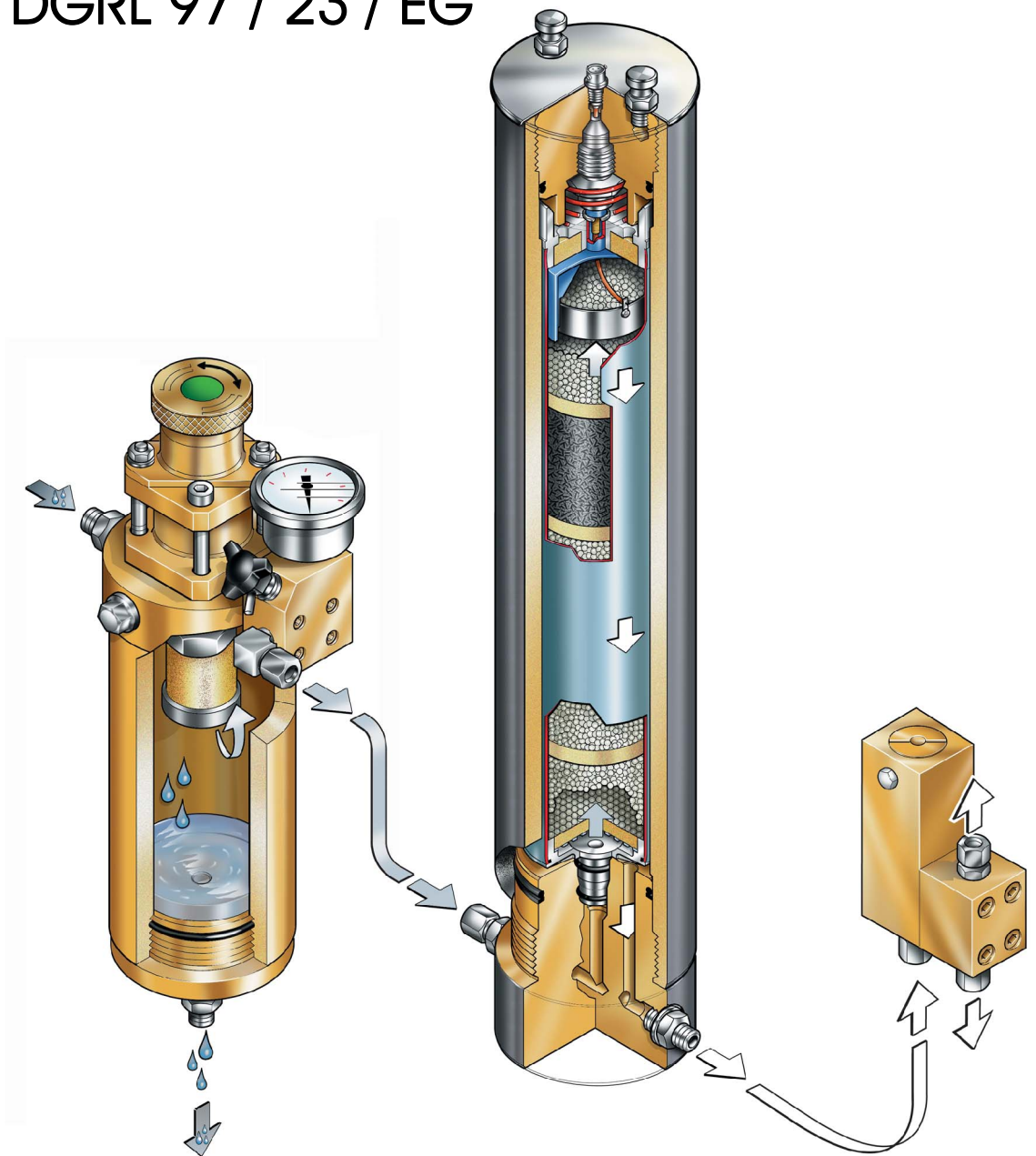


Instruction Manual

Pressure Vessels

acc. to DGRL 97 / 23 / EG



INSTRUCTION MANUAL FOR PRESSURE VESSELS ACCORDING TO DGRL 97/23/EG

Production year:	*
Pressure vessel production number:	*
Pressure vessel volume V:	*
Maximum allowed operating pressure PS:	*
Test pressure PT:	*
Permissible operating temperature TS min./max.	*
Medium:	Air, Nitrogen, Helium, (for CNG pressure vessels listed in table 2, only) (for Nitrox pressure vessels listed in table 3, only)
Specification:	DGRL 97/23/EG and AD 2000
Conformity evaluation process :	Module H/H1
Identification number of notified body :	CE 0036

* refer to identification plate and/or embossed data on pressure vessel

The proper use of pressure vessels is indispensable for safe operation. This manual contains important notices and information regarding the installation, operation and maintenance of the pressure vessels; it is imperative that the operating authority follows them. While every effort is made to ensure the accuracy of the particulars contained in this manual, the manufacturing company will not, under any circumstances, be held liable for any inaccuracies or the consequences thereof.

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1. Manufacturing information

1.1. Declaration of conformity

The declaration of conformity confirms the manufacturer's first construction and pressure test for the pressure vessel. Each declaration of conformity includes an operating manual acc. to DGRL 97/23/EG.

1.2. CE-certificate

The CE-certificate confirms that the pressure vessels conform to pressure vessel directive 97/23/EG.

1.3. Complaints

The pressure vessel has been tested in the factory prior to delivery. Upon delivery it should immediately be checked to make sure it's intact. Any damages caused by transport are to be reported immediately. Under no circumstances are damaged pressure vessels allowed to be put into operation.

1.4. Second-hand pressure vessels

Be particularly cautious with pressure vessels that have been bought second-hand and do not put them into operation if their previous operating mode has not explicitly been clarified.

2. General

2.1. Scope

This technical documentation is valid only for the pressure vessel delivered with this operating manual. You are not permitted to transfer it to another or similar pressure vessel.

2.2. Modification or change

You are not allowed to make any modifications or changes of the pressure vessel on your own authority.

2.3. Safety regulations

When starting-up and operating pressure vessels, you must comply to national regulations. In Germany, these are amongst others:

- Directive 97/23/EG (Pressure vessel-directive DGRL) as of 29.05.1997
- Operating safety regulation (BetrSichV) as of 27.09.2002

2.4. Safety notices

This manual contains important notices and information regarding the installation, operation and maintainance of the pressure vessels that the operating authority is to fol-

low. For this reason it is imperative that the complete documentation is handed-over to the specialist staff of the operators prior to assembly and start-up and made available wherever it's in use. The complete instruction manual must be carefully read by the specialist staff prior to assembly and start-up of the pressure vessel, then kept in a safe place. Ignoring to observe the safety notices can result in being seriously dangerous for the staff, the pressure vessel or the environment.

2.5. Maintenance, installation and repair work

The operating authority is obliged to ensure that all maintenance, installation and repair work is carried out by authorized and qualified specialist staff which have previously acquired enough information by carefully studying the instruction manual. The responsibility and liability regarding the equipment and assembly after start-up lies with the operating authority.

2.6. Storage

The pressure vessels are to be stored in a closed, dry and clean room. Avoid any damage that could be caused, for example by any objects falling on them or passing-by vehicles.

2.7. Exclusion of liability

If the following instructions and information are not observed, we exclude all liability. This exclusion of liability also leads to the loss of any right to claim for damages.

This particulary applies in the case of

- improper installation
- improper application
- any change or modification of the pressure vessel
- non-compliance to the safety notices
- improper maintenance work
- improper storage
- corrosion resulting from not complying to the above points

3. Product description

3.1. Application

The pressure vessel is to be used for drying or purifying gases.

The operating safety can only be guaranteed when used according to the regulations, with the intended operating medium and within the temperature and pressure limits marked on the vessels.

Operating medium:

For classification of the pressure vessels the media are divided into two groups:

- dangerous and non-dangerous media.

For **BAUER KOMPRESSOREN** this classification is applicable for the following media:

non-dangerous: air, nitrogen, helium
dangerous: CNG (compressed natural gas)



Only the pressure vessels listed in table 2 are approved for use with CNG!



Only the pressure vessels listed in table 3 are approved for use with Nitrox (max. oxygen content of 40%) and in BAUER B-Trox units, only!

3.2. Pressure vessels for alternating stress

Pressure vessels authorized for application with alternating stress can be operated under considerable fluctuating operating pressure. In such cases the pressure can fluctuate between the atmospheric pressure and the maximum permitted operating pressure. Only the vessels listed in table 1 are authorized for application with alternating stress according to AD 2000-Merkblättern (instructions).

Pressure vessels that do not appear in the table are not authorized for application with alternating stress!

Due to the fluctuation of the operating pressure, pressure vessels for application with alternating stress are subject to an exceptional load. The lifetime of these vessels is limited to a maximum number of alternations of load. An alternation of load (or load cycle) is defined as the pressure fluctuation that occurs between the minimum and maximum operating pressure (pressurization and depressurization). The difference that occurs between minimum and maximum operating pressure is defined as the pressure variation range.

The allowed number of load alternations (also called allowed number of cycles) of the respective pressure vessels at the occurring pressure variation range is listed in table 1.

In order to ensure safe operation, when half of the allowed number of load alternations has been reached (aluminum vessels: 1/4 of the allowed number of load cycles), the pressure vessel must be subjected to an internal inspection in which the critically stressed vessel

areas are checked using appropriate testing methods.

On reaching the total allowed number of load alternations the vessel has to be exchanged and scrapped.

Take written note of the amount of load alternations that have been done if you do not have an automatic cycle-counter.

4. Assembly

4.1. Mounting

When mounting and operating pressure vessels, you must comply to the relevant national regulations. In Germany this is, amongst others the operating safety regulation. The pressure vessels are only allowed to be used for the appropriate application, pressure stage and operating temperature.

4.2. Installation

The installation is to be carried out by qualified specialist staff. Make sure the pressure vessel and its fittings function perfectly.

4.3. Fittings

The pressure vessel has to be equipped with appropriate safety and test devices, which ensure that it is not possible to operate it outside the allowed operating conditions. Pay attention to the right disposition and choice of the safety devices.

In the case of pressure vessels that are not authorized for application with alternating stress, you must use the appropriate fittings (e.g.: non-return valves, pressure maintaining valves, ecc.) to make sure that they cannot be subject to unauthorized alternating stress.

Pressure vessels that are authorized for application with alternating stress have to be equipped with the appropriate fittings (e.g.: non-return valves, pressure maintaining valves, ecc.) to ensure that the allowed pressure variation range is not exceeded.

5. Operation

With anything regarding operation, you have to comply to the relevant national regulations. In Germany these are, among others things the operating safety regulation.

6. Tests

6.1. Test prior to start-up

Concerning the test prior to start-up, you have to comply to the relevant national regulations. In Germany these are, among other things the operating safety regulation.

6.2. Regular inspections

Concerning the regular inspections, you have to comply to the relevant national regulations. In Germany these are, among other things, the operating safety regulation. This sets the following maximum intervals for pressure vessels from category III or IV for gaseous mediums Air, N₂ und He.

Interior examination: 5 Years

Strength test: 10 Years

These intervals are also valid for our pressure vessels from category IV for the medium natural gas.

The inspections have to be performed by a surveying authority.

We recommend the same intervals for pressure vessels of category II and I, or according to article 3, para. 3 for the media air, N₂ and He as well as for pressure vessels of category II, II, or I according to article 3, para. 3 for the medium natural gas. Inspection of these vessels should be performed by an expert or by a surveying authority.

If national regulations in other countries do not specify regular inspections, we recommend to proceed according to the German operating safety regulation (Betriebssicherheitsverordnung).

Pressure vessels that are not subject to alternating stress can be used as long as the inspections, carried out on a regular basis, do not uncover any safety-related faults.

In order to ensure safe operation, when half of the allowed number of load alternations has been reached (aluminium vessels: 1/4 of the allowed number of load cycles), pressure vessels used for application with alternating stress are to be additionally (independent of the intervals above) subjected to an interior inspection in which the critically stressed vessel areas are checked using appropriate testing methods.

After reaching the total allowed number of load alternations the vessel has to be exchanged and scrapped.

We advise, in the case of aluminium vessels that they are exchanged at the latest after 15 years.

7. Maintenance

Check your pressure vessels inside and outside for damage and corrosion.



Never open or loosen vessel cover or tube connection parts under pressure. Always depressurize vessel or unit first.

7.1. Spare parts

To guarantee safe operation use only **original BAUER spare parts**. If a part of the vessel subject to pressure is

damaged the whole pressure vessel has to be exchanged. Individual vessel parts subject to pressure are not available as spare parts since tests and documentation are only done for the whole vessel.

7.2. Fittings to reduce the alternating stress of pressure vessels

In order to avoid pressure vessels being subject to unauthorized alternating stress, fittings that limit the pressure fluctuations of the pressure vessel must have their operability and internal and external tightness checked. These include in particular non-return valves mounted before the pressure valve and pressure maintaining valves mounted after the vessels; both are meant to avoid or reduce unwanted pressure decreases in the pressure vessels in the case of a reduction in pressure before or after the vessel.

8. General drawings

The manufacturer keeps a manufacturing drawing and it can be sent to you on request. For the drawing number, refer to the conformity certificate.

Table 1 Load cycles - synoptical table for pressure vessels

Part no.	Pressure variation range	Max. allowed no. of load cycles
014976 014938 055093 055144 055283	0-350-0 bar	2.000
055106 056365	0-350-0 bar	69.000
055719-EU 055720-EU 055721-EU 060261-EU 060294-EU	0-420-0 bar 0-400-0 bar 0-380-0 bar 0-360-0 bar 0-340-0 bar 0-320-0 bar 0-300-0 bar 0-280-0 bar 0-260-0 bar 0-240-0 bar 0-220-0 bar 0-200-0 bar 0-180-0 bar	16.492 19.295 22.881 27.592 33.895 42.630 55.230 74.450 105.540 160.890 291.620 675.000 w/o limitation
058416-EU 065519-EU	0-500-0 bar	65.000
061081-EU 061082-EU 061223-EU 061224-EU 061685-EU 062042-EU 090950-EU 090960-EU 090970-EU 81423-EU	140-350-140 bar 140-330-140 bar 140-310-140 bar 140-290-140 bar 140-270-140 bar 140-250-140 bar 140-230-140 bar	4.000 6.990 12.650 23.830 46.950 97.450 215.000
063716-EU	0-120-0 bar 0-100-0 bar	53.000 64.000
063859-EU	0-32-0 bar	64.000
062791 064632 066522 066523 067612 077170 077387 077388 78189 78223 78224 78269 80690 81106 81788 81798 81799 81800	0-100-0 bar	85.000

Part no.	Pressure variation range	Max. allowed no. of load cycles
064126-EU 80476-EU	0-350-0 bar	49.245
	0-340-0 bar	55.470
	0-320-0 bar	71.922
	0-300-0 bar	96.880
	0-280-0 bar	137.270
	0-260-0 bar	208.640
	0-240-0 bar	351.540
	0-220-0 bar	697.800
	0-200-0 bar	1.854.000
	0-180-0 bar	w/o limitation
064185	0-22-0 bar	751.160
	0-20-0 bar	999.800
	0-18-0 bar	1.372.000
	0-16-0 bar	1.953.000
065481-EU	140-420-140 bar	5.700
065482-EU	140-410-140 bar	6.700
065483-EU	140-390-140 bar	9.400
065484-EU	140-370-140 bar	13.600
065485-EU	140-350-140 bar	20.000
065486-EU	0-420-0 bar	2.200
067920-EU	0-410-0 bar	2.500
091020-EU	0-390-0 bar	3.400
091030-EU	0-370-0 bar	4.600
091040-EU	0-350-0 bar	6.500
065974-EU	0-500-0 bar	26.000
	0-480-0 bar	29.000
	0-460-0 bar	34.000
	0-440-0 bar	39.000
	0-420-0 bar	46.000
	0-400-0 bar	54.000
	0-380-0 bar	66.000
	0-360-0 bar	82.000
	0-340-0 bar	100.000
	0-320-0 bar	130.000
	0-300-0 bar	180.000
	0-280-0 bar	260.000
	0-260-0 bar	400.000
	0-240-0 bar	690.000
	0-220-0 bar	1.400.000
0-200-0 bar	w/o limitation	
067105-EU 067106-EU 091010-EU	140-350-140 bar	2.000
067571 069934	0-50-0 bar	40.000
074194	0-200-0 bar	169.480
	0-180-0 bar	325.900
	0-160-0 bar	681.800
	0-140-0 bar	1.573.000
	0-120-0 bar	4.079.000
	0-100-0 bar	w/o limitation

Part no.	Pressure variation range	Max. allowed no. of load cycles
074789 81841	0-200-0 bar 0-180-0 bar 0-160-0 bar 0-140-0 bar 0-120-0 bar 0-100-0 bar 0-80-0 bar	62.500 117.160 241.620 556.800 1.463.000 4.513.000 w/o limitation
075630	0-420-0 bar 0-400-0 bar 0-380-0 bar 0-360-0 bar 0-340-0 bar 0-320-0 bar 0-300-0 bar 0-280-0 bar 0-260-0 bar 0-240-0 bar 0-220-0 bar 0-200-0 bar	34.573 41.524 50.802 63.653 81.920 109.250 152.660 228.000 372.520 701.600 1.681.000 w/o limitation
075631-EU 090100-EU 090110-EU 80142-EU 82970-EU 82981-EU 83247-EU	0-420-0 bar 0-400-0 bar 0-380-0 bar 0-360-0 bar 0-340-0 bar 0-320-0 bar 0-300-0 bar 0-280-0 bar 0-260-0 bar 0-240-0 bar 0-220-0 bar	55.460 68.251 85.830 108.470 143.190 197.270 287.810 455.000 810.000 1.744.000 w/o limitation
076400-EU	0-350-0 bar 0-330-0 bar 0-310-0 bar 0-290-0 bar 0-270-0 bar 0-250-0 bar 0-227-0 bar	74.750 100.000 140.520 210.610 346.410 657.000 w/o limitation
077634-EU 077159-EU-V001 077159-EU-V002 82571-EU 82577-EU-V001 82577-EU-V002	0-350-0 bar 0-230-0 bar	4.000 35.000
078085-EU 078086-EU	0-350-0 bar 0-340-0 bar 0-330-0 bar 0-320-0 bar 0-310-0 bar 0-300-0 bar	11.700 14.300 17.700 22.000 27.500 34.800
78470	0-420-0 bar 0-400-0 bar 0-380-0 bar 0-360-0 bar 0-340-0 bar 0-320-0 bar 0-300-0 bar	166.230 225.570 322.720 492.720 831.100 1.609.000 w/o limitation

Part no.	Pressure variation range	Max. allowed no. of load cycles
79141	140-350-140 bar	46.000
	140-310-140 bar	85.900
	140-270-140 bar	175.000
	140-230-140 bar	400.000
	0-350-0 bar	25.000
	0-310-0 bar	39.600
	0-270-0 bar	66.900
	0-230-0 bar	123.000
79468-EU 090002-EU	0-400-0 bar	31.979
	0-380-0 bar	39.104
	0-360-0 bar	48.577
	0-340-0 bar	62.108
	0-320-0 bar	81.996
	0-300-0 bar	113.827
	0-280-0 bar	166.485
	0-260-0 bar	266.714
	0-240-0 bar	479.578
	0-220-0 bar	1.090.909
	0-200-0 bar	w/o limitation
79873-EU	0-350-0 bar	3.600
82568-EU	0-230-0 bar	20.000
80474-EU	0-32-0 bar	107.000
81130 81777	0-200-0 bar	278.500
	0-180-0 bar	539.800
	0-160-0 bar	1.126.000
	0-140-0 bar	2.528.000
	0-120-0 bar	w/o limitation
83111-EU 84577-EU	0-350-0 bar	127.380
	0-340-0 bar	143.190
	0-320-0 bar	197.270
	0-300-0 bar	287.810
	0-280-0 bar	455.000
	0-260-0 bar	810.000
	0-240-0 bar	1.744.000
0-220-0 bar	w/o limitation	
83487-EU	140-500-0 bar	118.140
83488-EU	140-480-0 bar	164.510
83489-EU	140-460-0 bar	244.560
83490-EU	140-440-0 bar	395.230
83491-EU	140-420-0 bar	732.500
83492-EU	140-400-0 bar	1.664.000
83493-EU	140-380-0 bar	w/o limitation
83494-EU		
83495-EU		
83487-EU		

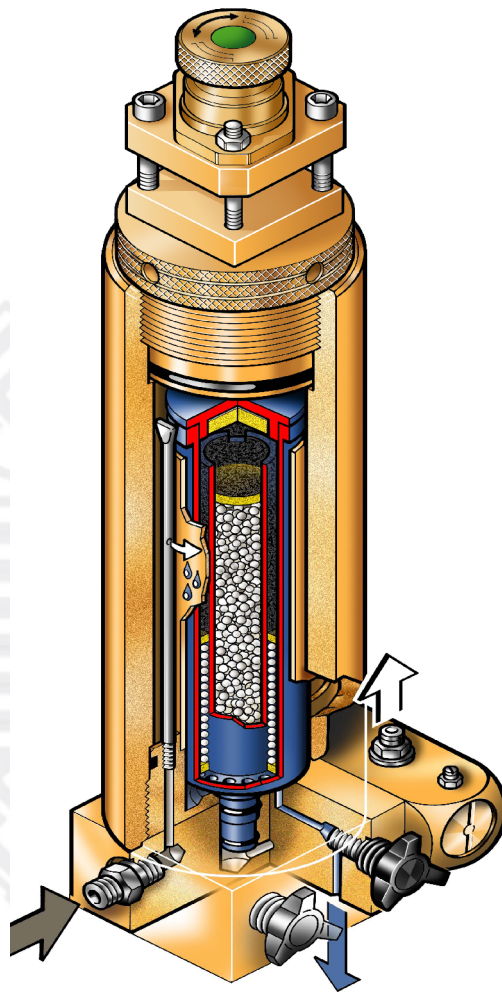
Part no.	Pressure variation range	Max. allowed no. of load cycles
83544-EU	0-500-0 bar	36.265
	0-480-0 bar	42.090
	0-460-0 bar	50.000
	0-440-0 bar	58.960
	0-420-0 bar	72.490
	0-400-0 bar	92.540
	0-380-0 bar	121.800
	0-360-0 bar	167.460
	0-340-0 bar	242.200
	0-320-0 bar	381.300
	0-300-0 bar	673.100
	0-280-0 bar	1.399.000
	0-260-0 bar	w/o limitation
84757	0-70-0 bar	85.000
090058-EU 090060 090300-EU	0-350-0 bar	85.000
	0-320-0 bar	150.000
	0-300-0 bar	170.000
	0-290-0 bar	200.000
090080	0-350-0 bar	100.000
090320-EU 83270-EU	0-420-0 bar	40.485
	0-400-0 bar	48.983
	0-380-0 bar	60.461
	0-360-0 bar	76.480
	0-340-0 bar	99.760
	0-320-0 bar	135.360
	0-300-0 bar	193.600
	0-280-0 bar	297.820
	0-260-0 bar	510.100
	0-240-0 bar	1.040.000
	0-220-0 bar	w/o limitation
091190-EU 091200-EU 091210-EU	0-350-0 bar	16.864
	0-330-0 bar	20.687
	0-310-0 bar	25.851
	0-290-0 bar	33.463
	0-270-0 bar	34.212
	0-250-0 bar	45.925
	0-230-0 bar	66.011
	0-210-0 bar	102.690
	0-190-0 bar	182.442
	0-170-0 bar	391.608
	0-150-0 bar	1.270.808
	0-130-0 bar	w/o limitation
091220-EU	0-350-0 bar	180.000
	0-239-0 bar	w/o limitation

Instruction manual • Pressure vessels
**Table 2 Pressure vessels approved for medium CNG
 (Natural gas group H or L DVGW, worksheet G260/I and G260/II, only)**

Part No.	
Oil and water separators	
078085-EU	80142-EU
078086-EU	80474-EU
090300-EU	80476-EU
63716-EU	82970-EU
79468-EU	82981-EU
Filters	
83123	
090002-EU	
Intermediate separators	
062791	78269
064632	80690
066522	81106
066523	81130
067612	81777
074194	81798
074789	81799
077387	81800
077388	81841
78189	84757
Others	
074552-EU	
068316	

**Table 3 Pressure vessels approved for medium Nitrox (max. oxygen content of 40%)
 and in BAUER B-Trox units, only.83123**

Part No.	
Oil and water separators	
84577-EU	
Filters	
061082-EU	
061224-EU	
061685-EU	
062042-EU	
090960-EU	
090970-EU	
79873-EU	



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