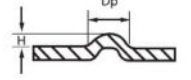
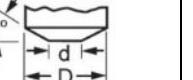
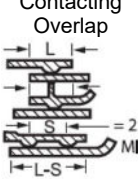


Design and Welding Data for Projection Welding Low Carbon Steels

Thickness of Thinnest Outside Pieces (inches)	Projection Design		Electrode Diameters		Electrode Force (lbs)	Weld Time (cycles) 60 cycles per second	Hold Time (cycles) Minimum	Welding Current Amperes (Approx.)	Diameter of Fused Zone	Minimum Shear Strength (Single Projection Only) (For Steel Having Strength of ≤100,000 psi)	Minimum Contacting Overlap
									DW (inches)		
	Base Diameter of Projection Dp (inches)	Height of Projection H (inches)	Minimum d (inches)	Minimum D (inches)					L (inches)		
.010	.055	.015	.125	1/2	50	3	3	2800	.112	150	1/8
.012	.055	.015	.125	1/2	80	3	3	3100	.112	200	1/8
.014	.055	.015	.125	1/2	100	3	3	3400	.112	250	1/8
.016	.067	.017	.187	1/2	115	4	4	3600	.112	285	5/32
.021	.067	.017	.187	1/2	150	6	6	4000	.140	380	5/32
.025	.081	.020	.187	1/2	200	6	8	4500	.140	525	3/16
.031	.094	.022	.187	1/2	300	8	8	5100	.169	740	7/32
.034	.094	.022	.187	1/2	350	10	10	5400	.169	900	7/32
.044	.119	.028	.250	5/8	480	13	14	6500	.169	1080	9/32
.050	.119	.028	.250	5/8	580	16	16	7100	.225	1500	9/32
.062	.156	.035	.312	7/8	750	21	20	8400	.225	2100	3/8
.070	.156	.035	.312	7/8	900	24	24	9200	.281	2550	3/8
.078	.187	.041	.375	7/8	1050	26	30	10500	.281	2950	7/16
.094	.218	.048	.500	7/8	1300	32	30	11800	.281	3700	1/2
.109	.250	.054	.500	7/8	1650	38	36	13300	.338	4500	5/8
.125	.281	.060	.500	7/8	1800	45	40	15000	.338	5200	11/16
.140	.312	.066	.625	1	2300	60	45	15700	.437	6000	3/4
.156	.343	.072	.625	1	2800	80	50	17250	.500	7500	13/16
.171	.375	.078	.750	1	3300	105	50	18600	.562	8500	7/8
.187	.406	.085	.750	1	3800	125	50	20000	.562	10000	15/16
.203	.437	.091	.875	1-1/4	4500	145	55	21500	.625	12000	1
.250	.531	.110	1.000	1-1/4	6600	230	60	26000	.687	15000	1-1/4

NOTES:

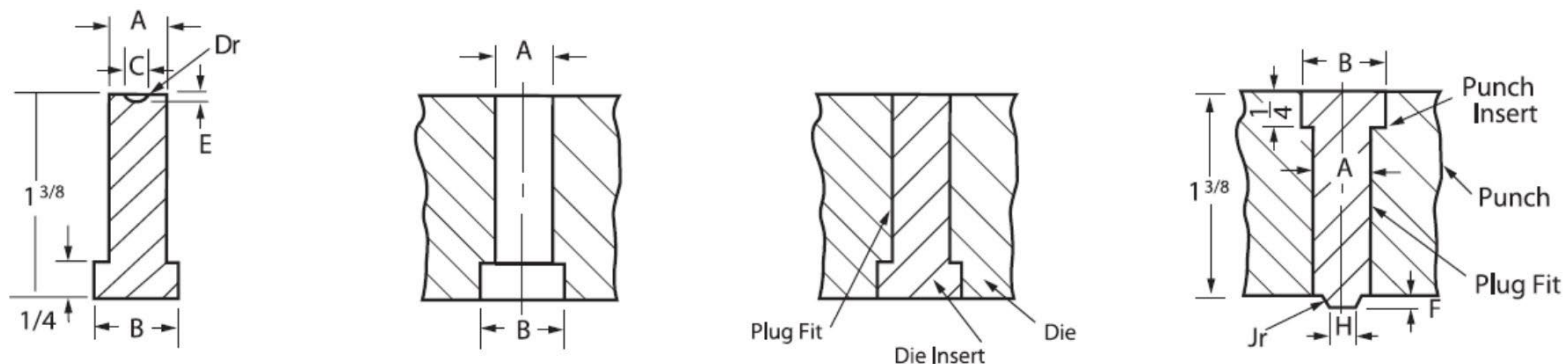
1. Type of Steel – Low Carbon SAE 1010-0.15% Carbon Maximum.
2. Material free of scale, oxide, paint, dirt, etc.
3. Size of projection determined by thickness of thinnest piece and projection should be on thickest piece.
4. Data is based on thickness of thinnest sheet for two thicknesses only. Maximum 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:

	Thickness <0.050"	>0.050"
Diameter "D".....	±0.003"	±0.007"
Height "H"	±0.002"	±0.005"

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

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	.35	.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
.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.