

# Aluminum Filler Alloy Selection Chart





# Recommended Welding Parameters

## Square - Groove Weld

Nominal Plate Thickness		Gap		Filler Wire Diameter		Amps	Volts	Wire Speed		Travel Speed		Wire Consumption		
in.	mm	in.	mm	in.	mm			ipm	m/min	ipm	cm/min	lbs/100 ft.	kg/m	
5/64	(.078)	2	0	.030	0.8	80	18-21	460	11.7	40	102	0.67	.01	
1/8	(.125)	3	0-1/32	0-0.5	.035	0.9	130	19-22	480	12.2	40	102	0.75	.01
5/32	(.156)	4	0-3/64	0-1	.040	1.0	160	20-23	450	11.4	40	102	1.25	.02

## Single V-Groove

(typical included groove angle = 60°)

Nominal Plate Thickness		Gap		Filler Wire Diameter		Amps	Volts	Wire Speed		Travel Speed		Wire Consumption		
in.	mm	in.	mm	in.	mm			ipm	m/min	ipm	cm/min	lbs/100 ft.	kg/m	
3/16	(.187)	5	0	0	.035	0.9	175	19-23	750	19.1	40	102	2.6	.04
1/4	(.250)	6	0	0	.047	1.2	195	20-24	430	10.9	40	102	4.6	.07
5/16	(.313)	8	0	0	.047	1.2	220	21-25	465	11.8	35	89	7.2	.11
3/8	(.375)	10	0-1/16	0-1	.062	1.6	240	22-26	320	8.1	35	89	10.3	.15
1/2	(.500)	12	0-1/16	0-1	.062	1.6	275	23-27	380	9.7	30	76	18.3	.27
3/4	(.750)	19	0-3/32	0-2	.071	1.8	290	24-28	335	8.5	24	61	41.3	.61
1	(1.00)	25	0-3/32	0-2	.094	2.4	330	26-32	180	4.6	18	46	73.4	1.09

## Horizontal Fillet Weld

Nominal Plate Thickness		Gap		Filler Wire Diameter		Amps	Volts	Wire Speed		Travel Speed		Wire Consumption	
in.	mm	in.	mm	in.	mm			ipm	m/min	ipm	cm/min	lbs/100 ft.	kg/m
5/64	(.078)	2	N/A	.030	0.8	100	18-20	500	12.7	41	104	0.4	.01
1/8	(.125)	3	N/A	.035	0.9	140	19-21	580	14.7	31	78	0.6	.01
5/32	(.156)	4	N/A	.040	1.0	150	20-22	425	10.8	20	51	1.6	.02
5/32	(.156)	4	N/A	.047	1.2	180	20-22	410	10.4	25	64	1.6	.02
3/16	(.187)	5	N/A	.047	1.2	190	21-23	425	10.8	22	56	2.2	.03
3/16	(.187)	5	N/A	.062	1.6	220	21-23	285	7.2	26	66	2.2	.03
1/4	(.250)	6	N/A	.047	1.2	210	22-24	480	12.2	20	51	4.0	.06
1/4	(.250)	6	N/A	.062	1.6	230	22-25	300	7.6	25	64	4.0	.06
5/16	(.313)	8	N/A	.062	1.6	230	23-26	300	7.6	20	51	6.2	.09
3/8	(.375)	10	N/A	.062	1.6	240	23-26	325	8.3	18	46	8.9	.13
1/2	(.500)	12	N/A	.071	1.8	280	24-28	335	8.5	24	61	15.9	.24

**NOTE:** Welding parameters were developed utilizing the GMAW process with 100% argon shielding gas under laboratory conditions and are provided as guidelines only. For 5XXX series electrodes use a welding amperage on the high side of the range and an arc voltage on the lower end of the range. For 1XXX, 2XXX and 4XXX series electrodes use the lower amperage and higher arc voltage.

## Typical Shear Strength - Fillet Welds

Filler Alloy	Longitudinal Shear Strength (KSI)	Transverse Shear Strength (KSI)
1100	7.5	7.5
2319	16.0	18.0
4043	11.5	15.0
4643	13.5	20.0
5183	18.5	28.0
5356	17.0	26.0
5554	15.0	23.0
5556	20.0	30.0
5654	12.0	18.0

**Welded Joint Strength** - Fillet welds are usually not diluted significantly by the base material. Therefore, the shear strengths of fillet welds are largely determined by the properties of the filler alloy and not necessarily by the condition of the heat-affected zone (HAZ) of the base material.

## Typical Tensile Properties - Groove Welds

Base Alloy & Temper	Base Tensile (KSI) (1)	Filler Alloy	As-Welded Tensile (KSI) (1)	PWHT* Tensile (KSI) (1)
5052-H32	33	ER 5356	28	N/A
5083-H116	46	ER 5183	43	N/A
5086-H34	47	ER 5356	39	N/A
5454-H32	39	ER 5554	35	N/A
6061-T4	35	ER 4043	27	35 (3) (4)
6061-T6	45	ER 4043	27	44 (4)
6061-T6	45	ER 5356	30	36 (2)

**Note:** Typical properties of GMAW welded groove joints in aluminum alloys.  
 (1) Reduced section tensile strength (3) Postweld aged only  
 (2) Filler alloy will not respond to heat treatment (4) Data assumes sufficient dilution of base alloy

**Welded Joint Strength** - Typically, the as-welded tensile strength of a groove weld is determined by the condition of the heat-affected zone (HAZ) of the base material.

\*Post Weld Heat Treated and Aged