October 16, 2012 Matls. IM 453.10
Supersedes October 18, 2011

SHEAR CONNECTOR STUDS

GENERAL

Shear connector studs shall be accepted on a certification basis and shall be from an approved manufacturer with the following requirements:

1. Studs shall meet the requirements of ASTM A108 for steel bars, carbon cold-finished, standard quality, Grades 1010 through 1020 inclusive either semi-killed or killed deoxidation.

2. Workmanship, pre-production testing, operator qualification and application qualification testing, shall be required and shall be performed by the contractor.

3. Quality control and proper inspection of stud welding during production.

4. Mechanical properties of steel studs and requirements for qualification of stud bases (only studs with qualified stud bases shall be used).

5. Type and size shall be as specified in the contract document and specifications.

6. An arc shield (ferrule) of heat-resistant ceramic or other suitable material (approved by the engineer) shall be furnished with each stud. Ferrules shall be kept dry and protected from moisture or oven-dried at 250°F for two hours.

7. Finished studs shall be of uniform quality and condition, free of injurious laps, fins, seams, cracks, twists, bends or other discontinuities. Radial cracks or bursts in the head of a stud shall not be acceptable.

8. Stud manufacturer certification shall be required.

9. Studs shall be fabricated from materials melted and manufactured in the USA.

ACCEPTANCE

Prior to being allowed to furnish studs on Department of Transportation projects, the manufacturer shall submit test reports showing conformance of their product to the applicable sections of AASHTO/AWS D1.5/D1.5M-02, Bridge Welding Code.

Shear connector studs shall be manufactured in the USA. The supplier/manufacturer shall certify that the studs are of domestic origin.

These reports shall be forwarded to the Office of Materials for review.

If the reports are approved, the manufacturer will be placed on the approved list (Appendix A).

TEST METHODS

Bend test – Studs shall be bend-tested by being bent 90 degrees from the original axis. Stud application shall be acceptable if the studs are bent 90 degrees and fracture occurs in the plate or shank of the stud, but not in the weld. Other test methods, such as torque testing, shall be acceptable if performed in accordance with Section 7.6.6.2 of the Welding Code D1.5/D1.5M-02. Welding shall not be performed when base metal temperature is below 10º F (-20º C) or when the surface is wet or exposed to falling rain or snow. Set-up shall include stud gun, power source, total welding lead length and stud diameter.

CERTIFICATION

Certifications shall be in the form of a manufacturer's certified test report on the studs. The test report shall include the chemical and the mechanical properties of the studs and must be signed and dated not more than six months prior to the manufacture of the studs.

MONITOR SAMPLING & TESTING

Ten (10) specimens shall be tested using acceptable (approved) test methods. The Office of Materials may sample and test studs for certification monitoring purposes.