



Table 15
Recommended Spot Weld Spacing, Edge Distance, Overlap, and Distance between Rows of Welds for Aluminum and Its Alloys

Sheet Thickness ^b	mm (in.)												
	mm ^a (in.)	0.41 (0.016)	0.51 (0.020)	0.64 (0.025)	0.81 (0.032)	1.02 (0.040)	1.27 (0.050)	1.60 (0.063)	1.80 (0.071)	2.03 (0.080)	2.29 (0.090)	2.54 (0.100)	3.18 (0.125)
Minimum Weld ^c Spacing	MIL ^f	9.5 (0.37)	9.5 (0.37)	9.5 (0.37)	12.7 (0.50)	12.7 (0.50)	15.9 (0.63)	15.9 (0.63)	19.0 (0.75)	19.0 (0.75)	22.2 (0.87)	25.4 (1.00)	38.1 (1.25)
	COMM ^g	12.7 (0.50)	12.7 (0.50)	15.9 (0.63)	15.9 (0.63)	19.0 (0.75)	19.0 (0.75)	25.4 (1.00)	28.6 (1.13)	28.6 (1.13)	31.8 (1.25)	34.9 (1.37)	38.1 (1.25)
Minimum Distance ^d Between Rows of Welds	MIL ^f	6.4 (0.25)	6.4 (0.25)	7.9 (0.31)	7.9 (0.31)	9.5 (0.37)	9.5 (0.37)	9.5 (0.37)	11.1 (0.44)	12.7 (0.50)	12.7 (0.50)	12.7 (0.50)	15.9 (0.63)
	COMM ^g	6.4 (0.25)	6.4 (0.25)	6.4 (0.25)	9.5 (0.37)	12.7 (0.50)	15.9 (0.63)	22.2 (0.87)	25.4 (1.00)	25.4 (1.00)	28.6 (1.13)	34.9 (1.37)	34.9 (1.37)
Minimum ^e Edge Distance	MIL ^f	4.8 (0.19)	4.8 (0.19)	5.6 (0.22)	6.4 (0.25)	6.4 (0.25)	7.9 (0.31)	9.5 (0.37)	9.5 (0.37)	9.5 (0.37)	11.1 (0.44)	11.1 (0.44)	12.7 (0.50)
	COMM ^g	4.8 (0.19)	4.8 (0.19)	5.6 (0.22)	6.4 (0.25)	6.4 (0.25)	7.9 (0.31)	7.9 (0.31)	9.5 (0.37)	9.5 (0.37)	9.5 (0.37)	11.1 (0.44)	12.7 (0.50)
Minimum Contacting Overlap	MIL ^f	9.5 (0.37)	9.5 (0.37)	11.1 (0.44)	12.7 (0.50)	14.3 (0.56)	15.9 (0.63)	19.0 (0.75)	20.6 (0.81)	22.2 (0.87)	23.8 (0.94)	25.4 (1.00)	28.6 (1.13)
	COMM ^g	9.5 (0.37)	9.5 (0.37)	11.1 (0.44)	12.7 (0.50)	12.7 (0.50)	15.9 (0.63)	15.9 (0.63)	19.0 (0.75)	19.0 (0.75)	19.0 (0.75)	22.2 (0.87)	25.4 (1.00)

^a All dimensions are in mm (in.).

^b For combinations of unequal thickness, use the thickness one lower than the heaviest to be welded as the thickness controlling dimensions indicated.

^c Minimum weld spacing is that for which no special precautions need be taken to compensate for shunted current effects of adjacent welds. It is measured from weld center to center.

^d Distance between rows of welds is measured from weld center to weld center.

^e Edge distance is measured from weld center to edge of sheet.

^f MIL = military requirements.

^g COMM = commercial requirements.

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



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**Spot Welding Parameters for Aluminum Alloys
on Standard Single-Phase A-C Type Equipment^b**

Sheet Thickness mm (in.)	Electrode Diameter and Shape ^a			Net Electrode Force (Weld) kN (lb)	Welding Current Approx. Amps	Welding ^c Time Approx. (Cycles)
	D mm (in.)	Radius mm (in.)				
		Top Electrode	Bottom Electrode			
0.41 (0.016)	15.9 (0.63)	1	Flat	1.42 (320)	15 000	4
0.51 (0.020)	15.9 (0.63)	1	Flat	1.51 (340)	18 000	5
0.64 (0.025)	15.9 (0.63)	2	Flat	1.73 (390)	21 800	6
0.81 (0.032)	15.9 (0.63)	2	Flat	2.22 (500)	26 000	7
1.02 (0.040)	15.9 (0.63)	3	Flat	2.67 (600)	30 700	8
1.27 (0.050)	15.9 (0.63)	3	Flat	2.96 (660)	33 000	8
1.60 (0.063)	15.9 (0.63)	3	Flat	3.34 (750)	35 800	10
1.80 (0.071)	15.9 (0.63)	4	4	3.56 (800)	35 000	10
2.03 (0.080)	22.2 (0.87)	4	4	3.83 (860)	41 800	10
2.29 (0.090)	22.2 (0.87)	6	6	4.23 (950)	46 000	12
2.54 (0.100)	22.2 (0.87)	6	6	4.67 (1050)	56 000	15
3.18 (0.125)	22.2 (0.87)	6	6	5.78 (1300)	76 000	15

^a Electrode material: RWMA Class 1.

^b Types of aluminum alloy: 1100-H12-H18, 3003-H12H-H18, 3004-H32-H38, 5052-H32-H38, 5050-H32-H38, 5356-H32-H38, 6061-T4-T6, 6063-T5-T6.

^c A-C 60 Hz equipment.

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



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Spot Welding Parameters for Aluminum Alloys on Single-Phase A-C Slope Control Type Machines

Alloy	Sheet Thickness mm (in.)	Electrode Diameter and Shape ^a		Net Electrode Force, kN (lb)		Time, Cycles ^c				Weld Current Approx. Amps × 1000		
				Weld	Forge	Up Slope	Weld Heat	Down Slope	Weld Time	Initial	Weld	Final Post Heat
		D mm (in.)	Radius mm (in.)									
2024 and 7075	0.64 (0.025)	15.9 (0.63)	76 (3.0)	2.2 (500)	4.9 (1100)	2	4	4	8	7.0	22.0	11.0
	0.81 (0.032)	15.9 (0.63)	76 (3.0)	2.7 (600)	5.7 (1280)	2	5	4	9	8.0	24.0	13.0
	1.02 (0.040)	15.9 (0.63)	76 (3.0)	3.1 (700)	6.2 (1400)	2	6	5	11	9.0	27.0	15.0
	1.27 (0.050)	15.9 (0.63)	76 (3.0)	3.6 (800)	7.6 (1700)	3	8	5	13	10.0	30.0	17.0
	1.63 (0.063)	15.9 (0.63)	152 (6.0)	4.2 (950)	8.9 (2000)	3	10	6	16	11.0	34.0	20.0
	1.80 (0.071)	15.9 (0.63)	152 (6.0)	4.9 (1100)	9.8 (2200)	3	12	6	18	12.0	37.0	22.0
	2.03 (0.080)	22.2 (0.87)	152 (6.0)	5.3 (1200)	11.1 (2500)	3	13	7	20	13.0	40.0	25.0
	2.29 (0.090)	22.2 (0.87)	152 (6.0)	6.2 (1400)	13.3 (3000)	4	15	8	23	14.0	43.0	28.0
	2.54 (0.100)	22.2 (0.87)	152 (6.0)	7.6 (1700)	16.5 (3700)	4	16	9	25	15.0	47.0	31.0
3.18 (0.125)	22.2 (0.87)	152 (6.0)	8.9 (2000)	20.0 (4500)	5	20	10	30	16.5	55.0	33.0	
5052 and 6061	0.64 (0.025)	15.9 (0.63)	76 (3.0)	2.0 (450)	4.4 (1000)	2	4	4	8	6.5	21.0	11.0
	0.81 (0.032)	15.9 (0.63)	76 (3.0)	2.4 (550)	5.1 (1150)	2	5	4	9	7.5	23.0	13.0
	1.02 (0.040)	15.9 (0.63)	76 (3.0)	2.7 (600)	5.8 (1300)	2	6	5	11	8.0	25.0	14.0
	1.27 (0.050)	15.9 (0.63)	76 (3.0)	3.1 (700)	6.7 (1500)	3	8	5	13	9.0	28.0	16.0
	1.63 (0.063)	15.9 (0.63)	152 (6.0)	3.7 (830)	7.8 (1750)	3	10	6	16	10.0	31.0	18.0
	1.80 (0.071)	15.9 (0.63)	152 (6.0)	4.0 (900)	8.9 (2000)	3	12	6	18	11.0	33.0	20.0
	2.03 (0.080)	22.2 (0.87)	152 (6.0)	4.4 (1000)	9.8 (2200)	3	13	7	20	12.0	36.0	22.0
	2.29 (0.090)	22.2 (0.87)	152 (6.0)	5.3 (1200)	10.7 (2400)	4	15	8	23	13.0	40.0	23.0
	2.54 (0.100)	22.2 (0.87)	152 (6.0)	6.2 (1400)	12.9 (2900)	4	16	9	25	14.0	44.0	28.0
3.18 (0.125)	22.2 (0.87)	152 (6.0)	8.9 (2000)	17.8 (4000)	5	20	10	30	18.0	53.0	37.0	

^a Electrode material: RWMA Class 1.

^b The top and bottom electrodes should have the same tip radius, or one has a radius tip and the other a flat tip.

^c A-C 60 Hz equipment.

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



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Spot Welding Parameters for Aluminum Alloys on Three-Phase Rectifier Type Equipment

Sheet Thickness mm (in.)	Electrode Diameter and Shape ^{a,b}		Net Electrode Force kN (lb) ^c		Welding Current ^c (Approx.) Amps		Welding Time ^d (Approx.) Cycles ^b	
	D mm (in.)	Radius mm (in.)	Weld	Forge	Weld	Post Heat	Weld	Post Heat
0.41 (0.016)	15.9 (0.63)	76 (3.0)	2.0 (450)	4.4 (980)	19.0	None	1	None
0.51 (0.020)	15.9 (0.63)	76 (3.0)	2.3 (520)	5.1 (1150)	22.0	None	1	None
0.81 (0.032)	15.9 (0.63)	76 (3.0)	3.0 (670)	6.9 (1550)	28.0	None	2	None
1.02 (0.040)	15.9 (0.63)	76 (3.0)	3.2 (730)	8.0 (1800)	32.0	None	3	None
1.27 (0.050)	15.9 (0.63)	203 (8.0)	4.0 (900)	10.0 (2250)	37.0	30.0	4	4
1.60 (0.063)	15.9 (0.63)	203 (8.0)	4.9 (1100)	12.9 (2900)	43.0	36.0	5	5
1.80 (0.071)	15.9 (0.63)	203 (8.0)	5.3 (1190)	1.44 (3240)	48.0	38.0	6	6
2.03 (0.080)	22.2 (0.87)	203 (8.0)	6.5 (1460)	16.9 (3800)	52.0	42.0	7	7
2.29 (0.090)	22.2 (0.87)	203 (8.0)	7.6 (1710)	19.1 (4270)	56.0	45.0	8	8
2.54 (0.100)	22.2 (0.87)	203 (8.0)	8.5 (1910)	22.2 (4990)	61.0	49.0	9	9
3.18 (0.125)	22.2 (0.87)	203 (8.0)	11.1 (2500)	28.9 (6500)	69.0	54.0	10	10

^a Electrode material: RWMA Class 1.

^b The top and bottom electrodes should have the same tip radius, or one has a radius tip and the other a flat tip.

^c The force and current values for alloys are 2014-T3, T4, T6, 2024-T3, T4, and 7075-T6. Somewhat lower values may be used for alloys such as 5052 and 6061.

^d A-C 60 Hz equipment.

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Spot Welding Parameters for Aluminum Alloys on Three-Phase Frequency Converter Type Equipment (Single Impulse Welds)

Sheet Thickness mm (in.)		Electrode Diameter and Shape ^c		Net Electrode Force kN (lb)		Weld Current (Approx.) Amps × 1000		Welding Time Cycles (60 per sec.)	
		D mm (in.)	Radius mm (in.)			Weld	Post Heat	Weld	Post Heat
0.51 (0.020)	COMM ^a	15.9 (0.63)	76 (3.0)	2.2 (500)	2.2 (500)	26	None	1/2	None
	MIL ^b	7.9 (0.31)	254 (10.0)	2.7 (600)	5.3 (1 200)	19	4.0	1	2
0.64 (0.025)	COMM ^a	15.9 (0.63)	76 (3.0)	2.2 (500)	5.3 (1 200)	34	8.5	1	3
	MIL ^b	7.9 (0.31)	254 (10.0)	2.7 (600)	7.1 (1 600)	25	6.3	1	2
0.81 (0.032)	COMM ^a	15.9 (0.63)	102 (4.0)	2.7 (600)	5.8 (1 300)	36	9.0	1	4
	MIL ^b	9.5 (0.37)	254 (10.0)	3.1 (700)	8.0 (1 800)	30	7.5	1	2
1.02 (0.040)	COMM ^a	15.9 (0.63)	102 (4.0)	3.1 (700)	6.7 (1 500)	42	12.6	1	4
	MIL ^b	9.5 (0.37)	254 (10.0)	3.6 (800)	8.9 (2 000)	40	12.0	2	4
1.27 (0.050)	COMM ^a	15.9 (0.63)	102 (4.0)	3.6 (800)	8.0 (1 800)	46	13.8	1	5
	MIL ^b	11.1 (0.44)	254 (10.0)	4.0 (900)	10.2 (2 290)	43	12.9	2	4
1.60 (0.063)	COMM ^a	15.9 (0.63)	152 (6.0)	4.4 (1000)	8.9 (2 000)	54	18.9	2	5
	MIL ^b	12.7 (0.50)	254 (10.0)	5.8 (1300)	13.3 (2 990)	51	17.9	3	6
1.80 (0.071)	COMM ^a	15.9 (0.63)	152 (6.0)	5.3 (1200)	11.1 (2 500)	61	21.4	2	6
	MIL ^b	15.9 (0.63)	254 (10.0)	7.1 (1600)	16.0 (3 600)	57	20.0	3	6
2.03 (0.080)	COMM ^a	22.2 (0.87)	152 (6.0)	6.2 (1400)	12.5 (2 810)	65	22.8	3	6
	MIL ^b	15.9 (0.63)	254 (10.0)	8.0 (1800)	18.2 (4 090)	63	22.1	4	8
2.29 (0.090)	COMM ^a	22.2 (0.87)	152 (6.0)	7.1 (1600)	14.2 (3 190)	75	30.0	3	8
	MIL ^b	15.9 (0.63)	254 (10.0)	10.7 (2400)	23.6 (5 310)	73	29.2	4	8
2.54 (0.100)	COMM ^a	22.2 (0.87)	203 (8.0)	8.9 (2000)	17.8 (4 000)	85	34.0	3	8
	MIL ^b	22.2 (0.87)	254 (10.0)	12.5 (2810)	30.2 (6 790)	81	32.4	5	10
3.18 (0.125)	COMM ^a	22.2 (0.87)	203 (8.0)	20.0 (4500)	22.2 (4 990)	100	45.0	4	10
	MIL ^b	22.2 (0.87)	254 (10.0)	17.8 (4000)	44.5 (10 000)	100	45.0	5	10

^a COMM = commercial requirements.

^b MIL = military requirements.

^c Electrode material: RWMA Class 1.

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