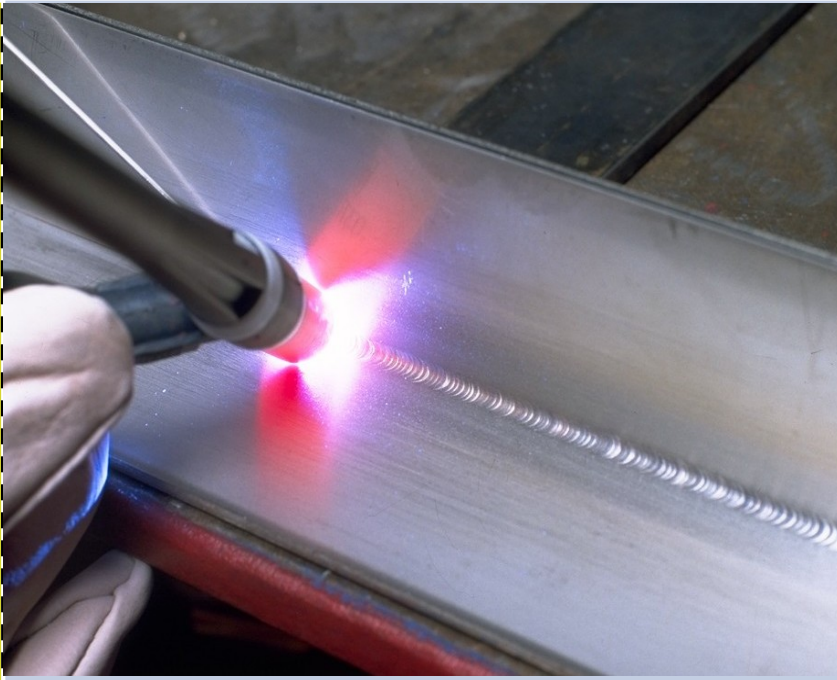


BLUESHIELDTM Aluminum Welding Consumables



Air Liquide is a market leader in providing consistent top quality welding filler metals. **BLUESHIELD CRYSTALTM** aluminum MIG and TIG products are manufactured using the highest quality standards and state-of-the-art technologies. The superior surface finish of **BLUESHIELD CRYSTAL** aluminum offers the maximum welding performance and trouble-free feeding possible.

*With **BLUESHIELD CRYSTAL** aluminum, your welds will be of "Crystal Quality".*



BLUESHIELD CRYSTAL aluminum wires and rods are manufactured using very high quality standards and unique testing methods in order to ensure maximum feedability and excellent weld quality.

BLUESHIELD CRYSTAL 4043 (AWS ER4043)

Alloy 4043 is one of the most widely used general-purpose aluminum welding alloy. This alloy contains silicon to lower the melting point, improve fluidity and enhance wetting action.

BLUESHIELD CRYSTAL 4043 produces a bright weld with very good appearance and offers excellent resistance to weld cracking.

BLUESHIELD CRYSTAL 5356 (AWS ER5356)

Alloy 5356 has a high magnesium content and is the most popular filler metal alloy typically chosen for its strength. Alloy 5356 is very versatile for applications like structures, ships, automotive, trailer, tanks, etc. It has a high compatibility with various base metals but is not recommended for high-temperature applications exceeding 65 °C (150 °F). **BLUESHIELD CRYSTAL 5356** offers good feedability characteristics.

BLUESHIELD CRYSTAL 4047 (AWS ER4047)

Alloy 4047 was originally designed for brazing and has a higher silicon content than alloy 4043, increasing the fluidity, reducing shrinkage and minimizing the hot-cracking phenomenon. Alloy 4047 is suitable for sustained elevated temperature service, i.e. above 65 °C (150 °F) and is often used in the automotive industry.

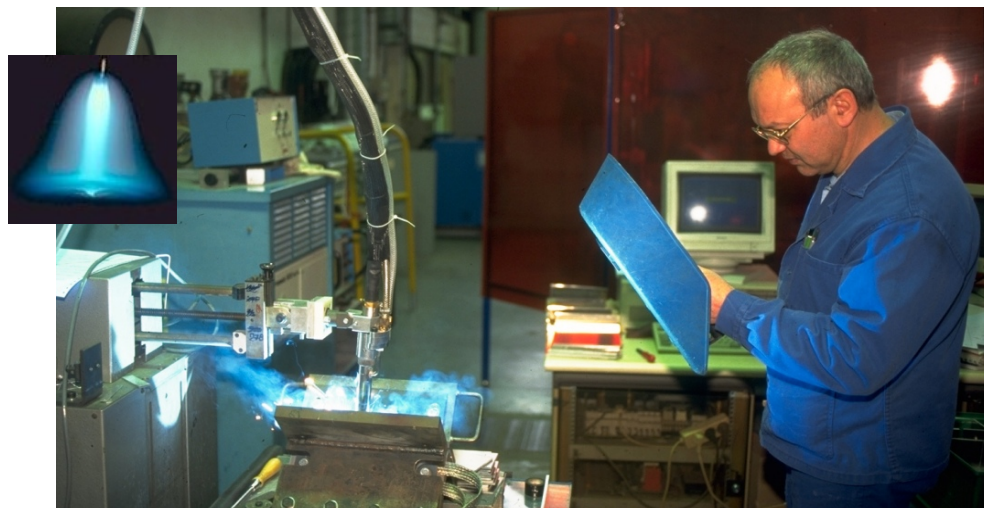
GMAW (MIG)					
NAME	AWS CLASS	DIAMETER		PACKAGING (spool)	
		mm	in	kg	lb
CRYSTAL 4043	ER4043	0.8 to 1.2	0.030 to 3/64	0.45	1
		0.8 to 1.6	0.030 to 1/16	9.1	20
CRYSTAL 5356	ER5356	0.8 to 1.2	0.030 to 3/64	0.45	1
		0.8 to 1.6	0.030 to 1/16	9.1	20
CRYSTAL 4047	ER4047	0.9 to 1.6	0.035 to 1/16	7.3	16

GTAW (TIG)					
NAME	AWS CLASS	DIAMETER		PACKAGING (tube)	
		mm	in	kg	lb
CRYSTAL 4043	ER4043	1.6 to 3.2	1/16 to 1/8	4.5	10
CRYSTAL 5356	ER5356	1.6 to 3.2	1/16 to 1/8	4.5	10



The aluminum alloys are specially designed and refined to minimize impurities. A sample spool of every pallet is randomly selected and tested before release. Our **BLUESHIELD CRYSTAL** is the perfect wire for the best weld possible; every time, every spool.

BLUESHIELD CRYSTAL



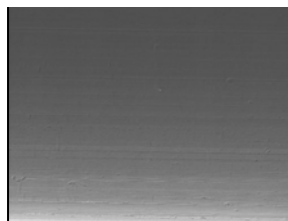
Continuous welding with aluminum wire on an automated bench test and computer data recording.

A QUALITY YOU CAN SEE, PROVED WITH A UNIQUE TESTING SYSTEM

LOWER QUALITY WIRE SURFACE
MAGNIFIED 60x



BLUESHIELD CRYSTAL WIRE SURFACE
MAGNIFIED 60x



One of the most important features of the **BLUESHIELD CRYSTAL** wire is its superior surface finish. Problems like wire burn-back, tangling and unstable arcs are often caused by a poor surface quality. Poor feeding will usually occur with a high imperfection content or with inconsistent diameters. By testing a sample spool out of every heat, "live" in a robotic cell similar to the one shown in the picture, we can assure the best feedability possible. By using cutting-edge manufacturing technologies, selecting the most rigorous chemistry and systematic testing on a live weld station, **BLUESHIELD CRYSTAL** will stand out among other competitive products.



Typical Aluminum Welding Parameters

GTAW (TIG) ALUMINUM WELDING PARAMETERS

METAL THICKNESS		JOINT	TUNGSTEN ELECTRODE DIAMETER		FILLER ROD DIAMETER (IF ANY)		AC CURRENT (FLAT WELD) A	GAS ³	GAS FLOW		ARC TRAVEL SPEED	
mm	in		mm	in	mm	in			l/min	cfh	cm/min	in/min
1.6	1/16	Butt Lap Corner Fillet	1.6	1/16	1.6	1/16	60-80 ¹	Argon or ALTIG or BLUESHIELD 1	7-15	15-32	30.5	12
							70-90 ¹				25.4	10
							60-80 ¹				30.5	12
							70-90 ¹				25.4	10
3.2	1/8	Butt Lap Corner Fillet	2.4	3/32	2.4, 3.2	3/32, 1/8	125-145 ¹	BLUESHIELD 1	8-17	17-36	30.5	12
					2.4	3/32	140-160 ¹				25.4	10
					---	---	125-145 ¹				30.5	12
					2.4, 1.6	3/32, 1/16	140-180 ¹				25.4	10
5.0	3/16	Butt Lap Corner Fillet	3.2	1/8	3.2	1/8	190-200 ¹	Argon or ALTIG or BLUESHIELD 1, 2	10-21	21-44	27.9	11
							210-240 ¹				22.9	9
							190-220 ¹				27.9	11
							210-240 ¹				22.9	9
6.0	1/4	Butt Lap Corner Fillet	5.0	3/16	2.4	3/32	260-300 ²	BLUESHIELD 1, 2	12-25	25-53	25.4	10
					or	or	290-340 ²				20.3	8
					5.0	3/16	280-320 ²				25.4	10
							280-320 ²				20.3	8
9.5	3/8	Butt Lap Corner Fillet	5.0	3/16	5.0	3/16	330-380 ²	Argon or ALTIG or BLUESHIELD 1, 2, 3	14-30	30-63	*	*
			or	or	or	or	330-380 ²					
			6.0	1/4	6.0	1/4	350-400 ²					
							330-380 ²					
13.0	1/2	Butt Lap Corner Fillet	5.0	3/16	5.0	3/16	440-450 ²	BLUESHIELD 1, 2, 3	15-32	32-68	*	*
			or	or	or	or	400-450 ²					
			6.0	1/4	6.0	1/4	420-470 ²					
							400-450 ²					

¹ Ceramic cup should be used for currents up to 250 A

² Water-cooled cup should be used for currents above 250 A

³ Please consult Air Liquide for optimized Blueshield gas selection and parameters.

* Welding speed for multiple passes cannot be accurately predicted



Typical Aluminum Welding Parameters

GMAW (MIG) ALUMINUM WELDING PARAMETERS

METAL THICKNESS		WELD POSITION ¹	WELD PASSES	ELECTRODE DIAMETER		AMPERAGE ² (DCEP) A	ARC VOLTAGE ²	GAS ³	GAS FLOW		ARC TRAVEL SPEED		APPROX. ELECTRODE CONSUMPTION	
mm	In			mm	in				l/min	cfh	cm/min	in/min	kg/100 m	lb/100 ft
2.4	3/32	F, V, H, O	1	0.8	0.030	100-130	18-22	Argon or ALTIG	14	30	60-78	23-30	2.7	1.8
3.2	1/8	F	1	0.8-1.2	0.030-0.045	125-150	20-24	Argon or ALTIG	14	30	60-78	23-30	3.0	2.0
		V, H	1	0.8	0.030	110-130	19-23		14	30				
		O	1	0.8-1.2	0.030-0.045	115-140	20-24		19	40				
4.8	3/16	F	1	1.2	0.045	180-210	22-26	Argon or ALTIG or BLU 1	14	30	60-78	23-30	6.7	4.5
		V, H	1	0.8-1.2	0.030-0.045	130-175	21-25		16	35				
		O	1	0.8-1.2	0.030-0.045	130-190	22-26		21	45				
6.3	¼	F	1	1.2-1.6	0.045-0.062	170-240	24-28	Argon or ALTIG or BLU 1	19	40	60-78	23-30	10.4	6.9
		V, H	1	1.2	0.045	170-210	23-27		21	45				
		O	1	1.2-1.6	0.045-0.062	190-220	24-28		28	60				
9.5	3/8	F	1	1.6		240-300	26-29	Argon or ALTIG or BLU 1, 2	23	50	48-60	19-23	25.3	16.9
		H, V	3	1.6	0.062	190-240	24-27		28	60	60-78	23-30		
		O	3	1.6		200-240	25-26		40	85	60-78	23-30		
19.0	¾	F	4	2.4	3/32	360-380	26-30	Argon or ALTIG or BLU 1, 2, 3	28	60	48-60	19-23	98.3	65.5
		H, V	4-6	1.6	0.062	260-310	25-29		33	70	60-78	23-30		
		O	10	1.6	0.062	275-310	25-29		40	85	60-78	23-30		

Note: Parameters suggested for fillet and lap welding with argon

¹ F = Flat, V = Vertical, H = Horizontal, O = Overhead

² For 5xxx series electrodes, use a welding current in the upper range and an arc voltage in the lowest range.

1xxx, 2xxx and 4xxx series electrodes should be used with the lower current and higher arc voltage.

³ Please consult Air Liquide for optimized **Blueshield** gas selection and parameters.

