



AEROSPACE STANDARD

AS478™**REV. P**

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Superseding AS478N

Identification Marking Methods

RATIONALE

Revise Section 6 (RULES FOR DESIGNATING MARKING METHODS), correct error in maximum depth (mm) for Method 1C in Table 1, and general editorial update.

1. SCOPE

This standard provides the following:

- a. Definition of terms pertaining to marking.
- b. Symbols for marking location.
- c. Requirements and restrictions for permanent markings.
- d. Types of marking methods.
- e. Rules for designating marking methods.
- f. Table listing marking methods.

1.1 Purpose

To define and control marking methods, and to provide a method for specifying desired marking methods on aerospace engineering drawings of parts and assemblies.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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on this Technical Report, please visit
<http://standards.sae.org/AS478P>**

2.1.1 U.S. Government Publications

Copies of these documents are available online at <http://quicksearch.dla.mil>.

MIL-HDBK-57 Listing of Fastener Manufacturers' Identification Symbols

H4/H8 Commercial and Government Entity (CAGE) Codes

2.1.2 ANSI Accredited Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

ANSI INCITS 17 Character Set for Optical Character Recognition (OCR-A)

ANSI INCITS 93M Character Positioning for Optical Character Recognition (OCR)

2.2 Definitions

For the purpose of this standard, the following definitions shall apply:

2.2.1 CONTRACTOR

Any individual, company, partnership, association, or corporation holding a contract or letter of intent to supply items for which this standard is specified.

2.2.2 IDENTIFICATION

Any marking applied to an item or its package for the purpose of engineering, manufacturing, or inspection control.

Examples are:

- a. Item number
- b. Vendor number
- c. Manufacturer's identification
- d. Inspection symbols

2.2.2.1 MANUFACTURER'S IDENTIFICATION

The actual manufacturer's name, registered trademark, or the identification symbol listed in MIL-HDBK-57, or the CAGE code identification established in Cataloging Handbooks H4/H8, or as otherwise specified.

2.2.3 ITEM

An article, used in this standard to relate to a part, assembly, or equipment.

2.2.4 PACKAGE

The smallest enclosure into which an item(s) is placed for protection during storage or shipment.

2.2.5 PERMANENT MARKING

Marking which will ensure identification during the normal service life of the item. Methods of permanent marking are listed in 4.1.

2.2.6 TEMPORARY MARKING

Marking which will ensure identification during ordinary handling and storage of items prior to assembly and use. Under certain service conditions these markings may exhibit the characteristics of permanent markings. Temporary marking methods are listed in 4.2.

2.2.7 OPTICAL CHARACTER RECOGNITION

An automatic data entry system that utilizes predefined human readable shaped alphanumeric character fonts which can be read by automatic scanning equipment.

3. GENERAL REQUIREMENTS

Items shall be marked in accordance with this standard unless otherwise specified on the item drawing. The method of marking shall be designated as shown in 6.1.

3.1 Marking Location

Location of marking on items shall be in accordance with the following as applicable:

3.1.1 General

The symbol as shown in Figure 1, or a local note, indicates general location for marking.



Figure 1 - Symbol for general location for marking

3.1.2 Pad

The symbol as shown in Figure 2, or a local note, indicates pad location for marking.

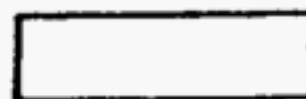


Figure 2 - Symbol for pad location for marking

3.1.3 Integral

The symbol as shown in Figure 3, or a local note, indicates pad location for integral marking (cast, forged, or molded).

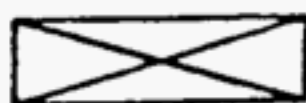


Figure 3 - Symbol for location for integral marking (cast, forged, or molded)

3.1.4 Specific

The symbol as shown in Figure 4, or a local note, indicates a specified area within which markings must be confined.



Figure 4 - Symbol for specified area within which markings must be confined

3.1.5 Multiple

Where two or more locations for marking are specified, markings shall be grouped so that as few of the locations as practicable are used.

3.2 Permanent Markings

Permanent markings are permitted on finished items only when specified on the engineering drawing from which the item is manufactured.

3.2.1 Items which require more than one identification number, such as item number, serial number, etc., shall have each number on a separate line; or consecutive identification numbers on the same line shall be separated by no less than two spaces. The separation or division of the digits of an identification number will not be objectionable provided the digits are in sequence and cannot be misread.

3.2.2 Permanent marking for the general categories of items shall normally be between 0.060 and 0.160 inch (1.5 and 4 mm) in height. In special cases when governed by size or configuration, 0.016 inch (0.4 mm) minimum or 0.250 inch (6.35 mm) maximum height is permissible, or as otherwise specified in this standard or on the item drawing. When integral marking is used, the height should not exceed 0.500 inch (12.7 mm) nominal character size.

3.2.3 Permanent marking is not recommended on contacting surfaces, nor on surfaces which are in motion with respect to the mating surface during operation of the items. However, when permanent markings must be placed on such surfaces, all raised metal and burrs shall be removed in accordance with the requirements given on the item drawing.

3.2.4 Permanent markings shall not be applied on surfaces which have been chemically processed, painted, or plated unless the marking will be legible and the minimum requirements of the surface treatment process is maintained or restored.

3.2.5 Permanent markings shall not be nearer than 0.031 inch (0.78 mm) to any corner, fillet, or edge unless specifically designated. Where a specific marking location, as designated and dimensioned, does not provide enough area for 0.031 inch (0.78 mm) distance to any edge, corner, or fillet, the markings shall be centered upon the area without breaking over an edge or encroaching into corners or fillets. When parts are machined from previously marked hexagon bar stock, the 0.031 inch (0.78 mm) edge restriction is waived, provided the marking is legible.

3.2.6 Precautions

Stress concentrations resulting from improper applications of marking methods may cause item distortion or failure. Marking methods, such as methods 4 or 6 in Table 1, may produce secondary effects which are detrimental to item reliability and must be properly evaluated to the item design. Items distorted or otherwise damaged by marking shall be subject to rejection. Permanent markings not in compliance with the limits given in this standard may be the basis for rejection of the items by the purchaser.

3.2.7 Legibility

Identification marking shall be legible and make full use of the available marking area. Characters shall be block form capital letters and Arabic numerals without serifs, such as "Gothic" or "Futura." Lower case letters may be used when required for metric unit symbols. Other characters shall be of similar appearance. Condensed letters and smeared letters shall be cause for rejection. Templates for the electrochemical process may be produced by a conventional typewriter provided legibility is maintained. Processes performed after marking which may reduce legibility (such as vapor or grit blasting, tumbling, etching, etc.) shall be controlled to prevent loss of legibility. Normally all characters shall be legible without magnification. However, where space or surface condition limits the size of characters that may be used, legibility with 3X magnification maximum is permissible when authorized.

3.2.8 Optical Character Recognition (OCR)

Marking requirements for the standard OCR-A character set are specified in ANSI INCITS 17. The OCR-A marking character's height, width, spacing and positioning requirements are specified in Table 2. See 6.1.1 for an example of designating OCR font marking method.

4. MARKING METHODS

4.1 Permanent Markings

Permanent markings shall not affect the function or serviceability of the item.

4.1.1 Integral

Characters are produced by casting, forging, or molding into or onto the item.

4.1.2 Metal Stamp

Characters are produced by forcible displacement of material.

4.1.2.1 Hammer

Characters are produced individually or in groups by impact force applied mechanically or by hand.

4.1.2.2 Press

Characters are produced individually or in groups with a controlled force applied without impact.

4.1.2.3 Roll

Characters are produced by a rotating motion of either the item or the tool, or both, when in contact with each other under a controlled force.

4.1.2.4 Vibro Peen, Manual

Characters are produced by a hand guided rapidly vibrating tool having a pointed tip making indentations on the item to produce the characters.

Table 1 - Marking method number, class letter, and depth

METHOD NUMBER			PARAGRAPH REFERENCE	SEE NOTE 1	MARKING METHOD See 3.2.6	DEPTH				CLASS LETTER																		
1 ST TIER	2 ND TIER	3 RD TIER				INCH		MILLIMETER		A	B	C	D	E	F	G	H	J	K	L	M	N	P	R				
						MIN	MAX	MIN	MAX																			
1	1A	1A1 1A2	4.1.1	-	PERMANENT MARKING METHODS INTEGRAL Light Raised Depressed																							
				0.005		0.010	0.13	0.25	X																			
				0.005		0.010	0.13	0.25	X																			
	1B	1B1 1B2		-	Intermediate Raised Depressed	0.008	0.035	0.20	0.89																			
1C				-	Heavy (Raised Only)	0.008	0.035	0.20	0.89																			
	1C				Heavy (Raised Only)	0.030	0.130	0.8	3.30																			
2	2A	2A1 2A2	4.1.2 4.1.2.1	-	METAL STAMP Hammer Shallow Deep																							
				0.001		0.006	0.03	0.15	X																			
				0.004		0.010	0.10	0.25	X																			
	2B	2B1 2B2		4.1.2.2	-	Press Shallow Deep	0.001	0.006	0.03	0.15	X																	
	2B			D	Press Shallow Deep	0.004	0.010	0.10	0.25	X																		
2C			4.1.2.3	-	Roll Shallow Deep	0.001	0.006	0.03	0.15	X																		
	2C			D	Roll Shallow Deep	0.004	0.010	0.10	0.25	X																		
2D			4.1.2.4	-	Vibro Peen, Manual Shallow Deep	0.001	0.006	0.03	0.15	X																		
	2D			D	Vibro Peen, Manual Shallow Deep	0.004	0.010	0.10	0.25	X																		
2E			4.1.2.5	-	Vibro Peen, Controlled Shallow Deep	0.001	0.006	0.03	0.15	X																		
	2E			-	Vibro Peen, Controlled Shallow Deep	(a)	0.002	(a)	0.05																			
2F			4.1.2.6	-	Dot-Peening Shallow Intermediate Deep	0.002	0.006	0.05	0.15	X																		
	2F			-	Dot-Peening Shallow Intermediate Deep	(a)	0.002	(a)	0.05																			
3	3A		4.1.3 4.1.3.1	-	ENGRAVE Manual	0.0005	0.006	0.013	0.15	X																		
	3B		4.1.3.2	-	Controlled Shallow Deep	0.0005	0.003	0.013	0.08																			
	3B			G	Controlled Shallow Deep	0.0020	0.006	0.050	0.15																			
4	4A		4.14 4.1.4.1	-	ELECTRIC ARC SCRIBE Manual Shallow Deep	0.001	0.003	0.030	0.08																			
	4A			-	ELECTRIC ARC SCRIBE Manual Shallow Deep	0.003	0.010	0.080	0.25																			
4B			4.1.4.2	-	Controlled Shallow Deep	0.001	0.003	0.013	0.03																			
	4B			M	Controlled Shallow Deep	0.0005	0.001	0.013	0.03																			
				-	Controlled Shallow Deep	0.0010	0.006	0.030	0.15																			

[illegible]

METHOD NUMBER			PARAGRAPH REFERENCE	SEE NOTE 1	MARKING METHOD See 3.2.6	DEPTH				CLASS LETTER															
1 ST TIER	2 ND TIER	3 RD TIER				INCH		MILLIMETER		A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	
						MIN	MAX	MIN	MAX																
29			4.2	-	<u>TEMPORARY MARKING METHODS</u> ANY TEMPORARY METHOD																				
30			4.2.1	-	INK																				
31			4.2.2	-	DYE																				
32			4.2.3	-	PAINT																				
	32A		4.2.3.1	-	Silk-Screen																				
33			4.2.4	-	CHALK																				
34			4.2.5	-	CRAYON																				
35	35A 35B 35C 35D		4.2.6	- N - P -	TAG Nonmetallic tag & string Nonmetallic tag & wire Metallic tag & wire Bag item & tag															X X X X					
36	36A 36B		4.2.7	- N P	BAND OR TAPE Nonmetallic Metallic	(b)														X X					
37			4.3	-	PACKAGE	(b)														X					

NOTE 1: This column indicates recommended class letter columns which contain suitable alternatives for the individual marking methods. Use of an alternative marking class is only allowed when that class letter is specified in the drawing marking note.

(a) Depth sufficient to provide marking that is discernable without magnification.

(b) Marking per method 35D is permissible where method 37 is specified.

Table 2 - Optical character recognition OCR-A marking

OCR FONT DESIGNATOR	CHARACTER HEIGHT ¹	CHARACTER WIDTH ¹	CHARACTER SPACING ²	CHARACTER SKEW ³	MAX DEVIATION FROM AVERAGE BASELINE ³	MINIMUM LINE SEPARATION ³
A03	0.030 inch ± 0.004 inch (0.76 mm ± 0.10 mm)	0.015 inch ± 0.004 inch (0.38 mm ± 0.10 mm)	0.025 inch ± 0.004 inch (0.64 mm ± 0.10 mm)	<3.0°	0.005 inch (0.13 mm)	0.015 inch (0.38 mm)
A04	0.040 inch ± 0.005 inch (1.02 mm ± 0.13 mm)	0.020 inch ± 0.005 inch (0.51 mm ± 0.13 mm)	0.033 inch ± 0.005 inch (0.84 mm ± 0.13 mm)	<3.0°	0.007 inch (0.18 mm)	0.020 inch (0.51 mm)
A06	0.060 inch ± 0.005 inch (1.52 mm ± 0.13 mm)	0.030 inch ± 0.005 inch (0.76 mm ± 0.13 mm)	0.048 inch ± 0.005 inch (1.22 mm ± 0.13 mm)	<3.0°	0.10 inch (0.25 mm)	0.030 inch (0.76 mm)
A08	0.083 inch ± 0.007 inch (2.11 mm ± 0.18 mm)	0.042 inch ± 0.007 inch (1.07 mm ± 0.18 mm)	0.068 inch ± 0.007 inch (1.73 mm ± 0.18 mm)	<3.0°	0.014 inch (0.36 mm)	0.042 inch (1.07 mm)
A09	0.094 inch ± 0.008 inch (2.39 mm ± 0.20 mm)	0.055 inch ± 0.008 inch (1.40 mm ± 0.20 mm)	0.100 inch ± 0.008 inch (2.54 mm ± 0.20 mm)	<3.0°	0.016 inch (0.41 mm)	0.047 inch (1.19 mm)
A12	0.126 inch ± 0.010 inch (3.20 mm ± 0.25 mm)	0.060 inch ± 0.010 inch (1.52 mm ± 0.25 mm)	0.134 inch ± 0.010 inch (3.40 mm ± 0.25 mm)	<3.0°	0.021 inch (0.53 mm)	0.063 inch (1.60 mm)
A15	0.150 inch ± 0.012 inch (3.81 mm ± 0.30 mm)	0.080 inch ± 0.012 inch (2.03 mm ± 0.30 mm)	0.159 inch ± 0.012 inch (4.04 mm ± 0.30 mm)	<3.0°	0.025 inch (0.64 mm)	0.075 inch (1.91 mm)

¹ Character height and width measurements are referenced from the center of the characters scribed line.

² Character spacing is the horizontal distance between two adjacent characters' vertical center lines.

³ For terms and definitions of the character's positional control requirements refer to ANSI INCITS 93M, except that skewness shall be measured from the average baseline of a line of characters rather than from a reference document edge.

4.1.2.5 Vibro Peen, Controlled

Characters are produced by a mechanically guided rapidly vibrating tool having a pointed tip. Multiple tipped tools may produce one or more complete characters simultaneously.

4.1.2.6 Dot-Peening

Characters are formed by a series of indentations or dots wherewith the spacing between dots and characters are controlled by a microprocessor.

4.1.3 Engrave

Characters are produced by a rotating cutter or grinder.

4.1.3.1 Manual

Characters are produced by a hand guided rotating cutter or grinder.

4.1.3.2 Controlled

Characters are produced by a mechanically guided rotating cutter or grinder.

4.1.4 Electric Arc Scribe

Characters are produced by the action of an electric arc between the surface and an electrode which acts as the scribe.

4.1.4.1 Manual

Characters are produced by a hand guided scribe.

4.1.4.2 Controlled

Characters are produced by a mechanically guided scribe.

4.1.5 Scribe

Characters are produced by a cutting or scratching action.

4.1.5.1 Manual

Characters are produced by a hand guided tool.

4.1.5.2 Controlled

Characters are produced by a mechanically or electromechanically guided, radius tipped, conical tool.

4.1.6 Acid Etch

Characters are produced by the use of a strong acid. Application of the acid may be by any means, but care shall be exercised to prevent acid fumes from spreading to the surrounding area. The surface to be etched shall be clean. After etching, the acid shall be neutralized and corrosion preventative treatment applied.

4.1.7 Electrochemical Process

Characters are produced by use of a controlled pH electrolytic solution to facilitate electrolysis which is confined to the area of the characters by a stencil. After marking, the electrolyte shall be neutralized and corrosion preventative treatment applied.

4.1.7.1 Electrochemical Etch

Characters are produced by removing material with an electrolytic process. Characters shall be dark or of a sufficient contrast to assure good visibility.

4.1.7.1.1 An optical measurement technique shall be used to determine the maximum depth within an electrochemical mark.

1. Test coupons may be used to determine marking depth provided the procedure is a valid simulation of marking the actual parts.
2. A metallurgical microscope with a magnification range from 50X to at least 200X, with a calibrated fine focus capability accurate to 0.0001 inch minimum, shall be used to measure the depth within an electrochemical mark. A calibrated digital readout, accurate to 0.0001 inch minimum, may be used to aid in the measurement of depth.
3. The deepest pit within each character on the test coupon shall be located with the microscope at low magnification, approximately 50X. The magnification shall then be increased to approximately 200X. After focusing on the deepest area of the deepest pit, the reading from the fine focus system shall be recorded. Then, the fine focus reading of the surface of the test coupon adjacent to the pit shall be recorded. The difference between the two fine focus readings is the depth of the pit.
4. All measured depths must be within the limits specified in Table 1.
5. An alternate process may be used if approved by the purchaser.

4.1.7.2 Electrochemical Deposit

Characters are produced by adding material with an electrolytic process employing DC reverse polarity. Deposit marking does not have the durability or permanency of etch or other material removal or displacement methods, and should not be specified where the loss of identification under normal service condition is objectionable.

INACTIVE FOR NEW DESIGN: There is no known source for marking equipment.

4.1.7.3 AC Etch

Characters are produced by removing material with an electrolytic process employing AC. When authorized, material may be removed by the use of DC straight polarity with the part positive electric charged.

4.1.7.4 AC Etch - DC Deposit

Characters are produced by removing material by the AC etch method followed by the addition of material by applying DC reverse polarity.

4.1.8 Blast

Characters are produced by the impingement of an abrasive substance confined to the area of the characters by a stencil.

4.1.9 Brand

Characters are produced by burning or displacing material with a heated tool.

4.1.9.1 Hot Press

Characters are produced by controlled impression of colored foil with a heated die.

4.1.10 Ceramic

Characters are produced by a contrasting ceramic coating applied by any means prior to the initial firing.

4.1.11 Decalcomania

A pigmented film bearing the required identification applied by transfer from a suitable backing to the item. When dried, it is recommended that the film be coated with a clear lacquer or polyurethane topcoat, air dried; the marking shall be legible after coating.

4.1.12 Plate

A data or nameplate bearing the required identification marking is securely affixed to the item.

4.1.13 Band

A band bearing the required identification marking is permanently attached to the item.

4.1.14 Pressure Sensitive Label

An environment resisting label bearing the required identification, backed with pressure sensitive adhesive, is applied to the item.

4.1.15 Laser

Characters are produced by displacing material with a laser beam. Depth is controlled by varying the pulse rate of the beam, the speed of advance, the focus, and the power.

4.1.15.1 Dot Matrix Mode

Characters are formed by a series of dot-like depressions in the material.

4.1.15.2 Engrave Mode

Characters are formed by a continuous depression in the material.

4.1.16 Plastic Laminate

On laid-up plastic parts, the identification marking may be applied with ink or paint and then covered by a layer of the same resin used in the underlying laminate. Alternatively, the identification may be marked on a separate piece of fabric or paper which is bonded to the substrate with resin and then covered with resin. The ink or paint and the fabric or paper shall withstand the cure cycle, if applicable. The ink or paint and the resin shall have good adhesion to the composite substrate, shall be compatible with each other, shall withstand the cure cycle if applicable, and be compatible with the service environment of the part. The marking shall be legible through the cured resin.

4.2 Temporary Marking

Temporary marking shall not adversely affect the function or serviceability of the item. On items subject to intense heat, any temporary marking method which leaves a heavy carbon deposit or sufficient detrimental residue such as copper, zinc, etc., should be avoided or, when used, should be removed before subjection to intense heat.

NOTE: The use of any known carcinogenic material; e.g., lead, cadmium, etc., is strictly prohibited.

4.2.1 Ink

Characters are produced by applying an ink by any means which does not injure the surface. When a final marking is applied to a painted surface by ink stamping, it is recommended that the marking be coated with a clear lacquer or polyurethane topcoat, air dried; the marking shall be legible after coating.

4.2.2 Dye

Characters are produced by applying a dye by any means which does not damage the surface. It is recommended that a coating of clear lacquer or polyurethane topcoat, air dried, be applied over the marking; the marking shall be legible after coating.

4.2.3 Paint

Characters are produced by painting, with or without a stencil. It is recommended that a coating of clear lacquer or polyurethane topcoat, air dried, be applied over the marking; the marking shall be legible after coating.

4.2.3.1 Silk-Screen

Characters are produced by forcing paint through a fabric stencil. It is recommended that a coating of clear lacquer or polyurethane topcoat, air dried, be applied over the marking; the marking shall be legible after coating.

4.2.4 Chalk

Characters are produced by marking with chalk.

4.2.5 Crayon

Characters are produced by marking with a wax crayon.

4.2.6 Tag

A tag bearing the required identification marking is attached to the item, or to a bag containing the item. The means of attachment and location shall be such that no damage shall be done to the item.

4.2.7 Band or Tape

A band or tape bearing the required identification marking is temporarily attached to the item.

4.3 Package Marking

The package bears the identification markings of the item(s) which is too small or otherwise impractical to be marked.

5. DEPTHS AND ALTERNATIVE METHODS OF MARKING

The alternative methods and recommended marking depths are given in Table 1 (see 3.2.6). The choice of alternatives is not limited to those recommended in Table 1 under the column headed "See Note 1".

6. RULES FOR DESIGNATING MARKING METHODS

6.1 General Practice

To specify marking methods in accordance with this standard, the marking requirements note shall contain the specific data to be marked and AS478 followed by all acceptable marking methods. Marking methods may include any specific 1st tier, 2nd tier, or 3rd tier method, any class of methods (as designated in Table 1), and any supplemental OCR Font Designator if applicable (as designated in Table 2), or any combination of such methods. OCR Font Designators shall be included for all methods to which they apply. Unless otherwise specified on the part drawing or other procurement document, all included methods or class of methods in a marking note are considered equally acceptable. It is recommended that each additional method or class be preceded by the word "OR" in the marking note (or alternatively, a comma). See example in 6.1.1d.

6.1.1 General Practice Example Notes (see Tables 1 and 2)

- a. MARK PART NUMBER PER AS478-2C1 - (Specifies marking by metal stamp, roll, shallow only.)
- b. MARK PART AND SERIAL NUMBER PER AS478 CLASS H - (Specifies marking by any method in Column H.)
- c. MARK MATERIAL CODE PER AS478-2C1 OR CLASS E - (Specifies marking by method 2C1 or any of the methods in Column E.)
- d. MARK MATERIAL CODE PER AS478-4 OR -5D OR -15A3 OR CLASS K - (Specifies marking by any method under 1st tier method 4 or any method under 2nd tier method 5D or method 15A3 or any method in Column K.)
- e. MARK PART NUMBER PER AS478-7A1 OCR-A09 OR 15B1 OCR-A09 - (Specifies marking by intermediate electrochemical etch or shallow laser engrave mode with optically recognized character fonts.)

6.2 1st Tier Methods

When a marking method number in the first tier of Table 1 is specified, any of its subordinate methods listed in the second and third tiers may be used.

6.2.1 1st Tier Methods Example Note

- a. MARK PART NUMBER PER AS478-2 - (Permits marking by any of its second-tier subordinates 2A, 2B, 2C, 2D, 2E, 2F, or any of its third tier subordinates 2A1 through 2F3.)

6.3 2nd Tier Methods

When a marking method number in the second tier of Table 1 is specified, any of its subordinates in the third tier may be used.

6.3.1 2nd Tier Methods Example Note

- a. MARK PART NUMBER PER AS478-2C - (Permits marking by methods 2C1 or 2C2.)

6.4 3rd Tier Methods When a marking method in the third tier of Table 1 is specified, only that method is allowed.

6.4.1 3rd Tier Methods Example Note

- a. MARK PART NUMBER PER AS478-2C1 - (Permits marking by method 2C1 only.)

6.5 Class of Methods When a Class letter or letters in Table 1 are specified, any of the marking methods indicated by an "X" in the column under the Class letter may be used. The limits for marking depths for the actual method used shall apply.

6.5.1 Class of Methods Example Note

- a. MARK PART NUMBER PER AS478 CLASS H - (Permits marking methods 2C1, 2D1, 2E2, 2F3, 3B2, 5B2, 7A2, 7C2, 8B, and 8C. If method 2E2 is the method used, depth limits 0.002 to 0.006 inch (0.05 to 0.15 mm) shall apply. If method 2C1 is the method used, depth limits 0.001 to 0.006 inch (0.03 to 0.15 mm) shall apply.)

7. NOTES

7.1 Revision Indicator

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PREPARED BY SAE COMMITTEE E-25, GENERAL STANDARDS FOR AEROSPACE AND PROPULSION SYSTEMS

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REV.
C

AS4663™

FEDERAL SUPPLY CLASS
4730

RATIONALE

ADDED CONDUCTIVE HIGH PURITY ALUMINUM COATING FOR ALUMINUM ALLOY FITTINGS.

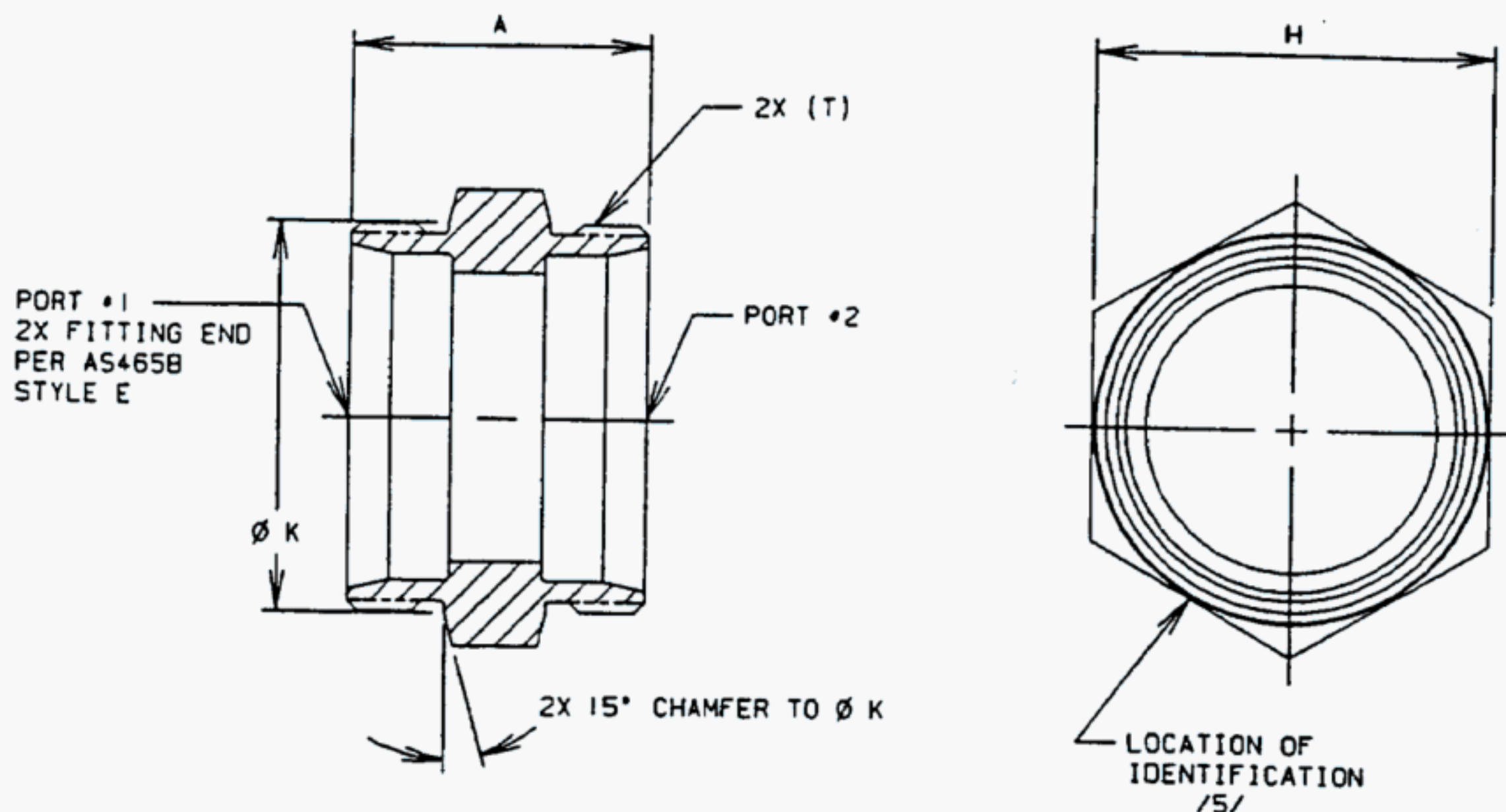


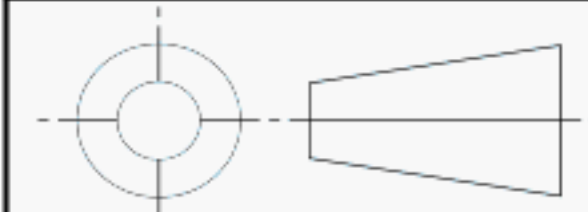
FIGURE 1 – FITTING, UNION, SHORT FLARELESS

TABLE 1 – DIMENSIONS AND WEIGHTS

BASIC NO. AS4663 /15/ SIZE CODE	(NOMINAL TUBE SIZE)	T THREAD PER AS8879 CLASS 3A	A	H	K	LB/EA APPROX REF ALUM	LB/EA APPROX REF CRES	LB/EA APPROX REF TI
2020	1.250	1.5625-12 UNJ	1.301	1.615-1.630	1.605	.096	.266	.152
2424	1.500	1.8125-12 UNJ	1.364	1.865-1.880	1.855	.134	.370	.212

SAE values your input. To provide feedback on this Technical Report, please visit
<http://standards.sae.org/AS4663C>

THIRD ANGLE PROJECTION



CUSTODIAN: G-3/G-3B

PROCUREMENT SPECIFICATION: AS18280 /4/



AEROSPACE STANDARD

FITTING, UNION, SHORT FLARELESS

AS4663™
SHEET 1 OF 3

**REV.
C**

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ISSUED 1992-06 REAFFIRMED 2004-07 REVISED 2017-06

NOTICE

THIS DOCUMENT REFERENCES A PART WHICH CONTAINS CADMIUM AS A PLATING MATERIAL. CONSULT LOCAL OFFICIALS IF YOU HAVE QUESTIONS CONCERNING CADMIUM'S USE.

/1/ MATERIAL:

- a. CODE LETTER T: TYPE 6AL-4V TITANIUM ALLOY BAR PER AMS4928
- b. CODE LETTER V: TYPE 15-5PH CORROSION RESISTANT STEEL BAR PER AMS5659
- c. CODE LETTER W: TYPE 7075-T7351 ALUMINUM ALLOY BAR PER AMS4124

2. HEAT TREATMENT:

- a. MATERIAL CODE LETTER T: NONE
- b. MATERIAL CODE LETTER V: HEAT TREAT TO CONDITION H-1075 PER AMS2759/3
- c. MATERIAL CODE LETTER W: NONE

/3/ FINISH:

- a. MATERIAL CODE LETTER T - FLUORIDE PHOSPHATE CONVERSION COAT PER AMS2486
- b. MATERIAL CODE LETTER V:
 - (1) V CODE PARTS TO BE PASSIVATED ONLY WILL HAVE NO FINISH CODE LETTER AFTER THE SIZE CODE IN THE PART NUMBER. THE FINISH WILL BE: PASSIVATE PER AMS2700 TYPE 2 OR 8.
 - (2) V CODE PARTS TO BE CADMIUM PLATED ONLY WILL HAVE THE FINISH CODE LETTER "P" AFTER THE SIZE CODE IN THE PART NUMBER. THE FINISH WILL BE: CADMIUM PLATE PER AMS-QQ-P-416, TYPE II, CLASS 2.
- c. MATERIAL CODE LETTER W:
 - (1) W CODE PARTS TO BE ANODIZED ONLY WILL HAVE NO FINISH CODE LETTER AFTER THE SIZE CODE IN THE PART NUMBER. THE FINISH WILL BE ANODIZE PER AMS2472 OR MIL-A-8625, TYPE II, CLASS 2, DYE BROWN SIMILAR TO COLOR 10080 OF AMS-STD-595.
 - (2) W CODE PARTS TO BE COATED WITH HIGH PURITY ALUMINUM ONLY WILL HAVE THE FINISH CODE LETTER "V" AFTER THE SIZE CODE IN THE PART NUMBER. SEE PROCUREMENT SPECIFICATION FOR REQUIREMENTS.

/4/ PROCUREMENT SPECIFICATION: AS18280 EXCEPT AS SPECIFIED ON THIS STANDARD. PRODUCT SUPPLIED TO THIS SPECIFICATION SHALL BE MANUFACTURED BY AN ACCREDITED MANUFACTURER AS LISTED IN THE PERFORMANCE REVIEW INSTITUTE (PRI) QUALIFIED PRODUCTS LIST (QPL) PRI-QPL-AS18280 FOR THIS STANDARD. SEE www.eAuditNet.com FOR CURRENT QPL ONLINE.

/5/ IDENTIFICATION AT LOCATION SHOWN: MARK PER AS478 CLASS C OR D OR METHOD 7A3, 15A3, OR 15B. MANUFACTURER'S NAME, TRADEMARK OR CAGE CODE, BASIC PART NUMBER, AND MATERIAL CODE LETTER.

6. INTENDED USE: THIS PART IS DESIGNED FOR USE IN TUBING CONNECTION SYSTEMS WITH NOMINAL OPERATING PRESSURES AS FOLLOWS:

- a. SIZES -20 AND -24 TITANIUM ALLOY AND CORROSION RESISTANT STEEL AT 3000 PSI
- b. SIZES -20 AND -24 ALUMINUM ALLOY AT 600 PSI

NOTE: THIS IS A NON-REDUCER FITTING. FOR REDUCER FITTING SEE AS4680.

/7/ FINISH CODE LETTER "P" SHALL BE PLACED AFTER SIZE CODES ONLY FOR MATERIAL CODE "V" PARTS THAT ARE TO BE CADMIUM PLATED. FINISH CODE LETTER "V" SHALL BE PLACED AFTER SIZE CODES ONLY FOR MATERIAL CODE "W" PARTS THAT ARE TO BE COATED WITH HIGH PURITY ALUMINUM TO PROVIDE LOW ELECTRICAL CONTACT RESISTANCE. NO OTHER LETTERS ARE TO FOLLOW THE SIZE CODES.

**AEROSPACE STANDARD**

FITTING, UNION, SHORT FLARELESS

AS4663™
SHEET 2 OF 3**REV.**
C

- 8. REVISION INDICATOR: A CHANGE BAR (I) LOCATED IN THE LEFT MARGIN IS FOR THE CONVENIENCE OF THE USER IN LOCATING AREAS WHERE TECHNICAL REVISIONS, NOT EDITORIAL CHANGES, HAVE BEEN MADE TO THE PREVIOUS ISSUE OF THIS DOCUMENT. AN (R) SYMBOL TO THE LEFT OF THE DOCUMENT TITLE INDICATES A COMPLETE REVISION OF THE DOCUMENT, INCLUDING TECHNICAL REVISIONS. CHANGE BARS AND (R) ARE NOT USED IN ORIGINAL PUBLICATIONS, NOR IN DOCUMENTS THAT CONTAIN EDITORIAL CHANGES ONLY.
- 9. INVENTORIED PARTS CONFORMING TO THE PREVIOUS "LETTER CHANGE" MAY BE USED TO DEPLETION.
- 10. INTERPRETATION OF DRAWING PER AS4296.
- 11. SURFACE TEXTURE: SYMBOLS PER ASME Y14.36M. REQUIREMENTS PER ASME B46.1. UNLESS OTHERWISE SPECIFIED, MACHINED SURFACES TO BE 125 MICROINCHES Ra.
- 12. BREAK EDGES .003 TO .015, UNLESS OTHERWISE SPECIFIED.
- 13. DIMENSIONING AND TOLERANCING: ANSI Y14.5M-1982.
- 14. DIMENSIONS ARE IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCES: LINEAR DIMENSIONS $\pm .010$, ANGULAR DIMENSIONS $\pm 5^\circ$.

/15/ EXAMPLE OF PART NUMBER:

