Procedures For Stud Welding Shear Connectors, Headed Anchors and Deformed Bar Anchors

In order to achieve optimum results in any shear connector or headed anchor weld, it is imperative that the following procedures be followed:

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 foreign materials. These materials are contaminants to any welding process, but especially stud welding due to the 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, therefore, affect weld quality.

3. **Power Requirement for Operating Power Source**
   Consult the power source manual or manufacturer for the recommended incoming power requirements prior to energizing the power source. This includes proper fuse selection, and primary cable size and length for the power source being used. Inadequate incoming primary power or incorrect conductor size or length can contribute to a reduction in the required weld current.

4. **Welding Current**
   It is essential to have the correct weld current for each application. The normal ranges are listed below. When excessive cable lengths are used, the result will be a reduction in weld current. This can contribute to weld inconsistency or even weld failure. Always use 4/0 cables in the welding circuit, when excessive length is required. 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 necessary.

1/4" = 350 to 450 amps	**5/8" = 1100 to 1400 amps**
3/8" = 525 to 700 amps	**3/4" = 1450 to 1750 amps**
1/2" = 750 to 925 amps	**7/8" = 1700 to 1950 amps**
	1" = 2000 to 2200 amps

5. Weld Setting

Exact weld settings cannot be given because no two jobs are the same. Actual settings will depend upon jobs site conditions. Listed below are approximate settings.

Stud Base Diameter			Welding Downhand				Welding Overhead				Welding to a Vertical Surface			
in.	mm	Area, in.[a]	Welding Current A	Weld Time, Seconds	Lift, in.	Plunge, in.	Welding Current A	Weld Time, Seconds	Lift, in.	Plunge, in.	Welding Current A	Weld Time, Seconds	Lift, in.	Plunge, in.
1/4	6.4	0.0491	450	.17	0.062	0.125	450	.17	0.062	0.125	450	.17	0.062	0.125
5/16	7.9	0.0767	500	.25	0.062	0.125	500	.25	0.062	0.125	500	.25	0.062	0.125
3/8	9.5	0.1105	550	.33	0.062	0.125	550	.33	0.062	0.125	600	.33	0.062	0.125
7/16	11.1	0.1503	675	.42	0.062	0.125	675	.42	0.062	0.125	750	.33	0.062	0.125
1/2	12.7	0.1964	800	.55	0.062	0.125	800	.55	0.062	0.125	875	.46	0.062	0.125
5/8	15.9	0.3068	1200	.67	0.093	0.187	1200	.67	0.062	0.187	1275	.60	0.062	0.187
3/4	19.1	0.4418	1500	.84	0.093	0.187	1500	.84	0.062	0.187	Consult SWP technical support			
7/8	22.2	0.6013	1700	1.00	0.125	0.250	1700	1.00	0.062	0.250	Consult SWP technical support			
1	25.4	0.7854	1900	1.40	0.125	0.250	2050	1.20	0.062	0.250	Consult SWP technical support			

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

Weld current should also be checked by using an amp meter and should be checked periodically due to cable heating which can cause a reduction in weld current.

NOTE: For 3/4" weld thru deck application settings, consult your local Stud Welding Products representative.

6. Testing of Welded Studs

At least two studs should be bent in any direction to a 30 degree angle from weld position striking with a hammer or bending with a pipe. For deformed bar anchors, bend around a pin the diameter that is equal to twice the diameter of the specimen. If a failure occurs, re-adjust settings and repeat test. Once the set-up has been approved, production may be started. It is a good idea to test two or three studs every half hour to assure that the set-up has not changed. This can be accomplished by bending several studs to a 15 degree angle from weld position. If a failure does not occur, the welds should be considered good. It is not necessary to straighten a stud that is bent. Testing should be carried out at the beginning of each day, after any change in operator, or if the set-up is changed in any way.

7. Visual Inspection

Visual inspection should show a full 360 degree weld fillet, although not necessarily the same fillet height around the circumference of the stud. An under cut at the weld interface will be cause for rejection. If the fillet is something less than 360 degrees complete the fillet by hand welding. The studs should then be tested by bending 15 degrees from their original axis either by striking with a hammer or placing a pipe over the stud and manually or mechanically bending the stud. If a failure does not occur, the weld should be considered good. If the weld fails, the studs should be replaced. (See AWS D1.1, Section 7.8.1)

8. General Information

A) Keep ferrules dry; wet ferrules cannot be used.

B) Keep studs dry; rusty studs cause welding problems and premature chuck failure

C) Do not weld when the temperature of the base material is below 0 degrees F per AWS D1.1, Section 7.5.4.

D) Do not attempt to weld through more than 2 thicknesses 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.

9. Certification

Certification of personnel for stud welding applications is available from SWP personnel upon request.