

**Part 2.1: Sealing-cushion filling pressure regulations**

**QAK/ | ZKAK/ | QADE/ and ZKADE/V (valve)  
and SSB2 | ZKSB2**

Sealing elements with swelling material/ cellular rubber

Sealing applications and filling pressure regulations for sealing elements coated with swelling material or cellular rubber.

All products, with and without valve inflation technology





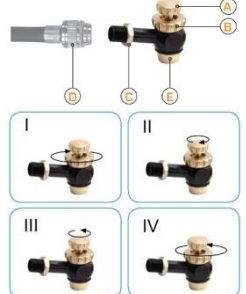
**Pressure filling**

Pressure filling indications are printed on the sealing cushion (reference value for installation- / ambient temperature +20°C). See example:



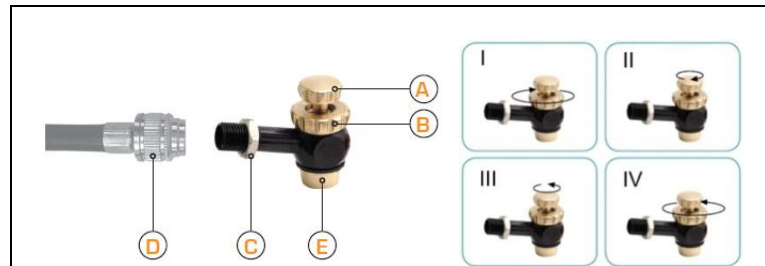
**QAK/V L- 100**  
Rohr Innen-Ø / Duct inner Ø: 105 mm (4.1 inch)  
Belegung / Config.: >0 <80 mm (>0 <3.1 inch)  
Fülldruck / Filling pressure: 2,6 bar (37.7 psi)

**Filling tools**

<p><u>Pressure filling tool</u> with pre-setting pressure selection and auto shut-off. Cordless air compressor e.g. Art. No. 33 ASI500</p> 	<p><u>Filling device</u> (inflator hose) e.g. Art. No. 33 EMS-150 &amp; Art. No. 33 E-VAS-3000</p> 	<p><u>Automatic fill-stop</u> - essential for sealing element types 40 to 60 e.g. Art. No 33 DB VG8-M8</p> 
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## Inflating sealing elements types 40 - 60

**Automatic fill-stop**  
**Art. No. 33 DB VG8-M8**  
**– essential for sealing element**  
**types 40 to 60**



- Screw the end cap onto the sealing element.
- Attach inflator hose (end D) to the automatic fill-stop (end C).
- Fig I: Attach end E to the valve and tighten with B, holding the valve extension immobile.
- Fig II: Turn part A in the clockwise direction.
- Pressure-fill the sealing element with air (CO<sub>2</sub>-neutral) using the cordless compressor and inflator hose e.g. Art.-No. 33 ASI 500.
- The max. permissible filling pressure is printed on the packaging unit and on the sealing element itself.
- Fig III: Loosen part A (turning it in the anti-clockwise direction).
- Fig IV: Unscrew part B (anti-clockwise), holding the valve extension immobile, and remove the fill-stop valve.
- After inflation of the sealing element, the valve end cap must be screwed finger-tight onto the valve (lengthens service life).

Tightness of 0.5 bar is reached immediately on water entry.

## Inflating sealing elements types 80 - 300

- Screw the valve end cap onto the sealing element.
- Inflate the sealing element with air (CO<sub>2</sub>-neutral) using the cordless compressor and inflator hose e.g. Art. No. 33 ASI 500 or the equivalent.
- The max. permissible filling pressure is printed on the packaging unit and on the sealing element itself.
- After inflation of the sealing element, the valve end cap must be screwed finger-tight onto the valve (lengthens service life).

Tightness of 0.5 bar is reached immediately on water entry.

## Requirements for inflation tools

### Warning!

- Filling capacity ≤ 20 litres/min
- Automatic pressure shut-off or 0 to 4 bar pressure gauge
- Accuracy of the pressure display in the 0.5-3.5 bar range at 20 °C (tolerance ± 0.1 bar) Füllleistung ≤ 20 Liter/min
- Please observe our safety instructions when using sealing elements made of aluminium and synthetic material composites.

**SI 05 part 1**



Table 1

## Sealing areas &amp; filling pressure

Art. No.	Duct ID [mm]	Sealing area configuration		Filling pressure at 20 ± 5 °C (68 ± Δ 9 °F)				
		Optimum [mm]	Minimum [mm]	[bar]	[psi]			
16.1 QAK/V 16.2 QAK/V 16.3 ZKAK/V 16.4 ZKAK/V 16.8 0-AK/V 19.1 SSB2 19.2 SSB2 19.3 ZKSB2 19.4 ZKSB2 19.8 0-SB2 20.3 ZKADE/V 20.4 ZKADE/V 20.5 QADE/V 20.6 QADE/V 20.8 0-DE/V	L 40	40	22	0	2,8	40.6		
		35	11	0				
	L 45	45	32	0				
		40	27	0				
	L 50	50	33	0				
		45	25	0				
	L 60	60	42	0				
		50	26	0				
	L 80	80	57	0				
		70	41	0				
	L 90	90	70	0			2,6	37.7
		80	55	0				
	L 100	105	80	0				
		95	65	0				
L 115	115	89	0					
	105	70	0					
L 125	125	97	20	2,1	30.5			
	115	82	10					
L 150	150	119	42	1,8	26.1			
	140	104	32					
16.1 QAK/V 16.2 QAK/V 16.3 ZKAK/V 16.4 ZKAK/V	L 175	175	130	70	1,5	21.8		
		165	115	60				
		155	105	50				
	L 200	200	155	90	1,2	17.4		
		190	140	80				
		180	130	70				
	L 225	225	175	120				
		215	160	110				
		205	150	100				
	L 250	250	190	140	1,1	16.0		
		240	180	130				
		230	170	120				
	L 275	275	230	170	1,0	14.5		
		265	215	160				
		255	205	150				
	L 300	300	250	190	0,9	13.1		
		290	240	180				
		280	225	170				

Group 16.1 and 16.2  
16.3 and 16.4  
16.8 and 19.8

**QV swelling material coating**  
**ZK cellular rubber coating**  
**without coating**

19.1 and 19.2  
19.3 and 19.4  
20.8

20.5 and 20.6  
20.3 and 20.4

**Table 2 Filling pressure dependent on ambient and operation temperature**

The values provided in table 1 for operational filling pressure are based on an ambient and operational temperature of 20 °C ± 5 °C.

Due to the physical properties of compressed air as a function of temperature, the filling pressure will change depending on the ambient and operational temperature.

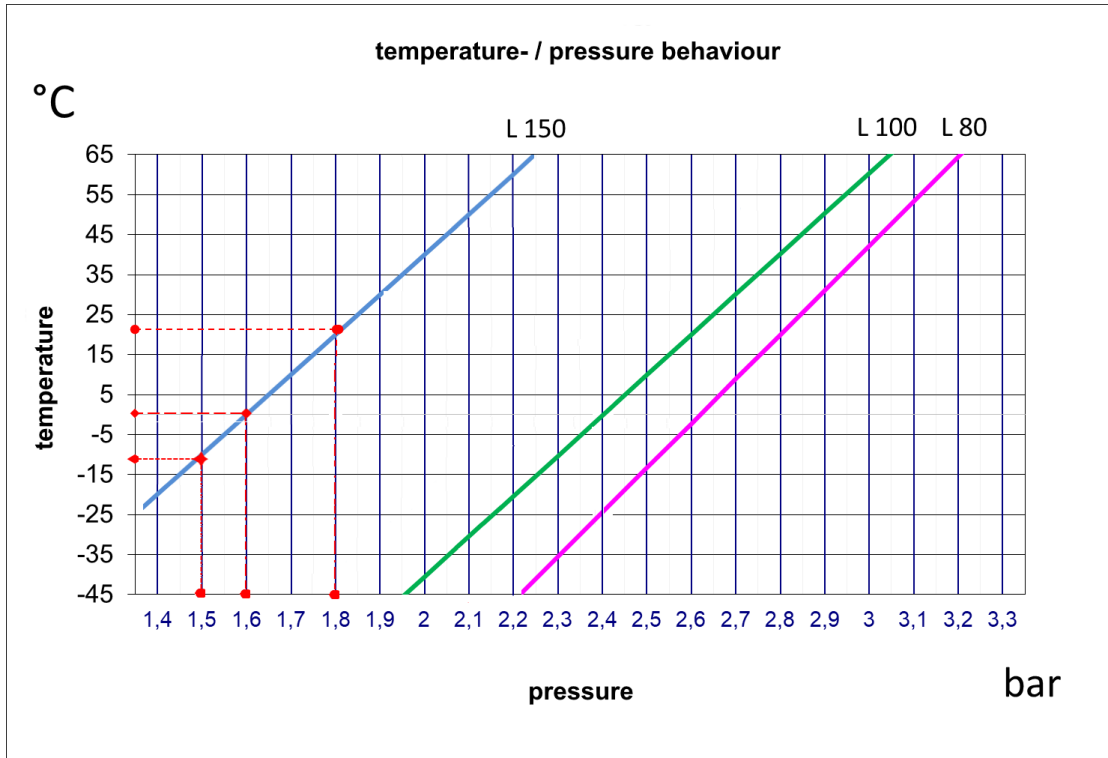
For this reason, an adjustment of the filling pressure must be adapted to the current ambient or operating temperatures during installation.

Sealing element type		Filling pressure [bar   psi] at installational- / ambient temperature [Δ ± 5 °C] / [Δ ± 9 °F]						
		-20 °C -4 °F	-10 °C 14 °F	0 °C 32 °F	+20 °C 68 °F	+30 °C 86 °F	+40 °C 104 °F	+70 °C 158 °F
QAK/V ZKAK/V	L 40	2,4 bar 34.8 psi	2,5 bar 36.3 psi	2,6 bar 37.7 psi	2,8 bar 40.6 psi	2,9 bar 42.1 psi	3,0 bar 43.5 psi	3,3 bar 47.9 psi
	L 45							
	L 50							
	L 60							
	L 80							
SSB2 ZKSB2	L 90	2,2 bar 31.9 psi	2,3 bar 33.4 psi	2,4 bar 34.8 psi	2,6 bar 37.7 psi	2,7 bar 39.2 psi	2,8 bar 40.6 psi	3,1 bar 45.0 psi
	L 100							
	L 115							
ZKADE/V QADE/V	L 125	1,7 bar 24.7 psi	1,8 bar 26.1 psi	1,9 bar 27.6 psi	2,1 bar 30.5 psi	2,2 bar 31.9 psi	2,3 bar 33.4 psi	2,6 bar 37.7 psi
	L 150	1,4 bar 20.3 psi	1,5 bar 21.8 psi	1,6 bar 23.2 psi	1,8 bar 26.1 psi	1,9 bar 27.6 psi	2,0 bar 29.0 psi	2,3 bar 33.4 psi
QAK/V ZKAK/V	L 175	1,1 bar 16.0 psi	1,2 bar 17.4 psi	1,3 bar 18.9 psi	1,5 bar 21.8 psi	1,6 bar 23.2 psi	1,7 bar 24.7 psi	2,0 bar 29.0 psi
	L 200	0,8 bar 11.6 psi	0,9 bar 13.1 psi	1,0 bar 14.5 psi	1,2 bar 17.4 psi	1,3 bar 18.9 psi	1,4 bar 20.3 psi	1,7 bar 24.7 psi
	L 225							
	L 250	0,7 bar 10.2 psi	0,8 bar 11.6 psi	0,9 bar 13.1 psi	1,1 bar 16.0 psi	1,2 bar 17.4 psi	1,3 bar 18.9 psi	1,6 bar 23.2 psi
	L 275	0,6 bar 8.7 psi	0,7 bar 10.2 psi	0,8 bar 11.6 psi	1,0 bar 14.5 psi	1,1 bar 16.0 psi	1,2 bar 17.4 psi	1,5 bar 21.8 psi
	L 300	0,5 bar 7.3 psi	0,6 bar 8.7 psi	0,7 bar 10.2 psi	0,9 bar 13.1 psi	1,0 bar 14.5 psi	1,1 bar 16.0 psi	1,4 bar 20.3 psi

## Example: Effects of unsuitable filling pressure

An unsuitable filling pressure can impair the transmission properties of the sealed cables and damage casing pipes, medium pipes, etc.

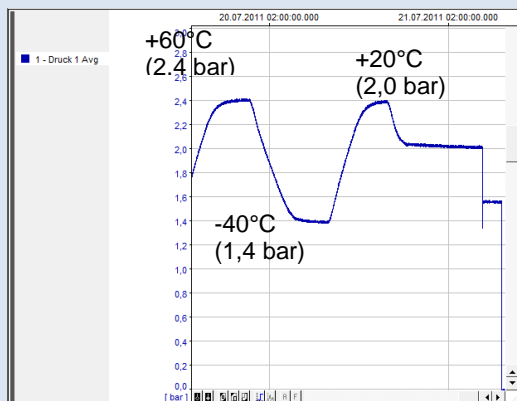
**Diagram: Benchmarks „Change in sealing element filling pressure depending on the ambient temperature“**



**Example: Measurement reports filling pressure**  
 "Influence of ambient or operating temperature on the filling pressure inside the sealing cushion "

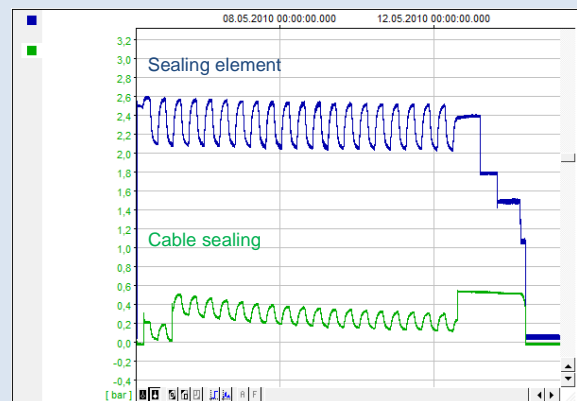
Change of a filling pressure of  
**2.0 bar (at +20 °C)**

in the temperature range  
 > +45 °C up to < +70 °C



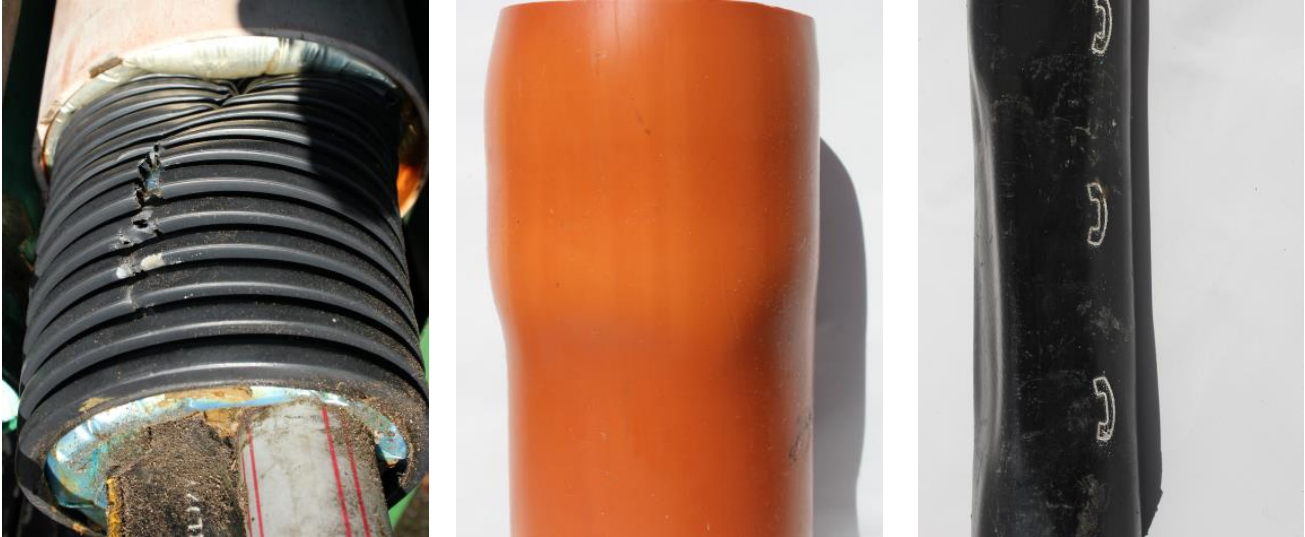
Change of a filling pressure of  
**2.5 bar (at 20 °C)**

in the temperature range  
 > -15 °C up to < +45 °C



Examples: Reasons why the filling pressure must be adapted to the current ambient or operating temperatures during installation.

Consequences of unreduced filling pressure at operational temperatures of -15 °C to +70 °C



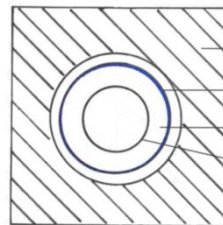
Adaptation of filling pressure to ambient & operational temperatures

1. Ambient or operational temperature > +25 °C

**Annular space sealing**

(the sealing element is between the borehole/ outer casing duct and the plastic inner duct made of plastic)

Reduction of the prescribed filling pressure by 0.5 bar as shown in Table 1 can prevent the plastic inner casing tube from collapsing.



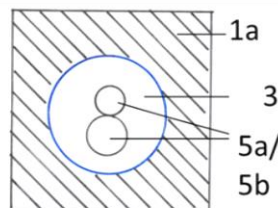
- 1 Borehole
- 2 Outer casing duct
- 3 Seal (ring)
- 4 Inner casing duct (made of plastic)

2. Ambient or operational temperature > +45 °C

**Cable sealing**

(the sealing element is between the borehole/ outer casing duct. the plastic inner duct made of plastic. and telecom cables):

Reduction of the prescribed filling pressure by 0.5 bar as shown in Table 1

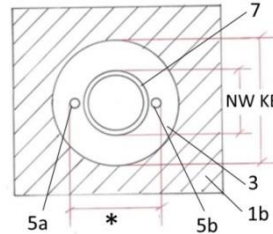


- 1 Bore hole
- 3 Sealing (ringe)
- 5a electrical and/ or optical telecom cables
- 5b inner casing duct

3. Operational temperature < +70 °C  
at cable sheath or duct (for local heating)

**Cable sealing**

Reduction of the prescribed filling pressure (Table 1) by 0.8 bar can prevent buckling of cable (5a) and/or microduct (5b) and bursting of the cable seal.



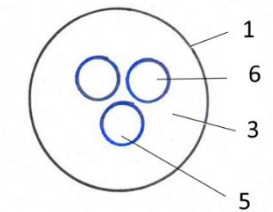
- KB Borehole
- 3 Seal
- 5 Electrical and/ or optical telecom cables or inner casing ducts
- NW Local heating duct

\*Additional configurations: cables, microducts

4. Operational temperature < +70 °C  
at cable sheath or duct (for local heating)

**Power cable acc. to DIN EN 61442 (short circuit):**

Reduction of the prescribed filling pressure (Table 1) by 0.8 bar can prevent buckling of cable (5a) and/or microduct (5b) and bursting of the cable seal.

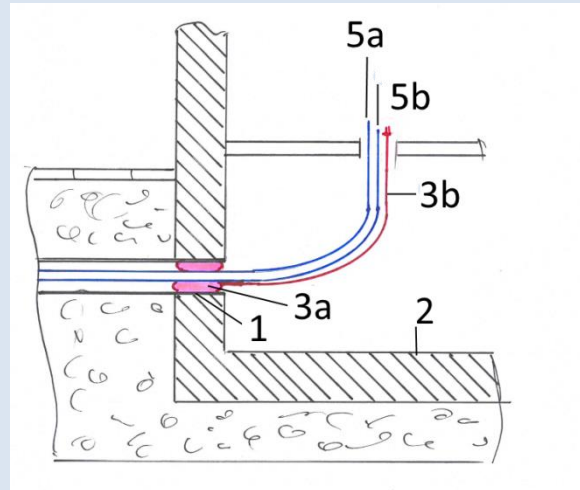


- 1 Outer casing duct
- 3 Cable seal
- 6 Power cable with short circuit (temperature +70 °C)
- 5b Inner casing duct

## How can the filling pressure be subsequently adapted to the ambient temperature?

The filling pressure can be checked, and if necessary topped up, via the custom-made pliable metal valve extension in the course of routine inspections.

- 1 Outer casing duct
- 2 Transmission station etc.
- 3a Sealing cushion (valve)  
16.1 and 16.2 QAK/V L  
16.3 and 16.4 ZKAK/V L  
16.8 0-AK/V L  
20.3 and 20.4 ZKADE/V L  
20.5 and 20.6 QADE/V L  
20.8 0-DE/V L
- 3b Pliable metal valve extension  
(with thread adhesive on the sealing cushion)  
Art. No. 83.8 MSR-VV
- 5a Electrical and/or optical telecommunication cables
- 5b Inner casing duct or power cable



### **Note (for 3b):**

With rubberised hose extensions, a leak rate of  $\leq 2.7$  mbarl/year will not be reached.

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