# SSC-352

# MARINE STRUCTURAL STEEL TOUGHNESS DATA BANK

## (Volume 1)



**SHIP STRUCTURE COMMITTEE**

**1991**

**SSC-352 Marine Structural Steel Toughness Data Bank – Volume 1 Ship Structure Committee 1991**

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SSC-339 Ice Loads and Ship Response to Ice - A Second Season by C. Daley, J. W. St. John, R. Brown, J. Meyer, and I. Glen 1990

SSC-340 Ice Forces and Ship Response to Ice - Consolidation Report by C. Daley, J. W. St. John, R. Brown, and I. Glen 1990

SSC-341 Global Ice Forces and Ship Response to Ice by P. Minnick, J. W. St. John, B. Cowper, and M. Edgecomb 1990

SSC-342 Global Ice Forces and Ship Response to Ice - Analysis of Ice Ramming Forces by Yung-Kuang Chen, Alfred L. Tunik, and Albert P-Y Chen 1990

SSC-343 Global Ice Forces and Ship Response to Ice - A Second Season by P. Minnick and J. W. St. John 1990

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SSC-350 Ship Vibration Design Guide by Edward F. Noonan 1989

SSC-351 An Introduction to Structural Reliability Theory by Alaa E. Mansour 1990

None Ship Structure Committee Publications - A Special Bibliography 1983

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Dedicated to the Improvement of Marine Structures

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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

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

Technical Report Documentation Page

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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

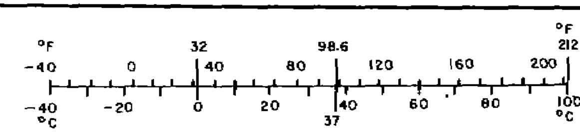
## Approximate Conversions to Metric Measures

| 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 |



# Contents





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# 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 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.



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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.

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.

# 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.


[1]*LOTUS* and *1-2-3* are trademarks of Lotus Development Corporation.
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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 | 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. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SPECIFIED COMPOSITION, element, per cent | | | | | | | | | | | | | |
| 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 | 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 Mi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SPECIFIED COMPOSITION, element, per cent | | | | | | | | | | | | |
| 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.[illegible] |
| 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



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# 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:<br>.01 - Base Metal<br>.02 - On fusion line<br>.03 - 1 mm into HAZ<br>.04 - 3 mm into HAZ<br>.05 - 5 mm into HAZ<br>.06 - 7 mm into HAZ<br>.07 - 9 mm into HAZ<br>.08 - 11 mm into HAZ<br>.09 - All weld metal |
| WWW | -Weld descriptors<br>A - As welded<br>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.



(A)

## 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 |



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### 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 |



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**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 ______________________________



(2)

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)



25

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. |
| _ _ _._ _ _._.__ | _ _ | ________ | ______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:



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 ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.001.01T | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25.0 mm | Composition Type | Actual |
| Composition Position | * | Lot ID | J131267 |
| Reference | S-1971 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.140 % | Mn | 0.79 % |
| P | 0.018 % | S | 0.013 % |
| Si | 0.25 % | Cr | 0.02 % |
| Ni | * | Mo | * |
| V | * | Cu | 0.040 % |
| Cb | * | Ti | * |
| B | * | Al | 0.002 % |
| N | 0.0072 % | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | F | Producer | Sumitomo |
| Year Produced | 1971 | Addl Info | None |
| Source | Sumitomo | Melting Practice | BOF |
| Ingot Position | Concast | Killing Process | Silicon |
| Process Temperature | 930 degC | Process Time | * |
| Rolling Conditions | 89 % | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | T |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Gage Length | * |
| Loading Rate | * | Tensile Strength Offset | * |
| Tensile Yield Strength | * | Uniform Elongation | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Position | Orient | Spec Type | Spec Thick mm | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % | RA % |
|---|---|---|---|---|---|---|---|---|
| 1/2T | L | Flat | 25 | Room | 45.9 | 30.5 | 30.1 | 66.5 |
| 1/2T | L | Flat | 25 | Room | 47.7 | 33.0 | 26.3 | 69.2 |
| 1/2T | T | Flat | 25 | Room | 46.8 | 31.9 | 29.1 | 68.1 |
| 1/2T | T | Flat | 25 | Room | 48.5 | 33.0 | 26.2 | 68.1 |
| * | T | Round | * | Room | 45.8 | 32.8 | 30.0 | 71.6 |
| * | T | Round | * | Room | 47.2 | 32.5 | 29.0 | 68.9 |

* - not reported

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# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.001.01B | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25.0 mm | Composition Type | Actual |
| Composition Position | * | Lot ID | J131267 |
| Reference | S-1971 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.140 % | Mn | 0.08 % |
| P | 0.018 % | S | 0.013 % |
| Si | 0.24 % | Cr | 0.02 % |
| Ni | * | Mo | * |
| V | * | Cu | 0.040 % |
| Cb | * | Ti | * |
| B | * | Al | 0.002 % |
| N | 0.0074 % | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | F | Producer | Sumitomo |
| Year Produced | 1971 | Addl Info | None |
| Source | Sumitomo | Melting Practice | BOF |
| Ingot Position | Concast | Killing Process | Silicon |
| Process Temperature | 930 degC | Process Time | * |
| Rolling Conditions | 89 % | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | B |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Gage Length | * |
| Loading Rate | * | Tensile Strength Offset | * |
| Tensile Yield Strength | * | Uniform Elongation | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Position | Orient | Spec Type | Spec Thick mm | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % | RA % |
|---|---|---|---|---|---|---|---|---|
| 1/2T | L | Flat | 25 | Room | 47.5 | 30.2 | 32.3 | 64.0 |
| 1/2T | L | Flat | 25 | Room | 48.2 | 30.7 | 26.0 | 63.7 |
| 1/2T | T | Flat | 25 | Room | 47.4 | 30.2 | 29.8 | 63.7 |
| 1/2T | T | Flat | 25 | Room | 47.7 | 30.2 | 28.0 | 63.3 |
| * | T | Round | * | Room | 47.5 | 31.5 | 30.9 | 66.3 |
| * | T | Round | * | Room | 47.5 | 32.2 | 30.9 | 67.7 |

* - not reported

## Material ABS-B



### Description

| | | | |
|---|---|---|---|
| Material Code | 004.001.01T | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25.0 mm | Composition Type | Actual |
| Composition Position | * | Lot ID | J131267 |
| Reference | S-1971 | | |

### Composition

| | | | |
|---|---|---|---|
| C | 0.140 % | Mn | 0.79 % |
| P | 0.018 % | S | 0.013 % |
| Si | 0.25 % | Cr | 0.02 % |
| Ni | * | Mo | * |
| V | * | Cu | 0.040 % |
| Cb | * | Ti | * |
| B | * | Al | 0.002 % |
| N | 0.0072 % | Other Components | None % |

### Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | F | Producer | Sumitomo |
| Year Produced | 1971 | Addl Info | None |
| Source | Sumitomo | Melting Practice | BOF |
| Ingot Position | Concast | Killing Process | Silicon |
| Process Temperature | 930 degC | Process Time | * |
| Rolling Conditions | 89 % | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | T |

### Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | 1/4T |
| Specimen Type | * | Lateral Expansion | * |
| Did Specimen Fracture? | Assumed | Did Specimen Split? | * |
| Standard Method | * | Standard Year | * |

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -40 | 0.6 | 6 |
| L-T ○ | -40 | 2.1 | 12 |
| L-T ○ | -40 | 3.0 | 12 |
| L-T ○ | -30 | 0.8 | 11 |
| L-T ○ | -30 | 2.6 | 17 |
| L-T ○ | -30 | 4.2 | 23 |
| L-T ○ | -20 | 5.3 | 31 |
| L-T ○ | -20 | 6.4 | 29 |
| L-T ○ | -20 | 6.8 | 36 |
| L-T ○ | -15 | 7.1 | 32 |
| L-T ○ | -15 | 7.2 | 32 |
| L-T ○ | -15 | 7.2 | 36 |
| L-T ○ | -10 | 7.4 | 40 |
| L-T ○ | -10 | 9.5 | 55 |
| L-T ○ | -10 | 9.9 | 54 |
| L-T ○ | 0 | 10.6 | 56 |
| L-T ○ | 0 | 13.7 | 69 |

(continued)

* - not reported

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# Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | 0 | 8.1 | 47 |
| L-T ○ | 20 | 15.1 | 81 |
| L-T ○ | 20 | 15.9 | 85 |
| L-T ○ | 20 | 7.2 | 82 |
| L-T ○ | 40 | 16.1 | 91 |
| L-T ○ | 40 | 16.3 | 89 |
| L-T ○ | 40 | 16.6 | 91 |
| T-L △ | -40 | 1.8 | 9 |
| T-L △ | -40 | 2.0 | 12 |
| T-L △ | -40 | 2.1 | 12 |
| T-L △ | -30 | 2.4 | 17 |
| T-L △ | -30 | 2.4 | 17 |
| T-L △ | -30 | 2.4 | 17 |
| T-L △ | -20 | 2.6 | 21 |
| T-L △ | -20 | 2.9 | 17 |
| T-L △ | -20 | 3.1 | 25 |
| T-L △ | -15 | 3.0 | 24 |
| T-L △ | -15 | 3.1 | 29 |
| T-L △ | -15 | 3.6 | 24 |
| T-L △ | -10 | 3.0 | 32 |
| T-L △ | -10 | 3.1 | 31 |
| T-L △ | -10 | 3.5 | 34 |
| T-L △ | 0 | 3.4 | 33 |
| T-L △ | 0 | 3.7 | 35 |
| T-L △ | 0 | 3.9 | 40 |
| T-L △ | 20 | 5.9 | 56 |
| T-L △ | 20 | 5.9 | 63 |
| T-L △ | 20 | 6.4 | 59 |
| T-L △ | 40 | 7.2 | 81 |
| T-L △ | 40 | 7.8 | 87 |
| T-L △ | 40 | 7.8 | 88 |

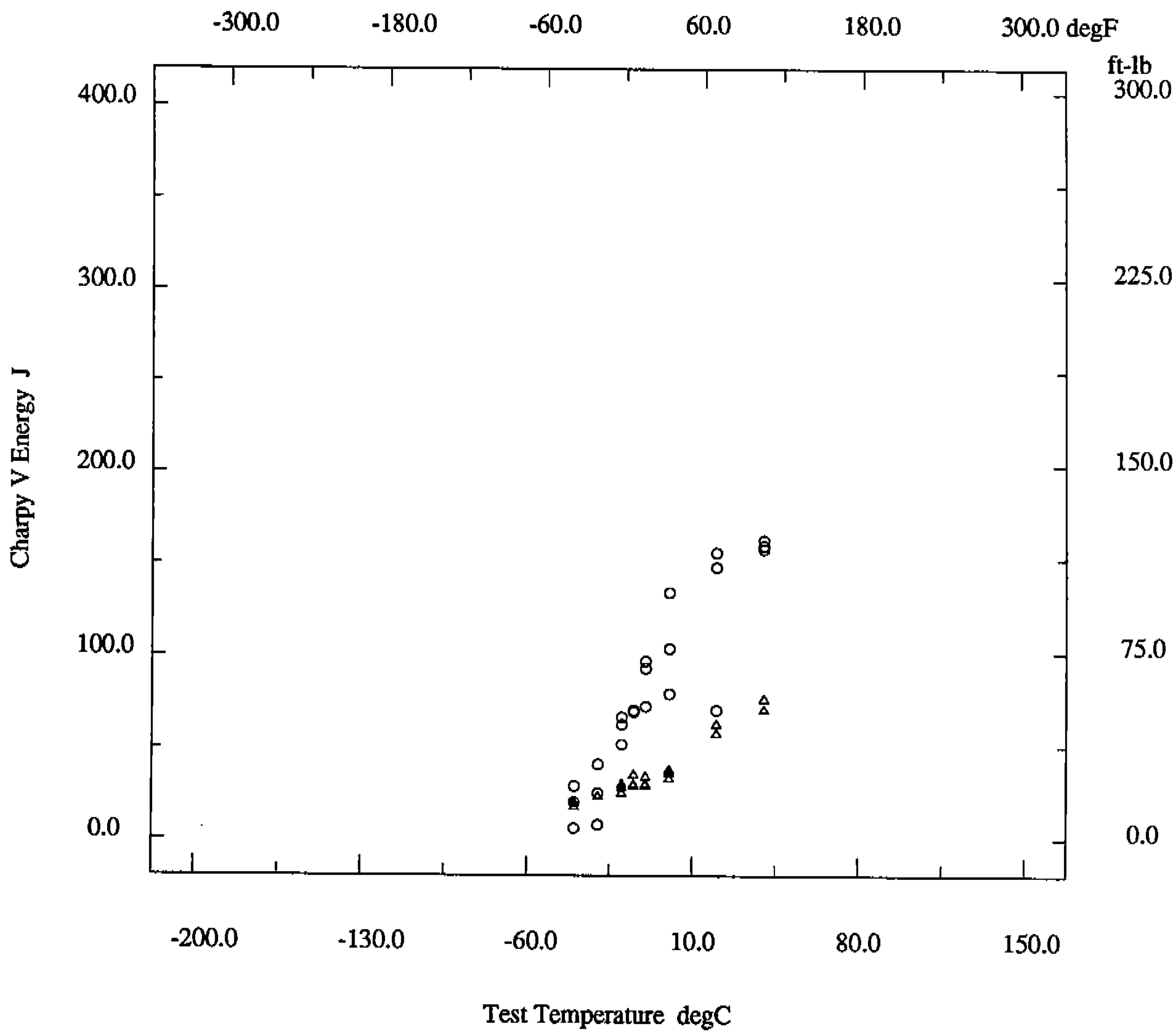
* - not reported

# Material ABS-B



**Description**

| | | | |
|---|---|---|---|
| Material Code | 004.001.01T | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25.0 mm | Composition Type | Actual |
| Composition Position | * | Lot ID | J131267 |
| Reference | S-1971 | | |




* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.001.01B | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25.0 mm | Composition Type | Actual |
| Composition Position | * | Lot ID | J131267 |
| Reference | S-1971 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.140 % | Mn | 0.08 % |
| P | 0.018 % | S | 0.013 % |
| Si | 0.24 % | Cr | 0.02 % |
| Ni | * | Mo | * |
| V | * | Cu | 0.040 % |
| Cb | * | Ti | * |
| B | * | Al | 0.002 % |
| N | 0.0074 % | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | F | Producer | Sumitomo |
| Year Produced | 1971 | Addl Info | None |
| Source | Sumitomo | Melting Practice | BOF |
| Ingot Position | Concast | Killing Process | Silicon |
| Process Temperature | 930 degC | Process Time | * |
| Rolling Conditions | 89 % | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | B |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | 1/4T |
| Specimen Type | * | Lateral Expansion | * |
| Did Specimen Fracture? | Assumed | Did Specimen Split? | * |
| Standard Method | * | Standard Year | * |

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -40 | 0.6 | 97 |
| L-T ○ | -40 | 0.7 | 94 |
| L-T ○ | -40 | 1.4 | 73 |
| L-T ○ | -30 | 0.3 | 94 |
| L-T ○ | -30 | 0.9 | 89 |
| L-T ○ | -30 | 2.3 | 91 |
| L-T ○ | -20 | 2.3 | 83 |
| L-T ○ | -20 | 3.1 | 80 |
| L-T ○ | -20 | 7.2 | 71 |
| L-T ○ | -15 | 1.2 | 86 |
| L-T ○ | -15 | 4.9 | 77 |
| L-T ○ | -15 | 5.2 | 77 |
| L-T ○ | -10 | 3.9 | 80 |
| L-T ○ | -10 | 4.4 | 80 |
| L-T ○ | -10 | 5.6 | 74 |
| L-T ○ | 0 | 10.0 | 51 |
| L-T ○ | 0 | 8.4 | 58 |

* - not reported

(continued)

# Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | 0 | 8.5 | 57 |
| L-T ○ | 20 | 12.2 | 29 |
| L-T ○ | 20 | 13.2 | 31 |
| L-T ○ | 20 | 14.5 | 26 |
| L-T ○ | 40 | 14.5 | 19 |
| L-T ○ | 40 | 15.3 | 14 |
| L-T ○ | 40 | 15.9 | 17 |
| T-L △ | -40 | 0.7 | 97 |
| T-L △ | -40 | 0.9 | 94 |
| T-L △ | -40 | 1.5 | 94 |
| T-L △ | -30 | 1.0 | 91 |
| T-L △ | -30 | 1.8 | 88 |
| T-L △ | -30 | 2.7 | 83 |
| T-L △ | -20 | 2.0 | 83 |
| T-L △ | -20 | 2.9 | 80 |
| T-L △ | -20 | 2.9 | 85 |
| T-L △ | -15 | 2.9 | 80 |
| T-L △ | -15 | 3.5 | 78 |
| T-L △ | -15 | 3.7 | 80 |
| T-L △ | -10 | 3.4 | 80 |
| T-L △ | -10 | 3.4 | 80 |
| T-L △ | -10 | 3.6 | 80 |
| T-L △ | 0 | 4.0 | 66 |
| T-L △ | 0 | 4.0 | 70 |
| T-L △ | 0 | 4.6 | 66 |
| T-L △ | 20 | 5.9 | 52 |
| T-L △ | 20 | 6.1 | 46 |
| T-L △ | 20 | 6.1 | 47 |
| T-L △ | 40 | 7.4 | 32 |
| T-L △ | 40 | 7.7 | 35 |
| T-L △ | 40 | 7.8 | 35 |

* - not reported

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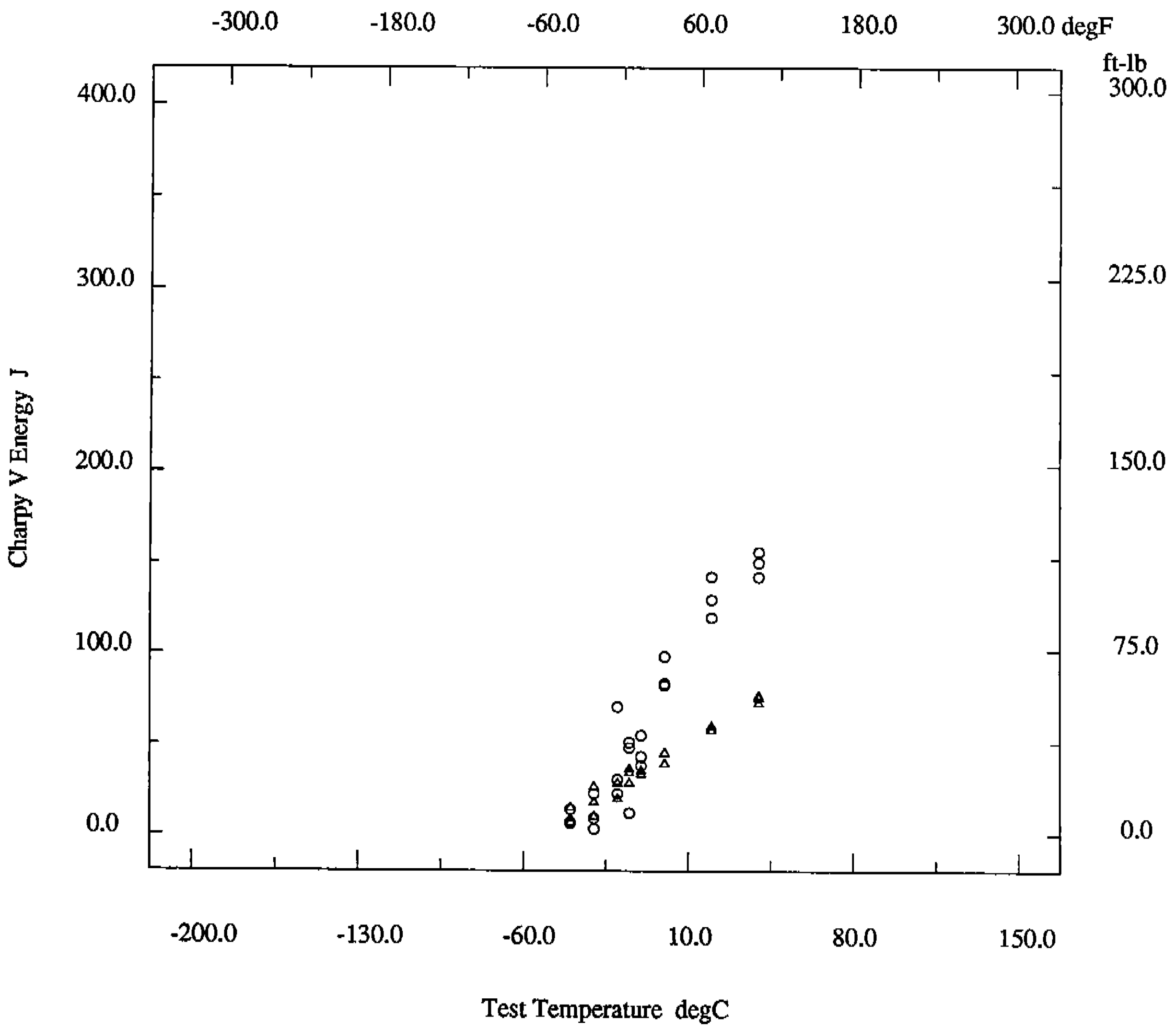
# Material ABS-B



| Description | | | |
|---|---|---|---|
| Material Code | 004.001.01B | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25.0 mm | Composition Type | Actual |
| Composition Position | * | Lot ID | J131267 |
| Reference | S-1971 | | |




* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.001.01TS1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25.0 mm | Composition Type | Actual |
| Composition Position | * | Lot ID | J131267 |
| Reference | S-1971 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.140 % | Mn | 0.79 % |
| P | 0.018 % | S | 0.013 % |
| Si | 0.25 % | Cr | 0.02 % |
| Ni | * | Mo | * |
| V | * | Cu | 0.040 % |
| Cb | * | Ti | * |
| B | * | Al | 0.002 % |
| N | 0.0072 % | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | F | Producer | Sumitomo |
| Year Produced | 1971 | Addl Info | None |
| Source | Sumitomo | Melting Practice | BOF |
| Ingot Position | Concast | Killing Process | Silicon |
| Process Temperature | 930 degC | Process Time | * |
| Rolling Conditions | 89 % | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | 5 % | Aging Temperature | 350 degC |
| Aging Time | 1.5 hr | Location | T |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | 1/4T |
| Specimen Type | * | Lateral Expansion | * |
| Did Specimen Fracture? | Assumed | Did Specimen Split? | * |
| Standard Method | * | Standard Year | * |

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -40 | 0.3 | 0 |
| L-T ○ | -40 | 0.3 | 1 |
| L-T ○ | -40 | 0.3 | 2 |
| L-T ○ | -20 | 0.3 | 6 |
| L-T ○ | -20 | 0.5 | 6 |
| L-T ○ | -20 | 0.5 | 6 |
| L-T ○ | -10 | 0.6 | 9 |
| L-T ○ | -10 | 1.1 | 12 |
| L-T ○ | -10 | 2.3 | 15 |
| L-T ○ | 0 | 1.0 | 11 |
| L-T ○ | 0 | 1.4 | 14 |
| L-T ○ | 0 | 2.4 | 18 |
| L-T ○ | 20 | 4.5 | 27 |
| L-T ○ | 20 | 4.5 | 27 |
| L-T ○ | 20 | 5.2 | 30 |
| L-T ○ | 40 | 5.2 | 48 |
| L-T ○ | 40 | 5.8 | 48 |

(continued)

* - not reported

## Material ABS-B



(continued)

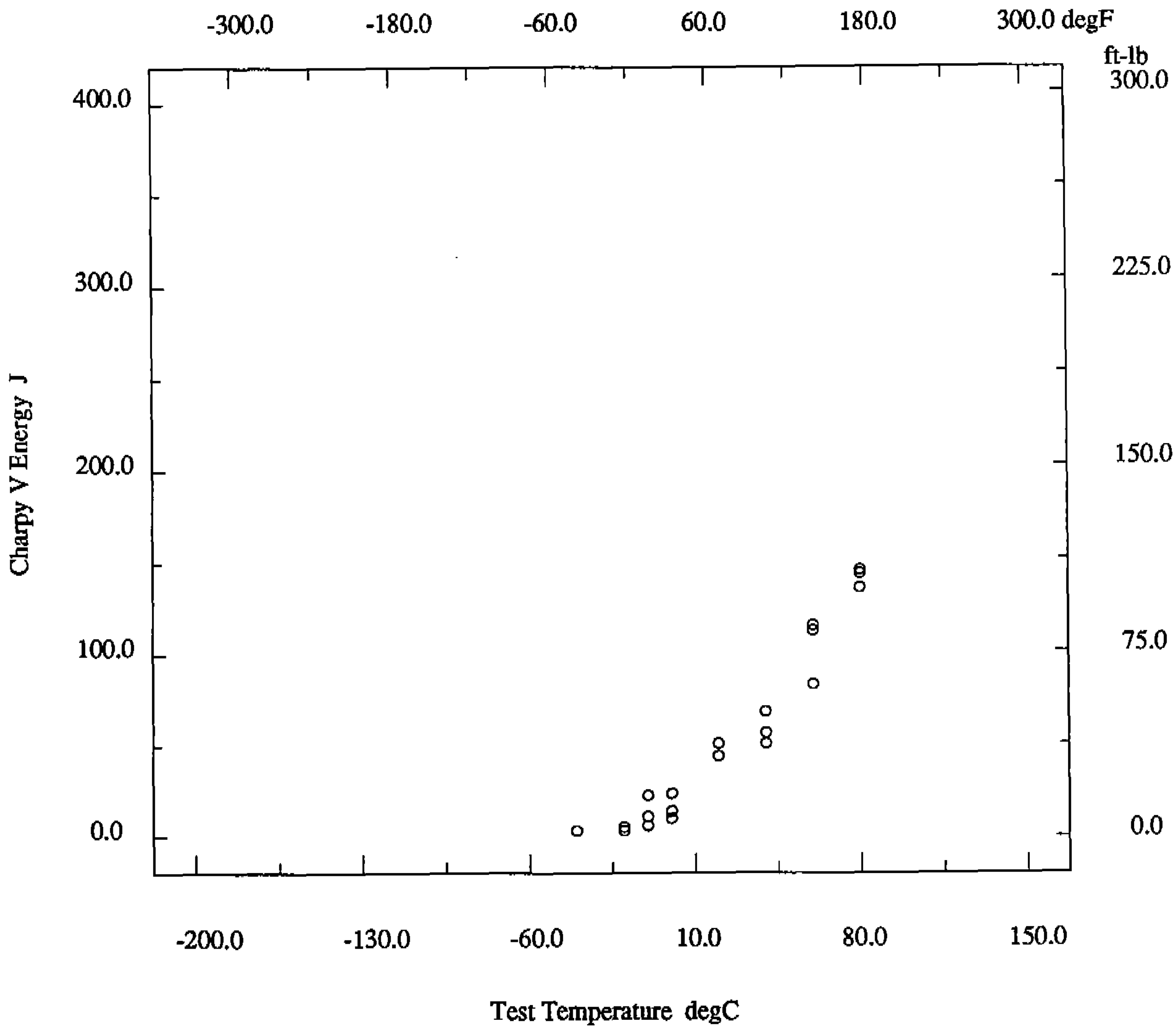
| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | 40 | 7.0 | 58 |
| L-T ○ | 60 | 11.5 | 82 |
| L-T ○ | 60 | 11.8 | 84 |
| L-T ○ | 60 | 8.5 | 76 |
| L-T ○ | 80 | 13.9 | 87 |
| L-T ○ | 80 | 14.7 | 100 |
| L-T ○ | 80 | 14.9 | 100 |

* - not reported

# Material ABS-B



| Description | | | |
|---|---|---|---|
| Material Code | 004.001.01TS1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25.0 mm | Composition Type | Actual |
| Composition Position | * | Lot ID | J131267 |
| Reference | S-1971 | | |




* - not reported

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## Material ABS-B



### Description

| | | | |
|---|---|---|---|
| Material Code | 004.001.01TS2 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25.0 mm | Composition Type | Actual |
| Composition Position | * | Lot ID | J131267 |
| Reference | S-1971 | | |

### Composition

See Page 1000.9

### Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | F | Producer | Sumitomo |
| Year Produced | 1971 | Addl Info | None |
| Source | Sumitomo | Melting Practice | BOF |
| Ingot Position | Concast | Killing Process | Silicon |
| Process Temperature | 930 degC | Process Time | * |
| Rolling Conditions | 89 % | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | 10 % | Aging Temperature | 250 degC |
| Aging Time | 1.0 hr | Location | T |

### Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | 1/4T |
| Specimen Type | * | Lateral Expansion | * |
| Did Specimen Fracture? | Assumed | Did Specimen Split? | * |
| Standard Method | * | Standard Year | * |

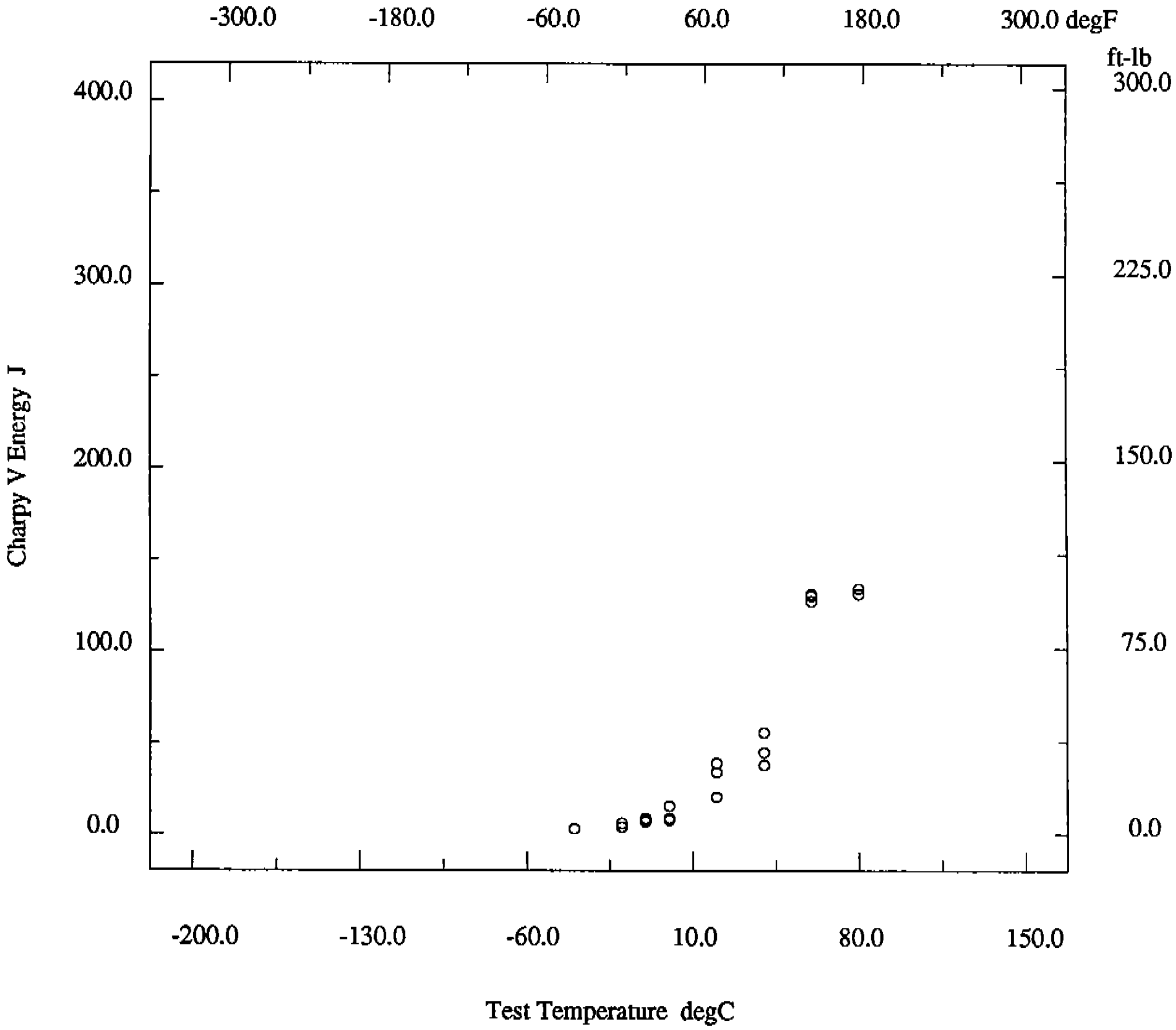
| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T o | -40 | 0.3 | 0 |
| L-T o | -40 | 0.3 | 0 |
| L-T o | -40 | 0.3 | 0 |
| L-T o | -20 | 0.4 | 2 |
| L-T o | -20 | 0.6 | 2 |
| L-T o | -20 | 0.6 | 2 |
| L-T o | -10 | 0.7 | 9 |
| L-T o | -10 | 0.8 | 11 |
| L-T o | -10 | 0.9 | 9 |
| L-T o | 0 | 0.8 | 11 |
| L-T o | 0 | 0.9 | 11 |
| L-T o | 0 | 1.6 | 11 |
| L-T o | 20 | 2.1 | 21 |
| L-T o | 20 | 3.5 | 27 |
| L-T o | 20 | 4.0 | 29 |
| L-T o | 40 | 3.9 | 36 |
| L-T o | 40 | 4.6 | 36 |
| L-T o | 40 | 5.7 | 47 |
| L-T o | 60 | 13.0 | 100 |
| L-T o | 60 | 13.3 | 100 |
| L-T o | 60 | 13.4 | 86 |
| L-T o | 80 | 13.4 | 100 |
| L-T o | 80 | 13.4 | 100 |
| L-T o | 80 | 13.7 | 100 |

* - not reported

# Material ABS-B



| Description | | | |
|---|---|---|---|
| Material Code | 004.001.01TS2 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25.0 mm | Composition Type | Actual |
| Composition Position | * | Lot ID | J131267 |
| Reference | S-1971 | | |




* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.001.01T | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25.0 mm | Composition Type | Actual |
| Composition Position | * | Lot ID | J131267 |
| Reference | S-1971 | | |

## Composition

See Page 1000.9

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | F | Producer | Sumitomo |
| Year Produced | 1971 | Addl Info | None |
| Source | Sumitomo | Melting Practice | BOF |
| Ingot Position | Concast | Killing Process | Silicon |
| Process Temperature | 930 degC | Process Time | * |
| Rolling Conditions | 89 % | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | T |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductility Transition | Position | 0/4T |
| Specimen Type | P-1 | Filler Alloy | * |
| Passes | 1 | Standard Method | E 208 |
| Standard Year | 1969 | | |

| Orien | Test Temp degC | Break? | NDTT |
|---|---|---|---|
| L | -20 | Yes | No |
| L | -20 | Yes | No |
| L | -20 | Yes | No |
| L | -15 | No | Yes |
| L | -15 | No | Yes |
| L | -15 | Yes | Yes |
| L | -10 | No | No |
| L | -10 | No | No |
| L | -10 | No | No |

* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.002.01.1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641661 |
| Reference | 004-2 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.13 % | Mn | 1.02 % |
| P | 0.015 % | S | 0.011 % |
| Si | 0.25 % | Cr | 0.03 % |
| Ni | 0.02 % | Mo | 0.005 % |
| V | * | Cu | 0.015 % |
| Cb | * | Ti | * |
| B | * | Al | 0.03 % |
| N | * | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Australia |
| Year Produced | 1979 | Addl Info | None |
| Source | Australia | Melting Practice | BOF |
| Ingot Position | Concast | Killing Process | Fully |
| Process Temperature | 870 degC | Process Time | * |
| Rolling Conditions | 81 % | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | 1/4T |
| Specimen Type | * | Specimen Thickness | * |
| Gage Length | 200 mm | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Tensile Modulus | * |
| Standard Method | * | Standard Year | * |

| Orient | Test Temp degC | UTS MPa | TYP MPa | Elongation % | RA % |
|---|---|---|---|---|---|
| L | 20 | 440 | 282 | 31 | 68 |
| T | 20 | 444 | 258 | 28 | 67 |
| T | 20 | 444 | 288 | 30 | 67 |

* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.002.01.1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641661 |
| Reference | 004-2 | | |

## Composition

See Page 1100.1

## Fabrication History

See Page 1100.1

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T o | -40 | 18 | 15 |
| L-T o | -40 | 44 | 20 |
| L-T o | -40 | 45 | 15 |
| L-T o | -40 | 45 | 15 |
| L-T o | -40 | 73 | 75 |
| L-T o | -40 | 90 | 30 |
| L-T o | -30 | 117 | 40 |
| L-T o | -30 | 29 | 20 |
| L-T o | -30 | 38 | 30 |
| L-T o | -30 | 56 | 25 |
| L-T o | -30 | 62 | 35 |
| L-T o | -30 | 90 | 45 |
| L-T o | -20 | 104 | 55 |
| L-T o | -20 | 113 | 50 |
| L-T o | -20 | 128 | 50 |
| L-T o | -20 | 129 | 60 |
| L-T o | -20 | 68 | 35 |
| L-T o | -20 | 96 | 50 |
| L-T o | -10 | 105 | 50 |
| L-T o | -10 | 110 | 55 |
| L-T o | -10 | 123 | 60 |
| L-T o | -10 | 130 | 65 |
| L-T o | -10 | 134 | 65 |
| L-T o | -10 | 144 | 70 |
| L-T o | 0 | 104 | 55 |
| L-T o | 0 | 116 | 60 |
| L-T o | 0 | 117 | 65 |
| L-T o | 0 | 133 | 65 |
| L-T o | 0 | 143 | 80 |
| L-T o | 0 | 186 | 100 |
| L-T o | 10 | 126 | 70 |
| L-T o | 10 | 130 | 75 |
| L-T o | 10 | 130 | 75 |
| L-T o | 10 | 136 | 90 |

(continued)

* - not reported

## Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | 10 | 138 | 70 |
| L-T ○ | 10 | 139 | 70 |
| L-T ○ | 20 | 143 | 75 |
| L-T ○ | 20 | 144 | 95 |
| L-T ○ | 20 | 148 | 85 |
| L-T ○ | 20 | 154 | 85 |
| L-T ○ | 20 | 156 | 90 |
| L-T ○ | 20 | 182 | 100 |
| L-T ○ | 40 | 155 | 90 |
| L-T ○ | 40 | 168 | 100 |
| L-T ○ | 40 | 168 | 100 |
| L-T ○ | 40 | 170 | 100 |
| L-T ○ | 40 | 170 | 100 |
| L-T ○ | 40 | 172 | 100 |
| T-L △ | -40 | 18 | 15 |
| T-L △ | -40 | 20 | 15 |
| T-L △ | -40 | 25 | 18 |
| T-L △ | -40 | 26 | 20 |
| T-L △ | -40 | 32 | 20 |
| T-L △ | -40 | 36 | 25 |
| T-L △ | -30 | 32 | 30 |
| T-L △ | -30 | 34 | 30 |
| T-L △ | -30 | 35 | 30 |
| T-L △ | -30 | 37 | 35 |
| T-L △ | -30 | 39 | 35 |
| T-L △ | -30 | 42 | 35 |
| T-L △ | -20 | 40 | 35 |
| T-L △ | -20 | 40 | 35 |
| T-L △ | -20 | 40 | 35 |
| T-L △ | -20 | 42 | 35 |
| T-L △ | -20 | 42 | 35 |
| T-L △ | -20 | 43 | 45 |
| T-L △ | -10 | 41 | 40 |
| T-L △ | -10 | 46 | 40 |
| T-L △ | -10 | 50 | 35 |
| T-L △ | -10 | 52 | 45 |
| T-L △ | -10 | 53 | 50 |
| T-L △ | -10 | 59 | 45 |
| T-L △ | 0 | 54 | 60 |
| T-L △ | 0 | 55 | 60 |
| T-L △ | 0 | 68 | 55 |
| T-L △ | 0 | 71 | 55 |
| T-L △ | 0 | 71 | 55 |
| T-L △ | 0 | 72 | 65 |
| T-L △ | 20 | 68 | 65 |
| T-L △ | 20 | 70 | 75 |
| T-L △ | 20 | 76 | 65 |

(continued)

* - not reported

# Material ABS-B



(continued)

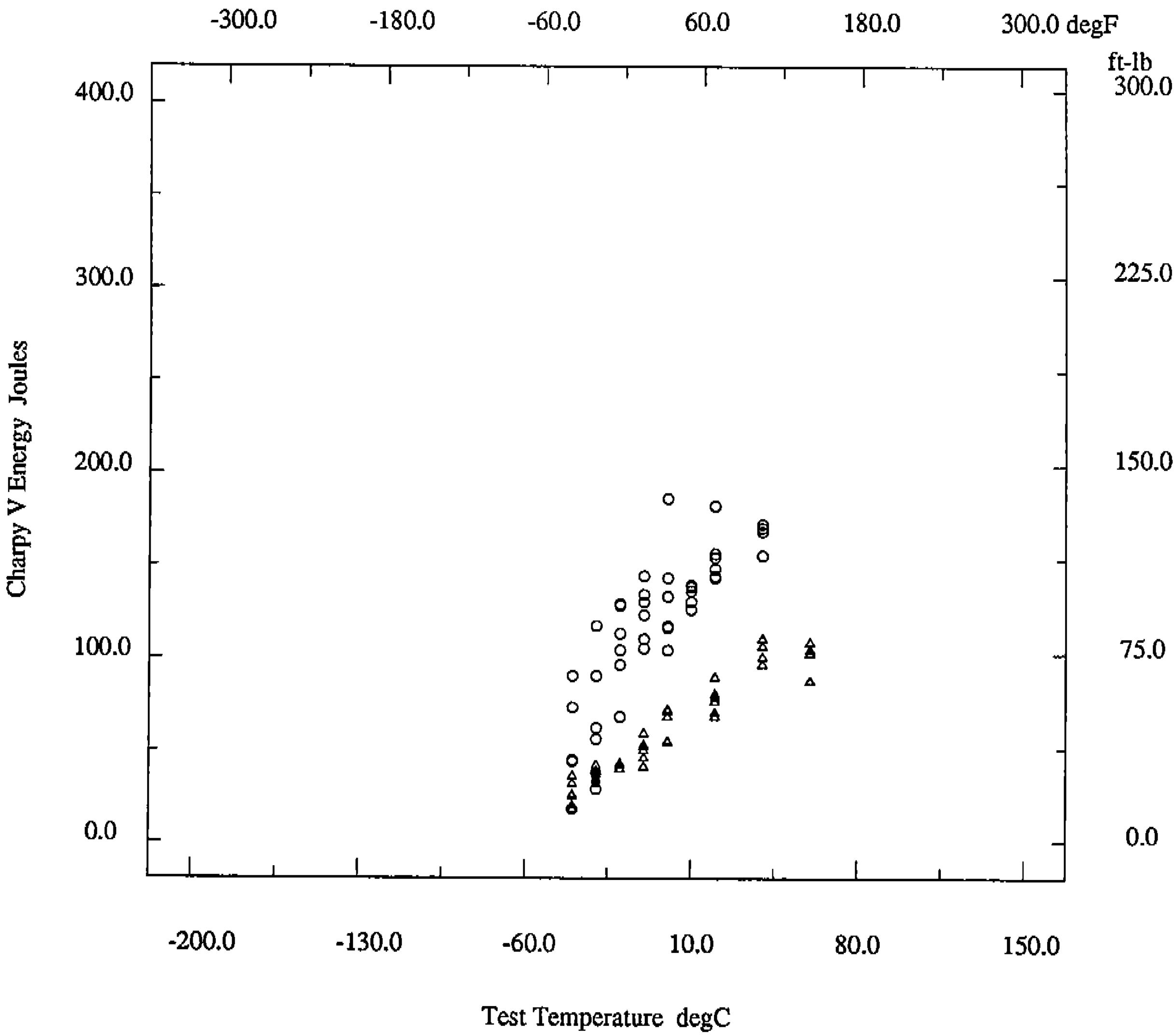
| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| T-L ▵ | 20 | 78 | 75 |
| T-L ▵ | 20 | 80 | 80 |
| T-L ▵ | 20 | 89 | 90 |
| T-L ▵ | 40 | 100 | 85 |
| T-L ▵ | 40 | 100 | 95 |
| T-L ▵ | 40 | 106 | 100 |
| T-L ▵ | 40 | 110 | 100 |
| T-L ▵ | 40 | 96 | 90 |
| T-L ▵ | 40 | 96 | 95 |
| T-L ▵ | 60 | 102 | 100 |
| T-L ▵ | 60 | 102 | 95 |
| T-L ▵ | 60 | 104 | 100 |
| T-L ▵ | 60 | 108 | 100 |
| T-L ▵ | 60 | 108 | 98 |
| T-L ▵ | 60 | 87 | 98 |

* - not reported

# Material ABS-B



| Description | | | |
|---|---|---|---|
| Material Code | 004.002.01.1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641661 |
| Reference | 004-2 | | |




* - not reported

**Description**

| | | | |
|---|---|---|---|
| Material Code | 004.002.01.1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641661 |
| Reference | 004-2 | | |

**Composition** See Page 1100.1

**Fabrication History** See Page 1100.1

**Property Measurements**

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

| Orien | Test Temp degC | Break? | NDTT |
|---|---|---|---|
| T | -30 | Yes | No |
| T | -25 | No | Yes |
| T | -20 | No | No |

* - not reported

57

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.002.01.2 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641661 |
| Reference | 004-2 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.13 % | Mn | 1.02 % |
| P | 0.015 % | S | 0.011 % |
| Si | 0.25 % | Cr | 0.03 % |
| Ni | 0.02 % | Mo | 0.005 % |
| V | * | Cu | 0.015 % |
| Cb | * | Ti | * |
| B | * | Al | 0.03 % |
| N | * | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Australia |
| Year Produced | 1979 | Addl Info | None |
| Source | Australia | Melting Practice | BOF |
| Ingot Position | Concast | Killing Process | Fully |
| Process Temperature | 910 degC | Process Time | * |
| Rolling Conditions | 81 % | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | 1/4T |
| Specimen Type | * | Specimen Thickness | * |
| Gage Length | 200 mm | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Tensile Modulus | * |
| Standard Method | * | Standard Year | * |

| Orient | Test Temp degC | UTS MPa | TYP MPa | Elongation % | RA % |
|---|---|---|---|---|---|
| T | 20 | 446 | 270 | 30 | 72 |
| T | 20 | 446 | 274 | 34 | 67 |
| T | 20 | 446 | 280 | 32 | 67 |

* - not reported

(2)

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.002.01.2 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641661 |
| Reference | 004-2 | | |

## Composition

See Page 1200.1

## Fabrication History

See Page 1200.1

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T o | -40 | 10 | 10 |
| L-T o | -40 | 12 | 15 |
| L-T o | -40 | 13 | 15 |
| L-T o | -40 | 16 | 15 |
| L-T o | -40 | 16 | 15 |
| L-T o | -40 | 46 | 25 |
| L-T o | -30 | 24 | 25 |
| L-T o | -30 | 56 | 30 |
| L-T o | -30 | 64 | 35 |
| L-T o | -30 | 65 | 35 |
| L-T o | -30 | 75 | 35 |
| L-T o | -30 | 94 | 40 |
| L-T o | -20 | 108 | 45 |
| L-T o | -20 | 108 | 45 |
| L-T o | -20 | 110 | 45 |
| L-T o | -20 | 51 | 35 |
| L-T o | -20 | 86 | 45 |
| L-T o | -20 | 92 | 40 |
| L-T o | -10 | 110 | 55 |
| L-T o | -10 | 111 | 55 |
| L-T o | -10 | 117 | 55 |
| L-T o | -10 | 119 | 55 |
| L-T o | -10 | 140 | 70 |
| L-T o | -10 | 87 | 45 |
| L-T o | 0 | 106 | 65 |
| L-T o | 0 | 111 | 55 |
| L-T o | 0 | 131 | 65 |
| L-T o | 0 | 134 | 75 |
| L-T o | 0 | 141 | 75 |
| L-T o | 0 | 149 | 80 |
| L-T o | 10 | 129 | 70 |
| L-T o | 10 | 130 | 75 |
| L-T o | 10 | 130 | 75 |
| L-T o | 10 | 134 | 75 |

(continued)

* - not reported

## Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | 10 | 138 | 80 |
| L-T ○ | 10 | 68 | 55 |
| L-T ○ | 20 | 133 | 80 |
| L-T ○ | 20 | 137 | 85 |
| L-T ○ | 20 | 142 | 80 |
| L-T ○ | 20 | 142 | 95 |
| L-T ○ | 20 | 149 | 90 |
| L-T ○ | 20 | 153 | 98 |
| L-T ○ | 40 | 154 | 100 |
| L-T ○ | 40 | 156 | 100 |
| L-T ○ | 40 | 157 | 100 |
| L-T ○ | 40 | 172 | 100 |
| L-T ○ | 40 | 174 | 100 |
| L-T ○ | 40 | 176 | 100 |
| T-L △ | -30 | 22 | 20 |
| T-L △ | -30 | 23 | 25 |
| T-L △ | -30 | 26 | 20 |
| T-L △ | -30 | 27 | 25 |
| T-L △ | -30 | 31 | 30 |
| T-L △ | -30 | 32 | 25 |
| T-L △ | -20 | 29 | 35 |
| T-L △ | -20 | 30 | 35 |
| T-L △ | -20 | 32 | 35 |
| T-L △ | -20 | 33 | 35 |
| T-L △ | -20 | 47 | 40 |
| T-L △ | -20 | 54 | 40 |
| T-L △ | -10 | 41 | 35 |
| T-L △ | -10 | 42 | 35 |
| T-L △ | -10 | 43 | 40 |
| T-L △ | -10 | 48 | 45 |
| T-L △ | -10 | 49 | 35 |
| T-L △ | -10 | 52 | 55 |
| T-L △ | 0 | 50 | 45 |
| T-L △ | 0 | 54 | 45 |
| T-L △ | 0 | 57 | 50 |
| T-L △ | 0 | 57 | 50 |
| T-L △ | 0 | 60 | 55 |
| T-L △ | 0 | 60 | 55 |
| T-L △ | 10 | 55 | 65 |
| T-L △ | 10 | 68 | 75 |
| T-L △ | 10 | 72 | 65 |
| T-L △ | 10 | 73 | 65 |
| T-L △ | 10 | 74 | 75 |
| T-L △ | 10 | 75 | 70 |
| T-L △ | 20 | 74 | 75 |
| T-L △ | 20 | 75 | 70 |
| T-L △ | 20 | 78 | 75 |

(continued)

* - not reported

# Material ABS-B



(continued)

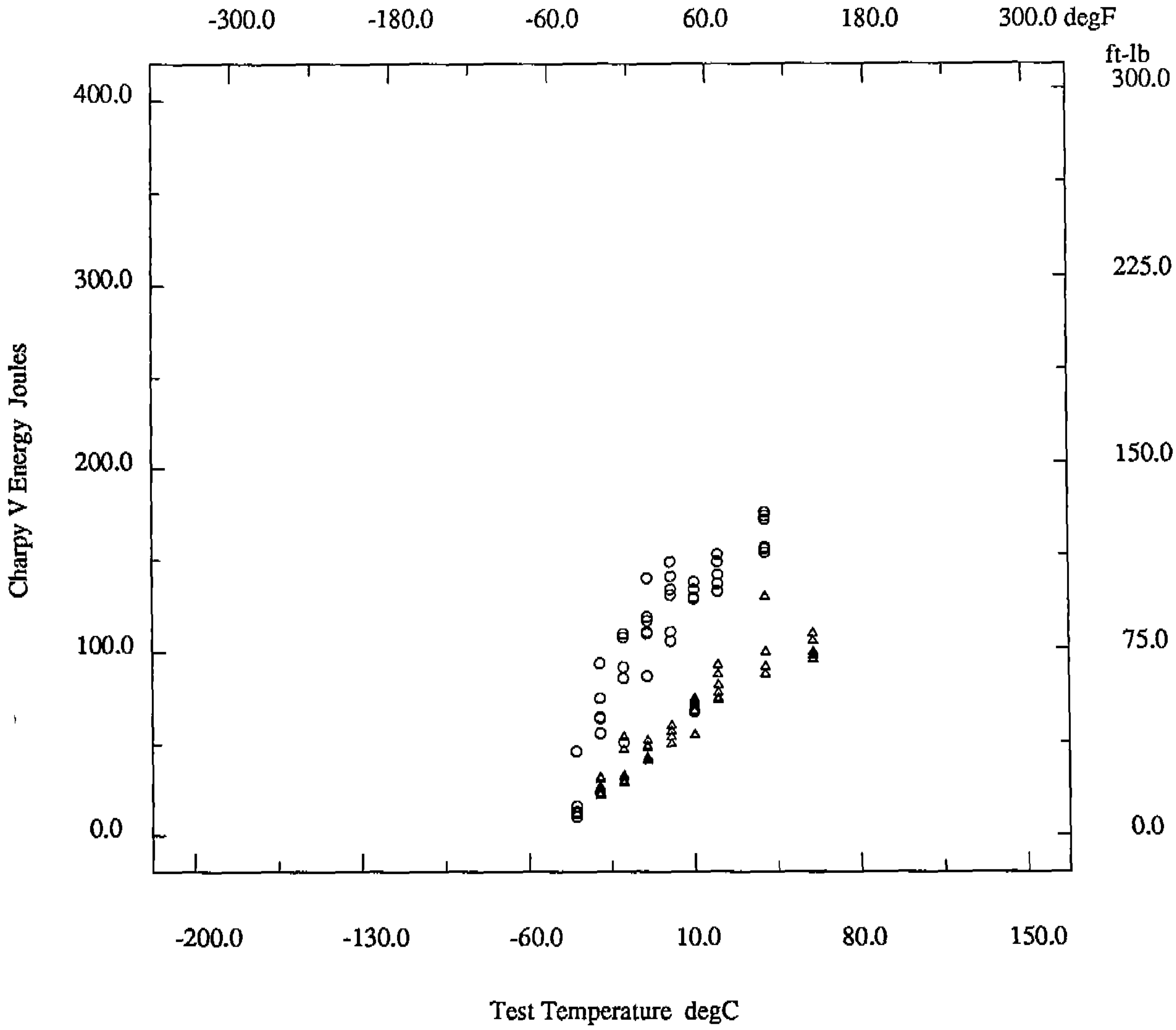
| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| T-L ▵ | 20 | 82 | 75 |
| T-L ▵ | 20 | 88 | 80 |
| T-L ▵ | 20 | 93 | 80 |
| T-L ▵ | 40 | 100 | 90 |
| T-L ▵ | 40 | 100 | 90 |
| T-L ▵ | 40 | 130 | 100 |
| T-L ▵ | 40 | 88 | 95 |
| T-L ▵ | 40 | 92 | 98 |
| T-L ▵ | 60 | 100 | 100 |
| T-L ▵ | 60 | 106 | 100 |
| T-L ▵ | 60 | 110 | 100 |
| T-L ▵ | 60 | 96 | 98 |
| T-L ▵ | 60 | 98 | 100 |
| T-L ▵ | 60 | 98 | 98 |

* - not reported

# Material ABS-B



| Description | | | |
|---|---|---|---|
| Material Code | 004.002.01.2 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641661 |
| Reference | 004-2 | | |




* - not reported

(57)

# Material ABS-B



**Description**

| | | | |
|---|---|---|---|
| Material Code | 004.002.01.2 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641661 |
| Reference | 004-2 | | |

**Composition** See Page 1200.1

**Fabrication History** See Page 1200.1

**Property Measurements**

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

| Orien | Test Temp degC | Break? | NDTT |
|---|---|---|---|
| T | -40 | Yes | No |
| T | -35 | Yes | No |
| T | -30 | No | Yes |
| T | -25 | No | No |
| T | -20 | No | No |

* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.002.01.6 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 36 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641661 |
| Reference | 004-2 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.13 % | Mn | 1.02 % |
| P | 0.015 % | S | 0.011 % |
| Si | 0.25 % | Cr | 0.03 % |
| Ni | 0.02 % | Mo | 0.005 % |
| V | * | Cu | 0.015 % |
| Cb | * | Ti | * |
| B | * | Al | 0.03 % |
| N | * | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Australia |
| Year Produced | 1979 | Addl Info | None |
| Source | Australia | Melting Practice | BOF |
| Ingot Position | Concast | Killing Process | Fully |
| Process Temperature | 875 degC | Process Time | * |
| Rolling Conditions | 86 % | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | 1/4T |
| Specimen Type | * | Specimen Thickness | * |
| Gage Length | 200 mm | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Tensile Modulus | * |
| Standard Method | * | Standard Year | * |

| Orient | Test Temp degC | UTS MPa | TYP MPa | Elongation % | RA % |
|---|---|---|---|---|---|
| L | 20 | 434 | 272 | 36 | 65 |
| T | 20 | 434 | 276 | 36 | 61 |
| T | 20 | 436 | 276 | 34 | 68 |

* - not reported

# Material ABS-B



**Description**

| | | | |
|---|---|---|---|
| Material Code | 004.002.01.6 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 36 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641661 |
| Reference | 004-2 | | |

**Composition** See Page 1300.1

**Fabrication History** See Page 1300.1

**Property Measurements**

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

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | -50 | 19 | 15 |
| L-T ○ | -50 | 69 | 30 |
| L-T ○ | -50 | 81 | 35 |
| L-T ○ | -40 | 103 | 40 |
| L-T ○ | -40 | 13 | 15 |
| L-T ○ | -40 | 15 | 15 |
| L-T ○ | -40 | 48 | 30 |
| L-T ○ | -40 | 92 | 40 |
| L-T ○ | -40 | 99 | 35 |
| L-T ○ | -30 | 114 | 40 |
| L-T ○ | -30 | 115 | 40 |
| L-T ○ | -30 | 116 | 40 |
| L-T ○ | -30 | 135 | 65 |
| L-T ○ | -30 | 142 | 65 |
| L-T ○ | -30 | 96 | 35 |
| L-T ○ | -20 | 101 | 50 |
| L-T ○ | -20 | 121 | 55 |
| L-T ○ | -20 | 126 | 55 |
| L-T ○ | -20 | 126 | 55 |
| L-T ○ | -20 | 141 | 65 |
| L-T ○ | -20 | 148 | 70 |
| L-T ○ | -10 | 131 | 65 |
| L-T ○ | -10 | 134 | 70 |
| L-T ○ | -10 | 136 | 65 |
| L-T ○ | -10 | 139 | 65 |
| L-T ○ | -10 | 140 | 70 |
| L-T ○ | -10 | 163 | 70 |
| L-T ○ | 0 | 108 | 60 |
| L-T ○ | 0 | 126 | 65 |
| L-T ○ | 0 | 151 | 70 |
| L-T ○ | 0 | 159 | 75 |
| L-T ○ | 0 | 167 | 80 |
| L-T ○ | 0 | 96 | 55 |
| L-T ○ | 10 | 132 | 75 |

(continued)

* - not reported

## Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | 10 | 142 | 75 |
| L-T ○ | 10 | 159 | 80 |
| L-T ○ | 20 | 136 | 85 |
| L-T ○ | 20 | 152 | 100 |
| L-T ○ | 20 | 173 | 90 |
| L-T ○ | 20 | 183 | 100 |
| L-T ○ | 20 | 184 | 100 |
| L-T ○ | 20 | 189 | 100 |
| L-T ○ | 40 | 159 | 98 |
| L-T ○ | 40 | 164 | 100 |
| L-T ○ | 40 | 170 | 100 |
| L-T ○ | 40 | 174 | 100 |
| L-T ○ | 40 | 179 | 100 |
| L-T ○ | 40 | 180 | 100 |
| T-L △ | -30 | 30 | 25 |
| T-L △ | -30 | 30 | 25 |
| T-L △ | -30 | 32 | 25 |
| T-L △ | -30 | 34 | 25 |
| T-L △ | -30 | 35 | 30 |
| T-L △ | -30 | 44 | 30 |
| T-L △ | -20 | 41 | 35 |
| T-L △ | -20 | 42 | 35 |
| T-L △ | -20 | 45 | 35 |
| T-L △ | -20 | 45 | 40 |
| T-L △ | -20 | 45 | 40 |
| T-L △ | -20 | 46 | 35 |
| T-L △ | -10 | 41 | 40 |
| T-L △ | -10 | 43 | 40 |
| T-L △ | -10 | 44 | 45 |
| T-L △ | -10 | 45 | 45 |
| T-L △ | -10 | 50 | 45 |
| T-L △ | -10 | 59 | 50 |
| T-L △ | 0 | 54 | 55 |
| T-L △ | 0 | 56 | 45 |
| T-L △ | 0 | 58 | 50 |
| T-L △ | 0 | 58 | 60 |
| T-L △ | 0 | 61 | 55 |
| T-L △ | 0 | 62 | 60 |
| T-L △ | 10 | 64 | 65 |
| T-L △ | 10 | 66 | 65 |
| T-L △ | 10 | 66 | 65 |
| T-L △ | 10 | 66 | 65 |
| T-L △ | 10 | 79 | 70 |
| T-L △ | 10 | 80 | 75 |
| T-L △ | 20 | 71 | 75 |
| T-L △ | 20 | 78 | 75 |
| T-L △ | 20 | 78 | 75 |

(continued)

* - not reported

(U)

(continued)

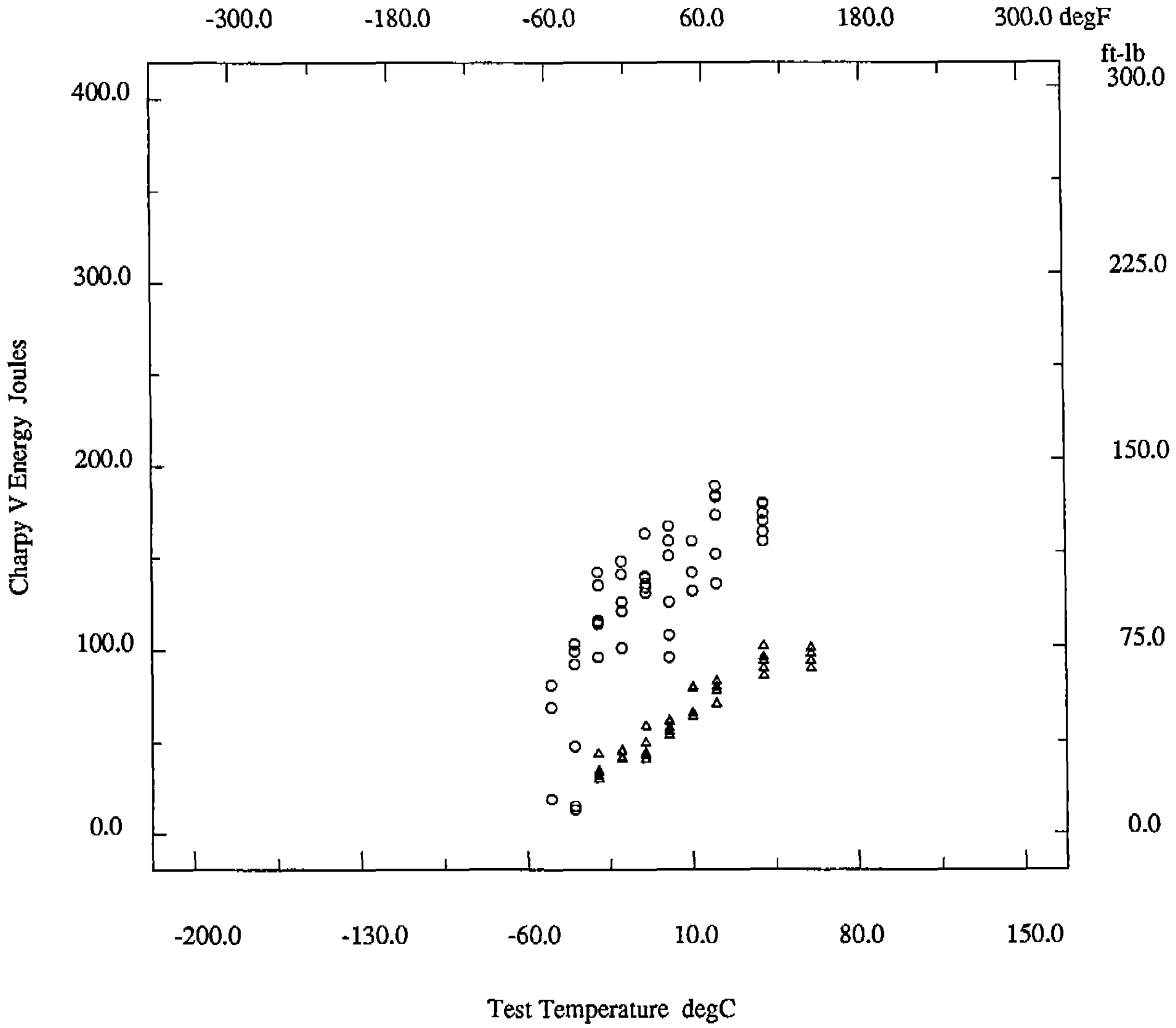
| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| T-L ▵ | 20 | 80 | 80 |
| T-L ▵ | 20 | 80 | 80 |
| T-L ▵ | 20 | 83 | 80 |
| T-L ▵ | 40 | 102 | 100 |
| T-L ▵ | 40 | 86 | 95 |
| T-L ▵ | 40 | 90 | 98 |
| T-L ▵ | 40 | 94 | 100 |
| T-L ▵ | 40 | 94 | 98 |
| T-L ▵ | 40 | 96 | 98 |
| T-L ▵ | 60 | 101 | 100 |
| T-L ▵ | 60 | 90 | 100 |
| T-L ▵ | 60 | 94 | 100 |
| T-L ▵ | 60 | 94 | 100 |
| T-L ▵ | 60 | 94 | 98 |
| T-L ▵ | 60 | 98 | 100 |

* - not reported

# Material ABS-B



| Description | | | |
|---|---|---|---|
| Material Code | 004.002.01.6 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 36 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641661 |
| Reference | 004-2 | | |




* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.002.01.6 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 36 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641661 |
| Reference | 004-2 | | |

## Composition

See Page 1300.1

## Fabrication History

See Page 1300.1

## Property Measurements

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

| Orien | Test Temp degC | Break? | NDTT |
|---|---|---|---|
| T | -40 | Yes | No |
| T | -35 | No | Yes |
| T | -30 | No | No |

* - not reported

# Material ABS-B



## Description

Material Code .................. 004.003.01.1
UNS .................................. *
Type ....................... Wrought Metal
Thickness .......................... 50 mm
Composition Position .................. Ladle
Reference ............................. 004-2
Material Name ....................... ABS-B
Other Designation ........................ *
Form ................................. Plate
Composition Type .................... Actual
Lot ID .............................. 641662

## Composition

C ............................... 0.12 %
P ............................... 0.019 %
Si .............................. 0.25 %
Ni .............................. 0.02 %
V ................................... *
Cb .................................. *
B ................................... *
N ................................... *
Mn .............................. 0.96 %
S ............................... 0.012 %
Cr .............................. 0.025 %
Mo .............................. 0.005 %
Cu .............................. 0.015 %
Ti .................................. *
Al .............................. 0.03 %
Other Components ................ None %

## Fabrication History

Heat Treatment ........................ *
Year Produced ...................... 1979
Source ......................... Australia
Ingot Position .................. Concast
Process Temperature ............ 960 degC
Rolling Conditions ................. 81 %
Final Temperature ..................... *
Cold Work Strain ...................... *
Aging Time ............................ *
Producer ....................... Australia
Addl Info ............................ None
Melting Practice ...................... BOF
Killing Process ..................... Fully
Process Time .......................... *
Final Processing ...................... A,R
Final Time ............................ *
Aging Temperature ..................... *
Location .............................. *

## Property Measurements

Test Type ......................... Tensile
Specimen Type ......................... *
Gage Length ..................... 200 mm
Tensile Strength Offset ............... *
Uniform Elongation .................... *
Standard Method ....................... *
Position ............................. 1/4T
Specimen Thickness .................... *
Loading Rate .......................... *
Tensile Yield Strength ................ *
Tensile Modulus ....................... *
Standard Year ......................... *

| Orient | Test Temp degC | UTS MPa | TYP MPa | Elongation % | RA % |
|---|---|---|---|---|---|
| L | 20 | 434 | 264 | 31 | 71 |
| T | 20 | 426 | 270 | 31 | 65 |
| T | 20 | 430 | 256 | 31 | 70 |

* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.003.01.1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641662 |
| Reference | 004-2 | | |

## Composition

See Page 1400.1

## Fabrication History

See Page 1400.1

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | -50 | 14 | 15 |
| L-T ○ | -50 | 54 | 25 |
| L-T ○ | -50 | 74 | 30 |
| L-T ○ | -40 | 100 | 30 |
| L-T ○ | -40 | 108 | 30 |
| L-T ○ | -40 | 123 | 40 |
| L-T ○ | -40 | 54 | 15 |
| L-T ○ | -40 | 92 | 30 |
| L-T ○ | -40 | 98 | 30 |
| L-T ○ | -30 | 118 | 40 |
| L-T ○ | -30 | 120 | 40 |
| L-T ○ | -30 | 124 | 45 |
| L-T ○ | -30 | 126 | 45 |
| L-T ○ | -30 | 136 | 45 |
| L-T ○ | -30 | 146 | 50 |
| L-T ○ | -20 | 121 | 45 |
| L-T ○ | -20 | 130 | 50 |
| L-T ○ | -20 | 132 | 50 |
| L-T ○ | -20 | 134 | 55 |
| L-T ○ | -20 | 136 | 55 |
| L-T ○ | -20 | 53 | 35 |
| L-T ○ | -10 | 141 | 55 |
| L-T ○ | -10 | 144 | 60 |
| L-T ○ | -10 | 144 | 60 |
| L-T ○ | -10 | 148 | 60 |
| L-T ○ | -10 | 164 | 65 |
| L-T ○ | -10 | 167 | 65 |
| L-T ○ | 0 | 136 | 60 |
| L-T ○ | 0 | 140 | 60 |
| L-T ○ | 0 | 144 | 65 |
| L-T ○ | 0 | 158 | 70 |
| L-T ○ | 0 | 160 | 75 |
| L-T ○ | 0 | 198 | 85 |
| L-T ○ | 10 | 165 | 95 |

(continued)

* - not reported

## Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | 10 | 190 | 85 |
| L-T ○ | 10 | 194 | 90 |
| L-T ○ | 10 | 196 | 100 |
| L-T ○ | 10 | 196 | 85 |
| L-T ○ | 10 | 206 | 100 |
| L-T ○ | 20 | 150 | 80 |
| L-T ○ | 20 | 160 | 85 |
| L-T ○ | 20 | 194 | 100 |
| L-T ○ | 20 | 202 | 100 |
| L-T ○ | 20 | 215 | 100 |
| L-T ○ | 20 | 216 | 100 |
| L-T ○ | 40 | 181 | 100 |
| L-T ○ | 40 | 192 | 100 |
| L-T ○ | 40 | 196 | 100 |
| T-L △ | -40 | 12 | 15 |
| T-L △ | -40 | 22 | 20 |
| T-L △ | -40 | 32 | 25 |
| T-L △ | -40 | 40 | 20 |
| T-L △ | -40 | 44 | 20 |
| T-L △ | -40 | 50 | 25 |
| T-L △ | -30 | 32 | 25 |
| T-L △ | -30 | 42 | 30 |
| T-L △ | -30 | 50 | 30 |
| T-L △ | -30 | 50 | 35 |
| T-L △ | -30 | 52 | 30 |
| T-L △ | -30 | 59 | 35 |
| T-L △ | -20 | 42 | 30 |
| T-L △ | -20 | 45 | 35 |
| T-L △ | -20 | 49 | 35 |
| T-L △ | -20 | 56 | 35 |
| T-L △ | -20 | 57 | 35 |
| T-L △ | -20 | 57 | 35 |
| T-L △ | -10 | 52 | 40 |
| T-L △ | -10 | 59 | 40 |
| T-L △ | -10 | 64 | 40 |
| T-L △ | -10 | 69 | 45 |
| T-L △ | -10 | 76 | 45 |
| T-L △ | -10 | 83 | 45 |
| T-L △ | 0 | 58 | 45 |
| T-L △ | 0 | 66 | 50 |
| T-L △ | 0 | 71 | 50 |
| T-L △ | 0 | 76 | 55 |
| T-L △ | 0 | 82 | 55 |
| T-L △ | 0 | 86 | 55 |
| T-L △ | 20 | 101 | 75 |
| T-L △ | 20 | 103 | 75 |
| T-L △ | 20 | 106 | 75 |

(continued)

* - not reported

# Material ABS-B



(continued)

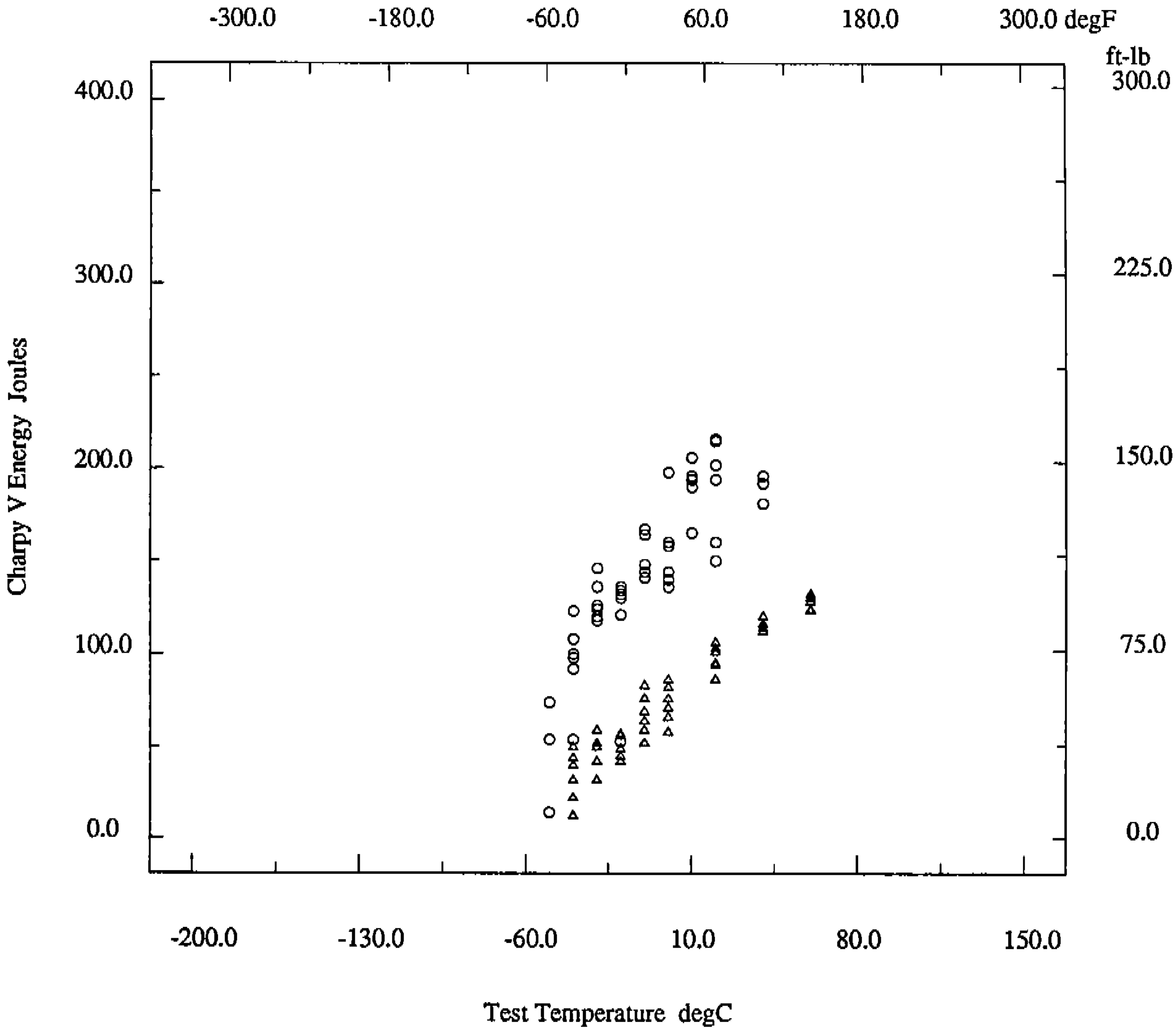
| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| T-L ▵ | 20 | 86 | 60 |
| T-L ▵ | 20 | 94 | 75 |
| T-L ▵ | 20 | 95 | 75 |
| T-L ▵ | 40 | 112 | 90 |
| T-L ▵ | 40 | 114 | 85 |
| T-L ▵ | 40 | 116 | 90 |
| T-L ▵ | 40 | 120 | 90 |
| T-L ▵ | 40 | 120 | 90 |
| T-L ▵ | 40 | 120 | 90 |
| T-L ▵ | 60 | 123 | 100 |
| T-L ▵ | 60 | 124 | 78 |
| T-L ▵ | 60 | 128 | 100 |
| T-L ▵ | 60 | 130 | 100 |
| T-L ▵ | 60 | 130 | 100 |
| T-L ▵ | 60 | 132 | 100 |

* - not reported

# Material ABS-B



| Description | | | |
|---|---|---|---|
| Material Code | 004.003.01.1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641662 |
| Reference | 004-2 | | |




* - not reported

# Material ABS-B



**Description**

| | | | |
|---|---|---|---|
| Material Code | 004.003.01.1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641662 |
| Reference | 004-2 | | |

**Composition** See Page 1400.1

**Fabrication History** See Page 1400.1

**Property Measurements**

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

| Orien | Test Temp degC | Break? | NDTT |
|---|---|---|---|
| T | -30 | Yes | Yes |
| T | -25 | No | No |
| T | -20 | No | No |

* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.003.01.2 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641662 |
| Reference | 004-2 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 0.96 % |
| P | 0.019 % | S | 0.012 % |
| Si | 0.25 % | Cr | 0.025 % |
| Ni | 0.02 % | Mo | 0.005 % |
| V | * | Cu | 0.015 % |
| Cb | * | Ti | * |
| B | * | Al | 0.03 % |
| N | * | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Australia |
| Year Produced | 1979 | Addl Info | None |
| Source | Australia | Melting Practice | BOF |
| Ingot Position | Concast | Killing Process | Fully |
| Process Temperature | 925 degC | Process Time | * |
| Rolling Conditions | 81 % | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | 1/4T |
| Specimen Type | * | Specimen Thickness | * |
| Gage Length | 200 mm | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Tensile Modulus | * |
| Standard Method | * | Standard Year | * |

| Orient | Test Temp degC | UTS MPa | TYP MPa | Elongation % | RA % |
|---|---|---|---|---|---|
| L | 20 | 434 | 290 | 34 | 68 |
| T | 20 | 430 | 270 | 29 | 69 |
| T | 20 | 434 | 258 | 30 | 67 |

* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.003.01.2 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641662 |
| Reference | 004-2 | | |

## Composition

See Page 1500.1

## Fabrication History

See Page 1500.1

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | -50 | 10 | 10 |
| L-T ○ | -50 | 13 | 10 |
| L-T ○ | -50 | 18 | 15 |
| L-T ○ | -40 | 14 | 10 |
| L-T ○ | -40 | 20 | 15 |
| L-T ○ | -40 | 24 | 15 |
| L-T ○ | -40 | 54 | 25 |
| L-T ○ | -40 | 74 | 30 |
| L-T ○ | -40 | 9 | 10 |
| L-T ○ | -30 | 108 | 35 |
| L-T ○ | -30 | 114 | 35 |
| L-T ○ | -30 | 130 | 50 |
| L-T ○ | -30 | 60 | 25 |
| L-T ○ | -30 | 70 | 30 |
| L-T ○ | -30 | 94 | 30 |
| L-T ○ | -20 | 102 | 40 |
| L-T ○ | -20 | 116 | 40 |
| L-T ○ | -20 | 121 | 45 |
| L-T ○ | -20 | 123 | 50 |
| L-T ○ | -20 | 136 | 55 |
| L-T ○ | -20 | 52 | 45 |
| L-T ○ | -10 | 103 | 45 |
| L-T ○ | -10 | 120 | 50 |
| L-T ○ | -10 | 124 | 55 |
| L-T ○ | -10 | 130 | 55 |
| L-T ○ | -10 | 130 | 55 |
| L-T ○ | -10 | 149 | 60 |
| L-T ○ | 0 | 106 | 60 |
| L-T ○ | 0 | 123 | 55 |
| L-T ○ | 0 | 136 | 65 |
| L-T ○ | 0 | 140 | 75 |
| L-T ○ | 0 | 144 | 65 |
| L-T ○ | 0 | 146 | 65 |
| L-T ○ | 10 | 130 | 65 |

(continued)

* - not reported

# Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | 10 | 146 | 65 |
| L-T ○ | 10 | 156 | 75 |
| L-T ○ | 10 | 158 | 70 |
| L-T ○ | 10 | 160 | 80 |
| L-T ○ | 10 | 164 | 85 |
| L-T ○ | 20 | 142 | 75 |
| L-T ○ | 20 | 154 | 95 |
| L-T ○ | 20 | 155 | 80 |
| L-T ○ | 20 | 160 | 100 |
| L-T ○ | 20 | 172 | 95 |
| L-T ○ | 20 | 211 | 100 |
| L-T ○ | 40 | 171 | 100 |
| L-T ○ | 40 | 178 | 100 |
| L-T ○ | 40 | 178 | 100 |
| T-L ▵ | -40 | 14 | 15 |
| T-L ▵ | -40 | 15 | 15 |
| T-L ▵ | -40 | 18 | 20 |
| T-L ▵ | -30 | 23 | 25 |
| T-L ▵ | -30 | 37 | 30 |
| T-L ▵ | -30 | 42 | 50 |
| T-L ▵ | -30 | 44 | 30 |
| T-L ▵ | -30 | 46 | 30 |
| T-L ▵ | -30 | 46 | 35 |
| T-L ▵ | -20 | 33 | 25 |
| T-L ▵ | -20 | 38 | 30 |
| T-L ▵ | -20 | 40 | 30 |
| T-L ▵ | -20 | 42 | 35 |
| T-L ▵ | -20 | 48 | 35 |
| T-L ▵ | -20 | 49 | 35 |
| T-L ▵ | -10 | 42 | 35 |
| T-L ▵ | -10 | 42 | 35 |
| T-L ▵ | -10 | 52 | 35 |
| T-L ▵ | -10 | 55 | 35 |
| T-L ▵ | -10 | 60 | 40 |
| T-L ▵ | -10 | 62 | 40 |
| T-L ▵ | 0 | 50 | 40 |
| T-L ▵ | 0 | 55 | 40 |
| T-L ▵ | 0 | 64 | 45 |
| T-L ▵ | 0 | 70 | 50 |
| T-L ▵ | 0 | 80 | 55 |
| T-L ▵ | 0 | 83 | 70 |
| T-L ▵ | 10 | 76 | 60 |
| T-L ▵ | 10 | 76 | 65 |
| T-L ▵ | 10 | 80 | 70 |
| T-L ▵ | 20 | 80 | 70 |
| T-L ▵ | 20 | 84 | 65 |
| T-L ▵ | 20 | 85 | 75 |

(continued)

* - not reported

# Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| T-L ▵ | 20 | 90 | 70 |
| T-L ▵ | 20 | 95 | 75 |
| T-L ▵ | 20 | 96 | 75 |
| T-L ▵ | 40 | 108 | 80 |
| T-L ▵ | 40 | 112 | 85 |
| T-L ▵ | 40 | 114 | 80 |
| T-L ▵ | 40 | 116 | 95 |
| T-L ▵ | 40 | 120 | 90 |
| T-L ▵ | 40 | 124 | 98 |
| T-L ▵ | 60 | 112 | 100 |
| T-L ▵ | 60 | 116 | 100 |
| T-L ▵ | 60 | 116 | 95 |
| T-L ▵ | 60 | 119 | 98 |
| T-L ▵ | 60 | 120 | 100 |
| T-L ▵ | 60 | 122 | 100 |

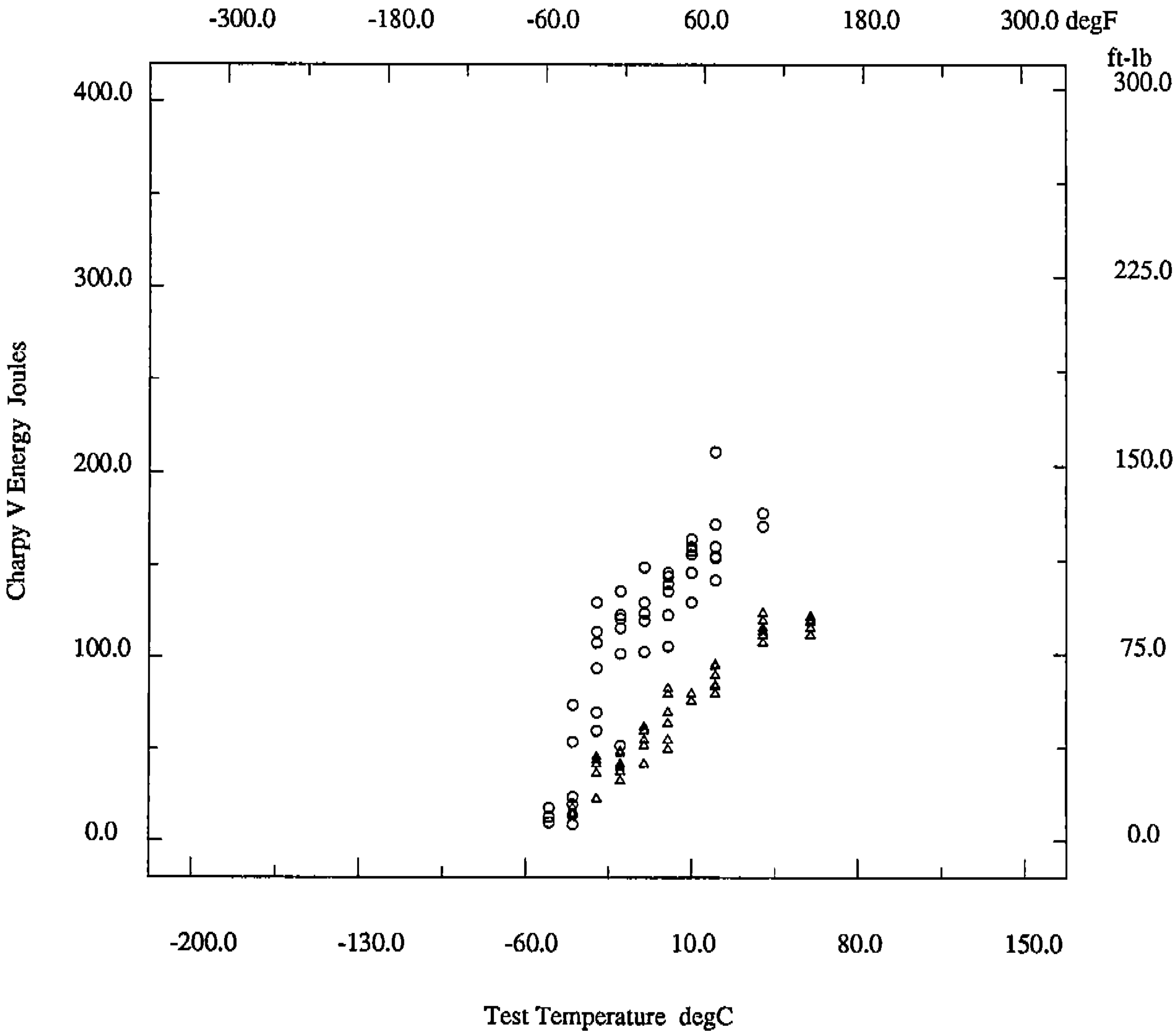
* - not reported

## Material ABS-B



**Description**

| | | | |
|---|---|---|---|
| Material Code | 004.003.01.2 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641662 |
| Reference | 004-2 | | |




* - not reported

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## Description

| | | | |
|---|---|---|---|
| Material Code | 004.003.01.2 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641662 |
| Reference | 004-2 | | |

## Composition

See Page 1500.1

## Fabrication History

See Page 1500.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductility Transition | Position | 0/4T |
| Specimen Type | P-1 | Filler Alloy | Hardex-N |
| Passes | 1 | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degC | Break? | NDTT |
|---|---|---|---|
| T | -40 | Yes | Yes |
| T | -35 | No | No |
| T | -30 | No | No |

* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.003.01.7 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 36 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641662 |
| Reference | 004-2 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 0.96 % |
| P | 0.019 % | S | 0.012 % |
| Si | 0.25 % | Cr | 0.025 % |
| Ni | 0.02 % | Mo | 0.005 % |
| V | * | Cu | 0.015 % |
| Cb | * | Ti | * |
| B | * | Al | 0.03 % |
| N | * | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Australia |
| Year Produced | 1979 | Addl Info | None |
| Source | Australia | Melting Practice | BOF |
| Ingot Position | Concast | Killing Process | Fully |
| Process Temperature | 965 degC | Process Time | * |
| Rolling Conditions | 86 % | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | 1/4T |
| Specimen Type | * | Specimen Thickness | * |
| Gage Length | 200 mm | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Tensile Modulus | * |
| Standard Method | * | Standard Year | * |

| Orient | Test Temp degC | UTS MPa | TYP MPa | Elongation % | RA % |
|---|---|---|---|---|---|
| L | 20 | 424 | 276 | 35 | 66 |
| T | 20 | 424 | 274 | 31 | 64 |
| T | 20 | 424 | 274 | 32 | 58 |

* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.003.01.7 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 36 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641662 |
| Reference | 004-2 | | |

## Composition

See Page 1600.1

## Fabrication History

See Page 1600.1

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | -40 | 115 | 40 |
| L-T ○ | -40 | 121 | 45 |
| L-T ○ | -40 | 15 | 15 |
| L-T ○ | -40 | 26 | 15 |
| L-T ○ | -40 | 75 | 25 |
| L-T ○ | -40 | 8 | 10 |
| L-T ○ | -30 | 118 | 40 |
| L-T ○ | -30 | 120 | 40 |
| L-T ○ | -30 | 121 | 40 |
| L-T ○ | -30 | 126 | 40 |
| L-T ○ | -30 | 130 | 45 |
| L-T ○ | -30 | 134 | 45 |
| L-T ○ | -20 | 121 | 50 |
| L-T ○ | -20 | 131 | 55 |
| L-T ○ | -20 | 134 | 60 |
| L-T ○ | -20 | 139 | 55 |
| L-T ○ | -20 | 142 | 60 |
| L-T ○ | -20 | 151 | 66 |
| L-T ○ | -10 | 120 | 55 |
| L-T ○ | -10 | 133 | 50 |
| L-T ○ | -10 | 133 | 55 |
| L-T ○ | -10 | 142 | 55 |
| L-T ○ | -10 | 159 | 65 |
| L-T ○ | -10 | 168 | 75 |
| L-T ○ | 0 | 119 | 60 |
| L-T ○ | 0 | 142 | 65 |
| L-T ○ | 0 | 148 | 70 |
| L-T ○ | 0 | 161 | 70 |
| L-T ○ | 0 | 171 | 80 |
| L-T ○ | 0 | 193 | 95 |
| L-T ○ | 10 | 152 | 75 |
| L-T ○ | 10 | 154 | 70 |
| L-T ○ | 10 | 154 | 70 |
| L-T ○ | 10 | 156 | 75 |

(continued)

* - not reported

## Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | 10 | 198 | 100 |
| L-T ○ | 10 | 200 | 100 |
| L-T ○ | 20 | 154 | 80 |
| L-T ○ | 20 | 158 | 80 |
| L-T ○ | 20 | 162 | 85 |
| L-T ○ | 20 | 170 | 85 |
| L-T ○ | 20 | 192 | 100 |
| L-T ○ | 20 | 195 | 100 |
| L-T ○ | 40 | 179 | 100 |
| L-T ○ | 40 | 179 | 100 |
| L-T ○ | 40 | 183 | 100 |
| L-T ○ | 40 | 184 | 100 |
| L-T ○ | 40 | 186 | 100 |
| L-T ○ | 40 | 188 | 100 |
| T-L △ | -30 | 29 | 15 |
| T-L △ | -30 | 36 | 25 |
| T-L △ | -30 | 39 | 25 |
| T-L △ | -30 | 43 | 25 |
| T-L △ | -30 | 46 | 25 |
| T-L △ | -30 | 50 | 30 |
| T-L △ | -20 | 36 | 30 |
| T-L △ | -20 | 42 | 30 |
| T-L △ | -20 | 42 | 30 |
| T-L △ | -20 | 46 | 35 |
| T-L △ | -20 | 52 | 35 |
| T-L △ | -20 | 58 | 35 |
| T-L △ | -10 | 42 | 30 |
| T-L △ | -10 | 50 | 35 |
| T-L △ | -10 | 52 | 35 |
| T-L △ | -10 | 54 | 30 |
| T-L △ | -10 | 54 | 40 |
| T-L △ | -10 | 57 | 40 |
| T-L △ | 0 | 60 | 40 |
| T-L △ | 0 | 66 | 45 |
| T-L △ | 0 | 71 | 35 |
| T-L △ | 0 | 72 | 40 |
| T-L △ | 0 | 76 | 40 |
| T-L △ | 0 | 81 | 55 |
| T-L △ | 10 | 76 | 50 |
| T-L △ | 10 | 80 | 55 |
| T-L △ | 10 | 84 | 50 |
| T-L △ | 10 | 84 | 60 |
| T-L △ | 10 | 85 | 60 |
| T-L △ | 10 | 88 | 55 |
| T-L △ | 20 | 100 | 70 |
| T-L △ | 20 | 88 | 70 |
| T-L △ | 20 | 90 | 60 |

(continued)

* - not reported

## Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| T-L △ | 20 | 92 | 60 |
| T-L △ | 20 | 94 | 70 |
| T-L △ | 20 | 95 | 75 |
| T-L △ | 40 | 105 | 80 |
| T-L △ | 40 | 106 | 85 |
| T-L △ | 40 | 111 | 90 |
| T-L △ | 40 | 113 | 90 |
| T-L △ | 40 | 114 | 90 |
| T-L △ | 40 | 115 | 95 |
| T-L △ | 60 | 111 | 95 |
| T-L △ | 60 | 115 | 98 |
| T-L △ | 60 | 117 | 100 |
| T-L △ | 60 | 117 | 98 |
| T-L △ | 60 | 118 | 100 |
| T-L △ | 60 | 122 | 100 |

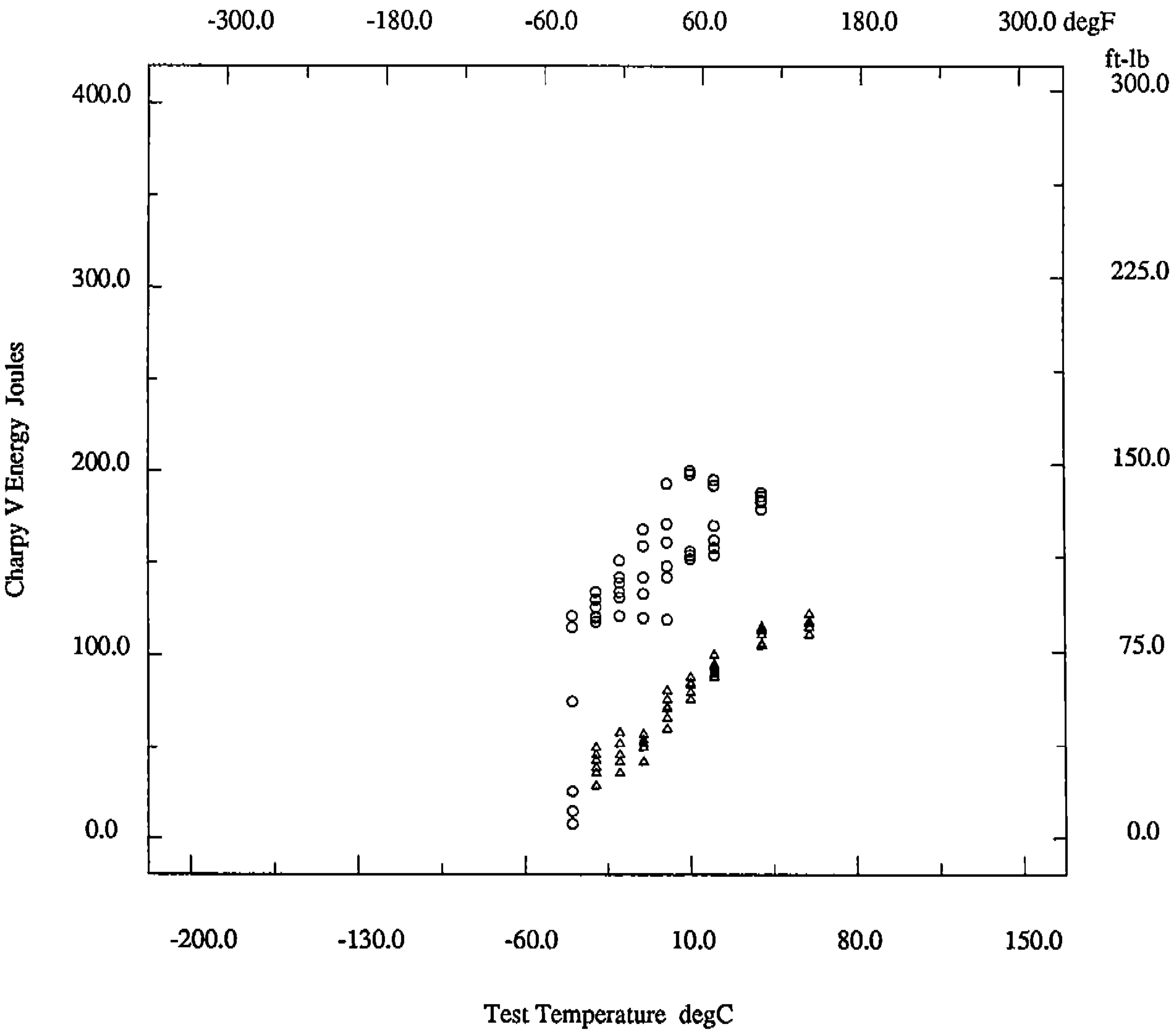
* - not reported

## Material ABS-B



**Description**

| | | | |
|---|---|---|---|
| Material Code | 004.003.01.7 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 36 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 641662 |
| Reference | 004-2 | | |




* - not reported

51

# Material ABS-B



**Description**

Material Code .................. 004.003.01.7
Material Name ....................... ABS-B
UNS .................................. *
Other Designation ........................ *
Type ......................... Wrought Metal
Form ................................ Plate
Thickness ......................... 36 mm
Composition Type .................. Actual
Composition Position ................ Ladle
Lot ID ............................ 641662
Reference ......................... 004-2

**Composition** See Page 1600.1

**Fabrication History** See Page 1600.1

**Property Measurements**

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

| Orien | Test Temp degC | Break? | NDTT |
|---|---|---|---|
| T | -30 | Yes | Yes |
| T | -25 | No | No |
| T | -20 | No | No |

* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.004.01.1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 642697 |
| Reference | 004-2 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 0.90 % |
| P | 0.026 % | S | 0.014 % |
| Si | 0.22 % | Cr | 0.025 % |
| Ni | 0.025 % | Mo | 0.005 % |
| V | * | Cu | 0.04 % |
| Cb | * | Ti | * |
| B | * | Al | 0.01 % |
| N | * | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Australia |
| Year Produced | 1979 | Addl Info | None |
| Source | Australia | Melting Practice | BOF |
| Ingot Position | Concast | Killing Process | Fully |
| Process Temperature | 950 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | 1/4T |
| Specimen Type | * | Specimen Thickness | * |
| Gage Length | 200 mm | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Tensile Modulus | * |
| Standard Method | * | Standard Year | * |

| Orient | Test Temp degC | UTS MPa | TYP MPa | Elongation % | RA % |
|---|---|---|---|---|---|
| L | 20 | 440 | 250 | 30 | 64 |
| T | 20 | 438 | 242 | 26 | 62 |
| T | 20 | 442 | 256 | 30 | 60 |

* - not reported

(83)

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.004.01.1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 642697 |
| Reference | 004-2 | | |

## Composition

See Page 1700.1

## Fabrication History

See Page 1700.1

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | -40 | 12 | 10 |
| L-T ○ | -40 | 13 | 20 |
| L-T ○ | -40 | 14 | 20 |
| L-T ○ | -40 | 18 | 10 |
| L-T ○ | -40 | 41 | 15 |
| L-T ○ | -40 | 56 | 25 |
| L-T ○ | -30 | 34 | 15 |
| L-T ○ | -30 | 46 | 25 |
| L-T ○ | -30 | 47 | 20 |
| L-T ○ | -30 | 74 | 30 |
| L-T ○ | -30 | 74 | 30 |
| L-T ○ | -30 | 98 | 35 |
| L-T ○ | -20 | 110 | 40 |
| L-T ○ | -20 | 112 | 45 |
| L-T ○ | -20 | 21 | 15 |
| L-T ○ | -20 | 26 | 25 |
| L-T ○ | -20 | 42 | 35 |
| L-T ○ | -20 | 52 | 20 |
| L-T ○ | -10 | 112 | 45 |
| L-T ○ | -10 | 119 | 45 |
| L-T ○ | -10 | 46 | 25 |
| L-T ○ | -10 | 84 | 35 |
| L-T ○ | -10 | 91 | 40 |
| L-T ○ | -10 | 94 | 40 |
| L-T ○ | 0 | 104 | 50 |
| L-T ○ | 0 | 104 | 50 |
| L-T ○ | 0 | 105 | 45 |
| L-T ○ | 0 | 108 | 50 |
| L-T ○ | 0 | 86 | 40 |
| L-T ○ | 0 | 92 | 45 |
| L-T ○ | 20 | 113 | 60 |
| L-T ○ | 20 | 128 | 60 |
| L-T ○ | 20 | 131 | 65 |
| L-T ○ | 20 | 137 | 65 |

(continued)

* - not reported

# Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | 20 | 138 | 60 |
| L-T ○ | 20 | 144 | 70 |
| L-T ○ | 30 | 142 | 75 |
| L-T ○ | 30 | 150 | 80 |
| L-T ○ | 30 | 155 | 80 |
| L-T ○ | 40 | 148 | 85 |
| L-T ○ | 40 | 154 | 80 |
| L-T ○ | 40 | 156 | 80 |
| L-T ○ | 40 | 158 | 85 |
| L-T ○ | 40 | 180 | 100 |
| L-T ○ | 40 | 190 | 100 |
| L-T ○ | 60 | 168 | 95 |
| L-T ○ | 60 | 172 | 95 |
| L-T ○ | 60 | 174 | 100 |
| T-L △ | -30 | 10 | 10 |
| T-L △ | -30 | 13 | 10 |
| T-L △ | -30 | 18 | 10 |
| T-L △ | -30 | 28 | 15 |
| T-L △ | -30 | 30 | 15 |
| T-L △ | -30 | 34 | 15 |
| T-L △ | -20 | 10 | 10 |
| T-L △ | -20 | 11 | 10 |
| T-L △ | -20 | 12 | 10 |
| T-L △ | -20 | 33 | 15 |
| T-L △ | -20 | 34 | 20 |
| T-L △ | -20 | 38 | 20 |
| T-L △ | -10 | 14 | 15 |
| T-L △ | -10 | 33 | 20 |
| T-L △ | -10 | 34 | 20 |
| T-L △ | -10 | 36 | 25 |
| T-L △ | -10 | 40 | 20 |
| T-L △ | -10 | 47 | 25 |
| T-L △ | 0 | 34 | 25 |
| T-L △ | 0 | 36 | 30 |
| T-L △ | 0 | 38 | 25 |
| T-L △ | 0 | 44 | 25 |
| T-L △ | 0 | 49 | 30 |
| T-L △ | 0 | 63 | 40 |
| T-L △ | 20 | 46 | 35 |
| T-L △ | 20 | 63 | 40 |
| T-L △ | 20 | 65 | 40 |
| T-L △ | 20 | 72 | 50 |
| T-L △ | 20 | 74 | 55 |
| T-L △ | 20 | 74 | 55 |
| T-L △ | 40 | 100 | 70 |
| T-L △ | 40 | 103 | 70 |
| T-L △ | 40 | 82 | 60 |

(continued)

* - not reported

# Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| T-L ▵ | 40 | 88 | 65 |
| T-L ▵ | 40 | 92 | 65 |
| T-L ▵ | 40 | 92 | 65 |
| T-L ▵ | 60 | 104 | 85 |
| T-L ▵ | 60 | 108 | 90 |
| T-L ▵ | 60 | 108 | 90 |
| T-L ▵ | 60 | 110 | 85 |
| T-L ▵ | 60 | 110 | 85 |
| T-L ▵ | 60 | 114 | 85 |
| T-L ▵ | 100 | 110 | 95 |
| T-L ▵ | 100 | 115 | 100 |
| T-L ▵ | 100 | 116 | 100 |
| T-L ▵ | 100 | 118 | 100 |
| T-L ▵ | 100 | 126 | 100 |
| T-L ▵ | 100 | 128 | 100 |

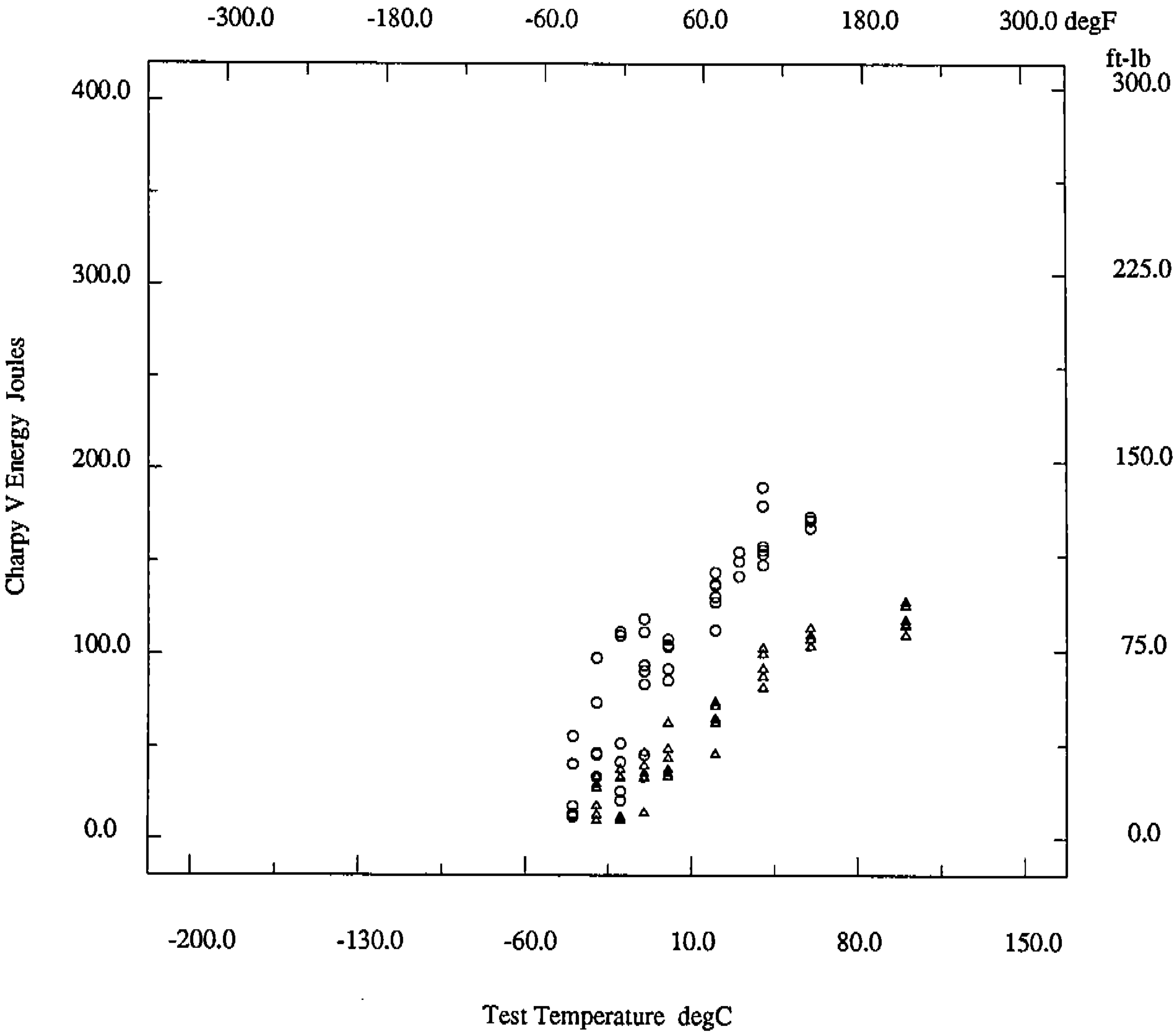
* - not reported

# Material ABS-B



**Description**

| | | | |
|---|---|---|---|
| Material Code | 004.004.01.1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 642697 |
| Reference | 004-2 | | |




* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.004.01.1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 642697 |
| Reference | 004-2 | | |

## Composition

See Page 1700.1

## Fabrication History

See Page 1700.1

## Property Measurements

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

| Orien | Test Temp degC | Break? | NDTT |
|---|---|---|---|
| T | -30 | Yes | No |
| T | -25 | Yes | Yes |
| T | -20 | No | No |

* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.005.01.1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 642696 |
| Reference | 004-2 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.13 % | Mn | 0.91 % |
| P | 0.024 % | S | 0.013 % |
| Si | 0.22 % | Cr | 0.025 % |
| Ni | 0.02 % | Mo | 0.005 % |
| V | * | Cu | 0.025 % |
| Cb | * | Ti | * |
| B | * | Al | 0.03 % |
| N | * | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Australia |
| Year Produced | 1979 | Addl Info | None |
| Source | Australia | Melting Practice | BOF |
| Ingot Position | Concast | Killing Process | Fully |
| Process Temperature | 970 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | 1/4T |
| Specimen Type | * | Specimen Thickness | * |
| Gage Length | 200 mm | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Tensile Modulus | * |
| Standard Method | * | Standard Year | * |

| Orient | Test Temp degC | UTS MPa | TYP MPa | Elongation % | RA % |
|---|---|---|---|---|---|
| L | 20 | 440 | 242 | 30 | 63 |
| T | 20 | 434 | 260 | 30 | 67 |
| T | 20 | 438 | 260 | 28 | 65 |

* - not reported

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# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.005.01.1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 642696 |
| Reference | 004-2 | | |

## Composition

See Page 1800.1

## Fabrication History

See Page 1800.1

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | -40 | 14 | 10 |
| L-T ○ | -40 | 14 | 10 |
| L-T ○ | -40 | 14 | 5 |
| L-T ○ | -40 | 20 | 10 |
| L-T ○ | -40 | 50 | 15 |
| L-T ○ | -40 | 8 | 5 |
| L-T ○ | -30 | 12 | 15 |
| L-T ○ | -30 | 14 | 15 |
| L-T ○ | -30 | 24 | 15 |
| L-T ○ | -30 | 27 | 15 |
| L-T ○ | -30 | 42 | 20 |
| L-T ○ | -30 | 48 | 25 |
| L-T ○ | -20 | 14 | 15 |
| L-T ○ | -20 | 15 | 20 |
| L-T ○ | -20 | 55 | 25 |
| L-T ○ | -20 | 57 | 25 |
| L-T ○ | -20 | 68 | 35 |
| L-T ○ | -20 | 70 | 30 |
| L-T ○ | -10 | 106 | 50 |
| L-T ○ | -10 | 36 | 45 |
| L-T ○ | -10 | 56 | 25 |
| L-T ○ | -10 | 76 | 55 |
| L-T ○ | -10 | 76 | 55 |
| L-T ○ | -10 | 96 | 40 |
| L-T ○ | 0 | 107 | 50 |
| L-T ○ | 0 | 118 | 55 |
| L-T ○ | 0 | 120 | 60 |
| L-T ○ | 0 | 130 | 60 |
| L-T ○ | 0 | 90 | 45 |
| L-T ○ | 0 | 93 | 45 |
| L-T ○ | 20 | 135 | 65 |
| L-T ○ | 20 | 139 | 60 |
| L-T ○ | 20 | 141 | 65 |
| L-T ○ | 20 | 141 | 65 |

(continued)

* - not reported

# Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | 20 | 146 | 60 |
| L-T ○ | 20 | 153 | 75 |
| L-T ○ | 40 | 146 | 80 |
| L-T ○ | 40 | 150 | 80 |
| L-T ○ | 40 | 152 | 80 |
| L-T ○ | 40 | 152 | 80 |
| L-T ○ | 40 | 163 | 85 |
| L-T ○ | 40 | 164 | 85 |
| L-T ○ | 60 | 160 | 90 |
| L-T ○ | 60 | 174 | 95 |
| L-T ○ | 60 | 179 | 100 |
| L-T ○ | 60 | 180 | 100 |
| L-T ○ | 60 | 182 | 100 |
| L-T ○ | 60 | 186 | 100 |
| T-L △ | -30 | 13 | 10 |
| T-L △ | -30 | 16 | 15 |
| T-L △ | -30 | 28 | 15 |
| T-L △ | -30 | 30 | 15 |
| T-L △ | -30 | 6 | 5 |
| T-L △ | -30 | 8 | 10 |
| T-L △ | -20 | 25 | 15 |
| T-L △ | -20 | 28 | 15 |
| T-L △ | -20 | 30 | 20 |
| T-L △ | -20 | 38 | 20 |
| T-L △ | -20 | 38 | 20 |
| T-L △ | -20 | 52 | 25 |
| T-L △ | -10 | 24 | 20 |
| T-L △ | -10 | 30 | 25 |
| T-L △ | -10 | 33 | 30 |
| T-L △ | -10 | 45 | 35 |
| T-L △ | -10 | 52 | 35 |
| T-L △ | -10 | 58 | 39 |
| T-L △ | 0 | 41 | 25 |
| T-L △ | 0 | 44 | 35 |
| T-L △ | 0 | 48 | 35 |
| T-L △ | 0 | 54 | 35 |
| T-L △ | 0 | 64 | 35 |
| T-L △ | 0 | 70 | 40 |
| T-L △ | 20 | 62 | 40 |
| T-L △ | 20 | 71 | 50 |
| T-L △ | 20 | 74 | 55 |
| T-L △ | 20 | 76 | 50 |
| T-L △ | 20 | 81 | 60 |
| T-L △ | 20 | 87 | 60 |
| T-L △ | 40 | 100 | 75 |
| T-L △ | 40 | 102 | 65 |
| T-L △ | 40 | 112 | 70 |

(continued)

* - not reported

# Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| T-L ▵ | 40 | 114 | 75 |
| T-L ▵ | 40 | 117 | 75 |
| T-L ▵ | 40 | 98 | 70 |
| T-L ▵ | 60 | 114 | 90 |
| T-L ▵ | 60 | 117 | 90 |
| T-L ▵ | 60 | 120 | 90 |
| T-L ▵ | 60 | 122 | 90 |
| T-L ▵ | 60 | 132 | 100 |
| T-L ▵ | 60 | 138 | 95 |
| T-L ▵ | 80 | 122 | 95 |
| T-L ▵ | 80 | 130 | 100 |
| T-L ▵ | 80 | 131 | 100 |
| T-L ▵ | 80 | 132 | 95 |
| T-L ▵ | 80 | 132 | 95 |
| T-L ▵ | 80 | 133 | 100 |

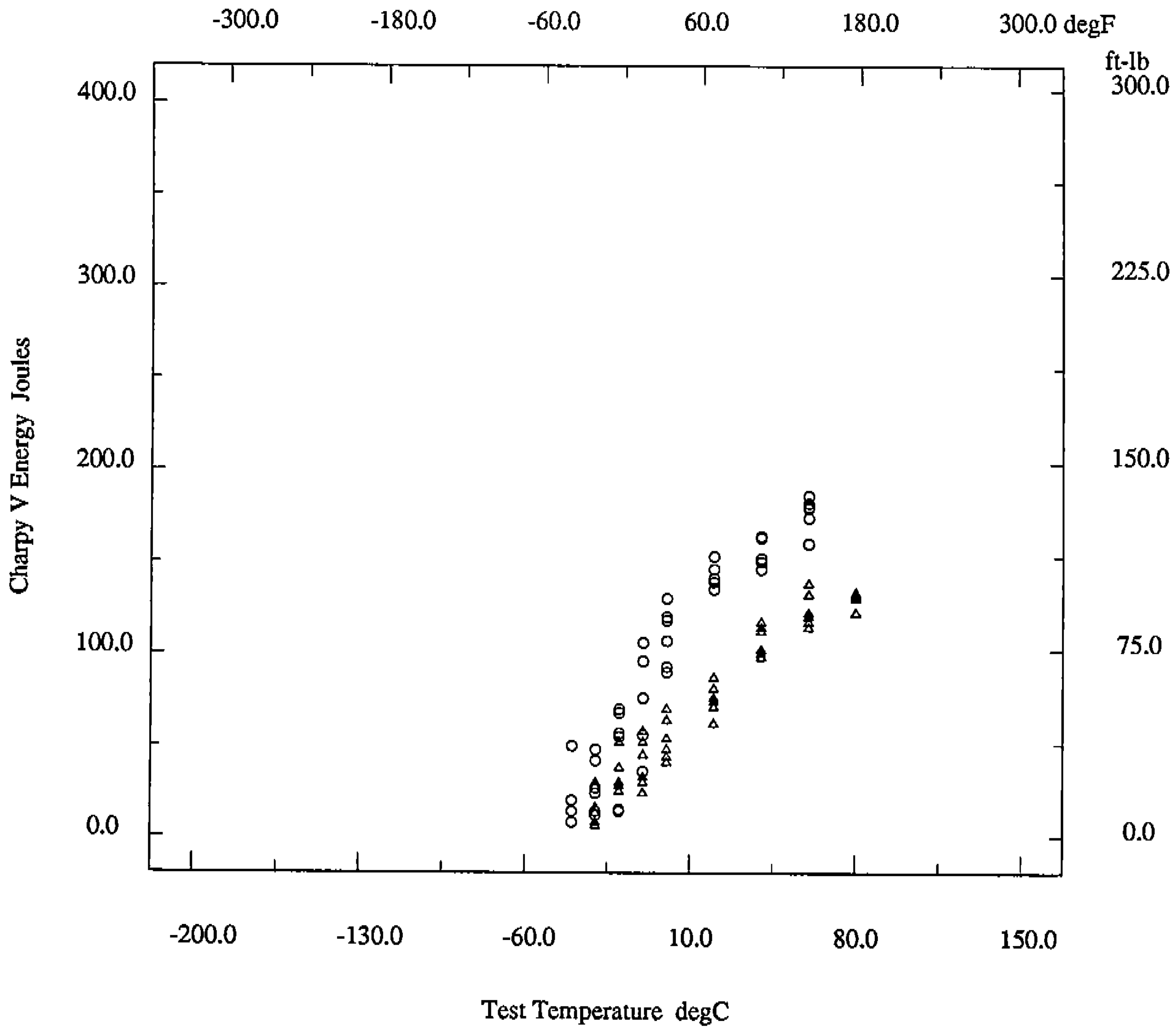
* - not reported

# Material ABS-B



**Description**

| | | | |
|---|---|---|---|
| Material Code | 004.005.01.1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 642696 |
| Reference | 004-2 | | |




* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.005.01.1 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 50 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 642696 |
| Reference | 004-2 | | |

## Composition

See Page 1800.1

## Fabrication History

See Page 1800.1

## Property Measurements

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

| Orien | Test Temp degC | Break? | NDTT |
|---|---|---|---|
| T | -30 | Yes | Yes |
| T | -25 | No | No |
| T | -20 | No | No |

* - not reported

64

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.005.01.7 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 36 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 642696 |
| Reference | 004-2 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.13 % | Mn | 0.91 % |
| P | 0.024 % | S | 0.013 % |
| Si | 0.22 % | Cr | 0.025 % |
| Ni | 0.02 % | Mo | 0.005 % |
| V | * | Cu | 0.025 % |
| Cb | * | Ti | * |
| B | * | Al | 0.03 % |
| N | * | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Australia |
| Year Produced | 1979 | Addl Info | None |
| Source | Australia | Melting Practice | BOF |
| Ingot Position | Concast | Killing Process | Fully |
| Process Temperature | 983 degC | Process Time | * |
| Rolling Conditions | 83 % | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | 1/4T |
| Specimen Type | * | Specimen Thickness | * |
| Gage Length | 200 mm | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Tensile Modulus | * |
| Standard Method | * | Standard Year | * |

| Orient | Test Temp degC | UTS MPa | TYP MPa | Elongation % | RA % |
|---|---|---|---|---|---|
| L | 20 | 422 | 252 | 40 | 62 |
| T | 20 | 420 | 250 | 32 | 67 |
| T | 20 | 420 | 250 | 33 | 57 |

* - not reported

# Material ABS-B



## Description

| | | | |
|---|---|---|---|
| Material Code | 004.005.01.7 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 36 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 642696 |
| Reference | 004-2 | | |

## Composition

See Page 1900.1

## Fabrication History

See Page 1900.1

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | -40 | 15 | 15 |
| L-T ○ | -40 | 15 | 15 |
| L-T ○ | -40 | 17 | 10 |
| L-T ○ | -40 | 24 | 10 |
| L-T ○ | -40 | 47 | 25 |
| L-T ○ | -40 | 9 | 5 |
| L-T ○ | -30 | 14 | 15 |
| L-T ○ | -30 | 15 | 15 |
| L-T ○ | -30 | 24 | 15 |
| L-T ○ | -30 | 26 | 20 |
| L-T ○ | -30 | 35 | 20 |
| L-T ○ | -30 | 40 | 25 |
| L-T ○ | -20 | 20 | 15 |
| L-T ○ | -20 | 42 | 20 |
| L-T ○ | -20 | 46 | 20 |
| L-T ○ | -20 | 60 | 30 |
| L-T ○ | -20 | 62 | 30 |
| L-T ○ | -20 | 63 | 30 |
| L-T ○ | -10 | 102 | 50 |
| L-T ○ | -10 | 66 | 40 |
| L-T ○ | -10 | 72 | 20 |
| L-T ○ | -10 | 72 | 40 |
| L-T ○ | -10 | 82 | 25 |
| L-T ○ | -10 | 94 | 45 |
| L-T ○ | 0 | 105 | 50 |
| L-T ○ | 0 | 106 | 45 |
| L-T ○ | 0 | 120 | 45 |
| L-T ○ | 0 | 80 | 35 |
| L-T ○ | 0 | 96 | 40 |
| L-T ○ | 0 | 98 | 45 |
| L-T ○ | 10 | 110 | 55 |
| L-T ○ | 10 | 112 | 55 |
| L-T ○ | 10 | 120 | 60 |
| L-T ○ | 20 | 122 | 70 |

(continued)

* - not reported

# Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| L-T ○ | 20 | 124 | 70 |
| L-T ○ | 20 | 124 | 70 |
| L-T ○ | 20 | 126 | 70 |
| L-T ○ | 20 | 134 | 70 |
| L-T ○ | 20 | 146 | 75 |
| L-T ○ | 40 | 140 | 80 |
| L-T ○ | 40 | 152 | 85 |
| L-T ○ | 40 | 152 | 90 |
| L-T ○ | 40 | 156 | 85 |
| L-T ○ | 40 | 174 | 100 |
| L-T ○ | 40 | 180 | 100 |
| L-T ○ | 60 | 168 | 95 |
| L-T ○ | 60 | 170 | 100 |
| L-T ○ | 60 | 174 | 100 |
| T-L △ | -30 | 14 | 15 |
| T-L △ | -30 | 22 | 15 |
| T-L △ | -30 | 25 | 15 |
| T-L △ | -30 | 27 | 15 |
| T-L △ | -30 | 29 | 20 |
| T-L △ | -30 | 31 | 20 |
| T-L △ | -20 | 22 | 15 |
| T-L △ | -20 | 22 | 20 |
| T-L △ | -20 | 34 | 20 |
| T-L △ | -20 | 36 | 20 |
| T-L △ | -20 | 36 | 25 |
| T-L △ | -20 | 38 | 20 |
| T-L △ | -10 | 26 | 25 |
| T-L △ | -10 | 36 | 25 |
| T-L △ | -10 | 39 | 30 |
| T-L △ | -10 | 48 | 25 |
| T-L △ | -10 | 51 | 30 |
| T-L △ | -10 | 53 | 30 |
| T-L △ | 0 | 48 | 30 |
| T-L △ | 0 | 50 | 30 |
| T-L △ | 0 | 50 | 35 |
| T-L △ | 0 | 52 | 35 |
| T-L △ | 0 | 58 | 35 |
| T-L △ | 0 | 59 | 35 |
| T-L △ | 20 | 70 | 50 |
| T-L △ | 20 | 71 | 50 |
| T-L △ | 20 | 77 | 50 |
| T-L △ | 20 | 77 | 55 |
| T-L △ | 20 | 78 | 55 |
| T-L △ | 20 | 81 | 50 |
| T-L △ | 40 | 82 | 65 |
| T-L △ | 40 | 90 | 70 |
| T-L △ | 40 | 92 | 70 |

(continued)

* - not reported

# Material ABS-B



(continued)

| Orien | Test Temp degC | CVN Energy Joules | Shear % |
|---|---|---|---|
| T-L ▵ | 40 | 94 | 70 |
| T-L ▵ | 40 | 96 | 70 |
| T-L ▵ | 40 | 99 | 75 |
| T-L ▵ | 60 | 106 | 95 |
| T-L ▵ | 60 | 106 | 95 |
| T-L ▵ | 60 | 108 | 95 |
| T-L ▵ | 60 | 112 | 95 |
| T-L ▵ | 60 | 114 | 98 |
| T-L ▵ | 60 | 116 | 98 |
| T-L ▵ | 100 | 112 | 98 |
| T-L ▵ | 100 | 114 | 100 |
| T-L ▵ | 100 | 120 | 100 |
| T-L ▵ | 100 | 120 | 100 |
| T-L ▵ | 100 | 120 | 100 |
| T-L ▵ | 100 | 122 | 100 |

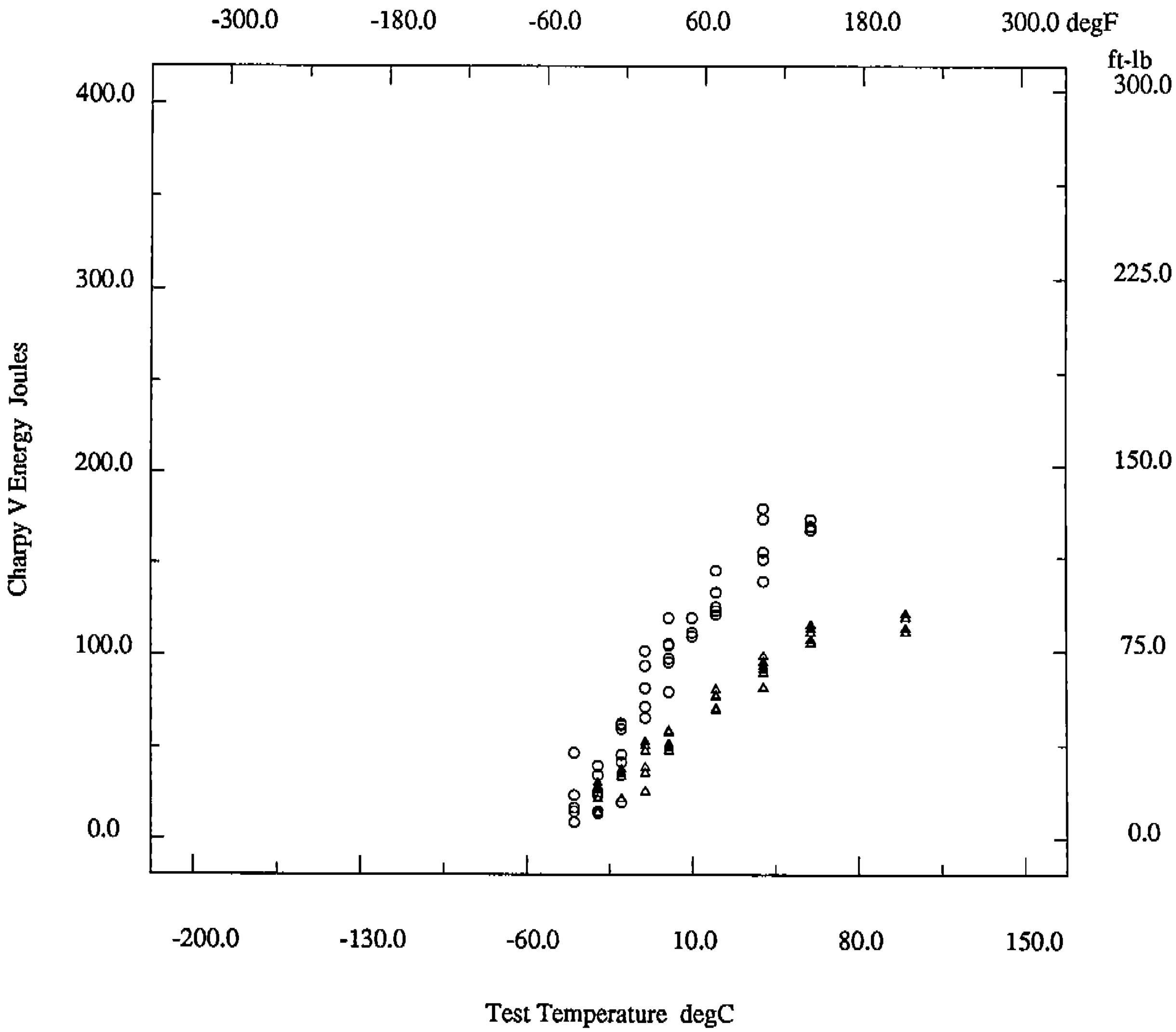
* - not reported

GS

# Material ABS-B



| Description | | | |
|---|---|---|---|
| Material Code | 004.005.01.7 | Material Name | ABS-B |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 36 mm | Composition Type | Actual |
| Composition Position | Ladle | Lot ID | 642696 |
| Reference | 004-2 | | |




* - not reported

(94)

# Material ABS-B



## Description

Material Code .................. 004.005.01.7
UNS .................................. *
Type ....................... Wrought Metal
Thickness ......................... 36 mm
Composition Position ................. Ladle
Reference ........................... 004-2

Material Name ...................... ABS-B
Other Designation ........................ *
Form ................................. Plate
Composition Type .................... Actual
Lot ID ............................ 642696

## Composition

See Page 1900.1

## Fabrication History

See Page 1900.1

## Property Measurements

Test Type ............ Nil Ductilty Transition
Specimen Type ........................ P-1
Passes ................................. 1
Standard Year .......................... *

Position ............................ 0/4T
Filler Alloy ...................... Hardex-N
Standard Method ..................... E 208

| Orien | Test Temp degC | Break? | NDTT |
|---|---|---|---|
| T | -30 | Yes | No |
| T | -20 | Yes | Yes |

* - not reported

# Material ABS-EH32



## Description

| | | | |
|---|---|---|---|
| Material Code | 032.001.01 | Material Name | ABS-EH32 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | METZ/MPC13 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.16 % | Mn | 1.25 % |
| P | 0.015 % | S | 0.025 % |
| Si | 0.21 % | Cr | 0.11 % |
| Ni | 0.074 % | Mo | 0.02 % |
| V | 0.045 % | Cu | 0.12 % |
| Cb | <0.005 % | Ti | * |
| B | * | Al | 0.04 % |
| N | 0.0085 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco | Melting Practice | * |
| Ingot Position | * | Killing Process | Fully |
| 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 | * | Specimen Thickness | * |
| Gage Length | 2 in | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Tensile Modulus | * |
| Standard Method | * | Standard Year | * |

| Orient | Test Temp degF | UTS ksi | TYP ksi | Elongation % | RA % |
|---|---|---|---|---|---|
| L | -40 | 82.0 | 52.7 | 38 | 68 |
| L | -40 | 82.2 | 56.0 | 37 | 68 |
| L | 0 | 78.6 | 51.4 | 38 | 68 |
| L | 0 | 79.1 | 51.9 | 37 | 68 |
| L | 32 | 75.9 | 49.8 | 37 | 70 |
| L | 32 | 76.8 | 50.2 | 38 | 68 |
| L | 75 | 72.9 | 49.1 | 36 | 69 |
| L | 75 | 74.0 | 50.7 | 36 | 70 |
| T | -40 | 81.7 | 54.6 | 37 | 65 |
| T | -40 | 81.9 | 50.8 | 38 | 66 |
| T | 0 | 78.9 | 53.1 | 39 | 65 |
| T | 0 | 79.0 | 53.0 | 36 | 65 |
| T | 32 | 76.2 | 51.0 | 36 | 65 |
| T | 32 | 76.8 | 51.1 | 38 | 66 |
| T | 75 | 72.7 | 48.8 | 35 | 66 |

(continued)

* - not reported

# Material ABS-EH32



(continued)

| Orient | Test Temp degF | UTS ksi | TYP ksi | Elongation % | RA % |
|---|---|---|---|---|---|
| T | 75 | 73.0 | * | 35 | 67 |

* - not reported

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# Material ABS-EH32



## Description

| | | | |
|---|---|---|---|
| Material Code | 032.001.01 | Material Name | ABS-EH32 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | METZ/MPC13 | | |

## Composition

See Page 2000.1

## Fabrication History

See Page 2000.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Fracture Toughness | Position | 1/2T |
| Specimen Type | Double Notch Bend | Specimen Thickness | 5/8 in |
| Crack Length | * | Loading Type | Slow |
| Loading Rate | * | KIc | * |
| Valid KIc? | * | Reason for Invalid | * |
| JIc | * | KJc | * |
| JIcpr | * | Maximum J, Jmax | * |
| Tearing Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | KQ ksi*in**0.5 | CODi mils | CODIc mils | Curve | JI in-lb/in2 |
|---|---|---|---|---|---|---|
| L-T | -166 | 70.6 | 1.2 | 1.2 | Cleavage | 257 |
| L-T | -166 | 79.0 | 1.8 | 1.8 | Cleavage | 372 |
| L-T | -150 | 73.0 | 2.0 | 2.0 | Cleavage | 379 |
| L-T | -150 | 77.0 | 4.0 | 4.0 | Cleavage | 847 |
| L-T | -130 | 71.8 | 6.8 | 19.0 | Unstable | 417 |
| L-T | -130 | 72.7 | 2.2 | 2.2 | Cleavage | 278 |
| L-T | -112 | 66.9 | 5.0 | 33.0 | Unstable | 1085 |
| L-T | -112 | 67.1 | 11.0 | 40.0 | Unstable | 1375 |
| L-T | -40 | 59.6 | 16.0 | 44.0 | Maximum | 1800 |
| L-T | -40 | 59.7 | 15.0 | 40.0 | Maximum | 1805 |
| L-T | 0 | 52.6 | 16.0 | 37.0 | Maximum | 1695 |
| L-T | 0 | 56.3 | 12.0 | 39.0 | Maximum | 1475 |
| L-T | 32 | 53.0 | 15.0 | 39.0 | Maximum | 1530 |
| L-T | 32 | 53.7 | 14.0 | 30.0 | Maximum | 1570 |
| L-T | 75 | 49.6 | 14.0 | 41.0 | Maximum | 1465 |
| L-T | 75 | 51.7 | 16.0 | 36.0 | Maximum | 1550 |

* - not reported

# Material ABS-EH32



## Description

| | | | |
|---|---|---|---|
| Material Code | 032.001.01 | Material Name | ABS-EH32 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | METZ/MPC13 | | |

## Composition

See Page 2000.1

## Fabrication History

See Page 2000.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | 1/2T |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T ○ | -125 | 3.0 | 2.0 | 0 |
| L-T ○ | -125 | 7.0 | 4.0 | 0 |
| L-T ○ | -100 | 10.0 | 8.0 | 0 |
| L-T ○ | -100 | * | 13.0 | 0 |
| L-T ○ | -75 | 13.5 | 14.0 | 2 |
| L-T ○ | -75 | 19.0 | 19.0 | 2 |
| L-T ○ | -50 | 33.0 | 31.0 | 30 |
| L-T ○ | -50 | 48.0 | 48.0 | 80 |
| L-T ○ | -40 | 35.0 | 32.0 | 40 |
| L-T ○ | -40 | 38.0 | 37.0 | 50 |
| L-T ○ | -40 | 40.0 | 38.0 | 60 |
| L-T ○ | -40 | * | 38.0 | 60 |
| L-T ○ | 0 | 51.0 | 47.0 | 80 |
| L-T ○ | 0 | 67.5 | 60.0 | 100 |
| L-T ○ | 32 | 66.0 | 62.0 | 100 |
| L-T ○ | 32 | 70.0 | 64.0 | 100 |
| L-T ○ | 75 | 71.0 | 65.0 | 100 |
| L-T ○ | 75 | 72.0 | 70.0 | 100 |
| T-L △ | -125 | 5.0 | 4.0 | 0 |
| T-L △ | -125 | 7.0 | 5.0 | 0 |
| T-L △ | -100 | 15.0 | 13.0 | 0 |
| T-L △ | -100 | 15.0 | 14.0 | 0 |
| T-L △ | -75 | 16.5 | 16.0 | 1 |
| T-L △ | -75 | 22.0 | 23.0 | 5 |
| T-L △ | -50 | 28.5 | 30.0 | 30 |
| T-L △ | -50 | 32.5 | 33.0 | 40 |
| T-L △ | -40 | 32.0 | 33.0 | 50 |
| T-L △ | -40 | 32.5 | 34.0 | 70 |
| T-L △ | -40 | 37.0 | 37.0 | 60 |
| T-L △ | -40 | 38.5 | 39.0 | 60 |
| T-L △ | 0 | 47.5 | 50.0 | 90 |
| T-L △ | 0 | * | 55.0 | 100 |
| T-L △ | 32 | 55.0 | 56.0 | 100 |
| T-L △ | 32 | 57.5 | 57.0 | 100 |

(continued)

* - not reported

# Material ABS-EH32



(continued)

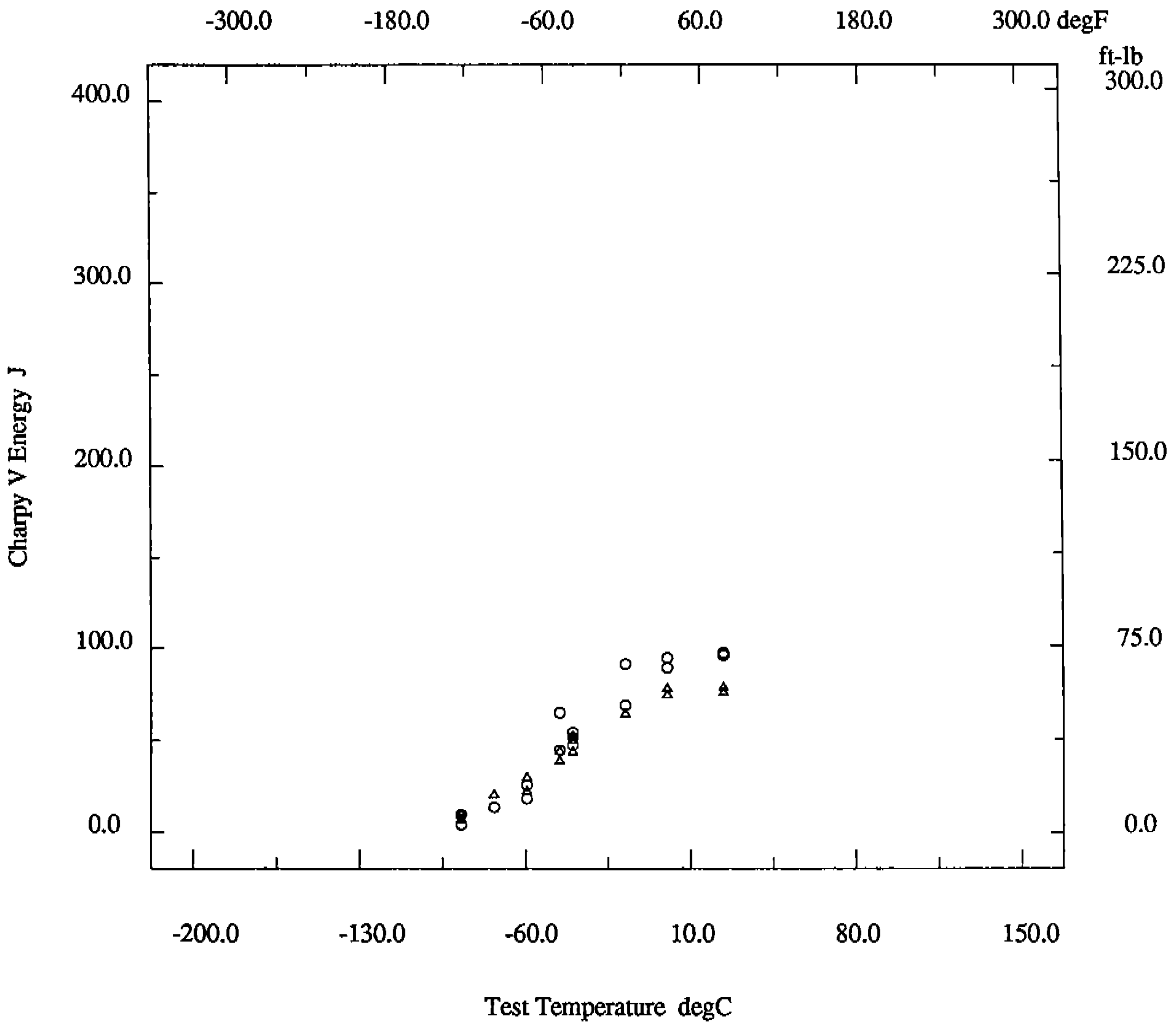
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| T-L ▵ | 75 | 56.0 | 60.5 | 100 |
| T-L ▵ | 75 | 58.0 | 58.5 | 100 |

* - not reported

# Material ABS-EH32



| Description | | | |
|---|---|---|---|
| Material Code | 032.001.01 | Material Name | ABS-EH32 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | METZ/MPC13 | | |




* - not reported

# Material ABS-EH32



## Description

| | | | |
|---|---|---|---|
| Material Code | 032.001.01 | Material Name | ABS-EH32 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | METZ/MPC13 | | |

## Composition

See Page 2000.1

## Fabrication History

See Page 2000.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Filler Alloy | * | Passes | * |
| Orientation | * | Standard Method | E 208 |
| Standard Year | * | | |

| Spec Type | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| P-3 | -50 | Yes | Yes |
| P-1 | -40 | Yes | Yes |

* - not reported

# Material ABS-EH32



## Description

| | | | |
|---|---|---|---|
| Material Code | 032.001.01 | Material Name | ABS-EH32 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | METZ/MPC13 | | |

## Composition

See Page 2000.1

## Fabrication History

See Page 2000.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Dynamic Tear | Position | 1/2T |
| Specimen Type | Dynamic Tear | Specimen Thickness | 5/8 in |
| Loading Rate | High ksi/sec | Standard Method | E 604 |
| Standard Year | * | | |

| Notch Prep | Orien | Test Temp degF | DT Energy ft-lb | Frac Apear % |
|---|---|---|---|---|
| Pressed | L-T ○ | -80 | 41 | <5 |
| Pressed | L-T ○ | -80 | 47 | <5 |
| Fatigued | L-T ○ | -60 | 67 | 10 |
| Fatigued | L-T ○ | -60 | 75 | 10 |
| Pressed | L-T ○ | -60 | 71 | <5 |
| Pressed | L-T ○ | -60 | 72 | <5 |
| Fatigued | L-T ○ | -40 | 82 | 20 |
| Fatigued | L-T ○ | -40 | 92 | 20 |
| Pressed | L-T ○ | -40 | 91 | 5 |
| Pressed | L-T ○ | -40 | 93 | 5 |
| Pressed | L-T ○ | -20 | 140 | 40 |
| Pressed | L-T ○ | -20 | 168 | 40 |
| Fatigued | L-T ○ | 0 | 347 | 50 |
| Fatigued | L-T ○ | 0 | 377 | 50 |
| Pressed | L-T ○ | 0 | 178 | 40 |
| Pressed | L-T ○ | 0 | 235 | 50 |
| Pressed | L-T ○ | 15 | 348 | 75 |
| Pressed | L-T ○ | 15 | 642 | 95 |
| Fatigued | L-T ○ | 32 | 655 | 95 |
| Fatigued | L-T ○ | 32 | 667 | 100 |
| Pressed | L-T ○ | 32 | 621 | 100 |
| Pressed | L-T ○ | 32 | 671 | 100 |
| Pressed | L-T ○ | 50 | 657 | 100 |
| Pressed | L-T ○ | 50 | 666 | 100 |
| Fatigued | L-T ○ | 72 | 658 | 100 |
| Fatigued | L-T ○ | 72 | 673 | 100 |
| Pressed | L-T ○ | 72 | 600 | 100 |
| Pressed | L-T ○ | 72 | 643 | 100 |
| Fatigued | L-T ○ | 212 | 644 | 100 |
| Pressed | L-T ○ | 212 | 579 | 100 |
| Pressed | L-T ○ | 212 | 604 | 100 |

* - not reported

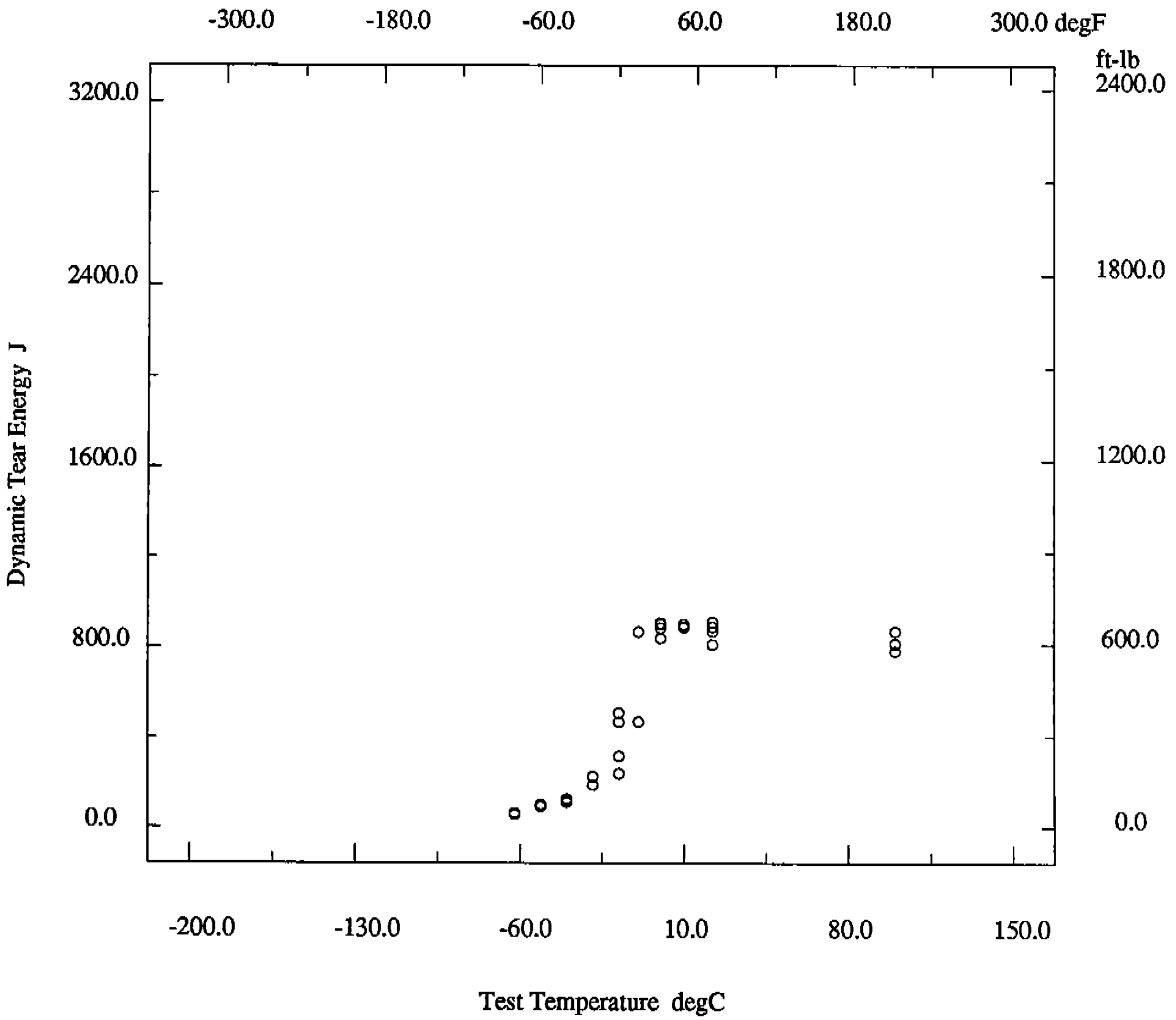
1C5

# Material ABS-EH32



**Description**

| | | | |
|---|---|---|---|
| Material Code | 032.001.01 | Material Name | ABS-EH32 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | METZ/MPC13 | | |




* - not reported

(10) 110X

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.001.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 12 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | KB6479 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.14 % | Mn | 1.10 % |
| P | 0.018 % | S | 0.015 % |
| Si | 0.19 % | Cr | 0.01 % |
| Ni | 0.02 % | Mo | * |
| V | * | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.038 % |
| N | 0.006 % | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 850 degC | Process Time | * |
| Rolling Conditions | 90 % | Final Processing | Q,T |
| Final Temperature | 680 degC | Final Time | 2/3 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | * |
| Specimen Type | Full | Specimen Thickness | 12 mm |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| L | 20 | 54.1 | 44.4 | 24.0 |
| T | 20 | 53.2 | 44.0 | 21.5 |

* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.001.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 12 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | KB6479 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 1.09 % |
| P | 0.016 % | S | 0.014 % |
| Si | 0.18 % | Cr | 0.01 % |
| Ni | 0.02 % | Mo | * |
| V | * | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.041 % |
| N | 0.005 % | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Bottom | Killing Process | Fully |
| Process Temperature | 910 degC | Process Time | * |
| Rolling Conditions | 90 % | Final Processing | Q,T |
| Final Temperature | 680 degC | Final Time | 2/3 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | * |
| Specimen Type | Full | Specimen Thickness | 12 mm |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| L | 20 | 52.6 | 42.8 | 26.0 |
| T | 20 | 51.6 | 43.0 | 22.0 |

* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.001.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 12 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | KB6479 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.14 % | Mn | 1.10 % |
| P | 0.018 % | S | 0.015 % |
| Si | 0.19 % | Cr | 0.01 % |
| Ni | 0.02 % | Mo | * |
| V | * | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.038 % |
| N | 0.006 % | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 850 degC | Process Time | * |
| Rolling Conditions | 90 % | Final Processing | Q,T |
| Final Temperature | 680 degC | Final Time | 2/3 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 1.6 | 10 |
| L-T ○ | -100 | 1.8 | 10 |
| L-T ○ | -100 | 2.2 | 10 |
| L-T ○ | -80 | 3.0 | 25 |
| L-T ○ | -80 | 3.4 | 25 |
| L-T ○ | -80 | 4.7 | 30 |
| L-T ○ | -60 | 12.5 | 60 |
| L-T ○ | -60 | 13.4 | 65 |
| L-T ○ | -60 | 13.9 | 65 |
| L-T ○ | -40 | 21.8 | 100 |
| L-T ○ | -40 | 23.4 | 100 |
| L-T ○ | -40 | 24.0 | 100 |
| L-T ○ | -30 | 23.4 | 100 |
| L-T ○ | -30 | 24.0 | 100 |
| L-T ○ | -30 | 24.2 | 100 |
| L-T ○ | -20 | 23.4 | 100 |
| L-T ○ | -20 | 23.4 | 100 |

(continued)

* - not reported

(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 24.2 | 100 |
| L-T ○ | -10 | 24.0 | 100 |
| L-T ○ | -10 | 24.0 | 100 |
| L-T ○ | -10 | 24.2 | 100 |
| L-T ○ | 0 | 23.9 | 100 |
| L-T ○ | 0 | 23.9 | 100 |
| L-T ○ | 0 | 24.6 | 100 |
| T-L △ | -100 | 0.9 | 5 |
| T-L △ | -100 | 1.1 | 10 |
| T-L △ | -100 | 1.6 | 10 |
| T-L △ | -80 | 2.8 | 30 |
| T-L △ | -80 | 2.9 | 30 |
| T-L △ | -80 | 3.7 | 40 |
| T-L △ | -60 | 5.1 | 85 |
| T-L △ | -60 | 5.5 | 85 |
| T-L △ | -60 | 5.9 | 80 |
| T-L △ | -40 | 10.3 | 100 |
| T-L △ | -40 | 11.2 | 100 |
| T-L △ | -40 | 9.9 | 100 |
| T-L △ | -30 | 11.0 | 100 |
| T-L △ | -30 | 11.5 | 100 |
| T-L △ | -30 | 11.7 | 100 |
| T-L △ | -20 | 11.2 | 100 |
| T-L △ | -20 | 11.5 | 100 |
| T-L △ | -20 | 11.7 | 100 |
| T-L △ | -10 | 10.8 | 100 |
| T-L △ | -10 | 11.2 | 100 |
| T-L △ | -10 | 11.5 | 100 |
| T-L △ | 0 | 11.0 | 100 |
| T-L △ | 0 | 11.5 | 100 |
| T-L △ | 0 | 9.9 | 100 |

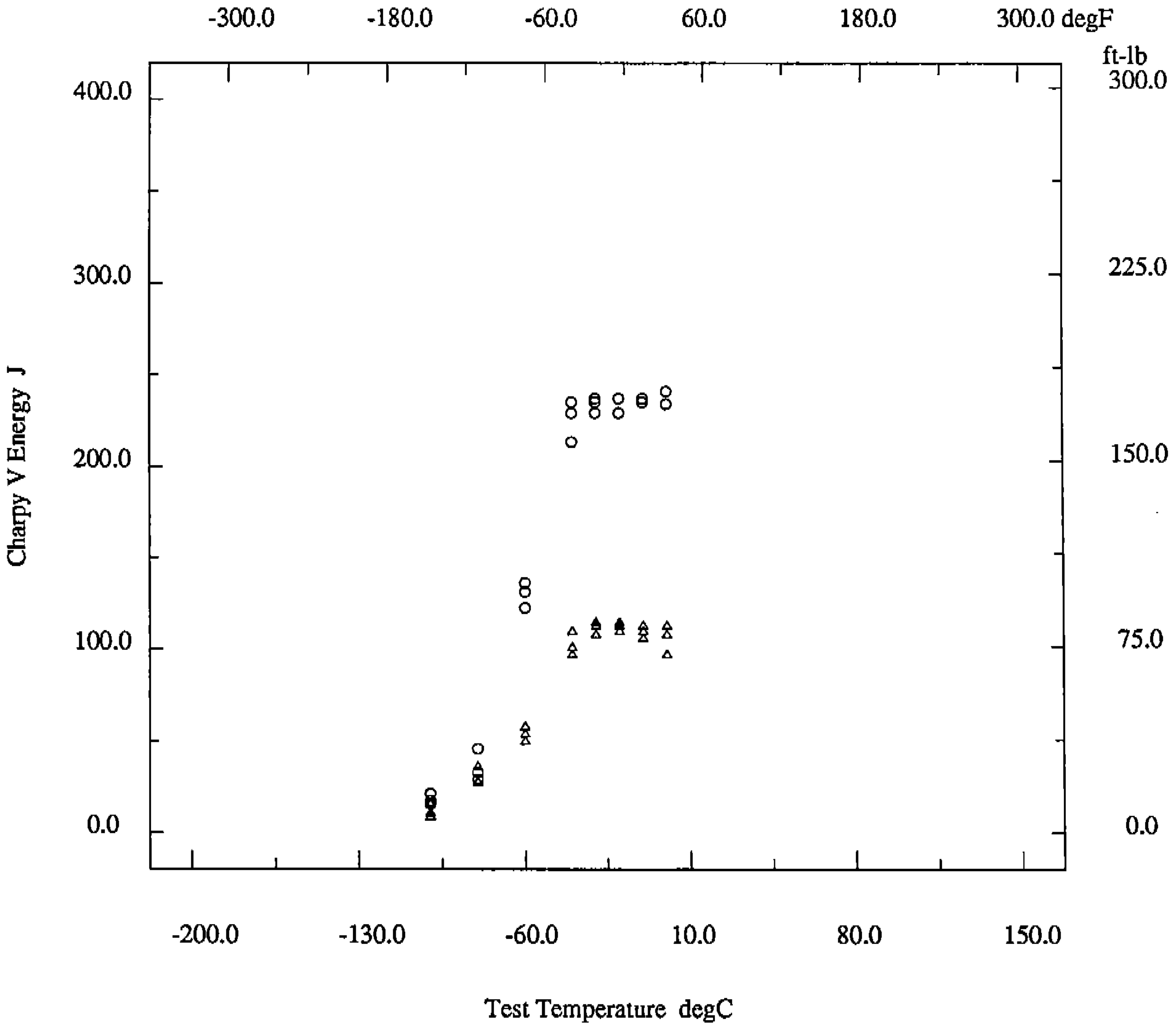
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.001.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 12 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | KB6479 |
| Reference | 007-1 | | |




* - not reported

(115

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.001.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 12 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | KB6479 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 1.09 % |
| P | 0.016 % | S | 0.014 % |
| Si | 0.18 % | Cr | 0.01 % |
| Ni | 0.02 % | Mo | * |
| V | * | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.041 % |
| N | 0.005 % | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Bottom | Killing Process | Fully |
| Process Temperature | 910 degC | Process Time | * |
| Rolling Conditions | 90 % | Final Processing | Q,T |
| Final Temperature | 680 degC | Final Time | 2/3 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 1.6 | 10 |
| L-T ○ | -100 | 1.6 | 10 |
| L-T ○ | -100 | 1.8 | 10 |
| L-T ○ | -80 | 5.0 | 40 |
| L-T ○ | -80 | 7.3 | 45 |
| L-T ○ | -80 | 8.6 | 45 |
| L-T ○ | -60 | 13.5 | 50 |
| L-T ○ | -60 | 17.3 | 70 |
| L-T ○ | -60 | 18.0 | 75 |
| L-T ○ | -40 | 23.8 | 100 |
| L-T ○ | -40 | 24.6 | 100 |
| L-T ○ | -40 | 25.0 | 100 |
| L-T ○ | -30 | 28.7 | 100 |
| L-T ○ | -30 | 31.9 | 100 |
| L-T ○ | -30 | 34.6 | 100 |
| L-T ○ | -20 | 29.1 | 100 |
| L-T ○ | -20 | 30.3 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 31.7 | 100 |
| L-T ○ | -10 | 30.1 | 100 |
| L-T ○ | -10 | 30.1 | 100 |
| L-T ○ | -10 | 30.1 | 100 |
| L-T ○ | 0 | 30.5 | 100 |
| L-T ○ | 0 | 31.2 | 100 |
| L-T ○ | 0 | 34.4 | 100 |
| T-L △ | -100 | 1.6 | 10 |
| T-L △ | -100 | 1.6 | 10 |
| T-L △ | -100 | 1.8 | 10 |
| T-L △ | -80 | 2.8 | 20 |
| T-L △ | -80 | 2.9 | 20 |
| T-L △ | -80 | 3.3 | 20 |
| T-L △ | -60 | 3.8 | 40 |
| T-L △ | -60 | 4.2 | 45 |
| T-L △ | -60 | 4.4 | 45 |
| T-L △ | -40 | 5.9 | 75 |
| T-L △ | -40 | 6.3 | 75 |
| T-L △ | -40 | 6.9 | 75 |
| T-L △ | -30 | 7.2 | 80 |
| T-L △ | -30 | 7.3 | 85 |
| T-L △ | -30 | 7.6 | 85 |
| T-L △ | -20 | 7.8 | 90 |
| T-L △ | -20 | 8.2 | 90 |
| T-L △ | -20 | 8.8 | 95 |
| T-L △ | -10 | 8.4 | 95 |
| T-L △ | -10 | 9.0 | 100 |
| T-L △ | -10 | 9.0 | 100 |
| T-L △ | 0 | 9.0 | 100 |
| T-L △ | 0 | 9.7 | 100 |
| T-L △ | 0 | 9.9 | 100 |

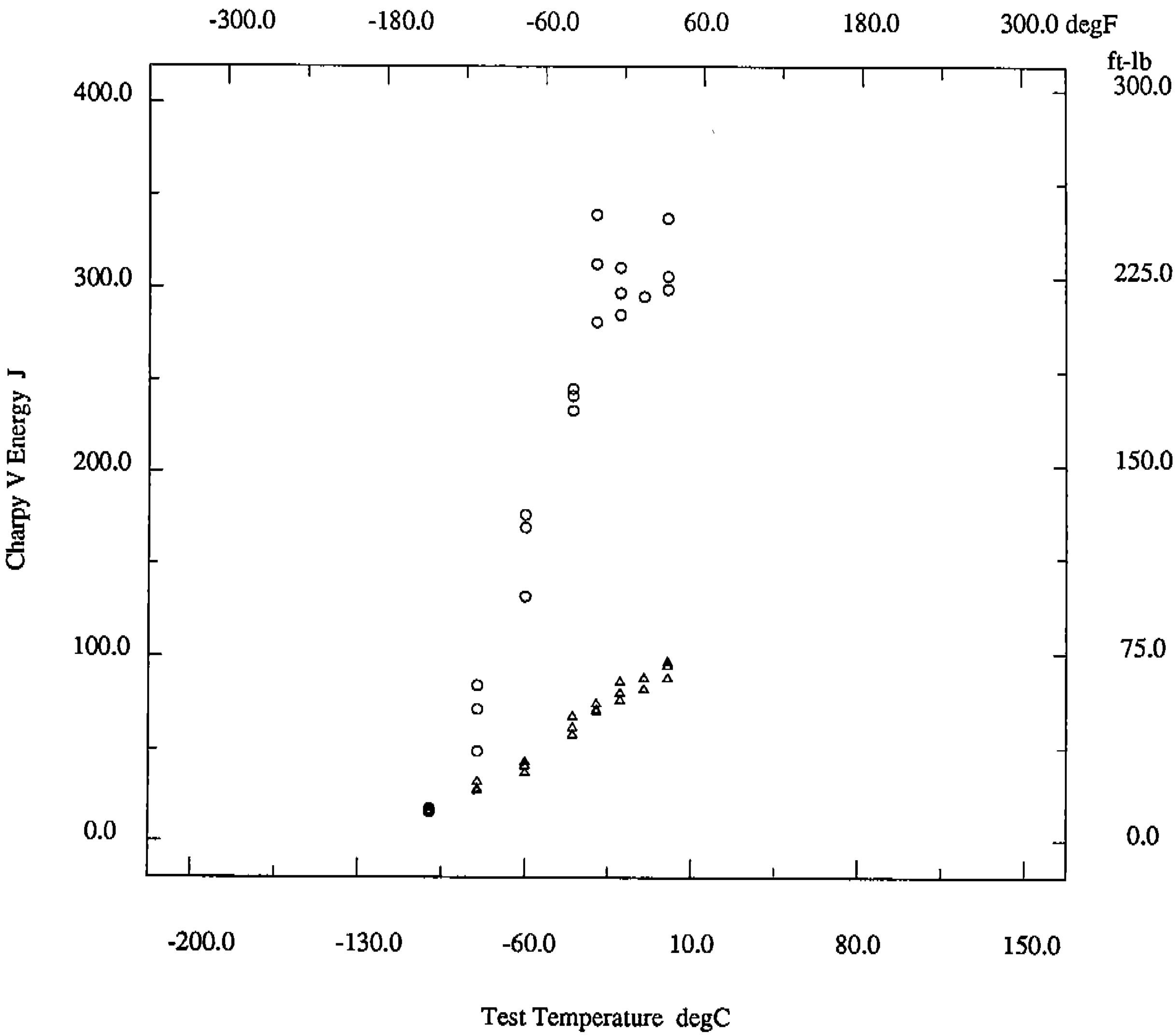
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.001.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 12 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | KB6479 |
| Reference | 007-1 | | |




* - not reported

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# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.002.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | KB6479 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.14 % | Mn | 1.09 % |
| P | 0.017 % | S | 0.015 % |
| Si | 0.19 % | Cr | 0.01 % |
| Ni | 0.02 % | Mo | * |
| V | * | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.039 % |
| N | 0.006 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 1055 degC | Process Time | * |
| Rolling Conditions | 85 % | Final Processing | Q,T |
| Final Temperature | 640 degC | Final Time | 1 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | * |
| Specimen Type | Full | Specimen Thickness | 25 mm |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| L | 20 | 53.7 | 41.6 | 26.0 |
| T | 20 | 54.3 | 41.4 | 22.0 |

* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.002.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | KB6479 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 1.05 % |
| P | 0.015 % | S | 0.015 % |
| Si | 0.19 % | Cr | 0.01 % |
| Ni | 0.02 % | Mo | * |
| V | * | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.040 % |
| N | 0.005 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Bottom | Killing Process | Fully |
| Process Temperature | 1060 degC | Process Time | * |
| Rolling Conditions | 85 % | Final Processing | Q,T |
| Final Temperature | 640 degC | Final Time | 1 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | * |
| Specimen Type | Full | Specimen Thickness | 25 mm |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| L | 20 | 52.2 | 40.4 | 26.5 |
| T | 20 | 52.1 | 39.5 | 28.5 |

* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.002.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | KB6479 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.14 % | Mn | 1.09 % |
| P | 0.017 % | S | 0.015 % |
| Si | 0.19 % | Cr | 0.01 % |
| Ni | 0.02 % | Mo | * |
| V | * | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.039 % |
| N | 0.006 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 1055 degC | Process Time | * |
| Rolling Conditions | 85 % | Final Processing | Q,T |
| Final Temperature | 640 degC | Final Time | 1 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % | Fracture? |
|---|---|---|---|---|
| L-T o | -100 | 0.8 | 5 | Yes |
| L-T o | -100 | 1.4 | 10 | Yes |
| L-T o | -100 | 1.9 | 10 | Assumed |
| L-T o | -80 | 2.1 | 20 | Yes |
| L-T o | -80 | 3.3 | 20 | Yes |
| L-T o | -80 | 5.2 | 20 | Yes |
| L-T o | -60 | 3.7 | 40 | Yes |
| L-T o | -60 | 4.8 | 45 | Yes |
| L-T o | -60 | 7.2 | 80 | Yes |
| L-T o | -40 | 21.9 | 100 | Yes |
| L-T o | -40 | 23.1 | 100 | Yes |
| L-T o | -40 | 24.1 | 100 | Yes |
| L-T o | -30 | 21.9 | 100 | Yes |
| L-T o | -30 | 22.6 | 100 | Yes |
| L-T o | -30 | 23.6 | 100 | Yes |
| L-T o | -20 | 22.6 | 100 | Yes |
| L-T o | -20 | 24.1 | 100 | Yes |

(continued)

* - not reported

(continued)

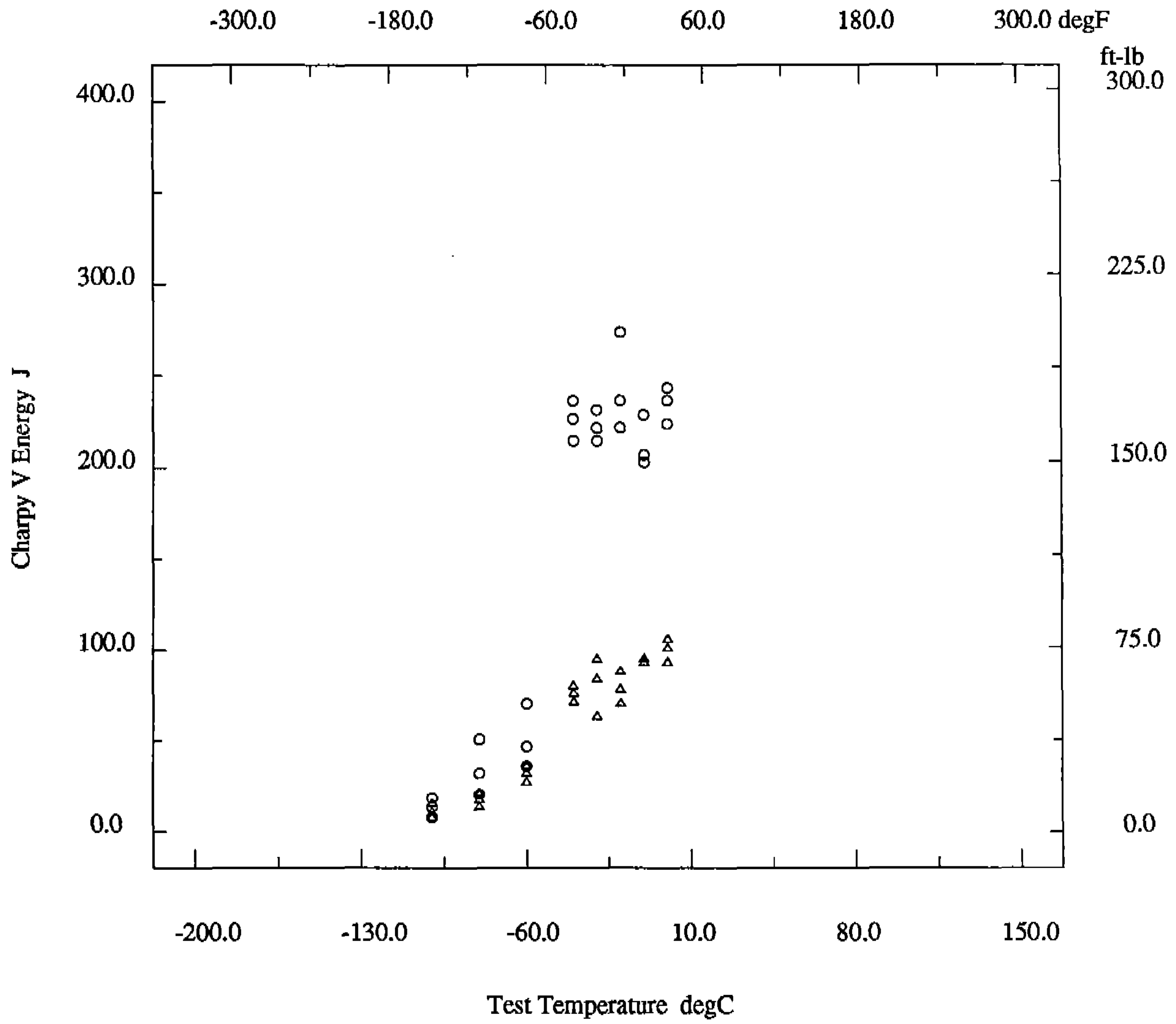
| Orien | Test Temp degC | CVN Energy kgf-m | Shear % | Fracture? |
|---|---|---|---|---|
| L-T ○ | -20 | 27.9 | 100 | Yes |
| L-T ○ | -10 | 20.7 | 100 | Yes |
| L-T ○ | -10 | 21.1 | 100 | Yes |
| L-T ○ | -10 | 23.3 | 100 | Yes |
| L-T ○ | 0 | 22.8 | 100 | Yes |
| L-T ○ | 0 | 24.1 | 100 | Yes |
| L-T ○ | 0 | 24.8 | 100 | Yes |
| T-L △ | -100 | 0.8 | 10 | Yes |
| T-L △ | -100 | 1.1 | 10 | Yes |
| T-L △ | -100 | 1.6 | 10 | Yes |
| T-L △ | -80 | 1.4 | 20 | Yes |
| T-L △ | -80 | 1.8 | 20 | Yes |
| T-L △ | -80 | 2.1 | 20 | Yes |
| T-L △ | -60 | 2.8 | 30 | Yes |
| T-L △ | -60 | 3.3 | 30 | Yes |
| T-L △ | -60 | 3.7 | 30 | Yes |
| T-L △ | -40 | 7.3 | 80 | Yes |
| T-L △ | -40 | 7.8 | 70 | Yes |
| T-L △ | -40 | 8.2 | 85 | Yes |
| T-L △ | -30 | 6.5 | 70 | Yes |
| T-L △ | -30 | 8.6 | 95 | Yes |
| T-L △ | -30 | 9.7 | 95 | Yes |
| T-L △ | -20 | 7.2 | 90 | Yes |
| T-L △ | -20 | 8.0 | 95 | Yes |
| T-L △ | -20 | 9.0 | 95 | Yes |
| T-L △ | -10 | 9.5 | 100 | Yes |
| T-L △ | -10 | 9.7 | 100 | Yes |
| T-L △ | -10 | 9.7 | 100 | Yes |
| T-L △ | 0 | 10.3 | 100 | Yes |
| T-L △ | 0 | 10.8 | 100 | Yes |
| T-L △ | 0 | 9.5 | 100 | Yes |

* - not reported

# Material ABS-EH36



| Description | | | |
|---|---|---|---|
| Material Code | 007.002.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | KB6479 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.002.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | KB6479 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 1.05 % |
| P | 0.015 % | S | 0.015 % |
| Si | 0.19 % | Cr | 0.01 % |
| Ni | 0.02 % | Mo | * |
| V | * | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.040 % |
| N | 0.005 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Bottom | Killing Process | Fully |
| Process Temperature | 1060 degC | Process Time | * |
| Rolling Conditions | 85 % | Final Processing | Q,T |
| Final Temperature | 640 degC | Final Time | 1 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 0.8 | 10 |
| L-T ○ | -100 | 1.9 | 10 |
| L-T ○ | -100 | 2.6 | 10 |
| L-T ○ | -80 | 2.1 | 15 |
| L-T ○ | -80 | 2.4 | 15 |
| L-T ○ | -80 | 3.8 | 15 |
| L-T ○ | -60 | 14.0 | 70 |
| L-T ○ | -60 | 19.9 | 75 |
| L-T ○ | -60 | 20.2 | 80 |
| L-T ○ | -40 | 29.1 | 100 |
| L-T ○ | -40 | 30.7 | 100 |
| L-T ○ | -40 | 34.8 | 100 |
| L-T ○ | -30 | 28.7 | 100 |
| L-T ○ | -30 | 32.4 | 100 |
| L-T ○ | -30 | 32.6 | 100 |
| L-T ○ | -20 | 33.0 | 100 |
| L-T ○ | -20 | 33.7 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

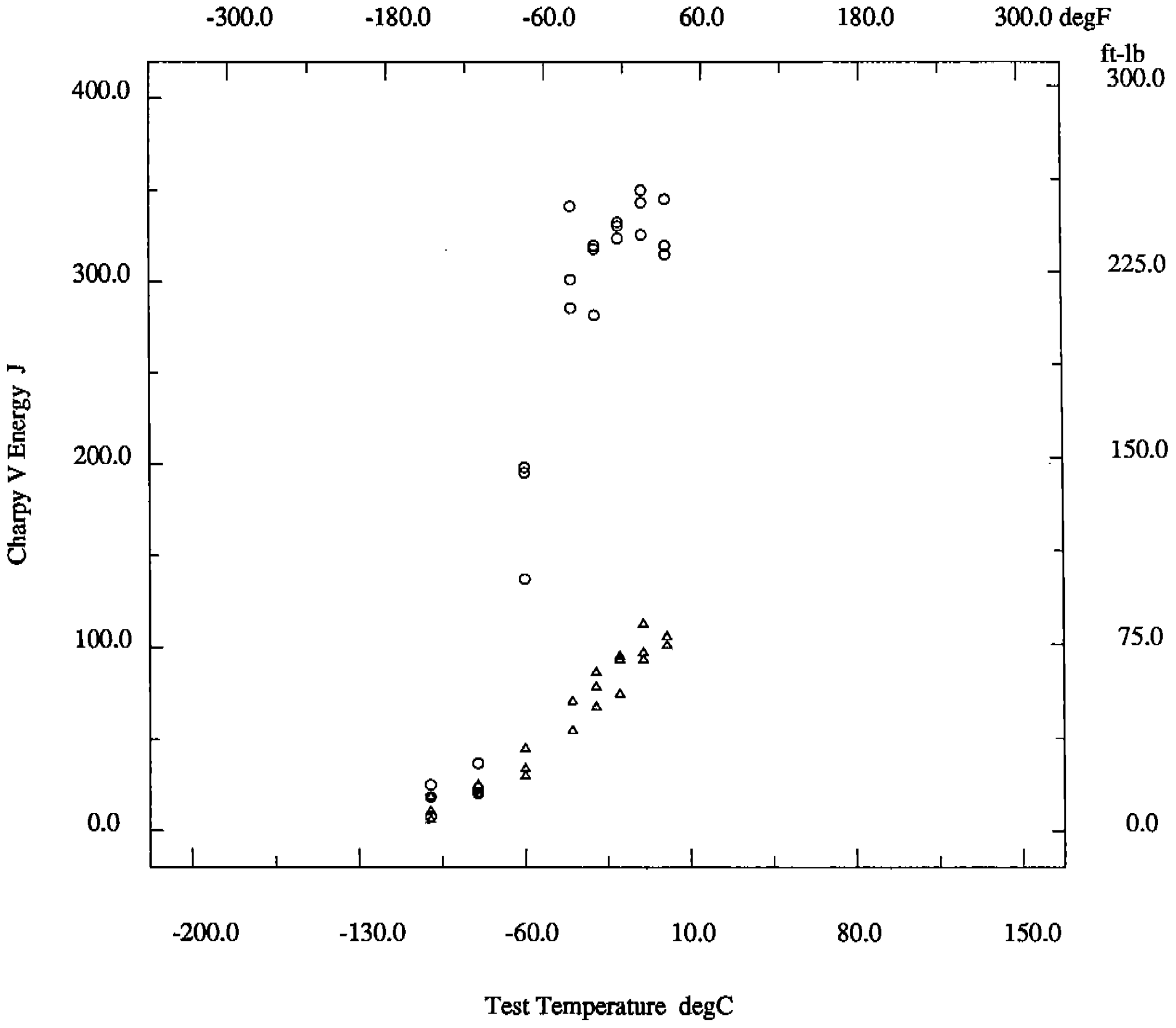
| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 33.9 | 100 |
| L-T ○ | -10 | 33.2 | 100 |
| L-T ○ | -10 | 35.0 | 100 |
| L-T ○ | -10 | 35.7 | 100 |
| L-T ○ | 0 | 32.1 | 100 |
| L-T ○ | 0 | 32.6 | 100 |
| L-T ○ | 0 | 35.2 | 100 |
| T-L △ | -100 | 0.6 | 5 |
| T-L △ | -100 | 1.1 | 5 |
| T-L △ | -100 | 1.9 | 5 |
| T-L △ | -80 | 2.1 | 15 |
| T-L △ | -80 | 2.1 | 15 |
| T-L △ | -80 | 2.6 | 15 |
| T-L △ | -60 | 3.1 | 35 |
| T-L △ | -60 | 3.5 | 40 |
| T-L △ | -60 | 4.6 | 40 |
| T-L △ | -40 | 5.6 | 70 |
| T-L △ | -40 | 5.6 | 70 |
| T-L △ | -40 | 7.2 | 75 |
| T-L △ | -30 | 6.9 | 75 |
| T-L △ | -30 | 8.0 | 80 |
| T-L △ | -30 | 8.8 | 80 |
| T-L △ | -20 | 7.6 | 90 |
| T-L △ | -20 | 9.5 | 95 |
| T-L △ | -20 | 9.7 | 100 |
| T-L △ | -10 | 11.5 | 100 |
| T-L △ | -10 | 9.5 | 95 |
| T-L △ | -10 | 9.9 | 95 |
| T-L △ | 0 | 10.3 | 100 |
| T-L △ | 0 | 10.3 | 100 |
| T-L △ | 0 | 10.8 | 100 |

* - not reported

# Material ABS-EH36



| Description | | | |
|---|---|---|---|
| Material Code | 007.002.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | KB6479 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.003.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9011 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.13 % | Mn | 1.15 % |
| P | 0.014 % | S | 0.024 % |
| Si | 0.20 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.04 % |
| Cb | * | Ti | * |
| B | * | Al | 0.043 % |
| N | 0.006 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 1055 degC | Process Time | * |
| Rolling Conditions | 88 % | Final Processing | Q,T |
| Final Temperature | 640 degC | Final Time | 1 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | * |
| Specimen Type | Full | Specimen Thickness | 25 mm |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| L | 20 | 53.0 | 40.3 | 25.5 |
| T | 20 | 53.5 | 40.9 | 25.0 |

* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.003.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | G9011 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 1.14 % |
| P | 0.014 % | S | 0.024 % |
| Si | 0.20 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.04 % |
| Cb | * | Ti | * |
| B | * | Al | 0.043 % |
| N | 0.007 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Bottom | Killing Process | Fully |
| Process Temperature | 1045 degC | Process Time | * |
| Rolling Conditions | 88 % | Final Processing | Q,T |
| Final Temperature | 640 degC | Final Time | 1 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | * |
| Specimen Type | Full | Specimen Thickness | 25 mm |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| L | 20 | 52.3 | 40.2 | 25.5 |
| T | 20 | 51.9 | 41.0 | 25.0 |

* - not reported

## Material ABS-EH36



### Description

| | | | |
|---|---|---|---|
| Material Code | 007.003.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9011 |
| Reference | 007-1 | | |

### Composition

| | | | |
|---|---|---|---|
| C | 0.13 % | Mn | 1.15 % |
| P | 0.014 % | S | 0.024 % |
| Si | 0.20 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.04 % |
| Cb | * | Ti | * |
| B | * | Al | 0.043 % |
| N | 0.006 % | Other Components | * |

### Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 1055 degC | Process Time | * |
| Rolling Conditions | 88 % | Final Processing | Q,T |
| Final Temperature | 640 degC | Final Time | 1 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

### Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 1.6 | 10 |
| L-T ○ | -100 | 1.6 | 10 |
| L-T ○ | -100 | 1.6 | 15 |
| L-T ○ | -80 | 3.5 | 20 |
| L-T ○ | -80 | 3.7 | 20 |
| L-T ○ | -80 | 4.0 | 20 |
| L-T ○ | -60 | 6.9 | 50 |
| L-T ○ | -60 | 7.3 | 55 |
| L-T ○ | -60 | 8.2 | 65 |
| L-T ○ | -40 | 15.4 | 100 |
| L-T ○ | -40 | 15.6 | 100 |
| L-T ○ | -40 | 17.0 | 100 |
| L-T ○ | -30 | 16.1 | 100 |
| L-T ○ | -30 | 17.3 | 100 |
| L-T ○ | -30 | 17.5 | 100 |
| L-T ○ | -20 | 16.1 | 100 |
| L-T ○ | -20 | 16.1 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

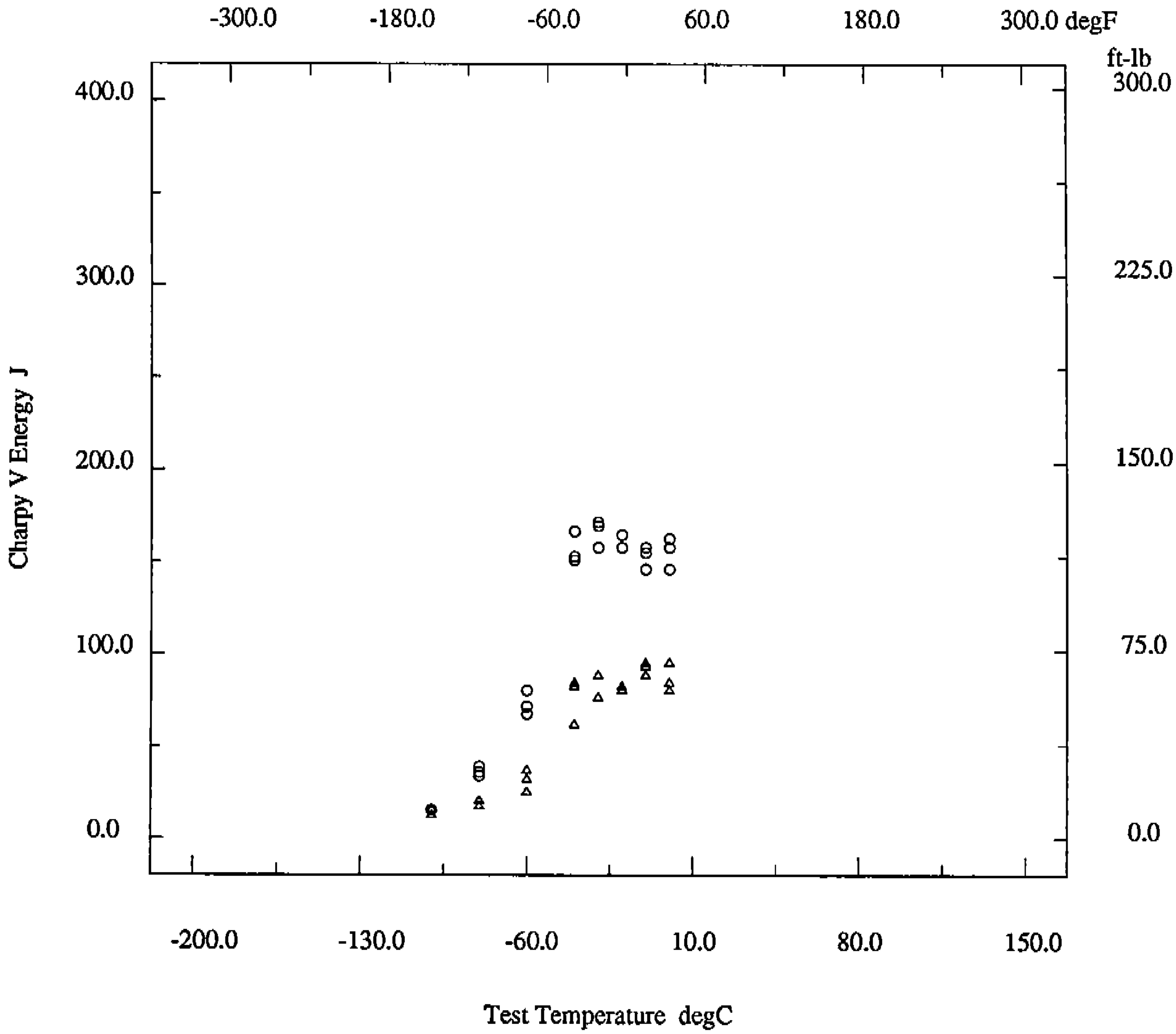
| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 16.8 | 100 |
| L-T ○ | -10 | 14.9 | 100 |
| L-T ○ | -10 | 15.8 | 100 |
| L-T ○ | -10 | 16.1 | 100 |
| L-T ○ | 0 | 14.9 | 100 |
| L-T ○ | 0 | 16.1 | 100 |
| L-T ○ | 0 | 16.6 | 100 |
| T-L △ | -100 | 1.3 | 10 |
| T-L △ | -100 | 1.6 | 10 |
| T-L △ | -100 | 1.6 | 10 |
| T-L △ | -80 | 1.8 | 20 |
| T-L △ | -80 | 2.1 | 20 |
| T-L △ | -80 | 2.1 | 20 |
| T-L △ | -60 | 2.6 | 40 |
| T-L △ | -60 | 3.3 | 40 |
| T-L △ | -60 | 3.8 | 45 |
| T-L △ | -40 | 6.3 | 75 |
| T-L △ | -40 | 8.4 | 95 |
| T-L △ | -40 | 8.6 | 100 |
| T-L △ | -30 | 7.8 | 95 |
| T-L △ | -30 | 9.0 | 100 |
| T-L △ | -30 | 9.0 | 100 |
| T-L △ | -20 | 8.2 | 100 |
| T-L △ | -20 | 8.2 | 100 |
| T-L △ | -20 | 8.4 | 95 |
| T-L △ | -10 | 9.0 | 100 |
| T-L △ | -10 | 9.5 | 100 |
| T-L △ | -10 | 9.7 | 100 |
| T-L △ | 0 | 8.2 | 100 |
| T-L △ | 0 | 8.6 | 100 |
| T-L △ | 0 | 9.7 | 100 |

* - not reported

# Material ABS-EH36



| Description | | | |
|---|---|---|---|
| Material Code | 007.003.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9011 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.003.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9011 |
| Reference | 007-1 | | |

**Composition** See Page 2300.3

**Fabrication History** See Page 2300.3

**Property Measurements**

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 0.8 | 5 |
| L-T ○ | -100 | 1.4 | 10 |
| L-T ○ | -100 | 1.8 | 10 |
| L-T ○ | -80 | 3.1 | 20 |
| L-T ○ | -80 | 3.5 | 20 |
| L-T ○ | -80 | 3.5 | 20 |
| L-T ○ | -60 | 12.1 | 65 |
| L-T ○ | -60 | 6.3 | 55 |
| L-T ○ | -60 | 8.0 | 55 |
| L-T ○ | -40 | 14.0 | 100 |
| L-T ○ | -40 | 15.4 | 100 |
| L-T ○ | -40 | 16.3 | 100 |
| L-T ○ | -30 | 16.1 | 100 |
| L-T ○ | -30 | 17.0 | 100 |
| L-T ○ | -30 | 17.5 | 100 |
| L-T ○ | -20 | 16.3 | 100 |
| L-T ○ | -20 | 17.3 | 100 |
| L-T ○ | -20 | 17.8 | 100 |
| L-T ○ | -10 | 15.8 | 100 |
| L-T ○ | -10 | 16.8 | 100 |
| L-T ○ | -10 | 17.0 | 100 |
| L-T ○ | 0 | 15.6 | 100 |
| L-T ○ | 0 | 16.3 | 100 |
| L-T ○ | 0 | 17.8 | 100 |
| T-L △ | -100 | 0.8 | 10 |
| T-L △ | -100 | 1.4 | 5 |
| T-L △ | -100 | 1.8 | 5 |
| T-L △ | -80 | 1.9 | 15 |
| T-L △ | -80 | 2.3 | 20 |
| T-L △ | -80 | 3.1 | 15 |
| T-L △ | -60 | 3.3 | 50 |
| T-L △ | -60 | 3.8 | 45 |
| T-L △ | -60 | 3.8 | 50 |
| T-L △ | -40 | 6.9 | 80 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ▵ | -40 | 8.6 | 100 |
| T-L ▵ | -40 | 8.8 | 100 |
| T-L ▵ | -30 | 8.8 | 100 |
| T-L ▵ | -30 | 9.7 | 100 |
| T-L ▵ | -30 | 9.9 | 100 |
| T-L ▵ | -20 | 8.5 | 100 |
| T-L ▵ | -20 | 8.5 | 100 |
| T-L ▵ | -20 | 9.5 | 100 |
| T-L ▵ | -10 | 9.0 | 100 |
| T-L ▵ | -10 | 9.5 | 100 |
| T-L ▵ | -10 | 9.7 | 100 |
| T-L ▵ | 0 | 8.2 | 100 |
| T-L ▵ | 0 | 8.6 | 100 |
| T-L ▵ | 0 | 9.0 | 100 |

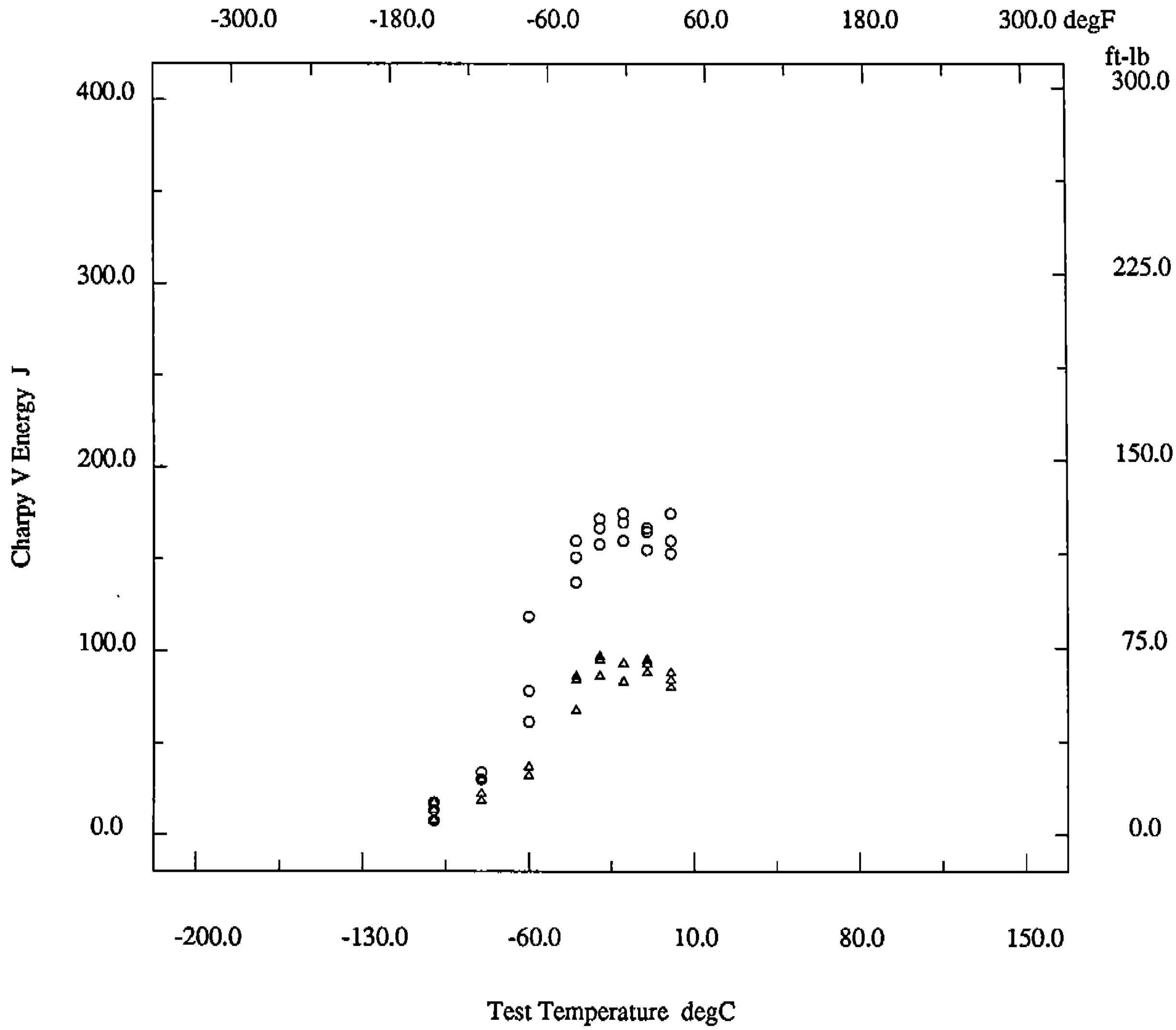
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.003.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 25 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9011 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.004.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.150 % | Mn | 1.20 % |
| P | 0.016 % | S | 0.019 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.030 % |
| Cb | * | Ti | * |
| B | * | Al | 0.045 % |
| N | 0.0070 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 1100 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 660 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | * |
| Specimen Type | Full | Specimen Thickness | 40 mm |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| L | 20 | 52.3 | 39.0 | 30.0 |
| T | 20 | 53.2 | 40.5 | 28.5 |

* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.004.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | K1325 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.150 % | Mn | 1.21 % |
| P | 0.015 % | S | 0.020 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.030 % |
| Cb | * | Ti | * |
| B | * | Al | 0.045 % |
| N | 0.0070 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Bottom | Killing Process | Fully |
| Process Temperature | 1100 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 660 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | * |
| Specimen Type | Full | Specimen Thickness | 40 mm |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| L | 20 | 51.9 | 38.1 | 31.5 |
| T | 20 | 53.1 | 39.8 | 28.5 |

* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.004.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.150 % | Mn | 1.20 % |
| P | 0.016 % | S | 0.019 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.030 % |
| Cb | * | Ti | * |
| B | * | Al | 0.045 % |
| N | 0.0070 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 1100 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 660 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | 0/4T |
| Specimen Type | Full | Lateral Expansion | * |
| Did Specimen Fracture? | Assumed | Did Specimen Split? | * |
| Standard Method | * | Standard Year | * |

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 0.9 | 5 |
| L-T ○ | -100 | 1.3 | 5 |
| L-T ○ | -100 | 1.8 | 5 |
| L-T ○ | -80 | 1.9 | 20 |
| L-T ○ | -80 | 3.5 | 20 |
| L-T ○ | -80 | 5.2 | 35 |
| L-T ○ | -60 | 4.2 | 40 |
| L-T ○ | -60 | 6.1 | 55 |
| L-T ○ | -60 | 8.4 | 55 |
| L-T ○ | -40 | 17.3 | 100 |
| L-T ○ | -40 | 17.3 | 100 |
| L-T ○ | -40 | 17.5 | 100 |
| L-T ○ | -30 | 16.8 | 100 |
| L-T ○ | -30 | 17.0 | 100 |
| L-T ○ | -30 | 17.8 | 100 |
| L-T ○ | -20 | 17.3 | 100 |
| L-T ○ | -20 | 17.3 | 100 |

(continued)

* - not reported

## Material ABS-EH36



(continued)

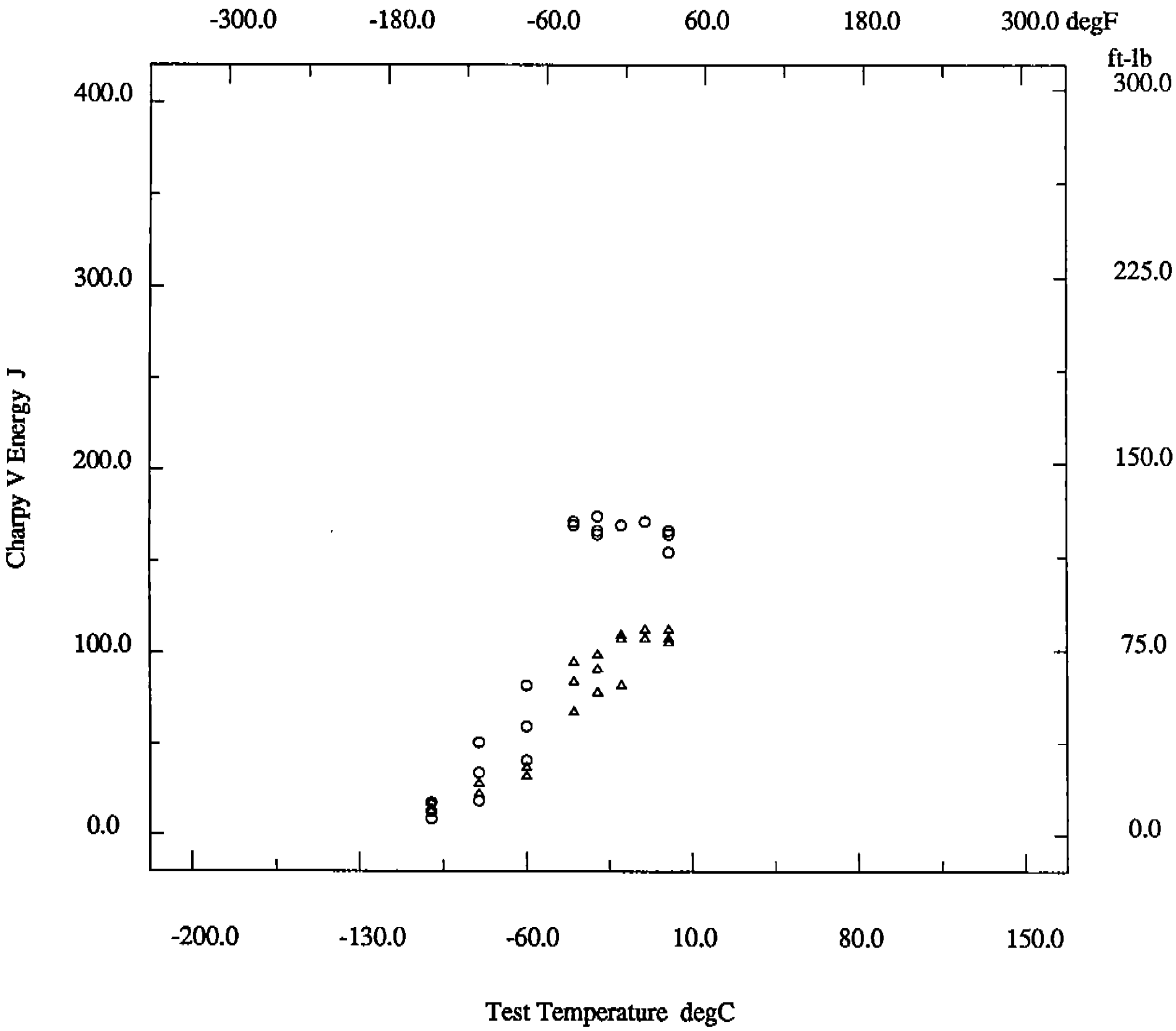
| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 17.3 | 100 |
| L-T ○ | -10 | 17.5 | 100 |
| L-T ○ | -10 | 17.5 | 100 |
| L-T ○ | -10 | 17.5 | 100 |
| L-T ○ | 0 | 15.8 | 100 |
| L-T ○ | 0 | 16.8 | 100 |
| L-T ○ | 0 | 17.0 | 100 |
| T-L △ | -100 | 1.3 | 5 |
| T-L △ | -100 | 1.8 | 5 |
| T-L △ | -100 | 1.8 | 5 |
| T-L △ | -80 | 2.3 | 20 |
| T-L △ | -80 | 2.3 | 20 |
| T-L △ | -80 | 2.9 | 20 |
| T-L △ | -60 | 3.3 | 55 |
| T-L △ | -60 | 3.8 | 60 |
| T-L △ | -60 | 3.8 | 60 |
| T-L △ | -40 | 6.9 | 75 |
| T-L △ | -40 | 8.6 | 80 |
| T-L △ | -40 | 9.7 | 80 |
| T-L △ | -30 | 10.1 | 95 |
| T-L △ | -30 | 8.0 | 75 |
| T-L △ | -30 | 9.3 | 85 |
| T-L △ | -20 | 11.0 | 100 |
| T-L △ | -20 | 11.2 | 100 |
| T-L △ | -20 | 8.4 | 85 |
| T-L △ | -10 | 11.0 | 100 |
| T-L △ | -10 | 11.5 | 100 |
| T-L △ | -10 | 11.5 | 100 |
| T-L △ | 0 | 10.8 | 100 |
| T-L △ | 0 | 11.0 | 100 |
| T-L △ | 0 | 11.5 | 100 |

* - not reported

# Material ABS-EH36



| Description | | | |
|---|---|---|---|
| Material Code | 007.004.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |




* - not reported

## Description

| | | | |
|---|---|---|---|
| Material Code | 007.004.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | K1325 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.150 % | Mn | 1.21 % |
| P | 0.015 % | S | 0.020 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.030 % |
| Cb | * | Ti | * |
| B | * | Al | 0.045 % |
| N | 0.0070 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Bottom | Killing Process | Fully |
| Process Temperature | 1100 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 660 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | 0/4T |
| Specimen Type | Full | Lateral Expansion | * |
| Did Specimen Fracture? | Assumed | Did Specimen Split? | * |
| Standard Method | * | Standard Year | * |

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 1.1 | 5 |
| L-T ○ | -100 | 1.8 | 5 |
| L-T ○ | -100 | 1.9 | 5 |
| L-T ○ | -80 | 1.9 | 20 |
| L-T ○ | -80 | 3.1 | 20 |
| L-T ○ | -80 | 3.3 | 20 |
| L-T ○ | -60 | 5.6 | 45 |
| L-T ○ | -60 | 6.5 | 50 |
| L-T ○ | -60 | 9.0 | 75 |
| L-T ○ | -40 | 14.4 | 75 |
| L-T ○ | -40 | 15.4 | 80 |
| L-T ○ | -40 | 16.3 | 80 |
| L-T ○ | -30 | 17.5 | 100 |
| L-T ○ | -30 | 18.0 | 100 |
| L-T ○ | -30 | 18.2 | 100 |
| L-T ○ | -20 | 17.8 | 100 |
| L-T ○ | -20 | 18.0 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 19.0 | 100 |
| L-T ○ | -10 | 17.5 | 100 |
| L-T ○ | -10 | 17.8 | 100 |
| L-T ○ | -10 | 18.2 | 100 |
| L-T ○ | 0 | 18.5 | 100 |
| L-T ○ | 0 | 18.7 | 100 |
| L-T ○ | 0 | 19.5 | 100 |
| T-L △ | -100 | 1.4 | 5 |
| T-L △ | -100 | 1.6 | 5 |
| T-L △ | -100 | 2.1 | 5 |
| T-L △ | -80 | 1.8 | 15 |
| T-L △ | -80 | 1.8 | 20 |
| T-L △ | -80 | 1.9 | 15 |
| T-L △ | -60 | 3.5 | 45 |
| T-L △ | -60 | 3.8 | 45 |
| T-L △ | -60 | 4.0 | 50 |
| T-L △ | -40 | 10.1 | 85 |
| T-L △ | -40 | 6.9 | 70 |
| T-L △ | -40 | 9.3 | 80 |
| T-L △ | -30 | 8.6 | 80 |
| T-L △ | -30 | 9.3 | 85 |
| T-L △ | -30 | 9.3 | 85 |
| T-L △ | -20 | 10.8 | 95 |
| T-L △ | -20 | 9.7 | 85 |
| T-L △ | -20 | 9.9 | 90 |
| T-L △ | -10 | 10.8 | 95 |
| T-L △ | -10 | 11.5 | 100 |
| T-L △ | -10 | 11.7 | 100 |
| T-L △ | 0 | 11.0 | 100 |
| T-L △ | 0 | 11.0 | 100 |
| T-L △ | 0 | 11.5 | 100 |

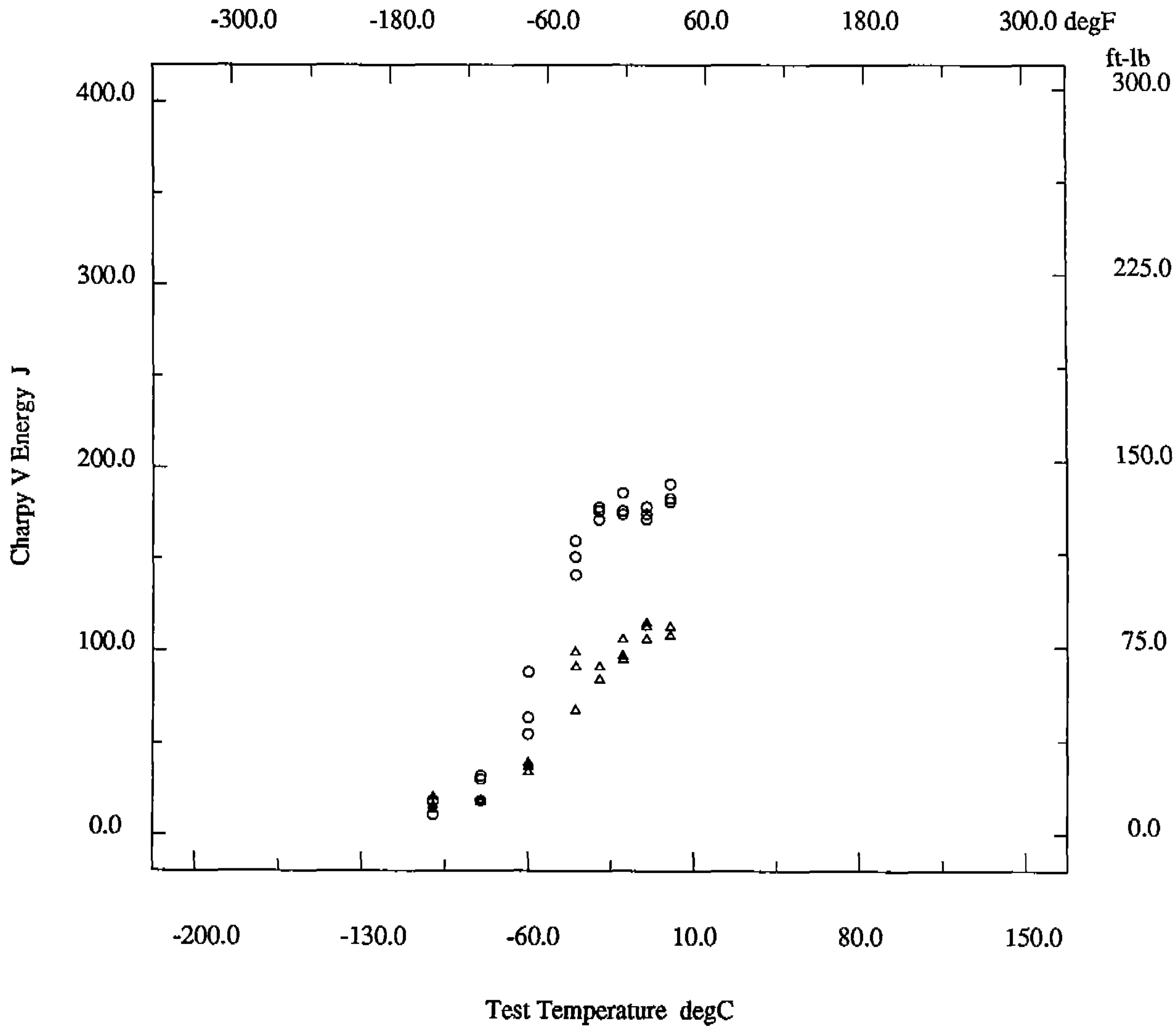
* - not reported

## Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.004.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | K1325 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.004.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.150 % | Mn | 1.20 % |
| P | 0.016 % | S | 0.019 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.030 % |
| Cb | * | Ti | * |
| B | * | Al | 0.045 % |
| N | 0.0070 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 1100 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 660 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 1.3 | 5 |
| L-T ○ | -100 | 1.4 | 5 |
| L-T ○ | -100 | 1.6 | 5 |
| L-T ○ | -80 | 0.6 | 10 |
| L-T ○ | -80 | 0.8 | 10 |
| L-T ○ | -80 | 1.6 | 10 |
| L-T ○ | -60 | 2.8 | 35 |
| L-T ○ | -60 | 5.6 | 45 |
| L-T ○ | -60 | 6.5 | 45 |
| L-T ○ | -40 | 10.3 | 60 |
| L-T ○ | -40 | 10.3 | 60 |
| L-T ○ | -40 | 10.3 | 70 |
| L-T ○ | -30 | 17.0 | 100 |
| L-T ○ | -30 | 17.3 | 95 |
| L-T ○ | -30 | 17.5 | 100 |
| L-T ○ | -20 | 15.8 | 100 |
| L-T ○ | -20 | 17.3 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 17.8 | 100 |
| L-T ○ | -10 | 16.8 | 100 |
| L-T ○ | -10 | 16.8 | 100 |
| L-T ○ | -10 | 17.3 | 100 |
| L-T ○ | 0 | 16.3 | 100 |
| L-T ○ | 0 | 17.3 | 100 |
| L-T ○ | 0 | 17.3 | 100 |
| T-L △ | -100 | 0.8 | 0 |
| T-L △ | -100 | 0.9 | 5 |
| T-L △ | -100 | 1.4 | 5 |
| T-L △ | -80 | 1.6 | 10 |
| T-L △ | -80 | 1.6 | 10 |
| T-L △ | -80 | 1.8 | 10 |
| T-L △ | -60 | 3.3 | 35 |
| T-L △ | -60 | 3.3 | 40 |
| T-L △ | -60 | 3.5 | 40 |
| T-L △ | -40 | 4.0 | 50 |
| T-L △ | -40 | 5.4 | 60 |
| T-L △ | -40 | 7.3 | 70 |
| T-L △ | -30 | 10.1 | 85 |
| T-L △ | -30 | 11.7 | 95 |
| T-L △ | -30 | 9.3 | 80 |
| T-L △ | -20 | 11.9 | 100 |
| T-L △ | -20 | 12.1 | 100 |
| T-L △ | -20 | 12.6 | 100 |
| T-L △ | -10 | 11.5 | 100 |
| T-L △ | -10 | 12.4 | 100 |
| T-L △ | -10 | 12.8 | 100 |
| T-L △ | 0 | 11.0 | 100 |
| T-L △ | 0 | 11.7 | 100 |
| T-L △ | 0 | 12.6 | 100 |

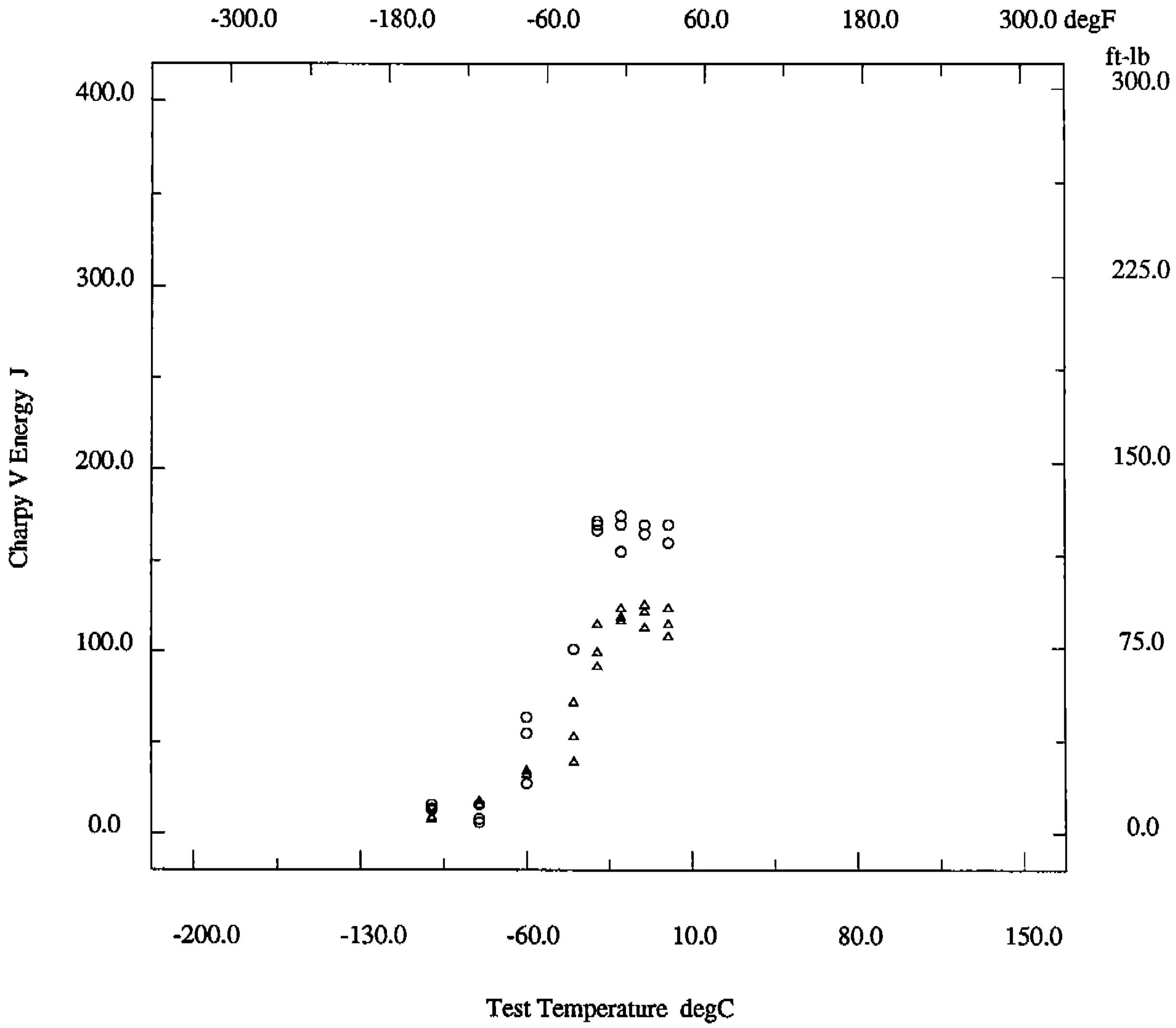
* - not reported

## Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.004.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |




* - not reported

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**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.004.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | K1325 |
| Reference | 007-1 | | |

**Composition**

| | | | |
|---|---|---|---|
| C | 0.150 % | Mn | 1.21 % |
| P | 0.015 % | S | 0.020 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.030 % |
| Cb | * | Ti | * |
| B | * | Al | 0.045 % |
| N | 0.0070 % | Other Components | * |

**Fabrication History**

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Bottom | Killing Process | Fully |
| Process Temperature | 1100 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 660 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

**Property Measurements**

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 0.8 | 0 |
| L-T ○ | -100 | 1.1 | 5 |
| L-T ○ | -100 | 1.8 | 5 |
| L-T ○ | -80 | 1.1 | 5 |
| L-T ○ | -80 | 1.3 | 5 |
| L-T ○ | -80 | 1.8 | 5 |
| L-T ○ | -60 | 3.1 | 30 |
| L-T ○ | -60 | 3.8 | 30 |
| L-T ○ | -60 | 5.4 | 40 |
| L-T ○ | -40 | 10.6 | 70 |
| L-T ○ | -40 | 12.1 | 75 |
| L-T ○ | -40 | 9.5 | 70 |
| L-T ○ | -30 | 16.3 | 85 |
| L-T ○ | -30 | 17.3 | 100 |
| L-T ○ | -30 | 17.3 | 100 |
| L-T ○ | -20 | 17.0 | 100 |
| L-T ○ | -20 | 17.5 | 100 |

(continued)

* - not reported

## Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 18.0 | 100 |
| L-T ○ | -10 | 17.3 | 100 |
| L-T ○ | -10 | 17.3 | 100 |
| L-T ○ | -10 | 17.5 | 95 |
| L-T ○ | 0 | 16.3 | 100 |
| L-T ○ | 0 | 17.0 | 100 |
| L-T ○ | 0 | 17.3 | 100 |
| T-L △ | -100 | 1.1 | 0 |
| T-L △ | -100 | 1.4 | 5 |
| T-L △ | -100 | 1.6 | 5 |
| T-L △ | -80 | 1.8 | 10 |
| T-L △ | -80 | 2.3 | 10 |
| T-L △ | -80 | 3.5 | 10 |
| T-L △ | -60 | 3.7 | 40 |
| T-L △ | -60 | 3.7 | 40 |
| T-L △ | -60 | 3.7 | 40 |
| T-L △ | -40 | 5.2 | 60 |
| T-L △ | -40 | 5.4 | 60 |
| T-L △ | -40 | 6.1 | 65 |
| T-L △ | -30 | 10.6 | 95 |
| T-L △ | -30 | 10.8 | 95 |
| T-L △ | -30 | 11.0 | 100 |
| T-L △ | -20 | 10.1 | 90 |
| T-L △ | -20 | 11.2 | 100 |
| T-L △ | -20 | 11.5 | 95 |
| T-L △ | -10 | 11.2 | 100 |
| T-L △ | -10 | 11.7 | 95 |
| T-L △ | -10 | 12.6 | 100 |
| T-L △ | 0 | 11.0 | 100 |
| T-L △ | 0 | 11.7 | 100 |
| T-L △ | 0 | 11.7 | 100 |

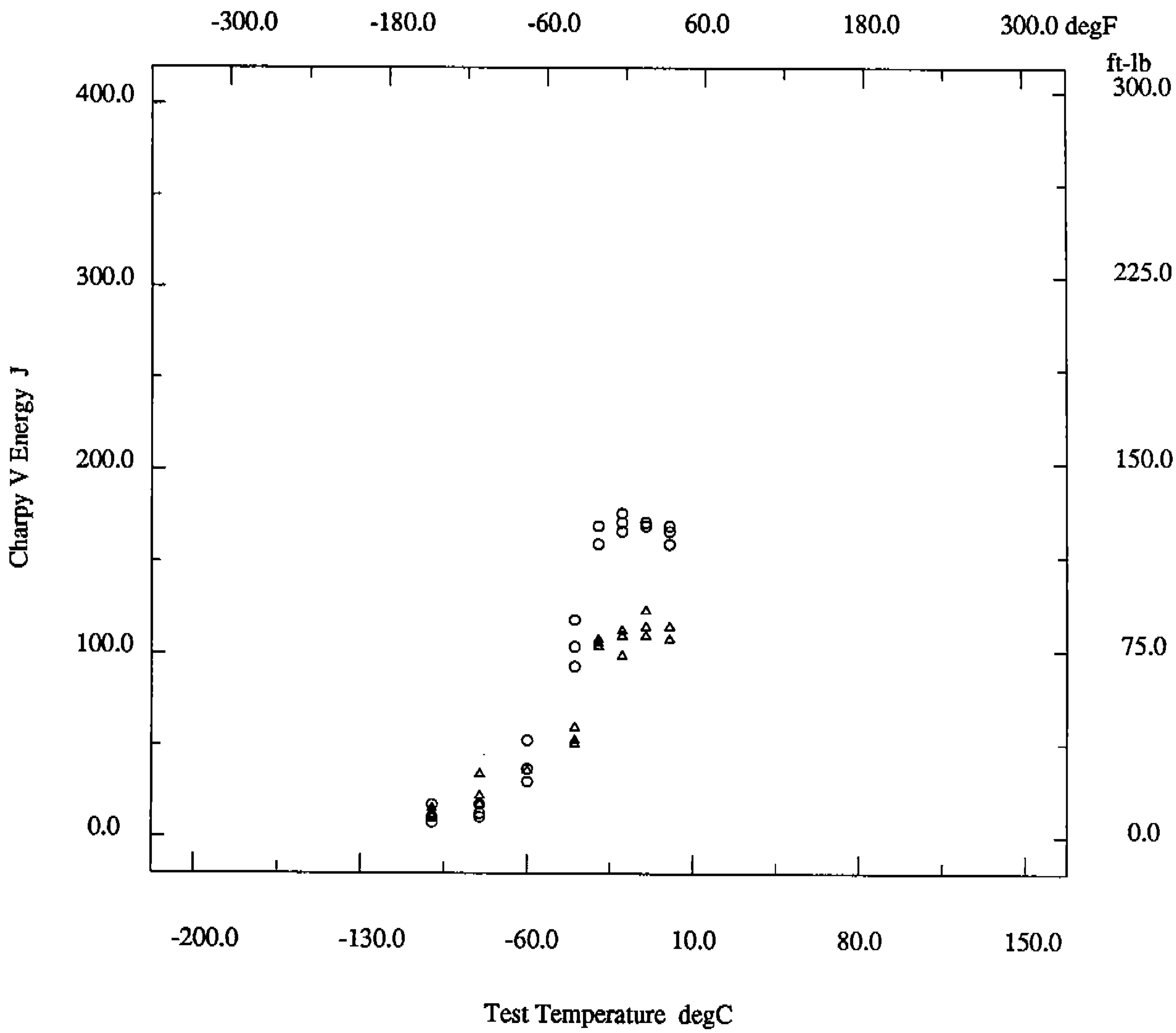
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.004.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | K1325 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.004.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.150 % | Mn | 1.20 % |
| P | 0.016 % | S | 0.019 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.030 % |
| Cb | * | Ti | * |
| B | * | Al | 0.045 % |
| N | 0.0070 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 1100 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 660 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 1.1 | 5 |
| L-T ○ | -100 | 1.1 | 5 |
| L-T ○ | -100 | 1.4 | 5 |
| L-T ○ | -80 | 1.3 | 10 |
| L-T ○ | -80 | 1.4 | 10 |
| L-T ○ | -80 | 2.6 | 10 |
| L-T ○ | -60 | 3.1 | 35 |
| L-T ○ | -60 | 3.3 | 35 |
| L-T ○ | -60 | 5.4 | 35 |
| L-T ○ | -40 | 11.0 | 70 |
| L-T ○ | -40 | 12.1 | 70 |
| L-T ○ | -40 | 8.0 | 60 |
| L-T ○ | -30 | 11.9 | 70 |
| L-T ○ | -30 | 14.0 | 90 |
| L-T ○ | -30 | 17.3 | 100 |
| L-T ○ | -20 | 14.0 | 75 |
| L-T ○ | -20 | 16.8 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 18.0 | 100 |
| L-T ○ | -10 | 17.3 | 100 |
| L-T ○ | -10 | 17.3 | 100 |
| L-T ○ | -10 | 17.5 | 100 |
| L-T ○ | 0 | 16.3 | 100 |
| L-T ○ | 0 | 16.8 | 100 |
| L-T ○ | 0 | 17.5 | 100 |
| T-L △ | -100 | 0.8 | 0 |
| T-L △ | -100 | 0.9 | 0 |
| T-L △ | -100 | 1.8 | 0 |
| T-L △ | -80 | 1.3 | 10 |
| T-L △ | -80 | 1.6 | 10 |
| T-L △ | -80 | 1.8 | 10 |
| T-L △ | -60 | 2.6 | 30 |
| T-L △ | -60 | 2.6 | 30 |
| T-L △ | -60 | 2.9 | 30 |
| T-L △ | -40 | 4.8 | 60 |
| T-L △ | -40 | 6.1 | 65 |
| T-L △ | -40 | 6.9 | 60 |
| T-L △ | -30 | 6.7 | 75 |
| T-L △ | -30 | 8.2 | 80 |
| T-L △ | -30 | 9.0 | 80 |
| T-L △ | -20 | 11.0 | 100 |
| T-L △ | -20 | 11.0 | 90 |
| T-L △ | -20 | 11.7 | 100 |
| T-L △ | -10 | 11.0 | 100 |
| T-L △ | -10 | 11.7 | 100 |
| T-L △ | -10 | 12.4 | 100 |
| T-L △ | 0 | 10.8 | 100 |
| T-L △ | 0 | 11.5 | 100 |
| T-L △ | 0 | 12.1 | 100 |

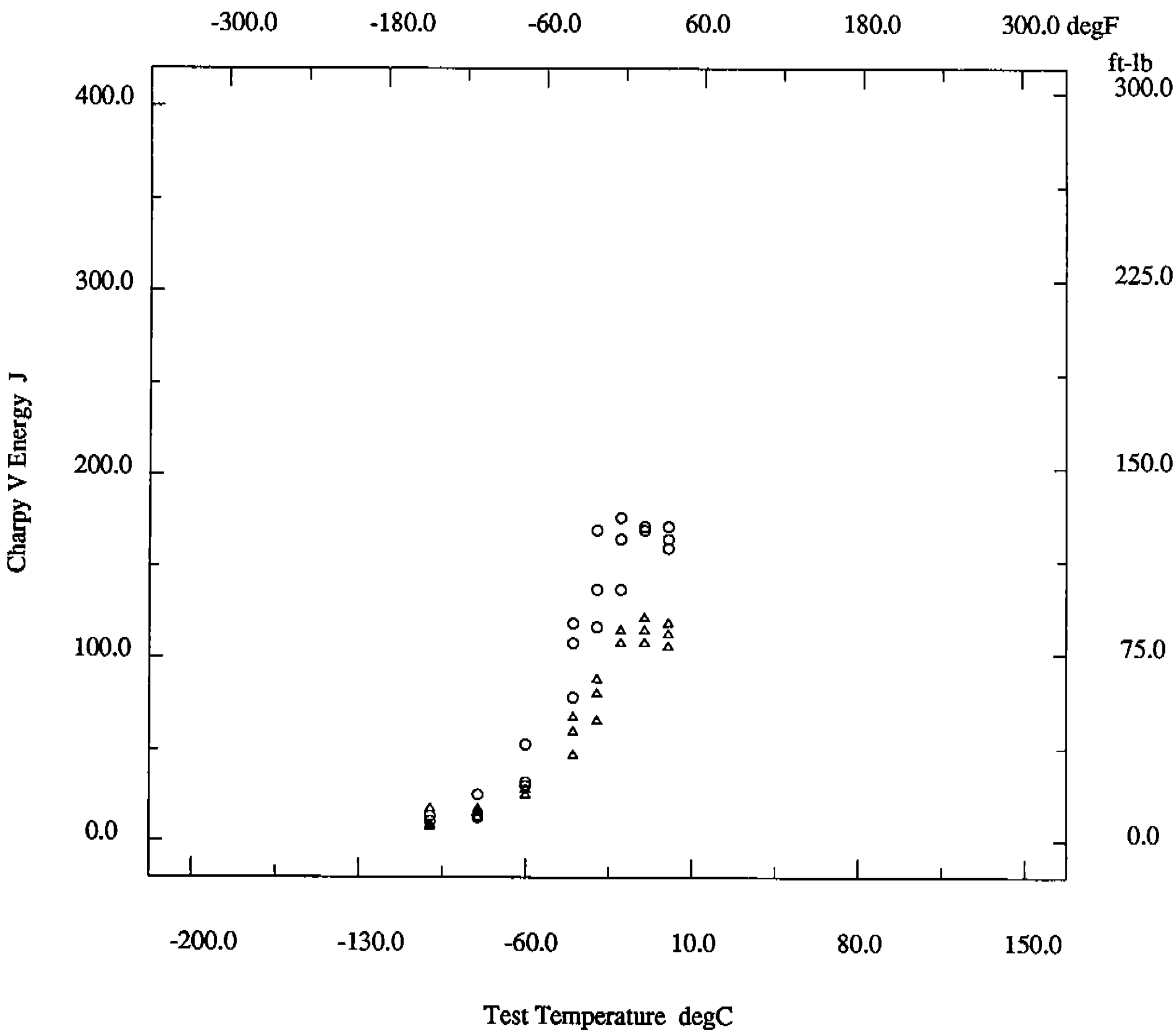
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.004.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.004.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | K1325 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.150 % | Mn | 1.21 % |
| P | 0.015 % | S | 0.020 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.030 % |
| Cb | * | Ti | * |
| B | * | Al | 0.045 % |
| N | 0.0070 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Bottom | Killing Process | Fully |
| Process Temperature | 1100 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 660 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 0.9 | 5 |
| L-T ○ | -100 | 1.1 | 5 |
| L-T ○ | -100 | 1.9 | 5 |
| L-T ○ | -80 | 0.8 | 5 |
| L-T ○ | -80 | 0.9 | 5 |
| L-T ○ | -80 | 1.4 | 10 |
| L-T ○ | -60 | 2.4 | 30 |
| L-T ○ | -60 | 4.8 | 35 |
| L-T ○ | -60 | 5.6 | 40 |
| L-T ○ | -40 | 11.2 | 70 |
| L-T ○ | -40 | 8.0 | 60 |
| L-T ○ | -40 | 9.5 | 60 |
| L-T ○ | -30 | 11.7 | 70 |
| L-T ○ | -30 | 15.8 | 95 |
| L-T ○ | -30 | 16.6 | 100 |
| L-T ○ | -20 | 15.6 | 100 |
| L-T ○ | -20 | 16.8 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

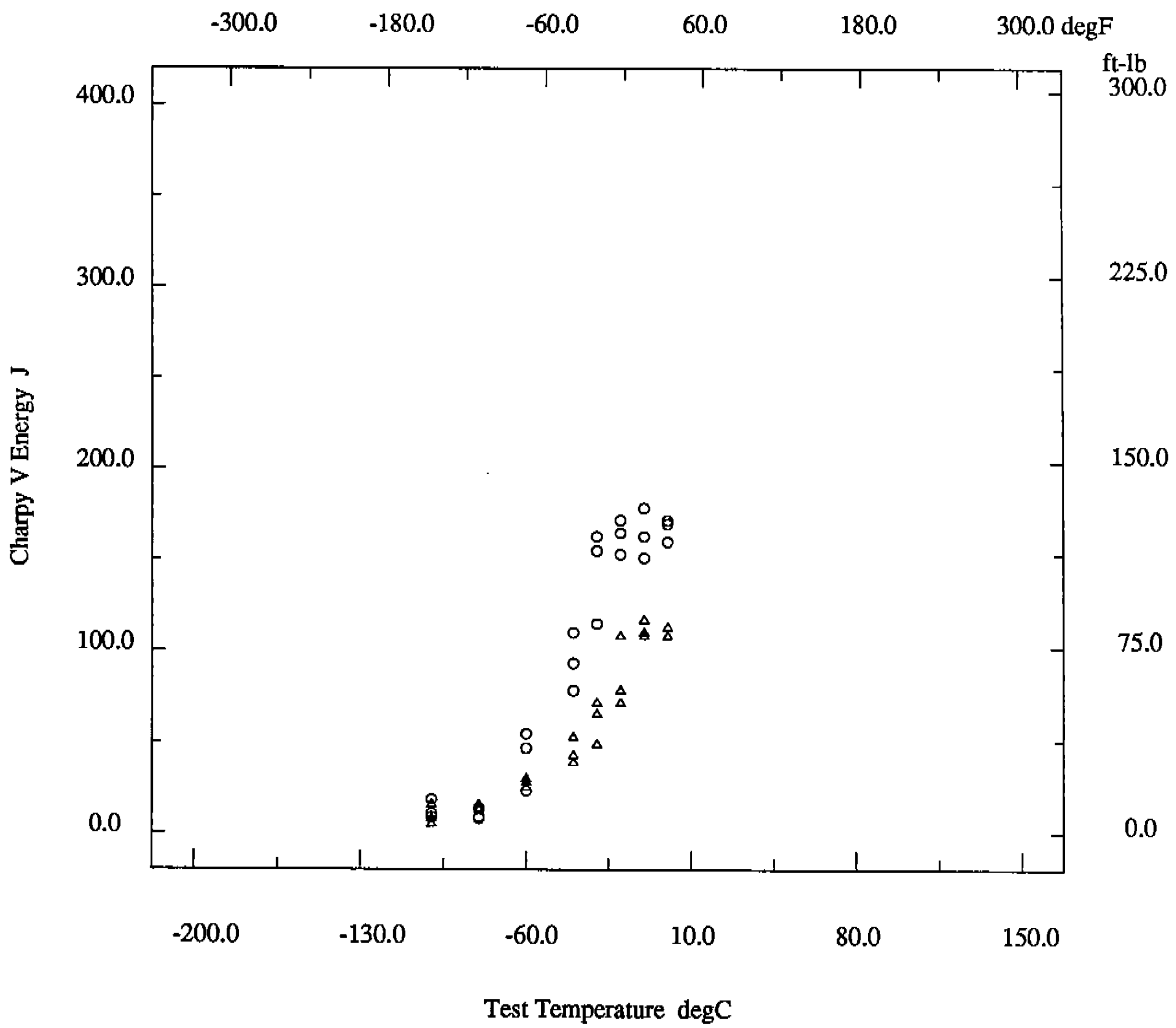
| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 17.5 | 100 |
| L-T ○ | -10 | 15.4 | 100 |
| L-T ○ | -10 | 16.6 | 100 |
| L-T ○ | -10 | 18.2 | 100 |
| L-T ○ | 0 | 16.3 | 100 |
| L-T ○ | 0 | 17.3 | 100 |
| L-T ○ | 0 | 17.5 | 100 |
| T-L △ | -100 | 0.5 | 5 |
| T-L △ | -100 | 0.8 | 0 |
| T-L △ | -100 | 1.6 | 5 |
| T-L △ | -80 | 1.3 | 5 |
| T-L △ | -80 | 1.4 | 5 |
| T-L △ | -80 | 1.6 | 5 |
| T-L △ | -60 | 2.6 | 35 |
| T-L △ | -60 | 2.9 | 35 |
| T-L △ | -60 | 3.1 | 35 |
| T-L △ | -40 | 4.0 | 60 |
| T-L △ | -40 | 4.4 | 50 |
| T-L △ | -40 | 5.4 | 50 |
| T-L △ | -30 | 5.0 | 70 |
| T-L △ | -30 | 6.7 | 75 |
| T-L △ | -30 | 7.3 | 75 |
| T-L △ | -20 | 11.0 | 100 |
| T-L △ | -20 | 7.3 | 75 |
| T-L △ | -20 | 8.0 | 75 |
| T-L △ | -10 | 11.0 | 95 |
| T-L △ | -10 | 11.2 | 95 |
| T-L △ | -10 | 11.9 | 100 |
| T-L △ | 0 | 11.0 | 100 |
| T-L △ | 0 | 11.0 | 100 |
| T-L △ | 0 | 11.5 | 95 |

* - not reported

## Material ABS-EH36



| Description | | | |
|---|---|---|---|
| Material Code | 007.004.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | K1325 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.004.02.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.15 % | Mn | 1.20 % |
| P | 0.016 % | S | 0.019 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.03 % |
| Cb | * | Ti | * |
| B | * | Al | 0.045 % |
| N | 0.007 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,A,F,Q,T | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 1100 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 660 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 007.004.02.1 | Weld Type | SAW |
| Base Metal Thickness | 40 mm | Welding Position | Downhand IG |
| Preheat Temperature | * | Metal Gap | 0 mm |
| Interpass Temperature | * | Passes | 10 |
| Filler Specification | PFH-60A | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | 4 mm |
| Shielding Gas | * | Voltage | 32 volts |
| Amperage | 630 amps | Polarity | * |
| Travel Speed | 30 cm/min | Heat Input/Pass | 40.5 KJ/cm |
| Joint Preparation | U Groove | Number of Sides | 1 |
| Location wrt Weld | Fusion line | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | US-43 |
| Weld Composition Reported? | No | | |

(continued)

* - not reported

# Material ABS-EH36



(continued)

**Property Measurements**

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | -80 | 0.9 | 5 |
| T-L ○ | -80 | 1.1 | 10 |
| T-L ○ | -80 | 1.9 | 10 |
| T-L ○ | -60 | 3.5 | 25 |
| T-L ○ | -60 | 4.4 | 30 |
| T-L ○ | -60 | 5.9 | 35 |
| T-L ○ | -40 | 11.0 | 80 |
| T-L ○ | -40 | 6.7 | 50 |
| T-L ○ | -40 | 9.6 | 55 |
| T-L ○ | -30 | 11.0 | 85 |
| T-L ○ | -30 | 7.1 | 60 |
| T-L ○ | -30 | 9.4 | 65 |
| T-L ○ | -20 | 12.6 | 75 |
| T-L ○ | -20 | 17.3 | 100 |
| T-L ○ | -20 | 9.5 | 70 |
| T-L ○ | -10 | 10.5 | 85 |
| T-L ○ | -10 | 12.5 | 80 |
| T-L ○ | -10 | 9.2 | 70 |
| T-L ○ | 0 | 15.8 | 95 |
| T-L ○ | 0 | 16.3 | 100 |
| T-L ○ | 0 | 16.3 | 100 |

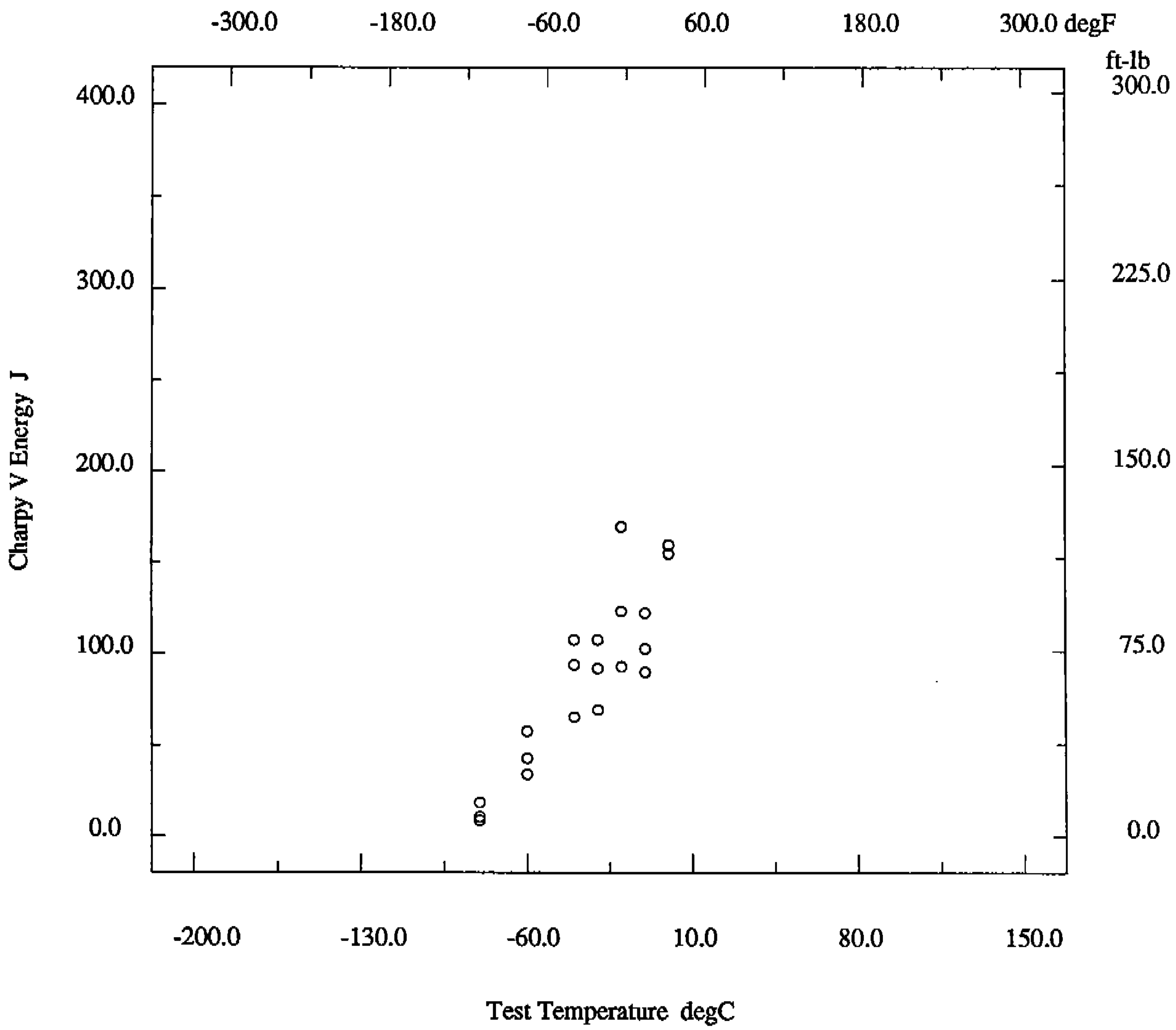
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.004.02.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.004.03.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |

## Composition

See Page 2500.1

## Fabrication History

See Page 2500.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 007.004.03.1 | Weld Type | SAW |
| Base Metal Thickness | 40 mm | Welding Position | Downhand IG |
| Preheat Temperature | * | Metal Gap | 0 mm |
| Interpass Temperature | * | Passes | 10 |
| Filler Specification | PFH-60A | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | 4 mm |
| Shielding Gas | * | Voltage | 32 volts |
| Amperage | 630 amps | Polarity | * |
| Travel Speed | 30 cm/min | Heat Input/Pass | 40.5 KJ/cm |
| Joint Preparation | U Groove | Number of Sides | 1 |
| Location wrt Weld | 1mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | US-43 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | -80 | 1.4 | 5 |
| T-L ○ | -80 | 1.7 | 10 |
| T-L ○ | -80 | 1.7 | 5 |
| T-L ○ | -60 | 5.7 | 35 |
| T-L ○ | -60 | 6.7 | 40 |
| T-L ○ | -60 | 7.3 | 40 |
| T-L ○ | -40 | 12.1 | 85 |
| T-L ○ | -40 | 5.7 | 60 |
| T-L ○ | -40 | 7.3 | 60 |
| T-L ○ | -30 | 15.3 | 100 |
| T-L ○ | -30 | 17.0 | 100 |
| T-L ○ | -30 | 9.0 | 75 |
| T-L ○ | -20 | 12.6 | 85 |
| T-L ○ | -20 | 15.1 | 85 |
| T-L ○ | -20 | 15.8 | 100 |
| T-L ○ | -10 | 16.5 | 100 |
| T-L ○ | -10 | 16.5 | 100 |
| T-L ○ | -10 | 16.7 | 100 |
| T-L ○ | 0 | 16.7 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | 0 | 17.5 | 100 |
| T-L ○ | 0 | 18.2 | 100 |

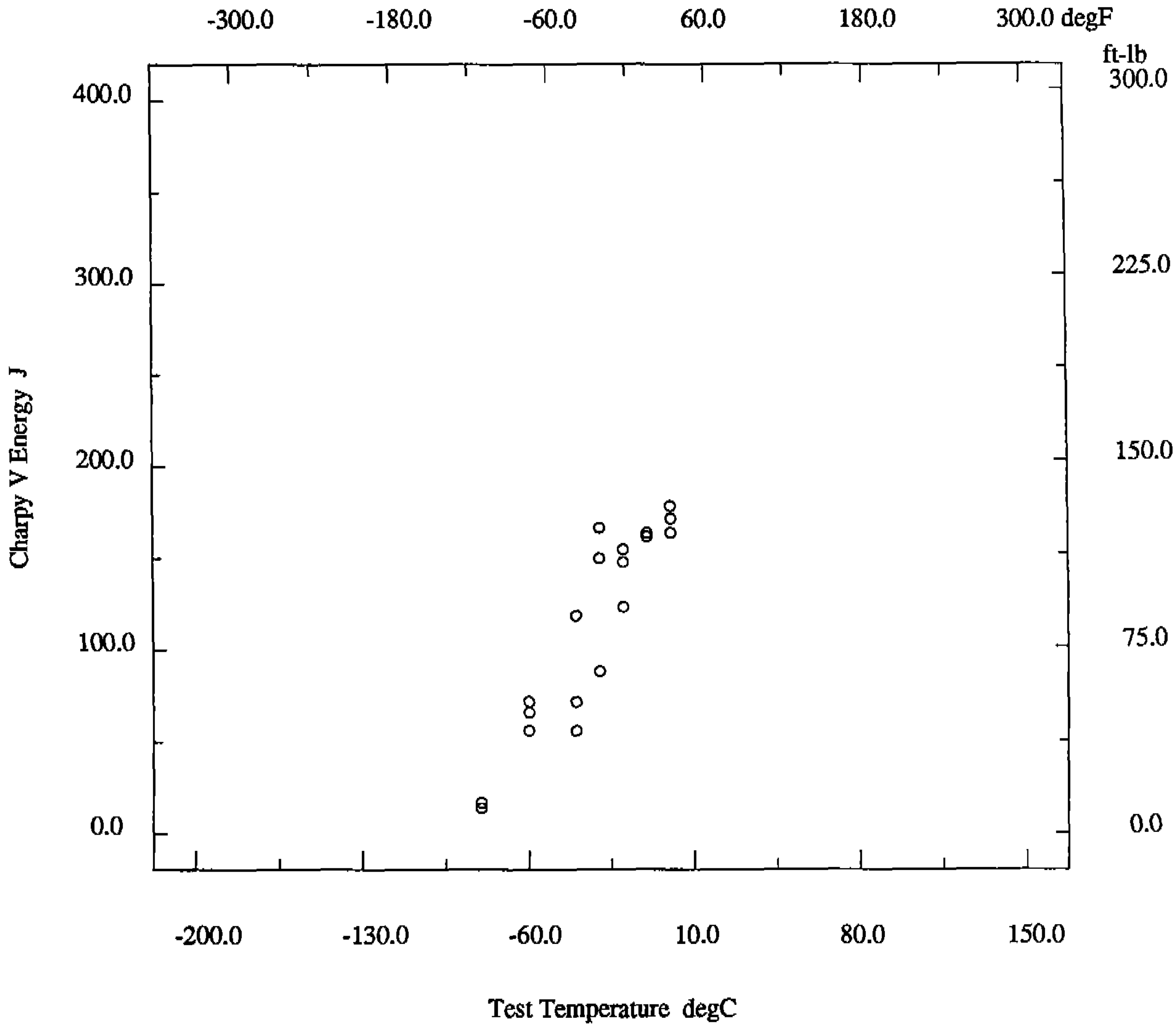
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.004.03.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.004.04.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |

## Composition

See Page 2500.1

## Fabrication History

See Page 2500.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 007.004.04.1 | Weld Type | SAW |
| Base Metal Thickness | 40 mm | Welding Position | Downhand IG |
| Preheat Temperature | * | Metal Gap | 0 mm |
| Interpass Temperature | * | Passes | 10 |
| Filler Specification | PFH-60A | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | 4 mm |
| Shielding Gas | * | Voltage | 32 volts |
| Amperage | 630 amps | Polarity | * |
| Travel Speed | 30 cm/min | Heat Input/Pass | 40.5 KJ/cm |
| Joint Preparation | U Groove | Number of Sides | 1 |
| Location wrt Weld | 3mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | US-43 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | -80 | 0.7 | 10 |
| T-L ○ | -80 | 1.2 | 15 |
| T-L ○ | -80 | 2.9 | 20 |
| T-L ○ | -60 | 2.1 | 20 |
| T-L ○ | -60 | 3.5 | 30 |
| T-L ○ | -60 | 4.2 | 25 |
| T-L ○ | -40 | 11.9 | 70 |
| T-L ○ | -40 | 12.3 | 65 |
| T-L ○ | -40 | 5.1 | 80 |
| T-L ○ | -30 | 15.3 | 100 |
| T-L ○ | -30 | 16.7 | 100 |
| T-L ○ | -30 | 17.5 | 95 |
| T-L ○ | -20 | 16.1 | 100 |
| T-L ○ | -20 | 16.8 | 100 |
| T-L ○ | -20 | 16.8 | 100 |
| T-L ○ | -10 | 15.6 | 100 |
| T-L ○ | -10 | 17.7 | 100 |
| T-L ○ | -10 | 18.0 | 100 |
| T-L ○ | 0 | 16.5 | 100 |

(continued)

* - not reported

(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | 0 | 17.2 | 100 |
| T-L ○ | 0 | 18.2 | 100 |

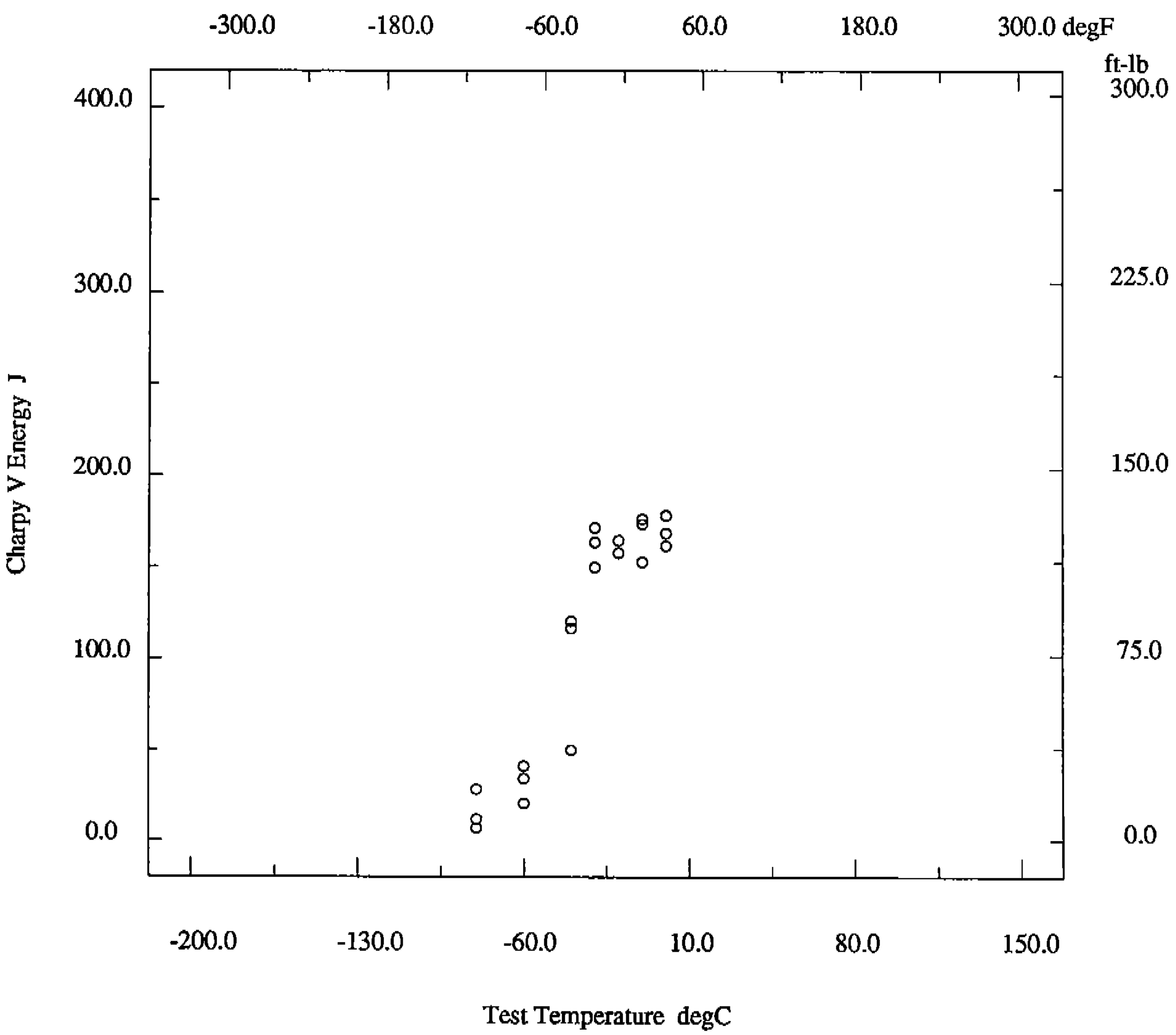
* - not reported

## Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.004.04.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.004.05.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |

## Composition

See Page 2500.1

## Fabrication History

See Page 2500.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 007.004.05.1 | Weld Type | SAW |
| Base Metal Thickness | 40 mm | Welding Position | Downhand IG |
| Preheat Temperature | * | Metal Gap | 0 mm |
| Interpass Temperature | * | Passes | 10 |
| Filler Specification | PFH-60A | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | 4 mm |
| Shielding Gas | * | Voltage | 32 volts |
| Amperage | 630 amps | Polarity | * |
| Travel Speed | 30 cm/min | Heat Input/Pass | 40.5 KJ/cm |
| Joint Preparation | U Groove | Number of Sides | 1 |
| Location wrt Weld | 5mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | US-43 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | -80 | 1.4 | 10 |
| T-L ○ | -80 | 1.9 | 10 |
| T-L ○ | -80 | 2.2 | 15 |
| T-L ○ | -60 | 4.2 | 30 |
| T-L ○ | -60 | 7.2 | 40 |
| T-L ○ | -60 | 7.8 | 40 |
| T-L ○ | -40 | 10.1 | 70 |
| T-L ○ | -40 | 15.8 | 90 |
| T-L ○ | -40 | 17.0 | 100 |
| T-L ○ | -30 | 13.5 | 100 |
| T-L ○ | -30 | 18.0 | 75 |
| T-L ○ | -30 | 18.7 | 100 |
| T-L ○ | -20 | 17.0 | 100 |
| T-L ○ | -20 | 17.5 | 100 |
| T-L ○ | -20 | 17.5 | 100 |
| T-L ○ | -10 | 18.0 | 90 |
| T-L ○ | -10 | 18.4 | 100 |
| T-L ○ | -10 | 19.2 | 100 |
| T-L ○ | 0 | 17.2 | 100 |

(continued)

* - not reported

(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | 0 | 18.0 | 100 |
| T-L ○ | 0 | 18.4 | 100 |

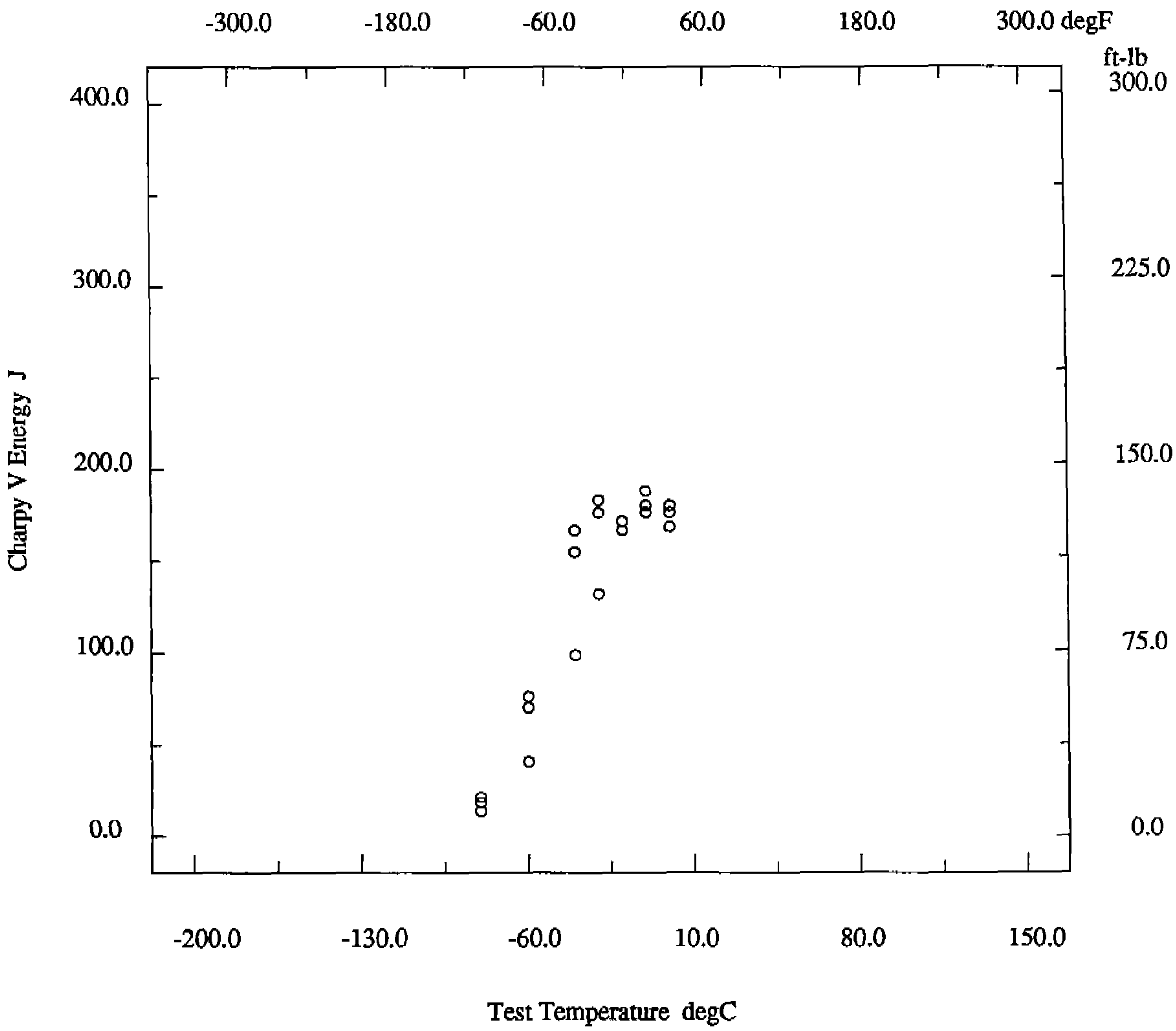
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.004.05.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |




* - not reported

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**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.004.06.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |

**Composition** See Page 2500.1

**Fabrication History** See Page 2500.1

**Weld**

| | | | |
|---|---|---|---|
| Weld Code | 007.004.06.1 | Weld Type | SAW |
| Base Metal Thickness | 40 mm | Welding Position | Downhand IG |
| Preheat Temperature | * | Metal Gap | 0 mm |
| Interpass Temperature | * | Passes | 10 |
| Filler Specification | PFH-60A | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | 4 mm |
| Shielding Gas | * | Voltage | 32 volts |
| Amperage | 630 amps | Polarity | * |
| Travel Speed | 30 cm/min | Heat Input/Pass | 40.5 KJ/cm |
| Joint Preparation | U Groove | Number of Sides | 1 |
| Location wrt Weld | 7mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | US-43 |
| Weld Composition Reported? | No | | |

**Property Measurements**

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | -80 | 0.9 | 10 |
| T-L ○ | -80 | 1.4 | 10 |
| T-L ○ | -80 | 2.9 | 20 |
| T-L ○ | -60 | 5.4 | 30 |
| T-L ○ | -60 | 5.4 | 45 |
| T-L ○ | -60 | 6.1 | 40 |
| T-L ○ | -40 | 10.5 | 55 |
| T-L ○ | -40 | 7.9 | 45 |
| T-L ○ | -40 | 9.4 | 60 |
| T-L ○ | -30 | 11.0 | 70 |
| T-L ○ | -30 | 16.5 | 80 |
| T-L ○ | -30 | 19.2 | 100 |
| T-L ○ | -20 | 13.5 | 100 |
| T-L ○ | -20 | 18.0 | 100 |
| T-L ○ | -20 | 18.2 | 100 |
| T-L ○ | -10 | 16.5 | 100 |
| T-L ○ | -10 | 17.7 | 100 |
| T-L ○ | -10 | 18.0 | 100 |
| T-L ○ | 0 | 17.7 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | 0 | 18.4 | 100 |
| T-L ○ | 0 | 19.4 | 100 |

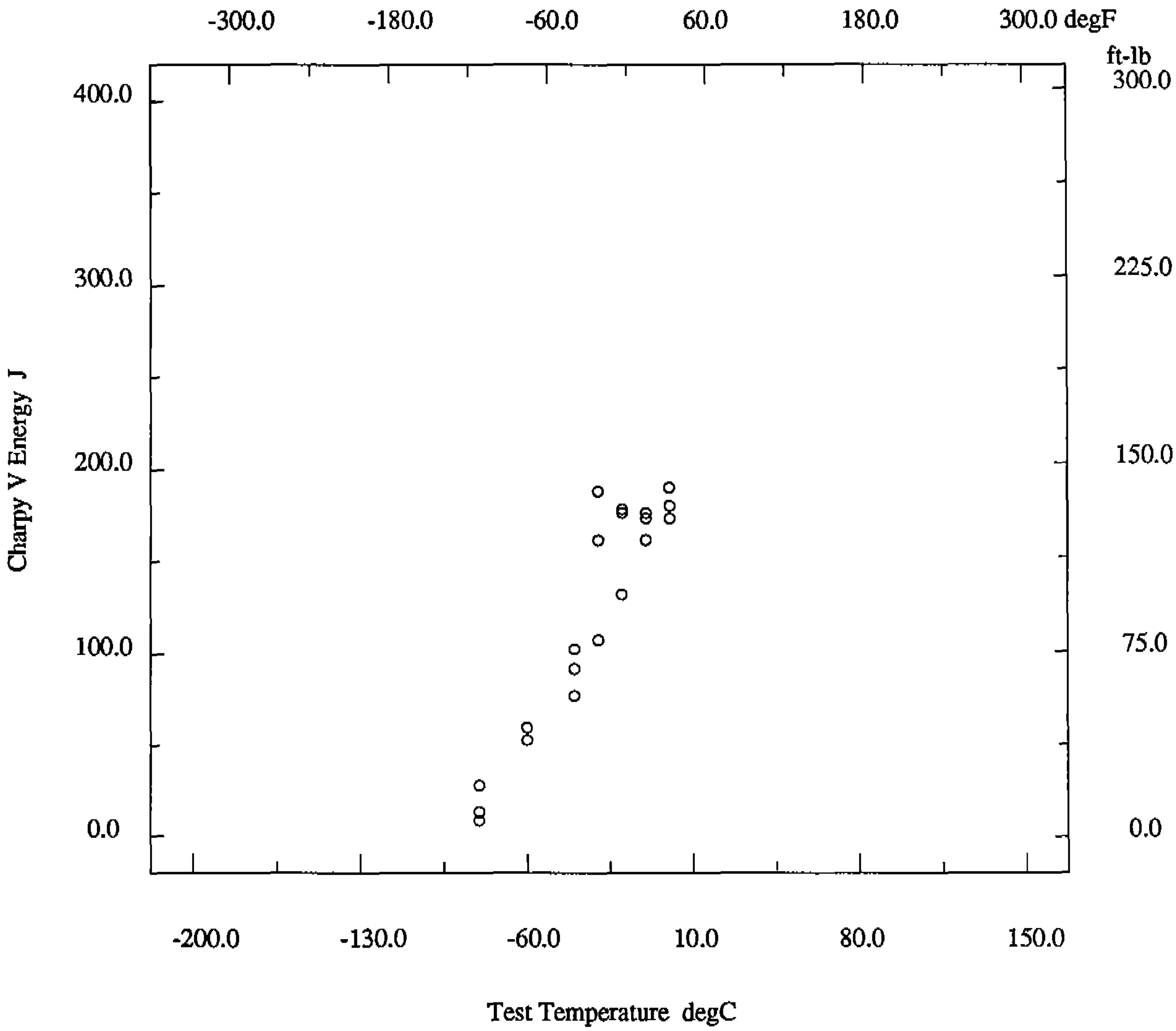
* - not reported

## Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.004.06.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |




* - not reported

**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.004.09.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |

**Composition** See Page 2500.1

**Fabrication History** See Page 2500.1

**Weld**

| | | | |
|---|---|---|---|
| Weld Code | 007.004.09.1 | Weld Type | SAW |
| Base Metal Thickness | 40 mm | Welding Position | Downhand IG |
| Preheat Temperature | * | Metal Gap | 0 mm |
| Interpass Temperature | * | Passes | 10 |
| Filler Specification | PFH-60A | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | 4 mm |
| Shielding Gas | * | Voltage | 32 volts |
| Amperage | 630 amps | Polarity | * |
| Travel Speed | 30 cm/min | Heat Input/Pass | 40.5 KJ/cm |
| Joint Preparation | U Groove | Number of Sides | 1 |
| Location wrt Weld | 11mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | US-43 |
| Weld Composition Reported? | No | | |

**Property Measurements**

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | -80 | 0.4 | 5 |
| T-L ○ | -80 | 0.7 | 10 |
| T-L ○ | -80 | 1.1 | 10 |
| T-L ○ | -60 | 0.8 | 20 |
| T-L ○ | -60 | 1.4 | 25 |
| T-L ○ | -60 | 2.1 | 25 |
| T-L ○ | -40 | 2.4 | 30 |
| T-L ○ | -40 | 2.6 | 35 |
| T-L ○ | -40 | 3.4 | 35 |
| T-L ○ | -30 | 3.3 | 55 |
| T-L ○ | -30 | 4.2 | 55 |
| T-L ○ | -30 | 7.1 | 55 |
| T-L ○ | -20 | 13.3 | 70 |
| T-L ○ | -20 | 14.4 | 75 |
| T-L ○ | -20 | 7.8 | 60 |
| T-L ○ | -10 | 14.2 | 90 |
| T-L ○ | -10 | 7.9 | 70 |
| T-L ○ | -10 | 8.1 | 70 |
| T-L ○ | 0 | 11.9 | 80 |

(continued)

* - not reported

(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | 0 | 13.5 | 85 |
| T-L ○ | 0 | 9.9 | 80 |

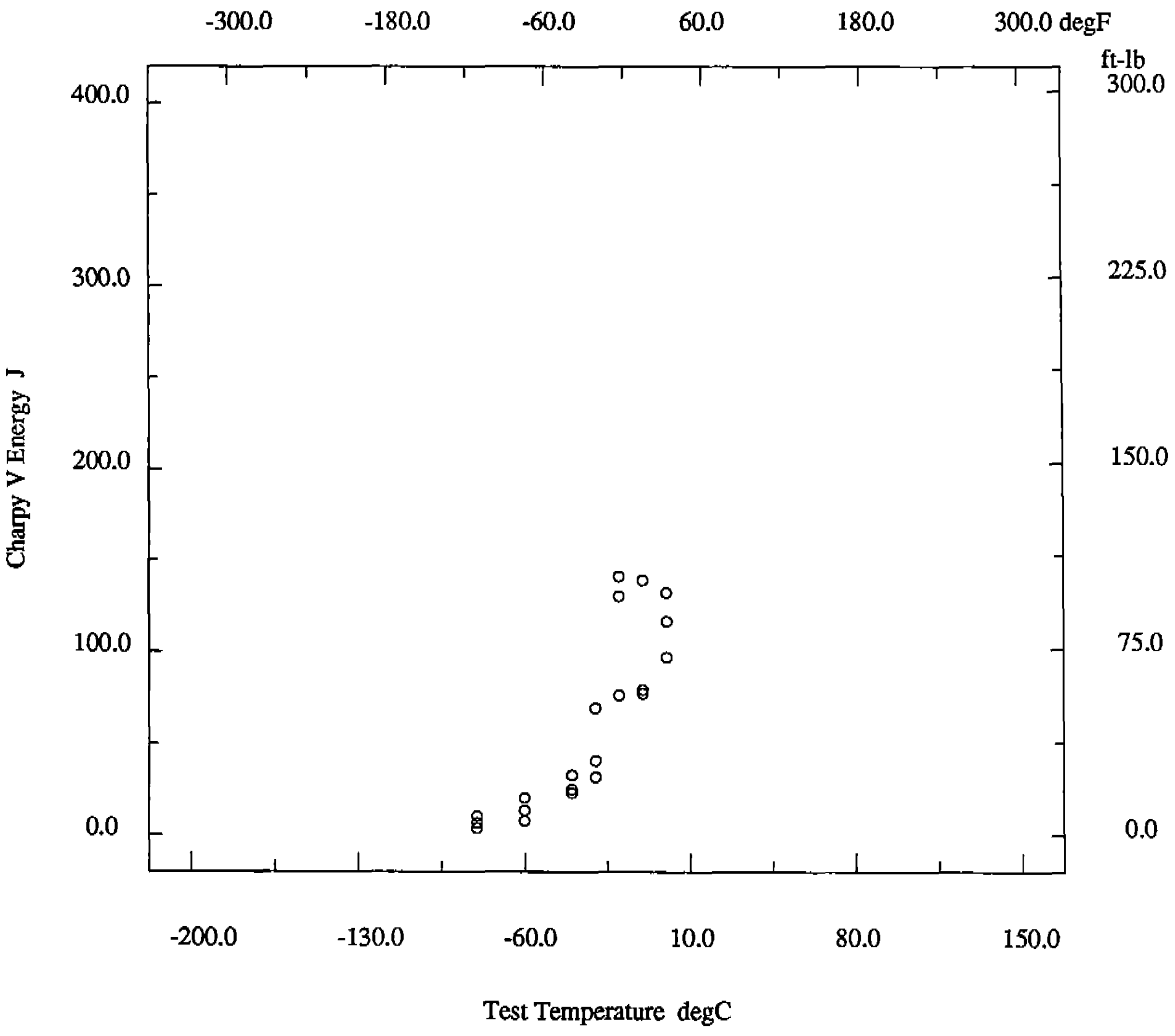
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.004.09.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K1325 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.005.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.120 % | Mn | 1.38 % |
| P | 0.014 % | S | 0.019 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.030 % |
| Cb | * | Ti | * |
| B | * | Al | 0.041 % |
| N | 0.0070 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 990 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 630 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | * |
| Specimen Type | Full | Specimen Thickness | 40 mm |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| L | 20 | 52.2 | 40.1 | 29.5 |
| T | 20 | 53.2 | 40.9 | 28.5 |

* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.005.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | G9837 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.120 % | Mn | 1.38 % |
| P | 0.014 % | S | 0.020 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.030 % |
| Cb | * | Ti | * |
| B | * | Al | 0.042 % |
| N | 0.0070 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Bottom | Killing Process | Fully |
| Process Temperature | 1000 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 630 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | * |
| Specimen Type | Full | Specimen Thickness | 40 mm |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| L | 20 | 52.0 | 38.6 | 29.5 |
| T | 20 | 52.8 | 40.1 | 26.5 |

* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.005.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.120 % | Mn | 1.38 % |
| P | 0.014 % | S | 0.019 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.030 % |
| Cb | * | Ti | * |
| B | * | Al | 0.041 % |
| N | 0.0070 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 990 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 630 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | 0/4T |
| Specimen Type | Full | Lateral Expansion | * |
| Did Specimen Fracture? | Assumed | Did Specimen Split? | * |
| Standard Method | * | Standard Year | * |

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 2.1 | 10 |
| L-T ○ | -100 | 2.8 | 10 |
| L-T ○ | -100 | 3.3 | 10 |
| L-T ○ | -80 | 5.0 | 25 |
| L-T ○ | -80 | 5.9 | 25 |
| L-T ○ | -80 | 6.1 | 25 |
| L-T ○ | -60 | 6.3 | 50 |
| L-T ○ | -60 | 6.7 | 45 |
| L-T ○ | -60 | 7.3 | 45 |
| L-T ○ | -40 | 18.2 | 100 |
| L-T ○ | -40 | 18.5 | 100 |
| L-T ○ | -40 | 19.2 | 100 |
| L-T ○ | -30 | 17.8 | 95 |
| L-T ○ | -30 | 18.0 | 100 |
| L-T ○ | -30 | 19.5 | 100 |
| L-T ○ | -20 | 18.7 | 100 |
| L-T ○ | -20 | 19.0 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

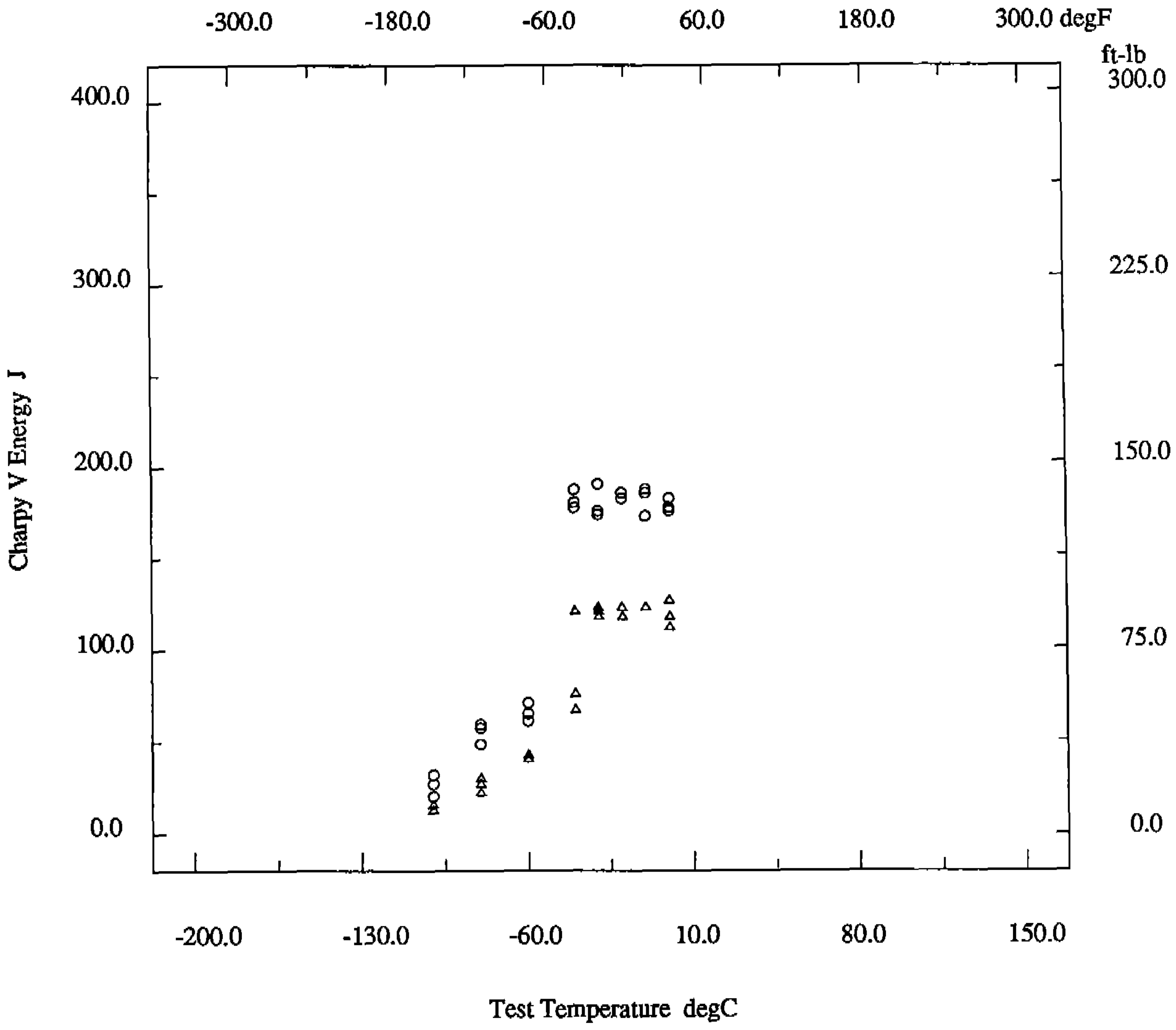
| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 19.0 | 100 |
| L-T ○ | -10 | 17.7 | 100 |
| L-T ○ | -10 | 19.0 | 100 |
| L-T ○ | -10 | 19.2 | 100 |
| L-T ○ | 0 | 18.0 | 100 |
| L-T ○ | 0 | 18.2 | 100 |
| L-T ○ | 0 | 18.7 | 100 |
| T-L △ | -100 | 1.3 | 10 |
| T-L △ | -100 | 1.6 | 10 |
| T-L △ | -100 | 1.6 | 10 |
| T-L △ | -80 | 2.3 | 15 |
| T-L △ | -80 | 2.8 | 15 |
| T-L △ | -80 | 3.1 | 20 |
| T-L △ | -60 | 4.2 | 40 |
| T-L △ | -60 | 4.2 | 40 |
| T-L △ | -60 | 4.4 | 40 |
| T-L △ | -40 | 12.4 | 100 |
| T-L △ | -40 | 6.9 | 70 |
| T-L △ | -40 | 7.8 | 70 |
| T-L △ | -30 | 12.1 | 100 |
| T-L △ | -30 | 12.4 | 100 |
| T-L △ | -30 | 12.6 | 100 |
| T-L △ | -20 | 12.1 | 100 |
| T-L △ | -20 | 12.1 | 100 |
| T-L △ | -20 | 12.6 | 100 |
| T-L △ | -10 | 12.6 | 100 |
| T-L △ | -10 | 12.6 | 100 |
| T-L △ | -10 | 12.6 | 100 |
| T-L △ | 0 | 11.5 | 100 |
| T-L △ | 0 | 12.1 | 100 |
| T-L △ | 0 | 13.0 | 100 |

* - not reported

## Material ABS-EH36



| Description | | | |
|---|---|---|---|
| Material Code | 007.005.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.005.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | G9837 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.120 % | Mn | 1.38 % |
| P | 0.014 % | S | 0.020 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.030 % |
| Cb | * | Ti | * |
| B | * | Al | 0.042 % |
| N | 0.0070 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Bottom | Killing Process | Fully |
| Process Temperature | 1000 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 630 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | 0/4T |
| Specimen Type | Full | Lateral Expansion | * |
| Did Specimen Fracture? | Assumed | Did Specimen Split? | * |
| Standard Method | * | Standard Year | * |

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 0.9 | 10 |
| L-T ○ | -100 | 1.3 | 10 |
| L-T ○ | -100 | 2.6 | 5 |
| L-T ○ | -80 | 3.3 | 20 |
| L-T ○ | -80 | 3.7 | 20 |
| L-T ○ | -80 | 3.8 | 20 |
| L-T ○ | -60 | 11.0 | 75 |
| L-T ○ | -60 | 12.4 | 70 |
| L-T ○ | -60 | 7.8 | 50 |
| L-T ○ | -40 | 16.8 | 100 |
| L-T ○ | -40 | 17.5 | 100 |
| L-T ○ | -40 | 18.5 | 100 |
| L-T ○ | -30 | 18.0 | 100 |
| L-T ○ | -30 | 18.2 | 100 |
| L-T ○ | -30 | 18.5 | 100 |
| L-T ○ | -20 | 17.5 | 90 |
| L-T ○ | -20 | 18.5 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

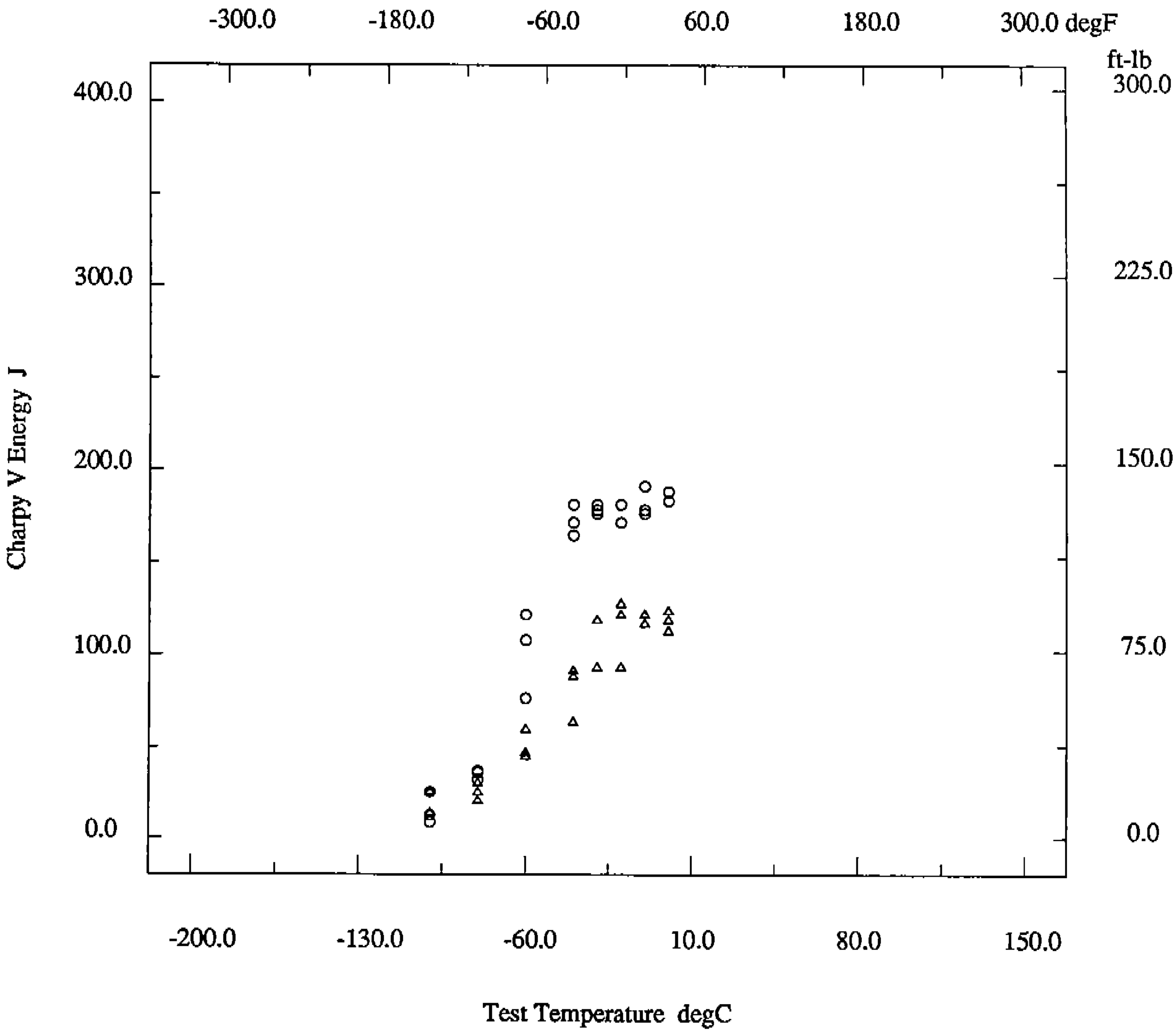
| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 18.5 | 100 |
| L-T ○ | -10 | 18.0 | 100 |
| L-T ○ | -10 | 18.2 | 100 |
| L-T ○ | -10 | 19.5 | 100 |
| L-T ○ | 0 | 18.7 | 100 |
| L-T ○ | 0 | 18.7 | 100 |
| L-T ○ | 0 | 19.2 | 100 |
| T-L △ | -100 | 1.4 | 5 |
| T-L △ | -100 | 2.6 | 10 |
| T-L △ | -100 | 2.6 | 10 |
| T-L △ | -80 | 2.1 | 15 |
| T-L △ | -80 | 2.6 | 15 |
| T-L △ | -80 | 3.1 | 20 |
| T-L △ | -60 | 4.6 | 50 |
| T-L △ | -60 | 4.8 | 55 |
| T-L △ | -60 | 6.1 | 55 |
| T-L △ | -40 | 6.5 | 65 |
| T-L △ | -40 | 9.0 | 75 |
| T-L △ | -40 | 9.3 | 75 |
| T-L △ | -30 | 12.1 | 100 |
| T-L △ | -30 | 12.1 | 100 |
| T-L △ | -30 | 9.5 | 85 |
| T-L △ | -20 | 12.4 | 100 |
| T-L △ | -20 | 13.0 | 100 |
| T-L △ | -20 | 9.5 | 85 |
| T-L △ | -10 | 11.9 | 100 |
| T-L △ | -10 | 12.4 | 100 |
| T-L △ | -10 | 12.4 | 100 |
| T-L △ | 0 | 11.5 | 100 |
| T-L △ | 0 | 12.1 | 100 |
| T-L △ | 0 | 12.6 | 100 |

* - not reported

# Material ABS-EH36



| Description | | | |
|---|---|---|---|
| Material Code | 007.005.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | G9837 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.005.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.120 % | Mn | 1.38 % |
| P | 0.014 % | S | 0.019 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.030 % |
| Cb | * | Ti | * |
| B | * | Al | 0.041 % |
| N | 0.0070 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 990 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 630 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 1.1 | 5 |
| L-T ○ | -100 | 1.4 | 5 |
| L-T ○ | -100 | 2.1 | 5 |
| L-T ○ | -80 | 3.7 | 10 |
| L-T ○ | -80 | 5.6 | 30 |
| L-T ○ | -80 | 6.3 | 35 |
| L-T ○ | -60 | 2.9 | 35 |
| L-T ○ | -60 | 4.4 | 35 |
| L-T ○ | -60 | 6.9 | 40 |
| L-T ○ | -40 | 13.0 | 70 |
| L-T ○ | -40 | 16.3 | 75 |
| L-T ○ | -40 | 16.3 | 75 |
| L-T ○ | -30 | 18.0 | 100 |
| L-T ○ | -30 | 18.5 | 100 |
| L-T ○ | -30 | 19.2 | 100 |
| L-T ○ | -20 | 19.2 | 100 |
| L-T ○ | -20 | 20.7 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 20.9 | 100 |
| L-T ○ | -10 | 19.7 | 100 |
| L-T ○ | -10 | 19.7 | 100 |
| L-T ○ | -10 | 20.2 | 100 |
| L-T ○ | 0 | 18.2 | 100 |
| L-T ○ | 0 | 18.5 | 100 |
| L-T ○ | 0 | 20.2 | 100 |
| T-L △ | -100 | 1.3 | 5 |
| T-L △ | -100 | 1.6 | 5 |
| T-L △ | -100 | 1.8 | 5 |
| T-L △ | -80 | 1.8 | 10 |
| T-L △ | -80 | 1.9 | 10 |
| T-L △ | -80 | 3.3 | 15 |
| T-L △ | -60 | 3.8 | 40 |
| T-L △ | -60 | 5.2 | 45 |
| T-L △ | -60 | 6.9 | 60 |
| T-L △ | -40 | 11.2 | 70 |
| T-L △ | -40 | 6.1 | 60 |
| T-L △ | -40 | 8.0 | 75 |
| T-L △ | -30 | 11.0 | 65 |
| T-L △ | -30 | 12.1 | 100 |
| T-L △ | -30 | 12.4 | 95 |
| T-L △ | -20 | 10.8 | 85 |
| T-L △ | -20 | 12.6 | 100 |
| T-L △ | -20 | 14.2 | 100 |
| T-L △ | -10 | 13.3 | 100 |
| T-L △ | -10 | 13.3 | 100 |
| T-L △ | -10 | 13.7 | 100 |
| T-L △ | 0 | 13.3 | 100 |
| T-L △ | 0 | 13.5 | 100 |
| T-L △ | 0 | 13.7 | 100 |

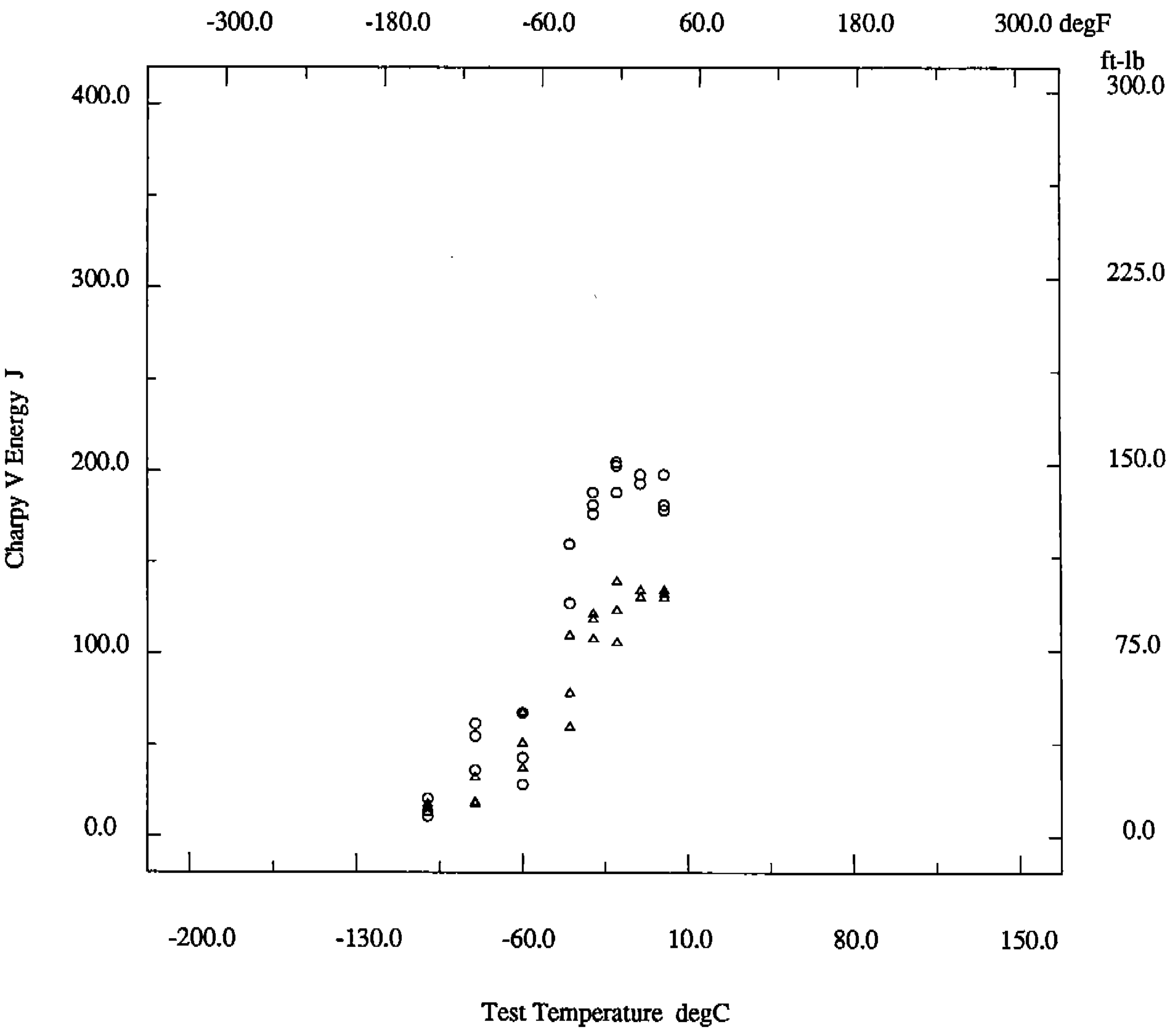
* - not reported

## Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.005.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.005.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | G9837 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.120 % | Mn | 1.38 % |
| P | 0.014 % | S | 0.020 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.030 % |
| Cb | * | Ti | * |
| B | * | Al | 0.042 % |
| N | 0.0070 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Bottom | Killing Process | Fully |
| Process Temperature | 1000 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 630 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 0.8 | 5 |
| L-T ○ | -100 | 1.6 | 5 |
| L-T ○ | -100 | 1.8 | 5 |
| L-T ○ | -80 | 2.1 | 10 |
| L-T ○ | -80 | 2.8 | 10 |
| L-T ○ | -80 | 3.7 | 10 |
| L-T ○ | -60 | 5.4 | 45 |
| L-T ○ | -60 | 5.7 | 45 |
| L-T ○ | -60 | 7.6 | 50 |
| L-T ○ | -40 | 16.8 | 100 |
| L-T ○ | -40 | 17.8 | 100 |
| L-T ○ | -40 | 19.0 | 100 |
| L-T ○ | -30 | 17.5 | 100 |
| L-T ○ | -30 | 17.8 | 100 |
| L-T ○ | -30 | 18.7 | 100 |
| L-T ○ | -20 | 17.8 | 100 |
| L-T ○ | -20 | 18.2 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 18.7 | 100 |
| L-T ○ | -10 | 17.3 | 100 |
| L-T ○ | -10 | 18.0 | 100 |
| L-T ○ | -10 | 19.2 | 100 |
| L-T ○ | 0 | 17.3 | 100 |
| L-T ○ | 0 | 17.8 | 100 |
| L-T ○ | 0 | 19.5 | 100 |
| T-L △ | -100 | 1.6 | 5 |
| T-L △ | -100 | 1.9 | 5 |
| T-L △ | -100 | 2.1 | 5 |
| T-L △ | -80 | 2.1 | 10 |
| T-L △ | -80 | 3.1 | 15 |
| T-L △ | -80 | 3.3 | 15 |
| T-L △ | -60 | 3.1 | 35 |
| T-L △ | -60 | 3.7 | 40 |
| T-L △ | -60 | 4.8 | 50 |
| T-L △ | -40 | 11.5 | 100 |
| T-L △ | -40 | 6.9 | 70 |
| T-L △ | -40 | 9.7 | 85 |
| T-L △ | -30 | 11.9 | 100 |
| T-L △ | -30 | 12.8 | 100 |
| T-L △ | -30 | 8.8 | 80 |
| T-L △ | -20 | 10.3 | 90 |
| T-L △ | -20 | 12.4 | 100 |
| T-L △ | -20 | 12.4 | 100 |
| T-L △ | -10 | 12.6 | 100 |
| T-L △ | -10 | 12.8 | 100 |
| T-L △ | -10 | 13.0 | 100 |
| T-L △ | 0 | 11.5 | 100 |
| T-L △ | 0 | 12.1 | 100 |
| T-L △ | 0 | 12.6 | 100 |

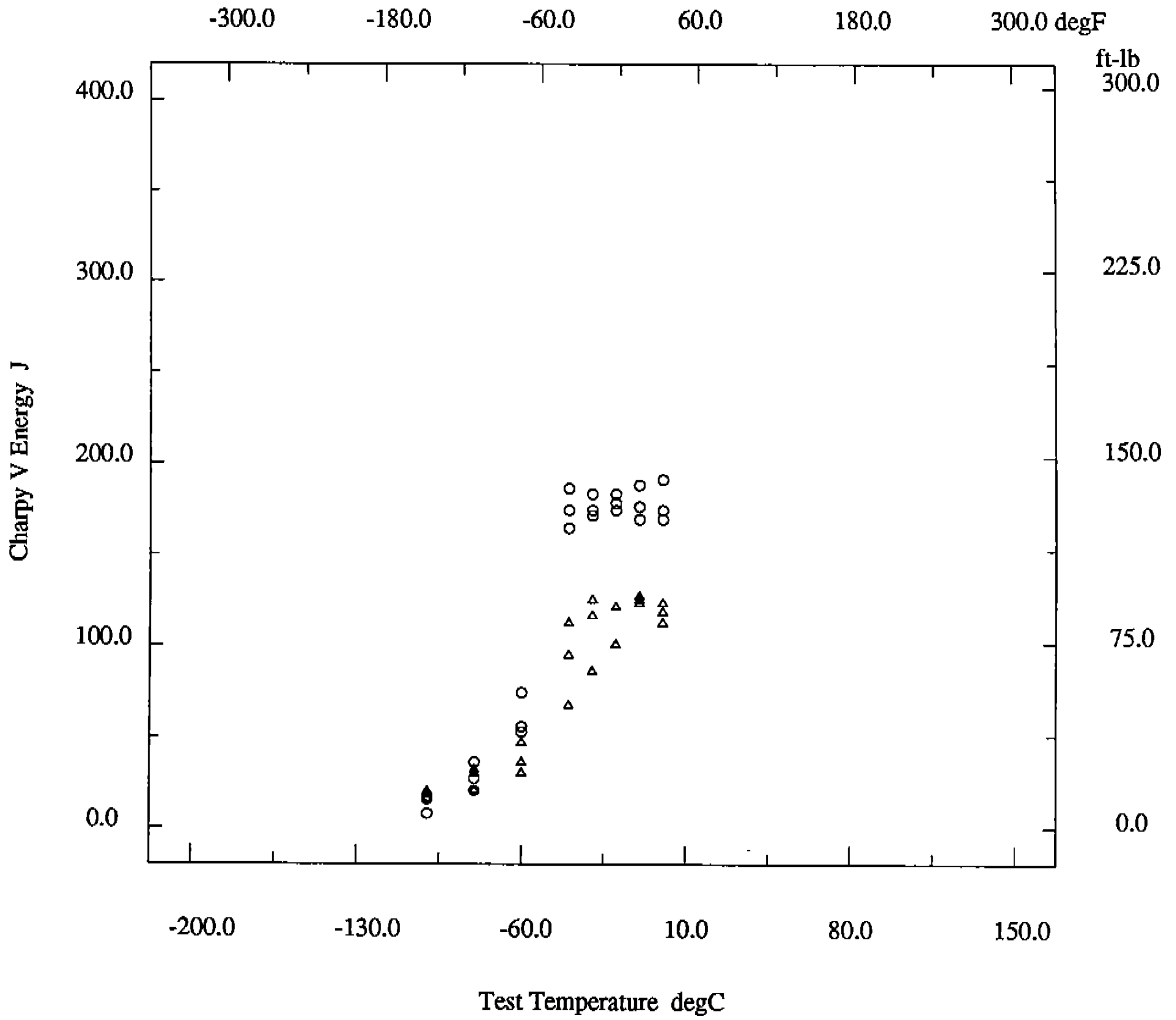
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.005.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | G9837 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.005.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.120 % | Mn | 1.38 % |
| P | 0.014 % | S | 0.019 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.030 % |
| Cb | * | Ti | * |
| B | * | Al | 0.041 % |
| N | 0.0070 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 990 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 630 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 1.4 | 5 |
| L-T ○ | -100 | 1.8 | 5 |
| L-T ○ | -100 | 2.3 | 5 |
| L-T ○ | -80 | 3.3 | 15 |
| L-T ○ | -80 | 3.8 | 15 |
| L-T ○ | -80 | 4.4 | 15 |
| L-T ○ | -60 | 4.4 | 35 |
| L-T ○ | -60 | 5.4 | 40 |
| L-T ○ | -60 | 6.3 | 40 |
| L-T ○ | -40 | 12.4 | 65 |
| L-T ○ | -40 | 15.1 | 75 |
| L-T ○ | -40 | 19.9 | 100 |
| L-T ○ | -30 | 18.2 | 100 |
| L-T ○ | -30 | 19.2 | 100 |
| L-T ○ | -30 | 19.5 | 100 |
| L-T ○ | -20 | 18.7 | 85 |
| L-T ○ | -20 | 19.0 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 19.0 | 100 |
| L-T ○ | -10 | 18.2 | 100 |
| L-T ○ | -10 | 18.5 | 100 |
| L-T ○ | -10 | 19.7 | 100 |
| L-T ○ | 0 | 18.5 | 100 |
| L-T ○ | 0 | 18.7 | 100 |
| L-T ○ | 0 | 19.7 | 100 |
| T-L △ | -100 | 1.9 | 5 |
| T-L △ | -100 | 2.1 | 5 |
| T-L △ | -100 | 2.3 | 5 |
| T-L △ | -80 | 2.1 | 10 |
| T-L △ | -80 | 2.3 | 10 |
| T-L △ | -80 | 2.9 | 10 |
| T-L △ | -60 | 3.3 | 40 |
| T-L △ | -60 | 3.8 | 40 |
| T-L △ | -60 | 3.8 | 45 |
| T-L △ | -40 | 6.5 | 70 |
| T-L △ | -40 | 8.4 | 70 |
| T-L △ | -40 | 8.6 | 75 |
| T-L △ | -30 | 10.1 | 85 |
| T-L △ | -30 | 11.5 | 100 |
| T-L △ | -30 | 9.0 | 80 |
| T-L △ | -20 | 11.7 | 95 |
| T-L △ | -20 | 12.6 | 100 |
| T-L △ | -20 | 13.0 | 100 |
| T-L △ | -10 | 12.6 | 100 |
| T-L △ | -10 | 13.0 | 100 |
| T-L △ | -10 | 13.3 | 100 |
| T-L △ | 0 | 11.9 | 100 |
| T-L △ | 0 | 11.9 | 100 |
| T-L △ | 0 | 12.1 | 100 |

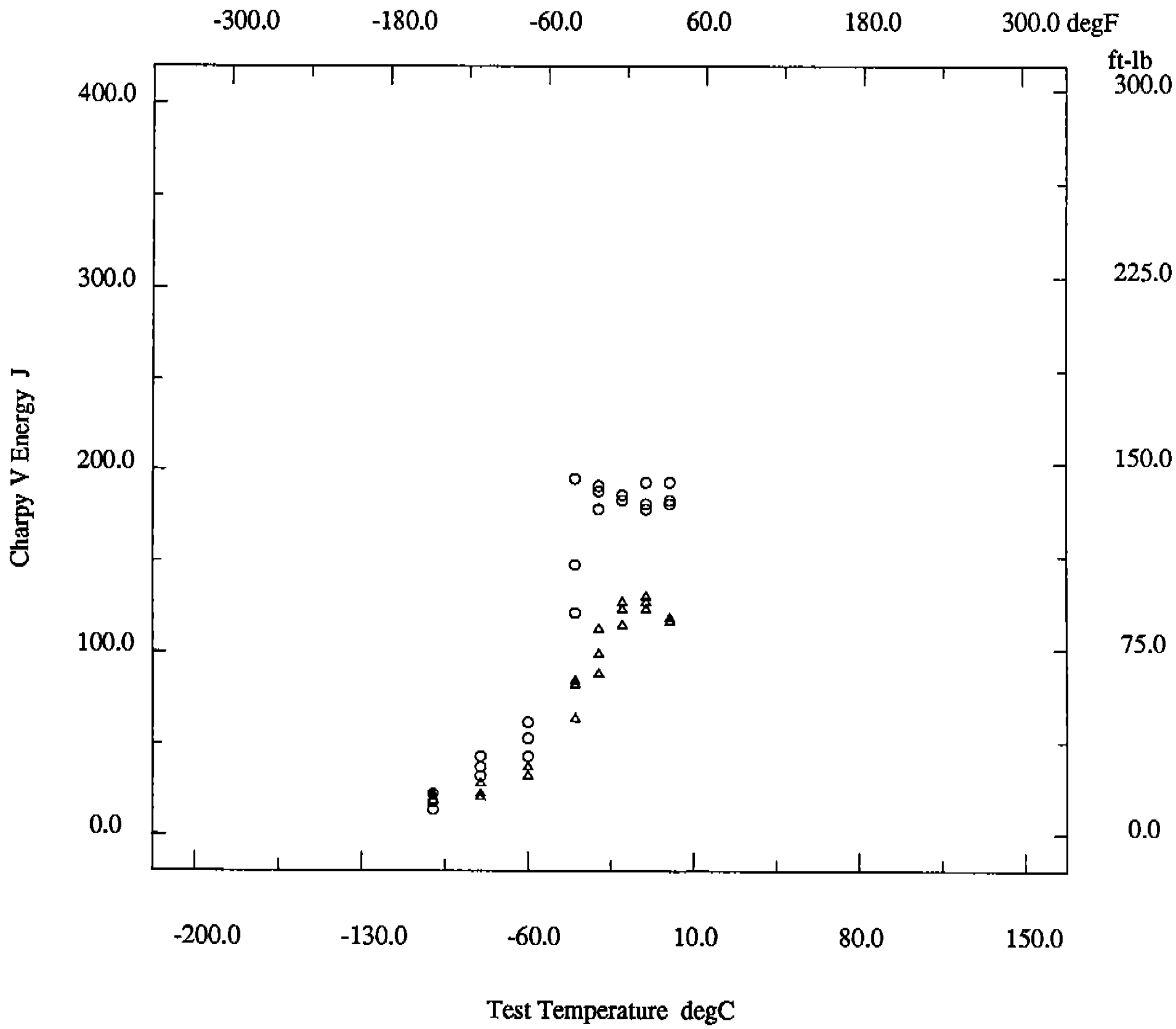
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.005.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

Material Code ........ 007.005.01B
UNS ........ *
Type ........ Wrought Metal
Thickness ........ 40 mm
Composition Position ........ Bottom
Reference ........ 007-1
Material Name ........ ABS-EH36
Other Designation ........ *
Form ........ Plate
Composition Type ........ Actual
Lot ID ........ G9837

## Composition

C ........ 0.120 %
P ........ 0.014 %
Si ........ 0.23 %
Ni ........ 0.01 %
V ........ *
Cb ........ *
B ........ *
N ........ 0.0070 %
Mn ........ 1.38 %
S ........ 0.020 %
Cr ........ 0.01 %
Mo ........ *
Cu ........ 0.030 %
Ti ........ *
Al ........ 0.042 %
Other Components ........ *

## Fabrication History

Heat Treatment ........ *
Year Produced ........ 1972
Source ........ Kobe
Ingot Position ........ Bottom
Process Temperature ........ 1000 degC
Rolling Conditions ........ 77 %
Final Temperature ........ 630 degC
Cold Work Strain ........ *
Aging Time ........ *
Producer ........ Kobe
Addl Info ........ None
Melting Practice ........ BOF
Killing Process ........ Fully
Process Time ........ *
Final Processing ........ Q,T
Final Time ........ 1.5 hr
Aging Temperature ........ *
Location ........ *

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -100 | 1.1 | 5 |
| L-T ○ | -100 | 1.3 | 5 |
| L-T ○ | -100 | 1.9 | 5 |
| L-T ○ | -80 | 0.9 | 10 |
| L-T ○ | -80 | 1.8 | 10 |
| L-T ○ | -80 | 2.4 | 10 |
| L-T ○ | -60 | 3.5 | 35 |
| L-T ○ | -60 | 3.5 | 35 |
| L-T ○ | -60 | 7.3 | 50 |
| L-T ○ | -40 | 10.3 | 70 |
| L-T ○ | -40 | 11.0 | 70 |
| L-T ○ | -40 | 11.9 | 70 |
| L-T ○ | -30 | 17.0 | 100 |
| L-T ○ | -30 | 18.7 | 100 |
| L-T ○ | -30 | 19.7 | 100 |
| L-T ○ | -20 | 17.3 | 100 |
| L-T ○ | -20 | 17.8 | 100 |

* - not reported

(continued)

# Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| L-T ○ | -20 | 18.0 | 100 |
| L-T ○ | -10 | 18.5 | 100 |
| L-T ○ | -10 | 18.7 | 100 |
| L-T ○ | -10 | 20.2 | 100 |
| L-T ○ | 0 | 16.8 | 100 |
| L-T ○ | 0 | 17.0 | 100 |
| L-T ○ | 0 | 18.0 | 100 |
| T-L △ | -100 | 0.8 | 5 |
| T-L △ | -100 | 1.3 | 5 |
| T-L △ | -100 | 1.4 | 5 |
| T-L △ | -80 | 1.4 | 10 |
| T-L △ | -80 | 1.6 | 10 |
| T-L △ | -80 | 2.3 | 10 |
| T-L △ | -60 | 1.9 | 35 |
| T-L △ | -60 | 3.1 | 40 |
| T-L △ | -60 | 3.5 | 35 |
| T-L △ | -40 | 4.8 | 60 |
| T-L △ | -40 | 5.4 | 60 |
| T-L △ | -40 | 5.6 | 65 |
| T-L △ | -30 | 7.3 | 75 |
| T-L △ | -30 | 8.6 | 80 |
| T-L △ | -30 | 9.5 | 85 |
| T-L △ | -20 | 11.0 | 100 |
| T-L △ | -20 | 11.5 | 100 |
| T-L △ | -20 | 11.7 | 100 |
| T-L △ | -10 | 11.5 | 100 |
| T-L △ | -10 | 12.4 | 100 |
| T-L △ | -10 | 13.0 | 100 |
| T-L △ | 0 | 12.4 | 100 |
| T-L △ | 0 | 12.6 | 100 |
| T-L △ | 0 | 12.6 | 100 |

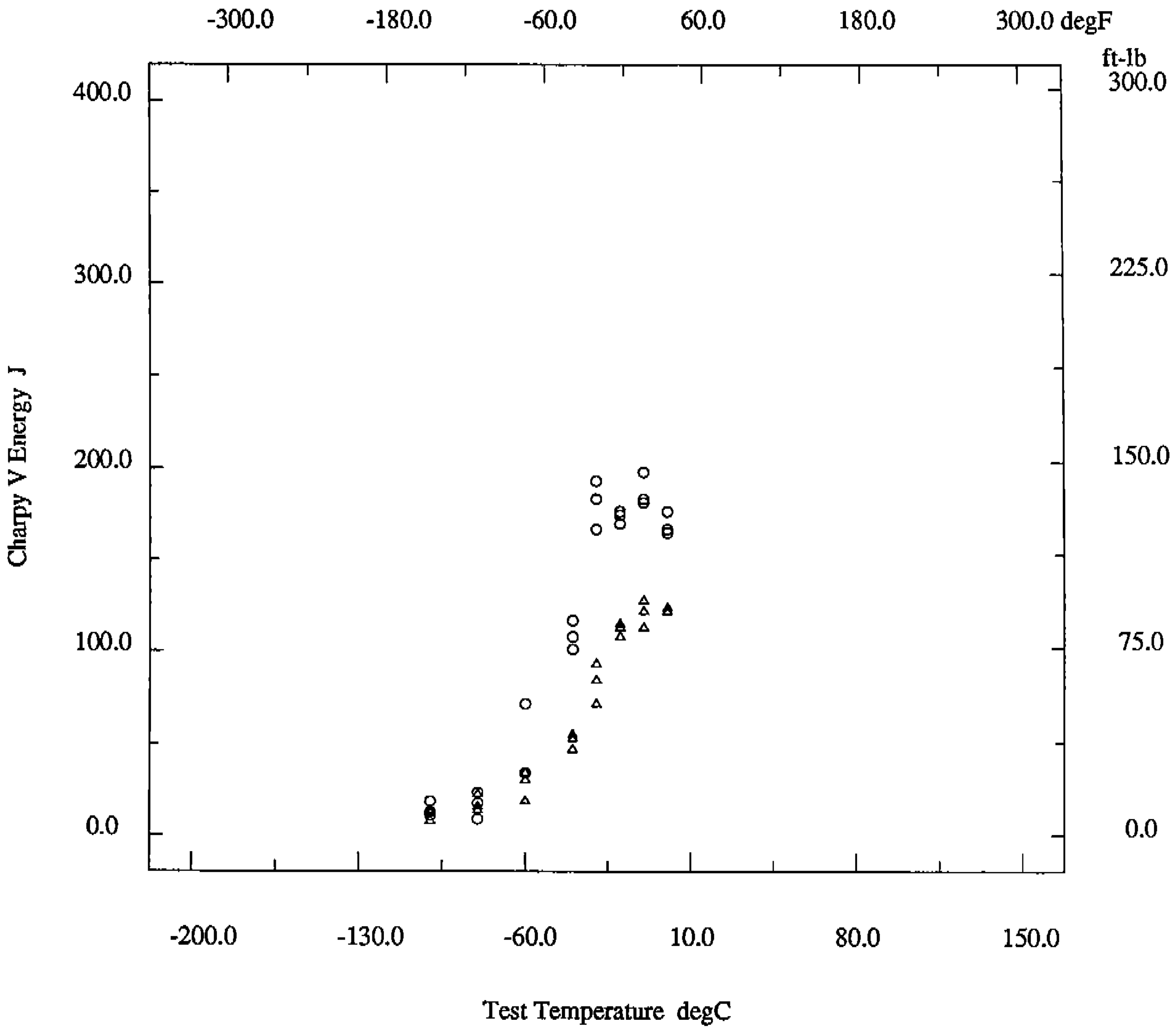
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.005.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | G9837 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.005.02.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 1.38 % |
| P | 0.014 % | S | 0.019 % |
| Si | 0.23 % | Cr | 0.01 % |
| Ni | 0.01 % | Mo | * |
| V | * | Cu | 0.03 % |
| Cb | * | Ti | * |
| B | * | Al | 0.041 % |
| N | 0.007 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Kobe |
| Year Produced | 1972 | Addl Info | None |
| Source | Kobe | Melting Practice | BOF |
| Ingot Position | Top | Killing Process | Fully |
| Process Temperature | 990 degC | Process Time | * |
| Rolling Conditions | 77 % | Final Processing | Q,T |
| Final Temperature | 630 degC | Final Time | 1.5 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 007.005.02.1 | Weld Type | SAW |
| Base Metal Thickness | 40 mm | Welding Position | Downhand IG |
| Preheat Temperature | * | Metal Gap | 0 mm |
| Interpass Temperature | * | Passes | 10 |
| Filler Specification | PFH-60A | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | 4 mm |
| Shielding Gas | * | Voltage | 32 volts |
| Amperage | 630 amps | Polarity | * |
| Travel Speed | 30 cm/min | Heat Input/Pass | 40.5 KJ/cm |
| Joint Preparation | U Groove | Number of Sides | 1 |
| Location wrt Weld | Fusion line | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | US-43 |
| Weld Composition Reported? | No | | |

(continued)

* - not reported

(continued)

**Property Measurements**

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | -80 | 1.1 | 15 |
| T-L ○ | -80 | 1.5 | 15 |
| T-L ○ | -80 | 2.0 | 15 |
| T-L ○ | -60 | 3.8 | 20 |
| T-L ○ | -60 | 4.2 | 20 |
| T-L ○ | -60 | 5.4 | 30 |
| T-L ○ | -40 | 4.4 | 35 |
| T-L ○ | -40 | 7.1 | 50 |
| T-L ○ | -40 | 8.1 | 50 |
| T-L ○ | -30 | 12.8 | 65 |
| T-L ○ | -30 | 17.5 | 100 |
| T-L ○ | -30 | 8.1 | 60 |
| T-L ○ | -20 | 14.9 | 80 |
| T-L ○ | -20 | 15.4 | 80 |
| T-L ○ | -20 | 9.3 | 65 |
| T-L ○ | -10 | 16.0 | 100 |
| T-L ○ | -10 | 17.7 | 100 |
| T-L ○ | -10 | 18.4 | 100 |
| T-L ○ | 0 | 15.3 | 90 |
| T-L ○ | 0 | 17.2 | 100 |
| T-L ○ | 0 | 18.2 | 100 |

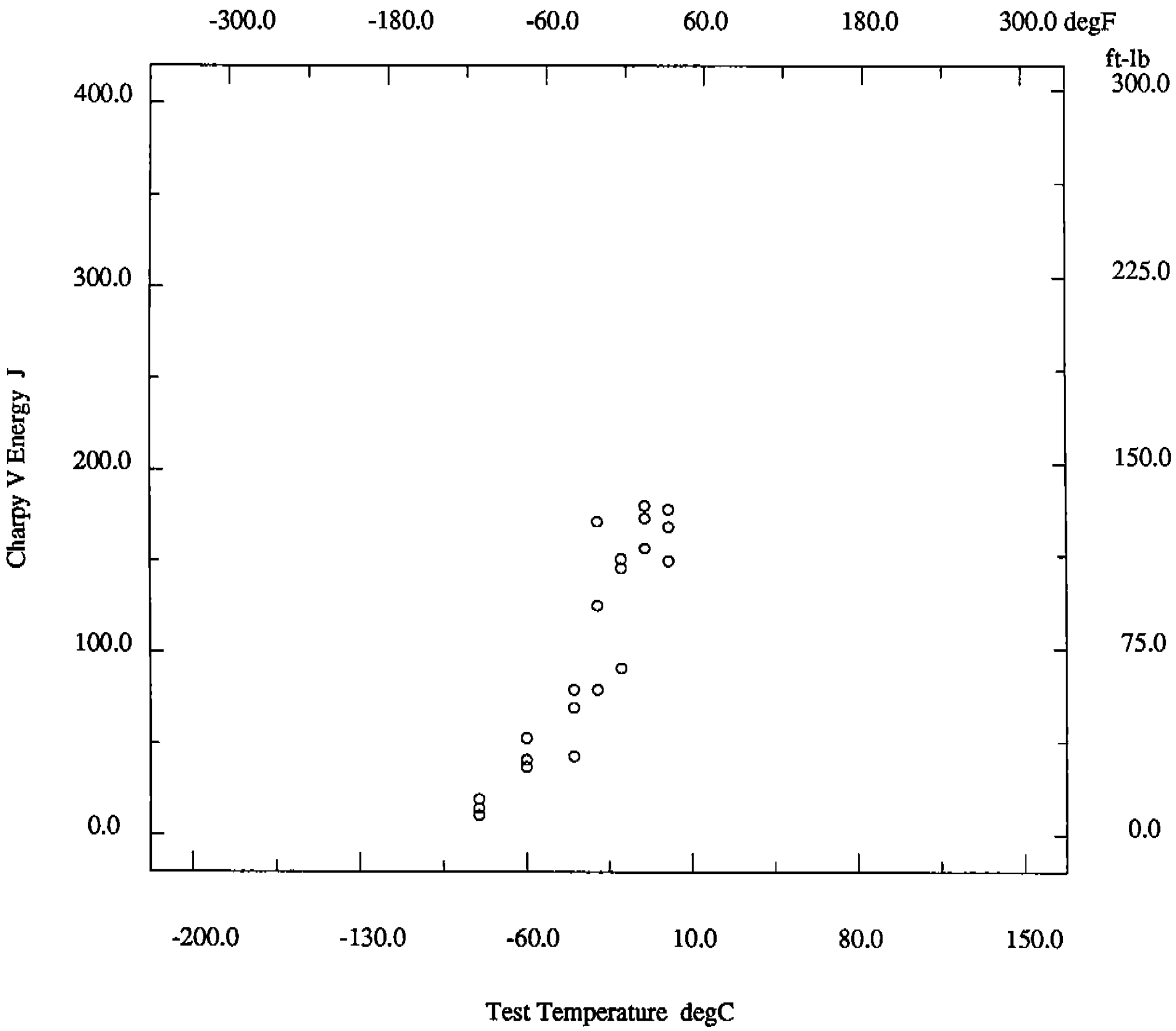
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.005.02.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |




* - not reported

## Description

| | | | |
|---|---|---|---|
| Material Code | 007.005.03.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |

## Composition

See Page 2700.1

## Fabrication History

See Page 2700.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 007.005.03.1 | Weld Type | SAW |
| Base Metal Thickness | 40 mm | Welding Position | Downhand IG |
| Preheat Temperature | * | Metal Gap | 0 mm |
| Interpass Temperature | * | Passes | 10 |
| Filler Specification | PFH-60A | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | 4 mm |
| Shielding Gas | * | Voltage | 32 volts |
| Amperage | 630 amps | Polarity | * |
| Travel Speed | 30 cm/min | Heat Input/Pass | 40.5 KJ/cm |
| Joint Preparation | U Groove | Number of Sides | 1 |
| Location wrt Weld | 1mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | US-43 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | -80 | 4.0 | 30 |
| T-L ○ | -80 | 5.1 | 30 |
| T-L ○ | -80 | 5.7 | 30 |
| T-L ○ | -60 | 14.0 | 70 |
| T-L ○ | -60 | 9.0 | 50 |
| T-L ○ | -60 | 9.9 | 55 |
| T-L ○ | -40 | 17.0 | 80 |
| T-L ○ | -40 | 18.7 | 100 |
| T-L ○ | -40 | 19.4 | 100 |
| T-L ○ | -30 | 16.7 | 95 |
| T-L ○ | -30 | 19.2 | 100 |
| T-L ○ | -30 | 21.3 | 100 |
| T-L ○ | -20 | 17.3 | 100 |
| T-L ○ | -20 | 17.5 | 90 |
| T-L ○ | -20 | 18.5 | 100 |
| T-L ○ | -10 | 18.4 | 100 |
| T-L ○ | -10 | 19.9 | 100 |
| T-L ○ | -10 | 20.6 | 100 |
| T-L ○ | 0 | 17.0 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | 0 | 17.5 | 100 |
| T-L ○ | 0 | 19.9 | 85 |

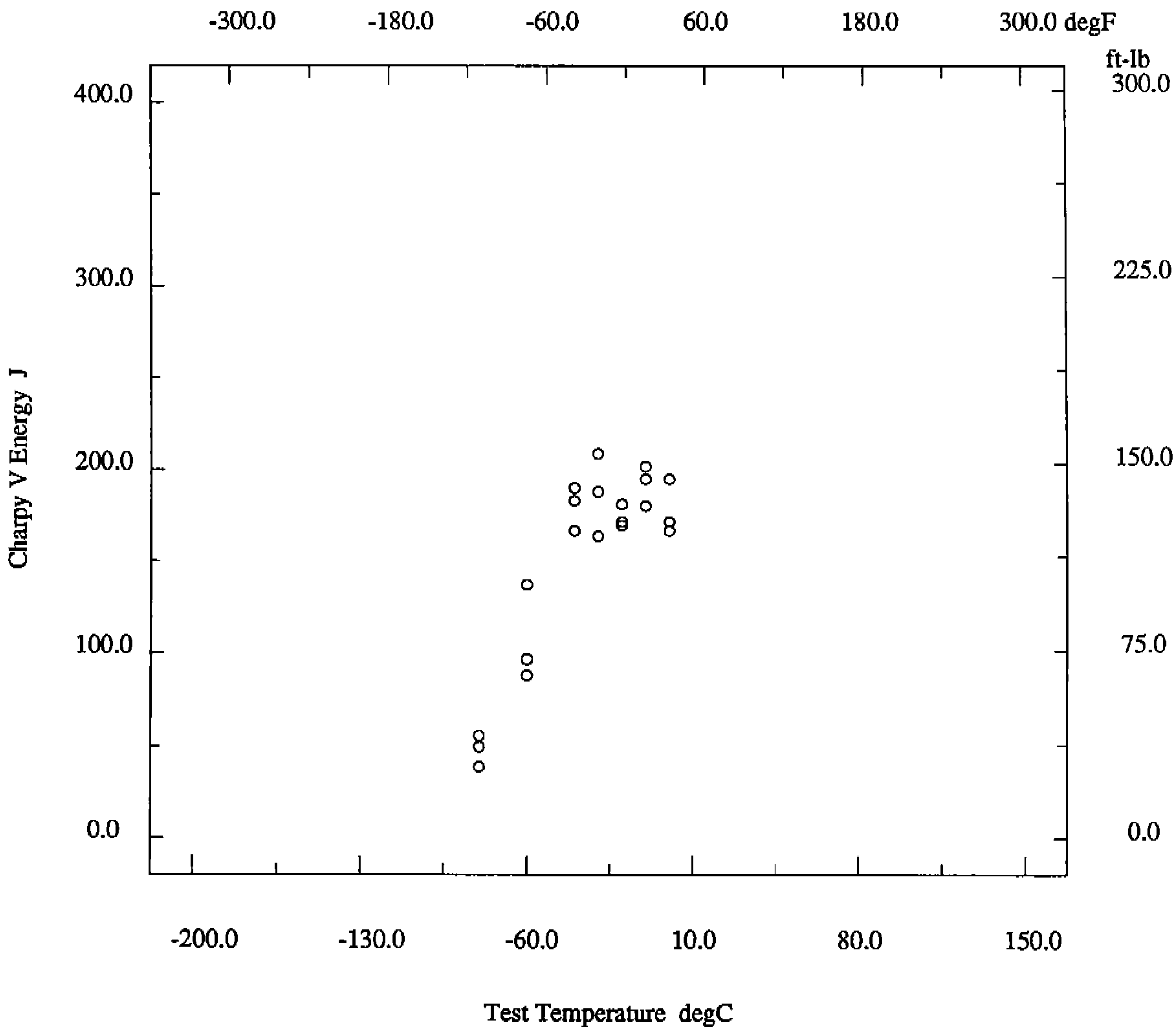
* - not reported

## Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.005.03.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.005.04.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |

## Composition

See Page 2700.1

## Fabrication History

See Page 2700.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 007.005.04.1 | Weld Type | SAW |
| Base Metal Thickness | 40 mm | Welding Position | Downhand IG |
| Preheat Temperature | * | Metal Gap | 0 mm |
| Interpass Temperature | * | Passes | 10 |
| Filler Specification | PFH-60A | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | 4 mm |
| Shielding Gas | * | Voltage | 32 volts |
| Amperage | 630 amps | Polarity | * |
| Travel Speed | 30 cm/min | Heat Input/Pass | 40.5 KJ/cm |
| Joint Preparation | U Groove | Number of Sides | 1 |
| Location wrt Weld | 3mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | US-43 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | -80 | 1.7 | 20 |
| T-L ○ | -80 | 2.0 | 20 |
| T-L ○ | -80 | 4.4 | 25 |
| T-L ○ | -60 | 12.1 | 70 |
| T-L ○ | -60 | 4.7 | 30 |
| T-L ○ | -60 | 6.9 | 35 |
| T-L ○ | -40 | 12.1 | 70 |
| T-L ○ | -40 | 17.2 | 75 |
| T-L ○ | -40 | 18.4 | 100 |
| T-L ○ | -30 | 17.5 | 85 |
| T-L ○ | -30 | 18.4 | 100 |
| T-L ○ | -30 | 18.7 | 100 |
| T-L ○ | -20 | 16.8 | 100 |
| T-L ○ | -20 | 17.3 | 100 |
| T-L ○ | -20 | 18.7 | 100 |
| T-L ○ | -10 | 17.0 | 100 |
| T-L ○ | -10 | 17.2 | 100 |
| T-L ○ | -10 | 19.6 | 100 |
| T-L ○ | 0 | 16.7 | 100 |

(continued)

* - not reported

(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | 0 | 17.5 | 100 |
| T-L ○ | 0 | 19.2 | 100 |

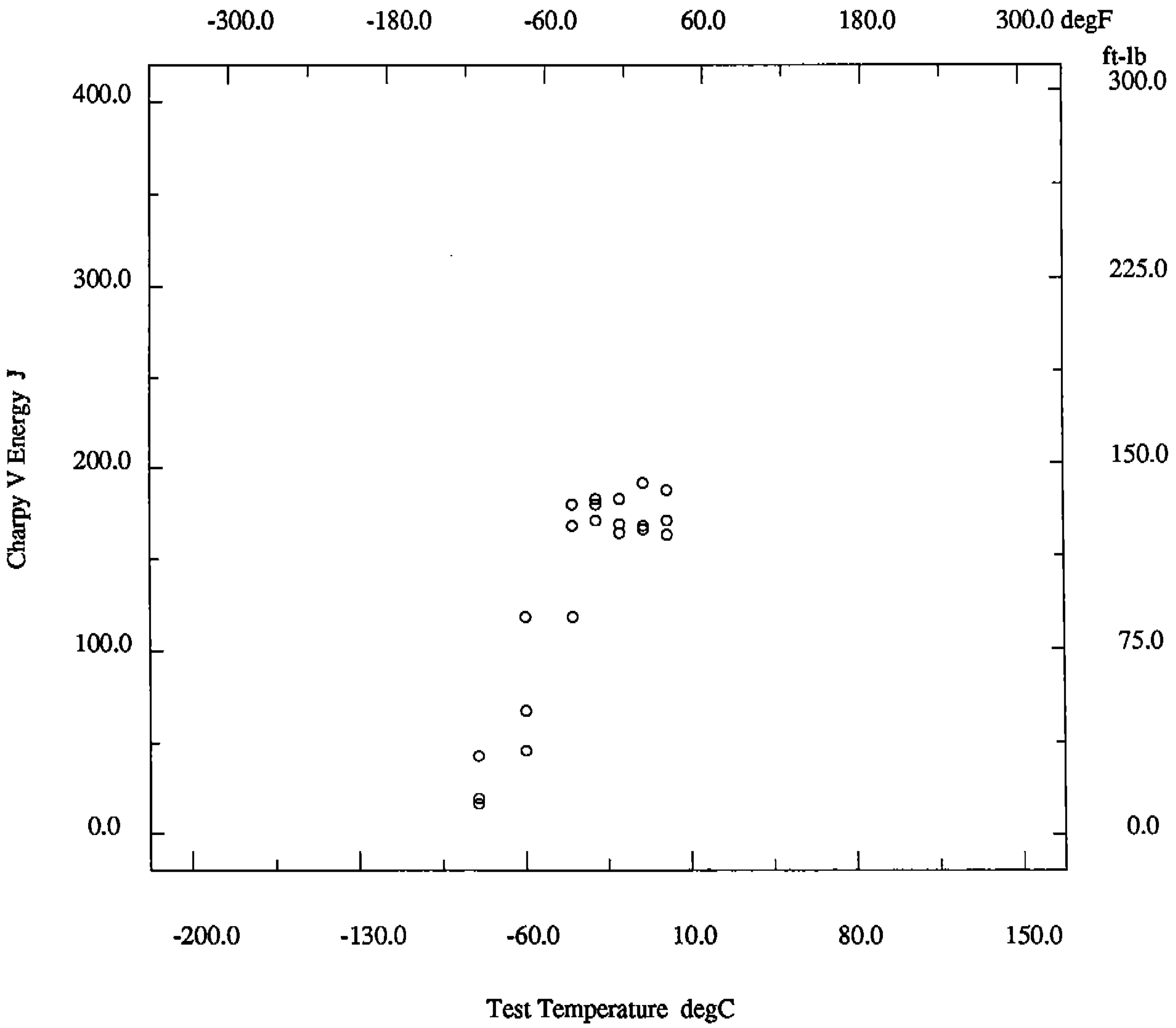
* - not reported

## Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.005.04.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.005.05.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |

## Composition

See Page 2700.1

## Fabrication History

See Page 2700.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 007.005.05.1 | Weld Type | SAW |
| Base Metal Thickness | 40 mm | Welding Position | Downhand IG |
| Preheat Temperature | * | Metal Gap | 0 mm |
| Interpass Temperature | * | Passes | 10 |
| Filler Specification | PFH-60A | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | 4 mm |
| Shielding Gas | * | Voltage | 32 volts |
| Amperage | 630 amps | Polarity | * |
| Travel Speed | 30 cm/min | Heat Input/Pass | 40.5 KJ/cm |
| Joint Preparation | U Groove | Number of Sides | 1 |
| Location wrt Weld | 5mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | US-43 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | -80 | 1.4 | 25 |
| T-L ○ | -80 | 2.2 | 25 |
| T-L ○ | -80 | 3.8 | 25 |
| T-L ○ | -60 | 14.9 | 75 |
| T-L ○ | -60 | 7.6 | 40 |
| T-L ○ | -60 | 8.6 | 30 |
| T-L ○ | -40 | 19.4 | 100 |
| T-L ○ | -40 | 19.4 | 100 |
| T-L ○ | -40 | 20.1 | 100 |
| T-L ○ | -30 | 18.7 | 100 |
| T-L ○ | -30 | 19.4 | 100 |
| T-L ○ | -30 | 20.6 | 100 |
| T-L ○ | -20 | 17.0 | 100 |
| T-L ○ | -20 | 19.7 | 100 |
| T-L ○ | -20 | 23.6 | 100 |
| T-L ○ | -10 | 19.2 | 100 |
| T-L ○ | -10 | 21.3 | 100 |
| T-L ○ | -10 | 22.3 | 100 |
| T-L ○ | 0 | 19.6 | 100 |

(continued)

* - not reported

(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | 0 | 21.6 | 100 |
| T-L ○ | 0 | 22.8 | 100 |

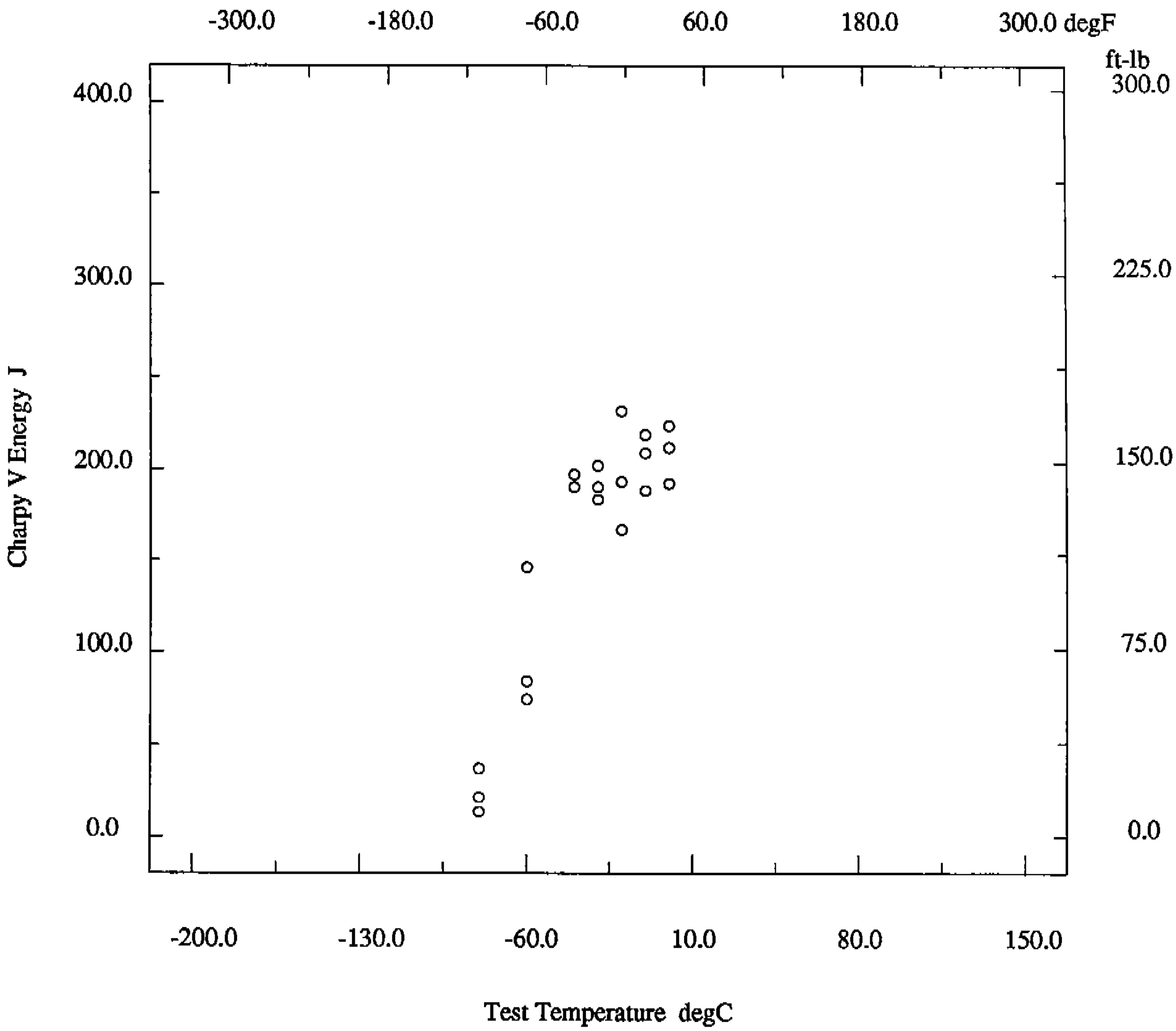
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.005.05.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.005.06.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |

## Composition

See Page 2700.1

## Fabrication History

See Page 2700.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 007.005.06.1 | Weld Type | SAW |
| Base Metal Thickness | 40 mm | Welding Position | Downhand IG |
| Preheat Temperature | * | Metal Gap | 0 mm |
| Interpass Temperature | * | Passes | 10 |
| Filler Specification | PFH-60A | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | 4 mm |
| Shielding Gas | * | Voltage | 32 volts |
| Amperage | 630 amps | Polarity | * |
| Travel Speed | 30 cm/min | Heat Input/Pass | 40.5 KJ/cm |
| Joint Preparation | U Groove | Number of Sides | 1 |
| Location wrt Weld | 7mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | US-43 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | -80 | 3.3 | 25 |
| T-L ○ | -80 | 3.4 | 25 |
| T-L ○ | -80 | 5.7 | 30 |
| T-L ○ | -60 | 4.8 | 30 |
| T-L ○ | -60 | 7.2 | 30 |
| T-L ○ | -60 | 7.2 | 35 |
| T-L ○ | -40 | 20.6 | 100 |
| T-L ○ | -40 | 20.9 | 100 |
| T-L ○ | -40 | 20.9 | 100 |
| T-L ○ | -30 | 19.6 | 100 |
| T-L ○ | -30 | 19.9 | 100 |
| T-L ○ | -30 | 20.9 | 100 |
| T-L ○ | -20 | 19.7 | 100 |
| T-L ○ | -20 | 19.9 | 100 |
| T-L ○ | -20 | 20.7 | 100 |
| T-L ○ | -10 | 20.1 | 100 |
| T-L ○ | -10 | 22.3 | 100 |
| T-L ○ | -10 | 24.8 | 100 |
| T-L ○ | 0 | 18.2 | 100 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

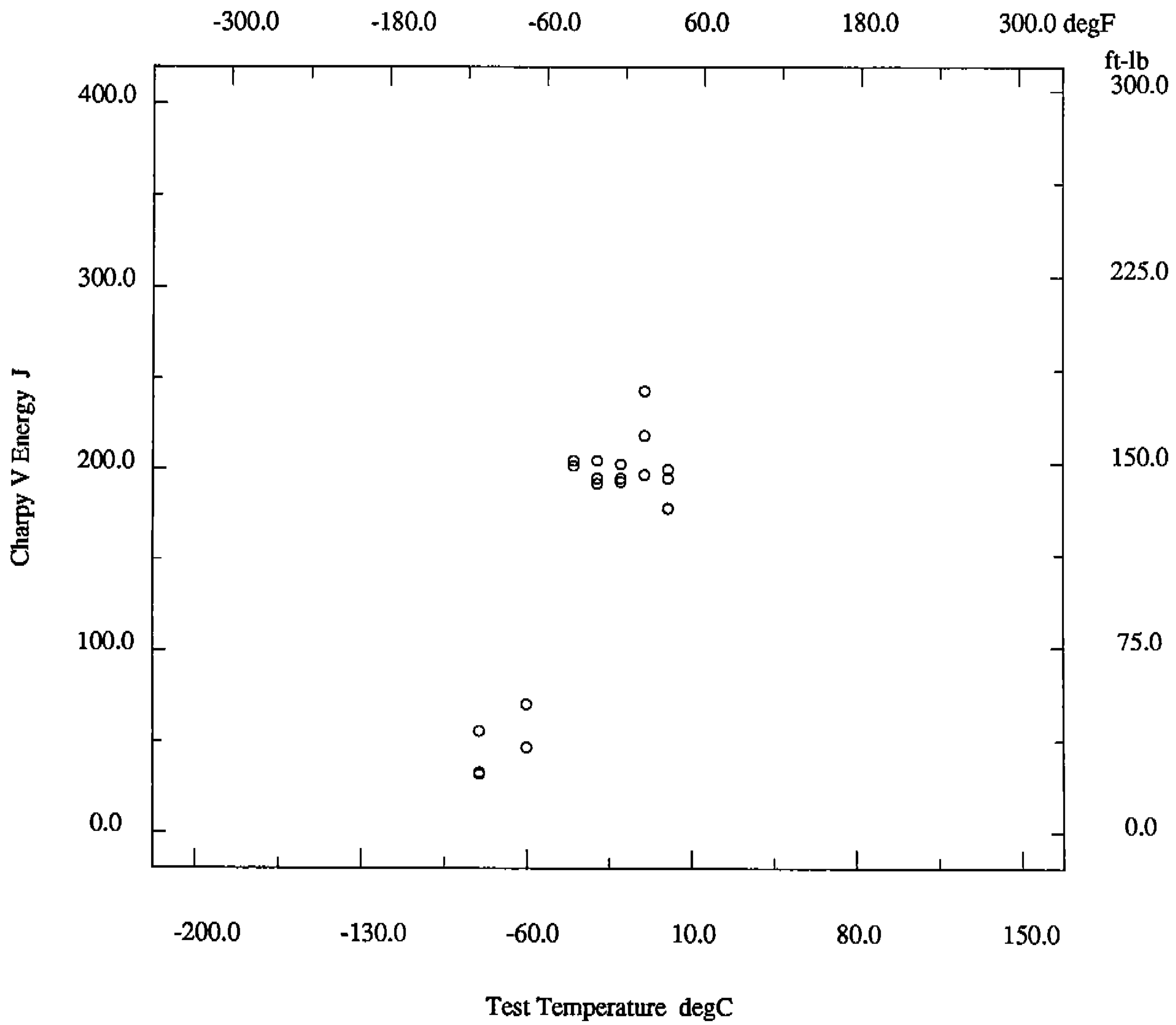
| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | 0 | 19.9 | 100 |
| T-L ○ | 0 | 20.4 | 100 |

* - not reported

## Material ABS-EH36



| Description | | | |
|---|---|---|---|
| Material Code | 007.005.06.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.005.09.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |

## Composition

See Page 2700.1

## Fabrication History

See Page 2700.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 007.005.09.1 | Weld Type | SAW |
| Base Metal Thickness | 40 mm | Welding Position | Downhand IG |
| Preheat Temperature | * | Metal Gap | 0 mm |
| Interpass Temperature | * | Passes | 10 |
| Filler Specification | PFH-60A | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | 4 mm |
| Shielding Gas | * | Voltage | 32 volts |
| Amperage | 630 amps | Polarity | * |
| Travel Speed | 30 cm/min | Heat Input/Pass | 40.5 KJ/cm |
| Joint Preparation | U Groove | Number of Sides | 1 |
| Location wrt Weld | 11mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | US-43 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | -80 | 0.7 | 10 |
| T-L ○ | -80 | 0.7 | 10 |
| T-L ○ | -80 | 1.2 | 10 |
| T-L ○ | -60 | 0.8 | 15 |
| T-L ○ | -60 | 1.4 | 10 |
| T-L ○ | -60 | 2.1 | 15 |
| T-L ○ | -40 | 2.6 | 40 |
| T-L ○ | -40 | 6.3 | 50 |
| T-L ○ | -40 | 8.0 | 60 |
| T-L ○ | -30 | 3.6 | 40 |
| T-L ○ | -30 | 5.1 | 45 |
| T-L ○ | -30 | 8.1 | 60 |
| T-L ○ | -20 | 11.7 | 75 |
| T-L ○ | -20 | 16.3 | 85 |
| T-L ○ | -20 | 7.2 | 60 |
| T-L ○ | -10 | 13.9 | 85 |
| T-L ○ | -10 | 18.0 | 90 |
| T-L ○ | -10 | 9.0 | 70 |
| T-L ○ | 0 | 14.4 | 90 |

(continued)

* - not reported

# Material ABS-EH36



(continued)

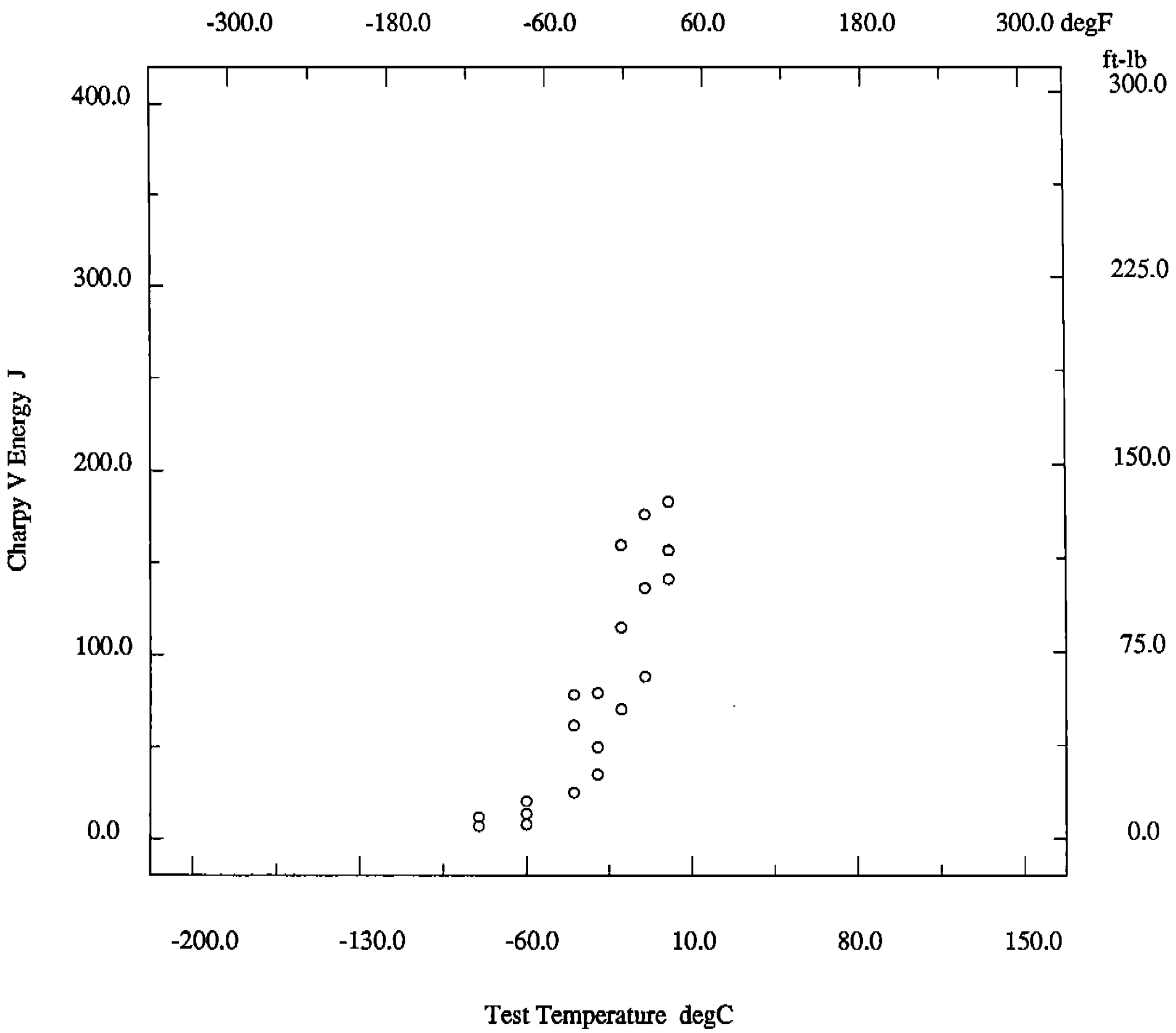
| Orien | Test Temp degC | CVN Energy kgf-m | Shear % |
|---|---|---|---|
| T-L ○ | 0 | 16.0 | 90 |
| T-L ○ | 0 | 18.7 | 95 |

* - not reported

# Material ABS-EH36



| **Description** | | | |
|---|---|---|---|
| Material Code | 007.005.09.1 | Material Name | ABS-EH36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 40 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | G9837 |
| Reference | 007-1 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.007.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K22-6296 |
| Reference | 007-4 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 1.50 % |
| P | 0.020 % | S | 0.006 % |
| Si | 0.35 % | Cr | 0.03 % |
| Ni | 0.01 % | Mo | 0.01 % |
| V | 0.07 % | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.023 % |
| N | 0.0061 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,N | Producer | Sumitomo |
| Year Produced | 1972 | Addl Info | No |
| Source | Sumitomo | Melting Practice | * |
| Ingot Position | Concast | Killing Process | Al-killed |
| Process Temperature | 1010 degC | Process Time | * |
| Rolling Conditions | 83 % | Final Processing | N |
| Final Temperature | 910 degC | Final Time | 1.33 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | 1/4T |
| Specimen Type | Round | Specimen Thickness | * |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| T | 20 | 52.5 | 37.8 | 31.4 |
| T | 20 | 52.8 | 37.5 | 32.1 |

* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.007.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | K22-6296 |
| Reference | 007-4 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 1.51 % |
| P | 0.021 % | S | 0.007 % |
| Si | 0.35 % | Cr | 0.02 % |
| Ni | 0.01 % | Mo | 0.01 % |
| V | 0.06 % | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.022 % |
| N | 0.0060 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F | Producer | Sumitomo |
| Year Produced | 1972 | Addl Info | No |
| Source | Sumitomo | Melting Practice | * |
| Ingot Position | Concast | Killing Process | Al-killed |
| Process Temperature | 1010 degC | Process Time | * |
| Rolling Conditions | 83 % | Final Processing | N |
| Final Temperature | 910 degC | Final Time | 1.33 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | 1/4T |
| Specimen Type | Round | Specimen Thickness | * |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| T | 20 | 52.2 | 37.0 | 31.7 |
| T | 20 | 52.3 | 37.1 | 31.4 |

* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.007.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K22-6296 |
| Reference | 007-4 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 1.50 % |
| P | 0.020 % | S | 0.006 % |
| Si | 0.35 % | Cr | 0.03 % |
| Ni | 0.01 % | Mo | 0.01 % |
| V | 0.07 % | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.023 % |
| N | 0.0061 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F,N | Producer | Sumitomo |
| Year Produced | 1972 | Addl Info | No |
| Source | Sumitomo | Melting Practice | * |
| Ingot Position | Concast | Killing Process | Al-killed |
| Process Temperature | 1010 degC | Process Time | * |
| Rolling Conditions | 83 % | Final Processing | N |
| Final Temperature | 910 degC | Final Time | 1.33 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | 1/4T |
| Specimen Type | Full | Lateral Expansion | * |
| Did Specimen Split? | * | Standard Method | ABS Sec43 |
| Standard Year | * | | |

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % | Fracture? |
|---|---|---|---|---|
| L-T o | -120 | 0.7 | 2 | Yes |
| L-T o | -120 | 1.2 | 2 | Yes |
| L-T o | -120 | 2.1 | 3 | Yes |
| L-T o | -100 | 0.9 | 3 | Yes |
| L-T o | -100 | 5.9 | 16 | Yes |
| L-T o | -100 | 6.6 | 16 | Yes |
| L-T o | -80 | 13.9 | 41 | Yes |
| L-T o | -80 | 15.8 | 47 | Yes |
| L-T o | -80 | 9.4 | 31 | Yes |
| L-T o | -60 | 23.9 | 79 | Yes |
| L-T o | -60 | 29.8 | 100 | Yes |
| L-T o | -60 | 30.0 | * | No |
| L-T o | -50 | 29.5 | 100 | Yes |
| L-T o | -50 | 30.0 | * | No |
| L-T o | -50 | 30.0 | * | No |
| L-T o | -40 | 29.6 | 100 | Yes |
| L-T o | -40 | 30.0 | * | No |

(continued)

* - not reported

# Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % | Fracture? |
|---|---|---|---|---|
| L-T ○ | -40 | 30.0 | * | No |
| L-T ○ | -30 | 29.3 | 100 | Yes |
| L-T ○ | -30 | 30.0 | * | No |
| L-T ○ | -30 | 30.0 | * | No |
| L-T ○ | -20 | 30.0 | * | No |
| L-T ○ | -20 | 30.0 | * | No |
| L-T ○ | -20 | 30.0 | * | No |
| L-T ○ | 0 | 30.0 | * | No |
| L-T ○ | 0 | 30.0 | * | No |
| L-T ○ | 0 | 30.0 | * | No |
| L-T ○ | 20 | 30.0 | * | No |
| L-T ○ | 20 | 30.0 | * | No |
| L-T ○ | 20 | 30.0 | * | No |
| T-L △ | -120 | 0.6 | 2 | Yes |
| T-L △ | -120 | 0.8 | 3 | Yes |
| T-L △ | -120 | 1.2 | 3 | Yes |
| T-L △ | -100 | 4.7 | 12 | Yes |
| T-L △ | -100 | 5.3 | 12 | Yes |
| T-L △ | -100 | 5.4 | 12 | Yes |
| T-L △ | -80 | 10.6 | 31 | Yes |
| T-L △ | -80 | 15.2 | 47 | Yes |
| T-L △ | -80 | 8.9 | 25 | Yes |
| T-L △ | -60 | 17.0 | 58 | Yes |
| T-L △ | -60 | 18.6 | 63 | Yes |
| T-L △ | -60 | 27.5 | 100 | Yes |
| T-L △ | -50 | 17.0 | 59 | Yes |
| T-L △ | -50 | 18.0 | 66 | Yes |
| T-L △ | -50 | 26.4 | 100 | Yes |
| T-L △ | -40 | 26.8 | 100 | Yes |
| T-L △ | -40 | 27.6 | 100 | Yes |
| T-L △ | -40 | 27.9 | 100 | Yes |
| T-L △ | -30 | 28.9 | 100 | Yes |
| T-L △ | -30 | 29.2 | 100 | Yes |
| T-L △ | -30 | 30.0 | * | No |
| T-L △ | -20 | 26.7 | 100 | Yes |
| T-L △ | -20 | 27.2 | 100 | Yes |
| T-L △ | -20 | 29.2 | 100 | Yes |
| T-L △ | 0 | 26.4 | 100 | Yes |
| T-L △ | 0 | 27.7 | 100 | Yes |
| T-L △ | 0 | 30.0 | * | No |
| T-L △ | 20 | 24.7 | 100 | Yes |
| T-L △ | 20 | 27.1 | 100 | Yes |
| T-L △ | 20 | 29.9 | 100 | Yes |

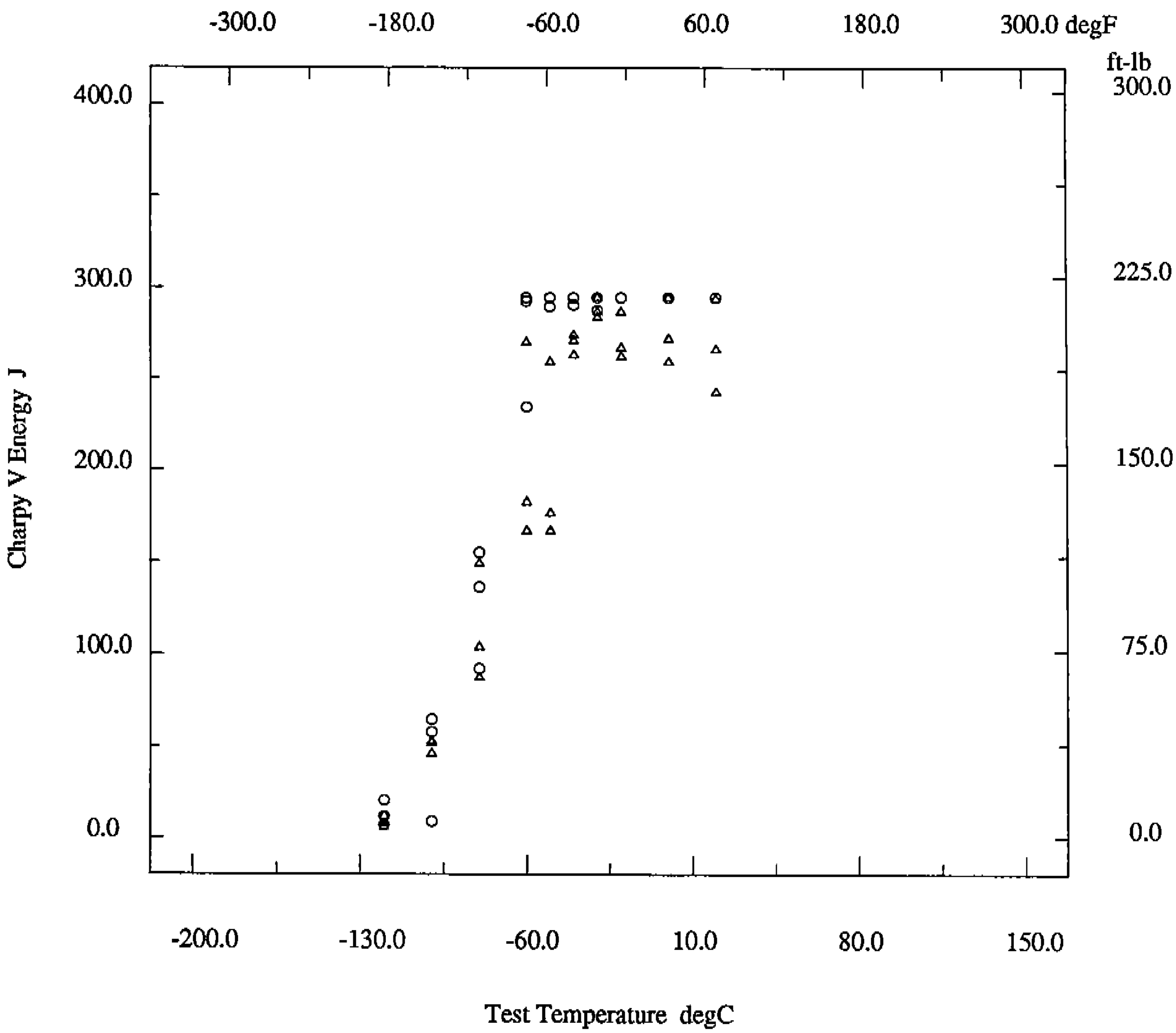
* - not reported

## Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.007.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K22-6296 |
| Reference | 007-4 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.007.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | K22-6296 |
| Reference | 007-4 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 1.51 % |
| P | 0.021 % | S | 0.007 % |
| Si | 0.35 % | Cr | 0.02 % |
| Ni | 0.01 % | Mo | 0.01 % |
| V | 0.06 % | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.022 % |
| N | 0.0060 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F | Producer | Sumitomo |
| Year Produced | 1972 | Addl Info | No |
| Source | Sumitomo | Melting Practice | * |
| Ingot Position | Concast | Killing Process | Al-killed |
| Process Temperature | 1010 degC | Process Time | * |
| Rolling Conditions | 83 % | Final Processing | N |
| Final Temperature | 910 degC | Final Time | 1.33 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | 1/4T |
| Specimen Type | Full | Lateral Expansion | * |
| Did Specimen Split? | * | Standard Method | ABS Sec43 |
| Standard Year | * | | |

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % | Fracture? |
|---|---|---|---|---|
| L-T ○ | -120 | 1.0 | 2 | Yes |
| L-T ○ | -120 | 1.0 | 2 | Yes |
| L-T ○ | -120 | 1.3 | 3 | Yes |
| L-T ○ | -100 | 1.7 | 5 | Yes |
| L-T ○ | -100 | 1.9 | 6 | Yes |
| L-T ○ | -100 | 3.3 | 9 | Yes |
| L-T ○ | -80 | 11.7 | 35 | Yes |
| L-T ○ | -80 | 19.2 | 66 | Yes |
| L-T ○ | -80 | 6.5 | 21 | Yes |
| L-T ○ | -60 | 24.8 | 100 | Yes |
| L-T ○ | -60 | 30.0 | * | No |
| L-T ○ | -60 | 30.0 | * | No |
| L-T ○ | -50 | 27.6 | 100 | Yes |
| L-T ○ | -50 | 28.1 | 100 | Yes |
| L-T ○ | -50 | 30.0 | * | No |
| L-T ○ | -40 | 30.0 | * | No |
| L-T ○ | -40 | 30.0 | * | No |

(continued)

* - not reported

(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % | Fracture? |
|---|---|---|---|---|
| L-T ○ | -40 | 30.0 | * | No |
| L-T ○ | -30 | 30.0 | * | No |
| L-T ○ | -30 | 30.0 | * | No |
| L-T ○ | -30 | 30.0 | * | No |
| L-T ○ | -20 | 30.0 | * | No |
| L-T ○ | -20 | 30.0 | * | No |
| L-T ○ | -20 | 30.0 | * | No |
| L-T ○ | 0 | 30.0 | * | No |
| L-T ○ | 0 | 30.0 | * | No |
| L-T ○ | 0 | 30.0 | * | No |
| L-T ○ | 20 | 30.0 | * | No |
| L-T ○ | 20 | 30.0 | * | No |
| L-T ○ | 20 | 30.0 | * | No |
| T-L △ | -120 | 0.2 | 0 | Yes |
| T-L △ | -120 | 0.4 | 0 | Yes |
| T-L △ | -120 | 1.3 | 2 | Yes |
| T-L △ | -100 | 2.7 | 6 | Yes |
| T-L △ | -100 | 2.9 | 6 | Yes |
| T-L △ | -100 | 3.6 | 6 | Yes |
| T-L △ | -80 | 11.4 | 33 | Yes |
| T-L △ | -80 | 7.0 | 25 | Yes |
| T-L △ | -80 | 7.9 | 30 | Yes |
| T-L △ | -60 | 13.7 | 41 | Yes |
| T-L △ | -60 | 16.9 | 54 | Yes |
| T-L △ | -60 | 18.3 | 66 | Yes |
| T-L △ | -50 | 18.9 | 62 | Yes |
| T-L △ | -50 | 19.0 | 100 | Yes |
| T-L △ | -50 | 24.6 | 69 | Yes |
| T-L △ | -40 | 18.7 | 76 | Yes |
| T-L △ | -40 | 28.0 | 100 | Yes |
| T-L △ | -40 | 30.0 | * | No |
| T-L △ | -30 | 19.4 | 75 | Yes |
| T-L △ | -30 | 30.0 | * | No |
| T-L △ | -30 | 30.0 | * | No |
| T-L △ | -20 | 29.2 | 100 | Yes |
| T-L △ | -20 | 30.0 | 100 | Yes |
| T-L △ | -20 | 30.0 | * | No |
| T-L △ | 0 | 26.8 | 100 | Yes |
| T-L △ | 0 | 28.9 | 100 | Yes |
| T-L △ | 0 | 30.0 | * | No |
| T-L △ | 20 | 29.9 | 100 | Yes |
| T-L △ | 20 | 30.0 | * | No |
| T-L △ | 20 | 30.0 | * | No |

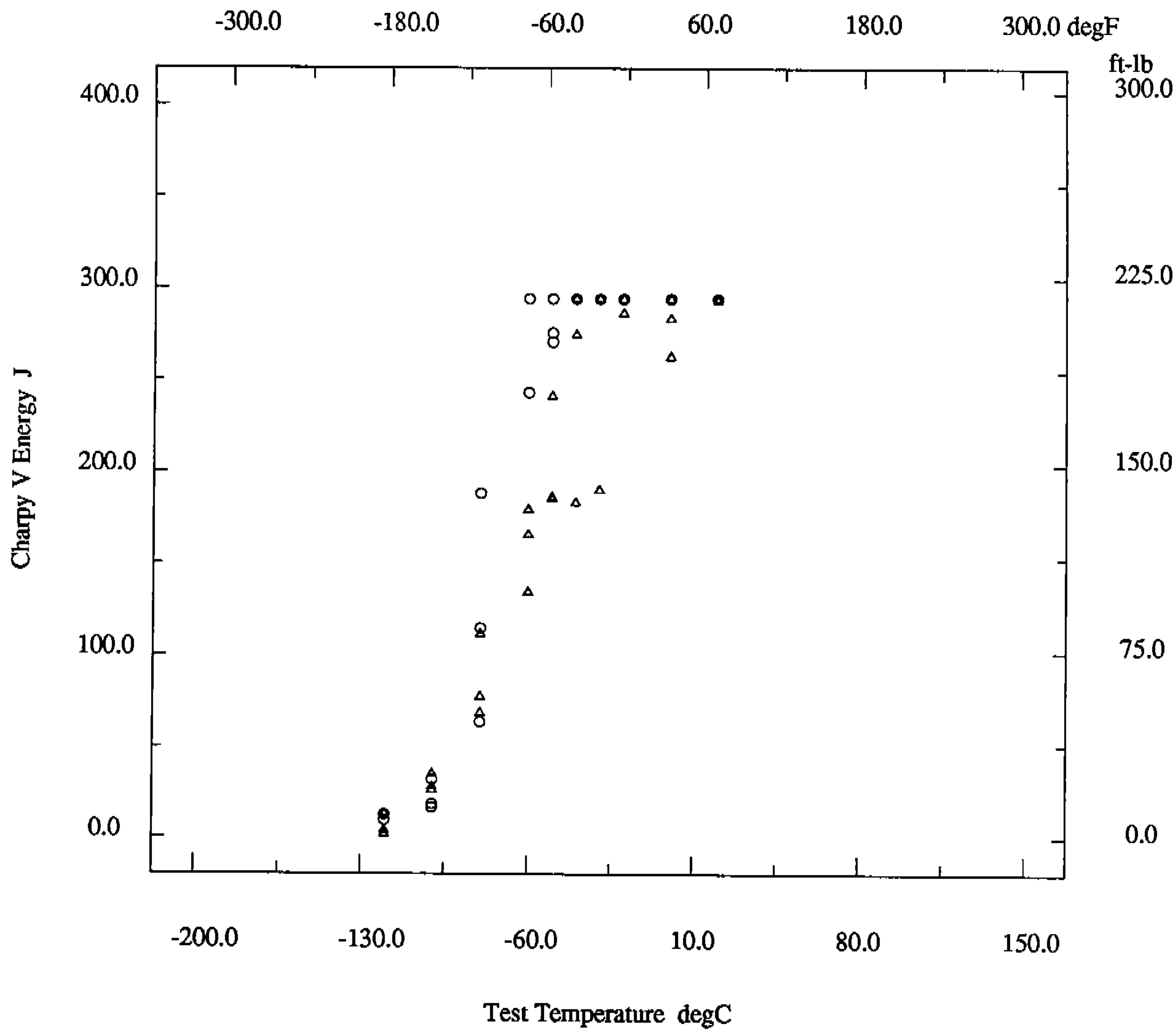
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.007.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | K22-6296 |
| Reference | 007-4 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.008.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K21-7102 |
| Reference | 007-4 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.16 % | Mn | 1.51 % |
| P | 0.020 % | S | 0.009 % |
| Si | 0.33 % | Cr | 0.02 % |
| Ni | 0.01 % | Mo | 0.01 % |
| V | * | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.025 % |
| N | 0.0051 % | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F | Producer | Sumitomo |
| Year Produced | 1972 | Addl Info | No |
| Source | Sumitomo | Melting Practice | * |
| Ingot Position | Concast | Killing Process | Al-killed |
| Process Temperature | 1035 degC | Process Time | * |
| Rolling Conditions | 83 % | Final Processing | N |
| Final Temperature | 910 degC | Final Time | 1.33 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | 1/4T |
| Specimen Type | Round | Specimen Thickness | * |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| T | 20 | 53.3 | 37.1 | 31.3 |
| T | 20 | 53.4 | 37.2 | 31.6 |

* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.008.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | K21-7102 |
| Reference | 007-4 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.15 % | Mn | 1.49 % |
| P | 0.018 % | S | 0.010 % |
| Si | 0.32 % | Cr | 0.02 % |
| Ni | 0.01 % | Mo | 0.01 % |
| V | * | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.033 % |
| N | 0.0050 % | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F | Producer | Sumitomo |
| Year Produced | 1972 | Addl Info | No |
| Source | Sumitomo | Melting Practice | * |
| Ingot Position | Concast | Killing Process | Al-killed |
| Process Temperature | 1030 degC | Process Time | * |
| Rolling Conditions | 83 % | Final Processing | N |
| Final Temperature | 910 degC | Final Time | 1.33 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | 1/4T |
| Specimen Type | Round | Specimen Thickness | * |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| T | 20 | 52.9 | 37.9 | 33.3 |
| T | 20 | 53.0 | 38.0 | 34.0 |

* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.008.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K21-7102 |
| Reference | 007-4 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.16 % | Mn | 1.51 % |
| P | 0.020 % | S | 0.009 % |
| Si | 0.33 % | Cr | 0.02 % |
| Ni | 0.01 % | Mo | 0.01 % |
| V | * | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.025 % |
| N | 0.0051 % | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F | Producer | Sumitomo |
| Year Produced | 1972 | Addl Info | No |
| Source | Sumitomo | Melting Practice | * |
| Ingot Position | Concast | Killing Process | Al-killed |
| Process Temperature | 1035 degC | Process Time | * |
| Rolling Conditions | 83 % | Final Processing | N |
| Final Temperature | 910 degC | Final Time | 1.33 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | 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 | ABS Sec43 |
| Standard Year | * | | |

| Orien | Test Temp degC | CVN Energy kgf-m |
|---|---|---|
| L-T ○ | -60 | 5.9 |
| L-T ○ | -60 | 7.7 |
| L-T ○ | -60 | 8.3 |
| L-T ○ | -50 | 11.7 |
| L-T ○ | -50 | 8.0 |
| L-T ○ | -50 | 8.6 |
| L-T ○ | -40 | 12.0 |
| L-T ○ | -40 | 13.3 |
| L-T ○ | -40 | 15.3 |
| L-T ○ | -30 | 11.4 |
| L-T ○ | -30 | 12.6 |
| L-T ○ | -30 | 18.9 |
| L-T ○ | -20 | 14.3 |
| L-T ○ | -20 | 16.3 |
| L-T ○ | -20 | 16.8 |
| L-T ○ | -15 | 17.2 |

(continued)

* - not reported

## Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m |
|---|---|---|
| L-T ○ | -15 | 19.2 |
| L-T ○ | -15 | 19.7 |
| L-T ○ | 0 | 18.5 |
| L-T ○ | 0 | 20.1 |
| L-T ○ | 0 | 22.6 |
| L-T ○ | 20 | 22.4 |
| L-T ○ | 20 | 22.5 |
| L-T ○ | 20 | 22.8 |
| L-T ○ | 40 | 19.3 |
| L-T ○ | 40 | 19.9 |
| L-T ○ | 40 | 20.4 |
| T-L △ | -60 | 3.8 |
| T-L △ | -60 | 4.4 |
| T-L △ | -60 | 4.6 |
| T-L △ | -50 | 5.1 |
| T-L △ | -50 | 5.4 |
| T-L △ | -50 | 7.5 |
| T-L △ | -40 | 6.9 |
| T-L △ | -40 | 7.3 |
| T-L △ | -40 | 8.4 |
| T-L △ | -30 | 11.3 |
| T-L △ | -30 | 11.5 |
| T-L △ | -30 | 9.1 |
| T-L △ | -20 | 11.9 |
| T-L △ | -20 | 5.7 |
| T-L △ | -20 | 8.5 |
| T-L △ | -15 | 10.5 |
| T-L △ | -15 | 11.5 |
| T-L △ | -15 | 11.9 |
| T-L △ | 0 | 13.2 |
| T-L △ | 0 | 14.1 |
| T-L △ | 0 | 15.2 |
| T-L △ | 20 | 16.1 |
| T-L △ | 20 | 17.0 |
| T-L △ | 20 | 17.2 |
| T-L △ | 40 | 16.3 |
| T-L △ | 40 | 16.3 |
| T-L △ | 40 | 17.0 |

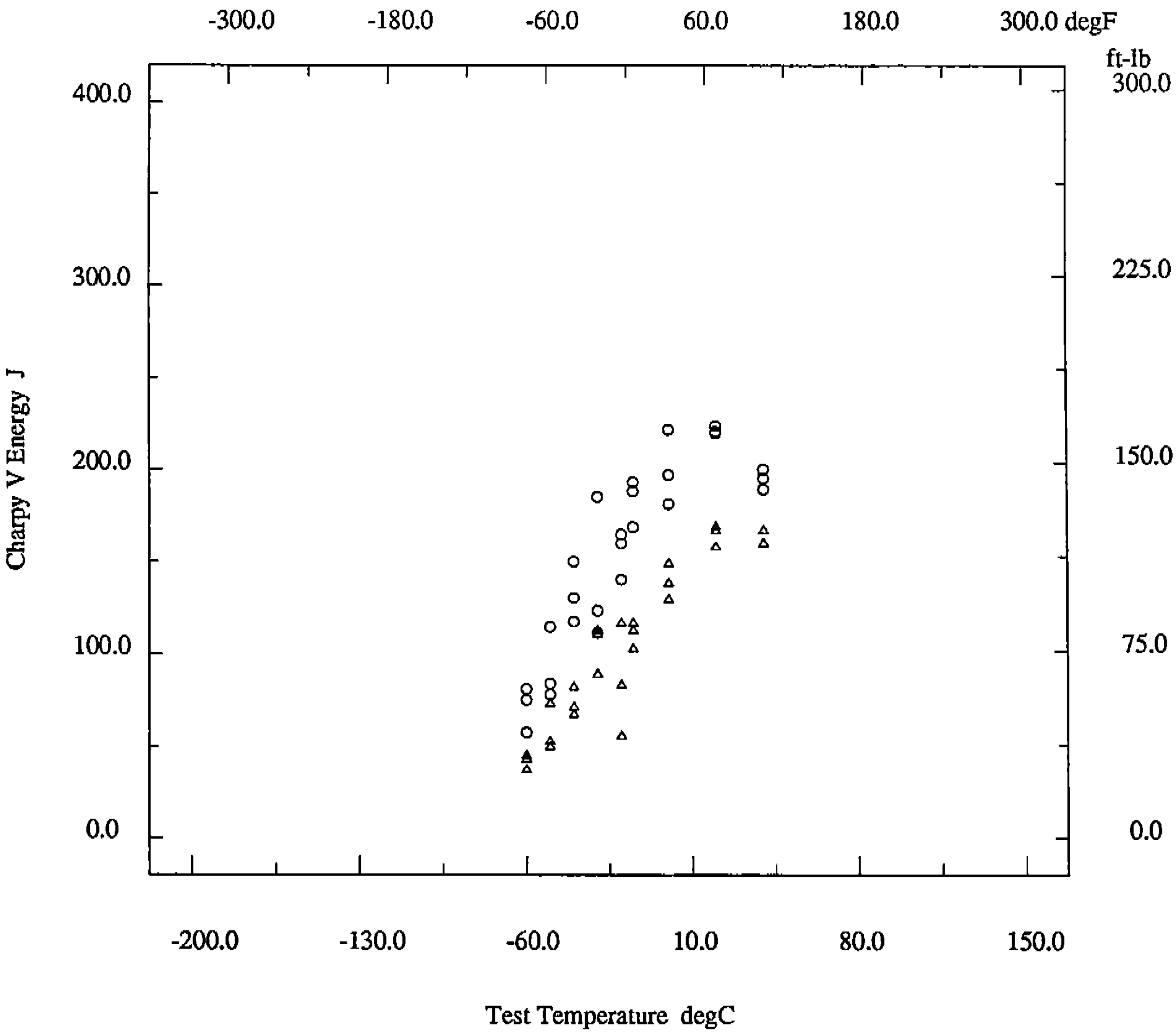
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.008.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | K21-7102 |
| Reference | 007-4 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.008.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | K21-7102 |
| Reference | 007-4 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.15 % | Mn | 1.49 % |
| P | 0.018 % | S | 0.010 % |
| Si | 0.32 % | Cr | 0.02 % |
| Ni | 0.01 % | Mo | 0.01 % |
| V | * | Cu | 0.02 % |
| Cb | * | Ti | * |
| B | * | Al | 0.033 % |
| N | 0.0050 % | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F | Producer | Sumitomo |
| Year Produced | 1972 | Addl Info | No |
| Source | Sumitomo | Melting Practice | * |
| Ingot Position | Concast | Killing Process | Al-killed |
| Process Temperature | 1030 degC | Process Time | * |
| Rolling Conditions | 83 % | Final Processing | N |
| Final Temperature | 910 degC | Final Time | 1.33 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | 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 | ABS Sec43 |
| Standard Year | * | | |

| Orien | Test Temp degC | CVN Energy kgf-m |
|---|---|---|
| L-T ○ | -60 | 10.7 |
| L-T ○ | -60 | 12.9 |
| L-T ○ | -60 | 14.5 |
| L-T ○ | -50 | 15.7 |
| L-T ○ | -50 | 16.1 |
| L-T ○ | -50 | 17.2 |
| L-T ○ | -40 | 14.7 |
| L-T ○ | -40 | 16.7 |
| L-T ○ | -40 | 17.2 |
| L-T ○ | -30 | 17.7 |
| L-T ○ | -30 | 19.6 |
| L-T ○ | -30 | 20.0 |
| L-T ○ | -20 | 17.9 |
| L-T ○ | -20 | 21.0 |
| L-T ○ | -20 | 22.0 |
| L-T ○ | -15 | 17.9 |

(continued)

* - not reported

(continued)

| Orien | Test Temp degC | CVN Energy kgf-m |
|---|---|---|
| L-T ○ | -15 | 19.5 |
| L-T ○ | -15 | 19.7 |
| L-T ○ | 0 | 19.6 |
| L-T ○ | 0 | 20.6 |
| L-T ○ | 0 | 20.9 |
| L-T ○ | 20 | 21.7 |
| L-T ○ | 20 | 22.5 |
| L-T ○ | 20 | 22.9 |
| L-T ○ | 40 | 19.6 |
| L-T ○ | 40 | 19.8 |
| L-T ○ | 40 | 19.8 |
| T-L △ | -60 | 5.9 |
| T-L △ | -60 | 6.5 |
| T-L △ | -60 | 7.0 |
| T-L △ | -50 | 6.6 |
| T-L △ | -50 | 6.8 |
| T-L △ | -50 | 8.1 |
| T-L △ | -40 | 10.0 |
| T-L △ | -40 | 8.8 |
| T-L △ | -40 | 9.4 |
| T-L △ | -30 | 11.0 |
| T-L △ | -30 | 11.7 |
| T-L △ | -30 | 13.2 |
| T-L △ | -20 | 16.5 |
| T-L △ | -20 | 16.5 |
| T-L △ | -20 | 17.1 |
| T-L △ | -15 | 11.3 |
| T-L △ | -15 | 16.1 |
| T-L △ | -15 | 17.5 |
| T-L △ | 0 | 16.7 |
| T-L △ | 0 | 16.9 |
| T-L △ | 0 | 17.0 |
| T-L △ | 20 | 16.6 |
| T-L △ | 20 | 17.0 |
| T-L △ | 20 | 17.1 |
| T-L △ | 40 | 16.4 |
| T-L △ | 40 | 16.7 |
| T-L △ | 40 | 16.8 |

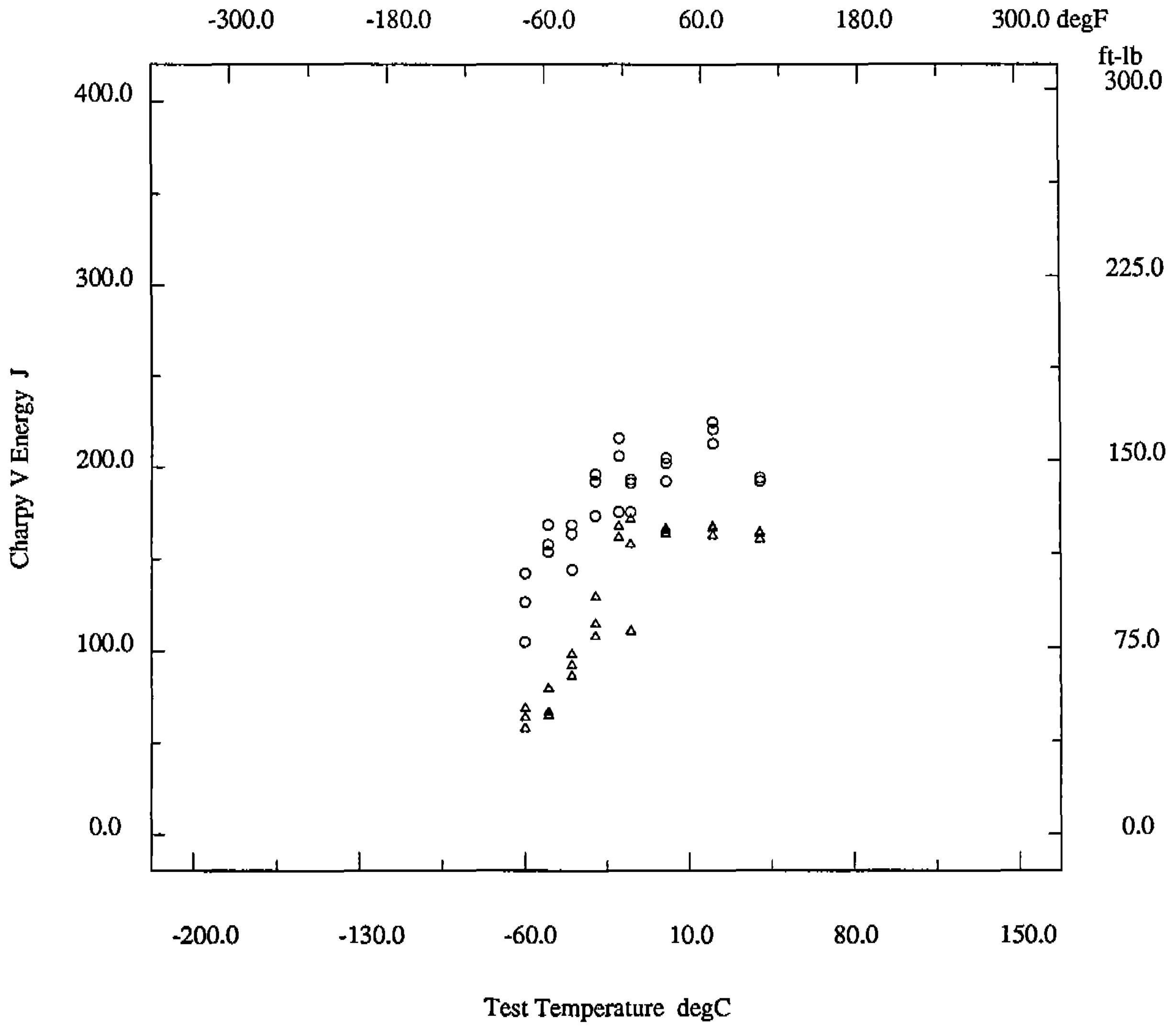
* - not reported

# Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.008.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | K21-7102 |
| Reference | 007-4 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.009.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | k21-6425 |
| Reference | 007-4 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 1.45 % |
| P | 0.015 % | S | 0.007 % |
| Si | 0.37 % | Cr | 0.02 % |
| Ni | 0.02 % | Mo | 0.01 % |
| V | * | Cu | 0.02 % |
| Cb | 0.019 % | Ti | * |
| B | * | Al | 0.029 % |
| N | 0.0065 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F | Producer | Sumitomo |
| Year Produced | 1972 | Addl Info | No |
| Source | Sumitomo | Melting Practice | * |
| Ingot Position | Concast | Killing Process | Al-killed |
| Process Temperature | 1005 degC | Process Time | * |
| Rolling Conditions | 83 % | Final Processing | N |
| Final Temperature | 910 degC | Final Time | 1.33 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | 1/4T |
| Specimen Type | Round | Specimen Thickness | * |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| T | 20 | 53.7 | 41.3 | 31.1 |
| T | 20 | 53.9 | 40.7 | 31.5 |

* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.009.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | k21-6425 |
| Reference | 007-4 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 1.42 % |
| P | 0.016 % | S | 0.007 % |
| Si | 0.36 % | Cr | 0.02 % |
| Ni | 0.01 % | Mo | 0.01 % |
| V | * | Cu | 0.02 % |
| Cb | 0.019 % | Ti | * |
| B | * | Al | 0.025 % |
| N | 0.0063 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F | Producer | Sumitomo |
| Year Produced | 1972 | Addl Info | No |
| Source | Sumitomo | Melting Practice | * |
| Ingot Position | Concast | Killing Process | Al-killed |
| Process Temperature | 1010 degC | Process Time | * |
| Rolling Conditions | 83 % | Final Processing | N |
| Final Temperature | 910 degC | Final Time | 1.33 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Tensile | Position | 1/4T |
| Specimen Type | Round | Specimen Thickness | * |
| Gage Length | * | Loading Rate | * |
| Tensile Strength Offset | * | Tensile Yield Strength | * |
| Uniform Elongation | * | Reduction in Area | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degC | UTS kgf/mm2 | TYP kgf/mm2 | Elongation % |
|---|---|---|---|---|
| T | 20 | 51.7 | 38.5 | 32.2 |
| T | 20 | 51.7 | 38.7 | 31.2 |

* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.009.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | k21-6425 |
| Reference | 007-4 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 1.45 % |
| P | 0.015 % | S | 0.007 % |
| Si | 0.37 % | Cr | 0.02 % |
| Ni | 0.02 % | Mo | 0.01 % |
| V | * | Cu | 0.02 % |
| Cb | 0.019 % | Ti | * |
| B | * | Al | 0.029 % |
| N | 0.0065 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F | Producer | Sumitomo |
| Year Produced | 1972 | Addl Info | No |
| Source | Sumitomo | Melting Practice | * |
| Ingot Position | Concast | Killing Process | Al-killed |
| Process Temperature | 1005 degC | Process Time | * |
| Rolling Conditions | 83 % | Final Processing | N |
| Final Temperature | 910 degC | Final Time | 1.33 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | 1/4T |
| Specimen Type | Full | Lateral Expansion | * |
| Did Specimen Split? | * | Standard Method | ABS Sec43 |
| Standard Year | * | | |

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % | Fracture? |
|---|---|---|---|---|
| L-T ○ | -80 | 19.0 | 66 | Yes |
| L-T ○ | -80 | 19.7 | 63 | Yes |
| L-T ○ | -80 | 20.9 | 76 | Yes |
| L-T ○ | -60 | 30.0 | * | No |
| L-T ○ | -60 | 30.0 | * | No |
| L-T ○ | -60 | 30.0 | * | No |
| L-T ○ | -50 | 30.0 | * | No |
| L-T ○ | -50 | 30.0 | * | No |
| L-T ○ | -50 | 30.0 | * | No |
| L-T ○ | -40 | 30.0 | * | No |
| L-T ○ | -40 | 30.0 | * | No |
| L-T ○ | -40 | 30.0 | * | No |
| L-T ○ | -30 | 30.0 | * | No |
| L-T ○ | -30 | 30.0 | * | No |
| L-T ○ | -30 | 30.0 | * | No |
| L-T ○ | -20 | 30.0 | * | No |
| L-T ○ | -20 | 30.0 | * | No |

(continued)

* - not reported

# Material ABS-EH36



(continued)

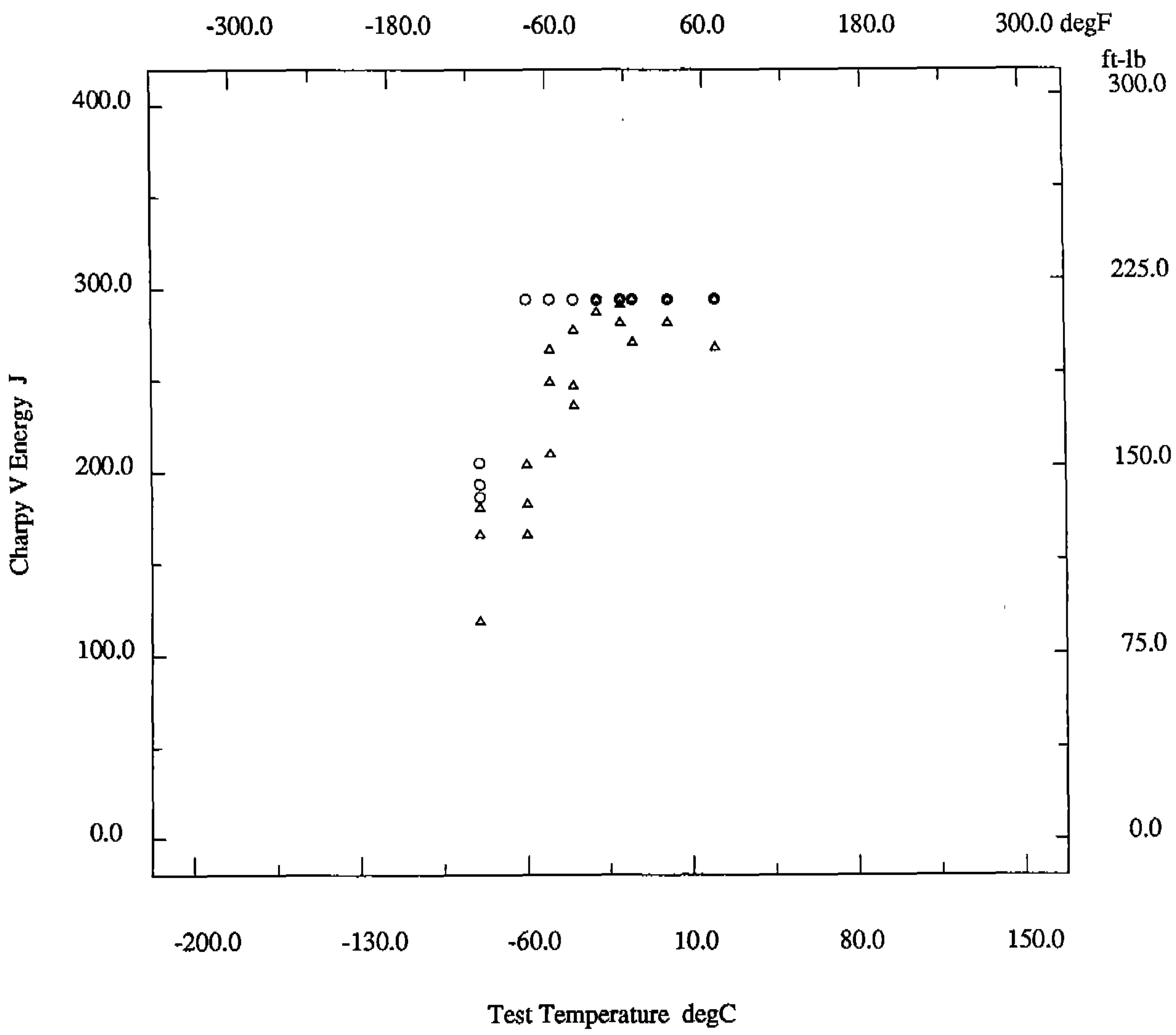
| Orien | Test Temp degC | CVN Energy kgf-m | Shear % | Fracture? |
|---|---|---|---|---|
| L-T ○ | -20 | 30.0 | * | No |
| L-T ○ | -15 | 30.0 | * | No |
| L-T ○ | -15 | 30.0 | * | No |
| L-T ○ | -15 | 30.0 | * | No |
| L-T ○ | 0 | 30.0 | * | No |
| L-T ○ | 0 | 30.0 | * | No |
| L-T ○ | 0 | 30.0 | * | No |
| L-T ○ | 20 | 30.0 | * | No |
| L-T ○ | 20 | 30.0 | * | No |
| L-T ○ | 20 | 30.0 | * | No |
| T-L △ | -80 | 12.1 | 44 | Yes |
| T-L △ | -80 | 16.9 | 56 | Yes |
| T-L △ | -80 | 18.4 | 67 | Yes |
| T-L △ | -60 | 16.9 | 57 | Yes |
| T-L △ | -60 | 18.6 | 71 | Yes |
| T-L △ | -60 | 20.8 | 26 | Yes |
| T-L △ | -50 | 21.4 | 84 | Yes |
| T-L △ | -50 | 25.4 | 100 | Yes |
| T-L △ | -50 | 27.2 | 100 | Yes |
| T-L △ | -40 | 24.1 | 100 | Yes |
| T-L △ | -40 | 25.2 | 100 | Yes |
| T-L △ | -40 | 28.3 | 100 | Yes |
| T-L △ | -30 | 29.3 | 100 | Yes |
| T-L △ | -30 | 30.0 | * | No |
| T-L △ | -30 | 30.0 | * | No |
| T-L △ | -20 | 28.7 | 100 | Yes |
| T-L △ | -20 | 29.7 | 100 | Yes |
| T-L △ | -20 | 30.0 | * | No |
| T-L △ | -15 | 27.6 | 100 | Yes |
| T-L △ | -15 | 30.0 | * | No |
| T-L △ | -15 | 30.0 | * | No |
| T-L △ | 0 | 28.7 | 100 | Yes |
| T-L △ | 0 | 30.0 | * | No |
| T-L △ | 0 | 30.0 | * | No |
| T-L △ | 20 | 27.3 | 100 | Yes |
| T-L △ | 20 | 30.0 | * | No |
| T-L △ | 20 | 30.0 | * | No |

* - not reported

# Material ABS-EH36



| Description | | | |
|---|---|---|---|
| Material Code | 007.009.01T | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Top | Lot ID | k21-6425 |
| Reference | 007-4 | | |




* - not reported

# Material ABS-EH36



## Description

| | | | |
|---|---|---|---|
| Material Code | 007.009.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | k21-6425 |
| Reference | 007-4 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.12 % | Mn | 1.42 % |
| P | 0.016 % | S | 0.007 % |
| Si | 0.36 % | Cr | 0.02 % |
| Ni | 0.01 % | Mo | 0.01 % |
| V | * | Cu | 0.02 % |
| Cb | 0.019 % | Ti | * |
| B | * | Al | 0.025 % |
| N | 0.0063 % | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | A,F | Producer | Sumitomo |
| Year Produced | 1972 | Addl Info | No |
| Source | Sumitomo | Melting Practice | * |
| Ingot Position | Concast | Killing Process | Al-killed |
| Process Temperature | 1010 degC | Process Time | * |
| Rolling Conditions | 83 % | Final Processing | N |
| Final Temperature | 910 degC | Final Time | 1.33 hr |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | 1/4T |
| Specimen Type | Full | Lateral Expansion | * |
| Did Specimen Split? | * | Standard Method | ABS Sec43 |
| Standard Year | * | | |

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % | Fracture? |
|---|---|---|---|---|
| L-T ○ | -80 | 15.5 | 51 | Yes |
| L-T ○ | -80 | 18.6 | 69 | Yes |
| L-T ○ | -80 | 19.0 | 69 | Yes |
| L-T ○ | -60 | 25.0 | 100 | Yes |
| L-T ○ | -60 | 29.5 | 100 | Yes |
| L-T ○ | -60 | 30.0 | * | No |
| L-T ○ | -50 | 30.0 | * | No |
| L-T ○ | -50 | 30.0 | * | No |
| L-T ○ | -50 | 30.0 | * | No |
| L-T ○ | -40 | 28.3 | 100 | Yes |
| L-T ○ | -40 | 30.0 | * | No |
| L-T ○ | -40 | 30.0 | * | No |
| L-T ○ | -30 | 29.8 | 100 | Yes |
| L-T ○ | -30 | 30.0 | * | No |
| L-T ○ | -30 | 30.0 | * | No |
| L-T ○ | -20 | 30.0 | * | No |
| L-T ○ | -20 | 30.0 | * | No |

(continued)

* - not reported

## Material ABS-EH36



(continued)

| Orien | Test Temp degC | CVN Energy kgf-m | Shear % | Fracture? |
|---|---|---|---|---|
| L-T ○ | -20 | 30.0 | * | No |
| L-T ○ | -15 | 30.0 | * | No |
| L-T ○ | -15 | 30.0 | * | No |
| L-T ○ | -15 | 30.0 | * | No |
| L-T ○ | 0 | 30.0 | * | No |
| L-T ○ | 0 | 30.0 | * | No |
| L-T ○ | 0 | 30.0 | * | No |
| L-T ○ | 20 | 30.0 | * | No |
| L-T ○ | 20 | 30.0 | * | No |
| L-T ○ | 20 | 30.0 | * | No |
| T-L △ | -80 | 7.0 | 29 | Yes |
| T-L △ | -80 | 7.0 | 32 | Yes |
| T-L △ | -80 | 9.9 | 35 | Yes |
| T-L △ | -60 | 14.4 | 55 | Yes |
| T-L △ | -60 | 14.4 | 55 | Yes |
| T-L △ | -60 | 15.4 | 61 | Yes |
| T-L △ | -50 | 13.3 | 54 | Yes |
| T-L △ | -50 | 15.3 | 64 | Yes |
| T-L △ | -50 | 16.0 | 61 | Yes |
| T-L △ | -40 | 17.2 | 76 | Yes |
| T-L △ | -40 | 18.9 | 86 | Yes |
| T-L △ | -40 | 19.3 | 73 | Yes |
| T-L △ | -30 | 17.3 | 76 | Yes |
| T-L △ | -30 | 18.4 | 83 | Yes |
| T-L △ | -30 | 19.2 | 100 | Yes |
| T-L △ | -20 | 17.0 | 100 | Yes |
| T-L △ | -20 | 19.9 | 100 | Yes |
| T-L △ | -20 | 22.4 | 100 | Yes |
| T-L △ | -15 | 19.6 | 100 | Yes |
| T-L △ | -15 | 20.5 | 100 | Yes |
| T-L △ | -15 | 21.7 | 100 | Yes |
| T-L △ | 0 | 21.9 | 100 | Yes |
| T-L △ | 0 | 22.0 | 100 | Yes |
| T-L △ | 0 | 26.7 | 100 | Yes |
| T-L △ | 20 | 26.5 | 100 | Yes |
| T-L △ | 20 | 26.5 | 100 | Yes |
| T-L △ | 20 | 27.4 | 100 | Yes |

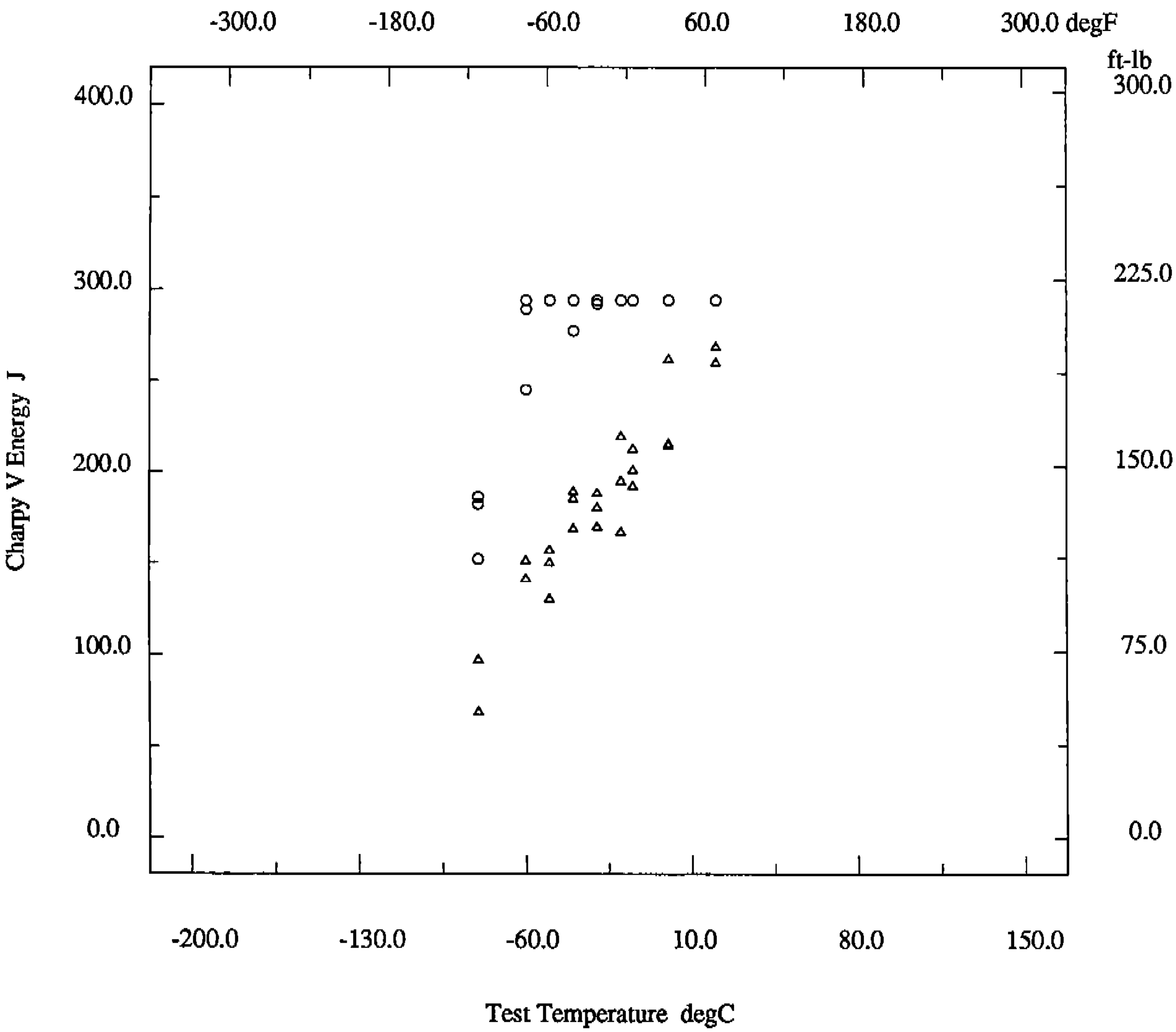
* - not reported

## Material ABS-EH36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 007.009.01B | Material Name | ABS-EH36 |
| UNS | * | Other Designation | ABS-EH36 |
| Type | Wrought Metal | Form | Plate |
| Thickness | 32 mm | Composition Type | Actual |
| Composition Position | Bottom | Lot ID | k21-6425 |
| Reference | 007-4 | | |




* - not reported

## Material A36



### Description

| | | | |
|---|---|---|---|
| Material Code | 009.002.010A | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |

### Composition

| | | | |
|---|---|---|---|
| C | 0.21 % | Mn | 1.17 % |
| P | 0.011 % | S | 0.022 % |
| Si | 0.04 % | Cr | 0.05 % |
| Ni | 0.03 % | Mo | 0.01 % |
| V | <0.002 % | Cu | 0.04 % |
| Cb | <0.005 % | Ti | * |
| B | * | Al | <0.002 % |
| N | 0.003 % | Other Components | None % |

### Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | US Steel |
| Year Produced | * | Addl Info | * |
| Source | US Steel | Melting Practice | * |
| Ingot Position | * | Killing Process | * |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| 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 | 0.357 in |
| Gage Length | 1.4 in | Loading Rate | * |
| Tensile Strength Offset | 0.2 % | Uniform Elongation | * |
| Tensile Modulus | * | Standard Method | * |
| Standard Year | * | | |

| Orient | Test Temp degF | UTS ksi | TYS ksi | TYP ksi | Elongation % | RA % |
|---|---|---|---|---|---|---|
| * | Room | 71.1 | 38.9 | * | 34.8 | 70.8 |

* - not reported

# Material A36



## Description

Material Code ................ 009.002.02AS1
Material Name ........................ A36
UNS ................................. *
Other Designation ...................... *
Type ........................ Welded Joint
Form ................................ Plate
Thickness ........................... 1 in
Composition Type .................. Actual
Composition Position .................. *
Lot ID ................................ *
Reference .................... KONKUL-1

## Composition

See Page 3100.1

## Fabrication History

See Page 3100.1

## Weld

Weld Code .................. 009.002.02AS1
Weld Type ........................... SMA
Base Metal Thickness .................. 1 in
Welding Position ............. Downhand IG
Preheat Temperature ............... 50 degF
Metal Gap ............................ 0 in
Interpass Temperature ............. 350 degF
Passes ................................ 15
Filler Specification ................. E7018
Filler Name ............................ *
Filler Carbon Content .................. *
Filler Metal Size ....................... *
Shielding Gas .......................... *
Voltage ................................ *
Amperage ............................... *
Polarity ............................... *
Travel Speed ........................... *
Heat Input/Pass ................... 34 KJ/in
Joint Preparation ................ K-Groove
Number of Sides ......................... 2
Location wrt Weld ............... Fusion line
Location wrt Surface ...... Mid thickness at root
Post-Weld Heat Temp ............ 1100 degF
Post-Weld Heat Time ................... 1 hr
Flux Type .............................. *
Flux Name .............................. *
Weld Composition Reported? ............ No

## Property Measurements

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

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T ○ | -50 | 10 | 12 | 10 |
| L-T ○ | -50 | 15 | 13 | 10 |
| L-T ○ | -25 | 11 | 12 | 20 |
| L-T ○ | -25 | 93 | 90 | 45 |
| L-T ○ | 0 | 106 | 88 | 70 |
| L-T ○ | 0 | 43 | 38 | 70 |
| L-T ○ | 0 | 8 | 12 | 15 |
| L-T ○ | 25 | 118 | 78 | 85 |
| L-T ○ | 25 | 35 | 32 | 60 |
| L-T ○ | 25 | 97 | 76 | 50 |
| L-T ○ | 50 | 123 | 87 | 85 |
| L-T ○ | 50 | 96 | 78 | 75 |

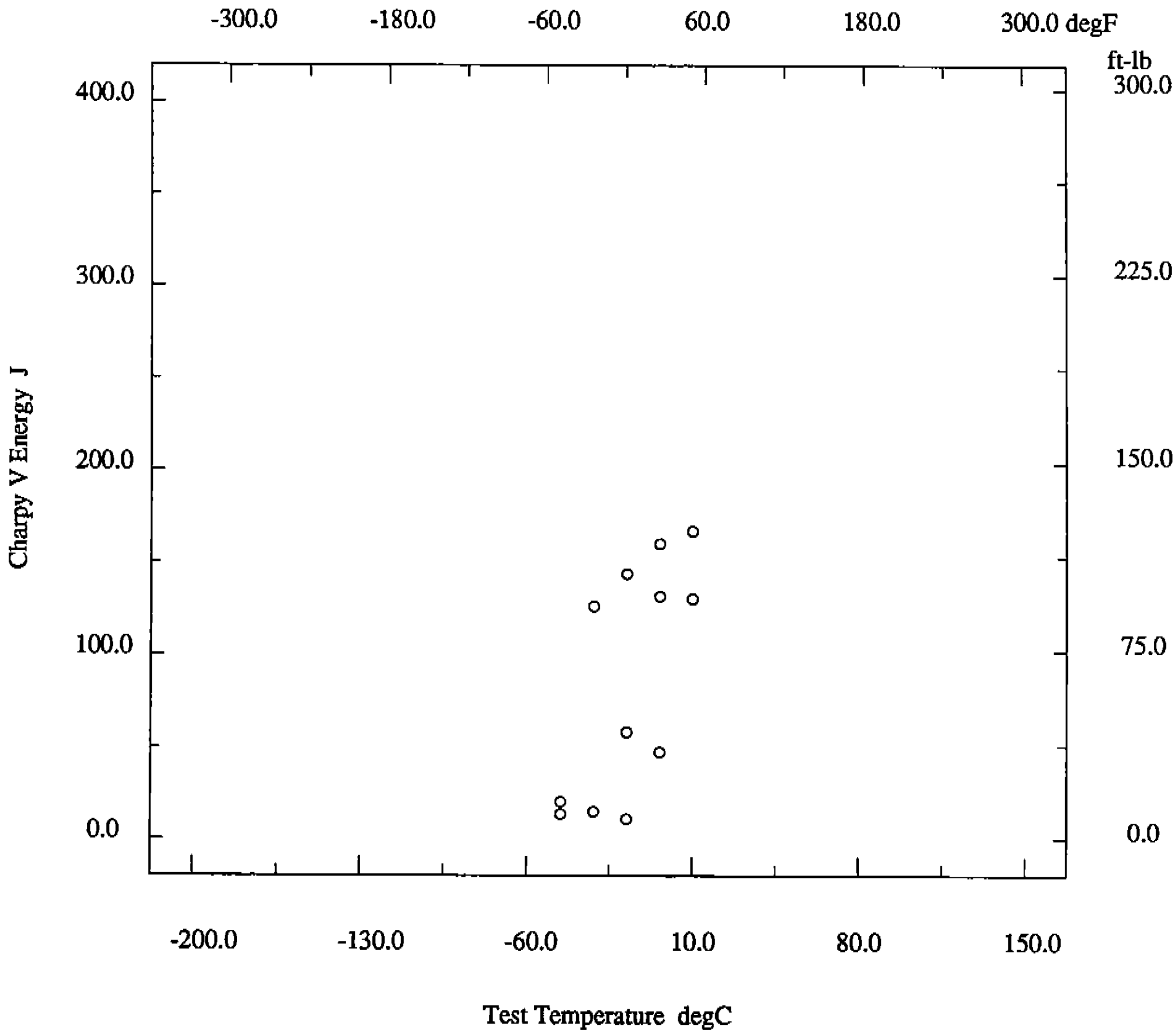
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.002.02AS1 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.002.02AS2 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |

## Composition

See Page 3100.1

## Fabrication History

See Page 3100.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.002.02AS2 | Weld Type | SMA |
| Base Metal Thickness | 1 in | Welding Position | Downhand IG |
| Preheat Temperature | 50 degF | Metal Gap | 0 in |
| Interpass Temperature | 350 degF | Passes | 15 |
| Filler Specification | E7018 | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | * |
| Shielding Gas | * | Voltage | * |
| Amperage | * | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 34 KJ/in |
| Joint Preparation | K-Groove | Number of Sides | 2 |
| Location wrt Weld | Fusion line | Location wrt Surface | Mid thickness at root |
| Post-Weld Heat Temp | 1100 degF | Post-Weld Heat Time | 5 hr |
| Flux Type | * | Flux Name | * |
| Weld Composition Reported? | No | | |

## Property Measurements

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

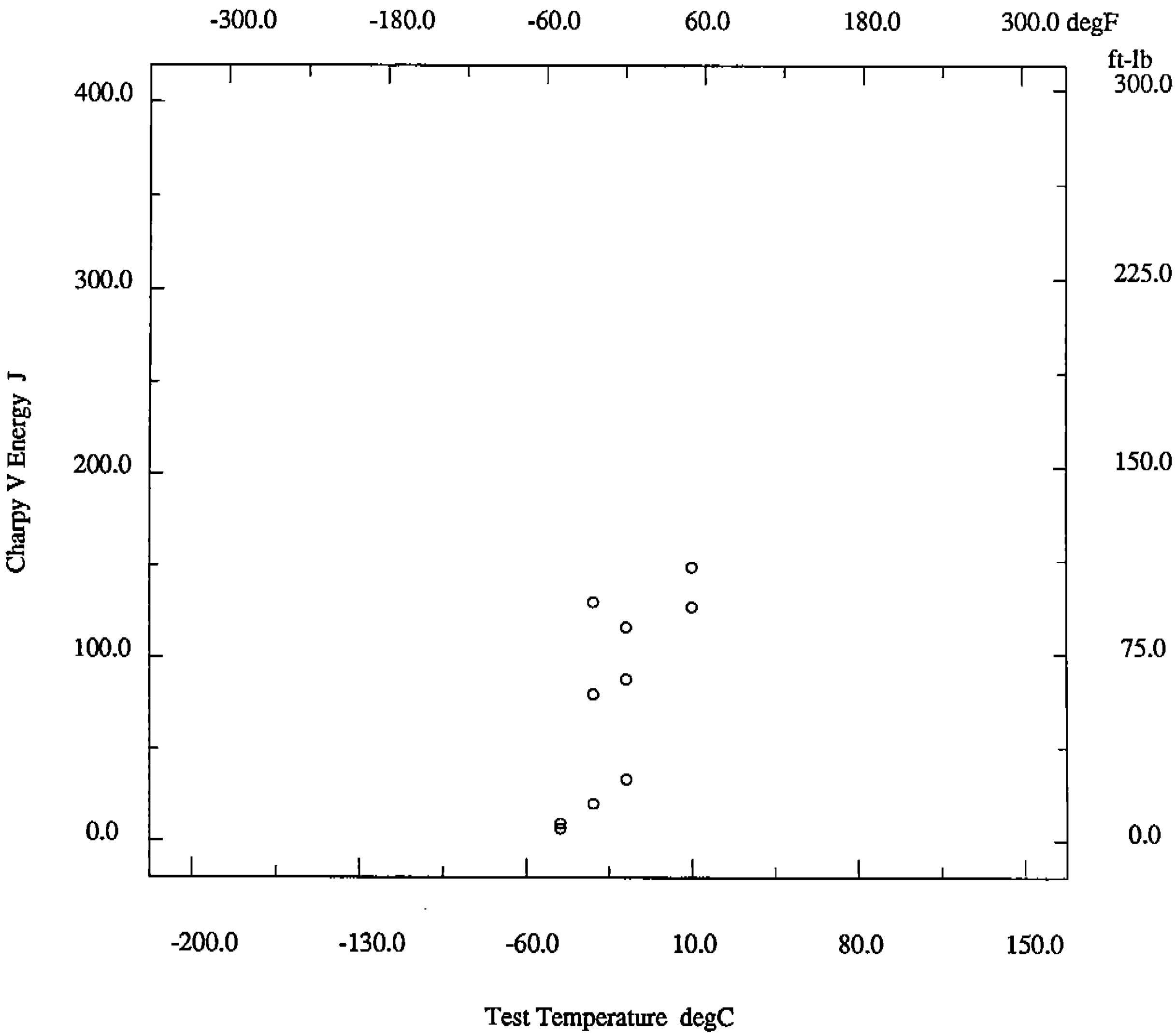
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T ○ | -50 | 5 | 7 | 5 |
| L-T ○ | -50 | 7 | 9 | 10 |
| L-T ○ | -25 | 15 | 15 | 35 |
| L-T ○ | -25 | 59 | 48 | 30 |
| L-T ○ | -25 | 96 | 79 | 70 |
| L-T ○ | 0 | 25 | 22 | 45 |
| L-T ○ | 0 | 65 | 51 | 70 |
| L-T ○ | 0 | 86 | 79 | 75 |
| L-T ○ | 50 | 110 | 93 | 100 |
| L-T ○ | 50 | 94 | 80 | 80 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.002.02AS2 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |




* - not reported

224

## Description

| | | | |
|---|---|---|---|
| Material Code | 009.002.02AS3 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |

## Composition

See Page 3100.1

## Fabrication History

See Page 3100.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.002.02AS3 | Weld Type | SMA |
| Base Metal Thickness | 1 in | Welding Position | Downhand IG |
| Preheat Temperature | 50 degF | Metal Gap | 0 in |
| Interpass Temperature | 350 degF | Passes | 15 |
| Filler Specification | E7018 | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | * |
| Shielding Gas | * | Voltage | * |
| Amperage | * | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 34 KJ/in |
| Joint Preparation | K-Groove | Number of Sides | 2 |
| Location wrt Weld | Fusion line | Location wrt Surface | Mid thickness at root |
| Post-Weld Heat Temp | 1200 degF | Post-Weld Heat Time | 1 hr |
| Flux Type | * | Flux Name | * |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T ○ | -50 | 11 | 12 | 15 |
| L-T ○ | -50 | 5 | 5 | 10 |
| L-T ○ | -25 | 18 | 20 | 75 |
| L-T ○ | -25 | 7 | 8 | 20 |
| L-T ○ | -25 | 81 | 61 | 75 |
| L-T ○ | 0 | 77 | 61 | 65 |
| L-T ○ | 0 | 80 | 65 | 75 |
| L-T ○ | 50 | 71 | 54 | 75 |
| L-T ○ | 50 | 90 | 74 | 50 |
| L-T ○ | 75 | 121 | 86 | 100 |
| L-T ○ | 75 | 125 | 89 | 90 |

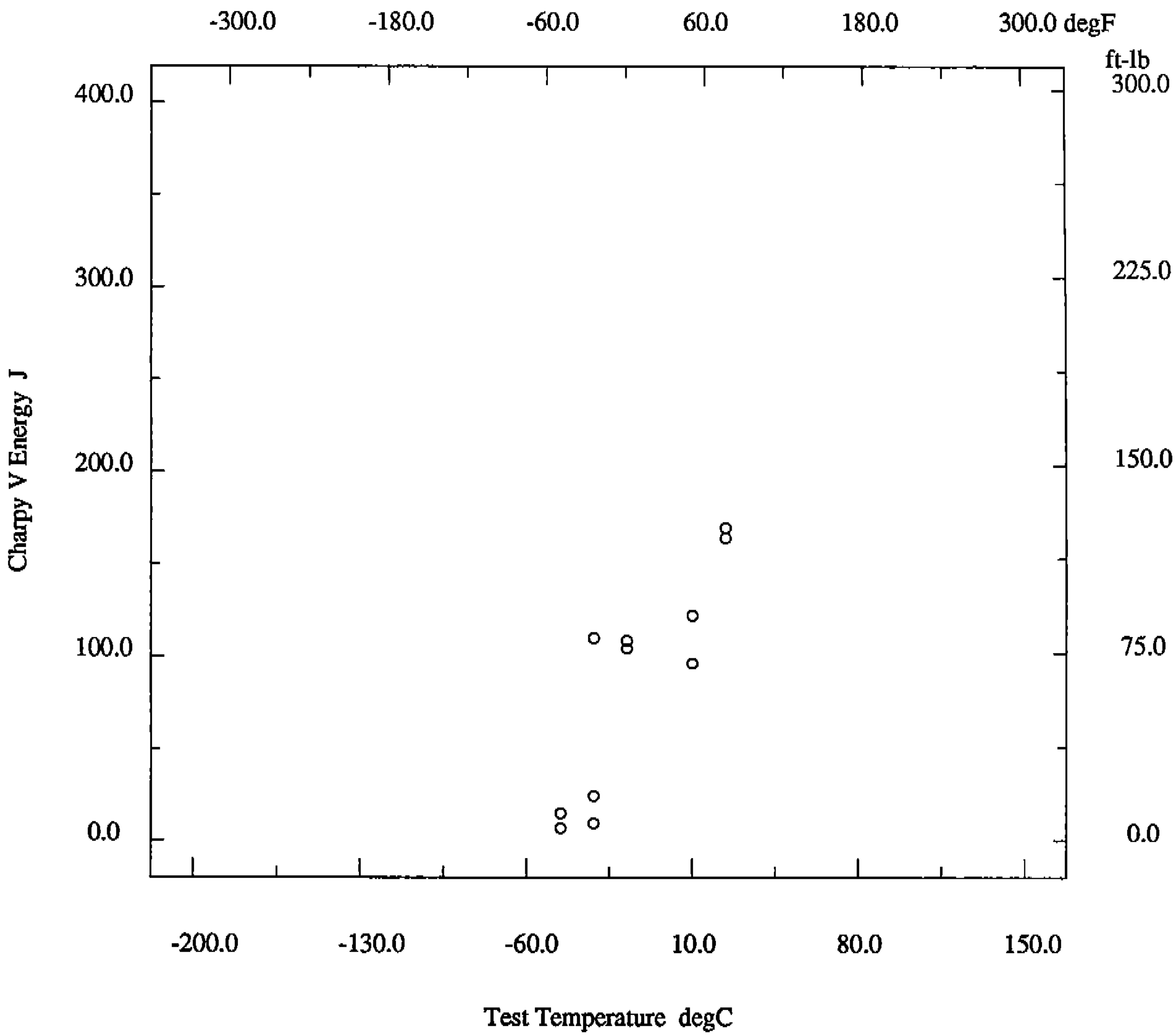
* - not reported

## Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.002.02AS3 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |




* - not reported

# Material A36



## Description

Material Code ................ 009.002.02AA
Material Name ........................ A36
UNS ................................... *
Other Designation ...................... *
Type ....................... Welded Joint
Form .............................. Plate
Thickness ........................... 1 in
Composition Type ................. Actual
Composition Position .................. *
Lot ID ................................ *
Reference ................... KONKUL-1

## Composition

See Page 3100.1

## Fabrication History

See Page 3100.1

## Weld

Weld Code .................. 009.002.02AA
Weld Type .......................... SMA
Base Metal Thickness ................ 1 in
Welding Position ......... Downhand IG
Preheat Temperature ............ 50 degF
Metal Gap ........................... 0 in
Interpass Temperature ......... 350 degF
Passes ................................ 15
Filler Specification ............... E7018
Filler Name ............................ *
Filler Carbon Content ................ *
Filler Metal Size ...................... *
Shielding Gas .......................... *
Voltage ................................ *
Amperage .............................. *
Polarity ................................ *
Travel Speed ........................... *
Heat Input/Pass ................. 34 KJ/in
Joint Preparation .............. K-Groove
Number of Sides ........................ 2
Location wrt Weld ............ Fusion line
Location wrt Surface ...... Mid thickness 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 ............................ 3/4T
Specimen Type ....................... Full
Did Specimen Fracture? ........ Assumed
Did Specimen Split? .................. *
Standard Method ........................ *
Standard Year ......................... *

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T ○ | -50 | 5 | 1 | 5 |
| L-T ○ | -50 | 9 | 9 | 10 |
| L-T ○ | -25 | 25 | 15 | 30 |
| L-T ○ | -25 | 42 | 32 | 40 |
| L-T ○ | -25 | 7 | 6 | 15 |
| L-T ○ | 0 | 15 | 19 | 20 |
| L-T ○ | 0 | 19 | 17 | 45 |
| L-T ○ | 0 | 21 | 25 | 25 |
| L-T ○ | 25 | 102 | 67 | 75 |
| L-T ○ | 25 | 33 | 30 | 70 |
| L-T ○ | 25 | 54 | 40 | 35 |
| L-T ○ | 50 | 109 | 78 | 90 |
| L-T ○ | 50 | 111 | 72 | 90 |

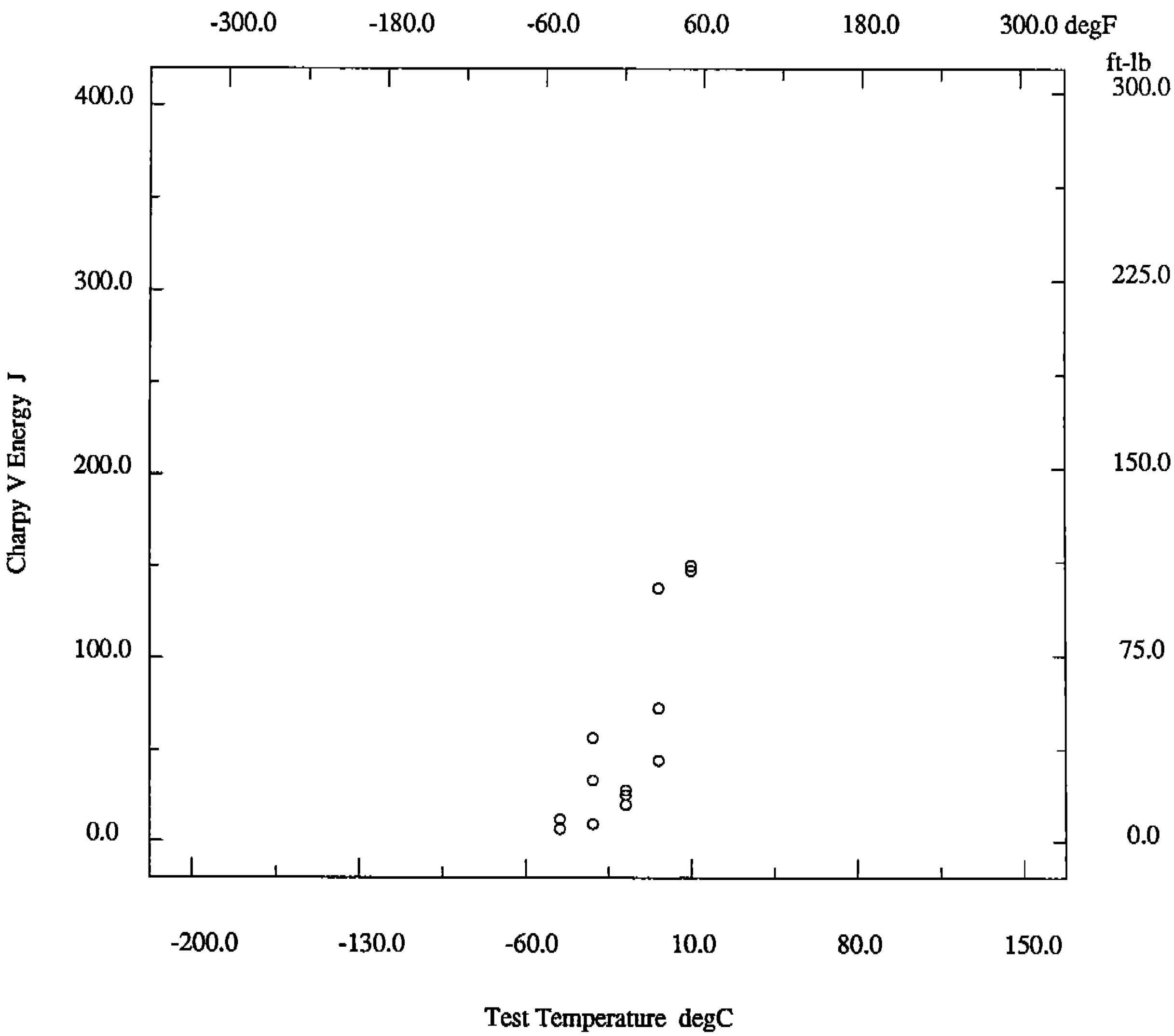
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.002.02AA | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |




* - not reported

## Description

| | | | |
|---|---|---|---|
| Material Code | 009.002.02AS4 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |

## Composition

See Page 3100.1

## Fabrication History

See Page 3100.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.002.02AS4 | Weld Type | SMA |
| Base Metal Thickness | 1 in | Welding Position | Downhand IG |
| Preheat Temperature | 50 degF | Metal Gap | 0 in |
| Interpass Temperature | 350 degF | Passes | 15 |
| Filler Specification | E7018 | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | * |
| Shielding Gas | * | Voltage | * |
| Amperage | * | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 34 KJ/in |
| Joint Preparation | K-Groove | Number of Sides | 2 |
| Location wrt Weld | Fusion line | Location wrt Surface | Mid thickness at root |
| Post-Weld Heat Temp | 1200 degF | Post-Weld Heat Time | 5 hr |
| Flux Type | * | Flux Name | * |
| Weld Composition Reported? | No | | |

## Property Measurements

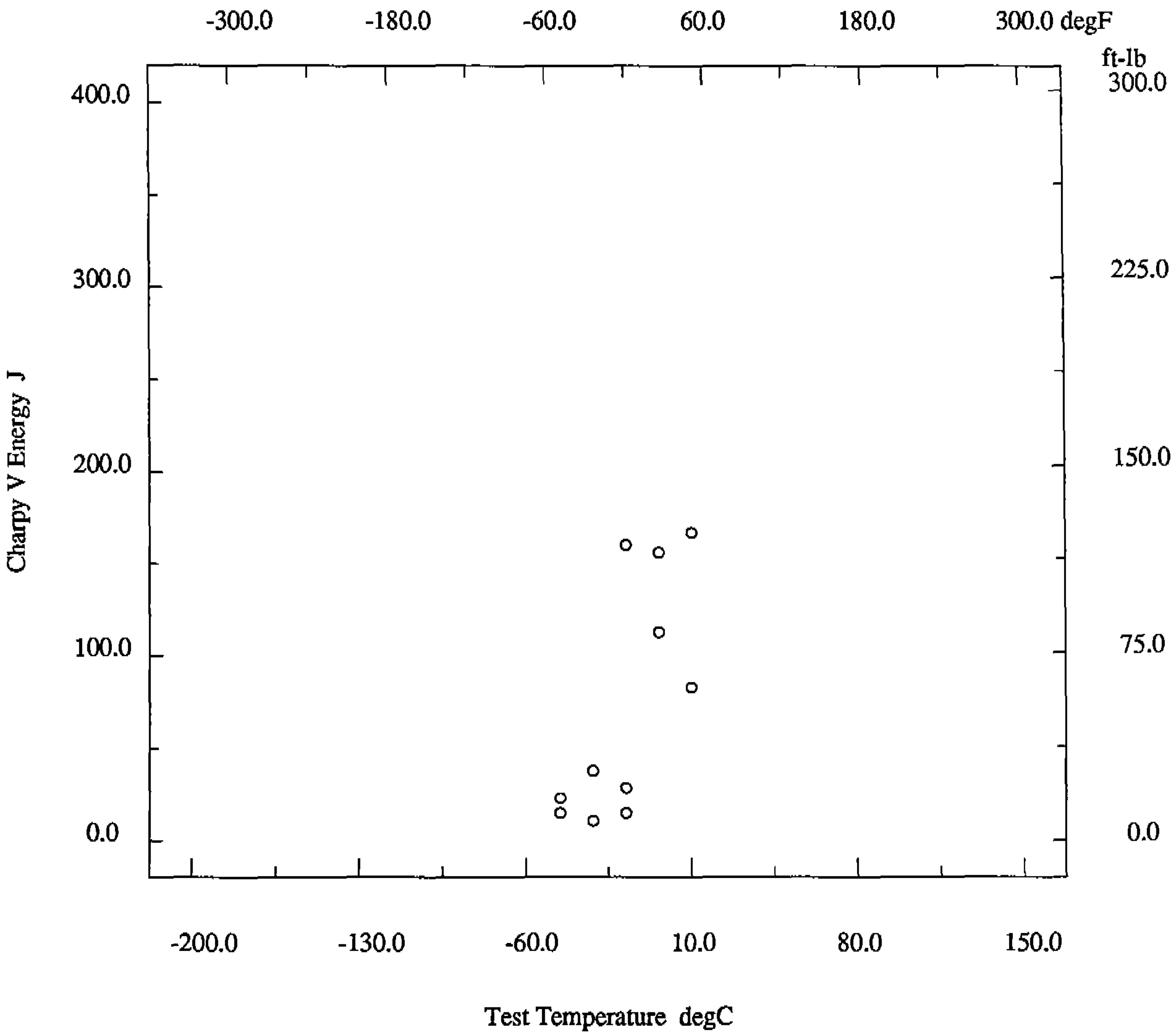
| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | 3/4T |
| Specimen Type | Full | Did Specimen Fracture? | Assumed |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T ○ | -50 | 11 | 10 | 15 |
| L-T ○ | -50 | 17 | 14 | 10 |
| L-T ○ | -25 | 28 | 26 | 30 |
| L-T ○ | -25 | 8 | 10 | 20 |
| L-T ○ | -25 | 8 | 6 | 20 |
| L-T ○ | 0 | 118 | 96 | 55 |
| L-T ○ | 0 | 11 | 16 | 15 |
| L-T ○ | 0 | 21 | 22 | 45 |
| L-T ○ | 25 | 115 | 75 | 85 |
| L-T ○ | 25 | 83 | 69 | 75 |
| L-T ○ | 50 | 123 | 90 | 80 |
| L-T ○ | 50 | 61 | 52 | 85 |

* - not reported

**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.002.02AS4 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.002.09BW | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.21 % | Mn | 1.17 % |
| P | 0.011 % | S | 0.022 % |
| Si | 0.04 % | Cr | 0.05 % |
| Ni | 0.03 % | Mo | 0.01 % |
| V | <0.002 % | Cu | 0.04 % |
| Cb | <0.005 % | Ti | * |
| B | * | Al | <0.002 % |
| N | 0.003 % | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | US Steel |
| Year Produced | * | Addl Info | * |
| Source | US Steel | Melting Practice | * |
| Ingot Position | * | Killing Process | * |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.002.09BW | Weld Type | SAW |
| Base Metal Thickness | 1 in | Welding Position | Downhand IG |
| Preheat Temperature | 50 degF | Metal Gap | 5/16 in |
| Interpass Temperature | 350 degF | Passes | 7 |
| Filler Specification | F72-EM12K | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | * |
| Shielding Gas | * | Voltage | * |
| Amperage | * | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 74 KJ/in |
| 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 | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | * |
| Weld Composition Reported? | No | | |

(continued)

* - not reported

(7-9)

# Material A36



(continued)

**Property Measurements**

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

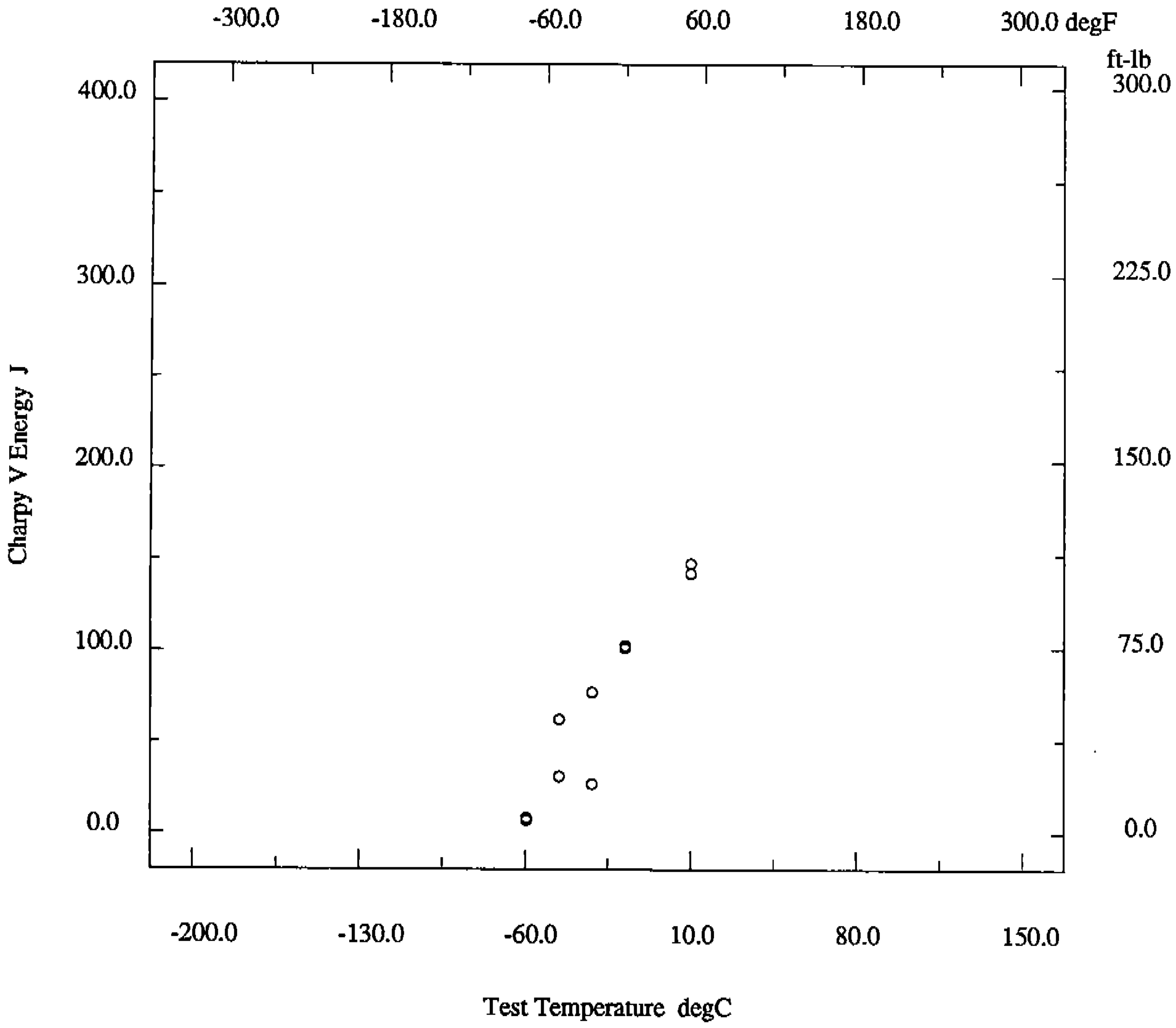
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T ○ | -75 | 5 | 4 | 10 |
| L-T ○ | -75 | 6 | 6 | 15 |
| L-T ○ | -50 | 23 | 21 | 35 |
| L-T ○ | -50 | 46 | 34 | 30 |
| L-T ○ | -25 | 20 | 24 | 35 |
| L-T ○ | -25 | 57 | 42 | 45 |
| L-T ○ | 0 | 75 | 58 | 65 |
| L-T ○ | 0 | 76 | 60 | 75 |
| L-T ○ | 50 | 105 | 79 | 90 |
| L-T ○ | 50 | 109 | 82 | 95 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.002.09BW | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.002.02BW | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |

## Composition

See Page 3200.1

## Fabrication History

See Page 3200.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.002.02BW | Weld Type | SAW |
| Base Metal Thickness | 1 in | Welding Position | Downhand IG |
| Preheat Temperature | 50 degF | Metal Gap | 5/16 in |
| Interpass Temperature | 350 degF | Passes | 7 |
| Filler Specification | F72-EM12K | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | * |
| Shielding Gas | * | Voltage | * |
| Amperage | * | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 74 KJ/in |
| Joint Preparation | V Groove | Number of Sides | 1 |
| Location wrt Weld | Fusion line | Location wrt Surface | Mid thickness 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 | Did Specimen Fracture? | Assumed |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

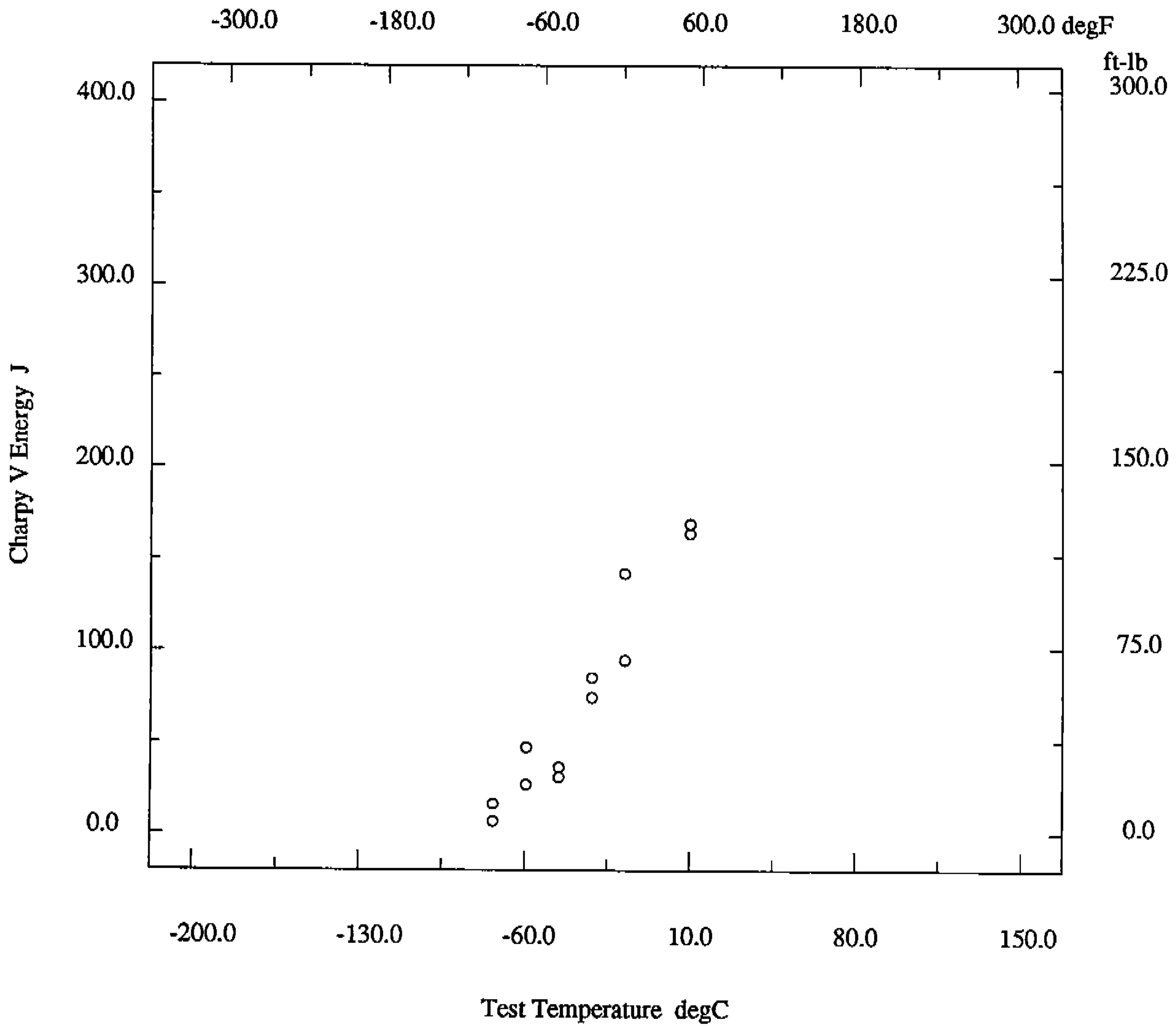
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T ○ | -100 | 12 | 8 | 10 |
| L-T ○ | -100 | 5 | 4 | 10 |
| L-T ○ | -75 | 20 | 13 | 25 |
| L-T ○ | -75 | 35 | 25 | 20 |
| L-T ○ | -50 | 23 | 22 | 35 |
| L-T ○ | -50 | 27 | 25 | 30 |
| L-T ○ | -25 | 55 | 45 | 30 |
| L-T ○ | -25 | 63 | 49 | 35 |
| L-T ○ | 0 | 105 | 78 | 80 |
| L-T ○ | 0 | 70 | 62 | 70 |
| L-T ○ | 50 | 121 | 85 | 95 |
| L-T ○ | 50 | 125 | 88 | 95 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.002.02BW | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.002.02BS1 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |

## Composition

See Page 3200.1

## Fabrication History

See Page 3200.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.002.02BS1 | Weld Type | SAW |
| Base Metal Thickness | 1 in | Welding Position | Downhand IG |
| Preheat Temperature | 50 degF | Metal Gap | 5/16 in |
| Interpass Temperature | 350 degF | Passes | 7 |
| Filler Specification | F72-EM12K | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | * |
| Shielding Gas | * | Voltage | * |
| Amperage | * | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 74 KJ/in |
| Joint Preparation | V Groove | Number of Sides | 1 |
| Location wrt Weld | Fusion line | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | 1100 degF | Post-Weld Heat Time | 1 hr |
| Flux Type | * | Flux Name | * |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T o | -100 | 2 | 1 | 5 |
| L-T o | -100 | 3 | 1 | 5 |
| L-T o | -75 | 21 | 11 | 10 |
| L-T o | -75 | 63 | 53 | 40 |
| L-T o | -75 | 8 | 4 | 5 |
| L-T o | -50 | 10 | 11 | 20 |
| L-T o | -50 | 45 | 40 | 35 |
| L-T o | -50 | 5 | 6 | 10 |
| L-T o | -25 | 21 | 14 | 25 |
| L-T o | -25 | 86 | 60 | 60 |
| L-T o | 0 | 108 | 77 | 90 |
| L-T o | 0 | 115 | 88 | 95 |
| L-T o | 50 | 109 | 73 | 100 |
| L-T o | 50 | 139 | 87 | 100 |

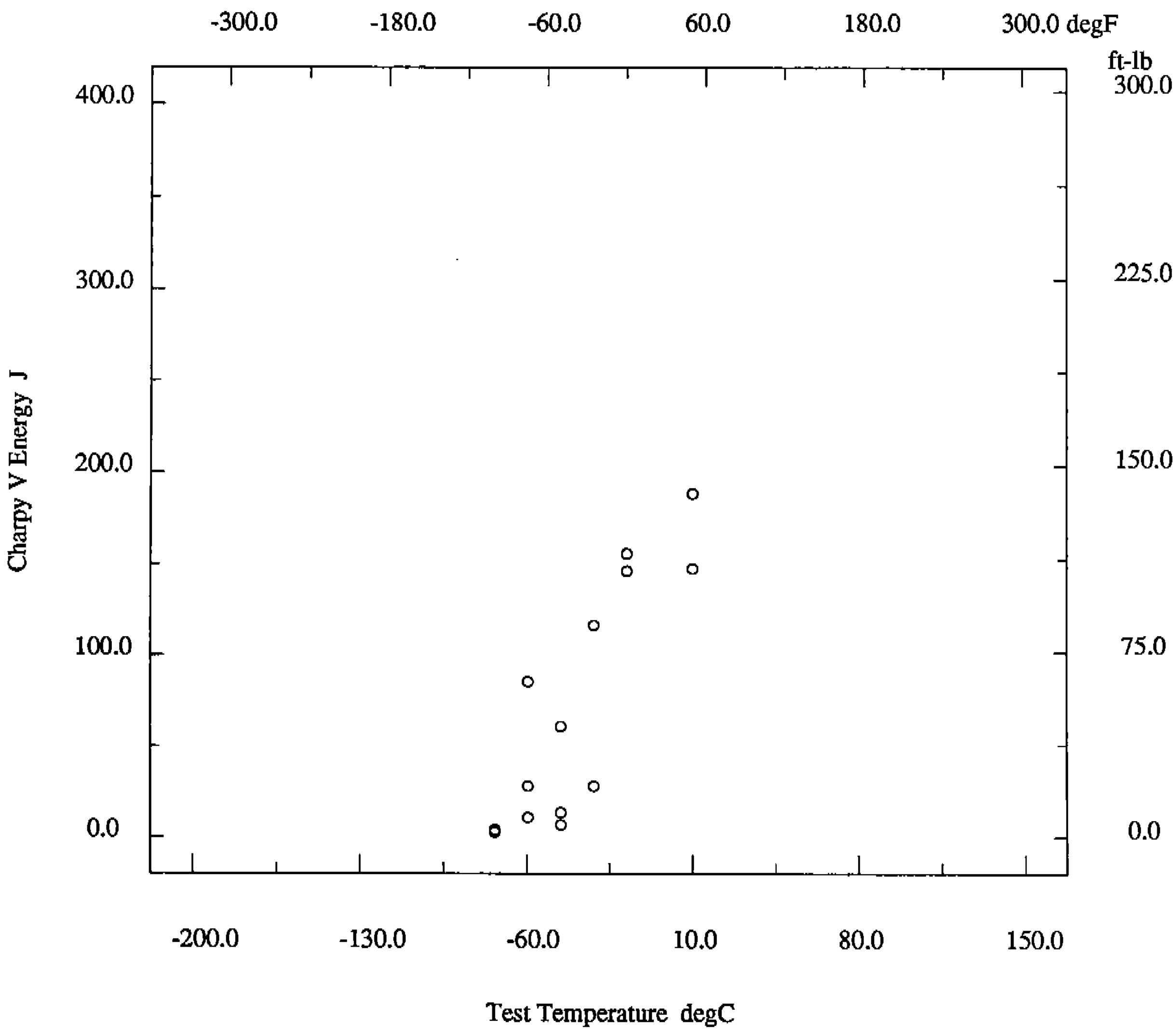
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.002.02BS1 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.002.09BS2 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |

## Composition

See Page 3200.1

## Fabrication History

See Page 3200.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.002.09BS2 | Weld Type | SAW |
| Base Metal Thickness | 1 in | Welding Position | Downhand IG |
| Preheat Temperature | 50 degF | Metal Gap | 5/16 in |
| Interpass Temperature | 350 degF | Passes | 7 |
| Filler Specification | F72-EM12K | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | * |
| Shielding Gas | * | Voltage | * |
| Amperage | * | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 74 KJ/in |
| 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 | 1100 degF | Post-Weld Heat Time | 5 hr |
| Flux Type | * | Flux Name | * |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T ○ | -100 | 11 | 13 | 20 |
| L-T ○ | -100 | 8 | 10 | 25 |
| L-T ○ | -75 | 29 | 22 | 35 |
| L-T ○ | -75 | 39 | 33 | 40 |
| L-T ○ | -50 | 36 | 38 | 45 |
| L-T ○ | -50 | 65 | 57 | 55 |
| L-T ○ | 0 | 100 | 79 | 85 |
| L-T ○ | 0 | 104 | 74 | 90 |
| L-T ○ | 50 | 120 | 84 | 95 |
| L-T ○ | 50 | 138 | 91 | 100 |

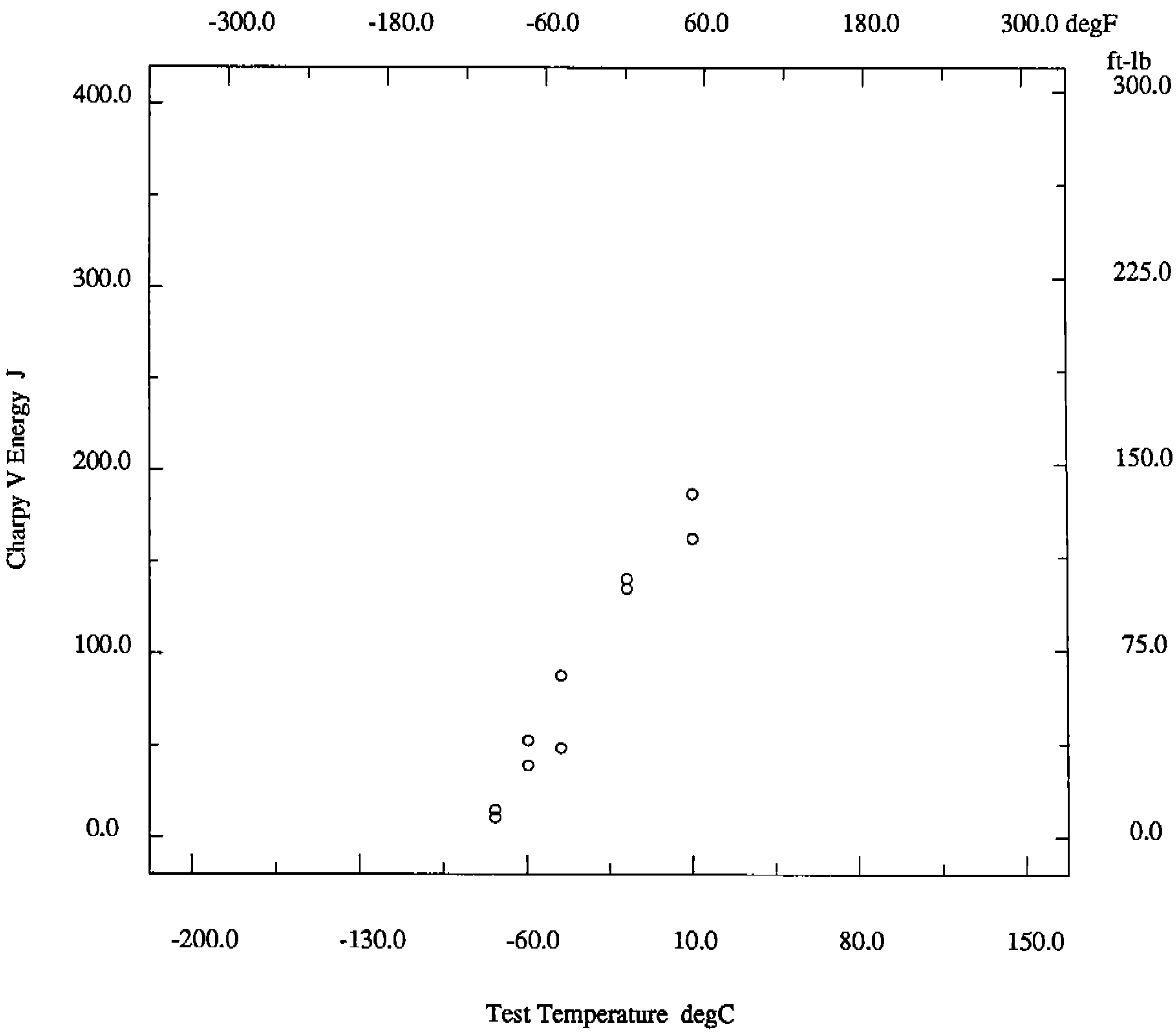
* - not reported

## Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.002.09BS2 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |




* - not reported

## Description

| | | | |
|---|---|---|---|
| Material Code | 009.002.02BS2 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |

## Composition

See Page 3200.1

## Fabrication History

See Page 3200.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.002.02BS2 | Weld Type | SAW |
| Base Metal Thickness | 1 in | Welding Position | Downhand IG |
| Preheat Temperature | 50 degF | Metal Gap | 5/16 in |
| Interpass Temperature | 350 degF | Passes | 7 |
| Filler Specification | F72-EM12K | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | * |
| Shielding Gas | * | Voltage | * |
| Amperage | * | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 74 KJ/in |
| Joint Preparation | V Groove | Number of Sides | 1 |
| Location wrt Weld | Fusion line | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | 1100 degF | Post-Weld Heat Time | 5 hr |
| Flux Type | * | Flux Name | * |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T ○ | -75 | 3 | 3 | 5 |
| L-T ○ | -75 | 5 | 6 | 10 |
| L-T ○ | -50 | 11 | 12 | 25 |
| L-T ○ | -50 | 5 | 7 | 15 |
| L-T ○ | -25 | 45 | 35 | 45 |
| L-T ○ | -25 | 7 | 9 | 20 |
| L-T ○ | 0 | 142 | 87 | 100 |
| L-T ○ | 0 | 21 | 23 | 15 |
| L-T ○ | 0 | 98 | 73 | 90 |
| L-T ○ | 50 | 113 | 70 | 90 |
| L-T ○ | 50 | 126 | 77 | 85 |

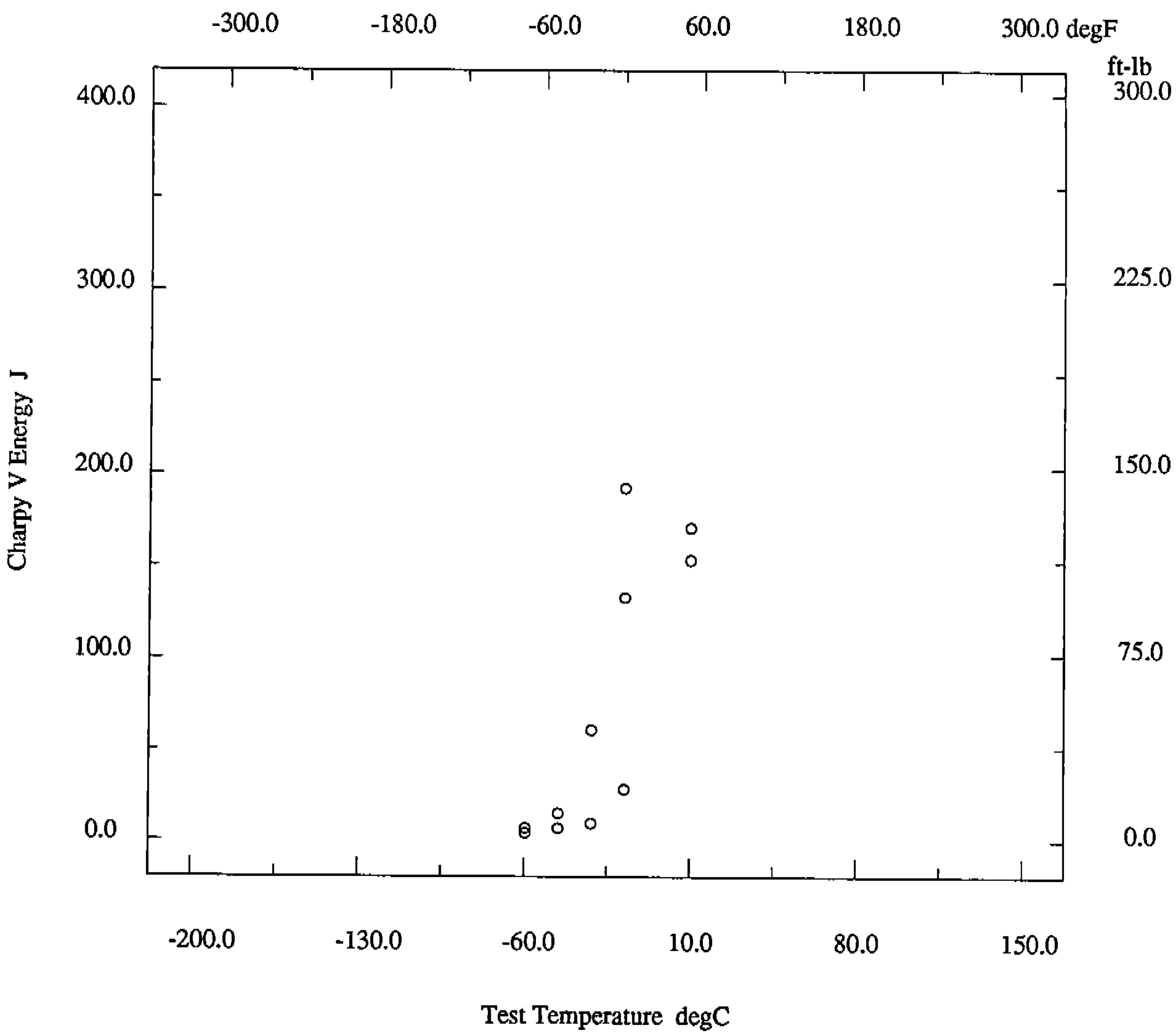
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.002.02BS2 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.002.09BS3 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |

## Composition

See Page 3200.1

## Fabrication History

See Page 3200.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.002.09BS3 | Weld Type | SAW |
| Base Metal Thickness | 1 in | Welding Position | Downhand IG |
| Preheat Temperature | 50 degF | Metal Gap | 5/16 in |
| Interpass Temperature | 350 degF | Passes | 7 |
| Filler Specification | F72-EM12K | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | * |
| Shielding Gas | * | Voltage | * |
| Amperage | * | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 74 KJ/in |
| 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 | 1200 degF | Post-Weld Heat Time | 1 hr |
| Flux Type | * | Flux Name | * |
| Weld Composition Reported? | No | | |

## Property Measurements

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

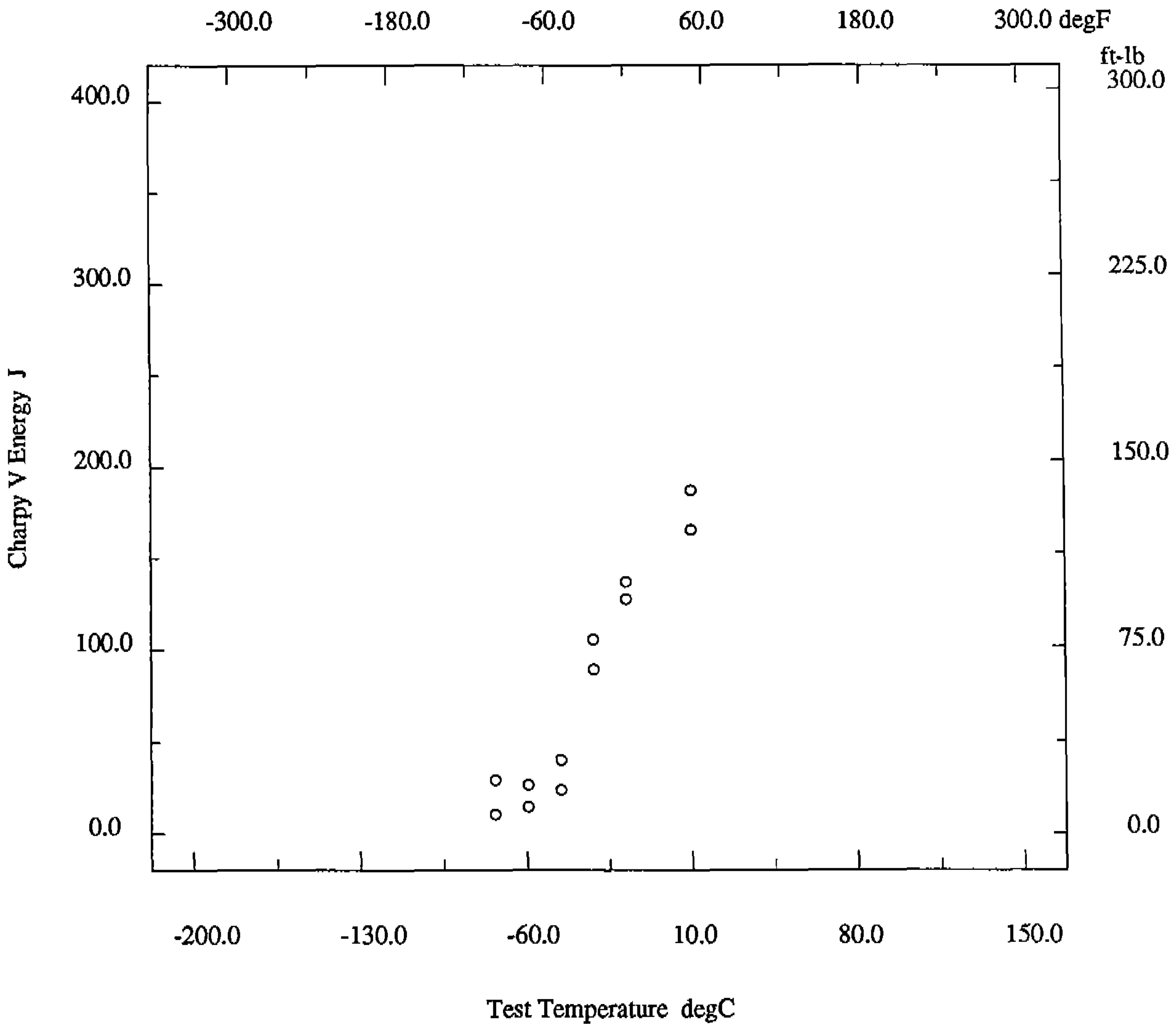
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T ○ | -100 | 22 | 17 | 20 |
| L-T ○ | -100 | 8 | 8 | 15 |
| L-T ○ | -75 | 11 | 14 | 20 |
| L-T ○ | -75 | 20 | 29 | 25 |
| L-T ○ | -50 | 18 | 21 | 40 |
| L-T ○ | -50 | 30 | 30 | 45 |
| L-T ○ | -25 | 66 | 56 | 45 |
| L-T ○ | -25 | 78 | 59 | 50 |
| L-T ○ | 0 | 101 | 74 | 85 |
| L-T ○ | 0 | 94 | 70 | 65 |
| L-T ○ | 50 | 122 | 85 | 90 |
| L-T ○ | 50 | 138 | 90 | 95 |

* - not reported

## Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.002.09BS3 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |




* - not reported

959

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.002.02BS3 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |

## Composition

See Page 3200.1

## Fabrication History

See Page 3200.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.002.02BS3 | Weld Type | SAW |
| Base Metal Thickness | 1 in | Welding Position | Downhand IG |
| Preheat Temperature | 50 degF | Metal Gap | 5/16 in |
| Interpass Temperature | 350 degF | Passes | 7 |
| Filler Specification | F72-EM12K | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | * |
| Shielding Gas | * | Voltage | * |
| Amperage | * | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 74 KJ/in |
| Joint Preparation | V Groove | Number of Sides | 1 |
| Location wrt Weld | Fusion line | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | 1200 degF | Post-Weld Heat Time | 1 hr |
| Flux Type | * | Flux Name | * |
| Weld Composition Reported? | No | | |

## Property Measurements

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

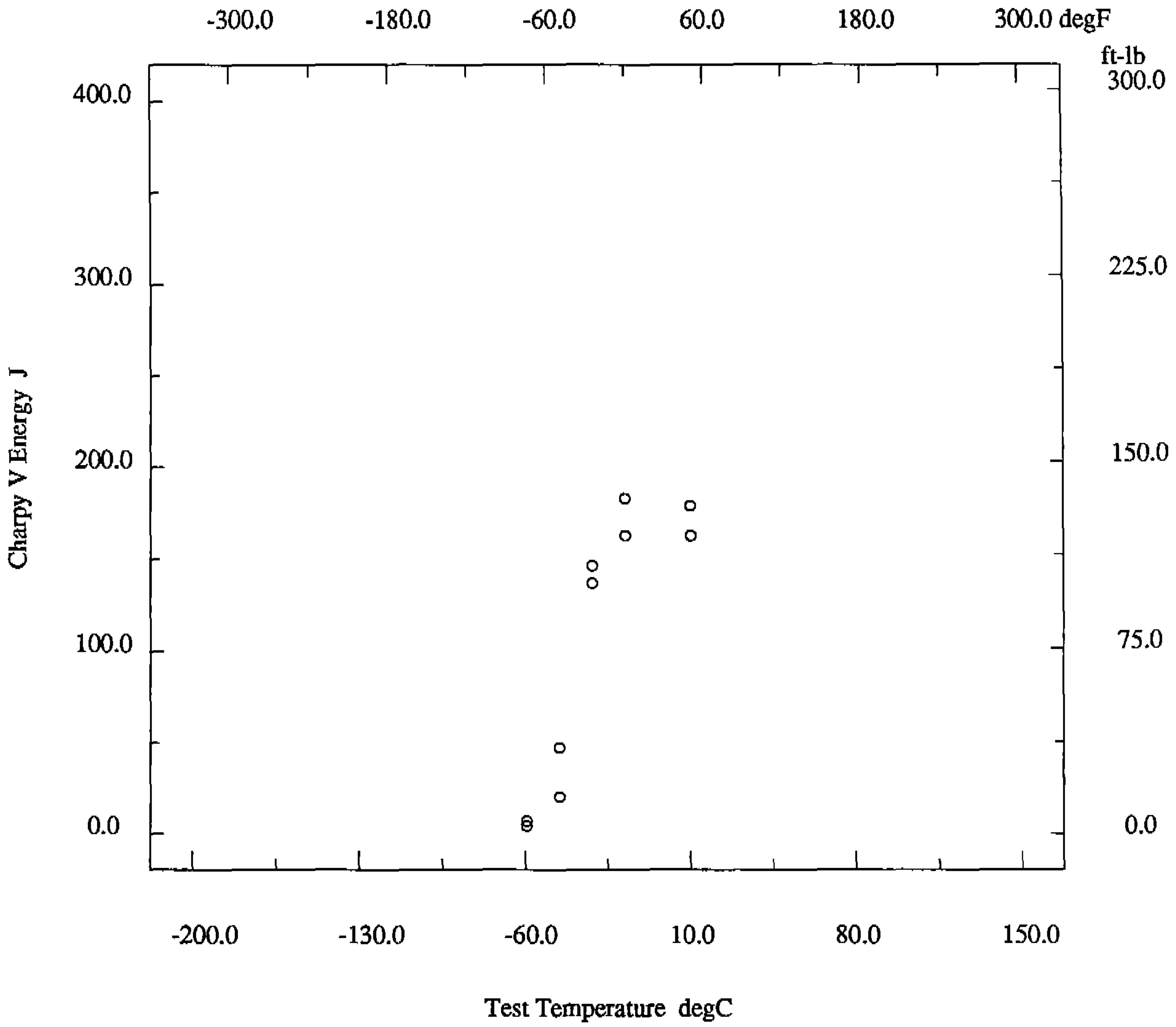
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T ○ | -75 | 3 | 5 | 10 |
| L-T ○ | -75 | 5 | 6 | 10 |
| L-T ○ | -50 | 15 | 13 | 25 |
| L-T ○ | -50 | 35 | 25 | 30 |
| L-T ○ | -25 | 101 | 73 | 80 |
| L-T ○ | -25 | 108 | 60 | 75 |
| L-T ○ | 0 | 120 | 73 | 80 |
| L-T ○ | 0 | 135 | 80 | 100 |
| L-T ○ | 50 | 120 | 71 | 90 |
| L-T ○ | 50 | 132 | 78 | 95 |

* - not reported

## Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.002.02BS3 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.002.09BS4 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |

## Composition

See Page 3200.1

## Fabrication History

See Page 3200.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.002.09BS4 | Weld Type | SAW |
| Base Metal Thickness | 1 in | Welding Position | Downhand IG |
| Preheat Temperature | 50 degF | Metal Gap | 5/16 in |
| Interpass Temperature | 350 degF | Passes | 7 |
| Filler Specification | F72-EM12K | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | * |
| Shielding Gas | * | Voltage | * |
| Amperage | * | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 74 KJ/in |
| 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 | 1200 degF | Post-Weld Heat Time | 5 hr |
| Flux Type | * | Flux Name | * |
| Weld Composition Reported? | No | | |

## Property Measurements

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

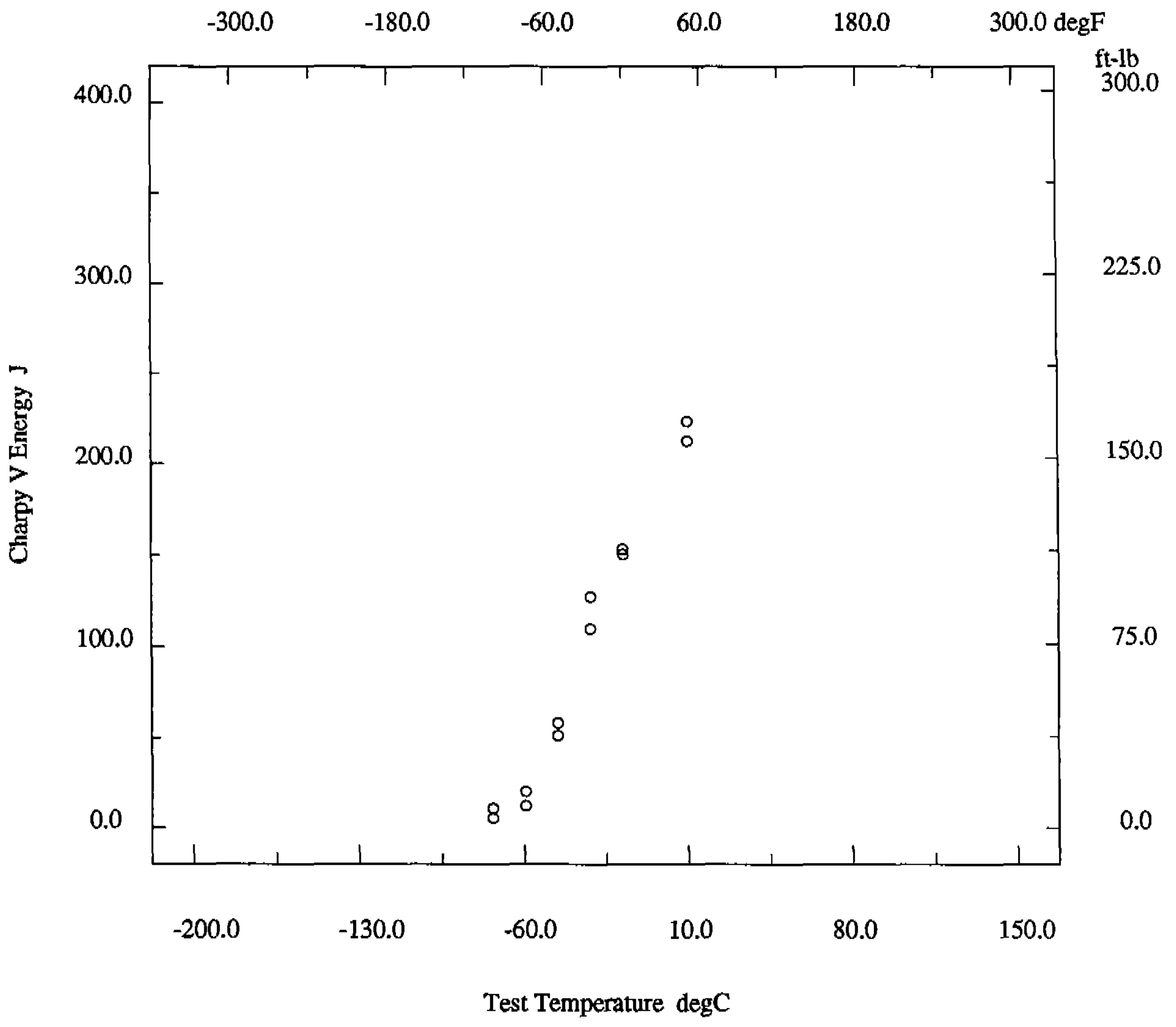
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T ○ | -100 | 4 | 4 | 10 |
| L-T ○ | -100 | 8 | 8 | 10 |
| L-T ○ | -75 | 15 | 18 | 20 |
| L-T ○ | -75 | 9 | 12 | 25 |
| L-T ○ | -50 | 38 | 34 | 35 |
| L-T ○ | -50 | 43 | 36 | 40 |
| L-T ○ | -25 | 81 | 68 | 65 |
| L-T ○ | -25 | 94 | 76 | 75 |
| L-T ○ | 0 | 111 | 80 | 80 |
| L-T ○ | 0 | 113 | 80 | 50 |
| L-T ○ | 50 | 157 | 80 | 100 |
| L-T ○ | 50 | 165 | 86 | 100 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.002.09BS4 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.002.02BS4 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |

## Composition

See Page 3200.1

## Fabrication History

See Page 3200.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.002.02BS4 | Weld Type | SAW |
| Base Metal Thickness | 1 in | Welding Position | Downhand IG |
| Preheat Temperature | 50 degF | Metal Gap | 5/16 in |
| Interpass Temperature | 350 degF | Passes | 7 |
| Filler Specification | F72-EM12K | Filler Name | * |
| Filler Carbon Content | * | Filler Metal Size | * |
| Shielding Gas | * | Voltage | * |
| Amperage | * | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 74 KJ/in |
| Joint Preparation | V Groove | Number of Sides | 1 |
| Location wrt Weld | Fusion line | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | 1200 degF | Post-Weld Heat Time | 5 hr |
| Flux Type | * | Flux Name | * |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T ○ | -75 | 2 | 3 | 5 |
| L-T ○ | -75 | 2 | 3 | 5 |
| L-T ○ | -50 | 5 | 8 | 10 |
| L-T ○ | -50 | 6 | 8 | 20 |
| L-T ○ | -25 | 13 | 9 | 20 |
| L-T ○ | -25 | 5 | 3 | 10 |
| L-T ○ | 0 | 42 | 37 | 40 |
| L-T ○ | 0 | 67 | 57 | 35 |
| L-T ○ | 50 | 119 | 79 | 90 |

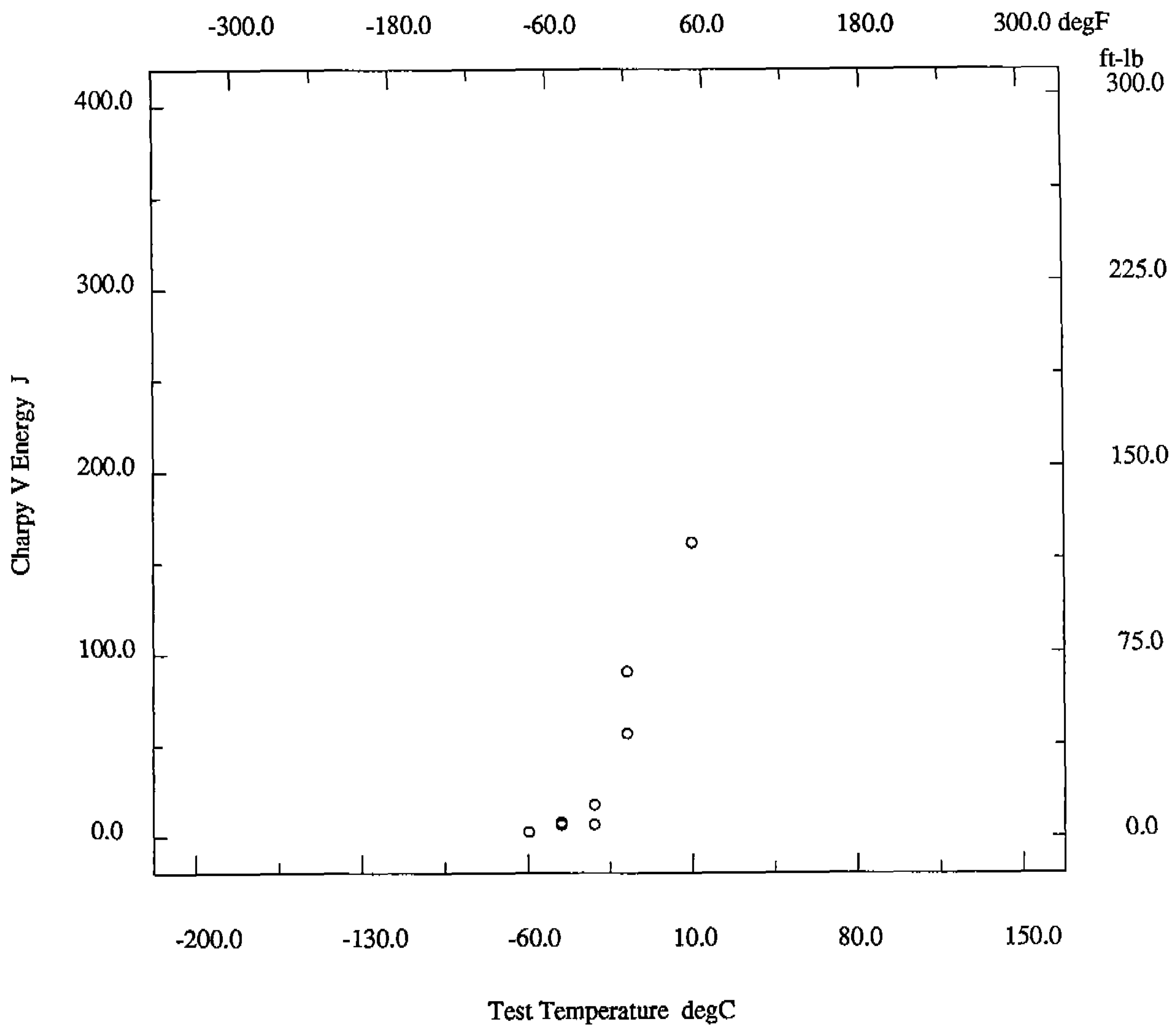
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.002.02BS4 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |




* - not reported

265

# Material A36



## Description

Material Code ................ 009.002.09BS1
Material Name ........................ A36
UNS .................................. *
Other Designation ...................... *
Type ......................... Welded Joint
Form ................................ Plate
Thickness ............................ 1 in
Composition Type ................... Actual
Composition Position ................... *
Lot ID ................................. *
Reference ...................... KONKUL-1

## Composition

See Page 3200.1

## Fabrication History

See Page 3200.1

## Weld

Weld Code .................. 009.002.09BS1
Weld Type ............................ SAW
Base Metal Thickness ................. 1 in
Welding Position ............. Downhand IG
Preheat Temperature .............. 50 degF
Metal Gap ........................ 5/16 in
Interpass Temperature ........... 350 degF
Passes ................................. 7
Filler Specification .......... F72-EM12K
Filler Name ............................ *
Filler Carbon Content .................. *
Filler Metal Size ...................... *
Shielding Gas .......................... *
Voltage ................................ *
Amperage ............................... *
Polarity ............................... *
Travel Speed ........................... *
Heat Input/Pass ................. 74 KJ/in
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 ............ 1100 degF
Post-Weld Heat Time .................. 1 hr
Flux Type .............................. *
Flux Name .............................. *
Weld Composition Reported? ............. No

## Property Measurements

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

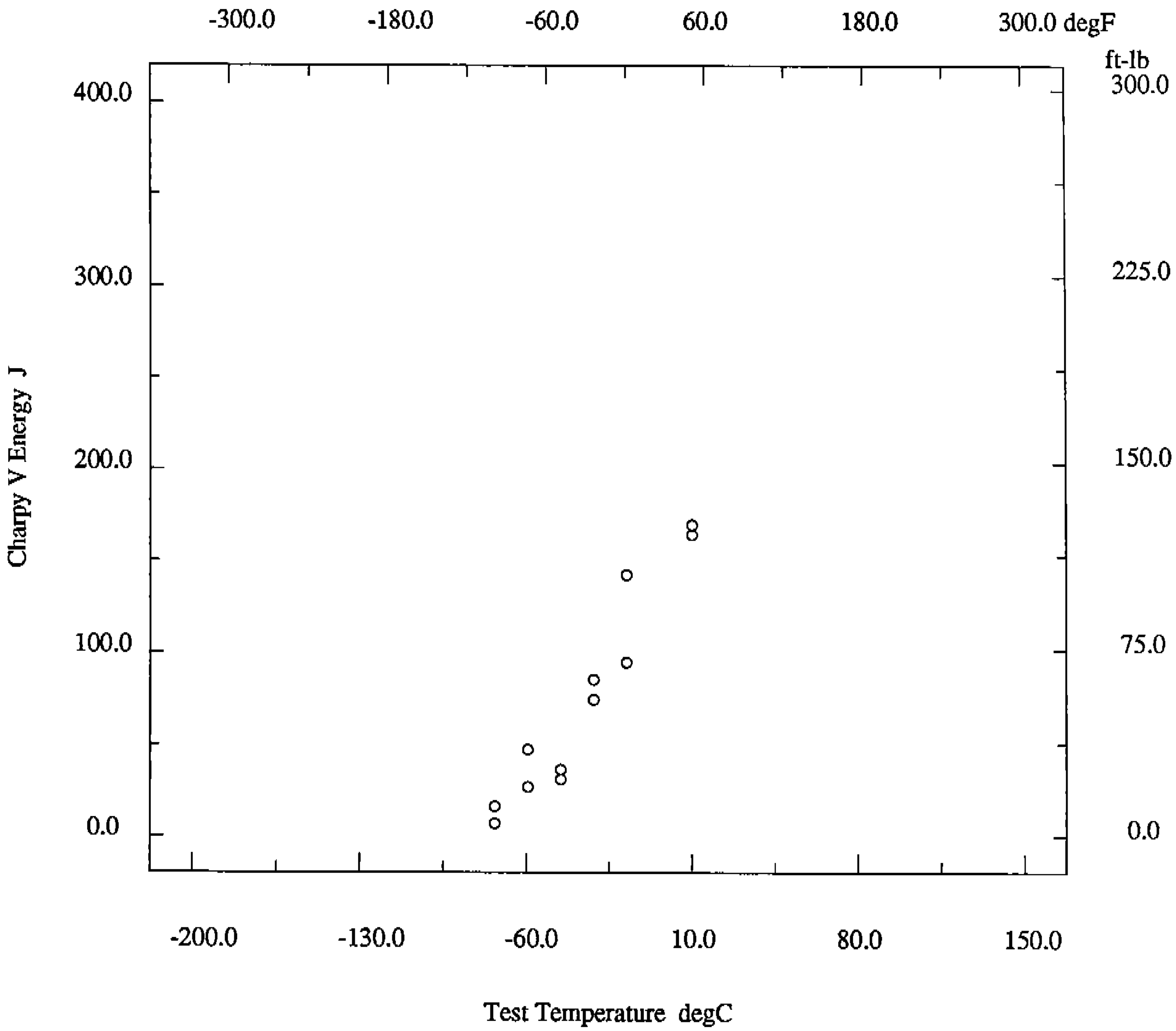
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans mils | Shear % |
|---|---|---|---|---|
| L-T ○ | -100 | 12 | 8 | 10 |
| L-T ○ | -100 | 5 | 4 | 10 |
| L-T ○ | -75 | 20 | 13 | 25 |
| L-T ○ | -75 | 35 | 25 | 20 |
| L-T ○ | -50 | 23 | 22 | 35 |
| L-T ○ | -50 | 27 | 25 | 30 |
| L-T ○ | -25 | 55 | 45 | 30 |
| L-T ○ | -25 | 63 | 49 | 35 |
| L-T ○ | 0 | 105 | 78 | 80 |
| L-T ○ | 0 | 70 | 62 | 70 |
| L-T ○ | 50 | 121 | 85 | 95 |
| L-T ○ | 50 | 125 | 88 | 95 |

* - not reported

## Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.002.09BS1 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 1 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | KONKUL-1 | | |




* - not reported

247

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.010.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 14460 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.19 % | Mn | 0.96 % |
| P | 0.01 % | S | 0.019 % |
| Si | 0.05 % | Cr | 0.04 % |
| Ni | 0.07 % | Mo | 0.03 % |
| V | * | Cu | 0.07 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 0 | No | Yes |

* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.010.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 14460 |
| Reference | Armco-MPC | | |

## Composition

See Page 3300.1

## Fabrication History

See Page 3300.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | * | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 10 | 9 | 5 |
| L-T ○ | -25 | 12 | 13 | 10 |
| L-T ○ | -25 | 8 | 8 | 5 |
| L-T ○ | 0 | 10 | 11 | 15 |
| L-T ○ | 0 | 25 | 26 | 15 |
| L-T ○ | 0 | 33 | 33 | 20 |
| L-T ○ | 25 | 26 | 34 | 30 |
| L-T ○ | 25 | 32 | 36 | 30 |
| L-T ○ | 25 | 41 | 40 | 40 |
| L-T ○ | 50 | 55 | 50 | 50 |
| L-T ○ | 50 | 62 | 52 | 55 |
| L-T ○ | 50 | 73 | 63 | 60 |
| L-T ○ | 75 | 69 | 60 | 60 |
| L-T ○ | 75 | 71 | 62 | 65 |
| L-T ○ | 75 | 77 | 63 | 70 |
| L-T ○ | 212 | 106 | 60 | 100 |
| L-T ○ | 212 | 107 | 60 | 100 |
| L-T ○ | 212 | 109 | 78 | 100 |
| T-L △ | -25 | 6 | 6 | 5 |
| T-L △ | -25 | 7 | 8 | 5 |
| T-L △ | -25 | 8 | 8 | 10 |
| T-L △ | 0 | 11 | 13 | 10 |
| T-L △ | 0 | 12 | 14 | 10 |
| T-L △ | 0 | 14 | 16 | 10 |
| T-L △ | 25 | 18 | 23 | 30 |
| T-L △ | 25 | 21 | 24 | 30 |
| T-L △ | 25 | 24 | 26 | 35 |
| T-L △ | 50 | 25 | 28 | 40 |
| T-L △ | 50 | 28 | 34 | 40 |
| T-L △ | 50 | 32 | 35 | 45 |
| T-L △ | 75 | 30 | 35 | 65 |
| T-L △ | 75 | 32 | 37 | 65 |
| T-L △ | 75 | 37 | 40 | 65 |
| T-L △ | 212 | 47 | 53 | 100 |

(continued)

* - not reported

# Material A36



(continued)

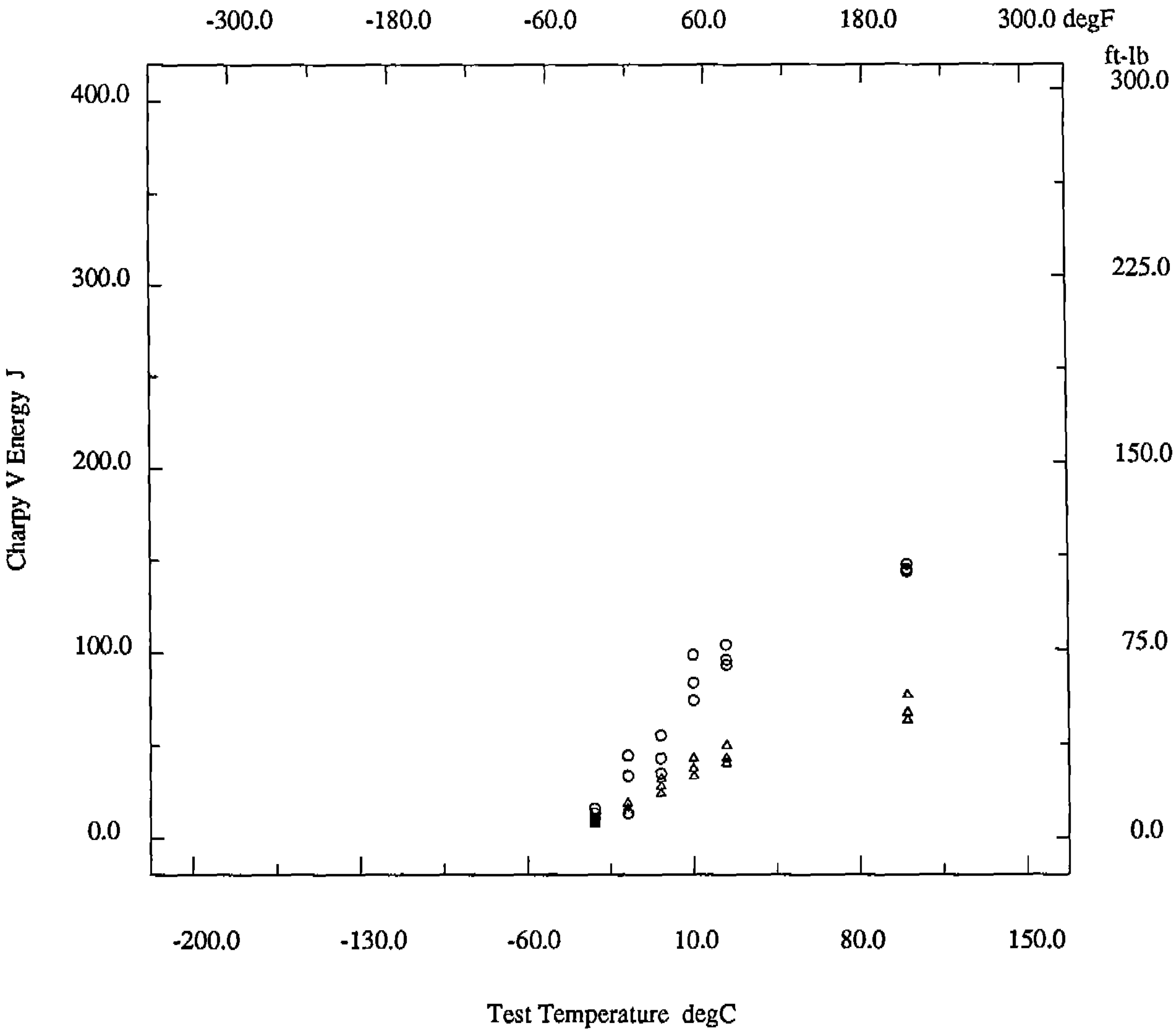
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| T-L △ | 212 | 50 | 58 | 100 |
| T-L △ | 212 | 57 | 64 | 100 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.010.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 14460 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.011.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 11672 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.22 % | Mn | 0.86 % |
| P | 0.01 % | S | 0.017 % |
| Si | 0.05 % | Cr | 0.01 % |
| Ni | 0.07 % | Mo | 0.01 % |
| V | * | Cu | 0.06 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 0 | No | Yes |

* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.011.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 11672 |
| Reference | Armco-MPC | | |

## Composition

See Page 3400.1

## Fabrication History

See Page 3400.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | * | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 13 | 15 | 10 |
| L-T ○ | -25 | 7 | 8 | 5 |
| L-T ○ | -25 | 8 | 8 | 5 |
| L-T ○ | 0 | 10 | 11 | 10 |
| L-T ○ | 0 | 10 | 12 | 15 |
| L-T ○ | 0 | 9 | 11 | 10 |
| L-T ○ | 25 | 14 | 20 | 30 |
| L-T ○ | 25 | 37 | 37 | 40 |
| L-T ○ | 25 | 39 | 39 | 40 |
| L-T ○ | 50 | 41 | 43 | 45 |
| L-T ○ | 50 | 49 | 45 | 55 |
| L-T ○ | 50 | 68 | 63 | 65 |
| L-T ○ | 75 | 63 | 58 | 70 |
| L-T ○ | 75 | 73 | 66 | 75 |
| L-T ○ | 75 | 81 | 67 | 85 |
| L-T ○ | 212 | 93 | 54 | 100 |
| L-T ○ | 212 | 95 | 56 | 100 |
| L-T ○ | 212 | 96 | 63 | 100 |
| T-L △ | -25 | 6 | 5 | 5 |
| T-L △ | -25 | 8 | 10 | 10 |
| T-L △ | -25 | 8 | 8 | 10 |
| T-L △ | 0 | 11 | 14 | 15 |
| T-L △ | 0 | 13 | 16 | 20 |
| T-L △ | 0 | 9 | 9 | 10 |
| T-L △ | 25 | 13 | 17 | 25 |
| T-L △ | 25 | 20 | 25 | 30 |
| T-L △ | 25 | 21 | 30 | 30 |
| T-L △ | 50 | 27 | 29 | 50 |
| T-L △ | 50 | 28 | 33 | 50 |
| T-L △ | 50 | 29 | 34 | 50 |
| T-L △ | 75 | 34 | 40 | 80 |
| T-L △ | 75 | 36 | 45 | 80 |
| T-L △ | 75 | 38 | 50 | 80 |
| T-L △ | 212 | 46 | 56 | 100 |

(continued)

* - not reported

## Material A36



(continued)

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| T-L ^ | 212 | 47 | 56 | 100 |
| T-L ^ | 212 | 48 | 57 | 100 |

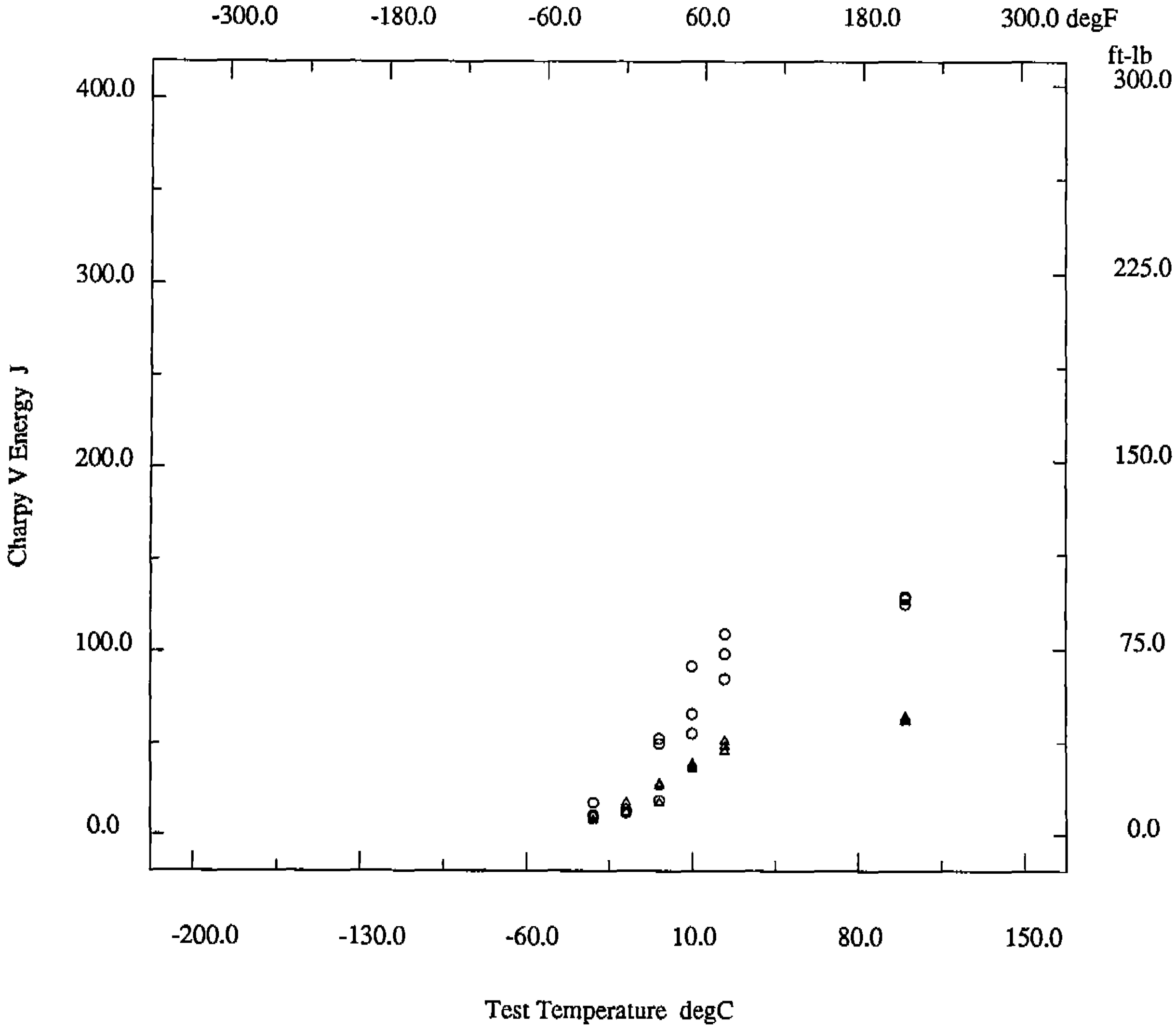
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.011.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 11672 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.012.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 43752 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.17 % | Mn | 0.89 % |
| P | 0.01 % | S | 0.018 % |
| Si | 0.04 % | Cr | 0.08 % |
| Ni | 0.04 % | Mo | 0.07 % |
| V | * | Cu | 0.09 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 0 | Yes | Yes |

* - not reported

# Material A36



| **Description** | | | |
|---|---|---|---|
| Material Code | 009.012.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 43752 |
| Reference | Armco-MPC | | |
| **Composition** | | See Page 3500.1 | |
| **Fabrication History** | | See Page 3500.1 | |
| **Property Measurements** | | | |
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | * | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 5 | 5 | 5 |
| L-T ○ | -25 | 6 | 6 | 5 |
| L-T ○ | -25 | 8 | 8 | 10 |
| L-T ○ | 0 | 10 | 13 | 10 |
| L-T ○ | 0 | 10 | 13 | 10 |
| L-T ○ | 0 | 30 | 33 | 15 |
| L-T ○ | 25 | 15 | 20 | 25 |
| L-T ○ | 25 | 18 | 22 | 25 |
| L-T ○ | 25 | 25 | 30 | 25 |
| L-T ○ | 50 | 26 | 30 | 45 |
| L-T ○ | 50 | 53 | 53 | 50 |
| L-T ○ | 50 | 58 | 55 | 55 |
| L-T ○ | 75 | 67 | 62 | 60 |
| L-T ○ | 75 | 91 | 88 | 70 |
| L-T ○ | 75 | 96 | 92 | 70 |
| L-T ○ | 212 | 133 | 61 | 100 |
| L-T ○ | 212 | 143 | 65 | 100 |
| L-T ○ | 212 | 154 | 69 | 100 |
| T-L △ | -25 | 6 | 8 | 5 |
| T-L △ | -25 | 8 | 10 | 5 |
| T-L △ | -25 | 8 | 8 | 5 |
| T-L △ | 0 | 10 | 13 | 15 |
| T-L △ | 0 | 11 | 13 | 15 |
| T-L △ | 0 | 9 | 12 | 10 |
| T-L △ | 25 | 13 | 18 | 30 |
| T-L △ | 25 | 17 | 22 | 30 |
| T-L △ | 25 | 18 | 23 | 30 |
| T-L △ | 50 | 24 | 30 | 40 |
| T-L △ | 50 | 25 | 31 | 40 |
| T-L △ | 50 | 26 | 34 | 45 |
| T-L △ | 75 | 33 | 42 | 70 |
| T-L △ | 75 | 34 | 42 | 80 |
| T-L △ | 75 | 36 | 44 | 80 |
| T-L △ | 212 | 52 | 58 | 100 |

(continued)

* - not reported

# Material A36



(continued)

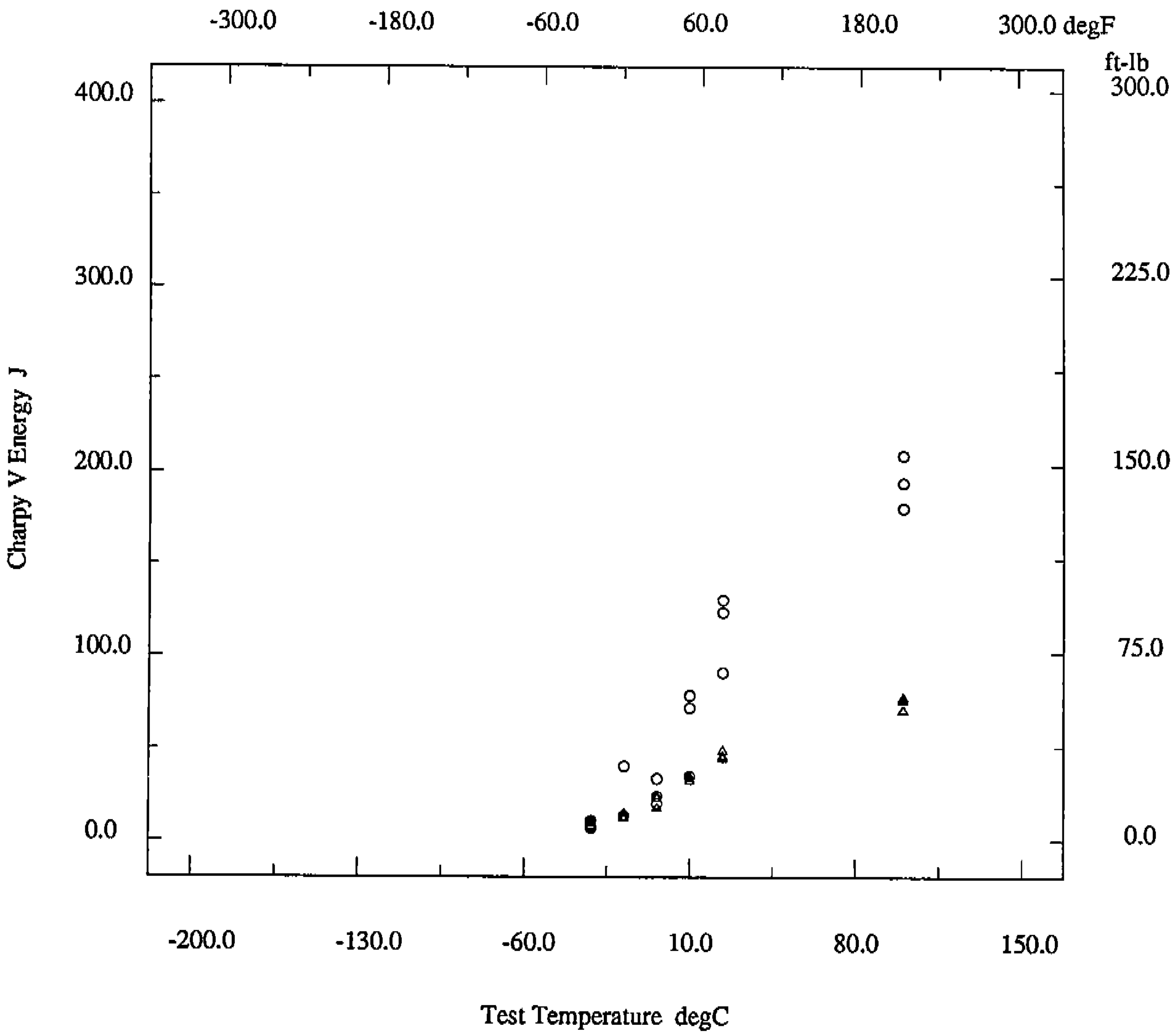
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| T-L ▵ | 212 | 56 | 60 | 100 |
| T-L ▵ | 212 | 57 | 62 | 100 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.012.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 43752 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.013.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 14320 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.21 % | Mn | 1.03 % |
| P | 0.01 % | S | 0.014 % |
| Si | 0.07 % | Cr | 0.02 % |
| Ni | 0.05 % | Mo | 0.01 % |
| V | * | Cu | 0.08 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 0 | Yes | Yes |

* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.013.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 14320 |
| Reference | Armco-MPC | | |

**Composition** See Page 3600.1

**Fabrication History** See Page 3600.1

**Property Measurements**

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | * | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 11 | 13 | 5 |
| L-T ○ | -25 | 6 | 8 | 5 |
| L-T ○ | -25 | 8 | 9 | 5 |
| L-T ○ | 0 | 30 | 29 | 25 |
| L-T ○ | 0 | 32 | 32 | 25 |
| L-T ○ | 0 | 36 | 33 | 25 |
| L-T ○ | 25 | 49 | 47 | 45 |
| L-T ○ | 25 | 59 | 55 | 50 |
| L-T ○ | 25 | 72 | 64 | 60 |
| L-T ○ | 50 | 61 | 56 | 55 |
| L-T ○ | 50 | 63 | 57 | 60 |
| L-T ○ | 50 | 76 | 64 | 60 |
| L-T ○ | 75 | 57 | 58 | 50 |
| L-T ○ | 75 | 77 | 65 | 60 |
| L-T ○ | 75 | 83 | 68 | 70 |
| L-T ○ | 212 | 107 | 85 | 100 |
| L-T ○ | 212 | 108 | 86 | 100 |
| L-T ○ | 212 | 111 | 89 | 100 |
| T-L ▵ | -25 | 5 | 6 | 5 |
| T-L ▵ | -25 | 6 | 7 | 5 |
| T-L ▵ | -25 | 7 | 8 | 10 |
| T-L ▵ | 0 | 13 | 18 | 10 |
| T-L ▵ | 0 | 18 | 20 | 15 |
| T-L ▵ | 0 | 21 | 22 | 15 |
| T-L ▵ | 25 | 15 | 18 | 25 |
| T-L ▵ | 25 | 24 | 28 | 25 |
| T-L ▵ | 25 | 26 | 33 | 25 |
| T-L ▵ | 50 | 32 | 36 | 40 |
| T-L ▵ | 50 | 35 | 36 | 40 |
| T-L ▵ | 50 | 37 | 37 | 50 |
| T-L ▵ | 75 | 35 | 41 | 70 |
| T-L ▵ | 75 | 39 | 45 | 70 |
| T-L ▵ | 75 | 44 | 47 | 70 |
| T-L ▵ | 212 | 61 | 62 | 100 |

(continued)

* - not reported

# Material A36



(continued)

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| T-L ▵ | 212 | 63 | 64 | 100 |
| T-L ▵ | 212 | 63 | 70 | 100 |

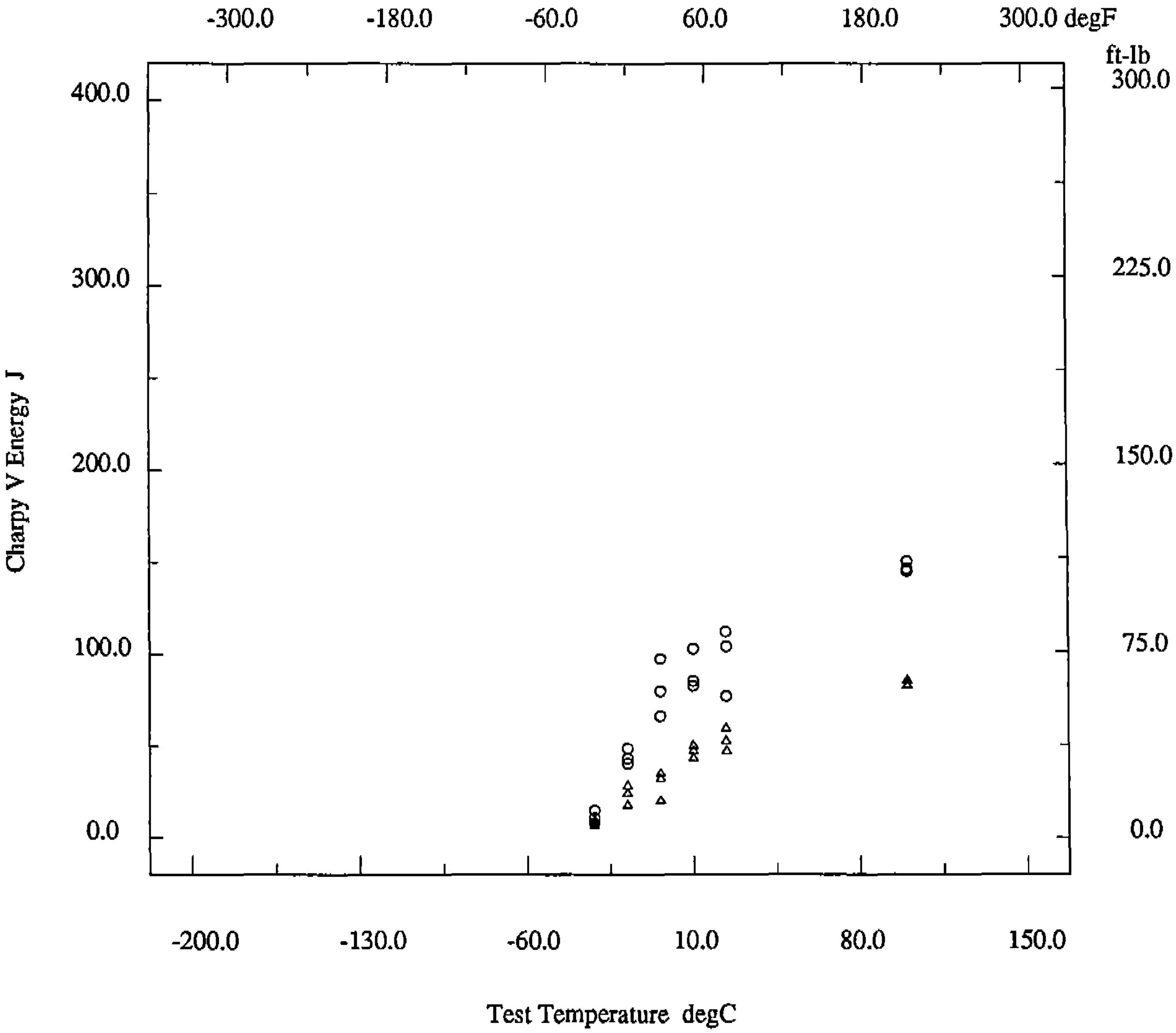
* - not reported

25

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.013.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 14320 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.014.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 60868 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.17 % | Mn | 1.19 % |
| P | 0.013 % | S | 0.018 % |
| Si | 0.07 % | Cr | 0.02 % |
| Ni | 0.02 % | Mo | 0.03 % |
| V | * | Cu | 0.06 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductility Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 0 | Yes | Yes |

* - not reported

285

# Material A36



**Description**

Material Code ................... 009.014.01
UNS ................................ *
Type ....................... Wrought Metal
Thickness ......................... 1.00 in
Composition Position ..................... *
Reference ..................... Armco-MPC
Material Name ....................... A36
Other Designation ...................... *
Form .................................. Plate
Composition Type .................. Actual
Lot ID ........................... 60868

**Composition** See Page 3700.1

**Fabrication History** See Page 3700.1

**Property Measurements**

Test Type ................. Charpy V Impact
Specimen Type ......................... Full
Did Specimen Split? ..................... *
Standard Year ............................ *
Position ................................ *
Did Specimen Fracture? ................ Yes
Standard Method ....................... *

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 4 | 3 | 5 |
| L-T ○ | -25 | 5 | 4 | 5 |
| L-T ○ | -25 | 6 | 5 | 5 |
| L-T ○ | 0 | 20 | 23 | 15 |
| L-T ○ | 0 | 7 | 10 | 15 |
| L-T ○ | 0 | 8 | 11 | 15 |
| L-T ○ | 25 | 12 | 14 | 20 |
| L-T ○ | 25 | 28 | 30 | 25 |
| L-T ○ | 25 | 57 | 52 | 40 |
| L-T ○ | 50 | 45 | 42 | 40 |
| L-T ○ | 50 | 48 | 46 | 45 |
| L-T ○ | 50 | 52 | 55 | 50 |
| L-T ○ | 75 | 49 | 51 | 55 |
| L-T ○ | 75 | 49 | 51 | 55 |
| L-T ○ | 75 | 64 | 62 | 60 |
| L-T ○ | 212 | 102 | 76 | 100 |
| L-T ○ | 212 | 103 | 78 | 100 |
| L-T ○ | 212 | 97 | 66 | 100 |
| T-L △ | -25 | 5 | 3 | 5 |
| T-L △ | -25 | 5 | 4 | 5 |
| T-L △ | -25 | 5 | 5 | 10 |
| T-L △ | 0 | 6 | 8 | 10 |
| T-L △ | 0 | 7 | 8 | 10 |
| T-L △ | 0 | 9 | 12 | 10 |
| T-L △ | 25 | 11 | 14 | 25 |
| T-L △ | 25 | 12 | 16 | 25 |
| T-L △ | 25 | 22 | 24 | 30 |
| T-L △ | 50 | 20 | 25 | 35 |
| T-L △ | 50 | 21 | 26 | 40 |
| T-L △ | 50 | 27 | 32 | 40 |
| T-L △ | 75 | 29 | 36 | 50 |
| T-L △ | 75 | 37 | 40 | 60 |
| T-L △ | 75 | 42 | 45 | 65 |
| T-L △ | 212 | 61 | 65 | 100 |

(continued)

* - not reported

# Material A36



(continued)

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| T-L ▵ | 212 | 62 | 70 | 100 |
| T-L ▵ | 212 | 65 | 73 | 100 |

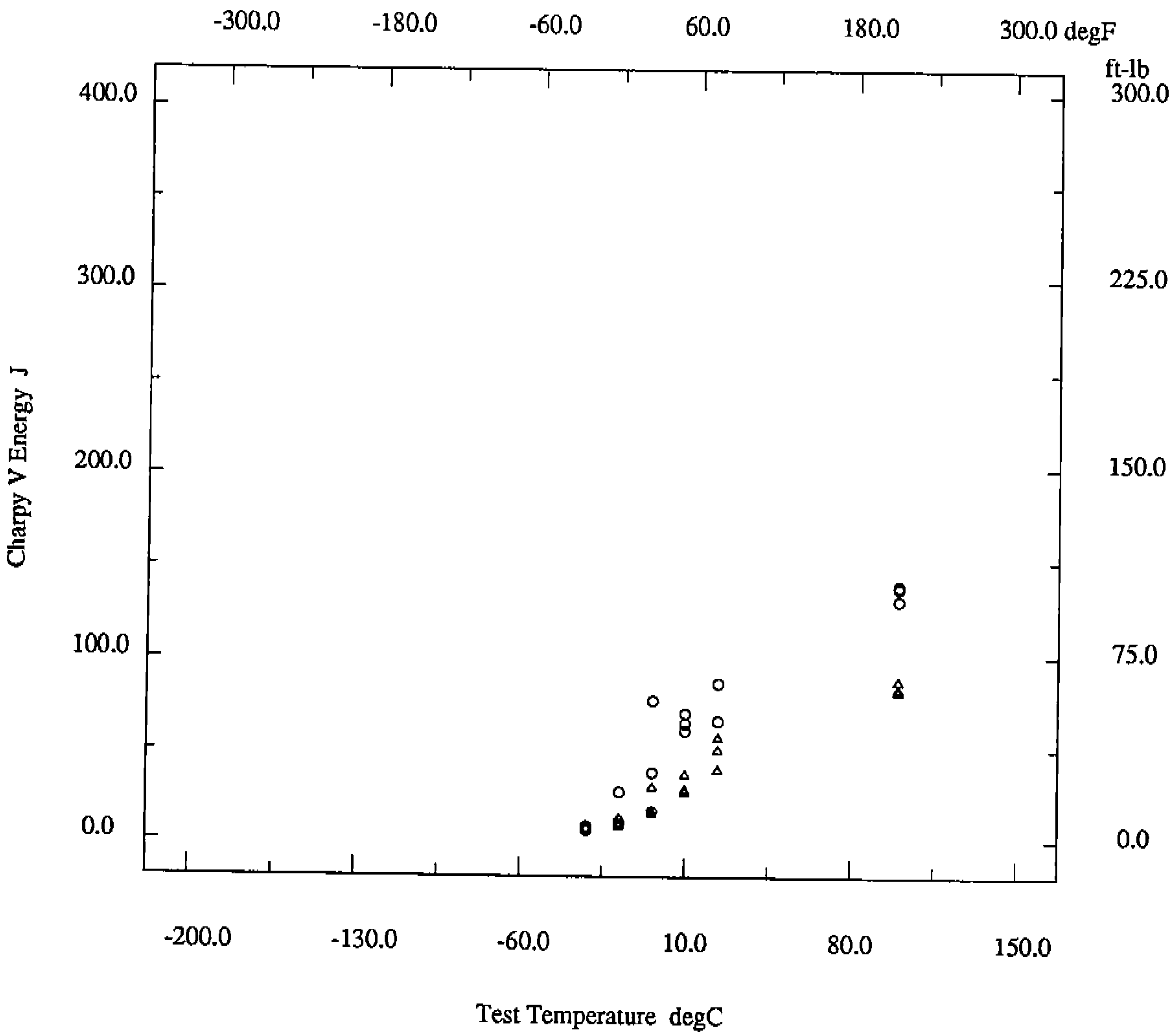
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.014.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 60868 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.015.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 0 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.22 % | Mn | 0.92 % |
| P | 0.01 % | S | 0.021 % |
| Si | 0.06 % | Cr | 0.05 % |
| Ni | 0.08 % | Mo | 0.01 % |
| V | * | Cu | 0.07 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | * |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 30 | Yes | Yes |

* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.015.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 0 |
| Reference | Armco-MPC | | |

**Composition** See Page 3800.1

**Fabrication History** See Page 3800.1

**Property Measurements**

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 16 | 6 | 5 |
| L-T ○ | -25 | 6 | 2 | 5 |
| L-T ○ | -25 | 8 | 3 | 5 |
| L-T ○ | 0 | 27 | 15 | 20 |
| L-T ○ | 0 | 31 | 18 | 20 |
| L-T ○ | 0 | 8 | 9 | 10 |
| L-T ○ | 25 | 32 | 20 | 35 |
| L-T ○ | 25 | 34 | 23 | 35 |
| L-T ○ | 25 | 36 | 25 | 35 |
| L-T ○ | 50 | 35 | 14 | 45 |
| L-T ○ | 50 | 47 | 28 | 50 |
| L-T ○ | 50 | 52 | 28 | 55 |
| L-T ○ | 75 | 50 | 34 | 60 |
| L-T ○ | 75 | 57 | 35 | 65 |
| L-T ○ | 75 | 65 | 36 | 70 |
| L-T ○ | 212 | 85 | 51 | 100 |
| L-T ○ | 212 | 86 | 53 | 100 |
| L-T ○ | 212 | 87 | 56 | 100 |
| T-L △ | -25 | 4 | 2 | 5 |
| T-L △ | -25 | 6 | 3 | 5 |
| T-L △ | -25 | 8 | 6 | 5 |
| T-L △ | 0 | 12 | 15 | 10 |
| T-L △ | 0 | 16 | 18 | 10 |
| T-L △ | 0 | 8 | 9 | 10 |
| T-L △ | 25 | 17 | 20 | 20 |
| T-L △ | 25 | 18 | 23 | 20 |
| T-L △ | 25 | 19 | 25 | 20 |
| T-L △ | 50 | 25 | 14 | 50 |
| T-L △ | 50 | 25 | 28 | 50 |
| T-L △ | 50 | 26 | 28 | 50 |
| T-L △ | 75 | 28 | 34 | 50 |
| T-L △ | 75 | 28 | 35 | 50 |
| T-L △ | 75 | 30 | 36 | 50 |
| T-L △ | 212 | 45 | 51 | 100 |

(continued)

* - not reported

# Material A36



(continued)

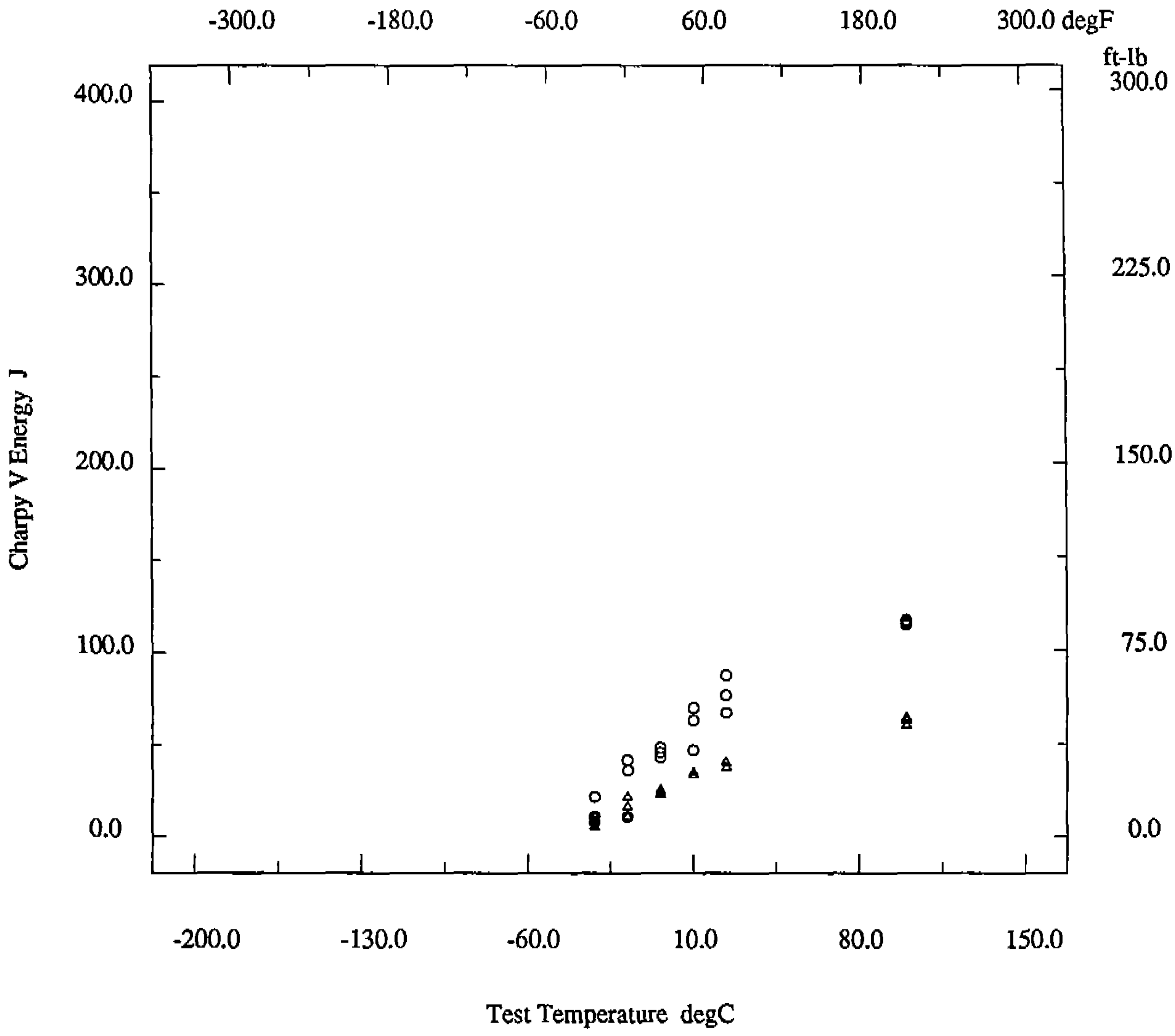
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| T-L ▵ | 212 | 47 | 53 | 100 |
| T-L ▵ | 212 | 48 | 56 | 100 |

* - not reported

## Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.015.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 0 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.016.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.125 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 1 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.22 % | Mn | 1.00 % |
| P | 0.013 % | S | 0.022 % |
| Si | 0.06 % | Cr | 0.04 % |
| Ni | 0.05 % | Mo | 0.02 % |
| V | * | Cu | 0.09 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | * |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductility Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 30 | Yes | Yes |

* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.016.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.125 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 1 |
| Reference | Armco-MPC | | |

## Composition

See Page 3900.1

## Fabrication History

See Page 3900.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

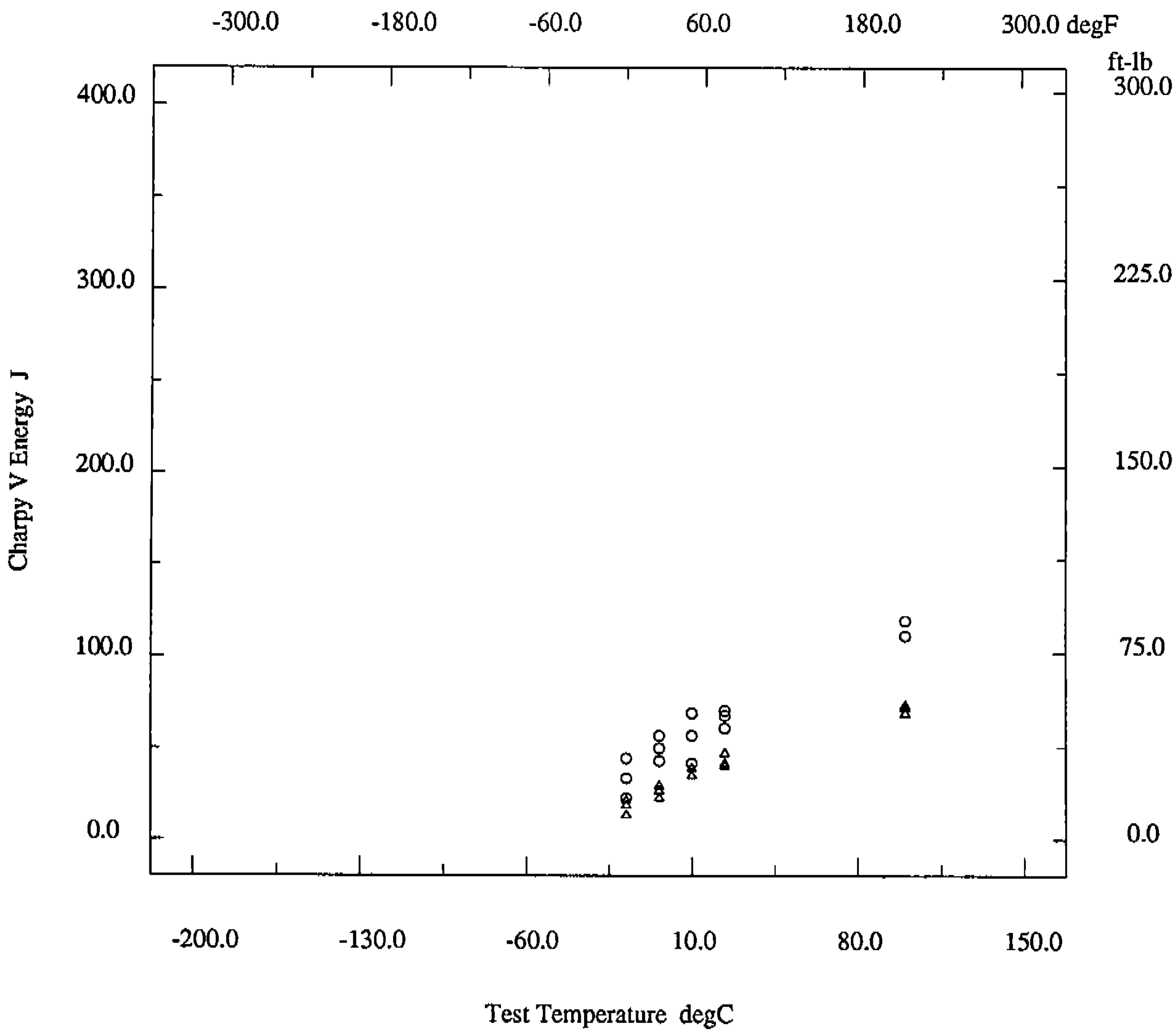
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | 0 | 17 | 18 | 15 |
| L-T ○ | 0 | 25 | 24 | 15 |
| L-T ○ | 0 | 33 | 34 | 20 |
| L-T ○ | 25 | 32 | 31 | 30 |
| L-T ○ | 25 | 37 | 37 | 30 |
| L-T ○ | 25 | 42 | 40 | 30 |
| L-T ○ | 50 | 31 | 29 | 45 |
| L-T ○ | 50 | 42 | 30 | 45 |
| L-T ○ | 50 | 51 | 31 | 50 |
| L-T ○ | 75 | 45 | 46 | 45 |
| L-T ○ | 75 | 50 | 49 | 45 |
| L-T ○ | 75 | 52 | 54 | 45 |
| L-T ○ | 212 | 82 | 68 | 100 |
| L-T ○ | 212 | 88 | 70 | 100 |
| L-T ○ | 212 | 88 | 72 | 100 |
| T-L △ | 0 | 10 | 12 | 10 |
| T-L △ | 0 | 14 | 18 | 10 |
| T-L △ | 0 | 16 | 19 | 10 |
| T-L △ | 25 | 17 | 21 | 25 |
| T-L △ | 25 | 20 | 24 | 25 |
| T-L △ | 25 | 22 | 25 | 25 |
| T-L △ | 50 | 26 | 30 | 40 |
| T-L △ | 50 | 26 | 31 | 40 |
| T-L △ | 50 | 29 | 31 | 50 |
| T-L △ | 75 | 30 | 36 | 60 |
| T-L △ | 75 | 31 | 40 | 60 |
| T-L △ | 75 | 35 | 41 | 60 |
| T-L △ | 212 | 51 | 54 | 100 |
| T-L △ | 212 | 53 | 58 | 100 |
| T-L △ | 212 | 54 | 62 | 100 |

* - not reported

## Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.016.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.125 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 1 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.017.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.125 in | Composition Type | Actual |
| Composition Position | * | Lot ID | C |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.19 % | Mn | 0.80 % |
| P | 0.01 % | S | 0.013 % |
| Si | 0.04 % | Cr | 0.03 % |
| Ni | 0.06 % | Mo | 0.02 % |
| V | * | Cu | 0.07 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | * |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 30 | Yes | Yes |

* - not reported

## Description

Material Code ........ 009.017.01
Material Name ........ A36
UNS ........ *
Other Designation ........ *
Type ........ Wrought Metal
Form ........ Plate
Thickness ........ 1.125 in
Composition Type ........ Actual
Composition Position ........ *
Lot ID ........ C
Reference ........ Armco-MPC

## Composition

See Page 4000.1

## Fabrication History

See Page 4000.1

## Property Measurements

Test Type ........ Charpy V Impact
Position ........ *
Specimen Type ........ Full
Did Specimen Fracture? ........ Yes
Did Specimen Split? ........ *
Standard Method ........ *
Standard Year ........ *

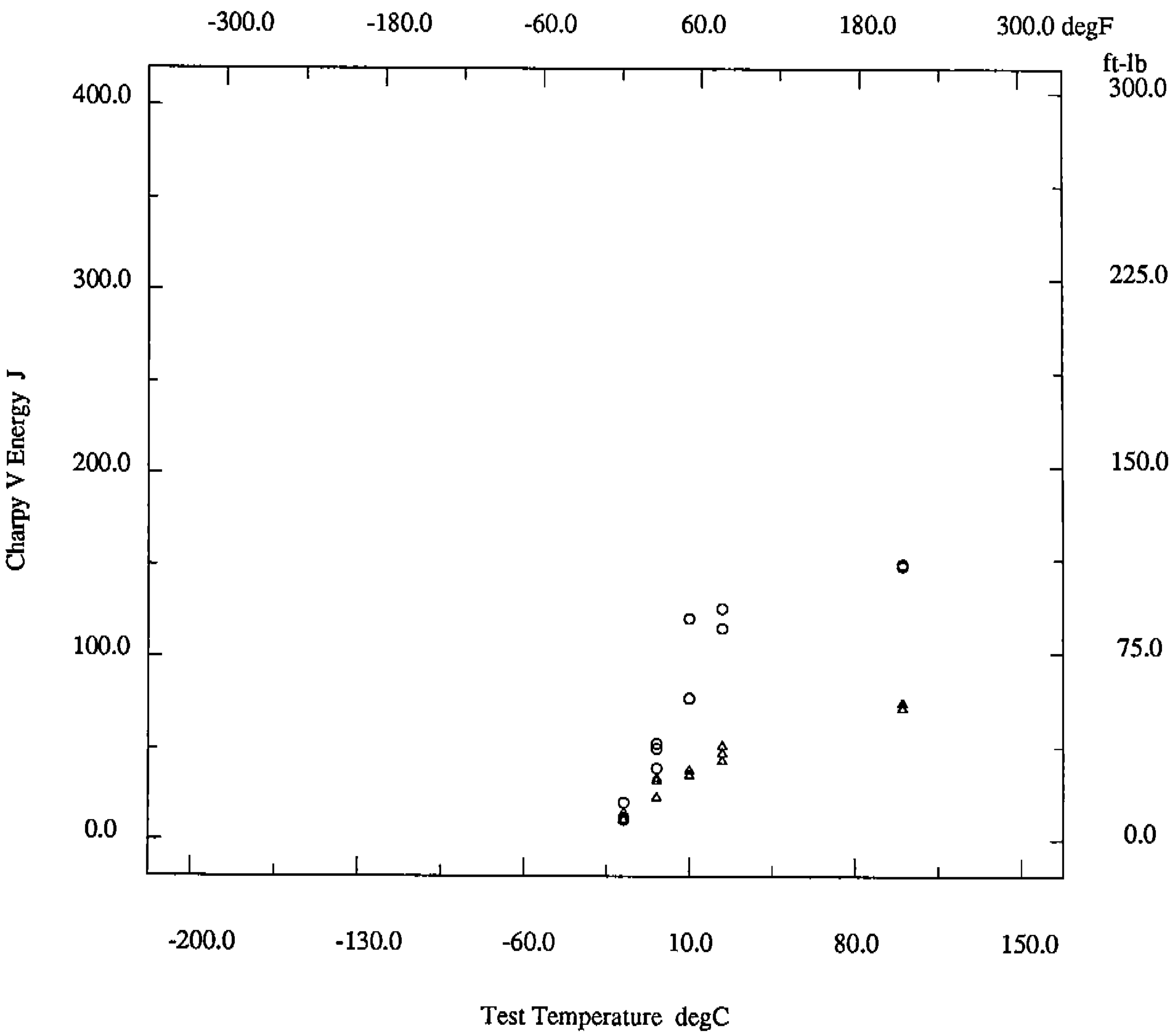
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | 0 | 15 | 17 | 10 |
| L-T ○ | 0 | 8 | 8 | 10 |
| L-T ○ | 0 | 9 | 12 | 10 |
| L-T ○ | 25 | 29 | 40 | 30 |
| L-T ○ | 25 | 37 | 41 | 30 |
| L-T ○ | 25 | 39 | 43 | 30 |
| L-T ○ | 50 | 57 | 52 | 60 |
| L-T ○ | 50 | 89 | 67 | 75 |
| L-T ○ | 50 | 89 | 67 | 80 |
| L-T ○ | 75 | 85 | 69 | 60 |
| L-T ○ | 75 | 85 | 70 | 60 |
| L-T ○ | 75 | 93 | 70 | 70 |
| L-T ○ | 212 | 110 | 64 | 100 |
| L-T ○ | 212 | 110 | 66 | 100 |
| L-T ○ | 212 | 111 | 73 | 100 |
| T-L △ | 0 | 11 | 14 | 10 |
| T-L △ | 0 | 8 | 11 | 10 |
| T-L △ | 0 | 9 | 13 | 10 |
| T-L △ | 25 | 17 | 21 | 25 |
| T-L △ | 25 | 24 | 27 | 25 |
| T-L △ | 25 | 25 | 30 | 25 |
| T-L △ | 50 | 26 | 31 | 35 |
| T-L △ | 50 | 28 | 32 | 40 |
| T-L △ | 50 | 28 | 36 | 40 |
| T-L △ | 75 | 32 | 31 | 70 |
| T-L △ | 75 | 35 | 43 | 75 |
| T-L △ | 75 | 38 | 44 | 75 |
| T-L △ | 212 | 53 | 58 | 100 |
| T-L △ | 212 | 55 | 62 | 100 |
| T-L △ | 212 | 55 | 63 | 100 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.017.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.125 in | Composition Type | Actual |
| Composition Position | * | Lot ID | C |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.018.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.375 in | Composition Type | Actual |
| Composition Position | * | Lot ID | G |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.20 % | Mn | 0.80 % |
| P | 0.012 % | S | 0.013 % |
| Si | 0.04 % | Cr | 0.03 % |
| Ni | 0.05 % | Mo | 0.02 % |
| V | * | Cu | 0.07 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | * |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 30 | Yes | Yes |

* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.018.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.375 in | Composition Type | Actual |
| Composition Position | * | Lot ID | G |
| Reference | Armco-MPC | | |

## Composition

See Page 4100.1

## Fabrication History

See Page 4100.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

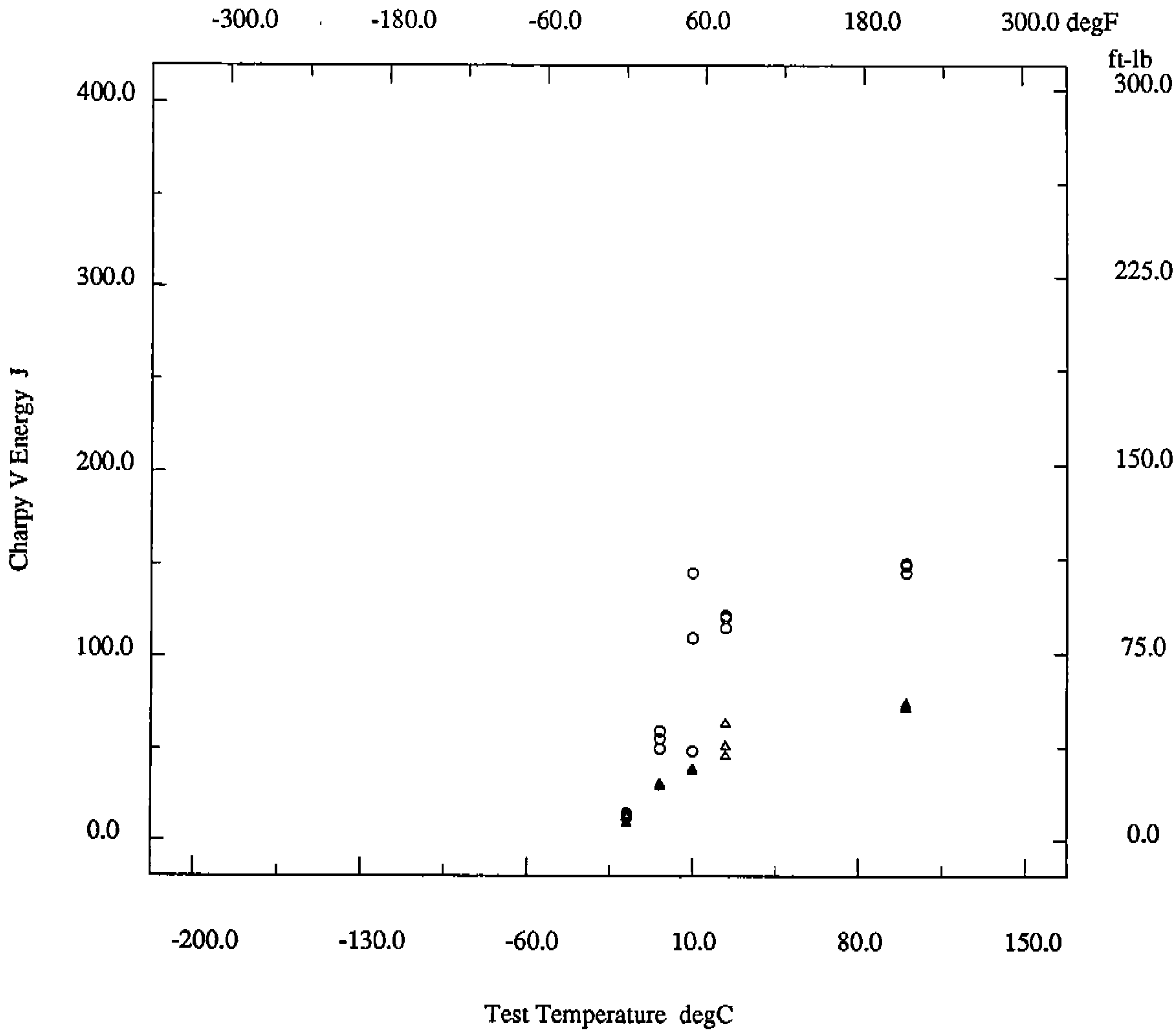
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | 0 | 10 | 13 | 10 |
| L-T ○ | 0 | 11 | 13 | 10 |
| L-T ○ | 0 | 9 | 9 | 10 |
| L-T ○ | 25 | 37 | 38 | 30 |
| L-T ○ | 25 | 41 | 43 | 30 |
| L-T ○ | 25 | 44 | 45 | 30 |
| L-T ○ | 50 | 107 | 58 | 70 |
| L-T ○ | 50 | 36 | 36 | 40 |
| L-T ○ | 50 | 81 | 57 | 60 |
| L-T ○ | 75 | 85 | 68 | 70 |
| L-T ○ | 75 | 89 | 72 | 75 |
| L-T ○ | 75 | 90 | 75 | 75 |
| L-T ○ | 212 | 107 | 62 | 100 |
| L-T ○ | 212 | 110 | 63 | 100 |
| L-T ○ | 212 | 111 | 66 | 100 |
| T-L △ | 0 | 10 | 17 | 10 |
| T-L △ | 0 | 7 | 12 | 10 |
| T-L △ | 0 | 9 | 12 | 10 |
| T-L △ | 25 | 22 | 26 | 25 |
| T-L △ | 25 | 23 | 27 | 25 |
| T-L △ | 25 | 23 | 28 | 25 |
| T-L △ | 50 | 28 | 32 | 40 |
| T-L △ | 50 | 28 | 33 | 45 |
| T-L △ | 50 | 29 | 34 | 45 |
| T-L △ | 75 | 34 | 40 | 60 |
| T-L △ | 75 | 38 | 44 | 65 |
| T-L △ | 75 | 47 | 46 | 70 |
| T-L △ | 212 | 53 | 60 | 100 |
| T-L △ | 212 | 54 | 62 | 100 |
| T-L △ | 212 | 55 | 63 | 100 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.018.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.375 in | Composition Type | Actual |
| Composition Position | * | Lot ID | G |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.019.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 11692 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.21 % | Mn | 1.05 % |
| P | 0.01 % | S | 0.015 % |
| Si | 0.07 % | Cr | 0.02 % |
| Ni | 0.09 % | Mo | 0.02 % |
| V | * | Cu | 0.07 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 10 | Yes | Yes |

* - not reported

3

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.019.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 11692 |
| Reference | Armco-MPC | | |

**Composition** See Page 4200.1

**Fabrication History** See Page 4200.1

**Property Measurements**

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | 0 | 6 | 12 | 10 |
| L-T ○ | 0 | 6 | 8 | 10 |
| L-T ○ | 0 | 8 | 12 | 10 |
| L-T ○ | 25 | 13 | 16 | 25 |
| L-T ○ | 25 | 13 | 16 | 30 |
| L-T ○ | 25 | 13 | 20 | 30 |
| L-T ○ | 50 | 18 | 48 | 55 |
| L-T ○ | 50 | 51 | 50 | 55 |
| L-T ○ | 50 | 52 | 56 | 55 |
| L-T ○ | 75 | 59 | 52 | 80 |
| L-T ○ | 75 | 61 | 58 | 80 |
| L-T ○ | 75 | 63 | 60 | 80 |
| L-T ○ | 212 | 86 | 76 | 100 |
| L-T ○ | 212 | 88 | 79 | 100 |
| L-T ○ | 212 | 90 | 85 | 100 |
| T-L △ | 0 | 6 | 4 | 10 |
| T-L △ | 0 | 6 | 4 | 10 |
| T-L △ | 0 | 7 | 6 | 10 |
| T-L △ | 25 | 10 | 18 | 30 |
| T-L △ | 25 | 11 | 20 | 35 |
| T-L △ | 25 | 13 | 24 | 35 |
| T-L △ | 50 | 18 | 20 | 55 |
| T-L △ | 50 | 21 | 24 | 55 |
| T-L △ | 50 | 28 | 42 | 55 |
| T-L △ | 75 | 33 | 44 | 60 |
| T-L △ | 75 | 34 | 44 | 60 |
| T-L △ | 75 | 43 | 54 | 75 |
| T-L △ | 212 | 51 | 61 | 100 |
| T-L △ | 212 | 52 | 64 | 100 |
| T-L △ | 212 | 53 | 67 | 100 |

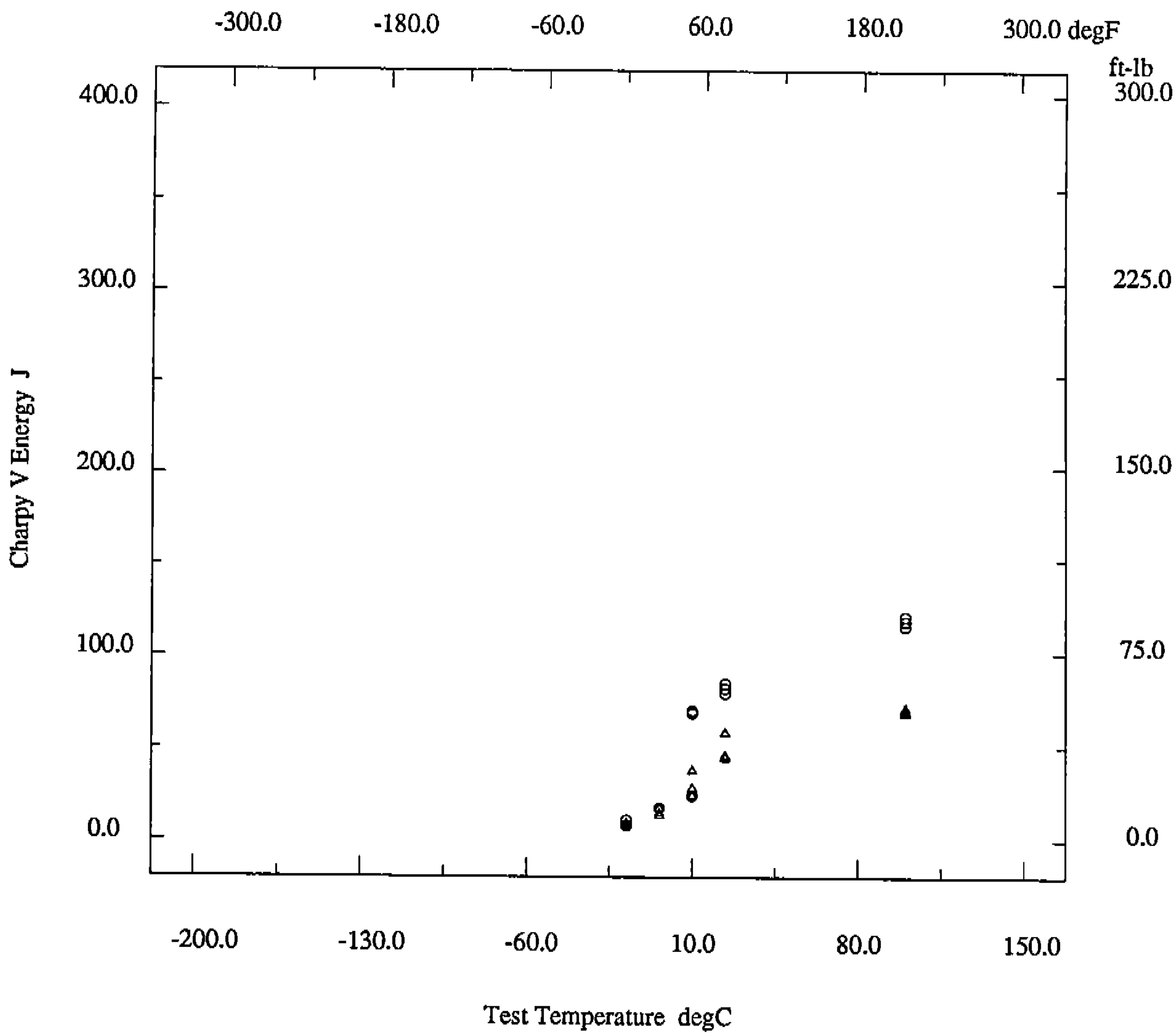
* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.019.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 11692 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.020.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 60865 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.18 % | Mn | 1.09 % |
| P | 0.013 % | S | 0.017 % |
| Si | 0.06 % | Cr | 0.02 % |
| Ni | 0.02 % | Mo | 0.03 % |
| V | * | Cu | 0.06 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 0 | Yes | Yes |

* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.020.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 60865 |
| Reference | Armco-MPC | | |

**Composition** See Page 4300.1

**Fabrication History** See Page 4300.1

**Property Measurements**

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

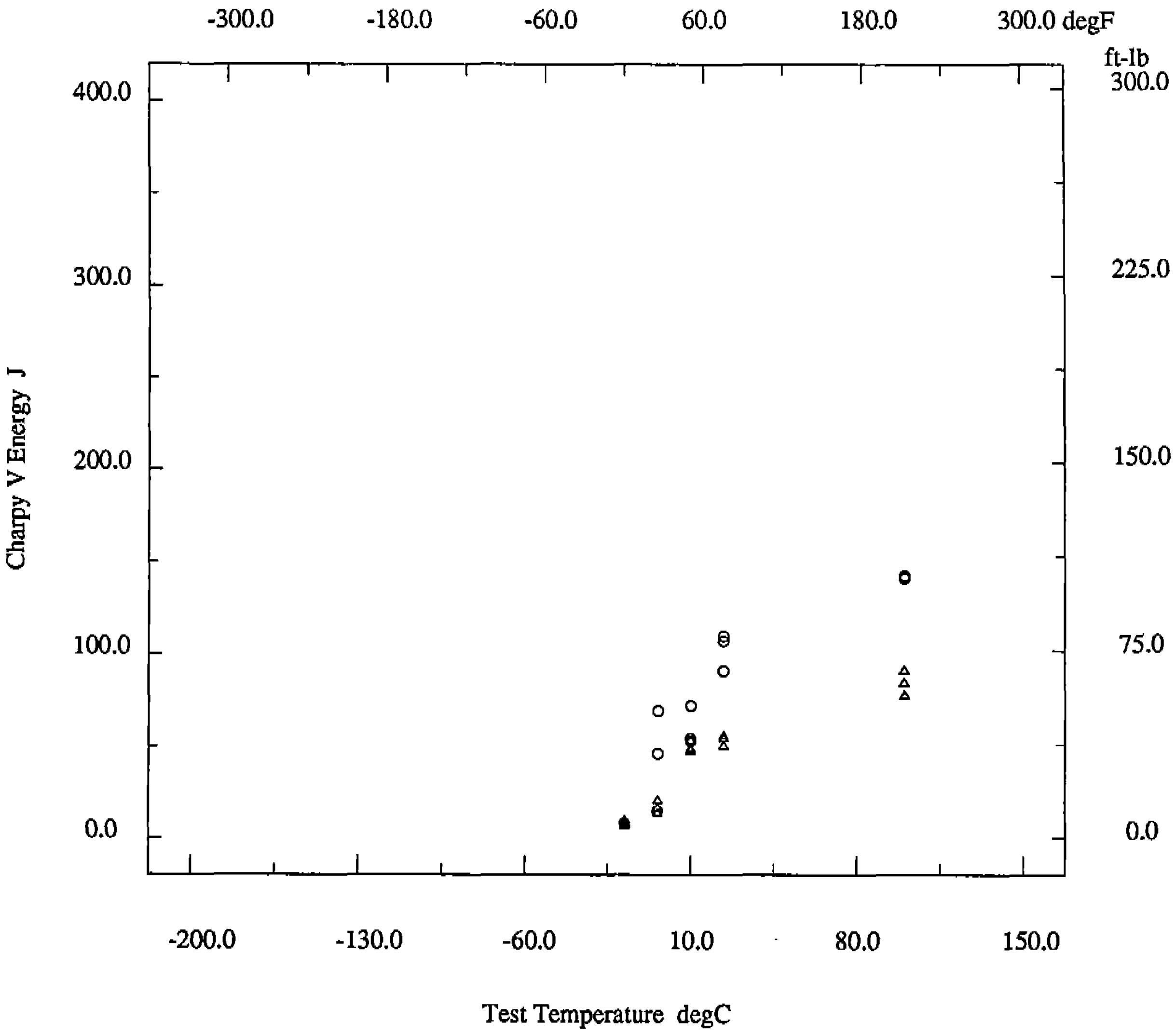
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | 0 | 6 | 10 | 10 |
| L-T ○ | 0 | 6 | 8 | 10 |
| L-T ○ | 0 | 6 | 9 | 10 |
| L-T ○ | 25 | 11 | 12 | 20 |
| L-T ○ | 25 | 34 | 15 | 25 |
| L-T ○ | 25 | 51 | 48 | 25 |
| L-T ○ | 50 | 39 | 36 | 40 |
| L-T ○ | 50 | 40 | 38 | 40 |
| L-T ○ | 50 | 53 | 48 | 45 |
| L-T ○ | 75 | 67 | 60 | 80 |
| L-T ○ | 75 | 79 | 66 | 90 |
| L-T ○ | 75 | 81 | 70 | 90 |
| L-T ○ | 212 | 104 | 68 | 100 |
| L-T ○ | 212 | 105 | 77 | 100 |
| L-T ○ | 212 | 105 | 79 | 100 |
| T-L △ | 0 | 5 | 7 | 10 |
| T-L △ | 0 | 6 | 7 | 10 |
| T-L △ | 0 | 7 | 10 | 10 |
| T-L △ | 25 | 10 | 10 | 20 |
| T-L △ | 25 | 12 | 16 | 20 |
| T-L △ | 25 | 15 | 24 | 20 |
| T-L △ | 50 | 35 | 32 | 45 |
| T-L △ | 50 | 36 | 40 | 45 |
| T-L △ | 50 | 39 | 44 | 50 |
| T-L △ | 75 | 37 | 36 | 55 |
| T-L △ | 75 | 40 | 48 | 55 |
| T-L △ | 75 | 41 | 48 | 55 |
| T-L △ | 212 | 57 | 63 | 99 |
| T-L △ | 212 | 62 | 65 | 99 |
| T-L △ | 212 | 67 | 69 | 99 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.020.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 60865 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.021.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 60868 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.17 % | Mn | 1.19 % |
| P | 0.013 % | S | 0.018 % |
| Si | 0.07 % | Cr | 0.02 % |
| Ni | 0.02 % | Mo | 0.03 % |
| V | * | Cu | 0.06 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductility Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 0 | Yes | Yes |

* - not reported

211

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.021.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 60868 |
| Reference | Armco-MPC | | |

## Composition

See Page 4400.1

## Fabrication History

See Page 4400.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 4 | 6 | 5 |
| L-T ○ | -25 | 5 | 8 | 5 |
| L-T ○ | -25 | 7 | 9 | 5 |
| L-T ○ | 0 | 13 | 13 | 15 |
| L-T ○ | 0 | 23 | 26 | 20 |
| L-T ○ | 0 | 9 | 10 | 10 |
| L-T ○ | 25 | 40 | 38 | 25 |
| L-T ○ | 25 | 46 | 52 | 25 |
| L-T ○ | 25 | 52 | 54 | 25 |
| L-T ○ | 50 | 27 | 42 | 35 |
| L-T ○ | 50 | 61 | 56 | 50 |
| L-T ○ | 50 | 69 | 60 | 50 |
| L-T ○ | 75 | 82 | 77 | 80 |
| L-T ○ | 75 | 90 | 78 | 80 |
| L-T ○ | 75 | 92 | 83 | 90 |
| L-T ○ | 212 | 115 | 71 | 100 |
| L-T ○ | 212 | 118 | 72 | 100 |
| L-T ○ | 212 | 126 | 76 | 100 |
| T-L △ | -25 | 4 | 5 | 5 |
| T-L △ | -25 | 5 | 8 | 5 |
| T-L △ | -25 | 6 | 9 | 5 |
| T-L △ | 0 | 16 | 17 | 15 |
| T-L △ | 0 | 23 | 26 | 20 |
| T-L △ | 0 | 8 | 10 | 15 |
| T-L △ | 25 | 10 | 14 | 20 |
| T-L △ | 25 | 32 | 38 | 30 |
| T-L △ | 25 | 33 | 40 | 30 |
| T-L △ | 50 | 44 | 42 | 55 |
| T-L △ | 50 | 47 | 42 | 55 |
| T-L △ | 50 | 49 | 42 | 55 |
| T-L △ | 75 | 49 | 48 | 55 |
| T-L △ | 75 | 60 | 50 | 70 |
| T-L △ | 75 | 61 | 52 | 70 |
| T-L △ | 212 | 117 | 78 | 100 |

(continued)

* - not reported

# Material A36



(continued)

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| T-L ^ | 212 | 81 | 74 | 100 |
| T-L ^ | 212 | 84 | 77 | 100 |

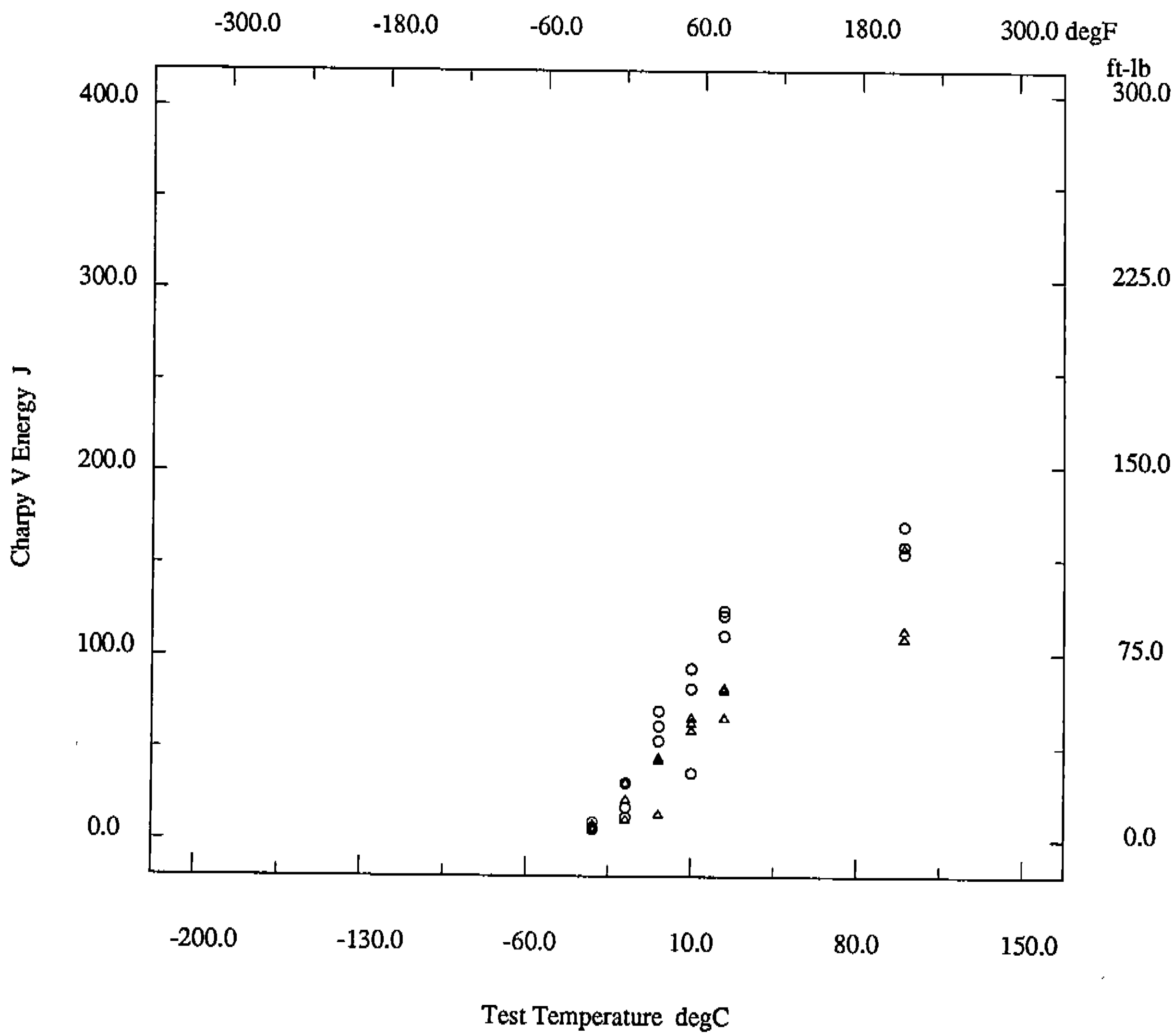
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.021.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 60868 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.022.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 14453 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.22 % | Mn | 0.97 % |
| P | 0.01 % | S | 0.017 % |
| Si | 0.08 % | Cr | 0.03 % |
| Ni | 0.06 % | Mo | 0.02 % |
| V | * | Cu | 0.09 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 0 | Yes | Yes |

* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.022.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 14453 |
| Reference | Armco-MPC | | |

**Composition** See Page 4500.1

**Fabrication History** See Page 4500.1

**Property Measurements**

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 5 | 6 | 10 |
| L-T ○ | -25 | 6 | 8 | 10 |
| L-T ○ | -25 | 6 | 9 | 10 |
| L-T ○ | 0 | 14 | 19 | 10 |
| L-T ○ | 0 | 20 | 23 | 15 |
| L-T ○ | 0 | 28 | 30 | 25 |
| L-T ○ | 25 | 30 | 28 | 20 |
| L-T ○ | 25 | 32 | 42 | 25 |
| L-T ○ | 25 | 48 | 52 | 30 |
| L-T ○ | 50 | 67 | 56 | 60 |
| L-T ○ | 50 | 70 | 58 | 60 |
| L-T ○ | 50 | 76 | 60 | 60 |
| L-T ○ | 75 | 40 | 46 | 55 |
| L-T ○ | 75 | 73 | 60 | 70 |
| L-T ○ | 75 | 87 | 76 | 90 |
| L-T ○ | 212 | 105 | 65 | 100 |
| L-T ○ | 212 | 106 | 69 | 100 |
| L-T ○ | 212 | 107 | 77 | 100 |
| T-L △ | -25 | 4 | 6 | 5 |
| T-L △ | -25 | 5 | 7 | 10 |
| T-L △ | -25 | 5 | 8 | 15 |
| T-L △ | 0 | 18 | 24 | 20 |
| T-L △ | 0 | 22 | 26 | 25 |
| T-L △ | 0 | 7 | 12 | 10 |
| T-L △ | 25 | 24 | 30 | 25 |
| T-L △ | 25 | 28 | 34 | 25 |
| T-L △ | 25 | 28 | 34 | 25 |
| T-L △ | 50 | 30 | 32 | 45 |
| T-L △ | 50 | 31 | 32 | 45 |
| T-L △ | 50 | 32 | 38 | 45 |
| T-L △ | 75 | 37 | 48 | 50 |
| T-L △ | 75 | 41 | 48 | 50 |
| T-L △ | 75 | 47 | 54 | 65 |
| T-L △ | 212 | 62 | 66 | 100 |

(continued)

* - not reported

# Material A36



(continued)

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| T-L ▵ | 212 | 63 | 67 | 100 |
| T-L ▵ | 212 | 66 | 67 | 100 |

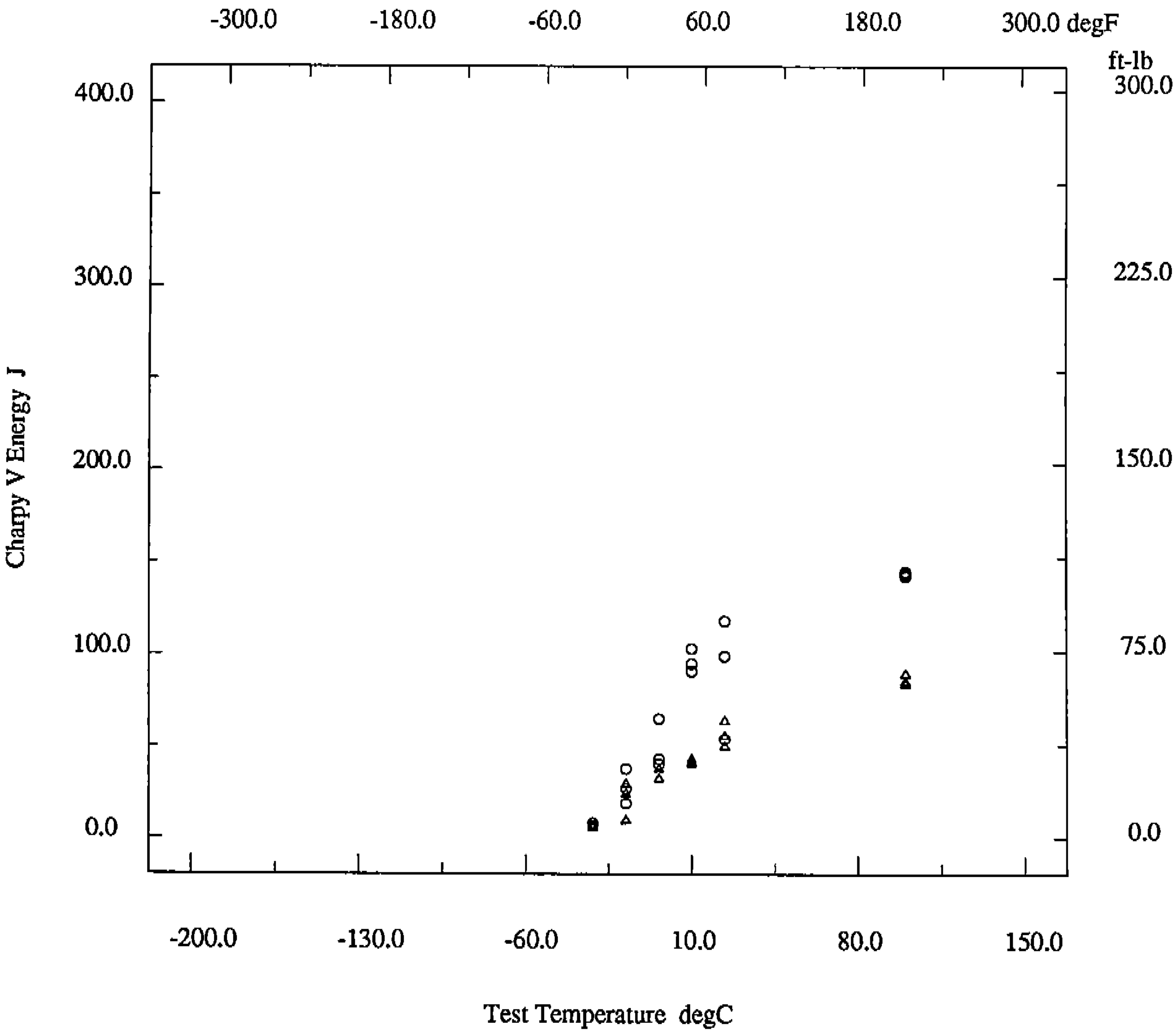
* - not reported

## Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.022.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 14453 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.023.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 11682 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.20 % | Mn | 0.96 % |
| P | 0.012 % | S | 0.021 % |
| Si | 0.07 % | Cr | 0.03 % |
| Ni | 0.06 % | Mo | 0.02 % |
| V | * | Cu | 0.08 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductility Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 10 | Yes | Yes |

* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.023.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 11682 |
| Reference | Armco-MPC | | |

## Composition

See Page 4600.1

## Fabrication History

See Page 4600.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | 25 | 10 | 14 | 20 |
| L-T ○ | 25 | 9 | 12 | 20 |
| L-T ○ | 25 | 9 | 12 | 20 |
| L-T ○ | 50 | 30 | 28 | 30 |
| L-T ○ | 50 | 40 | 38 | 40 |
| L-T ○ | 50 | 45 | 50 | 40 |
| L-T ○ | 75 | 59 | 56 | 60 |
| L-T ○ | 75 | 59 | 60 | 60 |
| L-T ○ | 75 | 65 | 62 | 65 |
| L-T ○ | 212 | 94 | 77 | 100 |
| L-T ○ | 212 | 94 | 78 | 100 |
| L-T ○ | 212 | 96 | 80 | 100 |
| T-L △ | 25 | 11 | 16 | 15 |
| T-L △ | 25 | 7 | 8 | 15 |
| T-L △ | 25 | 9 | 12 | 15 |
| T-L △ | 50 | 23 | 22 | 35 |
| T-L △ | 50 | 24 | 34 | 35 |
| T-L △ | 50 | 29 | 30 | 35 |
| T-L △ | 75 | 31 | 38 | 50 |
| T-L △ | 75 | 37 | 40 | 50 |
| T-L △ | 75 | 39 | 42 | 55 |
| T-L △ | 212 | 63 | 66 | 100 |
| T-L △ | 212 | 66 | 68 | 100 |
| T-L △ | 212 | 67 | 69 | 100 |

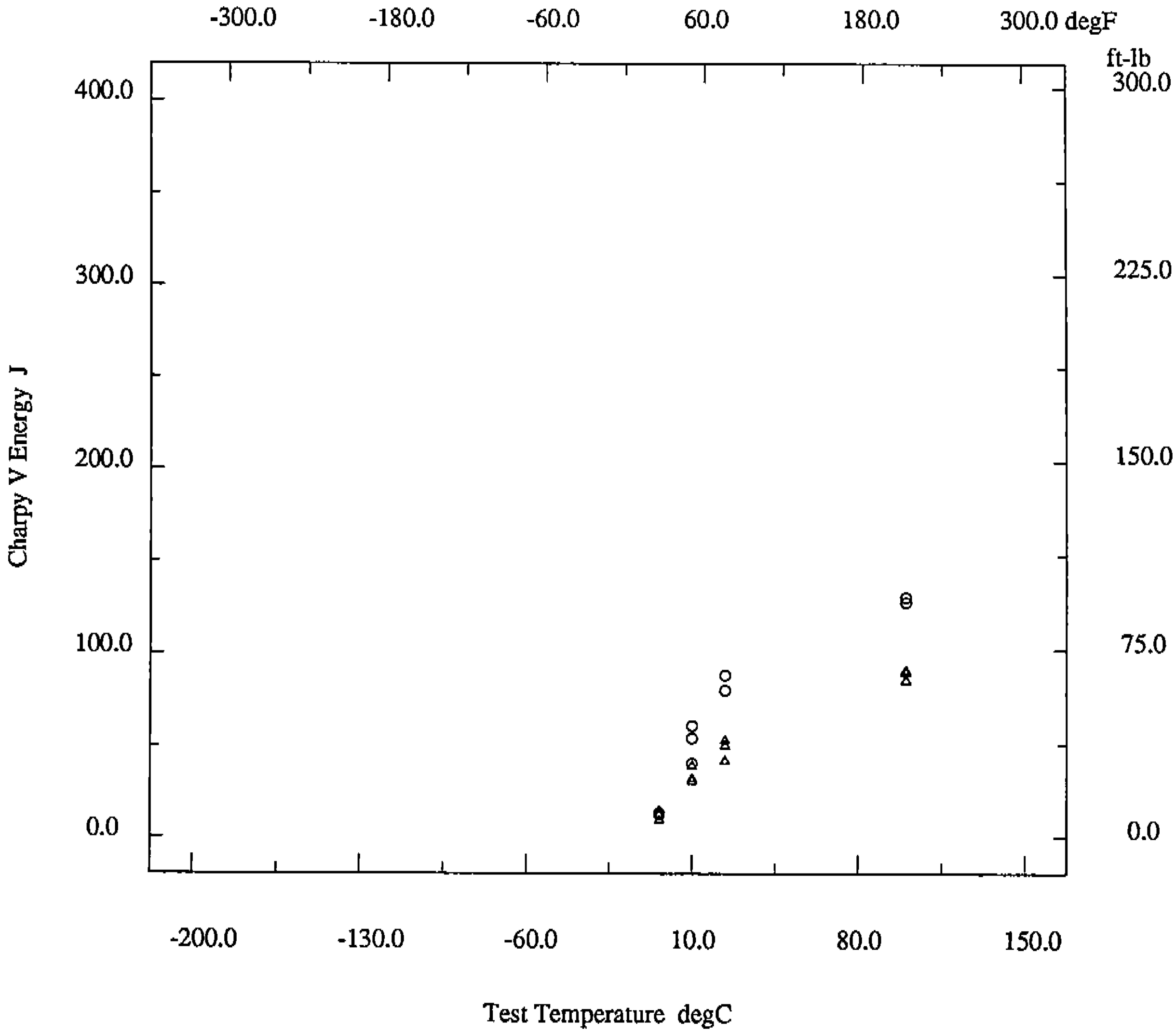
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.023.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 11682 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.024.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | T |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.20 % | Mn | 1.05 % |
| P | 0.016 % | S | 0.036 % |
| Si | 0.06 % | Cr | 0.04 % |
| Ni | 0.05 % | Mo | 0.01 % |
| V | * | Cu | 0.07 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | * |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 30 | Yes | Yes |

* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.024.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | T |
| Reference | Armco-MPC | | |

**Composition** See Page 4700.1

**Fabrication History** See Page 4700.1

**Property Measurements**

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

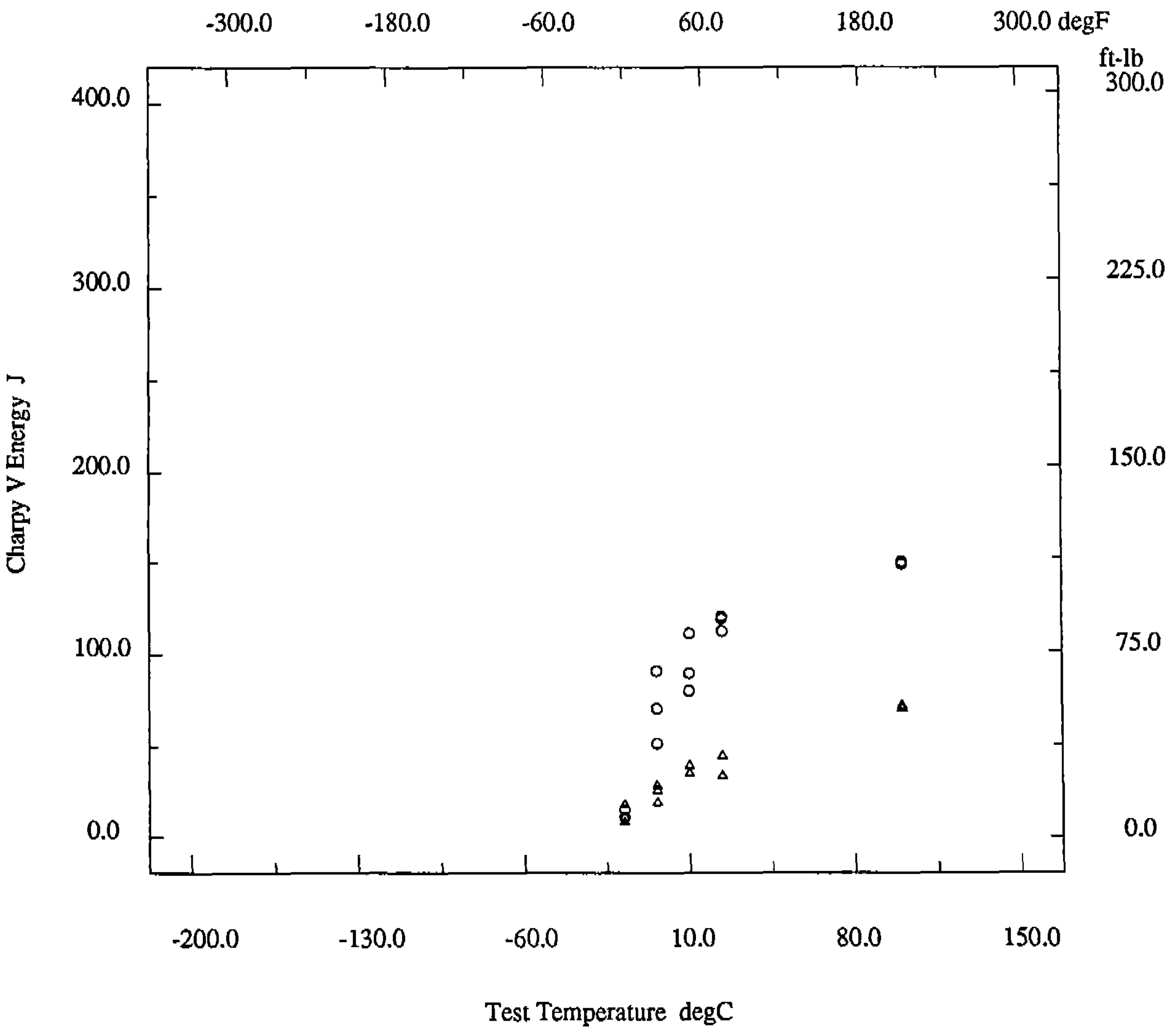
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | 0 | 11 | 16 | 10 |
| L-T ○ | 0 | 8 | 10 | 10 |
| L-T ○ | 0 | 8 | 9 | 10 |
| L-T ○ | 25 | 38 | 37 | 30 |
| L-T ○ | 25 | 52 | 50 | 40 |
| L-T ○ | 25 | 67 | 65 | 50 |
| L-T ○ | 50 | 59 | 50 | 60 |
| L-T ○ | 50 | 66 | 54 | 70 |
| L-T ○ | 50 | 82 | 56 | 75 |
| L-T ○ | 75 | 83 | 72 | 60 |
| L-T ○ | 75 | 88 | 74 | 70 |
| L-T ○ | 75 | 89 | 74 | 80 |
| L-T ○ | 212 | 110 | 59 | 100 |
| L-T ○ | 212 | 110 | 59 | 100 |
| L-T ○ | 212 | 111 | 85 | 100 |
| T-L △ | 0 | 13 | 14 | 10 |
| T-L △ | 0 | 6 | 9 | 10 |
| T-L △ | 0 | 8 | 9 | 10 |
| T-L △ | 25 | 14 | 19 | 25 |
| T-L △ | 25 | 19 | 24 | 25 |
| T-L △ | 25 | 21 | 24 | 25 |
| T-L △ | 50 | 26 | 30 | 40 |
| T-L △ | 50 | 26 | 31 | 40 |
| T-L △ | 50 | 29 | 31 | 50 |
| T-L △ | 75 | 25 | 32 | 60 |
| T-L △ | 75 | 33 | 39 | 70 |
| T-L △ | 75 | 33 | 40 | 70 |
| T-L △ | 212 | 52 | 53 | 100 |
| T-L △ | 212 | 52 | 54 | 100 |
| T-L △ | 212 | 53 | 58 | 100 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.024.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | T |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.025.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | S |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.20 % | Mn | 1.08 % |
| P | 0.014 % | S | 0.022 % |
| Si | 0.07 % | Cr | 0.03 % |
| Ni | 0.05 % | Mo | 0.02 % |
| V | * | Cu | 0.06 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | * |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 30 | Yes | Yes |

* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.025.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | S |
| Reference | Armco-MPC | | |

**Composition** See Page 4800.1

**Fabrication History** See Page 4800.1

**Property Measurements**

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| T-L ○ | 0 | 4 | 4 | 5 |
| T-L ○ | 0 | 5 | 4 | 5 |
| T-L ○ | 25 | 10 | 13 | 15 |
| T-L ○ | 25 | 8 | 10 | 15 |
| T-L ○ | 25 | 9 | 13 | 15 |
| T-L ○ | 50 | 23 | 25 | 30 |
| T-L ○ | 50 | 24 | 26 | 30 |
| T-L ○ | 50 | 24 | 28 | 30 |
| T-L ○ | 75 | 25 | 31 | 50 |
| T-L ○ | 75 | 27 | 34 | 50 |
| T-L ○ | 75 | 30 | 35 | 50 |
| T-L ○ | 212 | 50 | 55 | 100 |
| T-L ○ | 212 | 55 | 57 | 100 |
| T-L ○ | 212 | 58 | 59 | 100 |

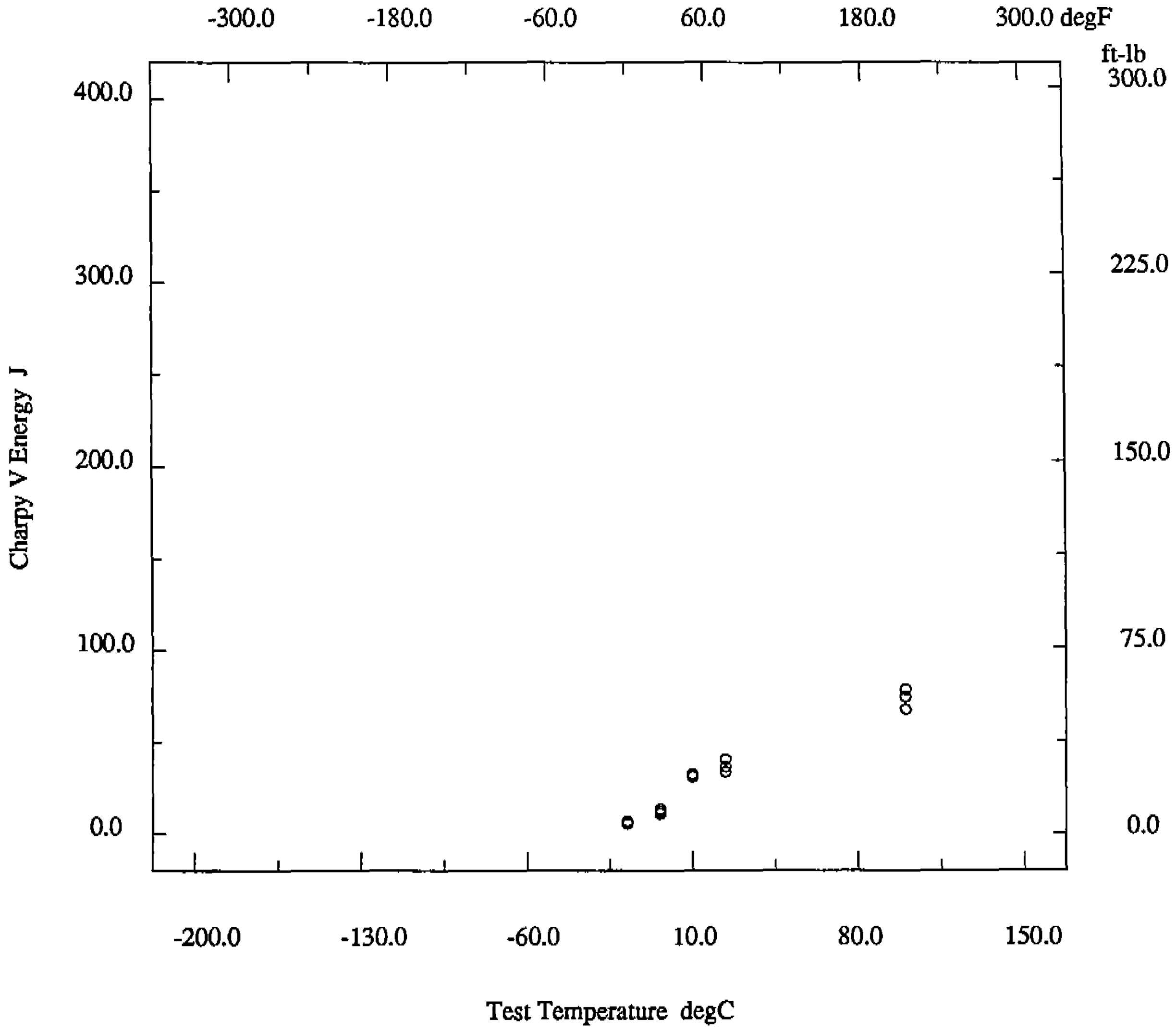
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.025.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | S |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.026.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | P |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.24 % | Mn | 1.14 % |
| P | 0.01 % | S | 0.034 % |
| Si | 0.08 % | Cr | 0.03 % |
| Ni | 0.06 % | Mo | 0.02 % |
| V | * | Cu | 0.06 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | * |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductility Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 30 | Yes | Yes |

* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.026.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | P |
| Reference | Armco-MPC | | |

## Composition

See Page 4900.1

## Fabrication History

See Page 4900.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

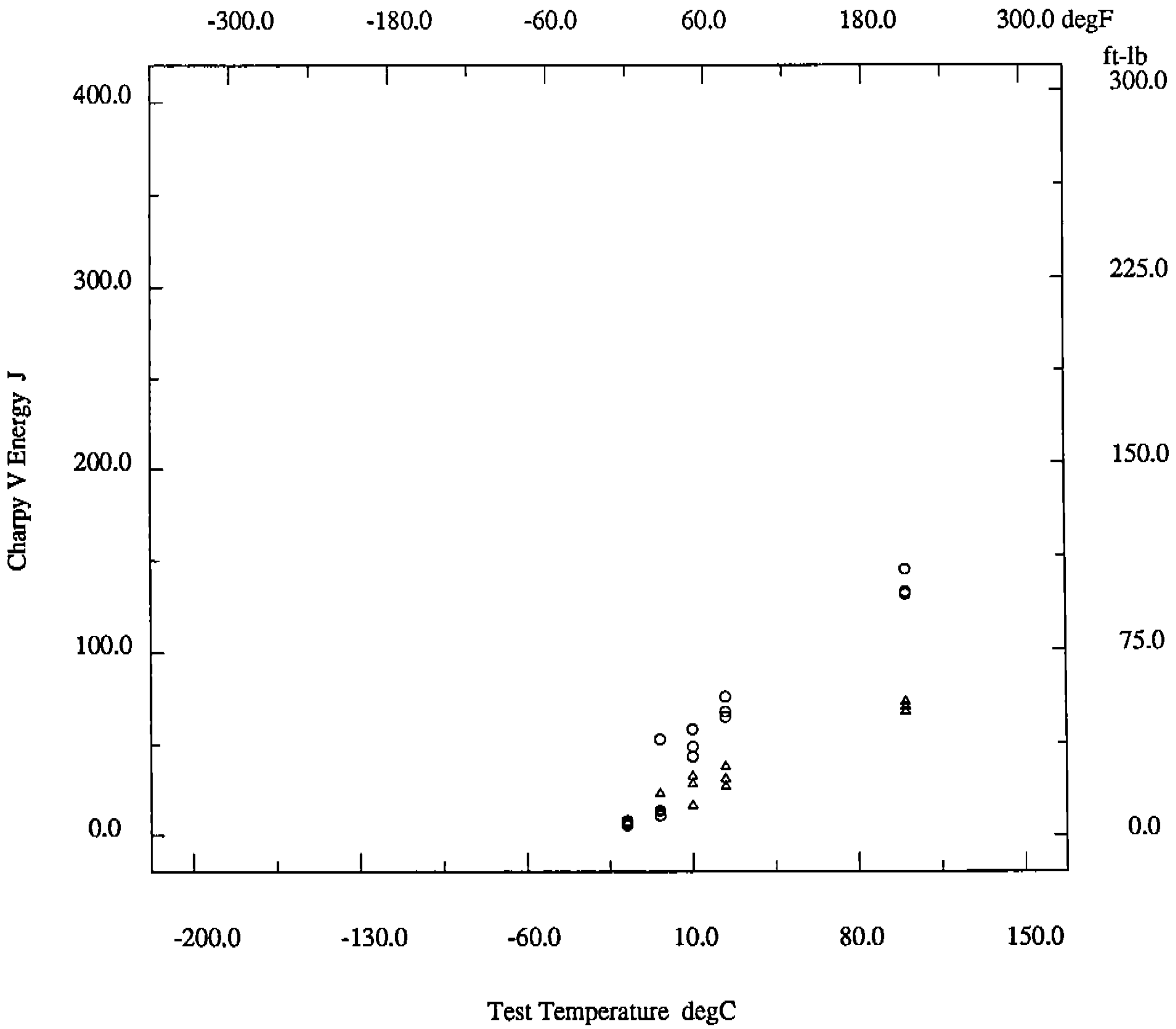
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | 0 | 4 | 1 | 10 |
| L-T ○ | 0 | 5 | 2 | 10 |
| L-T ○ | 0 | 6 | 8 | 10 |
| L-T ○ | 25 | 10 | 12 | 20 |
| L-T ○ | 25 | 39 | 37 | 25 |
| L-T ○ | 25 | 8 | 9 | 15 |
| L-T ○ | 50 | 32 | 34 | 30 |
| L-T ○ | 50 | 36 | 41 | 30 |
| L-T ○ | 50 | 43 | 43 | 35 |
| L-T ○ | 75 | 48 | 46 | 45 |
| L-T ○ | 75 | 50 | 49 | 45 |
| L-T ○ | 75 | 56 | 54 | 45 |
| L-T ○ | 212 | 107 | 78 | 100 |
| L-T ○ | 212 | 97 | 67 | 100 |
| L-T ○ | 212 | 98 | 68 | 100 |
| T-L ▵ | 0 | 5 | 2 | 10 |
| T-L ▵ | 0 | 5 | 3 | 10 |
| T-L ▵ | 0 | 5 | 4 | 10 |
| T-L ▵ | 25 | 10 | 13 | 20 |
| T-L ▵ | 25 | 10 | 13 | 20 |
| T-L ▵ | 25 | 17 | 20 | 20 |
| T-L ▵ | 50 | 12 | 18 | 35 |
| T-L ▵ | 50 | 21 | 23 | 35 |
| T-L ▵ | 50 | 24 | 26 | 35 |
| T-L ▵ | 75 | 20 | 29 | 45 |
| T-L ▵ | 75 | 23 | 30 | 45 |
| T-L ▵ | 75 | 28 | 35 | 45 |
| T-L ▵ | 212 | 50 | 55 | 100 |
| T-L ▵ | 212 | 52 | 56 | 100 |
| T-L ▵ | 212 | 54 | 56 | 100 |

* - not reported

# Material A36



| **Description** | | | |
|---|---|---|---|
| Material Code | 009.026.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | P |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.027.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | H |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.22 % | Mn | 1.16 % |
| P | 0.01 % | S | 0.046 % |
| Si | 0.06 % | Cr | 0.03 % |
| Ni | 0.05 % | Mo | 0.02 % |
| V | * | Cu | 0.06 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | * |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 30 | Yes | Yes |

* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.027.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | H |
| Reference | Armco-MPC | | |

**Composition** See Page 5000.1

**Fabrication History** See Page 5000.1

**Property Measurements**

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 10 | 10 | 5 |
| L-T ○ | -25 | 13 | 11 | 5 |
| L-T ○ | -25 | 29 | 25 | 5 |
| L-T ○ | 0 | 13 | 15 | 15 |
| L-T ○ | 0 | 18 | 19 | 15 |
| L-T ○ | 0 | 23 | 22 | 15 |
| L-T ○ | 25 | 15 | 20 | 15 |
| L-T ○ | 25 | 34 | 39 | 25 |
| L-T ○ | 25 | 37 | 35 | 20 |
| L-T ○ | 50 | 41 | 40 | 40 |
| L-T ○ | 50 | 51 | 50 | 45 |
| L-T ○ | 50 | 57 | 50 | 50 |
| L-T ○ | 75 | 41 | 33 | 50 |
| L-T ○ | 75 | 59 | 47 | 60 |
| L-T ○ | 75 | 67 | 64 | 100 |
| L-T ○ | 212 | 57 | 58 | 100 |
| L-T ○ | 212 | 96 | 69 | 100 |
| L-T ○ | 212 | 97 | 80 | 100 |
| T-L △ | -25 | 4 | 3 | 5 |
| T-L △ | -25 | 6 | 4 | 5 |
| T-L △ | -25 | 8 | 7 | 5 |
| T-L △ | 0 | 10 | 8 | 10 |
| T-L △ | 0 | 12 | 12 | 15 |
| T-L △ | 0 | 7 | 6 | 5 |
| T-L △ | 25 | 17 | 22 | 20 |
| T-L △ | 25 | 20 | 22 | 20 |
| T-L △ | 25 | 23 | 27 | 25 |
| T-L △ | 50 | 24 | 24 | 40 |
| T-L △ | 50 | 25 | 25 | 40 |
| T-L △ | 50 | 28 | 31 | 40 |
| T-L △ | 75 | 30 | 33 | 50 |
| T-L △ | 75 | 30 | 34 | 50 |
| T-L △ | 75 | 34 | 38 | 50 |
| T-L △ | 212 | 55 | 57 | 100 |

(continued)

* - not reported

(continued)

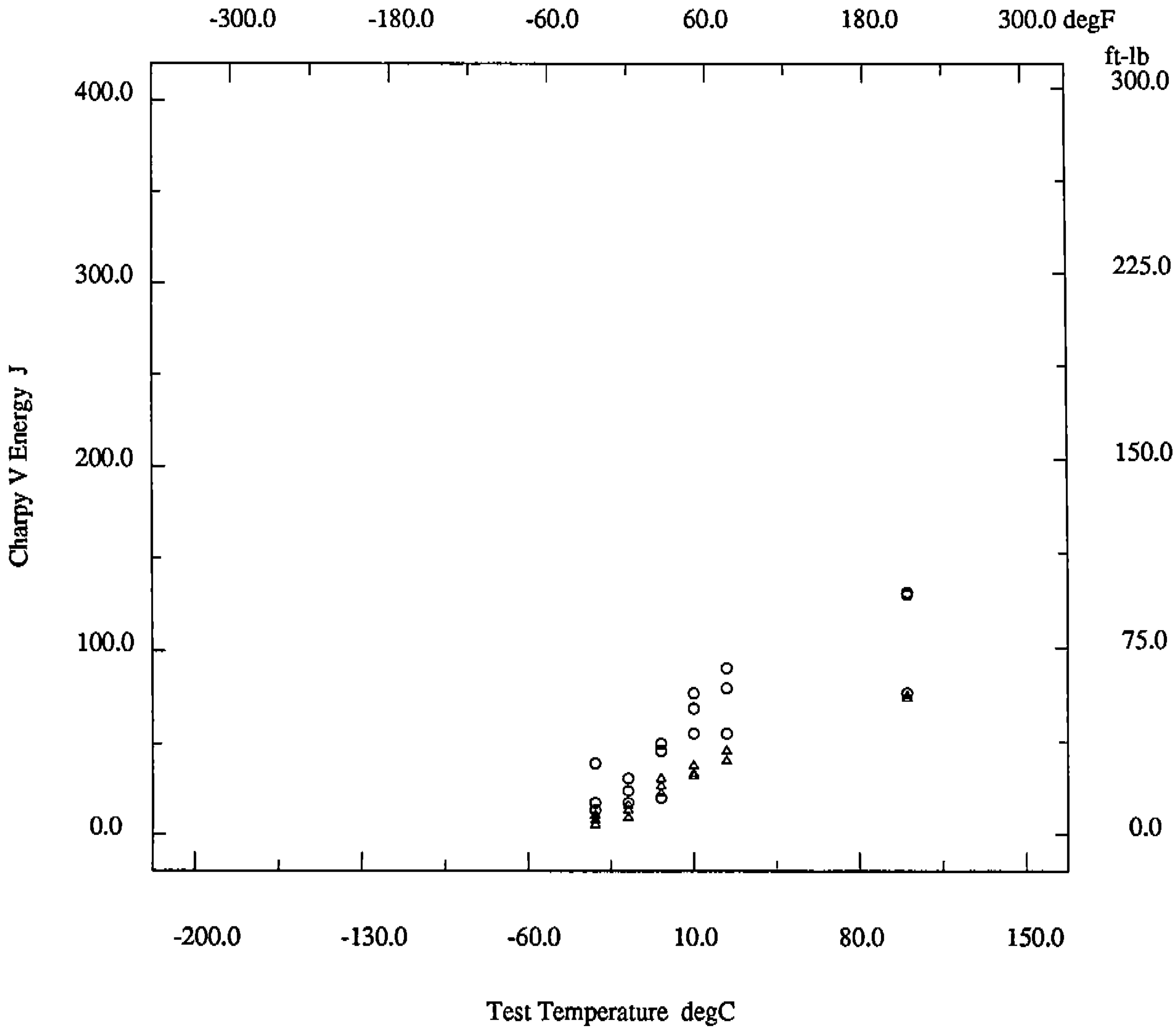
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| T-L ▵ | 212 | 55 | 59 | 100 |
| T-L ▵ | 212 | 56 | 61 | 100 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.027.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | H |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.028.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | I |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.21 % | Mn | 1.01 % |
| P | 0.01 % | S | 0.033 % |
| Si | 0.06 % | Cr | 0.03 % |
| Ni | 0.05 % | Mo | 0.02 % |
| V | * | Cu | 0.06 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | * |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 30 | Yes | Yes |

* - not reported

332

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.028.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | I |
| Reference | Armco-MPC | | |

## Composition

See Page 5100.1

## Fabrication History

See Page 5100.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 5 | 3 | 5 |
| L-T ○ | -25 | 8 | 7 | 5 |
| L-T ○ | -25 | 8 | 7 | 5 |
| L-T ○ | 0 | 13 | 12 | 10 |
| L-T ○ | 0 | 7 | 7 | 5 |
| L-T ○ | 0 | 8 | 10 | 5 |
| L-T ○ | 25 | 14 | 20 | 20 |
| L-T ○ | 25 | 35 | 36 | 25 |
| L-T ○ | 25 | 40 | 37 | 30 |
| L-T ○ | 50 | 34 | 35 | 30 |
| L-T ○ | 50 | 37 | 37 | 40 |
| L-T ○ | 50 | 58 | 50 | 50 |
| L-T ○ | 75 | 33 | 38 | 50 |
| L-T ○ | 75 | 58 | 52 | 55 |
| L-T ○ | 75 | 72 | 65 | 60 |
| L-T ○ | 212 | 102 | 77 | 100 |
| L-T ○ | 212 | 105 | 78 | 100 |
| L-T ○ | 212 | 96 | 66 | 100 |
| T-L △ | -25 | 13 | 13 | 5 |
| T-L △ | -25 | 5 | 3 | 5 |
| T-L △ | -25 | 7 | 7 | 5 |
| T-L △ | 0 | 17 | 21 | 10 |
| T-L △ | 0 | 5 | 3 | 5 |
| T-L △ | 0 | 5 | 4 | 5 |
| T-L △ | 25 | 10 | 13 | 20 |
| T-L △ | 25 | 17 | 27 | 20 |
| T-L △ | 25 | 23 | 30 | 25 |
| T-L △ | 50 | 23 | 25 | 40 |
| T-L △ | 50 | 26 | 29 | 45 |
| T-L △ | 50 | 27 | 30 | 45 |
| T-L △ | 75 | 30 | 35 | 40 |
| T-L △ | 75 | 30 | 37 | 40 |
| T-L △ | 75 | 32 | 38 | 45 |
| T-L △ | 212 | 55 | 58 | 100 |

(continued)

* - not reported

(continued)

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| T-L ▵ | 212 | 55 | 60 | 100 |
| T-L ▵ | 212 | 56 | 61 | 100 |

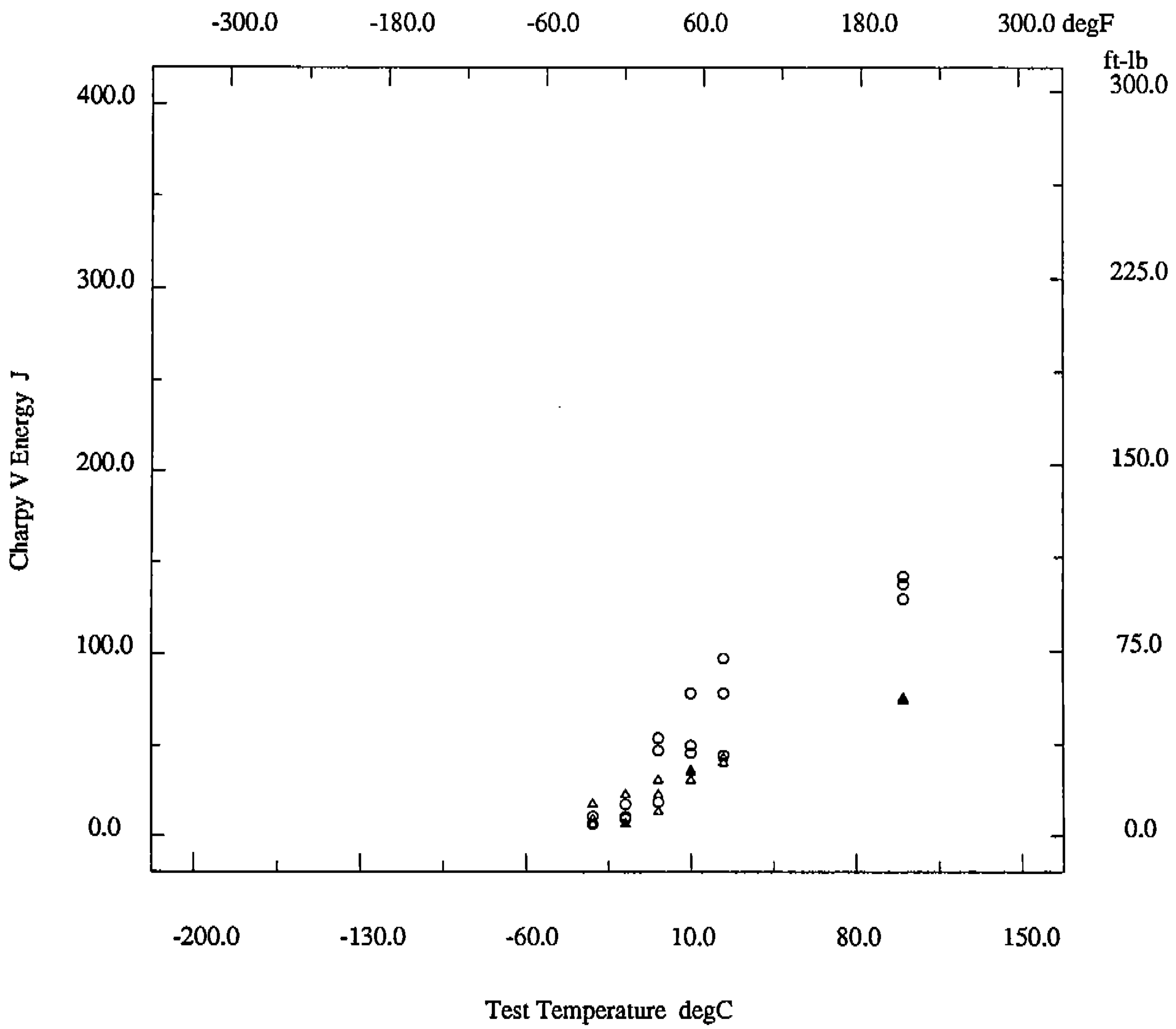
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.028.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.5 in | Composition Type | Actual |
| Composition Position | * | Lot ID | I |
| Reference | Armco-MPC | | |




* - not reported

335

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.029.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.188 in | Composition Type | Actual |
| Composition Position | * | Lot ID | A |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.20 % | Mn | 0.99 % |
| P | 0.011 % | S | 0.024 % |
| Si | 0.06 % | Cr | 0.03 % |
| Ni | 0.05 % | Mo | 0.02 % |
| V | * | Cu | 0.07 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | * |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 30 | Yes | Yes |

* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.029.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.188 in | Composition Type | Actual |
| Composition Position | * | Lot ID | A |
| Reference | Armco-MPC | | |

## Composition

See Page 5200.1

## Fabrication History

See Page 5200.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 13 | 11 | 5 |
| L-T ○ | -25 | 20 | 17 | 5 |
| L-T ○ | -25 | 6 | 5 | 5 |
| L-T ○ | 0 | 27 | 24 | 10 |
| L-T ○ | 0 | 30 | 28 | 15 |
| L-T ○ | 0 | 30 | 28 | 15 |
| L-T ○ | 25 | 16 | 19 | 25 |
| L-T ○ | 25 | 40 | 40 | 30 |
| L-T ○ | 25 | 59 | 54 | 30 |
| L-T ○ | 50 | 44 | 43 | 45 |
| L-T ○ | 50 | 49 | 44 | 50 |
| L-T ○ | 50 | 54 | 48 | 50 |
| L-T ○ | 75 | 66 | 60 | 70 |
| L-T ○ | 75 | 72 | 62 | 70 |
| L-T ○ | 75 | 80 | 64 | 75 |
| L-T ○ | 212 | 100 | 78 | 100 |
| L-T ○ | 212 | 96 | 67 | 100 |
| L-T ○ | 212 | 98 | 74 | 100 |
| T-L △ | -25 | 10 | 9 | 5 |
| T-L △ | -25 | 12 | 10 | 5 |
| T-L △ | -25 | 8 | 9 | 5 |
| T-L △ | 0 | 15 | 18 | 10 |
| T-L △ | 0 | 16 | 18 | 10 |
| T-L △ | 0 | 8 | 10 | 10 |
| T-L △ | 25 | 20 | 26 | 30 |
| T-L △ | 25 | 23 | 27 | 30 |
| T-L △ | 25 | 26 | 28 | 30 |
| T-L △ | 50 | 27 | 30 | 50 |
| T-L △ | 50 | 29 | 31 | 50 |
| T-L △ | 50 | 32 | 33 | 55 |
| T-L △ | 75 | 31 | 38 | 60 |
| T-L △ | 75 | 32 | 39 | 60 |
| T-L △ | 75 | 36 | 43 | 60 |
| T-L △ | 212 | 50 | 54 | 100 |

(continued)

* - not reported

## Material A36



(continued)

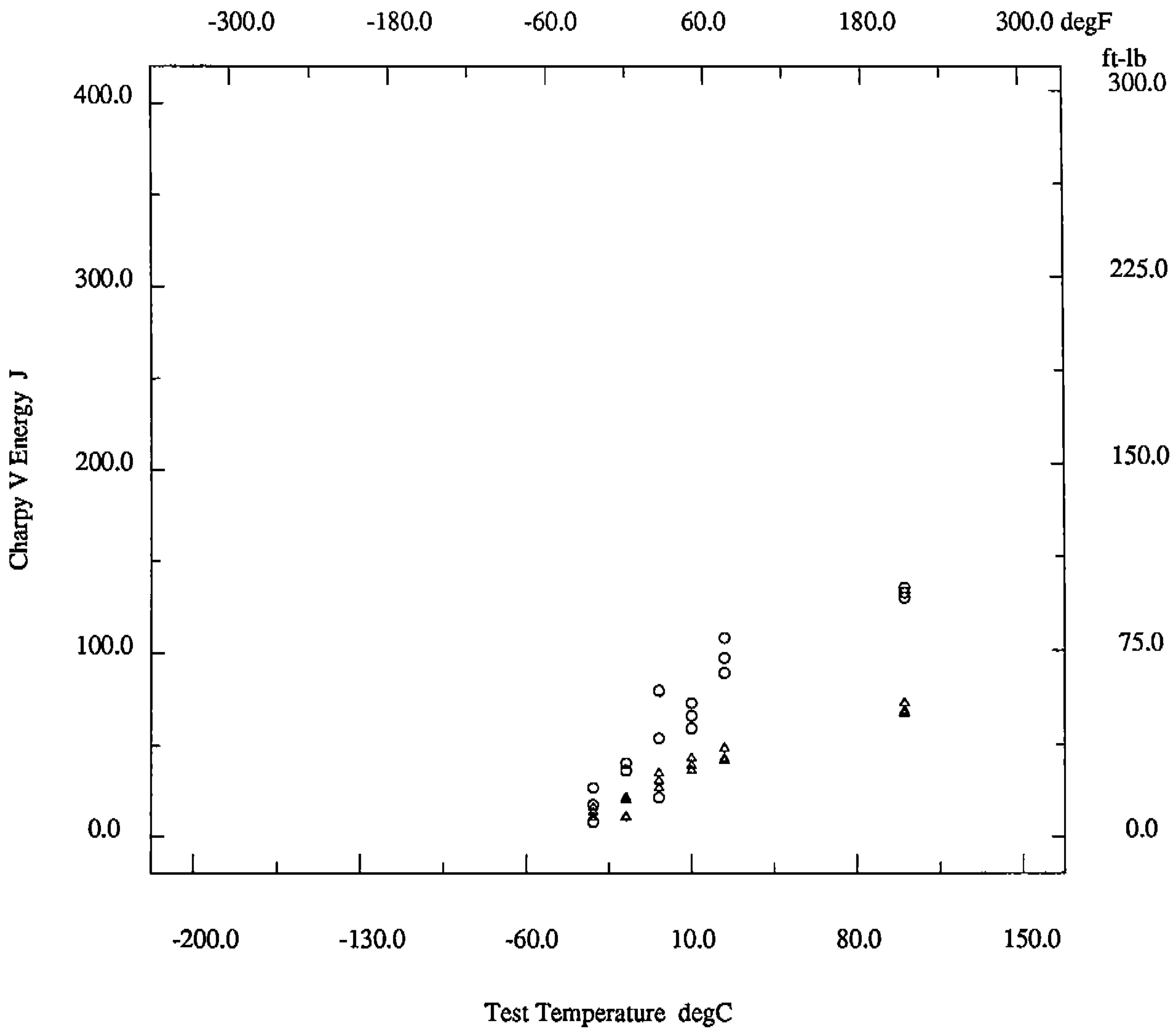
| Orien | Test Temp<br>degF | CVN Energy<br>ft-lb | Lat Expans<br>in | Shear<br>% |
|---|---|---|---|---|
| T-L ▵ | 212 | 51 | 54 | 100 |
| T-L ▵ | 212 | 54 | 54 | 100 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.029.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.188 in | Composition Type | Actual |
| Composition Position | * | Lot ID | A |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.030.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.188 in | Composition Type | Actual |
| Composition Position | * | Lot ID | E |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.20 % | Mn | 0.81 % |
| P | 0.01 % | S | 0.013 % |
| Si | 0.05 % | Cr | 0.03 % |
| Ni | 0.05 % | Mo | 0.02 % |
| V | * | Cu | 0.07 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | * |
| Ingot Position | * | Killing Process | SK |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 30 | Yes | Yes |

* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.030.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.188 in | Composition Type | Actual |
| Composition Position | * | Lot ID | E |
| Reference | Armco-MPC | | |

## Composition

See Page 5300.1

## Fabrication History

See Page 5300.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 5 | 2 | 5 |
| L-T ○ | -25 | 6 | 4 | 5 |
| L-T ○ | -25 | 6 | 5 | 5 |
| L-T ○ | 0 | 12 | 14 | 15 |
| L-T ○ | 0 | 7 | 7 | 15 |
| L-T ○ | 0 | 9 | 8 | 15 |
| L-T ○ | 25 | 31 | 40 | 30 |
| L-T ○ | 25 | 50 | 52 | 30 |
| L-T ○ | 25 | 56 | 60 | 45 |
| L-T ○ | 50 | 62 | 58 | 50 |
| L-T ○ | 50 | 63 | 60 | 50 |
| L-T ○ | 50 | 68 | 60 | 60 |
| L-T ○ | 75 | 53 | 56 | 50 |
| L-T ○ | 75 | 78 | 63 | 60 |
| L-T ○ | 75 | 91 | 76 | 70 |
| L-T ○ | 212 | 104 | 68 | 100 |
| L-T ○ | 212 | 106 | 89 | 100 |
| L-T ○ | 212 | 110 | 90 | 100 |
| T-L △ | -25 | 3 | 2 | 5 |
| T-L △ | -25 | 6 | 4 | 5 |
| T-L △ | -25 | 7 | 7 | 5 |
| T-L △ | 0 | 7 | 10 | 20 |
| T-L △ | 0 | 9 | 11 | 20 |
| T-L △ | 0 | 9 | 11 | 20 |
| T-L △ | 25 | 20 | 26 | 20 |
| T-L △ | 25 | 21 | 26 | 30 |
| T-L △ | 25 | 26 | 32 | 45 |
| T-L △ | 50 | 25 | 28 | 40 |
| T-L △ | 50 | 26 | 29 | 40 |
| T-L △ | 50 | 26 | 30 | 40 |
| T-L △ | 75 | 34 | 40 | 65 |
| T-L △ | 75 | 35 | 44 | 65 |
| T-L △ | 75 | 36 | 44 | 65 |
| T-L △ | 212 | 42 | 59 | 100 |

(continued)

* - not reported

# Material A36



(continued)

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| T-L ▵ | 212 | 52 | 60 | 100 |
| T-L ▵ | 212 | 59 | 61 | 100 |

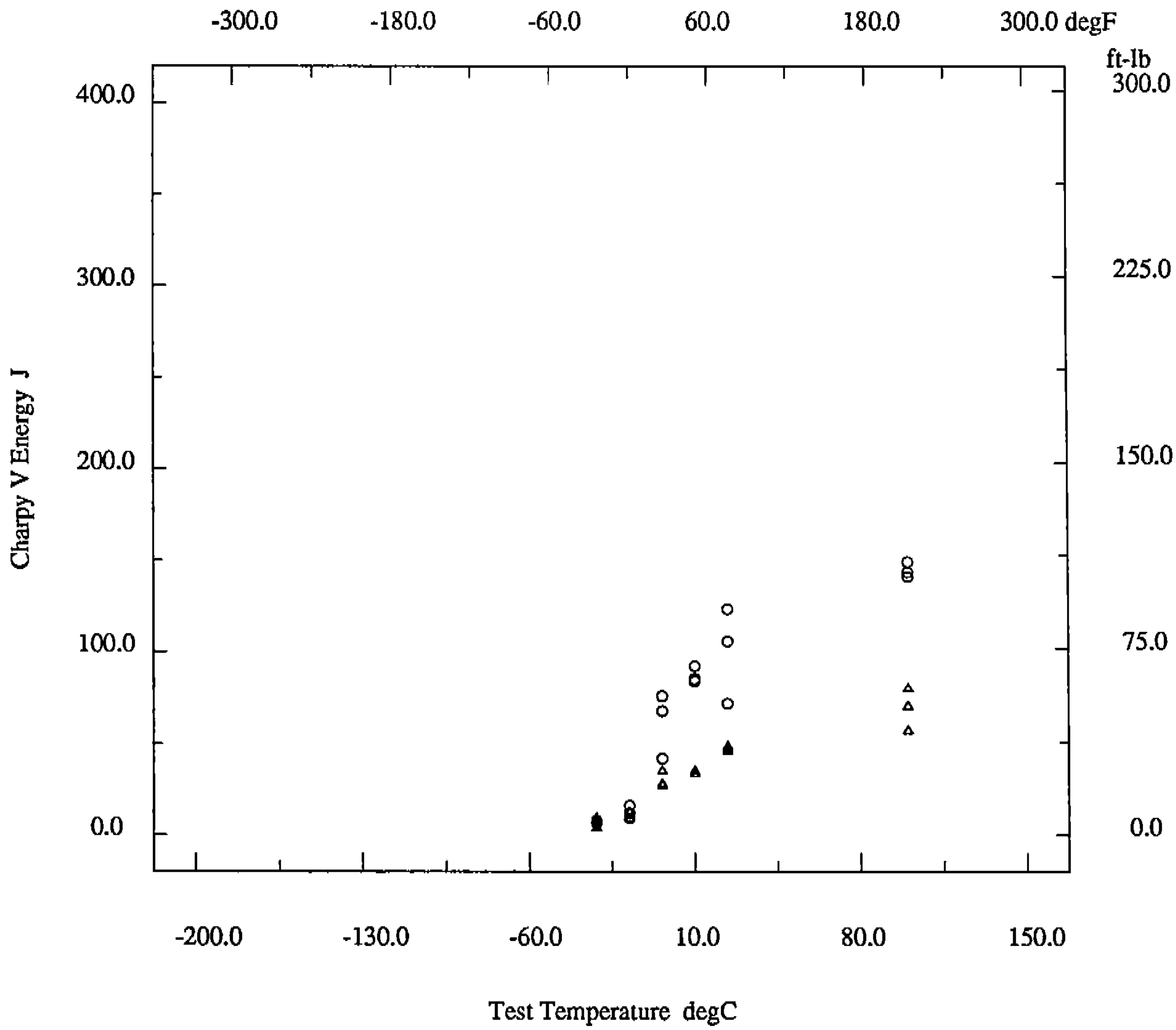
* - not reported

## Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.030.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 1.188 in | Composition Type | Actual |
| Composition Position | * | Lot ID | E |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.031.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 43731 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.22 % | Mn | 0.92 % |
| P | 0.01 % | S | 0.02 % |
| Si | 0.24 % | Cr | 0.07 % |
| Ni | 0.08 % | Mo | 0.02 % |
| V | * | Cu | 0.17 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | electric furnace |
| Ingot Position | * | Killing Process | K |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 30 | Yes | Yes |

* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.031.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 43731 |
| Reference | Armco-MPC | | |

## Composition

See Page 5400.1

## Fabrication History

See Page 5400.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

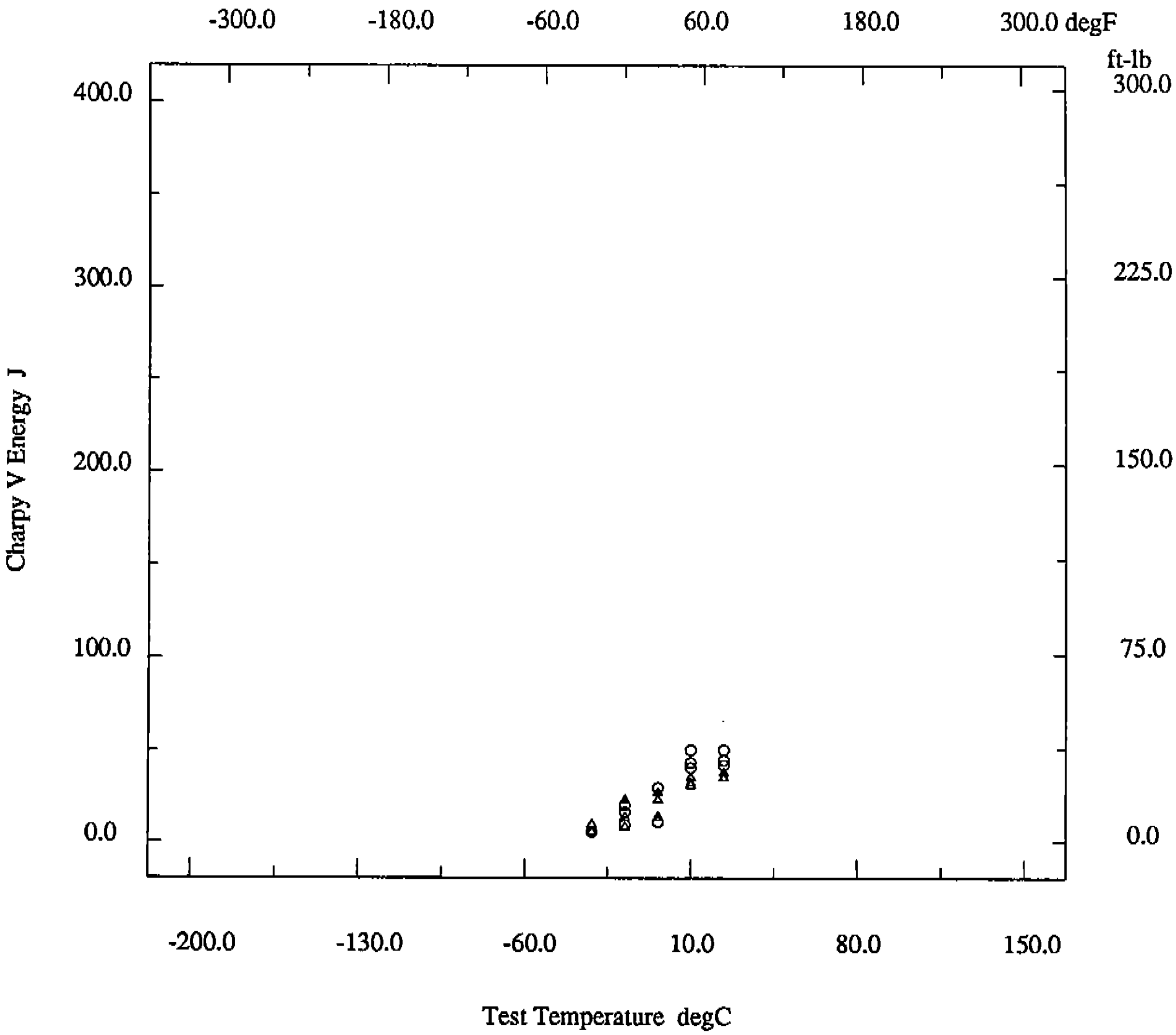
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 4 | 3 | 5 |
| L-T ○ | -25 | 4 | 3 | 5 |
| L-T ○ | -25 | 4 | 4 | 5 |
| L-T ○ | 0 | 12 | 14 | 10 |
| L-T ○ | 0 | 15 | 18 | 10 |
| L-T ○ | 0 | 7 | 8 | 5 |
| L-T ○ | 25 | 22 | 24 | 15 |
| L-T ○ | 25 | 8 | 11 | 10 |
| L-T ○ | 25 | 8 | 11 | 10 |
| L-T ○ | 50 | 30 | 36 | 25 |
| L-T ○ | 50 | 32 | 36 | 30 |
| L-T ○ | 50 | 37 | 37 | 30 |
| L-T ○ | 75 | 31 | 36 | 30 |
| L-T ○ | 75 | 33 | 38 | 30 |
| L-T ○ | 75 | 37 | 41 | 35 |
| T-L △ | -25 | 4 | 4 | 5 |
| T-L △ | -25 | 4 | 6 | 5 |
| T-L △ | -25 | 7 | 9 | 5 |
| T-L △ | 0 | 10 | 12 | 5 |
| T-L △ | 0 | 17 | 18 | 5 |
| T-L △ | 0 | 6 | 7 | 5 |
| T-L △ | 25 | 10 | 16 | 15 |
| T-L △ | 25 | 17 | 21 | 15 |
| T-L △ | 25 | 20 | 22 | 15 |
| T-L △ | 50 | 23 | 28 | 35 |
| T-L △ | 50 | 24 | 31 | 35 |
| T-L △ | 50 | 26 | 32 | 40 |
| T-L △ | 75 | 26 | 30 | 40 |
| T-L △ | 75 | 26 | 32 | 40 |
| T-L △ | 75 | 28 | 35 | 40 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.031.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 43731 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.032.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 52797 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.19 % | Mn | 0.88 % |
| P | 0.01 % | S | 0.018 % |
| Si | 0.22 % | Cr | 0.03 % |
| Ni | 0.08 % | Mo | 0.02 % |
| V | * | Cu | 0.11 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | electric furnace |
| Ingot Position | * | Killing Process | K |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 30 | Yes | Yes |

* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.032.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 52797 |
| Reference | Armco-MPC | | |

**Composition** See Page 5500.1

**Fabrication History** See Page 5500.1

**Property Measurements**

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

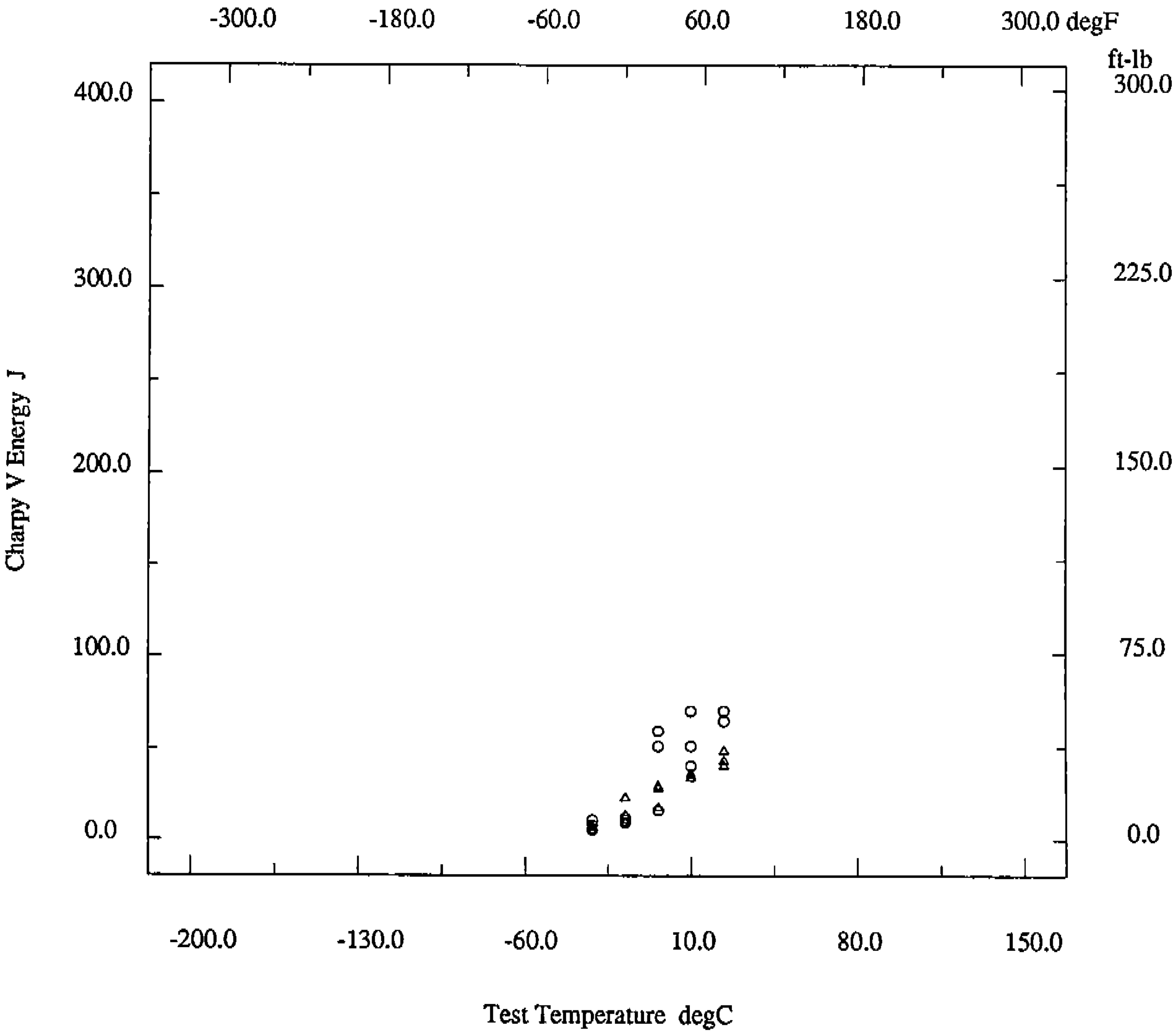
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 4 | 6 | 5 |
| L-T ○ | -25 | 6 | 8 | 5 |
| L-T ○ | -25 | 8 | 8 | 5 |
| L-T ○ | 0 | 7 | 9 | 10 |
| L-T ○ | 0 | 8 | 11 | 10 |
| L-T ○ | 0 | 9 | 13 | 10 |
| L-T ○ | 25 | 12 | 17 | 15 |
| L-T ○ | 25 | 38 | 38 | 20 |
| L-T ○ | 25 | 44 | 45 | 30 |
| L-T ○ | 50 | 30 | 25 | 30 |
| L-T ○ | 50 | 38 | 41 | 35 |
| L-T ○ | 50 | 52 | 52 | 35 |
| L-T ○ | 75 | 48 | 50 | 30 |
| L-T ○ | 75 | 52 | 54 | 35 |
| L-T ○ | 75 | 52 | 56 | 35 |
| T-L △ | -25 | 4 | 4 | 5 |
| T-L △ | -25 | 5 | 6 | 5 |
| T-L △ | -25 | 6 | 8 | 5 |
| T-L △ | 0 | 10 | 14 | 10 |
| T-L △ | 0 | 17 | 20 | 10 |
| T-L △ | 0 | 7 | 9 | 5 |
| T-L △ | 25 | 13 | 19 | 15 |
| T-L △ | 25 | 21 | 23 | 20 |
| T-L △ | 25 | 22 | 26 | 25 |
| T-L △ | 50 | 25 | 25 | 25 |
| T-L △ | 50 | 26 | 30 | 25 |
| T-L △ | 50 | 27 | 31 | 25 |
| T-L △ | 75 | 30 | 36 | 45 |
| T-L △ | 75 | 32 | 38 | 50 |
| T-L △ | 75 | 36 | 43 | 50 |

* - not reported

## Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.032.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 52797 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.033.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 52765 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.23 % | Mn | 0.91 % |
| P | 0.01 % | S | 0.016 % |
| Si | 0.20 % | Cr | 0.04 % |
| Ni | 0.10 % | Mo | 0.03 % |
| V | * | Cu | 0.11 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | electric furnace |
| Ingot Position | * | Killing Process | K |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 30 | Yes | Yes |

* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.033.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 52765 |
| Reference | Armco-MPC | | |

## Composition

See Page 5600.1

## Fabrication History

See Page 5600.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

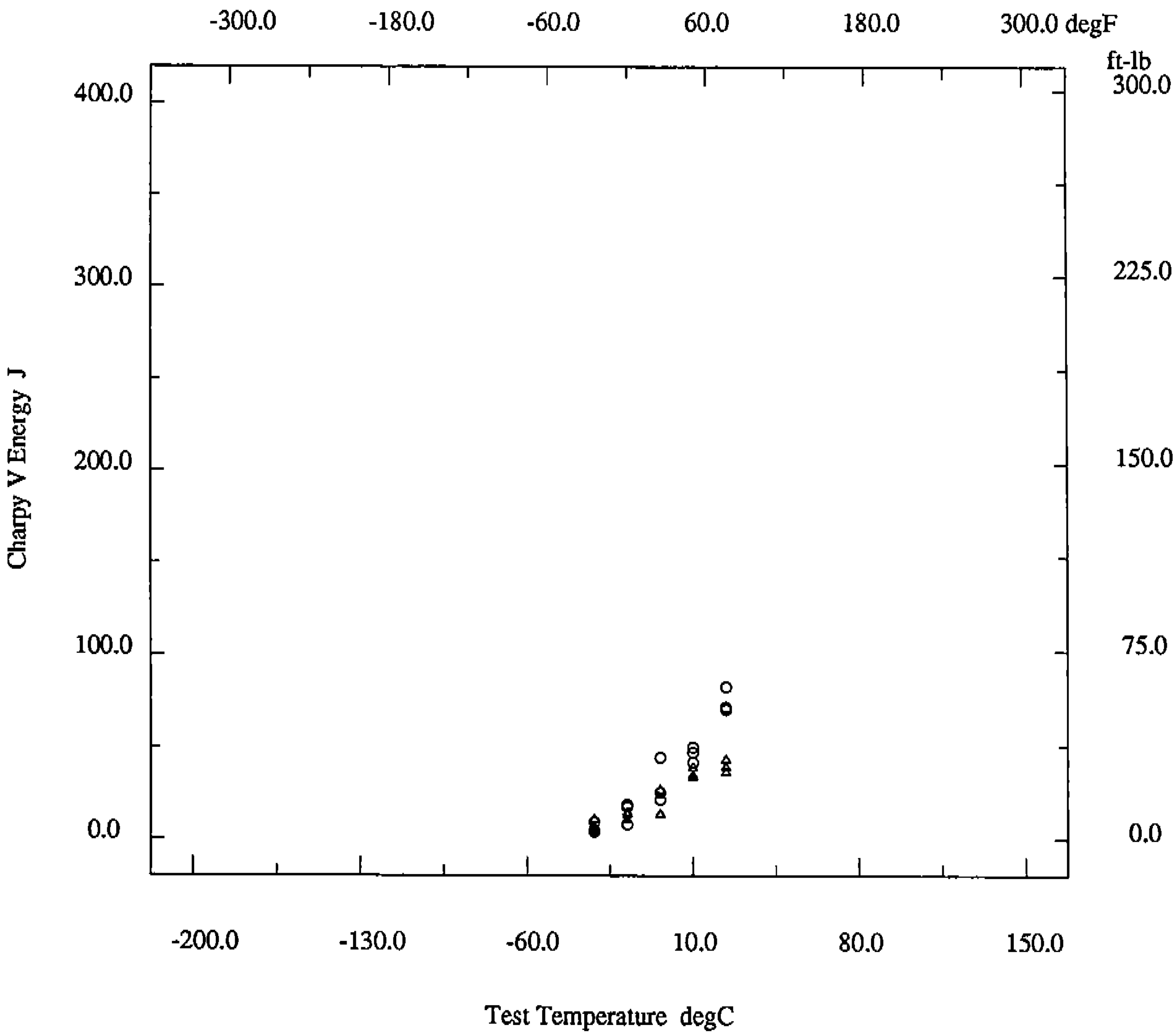
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 3 | 4 | 5 |
| L-T ○ | -25 | 4 | 5 | 5 |
| L-T ○ | -25 | 7 | 8 | 5 |
| L-T ○ | 0 | 13 | 15 | 15 |
| L-T ○ | 0 | 14 | 18 | 15 |
| L-T ○ | 0 | 6 | 8 | 10 |
| L-T ○ | 25 | 16 | 18 | 20 |
| L-T ○ | 25 | 19 | 22 | 25 |
| L-T ○ | 25 | 33 | 34 | 25 |
| L-T ○ | 50 | 31 | 35 | 30 |
| L-T ○ | 50 | 35 | 36 | 35 |
| L-T ○ | 50 | 37 | 38 | 35 |
| L-T ○ | 75 | 52 | 54 | 50 |
| L-T ○ | 75 | 53 | 57 | 50 |
| L-T ○ | 75 | 61 | 60 | 55 |
| T-L △ | -25 | 4 | 4 | 5 |
| T-L △ | -25 | 5 | 6 | 5 |
| T-L △ | -25 | 8 | 10 | 10 |
| T-L △ | 0 | 10 | 15 | 10 |
| T-L △ | 0 | 11 | 17 | 10 |
| T-L △ | 0 | 8 | 9 | 10 |
| T-L △ | 25 | 10 | 15 | 20 |
| T-L △ | 25 | 20 | 25 | 20 |
| T-L △ | 25 | 20 | 27 | 20 |
| T-L △ | 50 | 25 | 28 | 35 |
| T-L △ | 50 | 26 | 31 | 35 |
| T-L △ | 50 | 29 | 35 | 40 |
| T-L △ | 75 | 27 | 31 | 35 |
| T-L △ | 75 | 29 | 33 | 40 |
| T-L △ | 75 | 32 | 38 | 45 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.033.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 52765 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.034.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 14490 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.21 % | Mn | 1.16 % |
| P | 0.01 % | S | 0.016 % |
| Si | 0.23 % | Cr | 0.03 % |
| Ni | 0.05 % | Mo | 0.02 % |
| V | * | Cu | 0.09 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | K |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 20 | Yes | Yes |

* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.034.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 14490 |
| Reference | Armco-MPC | | |

## Composition

See Page 5700.1

## Fabrication History

See Page 5700.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

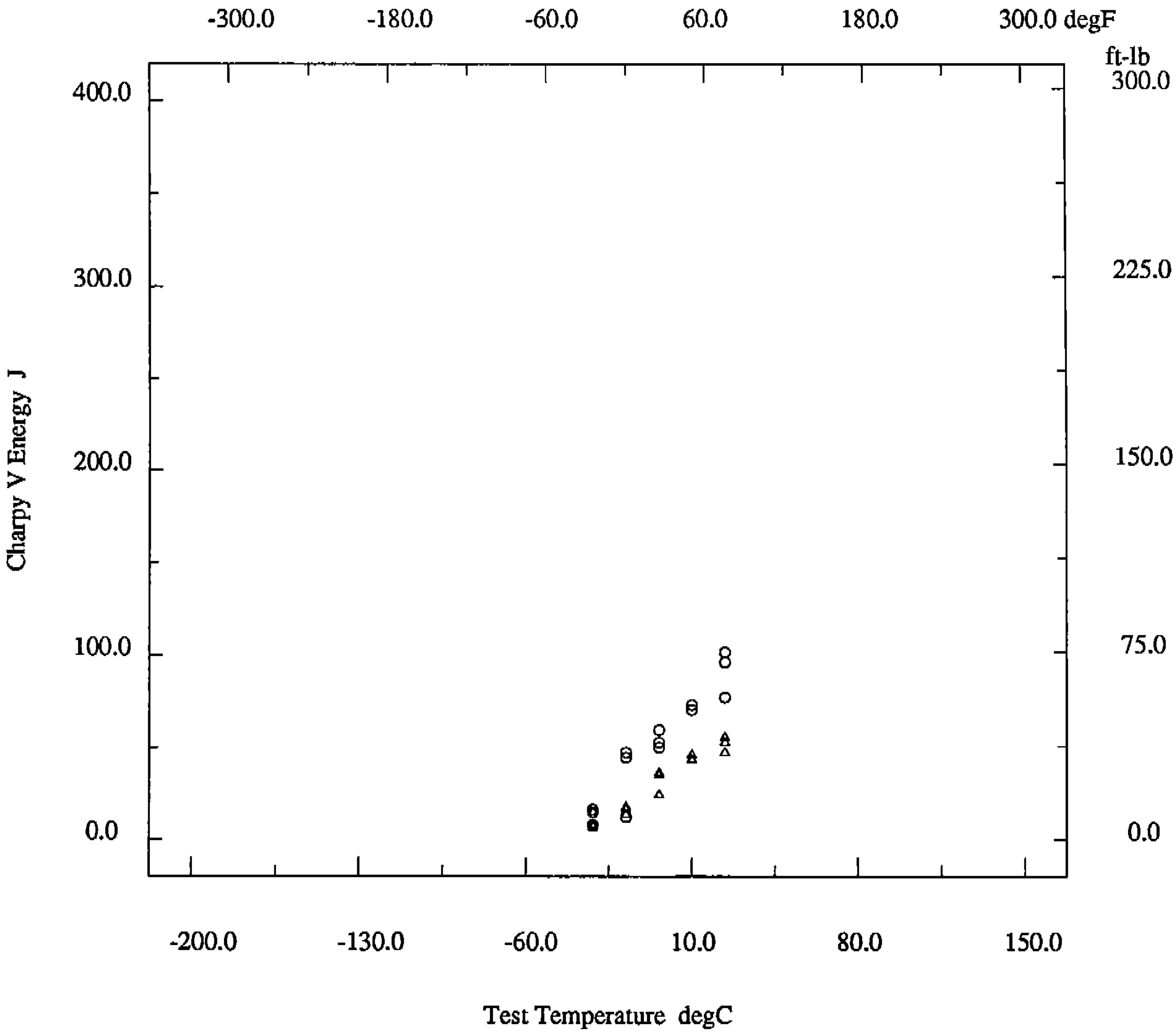
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 11 | 14 | 10 |
| L-T ○ | -25 | 12 | 16 | 10 |
| L-T ○ | -25 | 6 | 6 | 10 |
| L-T ○ | 0 | 33 | 33 | 20 |
| L-T ○ | 0 | 35 | 35 | 20 |
| L-T ○ | 0 | 9 | 10 | 10 |
| L-T ○ | 25 | 37 | 40 | 30 |
| L-T ○ | 25 | 39 | 41 | 30 |
| L-T ○ | 25 | 44 | 45 | 35 |
| L-T ○ | 50 | 52 | 48 | 40 |
| L-T ○ | 50 | 54 | 52 | 45 |
| L-T ○ | 50 | 54 | 54 | 45 |
| L-T ○ | 75 | 57 | 58 | 45 |
| L-T ○ | 75 | 71 | 65 | 55 |
| L-T ○ | 75 | 75 | 66 | 65 |
| T-L △ | -25 | 11 | 13 | 10 |
| T-L △ | -25 | 5 | 6 | 5 |
| T-L △ | -25 | 6 | 6 | 5 |
| T-L △ | 0 | 10 | 12 | 15 |
| T-L △ | 0 | 12 | 15 | 15 |
| T-L △ | 0 | 13 | 18 | 15 |
| T-L △ | 25 | 18 | 24 | 40 |
| T-L △ | 25 | 26 | 29 | 40 |
| T-L △ | 25 | 27 | 34 | 45 |
| T-L △ | 50 | 32 | 35 | 40 |
| T-L △ | 50 | 34 | 37 | 45 |
| T-L △ | 50 | 34 | 37 | 45 |
| T-L △ | 75 | 35 | 40 | 55 |
| T-L △ | 75 | 39 | 46 | 60 |
| T-L △ | 75 | 41 | 46 | 65 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.034.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 14490 |
| Reference | Armco-MPC | | |




* - not reported

362X

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.035.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 17754 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.19 % | Mn | 0.97 % |
| P | 0.01 % | S | 0.019 % |
| Si | 0.21 % | Cr | 0.01 % |
| Ni | 0.05 % | Mo | 0.02 % |
| V | * | Cu | 0.10 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | K |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductility Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 30 | Yes | Yes |

* - not reported

# Material A36



## Description

Material Code ........ 009.035.01
UNS ........ *
Type ........ Wrought Metal
Thickness ........ 2.00 in
Composition Position ........ *
Reference ........ Armco-MPC
Material Name ........ A36
Other Designation ........ *
Form ........ Plate
Composition Type ........ Actual
Lot ID ........ 17754

## Composition

See Page 5800.1

## Fabrication History

See Page 5800.1

## Property Measurements

Test Type ........ Charpy V Impact
Specimen Type ........ Full
Did Specimen Split? ........ *
Standard Year ........ *
Position ........ *
Did Specimen Fracture? ........ Yes
Standard Method ........ *

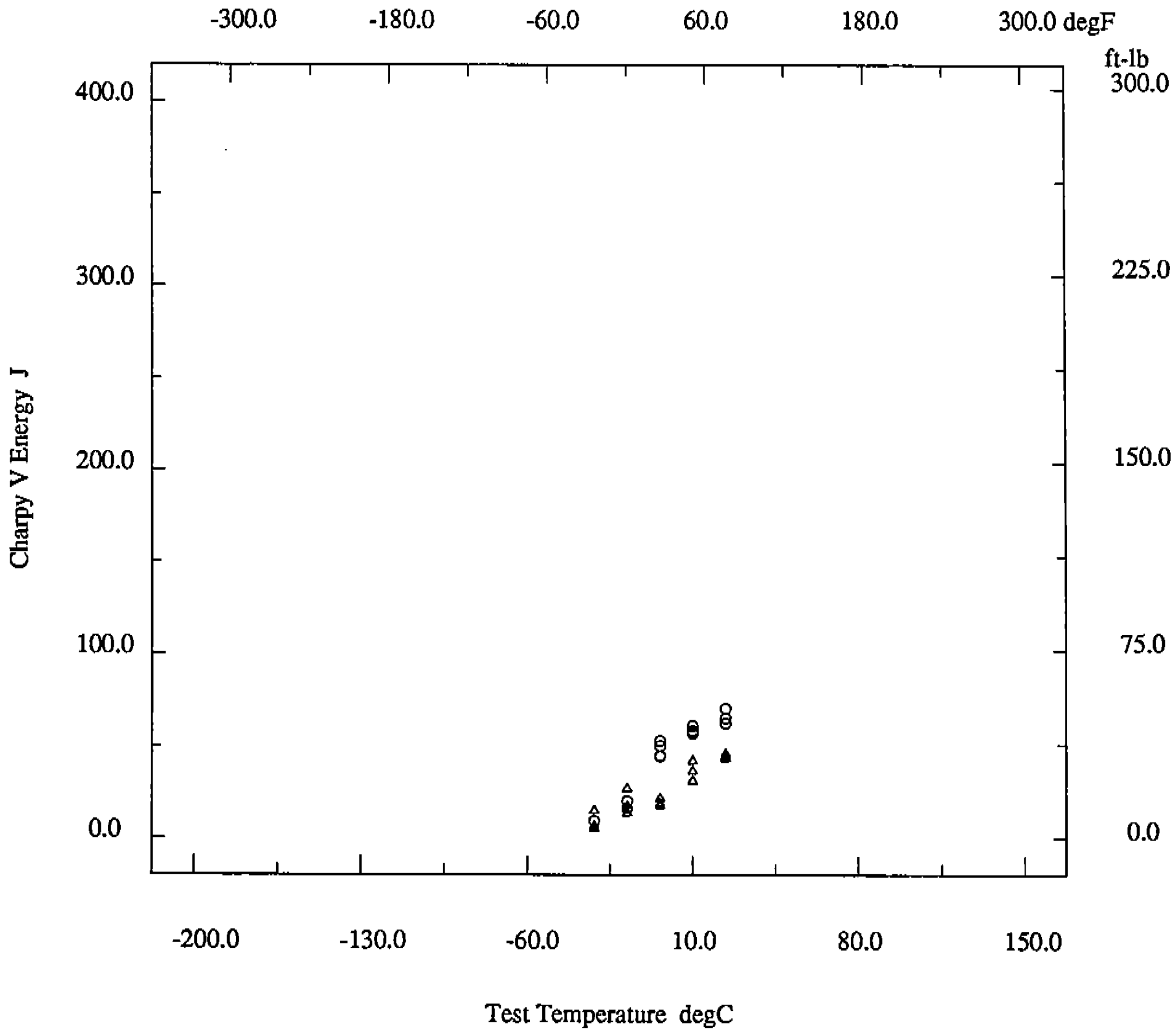
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | -25 | 7 | 11 | 15 |
| L-T ○ | -25 | 7 | 8 | 10 |
| L-T ○ | -25 | 7 | 9 | 10 |
| L-T ○ | 0 | 12 | 19 | 30 |
| L-T ○ | 0 | 15 | 21 | 30 |
| L-T ○ | 0 | 15 | 22 | 30 |
| L-T ○ | 25 | 33 | 46 | 90 |
| L-T ○ | 25 | 37 | 50 | 90 |
| L-T ○ | 25 | 39 | 54 | 90 |
| L-T ○ | 50 | 42 | 54 | 95 |
| L-T ○ | 50 | 43 | 55 | 95 |
| L-T ○ | 50 | 45 | 57 | 95 |
| L-T ○ | 75 | 46 | 58 | 96 |
| L-T ○ | 75 | 48 | 61 | 99 |
| L-T ○ | 75 | 52 | 63 | 99 |
| T-L △ | -25 | 11 | 17 | 10 |
| T-L △ | -25 | 4 | 6 | 10 |
| T-L △ | -25 | 5 | 9 | 10 |
| T-L △ | 0 | 10 | 18 | 40 |
| T-L △ | 0 | 13 | 21 | 45 |
| T-L △ | 0 | 20 | 31 | 85 |
| T-L △ | 25 | 13 | 20 | 25 |
| T-L △ | 25 | 14 | 21 | 35 |
| T-L △ | 25 | 16 | 25 | 40 |
| T-L △ | 50 | 23 | 33 | 75 |
| T-L △ | 50 | 27 | 40 | 85 |
| T-L △ | 50 | 31 | 45 | 95 |
| T-L △ | 75 | 32 | 42 | 75 |
| T-L △ | 75 | 33 | 48 | 75 |
| T-L △ | 75 | 34 | 48 | 98 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.035.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 17754 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.036.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 4.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 17846 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.19 % | Mn | 0.97 % |
| P | 0.01 % | S | 0.021 % |
| Si | 0.20 % | Cr | 0.05 % |
| Ni | 0.05 % | Mo | 0.04 % |
| V | * | Cu | 0.08 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | K |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 10 | Yes | Yes |

* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.036.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 4.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 17846 |
| Reference | Armco-MPC | | |

## Composition

See Page 5900.1

## Fabrication History

See Page 5900.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

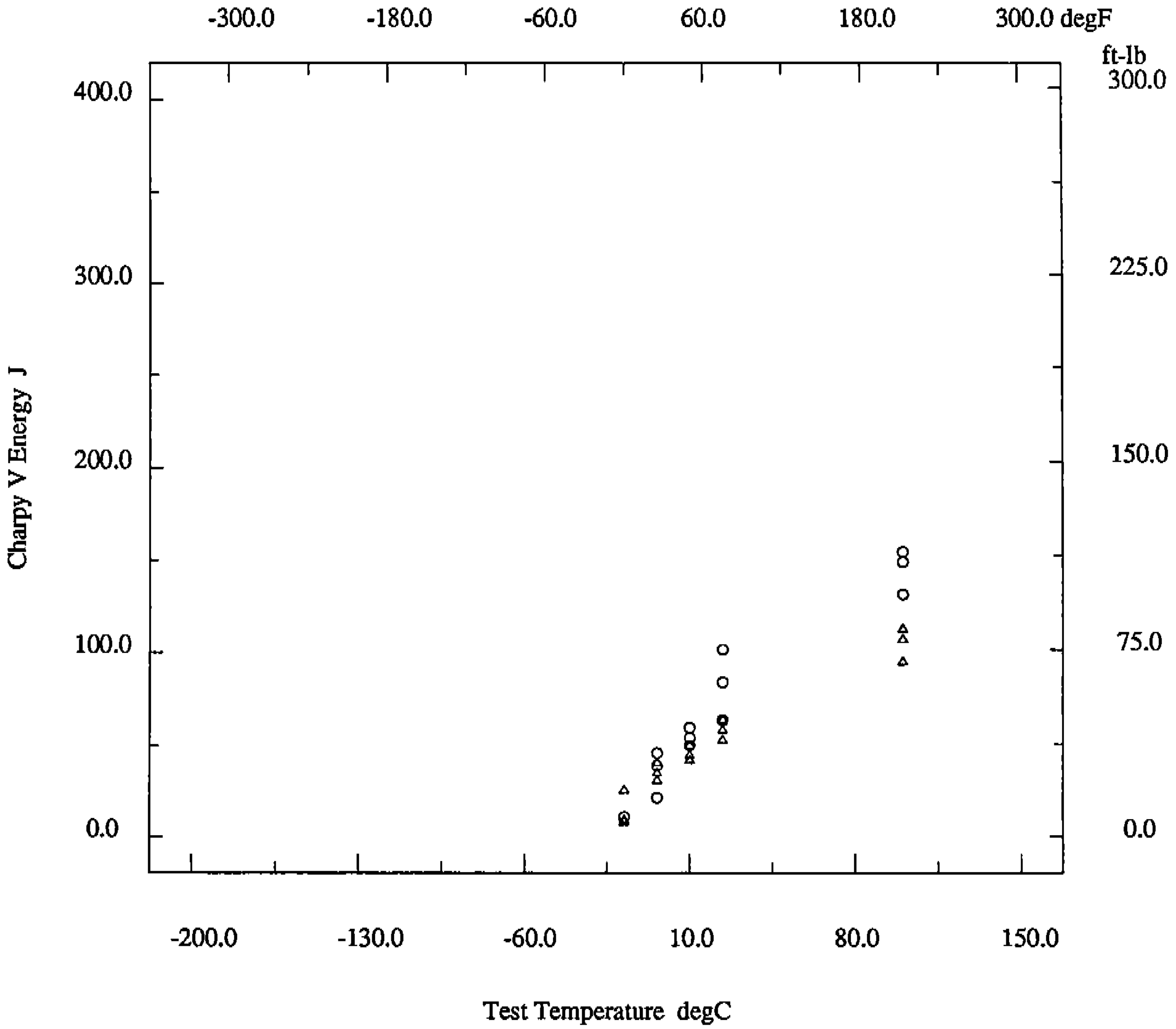
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | 0 | 8 | 10 | * |
| L-T ○ | 0 | 8 | 8 | * |
| L-T ○ | 0 | 8 | 9 | * |
| L-T ○ | 25 | 16 | 18 | 10 |
| L-T ○ | 25 | 29 | 29 | 15 |
| L-T ○ | 25 | 34 | 35 | 20 |
| L-T ○ | 50 | 37 | 38 | 25 |
| L-T ○ | 50 | 40 | 43 | 25 |
| L-T ○ | 50 | 44 | 47 | 25 |
| L-T ○ | 75 | 47 | 48 | 30 |
| L-T ○ | 75 | 62 | 56 | 40 |
| L-T ○ | 75 | 75 | 63 | 45 |
| L-T ○ | 212 | 110 | 64 | 100 |
| L-T ○ | 212 | 114 | 64 | 100 |
| L-T ○ | 212 | 97 | 54 | 95 |
| T-L △ | 0 | 19 | 20 | * |
| T-L △ | 0 | 6 | 8 | * |
| T-L △ | 0 | 7 | 8 | * |
| T-L △ | 25 | 23 | 25 | 15 |
| T-L △ | 25 | 26 | 28 | 15 |
| T-L △ | 25 | 30 | 30 | 20 |
| T-L △ | 50 | 31 | 36 | 15 |
| T-L △ | 50 | 33 | 37 | 20 |
| T-L △ | 50 | 37 | 37 | 25 |
| T-L △ | 75 | 39 | 44 | 25 |
| T-L △ | 75 | 43 | 45 | 30 |
| T-L △ | 75 | 47 | 46 | 35 |
| T-L △ | 212 | 70 | 56 | 90 |
| T-L △ | 212 | 79 | 65 | 95 |
| T-L △ | 212 | 83 | 68 | 100 |

* - not reported

## Material A36



| **Description** | | | |
|---|---|---|---|
| Material Code | 009.036.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 4.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 17846 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.037.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 4.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 14500 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.19 % | Mn | 0.97 % |
| P | 0.01 % | S | 0.017 % |
| Si | 0.21 % | Cr | 0.04 % |
| Ni | 0.05 % | Mo | 0.02 % |
| V | * | Cu | 0.08 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | K |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 10 | Yes | Yes |

---

* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.037.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 4.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 14500 |
| Reference | Armco-MPC | | |

## Composition

See Page 6000.1

## Fabrication History

See Page 6000.1

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | 0 | 6 | 7 | * |
| L-T ○ | 0 | 6 | 7 | * |
| L-T ○ | 0 | 7 | 10 | * |
| L-T ○ | 25 | 16 | 16 | * |
| L-T ○ | 25 | 6 | 8 | * |
| L-T ○ | 25 | 8 | 9 | * |
| L-T ○ | 50 | 20 | 25 | 10 |
| L-T ○ | 50 | 23 | 25 | 10 |
| L-T ○ | 50 | 29 | 31 | 15 |
| L-T ○ | 75 | 23 | 29 | 15 |
| L-T ○ | 75 | 26 | 29 | 20 |
| L-T ○ | 75 | 46 | 48 | 25 |
| L-T ○ | 212 | 103 | 64 | 75 |
| L-T ○ | 212 | 90 | 61 | 65 |
| L-T ○ | 212 | 97 | 63 | 70 |
| T-L △ | 0 | 4 | * | * |
| T-L △ | 0 | 6 | * | * |
| T-L △ | 0 | 6 | * | * |
| T-L △ | 25 | 8 | * | * |
| T-L △ | 25 | 8 | * | * |
| T-L △ | 25 | 9 | * | * |
| T-L △ | 50 | 17 | 18 | 10 |
| T-L △ | 50 | 18 | 19 | 10 |
| T-L △ | 50 | 18 | 19 | 10 |
| T-L △ | 75 | 19 | 22 | 15 |
| T-L △ | 75 | 23 | 29 | 15 |
| T-L △ | 75 | 29 | 32 | 20 |
| T-L △ | 212 | 61 | 52 | 70 |
| T-L △ | 212 | 63 | 54 | 70 |
| T-L △ | 212 | 67 | 56 | 80 |

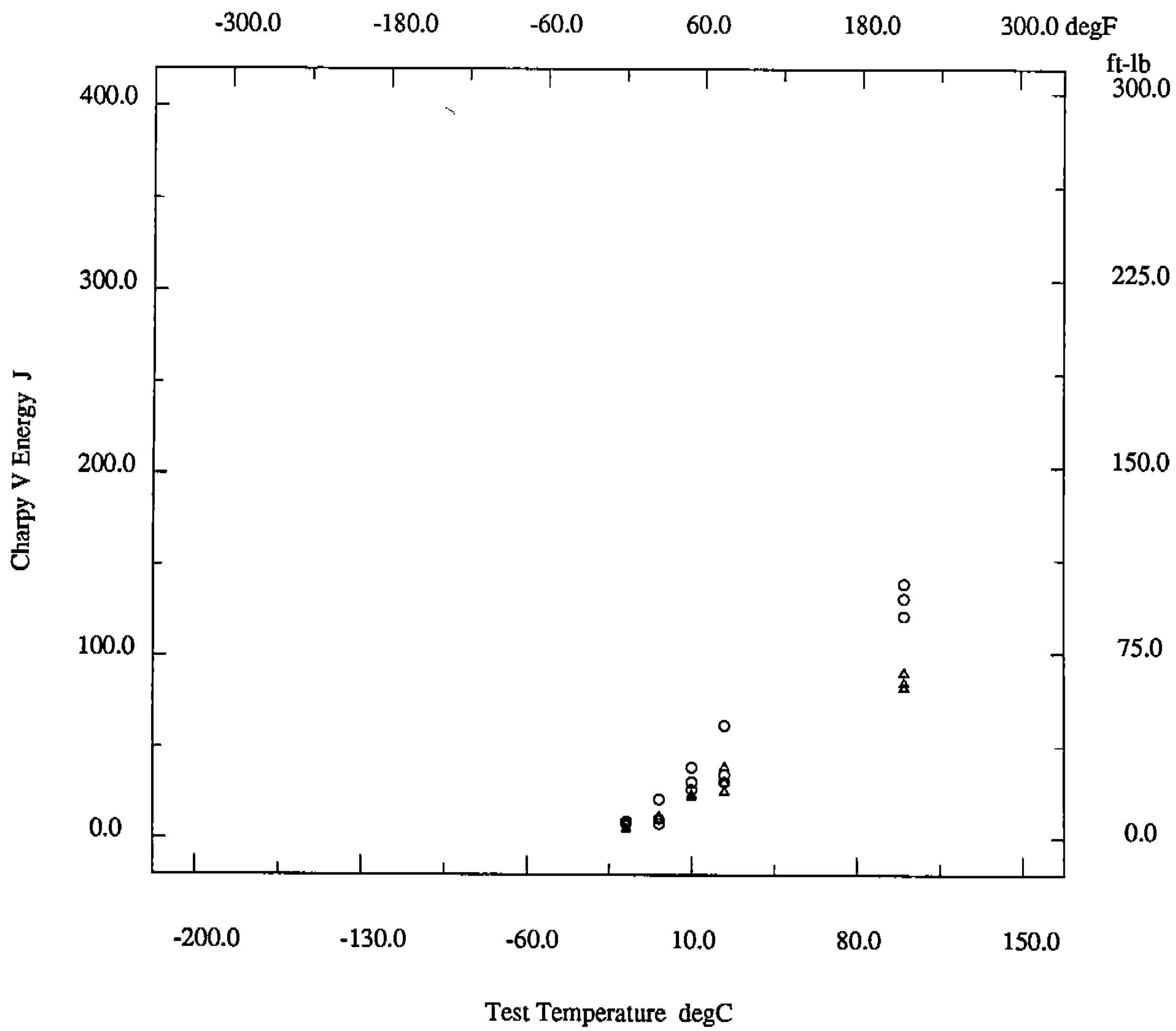
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.037.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 4.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 14500 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.038.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 4.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 17754 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.19 % | Mn | 0.97 % |
| P | 0.01 % | S | 0.019 % |
| Si | 0.21 % | Cr | 0.01 % |
| Ni | 0.05 % | Mo | 0.02 % |
| V | * | Cu | 0.10 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | K |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 20 | Yes | Yes |

* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.038.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 4.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 17754 |
| Reference | Armco-MPC | | |

**Composition** See Page 6100.1

**Fabrication History** See Page 6100.1

**Property Measurements**

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | 0 | 13 | 17 | * |
| L-T ○ | 0 | 13 | 17 | * |
| L-T ○ | 0 | 8 | 9 | * |
| L-T ○ | 25 | 12 | 14 | 10 |
| L-T ○ | 25 | 12 | 16 | 10 |
| L-T ○ | 25 | 13 | 17 | 10 |
| L-T ○ | 50 | 40 | 41 | 30 |
| L-T ○ | 50 | 47 | 47 | 30 |
| L-T ○ | 50 | 56 | 53 | 35 |
| L-T ○ | 75 | 38 | 39 | 40 |
| L-T ○ | 75 | 50 | 49 | 45 |
| L-T ○ | 75 | 63 | 63 | 50 |
| L-T ○ | 212 | 93 | 55 | 100 |
| L-T ○ | 212 | 93 | 63 | 100 |
| L-T ○ | 212 | 96 | 63 | 100 |
| T-L △ | 0 | 21 | 22 | * |
| T-L △ | 0 | 6 | 7 | * |
| T-L △ | 0 | 7 | 9 | * |
| T-L △ | 25 | 13 | 15 | * |
| T-L △ | 25 | 17 | 21 | * |
| T-L △ | 25 | 8 | 9 | * |
| T-L △ | 50 | 26 | 30 | 20 |
| T-L △ | 50 | 30 | 32 | 30 |
| T-L △ | 50 | 35 | 36 | 30 |
| T-L △ | 75 | 14 | 21 | 20 |
| T-L △ | 75 | 35 | 41 | 25 |
| T-L △ | 75 | 36 | 41 | 25 |
| T-L △ | 212 | 74 | 58 | 100 |
| T-L △ | 212 | 75 | 60 | 100 |
| T-L △ | 212 | 80 | 62 | 100 |

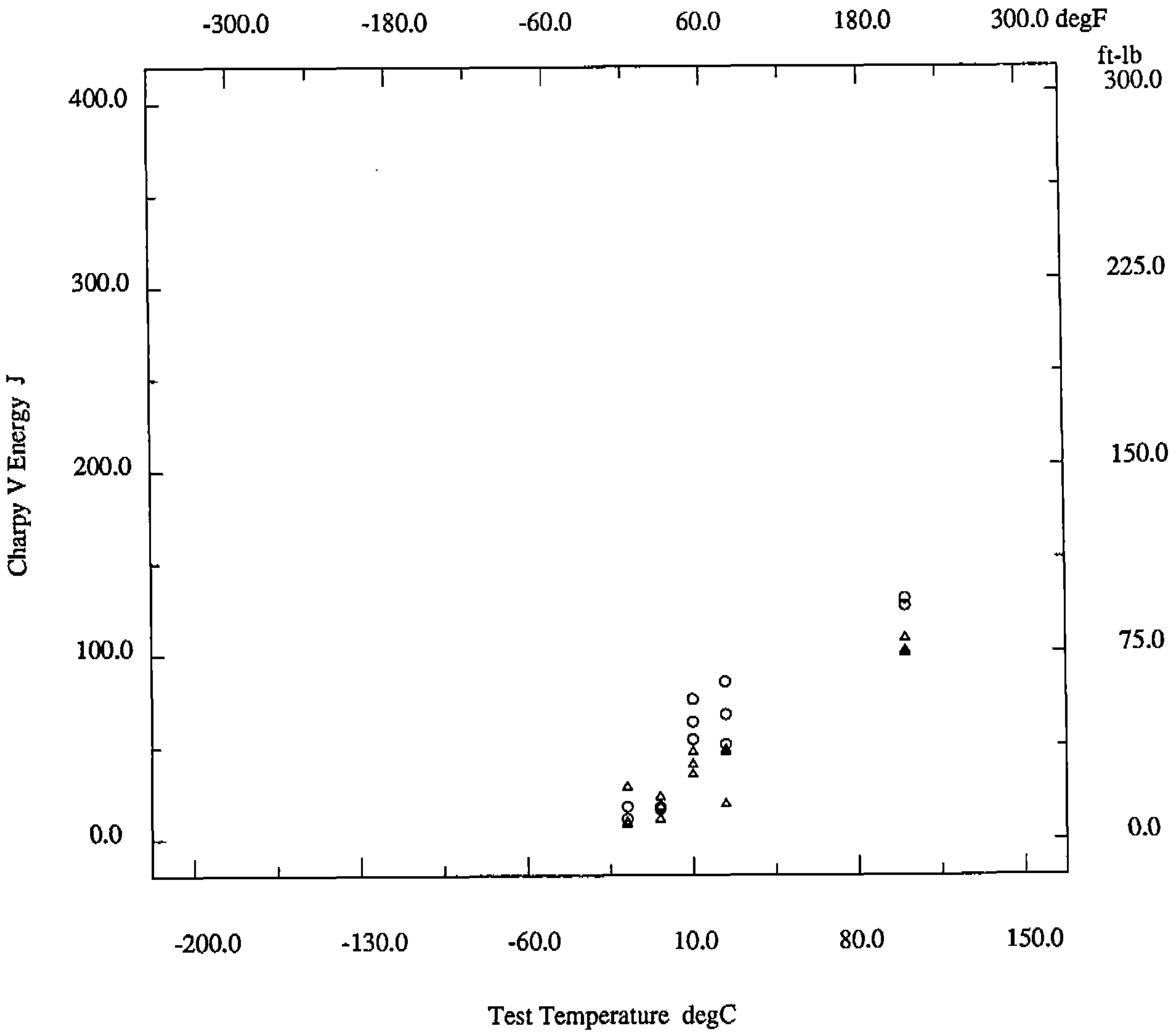
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.038.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 4.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 17754 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.039.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 4.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 17777 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.18 % | Mn | 0.90 % |
| P | 0.01 % | S | 0.02 % |
| Si | 0.20 % | Cr | 0.02 % |
| Ni | 0.05 % | Mo | 0.02 % |
| V | * | Cu | 0.08 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | K |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductility Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 20 | Yes | Yes |

* - not reported

# Material A36



## Description

Material Code ................ 009.039.01
Material Name ........................ A36
UNS .................................. *
Other Designation ..................... *
Type ..................... Wrought Metal
Form ................................ Plate
Thickness ....................... 4.00 in
Composition Type ................. Actual
Composition Position .................. *
Lot ID .......................... 17777
Reference ................... Armco-MPC

## Composition

See Page 6200.1

## Fabrication History

See Page 6200.1

## Property Measurements

Test Type ................. Charpy V Impact
Position .............................. *
Specimen Type ......................... Full
Did Specimen Fracture? ................ Yes
Did Specimen Split? ................... *
Standard Method ....................... *
Standard Year ......................... *

| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | 0 | 4 | 2 | * |
| L-T ○ | 0 | 5 | 4 | * |
| L-T ○ | 0 | 5 | 5 | * |
| L-T ○ | 25 | 7 | 11 | * |
| L-T ○ | 25 | 7 | 11 | * |
| L-T ○ | 25 | 8 | 14 | * |
| L-T ○ | 50 | 11 | 20 | 15 |
| L-T ○ | 50 | 12 | 21 | 20 |
| L-T ○ | 50 | 17 | 24 | 20 |
| L-T ○ | 75 | 19 | 29 | 20 |
| L-T ○ | 75 | 20 | 29 | 20 |
| L-T ○ | 75 | 22 | 30 | 20 |
| L-T ○ | 212 | 83 | 58 | 90 |
| L-T ○ | 212 | 84 | 60 | 95 |
| L-T ○ | 212 | 85 | 62 | 95 |
| T-L △ | 0 | 5 | 4 | * |
| T-L △ | 0 | 5 | 5 | * |
| T-L △ | 0 | 5 | 6 | * |
| T-L △ | 25 | 6 | 9 | * |
| T-L △ | 25 | 8 | 11 | * |
| T-L △ | 25 | 9 | 12 | * |
| T-L △ | 50 | 11 | 17 | 20 |
| T-L △ | 50 | 12 | 18 | 25 |
| T-L △ | 50 | 18 | 26 | 30 |
| T-L △ | 75 | 10 | 20 | 20 |
| T-L △ | 75 | 15 | 28 | 25 |
| T-L △ | 75 | 19 | 36 | 30 |
| T-L △ | 212 | 50 | 48 | 95 |
| T-L △ | 212 | 55 | 51 | 95 |
| T-L △ | 212 | 61 | 42 | 100 |

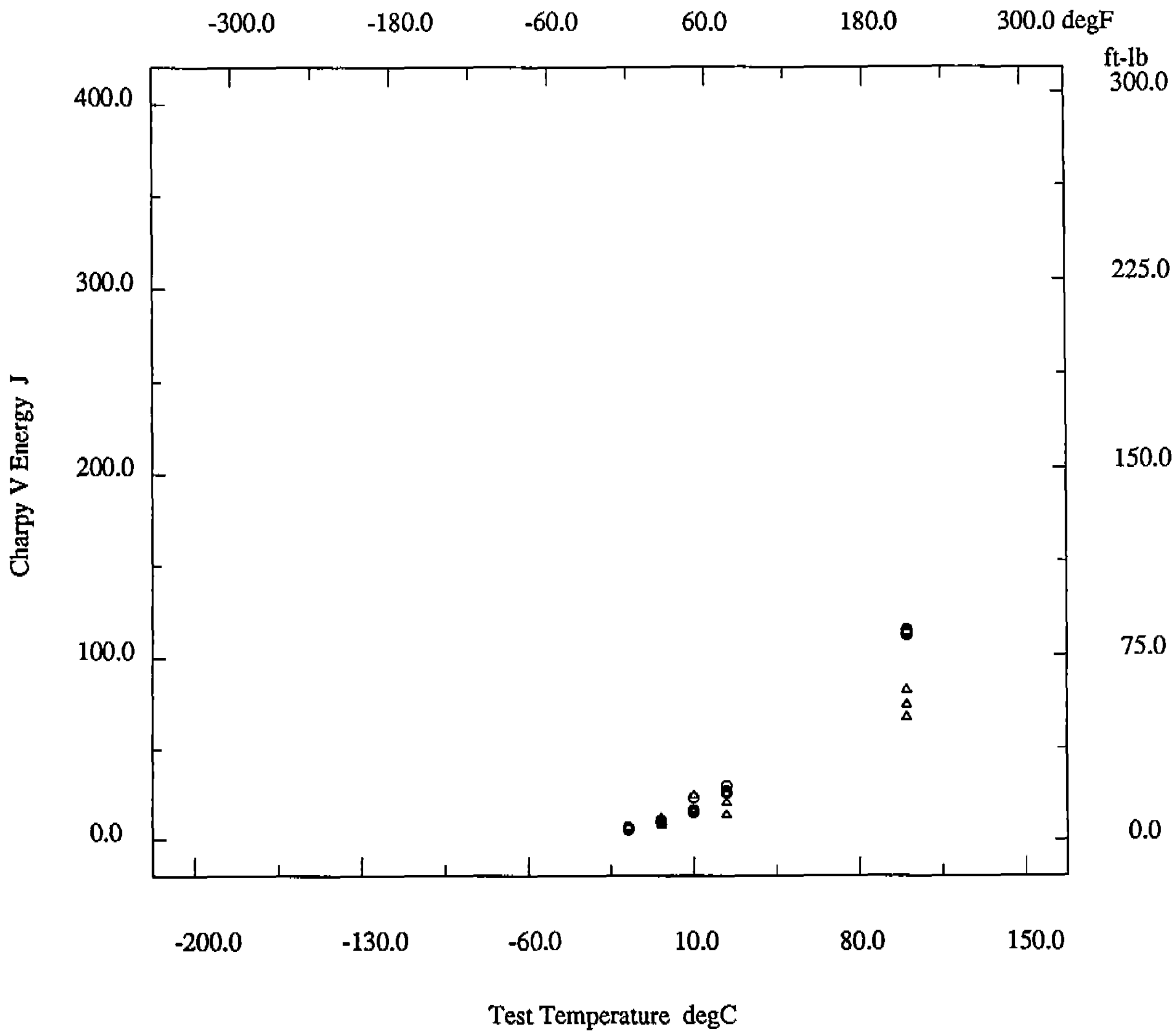
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.039.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 4.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 17777 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.040.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 4.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 18553 |
| Reference | Armco-MPC | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.22 % | Mn | 1.04 % |
| P | 0.01 % | S | 0.021 % |
| Si | 0.22 % | Cr | 0.04 % |
| Ni | 0.05 % | Mo | 0.01 % |
| V | * | Cu | 0.10 % |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | Armco |
| Year Produced | * | Addl Info | None |
| Source | Armco D&M | Melting Practice | open hearth |
| Ingot Position | * | Killing Process | K |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| Final Temperature | * | Final Time | * |
| Cold Work Strain | * | Aging Temperature | * |
| Aging Time | * | Location | * |

## Property Measurements

| | | | |
|---|---|---|---|
| Test Type | Nil Ductilty Transition | Position | * |
| Specimen Type | * | Filler Alloy | * |
| Passes | * | Standard Method | E 208 |
| Standard Year | * | | |

| Orien | Test Temp degF | Break? | NDTT |
|---|---|---|---|
| * | 10 | Yes | Yes |

* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.040.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 4.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 18553 |
| Reference | Armco-MPC | | |

**Composition** See Page 6300.1

**Fabrication History** See Page 6300.1

**Property Measurements**

| | | | |
|---|---|---|---|
| Test Type | Charpy V Impact | Position | * |
| Specimen Type | Full | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

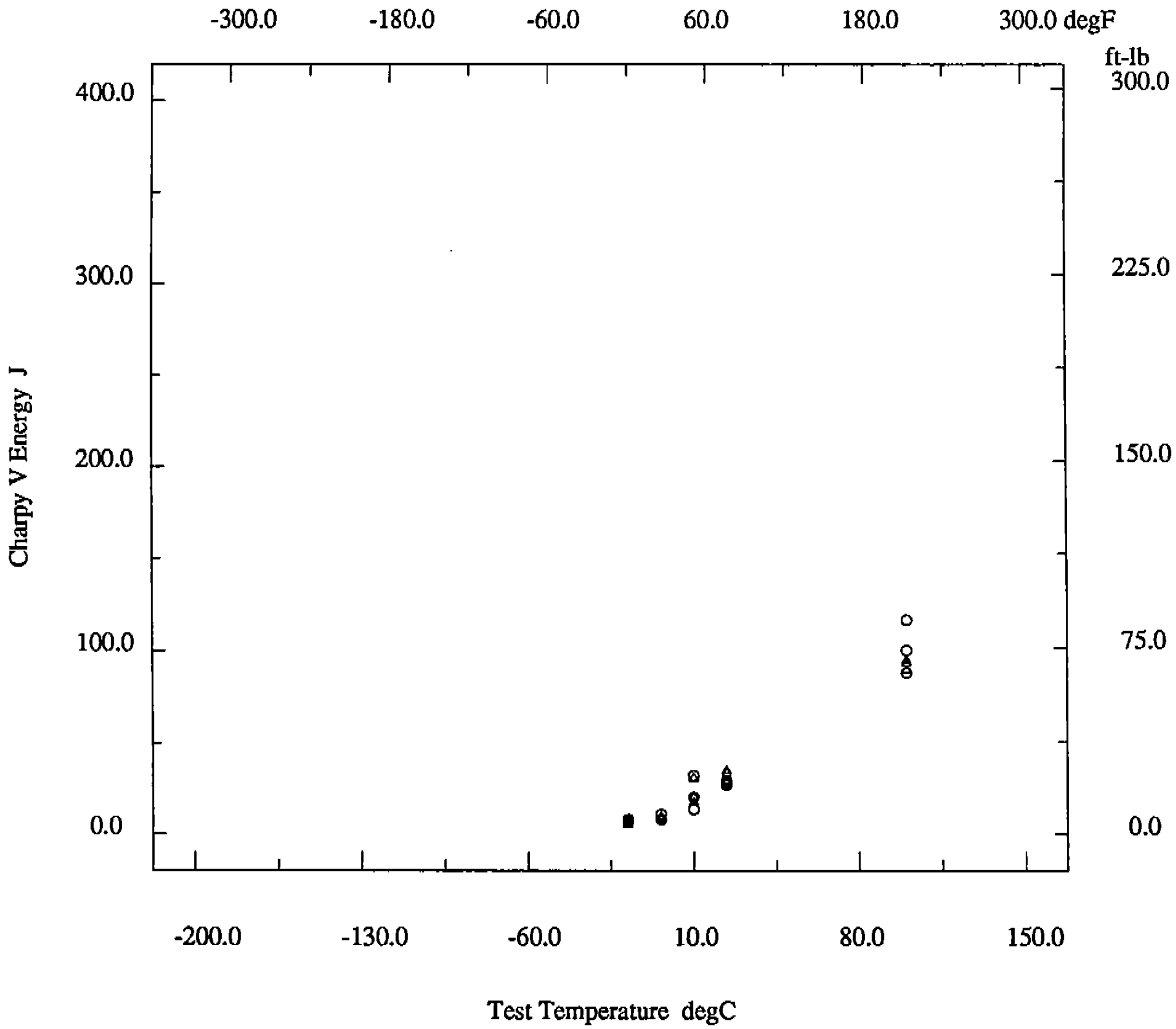
| Orien | Test Temp degF | CVN Energy ft-lb | Lat Expans in | Shear % |
|---|---|---|---|---|
| L-T ○ | 0 | 5 | 4 | * |
| L-T ○ | 0 | 5 | 4 | * |
| L-T ○ | 0 | 6 | 5 | * |
| L-T ○ | 25 | 6 | 8 | * |
| L-T ○ | 25 | 6 | 8 | * |
| L-T ○ | 25 | 8 | 9 | * |
| L-T ○ | 50 | 10 | 12 | 10 |
| L-T ○ | 50 | 15 | 19 | 10 |
| L-T ○ | 50 | 24 | 34 | 10 |
| L-T ○ | 75 | 20 | 27 | 10 |
| L-T ○ | 75 | 21 | 28 | 15 |
| L-T ○ | 75 | 22 | 30 | 15 |
| L-T ○ | 212 | 65 | 52 | 55 |
| L-T ○ | 212 | 74 | 53 | 65 |
| L-T ○ | 212 | 86 | 57 | 75 |
| T-L △ | 0 | 4 | 3 | * |
| T-L △ | 0 | 5 | 3 | * |
| T-L △ | 0 | 6 | 7 | * |
| T-L △ | 25 | 6 | 8 | * |
| T-L △ | 25 | 7 | 9 | * |
| T-L △ | 25 | 7 | 9 | * |
| T-L △ | 50 | 13 | 17 | 10 |
| T-L △ | 50 | 15 | 18 | 10 |
| T-L △ | 50 | 23 | 26 | 15 |
| T-L △ | 75 | 22 | 28 | 10 |
| T-L △ | 75 | 25 | 32 | 10 |
| T-L △ | 75 | 26 | 33 | 15 |
| T-L △ | 212 | 66 | 55 | 60 |
| T-L △ | 212 | 69 | 60 | 65 |
| T-L △ | 212 | 70 | 57 | 75 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.040.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 4.00 in | Composition Type | Actual |
| Composition Position | * | Lot ID | 18553 |
| Reference | Armco-MPC | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.041.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.17 % | Mn | 0.92 % |
| P | 0.01 % | S | 0.02 % |
| Si | 0.20 % | Cr | 0.02 % |
| Ni | 0.10 % | Mo | * |
| V | * | Cu | 0.20 % |
| Cb | * | Ti | * |
| B | * | Al | 0.024 % |
| N | * | Other Components | * |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | OrStMills |
| Year Produced | * | Addl Info | No |
| Source | OGC | 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 | Charpy V Impact | Position | * |
| Specimen Type | Full | Lateral Expansion | * |
| Shear Fracture | * | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| T-L ○ | -100 | 3.0 |
| T-L ○ | -100 | 3.0 |
| T-L ○ | -60 | 6.0 |
| T-L ○ | -60 | 7.0 |
| T-L ○ | -30 | 21.0 |
| T-L ○ | -30 | 23.0 |
| T-L ○ | 0 | 30.0 |
| T-L ○ | 0 | 31.0 |
| T-L ○ | 0 | 32.0 |
| T-L ○ | 32 | 48.0 |
| T-L ○ | 32 | 67.0 |
| T-L ○ | 50 | 60.0 |
| T-L ○ | 50 | 60.0 |
| T-L ○ | 68 | 84.0 |
| T-L ○ | 68 | 86.0 |
| T-L ○ | 104 | 81.0 |

(continued)

* - not reported

(continued)

| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| T-L ○ | 104 | 90.0 |
| T-L ○ | 104 | 93.0 |
| T-L ○ | 150 | 85.0 |
| T-L ○ | 150 | 90.0 |

* - not reported

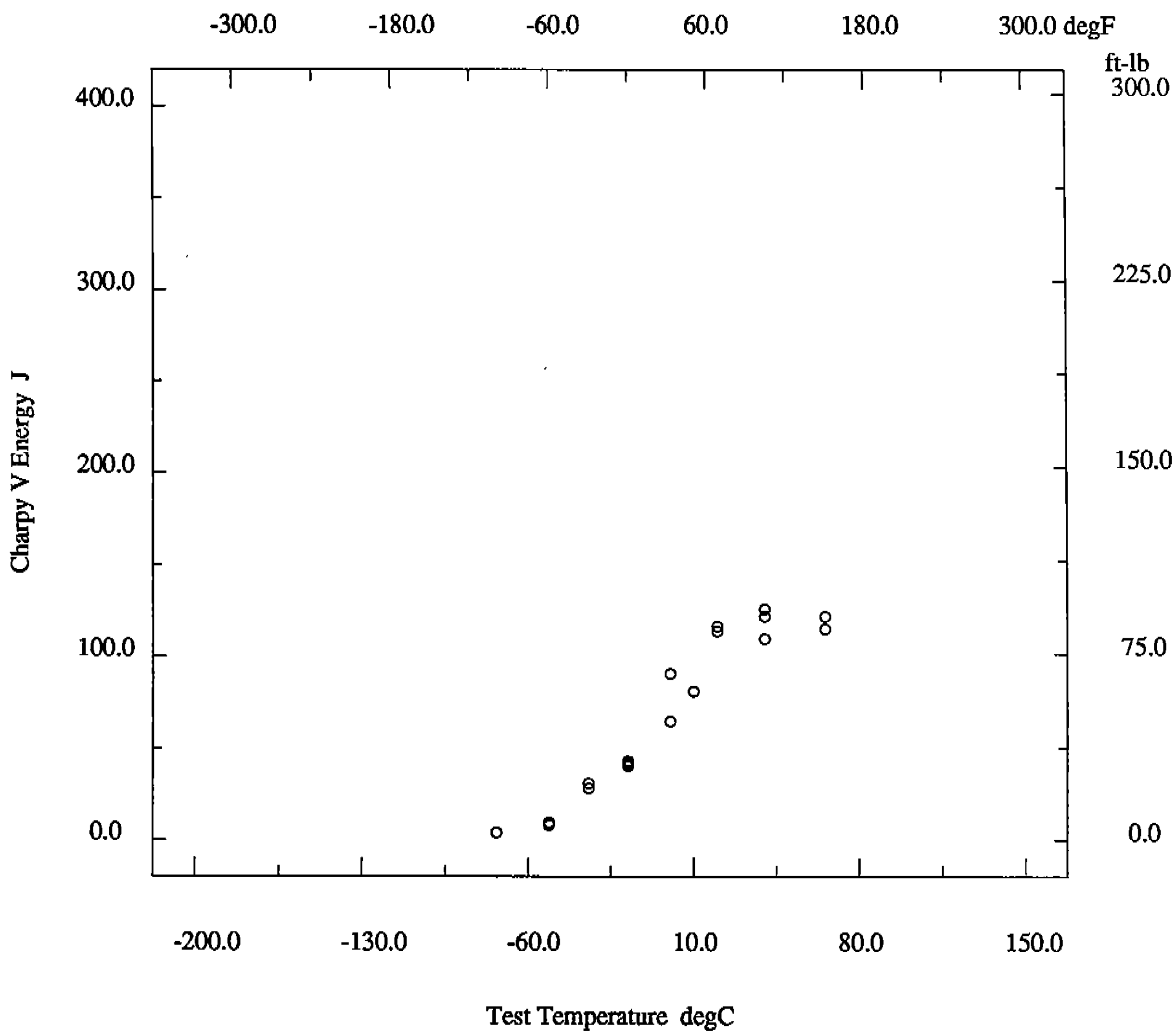
# Marine Structural Toughness Data Bank

## Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.041.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.041.09A | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

## Composition

See Page 6400.1

## Fabrication History

See Page 6400.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.041.09A | Weld Type | ESW |
| Base Metal Thickness | 2 in | Welding Position | Vertical |
| Preheat Temperature | * | Metal Gap | 1.25 in |
| Interpass Temperature | * | Passes | * |
| Filler Specification | * | Filler Name | Hobart25P |
| Filler Carbon Content | 0.11 % | Filler Metal Size | * |
| Shielding Gas | * | Voltage | 42 volts |
| Amperage | 600 amps | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 1980 KJ/in |
| Joint Preparation | Smooth Butt | Number of Sides | * |
| Location wrt Weld | 11mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | Hobart201 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Position | Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|---|
| 1/2T | T-L ○ | -100 | 2.5 |
| 1/2T | T-L ○ | -100 | 3.0 |
| 1/2T | T-L ○ | -60 | 5.0 |
| 1/2T | T-L ○ | -60 | 9.0 |
| 1/4T | T-L ○ | -60 | 5.0 |
| 1/4T | T-L ○ | -60 | 8.0 |
| 1/2T | T-L ○ | -30 | 20.0 |
| 1/2T | T-L ○ | -30 | 5.0 |
| 1/4T | T-L ○ | -30 | 4.0 |
| 1/4T | T-L ○ | -30 | 5.0 |
| 1/2T | T-L ○ | 0 | 10.0 |
| 1/2T | T-L ○ | 0 | 18.0 |
| 1/2T | T-L ○ | 0 | 21.0 |
| 1/2T | T-L ○ | 0 | 27.0 |
| 1/4T | T-L ○ | 0 | 14.0 |
| 1/4T | T-L ○ | 0 | 16.5 |
| 1/4T | T-L ○ | 0 | 19.0 |
| 1/4T | T-L ○ | 0 | 8.0 |
| 1/2T | T-L ○ | 32 | 23.0 |

(continued)

* - not reported

# Material A36



(continued)

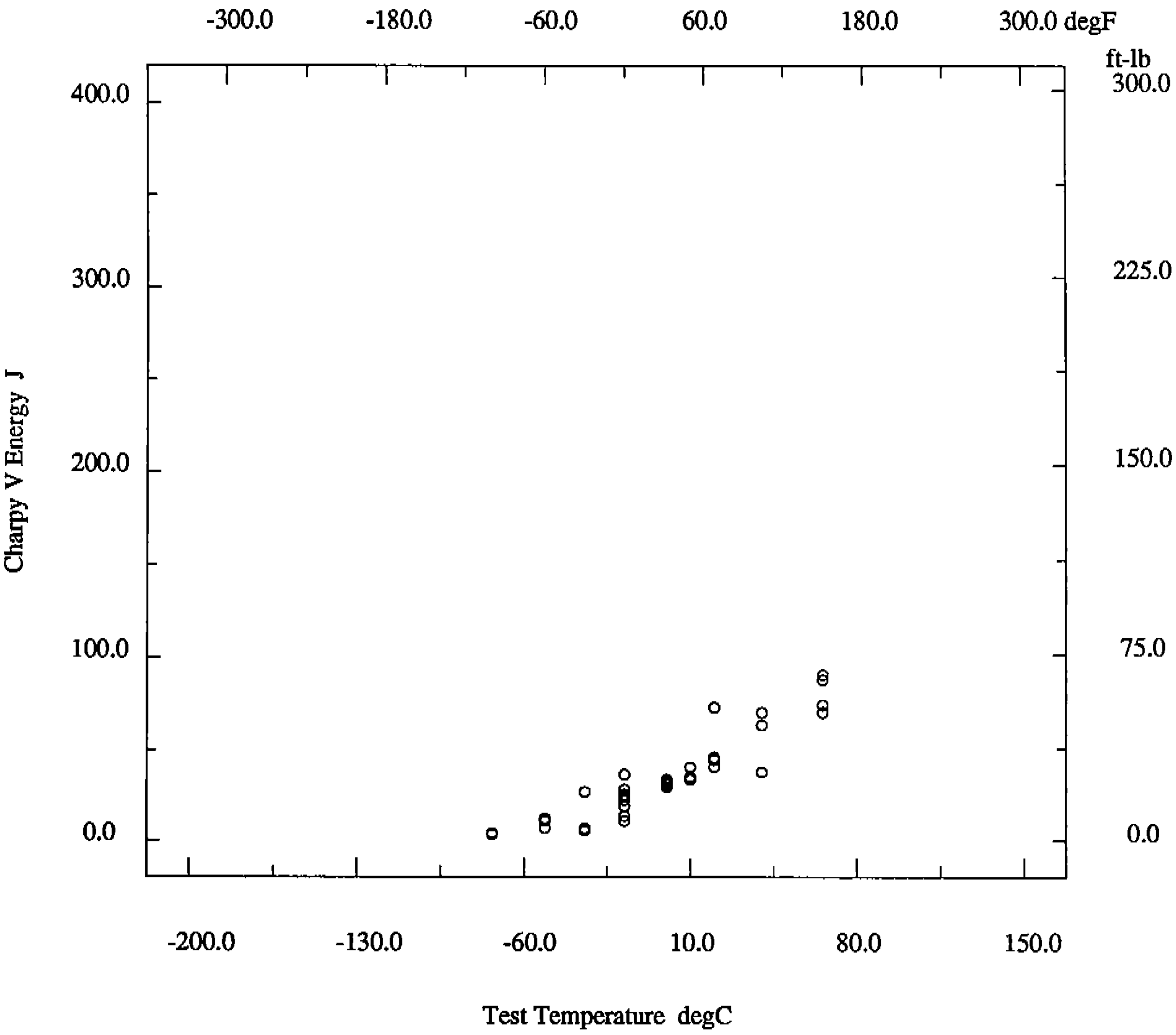
| Position | Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|---|
| 1/2T | T-L o | 32 | 24.0 |
| 1/4T | T-L o | 32 | 22.0 |
| 1/4T | T-L o | 32 | 25.0 |
| 1/2T | T-L o | 50 | 25.0 |
| 1/2T | T-L o | 50 | 26.0 |
| 1/4T | T-L o | 50 | 26.0 |
| 1/4T | T-L o | 50 | 30.0 |
| 1/2T | T-L o | 68 | 30.0 |
| 1/2T | T-L o | 68 | 54.0 |
| 1/4T | T-L o | 68 | 33.0 |
| 1/4T | T-L o | 68 | 34.0 |
| 1/2T | T-L o | 104 | 28.0 |
| 1/2T | T-L o | 104 | 52.0 |
| 1/4T | T-L o | 104 | 28.0 |
| 1/4T | T-L o | 104 | 47.0 |
| 1/2T | T-L o | 150 | 65.0 |
| 1/2T | T-L o | 150 | 67.0 |
| 1/4T | T-L o | 150 | 52.0 |
| 1/4T | T-L o | 150 | 55.0 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.041.09A | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

## Description

| | | | |
|---|---|---|---|
| Material Code | 009.041.03A | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

## Composition

See Page 6400.1

## Fabrication History

See Page 6400.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.041.03A | Weld Type | ESW |
| Base Metal Thickness | 2 in | Welding Position | Vertical |
| Preheat Temperature | * | Metal Gap | 1.25 in |
| Interpass Temperature | * | Passes | * |
| Filler Specification | * | Filler Name | Hobart25P |
| Filler Carbon Content | 0.11 % | Filler Metal Size | * |
| Shielding Gas | * | Voltage | 42 volts |
| Amperage | 600 amps | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 1980 KJ/in |
| Joint Preparation | Smooth Butt | Number of Sides | * |
| Location wrt Weld | 1mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | Hobart201 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| T-L ○ | -100 | 1.5 |
| T-L ○ | -100 | 3.0 |
| T-L ○ | -100 | 3.5 |
| T-L ○ | -100 | 4.0 |
| T-L ○ | -60 | 5.0 |
| T-L ○ | -60 | 8.0 |
| T-L ○ | -30 | 5.0 |
| T-L ○ | -30 | 9.0 |
| T-L ○ | 0 | 23.0 |
| T-L ○ | 0 | 26.0 |
| T-L ○ | 0 | 9.0 |
| T-L ○ | 32 | 29.0 |
| T-L ○ | 32 | 45.0 |
| T-L ○ | 50 | 35.0 |
| T-L ○ | 50 | 64.0 |
| T-L ○ | 68 | 42.0 |
| T-L ○ | 68 | 60.0 |
| T-L ○ | 104 | 52.0 |

(continued)

* - not reported

# Material A36



(continued)

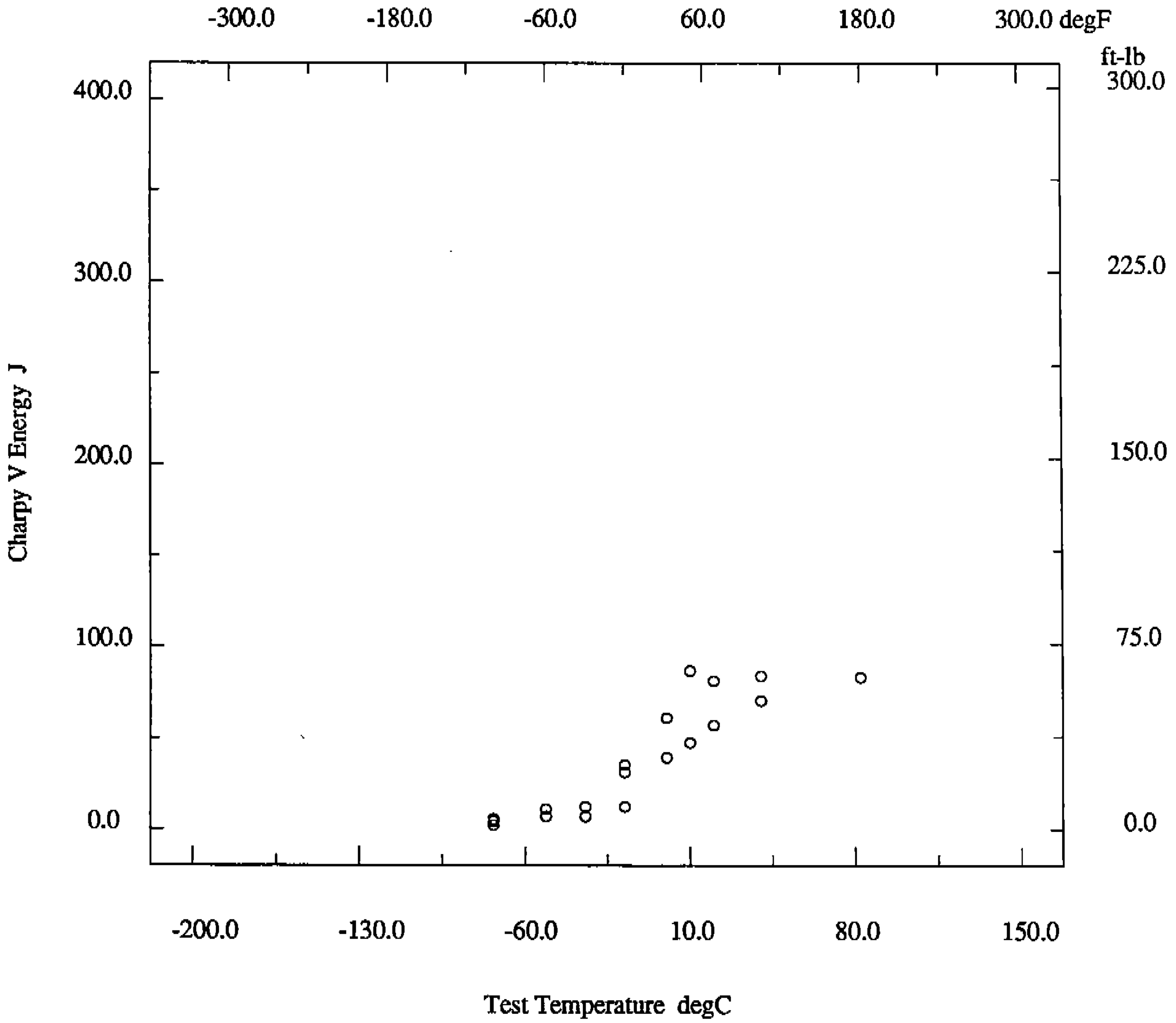
| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| T-L ○ | 104 | 62.0 |
| T-L ○ | 180 | 61.5 |

* - not reported

## Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.041.03A | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

## Material A36



### Description

| | | | |
|---|---|---|---|
| Material Code | 009.041.09B | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

### Composition

See Page 6400.1

### Fabrication History

See Page 6400.1

### Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.041.09B | Weld Type | NGESW |
| Base Metal Thickness | 2 in | Welding Position | Vertical |
| Preheat Temperature | * | Metal Gap | 0.75 in |
| Interpass Temperature | * | Passes | * |
| Filler Specification | * | Filler Name | Hobart25P |
| Filler Carbon Content | 0.11 % | Filler Metal Size | * |
| Shielding Gas | * | Voltage | 38 volts |
| Amperage | 1000 amps | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 1600 KJ/in |
| Joint Preparation | Smooth Butt | Number of Sides | * |
| Location wrt Weld | 11mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | Hobart201 |
| Weld Composition Reported? | No | | |

### Property Measurements

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

| Position | Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|---|
| 1/2T | T-L ○ | -100 | 4.0 |
| 1/2T | T-L ○ | -100 | 5.5 |
| 1/4T | T-L ○ | -100 | 7.0 |
| 1/2T | T-L ○ | -80 | 11.0 |
| 1/2T | T-L ○ | -80 | 6.5 |
| 1/4T | T-L ○ | -80 | 15.0 |
| 1/2T | T-L ○ | -60 | 16.0 |
| 1/2T | T-L ○ | -60 | 7.0 |
| 1/4T | T-L ○ | -60 | 12.0 |
| 1/4T | T-L ○ | -60 | 18.0 |
| 1/2T | T-L ○ | -20 | 17.0 |
| 1/2T | T-L ○ | -20 | 19.0 |
| 1/2T | T-L ○ | -20 | 23.0 |
| 1/4T | T-L ○ | -20 | 14.5 |
| 1/4T | T-L ○ | -20 | 22.0 |
| 1/2T | T-L ○ | 0 | 19.0 |
| 1/2T | T-L ○ | 0 | 20.0 |
| 1/2T | T-L ○ | 0 | 20.0 |
| 1/4T | T-L ○ | 0 | 21.0 |

(continued)

* - not reported

# Material A36



(continued)

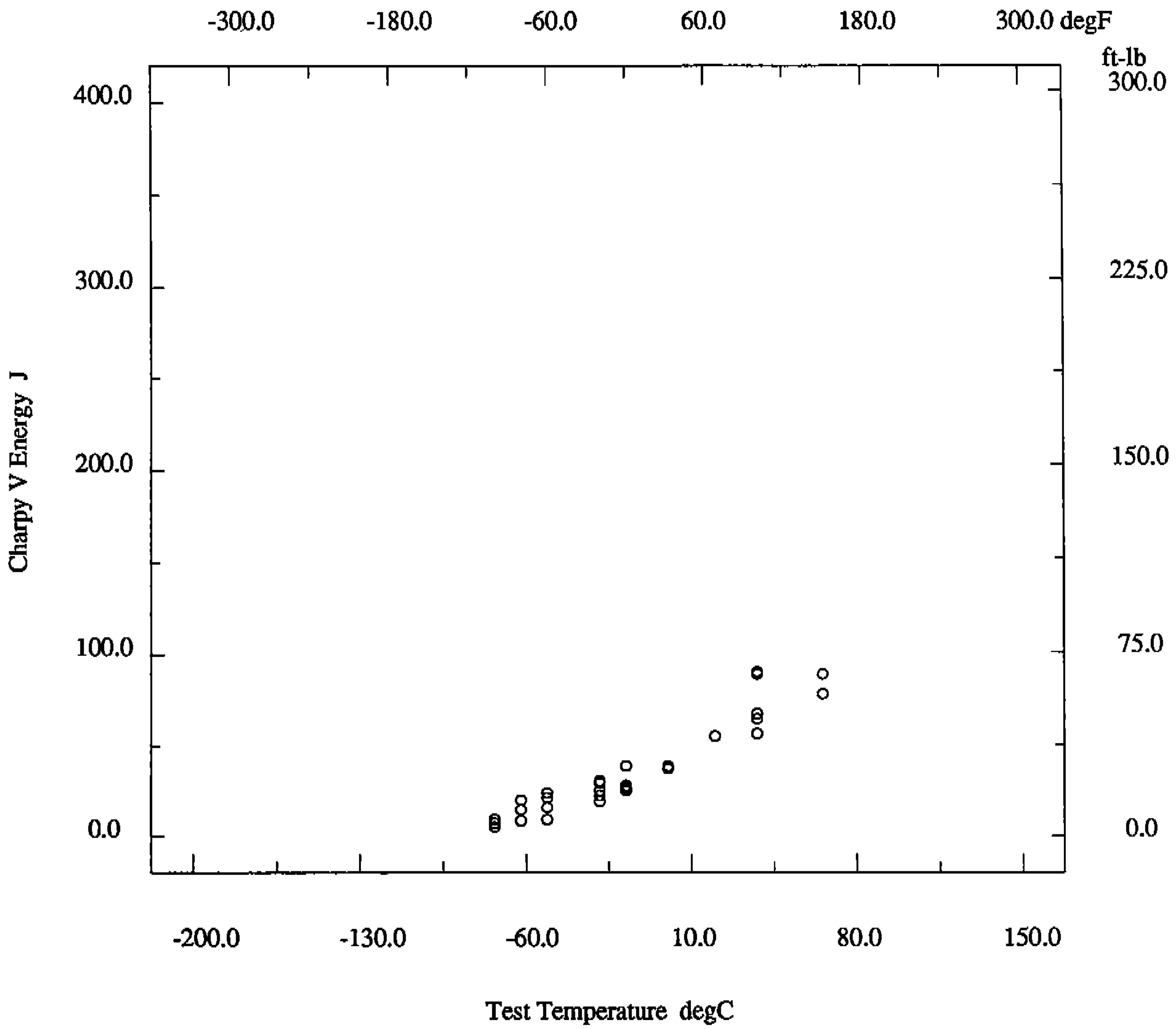
| Position | Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|---|
| 1/4T | T-L o | 0 | 29.0 |
| 1/2T | T-L o | 32 | 28.0 |
| 1/2T | T-L o | 32 | 29.0 |
| 1/4T | T-L o | 68 | 41.0 |
| 1/2T | T-L o | 100 | 48.0 |
| 1/2T | T-L o | 100 | 50.0 |
| 1/2T | T-L o | 100 | 66.0 |
| 1/4T | T-L o | 100 | 42.0 |
| 1/4T | T-L o | 100 | 67.0 |
| 1/2T | T-L o | 150 | 58.0 |
| 1/2T | T-L o | 150 | 66.0 |

* - not reported

## Material A36



| **Description** | | | |
|---|---|---|---|
| Material Code | 009.041.09B | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.041.03B | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

## Composition

See Page 6400.1

## Fabrication History

See Page 6400.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.041.03B | Weld Type | NGESW |
| Base Metal Thickness | 2 in | Welding Position | Vertical |
| Preheat Temperature | * | Metal Gap | 0.75 in |
| Interpass Temperature | * | Passes | * |
| Filler Specification | * | Filler Name | Hobart25P |
| Filler Carbon Content | 0.11 % | Filler Metal Size | * |
| Shielding Gas | * | Voltage | 38 volts |
| Amperage | 1000 amps | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 1600 KJ/in |
| Joint Preparation | Smooth Butt | Number of Sides | * |
| Location wrt Weld | 1mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | Hobart201 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| T-L ○ | -100 | 3.0 |
| T-L ○ | -100 | 7.0 |
| T-L ○ | -60 | 12.5 |
| T-L ○ | -60 | 21.0 |
| T-L ○ | -30 | 8.0 |
| T-L ○ | -30 | 9.0 |
| T-L ○ | 0 | 13.0 |
| T-L ○ | 0 | 14.0 |
| T-L ○ | 0 | 32.0 |
| T-L ○ | 0 | 35.0 |
| T-L ○ | 0 | 39.0 |
| T-L ○ | 0 | 46.0 |
| T-L ○ | 32 | 28.0 |
| T-L ○ | 32 | 37.0 |
| T-L ○ | 50 | 55.0 |
| T-L ○ | 50 | 60.0 |
| T-L ○ | 68 | 75.0 |
| T-L ○ | 68 | 82.0 |

(continued)

* - not reported

(continued)

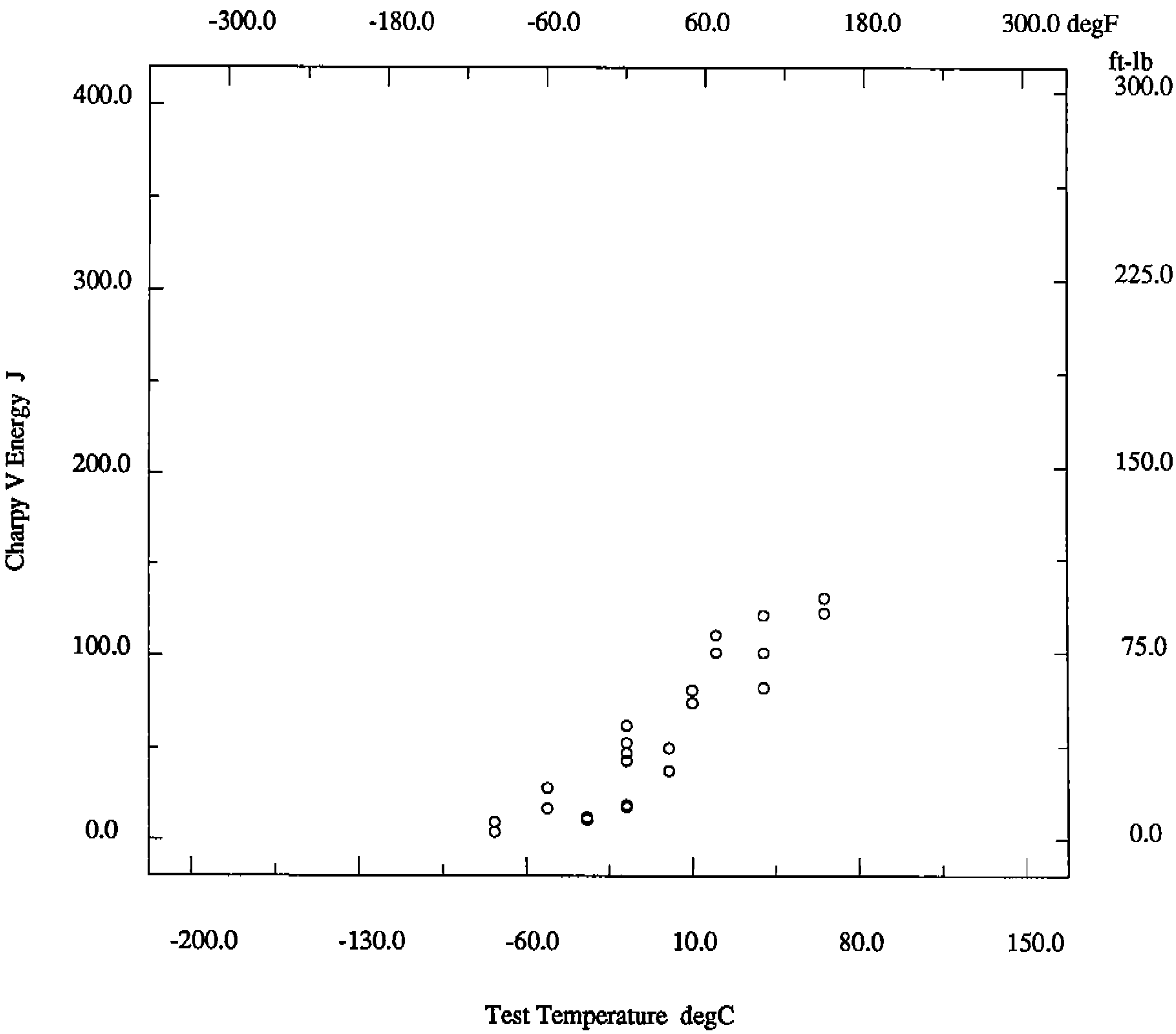
| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| T-L ○ | 104 | 61.0 |
| T-L ○ | 104 | 75.0 |
| T-L ○ | 104 | 90.0 |
| T-L ○ | 150 | 91.0 |
| T-L ○ | 150 | 97.0 |

* - not reported

## Material A36



| **Description** | | | |
|---|---|---|---|
| Material Code | 009.041.03B | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.041.09C | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

## Composition

See Page 6400.1

## Fabrication History

See Page 6400.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.041.09C | Weld Type | NGESW |
| Base Metal Thickness | 2 in | Welding Position | Vertical |
| Preheat Temperature | * | Metal Gap | 0.75 in |
| Interpass Temperature | * | Passes | * |
| Filler Specification | * | Filler Name | TW8544 |
| Filler Carbon Content | 0.03 % | Filler Metal Size | * |
| Shielding Gas | * | Voltage | 38 volts |
| Amperage | 800 amps | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 1650 KJ/in |
| Joint Preparation | Smooth Butt | Number of Sides | * |
| Location wrt Weld | 11mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | Hobart201 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Position | Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|---|
| 1/4T | T-L ○ | -100 | 5.5 |
| 1/4T | T-L ○ | -100 | 5.0 |
| 1/2T | T-L ○ | -80 | 4.0 |
| 1/2T | T-L ○ | -80 | 3.0 |
| 1/4T | T-L ○ | -80 | 11.5 |
| 1/4T | T-L ○ | -80 | 8.0 |
| 1/2T | T-L ○ | -60 | 8.5 |
| 1/2T | T-L ○ | -60 | 9.0 |
| 1/4T | T-L ○ | -60 | 18.5 |
| 1/4T | T-L ○ | -60 | 22.0 |
| 1/4T | T-L ○ | -40 | 26.0 |
| 1/4T | T-L ○ | -40 | 27.0 |
| 1/2T | T-L ○ | -20 | 14.5 |
| 1/4T | T-L ○ | -20 | 27.0 |
| 1/4T | T-L ○ | -20 | 34.0 |
| 1/2T | T-L ○ | 0 | 49.0 |
| 1/4T | T-L ○ | 0 | 44.0 |
| 1/4T | T-L ○ | 0 | 53.0 |
| 1/2T | T-L ○ | 32 | 59.0 |

(continued)

* - not reported

# Material A36



(continued)

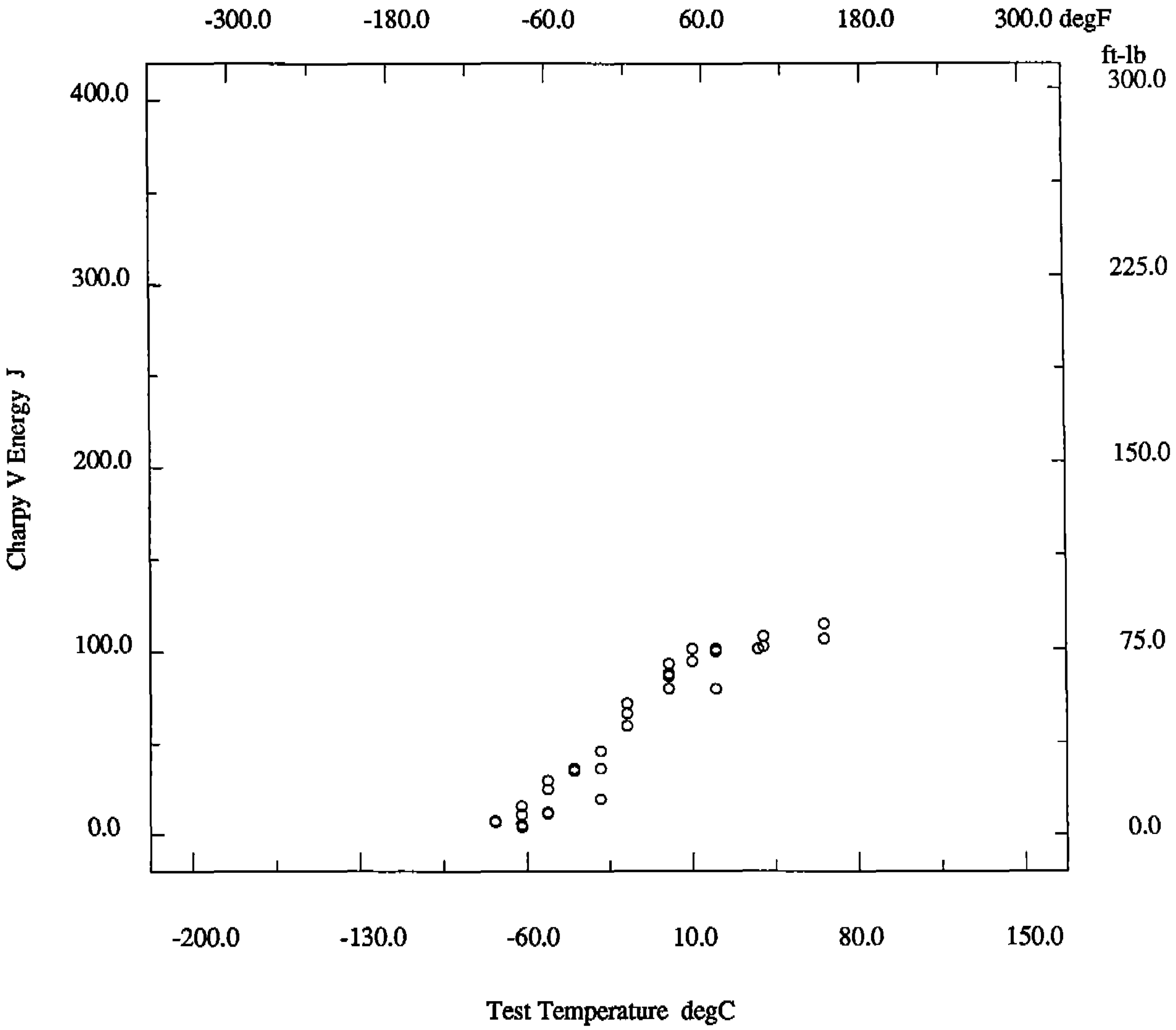
| Position | Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|---|
| 1/2T | T-L ○ | 32 | 65.0 |
| 1/4T | T-L ○ | 32 | 64.0 |
| 1/4T | T-L ○ | 32 | 69.0 |
| 1/4T | T-L ○ | 50 | 70.0 |
| 1/4T | T-L ○ | 50 | 75.0 |
| 1/2T | T-L ○ | 68 | 59.0 |
| 1/4T | T-L ○ | 68 | 74.0 |
| 1/4T | T-L ○ | 68 | 75.0 |
| 1/2T | T-L ○ | 100 | 75.0 |
| 1/4T | T-L ○ | 104 | 76.0 |
| 1/4T | T-L ○ | 104 | 80.0 |
| 1/2T | T-L ○ | 150 | 79.0 |
| 1/2T | T-L ○ | 150 | 85.0 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.041.09C | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

## Description

| | | | |
|---|---|---|---|
| Material Code | 009.041.03C | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

## Composition

See Page 6400.1

## Fabrication History

See Page 6400.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.041.03C | Weld Type | NGESW |
| Base Metal Thickness | 2 in | Welding Position | Vertical |
| Preheat Temperature | * | Metal Gap | 0.75 in |
| Interpass Temperature | * | Passes | * |
| Filler Specification | * | Filler Name | TW8544 |
| Filler Carbon Content | 0.03 % | Filler Metal Size | * |
| Shielding Gas | * | Voltage | 38 volts |
| Amperage | 800 amps | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 1650 KJ/in |
| Joint Preparation | Smooth Butt | Number of Sides | * |
| Location wrt Weld | 1mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | Hobart201 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| T-L ○ | -100 | 3.0 |
| T-L ○ | -100 | 4.5 |
| T-L ○ | -60 | 5.0 |
| T-L ○ | -60 | 7.0 |
| T-L ○ | -30 | 22.0 |
| T-L ○ | -30 | 9.0 |
| T-L ○ | 0 | 13.0 |
| T-L ○ | 0 | 20.0 |
| T-L ○ | 0 | 5.0 |
| T-L ○ | 32 | 23.0 |
| T-L ○ | 32 | 32.0 |
| T-L ○ | 50 | 49.0 |
| T-L ○ | 50 | 56.0 |
| T-L ○ | 68 | 58.0 |
| T-L ○ | 68 | 73.0 |
| T-L ○ | 104 | 84.0 |
| T-L ○ | 150 | 81.3 |
| T-L ○ | 150 | 91.0 |

* - not reported

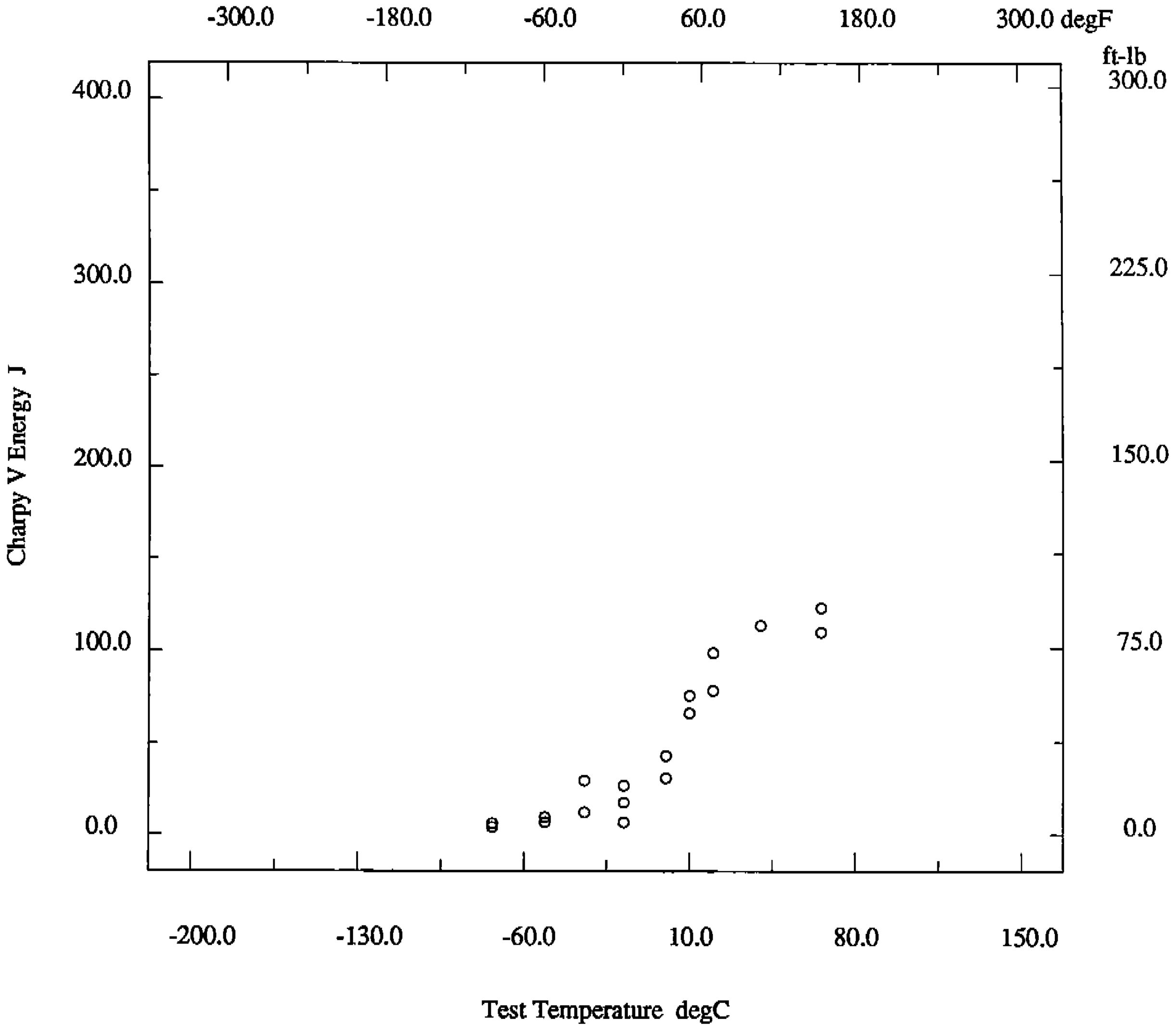
4c

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.041.03C | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

## Description

| | | | |
|---|---|---|---|
| Material Code | 009.041.03D | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

## Composition

See Page 6400.1

## Fabrication History

See Page 6400.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.041.03D | Weld Type | NGESW |
| Base Metal Thickness | 2 in | Welding Position | Vertical |
| Preheat Temperature | * | Metal Gap | 0.75 in |
| Interpass Temperature | * | Passes | * |
| Filler Specification | * | Filler Name | TW8544 |
| Filler Carbon Content | 0.03 % | Filler Metal Size | * |
| Shielding Gas | * | Voltage | 35 volts |
| Amperage | 1000 amps | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 1040 KJ/in |
| Joint Preparation | Smooth Butt | Number of Sides | * |
| Location wrt Weld | 1mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | Hobart201 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| T-L ○ | -100 | 3.0 |
| T-L ○ | -100 | 3.5 |
| T-L ○ | -60 | 4.0 |
| T-L ○ | -60 | 6.5 |
| T-L ○ | -30 | 8.0 |
| T-L ○ | -30 | 9.0 |
| T-L ○ | 0 | 10.0 |
| T-L ○ | 0 | 11.0 |
| T-L ○ | 0 | 54.0 |
| T-L ○ | 0 | 8.0 |
| T-L ○ | 32 | 40.0 |
| T-L ○ | 32 | 49.0 |
| T-L ○ | 50 | 45.0 |
| T-L ○ | 50 | 73.0 |
| T-L ○ | 68 | 55.0 |
| T-L ○ | 68 | 67.0 |
| T-L ○ | 104 | 78.0 |
| T-L ○ | 104 | 85.0 |

(continued)

* - not reported

# Material A36



(continued)

| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| T-L ○ | 150 | 104.0 |
| T-L ○ | 150 | 93.0 |

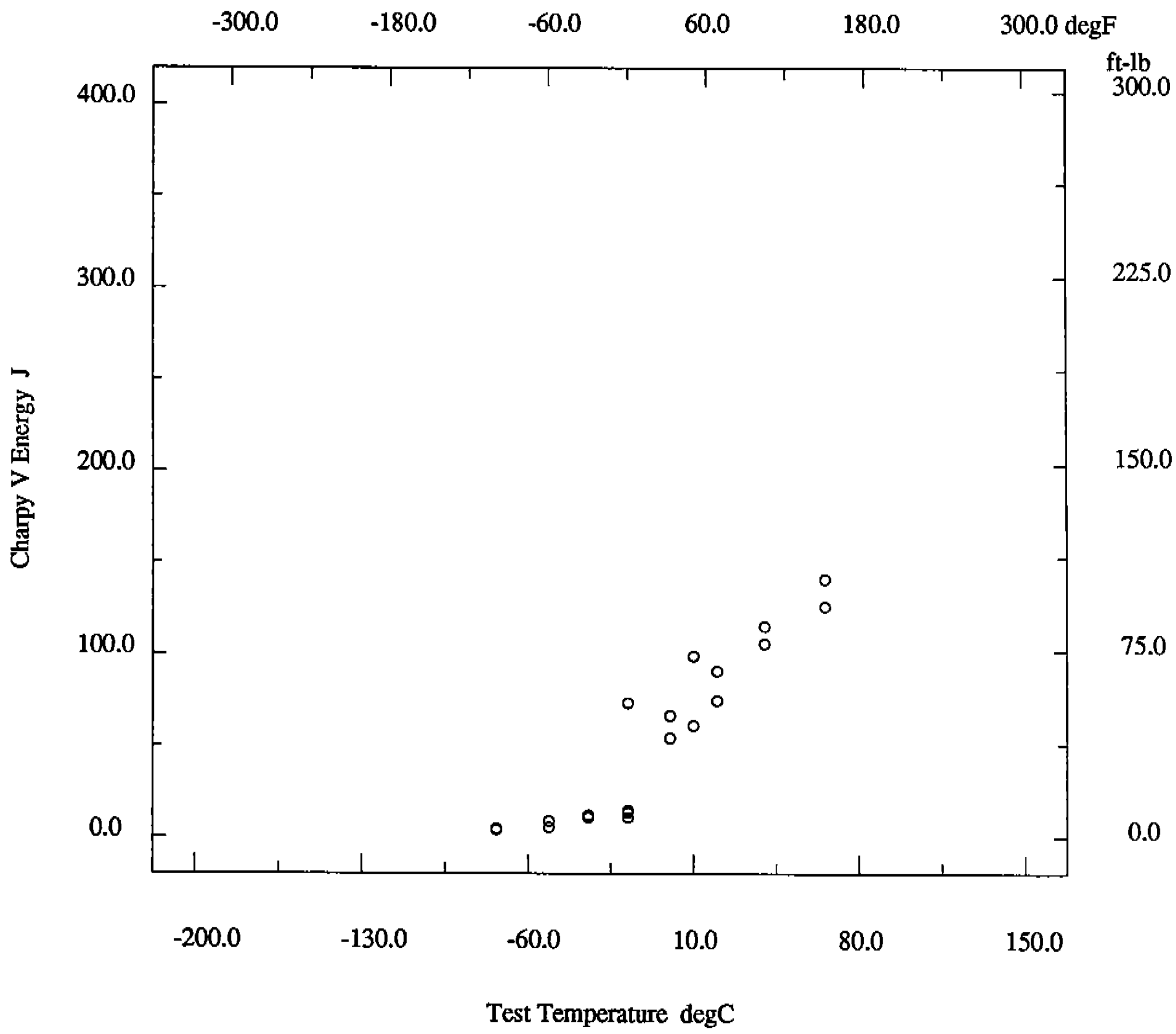
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.041.03D | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 2 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

| **Description** | | | |
|---|---|---|---|
| Material Code | 009.042.09A | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

| **Composition** | | | |
|---|---|---|---|
| C | 0.17 % | Mn | 0.92 % |
| P | 0.01 % | S | 0.02 % |
| Si | 0.20 % | Cr | 0.02 % |
| Ni | 0.10 % | Mo | * |
| V | * | Cu | 0.20 % |
| Cb | * | Ti | * |
| B | * | Al | 0.024 % |
| N | * | Other Components | None % |

| **Fabrication History** | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | US Steel |
| Year Produced | * | Addl Info | No |
| Source | OGC | 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 | 009.042.09A | Weld Type | ESW |
| Base Metal Thickness | 3 in | Welding Position | Vertical |
| Preheat Temperature | * | Metal Gap | 1.25 in |
| Interpass Temperature | * | Passes | * |
| Filler Specification | * | Filler Name | Hobart25P |
| Filler Carbon Content | 0.11 % | Filler Metal Size | * |
| Shielding Gas | * | Voltage | 38 volts |
| Amperage | 850 amps | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 3429 KJ/in |
| Joint Preparation | Smooth Butt | Number of Sides | * |
| Location wrt Weld | 11mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | Hobart201 |
| Weld Composition Reported? | No | | |

(continued)

* - not reported

## Material A36



(continued)

**Property Measurements**

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

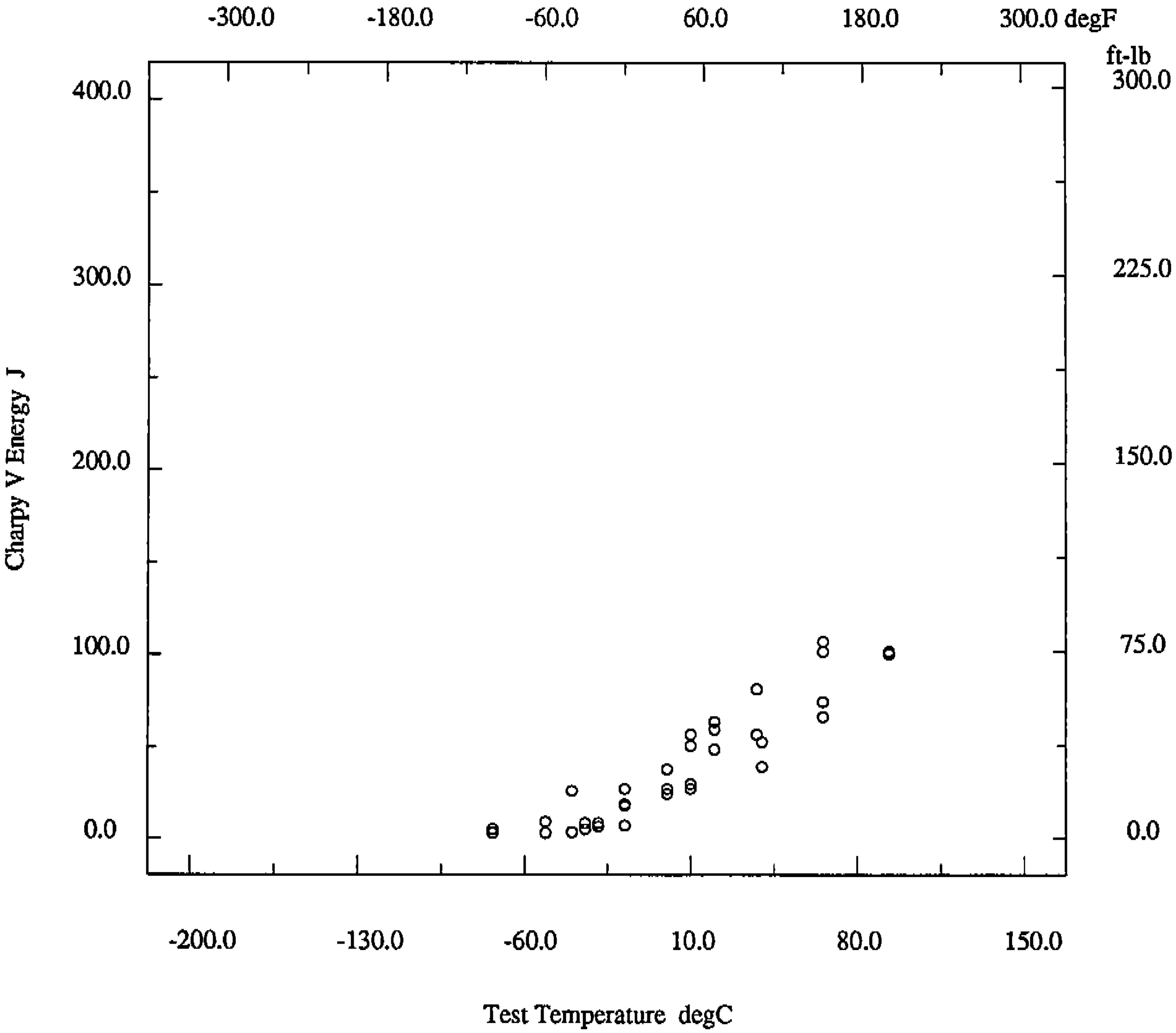
| Position | Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|---|
| 1/4T | T-L ○ | -100 | 2.0 |
| 1/4T | T-L ○ | -100 | 3.5 |
| 1/4T | T-L ○ | -60 | 2.0 |
| 1/4T | T-L ○ | -60 | 6.5 |
| 1/2T | T-L ○ | -40 | 19.2 |
| 1/2T | T-L ○ | -40 | 2.3 |
| 1/4T | T-L ○ | -30 | 3.5 |
| 1/4T | T-L ○ | -30 | 6.0 |
| 1/2T | T-L ○ | -20 | 4.6 |
| 1/2T | T-L ○ | -20 | 6.0 |
| 1/2T | T-L ○ | 0 | 13.0 |
| 1/2T | T-L ○ | 0 | 13.1 |
| 1/2T | T-L ○ | 0 | 13.8 |
| 1/4T | T-L ○ | 0 | 13.0 |
| 1/4T | T-L ○ | 0 | 20.0 |
| 1/4T | T-L ○ | 0 | 5.0 |
| 1/4T | T-L ○ | 0 | 5.0 |
| 1/2T | T-L ○ | 32 | 20.0 |
| 1/2T | T-L ○ | 32 | 28.0 |
| 1/4T | T-L ○ | 32 | 18.0 |
| 1/4T | T-L ○ | 32 | 20.0 |
| 1/2T | T-L ○ | 50 | 37.5 |
| 1/2T | T-L ○ | 50 | 42.0 |
| 1/4T | T-L ○ | 50 | 20.0 |
| 1/4T | T-L ○ | 50 | 22.0 |
| 1/2T | T-L ○ | 68 | 44.0 |
| 1/2T | T-L ○ | 68 | 47.0 |
| 1/4T | T-L ○ | 68 | 36.0 |
| 1/2T | T-L ○ | 100 | 42.0 |
| 1/2T | T-L ○ | 100 | 60.0 |
| 1/4T | T-L ○ | 104 | 29.0 |
| 1/4T | T-L ○ | 104 | 39.0 |
| 1/2T | T-L ○ | 150 | 75.0 |
| 1/2T | T-L ○ | 150 | 79.0 |
| 1/4T | T-L ○ | 150 | 49.0 |
| 1/4T | T-L ○ | 150 | 55.0 |
| 1/2T | T-L ○ | 200 | 74.0 |
| 1/2T | T-L ○ | 200 | 75.0 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.042.09A | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.042.03A | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

## Composition

See Page 6500.1

## Fabrication History

See Page 6500.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.042.03A | Weld Type | ESW |
| Base Metal Thickness | 3 in | Welding Position | Vertical |
| Preheat Temperature | * | Metal Gap | 1.25 in |
| Interpass Temperature | * | Passes | * |
| Filler Specification | * | Filler Name | Hobart25P |
| Filler Carbon Content | 0.11 % | Filler Metal Size | * |
| Shielding Gas | * | Voltage | 38 volts |
| Amperage | 850 amps | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 3429 KJ/in |
| Joint Preparation | Smooth Butt | Number of Sides | * |
| Location wrt Weld | 1mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | Hobart201 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| T-L ○ | -60 | 13.5 |
| T-L ○ | -60 | 4.0 |
| T-L ○ | -40 | 4.8 |
| T-L ○ | -40 | 5.2 |
| T-L ○ | -20 | 3.6 |
| T-L ○ | -20 | 6.3 |
| T-L ○ | 0 | 15.5 |
| T-L ○ | 0 | 20.3 |
| T-L ○ | 0 | 5.0 |
| T-L ○ | 32 | 12.0 |
| T-L ○ | 32 | 18.0 |
| T-L ○ | 100 | 43.0 |
| T-L ○ | 100 | 48.0 |
| T-L ○ | 150 | 75.0 |
| T-L ○ | 150 | 78.0 |

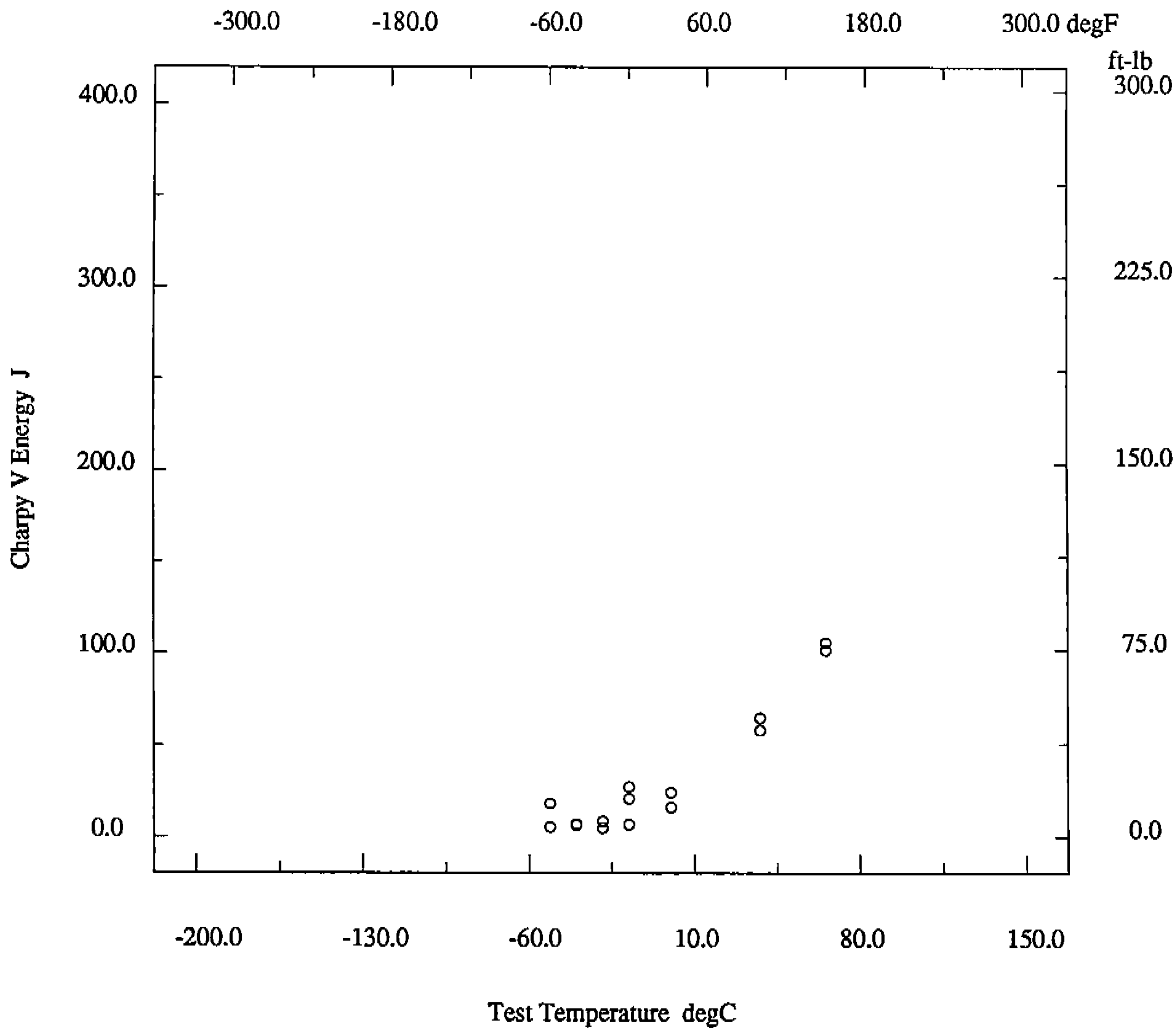
* - not reported

4th

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.042.03A | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

4K X

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.042.09B | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.17 % | Mn | 0.92 % |
| P | 0.01 % | S | 0.02 % |
| Si | 0.20 % | Cr | 0.02 % |
| Ni | 0.10 % | Mo | * |
| V | * | Cu | 0.20 % |
| Cb | * | Ti | * |
| B | * | Al | 0.024 % |
| N | * | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | US Steel |
| Year Produced | * | Addl Info | No |
| Source | OGC | 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 | 009.042.09B | Weld Type | NGESW |
| Base Metal Thickness | 3 in | Welding Position | Vertical |
| Preheat Temperature | * | Metal Gap | 0.75 in |
| Interpass Temperature | * | Passes | * |
| Filler Specification | * | Filler Name | Hobart25P |
| Filler Carbon Content | 0.11 % | Filler Metal Size | * |
| Shielding Gas | * | Voltage | 40 volts |
| Amperage | 1000 amps | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 2286 KJ/in |
| Joint Preparation | No Groove | Number of Sides | * |
| Location wrt Weld | 11mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | Hobart201 |
| Weld Composition Reported? | No | | |

(continued)

* - not reported

## Material A36



(continued)

**Property Measurements**

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

| Position | Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|---|
| 1/2T | T-L ○ | -100 | 1.0 |
| 1/2T | T-L ○ | -100 | 1.5 |
| 1/4T | T-L ○ | -100 | 1.5 |
| 1/4T | T-L ○ | -100 | 5.0 |
| 1/2T | T-L ○ | -70 | 4.5 |
| 1/4T | T-L ○ | -70 | 1.5 |
| 1/2T | T-L ○ | -60 | 12.0 |
| 1/2T | T-L ○ | -60 | 2.0 |
| 1/4T | T-L ○ | -60 | 13.5 |
| 1/4T | T-L ○ | -60 | 5.0 |
| 1/2T | T-L ○ | -40 | 6.5 |
| 1/4T | T-L ○ | -40 | 7.0 |
| 1/2T | T-L ○ | -30 | 16.5 |
| 1/2T | T-L ○ | -30 | 21.0 |
| 1/4T | T-L ○ | -30 | 15.1 |
| 1/4T | T-L ○ | -30 | 7.0 |
| 1/2T | T-L ○ | 0 | 10.0 |
| 1/2T | T-L ○ | 0 | 20.0 |
| 1/2T | T-L ○ | 0 | 23.5 |
| 1/4T | T-L ○ | 0 | 16.0 |
| 1/4T | T-L ○ | 0 | 25.0 |
| 1/2T | T-L ○ | 40 | 36.0 |
| 1/2T | T-L ○ | 40 | 37.0 |
| 1/4T | T-L ○ | 40 | 32.0 |
| 1/2T | T-L ○ | 68 | 30.0 |
| 1/2T | T-L ○ | 68 | 45.0 |
| 1/4T | T-L ○ | 68 | 40.0 |
| 1/4T | T-L ○ | 68 | 49.0 |
| 1/2T | T-L ○ | 100 | 41.0 |
| 1/2T | T-L ○ | 100 | 45.0 |
| 1/4T | T-L ○ | 100 | 41.0 |
| 1/4T | T-L ○ | 100 | 42.0 |
| 1/4T | T-L ○ | 100 | 46.0 |
| 1/2T | T-L ○ | 125 | 48.0 |
| 1/2T | T-L ○ | 125 | 50.0 |
| 1/4T | T-L ○ | 125 | 44.0 |
| 1/4T | T-L ○ | 125 | 51.0 |
| 1/2T | T-L ○ | 150 | 55.0 |
| 1/2T | T-L ○ | 150 | 55.0 |
| 1/4T | T-L ○ | 150 | 54.0 |
| 1/4T | T-L ○ | 150 | 77.0 |

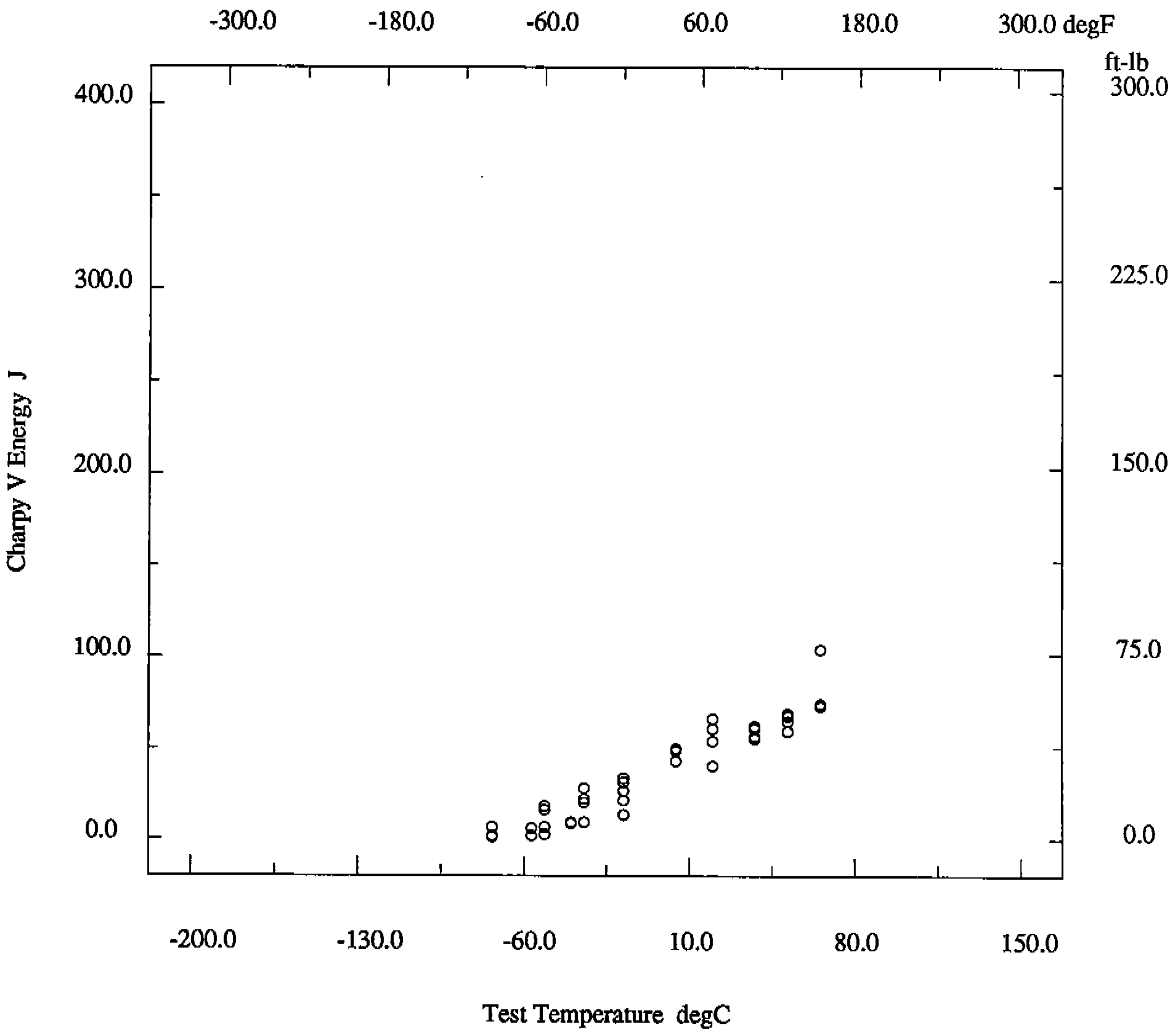
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.042.09B | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.042.03B | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

## Composition

See Page 6600.1

## Fabrication History

See Page 6600.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.042.03B | Weld Type | NGESW |
| Base Metal Thickness | 3 in | Welding Position | Vertical |
| Preheat Temperature | * | Metal Gap | 0.75 in |
| Interpass Temperature | * | Passes | * |
| Filler Specification | * | Filler Name | Hobart25P |
| Filler Carbon Content | 0.11 % | Filler Metal Size | * |
| Shielding Gas | * | Voltage | 40 volts |
| Amperage | 1000 amps | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 2286 KJ/in |
| Joint Preparation | No Groove | Number of Sides | * |
| Location wrt Weld | 1mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | Hobart201 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| T-L ○ | -100 | 2.0 |
| T-L ○ | -80 | 3.0 |
| T-L ○ | -80 | 8.0 |
| T-L ○ | -60 | 3.5 |
| T-L ○ | -60 | 3.5 |
| T-L ○ | -60 | 6.0 |
| T-L ○ | -60 | 6.0 |
| T-L ○ | -20 | 10.0 |
| T-L ○ | -20 | 4.0 |
| T-L ○ | 0 | 20.0 |
| T-L ○ | 0 | 9.0 |
| T-L ○ | 32 | 30.5 |
| T-L ○ | 32 | 35.5 |
| T-L ○ | 68 | 45.0 |
| T-L ○ | 100 | 60.0 |
| T-L ○ | 100 | 84.0 |
| T-L ○ | 150 | 73.0 |
| T-L ○ | 150 | 91.0 |

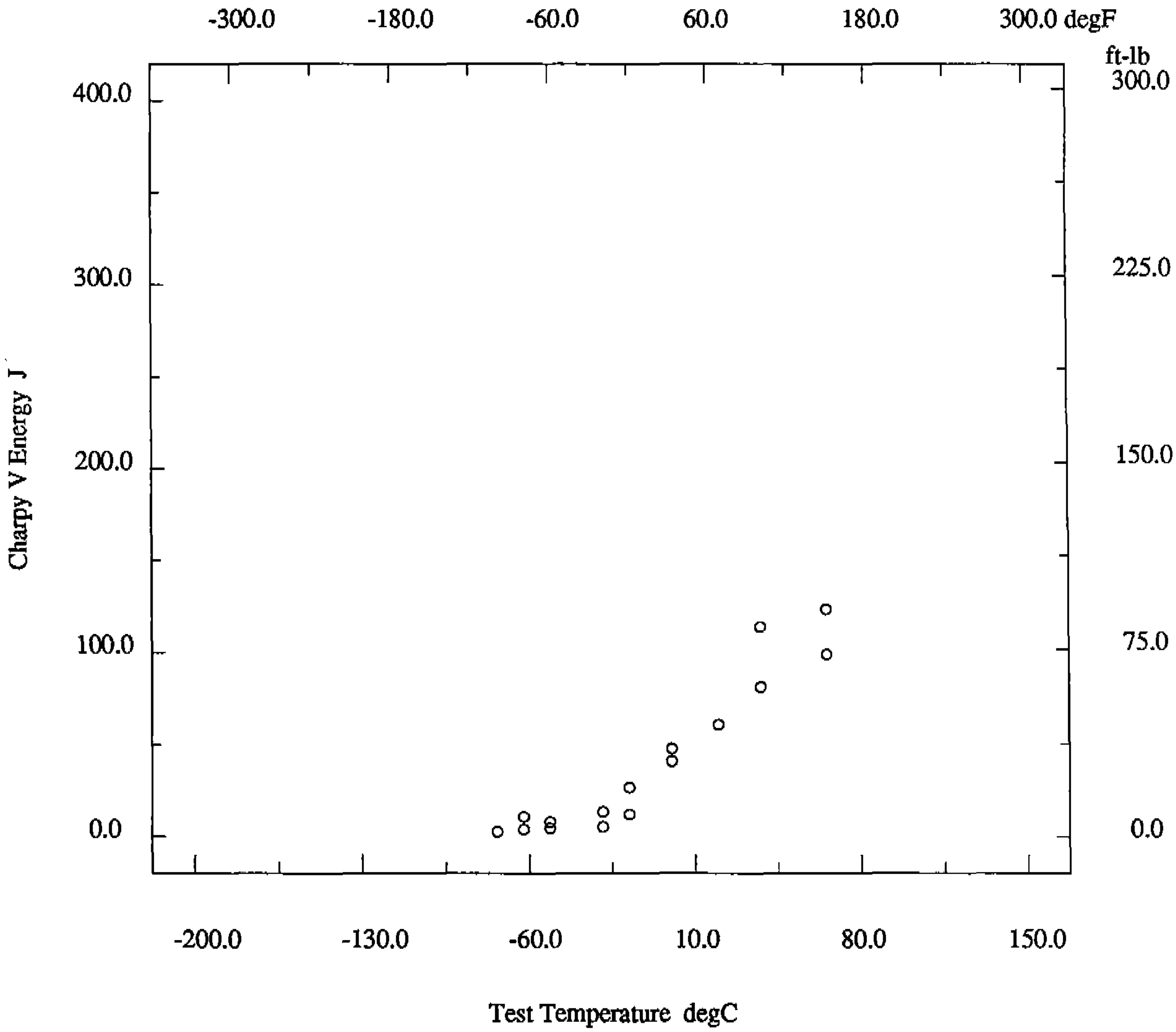
* - not reported

## Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.042.03B | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.042.09C | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.17 % | Mn | 0.92 % |
| P | 0.01 % | S | 0.02 % |
| Si | 0.20 % | Cr | 0.02 % |
| Ni | 0.10 % | Mo | * |
| V | * | Cu | 0.20 % |
| Cb | * | Ti | * |
| B | * | Al | 0.024 % |
| N | * | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | US Steel |
| Year Produced | * | Addl Info | No |
| Source | OGC | 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 | 009.042.09C | Weld Type | NGESW |
| Base Metal Thickness | 3 in | Welding Position | Vertical |
| Preheat Temperature | * | Metal Gap | 0.75 in |
| Interpass Temperature | * | Passes | * |
| Filler Specification | * | Filler Name | TW8544 |
| Filler Carbon Content | 0.03 % | Filler Metal Size | * |
| Shielding Gas | * | Voltage | 38 volts |
| Amperage | 1000 amps | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 2150 KJ/in |
| Joint Preparation | No Groove | Number of Sides | * |
| Location wrt Weld | 11mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | Hobart201 |
| Weld Composition Reported? | No | | |

(continued)

* - not reported

# Material A36



(continued)

**Property Measurements**

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

| Position | Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|---|
| 1/2T | T-L o | -100 | 1.0 |
| 1/2T | T-L o | -100 | 1.5 |
| 1/4T | T-L o | -100 | 1.0 |
| 1/4T | T-L o | -100 | 1.5 |
| 1/2T | T-L o | -60 | 3.0 |
| 1/2T | T-L o | -60 | 3.0 |
| 1/4T | T-L o | -60 | 3.0 |
| 1/4T | T-L o | -60 | 3.0 |
| 1/2T | T-L o | -40 | 4.5 |
| 1/2T | T-L o | -40 | 4.5 |
| 1/2T | T-L o | -40 | 9.5 |
| 1/4T | T-L o | -40 | 4.5 |
| 1/4T | T-L o | -40 | 4.5 |
| 1/4T | T-L o | -40 | 9.5 |
| 1/2T | T-L o | -30 | 18.0 |
| 1/2T | T-L o | -30 | 2.0 |
| 1/2T | T-L o | -30 | 3.5 |
| 1/4T | T-L o | -30 | 18.0 |
| 1/4T | T-L o | -30 | 2.0 |
| 1/4T | T-L o | -30 | 3.5 |
| 1/2T | T-L o | 0 | 18.0 |
| 1/2T | T-L o | 0 | 24.0 |
| 1/4T | T-L o | 0 | 18.0 |
| 1/4T | T-L o | 0 | 24.0 |
| 1/2T | T-L o | 34 | 13.5 |
| 1/2T | T-L o | 34 | 19.0 |
| 1/2T | T-L o | 34 | 7.0 |
| 1/4T | T-L o | 34 | 13.5 |
| 1/4T | T-L o | 34 | 19.0 |
| 1/4T | T-L o | 34 | 7.0 |
| 1/2T | T-L o | 68 | 23.0 |
| 1/2T | T-L o | 68 | 23.0 |
| 1/4T | T-L o | 68 | 23.0 |
| 1/4T | T-L o | 68 | 23.0 |
| 1/2T | T-L o | 100 | 39.0 |
| 1/2T | T-L o | 100 | 41.0 |
| 1/4T | T-L o | 100 | 39.0 |
| 1/4T | T-L o | 100 | 41.0 |
| 1/2T | T-L o | 125 | 48.0 |
| 1/2T | T-L o | 125 | 49.0 |
| 1/4T | T-L o | 125 | 48.0 |
| 1/4T | T-L o | 125 | 49.0 |

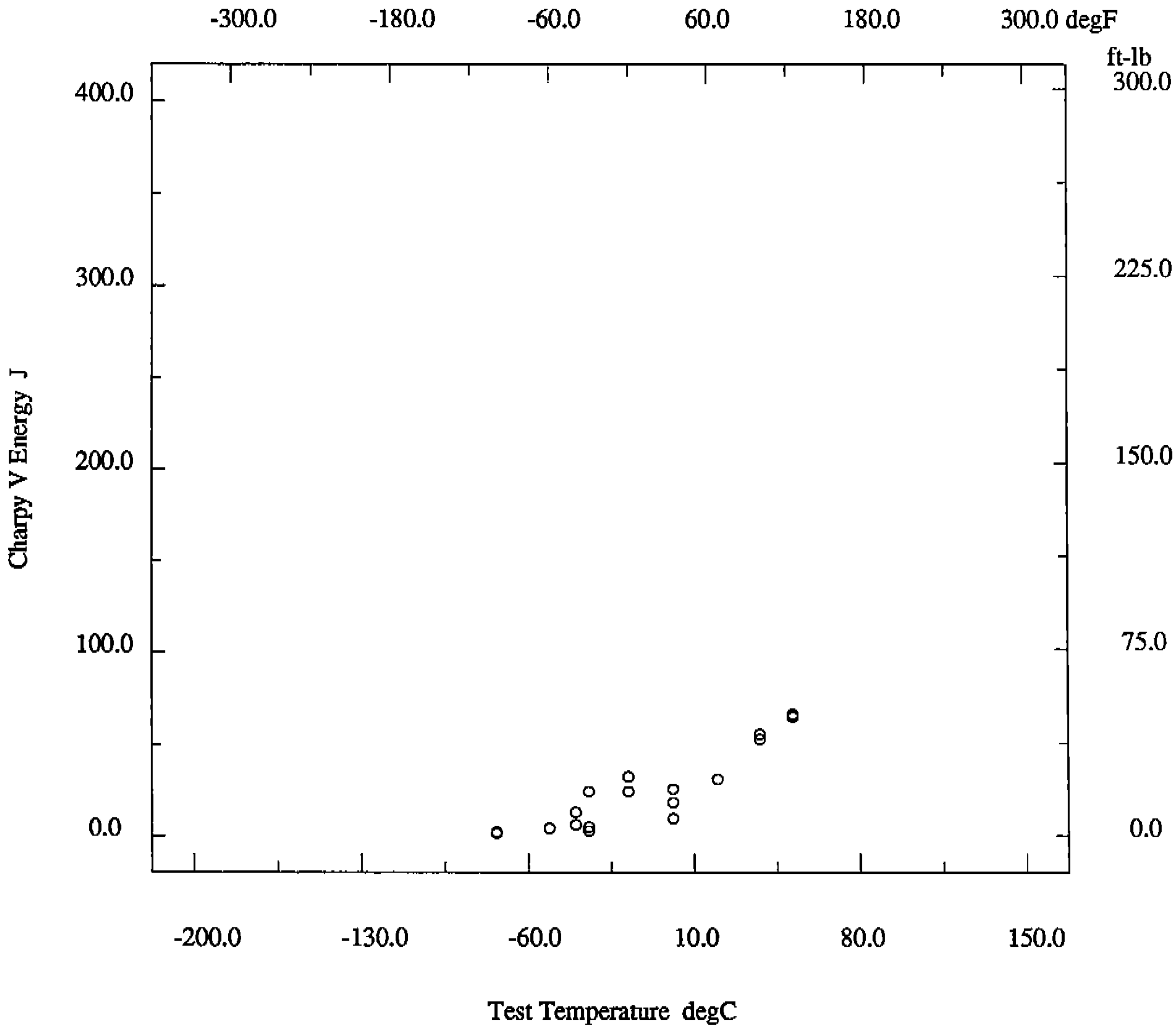
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.042.09C | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

425

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.042.03C | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

## Composition

See Page 6700.1

## Fabrication History

See Page 6700.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.042.03C | Weld Type | NGESW |
| Base Metal Thickness | 3 in | Welding Position | Vertical |
| Preheat Temperature | * | Metal Gap | 0.75 in |
| Interpass Temperature | * | Passes | * |
| Filler Specification | * | Filler Name | TW8544 |
| Filler Carbon Content | 0.03 % | Filler Metal Size | * |
| Shielding Gas | * | Voltage | 38 volts |
| Amperage | 1000 amps | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 2150 KJ/in |
| Joint Preparation | No Groove | Number of Sides | * |
| Location wrt Weld | 1mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | Hobart201 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

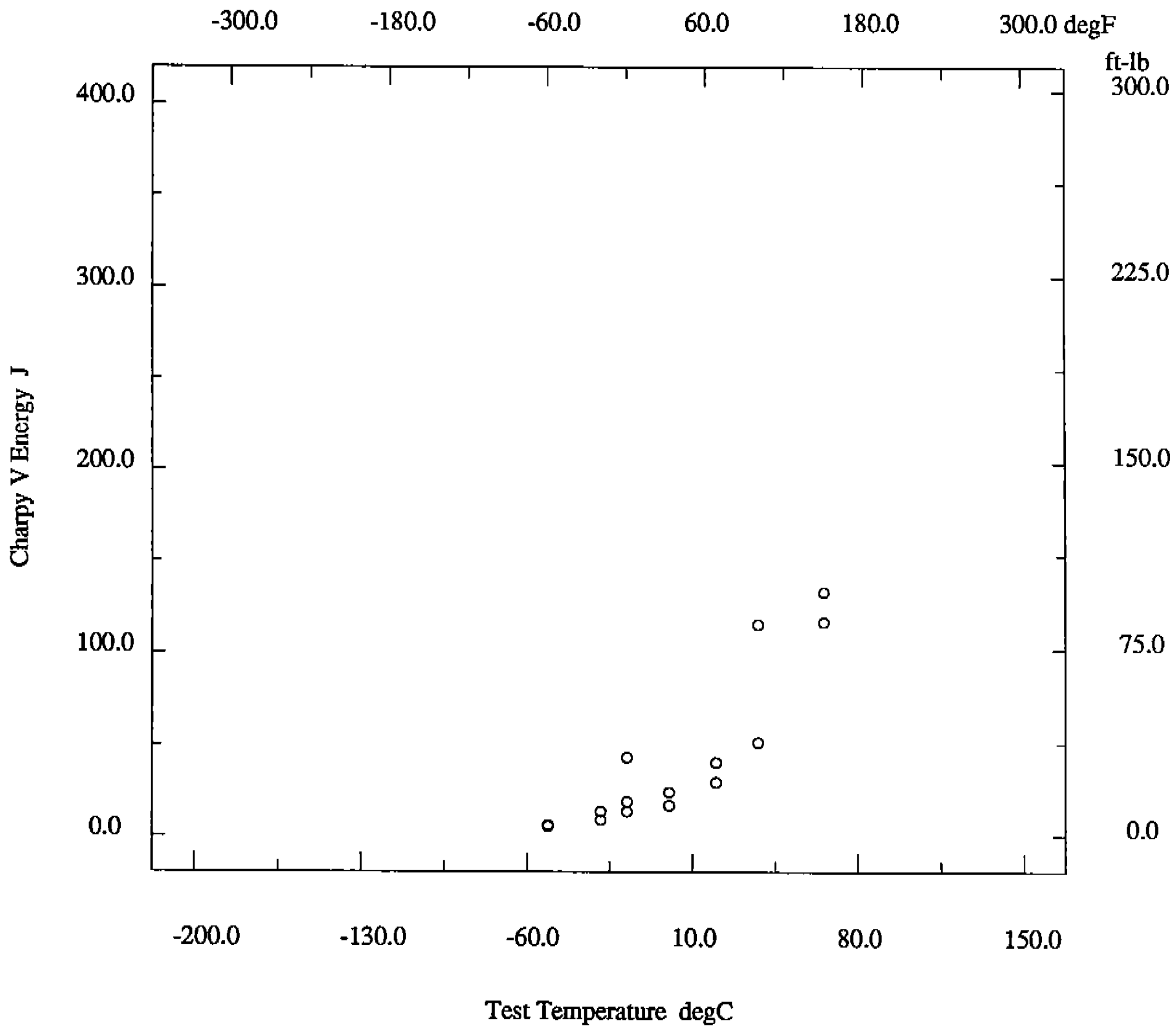
| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| T-L ○ | -60 | 4.0 |
| T-L ○ | -60 | 4.5 |
| T-L ○ | -20 | 10.0 |
| T-L ○ | -20 | 6.5 |
| T-L ○ | 0 | 10.0 |
| T-L ○ | 0 | 14.0 |
| T-L ○ | 0 | 32.0 |
| T-L ○ | 32 | 12.5 |
| T-L ○ | 32 | 18.0 |
| T-L ○ | 68 | 22.0 |
| T-L ○ | 68 | 30.0 |
| T-L ○ | 100 | 38.0 |
| T-L ○ | 100 | 85.0 |
| T-L ○ | 150 | 86.0 |
| T-L ○ | 150 | 98.0 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.042.03C | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.042.09D | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.17 % | Mn | 0.92 % |
| P | 0.01 % | S | 0.02 % |
| Si | 0.20 % | Cr | 0.02 % |
| Ni | 0.10 % | Mo | * |
| V | * | Cu | 0.20 % |
| Cb | * | Ti | * |
| B | * | Al | 0.024 % |
| N | * | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | US Steel |
| Year Produced | * | Addl Info | No |
| Source | OGC | 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 | 009.042.09D | Weld Type | NGESW |
| Base Metal Thickness | 3 in | Welding Position | Vertical |
| Preheat Temperature | * | Metal Gap | 0.75 in |
| Interpass Temperature | * | Passes | * |
| Filler Specification | * | Filler Name | TW8544 |
| Filler Carbon Content | 0.03 % | Filler Metal Size | * |
| Shielding Gas | * | Voltage | 35 volts |
| Amperage | 1300 amps | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 1830 KJ/in |
| Joint Preparation | No Groove | Number of Sides | * |
| Location wrt Weld | 11mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | Hobart201 |
| Weld Composition Reported? | No | | |

(continued)

* - not reported

# Material A36



(continued)

**Property Measurements**

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

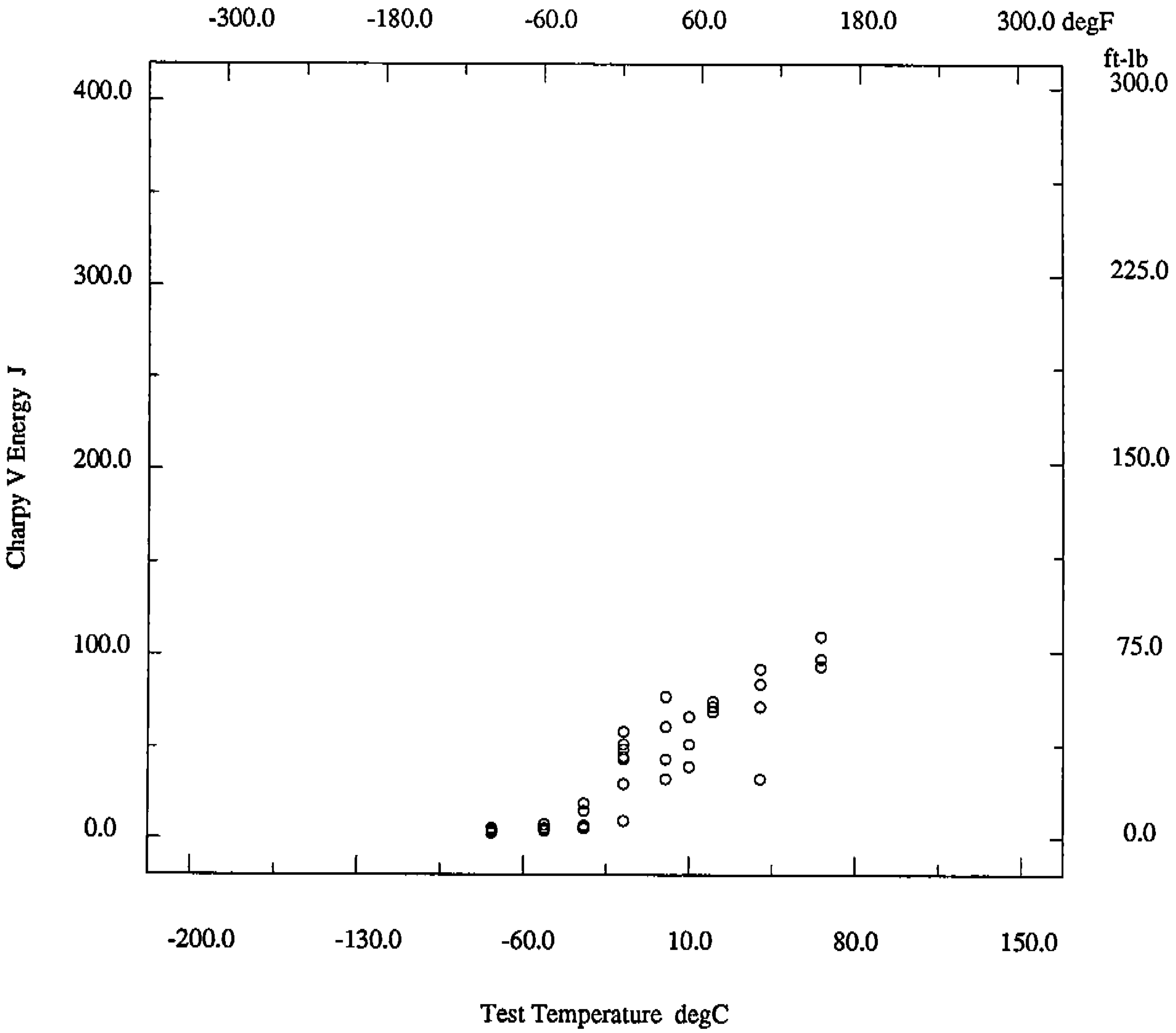
| Position | Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|---|
| 1/2T | T-L ○ | -100 | 3.5 |
| 1/2T | T-L ○ | -100 | 4.0 |
| 1/4T | T-L ○ | -100 | 2.0 |
| 1/4T | T-L ○ | -100 | 3.0 |
| 1/2T | T-L ○ | -60 | 4.0 |
| 1/2T | T-L ○ | -60 | 5.5 |
| 1/4T | T-L ○ | -60 | 3.0 |
| 1/4T | T-L ○ | -60 | 3.0 |
| 1/2T | T-L ○ | -30 | 11.0 |
| 1/2T | T-L ○ | -30 | 4.0 |
| 1/4T | T-L ○ | -30 | 14.0 |
| 1/4T | T-L ○ | -30 | 5.0 |
| 1/2T | T-L ○ | 0 | 22.0 |
| 1/2T | T-L ○ | 0 | 33.0 |
| 1/2T | T-L ○ | 0 | 43.0 |
| 1/2T | T-L ○ | 0 | 7.0 |
| 1/4T | T-L ○ | 0 | 32.0 |
| 1/4T | T-L ○ | 0 | 36.0 |
| 1/4T | T-L ○ | 0 | 38.0 |
| 1/2T | T-L ○ | 32 | 32.0 |
| 1/2T | T-L ○ | 32 | 57.0 |
| 1/4T | T-L ○ | 32 | 24.0 |
| 1/4T | T-L ○ | 32 | 45.0 |
| 1/2T | T-L ○ | 50 | 29.0 |
| 1/2T | T-L ○ | 50 | 29.0 |
| 1/4T | T-L ○ | 50 | 38.0 |
| 1/4T | T-L ○ | 50 | 49.0 |
| 1/2T | T-L ○ | 68 | 53.0 |
| 1/2T | T-L ○ | 68 | 55.0 |
| 1/4T | T-L ○ | 68 | 51.0 |
| 1/4T | T-L ○ | 68 | 51.0 |
| 1/2T | T-L ○ | 104 | 53.0 |
| 1/2T | T-L ○ | 104 | 68.0 |
| 1/4T | T-L ○ | 104 | 24.0 |
| 1/4T | T-L ○ | 104 | 62.0 |
| 1/2T | T-L ○ | 150 | 69.0 |
| 1/2T | T-L ○ | 150 | 81.0 |
| 1/4T | T-L ○ | 150 | 72.0 |
| 1/4T | T-L ○ | 150 | 81.0 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.042.09D | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.042.03D | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

## Composition

See Page 6800.1

## Fabrication History

See Page 6800.1

## Weld

| | | | |
|---|---|---|---|
| Weld Code | 009.042.03D | Weld Type | NGESW |
| Base Metal Thickness | 3 in | Welding Position | Vertical |
| Preheat Temperature | * | Metal Gap | 0.75 in |
| Interpass Temperature | * | Passes | * |
| Filler Specification | * | Filler Name | TW8544 |
| Filler Carbon Content | 0.03 % | Filler Metal Size | * |
| Shielding Gas | * | Voltage | 35 volts |
| Amperage | 1300 amps | Polarity | * |
| Travel Speed | * | Heat Input/Pass | 1830 KJ/in |
| Joint Preparation | No Groove | Number of Sides | * |
| Location wrt Weld | 1mm in HAZ | Location wrt Surface | Mid thickness not root |
| Post-Weld Heat Temp | * | Post-Weld Heat Time | * |
| Flux Type | * | Flux Name | Hobart201 |
| Weld Composition Reported? | No | | |

## Property Measurements

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

| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| T-L ○ | -100 | 3.0 |
| T-L ○ | -100 | 3.0 |
| T-L ○ | -60 | 2.5 |
| T-L ○ | -60 | 6.0 |
| T-L ○ | -30 | 7.0 |
| T-L ○ | -30 | 8.0 |
| T-L ○ | 0 | 13.0 |
| T-L ○ | 0 | 20.0 |
| T-L ○ | 0 | 30.0 |
| T-L ○ | 0 | 9.0 |
| T-L ○ | 32 | 22.0 |
| T-L ○ | 32 | 8.0 |
| T-L ○ | 50 | 47.0 |
| T-L ○ | 50 | 66.0 |
| T-L ○ | 68 | 21.0 |
| T-L ○ | 68 | 38.0 |
| T-L ○ | 104 | 52.0 |
| T-L ○ | 104 | 66.0 |

(continued)

* - not reported

# Material A36



*(continued)*

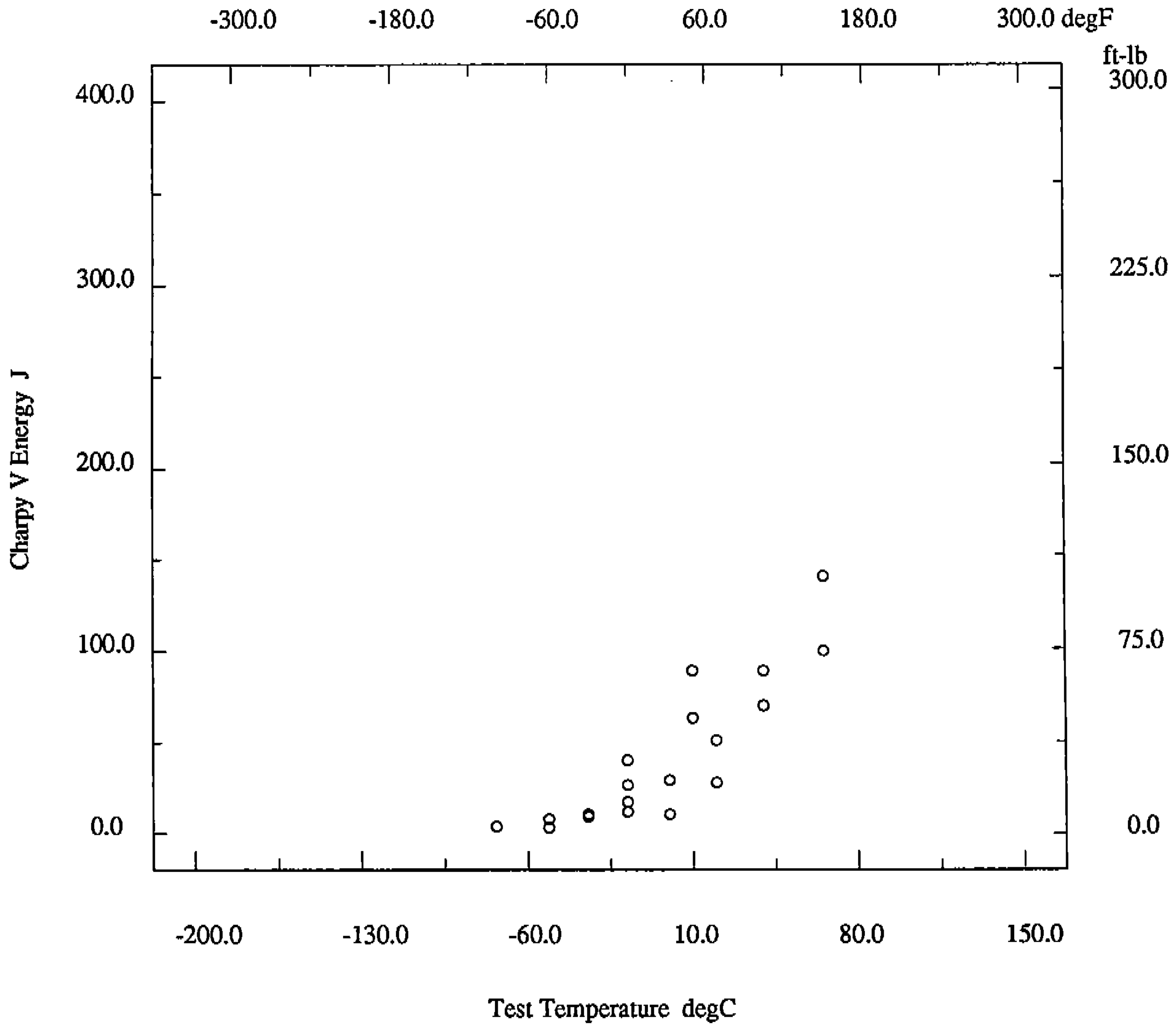
| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| T-L ○ | 150 | 104.0 |
| T-L ○ | 150 | 74.0 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.042.03D | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Welded Joint | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

431

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.042.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.17 % | Mn | 0.92 % |
| P | 0.01 % | S | 0.02 % |
| Si | 0.20 % | Cr | 0.02 % |
| Ni | 0.10 % | Mo | * |
| V | * | Cu | 0.20 % |
| Cb | * | Ti | * |
| B | * | Al | 0.024 % |
| N | * | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | US Steel |
| Year Produced | * | Addl Info | No |
| Source | OGC | 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 | Charpy V Impact | Position | * |
| Specimen Type | Full | Lateral Expansion | * |
| Shear Fracture | * | Did Specimen Fracture? | Yes |
| Did Specimen Split? | * | Standard Method | * |
| Standard Year | * | | |

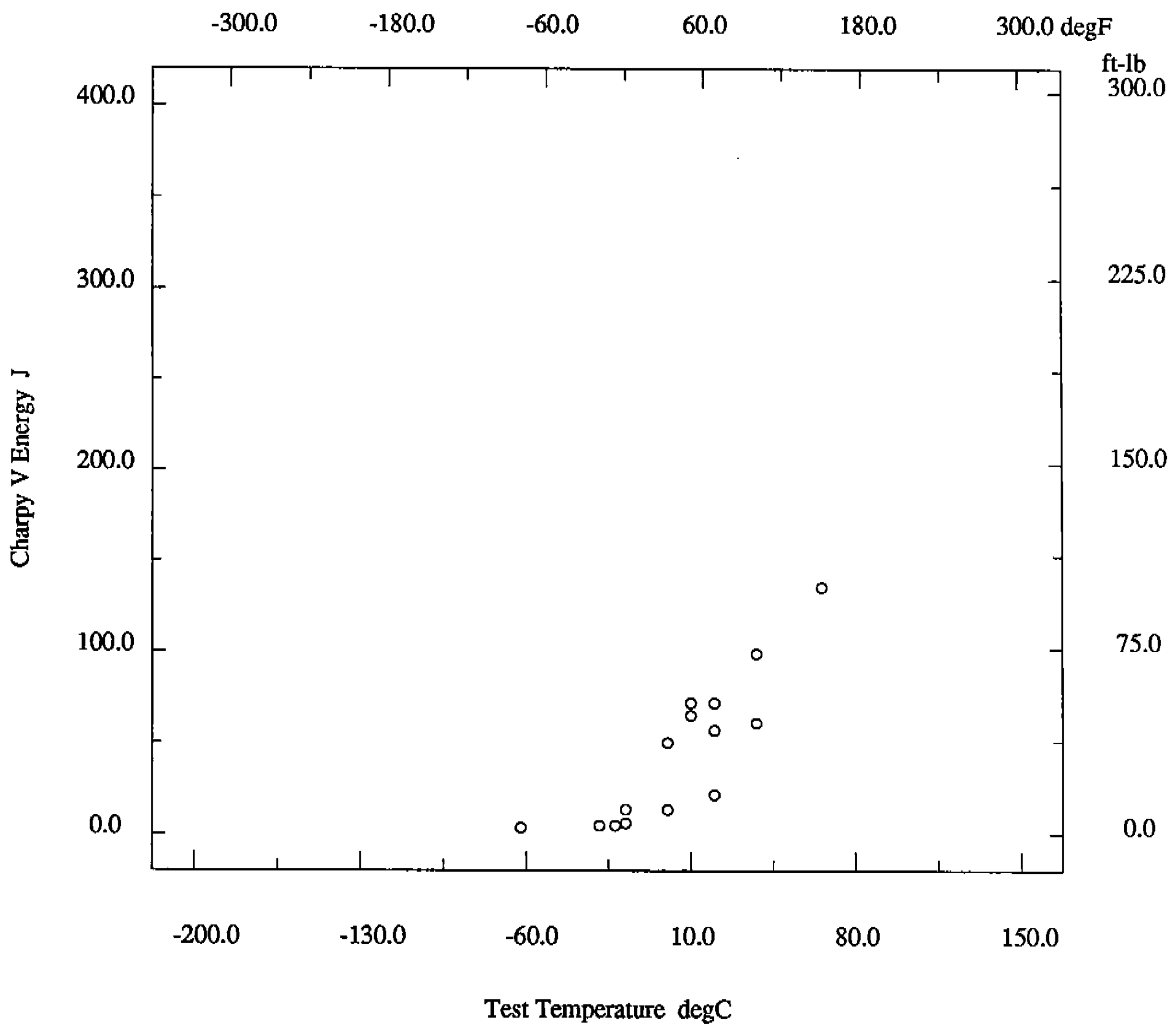
| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| T-L o | -80 | 2.5 |
| T-L o | -20 | 3.5 |
| T-L o | -8 | 3.5 |
| T-L o | 0 | 10.0 |
| T-L o | 0 | 4.5 |
| T-L o | 32 | 10.0 |
| T-L o | 32 | 37.0 |
| T-L o | 50 | 48.0 |
| T-L o | 50 | 53.0 |
| T-L o | 68 | 16.0 |
| T-L o | 68 | 42.0 |
| T-L o | 68 | 53.0 |
| T-L o | 100 | 45.0 |
| T-L o | 100 | 73.0 |
| T-L o | 150 | 100.0 |
| T-L o | 150 | 100.0 |

* - not reported

# Material A36



| Description | | | |
|---|---|---|---|
| Material Code | 009.042.01 | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | Plate |
| Thickness | 3 in | Composition Type | Actual |
| Composition Position | * | Lot ID | * |
| Reference | OGC-1 | | |




* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.043.010A | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | * |
| Thickness | 1.25 in | Composition Type | * |
| Composition Position | * | Lot ID | * |
| Reference | * | | |

## Composition

| | | | |
|---|---|---|---|
| C | 0.20 % | Mn | 1.11 % |
| P | 0.007 % | S | 0.023 % |
| Si | 0.029 % | Cr | * |
| Ni | * | Mo | * |
| V | * | Cu | * |
| Cb | * | Ti | * |
| B | * | Al | * |
| N | * | Other Components | None % |

## Fabrication History

| | | | |
|---|---|---|---|
| Heat Treatment | * | Producer | US Steel |
| Year Produced | * | Addl Info | None |
| Source | Un Kansas | Melting Practice | * |
| Ingot Position | * | Killing Process | * |
| Process Temperature | * | Process Time | * |
| Rolling Conditions | * | Final Processing | A,R |
| 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 | 0.505 in |
| Gage Length | 2 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 % |
|---|---|---|---|---|---|---|
| * | 68 | 66.8 | 35.5 | * | 38 | 67 |

* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.043.010A | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | * |
| Thickness | 1.25 in | Composition Type | * |
| Composition Position | * | Lot ID | * |
| Reference | * | | |

**Composition** See Page 7000.1

**Fabrication History** See Page 7000.1

**Property Measurements**

| | | | |
|---|---|---|---|
| Test Type | Fracture Toughness | Position | 1/2T |
| Specimen Type | Double Notch Bend | 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 | Spec Thick in | Test Temp degF | CODIc in | Curve |
|---|---|---|---|---|
| L-T | 0.50 | -320 | 0.0002 | Cleavage |
| L-T | 0.50 | -320 | 0.0002 | Cleavage |
| L-T | 0.50 | -320 | 0.0002 | Cleavage |
| L-T | 1.25 | -320 | 0.0002 | Cleavage |
| L-T | 1.25 | -320 | 0.0002 | Cleavage |
| L-T | 1.25 | -320 | 0.0002 | Cleavage |
| L-T | 0.50 | -170 | 0.0006 | Cleavage |
| L-T | 0.50 | -170 | 0.0008 | Cleavage |
| L-T | 0.50 | -170 | 0.0008 | Cleavage |
| L-T | 0.50 | -170 | 0.0010 | Cleavage |
| L-T | 0.50 | -170 | 0.0010 | Cleavage |
| L-T | 0.50 | -170 | 0.0014 | Cleavage |
| L-T | 0.50 | -170 | 0.0015 | Cleavage |
| L-T | 1.25 | -170 | 0.0004 | Cleavage |
| L-T | 1.25 | -170 | 0.0005 | Cleavage |
| L-T | 1.25 | -170 | 0.0006 | Cleavage |
| L-T | 1.25 | -170 | 0.0010 | Cleavage |
| L-T | 0.50 | -105 | 0.0008 | Cleavage |
| L-T | 0.50 | -105 | 0.0009 | Cleavage |
| L-T | 0.50 | -105 | 0.0010 | Cleavage |
| L-T | 0.50 | -105 | 0.0012 | Cleavage |
| L-T | 0.50 | -105 | 0.0013 | Cleavage |
| L-T | 0.50 | -105 | 0.0015 | Cleavage |
| L-T | 0.50 | -105 | 0.0015 | Cleavage |
| L-T | 0.50 | -105 | 0.0016 | Cleavage |
| L-T | 0.50 | -105 | 0.0017 | Cleavage |
| L-T | 0.50 | -105 | 0.0018 | Cleavage |
| L-T | 0.50 | -105 | 0.0018 | Cleavage |

(continued)

* - not reported

# Material A36



(continued)

| Orien | Spec Thick in | Test Temp degF | CODIc in | Curve |
|---|---|---|---|---|
| L-T | 0.50 | -105 | 0.0019 | Cleavage |
| L-T | 0.50 | -105 | 0.0029 | Cleavage |
| L-T | 0.50 | -105 | 0.0055 | Cleavage |
| L-T | 1.25 | -105 | 0.0010 | Cleavage |
| L-T | 1.25 | -105 | 0.0012 | Cleavage |
| L-T | 1.25 | -105 | 0.0013 | Cleavage |
| L-T | 1.25 | -105 | 0.0014 | Cleavage |
| L-T | 1.25 | -105 | 0.0014 | Cleavage |
| L-T | 1.25 | -105 | 0.0015 | Cleavage |
| L-T | 1.25 | -105 | 0.0016 | Cleavage |
| L-T | 1.25 | -105 | 0.0019 | Cleavage |
| L-T | 0.50 | -45 | 0.0019 | Cleavage |
| L-T | 0.50 | -45 | 0.0019 | Cleavage |
| L-T | 0.50 | -45 | 0.0027 | Cleavage |
| L-T | 0.50 | -45 | 0.0036 | Cleavage |
| L-T | 0.50 | -45 | 0.0042 | Cleavage |
| L-T | 0.50 | -45 | 0.0046 | Cleavage |
| L-T | 0.50 | -45 | 0.0046 | Cleavage |
| L-T | 0.50 | -45 | 0.0048 | Cleavage |
| L-T | 0.50 | -45 | 0.0049 | Cleavage |
| L-T | 0.50 | -45 | 0.0063 | Cleavage |
| L-T | 0.50 | -45 | 0.0065 | Cleavage |
| L-T | 0.50 | -45 | 0.0073 | Unstable |
| L-T | 0.50 | -45 | 0.0092 | Unstable |
| L-T | 0.50 | -45 | 0.0120 | Unstable |
| L-T | 0.50 | -45 | 0.0129 | Unstable |
| L-T | 0.50 | -45 | 0.0157 | Unstable |
| L-T | 0.50 | -45 | 0.0166 | Unstable |
| L-T | 0.50 | -45 | 0.0201 | Unstable |
| L-T | 1.25 | -45 | 0.0020 | Cleavage |
| L-T | 1.25 | -45 | 0.0022 | Cleavage |
| L-T | 1.25 | -45 | 0.0025 | Cleavage |
| L-T | 1.25 | -45 | 0.0026 | Cleavage |
| L-T | 1.25 | -45 | 0.0027 | Cleavage |
| L-T | 1.25 | -45 | 0.0029 | Cleavage |
| L-T | 1.25 | -45 | 0.0033 | Cleavage |
| L-T | 0.50 | 0 | 0.0054 | Cleavage |
| L-T | 0.50 | 0 | 0.0061 | Cleavage |
| L-T | 0.50 | 0 | 0.0065 | Unstable |
| L-T | 0.50 | 0 | 0.0068 | Cleavage |
| L-T | 0.50 | 0 | 0.0077 | Cleavage |
| L-T | 0.50 | 0 | 0.0087 | Unstable |
| L-T | 0.50 | 0 | 0.0088 | Unstable |
| L-T | 0.50 | 0 | 0.0110 | Unstable |
| L-T | 0.50 | 0 | 0.0141 | Unstable |
| L-T | 0.50 | 0 | 0.0154 | Unstable |
| L-T | 0.50 | 0 | 0.0157 | Unstable |

(continued)

* - not reported

# Material A36



(continued)

| Orien | Spec Thick in | Test Temp degF | CODIc in | Curve |
|---|---|---|---|---|
| L-T | 0.50 | 0 | 0.0187 | Unstable |
| L-T | 0.50 | 0 | 0.0193 | Unstable |
| L-T | 0.50 | 0 | 0.0200 | Unstable |
| L-T | 0.50 | 0 | 0.0208 | Unstable |
| L-T | 1.25 | 0 | 0.0041 | Cleavage |
| L-T | 1.25 | 0 | 0.0044 | Cleavage |
| L-T | 1.25 | 0 | 0.0053 | Cleavage |
| L-T | 1.25 | 0 | 0.0060 | Cleavage |
| L-T | 1.25 | 0 | 0.0062 | Cleavage |
| L-T | 0.50 | 32 | 0.0068 | Unstable |
| L-T | 0.50 | 32 | 0.0075 | Unstable |
| L-T | 0.50 | 32 | 0.0094 | Unstable |
| L-T | 0.50 | 32 | 0.0223 | Unstable |
| L-T | 0.50 | 32 | 0.0259 | Unstable |
| L-T | 0.50 | 32 | 0.0290 | Unstable |
| L-T | 0.50 | 32 | 0.0323 | Unstable |
| L-T | 0.50 | 32 | 0.0337 | Unstable |
| L-T | 1.25 | 32 | 0.0059 | Cleavage |
| L-T | 1.25 | 32 | 0.0074 | Cleavage |
| L-T | 1.25 | 32 | 0.0075 | Cleavage |
| L-T | 1.25 | 50 | 0.0082 | Unstable |
| L-T | 1.25 | 50 | 0.0085 | Unstable |
| L-T | 1.25 | 50 | 0.0112 | Unstable |
| L-T | 1.25 | 70 | 0.0126 | Unstable |
| L-T | 1.25 | 70 | 0.0183 | Unstable |
| L-T | 1.25 | 70 | 0.0209 | Unstable |

* - not reported

# Material A36



## Description

| | | | |
|---|---|---|---|
| Material Code | 009.043.010A | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | * |
| Thickness | 1.25 in | Composition Type | * |
| Composition Position | * | Lot ID | * |
| Reference | * | | |

## Composition

See Page 7000.1

## Fabrication History

See Page 7000.1

## Property Measurements

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

| Orien | Test Temp degF | CVN Energy ft-lb |
|---|---|---|
| L-T o | -90 | 2 |
| L-T o | -30 | 4 |
| L-T o | -30 | 6 |
| L-T o | 10 | 8 |
| L-T o | 32 | 10 |
| L-T o | 32 | 12 |
| L-T o | 50 | 20 |
| L-T o | 50 | 21 |
| L-T o | 70 | 37 |
| L-T o | 70 | 51 |
| L-T o | 90 | 45 |
| L-T o | 90 | 53 |
| L-T o | 110 | 77 |
| L-T o | 110 | 86 |
| L-T o | 140 | 104 |
| L-T o | 140 | 174 |
| L-T o | 180 | 102 |
| L-T o | 180 | 125 |

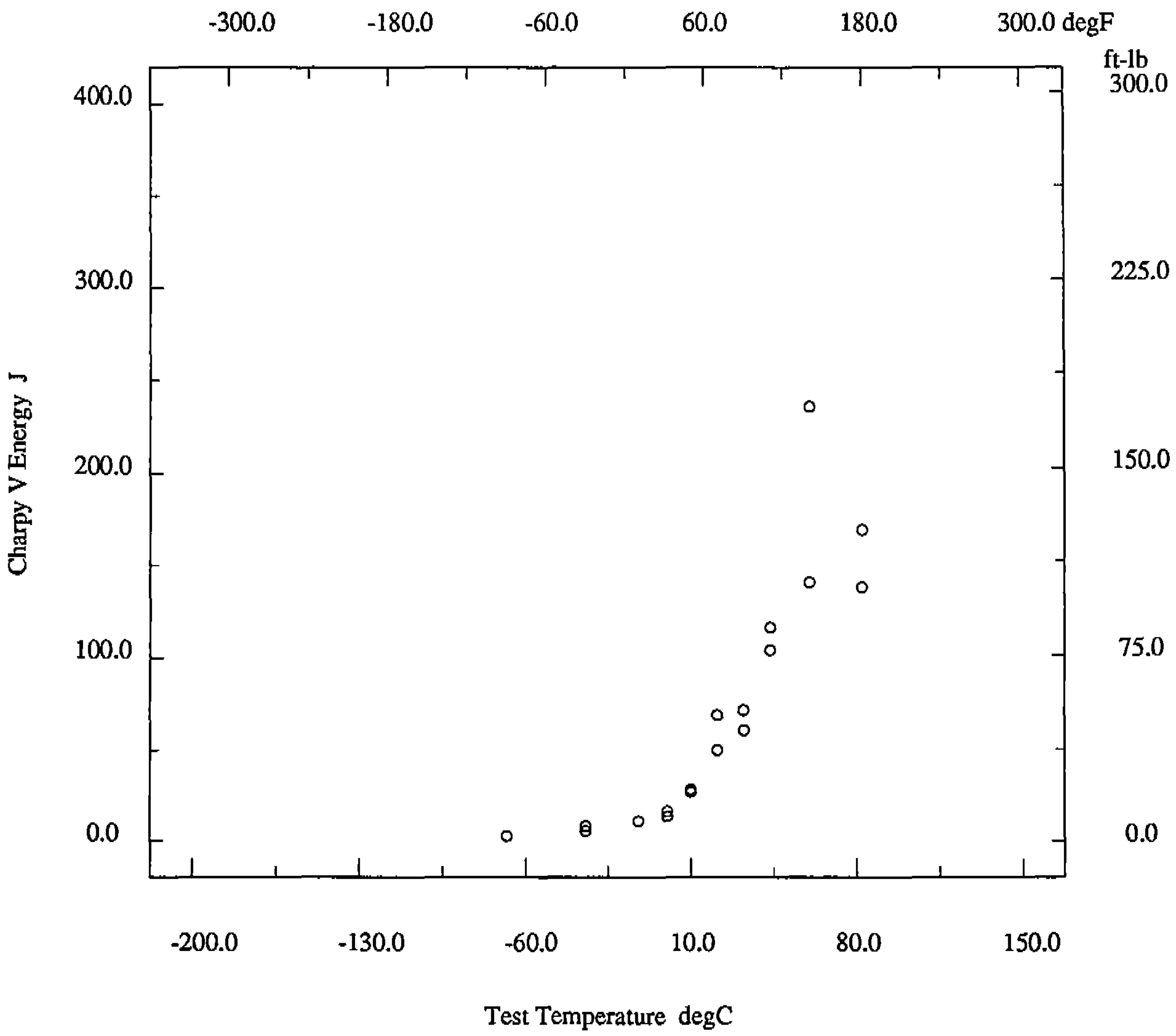
* - not reported

# Material A36



**Description**

| | | | |
|---|---|---|---|
| Material Code | 009.043.010A | Material Name | A36 |
| UNS | * | Other Designation | * |
| Type | Wrought Metal | Form | * |
| Thickness | 1.25 in | Composition Type | * |
| Composition Position | * | Lot ID | * |
| Reference | * | | |




* - not reported

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