

**EDITORIAL STYLE MANUAL
FOR THE
PREPARATION OF
AEROSPACE MATERIAL SPECIFICATIONS
(AMS)
METALS AND PROCESSES
and
NONMETALLIC MATERIALS**

Prepared by the AMS Editorial Consultants

SAE International

Metallic Materials and Processes – December 2002
NonMetallics – February 2000

Editorial Style Manual for the PREPARATION OF AEROSPACE MATERIAL SPECIFICATIONS METALLIC MATERIALS AND PROCESSES AND NONMETALLIC MATERIALS

Table of Contents

	Page
Foreward	ii
Index for Metals Specifications.....	iii
Index for Process Specifications.....	iv
Table of Contents for Nonmetallic Specifications.....	See G.1
Determination of Tensile and Compressive Strength Properties for AMS Specifications	See Part F
 GENERAL	
Typing, Drafting.....	A.1
Indicating Revisions.....	A.6
Specification Titles.....	A.7
Specification Sections.....	A.8
Scope Section.....	A.9
Applicable Documents Section.....	A.11
 TECHNICAL REQUIREMENTS	
Metals.....	B.1
Processes.....	C.1
Nonmetallics.....	See G.1
 QUALITY ASSURANCE	
Metals.....	B.8
Processes.....	C.3
Nonmetallics.....	See G.1
 PREPARATION FOR DELIVERY	
Metals.....	B.10
Processes.....	C.5
Nonmetallics.....	See G.1
 ACKNOWLEDGEMENTS	 D.1
REJECTIONS	D.1
NOTES	D.2
MISCELLANEOUS PHRASES, WORDINGS AND PROCEDURES	D.4

FOREWORD

This manual is a compilation of information dealing with AMS preparation. Except where Metric Aerospace Material specification (MAM) are specifically mentioned in this manual, the format for AMS applies equally to the corresponding MAM.

Part A outlines typing instructions.

Part B outlines the standard format and editorial procedure for metals.

Part C outlines the standard format and editorial procedure for processes.

Part D outlines Acknowledgements, Rejection, and Notes sections.

Part E outlines the use of metric units and provides factors for converting inch/pound units to SI units and conversion tables for temperatures, linear measurements, and force.

Part F outlines AMS procedures to establish validity of mechanical property values.

Part G outlines Nonmetallic Materials.

AS A GUIDE TO LATEST STANDARD WORDING, PERSONS PREPARING DRAFTS OF AMS ARE URGED TO FOLLOW THESE INSTRUCTIONS AND TO USE THE RECOMMENDED MODEL AMS WHICH IS INTENDED TO BE THE LATEST PUBLISHED SPECIFICATIONS FOR SIMILAR TYPES, FORMS, AND CONDITIONS OF MATERIAL. Recommended Model AMS lists can be found in the last minutes of each Commodity Committee Meeting. If a wording used is different from that given herein or from a recently published specification, the drafter is requested to call this to the attention of the SAE staff when submitting the draft and to include reasons for departure from standard wording. This information will be included in a letter of transmittal circulating the draft for review and comment.

NOTE: It is to be appreciated these manuals have been prepared (and will be maintained) by the editorial consultants of each group. The metals and processes consultants authored Parts A through F, and the nonmetallics consultants authored Part G. Questions or comments on the manuals should be appropriately directed.

INDEX FOR METALS SPECIFICATIONS

	PAGE		PAGE
Acceptance Tests	B.9	Precautions	A.10
Acknowledgement	D.1	Preparation for Delivery	B.10
Applicable Documents	A.11	Preproduction Tests	B.9
Application	A.10	Properties	B.5
Approval	B.9	Purpose (of Process)	A.9
Brinell Hardness Numbers	B.7	Quality Assurance Provisions	B.8
Check Analysis	B.5	Reference (Applicable) Documents	A.11
Classification (of tests)	B.9	Rejections	D.1
Classification Paragraph	A.10	Reports	B.9
Column Headings	A.4	Resampling and Retesting	B.9
Composition Paragraph	B.1	Responsibility for Inspection	B.8
Composition Tables	B.3	Revision Indicator (NOTES 8.1)	A.3/D.2
Condition, Steel	B.5	Sampling and Testing	B.9
Conversions ksi to MPa	E.29	Scope	A.9
Drawings, Drafting	A.6	Section Titles	A.8
Form (of product)	A.9	Similar Specifications	D.4
Hardness	B.6	Sizes Paragraphs	B.10
Hyphenation	D.5	Statistical Evaluation of Properties	F.1
Inch Fractions to SI Equivalentents	E.27	Technical Req'ts. Section, Metals	B.1
Identification	B.10	Temperature Conversion, Celsius	E.19
Jurisdiction	D.4	Temperature Conversion, Fahrenheit	E.12
Miscellaneous Phrases and Wording	D.4	Tests, Classification of	B.9
Marginal Indicia	A.6	Titles, Specifications	A.6
Melting Practice, Steel	B.5	Titles, Paragraphs	A.8
Metric Conversions	E.8	Titles, Sections	A.8
Metrics, General	E.1	Tolerances	B.8
Notes Section	D.2	Trade Names	A.8
Packaging	B.10	Typing Instructions	A.1
Paragraph Titles	A.8	UNS Number	A.8
Periodic Tests	B.9	Warning Paragraph	A.11

INDEX FOR PROCESS SPECIFICATIONS

	PAGE		PAGE
Acceptance Tests	C.3	Properties and Testing	C.2
Acknowledgement	D.1	Protective Treatment	C.4
Applicable Documents	A.11	Purpose (of process)	A.9
Application	A.10	Quality Assurance Provisions	C.2
Approval	C.4	Quality Paragraph	C.2
Classification of Tests	C.3	Reference (Applicable) Documents	A.11
Classification Paragraph	A.10	Rejections	D.1
Column Headings	A.4	Reports	C.4
Equipment	D.6	Resampling and Retesting	C.4
Hyphenation	D.5	Responsibility for Inspection	C.2
Identification	C.4	Revision Indicator (NOTES 8.1)	A3/D2
Jurisdiction	D.4	Sampling and Testing	C.4
Materials or Solutions Paragraph	C.1	Scope	A.9
Metrics, General	E.1	Section Titles	A.8
Notes Section	C.5/D.2	Similar Specifications	D.4
Packaging	C.5	Technical Requirements Section	C.1
Paragraph Titles	A.8	Titles, Specifications	A.6
Periodic Tests	C.3	Titles, Paragraphs	A.8
Post Treatment	C.2	Titles, Sections	A.8
Precautions	A.10	Tolerances	C.2
Preparation for Delivery	C.4	Trade Names	A.8
Preparation	C.2	Typing Instructions	A.1
Preproduction Tests	C.3	Warning Paragraph	A.11
Procedure Paragraph	C.2		

PART A

TYPING AND DRAFTING INSTRUCTIONS

A.1 TYPING INSTRUCTIONS:

The following are instructions of general application; exceptions and special instructions for a particular section are given in the appropriate portion of this manual.

A.1.1 Original drafts of new and revised specifications shall be submitted to the SAE office as 8½ x 11 inch masters on plain, white, bond paper. The first digit of the section or paragraph number shall be positioned on masters so as to provide a ¾ inch margin between the left hand edge of the paper and the numeral of the basic section number; the text should also be positioned so as to leave not less than a ½ inch margin at the right. Each page, except the first, shall carry a page number; all pages shall show the specification number or draft designation in the upper Left and right hand corners.

A.1.1.1 Preferably, original drafts of revisions of published specifications may be submitted as marked copies of the published specification with the changes made in red ink and extensive changes and additions made on an attachment to the marked copy provided such marked copies are legible for review by the reader, editor, and typist. If copy received for review is not legible, such copy will be returned to drafter for corrections.

A.1.1.2 A Change Summary sheet (See page 2) shall be completed and submitted with each draft.

A.1.2 Heading of Drafts:

AMS (or MAM)		(a) AMS (or MAM)
Date	Proposed	(b) Draft XXX-
Name of Drafter	AEROSPACE MATERIAL SPECIFICATION	(c) Common Name

For revisions of published specifications, show the assigned number and next revision letter. For new specifications, do not fill in a number.

This line shall be used only for new (not previously published) specifications. The "X" in the draft designation shall be the letter designating the Commodity Committee having jurisdiction over the specification; the "YY" is the last two digits of the year in which the draft is first circulated. The "--" is a two-letter code indicating the sequence of the draft in the year and will be assigned by the SAE staff (e.g., Draft D-97AC would be a specification under the jurisdiction of Committee D first circulated in 1997 and the third draft of that year. Redrafts, prior to publication, of a specification will carry the same designation, even if circulated in a later year, followed by a dash and a number indicating the redraft.) The AMS number is assigned when the specification has been approved by the Commodity Committee and has been prepared for circulation to Aerospace Council.

To provide identification during development of a specification, the common name, and any other more definitive designation when needed (commercial designation, UNS designation, AISI type number, etc) shall be shown on drafts of new specifications only, and then only if this designation is not normally included as part of the title (See A.4). This reference, if a commercial designation, will be removed when the specification is published but will usually appear in the AMS index.

AEROSPACE MATERIAL SPECIFICATION CHANGE SUMMARY FORM

(This form is to be completed by sponsor as cover sheet for draft.)

Date of This draft:		Consultant:	
Document No.		Proposed Rev Letter	
Title:			
Common Name			
Sponsor:		Phone:	Email:

Description of Change: (check one or both)	
	The proposed changes are editorial in nature and are not intended to alter the technical requirements of this specification.
	Changes have been made to the following technical requirements of this specification for the reason(s) cited:
Paragraph:	

For Action (check all applicable)													
B	D	E	F	G	AMEC	CE	P	CACRC	G8	G9	J	M	
For Information (check as applicable)													
B	D	E	F	G	AMEC	CE	P	CACR C	G8	G9	J	M	
Special Distribution Information: Sponsors indicate and attach a <i>For Information List</i>													

- A.1.3 All main section (X.) titles shall be typed in capital letters. In the specification title and in all paragraph titles, only the first letter of each principal word shall be capitalized. Section (X.) and primary paragraph (X.X) titles shall be separated vertically from the text by a double space. All other paragraph titles shall have the text run-on.
- A.1.4 The decimal points immediately following each basic section number shall be aligned vertically.
- A.1.5 Each section and paragraph title shall be separated from the last element of the number of that section or paragraph by two spaces. The first line of the text of each section or paragraph title shall start two spaces to the right of, and on the same line as, the title of that section or paragraph. If a paragraph has no title, the text shall be separated from the last element of the number by two spaces. Subsequent lines shall start under the first letter of the first line, including the title if any; i.e., two spaces to the right of the last element of the number.
- A.1.6 Paragraphs preferably should not be divided between the bottom of one page and the top of the next except when a "paragraph" (e.g., specifications for tolerances) requires more than one page. When so divided, the column headings shall be repeated on the subsequent page(s).
- A.1.7 The change bar (|) (See A.3) shall be placed beside the text of paragraphs containing technical revisions and shall be balanced at the left margin vertically. (See A.3 and A.3.1). The change bar shall extend the full length of the paragraph in which the technical change appears. If the change appears in a table, the change bar will be positioned (only) opposite the title of the table.
- A.1.8 All tabular presentations shall be made into formal tables with table numbers, table titles, and distinct columns and rows (i.e., no column heads spanning two columns).
 - A.1.8.1 In table presentations such as in the "Composition" and "Tolerances" paragraphs, the figures shall be arranged on the page to line up the decimal points of each column vertically. In addition, any common repetitive character shall also line up vertically except when a value in parts per million is listed in parentheses in the "Composition" paragraph. If a column includes both minimum and maximum values (e.g., size ranges of tolerance tables), minimum values shall be listed to the left and maximum values to the right except in two-line tables giving only one actual dimension (See A1.8.2).
 - A.1.8.2 In composition tables, the columns of minimum and maximum values shall be headed "min" and "max", respectively. Double dashes shall be used in the "min" column to indicate that no limit applies for elements specified only as maximum and in the "max" column for elements specified only as minimum. If the base element is specified as "remainder", the first "r" shall be aligned vertically with the farthest left digit of the values in the "min" column.

Example for Steel:

TABLE # - Composition

Element	min	max
Carbon	0.48	0.55
Manganese	0.65	0.90
Silicon	0.20	0.35
Phosphorus	--	0.025
Sulfur	--	0.025
Chromium	0.80	1.10
Vanadium	0.15	--
Nickel	--	0.25
Molybdenum	--	0.08
Copper	--	0.35

Example for Aluminum Alloys (See B.1.2.1.4.1)

TABLE # - Composition

Element	Min	max
Silicon	11.0	13.5
Iron	--	1.0
Copper	0.50	1.3
Magnesium	0.8	1.3
Chromium	--	0.10
Nickel	0.50	1.3
Zinc	--	0.25
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

A.1.8.3 The requirement for tabular data to be presented in formal tables discourages the use of two-line tables; tables giving only one actual dimension should be avoided. However, if essential, one of the following forms shall be used, as applicable:

- | | |
|-------------------------------------|---|
| (a) Up to 0.050, incl
Over 0.050 | (b) Up to 0.050, excl
0.050 and over |
|-------------------------------------|---|

A.1.8.4 In tables, column headings shall be presented in accordance with the following rules:

A.1.8.4.1 Column headings shall be distinct and shall apply to a single column. They shall not span multiple columns.

Example:

- | | |
|---------------------------------------|--|
| (a) Tolerance, Inch
plus and minus | (b) Tolerance, Millimeters
plus and minus |
|---------------------------------------|--|

A.1.8.4.2 The table shall be structured to minimize repetition in column heads. The table title can be utilized to avoid repetitive column heads or reversing columns and rows can reduce repetition.

A.1.8.4.3 Each line of each column heading shall be centered over the column or columns to which it applies.

A.1.8.4.4 Column headings shall be presented with the first letter of each major word capitalized.

A.1.8.4.5 There shall be a line beneath each of the following:

Table title
Column headings
Last line of the table

These lines shall run the entire width of the table.

A.1.8.4.6 Leave two blank lines between the last line of the paragraph title and/or text and the uppermost line of the table's title and number. Two blank lines shall also be left following the ending underline.

A.1.8.4.7 In tables, column headings shall be placed so that the bottom lines of all headings are on the same line horizontally.

A.1.8.4.8 In tables, there shall be a blank line between the underline below the column heading(s) and the first line of the tabulated material.

A.1.9 Tables and figures shall be numbered with Arabic numerals in the following format:

TABLE 1 - Title

FIGURE 1 - Title

Table titles shall be centered over the table. Figure titles shall be centered below the figure.

A.1.10 When a range of values is expressed, the word "to" shall be used rather than a dash between the minimum and maximum values.

Example: 1.500 to 2.000

A.1.11 The degree symbol (°) shall be used in expressing temperatures in accordance with the following rules:

A.1.11.1 In expressing a single temperature, use the degree symbol between the numerical value and the scale letter with a space.

Example: 1350 °F

A.1.11.2 In expressing a range of temperatures, use the degree symbol and the scale letter after only the second value, observing the spacing rule of A.1.11.1.

Example: 210 to 220 °C

A.1.11.3 In expressing a basic temperature with a tolerance, use the degree symbol and the scale letter after only the basic value.

Example: 1800 °F ± 25

A.1.12 In expressing any unit with a tolerance, there shall be a space between the last character of the basic value or its unit designation and the "±" sign and a space between the "±" sign and the first digit of the tolerance. Where the "±" sign is used to indicate a range or tolerance not associated with a basic value, there shall be no space between the "±" sign and the range or tolerance value.

Examples:

(a) 1 hour ± 0.2

(b) within ±15

A.1.13 Abbreviations of inch/pound units are not normally used. Abbreviations of SI (metric) units are always written without periods.

A.1.13.1 Uppercase and lowercase letters used as abbreviations by themselves or as prefixes to SI (metric) units have different meanings for the same letter (e.g., "M" means "mega" (10⁶) but "m" by itself means "meter" and when used as a prefix to a basic unit means "milli" (10⁻³). TAKE CARE TO USE THE PROPER CASE.

A.1.14 To avoid possible ambiguities which might otherwise occur in certain editorial constructions, every series of three or more approximately equivalent items shall have a comma between each two items; e.g.; "red, green, or black."

A.2 DRAFTING INSTRUCTIONS:

When figures or sketches are required, the following instructions shall apply:

- A.2.1 Good drafting practice shall be followed in preparing figures and sketches; practices described in the SAE Aerospace Drafting Manual are preferred.
- A.2.2 The person preparing the final draft of a specification that includes figures and sketches shall be responsible for furnishing to SAE the necessary sharp, black and white drawings suitable for reproduction by photo-offset method, unless drawings of these figures or sketches have already been furnished to SAE for use in other specifications.
- A.2.3 If figures to be used in a new or revised specification appear in a previously published specification, it is permissible in drafts of such new or revised specifications to refer to the published figures. This shall be accomplished by the following note appearing at the end of the draft:

"Figures X thru Z same as Figures A thru C of AMS XXXX".

A.3 MARGINAL INDICIA INDICATING TECHNICAL CHANGES:

In drafts of revisions of published specifications, a change bar (|) shall be used to indicate technical changes in text or figures for paragraphs of Sections 3, 4, and 5 of that particular revision only (i.e., drop all "φ's", (R)'s, or change bars that were in the previous issue unless a paragraph is again being revised). In preparing redrafts of previously circulated revisions, the change bar shall be used only to indicate paragraphs differing technically from the corresponding paragraph of the published specification and not those being changed from the previous draft of that subsequent revision. The (R) indication to the left of a specification title will be used to denote a complete revision of the specification. The meaning of the change bar (|) and the (R) shall be explained in the "NOTES" section of the specification. See A.3.1 for the applicable note.

- A.3.1 Example(to be used as 8.1 in all AMS/MAM; it accommodates all situations):

"A change bar (|) located in the left margin is for the convenience of the user in locating areas where technical revision, not editorial changes, have been made to the previous issue of a specification. An (R) symbol to the left of the document title indicates a complete revision of the specification, including technical revision. Change bars and (R) are not used in original publications, nor in specifications that contain editorial changes only.

- A.3.1.1 When it has become necessary to prepare an uncoordinated publication (to correct a serious error), the AMS warrants a 8.1.1. It is to read as follows:

8.1.1 This AMS XXXXY is an editorial correction necessary to correct publication errors in the (Y-1) revision. In this instance, the change bar symbol(s) included herein are for the convenience of the user in locating areas where technical changes have been made to the (Y-2) and (Y-1) revisions of this specification.

A.4 TITLING OF SPECIFICATIONS:

- A.4.1 For Metals:

- A.4.1.1 Include in the first line of the title the indication of the commodity, type of material, method of production, and form in this order. Inclusion of method of production applies primarily to tubing and castings; it does not apply to specifications for sheet, strip, plate, or combination thereof, or to melting practice for steels and alloys.

Example:

Steel, (Commodity)	Corrosion and Heat Resistant, (Type of Material)	Investment (Method of Production)	Castings (Form)
-----------------------	---	---	--------------------

A.4.1.1.1 If a specification covers too many forms for all to be listed in the title, list only the principal forms; e.g., a specification covering steel bars, wire, forgings, mechanical tubing, flash welded rings, and stock for forging, flash welding, and heading shall be titled:

Steel, Bars, Wire, Forgings, Tubing, and Rings

A.4.1.2 In the second line, include the basic elements or constituents or other characteristics necessary to identify the material and differentiate it from similar materials. In specifications for metals, nominal contents of alloying elements shall be listed in the order in which they appear in the tabulated composition except as follows:

A.4.1.2.1 If carbon is listed in the title of steel specifications, the range or the maximum amount, enclosed in parentheses, shall follow the list of alloying elements.

A.4.1.2.2 If common usage (e.g., the commercial designation of an alloy) lists elements in a sequence other than that normally used in AMS (See B.1.2.1), the common-usage sequence of listing elements shall be used in the title. However, aluminum alloy specifications do not include a composition listing except in documents that do not include an Aluminum Association Registration Number. The number will constitute the second line of the title.

A.4.1.3 Nominal contents of alloying elements shall normally be shown as follows:

a. To two significant figures when the nominal content is 1.0% or more, except as in "b" below.

Example: 20Cr

b. To one decimal place when the nominal content is 1.0% or more but less than 10% and when the nominal content is over 10% and the figure in the first decimal place is "5".

Examples: 3.2Mg, 10.5Ni

c. To two decimal places when the nominal content is 0.10% or more but less than 1.0%.

Example: 0.25Mo

d. To the first significant figure other than a zero when the nominal content is less than 0.10%.

Example: 0.006B

The element symbol shall be positioned next to the nominal percentage without a space between. Each element and its percentage shall be separated from adjacent ones by a space, a hyphen, and a space.

Example: 18Cr - 9.8Ni

A.4.1.4 To provide better cross reference to alloy composition and names in the title of specifications, include in parentheses at the end of the second line of the title reference to the SAE composition number (or AISI if there is no SAE standard composition number) for steels, the ASTM alloy number for magnesium alloys, and the AA number for aluminum alloys. Also show the Unified Numbering System (UNS) number, when assigned, in the lower right corner of the title block. It is to appear as: (Composition similar to UNS YXXXX).

A.4.1.4.1 REFERENCE SHALL NOT BE MADE TO COMPANY ALLOY DESIGNATIONS AND TRADE NAMES SUCH AS INCONEL X-750, HASTELLOY C, ETC, AS THESE TRADE NAMES ARE NOT ACTUALLY SPECIFICATIONS AND MAY BE REGISTERED TRADE NAMES.

A.4.1.5 If significant, or necessary to provide distinction between similar specifications, information such as the temper, condition, strength (tensile or yield), melting practice, or size shall be included in subsequent lines of the title except that designations which indicate both composition and temper shall appear in the second line. Do not reference "PREMIUM QUALITY", "BEARING QUALITY", or similar designations in the title.

A.4.2 For Processes:

A.4.2.1 Include in the first line of the title only the generic name of the process together with any descriptive adjectives defining the method of application; in specifications for plating, the name of the metal or alloy being deposited shall follow the word "PLATING" or "COATING".

Examples:

- (a) Anodic Treatment of Aluminum Alloys
- (b) Plating, Cadmium

A.4.2.2 Any words or phrases describing the use of the process or the type of solutions used, etc., shall appear in subsequent lines of the title.

A.5 TITLING AND NUMBERING OF SECTIONS AND PARAGRAPHS:

A.5.1 Sections:

A section is defined as all paragraphs having the same primary numeral (digit to the left of the first period in the decimal numbering system (See A.5.3)). All specifications, except those for dimensional tolerances and for identification of materials and parts, which have special formats as illustrated in recent issues of such specifications, shall contain eight sections titled and numbered as follows:

1. SCOPE
2. APPLICABLE DOCUMENTS
3. TECHNICAL REQUIREMENTS
4. QUALITY ASSURANCE PROVISIONS
5. PREPARATION FOR DELIVERY
6. ACKNOWLEDGMENT
7. REJECTIONS
8. NOTES

A.5.1.1 If no information is to be given under any of these section titles, the phrase "Not applicable" shall follow that section title, except that the word "None" shall follow the titles of Sections 2 and 8.

A.5.2 Paragraphs:

A paragraph is defined as everything having the same complete decimal designation within a section. Sequencing of paragraphs within each section shall be as given in the discussion of the respective sections on the following pages, insofar as appropriate.

A.5.3 Numbering:

The decimal system of numbering sections and paragraphs shall be used. Paragraphs within a section shall be numbered sequentially.

A.6 SCOPE SECTION:

This section shall define what the specification covers and shall include the following paragraphs, as applicable, in the following sequence:

- 1.1 Form (or Type or Purpose)
- 1.2 Application
- 1.3 Classification
- 1.4 Precautions
- 1.5 Limitations

A.6.1 Form Paragraph:

The "Form" paragraph shall show each product form covered by the specification, whether or not all forms are listed in the title. The paragraph should begin with the words "This specification covers (commodity) in the form of -----".

- A.6.1.1 When parallel AMS and MAM documents exist, the parallel specifications shall be cross-referenced in the "Form" paragraph, as a subparagraph, using the following sentences as applicable:

From AMS to MAM: "MAM is the metric version of this AMS."

From MAM to AMS: "AMS is the inch/pound version of this MAM."

A.6.2 Type Paragraph:

The "Type" paragraph is usually used in specifications for parts. This paragraph should begin with a statement similar to that shown above for the "Form" paragraph. Parallel AMS and MAM shall be cross-referenced as in A.6.1.1. Types shall be arabic numerals (eg, Type 1).

A.6.3 Purpose Paragraph:

The "Purpose" paragraph is usually used in specifications for processes. This paragraph should begin with a statement similar to that shown for the "Form" paragraph.

A.6.4 Application Paragraph:

All AMS should include an "Application" paragraph. This shall be worded to indicate typical applications for the product but shall not imply that the product be used only for such applications. For example: "These products have been used typically for, but usage is not limited to such applications." Complete sentences are not necessary if the intended application of the product can be clearly and suitably expressed otherwise.

- A.6.4.1 In AMS for alloys subject to significant stress corrosion, reference to an ARP providing guidance in how to avoid this phenomenon, such as ARP823, ARP982, and ARP1110, shall be included. The following sentences are standard for aluminum alloys; similar wording shall be used for other materials:

A.6.4.1.1 For specifications covering product in the fully heat treated condition:

"Certain designs and processing procedures may cause these products to become susceptible to stress-corrosion cracking; ARP823 recommends practices to minimize such conditions."

A.6.4.1.2 For specifications covering product in the annealed or partially heat treated conditions:

"Certain designs and processing procedures may cause these products to become susceptible to stress-corrosion cracking after heat treatment; ARP823 recommends practices to minimize such conditions."

A.6.5 Classification Paragraph:

If a specification covers more than one composition, surface condition, heat treatment, etc, the "Classification" paragraph shall be used to define briefly such variations and how they shall be designated.

A.6.5.1 Example of Classification Paragraph:

1.X Classification:

Steels covered by this specification are classified as follows:

Type 1 - Multiple melted using vacuum induction followed by vacuum consumable electrode practice

Type 2 - Multiple melted using vacuum induction followed by electroslag practice in the final melting

1.X.1 Unless a specific type is ordered, either type may be supplied.

or

1.X.1 Type 1 shall be supplied unless Type 2 is permitted or required by purchaser.

or

1.X.1 When a Type is not specified, Type x shall be supplied.

A.6.6 Precautions Paragraph:

In specifications covering hazardous or radioactive materials include, if appropriate, a note or notes warning of the specific hazards involved. Such notes should read as applicable to the product involved.

A.6.6.1 For most radioactive materials, this note shall read as follows:

"1.X Alloy covered by this specification is radioactive. All applicable rules and regulations pertaining to handling of radioactive material and all licensing provisions for use of such material should be observed."

A.6.6.2 In specifications for materials containing cadmium, such as silver solder, use the following wording:

"WARNING: Numerous scientific studies have determined that cadmium presents a health hazard if ingested."

A.6.6.3 In specifications for materials containing beryllium, use the following wording: "WARNING: Inhalation of beryllium dust or fumes may cause serious lung disease. There is a potential cancer hazard based principally on animal tests."

A.6.6.4 Safety-Hazardous Materials: While the use of materials, applications, and processes described or referenced in this specification may involve hazards, this specification does not address the hazards involved in their use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of materials and processes and to take necessary precautionary measures and training of personnel to ensure the health and safety of all personnel involved.

A.7 APPLICABLE DOCUMENTS SECTION:

This section shall list all specifications, standards, and recommended practices that are referenced within Sections 1, 3, 4, and 5 of the AMS. Referenced publications shall be listed in the following sequence: AMS and parallel MAM, AS and parallel MA, ARP, AIR, SAE Standards and Recommended Practices (published in the SAE Handbook), ASTM, others.

A.7.1 The introductory statement of this section shall read:

A.7.1.1 APPLICABLE DOCUMENTS:

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

A.7.1.2 Only those documents actually referenced in the specification shall be listed in the introductory paragraph given above.

A.7.2 Applicable documents of each issuing agency shall be listed in separate paragraphs. All classifications of documents from any issuing agency shall be listed in the appropriate paragraph. There shall be a paragraph (X.X) or subordinate paragraph (X.X.X) for each issuing agency. Following the paragraph title defining the type of document, include the name and address from which such documents are available or on other statement indicating where the document(s) may be obtained.

Example:

2. APPLICABLE DOCUMENTS: (Follow with wording given in A.7.1.1)

- 2.1 SAE Publications:
Available from SAE, 400 Commonwelath Drive, Warrendale, PA 15096-0001 or www.sae.org.
- 2.2 ASTM Publications:
Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.
- 2.3 U.S. Government Publications:
Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094 or www.dodssp.daps.mil.

Order of Preference:

- MIL Specifications
- MIL Standards
- FED Specifications
- FED Standards

- 2.4 U.S. Government Publications:
Available from DODSSP, Subscription Services Desk, Building 4D,
700 Robbins Avenue, Philadelphia, PA 19111-5094 or www.dodssp.daps.mil.
- The publications include those from the Code of Federal Regulations; the Federal Food, Drug and Cosmetic Act, and Regulations; and the Federal Aviation Administration.
- 2.5 U.S. Army Drawings:
Available from Quality Assurance Directorate, DRDAR-TST-S, Commander
U.S. Army, TACOM-ARDEC, Attention: AMSTA-AR-QAW-E, Picatinny
Arsenal, NJ 07806-5000 or www.tacom.army.mil.
- 2.6 Lyndon B. Johnson Space Center Publications:
Available from Lyndon B. Johnson Space Center, Houston, TX 77058 or
www.jsc.nasa.gov.
- 2.7 ANSI Publications:
Available from American National Standards Institute, Inc. (ANSI),
25 West 43rd Street, New York, NY 10036-7406 or www.ansi.org.
- 2.8 ASME Publications:
Available from American Society of Mechanical Engineers (ASME),
22 Law Drive, Box 2900, Fairfield, New Jersey 07007-2900 or
www.asme.org.
- 2.9 Goddard Space Flight Center Publications:
Available from Goddard Space Flight Center, Greenbelt, MD 20771 or
www.gsfc.nasa.gov.
- 2.10 Occupational Safety and Health Administration Publications:
Available from Regional Offices, U.S. Department of Labor, Bureau of Labor
Standards or www.osha.gov.
- 2.11 Federal Trade Commission Publications:
Available from Federal Trade Commission, Washington, DC 20580 or
www.ftc.gov.
- 2.12 ISO Publications:
Available from American National Standards Institute, Inc. (ANSI),
25 West 43rd Street, New York, NY 10036-8002 or www.ansi.org.
- 2.13 AWS Publications:
Available from American Welding Society, 550 N.W. LeJeune Road,
Miami, FL 33126 or www.aws.org.
- 2.14 NAS Publications:
Available from Aerospace Industries Association, Inc., 1250 Eye Street NW,
Washington, DC 20005 or www.aia-aerospace.org.
- 2.15 ASNT Publications:
Available from American Society for Nondestructive Testing, Inc. (NDT),
4153 Arlingate Plaza, Caller #28518, Columbus, OH 43228-0518 or
www.asnt.org.

- 2.16 AIA Publications:
Available from National Standards Association, Inc., 1321 14th Street, N.W.,
Washington, DC 20005.
- 2.17 AATCC Publications:
Available from American Association of Textile Chemists and Colorists,
P.O. Box 12215, Research Triangle Park, NC 27709 or www.aatcc.org.
- 2.18 ACGIH Publications:
Available from American Conference of Government and Industrial
Hygienists, P.O. Box 1937, Cincinnati, OH 45201 or www.acgih.org.
- 2.19 CSMA Publications:
Available from Chemical Specialists Manufacturing Association,
1001 Connecticut Avenue, Washington, DC 20036.
- 2.20 APHA Publications:
Available from American Public Health Association, 1015 18th Street, N.W.,
Washington, DC 20036 or www.apha.org.
- 2.21 AOAC Publications:
Available from Association of Official Agricultural Chemists, P.O. Box 540,
Benjamin Franklin Station, Washington, DC 20004.
- 2.22 CTFA Publications:
Available from Cosmetic, Toiletry, and Fragrance Association, 1625 I Street,
N.W., Washington, DC 20006 or www.ctfa.org.
- 2.23 UL Publications:
Available from Underwriters' Laboratories, Inc., 333 Pfingsten Road,
Northbrook, IL 60602 or www.ul.com.
- 2.24 ASM Publications:
Available from ASM International, Materials Park, OH 44073-0002 or
www.asm-intl.org.
- 2.25 Air Transport Association of America (ATA), 1709 New York Avenue, N.W.,
Washington, DC 20006 or www.air-transport.org.
- 2.26 Institute of Interconnecting and Packaging Electronic Circuits,
2215 Sanders Road, Northbrook, IL 60062-6135 or www.ipc.org.
- 2.27 American Gas Association, 400 N. Capitol Street, N.W., Washington, DC
20001 or www.aga.org.
- 2.28 National Institute of Standards and Technology (NIST), 100 Bureau Drive,
Stop 3460, Gaithersburg, MD 20899-3460 or www.nist.gov.

A.7.2.1 Documents in each group shall be listed numerically; when a letter or letters form a significant part of the designation (e.g., ASTM publications and Federal specifications), documents shall be listed alphabetically and numerically within each alphabetical group. The basic document designation (without revision designation) and title shall be shown. The second line, if any, as well as any subsequent lines of the document title, shall align with the first letter of the first line.

PART B METALS TECHNICAL REQUIREMENTS

Standard paragraphs to be used in preparation of new or revisions of specifications are not included in this manual. For guidance, use applicable paragraphs from the recommended model AMS or the latest published specification for the same or similar specification for the same alloy, form, and condition. Recommended model AMS are found in the last minutes of each commodity committee meeting.

B.1 TECHNICAL REQUIREMENTS SECTION:

B.1.1 This section shall define characteristics required to ensure that product or parts procured to the specification will be satisfactory for the intended use (misapplication excepted).

B.1.1.1 The fewest requirements necessary to define adequately the properties and quality of the product shall be included. Other properties which will be inherent in the product if the specified requirements are met or which may be of interest to designers but do not help to define and control the product shall not be included in this section but may be included in the "NOTES" section of the specification for information.

B.1.1.2 All requirements shall be expressed as "mandatory" in the usual manner (i.e., "--- shall be ---", "--- shall have ---", or "--- shall conform to ---"). The "Classification of Tests" paragraphs in Section 4 of specifications shall define the required frequency of testing.

B.1.1.3 Test methods specified for determining conformance to requirements stated in this section shall be specified in the paragraph stating the requirement or in an introductory paragraph to a series of requirements when the test method(s) can be stated by reference to ASTM or other standard methods of test or by a comparatively simple statement of test procedure. When it is necessary to detail completely the procedure(s) for one or more tests, such test procedures shall be detailed in the paragraph stating the requirement or in a following subparagraph.

B.1.2 Subjects in this section shall be shown in the following sequence; only those subjects applicable shall appear and shall be numbered consecutively:

Composition (or Material)

Melting Practice

Condition

Test Specimens (in specifications for castings)

Heat Treatment (in specifications for investment castings)

Properties

Quality

Tolerances

B.1.2.1 Composition or Material Paragraph:

B.1.2.1.1 An opening sentence is used in the "composition" paragraph to define the values as percentages by weight and to indicate methods of test; e.g.:

- B.1.2.1.1.1 For steels, heat and corrosion-resistant steels and alloys, magnesium, copper, and other alloys other than titanium and aluminum, use the following:
- "3.1 Composition:
- Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E YYY, by spectrochemical or other analytical methods acceptable to purchaser."
- B.1.2.1.1.1.1 For weld wire, use "Wire Composition" as the title of the paragraph.
- B.1.2.1.1.2 For titanium and titanium alloys, use the following:
- "3.1 Composition:
- Shall conform to the percentages by weight shown in Table 1; oxygen shall be determined in accordance with ASTM E 1409, hydrogen in accordance with ASTM E 1447, and other elements in accordance with ASTM E 120, by spectrochemical methods, or by other analytical methods acceptable to purchaser."
- B.1.2.1.1.3 For aluminum and aluminum alloys, use the following:
- "3.1 Composition:
- Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS 2355 or MAM 2355."
- B.1.2.1.1.4 ASTM E 34, ASTM E 35, ASTM E 36, ASTM E 38, ASTM E 39, ASTM E 54, ASTM E 75, ASTM E 76, ASTM E 350, ASTM E 351, ASTM E 352, ASTM E 353, and ASTM E 354 are some of the more frequently used test methods for chemical analysis.
- B.1.2.1.2 A special opening sentence in the "Composition" paragraph is used in special cases, such as for covered welding electrodes, where it is considered necessary to limit applicability of the listed composition to the end product only; e.g.:
- "Weld metal deposited from electrodes shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E YYY, or by spectrochemical or other analytical methods acceptable to purchaser."
- B.1.2.1.3 In specifications for steels of all types, for corrosion and heat-resistant alloys of iron, nickel, and cobalt, and for refractory metals (See B.1.2.1.3.1), those elements which are specified shall be listed by groups, but with no division between groups, with the elements in each group listed in the order shown in Table B1, except that the base element when specified as "remainder" shall be listed last. The first group shall be those of the first five elements listed in Table 1, which are specified; the second group shall be the intentionally added elements, usually specified by ranges; the final group shall be the impurities and residuals, specified as maximum values only.

TABLE B1 - Order of Composition Table Entries

Element	Symbol	Element	Symbol
1 Carbon	C	22 Zirconium	Zr
2 Manganese	Mn	23 Tin	Sn
3 Silicon	Si	24 Lanthanum	La
4 Phosphorus	P	25 Cerium	Ce
5 Sulfur	S	26 Hafnium	Hf
6 Chromium	Cr	27 Rhenium	Re
7 Nickel	Ni	28 Platinum	Pt
8 Cobalt	Co	29 Lead	Pb
9 Molybdenum	Mo	30 Bismuth	Bi
10 Tungsten	W	31 Silver	Ag
11 Columbium	Cb	32 Tellurium	Te
12 Titanium	Ti	33 Thallium	Tl
13 Tantalum	Ta	34 Gold	Au
14 Aluminum	Al	35 Palladium	Pd
15 Boron	B	36 Cadmium	Cd
16 Selenium (See B.2.1.3.2)	Se	37 Zinc	Zn
17 Iron (See B.2.1.3.3)	Fe	38 Thorium	Th
18 Copper	Cu	39 Lithium	Li
19 Vanadium	V	40 Oxygen	O
20 Beryllium	Be	41 Nitrogen	N
21 Yttrium	Y	42 Hydrogen	H

- B.1.2.1.3.1 Refractory metals shall be columbium, titanium, molybdenum, tungsten, tantalum, beryllium, and their alloys.
- B.1.2.1.3.2 When selenium appears as a trace element (e.g., as in AMS 2280) rather than as an intentional addition, it shall be listed after bismuth in the sequence of B.1.2.1.3.
- B.1.2.1.3.3 When the material is a steel as defined in 1.1 of the specification and by inclusion of the word "Steel" in the title, it is customary to not show "Iron" (Fe) as an element of the composition, either as a range, a minimum, or "remainder".
- B.1.2.1.4 In specifications for magnesium, titanium, precious metals, and their alloys and for nickel-copper alloys, the first elements to be listed shall be the intentionally added alloying elements, listed in decreasing order of the medians of the ranges or the minimum limits when no maximum limits are specified; these shall be followed by a listing of the named impurities in decreasing order of maximum permissible amounts; and then a listing of limits for individual (where necessary) unnamed impurities, total unnamed impurities, and the base metal if expressed as "remainder". If the base metal is specified to a definite range or minimum, it shall be listed first.

B.1.2.1.4.1 In specifications for aluminum, the listing of elements is unique. To be consistent with the convention established by ANSI H35.1-1997, elements (when specified) shall be listed in the following order:

- Iron
- Copper
- Manganese
- Magnesium
- Chromium
- Nickel
- Zinc
- Titanium

Other specified elements with compositional limits will be added alphabetically

- Other elements, each
- Other elements, total

Aluminum remainder

B.1.2.1.5 Individual elements in the "Composition" paragraph shall be presented to the same number of decimal places as the check analysis for individual elements when included or referenced.

B.1.2.1.5.1 As a general rule, limiting values for composition in specifications to which check analysis tolerances do not apply shall be presented to only one decimal place when the particular limiting value is over 0.50%; value shall be presented to two decimal places when the limiting value is 0.50% or less.

B.1.2.1.5.2 When oxygen, nitrogen, or hydrogen is controlled to an amount of 0.05% (500 ppm) or less, the permitted amount(s) in percentage shall be followed by the equivalent amount(s) in parts per million enclosed in parentheses; e.g.:

Oxygen 0.0125 (125 ppm)

B.1.2.1.5.2.1 When any of the elements of B.1.2.1.5.2 are controlled to a range and the maximum is not higher than 0.05%, the range shall be shown by proper percentages, followed by the equivalent range in parts per million enclosed in parentheses; e.g.,

	min	max	
Oxygen	0.003	0.020	(30 to 200 ppm)

B.1.2.1.6 To indicate that determination of the amount(s) of one or more elements is not normally required, place "(3.1.1)" after the name of each such element in the composition table and use the following subparagraph under the "Composition" paragraph.

"3.1.1 Determination not required for routine acceptance."

(NOTE: Each commodity committee will address this issue on an individual specification basis. For example, is it now easy/inexpensive to analyze for the element in question ---- in which instance the 3.1.1 would not be used. However, if 3.1.1 is used it may be helpful to have the Quality Assurance section identify analysis for such an element as a periodic test.)

- B.1.2.1.7 In steel, iron alloy, nickel alloy, and cobalt alloy weld wire specifications, include the following paragraph:
- "3.1.X Chemical analysis of initial ingot, bar, or rod stock before drawing is acceptable, provided the processes used for drawing or rolling, annealing, and cleaning are controlled to ensure continued conformance to composition requirements."
- B.1.2.1.8 Check analysis limits shall be specified in a subparagraph under the "Composition" paragraph by reference to the applicable check analysis specification, using the wording:
- "3.1.X Check Analysis: Composition variations shall meet the applicable requirements of AMS 22XX."
- B.1.2.1.8.1 The above wording shall be modified as necessary if closer than standard control is required or if reference to a particular part of the check analysis specification is necessary to ensure application of the proper limits, and shall be expanded as necessary when the check analysis specification does not specify all applicable limits.
- B.1.2.2 Melting Practice: Applicable only when the product requires specialized melting practice.
- B.1.2.3 Condition Paragraphs:
- B.1.2.3.1 These paragraphs shall define those processing parameters, such as method of finishing and state of heat treatment, necessary to establish the desired product characteristics.
- B.1.2.3.2 States of heat treatment shall be defined in the most precise terms practicable, generally following definitions given in the SAE and ASM Handbooks; e.g., a treatment intended to produce a single phase microstructure shall be termed "solution heat treatment" rather than "annealing" even though the material may be softened by the treatment. The following terminology, as applicable, is recommended for describing various states of heat treatment:
- Annealed
 Hardened and tempered
 Solution heat treated
 Solution and precipitation heat treated
 Solution heat treated and overaged
- B.1.2.3.2.1 The term "aged" or "overaged", with or without modifying prefixes, shall not be followed by the term "heat treated".
- B.1.2.3.3 When various product forms covered by a single specification are supplied in different conditions, subordinate paragraphs and subparagraphs shall be used as necessary to define adequately the condition of each product.
- B.1.2.4 Properties Paragraphs: These paragraphs shall include numerical or verbal limits for characteristics required of the product. Within a group of specifications for a similar type and form of commodity, properties shall be shown in a standard sequence established by the cognizant commodity committee. In general, properties of the product, as received, shall precede properties after heat treatment or exposure to deteriorating media. When thickness ranges or maximum dimensional limitations have been established and this limitation applies to all listed properties, the dimensional limitation shall be included in the text of "Properties" as shown in B.1.2.4.1.4.

- B.1.2.4.1 An introductory statement shall normally be included in the "Properties" paragraph. Representative standard wordings are as follows:
- B.1.2.4.1.1 For Steels of All Types:
- "3.X Properties:
- The product shall conform to the following requirements; tensile and hardness testing shall be performed in accordance with ASTM A 370."
- B.1.2.4.1.2 For Wrought Aluminum and Magnesium Alloys:
- "3.X Properties:
- The product shall conform to the following requirements, determined in accordance with AMS 2355 or MAM 2355."
- B.1.2.4.1.3 For All Other Alloys:
- "3.X Properties:
- The product shall conform to the following requirements."
- B.1.2.4.1.4 Where thickness range has been established, use for example:
- "3.X Properties:
- Product, 0.010 to 1.0 inch (0.25 to 25 mm) in nominal thickness, shall conform to the following requirements."
- B.1.2.4.2 Hardness requirements shall show the type of hardness test following the expression of the numerical values(s) and shall be indicated by use of the following ISO conventions:
- Brinell: HB
Vickers: HV
Knoop: HK
Rockwell: HR (Examples: HRA, HRB, HRC)
Rockwell Superficial: HR (Example: HR30N)
- B.1.2.4.2.1 Brinell hardness numbers shall be specified from Table B2. Brinell hardness numbers included in this Table from the SAE Handbook represent increments of 0.05 mm of impression diameter, which is the acceptable limit of precision of impression diameter measurement under usual operating conditions.

TABLE B2 - Brinell Hardness Numbers (10-mm Ball Diameter)

Dia of Indentation, mm	500 kg Load	1000 kg Load	500 kg Load	2000 kg Load	2500 kg Load	3000 kg Load	Dia of indentation, mm	500 kg Load	1000 kg Load	1500 kg Load	2000 kg Load	2500 kg Load	3000 kg Load
2.00	158	316	473	632	788	945	4.25	33.6	67.2	101	134	167	201
2.05	150	300	450	600	750	899	4.30	32.8	65.6	98.5	131	164	197
2.10	143	286	428	572	714	856	4.35	32.0	64.0	96.0	128	160	192
2.15	136	272	409	544	681	817	4.40	31.2	62.4	93.5	125	156	187
2.20	130	260	390	520	650	780	4.45	30.5	61.0	91.5	122	153	183
2.25	124	248	373	496	621	745	4.50	29.8	59.6	89.5	119	149	179
2.30	119	238	356	476	593	712	4.55	29.1	58.2	87.0	116	145	174
2.35	114	228	341	456	568	682	4.60	28.4	56.8	85.0	114	142	170
2.40	109	218	327	436	545	653	4.65	27.8	55.6	83.5	111	139	167
2.45	104	208	314	416	522	627	4.70	27.1	54.2	81.5	108	136	163
2.50	100	200	301	400	500	601	4.75	26.5	53.0	79.5	106	133	159
2.55	96.3	193	289	385	482	578	4.80	25.9	51.8	78.0	104	130	156
2.60	92.6	185	278	370	462	555	4.85	25.4	50.8	76.0	102	127	152
2.65	89.0	178	267	356	445	534	4.90	24.8	49.6	74.5	99.2	124	149
2.70	85.7	171	257	343	429	514	4.95	24.3	48.6	73.0	97.2	122	146
2.75	82.6	165	248	330	413	495	5.00	23.8	47.6	71.5	95.2	119	143
2.80	79.6	159	239	318	398	477	5.05	23.3	46.6	70.0	93.2	117	140
2.85	76.8	154	231	307	384	461	5.10	22.8	45.6	68.5	91.2	114	137
2.90	74.1	148	222	296	371	444	5.15	22.3	44.6	67.0	89.2	112	134
2.95	71.5	143	215	286	358	429	5.20	21.8	43.6	65.5	87.2	109	131
3.00	69.1	138	208	276	346	415	5.25	21.4	42.8	64.0	85.6	107	128
3.05	66.8	134	201	267	334	401	5.30	20.9	41.8	63.0	83.6	105	126
3.10	64.6	129	194	258	324	388	5.35	20.5	41.0	61.5	82.0	103	123
3.15	62.5	125	188	250	313	375	5.40	20.1	40.2	60.5	80.4	101	121
3.20	60.5	121	182	242	303	363	5.45	19.7	39.4	59.0	78.8	98.5	118
3.25	58.6	117	176	234	293	352	5.50	19.3	38.6	58.0	77.2	96.5	116
3.30	56.8	114	171	227	284	341	5.55	18.9	37.8	57.0	75.6	95.0	114
3.35	55.1	110	166	220	276	331	5.60	18.6	37.2	55.5	74.4	92.5	111
3.40	53.4	107	161	214	267	321	5.65	18.2	36.4	54.5	72.8	90.8	109
3.45	51.8	104	156	207	259	311	5.70	17.8	35.6	53.5	71.2	89.2	107
3.50	50.3	101	151	201	252	302	5.75	17.5	35.0	52.5	70.0	87.5	105
3.55	48.9	97.8	147	196	244	293	5.80	17.2	34.4	51.5	68.8	85.8	103
3.60	47.5	95.0	143	190	238	285	5.85	16.8	33.6	50.5	67.2	84.2	101
3.65	46.1	92.2	139	184	231	277	5.90	16.5	33.0	49.6	66.0	82.5	99.2
3.70	44.9	89.8	135	180	225	269	5.95	16.2	32.4	48.7	64.8	81.2	97.3
3.75	43.6	87.2	131	174	218	262	6.00	15.9	31.8	47.8	63.6	79.5	95.5
3.80	42.4	84.8	128	170	212	255	6.05	15.6	31.2	46.9	62.4	78.0	93.7
3.85	41.3	82.6	124	165	207	248	6.10	15.3	30.6	46.0	61.2	76.7	92.0
3.90	40.2	80.4	121	161	201	241	6.15	15.1	30.2	45.2	60.4	75.3	90.3
3.95	39.1	78.2	118	156	196	235	6.20	14.8	29.6	44.4	59.2	73.8	88.7
4.00	38.1	76.2	115	152	191	229	6.25	14.5	29.0	43.6	58.0	72.6	87.1
4.05	37.1	74.2	112	148	186	223	6.30	14.2	28.4	42.8	56.8	71.3	85.5
4.10	36.2	72.4	109	145	181	217	6.35	14.0	28.0	42.0	56.0	70.0	84.0
4.15	35.3	70.6	106	141	177	212	6.40	13.7	27.4	41.3	54.8	68.8	82.5
4.20	34.4	68.8	104	138	172	207	6.45	13.5	27.0	40.5	54.0	67.5	81.0

B.1.2.5 Quality Paragraphs: These paragraphs shall describe the cleanliness, workmanship, and freedom from imperfections, generally in qualitative terms, required in the product. The most widely used standard wording in specifications for wrought metals and metal parts is as follows:

“---, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the ---.”

B.1.2.5.1 In the paragraph quoted in B.1.2.5, use the term “The product” as the first words and “product” as the last word except when the specification covers a single form; in such cases, use the name of the product as the first and last words (e.g., Wire, Tubing, Forgings, Castings, Parts, etc).

B.1.2.5.2 Use “imperfections” when some degree of the defined conditions may be acceptable; use “defects” when no degree of the defined conditions is acceptable.

B.1.2.6 Tolerances Paragraphs:

B.1.2.6.1 Dimensional tolerances shall be specified by reference to the applicable tolerance specification insofar as possible. Specific tables of the tolerance specification(s) shall be referenced only if the “Condition” paragraphs do not define the finish parameters of all forms and sizes covered by the product specification or if characteristics of the product are such that normally expected tolerances do not apply.

B.1.2.6.2 Specifications shall not include tolerances for products such as forgings and castings because tolerances for such products are influenced by the size and shape of the piece and, hence, would be specified on the part drawing.

B.2 QUALITY ASSURANCE PROVISIONS SECTION:

B.2.1 This section shall describe the type and extent of sampling and testing and the sampling procedures for ensuring the production capability and reliability of the product. Test procedures shall not be included in this section (See B.1.1.3). Subjects in this section shall be shown in the following sequence; only those subjects applicable shall appear and shall be numbered consecutively:

- Responsibility for Inspection
- Classification of Tests
- Sampling and Testing
- Approval
- Reports
- Resampling and Retesting

B.2.2 Responsibility for Inspection Paragraph:

This paragraph shall read as follows:

"4.1 Responsibility for Inspection:

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements."

B.2.2.1 If a specification covers a single form of material (e.g., tubing, castings, etc) change "the product" to the name of the form in both sentences (B.1.2.5.1).

B.2.3 Classification of Tests Paragraphs:

These paragraphs shall define, in the following sequence, those requirements from the "TECHNICAL REQUIREMENTS" section for which the vendor is required to conduct tests:

Acceptance Tests - Tests for requirements for which testing of each heat, lot, or shipment is considered necessary to give reasonable assurance of acceptability of the product shall be classified as acceptance tests unless time or intricacy of testing makes testing of each lot impractical.

Periodic Tests - Tests for requirements for which there is reasonable assurance of acceptability of the product based on acceptance test requirements and those requirements for which time or intricacy of testing makes testing of each lot impractical shall be classified as periodic tests.

Preproduction Tests - For first article approval and after significant changes in processing.

Use this paragraph only when an approval paragraph (See B.2.5) is included.

B.2.4 Sampling and Testing Paragraphs:

These paragraphs shall show the required number and location of samples and definitions of the quantity (heat, lot, etc) from which the samples shall be taken and may include the frequency of sampling: definitions included elsewhere in the specification (e.g., castings specifications) need not be repeated in these paragraphs.

B.2.5 Approval Paragraphs:

These paragraphs shall be used only in specifications for products whose performance cannot be controlled completely by other requirements of the specification and which may be affected by changes in ingredients or methods of manufacture. They shall make provision for purchaser to evaluate the effects of changes in materials and/or processing.

B.2.6 Reports Paragraph: This paragraph shall identify information to be provided by the vendor with each shipment of product. As applicable, it will state the involvement of : (1) results of tests for each heat, (2) results of tests for each lot, (3) conformance to the other technical requirements, (4) identity of purchase order number, heat and lot numbers, AMS XXXXY, size and quantity, and (5) if forgings are supplied, the size and melt source of stock used to make the forgings. For aluminum alloy specifications, the following sentence shall be added: The report shall also identify the producer, the product form and size of the mill product.

B.2.6.1 It can be noted this paragraph can be complex and lengthy, thus difficult to read. A tabular format can be considered. Committees "E" and "F" will be using such.

B.2.6.2 In all revisions of published specifications include the applicable revision letter after "AMS XXXX" in all "Reports" paragraphs.

B.2.7 Resampling and Retesting Paragraph:

All specifications, except those for tolerances, shall include a "Resampling and Retesting" paragraph.

B.2.7.1 When resampling and retesting requirements are completely covered by the specifications referenced for sampling and testing (See B.2.4), use the paragraph title "Resampling and Retesting" and show the same applicable specification or specifications as shown for "Sampling and Testing" and in the same manner.

B.3 PREPARATION FOR DELIVERY SECTION:

B.3.1 This section shall describe requirements to ensure that the product will not be damaged mechanically or environmentally in shipment or during foreseeable storage and can be identified at destination as being the product required. Subjects in this section shall appear in logical sequence, which will vary with the product. Subjects in this section shall have the following titles; only those subjects applicable shall appear and shall be numbered consecutively:

Sizes
Identification
Protective Treatment (if applicable)
Packaging

B.3.2 Sizes Paragraphs:

These paragraphs shall be used to specify standard sizes in which a product is produced or to control one or more nominal dimensions of the product supplied.

B.3.3 Identification Paragraphs: Covers required identification of product.

B.3.4 Protective Treatment: If applicable, the appropriate coverage is included. (Example for low alloy steels: "The product shall be protected from corrosion prior to shipment")

B.3.5 Packaging:

Covers packaging of product to ensure compliance with applicable rules and regulations and to ensure carrier acceptance and safe delivery.

PART C

PROCESSES

TECHNICAL REQUIREMENTS SECTION

Standard paragraphs to be used in preparation of new or revisions of specifications are not included in this manual. For guidance, use applicable paragraphs from the recommended model AMS or latest published specification for the same or similar SAE process or procedure. Recommended model AMS are found in the last minutes of each commodity committee meeting.

C.1 TECHNICAL REQUIREMENTS SECTION:

C.1.1 The intent of this section is to identify and define the characteristics required of the processed material or product, the required materials and equipment, and any processing details, such as precautions or limitations, that are necessary to ensure a consistently high quality product that is suitable for the intended application.

C.1.1.1 This section shall include identification of the key requirements, which, if met, and if adequate process controls are followed, will adequately define the product, and ensure consistency. When those requirements are met, the product, by definition, is controlled and can be relied upon to have the other important properties and characteristics inherent in the product. Inclusion of collateral properties, such as those of interest to designers, is discouraged.

C.1.1.1.1 The specification should not include "how to" processing requirements except when an alternative is unlikely to produce compliant product. These details are best left to the supplier, who can elect to use the most cost-effective techniques or take advantage of recent advances in processing and materials technology. (See C.4)

C.1.1.2 Express all requirements as "mandatory" in the usual manner (i.e., "-----shall be -----", "----- shall have ----", or "----- shall conform to ----"). The "Classification of Tests" paragraphs in Section 4 of specifications shall define the required frequency of testing. Use of "should" and "may" connote nonmandatory information (See C.4)

C.1.1.3 Reference to test methods for determining conformance to requirements shall be stated in this section.

C.1.2 Subjects in this section shall be shown in the following sequence; only those subjects applicable shall be included and shall be numbered consecutively:

- Materials or Solutions
- Equipment
- Preparation
- Procedure
- Post Treatment
- Properties and Testing
- Quality
- Tolerances

C.1.2.1 Materials or Solutions: These paragraphs shall be used to describe qualitatively and/or quantitatively the characteristics of materials or solutions used in the process.

C.1.2.1.1 In specifications for coating processes (paints, solid film lubricants and related materials, thermal spray coatings, etc), the material shall, when possible, be specified by reference to the specification for the coating material.

- C.1.2.1.2 If necessary to control the concentration limits of solutions, the operating limits for solution composition (rather than the nominal solution composition) shall be specified. Priority shall be given to the use of manufacturer's recommended limits, where available, unless there is evidence to show that other limits are necessary.
- C.1.2.2 Equipment: These paragraphs shall be used to describe equipment used in processing, such as the types of furnaces required, tank materials, fixture materials, etc; equipment should be specified in general terms, not by manufacturer's name or model number. If necessary to call out specific equipment by name or model, follow it with "or equivalent".
- C.1.2.3 Preparation: These paragraphs shall be used to describe the steps required for preparation of parts prior to the treatment covered by the specification. These shall include such subjects as operations, which must be completed prior to processing, stress-relief before processing, cleaning prior to processing, and fixturing or racking.
- C.1.2.4 Procedure: These paragraphs are generally used to describe the steps in the actual processing.
- C.1.2.5 Post-Treatment: These paragraphs shall be used to describe operations required following the actual processing steps, such as plating, brazing and coating. These steps are not part of the coating or plating procedure stated in the title but improve the quality of the parts. These paragraphs are most commonly used in specifications for plated metals and include processing to prevent hydrogen embrittlement, enhance corrosion resistance, and develop hardness in plated metals.
- C.1.2.6 Properties and Testing: These paragraphs shall be used to describe the properties of the parts, finish, coating, etc and the testing methods for evaluating the properties. Properties usually included in these paragraphs are: (1) for plating: thickness, adhesion, and, where applicable, corrosion resistance, wear resistance, composition if deposit is an alloy, solderability, absence of hydrogen embrittlement, and hardness, (2) for anodizing: color, coating weight or thickness, corrosion resistance, and wear resistance (for hard anodize), (3) for brazing: coverage, proof load, and adequate removal of halide flux.
- C.1.2.7 Quality: These paragraphs shall describe, generally in qualitative terms, the cleanliness, workmanship, and freedom from imperfections required in the coating or part surface as a result of the processing.
- C.1.2.8 Tolerances: These paragraphs, while not commonly used in specifications for processes, shall, when used, describe the variations permitted in extent of areas to be coated or plated when selective coverage is used and may describe permissible variations of processing such as intensity of shot peening over the minimum specified requirement.

C.2 QUALITY ASSURANCE PROVISIONS SECTION:

- C.2.1 This section shall describe the responsibility for testing and providing of samples, type of tests, specimen configuration, and number of samples for each tested property and each process control test, the manner in which the processor reports/certifies information to purchaser, and the steps required when test results are not in compliance with specified requirements. Subjects in this section shall be shown in the following sequence; only those subjects applicable shall appear and shall be numbered consecutively:

Responsibility for Inspection
Classification of Tests
Sampling for Tests
Approval
Reports
Resampling and Retesting

C.2.2 Responsibility for Inspection:

This paragraph shall read as follows:

"The processor shall supply all test specimens (separate specimens representing parts) when required for processor's tests and shall be responsible for the performance of all required tests. Parts, if required for tests, shall be supplied by purchaser. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that processing conforms to specified requirements."

C.2.3 Classification of Tests: These paragraphs shall define, in the following sequence, those requirements from the "TECHNICAL REQUIREMENTS" section for which the vendor (processor) is required to conduct tests:

Acceptance Tests - Tests performed on parts or, when permitted, on representative test specimens, in order to determine the disposition of a lot, shipment, heat, or batch. Failure of an acceptance test shall be cause for rejection of the lot, shipment, heat, or batch unless individual parts can be tested to separate acceptable from unacceptable parts. Alternatively, parts may be reprocessed if reprocessing is acceptable to the purchaser.

Periodic Tests - Tests performed to determine if the process is under control. When a periodic test result is unsatisfactory, processing of parts shall cease until corrective action is taken and new specimens have been processed and tested. All purchasers, since the last successful periodic test, shall be notified of the failure.

Preproduction Tests – Tests for first article approval and after significant changes in processing. Such tests are necessary to demonstrate processor's capability of meeting specified requirements. Use this paragraph only when Approval paragraph is included.

C.2.3.1 Test classifications shall be selected as appropriate for each specification. Typically, tests are classified as shown in Table C1.

TABLE C1

Process	Acceptance Tests	Periodic Tests	Preproduction Tests
Plating	<ul style="list-style-type: none"> • Thickness • Adhesion • Quality 	<ul style="list-style-type: none"> • Corrosion Resistance • Wear Resistance • Hardness • Embrittlement Relief • Composition for Alloy Plating • Control of Solution Composition Limits • Solderability, when required 	<ul style="list-style-type: none"> • All Technical Requirements
Anodizing	<ul style="list-style-type: none"> • Color, if dyed • Coating Weight or thickness • Quality 	<ul style="list-style-type: none"> • Corrosion Resistance • Wear Resistance, for (hard) anodizing • Control of Solution Composition Limits 	<ul style="list-style-type: none"> • All Technical Requirements
Brazing	<ul style="list-style-type: none"> • Proof • Coverage (Non- destructive) • Quality 	<ul style="list-style-type: none"> • Coverage (Destructive) • Halide Flux Removal 	<ul style="list-style-type: none"> • All Technical Requirements
Applied Coatings	<ul style="list-style-type: none"> • Thickness • Adhesion • Quality 	<ul style="list-style-type: none"> • Color • Wear Resistance • Coefficient of Friction • Corrosion Resistance • Hardness 	<ul style="list-style-type: none"> • All Technical Requirements
Conversion Coatings	<ul style="list-style-type: none"> • Color(if required) • Quality 	<ul style="list-style-type: none"> • Corrosion Resistance • Control of Solution Composition Limits • Conductivity or resistance, if for electrical bonding 	<ul style="list-style-type: none"> • All Technical Requirements

C.2.4 Sampling and Testing:

This section summarizes, in tabular form where practical, the required number of samples, either actual parts or separate specimens, for each tested property or process control test. A description of the test sample configuration, whether actual part or separate panel, shall also be included.

C.2.5 Approval:

These paragraphs shall be used in specifications for processes whose characteristics cannot be controlled completely by the technical requirements of the specification and which may be affected by changes in ingredients or methods of processing. They shall make provision for purchaser to evaluate the effects or changes in materials or processing prior to their being incorporated in production processing. Control factors are an important part of the approval paragraphs and are added as a paragraph under the Approval subsection. Control factors are process functions, and process limits, material and solution selections, and in special cases, test methods, which are significant to the generation and confirmation of product which conforms to specification acceptance requirements. Once established and approved, changes to control factors require the approval of the cognizant engineering organization.

C.2.6 Reports:

This paragraph may be only a statement of conformance or may be more detailed as deemed appropriate for the process covered.

C.2.7 Resampling and Retesting:

Specifications shall include a "Resampling and Retesting" paragraph.

C.3 PREPARATION FOR DELIVERY SECTION:

C.3.1 This section shall describe requirements to ensure that processed parts will not be damaged in shipment and can be identified at destination as being what is required. Subjects in this section shall have the following titles; only those subjects applicable shall appear and shall be numbered consecutively:

Identification
Packaging, including Protective Treatment

C.3.2 Identification:

These paragraphs are normally used only in specifications for nondestructive inspection processes to show that parts have been tested and accepted.

C.3.3 Packaging:

This paragraph shall describe the handling and packaging of parts to prevent damage during shipment and may read as follows:

5.X Packaging:

Plated (coated) parts shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the plated parts to ensure carrier acceptance and safe delivery."

C.3.3.1 Protective Treatment:

These paragraphs shall be used if the parts, after being processed, require special protection during shipment and/or storage. If the specification requires, as part of the processing, a treatment such as oiling, these paragraphs need not be included. These paragraphs will normally be included in specifications for processing of non-corrosion-resistant materials where the processing is not applied to prevent corrosion.

C.4 NOTES SECTION:

Text that may be included in the NOTES section for information includes: (1) considerations not generally the responsibility of the processor, but which, if employed, may improve the final product, and (2) pertinent "how to" information, which is not mandatory, but considered good practice or significant.

PART D

ACKNOWLEDGEMENT, REJECTIONS, AND NOTES

D.1 ACKNOWLEDGMENT, REJECTIONS, AND NOTES:

D.1.1 ACKNOWLEDGMENT SECTION:

This section shall read as follows:

"6. ACKNOWLEDGMENT:

A vendor (processor) shall mention this specification number in all quotations and when acknowledging purchase orders."

D.1.1.1 The words "and its revision letter" shall be included after "specification number" at the first and each subsequent revision of a previously published AMS.

D.1.1.2 When a specification includes "slash number" detail specifications, change ACKNOWLEDGMENT to read as follows:

"6. ACKNOWLEDGMENT:

A vendor (processor) shall mention this specification number and the applicable detail specification number in all quotations and when acknowledging purchase orders."

or,

"6. ACKNOWLEDGMENT:

A vendor (processor) shall mention this specification number and the applicable detail specification number and their revision letters, if any, in all quotations and when acknowledging purchase orders."

D.1.2 REJECTIONS SECTION:

This section shall read:

"7. REJECTIONS:

Product not conforming to this specification, or to modifications authorized by purchaser, will be subject to rejection."

D.1.2.1 When a specification includes "slash number" detail specifications, change "Rejections" paragraph as follows:

"7. REJECTIONS:

Product not conforming to this specification and the applicable detail specification, or to modifications authorized by purchaser, will be subject to rejection."

D.1.2.2 In specifications covering a single form of product (e.g., castings, bars, extrusions, adhesive, enamel, etc), use the name of the form of product in place of "Product".

D.1.2.3 In process specifications, use "Parts on which the (process) does not conform" in place of "Product not conforming".

D.1.3 NOTES SECTION:

This section shall include information and data of a nonmandatory or descriptive nature. Such information should include precautions to be observed in processing, data to be shown in purchase orders, the meaning of the revision indicator (See D.1.3.1), and the listing of similar specifications, if any.

D.1.3.1 The "change bar" paragraph shall be used in all specifications and shall be the first paragraph in the "Notes" section. Refer to A.3.1 for the wording.

D.1.3.2 Copper alloy products which include a temper designation in the Condition paragraph should include the following note:

"8.X Copper temper designations are defined in ASTM B 601."

D.1.3.3 In metal specifications where hardness is indicated as a value plus "or equivalent", add the following note:

"Hardness conversion tables for metals are presented in ASTM E 140."

D.1.3.4 In steel specifications where tensile strength is specified plus the phrase "or equivalent hardness" add the following note:

"Tensile strength to hardness conversions are presented in ASTM A 370."

D.1.3.5 In metal specifications including grain size requirements, when revised to delete "with occasional grains as large as Y", add the following note:

"The phrase "occasional grains as large as Y" has been deleted to clarify the intended use of ASTM E 112".

D.1.3.6 In aluminum alloy specifications including a hardness requirement for the as-received condition from producer, add the following note:

"Hardness should be XX to YY, determined in accordance with ASTM E ZZZ. Hardness has been used to verify that the product has been properly processed but an out-of-range hardness number is not always indicative of product with out-of-specification tensile properties. Further analysis including material composition verification, heat treat process parameter review and/or tensile property evaluation of product with out-of-range hardness may be necessary."

D.1.3.7 When properties are based on values published in another document and not based on data substantiated by AMS statistical procedures, the following note shall be referenced from the requirements section:

"8.X The values shown in Table X were taken from MIL-X-YYYY, Revision Z, and have not been substantiated by the AMS statistical procedure."

D.1.3.8 When properties are at variance with those for the same product condition published in MIL-HDBK-5, the following note shall be referenced from the requirements section:

"8.X The values in Table X are lower (higher) than those shown in MIL-HDBK-5."

- D.1.3.9 For aluminum alloys showing a "P" in the temper designation, e.g. A356.0-T6P, add the following note:
- "The "P" in the temper designation "A356.0-T6P" denotes a temper variation that requires negotiation between purchaser and vendor and is different from the temper registered with the Aluminum Association."
- D.1.3.10 For aluminum alloy tubing requiring a double or single flare in flarability requirements, add the following note:
- "A double flare is similar to a standard single flare except the flare is folded back on itself such that the cut edge is inside the flare near the ID of the tube. Definitions and illustration of single flaring is shown in MS 33584; double flaring is defined and illustrated in MS 33883."
- D.1.3.11 In all metal specifications, include the following note:
- "Terms used in AMS are clarified in ARP1917."
- D.1.3.11.1 If other clarifications are to be included in the Notes section, use the sentence of D.1.3.11, adding "and as follows:". Then include such definitions as sub-paragraphs.
- D.1.3.11.2 In casting specifications it usually is desirable to include true definitions to supplement the clarifications provided in ARP1917. Use the following, followed by sub paragraphs with the definitions: "Terms used in this AMS are defined as follows. Other terms not specifically defined here are clarified in ARP1917."
- D.1.3.12 In specifications which include dimensions, properties, or both in both inch/pound and SI (metric) units, the following paragraph shall be included; this paragraph shall follow all other notes except those covering ordering data and similar specifications:
- "Dimensions and properties in inch/pound units are primary; dimensions and properties in SI units are shown as the approximate equivalents of the primary units and are presented only for information."
- D.1.3.12.1 If temperatures appear in the specification, insert "and the Fahrenheit temperatures" after "inch/pound units" and insert "and the Celsius temperatures" after "SI units" in the above paragraph when Fahrenheit temperatures are primary, as in specifications for metals and most processes; if Celsius temperatures are primary, as in most specifications for nonmetallic materials, reverse the order of these insertions.
- D.1.3.13 In all specifications except those for tolerances, quality assurance sampling, and nondestructive inspection, include a note describing the ordering data required.
- D.1.3.13.1 An example for a material specification is as follows:
- "8.X Purchase documents should specify not less than the following:
- AMS XXXX Y
Form and size of product desired
Quantity of product desired."
- An example for a process specification is as follows:
- "8.X Purchase documents should specify not less than the following:
- AMS XXXX Y
Material and tensile strength of parts
Quantity of parts to be plated (coated)
Plate (coating) thickness required".

D.1.3.14 The "Similar Specifications" paragraph, when used, shall be numbered and shall be as follows:

"8.X Similar Specifications:

MIL-X-XXXX is listed for information only and shall not be construed as an acceptable alternate unless all requirements of this AMS are met." (NOTE: If the military specification has been converted to a word-for-word AMS, include that designation as: MIL-X-XXXX/ AMS-X-XXXX.)

D.1.3.14.1 REFERENCE SHALL NOT BE MADE TO COMPANY ALLOY DESIGNATIONS AND TRADE NAMES OR OTHER PROPRIETARY DESIGNATIONS, SUCH AS INCONEL X-750 AND HASTELLOY C, ETC. AS THESE ARE NOT ACTUALLY SPECIFICATIONS AND MAY BE REGISTERED TRADE NAMES.

D.1.3.14.2 When there are no similar specifications known, the "Similar Specifications" paragraph shall be omitted.

D.1.3.15 Jurisdiction:

Shall be centered at the bottom of the last page of the text.

On all AMS specifications (as well as ARP, AS and AIR documents) use the following words:

"PREPARED UNDER THE JURISDICTION OF AMS COMMITTEE "X""

On documents sponsored by the Aerospace Metals Engineering Committee, use the following words:

"PREPARED UNDER THE JURISDICTION OF AMEC and AMS COMMITTEE "X"

D.2 MISCELLANEOUS PHRASES, WORDINGS, and PROCEDURES:

D.2.1 When the need for negotiation between purchaser and vendor is indicated, the phrase "as agreed upon by purchaser and vendor" shall be used.

D.2.2 When referring to those major portions of the specification designated by the first series of digits, they shall be referred to as "Section 5", etc. When referring to any of the subordinate portions of the various sections, they shall be referred to by number only; e.g., "5.1" or "5.1.1", etc.

D.2.3 Abbreviations shall be in accordance with the latest issue of ANSI Z10.1, "Abbreviations for Scientific and Engineering Terms" except in the following cases:

- a. In column headings of tolerance specifications.
- b. In size column headings of tables in specifications.
- c. When the word which would be abbreviated is the last word of a sentence except when this word is enclosed in parentheses; e.g., "----0.50 inch (12.7 mm)".

D.2.4 In expressing tolerances in general, the unit of measurement shall precede the specified tolerance value; e.g., 6.00 inches \pm 0.05, 6.0% + 0.5, 20 to 30 °C (68 to 86 °F), 315 °C \pm 5 (600 °F \pm 9).

D.2.5 In accordance with rules of the SAE Technical Board, all units of measure shall be given in both inch/pound and SI (metric) units except where separate specifications in inch/pound and SI (metric) units are prepared.

D.2.6 Revision letters shall be used in alphabetical sequence omitting letters "I" "O", and "Q". When the full alphabet is used up, "AA", "AB", "AC", etc shall be used.

D.2.7 In size column headings, the following example shall be used as a guide:

"Nominal Diameter or Least Distance
Between Parallel Sides
Inches"

D.2.8 When ASTM test methods are referenced in specifications, only the basic designation, without issue year and status letter, shall be shown.

D.2.9 In specifications for brazing and brazing materials, use the term "filler metal" in preference to the term "brazing alloy".

D.2.10 The forms and sizes of product covered by a specification shall be named in terms as defined by the respective producing industries.

D.2.11 When preparing a noncurrency or cancellation notice:

Regarding the NOTICE sheet, this becomes page 1. The revision letter is advanced, a proper identification box is authored, and an appropriate text for the notice is presented.

Regarding the text of the AMS/MAM, the revision letter on all pages is advanced, and page 2 starts with SCOPE. The format is to be that of TIMS, and all phi symbols or change bars are deleted. No editorial updating is done except: 1) If the revision letter appears in text, advance it. 2) The 8.1 is to be current wording.

D.3 HYPHENATION:

Sound editorial judgment and readability shall be the guideposts in the use of hyphens. Webster's Dictionary and the U.S. Government Printing Office Style Manual (see Note following D.3.1) are useful references for the use of hyphens. Some specific rules of hyphenation are included here:

- a. Hyphens should be used only when absolutely necessary for clarity.
- b. Webster's Dictionary and the Government Printing Office Style Manual are our accepted authorities, and should be consulted if there is a question of usage
- c. Words preceded by pre, post, re, non, semi, anti, etc. are generally one word, with no hyphen between the prefix and the following word.
- d. Words preceded by self, cross, or well are generally hyphenated if they modify a noun. If they are not modifying a noun, they are generally presented as two words.
- e. Adverbs ending in "ly" are not hyphenated (i.e., naturally occurring).
- f. Compound numbers and fractions are hyphenated (i.e., twenty-three and one-fourth).

See D.3.1 for expanded pertinent rules on compound words in general and hyphenation in particular.

D.3.1 Compounding Rules: A compound word is a union of two or more words, either with or without a hyphen. It conveys a unit idea that is not as clearly or quickly conveyed by the component words in unconnected succession. The hyphen is a mark of punctuation that not only unites but separates the component words, and thus facilitates understanding, aids readability, and ensures correct pronunciation.

D.3.1.1 In general, do not use a hyphen when words appear in regular order and the omission causes no ambiguity in sense or sound. Examples:

Heat treat
Patent right.

D.3.1.2 A hyphen is used to avoid doubling a vowel or tripling a consonant, except after the short prefixes co, de, pre, pro, and re, which are generally printed solid. Examples:

Cooperation
Preexisting
Semi-independent
But: co-occupant
Cross-section

D.3.1.3 Print solid a noun consisting of a short verb and an adverb as its second element, except when the use of the solid form would interfere with comprehension. Examples:

Blowout
Breakdown
But: cut-in
Phase-in

D.3.1.4 Print a hyphen between words, or abbreviations and words, combined to form a unit modifier preceding the word modified, except as otherwise indicated. Examples:

Agreed-upon standards
Rust-resistant covering
State-of-the art technology
1-inch diameter; 2-inch-diameter tubing
a 4-percent increase.

D.3.1.5 Print a hyphen between the elements of compound numbers from twenty-one to ninety-nine and in adjective compounds with a numerical first element. Examples:

Twenty-one
Twenty-first
8-hour day
But: 8 hours, 2 inches, etc. if not further modifying a noun.

D.3.1.6 Print a hyphen between the elements of a fraction. Examples:

Two-thirds
Two one-thousandths
Three-fourths of an inch.

D.3.1.7 Use a hyphen to join a single capital letter to a noun or a participle. Examples:

I-beam
T-shaped
V-block

D.3.1.8 In a series of numbers modifying a subsequent noun, it is permissible to use a hyphen on only the last number. Example:

18, 27, or 36-inch (457, 666, or 914-mm) lengths

Note: Complete guidance on hyphenation may be found in the Government Printing Office Style Manual, Section 6, which can be accessed or downloaded free of charge at: http://www.access.gpo.gov/styleman/2000/chapter_txt-6.html

A comprehensive listing of specific compound words can be found in the Government Printing Office Style Manual, Section 7, "Compounding Examples". Also available free of charge, at: http://www.access.gpo.gov/styleman/2000/chapter_txt-7.html

D.3.2 For quick reference, the following list presents compound words commonly used in AMS documents that are to be hyphenated when modifying a noun:

1-inch (25.4-mm) thickness	hydraulic-pressure testing
1-1/4 inches	in-process
1-1/4-inch thickness	long-term
24-hour test	low-alloy steel
acetone-moistened pad	low-embrittling procedure
aircraft-quality	low-melting-temperature alloy
alkaline-cleaned	nitrogen-hydrogen blend
alpha-beta alloys	optical-quality
anti-galling	out-of-range hardness
anti-wear agent	point-counting grid
as-received	post-heated
as-supplied	post-treated
austenite-conditioning	post-treatment
black-dyed	precipitation-hardenable
bottom-poured ingot	precipitation-hardening alloy
chloride-free	pump-down cycle
circulating-air oven	ready-to-use
cold-rolled plate	reflection-microscope
corrosion-inhibiting	resin-impregnated fibers
corrosion-resistant steel	run-off tabs
cross-section	run-on tabs
dry-cleaning solvent	rust-inhibiting
emulsion-type	scale-free
end-product	sharp-cornered inclusions
fade-proof ink	short-term
finely-crystalline	soft-bristle brush
first-article inspection	solvent-dispersed
flash-line	stop-off
formed-in-place gasket	stress-corrosion
gas-pressure welding	stress-inducing
gas-tungsten-arc welding	sub-critical
goggle-type glasses	sub-zero
grayish-black color	top-poured ingot
ground-glass screen	touch-up
ground-glass-joint	use-dilution
heat-resistant steel	water-break-free
heat-treatable	water-displacing
high-pressure tubing	water-soluble
hot-rolled plate	

PART E

METRIC (SI) UNITS IN AMS

E.1 INTRODUCTION:

In keeping with the practice of converting industrial-scientific-engineering measurements from the system of inches, pounds, etc to the Metric (more properly, the International System of Units (hereinafter "SI")) system of meters, kilograms, etc and to conform to SAE Technical Board Rules and Regulations, the AMS Division established a program to include SI units and values in all AMS and related documents.

With the accelerating establishment of metric standards, particularly for dimensional tolerances and for fabricated parts, current policy is to determine the need for a parallel document using SI units. If the need for such a document is indicated, two specifications will be prepared, one (AMS) showing only inch/pound units and the other (MAM) showing only SI units.

E.2 APPLICATION:

All published AMS and related documents are to show inch/pound units followed by the equivalent SI values, unless the need for a separate SI (MAM) specification is established.

Specifications for new types of materials or processes, for which there is no strong precedent for the primary use of inch/pound units, and specifications for older types of materials and processes for which adequate data in SI units exist shall start as an "SI" specification either with or without a parallel specification in inch/pound units.

In certain instances, it is permissible to have some parts of a specification show inch/pound units as primary and other parts show SI units as primary.

Progression of specifications from inch/pound (SI) units to separate specifications is to be effected when production, testing, and use of a particular type of material or process is well established in SI units.

It is the intention to have primary SI values, wherever possible, expressed as whole (non-decimal) numbers, except when the value is less than one, or as close thereto as the desired precision will permit. This means that industry practice and usage is an important factor in the preparation of SI specifications.

E.3 APPROVED SI UNITS AND PREFIXES:

The following units and prefixes are approved for use in AMS and related documents:

TABLE E1 - Base Units of SI System

Measure	Unit
Length	meter (m)
Mass	kilogram (kg)
Time	second (s)
Electric current	ampere (A)
Thermodynamic temperature	kelvin (K)
Amount of substance	mole (mol)
Luminous intensity	candela (cd)

NOTE: Supplementary SI Units:

Plane Angle: radian (rad)

Spherical Angle: steradian (sr)

TABLE E2 - Recognized Derived SI Units:

Property	Unit and Symbol	Formula
Absorbed dose	gray (Gy)	J/kg
Activity Dof radionuclides	becquerel (Bq)	l/s
Energy	joule (J)	N·m
Electric capacitance	farad (F)	C/v
Electric conductance	siemens (S)	A/v
Electric inductance	henry (H)	Wb/A
Electric potential difference	volt (V)	W/A
Electric resistance	ohm (Ω)	V/A
Force	newton (N)	kg·m/s ²
Frequency	hertz (Hz)	l/s
Illuminance	lux (lx)	lm/m ²
Luminous flux	lumen (lm)	cd·sr
Magnetic flux	weber (Wb)	V·s
Magnetic flux density	tesla (T)	Wb/m ²
Power	watt (W)	J/s
Pressure or stress	pascal (Pa)	N/m ²
Quantity of electricity	coulomb (C)	A·s

E.3.1 The liter is established as a special name for the cubic decimeter (one-thousandth of a cubic meter) and is approved for use in AMS for the volume measurement of liquids and gases and of volumetric capacity only; the only prefix allowed is "m" (milli). Thus 0.001 liter shall be expressed as either 1 mL or 1 cm³.

E.3.2 Prefixes for SI Units:

In expressing fractions or multiples of SI units, the following prefixes shall be used; use of prefixes representing 10 raised to a power which is a multiple of 3 is recommended:

TABLE E3 - Prefixes for SI Units

Multiple and Submultiple	Prefix	Symbol
10 ¹⁸	exa	E ^a
10 ¹⁵	peta	P ^a
10 ¹²	tera	T ^a
10 ⁹	giga	G
10 ⁶	mega	M
10 ³	kilo	K
10 ²	hecto	h ^a
10 ¹	deka	da ^a
10 ⁻¹	deci	d ^a
10 ⁻²	centi	c ^a
10 ⁻³	milli	m
10 ⁻⁶	micro	μ
10 ⁻⁹	nano	n
10 ⁻¹²	pico	p ^a
10 ⁻¹⁵	femto	f ^a
10 ⁻¹⁸	atto	a ^a

^aUsage of these multiples is to be avoided.

E.4 HOW TO PORTRAY EQUIVALENTS:

- E.4.1 When the primary value(s) and unit appear singly (or as a range) in the text, the secondary value(s) and unit shall appear in parentheses immediately following.

Examples: 1500 °F (816 °C)

1500 °F ± 15 (816 °C ± 8)

---panels 1 x 4 inches (25 x 102 mm)

- E.4.2 When the primary value and unit appear in a simple tabulation, as for tensile properties, the secondary value and unit shall appear in parentheses immediately following or directly below the primary value and unit, depending on layout and available space.

Examples: Tensile Strength, minimum 32.0 ksi (221 MPa)

Tensile Strength, Minimum 110 ksi (758 Mpa)

(Note: When expressing tensile and yield strengths, for all committees except "D", ksi values less than 50 are expressed XX.X and values 50 and greater are expressed XX or XXX. Committee "D" specifications use a breakoff value of 100, i.e., values less than 100 are expressed XX.X ksi.)

- E.4.3 When a large number of primary values and units appear in the same table, so that placing a parenthetical secondary value after each primary value would confusingly clutter up the table, e.g., tables of tolerances, the primary table shall be followed by a similar table containing only the secondary values and units, and so labeled.

Example: TABLE 1A - Title, Inch/Pound Units

TABLE 1B - Title, SI Units

- E.4.4 When several consecutive tables of primary values and units appear in a specification, e.g., tolerance tables, similar tables of equivalent secondary values and units shall follow the corresponding primary table.

Example:

"TABLE 1A - Title, Inch/Pound Units

"TABLE 1B - Title, SI Units

"TABLE 2A - Title, Inch/Pound Units

"TABLE 2B - Title, SI Units

"TABLE 3A - Title, Inch/Pound Units

"TABLE 3B - Title, SI Units

E.5 HOW TO DETERMINE EQUIVALENT VALUES:

- E.5.1 Following the text of this Appendix, Table E4 provides a listing of the SI units corresponding to the inch/pound units appearing in AMS documents. Also shown are the corresponding "conversion factors" derived from the National Institute of Standards and Technology seven-digit factors.
- E.5.2 To determine the SI equivalent for an inch/pound value, multiply the latter by the applicable factor as shown and round off the result in accordance with E6 to the degree of accuracy specified in E7.
- E.5.3 To determine the inch/pound equivalent of an SI value, divide the latter by the applicable factor and round off as above.

E.6 ROUNDING OFF VALUES:

- E.6.1 When the digit to the right of the last digit to be retained is less than 5, do not change the last digit retained.
- E.6.2 When the digit to the right of the last digit to be retained is greater than 5, or is 5 followed by other than all zeros, increase the last digit to be retained by 1.
- E.6.3 When the digit to the right of the last digit to be retained is exactly 5 (5 followed by nothing but zeros), leave the last digit to be retained unchanged if it is even but increase it by 1 if it is odd.

Examples: Rounded to three places, the following become as indicated:

6.753497 = 6.753 (rounding down - See E.6.1)

6.753507 = 6.754 (rounding up - See E.6.2)

6.753500 = 6.754 (rounding up - See E.6.3)

6.754500 = 6.754 (rounding down - See E.6.3)

6.754600 = 6.755 (rounding up - See E.6.2)

- E.6.4 Exceptions to the above may arise, as in the case of dimensional limits, when it may be necessary to round toward the interior of the tolerance zone or toward the minimum material condition. (See E.7.2.1.7)

E.7 PRECISION OF EXPRESSION OF EQUIVALENTS:

The precision with which equivalents are expressed depends on the intent of the specified value and the accuracy to which it can be controlled or measured with usual controlling or measuring equipment. SAE TSB003 gives rules for determining the precision to which equivalents should be expressed; these rules should be followed in preparing AMS and related documents. However, it is preferable to show equivalents in the secondary scale in rounded equivalent numbers, rather than exact equivalent numbers, whenever feasible. Following are recommendations for practices to be followed.

E.7.1 Temperatures:

Any temperature, and its tolerance when given, shall normally be expressed in whole degrees in the primary temperature scale followed by the temperature and its tolerance in the secondary scale expressed with the following precision:

- E.7.1.1 In general, show the equivalent temperature, and its tolerance when specified, in the secondary scale to the nearest whole degree.

Examples: "1435 °F": 1435 °F = 779.4 °C (calculated), show "1435 °F (779 °C)".

"1500 to 1550 °F": 1500 to 1550 °F = 815.6 to 843.3 °C (calculated), show "1500 to 1550 °F (816 to 843 °C)".

Example: "1520 °F ± 20" = 826.7 °C ± 11.1 (Calculated), show "1520 °F ± 20 (827 °C ± 11)".

- E.7.1.2 When close control of temperature is required (e.g., viscosity tests, specific gravity tests), show the temperature, and its tolerance when specified, in the secondary scale to the nearest 0.1 degree.

Example: 23 °C (73.4 °F)

- E.7.1.3 For convenience, conversion tables from Fahrenheit to Celsius temperatures and from Celsius to Fahrenheit temperatures are given in Tables E5 and E6, respectively.

E.7.1.3.1 Conversion between the two temperature scales is based on the following equations:

$$^{\circ}\text{C} = \frac{5}{9} (^{\circ}\text{F} - 32) \quad (\text{Eq. E1})$$

$$^{\circ}\text{F} = \frac{9}{5} ^{\circ}\text{C} + 32 \quad (\text{Eq. E2})$$

E.7.1.3.1.1 Celsius equivalents of Fahrenheit temperatures higher than those shown in Table E5 may conveniently be determined by subtracting 1800 °F (or multiple thereof) from the Fahrenheit value, finding the Celsius equivalent of that figure in Table E5, and adding 1000 °C (or multiple thereof) to it.

E.7.1.3.1.2 Conversely, Fahrenheit equivalents of Celsius temperatures greater than those shown in Table E6 may conveniently be determined by subtracting 1000 °C (or multiple thereof) from the Celsius value, finding the Fahrenheit equivalent of that figure in Table E6, and adding 1800 °F (or multiple thereof) to it.

E.7.2 Linear Measurement:

E.7.2.1 When Inch/Pound Units Are Primary:

E.7.2.1.1 Equivalents of dimensions in inches shall be expressed in millimeters for all dimensions having any degree of precision; dimensions over 1000 millimeters shall be expressed in meters if precision is not implied except that in expressing ranges of dimensions in a paragraph title or in a series of column headings in a table, all dimensions shall be shown in the same unit.

E.7.2.1.2 Equivalents of dimensions in inches to be expressed in millimeters shall normally be expressed to one less decimal place than the inch/pound unit. Equivalents, before rounding off, are shown in Table E7.

E.7.2.1.3 When the inch/pound unit is stated as a fraction, convert this to a decimal value, or use Table B8 and express the SI equivalent to only one decimal place or, if that degree of accuracy is not required, to whole millimeters.

E.7.2.1.4 If the SI equivalent of an inch/pound unit dimension in inches is to be expressed in meters, show the SI equivalent to two decimal places (e.g., 60 inches: show 1.52 m).

E.7.2.1.5 If an inch/pound unit is expressed in feet, show the SI equivalent in millimeters to the nearest whole unit or in meters to one decimal place (e.g., 5 feet: show 1.5 m).

E.7.2.1.6 If an inch/pound unit is expressed in yards, show the SI equivalent to the nearest whole unit in meters (e.g., 50 yards = 45.72 m: use 46 m).

E.7.2.1.7 When it is necessary to ensure interchangeability of parts (e.g., fit of mating parts, screw thread elements, reference standards or test standards, etc), express the SI units such that the resulting dimensions will be within the range permitted by the inch/pound units. If the inch/pound unit is expressed as a basic dimension with tolerances, convert this to a range and express the SI equivalent dimensions as a range, the extremes of which will be within the range of dimensions permitted by the inch/pound units.

Examples:

Inch/pound range: 0.1065 to 0.1069 inch
SI Unit conversion = 2.70510 to 2.71526 mm
Express SI unit range as 2.706 to 2.715 mm

Inch/pound unit dimension and tolerance: 0.0813 inch + 0.000 - 0.020

Inch/pound unit range = 0.0613 - 0.0813 inch
SI unit conversion = 1.55702 - 2.06502 mm
Express SI unit range as: 1.557 to 2.065 mm

- E.7.2.1.8 Exact conversions from Inches to millimeters are given in Table E7 and from fractions of inches to millimeters in Table E8.
- E.7.2.1.9 When exact conversions to millimeters are not required (for nominal sizes or nonprecise limits or steps), use 1 inch = 25.4 mm, then round to "logical" SI values.
- E.7.2.2 When SI Units Are Primary:
- E.7.2.2.1 To the left of decimal points, express inch/pound unit equivalents to the same degree of accuracy as is normally used when such inch/pound unit is a primary unit of measure.
- E.7.2.2.2 To the right of decimal points, express inch/pound unit equivalents to one more decimal place than the SI units stated, unless the accuracy of measurement does not require such precision; in the latter case, the inch/pound unit equivalent should be stated to the same number of decimal places or even one less if this gives the required accuracy.
- E.7.2.2.3 As in 7.2.1.7 above, follow the rule of "rounding within" when necessary to ensure interchangeability.
- E.7.2.2.4 When exact conversions to inch units are not required (for nominal sizes, etc.) use 25.4 mm = 1 inch, then round to "logical" inch values.
- E.7.3 Angular Measurement:
- In the text, tables, and figures of specifications, show angles in degrees and decimal parts of degrees.
- E.7.4 Stress and Pressure Measurements:
- E.7.4.1 When Inch/Pound Units Are Primary:
- Show the SI equivalent to not more than four significant figures rounded to the nearest whole number in the least significant figure used, and in no case to more than two decimal places. For stresses in inch/pound units (ksi) show the SI equivalent in MPa, or in GPa where appropriate; for hydraulic pressures, always show the SI equivalent in kPa (except in meteorological use).
- E.7.4.2 When SI Units Are Primary:
- Show the inch/pound equivalent to the same degree of accuracy as is normally used when the same unit is expressed as the primary unit of measure. For example, in expressing stress or pressure in ksi, usually show the ksi to the nearest whole number, or to one decimal place for numbers less than 100.
- E.7.4.3 Conversions from ksi to MPa are given in Table E9.

E.8 SI EQUIVALENTS OF INCH/POUND UNITS:

- E.8.1 When more than one conversion factor and SI unit is listed for the same inch/pound unit in Table E4, the first is recommended but the other(s) may be used if the AMS Metric Task Force or the Commodity Committee deems them to be more customary in the particular test or commodity.
- E.8.2 Conversion factors for units not included in the table may be determined by combining the factors for the components of the unlisted units.

E.9 EXPRESSION OF SI UNITS:

- E.9.1 Abbreviations and symbols shall not be mixed in expressing SI units unless no symbol exists for the quantity.

Example: mm/s, not mm/sec

Example: Use "not less than X minutes", not "X minutes, min"

E.10 FORMAT OF VALUES:

The following rules apply to expressions of values in both inch/pound and SI units:

- E.10.1 In keeping with U.S. standard practice, the decimal point, when required, shall be the period.
- E.10.2 To the left of the decimal point, if a value is expressed in five or more digits, a comma shall be used to separate each group of three digits, counting from right to left starting at the decimal point.
- E.10.3 To the left of the decimal point, if a value is expressed in four digits, no comma shall be used except in columns of tables in which values are shown in both four-digit and five-digit figures; in such cases, for uniformity of appearance, a comma shall be used in four-digit values.
- E.10.4 To the right of the decimal point, all digits shall appear consecutively, with no space or comma between groups of three digits.
- NOTE: In the following conversion tables the rule at E.10.4 is not followed because it was felt that the spaces between every third decimal place increased the ease of copying the critical conversion factors.
- E.10.5 To indicate the multiplication of two SI units, use the elevated dot (·) symbol, not the letter "x" in either the upper or lower case.

TABLE E4 - Conversion Factors

Inch/Pound Unit	Conversion Factor	SI Unit
amp-min per sq ft	x 10.763 91	= A·min/m ²
amp per sq ft	x 10.763 91	= A/m ²
Angstrom unit	x 10 ⁻¹⁰	= m
	x 100	= pm
BTU (thermochemical) per lb	x 2324.444	= J/kg
Centipoise	x 0.001	= Pa·s
Cu inch	x 16.387 06	= mL
	x 16.387.06	= cm ³
	x 16,387.06	= mm ³
cu inch per lb (mass)	x 36.127 28	= cm ³ /kg
cu ft	x 0.028 316 85	= m ³
cu ft per sq ft	x 0.304 798 85	= m ³ /m ²
cc per inch	x 0.039 370 08	= mL/mm
	x 0.393 700 8	= mL/cm
cc/hr per ft	x 3.280 84	= mL/h per m
Cycles per sec	x 1.000	= Hz
deg (angle)		Do not convert
deg, API (dimensionless)	--	None
deg F	$\frac{5}{9} (^{\circ}\text{F} - 32)$	= deg C (See E.7.1.3.1 and Table E5)
	$\frac{5}{9} (^{\circ}\text{F} + 459.67)$	= K
Ft	x 0.304 8	= m ^(a)
	x 304.8	= mm ^(b)
ft-candles	x 10.763 91	= lx
ft-lb (work, energy)	x 1.355 818	= J
ft-lb (work, energy) per inch	x 53.378 66	= J/m
ft-lb (work, energy) per sq inch	x 2101.522	= J/m ²
ft per hr	x 84.666 67	= m/s
ft per minute	x 5.08	= mm/s
	x 0.005 08	= m/s
ft per lb (mass)	x 0.671 968 9	= m/kg
gal (U.S. liquid)	x 3.785 412	= L or dm ³
Gauss	x 0.000 1	= T (tesla)
grains per sq ft	x 697.489 7	= mg/m ²
grains per cu ft	x 2228.352	= mg/m ³
g (gram) per ft (linear)	x 0.00328084	= kg/m
g (gram) per yd	x 0.00109361	= kg/m
g (gram) per sq inch	x 0.001 550 003	= g/mm ²
	x 0.155 000 3	= g/cm ²
g (gram) per sq ft	x 10.763 91	= g/m ²

(a) For random lengths and dimensions over 1000 mm, except as in (b).

(b) For design and precise dimensions.

TABLE E4 - Conversion Factors (Continued)

Inch/Pound Unit	Conversion Factor	SI Unit
g (gram) per sq yd	x 1.195 99	= g/m ²
g (gram) per cu ft	x 35.314 66	= g/m ³
IACS, %	x 0.58	= MS/m
inch	x 25.4	= mm
inch, Hg	x 25.4	= mm, Hg
	x 3 386.389 (32 EF)	= Pa
	x 3 376.85 (60 E)	= Pa
inch -lb	x 0.112 984 8	= N·m
inch per ft	x 83.33333	= mm/m
inch per inch	x 1.000	= m/m
		= mm/mm
inch/inch per minute	x 1.000	= m/m per minute
		= mm/mm per minute
inch/inch per °C	x 1.000	= m/m per °C
		= mm/mm per °C
Inch/inch per °F	x 1.8	= m/m per °C
		= mm/mm per °C
inch per lb (mass)	x 55.997 41	= mm/kg
inch per minute	x 0.423 333 3	= mm/s
kilogauss	x 0.1	= T (tesla)
	x 0.000 000 1	= MT (megatesla)
kV per inch	x 0.039 370 08	= kV/mm
	x 39.370 08	= kV/m
lb (force) (avoirdupois)	x 4.448 222	= N (newton)
lb (mass) (avoirdupois)	x 0.453 592 4	= kg
lb (mass) per gal (U.S. Liquid)	x 119.826 4	= kg/m ³
	x 0.119 826 4	= kg/L
lb (force) per inch	x 175.126 8	= N/m
lb (force) per ft	x 14.593 9	= N/m
lb (mass) per inch	x 17.857 97	= kg/m
lb (mass) per ft	x 1.488 164	= kg/m
lb (mass) per sq ft	x 4.882 428	= kg/m ²
lb (force) per sq inch (psi)	x 6894.757	= Pa
lb (force) per 50 sq inch	x 137.895 14	= Pa
lb (force) per sec	x 4.448 222	= N/s
lb (mass) per sec	x 0.453 592 4	= kg/s
lb (mass) per cu inch	x 27,679.91	= kg/m ³
lb (mass) per cu ft	x 16.018 46	= k/m ³
lb (mass) per 1000 bbl (petroleum)	x 2.853 01	= g/m ³
lb (force) - inch (torque)	x 0.112 984 8	= N·m
lb (force) - ft (torque)	x 1.355 818	= N·m
liter	x 1.000	= dm ³
	x 1000	= mL
microfarad per 1000 ft	x 0.003 280 840	= μF/m

TABLE E4 - Conversion Factors (Continued)

Inch/Pound Unit	Conversion Factor	SI Unit
microinch	x 0.0254	= μm
	x 0.000 0254	= mm
microhms per sq inch	x 0.001 550 003	= $\mu\Omega/\text{mm}^2$ (microhms/ mm^2) ^(c)
	x 0.000 000 155 000 3	= Ω/cm^2 (ohms/ cm^2) ^(c)
microns	x 1.000	= μm
millimicrons	x 1.00	= nm
mg per gal (U.S. liquid)	x 0.264 172	= mg/L
	x 264.172	= mg/m^3
mg per sq inch	x 1550.003	= mg/m^2
	x 0.155 000 3	= mg/cm^2
mg per sq ft	x 10.763 91	= mg/m^2
mil	x 0.0254	= mm
mL per gal (U.S. liquid)	x 0.264 172	= mL/L
	x 264.172	= mL/m^3
mL per sq ft	x 10.763 910	= mL/m^2
Minutes per inch	x 39.370 08	= minutes/m
	x 0.039 437 008	= minutes/mm
minutes per 1/2 inch	x 78.740 16	= minutes/m
	x 0.078 740 16	= minutes/mm
Oersted	x 79.577 47	= A/m
ohms per ft	x 3.280 84	= Ω/m (ohms/m) ^(c)
ohms per 1000 ft	x 0.003 280 84	= Ω/m (ohms/m) ^(c)
ohm-circ mil per ft	x 0.001 662 427	= $\Omega\cdot\text{mm}^2/\text{m}$ (ohm- mm^2/m) ^(c)
oz (U.S. fluid)	x 29.573 53	= mL
	x 29.573 53	= mm^3
oz (avdp) (force)	x 0.278 013 9	= N
oz (avdp) (mass)	x 28.349 52	= g
	x 0.028 349 52	= kg
oz (Troy) (mass)	x 31.103 48	= g
oz (avdp) (force) per inch	x 0.010 945 43	= N/mm
oz (avdp) (mass) per inch	x 1.116 123	= g/mm
	x 1.116 123	= kg/m
oz (avdp) (mass) per ft	x 93.010236	= g/m
	x 0.093 010 2	= kg/m
oz (avdp) (mass) per yd	x 31.003 412	= g/m
	x 0.031 003 41	= kg/m
oz (avdp) (force) per sq inch	x 0.000 430 922 4	= N/mm^2
oz (avdp) (mass) per sq ft	x 0.305 151 7	= kg/m^2
	x 305.151 7	= g/m^2
oz (avdp) (mass) per sq yd	x 0.033 905 74	= kg/m^2
	x 33.905 74	= g/m^2

^(c) Use of the Greek letter Omega is correct and preferred practice but "microhm" and "ohm" may be spelled out if it is impractical to use the Omega.

TABLE E4 - Conversion Factors (Continued)

Inch/Pound Unit	Conversion Factor	SI Unit
oz (avdp) (force) per cu inch	x 16,965.45	= N/m ³
oz (avdp) (mass) per cu inch	x 1729.994	= kg/m ³
	x 1,729,994	= g/m ³
oz (avdp) (mass) per gal (U.S. fluid)	x 7.489 150	= g/L
	x 7.489 150	= kg/m ³
oz (U.S. fluid) per gal	x 7.812 499	= mL/L
% IACS	x 0.58	= MS/m
picks per inch	x 0.039 380 08	= picks/mm
pt (U.S. liquid)	x 0.473 176 5	= L
	x 473.176 5	= mL
pt per gal (U.S. liquid)	x 125	= mL/L
Poise	x 0.1	= Pa·s
pound (mass) (avoirdupois)	x 0.4535924	= kg
psi (pressure)	x 6.894 757	= kPa
1000 psi (stress) (1 ksi) ^(d)	x 6.894 757	= MPa
1000 psi (stress) inch (ksi inch)	x 1.098 844	= MPa m
Psi (pressure) per °F	x 12.410 56	= kPa/°C
qt (U.S. liquid)	x 0.946 352 9	= L
	x 0.000 946 352 9	= m ³
Roentgen	x 0.000 257 976	= C/kg
Sieve Sizes ^(e)		
sq inch	x 6.451 6	= cm ²
	x 645.16	= mm ²
sq inch per lb (mass)	x 14.223 34	= cm ² /kg
sq ft	x 0.092 903 04	= m ²
sq yd	x 0.836 127 4	= m ²
Threads per inch	x 0.039 370 08	= threads/mm
time per inch	x 39.370 08	= time/m
	x 0.039 370 08	= time/mm
tons (short, 2000 lb)	x 907.184 7	= kg
tons (long, 2240 lb)	x 1016.047	= kg
tons (metric)	x 1000	= kg
Torr (mm Hg, 0°C)	x 133.322	= Pa
V per mil	x 39.370 08	= V/mm
watts per lb (mass)	x 2.204 622	= W/kg
yd	x 0.914 4	= m
yd per lb (mass)	x 2.015 907	= m/kg

^(d)See Table E9^(e)See Table E10

REFERENCE PUBLICATIONS

- TSB003 - Rules for SAE Use of SI (Metric) Units - JUN92
 ISO R1000 - Rules for the use of Units of the International System of Units - February 1969
 NBS 304A - Brief History and Use of the English and Metric Systems of Measurement - 1968

TABLE E5 - Temperature Conversion Fahrenheit to Celsius
(Zero to -459.4)

	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9
0	-17.78	-18.33	-18.89	-19.44	-20	-20.56	-21.11	-21.67	-22.22	-22.78
-10	-23.33	-23.89	-24.44	-25	-25.56	-26.11	-26.67	-27.22	-27.78	-28.33
-20	-28.89	-29.44	-30	-30.56	-31.11	-31.67	-32.22	-32.78	-33.33	-33.89
-30	-34.44	-35	-35.56	-36.11	-36.67	-37.22	-37.78	-38.33	-38.89	-39.44
-40	-40	-40.56	-41.11	-41.67	-42.22	-42.78	-43.33	-43.89	-44.44	-45
-50	-45.56	-46.11	-46.67	-47.22	-47.78	-48.33	-48.89	-49.44	-50	-50.56
-60	-51.11	-51.67	-52.22	-52.78	-53.33	-53.89	-54.44	-55	-55.56	-56.11
-70	-56.67	-57.22	-57.78	-58.33	-58.89	-59.44	-60	-60.56	-61.11	-61.67
-80	-62.22	-62.78	-63.33	-63.89	-64.44	-65	-65.56	-66.11	-66.67	-67.22
-90	-67.78	-68.33	-68.89	-69.44	-70	-70.56	-71.11	-71.67	-72.22	-72.78
-100	-73.33	-73.89	-74.44	-75	-75.56	-76.11	-76.67	-77.22	-77.78	-78.33
-110	-78.89	-79.44	-80	-80.56	-81.11	-81.67	-82.22	-82.78	-83.33	-83.89
-120	-84.44	-85	-85.56	-86.11	-86.67	-87.22	-87.78	-88.33	-88.89	-89.44
-130	-90	-90.56	-91.11	-91.67	-92.22	-92.78	-93.33	-93.89	-94.44	-95
-140	-95.56	-96.11	-96.67	-97.22	-97.78	-98.33	-98.89	-99.44	-100	-100.6
-150	-101.1	-101.7	-102.2	-102.8	-103.3	-103.9	-104.4	-105	-105.6	-106.1
-160	-106.7	-107.2	-107.8	-108.3	-108.9	-109.4	-110	-110.6	-111.1	-111.7
-170	-112.2	-112.8	-113.3	-113.9	-114.4	-115	-115.6	-116.1	-116.7	-117.2
-180	-117.8	-118.3	-118.9	-119.4	-120	-120.6	-121.1	-121.7	-122.2	-122.8
-190	-123.3	-123.9	-124.4	-125	-125.6	-126.1	-126.7	-127.2	-127.8	-128.3
-200	-128.9	-129.4	-130	-130.6	-131.1	-131.7	-132.2	-132.8	-133.3	-133.9
-210	-134.4	-135	-135.6	-136.1	-136.7	-137.2	-137.8	-138.3	-138.9	-139.4
-220	-140	-140.6	-141.1	-141.7	-142.2	-142.8	-143.3	-143.9	-144.4	-145
-230	-145.6	-146.1	-146.7	-147.2	-147.8	-148.3	-148.9	-149.4	-150	-150.6
-240	-151.1	-151.7	-152.2	-152.8	-153.3	-153.9	-154.4	-155	-155.6	-156.1
-250	-156.7	-157.2	-157.8	-158.3	-158.9	-159.4	-160	-160.6	-161.1	-161.7
-260	-162.2	-162.8	-163.3	-163.9	-164.4	-165	-165.6	-166.1	-166.7	-167.2
-270	-167.8	-168.3	-168.9	-169.4	-170	-170.6	-171.1	-171.7	-172.2	-172.8
-280	-173.3	-173.9	-174.4	-175	-175.6	-176.1	-176.7	-177.2	-177.8	-178.3
-290	-178.9	-179.4	-180	-180.6	-181.1	-181.7	-182.2	-182.8	-183.3	-183.9
-300	-184.4	-185	-185.6	-186.1	-186.7	-187.2	-187.8	-188.3	-188.9	-189.4
-310	-190	-190.6	-191.1	-191.7	-192.2	-192.8	-193.3	-193.9	-194.4	-195
-320	-195.6	-196.1	-196.7	-197.2	-197.8	-198.3	-198.9	-199.4	-200	-200.6
-330	-201.1	-201.7	-202.2	-202.8	-203.3	-203.9	-204.4	-205	-205.6	-206.1
-340	-206.7	-207.2	-207.8	-208.3	-208.9	-209.4	-210	-210.6	-211.1	-211.7
-350	-212.2	-212.8	-213.3	-213.9	-214.4	-215	-215.6	-216.1	-216.7	-217.2
-360	-217.8	-218.3	-218.9	-219.4	-220	-220.6	-221.1	-221.7	-222.2	-222.8
-370	-223.3	-223.9	-224.4	-225	-225.6	-226.1	-226.7	-227.2	-227.8	-228.3
-380	-228.9	-229.4	-230	-230.6	-231.1	-231.7	-232.2	-232.8	-233.3	-233.9
-390	-234.4	-235	-235.6	-236.1	-236.7	-237.2	-237.8	-238.3	-238.9	-239.4
-400	-240	-240.6	-241.1	-241.7	-242.2	-242.8	-243.3	-243.9	-244.4	-245
-410	-245.6	-246.1	-246.7	-247.2	-247.8	-248.3	-248.9	-249.4	-250	-250.6
-420	-251.1	-251.7	-252.2	-252.8	-253.3	-253.9	-254.4	-255	-255.6	-256.1
-430	-256.7	-257.2	-257.8	-258.3	-258.9	-259.4	-260	-260.6	-261.1	-261.7
-440	-262.2	-262.8	-263.3	-263.9	-264.4	-265	-265.6	-266.1	-266.7	-267.2
-4.50	-267.8	-268.3	-268.9	-269.4	-270	-270.6	-271.1	-271.7	-272.2	-272.8
-459.4	-273									

TABLE E5 - Temperature Conversion Fahrenheit to Celsius (Continued)
(Zero to 300)

	0	1	2	3	4	5	6	7	8	9
0	-17.78	-17.22	-16.67	-16.11	-15.56	-15.00	-14.44	-13.89	-13.33	-12.78
10	-12.22	-11.67	-11.11	-10.56	-10.00	-9.44	-8.89	-8.33	-7.78	-7.22
20	-6.67	-6.11	-5.56	-5.00	-4.44	-3.89	-3.33	-2.78	-2.22	-1.67
30	-1.11	-0.56	0.00	0.56	1.11	1.67	2.22	2.78	3.33	3.89
40	4.44	5.00	5.56	6.11	6.67	7.22	7.78	8.33	8.89	9.44
50	10.00	10.56	11.11	11.67	12.22	12.78	13.33	13.89	14.44	15.00
60	15.56	16.11	16.67	17.22	17.78	18.33	18.89	19.44	20.00	20.56
70	21.11	21.67	22.22	22.78	23.33	23.89	24.44	25.00	25.56	26.11
80	26.67	27.22	27.78	28.33	28.89	29.44	30.00	30.56	31.11	31.67
90	32.22	32.78	33.33	33.89	34.44	35.00	35.56	36.11	36.67	37.22
100	37.78	38.33	38.89	39.44	40.00	40.56	41.11	41.67	42.22	42.78
110	43.33	43.89	44.44	45.00	45.56	46.11	46.67	47.22	47.78	48.33
120	48.89	49.44	50.00	50.56	51.11	51.67	52.22	52.78	53.33	53.89
130	54.44	55.00	55.56	56.11	56.67	57.22	57.78	58.33	58.89	59.44
140	60.00	60.56	61.11	61.67	62.22	62.78	63.33	63.89	64.44	65.00
150	65.56	66.11	66.67	67.22	67.78	68.33	68.89	69.44	70.00	70.56
160	71.11	71.67	72.22	72.78	73.33	73.89	74.44	75.00	75.56	76.11
170	76.67	77.22	77.78	78.33	78.89	79.44	80.00	80.56	81.11	81.67
180	82.22	82.78	83.33	83.89	84.44	85.00	85.56	86.11	86.67	87.22
190	87.78	88.33	88.89	89.44	90.00	90.56	91.11	91.67	92.22	92.78
200	93.33	93.89	94.44	95.00	95.56	96.11	96.67	97.22	97.78	98.33
210	98.89	99.44	100.00	100.56	101.11	101.67	102.22	102.78	103.33	103.89
220	104.44	105.00	105.56	106.11	106.67	107.22	107.78	108.33	108.89	109.44
230	110.00	110.56	111.11	111.67	122.22	112.78	113.33	113.89	114.44	115.00
240	115.56	116.11	116.67	117.22	117.78	118.33	118.89	119.44	120.00	120.56
250	121.11	121.67	122.22	122.78	123.33	123.89	124.44	125.00	125.56	126.11
260	126.67	127.22	127.78	128.33	128.89	129.44	130.00	130.56	131.11	131.67
270	132.22	132.78	133.33	133.89	134.44	135.00	135.56	136.11	136.67	137.22
280	137.78	138.33	138.89	139.44	140.00	140.56	141.11	141.67	142.22	142.78
290	143.33	143.89	144.44	145.00	145.56	146.11	146.67	147.22	147.78	148.33
300	148.89	149.44	150.00	150.56	151.11	151.67	152.22	152.78	153.33	153.89
310	154.44	155.00	155.56	156.11	156.67	157.22	157.78	158.33	158.89	159.44
320	160.00	160.56	161.11	161.67	162.22	162.78	163.33	163.89	164.44	165.00
330	165.56	166.11	166.67	167.22	167.78	168.33	168.89	169.44	170.00	170.56
340	171.11	171.67	172.22	172.78	173.33	173.89	174.44	175.00	175.56	176.11
350	176.67	177.22	177.78	178.33	178.89	179.44	180.00	180.56	181.11	181.67
360	182.22	182.78	183.33	183.89	184.44	185.00	185.56	186.11	186.67	187.22
370	187.78	188.33	188.89	189.44	190.00	190.56	191.11	191.67	192.22	192.78
380	193.33	193.89	194.44	195.00	195.56	196.11	196.67	197.22	197.78	198.33
390	198.89	199.44	200.00	200.56	201.11	201.67	202.22	202.78	203.33	203.89

TABLE E5 - Temperature Conversion Fahrenheit to Celsius (Continued)
(400 to 799)

	0	1	2	3	4	5	6	7	8	9
400	204.44	205.00	205.56	206.11	206.67	207.22	207.78	208.33	208.89	209.44
410	210.00	210.56	211.11	211.67	212.22	212.78	213.33	231.89	214.44	215.00
420	215.56	216.11	216.67	217.22	217.78	218.33	218.89	219.44	220.00	220.56
430	221.11	221.67	222.22	222.78	223.33	223.89	224.44	225.00	225.56	226.11
440	226.67	227.22	227.78	228.33	228.89	229.44	230.00	230.56	231.11	231.67
450	232.22	232.78	233.33	233.89	234.44	235.00	235.56	236.11	236.67	237.22
460	237.78	238.33	238.89	239.44	240.00	240.56	241.11	241.67	242.22	242.78
470	243.33	243.89	244.44	245.00	245.56	246.11	246.67	247.22	247.78	248.33
480	248.89	249.44	250.00	250.56	251.11	251.67	252.22	252.78	253.33	253.89
490	254.44	255.00	255.56	256.11	256.67	257.22	257.78	258.33	258.89	259.44
500	260.00	260.56	261.11	261.67	262.22	262.78	263.33	263.89	264.44	265.00
510	265.56	266.11	266.67	267.22	267.78	268.33	268.89	269.44	270.00	270.56
520	271.11	271.67	272.22	272.78	273.33	273.89	274.44	275.00	275.56	276.11
530	276.67	277.22	277.78	278.33	278.89	279.44	280.00	280.56	281.11	281.67
540	282.22	282.78	283.33	283.89	284.44	285.00	285.56	286.11	286.67	287.22
550	287.78	288.33	288.89	289.44	290.00	290.56	291.11	291.67	292.22	292.78
560	293.33	293.89	294.44	295.00	295.56	296.11	296.67	297.22	297.78	298.33
570	298.89	299.44	300.00	300.56	301.11	301.67	302.22	302.78	303.33	303.89
580	304.44	305.00	305.56	306.11	306.67	307.22	307.78	308.33	308.89	309.44
590	310.00	310.56	311.11	311.67	312.22	312.78	313.33	313.89	314.44	315.00
600	315.56	316.11	316.67	317.22	317.78	318.33	318.89	319.44	320.00	320.56
610	321.11	321.67	322.22	322.78	323.33	323.89	324.44	325.00	325.56	326.11
620	326.67	327.22	327.78	328.33	328.89	329.44	330.00	330.56	331.11	331.67
630	332.22	332.78	333.33	333.89	334.44	335.00	335.56	336.11	336.67	337.22
640	337.78	338.33	338.89	339.44	340.00	340.56	341.11	341.67	342.22	342.78
650	343.33	343.89	344.44	345.00	345.56	346.11	346.67	347.22	347.78	348.33
660	348.89	349.44	350.00	350.56	351.11	351.67	352.22	352.78	353.33	353.89
670	354.44	355.00	355.56	356.11	356.67	357.22	357.78	358.33	358.89	359.44
680	360.00	360.56	361.11	361.67	362.22	362.78	363.33	363.89	364.44	365.00
690	365.56	366.11	366.67	367.22	367.78	368.33	368.89	369.44	370.00	370.56
700	371.11	371.67	372.22	372.78	373.33	373.89	374.44	375.00	375.56	376.11
710	376.67	377.22	377.78	378.33	378.89	379.44	380.00	380.56	381.11	381.67
720	382.22	382.78	383.33	383.89	384.44	385.00	385.56	386.11	386.67	387.22
730	387.78	388.33	388.89	389.44	390.00	390.56	391.11	391.67	392.22	392.78
740	393.33	393.89	394.44	395.00	395.56	396.11	396.67	397.22	397.78	398.33
750	398.89	399.44	400.00	400.56	401.11	401.67	402.22	402.78	403.33	403.89
760	404.44	405.00	405.56	406.11	406.67	407.22	407.78	408.33	408.89	409.44
770	410.00	410.56	411.11	411.67	412.22	412.78	413.33	413.89	414.44	415.00
780	415.56	416.11	416.67	417.22	417.78	418.33	418.89	419.44	420.00	420.56
790	421.11	421.67	422.22	422.78	423.33	423.89	424.44	425.00	425.56	426.11

TABLE E5 - Temperature Conversion Fahrenheit to Celsius (Continued)
(800 to 1595)

F	0	5	F	0	5
800	427	429	1200	649	652
810	432	435	1210	654	657
820	438	441	1220	660	663
830	443	446	1230	666	668
840	449	452	1240	671	674
850	454	457	1250	677	679
860	460	463	1260	682	685
870	466	468	1270	688	691
880	471	474	1280	693	696
890	477	479	1290	699	702
900	482	485	1300	704	707
910	488	491	1310	710	713
920	493	496	1320	716	718
930	499	502	1330	721	724
940	504	507	1340	727	729
950	510	513	1350	732	735
960	516	518	1360	738	741
970	521	524	1370	743	746
980	527	529	1380	749	752
990	532	535	1390	754	757
1000	538	541	1400	760	763
1010	543	546	1410	766	768
1020	549	552	1420	771	774
1030	554	557	1430	777	779
1040	560	563	1440	782	785
1050	566	568	1450	788	791
1060	571	574	1460	793	796
1070	577	579	1470	799	802
1080	582	585	1480	804	807
1090	588	591	1490	810	813
1100	593	596	1500	816	818
1110	599	602	1510	821	824
1120	604	607	1520	827	829
1130	610	613	1530	832	835
1140	616	618	1540	838	841
1150	621	624	1550	843	846
1160	627	629	1560	849	852
1170	632	635	1570	854	857
1180	638	641	1580	860	863
1190	643	646	1590	866	868

TABLE E5 - Temperature Conversion Fahrenheit to Celsius (Continued)
(1600 to 2395)

F	0	5	F	0	5
1600	871	874	2000	1093	1096
1610	877	879	2010	1099	1102
1620	882	885	2020	1104	1107
1630	888	891	2030	1110	1113
1640	893	896	2040	1116	1118
1650	899	902	2050	1121	1124
1660	904	907	2060	1127	1129
1670	910	913	2070	1132	1135
1680	916	918	2080	1138	1141
1690	921	924	2090	1143	1146
1700	927	929	2100	1149	1152
1710	932	935	2110	1154	1157
1720	938	941	2120	1160	1163
1730	943	946	2130	1166	1168
1740	949	952	2140	1171	1174
1750	954	957	2150	1177	1179
1760	960	963	2160	1182	1185
1770	966	968	2170	1188	1191
1780	971	974	2180	1193	1196
1790	977	979	2190	1199	1202
1800	982	985	2200	1204	1207
1810	988	991	2210	1210	1213
1820	993	996	2220	1216	1218
1830	999	1002	2230	1221	1224
1840	1004	1007	2240	1227	1229
1850	1010	1013	2250	1232	1235
1860	1016	1018	2260	1238	1241
1870	1021	1024	2270	1243	1246
1880	1027	1029	2280	1249	1252
1890	1032	1035	2290	1254	1257
1900	1038	1041	2300	1260	1263
1910	1043	1046	2310	1266	1268
1920	1049	1052	2320	1271	1274
1930	1054	1057	2330	1277	1279
1940	1060	1063	2340	1282	1285
1950	1066	1068	2350	1288	1291
1760	1071	1074	2360	1293	1296
1970	1077	1079	2370	1299	1302
1980	1082	1085	2380	1304	1307
1990	1088	1091	2390	1310	1313

TABLE E5 - Temperature Conversion Fahrenheit to Celsius (Continued)
(2400 to 3195)

F	0	5	F	0	5
2400	1316	1318	2800	1538	1541
2410	1321	1324	2810	1543	1546
2420	1327	1329	2820	1549	1552
2430	1332	1335	2830	1554	1557
2440	1338	1341	2840	1560	1563
2450	1343	1346	2850	1566	1568
2460	1349	1352	2860	1571	1574
2470	1354	1357	2870	1577	1579
2480	1360	1363	2880	1582	1585
2490	1366	1368	2890	1588	1591
2500	1371	1374	2900	1593	1596
2510	1377	1379	2910	1599	1602
2520	1382	1385	2920	1604	1607
2530	1388	1391	2930	1610	1613
2540	1393	1396	2940	1616	1618
2550	1399	1402	2950	1621	1624
2560	1404	1407	2960	1627	1629
2570	1410	1413	2970	1632	1635
2580	1416	1418	2980	1638	1641
2590	1421	1424	2990	1643	1646
2600	1427	1429	3000	1649	1652
2610	1432	1435	3010	1654	1657
2620	1438	1441	3020	1660	1663
2630	1443	1446	3030	1666	1668
2640	1449	1452	3040	1671	1674
2650	1454	1457	3050	1677	1679
2660	1460	1463	3060	1682	1685
2670	1466	1468	3070	1688	1691
2680	1471	1474	3080	1693	1696
2690	1477	1479	3090	1699	1702
2700	1482	1485	3100	1704	1707
2710	1488	1491	3110	1710	1713
2720	1493	1496	3120	1716	1718
2730	1499	1502	3130	1721	1724
2740	1504	1507	3140	1727	1729
2750	1510	1513	3150	1732	1735
2760	1516	1518	3160	1738	1741
2770	1521	1524	3170	1743	1746
2780	1527	1529	3180	1749	1752
2790	1532	1535	3190	1754	1757

TABLE E5 - Temperature Conversion Fahrenheit to Celsius (Continued)
(3200 to 3995)

F	0	5	F	0	5
3200	1760	1763	3600	1982	1985
3210	1766	1768	3610	1988	1991
3220	1771	1774	3620	1993	1996
3230	1777	1779	3630	1999	2002
3240	1782	1785	3640	2004	2007
3250	1788	1791	3650	2010	2013
3260	1793	1796	3660	2016	2018
3270	1799	1802	3670	2021	2024
3280	1804	1807	3680	2027	2029
3290	1810	1813	3690	2032	2035
3300	1816	1818	3700	2038	2041
3310	1821	1824	3710	2043	2046
3320	1827	1829	3720	2049	2052
3330	1832	1835	3730	2054	2057
3340	1838	1841	3740	2060	2063
3350	1843	1846	3750	2066	2068
3360	1849	1852	3760	2071	2074
3370	1854	1857	3770	2077	2079
3380	1860	1863	3780	2082	2085
3390	1866	1868	3790	2088	2091
3400	1871	1874	3800	2093	2096
3410	1877	1879	3810	2099	2102
3420	1882	1885	3820	2104	2107
3430	1888	1891	3830	2110	2113
3440	1893	1896	3840	2116	2118
3450	1899	1902	3850	2121	2124
3460	1904	1907	3860	2127	2129
3470	1910	1913	3870	2132	2135
3480	1916	1918	3880	2138	2141
3490	1921	1924	3890	2143	2146
3500	1927	1929	3900	2149	2152
3510	1932	1935	3910	2154	2157
3520	1938	1941	3920	2160	2163
3530	1943	1946	3930	2166	2168
3540	1949	1952	3940	2171	2174
3550	1954	1957	3950	2177	2179
3560	1960	1963	3960	2182	2185
3570	1966	1968	3970	2188	2191
3580	1971	1974	3980	2193	2196
3590	1977	1979	3990	2199	2202

TABLE E6 - Conversion Factors, Celsius to Fahrenheit
(Zero and Below)

0	0	-1	-2	-3	-4	-5	-6	-7	-8	-9
0	32	30.2	28.4	26.6	24.8	23	21.2	19.4	17.6	15.8
-10	14	12.2	10.4	8.6	6.8	5	3.2	1.4	-.4	-2.2
-20	-4	-5.8	-7.6	-9.4	-11.2	-13	-14.8	-16.6	-18.4	-20.2
-30	-22	-23.8	-25.6	-27.4	-29.2	-31	-32.8	-34.6	-36.4	-38.2
-40	-40	-41.8	-43.6	-45.4	-47.2	-49	-50.8	-52.6	-54.4	-56.2
-50	-58	-59.8	-61.6	-63.4	-65.2	-67	-68.8	-70.6	-72.4	-74.2
-60	-76	-77.8	-79.6	-81.4	-83.2	-85	-86.8	-88.6	-90.4	-92.2
-70	-94	-95.8	-97.6	-99.4	-101.2	-103	-104.8	-106.6	-108.4	-110.2
-80	-112	-113.8	-115.6	-117.4	-119.2	-121	-122.8	-124.6	-126.4	-128.2
-90	-130	-131.8	-133.6	-135.4	-137.2	-139	-140.8	-142.6	-144.4	-146.2
-100	-148	-149.8	-151.6	-153.4	-155.2	-157	-158.8	-160.6	-162.4	-164.2
-110	-166	-167.8	-169.6	-171.4	-173.2	-175	-176.8	-178.6	-180.4	-182.2
-120	-184	-185.8	-187.6	-189.4	-191.2	-193	-194.8	-196.6	-198.4	-200.2
-130	-202	-203.8	-205.6	-207.4	-209.2	-211	-212.8	-214.6	-216.4	-218.2
-140	-220	-221.8	-223.6	-225.4	-227.2	-229	-230.8	-232.6	-234.4	-236.2
-150	-238	-239.8	-241.6	-243.4	-245.2	-247	-248.8	-250.6	-252.4	-254.2
-160	-256	-257.8	-259.6	-261.4	-263.2	-265	-266.8	-268.6	-270.4	-272.2
-170	-274	-275.8	-277.6	-279.4	-281.2	-283	-284.8	-286.6	-288.4	-290.2
-180	-292	-293.8	-295.6	-297.4	-299.2	-301	-302.8	-304.6	-306.4	-308.2
-190	-310	-311.8	-313.6	-315.4	-317.2	-319	-320.8	-322.6	-324.4	-326.2
-200	-328	-329.8	-331.6	-333.4	-335.2	-337	-338.8	-340.6	-342.4	-344.2
-210	-346	-347.8	-349.6	-351.4	-353.2	-355	-356.8	-358.6	-360.4	-362.2
-220	-364	-365.8	-367.6	-369.4	-371.2	-373	-374.8	-376.6	-378.4	-380.2
-230	-382	-383.8	-385.6	-387.4	-389.2	-391	-392.8	-394.6	-396.4	-398.2
-240	-400	-401.8	-403.6	-405.4	-407.2	-409	-410.8	-412.6	-414.4	-416.2
-250	-418	-419.8	-421.6	-423.4	-425.2	-427	-428.8	-430.6	-432.4	-434.2
-260	-436	-437.8	-439.6	-441.4	-443.2	-445	-446.8	-448.6	-450.4	-452.2
-270	-454	-455.8	-457.6	-459.4						

TABLE E6 - Conversion Factors, Celsius to Fahrenheit (Continued)
(Zero to 399)

0	0	1	2	3	4	5	6	7	8	9
0	32	33.8	35.6	37.4	39.2	41	42.8	44.6	46.4	48.2
10	50	51.8	63.6	55.4	57.2	59	60.8	62.6	64.4	66.2
20	68	69.8	71.6	73.4	75.2	77	78.8	80.6	82.4	84.2
30	86	87.8	89.6	91.4	93.2	95	96.8	98.6	100.4	102.2
40	104	105.8	107.6	109.4	111.2	113	114.8	116.6	118.4	120.2
50	122	123.8	125.6	127.4	129.2	131	132.8	134.6	136.4	138.2
60	140	141.8	143.6	145.4	147.2	149	150.8	152.6	154.4	156.2
70	158	159.8	161.6	163.4	165.2	167	168.8	170.6	172.4	174.2
80	176	177.8	179.6	181.4	183.2	185	186.8	188.6	190.4	192.2
90	194	195.8	197.6	199.4	201.2	203	204.8	206.6	208.4	210.2
100	212	213.8	215.6	217.4	219.2	221	222.8	224.6	226.4	228.2
110	230	231.8	233.6	235.4	237.2	239	240.8	242.6	244.4	246.2
120	248	249.8	251.6	253.4	255.2	257	258.8	260.6	262.4	264.2
130	266	267.8	269.6	271.4	273.2	275	276.8	278.6	280.4	282.2
140	284	285.8	287.6	289.4	291.2	293	294.8	296.6	298.4	300.2
150	302	303.8	305.6	307.4	309.2	311	312.8	314.6	316.4	318.2
160	320	321.8	323.6	325.4	327.2	329	330.8	332.6	334.4	336.2
170	338	339.8	341.6	343.4	345.2	347	348.8	350.6	352.4	354.2
180	356	357.8	359.6	361.4	363.2	365	366.8	368.6	370.4	372.2
190	374	375.8	377.6	379.4	381.2	383	384.8	386.6	388.4	390.2
200	392	393.8	395.6	397.4	399.2	401	402.8	404.6	406.4	408.2
210	410	411.8	413.6	415.4	417.2	419	420.8	422.6	424.4	426.2
220	428	429.8	431.6	433.4	435.2	437	438.8	440.6	442.4	444.4
230	446	447.8	449.6	451.4	453.2	455	456.8	458.6	460.4	462.2
240	464	465.8	467.6	469.4	471.2	473	474.8	476.6	478.4	480.2
250	482	483.8	485.6	487.4	489.2	491	492.8	494.6	496.4	498.2
260	500	501.8	503.6	505.4	507.2	509	510.8	512.6	514.4	516.2
270	518	519.8	521.6	523.4	525.2	527	528.8	530.6	532.4	534.2
280	536	537.8	539.6	541.4	543.2	545	546.8	548.6	550.4	552.2
290	554	555.8	557.6	559.4	561.2	563	564.8	566.6	568.4	570.2
300	572	573.8	575.6	577.4	579.2	591	582.8	584.6	586.4	588.2
310	590	591.8	593.6	595.4	597.2	599	600.8	602.6	604.4	606.2
320	608	609.8	611.6	613.4	615.2	617	618.8	620.6	622.4	624.2
330	626	627.8	629.6	631.4	633.2	635	636.8	638.6	640.4	642.2
340	644	645.8	647.6	649.4	651.2	653	654.8	656.6	658.4	660.2
350	662	663.8	665.6	667.4	669.2	671	672.8	674.6	676.4	678.2
360	680	681.8	683.6	685.4	687.2	689	690.8	692.6	694.4	696.2
370	698	699.8	701.6	703.4	705.2	707	708.8	710.6	712.4	714.2
380	716	717.8	719.6	721.4	723.2	725	726.8	728.6	730.4	732.2
390	734	735.8	737.6	739.4	741.2	743	744.8	746.6	748.4	750.2

TABLE E6 - Conversion Factors, Celsius to Fahrenheit (Continued)
(400 to 799)

°C	0	1	2	3	4	5	6	7	8	9
400	752	754	756	757	759	761	763	765	766	768
410	770	772	774	775	777	779	781	783	784	786
420	788	790	792	793	795	797	799	801	802	804
430	806	808	810	811	813	815	817	819	820	822
440	824	826	828	829	831	833	835	837	838	840
450	842	844	846	847	849	851	853	855	856	858
460	860	862	864	865	867	869	871	873	874	876
470	878	880	882	883	885	887	889	891	892	894
480	896	898	900	901	903	905	907	909	910	912
490	914	916	918	919	921	923	925	927	928	930
500	932	934	936	937	939	941	943	945	946	948
510	950	952	954	955	957	959	961	963	964	966
520	968	970	972	973	975	977	979	981	982	984
530	986	988	990	991	993	995	997	999	1000	1002
540	1004	1006	1008	1009	1011	1013	1015	1017	1018	1020
550	1022	1024	1026	1027	1029	1031	1033	1035	1036	1038
560	1040	1042	1044	1045	1047	1049	1051	1053	1054	1056
570	1058	1060	1062	1063	1065	1067	1069	1071	1072	1074
580	1076	1078	1080	1081	1083	1085	1087	1089	1090	1092
590	1094	1096	1098	1099	1101	1103	1105	1107	1108	1110
600	1112	1114	1116	1117	1119	1121	1123	1125	1126	1128
610	1130	1132	1134	1135	1137	1139	1141	1143	1144	1146
620	1148	1150	1152	1153	1155	1157	1159	1161	1162	1164
630	1166	1168	1170	1171	1173	1175	1177	1179	1180	1182
640	1184	1186	1188	1189	1191	1193	1195	1197	1198	1200
650	1202	1204	1206	1207	1209	1211	1213	1215	1216	1218
660	1220	1222	1224	1225	1227	1229	1231	1233	1234	1236
670	1238	1240	1242	1243	1245	1247	1249	1251	1252	1254
680	1256	1258	1260	1261	1263	1265	1267	1269	1270	1272
690	1274	1276	1278	1279	1281	1283	1285	1287	1288	1290
700	1292	1294	1296	1297	1299	1301	1303	1305	1306	1308
710	1310	1312	1314	1315	1317	1319	1321	1323	1324	1326
720	1328	1330	1332	1333	1335	1337	1339	1341	1342	1344
730	1346	1348	1350	1351	1353	1355	1357	1359	1360	1362
740	1364	1366	1368	1369	1371	1373	1375	1377	1378	1380
750	1382	1384	1386	1387	1389	1391	1393	1395	1396	1398
760	1400	1402	1404	1405	1407	1409	1411	1413	1414	1416
770	1418	1420	1422	1423	1425	1427	1429	1431	1432	1434
780	1436	1438	1440	1441	1443	1445	1447	1449	1450	1452
790	1454	1456	1458	1459	1461	1463	1465	1467	1468	1470

TABLE E6 - Conversion Factors, Celsius to Fahrenheit (Continued)
(800 to 1199)

°C	0	1	2	3	4	5	6	7	8	9
800	1472	1474	1476	1477	1479	1481	1483	1485	1486	1488
810	1490	1492	1494	1495	1497	1499	1501	1503	1504	1506
820	1508	1510	1512	1513	1515	1517	1519	1521	1522	1524
830	1526	1528	1530	1531	1533	1535	1537	1539	1540	1542
840	1544	1546	1548	1549	1551	1553	1555	1557	1558	1560
850	1562	1564	1566	1567	1569	1571	1573	1575	1576	1578
860	1580	1582	1584	1585	1587	1589	1591	1593	1594	1596
870	1598	1600	1602	1603	1605	1607	1609	1611	1612	1614
880	1616	1618	1620	1621	1623	1625	1627	1629	1630	1632
890	1634	1636	1638	1639	1641	1643	1645	1647	1648	1650
900	1652	1654	1656	1657	1659	1661	1663	1665	1666	1668
910	1670	1672	1674	1675	1677	1679	1681	1683	1684	1686
920	1688	1690	1692	1693	1695	1697	1699	1701	1702	1704
930	1706	1708	1710	1711	1713	1715	1717	1719	1720	1722
940	1724	1726	1728	1729	1731	1733	1735	1737	1738	1740
950	1742	1744	1746	1747	1749	1751	1753	1755	1756	1758
960	1760	1762	1764	1765	1767	1769	1771	1773	1774	1776
970	1778	1780	1782	1783	1785	1787	1789	1791	1792	1794
980	1796	1798	1800	1801	1803	1805	1807	1809	1810	1812
990	1814	1816	1818	1819	1821	1823	1825	1827	1828	1830
1000	1832	1834	1836	1837	1839	1841	1843	1845	1846	1848
1010	1850	1852	1854	1855	1857	1859	1861	1863	1864	1866
1020	1868	1870	1872	1873	1875	1877	1879	1881	1882	1884
1030	1886	1888	1890	1891	1893	1895	1897	1899	1900	1902
1040	1904	1906	1908	1909	1911	1913	1915	1917	1918	1920
1050	1922	1924	1926	1927	1929	1931	1933	1935	1936	1938
1060	1940	1942	1944	1945	1947	1949	1951	1953	1954	1956
1070	1958	1960	1962	1963	1965	1967	1969	1971	1972	1974
1080	1976	1978	1980	1981	1983	1985	1987	1989	1990	1992
1090	1994	1996	1998	1999	2001	2003	2005	2007	2008	2010
1100	2012	2014	2016	2017	2019	2021	2023	2025	2026	2028
1110	2030	2032	2034	2035	2037	2039	2041	2043	2044	2046
1120	2048	2050	2052	2053	2055	2057	2059	2061	2062	2064
1130	2066	2068	2070	2071	2073	2075	2077	2079	2080	2082
1140	2084	2086	2088	2089	2091	2093	2095	2097	2098	2100
1150	2102	2104	2106	2107	2109	2111	2113	2115	2116	2118
1160	2120	2122	2124	2125	2127	2129	2131	2133	2134	2136
1170	2138	2140	2142	2143	2145	2147	2149	2151	2152	2154
1180	2156	2158	2160	2161	2163	2165	2167	2169	2170	2172
1190	2174	2176	2178	2179	2181	2183	2185	2187	2188	2190

TABLE E6 - Conversion Factors, Celsius to Fahrenheit (Continued)
(1200 to 1995)

C	0	5	C	0	5
1200	2192	2201	1600	2912	2921
1210	2210	2219	1610	2930	2939
1220	2228	2237	1620	2948	2957
1230	2246	2255	1630	2966	2975
1240	2264	2273	1640	2984	2993
1250	2282	2291	1650	3002	3011
1260	2300	2309	1660	3020	3029
1270	2318	2327	1670	3038	3047
1280	2336	2345	1680	3056	3065
1290	2354	2363	1690	3074	3083
1300	2372	2381	1700	3092	3101
1310	2390	2399	1710	3110	3119
1320	2408	2417	1720	3128	3137
1330	2426	2435	1730	3146	3155
1340	2444	2453	1740	3164	3173
1350	2462	2471	1750	3182	3191
1360	2480	2489	1760	3200	3209
1370	2498	2507	1770	3218	3227
1380	2516	2525	1780	3236	3245
1390	2534	2543	1790	3254	3263
1400	2552	2561	1800	3272	3281
1410	2570	2579	1810	3290	3299
1420	2588	2597	1820	3308	3317
1430	2606	2615	1830	3326	3335
1440	2624	2633	1840	3344	3353
1450	2642	2651	1850	3362	3371
1460	2660	2669	1860	3380	3389
1470	2678	2687	1870	3398	3407
1480	2696	2705	1880	3416	3425
1490	2714	2723	1890	3434	3443
1500	2732	2741	1900	3452	3461
1510	2750	2759	1910	3470	3479
1520	2768	2777	1920	3488	3497
1530	2786	2795	1930	3506	3515
1540	2904	2813	1940	3524	3533
1550	2822	2831	1950	3542	3551
1560	2840	2849	1960	3560	3569
1570	2858	2867	1970	3578	3587
1580	2876	2885	1980	3596	3605
1590	2894	2903	1990	3614	3623

TABLE E7 - Millimeter Equivalents of Inches
(Converting decimals of an inch to millimeters)

Inches	0.000 mm	0.001 mm	0.002 mm	0.003 mm	0.004 mm	0.005 mm	0.006 mm	0.007 mm	0.008 mm	0.009 mm
0.000	-	0.0254	0.0508	0.0762	0.1016	0.1270	0.1524	0.1778	0.2032	0.2286
0.010	0.2540	0.2794	0.3048	0.3302	0.3556	0.3810	0.4064	0.4318	0.4572	0.4826
0.020	0.5080	0.5334	0.5588	0.5842	0.6096	0.6350	0.6604	0.6858	0.7112	0.7366
0.030	0.7620	0.7874	0.8128	0.8382	0.8636	0.8890	0.9144	0.9398	0.9652	0.9906
0.040	1.0160	1.0414	1.0668	1.0922	1.1176	1.1430	1.1684	1.1938	1.2192	1.2446
0.050	1.2700	1.2954	1.3208	1.3462	1.3716	1.3970	1.4224	1.4478	1.4732	1.4986
0.060	1.5240	1.5494	1.5748	1.6002	1.6256	1.6510	1.6764	1.7018	1.7272	1.7526
0.070	1.7780	1.8034	1.8288	1.8542	1.8796	1.9050	1.9304	1.9558	1.9812	2.0066
0.080	2.0320	2.0574	2.0828	2.1082	2.1336	2.1590	2.1844	2.2098	2.2352	2.2606
0.090	2.2860	2.3114	2.3368	2.3622	2.3876	2.4130	2.4384	2.4638	2.4892	2.5146
0.100	2.5400	2.5654	2.5908	2.6162	2.6416	2.6670	2.6924	2.7178	2.7432	2.7686
0.110	2.7940	2.8194	2.8448	2.8702	2.8956	2.9210	2.9464	2.9718	2.9972	3.0226
0.120	3.0480	3.0734	3.0988	3.1242	3.1496	3.1750	3.2004	3.2258	3.2512	3.2766
0.130	3.3020	3.3274	3.3528	3.3782	3.4036	3.4290	3.4544	3.4798	3.5052	3.5306
0.140	3.5560	3.5814	3.6068	3.6322	3.6576	3.6830	3.7084	3.7338	3.7592	3.7846
0.150	3.8100	3.8354	3.8608	3.8862	3.9116	3.9370	3.9624	3.9878	4.0132	4.0386
0.160	4.0640	4.0894	4.1148	4.1402	4.1656	4.1910	4.2164	4.2418	4.2672	4.2926
0.170	4.3180	4.3434	4.3688	4.3942	4.4196	4.4450	4.4704	4.4958	4.5212	4.5466
0.180	4.5720	4.5974	4.6228	4.6482	4.6736	4.6990	4.7244	4.7498	4.7752	4.8006
0.190	4.8260	4.8514	4.8768	4.9022	4.9276	4.9530	4.9784	5.0038	5.0292	5.0546
0.200	5.0800	5.1054	5.1308	5.1562	5.1816	5.2070	5.2324	5.2578	5.2832	5.3086
0.210	5.3340	5.3594	5.3848	5.4102	5.4356	5.4610	5.4864	5.5118	5.5372	5.5626
0.220	5.5880	5.6134	5.6388	5.6642	5.6896	5.7150	5.7404	5.7658	5.7912	5.8166
0.230	5.8420	5.8674	5.8928	5.9182	5.9436	5.9690	5.9944	6.0198	6.0452	6.0706
0.240	6.0960	6.1214	6.1468	6.1722	6.1976	6.2230	6.2484	6.2738	6.2992	6.3246
0.250	6.3500	6.3754	6.4008	6.4262	6.4516	6.4770	6.5024	6.5278	6.5532	6.5786
0.260	6.6040	6.6294	6.6548	6.6802	6.7056	6.7310	6.7564	6.7818	6.8072	6.8326
0.270	6.8580	6.8834	6.9088	6.9342	6.9596	6.9850	7.0104	7.0358	7.0612	7.0866
0.280	7.1120	7.1374	7.1628	7.1882	7.2136	7.2390	7.2644	7.2898	7.3152	7.3406
0.290	7.3660	7.3914	7.4168	7.4422	7.4676	7.4930	7.5184	7.5438	7.5692	7.5946
0.300	7.6200	7.6454	7.6708	7.6962	7.7216	7.7470	7.7724	7.7978	7.8232	7.8486
0.310	7.8740	7.8994	7.9248	7.9502	7.9756	8.0010	8.0264	8.0518	8.0772	8.1026
0.320	8.1280	8.1534	8.1788	8.2042	8.2296	8.2550	8.2804	8.3058	8.3312	8.3566
0.330	8.3820	8.4074	8.4328	8.4582	8.4836	8.5090	8.5344	8.5598	8.5852	8.6106
0.340	8.6360	8.6614	8.6868	8.7122	8.7376	8.7630	8.7884	8.8138	8.8392	8.8646
0.350	8.8900	8.9154	8.9408	8.9662	8.9916	9.0170	9.0424	9.0678	9.0932	9.1186
0.360	9.1440	9.1694	9.1948	9.2202	9.2456	9.2710	9.2964	9.3218	9.3472	9.3726
0.370	9.3980	9.4234	9.4488	9.4742	9.4996	9.5250	9.5504	9.5758	9.6012	9.6266
0.380	9.6520	9.6774	9.7028	9.7282	9.7536	9.7790	9.8044	9.8298	9.8552	9.8806
0.390	9.9060	9.9314	9.9568	9.9822	10.0076	10.0330	10.0584	10.0838	10.1092	10.1346

TABLE E7 - Millimeter Equivalents of Inches (Continued)
 (Converting decimals of an inch to millimeters)

Inches	0.000 mm	0.001 mm	0.002 mm	0.003 mm	0.004 mm	0.005 mm	0.006 mm	0.007 mm	0.008 mm	0.009 mm
0.400	10.1600	10.1854	10.2108	10.2362	10.2616	10.2870	10.3124	10.3378	10.3632	10.3886
0.410	10.4140	10.4394	10.4648	10.4902	10.5156	10.5410	10.5664	10.5918	10.6172	10.6426
0.420	10.6680	10.6934	10.7188	10.7442	10.7696	10.7950	10.8204	10.8458	10.8712	10.8966
0.430	10.9220	10.9474	10.9728	10.9982	11.0236	11.0490	11.0744	11.0998	11.1252	11.1506
0.440	11.1760	11.2014	11.2268	11.2522	11.2776	11.3030	11.3284	11.3538	11.3792	11.4046
0.450	11.4300	11.4554	11.4808	11.5062	11.5316	11.5570	11.5824	11.6078	11.6332	11.6586
0.460	11.6840	11.7094	11.7348	11.7602	11.7856	11.8110	11.8364	11.8618	11.8872	11.9126
0.470	11.9380	11.9634	11.9888	12.0142	12.0396	12.0650	12.09041	12.1158	12.1412	12.1666
0.480	12.1920	12.2174	12.2428	12.2682	12.2936	12.3190	2.3444	12.3698	12.3952	12.4206
0.490	12.4460	12.4714	12.4968	12.5222	12.5476	12.5730	12.5984	12.6238	12.6492	12.6746
0.500	12.7000	12.7254	12.7508	12.7762	12.8016	12.8270	12.8524	12.8778	12.9032	12.9236
0.510	12.9540	12.9794	13.0048	13.0302	13.0556	13.0810	13.1064	13.1318	13.1572	13.1836
0.520	13.2080	13.2334	13.2588	13.2842	13.3096	13.3350	13.3604	13.3858	13.4112	13.4366
0.530	13.4620	13.4874	13.5128	13.5382	13.5636	13.5890	13.6144	13.6398	13.6652	13.6906
0.540	13.7160	13.7414	13.7668	13.7922	13.8176	13.8430	13.8684	13.8938	13.9192	13.9446
0.550	13.9700	13.9954	14.0208	14.0462	14.0716	14.0970	14.1224	14.1478	14.1732	14.1986
0.560	14.2240	14.2494	14.2748	14.3002	14.3256	14.3510	14.3764	14.4018	14.4272	14.4526
0.570	14.4780	14.5034	14.5288	14.5542	14.5796	14.6050	14.6304	14.6558	14.6812	14.7066
0.580	14.7320	14.7574	14.7828	14.8082	14.8336	14.8590	14.8844	14.9098	14.9352	14.9606
0.590	14.9860	15.0114	15.0368	15.0622	15.0876	15.1130	15.1384	15.1638	15.1892	15.2146
0.600	15.2400	15.2654	15.2908	15.3162	15.3416	15.3670	15.3924	15.4178	15.4432	15.4686
0.610	15.4940	15.5194	15.5448	15.5702	15.5956	15.6210	15.6464	15.5718	15.6972	15.7226
0.620	15.7480	15.7734	15.7988	15.8242	15.8496	15.8750	15.9004	15.9258	15.9512	15.9766
0.630	16.0020	16.0274	16.0528	16.0782	16.1036	16.1290	16.1544	16.1798	16.2052	16.2306
0.640	16.2560	16.2814	16.3068	16.3322	16.3576	16.3830	16.4084	16.4338	16.4592	16.4846
0.650	16.5100	16.5354	16.5608	16.5862	16.6116	16.6370	16.6624	16.6878	16.7132	16.7386
0.660	16.7640	16.7894	16.8148	16.8402	16.8656	16.8910	16.9164	16.9418	16.9672	16.9926
0.670	17.0180	17.0434	17.0688	17.0942	17.1196	17.1450	17.1704	17.1958	17.2212	17.2466
0.680	17.2720	17.2974	17.3228	17.3482	17.3736	17.3990	17.4244	17.4498	17.4752	17.5006
0.690	17.5260	17.5514	17.5768	17.6022	17.6276	17.6530	17.6784	17.7038	17.7292	17.7546
0.700	17.7800	17.8054	17.8308	17.8562	17.8816	17.9070	17.9324	17.9578	17.9832	18.0086
0.710	18.0340	18.0594	18.0848	18.1102	18.1356	18.1610	18.1864	18.2118	18.2372	18.2626
0.720	18.2880	18.3134	18.3388	18.3642	18.3896	18.4150	18.4404	18.4658	18.4912	18.5166
0.730	18.5420	18.5674	18.5928	18.6182	18.6436	18.6690	18.6944	18.7198	18.7452	18.7706
0.740	18.7960	18.8214	18.8468	18.8722	18.8976	18.9230	18.9484	18.9738	18.9992	19.0246
0.750	19.0500	19.0754	19.1008	19.1262	19.1516	19.1770	19.2024	19.2278	19.2532	19.2786
0.760	19.3040	19.3294	19.3548	19.3802	19.4056	19.4310	19.4564	19.4818	19.5072	19.5326
0.770	19.5580	19.5834	19.6088	19.6342	19.6596	19.6850	19.7104	19.7358	19.7612	19.7866
0.780	19.8120	19.8374	19.8628	19.8882	19.9136	19.9390	19.9644	19.9898	20.0152	20.0406
0.790	20.0660	20.0914	20.1168	20.1422	20.1676	20.1930	20.2184	20.2438	20.2692	20.2946

TABLE E7 - Millimeter Equivalents of Inches (Continued)
 (Converting decimals of an inch to millimeters)

Inches	0.000 mm	0.001 mm	0.002 mm	0.003 mm	0.004 mm	0.005 mm	0.006 mm	0.007 mm	0.008 mm	0.009 mm
0.800	20.3200	20.3454	20.3708	20.3962	20.4216	20.4470	20.4724	20.4978	20.5232	20.5486
0.810	20.5740	20.5994	20.6248	20.6502	20.6756	20.7010	20.7264	20.7518	20.7772	20.8026
0.820	20.8280	20.8534	20.8788	20.9042	20.9296	20.9550	20.9804	21.0058	21.0312	21.0566
0.830	21.0820	21.1074	21.1328	21.1582	21.1836	21.2090	21.2344	21.2598	21.2852	21.3106
0.840	21.3360	21.3614	21.3868	21.4122	21.4376	21.4630	21.4884	21.5138	21.5392	21.5646
0.850	21.5900	21.6154	21.6408	21.6662	21.6916	21.7170	21.7424	21.7678	21.7932	21.8186
0.860	21.8440	21.8694	21.8948	21.9202	21.9456	21.9710	21.9964	22.0218	22.0472	22.0726
0.870	22.0980	22.1234	22.1488	22.1742	22.1996	22.2250	22.2504	22.2758	22.3012	22.3266
0.880	22.3520	22.3774	22.4028	22.4282	22.4536	22.4790	22.5044	22.5298	22.5552	22.5806
0.890	22.6060	22.6314	22.6568	22.6822	22.7076	22.7330	22.7584	22.7838	22.8092	22.8346
0.900	22.8600	22.8854	22.9108	22.9362	22.9616	22.9670	23.0124	23.0378	23.0632	23.0886
0.910	23.1140	23.1394	23.1648	23.1902	23.2156	23.2410	23.2664	23.2918	23.3172	23.3426
0.920	23.3680	23.3934	23.4188	23.4442	23.4696	23.4950	23.5204	23.5458	23.5712	23.5966
0.930	23.6220	23.6474	23.6728	23.6982	23.7236	23.7490	23.7744	23.7998	23.8252	23.8506
0.940	23.8760	23.9014	23.9268	23.9522	23.9776	24.0030	24.0284	24.0538	24.0792	24.1046
0.950	24.1300	24.1554	24.1808	24.2062	24.2316	24.2570	24.2824	24.3078	24.3332	24.3586
0.960	24.3840	24.4094	24.4348	24.4602	24.4856	24.5110	24.5364	24.5618	24.5872	24.6126
0.970	24.6380	24.6634	24.6888	24.7142	24.7396	24.7650	24.7904	24.8158	24.8412	24.8666
0.980	24.8920	24.9174	24.9428	24.9682	24.9936	25.0190	25.0444	25.0698	25.0952	25.1206
0.990	25.1460	25.1714	25.1968	25.2222	25.2476	25.2730	25.2984	25.3238	25.3492	25.3746
1.000	25.40	-	-	-	-	-	-	-	-	-

Note: All values in this table are exact and are based on 1.000 inch equal to 25.4 millimeters (exactly).

TABLE E8 - Inch Fractions and Decimals to SI Equivalents

Inches Fractions	Inches Decimals	mm	Inches Fractions	Inches Decimals	mm	Inches Fractions	Inches Decimals	mm
-	.0004	.01	-	.4331	11	31/32	.96875	24.606
-	.004	.10	7/16	.4375	11.113	-	.9843	25
-	.01	.25	29/64	.4531	11.509	1	1.000	25.4
1/64	.0156	.397	15/32	.46875	11.906	-	1.0236	26
-	.0197	.50	-	.4724	12	1 1/32	1.0312	26.194
-	.0295	.75	31/64	.48437	12.303	1 1/16	1.062	26.988
1/32	.03125	.794	-	.492	12.5	-	1.063	27
-	.0394	1	1/2	.500	12.700	1 3/32	1.094	27.781
3/64	.0469	1.191	-	.5118	13	-	1.1024	28
-	.059	1.5	33/64	.5156	13.097	1 1/8	1.125	28.575
1/16	.0625	1.588	17/32	.53125	13.494	-	1.1417	29
5/64	.0781	1.984	35/64	.54687	13.891	1 5/32	1.156	29.369
-	.0787	2	-	.5512	14	-	1.1811	30
3/32	.094	2.381	9/16	.5625	14.288	1 3/16	1.1875	30.163
-	.0984	2.5	-	.571	14.5	1 7/32	1.219	30.956
7/64	.1093	2.776	37/64	.57812	14.684	-	1.2205	31
-	.1181	3	-	.5906	15	1 1/4	1.250	31.750
1/8	.1250	3.175	19/32	.59375	15.081	-	1.2598	32
-	.1378	3.5	39/64	.60937	15.478	1 9/32	1.281	32.544
9/64	.1406	3.572	5/8	.6250	15.875	-	1.2992	33
5/32	.15625	3.969	-	.6299	16	1 5/16	1.312	33.338
-	.1575	4	41/64	.6406	16.272	-	1.3386	34
11/64	.17187	4.366	-	.6496	16.5	1 11/32	1.344	34.131
-	.177	4.5	21/32	.65625	16.669	1 3/8	1.375	34.925
3/16	.1875	4.761	-	.6693	17	-	1.3779	35
-	.1969	5	43/64	.67187	17.066	1 13/32	1.406	35.719
13/64	.2031	5.159	11/16	.6875	17.463	-	1.4173	36
-	.2165	5.5	45/64	.7031	17.859	1 7/16	1.438	36.513
7/32	.21875	5.556	-	.7087	18	-	1.4567	37
15/64	.23427	5.953	23/32	.71875	18.256	1 15/32	1.469	37.306
-	.2362	6	-	.7283	18.5	-	1.4961	38
1/4	.2500	6.350	47/64	.73437	18.653	1 1/2	1.500	38.100
-	.2559	6.5	-	.7480	19	1 17/32	1.531	38.894
17/64	.2656	6.747	3/4	.7500	19.050	-	1.5354	39
-	.2756	7	49/64	.7656	19.447	1 9/16	1.562	39.688
9/32	.28125	7.144	25/32	.78125	19.844	-	1.5748	40
-	.2953	7.5	-	.7874	20	1 19/32	1.594	40.481
19/64	.29687	7.541	51/64	.79687	20.241	-	1.6142	41
5/16	.3125	7.938	13/16	.8125	20.638	1 5/8	1.625	41.275
-	.3150	8	-	.8268	21	-	1.6535	42
21/64	.3281	8.334	53/64	.8281	21.034	1 21/32	1.6562	42.069
-	.335	8.5	27/32	.84375	21.431	1 11/16	1.6875	42.863
11/32	.34375	8.731	55/64	.85937	21.828	-	1.6929	43
-	.3543	9	-	.8662	22	1 23/32	1.719	43.656
23/64	.35937	9.128	7/8	.8750	22.225	-	1.7323	44
-	.374	9.5	57/64	.8906	22.622	1 3/4	1.750	44.450
3/8	.3750	9.525	-	.9055	23	-	1.7717	45
25/64	.3906	9.922	29/32	.90625	23.019	1 25/32	1.78125	45.244
-	.3937	10.	59/64	.92187	23.416	-	1.8110	46
13/32	.4062	10.319	15/16	.9375	23.813	1 13/16	1.8125	46.038
-	.413	10.5	-	.9449	24	1 27/32	1.844	46.831
27/64	.42187	10.716	61/64	.9531	24.209	-	1.8504	47

TABLE E8 - Inch Fractions and Decimals to SI Equivalents (Continued)

Inches Fractions	Inches Decimals	mm	Inches Fractions	Inches Decimals	mm	Inches Fractions	Inches Decimals	mm
1 7/8	1.875	47.625	-	3.0709	78	-	4.7244	120
-	1.8898	48	-	3.1102	79	4 3/4	4.750	120.650
1 29/32	1.9062	48.419	3 1/8	3.125	79.375	4 7/8	4.875	123.825
-	1.9291	49	-	3.1496	80	-	4.9212	125
1 15/16	1.9375	49.213	3 3/16	3.1875	80.963	5	5.000	127
-	1.9685	50	-	3.1890	81	-	5.1181	130
1 31/32	1.969	50.006	-	3.2283	82	5 1/4	5.250	133.350
2	2.000	50.800	3 1/4	3.250	82.550	5 1/2	5.500	139.700
-	2.0079	51	-	3.2677	83	-	5.5118	140
-	2.0472	52	-	3.3071	84	5 3/4	5.750	146.050
2 1/16	2.062	52.388	3 5/16	3.312	84.1377	-	5.9055	150
-	2.0866	53	-	3.3464	85	6	6.000	152.400
2 1/8	2.125	53.975	3 3/8	3.375	85.725	6 1/4	6.250	158.750
-	2.126	54	-	3.3858	86	-	6.2992	160
-	2.165	55	-	3.4252	87	6 1/2	6.500	165.100
2 3/16	2.1875	55.563	3 7/16	3.438	87.313	-	6.6929	170
-	2.2047	56	-	3.4648	88	6 3/4	6.750	171.450
-	2.244	57	3 1/2	3.500	88.900	7	7.000	177.800
2 1/4	2.250	57.150	-	3.5039	89	-	7.0866	180
-	2.2835	58	-	3.5433	90	-	7.4803	190
2 5/16	2.312	58.738	3 9/16	3.562	90.4877	7 1/2	7.500	190.500
-	2.3228	59	-	3.5827	91	-	7.8740	200
-	2.3622	60	-	3.622	92	8	8.000	203.200
2 3/8	2.375	60.325	3 5/8	3.625	92.075	-	8.2677	210
-	2.4016	61	-	3.6614	93	8 1/2	8.500	215.900
2 7/16	2.438	61.913	3 11/16	3.6875	93.663	-	8.6614	220
-	2.4409	62	-	3.7008	94	9	9.000	228.600
-	2.4803	63	-	3.7401	95	-	9.0551	230
2 1/2	2.500	63.500	3 3/4	3.750	95.250	-	9.4488	240
-	2.5197	64	-	3.7795	96	9 1/2	9.500	241.300
-	2.559	65	3 13/16	3.8125	96.838	-	9.8425	250
2 9/16	2.562	65.088	-	3.8189	97	10	10.000	254.000
-	2.5984	66	-	3.8583	98	-	10.2362	260
2 5/8	2.625	66.675	3 7/8	3.875	98.425	-	10.6299	270
-	2.638	67	-	3.8976	99	11	11.000	279.400
-	2.6772	68	-	3.9370	100	-	11.0236	280
2 11/16	2.6875	68.263	3 15/16	3.9375	100.013	-	11.4173	290
-	2.7165	69	-	3.9764	101	-	11.8110	300
2 3/4	2.750	69.850	4	4.000	101.600	12	12.000	304.800
-	2.7559	70	4 1/16	4.062	103.188	13	13.000	330.200
-	2.7953	71	4 1/8	4.125	104.775	-	13.7795	350
2 13/16	2.8125	71.438	-	4.1338	105	14	14.000	355.600
-	2.8346	72	4 3/16	4.1875	106.363	15	15.000	381
-	2.8740	73	4 1/4	4.250	107.950	-	14.7480	400
2 7/8	2.875	73.025	4 5/16	4.312	109.538	16	16.000	406.400
-	2.9134	74	-	4.3307	110	17	17.000	431.800
2 15/16	2.9375	74.613	4 3/8	4.375	111.125	-	17.7165	450
-	2.9527	75	4 7/16	4.438	112.713	18	18.000	457.200
-	2.9921	76	4 1/2	4.500	114.300	19	19.000	482.600
3	3.000	76.200	-	4.5275	115	-	19.6850	500
-	3.0315	77	4 9/16	4.562	115.888	20	20.000	508
3 1/16	3.062	77.788	4 5/8	4.652	117.475	21	21.000	533.400

TABLE E9 - Conversion of ksi to MPa (See Note)

ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
1	6.895	51	351.633	101	696.370	151	1041.108
2	13.790	52	358.527	102	703.265	152	1048.003
3	20.684	53	365.422	103	710.160	153	1054.898
4	27.579	54	372.317	104	717.055	154	1061.792
5	34.474	55	379.212	105	723.949	155	1068.687
6	41.369	56	386.106	106	730.844	156	1075.582
7	48.263	57	393.001	107	737.739	157	1082.477
8	55.158	58	399.896	108	744.634	158	1089.372
9	62.053	59	406.791	109	751.529	159	1096.266
10	68.948	60	413.685	110	758.423	160	1103.161
11	75.842	61	420.580	111	765.318	161	1110.056
12	82.737	62	427.475	112	772.213	162	1116.951
13	89.632	63	434.370	113	779.108	163	1123.845
14	96.527	64	441.264	114	786.002	164	1130.740
15	103.421	65	448.159	115	792.897	165	1137.635
16	110.316	66	455.054	116	799.792	166	1144.530
17	117.211	67	461.949	117	806.687	167	1151.424
18	124.106	68	468.844	118	813.581	168	1158.319
19	131.000	69	475.738	119	820.476	169	1165.214
20	137.895	70	482.633	120	827.371	170	1172.109
21	144.790	71	489.528	121	834.266	171	1179.003
22	151.685	72	496.422	122	841.160	172	1185.898
23	158.579	73	503.317	123	848.055	173	1192.793
24	165.474	74	510.212	124	854.950	174	1199.688
25	172.369	75	517.107	125	861.845	175	1206.582
26	179.264	76	524.002	126	868.739	176	1213.477
27	186.158	77	530.996	127	875.634	177	1220.372
28	193.053	78	537.791	128	882.529	178	1227.267
29	199.948	79	544.686	129	889.424	179	1234.162
30	206.843	80	551.581	130	896.318	180	1241.056
31	213.737	81	558.475	131	903.213	181	1247.951
32	220.632	82	565.370	132	910.108	182	1254.846
33	227.527	83	572.265	133	917.003	183	1261.740
34	234.422	84	579.160	134	923.897	184	1268.635
35	241.316	85	586.054	135	930.792	185	1275.530
36	248.211	86	592.949	136	937.687	186	1282.425
37	255.106	87	599.844	137	944.582	187	1289.320
38	262.001	88	606.739	138	951.476	188	1296.214
39	268.896	89	613.634	139	958.371	189	1303.109
40	275.790	90	620.528	140	965.266	190	1310.004
41	282.685	91	627.423	141	972.161	191	1316.898
42	289.580	92	634.318	142	979.055	192	1323.793
43	296.475	93	641.212	143	985.950	193	1330.688
44	303.369	94	648.107	144	992.845	194	1337.583
45	310.264	95	655.002	145	999.740	195	1344.478
46	317.159	96	661.897	146	1006.634	196	1351.372
47	324.054	97	668.791	147	1013.529	197	1358.267
48	330.948	98	675.686	148	1020.424	198	1365.162
49	337.843	99	682.581	149	1027.319	199	1372.057
50	344.738	100	689.476	150	1034.214	200	1378.951

TABLE E9 - Conversion of ksi to MPa (Continued)

ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
201	1385.846	233	1606.478	265	1827.111	297	2047.743
202	1392.741	234	1613.373	266	1834.005	298	2054.638
203	1399.636	235	1620.268	267	1840.900	299	2061.532
204	1406.530	236	1627.163	268	1847.795	300	2068.427
205	1413.425	237	1634.057	269	1854.690	305	2102.901
206	1420.320	238	1640.952	270	1861.584	310	2137.375
207	1427.215	239	1645.847	271	1868.479	315	2171.848
208	1434.109	240	1654.742	272	1875.374	320	2206.322
209	1441.004	241	1661.636	273	1882.269	325	2240.796
210	1447.899	242	1668.531	274	1889.163	330	2275.270
211	1454.794	243	1675.426	275	1896.058	335	2309.744
212	1461.688	244	1682.321	276	1902.953	340	2344.217
213	1468.583	245	1689.215	277	1909.848	345	2378.691
214	1475.478	246	1696.110	278	1916.742	350	2413.165
215	1482.373	247	1703.005	279	1923.637	355	2447.639
216	1489.268	248	1709.900	280	1930.532	360	2482.112
217	1496.162	249	1716.794	281	1937.427	365	2516.586
218	1503.057	250	1723.689	282	1944.321	370	2551.060
219	1509.952	251	1730.584	283	1951.216	375	2585.534
220	1516.846	252	1737.479	284	1958.111	380	2620.008
221	1523.741	253	1744.374	285	1965.006	385	2654.481
222	1530.636	254	1751.268	286	1971.900	390	2688.952
223	1537.531	255	1758.263	287	1978.795	395	2723.429
224	1544.425	256	1765.058	288	1985.690	400	2757.903
225	1551.320	257	1771.952	289	1992.585	405	2792.376
226	1558.215	258	1778.847	290	1999.480	410	2826.850
227	1565.110	259	1785.742	291	2006.374	415	2861.324
228	1572.004	260	1792.637	292	2013.269	420	2895.798
229	1578.899	261	1799.532	293	2020.164	425	2930.272
230	1585.794	262	1806.426	294	2027.058		
231	1592.689	263	1813.321	295	2033.953		
232	1599.584	264	1820.216	296	2040.848		

Note: The converted values are more precise than are required for use in most specifications. In using this Table, follow the rule given in E.7.4.1 for the number of significant figures to be shown in specifications.

TABLE E10 - Standard Wire Cloth Sieve Sizes

Standard ISO, Metric	Alternate Inch	Standard ISO, Metric	Alternate Inch
125 mm	5	4.00 mm	No. 5
106 mm	4.24	3.35 mm	No. 6
100 mm*	4*	2.80 mm	No. 7
90 mm*	3-1/2*	2.36 mm	No. 8
75 mm	3	2.00 mm	No. 10
63 mm	2-1/2	1.70 mm	No. 12
53 mm	2.12	1.40 mm	No. 14
50 mm*	2*	1.18 mm	No. 16
45 mm	1-3/4	1.00 mm	No. 18
37.5 mm	1-1/2	850 µm	No. 20
31.5 mm	1-1/4	710 µm	No. 25
26.5 mm	1.06	600 µm	No. 30
25.0 mm*	1*	500 µm	No. 35
22.4 mm	7/8	425 µm	No. 40
19.0 mm	3/4	355 µm	No. 45
16.0 mm	5/8	300 µm	No. 50
13.2 mm	0.530	250 µm	No. 60
12.5 mm*	1/2*	212 µm	No. 70
11.2 mm	7/16	180 µm	No. 80
9.5 mm	3/8	150 µm	No. 100
8.0 mm	5/16	125 µm	No. 120
6.7 mm	0.265	106 µm	No. 140
6.3 mm*	1/4*	90 µm	No. 170
5.6 mm	No. 3-1/2	75 µm	No. 200
4.75 mm	No. 4	63 µm	No. 230
		44 µm	No. 325

* These non-standard sizes are included because they are in common usage.

NOTE: This table is intended to assist in the proper designation of equivalent inch/pound - metric test sieve sizes in AMS documents. This table is based upon Table I of ASTM E 11-81, Wire-Cloth Sieves for Testing Purposes.

PART F

DETERMINATION OF TENSILE AND COMPRESSIVE STRENGTH PROPERTIES FOR AMS SPECIFICATIONS

INTRODUCTION — This guideline has been established to provide a consistent method that ensures the validity of mechanical property requirements for AMS specifications covering metallic materials. The statistical methods described shall be used to determine the specified limits (also called “S-basis”) for mechanical properties required by the specification such as ultimate tensile strength, tensile yield strength, elongation, reduction of area, compressive yield strength, or other mechanical property characteristics selected by the committee with jurisdiction for the specification. These properties are applicable to the metallurgical form (thickness and heat treat condition) in which the product is purchased and to any related metallurgical form (other condition resulting from response to heat treat) that is also a requirement of the specification (i.e., -T351 and -T851, respectively).

DATA SUBMISSION— The sponsor of a new AMS specification or a revision involving changes to the minimum mechanical properties shall provide with the draft the data to substantiate the new or changed technical requirements for the material. This data shall include consideration of specified sizes, product forms, heat treatments, thermomechanical treatments, and other variables affecting mechanical properties.

Data shall be submitted in electronic format to Battelle <jacksonj@Battelle.org>. Along with the spreadsheet data, provide a text file containing other relevant supporting documentation such as specimen dimensions, gage length, etc. The data’s units of measure shall be noted in each data file.

Tables 1A and 1B, for wrought and cast products respectively, show the type of information to be supplied and the format. The columns (or data fields), in order, will contain alloy type, specification number, temper/heat treatment, lot and/or heat number, product form, product thickness, specimen location, grain direction (for wrought product), and specimen number. Columns will be added towards the right of the specimen number in Tables 1A and 1B as shown in Table 2. Table 2 will contain the individual test results when assembled with Tables 1A or 1B.

When specifying grain direction for wrought products, use the conventions L for longitudinal, LT for long transverse, and ST for short transverse. Products that are anticipated to have significantly different properties in directions other than those stated above should be tested in the appropriate directions and the results reported.

There are several types of product forms covered by AMS; therefore, the term product form should be properly defined and reported in this column. Examples for wrought products are sheet, plate, bar, and forging. Examples for cast products are sand casting, investment casting, and permanent mold casting.

DATA REQUIREMENTS— To compute the S-basis values, it is required that a minimum of 30 observations be provided representing 3 heats, cast, or melts of material. The reason 30 observations are required is due to the fact that the computation of the S-basis value is a function of the number of observations (n). The one-sided tolerance limit factor (k99), as shown in Table 3, has a value near of 3.064 for n equal to 30. Sample sizes less than 30 will have higher one-sided tolerance limit factors (k99) and will generally produce lower S-basis values.

For wrought products, this minimum data set (30 observations) shall be submitted for each thickness range. Another approach for wrought products where the tensile and compressive properties can vary significantly with thickness is to use regression analysis. Regression analysis methods are identified in the subsection on Other Statistical Procedures.

It is also recognized that for new specifications covering recently developed materials, only limited quantities of data may be available. When only very small quantities of data are available, particularly for compressive yield strength, properties may be derived by determining the relationship to an established tensile property. This indirect method of computation using paired ratios is applicable to tensile ultimate and tensile yield strengths in grain directions other than the specified testing direction, and for all grain directions for secondary properties (such as compressive). Paired ratio analysis methods are identified in the subsection on Other Statistical Procedures.

COMPUTATION OF MINIMUM VALUES (S-BASIS)— For tensile and compressive strength properties, the substantiation shall be based upon the analysis of the data using the statistical procedure below. Although the establishment of a specification limit (S-basis*) should be based upon the computation of an estimated S-basis value, the specification value may vary slightly with the estimated S-basis value based upon experience and judgment. For sample sizes ≥ 100 , other statistical methods are preferred as described in Chapter 9 of the MMPDS Handbook.

Ultimate, Yield, and Compressive Strength - This procedure assumes that the data are normally distributed and supports an estimated S-basis value. The specification tensile and compressive strength properties may be determined in the following manner from test data. An estimated S-basis value may be computed by assuming the distribution of the sample population to be normal and utilizing the following equation:

$$S_{est.} = \bar{x} - k_{99} s ,$$

where:

- \bar{x} = sample mean
- s = standard deviation (based upon sample population)
- k_{99} = one-sided tolerance tolerance-limit factor corresponding to a proportion at least 0.99 of a normal distribution and a confidence coefficient of 0.95 (see Table 3).
- S_{est} = estimated S-basis value before rounding.

Round-off Procedure - The standard round-off methods as described in ASTM E29 shall be employed to arrive at whole number S-basis value.

Elongation and Reduction of Area - The S-basis values for elongation and reduction of area may be calculated using the S-basis equation above or, when there is a high degree of scatter, the minimum reported observation may be used.

Other Statistical Procedures - The above statistical procedure is recommended for the substantiation of the minimum mechanical properties; however, the sponsor may elect to apply the statistical procedures in MMPDS to substantiate the minimum mechanical properties provided all the requirements for sample size are met. The methods outlined in Chapter 9 of MMPDS for the computation of the T99 value are to be used (not the T90 methods) to establish the S-basis value for an AMS specification.

Chapter 9 of MMPDS also contains statistical methods to compute the minimum mechanical properties using regression and paired ratios analysis techniques. These procedures may be used to compute the minimum mechanical properties for an AMS specification provided all the data requirements stated in MMPDS for these procedures are met. The methods for the computation of the T99 value are to be used (not the T90 methods) to establish the S-basis value for an AMS specification.

* At least 99 percent of the population of values is expected to equal or exceed the S-basis mechanical property value, with a confidence of 95 percent.

*At least 99 percent of the population of values is expected to equal or exceed the S-basis mechanical property value, with a confidence of 95 percent.

Table 1A - General Data Format for Wrought Products

Alloy Trade Name	Industry or Government Specification Number	Temper or Heat Treatment	Heat or Melt Number	Lot Number	Product Form	Product Thickness (in), or Area (in ²)	Specimen Location	Grain Direction	Specimen Number

Table 1B - General Data Format for Cast Products

Alloy Trade Name	Industry or Government Specification Number	Temper or Heat Treatment	Heat or Melt Number	Lot Number	Product Form	Product Thickness (in)	Specimen Location (Designated, Nondesignated)	Specimen Number

TABLE 2 Data Format for Determination of S-Basis Values

Alloy Trade Name	Specimen No.	TUS ksi	TYS ksi	% E	% R	Elastic Modulus, msi

The information to be entered between these two columns depends upon the product form, see Table 1(a) or 1(b).

Table 3 - One-sided tolerance limit factors, k_{99} , corresponding to at least a 99% proportion of a normal distribution with a confidence of 95% and n-1 degrees of freedom.

n	k_{99}	n	k_{99}	n	k_{99}	n	k_{99}	n	k_{99}	n	k_{99}
		31	3.048	61	2.802	91	2.704	121	2.648	151	2.610
2	37.094	32	3.034	62	2.798	92	2.701	122	2.646	152	2.609
3	10.553	33	3.020	63	2.793	93	2.699	123	2.645	153	2.608
4	7.042	34	3.007	64	2.789	94	2.697	124	2.643	154	2.607
5	5.741	35	2.995	65	2.785	95	2.695	125	2.642	155	2.606
6	5.062	36	2.983	66	2.781	96	2.692	126	2.640	156	2.605
7	4.642	37	2.972	67	2.777	97	2.690	127	2.639	157	2.604
8	4.354	38	2.961	68	2.773	98	2.688	128	2.638	158	2.603
9	4.143	39	2.951	69	2.769	99	2.686	129	2.636	159	2.602
10	3.981	40	2.941	70	2.765	100	2.684	130	2.635	160	2.601
11	3.852	41	2.932	71	2.762	101	2.682	131	2.634	161	2.600
12	3.747	42	2.923	72	2.758	102	2.680	132	2.632	162	2.600
13	3.659	43	2.914	73	2.755	103	2.678	133	2.631	163	2.599
14	3.585	44	2.906	74	2.751	104	2.676	134	2.630	164	2.598
15	3.520	45	2.898	75	2.748	105	2.674	135	2.628	165	2.597
16	3.464	46	2.890	76	2.745	106	2.672	136	2.627	166	2.596
17	3.414	47	2.883	77	2.742	107	2.671	137	2.626	167	2.595
18	3.370	48	2.876	78	2.739	108	2.669	138	2.625	168	2.594
19	3.331	49	2.869	79	2.736	109	2.667	139	2.624	169	2.593
20	3.295	50	2.862	80	2.733	110	2.665	140	2.622	170	2.592
21	3.263	51	2.856	81	2.730	111	2.663	141	2.621	171	2.592
22	3.233	52	2.850	82	2.727	112	2.662	142	2.620	172	2.591
23	3.206	53	2.844	83	2.724	113	2.660	143	2.619	173	2.590
24	3.181	54	2.838	84	2.721	114	2.658	144	2.618	174	2.589
25	3.158	55	2.833	85	2.719	115	2.657	145	2.617	175	2.588
26	3.136	56	2.827	86	2.716	116	2.655	146	2.616	176	2.587
27	3.116	57	2.822	87	2.714	117	2.654	147	2.615	177	2.587
28	3.098	58	2.817	88	2.711	118	2.652	148	2.613	178	2.586
29	3.080	59	2.812	89	2.709	119	2.651	149	2.612	179	2.585
30	3.064	60	2.807	90	2.706	120	2.649	150	2.611	180	2.584

Table 3 - One-sided tolerance limit factors, k_{99} , corresponding to at least a 99% proportion of a normal distribution with a confidence of 95% and n-1 degrees of freedom. (continued)

n	k_{99}	n	k_{99}	n	k_{99}	n	k_{99}	n	k_{99}	n	k_{99}
181	2.583	196	2.572	255	2.540	330	2.512	425	2.489	800	2.443
182	2.583	197	2.572	260	2.537	335	2.511	450	2.484	825	2.441
183	2.582	198	2.571	265	2.535	340	2.509	475	2.480	850	2.439
184	2.581	199	2.570	270	2.533	345	2.508	500	2.475	875	2.438
185	2.580	200	2.570	275	2.531	350	2.506	525	2.472	900	2.436
186	2.580	205	2.566	280	2.529	355	2.505	550	2.468	925	2.434
187	2.579	210	2.563	285	2.527	360	2.504	575	2.465	950	2.433
188	2.578	215	2.56	290	2.525	365	2.502	600	2.462	975	2.432
189	2.577	220	2.557	295	2.524	370	2.501	625	2.459	1000	2.43
190	2.577	225	2.555	300	2.522	375	2.500	650	2.456	1500	2.411
191	2.576	230	2.552	305	2.520	380	2.499	675	2.454	2000	2.399
192	2.575	235	2.549	310	2.518	385	2.498	700	2.451	3000	2.385
193	2.575	240	2.547	315	2.517	390	2.496	725	2.449	5000	2.372
194	2.574	245	2.544	320	2.515	395	2.495	750	2.447	10000	2.358
195	2.573	250	2.542	325	2.514	400	2.494	775	2.445		2.326

PART G NONMETALLIC MATERIALS

Addendum to EDITORIAL STYLE MANUAL for the Preparation of Aerospace Material Specifications (AMS)

D. B. Hester, Editorial Consultant, February, 2000

TABLE OF CONTENTS

G.1 GENERAL

- Typing, Drafting
- Indicating Revisions
- Specification Titles
- Specification of Sections
- Trademarks
- Vendor, Manufacturer, Supplier, Re-Packager Terminology

G.2 SCOPE SECTION

G.3 APPLICABLE DOCUMENTS SECTION

G.4 TECHNICAL REQUIREMENTS SECTION

- G.4.1 Special Requirements for Nonmetallic Specifications:
 - Test Temperatures
 - Standard Test Temperatures
 - Standard Test Conditions
- G.4.2 Abbreviations (Symbols) for Plastics and Rubbers
- G.4.3 Subjects in the REQUIREMENTS Section
 - G.4.3.1 Detail Specification or Basic Specification Requirements
 - G.4.3.2 Composition Paragraph
 - G.4.3.3 Material or Material and Fabrication Paragraph
 - G.4.3.4 Finish Paragraph
 - G.4.3.5 Properties Paragraphs
 - G.4.3.6 Quality Paragraphs
 - G.4.3.7 Sizes Paragraphs
 - G.4.3.8 Tolerances Paragraphs

G.5 QUALITY ASSURANCE SECTION

- G.5.1 Responsibility for Inspection Paragraphs
- G.5.2 Source Approval (NADCAP)
- G.5.3 Classification of Tests Paragraphs
- G.5.4 Sampling and Testing Paragraphs
- G.5.5 Approval Paragraphs
- G.5.6 Test Methods Paragraphs
- G.5.7 Reports Paragraph
- G.5.8 Resampling and Retesting Paragraphs

G.6 PREPARATION FOR DELIVERY SECTION

- G.6.1 Protective Treatment Paragraph
- G.6.2 Identification Paragraphs
- G.6.3 Packaging Paragraphs
- G.6.4 Combined Packaging and Identification Paragraphs

G.7 ACKNOWLEDGEMENT SECTION

G.8 REJECTIONS SECTION

G.9 NOTES SECTION

- Change Bar
- Qualified Products List Procedures
- Key Words
- Jurisdiction
- Miscellaneous Phrases and Wording

G.1 GENERAL

Guidelines as in Part A of Editorial Style Manual shall be used.

Typing, Drafting	(See A.1)
Indicating Revisions	(See A.3)
Specification Titles	(See A.4)
Specification of Sections	(See A.5)

Exceptions, as deemed applicable only to nonmetallic materials should not as a rule be necessary. Where needed to ensure clarity, exceptions shall be made with caution.

Trademarks shall not be used. Use generic or scientific names of materials. Occasionally use of a specific trade name of test equipment or a reference material is necessary; in that case equivalent sources shall be indicated, if possible, or a disclaimer that use of a trade name does not constitute an endorsement by SAE.

In the "APPLICATION" paragraph for nonmetallics, add the following sentence to accommodate unanticipated but practical uses of a material (other than its usual intended use) for which requirements may overspecify the product: "Each application should be considered separately".

The word "manufacturer", or "supplier", or "re-packager" as appropriate shall replace the word "vendor" throughout.

G.2 SCOPE SECTION

Guidelines as in Part A (See A.6) of Editorial Style Manual shall be used.

Exceptions, as deemed applicable only to nonmetallic materials should not as a rule be necessary. Where needed to ensure clarity, exceptions shall be made with caution.

This section must clearly define whether the nonmetallic material specification defines Finished Parts (e.g.: O-ring), or Uncured Materials (e.g.: curative base polymeric material, as for example in some sealants and coatings), Reference Materials (e.g.: reference rubbers or reference fluids), Packaging and Identification, Tolerances, or other categories, as needed.

Materials which may be covered by a Nonmetallic AMS shall include the following: Plastics and polymers (laminated plastics, polymeric composites, molded parts, sheet, tubing, etc.), elastomers or rubber (parts, uncured rubber, foamed, etc.), sealants, organic coatings, fluids (solvents, lubricants, etc.), ceramics, cloth (cotton, fiberglass, carbon, rubber coated fabrics, etc.), reinforced hose, gaskets, etc., and other nonmetallic materials not otherwise categorized above.

G.3 APPLICABLE DOCUMENTS SECTION

Guidelines as in Part A (See A.6) of Editorial Style Manual shall be used.

Exceptions, as deemed applicable only to nonmetallic materials should not as a rule be necessary. Where needed to ensure clarity, exceptions shall be made with caution.

Applicable documents frequently used in nonmetallic specifications may include the following:

SAE Publications:

AS5127	Methods for Testing Aerospace Sealants
AS5127/1	Methods for Testing Aerospace Sealants, Two-Component Synthetic Rubber Compounds
AS5127/2	Methods for Testing Aerospace Sealants, Firewall Sealant Flame Penetration (proposed)
AS7001	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Program Description
AS7002	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Rules for Implementation
AS7003	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Program Operation
AS7200/1	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Audit and Inspection Procedures and Checklists for the Sealant Manufacturers Accreditation Program
AS7201	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Requirements for Accreditation of Pass-Thru Distributors
AS7202	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Requirements for Accreditation of Value Added Distributors
PD 2000	Procedures for an Industry Qualified Product management Process

Note: Where both an AMS and a parallel metric MAM are published, both the AMS and the MAM shall be listed if referenced in Applicable Documents.

ASTM Publications:

ASTM D 1349	Rubber - Standard Temperatures for Testing
ASTM D 832	Rubber Conditioning for Low-Temperature Testing
ASTM D 1418	Rubber and Rubber Latices - Nomenclature

ISO Publications:

ISO 1043	Plastics - Symbols and Abbreviated Terms
	Part 1: Basic polymers and their special characteristics
	Part 2: Fillers and reinforcing materials
	Part 3: Plasticizers
	Part 4: Flame retardants

G.4 TECHNICAL REQUIREMENTS SECTION

This section shall define characteristics required to ensure that the product or parts procured to the specification will be satisfactory for the intended use (misapplication excepted).

Include the fewest requirements necessary to define adequately the properties and quality of the product. Other properties which will be inherent in the product if the specified requirements are met, or which may be of interest to designers but do not help to define and control the product, may be included in the "NOTES" section of the specification for information.

Express all requirements as "mandatory" requirements in the usual manner, i.e.:

"--- shall be ---",

"--- shall have ---", or

"--- shall conform to ---".

The "Classification of Tests" paragraphs in Section 4 of the specification shall defined the required frequency of testing.

Test methods for determining conformance to requirements stated in this section are to be specified in the paragraph stating the requirement, in an introductory paragraph to a series of requirements when the test method(s) can be stated by reference to ASTM or other standard methods of test, or by a comparatively simple statement of test procedure. When it is necessary to detail completely the procedure(s) for one or more tests, the requirement statement shall be as follows: "---, determined in accordance with 4.X.Y." The procedure would then be detailed in 4.X.T., the appropriate paragraph in the "QUALITY ASSURANCE PROVISIONS" section of the specification.

G.4.1 Special Recommendations for Nonmetallic Specifications:

Test Temperatures:

In some cases the recommended use temperature indicated in the "Application" paragraphs might be higher than the test temperature specified in Sections 3 and 4. This may occur to ensure testing reproducibility and evaluation under standard test conditions for a particular product.

Relative terms should be used cautiously regarding service temperature in "Application". Expressions of "up to XXX °C (YYY °F)" imply extended use up to these temperatures. The term "long-term" generally implies over 1000 hours, while "short-term" mean anything less. If possible, provide a temperature-time relationship, as for example:

"This product, properly applied, may be expected to maintain useful properties at the following approximate time-temperature exposures:

1000 hours at 250 °C (482 °F)
100 hours at 300 °C (572 °F)
10 hours at 400 °C (752 °F)

Suggested Standard Test Temperatures - (See Table G1):

Equivalent Celsius and Fahrenheit temperatures frequently used are shown in Table G1. Depending on whether °C or °F is primary, a selection of round integral numbers are usually preferred, since temperature range tolerances are usually required. ASTM D 1349 and ASTM D 832 list frequently used test temperatures for rubber (see Table G3).

TABLE G1 - Suggested Standard Test Temperatures
For Use in Nonmetallic Material Specifications

°C	°F	°C	°F	°C	°F	°C	°F
-85	-121	4.4	40	85	185	225	437
-80	-112	10	50	90	194	230	446
-75	-103	15	59	95	203	232	450
-70	-94	15.6	60	100	212	240	464
-65	-85	20	68	110	230	246	475
-62.2	-80	21.1	70	115	239	250	482
-60	-76	23	73.4	120	248	254	490
-55	-67	23.9	75	121	250	260	500
-54	-65	25	77	125	257	266	510
-50	-58	26.7	80	130	266	271	520
-45	-49	30	86	135	275	274	525
-40	-40	32.2	90	140	284	280	536
-35	-31	37.8	100	145	293	285	545
-30	-22	40	104	149	300	288	550
-25	-13	43.3	110	150	302	296	565
-21	-6	48.9	120	155	311	300	572
-20	-4	50	122	160	320	316	600
-18	0	54.4	130	165	329	325	617
-15	5	55	131	170	338	350	662
-12.2	10	60	140	175	347	375	707
-10	14	65.6	150	176	350	399	750
-6.7	20	70	158	190	374	427	800
-3.9	25	75	167	200	392	450	842
-1.1	30	79.4	175	210	410	475	887
0	32	80	176	221	430	500	932

Room Temperature is defined as 20 to 30 °C (68 to 86 °F).

Recommended tolerances for tests are as follows:

TABLE G2 - Recommended Temperature Tolerances

°C		°F	
Below -55	±3	Below -67	±5
-55 to +100	±1	-67 to +212	±2
Above +100	±3	Above +212	±5

Where more liberal tolerances can be specified, use ±5 °C and ±10 °F.

For testing aerospace sealants, tolerances shall be in accordance with AS5127. AS5127 defines Standard Tolerance for temperatures (±1 °C and ±2 °F) as well as for other measurement units.

TABLE G3 - ASTM D 1349 Test Temperatures for Rubber

°C	°F	°C	°F
-75	-103	85	185
-55	-67	100	212
-40	-40	125	257
-25	-13	150	302
-10	14	160	320
0	32	175	347
23	73.4	200	392
40	104	225	437
55	131	250	482
70	158		

TABLE G4 - ASTM D 832 Low Temperature Tests for Rubber

°C	°F	°C	°F
-70	-94	-10	14
-55	-67	0	32
-40	-40	23	73.4
-25	-13		

Standard Test Conditions:

Standard test conditions for laboratory testing shall be 75 °F ± 5 (24 °C ± 3) and 50% RH ± 15 unless otherwise specified. For sealants, AS5127 defines Standard Test Conditions for laboratory testing as 77 °F (25 °C), and 50% RH ± 5.

G.4.2 Abbreviations (Symbols) for Plastics and Rubber Polymers: See Tables G5 and G6)

Use the following abbreviations in the specification title and in the "Form" and "Material" paragraphs. The abbreviations should be enclosed in parenthesis (XX) and should be preceded by the written word or words being abbreviated; subsequent references to such words in the text can then be indicated by the appropriate abbreviations.

TABLE G5 - Plastics Abbreviations (From ISO Recommendation R1043)

Plastic	Abbreviation	Plastic	Abbreviation
Acrylonitrile-Butadiene-Styrene	ABS	Polyacetal	POM
Carbocmethyl Cellulose	CMC	Polyamide	PA
Casein	CS	Polyimide	PI
Cellulose Acetate	CA	Polyamide-Imide	PAI
Cellulose Acetate Butyrate	CAB	Polyaryl Sulfone	PAS
Cellulose Acetate Propionate	CAP	Polyaryletherketone	PAEK
Cellulose Nitrate	CN	Polybutylene Terephthalate	PBT
Cellulose Propionate	CP	Polycarbonate	PC
Cresol-Formaldehyde	CF	Polychloro-trifluoroethylene Homopolymer	PCTFE
Epoxy, epoxide	EP	Polyether Ketone	PEK
Ethyl Cellulose	EC	Polyether Sulfone	PES
Ethylene Vinyl Acetate	EVA	Polyetheretherketone	PEEK
Ethylene Vinyl Alcohol	EVOH	Polyetherimide	PEI
Fluorinated Ethylene Propylene	FEP	Polyethylene	PE
High Density Polyethylene	HDPE	Polyethylene Terephthalate	PET
Liquid Crystal Polymer	LCP	Polyisobutylene	PIB
Low Density Polyethylene	LDPE	Polyisobutylene Oxide	PPO
Melamine Formaldehyde	MF	Polyisobutylene Sulfide	PPS
Perfluoroalkoxy	PFA	Polyoxymethylene, Polyformaldehyde, (Polyacetal)	POM
Phenol-Formaldehyde	PF	Polypropylene	PP
Polydiallyl Phthalate	PDAP	Polystyrene	PS
Polyethylene Terephthalate	PETP	Polysulfone	PSO
Polymethyl Methacrylate	PMMA	Polytetrafluoroethylene	PTFE
Polyvinyl Acetate	PVAC	Polyurethane	PUR
Polyvinyl Alcohol	PVAL	Styrene-Acrylonitrile	SAN
PolyvinylButyral	PCB	Styrene-Butadiene	SB
Polyvinyl Chloride	PVC	Styrene Maleic Anhydride	SMA
Polyvinyl Chloride Acetate,	PVCA	Ultra High Molecular Weight Polyethylene	UHMW
Polyvinyl Chloride-Covinyl Acetate			
Polyvinyl Fluoride	PVF	Urea Formaldehyde	UF
Polyvinyl Formal	PVFM	Unsaturated Polyester	UP
Polyvinyl Vinylidene Chloride	PVDC		

TABLE G6 - Rubber/Elastomer Abbreviations (From ASTM D 1418)

Rubber/Elastomer	Abbreviation	Rubber/Elastomer	Abbreviation
Acrylate-Acrylonitrile	ANM	Methyl-Phenyl-Vinyl-Silicone	PVMQ
Acrylate-Butadiene	ABR	Methyl Silicone	MQ
Acrylonitrile -Butadiene	NBR	Methyl-Vinyl-Silicone	VMQ
Acrylonitrile - Chloroprene	NCR	Natural Rubber	NR
Acrylonitrile - Isoprene	NIR	Perfluoro Rubber	FFKM
Block Copolymer Styrene-Butadiene	YSBR	Polyacrylate	ACM
Block Copolymer Styrene-Butadiene and Carboxylic Acid	YXSBR	Polyacrylate-ethylene	AEM
Bromo-Isobutylene-Isoprene	BIIR	Polybutadiene	BR
Carboxylic-Nitrile-Butadiene	XNBR	Polychloro-Trifluoroethylene	CFM
Chloro Butyl	CIIR	Polychloroprene	CR
Chloro-Isobutene-Isoprene			
Chloro-Sulfonyl-Polyethylene	CSM	Polyester Urethane	AU
Chloropolyethylene	CM	Polyether Urethane	EU
Chloroprene	CR	Polyetherester	YBPO
		Thermoplastic Rubber	
Epichlorohydrin copolymer	ECO	Polysulfide	T
Epichlorohydrin Homopolymer	CO	Polypropylene Oxide and Allyl Glycidyl Ether	GPO
Ethylene-Propylene	EPM	Polysulfide Rubbers	OT, EOT
Ethylene-Propylene-Diene Modified	EPDM	Silicone	SI
Ethylene-Vinyl Acetate Copolymers	EAM	Styrene-Butadiene	SBR
Fluorocarbon	FKM	Styrene-Chloroprene	SCR
Fluorosilicone	FVM or FVMQ	Styrene-Isoprene	SIR
Hydrogenated Acrylonitrile-Butadiene	HNBR	Tetrafluoroethylene-Propylene	FEPM
Isobutene-Isoprene	IIR	Tetrafluoroethylene-Trifluoronitroso-Methane-Nitroso-Perfluorobutyric Acid	AMFU
Isoprene, Synthetic	IR	Vinylpyridine-Butadiene	PBR
Isoprene, Natural	NR	Vinylpyridine-Styrene-Butadiene	PSBR
Methyl-Phenyl-Silicone	PMQ		

G.4.3 Subjects in the REQUIREMENTS Section:

Shall be shown in the following sequence; only those subjects applicable shall appear and shall be numbered consecutively:

- Detail Specification or Basic Specification
- Composition
- Material (or Material and Fabrication)
- Finish
- Properties
- Quality
- *Sizes
- *Tolerances
- *may be combined

G.4.3.1 Detail Specification or Basic Specification Paragraphs:

These paragraphs shall be used only in those specifications that specify requirements applicable to a family of closely related materials and in the accompanying detail specifications with requirements applicable to a specific material in that family. The "Detail Specification" paragraph shall appear in the basic specification, and the "Basic Specification" paragraph shall appear in the detail specification. Standard wordings shall be as follows:

Paragraph for Use in Basic Specifications:

"3.1 Detail Specifications:

The requirements for a specific product shall consist of all requirements specified herein in addition to requirements specified in the applicable detail specification. In case of conflict between requirements of this basic specification and an applicable detail specification, requirements of the detail specification shall govern."

Paragraph for Use in Detail Specifications:

"3.1 Basic Specifications:

The complete requirements for procuring the product described herein shall consist of this document and the latest issue of the basic specification, AMS XXXX."

G.4.3.2 Composition Paragraph:

This paragraph shall be used to describe the composition of the product whenever it is possible to do so quantitatively. Representative standard wording is as follows:

"3.X Composition

"3.1.X Product, by Weight:

	min	max
Nonvolatile	50%	--
Volatile	--	50%

"3.X.1.1 Nonvolatile:

	min	max
Resin	74%	75%
Pigment	25%	26%

"3.X.1.1.1 Resin: Shall be a thermosetting phenolic type with softening agents added; it shall be free from rosin, rosin derivatives, oils, and cellulosic derivatives.

"3.X.1.1.2 Pigment: Shall be a mixture of carbon black and animal black in proportions required to produce an enamel meeting the requirements of 3.Y.

"3.X.1.2 Volatile: Shall be an organic solvent composed of one or more of the following types of compounds: alcohols, esters, hydrocarbons, and ketones."

G.4.3.3 Material or Material and Fabrication Paragraph:

The “Material” paragraph is generally used in lieu of the “Composition” paragraph when the constitution of the material is expressed only in qualitative terms. When some processing of the material is to be specified in this paragraph, the title “Material and Fabrication” should be used. Representative standard wordings are as follows:

Material Paragraph (examples):

Molded Plastics:

“3.X Material:

Shall be a polyamide (PA) resin with any necessary fillers, modifiers, and plasticizers required to meet the requirements of 3.Y.”

“3.X Plastic Tubing:

Tubing shall be made from virgin polytetrafluoroethylene (PTFE) free from contamination and from foreign, reground, and scrap materials. It shall be processed to meet the requirements of 3.Y.”

Petroleum Solvents:

“3.X Material:

Shall consist of a carefully refined, straight-run distillate from crude petroleum without the admixture of benzol, ether, alcohols, chlorinated hydrocarbons, and other compounds not occurring naturally in crude petroleum.”

Material and Fabrication Paragraph (examples):

Glass Fiber and (Polymer Name*) Rubber Sheet:

“3.X Material and Fabrication:

The product shall be made from selected glass fabric and heat-resisting rubber compounds bonded and felted together under pressure into a pliable, resilient sheet.”

*Represents the principal polymer name, such as “acrylonitrile-butadiene” or “chloroprene”. If polymer control is not required and any rubber polymer can be used, the word “synthetic” may be used.

Rubber Coated Fabrics:

“3.X Material and Fabrication:

The product shall consist of a single ply of woven cotton fabric impregnated and coated on both sides with a chloroprene (CR) rubber compound. Thickness of coating shall be substantially uniform on both sides of the sheet.”

Reinforced Hose:

“3.X Material and Fabrication:

3.X.1 Hose: Shall consist of an acrylonitrile-butadiene (NBR) rubber inner tube, single wire braided reinforcement, and a chloroprene (CR) rubber cover. In addition to the steel, wire reinforcement, one or more textile braids or plies may be incorporated at the manufacturer’s option.

3.X.1.1 Tube: Shall be a seamless, continuous extrusion of fuel resistant rubber. Thickness of tube shall be not less than 0.078 inch (1.98 mm). The bore shall be smooth and free from pitting and from objectionable cuttings, borings, and cements.

3.X.1.2 Reinforcement: Shall be evenly and firmly braided and shall be free from dirt, lumps, and irregularities of braid.

3.X.1.3 Cover: Shall be chloroprene (CR) rubber, or other polymer or blends having equivalent resistance to weathering and petroleum products, and shall be free from pitting.”

Laminated Plastics:

“3.X Material and Fabrication: The product shall be flat sheets, consisting of laminations of cotton fabric which have been impregnated with a thermosetting, phenolic type of synthetic resin, and properly cured.”

Change “cotton”, “phenolic type”, or both as applicable to the product specified.

G.4.3.4 Finish Paragraph:

This paragraph is used to describe the type of surface required in the product as a result of manufacturing operations or the treatment to prepare it for further operations or for service. Representative standard wordings are as follows (modify the product-type adjectives as necessary):

Foamed Elastomers:

“3.X Finish:

All surfaces of sheet and strip shall have a cut finish.”

Laminated Plastics:

“3.X Finish:

Shall be buffed.”

Cloth Not Used in Resin Impregnated Composites: The word “cloth” is preferred to “fabric”, which is usually used to denote “fabric style” with an identifying number following:

”3.X Finish:

Cloth shall be uniformly finished in accordance with the best practice for high-grade airplane cloth. Finishing shall consist of washing, framing, and calendering. The calendering shall be sufficient to lay any nap present and shall provide a smooth, even surface. Nap may be removed by singeing.”

Cloth Used in Resin Impregnated Composites:

“3.X Finish:

The finish shall be compatible with, and produce the required performance characteristics for the resin system specified in the applicable impregnated cloth specification, the laminate specification, or the procuring document.

Note: A distinction should be made between “size” and “sizing”, which is applied to facilitate yarn formation or cloth weaving, and “finish”, which is applied to enhance the bond between the filament or yarn fiber surfaces and the impregnating resin to achieve the required performance characteristics.

G.4.3.5 Properties Paragraphs:

These paragraphs shall include numerical or verbal limits for properties required of the product or parts. Within a group of specifications for a similar type and form of commodity, properties shall be shown in a standard sequence established by the cognizant commodity committee. In general, properties of the as-received product shall be listed first, followed by any properties after further processing or exposure to deteriorating media.

In specifications for most nonmetallic materials, there generally should be an introductory paragraph followed by one or more tabulations and paragraphs of requirements, as follows:

“3.X Properties:

The product shall conform to the requirements of Table 1, Table 2*, 3.X.X*, and 3.X.Y*; test shall be performed on the product supplied and in accordance with specified test methods, insofar as practicable.

*Omit if all requirements are in paragraphs with Table 1.

TABLE 1 – Properties

Paragraph	Property	Requirement	Test Method
3.X.1	Hardness, Durometer “A” or equivalent	50 ± 5	ASTM D 2240

“To Be Reported” or “TBR” shall not be used. When such requirements are found in existing specifications, they shall be removed by the editor. (While well intended and apparently for the purpose of data collection, as for setting of a future limit, it is in practice an impractical procedure and is almost never completed.)

Begin the paragraph numbering with the first property, i.e., do not include a category titled “As Received”.

In the Test Method column, enter the ASTM or other standardized test method and any specific conditions needed, or a paragraph number if the method is stated in another paragraph in the specification; use the following notation for fluid resistance tests:

ASTM D 471
Ref. Fuel B
20 to 30 °C
(68 to 86 °F)
168 hours ± 0.5

The above notation is specifically for Aromatic Fuel Resistance (30%). For other tests, enter the appropriate fluid requirement in place of "Ref. Fuel B", and the appropriate temperature and time requirements, e.g.:

Anti-Icing Fluid Resistance:	AMS 1425
Aliphatic Fuel Resistance:	ASTM Ref. Fuel B
Aromatic Fuel Resistance (10%):	AMS 3022 or AMS 2629
Diester Lubricating Oil Resistance:	AMS 3020 or ARM 200
Petroleum Hydraulic Oil Resistance:	AMS 3020 (ARM 201) or ASTM Oil No. 3
Petroleum Lubricating Oil Resistance:	Ref. Oil No. 1
Phosphate Ester Resistance:	AS1241, Type IV, CL1, Grade A

When a specification covers a single form of product, a single type of material, or a single type of part, use the name of the form, material, or part in place of "the product". For example: Sheet, Enamel, Rings, etc.

When it is necessary to control the direction of testing or to control other factors such as conditioning of the product for testing or limiting dimensions to which the requirements apply, the above wording shall be modified as necessary.

When required to provide a description of required properties in other than numerical terms and for which testing to determine conformance is not normally expected, such properties shall be specified in subparagraphs following those in which properties are expressed numerically.

When properties are specified in a series of paragraphs rather than in tabular form, specify the test methods by the expression: "----, determined in accordance with ----".

In specifications for elastomeric O-rings, use the following wording as an introduction to the tabulated properties:

"3.X Properties:

Rings shall conform to the requirements shown in Table 1; tests shall be performed in the rings supplied, and except as otherwise specified herein, in accordance with ASTM D 1414, insofar as practicable. Tensile strength testing is not required on rings which are too small to permit assembly on rollers for testing and are, after cutting, too short to permit testing as a single strand. Eliminating testing for tensile strength does not eliminate testing for elongation; elongation test can be performed by stretching a ring over a mandrel of a size, which will stretch the ring sufficiently to produce the required elongation when measured on the ID of the ring. Calculations of tensile strength and elongation may be made in accordance with AIR851. In general, finished O-rings rather than mill-mixed batch shall be tested; however more expensive materials (AMS 7257, for example) shall be the exception."

In specifications of the type described in G.4.3.1 (Detail Specification or Basic Specification Paragraphs), for resin-impregnated cloths and fibers in tape or sheet form, use the following wordings in the basic and detail specifications:

In Basic Specifications:

"3.X Properties:

"3.X.1 Uncured Impregnated Product:

The as-received product shall conform to the requirements of this specification and the applicable detail specification. Tests shall be performed on the product supplied and in accordance with test methods specified herein.

3.X.2 Cured Laminate:

Test laminates shall conform to the requirements of this specification and the applicable detail specification. Tests shall be performed on specimens cut from laminates prepared and tested in accordance with 4.X.”

In Detail Specifications:

“3.X Properties:

“3.X.1 Uncured Impregnated Product:

Shall conform to the requirements shown in Table 1; tests shall be performed on the product after warming to above the dew point prior to sampling and in accordance with test methods listed in the basic specification.

“3.X.2 Cured Laminate:

Shall conform to the following requirements; tests shall be performed on specimens cut from a test panel prepared and tested in accordance with methods specified in the basic specification.

“3.X.2.1 Mechanical Properties:

Shall be as specified in Table 2.

“3.X.2.2 Density:

Shall be determined on the test laminate used to determine mechanical properties; values for each test laminate shall be reported. Fiber density and cured resin density shall also be reported.

“3.X.2.3 Void Content

Shall not be greater than x%.”

In specifications requiring flammability controls, use the following:

Liquid or Viscous Materials: Specify “Flash Point” as follows:

“3.X.Y Flash Point:

Shall not be lower than XX °C (YY °F), determined in accordance with _____.” (Insert appropriate test method.)

Materials Requiring FAA Flame Resistance: For such products, include the following paragraph; also see G.5.5:

3.X.Y.Z Flame Resistance:

Time to extinguish, defined as the total of flame time and glow time, shall not exceed 5.0 seconds average or 6.0 seconds individual. Burn length shall not exceed 6.0 inches (152 mm) average or 7.0 inches (178 mm) individual. Specimens shall be tested in the vertical positions with 60 seconds ± 1 flame exposure in accordance with 4.5.X.”

For Flame Resistance of sealants, see AS5127/2 (proposed).

Other Flame Resistance:

“3.X.Y Flammability, V.V inch per minute Burning rate, (V.V mm/sec) Maximum	ASTM D 635 Use specimen 1/8 inch (3.2 mm) in nominal thickness
---	---

G.4.3.6 Quality Paragraphs:

These paragraphs shall describe the cleanliness, workmanship, and freedom from imperfections, generally in qualitative terms, required for the product. The most widely used standard wording in specifications for materials is as follows:

“ , as received by purchaser, shall be uniform in quality and condition, and free from foreign materials and from imperfections detrimental to the usage of the product.”

or

“ , as received by purchaser, shall be uniform in quality and condition, and free from foreign materials and from other imperfections detrimental to the usage of the product.”

In the paragraphs quoted above, use the term “The product” as the first two words and “product” as the last word, except in the following cases:

In specifications covering a single product (e.g., enamel, thinner, fuel) or a single form of a product, use the name of the product or the name of the form as the first word.

In specifications for parts, use “Parts” as the first word, or, if the specification covers only one type of part, use the name of the part (e.g., “Rings”).

G.4.3.7 Sizes Paragraphs:

These paragraphs shall be used to specify standard sizes in which a product is produced or to control one or more nominal dimensions of the product supplied. These paragraphs in specifications for nonmetallic materials are commonly combined with the “Tolerances” paragraphs, using the heading “Sizes and Tolerances”.

G.4.3.8 Tolerance Paragraphs:

These paragraphs shall be used to specify tolerances permitted in dimensions, weight, or volume, both in inch/pound units and SI (metric) units. Tolerance will normally be specified in tables in each specification except where tolerances for products of the same general type are specified in a specification for tolerances.

When tolerances are specified by a reference to a “TOLERANCES” specification, such as AMS 2279 or MAM 2279, use the following wording:

“3.X Tolerances:

Shall be in accordance with AMS XXXX or MAM XXXX.”

In stating sizes and tolerances, decimal figures based on existing industry practices shall be specified unless industry practice is to use fractions.

Note: When fractions are used as “size designators” or “identifiers”, show the decimal equivalent for the nominal size with the applicable decimal tolerance.

In headings of columns for thickness and other dimensions in tables, the word “nominal” shall be used in place of “ordered” or “specified”.

Specifications shall not include tolerances for products such as castings and molded shapes because such tolerances are influenced by the size and shape of the piece and hence would be specified on the part drawing.

G.5 QUALITY ASSURANCE PROVISIONS SECTION:

This section shall describe the type and extent of sampling and testing and the sampling procedures for ensuring the production capability and reliability of the product. Test procedures shall be included in this section if not included in the “Properties” paragraphs (See G.4). Subjects in this section shall be shown in the following sequence; only those subjects applicable shall appear and shall be numbered consecutively:

- Responsibility for Inspection
- Classification of Tests
- Sampling and Testing
- Approval
- Test Methods
- Reports
- Resampling and Retesting

G.5.1 Responsibility for Inspection Paragraphs:

This paragraph shall read as follows; the 4.X mentioned therein shall be the number heading the “Reports” paragraph which appears farther along in most specifications.

“4.1 Responsibility for Inspection:

“The manufacturer of the product shall supply all samples and shall be responsible for all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.”

If a specification covers a single form of a product (e.g., tubing, sheet, rings, coating, enamel, etc.), change “product” to the name of the form in both the first and third sentences.

G.5.2 Source Inspection:

The following paragraph shall be added immediately after Responsibility for Inspection when the product is subject to source inspection, such as NADCAP approval of sealant suppliers:

“4.1.1 Source Inspection

“Material procured by the U. S. Military under this specification shall be third party approved prior to shipment, to ensure that material meets acceptance tests (4.2.1). Third party approval shall be by a third party accreditation process in accordance with AS7001, AS7002, AS7003, ad AS7200/1. Sealant shall be from a manufacturer that currently holds a third party accreditation and shall be from a batch of material that has been third party source inspected in accordance with AS7200/1. Distributors supplying sealant shall supply material from an accredited manufacturer and from a batch of material that has been third party source inspected. Distributors shall also be third party accredited in accordance with AS7201 or AS7202, whichever is applicable.

G.5.3 Classification of Tests Paragraphs:

These paragraphs shall define, in the following sequence, those requirements from the "TECHNICAL REQUIREMENTS" section for which the manufacturer is required to conduct tests or have tests conducted:

Acceptance Tests: For which testing of each lot or batch is required.

Periodic Tests: For which tests are to be conducted at intervals but not on each lot or batch. Periodic tests generally are applicable only to long-run or continuous production materials.

Preproduction Tests: For first article approval and after significant changes in processing. Use this paragraph only when an "Approval" paragraph is included.

When testing to all requirements is required on each lot or batch, the single paragraph of 4.X shall be used when an "Approval" paragraph is not included in the specification; the wording of 4.Y shall be used when an "Approval" paragraph is part of the specification.

"4.X Classification of Tests:

All technical requirements are acceptance tests and shall be performed on each lot.

"4.Y Classification of Tests:

All technical requirements are acceptance tests, however, preproduction tests shall also include such additional tests as required by the purchaser and shall be performed prior to or on the initial shipment of a product by the manufacturer, on each lot, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required."

When testing to all requirements is not required to represent each shipment, either two or three paragraphs shall be used. The first paragraph shall specify the "Acceptance Tests" using the wording of the following as applicable. When no "Periodic Tests" as defined above are specified, only two paragraphs shall be used and the second paragraph shall specify the "Preproduction Tests". When periodic tests for some requirements are specified, three paragraphs shall be used; the second paragraph shall specify the "Periodic Tests" and the third paragraph shall specify the "Preproduction Tests". The wording for this third paragraph, when used, shall be the same as shown in 4.2.2 as below.

A typical wording when "Acceptance Tests" and "Periodic Tests" are specified is as follows:

"4.2 Classification of Tests:

"4.2.1 Acceptance Tests: Hardness (3.X.A.A), tensile strength (3.X.B.B), elongation (3.X.C.C), and specific gravity (3.X.D.D) are acceptance tests and shall be performed on each lot.

"4.X.2 Periodic Tests: Volume change in oil (3.Y.E.E) and compression set (3.2.F) are periodic tests and shall be performed at a frequency selected by the manufacturer unless frequency of testing is specified by the purchaser."

A typical wording when “Acceptance Tests” and “Preproduction Tests” are specified is as follows:

“4.2 Classification of Tests:

“4.2.1 Acceptance Tests: Construction (3.2.1), splicing (3.2.3), bending (3.2.4), quality (3.4), and properties in accordance with 3.3 or as specified in the applicable detail specification are acceptance tests and shall be performed on each lot.

“4.2.2 Preproduction Tests: All technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of the product by the manufacturer, on each lot, when a change in ingredients and/or processing requires reapproval as in 4.2.2, and when purchaser deems confirmatory testing to be required.”

Omit “or as specified in the applicable detail specification” from 4.2.1 and “and the applicable detail specification” from 4.2.2 when the specification is complete within itself (i.e., not a basic specification without supplementary detail specifications).

In O-ring specifications, change “initial shipment” to “first article shipment” in 4.2.2, unless it is determined that this terminology does not apply in a particular specification.

A typical wording when all three classes of tests are specified is as follows:

“4.2 Classification of Tests:

“4.2.1 Acceptance Tests: Hardness (3.X.A.A), tensile strength (3.X.A.B), elongation (3.X.A.C), tensile stress (3.X.A.D), specific gravity (3.X.A.F), volume change in fuel (3.X.B.A), and compression set (3.X.E) are acceptance tests and shall be performed on each lot.

“4.2.2 Periodic Tests: Corrosion (3.X.A.E), tensile strength change in oil (3.X.D.A), elongation in oil (3.X.D.B), volume change in oil (3.X.D.C), hardness change after dry heat exposure (3.X.C.A), bend after dry heat exposure (3.X.C.B), simulated component test (3.X.F), and temperature retraction, TR10 point (3.X.G) are periodic tests and shall be performed at a frequency selected by the manufacturer unless frequency of testing is specified by the purchaser.”

“4.2.3 Preproduction Tests: All technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of the product by the manufacturer, on each lot, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.”

When the specification includes an “Approval” paragraph and when the final paragraph of either the two- or three-paragraph form is titled “Preproduction Tests”, the following paragraph shall be included as a subparagraph to the final “Classification of Tests” paragraph:

“4.2.Y.1 For direct military procurement, substantiating test data, and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, contracting officer, or request for procurement.”

Tests for requirements for which testing of each batch, lot, or shipment is considered necessary to give reasonable assurance of acceptability of the product shall be classified as acceptance tests unless length of the testing time or testing intricacy makes “per shipment” testing impractical shall be classified as periodic tests.

Tests for requirements for which there is reasonable assurance of acceptability of the product if the acceptance test and periodic test requirements are met or which will be inherent in the product if these properties are met shall be classified as preproduction tests.

G.5.4 Sampling and Testing Paragraphs

These paragraphs shall show the required number and location of samples and definitions of the quality (lot, batch, etc.) from which samples shall be taken, and may include the frequency of sampling; definitions included elsewhere in the specification need not be repeated in these paragraphs.

Representative standard wordings for this paragraph are as follows:

When a fixed sampling plan is to be used:

“4.3 Sampling and Testing:

Shall be as follows:

“4.3.1 For Acceptance Tests:

“4.3.1.1 Sampling Schedule: Shall be in accordance with Table X. Test specimens shall be taken from product selected at random throughout the lot.

TABLE X – Sampling Schedules

Number of Inspection Units in the Lot		Number of Inspection Units from Which Samples Are to be Taken		Accept	Reject
1	to 13	All		0	1
14	to 150	13		0	1
151	to 280	20		0	1
281	to 500	29		0	1
501	to 12,000	34		0	1

“4.3.1.2 A lot shall be all product produced in a single production run from the same batches of raw materials, under the same fixed conditions, and presented for manufacturer’s inspection at one time.”

“4.3.1.3 An inspection unit shall be each 5.0 pounds (2.27 kg) of fiber or fraction thereof.”

When sampling is based on the number of specimens to be tested:

“4.3 Sampling and Testing:

“Shall be as follows:

“4.3.1 For Acceptance Tests: Sufficient product shall be taken at random from each lot to perform all required tests. Except as specified in 4.5.Y (test methods paragraph), the number of determinations for each requirement shall be as specified in the applicable test procedure or, if not specified herein, not less than three.”

In specifications for elastomeric products which include extrusions, molded shapes, or both, add the following first sentence and, for extrusions the second and third sentences, for molded shapes the fourth sentence, and for both forms, all sentences.

“4.3.1.1 If specimens cannot be prepared from the product, test specimens prepared from the same batch and state of cure shall be used for the required tests. When the product supplied is an extrusion of such shape that suitable test specimens cannot be cut from the product, a separate flat strip test sample from the same production lot shall be supplied upon request. This strip shall be prepared from tubing 1.000 inch \pm 0.063 (25.40 mm \pm 1.60) in OD by 0.075 inch \pm 0.008 (1.90 mm \pm 0.20) in wall thickness, mechanically slit and flattened into a strip while being extruded, and cured in the same manner as the production product. When the product is a molded slab from which test specimens cannot be cut, a slab 6 inches (152 mm) square by 0.075 inch \pm 0.008 (1.90 mm \pm 0.20) thick molded from the same batch of compound shall be supplied upon request.”

In specifications for elastomeric sealing ring (O-rings), use the following lot definition:

“4.3.1.X A lot shall be all rings of the same size from the same batch of compound processed in one continuous run and presented for manufacturer’s inspection at one time.”

or, when special rings are required for test:

“4.3.1.X A lot shall be all rings of the same size from the same batch of compound processed in one continuous run and presented for manufacturer’s inspection at one time plus rings as required for the simulated component test when the sizes for that test are not part of the lot.”

“4.3.1.Y A batch shall be the quantity of compound run through a mill or mixer at one time.”

In specifications for elastomeric products other than sealing rings, use the following subparagraphs for lot and batch definitions:

“4.3.1.X A lot shall be all product from the same batch of compound processed in one continuous run and presented for manufacturer’s inspection at one time.

“4.3.1.Y A batch shall be the quantity of compound run through a mill or mixer at one time.”

In specifications for resin impregnated cloth use the following:

“4.3 Sampling and Testing:

Shall be as follows:

“4.X.1 For Acceptance Tests:

“4.X.1.1 Frequency of Sampling: The manufacturer shall sample the product at random according to the schedule in Table X.

TABLE X - Sampling Frequency

Product	Frequency
Resin Solids	Lot Basis
Volatiles	Lot Basis
Gel Time	Lot Basis
Resin Flow	Lot Basis
Tensile Strength	Every master roll
Compressive Strength	Every master roll
Flexural Strength	Every master roll
Flexural Modulus	Every master roll
Flame Resistance	Every master roll

“4.3.1.1.1 Each roll offered for acceptance shall not exceed 250 yards (229 m) in length.

“4.3.1.2 A lot shall be all product treated at one time without significant changes in treater settings using a single batch of resin and a single master roll of reinforcement and presented for impregnator’s inspection at one time.”

The following may be used as the closing paragraph of each nonstatistical sampling plan:

“4.X.1.Y A statistical sampling plan, acceptable to the purchaser, may be used in lieu of sampling as in 4.X.1.”

In all applicable specifications after sampling and acceptance tests, use the following:

“4.3.2 For Periodic Tests: Acceptable to purchaser.

“4.3.3 For Preproduction Tests: Acceptable to purchaser.”

G.5.5 Approval Paragraphs:

These paragraphs shall be used in specifications for products whose characteristics cannot be controlled completely by the technical requirements of the specification and which may be affected by changes in ingredients or methods of manufacture. They shall make provision for the purchaser to evaluate the effects of changes in material, processing, or both prior to their being incorporated into production operations. Representative standard wordings follow:

When the significant manufacturing parameters cannot be defined or quantitative knowledge of them is unnecessary, wording similar to the following shall be used:

“4.4 Approval

“4.4.1 Sample product shall be approved by purchaser before product for production use is supplied, unless such approval be waived by purchaser.

“4.4.2 Manufacturer shall use ingredients, manufacturing procedures, processes, and methods of inspection on production product which are essentially the same as those used on the approval sample. If necessary to make any change in ingredients, in type of equipment or processing, or in manufacturing procedures, manufacturer shall submit for reapproval a statement of the proposed changes in ingredients and/or processing and, when requested, sample product. Production product made by the revised procedure shall not be shipped prior to receipt of reapproval.”

When it is possible to define significant manufacturing parameters and quantitative knowledge of these is necessary or desired because of the critical nature or application of the product, wording similar to the following shall be used:

“4.4 Approval

“4.4.1 Sample product shall be approved by purchaser before product for production use is supplied unless such approval be waived by purchaser.

“4.4.2 Manufacturer shall establish, for each form and size of product parameters for the process and control factors which will yield product meeting the technical requirements of this specification; these shall constitute the approved procedure and shall be used for manufacturing production product. If necessary to make any change in parameters for the process or control factors, manufacturer shall submit for approval a statement of the proposed changes in ingredients and/or processing and, when requested, sample product. Production product made by the revised procedure shall not be shipped prior to receipt of reapproval.”

“4.4.2.1 Control factors for producing product include, but are not limited to, the following:

- Compound ingredients or proportions thereof outside established limits
- Sequence of mixing compound ingredients
- Type of mixing equipment
- Method of equipment for preparing performs
- Basic molding procedure; compression, injection, transfer
- Curing time and pressure; variation of $\pm X\%$ from established limits is permissible
- Basic and minimum curing temperatures
- Finishing methods
- Methods of inspection

“4.4.2.1.1 Any of the above process control factors for which parameters are considered proprietary by the manufacturer may be assigned a code designation. Each variation in such parameters shall be assigned a modified code designation.”

In specifications for parts (e.g., elastomeric sealing rings), change “each form and size of product” in 4.4.2 of 12.5.2 to “(part name) of each part number” or to “each size of (part name)”. Specifically for O-rings, use the following wording:

“4.4.2 Manufacturer shall establish, for each size of ring, parameters for the process control factors which will produce rings meeting the technical requirements of this specification; these shall constitute the approval procedure and shall be used for manufacturing production rings. If necessary to make any change in parameters for the process control factors, manufacturer shall submit for reapproval a statement of the proposed changes in ingredients and/or processing, and, when requested, sample rings. Production rings incorporating the revised procedure shall not be shipped prior to the receipt of reapproval.”

G.5.6 Test Method Paragraphs:

These paragraphs shall be used to detail test methods not specified in Section 3 of the material specification by reference to ASTM or other standard test methods. Test methods detailed in these paragraphs shall be shown in the same sequence in which the requirements appear in Section 3 of the material specification.

When a family of similar materials is covered by a basic specification and a series of detail specifications, the “Test Methods” paragraphs shall appear in the basic specification.

A typical wording for “Test Methods” paragraph in a basic specification is as follows:

“4.5 Test Methods

“Tests to determine conformance to the requirements of this specification and the applicable detail specification shall be conducted as shown in Table X.

TABLE X – Testing Requirements

Property	Minimum Number of Specimens per Requirement	Test Method
Volatile content	1	ASTM D 3530
Total nonfiber content	2	4.5.3
Resin flow	1	4.5.4
Gel time	1	4.5.5
Tack	1	4.5.6
Tensile strength and Modulus of elasticity	4	4.5.7
Compressive strength and Modulus of elasticity	4	ASTM D 3410
Density	3	ASTM D 792

Omit the “Number of Specifications per Requirement” column when the number of specimens is specified in the ASTM method or in the paragraph detailing the test method.

When preparation of test material is required, (e.g., a test laminate panel to represent resin impregnated fibers or cloth for laminated composites), preparation of the test material shall be specified in the first subparagraph following 4.5. This shall be followed by descriptions of the test procedures not covered by standard test methods; these shall be numbered sequentially and shall appear in the same sequence in which the requirements are specified.

Materials Requiring FAA Flame Resistance: Insert the following paragraph:

“4.5.X Flame Resistance: Shall be determined in accordance with ASTM F 501, using three specimens, 0.060 inch ± 0.010 (1.52 mm ± 0.25) thick by nominally 3 x 12 inches (76 x 305 mm), with the 12 inch (305 mm) dimension vertical.”

G.5.7 Reports Paragraph:

The word “product” shall be used instead of the form designations when the specification covers more than one form.

For solid nonmetallic materials, the “Reports” paragraph shall read as follows:

“4.X Reports:

The supplier of the product shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance requirements, and stating that the product conform to the other technical requirements. This report shall include the purchase order number, lot number, AMS XXXX, manufacturer’s identification, value to be reported, form or part number, and quantity.”

(When periodic tests are required, modify the statement above by adding the following: “--- acceptance test requirements, and, when performed, to the periodic test requirements, and stating ---”).

Omit “value to be reported” when numerical values are assigned to all test requirements. Use “values” when more than one test requirement states the value is “to be reported.”

When a specification includes a number of “slash number” detail specifications, add “and the applicable detail specification number and its revision letter, if any,” after “AMS XXXX”.

For liquid or semi-solid nonmetallic products, a single “Reports” paragraph shall be used. A typical standard wording for this paragraph is as follows:

“4.X Reports:

“The supplier of the product shall furnish with each shipment a report showing the composition and the results of tests to determine conformance to the acceptance requirements, and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS XXXX, manufacturer’s identification, and quantity.”

In specifications requiring reports of periodic test results in addition to acceptance test results, a typical standard wording for the “Reports: paragraph is as follows:

“4.X Reports:

“The supplier of the product shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance requirements, and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS XXXX, manufacturer’s identification number, part number, and quantity.

In all revisions of published specifications include the revision letter after “AMS XXXX” in the “Reports” paragraph.

[The following paragraph must be modified if AMS 2825 is cancelled Ed.]

In all specifications where a material safety data sheet is required, add the following paragraph after “Reports”; also add a “Safety-Hazardous Materials” paragraph (see A.6.6.3 of the Editorial Style Manual).

“4.X.2 A material safety data sheet conforming to AMS 2825, or equivalent, shall be supplied to each purchaser prior to, or concurrent with, the report of preproduction test results or, if preproduction testing be waived by purchaser, concurrent with the first shipment of the product for production use. Each request for modification of product formulation shall be accompanied by a revised data sheet for the proposed formulation.”

G.5.8 Resampling and Retesting Paragraphs:

All specifications, except for those for tolerances, shall include a “Resampling and Retesting” paragraph. The following wording shall be used except as shown below:

“4.X Resampling and Retesting:

If any specification used in the above tests fails to meet the specified requirements, disposition of the product may be based on the results of testing three additional specimens for each nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the product represented. Results of all tests shall be reported.”

In specifications for resin impregnated cloths and fibers, change the first sentence of 4.X above to read:

“--- results of testing three additional specimens cut from the same panel or a newly prepared panel for each original nonconforming specimen .”

In specifications for heat-shrinkable tubing, the following wording shall be used:

“4.X Resampling and Retesting:

If the average result of the specimens tested for any requirement fail to meet the specified value, disposition of the tubing may be based on the results of testing three additional specimens for each original specimen failing to meet the specified average requirement. Failure of the average of the original specimens plus the retest specimens to meet any specified requirements shall be cause for rejection of the tubing represented. Results of all tests shall be reported.”

G.6 PREPARATION FOR DELIVERY SECTION:

This section shall describe requirements to ensure that the product can be identified at its destination as being the product required and will not be damaged in shipment. Subjects in this section shall appear in logical sequence, which will vary with the product. Paragraphs in this section shall have the following titles; only these subjects applicable shall appear and shall be numbered consecutively:

Protective Treatment

Identification

Packaging

The “Identification” and “Packaging” paragraphs may be combined under a single title if requirements can be expressed in more logical sequence by doing so. See below for wording of the combined paragraph.

G.6.1 Protective Treatment Paragraph:

These paragraphs shall be used if the commodity requires special protection during shipment and storage. It is not normally required in specifications for nonmetallic materials and parts except where scratches could be detrimental to optical qualities. A representative wording for such cases is as follows:

“5.X Protective Treatment:

Individual sheets shall be covered on both surfaces by a suitable adhered paper that can be removed readily without the use of solvents or injury to the surfaces. The paper covering shall adequately protect the surfaces from scratches or other damage during handling, shipping, and storage. The adhesive on the paper covering shall be of a type that will not craze the product.”

G.6.2 Identification Paragraphs:

Identification requirements for all products for which there is an "IDENTIFICATION" specification shall be specified by reference to that specification.

If the "IDENTIFICATION" specification also covers packaging, the title of the paragraph shall be "Identification and Packaging" or, if packaging requirements are specified first, "Packaging and Identification" (see below).

When a specification number is required as part of the specification, the revision letter, if any, shall also be required.

Representative standard wordings for the "Identification" paragraphs in specifications for products for which there is no "IDENTIFICATION" specification are as follows:

Elastomeric Hose:

"5.X Identification:

Each length of hose shall inlaid at intervals of approximately 25 feet (7.6 m) a label showing the manufacturer's identification, date of manufacture (quarter and year), AMS XXXX, working pressure, and lot identification number."

Plastic Sheet and Tube (Thermosetting):

"5.X Identification:

Each sheet (tube) shall be legibly marked on one corner (near one end) with not less than the manufacturer's identification and AMS XXXX. The characters shall be applied using a suitable marking fluid sufficiently stable to withstand normal handling."

Plastic Sheet (Thermoplastic):

"5.X Identification:

Each sheet shall be legibly marked, on the protective paper covering at intervals of approximately 1 foot (305 mm), with not less than the manufacturer's identification and AMS XXXX. The method of marking is optional, but shall have no deleterious effect on the product or its performance. The characters shall be sufficiently stable to withstand normal handling."

Plastic Film:

"5.X Identification:

"5.X.1 Wide Cores: Each core 2 inches (51 mm) and over in width shall be legibly marked with the manufacturer's identification, thickness, width, footage, product designation, AMS XXXX, batch number, and date of manufacture.

"5.X.2 Narrow Cores: Each core under 2 inches (51 mm) in width shall be legibly marked with the manufacturer's identification, product designation, AMS XXXX, and thickness.

- "5.X.3 Labeling: Each package shall be permanently and legibly marked with not less than (plastic type) film, AMS XXXX, size (thickness x width x footage), number of rolls, core ID, roll OD, purchase order number, manufacturer's identification, batch number, and date of manufacture."

Plastic Moldings and Extrusions:

"5.X Identification:

- "5.X.1 All molded parts of suitable size shall have the part number molded or permanently impressed therein. Extrusions shall be marked near one end or, if coiled, near the outside end with the manufacturer's identification and AMS XXXX.
- "5.X.2 Each package shall be legibly marked with not less than size or part number, AMS XXXX, color, quantity, purchase order number (not used with prepackaged materials, and manufacturer's identification."

Plastic and Elastomeric Heat Shrinkage Tubing:

"5.X Identification:

"Each package shall be permanently and legibly marked with not less than AMS XXXX, size, color, quantity, purchase order number, manufacturer's identification, and date of manufacture."

Glass Cloth:

"5.X Identification:

- "5.X.1 Rolls: Each roll of cloth shall have a tag attached that is legibly marked with the manufacturer's identification and the phrase CLOTH, GLASS, STYLE _____, FINISH NUMBER _____.
- "5.X.2 Packages: Each package shall be permanently and legibly marked with not less than cloth, glass, style XYZ, finish number LMN, AMS XXXX, yardage, width, purchase order number, manufacturer's identification, and lot number."

For other types of cloth, use the wording above except for naming the applicable cloth type, style, and finish.

Resin Impregnated Cloth:

"5.X Identification:

- "5.X.1 Each roll shall be legibly identified by attached removable tags using characters which will not be obliterated by normal handling.
- "5.X.2 Each tag shall be legibly marked with not less than the specification title (may be shortened), AMS XXXX, purchase order number, manufacturer's identification, and date of manufacture."

Paints and Related Materials:

“5.X Identification:

“Each container shall be legibly marked with not less than AMS XXXX, manufacturer’s identification, formula number and batch number, date of manufacture, directions for mixing and application, and weight of contents.”

Brazing Fluxes:

“5.X Identification:

Each package shall be legibly marked with not less than flux (metal) brazing, AMS XXXX, purchase order number, manufacturer’s identification, batch number, date of manufacture, directions for mixing and application, and weight of contents.”

G.6.3 Packaging Paragraphs:

These paragraphs shall describe the wrapping, boxing, bundling, tying, etc., for shipment, and the size of shipping containers required.

The first paragraphs shall describe interior packaging and the method of supporting or confining the product during shipment and storage, and may include requirements for marking of shipping containers. Representative wording is as follows:

Plastic Sheet:

“5.X Packaging:

“5.X.1 Shall be accomplished to ensure that the product, during shipment and storage, will not be permanently distorted and will be protected against damage from exposure to weather or any other normal hazard.

“5.X.2 Each package shall be permanently and legibly marked with not less than the specification title (may be shortened), AMS XXXX, purchase order number, size and number of sheets, and manufacturer’s identification.”

Plastic Film:

“5.X Packaging:

Shall be accomplished to ensure that the product, during shipment and storage, will not be permanently distorted and will be protected against damage from exposure to weather or any other normal hazard. Film should be wound on cores meeting the following requirements:

“5.X.1 Cores: Shall have sufficient strength to prevent collapsing during handling and shall have either a 3-inch (76-mm) or 6-inch (152-mm) ID, as ordered.”

“5.X.2 Rolls: The OD of the slit roll and core width shall be as shown in Table X.

TABLE X – Core ID and OD of Roll

Inches	Millimeters	Inches	Millimeters
3	76	9½ ± ¼	241 ± 6
6	52	11 ± ¼	279 ± 6
6	52	14 ± ¼	356 ± 6

- “5.X.2.1 Core width may vary from flush with the roll face to not more than 1/8 inch (3.2 mm) greater than film width. The outside and starting ends shall be fastened to prevent unwinding. Roll sides shall be smooth and even, and no portion of the film shall extend more than 1/16 inch (1.6 mm) from a straight edge laid across the diameter of the roll.
- “5.X.3 Splices: Splices shall be located not less than 100 feet (30.5 m) from beginning to end of a roll, and not less than 100 feet (30.5 m) apart within a roll. There shall be no more than 2 splices per 9½- or 11½- inch (241- or 279-mm) OD roll, or 6 splices per 14-inch (356-mm) roll.
- “5.X.3.1 Configuration of Splices: Shall be as follows:
 - “5.X.3.1.1 Thickness Up to 0.0020 Inch (0.051 mm), Incl: Sandwich-type splice made with two-side-coated, 1 inch (25 mm) wide, colored, pressure sensitive polyester film tape. Tail of splice on bottom of web shall be trailing as film is unwound from the top of the roll.
 - “5.X.3.1.1 Thickness Over 0.0020 Inch (0.051 mm), Incl: Butt-type splice made with one-side-coated, 2 inches (51 mm) wide, colored, pressure sensitive polyester film tape, applied to both sides of the splice.”

Plastic and Elastomeric Heat Shrinkable Tubing:

- “5.X Packaging:
 - “5.X.1 Packaging shall be accomplished to ensure that the product, during shipment and storage, will not be permanently distorted and will be protected against damage from exposure to weather or any other normal hazard. Standard packages shall contain the following quantities:

3/64, 1/16, 3/32, 1/8, 3/16:	200 feet (61 m)
¼, 3/8, ½, ¾:	100 feet (30.5 m)
1, 1½:	48 feet (14.6 m)
2, 3, 4:	24 feet (7.3 m)”

Brazing Flux:

- “5.X Packaging:
 - “5.X.1 Flux shall be supplied in 8-ounce (227-g), 16-ounce (454-g), or 5-pound (2.3-kg) glass containers, as ordered.”

Other Commodities:

“5.X Packaging:

“5.X.1 Packaging shall be accomplished to ensure that the product, during shipment and storage, will be protected against damage from exposure to moisture, weather, or any other normal hazard.

The following phrase should be added to the packaging section of specifications containing product lot identification requirements as applicable:

“A lot may be packaged in small quantities and delivered under the basic lot approval provided lot identification is maintained.”

Date of Packaging:

In sealant specifications, the following paragraphs shall be as follows:

“3.X.1 Date of Packaging:

“Date of Packaging is defined as the date finished material is assembled from its components, base compound and curing compound, into a package, labeled kit or unit by the manufacturer or re-packager. Date of Packaging shall be no more than 90 days from the last day of full quality conformance testing in accordance with 4.2.2. Material may be retested by the manufacturer at any time to determine conformance to full quality conformance testing in accordance with 4.2.2.”

G.6.4 Combined Packaging and Identification Paragraphs:

Combining of the “Packaging” and “Identification” paragraphs is applicable in the following cases:

- a. When a referenced specification covers both identification and packaging requirements as noted above.
- b. When packaging and identification requirements are included in a single paragraph.
- c. When a series of paragraphs is used and the logical sequence of the paragraphs is packaging of the product, identification of the product, packaging of exterior shipping containers, and identification of exterior containers.

Representative standard words for these cases are as follows:

Identification and Packaging Covered in Referenced Specification:

“5.X Packaging and Identification:

Shall be in accordance with AMS XXXX.”

For O-rings, use the following wording:

“5.X Packaging and Identification:

Shall be in accordance with AMS 2817 or other procedure acceptable to purchaser.”

Identification and Packaging Included in One Paragraph:

- “5.X Packaging and Identification:
 - “5.X.1 The product shall be supplied in kit form with separate containers of base resin formulation and of catalyst or curing agent. Each can or container shall be legibly identified with not less than AMS XXXX, manufacturer’s identification, lot number, date of expiration, method of storage, and net quantity. In addition, the label shall indicate that the product should be stored at a temperature not exceeding XX °F (YY °C).”

Identification and Packaging of Product and Exterior Containers in Sequence:

- “5.X Packaging and Identification:
 - “5.X.1 Cloth shall be supplied in rolls wound on suitable cores not less than 3 inches (76 mm) in diameter.
 - “5.X.2 Each roll shall be identified by a label containing not less than cloth, quartz, fabric style, finish number, AMS XXXX, manufacturer’s identification, lot number, and quantity. This information shall be attached on the inside of the core, using characters which will not be obliterated by normal handling.
 - “5.X.3 Packaging shall be accomplished to ensure that the cloth, during shipment and storage, will be protected against damage from exposure to moisture, weather, or any other normal hazard.
 - “5.X.4 Each package shall be permanently and legibly marked with not less than cloth, quartz, fabric style, finish number, AMS XXXX, yardage, width, purchase order number, manufacturer’s identification, lot number, and weight of package.”

In all specifications, the final two paragraphs of the “Packaging” or “Packaging and Identification” requirements shall be as follows except when identification and packaging requirements are covered in a referenced specification:

- “5.X.X The product shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery.
- “5.X.Y For direct U.S. Military procurement, packaging shall be in accordance with MIL-STD-XXX, Level C, unless Level A is specified in the request for procurement.”

Note: Some products are covered by applicable Federal or Military specifications which should be shown in lieu of MIL-STD-XXX.

When the type of container for interior packaging is specified in the first paragraphs, change “The product” at the beginning of 5.X.X to the name of the type of container (e.g., spools, cores, jars, cartons, etc.).

G.7 ACKNOWLEDGEMENT SECTION

Guidelines as in Part D (See D.1.1) of the Editorial Style manual shall be used, except the terminology “manufacturer”, “supplier”, or “re-packager” as appropriate shall be used instead of “vendor”.

G.8 REJECTIONS SECTION

Guidelines as in Part D (See D.1.2) of the Editorial Style manual shall be used.

G.9 NOTES SECTION

Guidelines as in Part D (See D.1.3) of the Editorial Style manual shall be used.

MISCELLANEOUS PHRASES AND WORDING (See D.2) of the Editorial Style manual shall be used where appropriate.

Qualified Products Lists and Procedures for Approval:

All paragraphs regarding Qualified Products Lists shall be included in the NOTES section. Revisions shall change to Process Review Institute (PRI) requirements as follows:

In Section 3 REQUIREMENTS: (See G.4)

“3.X Qualification:

All products sold to this specification shall be listed, or approved for listing, on the qualified products list, PRI QPL AMS XXXX. The qualified products list shall be in accordance with PD 2000.”

In Section 4 QUALITY ASSURANCE PROVISIONS: (See G.3.5.4)

“4.4 Approval:

“4.4.1 Sealing compound supplied to this specification shall be listed, or approved for listing, on the qualified products list, PRI QPL AMS XXXX.

“4.4.2 Manufacturer shall use ingredients, manufacturing procedures, processes, and methods of inspection on production product which are essentially the same as those used on the approval sample. If necessary to make any change in ingredients, in type of equipment for processing, or in manufacturing procedures, manufacturer shall submit for reapproval a statement of the proposed changes in ingredients and/or processing and, when requested, sample product. Production product made by the revised procedure shall not be shipped prior to receipt of reapproval.”

In Section 8 NOTES:

“8.X Qualification of Sealing Compound:

“8.X.1 Awards will be made only for sealing compounds which are, prior to the award of contract, qualified for inclusion in the applicable qualified products list (QPL) whether or not such products have actually been so listed by that date. The attention of contractors is called to these requirements, and manufacturers are urged to arrange to have the sealing compound that they propose to offer tested for qualification in order that they may be eligible to be awarded contracts or orders for the sealing compound covered by this specification, The activity responsible for the QPL is the Performance Review Institute, 161 Thornhill Road, Warrendale, PA 15086-7527, phone (724) 772-1616, fax (724) 772-1699. Information pertaining qualification of sealing compound may be obtained from that activity.

“8.X.2 Qualification shall be approved every three years in accordance with PD 2000 and the instructions from the Performance Review institute.”