HOBART FILLER METALS | MAXAL

ALUMINUM FILLER METAL SELECTION CHART

Explanation of Relative Rating A, B, C, & D
Filler metal property ratings A, B, C and D are relative values for welding base metals indicated in a specific box. An “A” rating is the best fit for the weldment property and “D” rating is the least fit. A “blank” rating indicates that the filler metal is not recommended for that specific weldment property application. All ratings listed are in the as welded condition. For post weld heat treatment (PWHT) ratings, refer to the table on the right.

Explanation of Ratings A, B, C, & D - Comparison Between Boxes Ratings have comparative meaning within a single box only. For example, an “A” rating in one box does not have any comparative value to an “A” rating in another box.

**Special Filler Metal Considerations
Filler Metal 4943
4943 will provide substantially higher strength with comparable weldability and crack sensitivity when compared to 4043. This filler metal has an addition of Mg which provides it with higher as-welded strength without dependence on dilution from base material. It will also provide greater strength in components that are subjected to post weld heat treatment (solutionizing and/or precipitation hardening).
Filler Metal 4047
4047 has a lower melting temperature, slightly higher shear strength, higher fluidity and reduced sensitivity to termination cracking when compared to 4043. It is often selected for leak-tight joints and may also make a good substitute for 4043 when welding other types of thin sections.

WELD METAL PROPERTIES

CRACKING	**CRACK SENSITIVITY** The Probability of Hot Cracking - this rating is established through use of crack sensitivity curves (Developed by Alcoa) and the consideration of filler metal and base metal chemistry combinations. There are levels of various alloying elements within aluminum that have been identified as seriously affecting hot cracking susceptibility during weld solidification. This rating is primarily based on the probability of producing a weld outside these crack sensitive chemistry ranges.
STRENGTH	**STRENGTH** Ratings are for fillet weld and groove weld strength in the as welded condition. Groove welds – Any specified filler metal with a rating can provide minimum transverse tensile strength in groove welds that will meet the as-welded strength of the base material. Fillet welds – Ratings provided are for fillet weld shear strength.
DUCTILITY	**DUCTILITY** This characteristic of the completed weld may be of consideration if forming operations are to be used on a completed weldment during fabrication. Note: Testing procedure requirements for guided bend tests may need to be adjusted to accommodate the varying ductility of filler metals (AWS D1.2).
CORROSION	**CORROSION RESISTANCE** This variable may be a consideration for some environmental conditions. The rating is based on exposure to fresh and salt water environments and is not associated with a specific chemical exposure. It gives an indication as to the possibility of galvanic corrosion due to the difference in the electrode potential between the base metal and the filler metal. For consideration for other environmental and chemical exposures contact MAXAL.
TEMPERATURE	**ELEVATED TEMPERATURE SERVICE** This rating is based on the reaction of some filler metals when exposed to sustained elevated temperature: 150°F to 350°F (66°C to 180°C). If 5xxx series base metal or filler metal with more than 3% magnesium content are subjected to prolonged exposure to these temperatures, precipitate can form within them that is highly anodic to the aluminum-magnesium matrix. It is this continuous grain boundary network of precipitate that produces susceptibility to stress corrosion cracking (SCC) and the potential for premature component failure.
COLOR	**COLOR MATCH AFTER ANODIZING** Base metal and filler metal color match after post-weld anodizing can be of major concern in cosmetic applications. Some filler metals closely match the base metal color after anodizing and others will react to the anodizing process by changing to a color very different to that of the base metal.
PWHT	**POST WELD HEAT TREATMENT** This rating applies to the ability of a weld to respond to post-weld heat treatment in the form of solution heat treatment and artificial aging. An “A” rating indicates that the filler metal is heat treatable and will therefore respond to post weld heat treatment even without dilution of the base metal. A “B” rating indicates that the filler metal is not heat treatable. However, it may be used for applications requiring post weld heat treatment but with the understanding that the weld may or may not acquire substantial increase in strength dependent on the joint design, welding procedure, and resultant amount of dilution of base metal obtained during welding. A “C” rating requires consultation with MAXAL®. No rating indicates that the filler metal is not heat treatable and that it should not be used for applications requiring post weld heat treatment as it may result in substantial reduction in weld performance.
TOUGHNESS	**TOUGHNESS** This rating applies to the ability of an aluminum weldment to deform plastically in the presence of stress raisers without low-energy initiation and propagation of cracks. The most useful test data is from tear resistance testing expressed in unit propagation energy of measured crack lengths. In structural design, notch toughness is becoming more emphasized by designers to facilitate the ability to inspect highly stressed structures and find cracks in weldments before catastrophic failure occurs. It may also be a design consideration if fatigue and impact loading are factors directly associated with a weldment.

HOBART FILLER METALS | MAXAL

METAL GROUPS		Pure Aluminum							
BASE METAL	FILLER METAL	1100, 1060, 1070, 1080, 1350							
WELD METAL PROPERTIES		CRACKING	STRENGTH	DUCTILITY	CORROSION	TEMPERATURE	COLOR	PWHT	TOUGHNESS
319.0, 333.0 354.0, 355.0 C355.0, 380.0	2319								
	4043/4943**	B	A	A	A	A	A		C
	4145	A	A	B	A	A	A		D
413.0, 443.0 444.0, 356.0 A356.0, 357.0 359.0	4043/4943**	A	A	A	A	A	A		C
	4145	A	A	B	B	A			D
	A356.0								
	A357.0								
	5356								
7005, 7021 7039, 7046 7146 710.0, 711.0	4043/4943**	A	D	C	A	A			D
	4145								
	5183	B	A	B	A	A			B
	5356	B	B	A	A	A			A
	5554								B
	5556	B	A	B	A	A			B
	5654								
6061,6005 6063,6070 6151,6201 6351,6951,6082	4043**	A	D	C	A	A			C
	4145	A	C	D	B	A			D
	4943**	A	C	C	A	A			C
	5183	B	A	B		A			B
	5356	B	B	A		A			A
	5554								
	5556	B	A	B		A			B
	5654								
5454	5183	B	A	B	B		A		B
	5356	B	B	A	B		A		A
	5554	C	C	A	A	A	A		B
	5556	B	A	B	B		A		B
	5654								
511.0, 512.0 513.0, 514.0 535.0 5154, 5254	5183	B	A	B	B		A		B
	5356	B	B	A	B		A		A
	5554	C	C	A	A		A		B
	5556	B	A	B	B		A		B
	5654	C	C	A	A		B		B
5086, 5083, 5456, 5383	5183	A	A	B	A		A		B
	5356	A	B	A	A		A		A
	5554								
	5556	A	A	B	A		A		B
	5654								
5005, 5050 5052, 5652	4043/4943**	A	D	C	A	A			D
	5183	B	A	B			A		B
	5356	B	B	A			A		A
	5554								
	5556	B	A	B			A		B
	5654								
3004 Alclad 3004	1100	D	D	A	A	A	A		C
	4043/4943**	A	C	C	A	A			D
	4145	B	C	D	B	A			D
	5183	C	A	B			B		B
	5356	C	B	B			B		A
	5554								
	5556	C	A	B			B		B
3003, Alclad 3003	1100	B	B	A	A	A	A		A
	4043/4943**	A	A	B	A	A			D
	4145	A	A	C	B	A			D
2219	2319								
	4043/4943**	B	B	A	A	A			D
	4145	A	A	B	A	A			D
2014, 2036	2319								
	4043/4943**	B	B	A	A	A			D
	4145	A	A	B	A	A			D
1100, 1060, 1070, 1080, 1350	1100	B	B	A	A	A	B		A
	1188	C		A	A	A	A		A
	4043/4943**	A	A	B	A	A			D

METAL GROUPS		Aluminum - Copper							
BASE METAL	FILLER METAL	2014, 2036							
WELD METAL PROPERTIES		CRACKING	STRENGTH	DUCTILITY	CORROSION	TEMPERATURE	COLOR	PWHT	TOUGHNESS
319.0, 333.0 354.0, 355.0 C355.0, 380.0	2319	B	A	A	A	A	A	A	A
	4043/4943**	C	C	B	C	A	A	B	C
	4145	A	B	C	B	A	A	A	D
413.0, 443.0 444.0, 356.0 A356.0, 357.0 359.0	4043/4943**	B	B	A	A	A	A	B	C
	4145	A	A	B	A	A		A	D
	A356.0								
	A357.0								
	5356								
7005, 7021 7039, 7046 7146 710.0, 711.0	4043/4943**	B	B	A	A	A			C
	4145	A	A	B	A	A			D
	5183								
	5356								
	5554								
	5556								
	5654								
6061,6005 6063,6070 6151,6201 6351,6951,6082	4043**	B	B	A	A	A			C
	4145	A	A	B	A	A			D
	4943**								
	5183								
	5356								
	5554								
	5556								
	5654								
5454	5183								
	5356								
	5554								
	5556								
	5654								
511.0, 512.0 513.0, 514.0 535.0 5154, 5254	5183								
	5356								
	5554								
	5556								
	5654								
5086, 5083, 5456, 5383	5183								
	5356								
	5554								
	5556								
	5654								
5005, 5050 5052, 5652	4043/4943**								
	5183								
	5356								
	5554								
	5556								
	5654								
3004 Alclad 3004	1100								
	4043/4943**								
	4145								
	5183								
	5356								
	5554								
	5556								
3003, Alclad 3003	1100								
	4043/4943**	B	A	A	A	A			D
	4145	A	A	B	A	A			D
2219	2319	B	A	A	A	A	A	A	A
	4043/4943**	B	C	B	C	A		B	D
	4145	A	B	C	B	A		A	D
2014, 2036	2319	C	A	A	A	A	A	A	A
	4043/4943**	B	C	B	C	A		B	D
	4145	A	B	C	B	A		A	D

METAL GROUPS		Aluminum - Copper							
BASE METAL	FILLER METAL	2219							
WELD METAL PROPERTIES		CRACKING	STRENGTH	DUCTILITY	CORROSION	TEMPERATURE	COLOR	PWHT	TOUGHNESS
319.0, 333.0 354.0, 355.0 C355.0, 380.0	2319	B	A	A	A	A	A	A	A
	4043/4943**	C	C	B	C	A	A	B	C
	4145	A	B	C	B	A	A	A	D
413.0, 443.0 444.0, 356.0 A356.0, 357.0 359.0	4043/4943**	B	B	A	A	A	A	B	C
	4145	A	A	B	A	A		A	D
	A356.0								
	A357.0								
	5356								
7005, 7021 7039, 7046 7146 710.0, 711.0	4043/4943**	B	B	A	A	A			C
	4145	A	A	B	A	A			D
	5183								
	5356								
	5554								
	5556								
	5654								
6061,6005 6063,6070 6151,6201 6351,6951,6082	4043**	B	B	A	A	A			C
	4145	A	A	B	A	A			D
	4943**								
	5183								
	5356								
	5554								
	5556								
	5654								
5454	5183								
	5356								
	5554								
	5556								
	5654								
511.0, 512.0 513.0, 514.0 535.0 5154, 5254	5183								
	5356								
	5554								
	5556								
	5654								
5086, 5083, 5456, 5383	5183								
	5356								
	5554								
	5556								
	5654								
5005, 5050 5052, 5652	4043/4943**								
	5183								
	5356								
	5554								
	5556								
	5654								
3004 Alclad 3004	1100								
	4043/4943**								
	4145								
	5183								
	5356								
	5554								
	5556								
3003, Alclad 3003	1100								
	4043/4943**	B	A	A	A	A			D
	4145	A	A	B	A	A			D
2219	2319	A	A	A	A	A	A	A	A
	4043/4943**	B	C	B	C	A		B	D
	4145	A	B	C	B	A		A	D

METAL GROUPS		Aluminum - Manganese							
BASE METAL	FILLER METAL	3003, Alclad 3003							
WELD METAL PROPERTIES		CRACKING	STRENGTH	DUCTILITY	CORROSION	TEMPERATURE	COLOR	PWHT	TOUGHNESS
319.0, 333.0 354.0, 355.0 C355.0, 380.0	2319								
	4043/4943**	B	B	A	A	A	A		C
	4145	A	A	B	A	A	A		D
413.0, 443.0 444.0, 356.0 A356.0, 357.0 359.0	4043/4943**	A	A	A	A	A	A		D
	4145								
	A356.0								
	A357.0								
	5356								
7005, 7021 7039, 7046 7146 710.0, 711.0	4043/4943**	A	D	C	A	A			D
	4145								
	5183	B	A	B	A		A		B
	5356	B	B	A	A		A		A
	5554								
	5556	B	A	B	A		A		B
	5654								
6061,6005 6063,6070 6151,6201 6351,6951,6082	4043**	A	D	C	A	A			C
	4145	A	C	D	B	A			D
	4943**	A	C	C	A	A			C
	5183	B	A	B			A		B
	5356	B	B	A			A		A
	5554								
	5556	B	A	B			A		B
	5654								
5454	5183	B	A	B	A		A		B
	5356	B	B	A	B		A		A
	5554	C	C	A	A	A	A		B
	5556	B	A	B	B		A		B
	5654								
511.0, 512.0 513.0, 514.0 535.0 5154, 5254	5183	B	A	B	B		A		B
	5356	B	B	A	B		A		A
	5554	C	C	A	A		A		B
	5556	B	A	B	B		A		B
	5654	C	C	A	A		B		B
5086, 5083, 5456, 5383	5183	A	A	B	A		A		B
	5356	A	B	A	A		A		A
	5554								
	5556	A	A	B	A		A		B
	5654								
5005, 5050 5052, 5652	4043/4943**	A	D	C	A	A			D
	5183	B	A	B			A		B
	5356	B	B	A			A		A
	5554								
	5556	B	A	B			A		B
	5654								
3004 Alclad 3004	1100	C		A	A	A	A		C
	4043/4943**	A	C	C	A	A			D
	4145	B	C	D	B	A			D
	5183	C	A	B	C		A		B
	5356	C	B	B	C		A		A
	5554								
	5556	C		B	C		A		B
3003, Alclad 3003	1100	B		A	A	A	A		A
	4043/4943**	A	A	B	A	A			D
	4145	A	A	C	B	A			D

METAL GROUPS		Aluminum - Manganese							
BASE METAL	FILLER METAL	3004, Alclad 3004							
WELD METAL PROPERTIES		CRACKING	STRENGTH	DUCTILITY	CORROSION	TEMPERATURE	COLOR	PWHT	TOUGHNESS
319.0, 333.0 354.0, 355.0 C355.0, 380.0	2319								
	4043/4943**	B	B	A	A	A	A		C
	4145	A	A	B	A	A	A		D
413.0, 443.0 444.0, 356.0 A356.0, 357.0 359.0	4043/4943**	A	A	A	A	A	A		D
	4145								
	A356.0								
	A357.0								
	5356								
7005, 7021 7039, 7046 7146 710.0, 711.0	4043/4943**	A	D	C	B	A			D
	4145								
	5183	B	A	B	A		A		B
	5356	B	B	A	A		A		A
	5554	C	C	A	A	A	A		B
	5556	B	A	B	A		A		B
	5654	C	C	A	A		B		B
6061,6005 6063,6070 6151,6201 6351,6951,6082	4043**	A	D	C	A	A			C
	4145	B	C	D	B	A			D
	4943**	A	C	C	A	A			C
	5183	B	A	B			A		B
	5356	B	B	A			A		A
	5554								
	5556	B	A	B			A		B
	5654								
5454	5183	B	A	B	B		A		B
	5356	B	B	A	B		A		A
	5554	C	C	A	A	A	A		B
	5556	B	A	B	B		A		B
	5654								
511.0, 512.0 513.0, 514.0 535.0 5154, 5254	5183	B	A	B	B		A		B
	5356	B	B	A	B		A		A
	5554	C	C	A	A		A		B
	5556	B	A	B	B		A		B
	5654	C	C	A	A		B		B
5086, 5083, 5456, 5383	5183	A	A	B	A		A		B
	5356	A	B	A	A		A		A
	5554								
	5556	A	A	B	A		A		B
	5654								
5005, 5050 5052, 5652	4043/4943**	A	D	C	A	A			D
	5183	B	A	B			A		B
	5356	B	B	A			A		A
	5554								
	5556	B	A	B			A		B
	5654								
3004 Alclad 3004	1100								
	4043/4943**	A	D	D	A	A			D
	4145								
	5183	B	A	C	C		A		B
	5356	B	B	B	C		A		A
	5554	C	C	A	B	A	A		B
	5556	B	A	C	C		A		B

METAL GROUPS		Aluminum - Magnesium							
BASE METAL	FILLER METAL	5005, 5050 5052, 5652							
WELD METAL PROPERTIES		CRACKING	STRENGTH	DUCTILITY	CORROSION	TEMPERATURE	COLOR	PWHT	TOUGHNESS
319.0, 333.0 354.0, 355.0 C355.0, 380.0	2319								
	4043/4943**	A	A	A	A	A	A		D
	4145								
413.0, 443.0 444.0, 356.0 A356.0, 357.0 359.0	4043/4943**	A	B	A	A	A	A		D
	4145								
	A356.0								
	A357.0								
	5356	B	A	B	B		A		A
7005, 7021 7039, 7046 7146 710.0, 711.0	4043/4943**	B	D	C	B	A			D
	4145								
	5183	A	A	B	A		A		B
	5356	A	B	A	A		A		A
	5554	B	C	A	A	A	A		B
	5556	A	A	B	A		A		B
	5654	B	C	A	A		A		B
6061,6005 6063,6070 6151,6201 6351,6951,6082	4043**	A	D	C	A	A			D
	4145								
	4943**	A	C	C	A	A			D
	5183	B	A	B	C		B		B
	5356	B	B	A	C		A		A
	5554	C	C	A	B	A	B		B
	5556	B	A	B	C		B		B
	5654	C	C	A	B		A		
5454	5183	A	A	B	B		A		B
	5356	A	B	A	B		A		A
	5554	C	C	A	A	A	A		B
	5556	A	A	B	B		A		B
	5654	B	C	A	B		B		B
511.0, 512.0 513.0, 514.0 535.0 5154, 5254	5183	A	A	B	B		B		B
	5356	A	B	A	B		A		A
	5554	C	C	A	A		B		B
	5556	A	A	B	B		B		B
	5654	B	C	A	A		A		B
5086, 5083, 5456, 5383	5183	A	A	B	A		A		B
	5356	A	B	A	A		A		A
	5554	C	C	A	A		A		B
	5556	A	A	B	A		A		B
	5654	B	C	A	B		A		B
5005, 5050 5052, 5652	4043/4943**	A	D	C	B	A			D
	5183	A	A	B	A		A		B
	5356	A	B	A	A		A		A
	5554	C	C	A	A	A	A		B
	5556	A	A	B	A		A		B
	5654	B	C	A	B		A		B

METAL GROUPS		Aluminum - Magnesium							
BASE METAL	FILLER METAL	5086, 5083, 5456, 5383							
WELD METAL PROPERTIES		CRACKING	STRENGTH	DUCTILITY	CORROSION	TEMPERATURE	COLOR	PWHT	TOUGHNESS
319.0, 333.0 354.0, 355.0 C355.0, 380.0	2319								
	4043/4943**								
	4145								
413.0, 443.0 444.0, 356.0 A356.0, 357.0 359.0	4043/4943**								
	4145								
	A356.0								
	A357.0								
	5356								
7005, 7021 7039, 7046 7146 710.0, 711.0	4043/4943**								
	4145								
	5183	A	A	B	A		A		B
	5356	A	B	A	A		A		A
	5554								
	5556	A	A	B	A		A		B
	5654								
6061,6005 6063,6070 6151,6201 6351,6951,6082	4043**								
	4145								
	4943**								
	5183	A	A	B	A		A		B
	5356	A	B	A	A		A		A
	5554	B	C	A	A		A		B
	5556	A	A	B	A		A		B
	5654	B	C	A	A		B		B
5454	5183	A	A	B	B		A		B
	5356	A	B	A	B		A		A
	5554	B	C	A	A		A		B
	5556	A	A	B	B		A		B
	5654								
511.0, 512.0 513.0, 514.0 535.0 5154, 5254	5183	A	A	B	A		A		B
	5356	A	B	A	A		A		A
	5554	B	C	A	A		A		B
	5556	A	A	B	A		A		B
	5654	B	C	A	A		B		B
5086, 5083, 5456, 5383	5183	A	*	B	A		A		B
	5356	A	*	A	A		A		A
	5554								
	5556	A	*	B	A		A		B
	5654								

METAL GROUPS		Aluminum - Magnesium							
BASE METAL	FILLER METAL	511.0, 512.0 513.0, 514.0 535.0 5154, 5254							
WELD METAL PROPERTIES		CRACKING	STRENGTH	DUCTILITY	CORROSION	TEMPERATURE	COLOR	PWHT	TOUGHNESS
319.0, 333.0 354.0, 355.0 C355.0, 380.0	2319								
	4043/4943**								
	4145								
413.0, 443.0 444.0, 356.0 A356.0, 357.0 359.0	4043/4943**								
	4145								
	A356.0								
	A357.0								
	5356								
7005, 7021 7039, 7046 7146 710.0, 711.0	4043/4943**								
	4145								
	5183	A	A	B	A		A		B
	5356	A	B	A	A		A		A
	5554	B	C	A	A		A		B
	5556	A	A	B	A		A		B
	5654	B	C	A	A		A		B
6061,6005 6063,6070 6151,6201 6351,6951,6082	4043**								
	4145								
	4943**								
	5183	B	A	B	C		A		B
	5356	B	B	A	C		A		A
	5554	C	C	A	B		A		B
	5556	B	A	B	C		A		B
	5654	C	C	A	B		A		B
5454	5183	A	A	B	B		A		B
	5356	A	B	A	B		A		A
	5554	B	C	A	A		A		B
	5556	A	A	B	B		A		B
	5654	B	C	A	A		B		B
511.0, 512.0 513.0, 514.0 535.0 5154, 5254	5183	A	A	B	B		B		B
	5356	A	B	A	B		A		A
	5554	B	C	A	A		B		B
	5556	A	A	B	B		A		B
	5654	B	C	A	A		A		B

METAL GROUPS		Aluminum - Magnesium							
BASE METAL	FILLER METAL	5454							
WELD METAL PROPERTIES		CRACKING	STRENGTH	DUCTILITY	CORROSION	TEMPERATURE	COLOR	PWHT	TOUGHNESS
319.0, 333.0 354.0, 355.0 C355.0, 380.0	2319								
	4043/4943**								
	4145								
413.0, 443.0 444.0, 356.0 A356.0, 357.0 359.0	4043/4943**								
	4145								
	A356.0								
	A357.0								
	5356								
7005, 7021 7039, 7046 7146 710.0, 711.0	4043/4943**								
	4145								
	5183	A	A	B	A		A		B
	5356	A	B	A	A		A		A
	5554	B	C	A	A	A	A		B
	5556	A	A	B	A		A		B
	5654	B	C	A	A		A		B
6061,6005 6063,6070 6151,6201 6351,6951,6082	4043**								
	4145								
	4943**								
	5183	B	A	B	C		A		B
	5356	B	B	A	C		A		D
	5554	C	C	A	A	A	A		B
	5556	B	A	B	C		A		B
	5654	C	C	A	B		B		B
5454	5183	A	A	B	B		A		B
	5356	A	B	A	B		A		A
	5554	B	C	A	A	A	A		B
	5556	A	A	B	B		A		B
	5654	B	C	A	B		B		B

METAL GROUPS		AL-Mg$_2$ Si							
BASE METAL	FILLER METAL	6061,6005 6063,6070 6151,6201 6351,6951,6082							
WELD METAL PROPERTIES		CRACKING	STRENGTH	DUCTILITY	CORROSION	TEMPERATURE	COLOR	PWHT	TOUGHNESS
319.0, 333.0 354.0, 355.0 C355.0, 380.0	2319								
	4043/4943**	B	B	A	A	A	A		C
	4145	A	A	B	A	A	A		D
413.0, 443.0 444.0, 356.0 A356.0, 357.0 359.0	4043/4943**	A	B	A	A	A	A		C
	4145	A	A	B	B	A			D
	A356.0								
	A357.0								
	5356								
7005, 7021 7039, 7046 7146 710.0, 711.0	4043/4943**	A	D	C	B	A			D
	4145								
	5183	A	A	B	A		A		B
	5356	A	B	A	A		A		A
	5554	B	C	A	A	A	A		B
	5556	A	A	B	A		A		B
	5654	B	C	A	A		A		A
6061,6005 6063,6070 6151,6201 6351,6951,6082	4043**	A	D	B	A	A		B	D
	4145								
	4943**	A	C	B	A	A		A	D
	5183	B	A	A	C		A		B
	5356	B	B	A	C		A		A
	5554	C	C	A	B	B	A	C	B
	5556	B	A	A	C		A		B
	5654	C	C	A	B		B		B

METAL GROUPS		AL - Zinc							
BASE METAL	FILLER METAL	7005, 7021 7039, 7046 7146 710.0, 711.0							
WELD METAL PROPERTIES		CRACKING	STRENGTH	DUCTILITY	CORROSION	TEMPERATURE	COLOR	PWHT	TOUGHNESS
319.0, 333.0 354.0, 355.0 C355.0, 380.0	2319								
	4043/4943**	B	B	A	A	A	A		C
	4145	A	A	B	A	A	A		D
413.0, 443.0 444.0, 356.0 A356.0, 357.0 359.0	4043/4943**	A	D	B	A	A	A		C
	4145	A	C	B	B	A			D
	A356.0								
	A357.0								
	5356	A	A	A	A		B		
7005, 7021 7039, 7046 7146 710.0, 711.0	4043/4943**	B	D	C	B	A			D
	4145								
	5183	A	A	B	A		A	C	B
	5356	A	B	A	A		A	C	A
	5554	B	C	A	A	A	A	C	B
	5556	A	A	B	A		A	C	B
	5654	B	C	A	A		A	C	B

METAL GROUPS		AL - Castings							
BASE METAL	FILLER METAL	413.0, 443.0 444.0, 356.0 A356.0, 357.0 359.0							
WELD METAL PROPERTIES		CRACKING	STRENGTH	DUCTILITY	CORROSION	TEMPERATURE	COLOR	PWHT	TOUGHNESS
319.0, 333.0 354.0, 355.0 C355.0, 380.0	2319								
	4043/4943**	B	B	A	A	A	A		C
	4145	A	A	B	A	A	A		D
413.0, 443.0 444.0, 356.0 A356.0, 357.0 359.0	4043/4943**	A	D	A	A	A	A	C	C
	4145	A	C	B	B	A	B	C	D
	A356.0	A	A	A	A	A	A	C	A
	A357.0	A	A	A	A	A	A	C	B
	5356								

METAL GROUPS		AL - Castings							
BASE METAL	FILLER METAL	319.0, 333.0 354.0, 355.0 C355.0, 380.0							
WELD METAL PROPERTIES		CRACKING	STRENGTH	DUCTILITY	CORROSION	TEMPERATURE	COLOR	PWHT	TOUGHNESS
319.0, 333.0 354.0, 355.0 C355.0, 380.0	2319	B	A	A	A	A	A	A	A
	4043/4943**								
	4145	A	C	B	B	A	A	A	D

*5XXX Series Strength Ratings		
Base Metal	Filler Metal	Strength Rating
5086	5356	C
	5183	B
	5556	A
5083	5356	
	5183	B
	5556	A
5456, 5383	5356	
	5183	
	5556	A

Note: Any strength rating will meet the minimum transverse tensile strength requirements of AWS D1.2, a blank rating typically will not.

Example:
Welding 5454 base material that will be used as a support bracket for an industrial heater – This weldment will be subjected to sustained elevated temperature of 250 to 300°F (121 to 149°C).

1. As the welded component is operating at temperature above 150°F (66°C). Elevated TEMPERATURE is the most important weld metal property.
2. Left hand column 5454 (fifth from top), and top row 5454 (fifth from right).
3. See insert picture of intersecting row and column (On Right).
4. There is only one row that has a rating for elevated temperature.
5. For this particular application we only have one filler metal that is suitable for this application, and that is filler metal 5554. All the other filler metals within the box have a blank rating for elevated temperature which indicates that they are not suitable for this particular welding application.

Filler Metal Selection for Aluminum Welding

This chart is a tool that is designed to help you select the most appropriate filler metal, taking into consideration base metal, the application, and the desired weld metal properties.

How to use the Chart

1. Determine which of the weld metal properties are most important for your application. (Table located on far left)
2. Locate the base metal to be welded in the blue left hand column and in the blue row across the top of the chart.
3. Locate the white box where the base metal row and column intersect.
4. Examine the data in the white box and select the row that provides the best match for your application based on the weld metal properties. (There may be more than one filler metal that is acceptable.)
5. Once you identify the row that gives you the properties you need, follow that row to the left or right until you come to a gray box. The filler metal located in that row in the gray box is the most suitable match.
6. Economic Considerations:
If there is more than one filler metal that meets the design criteria requirements, choose the most economical product. More than 85% of all aluminum filler metal that is used is 5356 or 4043. These two products are easily acquired and, because of their production volume the cost of these products is generally less than others.

		5454							
		CRACKING	STRENGTH	DUCTILITY	CORROSION	TEMPERATURE	COLOR	PWHT	TOUGHNESS
5454	5183	A	A	B	B		A		B
	5356	A	B	A	B		A		A
	5554	B	C	A	A	A	A		B
	5556	A	A	B	B		A		B
	5654	B	C	A	B		B		B