

Guide to the Choice of Filler Metal for General Purpose Welding

Base Metal	356.0, A356.0		511.0		6005, 6061		5154		5086		5083		5052		5005		3004		2014		1100		1060	
	201.0	319.0, 333.0	357.0, 413.0, 443.0	513.0	7004, 7005	6009	6063, 6101	6010	5154	5086	5083	5052	5005	3004	2014	1100	1060	1070	1080	1090	1100	3003	1060	1070
	224.0	C355.0	A444.0	535.0	712.0	6070	6351, 6951	5456	5454	5254 ⁱ	5086	5083	5652	5050	Aic 3004	2219	2036	Aic 3003	1350	1350	1350	1350	1350	1350
1060, 1070, 1080, 1350	ER4145	ER4145	ER4043 ^{a,b}	ER5356 ^{c,d}	ER5356 ^{c,d}	ER4043 ^{b,h}	ER4043 ^b	ER5356 ^d	ER4043 ^{b,i}	ER5356 ^{c,d}	ER5356 ⁱ	ER5356 ^j	ER4043 ^{b,d}	ER1100 ^{b,c}	ER4043 ^{b,d}	ER4145 ^{b,c}	ER4145	ER1100 ^{b,c}	ER1188 ^{a,h,i}					
1100, 3003, Aic 3003	ER4145	ER4145	ER4043 ^{a,b}	ER5356 ^{c,d}	ER5356 ^{c,d}	ER4043 ^{b,h}	ER4043 ^b	ER5356 ^d	ER4043 ^{b,i}	ER5356 ^{c,d}	ER5356 ⁱ	ER5356 ^j	ER4043 ^{b,d}	ER1100 ^{b,c}	ER4043 ^{b,d}	ER4145 ^{b,c}	ER4145	ER1100 ^{b,c}						
2014, 2036	ER4145 ^o	ER4145 ^o	ER4145			ER4145	ER4145							ER4145	ER4145	ER4145 ^o	ER4145 ^o							
2219	ER2319 ^h	ER4145 ^o	ER4145 ^{b,c}	ER4043	ER4043	ER4043 ^{b,h}	ER4043 ^{b,h}		ER4043 ^b	ER4043			ER4043 ^b	ER4043 ^{b,h}	ER4043 ^{b,h}	ER2319 ^h								
3004, Aic 3004		ER4043 ^b	ER4043 ^b	ER5356 ⁱ	ER5356 ⁱ	ER4043 ^b	ER4043 ^b	ER5356 ^d	ER5356 ⁱ	ER5356 ⁱ	ER5356 ⁱ	ER5356 ^j	ER5356 ^k	ER5356 ^l	ER5356 ^l	ER5356 ^l	ER5356 ^l							
5005, 5050		ER4043 ^b	ER4043 ^b	ER5356 ⁱ	ER5356 ⁱ	ER4043 ^b	ER4043 ^b	ER5356 ^d	ER5356 ⁱ	ER5356 ⁱ	ER5356 ⁱ	ER5356 ^j	ER5356 ^k	ER5356 ^l	ER5356 ^l	ER5356 ^l	ER5356 ^l							
5052, 5652 ^l		ER4043 ^b	ER4043 ^b	ER5356 ⁱ	ER5356 ⁱ	ER4043 ^b	ER4043 ^b	ER5356 ^d	ER5356 ⁱ	ER5356 ⁱ	ER5356 ⁱ	ER5356 ^j	ER5356 ^k	ER5356 ^l	ER5356 ^l	ER5356 ^l	ER5356 ^l							
5083			ER5356 ^{c,d}	ER5356 ^d	ER5183 ^g			ER5356 ^d	ER5183 ^g	ER5356 ^d	ER5356 ^d	ER5356 ^e	ER5356 ^f	ER5356 ^g	ER5356 ^h	ER5183 ^g								
5086			ER5356 ^{c,d}	ER5356 ^d	ER5356 ^d			ER5356 ^d	ER5356 ^d	ER5356 ^d	ER5356 ^d	ER5356 ^e	ER5356 ^f	ER5356 ^g	ER5356 ^h	ER5356 ⁱ								
5154, 5254 ⁱ			ER4043 ^b	ER5356 ⁱ	ER5356 ⁱ			ER5356 ⁱ	ER5356 ⁱ	ER5356 ⁱ	ER5356 ⁱ	ER5654 ^j												
5454		ER4043 ^b	ER4043 ^b	ER5356 ⁱ	ER5356 ⁱ	ER4043 ^b		ER5356 ⁱ	ER5356 ⁱ	ER5356 ⁱ	ER5356 ⁱ	ER5356 ⁱ												
5456			ER5356 ^{c,d}	ER5356 ^d	ER5556 ^e			ER5356 ^d	ER5356 ^d	ER5356 ^d	ER5356 ^d	ER5356 ^e												
6005, 6061, 6063																								
6101, 6151, 6201	ER4145	ER4145 ^{b,c}	ER4043 ^{b,h,g}	ER5356 ⁱ	ER5356 ^{i,j}	ER4043 ^{b,h,g}	ER4043 ^{b,h,g}		ER4043 ^{b,h,g}															
6351, 6951																								
6009, 6010, 6070	ER4145	ER4145 ^{b,c}	ER4043 ^{b,h,g}	ER4043	ER4043	ER4043 ^{b,h,g}																		
7004, 7005, 7039		ER4043 ^b	ER4043 ^{b,f}	ER5356 ⁱ	ER5356 ⁱ																			
710.0, 712.0																								
511.0, 512.0, 513.0			ER4043 ^b	ER5356 ⁱ																				
514.0, 535.0																								
356.0, A356.0, 357.0																								
A357.0, 413.0, 443.0, A444.0	ER4145	ER4145 ^{b,c}	ER4043 ^{b,h}																					
319.0, 333.0, 354.0, 355.0, C355.0	ER4145 ^o	ER4145 ^{b,c,h}																						
201.0, 206.0, 224.0	ER2319 ^h																							

NOTES:

1. Service conditions such as immersion in fresh or salt water, exposure to specific chemicals, or a sustained high temperature (over 150°F (66°C)) may limit the choice of filler metals. Filler metals ER5183, ER5356, ER5556, and ER5654 are not recommended for sustained elevated temperature service.
2. Recommendations in this table apply to gas shielded arc welding processes. For oxyfuel gas welding, only ER1188, ER1100, ER4043, ER4047, and ER4145 filler metals are ordinarily used.
3. Where no filler metal is listed, the base metal combination is not recommended for welding.
 - a. ER4145 may be used for some applications.
 - b. ER4047 may be used for some applications.
 - c. ER4043 may be used for some applications.
 - d. ER5183, ER5356, or ER5556 may be used.
 - e. ER2319 may be used for some applications. It can supply high strength when the weldment is postweld solution heat treated and aged.
 - f. ER5183, ER5356, ER5554, ER5556, and ER5654 may be used. In some cases, they provide: (1) improved color match after anodizing treatment, (2) highest weld ductility, and (3) higher weld strength. ER5554 is suitable for sustained elevated temperature service.
 - g. ER4643 will provide high strength in 1/2 in. (12mm) and thicker groove welds in 6XXX base alloys when postweld solution heat treated and aged.
 - h. Filler metal with the same analysis as the base metal is sometimes used. The following wrought filler metals possess the same chemical composition limits as cast filler alloys: ER4009 and R4009 as R-C355.0; ER4010 and R4010 as R-A 356.0; and R4011 as R-A357.0.
 - i. Base metal alloys 5254 and 5652 are used for hydrogen peroxide service. ER5654 filler metal is used for welding both alloys for service temperatures below 150°F (66°C).
 - j. ER1100 may be used for some applications.

OTHER AVAILABLE FILLER METALS

Washington Alloy 2319	AWS/SFA.510	ER2319
Washington Alloy 5554	AWS/SFA 5.10	ER5554
Washington Alloy 5654	AWS/SFA 5.10	ER5654
Washington Alloy 4145 (716)	AWS/SFA 5.10	ER4145(716)
Washington Alloy 4643	AWS/SFA 5.10	ER4643
Washington Alloy A356.0	AWS/SFA5.10 R-A356.0	
Washington Alloy A357.0	AWS/SFA 5.10 R-A357.0	
Washington Alloy C355.0	AWS/SFA 5.10 R-C355.0	

AVAILABLE PACKAGING AND DIAMETERS

1 lb. (0.45 kg) spools: .023 (0.6 mm), .030 (0.8 mm), .035 (0.9 mm), .040 (1.0 mm), 3/64 (1.2 mm), 1/16 (1.6 mm)
4 lb. (1.81 kg) spools: .023 (0.6 mm), .030 (0.8 mm), .035 (0.9 mm), .040 (1.0 mm), 3/64 (1.2 mm), 1/16 (1.6 mm)
13 lb. (5.90 kg) spools: .023 (0.6 mm), .030 (0.8 mm), .035 (0.9 mm), .040 (1.0 mm), 3/64 (1.2 mm), 1/16 (1.6 mm), 3/32 (2.4 mm)
36 in. (914 mm) rods: .023 (0.6 mm), .030 (0.8 mm), .035 (0.9 mm), .040 (1.0 mm), 3/64 (1.2 mm), 1/16 (1.6 mm), 3/32 (2.4 mm), 1/8 (3.2 mm), 5/32 (4.0 mm), 3/16 (4.8 mm), 1/4 (6.4 mm)