Georgia Department of Transportation
Office of Materials and Research

FIELD WELDER CERTIFICATION GUIDE

Effective July 1, 2008

Supersedes: Inspection Services Welding Seminar.

QUALIFICATION TESTING OF FIELD WELDERS

STATEMENT OF INTENT

The intent of this Publication is to clarify the qualification testing process and inspection procedures for Field Welders and limit the testing to only those who can reasonably be expected to have a need to field weld on Georgia Department of Transportation projects according to GDOT Specifications.

The qualification tests are specifically designed tests to determine the welder's ability to produce sound welds.

ROLES AND RESPONSIBILITIES

Field Welders shall be qualified and employed in accordance with Section 501.3.01 B of the Georgia Department of Transportation *2001 Standard Specifications for Construction of Transportation Systems,* current Special Provisions and Supplemental Specifications. Field Welders will be responsible for furnishing test plates and all other equipment needed for field welder qualification testing as affirmed by this document. The Office of Materials and Research will provide a site for qualification testing, assistance in initial fit-up and positioning of test assemblies, oversight of qualification welding and laboratory testing of the test specimens. Applicants are responsible for any and all other equipment, costs and work associated with the qualification process.

FIELD WELDER DESCRIPTION

Field welding is welding that occurs in areas other than in a monitored or pre-approved fabrication shop but must be accomplished in accordance with Georgia Department of Transportation specifications.

"Field Welder" as used herein refers to a unit consisting of the welder, the welding machine, a class or group of shielded metal arc welding (SMAW) electrodes typically suitable for welding structural grades of steel and supporting tools and devices typically required to satisfactorily perform field welding.

As a minimum, the equipment that must be in an applicant's possession for qualification testing includes:

- Portable AC/DC welding machine with all necessary accessories. Welding Parameters are to be set at time of test.
- Rod oven
- Sealed container(s) of new E7018, or E8018 electrodes. (All SMAW electrodes *must* be of the *low-hydrogen classification.**)***
- Fillet weld gage
- Hand wire brush
- Hand chipping hammer
- Clamps for adequately holding test plates
- Scrap metal for setting machine and practice welds if desired
- Gas heating torch for drying off moisture, acquiring preheat and maintaining interpass temperatures.

All Field Welders are required to be qualified by the Georgia Department of Transportation Office of Materials and Research, Inspection Services Branch before being permitted to field weld on any structural steel components. That includes not only the pay item Structural Steel and specific bridge applications, but all other field welding processes performed on steel products that are applicable due to specification reference, including temporary structures, that will carry public traffic.

FIELD WELDER QUALIFICATION

The qualification of Field Welders shall conform to this Publication, the Bridge Welding Code ANSI/AASHTO/AWS D1.5 (current edition) and Georgia Department of Transportation Standard Specifications for Construction of Transportation Systems, Special Provisions and Supplemental Specifications. Pipe and Rebar Welders shall be qualified according to ANSI/AASHTO/AWS D1.1 and AWS D1.4 respectively.

The applicant may apply to be qualified in the following classifications:

(A) S.I.P. Welder
- (2F) Horizontal Fillet weld, limited to (S.I.P.) Stay-in-place metal deck form plates and overhang brackets.

(B) Bridge Welder
- (3F, 4F) Vertical & Overhead Fillet weld qualified all positions: Stay-in-place metal deck form plates and overhang brackets, H-Pile splicing and secondary bridge members (cross frame & diaphragm connections).
- (3G, 4G) Groove Weld Unlimited Thickness, qualified all positions: Stay-in-place metal deck form plates and overhang brackets, H-Pile Splicing, secondary bridge members (cross frame & diaphragm connections) and beam/girder butt splicing.*

**** Beam/Girder butt splicing requires approval of welding contractor by the Inspection Services Branch of the Georgia Department of Transportation Office of Materials and Research prior to beginning work.***

(C) Pipe Welder
- (6G) for welding pipe, and plate. Certified Unlimited, all positions and all diameters of Metal Shell piling, Pipe, Stay-in-place metal deck form plates and overhang brackets and H-Pile Splicing.

(D) Rebar Welder
- (2G) for welding rebar. Certified Unlimited, all positions and all diameters of rebar.

Applicants satisfactorily completing required tests and meeting qualifications herein specified will be issued a "Welder Certification Card" by the Georgia Department of Transportation, Office of Materials and Research.

Field Welder Qualifications herein specified will expire and be considered void following the 12 month period after issuance. It is the responsibility of the welder to schedule and re-qualify at that time. Field Welder re-qualification may be required at any time there is a specific reason to question the Field Welder's ability to make acceptable welds.

The qualification tests are not intended to be used as a guide for welding during actual construction. Field Welding shall be performed in accordance with the requirements of the ANSI/AASHTO/AWS D1.5 and Georgia Department of Transportation Specifications.

WELDING OF TEST PLATE ASSEMBLIES

Welding of test plate assemblies shall occur under GDOT Office of Materials and Research - Inspection Services Branch oversight at a predetermined location.

Applicants or their employer may contact the Office of Materials and Research, Inspection Services Branch by phone, mail, fax, or email at the following:

Georgia Department of Transportation
Office of Materials and Research
Inspection Services Branch
15 Kennedy Dr.
Forest Park, GA 30297
Phone (404) 363-7516
Fax (404) 363-7509
Email to: rlee@dot.ga.gov

At this time the applicant may schedule a welding test and ask any questions. Before an applicant will be allowed to test the following items must be presented to the Office of Materials and Research:

- Valid State issued picture ID or Drivers License

- Sponsor letter, on company letterhead, from a GDOT approved contractor or sub-contractor requesting testing. Letter must state Welder's Name, GDOT Project Number and type of welding expected in the field.

All welding tests will be performed outdoors between the hours of 7 am and 4 pm. Applicants are asked to arrive at the testing site no later than 9:00 am on the day of testing. Testing personnel reserves the right to delay or reschedule welding tests due to rain or other inclement weather. Applicants are responsible for cleaning weld area of all spent rods, slag and other deposited trash after testing.

In making up test welds, the applicant should restrain the warping of assemblies as much as possible by using their clamps. Assemblies shall not be stress relieved or straightened after welding.

Cleaning between weld passes shall be limited to hand chipping and hand wire brushing. Power chippers or grinders can only be used prior to the test in order to properly clean the assemblies per AWS specifications. They shall not be used during the qualification test. Weld cleaning shall be done with the test weld in the same position as the qualification test position.

All vertical welds for groove and fillet weld assemblies shall be made with the progression for all passes in the upward direction.

Each assembly will be visually examined by the testing authority prior to welding, during welding and upon completion prior to removal from test position. Should welds or assemblies be found not in compliance with requirements, the qualification test will be stopped and the applicant informed of their options at the testing personnel's discretion. After completing the welding, all assemblies will be marked and presented to the testing authority. To pass the visual examination, the fillet weld shall present a reasonably uniform appearance and shall be free of slag, overlap, cracks and excessive undercut (1/32 in.). There shall be no porosity visible on the surface of the weld.

NOTIFICATION OF LABORATORY TEST RESULTS

Testing personnel will evaluate the test specimens and inform the applicant of the results in a timely manner.

SUCCESSFUL COMPLETION OF QUALIFICATION

Applicants successfully completing the entire test as described herein will be required to sign the **Field Welder Agreement** before being issued their "Welder Certification Card" by mail at a later date. An example Field Welder Agreement is at the end of this document. Welder Certification shall only be valid for a period of 12 months from the date of test pending compliance with applicable specifications.

FAILURE OF QUALIFICATION TEST

An applicant failing one or more of the fillet qualification test position/types (3F, 4F) will not be permitted to test for the groove qualification test position/types (3G, 4G, 6G).

An applicant failing only one of the position/types must retest within thirty days by welding two assemblies of the one position/type that they failed. Both retests must pass. Failure to retest within thirty days shall be considered as failure of the retest.

An applicant failing two or more of the position/types or an applicant failing one of the position/types and then failing one or both of the retests on the position/types may not retest again for 90 days. At this time a new welding test must be requested. No credits will be given for previously passed sections. If the welder fails this test a second time they must wait 180 days to take the test again. All subsequent tests to the first retest will be at 180 day intervals.

REVOCATION OF FIELD WELDER CERTIFICATION OF QUALIFICATION

Failure to comply with the Field Welder Agreement may result in the immediate revocation of the Field Welder's "Welder Certification Card" by the Inspection Services Branch. This revocation will be for a minimum of one year. The Field Welder will then be required to re-qualify before the revocation is lifted. Two or more revocations or any improper welding which results in loss of life or serious injury may result in permanent revocation. All appeals of revocation should

be addressed to the Georgia Department of Transportation, Office of Materials and Research-Inspection Services Branch Chief.

QUALIFICATION WELD TESTS

Tests described herein are the required to determine the applicant's ability to produce sound welds and specific size fillet welds having acceptable profiles as defined by the AWS Welding code.

The Georgia DOT Office of Materials and Research will evaluate all welder qualification tests by destructive testing.

Assembly 1: Fillet Weld Test (2F) S.I.P. Welder.

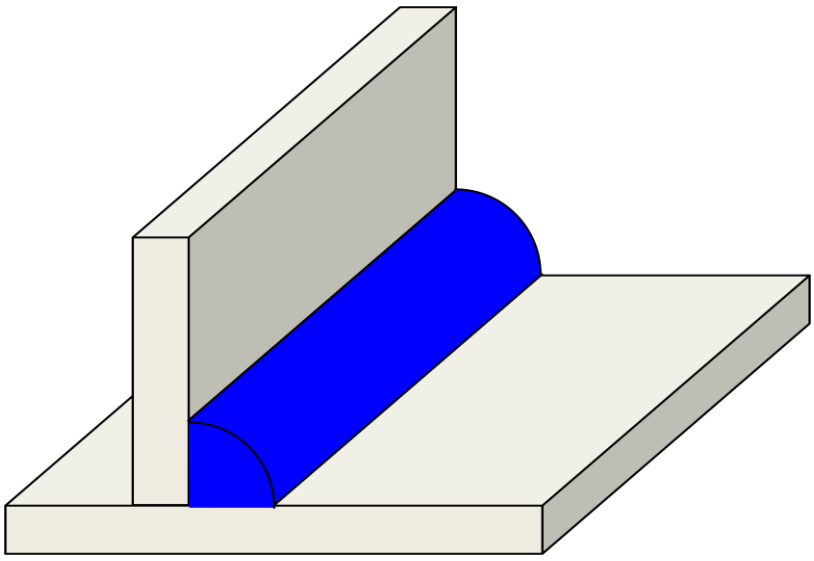
Joint Detail: 2 pcs, 4x8x½ in. plates "T"

Weld: 5/16 in. fillet weld on one side of assembly

SMAW Electrode: E7018

Minimum preheat and interpass temperature 50 deg. F (10 deg. C)

Position for side 1: **2F - Plates and axis of weld horizontal.



Horizontal (2F)

**This is typically the first qualification weld. It may not be undersize. It may be oversize by not greater than 1/16 in. Profile must meet code requirements. Upon visual inspection by the GDOT-OMR, applicant will be instructed on how to proceed.

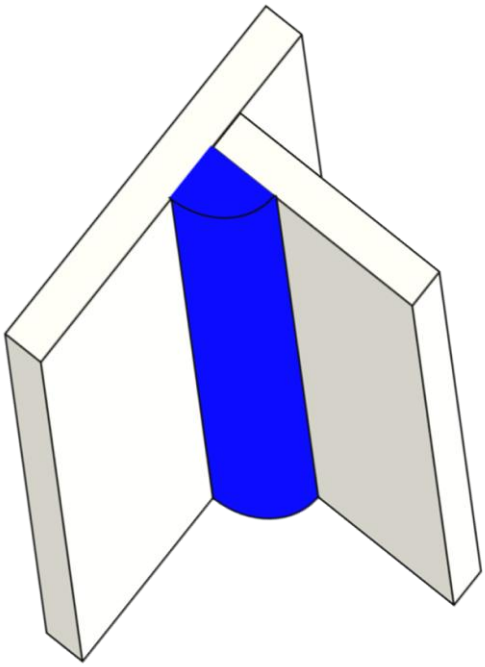
Assembly 2: Vertical & Overhead Fillet Weld Test (3F & 4F) Bridge Welder

Joint Detail: 2 pcs, 4x8x½ in. plates “T”

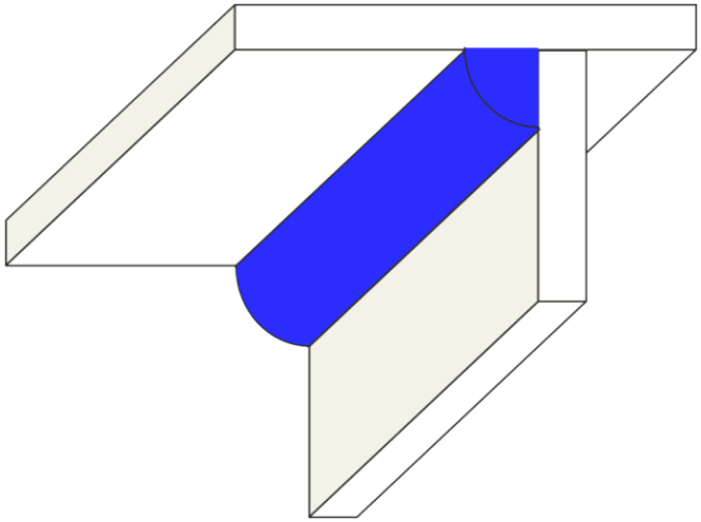
Welds: 5/16 in. fillet weld one side of assembly

SMAW Electrode: E7018

Minimum preheat and interpass temperature 50 deg. F (10 deg. C)



Vertical (3F)



Overhead (4F)

Position for side 1: **3F - Plates and axis of weld Vertical
Position for side 1: **4F - Plates and axis of weld Horizontal

Assembly 3: Vertical & Overhead Groove Weld Test (3G & 4G) Bridge Welder

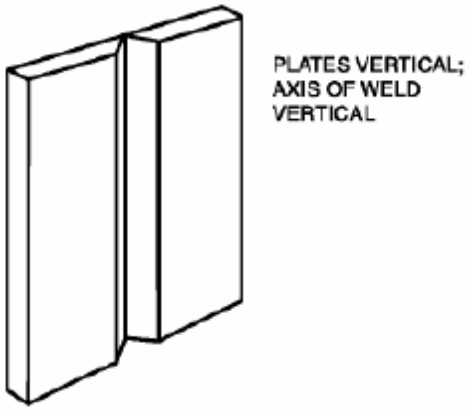
Joint Detail: 2 pcs, 3x5x1.00 in. plates, double-V-groove, 45 degree combined angle (22.5 degree bevel per plate), 1/4 in. root opening with 2x6x¼ in. backing

Weld: Double-V-Groove

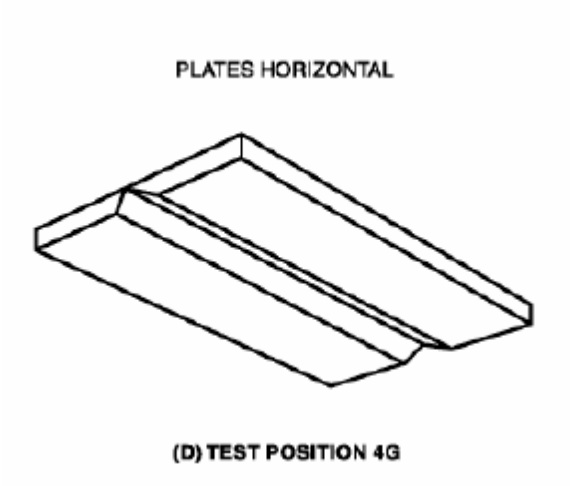
SMAW Electrode: E7018

Minimum preheat and interpass temperature 70 deg. F (20 deg. C)

Position: **3G** - Plates vertical and axis of weld vertical
Position: **4G** - Overhead, plates horizontal and axis of weld horizontal



(C) TEST POSITION 3G



(D) TEST POSITION 4G

* **The backing shall be in intimate contact with the base metal.**

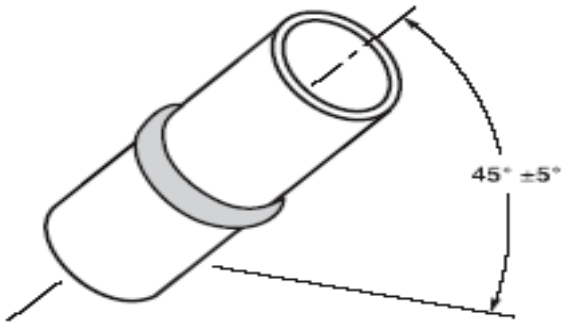
Post Weld Heat Treatment: The weld reinforcement and the backing shall be removed flush with the base metal. Oxygen cutting may be used for the removal of the major part of the backing provided at least 1/8 in. of its thickness is left to be removed by machining or grinding.

Assembly 4: Pipe Weld Test (6G)

Joint Detail: 2 pcs, 6-inch schedule120 or 8-inch schedule 80 pipe, 6 inches long, 60 degree combined angle (30 degrees bevel per pipe) with or without backing. If backing is used it shall be in intimate contact with the base metal.

SMAW Electrode: E7018

Minimum preheat and interpass temperature 70 deg. F (20 deg. C)



PIPE INCLINATION FIXED (45° ±5°) AND NOT ROTATED DURING WELDING.

(D) MULTIPLE WELDING TEST POSITION 6G

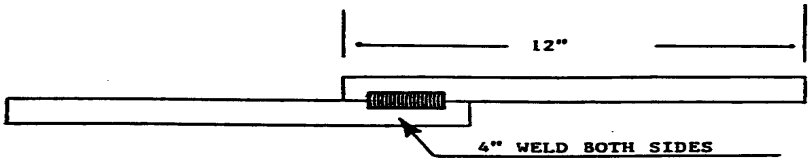
AWS D1.1

Post Weld Heat Treatment: The Weld Cap Pass shall be ground flush with the base metal after completion of test weld.

Assembly 5: Rebar Weld Test (2G)

Joint Detail: 4pcs, #5 (16mm) or #6 (19mm) Rebar, Grade 60 (Grade 420 M) 12 inches long

SMAW Electrode: E7018



Lap Splice for Welding Re-Bar
AWS D1.4

GEORGIA DEPARTMENT OF TRANSPORTATION
Field Welder Agreement

When performing work to Georgia Department of Transportation specifications, Field Welders are required to follow proper procedures as listed below:

1. Prior to welding, thoroughly clean, remove all paint, rust and loose scale.

2. Use a heating torch to dry off moisture, acquire proper preheat and maintain proper interpass temperatures.

3. Use *only* E7018 electrodes for coated members and E8018 for non-coated weathering material to be welded.

4. Have and use a suitable portable electrode oven (hotbox) on site.

5. Remove all slag after welding.

6. Follow proper welding procedures as required by ANSI/AASHTO/AWS D1.5 Bridge Welding Code (Current Edition)

7. Strike arcs within the weld zone. Avoid wayward arc strikes. When they accidentally occur, grind them off appropriately.

8. Do not weld when the ambient temperature is lower than 0^0F (-18^0C), when surfaces are wet or exposed to rain, snow, high wind velocities or when welders are exposed to inclement conditions.

9. Do not use shortcuts (slugging weld joints, insufficient weld size, etc.)

I understand that failure to comply is cause for immediate revocation of the Field Welder Certification of qualification issued to me by the Georgia Department of Transportation for a minimum of one year or indefinitely and that all information contained in this document is considered “Public Information.”

Signature: _____Date:_____

Printed Name: _____

Witnessed by: _____Date:_____

Georgia Department of Transportation Office of Materials and Research
Original will remain with the Office of Materials and Research, Georgia Department of Transportation