

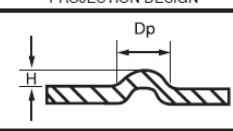
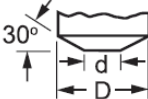




PROJECTION WELDING DATA
DESIGN AND WELDING DATA FOR PROJECTION WELDING LOW CARBON STEELS

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) Pounds 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	0.067	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:

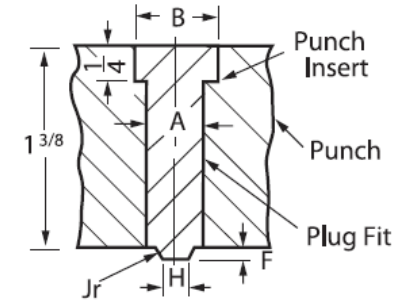
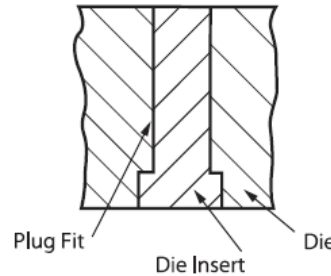
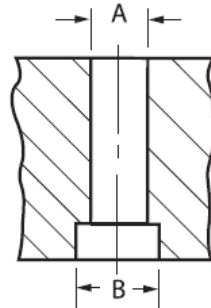
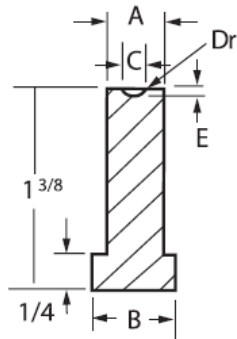
Dimension	Thickness Up to 0.050"	Thickness Over 0.050"
Diameter "D"	±0.003"	±0.007"
Height "H"	±0.002"	±0.005"

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.

From American Welding Society "Recommended Practices for Resistance Welding"