

Bladder-Type Accumulators

An Overview

The typical bladder accumulator makes use of the considerable differences in the relative compressibility between a gas and a fluid. A typical design consists of a gas proof elastomer membrane enclosed within a steel shell. The membrane contains compressed gas (normally dry nitrogen) and separates the gas from the hydraulic fluid. The compressed gas provides a pneumatic spring action to force stored hydraulic fluid from the accumulator into the system as needed.

The steel shells are typically manufactured of homogenous seamless steel tubing with both ends formed hemispherically by spinning or forging. The shells are then heat treated and stress relieved to obtain the desired mechanical properties, as required by ASME Code Section VIII, Division 1 pressure vessel requirements. Corrosion resistance can be achieved with the use of stainless steel, but is more commonly obtained by plating the shell interior with nickel or coating with an epoxy or phenolic compound.

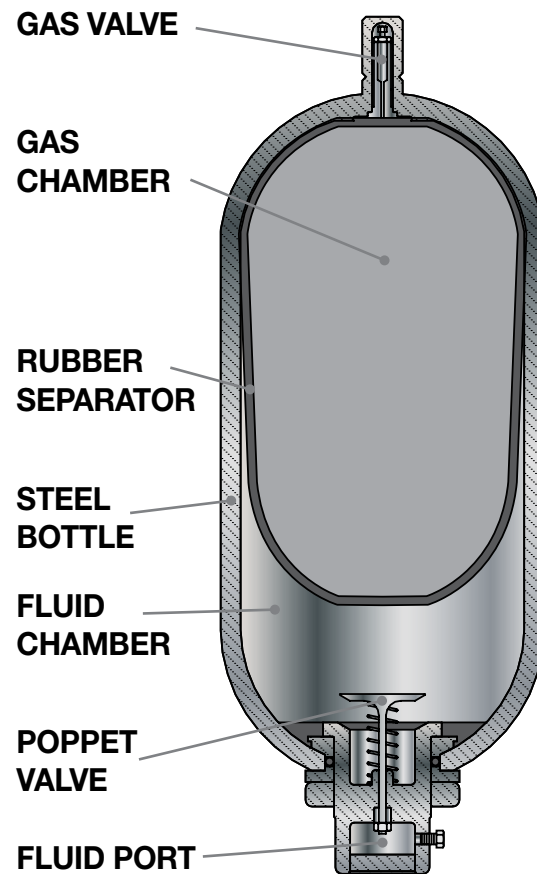
Common bladder-type accumulator capacities are one pint, one quart, and one through fifteen gallons (1, 2.5, 5, 10, 11, and 15). Bladders are commonly constructed of a particular elastomer (Buna-N, Butyl, EPR, Viton, etc.) specified to achieve a desired compatibility with the system fluid (hydraulic oil, water glycols, etc.) and elasticity throughout the operating temperature range (typically -20°F to 200°F). Normally, a spring-loaded poppet valve assembly is utilized to prevent extrusion of the bladder. This commonly limits the fluid flow rate to a maximum of 220 gallons per minute into the system from the accumulator, but higher flows can be obtained with a special poppet valve assembly.

The typical bladder-type accumulator is a bottom repairable design, in that the bladder is inserted into the shell through a bottom opening in the shell. This opening allows the installation of the oil port body/poppet valve assembly to seal the accumulator. Optional top repairable designs are

available, along with various gas stem sizes (7/8" & 2") if desired. Tobul's parts and bladder kits are interchangeable with most major manufacturers.

Due to the limited volume capacities, it is common to find banks of bladder-type accumulators connected to a manifold in order to provide the desired quantity of fluid to a system. Unfortunately, this can cause physical space limitations in certain applications.

Generally, bladder-type units are connected to a system by threading a pressure connection directly into the fluid port of the accumulator. Various sized porting must be specified and may entail the use of special adaptors or bolt-on flanges to achieve desired fluid connections.





Bottom repairable models

Bottom repairable bladder-type designs (Tobul model designation TBR) are the most commonly found units in the marketplace.

Fluid capacities are generally limited to a small variety of sizes (one pint to fifteen gallons/ approximately .5 Liter to 57 Liters).

Pressure ratings of these vessels are generally 3000 PSI (207 Bar), 5000 PSI (345 Bar) or less. Specially rated units, though, can contain up to 6600 PSI (455 Bar).



TBR30 1 Quart Accumulators 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION				E
	In. ³	Cm. ³	Gallon	Liters	Lbs.	Kg.	C		D		
							In.	mm.	In.	mm.	
TBR30-2*	73	1,196	.25	1	10	5	2.125	54	1.375	41	SAE-20 or 1.25" NPT available as standard. To specify 1.25" NPT, add "P" to end of Accumulator Model Number.

* = Bladder Material Suffix
N = BUNA-N B = BUTYL H = EPR E = VITON

GENERAL DESIGN DATA

Maximum Working Pressure 3,000 PSI (207 Bar)

Maximum Proof Pressure 4,500 PSI (310 Bar)

Operating Temperature (Buna/Nitrile) -20° to +200°F (-28° to 93°C)

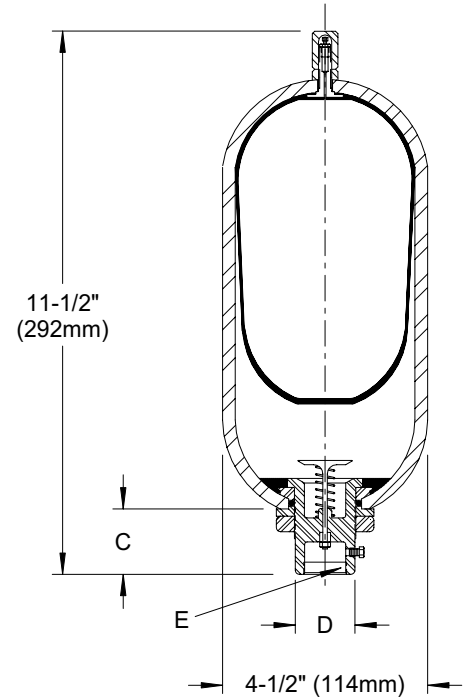
Bladder for petroleum base oil.

Shell ASME "U" stamped.

Optional higher pressure rating of 4,000 PSI (276 Bar) available on request.

Specifications subject to change without notice.

See Data Sheets for breakdown of parts.



TBR30 1 Gallon Accumulators 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION				E
	In. ³	Cm. ³	Gallon	Liters	Lbs.	Kg.	C		D		
							In.	mm.	In.	mm.	
TBR30-1*	235	3,851	1	4	34	15	4	89	2.38	60	SAE-20 or 1.25" NPT available as standard. To specify 1.25" NPT, add "P" to end of Accumulator Model Number.

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GENERAL DESIGN DATA

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Maximum Proof Pressure 4,500 PSI (310 Bar)

Operating Temperature (Buna/Nitrile) -20° to +200°F (-28° to 93°C)

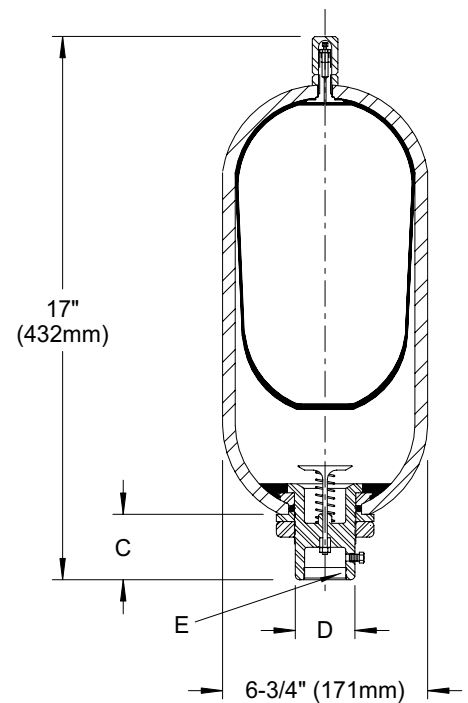
Bladder for petroleum base oil.

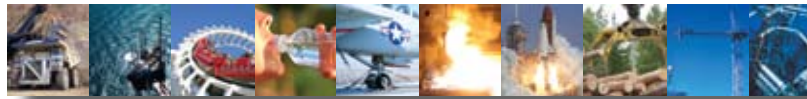
Shell ASME "U" stamped.

Optional higher pressure rating of 4,000 PSI (276 Bar) available on request.

Specifications subject to change without notice.

See Data Sheets for breakdown of parts.





TBR30 Accumulators 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION		SAE-24 or 2" NPT available as standard. To specify 2" NPT, add "P" to end of Accumulator Model Number.
	In. ³	Cm. ³	Gallon	Liters	Lbs.	Kg.	A		
							In.	mm.	
TBR30-2.5*	600	9,832	2.5	10	80	36	21	533	
TBR30-5*	1,203	19,714	5	19	120	54	33.25	845	
TBR30-10*	2,259	37,018	10	38	220	100	54	1,372	
TBR30-11*	2,535	41,541	11	42	240	109	59.5	1,511	
TBR30-15*	3,440	56,372	15	57	305	138	77.5	1,969	

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GENERAL DESIGN DATA

Maximum Working Pressure 3,000 PSI (207 Bar)

Maximum Proof Pressure 4,500 PSI (310 Bar)

Operating Temperature (Buna/Nitrile) -20° to +200°F (-28° to 93°C)

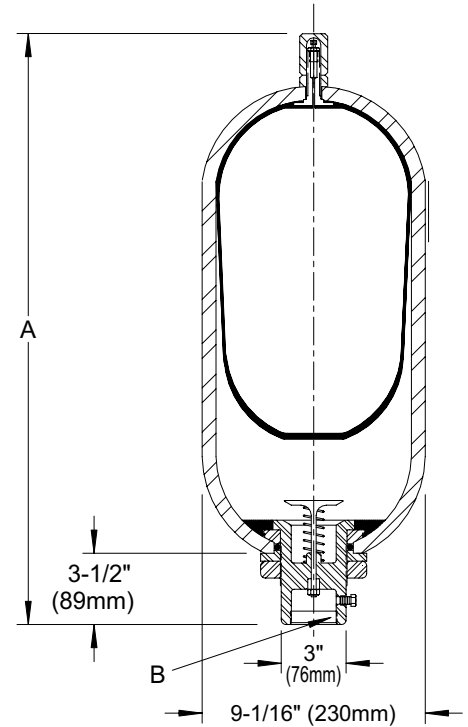
Bladder for petroleum base oil.

Shell ASME "U" stamped.

Optional higher pressure rating of 4,000 PSI (276 Bar) available on request.

Specifications subject to change without notice.

See Page 32 for Repair Kits, Bladders, etc.



TBR50 Accumulators 5,000 PSI (345 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION		SAE-24 or 2" NPT available as standard. To specify 2" NPT, add "P" to end of Accumulator Model Number.
	In. ³	Cm. ³	Gallon	Liters	Lbs.	Kg.	A		
							In.	mm.	
TBR50-2.5*	577	9,454	2.5	10	120	54	21.5	546	
TBR50-5*	1,151	18,858	5	19	220	100	33.75	857	
TBR50-10*	2,142	35,095	10	38	335	152	54.5	1,384	
TBR50-15*	3,260	53,413	15	57	485	220	78	1,981	

* = Bladder Material Suffix
N = BUNA-N B = BUTYL H = EPR E = VITON

GENERAL DESIGN DATA

Maximum Working Pressure 5,000 PSI (345 Bar)

Maximum Proof Pressure 7,500 PSI (517 Bar)

Operating Temperature (Buna/Nitrile) -20° to +200°F (-28° to 93°C)

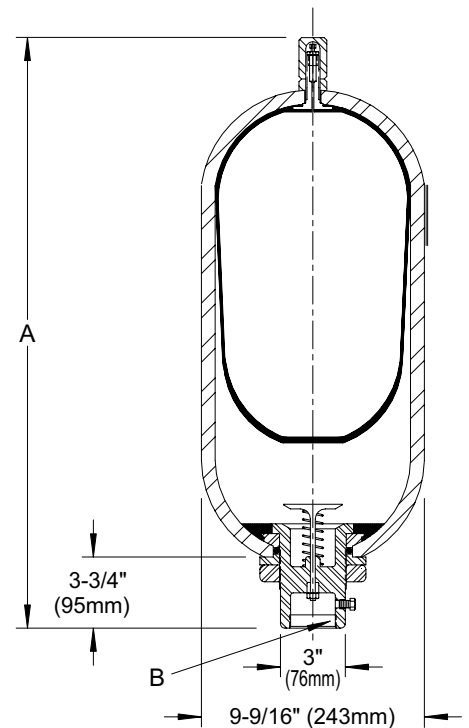
Bladder for petroleum base oil.

Shell ASME "U" stamped.

Optional higher pressure rating of 6,600 PSI (455 Bar) available on request.

Specifications subject to change without notice.

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Bladder Accumulators

Top repairable models

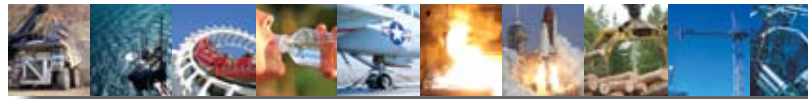
Top repairable bladder-type designs (Tobul model designation TBRT) are readily available in the marketplace, but much less commonly seen than bottom repairable units. TBRT's are more expensive than TBR's since an additional gas port body and anti-extrusion ring is necessary to completely seal the accumulator shell.

Top Repairable Versus Bottom Repairable?

The distinct advantage of a TBRT (Top Repairable) unit is the fact that a unit may be repaired (i.e., bladder replaced) without dismounting an accumulator from the system. As long as the unit can be isolated and the system pressure relieved, the top gas port assembly can be accessed and a replacement bladder installed.



***Note:** It is extremely important to follow ALL guidelines for maintenance and repair of any pressure vessel! Please contact Tobul sales & service engineering (803-245-5111) for assistance with any questions. Please visit www.tobul.com for a downloadable copy of Tobul's Operating and Maintenance Procedures prior to beginning any procedure on any Tobul accumulator.*



TBRT30 Accumulators 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION			
	In. ³	Cm. ³	Gallon	Liters	Lbs.	Kg.	A		B	
							In.	mm.		
TBRT30-2.5*	600	9,382	2.5	10	80	36	21	533	SAE-24 or 2" NPT available as standard. To specify 2" NPT, add "P" to end of Accumulator Model Number.	
TBRT30-5*	1,203	19,714	5	19	120	54	33	838		
TBRT30-10*	2,259	37,018	10	38	220	100	54	1,372		
TBRT30-11*	2,535	41,541	11	42	240	109	59.5	1,511		
TBRT30-15*	3,440	56,372	15	57	305	138	77.5	1,969		

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Maximum Working Pressure 3,000 PSI (207 Bar)

Maximum Proof Pressure 4,500 PSI (310 Bar)

Operating Temperature (Buna/Nitrile) -20° to +200°F (-28° to 93°C)

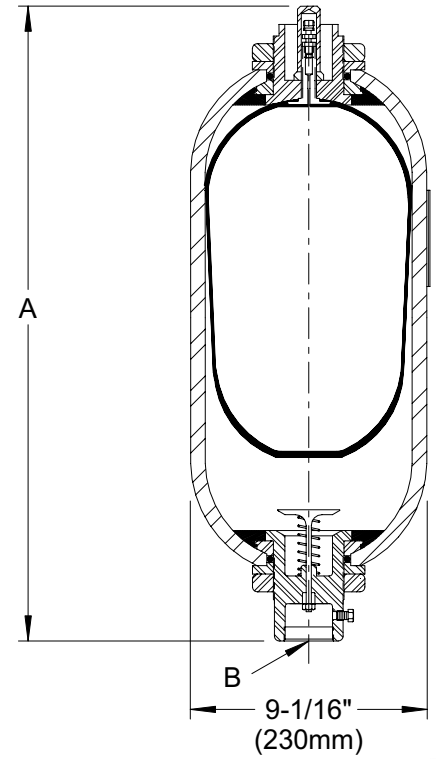
Bladder for petroleum base oil.

Shell ASME "U" stamped.

Optional higher pressure rating of 4,000 PSI (276 Bar) available on request.

Specifications subject to change without notice.

See Page 32 for Repair Kits, Bladders, etc.



TBRT50 Accumulators 5,000 PSI (345 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION			
	In. ³	Cm. ³	Gallon	Liters	Lbs.	Kg.	A		B	
							In.	mm.		
TBRT50-2.5*	577	9,454	2.5	10	120	54	21.5	546	SAE-24 or 2" NPT available as standard. To specify 2" NPT, add "P" to end of Accumulator Model Number.	
TBRT50-5*	1,151	18,858	5	19	220	100	33.75	857		
TBRT50-10*	2,142	35,095	10	38	335	152	54.5	1,384		
TBRT50-15*	3,260	53,413	15	57	485	220	78	1,981		

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GENERAL DESIGN DATA

Maximum Working Pressure 5,000 PSI (345 Bar)

Maximum Proof Pressure 7,500 PSI (517 Bar)

Operating Temperature (Buna/Nitrile) -20° to +200°F (-28° to 93°C)

Bladder for petroleum base oil.

Shell ASME "U" stamped.

Optional higher pressure rating of 6,600 PSI (455 Bar) available on request.

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