

713 - QUALIFICATION OF FIELD WELDERS

SECTION 713

QUALIFICATION OF FIELD WELDERS

713.1 DESCRIPTION

To field weld structural steel on KDOT projects, become qualified for each welding process by passing tests witnessed by the Regional Materials Engineer or a designated representative, according to this specification and the latest version AASHTO/AWS D1.5 "Bridge Welding Code" (except as modified by this section). Perform testing using portable equipment at an outdoor location selected by the Regional Materials Engineer.

713.2 TEST SPECIMENS

Supply test plates and backing bars. Present mill test reports for each heat used in the test plates and backing bars before the test begins.

a. Base Metal for Test Specimens. Qualification established with any of the steels listed shall be considered as qualification to weld or tack weld any of the other steels listed except qualification to weld or tack weld steel with a minimum yield strength of 90 ksi or greater shall be established with steel meeting the same specification as steel for the project. Use the following base metals for tests: AASHTO M 270 or ASTM A 709. Other steels may be approved by the Regional Materials Engineer.

b. Shielded Metal Arc Welding (SMAW) Restrictions. A welder qualified for SMAW using EXX18 electrodes shall be qualified to weld with all SMAW electrodes allowed by AASHTO/AWS D1.5 except welders required to use an electrode classification of E100XX-X or higher to join metals with a minimum specified yield strength of 90 ksi or greater shall be tested using E10018-X or E11018-X electrodes as necessary to match the yield strength of the base metal to be used in the work.

713.3 PREPARATION OF SPECIMENS

Use test plates as shown in AASHTO/AWS D1.5, Figure 5.17 and free from rust, grease, paint and dirt. Test in the vertical and in the overhead positions.

Securely tack or clamp the plates in position. Then, weld and prepare as follows:

- The weld reinforcing shall be sufficient to obtain full cross-sectional area and in no case shall it be greater than $\frac{1}{8}$ inch;
- Deposit all vertical welds from the bottom to the top;
- Use hand chipping and hand brushing to clean between weld passes. Power chippers or grinders are prohibited during the test. Do not modify root or intermediate weld contours by chipping, grinding, cutting, or other means before depositing subsequent weld passes. Perform weld cleaning without moving the test plates out of position during the test;
- Cut out the side bend specimens (see D1.5, Figure 5.17) with a saw. Smoothly cut the edges of the specimens with a grinding wheel or file. If the welder elects to have the test weld radiographically examined, do not make saw cuts; and
- Unless radiography is used, carefully remove the weld reinforcement and backing by grinding or machining so that the weld shall be flush with the parent metal. Perform all grinding or machine marks perpendicular to the weld. Emery cloth or a file finish is recommended. When radiography is used, leave a 3 inch minimum width backing bar in place.

713.4 TESTING OF SPECIMENS

a. General. All testing shall be by or in the presence of the Regional Materials Engineer or a designated representative.

With the exception of fracture critical welder testing, testing may be by mechanical means or by radiography at the welder's option. All radiography will be at the welder's expense. If all specimens meet the test requirements, the welder will be qualified and an identification card will be issued. A card will be issued yearly unless either **subsection 713.5a** applies, or the welder fails to meet the reporting requirements of **subsection 713.6**.

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b. Test Procedure for Mechanical Testing. Each test specimen shall be subjected to a side bend test by bending around a 1 ½ inch diameter pin in a test jig. A specimen whose surface contains undercut or discontinuities exceeding the following dimensions will be considered to have failed the test.

- ⅛ inch measured in any direction on the surface.
- ⅜ inch for the sum of the greatest dimensions of all discontinuities exceeding 1/32 inch, but less than or equal to ⅛ inch.
- ¼ inch for the maximum corner crack, except:
 - When that corner crack results from a visible slag inclusion or other fusion type discontinuity, the ⅛ inch maximum shall apply.
 - Specimens with corner cracks exceeding ¼ inch with no evidence of slag inclusions or other fusion type discontinuities shall be disregarded, and a replacement test specimen from the original welding shall be tested.

c. Procedures for Radiographic Qualification. Ground the weld reinforcement flush with the surface of the test plate. Follow radiographic procedures and techniques that are in compliance with the latest edition of AASHTO/AWS D1.5.

d. Retesting. If any specimen fails to pass the above test requirements, the test may be repeated. The welder shall prepare 2 sets of specimens for retest for each position that failed. If both sets of specimens meet the requirements, the welder will be qualified. If either of the sets of specimens submitted for retest fails to meet the requirements, the welder will not be permitted to take qualification tests for a minimum of 6 months unless evidence of further training is provided.

713.5 REQUALIFICATION

a. General. With the exception of fracture critical field welding, the welder's qualification here-in specified shall be considered as remaining in effect indefinitely unless:

- (1) The welder has not welded steel for use on a KDOT project for a period of 1 year.
- (2) The welder has not welded for a period exceeding 6 months in a given process of welding for which the welder was qualified. The requalification test need be made only in the ⅜ inch thickness.
- (3) The welder has been suspended while welding on a KDOT project due to one of the following:
 - Poor workmanship.
 - Unsatisfactory appearance of the weld.
 - Undercutting.
 - Slugging.
 - Using electrodes that have not been properly dried or stored.
 - Poor cable connection.
 - Excessive inclusions determined by radiographic inspection.

b. Test Required for Re-Qualification. When the quality of welder's work becomes unsatisfactory, as defined above, the welder will be suspended and will remain suspended until permitted to re-qualify by the Regional Materials Engineer.

Prepare and test all specimens required for re-qualification tests in the presence of the Regional Materials Engineer or a designated representative.

713.6 EVIDENCE OF WELDING ON KDOT PROJECTS

Regional Materials Engineers will maintain a record on each field welder who is qualified by their office to weld on KDOT projects. Annually submit to the qualifying Regional Materials Engineer a list of KDOT project numbers on which field welding was performed during the past 12 months.

713.7 QUALIFICATION FOR FILLET WELDING ONLY

Some KDOT projects require only fillet welds to attach stiffeners or bearings in the field. In this case, and with the approval of the Regional Materials Engineer, qualification for fillet welding will be done on a job by job

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basis by testing in the vertical and overhead fillet weld positions according to AASHTO/AWS D1.5 Section 5.26.3.1. See D1.5, Figure 5.21 for the test. No welder's card will be issued to fillet welders. The approval by the Regional Materials Engineer to accept this type of qualification will be based on the structure type, location of work within structure, and the overall complexity of work.

713.8 QUALIFICATION FOR FRACTURE CRITICAL WELDING

Perform fracture critical welder qualification according to AASHTO/AWS D1.5, Section 12.

713.9 REGIONAL MATERIAL'S LABS

Kansas City Regional Materials Lab
P.O. Box 860462
Shawnee Mission, KS 66286-0462
Phone: 913-441-0346

Wichita Regional Materials Lab:
3200 E. 45th St. N.
Wichita, KS 67220
Phone: 316-744-0421