

BOC shielding gases

ARGOSHIELD[®]

ALUSHIELD[®]

STAINSHIELD[®]

SPECSHIELD[®]



BOC shielding gases.

For the serious welder.
ARGOSHIELD® STAINSHIELD®
ALUSHIELD® SPECSHIELD®

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The role of shielding gas.

What shielding gas can do.

The primary function of the shielding gas in gas-shielded arc welding is to protect molten and heated metal from the damaging effects of the surrounding air and to provide suitable conditions for the arc. If air comes in contact with the molten or heated metal, the oxygen in the air will oxidise the metal, the nitrogen might cause porosity or brittleness in the weld metal, and moisture from the air may also cause porosity.

The shielding gas composition affects the material transition from the molten electrode to the weld pool, which in turn influences the amount and size of the spatter created. It also affects the appearance of the weld bead, the weld geometry, the possible welding speed and plays a key role in the possible burn-off of alloying elements (which affects material strength), or oxide formation on the bead surface.

The figure below illustrates how the shielding gas influences the process and the results in GMA welding.

Environment

The emission of fume and gases is influenced by the shielding gas.

Shielding effect

Molten or heated metal is shielded from the air in a controlled shielding gas atmosphere.

Metal transfer

The type of metal transfer is strongly influenced by the shielding gas. The shielding gas also influences the size and forces acting on the droplets.

Arc stability

Arc stability and arc ignition are influenced by the shielding gas.

Surface appearance

The amount of spatter and surface slag is also influenced by the shielding gas.

Metallurgy and mechanical properties

The loss of alloying elements and pick-up of oxygen, nitrogen, and carbon is influenced by the shielding gas. This loss and pick-up will influence the mechanical properties of the weld metal.

Weld geometry

The profiles of the weld bead and penetration are influenced by the shielding gas.

Welding speed

The choice of shielding gas will affect the welding speed and the total welding cost.

The influence of shielding gas upon GMA welding.

Environment

The emission of fume and gases is influenced by the shielding gas.

Shielding effect

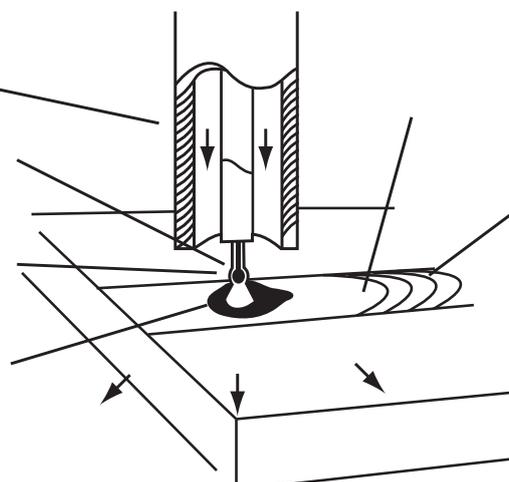
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The role of shielding gas (cont.)

Effects of the different shielding gas components.

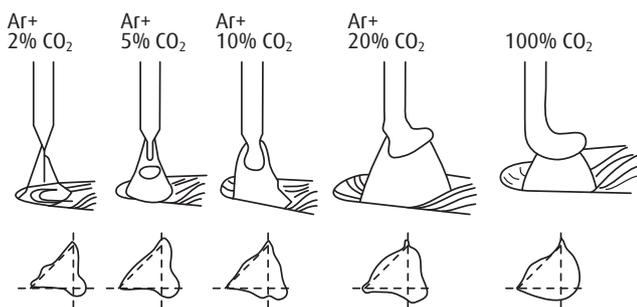
Argon

Argon (Ar) is an inert gas. This means it does not oxidise and that it has no impact on the chemical composition of the weld metal. Argon is the main component in most shielding gases for GMA and GTA welding.

Carbon Dioxide and Oxygen

Pure argon cannot be used for GMA welding of steels since the arc becomes too unstable. An oxidising gas component is therefore used to stabilise the arc and to ensure a smooth metal transfer during welding. This oxidising component may be either Carbon Dioxide (CO₂), Oxygen (O₂) or a combination of these gases. The amount of the oxidising component added will depend on the material type and application.

The electrical arc in gas-shielded arc welding can be divided into three parts: the arc plasma, the cathode area and the anode area. In the GMA welding, where the filler metal constitutes the positive electrode (the anode), the cathode area is on the workpiece in the form of one or more cathode spots. The oxidising additive is necessary to stabilise these cathode spots, otherwise the arc will tend to flicker around on the surface of the workpiece, forming spatter, irregular weld bead and minimal penetration.



The metal transfer and penetration profile can be changed by selecting different argon-carbon dioxide mixtures. The figure shows the type of metal transfer in spray arc and typical penetration profile for mixtures with 2% CO₂ up to pure CO₂. Higher CO₂ content gives better side wall penetration but more spatter and fume. For most applications, the penetration given by a smaller percentage of CO₂ is acceptable. A spray arc cannot be achieved when using 100% CO₂.

Carbon Dioxide or Oxygen?

There are often advantages in using CO₂ in argon. One is the slight improvement in weld geometry and appearance over oxygen-argon mixtures. This occurs because of the differences in weld pool fluidity, surface tension and oxides in the molten metal. With CO₂ instead of O₂, there is also less oxidation and slag formation, which can have an effect on the appearance of the weld as well as the need for cleaning the weld.

Another advantage is improved penetration, especially side wall penetration. This is mainly a factor of the higher arc voltage and the energy employed when welding with CO₂ in the mixture.

Helium

Helium (He) is like argon – an inert gas. Helium is used together with argon and a small percent of CO₂ or O₂ for GMA welding of stainless steel. In its pure state, or mixed with argon, it is used as a shielding gas for GTA and MIG welding. Compared with argon, helium provides better side wall penetration and higher welding speeds, by generating a more energy-rich arc. The process is more sensitive to arc length variations with helium as a shielding gas, and the arc is more difficult to strike when TIG welding.

Hydrogen

Hydrogen (H₂) can be added to shielding gases for GTA welding of austenitic stainless steels in order to reduce oxide formation. The addition also means more heat in the arc and a more constricted arc, which improves penetration. It also gives a smoother transition between weld bead and base metal.

For root protection purposes, hydrogen addition is commonly used. It is not recommended for root protection of austenitic-ferritic (duplex) steels. For this application, argon or high purity nitrogen should be used.

Nitrogen

Nitrogen (N₂) is used as an additive in shielding gases for GTA welding of austenitic, duplex and superduplex stainless steels. These steels are alloyed with up to 0.5% nitrogen in order to increase the mechanical properties and resistance against pitting. If the shielding gas contains a few percent of nitrogen, nitrogen losses in the weld metal can be reduced.

Nitrogen with 5% hydrogen is a common root protection gas that delivers a good reducing effect. Pure nitrogen will further increase pitting resistance at the root when welding austenitic duplex and superduplex stainless steels.

A versatile tool in the value-added process.

The two product lines – COMPETENCE LINE® and PERFORMANCE LINE®.

In order to achieve both technically and economically high-quality weld seams, everything involved in the process – material, equipment, process gas and welding technology has to do its part. This requires a better understanding of how our shielding gases are used as more than just a ‘welding consumable commodity’, they also:

- Influence the arc – both electrically and thermally
- Determine viscosity and surface tension – both of the drop and of the pool
- Control wetting properties
- Control penetration, seam geometry and seam surface
- React metallurgically with the filler metal and pool
- Influence radiation, heat transfer and arc efficiency
- Determine metal transfer and energy distribution in the arc
- Influence certain pollutant emissions

These properties have to be optimally utilised in order to reap the full potential of gases in the welding process. Through our understanding of how this tool functions, we are able to make an active contribution towards the added value in our customers’ production processes.

Our customers continue to demand specialised solutions to keep pace with the growing requirements in the field of welding. Advances made in equipment and materials science, new measuring technologies and simulation techniques require state-of-the-art, innovative gas products. Expensive specialised materials require customised solutions – sometimes even at a molecular level. Gases require the same diversification as materials and joining processes. To improve product transparency and to make selecting a product easier, we offer two product lines. Both lines contain shielding gases for every material and process combination.

COMPETENCE LINE®

The COMPETENCE LINE® of proven gases and gas mixtures offer the very highest quality, supported by BOC service. This line contains our all-rounders, such as ARGOSHIELD® Universal, STAINSHIELD® Light and argon, products that are indispensable to everyday welding technology and are ranked amongst some of the best-selling gas products in the world.

- Reliable
- High quality
- Versatile
- User-friendly

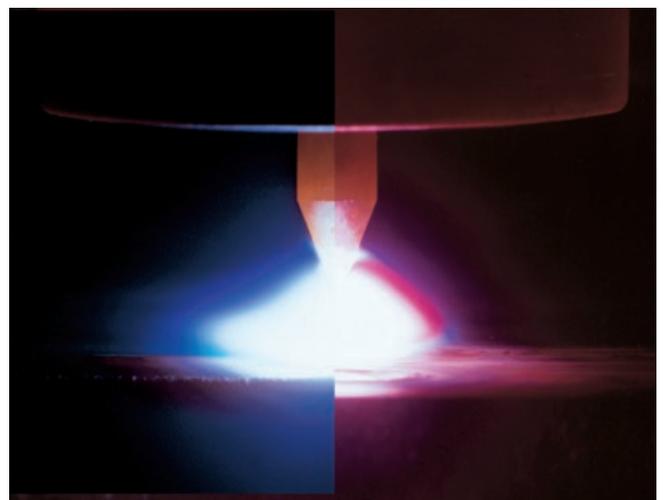
PERFORMANCE LINE®

The PERFORMANCE LINE® of argon mixtures containing helium, nitrogen or hydrogen is for specialised applications. These components improve arc efficiency and enhance heat transfer from the arc to the joint, resulting in higher welding speeds. If improvements in quality alone are required, helium or hydrogen can be used without increasing the welding speed. For example, helium can be used as an additive in many robot applications to better compensate for component tolerances. The wider acting arc improves edge wetting and reduces lack of fusion problems resulting in greater output and improved quality.

A TIG arc with Argon (COMPETENCE LINE®) and ARGOPLAS® 5 (PERFORMANCE LINE®) as the shielding gas.

Argon

ARGOPLAS® 5



Are you using the right gases correctly?

Frequently asked questions.

Here are some common questions about the correct use of shielding gases. Some of you will know the answer but for others, the answer may not be what you were expecting.

Why am I getting holes in my welds?

Holes (porosity) are usually caused by gas entrapment inside the cooling weld metal. While gases such as nitrogen are one of the main causes of porosity, other sources such as water, oil and grease on the material can be as much of a problem.

The main causes of porosity are:

- Too high or too low a flow of shielding gas – too high and air is entrained into the shield; too low and the gas can't protect the cooling weld metal from the atmosphere
- Poor welder technique – too long a stick-out or bad torch angle
- Incorrect choice of shielding gas – shielding gases containing hydrogen and/or nitrogen are beneficial for some materials but can cause porosity in others
- Poorly maintained equipment
- If hose fittings are not tightened

- If there are gas leaks in the power source or torch, air can be entrained into the shielding gas. Some types of hose are permeable and can allow moisture to enter the shielding gas
- Surface contamination – oil, grease, water and other contamination on the welded component can add hydrogen into the weld metal.

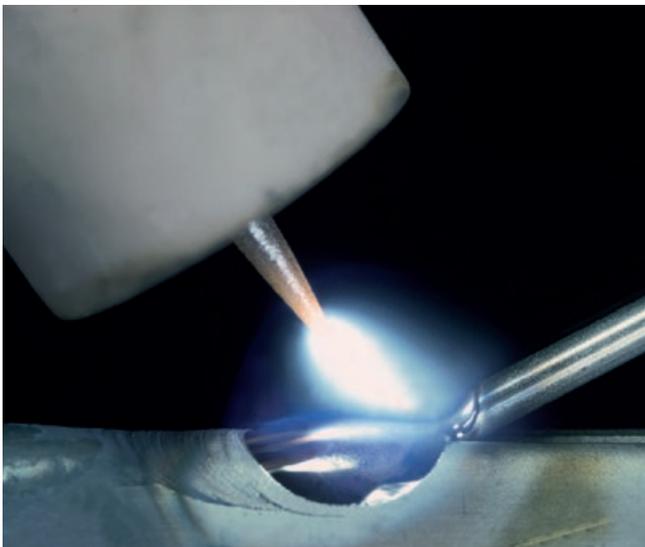
This is not an exhaustive list but most causes of porosity are caused by poor housekeeping and/or poor welding procedures.

Why can I not use pure argon for GMA welding steels?

While it is possible to GMA-weld steels with pure argon, the arc produced is very unstable and erratic, and the resultant weld will have a lot of spatter and an unsatisfactory penetration profile.

When GMA welding steels, a small amount of oxidising gas (either carbon dioxide or oxygen) is needed to help to stabilise the arc and produce sound welds.

TIG Arc.



Why am I getting a lot of spatter on my welds?

There are several causes of spatter, but the most common are:

- Using unstable welding conditions – incorrect voltage for a given welding current
- Poor welder technique – too long a stick-out or bad torch angle
- Surface contamination on component – oil, grease, moisture
- Surface coatings such as paint and zinc galvanising
- Using carbon dioxide as the shielding gas – mixed gases are more stable and produce less spatter.

Training the welder to set good welding conditions and clean the component properly can eliminate many of the problems.

I get cracking when welding stainless steels. Why?

There are two main types of cracking in stainless steels: 'hot cracking' and 'cold cracking'.

Hot cracking, properly called 'solidification cracking', tends to be a problem in austenitic stainless steels. It is called 'hot cracking' as it tends to occur immediately after welding while the weld is still hot. Weld-metal solidification cracking is more likely in fully austenitic structures which are more crack-sensitive than those containing a small amount of ferrite. The best way to prevent cracking is to choose a consumable which has a high enough ferrite content to ensure that the weld metal does not crack.

Cold cracking, properly called 'hydrogen cracking', occurs in welds that are intolerant of hydrogen (e.g. martensitic stainless steels). Hydrogen dissolves in the weld metal while it is molten, then after solidification, it diffuses to small defects in the weld and hydrogen gas forms, building up in pressure as the weld cools. Then, when the pressure is sufficiently high and the weld is cool and more brittle, this internal pressure can cause the weld to crack. This may not occur until many hours after welding.

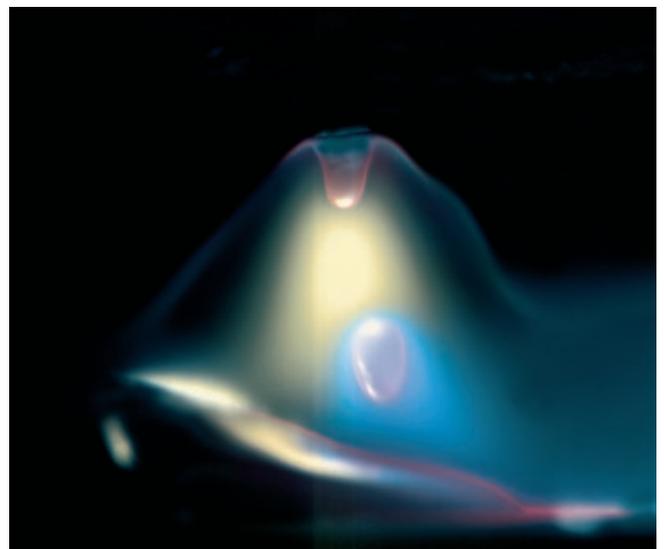
What causes the sooty deposit when welding aluminium?

This sooty deposit is not soot (carbon) at all, but a form of aluminium oxide.

When welding occurs, some of the parent material and filler wire is volatilised by the welding arc. As this fine metal vapour leaves the area covered by the shielding gas, it reacts with air, forming aluminium oxide that condenses on the component being welded. The higher the welding current used, the greater the amount of oxide produced.

It is not always possible to eliminate this problem but altering the torch angle and ensuring correct shielding gas coverage can minimise the effect. Also, if the weld is cleaned immediately after welding, the oxide is much easier to remove than if it is left until the weld is cold. The use of an ALUSHIELD® shielding gas will also help reduce the coverage of aluminium oxide.

Pulsed Arc.



Shielding gas codes.

AS 4882: 2003 shielding gases for welding.

Designation as specified in AS 4882-2003 Shielding Gases for Welding.

Individual gas components shall be identified as follows:

- A – Argon
- C – Carbon Dioxide
- He – Helium
- H – Hydrogen
- N – Nitrogen
- O – Oxygen

The designation system shall be based on volumetric percentages. The shielding gas designation system shall be composed of the following designator and number arrangement:

SG – shielding gas designator

The letters SG at the beginning of each designation identifies the product as a shielding gas. These letters are followed by a hyphen.

SG-B – Base gas designator

Shielding gases are designated according to chemical composition. The letter immediately to the right of SG indicates the singular or major gas in the shielding gas or mixture.

SG-B XYZ – Minor gas component designators

The letter(s) immediately following the base gas indicates the minor individual gas indicators in decreasing order of percent. These letters are followed by a hyphen.

SG-B XYZ-%/%/% – Percentage designators

A slash shall be used to separate the individual minor components percentages for two or more component mixtures.

Gas	Code	Classification
ARGOSHIELD® Light	060	SG-ACO-5/3.1
ARGOSHIELD® Universal	065	SG-ACO-16/2.75
ARGOSHIELD® MCW	066	SG-AC-10
ARGOSHIELD® 12S2	121	SG-ACO-12/2
ARGOSHIELD® Heavy	122	SG-AC-18
ARGOSHIELD® 52	070	SG-AC-25
ARGOSHIELD® 40	068	SG-AO-5
ARGOSHIELD® 54	071	SG-ACO-7/1.5
ARGOSHIELD® 100	095	SG-AHeC-25/10
ARGOSHIELD® Pipeline	107	SG-AC-50
STAINSHIELD®	075	SG-AO-1.5
STAINSHIELD® Light	119	SG-AC-2.5
STAINSHIELD® Heavy	092	SG-AHeC-35/2.8
STAINSHIELD® 66	093	SG-ACH-2.8/1
STAINSHIELD® 69	094	SG-AHeO-35/0.9
STAINSHIELD® Duplex	114	SG-AN-2
STAINSHIELD® Pipeline	399	SG-HeAC-7.5/2.5
ALUSHIELD® He10	127	SG-AHe-10
ALUSHIELD® Light	079	SG-AHe-27
ALUSHIELD® Universal	133	SG-AHe-50
ALUSHIELD® Heavy	069	SG-HeA-25
ARGOPLAS® 5	143	SG-AH-5
ARGOPLAS® 20	144	SG-AH-20
ARGOPLAS® 35	145	SG-AH-35
SPECSHIELD® Copper	077	SG-AO-0.7

Shielding gases.



Argon Welding Grade, Compressed (Ar) Gas Code 061

Gas	Purity
Argon	>99.995%



NOTE: Higher grades and purities of this product are available from BOC. Call our Scientific Support Centre on 1800 658 278 for more information.

Cylinder Sizes	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
G3VIPR	14.8	30,000	AS 4267 5/8-18 UNF
F3VIPR	9.7	30,000	
G2	10.2	20,000	AS 2473 Type 10
E2	4.1	20,000	
D2	2.0	20,000	

Pack Sizes

COP64	948.8	30,000*	AS 2473 Type 10
COP16	241.3	30,000*	
KAY15	227.2	30,000*	
KAY9	136.3	30,000*	
KAY4	60.6	30,000*	

Cylinder colour (to AS 4484): Peacock blue body, shoulder and neck.

Not all cylinders and packs are available at all BOC outlets. Please check with your local BOC branch on 131 262. Other sized cylinders and packs may also be available on request.

* Indicates fitted with a pressure regulating valve outlet connection, 6,000–9,000 kPa.

Argon Welding Grade, Liquid CRYOSPEED® (Ar) Gas Code 731

Vessel Size	Capacity (m ³ @ STP)
VIE230	189.0
VIE430	352.0
VIE700	575.0
VIE950HP	780.9
VIE1500HP	1,167.2
VIE2000HP	1,516.6

Details of the wide range of storage vessels and ancillary equipment are available from BOC on request.



Carbon Dioxide (CO₂)

Applications

- MIG welding mild steel
- For welding carbon and alloy steel and stainless steel with flux cored wires
- Shielding gas in plasma cutting
- Liquid for substrate cooling to control the heat build-up when thermal and plasma spraying
- BOC recommends the use of the ARGOSHIELD® range as the preferred mild steel MIG welding gas
- Suitable for inerting applications
- Balancing pH levels in swimming pools
- Cryogenic liquid carbon dioxide can also be used in small pipe freezing applications

Features

- A colourless and odourless gas that can cause the nose to sting in high concentration
- Toxic in high concentrations
- An asphyxiant (does not support life)
- Slightly corrosive in the presence of moisture
- Heavier than air, carbon dioxide will collect in ducts, drains and low-lying areas
- Highly soluble in water at moderate pressures. At elevated temperatures, carbon dioxide reacts with many substances
- Dip tubes are used in liquid withdrawal carbon dioxide cylinders to extract the liquid from the cylinder. The tube runs down the centre of the pressurised cylinder and draws the liquid up through the valve. To identify these cylinders, a black stripe is painted down the length of the cylinder

Benefits

- Higher density than air provides good blanketing properties
- This chemical property has led to its use as a reactant in some chemical processes

Carbon Dioxide Industrial Grade, Compressed (CO₂) Gas Code 081

Gas	Purity	Cylinder Sizes	Content (kg)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
Carbon Dioxide (Liquid Phase)	>99.99%	G	31.0	-	AS 2473 Type 30
		E	15.0	-	
		D	6.0	-	
		Pack Sizes			
		MAN15	465.0		AS 2473 Type 30
		MAN9	279.0		



NOTE: Higher grades and purities of this product are available from BOC. Call our Scientific Support Centre on 1800 658 278 for more information.

Cylinder colour (to AS 4484): Green grey body, shoulder and neck.

Not all cylinders and packs are available at all BOC outlets. Please check with your local BOC branch on 131 262. Other sized cylinders and packs may also be available on request.

Carbon Dioxide Welding Grade, Liquid CRYOSPEED® (CO₂) Gas Code 740

Vessel Size	Capacity (m ³ @ STP)
MIXONSITE450	216.4
MIXONSITE600	269.0
MIXONSITE750	357.9
MIXONSITE900	432.8
MIXONSITE1500	715.8
VIE950	793.0
VIE1500	1186.0



ARGOSHIELD® Light Gas Code 060

Applications

- Sheet metal engineering industries
- Automotive components manufacture
- Vehicle repair
- Cabinets/steel furniture manufacture
- Air conditioning industries
- Domestic appliance manufacture
- Light gauge storage tanks

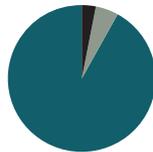
Features

- Excellent arc stability
- Low arc energy
- Low oxidation potential
- Uses less wire than higher CO₂ mixes
- Wide operating envelope
- Fast weld speed

Benefits

- Easy to use
- Low defect levels
- Low distortion levels
- Good appearance and quality finish
- Increased productivity
- Minimal spatter production negates the need to clean weld
- Can be used with manual, automatic and robotic machines

Gas	Composition
Oxygen	3.1%
Carbon Dioxide	5%
Argon	Balance



Cylinder Sizes	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
G3VIPR	15.1	30,000	AS 4267 5/8-18 UNF
F3VIPR	10.0	30,000	
G	8.7	16,900	AS 2473 Type 10
E2	4.2	20,000	
D2	2.1	20,000	

Pack Sizes

KAY15	230.2	29,700*	AS 2473 Type 10
KAY9	138.1	29,700*	
KAY4	61.4	29,700*	

Cylinder colour (to AS 4484): Peacock blue body, green grey shoulder, black neck.

Not all cylinders and packs are available at all BOC outlets. Please check with your local BOC branch on 131 262. Other sized cylinders and packs may also be available on request.

* Indicates fitted with a pressure regulating valve outlet connection, 6,000-9,000 kPa.

Indicative Welding Parameters

Material thickness (mm)	Dip Transfer				Spray Transfer			
	1-1.6	2	3	4	3	4	6	8-9
Welding position	Horizontal/ Vertical	Horizontal/ Vertical	Horizontal/ Vertical	Horizontal/ Vertical	Horizontal	Horizontal	Horizontal	Horizontal
Wire diameter (mm)	0.8-0.9	0.8-0.9	0.8-0.9	0.9-1.0	0.9	0.8	1.0	1.2
Current (amps)	45-80	60-100	80-120	80-150	160-180	170-200	180-220	240-280
Voltage (volts)	14-16	16-17	16-18	16-18	23-25	24-27	24-26	27-29
Wire feed speed (m/min)	3.5-5.0	4.0-7.0	4.0-7.0	4.0-7.0	7.5-9.0	9.0-12.0	8.0-10.0	7.0-9.0
Gas rate flow (L/min)	15	15	15	15	15	15	18	18
Travel speed (mm/min)	350-500	350-500	320-500	280-450	800-1000	420-500	300-400	400-500



ARGOSHIELD® MCW Gas Code 066

Applications

- General fabrication
- Light to medium plate fabrication
- Structural steelworks
- 2GR pipe spooling
- Pipe and tube joining
- Rolled sections
- Pressure vessels and boilers

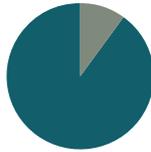
Features

- Excellent arc stability
- Minimal spatter
- Fluid weld pool
- Excellent weld shape
- Virtually no slug with metal-cored wires
- Uses less wire than higher CO₂ mixes

Benefits

- Low defect levels
- Improved weld fusion
- Good appearance and quality finish
- Minimal clean-up required
- Lowers overall costs by using less wire
- Lower spatter reduces clean-up time
- Can be used with manual, automatic and robotic machines

Gas	Composition
Carbon Dioxide	10%
Argon	Balance



Cylinder Sizes	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
G3VIPR	15.5	30,000	AS 4267 5/8-18 UNF
F3VIPR	10.2	30,000	
G	8.9	16,900	AS 2473 Type 10
Pack Sizes			
MCP4	63.6	30,000	AS 2473 Type 10
MCP15	237.4	30,000	

Cylinder colour (to AS 4484): Peacock blue body, green grey shoulder.

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* Indicates fitted with a pressure regulating valve outlet connection, 6,000–9,000 kPa.

Indicative Welding Parameters

	Spray Transfer		
	6	8	12 (3pass)
Material thickness (mm)	6	8	12 (3pass)
Welding position	Horizontal	Horizontal	Horizontal
Wire diameter (mm)	1.2	1.6	1.6
Current (amps)	250–300	320–400	320–400
Voltage (volts)	28–31	28–32	28–32
Wire feed speed (m/min)	8.0–10.0	45.0–7.0	45.0–7.0
Gas rate flow (L/min)	18	18	18
Travel speed (mm/min)	350–400	200–280	270–370



ARGOSHIELD® Universal Gas Code 065

Applications

- General fabrication
- Light to medium plate fabrication
- Structural steelworks
- Bridgework
- Pipe and tube joining
- Vehicle manufacture/
heavy trucks
- Rolled sections
- Pressure vessels and boilers
- Boats and ship building

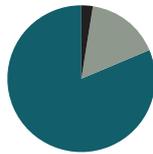
Features

- Excellent arc stability
- Fluid weld pool
- Used in dip, pulsed and
spray metal transfer modes
- Fast travel speed

Benefits

- Low defect levels
- Improved weld fusion
- Good weld appearance with
low reinforcement levels
- Easy to use
- Higher productivity due
to faster welding speeds
- Lowers overall costs by
using less wire
- Lower spatter reduces
clean-up time
- Can be used with manual,
automatic and robotic machines

Gas	Composition
Oxygen	2.75%
Carbon Dioxide	16%
Argon	Balance



Cylinder Sizes	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
G3VIPR	15.0	27,600	AS 4267 5/8-18 UNF
F3VIPR	10.0	25,000	
G	8.7	16,000	AS 2473 Type 10
E2	4.4	20,000	
D2	2.2	20,000	

Pack Sizes

KAY 15	230.2	27,600*	AS 2473 Type 10
KAY 9	138.1	27,600*	
KAY 4	61.4	27,600*	

Cylinder colour (to AS 4484): Peacock blue body, green grey shoulder, black neck.

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* Indicates fitted with a pressure regulating valve outlet connection, 6,000–9,000 kPa.

Indicative Welding Parameters

Material thickness (mm)	Dip Transfer			Spray Transfer		
	4	6	8	4	6	12
Welding position	Horizontal/ Vertical	Horizontal/ Vertical	Horizontal/ Vertical	Horizontal	Horizontal	Horizontal
Wire diameter (mm)	0.9–1.0	0.9–1.0	1.2	1.0	1.2	1.2
Current (amps)	120–160	140–160	140–160	180–210	240–260	280–310
Voltage (volts)	17–19	17–18	17–18	23–25	25–27	27–31
Wire feed speed (m/min)	4.0–5.2	4.0–5.0	3.2–4.0	8.0–12.0	7.0–9.0	9.0–11.0
Gas rate flow (L/min)	15	15	15	18	18	18
Travel speed (mm/min)	240–300	280–340	380–460	400–500	420–530	370–440



ARGOSHIELD® 12S2 Gas Code 121

Applications

- General fabrication
- Light to medium plate
- Structural steel works
- Pipe and joining
- Rolled sections

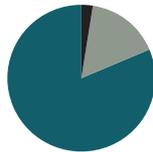
Features

- Superior arc stability
- Fluid weld pool
- Suitable for a wide range of welding parameters and applications
- Fast travel speeds

Benefits

- Easy to use
- Stable arc during welding
- Particularly suited for inverter power sources
- Great for step change welding processes

Gas	Composition
Oxygen	2%
Carbon Dioxide	12%
Argon	Balance



Cylinder Sizes	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
F3VIPR	10.3	30,000	AS4267 5/8-18 UNF

Cylinder colour (to AS 4484): Peacock blue body, green grey shoulder, black neck.
Other sized cylinders and packs may also be available on request.

ARGOSHIELD® 12S2 delivers a saving of 16.5%

Material	Thickness	Joint	Position
Steel	6mm	Fillet	Flat

Parameters			
Welding process		MIG	MIG
Shielding gas		ARGOSHIELD® Universal	ARGOSHIELD® 12S2
Wire used		ER 70-S6	ER 70-S6
Gas flow rate	l/min	12	12
Wire diameter	mm	1.2	1.2
Welding current	A	182	186
Welding voltage	V	28	29
Wire feed speed	m/min	11.6	11.6
No electrodes used	No		
Weld length	mm	150	150
Weld time	secs	30	25
Clean up time	secs		
Wire density	q/m	8.4	8.4
Electrode weight	q/electrode		
Gas price	\$/m ³	3.95	3.95
Wire/rod price	\$/kg	2.70	2.70
Electricity price	\$/kWhr	0.40	0.40
Labour rate	\$/hr	65.00	65.00

Outcome			
Wire used	m	5.80	4.83
Cost of wire used	\$	0.13	0.11
Cost of electrodes	\$	0.00	0.00
Gas used	litres	6.00	5.00
Cost of gas used	\$	0.02	0.02
Labour time	secs	30.00	25.00
Labour cost	\$	0.54	0.45
Power used	W	5150.60	5301.00
Power cost	\$	0.02	0.01
Total cost	\$	0.71	0.60
Unit weld length	mm	1000.0	1000.0
Unit weld length cost	\$/m	4.76	3.97



ARGOSHIELD® Heavy Gas Code 122

Applications

- Heavy engineering
- Heavy structural steel
- Boiler manufacture
- Ship building and repair
- Heavy vehicle manufacture
- Thick walled pipes and pressure vessels
- Pad-eyes and lifting lugs
- Earth moving equipment

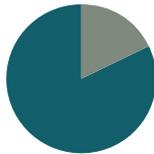
Features

- Stable welding arc
- Fluid weld pool
- Used in dip and spray metal transfer modes

Benefits

- Improved weld fusion
- Low defect levels on thick materials
- Good appearance and finish
- Easy to use
- Increased productivity
- Can be used on automated machines

Gas	Composition
Carbon Dioxide	18%
Argon	Balance



Cylinder Size	Content (m³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
G3VIPR	14.0	25,000	AS 4267 5/8-18 UNF
F3VIPR	9.2	25,000	
G2	11.3	20,000	AS 2473 Type 10

Pack Sizes

MCP9	130.5	30,000*	AS 2473 Type 10
MCP15	217.6	30,000*	

Cylinder colour (to AS 4484): Peacock blue body, green grey shoulder and neck

Not all cylinders and packs are available at all BOC outlets. Please check with your local BOC branch on 131 262. Other sized cylinders and packs may also be available on request.

* Indicates fitted with a pressure regulating valve outlet connection, 6,000–9,000 kPa.

Indicative Welding Parameters

	Dip Transfer		Spray Transfer	
	10	12+	10	12+
Material thickness (mm)	10	12+	10	12+
Welding position	Horizontal/Vertical	Horizontal/Vertical	Horizontal	Horizontal
Wire diameter (mm)	1.2	1.2	1.2	1.2
Current (amps)	140–160	140–160	240–260	290–330
Voltage (volts)	17–18	17–18	27–29	28–31
Wire feed speed (m/min)	3.2–4.0	3.2–4.0	7.0–8.0	10.0–12.0
Gas rate flow (L/min)	18	18	18	18
Travel speed (mm/min)	300–450	300–450	400–480	370–440



ARGOSHIELD® 52 Gas Code 070

Applications

- Heavy structural steel
- Mining equipment
- Pressure vessels and boilers
- Heavy wall piping
- Ships and offshore structures
- Earth moving equipment

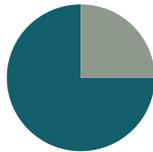
Features

- High heat input efficiency
- Deep penetration
- Faster weld speeds than CO₂
- Prevents porosity
- Excellent dip transfer characteristics
- Used in dip and pulsed transfer modes
- Approved with most FCAW and MCAW wires

Benefits

- Higher productivity due to faster welding speeds than CO₂ with flux cored wires
- Versatile
- Low repair rates
- Good weld appearance
- Easy to use

Gas	Composition
Carbon Dioxide	25%
Argon	Balance



Cylinder Sizes	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
G3VIPR	14.7	25,000	AS 4267 5/8-18 UNF
F3VIPR	9.7	25,000	
G2†	11.9	20,000	AS 2473 Type 10
G	9.0	16,000	
E	4.1	15,000	
Pack Sizes			
KAY15	231.0	26,000*	AS 2473 Type 10
KAY9	138.6	26,000*	
KAY4	61.6	26,000*	

Cylinder colour (to AS 4484): Peacock blue body, green grey shoulder and neck.

Not all cylinders and packs are available at all BOC outlets. Please check with your local BOC branch on 131 262. Other sized cylinders and packs may also be available on request.

* Indicates fitted with a pressure regulating valve outlet connection, 6,000–9,000 kPa.

† The G2 package available in QLD and WA only.

Indicative Welding Parameters

	Metal Cored Wires			Flux Cored Wires			
	10	12	20	12	12	20	20
Material thickness (mm)	10	12	20	12	12	20	20
Welding position	Horizontal	Horizontal	Horizontal	Horizontal	Vertical	Horizontal	Vertical
Wire diameter (mm)	1.2	1.2	1.6	1.2	1.2	1.6	1.6
Current (amps)	200–250	300–350	300–400	200–250	175–200	350–400	200–250
Voltage (volts)	27–29	31–34	30–32	25–28	24–25	29–32	24–26
Wire feed speed (m/min)	6.9–10.0	13.2–16.3	5.6–8.4	9.1–13.1	7.5–9.1	8.7–11.2	4.1–5.3
Gas flow rate (L/min)	18	18	18	18	15	18	15
Travel speed (mm/min)	380–550	380–550	350–450	200–300	150–250	300–400	150–200



ARGOSHIELD® 40
Gas Code **068**

Application

- Welding lighter steel

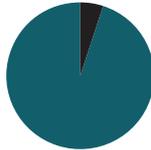
Features

- Clean, smooth weld bead with low reinforcement
- Good arc stability
- Low surface tension

Benefits

- Clean weld appearance and finish
- Improved fusion of the parent metal

Gas	Composition
Oxygen	5%
Argon	Balance



Cylinder Sizes	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
F3VIPR	9.7	30,000	AS4267 5/8-18 UNF
E	3.9	15,800	AS2473 Type 10

Pack Sizes			
KAY15	227.2	30,000*	AS2473 Type 10
KAY9	136.3	30,000*	
KAY4	60.6	30,000*	

Cylinder colour (to AS 4484): Peacock blue body, black shoulder and neck.

Not all cylinders and packs are available at all BOC outlets. Please check with your local BOC branch on 131 262. Other sized cylinders and packs may also be available on request.

* Indicates fitted with a pressure regulating valve outlet connection, 6,000–9,000 kPa.



ARGOSHIELD® 54 Gas Code 071

Applications

- Welding lighter steel
- Fabrication for electroplating, enameling or painting
- Panel beating
- Furniture manufacturing industries

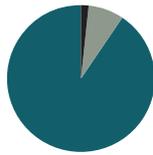
Feature

- Reduced spatter

Benefits

- Excellent finish
- Minimal clean-up required

Gas	Composition
Oxygen	1.5%
Carbon Dioxide	7%
Argon	Balance



Cylinder Sizes	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
F3VIPR	10.1	30,000	AS4267 5/8-18 UNF
E2	4.2	20,000	AS2473 Type 10
D2†	2.1	20,000	
D	1.6	15,800	

Pack Sizes

KAY4	61.8	29,500*	AS 2473 Type 10
KAY9	61.8	29,500*	
KAY15	231.7	29,500*	

Cylinder colour (to AS 4484): Peacock blue body, green grey shoulder, black neck.

Not all cylinders and packs are available at all BOC outlets. Please check with your local BOC branch on 131 262. Other sized cylinders and packs may also be available on request.

* Indicates fitted with a pressure regulating valve outlet connection, 6,000–9,000 kPa.

† The D2 package is available in TAS only.

Indicative Welding Parameters

	Dip Transfer				Spray Transfer			
	1–1.6	2	3	4	3	4	6	8–9
Material thickness (mm)	1–1.6	2	3	4	3	4	6	8–9
Welding position	Horizontal/ Vertical	Horizontal/ Vertical	Horizontal/ Vertical	Horizontal/ Vertical	Horizontal	Horizontal	Horizontal	Horizontal
Wire diameter (mm)	0.8–0.9	0.8–0.9	0.8–0.9	0.9–1.0	0.9	0.8	1.0	1.2
Current (amps)	45–80	60–100	80–120	80–150	160–180	170–200	180–220	240–280
Voltage (volts)	14–16	16–17	16–18	16–18	23–25	24–27	24–26	27–29
Wire feed speed (m/min)	3.5–5.0	4.0–7.0	4.0–7.0	4.0–7.0	7.5–9.0	9.0–12.0	8.0–10.0	7.0–9.0
Gas rate flow (L/min)	15	15	15	15	15	15	18	18
Travel speed (mm/min)	350–500	350–500	320–500	280–450	800–1000	420–500	300–400	400–500



ARGOSHIELD® 100 Gas Code 095

Applications

- Heavy steel
- GMA(MIG) welding of carbon manganese and low alloy steels

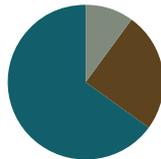
Features

- Good arc stability
- Flatter weld bead
- Excellent fusion characteristics
- Lower spatter levels
- Faster welding speeds

Benefits

- Lower risk of defect levels
- Higher productivity due to faster welding speeds
- Low distortion
- Clean weld appearance and finish

Gas	Composition
Carbon Dioxide	10%
Helium	25%
Argon	Balance



Cylinder Sizes	Content (m³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
F3VIPR	9.5	30,000	AS 4267 5/8-18 UNF
E	3.8	16,000	AS2473 Type 10
D	1.5	16,000	

Pack Sizes			
MAN9	73	16,9000	AS2473 Type 10

Cylinder colour (to AS 4484): Peacock blue body, brown shoulder, green grey neck.

Not all cylinders are available at all BOC outlets. Please check with your local BOC branch on 131 262. Other sized cylinders may also be available on request.



ARGOSHIELD® Pipeline Gas Code 107

Applications

- Carbon steel pipe
- Heavy wall pipe

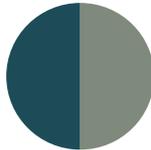
Features

- Very short arc length
- Excellent dip transfer characteristics
- Faster welding speed than CO₂

Benefits

- Deep penetration
- Lower risk of defect levels

Gas	Purity
Carbon Dioxide	50%
Argon	50%



Cylinder Sizes	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
G	9.5	13,700	AS2473 Type 10
MCP9	89.6	13,700	
COP16	159.4	13,700	

Cylinder colour (to AS 4484): Peacock blue body, green grey shoulder and neck.

Not all cylinders and packs are available at all BOC outlets. Please check with your local BOC branch on 131 262. Other sized cylinders may also be available on request.



STAINSHIELD® Gas Code 075

Applications

- Railway rolling stock
- Process equipment
- Storage tanks
- Architectural work

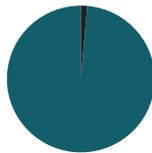
Features

- No carbon pick-up
- Good arc stability
- Low heat input
- Good edge wetting
- Fast weld speed

Benefits

- Improved productivity due to faster weld speed
- Low distortion
- Clean weld appearance and finish
- Optimum corrosion resistance
- Higher operator appeal
- Minimal weld finish

Gas	Composition
Oxygen	1.5%
Argon	Balance



Cylinder Sizes	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
F3VIPR	9.7	30,000	AS 4267 5/8-18 UNF
E	4.0	15,800	AS 2473 Type 10
D	1.5	15,800	

Pack Sizes

KAY15	227.25	30,000
MCP4	59.3	30,000

Cylinder colour (to AS 4484): Peacock blue body, black neck.

Not all cylinders and packs are available at all BOC outlets. Please check with your local BOC branch on 131 262. Other sized cylinders and packs may also be available on request.

* Indicates fitted with a pressure regulating valve outlet connection, 6,000–9,000 kPa.



STAINSHIELD® Light Gas Code 119

Applications

- Pressure vessels and tanks
- Exhausts
- Duct work

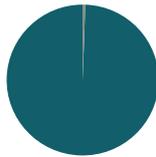
Features

- Excellent arc stability
- Low oxidation potential
- Good surface appearance
- Less surface oxidation than traditional Oxygen-Argon mixtures

Benefits

- Good fusion
- Clean weld appearance and finish
- Oxide film less tenacious and easy to remove
- Increase in weld speed compared to traditional Oxygen-Argon mixtures

Gas	Composition
Carbon Dioxide	2.5%
Argon	Balance



Cylinder Sizes	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
F3VIPR	9.8	30,000	AS 4267 5/8-18 UNF
Pack Sizes			
MCP15	224.9	30,000	AS2473 Type 10
MCP9	134.9	30,000	

Cylinder colour (to AS 4484): Peacock blue body, green grey neck.

Not all cylinders are available at all BOC outlets. Please check with your local BOC branch on 131 262. Other sized cylinders may also be available on request.

Indicative Welding Parameters

Material thickness (mm)	Dip Transfer			Spray Transfer		
	4	6	8	6	8	10
Welding position	Horizontal/ Vertical	Horizontal/ Vertical	Horizontal/ Vertical	Horizontal	Horizontal	Horizontal
Wire diameter (mm)	0.9-1.0	0.9-1.0	0.9-1.0	1.0	1.2	1.2
Current (amps)	100-125	120-150	120-150	180-220	260-280	260-310
Voltage (volts)	17-19	18-20	18-20	24-28	26-30	28-32
Wire feed speed (m/min)	5.0-6.5	6.0-7.5	6.0-8.0	7.0-9.0	8.0-10.0	9.0-11.0
Gas flow rate (L/min)	15	15	18	18	18	18
Travel speed (mm/min)	400-600	280-500	280-450	350-450	380-460	320-450



STAINSHIELD® Heavy Gas Code 092

Applications

- Pressure vessels and piping
- Structural high alloy steel work
- Storage tanks
- Food and beverage industry components
- Petrochemical plants

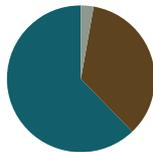
Features

- High heat input efficiency
- Excellent arc stability
- Low oxidation potential
- Used in dip, spray and pulsed transfer modes
- Faster welding speeds
- Fluid weld pool
- Reduced spatter

Benefits

- Low defect levels on thicker sections of material
- Clean, bright appearance and finish
- Easy to use
- High productivity due to faster welding speeds
- Reduced clean-up and repair
- X-ray quality welds
- Can be used on robotic and mechanical machines

Gas	Composition
Carbon Dioxide	2.8%
Helium	35%
Argon	Balance



Cylinder Size	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
F3VIPR	8.8	30,000	AS 4267 5/8-18 UNF
Pack Size			
MAN9	69.5	16,900	AS 2473 Type 10

Cylinder colour (to AS 4484): Peacock blue body, brown shoulder, green grey neck.

Not all cylinders and packs are available at all BOC outlets. Please check with your local BOC branch on 131 262.

Indicative Welding Parameters

Material thickness (mm)	Dip Transfer			Spray Transfer		
	8	10	12+	8	10	12+
Welding position	Horizontal/ Vertical	Horizontal/ Vertical	Horizontal/ Vertical	Horizontal	Horizontal	Horizontal
Wire diameter (mm)	1.2	1.2	1.2	1.2	1.2	1.2
Current (amps)	120-150	120-150	130-170	250-270	260-280	270-310
Voltage (volts)	16-19	16-19	17-20	25-29	26-30	28-31
Wire feed speed (m/min)	4.0-6.0	4.0-6.0	4.0-6.0	7.0-9.0	8.0-9.5	9.0-10.5
Gas flow rate (L/min)	18	18	18	18	18	18
Travel speed (mm/min)	380-460	320-450	220-400	400-600	400-600	450-600



STAINSHIELD® Duplex Gas Code 114

Application

- GTA welding without filler for duplex, super duplex and super austenitic stainless steel

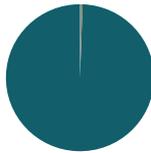
Features

- The addition of Nitrogen in the shielding gas balances the loss of Nitrogen from the base metal when welded

Benefits

- The balance between austenite and ferrite is maintained
- The corrosion and mechanical properties are maintained
- Surface oxidation is low
- Increased welding speed
- Increased penetration compared to pure Argon

Gas	Composition
Nitrogen	2%
Argon	Balance



Cylinder Sizes	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
G2	10.2	20,000	AS2473 Type 10
Pack Size			
COP16	236.3	30,000	AS2473 Type 10
MPC15	221.5	30,000	
MCP9	132.9	30,000	

Cylinder colour (to AS 4484): Peacock blue body and pewter neck.

Not all cylinders are available at all BOC outlets. Please check with your local BOC branch on 131 262. Other sized cylinders may also be available on request.



STAINSHIELD® Pipeline Gas Code 399

Application

- Shot arc or low voltage processes on stainless steel in all welding positions

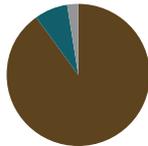
Features

- Enhances welding performance in GMAW applications
- Carbon Dioxide content is kept low to minimise carbon pickup and maintain corrosion resistance
- Excellent in multi pass welds

Benefits

- Dramatically increases welding speeds
- Creates better toe wetting
- Deeper root penetration

Gas	Composition
Argon	7.5%
Carbon Dioxide	2.5%
Helium	Balance



Cylinder Sizes	Content (m³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
G	7.0	16,900	AS2473 Type 10

Cylinder colour (to AS 4484): Brown body, peacock blue shoulder and green grey neck.
Not all cylinders are available at all BOC outlets. Please check with your local BOC branch on 131 262. Other sized cylinders may also be available on request.



STAINSHIELD® 66 Gas Code 051

Applications

- Welding austenitic stainless steels
- All positional welding

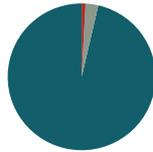
Features

- High integrity welds
- Good arc stability
- Clean weld surface
- Excellent fusion characteristics
- Lower spatter levels
- Designed for short arc and pulse welding austenetic stainless steels only

Benefits

- Optimised weld appearance
- Higher productivity due to lower spatter levels

Gas	Composition
Hydrogen	1%
Carbon Dioxide	2.8%
Argon	Balance



Cylinder Size	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
G	8.6	16,900	AS2473 Type 10

Currently not available in packs.

Cylinder colour (to AS 4484): Peacock blue body, green grey shoulder and signal red neck.
Not available at all BOC outlets. Please check with your local BOC branch on 131 262.



STAINSHIELD® 69
Gas Code **094**

Applications

- Welding stainless steels
- All positional welding

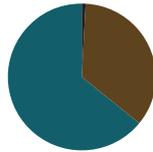
Features

- High integrity welds
- Good arc stability
- Faster welding speeds
- Clean weld surface
- Excellent fusion characteristics
- Lower spatter levels
- No carbon pick-up

Benefits

- Higher productivity due to faster welding speeds
- Low distortion
- Optimised corrosion resistance

Gas	Composition
Oxygen	0.9%
Helium	35%
Argon	Balance



Cylinder Size	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
F3VIPR	8.6	30,000	AS 4267 5/8-18 UNF
G	7.6	16,900	AS 2473 Type 10

Cylinder colour (to AS 4484): Peacock blue body, brown shoulder and black neck.
Not available at all BOC outlets. Please check with your local BOC branch on 131 262.
Other sized cylinders may also be available on request.



ALUSHIELD® He10 Gas Code 127

Applications

- Aluminium boat building
- Light aluminium fabrication
- Piping and balustrades
- Light busbars

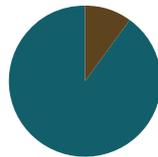
Features

- Excellent arc stability
- Improvement in heat input efficiency
- Faster weld speeds
- Improved side wall penetration

Benefits

- Efficiency improvements
- Reduction of defects
- Reduced spatter

Gas	Composition
Helium	10%
Argon	Balance



Cylinder Size	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
F3VIPR	9.3	30,000	AS4267 5/8-18 UNF

Cylinder colour (to AS 4484): Peacock blue body and brown shoulder and neck.
Other sized cylinders and packs may also be available on request.



ALUSHIELD® Light Gas Code 079

Applications

- Boat and ship building
- Tankers
- Truck body work
- Water heaters and heat exchangers
- Piping and balustrades
- Light busbars

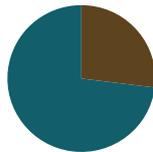
Features

- Excellent arc stability
- High heat input efficiency
- Low distortion
- Flatter weld bead with low reinforcement
- Faster welding speed
- Good fusion characteristics
- Little or no spatter
- Used in dip, spray and pulsed transfer modes

Benefits

- Lower spatter reduces clean-up time
- Improved weld metal properties
- Easy to use
- Good appearance and finish with low reinforcement levels
- Increased productivity due to fast weld speeds
- Can be used on robotic machines

Gas	Composition
Helium	27%
Argon	Balance



Cylinder Sizes	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
F3VIPR	8.8	30,000	AS 4267 5/8-18 UNF
Pack Sizes			
KAY4	55.6	30,000	AS2473 Type 10
MCP15	200.4	30,000	

Cylinder colour (to AS 4484): Peacock blue body and brown shoulder and neck.
Not all cylinders and packs are available at all BOC outlets. Please check with your local BOC branch on 131 262. Other sized cylinders may also be available on request.

Indicative GMA (MIG) Welding Parameters

Material thickness (mm)	Dip Transfer		Spray Transfer		
	1-2	3	3	6	8
Welding position	Horizontal/Vertical	Horizontal/Vertical	Horizontal	Horizontal	Horizontal
Wire diameter (mm)	0.9-1.0	1.2	1.0	1.2	1.2
Current (amps)	70-100	105-120	140-180	160-200	210-250
Voltage (volts)	17-18	17-20	17-20	27-30	26-29
Wire feed speed (m/min)	4.0-6.0	5.0-7.0	6.0-8.0	8.0-10.0	6.0-9.0
Gas flow rate (L/min)	15	15	18	18	18
Travel speed (mm/min)	450-600	500-700	500-700	500-800	450-680

Indicative GMA (MIG) Welding Parameters

Material thickness (mm)	3	4
Welding position	Horizontal/Vertical	Horizontal/Vertical
Wire diameter (mm)	2.4	2.4
Current (amps)	110-150	110-140
Voltage (volts)	11-13	11-13
Wire feed speed (m/min)	Not Applicable	Not Applicable
Gas flow rate (L/min)	6.0	7.0
Travel speed (mm/min)	110-180	150-230



ALUSHIELD® Universal Gas Code 133

Applications

- Heat exchangers
- Tank vessels
- Rail carriages
- MIG or TIG welding of aluminium
- Can be used for copper and stainless steel TIG welding

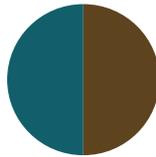
Features

- Stable welding arc
- Excellent appearance finish
- Excellent fusion characteristics
- Suitable for applications where penetration is critical

Benefits

- Faster welding speed
- Reduced porosity
- Improved productivity
- Low defect levels

Gas	Composition
Helium	50%
Argon	50%



Cylinder Size	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
F3VIPR	8.4	30,000	AS 4267 5/8-18 UNF

Cylinder colour (to AS 4484): Peacock blue body and brown shoulder and neck.

Not all cylinders and packs are available at all BOC outlets. Please check with your local BOC branch on 131 262. Other sized cylinders may also be available on request.



ALUSHIELD® Heavy Gas Code 069

Applications

- Aluminium castings
- Ship building and armoured vehicles
- Heavy aluminium fabrication
- Road and rail transport
- Chemical and petrochemical plants
- Copper and aluminium busbars

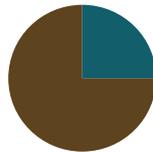
Features

- Excellent arc stability
- High heat input efficiency
- Low distortion and oxidation potential
- Wide bead shape with low reinforcement
- Faster welding speeds
- Good fusion characteristics
- Reduced spatter

Benefits

- Lower spatter reduces clean-up time
- Improved weld metal properties
- Easy to use
- Reduced reject rates
- Lower risk of defect levels
- Good appearance and high quality finish with low reinforcement levels
- Increased productivity due to fast weld speeds
- Can be used on robotic machines

Gas	Composition
Argon	25%
Helium	Balance



Cylinder Size	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
F3VIPR	8.1	30,000	AS 4267 5/8-18 UNF

Currently not available in packs.

Cylinder colour (to AS 4484): Brown body, peacock blue shoulder and neck.

Not available at all BOC outlets. Please check with your local BOC branch on 131 262.

Indicative GMA (MIG) Welding Parameters

	Spray Transfer		
	8	10	12+
Material thickness (mm)	8	10	12+
Welding position	Horizontal	Horizontal	Horizontal
Wire diameter (mm)	1.2	1.6	1.6-2.4
Current (amps)	170-220	240-300	300-500
Voltage (volts)	27-30	29-32	32-40
Wire feed speed (m/min)	9.0-12.0	8.0-11.0	9.0-14.0
Gas flow rate (L/min)	20	20	20
Travel speed (mm/min)	500-700	500-700	400-550

Indicative GTA (TIG) Welding Parameters

	6	10
	Material thickness (mm)	6
Welding position	Horizontal/Vertical	Horizontal/Vertical
Wire diameter (mm)	3.2	3.2
Current (amps)	140-220	190-240
Voltage (volts)	15-18	18-20
Wire feed speed (m/min)	Not Applicable	Not Applicable
Gas flow rate (L/min)	8.0	10.0
Travel speed (mm/min)	160-230	170-230



ARGOPLAS® 5 Gas Code 143

Applications

- Recommended as the shielding (secondary) gas for most plasma welding applications
- Suitable for plasma welding and cutting stainless steels, copper and nickel alloys

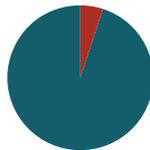
Features

- Suitable for plasma welding of all thicknesses
- Low distortion
- Faster weld speed
- Increasing the cleaning of the weld metal

Benefits

- Reduction in post-weld clean-up time
- Reduced distortion levels
- Increased productivity due to faster weld speeds
- Can be used on automated machines

Gas	Composition
Hydrogen	5%
Argon	Balance



Cylinder Size	Content (m ³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
G	7.4	15,000	AS 2473 Type 20
Pack Sizes			
MAN15	118	16,300	AS 2473 Type 20

Cylinder colour (to AS 4484): Peacock blue body, signal red shoulder and neck.
Not available at all BOC outlets. Please check with your local BOC branch on 131 262.

Have you got the right gas working for you?

TIG welding of stainless steel Argon versus ARGOPLAS® 5

COMPETENCE® LINE



Welding gas: Argon
Welding speed: 35 cm/min, mechanised welding
Parent material: 304, t= 4 mm
Filler metal: 308LSi

Argon is the most frequently used shielding gas for TIG welding. It is suitable for all weldable metallic materials. BOC offers reliable qualities up to 5.0 (99.999%) purity for welding applications.

PERFORMANCE® LINE



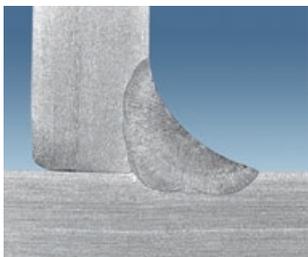
Welding gas: ARGOPLAS® 5
Welding speed: 55 cm/min, mechanised welding
Parent material: 304, t= 4 mm
Filler metal: 308LSi

Hydrogen and helium can accelerate the TIG welding process due to their physical properties. Better thermal conductivity improves penetration and wetting ability. Compared to helium, hydrogen provides an even more effective heat input because of its molecular nature. Beyond this, a hydrogen addition to the shielding gas leads to cleaner weld surfaces as a result of its reducing action. Helium as a shielding gas component is the better choice where hydrogen cannot be used due to incompatibility with the base or filler metal.

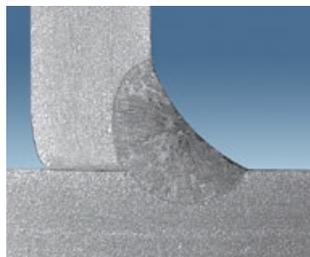
- ARGOPLAS® series with 5 to 35% H₂ for all austenitic stainless steel grades
- ARGOPLAS® 5 is 5% H₂ with a balance of Argon

ARGOPLAS® 5 improves speed of welding and penetration.

Manual welding of stainless steel 304, sheet thickness 4 mm



TIG DC, Argon,
 $v_s = 13$ cm/mm

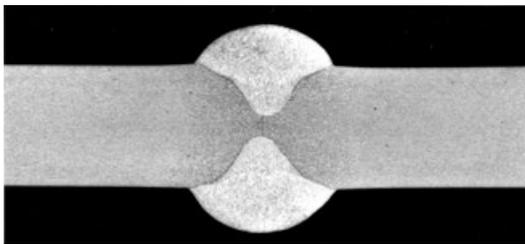


TIG AC, ARGOPLAS® 5,
 $v_s = 18$ cm/mm

Have you got the right gas working for you?

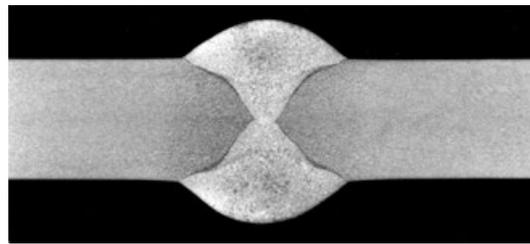
GMA welding of aluminium penetration profiles
Argon versus ALUSHIELD® shielding gases.

Argon (061)



280 A / 25 V

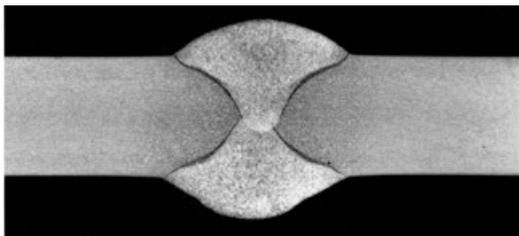
ALUSHIELD® Light (060)



282 A / 27 V

ALUSHIELD® Light is 27% Helium with a balance of Argon

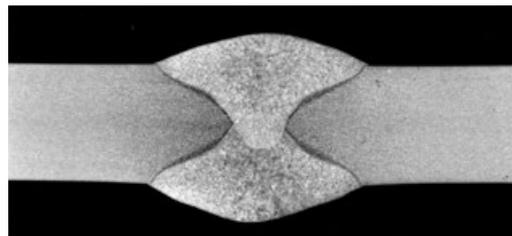
ALUSHIELD® Universal (065)



285 A / 30 V

ALUSHIELD® Universal is 50% Helium with a balance of Argon

ALUSHIELD® Heavy (122)



285 A / 34 V

ALUSHIELD® Heavy is 25% Argon with a balance of Helium

Parameters Used:

Parent metal	EN AW-5754 [AlMg3]
Filler metal	ISO 18273 – S Al 5183 (AlMg4.5Mn)
Wire feed speed	9.7 m/min
Welding speed	62 cm/min

t = 10 mm
ø = 1.6 mm



SPECSHIELD® Copper Gas Code 077

Applications

- Joining of copper to steel
- Welding of copper alloys, including silicon and nickel bronzes

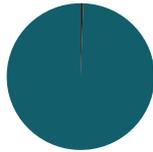
Features

- Produces good edge wetting
- Excellent spray transfer characteristics
- Faster welding speeds than pure argon
- Low spatter

Benefits

- Good appearance and finish
- Easier to use than pure argon for welding copper alloys
- High productivity due to faster welding speeds
- Can be used on robotic and mechanical machines

Gas	Composition
Oxygen	0.7%
Argon	Balance



Cylinder Size	Content (m³ @ STP)	Gauge Pressure (kPa @ 15°C)	Outlet Connection
G2	10.2	20,000	AS 2473 Type 10

Cylinder colour (to AS 4484): Peacock blue body, black neck.

Not all cylinders and packs are available at all BOC outlets. Please check with your local BOC branch on 131 262.

Indicative Welding Parameters

	Spray Transfer		
	1.6	3	6
Material thickness (mm)	1.6	3	6
Welding position	Horizontal	Horizontal	Horizontal
Wire diameter (mm)	0.9	1.2	1.2
Current (amps)	150–200	150–220	180–250
Voltage (volts)	21–26	22–28	22–28
Wire feed speed (m/min)	7.5–14.5	5.5–11.5	5.5–11.5
Gas flow rate (L/min)	10–15	10–15	10–15
Travel speed (mm/min)	500	450	400

SPECSHIELD® Gas Mixtures (Custom Made) Gas Code 265

These are custom made Shielding Gases usually produced in low volumes. Available on special request. Ring your BOC Customer Service on 131 262 for details.



Have you got the right gas working for you?

Shielding gas selection is a critical part of cost-effective welding.

You can maximise your productivity and improve efficiencies by making one simple decision – investing in the right welding gas for your specific application.

BOC’s welding gases range of ARGOSHIELD®, STAINSHIELD®, ALUSHIELD® and SPECSHIELD® aren’t just commodities. These are optimisation tools for the serious welder and re designed to provide you with quality welding performance and improved cost-effectiveness. How?

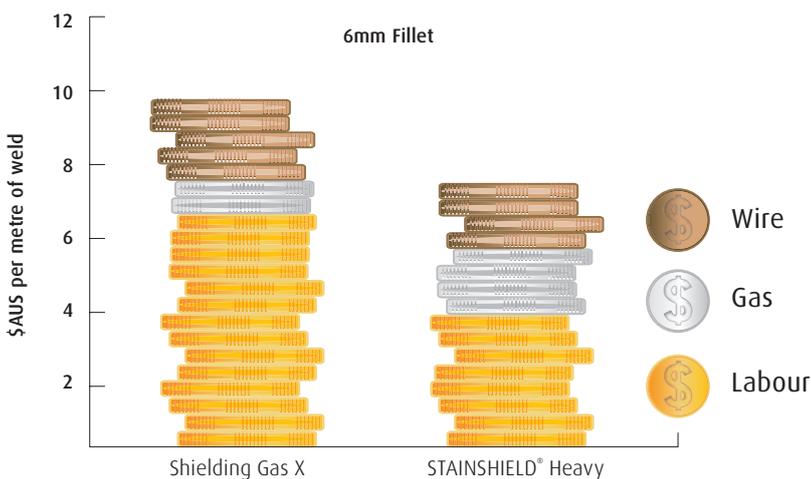
The typical cost drivers for Gas Metal Arc welding are:

- Labour
- Welding gas
- Welding wire
- Power consumption

If you were to invest in the right BOC welding gas for your specific application, as opposed to using regular gas for your welding, you will notice that while the cost of the welding gas is slightly higher, your actual overall production cost can be reduced dramatically as shown on the diagram. This reduced production cost can vary, depending on factors specific to your individual business operations.

Welding gases can positively influence your welding result through the following:

- Surface appearance
- Welding speed
- Metallurgy and mechanical properties
- Weld geometry
- Arc stability
- Metal transfer
- Shielding effect



This reduced production cost can vary, depending on factors specific to your individual business operations.

Weld cost calculation.

Time cost study

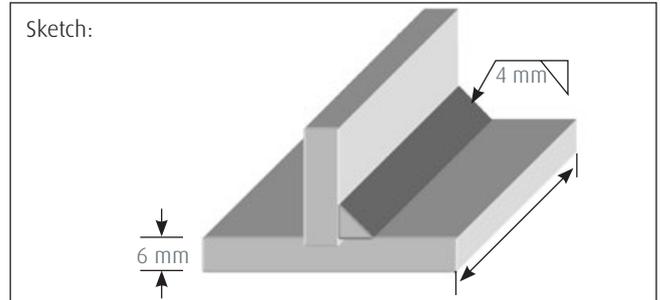
Customer: Customer ABC

Contact: _____

Date _____

Welding Process: GMA

Material: 316 Stainless Steel



General Data						
1	Type of seam	Fillet	7A	Labour costs		\$65.00/h
2	Welding position	PB	7B	Labour costs		\$1.08/min
3	Plate thickness	6 mm	8	Wire costs		\$18.00/kg
4	Throat/Leg Length	4 mm	9	Gas 1: STAINSHIELD®		\$8.00 /m³
	Material Length	1 m	10	Gas 2: STAINSHIELD® Heavy		\$22.00 /m³
5	Wire diameter mm		0.8	1.0	1.2	1.6
6	Wire spec.	Steel	3.95	6.2	8.9	15.8
	Weight g/m	Alu.	1.36	2.12	3.05	5.43

Pre-set and measured parameters		Gas 1	Gas 2
11	Voltage/Current	148 A/ 14.3 V	150 A/ 15.8 V
12	Wire feed speed	5 m/min	5 m/min
13	Gas flow rate	15 l/min	18 l/min
14	Type of wire electrode	Solid	Solid
15	Wire diameter	1.2 mm	1.2 mm
16	Arc on time t_h	4.16 min	3.48 min
17	Process related costs $t_{h, process}$ (cleaning time)	min - na	min - na

Consumables			
18	Wire electrode	(12x16x6)	185.12 g
19	Shielding gas	(13x16)	62.4 L

Costs			
20	Labour costs (t_h)	(7Bx16)	\$4.49
21	Labour costs (t_h)	(7Bx17)	\$na
22	Wire electrode costs	(18x8/1000)	\$3.33
23	Gas costs	(9 or 10x19/1000)	\$0.50

Total		\$	\$
Total per metre length of weld		\$8.32	\$7.92

Getting ahead through innovation.

With its innovative concepts, BOC is playing a pioneering role in the global market. As a technology leader, it is our task to constantly raise the bar. Traditionally driven by entrepreneurship, we are working steadily on new high-quality products and innovative processes.

BOC offers more. We create added value, clearly discernible competitive advantages, and greater profitability. Each concept is tailored specifically to meet our customers' requirements – offering standardised as well as customised solutions. This applies to all industries and all companies regardless of their size.

If you want to keep pace with tomorrow's competition, you need a partner by your side for whom top quality, process optimisation, and enhanced productivity are part of daily business. However, we define partnership not merely as being there for you but being with you. After all, joint activities form the core of commercial success.

BOC – turning ideas into solutions.



Check out our YouTube video to find out how BOC can help you determine the right shielding gas for your job

For more information contact the BOC Customer Engagement Centre on:

Australia

ABN 95 000 029 729

131 262

contact@boc.com

www.boc.com.au

Riverside Corporate Park
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