



**AZERBAIJAN BUSINESS UNIT
(AzBU)**

**Procedure for:
Compressed Gas Cylinders**

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1 INTRODUCTION

1.1 DOCUMENT PURPOSE

This procedure specifies the requirements necessary for the safe procurement, handling, use, storage, and transportation of gas cylinders for compressed gases and gases liquefied under pressure.

1.2 DOCUMENT SCOPE

The contents of this procedure apply to gas cylinders that contain pressures greater than 10 psi (0.5 bar) on all BP managed and owned sites in Azerbaijan and Georgia.

Where necessary, this procedure should be used in conjunction with procedure *UNIF-HSE-PRO-208 Welding and Cutting*, which provides advice specifically for the storage and use of compressed gas cylinders for welding and cutting activities.

1.3 NORMATIVE REFERENCES

This document has been updated to include selected international standards referenced by “*The European Agreement Concerning the International Carriage of Dangerous Goods By Road*” (ADR). Azerbaijan became signatory to ADR in September 2000.

In addition to the referenced standards stated here, other requirements of ADR may be useful as additional detailed guidance on e.g. cylinder securing and transport aspects.

2 RESPONSIBILITIES

2.1 SITE MANAGER

Site Managers have overall responsibility for the receipt, safe storage and use of gas cylinders on their sites and shall ensure that:

- procedures for procurement, receipt, safe use and storage of gas cylinders are established and observed on site
- gas cylinders are procured and stored in accordance with these guidelines
- receipt, storage and use of gas cylinders are carried out by suitably competent and qualified personnel.

2.2 AREA AUTHORITY

Area Authorities are responsible for ensuring that the contents of these guidelines are observed within their areas of authority.

2.3 DEFINITIONS

Equivalent standard: A standard that is demonstrated to give a level of safety at least as good as the referenced standard in this document which it will replace.

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3 GAS CYLINDER PROCUREMENT

3.1 DESIGN, MANUFACTURE AND TESTING

Gas cylinders shall be designed, manufactured and tested according to recognised standards. Generally accepted standards for refillable cylinders are:

- Seamless steel gas cylinders: ISO 9809, EN 1964
- Welded cylinders for LPG: ISO 22991, EN 1442
- Welded cylinders: ISO 4706, EN 13322

or an equivalent standard.

The cylinders shall be subject to initial certification as required by chapter 6.2.1.4 of Annex A to "The European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)" or alternatively according to ADR chapter 6.2.5.6.

Cylinders conforming to EC directive 1999/36/EC and bearing the T mark of conformity are also acceptable.

Cylinders shall be colour legibly labelled and stamped in accordance with Section 3.3 and Tables 1a, 1b.

3.2 FILLING OF CYLINDERS

Gas cylinders shall only be filled by BP approved filling centres. Cylinders must only be filled with the type of gas for which they are intended. In no case shall cylinders be filled in excess of the limit permitted by ADR chapter 4.1, Packing instructions P200.

During filling, the filling centre shall carry out inspections in accordance with the requirements of one of the following standards

- Liquefied gases: EN 1919
- Compressed gases: EN 1920
- LPG EN 1439

or an equivalent standard.

3.3 PERIODIC INSPECTION

The cylinders shall be subject to periodic inspection at regular intervals not exceeding the intervals required by ADR chapter 4.1, Packing instructions P200. The inspection shall be carried out in accordance with one of the following standards:

- Seamless steel cylinders EN 1968
- Welded LPG Cylinders EN 1440

or an equivalent standard.

The tests shall be carried out by a Testing and Certification body approved by BP.

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4 RECEIPT OF CYLINDERS ON SITE

4.1 CYLINDER INSPECTION

Gas cylinders shipped to any BP site shall be thoroughly inspected by qualified and competent personnel before being accepted. On arrival at site, cylinders shall be:

- verified as bearing the correct marking (see Section 3.3. and table 1a, 1b), and with minimum 6 months to the date of next periodic inspection.
- inspected for corrosion, dents, general distortion, scorch marks, defacing, illicit repairs, modification, or any defect.

Note: Defective cylinders shall be returned to the supplier/manufacturer.

Cylinders with faulty outlet valve connections, e.g., damaged threads, seized valve spindles, etc., must be returned immediately to stores with a note stating the cylinder number, the nature of the fault and whether the cylinder is charged.

Note: Under no circumstances may the user of the cylinder attempt any repair.

4.2 CYLINDER IDENTIFICATION

Compressed gas cylinders are painted in accordance with the National Colour Coding System to properly identify their contents. The required colour codes for Azerbaijan and Georgia are listed in *Tables 1a and 1b*. A cross reference to the European coding system defined by EN 1089-3:2004 is included.

Note (01): If cylinders cannot be identified in accordance with this colour coding standard, they shall not be accepted or used on site, but shall be returned to the supplier.

Note (02): This colour coding system does not apply to Diving Gases which are covered under separate standards and practices applicable to diving and subsea operations.

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ADR Classification			Marking according to local standard ¹				EN1089-3 ^{2, 3}
UN Number	Classification code	Gas name	Bottle Colour	Label Text	Label Colour	Stripe Colour	Colour on shoulder
1002	1A	Air	Black	COMPRESSED AIR (technical)	White	-	Bright green
1046	1A	Helium	Brown	HELIUM	White	-	Brown
1049	1F	Hydrogen	Dark green	HYDROGEN	Red	-	Red
1072	1O	Medical Oxygen	Blue	MEDICAL OXYGEN	Black	-	
1066	1A	Nitrogen	Black	NITROGEN	Yellow	Brown	Black
1072	1O	Oxygen	Blue	OXYGEN	Black	-	White
1006	1A	Technical Argon	Black	TECHNICAL ARGON	Dark blue	Dark blue	Dark green

Notes: 1. Reference: *Regulation of "Structure (working principles) and Safe Operation of Pressure Vessels" – Moscow 1976*

2. Note that according to EN 1089-3, colour coding applies to cylinder shoulders. Manufacturers may select the colour for the main cylinder body.

3. Cylinders coded in accordance with EN 1089-3 2004 requirements will be marked with "N" twice on the cylinder shoulders.

Table 1a Compressed Gas Cylinder Identification

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ADR Classification			Marking according to local standard ¹				EN1089-3 ^{2, 3}
UN Number	Classification code	Gas name	Bottle Colour	Label Text	Label Colour	Stripe Colour	Colour on shoulder
1001	4F	Acetylene	White	ACETYLENE	Red	-	Maroon
1005	2TC	Ammonia	Yellow	AMMONIA	Black	-	Yellow
1011	2F	Butane	Red	BUTANE	White	-	Red
1013	2A	Carbon dioxide	Black	CARBON DIOXIDE	Yellow	-	Grey
1017	2TC	Chlorine	Khaki	CHLORINE	-	Green	Yellow
1965	2F	Hydrocarbon gas mixture, liquefied, n.o.s.					N.A.
1053	2TF	Hydrogen Sulfide	White	HYDROGEN SULPHIDE	Red	Red	Yellow
1978	2F	Propane	Red	PROPANE	White	-	Red
1079	2TC	Sulphur Dioxide	Black	SULPHUR DIOXIDE	White	Yellow	Yellow

Notes: 1. Reference: *Regulation of "Structure (working principles) and Safe Operation of Pressure Vessels" – Moscow 1976*

2. Note that according to EN 1089-3, colour coding applies to cylinder shoulders. Manufacturers may select the colour for the main cylinder body.

3. Cylinders coded in accordance with EN 1089-3 2004 requirements shall be marked with "N" twice on the cylinder shoulders.

Table 1b Liquefied and Dissolved Gas Cylinder Identification

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4.3 CYLINDER MARKINGS

All cylinders shall be permanently and legibly labelled or stamped in accordance with the applied standard (ref Section 3). The marking shall include, at minimum, the following elements:

- trade symbol of manufacturer
- serial number
- calculated quantity (tare) of empty mass
- manufacturing date (month, year)
- marking of inspection body, date of next inspection/test date, adjacent to the previous performed inspection date (month, year)
- service pressure (psi/bar)
- test pressure (psi/bar)
- capacity (cubic feet/litres).

All markings shall be stamped on the shoulder of cylinders near valves.

Note: Do not remove or change any numbers or marks stamped on cylinders. Any cylinders that do not comply with this system or show tampered cylinder markings shall not be accepted or used on site but shall be returned to the manufacturer/supplier.

5 CYLINDER STORAGE

5.1 ALL CYLINDERS

All cylinders **shall be stored** in a cool, well ventilated area preferably in the open air and at least 3 metres (10 feet) from combustible materials.

Cylinders should be chained or otherwise secured, with valves shut and valve caps in place when cylinders are not in use.

Cylinders **should not be stored** in enclosed spaces such as workshops, accommodation or enclosed modules on offshore installations.

All cylinders **shall be stored away from:**

- the direct rays of the sun or from radiant heat, e.g., flares
- locations where the temperature may exceed 45°C (113°F)
- locations exposed to adverse weather

Note: Weather protection shall be provided if required

- possible sources of ignition
- flammable materials
- corrosive liquids

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- any direct contact with soft or damp ground, or any other location where water can accumulate, thereby increasing exposure to the possible effects of corrosion
- locations where cylinders are vulnerable to impact, e.g. fork lift trucks.

Cylinders containing different gases must be stored separately and in accordance with established spacing requirements. Oxygen cylinders shall be separated from the cylinders containing flammable gas by at least 3 metres or by non-combustible barrier at least 2 metres high.

Empty cylinders shall be marked with "EMPTY" or "MT", and stored separately from full cylinders.

Leaking cylinders or cylinders with leaking valves that cannot be shut off must be removed to a safe area away from any possible source of ignition and drainage, where they shall be allowed to vent off slowly until empty. Stores shall be advised of the fault.

Note: Propane and Butane are heavier than air and may therefore accumulate in dips and hollows.

Note: Regardless of whether or not cylinders have been marked, all cylinders shall be handled and treated as if they were full.

5.2 OXYGEN CYLINDERS

Warning: Oils and greases are spontaneously combustible in the presence of oxygen.

Oxygen cylinders and their fittings, including hoses, **must not** be stored or used where they can come into contact with oil or grease. This includes handling the equipment with oily hands, gloves or rags.

Oxygen cylinders must be stored apart from fuel gas cylinders by a minimum distance of 3 metres (10 feet). Separation by using cylinders of non-flammable gases is acceptable. This separation must be maintained.

The preferred practice is to store oxygen cylinders vertically, valve end up. However, it is acceptable to store oxygen cylinders horizontally provided that:

- the stacks shall not exceed a maximum height of three cylinders
- the largest cylinders must be at the bottom
- the row must be securely wedged.

5.3 CYLINDERS FOR LIQUEFIED OR DISSOLVED GASES

Warning: Cylinders **must not** be stored or used in a horizontal position. All Acetylene cylinders, full or empty, shall be stored and used in the vertical, valve end up position.

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5.4 DAMAGED CYLINDERS

Cylinders that may have been damaged in any way shall be returned to the supplier.

Leaking cylinders shall immediately be moved to a freely ventilated area away from any source of ignition or places where leaking gas will become tapped.

6 CYLINDERS EXPOSED TO FIRE

In the event of gas cylinders being involved in a fire, they must be kept cool with water spray, e.g., a fog nozzle, and where possible, removed to a safe area. Such cylinders must be returned to the manufacturer for checking prior to re-use.

In the case of acetylene cylinders that have been so exposed, prolonged cooling is necessary for several hours after the incident to prevent exothermic decomposition.

7 CYLINDER HANDLING

7.1 TRANSPORT

The transport shall, at minimum, comply with the national regulations applicable for the relevant mode of transport. The following shall be observed:

- Gas cylinders shall only be transported in properly ventilated cargo areas
- Suitable valve protection caps shall be fitted,
- Ensure cylinders are securely stowed to prevent moving, e.g. by use of baskets
- Cylinders should be stowed in the upright position unless instructions for transport specifically say otherwise.
- Do not let gas cylinders project beyond the sides or end of a vehicle.

7.2 LIFTING

If cylinders are lifted by crane, a suitable cradle or similar device should be used. If a trolley is used as a cradle during lifting, care should be taken to ensure that its base is strong enough to take the weight of the cylinders.

Cylinders **shall not** be lifted using:

- the cylinder valves
- chain or wire rope slings (these can allow the cylinder to slip during lifting)
- lifting magnets.

7.3 MOVEMENT OF CYLINDERS ON SITE

Note: Cylinders **shall not** be dropped, dragged, rolled, used as supports or for any other purpose than the storage and transport of gas, and **must be** protected from damage at all times.

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7.3.1 Cylinder Trolleys

Cylinders should be transferred to, and moved within, the working area on trolleys specifically designed for that purpose, or in suitable containers providing stable and secure positioning of the cylinders.

All valves must be closed before a cylinder is moved and, if the correct trolley is not being used, regulators and hoses should be detached from the cylinders.

7.3.2 Electric Cables

Cylinders and gas hoses shall not be allowed to come into contact with current carrying wires. Therefore:

- special attention should be paid to the places where electro-welding and gas burning of metals are carried out simultaneously
- the distance from oxygen or fuel gas cylinders to electro-welding cables shall be not less than 1 m.

When in use, hoses should be protected from damage, and laid out in such a manner as to avoid being a tripping hazard.

8 CYLINDER USE

Many of the specific uses of gases will vary from gas to gas but there are several points that apply to all of them:

- Do not use a cylinder that appears to be damaged or defect in any way.
- Keep the cylinders away from operations that create sparks, heat, fire and electrical circuits.
- Do not use oil or grease on cylinders or handle them with oily hands or gloves. Do not let oxygen spray on an oily or greasy surface, or on your clothes.
- Use cylinders in ventilated areas only.
- Keep cylinders secured upright in cylinder racks.
- Open valves by hand, not with a wrench or other tool. If they cannot be opened by hand, notify the supplier/manufacturer.
- Do not tamper with safety devices.
- Check that the regulator is rated for the correct pressure and service, is in date, stamped, and does not show signs of damage or temporary repair (e.g. jointing compound or tape).
- If a cylinder has a leaky valve or fitting which cannot be stopped by closing the valve, the cylinder must be taken outdoors away from sources of ignition. Tag the cylinder as in bad order and promptly notify the supplier. Do not try to fix a leaking cylinder or valve. Dented cylinders should never be used.
- Ensure that all equipment, including hosing/tubing, for use in oxygen service is designed for this purpose and is completely degreased and dust free before each use

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- Always open valves slowly. If a valve cannot be opened by hand with the key or hand wheel provided, the cylinder shall be returned to the supplier/manufacturer. Do not force the valve open using wrenches or other hand tools.
- Do not empty gas cylinders completely. If appropriate, cylinders should be fitted with residual pressure valves (non-return valves) to prevent backflow of air or other contaminants.

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9 REFERENCES

Standard No	Title
EN 1089-3, edition 2, 2004	Transportable gas cylinders - Gas cylinder identification (excluding LPG) - Part 3: Colour coding
EN 1439, edition 1, 1997	Transportable refillable welded steel cylinders for liquefied petroleum gas (LPG) - Procedure for checking before, during and after filling
EN 1440, edition 1, 1997	Transportable refillable welded steel cylinders for liquefied petroleum gas (LPG) – Periodic requalification (Corrigendum AC:1999 incorporated)
EN 1442, edition 1, 1999	Transportable refillable welded steel cylinders for liquefied petroleum gas (LPG) - Design and construction (Corrigendum AC:1999 incorporated)
EN 1919, edition 1, 2000	Transportable gas cylinders - Cylinders for liquefied gases (excluding acetylene and LPG) - Inspection at time of filling
EN 1920, edition 1, 2000	Transportable gas cylinders - Cylinders for compressed gases (excluding acetylene) - Inspection at time of filling
EN 1964-1, edition 1, 1999	Transportable gas cylinders - Specification for the design and construction of refillable transportable seamless steel gas cylinders of water capacities from 0,5 litre up to and including 150 litres - Part 1: Cylinders made of seamless steel with an Rm value of less than 1100 Mpa
EN 1964-2, edition 1, 2002	Transportable gas cylinders - Specification for the design and construction of refillable transportable seamless steel gas cylinders of water capacities from 0,5 litre up to and including 150 litres - Part 2: Cylinders made of seamless steel with an Rm value of 1100 MPa and above
EN 1964-3, edition 1, 2000	Transportable gas cylinders - Specification for the design and construction of refillable transportable seamless steel gas cylinders of water capacities from 0,5 litre up to and including 150 litres - Part 3: Cylinders made of seamless stainless steel with an Rm value of less than 1100 MPa
EN 1968, edition 1, 2002	Transportable gas cylinders - Periodic inspection and testing of seamless steel gas cylinders
EN 13322-1, edition 1, 2003	Transportable gas cylinders - Refillable welded steel gas cylinders - Design and construction - Part 1: Carbon steel
EN 13322-2, edition 1, 2003	Transportable gas cylinders - Refillable welded steel gas cylinders - Design and construction - Part 2: Stainless steel
ISO 4706:1989, edition 1, 1989	Refillable welded steel gas cylinders
ISO 9809-1:1999, edition 1, 1999	Gas cylinders -- Refillable seamless steel gas cylinders -- Design, construction and testing -- Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa
ISO 9809-2:2000, edition 1, 2000	Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1 100 MPa
ISO 9809-3:2000, edition 1, 2000	Part 3: Normalized steel cylinders
ISO 22991:2004, edition 1, 2004	Gas cylinders -- Transportable refillable welded steel cylinders for liquefied petroleum gas (LPG) -- Design and construction

Copies of these standards can be found for reference @ www.Technical_Practices.bpweb.bp.com.