

MIL-E-6843C

10 Feb. 1967
 SUPERSEDING
 MIL-E-6843B
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MILITARY SPECIFICATION

**ELECTRODES, WELDING, COVERED, LOW-ALLO
 STEEL (PRIMARILY FOR AIRCRAFT AND
 WEAPON APPLICATIONS)**

This specification is mandatory for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 **Scope** - This specification covers metallic arc welding covered electrodes for use in the manual welding of medium carbon and low alloy steels, used in the stress relieved condition.

1.2 **Classification** - Electrodes shall be furnished in the classes and sizes shown in Table I, as specified (see 6.2):

TABLE I**CLASSES AND SIZES**

Electrode Material Class	E-10013	E-10020
Cover description	High-titanium potassium	High iron oxide
Size	1/16, 5/64, 3/32, 1/8, 5/32, 3/16	1/16, 5/64, 3/32, 1/8, 5/32, 3/16
Position of welding	All	Horizontal fillets and flats
Type of current	AC or DC (either polarity depending upon application)	

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

FSC 3439

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SPECIFICATIONS

Military

MIL-T-5021	Tests, Aircraft and Missile Welding Operators, Qualification
MIL-I-6868	Inspection Process, Magnetic Particle
MIL-S-7809	Steel, High Strength, Low Alloy, Bars, Shapes, Sheet, Strip and Plate
MIL-W-10430	Welding Rods and Electrodes; Preparation for Delivery of
MIL-S-18728	Steel Plate, Sheet and Strip, Alloy, 8630, Aircraft Quality
MIL-S-18729	Steel Plate, Sheet and Strip, Alloy, 4130, Aircraft Quality

STANDARDS

Federal

Fed. Test Method Std. No. 151	Metals; Test Methods
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Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-248	Qualification Tests for Welders (Other than Aircraft Weldments)
MIL-STD-453	Inspection, Radiographic

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

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3. REQUIREMENTS

- * 3.1 Electrodes - Core wire and coatings may be made by any process yielding electrodes conforming to this specification.

3.2 Material -

- 3.2.1 Core wire - The core wire shall be free from injurious defects such as segregation and nonmetallic inclusions.

- * 3.2.2 Core wire dimensions and tolerances -

- * 3.2.2.1 Dimensions - Unless otherwise specified, the diameters of the core wire and lengths of electrodes shall be in accordance with the requirements of Table II.

TABLE II

DIAMETERS AND LENGTHS OF ELECTRODES

Diameter of Core Wire (Inch)	Length of Electrodes (Inches)
1/16	9 (18 when center grip is used)
5/64 and 3/32	9 or 12 (18 when center grip is used)
1/8, 5/32, and 3/16	14 or 18

- * 3.2.2.2 Tolerances -

- * 3.2.2.2.1 Diameter of core wire - The diameters of core wire shall not vary more than ± 0.002 inch from the diameter specified in the contract or purchase order.

- * 3.2.2.2.2 Length - The length of electrodes shall not vary more than $\pm 1/8$ inch from the length specified in the contract or purchase order. Electrodes shall be commercially straight.

- * 3.2.3 Electrode coatings - Coatings shall be capable of producing satisfactory arc characteristics, shall be consumed uniformly, and shall protect the molten metal from contamination. The coatings shall be uniform in quality, adherence, and free from injurious scabs, scales, blisters, pock marks, and other surface imperfections. The coatings shall be capable of withstanding ordinary handling without becoming detached. The coating shall be heat resistant so that it will not flake or crack off when the electrode is used intermittently within the recommended current range for that electrode class and size.

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3.2.3.1 Coating composition - The chemical composition of the coating shall be optional with the manufacturer.

3.2.4 Extent of coating -

3.2.4.1 Grip ends - Electrodes shall be bare or free from coatings for a distance of approximately 3/4 inch but not to exceed 1-1/2 inches for end-grip electrodes, and for approximately 1-1/2 inches but not to exceed 2 inches for center grip electrodes, for making electrical contact with the holder.

3.2.4.2 Arc ends - The arc end of each electrode shall be sufficiently bare and the covering sufficiently tapered to permit easy striking of the arc. The covering shall cover the core wire for at least one half of the circumference of the electrode at a distance equal to one-half of the diameter of the core wire or 1/16 inch maximum, whichever is smaller from the arc end.

3.2.4.3 Tolerance, concentricity of coating - The coatings shall be concentric with the core to such a degree that the maximum core-plus-one coating dimensions shall not exceed the minimum core-plus-one coating dimension by more than 3 percent of the mean dimension at the respective location.

3.3 Stability - Coatings shall not be damaged by storage under normal conditions and shall be satisfactory for use after storage for 36 months from date of manufacture, in unopened hermetically sealed, vapor-proof, metal containers on a dry floor and under a roof.

3.4 Dielectric strength - Coatings shall have sufficient dielectric strength at ambient temperatures and as removed from the container, to effectively insulate against a potential difference of 100 volts, alternating current (AC) or direct current (DC).

3.5 Usability characteristics - Electrodes shall be suitable for producing sound, dense weld deposits that are reasonably smooth and free from defects such as undercutting, overlapping, lack of fusion, porosity, entrapped slag, and cracks, when used with the recommended current and voltage settings, and pre-heated where required or specified.

3.5.1 Positioning - Electrodes shall be suitable for depositing weld metal in positions as indicated in Table 1. Class E-10013 electrodes shall be capable of producing satisfactory welds in the flat, vertical, overhead and horizontal positions. Class E-10020 electrodes shall be capable of producing satisfactory welds in the flat or horizontal-fillet positions.

3.5.2 Root penetration - Electrodes shall be capable of depositing satisfactory single-pass fillet welds with complete root penetration. The deposited

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single-pass fillet welds shall be within the size and contour limits shown on Figures 2 and 3. The fillet weld shall be free from objectionable undercut or overlap. Fillet welds made and tested in accordance with 4.5.8, Figure 2 and the notes thereof shall exhibit complete fusion with the base metal.

3.5.3 Slag removal - The flux residues shall be readily removable from weld beads by the use of hand tools after welds have cooled.

3.5.4 Fumes - The fumes from the burning coatings during welding shall not be injurious to personnel when electrodes are used in adequately ventilated spaces.

3.6 Mechanical properties of the deposited metal -

3.6.1 Compatibility of base metal - Weld deposited on the indicated base metal shall exhibit mechanical and physical properties that shall be in accordance with Table III after stress relief treatment when the specimens are prepared and tested in accordance with 4.5.9.1, 4.5.9.2, and 4.5.9.3.

3.6.2 Tensile strength of welded joints - Tensile specimens prepared from weld deposits made with E-10013 and E-10020 electrodes shall be stress relieved at 1150 \pm 25° F for 1 hour and shall conform to the mechanical properties requirements of Table III, except that yield strength and elongation requirements are not applicable to transverse weld specimens. Transverse weld specimens which fail outside the fusion zone at a tensile strength greater than specified in Table III shall be considered satisfactory, but if the tensile strength is less than that specified in Table III the test shall be considered valid.

TABLE III

MECHANICAL PROPERTIES OF DEPOSITED WELD METAL ^{1/}

Electrode Material Class	Ultimate Tensile Strength, KSI (Minimum)	Yield Strength 0.2% Offset, KSI (Minimum) ^{2/}	Elongation, 2 Inches Or 4 x Dia., Percent (Minimum) ^{2/}
E-10013	100	87	13.0
E-10020	100	87	18.0

^{1/} Stress relieved at 1150 \pm 25° F for 1 hour.

^{2/} Not required of transverse weld tensile specimens.

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3.7 Electrode identification -

3.7.1 Labeling - The classification number shall be stamped or imprinted on the covering of each electrode at not less than two points or locations. One imprinted class designation shall appear as closely as practicable to the bare grip-end, the location of the second shall be at the discretion of the manufacturer.

3.7.2 Size and legibility - The imprinted designation shall be composed of equal-size block characters, the height of which shall be approximately 50 to 100 percent of the overall electrode diameter but need not exceed a 5/32 inch height. The imprinted designation shall read from left to right from the grip-end. The color of the print shall contrast color of the electrode covering and printed designations shall be readable under normal lighting conditions.

3.7.3 Stability - Printed type designations shall remain discernible on electrodes rebaked at temperatures up to 850°F and on unused portions of partially consumed electrodes or discarded stubs, and shall resist effacement by contact incidental to normal handling, shipping and storing.

3.8 Workmanship - Electrodes shall be manufactured in accordance with high-grade commercial practice covering the class of work. The electrodes shall be uniform in quality and temper, clean, sound and smooth. The material shall be free from injurious scabs, blisters, pock marks, bruises or other defects. The electrodes shall be free of any materials, conditions, or defects which would create unsatisfactory operating characteristics or unsound weld metal.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection - Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Lot - Unless otherwise specified in the contract or purchase order, a lot of electrodes shall consist of one class and size produced under the same conditions from one heat of wire and one batch of coating material and submitted for delivery at one time. The maximum weight of a lot shall be 5000 pounds.

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4.3 Sampling -

4.3.1 Packages - A random sample of unit packages, with the contents intact, shall be selected from each lot in accordance with MIL-STD-105, Inspection Level I, Acceptable Quality Level 2.5 percent. Packages shall be weighed for contents, visually examined (4.5.1) and tested for leakage (4.5.2) to determine conformance to Section 5.

4.3.2 Electrodes - One or more unit packages of electrodes shall be taken at random from the samples of unit packages selected in accordance with 4.3.1, or random samples of electrodes shall be selected from each lot in accordance with MIL-STD-105, Inspection Level II for sampling tests.

4.3.2.1 For visual and dimensional examination - Samples of the electrodes selected as specified in 4.3.2 shall be in accordance with MIL-STD-105, Inspection Level II, Acceptable Quality Level 2.5 percent defective and shall be taken for visual and dimensional examination. Samples selected shall be visually examined (4.5.3) for conformance with 3.2.1, 3.2.3, 3.7 and 3.8; measured for conformance with 3.2.2.2.2, 3.2.4.1 and 3.2.4.2; and examined for diameter of core wire (4.5.4) to determine conformance to 3.2.2.1.

4.3.2.2 For stability - When specified in the contract or purchase order, one or more unit packages shall be taken at random from the samples of unit packages selected in accordance with 4.3.1 from each lot for storage. At the end of the specified storage period, the material shall be examined by the applicable procedures contained herein to determine conformance to 3.3.

4.3.2.3 For other tests - The samples selected in accordance with 4.3.2 shall be subjected to the following tests:

Test	Paragraph Giving Further Reference	Paragraph Giving Requirements
Concentricity of coating	4.5.5	3.2.4.3
Dielectric strength	4.5.6	3.4
Usability characteristics	4.5.7	3.5, 3.5.1, 3.5.2, 3.5.3, and 3.5.4
Fillet Weld tests	4.5.8	3.5, 3.5.1, and 3.5.2
Tensile tests	4.5.9	3.6, 3.6.1, and 3.6.2

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4.4 Requirement applicable to all testing -

4.4.1 Welders - Welding of test joints shall be accomplished by welders qualified in accordance with specifications or standards applicable to the procuring activity (see MIL-T-5021 and MIL-STD-248).

4.5 Test methods -

4.5.1 Visual examination of packages - Each unit package sample shall be visually examined to determine conformance to the applicable packaging and marking requirements of MIL-W-10430 and Section 5 herein.

4.5.2 Leakage test (unit package) - Filled unit package sample shall be immersed in water that has been heated to a temperature of 150°F or above. The package shall be immersed and rotated so that the top surface is 1 inch below the water level. All packages shall be so immersed that the greater basic dimension is parallel to the water surface and held for 2 minutes. The presence of leaks as evidenced by the emanation of a steady stream of air bubbles from the container for a least 30 seconds or otherwise, shall be the cause for rejection of the package of contents. Rejection of the lot represented by the Class 1a or Class 1b metal containers or Class 5 when as a metal container of MIL-W-10430 shall be in accordance with 4.3.1.

4.5.3 Examination of product - Electrodes shall be examined for compliance with dimensional requirements, condition of the coatings, imprint identification and freedom from obvious defects which can be detected visually.

4.5.4 Diameter of core - The diameter of the core wire shall be determined by direct measurement of the uncoated portion of the electrode.

4.5.5 Concentricity of covering - The core wire shall be exposed by removing a small amount of covering from a spot on one side of the core wire near one end of the covered length, care being taken to insure that no metal is removed from the core wire. The diameter of the core wire and the thickness of the covering on the side opposite the bared spot shall be measured with a micrometer. The covering shall then be removed from a spot on the opposite side of the core wire at a point immediately adjacent to that at which the first measurement was made, and a similar measurement made. Second and third pairs of similar measurements shall be made at approximately mid-length and at the other end of the covered portion, or diameters approximately 60 degrees and 120 degrees, respectively, from the diameter on which the first pair of measurements were made. A pair of measurements (two adjacent measurements) which show the greatest variation shall be used to determine the acceptability of the electrodes.

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4.5.6 Dielectric strength - Two or more electrodes from each sample shall be tested by laying each electrode flat on a steel plate and applying a potential of 100 volts dc between the grip end of the electrode and the steel plate. If the electrode covering effectively prevents the flow of current, that is, if no arcing occurs, the dielectric properties shall be considered satisfactory.

4.5.7 Usability characteristics - The operating characteristics of the electrodes and the burning characteristics of the coverings shall be observed during the fabrication of welded test specimens. Welds shall be examined externally for smoothness of surface, surface porosity, cracking, undercutting and overlapping. Welds shall be examined for the presence of internal defects by visual inspection of the fractured surfaces of transverse weld tensile specimens after failure in tension. Test plates welded as specified in 4.5.9.1 and 4.5.9.2 shall be examined magnetically and radiographically in accordance with MIL-I-6868 and MIL-STD-453 respectively after removing the weld reinforcement and backing plate by machining flush with the adjacent plate surfaces. Indications of defects exceeding those shown in Figure 4A in size and frequency shall be cause for rejection of welded test plates 1/4 inch or less in thickness. Indications of defects exceeding those shown in Figure 4B in size and frequency shall be cause for rejection of welded test plates 3/8 inch or greater in thickness. Magnetic indications definitely established as cracks shall be cause for rejection.

4.5.8 Fillet weld test -

4.5.8.1 Preparation of specimens - Fillet-weld T-joint assemblies, conforming to Figure 2, shall be made of plate materials conforming to MIL-S-18728 or MIL-S-18729. Specimens shall be prepared in the vertical and overhead positions for Class E-10013 electrodes and for welding in the horizontal position only for Class E-10020 electrodes. Welding positions shall be as indicated in Figure 1. Duplicate samples shall be welded with AC or DC current as appropriate for the respective electrode class. When testing any 3/16 inch diameter electrode, an initial root pass with a smaller diameter electrode of the same class and manufacture is permissible. The single-fillet welded joint shall be prepared in accordance with Figure 2 from the selected electrodes of the sizes indicated by that figure and the notes applying thereto.

4.5.9.2 Examination and test - The weld shall be examined for smoothness of surface, cracking, gas pockets, undercutting, overlapping and excessive convexity or concavity to determine conformance to 3.5 and 3.5.2 and to size and contour limits shown on Figure 3. The joint shall then be tested by bending in the direction indicated in Figure 2 until the weld has fractured. The fracture surface shall then be examined for the presence of root defects to determine conformance to 3.5.2.

4.5.9 Tensile tests - A minimum of two specimens are required for the tensile tests shown in Table IV.

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TABLE IV

TENSILE TESTS FOR E-10013 and E-10020

Electrode Diameter, Inch	All Weld Metal Tensile Test	Transverse Tensile Test
1/16 to 1/8	Not required	Flat position
1/8 and over	Flat position	Not required

4.5.9.1 Transverse tensile specimens -

4.5.9.1.1 Preparation of specimens - Test plates shall be prepared in accordance with Figure 6 and the notes applying thereto from normalized sheet material conforming to MIL-S-18728 or MIL-S-18729. Test plates shall be welded from one side only in the flat position as indicated in Figure 1 using the electrode size indicated by Figure 5. After welding, the test plates shall be stress relieved by heating at $1150 \pm 25^\circ \text{F}$ for 1 hour to conform to the requirement specified in Note 1 of Table III.

4.5.9.1.2 Machining of transverse tensile specimens - Tensile specimens shall be machined from the locations and to the dimensions indicated in Figure 5.

4.5.9.2 All weld metal tensile specimens -

4.5.9.2.1 Preparation of specimens - The plates shall be prepared as indicated in Figure 6 from plate material conforming to MIL-S-7809. Welding shall be performed in the flat position as indicated in Figure 1. The beveled edges of the base metal plate and surface of backing plate shall be clad with a layer of weld metal (not less than 3/16 inch thick) deposited with the electrode being tested. The plate edges shall be clad, using a stringer bead technique, and machined or ground smooth before assembly of the test plate.

4.5.9.2.2 Welding technique - Welds shall be deposited in layers, using the 2-1/2 diameter split weave buildup sequence shown in Figure 6. Layers shall be approximately 1/8 inch thick, and should be deposited in such a manner that the final layers include a reinforcement of standard proportions (1/32 to 1/8 inch). Temperature between passes shall not be stress relieved at $1150 \pm 25^\circ \text{F}$ for 1 hour.

4.5.9.2.3 Machining of all weld metal tensile specimens - The all weld metal tensile specimens of the dimensions indicated by Figure 7, shall be machined from location indicated in Figure 6.

4.5.9.3 Testing of tensile specimens - Tests of specimens prepared in accordance with 4.5.9.1.2 and 4.5.9.2.3 shall be conducted in accordance with the applicable requirements of Method 211 of Fed. Test Method Std. No. 151.

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- * 4.6 Rejection and retest - When electrodes or specimens welded with electrodes fail to meet any of the tests required by this specification, the lot represented shall be subject to rejection, except as otherwise provided by MIL-STD-105. Retests shall be permitted in accordance with the requirements of Fed. Test Method Std. No. 151.

- * 4.6.1 Resubmitted lots - Paragraph 6.4 of MIL-STD-105 shall apply except that a resubmitted lot shall be inspected using tightened inspection. For visual examination where the original acceptance number was zero, a sample size represented by the next higher sample size code letter shall be chosen.

4.7 Waiver of tests - At the discretion of the procuring activity, tests may be waived on electrodes from lots from which electrodes of the same heat of core wire, size of wire, and batch covering material have been tested and found acceptable.

5. PREPARATION FOR DELIVERY

- * 5.1 Packaging - The level of packaging shall be Level A or Level C unless otherwise specified (see 6.2).

- * 5.1.1 Level A - Unless otherwise specified in the contract or purchase order, electrodes shall be packaged in accordance with MIL-W-10430. A unit package shall contain one size and class as specified by the procuring activity. When specified by the procuring activity, the net weight of the container shall be 5, 10, 25, or 50 pounds of electrodes.

- * 5.1.2 Level C - Unless otherwise specified in the contract or purchase order, electrodes shall be packaged in Class 1a, Class 1b, or Class 2 containers in accordance with MIL-W-10430. The electrodes shall be packaged to afford the minimum degree of protection necessary to prevent deterioration or damage during shipment under normal environmental conditions and commercial modes of transportation.

- * 5.2 Packing - Electrodes, packaged in accordance with Level A or C, as specified (see 5.1), shall be packed in accordance with Levels A, B or C of MIL-W-10430, as specified (see 6.2).

- * 5.3 Tests on shipping containers as specified in MIL-W-10430 shall apply to Levels A and B packing only.

- * 5.4 Marking - In addition to any special marking required by the contract or purchase order, interior packages, exterior shipping containers, and palletized unit loads shall be marked in accordance with MIL-STD-129 (see 6.2). The markings shall also include the following information:

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Material class

Size (diameter)

Polarity 1/Recommended voltage and current 1/Manufacturer's or distributor's brand or type name 1/Quantity (net weight) 1/Date of manufacture (month and year) 1/Lot or control number 1/1/ Information to be entered by manufacturer or distributor.

6. NOTES

6.1 Intended use -

6.1.1 E-10013 electrodes are suitable for welding low-alloy steel in all positions where shallow penetration is desired. They are suitable for use with either direct or alternating current where a single pass is required, and are satisfactory for welding alloy steel, to be followed by stress-relief treatment.

6.1.2 E-10020 electrodes are suitable for welding alloy steel of moderate tensile strengths to be followed by stress-relief treatment. They are suitable for use with either direct or alternating current (either polarity depending upon application).

6.2 Ordering data -

6.2.1 Procurement documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Electrode material class (see Table I).
- (c) Size of electrode (see Table I).
- (d) Length of electrodes (see Table II).
- (e) Storage stability, if required (see 4.3.2.2).
- (f) Applicable levels of packaging and packing (see 5.1 and 5.2).
- (g) Special markings, if applicable (see 5.4).

6.2.2 Electrodes shall be ordered by the pound.

6.3 The acceptance standards for radiographic inspection showing maximum permissible porosity, Figure 4, will shortly be promulgated in MIL-STD-779, Reference Radiographs for Steel Welds, Volumes I and II as well as similar documents to be issued by the American Society for Testing and Materials. Figure 4A will be reference radiograph for Grade 1, Fine Scattered Porosity for section thickness of 0.187 inch, applicable for a thickness range of over 0.125 inch and including 0.250 inch. Figure 4B will be the reference radiograph for Grade 1, Fine Scattered Porosity for section thickness of 0.375 inch, applicable for a thickness range of over 0.250 and including 0.500 inch.

6.4 Changes from previous issue - The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Army - WC
Navy - AS
Air Force - 11

Preparing activity:

Navy - AS
(Project No. 3439-0122)

Review activities:

Army - MR, MI, GL, WC
Navy - AS, OS
Air Force - 11

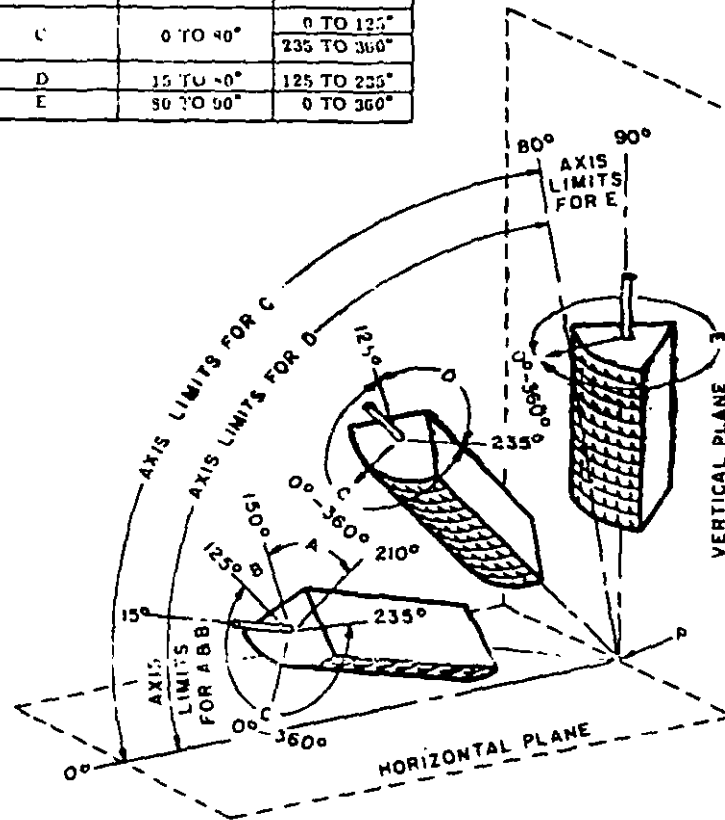
User activities:

Army - MU, AV
Navy - NONE
Air Force - 94

Review/user information is current as of date of this document. For future coordination of changes to this document, draft circulation should be based on information in the current DODISS.

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TABULATION OF POSITIONS OF FILLET WELDS			
POSITION	DIAGRAM REFERENCE	INCLINATION OF AXIS	ROTATION OF FACE
FLAT	A	0 TO 15°	150 TO 210°
HORIZONTAL	B	0 TO 15°	125 TO 150°
			210 TO 235°
OVERHEAD	C	0 TO 40°	0 TO 125°
			235 TO 360°
VERTICAL	D	15 TO 40°	125 TO 235°
	E	50 TO 90°	0 TO 360°



THE HORIZONTAL REFERENCE PLANE IS TAKEN TO LIE ALWAYS BELOW THE WELD UNDER CONSIDERATION.

INCLINATION OF AXIS IS MEASURED FROM THE HORIZONTAL REFERENCE TOWARD THE VERTICAL.

ANGLE OF ROTATION OF FACE IS MEASURED FROM A LINE PERPENDICULAR TO THE AXIS OF THE WELD AND LYING IN A VERTICAL PLANE CONTAINING THIS AXIS. THE REFERENCE POSITION (0°) OF ROTATION OF THE FACE INVARIABLY POINTS IN THE DIRECTION OPPOSITE TO THAT IN WHICH THE AXIS ANGLE INCREASES. THE ANGLE OF ROTATION OF THE FACE OF WELD IS MEASURED IN A CLOCKWISE DIRECTION FROM THIS REFERENCE POSITION (0°) WHEN LOOKING AT POINT P.

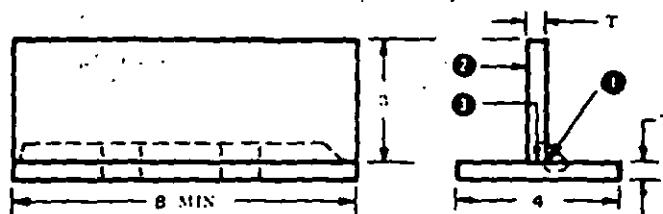
Figure 1. Positions of Fillet Welds

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① THE ROOT PENETRATION SHALL BE COMPLETE AT THE THEORETICAL THROAT OF THE WELD

② BEND BY PRESSURE APPLIED THIS DIRECTION RELATIVE TO FILLET

③ THIS EDGE OF STANDING MEMBER MACHINED AND IN CONTACT WITH PLATE SURFACE THROUGHOUT



ELECTRODE CLASS	TESTING POSITION	PLATE MATERIAL
E-10013	VERTICAL & OVERHEAD	MIL-S-19729 or
E-10020	HORIZONTAL	MIL-S-15729

WHEN VERTICAL WELDING TESTS ARE REQUIRED, WELD SHALL BE MADE UPWARD.

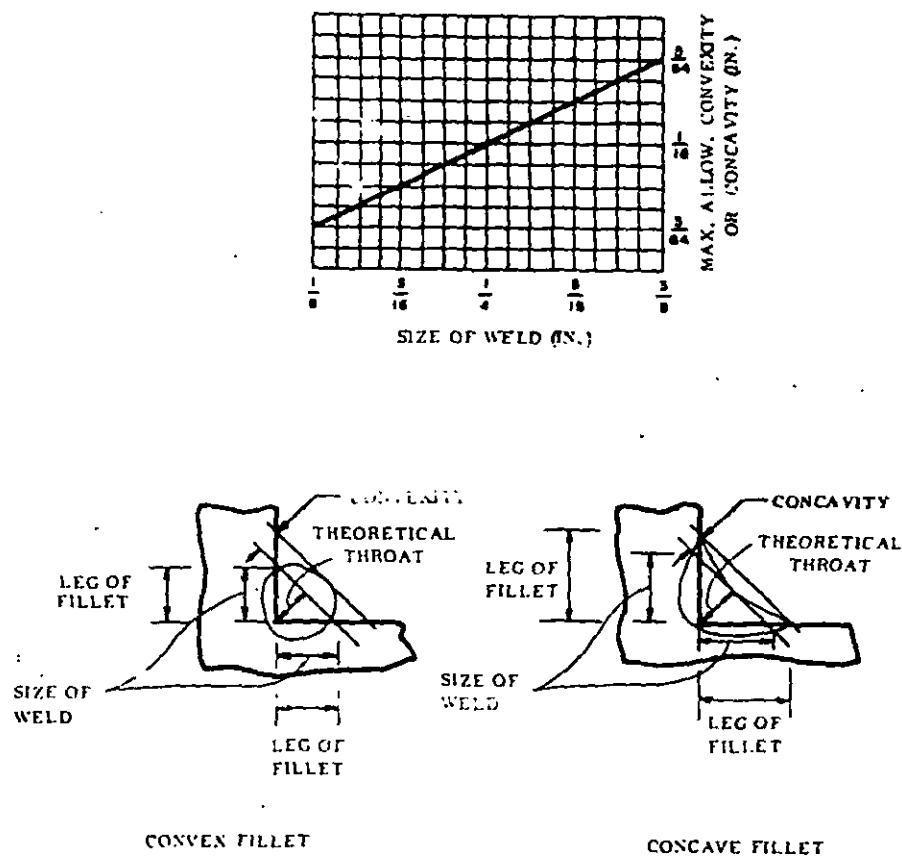
ELECTRODE SIZE	THICKNESS T	FILLET WELD SIZE
3/32	1/4	1/8 TO 3/16
1/8	3/8	3/16 TO 1/4
5/32	3/8	1/4 TO 5/16
3/16	1/2	5/16 TO 3/8

DIMENSIONS IN INCHES.

APPLICABLE TO ELECTRODES OVER 5/64 DIAMETER

Figure 2. Details of Single Fillet Weld Specimens

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For contour measurements -

1. Size of fillet weld leg is equal to length of largest inscribed isosceles right triangle.
2. Length of horizontal leg of fillet weld shall not vary more than $\frac{1}{16}$ inch from length of vertical leg.
3. Fillet weld size, convexity or concavity and leg lengths of fillet welds shall be determined by actual measurements (to nearest $\frac{1}{64}$ inch) on section laid out with scribed lines as shown.

Figure 3. Contour Dimensions of Fillet Welds for Usability Test

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Figure 4A -
(Fine Scattered Porosity
0.187 inch)

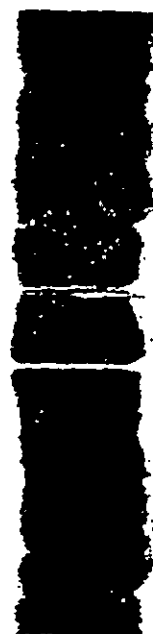
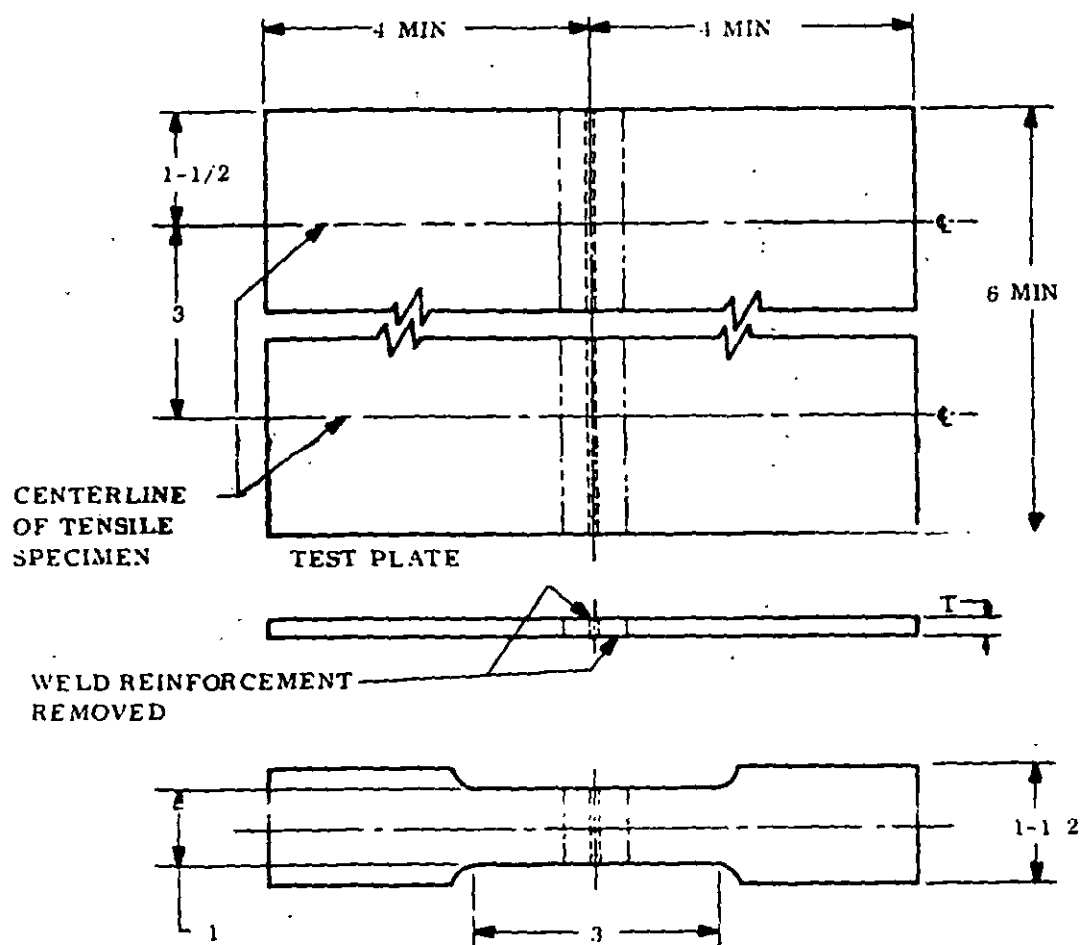


Figure 4B -
(Fine Scattered Porosity
0.375 inch)

Figure 4. Acceptance Standards for Radiographic Inspection Showing
Maximum Permissible Porosity

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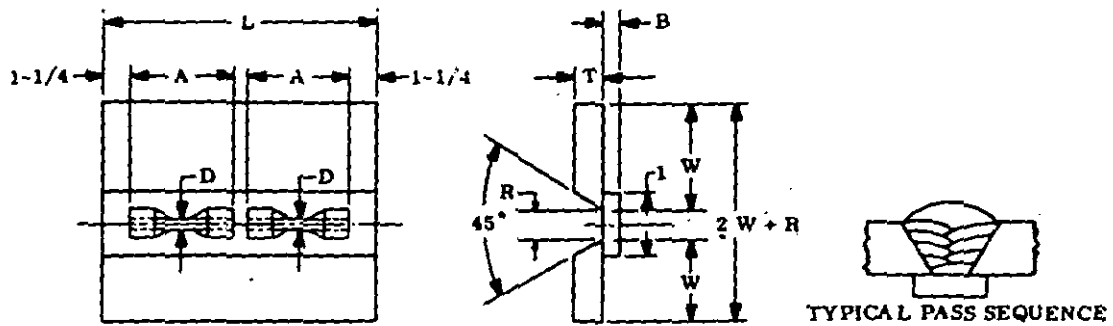


DIMENSIONS IN INCHES.

ELECTRODE SIZE	T APPROX
1/16	0.064
5/64	
3/32	
1/8	0.125
5/32	
3/16	
	0.250

Figure 5. Details of Test Plates for Usability and Transverse Weld Tensile Specimens

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TEST PLATE FOR CHECKING USABILITY CHARACTERISTICS OF ELECTRODES
AND PROPERTIES OF WELD DEPOSITS

DIMENSIONS FOR TENSILE TEST SPECIMENS					DIMENSIONS FOR USABILITY TEST (BUTT WELD) SPECIMENS				
DIMENSION	ELECTRODE DIAMETER				DIMENSION	ELECTRODE DIAMETER			
	5/32, 3/16	1/8	1/16, 5/64	3/32		1/16	5/64, 3/32	1/8, 5/32	3/16
D	0.505 ±0.010	0.250 ±0.005	--	--	B	1/8	1/8	3/16	1/4
A	4-1/2	2-5/8	--	--	L	6	6	6	6
B	1/4	3/16	--	--	W	4	4	4	4
L	12-1/2	8-3/4	6	6	T	1/8	1/4	3/8	1/2
W	5	5	4	4	R	3/32	1/8	3/16	1/4
T	3/4	1.2	0.064	0.125					
R	1/2	1/4	1/16	1/16					

D = DIAMETER OF GAGE LENGTH

A = LENGTH OF SPECIMEN

B = THICKNESS OF BACK-UP STRIP (NOT REQUIRED FOR 1/16, 5/64, OR 3/32 DIAMETER OF ELECTRODES)

L = LENGTH OF PLATES

W = WIDTH OF PLATES

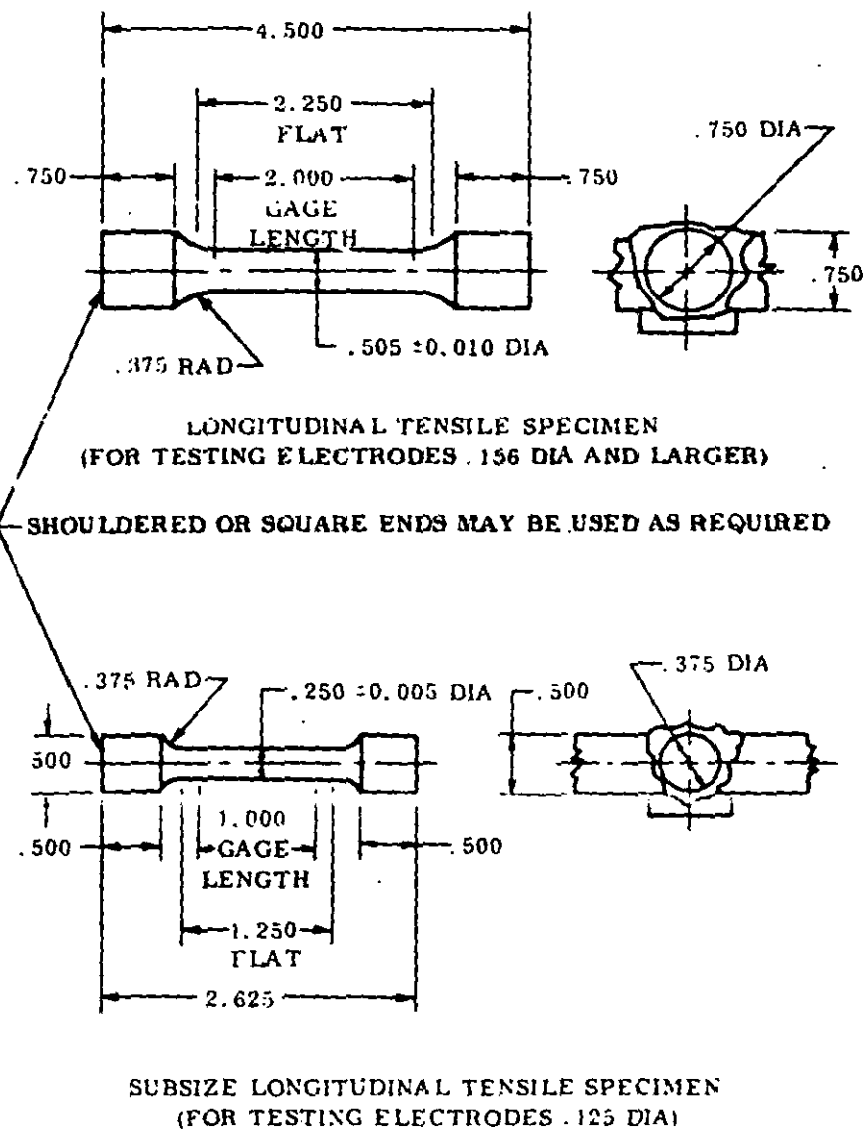
T = THICKNESS OF PLATES

R = DISTANCE BETWEEN PLATES FOR WELD METAL

DIMENSIONS IN INCHES.

Figure 6. Details of Test Plates for Usability and All-Weld-Metal Tensile Test

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DIMENSIONS IN INCHES.

Figure 7. Details of Specimens for All-Weld-Metal Tensile Test

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3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
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		<input type="checkbox"/> USER	
		<input type="checkbox"/> MANUFACTURER	
		<input type="checkbox"/> OTHER (Specify): _____	
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
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