

Southern Copper and Supply 800-289-2728  
**GCAP® WELD AND STEPPER SCHEDULE**



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**GCAP® ELECTRODE WELD SCHEDULE FOR GALVANIZED STEEL**

Metal Thickness	.020	.030	.035	.040	.050	.060	.078	.093	.125
G-CAP	244	254	254	254	255	255	266	266	266
Pressure	300	400	500	650	750	800	1000	1200	1400
Squeeze cycle	25	25	25	25	30	30	30	35	35
Up-Slope cycle					4	4	4	4	5
Upslope Kiloamps					2.0 to S.C.*	2.0 to S.C.*	2.0 to S.C.*	2.0 to S.C.*	2.0 to S.C.*
Weld cycle	6	8	9	10	7	8	10	12	10
Kiloamps	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.5	13.5
Cool cycle					1	1	1	1	1
Weld cycle					7	8	10	12	10
Kiloamps					10.5	11.0	11.5	12.5	13.5
Cool cycle									1
Weld cycle									10
Kiloamps									13.5
Hold cycle	3	4	4	5	5	10	10	15	20

\* S.C. – Starting Weld Current

**GCAP® LINEAR STEPPER**

<b>Total Weld Count</b>	500	1,000	3,000	5,000	7,500	10,000	12,000
<b>Total Amps Boost</b>	600	1000	3000	5000	6800	8400	9200
<b>Amps Boost Per Weld</b>	1.20	.88		.60			

The above schedules and stepper is only meant to be a guide and will require adjustments to fit the application.

APPLICATION DATA SHEET



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SPOT WELDING DATA

OPTIMUM CONDITIONS

SCHEDULES FOR SPOT WELDING LOW CARBON STEEL—SAE 1010

Thickness of Thinnest Outside Piece (Inches)	Electrode Diameters and Shape*			Recommended Minimum Standard Electrode Size	Weld Force (Lbs.)	Weld Time (Cycles) (60 Cycles per Sec.)	Hold Time (Cycles) Min.	Welding Current (Amps.) (Approx.)	Weld Shear Strength (For Steels Having Ultimate Tensile Strength of 90,000 psi and below) Minimum Strength (Lbs./Weld)	Diameter of Fused Zone (Approx.) 	Minimum Weld Spacing 	Minimum Contacting Overlap 
	Flat Face 		Radius Face 									
	Maximum d (Inches)	Min. D (Inches)	Radius R (Inches)									
0.010	0.125	1/2	2	4RW 1MT	160	4	5	4,000	130	0.113	1/4	3/8
0.021	0.187	1/2	2	4RW 1MT	244	6	8	6,500	300	0.139	3/8	7/16
0.031	0.187	1/2	2	4RW 1MT	326	8	10	8,000	530	0.161	1/2	7/16
0.040	0.250	5/8	3	5RW 2MT	412	10	12	8,800	812	0.181	3/4	1/2
0.050	0.250	5/8	3	5RW 2MT	554	14	16	9,600	1,195	0.210	7/8	9/16
0.062	0.250	5/8	3	5RW 2MT	670	18	20	10,600	1,717	0.231	1	5/8
0.078	0.312	5/8	3	5RW 2MT	903	25	30	11,800	2,365	0.268	1-1/8	11/16
0.094	0.312	5/8	4	7RW 3MT	1,160	34	35	13,000	3,054	0.304	1-1/4	3/4
0.109	0.375	7/8	4	7RW 3MT	1,440	45	40	14,200	3,672	0.338	1-5/16	13/16
0.125	0.375	7/8	4	7RW 3MT	1,760	60	45	15,600	4,300	0.375	1-1/2	7/8
0.156	0.500	7/8	6	Male or Female Threaded	2,500	93	50	18,000	6,500	0.446	1-3/4	1
0.187	0.625	1	6	Male or Female Threaded	3,340	130	55	20,500	9,000	0.516	2	1-1/2
0.250	0.750	1-1/4	6	Male or Female Threaded	5,560	230	60	26,000	18,000	0.660	4	1-1/2

PERMISSIBLE SCHEDULE VARIATIONS FOR SPOT WELDING LOW CARBON STEEL

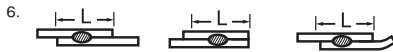
Low Carbon Steel Spot Welding Data Chart—Single Impulse Welding

DATA COMMON TO ALL CLASSES OF SPOT WELDS				WELDING SET-UP FOR BEST QUALITY—CLASS A WELDS					WELDING SET-UP FOR MEDIUM QUALITY—CLASS B WELDS					WELDING SET-UP FOR GOOD QUALITY—CLASS C WELDS															
Thickness of Each of the Two Work Pieces (Inches)	Electrode Diam. & Shape 		Min. Weld Spacing (Note 4) (Inches)	Min. Contacting Overlap (Note 6) (Inches)	Weld Time (Note 7) (Cycles)	Electrode Force (Pounds)	Welding Current (Amps.)	Diam. of Fused Zone (Inches) 	Average Tensile Shear Strength ±14% (Pounds)	Weld Time (Note 7) (Cycles)	Electrode Force (Pounds)	Welding Current (Amps.)	Diam. of Fused Zone (Inches) 	Average Tensile Shear Strength ±17% (Pounds)	Weld Time (Note 7) (Cycles)	Electrode Force (Pounds)	Welding Current (Amps.)	Diam. of Fused Zone (Inches) 	Average Tensile Shear Strength ±20% (Pounds)										
	Min. D (Inches)	Max. d (Inches)																		Weld Time (Note 7) (Cycles)	Electrode Force (Pounds)	Welding Current (Amps.)	Diam. of Fused Zone (Inches)	Average Tensile Shear Strength ±17% (Pounds)	Weld Time (Note 7) (Cycles)	Electrode Force (Pounds)	Welding Current (Amps.)	Diam. of Fused Zone (Inches)	Average Tensile Shear Strength ±20% (Pounds)
	.010	1/2																		1/8	1/4	3/8	4	200	4000	.13	235	5	130
.021	1/2	3/16	3/8	7/16	6	300	6100	.17	530	10	200	5100	.16	460	22	100	3800	.14	390										
.031	1/2	3/16	1/2	7/16	8	400	8000	.21	980	15	275	6300	.20	850	29	135	4700	.18	790										
.040	5/8	1/4	3/4	1/2	10	500	9200	.23	1305	21	360	7500	.22	1230	38	180	5600	.21	1180										
.050	5/8	1/4	7/8	9/16	12	650	10300	.25	1820	24	410	8000	.23	1700	42	205	6100	.22	1600										
.062	5/8	1/4	1	5/8	14	800	11600	.27	2350	29	500	9000	.26	2150	48	250	6800	.25	2050										
.078	5/8	5/16	1-1/8	11/16	21	1100	13300	.31	3225	36	650	10400	.30	3025	58	325	7900	.28	2900										
.094	5/8	5/16	1-1/4	3/4	25	1300	14700	.34	4100	44	790	11400	.33	3900	66	390	8800	.31	3750										
.109	7/8	3/8	1-5/16	13/16	29	1600	16100	.37	5300	50	960	12200	.36	5050	72	480	9500	.35	4850										
.125	7/8	3/8	1-1/2	7/8	30	1800	17500	.40	6900	60	1140	12900	.39	6500	78	570	10000	.37	6150										

NOTES:

- Low Carbon Steel as hot rolled, pickled, and slightly oiled with an ultimate strength of 42,000 to 45,000 PSI Similar to SAE 1005—SAE 1010.
- Electrode Material is CMW® 3.
- Surface of steel is lightly oiled but free from grease, scale or dirt.
- Minimum weld spacing is that distance for which no increase in welding current is necessary to compensate for the shunted current effect in adjacent welds.

- Radius Face electrodes may be used:  
0.010 to 0.031 — 2" Radius  
0.031 to 0.078 — 3" Radius  
0.078 to 0.125 — 4" Radius



- Weld time is indicated in cycles of 60 cycle frequency.

- Tensile shear strength values are based on recommended test sample sizes:  
Direction of Force    Thickness    Width    Length  
.000" to .029"    5/8"    3"  
.030" to .058"    1"    4"  
.059" to .115"    1-1/2"    5"  
.116" to .190"    2"    6"
- Tolerance for machining of electrode diameter "d" is ±.015" of specified dimension.
- Electrode force does not provide for force to press ill-fitting parts together.

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### PROJECTION WELDING DATA

#### DESIGN AND WELDING DATA FOR PROJECTION WELDING LOW CARBON STEELS

Thickness of Thinnest Outside Piece Inches	PROJECTION DESIGN		ELECTRODE DIAMETERS (d=2 x Projection Diameter)		Electrode Force Pounds	Weld Time (Cycles) 60 Cycles per Sec.	Hold Time (Cycles) Minimum	Welding Current Amperes (Approx.)	Diameter of Fused Zone  Dw Inches	Minimum Shear Strength (Single Projection) Only (For Steels Having Strength of 100,000 psi and below) Pounds	Minimum Contacting Overlap  L Inches
	Base Diameter of Projection Dp Inches	Height of Projection H Inches	Minimum d Inches	Minimum D Inches							
0.010	0.055	0.015	0.125	1/2	50	3	3	2,800	0.112	150	1/8
0.012	0.055	0.015	0.125	1/2	80	3	3	3,100	0.112	200	1/8
0.014	0.055	0.015	0.125	1/2	100	3	3	3,400	0.112	250	1/8
0.016	0.067	0.017	0.187	1/2	115	4	4	3,600	0.112	285	5/32
0.021	0.087	0.017	0.187	1/2	150	6	6	4,000	0.140	380	5/32
0.025	0.081	0.020	0.187	1/2	200	6	8	4,500	0.140	525	3/16
0.031	0.094	0.022	0.187	1/2	300	8	8	5,100	0.169	740	7/32
0.034	0.094	0.022	0.187	1/2	350	10	10	5,400	0.169	900	7/32
0.044	0.119	0.028	0.250	5/8	480	13	14	6,500	0.169	1,080	9/32
0.050	0.119	0.028	0.250	5/8	580	16	16	7,100	0.225	1,500	9/32
0.062	0.156	0.035	0.312	7/8	750	21	20	8,400	0.225	2,100	3/8
0.070	0.156	0.035	0.312	7/8	900	24	24	9,200	0.281	2,550	3/8
0.078	0.187	0.041	0.375	7/8	1,050	26	30	10,500	0.281	2,950	7/16
0.094	0.218	0.048	0.500	7/8	1,300	32	30	11,800	0.281	3,700	1/2
0.109	0.250	0.054	0.500	7/8	1,650	38	36	13,300	0.338	4,500	5/8
0.125	0.281	0.060	0.500	7/8	1,800	45	40	15,000	0.338	5,200	11/16
0.140	0.312	0.066	0.625	1	2,300	60	45	15,700	0.437	6,000	3/4
0.156	0.343	0.072	0.625	1	2,800	80	50	17,250	0.500	7,500	13/16
0.171	0.375	0.078	0.750	1	3,300	105	50	18,600	0.562	8,500	7/8
0.187	0.406	0.085	0.750	1	3,800	125	50	20,000	0.562	10,000	15/16
0.203	0.437	0.091	0.875	1-1/4	4,500	145	55	21,500	0.625	12,000	1
0.250	0.531	0.110	1.000	1-1/4	6,600	230	60	26,000	0.687	15,000	1-1/4

**NOTES:**

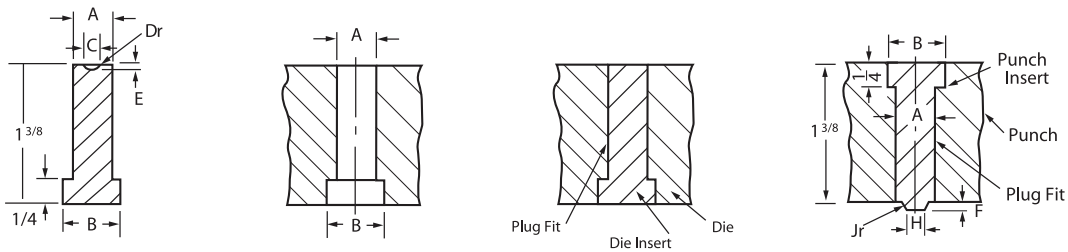
1. Type of Steel—Low Carbon SAE 1010—0.15% Carbon Maximum.
2. Material free of scale, oxide, paint, dirt, etc.
3. Size of projection determined by thickness of thinnest piece and projection should be on thickest piece.
4. Data is based on thickness of thinnest sheet for two thicknesses only. Maximum ratio between two thicknesses = 3 to 1.
5. See TABLE BELOW for design of punch and die for making projections.
6. Contacting overlap does not include any radii from forming.
7. Projection should be located in center of overlap.
8. Tolerance for Projection Dimensions:

Dimension	Thickness Up to 0.050"	Thickness Over 0.050"
Diameter "D" .....	±0.003"	±0.007"
Height "H" .....	±0.002"	±0.005"

9. Electrode Material:  
 CMW\*100 ELKONITE®TC-10 ELKONITE®10W3

From American Welding Society "Recommended Practices for Resistance Welding"

#### PUNCH AND DIE DESIGN FOR FORMING WELDING PROJECTIONS



Mat Thickness	Pt. No.	A	B	±.002 C	Dr	±.001 E	±.001 F	±.001 H	Jr
0.010-0.015	1	3/8	9/16	.055	.033	.015	.015	.035	.005
0.016-0.021	2	3/8	9/16	.067	.042	.017	.020	.039	.005
.025	3	3/8	9/16	.081	.050	.020	.025	.044	.005
.031	4	3/8	9/16	.094	.062	.022	.030	.050	.005
.034	5	3/8	9/16	.094	.062	.022	.030	.050	.005
.044	6	3/8	9/16	.119	.078	.028	.035	.062	.005
.050	7	3/8	9/16	.119	.078	.028	.035	.062	.005
.062	8	3/8	9/16	.156	.105	.035	.043	.081	.005
.070	9	3/8	9/16	.156	.105	.035	.043	.081	.005
.078	10	3/8	9/16	.187	.128	.041	.055	.104	.010

Mat Thickness	Pt. No.	A	B	±.002 C	Dr	±.001 E	±.001 F	±.001 H	Jr
.094	11	1/2	11/16	.218	.148	.048	.065	.115	.010
.109	12	1/2	11/16	.250	.172	.054	.075	.137	1/64
.125	13	1/2	11/16	.281	.193	.060	.085	.154	1/64
.140	14	1/2	11/16	.312	.217	.066	.096	.172	1/64
.156	15	5/8	13/16	.343	.243	.072	.107	.191	1/64
.171	16	5/8	13/16	.375	.265	.078	.118	.210	1/64
.187	17	5/8	13/16	.406	.285	.085	.130	.229	1/64
.203	18	11/16	7/8	.437	.308	.091	.143	.240	.020
.250	19	13/16	1	.531	.375	.110	.175	.285	.025

Material: Tool Steel. Finish all over and harden to 65-68 Rockwell "C" scale. Note: All working surfaces of die unit must be polished.

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APPLICATION DATA SHEET



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SCHEDULE FOR SPOT WELDING STAINLESS STEEL

THICKNESS "T" OF THINNEST OUTSIDE PIECE (See Notes 1, 2, 3 and 4 Below)  INCHES	ELECTRODE DIAMETER AND SHAPE (See Note 5)		ELECTRODE FORCE  LB.	WELD TIME  CYCLES (60 Per Sec.)	WELDING CURRENT (Approx.)  AMPS		MINIMUM CONTACTING OVERLAP  IN.	MINIMUM WELD SPACING (See Note 6 Below)  IN.	DIAMETER OF FUSED ZONE  IN. Approx.	MINIMUM SHEAR STRENGTH  LB.		
	D, IN., Min.	d, IN., Max.			Tensile Strength Below 150000 Psi	Tensile Strength 150000 Psi and Higher				Ultimate Tensile Strength of Metal		
										70000 Up to 90000 Psi	90000 Up to 150000 Psi	150000 Psi and Higher
	20° 											
0.006	3/16	3/32	180	2	2000	2000	3/16	3/16	0.045	60	70	85
0.008	3/16	3/32	200	3	2000	2000	3/16	3/16	0.065	150	170	210
0.012	1/4	1/8	260	3	2100	2000	1/4	1/4	0.076	185	210	250
0.014	1/4	1/8	300	4	2500	2200	1/4	1/4	0.082	240	250	320
0.016	1/4	1/8	330	4	3000	2500	1/4	5/16	0.088	280	300	380
0.018	1/4	1/8	380	4	3500	2800	1/4	5/16	0.093	320	360	470
0.021	1/4	5/32	400	4	4000	3200	5/16	5/16	0.100	370	470	500
0.025	3/8	5/32	520	5	5000	4100	3/8	7/16	0.120	500	600	680
0.031	3/8	3/16	650	5	6000	4800	3/8	1/2	0.130	680	800	930
0.034	3/8	3/16	750	6	7000	5500	7/16	9/16	0.150	800	920	1100
0.040	3/8	3/16	900	6	7800	6300	7/16	5/8	0.160	1000	1270	1400
0.044	3/8	3/16	1000	8	8700	7000	7/16	11/16	0.180	1200	1450	1700
0.050	1/2	1/4	1200	8	9500	7500	1/2	3/4	0.190	1450	1700	2000
0.056	1/2	1/4	1350	10	10300	8300	9/16	7/8	0.210	1700	2000	2450
0.062	1/2	1/4	1500	10	11000	9000	5/8	1	0.220	1950	2400	2900
0.070	5/8	1/4	1700	12	12300	10000	5/8	1-1/8	0.250	2400	2800	3550
0.078	5/8	5/16	1900	14	14000	11000	11/16	1-1/4	0.275	2700	3400	4000
0.094	5/8	5/16	2400	16	15700	12700	3/4	1-1/2	0.290	3550	4200	5300
0.109	3/4	3/8	2800	18	17700	14000	13/16	1-1/2	0.290	4200	5000	6400
0.125	3/4	3/8	3300	20	18000	15500	7/8	2	0.300	5000	6000	7600

NOTES:

- Types of Steel—301, 302, 303, 304, 308, 309, 310, 316, 317, 321, 347 & 349
- Material should be free from scale, oxides, paint, grease and oil.
- Welding conditions determined by thickness of thinnest outside piece "T".
- Data for total thickness of pile-up not exceeding 4 "T". Maximum ratio between two thicknesses 3 to 1.
- Electrode Material, CMW® 3, CMW® 100, or ELKONITE® 10W3
- Minimum weld spacing is that spacing for two pieces for which no special precautions need be taken to compensate for shunted current effect of adjacent welds. For three pieces increase spacing 30 per cent.

SCHEDULE FOR SEAM WELDING STAINLESS STEEL

THICKNESS "T" OF THINNEST OUTSIDE PIECE (See Notes 1, 2, 3 and 4 Below)  INCHES	ELECTRODE WIDTH AND SHAPE (See Note 5 Below)  W, IN., Min.	ELECTRODE FORCE  LB.	ON TIME  CYCLES (60 Per Sec.)	OFF TIME FOR MAXIMUM SPEED (Pressure-Tight)		MAXIMUM WELD SPEED		WELDS PER INCH		WELDING CURRENT (Approx.)  AMPS.	MINIMUM CONTACTING OVERLAP (See Note 6 Below)  IN.
				CYCLES		IN. PER MINUTE		PER INCH			
				2 "T"	4 "T"	2 "T"	4 "T"	2 "T"	4 "T"		
0.006	3/16	300	2	1	1	60	67	20	18	4000	1/4
0.008	3/16	350	2	2	2	67	56	18	16	4600	1/4
0.010	3/16	400	3	2	2	45	51	16	14	5000	1/4
0.012	1/4	450	3	2	2	48	55	15	13	5600	5/16
0.014	1/4	500	3	2	3	51	46	14	13	6200	5/16
0.016	1/4	600	3	2	3	51	50	14	12	6700	5/16
0.018	1/4	650	3	2	3	55	50	13	12	7300	5/16
0.021	1/4	700	3	2	3	55	55	13	11	7900	3/8
0.025	3/8	850	3	3	4	50	47	12	11	9200	7/16
0.031	3/8	1000	3	3	4	50	47	12	11	10600	7/16
0.040	3/8	1300	3	4	5	47	45	11	10	13000	1/2
0.050	1/2	1600	4	4	5	45	44	10	9	14200	5/8
0.062	1/2	1850	4	5	7	40	41	10	8	15100	5/8
0.070	5/8	2150	4	5	7	44	41	9	8	15900	11/16
0.078	5/8	2300	4	6	7	40	41	9	8	16500	11/16
0.094	5/8	2550	5	6	7	36	38	9	8	16600	3/4
0.109	3/4	2950	5	7	9	38	37	8	7	16800	13/16
0.125	3/4	3300	6	6	8	38	37	8	7	17000	7/8

NOTES:

- Types of Steel—301, 302, 303, 304, 308, 309, 310, 316, 317, 321, 347 & 349.
- Material should be free from scale, oxides, paint, grease and oil.
- Welding conditions determined by thickness of thinnest outside piece "T".
- Data for total thickness of pile-up not exceeding 4 "T". Maximum ratio between two thicknesses 3 to 1.
- Electrode material, CMW® 100
- For large assemblies minimum contacting overlap indicated should be increased 30 per cent.

From American Welding Society "Recommended Practices for Resistance Welding"

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### Spot welding galvanized low-carbon steel

Material Thickness	Electrode Diameter And Shape		Net Electrode Force	Welding Current (Approx.)	Weld Time	Weld Nugget Size	Minimum Tension-Shear Strength	Minimum Weld Spacing	Minimum Contacting Overlap	
	D	d								Oc
Inches	In.	In.	Deg.	Lb.	Amps.	Cycles	In.	Lb.	Inches	Inches
notes 1, 2, & 3	note 4									
0.022	5/8	3/16	120	300	13000	8	0.15	550	5/8	5/8
0.030	5/8	3/16	120	400	13000	10	0.16	1000	5/8	5/8
0.036	5/8	1/4	120	500	13500	12	0.19	1180	3/4	5/8
0.039	5/8	1/4	120	650	14000	13	0.21	1400	3/4	5/8
0.052	5/8	1/4	120	725	14500	18	0.22	1700	7/8	11/16
0.063	3/4	1/4	120	850	15500	22	0.24	2500	1-1/8	3/4
0.078	3/4	5/16	120	1200	19000	24	0.28	3200	1-1/4	7/8
0.093	3/4	3/8	120	1400	21000	30	0.34	4200	1-1/2	1
0.108	7/8	3/8	120	1750	20000	37	0.40	5900	1-3/4	1-1/8
0.123	7/8	3/8	120	2000	20000	42	0.48	7200	2	1-1/8

**NOTES:**

1. Material must be free from dirt, grease, paint etc. prior to welding, but may have light oil.
2. Two equal metal thicknesses of each gage.
3. Commercial coating weight is 1.25 oz. per square foot.
4. Electrode Material-RWMA Group A, Class 2. CMW® 3.
5. Water Cooling: 2 gallons per minute.

Projections should be larger in diameter for galvanized than for uncoated material.

### Projection welding galvanized low-carbon steel

Material Thickness	Electrode Diameter And Shape		Net Electrode Force	Welding Current (Approx.)	Weld Time	Weld Nugget Size	Minimum Tension-Shear Strength	Projection Size	
	D	d						Diameter	Height
Inches	In.	In.	Lb.	Amps.	Cycles	In.	Lb.	In.	In.
notes 1, 2, & 3	note 4						(For Single Projections Only)		
0.039	5/8	3/8	250	10000	15	0.15	925	0.187	0.041
0.063	5/8	7/16	400	11500	20	0.25	2050	0.218	0.048
0.078	3/4	1/2	550	16000	25	0.25	2700	0.250	0.054
0.093	3/4	1/2	750	16000	30	0.30	4300	0.250	0.054
0.108	7/8	1/2	950	22000	33	0.31	4900	0.250	0.054

**NOTES:**

1. Material must be free from dirt, grease, paint etc. prior to welding, but may have light oil.
2. Two equal metal thicknesses of each gage.
3. Commercial coating weight is 1.25 oz. per square foot.
4. Electrode Material-RWMA Group A, Class 2. CMW® 3.
5. Pressure-tight joints require stripping the zinc coating prior to welding.
6. Nominal electrode diameter ranges between 8 to 10 inches.

From American Welding Society "Recommended Practices for Resistance Welding."

### Seam welding galvanized low-carbon steel

Material Thickness	Electrode Width And Shape		Net Electrode Force	Welding Current (Approx.)	Weld Time		Welding Speed	Welds Per Inch	Minimum Contacting Overlap
	W	E			Heat Time	Cool Time			
Inches	In.	In.	Lb.	Amps.	Cycles	Cycles	In./Min.	W/In.	Inches
notes 1, 2, & 3	note 4								
0.015	3/8	1/4	900	15000	2	2	120	7.5	3/8
0.036	1/2	1/4	1100	18000	4	2	60	10.0	1/2
0.039	1/2	1/4	1200	19000	4	3	60	9.0	1/2
0.052	1/2	1/4	1350	20000	5	1	90	7.0	9/16
0.063	1/2	5/16	1500	19800	8	2	54	7.0	5/8
0.078	5/8	5/16	1850	23000	10	7	30	7.0	11/16



# Southern Copper and Supply 800-289-2728

## RESISTANCE WELDING ELECTRODE MAINTENANCE



Phone: 866-634-8884

Fax: 866-239-6995

Email: cmw@cmwinc.com

This Chart shows graphically the importance of Electrode maintenance. This is not only important from the quality of the weld, which is of first importance, also extra load added to the welding machine and equipment. Read the data on the chart, you can then draw your own conclusions.

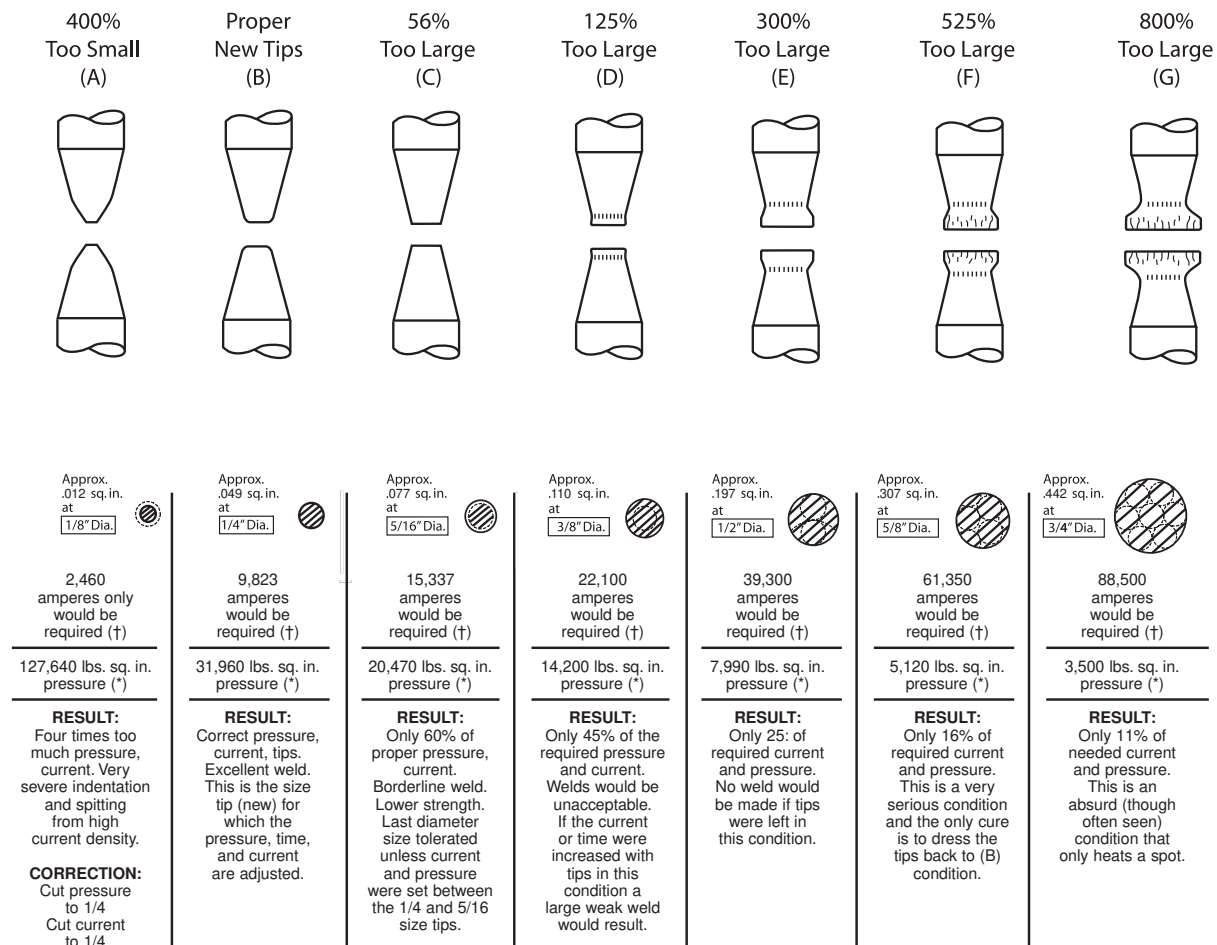
### YOU CAN'T AFFORD TO NEGLECT YOUR ELECTRODES!

Keep your Electrodes dressed for maximum production and quality welds.

### A TIP DRESSER WILL PAY DIVIDENDS!

We can supply you with hand operated Tip Dressers or Pneumatic Power Driven Dressers. Design or type will depend on your production requirements. Pages 66 & 67.

## RESISTANCE WELDING



(†) Current density required for this gage to be 200,000 amps per sq. in. Setting is 9,900 amps for condition (B)

(\*) Five inch diameter air cylinder A 80 lbs. air pressure—1570 lbs. on ram.

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Southern Copper and Supply 800-289-2728  
**WELDING ELECTRODE / CAP EVALUATION FORM**



Phone: 866-634-8884

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Email: cmw@cmwinc.com

Facility \_\_\_\_\_

Location \_\_\_\_\_

Contact \_\_\_\_\_ Phone \_\_\_\_\_ Fax \_\_\_\_\_ Date \_\_\_\_\_

Equipment --- Plant/Line # _____							
TYPE	Robot	Fixed Auto	Press	Hand	Online	Offline	Other (Specify)
GUN STYLE	C Gun	Pinch	Scissor	Other (Specify)	Comment		
CONDITION	New	Old	Good	Poor			
STEPPER CAPABILITY	Number of Steps	Linear	Non-linear	None			
UP-SLOPE CAPABILITY	Yes	No					
PULSE CAPABILITY	Yes	No					
NUMBER OF	Schedules per SCR	Transformers per SCR	Guns per Transformer	Transformer Taps	Transformer KVA		

Workpieces (Materials)							
POSITION	THICKNESS	CHECK ONE (per workpiece)					
		Bare Steel	Aluminized	Zn Electroplate	Galvanneal	Hot Dipped Galvanized	Organic
Outside							
Inside							
Inside							
Outside							
FIT-UP	Good	Poor	Comments				

ELECTRODES							
NOSE STYLE	A (Pointed)	B (Dome)	C (Flat)	D (Offset)	E (Truncated)	F (Radius)	Other (Specify)
MATERIAL	Class 1	Class 2	Class 20 (DSC)	Other (Specify)			
TAPER STYLE	Female	Male			Comments		
ALIGNMENT	Good	Poor	Requires Backup				





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**DO'S AND DON'TS FOR RESISTANCE WELDING ELECTRODES**

DO'S	DON'TS
<ol style="list-style-type: none"> <li>1. Use the proper electrode material for the job you are doing.</li> <li>2. Use standard electrodes wherever possible.</li> <li>3. Use the most suitable tip diameter for the thickness of stock being welded.</li> <li>4. Use open sight drains to observe more readily the water flow through the holders.</li> <li>5. Connect the water inlet hose to the proper holder inlet so that the water flows through the center cooling tube first.</li> <li>6. Internally cool the spot welding tips with cool water flowing at a rate of at least 1/2 gallon per minute through each tip.</li> <li>7. Be sure the internal water cooling tube of the holder projects into the tip water hole to within 1/4" of the tip hole bottom.</li> <li>8. Adjust the internal water cooling tube of the holder to the proper height when changing to a different length tip.</li> <li>9. Be sure top of adjustable water cooling tube in holders is cut at an angle so as to avoid jamming tip down and shutting water off.</li> <li>10. Place a thin film of cup grease on the tip taper prior to inserting in the holder, to make it easier to remove.</li> <li>11. Use ejector type holders for easy removal of tips and to avoid damage to tip tapers.</li> <li>12. Keep the tip taper and holder taper clean, smooth and free of foreign deposits.</li> <li>13. Dress spot welding electrodes frequently to maintain the quality of the welds.</li> <li>14. Dress electrodes in a lathe to their original contour whenever possible.</li> <li>15. Use a rawhide or rubber mallet for striking holder or tips in aligning operations.</li> <li>16. Provide flood cooling on both sides of the seam welding wheel.</li> <li>17. Use properly designed knurling wheels to maintain proper seam welding wheel shape.</li> </ol>	<ol style="list-style-type: none"> <li>1. Never use unidentified electrodes or electrode materials.</li> <li>2. Avoid special, offset or irregular tips when the job can be done with a standard straight tip.</li> <li>3. Don't use small tips on heavy gauge welding jobs or large tips on small work.</li> <li>4. Don't forget to turn on the cooling water full force before starting to weld.</li> <li>5. Never use water hose that will not fit the holder water connection nipples snugly.</li> <li>6. Do not allow water connections to become leaky, clogged or broken.</li> <li>7. Avoid using holders with leaking or deformed tapers.</li> <li>8. Never use electrode holders that do not have an adjustable internal water cooling tube.</li> <li>9. Do not permit adjustable water tube to be "frozen" by accumulation of deposits. A few drops of oil periodically will keep the tube free.</li> <li>10. Do not allow electrodes to remain idle in tapered holder seats for extended periods.</li> <li>11. Don't use pipe wrenches or similar tools in removing electrodes.</li> <li>12. Avoid using white lead or similar compounds to seal a leaking taper.</li> <li>13. Never permit a spot welding tip to mushroom enough to make dressing difficult.</li> <li>14. Never dress electrodes with a coarse file.</li> <li>15. Don't pound on the holder or tip with a steel hammer in aligning the welder arms.</li> <li>16. Avoid the use of seam welder wheels too thin to stand the heat or pressure of your job.</li> <li>17. Do not permit seam welding wheel to run off the corners of the work being welded.</li> </ol>