

# Arc Stud Welding- Specifications

AWS D1.1/1.1-M-15

## Headed Concrete Anchors

Concrete Anchors are designed for welding to flat surfaces, in the fillet of an angle, or to the heel of an angle. When ordering, please specify if studs will not be welded to a flat surface. All orders placed for weld studs included ferrules.

Length of concrete anchors are given before weld. Concrete Anchors with the diameter of 1/2" or below will be approximately 1/8" shorter after weld. 5/8" concrete anchors will be 3/16" shorter after weld (burn-off).

Concrete Anchors are made from low carbon steel (1010-1020) ASTM A29. Studs are also available in weldable stainless steel (except Type 303).

<b>CA Studs</b>	<b>Type B</b>
Tensile Strength, min	65,000 PSI
Tensile Strength, min	450 MPa
Yield Strength (0.2% offset), min	51,000 PSI
Yield Strength (0.2% offset), min	350 MPa
Elongation (% in 2 in.)	20% Min
Reduction of Area	50% Min

## Shear Connectors (Including Thru-Deck)

Shear Connectors are designed to effectively tie the concrete to the steel beams and to resist shear loadings between the concrete slab and steel beam in composite construction. All orders for shear connectors include ferrules.

Length of shear connectors are given before weld. When welded to base material, studs will be approximately 3/16" shorter after weld. When studs are welded Thru-Deck, studs will be approximately 3/8" shorter after weld.

Shear Connectors are made from low carbon steel (1010-1020) ASTM A29. Studs are also available in weldable stainless steel (except Type 303).

<b>SC/DSC Studs</b>	<b>Type B</b>
Tensile Strength, min	65,000 PSI
Tensile Strength, min	450 MPa
Yield Strength (0.2% offset), min	51,000 PSI
Yield Strength (0.2% offset), min	350 MPa
Elongation (% in 2 in.)	20% Min
Reduction of Area	50% Min



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## Deformed Bar Anchors

Deformed Bar Anchors are designed for weld and bearing plates in concrete connections.

Length is listed before weld. Stud diameters 1/2" and below will be approx. 1/8" shorter after welding. 5/8" and above will be approx. 3/16" shorter after welding.

Deformed Bar Anchors are made with low carbon steel (ASTM A1064)

<b>DBA Studs</b>	<b>Type C</b>
Tensile Strength, min	80,000 PSI
Tensile Strength, min	550 MPa
Yield Strength (0.2% offset or 0.5% Extension), min	70,000 PSI
Yield Strength (0.2% offset or 0.5% Extension), min	485 MPa

1. Type A Studs are general purpose of any type and size used for purposes other than shear transfer in composite beam design and construction.
2. Type B Studs are studs that are headed, bent or of other configuration in 3/8" (10mm), 1/2" (12.7mm), 5/8" (15.9mm), 3/4" (19mm), 7/8" (22.2mm) and 1" (25.4mm) diameter, that are used as an essential component in composite beam design and construction.
3. Type C studs are cold worked deformed steel bars manufactured in accordance with specification ASTM A1064, having a nominal diameter equivalent to the diameter of a plain wire having the same weight per foot as the deformed wire. ASTM A1064 specifies a maximum diameter of 0.757 in. (19.2mm). Any bar supplied above that diameter must have the same physical characteristics regarding deformations as required by ASTM A1064.

## Stud Weldable Rebar A706 Anchors

Stud Weldable Rebar A706 anchors are designed for weld and bearing plates in concrete structures and more specifically in seismic application. In compliance with ACI 318 and ASTM A706 requirements for deformed reinforcing bar ("rebar"). A706 weldable rebar is available in 1/2", 5/8" and 3/4" diameters.

Length is listed before weld. The 1/2" stud diameter will be approx. 1/8" shorter after welding, 5/8" and above will be approx. 3/16" shorter after welding.

Stud Weldable Rebar A706 anchors are made with low carbon steel (ASTM A706) with CEV conducive to stud welding meeting AWS D1.1/1.1-M and ACI 318 requirements. 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.

<b>SWRB Studs</b>	<b>Grade 60 [420]</b>
Tensile Strength, min, psi [MPa]	80,000 [550] <sup>A</sup>
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

<sup>A</sup> Tensile strength shall not be less than 1.25 times the actual yield strength.



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## Stud Dimensions

The length dimension, L, is the overall stud length before weld not including flux load. The after weld length will be shortened, depending on the sizes of the stud, the welding process, and weld settings. Approximate length reductions are shown in the table below.

Stud Diameter	Weld Process	Length Reduction
10 (0.134") and 12 gauge (0.105") pins	Stored Arc	--
6-32 thru 1/4-20, CD studs	Stored Arc	1/32"
10 gauge (0.134") pins	Electric Arc	3/32"
3/16" thru 1/2" diameter studs	Electric Arc	1/8"
5/8" thru 7/8" diameter studs	Electric Arc	3/16"
1" diameter or large studs	Electric Arc	1/4"
1/4" and 1/2" CA studs weld thru metal deck	Electric Arc	3/16"-1/4"
5/8" CA studs weld thru metal deck	Electric Arc	5/16"-3/8"
3/4" SC studs weld thru metal deck	Electric Arc	3/8"-7/16"
M6 and 6mm diameter studs	Electric Arc	2mm
M8, 8mm, M10, 10mm and M12 diameter studs	Electric Arc	3mm
12mm, M16, and 16mm diameter studs	Electric Arc	4mm
M20, 19mm and 20mm diameter studs	Electric Arc	5mm
M24, 22mm and 24mm diameter studs	Electric Arc	6mm

The stud length reduction is also known as "burn off."

## Threads

The standard external threads on Tru-Weld studs are UNC-2A, and the internal threads are UNC-2B, prior to plating. Other threads are available upon request. Standard thread length is 3". Longer thread lengths may be ordered. Whenever possible, threads are cold-rolled. The surface quality and strength of rolled threads is greatly improved compared to cut threads.

The surface finish on rolled threads is less subject to wear and offers more corrosion resistance than cut threads.

## Flux

Flux quality and quantity is an essential factor for obtaining consistent weld results. All standard Tru-Weld studs 5/16" diameter and greater have solid flux load.

## Plating

Plating is useful to increase a stud's corrosion resistance. Unless otherwise specified at the time of order, Tru-Weld studs will be supplied un-plated. Upon request, the following types of surface protection are available:

Zinc Plating- ASTM B-633 Trivalent  
Zinc With Dye - ASTM B633 Trivalent

Copper Plating  
Nickel Plating (Electrolytic)

## Ferrules

For weld integrity, certain Tru-Weld stud types must be welded using a ceramic ferrule. Appropriate ceramic ferrules are included in the stud purchase price. Ferrules will be shipped with Tru-Weld studs, when required. Ferrules for welding special applications should be specified when orders for studs are placed.



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