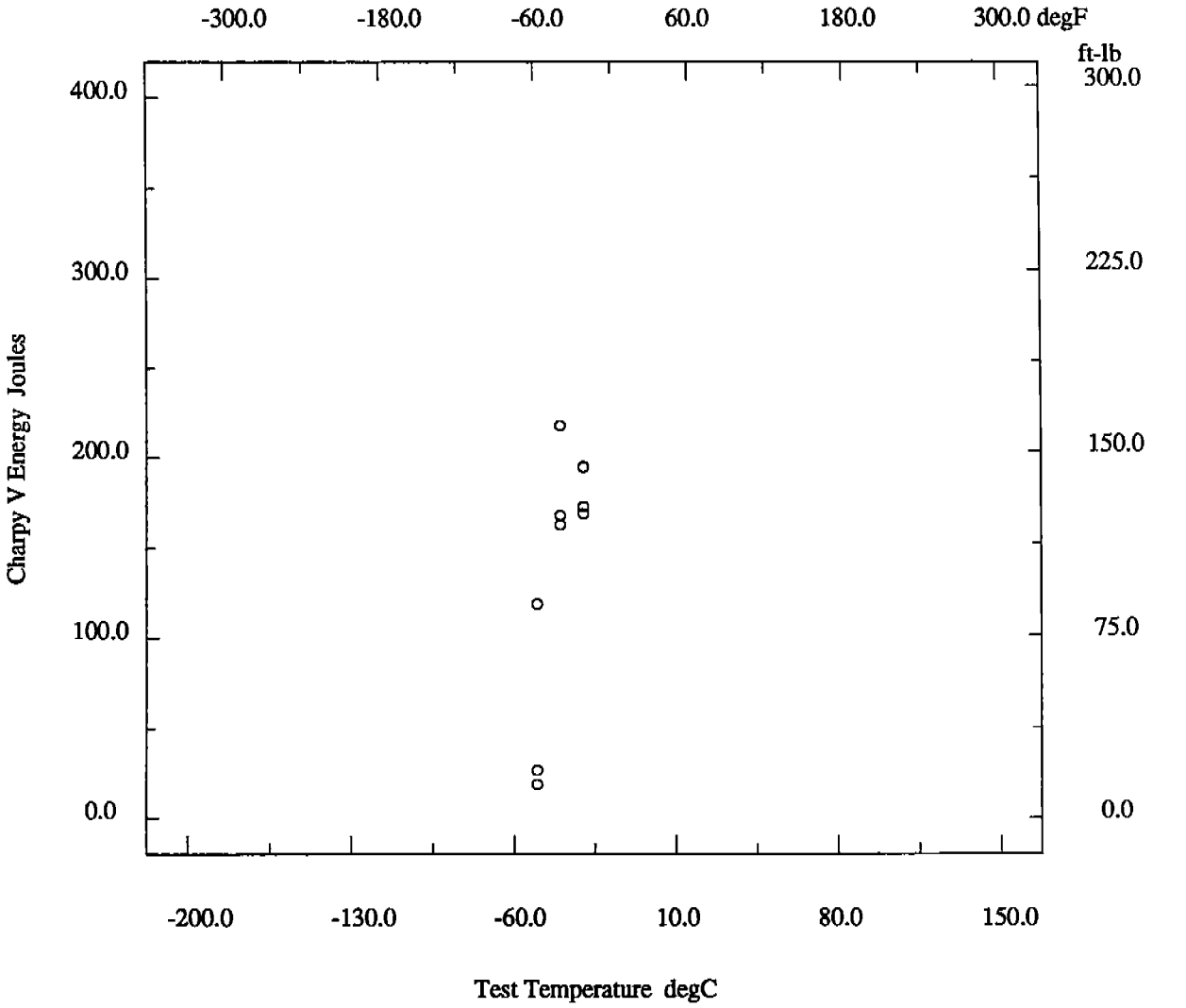
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	119
T-L °	-50	19
T-L °	-50	27
T-L °	-40	163
T-L °	-40	168
T-L °	-40	218
T-L °	-30	169
T-L °	-30	173
T-L °	-30	195

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09MBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09NSA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.08 %	Mn	0.85 %
P	0.005 %	S	0.006 %
Si	0.04 %	Cr	0.07 %
Ni	0.67 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.013 %	Ti	0.004 %
B	*	Al	0.94 %
N	0.0257 %	Other Components	O=.0116 %

Fabrication History

See Page 15100.1

Weld

Weld Code	010.003.09NSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	1979

Orien	Test Temp degC	CODIc mm	Curve
T-L	-10	0.13	Cleavage
T-L	-10	1.24	Unstable
T-L	-10	>1.88	Maximum

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09NFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 15100.20

Fabrication History

See Page 15100.1

Weld

Weld Code	010.003.09NFA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	514	437	*	27	65

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09NFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15100.20

Fabrication History See Page 15100.1

Weld See Page 15100.21

Property Measurements

Test Type	Charpy V Impact	Position	0/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

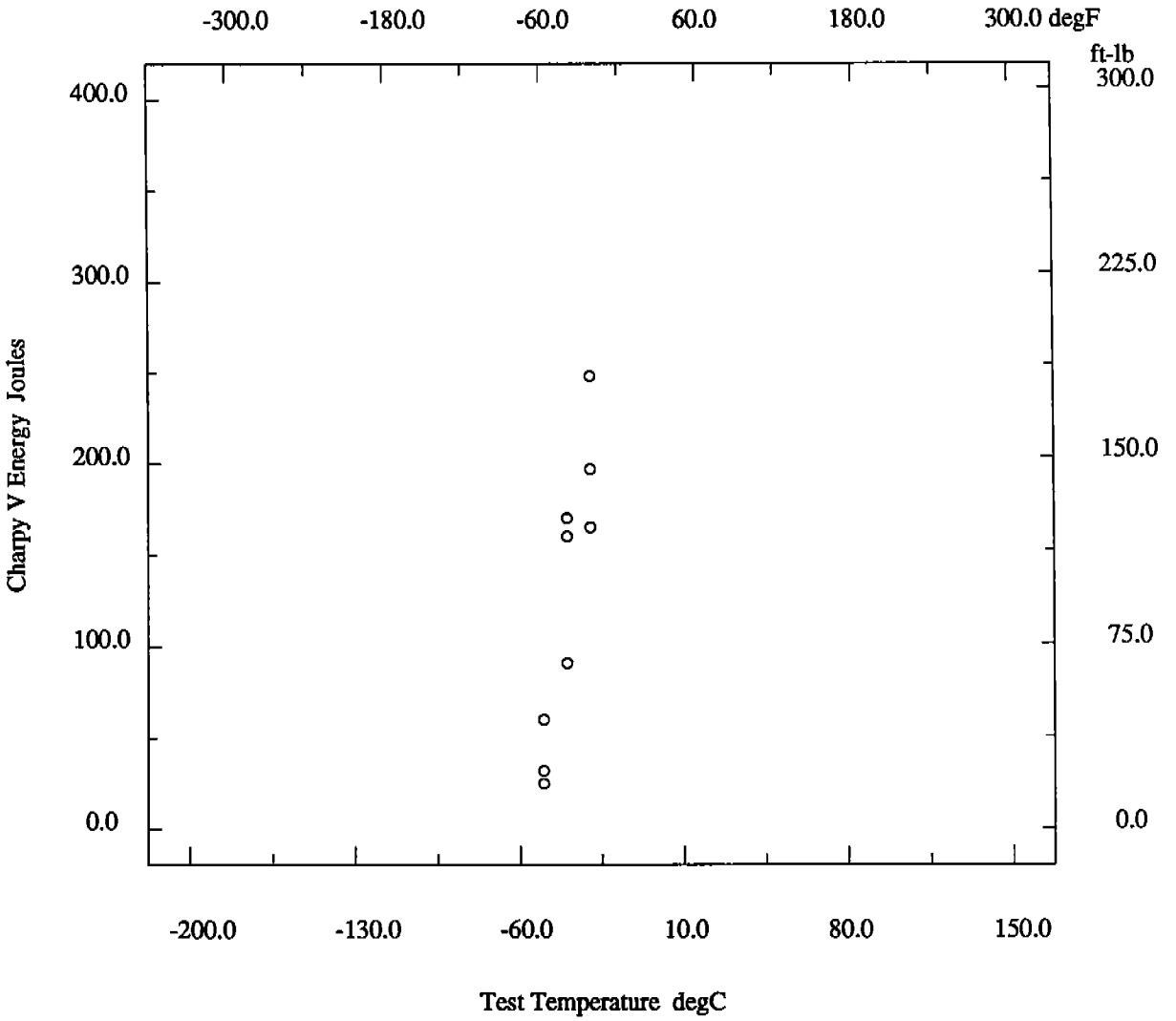
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	25
T-L °	-50	32
T-L °	-50	60
T-L °	-40	160
T-L °	-40	170
T-L °	-40	91
T-L °	-30	165
T-L °	-30	197
T-L °	-30	248

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09NFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09NMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15100.20

Fabrication History See Page 15100.1

Weld

Weld Code	010.003.09NMA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

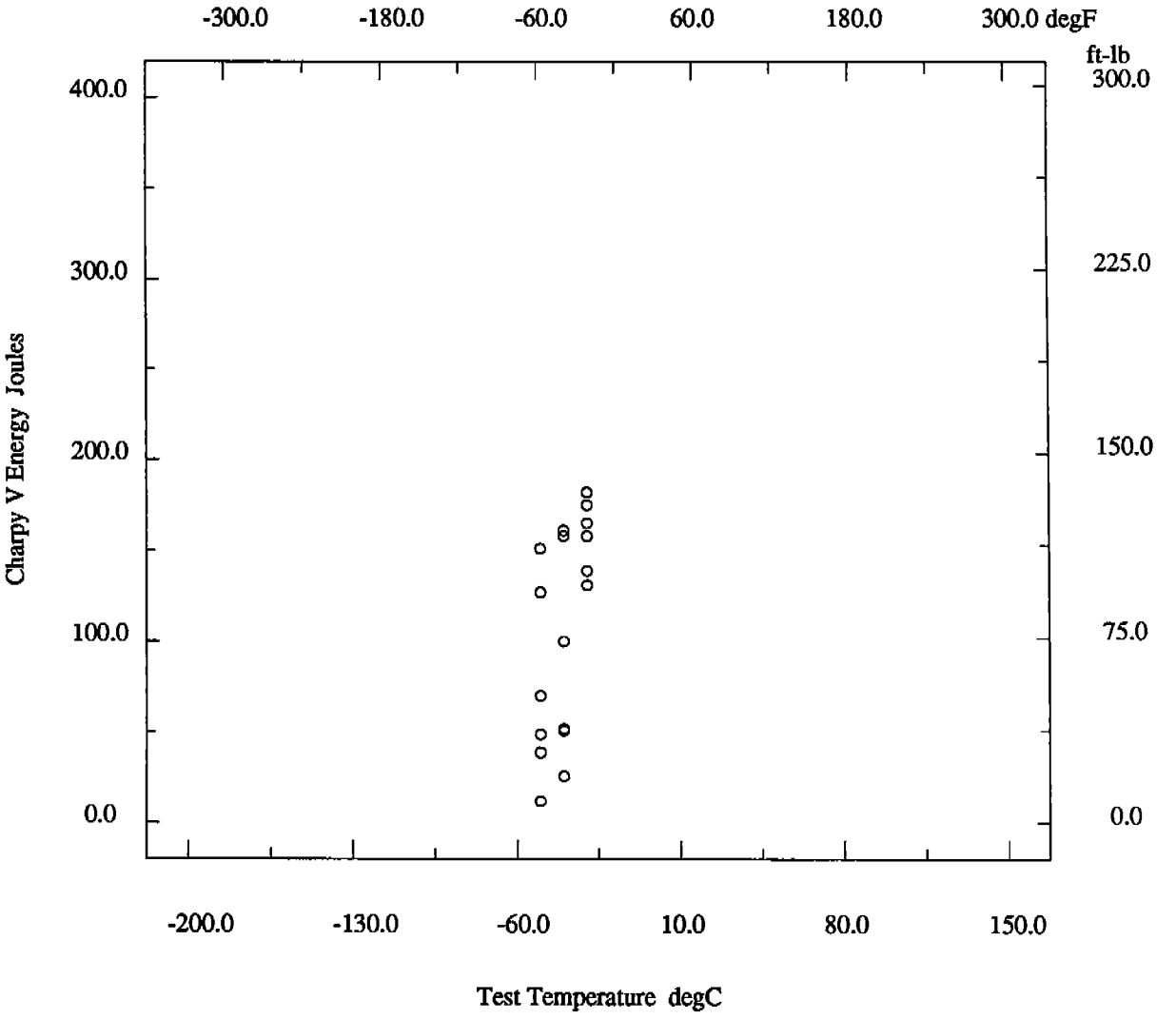
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	127
T-L °	-50	12
T-L °	-50	151
T-L °	-50	39
T-L °	-50	49
T-L °	-50	70
T-L °	-40	100
T-L °	-40	158
T-L °	-40	161
T-L °	-40	26
T-L °	-40	51
T-L °	-40	52
T-L °	-30	131
T-L °	-30	139
T-L °	-30	158
T-L °	-30	165
T-L °	-30	175
T-L °	-30	182

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09NMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09NBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.90 %
P	0.007 %	S	0.006 %
Si	0.06 %	Cr	0.09 %
Ni	0.64 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.016 %	Ti	0.004 %
B	*	Al	1.03 %
N	0.0221 %	Other Components	O=.0086 %

Fabrication History

See Page 15100.1

Weld

Weld Code	010.003.09NBRA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	538	465	*	28	73

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09NBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15100.26

Fabrication History See Page 15100.1

Weld See Page 15100.26

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

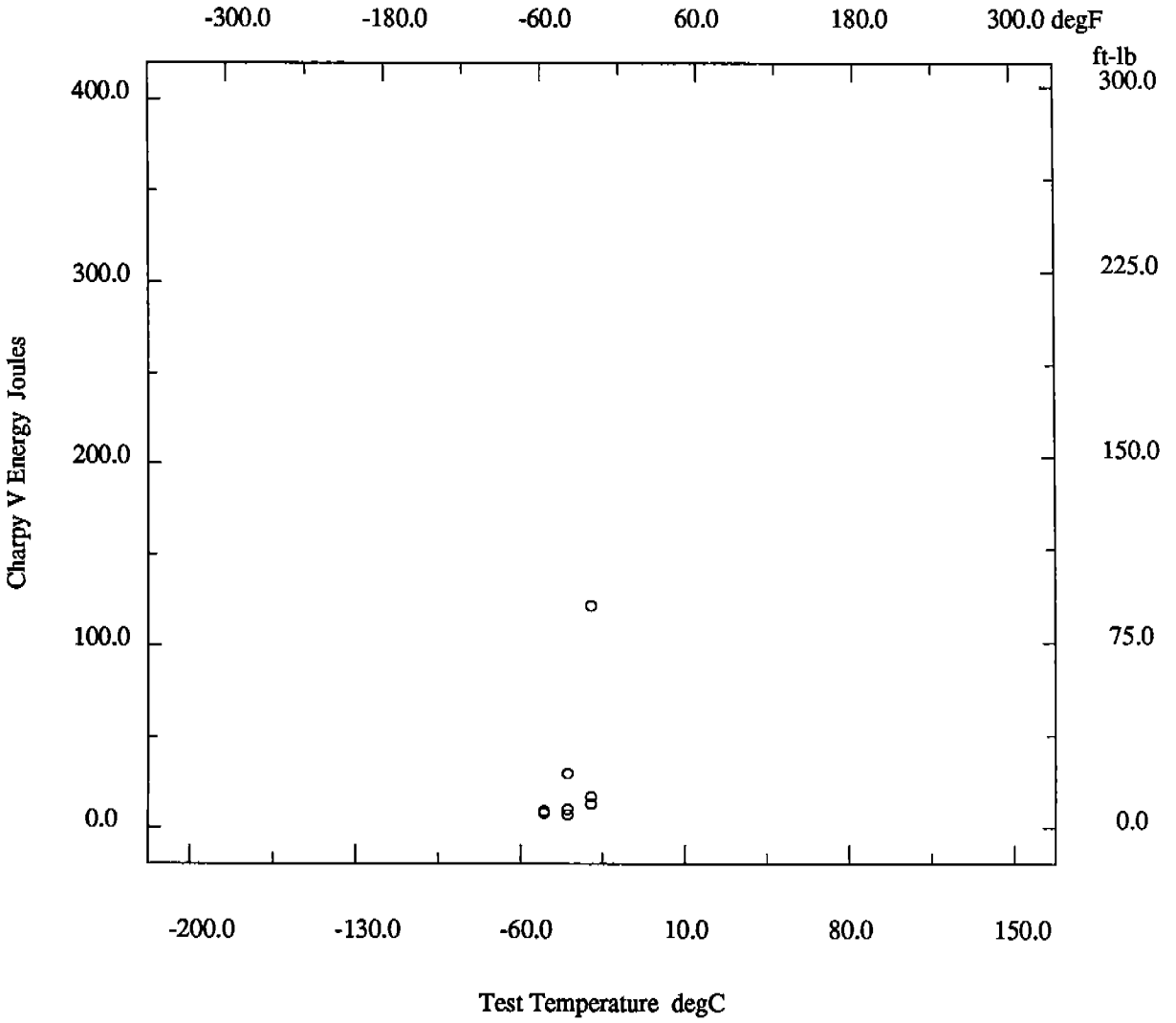
Orien	Test Temp degC	CVN Energy Joules
T-L o	-50	8
T-L o	-50	8
T-L o	-50	9
T-L o	-40	10
T-L o	-40	30
T-L o	-40	7
T-L o	-30	122
T-L o	-30	13
T-L o	-30	17

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09NBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09PSA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.08 %	Mn	0.84 %
P	0.006 %	S	0.006 %
Si	0.04 %	Cr	0.07 %
Ni	0.61 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.013 %	Ti	0.004 %
B	*	Al	0.99 %
N	0.0201 %	Other Components	O=.0103 %

Fabrication History

Heat Treatment	*	Producer	*
Year Produced	*	Addl Info	None
Source	HIFAB	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	H
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Weld

Weld Code	010.003.09PSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Initial JI, JI	*
Maximum J, Jmax	*	Tearing Modulus	*
Standard Method	BS5762	Standard Year	1979

Orien	Test Temp degC	CODIc mm	Curve
T-L	-10	0.24	Cleavage
T-L	-10	0.85	Unstable
T-L	-10	1.24	Unstable

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09PFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 15200.1

Fabrication History

See Page 15200.1

Weld

Weld Code	010.003.09PSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	515	445	*	30	76

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09PFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15200.1

Fabrication History See Page 15200.1

Weld See Page 15200.3

Property Measurements

Test Type	Charpy V Impact	Position	0/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

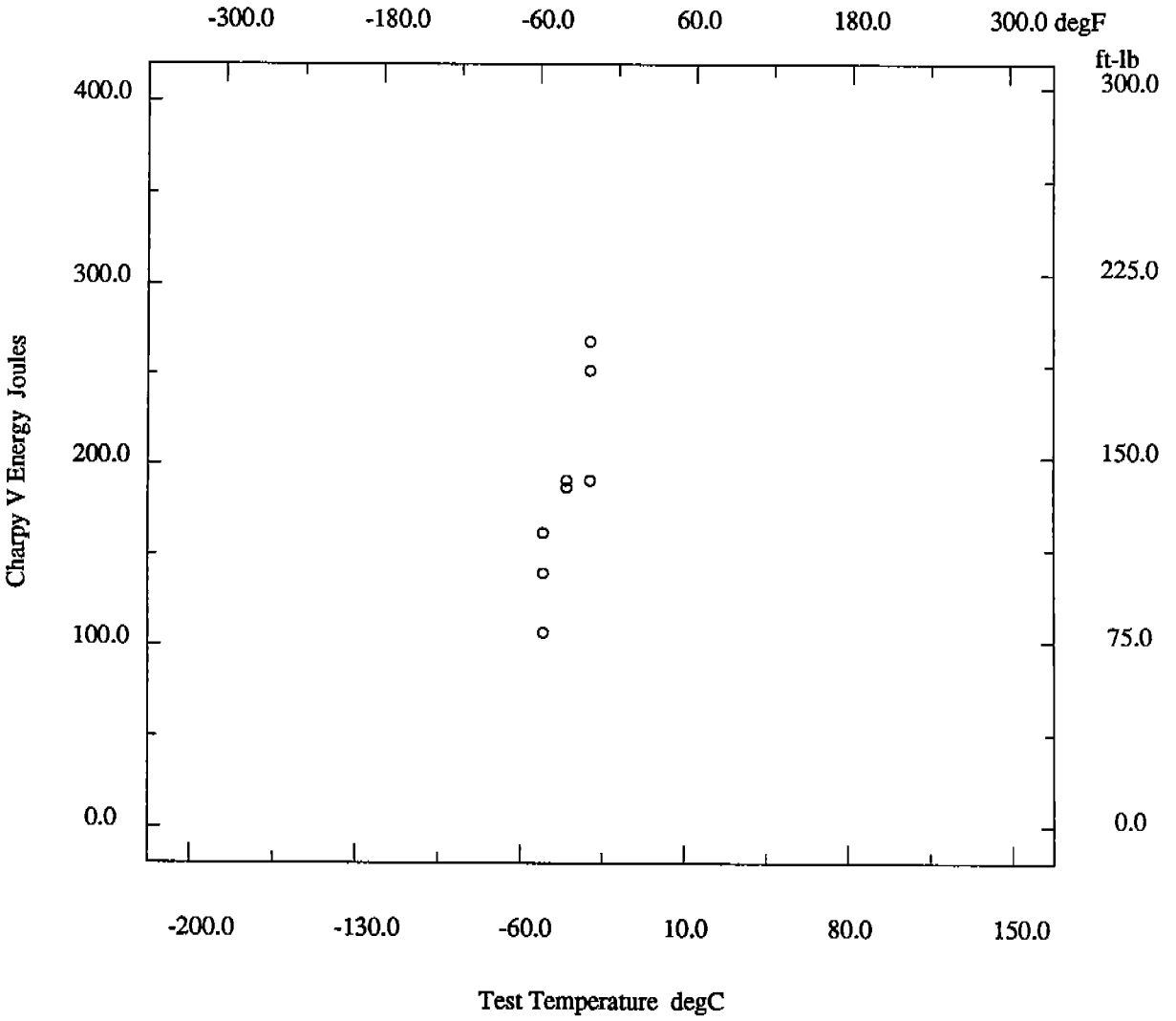
Orien	Test Temp degC	CVN Energy Joules
T-L o	-50	107
T-L o	-50	140
T-L o	-50	162
T-L o	-40	187
T-L o	-40	187
T-L o	-40	191
T-L o	-30	191
T-L o	-30	252
T-L o	-30	268

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09PFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09PMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 15200.1

Fabrication History

See Page 15200.1

Weld

Weld Code	010.003.09PSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

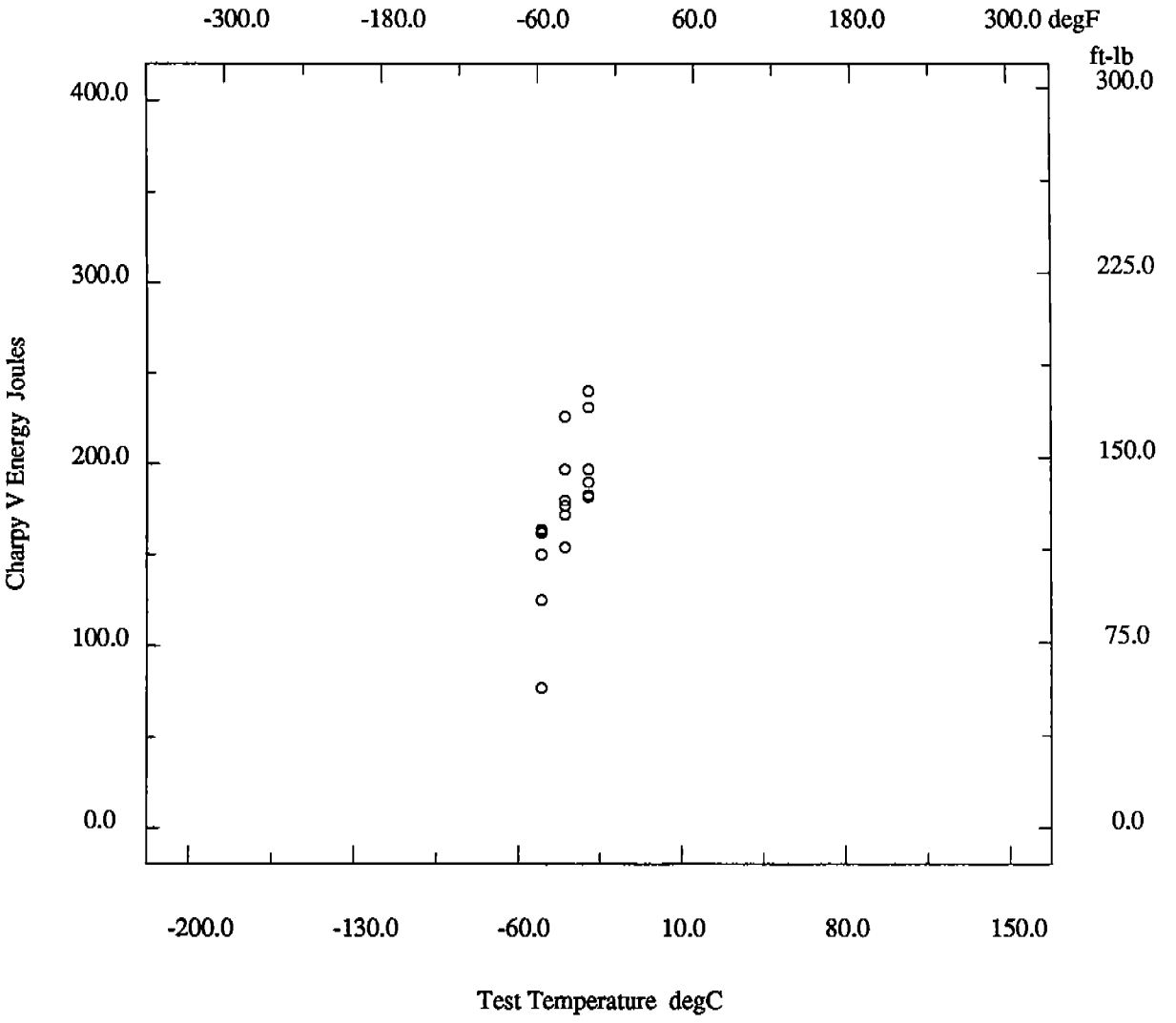
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	125
T-L °	-50	150
T-L °	-50	162
T-L °	-50	163
T-L °	-50	164
T-L °	-50	77
T-L °	-40	154
T-L °	-40	172
T-L °	-40	177
T-L °	-40	180
T-L °	-40	197
T-L °	-40	226
T-L °	-30	182
T-L °	-30	183
T-L °	-30	190
T-L °	-30	197
T-L °	-30	231
T-L °	-30	240

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09PMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09PBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.91 %
P	0.005 %	S	0.005 %
Si	0.06 %	Cr	0.05 %
Ni	0.61 %	Mo	0.02 %
V	0.002 %	Cu	0.04 %
Cb	0.011 %	Ti	0.004 %
B	*	Al	0.93 %
N	0.0198 %	Other Components	O=.0105 %

Fabrication History

See Page 15200.1

Weld

Weld Code	010.003.09PBRA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	IG
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	20.5 volts
Amperage	240 amps	Polarity	DCRP
Travel Speed	25-40 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	548	472	*	25	71

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09PBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15200.8

Fabrication History See Page 15200.1

Weld See Page 15200.8

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

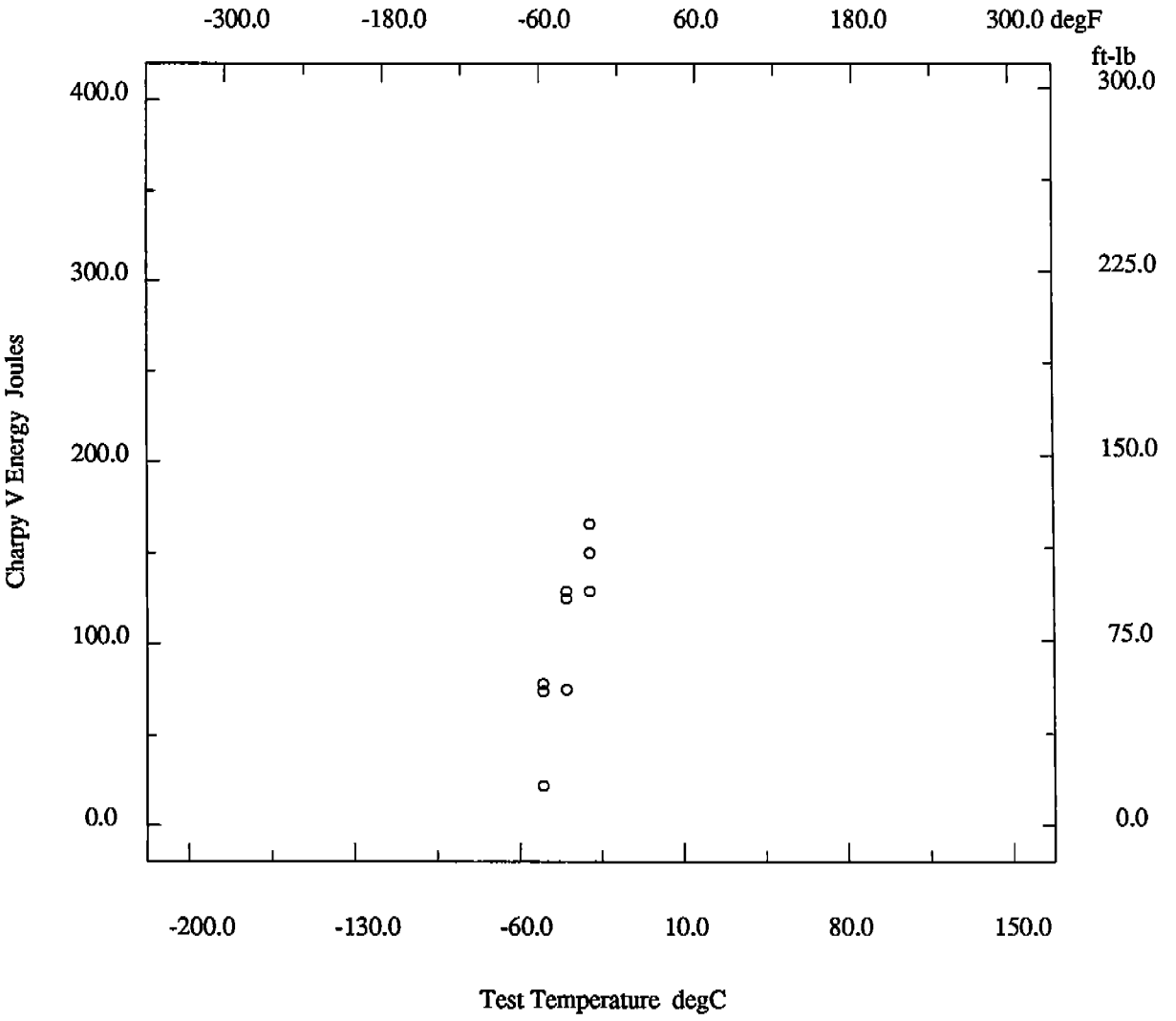
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	22
T-L °	-50	74
T-L °	-50	78
T-L °	-40	125
T-L °	-40	129
T-L °	-40	75
T-L °	-30	129
T-L °	-30	150
T-L °	-30	166

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09PBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09QSA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.08 %	Mn	0.85 %
P	0.005 %	S	0.006 %
Si	0.04 %	Cr	0.07 %
Ni	0.67 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.013 %	Ti	0.004 %
B	*	Al	0.94 %
N	0.0257 %	Other Components	O=.0116 %

Fabrication History

See Page 15200.1

Weld

Weld Code	010.003.09QSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Fracture Toughness	Position	Full
Specimen Type	Double Notch Bend	Specimen Thickness	50 mm
Crack Length	*	Loading Type	Slow
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	*
Initial COD	*	Curve Shape	*
Initial JI, JI	*	Maximum J, Jmax	*
Tearing Modulus	*	Standard Method	BS5762
Standard Year	1979		

Orien	Test Temp degC	CODIc mm
T-L	-10	0.09
T-L	-10	0.33
T-L	-10	>1.91

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09QFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15200.11

Fabrication History See Page 15200.1

Weld

Weld Code	010.003.09QSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Final surface
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	0/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	497	437	*	26	73

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09QFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15200.11

Fabrication History See Page 15200.1

Weld See Page 15200.12

Property Measurements

Test Type	Charpy V Impact	Position	0/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

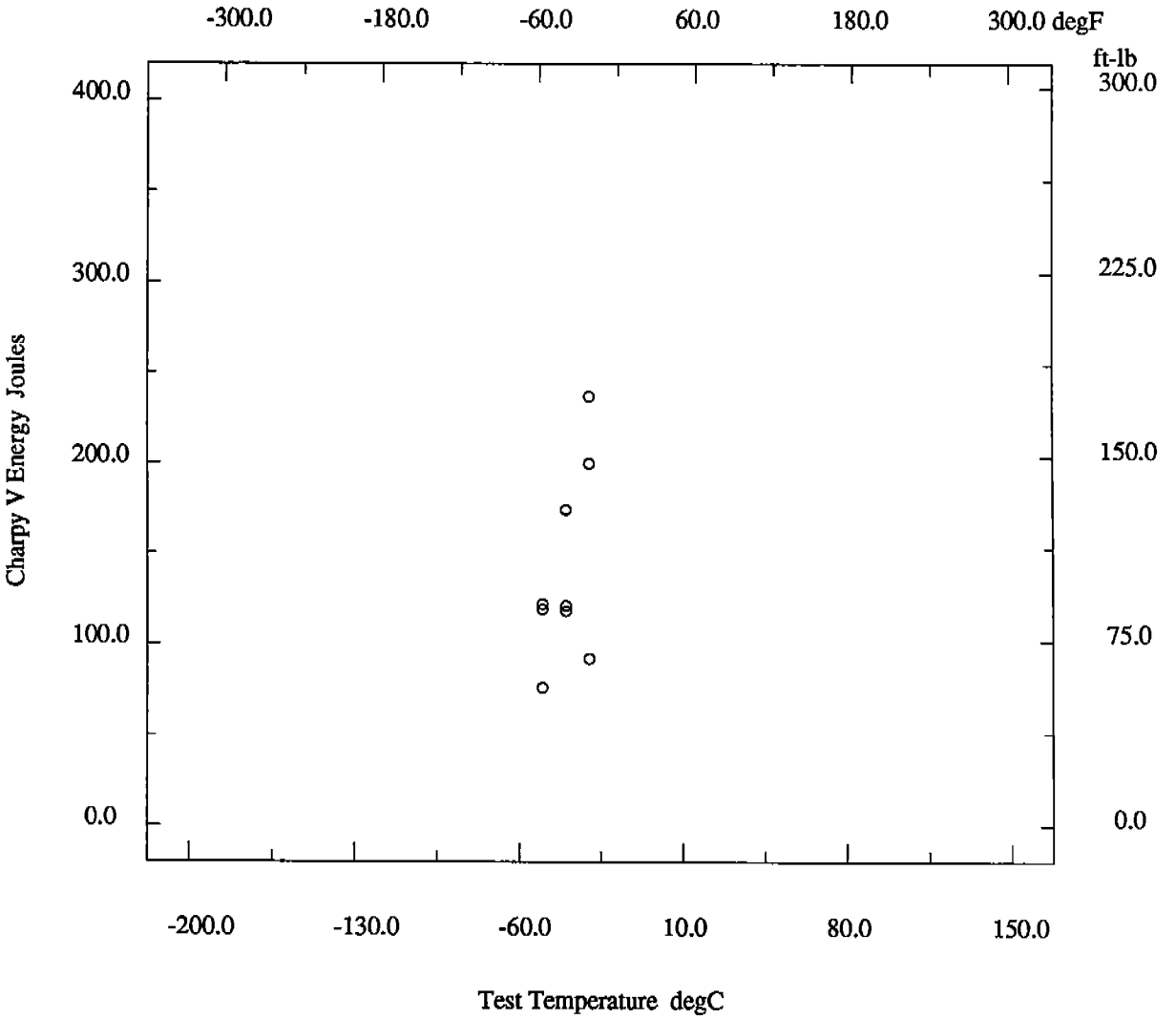
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	119
T-L °	-50	122
T-L °	-50	76
T-L °	-40	118
T-L °	-40	121
T-L °	-40	174
T-L °	-30	200
T-L °	-30	237
T-L °	-30	92

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09QFA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09QMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

See Page 15200.11

Fabrication History

See Page 15200.1

Weld

Weld Code	010.003.09QSA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Mid thickness not root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

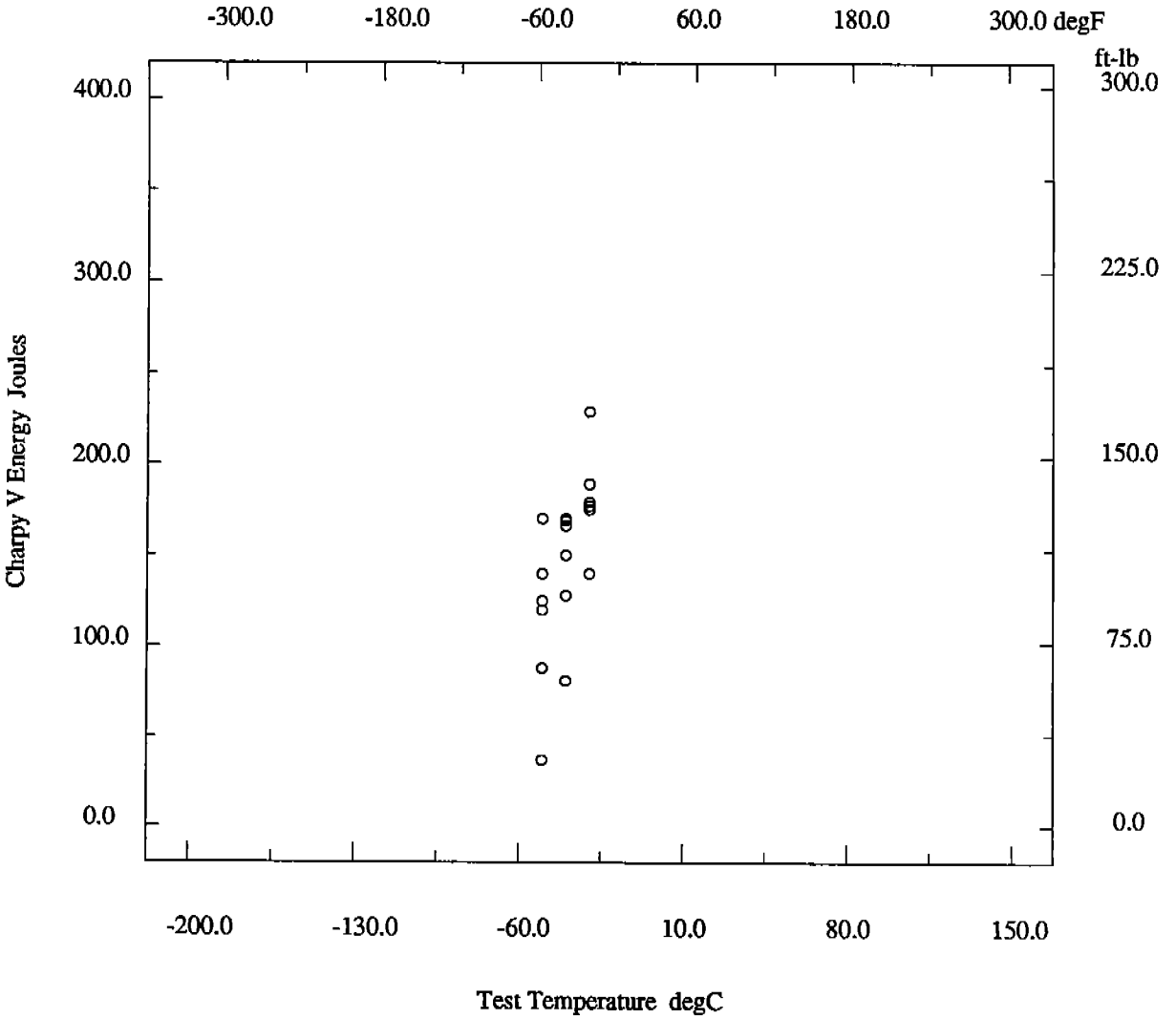
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	120
T-L °	-50	125
T-L °	-50	140
T-L °	-50	170
T-L °	-50	37
T-L °	-50	88
T-L °	-40	128
T-L °	-40	150
T-L °	-40	166
T-L °	-40	169
T-L °	-40	170
T-L °	-40	81
T-L °	-30	140
T-L °	-30	175
T-L °	-30	177
T-L °	-30	179
T-L °	-30	189
T-L °	-30	229

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09QMA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09QBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition

C	0.09 %	Mn	0.90 %
P	0.007 %	S	0.006 %
Si	0.06 %	Cr	0.09 %
Ni	0.64 %	Mo	0.03 %
V	0.002 %	Cu	0.02 %
Cb	0.016 %	Ti	0.004 %
B	*	Al	1.03 %
N	0.0221 %	Other Components	O=.0086 %

Fabrication History

See Page 15200.1

Weld

Weld Code	010.003.09QBRA	Weld Type	FCA
Base Metal Thickness	50 mm	Welding Position	3G
Preheat Temperature	100 degC	Metal Gap	5 mm
Interpass Temperature	150 degC	Passes	*
Filler Specification	*	Filler Name	Nk203NiC
Filler Carbon Content	0.09 %	Filler Metal Size	2 mm
Shielding Gas	*	Voltage	17.5 volts
Amperage	200-210 amps	Polarity	DCRP
Travel Speed	24-36 cm/min	Heat Input/Pass	*
Joint Preparation	V Groove	Number of Sides	1
Location wrt Weld	11mm in HAZ	Location wrt Surface	Back surface at root
Post-Weld Heat Temp	150 degC	Post-Weld Heat Time	48 hr
Flux Type	*	Flux Name	*
Weld Composition Reported?	Yes		

Property Measurements

Test Type	Tensile	Position	4/4T
Specimen Type	Cylindrical	Specimen Thickness	50 mm
Gage Length	*	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degC	UTS N/mm2	TYS N/mm2	TYP kgf/mm2	Elongation %	RA %
L	Room	527	470	*	31	72

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09QBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		

Composition See Page 15200.17

Fabrication History See Page 15200.1

Weld See Page 15200.17

Property Measurements

Test Type	Charpy V Impact	Position	4/4T
Specimen Type	Full	Lateral Expansion	*
Shear Fracture	*	Did Specimen Fracture?	Assumed
Did Specimen Split?	*	Standard Method	BS131H2
Standard Year	*		

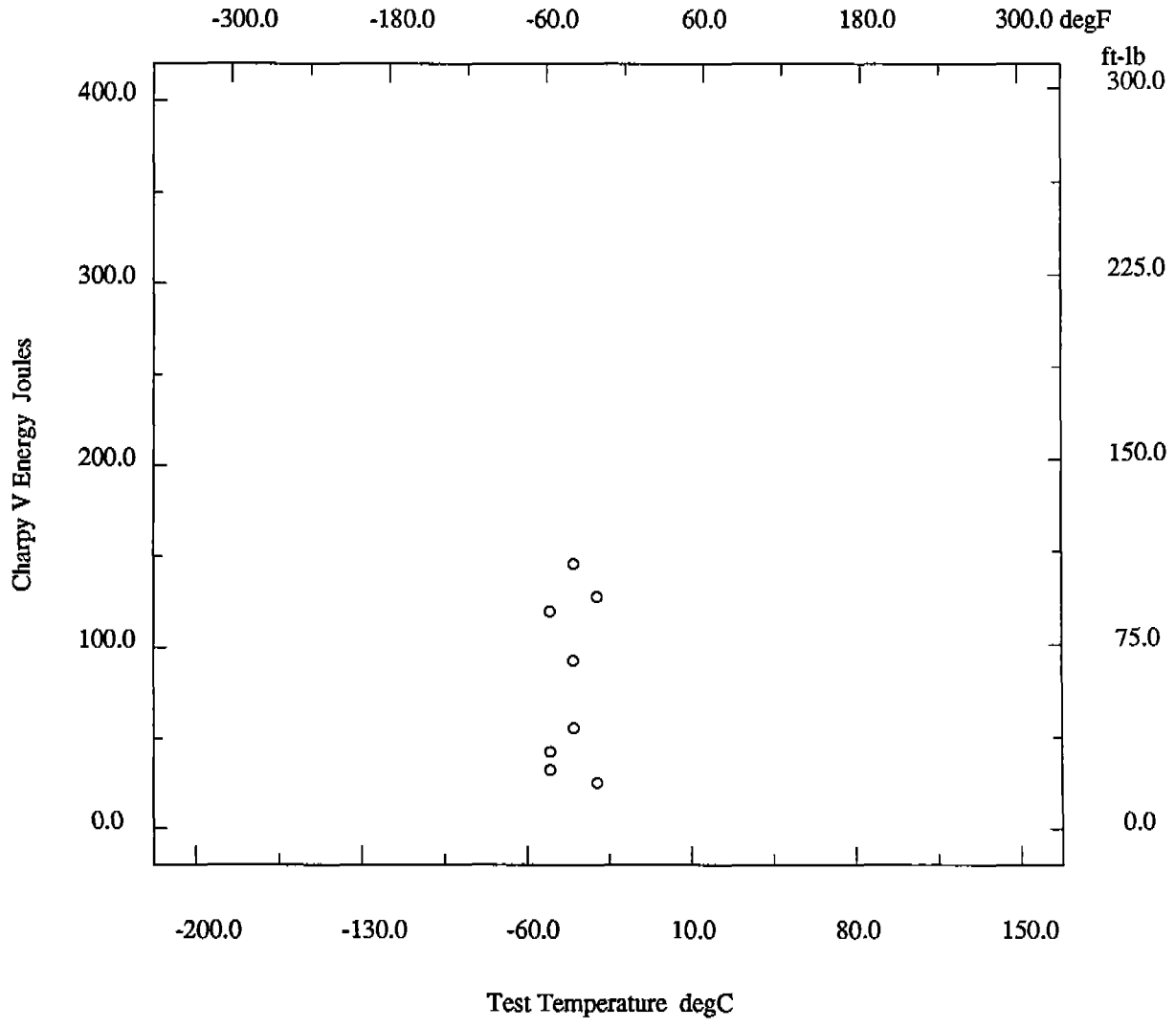
Orien	Test Temp degC	CVN Energy Joules
T-L °	-50	120
T-L °	-50	33
T-L °	-50	43
T-L °	-40	146
T-L °	-40	56
T-L °	-40	93
T-L °	-30	128
T-L °	-30	26
T-L °	-30	26

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.003.09QBRA	Material Name	BS4360 Gr50D
UNS	*	Other Designation	BS4360 Gr50D/E
Type	Welded Joint	Form	Plate
Thickness	50 mm	Composition Type	Actual
Composition Position	*	Lot ID	*
Reference	WJ,7/87		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.004.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	*	Lot ID	C5830-5T
Reference	3202		

Composition

C	0.11 %	Mn	1.31 %
P	*	S	0.025 %
Si	*	Cr	*
Ni	*	Mo	*
V	*	Cu	*
Cb	0.031 %	Ti	*
B	*	Al	0.071 %
N	*	Other Components	None %

Fabrication History

Heat Treatment	Q,T	Producer	Lukens
Year Produced	1976	Addl Info	None
Source	Lukens	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements

Test Type	Tensile	Position	1/2T
Specimen Type	Cylindrical	Specimen Thickness	0.252 in
Gage Length	1 in	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
L	Room	87.900	74.271	83.871	27.1	75.6
L	Room	90.200	77.200	85.211	26.9	75.8
T	Room	86.397	72.755	75.784	23.5	65.2
T	Room	86.397	72.755	81.850	24.8	66.6

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.004.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	*	Lot ID	C5830-5T
Reference	3202		

Composition See Page 15300.1

Fabrication History See Page 15300.1

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Did Specimen Fracture?	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %	Split?
L-T ○	-220	2	2	0	*
L-T ○	-200	17	8	6	*
L-T ○	-190	7	3	0	*
L-T ○	-180	10	7	5	*
L-T ○	-160	19	11	11	*
L-T ○	-140	21	16	17	*
L-T ○	-130	26	19	27	*
L-T ○	-125	34	26	27	*
L-T ○	-120	10	7	16	Yes
L-T ○	-115	25	23	27	*
L-T ○	-110	11	11	21	*
L-T ○	-105	39	31	36	*
L-T ○	-100	42	34	55	Yes
L-T ○	-80	46	39	65	Yes
L-T ○	-60	55	45	69	Yes
L-T ○	-40	65	56	100	Yes
L-T ○	-20	67	58	100	Yes
L-T ○	0	74	62	100	Yes
L-T ○	40	80	64	100	Yes
L-T ○	77	75	66	100	Yes
T-L △	-220	6	4	0	*
T-L △	-200	6	2	0	*
T-L △	-180	10	8	2	*
T-L △	-170	10	6	5	*
T-L △	-160	10	7	5	Yes
T-L △	-160	4	2	5	*
T-L △	-150	12	8	10	*
T-L △	-140	13	9	11	*
T-L △	-130	14	9	11	*
T-L △	-120	11	11	21	Yes
T-L △	-110	16	16	31	Yes
T-L △	-100	19	19	47	*
T-L △	-80	22	24	45	*
T-L △	-60	25	25	67	*
T-L △	-50	29	27	80	*

(continued)

* - not reported

Material BS4360 Gr50D

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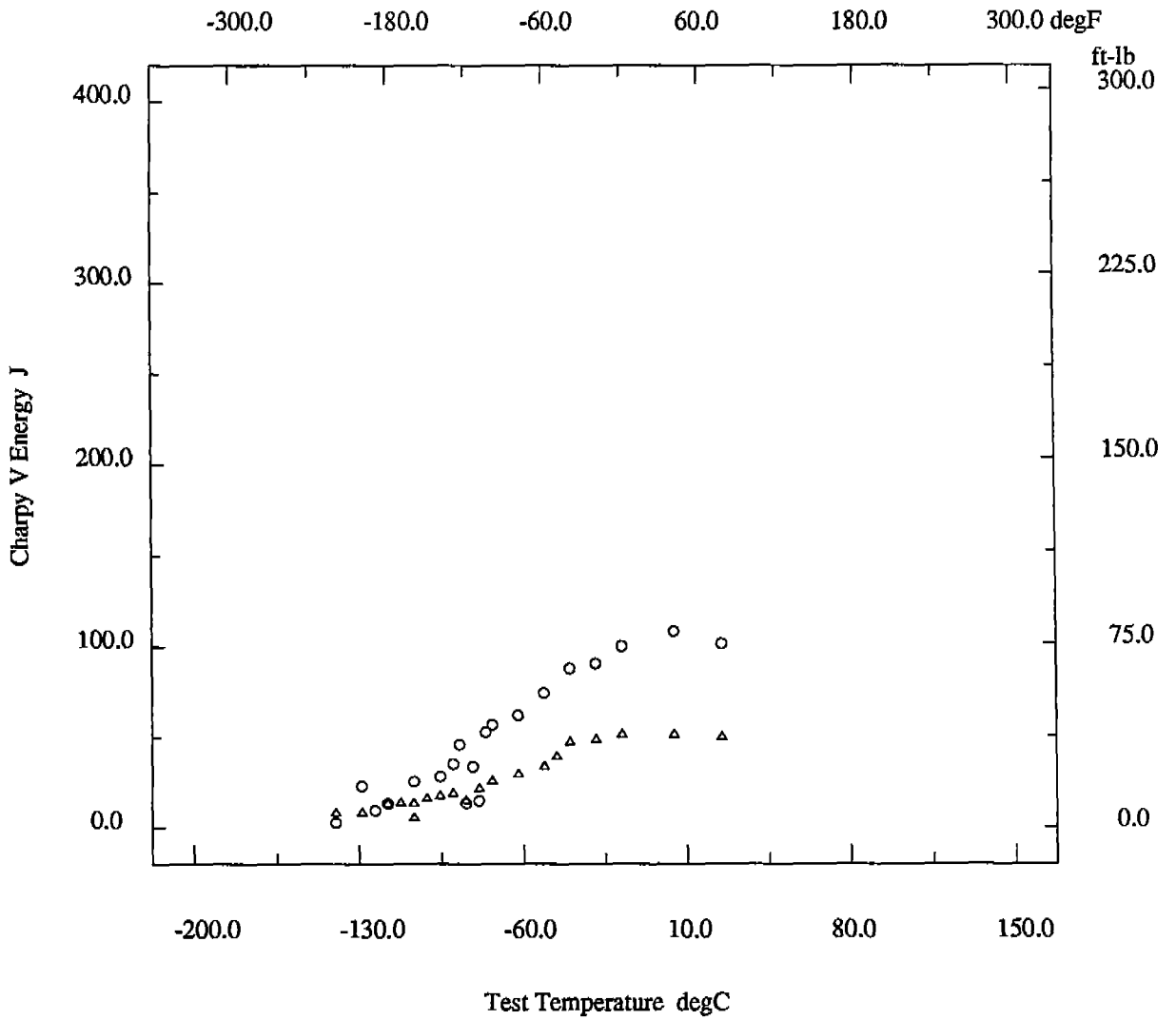
Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %	Split?
T-L ^	-40	35	35	92	Yes
T-L ^	-20	36	36	100	Yes
T-L ^	0	38	40	100	*
T-L ^	40	38	41	100	Yes
T-L ^	77	37	39	100	Yes

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.004.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	*	Lot ID	C5830-5T
Reference	3202		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.004.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	*	Lot ID	C5830-5T
Reference	3202		

Composition See Page 15300.1

Fabrication History See Page 15300.1

Property Measurements

Test Type	Dynamic Tear	Position	1/2T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

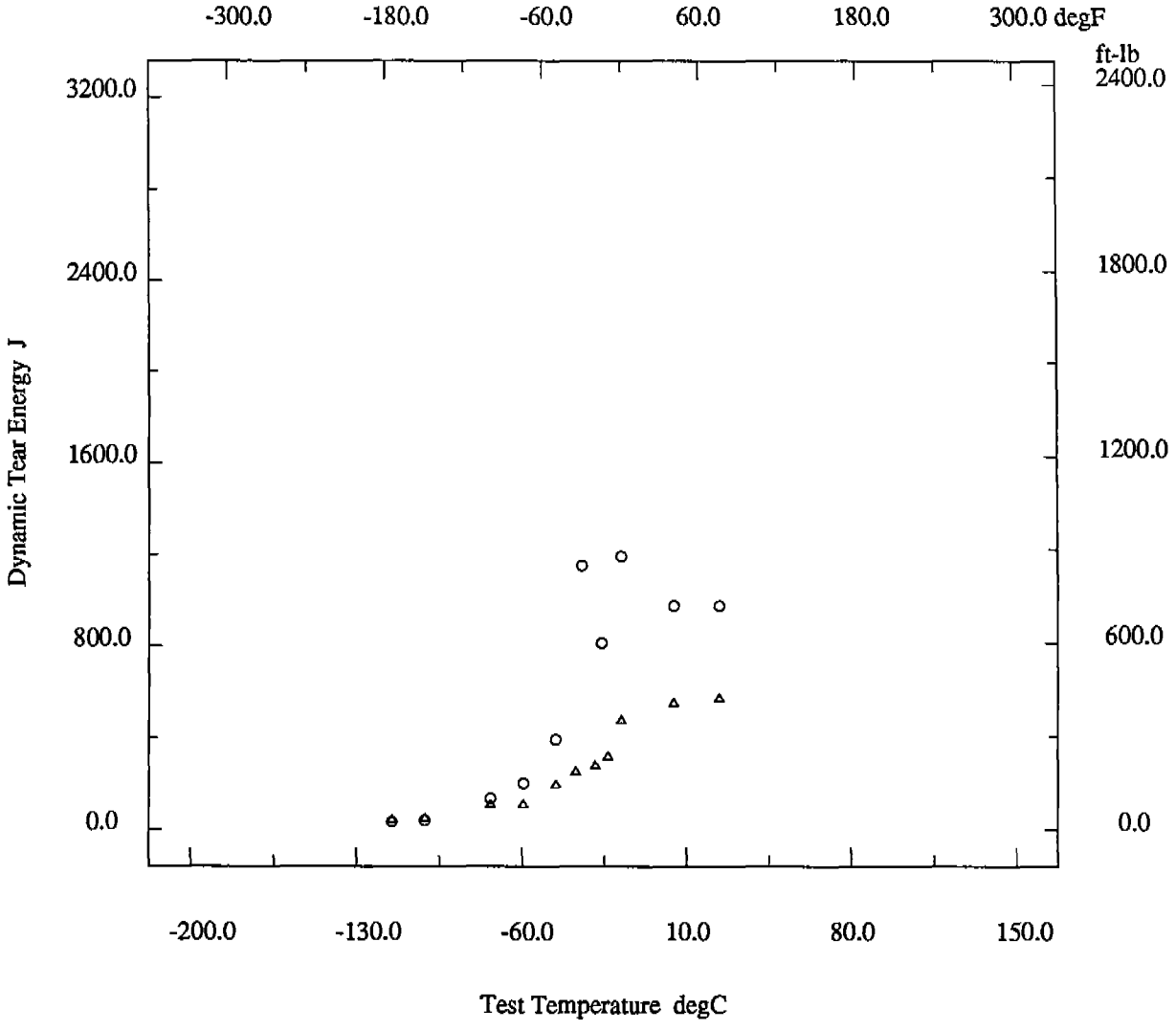
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
L-T ○	-175	25	2
L-T ○	-150	30	5
L-T ○	-100	100	17
L-T ○	-75	150	32
L-T ○	-50	290	42
L-T ○	-30	850	86
L-T ○	-15	600	79
L-T ○	0	880	100
L-T ○	40	720	100
L-T ○	75	720	100
T-L △	-175	30	2
T-L △	-150	35	8
T-L △	-100	80	11
T-L △	-75	80	38
T-L △	-50	145	48
T-L △	-35	185	62
T-L △	-20	205	63
T-L △	-10	235	64
T-L △	0	350	100
T-L △	40	405	100
T-L △	75	420	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.004.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	*	Lot ID	C5830-5T
Reference	3202		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.005.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 1/8 in	Composition Type	Actual
Composition Position	*	Lot ID	B0469-2C
Reference	3201		

Composition

C	0.19 %	Mn	1.32 %
P	*	S	0.005 %
Si	*	Cr	*
Ni	*	Mo	*
V	*	Cu	*
Cb	0.028 %	Ti	*
B	*	Al	*
N	*	Other Components	None %

Fabrication History

Heat Treatment	Q,T	Producer	Lukens
Year Produced	1976	Addl Info	None
Source	Lukens	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements

Test Type	Tensile	Position	1/4T
Specimen Type	Cylindrical	Specimen Thickness	0.252 in
Gage Length	1 in	Loading Rate	*
Tensile Strength Offset	*	Tensile Yield Point	*
Uniform Elongation	*	Tensile Modulus	*
Standard Method	*	Standard Year	*

Orient	Test Temp degF	UTS ksi	TYS ksi	Elongation %	RA %
L	80	94.2	80.2	26.2	76.6
L	80	94.2	*	27.5	77.3
T	80	91.4	79.3	26.3	73.6
T	80	92.5	81.8	26.4	73.2

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.005.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 1/8 in	Composition Type	Actual
Composition Position	*	Lot ID	B0469-2C
Reference	3201		

Composition See Page 15400.1

Fabrication History See Page 15400.1

Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Did Specimen Fracture?	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %	Split?
L-T ○	-240	5	2	0	*
L-T ○	-220	10	4	0	*
L-T ○	-200	11	5	5	*
L-T ○	-190	7	4	0	*
L-T ○	-180	42	28	11	*
L-T ○	-160	54	36	17	*
L-T ○	-150	62	45	19	*
L-T ○	-140	71	52	23	*
L-T ○	-120	76	56	38	*
L-T ○	-100	81	59	44	Yes
L-T ○	-90	95	67	52	Yes
L-T ○	-80	106	74	60	*
L-T ○	-60	118	82	74	*
L-T ○	-50	149	93	100	Yes
L-T ○	-40	142	90	100	*
L-T ○	-30	132	86	82	*
L-T ○	-20	122	84	78	*
L-T ○	-10	161	94	100	Yes
L-T ○	0	165	94	100	Yes
L-T ○	40	175	96	100	Yes
T-L △	-220	3	1	0	*
T-L △	-200	15	10	0	*
T-L △	-180	13	6	5	*
T-L △	-160	44	31	11	*
T-L △	-150	28	18	11	*
T-L △	-140	39	29	11	*
T-L △	-120	33	23	21	*
T-L △	-110	47	34	31	*
T-L △	-100	48	36	36	*
T-L △	-90	56	44	48	*
T-L △	-80	72	55	38	*
T-L △	-60	70	56	53	*
T-L △	-40	82	63	65	*
T-L △	-30	91	70	58	*
T-L △	-20	66	58	62	Yes

(continued)

* - not reported

Material BS4360 Gr50D

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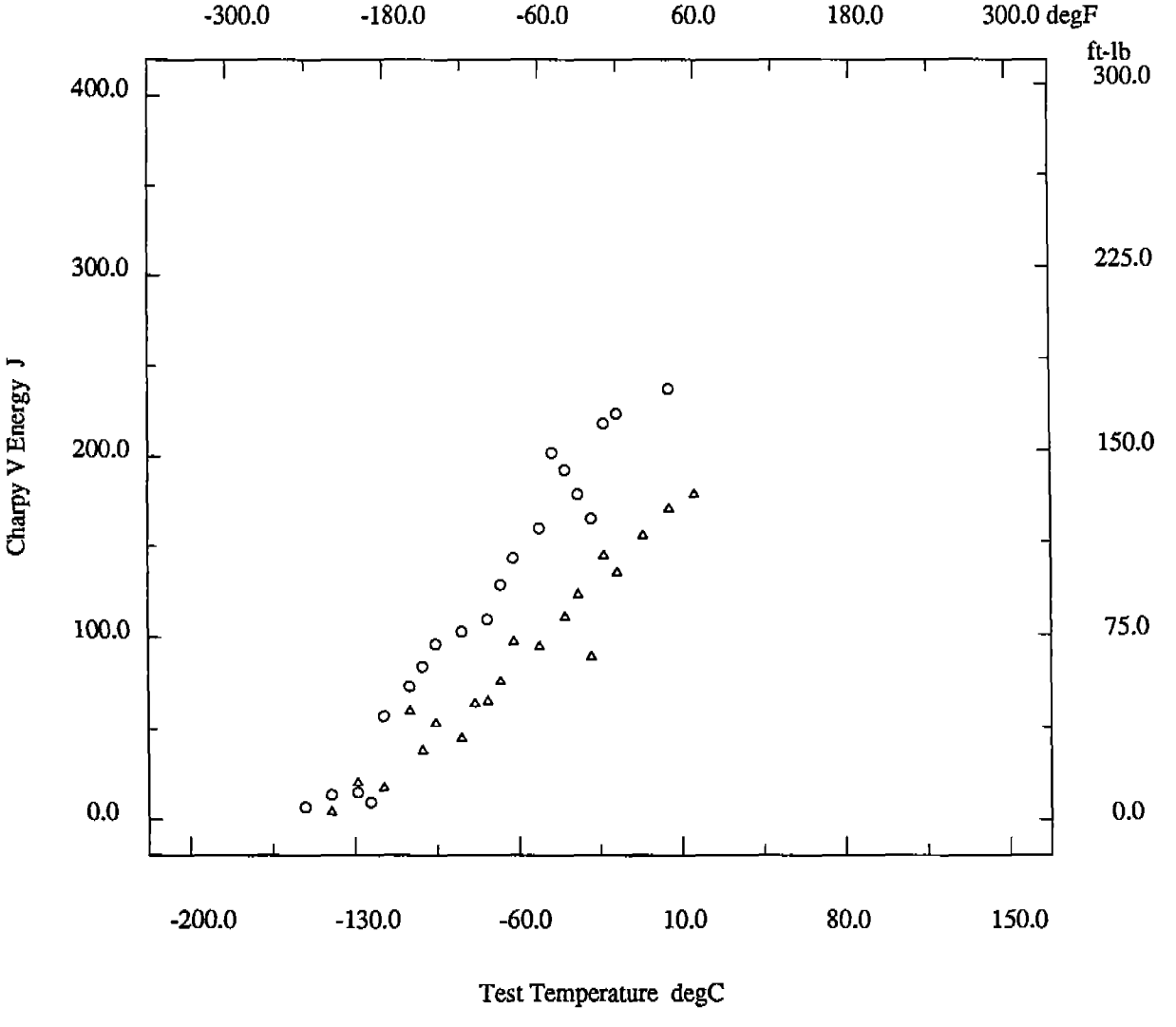
Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %	Split?
T-L ▵	-10	107	78	85	*
T-L ▵	0	100	73	82	*
T-L ▵	20	115	84	100	*
T-L ▵	40	126	88	100	*
T-L ▵	60	132	84	100	*

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.005.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 1/8 in	Composition Type	Actual
Composition Position	*	Lot ID	B0469-2C
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.005.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 1/8 in	Composition Type	Actual
Composition Position	*	Lot ID	B0469-2C
Reference	3201		

Composition See Page 15400.1

Fabrication History See Page 15400.1

Property Measurements

Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

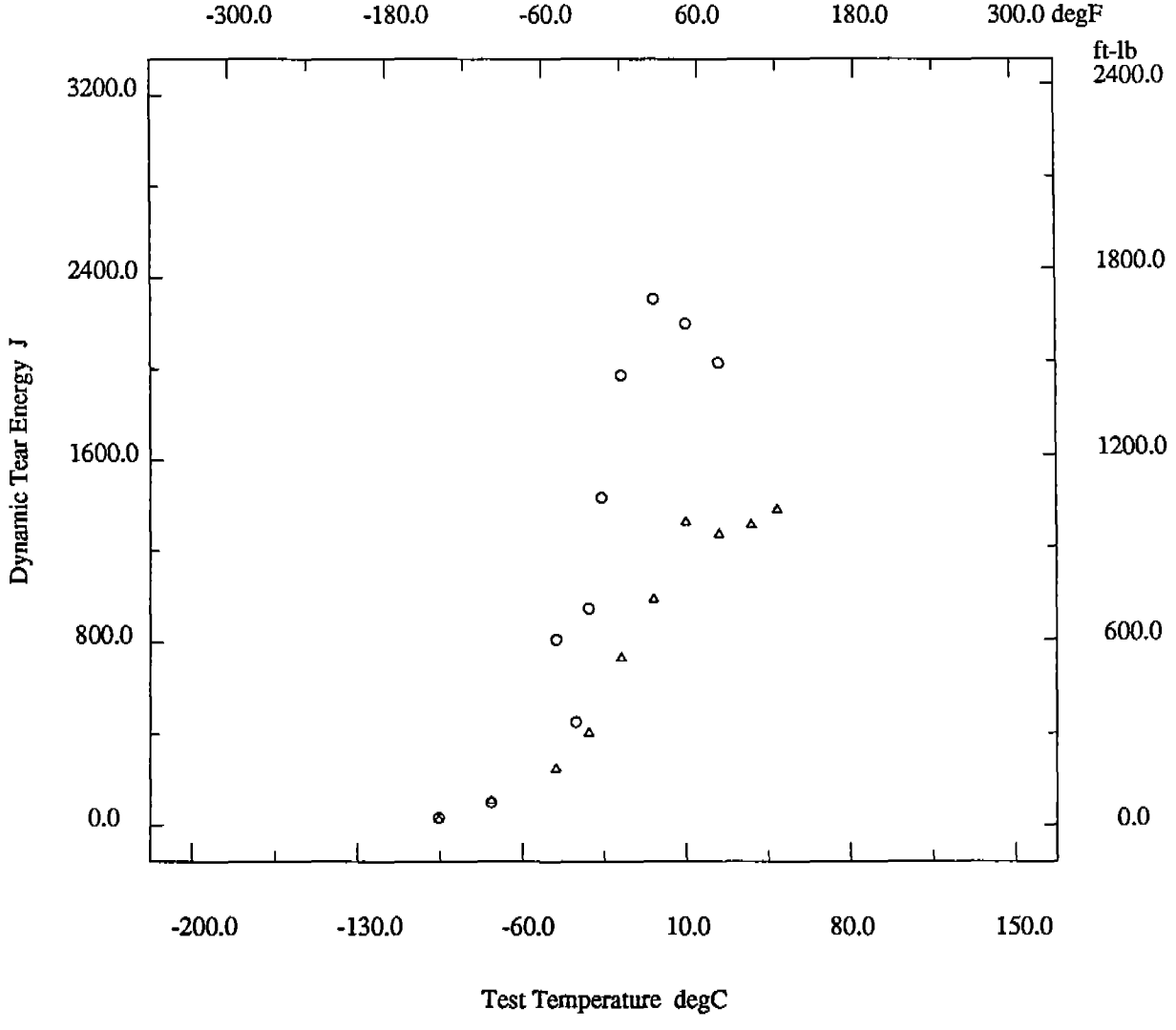
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
L-T ○	-140	25	0
L-T ○	-100	75	8
L-T ○	-50	600	48
L-T ○	-35	335	40
L-T ○	-25	700	54
L-T ○	-15	1060	67
L-T ○	0	1455	100
L-T ○	25	1700	100
L-T ○	50	1620	100
L-T ○	75	1495	100
T-L △	-140	20	0
T-L △	-100	80	10
T-L △	-50	185	31
T-L △	-25	300	39
T-L △	0	540	54
T-L △	25	730	73
T-L △	50	980	92
T-L △	75	940	100
T-L △	100	970	100
T-L △	120	1020	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.005.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 1/8 in	Composition Type	Actual
Composition Position	*	Lot ID	B0469-2C
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.006.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	6 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B1908-3
Reference	3202		

Composition

C	0.14 %	Mn	1.44 %
P	*	S	0.006 %
Si	*	Cr	0.29 %
Ni	0.28 %	Mo	0.09 %
V	*	Cu	*
Cb	0.026 %	Ti	*
B	*	Al	0.03 %
N	*	Other Components	None %

Fabrication History

Heat Treatment	Q,T	Producer	Lukens
Year Produced	1978	Addl Info	None
Source	Lukens	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	*
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements

Test Type	Tensile	Specimen Type	Cylindrical
Specimen Thickness	0.252 in	Gage Length	1 in
Loading Rate	*	Tensile Strength Offset	*
Uniform Elongation	*	Tensile Modulus	*
Standard Method	*	Standard Year	*

Position	Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
0/4T	L	80	86.7	71.7	73.7	27.0	75.8
0/4T	L	80	90.2	*	72.2	25.8	76.2
1/2T	L	80	79.6	57.5	58.8	30.0	73.0
1/2T	L	80	80.0	57.3	59.6	29.5	72.1
1/4T	L	80	79.7	58.6	60.1	29.0	73.4
1/4T	L	80	81.0	*	59.2	29.4	75.0
0/4T	T	80	89.2	*	72.2	27.2	73.0
0/4T	T	80	90.2	*	69.2	25.6	75.8
1/2T	T	80	81.1	*	56.1	28.5	69.8
1/2T	T	80	81.2	*	57.0	28.4	70.9
1/4T	T	80	80.2	58.1	58.6	28.9	73.8
1/4T	T	80	80.2	59.1	61.2	29.4	74.2

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.006.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	6 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B1908-3
Reference	3202		

Composition See Page 15500.1

Fabrication History See Page 15500.1

Property Measurements

Test Type	Charpy V Impact	Specimen Type	Full
Did Specimen Fracture?	*	Did Specimen Split?	*
Standard Method	*	Standard Year	*

Position	Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
0/4T	L-T o	-220	4	1	0
1/4T	L-T o	-220	2	1	0
0/4T	L-T o	-200	5	2	0
1/4T	L-T o	-200	7	5	0
0/4T	L-T o	-180	14	7	3
1/2T	L-T o	-180	4	2	0
1/4T	L-T o	-180	14	9	0
0/4T	L-T o	-160	47	33	6
1/2T	L-T o	-160	9	4	0
1/4T	L-T o	-160	18	12	3
0/4T	L-T o	-140	60	45	12
1/2T	L-T o	-140	7	4	0
1/4T	L-T o	-140	44	33	10
0/4T	L-T o	-130	64	47	12
1/4T	L-T o	-130	27	19	6
0/4T	L-T o	-120	23	14	6
0/4T	L-T o	-120	55	38	10
1/2T	L-T o	-120	19	13	6
1/4T	L-T o	-120	6	3	3
0/4T	L-T o	-110	80	63	23
1/4T	L-T o	-110	75	64	12
0/4T	L-T o	-100	88	70	28
1/2T	L-T o	-100	55	42	15
1/4T	L-T o	-100	85	71	20
1/2T	L-T o	-90	26	21	6
0/4T	L-T o	-80	106	79	39
1/2T	L-T o	-80	45	35	12
1/4T	L-T o	-80	87	70	25
1/2T	L-T o	-70	60	48	15
0/4T	L-T o	-60	111	81	52
1/2T	L-T o	-60	88	72	41
1/4T	L-T o	-60	110	78	46
0/4T	L-T o	-50	108	79	49
1/2T	L-T o	-50	82	65	40
1/4T	L-T o	-50	120	91	58

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Position	Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
0/4T	L-T ○	-40	120	89	57
1/2T	L-T ○	-40	45	38	36
1/2T	L-T ○	-40	64	52	33
1/4T	L-T ○	-40	105	73	49
1/2T	L-T ○	-30	85	67	52
1/2T	L-T ○	-30	88	70	57
1/4T	L-T ○	-30	127	85	60
1/4T	L-T ○	-30	130	87	66
0/4T	L-T ○	-20	142	90	78
1/2T	L-T ○	-20	110	84	70
1/4T	L-T ○	-20	159	91	100
0/4T	L-T ○	-10	130	89	78
1/2T	L-T ○	-10	134	90	92
0/4T	L-T ○	0	164	94	100
1/2T	L-T ○	0	130	88	100
1/4T	L-T ○	0	155	95	80
0/4T	L-T ○	20	164	96	100
1/2T	L-T ○	20	145	93	100
1/4T	L-T ○	20	181	95	100
0/4T	L-T ○	40	167	98	100
1/2T	L-T ○	40	132	86	100
1/4T	L-T ○	40	175	95	100
0/4T	L-T ○	60	166	99	100
1/2T	L-T ○	60	134	90	100
1/4T	L-T ○	60	170	90	100
0/4T	T-L △	-200	4	1	0
1/4T	T-L △	-200	2	2	0
0/4T	T-L △	-180	5	3	0
1/2T	T-L △	-180	4	1	0
1/4T	T-L △	-180	6	2	0
0/4T	T-L △	-160	23	14	3
1/2T	T-L △	-160	3	2	0
1/4T	T-L △	-160	14	8	0
1/4T	T-L △	-150	22	13	3
0/4T	T-L △	-140	47	33	10
1/2T	T-L △	-140	27	18	3
1/4T	T-L △	-140	6	2	0
0/4T	T-L △	-130	60	46	12
1/4T	T-L △	-130	28	19	6
0/4T	T-L △	-120	71	55	19
1/2T	T-L △	-120	28	21	6
1/4T	T-L △	-120	40	30	10
1/2T	T-L △	-110	29	21	6
0/4T	T-L △	-100	66	50	19
1/2T	T-L △	-100	52	42	17
1/4T	T-L △	-100	59	48	15
1/2T	T-L △	-90	22	17	5

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

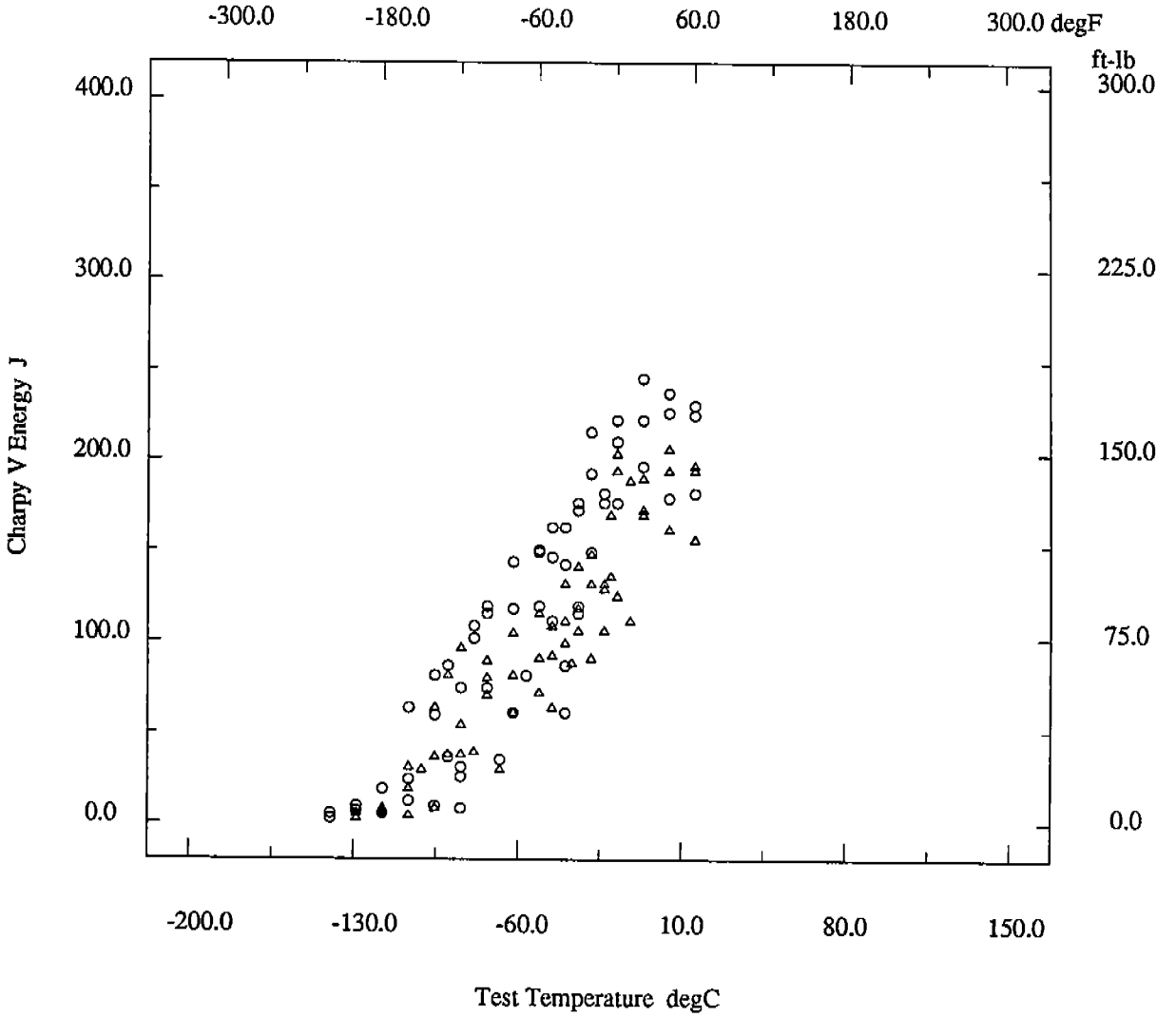
Position	Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
0/4T	T-L ^	-80	77	59	31
1/2T	T-L ^	-80	45	37	30
1/4T	T-L ^	-80	60	50	20
0/4T	T-L ^	-60	85	63	41
1/2T	T-L ^	-60	53	43	33
1/4T	T-L ^	-60	67	54	27
0/4T	T-L ^	-50	80	60	35
1/2T	T-L ^	-50	47	40	33
1/4T	T-L ^	-50	68	56	38
0/4T	T-L ^	-40	97	68	45
1/2T	T-L ^	-40	82	66	44
1/4T	T-L ^	-40	73	55	38
1/2T	T-L ^	-35	65	55	38
0/4T	T-L ^	-30	104	78	57
1/2T	T-L ^	-30	78	63	44
1/4T	T-L ^	-30	87	71	50
0/4T	T-L ^	-20	109	77	72
1/2T	T-L ^	-20	67	51	42
1/4T	T-L ^	-20	97	78	63
0/4T	T-L ^	-10	95	72	50
1/2T	T-L ^	-10	78	64	55
1/4T	T-L ^	-10	97	75	55
0/4T	T-L ^	-5	125	91	78
1/4T	T-L ^	-5	100	82	60
0/4T	T-L ^	0	150	96	100
1/2T	T-L ^	0	92	70	65
1/4T	T-L ^	0	143	93	100
0/4T	T-L ^	10	139	91	100
1/2T	T-L ^	10	82	64	62
0/4T	T-L ^	20	127	90	78
1/2T	T-L ^	20	125	87	100
1/4T	T-L ^	20	140	93	100
0/4T	T-L ^	40	152	95	100
1/2T	T-L ^	40	119	87	100
1/4T	T-L ^	40	143	91	100
0/4T	T-L ^	60	143	92	100
1/2T	T-L ^	60	115	87	100
1/4T	T-L ^	60	145	90	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.006.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	6 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B1908-3
Reference	3202		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.006.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	6 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B1908-3
Reference	3202		

Composition See Page 15500.1

Fabrication History See Page 15500.1

Property Measurements

Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

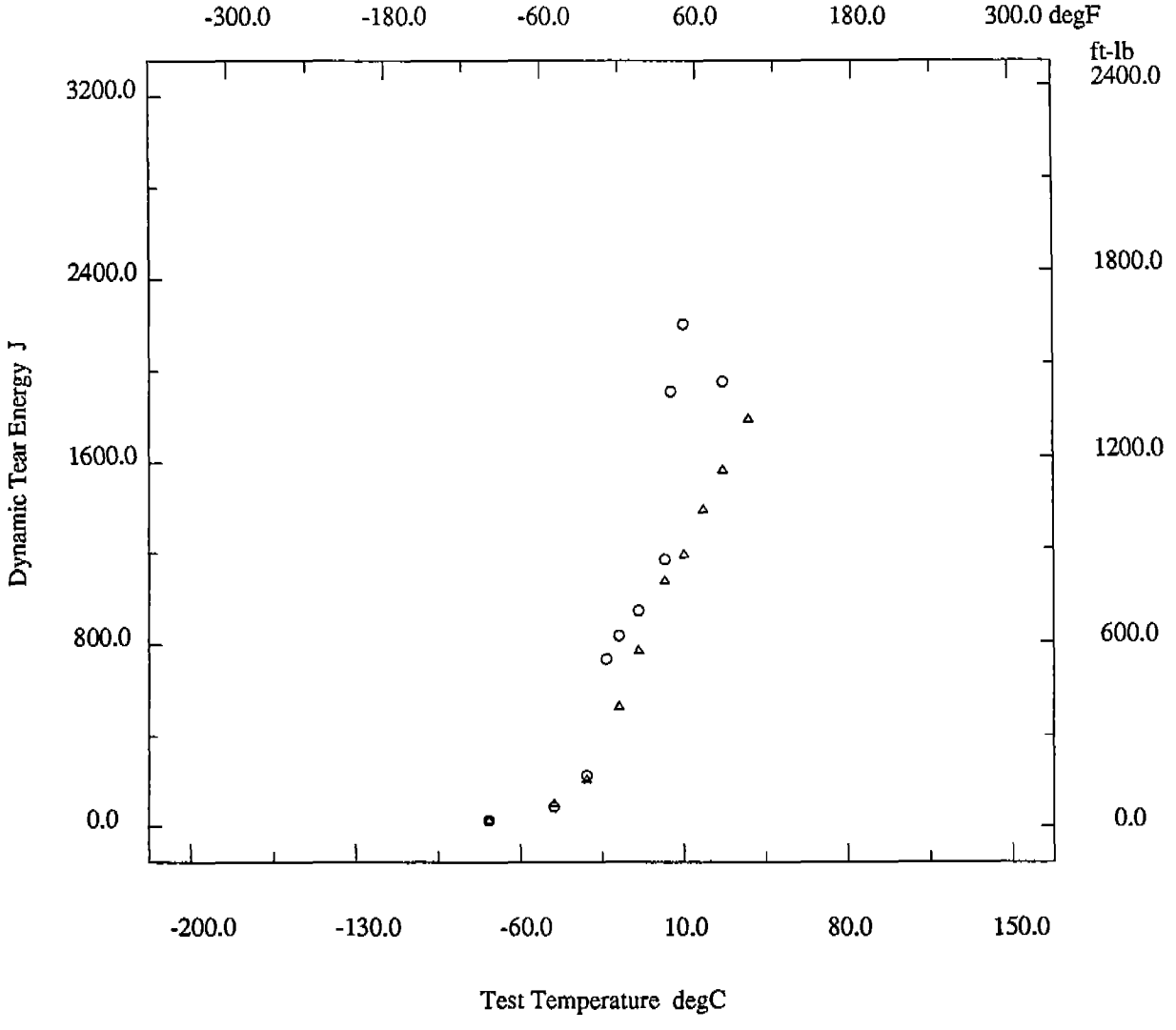
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
L-T ○	-100	20	7
L-T ○	-50	65	20
L-T ○	-25	170	25
L-T ○	-10	545	41
L-T ○	0	620	43
L-T ○	15	700	54
L-T ○	35	865	77
L-T ○	40	1410	99
L-T ○	50	1625	100
L-T ○	80	1440	100
T-L △	-100	20	5
T-L △	-50	75	21
T-L △	-25	155	29
T-L △	0	390	34
T-L △	15	570	36
T-L △	35	795	69
T-L △	50	880	78
T-L △	65	1025	89
T-L △	80	1155	100
T-L △	100	1320	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.006.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	6 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B1908-3
Reference	3202		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.007.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B1908-5A
Reference	3202		

Composition

C	0.14 %	Mn	1.44 %
P	*	S	0.006 %
Si	*	Cr	0.29 %
Ni	0.28 %	Mo	0.09 %
V	*	Cu	*
Cb	0.026 %	Ti	*
B	*	Al	0.03 %
N	*	Other Components	None %

Fabrication History

Heat Treatment	Q,T	Producer	Lukens
Year Produced	1978	Addl Info	None
Source	Lukens	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	*
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements

Test Type	Tensile	Specimen Type	Cylindrical
Specimen Thickness	0.252 in	Gage Length	1 in
Loading Rate	*	Tensile Strength Offset	*
Uniform Elongation	*	Tensile Modulus	*
Standard Method	*	Standard Year	*

Position	Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
0/4T	L	80	88.2	73.2	76.2	27.4	76.2
0/4T	L	80	87.7	72.2	75.2	27.7	76.6
1/2T	L	80	81.7	61.0	62.0	27.1	68.2
1/2T	L	80	83.4	62.9	65.8	27.5	73.6
1/4T	L	80	83.2	64.1	69.1	28.7	75.0
1/4T	L	80	83.4	63.5	69.1	29.5	76.0
0/4T	T	80	87.7	*	69.2	26.9	74.6
0/4T	T	80	88.2	*	73.2	25.8	74.6
1/2T	T	80	80.7	59.8	63.2	26.6	67.5
1/2T	T	80	81.2	58.8	59.6	27.5	73.4
1/4T	T	80	83.4	62.2	64.5	28.1	72.3
1/4T	T	80	83.7	*	58.7	28.6	74.6

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.007.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B1908-5A
Reference	3202		

Composition See Page 15600.1

Fabrication History See Page 15600.1

Property Measurements

Test Type	Charpy V Impact	Specimen Type	Full
Did Specimen Fracture?	*	Did Specimen Split?	*
Standard Method	*	Standard Year	*

Position	Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
0/4T	L-T °	-220	2	1	0
0/4T	L-T °	-200	12	7	0
0/4T	L-T °	-180	9	4	0
1/4T	L-T °	-180	5	2	0
0/4T	L-T °	-170	44	32	6
0/4T	L-T °	-160	60	44	12
1/4T	L-T °	-160	10	6	0
1/4T	L-T °	-150	78	62	19
0/4T	L-T °	-140	78	61	19
1/4T	L-T °	-140	14	9	3
1/4T	L-T °	-130	59	47	12
0/4T	L-T °	-120	78	62	19
1/4T	L-T °	-120	73	58	15
0/4T	L-T °	-110	76	59	19
1/4T	L-T °	-110	61	48	12
0/4T	L-T °	-100	103	77	37
1/4T	L-T °	-100	77	62	19
0/4T	L-T °	-90	106	82	37
1/4T	L-T °	-90	108	87	37
0/4T	L-T °	-80	105	80	41
1/4T	L-T °	-80	101	76	31
1/4T	L-T °	-75	127	95	54
0/4T	L-T °	-70	99	72	41
1/4T	L-T °	-70	147	89	70
0/4T	L-T °	-60	167	98	100
1/4T	L-T °	-60	135	91	61
0/4T	L-T °	-50	123	87	55
1/4T	L-T °	-50	134	97	62
0/4T	L-T °	-40	132	90	70
1/4T	L-T °	-40	168	97	89
0/4T	L-T °	-30	121	89	60
0/4T	L-T °	-20	172	98	100
1/4T	L-T °	-20	182	97	100
0/4T	L-T °	0	176	100	100
1/4T	L-T °	0	157	92	84

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

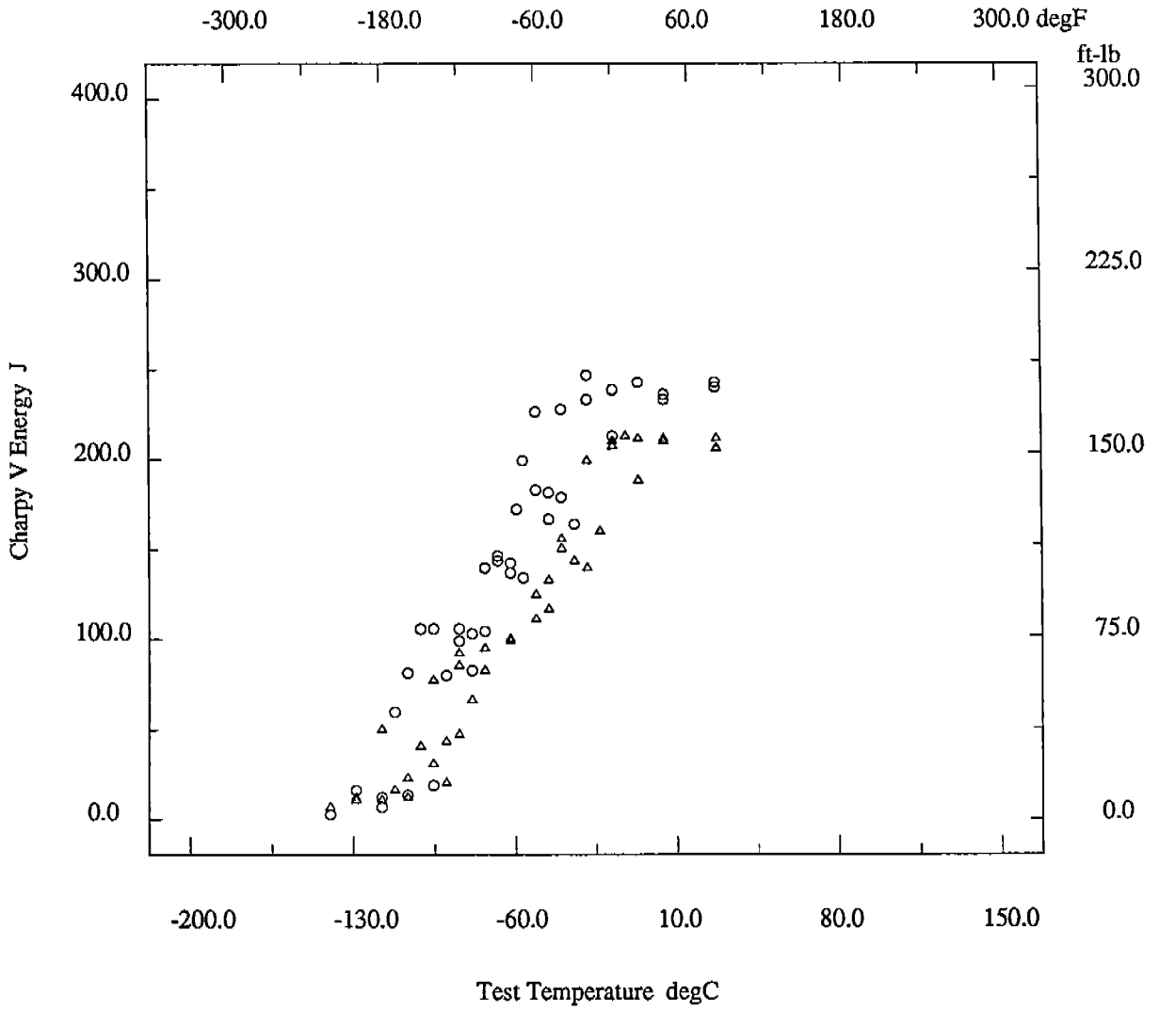
Position	Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
1/4T	L-T ○	20	179	93	100
0/4T	L-T ○	40	172	96	100
1/4T	L-T ○	40	174	95	100
0/4T	L-T ○	80	177	94	100
1/4T	L-T ○	80	179	96	100
0/4T	T-L △	-220	5	1	0
0/4T	T-L △	-200	8	3	0
1/4T	T-L △	-200	9	4	0
0/4T	T-L △	-180	37	24	6
1/4T	T-L △	-180	8	3	0
0/4T	T-L △	-170	12	7	3
0/4T	T-L △	-160	9	3	3
1/4T	T-L △	-160	17	9	3
0/4T	T-L △	-150	30	20	6
0/4T	T-L △	-140	57	40	12
1/4T	T-L △	-140	23	16	5
0/4T	T-L △	-130	15	8	3
1/4T	T-L △	-130	32	23	6
0/4T	T-L △	-120	63	47	19
1/4T	T-L △	-120	35	26	6
1/4T	T-L △	-120	68	54	12
1/4T	T-L △	-110	49	37	10
0/4T	T-L △	-100	61	47	19
1/4T	T-L △	-100	70	54	15
0/4T	T-L △	-80	74	56	28
1/4T	T-L △	-80	73	57	19
0/4T	T-L △	-60	92	67	38
1/4T	T-L △	-60	82	65	29
0/4T	T-L △	-50	86	66	38
1/4T	T-L △	-50	98	79	35
0/4T	T-L △	-40	111	84	57
1/4T	T-L △	-40	115	85	52
1/4T	T-L △	-30	106	78	46
0/4T	T-L △	-20	103	73	58
1/4T	T-L △	-20	147	91	83
0/4T	T-L △	-10	118	83	68
0/4T	T-L △	0	153	93	100
1/4T	T-L △	0	155	95	100
1/4T	T-L △	10	157	93	100
0/4T	T-L △	20	156	95	100
1/4T	T-L △	20	139	90	81
0/4T	T-L △	40	155	95	100
1/4T	T-L △	40	156	94	100
0/4T	T-L △	81	152	95	100
1/4T	T-L △	81	156	94	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.007.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B1908-5A
Reference	3202		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.007.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B1908-5A
Reference	3202		

Composition See Page 15600.1

Fabrication History See Page 15600.1

Property Measurements

Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

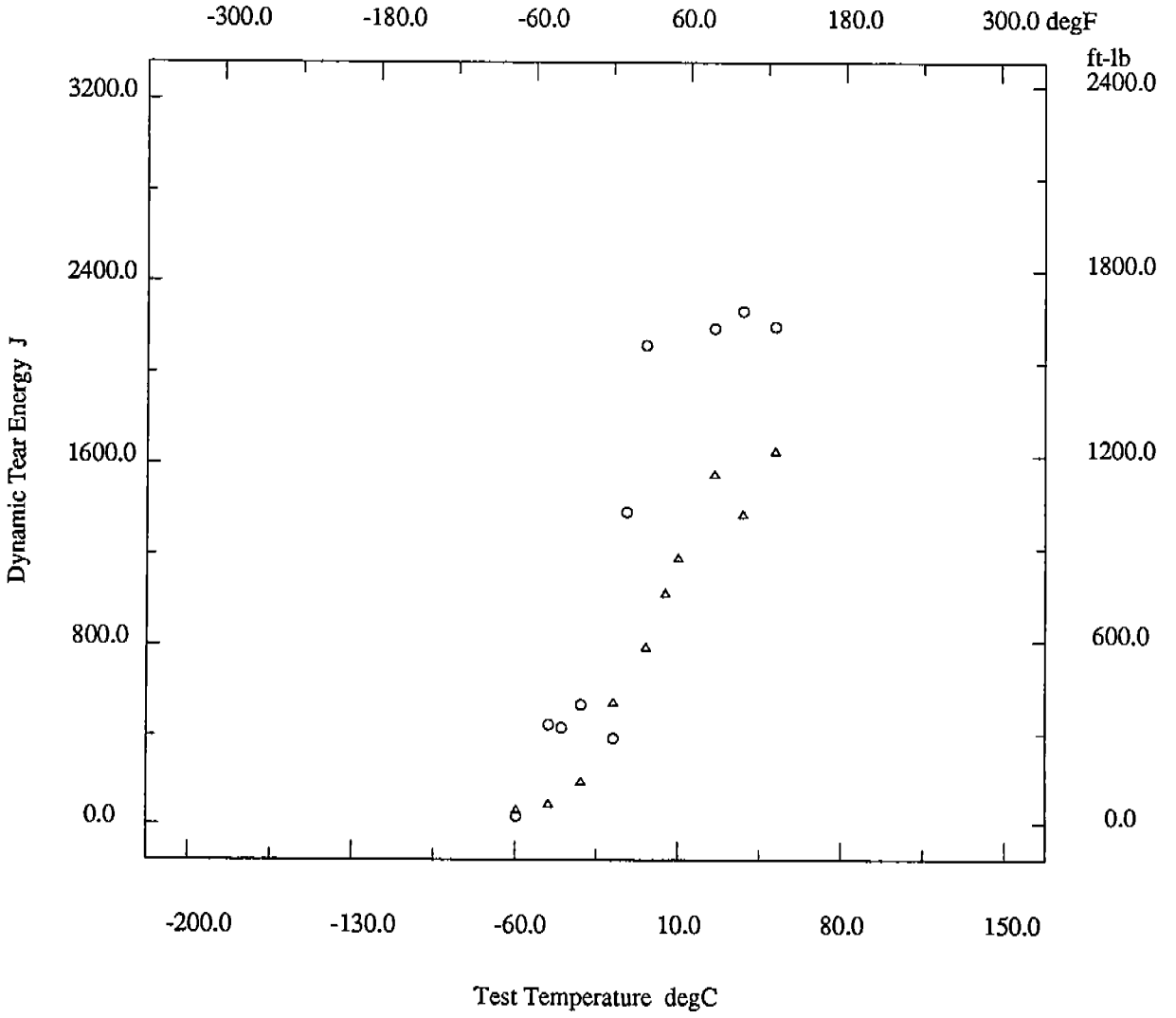
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
L-T o	-75	25	9
L-T o	-50	330	14
L-T o	-40	320	16
L-T o	-25	395	23
L-T o	0	285	42
L-T o	10	1020	48
L-T o	25	1560	90
L-T o	78	1615	94
L-T o	100	1670	100
L-T o	125	1620	100
T-L ▵	-75	45	10
T-L ▵	-50	65	23
T-L ▵	-25	140	27
T-L ▵	0	400	41
T-L ▵	25	580	60
T-L ▵	40	755	70
T-L ▵	50	870	74
T-L ▵	78	1140	97
T-L ▵	100	1010	100
T-L ▵	125	1215	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.007.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	Ladle	Lot ID	B1908-5A
Reference	3202		



* - not reported

559

Material BS4360 Gr50D

Description

Material Code	010.008.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	*	Lot ID	D3007-3
Reference	3201		

Composition

C	0.14 %	Mn	1.41 %
P	0.011 %	S	0.021 %
Si	0.24 %	Cr	0.20 %
Ni	0.23 %	Mo	0.06 %
V	*	Cu	0.23 %
Cb	0.026 %	Ti	*
B	*	Al	0.049 %
N	*	Other Components	None %

Fabrication History

Heat Treatment	N	Producer	Lukens
Year Produced	1979	Addl Info	None
Source	Lukens	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	1650 degF	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements

Test Type	Tensile	Position	1/2T
Specimen Type	Cylindrical	Specimen Thickness	0.252 in
Gage Length	1 in	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
L	80	73.7	47.7	49.3	34.9	77.7
L	80	75.9	48.7	51.3	37.2	77.3
T	80	74.4	48.5	49.7	31.4	70.2
T	80	76.8	49.9	51.1	31.7	71.3
S	80	74.2	46.3	46.9	21.2	38.3
S	80	74.4	47.1	48.1	24.2	54.5

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.008.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	*	Lot ID	D3007-3
Reference	3201		

Composition See Page 15700.1

Fabrication History See Page 15700.1

Property Measurements

Test Type	Fracture Toughness	Position	1/2T
Specimen Type	Compact	Specimen Thickness	1 in
Crack Length	*	Loading Type	*
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	Per Standard
Curve Shape	*	Standard Method	E813
Standard Year	1987		

Orien	Test Temp degF	CODi in	CODIc in	JI in-lb/in2	Jmax in-lb/in2	Tear Mod in-lb/in**2
L-T	72	0.0183	0.0222	2524	2349	244.6
L-T	72	0.0211	0.0216	2801	2315	198.8
T-L	72	0.0113	0.0137	1256	1364	150.9
T-L	72	0.0126	0.0142	1550	1437	139.4
S-L	72	0.0060	0.0067	622	630	88.1
S-L	72	0.0079	0.0084	843	796	80.4

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.008.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	*	Lot ID	D3007-3
Reference	3201		

Composition See Page 15700.1

Fabrication History See Page 15700.1

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
L-T ○	-140	4	2	0
L-T ○	-120	16	12	3
L-T ○	-100	11	9	3
L-T ○	-80	40	34	6
L-T ○	-60	72	64	15
L-T ○	-50	33	33	21
L-T ○	-40	52	46	27
L-T ○	-30	92	74	35
L-T ○	-20	146	80	70
L-T ○	0	129	80	66
L-T ○	20	129	87	68
L-T ○	30	129	92	79
L-T ○	40	146	91	100
L-T ○	60	154	89	100
L-T ○	76	141	82	100
L-T ○	100	137	89	100
L-S △	-140	8	5	0
L-S △	-130	54	44	10
L-S △	-120	53	43	12
L-S △	-110	25	20	6
L-S △	-100	113	93	37
L-S △	-90	61	52	12
L-S △	-80	84	70	22
L-S △	-60	86	74	30
L-S △	-50	115	89	58
L-S △	-40	132	88	70
L-S △	-35	104	80	46
L-S △	-30	207	97	100
L-S △	-20	196	100	100
L-S △	0	222	88	100
L-S △	40	217	83	100
L-S △	76	227	103	100
T-L ×	-120	10	8	2
T-L ×	-100	18	19	6

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
T-L ×	-80	27	25	11
T-L ×	-60	34	32	17
T-L ×	-50	31	31	23
T-L ×	-40	30	31	29
T-L ×	-20	50	44	36
T-L ×	0	50	46	38
T-L ×	20	62	56	63
T-L ×	30	67	58	72
T-L ×	40	86	72	100
T-L ×	60	89	75	100
T-L ×	76	96	81	100
T-L ×	80	81	70	100
T-L ×	100	82	73	100
T-L ×	120	86	74	100
T-S □	-120	12	10	5
T-S □	-100	17	16	10
T-S □	-80	17	18	15
T-S □	-60	46	42	19
T-S □	-50	32	32	19
T-S □	-40	33	32	21
T-S □	-20	40	40	42
T-S □	-10	60	56	52
T-S □	0	75	63	57
T-S □	10	90	68	100
T-S □	20	70	65	74
T-S □	40	89	71	100
T-S □	60	100	74	100
T-S □	76	95	76	100
T-S □	100	108	80	100
T-S □	120	99	76	100
S-L +	-60	7	9	11
S-L +	-50	11	13	11
S-L +	-40	18	25	19
S-L +	-30	22	25	31
S-L +	-20	16	22	36
S-L +	-10	22	28	31
S-L +	0	26	32	39
S-L +	10	30	35	60
S-L +	20	40	43	66
S-L +	40	39	44	83
S-L +	60	37	46	90
S-L +	76	38	48	98
S-L +	100	46	52	99
S-L +	120	46	54	100
S-L +	140	44	54	100
S-L +	160	44	53	100
S-T ◇	-60	10	10	10

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

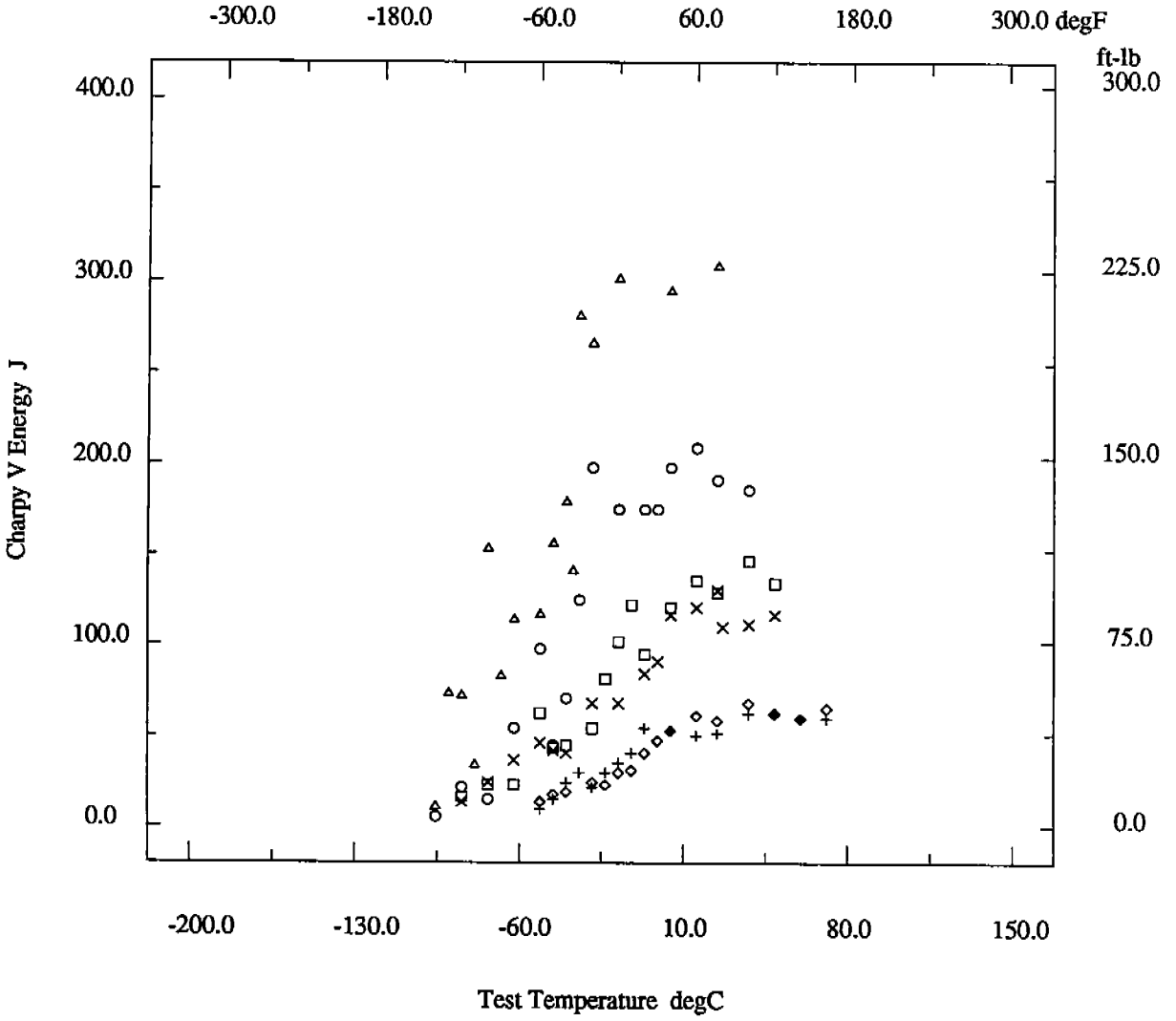
Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
S-T ◇	-50	13	16	17
S-T ◇	-40	14	16	16
S-T ◇	-20	18	24	35
S-T ◇	-10	17	21	35
S-T ◇	0	22	26	44
S-T ◇	10	23	28	50
S-T ◇	20	30	38	70
S-T ◇	30	35	43	76
S-T ◇	40	39	45	88
S-T ◇	60	45	49	98
S-T ◇	76	43	49	98
S-T ◇	100	50	52	100
S-T ◇	120	46	54	100
S-T ◇	140	44	49	100
S-T ◇	160	48	55	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.008.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	*	Lot ID	D3007-3
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.008.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	*	Lot ID	D3007-3
Reference	3201		

Composition See Page 15700.1

Fabrication History See Page 15700.1

Property Measurements

Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

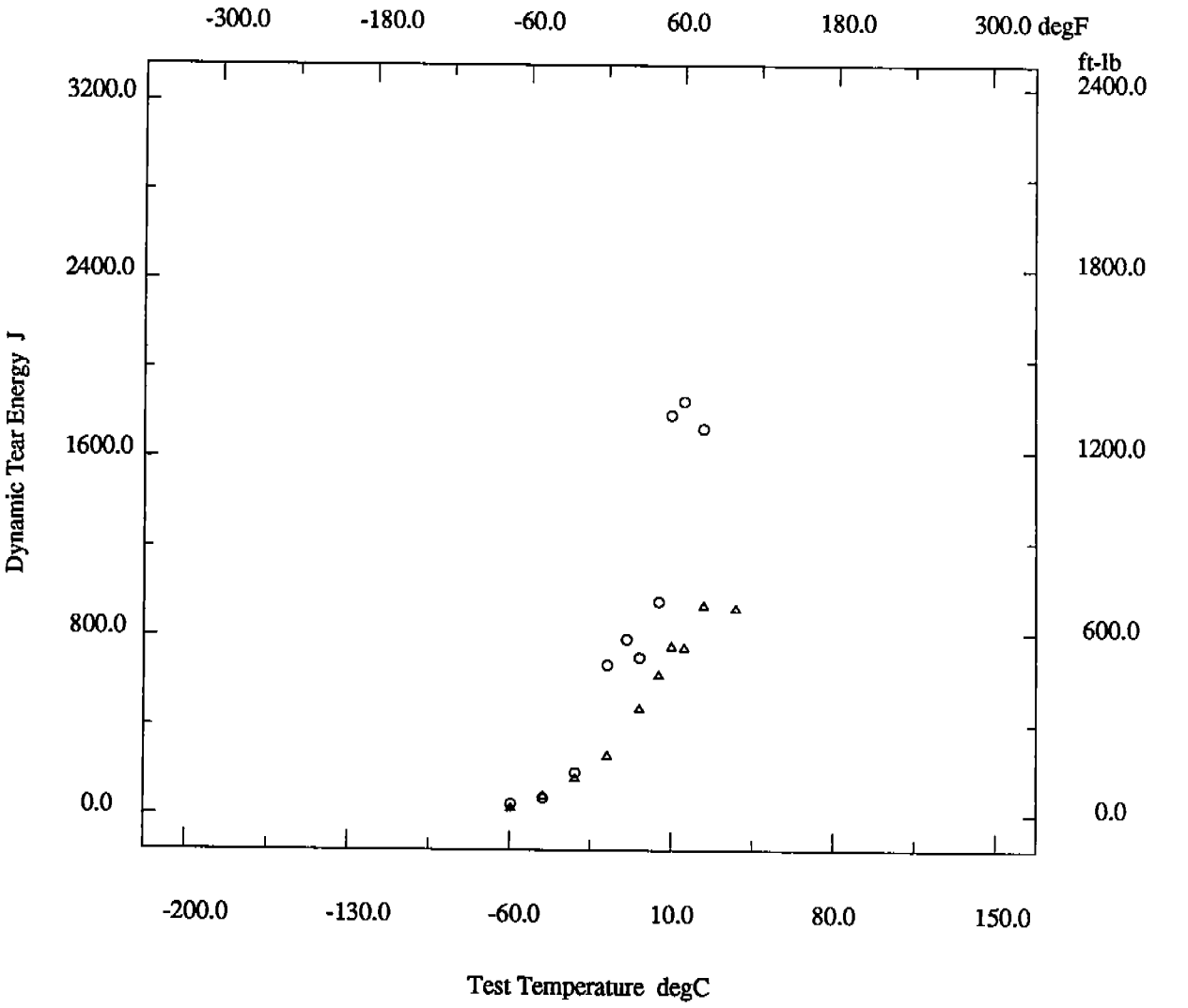
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
L-T ○	-75	35	7
L-T ○	-50	55	17
L-T ○	-25	140	25
L-T ○	0	495	38
L-T ○	15	580	47
L-T ○	25	520	43
L-T ○	40	705	63
L-T ○	50	1320	100
L-T ○	60	1365	93
L-T ○	75	1275	100
T-L △	-75	20	5
T-L △	-50	60	16
T-L △	-25	120	27
T-L △	0	195	37
T-L △	25	350	46
T-L △	40	460	61
T-L △	50	555	66
T-L △	60	550	79
T-L △	75	690	100
T-L △	100	680	96

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.008.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	*	Lot ID	D3007-3
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.009.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	*	Lot ID	B1908-5B
Reference	3201		

Composition

C	0.14 %	Mn	1.46 %
P	0.007 %	S	0.006 %
Si	0.17 %	Cr	0.21 %
Ni	0.26 %	Mo	0.08 %
V	*	Cu	0.24 %
Cb	0.025 %	Ti	*
B	*	Al	0.032 %
N	*	Other Components	None %

Fabrication History

Heat Treatment	N	Producer	Lukens
Year Produced	1979	Addl Info	None
Source	Lukens	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements

Test Type	Tensile	Position	1/2T
Specimen Type	Cylindrical	Specimen Thickness	0.252 in
Gage Length	1 in	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
L	80	79.5	54.4	57.5	33.8	76.6
L	80	79.9	55.5	56.0	32.5	75.8
T	80	78.9	54.1	56.3	30.0	71.3
T	80	79.2	54.7	57.1	33.1	71.3
S	80	78.6	54.3	55.1	29.5	66.0
S	80	78.6	54.7	57.9	29.0	69.1

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.009.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	*	Lot ID	B1908-5B
Reference	3201		

Composition See Page 15800.1

Fabrication History See Page 15800.1

Property Measurements

Test Type	Fracture Toughness	Position	1/2T
Specimen Type	Compact	Specimen Thickness	1 in
Crack Length	*	Loading Type	*
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	Per Standard
Curve Shape	*	Standard Method	E813
Standard Year	1987		

Orien	Test Temp degF	CODi in	CODIc in	JI in-lb/in2	Jmax in-lb/in2	Tear Mod in-lb/in**2
L-T	72	0.0216	0.0300	3888	3679	284.5
L-T	72	0.0228	0.0331	4402	4102	286.3
T-L	72	0.0153	0.0228	2385	2728	252.3
T-L	72	0.0165	0.0217	2753	2574	209.5
S-L	72	0.0123	0.0150	1542	1631	141.1
S-L	72	0.0129	0.0130	1690	1412	146.0

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.009.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	*	Lot ID	B1908-5B
Reference	3201		

Composition See Page 15800.1

Fabrication History See Page 15800.1

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
L-T ○	-180	8	7	0
L-T ○	-160	24	17	3
L-T ○	-140	56	45	11
L-T ○	-120	70	56	17
L-T ○	-100	61	50	17
L-T ○	-80	122	82	44
L-T ○	-60	93	72	38
L-T ○	-50	151	90	66
L-T ○	-40	149	90	68
L-T ○	-20	151	94	75
L-T ○	0	185	93	100
L-T ○	10	213	86	100
L-T ○	20	240	82	100
L-T ○	40	235	80	100
L-T ○	60	228	78	100
L-T ○	72	240	87	100
L-S △	-180	7	4	0
L-S △	-160	18	14	3
L-S △	-140	56	46	10
L-S △	-120	69	57	15
L-S △	-100	108	81	37
L-S △	-80	130	87	50
L-S △	-60	123	84	55
L-S △	-50	126	84	55
L-S △	-40	192	89	100
L-S △	-20	141	84	65
L-S △	0	208	83	100
L-S △	10	240	77	100
L-S △	20	200	78	100
L-S △	40	240	80	100
L-S △	60	240	78	100
L-S △	72	239	91	100
T-L ×	-180	9	6	0
T-L ×	-160	14	11	3

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
T-L ×	-140	46	37	8
T-L ×	-120	68	56	12
T-L ×	-100	73	59	20
T-L ×	-80	71	58	23
T-L ×	-60	86	64	35
T-L ×	-50	86	67	38
T-L ×	-40	102	77	50
T-L ×	-20	112	83	60
T-L ×	0	111	78	65
T-L ×	20	141	87	86
T-L ×	40	160	91	100
T-L ×	60	148	89	100
T-L ×	72	156	95	100
T-L ×	100	164	90	100
T-S □	-180	4	3	0
T-S □	-160	31	23	6
T-S □	-140	30	25	10
T-S □	-120	57	47	15
T-S □	-100	74	57	22
T-S □	-80	88	70	31
T-S □	-60	118	82	55
T-S □	-50	107	75	50
T-S □	-40	106	77	49
T-S □	-20	110	77	60
T-S □	0	143	95	80
T-S □	20	162	89	100
T-S □	40	162	87	100
T-S □	60	170	84	100
T-S □	72	160	92	100
T-S □	100	159	87	100
S-L +	-120	7	5	3
S-L +	-100	9	9	10
S-L +	-80	45	40	21
S-L +	-60	30	32	21
S-L +	-50	45	39	33
S-L +	-40	37	36	35
S-L +	-20	55	49	42
S-L +	0	65	60	56
S-L +	20	80	66	70
S-L +	40	112	76	76
S-L +	60	128	82	84
S-L +	72	127	83	100
S-L +	100	125	85	100
S-L +	120	81	70	100
S-L +	140	84	72	100
S-L +	160	91	73	100
S-T ◇	-100	6	6	6

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

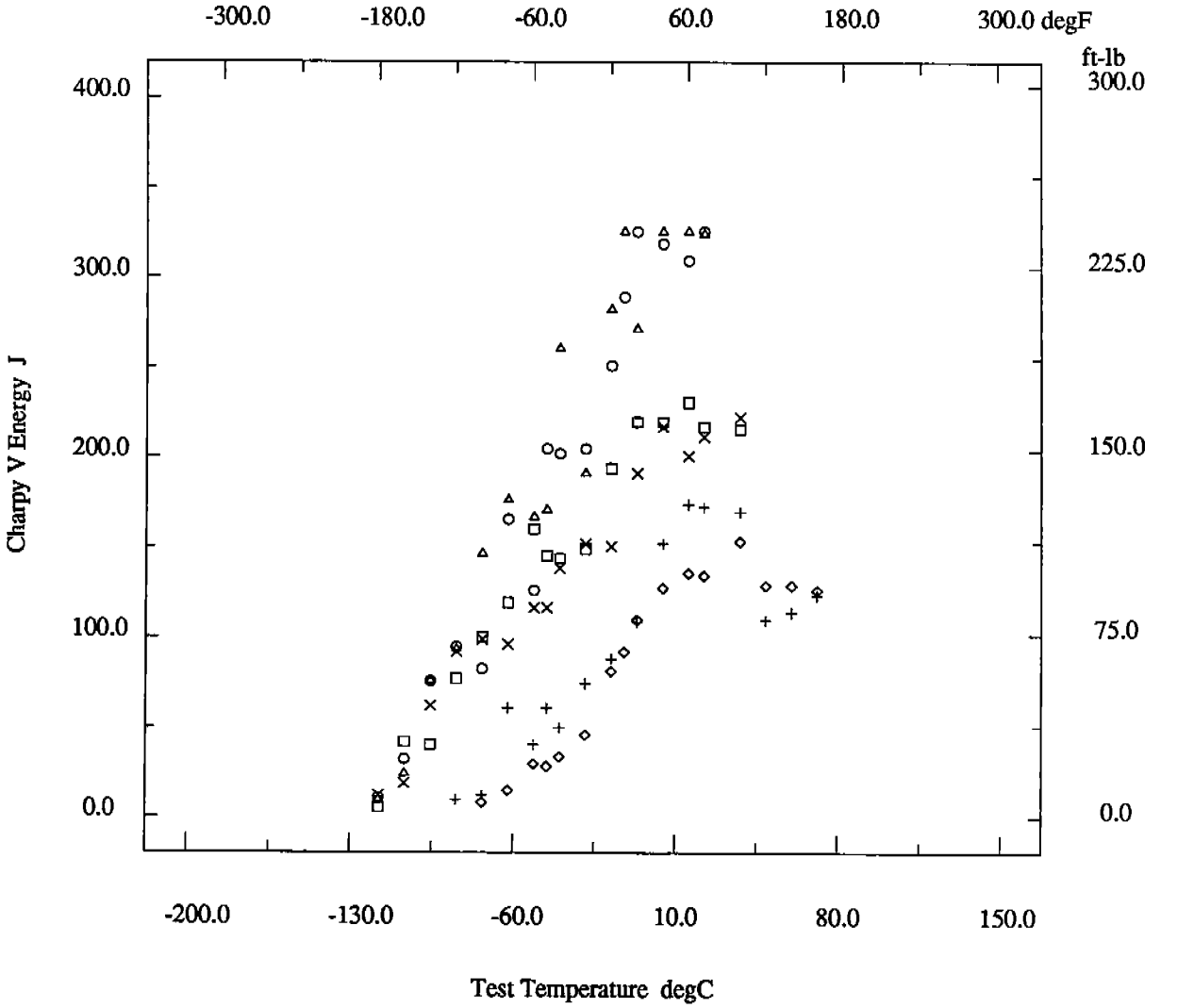
Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
S-T ◇	-80	11	13	12
S-T ◇	-60	22	24	26
S-T ◇	-50	21	25	31
S-T ◇	-40	25	28	28
S-T ◇	-20	34	36	38
S-T ◇	0	60	53	67
S-T ◇	10	68	53	60
S-T ◇	20	81	65	72
S-T ◇	40	94	69	90
S-T ◇	60	100	73	87
S-T ◇	72	99	74	100
S-T ◇	100	113	80	100
S-T ◇	120	95	71	100
S-T ◇	140	95	67	100
S-T ◇	160	93	73	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.009.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	*	Lot ID	B1908-5B
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.009.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	*	Lot ID	B1908-5B
Reference	3201		

Composition See Page 15800.1

Fabrication History See Page 15800.1

Property Measurements

Test Type	Dynamic Tear	Position	1/2T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

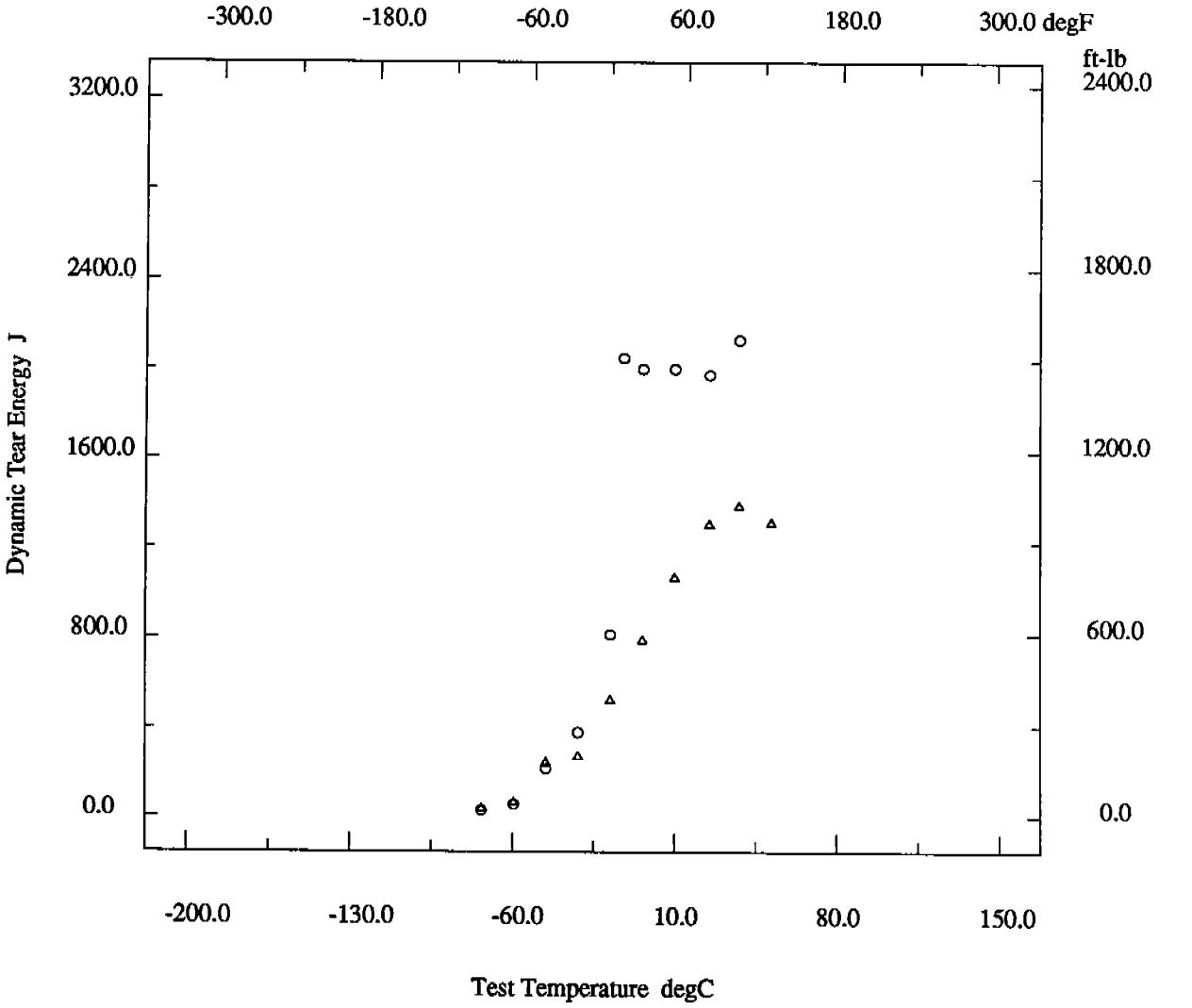
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
L o	-100	20	3
L o	-75	40	13
L o	-50	160	20
L o	-25	280	34
L o	0	600	51
L o	10	1510	86
L o	25	1475	84
L o	50	1475	100
L o	77	1455	100
L o	100	1570	100
T △	-100	25	7
T △	-75	45	17
T △	-50	180	26
T △	-25	200	29
T △	0	385	43
T △	25	580	58
T △	50	785	76
T △	77	960	100
T △	100	1020	100
T △	125	965	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.009.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	4 in	Composition Type	Actual
Composition Position	*	Lot ID	B1908-5B
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.010.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1.25 in	Composition Type	Actual
Composition Position	*	Lot ID	A1579-2AA
Reference	3201		

Composition

C	0.09 %	Mn	1.39 %
P	0.004 %	S	0.008 %
Si	0.25 %	Cr	0.14 %
Ni	0.13 %	Mo	0.07 %
V	*	Cu	0.12 %
Cb	*	Ti	*
B	*	Al	*
N	*	Other Components	None %

Fabrication History

Heat Treatment	N	Producer	Lukens
Year Produced	1978	Addl Info	None
Source	Lukens	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements

Test Type	Tensile	Position	1/2T
Specimen Type	Cylindrical	Specimen Thickness	0.252 in
Gage Length	1 in	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
L	80	80.7	58.3	59.7	31.1	80.6
L	80	80.7	*	58.5	32.2	80.6
T	80	79.8	61.8	69.2	30.2	75.8
T	80	79.9	61.5	68.9	30.5	76.2

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.010.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1.25 in	Composition Type	Actual
Composition Position	*	Lot ID	A1579-2AA
Reference	3201		

Composition See Page 15900.1

Fabrication History See Page 15900.1

Property Measurements

Test Type	Fracture Toughness	Position	1/2T
Specimen Type	Compact	Specimen Thickness	1 in
Crack Length	*	Loading Type	*
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	Per Standard
Curve Shape	*	Standard Method	E813
Standard Year	1987		

Orien	Test Temp degF	CODi in	CODIc in	JI in-lb/in2	Jmax in-lb/in2	Tear Mod in-lb/in**2
L-T	69	0.0275	0.0333	6037	4036	499.6
L-T	69	0.0298	0.0312	6697	3711	419.2
T-L	-80	0.0203	0.0204	3920	2680	207.8
T-L	69	0.0151	0.0182	2564	2080	224.5
T-L	69	0.0163	0.0225	2893	2639	233.2
T-L	73	0.0144	0.0234	2292	2483	256.3

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.010.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1.25 in	Composition Type	Actual
Composition Position	*	Lot ID	A1579-2AA
Reference	3201		

Composition See Page 15900.1

Fabrication History See Page 15900.1

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

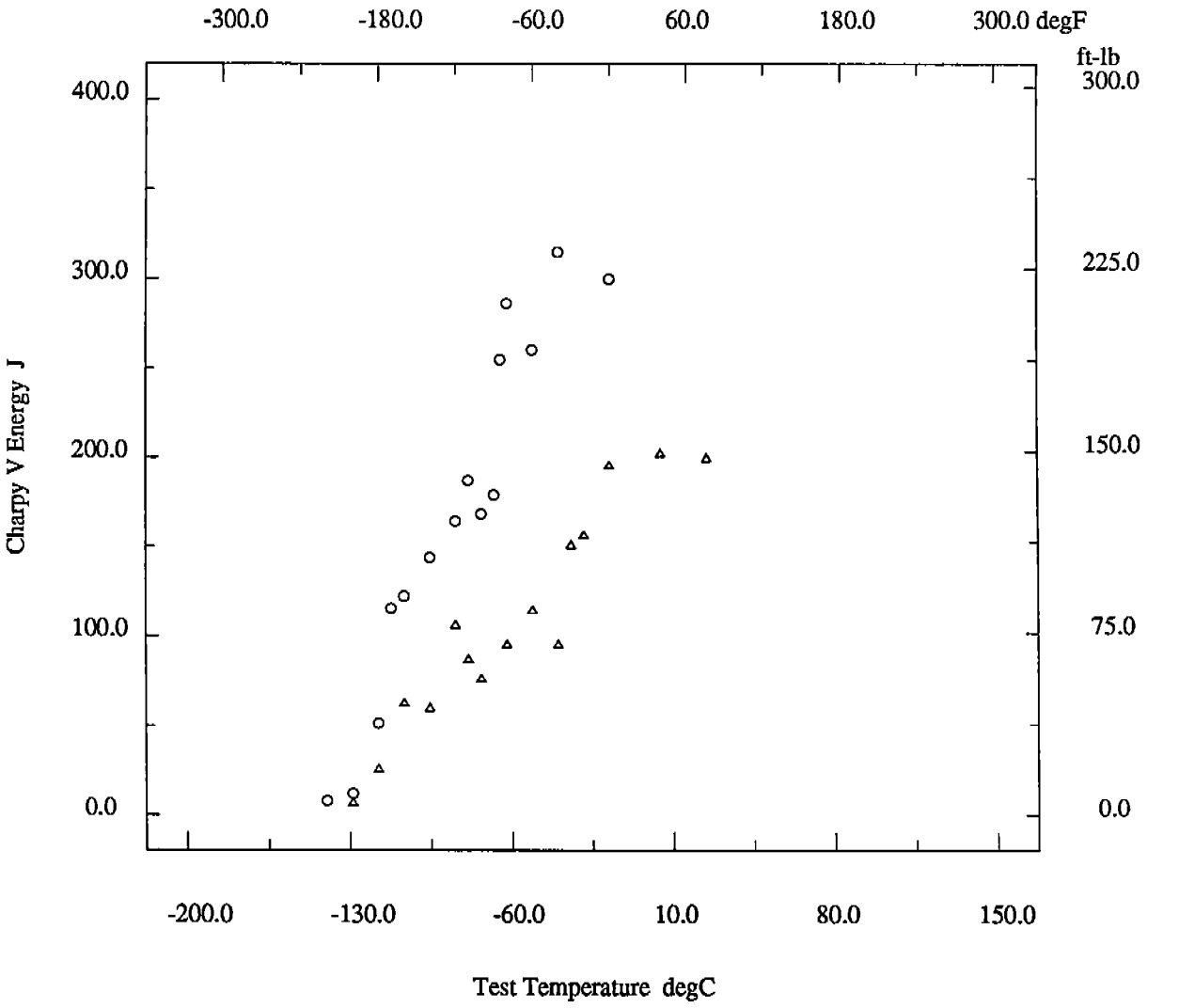
Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
L-T ○	-220	6	3	0
L-T ○	-200	9	6	0
L-T ○	-180	38	28	6
L-T ○	-170	85	68	19
L-T ○	-160	90	70	25
L-T ○	-140	106	81	31
L-T ○	-120	121	95	37
L-T ○	-110	138	104	56
L-T ○	-100	124	87	37
L-T ○	-90	132	89	55
L-T ○	-85	188	87	100
L-T ○	-80	211	79	100
L-T ○	-60	192	91	100
L-T ○	-40	232	93	100
L-T ○	0	221	87	100
T-L △	-200	5	3	0
T-L △	-180	19	11	3
T-L △	-160	46	35	6
T-L △	-140	44	35	11
T-L △	-120	78	61	30
T-L △	-110	64	53	23
T-L △	-100	56	45	23
T-L △	-80	70	55	36
T-L △	-60	84	63	50
T-L △	-40	70	54	50
T-L △	-30	111	83	74
T-L △	-20	115	84	78
T-L △	0	144	90	100
T-L △	40	149	84	100
T-L △	76	147	93	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.010.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1.25 in	Composition Type	Actual
Composition Position	*	Lot ID	A1579-2AA
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.010.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1.25 in	Composition Type	Actual
Composition Position	*	Lot ID	A1579-2AA
Reference	3201		

Composition See Page 15900.1

Fabrication History See Page 15900.1

Property Measurements

Test Type	Dynamic Tear	Position	1/2T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

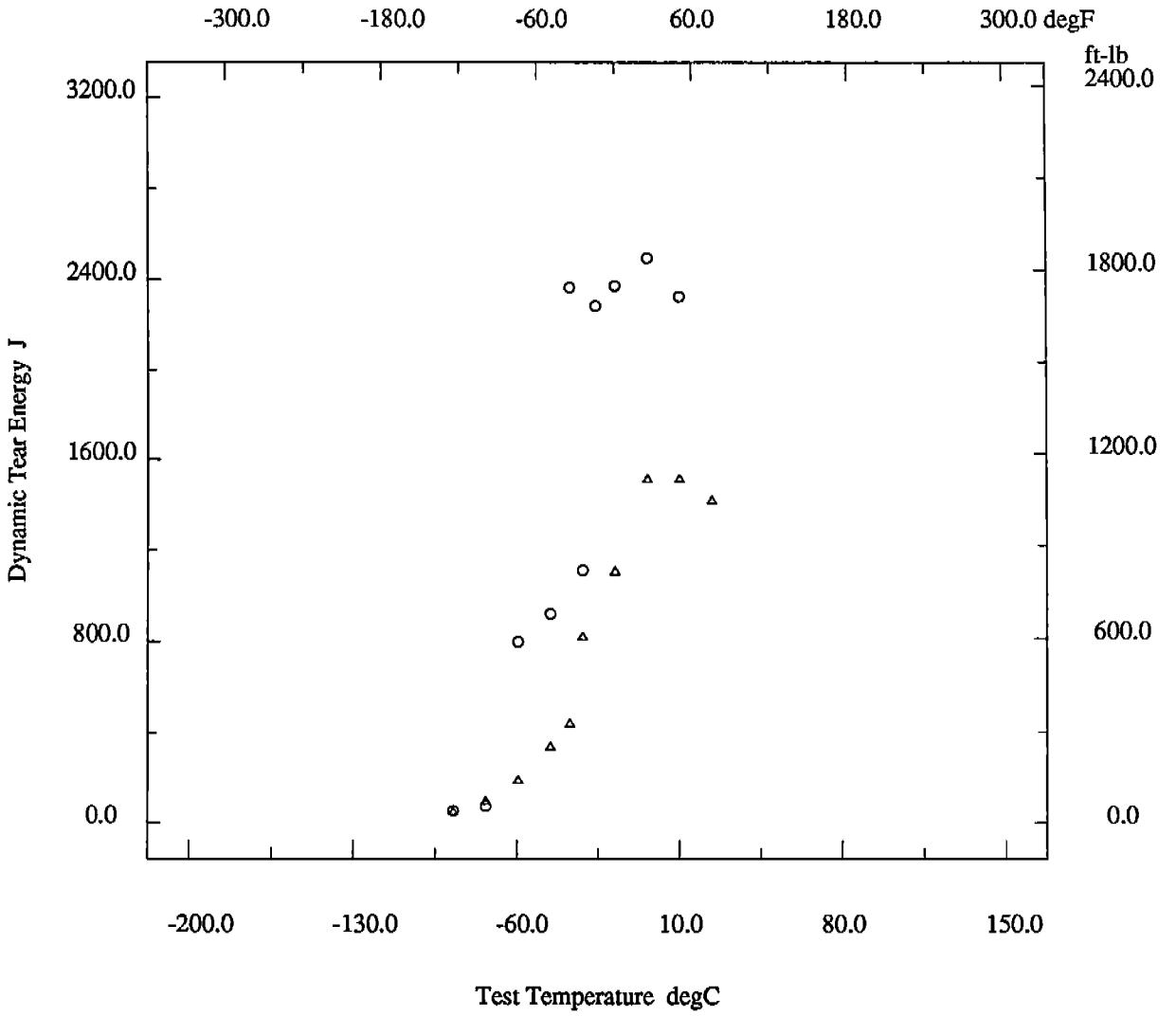
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
L-T o	-125	40	5
L-T o	-100	55	11
L-T o	-75	590	29
L-T o	-50	680	40
L-T o	-35	1745	100
L-T o	-25	820	54
L-T o	-15	1685	100
L-T o	0	1750	100
L-T o	25	1840	100
L-T o	50	1715	100
T-L △	-125	35	3
T-L △	-100	70	13
T-L △	-75	140	23
T-L △	-50	250	29
T-L △	-35	325	44
T-L △	-25	605	50
T-L △	0	815	73
T-L △	25	1115	100
T-L △	50	1115	100
T-L △	75	1045	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.010.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1.25 in	Composition Type	Actual
Composition Position	*	Lot ID	A1579-2AA
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.011.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	*	Lot ID	C5830
Reference	3201		

Composition

C	0.11 %	Mn	1.31 %
P	*	S	0.025 %
Si	*	Cr	*
Ni	*	Mo	*
V	*	Cu	*
Cb	0.031 %	Ti	*
B	*	Al	0.071 %
N	*	Other Components	None %

Fabrication History

Heat Treatment	N	Producer	Lukens
Year Produced	1976	Addl Info	None
Source	Lukens	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	1650 degF	Final Time	1 hr
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements

Test Type	Tensile	Position	1/2T
Specimen Type	Cylindrical	Specimen Thickness	0.252 in
Gage Length	1 in	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
L	Room	76.390	54.736	59.548	33.0	67.8
L	Room	76.490	54.535	59.849	33.0	67.3
L	Room	76.590	54.535	60.751	35.0	75.0
L	Room	76.891	54.900	61.051	33.9	75.0

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.011.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	*	Lot ID	C5830
Reference	3201		

Composition See Page 16000.1

Fabrication History See Page 16000.1

Property Measurements

Test Type	Charpy V Impact	Position	1/2T
Specimen Type	Full	Did Specimen Fracture?	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %	Split?
L-T ○	-220	3	2	0	*
L-T ○	-200	5	4	0	*
L-T ○	-180	14	12	0	*
L-T ○	-160	17	13	0	*
L-T ○	-140	16	12	0	*
L-T ○	-120	27	22	6	*
L-T ○	-100	37	31	17	*
L-T ○	-80	37	33	27	*
L-T ○	-70	63	54	38	*
L-T ○	-60	65	56	42	*
L-T ○	-50	61	53	47	Yes
L-T ○	-40	58	50	50	*
L-T ○	-30	70	60	55	*
L-T ○	-20	75	63	60	Yes
L-T ○	-10	74	61	62	Yes
L-T ○	0	94	77	100	Yes
L-T ○	20	104	79	100	Yes
L-T ○	40	99	81	100	*
L-T ○	60	102	79	100	*
L-T ○	77	105	78	100	*
T-L △	-220	3	2	0	*
T-L △	-200	6	3	0	*
T-L △	-180	3	2	0	*
T-L △	-160	12	9	0	*
T-L △	-140	13	10	0	*
T-L △	-120	15	12	6	*
T-L △	-110	15	14	11	*
T-L △	-100	24	25	21	Yes
T-L △	-80	25	26	27	*
T-L △	-60	26	29	36	*
T-L △	-50	30	31	42	Yes
T-L △	-40	31	34	55	Yes
T-L △	-30	43	42	62	Yes
T-L △	-20	44	44	77	Yes
T-L △	-10	47	46	79	Yes

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

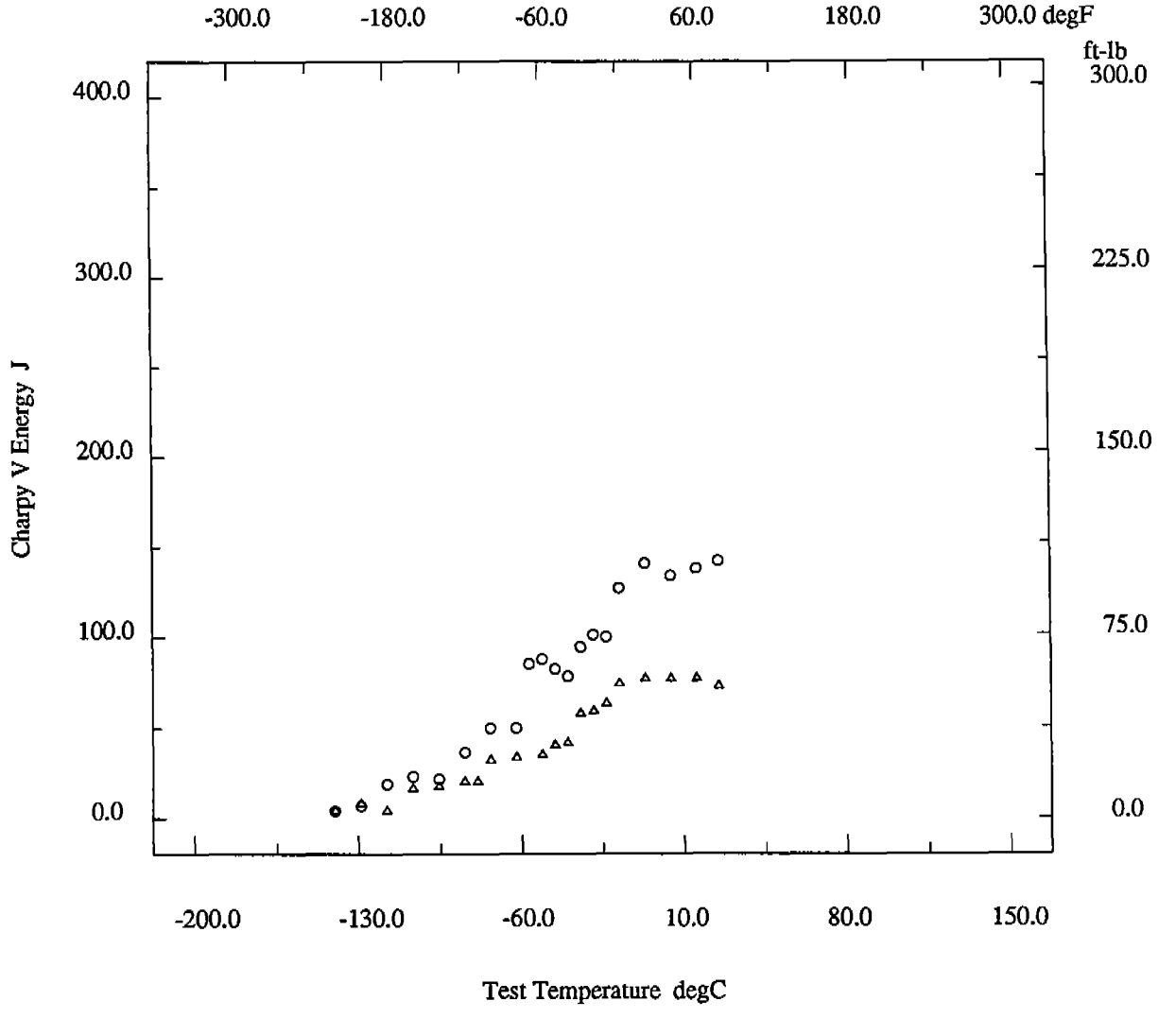
Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %	Split?
T-L ▵	0	55	53	95	Yes
T-L ▵	20	57	54	100	Yes
T-L ▵	40	57	56	100	*
T-L ▵	60	57	56	100	*
T-L ▵	77	54	56	100	*

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.011.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	*	Lot ID	C5830
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.011.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	*	Lot ID	C5830
Reference	3201		

Composition See Page 16000.1

Fabrication History See Page 16000.1

Property Measurements

Test Type	Dynamic Tear	Position	1/2T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

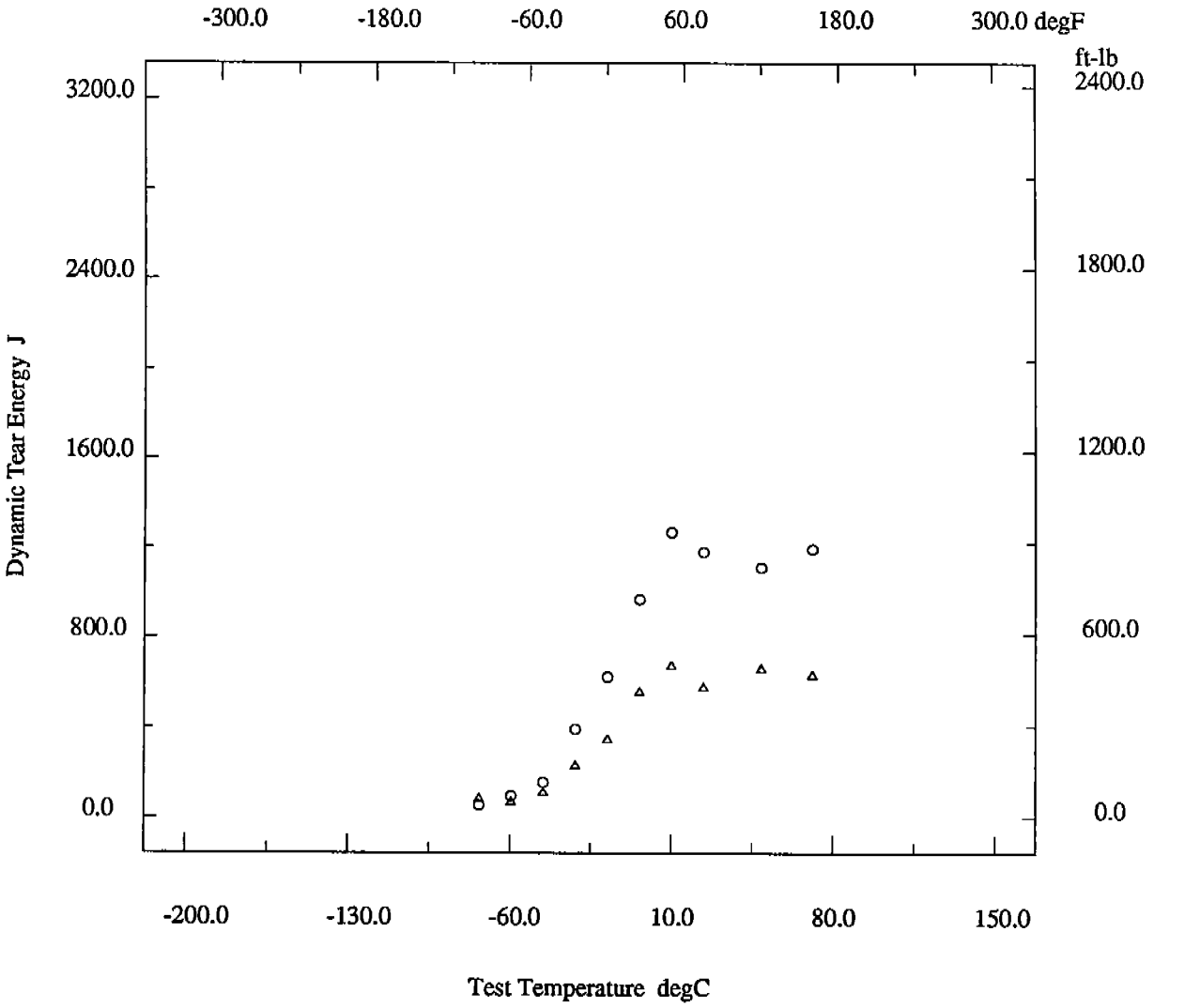
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
L-T ○	-100	40	7
L-T ○	-75	70	20
L-T ○	-50	115	23
L-T ○	-25	290	46
L-T ○	0	460	60
L-T ○	25	715	80
L-T ○	50	935	97
L-T ○	75	870	100
L-T ○	120	820	100
L-T ○	160	880	100
T-L △	-100	60	6
T-L △	-75	50	17
T-L △	-50	80	23
T-L △	-25	170	47
T-L △	0	255	63
T-L △	25	410	91
T-L △	50	495	100
T-L △	75	425	100
T-L △	120	485	100
T-L △	160	465	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.011.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	0.75 in	Composition Type	Actual
Composition Position	*	Lot ID	C5830
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.012.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	7 in	Composition Type	Actual
Composition Position	*	Lot ID	A6175-8
Reference	3201		

Composition

C	0.15 %	Mn	1.37 %
P	*	S	0.018 %
Si	*	Cr	*
Ni	*	Mo	*
V	*	Cu	*
Cb	0.023 %	Ti	*
B	*	Al	0.032 %
N	*	Other Components	None %

Fabrication History

Heat Treatment	N	Producer	Lukens
Year Produced	1977	Addl Info	None
Source	Lukens	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements

Test Type	Tensile	Specimen Type	Cylindrical
Specimen Thickness	0.252 in	Gage Length	1 in
Loading Rate	*	Tensile Strength Offset	*
Uniform Elongation	*	Tensile Modulus	*
Standard Method	*	Standard Year	*

Position	Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
0/4T	L	80	74.3	48.0	52.7	33.7	76.6
0/4T	L	80	74.3	48.2	53.8	33.0	76.9
1/2T	L	80	72.2	43.6	48.3	32.5	69.1
1/2T	L	80	72.3	43.6	48.3	30.5	65.5
1/4T	L	80	73.7	44.3	49.1	33.8	76.2
1/4T	L	80	73.8	44.5	49.4	33.5	76.4
0/4T	T	80	74.1	47.9	51.4	32.2	72.1
0/4T	T	80	74.5	47.5	49.2	32.8	72.1
1/2T	T	80	71.7	43.0	46.8	32.2	70.9
1/2T	T	80	72.1	43.4	48.2	33.0	71.7
1/4T	T	80	74.1	45.0	48.2	31.2	68.2
1/4T	T	80	74.4	44.9	47.1	32.5	72.6

* - not reported



Material BS4360 Gr50D

Description

Material Code	010.012.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	7 in	Composition Type	Actual
Composition Position	*	Lot ID	A6175-8
Reference	3201		

Composition See Page 16100.1

Fabrication History See Page 16100.1

Property Measurements

Test Type	Fracture Toughness	Position	*
Specimen Type	Compact	Specimen Thickness	1 in
Crack Length	*	Loading Type	*
Loading Rate	*	KQ	*
KIc	*	Valid KIc?	*
Reason for Invalid	*	JIc	*
KJc	*	JIcpr	Per Standard
Curve Shape	*	Standard Method	E813
Standard Year	1987		

Orien	Test Temp degF	CODi in	CODIc in	JI in-lb/in2	Jmax in-lb/in2	Tear Mod in-lb/in**2
L-T	200	0.0115	0.0143	3108	1764	298.4
L-T	200	0.0139	0.0133	3285	1642	277.0
T-L	80	0.0080	0.0071	1421	848	165.2
T-L	200	0.0075	0.0081	1152	933	137.9
T-L	200	0.0077	0.0075	1275	858	168.5
S-L	200	0.0037	0.0045	620	497	126.6
S-L	200	0.0056	0.0050	920	565	129.8

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.012.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	7 in	Composition Type	Actual
Composition Position	*	Lot ID	A6175-8
Reference	3201		

Composition See Page 16100.1

Fabrication History See Page 16100.1

Property Measurements

Test Type	Charpy V Impact	Specimen Type	Full
Did Specimen Fracture?	*	Did Specimen Split?	*
Standard Method	*	Standard Year	*

Position	Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
0/4T	L-T °	-180	6	6	0
1/2T	L-T °	-180	4	2	0
0/4T	L-T °	-160	2	2	0
1/2T	L-T °	-160	8	5	0
1/4T	L-T °	-160	4	4	*
0/4T	L-T °	-140	15	11	0
1/2T	L-T °	-140	17	15	3
1/4T	L-T °	-140	5	2	*
0/4T	L-T °	-120	37	29	10
1/2T	L-T °	-120	27	23	6
1/4T	L-T °	-120	16	13	*
0/4T	L-T °	-110	17	13	6
0/4T	L-T °	-100	24	20	11
1/2T	L-T °	-100	49	41	12
1/4T	L-T °	-100	27	21	*
0/4T	L-T °	-90	36	29	12
1/2T	L-T °	-90	30	26	10
1/4T	L-T °	-90	12	12	*
1/4T	L-T °	-90	78	65	*
0/4T	L-T °	-80	71	58	19
1/2T	L-T °	-80	42	35	17
1/4T	L-T °	-80	70	60	*
1/4T	L-T °	-75	78	65	*
0/4T	L-T °	-70	53	45	23
1/2T	L-T °	-70	77	63	25
1/4T	L-T °	-70	79	69	*
0/4T	L-T °	-60	51	44	27
1/2T	L-T °	-60	79	66	25
1/4T	L-T °	-60	90	75	*
0/4T	L-T °	-50	83	67	38
1/2T	L-T °	-50	63	53	23
1/4T	L-T °	-50	62	51	*
1/4T	L-T °	-50	79	67	*
1/2T	L-T °	-45	64	55	23
0/4T	L-T °	-40	116	87	49

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

Position	Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
1/2T	L-T ○	-40	107	85	41
1/2T	L-T ○	-40	30	34	29
1/4T	L-T ○	-40	93	73	*
0/4T	L-T ○	-30	105	84	55
1/2T	L-T ○	-30	110	83	44
0/4T	L-T ○	-20	117	88	66
1/2T	L-T ○	-20	105	82	49
1/4T	L-T ○	-20	104	76	*
1/4T	L-T ○	-10	117	92	*
0/4T	L-T ○	0	114	85	57
1/2T	L-T ○	0	123	84	66
1/4T	L-T ○	0	125	84	*
0/4T	L-T ○	20	123	85	67
1/2T	L-T ○	20	149	90	85
1/4T	L-T ○	20	156	97	*
0/4T	L-T ○	30	141	89	100
0/4T	L-T ○	40	146	94	100
1/2T	L-T ○	40	173	84	100
1/4T	L-T ○	40	153	94	*
0/4T	L-T ○	60	141	92	100
1/2T	L-T ○	60	157	77	100
1/4T	L-T ○	60	178	84	*
0/4T	L-T ○	77	141	97	100
1/2T	L-T ○	77	167	93	100
1/4T	L-T ○	77	156	97	*
0/4T	T-L △	-180	6	2	0
0/4T	T-L △	-160	9	5	0
1/2T	T-L △	-160	7	3	0
1/4T	T-L △	-160	7	3	0
0/4T	T-L △	-140	19	13	3
1/2T	T-L △	-140	10	5	0
1/4T	T-L △	-140	12	8	0
0/4T	T-L △	-120	12	9	3
1/2T	T-L △	-120	14	11	3
1/4T	T-L △	-120	8	5	0
0/4T	T-L △	-100	14	16	11
1/2T	T-L △	-100	14	14	5
1/4T	T-L △	-100	17	14	5
0/4T	T-L △	-90	28	25	17
1/2T	T-L △	-90	21	19	11
0/4T	T-L △	-80	33	30	21
1/2T	T-L △	-80	36	32	17
1/4T	T-L △	-80	24	25	12
0/4T	T-L △	-70	34	30	27
1/2T	T-L △	-70	37	35	19
0/4T	T-L △	-60	29	30	33
1/2T	T-L △	-60	32	34	21

(continued)

* - not reported

Material BS4360 Gr50D

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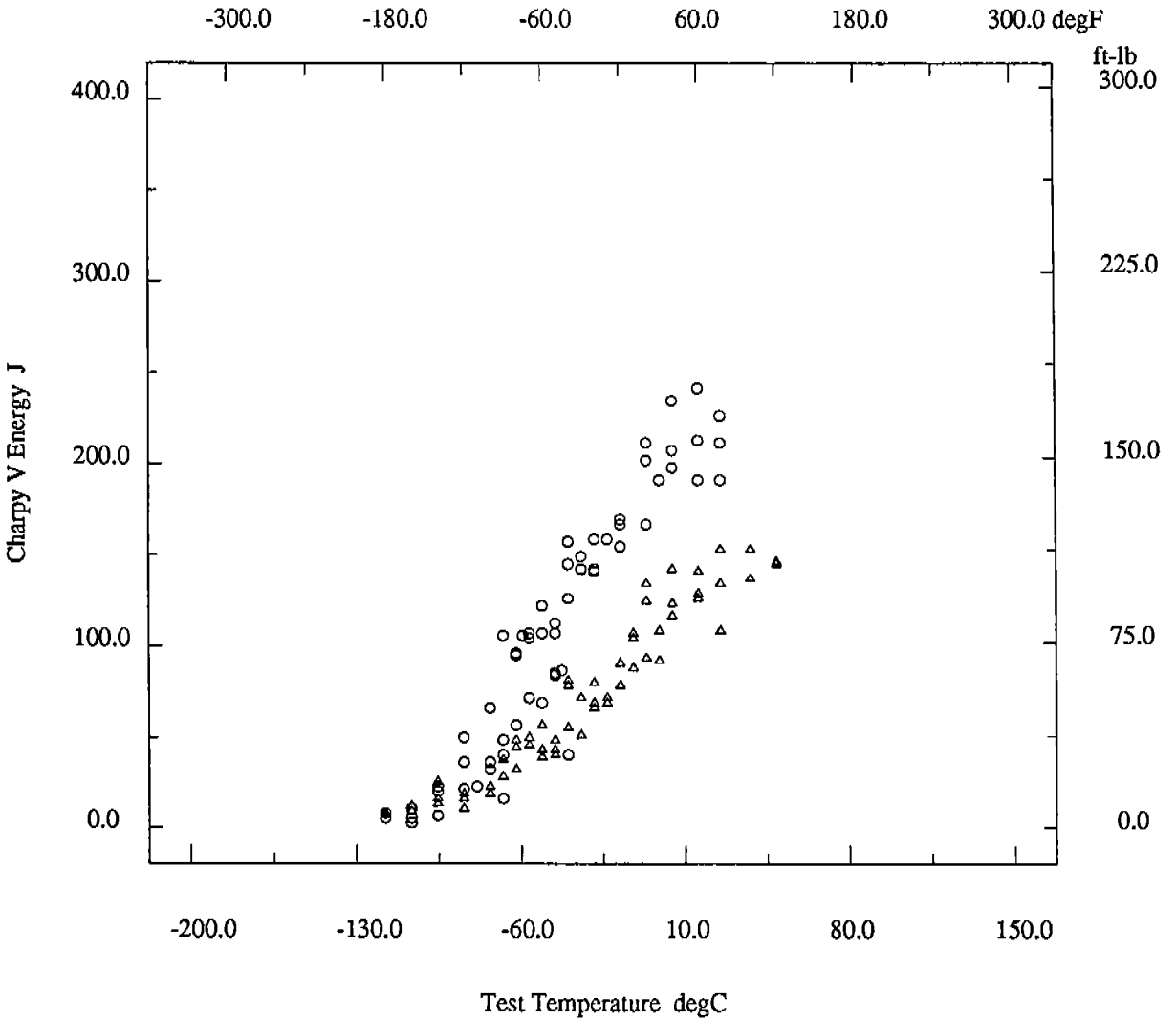
Position	Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
1/4T	T-L Δ	-60	42	38	21
0/4T	T-L Δ	-50	36	35	40
1/2T	T-L Δ	-50	32	32	27
1/4T	T-L Δ	-50	30	32	27
0/4T	T-L Δ	-40	41	38	42
1/2T	T-L Δ	-40	60	53	29
1/4T	T-L Δ	-40	58	49	27
1/2T	T-L Δ	-30	53	48	42
1/4T	T-L Δ	-30	38	36	27
0/4T	T-L Δ	-20	49	45	45
1/2T	T-L Δ	-20	59	51	42
1/4T	T-L Δ	-20	51	46	42
0/4T	T-L Δ	-10	51	47	40
1/4T	T-L Δ	-10	53	49	42
0/4T	T-L Δ	0	67	58	77
1/2T	T-L Δ	0	67	58	50
1/4T	T-L Δ	0	58	51	40
0/4T	T-L Δ	10	77	66	74
1/2T	T-L Δ	10	79	66	55
1/4T	T-L Δ	10	65	55	45
0/4T	T-L Δ	20	69	64	81
1/2T	T-L Δ	20	92	72	74
1/4T	T-L Δ	20	99	76	75
0/4T	T-L Δ	30	68	59	78
1/4T	T-L Δ	30	80	66	65
0/4T	T-L Δ	40	86	74	100
1/2T	T-L Δ	40	105	80	82
1/4T	T-L Δ	40	91	69	78
0/4T	T-L Δ	60	95	81	100
1/2T	T-L Δ	60	104	77	83
1/4T	T-L Δ	60	93	76	79
0/4T	T-L Δ	77	80	72	100
1/2T	T-L Δ	77	113	83	100
1/4T	T-L Δ	77	99	80	100
1/2T	T-L Δ	100	113	81	100
1/4T	T-L Δ	100	101	81	100
1/2T	T-L Δ	120	107	80	100
1/4T	T-L Δ	120	108	82	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.012.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	7 in	Composition Type	Actual
Composition Position	*	Lot ID	A6175-8
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.012.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	7 in	Composition Type	Actual
Composition Position	*	Lot ID	A6175-8
Reference	3201		

Composition See Page 16100.1

Fabrication History See Page 16100.1

Property Measurements

Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

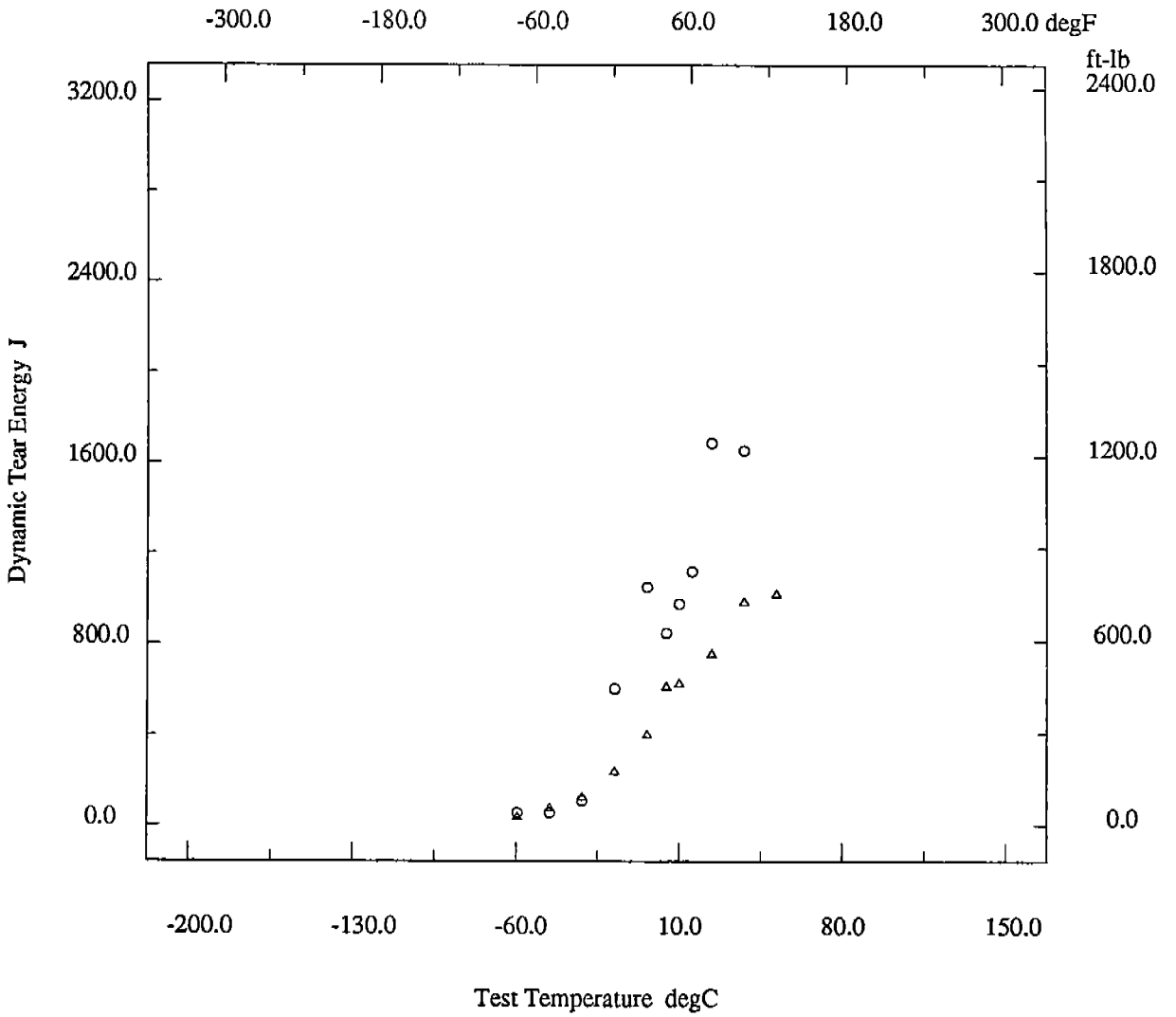
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
L-T ○	-75	40	7
L-T ○	-50	40	11
L-T ○	-25	80	21
L-T ○	0	445	41
L-T ○	25	775	58
L-T ○	40	625	43
L-T ○	50	720	65
L-T ○	60	825	69
L-T ○	75	1245	100
L-T ○	100	1220	100
T-L △	-75	25	7
T-L △	-50	55	16
T-L △	-25	90	21
T-L △	0	175	29
T-L △	25	295	43
T-L △	40	450	53
T-L △	50	460	61
T-L △	75	555	74
T-L △	100	725	100
T-L △	125	750	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.012.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	7 in	Composition Type	Actual
Composition Position	*	Lot ID	A6175-8
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.013.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 1/8 in	Composition Type	Actual
Composition Position	*	Lot ID	B0469-2C
Reference	3201		

Composition

C	0.19 %	Mn	1.32 %
P	*	S	0.005 %
Si	*	Cr	*
Ni	*	Mo	*
V	*	Cu	*
Cb	0.028 %	Ti	*
B	*	Al	*
N	*	Other Components	None %

Fabrication History

Heat Treatment	N	Producer	Lukens
Year Produced	1976	Addl Info	None
Source	Lukens	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	1650 degF	Final Time	1 hr
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements

Test Type	Tensile	Position	1/4T
Specimen Type	Cylindrical	Specimen Thickness	0.252 in
Gage Length	1 in	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
L	80	79.4	54.7	58.0	33.1	76.6
L	80	80.0	54.6	59.3	32.4	76.0
T	80	79.6	54.8	59.3	32.2	72.4
T	80	80.7	55.9	60.7	34.9	74.6

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.013.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 1/8 in	Composition Type	Actual
Composition Position	*	Lot ID	B0469-2C
Reference	3201		

Composition See Page 16200.1

Fabrication History See Page 16200.1

Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Did Specimen Fracture?	*
Did Specimen Split?	*	Standard Method	*
Standard Year	*		

Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
L-T ○	-180	7	5	0
L-T ○	-160	9	5	0
L-T ○	-140	9	7	0
L-T ○	-130	17	13	0
L-T ○	-120	40	34	6
L-T ○	-110	57	46	12
L-T ○	-100	74	61	23
L-T ○	-90	76	62	25
L-T ○	-80	66	54	23
L-T ○	-60	86	71	35
L-T ○	-50	97	75	44
L-T ○	-40	97	74	49
L-T ○	-30	120	87	60
L-T ○	-20	114	87	60
L-T ○	-10	117	86	70
L-T ○	-5	124	85	68
L-T ○	0	158	97	100
L-T ○	20	158	97	100
L-T ○	40	167	95	100
L-T ○	60	170	94	100
T-L △	-180	5	2	0
T-L △	-160	11	9	0
T-L △	-140	7	5	0
T-L △	-130	30	26	6
T-L △	-120	35	29	6
T-L △	-100	41	34	11
T-L △	-80	55	46	23
T-L △	-70	32	30	17
T-L △	-60	47	42	27
T-L △	-50	79	66	41
T-L △	-40	70	59	38
T-L △	-20	75	64	42
T-L △	-10	74	63	45
T-L △	0	86	72	60

(continued)

* - not reported

Material BS4360 Gr50D

(continued)

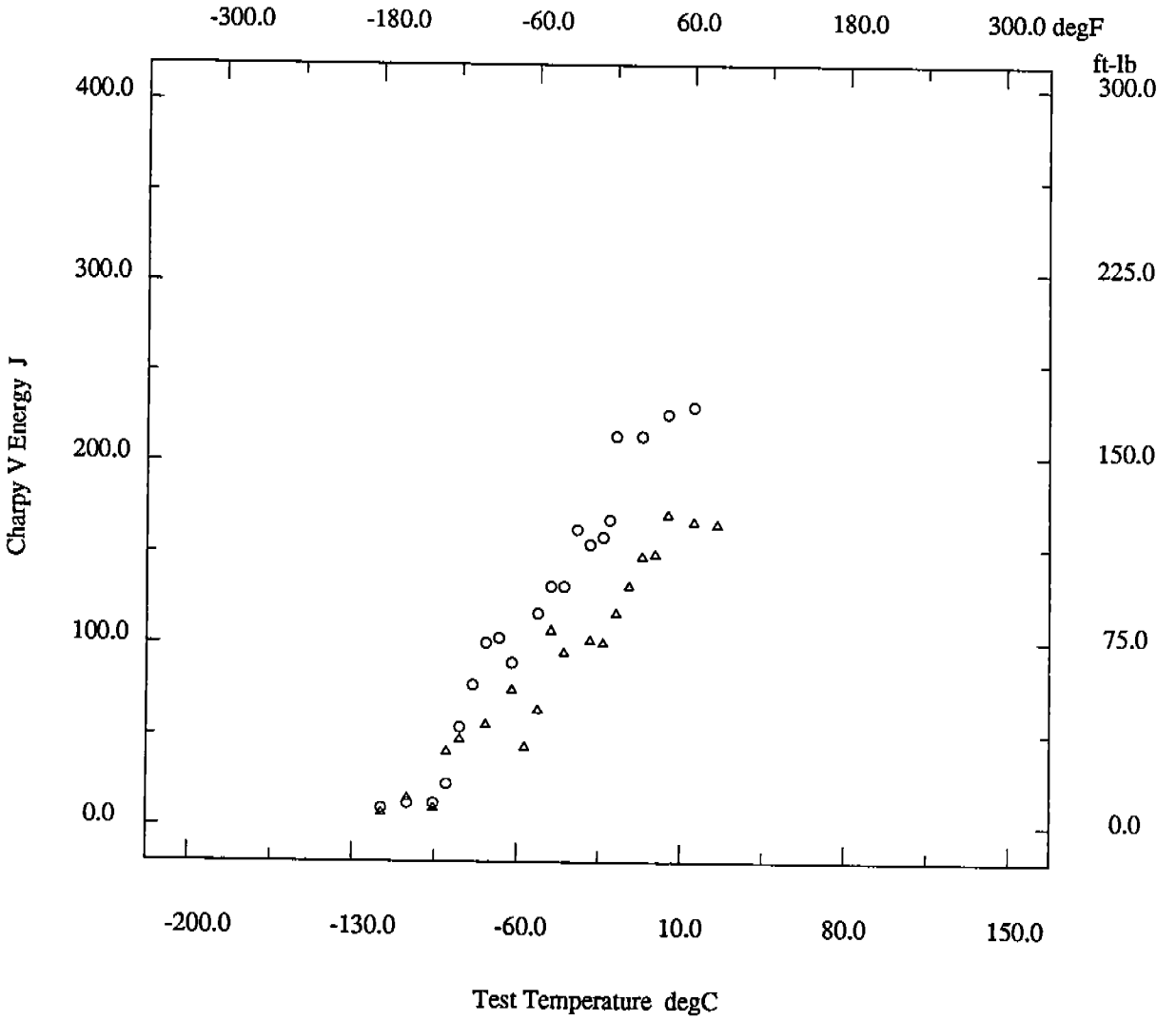
Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %
T-L ^	10	97	78	62
T-L ^	20	109	85	80
T-L ^	30	110	86	80
T-L ^	40	126	91	100
T-L ^	60	123	88	100
T-L ^	78	122	91	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.013.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 1/8 in	Composition Type	Actual
Composition Position	*	Lot ID	B0469-2C
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.013.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 1/8 in	Composition Type	Actual
Composition Position	*	Lot ID	B0469-2C
Reference	3201		

Composition See Page 16200.1

Fabrication History See Page 16200.1

Property Measurements

Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

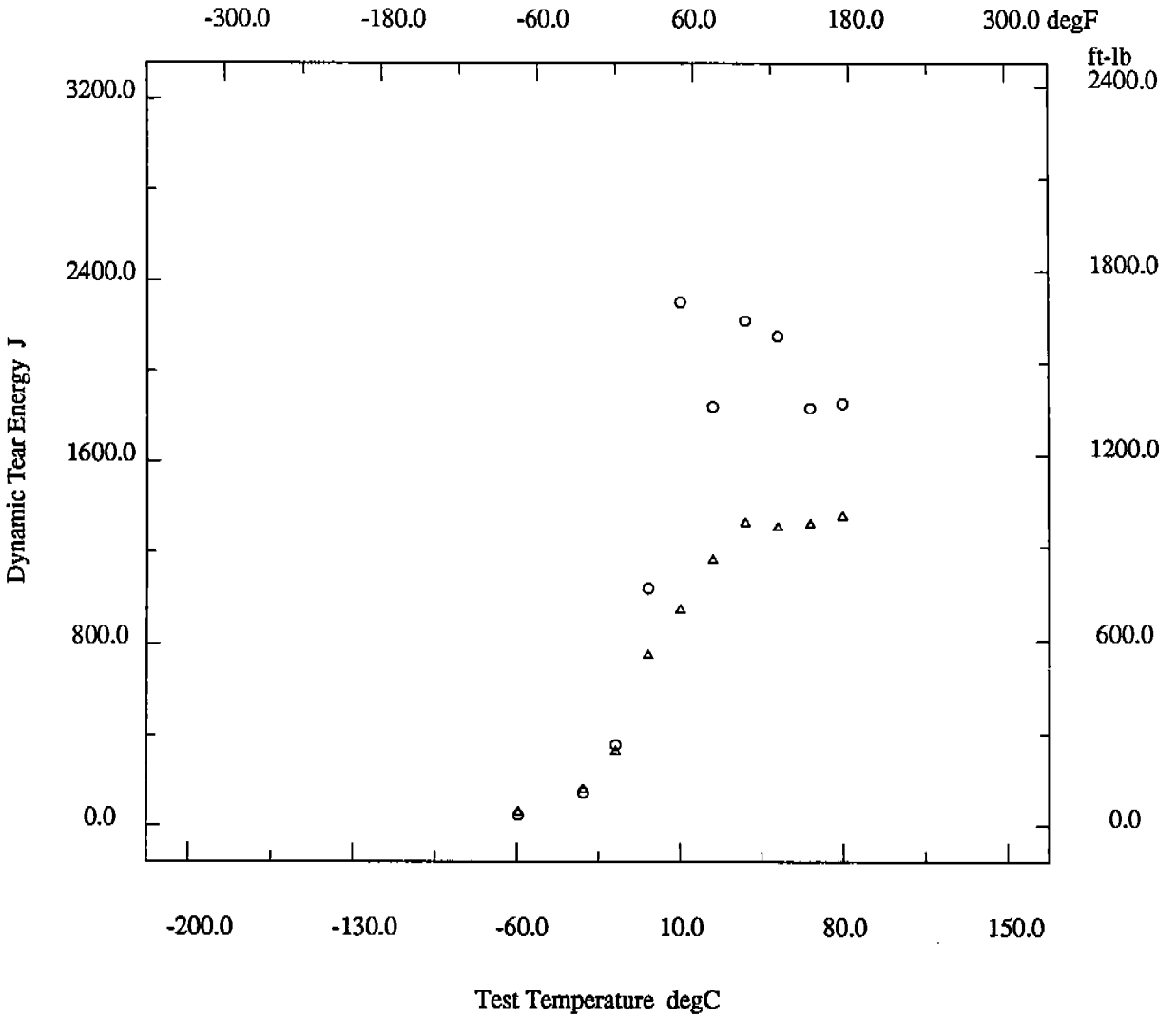
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
L-T ○	-75	35	5
L-T ○	-25	110	25
L-T ○	0	265	35
L-T ○	25	770	52
L-T ○	50	1700	100
L-T ○	75	1360	100
L-T ○	100	1640	100
L-T ○	125	1590	100
L-T ○	150	1355	100
L-T ○	175	1370	100
T-L △	-75	45	8
T-L △	-25	120	17
T-L △	0	245	32
T-L △	25	555	46
T-L △	50	700	71
T-L △	75	860	88
T-L △	100	980	100
T-L △	125	965	100
T-L △	150	975	100
T-L △	175	1000	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.013.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 1/8 in	Composition Type	Actual
Composition Position	*	Lot ID	B0469-2C
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.014.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 in	Composition Type	Actual
Composition Position	*	Lot ID	A6670-3B
Reference	3201		

Composition

C	0.13 %	Mn	1.34 %
P	*	S	0.012 %
Si	*	Cr	*
Ni	*	Mo	*
V	*	Cu	*
Cb	0.03 %	Ti	0.015 %
B	*	Al	*
N	*	Other Components	None %

Fabrication History

Heat Treatment	N	Producer	Lukens
Year Produced	1979	Addl Info	None
Source	Lukens	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	N
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements

Test Type	Tensile	Position	1/4T
Specimen Type	Cylindrical	Specimen Thickness	0.252 in
Gage Length	1 in	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
L	80	77.5	54.4	59.5	34.6	75.8
L	80	77.6	55.0	59.5	31.8	75.0
T	80	76.7	54.5	59.3	31.0	66.4
T	80	77.2	55.3	59.2	30.8	67.3

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.014.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 in	Composition Type	Actual
Composition Position	*	Lot ID	A6670-3B
Reference	3201		

Composition See Page 16300.1

Fabrication History See Page 16300.1

Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Did Specimen Fracture?	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %	Split?
L-T ○	-140	6	3	3	*
L-T ○	-120	17	15	6	*
L-T ○	-100	26	24	14	*
L-T ○	-80	35	32	19	*
L-T ○	-60	49	45	27	*
L-T ○	-50	56	50	31	*
L-T ○	-50	75	63	36	*
L-T ○	-40	67	58	44	*
L-T ○	-40	73	63	42	*
L-T ○	-30	65	56	42	*
L-T ○	-20	73	61	45	*
L-T ○	-10	80	68	56	*
L-T ○	0	104	82	77	Yes
L-T ○	0	116	86	100	Yes
L-T ○	10	108	84	80	Yes
L-T ○	20	114	83	76	*
L-T ○	40	118	89	100	Yes
L-T ○	60	117	95	100	Yes
L-T ○	74	118	90	100	Yes
L-T ○	74	126	91	100	*
T-L △	-140	3	2	0	*
T-L △	-120	11	10	10	*
T-L △	-100	9	10	10	*
T-L △	-90	18	18	15	*
T-L △	-80	23	24	19	*
T-L △	-60	27	28	21	*
T-L △	-50	27	29	27	*
T-L △	-40	29	34	30	*
T-L △	-30	30	32	35	*
T-L △	-20	35	38	35	*
T-L △	-10	43	43	55	Yes
T-L △	0	44	44	54	Yes
T-L △	0	49	50	60	*
T-L △	10	43	46	61	*
T-L △	20	59	58	85	*

(continued)

* - not reported

Material BS4360 Gr50D

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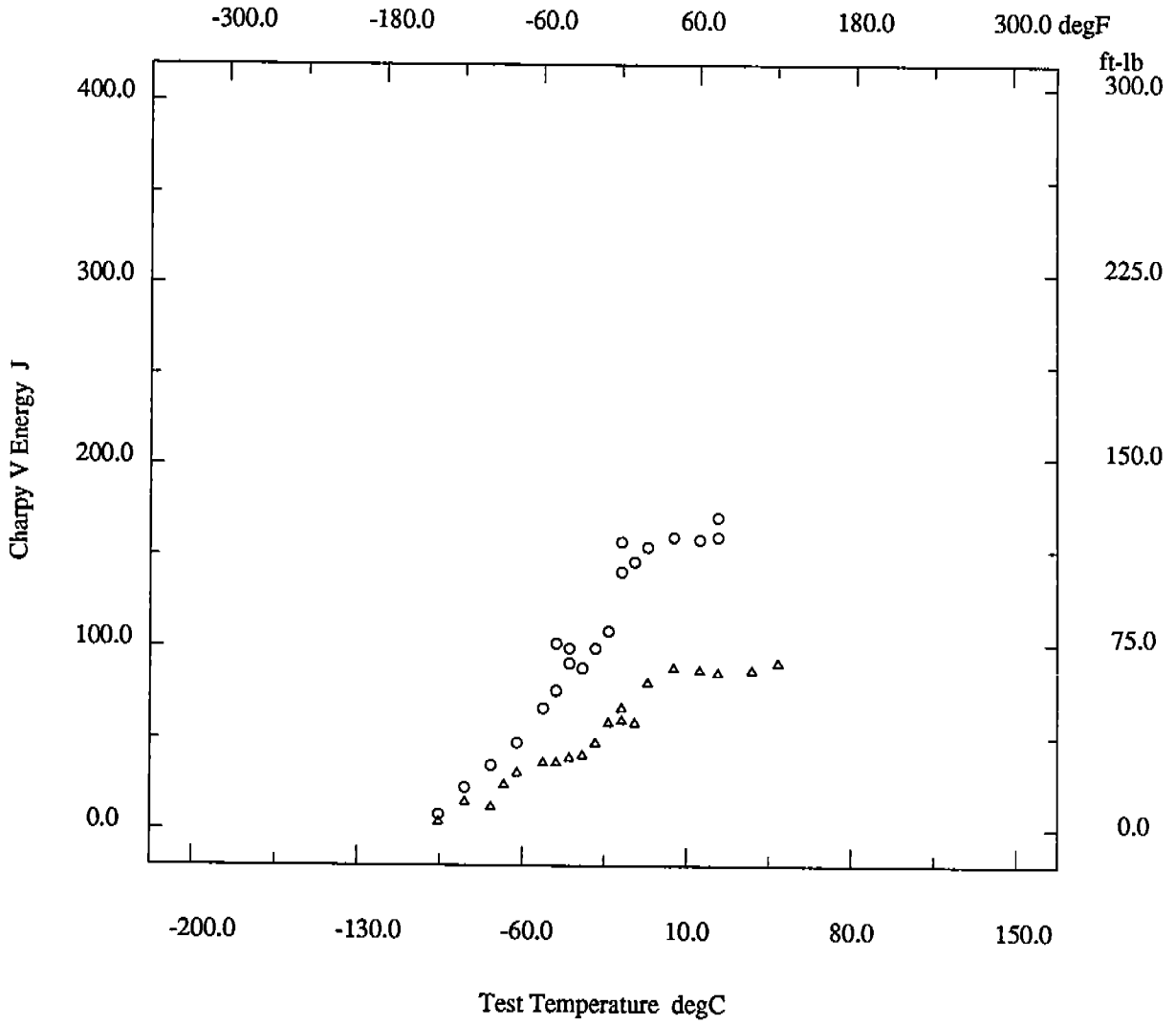
Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %	Split?
T-L △	40	65	63	94	*
T-L △	60	64	62	100	Yes
T-L △	74	63	63	100	*
T-L △	100	64	65	100	Yes
T-L △	120	67	65	100	Yes

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.014.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 in	Composition Type	Actual
Composition Position	*	Lot ID	A6670-3B
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.014.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 in	Composition Type	Actual
Composition Position	*	Lot ID	A6670-3B
Reference	3201		

Composition See Page 16300.1

Fabrication History See Page 16300.1

Property Measurements

Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

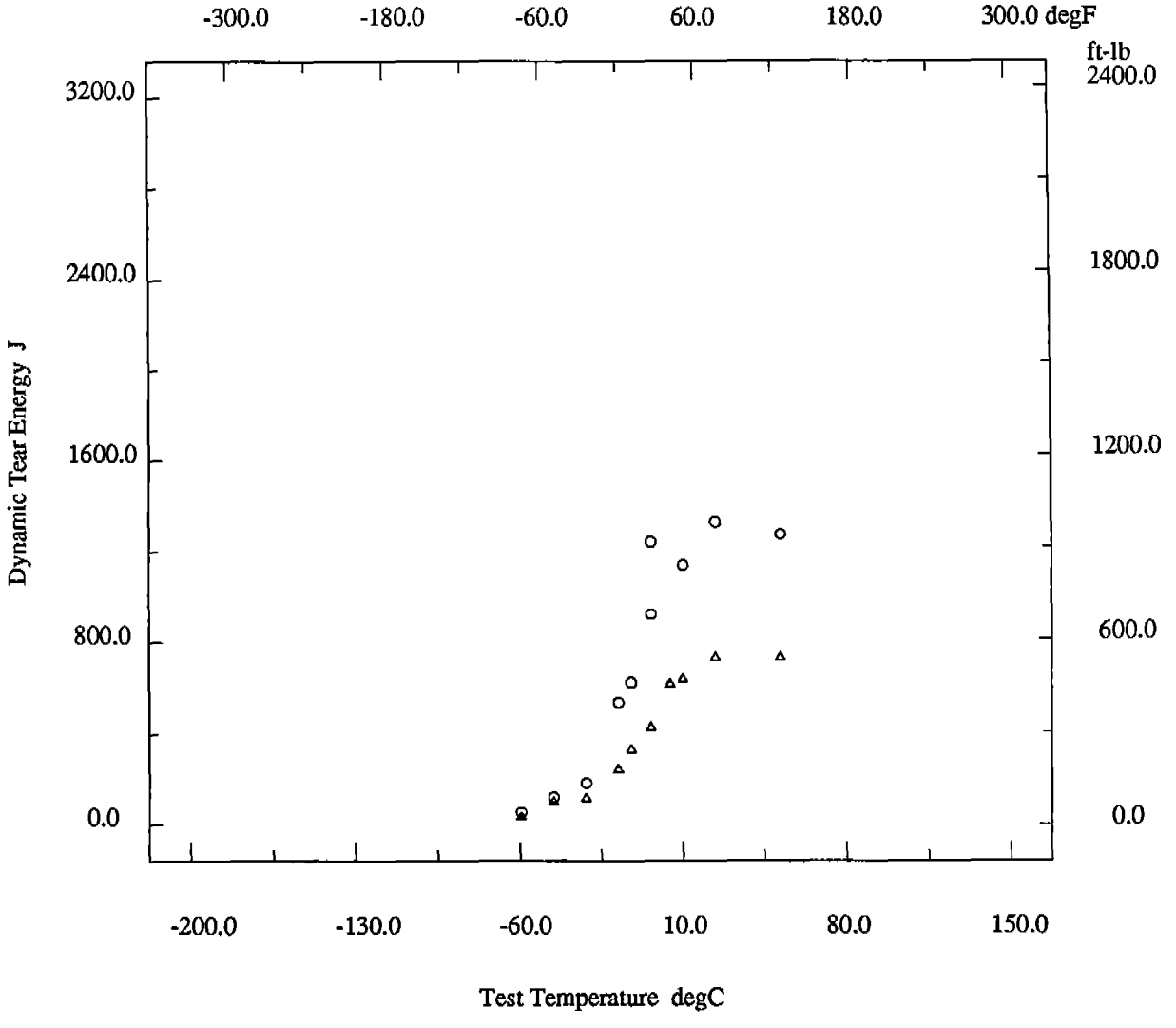
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
L-T ○	-75	40	12
L-T ○	-50	90	18
L-T ○	-25	135	24
L-T ○	0	395	41
L-T ○	10	460	47
L-T ○	25	680	68
L-T ○	25	915	83
L-T ○	50	840	87
L-T ○	75	980	99
L-T ○	125	940	100
T-L △	-75	25	10
T-L △	-50	75	17
T-L △	-25	85	26
T-L △	0	180	43
T-L △	10	245	48
T-L △	25	315	62
T-L △	40	455	77
T-L △	50	470	83
T-L △	75	540	99
T-L △	125	540	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.014.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 in	Composition Type	Actual
Composition Position	*	Lot ID	A6670-3B
Reference	3201		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.015.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 in	Composition Type	Actual
Composition Position	*	Lot ID	A6670-3A
Reference	3202		

Composition

C	0.13 %	Mn	1.34 %
P	*	S	0.012 %
Si	*	Cr	*
Ni	*	Mo	*
V	*	Cu	*
Cb	0.03 %	Ti	0.015 %
B	*	Al	0.037 %
N	*	Other Components	None %

Fabrication History

Heat Treatment	Q,T	Producer	Lukens
Year Produced	1979	Addl Info	None
Source	Lukens	Melting Practice	*
Ingot Position	*	Killing Process	*
Process Temperature	*	Process Time	*
Rolling Conditions	*	Final Processing	Q,T
Final Temperature	*	Final Time	*
Cold Work Strain	*	Aging Temperature	*
Aging Time	*	Location	*

Property Measurements

Test Type	Tensile	Position	1/4T
Specimen Type	Cylindrical	Specimen Thickness	0.252 in
Gage Length	1 in	Loading Rate	*
Tensile Strength Offset	*	Uniform Elongation	*
Tensile Modulus	*	Standard Method	*
Standard Year	*		

Orient	Test Temp degF	UTS ksi	TYS ksi	TYP ksi	Elongation %	RA %
L	80	81.7	68.7	73.7	29	77.7
L	80	82.4	67.7	72.8	29	78.3
T	80	81.2	66.2	69.2	29	70.9
T	80	82.2	68.2	71.7	28	70.9

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.015.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 in	Composition Type	Actual
Composition Position	*	Lot ID	A6670-3A
Reference	3202		

Composition See Page 16400.1

Fabrication History See Page 16400.1

Property Measurements

Test Type	Charpy V Impact	Position	1/4T
Specimen Type	Full	Did Specimen Fracture?	*
Standard Method	*	Standard Year	*

Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %	Split?
L-T o	-180	3	1	0	*
L-T o	-160	4	2	2	*
L-T o	-140	10	6	5	*
L-T o	-120	30	25	17	*
L-T o	-100	31	26	19	*
L-T o	-90	55	43	30	*
L-T o	-80	53	42	30	*
L-T o	-70	50	41	36	*
L-T o	-65	52	44	42	*
L-T o	-60	80	60	47	*
L-T o	-50	66	53	48	*
L-T o	-40	76	57	50	*
L-T o	-30	86	64	72	*
L-T o	-20	101	75	90	*
L-T o	-10	106	75	100	*
L-T o	0	124	83	100	*
L-T o	20	111	80	100	Yes
L-T o	40	116	84	100	*
L-T o	60	116	85	100	*
L-T o	76	122	90	100	*
T-L △	-180	2	2	0	*
T-L △	-160	12	8	5	*
T-L △	-140	14	12	10	*
T-L △	-120	17	15	14	*
T-L △	-100	21	21	21	*
T-L △	-80	26	26	33	*
T-L △	-60	30	29	36	*
T-L △	-50	33	32	40	*
T-L △	-40	36	35	50	*
T-L △	-35	36	36	50	*
T-L △	-30	36	36	50	*
T-L △	-25	43	40	55	*
T-L △	-20	52	46	85	*
T-L △	-10	55	50	78	*
T-L △	0	59	51	98	*

(continued)

* - not reported

Material BS4360 Gr50D

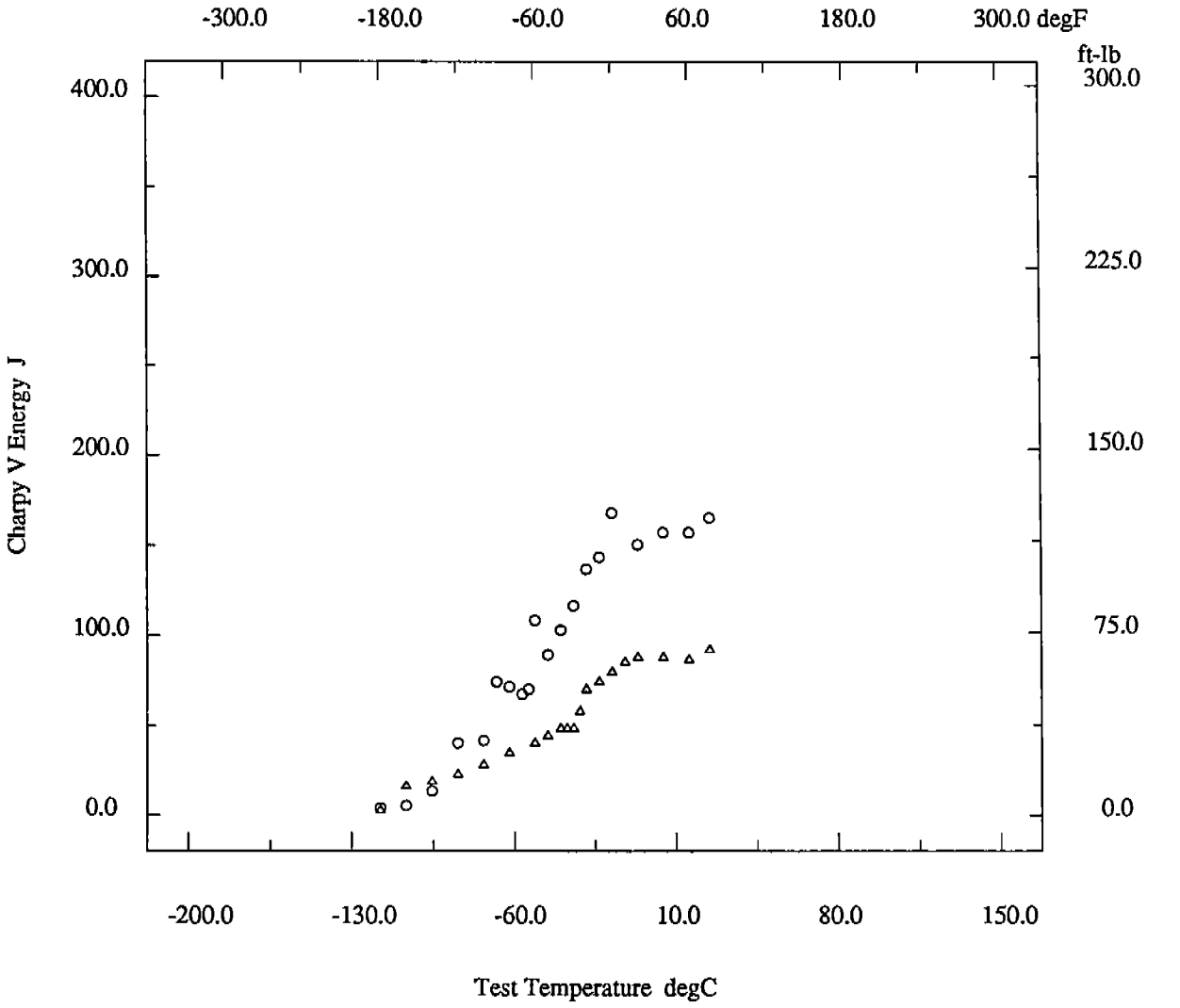
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Orien	Test Temp degF	CVN Energy ft-lb	Lat Expans mils	Shear %	Split?
T-L ▵	10	63	58	100	*
T-L ▵	20	65	59	100	*
T-L ▵	40	65	56	100	*
T-L ▵	60	64	59	100	*
T-L ▵	76	68	62	100	*

* - not reported

Material BS4360 Gr50D

Description			
Material Code	010.015.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 in	Composition Type	Actual
Composition Position	*	Lot ID	A6670-3A
Reference	3202		



* - not reported

Material BS4360 Gr50D

Description

Material Code	010.015.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 in	Composition Type	Actual
Composition Position	*	Lot ID	A6670-3A
Reference	3202		

Composition See Page 16400.1

Fabrication History See Page 16400.1

Property Measurements

Test Type	Dynamic Tear	Position	1/4T
Specimen Type	Dynamic Tear	Notch Preparation	Pressed
Specimen Thickness	0.625 in	Loading Rate	*
Standard Method	*	Standard Year	*

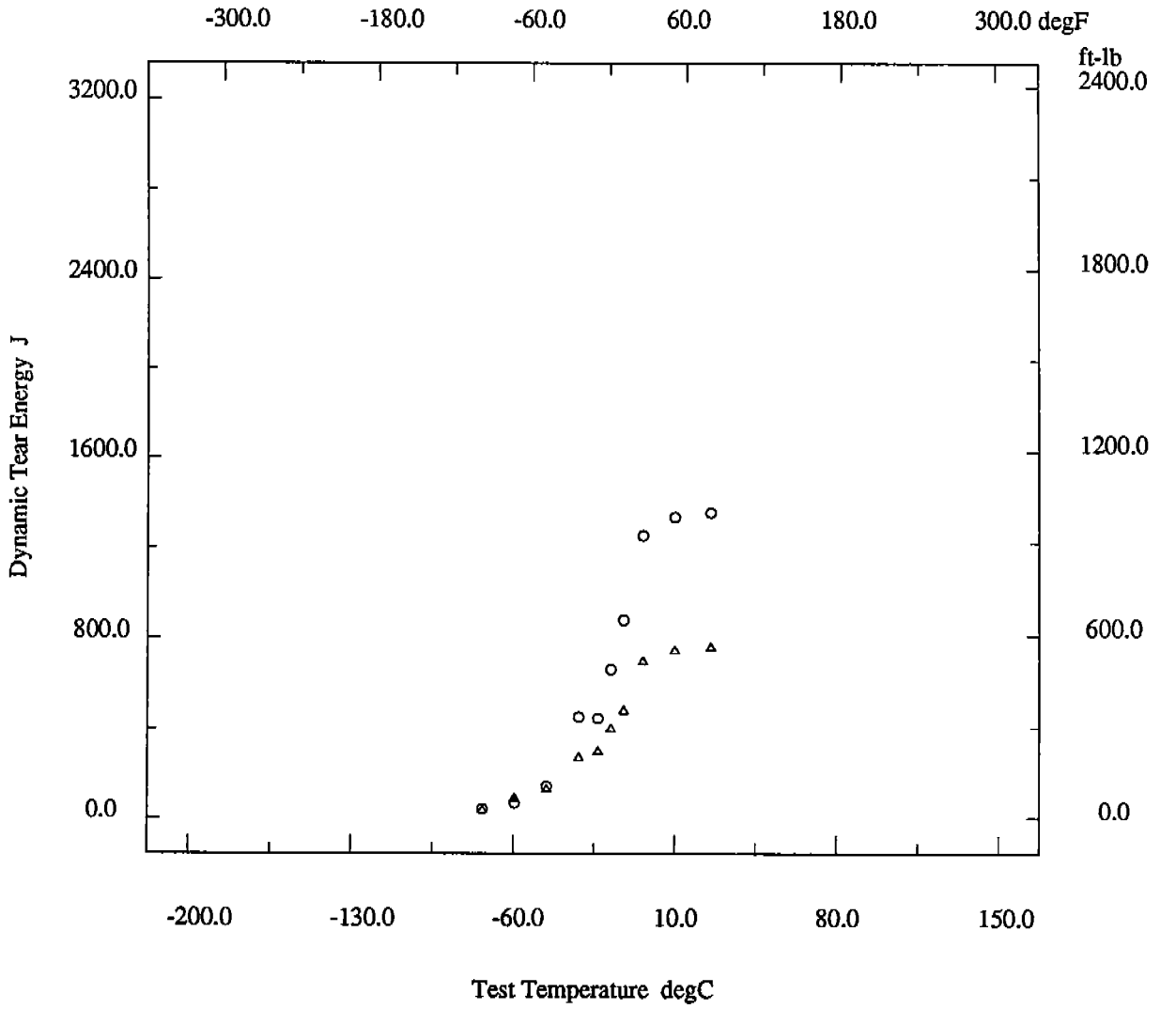
Orien	Test Temp degF	DT Energy ft-lb	Frac Apear %
L-T ○	-100	30	10
L-T ○	-75	50	19
L-T ○	-50	105	24
L-T ○	-25	335	53
L-T ○	-10	330	49
L-T ○	0	490	58
L-T ○	10	650	67
L-T ○	25	925	96
L-T ○	50	985	100
L-T ○	78	1000	100
T-L △	-100	25	8
T-L △	-75	65	17
T-L △	-50	95	26
T-L △	-25	200	40
T-L △	-10	220	45
T-L △	0	295	59
T-L △	10	355	68
T-L △	25	515	91
T-L △	50	550	100
T-L △	78	560	100

* - not reported

Material BS4360 Gr50D

Description

Material Code	010.015.01	Material Name	BS4360 Gr50D
UNS	*	Other Designation	Frostline
Type	Wrought Metal	Form	Plate
Thickness	1 in	Composition Type	Actual
Composition Position	*	Lot ID	A6670-3A
Reference	3202		



* - not reported

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0 Lot ID 3800.1–3800.4

004-2 Reference 1100.1–1100.2, 1100.5–1100.6, 1200.1–1200.2, 1200.5–1200.6, 1300.1–1300.2, 1300.5–1300.6, 1400.1–1400.2, 1400.5–1400.6, 1500.1–1500.2, 1500.5–1500.6, 1600.1–1600.2, 1600.5–1600.6, 1700.1–1700.2, 1700.5–1700.6, 1800.1–1800.2, 1800.5–1800.6, 1900.1–1900.2, 1900.5–1900.6

007-1 Reference 2100.1–2100.8, 2200.1–2200.8, 2300.1–2300.8, 2400.1–2400.20, 2500.1–2500.18, 2600.1–2600.20, 2700.1–2700.18

007-4 Reference 2800.1–2800.8, 2900.1–2900.8, 3000.1–3000.8

1 Lot ID 3900.1–3900.3

1010 Reference 7800.1–7800.6, 7900.1–7900.6

1120 Reference 16600.1–16600.7

11672 Lot ID 3400.1–3400.4

11682 Lot ID 4600.1–4600.3

11692 Lot ID 4200.1–4200.3

11mm in HAZ Location wrt Weld 2500.16, 2700.16, 3200.1, 3200.8, 3200.12, 3200.16, 3200.20, 6400.4, 6400.10, 6400.16, 6500.1, 6600.1, 6700.1, 6800.1, 7200.7–7200.8, 7500.1, 7500.6, 7500.12, 7500.16, 7500.20, 7600.2, 7600.6, 7600.10, 7600.14, 7600.18, 7700.1, 7700.6, 7700.10, 7700.14, 7700.18, 8000.1, 8100.1, 8200.1, 8300.1, 8500.1, 8600.1, 8700.1, 8800.1, 9200.2, 9200.6, 9200.10, 9200.14, 9200.18, 9300.1, 9300.6, 9300.10, 9300.14, 9300.18, 9700.7, 9900.7, 10200.4, 10200.8, 10500.4, 10800.4, 10900.4, 11000.4, 11500.4, 12300.4, 12300.8, 12300.12, 13800.8, 13800.20, 13800.24, 13800.34, 13900.1, 13900.14, 13900.24, 14000.1, 14000.4, 14000.14, 14200.1, 14200.4–14200.6, 14200.16–14200.18, 14200.28, 14200.38–14200.40, 14300.1, 14300.4–14300.6, 14300.16–14300.18, 14300.28, 14300.38–14300.40, 14400.1, 14400.4–14400.6, 14400.16–14400.18, 14400.28, 14400.38–14400.40, 14500.1, 14500.4–14500.6, 14500.16, 14500.26, 14500.36, 14600.1, 14600.4–14600.6, 14600.16, 14600.26, 14600.36, 14700.1–14700.3, 14700.6–14700.8, 14700.11–14700.12, 14700.15–14700.17, 14700.20–14700.21, 14700.24–14700.26, 14800.1–14800.3, 14800.6–14800.8, 14800.11–14800.12, 14800.15–14800.17, 14800.20–14800.21, 14800.24–14800.26, 14900.1–14900.3, 14900.6–14900.8, 14900.11–14900.12, 14900.15–14900.17, 15000.1–15000.3, 15000.6–15000.8, 15000.11–15000.12, 15000.15–15000.17, 15000.20–15000.21, 15000.24–15000.26, 15100.1–15100.3, 15100.6–15100.8, 15100.11–15100.12, 15100.15–15100.17, 15100.20–15100.21, 15100.24–15100.26, 15200.1–15200.3, 15200.6–15200.8, 15200.11–15200.12, 15200.15–15200.17, 16500.1, 16500.5, 19000.1, 19100.1, 19200.1, 19300.1, 19400.1, 19600.7, 19600.14

1/2 V-Groove Joint Preparation 13800.8–13800.36, 13900.1, 13900.4–13900.26, 14000.1–14000.22

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14453 Lot ID 4500.1–4500.4

14460 Lot ID 3300.1–3300.4

14490 Lot ID 5700.1–5700.3

14500 Lot ID 6000.1–6000.3

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1/4T Location wrt Surface 7200.7–7200.8, 7200.13

17754 Lot ID 5800.1–5800.3, 6100.1–6100.3

17777 Lot ID 6200.1–6200.3

17846 Lot ID 5900.1–5900.3

18553 Lot ID 6300.1–6300.3

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1971 Year Produced 1000.1–1000.3, 1000.6, 1000.9, 1000.12–1000.14

1972 Standard Year 18600.3, 18700.2, 18800.3, 18900.3, 19600.3, 19600.10, 19600.16–19600.18

1972 Year Produced 2100.1–2100.3, 2100.6, 2200.1–2200.3, 2200.6, 2300.1–2300.3, 2400.1–2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1–2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1, 2800.1–2800.3, 2800.6, 2900.1–2900.3, 2900.6, 3000.1–3000.3, 3000.6

1976 Standard Year 7100.5, 7200.5, 7200.11, 7200.15

1976 Year Produced 15300.1, 15400.1, 16000.1, 16200.1

1977 Year Produced 16100.1, 16600.1

1978 Year Produced 7300.1, 15500.1, 15600.1, 15900.1

1979 Standard Year 7000.2, 14700.2, 14700.11, 14700.20, 14800.2, 14800.11, 14800.20, 14900.2, 14900.11, 15000.2, 15000.11, 15000.20, 15100.2, 15100.11, 15100.20, 15200.2, 15200.11

1979 Year Produced 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1, 15700.1, 15800.1, 16300.1, 16400.1

1980 Standard Year 18600.5, 18700.4, 18800.5, 18900.5, 19600.5, 19600.12, 19600.20

1980 Year Produced 9000.1, 9100.1

1981 Standard Year 16500.2–16500.6

1981 Year Produced 17400.1, 17400.11, 17400.20
1982 Year Produced 12600.1, 16700.1, 16700.11, 16700.20, 16800.1, 16800.5, 16900.1, 16900.5, 17000.1, 17000.7, 17100.1, 17100.11, 17200.1, 17200.17, 17200.32, 17300.1, 17300.11, 17500.1, 17500.11, 17600.1, 17600.5, 17700.1, 17700.11, 17700.20, 17800.1, 17800.5, 17900.1, 17900.17, 17900.32, 18000.1, 18000.7, 18100.1, 18100.7, 18200.1, 18200.11, 18200.20, 18300.1, 18300.17, 18300.32, 18400.1, 18400.11, 18400.20, 18500.1, 18500.5, 19500.1
1983 Year Produced 7800.1, 7900.1
1984 Year Produced 12500.1, 12700.1
1987 Standard Year 7800.2, 9000.6, 9100.2, 12500.2, 12600.2, 12700.2, 15700.2, 15800.2, 15900.2, 16100.2
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47444 Lot ID 11200.1–11200.6
47574 Lot ID 9600.1–9600.7, 9700.1–9700.10, 9800.1–9800.3
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52110 Lot ID 12300.1–12300.15
52765 Lot ID 5600.1–5600.3
52797 Lot ID 5500.1–5500.3
54614 Lot ID 11100.1–11100.4
55946 Lot ID 11800.1–11800.6, 11900.1–11900.6
57053 Lot ID 11700.1–11700.6
57221 Lot ID 9400.1–9400.3, 9500.1–9500.6
58568 Lot ID 11300.1–11300.3, 11400.1–11400.3
59609 Lot ID 10300.4–10300.6, 10600.1–10600.4, 10700.1–10700.7
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60868 Lot ID 3700.1–3700.4, 4400.1–4400.4
641661 Lot ID 1100.1–1100.2, 1100.5–1100.6, 1200.1–1200.2, 1200.5–1200.6, 1300.1–1300.2, 1300.5–1300.6
641662 Lot ID 1400.1–1400.2, 1400.5–1400.6, 1500.1–1500.2, 1500.5–1500.6, 1600.1–1600.2, 1600.5–1600.6
642696 Lot ID 1800.1–1800.2, 1800.5–1800.6, 1900.1–1900.2, 1900.5–1900.6
642697 Lot ID 1700.1–1700.2, 1700.5–1700.6
7mm in HAZ Location wrt Weld 2500.13, 2700.13
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A1579-2AA Lot ID 15900.1–15900.6
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Armco W24 Filler Name 10200.4–10200.6, 10800.4–10800.6, 11000.4–11000.6, 12300.4–12300.6

Armco W25 Filler Name 9900.7–9900.9

Armco-MPC Reference 3300.1–3300.4, 3400.1–3400.4, 3500.1–3500.4, 3600.1–3600.4, 3700.1–3700.4, 3800.1–3800.4, 3900.1–3900.3, 4000.1–4000.3, 4100.1–4100.3, 4200.1–4200.3, 4300.1–4300.3, 4400.1–4400.4, 4500.1–4500.4, 4600.1–4600.3, 4700.1–4700.3, 4800.1–4800.3, 4900.1–4900.3, 5000.1–5000.4, 5100.1–5100.4, 5200.1–5200.4, 5300.1–5300.4, 5400.1–5400.3, 5500.1–5500.3, 5600.1–5600.3, 5700.1–5700.3, 5800.1–5800.3, 5900.1–5900.3, 6000.1–6000.3, 6100.1–6100.3, 6200.1–6200.3, 6300.1–6300.3

Assumed Did Specimen Fracture? 1000.3, 1000.6, 1000.9, 1000.12, 2100.3, 2100.6, 2300.3, 2300.6, 2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.2–2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.2–2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 3100.2–3100.10, 3200.2–3200.20, 7100.2, 7300.2, 7400.2–7400.10, 7500.2–7500.20, 7600.2–7600.20, 7700.2–7700.20, 9200.2–9200.20, 9300.2–9300.20, 9400.2, 9500.2, 9500.5, 9600.2, 9600.5, 9700.2, 9700.5–9700.9, 9800.2, 9900.2, 9900.5–9900.9, 10100.2, 10200.2–10200.10, 10300.2, 10300.5, 10400.2, 10500.2–10500.6, 10600.1, 10700.2–10700.4, 10800.2–10800.6, 10900.2–10900.6, 11000.2–11000.6, 11100.1, 11200.2, 11200.5, 11300.2, 11400.2, 11500.2–11500.6, 11600.2, 11700.2, 11700.5, 11900.2, 12000.2, 12100.2, 12200.2, 12300.2–12300.14, 12400.2, 13800.8–13800.32, 13900.2–13900.22, 14000.4–14000.22, 14700.4–14700.6, 14700.9, 14700.13–14700.15, 14700.18, 14700.22–14700.24, 14700.27, 14800.4–14800.6, 14800.9, 14800.13–14800.15, 14800.18, 14800.22–14800.24, 14800.27, 14900.4–14900.6, 14900.9, 14900.13–14900.15, 14900.18, 15000.4–15000.6, 15000.9, 15000.13–15000.15, 15000.18, 15000.22–15000.24, 15000.27, 15100.4–15100.6, 15100.9, 15100.13–15100.15, 15100.18, 15100.22–15100.24, 15100.27, 15200.4–15200.6, 15200.9, 15200.13–15200.15, 15200.18, 16500.3, 16500.6, 16700.2, 16700.6, 16700.9, 16700.12, 16700.15, 16700.18, 16700.21, 16700.24, 16700.27, 16800.2, 16800.6, 16900.2, 16900.6, 17000.2, 17000.8, 17100.2, 17100.6, 17100.9, 17100.12, 17100.15, 17100.18, 17200.2, 17200.8, 17200.13, 17200.18, 17200.23, 17200.28, 17200.33, 17200.38, 17200.43, 17300.2, 17300.6, 17300.9, 17300.12, 17300.15, 17300.18, 17400.2, 17400.6, 17400.9, 17400.12, 17400.15, 17400.18, 17400.21, 17400.24, 17400.27, 17500.2, 17500.6, 17500.9, 17500.12, 17500.15, 17500.18, 17600.2, 17600.6, 17700.2, 17700.6, 17700.9, 17700.12, 17700.15, 17700.18, 17700.21, 17700.24, 17700.27, 17800.2, 17800.6, 17900.2, 17900.8, 17900.13, 17900.18, 17900.23, 17900.28, 17900.33, 17900.38, 17900.43, 18000.2, 18000.8, 18100.2, 18100.8, 18200.2, 18200.6, 18200.9, 18200.12, 18200.15, 18200.18, 18200.21, 18200.24, 18200.27, 18300.2, 18300.8, 18300.13, 18300.18, 18300.23, 18300.28, 18300.33, 18300.38, 18300.43, 18400.2, 18400.6, 18400.9, 18400.12, 18400.15, 18400.18, 18400.21, 18400.24, 18400.27, 18500.2, 18500.6, 18600.3, 18700.2, 18800.3, 18900.3, 19000.4, 19100.4, 19200.4, 19300.4, 19400.4, 19600.3, 19600.10, 19600.16–19600.18

Australia Producer 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1

Australia Source 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1

B

B Location 1000.2, 1000.6

B0469-2C Lot ID 15400.1–15400.6, 16200.1–16200.6

B1038-2B Lot ID 18600.1–18600.6

B-1088-3 Lot ID 18800.1–18800.6

B-1088-5 Lot ID 18900.1–18900.6

B1908-3 Lot ID 15500.1–15500.2, 15500.5–15500.7

B1908-5A Lot ID 15600.1–15600.6

B1908-5B Lot ID 15800.1–15800.3, 15800.6–15800.8

B5761-2R Lot ID 19500.1–19500.7

B8478-3 Lot ID 17800.1–17800.7

B8490-2 Lot ID 17500.1–17500.19

B8563-4 Lot ID 17300.1–17300.19

B8601-5 Lot ID 17100.1–17100.19

B8687-1 Lot ID 17600.1–17600.7

B8740-2 Lot ID 17200.1–17200.46

B8740-3 Lot ID 16700.1–16700.28

B8817-1 Lot ID 18400.1–18400.28

B9353-3 Lot ID 16600.1–16600.7

B9671-1E Lot ID 12600.1–12600.14

Back surface at root Location wrt Surface 14200.16, 14200.38, 14300.16, 14300.38, 14400.16, 14400.38, 14500.16–14500.24, 14500.36–14500.44, 14600.16–14600.24, 14600.36–14600.44, 14700.8, 14700.17, 14700.26, 14800.8, 14800.17, 14800.26, 14900.8, 14900.17, 15000.8, 15000.17, 15000.26, 15100.8, 15100.17, 15100.26, 15200.8, 15200.17

Back surface not root Location wrt Surface 13800.20–13800.22, 14200.18–14200.26, 14200.40–14200.48, 14300.18–14300.26, 14300.40–14300.48, 14400.18–14400.26, 14400.40–14400.48

Basic Flux Type 16500.1, 16500.5

BL55 Flux Name 13900.1, 13900.4–13900.26, 14000.4–14000.22, 14300.1–14300.48, 14400.1–14400.48, 14500.1–14500.47, 14600.1–14600.47

BOF Melting Practice 1000.1–1000.3, 1000.6, 1000.9, 1000.12–1000.14, 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1, 2100.1–2100.3, 2100.6, 2200.1–2200.3, 2200.6, 2300.1–2300.3, 2400.1–2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1–2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1

Bottom Composition Position 2100.2, 2100.6–2100.8, 2200.2, 2200.6–2200.8, 2300.2, 2400.2, 2400.6–2400.8, 2400.12–2400.14, 2400.18–2400.20, 2600.2, 2600.6–2600.8, 2600.12–2600.14, 2600.18–2600.20, 2800.2, 2800.6–2800.8, 2900.2, 2900.6–2900.8, 3000.2, 3000.6–3000.8

Bottom Ingot Position 2100.2, 2100.6, 2200.2, 2200.6, 2300.2, 2400.2, 2400.6, 2400.12, 2400.18, 2600.2, 2600.6, 2600.12, 2600.18, 16700.20, 16800.5, 16900.5, 17000.7, 17100.11, 17200.32, 17300.11, 17400.20, 17500.11, 17600.5, 17700.20, 17800.5, 17900.32, 18000.7, 18100.7, 18200.20, 18300.32, 18400.20, 18500.5

BS131H2 Standard Method 14700.4–14700.6, 14700.9, 14700.13–14700.15, 14700.18, 14700.22–14700.24, 14700.27, 14800.4–14800.6, 14800.9, 14800.13–14800.15, 14800.18, 14800.22–14800.24, 14800.27, 14900.4–14900.6, 14900.9, 14900.13–14900.15, 14900.18, 15000.4–15000.6, 15000.9, 15000.13–15000.15, 15000.18, 15000.22–15000.24, 15000.27, 15100.4–15100.6, 15100.9, 15100.13–15100.15, 15100.18, 15100.22–15100.24, 15100.27, 15200.4–15200.6, 15200.9, 15200.13–15200.15, 15200.18

BS4360 Gr50D Material Name 13800.1–13800.37, 13900.1–13900.26, 14000.1–14000.23, 14100.1–14100.10, 14200.1–14200.49, 14300.1–14300.49, 14400.1–14400.49, 14500.1–14500.47, 14600.1–14600.47, 14700.1–14700.28, 14800.1–14800.28, 14900.1–14900.19, 15000.1–15000.28, 15100.1–15100.28, 15200.1–15200.19, 15300.1–15300.6, 15400.1–15400.6, 15500.1–15500.2, 15500.5–15500.7, 15600.1–15600.6, 15700.1–15700.3, 15700.6–15700.8, 15800.1–15800.3, 15800.6–15800.8, 15900.1–15900.6, 16000.1–16000.6, 16100.1–16100.3, 16100.6–16100.8, 16200.1–16200.6, 16300.1–16300.6, 16400.1–16400.6

BS5762 Standard Method 7000.2, 13800.34–13800.37, 13900.24–13900.26, 14200.2–14200.5, 14300.2–14300.5, 14400.2–14400.5, 14500.2–14500.5, 14600.2–14600.5, 14700.2, 14700.11, 14700.20, 14800.2, 14800.11, 14800.20, 14900.2, 14900.11, 15000.2, 15000.11, 15000.20, 15100.2, 15100.11, 15100.20, 15200.2, 15200.11

Bunge Producer 16500.1

C

C Lot ID 4000.1–4000.3

C4771-39A Lot ID 18500.1–18500.7

C5830 Lot ID 16000.1–16000.6

C5830-5T Lot ID 15300.1–15300.6

C-9283-11 Lot ID 18700.1–18700.5

CG A537M Material Name 7100.1–7100.6, 7200.1–7200.16

Charpy V Impact Test Type 1000.3, 1000.6, 1000.9, 1000.12, 1100.2, 1200.2, 1300.2, 1400.2, 1500.2, 1600.2, 1700.2, 1800.2, 1900.2, 2000.4, 2100.3, 2100.6, 2200.3, 2200.6, 2300.3, 2300.6, 2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.2–2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.2–2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 2800.3, 2800.6, 2900.3, 2900.6, 3000.3, 3000.6, 3100.2–3100.10, 3200.2–3200.20, 3300.2, 3400.2, 3500.2, 3600.2, 3700.2, 3800.2, 3900.2, 4000.2, 4100.2, 4200.2, 4300.2, 4400.2, 4500.2, 4600.2, 4700.2, 4800.2, 4900.2, 5000.2, 5100.2, 5200.2, 5300.2, 5400.2, 5500.2, 5600.2, 5700.2, 5800.2, 5900.2, 6000.2, 6100.2, 6200.2, 6300.2, 6400.1, 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6500.2–6500.4, 6600.2–6600.4, 6700.2–6700.4, 6800.2–6800.4, 6900.1, 7000.5, 7100.2, 7200.2, 7200.8, 7200.13, 7300.2, 7400.2–7400.10, 7500.2–7500.20, 7600.2–7600.20, 7700.2–7700.20, 7800.3, 7900.3, 8000.2–8000.4, 8100.2–8100.4, 8200.2–8200.4, 8300.2–8300.4, 8400.1, 8500.2–8500.4, 8600.2–8600.4, 8700.2–8700.4, 8800.2–8800.4, 8900.1, 9000.2, 9100.3, 9200.2–9200.20, 9300.2–9300.20, 9400.2, 9500.2, 9500.5, 9600.2, 9600.5, 9700.2, 9700.5–9700.9, 9800.2, 9900.2, 9900.5–9900.9, 10000.2, 10100.2, 10200.2–10200.10, 10300.2, 10300.5, 10400.2, 10500.2–10500.6, 10600.1, 10700.2–10700.4, 10800.2–10800.6, 10900.2–10900.6, 11000.2–11000.6, 11100.1, 11200.2, 11200.5, 11300.2, 11400.2, 11500.2–11500.6, 11600.2, 11700.2, 11700.5, 11800.2, 11800.5, 11900.2–11900.4, 12000.2, 12100.2, 12200.2, 12300.2–12300.14, 12400.2, 12500.3, 12600.3, 12600.6, 12700.3, 12800.2, 12900.2, 13000.2, 13100.2, 13200.2, 13300.2, 13400.2, 13500.2, 13600.2, 13700.2, 13800.3–13800.5, 13800.8–13800.32, 13900.2–13900.22, 14000.4–14000.22, 14100.5–14100.9, 14200.6–14200.48, 14300.6–14300.48, 14400.6–14400.48, 14500.6–14500.44, 14600.6–14600.44, 14700.4–14700.6, 14700.9, 14700.13–14700.15, 14700.18,

14700.22–14700.24, 14700.27, 14800.4–14800.6, 14800.9, 14800.13–14800.15, 14800.18, 14800.22–14800.24, 14800.27, 14900.4–14900.6, 14900.9, 14900.13–14900.15, 14900.18, 15000.4–15000.6, 15000.9, 15000.13–15000.15, 15000.18, 15000.22–15000.24, 15000.27, 15100.4–15100.6, 15100.9, 15100.13–15100.15, 15100.18, 15100.22–15100.24, 15100.27, 15200.4–15200.6, 15200.9, 15200.13–15200.15, 15200.18, 15300.2, 15400.2, 15500.2, 15600.2, 15700.3, 15800.3, 15900.3, 16000.2, 16100.3, 16200.2, 16300.2, 16400.2, 16500.3, 16500.6, 16600.2, 16700.2, 16700.6, 16700.9, 16700.12, 16700.15, 16700.18, 16700.21, 16700.24, 16700.27, 16800.2, 16800.6, 16900.2, 16900.6, 17000.2, 17000.8, 17100.2, 17100.6, 17100.9, 17100.12, 17100.15, 17100.18, 17200.2, 17200.8, 17200.13, 17200.18, 17200.23, 17200.28, 17200.33, 17200.38, 17200.43, 17300.2, 17300.6, 17300.9, 17300.12, 17300.15, 17300.18, 17400.2, 17400.6, 17400.9, 17400.12, 17400.15, 17400.18, 17400.21, 17400.24, 17400.27, 17500.2, 17500.6, 17500.9, 17500.12, 17500.15, 17500.18, 17600.2, 17600.6, 17700.2, 17700.6, 17700.9, 17700.12, 17700.15, 17700.18, 17700.21, 17700.24, 17700.27, 17800.2, 17800.6, 17900.2, 17900.8, 17900.13, 17900.18, 17900.23, 17900.28, 17900.33, 17900.38, 17900.43, 18000.2, 18000.8, 18100.2, 18100.8, 18200.2, 18200.6, 18200.9, 18200.12, 18200.15, 18200.18, 18200.21, 18200.24, 18200.27, 18300.2, 18300.8, 18300.13, 18300.18, 18300.23, 18300.28, 18300.33, 18300.38, 18300.43, 18400.2, 18400.6, 18400.9, 18400.12, 18400.15, 18400.18, 18400.21, 18400.24, 18400.27, 18500.2, 18500.6, 18600.3, 18700.2, 18800.3, 18900.3, 19000.4, 19100.4, 19200.4, 19300.4, 19400.4, 19500.5, 19600.3, 19600.10, 19600.16–19600.18

Cleavage Curve Shape 14800.20, 14900.11

Compact Specimen Type 7800.2, 9000.6, 9100.2, 12500.2, 12600.2, 12700.2, 15700.2, 15800.2, 15900.2, 16100.2

Compact Tension Specimen Type 18600.2, 18700.1, 18800.2, 18900.2, 19000.3, 19100.3, 19200.3, 19300.3, 19400.3, 19600.2, 19600.9, 19600.15

Composition Position

- **1/4T** 13800.1–13800.37, 13900.1–13900.26, 14000.1–14000.23
- **Bottom** 2100.2, 2100.6–2100.8, 2200.2, 2200.6–2200.8, 2300.2, 2400.2, 2400.6–2400.8, 2400.12–2400.14, 2400.18–2400.20, 2600.2, 2600.6–2600.8, 2600.12–2600.14, 2600.18–2600.20, 2800.2, 2800.6–2800.8, 2900.2, 2900.6–2900.8, 3000.2, 3000.6–3000.8
- **Ladle** 1100.1–1100.2, 1100.5–1100.6, 1200.1–1200.2, 1200.5–1200.6, 1300.1–1300.2, 1300.5–1300.6, 1400.1–1400.2, 1400.5–1400.6, 1500.1–1500.2, 1500.5–1500.6, 1600.1–1600.2, 1600.5–1600.6, 1700.1–1700.2, 1700.5–1700.6, 1800.1–1800.2, 1800.5–1800.6, 1900.1–1900.2, 1900.5–1900.6, 15500.1–15500.2, 15500.5–15500.7, 15600.1–15600.6, 16700.1–16700.28, 16800.1–16800.7, 16900.1–16900.7, 17000.1–17000.11, 17100.1–17100.19, 17200.1–17200.46, 17300.1–17300.19, 17400.1–17400.28, 17500.1–17500.19, 17600.1–17600.7, 17700.1–17700.28, 17800.1–17800.7, 17900.1–17900.46, 18000.1–18000.11, 18100.1–18100.11, 18200.1–18200.28, 18300.1–18300.46, 18400.1–18400.28, 18500.1–18500.7
- **Top** 2100.1–2100.5, 2200.1–2200.5, 2300.1–2300.8, 2400.1–2400.5, 2400.9–2400.11, 2400.15–2400.17, 2500.1–2500.18, 2600.1–2600.5, 2600.9–2600.11, 2600.15–2600.17, 2700.1–2700.18, 2800.1–2800.5, 2900.1–2900.5, 3000.1–3000.5

Concast Ingot Position 1000.1–1000.3, 1000.6, 1000.9, 1000.12–1000.14, 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1, 2800.1–2800.3, 2800.6, 2900.1–2900.3, 2900.6, 3000.1–3000.3, 3000.6

Curve Shape

- **Cleavage** 14800.20, 14900.11
- **Maximum** 15000.2, 15000.20

Cylindrical Specimen Type 3100.1, 7000.1, 7300.1, 7400.1, 7600.1, 7800.1, 7900.1, 9000.1, 9100.1, 9200.1, 12500.1, 12600.1, 12700.1, 14700.3, 14700.8, 14700.12, 14700.17, 14700.21, 14700.26, 14800.3, 14800.8, 14800.12, 14800.17, 14800.21, 14800.26, 14900.3, 14900.8, 14900.12, 14900.17, 15000.3, 15000.8, 15000.12, 15000.17, 15000.21, 15000.26, 15100.3, 15100.8, 15100.12, 15100.17, 15100.21, 15100.26, 15200.3, 15200.8, 15200.12, 15200.17, 15300.1, 15400.1, 15500.1, 15600.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1, 16400.1, 16500.2, 16500.5, 18600.1, 18800.1, 18900.1, 19000.2, 19100.2, 19200.2, 19300.2, 19400.2, 19600.1, 19600.8, 19600.14

D

D2580-4 Lot ID 17400.1–17400.28

D3007-3 Lot ID 15700.1–15700.3, 15700.6–15700.8

D3631-7L Lot ID 16900.1–16900.7

D3667-3M Lot ID 17000.1–17000.11

D3703-4B Lot ID 16800.1–16800.7

D3710-42B Lot ID 17900.1–17900.46

D3791-2B Lot ID 7300.1–7300.6

D3974-1B Lot ID 18200.1–18200.28

D3975-3E Lot ID 17700.1–17700.28

D4030-4A Lot ID 18300.1–18300.46

D4179-3B Lot ID 7900.1–7900.6

D6274-4 Lot ID 9000.1–9000.2, 9000.5–9000.9, 9100.1–9100.3, 9100.6–9100.9

D6873-1A Lot ID 12500.1–12500.6

D6873-1B Lot ID 12700.1–12700.7

Did Specimen Fracture?
Assumed 1000.3, 1000.6, 1000.9, 1000.12, 2100.3, 2100.6, 2300.3, 2300.6, 2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.2–2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.2–2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 3100.2–3100.10, 3200.2–3200.20, 7100.2, 7300.2, 7400.2–7400.10, 7500.2–7500.20, 7600.2–7600.20, 7700.2–7700.20, 9200.2–9200.20, 9300.2–9300.20, 9400.2, 9500.2, 9500.5, 9600.2, 9600.5, 9700.2, 9700.5–9700.9, 9800.2, 9900.2, 9900.5–9900.9, 10100.2, 10200.2–10200.10, 10300.2, 10300.5, 10400.2, 10500.2–10500.6, 10600.1, 10700.2–10700.4, 10800.2–10800.6, 10900.2–10900.6, 11000.2–11000.6, 11100.1, 11200.2, 11200.5, 11300.2, 11400.2, 11500.2–11500.6, 11600.2, 11700.2, 11700.5, 11900.2, 12000.2, 12100.2, 12200.2, 12300.2–12300.14, 12400.2, 13800.8–13800.32, 13900.2–13900.22, 14000.4–14000.22, 14700.4–14700.6, 14700.9, 14700.13–14700.15, 14700.18, 14700.22–14700.24, 14700.27, 14800.4–14800.6, 14800.9, 14800.13–14800.15, 14800.18, 14800.22–14800.24, 14800.27, 14900.4–14900.6, 14900.9, 14900.13–14900.15, 14900.18, 15000.4–15000.6, 15000.9, 15000.13–15000.15, 15000.18, 15000.22–15000.24, 15000.27, 15100.4–15100.6, 15100.9, 15100.13–15100.15, 15100.18, 15100.22–15100.24, 15100.27, 15200.4–15200.6, 15200.9, 15200.13–15200.15, 15200.18, 16500.3, 16500.6, 16700.2, 16700.6, 16700.9, 16700.12, 16700.15, 16700.18, 16700.21, 16700.24, 16700.27, 16800.2, 16800.6, 16900.2, 16900.6, 17000.2, 17000.8, 17100.2, 17100.6, 17100.9, 17100.12, 17100.15, 17100.18, 17200.2, 17200.8, 17200.13, 17200.18, 17200.23, 17200.28, 17200.33, 17200.38, 17200.43, 17300.2, 17300.6, 17300.9, 17300.12, 17300.15, 17300.18, 17400.2, 17400.6, 17400.9, 17400.12, 17400.15, 17400.18, 17400.21, 17400.24, 17400.27, 17500.2, 17500.6, 17500.9, 17500.12, 17500.15, 17500.18, 17600.2, 17600.6, 17700.2, 17700.6, 17700.9, 17700.12, 17700.15, 17700.18, 17700.21, 17700.24, 17700.27, 17800.2, 17800.6, 17900.2, 17900.8, 17900.13, 17900.18, 17900.23, 17900.28, 17900.33, 17900.38, 17900.43, 18000.2, 18000.8, 18100.2, 18100.8, 18200.2, 18200.6, 18200.9, 18200.12, 18200.15, 18200.18, 18200.21, 18200.24, 18200.27, 18300.2, 18300.8, 18300.13, 18300.18, 18300.23, 18300.28, 18300.33, 18300.38, 18300.43, 18400.2, 18400.6, 18400.9, 18400.12, 18400.15, 18400.18, 18400.21, 18400.24, 18400.27, 18500.2, 18500.6, 18600.3, 18700.2, 18800.3, 18900.3, 19000.4, 19100.4, 19200.4, 19300.4, 19400.4, 19600.3, 19600.10, 19600.16–19600.18
Yes 1100.2, 1200.2, 1300.2, 1400.2, 1500.2, 1600.2, 1700.2, 1800.2, 1900.2, 2000.4, 2200.6, 2900.3, 2900.6, 3300.2, 3400.2, 3500.2, 3600.2, 3700.2, 3800.2, 3900.2, 4000.2, 4100.2, 4200.2, 4300.2, 4400.2, 4500.2, 4600.2, 4700.2, 4800.2, 4900.2, 5000.2, 5100.2, 5200.2, 5300.2, 5400.2, 5500.2, 5600.2, 5700.2, 5800.2, 5900.2, 6000.2, 6100.2, 6200.2, 6300.2, 6400.1, 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6500.2–6500.4, 6600.2–6600.4, 6700.2–6700.4, 6800.2–6800.4, 6900.1, 8000.2–8000.4, 8100.2–8100.4, 8200.2–8200.4, 8300.2–8300.4, 8400.1, 8500.2–8500.4, 8600.2–8600.4, 8700.2–8700.4, 8800.2–8800.4, 8900.1, 14100.5–14100.9
Did Specimen Split?
No 8000.2–8000.4, 8100.2–8100.4, 8200.2–8200.4, 8300.2–8300.4, 8400.1, 8500.2–8500.4, 8600.2–8600.4, 8700.2–8700.4, 8800.2–8800.4, 8900.1
DO733-1D Lot ID 18000.1–18000.11
Double Notch Bend Specimen Type 2000.3, 7000.2, 14700.2, 14700.11, 14700.20, 14800.2, 14800.11, 14800.20, 14900.2, 14900.11, 15000.2, 15000.11, 15000.20, 15100.2, 15100.11, 15100.20, 15200.2, 15200.11
Double U-Groove Joint Preparation 10800.4–10800.6, 10900.4–10900.6, 11000.4–11000.6, 12300.4–12300.6
Double V-Groove Joint Preparation 7200.7–7200.8, 7200.13, 10500.4–10500.6, 11500.4–11500.6, 12300.8–12300.14, 14500.1–14500.47, 14600.1–14600.47, 16500.1, 16500.5
Downhand IG Welding Position 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 3100.2–3100.10, 3200.1, 3200.4–3200.20, 7400.2–7400.10, 7500.1, 7500.4–7500.20, 14200.1–14200.48, 14300.1–14300.48, 14400.1–14400.48, 14500.1–14500.47, 14600.1–14600.47
Downhand Welding Position 7200.7–7200.8, 7200.13, 13800.8–13800.36, 13900.1, 13900.4–13900.26, 14000.1–14000.22, 16500.1, 16500.5, 19000.1, 19100.1, 19200.1, 19300.1, 19400.1, 19600.7, 19600.14
DTNSRDC Producer 19000.1, 19100.1, 19200.1
Dynamic Tear Specimen Type 2000.8, 7100.5, 7200.5, 7200.11, 7200.15, 7300.5, 7800.5, 7900.5, 9000.7, 9100.7, 12500.5, 12600.9–12600.13, 12700.6, 12800.4, 12900.4, 13000.4, 13100.4, 13300.4, 13400.4, 13500.4, 13600.4, 15300.5, 15400.5, 15500.6, 15600.5, 15700.7, 15800.7, 15900.5, 16000.5, 16100.7, 16200.5, 16300.5, 16400.5, 16600.6, 17000.5, 17000.10, 17200.5, 17200.10, 17200.15, 17200.20, 17200.25, 17200.30, 17200.35, 17200.40, 17200.45, 17900.5, 17900.10, 17900.15, 17900.20, 17900.25, 17900.30, 17900.35, 17900.40, 17900.45, 18000.5, 18000.10, 18100.5, 18100.10, 18300.5, 18300.10, 18300.15, 18300.20, 18300.25, 18300.30, 18300.35, 18300.40, 18300.45,

18600.5, 18700.4, 18800.5, 18900.5, 19000.6, 19100.6, 19200.6, 19300.6, 19400.6, 19500.2, 19600.5, 19600.12, 19600.20

Dynamic Tear Test Type 2000.8, 7100.5, 7200.5, 7200.11, 7200.15, 7300.5, 7800.5, 7900.5, 9000.7, 9100.7, 12500.5, 12600.9–12600.13, 12700.6, 12800.4, 12900.4, 13000.4, 13100.4, 13300.4, 13400.4, 13500.4, 13600.4, 15300.5, 15400.5, 15500.6, 15600.5, 15700.7, 15800.7, 15900.5, 16000.5, 16100.7, 16200.5, 16300.5, 16400.5, 16600.6, 17000.5, 17000.10, 17200.5, 17200.10, 17200.15, 17200.20, 17200.25, 17200.30, 17200.35, 17200.40, 17200.45, 17900.5, 17900.10, 17900.15, 17900.20, 17900.25, 17900.30, 17900.35, 17900.40, 17900.45, 18000.5, 18000.10, 18100.5, 18100.10, 18300.5, 18300.10, 18300.15, 18300.20, 18300.25, 18300.30, 18300.35, 18300.40, 18300.45, 18600.5, 18700.4, 18800.5, 18900.5, 19000.6, 19100.6, 19200.6, 19300.6, 19400.6, 19500.2, 19600.5, 19600.12, 19600.20

E

E 208 Standard Method 1000.14, 1100.6, 1200.6, 1300.6, 1400.6, 1500.6, 1600.6, 1700.6, 1800.6, 1900.6, 2000.7, 3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 3800.1, 3900.1, 4000.1, 4100.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 4700.1, 4800.1, 4900.1, 5000.1, 5100.1, 5200.1, 5300.1, 5400.1, 5500.1, 5600.1, 5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1, 7100.4, 7200.4, 7200.10, 13800.7

E 23 Standard Method 7100.2, 16500.3, 16500.6, 18600.3, 18700.2, 18800.3, 18900.3, 19000.4, 19100.4, 19200.4, 19300.4, 19400.4, 19600.3, 19600.10, 19600.16–19600.18

E 604 Standard Method 2000.8, 7100.5, 7200.5, 7200.11, 7200.15, 18600.5, 18700.4, 18800.5, 18900.5, 19000.6, 19100.6, 19200.6, 19300.6, 19400.6, 19600.5, 19600.12, 19600.20

E 8 Standard Method 7100.1, 7200.1, 7200.7, 16500.2, 16500.5, 18600.1, 18800.1, 18900.1, 19000.2, 19100.2, 19200.2, 19300.2, 19400.2, 19600.1, 19600.8, 19600.14

E Lot ID 5300.1–5300.4

E10018 Filler Specification 16500.1, 16500.5

E11018-M Filler Specification 9900.7–9900.9, 10200.8–10200.10

E22000/1E Filler Name 19100.1, 19200.1, 19300.1, 19400.1

E318 Standard Method 12600.2

E7018 Filler Specification 3100.2–3100.10, 7600.2–7600.20

E70-EA2 Filler Specification 7700.1, 7700.4–7700.20

E72-EW-W Filler Specification 9300.1, 9300.4–9300.20

E8018 Filler Specification 10500.4–10500.6

E8018-C1 Filler Specification 12300.8–12300.14

E8018C-2 Filler Specification 9200.2–9200.20, 9700.7–9700.9

E8018-C3 Filler Specification 7400.2–7400.10

E813 Standard Method 7800.2, 7900.2, 9000.6, 9100.2, 12500.2, 12700.2, 15700.2, 15800.2, 15900.2, 16100.2, 19000.3, 19100.3, 19200.3, 19300.3, 19400.3

EF2-F2 Filler Specification 7500.1, 7500.4–7500.20

electric furnace Melting Practice 5400.1, 5500.1, 5600.1

ESW Weld Type 6400.4, 6400.7, 6500.1, 6500.4, 8000.1, 8000.4, 8600.1, 8600.4

F

F Heat Treatment 1000.1–1000.3, 1000.6, 1000.9, 1000.12–1000.14, 7800.1, 7900.1

F72-EM12K Filler Specification 3200.1, 3200.4–3200.20

F96 Flux Type 7500.1, 7500.4–7500.20

FCA Weld Type 14700.1–14700.3, 14700.6–14700.8, 14700.11–14700.12, 14700.15–14700.17, 14700.20–14700.21, 14700.24–14700.26, 14800.1–14800.3, 14800.6–14800.8, 14800.11–14800.12, 14800.15–14800.17, 14800.20–14800.21, 14800.24–14800.26, 14900.1–14900.3, 14900.6–14900.8, 14900.11–14900.12, 14900.15–14900.17, 15000.1–15000.3, 15000.6–15000.8, 15000.11–15000.12, 15000.15–15000.17, 15000.20–15000.21, 15000.24–15000.26, 15100.1–15100.3, 15100.6–15100.8, 15100.11–15100.12, 15100.15–15100.17, 15100.20–15100.21, 15100.24–15100.26, 15200.1–15200.3, 15200.6–15200.8, 15200.11–15200.12, 15200.15–15200.17

Filler Alloy

- **Hardex-N** 1100.6, 1200.6, 1300.6, 1400.6, 1500.6, 1600.6, 1700.6, 1800.6, 1900.6, 7100.4, 7200.4, 7200.10

Filler Name

- **Armco W18** 7200.7–7200.8, 7200.13, 10900.4–10900.6, 11500.4–11500.6
- **Armco W24** 10200.4–10200.6, 10800.4–10800.6, 11000.4–11000.6, 12300.4–12300.6
- **Armco W25** 9900.7–9900.9
- **E22000/1E** 19100.1, 19200.1, 19300.1, 19400.1
- **Hobart25P** 6400.4, 6400.7, 6400.10, 6400.13, 6500.1, 6500.4, 6600.1, 6600.4
- **L-50N** 13800.8–13800.36, 14200.1–14200.48
- **LindeWS** 8000.1, 8000.4, 8100.1, 8100.4, 8200.1, 8200.4, 8600.1, 8600.4, 8700.1, 8700.4
- **Nk203NiC** 14700.1–14700.3, 14700.6–14700.8, 14700.11–14700.12, 14700.15–14700.17, 14700.20–

14700.21, 14700.24–14700.26, 14800.1–14800.3, 14800.6–14800.8, 14800.11–14800.12, 14800.15–14800.17, 14800.20–14800.21, 14800.24–14800.26, 14900.1–14900.3, 14900.6–14900.8, 14900.11–14900.12, 14900.15–14900.17, 15000.1–15000.3, 15000.6–15000.8, 15000.11–15000.12, 15000.15–15000.17, 15000.20–15000.21, 15000.24–15000.26, 15100.1–15100.3, 15100.6–15100.8, 15100.11–15100.12, 15100.15–15100.17, 15100.20–15100.21, 15100.24–15100.26, 15200.1–15200.3, 15200.6–15200.8, 15200.11–15200.12, 15200.15–15200.17

TW8544 6400.16, 6400.19–6400.21, 6700.1, 6700.4, 6800.1, 6800.4, 8300.1, 8300.4, 8500.1, 8500.4, 8800.1, 8800.4

W36 13900.1, 13900.4–13900.26, 14000.1–14000.22, 14300.1–14300.48, 14400.1–14400.48, 14500.1–14500.47, 14600.1–14600.47

Filler Specification

E10018 16500.1, 16500.5

E11018-M 9900.7–9900.9, 10200.8–10200.10

E7018 3100.2–3100.10, 7600.2–7600.20

E70-EA2 7700.1, 7700.4–7700.20

E72-EW-W 9300.1, 9300.4–9300.20

E8018 10500.4–10500.6

E8018-C1 12300.8–12300.14

E8018C-2 9200.2–9200.20, 9700.7–9700.9

E8018-C3 7400.2–7400.10

EF2-F2 7500.1, 7500.4–7500.20

F72-EM12K 3200.1, 3200.4–3200.20

M22000/10 19600.7, 19600.14

M22000/1E 19000.1

PFH-60A 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16

Final Processing

A,Q,T 16700.1, 16700.11, 16700.20, 16800.1, 16800.5, 16900.1, 16900.5, 17000.1, 17000.7, 17100.1, 17100.11, 17200.1, 17200.17, 17200.32, 17300.1, 17300.11, 17400.1, 17400.11, 17400.20, 17500.1, 17500.11, 17600.1, 17600.5, 17700.1, 17700.11, 17700.20, 17800.1, 17800.5, 17900.1, 17900.17, 17900.32, 18000.1, 18000.7, 18100.1, 18100.7, 18200.1, 18200.11, 18200.20, 18300.1, 18300.17, 18300.32, 18400.1, 18400.11, 18400.20, 18500.1, 18500.5

A,R 1000.1–1000.3, 1000.6, 1000.9, 1000.12–1000.14, 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1, 3100.1, 3200.1, 3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 3800.1, 3900.1, 4000.1, 4100.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 4700.1, 4800.1, 4900.1, 5000.1, 5100.1, 5200.1, 5300.1, 5400.1, 5500.1, 5600.1, 5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1, 7000.1, 7600.1, 7700.1, 7800.1, 7900.1

H 14700.1, 14800.1, 14900.1, 15000.1, 15100.1, 15200.1

K 9400.1, 9500.1, 9500.4, 9600.1, 9700.1, 9700.4, 9800.1, 9900.1, 9900.4, 9900.7, 10000.1, 10100.1, 10200.1, 10300.1, 10300.4, 10400.1, 10500.1, 10600.1, 10700.1, 10700.4, 10800.1, 10900.1, 11000.1, 11100.1, 11200.1, 11200.4, 11300.1, 11400.1, 11500.1, 11600.1, 11700.1, 11800.1, 11800.5, 11900.1, 11900.4, 12000.1, 12100.1, 12200.1, 12300.1, 12400.1

N 2000.1, 2800.1–2800.3, 2800.6, 2900.1–2900.3, 2900.6, 3000.1–3000.3, 3000.6, 7300.1, 7400.1, 7500.1, 9000.1, 9100.1, 9200.1, 9300.1, 13800.2, 13800.5, 13900.1, 14000.4, 14100.1, 14200.1, 14300.1, 14400.1, 14500.1, 14600.1, 15300.1, 15400.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1

N,A 13800.1–13800.3, 14100.4–14100.5

N,C,A 14100.7–14100.9

Q,K 12500.1, 12700.1

Q,T 2100.1–2100.3, 2100.6, 2200.1–2200.3, 2200.6, 2300.1–2300.3, 2400.1–2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1–2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1, 7100.1, 7200.1, 12600.1, 16400.1, 18600.1, 18700.1, 18800.1, 18900.1, 19500.1, 19600.1

Q,T,W 19600.7

W 19000.1, 19100.1, 19200.1, 19300.1, 19400.1

Final surface Location wrt Surface 11500.4–11500.6, 12300.4–12300.14, 13800.8–13800.18, 13800.24–13800.32, 13900.1, 13900.4–13900.22, 14000.4–14000.22, 14200.6–14200.14, 14200.28–14200.36, 14300.6–14300.14, 14300.28–14300.36, 14400.6–14400.14, 14400.28–14400.36, 14500.6–14500.14, 14500.26–14500.34, 14600.6–14600.14, 14600.26–14600.34, 14700.3, 14700.12, 14700.21, 14800.3, 14800.12, 14800.21, 14900.3, 14900.12, 15000.3, 15000.12, 15000.21, 15100.3, 15100.12, 15100.21, 15200.3, 15200.12

Flat Specimen Type 13800.1–13800.2

Flat Welding Position 9700.7–9700.9, 9900.7–9900.9, 10200.4–10200.10, 10800.4–10800.6, 10900.4–10900.6, 11000.4–11000.6, 11500.4–11500.6, 12300.4–12300.6

Flux Name

BL55 13900.1, 13900.4–13900.26, 14000.4–14000.22, 14300.1–14300.48, 14400.1–14400.48, 14500.1–14500.47, 14600.1–14600.47

Hobart201 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6500.1, 6500.4, 6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 8000.1, 8000.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4, 8600.1, 8600.4, 8700.1, 8700.4, 8800.1, 8800.4

Linc 860 7200.7–7200.8, 7200.13

Linc 880 11500.4–11500.6
Linc 882 10900.4–10900.6
Linde166p 10200.4–10200.6, 10800.4–10800.6, 11000.4–11000.6, 12300.4–12300.6
Linde709-5 9900.7–9900.9
US-43 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16
Flux Type
Basic 16500.1, 16500.5
F96 7500.1, 7500.4–7500.20
Fracture Toughness Test Type 2000.3, 7000.2, 7800.2, 7900.2, 9000.6, 9100.2, 12500.2, 12600.2, 12700.2, 13800.34–13800.37, 13900.24–13900.26, 14000.2–14000.3, 14100.3, 14200.2–14200.5, 14300.2–14300.5, 14400.2–14400.5, 14500.2–14500.5, 14600.2–14600.5, 14700.2, 14700.11, 14700.20, 14800.2, 14800.11, 14800.20, 14900.2, 14900.11, 15000.2, 15000.11, 15000.20, 15100.2, 15100.11, 15100.20, 15200.2, 15200.11, 15700.2, 15800.2, 15900.2, 16100.2, 16600.1, 18600.2, 18700.1, 18800.2, 18900.2, 19000.3, 19100.3, 19200.3, 19300.3, 19400.3, 19600.2, 19600.9, 19600.15
FRM Lot ID 19000.1–19000.7
FRN Lot ID 19100.1–19100.7
FRO Lot ID 19600.7–19600.13
FRP Lot ID 19600.14–19600.21
Full cross section Location wrt Surface 13800.34–13800.36, 13900.24–13900.26, 14000.1–14000.3, 14200.1–14200.5, 14300.1–14300.5, 14400.1–14400.5, 14500.1–14500.5, 14600.1–14600.5, 14600.46–14600.47
Full Specimen Type 1100.2, 1200.2, 1300.2, 1400.2, 1500.2, 1600.2, 1700.2, 1800.2, 1900.2, 2000.4, 2100.1–2100.3, 2100.6, 2200.1–2200.3, 2200.6, 2300.1–2300.3, 2300.6, 2400.1–2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.2–2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2600.1–2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.2–2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 2800.3, 2800.6, 2900.3, 2900.6, 3000.3, 3000.6, 3100.2–3100.10, 3200.2–3200.20, 3700.2, 3800.2, 3900.2, 4000.2, 4100.2, 4200.2, 4300.2, 4400.2, 4500.2, 4600.2, 4700.2, 4800.2, 4900.2, 5000.2, 5100.2, 5200.2, 5300.2, 5400.2, 5500.2, 5600.2, 5700.2, 5800.2, 5900.2, 6000.2, 6100.2, 6200.2, 6300.2, 6400.1, 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6500.2–6500.4, 6600.2–6600.4, 6700.2–6700.4, 6800.2–6800.4, 6900.1, 7000.5, 7100.2, 7200.2, 7200.8, 7200.13, 7300.2, 7400.2–7400.10, 7500.2–7500.20, 7600.2–7600.20, 7700.2–7700.20, 7800.3, 7900.3, 8000.2–8000.4, 8100.2–8100.4, 8200.2–8200.4, 8300.2–8300.4, 8400.1, 8500.2–8500.4, 8600.2–8600.4, 8700.2–8700.4, 8800.2–8800.4, 8900.1, 9000.2, 9100.3, 9200.2–9200.20, 9300.2–9300.20, 10100.2, 10300.2, 10300.5, 10400.2, 10500.2–10500.6, 10600.1, 10700.2–10700.4, 10800.2–10800.6, 10900.2–10900.6, 11000.2–11000.6, 11100.1, 11200.2, 11200.5, 11500.4–11500.6, 11800.2, 11800.5, 11900.2–11900.4, 12000.2, 12100.2, 12200.2, 12300.2–12300.14, 12400.2, 12500.3, 12600.3, 12600.6, 12700.3, 12800.2, 12900.2, 13000.2, 13100.2, 13200.2, 13300.2, 13400.2, 13500.2, 13600.2, 13700.2, 13800.8–13800.32, 13900.2–13900.22, 14100.5–14100.9, 14700.4–14700.6, 14700.9, 14700.13–14700.15, 14700.18, 14700.22–14700.24, 14700.27, 14800.4–14800.6, 14800.9, 14800.13–14800.15, 14800.18, 14800.22–14800.24, 14800.27, 14900.4–14900.6, 14900.9, 14900.13–14900.15, 14900.18, 15000.4–15000.6, 15000.9, 15000.13–15000.15, 15000.18, 15000.22–15000.24, 15000.27, 15100.4–15100.6, 15100.9, 15100.13–15100.15, 15100.18, 15100.22–15100.24, 15100.27, 15200.4–15200.6, 15200.9, 15200.13–15200.15, 15200.18, 15300.2, 15400.2, 15500.2, 15600.2, 15700.3, 15800.3, 15900.3, 16000.2, 16100.3, 16200.2, 16300.2, 16400.2, 16500.3, 16500.6, 16700.2, 16700.6, 16700.9, 16700.12, 16700.15, 16700.18, 16700.21, 16700.24, 16700.27, 16800.2, 16800.6, 16900.2, 16900.6, 17000.2, 17000.8, 17100.2, 17100.6, 17100.9, 17100.12, 17100.15, 17100.18, 17200.2, 17200.8, 17200.13, 17200.18, 17200.23, 17200.28, 17200.33, 17200.38, 17200.43, 17300.2, 17300.6, 17300.9, 17300.12, 17300.15, 17300.18, 17400.2, 17400.6, 17400.9, 17400.12, 17400.15, 17400.18, 17400.21, 17400.24, 17400.27, 17500.2, 17500.6, 17500.9, 17500.12, 17500.15, 17500.18, 17600.2, 17600.6, 17700.2, 17700.6, 17700.9, 17700.12, 17700.15, 17700.18, 17700.21, 17700.24, 17700.27, 17800.2, 17800.6, 17900.2, 17900.8, 17900.13, 17900.18, 17900.23, 17900.28, 17900.33, 17900.38, 17900.43, 18000.2, 18000.8, 18100.2, 18100.8, 18200.2, 18200.6, 18200.9, 18200.12, 18200.15, 18200.18, 18200.21, 18200.24, 18200.27, 18300.2, 18300.8, 18300.13, 18300.18, 18300.23, 18300.28, 18300.33, 18300.38, 18300.43, 18400.2, 18400.6, 18400.9, 18400.12, 18400.15, 18400.18, 18400.21, 18400.24, 18400.27, 18500.2, 18500.6, 18600.3, 18700.2, 18800.3, 18900.3, 19000.4, 19100.4, 19200.4, 19300.4, 19400.4, 19500.5, 19600.3, 19600.10, 19600.16–19600.18
Fully Killing Process 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1, 2000.1, 2100.1–2100.3, 2100.6, 2200.1–2200.3, 2200.6, 2300.1–2300.3, 2400.1–2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1–2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1
Fusion line Location wrt Weld 2500.1, 2700.1, 3100.2–3100.10, 3200.4–3200.6, 3200.10, 3200.14, 3200.18, 7400.2–7400.10, 7500.4, 7500.8–7500.10,

7500.14, 7500.18, 7600.4, 7600.8, 7600.12, 7600.16, 7600.20, 7700.4, 7700.8, 7700.12, 7700.16, 7700.20, 9200.4, 9200.8, 9200.12, 9200.16, 9200.20, 9300.4, 9300.8, 9300.12, 9300.16, 9300.20, 9700.9, 9900.9, 10200.6, 10200.10, 10500.6, 10800.6, 10900.6, 11000.6, 11500.6, 12300.6, 12300.10, 12300.14, 13800.10, 13800.22, 13800.26, 13800.36, 13900.4, 13900.16, 13900.26, 14000.3, 14000.6, 14000.16, 14200.3–14200.5, 14200.8, 14200.20, 14200.30, 14200.42, 14300.3–14300.5, 14300.8, 14300.20, 14300.30, 14300.42, 14400.3–14400.5, 14400.8, 14400.20, 14400.30, 14400.42, 14500.3–14500.5, 14500.8, 14500.18, 14500.28, 14500.38, 14600.3–14600.5, 14600.8, 14600.18, 14600.28, 14600.38

FVD Lot ID 19200.1–19200.7

FXF Lot ID 19400.1–19400.7

FXG Lot ID 19300.1–19300.7

G

G Lot ID 4100.1–4100.3

G9011 Lot ID 2300.1–2300.8

G9837 Lot ID 2600.1–2600.20, 2700.1–2700.18

H

H Final Processing 14700.1, 14800.1, 14900.1, 15000.1, 15100.1, 15200.1

H Lot ID 5000.1–5000.4

Hardex-N Filler Alloy 1100.6, 1200.6, 1300.6, 1400.6, 1500.6, 1600.6, 1700.6, 1800.6, 1900.6, 7100.4, 7200.4, 7200.10

Heat Treatment

- **A,F** 2800.2, 2800.6, 2900.1–2900.3, 2900.6, 3000.1–3000.3, 3000.6
- **A,F,A,F,Q,T** 2100.2, 2100.6, 2200.1–2200.3, 2300.1–2300.3, 2400.1–2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1
- **A,F,N** 2800.1–2800.3
- **A,K** 12800.1, 12900.1, 13000.1, 13100.1, 13200.1, 13300.1, 13400.1, 13500.1, 13600.1, 13700.1
- **A,Q,T** 16700.1, 16700.11, 16700.20, 16800.1, 16800.5, 16900.1, 16900.5, 17000.1, 17000.7, 17100.1, 17100.11, 17200.1, 17200.17, 17200.32, 17300.1, 17300.11, 17400.1, 17400.11, 17400.20, 17500.1, 17500.11, 17600.1, 17600.5, 17700.1, 17700.11, 17700.20, 17800.1, 17800.5, 17900.1, 17900.17, 17900.32, 18000.1, 18000.7, 18100.1, 18100.7, 18200.1, 18200.11, 18200.20, 18300.1, 18300.17, 18300.32, 18400.1, 18400.11, 18400.20, 18500.1, 18500.5
- **F** 1000.1–1000.3, 1000.6, 1000.9, 1000.12–1000.14, 7800.1, 7900.1
- **N** 7300.1, 9000.1, 9100.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1
- **Q,K** 9400.1, 9500.1, 9500.4, 9600.1, 9700.1, 9700.4, 9800.1, 9900.1, 9900.4, 9900.7, 10000.1, 10100.1, 10200.1, 10300.1, 10300.4, 10400.1, 10500.1, 10600.1, 10700.1, 10700.4, 10800.1, 10900.1, 11000.1, 11100.1, 11200.1, 11200.4, 11300.1, 11400.1, 11500.1, 11600.1, 11700.1, 11800.1, 11800.5, 11900.1, 11900.4, 12000.1, 12100.1, 12200.1, 12300.1, 12400.1, 12500.1, 12700.1
- **Q,T** 7100.1, 7200.1, 12600.1, 15300.1, 15400.1, 15500.1, 15600.1, 16400.1, 18600.1, 18700.1, 18800.1, 18900.1, 19500.1, 19600.1
- **Q,T,W** 19600.7
- **W** 19000.1, 19100.1, 19200.1, 19300.1, 19400.1

HIFAB Source 14700.1, 14800.1, 14900.1, 15000.1, 15100.1, 15200.1

Hobart201 Flux Name 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6500.1, 6500.4, 6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 8000.1, 8000.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4, 8600.1, 8600.4, 8700.1, 8700.4, 8800.1, 8800.4

Hobart25P Filler Name 6400.4, 6400.7, 6400.10, 6400.13, 6500.1, 6500.4, 6600.1, 6600.4

HY100 Material Name 19500.1–19500.7, 19600.1–19600.21

HY80 Material Name 16500.1–16500.7, 16600.1–16600.7, 16700.1–16700.28, 16800.1–16800.7, 16900.1–16900.7, 17000.1–17000.11, 17100.1–17100.19, 17200.1–17200.46, 17300.1–17300.19, 17400.1–17400.28, 17500.1–17500.19, 17600.1–17600.7, 17700.1–17700.28, 17800.1–17800.7, 17900.1–17900.46, 18000.1–18000.11, 18100.1–18100.11, 18200.1–18200.28, 18300.1–18300.46, 18400.1–18400.28, 18500.1–18500.7, 18600.1–18600.6, 18700.1–18700.5, 18800.1–18800.6, 18900.1–18900.6, 19000.1–19000.7, 19100.1–19100.7, 19200.1–19200.7, 19300.1–19300.7, 19400.1–19400.7

I

I Loading Type 18600.2, 18700.1, 18800.2, 18900.2, 19000.3, 19100.3, 19200.3, 19300.3, 19400.3, 19600.2, 19600.9, 19600.15

I Lot ID 5100.1–5100.4

IG Welding Position 7600.2–7600.20, 7700.1, 7700.4–7700.20, 9200.2–9200.20, 9300.1, 9300.4–9300.20, 14700.1–14700.3, 14700.6–14700.8, 15000.1–15000.3, 15000.6–15000.8, 15000.11–15000.12, 15000.15–15000.17, 15100.11–15100.12, 15100.15–15100.17, 15200.1–15200.3, 15200.6–15200.8

Ingot Position

- **Bottom** 2100.2, 2100.6, 2200.2, 2200.6, 2300.2, 2400.2, 2400.6, 2400.12, 2400.18, 2600.2, 2600.6, 2600.12, 2600.18, 16700.20, 16800.5, 16900.5, 17000.7, 17100.11, 17200.32, 17300.11, 17400.20, 17500.11, 17600.5, 17700.20, 17800.5, 17900.32, 18000.7, 18100.7, 18200.20, 18300.32, 18400.20, 18500.5
- **Concast** 1000.1–1000.3, 1000.6, 1000.9, 1000.12–1000.14, 1100.1, 1200.1, 1300.1, 1400.1, 1500.1,

1600.1, 1700.1, 1800.1, 1900.1, 2800.1–2800.3, 2800.6, 2900.1–2900.3, 2900.6, 3000.1–3000.3, 3000.6
Mid 16700.11, 17200.17, 17400.11, 17700.11, 17900.17, 18200.11, 18300.17, 18400.11
Top 2100.1–2100.3, 2200.1–2200.3, 2300.1–2300.3, 2400.1–2400.3, 2400.9, 2400.15, 2500.1, 2600.1–2600.3, 2600.9, 2600.15, 2700.1, 16700.1, 16800.1, 16900.1, 17000.1, 17100.1, 17200.1, 17300.1, 17400.1, 17500.1, 17600.1, 17700.1, 17800.1, 17900.1, 18000.1, 18100.1, 18200.1, 18300.1, 18400.1, 18500.1

J

J131267 Lot ID 1000.1–1000.14
JIcpr
Modified Standard 18600.2, 18700.1, 18800.2, 18900.2, 19000.3, 19100.3, 19200.3, 19300.3, 19400.3, 19600.2, 19600.9, 19600.15
Per Standard 7800.2, 7900.2, 9000.6, 9100.2, 12500.2, 12600.2, 12700.2, 15700.2, 15800.2, 15900.2, 16100.2
JISZ3121 Standard Method 14600.46–14600.47
Joint Preparation
1/2 V-Groove 13800.8–13800.36, 13900.1, 13900.4–13900.26, 14000.1–14000.22
Double U-Groove 10800.4–10800.6, 10900.4–10900.6, 11000.4–11000.6, 12300.4–12300.6
Double V-Groove 7200.7–7200.8, 7200.13, 10500.4–10500.6, 11500.4–11500.6, 12300.8–12300.14, 14500.1–14500.47, 14600.1–14600.47, 16500.1, 16500.5
K-Groove 3100.2–3100.10, 7400.2–7400.10, 7600.2–7600.20, 9200.2–9200.20, 9300.1, 9300.4–9300.20, 14200.1–14200.48, 14300.1–14300.48, 14400.1–14400.48
No Groove 6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4, 8700.1, 8700.4, 8800.1, 8800.4
Smooth Butt 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6500.1, 6500.4, 8000.1, 8000.4, 8600.1, 8600.4, 10200.4–10200.6
U Groove 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16
V Groove 3200.1, 3200.4–3200.20, 7500.1, 7500.4–7500.20, 7700.1, 7700.4–7700.20, 9700.7–9700.9, 9900.7–9900.9, 10200.8–10200.10, 14700.1–14700.3, 14700.6–14700.8, 14700.11–14700.12, 14700.15–14700.17, 14700.20–14700.21, 14700.24–14700.26, 14800.1–14800.3, 14800.6–14800.8, 14800.11–14800.12, 14800.15–14800.17, 14800.20–14800.21, 14800.24–14800.26, 14900.1–14900.3, 14900.6–14900.8, 14900.11–14900.12, 14900.15–14900.17, 15000.1–15000.3, 15000.6–15000.8, 15000.11–15000.12, 15000.15–15000.17, 15000.20–15000.21, 15000.24–15000.26, 15100.1–15100.3, 15100.6–15100.8, 15100.11–15100.12, 15100.15–15100.17, 15100.20–15100.21, 15100.24–15100.26, 15200.1–15200.3, 15200.6–15200.8, 15200.11–15200.12, 15200.15–15200.17

K

K Final Processing 9400.1, 9500.1, 9500.4, 9600.1, 9700.1, 9700.4, 9800.1, 9900.1, 9900.4, 9900.7, 10000.1, 10100.1, 10200.1, 10300.1, 10300.4, 10400.1, 10500.1, 10600.1, 10700.1, 10700.4, 10800.1, 10900.1, 11000.1, 11100.1, 11200.1, 11200.4, 11300.1, 11400.1, 11500.1, 11600.1, 11700.1, 11800.1, 11800.5, 11900.1, 11900.4, 12000.1, 12100.1, 12200.1, 12300.1, 12400.1
K Killing Process 5400.1, 5500.1, 5600.1, 5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1
K1325 Lot ID 2400.1–2400.20, 2500.1–2500.18
k21-6425 Lot ID 3000.1–3000.8
K21-7102 Lot ID 2900.1–2900.8
K22-6296 Lot ID 2800.1–2800.8
KB6479 Lot ID 2100.1–2100.8, 2200.1–2200.8
K-Groove Joint Preparation 3100.2–3100.10, 7400.2–7400.10, 7600.2–7600.20, 9200.2–9200.20, 9300.1, 9300.4–9300.20, 14200.1–14200.48, 14300.1–14300.48, 14400.1–14400.48
Killing Process
Al-killed 2800.1–2800.3, 2800.6, 2900.1–2900.3, 2900.6, 3000.1–3000.3, 3000.6
Fully 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1, 2000.1, 2100.1–2100.3, 2100.6, 2200.1–2200.3, 2200.6, 2300.1–2300.3, 2400.1–2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1–2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1
K 5400.1, 5500.1, 5600.1, 5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1
Si-Al 7400.1, 7500.1
Silicon 1000.1–1000.3, 1000.6, 1000.9, 1000.12–1000.14
SK 3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 3800.1, 3900.1, 4000.1, 4100.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 4700.1, 4800.1, 4900.1, 5000.1, 5100.1, 5200.1, 5300.1
Kobe Producer 2100.1–2100.3, 2100.6, 2200.1–2200.3, 2200.6, 2300.1–2300.3, 2400.1–2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1–2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1
Kobe Source 2100.1–2100.3, 2100.6, 2200.1–2200.3, 2200.6, 2300.1–2300.3, 2400.1–2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1–2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1
KONKUL-1 Reference 3100.1–3100.11, 3200.1–3200.21, 7400.1–7400.11, 7500.1–7500.21, 7600.1–

7600.21, 7700.1–7700.21, 9200.1–9200.21, 9300.1–9300.21

L

L467OV559 Lot ID 19600.1–19600.6
L-50N Filler Name 13800.8–13800.36, 14200.1–14200.48
Ladle Composition Position 1100.1–1100.2, 1100.5–1100.6, 1200.1–1200.2, 1200.5–1200.6, 1300.1–1300.2, 1300.5–1300.6, 1400.1–1400.2, 1400.5–1400.6, 1500.1–1500.2, 1500.5–1500.6, 1600.1–1600.2, 1600.5–1600.6, 1700.1–1700.2, 1700.5–1700.6, 1800.1–1800.2, 1800.5–1800.6, 1900.1–1900.2, 1900.5–1900.6, 15500.1–15500.2, 15500.5–15500.7, 15600.1–15600.6, 16700.1–16700.28, 16800.1–16800.7, 16900.1–16900.7, 17000.1–17000.11, 17100.1–17100.19, 17200.1–17200.46, 17300.1–17300.19, 17400.1–17400.28, 17500.1–17500.19, 17600.1–17600.7, 17700.1–17700.28, 17800.1–17800.7, 17900.1–17900.46, 18000.1–18000.11, 18100.1–18100.11, 18200.1–18200.28, 18300.1–18300.46, 18400.1–18400.28, 18500.1–18500.7
Linc 860 Flux Name 7200.7–7200.8, 7200.13
Linc 880 Flux Name 11500.4–11500.6
Linc 882 Flux Name 10900.4–10900.6
Linde166p Flux Name 10200.4–10200.6, 10800.4–10800.6, 11000.4–11000.6, 12300.4–12300.6
Linde709-5 Flux Name 9900.7–9900.9
LindeWS Filler Name 8000.1, 8000.4, 8100.1, 8100.4, 8200.1, 8200.4, 8600.1, 8600.4, 8700.1, 8700.4
Loading Type
- **I** 18600.2, 18700.1, 18800.2, 18900.2, 19000.3, 19100.3, 19200.3, 19300.3, 19400.3, 19600.2, 19600.9, 19600.15
- **Slow** 2000.3, 7000.2, 14700.2, 14700.11, 14700.20, 14800.2, 14800.11, 14800.20, 14900.2, 14900.11, 15000.2, 15000.11, 15000.20, 15100.2, 15100.11, 15100.20, 15200.2, 15200.11

Location
- **B** 1000.2, 1000.6
- **T** 1000.1–1000.3, 1000.9, 1000.12–1000.14

Location wrt Surface
- **1/4T** 7200.7–7200.8, 7200.13
- **Back surface at root** 14200.16, 14200.38, 14300.16, 14300.38, 14400.16, 14400.38, 14500.16–14500.24, 14500.36–14500.44, 14600.16–14600.24, 14600.36–14600.44, 14700.8, 14700.17, 14700.26, 14800.8, 14800.17, 14800.26, 14900.8, 14900.17, 15000.8, 15000.17, 15000.26, 15100.8, 15100.17, 15100.26, 15200.8, 15200.17
- **Back surface not root** 13800.20–13800.22, 14200.18–14200.26, 14200.40–14200.48, 14300.18–14300.26, 14300.40–14300.48, 14400.18–14400.26, 14400.40–14400.48
- **Final surface** 11500.4–11500.6, 12300.4–12300.14, 13800.8–13800.18, 13800.24–13800.32, 13900.1, 13900.4–13900.22, 14000.4–14000.22, 14200.6–14200.14, 14200.28–14200.36, 14300.6–14300.14, 14300.28–14300.36, 14400.6–14400.14, 14400.28–14400.36, 14500.6–14500.14, 14500.26–14500.34, 14600.6–14600.14, 14600.26–14600.34, 14700.3, 14700.12, 14700.21, 14800.3, 14800.12, 14800.21, 14900.3, 14900.12, 15000.3, 15000.12, 15000.21, 15100.3, 15100.12, 15100.21, 15200.3, 15200.12
- **Full cross section** 13800.34–13800.36, 13900.24–13900.26, 14000.1–14000.3, 14200.1–14200.5, 14300.1–14300.5, 14400.1–14400.5, 14500.1–14500.5, 14600.1–14600.5, 14600.46–14600.47
- **Mid thickness at root** 3100.2–3100.10, 7400.2–7400.10, 7600.2–7600.20, 9200.2–9200.20, 9900.7–9900.9, 10200.4–10200.6
- **Mid thickness not root** 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 3200.1, 3200.4–3200.20, 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6500.1, 6500.4, 6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 7500.1, 7500.4–7500.20, 7700.1, 7700.4–7700.20, 8000.1, 8000.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4, 8600.1, 8600.4, 8700.1, 8700.4, 8800.1, 8800.4, 9300.1, 9300.4–9300.20, 9700.7–9700.9, 10200.8–10200.10, 14700.6, 14700.15, 14700.24, 14800.6, 14800.15, 14800.24, 14900.6, 14900.15, 15000.6, 15000.15, 15000.24, 15100.6, 15100.15, 15100.24, 15200.6, 15200.15
- **Surface** 14700.1, 14700.11, 14700.20, 14800.1, 14800.11, 14800.20, 14900.1, 14900.11, 15000.1, 15000.11, 15000.20, 15100.1, 15100.11, 15100.20, 15200.1, 15200.11

Location wrt Weld
- **11mm in HAZ** 2500.16, 2700.16, 3200.1, 3200.8, 3200.12, 3200.16, 3200.20, 6400.4, 6400.10, 6400.16, 6500.1, 6600.1, 6700.1, 6800.1, 7200.7–7200.8, 7500.1, 7500.6, 7500.12, 7500.16, 7500.20, 7600.2, 7600.6, 7600.10, 7600.14, 7600.18, 7700.1, 7700.6, 7700.10, 7700.14, 7700.18, 8000.1, 8100.1, 8200.1, 8300.1, 8500.1, 8600.1, 8700.1, 8800.1, 9200.2, 9200.6, 9200.10, 9200.14, 9200.18, 9300.1, 9300.6, 9300.10, 9300.14, 9300.18, 9700.7, 9900.7, 10200.4, 10200.8, 10500.4, 10800.4, 10900.4, 11000.4, 11500.4, 12300.4, 12300.8, 12300.12, 13800.8, 13800.20, 13800.24, 13800.34, 13900.1, 13900.14, 13900.24, 14000.1, 14000.4, 14000.14, 14200.1, 14200.4–14200.6, 14200.16–14200.18, 14200.28, 14200.38–14200.40, 14300.1, 14300.4–14300.6, 14300.16–14300.18, 14300.28, 14300.38–14300.40, 14400.1, 14400.4–14400.6, 14400.16–14400.18, 14400.28,

14400.38–14400.40, 14500.1, 14500.4–14500.6, 14500.16, 14500.26, 14500.36, 14600.1, 14600.4–14600.6, 14600.16, 14600.26, 14600.36, 14700.1–14700.3, 14700.6–14700.8, 14700.11–14700.12, 14700.15–14700.17, 14700.20–14700.21, 14700.24–14700.26, 14800.1–14800.3, 14800.6–14800.8, 14800.11–14800.12, 14800.15–14800.17, 14800.20–14800.21, 14800.24–14800.26, 14900.1–14900.3, 14900.6–14900.8, 14900.11–14900.12, 14900.15–14900.17, 15000.1–15000.3, 15000.6–15000.8, 15000.11–15000.12, 15000.15–15000.17, 15000.20–15000.21, 15000.24–15000.26, 15100.1–15100.3, 15100.6–15100.8, 15100.11–15100.12, 15100.15–15100.17, 15100.20–15100.21, 15100.24–15100.26, 15200.1–15200.3, 15200.6–15200.8, 15200.11–15200.12, 15200.15–15200.17, 16500.1, 16500.5, 19000.1, 19100.1, 19200.1, 19300.1, 19400.1, 19600.7, 19600.14

1mm in HAZ 2500.4, 2700.4, 6400.7, 6400.13, 6400.19–6400.21, 6500.4, 6600.4, 6700.4, 6800.4, 7200.13, 8000.4, 8100.4, 8200.4, 8300.4, 8500.4, 8600.4, 8700.4, 8800.4, 13800.12, 13800.28, 13900.6, 13900.18, 14000.8, 14000.18, 14200.10, 14200.22, 14200.32, 14200.44, 14300.10, 14300.22, 14300.32, 14300.44, 14400.10, 14400.22, 14400.32, 14400.44, 14500.10, 14500.20, 14500.30, 14500.40, 14600.10, 14600.20, 14600.30, 14600.40

3mm in HAZ 2500.7, 2700.7, 13800.14, 13800.30, 13900.8, 13900.20, 14000.10, 14000.20, 14200.12, 14200.24, 14200.34, 14200.46, 14300.12, 14300.24, 14300.34, 14300.46, 14400.12, 14400.24, 14400.34, 14400.46, 14500.12, 14500.22, 14500.32, 14500.42, 14600.12, 14600.22, 14600.32, 14600.42

50% weld, 50% HAZ 13800.18, 13900.12

5mm in HAZ 2500.10, 2700.10, 13800.16, 13800.32, 13900.10, 13900.22, 14000.12, 14000.22, 14200.14, 14200.26, 14200.36, 14200.48, 14300.14, 14300.26, 14300.36, 14300.48, 14400.14, 14400.26, 14400.36, 14400.48, 14500.14, 14500.24, 14500.34, 14500.44, 14600.14, 14600.24, 14600.34, 14600.44

7mm in HAZ 2500.13, 2700.13

Fusion line 2500.1, 2700.1, 3100.2–3100.10, 3200.4–3200.6, 3200.10, 3200.14, 3200.18, 7400.2–7400.10, 7500.4, 7500.8–7500.10, 7500.14, 7500.18, 7600.4, 7600.8, 7600.12, 7600.16, 7600.20, 7700.4, 7700.8, 7700.12, 7700.16, 7700.20, 9200.4, 9200.8, 9200.12, 9200.16, 9200.20, 9300.4, 9300.8, 9300.12, 9300.16, 9300.20, 9700.9, 9900.9, 10200.6, 10200.10, 10500.6, 10800.6, 10900.6, 11000.6, 11500.6, 12300.6, 12300.10, 12300.14, 13800.10, 13800.22, 13800.26, 13800.36, 13900.4, 13900.16, 13900.26, 14000.3, 14000.6, 14000.16, 14200.3–14200.5, 14200.8, 14200.20, 14200.30, 14200.42, 14300.3–14300.5, 14300.8, 14300.20, 14300.30, 14300.42, 14400.3–14400.5, 14400.8, 14400.20, 14400.30, 14400.42, 14500.3–14500.5, 14500.8, 14500.18, 14500.28, 14500.38, 14600.3–14600.5, 14600.8, 14600.18, 14600.28, 14600.38

Transverse 14500.46–14500.47, 14600.46–14600.47

Lot ID

0 3800.1–3800.4

1 3900.1–3900.3

11672 3400.1–3400.4

11682 4600.1–4600.3

11692 4200.1–4200.3

14320 3600.1–3600.4

14453 4500.1–4500.4

14460 3300.1–3300.4

14490 5700.1–5700.3

14500 6000.1–6000.3

17754 5800.1–5800.3, 6100.1–6100.3

17777 6200.1–6200.3

17846 5900.1–5900.3

18553 6300.1–6300.3

40574 12000.1–12000.3, 12100.1–12100.3, 12200.1–12200.3

41509 10200.1–10200.11

42252 10800.1–10800.7, 10900.1–10900.7, 11000.1–11000.7

43731 5400.1–5400.3

43752 3500.1–3500.4

47444 11200.1–11200.6

47574 9600.1–9600.7, 9700.1–9700.10, 9800.1–9800.3

48160 9900.1–9900.10, 10000.1–10000.5, 10100.1–10100.5

48682 11500.1–11500.7, 11600.1–11600.3

50054 10300.1–10300.3, 10400.1–10400.3, 10500.1–10500.7

52100 12400.1–12400.3

52110 12300.1–12300.15

52765 5600.1–5600.3

52797 5500.1–5500.3

54614 11100.1–11100.4

55946 11800.1–11800.6, 11900.1–11900.6

57053 11700.1–11700.6

57221 9400.1–9400.3, 9500.1–9500.6

58568 11300.1–11300.3, 11400.1–11400.3

59609 10300.4–10300.6, 10600.1–10600.4, 10700.1–10700.7

60865 4300.1–4300.3

60868 3700.1–3700.4, 4400.1–4400.4

641661 1100.1–1100.2, 1100.5–1100.6, 1200.1–1200.2, 1200.5–1200.6, 1300.1–1300.2, 1300.5–1300.6

641662 1400.1–1400.2, 1400.5–1400.6, 1500.1–1500.2, 1500.5–1500.6, 1600.1–1600.2, 1600.5–1600.6

642696 1800.1–1800.2, 1800.5–1800.6, 1900.1–1900.2, 1900.5–1900.6

642697 1700.1–1700.2, 1700.5–1700.6

A 5200.1–5200.4
A0161 7800.1–7800.6
A1579-2AA 15900.1–15900.6
A6175-8 16100.1–16100.3, 16100.6–16100.8
A6670-3A 16400.1–16400.6
A6670-3B 16300.1–16300.6
B0469-2C 15400.1–15400.6, 16200.1–16200.6
B1038-2B 18600.1–18600.6
B-1088-3 18800.1–18800.6
B-1088-5 18900.1–18900.6
B1908-3 15500.1–15500.2, 15500.5–15500.7
B1908-5A 15600.1–15600.6
B1908-5B 15800.1–15800.3, 15800.6–15800.8
B5761-2R 19500.1–19500.7
B8478-3 17800.1–17800.7
B8490-2 17500.1–17500.19
B8563-4 17300.1–17300.19
B8601-5 17100.1–17100.19
B8687-1 17600.1–17600.7
B8740-2 17200.1–17200.46
B8740-3 16700.1–16700.28
B8817-1 18400.1–18400.28
B9353-3 16600.1–16600.7
B9671-1E 12600.1–12600.14
C 4000.1–4000.3
C4771-39A 18500.1–18500.7
C5830 16000.1–16000.6
C5830-5T 15300.1–15300.6
C-9283-11 18700.1–18700.5
D2580-4 17400.1–17400.28
D3007-3 15700.1–15700.3, 15700.6–15700.8
D3631-7L 16900.1–16900.7
D3667-3M 17000.1–17000.11
D3703-4B 16800.1–16800.7
D3710-42B 17900.1–17900.46
D3791-2B 7300.1–7300.6
D3974-1B 18200.1–18200.28
D3975-3E 17700.1–17700.28
D4030-4A 18300.1–18300.46
D4179-3B 7900.1–7900.6
D6274-4 9000.1–9000.2, 9000.5–9000.9, 9100.1–9100.3, 9100.6–9100.9
D6873-1A 12500.1–12500.6
D6873-1B 12700.1–12700.7
DO733-1D 18000.1–18000.11
E 5300.1–5300.4
FRM 19000.1–19000.7
FRN 19100.1–19100.7
FRO 19600.7–19600.13
FRP 19600.14–19600.21
FVD 19200.1–19200.7
FXF 19400.1–19400.7
FXG 19300.1–19300.7
G 4100.1–4100.3
G9011 2300.1–2300.8
G9837 2600.1–2600.20, 2700.1–2700.18
H 5000.1–5000.4
I 5100.1–5100.4
J131267 1000.1–1000.14
K1325 2400.1–2400.20, 2500.1–2500.18
k21-6425 3000.1–3000.8
K21-7102 2900.1–2900.8
K22-6296 2800.1–2800.8
KB6479 2100.1–2100.8, 2200.1–2200.8
L467OV559 19600.1–19600.6
N8686-5 18100.1–18100.11
P 4900.1–4900.3
S 4800.1–4800.3
T 4700.1–4700.3
LR3201 Reference 7300.1–7300.6
Lukens Producer 7300.1, 7800.1, 7900.1, 9000.1, 9100.1, 12500.1, 12600.1, 12700.1, 15300.1, 15400.1, 15500.1, 15600.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1, 16400.1, 16600.1, 19500.1
Lukens Source 7300.1, 7800.1, 7900.1, 9000.1, 9100.1, 12500.1, 12600.1, 12700.1, 15300.1, 15400.1, 15500.1, 15600.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1, 16400.1, 16600.1, 19500.1

M

M22000/10 Filler Specification 19600.7, 19600.14
M22000/1E Filler Specification 19000.1
Material Code
001.001.09B 16500.1–16500.4
001.001.09F 16500.5–16500.7
001.002.01 16600.1–16600.7
001.003.01B1 16700.20–16700.22
001.003.01B2 16700.26–16700.28
001.003.01BM 16700.23–16700.25
001.003.01M1 16700.11–16700.13
001.003.01M2 16700.17–16700.19
001.003.01MM 16700.14–16700.16
001.003.01T1 16700.1–16700.4
001.003.01T2 16700.8–16700.10
001.003.01TM 16700.5–16700.7
001.004.01B2 16800.5–16800.7
001.004.01T1 16800.1–16800.4
001.005.01B2 16900.5–16900.7
001.005.01T1 16900.1–16900.4
001.006.01B2 17000.7–17000.11
001.006.01T1 17000.1–17000.6
001.007.01B1 17100.11–17100.13
001.007.01B2 17100.17–17100.19
001.007.01BM 17100.14–17100.16
001.007.01T1 17100.1–17100.4
001.007.01T2 17100.8–17100.10

001.007.01TM 17100.5–17100.7
001.008.01B1 17200.32–17200.36
001.008.01B2 17200.42–17200.46
001.008.01BM 17200.37–17200.41
001.008.01M1 17200.17–17200.21
001.008.01M2 17200.27–17200.31
001.008.01MM 17200.22–17200.26
001.008.01T1 17200.1–17200.6
001.008.01T2 17200.12–17200.16
001.008.01TM 17200.7–17200.11
001.009.01B1 17300.11–17300.13
001.009.01B2 17300.17–17300.19
001.009.01BM 17300.14–17300.16
001.009.01T1 17300.1–17300.4
001.009.01T2 17300.8–17300.10
001.009.01TM 17300.5–17300.7
001.010.01B1 17400.20–17400.22
001.010.01B2 17400.26–17400.28
001.010.01BM 17400.23–17400.25
001.010.01M1 17400.11–17400.13
001.010.01M2 17400.17–17400.19
001.010.01MM 17400.14–17400.16
001.010.01T1 17400.1–17400.4
001.010.01T2 17400.8–17400.10
001.010.01TM 17400.5–17400.7
001.011.01B1 17500.11–17500.13
001.011.01B2 17500.17–17500.19
001.011.01BM 17500.14–17500.16
001.011.01T1 17500.1–17500.4
001.011.01T2 17500.8–17500.10
001.011.01TM 17500.5–17500.7
001.012.01B2 17600.5–17600.7
001.012.01T1 17600.1–17600.4
001.013.01B1 17700.20–17700.22
001.013.01B2 17700.26–17700.28
001.013.01BM 17700.23–17700.25
001.013.01M1 17700.11–17700.13
001.013.01M2 17700.17–17700.19
001.013.01MM 17700.14–17700.16
001.013.01T1 17700.1–17700.4
001.013.01T2 17700.8–17700.10
001.013.01TM 17700.5–17700.7
001.014.01B2 17800.5–17800.7
001.014.01T1 17800.1–17800.4
001.015.01B1 17900.32–17900.36
001.015.01B2 17900.42–17900.46
001.015.01BM 17900.37–17900.41
001.015.01M1 17900.17–17900.21
001.015.01M2 17900.27–17900.31
001.015.01MM 17900.22–17900.26
001.015.01T1 17900.1–17900.6
001.015.01T2 17900.12–17900.16
001.015.01TM 17900.7–17900.11
001.016.01B2 18000.7–18000.11
001.016.01T1 18000.1–18000.6
001.017.01B2 18100.7–18100.11
001.017.01T1 18100.1–18100.6
001.018.01B1 18200.20–18200.22
001.018.01B2 18200.26–18200.28
001.018.01BM 18200.23–18200.25
001.018.01M1 18200.11–18200.13
001.018.01M2 18200.17–18200.19
001.018.01MM 18200.14–18200.16
001.018.01T1 18200.1–18200.4
001.018.01T2 18200.8–18200.10
001.018.01TM 18200.5–18200.7
001.019.01B1 18300.32–18300.36
001.019.01B2 18300.42–18300.46
001.019.01BM 18300.37–18300.41
001.019.01M1 18300.17–18300.21
001.019.01M2 18300.27–18300.31
001.019.01MM 18300.22–18300.26
001.019.01T1 18300.1–18300.6
001.019.01T2 18300.12–18300.16
001.019.01TM 18300.7–18300.11
001.020.01B1 18400.20–18400.22
001.020.01B2 18400.26–18400.28
001.020.01BM 18400.23–18400.25
001.020.01M1 18400.11–18400.13
001.020.01M2 18400.17–18400.19
001.020.01MM 18400.14–18400.16
001.020.01T1 18400.1–18400.4
001.020.01T2 18400.8–18400.10
001.020.01TM 18400.5–18400.7
001.021.01B2 18500.5–18500.7
001.021.01T1 18500.1–18500.4
001.023.01 18600.1–18600.6
001.024.01 18700.1–18700.5
001.025.01 18800.1–18800.6
001.026.01 18900.1–18900.6
001.027.09 19000.1–19000.7
001.028.09 19100.1–19100.7
001.029.09 19200.1–19200.7
001.030.09 19300.1–19300.7
001.031.09 19400.1–19400.7
002.001.01A1 9400.1–9400.3
002.001.01B1 9500.1–9500.3
002.001.01B2 9500.4–9500.6
002.002.01A1 9600.1–9600.3
002.002.01A2 9600.4–9600.7
002.002.01B1 9700.1–9700.3
002.002.01B2 9700.4–9700.6
002.002.01C1 9800.1–9800.3
002.002.02B2 9700.9–9700.10
002.002.09B2 9700.7–9700.8
002.003.01A1 9900.1–9900.3

002.003.01A2 9900.4–9900.6
002.003.01B1 10000.1–10000.5
002.003.01C1 10100.1–10100.5
002.003.02A1 9900.9–9900.10
002.003.09A1 9900.7–9900.8
002.004.01A1 10200.1–10200.3
002.004.02AAA 10200.10–10200.11
002.004.02ABA 10200.6–10200.7
002.004.09AAA 10200.8–10200.9
002.004.09ABA 10200.4–10200.5
002.005.01A1 10300.1–10300.3
002.005.01B1 10400.1–10400.3
002.005.01C1 10500.1–10500.3
002.005.02C 10500.6–10500.7
002.005.09C 10500.4–10500.5
002.006.01A1 10300.4–10300.6
002.006.01B1 10600.1–10600.4
002.006.01C1 10700.1–10700.3
002.006.01C2 10700.4–10700.7
002.007.01A1 10800.1–10800.3
002.007.01B1 10900.1–10900.3
002.007.01C1 11000.1–11000.3
002.007.02AAA 10800.6–10800.7
002.007.02BAA 10900.6–10900.7
002.007.02CAA 11000.6–11000.7
002.007.09AAA 10800.4–10800.5
002.007.09BAA 10900.4–10900.5
002.007.09CAA 11000.4–11000.5
002.008.01C1 11100.1–11100.4
002.009.01B1 11200.1–11200.3
002.009.01B2 11200.4–11200.6
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016.001.010A 7600.1
016.001.02AA 7600.4–7600.5
016.001.02AS1 7600.8–7600.9
016.001.02AS2 7600.12–7600.13
016.001.02AS3 7600.16–7600.17
016.001.02AS4 7600.20–7600.21
016.001.02BA 7700.4–7700.5
016.001.02BS1 7700.8–7700.9
016.001.02BS2 7700.12–7700.13
016.001.02BS3 7700.16–7700.17
016.001.02BS4 7700.20–7700.21
016.001.09AA 7600.2–7600.3
016.001.09AS1 7600.6–7600.7
016.001.09AS2 7600.10–7600.11
016.001.09AS3 7600.14–7600.15
016.001.09AS4 7600.18–7600.19
016.001.09BA 7700.1–7700.3
016.001.09BS1 7700.6–7700.7
016.001.09BS2 7700.10–7700.11
016.001.09BS3 7700.14–7700.15
016.001.09BS4 7700.18–7700.19
016.002.01 7800.1–7800.6
016.003.01 7900.1–7900.6
032.001.01 2000.1–2000.9

Material Name

A36 3100.1–3100.11, 3200.1–3200.21, 3300.1–3300.4, 3400.1–3400.4, 3500.1–3500.4, 3600.1–3600.4, 3700.1–3700.4, 3800.1–3800.4, 3900.1–3900.3, 4000.1–4000.3, 4100.1–4100.3, 4200.1–4200.3, 4300.1–4300.3, 4400.1–4400.4, 4500.1–4500.4, 4600.1–4600.3, 4700.1–4700.3, 4800.1–4800.3, 4900.1–4900.3, 5000.1–5000.4,

5100.1–5100.4, 5200.1–5200.4, 5300.1–5300.4, 5400.1–5400.3, 5500.1–5500.3, 5600.1–5600.3, 5700.1–5700.3, 5800.1–5800.3, 5900.1–5900.3, 6000.1–6000.3, 6100.1–6100.3, 6200.1–6200.3, 6300.1–6300.3, 6400.1–6400.23, 6500.1–6500.5, 6600.1–6600.5, 6700.1–6700.5, 6800.1–6800.6, 6900.1–6900.2, 7000.1–7000.2, 7000.5–7000.6

A537 CL1 7300.1–7300.6, 7400.1–7400.11, 7500.1–7500.21

A572 Gr50 7600.1–7600.21, 7700.1–7700.21, 7800.1–7800.6, 7900.1–7900.6

A588 8000.1–8000.5, 8100.1–8100.5, 8200.1–8200.5, 8300.1–8300.5, 8400.1–8400.2, 8500.1–8500.5, 8600.1–8600.5, 8700.1–8700.5, 8800.1–8800.5, 8900.1–8900.2, 9000.1–9000.2, 9000.5–9000.9, 9100.1–9100.3, 9100.6–9100.9

A588 GrA 9200.1–9200.21, 9300.1–9300.21

A710 9400.1–9400.3, 9500.1–9500.6, 9600.1–9600.7, 9700.1–9700.10, 9800.1–9800.3, 9900.1–9900.10, 10000.1–10000.5, 10100.1–10100.5, 10200.1–10200.11, 10300.1–10300.6, 10400.1–10400.3, 10500.1–10500.7, 10600.1–10600.4, 10700.1–10700.7, 10800.1–10800.7, 10900.1–10900.7, 11000.1–11000.7, 11100.1–11100.4, 11200.1–11200.6, 11300.1–11300.3, 11400.1–11400.3, 11500.1–11500.7, 11600.1–11600.3, 11700.1–11700.6, 11800.1–11800.6, 11900.1–11900.6, 12000.1–12000.3, 12100.1–12100.3, 12200.1–12200.3, 12300.1–12300.15, 12400.1–12400.3, 12700.1–12700.7, 12800.1–12800.5, 12900.1–12900.5, 13000.1–13000.5, 13100.1–13100.5, 13200.1–13200.3, 13300.1–13300.5, 13400.1–13400.5, 13500.1–13500.5, 13600.1–13600.5, 13700.1–13700.3

A710-A 12500.1–12500.6, 12600.1–12600.14

ABS-B 1000.1–1000.14, 1100.1–1100.2, 1100.5–1100.6, 1200.1–1200.2, 1200.5–1200.6, 1300.1–1300.2, 1300.5–1300.6, 1400.1–1400.2, 1400.5–1400.6, 1500.1–1500.2, 1500.5–1500.6, 1600.1–1600.2, 1600.5–1600.6, 1700.1–1700.2, 1700.5–1700.6, 1800.1–1800.2, 1800.5–1800.6, 1900.1–1900.2, 1900.5–1900.6

ABS-EH32 2000.1–2000.9

ABS-EH36 2100.1–2100.8, 2200.1–2200.8, 2300.1–2300.8, 2400.1–2400.20, 2500.1–2500.18, 2600.1–2600.20, 2700.1–2700.18, 2800.1–2800.8, 2900.1–2900.8, 3000.1–3000.8

BS4360 Gr50D 13800.1–13800.37, 13900.1–13900.26, 14000.1–14000.23, 14100.1–14100.10, 14200.1–14200.49, 14300.1–14300.49, 14400.1–14400.49, 14500.1–14500.47, 14600.1–14600.47, 14700.1–14700.28, 14800.1–14800.28, 14900.1–14900.19, 15000.1–15000.28, 15100.1–15100.28, 15200.1–15200.19, 15300.1–15300.6, 15400.1–15400.6, 15500.1–15500.2, 15500.5–15500.7, 15600.1–15600.6, 15700.1–15700.3, 15700.6–15700.8, 15800.1–15800.3, 15800.6–15800.8, 15900.1–15900.6, 16000.1–16000.6, 16100.1–16100.3, 16100.6–16100.8, 16200.1–16200.6, 16300.1–16300.6, 16400.1–16400.6

CG A537M 7100.1–7100.6, 7200.1–7200.16

HY100 19500.1–19500.7, 19600.1–19600.21

HY80 16500.1–16500.7, 16600.1–16600.7, 16700.1–16700.28, 16800.1–16800.7, 16900.1–16900.7, 17000.1–17000.11, 17100.1–17100.19, 17200.1–17200.46, 17300.1–17300.19, 17400.1–17400.28, 17500.1–17500.19, 17600.1–17600.7, 17700.1–17700.28, 17800.1–17800.7, 17900.1–17900.46, 18000.1–18000.11, 18100.1–18100.11, 18200.1–18200.28, 18300.1–18300.46, 18400.1–18400.28, 18500.1–18500.7, 18600.1–18600.6, 18700.1–18700.5, 18800.1–18800.6, 18900.1–18900.6, 19000.1–19000.7, 19100.1–19100.7, 19200.1–19200.7, 19300.1–19300.7, 19400.1–19400.7

Maximum Curve Shape 15000.2, 15000.20

Melting Practice

- **BOF** 1000.1–1000.3, 1000.6, 1000.9, 1000.12–1000.14, 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1, 2100.1–2100.3, 2100.6, 2200.1–2200.3, 2200.6, 2300.1–2300.3, 2400.1–2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1–2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1
- **electric furnace** 5400.1, 5500.1, 5600.1
- **open hearth** 3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1

METZ/MPC13 Reference 2000.1–2000.9

Mid Ingot Position 16700.11, 17200.17, 17400.11, 17700.11, 17900.17, 18200.11, 18300.17, 18400.11

Mid thickness at root Location wrt Surface 3100.2–3100.10, 7400.2–7400.10, 7600.2–7600.20, 9200.2–9200.20, 9900.7–9900.9, 10200.4–10200.6

Mid thickness not root Location wrt Surface 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 3200.1, 3200.4–3200.20, 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6500.1, 6500.4, 6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 7500.1, 7500.4–7500.20, 7700.1, 7700.4–7700.20, 8000.1, 8000.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4, 8600.1, 8600.4, 8700.1, 8700.4, 8800.1, 8800.4, 9300.1, 9300.4–9300.20, 9700.7–9700.9, 10200.8–10200.10, 14700.6, 14700.15, 14700.24, 14800.6, 14800.15, 14800.24, 14900.6, 14900.15, 15000.6, 15000.15, 15000.24, 15100.6, 15100.15, 15100.24, 15200.6, 15200.15

Minsy Producer 19300.1, 19400.1

Modified Standard JIcpr 18600.2, 18700.1, 18800.2, 18900.2, 19000.3, 19100.3, 19200.3, 19300.3, 19400.3, 19600.2, 19600.9, 19600.15

N

N Final Processing 2000.1, 2800.1–2800.3, 2800.6, 2900.1–2900.3, 2900.6, 3000.1–3000.3, 3000.6, 7300.1, 7400.1, 7500.1, 9000.1, 9100.1, 9200.1, 9300.1, 13800.2, 13800.5, 13900.1, 14000.4, 14100.1, 14200.1, 14300.1, 14400.1, 14500.1, 14600.1, 15300.1, 15400.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1

N Heat Treatment 7300.1, 9000.1, 9100.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1

N8686-5 Lot ID 18100.1–18100.11

N,A Final Processing 13800.1–13800.3, 14100.4–14100.5

N,C,A Final Processing 14100.7–14100.9

NGESW Weld Type 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4, 8700.1, 8700.4, 8800.1, 8800.4

Nil Ductilty Transition Test Type 1000.14, 1100.6, 1200.6, 1300.6, 1400.6, 1500.6, 1600.6, 1700.6, 1800.6, 1900.6, 2000.7, 3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 3800.1, 3900.1, 4000.1, 4100.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 4700.1, 4800.1, 4900.1, 5000.1, 5100.1, 5200.1, 5300.1, 5400.1, 5500.1, 5600.1, 5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1, 7100.4, 7200.4, 7200.10, 10000.5, 10100.5, 10600.4, 10700.7, 11100.4, 11800.4, 11900.6, 13800.7, 14100.2

Nk203NiC Filler Name 14700.1–14700.3, 14700.6–14700.8, 14700.11–14700.12, 14700.15–14700.17, 14700.20–14700.21, 14700.24–14700.26, 14800.1–14800.3, 14800.6–14800.8, 14800.11–14800.12, 14800.15–14800.17, 14800.20–14800.21, 14800.24–14800.26, 14900.1–14900.3, 14900.6–14900.8, 14900.11–14900.12, 14900.15–14900.17, 15000.1–15000.3, 15000.6–15000.8, 15000.11–15000.12, 15000.15–15000.17, 15000.20–15000.21, 15000.24–15000.26, 15100.1–15100.3, 15100.6–15100.8, 15100.11–15100.12, 15100.15–15100.17, 15100.20–15100.21, 15100.24–15100.26, 15200.1–15200.3, 15200.6–15200.8, 15200.11–15200.12, 15200.15–15200.17

No Did Specimen Split? 8000.2–8000.4, 8100.2–8100.4, 8200.2–8200.4, 8300.2–8300.4, 8400.1, 8500.2–8500.4, 8600.2–8600.4, 8700.2–8700.4, 8800.2–8800.4, 8900.1

No Groove Joint Preparation 6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4, 8700.1, 8700.4, 8800.1, 8800.4

None Shielding Gas 10500.4–10500.6

Notch Preparation

Pressed 7100.5, 7200.5, 7200.11, 7200.15, 7300.5, 7800.5, 7900.5, 9000.7, 9100.7, 12500.5, 12600.9–12600.13, 12700.6, 12800.4, 12900.4, 13000.4, 13100.4, 13300.4, 13400.4, 13500.4, 13600.4, 15300.5, 15400.5, 15500.6, 15600.5, 15700.7, 15800.7, 15900.5, 16000.5, 16100.7, 16200.5, 16300.5, 16400.5, 17000.5, 17000.10, 17200.5, 17200.10, 17200.15, 17200.20, 17200.25, 17200.30, 17200.35, 17200.40, 17200.45, 17900.5, 17900.10, 17900.15, 17900.20, 17900.25, 17900.30, 17900.35, 17900.40, 17900.45, 18000.5, 18000.10, 18100.5, 18100.10, 18300.5, 18300.10, 18300.15, 18300.20, 18300.25, 18300.30, 18300.35, 18300.40, 18300.45, 18600.5, 18700.4, 18800.5, 18900.5, 19000.6, 19100.6, 19200.6, 19300.6, 19400.6, 19500.2, 19600.5, 19600.12, 19600.20

O

OGC Source 6400.1, 6500.1, 6600.1, 6700.1, 6800.1, 6900.1, 8000.1, 8100.1, 8200.1, 8300.1, 8400.1, 8500.1, 8600.1, 8700.1, 8800.1, 8900.1

OGC-1 Reference 6400.1–6400.23, 6500.1–6500.5, 6600.1–6600.5, 6700.1–6700.5, 6800.1–6800.6, 6900.1–6900.2, 8000.1–8000.5, 8100.1–8100.5, 8200.1–8200.5, 8300.1–8300.5, 8400.1–8400.2, 8500.1–8500.5, 8600.1–8600.5, 8700.1–8700.5, 8800.1–8800.5, 8900.1–8900.2

open hearth Melting Practice 3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1

OrStMills Producer 6400.1, 8600.1, 8700.1, 8800.1, 8900.1

P

P Lot ID 4900.1–4900.3

P-1 Specimen Type 1000.14, 1100.6, 1200.6, 1300.6, 1400.6, 1500.6, 1600.6, 1700.6, 1800.6, 1900.6, 13800.7, 14100.2

P-2 Specimen Type 10600.4, 10700.7, 11100.4, 11800.4, 11900.6

P-3 Specimen Type 7100.4, 7200.4, 7200.10, 10000.5, 10100.5

Per Standard JIcpr 7800.2, 7900.2, 9000.6, 9100.2, 12500.2, 12600.2, 12700.2, 15700.2, 15800.2, 15900.2, 16100.2

P&EStat Source 16500.1

PFH-60A Filler Specification 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16

Pressed Notch Preparation 7100.5, 7200.5, 7200.11, 7200.15, 7300.5, 7800.5, 7900.5, 9000.7, 9100.7, 12500.5, 12600.9–12600.13, 12700.6, 12800.4, 12900.4, 13000.4, 13100.4, 13300.4, 13400.4, 13500.4, 13600.4, 15300.5, 15400.5, 15500.6, 15600.5, 15700.7, 15800.7, 15900.5, 16000.5, 16100.7, 16200.5, 16300.5, 16400.5, 17000.5, 17000.10, 17200.5, 17200.10, 17200.15, 17200.20, 17200.25, 17200.30, 17200.35,

17200.40, 17200.45, 17900.5, 17900.10, 17900.15, 17900.20, 17900.25, 17900.30, 17900.35, 17900.40, 17900.45, 18000.5, 18000.10, 18100.5, 18100.10, 18300.5, 18300.10, 18300.15, 18300.20, 18300.25, 18300.30, 18300.35, 18300.40, 18300.45, 18600.5, 18700.4, 18800.5, 18900.5, 19000.6, 19100.6, 19200.6, 19300.6, 19400.6, 19500.2, 19600.5, 19600.12, 19600.20

Producer

Armco 2000.1, 3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 3800.1, 3900.1, 4000.1, 4100.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 4700.1, 4800.1, 4900.1, 5000.1, 5100.1, 5200.1, 5300.1, 5400.1, 5500.1, 5600.1, 5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1, 7100.1, 7200.1

Australia 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1

Bunge 16500.1

DTNSRDC 19000.1, 19100.1, 19200.1

Kobe 2100.1–2100.3, 2100.6, 2200.1–2200.3, 2200.6, 2300.1–2300.3, 2400.1–2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1–2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1

Lukens 7300.1, 7800.1, 7900.1, 9000.1, 9100.1, 12500.1, 12600.1, 12700.1, 15300.1, 15400.1, 15500.1, 15600.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1, 16400.1, 16600.1, 19500.1

Minsy 19300.1, 19400.1

OrStMills 6400.1, 8600.1, 8700.1, 8800.1, 8900.1

Sumitomo 1000.1–1000.3, 1000.6, 1000.9, 1000.12–1000.14, 2800.1–2800.3, 2800.6, 2900.1–2900.3, 2900.6, 3000.1–3000.3, 3000.6, 13800.1–13800.5, 13800.34, 13900.1, 13900.24, 14000.1, 14000.4, 14100.1, 14100.4–14100.9, 14200.1, 14300.1, 14400.1, 14500.1, 14600.1

US Steel 3100.1, 3200.1, 6500.1, 6600.1, 6700.1, 6800.1, 6900.1, 7000.1, 7400.1, 7500.1, 7600.1, 7700.1, 8000.1, 8100.1, 8200.1, 8300.1, 8400.1, 8500.1, 9200.1, 9300.1

Q

Q,K Final Processing 12500.1, 12700.1

Q,K Heat Treatment 9400.1, 9500.1, 9500.4, 9600.1, 9700.1, 9700.4, 9800.1, 9900.1, 9900.4, 9900.7, 10000.1, 10100.1, 10200.1, 10300.1, 10300.4, 10400.1, 10500.1, 10600.1, 10700.1, 10700.4, 10800.1, 10900.1, 11000.1, 11100.1, 11200.1, 11200.4, 11300.1, 11400.1, 11500.1, 11600.1, 11700.1, 11800.1, 11800.5, 11900.1, 11900.4, 12000.1, 12100.1, 12200.1, 12300.1, 12400.1, 12500.1, 12700.1

Q,T Final Processing 2100.1–2100.3, 2100.6, 2200.1–2200.3, 2200.6, 2300.1–2300.3, 2400.1–2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1–2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1, 7100.1, 7200.1, 12600.1, 16400.1, 18600.1, 18700.1, 18800.1, 18900.1, 19500.1, 19600.1

Q,T Heat Treatment 7100.1, 7200.1, 12600.1, 15300.1, 15400.1, 15500.1, 15600.1, 16400.1, 18600.1, 18700.1, 18800.1, 18900.1, 19500.1, 19600.1

Q,T,W Final Processing 19600.7

Q,T,W Heat Treatment 19600.7

R

Reference

004-2 1100.1–1100.2, 1100.5–1100.6, 1200.1–1200.2, 1200.5–1200.6, 1300.1–1300.2, 1300.5–1300.6, 1400.1–1400.2, 1400.5–1400.6, 1500.1–1500.2, 1500.5–1500.6, 1600.1–1600.2, 1600.5–1600.6, 1700.1–1700.2, 1700.5–1700.6, 1800.1–1800.2, 1800.5–1800.6, 1900.1–1900.2, 1900.5–1900.6

007-1 2100.1–2100.8, 2200.1–2200.8, 2300.1–2300.8, 2400.1–2400.20, 2500.1–2500.18, 2600.1–2600.20, 2700.1–2700.18

007-4 2800.1–2800.8, 2900.1–2900.8, 3000.1–3000.8

1010 7800.1–7800.6, 7900.1–7900.6

1120 16600.1–16600.7

1211 9000.1–9000.2, 9000.5–9000.9, 9100.1–9100.3, 9100.6–9100.9

3200 12600.1–12600.14

3201 15400.1–15400.6, 15700.1–15700.3, 15700.6–15700.8, 15800.1–15800.3, 15800.6–15800.8, 15900.1–15900.6, 16000.1–16000.6, 16100.1–16100.3, 16100.6–16100.8, 16200.1–16200.6, 16300.1–16300.6

3202 15300.1–15300.6, 15500.1–15500.2, 15500.5–15500.7, 15600.1–15600.6, 16400.1–16400.6

3400 12500.1–12500.6, 12700.1–12700.7

3530 19500.1–19500.7

Armco-MPC 3300.1–3300.4, 3400.1–3400.4, 3500.1–3500.4, 3600.1–3600.4, 3700.1–3700.4, 3800.1–3800.4, 3900.1–3900.3, 4000.1–4000.3, 4100.1–4100.3, 4200.1–4200.3, 4300.1–4300.3, 4400.1–4400.4, 4500.1–4500.4, 4600.1–4600.3, 4700.1–4700.3, 4800.1–4800.3, 4900.1–4900.3, 5000.1–5000.4, 5100.1–5100.4, 5200.1–5200.4, 5300.1–5300.4, 5400.1–5400.3, 5500.1–5500.3, 5600.1–5600.3, 5700.1–5700.3, 5800.1–5800.3, 5900.1–5900.3, 6000.1–6000.3, 6100.1–6100.3, 6200.1–6200.3, 6300.1–6300.3

KONKUL-1 3100.1–3100.11, 3200.1–3200.21, 7400.1–7400.11, 7500.1–7500.21, 7600.1–7600.21, 7700.1–7700.21, 9200.1–9200.21, 9300.1–9300.21

LR3201 7300.1–7300.6

METZ/MPC13 2000.1–2000.9

OGC-1 6400.1–6400.23, 6500.1–6500.5, 6600.1–6600.5, 6700.1–6700.5, 6800.1–6800.6, 6900.1–6900.2, 8000.1–8000.5, 8100.1–8100.5, 8200.1–8200.5, 8300.1–8300.5, 8400.1–8400.2, 8500.1–8500.5, 8600.1–8600.5,

8700.1–8700.5, 8800.1–8800.5, 8900.1–8900.2
S-1971 1000.1–1000.14
SHI-01 13800.1–13800.37, 13900.1–13900.26, 14000.1–14000.23, 14100.1–14100.10, 14200.1–14200.49, 14300.1–14300.49, 14400.1–14400.49, 14500.1–14500.47, 14600.1–14600.47
SSC-276 7100.1–7100.6
USN 6/9 18600.1–18600.6, 18700.1–18700.5, 18800.1–18800.6, 18900.1–18900.6, 19000.1–19000.7, 19100.1–19100.7, 19200.1–19200.7, 19300.1–19300.7, 19400.1–19400.7, 19600.1–19600.21
USN 9/9 12800.1–12800.5, 12900.1–12900.5, 13000.1–13000.5, 13100.1–13100.5, 13200.1–13200.3, 13300.1–13300.5, 13400.1–13400.5, 13500.1–13500.5, 13600.1–13600.5, 13700.1–13700.3
USN-1 16700.1–16700.28, 16800.1–16800.7, 16900.1–16900.7, 17000.1–17000.11, 17100.1–17100.19, 17200.1–17200.46, 17300.1–17300.19, 17400.1–17400.28, 17500.1–17500.19, 17600.1–17600.7, 17700.1–17700.28, 17800.1–17800.7, 17900.1–17900.46, 18000.1–18000.11, 18100.1–18100.11, 18200.1–18200.28, 18300.1–18300.46, 18400.1–18400.28, 18500.1–18500.7
WJ,3/87 16500.1–16500.7
WJ,7/87 14700.1–14700.28, 14800.1–14800.28, 14900.1–14900.19, 15000.1–15000.28, 15100.1–15100.28, 15200.1–15200.19
Round Specimen Type 2800.1–2800.2, 2900.1–2900.2, 3000.1–3000.2, 7100.1, 7200.1, 7200.7, 14100.1, 14100.4

S

S Lot ID 4800.1–4800.3
S-1971 Reference 1000.1–1000.14
SAW Weld Type 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 3200.1, 3200.4–3200.20, 7200.7–7200.8, 7200.13, 7500.1, 7500.4–7500.20, 7700.1, 7700.4–7700.20, 9300.1, 9300.4–9300.20, 10200.4–10200.6, 10800.4–10800.6, 10900.4–10900.6, 11000.4–11000.6, 11500.4–11500.6, 12300.4–12300.6, 13900.1, 13900.4–13900.26, 14300.1–14300.48, 14500.1–14500.47
SHI-01 Reference 13800.1–13800.37, 13900.1–13900.26, 14000.1–14000.23, 14100.1–14100.10, 14200.1–14200.49, 14300.1–14300.49, 14400.1–14400.49, 14500.1–14500.47, 14600.1–14600.47
Shielding Gas
None 10500.4–10500.6
Si-Al Killing Process 7400.1, 7500.1
Silicon Killing Process 1000.1–1000.3, 1000.6, 1000.9, 1000.12–1000.14
SK Killing Process 3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 3800.1, 3900.1, 4000.1, 4100.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 4700.1, 4800.1, 4900.1, 5000.1, 5100.1, 5200.1, 5300.1
Slow Loading Type 2000.3, 7000.2, 14700.2, 14700.11, 14700.20, 14800.2, 14800.11, 14800.20, 14900.2, 14900.11, 15000.2, 15000.11, 15000.20, 15100.2, 15100.11, 15100.20, 15200.2, 15200.11
SMA Weld Type 3100.2–3100.10, 7400.2–7400.10, 7600.2–7600.20, 9200.2–9200.20, 13800.8–13800.36, 14200.1–14200.48, 16500.1, 16500.5, 19000.1, 19100.1, 19200.1, 19300.1, 19400.1, 19600.7, 19600.14
SMAW Weld Type 9700.7–9700.9, 10200.8–10200.10, 10500.4–10500.6, 12300.8–12300.14
SMAW/SAW Weld Type 9900.7–9900.9
Smooth Butt Joint Preparation 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6500.1, 6500.4, 8000.1, 8000.4, 8600.1, 8600.4, 10200.4–10200.6
Source
Armco 2000.1, 3300.1, 3400.1, 3500.1, 3600.1
Armco D&M 3700.1, 3800.1, 3900.1, 4000.1, 4100.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 4700.1, 4800.1, 4900.1, 5000.1, 5100.1, 5200.1, 5300.1, 5400.1, 5500.1, 5600.1, 5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1
Australia 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1
HIFAB 14700.1, 14800.1, 14900.1, 15000.1, 15100.1, 15200.1
Kobe 2100.1–2100.3, 2100.6, 2200.1–2200.3, 2200.6, 2300.1–2300.3, 2400.1–2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1–2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1
Lukens 7300.1, 7800.1, 7900.1, 9000.1, 9100.1, 12500.1, 12600.1, 12700.1, 15300.1, 15400.1, 15500.1, 15600.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1, 16400.1, 16600.1, 19500.1
OGC 6400.1, 6500.1, 6600.1, 6700.1, 6800.1, 6900.1, 8000.1, 8100.1, 8200.1, 8300.1, 8400.1, 8500.1, 8600.1, 8700.1, 8800.1, 8900.1
P&EStat 16500.1
Sumitomo 1000.1–1000.3, 1000.6, 1000.9, 1000.12–1000.14, 2800.1–2800.3, 2800.6, 2900.1–2900.3, 2900.6, 3000.1–3000.3, 3000.6, 13800.1–13800.5, 13800.34, 13900.1, 13900.24, 14000.1, 14000.4, 14100.1, 14100.4–14100.9, 14200.1, 14300.1, 14400.1, 14500.1, 14600.1
SWRI 7100.1, 7200.1
Un Kansas 7000.1
US Steel 3100.1, 3200.1, 7400.1, 7500.1, 7600.1, 7700.1, 9200.1, 9300.1
USN 12800.1, 12900.1, 13000.1, 13100.1, 13200.1, 13300.1, 13400.1, 13500.1, 13600.1, 13700.1, 18600.1, 18700.1, 18800.1, 18900.1, 19000.1, 19100.1, 19200.1, 19300.1, 19400.1, 19600.1, 19600.7

Specimen Type
2/3 9400.2, 9600.2
3/4 9500.2, 9500.5, 9700.2, 9700.5–9700.9, 9800.2, 9900.2, 9900.5–9900.9, 10200.2–10200.10, 11300.2, 11400.2, 11500.2, 11600.2, 11700.2, 11700.5
Compact 7800.2, 9000.6, 9100.2, 12500.2, 12600.2, 12700.2, 15700.2, 15800.2, 15900.2, 16100.2
Compact Tension 18600.2, 18700.1, 18800.2, 18900.2, 19000.3, 19100.3, 19200.3, 19300.3, 19400.3, 19600.2, 19600.9, 19600.15
Cylindrical 3100.1, 7000.1, 7300.1, 7400.1, 7600.1, 7800.1, 7900.1, 9000.1, 9100.1, 9200.1, 12500.1, 12600.1, 12700.1, 14700.3, 14700.8, 14700.12, 14700.17, 14700.21, 14700.26, 14800.3, 14800.8, 14800.12, 14800.17, 14800.21, 14800.26, 14900.3, 14900.8, 14900.12, 14900.17, 15000.3, 15000.8, 15000.12, 15000.17, 15000.21, 15000.26, 15100.3, 15100.8, 15100.12, 15100.17, 15100.21, 15100.26, 15200.3, 15200.8, 15200.12, 15200.17, 15300.1, 15400.1, 15500.1, 15600.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1, 16400.1, 16500.2, 16500.5, 18600.1, 18800.1, 18900.1, 19000.2, 19100.2, 19200.2, 19300.2, 19400.2, 19600.1, 19600.8, 19600.14
Double Notch Bend 2000.3, 7000.2, 14700.2, 14700.11, 14700.20, 14800.2, 14800.11, 14800.20, 14900.2, 14900.11, 15000.2, 15000.11, 15000.20, 15100.2, 15100.11, 15100.20, 15200.2, 15200.11
Dynamic Tear 2000.8, 7100.5, 7200.5, 7200.11, 7200.15, 7300.5, 7800.5, 7900.5, 9000.7, 9100.7, 12500.5, 12600.9–12600.13, 12700.6, 12800.4, 12900.4, 13000.4, 13100.4, 13300.4, 13400.4, 13500.4, 13600.4, 15300.5, 15400.5, 15500.6, 15600.5, 15700.7, 15800.7, 15900.5, 16000.5, 16100.7, 16200.5, 16300.5, 16400.5, 16600.6, 17000.5, 17000.10, 17200.5, 17200.10, 17200.15, 17200.20, 17200.25, 17200.30, 17200.35, 17200.40, 17200.45, 17900.5, 17900.10, 17900.15, 17900.20, 17900.25, 17900.30, 17900.35, 17900.40, 17900.45, 18000.5, 18000.10, 18100.5, 18100.10, 18300.5, 18300.10, 18300.15, 18300.20, 18300.25, 18300.30, 18300.35, 18300.40, 18300.45, 18600.5, 18700.4, 18800.5, 18900.5, 19000.6, 19100.6, 19200.6, 19300.6, 19400.6, 19500.2, 19600.5, 19600.12, 19600.20
Flat 13800.1–13800.2
Full 1100.2, 1200.2, 1300.2, 1400.2, 1500.2, 1600.2, 1700.2, 1800.2, 1900.2, 2000.4, 2100.1–2100.3, 2100.6, 2200.1–2200.3, 2200.6, 2300.1–2300.3, 2300.6, 2400.1–2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.2–2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2600.1–2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.2–2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 2800.3, 2800.6, 2900.3, 2900.6, 3000.3, 3000.6, 3100.2–3100.10, 3200.2–3200.20, 3700.2, 3800.2, 3900.2, 4000.2, 4100.2, 4200.2, 4300.2, 4400.2, 4500.2, 4600.2, 4700.2, 4800.2, 4900.2, 5000.2, 5100.2, 5200.2, 5300.2, 5400.2, 5500.2, 5600.2, 5700.2, 5800.2, 5900.2, 6000.2, 6100.2, 6200.2, 6300.2, 6400.1, 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6500.2–6500.4, 6600.2–6600.4, 6700.2–6700.4, 6800.2–6800.4, 6900.1, 7000.5, 7100.2, 7200.2, 7200.8, 7200.13, 7300.2, 7400.2–7400.10, 7500.2–7500.20, 7600.2–7600.20, 7700.2–7700.20, 7800.3, 7900.3, 8000.2–8000.4, 8100.2–8100.4, 8200.2–8200.4, 8300.2–8300.4, 8400.1, 8500.2–8500.4, 8600.2–8600.4, 8700.2–8700.4, 8800.2–8800.4, 8900.1, 9000.2, 9100.3, 9200.2–9200.20, 9300.2–9300.20, 10100.2, 10300.2, 10300.5, 10400.2, 10500.2–10500.6, 10600.1, 10700.2–10700.4, 10800.2–10800.6, 10900.2–10900.6, 11000.2–11000.6, 11100.1, 11200.2, 11200.5, 11500.4–11500.6, 11800.2, 11800.5, 11900.2–11900.4, 12000.2, 12100.2, 12200.2, 12300.2–12300.14, 12400.2, 12500.3, 12600.3, 12600.6, 12700.3, 12800.2, 12900.2, 13000.2, 13100.2, 13200.2, 13300.2, 13400.2, 13500.2, 13600.2, 13700.2, 13800.8–13800.32, 13900.2–13900.22, 14100.5–14100.9, 14700.4–14700.6, 14700.9, 14700.13–14700.15, 14700.18, 14700.22–14700.24, 14700.27, 14800.4–14800.6, 14800.9, 14800.13–14800.15, 14800.18, 14800.22–14800.24, 14800.27, 14900.4–14900.6, 14900.9, 14900.13–14900.15, 14900.18, 15000.4–15000.6, 15000.9, 15000.13–15000.15, 15000.18, 15000.22–15000.24, 15000.27, 15100.4–15100.6, 15100.9, 15100.13–15100.15, 15100.18, 15100.22–15100.24, 15100.27, 15200.4–15200.6, 15200.9, 15200.13–15200.15, 15200.18, 15300.2, 15400.2, 15500.2, 15600.2, 15700.3, 15800.3, 15900.3, 16000.2, 16100.3, 16200.2, 16300.2, 16400.2, 16500.3, 16500.6, 16700.2, 16700.6, 16700.9, 16700.12, 16700.15, 16700.18, 16700.21, 16700.24, 16700.27, 16800.2, 16800.6, 16900.2, 16900.6, 17000.2, 17000.8, 17100.2, 17100.6, 17100.9, 17100.12, 17100.15, 17100.18, 17200.2, 17200.8, 17200.13, 17200.18, 17200.23, 17200.28, 17200.33, 17200.38, 17200.43, 17300.2, 17300.6, 17300.9, 17300.12, 17300.15, 17300.18, 17400.2, 17400.6, 17400.9, 17400.12, 17400.15, 17400.18, 17400.21, 17400.24, 17400.27, 17500.2, 17500.6, 17500.9, 17500.12, 17500.15, 17500.18, 17600.2, 17600.6, 17700.2, 17700.6, 17700.9, 17700.12, 17700.15, 17700.18, 17700.21, 17700.24, 17700.27, 17800.2, 17800.6, 17900.2, 17900.8, 17900.13, 17900.18, 17900.23, 17900.28, 17900.33, 17900.38, 17900.43, 18000.2, 18000.8, 18100.2, 18100.8, 18200.2, 18200.6, 18200.9, 18200.12, 18200.15, 18200.18, 18200.21, 18200.24, 18200.27, 18300.2, 18300.8, 18300.13, 18300.18, 18300.23, 18300.28, 18300.33, 18300.38, 18300.43, 18400.2, 18400.6, 18400.9, 18400.12, 18400.15, 18400.18, 18400.21, 18400.24, 18400.27, 18500.2, 18500.6, 18600.3, 18700.2, 18800.3, 18900.3,

19000.4, 19100.4, 19200.4, 19300.4, 19400.4, 19500.5, 19600.3, 19600.10, 19600.16–19600.18

P-1 1000.14, 1100.6, 1200.6, 1300.6, 1400.6, 1500.6, 1600.6, 1700.6, 1800.6, 1900.6, 13800.7, 14100.2

P-2 10600.4, 10700.7, 11100.4, 11800.4, 11900.6

P-3 7100.4, 7200.4, 7200.10, 10000.5, 10100.5

Round 2800.1–2800.2, 2900.1–2900.2, 3000.1–3000.2, 7100.1, 7200.1, 7200.7, 14100.1, 14100.4

SSC-276 Reference 7100.1–7100.6

Standard Method

813 18600.2, 18700.1, 18800.2, 18900.2, 19600.2, 19600.9, 19600.15

ABS Sec43 2800.3, 2800.6, 2900.3, 2900.6, 3000.3, 3000.6

BS131H2 14700.4–14700.6, 14700.9, 14700.13–14700.15, 14700.18, 14700.22–14700.24, 14700.27, 14800.4–14800.6, 14800.9, 14800.13–14800.15, 14800.18, 14800.22–14800.24, 14800.27, 14900.4–14900.6, 14900.9, 14900.13–14900.15, 14900.18, 15000.4–15000.6, 15000.9, 15000.13–15000.15, 15000.18, 15000.22–15000.24, 15000.27, 15100.4–15100.6, 15100.9, 15100.13–15100.15, 15100.18, 15100.22–15100.24, 15100.27, 15200.4–15200.6, 15200.9, 15200.13–15200.15, 15200.18

BS5762 7000.2, 13800.34–13800.37, 13900.24–13900.26, 14200.2–14200.5, 14300.2–14300.5, 14400.2–14400.5, 14500.2–14500.5, 14600.2–14600.5, 14700.2, 14700.11, 14700.20, 14800.2, 14800.11, 14800.20, 14900.2, 14900.11, 15000.2, 15000.11, 15000.20, 15100.2, 15100.11, 15100.20, 15200.2, 15200.11

E 208 1000.14, 1100.6, 1200.6, 1300.6, 1400.6, 1500.6, 1600.6, 1700.6, 1800.6, 1900.6, 2000.7, 3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 3800.1, 3900.1, 4000.1, 4100.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 4700.1, 4800.1, 4900.1, 5000.1, 5100.1, 5200.1, 5300.1, 5400.1, 5500.1, 5600.1, 5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1, 7100.4, 7200.4, 7200.10, 13800.7

E 23 7100.2, 16500.3, 16500.6, 18600.3, 18700.2, 18800.3, 18900.3, 19000.4, 19100.4, 19200.4, 19300.4, 19400.4, 19600.3, 19600.10, 19600.16–19600.18

E 604 2000.8, 7100.5, 7200.5, 7200.11, 7200.15, 18600.5, 18700.4, 18800.5, 18900.5, 19000.6, 19100.6, 19200.6, 19300.6, 19400.6, 19600.5, 19600.12, 19600.20

E 8 7100.1, 7200.1, 7200.7, 16500.2, 16500.5, 18600.1, 18800.1, 18900.1, 19000.2, 19100.2, 19200.2, 19300.2, 19400.2, 19600.1, 19600.8, 19600.14

E318 12600.2

E813 7800.2, 7900.2, 9000.6, 9100.2, 12500.2, 12700.2, 15700.2, 15800.2, 15900.2, 16100.2, 19000.3, 19100.3, 19200.3, 19300.3, 19400.3

JISZ3121 14600.46–14600.47

Standard Year

1969 1000.14, 18600.1, 18800.1, 18900.1, 19000.2, 19100.2, 19200.2, 19300.2, 19400.2, 19600.1, 19600.8, 19600.14

1972 18600.3, 18700.2, 18800.3, 18900.3, 19600.3, 19600.10, 19600.16–19600.18

1976 7100.5, 7200.5, 7200.11, 7200.15

1979 7000.2, 14700.2, 14700.11, 14700.20, 14800.2, 14800.11, 14800.20, 14900.2, 14900.11, 15000.2, 15000.11, 15000.20, 15100.2, 15100.11, 15100.20, 15200.2, 15200.11

1980 18600.5, 18700.4, 18800.5, 18900.5, 19600.5, 19600.12, 19600.20

1981 16500.2–16500.6

1987 7800.2, 9000.6, 9100.2, 12500.2, 12600.2, 12700.2, 15700.2, 15800.2, 15900.2, 16100.2

Sumitomo Producer 1000.1–1000.3, 1000.6, 1000.9, 1000.12–1000.14, 2800.1–2800.3, 2800.6, 2900.1–2900.3, 2900.6, 3000.1–3000.3, 3000.6, 13800.1–13800.5, 13800.34, 13900.1, 13900.24, 14000.1, 14000.4, 14100.1, 14100.4–14100.9, 14200.1, 14300.1, 14400.1, 14500.1, 14600.1

Sumitomo Source 1000.1–1000.3, 1000.6, 1000.9, 1000.12–1000.14, 2800.1–2800.3, 2800.6, 2900.1–2900.3, 2900.6, 3000.1–3000.3, 3000.6, 13800.1–13800.5, 13800.34, 13900.1, 13900.24, 14000.1, 14000.4, 14100.1, 14100.4–14100.9, 14200.1, 14300.1, 14400.1, 14500.1, 14600.1

Surface Location wrt Surface 14700.1, 14700.11, 14700.20, 14800.1, 14800.11, 14800.20, 14900.1, 14900.11, 15000.1, 15000.11, 15000.20, 15100.1, 15100.11, 15100.20, 15200.1, 15200.11

SWRI Source 7100.1, 7200.1

T

T Location 1000.1–1000.3, 1000.9, 1000.12–1000.14

T Lot ID 4700.1–4700.3

Tensile Test Type 1000.1–1000.2, 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1, 2000.1, 2100.1–2100.2, 2200.1–2200.2, 2300.1–2300.2, 2400.1–2400.2, 2600.1–2600.2, 2800.1–2800.2, 2900.1–2900.2, 3000.1–3000.2, 3100.1, 7000.1, 7100.1, 7200.1, 7200.7, 7300.1, 7400.1, 7600.1, 7800.1, 7900.1, 9000.1, 9100.1, 9200.1, 9400.1, 9500.1, 9500.4, 9600.1, 9600.4, 9600.7, 9700.1, 9700.4, 9800.1, 9900.1, 9900.4, 10000.1, 10100.1, 10200.1, 10300.1, 10300.4, 10400.1, 10500.1, 10700.1, 10800.1, 10900.1, 11000.1, 11200.1, 11200.4, 11300.1, 11400.1, 11500.1, 11600.1, 11700.1, 11700.4, 11800.1, 11900.1, 12000.1, 12100.1, 12200.1, 12300.1, 12400.1, 12500.1, 12600.1, 12700.1, 12800.1, 12900.1, 13000.1, 13100.1, 13200.1, 13300.1, 13400.1, 13500.1, 13600.1, 13700.1, 13800.1–13800.2, 14100.1, 14100.4, 14500.46–14500.47, 14600.46–14600.47, 14700.3, 14700.8, 14700.12,

14700.17, 14700.21, 14700.26, 14800.3, 14800.8, 14800.12, 14800.17, 14800.21, 14800.26, 14900.3, 14900.8, 14900.12, 14900.17, 15000.3, 15000.8, 15000.12, 15000.17, 15000.21, 15000.26, 15100.3, 15100.8, 15100.12, 15100.17, 15100.21, 15100.26, 15200.3, 15200.8, 15200.12, 15200.17, 15300.1, 15400.1, 15500.1, 15600.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1, 16400.1, 16500.2, 16500.5, 16600.5, 16700.1, 16700.5, 16700.8, 16700.11, 16700.14, 16700.17, 16700.20, 16700.23, 16700.26, 16800.1, 16800.5, 16900.1, 16900.5, 17000.1, 17000.7, 17100.1, 17100.5, 17100.8, 17100.11, 17100.14, 17100.17, 17200.1, 17200.7, 17200.12, 17200.17, 17200.22, 17200.27, 17200.32, 17200.37, 17200.42, 17300.1, 17300.5, 17300.8, 17300.11, 17300.14, 17300.17, 17400.1, 17400.5, 17400.8, 17400.11, 17400.14, 17400.17, 17400.20, 17400.23, 17400.26, 17500.1, 17500.5, 17500.8, 17500.11, 17500.14, 17500.17, 17600.1, 17600.5, 17700.1, 17700.5, 17700.8, 17700.11, 17700.14, 17700.17, 17700.20, 17700.23, 17700.26, 17800.1, 17800.5, 17900.1, 17900.7, 17900.12, 17900.17, 17900.22, 17900.27, 17900.32, 17900.37, 17900.42, 18000.1, 18000.7, 18100.1, 18100.7, 18200.1, 18200.5, 18200.8, 18200.11, 18200.14, 18200.17, 18200.20, 18200.23, 18200.26, 18300.1, 18300.7, 18300.12, 18300.17, 18300.22, 18300.27, 18300.32, 18300.37, 18300.42, 18400.1, 18400.5, 18400.8, 18400.11, 18400.14, 18400.17, 18400.20, 18400.23, 18400.26, 18500.1, 18500.5, 18600.1, 18800.1, 18900.1, 19000.2, 19100.2, 19200.2, 19300.2, 19400.2, 19500.1, 19600.1, 19600.8, 19600.14

Test Type

Charpy V Impact 1000.3, 1000.6, 1000.9, 1000.12, 1100.2, 1200.2, 1300.2, 1400.2, 1500.2, 1600.2, 1700.2, 1800.2, 1900.2, 2000.4, 2100.3, 2100.6, 2200.3, 2200.6, 2300.3, 2300.6, 2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.2–2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.2–2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 2800.3, 2800.6, 2900.3, 2900.6, 3000.3, 3000.6, 3100.2–3100.10, 3200.2–3200.20, 3300.2, 3400.2, 3500.2, 3600.2, 3700.2, 3800.2, 3900.2, 4000.2, 4100.2, 4200.2, 4300.2, 4400.2, 4500.2, 4600.2, 4700.2, 4800.2, 4900.2, 5000.2, 5100.2, 5200.2, 5300.2, 5400.2, 5500.2, 5600.2, 5700.2, 5800.2, 5900.2, 6000.2, 6100.2, 6200.2, 6300.2, 6400.1, 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6500.2–6500.4, 6600.2–6600.4, 6700.2–6700.4, 6800.2–6800.4, 6900.1, 7000.5, 7100.2, 7200.2, 7200.8, 7200.13, 7300.2, 7400.2–7400.10, 7500.2–7500.20, 7600.2–7600.20, 7700.2–7700.20, 7800.3, 7900.3, 8000.2–8000.4, 8100.2–8100.4, 8200.2–8200.4, 8300.2–8300.4, 8400.1, 8500.2–8500.4, 8600.2–8600.4, 8700.2–8700.4, 8800.2–8800.4, 8900.1, 9000.2, 9100.3, 9200.2–9200.20, 9300.2–9300.20, 9400.2, 9500.2, 9500.5, 9600.2, 9600.5, 9700.2, 9700.5–9700.9, 9800.2, 9900.2, 9900.5–9900.9, 10000.2, 10100.2, 10200.2–10200.10, 10300.2, 10300.5, 10400.2, 10500.2–10500.6, 10600.1, 10700.2–10700.4, 10800.2–10800.6, 10900.2–10900.6, 11000.2–11000.6, 11100.1, 11200.2, 11200.5, 11300.2, 11400.2, 11500.2–11500.6, 11600.2, 11700.2, 11700.5, 11800.2, 11800.5, 11900.2–11900.4, 12000.2, 12100.2, 12200.2, 12300.2–12300.14, 12400.2, 12500.3, 12600.3, 12600.6, 12700.3, 12800.2, 12900.2, 13000.2, 13100.2, 13200.2, 13300.2, 13400.2, 13500.2, 13600.2, 13700.2, 13800.3–13800.5, 13800.8–13800.32, 13900.2–13900.22, 14000.4–14000.22, 14100.5–14100.9, 14200.6–14200.48, 14300.6–14300.48, 14400.6–14400.48, 14500.6–14500.44, 14600.6–14600.44, 14700.4–14700.6, 14700.9, 14700.13–14700.15, 14700.18, 14700.22–14700.24, 14700.27, 14800.4–14800.6, 14800.9, 14800.13–14800.15, 14800.18, 14800.22–14800.24, 14800.27, 14900.4–14900.6, 14900.9, 14900.13–14900.15, 14900.18, 15000.4–15000.6, 15000.9, 15000.13–15000.15, 15000.18, 15000.22–15000.24, 15000.27, 15100.4–15100.6, 15100.9, 15100.13–15100.15, 15100.18, 15100.22–15100.24, 15100.27, 15200.4–15200.6, 15200.9, 15200.13–15200.15, 15200.18, 15300.2, 15400.2, 15500.2, 15600.2, 15700.3, 15800.3, 15900.3, 16000.2, 16100.3, 16200.2, 16300.2, 16400.2, 16500.3, 16500.6, 16600.2, 16700.2, 16700.6, 16700.9, 16700.12, 16700.15, 16700.18, 16700.21, 16700.24, 16700.27, 16800.2, 16800.6, 16900.2, 16900.6, 17000.2, 17000.8, 17100.2, 17100.6, 17100.9, 17100.12, 17100.15, 17100.18, 17200.2, 17200.8, 17200.13, 17200.18, 17200.23, 17200.28, 17200.33, 17200.38, 17200.43, 17300.2, 17300.6, 17300.9, 17300.12, 17300.15, 17300.18, 17400.2, 17400.6, 17400.9, 17400.12, 17400.15, 17400.18, 17400.21, 17400.24, 17400.27, 17500.2, 17500.6, 17500.9, 17500.12, 17500.15, 17500.18, 17600.2, 17600.6, 17700.2, 17700.6, 17700.9, 17700.12, 17700.15, 17700.18, 17700.21, 17700.24, 17700.27, 17800.2, 17800.6, 17900.2, 17900.8, 17900.13, 17900.18, 17900.23, 17900.28, 17900.33, 17900.38, 17900.43, 18000.2, 18000.8, 18100.2, 18100.8, 18200.2, 18200.6, 18200.9, 18200.12, 18200.15, 18200.18, 18200.21, 18200.24, 18200.27, 18300.2, 18300.8, 18300.13, 18300.18, 18300.23, 18300.28, 18300.33, 18300.38, 18300.43, 18400.2, 18400.6, 18400.9, 18400.12, 18400.15, 18400.18, 18400.21, 18400.24, 18400.27, 18500.2, 18500.6, 18600.3, 18700.2, 18800.3, 18900.3, 19000.4, 19100.4, 19200.4, 19300.4, 19400.4, 19500.5, 19600.3, 19600.10, 19600.16–19600.18

Dynamic Tear 2000.8, 7100.5, 7200.5, 7200.11, 7200.15, 7300.5, 7800.5, 7900.5, 9000.7, 9100.7,

12500.5, 12600.9–12600.13, 12700.6, 12800.4, 12900.4, 13000.4, 13100.4, 13300.4, 13400.4, 13500.4, 13600.4, 15300.5, 15400.5, 15500.6, 15600.5, 15700.7, 15800.7, 15900.5, 16000.5, 16100.7, 16200.5, 16300.5, 16400.5, 16600.6, 17000.5, 17000.10, 17200.5, 17200.10, 17200.15, 17200.20, 17200.25, 17200.30, 17200.35, 17200.40, 17200.45, 17900.5, 17900.10, 17900.15, 17900.20, 17900.25, 17900.30, 17900.35, 17900.40, 17900.45, 18000.5, 18000.10, 18100.5, 18100.10, 18300.5, 18300.10, 18300.15, 18300.20, 18300.25, 18300.30, 18300.35, 18300.40, 18300.45, 18600.5, 18700.4, 18800.5, 18900.5, 19000.6, 19100.6, 19200.6, 19300.6, 19400.6, 19500.2, 19600.5, 19600.12, 19600.20

Fracture Toughness 2000.3, 7000.2, 7800.2, 7900.2, 9000.6, 9100.2, 12500.2, 12600.2, 12700.2, 13800.34–13800.37, 13900.24–13900.26, 14000.2–14000.3, 14100.3, 14200.2–14200.5, 14300.2–14300.5, 14400.2–14400.5, 14500.2–14500.5, 14600.2–14600.5, 14700.2, 14700.11, 14700.20, 14800.2, 14800.11, 14800.20, 14900.2, 14900.11, 15000.2, 15000.11, 15000.20, 15100.2, 15100.11, 15100.20, 15200.2, 15200.11, 15700.2, 15800.2, 15900.2, 16100.2, 16600.1, 18600.2, 18700.1, 18800.2, 18900.2, 19000.3, 19100.3, 19200.3, 19300.3, 19400.3, 19600.2, 19600.9, 19600.15

Nil Ductilty Transition 1000.14, 1100.6, 1200.6, 1300.6, 1400.6, 1500.6, 1600.6, 1700.6, 1800.6, 1900.6, 2000.7, 3300.1, 3400.1, 3500.1, 3600.1, 3700.1, 3800.1, 3900.1, 4000.1, 4100.1, 4200.1, 4300.1, 4400.1, 4500.1, 4600.1, 4700.1, 4800.1, 4900.1, 5000.1, 5100.1, 5200.1, 5300.1, 5400.1, 5500.1, 5600.1, 5700.1, 5800.1, 5900.1, 6000.1, 6100.1, 6200.1, 6300.1, 7100.4, 7200.4, 7200.10, 10000.5, 10100.5, 10600.4, 10700.7, 11100.4, 11800.4, 11900.6, 13800.7, 14100.2

Tensile 1000.1–1000.2, 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1, 2000.1, 2100.1–2100.2, 2200.1–2200.2, 2300.1–2300.2, 2400.1–2400.2, 2600.1–2600.2, 2800.1–2800.2, 2900.1–2900.2, 3000.1–3000.2, 3100.1, 7000.1, 7100.1, 7200.1, 7200.7, 7300.1, 7400.1, 7600.1, 7800.1, 7900.1, 9000.1, 9100.1, 9200.1, 9400.1, 9500.1, 9500.4, 9600.1, 9600.4, 9600.7, 9700.1, 9700.4, 9800.1, 9900.1, 9900.4, 10000.1, 10100.1, 10200.1, 10300.1, 10300.4, 10400.1, 10500.1, 10700.1, 10800.1, 10900.1, 11000.1, 11200.1, 11200.4, 11300.1, 11400.1, 11500.1, 11600.1, 11700.1, 11700.4, 11800.1, 11900.1, 12000.1, 12100.1, 12200.1, 12300.1, 12400.1, 12500.1, 12600.1, 12700.1, 12800.1, 12900.1, 13000.1, 13100.1, 13200.1, 13300.1, 13400.1, 13500.1, 13600.1, 13700.1, 13800.1–13800.2, 14100.1, 14100.4, 14500.46–14500.47, 14600.46–14600.47, 14700.3, 14700.8, 14700.12, 14700.17, 14700.21, 14700.26, 14800.3, 14800.8, 14800.12, 14800.17, 14800.21, 14800.26, 14900.3, 14900.8, 14900.12, 14900.17, 15000.3, 15000.8, 15000.12, 15000.17, 15000.21, 15000.26, 15100.3, 15100.8, 15100.12, 15100.17, 15100.21, 15100.26, 15200.3, 15200.8, 15200.12, 15200.17, 15300.1, 15400.1, 15500.1, 15600.1, 15700.1, 15800.1, 15900.1, 16000.1, 16100.1, 16200.1, 16300.1, 16400.1, 16500.2, 16500.5, 16600.5, 16700.1, 16700.5, 16700.8, 16700.11, 16700.14, 16700.17, 16700.20, 16700.23, 16700.26, 16800.1, 16800.5, 16900.1, 16900.5, 17000.1, 17000.7, 17100.1, 17100.5, 17100.8, 17100.11, 17100.14, 17100.17, 17200.1, 17200.7, 17200.12, 17200.17, 17200.22, 17200.27, 17200.32, 17200.37, 17200.42, 17300.1, 17300.5, 17300.8, 17300.11, 17300.14, 17300.17, 17400.1, 17400.5, 17400.8, 17400.11, 17400.14, 17400.17, 17400.20, 17400.23, 17400.26, 17500.1, 17500.5, 17500.8, 17500.11, 17500.14, 17500.17, 17600.1, 17600.5, 17700.1, 17700.5, 17700.8, 17700.11, 17700.14, 17700.17, 17700.20, 17700.23, 17700.26, 17800.1, 17800.5, 17900.1, 17900.7, 17900.12, 17900.17, 17900.22, 17900.27, 17900.32, 17900.37, 17900.42, 18000.1, 18000.7, 18100.1, 18100.7, 18200.1, 18200.5, 18200.8, 18200.11, 18200.14, 18200.17, 18200.20, 18200.23, 18200.26, 18300.1, 18300.7, 18300.12, 18300.17, 18300.22, 18300.27, 18300.32, 18300.37, 18300.42, 18400.1, 18400.5, 18400.8, 18400.11, 18400.14, 18400.17, 18400.20, 18400.23, 18400.26, 18500.1, 18500.5, 18600.1, 18800.1, 18900.1, 19000.2, 19100.2, 19200.2, 19300.2, 19400.2, 19500.1, 19600.1, 19600.8, 19600.14

Top Composition Position 2100.1–2100.5, 2200.1–2200.5, 2300.1–2300.8, 2400.1–2400.5, 2400.9–2400.11, 2400.15–2400.17, 2500.1–2500.18, 2600.1–2600.5, 2600.9–2600.11, 2600.15–2600.17, 2700.1–2700.18, 2800.1–2800.5, 2900.1–2900.5, 3000.1–3000.5

Top Ingot Position 2100.1–2100.3, 2200.1–2200.3, 2300.1–2300.3, 2400.1–2400.3, 2400.9, 2400.15, 2500.1, 2600.1–2600.3, 2600.9, 2600.15, 2700.1, 16700.1, 16800.1, 16900.1, 17000.1, 17100.1, 17200.1, 17300.1, 17400.1, 17500.1, 17600.1, 17700.1, 17800.1, 17900.1, 18000.1, 18100.1, 18200.1, 18300.1, 18400.1, 18500.1

Transverse Location wrt Weld 14500.46–14500.47, 14600.46–14600.47

TSAW Weld Type 14000.1–14000.22, 14400.1–14400.48, 14600.1–14600.47

TW8544 Filler Name 6400.16, 6400.19–6400.21, 6700.1, 6700.4, 6800.1, 6800.4, 8300.1, 8300.4, 8500.1, 8500.4, 8800.1, 8800.4

U

U Groove Joint Preparation 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16

Un Kansas Source 7000.1
US Steel Producer 3100.1, 3200.1, 6500.1, 6600.1, 6700.1, 6800.1, 6900.1, 7000.1, 7400.1, 7500.1, 7600.1, 7700.1, 8000.1, 8100.1, 8200.1, 8300.1, 8400.1, 8500.1, 9200.1, 9300.1
US Steel Source 3100.1, 3200.1, 7400.1, 7500.1, 7600.1, 7700.1, 9200.1, 9300.1
US-43 Flux Name 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16
USN 6/9 Reference 18600.1–18600.6, 18700.1–18700.5, 18800.1–18800.6, 18900.1–18900.6, 19000.1–19000.7, 19100.1–19100.7, 19200.1–19200.7, 19300.1–19300.7, 19400.1–19400.7, 19600.1–19600.21
USN 9/9 Reference 12800.1–12800.5, 12900.1–12900.5, 13000.1–13000.5, 13100.1–13100.5, 13200.1–13200.3, 13300.1–13300.5, 13400.1–13400.5, 13500.1–13500.5, 13600.1–13600.5, 13700.1–13700.3
USN Source 12800.1, 12900.1, 13000.1, 13100.1, 13200.1, 13300.1, 13400.1, 13500.1, 13600.1, 13700.1, 18600.1, 18700.1, 18800.1, 18900.1, 19000.1, 19100.1, 19200.1, 19300.1, 19400.1, 19600.1, 19600.7
USN-1 Reference 16700.1–16700.28, 16800.1–16800.7, 16900.1–16900.7, 17000.1–17000.11, 17100.1–17100.19, 17200.1–17200.46, 17300.1–17300.19, 17400.1–17400.28, 17500.1–17500.19, 17600.1–17600.7, 17700.1–17700.28, 17800.1–17800.7, 17900.1–17900.46, 18000.1–18000.11, 18100.1–18100.11, 18200.1–18200.28, 18300.1–18300.46, 18400.1–18400.28, 18500.1–18500.7

V

V Groove Joint Preparation 3200.1, 3200.4–3200.20, 7500.1, 7500.4–7500.20, 7700.1, 7700.4–7700.20, 9700.7–9700.9, 9900.7–9900.9, 10200.8–10200.10, 14700.1–14700.3, 14700.6–14700.8, 14700.11–14700.12, 14700.15–14700.17, 14700.20–14700.21, 14700.24–14700.26, 14800.1–14800.3, 14800.6–14800.8, 14800.11–14800.12, 14800.15–14800.17, 14800.20–14800.21, 14800.24–14800.26, 14900.1–14900.3, 14900.6–14900.8, 14900.11–14900.12, 14900.15–14900.17, 15000.1–15000.3, 15000.6–15000.8, 15000.11–15000.12, 15000.15–15000.17, 15000.20–15000.21, 15000.24–15000.26, 15100.1–15100.3, 15100.6–15100.8, 15100.11–15100.12, 15100.15–15100.17, 15100.20–15100.21, 15100.24–15100.26, 15200.1–15200.3, 15200.6–15200.8, 15200.11–15200.12, 15200.15–15200.17
Vertical Welding Position 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6500.1, 6500.4, 6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 8000.1, 8000.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4, 8600.1, 8600.4, 8700.1, 8700.4, 8800.1, 8800.4
Vert-Up Welding Position 10500.4–10500.6, 12300.8–12300.14

W

W Final Processing 19000.1, 19100.1, 19200.1, 19300.1, 19400.1
W Heat Treatment 19000.1, 19100.1, 19200.1, 19300.1, 19400.1
W36 Filler Name 13900.1, 13900.4–13900.26, 14000.1–14000.22, 14300.1–14300.48, 14400.1–14400.48, 14500.1–14500.47, 14600.1–14600.47
Weld Type
- **ESW** 6400.4, 6400.7, 6500.1, 6500.4, 8000.1, 8000.4, 8600.1, 8600.4
- **FCA** 14700.1–14700.3, 14700.6–14700.8, 14700.11–14700.12, 14700.15–14700.17, 14700.20–14700.21, 14700.24–14700.26, 14800.1–14800.3, 14800.6–14800.8, 14800.11–14800.12, 14800.15–14800.17, 14800.20–14800.21, 14800.24–14800.26, 14900.1–14900.3, 14900.6–14900.8, 14900.11–14900.12, 14900.15–14900.17, 15000.1–15000.3, 15000.6–15000.8, 15000.11–15000.12, 15000.15–15000.17, 15000.20–15000.21, 15000.24–15000.26, 15100.1–15100.3, 15100.6–15100.8, 15100.11–15100.12, 15100.15–15100.17, 15100.20–15100.21, 15100.24–15100.26, 15200.1–15200.3, 15200.6–15200.8, 15200.11–15200.12, 15200.15–15200.17
- **NGESW** 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4, 8700.1, 8700.4, 8800.1, 8800.4
- **SAW** 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 3200.1, 3200.4–3200.20, 7200.7–7200.8, 7200.13, 7500.1, 7500.4–7500.20, 7700.1, 7700.4–7700.20, 9300.1, 9300.4–9300.20, 10200.4–10200.6, 10800.4–10800.6, 10900.4–10900.6, 11000.4–11000.6, 11500.4–11500.6, 12300.4–12300.6, 13900.1, 13900.4–13900.26, 14300.1–14300.48, 14500.1–14500.47
- **SMA** 3100.2–3100.10, 7400.2–7400.10, 7600.2–7600.20, 9200.2–9200.20, 13800.8–13800.36, 14200.1–14200.48, 16500.1, 16500.5, 19000.1, 19100.1, 19200.1, 19300.1, 19400.1, 19600.7, 19600.14
- **SMAW** 9700.7–9700.9, 10200.8–10200.10, 10500.4–10500.6, 12300.8–12300.14
- **SMAW/SAW** 9900.7–9900.9
- **TSAW** 14000.1–14000.22, 14400.1–14400.48, 14600.1–14600.47

Welding Position
- **1G** 14800.11–14800.12, 14800.15–14800.17
- **2G** 14700.11–14700.12, 14700.15–14700.17, 14800.20–14800.21, 14800.24–14800.26

3G 14700.20–14700.21, 14700.24–14700.26, 14900.1–14900.3, 14900.6–14900.8, 15000.20–15000.21, 15000.24–15000.26, 15100.1–15100.3, 15100.6–15100.8, 15100.20–15100.21, 15100.24–15100.26, 15200.11–15200.12, 15200.15–15200.17

4G 14800.1–14800.3, 14800.6–14800.8, 14900.11–14900.12, 14900.15–14900.17

Downhand 7200.7–7200.8, 7200.13, 13800.8–13800.36, 13900.1, 13900.4–13900.26, 14000.1–14000.22, 16500.1, 16500.5, 19000.1, 19100.1, 19200.1, 19300.1, 19400.1, 19600.7, 19600.14

Downhand IG 2500.1, 2500.4, 2500.7, 2500.10, 2500.13, 2500.16, 2700.1, 2700.4, 2700.7, 2700.10, 2700.13, 2700.16, 3100.2–3100.10, 3200.1, 3200.4–3200.20, 7400.2–7400.10, 7500.1, 7500.4–7500.20, 14200.1–14200.48, 14300.1–14300.48, 14400.1–14400.48, 14500.1–14500.47, 14600.1–14600.47

Flat 9700.7–9700.9, 9900.7–9900.9, 10200.4–10200.10, 10800.4–10800.6, 10900.4–10900.6, 11000.4–11000.6, 11500.4–11500.6, 12300.4–12300.6

IG 7600.2–7600.20, 7700.1, 7700.4–7700.20, 9200.2–9200.20, 9300.1, 9300.4–9300.20, 14700.1–14700.3, 14700.6–14700.8, 15000.1–15000.3, 15000.6–15000.8, 15000.11–15000.12, 15000.15–15000.17, 15100.11–15100.12, 15100.15–15100.17, 15200.1–15200.3, 15200.6–15200.8

Vertical 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6500.1, 6500.4, 6600.1, 6600.4, 6700.1, 6700.4, 6800.1, 6800.4, 8000.1, 8000.4, 8100.1, 8100.4, 8200.1, 8200.4, 8300.1, 8300.4, 8500.1, 8500.4, 8600.1, 8600.4, 8700.1, 8700.4, 8800.1, 8800.4

Vert-Up 10500.4–10500.6, 12300.8–12300.14

WJ,3/87 Reference 16500.1–16500.7

WJ,7/87 Reference 14700.1–14700.28, 14800.1–14800.28, 14900.1–14900.19, 15000.1–15000.28, 15100.1–15100.28, 15200.1–15200.19

Y

Year Produced

1971 1000.1–1000.3, 1000.6, 1000.9, 1000.12–1000.14

1972 2100.1–2100.3, 2100.6, 2200.1–2200.3, 2200.6, 2300.1–2300.3, 2400.1–2400.3, 2400.6, 2400.9, 2400.12, 2400.15, 2400.18, 2500.1, 2600.1–2600.3, 2600.6, 2600.9, 2600.12, 2600.15, 2600.18, 2700.1, 2800.1–2800.3, 2800.6, 2900.1–2900.3, 2900.6, 3000.1–3000.3, 3000.6

1976 15300.1, 15400.1, 16000.1, 16200.1

1977 16100.1, 16600.1

1978 7300.1, 15500.1, 15600.1, 15900.1

1979 1100.1, 1200.1, 1300.1, 1400.1, 1500.1, 1600.1, 1700.1, 1800.1, 1900.1, 15700.1, 15800.1, 16300.1, 16400.1

1980 9000.1, 9100.1

1981 17400.1, 17400.11, 17400.20

1982 12600.1, 16700.1, 16700.11, 16700.20, 16800.1, 16800.5, 16900.1, 16900.5, 17000.1, 17000.7, 17100.1, 17100.11, 17200.1, 17200.17, 17200.32, 17300.1, 17300.11, 17500.1, 17500.11, 17600.1, 17600.5, 17700.1, 17700.11, 17700.20, 17800.1, 17800.5, 17900.1, 17900.17, 17900.32, 18000.1, 18000.7, 18100.1, 18100.7, 18200.1, 18200.11, 18200.20, 18300.1, 18300.17, 18300.32, 18400.1, 18400.11, 18400.20, 18500.1, 18500.5, 19500.1

1983 7800.1, 7900.1

1984 12500.1, 12700.1

Yes Did Specimen Fracture? 1100.2, 1200.2, 1300.2, 1400.2, 1500.2, 1600.2, 1700.2, 1800.2, 1900.2, 2000.4, 2200.6, 2900.3, 2900.6, 3300.2, 3400.2, 3500.2, 3600.2, 3700.2, 3800.2, 3900.2, 4000.2, 4100.2, 4200.2, 4300.2, 4400.2, 4500.2, 4600.2, 4700.2, 4800.2, 4900.2, 5000.2, 5100.2, 5200.2, 5300.2, 5400.2, 5500.2, 5600.2, 5700.2, 5800.2, 5900.2, 6000.2, 6100.2, 6200.2, 6300.2, 6400.1, 6400.4, 6400.7, 6400.10, 6400.13, 6400.16, 6400.19–6400.21, 6500.2–6500.4, 6600.2–6600.4, 6700.2–6700.4, 6800.2–6800.4, 6900.1, 8000.2–8000.4, 8100.2–8100.4, 8200.2–8200.4, 8300.2–8300.4, 8400.1, 8500.2–8500.4, 8600.2–8600.4, 8700.2–8700.4, 8800.2–8800.4, 8900.1, 14100.5–14100.9