Product Range Catalogue

ARCAL

2023 EDITION

Air Liquide

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and quick reference

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	Carbon Steel	Stainless Steel	Aluminium	
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About Air Liquide

~66,000
employees

2+
million
customers

1.8+
million
patients

80
countries

€304m
of innovation
spendings
in 2021

In 2022,
revenues were
€21bn

400+
partnerships

13,500
patents filed

354
new patent
filed in 2021

Our actions have always been driven by

STRONG ETHICAL PRINCIPLES

SAFETY

One of Air Liquide's main priorities is the safety of its employees and of its customers.

Safety is absolutely essential and is based on the conviction that all accidents can be prevented. Everyone, from the group's managing director to all employees, contractors, and our Agents is responsible for preventing accidents. Safety is a basic work requirement, and everyone must observe safety rules. This conviction, and the development of **SAFETY AWARENESS**, have reduced the number of work-related accidents considerably over the years.

Our Policy:
Safety is and will remain our first priority

Our Target:
Zero accidents

Our Objective:
Measurable and significant continuous improvement

Ensuring the safety of our customers means that our gas distribution facilities must take into account safety criteria, the specific requirements of each customer and environmental protection. We inform our customers of the risks associated with the handling and use of industrial gases and recommend precautions to prevent accidents.

ETHICS, INTEGRITY & TRANSPARENCY

Our actions have always been driven by strong ethical principles. With approximately 66,000 employees in over 80 countries, we adhere to the highest ethical standards when conducting our business activities, in particular as concerns human rights, labour rights and the environment.

Wherever we operate, our subsidiaries respect the local cultures and traditions while also transmitting the Group's values through their actions and local commitment.

In line with our Principles of Action, we are committed to complying with all laws and regulations in force, and in particular the rules of fair trade and we do not tolerate corruption in any form. Our behaviour and actions are driven by the principles of integrity and transparency.

The Group's ethics program is built to help employees develop their activities with integrity and transparency in compliance with the rules of conduct.

SUSTAINABLE DEVELOPMENT

Air Liquide publishes a detailed report and monitors its environmental footprint in its Sustainable Development Report. These indicators are audited by an independent verifier and are part of a transparency approach that is recognised by specialised bodies and non-financial rating agencies. The latter assess the company's level of responsibility and transparency in terms of sustainable development.

By talking continuously and extensively with our stakeholders and collaborating and working together with them we can contribute to a more sustainable world.

Our stakeholders are our employees, our customers, our suppliers, our shareholders and investors, governments, NGOs and other groups.

CLIMATE & AIR QUALITY

As part of the Air Liquide global approach to climate, we set the most ambitious objectives of its sector.

- **In our company**, reduce by 30% the carbon intensity of our activities by 2025 vs 2015.
- **With its customers,** the Group is also committed to a sustainable industry. Thanks to its in-depth knowledge of essential small molecules (oxygen, hydrogen, CO_2...) and customers' processes, Air Liquide is offering technologies which allow its customers to improve the energy efficiency of their industrial processes and reduce their emissions. The Group is permanently innovating to offer new low-carbon solutions.
- **For the planet,** contribute to the development of a new low carbon society. With ecosystems, via an active dialogue with key players (public policymakers, industrial partners, NGOs and other) Air Liquide is contributing to the development of a low carbon society.

Taking action for the climate:

REDUCE BY 30%

the carbon intensity of our activities by 2025 vs 2015.

Basic Gas Cylinder Anatomy

Premium Packaged Gas Solutions

From basic needs to full process support, Air Liquide knows that reliable gas supply is crucial to its customers' operations. Our teams work with our customers to determine the most appropriate and cost-effective supply mode based on their purity, flow and safety requirements as well as the volume of gases needed for their manufacturing processes.

Our goal is to offer an industry-leading safe and efficient supply chain that meets the specific requirements of all industries.

Air Liquide designs and produces the market's safest, most ergonomic, user-friendly cylinders and valves for small, medium and mobile gas needs.

We offer advanced packages including:

- **SMARTOP™**, our cutting-edge, smart residual pressure valve. It features on/off lever and permanent content gauge. **SMARTOP™** is included in our **ARCAL™** shielding gases
- **ALTOP™**, the world's first built-in regulator with an on/off lever. As one of our best-sellers, it is available in over 35 countries
- **EXELTOP™**, the next generation built-in regulator

CYLINDERS
and their features

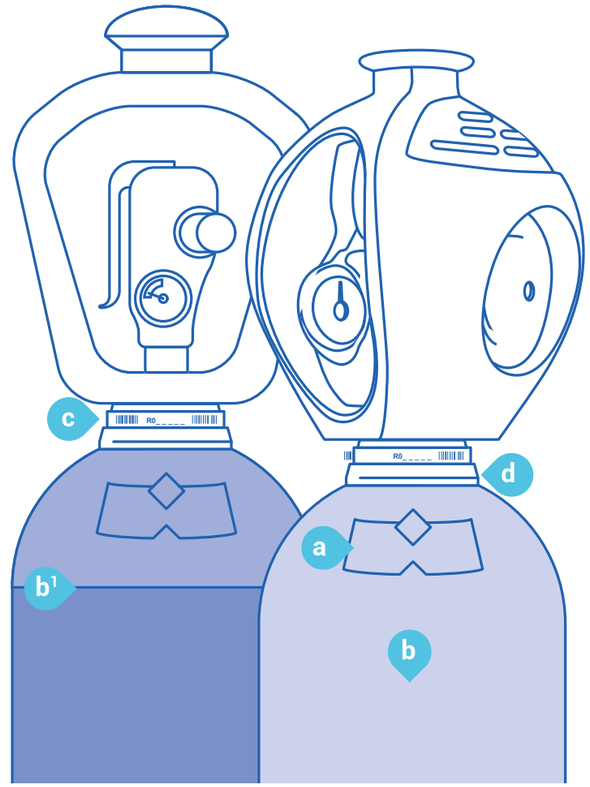
CYLINDER IDENTIFICATION

a All Air Liquide cylinders are uniquely identified and have an identification / caution label located at the neck of the cylinder. It identifies the contents, size, capacity and gas supplier ownership of the cylinder, together with the necessary safety information strictly complying with Australian Standards.

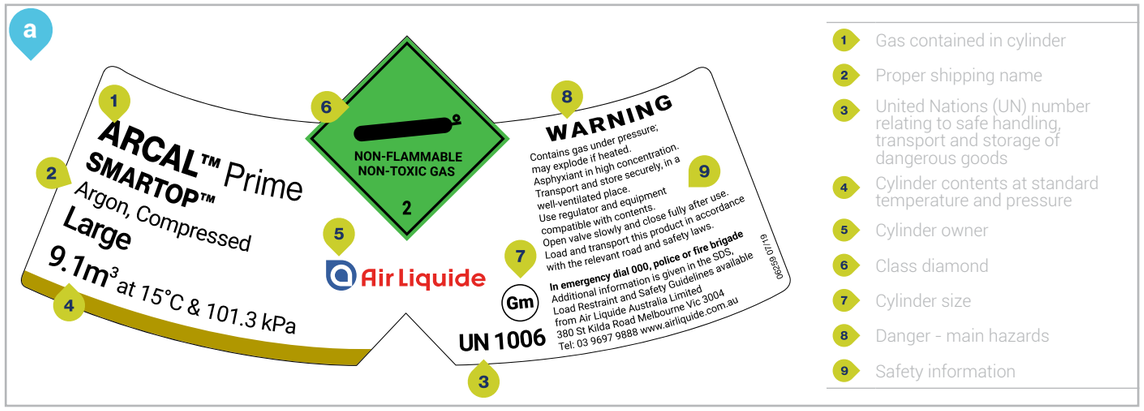
b The contents of a cylinder are stated on the identification label. Additionally, each cylinder is colour coded. Colour charts are available from Air Liquide on request. The predominant colour of the cylinder denotes the main gas contained within the cylinder. When other colours are painted in bands around the shoulder area **[b¹]**, this means other gases are present and the cylinder contents are a mix of gases.

c Air Liquide cylinders are uniquely and individually identifiable with a cylinder barcode located around the neck or collar of the cylinder. These barcodes are usually a 7 digit alphanumeric combination normally beginning with R0_ _ _ _ _

d In most instances the letters "ALA" or "LAA" are stamped into the cylinder, usually around the neck area. Some of the earlier versions of our cylinders may have the letters "CARBA", "AIR LIQUIDE" or "LIQUID AIR" on the cylinder. In all cases the cylinder remains the property of Air Liquide Australia . Only Air Liquide cylinders can be accepted for exchange.



***Example** of Air Liquide cylinder identification*



***Example** of Air Liquide cylinder identification label*

TYPES OF VALVES
to make life easier

SMARTOP™

Air Liquide's exclusive **SMARTOP™** valve for speciality lab gases and industrial gases in compressed gas cylinders saves time and gas while improving workplace safety.

SMARTOP™ is available with **ALPHAGAZ™** brand specialty pure gases and **ARCAL™**, **LASAL™**, and **ALIGAL™** brand industrial gases. It works perfectly with all single and two-stage gas pressure regulators from Air Liquide.

1 Shock-absorbing cap
2 On/off lever
3 RPV/NRV function
4 Permanent content gauge

ALTOP™

ALTOP™ is an innovative approach to gas cylinders.

Developed by Air Liquide, **ALTOP**'s built-in features make quality, safety, and time and money savings easy. **ALTOP™** is an integrated cylinder valve and regulator system that eliminates high-pressure gas loss and maintains gas quality.

It's simple to use, easy to move, proven technology, hassle free gas control.

1 Shock-absorbing cap
2 On/off lever
3 Built-in Regulator
4 Permanent content gauge

Valve Type	Valve Details and Description	Thread (mm) Inside Diameter	Thread (mm) Outside Diameter	Gases: Acetylene	Air	Argon	Carbon Dioxide	Hydrogen	Helium	Nitrogen	Oxygen	Others
Type 10	**5/8" BSP RH Internal, 14 T.P.I.** Internal angled sealing face	21.0	–			●			●		●	○
Type 20	**5/8" BSP LH Internal, 14 T.P.I.** Internal angled sealing face	21.0	–	●				●				○
Type 30	**0.860" WHIT RH, 14 T.P.I.** Flat end sealing face	–	21.8				●					○
Type 50	**W24x2 RH External, 14 T.P.I.** Internal angled sealing face 1st centre hole 13.3mm x 8.1mm deep	–	24.0							●		○
Type 51	**1.045" NGO RH External, 14 T.P.I.** Internal angled sealing face	24.6	–			◆			◆	◆		○
Type 60	**W27x2 RH External, 14 T.P.I.** Internal angled sealing face 1st centre hole 18.2mm x 8.1mm deep	–	27.0		●							

○ **OTHERS include but not limited to:** Carbon Monoxide, Ethane, Ethylene, Krypton, Neon, Nitrous oxide, Xenon

● Gases ◆ Up to 31,500 kPa

EXELTOP™

EXELTOP™ has been developed by Air Liquide's Research & Development and Welding Teams and is a built-in regulator for industrial gas cylinders.

EXELTOP™ is dedicated to professionals and industries in the metal fabrication and construction fields, and is available for the **ARCAL™** premium gas range dedicated to arc welding and the **FLAMAL™** premium gas range for flame applications - oxygen/acetylene.

1 Shock-absorbing cap
2 On/off lever
3 Built-in Regulator
4 Permanent content gauge

WITH EXELTOP™ FOCUS ON YOUR OWN PERFORMANCE

GAIN PERFORMANCE

Intuitive to use - ensures accurate and stable gas flow.

SAVE MONEY

No need to buy and maintain a separate regulator - regular checks by Air Liquide.

WORK SAFELY

Emergency cut-off – Protected valve – No more exposure to high pressure gas flow.

SAVE TIME

Ready to use due to the built-in regulator and on/off lever- quick connect available for all gases.

SAVE GAS

No gas loss thanks to the on/off lever - check content at a glance with the permanent pressure gauge.

ADVANCED TWO-STAGE BUILT-IN REGULATOR

- No need to buy a separate regulator
- No more exposure to high pressure gas flow
- Accurate outlet pressure or flow rate
- Precise setting with a new graduated handwheel

QUICK CONNECT SYSTEM

- Available for all gases
- Simply connect the hose and get to work

ERGONOMIC AND SHOCK-ABSORBING CAP

- Easy handling
- Simple access to all functions
- Permanent, reliable protection for the valve and regulator

NEWLY DESIGNED ON/OFF LEVER

- Immediate gas cut-off
- On/off status at a glance

PERMANENT CONTENT GAUGE

- At a glance content monitoring
- Get a reading even when flow is stopped

GAS IDENTIFICATION
and safety recommendations

FLAMMABLE GAS	NON-FLAMMABLE, NON-TOXIC GAS	OXIDISING GAS	TOXIC GAS
			
DIVISION			
2.1	2.2	2.2 / 5.1	2.3
AUSTRALIAN STANDARD DEFINITION			
A gas which will burn in air at a pressure of 101.3 KPa absolute.	A gas which is non-flammable, non-toxic, non oxidising, and is resistant to chemical action under normally encountered conditions	A gas which gives up oxygen readily, removes hydrogen from a compound, or readily accepts electrons.	A gas that is known to be: **a** toxic or corrosive to humans as to pose a hazard to health; or **b** presumed to be toxic or corrosive to humans because it has an LC 50 value equal to or less than 5000ml/m³ (ppm)
AIR LIQUIDE BRANDS			
• **FLAMAL™** - Acetylene	• **ALIGAL™ Range** (excluding ALIGAL 3) • **ARCAL™ Range**	• **FLAMAL™** - Oxygen • **ALIGAL™ 3**	
COMMON GASES			
• Acetylene • LPG	• Argon and Argon Mixtures • Nitrogen • Carbon Dioxide • Helium	• Oxygen • Nitrous Oxide • Air	• Sulphur Dioxide
RISKS			
• Highly flammable • Can become dangerously explosive	• May cause suffocation.	• May be toxic or corrosive • Can result is spontaneous combustion • Faster burning rates and severe injury	• Toxicity

Colour Coding for Gas Cylinder Identification

	Argon	Acetylene	Carbon Dioxide	Helium	Hydrogen	LPG	Nitrogen	Nitrous Oxide	Oxygen	Sulphur Dioxide
Australian Standard AS2700	T53 **Peacock Blue**	R55 **Claret**	N32 **Green Grey**	X54 **Brown**	R13 **Signal Red**	N24 **Silver Grey**	N63 **Pewter**	B21 **Ultramarine**	N61 **Black**	Y14 **Golden Yellow**
Sample										
RGB	**R** 36 **G** 87 **B** 99	**R** 102 **G** 41 **B** 45	**R** 142 **G** 146 **B** 129	**R** 103 **G** 69 **B** 44	**R** 185 **G** 48 **B** 43	**R** 189 **G** 199 **B** 198	**R** 89 **G** 96 **B** 101	**R** 44 **G** 80 **B** 151	**R** 42 **G** 42 **B** 43	**R** 245 **G** 166 **B** 0
CMYK	**C** 64 **M** 12 **Y** 00 **K** 61	**C** 00 **M** 60 **Y** 56 **K** 60	**C** 03 **M** 00 **Y** 12 **K** 43	**C** 00 **M** 33 **Y** 57 **K** 60	**C** 00 **M** 74 **Y** 77 **K** 27	**C** 05 **M** 00 **Y** 01 **K** 22	**C** 12 **M** 05 **Y** 00 **K** 60	**C** 71 **M** 47 **Y** 00 **K** 41	**C** 02 **M** 02 **Y** 00 **K** 83	**C** 00 **M** 32 **Y** 100 **K** 04
HEX	#245763	#66292D	#8E9281	#67452C	#BA302B	#BDC7C6	#596065	#2C5097	#2A2A2B	#F5A600
PMS	7477 C	19-1535 TCX	177-5 C	7582 CP	180 C	14-4504 TCX	10391 C	7686 C	19-4004 TCX	103 C

BODY COLOUR denotes balance gas or major component
BAND COLOUR/S denotes minor components or mixture charateristics

CYLINDER
dimensions and sizes

	GX	G	F	E	Ez	Ex	Dx	D	CL	
			Steel	Alum.					Steel	Alum.
WATER CAPACITY (LITRES)	50	49	35	34	25	20	20	11	10	10
TARE WEIGHT (KILOGRAMS)	50	57	45	24	23	34	24	13	15	10
HEIGHT (METERS)	1.45	1.44	1.35	1.25	0.98	0.83	0.79	0.58	0.65	0.65
DIAMETER (CENTIMETERS)	22.9	23.0	20.3	21.5	21.8	20.4	20.4	17.6	16.5	17.5
AVAILABLE IN 300 BAR	✘	✘	✘	✘	✘	✔	✘	✘	✘	✘

	HIGH PRESSURE MAXI 16	HIGH PRESSURE MAXI 8	Acetylene Pack 9	Acetylene Pack 4
	MAXI	MAXI	PACK	PACK
WATER CAPACITY (LITRES)	800	784	400	392
TARE WEIGHT (KILOGRAMS)	1,600	900	750	400
HEIGHT (METERS)	2.0	1.8	1.0	1.0
FOOTPRINT (METERS)	1 x 1	1 x 0.5	1 x 1	0.75 x 0.75
AVAILABLE IN 300 BAR	✔	✘	✘	✘

Metal Fabrication

High-performance Fabrication Gas Solutions

Air Liquide draws on more than 100 years of its experience in the fabrication industry to develop specialised gases, equipment and services for a range of welding, cutting, coating, heating and cryogenic treatment applications.

We supply gases and mixtures of gases such as argon, oxygen, nitrogen, carbon dioxide, helium and hydrogen in compressed gas cylinders or in bulk liquid cryogenic tanks, depending on the volume needed. Our **ARCAL™** brand gases, equipment and services have been developed by our network of experts to meet the diverse needs of the metal fabrication industry.

Welding Guide

MIG/MAG WELDING

Mild Steel

Thickness (mm)	1	2	3	4	5	6	8	10	12	16	20	25	32+
ARCAL 14	●	●	●	●	●	●	○	○	○	○	○	○	○
ARCAL SPEED	○	○	●	●	●	●	●	●	●	●	●	●	○
ARCAL FORCE	○	○	○	○	●	●	●	●	●	●	●	●	●
ARCAL FLUX	○	○	○	○	○	○	●	●	●	●	●	●	●
ARCAL 211	○	○	○	○	○	●	●	●	●	●	●	●	●

Stainless Steel

Thickness (mm)	1	2	3	4	5	6	8	10	12	16	20	25	32+
ARCAL CHROME	●	●	●	●	●	●	○	○	○	○	○	○	○
ARCAL 121	○	○	●	●	●	●	●	●	●	●	●	○	○
ARCAL 112	○	○	○	○	○	○	●	●	●	●	●	●	●
ARCAL 129 (DUPLEX)	○	○	●	●	●	●	●	●	●	●	●	●	●

Aluminium

Thickness (mm)	1	2	3	4	5	6	8	10	12	16	20	25	32+
ARCAL PRIME	●	●	●	●	●	●	●	●	○	○	○	○	○
ARCAL 32	○	○	●	●	●	●	●	●	●	●	●	●	○
ARCAL 35	○	○	○	○	●	●	●	●	●	●	●	●	○
ARCAL 37	○	○	○	○	○	○	●	●	●	●	●	●	●

TIG WELDING

Thickness (mm)	1	2	3	4	5	6	8	10	12	16	20	25	32+
ARCAL PRIME	●	●	●	●	●	●	●	●	○	○	○	○	○
ARCAL 10	○	○	●	●	●	●	●	●	●	●	●	●	●
ARCAL 32	○	○	●	●	●	●	●	●	●	●	●	●	○
ARCAL 35	○	○	○	○	●	●	●	●	●	●	●	●	○
ARCAL 37	○	○	○	○	○	○	●	●	●	●	●	●	●
ARCAL 39 (DUPLEX)	○	○	●	●	●	●	●	●	●	●	●	●	●

● **Recommended** ○ Suitable

Photo by Movidagrafica Barcelona from Pexels

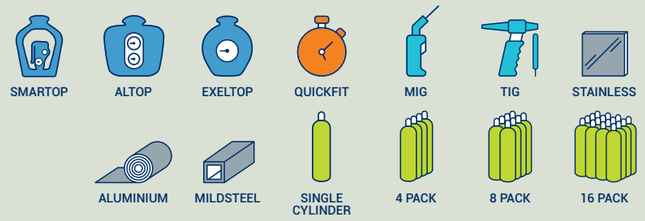
ARCAL Prime

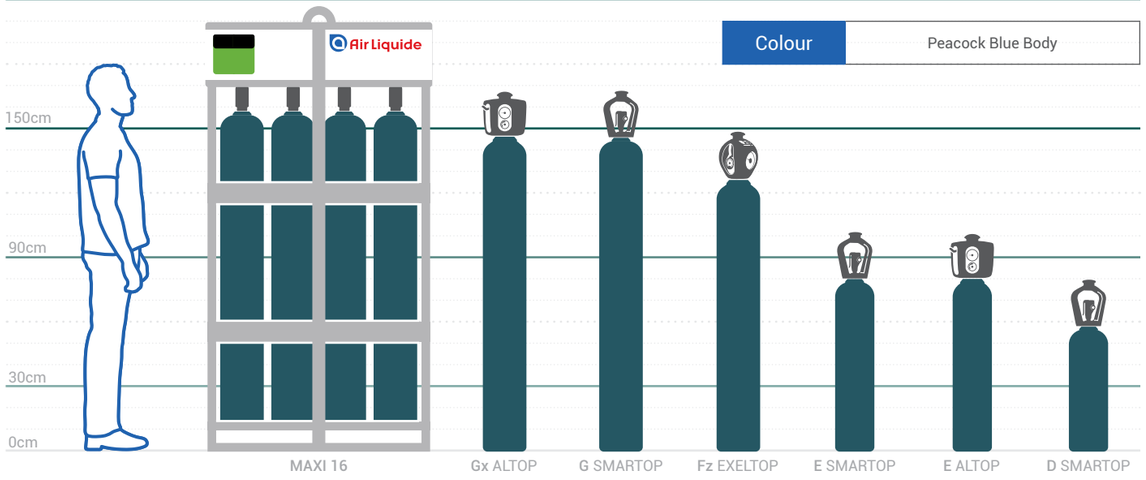
WELDING | ARGON ≥ 99.998%

Quality, purity and performance captured in one shielding gas

Applications

- TIG and plasma welding for all materials
- MIG Welding for aluminium and copper alloys
- Root shielding of all materials
- Plasma and annular gas in plasma processes
- Pilot arc gas for plasma cutting





PRODUCT CODES:	033692	033694	033693	033689	030100	033691, 033804	033805
Cylinder Size Offering	MAXI 16	MAXI 8	MAXI 4	Gx / Fz	G	E	D
Top Type Offering	Standard	Standard	Standard	EXELTOP, ALTOP	SMARTOP	ALTOP, SMARTOP	SMARTOP
Volume (m^3)	232	116	58	10.2	9.1	4.1 - 4.5	2.2
Weight (kg)	1430	980	460	75	65	34 - 38	20
Pressure (bar)	291	291	291	291	176	176 - 201	201
Water Capacity (L)	800	400	200	35 - 49	49	20 - 25.5	11
Impurities (ppm)	$H_2O \leq 5$ ppm $O_2 \leq 5$ ppm $N_2 \leq 10$ ppm						

Appearance	Odour	Flammability
Colourless	Odourless	Non Flammable

UN Number	Hazard Class	HAZCHEM (EAC)	SDS
1006	2.2	2T	AL032.pdf

This product complies with the following Australian and International Standards: ISO 14175-I1-Ar AWS-A5.32 AS4882-2003 and AS1554

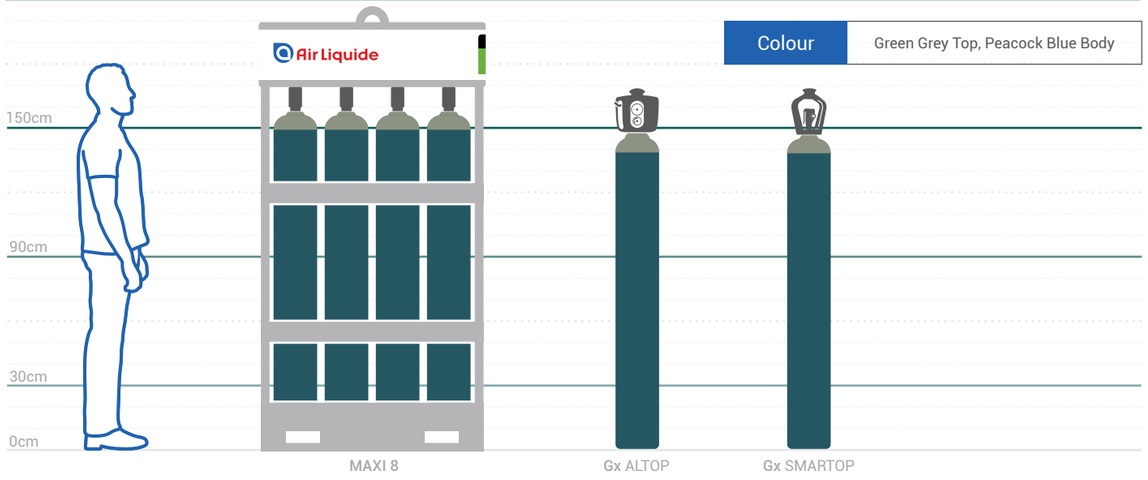
ARCAL Chrome

WELDING | 98% ARGON + 2% CARBON DIOXIDE

The Brilliant Choice

Applications

- All-purpose MAG welding of austenitic and ferritic stainless
- steels (> 10% Chromium steels)
- Clean and bright weld



PRODUCT CODE:	033652	033651	033656, 033648	033842	033402
Cylinder Size Offering	MAXI 8	MAXI 4	Gx	Gx	G
Top Type Offering	Standard	Standard	EXELTOP, ALTOP	SMARTOP	Standard
Volume (m^3)	116	58.5	10.4	8.4	9.3
Weight (kg)	892	462	73	70	65
Pressure (bar)	291	291	201	167	176
Water Capacity (L)	400	200	50	49	49
Impurities (ppm)	$H_2O \leq 40$ ppm $O_2 \leq 50$ ppm $N_2 \leq 200$ ppm				

Appearance	Odour	Flammability
Colourless Gas	Odourless	Non Flammable

UN Number	Hazard Class	HAZCHEM (EAC)	SDS
1956	2.2	2TE	AL615.pdf

This product complies with the following Australian and International Standards: ISO 14175-M12-ArC-2 AWS-A5.32 AS4882-2003 and AS1554

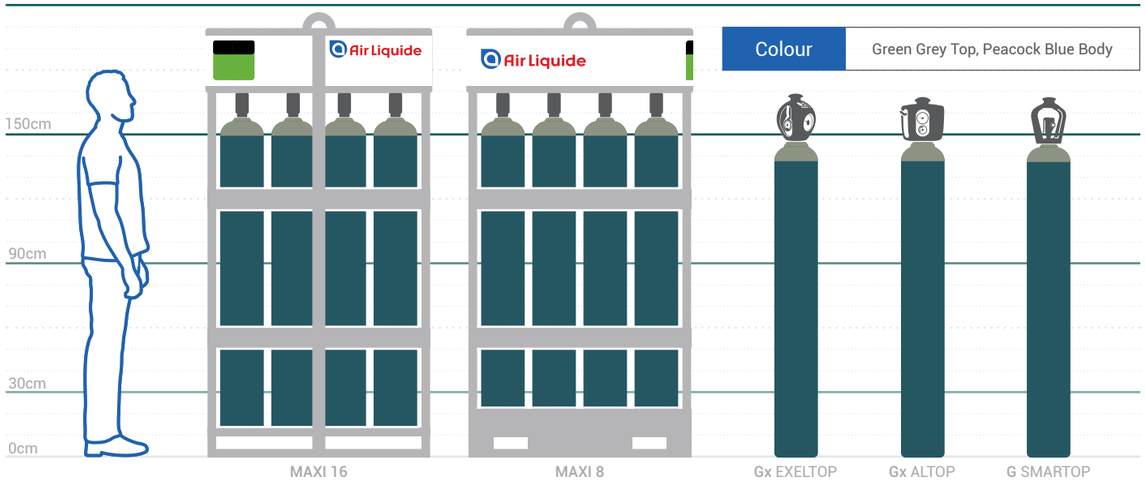
ARCAL Speed

Productivity Plus

WELDING | 92% ARGON + 8% CARBON DIOXIDE

Applications

- Highly productive MAG welding of carbon steel
- High deposition rate welding



PRODUCT CODE:	033643	033644	033642	033640, 033655	033871
Cylinder Size Offering	MAXI 16	MAXI 8	MAXI 4	Gx	G
Top Type Offering	Standard	Standard	Standard	EXELTOP, ALTOP	SMARTOP
Volume (m^3)	242	121	60	10.8	8.7
Weight (kg)	1448	900	465	72	70
Pressure (bar)	292	292	292	201	167
Water Capacity (L)	800	400	202	50	49
Impurities (ppm)	$H_2O \leq 40$ ppm $O_2 \leq 50$ ppm $N_2 \leq 200$ ppm				

Appearance	Odour	Flammability
Colourless	Odourless	Non Flammable

UN Number	Hazard Class	HAZCHEM (EAC)	SDS
1956	2.2	2TE	AL615.pdf

This product complies with the following Australian and International Standards: ISO 14175-M21-ArC-8 AWS-A5.32 AS4882-2003 and AS1554

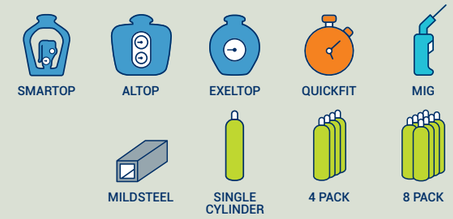
ARCAL Force

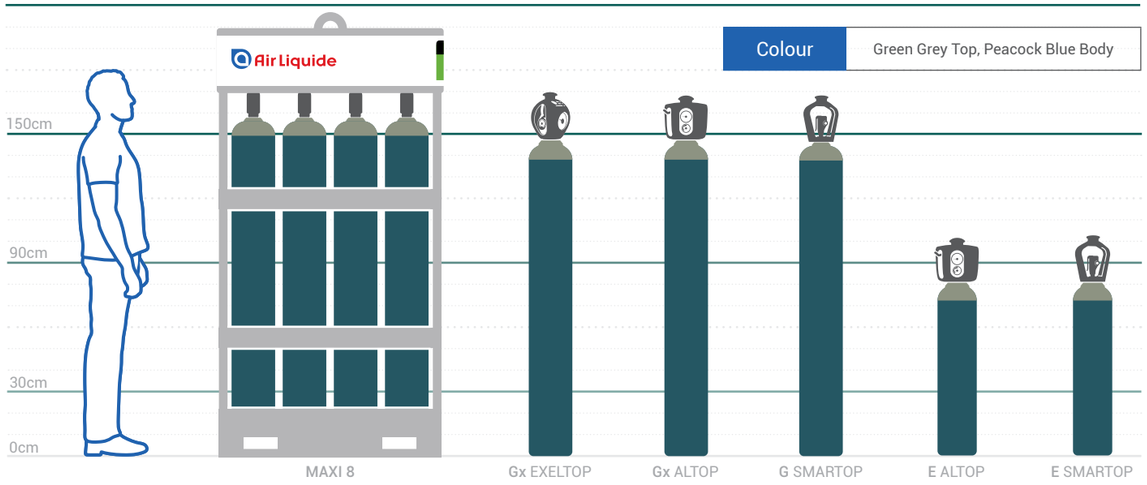
Powerful Results

WELDING | 82% ARGON + 18% CARBON DIOXIDE

Applications

- All purpose MAG welding of carbon steels
- MAG welding of solid and flux cored wires





PRODUCT CODE:	030680	030640	033637, 033634	030606	033633	033813
Cylinder Size Offering	MAXI 8	MAXI 4	Gx	G	E	E
Top Type Offering	Standard	Standard	EXELTOP, ALTOP	Standard	ALTOP	SMARTOP
Volume (m^3)	128	64.3	11.5	10.2	4.6	4.6
Weight (kg)	910	470	72.5	65	36	39
Pressure (bar)	300	300	201	176	201	167
Water Capacity (L)	404	202	50	49	20	25
Impurities (ppm)	$H_2O \leq 40$ ppm $O_2 \leq 50$ ppm $N_2 \leq 200$ ppm					

Appearance	Odour	Flammability
Colourless Gas	Odourless	Non Flammable

UN Number	Hazard Class	HAZCHEM (EAC)	SDS
1956	2.2	2TE	AL615.pdf

This product complies with the following Australian and International Standards: ISO 14175-M21-ArC-18 AWS-A5.32 AS4882-2003 and AS1554

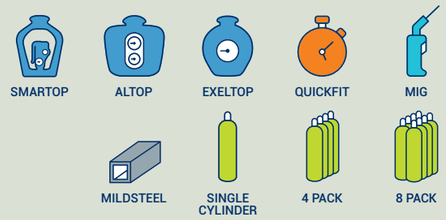
ARCAL Flux

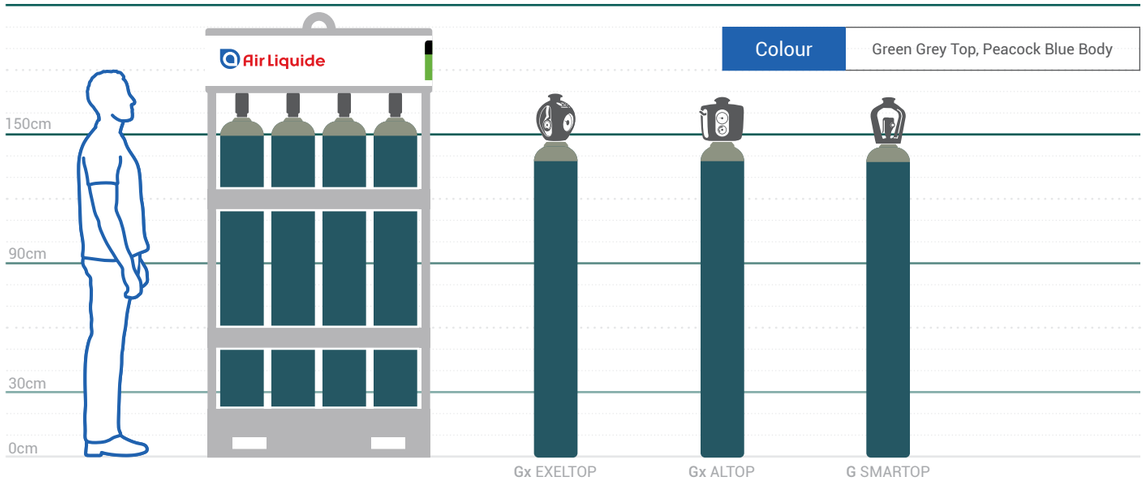
WELDING | 75% ARGON + 25% CARBON DIOXIDE

The solution for heavy industry GMAW processes

Applications

- All purpose MAG welding of carbon steels
- MAG welding of solid and flux cored wires





PRODUCT CODE:	034900	034899	034903, 030425	033821
Cylinder Size Offering	MAXI 8	MAXI 4	Gx	G
Top Type Offering	Standard	Standard	EXELTOP, ALTOP	SMARTOP
Volume (m^3)	133	66.8	11.6	9.5
Weight (kg)	920	480	75	71
Pressure (bar)	300	291	193	163
Water Capacity (L)	400	200	50	49
Impurities (ppm)	$H_2O \leq 40$ ppm $O_2 \leq 50$ ppm $N_2 \leq 200$ ppm			

Appearance	Odour	Flammability
Colourless	Odourless	Non Flammable

UN Number	Hazard Class	HAZCHEM (EAC)	SDS
1956	2.2	2TE	AL615.pdf

This product complies with the following Australian and International Standards: ISO 14175-M21-ArC-25 AWS-A5.32 AS4882-2003 and AS1554

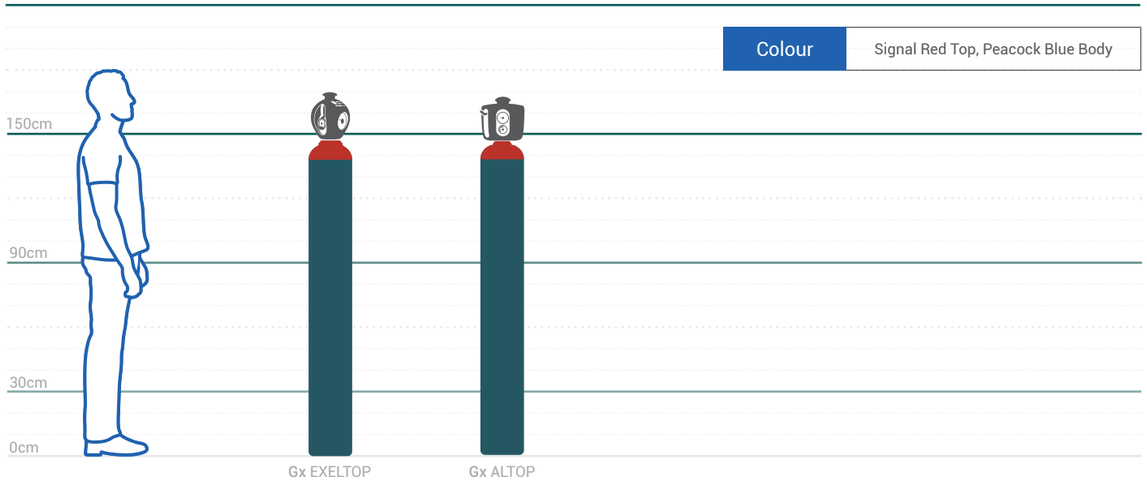
ARCAL 10

WELDING | 97.6% ARGON + 2.4% HYDROGEN

Improves arc efficiency, penetration, higher travel speed and reduced oxidation clean up

Applications

- TIG and Plasma welding of austenitic stainless steels
- TIG brazing of galvanised steels
- TIG orbital welding of austenitic stainless steels



PRODUCT CODE:	033670
Cylinder Size Offering	Gx
Top Type Offering	EXELTOP, ALTOP
Volume (m^3)	10.6
Weight (kg)	70
Pressure (bar)	201
Water Capacity (L)	50
Impurities (ppm)	$H_2O \leq 40$ ppm $O_2 \leq 20$ ppm $N_2 \leq 80$ ppm

Appearance	Odour	Flammability
Colourless Gas	Odourless	Non Flammable

UN Number	Hazard Class	HAZCHEM (EAC)	SDS
1956	2.2	2TE	AL615.pdf

This product complies with the following Australian and International Standards: ISO 14175-R1-ArH-2.4 AWS-A5.32 AS4882-2003 and AS1554

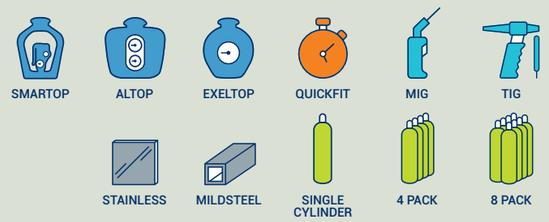
ARCAL 14

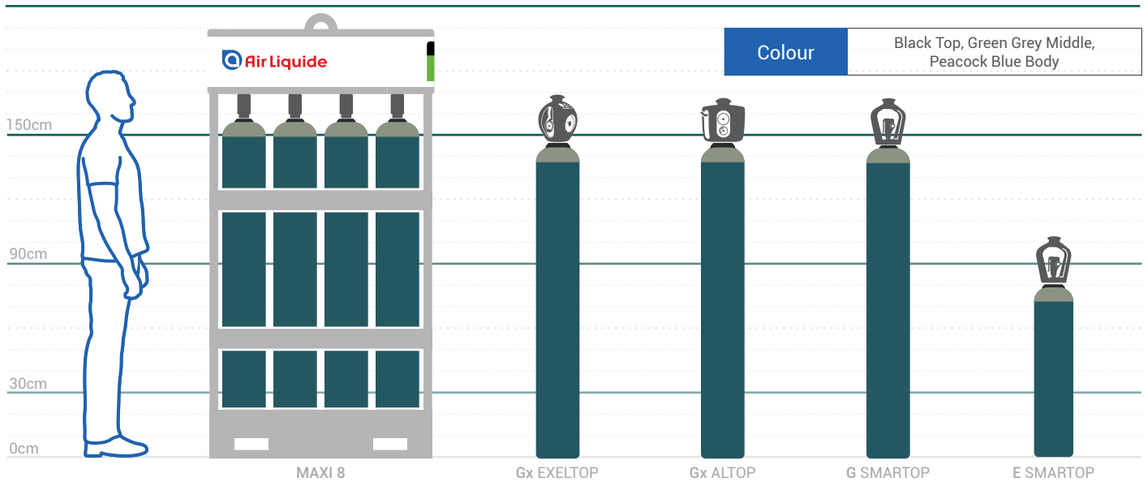
WELDING | 96% ARGON + 3% CARBON DIOXIDE + 1% OXYGEN

Optimised shielding gas for light metal fabrication

Applications

- GMAW welding of carbon steels
- GMAW welding of stainless steels
- Dedicated to pulsed welding
- Welding of electro-galvanised steels





PRODUCT CODE:	033639	033638	033635	033636, 033862	033863
Cylinder Size Offering	MAXI 8	MAXI 4	Gx	G	E
Top Type Offering	Standard	Standard	EXELTOP, ALTOP	SMARTOP	SMARTOP
Volume (m^3)	118	59	10.5	8.5 - 10.5	4.3
Weight (kg)	890	460	75	71 - 75	38
Pressure (bar)	292	292	201	167 - 201	167
Water Capacity (L)	400	200	50	50	25
Impurities (ppm)	$H_2O \leq 40$ ppm $N_2 \leq 200$ ppm				

Appearance	Odour	Flammability
Colourless	Odourless	Non Flammable

UN Number	Hazard Class	HAZCHEM (EAC)	SDS
1956	2.2	2TE	AL615.pdf

This product complies with the following Australian and International Standards: ISO 14175-M14-ArCO-3/1 AWS-A5.32 AS4882-2003 and AS1554

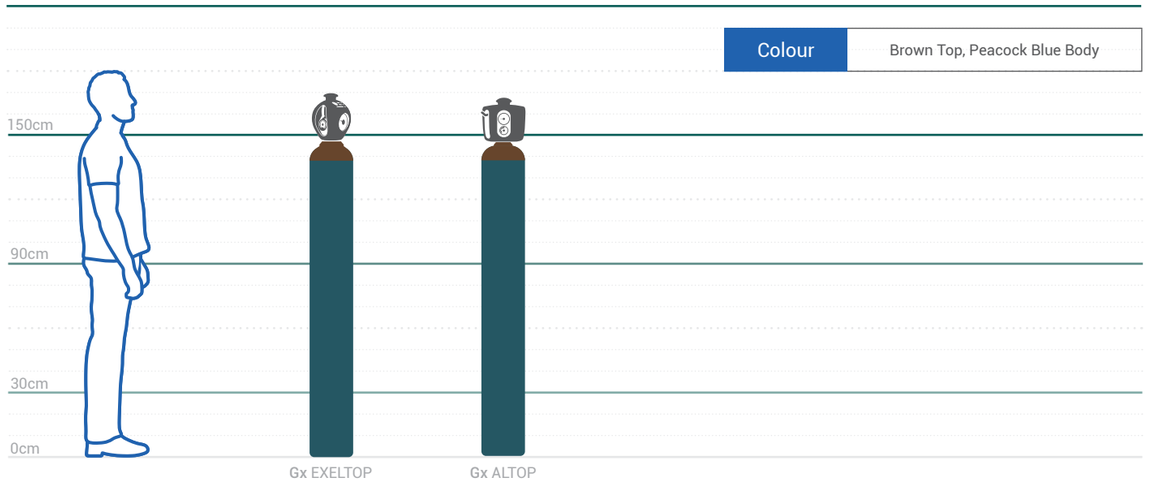
ARCAL 32

WELDING | 80% ARGON + 20% HELIUM

Turns good welders into great welders

Applications

- MIG welding of aluminium and copper alloys
- TIG welding of all materials
- TIG welding of H2 sensitive materials
- Annular gas for plasma welding of aluminium



PRODUCT CODE:	033676, 033675
Cylinder Size Offering	Gx
Top Type Offering	EXELTOP, ALTOP
Volume (m^3)	10.2
Weight (kg)	70
Pressure (bar)	201
Water Capacity (L)	50
Impurities (ppm)	$H_2O \leq 40$ ppm $O_2 \leq 20$ ppm $N_2 \leq 80$ ppm

Appearance	Odour	Flammability
Colourless Gas	Odourless	Non Flammable

UN Number	Hazard Class	HAZCHEM (EAC)	SDS
1956	2.2	2TE	AL615.pdf

This product complies with the following Australian and International Standards: ISO 14175-I3-ArHe-20 AWS-A5.32 AS4882-2003 and AS1554

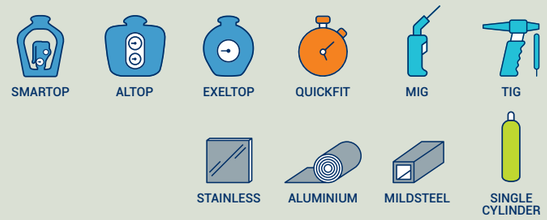
ARCAL 35

WELDING | 50% ARGON + 50% HELIUM

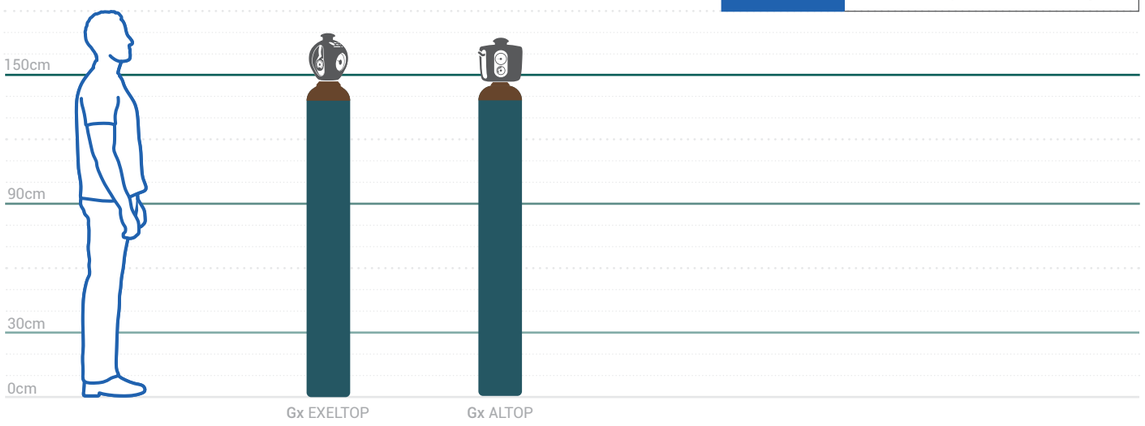
Increase penetration and higher travel speed for all heavy TIG welding applications

Applications

- MIG welding of aluminium and copper alloys
- TIG welding of all materials
- TIG welding of H2 sensitive materials
- Annular gas for plasma welding of aluminium



Colour	Brown Top, Peacock Blue Body



PRODUCT CODE:	033683
Cylinder Size Offering	Gx
Top Type Offering	EXELTOP, ALTOP
Volume (m^3)	9.7
Weight (kg)	71
Pressure (bar)	201
Water Capacity (L)	50
Impurities (ppm)	$H_2O \leq 40$ ppm $O_2 \leq 20$ ppm $N_2 \leq 80$ ppm

Appearance	Odour	Flammability
Colourless Gas	Odourless	Non Flammable

UN Number	Hazard Class	HAZCHEM (EAC)	SDS
1956	2.2	2TE	AL615.pdf

This product complies with the following Australian and International Standards: ISO 14175-I3-ArHe-50 AWS-A5.32 AS4882-2003 and AS1554

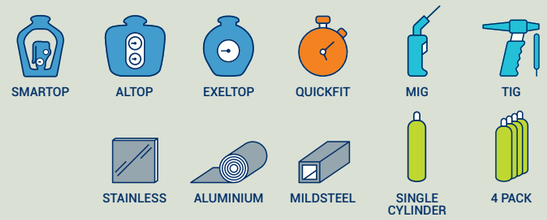
ARCAL 37

WELDING | 30% ARGON + 70% HELIUM

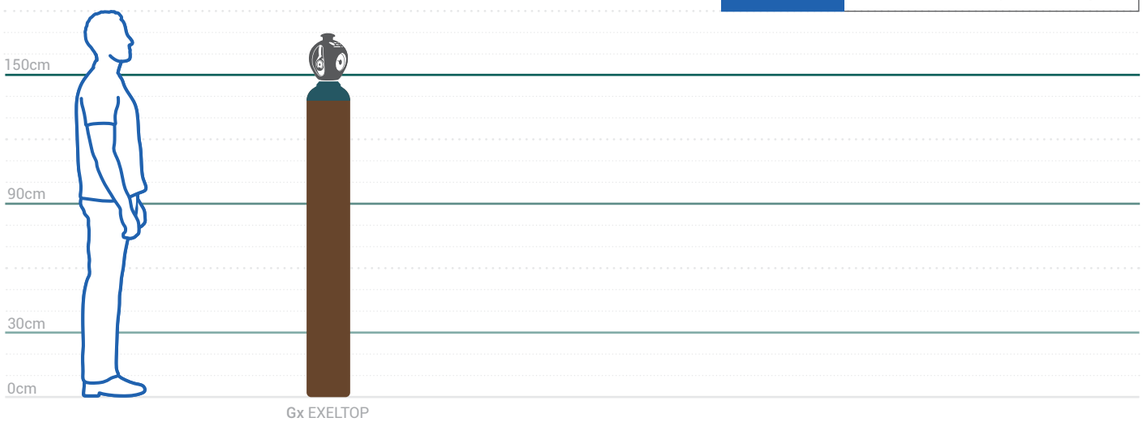
Increase penetration and higher travel speed for all heavy TIG welding applications

Applications

- MIG welding of aluminium and copper alloys
- TIG welding of all materials
- TIG welding of H2 sensitive materials
- Annular gas for plasma welding of aluminium



Colour	Peacock Blue Top, Brown Body



PRODUCT CODE:	033686
Cylinder Size Offering	Gx
Top Type Offering	EXELTOP
Volume (m^3)	10
Weight (kg)	60
Pressure (bar)	201
Water Capacity (L)	50
Impurities (ppm)	$H_2O \leq 40$ ppm $O_2 \leq 20$ ppm $N_2 \leq 80$ ppm

Appearance	Odour	Flammability
Colourless Gas	Odourless	Non Flammable

UN Number	Hazard Class	HAZCHEM (EAC)	SDS
1956	2.2	2TE	AL615.pdf

This product complies with the following Australian and International Standards: ISO 14175-I3-HeAr30 AWS-A5.32 AS4882-2003 and AS1554

ARCAL 39

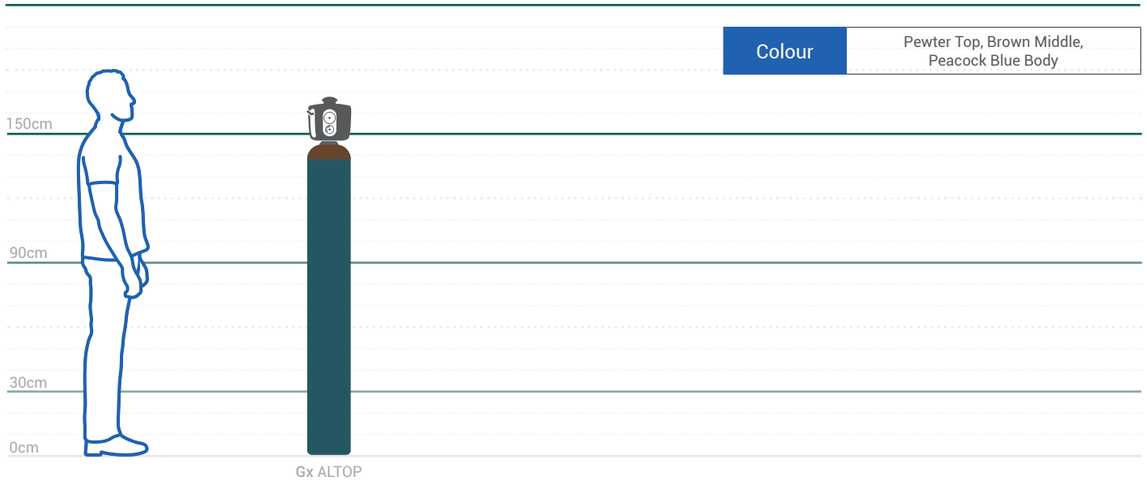
WELDING | 88% ARGON + 10% HELIUM + 2% NITROGEN

A technical gas for all your TIG Duplex and Super Duplex needs

Applications

- TIG welding of Duplex and Superduplex steels
- TIG welding of N2 doped stainless steels
- TIG welding of austenic stainless steels

ALTOP · QUICKFIT · TIG · STAINLESS · SINGLE CYLINDER



PRODUCT CODE:	033881
Cylinder Size Offering	Gx
Top Type Offering	ALTOP
Volume (m^3)	10.3
Weight (kg)	70
Pressure (bar)	201
Water Capacity (L)	50
Impurities (ppm)	$H_2O \leq 40$ ppm $O_2 \leq 20$ ppm $N_2 \leq 80$ ppm

Appearance	Odour	Flammability
Colourless Gas	Odourless	Non Flammable

UN Number	Hazard Class	HAZCHEM (EAC)	SDS
1956	2.2	2TE	AL615.pdf

This product complies with the following Australian and International Standards: ISO 14175-N2-ArHeN-10/2 AWS-A5.32 AS4882-2003 and AS1554

ARCAL 112

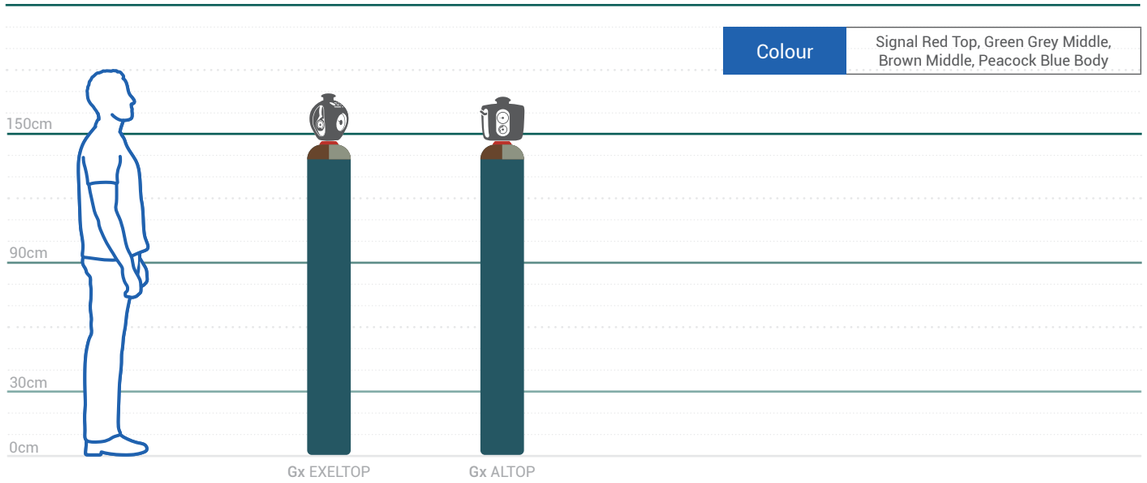
WELDING | 56.5% ARGON + 40% HELIUM + 2% CARBON DIOXIDE + 1.5% HYDROGEN

For heavy stainless steel applications with high travel speed, penetration and reduced oxidation

Applications

- High performance MAG welding of stainless steels
- Welding of all ELC (extra low carbon) stainless steels
- Multi-pass welding of stainless steels

ALTOP · EXELTOP · QUICKFIT · MIG · TIG · STAINLESS · SINGLE CYLINDER



PRODUCT CODE:	033660
Cylinder Size Offering	Gx
Top Type Offering	EXELTOP, ALTOP
Volume (m^3)	9.4
Weight (kg)	63
Pressure (bar)	201
Water Capacity (L)	50
Impurities (ppm)	$H_2O \leq 40$ ppm $O_2 \leq 20$ ppm $N_2 \leq 80$ ppm

Appearance	Odour	Flammability
Colourless Gas	Odourless	Non Flammable

UN Number	Hazard Class	HAZCHEM (EAC)	SDS
1956	2.2	2TE	AL615.pdf

This product complies with the following Australian and International Standards: ISO 14175-M12(1)-ArHeCH-40/2/1.5 AWS-A5.32 AS4882-2003 and AS1554

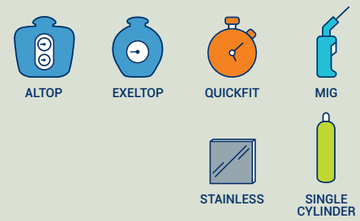
ARCAL 121

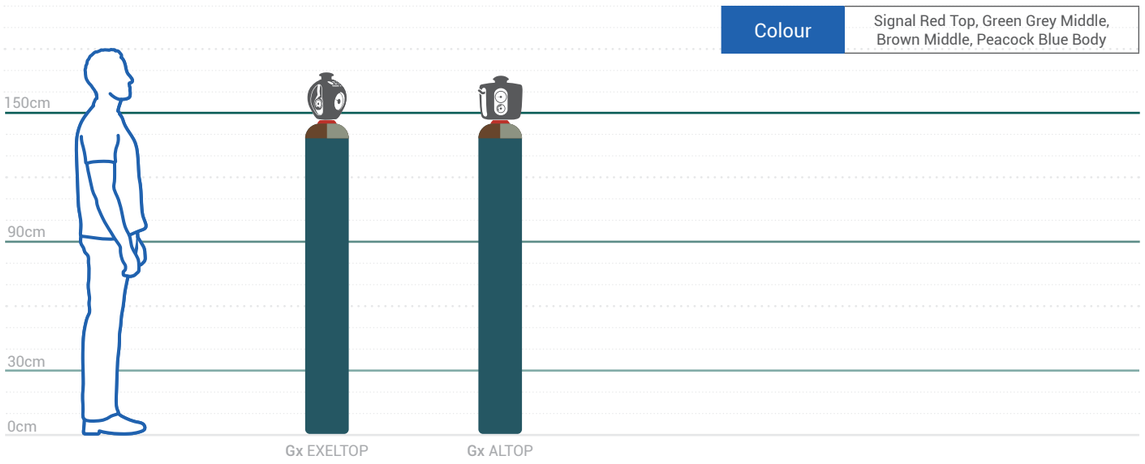
WELDING | 81% ARGON + 18% HELIUM + 1% CARBON DIOXIDE

A technical shielding gas for high performance welding

Applications

- High performance MAG welding of stainless steels
- Welding of all ELC (Extra Low Carbon) stainless steels
- Welding of dissimilar metals
- Welding of heavy guage stainless steels
- Cladding eg: monel





PRODUCT CODE:	033650
Cylinder Size Offering	Gx
Top Type Offering	EXELTOP, ALTOP
Volume (m^3)	10.2
Weight (kg)	70
Pressure (bar)	201
Water Capacity (L)	50
Impurities (ppm)	$H_2O \leq 40$ ppm $O_2 \leq 20$ ppm $N_2 \leq 80$ ppm

Appearance	Odour	Flammability
Colourless Gas	Odourless	Non Flammable

UN Number	Hazard Class	HAZCHEM (EAC)	SDS
1956	2.2	2TE	AL615.pdf

This product complies with the following Australian and International Standards: ISO 14175-M12(1)-ArHeC-18/1 AWS-A5.32 AS4882-2003 and AS1554

ARCAL 129

WELDING | 91.5% ARGON + 5% HELIUM + 1.8% CARBON DIOXIDE + 1.7% NITROGEN

A technical gas for all your MAG Duplex and Super Duplex needs

Applications

- MAG welding of Duplex and Superduplex steels
- MAG welding of N2 doped stainless steels
- MAG welding of austenic stainless steels

PRODUCT CODE:	033885
Cylinder Size Offering	Gx
Top Type Offering	SMARTOP
Volume (m^3)	10.1
Weight (kg)	71
Pressure (bar)	201
Water Capacity (L)	50
Impurities (ppm)	$H_2O \leq 40$ ppm $O_2 \leq 50$ ppm $N_2 \leq 80$ ppm

Appearance	Odour	Flammability
Colourless Gas	Odourless	Non Flammable

UN Number	Hazard Class	HAZCHEM (EAC)	SDS
1956	2.2	2TE	AL615.pdf

This product complies with the following Australian and International Standards: ISO 14175-N2-ArHeCN-5/1.8/1.7 AWS-A5.32 AS4882-2003 and AS1554

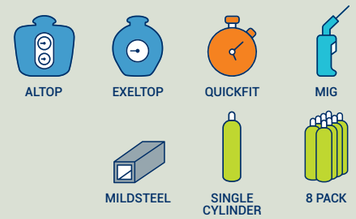
ARCAL 211

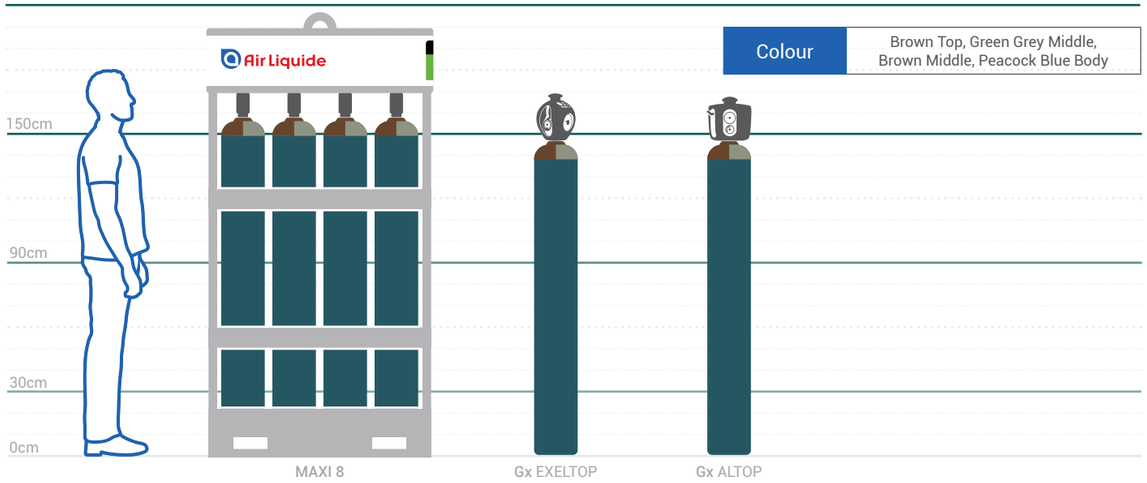
WELDING | 75% ARGON + 10% HELIUM + 15% CARBON DIOXIDE

Superior travel speed, excellent penetration and lowering overall costs in heavy welding

Applications

- High performance GMAW welding of carbon steels
- GMAW welding of Flux cored wires
- Robotic welding of steel structures





Colour	Brown Top, Green Grey Middle, Brown Middle, Peacock Blue Body

PRODUCT CODE:	033647	033645
Cylinder Size Offering	MAXI 8	Gx
Top Type Offering	Standard	EXELTOP, ALTOP
Volume (m^3)	118	10.7
Weight (kg)	890	60
Pressure (bar)	290	201
Water Capacity (L)	400	50
Impurities (ppm)	$H_2O \leq 40$ ppm $O_2 \leq 50$ ppm $N_2 \leq 200$ ppm	

Appearance	Odour	Flammability
Colourless Gas	Odourless	Non Flammable

UN Number	Hazard Class	HAZCHEM (EAC)	SDS
1956	2.2	2TE	AL615.pdf

This product complies with the following Australian and International Standards: ISO 14175-M21(1)-ArCHe-15/10 AWS-A5.32 AS4882-2003 and AS1554

Safety Guidelines

Safety is ALA's number one priority

Safety is a fundamental value. It is an integral part of Air Liquide's operational excellence and culture. The Group is committed to efficiently and under all circumstances reducing the exposure of its employees, customers, subcontractors, suppliers and local communities to professional and industrial risks.

HANDLING CYLINDERS
tips and safety guidelines

ABOUT HANDLING CYLINDERS

The highest risk of accidents or injuries involving cylinders happen when moving or handling cylinders. Larger cylinder sizes (G or F size) can be heavy, and often difficult to handle. Special care and equipment should be considered when handling cylinders to avoid falls, trips and injury. Larger full G size cylinders, combined with certain gas types can weight in excess of 80kg.

Precautions for safe handling of cylinders:

- Only experienced and properly instructed persons should handle cylinders.
- Handle cylinders with care and avoid dropping or hitting them against other objects
- Use the right PPE, including safety glasses, gloves and protective footwear.
- Protect cylinders from physical damage; do not drag, roll, slide or drop.

Use a Trolly

For moving cylinders more than 5m, a trolly makes moving cylinders safer, faster and easier

Large Cylinders are Heavy

Never attempt to catch or restrain a falling cylinder

Protect Yourself

Safety Glasses, Protective Wear, Safety Gloves and Safety Boots

Example of the Gas Cylinder Safety Guidelines poster

CYLINDER STORAGE
and helpful information

STORAGE OF GAS CYLINDERS

Customers and Agents responsible for providing and maintaining a suitable, safe and secure storage facility for gas cylinders that meet the requirements of the Australian Standard® AS4332 – The Storage and Handling of Gases in Cylinders.

Safety is the number one priority for Air Liquide and our objective is zero accidents, in every site, in every region, at every Agent.

This facility must be easily accessible for Air Liquide delivery and a suitable parking area provided for Air Liquide and customer vehicles.

MINOR AND INDOOR STORAGE

Compressed gas cylinders contain gas stored under significant pressure, presenting a significant hazard in the workplace.

Gas cylinders should be stored outdoors, preferably in a secure, cage that's protected from sunlight.

Storage indoors is not recommended unless the building has been designed for that purpose. Refer to AS4332 for more guidance

PLACARD AND MANIFEST REQUIREMENTS

A manifest is a written summary of hazardous chemicals or stored at a workplace. The primary purpose of a manifest is to provide emergency services with information on the quantity, classification and location of hazardous chemicals at the workplace. It also contains information such as site plans and emergency contact details.

SEGREGATION

Different dangerous goods classes of gas cylinders within a store must be segregated *(Table 1)*. Inert gases (e.g. Class 2.2, without subsidiary risk) may be placed between incompatible Flammable and Oxidising gases. For example a compressed argon, argon mix, nitrogen, carbon dioxide cylinder could be placed between a flammable gas such as acetylene or LPG.

	Class 2.1	Class 2.2	Class 2.2 2.2 / 5.1	Class 2.3 2.3 / 8
Class 2.1		0	3m	3m
Class 2.2	0		0	0
Class 2.2 2.2 / 5.1	3m	0		3m
Class 2.3 2.3 / 8	3m	0	3m	

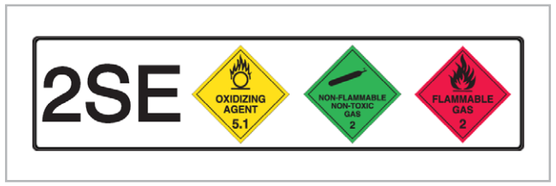
Table1 Separation of gases within the cylinder storage compound

CYLINDER SAFETY SIGNAGE AND IDENTIFICATION

Customers and Agents must ensure safety diamond signage is clearly displayed at the entrance of the cylinder storage compound, alternatively this signage can be displayed at the site main entrance if the cylinder storage area is in-fact visible from the entrance point.

The safety diamonds displayed must be those cylinders stored within the compound and can be identified on the neck label of each cylinder.

Air Liquide Agents are strongly recommended to contact their appropriate State or local Statutory Authority and Insurance Underwriter to ensure that their storage facility comply in all respects for the storage of cylinder gases.



Example of Safety Diamond indification sign

Example of a HAZCHEM sign

VOLUMES AND STORAGE

Dangerous goods sites storing or handling more than the manifest quantities of dangerous goods must maintain a manifest and a dangerous goods site plan.

THE GOLDEN RULES FOR CYLINDER STORAGE

- Store Cylinders on a flat, level, stable surface in an upright position.
- Store cylinders on concrete hardstand, cylinders stored on other surfaces (dirt, gravel, roadbase) are more likely to fall over and cause injury.
- Restrain cylinders to prevent them falling over.
- Separate by minimum 3 metres cylinders containing flammable gases from oxidising gases.
- Secure cylinders away from public access to prevent unauthorised entry.
- Keep full cylinders separate from empty cylinders.
- Ensure the cylinder store is well ventilated.
- Maintain a clean cylinder store.
- Visibly display a “no smoking” sign.
- Protect cylinders from heat, ignition sources and combustible materials.
- Rotate cylinders: first in, first out.
- Minimise stock levels.
- Ensure oil based substances, greases, lubricants or aerosols are stored away from oxidising gas cylinders.
- Always take care when loading and unloading cylinder products from vehicles; always maintain an exclusion zone around mobile equipment (forklifts, cranes).

TRANSPORTING GAS CYLINDERS

Air Liquide does not recommend the practice of transporting cylinders in a closed passenger compartment, car boot, or cargo area of a passenger vehicle. This is primarily due to the risk of asphyxiation and the inability to adequately restrain cylinders.

If transporting in a passenger vehicle the following steps must be taken:

- Limit the number of cylinders to be transported;
- Do not transport toxic or corrosive gases
- Make sure the vehicle windows are down;
- The ventilation fan should be set to maximum and air intake set to 'fresh,' not recirculating;
- The cylinder(s) or boxes are secured in the footwell behind the front passenger seat (Dry Ice boxes can alternatively be transported in the boot with the lid held in open position to allow ventilation);

Drivers should be informed to drive directly to their destination and unload immediately; cylinders or Dry Ice should **NOT** be stored or left for long periods of time in the vehicle.

Safety is the number one priority for Air Liquide and our objective is

ZERO ACCIDENTS,

in every site, in every region, at every Agent.

Cylinder gases can be dangerous if not transported correctly. Follow these safety guidelines to avoid accidents.

Beware of leaks:

- A cylinder is never totally empty. A few litres of acetylene can cause the trunk of a vehicle to explode.
- A leak is more likely to occur from the pressure regulator, pipes or blowpipe.

Beware of shocks:

- Even when stored inside a trunk, a cylinder can become a dangerous projectile in case of a frontal shock or a roll-over.

What you should do:

- Dismantle all equipment during transportation.
- Close all faucets, even if the cylinder is “empty”.
- Air out the vehicle.
- Do not leave the cylinders inside the vehicle for a long period of time.
- Secure the cylinders in an upright position.

Depending on the nature and quantity of the products, the transportation may be subjected to the *Transport of Dangerous Goods* regulation in terms of:

- Display of *Dangerous Goods Safety Marks* (i.e. Placards).
- Shipping documentation.
- Circulation on roads designated for dangerous goods.
- Training on the regulation and the products transported.

Air Liquide recommends that you do not transport your cylinders in a non-ventilated trunk or space of a vehicle:

- Close the cylinder valves.
- Disconnect the equipment.
- Ensure your vehicle is well ventilated
- Do not leave cylinders inside the vehicle for prolonged periods.

LOAD RESTRAINT PRINCIPLES

The National Transport Commission (NTC) publish the *Load Restraint Guidelines 2018*.

Web link:
www.ntc.gov.au/heavy-vehicles/safety/load-restraint-guide/

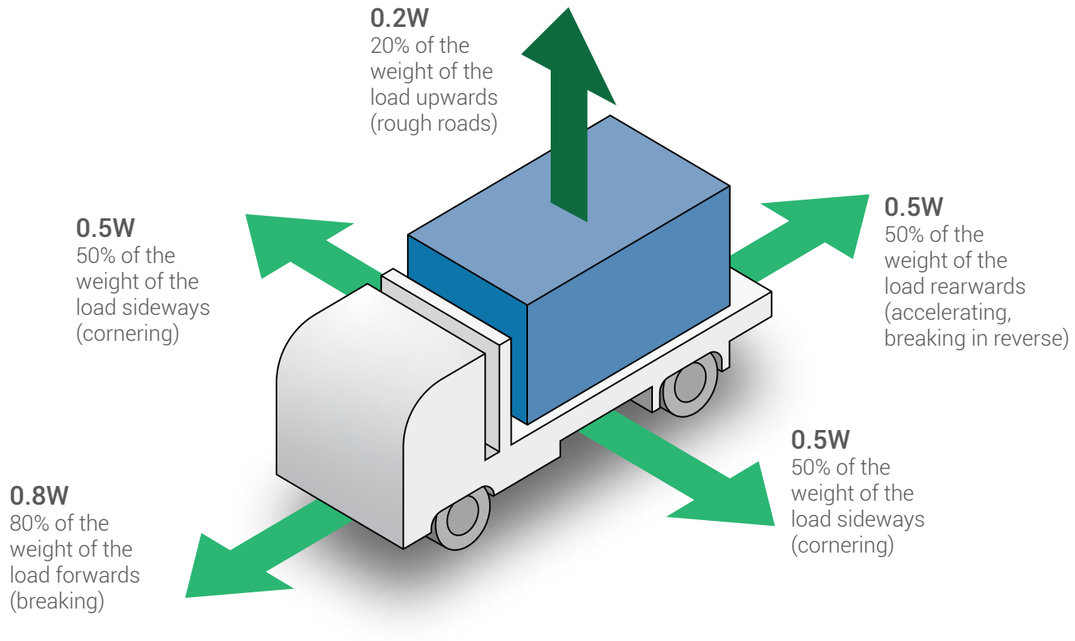
This section of the manual provides transport drivers, operators, and other participants in the transport chain of responsibility with basic safety principles which should be followed for the safe carriage of loads on road vehicles.

It also specifies the performance standards which must be met when restraining loads on road vehicles in Australia.

Just like any unrestrained person in a vehicle, loads can move forwards, backwards, sideways and upwards:

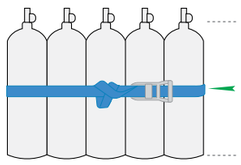
- **Forward shifts** are caused by: braking while driving forward, accelerating in reverse, downhill slopes.
- **Backward shifts** are caused by: braking in reverse, accelerating forward, uphill slopes.
- **Sideways shifts** are caused by: cornering, cambered roads.
- **Upward shifts** are caused by: uneven road surfaces.

If a load is restrained to meet these minimum Performance Standards it will not fall off or affect the stability of the vehicle under expected driving conditions. This includes emergency braking and minor collisions.

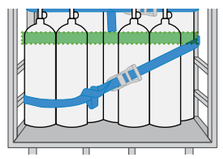


WEBBING STRAP
assembly and warnings

SECURING CYLINDERS USING THE WEBBING ASSEMBLY AND RATCHET:

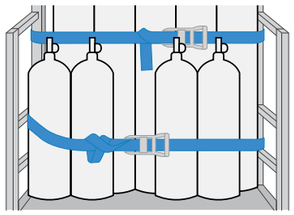


1. Inspect ratchets and webbing and ensure the straps are either securely attached to the vertical pole of the pallet (traditional fixed straps) or pass through the space between the vertical pole and outer corner of pallet (continuous straps).

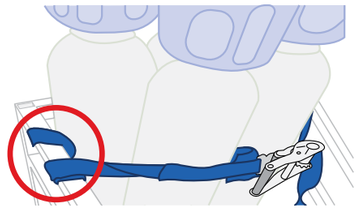


2. Straps should only remain inside the pallet and centralised around the load.

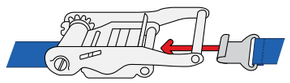
3. Ensure the straps remain horizontal on each side of the load. Securing the straps at an excessive angle can cause strap slippage and loosening.



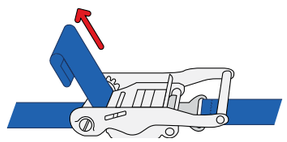
4. For two strap pallets, secure the lower strap first.



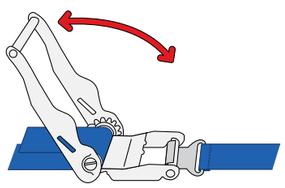
5. Ensure the strap is not twisted around the load or in the ratchet mechanism.



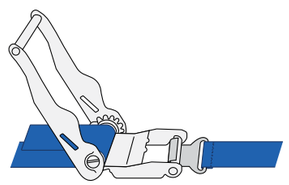
6. Engage the mating hook of the ratchet around the bar on the ratchet.



7. Pull the strap through the roller/ spindle to take up the excess slack. Note: A minimum of two wraps of webbing material should be used around the ratchet spindle for secure tightening.

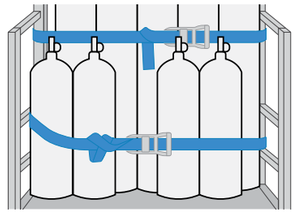


8. Lift the locking latch to operate the handle back and forth until the webbing is properly tensioned



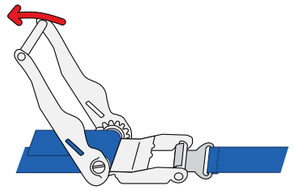
9. Do not leave ratchet handles in the open position, as they may not retain tension and may become damaged when parking the pallet against a wall or up against another pallet.

RELEASING CYLINDERS FROM RESTRAINTS:



1. For a stillage with two straps, loosen the tension on the lower strap first.

2. Check the stability of the load. Under no circumstances should products be unrestrained if there is a risk that products can move towards the driver when either webbing assemblies are loosened or ratchets released.



3. Undo the ratchet and carefully release the tension in the webbing by disengaging the ratchet's locking latch via the finger operated sliding plate and opening the ratchet by means of the handle.

WEBBING STRAP WEAR AND TEAR

When assessing the serviceability of webbing and ratchet, if any of the following conditions exist, the webbing or ratchet must be replaced:

- **Ratchet or hook damaged, corroded or rusted** such that it is weakened by 10% or does not effectively function.
- **Webbing weakened by 10% or more** of its original minimum breaking strength, by wear, damage, or stitching failure caused by excessive loading, knotting and bending.

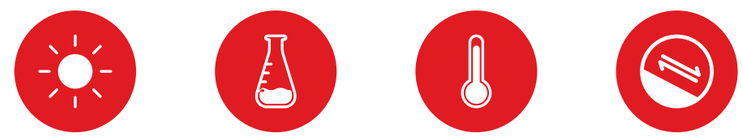
If you have any concerns about the condition of a stillage, webbing or ratched please highlight to the Air Liquide driver.

Note: Wear caused by chafing on rough surfaces causes a furry appearance on the webbing which indicates broken load-bearing fibres.

Damage can be caused by:

- Exposure to high temperatures.
- Exposure to chemicals, including acid and alkaline solutions and organic solvents.
- Prolonged exposure to sunlight or ultraviolet light.
- Prolonged friction against the load.

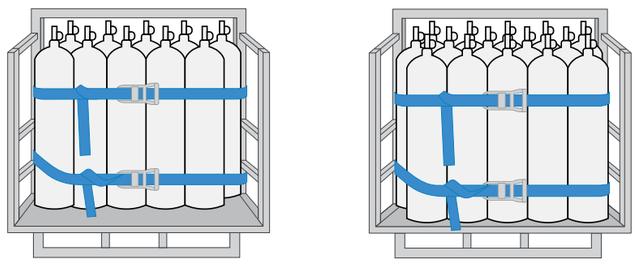
4 Major Causes of Damage to Straps



GENERAL GUIDELINES FOR LOADING CYLINDERS:

Guidelines for loading cylinders into cylinder stillages of the same size:

- Load cylinders centrally within the stillage.
- Nest cylinders to prevent movement when secured inside the stillage.
- Load stillage with cylinders the same size wherever possible.
- Do not place a cylinder on top of the valve of another cylinder.
- Cylinders must not overhang the base of the stillage.
- Ensure the load is stable.
- Stillage is on firm level surface.
- Cylinders should be upright and not stacked on to of other cylinders.

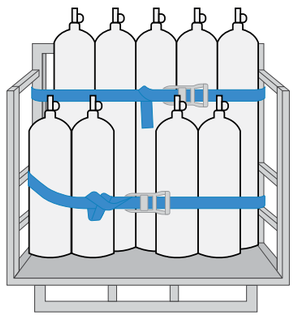


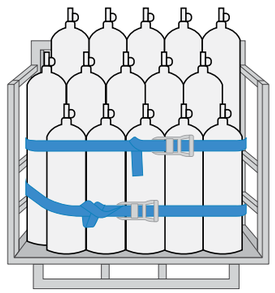
EXAMPLE
STILLAGE LOADED WITH CYLINDERS THE SAME SIZE AND A PARTLY LOADED STILLAGE

LOADING MIXED CYLINDERS

Guidelines for loading cylinders into cylinder stillages with different sizes:

- Ensure the load is stable.
- Place taller cylinders at the back of the stillage, with shorter cylinders placed in front and against the taller cylinders.
- Avoid placing small cylinders amongst larger cylinders.
- Use two web strapping to secure larger cylinders and smaller cylinders.





EXAMPLE
STILLAGE LOADED WITH LARGE AND MEDIUM CYLINDERS AND A STILLAGE LOADED WITH MEDIUM AND SMALL CYLINDERS

RESTRAINING STILLAGES OR PACKS

RESTRAINING ONE STILLAGE

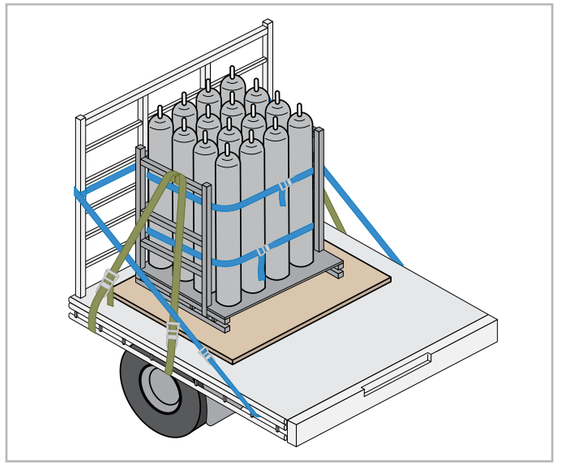


Diagram of Restraining Stillage or Packs on steel deck

RESTRAINING SINGLE PACKS

- Load single packs along the centreline of the deck.
- Single cylinder packs should be restrained with 2 looped straps, with plywood between the pack and headboard as shown in the diagram.
- Where the manifold pack does not have tie down anchorage points, vertical restraint should be provided as per the diagram.
- The same restraints are required for steel decks and timber decks.

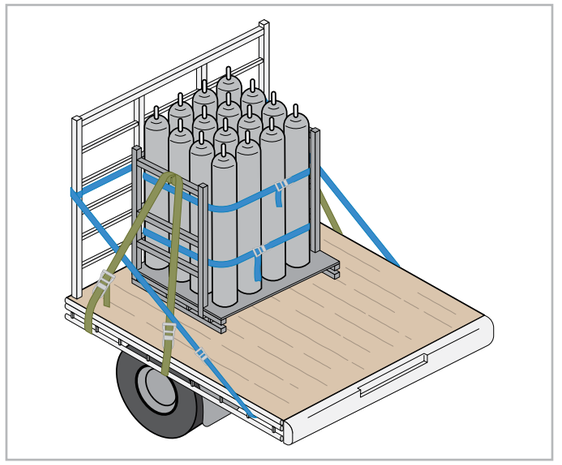


Diagram of Restraining Stillage or Packs on timber deck

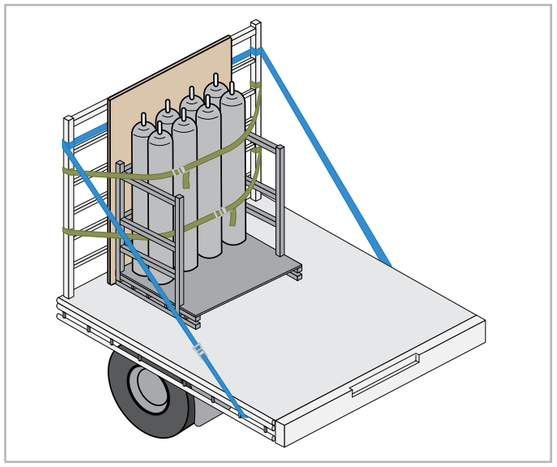


Diagram of Restraining Single Packs

LOAD RESTRAINT

TRANSPORTING CYLINDERS IN LIGHT COMMERCIAL VEHICLES

Transporting cylinders upright

Restrain cylinders by lashing them to the vehicle body or containing them in a purpose built frame.

If transporting cylinders upright against a headboard:

- The total weight of the cylinders should not exceed 250 kg.
- Apply at least two horizontal straps, as shown in the diagram.

Webbing straps must be at least 38mm wide with a minimum Lashing Capacity of 1000 kg.

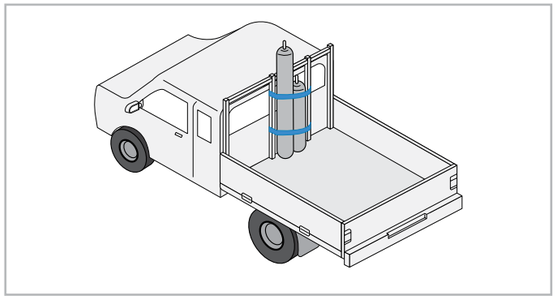


Diagram of how to transport cylinders upright

TRANSPORTING CYLINDERS LYING DOWN

Place the cylinders lengthwise on the deck.

- Position the cylinders with the valves facing rearwards, with the base blocked against the headboard or another strong part of the load.
- Apply at least two tie-down strap, as shown below.
- Cylinders containing liquid (LPG, Acetylene, CO2 Liquid withdrawal) must be transported in an upright position.
- Cylinders must be transported horizontally on timber pallet and restrained as shown in the diagram.
- Where required, the stillage must be suitably blocked in front to maintain the correct load distribution over the axle. The stillage must either be blocked in all directions or tied down to prevent moving.
- Due to manual handling hazards, it is best practice to load and restrain the cylinder with the stillage at ground level and to then load the stillage by forklift.

NOTE Please refer to the ADG for any additional requirements that are applicable for transport.

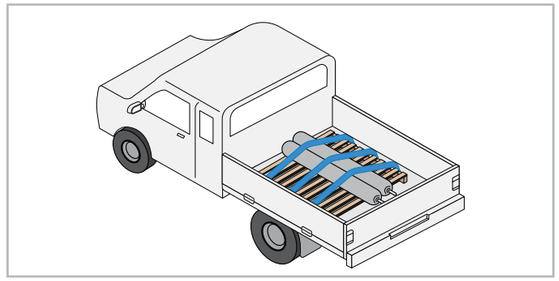


Diagram of how to transport cylinders lying down

TRANSPORT OF CYLINDERS IN VANS

Vans are only suitable for the transport of gas cylinders if they have:

- A sealed compartment or sealed bulkhead, separated from the driver's compartment
- High-level and low-level ventilation
- Suitable load restraint anchorage points

Cylinders must not be transported loose, they **must always be restrained.**

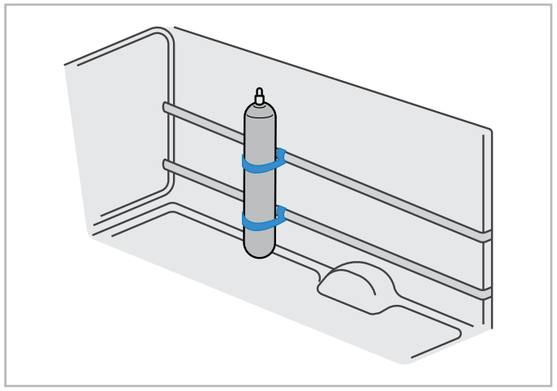


Diagram of transporting cylinders in a Van

TRANSPORT OF CYLINDERS IN TRAILERS

NOTE: IT IS NOT RECOMMENDED TO TRANSPORT CYLINDERS IN TRAILERS.

- Cylinders must be transported horizontally on timber pallet and restrained as shown in the diagram.
- Where required, the stillage must be suitably blocked in front to maintain the correct load distribution over the axle. The stillage must either be blocked in all directions or tied down to prevent moving.
- Due to manual handling hazards, it is best practice to load and restrain the cylinder with the stillage at ground level and to then load the stillage by forklift.

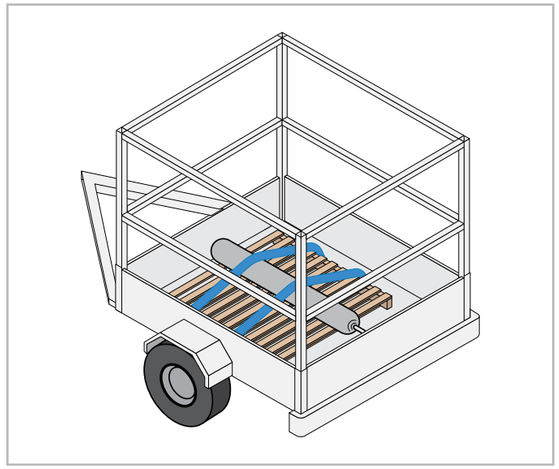


Diagram of transporting cylinders in a box trailer

DANGEROUS GOODS PLACARDING

A placard load refers to a vehicle carrying over a certain amount of dangerous goods (other than explosives, infectious and radioactive substances) that is required to display placards (i.e. Class label or Emergency Information Panel) during transport.

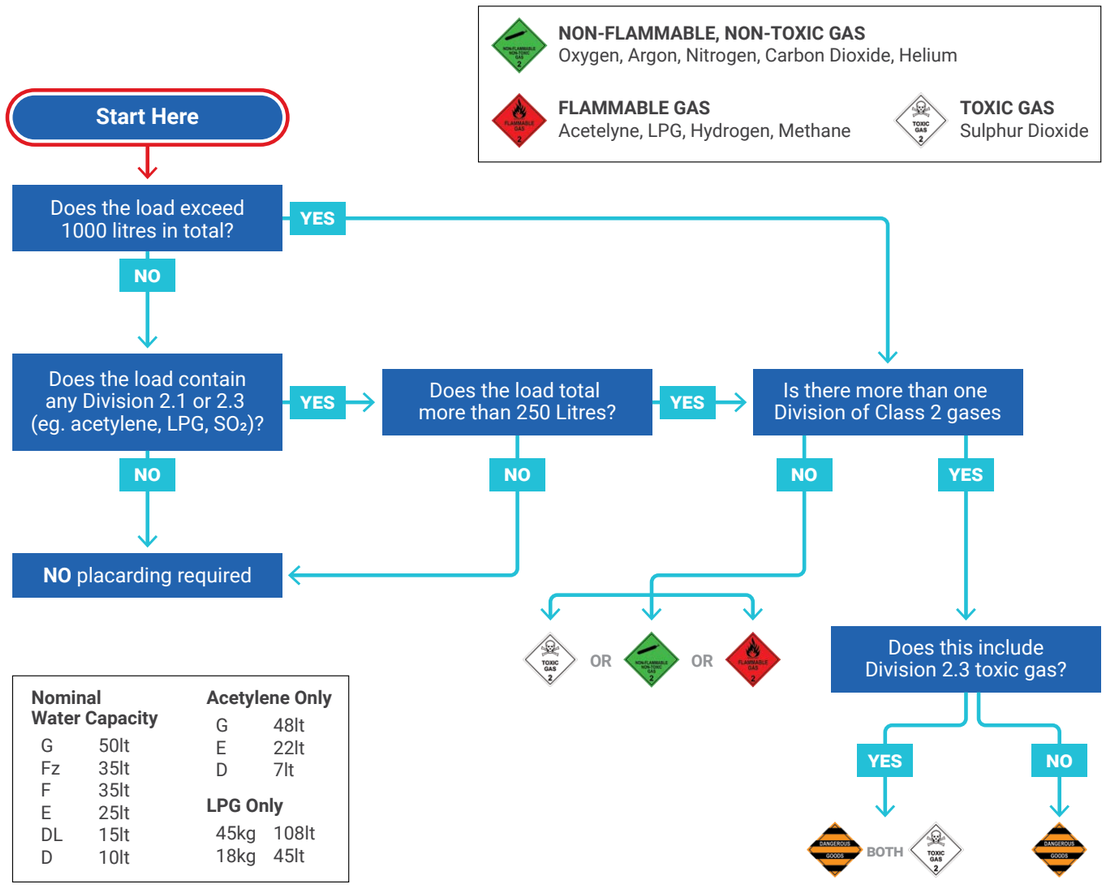
The carriage of gases in a non-dedicated enclosed vehicle, such as a car, van or station wagon is particularly hazardous because gas can accumulate very quickly. The gas may be toxic, flammable or cause asphyxiation by displacing air.

It is most important that all gases are transported in open trucks, utilities, trailers etc, and not closed vans. The rules state that acetylene and **LPG cannot be carried in the same air space as the driver**. They should be in a separate compartment, carried upright and safely secured, with the pressure release valve in a ventilated space.

If a customer is transporting oxygen, the **cylinders cannot be carried on a vehicle that also carries any oil-based product.** Remember, oxygen and oil/grease compounds can form an explosive combination. Similarly, oxygen cannot be carried with flammable liquids such as paint thinners.

The regulations are contained in detail in *"The Australian Dangerous Goods Code – Requirements and Recommendations"*. A summary of the code has been produced by **ANZIGA (Australia and New Zealand Industrial Gas Association)** in booklet form and is available from Air Liquide.

Agents are obliged to inform customers and their drivers about the rules and regulations of loading and transporting gas cylinders. Please refer to the attached *Shared Standard Operating Procedure – Transportation of Products in Non-Dedicated Vehicles.*



Flowchart Diagram of Placarding of Dangerous Goods Vehicles for road Transport

GENERAL SAFETY guidelines

GUIDELINES

a. Air Liquide Australia Agents are strongly recommended to contact their appropriate State/ Territory or local Statutory Authority and Insurance Underwriter to ensure that their storage facilities comply in all respects for the storage of cylinder gases. See the *Australian Standard® AS4332 – The Storage and Handling of Gases in Cylinders* for detailed information.

b. Appropriate Hazardous Goods signage and identification for cylinder storage will be provided by Air Liquide. The Agent must ensure that the signage is clearly and correctly displayed.

c. Air Liquide has a range of 'TECH SPECS' brochures available that contain safety and handling information about individual gas types. There are also Safety Advice brochures detailing information regarding "Oxygen Enriched or Deficient Atmospheres". This information can be found via the **ALNET** portal.

d. Cylinders are not to be lifted by their control valves and should be moved by a suitable hand truck or trolley.
   - During transportation, cylinders should be stowed and secured in such a manner that no part of the cylinder protrudes beyond the edge of the vehicle.
   - Cylinders must **NEVER** be dropped, subjected to violent impact or exposed to grease, oil or direct heat.

e. No attempt should be made to repair or dismantle any cylinders or valves; this includes those that are suspect or damaged. Please refer to the procedure on Suspect Cylinders.

f. Safety Data Sheets (SDS)
   - Copies of *Safety Data Sheets* for the cylinder gas types held by Agents must be supplied to all new rental agreement customers at first delivery and at other times upon request. The SDS provided to Customers at point of sale must concur with the gas type they have purchased. This is a legislative requirement under the NOHSC National Standard for the *Storage and handling of Dangerous Goods. [NOHSC: 1015(2001)].*
   - The Safety Data Sheets are available from the Air Liquide Australia website **www.airliquide.com.au**
   - The SDS details basic physical and chemical properties of the gases together with any special protection required and relevant safety information for their use.
   - If you require *Material Safety Data Sheets* for gases, please ask your Air Liquide Representative or contact customer service for help.

g. A Safety Booklet entitled *It's Smart to be Safe* contains information on the safe handling and use of compressed gases and other Air Liquide products and is available on request from Air Liquide. Air Liquide advises that the booklet is to be read in conjunction with the following Australian Standards and Publications:
   - *AS 1674 - Fire precautions in cutting, heating and welding operations*
   - *AS 1894 - The safe handling of cryogenic liquids*
   - *AS 2030 - SAA Gas Cylinders Code*
   - Worksafe Australia Guide *'Welding Fumes and Gases'.*

HAZCHEM Code
and helpful information

The Hazchem Code is fully titled “Hazchem Emergency Action Code”. In European publications, it is now frequently referred to simply as “Emergency Action Code” or “EAC”.

The Hazchem Code advises on:

- Firefighting media
- Personal protection requirements
- Risk of violent reaction
- Spillage handling
- Evacuation consideration

A Hazchem Code offers guidance on appropriate initial emergency response in a potentially dangerous situation such as leakage, spillage or fire involving the dangerous goods to which it relates.

The Hazchem Code is composed of a number, followed by one or more letters.

EXTINGUISHING MEDIA

The firefighting extinguishing media is determined by reference to the first character of the Hazchem Code as follows:

1	**Coarse Water Spray**
2	**Fine Water Spray**
•2	**Alcohol Resistant Foam**
3	**Foam**
•3	**Alcohol Resistant Foam**
4	**Dry Agent**

NOTE: Any higher number than the one shown can be used, but a lower number must not be used.

A bullet ‘•’ sometimes precedes the number 2 or 3 and have the following meanings:

•**2** denotes that alcohol resistant foam is the preferred firefighting medium but, if it is not available, fine water spray can be used.

•**3** denotes that alcohol resistant foam is the preferred firefighting medium but, if it is not available, normal foam can be used.

However, if such foam is not available, fine water spray, as the next most effective medium, should be used.

MEANING OF SECOND CHARACTER OF HAZCHEM CODE

P	V	LTS	DILUTE
R			
S	V	BA and FIRE KIT	
T			
W	V	LTS	CONTAIN
X			
Y	V	BA and FIRE KIT	
Z			

E	PUBLIC SAFETY HAZARD

SOURCE: 2018 AUSTRALIAN EMERGENCY RESPONSE GUIDE BOOK
https://www.ntc.gov.au/Media/Reports/(D698F2D2-CBFB-D6CC-A74F-6D3A51063694).pdf

DRY AGENT

Water **must not** be allowed to come into contact with the substance

V

Substance can be violently or even explosively reactive, including combustion.

LTS

Liquid - Tight Chemical Protective Suit with BA (Breathing Apparatus). Full **FIRE KIT** should also be worn for thermal protection if the substance is:

Liquid Oxygen
or Liquefied Toxic Gas (Division 2.3)
or Toxic Gas with sub-risk 2.1 or 5.1
or Class or sub-risk 3
or Division 5.1 PGI with sub-risk 6.1 or 8
or carried at temperature < 100 C

DILUTE

May be washed to drain with large quantities of water

CONTAIN

Prevent, by any means available, spillage from entering drains or water course.

E

People should be warned to stay indoors with all doors and windows closed, - but evacuation may need to be considered. Consult Control, Police and product expert.

Where the second character of the Hazchem Code is S, T, Y or Z, normal firefighting clothing is appropriate, i.e. self-contained open circuit positive pressure compressed air breathing apparatus, worn in combination with fire kit, firefighters' gloves and firefighters' boots.

Where the second character of the Hazchem Code is P, R, W or X, liquid-tight chemical protective clothing in combination with breathing apparatus specified.

Violent Reaction

Where the second character of a Hazchem Code is a P, S, W or Y there is a danger that the substance can be violently or explosively reactive. This danger may be present due to one of the following:

- Violent or explosive decomposition of the material involved, including ignition or friction.
- The ignition of a flammable gas or vapour cloud (this danger exists for all flammable gases and flammable liquids with a flash point below 60 °C)
- The rapid acceleration of combustion due to the involvement of an oxidiser.
- A reaction with water which is itself violent, and may also evolve flammable gases.

Contain/Dilute

Where the second character of a Hazchem Code is W, X, Y or Z spillages and decontamination run-off should be prevented from entering drains and watercourses. Where the second character of the code is P, R, S or T spillages and decontamination run-off may be washed to drains with large quantities of water. Due care must however still be exercised to avoid unnecessary pollution of watercourses.

E “Public Safety Hazard”

An ‘E’ following the first two characters of a Hazchem Code indicates that there may be a public safety hazard outside the immediate area of the incident, and that the following actions should be considered. People should be warned to stay indoors with all doors and windows closed, but evacuation may need to be considered.Consult Control, Police, and product experts.

WEIGHT: Weights added from Data Sheets are the Components weight and does not include cylinder/tops. Stated is the amount that needs to be added.

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The world leader in gases, technologies and services for Industry and Health, Air Liquide is present in 80 countries with approximately 66,000 employees and serves more than 3.6 million customers and patients.

Air Liquide