

SB 210 to 600 Bladder Accumulators Maintenance & Service Instructions

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To safeguard against a potential source of danger which can occur in bladder and diaphragm accumulators, we would like to draw your attention to the following information.

Please note that this should be taken into account when carrying out any work on systems with hydraulic accumulators.



After discharging and/or completely draining the accumulator (e.g. to depressurize the hydraulic system before work is carried out), the accumulator can build-up an amount of pressure again when the lines are later shut off on the fluid side.

This problem must be taken into account generally and in particular before carrying out work on hydraulic systems which include connected hydraulic accumulators.

All the fluid-side lines connected to the accumulator must therefore be depressurized and after that the lines remain open. Only then may the appropriate work (e.g. disassembly of the accumulator) be carried out.

WARNING!

Hydraulic accumulators are pressurized vessels and only qualified technicians should perform repairs. Never weld, braze or perform any type of mechanical work on the accumulator shell. Always drain the fluid completely from the accumulator before performing any work, such as recommended repairs or connecting pressure gauges.

Special Tools Required:

1. HYDAC Charging and Gauging Unit:
 - For bottom repairable bladder accumulators: FPS or FPK with adapter FPK/SB may be used.
 - For top repairable bladder accumulators only the FPK with adapter FPK/SB may be used.
2. Gas Valve Core Tool
3. Spanner Wrench(es)
4. Bladder Pull Rod
5. Sockets 27mm / 32mm (*top repairable only*) / 36 mm
6. Blunt Flathead Screwdriver (*with rounded edges*)

NOTE: Additional standard tools are required including but not limited to: Soft Faced Hammer / Sockets / Torque Wrenches / anti seize compound for stainless steel assemblies.

Refer to additional information contained in the "Operating and Installation Instructions for HYDAC Accumulators".

The instructions included in this brochure cover Bottom Repairable and Top Repairable Bladder Accumulators.

Before servicing a bladder accumulator obtain the appropriate HYDAC repair kit. Use only original HYDAC replacement parts.

Read all instructions thoroughly before beginning any type of service or repair work.



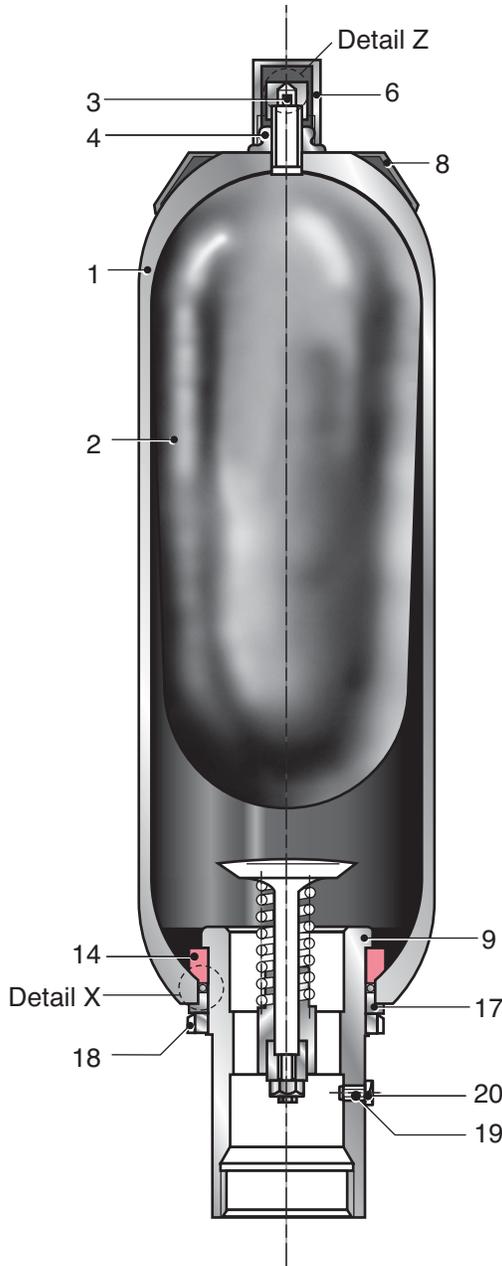
PRESSURIZED VESSEL USE DRY NITROGEN GAS ONLY

Please refer to HYDAC Operating and Installation Instructions

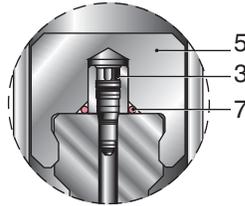
NOTE: All details subject to technical modification

2. Replacement Parts Drawing:

SB210, SB330, SB330H, SB330N, SB400, SB500, SB550 SB600, SB600N

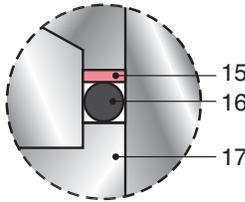


Detail Z (SB...S11...similar)

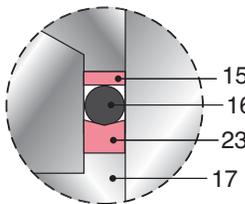


Detail X

SB 210
 SB 330: size 1 to 54
 SB 600: size 1 to 4
 SB 330N: size 1 to 54
 SB330/400 (european mfg)0.5 to 6L



SB 600: size 10 to 54
 SB 600N: size 10 to 54
 SB330/400/500/550
 (european mfg)10 to 50L



- | Item | Description: |
|------|------------------------|
| 1 | Shell |
| 2 | *Bladder |
| 3 | Gas Valve Core |
| 4 | *Bladder Stem Lock Nut |
| 5 | *Valve Seal Cap |
| 6 | Valve Protection Cap |
| 7 | *O-ring |
| 8 | Name Plate |
| 9 | Fluid Port |
| 14 | Anti-extrusion Ring |
| 15 | Flat Ring |
| 16 | O-ring |
| 17 | Spacer Ring |
| 18 | *Fluid Port Lock Nut |
| 19 | Fluid Port Vent Screw |
| 20 | Seal Ring |
| 23 | Back-up Ring |

Repair Kit Consists Of:

- | | |
|----|--|
| 2 | Bladder |
| 3 | Gas Valve Core |
| 4 | Bladder Stem Lock Nut
(SB 600 only) |
| 5 | Valve Seal Cap |
| 7 | O-Ring |
| 15 | Flat Ring |
| 16 | O-Ring |
| 23 | Back-up Ring
(where applicable) |

*Complete model code required. Must state A1 or S11
 All SB 50L assemblies use the M50
 (2" diameter gas valve, not the M22 (7/8") diameter gas valve.

2.1 Torque Requirements:

Bottom Repairable Bladder Accumulators in Nm (lb-ft)

Part Name	SB 210/ SB 330 / SB330N			SB 330 H / SB 400 / SB500	SB 550	SB 600 / SB 600N	
	1	4 to 6	10 to 54	10 to 20	1 to 5	1 to 4	10 to 54
Gas Valve Core	0.5 (0.4)	0.5 (0.4)	0.5 (0.4)	0.5 (0.4)	0.5 (0.4)	0.5 (0.4)	0.5 (0.4)
Bladder Stem Lock Nut	80 (59)	80 (59)	80 (59)	80 (59)	80 (59)	80 (59)	150 (111)
Valve Seal Cap	30 (22)	30 (22)	30 (22)	30 (22)	30 (22)	30 (22)	30 (22)
Fluid Port Lock Nut	90 (66)	200 (148)	440 (325)	600 (443)	150(110)	200 (148)	440 (325)
Vent Screw ¹⁾	4 (3)	22 (16)	30 (22)	30 (22)	4 (3)	22 (16)	30 (22)

1) For SAE threads only. For other thread types, consult HYDAC.

3. Bottom Repairable Bladder Accumulators

3.1 Disassembly

A After removal from the system, place the accumulator in a vice or secure it to a workbench. Remove **valve protection cap** (item 6) and unscrew **valve seal cap** (item 5). Attach the proper HYDAC Charging and Gauging Unit and completely relieve the gas precharge (refer to HYDAC Charging and Gauging brochure #02068202).

Remove **gas valve core** (item 3) by using the gas valve core tool.

B Unscrew **vent screw** (item 19) and remove **seal ring** (item 20).

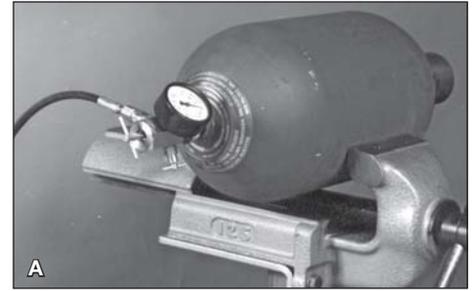
Unscrew **lock nut** (item 18) by using spanner wrench. Remove **spacer ring** (item 17). If necessary, tap spacer ring with a plastic hammer to loosen.

C Loosen **fluid port** (item 9) and push it into the shell. Remove **back-up ring**, (item 23) where applicable, **O-ring** (item 16) and **flat ring** (item 15) from fluid port.

D Pull **anti-extrusion ring** (item 14) off fluid port and remove it through fluid side opening by folding it in half.

E Remove **fluid port** (item 9).

F Remove **bladder stem lock nut** (item 4) and **name plate** (item 8) from the gas side. Remove **bladder** (item 2) from fluid side. It may be necessary to fold the bladder lengthwise to remove it.



3.2 Inspection of Components

Shell:

- inside to ensure it is free of debris, rough spots, or chafe marks.
- fluid side bore for damage which could hamper proper sealing.
- exterior for any sign of damage.

If any interior or exterior damage is found, contact HYDAC for proper repair or replacement instructions.

Bladder:

The bladder must be checked for leakage. Reinstall gas valve core (item 3) and charge the bladder with nitrogen or compressed air to its natural shape and inspect for leakage.

If leakage occurs, first check the gas valve core (item 3) and replace it if necessary. If leakage still occurs, then the bladder must be replaced. The bladder must be visually inspected for lateral grooves and deep chafe marks. If any are found, the bladder should be replaced. Shallow chafe marks are insignificant and will not hamper performance.

Note: Bladders can not be repaired or revulcanized!

Fluid Port:

Depress poppet and rotate 90° to ensure free movement. Visually inspect poppet, threads, and sealing surfaces for any damage. If any damage is found, the fluid port should be replaced.

Vulcanized Anti-extrusion Ring:

Visually check vulcanized area between steel and rubber to make sure it is undamaged and that adhesion is still good (no gaps between rubber and metal). If the adhesion is poor or the rubber is cracked or shows signs of embrittlement or aging, replace anti-extrusion ring. Also check the seat area on the steel parts for grooves or any other damage. If any are found replace anti-extrusion ring.

Non-Vulcanized Anti-extrusion Ring:

Visually inspect area between the steel and rubber to make sure that the steel ring is properly seated. If the rubber is cracked or shows signs of embrittlement or aging, replace anti-extrusion ring. Also check the seat area on the steel parts for grooves or any other damage. If any are found replace anti-extrusion ring.

Seals:

New seals should always be used whenever reassembling any bladder accumulator.

Other Parts:

Inspect for damage and replace if necessary.

3.3 Assembly:

The interior of the shell must be absolutely free of any contamination or debris prior to assembly.

Prepare bladder for installation by removing **valve seal cap** (item 5), and **gas valve core** (item 3). Press all residual air out of bladder.

G Lubricate interior of shell and exterior of bladder with appropriate filtered fluid, using a fluid volume of approximately 10% of total accumulator volume.

(Do not use water, it is not a lubricant).

Different bladder compounds require different lubricants.

H Place **bladder stem lock nut** (item 4) over the pull rod with the male threads facing the pull rod handle. Insert bladder pull rod through shell (threaded connection toward fluid side opening).

Thread pull rod onto gas valve. Fold bladder in half lengthwise, then again if necessary. Pull the pull rod until gas valve emerges through gas port opening. Make sure bladder is stretched and not twisted when being inserted. Once gas valve is through opening, loosely attach **bladder stem lock nut** (item 4) to prevent bladder from slipping back into shell. Remove pull rod from gas valve.

Insert **gas valve core** (item 3) and torque to 0.5 Nm (0.4 lb-ft).

I To prevent damage to the threads and O-ring, tape fluid port threads before assembly. Insert fluid port into shell. Make sure bladder is fully extended within the shell.

J Fold **anti-extrusion ring** (item 14) in half and insert into shell with steel seat facing fluid side opening. To do this, push fluid port further into shell and then pull it back through the middle of the anti-extrusion ring.

K Slightly pull on the fluid port to position it. Do not allow fluid port to fall back into shell. This can be accomplished by either pulling on the fluid port while inserting seals or precharging the bladder with 10 to 15 psi of dry nitrogen to keep fluid port in position (refer to HYDAC Charging and Gauging brochure #02068202).

L Order of Assembly:

flat ring	item 15
O-Ring	item 16
back-up ring (where applicable)	item 23
spacer ring	item 17
fluid port lock nut	item 18



- M** Insert **flat ring** (item 15) into space between fluid port and shell. If it does not slide on properly, recenter fluid port in opening. Next, insert O-ring by pressing with a blunt flathead screwdriver (with rounded edges) at 90° intervals. Carefully, level O-ring onto seat. Where applicable insert **back-up ring** (item 23) over O-ring with grooved surface toward O-ring.
- N** Remove protective tape from fluid port threads. Insert **spacer ring** (item 17) with “lip” placed in the shell. Thread on **fluid port lock nut** (item 18) and torque with spanner wrench*. Place **seal ring** (item 20) on **vent screw** (item 19) install in fluid port and torque*.
- O** On gas side, remove loosely attached **bladder stem lock nut** (item 4) and position **name plate** (item 8). Reapply **bladder stem lock nut** (item 4) and torque*.
- P** Attach appropriate HYDAC Charging and Gauging Unit and apply proper gas precharge (refer to HYDAC Charging and Gauging brochure #02068202). Check **bladder stem lock nut** (item 4) torque*.
- Q** Screw on **valve seal cap** (item 5) and torque*. Replace **valve protection cap** (item 6).

*refer to torque table in section 2.1



WARNING!

HYDAC offers either a 7/8" - 14UNF gas valve body or M50x1.5 gas valve body depending on accumulator size and pressure.



Never under any circumstances should a 7/8" gas valve body be used in an accumulator assembly with a shell having a ~ø 2" opening in the shell. Do not add spacers of any kind!

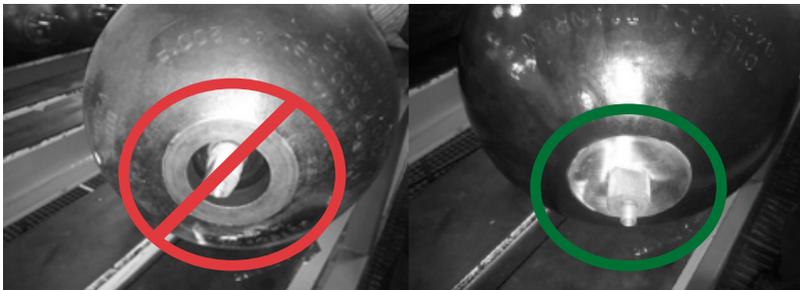


Figure 1: 7/8" (22.3mm) gas valve body in ~ø2" (~ø50.8mm) shell opening

Figure 2: 7/8" (22.3mm) gas valve body in ~ø7/8" (~ø22.23mm) shell opening



Never under any circumstances should a 2" gas valve body be used in an accumulator assembly with a shell having a ~ø 7/8" opening in the shell. Do not add spacers of any kind!

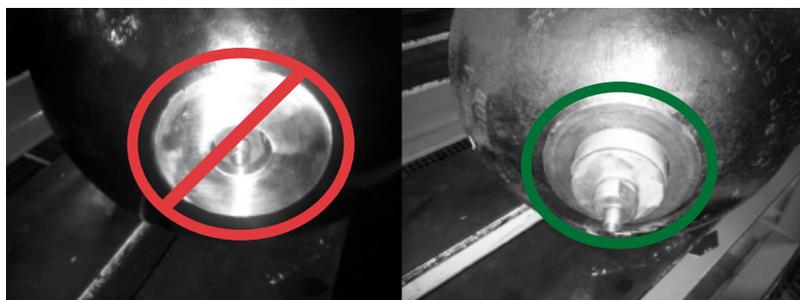
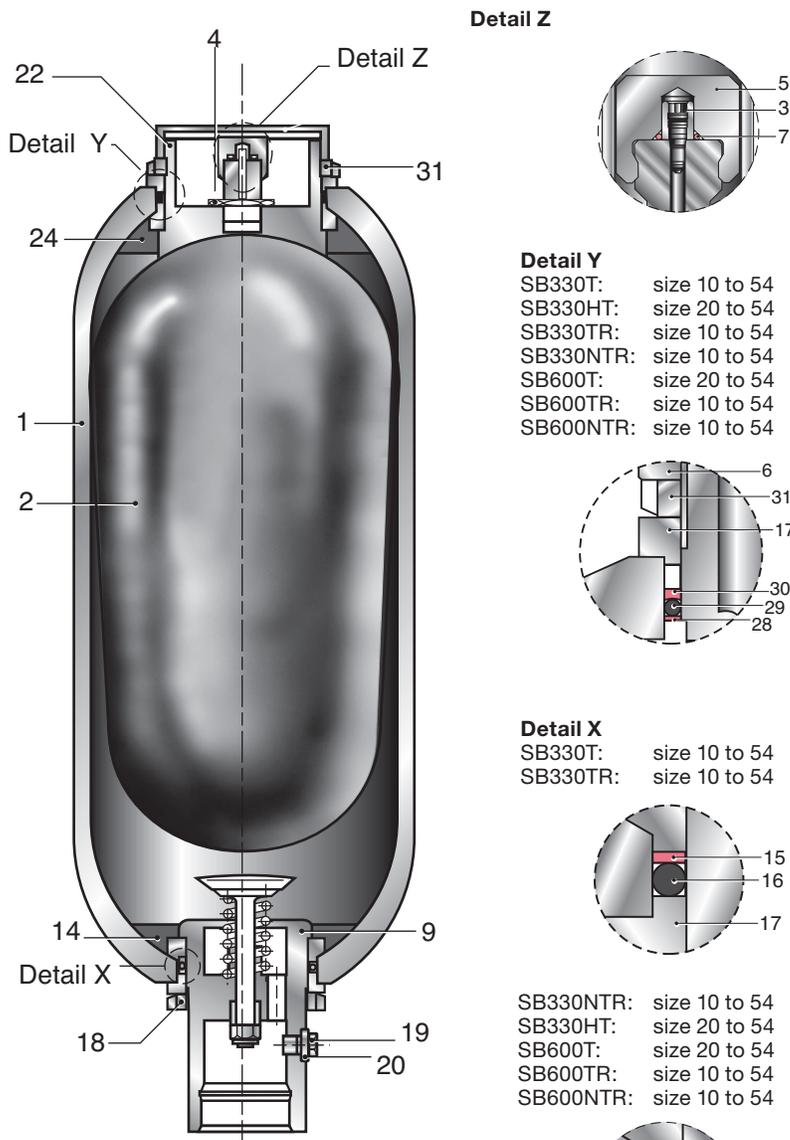


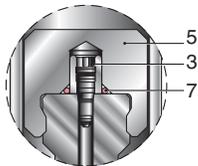
Figure 3: 2" (50.8mm) gas valve body in ~ø2" (~ø22.3mm) shell opening

Figure 4: 7/8" (50.8mm) gas valve body in ~ø7/8" (~ø50.8mm) shell opening

4. Replacement Parts Drawing: SB330T, SB330HT, SB330TR, SB330NTR, SB 600T, SB600TR, SB600NTR

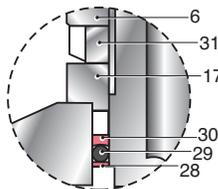


Detail Z



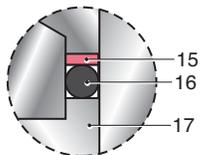
Detail Y

SB330T: size 10 to 54
 SB330HT: size 20 to 54
 SB330TR: size 10 to 54
 SB330NTR: size 10 to 54
 SB600T: size 20 to 54
 SB600TR: size 10 to 54
 SB600NTR: size 10 to 54

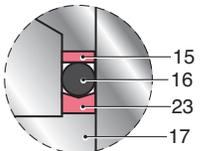


Detail X

SB330T: size 10 to 54
 SB330TR: size 10 to 54



SB330NTR: size 10 to 54
 SB330HT: size 20 to 54
 SB600T: size 20 to 54
 SB600TR: size 10 to 54
 SB600NTR: size 10 to 54



- Item Description:**
- 1 Shell
 - 2 *Bladder
 - 3 Gas Valve Core
 - 4 *Bladder Stem Lock Nut
 - 5 *Valve Seal Cap
 - 6 Valve Protection Cap
 - 7 *O-ring

Fluid Side

- 9 Fluid Port
- 14 Anti-extrusion Ring
- 15 Flat Ring
- 16 O-ring
- 17 Spacer Ring
- 18 *Fluid Port Lock Nut
- 19 Vent Screw
- 20 Seal Ring
- 23 Back-up Ring

Gas Side

- 22 Gas Port Adapter
- 24 Anti-extrusion Ring
- 28 Flat Ring
- 29 O-ring
- 30 Back-up Ring
- 31 Gas Port Lock Nut

**SB330T, SB330TR, SB330NTR, SB600T,
SB600TR, SB600NTR
Repair Kit consists of:**

- 2 Bladder
- 3 Gas Valve Core
- 5 Valve Seal Cap
- 7 O-ring
- 15 Flat Ring
- 16 O-ring
- 23 Back-up Ring (where applicable)
- 28 Flat Ring
- 29 O-ring
- 30 Back-up Ring

SB330HT

Repair Kit consists of:

- 2 Bladder
- 3 Gas Valve Core
- 5 Valve Seal Cap
- 7 O-ring
- 23 Back-up Ring (where applicable)
- 28 Flat Ring
- 29 O-ring
- 30 Back-up Ring

*Complete model code required. Must state A1 or S11

4.1 Torque Requirements:

Top Repairable Bladder Accumulators in Nm (lb-ft)

Part Name	SB 330 H 20 to 54	SB 330 T 10 to 54	SB 330 TR 10 to 54	SB 600 T 20 to 54	SB 600 TR 10 to 54
Gas Valve Core	0.5 (0.4)	0.5 (0.4)	0.5 (0.4)	0.5 (0.4)	0.5 (0.4)
Bladder Stem Lock Nut	80 (59)	80 (59)	80 (59)	80 (59)	80 (59)
Valve Seal Cap	30 (22)	30 (22)	30 (22)	30 (22)	30 (22)
Fluid Port Lock Nut	600 (443)	440 (325)	440 (325)	440 (325)	440 (325)
Vent Screw ³⁾	30 (22)	30 (22)	30 (22)	30 (22)	30 (22)
Gas Port Lock Nut	600 (443)	600 (443)	440 (325)	440 (325)	30 (22)

3) For SAE threads only. For other thread types, consult HYDAC.

5. Top Repairable Bladder Accumulators

Top repairable accumulators may also be repaired from the bottom (*fluid*) side. For this procedure please see section 3.

5.1 Disassembly

A Relieve system fluid pressure and drain all fluid from accumulator.

Remove **valve protection cap** (*item 6*) (if applicable) and unscrew **valve seal cap** (*item 5*). Attach proper HYDAC Charging and Gauging Unit (*FPK with adapter FPK/SB*) and completely relieve the gas precharge pressure (refer to *HYDAC Charging and Gauging brochure #02068202*).

B Remove **gas valve core** (*item 3*) by using the gas valve core tool. Thread pull rod onto gas valve and hold to keep gas port from falling into shell.

C Unscrew **gas port lock nut** (*item 31*) using spanner wrench. Remove **spacer ring** (*item 17*). If necessary, tap spacer ring with a plastic hammer to loosen. Push gas port adapter into shell.

D Remove **back-up ring** (*item 30*), **O-ring** (*item 29*), and **flat ring** (*item 28*) before removing anti-extrusion ring. Remove **anti-extrusion ring** (*item 24*) from gas port adapter, then fold it in half to pull it through the gas side opening.

E Pull gas port adapter through gas side opening and grasp the gas port adapter with one hand, while removing the pull rod with the other.

Remove the **gas port/bladder assembly** (*item 22 and 2*) from the shell. It may be necessary to fold the bladder lengthwise to remove it.

F Remove **bladder stem lock nut** (*item 4*) from gas valve and separate **gas port adapter** (*item 22*) from **bladder** (*item 2*).



5.2 Inspection of Components

Shell:

- inside to ensure it is free of debris, rough spots, or chafe marks.
- fluid side and gas side bores for damage which could hamper proper sealing.
- exterior for any sign of damage.

If any interior or exterior damage is found, contact HYDAC for proper repair or replacement instructions.

Bladder:

The bladder must be checked for leakage. Reinstall gas valve core (*item 3*) and charge the bladder with nitrogen or compressed air to its natural shape and inspect for leakage.

If leakage occurs, first check the gas valve core (*item 3*) and replace it if necessary. If leakage still occurs, then the bladder must be replaced. The bladder must be visually inspected for lateral grooves and deep chafe marks. If any are found, the bladder should be replaced. Shallow chafe marks are insignificant and will not hamper performance.

Note: Bladders can not be repaired or revulcanized.

Fluid Port:

Depress poppet and rotate 90° to ensure free movement. Visually inspect poppet, threads, and sealing surfaces for any damage. If any damage is found, the fluid port should be replaced.

Vulcanized Anti-extrusion Ring:

Visually check vulcanized area between steel and rubber to make sure it is undamaged and that adhesion is still good (*no gaps between rubber and metal*). If the adhesion is poor or the rubber is cracked or shows signs of embrittlement or aging, replace anti-extrusion ring. Also check the seat area on the steel parts for grooves or any other damage. If any are found replace anti-extrusion ring.

Non-Vulcanized Anti-extrusion Ring:

Visually inspect area between the steel and rubber to make sure that the steel ring is properly seated. If the rubber is cracked or shows signs of embrittlement or aging, replace anti-extrusion ring. Also check the seat area on the steel parts for grooves or any other damage. If any are found replace anti-extrusion ring.

Gas Porter Adapter:

Visually inspect the threads and sealing surfaces of the gas port adapter for signs of damage. If any damage is found, the gas port adapter should be replaced.

Seals:

New seals should always be used whenever reassembling any bladder accumulator.

Other Parts:

Inspect for damage and replace if necessary.

5.3 Assembly

The interior of the shell must be absolutely free of any contamination or debris prior to assembly.

Prepare bladder for installation by removing **valve seal cap** (item 5), and **gas valve core** (item 3). Purge all residual air.

Lubricate interior of shell and exterior of bladder with appropriate filtered fluid, using a fluid volume of approximately 10% of total accumulator volume.

(Do not use water, it is not a lubricant).

Different bladder compounds require different lubricants.

G Attach **gas port adapter** (item 22) to bladder with gas valve protruding through adapter opening. Loosely screw **bladder stem lock nut** (item 4) onto gas valve to keep gas port and bladder connected.

H Fold **bladder** (item 2) in half lengthwise and insert through gas side opening. Make sure bladder is stretched and not twisted when being inserted. Thread pull rod onto gas valve to position gas port adapter.

I Place the **anti-extrusion ring** (item 24) over the pull rod with the steel parts facing upward. Fold **anti-extrusion ring** (item 24) in half and insert into shell. To do this, push gas port adapter further into shell and then pull it back through anti-extrusion ring. Slide **gas port lock nut** (item 31) over and pull rod with beveled surface facing away from shell; loosely thread the gas port lock nut onto the gas port adapter. Remove pull rod from gas valve.

J Insert **gas valve core** (item 3) and torque to 0.5 Nm (0.4 lb-ft). Precharge bladder with 10 to 15 psi of dry nitrogen to hold **gas port adapter** (item 22) in place while completing assembly.

K Remove **gas port lock nut** (item 31). Insert **flat ring** (item 28) into space between gas port and shell. If it does not slide on properly, re-center gas port in opening. Next, insert **O-ring** (item 29) by pressing with a blunt flathead screwdriver (with rounded edges) at 90° intervals. Carefully, level O-ring onto seat. Insert **back-up ring** (item 30) over O-ring with grooved surface toward O-ring.

L Install **spacer ring** (item 17). Thread on **gas port lock nut** (item 31) with beveled surface facing away from shell and torque with spanner wrench*. Torque* **bladder stem lock nut** (item 4).

M Attach HYDAC Charging and Gauging Unit (FPK with adapter FPK/SB) and apply proper gas precharge pressure (refer to HYDAC Charging and Gauging brochure #02068202). Check **bladder stem lock nut** (item 4) torque².

N Screw on **valve seal cap** (item 5) and torque*. Replace **valve protection cap** (item 6) (if applicable).

*refer to torque table in section 4.1.

