

## Procedures for Stud Welding Shear Connectors & Headed Anchors

### 1.) Top Flange of Beam:

The top flange of all beams or plates to be welded should be free of paint, excessive rust or mill scale, dirt, moisture and all other materials. These materials are contaminants to any welding process, especially stud welding due to short duration of the weld cycle.

### 2.) 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 a loss of weld current and affect weld quality.

### 3.) Power Requirement for Operating Power Source

Consult either the manufacturer or manual for the recommended fusing, primary wire size and primary wire length for the power source used. Inadequate primary power or incorrect wire size or length can contribute to a reduction in the 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.

### 4.) Welding Current:

It is essential to have the correct weld current for the application. The normal ranges are listed in the table below. When excessive cable lengths are used, the result will be a reduction in weld current. This can contribute to weld inconsistency or complete weld failure. Always use 4/0 cables in the welding circuit when excessive length is required. The amount of cable depends on the power source being used. It may be necessary in some cases to parallel cable when long runs are required.

### 5.) Weld Settings:

Exact weld settings cannot be given because no two jobs are the same. Listed below are the approximate setting, minimum and maximum. Most jobs fall within these ranges.

Size	Weld Time	*Weld Current Amps	**Lift	Plunge	Polarity	Cable
1/4"	0.20 - 0.40	410-550	0.063	1/8"-1/4"	Straight	65' of 4/0
3/8"	0.30 - 0.45	620-830	0.063	1/8"-1/4"	Straight	65' of 4/0
1/2"	0.45 - 0.60	855-1045	0.093	1/8"-1/4"	Straight	50' of 4/0
5/8"	0.60 - 0.80	1120-1420	0.093	1/8"-1/4"	Straight	50' of 4/0
3/4"	0.80 - 1.60	1400-1700	0.093	1/4"-3/8"	Straight	50' of 4/0
1"	1.0 - 1.20	1648-2020	0.093	1/4"-3/8"	Straight	50' of 4/0

\*Weld current should be checked by using an ammeter and re-checked periodically due to cable heating, which can cause reduction in weld current.

\*\*Gun lift should be measured with a stud and a ferrule in place while the gun is compressed on an insulated piece of material, such as wood, as if to weld.

**Note: The wide range of weld time on 3/4" studs is due to the wide range of applications including thru-deck.**

## 6.) Testing of Studs:

After the studs have cooled, at least 2 studs should be bent in any direction to a 30° angle from original axis. This can be achieved by either striking the studs with a hammer or placing a pipe or other suitable hollow device over the stud and manually or mechanically bending the stud. At temperatures below 50° F, bending shall be done by continuous slow application of load. If failure occurs, adjust settings and repeat test. Once the set-up has been approved, production may begin. It is recommended to repeat this test every half hour to assure set-up has not changed. This can be accomplished by bending several studs to a 15° angle from weld position. It is not necessary to straighten a stud that has been bent.

**Note: Testing should be completed at the beginning of each day, after any change in operator or if the set up has been changed in any way.**

## 7.) Visual Inspection:

Visual inspection should show a full 360° 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 less than 360°, bending the stud 15° with a hammer will suffice. If failure does not occur, the weld should be considered good. If the weld fails either of these tests; studs should be replaced.

## 8.) General Information

- Keep ferrules dry; wet ferrules cannot be used.
- Keep studs dry; rusty studs can cause welding problems and cause premature chuck failure.
- Do not weld when base material is below 0° F per AWS D1.1 Section 4.28.7.
- Do not attempt to weld through more that 2 layers of galvanizing.
- Do not weld when water is present.
- Do not weld through dirt, sand, or other foreign material.
- Beam flanges should be free of paint rust and other foreign materials
- If welding thru-deck, deck must be tight against beam flange.
- Weld studs in the center of beam flange whenever possible to eliminate arc blow.
- Hold gun perpendicular to base material.
- Test weld set up at the start of each day and every half hour.