



A706 Stud Weldable Rebar-SWR

SWR (Stud Weldable Rebar) A706 anchors are fully stud weldable with standard stud welding equipment and accessories.

Benefits of Stud Welding:

- *Full penetration welds
- *Faster production than traditional welding
- *Bridge and building construction
- *Automatic machine controlled welds

SWR A706 Applications:

- *Precast concrete grade crossings
- *Concrete connections where ductility is key
- *Thread, bent and straight bar stud uses
- *Seismic management
- *Bridge and Building construction



SWP Part #	Size	Ferrule Part #	Chuck Part #	Foot Part #	Grip Part #
SWR 12 1218	1/2 X 12-1/8	FER10-P flat welding FER10-PV vertical welding	CSW-050	B-2C	GC-062
SWR 12 1818	1/2 X 18-1/8				
SWR 12 2418	1/2 X 24-1/8				
SWR 12 3018	1/2 X 30-1/8				
SWR 12 3618	1/2 X 36-1/8				
SWR 12 4818	1/2 X 48-1/8				
SWR 58 18316	5/8 X 18-3/16	FER12-P flat welding FER12-PV vertical welding	CSW-062	B-2C	GC-075
SWR 58 24316	5/8 X 24-3/16				
SWR 58 30316	5/8 X 30-3/16				
SWR 58 36316	5/8 X 36-3/16				
SWR 58 48316	5/8 X 48-3/16				
SWR 34 18316	3/4 X 18-3/16	FER14-P flat welding FER14-PV vertical welding	CSW-075	B-3C	GC-087
SWR 34 24316	3/4 X 24-3/16				
SWR 34 30316	3/4 X 30-3/16				
SWR 34 36316	3/4 X 36-3/16				
SWR 34 48316	3/4 X 48-3/16				

STUD WELDING PRODUCTS, INC

your number one stud



SWR A706 meets all the following requirements:

- *ASTM A706 Standard Specification for Deformed and Plain Low Alloy Steel Bars for Concrete Reinforcement Grade 60 deformed concrete reinforcement.
- *ACI 318 Earthquake Resistant Structures
- *Seismic Design Requirements for Ductile Steel Reinforcing Elements
- *Studweldable in accordance with the requirements AWS D1.1/ D1.1 M Structural Welding Code Steel Clause 7 Stud Welding and/or AWS D1.4/ D1.4 M



A706/A706M – 16

Bar Designation	Nominal Weight, lb/ft [Nominal Mass, kg/m]	Diameter, in. [mm]	Cross-Sectional Area in. ² [mm ²]	Perimeter, in. [mm]
Nominal Dimensions ^A				
4 [13]	0.668 [0.994]	0.500 [12.7]	0.20 [129]	1.571 [39.9]
5 [16]	1.043 [1.552]	0.625 [15.9]	0.31 [199]	1.963 [49.9]
6 [19]	1.502 [2.235]	0.750 [19.1]	0.44 [284]	2.356 [59.8]

^A The nominal dimensions of a deformed bar are equivalent to those of a plain round bar having the same weight [mass] per foot [metre] as the deformed bar

Tensile Requirements	
	Grade 60 [420]
Tensile Strength, min, psi [MPa]	80,000 [550] ^A
Yield Strength, min, psi [MPa]	60,000 [420]
Yield Strength, max, psi [MPa]	78,000 [540]
Elongation in 8 in. [200 mm], min %	
Bar Designation Nos. 4, 5, 6 [13, 16, 19]	14
^A Tensile strength shall not be less than 1.25 times the actual yield strength.	



Physical & Embedment Properties

Below are physical properties of SWR A706 Weld Studs per A706/A706M16 Grade 60. Using formulas in ACI 31814 (Table 4.2.2) development length for deformed bars in tension can be calculated. Below are embedment length requirements to develop the full bar strength capacity. Free edge distance and anchor spacing should be observed in regard to achieving full capacity. In actual practice, SWP applications should include a factor of safety. Embedment length can be reduced based upon factors given in **ACI 31814 Section 25.4. The user of these Stud Welding Products studs will make this determination.**

Dia.	A _s	ASTM	A _s F _y Yield Lbs. (Min)	A _s F _u Tensile Lbs. (Min.)
1/2	0.20	4 [13]	12,000	16,000
5/8	0.31	5 [16]	18,600	24,800
3/4	0.44	6 [19]	26,400	35,200
A _s Nominal Area				
F _y Yield--60,000 PSI Min				
F _u Tensile--80,000 PSI Min				

Per A706/A706M-16 Grade 60 6.2 The chemical composition as shown by heat analysis shall be limited by the following:

Element max, %
 Carbon 0.33 %
 Manganese 1.56 %
 Phosphorus 0.043 %
 Sulfur 0.053 %

Per ACI 318-14:25.4.2.1 Development length l_d for deformed bars and deformed wires in tension shall be the greater of (a) and (b):

- (a) Length calculated in accordance with 25.4.2.2 or 25.4.2.3 using the application modification factors of 25.4.2.4
- (b) 12 in. min. (per ACI)

Normal Weight Concrete Compressive Strength, f'c (psi)	Minimum Embedment Length for Full Anchor Capacity Development, After Welding (inches)		
	Bar Diameter, db		
	0.5	0.625	0.75
3000	21.91	27.39	32.86
4000	18.98	23.72	28.46
5000	16.97	21.21	25.46

Light Weight Concrete Compressive Strength, f'c (psi)	Minimum Embedment Length for Full Anchor Capacity Development, After Welding (inches)		
	Bar Diameter, db		
	0.5	0.625	0.75
3000	29.21	36.52	43.82
4000	25.30	31.63	37.95
5000	22.63	28.28	33.94

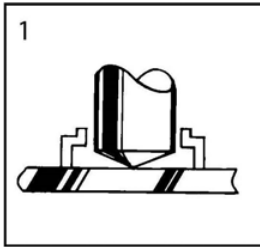


Set up for Welding SWR A706

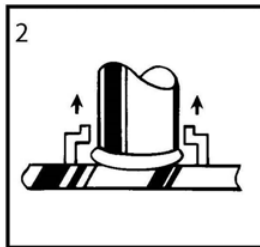
In house parameters provided acceptable results in welding application and testing. The parameters may need modification with respect to application or field conditions. Please refer to AWS requirements for further information.

Dia., in. [mm]	Area in ² [mm ²]	ASTM	Downhand Welding			
			Amp	Sec	Lift	Plunge
0.500 [12.7]	0.20 [129]	4 [13]	900	0.67	0.125	0.312
0.625 [15.9]	0.31 [199]	5 [16]	1200	0.71	0.1875	0.375
0.750 [19.1]	0.44 [284]	6 [19]	1700	0.98	0.1875	0.375

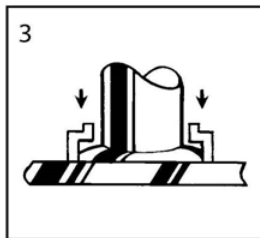
Stud Welding - Step by Step



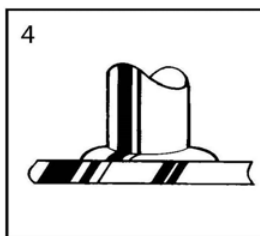
The weld gun is positioned over the base material and the main gun spring is partially compressed. Hold gun perpendicular to work surface and hold ferrule firmly against the surface.



The trigger is pressed and the stud lifts off the base, drawing an arc. The arc melts the end of the weld stud and the base material below. The arc shield (ferrule) concentrates the heat below the weld stud and contains the molten metal within the weld zone. Do not move weld gun during weld.



The main spring plunges the weld stud down into the molten pool of metal in the base material. The cycle is completed in less than a second and the resulting weld bond develops the full strength of the fastener in the weld zone. Allow metal to cool and withdraw gun from the stud, pulling the gun straight up off of the stud.



The weld gun is withdrawn from the weld stud leaving and the ferrule. The ferrule is broken away and discarded. Visually inspect weld.

Note - when determining finished length required for the particular application, keep in mind the reduction in length (burn-off) from stud welding operations. TRU-WELD stud lengths are always given before weld.

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