Kentucky Method 64-110-~~03~~05
Revised ~~2/11/03~~1/4/05
Supersedes 64-110-~~00~~03
Dated ~~1/27/00~~2/11/03

QUALIFICATION OF SHIELDED METAL ARC WELDERS

1. SCOPE:

1.1. This method, based on modifications of the American Welding Society Bridge Welding Code D1.5, current edition, outlines the procedures for qualifying welders for the following positions and types of welds:

1.1.1. 3F: vertical fillet

1.1.2. 4F: overhead fillet

1.1.3. 2G: horizontal groove

1.1.4. 3G: vertical groove

1.1.5. 4G: overhead groove

1.2. Qualification in accordance with this method is required prior to performing the following welding operations:

1.2.1. Splicing steel piles.

1.2.2. Welding grates and frames.

1.2.3 Welding to expansion dams, bearing shoes, beam stiffeners and bridge repair.

1.2.4 Other welding tasks specified or permitted by the Engineer.

1.3. Qualification in accordance with this method has a maximum limitation of 3/4 inch plate thickness that may be welded.

1.4. Radiographic examination of the test plates is accepted in lieu of a bend test if a private laboratory is performing the test and is qualified for such testing.

2. LIMITATIONS ON POSITIONS AND TYPES OF WELDING:

2.1. Qualification in the 3F position (vertical fillet) qualifies a welder for flat, horizontal, and vertical fillet plate welding.

2.2. Qualification in the 4F position (overhead fillet) qualifies a welder for flat, horizontal and overhead position fillet plate welding.

2.3. Qualification in the 2G position (horizontal groove) qualifies a welder for flat and horizontal position groove welding and for flat and horizontal position fillet plate welding.

2.4. Qualification in the 3G position (vertical groove) qualifies a welder for flat, horizontal, and vertical groove and fillet plate welding.

2.5. Qualification in the 4G position (overhead groove) qualifies a welder for flat and overhead groove and for flat, horizontal and overhead fillet plate welding.

2.6. Qualification in the 3G and 4G positions (vertical and overhead groove) qualifies a welder for all positions groove and fillet plate welding.

3. TEST METALS:

3.1. The base metal shall be structural steel plates, 3/8 inch ~~-~~in thickness, conforming to the requirements of ASTM A-36, or ASTM A-36 Modified to include the added requirements of 0.2% copper content. The test specimens shall conform to the dimensions shown in Attachment # 1. Test plates shall be cut to size by means of sawing or shearing only.

3.2. Electrodes:

3.2.1. The electrodes (filler metal) shall be AWS classification numbers E 6010, E 6011, or E 7018, as required for the positions, type and polarity of current, and other conditions of intended use.

3.2.2. The electrode size shall be 1/8" to 3/16" inclusive.

4. AUTHORIZED INSPECTION AND TESTING:

4.1. The inspection of welders as they weld test plates in various positions may be performed by any of the following:

4.1.1. Division of Materials (Division) Physical ~~Properties Testing~~ Section personnel.

4.1.2. Welding instructors at approved vocational tech schools.

4.1.3. Welding instructors at approved trade schools.

4.1.4. Approved commercial testing laboratories.

4.2. Testing of Weld Specimens:

4.2.1. Test specimens of welders inspected by the Division's Physical ~~Properties Testing~~ Section will be tested by the Division.

4.2.2. Test specimens of welders inspected by any of the other agencies listed in 4.1 will be tested by the agency performing the welding inspection.

5. WELDING INSPECTOR'S (Anyone Listed in Section 4.1) DUTIES:

5.1. The ~~Inspector~~ inspector shall verify that the electrodes conform to the requirements of Section 3.2. The classification number is stamped on each electrode.

5.2. The ~~Inspector~~ inspector shall require strict conformance to the procedures, dimensions, positions, and any other requirements of Section 6.

5.3. After air-cooling and removal of slag from the weld metal, the weld specimens shall be inspected for surface defects and irregularities. The ~~Inspector~~ inspector shall examine the weld specimens very closely and reject those containing any of the following:

5.3.1. Undercutting.

5.3.2. Lack of fusion at edges of weld.

5.3.3. Lack of penetration and porosity.

5.3.4. Crater cracks.

5.3.5. Cracks in the weld metal.

5.3.6. Base metal cracks adjacent to the welds.

5.4. The ~~Inspector~~ inspector shall verify that the welder has marked each test specimen with either paint or metal stencil to identify the position and type of weld.

5.5. All inspectors shall complete form TC 64-753 for each welder taking the qualification test:

5.5.1. Kentucky Transportation Cabinet (KYTC) ~~"I~~inspectors~~"~~ submit completed forms and weld specimens in accordance with instructions and examples provided in the Sampling Manual.

5.5.2. Other ~~"I~~inspectors~~"~~ shall submit a copy of the TC 64-753 form to the Division, upon completion of the qualification testing.

6. WELDER QUALIFICATION PROCEDURES: Welders shall be qualified for fillet welds (vertical or overhead position) and/or groove welds (horizontal, vertical or overhead position), depending upon the required type of welding to be performed on the project.

6.1. Fillet Welds: In making tests to qualify for fillet welds, test plates shall be welded in the following positions:

6.1.1. 3F-Vertical Fillet: The test plates shall be placed in a vertical position and each fillet weld shall be made vertically and with bottom to top placement. See Attachment No. 1 - Position 3F. The entire welding process shall be done with the plates in the vertical position.

6.1.2. 4F-Overhead Fillet: The test plates shall be placed so that each fillet weld is deposited on the under side of the horizontal surface of the 3/8" x 2" back up plate and against the vertical edges of the base plates. See Attachment No. 1 - Position 4F. The entire welding process shall be done with the plates in the overhead position.

6.2. Groove Weld: In making tests to qualify for groove welds, the test plates shall be welded in the following position.

6.2.1. 2G-Horizontal Groove: The test plates shall be placed in an approximately vertical plane with the welding groove approximately horizontal. See Attachment No. 1 - 2G.

6.2.2. 3G-Vertical Groove: The test plates shall be placed in a vertical position and each groove weld shall be made vertically and with a bottom to top placement. See Attachment No. 1 - Position 3G. The entire welding process shall be done with the plates in the vertical position.

6.2.3 4G - Overhead Groove - The test plates shall be placed so that each groove weld is deposited on the underside of the horizontal plates. See Attachment No. 1 - Position 4G. The entire welding process shall be done with the plates in the overhead position.

6.3 The gap, in all cases, shall be filled until the weld metal forms a convex surface slightly above the base metal. See illustration in Attachment No. 2.

6.4 Cleaning between weld passes shall be limited to hand chipping, hand wire brushing, or powered wire brushes. Power chippers or grinders shall not be used during the weld test.

7. QUALIFIED STATUS:

7.1. If the welder fails to meet the qualification requirements, he may take a re-test provided two test specimens are welded for each specimen that failed. If the re-test specimens do not meet all requirements, the welder must wait 90 days before he can take the test again.

7.2. Qualified status shall be limited to two years from the date of completion of testing unless the welder is not engaged in the welding process for which he/she is qualified for a period exceeding 6 months or, in the judgment of the Engineer, there is reason to question the

welder's ability.

8. COST OF TESTING:

8.1. KYTC Testing.

8.1.1. The cost of the test plates is always the responsibility of the welder or contractor.

8.1.2. The cost of preparing and testing weld specimens of each welders first attempt at qualifying will be charged to the project if there is a project.

8.1.3. The cost of preparing and testing weld specimens shall be the responsibility of the welder or contractor if:

8.1.3.1. The welder is taking a re-test.

8.1.3.2. There is no highway project.

8.2. Other Than KYTC Testing: The welder or contractor shall make their own arrangements with the testing agency.

APPROVED _____
Director
DIVISION OF MATERIALS

DATE _____~~2/11/03~~1/4/05_____

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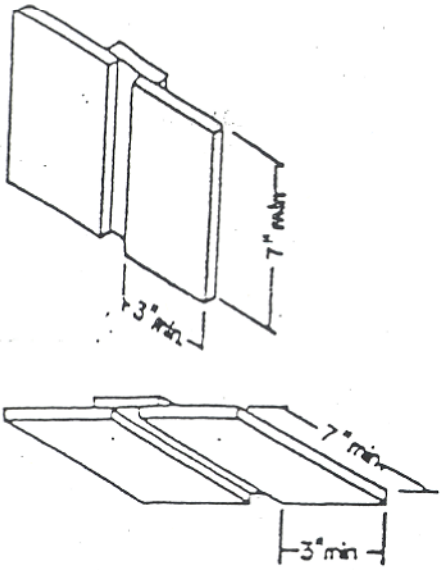
Attachments

~~km11003~~km11005.doc

DIMENSIONS, JOINT TYPES & POSITIONS FOR TEST PLATES



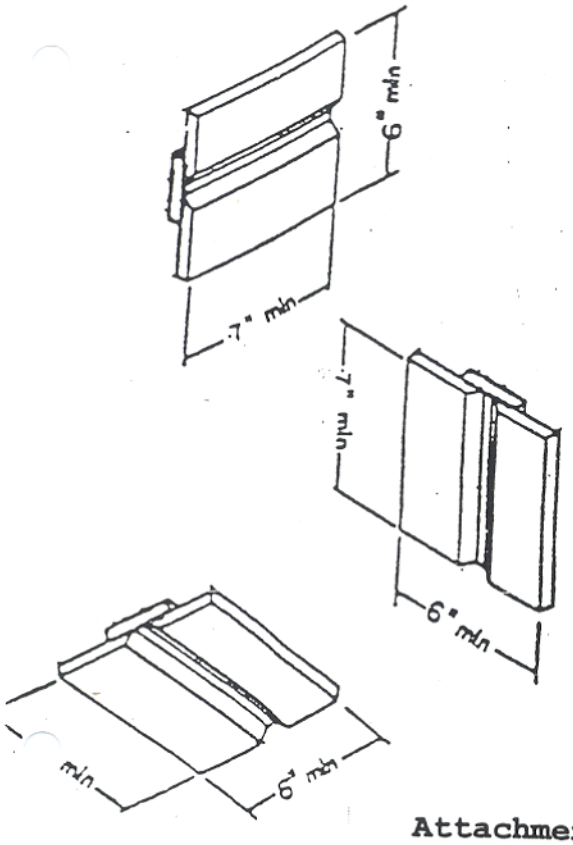
Fillet

POSITION 3F (Vertical)

3/8 inch plate, 15/16 inch gap between the two pieces of base metal, backing 3/8 inch by 2 inch.

POSITION 4F (Overhead)

3/8 inch plate, 15/16 inch gap between the two pieces of base metal, backing 3/8 inc) by 2 inch.



Groove

POSITION 2G (horizontal)

3/8 inch) plate, 45 degree single V groove, 1/4 inch roof opening, backing 3/8 inch by 1 inch.

POSITION 3G (vertical)

3/8 inch plate, 45 degree single V groove, 1/4 inch roof opening, backing 3/8 inch by 1 inch.

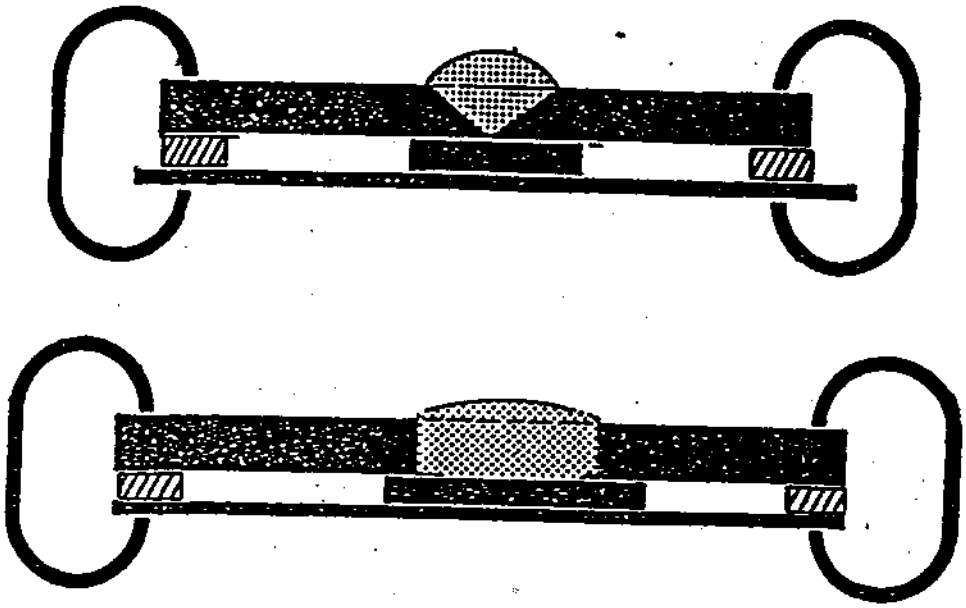
POSITION 4G (overhead)

3/8 inch plate, 45 degree single V groove, 1/4 inch roof opening, backing 3/8 inch by 1 inch.

Attachment No. 1

KM 110

FINISHED WELD SPECIMENS



1. Plates should be clamped into position as shown.
2. Welds should be rounded above the top of the plates, as shown, so that machine work will leave smooth surface.

ATTACHMENT No. 2

May 18, 1992