Aluminum Filler Alloy Chart

Base Alloys	Filler Alloys	1060 1070 1080 1350						1100						2014 2036					
Characteristics		W	S	D	C	T	M	W	S	D	C	T	M	W	S	D	C	T	M
319.0 333.0 354.0 355.0 C355.0 380.0	2319*													B	A	A	A	A	
	4043/4047*	A	C	B	A	A		A	C	B	A	A		C	D	C	D	A	
	4009*	B	B	A	A	A		B	B	A	A	A		B	C	B	C	A	
	4145*	A	A	B	A	A		A	A	B	A	A		A	B	C	B	A	
	5554																		
413.0 443.0 444.0 356.0 A356.0 A357.0 359.0	4043/4047*	B	B	A	A	A		B	B	A	A	A		B	B	A	A	A	
	4145*	A	A	B	B	A		A	A	B	B	A		A	A	B	A	A	
	4008*																		
	5554																		
7005 7021 7039 7046 710.0 711.0	4043/4047*	A	C	C	A	A		A	C	C	A	A		B	B	A	A	A	
	4145*													A	A	B	A	A	
	5183	B	A	B	A		A	B	A	B	A		A						
	5356	B	B	A	A		A	B	B	A	A		A						
	5554																		
	5556	B	A	B	A		A	B	A	B	A		A						
	5654																		
6061 6070	4043/4047*	A	E	C	A	A		A	E	C	A	A		B	B	A	A	A	
	4145*	A	D	D	B	A		A	D	D	B	A		A	A	B	A	A	
	4643*																		
	5183	B	A	B			A	B	A	B			A						
	5356	B	B	A			A	B	B	A			A						
	5554	B	C	A		B	A	B	C	A		B	A						
	5556	B	A	B			A	B	A	B			A						
	5654																		
6005 6060 6063 6101 6151 6351 6951	4043/4047*	A	E	C	A	A		A	E	C	A	A		B	B	A	A	A	
	4145*	A	D	D	B	A		A	D	D	B	A		A	A	B	A	A	
	4643*																		
	5183	B	A	B			A	B	A	B			A						
	5356	B	B	A			A	B	B	A			A						
	5554	B	C	A		B	A	B	C	A		B	A						
	5556	B	A	B			A	B	A	B			A						
	5654																		
5454	5183	A	A	B	B		A	A	A	B	B		A						
	5356	A	B	A	B		A	A	B	A	B		A						
	5554	B	C	A	A	A	A	B	C	A	A	A	A						
	5556	A	A	B	B		A	A	A	B	B		A						
	5654																		
511.0 512.0 513.0 514.0 5154 5254	5183	A	A	B	B		A	A	A	B	B		A						
	5356	A	B	A	B		A	A	B	A	B		A						
	5554	B	C	A	A		A	B	C	A	A		A						
	5556	A	A	B	B		A	A	A	B	B		A						
	5654	B	C	A	A		B	B	C	A	A		B						
5086 5056	5183	A	A	B	A		A	A	A	B	A		A						
	5356	A	B	A	A		A	A	B	A	A		A						
	5554																		
	5556	A	A	B	A		A	A	A	B	A		A						
	5654																		
5083 5456	5183	A	A	B	A		A	A	A	B	A		A						
	5356	A	B	A	A		A	A	B	A	A		A						
	5554																		
	5556	A	A	B	A		A	A	A	B	A		A						
	5654																		
5052	4043/4047*	A	C	C	A	A		A	C	C	A	A							
	5183	B	A	B			A	B	A	B			A						
	5356	B	B	A			A	B	B	A			A						
	5554																		
	5556	B	A	B			A	B	A	B			A						
	5654																		
5005 5050	1100	C	E	A	A	A	A	C	E	A	A	A	A						
	4043/4047*	A	D	D	A	A		A	D	D	A	A							
	4145*	B	C	E	B	A		B	C	E	B	A							
	5183	C	A	C			B	C	A	C			B						
	5356	C	B	B			B	C	B	B			B						
	5556	C	A	C			B	C	A	C			B						
3004	1100	D	E	A	A	A	A	D	E	A	A	A	A						
	4043/4047*	A	D	D	A	A		A	D	D	A	A							
	4145*	B	C	E	B	A		B	C	E	B	A							
	5183	C	A	C			B	C	A	C			B						
	5356	C	B	B			B	C	B	B			B						
	5554																		
	5556	C	A	C			B	C	A	C			B						
3003	1100	C	C	A	A	A	A	C	C	A	A	A	A						
	4043/4047*	B	B	B	A	A		B	B	B	A	A		B	B	A	A	A	
	4145*	A	A	C	B	A		A	A	C	B	A		A	A	B	A	A	
2219	2319*													B	A	A	A	A	A
	4043/4047*	B	B	A	A	A		B	B	A	A	A		B	C	B	C	A	
	4145*	A	A	B	A	A		A	A	B	A	A		A	B	C	B	A	
2014 2036	2319*													C	A	A	A	A	A
	4043/4047*	B	B	A	A	A		B	B	A	A	A		B	C	B	C	A	
	4145*	A	A	B	A	A		A	A	B	A	A		A	B	C	B	A	
1100	1100	B	B	A	A	A	A	B	B	A	A	A	A	1100					
	4043/4047*	A	A	B	A	A		A	A	B	A	A		4043/4047*					
1060 1070 1080 1350	1100	B	B	A	A	A	B	1100											
	1188	C	C	A	A	A	A	1188											
	4043/4047*	A	A	B	A	A		4043/4047*											

Base Alloys	Filler Alloys	2219						3003						3004					
Characteristics		W	S	D	C	T	M	W	S	D	C	T	M	W	S	D	C	T	M
319.0 333.0 354.0 355.0 C355.0 380.0	2319*	B	A	A	A	A													
	4043/4047*	C	D	C	D	A		A	C	B	A	A		A	C	B	A	A	
	4009*	B	C	B	C	A		B	B	A	B	A		B	B	A	B	A	
	4145*	A	B	C	B	A		A	A	B	B	A		A	A	B	B	A	
	5554																		
413.0 443.0 444.0 356.0 A356.0 A357.0 359.0	4043/4047*	B	B	A	A	A		B	B	A	A	A		A	A	A	A	A	
	4145*	A	A	B	A	A		A	A	B	B	A							
	4008*																		
	5554																		
7005 7021 7039 7046 710.0 711.0	4043/4047*	B	B	A	A	A		A	C	C	A	A		A	D	C	B	A	
	4145*	A	A	B	A	A													
	5183							B	A	B	A		A	B	A	B	A		A
	5356							B	B	A	A		A	B	B	A	A		A
	5554													C	C	A	A	A	A
	5556							B	A	B	A		A	B	A	B	A		A
	5654													C	C	A	A		B
6061 6070	4043/4047*	B	B	A	A	A		A	E	C	A	A		A		C	A	A	
	4145*	A	A	B	A	A		A	D	D	B	A		A	D	D	B	A	
	4643*																		
	5183							B	A	B			A	B	A	B			A
	5356							B	B	A			A	B	B	A			A
	5554							B	C	A		B	A	B	C	A		B	A
	5556							B	A	B			A	B	A	B			A
	5654																		
6005 6060 6063 6101 6151 6351 6951	4043/4047*	B	B	A	A	A		A	E	C	A	A		A		C	A	A	
	4145*	A	A	B	A	A		A	D	D	B	A		A	D	D	B	A	
	4643*																		
	5183							B	A	B			A	B	A	B			A
	5356							B	B	A			A	B	B	A			A
	5554							B	C	A		B	A	B	C	A		B	A
	5556							B	A	B			A	B	A	B			A
	5654																		
5454	5183							A	A	B	B		A	A	A	B	B		A
	5356							A	B	A	B		A	A	B	A	B		A
	5554							B	C	A	A	A	A	B	C	A	A	A	A
	5556							A	A	B	B		A	A	A	B	B		A
	5654																		
511.0 512.0 513.0 514.0 5154 5254	5183							A	A	B	B		A	A	A	B	B		A
	5356							A	B	A	B		A	A	B	A	B		A
	5554							B	C	A	A		A	B	C	A	A		A
	5556							A	A	B	B		A	A	A	B	B		A
	5654							B	C	A	A		B	B	C	A	A		B
5086 5056	5183							A	A	B	A		A	A	A	B	A		A
	5356							A	B	A	A		A	A	B	A	A		A
	5554																		
	5556							A	A	B	A		A	A	A	B	A		A
	5654																		
5083 5456	5183							A	A	B	A		A	A	A	B	A		A
	5356							A	B	A	A		A	A	B	A	A		A
	5554																		
	5556							A	A	B	A		A	A	A	B	A		A
	5654																		
5052	4043/4047*							A	C	C	A	A		A	C	C	A	A	
	5183							B	A	B			A	B	A	B			A
	5356							B	B	A			A	B	B	A			A
	5554																		
	5556							B	A	B			A	B	A	B			A
	5654																		
5005 5050	1100							C		A	A	A	A						
	4043/4047*							A	D	D	A	A		A	C	C	A	A	
	4145*							B	C	E	B	A							
	5183							C	A	C	C		B	B	A	B			A
	5356							C	B	B	C		B	B	B	A			A
	5556							C	A	C	C		B	B	A	B			A
3004	1100							D		A	A	A	A						
	4043/4047*							A	D	D	A	A		A	D	D	A	A	
	4145*							B	C	E	B	A							
	5183							C	A	C			B	B	A	C	C		A
	5356							C	B	B			B	B	B	B	C		A
	5554													C	C	A	B	A	A
	5556							C	A	C			B	B	A	C	C		A
3003	1100								C	A	A	A	A	1100					
	4043/4047*	B	B	A	A	A		B	B	B	A	A		4043/4047*					
	4145*	A	A	B	A	A		A	A	C	B	A		4145*					
2219	2319*	A	A	A	A	A	A	2319*											
	4043/4047*		C	B	C	A		4043/4047*											
	4145*		B	C	B	A		4145*											
2014 2036	2319*	2319*																	
	4043/4047*	4043/4047*																	
	4145*	4145*																	

Base Alloys	Filler Alloys	5005 5050						5052						5083 5456					
Characteristics		W	S	D	C	T	M	W	S	D	C	T	M	W	S	D	C	T	M
319.0 333.0 354.0 355.0 C355.0 380.0	2319*																		
	4043/4047*	A	C	B	A	A		A	C	B	A	A							
	4009*	B	B	A	B	A		B	B	A	B	A							
	4145*	A	A	B	B	A													
	5554	A	A	A	A	A		A	A	A	A	A							
413.0 443.0 444.0 356.0 A356.0 A357.0 359.0	4043/4047*	A	A	A	A	A		A	A	A	A	A							
	4145*																		
	4008*																		
	5554																		
7005 7021 7039 7046 710.0 711.0	4043/4047*	A	D	C	B	A		B	D	C	B	A							
	4145*																		
	5183	B	A	B	A		A	A	A	B	A		A	A	A	B	A		A
	5356	B	B	A	A		A	A	B	A	A		A	A	B	A	A		A
	5554	C	C	A	A	A	A	B	C	A	A	A	A						
	5556	B	A	B	A		A	A	A	B	A		A	A	A	B	A		A
	5654	C	C	A	A		A	B	C	A	A		A						
6061 6070	4043/4047*	A	D	C	A	A		A	D	C	A	A							
	4145*																		
	4643*																		
	5183	B	A	B			A	B	A	B			A	A	A	B	A		A
	5356	B	B	A			A	B	B	A			A	A	B	A	A		A
	5554	B	C	A		B	A	B	C	A		B	A	B	C	A	B		A
	5556	B	A	B			A	B	A	B			A	A	A	B	A		A
	5654	C	C	A	B		A	C	C	A	B		A	B	C	A	B		A
6005 6060 6063 6101 6151 6351 6951	4043/4047*	A	D	C	A	A		A	D	C	A	A							
	4145*																		
	4643*																		
	5183	B	A	B			A	B	A	B			A	A	A	B	A		A
	5356	B	B	A			A	B	B	A			A	A	B	A	A		A
	5554	B	C	A		B	A	B	C	A		B	A	B	C	A	B		A
	5556	B	A	B			A	B	A	B			A	A	A	B	A		A
	5654	C	C	A	B		A	C	C	A	B		A	B	C	A	B		A
5454	5183	A	A	B	B		A	A	A	B	B		A	A	A	B	B		A
	5356	A	B	A	B		A	A	B	A	B		A	A	B	A	B		A
	5554	B	C	A	A	A	A	C	C	A	A	A	A	C	C	A	A		A
	5556	A	A	B	B		A	A	A	B	B		A	A	A	B	B		A
	5654							B	C	A	B		A	B	C	A	B		A
511.0 512.0 513.0 514.0 5154 5254	5183	A	A	B	B		A	A	A	B	B		B	A	A	B	A		A
	5356	A	B	A	B		A	A	B	A	B		A	A	B	A	A		A
	5554	B	C	A	A		A	C	C	A	A		B	B	C	A	A		A
	5556	A	A	B	B		A	A	A	B	B		B	A	A	B	A		A
	5654	B	C	A	A		B	B	C	A	A		A	B	C	A	A		B
5086 5056	5183	A	A	B	A		A	A	A	B	A		A	A	A	B	A		A
	5356	A	B	A	A		A	A	B	A	A		A	A	B	A	A		A
	5554							C	C	A	A		A						
	5556	A	A	B	A		A	A	A	B	A		A	A	A	B	A		A
	5654							B	C	A	A		B						
5083 5456	5183	A	A	B	A		A	A	A	B	A		A	A	(3)	B	A		A
	5356	A	B	A	A		A	A	B	A	A		A	A		A	A		A
	5554							C	C	A	A		A						
	5556	A	A	B	A		A	A	A	B	A		A	A	A	B	A		A
	5654							B	C	A	A		B						
5052	4043/4047*	A	C	C	A	A		A	D	C	B	A		4043/4047*					
	5183	B	A	B			A	A	A	B	C		B	5183					
	5356	B	B	A			A	A	B	A	C		A	5356					
	5554							C	C	A	A	A	B	5554					
	5556	B	A	B			A	A	A	B	C		B	5556					
	5654							B	C	A	B		A	5654					
5005 5050	1100	B		A	A	A	A	1100											
	4043/4047*	A	C	D	A	A		4043/4047*											
	4145*							4145*											
	5183	B	A	C			B	5183											
	5356	B	B	B			B	5356											
	5556	B	A	C			B	5556											
3004	1100	1100																	
	4043/4047*	4043/4047*																	
	4145*	4145*																	
	5183	5183																	
	5356	5356																	
	5554	5554																	
	5556	5556																	

Base Alloys	Filler Alloys	5086 5056						511.0 512.0 513.0 514.0 5154 5254						5454					
Characteristics		W	S	D	C	T	M	W	S	D	C	T	M	W	S	D	C	T	M
319.0 333.0 354.0 355.0 C355.0 380.0	2319*																		
	4043/4047*													A	C	B	A	A	
	4009*													B	B	A	B	A	
	4145*																		
	5554							A	A	A	A			B	A	A	A	A	
413.0 443.0 444.0 356.0 A356.0 A357.0 359.0	4043/4047*																		
	4145*																		
	4008*																		
	5554																		
7005 7021 7039 7046 710.0 711.0	4043/4047*																		
	4145*																		
	5183	A	A	B	A		A	A	A	B	A		A	A	A	B	A		A
	5356	A	B	A	A		A	A	B	A	A		A	A	B	A	A		A
	5554							B	C	A	A		A	B	C	A	A	A	A
	5556	A	A	B	A		A	A	A	B	A		A	A	A	B	A		A
	5654							B	C	A	A		A	B	C	A	A		A
6061 6070	4043/4047*																		
	4145*																		
	4643*																		
	5183	A	A	B	A		A	A	A	B	B		B	A	A	B	B		B
	5356	A	B	A	A		A	A	B	A	B		A	A	B	A	B		A
	5554	B	C	A	B		A	B	C	A	A		B	B	C	A	A	A	B
	5556	A	A	B	A		A	A	A	B	B		B	A	A	B	B		B
	5654	B	C	A	B		A	B	C	A	A		A	B	C	A	A		A
6005 6060 6063 6101 6151 6351 6951	4043/4047*																		
	4145*																		
	4643*																		
	5183	A	A	B	A		A	B	A	B	B		A	B	A	B	B		A
	5356	A	B	A	A		A	B	B	A	B		A	B	B	A	B		A
	5554	B	C	A	B		A	C	C	A	A		A	C	C	A	A	A	A
	5556	A	A	B	A		A	B	A	B	B		A	B	A	B	B		A
	5654	B	C	A	B		A	C	C	A	A		B	C	C	A	B		B
5454	5183	A	A	B	B		A	A	A	B	B		A	A	A	B	B		A
	5356	A	B	A	B		A	A	B	A	B		A	A	B	A	B		A
	5554	C	C	A	A		A	B	C	A	A		A	B	C	A	A	A	A
	5556	A	A	B	B		A	A	A	B	B		A	A	A	B	B		A
	5654	B	C	A	B		A	B	C	A	B		A	B	C	A	B		A
511.0 512.0 513.0 514.0 5154 5254	5183	A	A	B	A		A	A	A	B	B		B	5183					
	5356	A	B	A	A		A	A	B	A	B		A	5356					
	5554	B	C	A	A		A	B	C	A	A		B	5554					
	5556	A	A	B	A		A	A	A	B	B		A	5556					
	5654	B	C	A	A		B	B	C	A	A		A	5654					
5086 5056	5183	A	A	B	A		A	5183											
	5356	A	B	A	A		A	5356											
	5554							5554											
	5556	A	A	B	A		A	5556											
	5654							5654											
5083 5456	5183	5183																	
	5356	5356																	
	5554	5554																	
	5556	5556																	
	5654	5654																	

Base Alloys	Filler Alloys	6005 6060 6063 6101 6151 6351 6951						6061 6070						7005 7021 7039 7046 710.0 711.0					
Characteristics		W	S	D	C	T	M	W	S	D	C	T	M	W	S	D	C	T	M
319.0 333.0 354.0 355.0 C355.0 380.0	2319*																		
	4043/4047*	A	C	B	A	A		A	C	B	A	A		A		B	A	A	
	4009*	B	B	A	B	A		B	B	A	B	A		B	B	A	B	A	
	4145*							A	A	B	B	A		A	A	B	B	A	
	5554	B	A	A	A	A		B	A	A	A	A							
413.0 443.0 444.0 356.0 A356.0 A357.0 359.0	4043/4047*	B	B	A	A	A		B	B	A	A	A		B	B	A	A	A	
	4145*	A	A	B	B	A		A	A	B	B	A		A	A	B	B	A	
	4008*																		
	5554																		
7005 7021 7039 7046 710.0 711.0	4043/4047*							A	D	C	B	A		B	D	C	B	A	
	4145*																		
	5183	A	A	B	A		A	A	A	B	A		A	A	A	B	A		A
	5356	A	B	A	A		A	A	B	A	A		A	A	B	A	A		A
	5554	B	C	A	A	A	A	B	C	A	A	A	A	B	C	A	A	A	A
	5556	A	A	B	A		A	A	A	B	A		A	A	A	B	A		A
	5654	B	C	A	A		A	B	C	A	A		A	B	C	A	A		A
6061 6070	4043/4047*	A	D	C	A	A		A	C	C	A	A		4043/4047*					
	4145*													4145*					
	4643*	A	D	C	A	A		A	C	C	A	A		4643*					
	5183	B	A	B	B		A	B	A	B	B		B	5183					
	5356	B	B	A	B		A	B	B	A	B		A	5356					
	5554	C	C	A	B	B	A	C	B	A	B	B	B	5554					
	5556	B	A	B	B		A	B	A	B	B		B	5556					
	5654	C	C	A	B		B	C	B	A	B		B	5654					
6005 6060 6063 6101 6151 6351 6951	4043/4047*	A	D	C	A	A		4043/4047*											
	4145*							4145*											
	4643*	A	D	C	A	A		4643*											
	5183	B	A	B	B		A	5183											
	5356	B	B	A	B		A	5356											
	5554	C	C	A	B	B	A	5554											
	5556	B	A	B	B		A	5556											
	5654	C	C	A	B		B	5654											
5454	5183	5183																	
	5356	5356																	
	5554	5554																	
	5556	5556																	
	5654	5654																	

Base Alloys	Filler Alloys	413.0 443.0 444.0 356.0 A356.0 A357.0 359.0						319.0 333.0 354.0 355.0 C355.0 380.0						
Characteristics		W	S	D	C	T	M	W	S	D	C	T	M	
319.0 333.0 354.0 355.0 C355.0 380.0	2319*													2319*
	4043/4047*	A	C	B	A	A	C							4043/4047*
	4009*	B	B	A	A	A	A	B	B	A	A	A	A	4009*
	4145*	A	A	B	A	A	B	A	A	B	B	A	B	4145*
	5554													5554
413.0 443.0 444.0 356.0 A356.0 A357.0 359.0	4043/4047*	A	B	A	A	A	B	4043/4047*						
	4145*	A	A	B	B	A	B	4145*						
	4008*	A	A	A	A	A	A	4008*						
	5554							5554						
7005 7021 7039 7046 710.0 711.0	4043/4047*	4043/4047*												
	4145*	4145*												
	5183	5183												
	5356	5356												
	5554	5554												
	5556	5556												
	5654	5654												

SYMBOL	CHARACTERISTIC
W	**Ease of welding** Relative freedom from weld cracking.
S	**Strength of welded joint** (as-welded condition) Rating applies particularly to fillet welds. All rods & electrodes rated should develop presently specified minimum strengths for butt welds.
D	**Ductility** Rating is based upon the free bend elongation of the weld.
C	**Corrosion resistance** in continuous or alternate immersion in fresh or salt water.
T	Recommended for service at **sustained temperatures** above 150°F (65.5°C).
M	**Color match** after anodizing.
A, B, C, & D are relative ratings in decreasing order of merit. The ratings have relative meaning only within a given block.	

How To Use This Chart

1. Select base alloys to be joined (one from the side blue column, the other from the top blue row).
2. Find the block where the column and row intersect.
3. This block contains horizontal rows of letters (A, B, C or D) representative of the alloy directly across from them in the filler alloy box at the end of each row. The letters in each line give the A-to-D rating of the characteristics listed at the top of each column – W, S, D, C, T and M (see Legend at right for explanation of each letter).
4. Analyze the weld characteristics afforded by each filler alloy. You will find that you can "trade off" one characteristic for another until you find the filler that best meets your needs.

Example

If joining base alloys 6061 and 5086; first find the box where the 6061 row and the 5086 column intersect. Then notice that there are no ratings for filler alloys 4043/4047, 4145 or 4643 – this means they are not usually recommended for this base combination.

Filler alloy 5356 has an "A" rating for ductility, but a "B" rating for strength. However, alloy 5556 has an "A" rating for strength, but a "B" rating for ductility. Therefore, it must be decided which attribute has the highest priority.

**NOTES:*

(1) Combinations having no rating are not usually recommended.

(2) The following filler alloys are heat-treatable and can produce higher strength weldments after postweld solution heat treatment and aging: 206, 357, 2319, 4008, 4009, 4145, and 4643.

(3) An "A" rating for alloy 5083 to 5083 and 5083 to 5456. No rating for alloy 5456 to 5456.

(4) 4047 can be used in lieu of 4043. Alloy 4047 provides increased fluidity for welding leak-tight joints, minimizes solidification cracking, and has a slightly higher fillet weld shear strength.

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