OHIO Welding Manual

for engineering fastener foundations

What's Inside?

For a complete catalog of Ohio Weld Fasteners, contact:

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A Division of Fastener Industries Inc – An Employee Owned Company

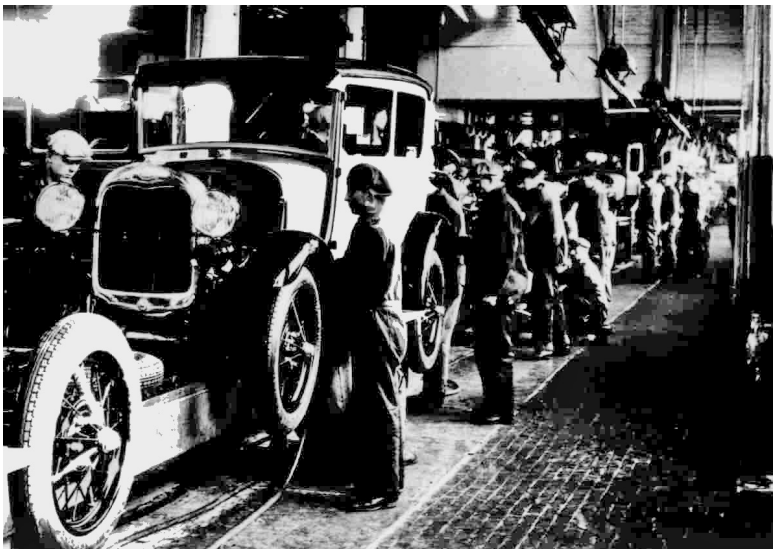
Introduction

The purpose of this Manual is to provide you with our latest and most complete information available on welding projection and spot weld fasteners.

Included are the recommended setups for all Ohio standard weld screws and weld nuts welded to materials .025” to .179” thick. There is also a section on setting up a press welder and a number of other helpful sections on electrodes, projection welding characteristics, heat balance and a chart giving recommendations for eliminating faulty welds.

This information represents over seventy five years of research and experimental development work.

For more complete information, refer to the weld data section in the back of this manual. By following these recommendations, we are certain you will achieve consistency and improve quality when using **Ohio Weld Fasteners** in your application.



In 1928, Buckeye Fasteners first large commercial use of weld screws, were on the Model A Ford.

NOTE: All welds were performed on Alternating Current press type resistance welders. These charts are generic and should be used as a base point for set up settings. The settings may need to be adjusted to different welding environments.

Setting up a press welder to weld fasteners

Figure 1 is a schematic of a typical press welder. Electrodes should be located on the centerline of the pressure application and should be parallel to each other to assure uniform pressure on all projections.

The throat area should be kept to a minimum, the larger the throat depth, the greater the reactance which must be overcome.

1. Make sure cooling water is on and flowing properly through the transformer and electrodes.
2. Check pressure, timing and switches. Make sure they are functioning properly.
3. Check electrode alignment and parallelism. This can be done by placing carbon paper between the electrodes with the current off and pressure applied.
4. Make sure locating devices are tight and properly insulated.
5. Make sure you are using the correct weld setup shown in this guide.

Standard Press Type Welding Machine

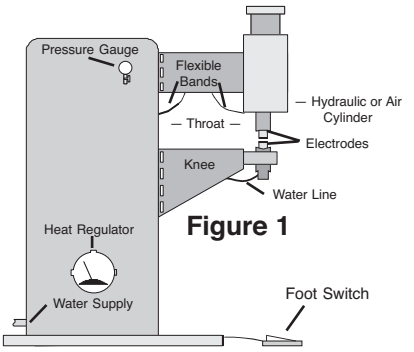


Figure 1

Pressure

The pressure shown in the tables is measured in terms of pressure at the electrodes. A force gage will give you accurate readings.

Secondary amperes

Secondary Amperes is a term used in determining the size of the welder required for the job. Most machines show the maximum secondary current rating on the nameplate. It is the current required to make the weld.

Secondary volts

Secondary volts are adjusted by the heat control lever, which changes the ratio of volts and amperes. The welder can thus be used for both light and heavy work.

When setting up to welder on a new job, use the recommended weld setups as a guide. Set the pressure on the high side, use short weld time cycles (3 to 5) and number 1 heat tap.

As trial welds are made, increase the heat tap, then weld time cycles progressively until good welds can be obtained using a weld time of not over 15 cycles.

Pressure can then be lowered or increased as required without burning up the work or damaging the electrodes or equipment.

Electrode pressure chart

On the electrode pressure chart shown below, measuring the diameter or the cylinder derives electrode pressure, checking the line pressure setting and reading across the chart.

Electrode pressures are approximate. Deduct 10% for friction loss and weight of head on friction-type rams.

Electrode pressure chart

Diameter of cylinder	Line pressure – Air pressure shown on gage (PSI)								
	20	25	30	35	40	50	60	70	80
2"	60	75	90	100	125	150	175	200	250
2.5"	100	125	150	175	200	250	300	350	375
3"	140	175	200	250	275	350	425	500	550
4"	250	300	375	425	500	625	750	875	1,000
4.5"	320	375	475	550	625	800	950	1,100	1,275
5"	400	490	575	675	775	975	1,175	1,375	1,550
6"	550	700	850	1,000	1,100	1,400	1,700	1,975	2,250
7"	775	950	1,150	1,300	1,500	1,900	2,300	2,700	3,075
8"	1,000	1,250	1,500	1,750	2,000	2,500	3,000	3,500	4,000
10"	1,575	1,850	2,300	2,700	3,100	3,900	1,700	5,500	6,250
12"	2,250	2,800	3,400	3,800	4,500	5,600	6,700	7,900	9,000
14"	3,075	3,800	4,600	5,300	6,100	7,700	9,200	10,775	12,250

Heat balance in projection welding fasteners

Heat balance is important to good welds. Proper heat balance is attained when the projections on the fastener and the sheet to which it is welded, reach the welding temperature at the same time.

Increasing heat to correct any faulty weld, or specifying that parts should be “burned in”, do not take into account the variables, which affects the heat.

1. Weld time too long.
2. Welding current too high.
3. Electrode pressure too low.
4. Welding force not long enough. Out of balance with weld cycles.
5. Electrode face diameter too small.
6. Electrode face incorrectly shaped.
7. Incorrect copper alloy electrode
8. Faulty electrode alignment.
9. Failure to make proper adjustments when changing metal thickness.
10. Unclean sheet or plate.

The heat or current is adjusted by a regulator, which changes the ratio of primary to secondary voltage. The amount of heat generated in the welding projection increases with the square of the current expressed in amperes.

Most weld parts require from 5,000 to 25,000 secondary amperes to produce enough heat to make the weld.

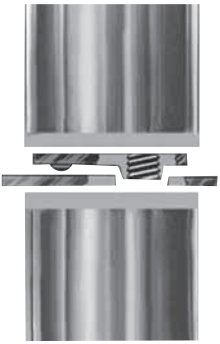
Secondary voltage is also an important factor in making optimum welds. The heat regulator should be set so that the voltage will not cause flashing or sparking when the weld is made. If the heat tap control is set too high, the increased voltage, along with the high current values, will cause weld splatter, expulsion or arching conditions, which will result in poor welds.

Aids in correcting improper heat balance

1. Weld time should be from 3 to 10 cycles for small fasteners and from 10 to 20 cycles for lager fasteners.
2. Secondary amperes will range from 5,000 to 15,000 on smaller sizes, 15,000 to 25,000 on larger sizes and as high as 75,000 on large ring projections.
3. Pressures range from 300 to 1,000 psi (pounds per square inch) on smaller sizes, 1,000 to 2,000 psi on larger sizes and up to 4,000 psi for larger ring projections. Stainless steel requires from 1,500 to 5,000 psi.
4. Welding force should be long enough to include 10 to 20 cycles of hold time to allow the weld to cool slightly.
5. The electrode must be large enough to cover the complete projection area.
6. The electrode face should be flat and **never** dressed with a coarse file. If possible, they should be faced off in a lathe.
7. Use proper electrode alloy – RWMA copper based, class II, class III or class 12 Elkonite.
8. Keep electrode faces parallel. Failure to do so will cause the parts to heat unevenly and cause expulsion.
9. When changing metal thickness, welding adjustments must be made. Use recommended weld setups. Refer to the weld data section in this Manual.
10. Materials should be clean, free of rust, scale, grease and oxides. Many times the current cannot penetrate the coating, resulting in erratic welds.

Ten electrode tips for better results when projection welding fasteners

1. It is essential that projection welding electrodes are located directly on the center line of pressure application and that the lower arm is sturdy enough to avoid deflection.
2. Parallelism must be maintained between opposing faces of the electrodes. Check this by placing carbon paper between the electrodes with the current off and pressure applied.
3. When it is difficult to keep the electrodes parallel due to the age or condition of the welder, try a swivel type electrode or a self aligning electrode as pictured to correct alignment.
4. The electrode face should be large enough to cover the entire part being welded. The greater the bearing surface, the longer the life of the electrode.
5. Use standard electrodes whenever possible. For most projection welding of fasteners, RWMA class 2 copper-based alloy electrodes are recommended. For longer electrode life in high production welding, a piece of copper tungsten alloy, RWMA Class 12, such as “Elkonite”, 1/4” thick, can be brazed to the electrode face.
6. Dress the electrodes or face them in a lathe often enough to maintain weld quality and appearance.
7. Use water cooled tips with internal water cooling coming to within 1/2” of the welding face.
8. In special, hard to cool applications, use external water cooling chambers, available in 5/8” and 1 1/4” diameters. They will supply supplementary cooling as well as additional cooling capacity on internally cooled applications operating at elevated temperatures.
9. When welding long screws, use a hinged electrode. This saves time by reducing the stroke of the ram and makes it easier for the operator to remove the work after welding.
10. Insulate the locating electrode whenever the part passes through a hole in the sheet.



Parallel Electrode

Misaligned Electrode

Nonparallel Electrode

Recognizing and eliminating faulty welds

There are many factors which can affect the welding operations and which must be checked when analyzing welding problems or attempting to improve the quality and uniformity of resistance welds.

1. The welding machine – mechanical, electrical, water or air inadequacies. Using spotweld when pressweld is needed.
2. The weld setup – incorrect heat, time or pressure.
3. The electrodes – faulty design, improperly maintained, not properly cooled and/or insulated.
4. The electronic controls – tube failures, faulty firing board or SCR failure.
5. The parts being welded – poor design, wrong or dissimilar material, projection design or location.
6. The material to which the parts are welded – is it clean and of good welding quality?
7. Jigs, fixtures and feeding devices – are they effective?
8. The operator – the human element.

Periodic problems such as these described below may be solved by one of the corrective measures listed.

Burning – discoloration of screw head:

1. Increase pressure, or
2. Shorten weld time, or
3. Add hold time, or
4. Reduce heat (secondary voltage) tap.

Flashing of projections or "spitting" of molten metal on threads:

1. Increase pressure, or
2. Shorten weld time, or
3. Increase squeeze time, or
4. Reduce heat (secondary voltage) tap, or
5. Check insulation in locating electrode.

Poor, weak or no welds at all:

1. Increase welder capacity, or
2. Increase weld time, or
3. Increase heat (secondary voltage) tap, or
4. Reduce electrode pressure.

Electrode indentation, holes or expulsion:

1. Increase pressure, or
2. Increase welder capacity, or
3. Check for dirty or scaly metal, or
4. Correct to proper size electrode, or
5. Check complete electronic controls.

Troubleshooting

Most welding difficulties are caused by two of these elements - poor electrode designs and improper weld setup. **Figures 1, 2, and 3** illustrate the results of welds made with improper electrodes. **Figures 4 and 5** also show indentations made by electrodes which did not cover the entire head of the weld screw, which is mandatory in projection welding.

Since the projections are fairly close to the perimeter of the screw head, both of these welds failed to fuse all of the projections resulting in weak welds. In **figure 3**, you can see the weld spatter in the screw threads caused by poor or complete lack of insulation. Whenever the screw or nut is welded through a hole in a sheet, the lower electrode must be insulated.

Figures 4 and 5 show the results of improper weld setups. In **figure 4** there is expulsion at the projections and a great deal or discoloration, both usually caused by inadequate electrode pressure or excessive current. In **figure 5**, the operator attempted to offset the lack of pressure by increasing the heat. You can see the expulsion and discoloration has increased. In addition, the area around the weld has been made over heated, weakening the sheet at the weld point.

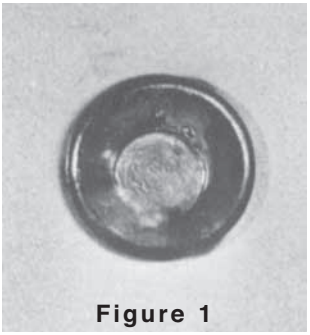


Figure 1

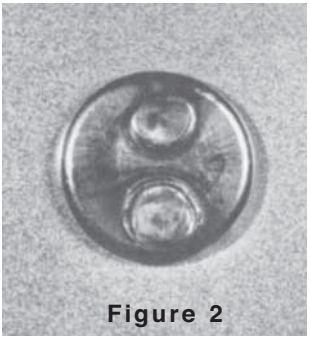


Figure 2

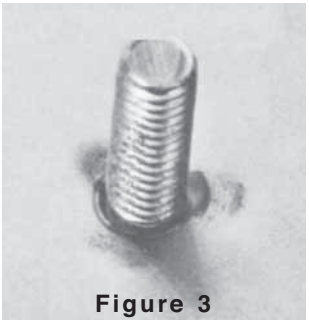


Figure 3

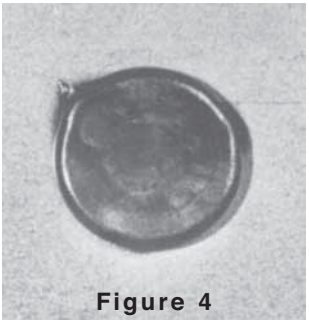


Figure 4

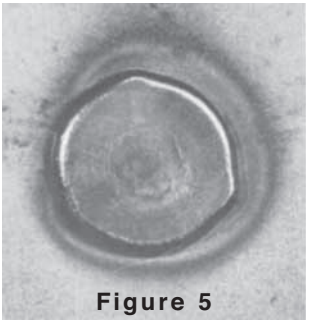
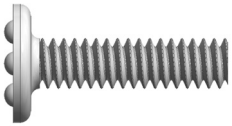


Figure 5

The importance of proper projection design

There are many types of projections, both integral and embossed, used on fasteners and all can give good welding results if the right projection is used. Projections may be spherical, rib, ring or pyramidal.

Projections vary in sizes and shapes, depending on the application and the strength of the weld required. Proper projections localize or concentrate the welding current and accurately control the weld location, insuring definite and regular weld patterns.

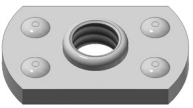


Spherical projections

Most weld screws are designed to give a 3 point bearing, that is, when three projections are used, they will equalize themselves if the welding electrodes are in reasonable alignment. The three projections are equally spaced and located radially as far from the part axis as possible to achieve the best results.

Single button projection

Many applications are suited for the single spherical or button projection. This is probably the easiest of all projections to weld, particularly to heavier thickness of steel and to curved surfaces.

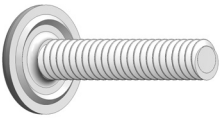


Four spherical projections

When the configuration of the product, as on square or rectangular welding sections, does not permit the logical use of the 3 point bearing principle, four spherical projections can be used, as shown above. This design provides distribution of the weld over the maximum surface area.

Rib projection

The dual line rib projection can also be used on square or rectangular shapes and is particularly effective on thicker gages of material, or in applications where the weld is in tension.

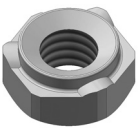


Annular ring projection

Annular or ring type projections, as shown above, are used when a water, gas or oil tight seal is required. The ring projection is used when high strength or greater weld area is required when welding to thin sheet metal. Self-locating weld screw which provides a complete hermetic seal. Ideal for welding to cross wire or perforated sheets.

Pyramid projection

This is used for blind and through hole applications. The design gives good clean welds. Best for appearance in thinner sheet applications.



Hex nut
Bar projections

Three uniform projections ensure reliable contact with the weld surface, even if it is not perfectly flat. The precision pilot accurately locates the threads in the pilot hole and prevents the nut from slipping off center during welding.

When to use projection weld fasteners or spotweld fasteners

If you are faced with the decision of whether to projection weld or spotweld a fastener into your assembly, consider these factors:

Projection weld fasteners

1. Press type welder of sufficient capacity, with electronic controls, is available.
2. Appearance is important. Good, strong, dependable welds can be made with very little or no weld marks or discoloration on the opposite side of the sheet. Ideal for plating, painting, etc...
3. Welding more than one fastener at a time. Recommended for multiple welding. You get increased welding machine efficiently, faster production, increased output and improvement in product.
4. Weld spacing is too close. Several parts can be welded simultaneously with less current per weld than individual spots. The projections also provide an insurance against shunting.
5. Flat electrodes, efficiently water-cooled, eliminate the necessity for frequent dressing of tips, as in spotwelding. Proper projections localize the pressure, concentrate the welding current and accurately control the weld location, insuring definite and regular weld patterns. In projection welding, the electrodes control area means less electrode wear, easier to reface makes for less shop maintenance, resulting in longer electrode life.
6. Welding one part to various sheet thicknesses without changing electrodes. This simplifies welding onto different size materials.
7. Perfect welds are essential to product performance. Projection weld parts provide a greater consistency in weld size and strength creating the vitally needed heat balance. Merely set the electronic controls to the predetermined setting and the last weld, just as the first weld and all in between, will be the same size, strength and consistency.
8. Welding parts or assemblies which could not be resistance welded by any other process. This is especially true on parts of unusual shape, or with inaccessible weld locations or when a water, air, gas or oil tight seal is required.

Spotweld fasteners

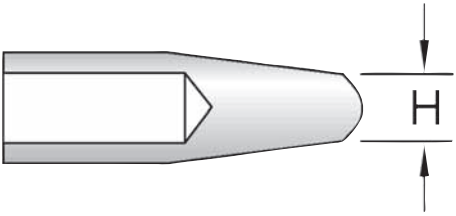
1. Rocker–arm spotwelding equipment is available. Unlike projection welding, spotwelding is accomplished by forcing the metal of the two parts to be welded to flow together.
2. Appearance is not too important. A spotweld leaves a slight indentation on the opposite side of the parent part where the metal had fused to the part.
3. The fastener can be incorporated into the assembly with the same electrodes used to spotweld the assembly together.

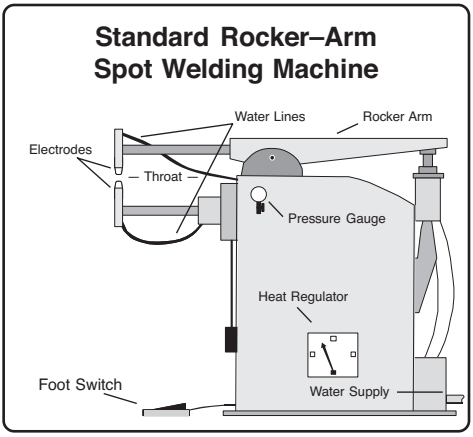
4. Electrode life is not too important. The electrodes control the weld in spotwelding. Shorter runs before refacing must be expected. The flat portion of the tip or contact area controls the weld area. This must be changed whenever material thicknesses change.
5. Shape or size of confined location does not permit the use of a projection weld part.

Spotwelding

In spotwelding fasteners, conventional spotweld tips are used and normally fasteners can be attached with the same tips used in making other spotwelds on the assembly.

The following table gives the recommended electrode tip diameters for spotwelding.





Recommended Electrode Tip Diameters For Spotwelding

Thickness of sheet or nut (in.)	Tip (H) Diameter (in.)	Welding Pressure (lb.)	Weld Time (cycles)	Welding Current (amp.)
0.016	0.125	200	4	7,000
0.031	0.156	300	5	9,500
0.047	0.187	500	6	10,800
0.062	0.218	600	7	13,200
0.078	0.250	800	9	14,800
0.094	0.281	900	10	16,600
0.109	0.312	1,100	12	18,100
0.125	0.343	1,300	14	19,600
0.141	0.375	1,500	18	21,300
0.156	0.406	1,800	22	23,000
0.172	0.439	2,000	28	24,500
0.187	0.468	2,300	32	26,000
0.203	0.500	2,500	38	28,000

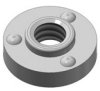
Recommended welding practices and setups

On the following pages, there are complete tables of recommended weld setups.

These weld setups cover the welding of parts to the most popular metal thicknesses. They are specifically given for use with low carbon, cold rolled steel and 302 stainless steel where applicable.

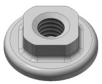
Material welded to: low carbon cold rolled steel

Welding setups to metal thickness: 24 to 11 Gage

Part Type	Thread Size		Pressure Range in LBS.		Weld Cycles		Current in Secondary Amps.		Recommended Electrode Dia.		Approx. KVA Size
	Inch	Metric	From	To	From	To	From	To	Part Side	Sheet Side	Welder
BT / BTM	#8	M4	700	1,000	4	7	9,000	14,000	0.500	0.500	50
	#10	M5	700	1,000	4	7	9,000	14,000	0.500	0.500	50
	1/4-20	M6	800	1,200	5	9	10,000	15,000	0.500	0.500	75
	5/16-18	M8	1,000	1,300	8	10	12,000	17,000	0.625	0.625	75
ND / NDM	#6	M3.5	550	800	6	10	12700	19500	0.250	0.250	30
	#8	M4	550	800	6	10	12700	19500	0.250	0.250	30
	#10	M5	550	800	6	10	12700	19500	0.250	0.250	30
	1/4-20	M6	800	1,300	8	15	14,000	20,000	0.312	0.312	50
	5/16-18	M8	1,000	2,000	10	25	15,000	25,000	0.375	0.375	75
	3/8-16	M10	1,000	2,000	10	25	15,000	25,000	0.375	0.375	75
PN / PNM	#6	M3.5	300	1,000	3	10	7300	15,000	0.625	0.625	30
	#8	M4	300	1,000	3	10	7300	15,000	0.625	0.625	30
	#10	M5	300	1,000	3	10	7300	15,000	0.625	0.625	30
	1/4-20	M6	700	1,300	3	10	8500	16,000	0.813	0.813	50
	5/16-18	M8	1,000	1,500	6	12	10,000	17,000	1.000	1.000	75
	3/8-16	M10	1,000	1,500	6	12	10,000	17,000	1.125	1.125	75
QN / QNM	#6	M3.5	400	900	3	8	8,000	16,000	0.625	0.625	30
	#8	M4	400	900	3	8	8,000	16,000	0.625	0.625	30
	#10	M5	400	900	3	8	8,000	16,000	0.625	0.625	30
	1/4-20	M6	800	1,200	4	10	13,000	20,000	0.813	0.813	50
	5/16-18	M8	900	1,500	5	15	15,000	24,000	1.000	1.000	75
	3/8-16	M10	900	1,500	5	15	15,000	24,000	1.000	1.000	75
	1/2-13	M12	1,000	3,500	6	16	20,000	35,000	1.250	1.250	100
RD / RDM	#6	M3/M3.5	600	800	3	7	9,000	12,000	0.625	0.625	20
	#8	M4	600	800	3	7	9,000	12,000	0.625	0.625	20
	#10	M5	600	800	3	7	9,000	12,000	0.625	0.625	20
	1/4-20	M6	600	900	6	10	9,000	14,000	0.875	0.875	30
	5/16-18	M8	800	1,300	4	12	13,000	22,000	0.813	0.813	50
RH / RHM	#6	M3.5	700	1,000	3	12	10,000	16,000	0.625	0.625	30
	#8	M4	700	1,000	3	12	10,000	16,000	0.625	0.625	30
	#10	M5	800	1,100	4	16	12,000	18,000	0.750	0.750	50
	1/4-20	M6	900	1,200	6	18	13,000	20,000	1.000	1.000	75
	5/16-18	M8	1,000	1,500	10	20	14,000	22,000	1.000	1.000	75
	3/8-16	M10	1,000	1,500	10	20	14,000	22,000	1.000	1.000	75
RN / RNM	#6	M3.5	500	1,000	3	10	8,000	12,000	0.625	1.000	30
	#8	M4	500	1,000	3	10	8,000	12,000	0.625	0.625	30
	#10	M5	500	1,000	3	10	8,000	12,000	0.625	0.625	30
	1/4-20	M6	700	1,300	4	12	9,000	16,000	0.813	0.813	50
	5/16-18	M8	900	1,500	5	14	10,000	18,000	1.000	1.000	75
	3/8-16	M10	900	1,500	5	14	10,000	18,000	1.000	1.000	75
	1/2-13	M12	1,000	1,700	6	16	11,000	20,000	1.125	1.125	75

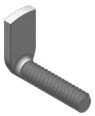
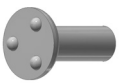
Material welded to: low carbon cold rolled steel

Welding setups to metal thickness: 24 to 11 Gage

Part Type	Thread Size		Pressure Range in LBS.		Weld Cycles		Current in Secondary Amps.		Recommended Electrode Dia.		Approx. KVA Size
	Inch	Metric	From	To	From	To	From	To	Part Side	Sheet Side	Welder
SF 	5/16-18	—	1,500	3,000	10	25	30,000	50,000	1.125	1.125	200
	3/8-16	—	1,500	3,000	10	25	30,000	50,000	1.125	1.125	200
	1/2-13	—	2,200	3,700	15	25	30,000	50,000	1.125	1.125	200
SN / SNM 	#6	M3.5	550	800	6	10	12700	19500	0.218	0.250	30
	#8	M4	550	800	6	10	12700	19500	0.022	0.250	30
	#10	M5	550	800	6	10	12700	19500	0.250	0.250	30
	1/4-20	M6	800	1,300	8	15	14,000	20,000	0.312	0.312	50
	5/16-18	M8	1,000	2,000	10	25	15,000	25,000	0.375	0.375	75
	3/8-16	M10	1,000	2,000	10	25	15,000	25,000	0.375	0.375	75
TP 	#6	—	550	800	6	10	12700	19500	0.250	0.250	30
	#8	—	550	800	6	10	12700	19500	0.250	0.250	30
	#10	—	550	800	6	10	12700	19500	0.250	0.250	30
	1/4-20	—	800	1,300	8	15	14,000	20,000	0.312	0.312	50
	5/16-18	—	1,000	2,000	10	25	15,000	25,000	0.375	0.375	75
	3/8-16	—	1,000	2,000	10	25	15,000	25,000	0.375	0.375	75
WF / WFM 	#6	M3.5	700	950	3	8	8,000	14500	0.625	1.000	30
	#8	M4	700	950	3	8	8,000	14500	0.625	0.625	30
	#10	M5	800	1,050	6	12	9,000	15200	0.750	0.750	50
	1/4-20	M6	900	1,100	7	14	10,000	16100	1.000	1.000	75
	5/16-18	M8	1,000	1,200	8	15	12,000	18,000	1.000	1.000	75
	3/8-16	M10	1,000	1,200	8	15	12,000	18,000	1.000	1.000	75
WP / WPM 	#6	M3.5	400	900	3	8	8,000	16,000	0.625	0.625	30
	#8	M4	400	900	3	8	8,000	16,000	0.625	0.625	30
	#10	M5	450	950	3	10	11,000	16,000	0.625	0.625	50
	1/4-20	M6	600	1,000	4	11	12,000	17,000	0.625	0.625	75
	5/16-18	M8	800	1,100	5	12	13,000	18,000	0.750	0.750	75
WS / WSM 	#6	M3.5	400	900	3	8	8,000	16,000	0.625	0.625	30
	#8	M4	400	900	3	8	8,000	16,000	0.625	0.625	30
	#10	M5	450	950	3	10	11,000	16,000	0.625	0.625	50
	1/4-20	M6	600	1,000	4	11	12,000	17,000	0.625	0.625	75
	5/16-18	M8	800	1,100	5	12	13,000	18,000	0.750	0.750	75
	3/8-16	M10	900	1,200	6	13	14,000	19,000	0.875	0.875	75
WT / WTM 	#6	M3.5	800	1,000	4	9	9,000	15,000	0.625	0.625	30
	#8	M4	800	1,000	4	9	9,000	15,000	0.625	0.625	30
	#10	M5	900	1,200	7	13	10,000	16,000	0.750	0.750	50
	1/4-20	M6	1,000	1,300	8	15	11,000	17,000	1.000	1.000	75
WW / WWM 	#6	M3.5	700	1,200	5	9	13,000	20,000	0.625	0.625	75
	#8	M4	900	1,800	6	10	18,000	30,000	0.625	0.625	75
	#10	M5	1,200	2,000	7	15	20,000	40,000	0.750	0.750	100
	1/4-20	M6	1,600	3,000	8	20	25,000	50,000	1.000	1.000	150
	5/16-18	M8	1,800	3,200	10	25	30,000	60,000	1.00	0 1.000	200
	3/8-16	M10	1,800	3,200	10	25	30,000	60,000	1.000	1.000	200
XN / XNM 	#6	M3.5	350	800	5	10	9700	17800	0.218	0.250	20
	#8	M4	350	800	5	10	9700	17800	0.218	0.250	20
	#10	M5	350	800	5	10	9700	17800	0.218	0.250	20
	1/4-20	M6	350	800	5	10	9700	17800	0.250	0.250	20
	5/16-18	M8	800	1,300	8	15	14,000	20,000	0.312	0.312	50
	3/8-16	M10	800	1,300	8	15	14,000	20,000	0.312	0.312	50

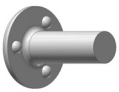
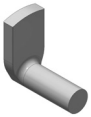
Material welded to: low carbon cold rolled steel

Welding setups to metal thickness: 24 to 11 Gage

Part Type	Thread Size		Pressure Range in LBS.		Weld Cycles		Current in Secondary Amps.		Recommended Electrode Dia.		Approx. KVA Size
	Inch	Metric	From	To	From	To	From	To	Part Side	Sheet Side	Welder
DW	1/4-20	—	700	1,100	3	8	8,000	15,000	0.500	0.500	50
	5/16-18	—	800	1,200	4	12	9,000	16,000	0.625	0.625	75
GW / GWM	#6	M3.5	200	800	3	5	3,000	7500	0.500	0.500	20
	#8	M4	300	800	3	5	3700	8500	0.500	0.500	20
	#10	M5	400	850	3	7	6,000	12300	0.500	0.500	20
	1/4-20	M6	700	950	3	8	8,000	14500	0.500	0.500	30
	5/16-18	M8	800	1,050	8	12	9,000	15200	0.625	0.625	50
	3/8-16	M10	900	1,150	7	14	10,000	16100	0.750	0.750	50
HW / HWM	#6	M3.5	300	900	3	7	4,000	13,000	0.500	0.500	20
	#8	M4	300	900	3	7	4,000	13,000	0.500	0.500	20
	#10	M5	300	900	3	7	4,000	13,000	0.500	0.500	20
	1/4-20	M6	700	1,000	3	12	10,000	16,000	0.625	0.625	30
	5/16-18	M8	800	1,100	4	16	12,000	18,000	0.750	0.750	50
	3/8-16	M10	900	1,200	6	18	13,000	20,000	0.875	0.875	50
	1/2-13	M12	1,000	1,500	10	20	14,000	22,000	1.000	1.000	75
PD	#6	—	250	800	3	6	5,000	11,000	0.437	0.437	20
	#8	—	350	800	3	7	6,000	12,000	0.500	0.500	20
	#10	—	900	1,200	4	8	8,000	13,000	0.500	0.500	30
	1/4-20	—	900	1,500	5	9	9,000	14,000	0.625	0.625	50
	5/16-18	—	900	1,500	6	15	12,000	17,000	0.875	0.875	75
	3/8-16	—	1,000	1,600	7	18	13,000	21,000	1.000	1.000	75
RW / RWM	#6	M3.5	300	600	4	6	8500	13,000	0.500	0.500	20
	#8	M4	500	1,200	2	5	9,000	17,000	0.500	0.500	50
	#10	M5	900	1,200	2	5	14,000	22,000	0.500	0.500	75
	1/4-20	M6	900	1,500	5	15	15500	24,000	0.625	0.625	100
	5/16-18	M8	1,600	1,800	11	20	21,000	25,000	0.750	0.750	150
	3/8-16	M10	2,200	2,600	11	15	27,000	35,000	0.875	0.875	150
SS / SSM #	6	M3.5	300	700	4	10	8,000	14,000	0.218	0.250	20
	#8	M4	300	700	4	10	8,000	14,000	0.218	0.250	20
	#10	M5	300	700	4	10	8,000	14,000	0.250	0.250	20
	1/4-20	M6	500	900	6	12	12,000	18,000	0.281	0.312	50
	5/16-18	M8	800	1,300	8	15	14,000	20,000	0.375	0.375	75
	3/8-16	M10	1,000	2,000	10	25	15,000	25,000	0.375	0.375	75
KL	0.190	—	300	700	4	10	8,000	14,000	0.250	0.250	30
											
PC	0.375	—	500	900	4	9	8,000	12,000	0.375	0.375	50
	0.750	—	900	1,400	5	10	10,000	18,000	0.750	0.750	75
	1.000	—	1,000	1,500	5	15	12,000	20,000	1.000	1.000	75
PG / PGM	0.117	3mm	200	800	3	5	3,000	7500	0.500	0.500	20
	0.144	—	300	800	3	5	3,700	8,500	1.000	1.000	20
	0.163	4mm	400	850	3	6	6,000	12300	0.500	0.500	20
	0.190	5mm	600	900	3	7	7,000	13200	0.500	0.500	30
	0.218	—	700	950	3	8	8,000	14500	0.500	0.500	30
	0.250	6mm	700	950	3	8	8,000	14500	0.500	0.500	30
	0.277	—	800	1,050	6	12	9,000	15200	0.625	0.625	50
	0.335	8mm	900	1,150	7	14	10,000	16100	0.750	0.750	50
	0.375	10mm	900	1,150	7	14	10,000	16100	0.750	0.750	50

Material welded to: low carbon cold rolled steel

Welding setups to metal thickness: 24 to 9 Gage

Part Type	Thread Size		Pressure Range in LBS.		Weld Cycles		Current in Secondary Amps.		Recommended Electrode Dia.		Approx. KVA Size
	Inch	Metric	From	To	From	To	From	To	Part Side	Sheet Side	Welder
PH / PHM	0.117	3mm	300	900	3	7	4,000	13,000	0.500	0.500	20
	0.144	—	300	900	3	7	4,000	13,000	0.500	0.500	20
	0.163	4mm	400	900	3	8	6,000	14,000	0.500	0.500	20
	0.190	5mm	600	1,000	3	10	9,000	15,000	0.500	0.500	30
	0.218	—	700	1,000	3	12	10,000	16,000	0.625	0.625	30
	0.250	6mm	700	1,000	3	12	10,000	16,000	0.625	0.625	30
	0.277	—	800	1,100	4	16	12,000	18,000	0.750	0.750	50
	0.335	8mm	900	1,200	6	18	13,000	20,000	0.875	0.875	50
	0.375	10mm	900	1,200	6	18	13,000	20,000	0.875	0.875	50
	0.500	12mm	1,000	1,500	1	20	14,000	22,000	1.000	1.000	75
SP	0.117	—	300	700	4	10	8,000	14,000	0.250	0.250	20
	0.144	—	300	700	4	10	8,000	14,000	0.250	0.250	20
	0.163	—	300	700	4	10	8,000	14,000	0.250	0.250	20
	0.190	—	300	700	4	10	8,000	14,000	0.250	0.250	20
	0.218	—	500	900	6	12	12,000	18,000	0.312	0.312	50
	0.250	—	600	1,000	8	15	12,000	18,000	0.312	0.312	50
	0.277	—	800	1,300	10	25	14,000	20,000	0.375	0.375	75
BF N6215	—	M6	700	1,250	7	18	12,500	19,500	.625	.625	75
	—	M8	900	1,500	7	21	13,800	24,000	.750	.750	75
	—	M10	900	1,700	8	23	15,000	28,500	.750	.750	75
	—	M12	1,100	1,850	8	24	16,500	29,000	1.250	1.250	100
	—	M16	1,250	2,300	9	26	18,000	31,000	1.250	1.250	150
BF W5207	—	M6	800	1,250	7	12	15,000	19,600	0.750	0.750	75
	—	M8	950	1,250	7	15	17,300	23,000	0.750	0.750	75
	—	M10	1,100	1,250	7	16	17,800	24,500	1.000	1.000	100
	—	M12	1,200	1,400	8	15	18,300	32,200	1.000	1.000	100
HS3	#8	M4	450	950	4	9	8,000	17,000	0.625	0.626	30
HL3	#10	M5	500	1,000	4	12	10,500	17,500	0.625	0.625	50
	1/4-20	M6	700	1,200	6	13	13,500	18,500	0.625	0.625	75
	5/16-18	M8	900	1,250	7	14	14,500	21,500	0.750	0.750	75
	3/8-16	M10	950	1,450	7	16	16,500	23,500	0.875	0.875	100
	7/16-14	M12	1,100	1,800	7	18	17,500	31,000	1.225	1.225	150
	1/2-13	M16	1,100	1,800	8	21	18,000	36,500	1.250	1.250	150
HS6	#10	M5	600	1,100	5	14	12,500	18,000	.625	.625	30
HL6	1/4-20	M6	700	1,200	7	15	13,500	20,500	.625	.625	50
	5/16-18	M8	900	1,400	7	18	14,500	23,000	.750	.750	75
	3/8-16	M10	1,100	1,800	8	21	17,000	28,500	.750	.750	100
	7/16-14	M12	1,100	2,000	8	21	17,500	31,500	1.250	1.250	150
	1/2-13	M16	1,200	2,200	9	23	17,500	34,500	1.250	1.250	150
BF DIN 929		M3.5	450	900	3	7	6,500	13,500	.625	.625	20
	—	M4	500	950	3	8	6,500	14,000	.625	.625	30
	—	M5	600	1,100	5	14	12,500	18,000	.750	.750	30
	—	M6	700	1,250	7	16	12,800	19,000	.750	.750	50
	—	M8	900	1,500	7	18	13,500	23,000	.750	.750	75
	—	M10	1,100	2,000	7	21	15,000	30,000	.750	.750	100
	—	M12	1,100	2,200	8	23	17,500	32,000	1.250	1.250	150
	—	M14	1,250	2,300	9	24	18,000	32,000	1.250	1.250	150
		M16	1,250	2,450	9	24	18,000	38,000	1.250	1.250	150

Material welded to: low carbon cold rolled steel

Welding setups to metal thickness: 16 to 11 Gage

Part Type	Thread Size		Pressure Range in LBS.		Weld Cycles		Current in Secondary Amps.		Recommended Electrode Dia.		Approx. KVA Size
	Inch	Metric	From	To	From	To	From	To	Part Side	Sheet Side	Welder
SW8	1/4-20	M6	1,100	1,800	11	16	14,800	20,500	0.750	0.750	75

Welding setups to metal thickness: 14 to 7 Gage

RWH	5/16-18	M8	1,600	2,000	12	26	20,500	29,500	1.000	1.000	150
	3/8-16	M10	2,200	2,600	14	28	23,500	39,500	1.250	1.250	200

Welding setups to metal thickness: 13 to 3 Gage

HS3	5/8-11	—	2,000	2,900	2	8	16,100	28,700	1.250	1.250	150
HL3	3/4-10	—	2,550	3,400	3	16	27,000	41,000	1.250	1.250	200

Special notes: All welds for HS3 3410 and HL3 5811 were performed using a single phase A/C welder, the secondary amperage is the most importand information. The single phase will need 75 - 95% current. The three phase welder can weld at a lower percentage of current.

Material welded to: 302 Stainless steel

Welding setups to metal thickness: 24 to 11 Gage

Part Type	Thread Size	Base Material Gage	Pressure Range in LBS.		Weld Cycles		Current in Secondary Amps.		Recommended Electrode Dia.		Approx. KVA Size
			From	To	From	To	From	To	Part Side	Sheet Side	Welder
BTZ	#10	20 to 13	750	900	3	8	7,300	11,000	0.500	0.500	50

PNZ	#8	24 to 14	750	900	4	6	6,800	8,500	0.625	0.625	30
	#10	24 to 14	750	900	4	6	6,800	8,500	0.625	0.625	30
	1/4–20	24 to 13	850	1,500	3	6	4,500	13,500	1.250	1.250	50–75
	5/16–18	20 to 11	1,400	1,600	4	8	10,500	13,500	1.250	1.250	75
	3/8–16	20 to 11	1,400	1,600	4	8	10,500	13,500	1.250	1.250	75

PNZ Metric	M4	24 to 14	750	900	4	6	6,800	8,500	0.625	0.625	30
	M5	24 to 14	750	900	4	6	6,800	8,500	0.625	0.625	30
	M6	24 to 13	850	1,500	3	6	4,500	13,500	1.250	1.250	50–75
	M8	20 to 11	1,400	1,600	4	8	10,500	13,500	1.250	1.250	75

RHZ	#6	24 to 14	750	900	4	10	7,800	12,500	0.625	0.625	30
	#8	24 to 14	750	900	4	10	7,800	12,500	0.625	0.625	30
	#10	24 to 14	850	1,500	4	8	7,500	18,000	0.750	0.750	75
	1/4–20	20 to 11	850	1,600	8	14	10,500	16,000	1.000	1.000	75
	5/16–18	20 to 11	1,500	1,600	7	15	10,750	16,000	1.000	1.000	100
	3/8–16	18 to 11	1,500	1,600	7	15	10,750	16,000	1.000	1.000	100

RNZ	#8	24 to 14	700	800	4	6	6,500	9,000	0.625	0.625	30
	#10	24 to 14	700	800	4	6	6,500	9,000	0.625	0.625	30
	1/4–20	20 to 11	850	1,500	3	6	11,500	13,500	0.813	0.813	30
	5/16–18	20 to 11	1,400	1,600	4	8	11,000	14,000	1.000	1.000	100
	3/8–16	20 to 11	1,400	1,600	4	8	11,000	14,000	1.000	1.000	100

RNZ Metric	M4	24 to 14	700	800	4	6	6,500	9,000	0.625	0.625	30
	M5	24 to 14	700	800	4	6	6,500	9,000	0.625	0.625	30
	M6	20 to 11	850	1,500	3	6	11,500	13,500	0.813	0.813	30
	M8	20 to 11	1,400	1,600	4	8	11,000	14,000	1.000	1.000	100

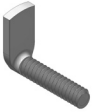
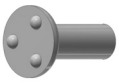
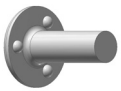
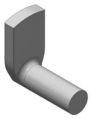
Material welded to: 302 Stainless steel

Welding setups to metal thickness: 24 to 11 Gage

Part Type	Thread Size	Base Material Gage	Pressure Range in LBS. From	Pressure Range in LBS. To	Weld Cycles From	Weld Cycles To	Current in Secondary Amps. From	Current in Secondary Amps. To	Recommended Electrode Dia. Part Side	Recommended Electrode Dia. Sheet Side	Approx. KVA Size Welder
SNZ 	#8	24 to 14	750	900	4	8	7,200	10,500	0.218	0.250	30
	#10	24 to 14	750	900	4	8	7,200	10,500	0.218	0.250	30
	1/4–20	24 to 13	850	1,250	2	8	10,000	11,000	0.250	0.250	40
	5/16–18	20 to 11	850	1,500	4	10	10,800	13,000	0.312	0.375	50
	3/8–16	20 to 11	850	1,500	4	10	10,800	13,000	0.312	0.375	75
SNZ Metric 	M4	24 to 14	750	900	4	8	7,200	10,500	0.218	0.250	30
	M5	24 to 14	750	900	4	8	7,200	10,500	0.218	0.250	30
	M6	24 to 13	850	1,250	2	8	10,000	11,000	0.250	0.250	40
	M8	20 to 11	850	1,500	4	10	10,800	13,000	0.312	0.375	50
WFZ 	#6	20 to 14	750	850	3	6	7,800	11,000	0.625	0.625	30
	#8	20 to 14	750	850	3	6	7,800	11,000	0.625	0.625	30
	#10	20 to 13	750	900	3	8	8,800	12,000	0.750	0.750	50
	1/4–20	20 to 11	1,350	1,600	3	8	11,300	18,000	1.000	1.000	75
	5/16–18	16 to 11	1,400	1,600	4	10	10,800	18,000	1.000	1.000	100
	3/8–16	16 to 11	1,400	1,600	4	10	10,800	18,000	1.000	1.000	100
WTZ 	#6	24 to 13	750	900	4	7	7,000	10,300	0.625	0.625	30
	#8	24 to 13	750	900	4	9	7,000	10,300	0.625	0.625	30
	#10	24 to 11	700	900	4	9	7,800	13,000	1.000	1.000	50
	1/4–20	20 to 11	1,300	1,600	4	9	11,600	14,500	1.000	1.000	100
WWZ 	#6	24 to 13	850	1,600	4	8	11,700	18,000	0.625	0.625	50
	#8	24 to 13	850	1,600	4	8	11,700	18,000	0.625	0.625	50
	#10	24 to 11	1,400	1,800	6	12	14,000	30,000	1.000	1.000	100–150
	1/4–20	20 to 11	2,900	4,400	5	10	27,500	33,000	1.250	1.250	200
	5/16–18	18 to 11	3,500	4,400	7	12	33,300	35,000	1.250	1.250	200
	3/8–16	18 to 11	3,500	4,400	7	12	33,300	35,000	1.250	1.250	200
GWZ 	#6	24 to 14	750	900	2	6	4,000	9,000	0.500	0.500	20
	#8	24 to 14	750	900	2	8	6,000	9,000	0.500	0.500	20
	#10	20 to 14	750	850	4	10	7,700	11,300	0.500	0.500	30
	1/4–20	20 to 14	750	850	4	12	8,000	12,200	0.500	0.500	50
	5/16–18	20 to 11	1,400	1,600	4	8	11,200	18,300	0.750	0.750	100
	3/8–16	20 to 11	1,400	1,700	4	10	11,300	19,000	1.000	1.000	100
GWZ Metric 	M4	24 to 14	750	900	2	8	6,000	9,000	0.500	0.500	20
	M5	20 to 14	750	850	4	10	7,700	11,300	0.500	0.500	30
	M6	20 to 14	750	850	4	12	8,000	12,200	0.500	0.500	50
	M8	20 to 11	1,400	1,600	4	8	11,200	18,300	0.750	0.750	100
	M10	20 to 11	1,400	1,700	4	10	11,300	19,000	1.000	1.000	100
HWZ 	#6	24 to 14	750	900	2	6	4,000	9,000	0.500	0.500	20
	#8	24 to 14	750	900	2	8	6,000	9,000	0.500	0.500	20
	#10	20 to 14	750	850	4	10	7,700	11,300	0.500	0.500	30
	1/4–20	20 to 14	750	850	4	12	8,000	12,200	0.500	0.500	50
	5/16–18	20 to 11	1,400	1,600	4	8	11,200	18,300	0.750	0.750	100
	3/8–16	20 to 11	1,400	1,700	4	10	11,300	19,000	1.000	1.000	100
	1/2–13	16 to 11	1,400	1,800	4	10	10,700	16,500	1.000	1.000	100–150
HWZ Metric 	M4	24 to 14	750	900	2	8	6,000	9,000	0.500	0.500	20
	M5	20 to 14	750	850	4	10	7,700	11,300	0.500	0.500	30
	M6	20 to 14	750	850	4	12	8,000	12,200	0.500	0.500	50
	M8	20 to 11	1,400	1,600	4	8	11,200	18,300	0.750	0.750	100
	M10	20 to 11	1,400	1,700	4	10	11,300	19,000	1.000	1.000	100
PDZ 	#6	24 to 14	800	900	4	8	3,500	7,700	0.500	0.500	30
	#8	24 to 14	800	900	4	8	3,500	7,700	0.500	0.500	30
	#10	20 to 14	800	950	3	8	2,700	10,300	0.625	0.625	30
	1/4–20	20 to 13	850	1,500	4	8	6,700	10,300	0.750	0.750	50
	5/16–18	20 to 13	1,500	1,650	3	8	9,500	12,000	0.875	0.875	50
RWZ 	#6	24 to 14	850	1,400	2	6	5,700	12,500	0.500	0.500	50–75
	#8	24 to 14	850	1,400	3	6	10,800	13,500	0.500	0.500	50–75
	#10	20 to 14	800	1,000	3	6	12,100	14,400	0.500	0.500	50–75
	1/4–20	18 to 11	2,700	3,400	3	6	23,500	28,500	1.000	1.000	150
	5/16–18	18 to 11	3,300	4,200	5	8	27,500	30,000	1.250	1.250	150
	3/8–16	18 to 11	3,500	4,200	6	10	29,500	32,500	1.250	1.250	200

Material welded to: 302 Stainless steel

Welding setups to metal thickness: 24 to 9 Gage

Part Type	Thread Size	Base Material Gage	Pressure Range in LBS. From	Pressure Range in LBS. To	Weld Cycles From	Weld Cycles To	Current in Secondary Amps. From	Current in Secondary Amps. To	Recommended Electrode Dia. Part Side	Recommended Electrode Dia. Sheet Side	Approx. KVA Size Welder
SSZ	#6	24 to 14	700	850	2	6	5,300	6,500	0.219	0.219	20
	#8	24 to 14	700	850	2	8	5,500	6,700	0.219	0.312	20
	#10	24 to 14	700	850	2	8	5,500	6,700	0.219	0.312	20
	1/4–20	20 to 13	700	900	4	8	6,600	8,500	0.250	0.312	30
	5/16–18	18 to 11	850	1,500	3	8	8,400	14,800	0.312	0.375	50
	3/8–16	18 to 11	1,450	1,550	7	12	10,900	19,400	0.312	0.375	75
PGZ	0.119	24 to 14	750	900	2	6	4,000	9,000	0.500	0.500	20
	0.144	24 to 14	750	900	2	8	6,000	9,000	0.500	0.500	20
	0.163	20 to 14	750	850	4	10	7,700	11,300	0.500	0.500	30
	0.190	24 to 14	800	1,100	5	10	9,500	13,200	0.500	0.500	50
	0.250	20 to 13	750	1,000	4	12	8,000	12,200	0.625	0.625	50
	0.335	20 to 11	1,400	1,700	4	10	11,300	19,000	1.000	1.000	75–100
	0.375	20 to 11	1,400	1,700	4	10	11,300	19,000	1.000	1.000	75–100
PHZ	0.119	24 to 14	750	900	2	6	4,000	9,000	0.500	0.500	20
	0.144	24 to 14	750	900	2	8	6,000	9,000	0.500	0.500	20
	0.163	20 to 14	750	850	4	10	7,700	11,300	0.500	0.500	30
	0.190	24 to 14	800	1,100	5	10	9,500	13,200	0.500	0.500	50
	0.218	20 to 13	750	1,000	5	12	8,000	12,200	0.625	0.625	50
	0.250	20 to 13	750	1,000	4	12	8,000	12,200	0.625	0.625	50
	0.277	20 to 11	750	1,000	5	12	8,000	12,200	0.625	0.625	50
	0.335	20 to 11	1,400	1,700	4	10	11,300	19,000	1.000	1.000	75–100
	0.375	20 to 11	1,400	1,700	4	10	11,300	19,000	1.000	1.000	75–100
	0.500	16 to 11	1,400	1,800	4	10	11,000	16,500	1.000	1.000	100–150
SPZ	0.119	24 to 14	700	850	2	6	5,300	6,500	0.219	0.219	20
	0.144	24 to 14	700	850	2	8	5,500	6,700	0.219	0.312	20
	0.163	24 to 14	700	850	2	8	5,500	6,700	0.219	0.312	20
	0.190	24 to 14	700	850	2	8	5,500	6,700	0.219	0.312	20
	0.218	20 to 13	700	900	4	8	6,600	8,500	0.250	0.312	30
	0.250	20 to 13	850	1,450	4	8	6,400	13,900	0.250	0.31	50
	0.277	18 to 11	850	1,500		8	8,400	14,800	0.250	0.375	50–75
HS3Z / HL3Z	1/4-20	24 to 11	1,300	1,600	5	13	11,600	15,800	1.000	1.000	75
	5/16-18	24 to 11	1,400	1,750	6	13	12,100	19,400	1.000	1.000	100
	3/8-16	24 to 11	1,450	1,800	7	14	13,700	24,500	1.000	1.000	100
	1/2-13	24 to 9	1,600	2,100	8	18	15,800	29,500	1.000	1.000	100
HS3Z / HL3Z Metric	M6	24 to 11	1,300	1,600	5	13	11,600	15,800	1.000	1.000	75
BF DIN 929Z Metric	M3.5	24 to 11	950	1,350	3	8	8,300	14,500	.625	.625	50
	M4	24 to 11	1,100	1,450	4	8	9,000	14,900	.625	.625	75
	M6	24 to 11	1,200	1,600	4	11	10,900	15,100	1.000	1.000	75
	M8	24 to 11	1,250	1,650	4	13	11,200	18,700	1.000	1.000	100
	M10	24 to 9	1,300	1,650	4	13	13,100	23,000	1.000	1.000	100
	M12	24 to 9	1,450	1,900	5	14	14,300	29,000	1.000	1.000	100
BF 11611670 Metric	M6	24 to 11	1,450	2,000	6	11	16,000	24,000	1.000	1.000	100
											

Nut Electrode

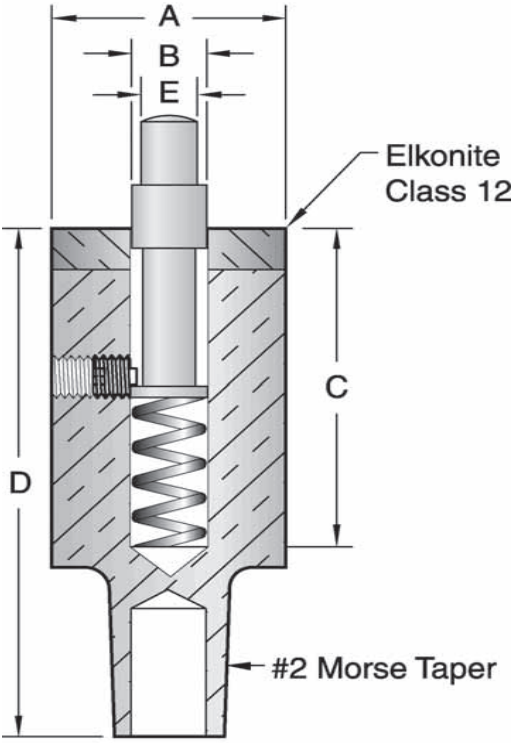
For locating nuts without pilots

Nut Electrode Inch

Thread Size	Part Numbers	(A) Electrode Diameter	(B) Sheet Locator	(C) Hole Depth	(D) Overall Length	(E) Nut Locator
#6	ELM 0035 N	0.625	0.203	1.750	3.000	.102
#8	ELM 0040 N	0.625	0.218	1.750	3.000	.125
#10	EL 0190 N	0.625	0.250	1.750	3.000	.158
1/4-20	ELM 0060 N	1.250	0.312	1.750	3.250	.188
5/16-18	EL 0312 N	1.250	0.342	2.125	3.250	.245
3/8-16	EL 0375 N	1.250	0.406	2.125	3.250	.300

Nut Electrode Metric

Thread Size	Part Numbers	(A) Electrode Diameter	(B) Pin Diameter	(C) Hole Depth	(D) Overall Length	(E) Nut Locator
M3.5	ELM 0035 N	0.625	0.203	1.750	3.000	.102
M4	ELM 0040 N	0.625	0.218	1.750	3.000	.125
M5	ELM 0050 N	0.625	0.250	1.750	3.000	.158
M6	ELM 0060 N	1.250	0.312	2.125	3.250	.188
M8	ELM 0080 N	1.250	0.342	2.125	3.250	.255
M10	ELM 0100 N	1.250	0.406	2.125	3.250	.322

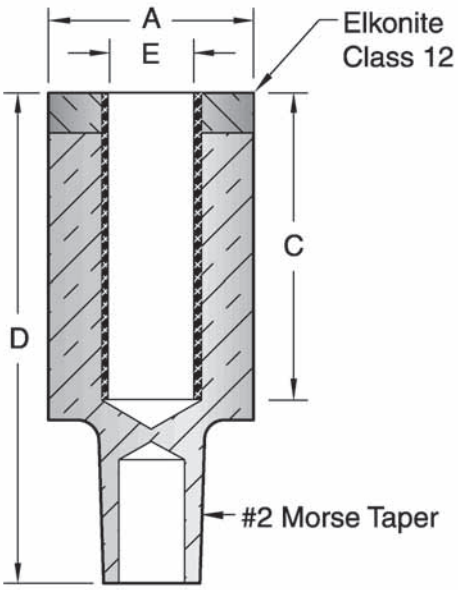


Screw Electrode

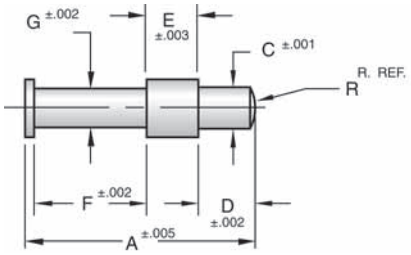
For through the hole weld screws

Screw Electrode Inch					
Thread Size	Part Numbers	(A) Electrode Diameter	(C) Hole Depth	(D) Overall Length	(E) Internal Diameter
#6	ELM 0035 S	0.625	1.750	3.000	.140
#8	EL 0164 S	0.625	1.750	3.000	.168
#10	EL 0190 S	0.625	1.750	3.000	.194
1/4-20	EL 0250 S	0.625	1.750	3.000	.225
5/16-18	ELM 0080 S	1.250	2.125	3.250	.321
3/8-16	EL 0375 S	1.250	2.125	3.250	.380
1/2-13	EL 0500 S	1.250	2.125	3.250	.510

Screw Electrode Metric					
Thread Size	Part Numbers	(A) Electrode Diameter	(C) Hole Depth	(D) Overall Length	(E) Internal Diameter
M3.5	ELM 0035 S	0.625	1.750	3.000	.140
M4	ELM 0040 S	0.625	1.750	3.000	.164
M5	ELM 0050 S	0.625	1.750	3.000	.201
M6	ELM 0060 S	0.625	1.750	3.000	.240
M8	ELM 0080 S	1.250	2.125	3.250	.321
M10	ELM 0100 S	1.250	2.125	3.250	.402
M12	ELM 0120 S	1.250	2.125	3.250	.482

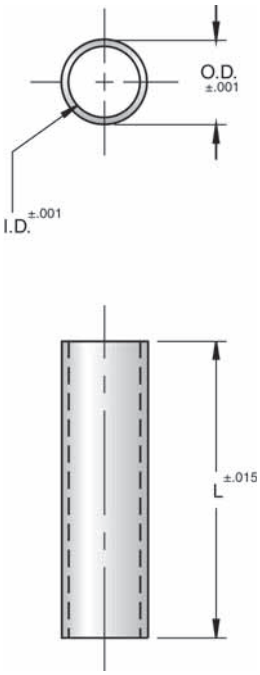


Electrode Pins & Springs



Part Number	For Electrode	A	B	C	D	E	F	G	R
EL - 3013	ELM 0035 N	1.234	.201	.102	.281	.250	.641	.081	.11
EL - 3023	ELM 0040 N	1.234	.217	.125	.281	.250	.641	.097	.12
EL - 3033	EL 0190 N	1.234	.248	.143	.281	.250	.641	.128	.14
EL - 3043	ELM 0050 N	1.234	.248	.158	.281	.250	.641	.128	.14
EL - 3053	ELM 0060 N	1.656	.311	.188	.406	.375	.812	.191	.18
EL - 3063	EL 0312 N	1.656	.340	.245	.406	.375	.812	.220	.25
EL - 3073	ELM 0080 N	1.656	.340	.255	.406	.375	.812	.220	.25
EL - 3083	EL 0375 N	1.656	.403	.300	.406	.375	.812	.283	.31
EL - 3093	ELM 0100 N	1.656	.403	.322	.406	.375	.812	.283	.31

Electrode Sleeves



Part Number	For Electrode	I.D.	O.D.	L
EL - 3013	ELM 0035 S	.140	.189	1.750
EL - 1023	ELM 0040 S	.164	.213	1.750
EL - 1033	EL 0164 S	.168	.221	1.750
EL - 1043	ELM 0190 S	.194	.250	1.750
EL - 1053	ELM 0050 S	.201	.257	1.750
EL - 1063	ELM 0060 S	.240	.302	1.750
EL - 1073	EL 0250 S	.255	.316	1.750
EL - 1083	ELM 0080 S	.321	.406	2.125
EL - 1093	EL 0375 S	.380	.484	2.125
EL - 1103	ELM 0100 S	.402	.500	2.125
EL - 1113	ELM 0120 S	.482	.570	2.125
EL - 1123	EL 0500 S	.510	.610	2.125

About Ohio Weld Fasteners

Permanently prepositioned by resistance welding, weld fasteners provide strong and reliable fastener foundations. With Ohio Weld Fasteners in place, mating parts can be rapidly assembled with power equipment. There is no need to hold weld fasteners because they are fused to the component part. Weld fasteners will not work loose under shock, torque, or vibration.

Ohio Weld Fasteners are available in two types; spot weld and projection weld fasteners. Spot weld fasteners can be welded with the same electrodes, weld settings and equipment used in normal production of components and assemblies.

Ohio Weld Fasteners produce primary fastener foundations faster and more efficiently for less in-place cost than many other fastening methods. The wide variety of Ohio Weld Fasteners are helping metal working companies turn out components with predictable strength, durability and performance.

Custom product

Buckeye Fastener Company specializes in the manufacturing of custom cold headed fasteners which include weld products, leg levelers and various other fastener products. We will offer a custom part within our capabilities which will satisfy your fastening requirements. Low minimums and fast delivery.

Purchasing information

Orders can be placed by phone, fax or email by contacting our sales team.

- Phone: (800) 437-1689 (216) 267-2240
- Email: info@buckeyefasteners.com
- Fax: (216) 267-3228

Minimum order quantity

Minimum ordering quantity on stock part is just 100 pieces.

Buckeye Fasteners Company – “The Fastener People”

5250 West 164th St. Cleveland, Ohio 44142
(800) 437-1689 FAX: (216) 267-3228
www.buckeyefasteners.com
E-Mail: info@buckeyefasteners.com

Warehouse locations in:

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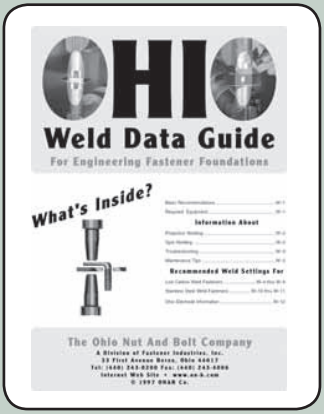
BUCKEYE FASTENERS COMPANY
THE FASTENER PEOPLE®

For maximum benefits from Ohio Weld Fasteners These services are available:

3D Models & Samples

3D/2D formats available on our web site. Prototype samples for use in design and model work are also available upon request.



Welding Guide

Avoid faulty welds, increase productivity, also insure effective and consistently strong welds. Helpful hints and suggested weld settings are available on the resource tab of our website www.buckeyefasteners.com

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AWS® RWMA®
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