

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 Cycles (60 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.) Dw (Inches) | Minimum Weld Spacing S (Inches) | Minimum Contacting Overlap L (Inches) |
|--|--------------------------------|-----------------|-------------------|---|-------------------|---------------------------|-------------------------|-----------------------------------|---|--|---------------------------------|---------------------------------------|
| | 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

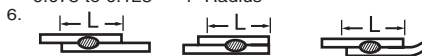
Low Carbon Steel Spot Welding Data Chart—Single Impulse Welding

| 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 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) | | | | | | | | | | | | | | | | | |
| .010 | 1/2 | 1/8 | 1/4 | 3/8 | 4 | 200 | 4000 | .13 | 235 | 5 | 130 | 3700 | .12 | 200 | 15 | 65 | 3000 | .11 | 160 |
| .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.