Compressed air cylinders
Breathing air for respiratory protection equipment

1 For your safety
These instructions are intended for trained and competent users of respiratory protection equipment and breathing air supply systems. This document provides instructions for the safe use, handling and maintenance of steel, aluminium and carbon-composite compressed air cylinders supplied by Dräger.

1.1 General safety statements

1.1.1 Before using this product, carefully read the Instructions for Use.

1.1.2 Strickly follow the Instructions for Use. The user must fully understand and agree to observe the instructions.

1.1.3 Use the product only for the purposes specified in the Intended Use section of this document.

1.1.4 Do not dispose of the Instructions for Use. Ensure that they are retained and appropriately used by the product user.

1.1.5 Only fully trained and competent users are permitted to use this product.

1.1.6 Comply with all local and national regulations and procedures associated with this product.

1.1.7 Only, for competent personnel are permitted to inspect, repair and service the product.

1.1.8 Dräger recommends a Dräger service contract for all maintenance activities and that all repairs are carried out by Dräger.

1.1.9 Properly trained service personnel must inspect and service this product as detailed in the Maintenance section of this document.

1.1.10 Use only genuine Dräger spare parts and accessories, or the proper functioning of the product may be impaired.

1.1.11 Do not use a faulty or incomplete product, and do not modify the product.

1.1.12 Notify Dräger in the event of any component fault or failure.

1.1.13 The air supply shall meet the requirements for breathing air according to EN 12021.

1.2 Definitions of alert icons
Alert icons are used in this document to provide and highlight text that requires a greater awareness by the user. A definition of the meaning of each icon is as follows:

**WARNING**
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION**
Indicates a potentially hazardous situation which, if not avoided, could result in injury or damage to the product or environment. It may also be used to alert against unsafe practices.

**NOTICE**
Indicates additional information on how to use the product.

2 Description

2.1 Product overview
Dräger compressed air cylinders are designed and manufactured according to the requirements of the Pressure Equipment Directive (PED). The cylinders have the CE conformity marking to indicate that they have undergone an approval assessment by a relevant notified body. The cylinder is rated at a working pressure of 200 bar or 300 bar, and the cylinder body and cylinder valve are labelled with the pressure rating (see Section 2.5).

Cylinders supplied by Dräger are normally supplied fully charged unless shipping/transportation regulations prevent this. Fully charged cylinders are used with breathing air (according to EN 12021) to the working pressure at 15 °C.

2.1.1 Cylinder valve
The cylinder is fitted with one of the cylinder valve types available, including straight, right-angled or cross-flow valves (Fig A). The cylinder valve is rated at the same working pressure as the cylinder. The cylinder valve outlet is normally a G5/8" connector as per EN144-2, although other connector types are available.

Options available for the cylinder valve include a standard (non-ratchet) or ratchet type hand wheel, an excess flow valve (EFV), and an integral pressure gauge, all of which are described later.

The hand wheel is black unless the valve contains an excess flow valve in which case it is grey or blue (see Section 2.1.3). The hand wheel can be turned freely when opening the valve but is restricted by the ratchet mechanism during cylinder closing. To close the valve it is necessary to lift the hand wheel over the ratchet, against spring force, and simultaneously turn the hand wheel clockwise.

Excess flow valve
An excess flow valve (EFV) is an option available for air cylinders. When used, the excess flow valve is a safety device which prevents uncontrolled release of high-pressure air in case of cylinder valve high-pressure air pipe damage. The excess flow valve also activates if the cylinder valve is opened when the cylinder valve outlet is open to atmosphere.

The excess flow valve activates to reduce the rate of escaping air when required, but does not affect performance during normal use.

Cylinder valving containing an excess flow valve have a grey hand wheel in most countries, but have a blue hand wheel in some countries (e.g. Switzerland) to comply with national regulations.

2.1.4 Integral pressure gauge
An integral pressure gauge is fitted on some cylinders valves to indicate the air pressure remaining in the cylinder. The pressure gauge connects to the cylinder side of the cylinder valve to provide a constant pressure reading, including when the cylinder valve is closed.

2.2 Intended use
Dräger compressed air cylinders are intended to supply breathing air to compatible Dräger respiratory protection equipment and breathing air supply systems which are approved to one of the following technical standards:
EN 137, EN402 or EN1146. When fitted to an approved Dräger respiratory protection device, the cylinder provides the wearer with respiratory protection for working in contaminated or oxygen-deficient conditions.

2.3 Limitations on use
Dräger compressed air cylinders are not approved for scuba diving and should not be immersed in fresh or salt water.

2.4 Approvals
Dräger compressed air cylinders are designed and manufactured according to the requirements of:

- Pressure Equipment Directive (PED).

The following conformity assessment modules apply: Module B and Module D (production quality assurance). For approval certificate reports, see the declaration of conformity.

Users must ensure that the cylinders comply with any relevant national regulations in the country of use. Contact Dräger, a national approval agency or an accredited test station for advice if necessary.

2.5 Explanation of marking and symbols

2.5.1 Cylinder marking
The cylinders are intended for breathing air only and are labelled and colour coded in accordance with these standards. The cylinder colour coding is painted on the shoulder of the cylinder.

An example of the information shown on a Dräger carbon-composite cylinder label is shown in Fig D and explained in the table below.

<table>
<thead>
<tr>
<th>Marking</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN144-1 M18 x 1.5</td>
<td>Thread standard and size</td>
</tr>
<tr>
<td>DR</td>
<td>Dräger Name</td>
</tr>
<tr>
<td>BRUH-1598/333195</td>
<td>Unique serial number / Drawing number of approved cylinder</td>
</tr>
<tr>
<td>2A061LUNR</td>
<td>Cylinder leak alloy specification</td>
</tr>
<tr>
<td>4.09G5</td>
<td>Nominal unpressurised weight in kilograms, without valve</td>
</tr>
<tr>
<td>VR-BL</td>
<td>Maximum water capacity in litres</td>
</tr>
<tr>
<td>FP 200 at 15°C</td>
<td>Maximum working pressure in bar, at a reference temperature of 15°C</td>
</tr>
<tr>
<td>EP</td>
<td>Test pressure</td>
</tr>
<tr>
<td>EN1245:2000</td>
<td>Standard which specifies the design, testing and production of the cylinder</td>
</tr>
<tr>
<td>B5</td>
<td>Date of first hydrostatic pressure test. Alternatively shown in month/year format (03/2014 or 03/14)</td>
</tr>
<tr>
<td>FINAL 200/11</td>
<td>Date of end of life test, after which the cylinder should not be used. Alternatively shown as EN 2000/11</td>
</tr>
<tr>
<td>20°C-50°C</td>
<td>Operating temperature range</td>
</tr>
<tr>
<td>PSmax: 374BAR at 50°C</td>
<td>Maximum developed cylinder pressure at 50°C</td>
</tr>
<tr>
<td>Year of first re-test 2011</td>
<td>This date reflects the relevant national regulations for cylinder re-test within the cylinder life of the cylinder. The cylinder should be re-certified before the end of the month of the first hydrostatic pressure test (November in this case)</td>
</tr>
<tr>
<td>Indicates a non-oxidising compressed gas</td>
<td></td>
</tr>
</tbody>
</table>

An adhesive label (Fig E) is placed across the joint between the cylinder neck and the cylinder valve when the valve is fitted during manufacture. The label indicates that the joint is subject to approval in accordance with the Pressure Equipment Directive (PED), and identifies the cylinder as an authentic Dräger product.

The label should be present and intact on initial receipt of the cylinder – if not, please contact Dräger or your supplier. The label can become damaged or detached during the life of the cylinder, and this does not have any detrimental effect on the cylinder.

2.5.2 Cylinder valve marking
The cylinder valve marking (Fig F, Item 2) is engraved around the valve body and the working pressure (Fig F, Item 1) is marked on the valve body or the outlet port. An example of the valve marking and the explanation is :

K800-502-0-S8 EN144 TS-5089 XX/XX M18 -F-40°C+60°C

<table>
<thead>
<tr>
<th>Marking</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>K800-502-0-S8</td>
<td>Valve type</td>
</tr>
<tr>
<td>EN144</td>
<td>Applied standard</td>
</tr>
<tr>
<td>TS-5089</td>
<td>Indicates that the valve meets the Transportable Pressure Equipment Directive (PED) requirements</td>
</tr>
<tr>
<td>XX/XX</td>
<td>Identification number of the notified body</td>
</tr>
<tr>
<td>M18</td>
<td>Year and month of manufacture</td>
</tr>
<tr>
<td>-F-</td>
<td>Cylinder thread</td>
</tr>
<tr>
<td>40°C+60°C</td>
<td>Temperature range</td>
</tr>
</tbody>
</table>

3 Use

3.1 Cylinder handling

Compressed air cylinders are heavy and can be difficult and awkward to move. Improper handling could result in injuries or death. When handling cylinders take all necessary precautions to prevent accidents.

- Only trained and competent personnel, familiar with the correct handling techniques and the hazards associated with compressed air cylinders, should handle cylinders.

- Adequately trained personnel are aware of the hazards associated with handling, transportation and storage, and do not allow them to handle compressed air cylinders.

- Hold the valve body or the cylinder body to carry the cylinder. Do not carry the cylinder by holding the valve hand wheel.

For detailed instructions on using Dräger compressed air cylinders, refer to the User Manual, which is included in each cylinder package.
3.2 Preparing and using the cylinder

3.2.1 General statements

- Carry out a visual inspection of the cylinder (see Section 4.4).
- Ensure that the cylinder is within the design life and the periodic inspection indicated by the last date on the cylinder.
- Before using the cylinder to the respiratory protection equipment, remove the protective cap from the cylinder valve outlet. Retain the protective cap as a reference for the design life.
- Fill the cylinder and carry out leak and functional tests as described in the instructions for use provided with the respiratory protection equipment.
- Do not commence any operation using a cylinder that is less than 90% full (or greater when required by national regulations).
- The cylinder is less than 90% full, charge the cylinder to the full rated working pressure (see Section 4.4.3).
- The duration of protection is dependent on air available from the cylinder and the breathing rate of the wearer.

3.2.2 Operating the cylinder valve

**WARNING**
Do not open the cylinder valve unless the cylinder is connected to the breathing equipment or a test gauge.

**CAUTION**
Do not apply excessive force or use tools to open or close a cylinder valve.

- To open the valve, turn the hand wheel fully anti-clockwise (looking at the top of the hand wheel).
  - A ratchet-type hand wheel will lift over the ratchet lugs during opening.
  - Once a ratchet-type hand wheel is fully open, turn the hand wheel clockwise less than 60° to engage the first ratchet in order to prevent inadvertent closing of the valve.
- To close the valve, turn the hand wheel fully clockwise.
  - For a ratchet-type hand wheel, simultaneously lift the hand wheel over the ratchet lugs and turn clockwise.
- To fully open or fully close the valve, turn until a resistance is felt and no further rotation is possible. This ensures that the valve is fully opened or closed.
  - There is no restriction to the air when the valve is open.
  - Air release is prevented when the valve is closed.
- From the fully closed to the fully open position requires more than two full revolutions of the hand wheel.

3.3 After use

- Immediately after use close the cylinder valve to prevent moisture from entering the cylinder.
- If required, remove the cylinder from the respiratory protection equipment and transport the cylinder to an accredited test/repair station when the tasks are required.

3.4 Maintenance

4.1 Maintenance table

Maintain and test the cylinder, including out-of-use cylinders, in accordance with the maintenance table. Record all maintenance details and task inspections and testing may be required in the country of use to ensure compliance with national regulations.

<table>
<thead>
<tr>
<th>Component/System</th>
<th>Task Before Use</th>
<th>After Use</th>
<th>Every Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylinder</td>
<td>Inspection and clean if necessary</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>Check test date of cylinder</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>Check charged pressure</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>Charging to the working pressure (see Section 4.3)</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>Periodic inspection (see Note 1 below)</td>
<td>According to national regulations in the country of use</td>
<td></td>
</tr>
<tr>
<td>Cylinder valve</td>
<td>Overhaul (see Note 1 below)</td>
<td>At the time of cylinder periodic inspection</td>
<td></td>
</tr>
</tbody>
</table>

**NOTICE**
Do not dispose of the cylinder in accordance with normal regulations for waste disposal.

A cylinder which is beyond the end of its design life or is found on inspection to be damaged beyond repair must be destroyed. Cylinder destruction can only be carried out by Dräger or an accredited test/repair station, and involves damaging the cylinder sufficiently to prevent it from holding gas under pressure. Contact service personnel or Dräger if cylinder destruction is required.

4.2 Cleaning

**CAUTION**
Cleaning using grit or shot blasting, chemical cleaning agents, paint strippers and solvents could damage the cylinder or cylinder valve. Use the cleaning media or materials that could cause damage.

When required, clean the cylinder using a mild soap-based detergent. Contact Dräger or other competent service personnel if further cleaning is required.

4.3 Recharging air cylinders

**WARNING**
Air quality for compressed air cylinders must conform to requirements of EN 12021.

- Dräger cylinders are intended only for use with compressed air breathing equipment. Only charge cylinders with breathing quality air. If the cylinder is not used, store the cylinder in accordance with the manufacturer's instructions.

The design life of a cylinder is only valid if the necessary periodic inspections are carried out and the cylinder is not damaged.

4.4 Inspecting cylinders

4.4.1 Visual Inspection

If the cylinder is fitted with a protective cover, remove the cover before inspecting the cylinder.

Thoroughly inspect the cylinder and valve, ensuring that they are clean and undamaged. Typical signs of damage that may affect the cylinder include:

- Abrasion, cutting, corrosion and discolouration. Report damage to service personnel or Dräger, and do not use the cylinder unless it is safe to do so.

4.4.2 Dräger carbon-composite cylinders

All damage to Dräger carbon-composite cylinders requires expert inspection to ensure that the cylinder is safe for continued use. Contact service personnel or Dräger if damage occurs.

An inspection manual and a poster provide inspection advice about damage from:
- Cuts, abrasion, impact, heat/fire and chemicals. The manual and poster are intended for trained service personnel, and are available from Dräger on request.

**Igblege cylinder label**

The label on the cylinder must be legible as it contains essential safety information. If the label is illegible, return the cylinder to Dräger for inspection. Dräger can identify the cylinder. It may be possible to fit a replacement label and return the cylinder to the owner. Otherwise, the cylinder will be removed from use.

4.5 Cylinder periodic inspection

Periodic inspection is an examination of the cylinder which must be carried out by an accredited test station. The examination includes a visual inspection and a hydrostatic pressure test to ensure that the cylinder is still safe, and to recertify it for continued use.

- The dates of the first hydrostatic pressure test (carried out during manufacture) and the first required periodic inspection are marked on the cylinder during manufacture. The date of subsequent periodic inspections is marked on the cylinder by the test station which carries out the inspection.

Dräger cylinders must have a periodic inspection in accordance with the relevant European standards or national regulations in the country of use. The frequency is currently every five years for EU countries. When periodic inspection is due, the cylinder should be recertified before the end of the month shown for the date of the first hydrostatic pressure test.

4.6 End of design life

For cylinders with a limited life, the end of design life is the date after which the cylinder should not be used. It is normally recorded on the cylinder as FIN with a date. Composite cylinders with a limited life have a life of 15, 20 or 30 years as indicated by the marking on the cylinder.

Some cylinders have a non-limited life. Composite cylinders with a non-limited life are marked NIL to indicate that the cylinder is non-limited. All composite cylinders have a non-limited life and therefore do not have any marking to indicate the end of life.

The design life of a cylinder is only valid if the necessary periodic inspections are carried out and the cylinder is not damaged.