



North Carolina Department of Transportation Materials & Tests Unit

Effective January 6, 2006 Mandatory July 1, 2006

Supersedes: Field Welder Certification Test Procedure Weld Test Operator Qualification

Test Plate Details Revised

QUALIFICATION TESTING OF FIELD WELDERS

STATEMENT OF INTENT

The intent of this Publication is to clarify the qualification testing process for Field Welders and limit the testing to only those who can be reasonably expected to have a need to field weld to North Carolina Department of Transportation specifications.

ROLES AND RESPONSIBILITIES

In accordance with Section 1072-20 of the North Carolina Department of Transportation *2002 Standard Specifications for Roads and Structures*, Current Special Provisions and Contract Documents, the Materials and Tests Structural Members Unit will furnish test plates for field welder qualification testing as amended by this document.

Additionally, the Materials and Tests Unit 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. If requested the Department will furnish the equipment to perform the weld test.

FIELD WELDER DESCRIPTION

Field welding occurs other than in a monitored or inspected fabrication shop but must be accomplished in accordance with North Carolina 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 (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 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
- 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 North Carolina Department of Transportation - Materials and Tests Unit, Structural Members Representative 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 North Carolina Department of Transportation Standard Specifications for Roads and Structures, Special Provisions and Contract Documents.

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

- (A) S.I.P. Welder, (2F) Fillet weld, limited to (S.I.P.) Stay in place form plates and over hang brackets.
- (B) Bridge Welder, (3F, 4F) Fillet Weld Qualified all positions, (3G, 4G) Limited Thickness, Groove welds all positions.
- (C) Pipe Welder (6G) for welding pipe, and plate. Certified Unlimited, all positions and all diameters

Applicants satisfactorily completing required tests and meeting qualifications herein specified will be issued a "Welder Certification with Picture ID" card by the testing authority. The Department will provide a "**Period of Effectiveness**" (**P.O.E.**) card for a

Resident Engineer or his designated representative to document satisfactory field weld work performed specifically on North Carolina Department of Transportation projects. Welders are responsible for requesting that Resident Engineers or their designated representatives sign their cards certifying that satisfactory field welding was performed and should do so immediately upon completion of satisfactory welding. Field Welder Qualifications herein specified will be considered void following any 12 month period after issuance in which the welder has not accomplished satisfactory field welding on a North Carolina Department of Transportation specification project. 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.

WELDING OF TEST PLATE ASSEMBLIES

Welding of test plate assemblies shall occur under North Carolina Department of Transportation – Materials and Tests Unit oversight at a predetermined location.

Applicants or their employer should complete the "NCDOT Welding Test Request Form" and mail, fax, or email to the following:

Materials and Tests Unit
770-B Park Centre Drive
Kernersville, North Carolina 27284
Fax (336) 993-8740
Email to: weldtest@state.dot.nc.us

A nominal charge will be required for testing and certification as follows:

S.I.P. Welder \$150.00

Bridge Welder \$300.00

Pipe Welder \$300.00

Replacement Picture ID Card \$10.00

Proper Identification and a **Check or Money Order** payable to North Carolina Department of Transportation is required prior processing. No Exceptions.

Afterwards the applicants will be contacted to schedule a welding test and to ask any questions. All welding tests will be performed outdoors between the hours of 8 am and 4 pm. Testing personnel reserve the right to delay or reschedule welding tests due to rain or other inclement weather. Applicants are responsible to clean 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 clean the assemblies (if desired). 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.

NOTIFICATION OF LABORATORY TEST RESULTS

Testing personnel will evaluate the test specimens and inform the tester of the results.

SUCCESSFUL COMPLETION OF QUALIFICATION

Applicants successfully completing the entire test as described herein will be required to sign the: **Field Welder Agreement** and then they will be issued their "Welder Certification Picture ID" card. An example Field Welder Agreement is at the end of this document. Welder Certification shall be valid for five years pending compliance with applicable specifications.

FAILURE OF QUALIFICATION TEST

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

An applicant failing only one of the position/types must retest within one month by welding two assemblies of the one position/type that they failed. Both retests must pass. Failure to retest within one month 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.

REVOCAION 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 Materials Engineer or his designated representative. 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 North Carolina Department of Transportation State Materials Engineer.

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 code.

The qualification test consists of 3 welding classifications:

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

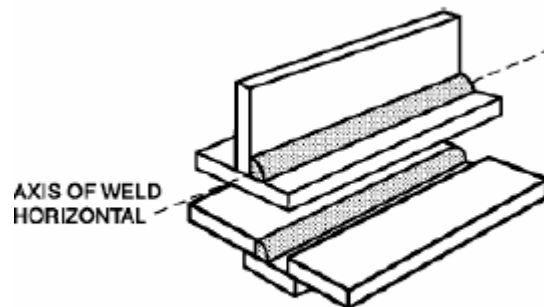
Joint Detail: ½ in. plates "T"

Welds: 5/16 in. fillet welds both sides of same 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.



NOTE: ONE PLATE MUST BE HORIZONTAL

(B) HORIZONTAL POSITION 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 NCDOT-M&T, applicant will be instructed on how to proceed.

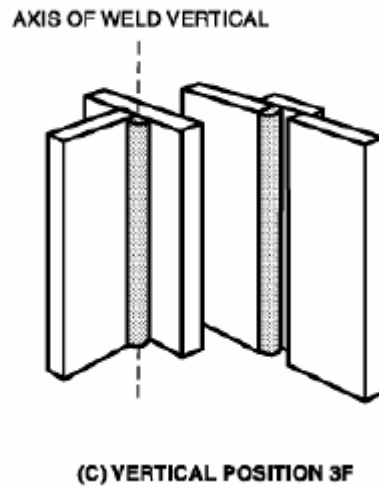
Assembly 2: Fillet Weld Test (3F) Vertical Bridge Welder

Joint Detail: ½ in. plates "T"

Welds: 5/16 in. fillet welds both sides of same assembly SMAW Electrode: E7018

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

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



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

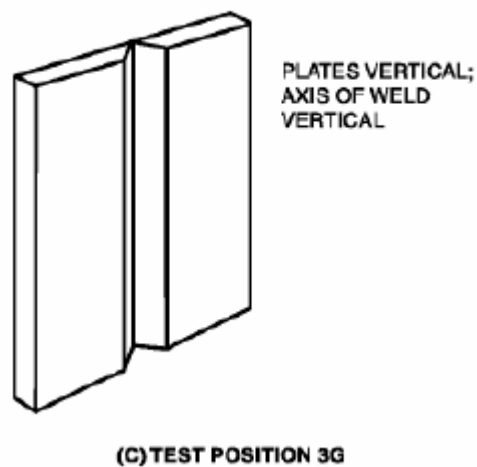
Joint Detail: 3/8 in. plates, double-V-groove, 45 degree combined angle, 1/4 in. root opening with backing

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



Assembly 4: Overhead Groove Weld Test (4G)

Joint Detail: 3/8 in. plates, double-V-groove, 45 degree combined angle, 1/4 in. root opening with backing

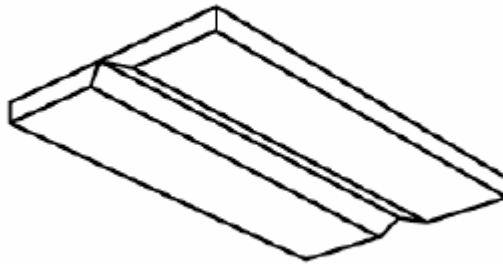
Weld: Double-V-Groove

SMAW Electrode: E7018

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

Position: 4G Overhead, plates horizontal and axis of weld horizontal

PLATES HORIZONTAL

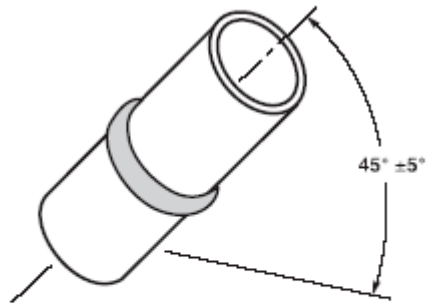


(D) TEST POSITION 4G

Assembly 4: Pipe Welder 6G for groove weld on 6-inch schedule 80 pipe. Certification for welding all diameters pipe, and plate all positions, unlimited thickness.

SMAW Electrode: E7018

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



PIPE INCLINATION FIXED ($45^\circ \pm 5^\circ$) AND NOT ROTATED DURING WELDING.

(D) MULTIPLE WELDING TEST POSITION 6G

The North Carolina DOT Materials and Tests Unit will have the weld tests evaluated by Radiographic Test Methods or Fillet Weld Break Test.