

SAFER[®]

2025

EDITION 5

USER MAINTENANCE AND PERIODIC INSPECTION GUIDE



Techplast Sp. z o.o.
Przemysłowa 60
34-120 Andrychów
Poland

VAT: PL6772147485
KRS: 0000091668

District Court
for Kraków Śródmieście
XII Economic Division
Share capital: 569 000,00

Production Plant
Przemysłowa 60
34-120 Andrychów
Poland

T / FAX [+48] 033 875 29 88
E office@techplast.net
W safercylinders.com



ULTRA LIGHT
COMPOSITE
CYLINDERS

Contents

1. History of the Company	1
2. General recommendations.....	2
3. Design and manufacture	3
3.1 DESIGN.....	4
3.2 PRODUCTION.....	5
4. Marking	7
5. Assembly and disassembly of the valve	9
5.1 OPERATIONS BEFORE ASSEMBLY OF THE VALVE	9
5.2 ASSEMBLY OF A VALVE TO THE CYLINDER	10
5.3 DISASSEMBLY OF A VALVE FROM THE CYLINDER	10
6. Filling the cylinder	11
7. Protection against prohibited moisture	12
8. Maintenance of a cylinder	13
8.1 EXTERNAL VISUAL INSPECTION	13
8.2 WASHING AND CLEANING THE CYLINDER SURFACE.....	14
8.3 DRYING THE CYLINDER INTERIOR.....	14
8.4 LEAK TEST	15
9. Periodic inspections.....	16
9.1 INNER VISUAL INSPECTION	17
9.2 OUTER INSPECTION.....	19
9.3 REJECTION AND DESTRUCTION OF CYLINDERS NOT SUITABLE FOR FURTHER USE	20
10. Damages and repairs	21
10.1 DAMAGE TYPES AND LEVELS	22
10.2 CAUSED BY ABRASION, CUT OR CRACK	23
10.3 CAUSED BY IMPACT	25
10.4 CAUSED BY HIGH TEMPERATURE OR FIRE.....	26
10.5 DELAMINATION.....	28
10.6 ILLEGIBLE LABEL.....	29
10.7 STRUCTURAL DAMAGE	29

10.8	DAMAGE REPAIR	29
11.	Storage.....	30
12.	Transport	30
13.	Usage.....	30

1. History of the Company

Techplast Sp. z o.o. was established in 2002 by Adam Saferna. The Company became a leading manufacturer of composite cylinders in Poland, effectively developing its activity both in domestic and foreign markets. We used to manufacture PET items. We cooperated with IKEA, Aquafilter (USA) – European branch.

We guarantee the highest quality of Safer® composite cylinders thanks to use of the highest quality specialized materials for the production of them.

We were developing in many areas of production, however answering to the needs of a market in 2007 we focused mainly on manufacture of composite high pressure cylinders that are in high demand. In the following few years we have focused our activities on developing a new technology of composite containers production which would significantly lower a cylinder's weight and ensure its higher safety and durability.

This way a PET based technology cylinders were developed as well as cylinders based on carbon fiber and aramid over-wrapping. In 2010 we completed the research and obtained an official certificate for a 6.8 l capacity container.

Two years later we were recognized internationally by receiving a "Kevlar Innovation Reward 2012" for creation of a new generation of pressurized containers for lighter and safer gas storage.

Product innovation

Thanks to the use carbon and aramid fibers we managed to strengthen the structure of traditional containers while lowering their mass at the same time. These lowered mass containers are the perfect solution for medical industry. Our products are also perfect for entities that use their cylinders in difficult or even extreme conditions.

2. General recommendations

This instruction contains important information which serves for ensuring safety of operation and maintenance of high pressure composite cylinders.

This product will carry out tasks for which it is intended only when it is used, serviced, repaired and controlled according to its intended use and to the recommendations stipulated in this User Guide.



Operation that not complies with this User Guide may endanger safety of people and tangible assets.

Filling, maintenance and repair of composite cylinders can be done only by qualified and competent staff, equipped in proper training and qualifications consistent with the manufacturer's requirements and with national provisions in force.

In case the composite cylinders are serviced or repaired by not employed or not authorized staff by Techplast, or if the containers are used in the way that is inconsistent with their application, responsibility for their incorrect operation shall be transferred to a user.

The manufacturer shall not be liable for damages caused by improper use, operation, servicing and repair of a cylinder.

All alterations to the design can be done solely under a written consent of the manufacturer.

Do not use a vacuum.

In case of ambiguity please turn to the manufacturer for explanations. Contact data can be found online at www.safercylinders.com or send an email to our technical service at service@techplast.net.

3. Design and manufacture

Design and manufacture of the SAFER[®] pressurized cylinders by Techplast has been adjusted to demands stated in the EN 12245 or ISO 11119-3 standards. A design of a cylinder is based on a PET liner and overwrapping of carbon and aramid fibers in epoxy matrix.

PET ultralight polymers were used for the liner of SAFER[®] pressurized cylinders, thanks to which the lightest possible high pressure composite container has been obtained.

PET polymers are compatible with stored gas, according to EN ISO 11114-1, they enable the collection of pressurized gases of: air, nitrogen and its mixtures, they do not react with the above mentioned gases and their mixtures which guarantees gas purity within the whole period of its storage and lack of corrosion generation.

Layers of carbon and aramid fibers over-wrap, winded on the PET liner by specially designed machines according to precisely determined pattern, in epoxy matrix are soaked in precisely determined temperature by manufacturer. They ensure proper rigidity and durability which enables the storage of high pressurized gases. Outer layer is made of epoxy resin, which protects the pressurized cylinders against ambient conditions and against scratches and impacts.

Some pressurized cylinders are equipped with a cup and a bottom's guard. These elements are made of PVC - impact, deformation and abrasion-proof material.

3.1 Design

The following figure shows a typical design of a SAFER® composite cylinder.

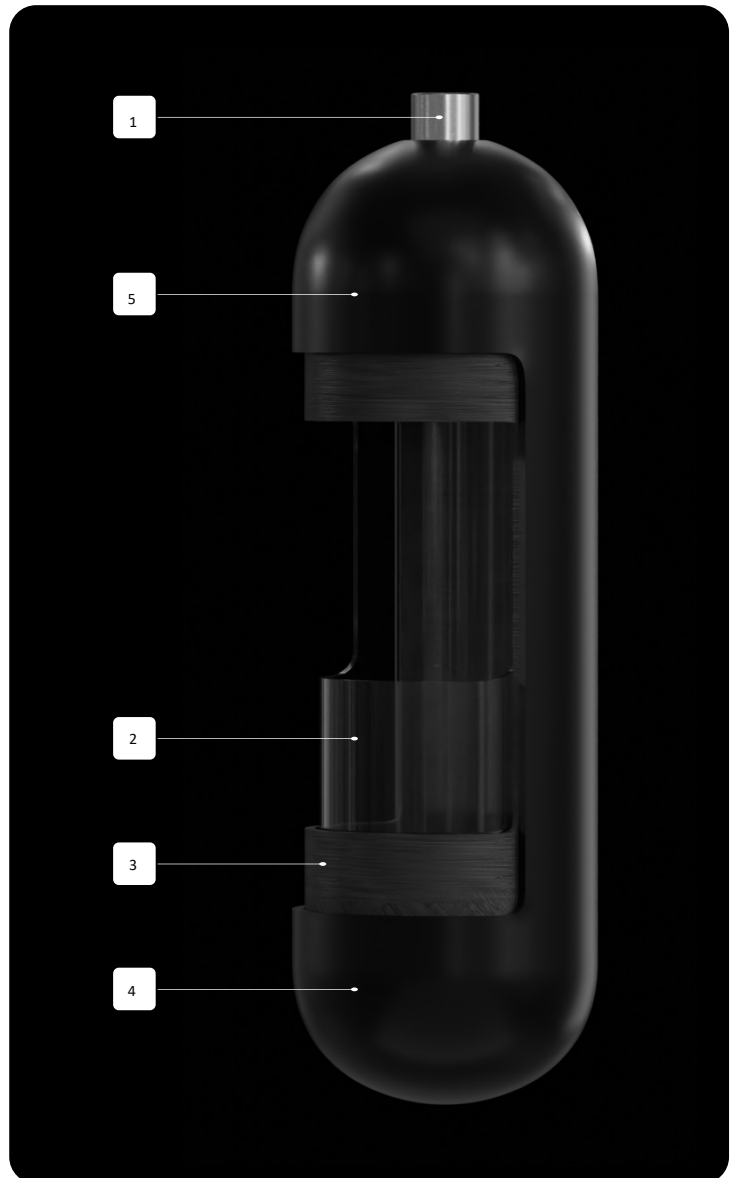
1
Connection part
 made of anodized aluminum or stainless steel

2
Liner
 made of PET polymers

3
Braid
 of composite fibers in epoxy matrix

4
Epoxy resin layer
 giving coloring of the cylinder

5
External coating
 made of glass fibers and transparent epoxy resins



3.2 Production

The use of materials with the best characteristics is a guarantee of top quality. The technology and production process of the SAFER® composite cylinders is patent-protected.

All the manufactured pressure cylinders undergo comprehensive tests under the supervision of a notified body.

At Techplast, pressure cylinders are produced in line with the procedures of the ISO 9001 quality assurance and the requirements of the EN 12245 standard. They are tested and approved based on the above criteria and requirements.

Cylinders are produced in batches of maximally 200 pieces plus cylinders for destructive tests.

CYLINDER INSPECTIONS AND TESTS

Each batch of composite cylinders is verified in terms of its conformity with the design specifications.

The following inspections are performed in each batch:

- Visual inspection – 100% cylinders
- Capacity inspection – 10 % cylinders
- Dimensional inspection – 10% cylinders or according to the customer's requirements
- Weight inspection – 100% cylinders or according to the customer's requirements
- Tightness inspection – 100% cylinders
- Hydrostatic inspection – 100% cylinders

Hydrostatic test Pressure in cylinders is increased by controlled means until the test pressure is reached. Cylinders are kept under stable test pressure for at least 30 seconds. The limit deviations of the reached test pressure should equal +3% - 0% of the test pressure value. During the test, cylinders are checked in terms of tightness and resistance to permanent deformations.

Destructive tests 1 pc./ 200 cylinders undergoes a cylinder resistance test (burst test). Bursting pressure is equal to or higher than the minimum designed bursting pressure and is at least twice higher than the test pressure. Bursting should be initiated in the cylindrical part and the cylinders should remain in one piece.

Cyclic test 1 pc./ 10000 cylinders undergoes a test of resistance to pressure change cycles at the test pressure in ambient temperature. The cylinder is subject to subsequent pressure rises and drops. Cylinders

are tested for 12,000 cycles up to the test pressure value and they ought to pass them without damage consisting in leaks or deformations.

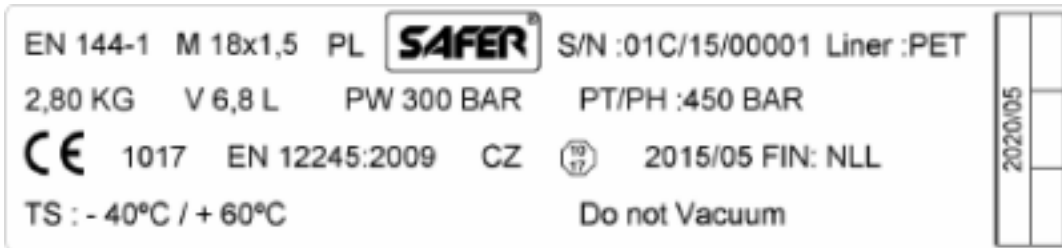
Performing and satisfying the requirements of the above cyclic test allows the non-limited life (NLL) cylinders to be labelled and handed over for use.

4. Marking

Pressurized cylinders are designated with an information label conformable with the requirements of the EN 13769 standard and with requirements of the ADR/RID provisions.

Below is a sample of a label used for compressed air pressurized cylinders for a breathing apparatus:


LABEL 01



LABEL 02



Meaning of the designations used:

Oznaczenie	Dotyczy
EN 144-1	Standard's number concerning the thread
M 18x1,5	Thread type
PL	Cylinder country of manufacture
SAFER®	Cylinder manufacturer
S/N: 01C/15/00001	Cylinder serial number
Liner: PET	Type of a lining material
2,80 KG	Weight of an empty cylinder without a valve
V 6,8L	Water capacity of cylinder
PW 300 BAR	Working pressure at 15°C
PT/PH: 450 BAR	Test pressure
CE 1017	CE mark and Notified Body Number
EN 12245: 2009	Number of the standard concerning the design specification, manufacture and control of composite cylinders.
	Notified Body's country and its sign
2015/05	Date of first hydrostatic inspection
FIN: NLL	Designation informing that a vessel has indefinite lifespan (non-limited life)
UW	Appearance of the marking on the label indicates that the cylinder can be used in underwater applications
TS: -40°C / +60°C	Range of working temperature
2020/05	Next inspection date

* FIRST PERIODIC INSPECTION'S DATE IS DETERMINED ACCORDING TO NATIONAL REQUIREMENTS

A cylinder that does not have a label or the label of which is damaged in such a way that is not possible to identify its designations one should be immediately withdrawn from use and transferred to manufacturer for repair of its label.



A label can be repaired only by the manufacturer or can be replaced with a new one under condition of univocal identification of the cylinder.

5. Assembly and disassembly of the valve

5.1 Operations before assembly of the valve

Valves can be mounted to the cylinder only by authorized service!

Before assembly of a cylinder valve one should check:

1. Condition of the cylinder interior:
 - cylinder interior should be free from any dust or impurities
 - cylinder interior should be dry
2. Condition of the cylinder exterior and its designations.
3. Condition of a thread on cylinder neck:
 - damaged thread makes it necessary to scrap the cylinder
 - soiled thread needs to be cleaned
 - thread parameters should be checked with proper gauges if needed
4. Condition of a gasket groove:
 - damaged groove makes it necessary to scrap the cylinder
 - soiled groove should be cleaned
5. Condition of the cylinder valve:
 - thread surface should be smooth and free from damages
 - in case of damage of a valve thread (surface, coils etc.) or any other part of the valve one should proceed according to the guidelines of the manufacturer of the cylinder valve or the manufacturer of the respiratory protective device
 - if needed, the thread parameters should be checked with a proper gauge,
 - soiled valves should be cleaned

Any damages or soiling can cause leakage and inefficiency of a complete cylinder. In extreme cases they may lead to health and life risk of users and other people.

In case of doubts regarding the condition of the cylinder neck thread or the gasket groove one should pass the cylinder to the manufacturer in order to gain their technical opinion or to repair of damaged elements, as far as possible.

5.2 Assembly of a valve to the cylinder

A cylinder should be mounted at a specially designed post that ensures its stable position. Elements of the cylinder grip should be effectively protected against possibility of external layer damage.

It is strictly prohibited to oil and lubricate the valves and parts of the cylinder.

Valves should be screwed into the cylinder according to provisions, acts and standards applicable in a user's country.

It is recommended to screw valves into cylinders according to the ISO 13341 standard.

5.3 Disassembly of a valve from the cylinder



Cylinder valve can be disassembled only from a cylinder that is fully emptied.

One should make sure that the cylinder is empty by slowly opening the cylinder valve with its exhaust outlet directed away from a user.

The cylinder should be mounted at a specially designed post that ensures its stable position. Elements of the cylinder grip should be effectively protected against possibility of the external layer damage.

6. Filling the cylinder

Filling the cylinders with gas can be done only by entities and persons with proper authorization according to the provisions, arrangements and standards applicable in the country of use.

Filling pressure cannot exceed the working pressure shown at the cylinder label.

Material of cylinders is a good heat isolator, thus the cylinder temperature rise will be slow but on the other hand the return of the cylinder surface temperature will definitely slower than in steel cylinders.

Return of a cylinder temperature to ambient temperature results in pressure drop inside the cylinder.

- In order to obtain maximum pressure, it is necessary to refill the cylinder.
- In order to obtain maximum pressure, one should optimize filling procedures (for example a change of filling rate).

During the process of filling the cylinder immersed in water, small air bubbles can appear on the cylinder surface. It is the effect of air release that is bound between the liner layer and the layer of composite fibers. This process may last for a few minutes since the end of the cylinder filling.



When filling a cylinder immersed in water, it is recommended that the water temperature should not be lower than 20°C.

PREPARATION FOR FILLING

Fill a cylinder without pressure (empty) with compressed gas up to the pressure of 5 bar and leave it in such a condition for 5 minutes.

Slow filling

Slow filling should be carried out in the following way:

It is recommended that the filling rate is slower than 30 bar/min. It ensures the temperature drop that was created during filling.

Fast filling

During normal use cylinders can be filled at a higher rate than recommended however not higher than the temperature that would cause a cylinder temperature rise above 60°C.

Cylinder temperature rise during its filling is a natural phenomenon. Fast filled cylinders show high temperature rise which results in pressure drop after cool-down of a cylinder to ambient temperature. Therefore when a cylinder temperature returns to ambient temperature one should control cylinder pressure and if necessary one should complete its pressure up to working pressure.



Cylinder temperature during filling cannot exceed 60°C.



7. Protection against prohibited moisture

Cylinders should be filled only with compressed gases that meet the requirements of their standards.



In order to avoid possible soiling or dampness of a cylinder interior, manufacturer requests to sustain minimum pressure of 2 bar.

8. Maintenance of a cylinder

A cylinder during operation should demand maintenance especially after its use in difficult conditions

Maintenance of a cylinder should be carried out by persons with proper authorization, training and experience in a properly equipped service center and should act according to the ISO 11623 standard.

8.1 External visual inspection

External visual inspection must be performed in order to check the following:

- Cylinder staining condition
- Whether the label is legible and whether all the symbols are clearly identifiable
- Whether the cylinder service life is not exceeded
- Whether the periodical test period is not exceeded
- Whether the cylinder and the cylinder valve have no external damage preventing their further usage

A dirty cylinder should undergo activities according to the 8.2. and 8.3 items.

Damages to a cylinder should be identified based on information contained in item 10 of this guide and proceed according to its recommendations.

8.2 Washing and cleaning the cylinder surface

Cylinder should be cleaned in the way that does not damage its outer coat.

Cylinder can be washed with warm water (temperature should not exceed 45°C) with mild washing agents: soap, cleaners for washing dishes and their concentrates.

For stubborn stains of chemical origin e.g. paints one can use extraction naphtha.

It is prohibited to use corrosive substances for cleaning cylinders.

8.3 Drying the cylinder interior.



It is prohibited to dry a cylinder with negative pressure (vacuum).

Cylinders can be dried in a specially designed devices for this purpose, by blowing the interior of a cylinder with a dry, clean, and not soiled with oil, warm air the temperature of which should not exceed 70°C.

If the above instructions are not followed, there is a risk of the liner overheating, which may damage the liner and cause the leak of the cylinder. Overheated liner is characterized by a milky, opaque color.



8.4 Leak test

In order to perform the leak test, the cylinder must be filled with compressed gas (air, nitrogen) up to work pressure and left pressurised for at least 2 hours. After that time the cylinder can be immersed in water.

If air escapes through the threaded connection between a cylinder valve body and a cylinder neck body, it may indicate:

- incorrect tightening of the valve on the cylinder
- damage to the sealing ring
- damage to the seal ring groove
- incorrect sealing with a tapered thread sealing tape
- the release of trapped air between the PET liner and the composite layer described in item 9.1 of this Manual

After the test has been carried out a cylinder should be dried with methods described in item 8.3. of this guide.

9. Periodic inspections

Periodic and inspection testing of composite cylinders is regulated by the EN ISO 11623 standard.

Control and testing composite cylinders can be carried out only by authorized entities and persons.

Cylinders that have not passed the inspection or the test are rejected. If a reason for a cylinder rejection is a damage that can be repaired, such cylinder should be repaired and should undergo re-inspection in order to be admitted to further use. Repairs are carried out according to the manufacturer's recommendations.



When performing a pressure test with the measurement of the cylinder's expansion, it should be taken into account that air trapped between the PET Liner and the composite layer can escape. The measurement device should be able to perform degassing of the chamber during the test.

9.1 Inner visual inspection

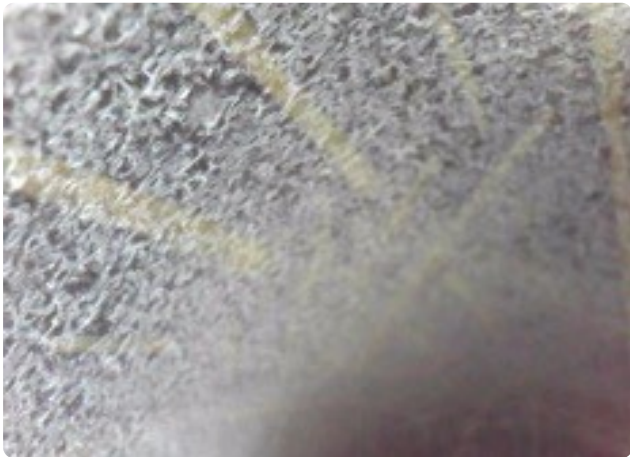
Inner visual inspection aims to reveal all abnormalities in form of soiling and humidity.

All kind of soiling should be removed by emptying out, rinsing with stream of water with possible use of delicate washing agents, blown out with compressed air.



It is prohibited to use for this purpose any chemical agents, sharp objects, very strong jets of water (high pressure washer), water steam, sand blasting or shot blasting and similar techniques.

Any visual changes arise from the high pressure to which PET liner is subjected during the duty cycles. These visual changes do not affect the performance or safety of the cylinder. SAFER® cylinder should be controlled inside only in terms of moisture and purity.



Example picture of PET liner with visual changes

The effect of **"BULGING"** of the liner inside the cylinder is not a defect. This phenomenon is the result of the accumulation of air in the space between the liner and the composite structure, and it does not affect the performance of the cylinder.



To eliminate the effect of "BULGING" in the process of rapid pressure drop, the cylinder must be filled to a pressure min 5 bar and leave for at least 5 minutes.



Bulging effect visible inside the cylinder



Cylinder interior after filling to 5 bar

If we do not eliminate the "bulge" and then fill-up the cylinder fast, there is a risk of air particles closing between the PET liner and the fiber layer. Closed air over time finds a way to escape outside the cylinder, which can result in:

- "Bubbling" during the tightness test around the rubber covers, which will disappear a few minutes after the start of filling;
- A permanent bulge in the outer shell of the cylinder or covers, which is a visual effect that does not affect the functionality and safety of the cylinder user. Any repair of the shell can be carried out only by the manufacturer.



9.2 Outer inspection

Before starting the periodical tests, it is necessary to verify whether:

- The label is legible
- All the symbols are clearly identifiable
- The cylinder service life is not exceeded
- The cylinder neck thread and seal ring groove are free of damage (if necessary, check the thread condition with suitable gauges).

A cylinder should be properly prepared to outer inspection, by cleaning, washing, brushing and drying with methods and agents described in items 8.2. and 8.3.

Composite cylinders should be carefully checked against outer damages like: chafing, impact, indentation, decrement, chip, exfoliation, melt down etc. Depending on a damage, there are three levels

Level 1

small damages of outer surface like small chafing, small indentations, incisions and scratches. Such cylinders can be re-used.

Level 2

damages that can be and should be repaired, like: decrements, chips, incisions, gouges etc. After repair such cylinders must be re-tested against test pressure. A cylinder's repair can be done by the manufacturer.

Level 3

damages exceeding level 2, e.g. damage to the carbon fiber layer. Such cylinders must be rejected and excluded from further use and scrapped.

Detailed description of damages with their levels is described in Chapter 10 of this guide: Damages and repairs.



A cylinder with level 3 damage must be immediately decommissioned, emptied and submitted for assessment to the relevant bodies (technical organization).

9.3

Rejection and destruction of cylinders not suitable for further use

In order for cylinders deemed unfit for further operation not to be filled again, they should be emptied and destroyed by:

- mechanical crushing of a cylinder
- sawing the cylinder neck right at the cylinder cup
- sawing the body of a cylinder across for at least two parts
- drilling of a cylinder body.



It is unacceptable to scrap a pressurized cylinder. It can cause risk of health or life loss.

10. Damages and repairs

All kind of damages should be repaired exclusively by persons trained for these tasks and authorized by Techplast.



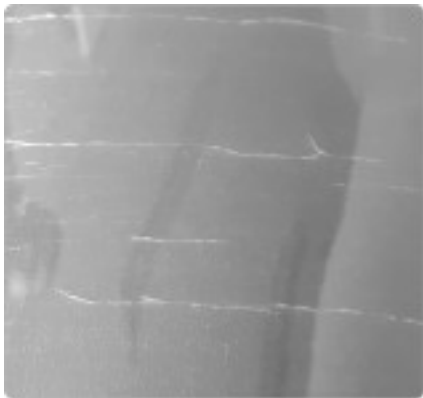
Labels and outer shells may be repaired only by the manufacturer's service.

The following types of damages are distinguished:

- wear damages
- cut damages
- impact damages
- thermal damages
- chemical damages
- delamination
- structural damage

Occasionally superficial cracks appear in the finish outer resin layer around label and cylindrical part of cylinder. Such a minor cracks do not affect cylinder performance and do not require rework.

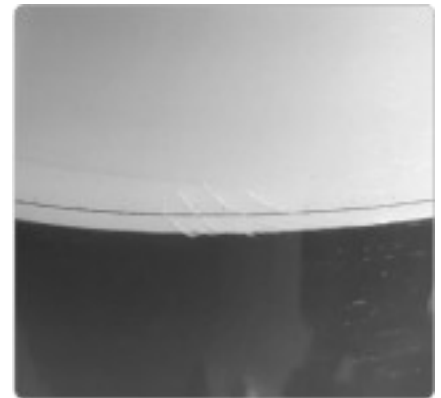
01



02



03



10.1 Damage types and levels

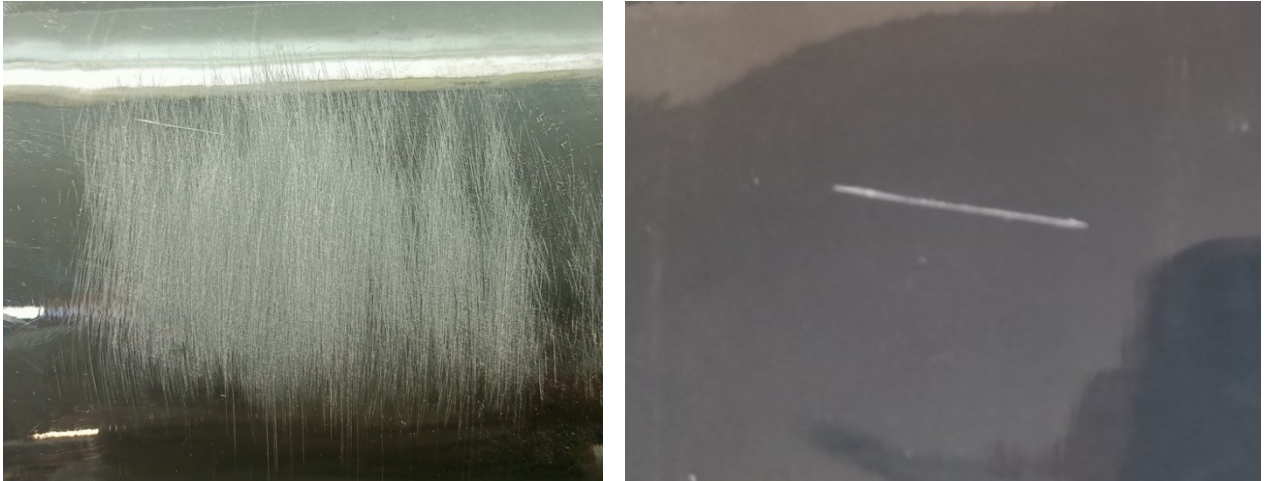
Levels of damages have limiting parameters according to the undermentioned table:

Damage type	Damage level		
	Level 1	Level 2	Level 3
Caused by a scratch, cut or crack	Damage affecting only the outer shell, leaving no sharp ends that could injure the user ≤ 1 mm of depth	Damage affecting only the outer shell, leaving sharp ends that could injure the user; Damage making the label illegible ≤ 1 mm of depth	Damage affecting the cylinder structural layer > 1 mm of depth
Caused by impact	Slight damage characterised by small cracks and slight tarnish on a small area of the cylinder	none	A defect on a large area of the cylinder characterised by structural damage, e.g. separation of fibres of the structural layer
Damage caused by high temperature or fire	Damage on the outer shell and a small surface area in terms of burping and discolouration	Thermal damage on the rubber shell not affecting the cylinder structural layer	Thermal damage affecting the cylinder structure (molten outer shell / affecting the carrier layer)
Delamination	none	Outer shell delamination	Cylinder structural layer delamination
Illegible label or identification symbol	Label damage not affecting its identifiability or legibility	If the manufacturer is able to identify a given cylinder clearly, at least based on a serial number	All the cylinders which cannot be identified and re-labelled

10.2 Caused by abrasion, cut or crack

Level 1

Superficial damage affecting only the cylinder outer shell, not exceeding the depth specified in the table. Damage not affecting the cylinder technical parameters only lowers its aesthetics. Cylinders with such damage may be approved for further use.



Exemplary damage of level 1 caused by a scratch, cut or crack.

Level 2

Damage affecting only the outer shell, not exceeding the depth specified in the table, leaving sharp ends that could cause injury to the user; damage to the protective cap or damage that makes the label illegible.



Damage depth measuring method



Exemplary damage of level 2 (cut)

Level 3

Damage affecting the cylinder structural layer, exceeding the depth specified in the table.



Exemplary damage of level 3 caused by abrasion or cut

10.3 Caused by impact

Level 1

Slight touching damage characterized by small cracks and light tarnishing in a small area of the cylinder.



Exemplary damage of level 1 caused by impact

Level 3

A defect on a large area of the cylinder characterized by structural damage, e.g. delamination of fibers of the carrier layer.



10.4 Caused by high temperature or fire

Level 1

Damage on the outer shell and a small surface area in terms of burping and discoloration.



Exemplary damage of level 1 caused by high temperature or fire

Level 2

Thermal damage of the rubber shell not affecting the cylinder structure.



Thermal damage of the rubber shell not affecting the cylinder structure

Level 3

Thermal damage affecting the cylinder structure (molten outer shell / affecting the structural layer)



Exemplary damage of level 3 caused by high temperature or fire

10.5 Delamination

Level 1

Due to the specificity of a glass fiber which is likely to cause an injury to the user when contacted, it is not recommended to use cylinders with layer delamination without its repair.

Level 2

Outer shell delamination.



Exemplary damage of level 2 caused by outer shell fibre delamination

Level 3

Cylinder structural layer delamination.



Exemplary damage of level 3 caused by structural shell fiber delamination

10.6 Illegible label

Level 1

Label damage not affecting its identification and legibility.

Level 2

If the manufacturer is able to identify a given cylinder clearly, at least based on a serial number.

Level 3

All the cylinders which cannot be identified and re-labelled.

10.7 Structural damage

Damage to the structure of the cylinder, i.e. change in shape, form, dents, neck curvature are unacceptable and result in the rejection and destruction of the cylinder.

Damage to the outer shell around the cylinder neck can result from constant changes in temperature and pressure. It consists in a small gap around the cylinder neck. Such damage does not affect cylinder technical parameters and the cylinder may be used further after repairing.

10.8 Damage repair

Damage ought to be repaired only by properly trained personnel which is authorized by the manufacturer

11. Storage

Cylinders when stored should be:

- stored under supervised conditions
- protected against mechanical damage, falling and rolling
- kept clean and dry, protected from dirt, chemical and corrosive substances
- protected against adverse temperatures (the recommended storage temperature is between -30°C and +60°C)
- cylinders with pressure valves are recommended to store at least 2 bar

For cylinders without pressure valves, use transport plugs with an o-ring.

12. Transport

The manufacturer recommends the application of ADR - European agreement on the international carriage of dangerous goods by road. Cylinders must be transported in containers, baskets or pallets which prevent damage and dirt.

Cylinders with pressure valves are recommended to be transported filled-up to the minimum pressure of 2 bar. For cylinders without pressure valves, use transport plugs with an o-ring.

13. Usage

GENERAL RECOMMENDATIONS:

1. It is required to read the cylinder manual and follow its terms and conditions.
2. Devices referred to in this Manual must be used according to their purpose.
3. The manufacturer is not held liable for any damage resulting from the incorrect use, operation and maintenance of gas cylinders.
4. The maintenance, service and repair of cylinders for compressed gases may be carried out only by qualified and competent personnel that attended proper training and hold license pursuant to the legal regulations valid in the country of their use.
5. If cylinders are serviced or repaired by personnel not employed or not authorized by Techplast, or if they are used against their intended purpose, the user will be responsible for their improper functioning.
6. Any changes within the cylinder structure may be introduced only upon obtaining the manufacturer's consent in writing.

7. Techplast recommends concluding an agreement on providing technical service at the manufacturer's.
8. If there are any faults or damage revealed in a new product, it must be put away, protected and the manufacturer must be informed promptly.
9. The manufacturer recommends the application of ADR - European agreement on the international carriage of dangerous goods by road.
10. Containers, baskets, pallets, etc. must be used to transport cylinders in order to avoid unacceptable damage and contamination
11. Equipment to protect valves, connections (e.g. protective caps) must be used during transport.
12. Cylinders with pressure valves are recommended to be transported/stored filled-up to the minimum pressure of 2 bar. For cylinders without pressure valves, use transport plugs with an o-ring.
13. The cylinder must be equipped with a valve and connections with the recommended test pressure. The components, connections, and valve should have approval in accordance with the regulations, laws, and standards applicable in the country of use.
14. Valves for cylinders should be screwed in according to the regulations, laws, and standards applicable in the country of use.
15. The manufacturer recommends screwing the valves into the cylinders in accordance with the standard EN ISO 13341. Example tightening torques for valves to cylinders according to tables A.3. and A.4.
16. To seal the connections between the valve and the cylinder, materials in accordance with the standard EN ISO 11114-2 should be used. If necessary, the manufacturer recommends using PTFE tape with a minimum thickness of 0.1mm.

IT IS FORBIDDEN TO:

1. Use cylinders for purposes other than approved.
2. Use cylinders with an expired test due date.
3. Use cylinders which have illegible or incomplete markings.
4. Use cylinders which have visible unacceptable defects described in this Manual.
5. Use cylinders with damaged or not tight equipment (valve, connections, shields, etc.)
6. Oil and lubricate valves and cylinder parts.
7. Lifting / carrying / transporting the cylinder by the valve.
8. Throwing the cylinder.
9. Rolling the cylinder in a lying position.
10. Use vacuum.
11. Use cylinders with pressure exceeding the work pressure.
12. Fill-up cylinders with gas other than approved.

**ULTRA LIGHT
COMPOSITE
CYLINDERS**

Techplast Sp. z o.o.
Przemysłowa 60
34-120 Andrychów
Poland

VAT: PL6772147485
KRS: 0000091668

District Court
for Kraków Śródmieście
XII Economic Division
Share capital: 569 000,00

Production Plant
Przemysłowa 60
34-120 Andrychów
Poland

T / FAX [+48] 033 875 29 88
E service@techplast.net
W safercylinders.com



SAFER[®]