



Procedures for Stud Welding 3/4" Shear Connectors Through Metal Deck

In order to achieve good results in any shear connector weld-thru deck job, it is imperative the following procedures be followed.

1. Top Flange of Beam

The top flange of all beams to be welded should be free of paint, excessive rust or mill scale, dirt, moisture and all other foreign materials. These materials are contaminants to any welding process, especially stud welding due to the short duration of the weld cycle. Do not weld studs to galvanized beams.

2. Fit-Up Between Beam Flange and Deck

When installing the material deck and tacking it in place, it is important that the decking be held as tight as possible to the Beam flange. A gap between the deck and flange will cause an inconsistent arch length and also allow the molten metal to escape the weld area, thereby resulting in inconsistent welds.

3. Deck Placement

Whenever flashing is used as a closure on spandrel beams, care should be taken to butt the deck to the flashing as opposed to lapping. In most cases, the flashing is made of hot dipped galvanized sheet without controls on the amount of zinc. Most deck manufacturers limit the deck coating to 1-¼ oz/sq ft. The welding of studs should be avoided at lapped points due to the lack of proper nesting, resulting in gaps between the sheets. If it is necessary to weld in a lapped area, it is recommended that a portion of the top sheet be removed, especially in the case of hot dipped galvanized decking.

4. Deck Conditions Prior to Welding

Prior to welding, the deck surface should be swept to remove all dirt, sand, or other foreign materials that has accumulated during construction. The deck must be dry. In wet conditions, it may be necessary to heat or blow dry each stud location in order to remove moisture from between the deck and beam flange.

5. Structural Ground

It is always recommended that the welding ground be attached to a spot on a beam that has been ground clean. Poor or inadequate ground connections can result in loss of weld current and affect the weld quality.

6. Power Requirement for Operating Power Source

Consult either the manufacture or manual for the recommended fusing, primary wire size and primary wire length for the power source to be used. Inadequate primary power or incorrect wire size or length can contribute to a reduction in weld current when some rectifier type power sources are used. Inadequate power or fusing can also hamper the starting and output current for a motor generator.

7. Welding Current

It is essential to have the correct weld current for thru-deck applications with $\frac{3}{4}$ " diameter studs, normally between 1,500 and 1,900 amps (using Tru-Weld Equipment we have found that 1830 amps with the time set at .89 seconds is a good general setting). When excessive cable lengths are used the result will be a reduction in weld currents. This can contribute to weld inconsistency or even weld failure. Always use 4/0 cables in the welding circuit. The amount of cable totally depends upon the power source being used. It may be necessary in some cases to parallel cable when long runs are needed. The Tru-Weld SC-3402 can run up to 600' of cable before losing weld current, but always inspect your work rigorously when running more than 300' of 4/0 weld cable.

8. Weld Settings

Exact weld settings cannot be given because no two jobs are the same. Actual settings will depend upon job site conditions, deck thickness, type of deck used, amount of galvanizing and ambient temperature. Listed below are approximate settings, minimum and maximum. Most jobs will fall within these settings.

Light gauge, lightly galvanized or phosphotized/painted black iron deck of single thickness should fall close to the minimum setting. Double thickness and heavily galvanized deck will be close to the maximum setting.

Weld Time 0.8 to 1.6 sec
Weld Current 1,500-1,900 amps DC
Lift 1/8 – 1/4"
Plunge 3/16"- 1/2"
Polarity Straight
Ferrule WTD

9. Gun Set-Up

Gun lift should be measured with a stud and ferrule in place and the gun compressed to weld, but on an isolated piece of material, such as piece of wood.

Accessories:

Legs L-037XX (XX = Leg Length, ie, 14 = 14", 18 = 18")
Footpiece B-0021 Foot Extension Assembly
Grip B-0060-1
Chuck - CH-075

Weld current should be checked by using a time current monitor. It should be monitored periodically due to cable heating which can cause a reduction in weld current. **NOTE: The above settings are for 3/4" diameter shear connectors only.**

10. Testing of Weld Studs

All pre-productions and productions testing should be done in accordance with American Welding Society Structural Welding Code D1.1. (in severe cold weather conditions, the testing should be done before the stud is cold but yet not while it is hot, preferable when the stud is warm to the touch. Reference: Weld Test Procedure Report.)

11. Visual Inspection

Visual inspection should be allowed and should show a full 360 degree weld fillet, not necessarily the same fillet height around the circumference of the stud. An undercut at the weld interface will be cause for rejection. If the fillet is something less than 360 degrees, the stud should be tested by hammer blow or bending with a pipe to 15 degrees. The bending method is preferred. If a failure does not occur, the weld should be considered good and left in the bent condition. If the weld fails, the studs should be replaced.

12. General Information

- A) Keep ferrules dry. Wet ferrules cannot be used.
- B) Keep studs dry; rusty studs cause welding problems and premature chuck failure. If rusted studs are sand blasted to clean, be aware that many of the flux balls will be removed during this process and should be discarded.
- C) Do not weld when the temperature of the base material is below 0 degrees F per AWS D1.1, Section 7.5.4
“Welding shall not be done when the base metal temperature is below 0 degrees F (-18 Degrees C) or when the surface is wet and exposed to falling rain or snow. When the temperature of the base metal is below 32 degrees F (0 degrees C) one additional stud in each 100 studs welded shall be tested by methods specified in 7.7.1.3 and 7.7.1.4, except that the angle of testing shall be approximately 15 degrees. This is in addition to the first two studs tested for each start of a new production period or change in set-up.”
- D) Do not attempt to weld through more than 2 thickness of galvanized decking
- E) Do not weld where water is present on the weld surface.
- F) Do not weld through dirt, sand or other foreign material.
- G) Beam flanges should be free of paint, rust and any other foreign material.
- H) If welding thru deck, deck must be tight against beam flange.
- I) Weld studs in the center of beam flange whenever possible to eliminate arc blow.
- J) Hold gun perpendicular to base material.
- K) Test weld set-up at the start of each day and every half hour.
- L) Do Not weld to galvanized beams.