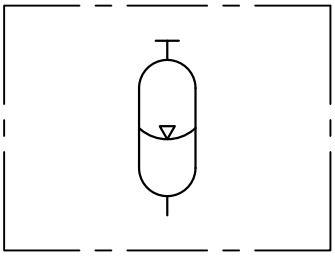
ASME Bladder Accumulator
Type : AA

Hydraulic Symbol



Specifications

Material of Construction
- Body : Carbon Steel / Stainless Steel.
- Bladder : Nitrile(NBR) / Butyl (IIR) / Viton (FKM) / EPDM .... others listed on ordering code.

Connections
- Gas Side : 5/16" UNEF/Vg8.
- Fluid Side : Female Threaded or Flanged. Others on request.

Paint-CS Accumulators : Externally painted to RAL-5010. Others on request.

Technical Data

Design	: Seamless shell.
Max. Pressure (PS)	: 1000 PSI ~ 15000 PSI
Test Pressure (PT)	: 1.3 / 1.5 x PS as required.
Temperature range	: -20°C to +80°C (Standard)
Allowable pre.ratio (P_2/P_0)	: 4:1
Nominal capacity	: 1/6 to 15 Gallons
Max. Flow rate	: Refer page 5
Fluid	
Fluid Viscosity range	: 10 to 400 cSt
Recommended viscosity	: 32 cSt
Fluid contamination degree	: Class 21/19/16 according to ISO 4406:1999 or better on request.

Description

A hydro-pneumatic accumulator is a device used specifically for storage of liquid under pressure. As liquids, for all practical purposes, are incompressible, this objective is achieved by utilizing the compressibility of gases.

A flexible rubber separator i.e., bladder is fitted into the accumulator shell.
An inert gas - nitrogen - is filled into the bladder through a pressure valve to a pressure P_0. The bladder expands, filling the entire volume V_0 of the accumulator shell.
When the system pressure P_1 is higher than the gas precharge pressure P_0, the liquid enters the accumulator and the bladder is compressed reducing the gas volume to V_1.
Should the liquid pressure rise to P_2, the volume of gas reduces to V_2 with an attendant rise in pressure, thus balancing the Liquid pressure.

A potential energy is now stored in the accumulator to be utilised whenever needed.

Certification

The EPE AA range bladder accumulators are generally designed & manufactured according to ASME Sec. VIII Divn.1. Bladder accumulators can also be supplied as per European Directive or others on request.

Materials

In standard version, the shell is made of carbon steel and painted on the outside with a coat of rust inhibitor; the valves are made from carbon steel - phosphated. This configuration is suitable for oils and non-corrosive liquids.
Options for shell in stainless steel / aluminium / titanium alloy are available on request.
Shells Nickle plated / Rilsan coated or others are also available on request.

Operation

Sequence of operations in the accumulator working cycle

A) General appearance in assembled condition.

B) Bladder occupying the entire space inside the shell after precharge.

C&D) The accumulator in working condition between minimum pressure (C) & maximum pressure (D) delivers fluid and calculated between V_1 & V_2 i.e., $\mathbf{\Delta V = V_1 - V_2}$.

Accumulator now has a potential energy to be utilised as desired.

Fig.1

Construction

The EPE bladder accumulator, generally designed & manufactured according to European directive, comprises a steel shell in which is fitted a bladder complete with a gas valve and a fluid port with the poppet valve (Fig.2)

The accumulator shell is a pressure vessel forged or fabricated from high grade steel designed and manufactured to meet relevant international standards. For special applications various surface coatings are available as well as stainless steel construction.

The bladder construction which is unique to EPE is moulded in a single piece thus obviating problems associated with seamed construction. The gas valve is fitted in such a manner which allows it to be connected and easily and safely. In addition the valve, not an integral part of the bladder, can be re-used, thus reducing maintenance costs.

Bladders are normally manufactured from nitrile, but for special applications butyl, neoprene, ethylene-propylene etc, are available.

The gas valve is connected to the bladder by a rubber coated washer to ensure a gas tight joint and a non return valve is incorporated for bladder inflation. The bladder, complete with the gas valve is attached to the accumulator shell by a lock nut, and the assembly is protected by a cover.

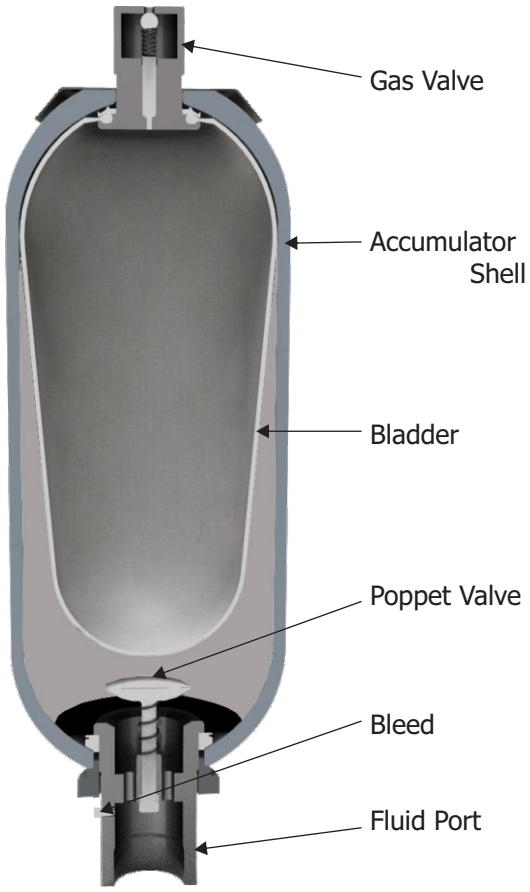


Fig.2

The fluid port contains a **poppet valve** to prevent bladder from extruding out of the fluid port while allowing fluid to flow.

Ordering Code - Accumulators - ASME Range

1	2	3	4	5	6	7	8	9	10	11	12	13	14	
AA	**10**	**P**	**3000**	**C**	**G**	**09**	**F**	**7W**	**C**	**C**	**4**	**/ PO:100 /**	**–**	**-**

To indicate only if applicable

1	**Series**	ASME Design Accumulators	**= AA**
2	**Nominal Capacity (Gal)**	1/6 Gallon 1/4 Gallon 1 Gallon 2.5 Gallons 5 Gallons 10 Gallons 15 Gallons	**= 0.6** **= 1** **= 4** **= 10** **= 20** **= 37** **= 57**
3	**Bladder & Seal material**	Nitrile Butyl Viton EPDM Hydrogeneted Nitrile Neoprene Nitrile for Hydrocarbons Low Temp. Nitrile Epichlorohydrin	**= P** (standard) **= B** **= V** **= E** **= K** **= N** **= H** **= F** **= Y**
4	**Max. Working Pressure (PSI)**	1000 PSI 2000 PSI 3000 PSI 4000 PSI 5000 PSI 10000 PSI 15000 PSI * Other pressures available in request	**= 1000** **= 2000** **= 3000** **= 4000** **= 5000** **= 10000** **= 15000**
5	**Shell material**	Carbon Steel Nickel Coated Carbon Steel Stainless Steel Rilsan Coated Carbon Steel	**= C** (standard) **= N** **= X** **= V**
6	**Fluid Port Connection type**	BSPP (Parallel Thread) BSPT (Taper Thread) NPT (Taper Thread) To suit SAE 3000 PSI flange To suit SAE 6000 PSI flange Square Flange SAE Internal Thread Metric UNI-DIN Flange ANSI Flange Adaptor (for use with type G connection)	**= G** (standard) **= T** **= N** **= 3** **= 6** **= Q** **= S** **= M** **= D** **= A** **= R#** {# = G/T/N/S/M}

* Before ordering, check for availability

Ordering Code - Accumulators

1	2	3	4	5	6	7	8	9	10	11	12	13	14
AA	**10**	**P**	**3000**	**C**	**G**	**09**	**F**	**7W**	**C**	**C**	**4**	**/ PO:100 /**	**– -**

To indicate only if applicable

7	**Fluid Port Connection size**	for **G**	1/8″	**= 01**	for **D**	DN20/40 **= 51** DN20/250 **= 52** DN25/16 **= 53** DN25/40 **= 54** DN25/250 **= 55** DN32/40 **= 56** DN32/250 **= 57** DN40/40 **= 58** DN40/250 **= 59** DN50/16 **= 60** DN50/40 **= 61** DN50/64 **= 62** DN50/250 **= 63** DN65/16 **= 64** DN65/40 **= 65** DN80/16 **= 66** DN100/16 **= 67** DN100/40 **= 68**
		T	1/4″	**= 02**		
		N	3/8″	**= 03**		
		3	1/2″	**= 04**		
		6	3/4″	**= 05**		
		Q	1″	**= 06**		
		R	1-1/4″	**= 07**		
			1-1/2″	**= 08**		
			2″	**= 09**		
			Multi Ports (R) (Ref. other variants)	**= zz**		
		for **S**	1-1/16″-12	**= 21**		
			1-5/8″-12	**= 22**		
			1-7/8″-12	**= 23**		
		for **M**	M14x1.5	**= 31**	for **A**	3/4″ /300 **= 81** 3/4″ /1500 **= 82** 1″ /300 **= 83** 1″ /1500 **= 84** 1-1/4″ /300 **= 85** 1-1/4″ /1500 **= 86** 1-1/2″ /300 **= 87** 1-1/2″ /1500 **= 88** 2″ /150 **= 89** 2″ /300 **= 90** 2″ /400 **= 91** 2″ /1500 **= 92**
			M16x1.5	**= 32**		
			M18x1.5	**= 33**		
			M22x1.5	**= 34**		
			M27x2.0	**= 35**		
			M32x1.5	**= 36**		
			M33x1.5	**= 37**		
			M40x1.5	**= 38**		
			M42x1.5	**= 39**		
			M45x1.5	**= 40**		
			M50x1.5	**= 41**		

8	**Fluid Port Connection design**	Female Thread	**= F**	for **A**	WN-RF **= WN** WN-RTJ **= WJ** SO-RF **= SO** SW-RF **= SW** SW-RTJ **= SJ**
		Male Thread	**= M**		
		For SAE Flange	**= S**		
		Flange	**= L**		
		Socket Weld Nipple	**= SW**		

9	**Certification**	ASME Sec.VIII Divn.1 App.22 (w/o stamp)	**= 7W** (standard)
		ASME Sec.VIII Divn.1 App.22 - U stamp	**= 7U**
10	**Fluid Valve material**	Carbon steel	**= C** (standard)
		Nickel Coated carbon steel	**= N**
		Stainless Steel	**= X**
		Zn-Ni Coated Carbon Steel	**= Z**
11	**Gas Valve material**	Carbon steel	**= C** (standard)
		Nickel Coated carbon steel	**= N**
		Stainless Steel	**= X**
		Zn-Ni Coated Carbon Steel	**= Z**
12	**Gas Fill Valve connection**	5/16″ UNEF (integral in 7/8 UNF Gas Valve)	**= 4** (standard)
		Without Gas Fill Valve	**= 0**
		5/8″ UNF	**= V**
		5/8″ UNF in Stainless Steel	**= X**
		5/16″ UNEF/Vg8	**= 1**
		1/4″ BSP	**= 2**
		Double Lock Military Valve	**= 8**

* Before ordering, check for availability

Ordering Code - Accumulators

1	2	3	4	5	6	7	8	9	10	11	12	13	14	
AA	**10**	**P**	**3000**	**C**	**G**	**09**	**F**	**7W**	**C**	**C**	**4**	**/ PO:100 /**	**–**	**-**

To indicate only if applicable

13	**Precharge Pressure**	Uncharged Condition Precharge Pressure in PSIG	**= -** **= XX**

14	**Other variants**	Standard Accumulator - Without any variants	**= --**
		Liquid Side Variants	
		Liquid Adapter in SS (if different from FPA)	**= L01**
		Poppet & spring in SS (if different from FPA)	**= L02**
		Fluid Port Assembly without Bleed Port	**= L03**
		3-Way adaptor - 1/2" BSPF x 1/4" BSPF	**= L11**
		3-Way adaptor - 1/2" BSPF x 3/8" BSPF	**= L12**
		3-Way adaptor - 1/2" BSPF x 1/2" BSPF	**= L13**
		3-Way adaptor - 3/4" BSPF x 1/4" BSPF	**= L14**
		3-Way adaptor - 3/4" BSPF x 3/8" BSPF	**= L15**
		3-Way adaptor - 1" BSPF x 1/4" BSPF	**= L16**
		Gas Side Variants	
		Protection cap in SS (if different from GVA)	**= G01**
		Protection cap with Plastic Insert	**= G02**
		Name plate in Brass	**= G03**
		Name Plate in SS	**= G04**
		Lifting Hook	**= G06**
		Adapter for connecting ¼" Gauge (without gauge)	**= G11**
		Adapter with xxx PSI 63mm Pressure Gauge	**= G12(xxx)**
		Adapter with xxx PSI rupture disc	**= G13(xxx)**
		Adapter with xxx PSI rupture disc + 1/4" BSPF Port	**= G14(xxx)**
		Adapter with xxx PSI rupture disc + yyy PSI 63mm Gauge	**= G15(xxx/yyy)**
		Adapter with xxx PSI rupture disc + 1/4" NPTF Port	**= G16(xxx)**
		Adapter with xxx PSI rupture disc + 3/8" NPTF Port	**= G17(xxx)**
		Adapter with xxx PSI rupture disc + 1/2" NPTF Port	**= G18(xxx)**
		Adapter with VS214 Gas Safety Valve set at xxx PSI	**= G19(xxx)**
		Adapter with 1/4" BSP Needle Valve	**= G21**
		Adapter with 1/4" BSP Needle Valve in SS	**= G22**
		Adapter with PGSV (Pressure Gauge Shut-off Valve)	**= G23**
		Adapter with PGSV + xxx PSI 63mm pressure gauge	**= G24(xxx)**
		External Variants	
		Finish Paint - RAL-5003	**= E01**
		Internal Variants	
		Flushing to NAS-10	**= F10**
		Flushing to NAS-9	**= F09**
		Flushing to NAS-8	**= F08**
		Flushing to NAS-7	**= F07**
		Flushing to NAS-6	**= F06**
		Flushing to NAS-5	**= F05**

* Before ordering, check for availability

Max. Flow Rates (l/min)

Type⇩ \ Size ⇨	0.6	1	4	10	20	37	57
AA	300	300	600	1000	1000	1000	1000

Dimensions & Spare Parts List - AA (Poppet design)

AA

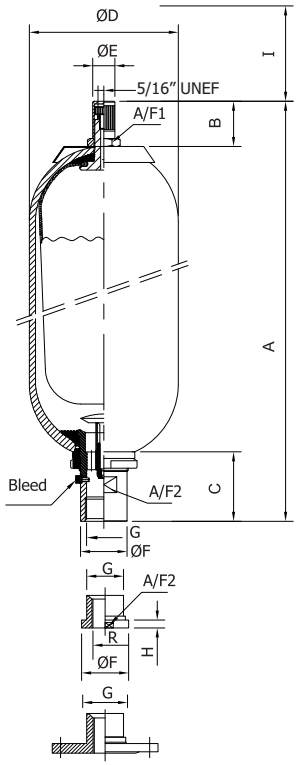


Fig.3

AA

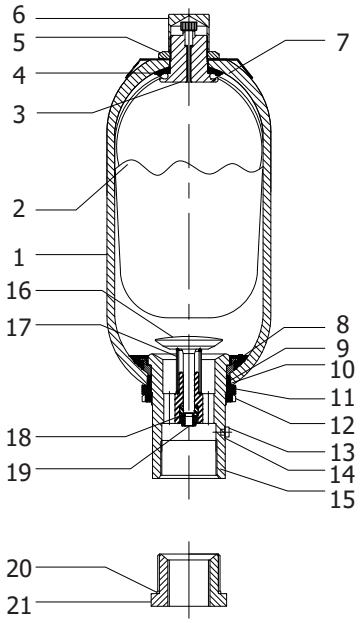


Fig.4

Model	Max. Pre. PSI	Gas Vol. Gal	Dry Wt. kgs	Fluid Port Connection (BSP)		A	B	C	ØD	ØE	ØF	H	I	A/F1	A/F2
				G	R										
AA-0.6	3000	1/6	3.1	3/4"	3/8"	280	47	52	89	25	36	11	140	32	32
AA-1		1/4	5	3/4"	3/8"	290	47	52	114	25	36	11	140	32	32
AA-4		1	14	1-1/4"	3/8" - 1/2" - 3/4"	400	47	65	168	25	53	11	140	32	50
AA-10		2.5	36.5	2"	1/2" - 3/4" - 1" 1-1/4" - 1-1/2"	570	60	101	223	25	77	11	140	32	70
AA-20		5	58			880									
AA-37		10	92			1400									
AA-57		15	130			1990									
AA-0.6	4000	1/6	3.1	3/4"	3/8"	280	47	52	89	25	36	11	140	32	32
AA-1		1/4	5	3/4"	3/8"	290	47	52	114	25	36	11	140	32	32
AA-4		1	14	1-1/4"	3/8" - 1/2" - 3/4"	400	47	65	168	25	53	11	140	32	50
AA-10		2.5	40	2"	1/2" - 3/4" - 1" 1-1/4" - 1-1/2"	570	60	101	232	25	77	11	140	32	70
AA-20		5	65			880									
AA-37		10	105			1400									
AA-57		15	153.5			1990									

* Other pressures and capacities available on request

All dimensions in mm

Item#	Description	Qty.	AA-0.6	AA-1	AA-4	AA-10	AA-20	AA-37	AA-57
1	Accumulator Shell	1	-	-	-	-	-	-	-
2	Bladder	1	-	-	-	-	-	-	-
3	Gas Valve Body	1	B10106	B10106	B10203	B10337	B10337	B10337	B10337
4	Rubber-coated Washer	1	C10106	C10106	C10205	NI0023	Ni0023	Ni0023	Ni0023
5	Gas Valve Lock Nut	1	110240	110240	110240	110240	110240	110240	110240
6	Protection Cap	1	110241	110241	110241	110241	110241	110241	110241
7	Name Plate	1	G10304	G10304	G10305	G10306	G10306	G10306	G10306
8	Retaining Ring	1	I10123	I10127	I10222	I10317	I10317	I10317	I10317
9	"O" Ring	1	I56022	I56022	211030	237032	237032	237032	237032
10	Supporting Ring	1	K10133	K10133	K10227	K10320	K10320	K10320	K10320
11	Spacer Ring	1	L10120	L10120	L10223	L10319	L10319	L10319	L10319
12	Fluid Port Ring Nut	1	M10122	M10122	M10217	M10321	M10321	M10321	M10321
13	Bleed Screw	1	05XXXX	05XXXX	05XXXX	BBXXXX	BBXXXX	BBXXXX	BBXXXX
14	Seal Ring	1	C13384	C13384	C13384	C39XXX	C39XXX	C39XXX	C39XXX
15	Fluid Port Body	1	N10115	N10115	N10144	N10311	N10311	N10311	N10311
16	Poppet	1	O10111	O10111	O10221	O10310	O10310	O10310	O10310
17	Spring	1	P10112	P10112	P10149	P10322	P10322	P10322	P10322
18	Brake Bushing	1	Q10113	Q10113	Q10226	Q10314	Q10314	Q10314	Q10314
19	Self-Locking Nut	1	S10114	803XXX	S10228	S10341	S10341	S10341	S10341
20	Adaptor O-Ring	1	097013	097009	161013	212013	212013	212013	212013
Gas Valve Assembly - consists item # 3 to 6		1	V12044	V12044	V12046	V12071	V12071	V12071	V12071
Fluid Port Assembly - consists item # 8 to 19		1	H12023	H12024	H12044	H12064	H12064	H12064	H12064
Gasket Set - consists item # 8,9,10,14		1	R12030	R12030	R12050	R12080	R12080	R12080	R12080

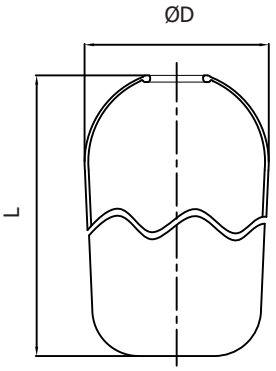
Ordering Code - Bladder Assembly

1	2	3	4	5	6
SA	**10**	**P**	**U7/8V**	**C**	**4**

1	**Design**	Standard	= **SA** (standard)
2	**Nominal Capacity (Gal)**	1/6 Gal to 15 Gal - As per page 3	**= 0.6 ~ 57**
3	**Bladder & Seal material**	Nitrile (NBR) Butyl (IIR) Viton (FKM) Ehtylene-Propylene (EPDM) Hydrogenated Nitrile (HNBR) Neoprene (CR) Nitrile for Hydrocarbons Low Temp. Nitrile Epichlorohydrin (ECO) For foods	**= P** (standard) **= B** **= V** **= E** **= K** **= N** **= H** **= F** **= Y** **= A**
4	**Gas Valve type**	Without Gas Valve (only bladder) 7/8" UNF(M) with Integral 5/16" UNEF/Vg8 fill valve 7/8" UNF(M) with screw-in Gas Fill Valve M22x1.5(M) with screw-in Gas Fill Valve	**= 0** **= U7/8V** (Std) **= U7/8** **= M22**
5	**Gas Valve material**	Carbon steel Nickel Coated carbon steel Stainless Steel Zn-Ni Coated Carbon Steel	**= C** (standard) **= N** **= X** **= Z**
6	**Gas Fill Valve connection**	5/16" UNEF (integral in 7/8 UNF Gas Valve) Without Gas Fill Valve Others - As per page 4	**= 4** (standard) **= 0** **=** x (ref page 4)

* Before ordering, check for availability

Bladder dimensions



Model	ØD mm	L mm	Weight Kgs
SA-0.6	74	120	0.06
SA-1	95	131	0.13
SA-4	145	198	0.39
SA-10	198	305	0.92
SA-20		580	1.75
SA-37		1105	3.30
SA-57		1538	4.60

Fig.5

Valve design

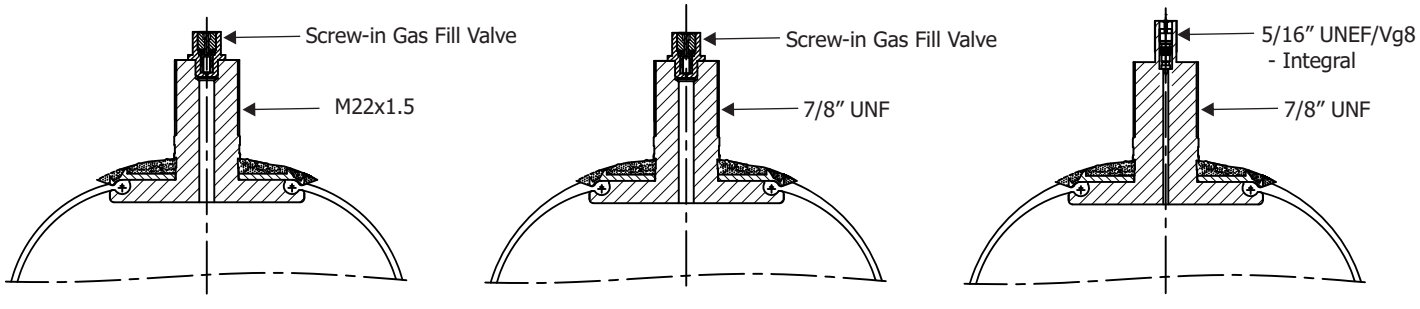


Fig.6

Material

The choice of the elastomer used for the bladder depends on the liquid to be used and on the operating temperatures (and at times, storage). In the chart below, each polymer has a designated letter to be used in the ordering code.

Code letter	Polymer	ISO	Temperature range (°C)	Some of the liquids compatible with the polymer
P	Nitrile (Buna-N / Perbunan)	NBR	-20 to +85	Mineral, vegetable, silicon and lubricating oils, industrial water, glycols, non-flammable liquids (HFA-HFB-HFC), aliphatic hydrocarbons, butane, diesel oil, kerosene, fuel oils etc.
F	Low Temperature Nitrile	NBR	-40 to +70	The same as with standard nitrile + a number of different types of Freon. (This contains less acrylonitrile than the standard and is therefore more suitable for low temperatures, but is chemical resistance is slightly lower.
H	Nittrile for Hydrocarbons	NBR	-10 to +90	The same as with standard nitrile + regular and premium grade slightly aromatic gasoline.
K	Hydrogenated Nitrile	HNBR	-50 to +130	The same as with standard nitrile but with excellent performance at both high and low temperatures.
A	For food-stuffs	NBR	-20 to +85	Foods (specify which type when ordering).
B	Butyl	IIR	-20 to +90	Phosphoric esters (HFD-R), phosphate esters, fyrquel, hot water, ammonia, caustic soda, some kinds of Freon (22-31-502), glycol-based brake fluids, some acids, alcohols, ketones, esters, skydrol 7000, etc.
E	Ethylene-Propylene	EPDM	-20 to +90	Break fluids, hot water, leaching fluids, detergents, water-glycol (HFC), many acids and bases, saline solutions, skydrol 500, etc.
N	Chloroprene (Neoprene)	CR	-20 to +85	Freon (12-21-22-113-114-115), water and aqueous solutions, ammonia, carbon dioxide, mineral, paraffin and silicon oils.
Y	Epichloridrin	ECO	-30 to +100	Lead-free gasoline, mineral oils.
V	Viton (Flouroelastomer)	FKM	-20 to +121	The same as with standard nitrile but with excellent performance at both high and low temperatures.

* Check availability before ordering.

Durability of the Bladders

It is essential, in order to make the correct choice, to take into consideration the working conditions that the bladder will be operating in, because these can considerably affect the durability of the bladder. Assuming that the liquid used is **clean** and compatible with the bladder material, there are a number of factors which can affect the life of the bladder:

The precharge pressure P_0 - In most cases the values recomended in Gas Precharge Pressure - page-3 are valid although, as the pressure and, above all, the velocity of the yield required increase, there is the danger that in each cycle the bladder will knock against the poppet valve. In these cases it is possible to use $P_0 = 0.8$ to $0.7\ P_1$.

The P_2/P_0 ratio - Any increase in this, will increase the stress the bladder is subjected to in each cycle.

The maximum operating pressure P_2 - Any increase in this will subject the bladder to greater stress.

Flow rate - Flow rate does not affect bladder working life if values given in Table.2 are not exceeded. When approaching the maximum values, make sure there remains a residual volume of liquid > 10% of the volume V_0 in the accumulator, in both loading & unloading conditions.

The frequency or number of cycles per day.

Installation - The vertical position with gas valve on top is the recommended arrangement. When the position is horizontal the bladder tends to rest and rub against the accumulator body. This could result in quicker wear.

The operating temperature - This is one of the factors which most affects the life of the bladder: at very low temperatures the bladder tends to become brittle; as the temperature rises, reaching, or going beyond the limits for the elastomer, the stress the bladder is subjected to increases exponentially, which can lead to fracturing within a short time.

It should be remembered that the temperature in the accumulator is in many cases higher than the one of the system, and that it rises with each increase of P_2, of P_2/P_1, and with the volume of the accumulator (in other words, larger the accumulator, lesser is the capacity to dissipate heat).

General

All EPE accumulators are carefully inspected and tested at the factory and are exactly as designated by the code printed on the name plate.
In addition the name plate carries the accumulators serial number and if specified on order, the value on precharge.

On the accumulator shell are also marked :
Manufacturer's serial number & date shell manufactured; identification mark; design standard applicable; maximum recommended working pressure; temperature range; capacity in liters.
Accumulators are normally supplied empty (uncharged).
Charged units can be supplied on request.
ATTENTION: The max working pressure marked on the accumulator must be ≥ that the calibrated pressure of the relief valve.
Before undertaking any work (repairs, replacement etc.) on the hydraulic circuit for mounting an accumulator, it is advisable to release completely the liquid pressure.
Test certificates if required are supplied with the accumulator, or forwarded by mail.

Installation

To achieve a high degree of efficiency, the accumulator should be fitted as close as possible to the installation it serves.
The space necessary for testing and filling equipment is at least 150mm above the gas-fill valve.

POSITION is possible from vertical one (gas valve on top) to the horizontal one.
The manufacturers name plate stating initial pressure must remain visible.
Access to vent screw must be kept unobstructed.
MOUNTING by means of clamps, brackets and rubber support rings.

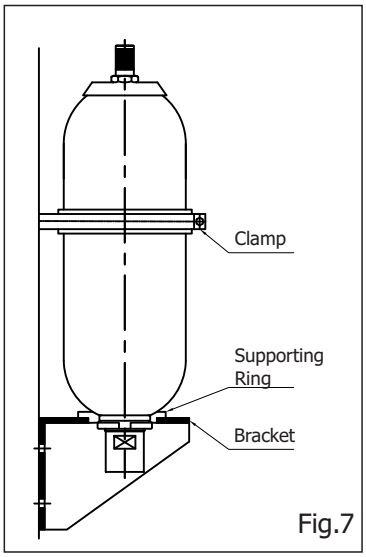


Fig.7

The mounting must be such that should a rupture occur on the pipe system at the liquid connection, or should the gas-fill valve break, the accumulator cannot be pulled from its mounting by the forces involved.

No welding or other mechanical process must be carried out on the accumulator shell for the purpose of attaching fastenings.

CONNECTION adopters and flanges are available on request. When fitting screws, reducers or the safety and shut-off block, care must be taken that the accumulator is held firmly by means of a spanner at the liquid valve, so that the liquid valve is not turned independently of the accumulator body.

To guarantee trouble free operation, the following points should be observed:

- A non-return valve to be fitted between pump and accumulator to prevent reversal.
- The installation relief valve must be fitted directly to the accumulator, after the non-return valve, and calibrated lower than the working pressure marked on the accumulator shell.
- A shut-off valve and a dump valve are recommended to enable periodic checks or removals during normal operation. EPE safety blocks type B incorporate all the essential functions.

Preliminary Checking

Upon receipt check:
That there has been no damage in transit.
The identification code is as ordered.
Before installation it is most important to ensure that the gas pressure corresponds to the desired value.
The initial gas pressure must be selected to meet the service requirement.
In general the design values are as follows:
P0 = 0.9 P1, (energy reserve, line shock absorber, etc.)
P0 = 0.6 - 0.7 P1 (pulsation damper)
Gas precharge pressure is of crucial importance to the correct functions of the accumulator and the durability of the bladder.
The gas pressure, when the accumulator is supplied pre-charged is related to the temperature of 20°C.
In the case of accumulators supplied without pre-loading pressure, or after repair work it is necessary to perform inflation with nitrogen; must also be performed also the verification of the system by using the equipment type-PC following procedure checking & charging - page-10.

Initial Operation

Before the system is pressurised it has to be bled. For this, the vent screw in the fluid port assembly has to be eased until fluid emerges.
Then retighten the gas valve locknut carefully.
The system is charged with maximum pressure and sealings and connections should be checked.

Periodic Checking

After the installation of a new unit, or following repairs, the initial pressure must be tested as follows:
Atleast once during the first week so that any gas losses can be immediately observed and remedied.
If no gas losses are observed during the first check, a second check should be carried out approximately 3 months later,
If during this check no gas losses are evident, a six-month check should be sufficient.
It is however recommend that heavy duty applications be checked every month.

Checking & Charging

Pre-Loading & Checking Set type-PC (refer Fig.8) is to be used for checking / charging of Bladder Accumulators. When charging, the nitrogen bottles must be capable of delivering pressure higher than the desired accumulator gas pressure.
Use dry industrial nitrogen. NEVER USE OXYGEN OR AIR.
Proceed as follows:

- Fit the suitable pre-charging equipment to the gas valve;
- Connect it to the nitrogen cylinder with the charging hose;
- Slowly introduce nitrogen into the accumulator until reaching a pressure slightly above the required level;
- Close the valve of nitrogen cylinder and disconnect the charging hose from the equipment;
- Wait for the gas temperature stabilization;
- Set the pressure by venting off the excess of gas.

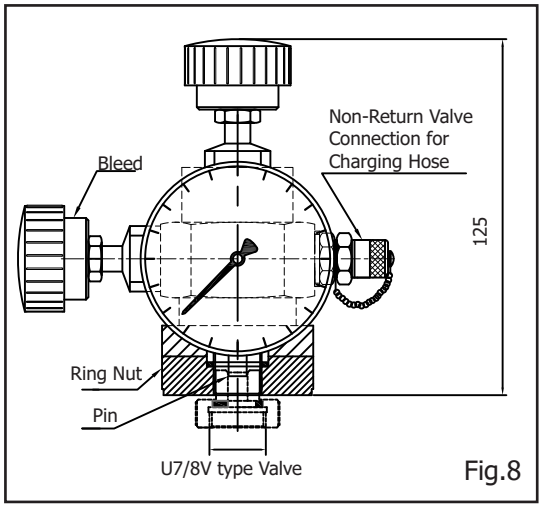


Fig.8

It is important that the gas pressure be kept constant and should therefore be checked periodically by means of the filling and checking equipment PC/...
The same equipment is used for re-inflating the bladder after repair work or change of use.
Connection is made by the special hose to the dry nitrogen bottle.

ONLY NITROGEN MUST BE USED. AIR OR OXYGEN COULD CAUSE AN EXPLOSION.

Pressure Checks

This is simple operation, the correct procedure is as follows:

- Isolate the accumulator from the system and reduce the liquid pressure to zero.
- Remove the protective and sealing caps from the gas valve.
- Prior to the mounting PC/ - equipment ensure that the valve A is unscrewed, that bleed valve B is closed and that is non-return valve C is screwed tight. (refer Fig.9)
- Attach the unit to the gas-fill valve by means of the knurled nut D.
- Screw valve A to a point where pressure is registered.

If the pressure is OK remove the PC/unit as follows:

- Unscrew the valve A.
- Open the bleed valve B and unscrew the nut D.

Pressure Reduction

If the pressure has to be reduced this is done by opening the bleed valve B slowly until the correct pressure is registered on the gauge.

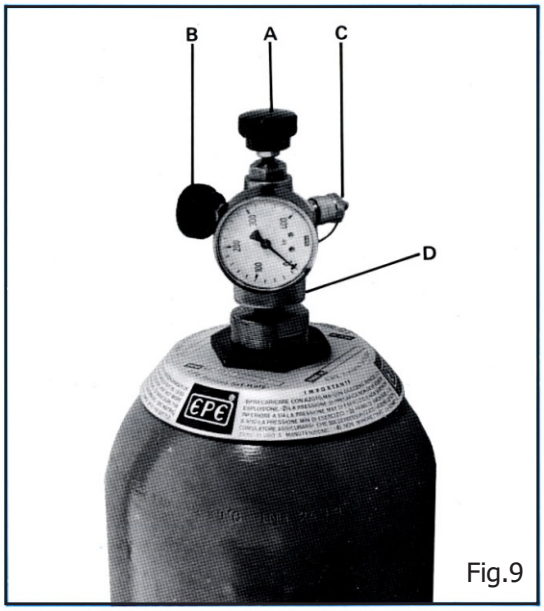


Fig.9

Increase or reset precharge pressure

If it is necessary to fill, or to increase the gas pressure, proceed as follows:

- Fit the PC/ unit as described above.
- Fit the connection to nitrogen cylinder. (refer Fig.9 & Fig.10)
- Connect the hose between the cylinder and the non-return valve C.
- Slowly open the valve on the cylinder till the gauge registers a pressure slightly higher than the one desired, then shut.
- Unscrew A and reduce the pressure PC/ unit to zero by means of the bleed valve B.
- Disconnect the hose from the non-return valve C. and replace cap.
- Close the bleed valve and wait approximately 5 mins. for the temperature to adjust.
- Screw valve A until the pressure can be read. This should be slightly higher than the desired pressure.
- Adjust by means of bleed valve, remove the filling unit.
- Use soapy water test for leaks.
- Replace the valve cover and protection cap.

The accumulator is ready for use.

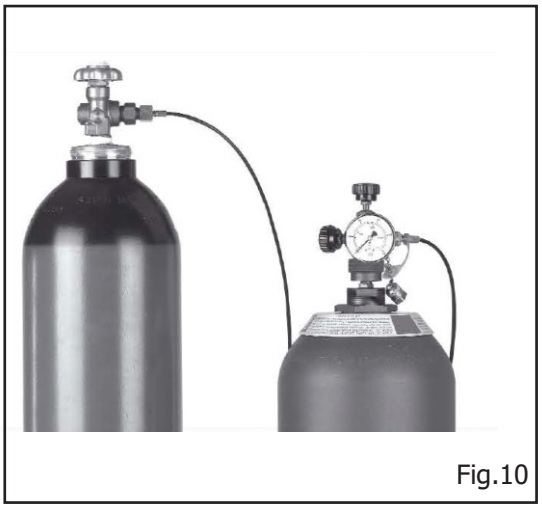


Fig.10

Standard equipment PC-280/70 is supplied with two pressure gauges: the high pressure gauge (0-280 bar) is used for pre-loading values higher than 50 bar and low pressure gauge (0-70 bar) for values lower than 50 bar.

A PRESSURE REDUCING VALVE MUST BE INSTALLED BETWEEN THE NITROGEN GAS CYLINDER AND THE ACCUMULATOR WHEN THE GAS CYLINDER PRESSURE IS HIGHER THAN MAX PERMISSIBLE PRESSURE OF ACCUMULATOR.

Tightening Torque Values (Nm)

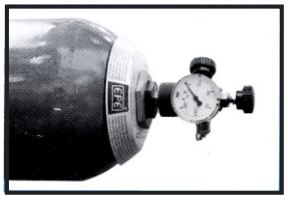
Component⇩ \ Size ⇨	0.6	1	4	10	20	37	57
Fluid Port Ring Nut	90 + 15	90 + 15	200 + 20	440 + 60	440 + 60	440 + 60	440 + 60
Bleed Screw	5 + 1	5 + 1	5 + 1	30 + 10	30 + 10	30 + 10	30 + 10
Gas Valve Lock Nut	80 + 20	80 + 20	80 + 20	140 + 40	140 + 40	140 + 40	140 + 40
Gas Fill Valve	30 + 5	30 + 5	30 + 5	30 + 5	30 + 5	30 + 5	30 + 5
Valve Insert	0.3 + 0.2	0.3 + 0.2	0.3 + 0.2	0.3 + 0.2	0.3 + 0.2	0.3 + 0.2	0.3 + 0.2

General

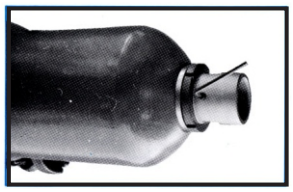
If the Accumulator has to be stripped for any reason, the following procedure must be followed in the sequence shown below.

Before removing Accumulators for servicing, the fluid pressure must be reduced to zero by exhausting the fluid through the system and back to the reservoir.

When this is not possible the Accumulator shut-off valve must be closed and the dump valve opened to exhaust the Accumulator directly to the reservoir.



D-1

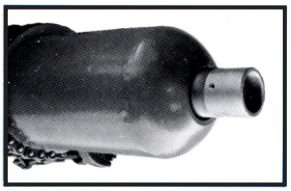


D-2

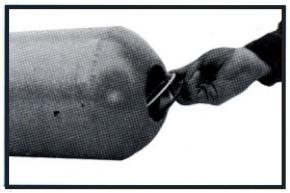
Dismantling the Accumulator

- Isolate from the liquid connection and drain.
- Place the Accumulator in a vice horizontally.
- Remove the protection caps.
- Discharge gas from the bladder by means of pre-loading & checking device. (Fig. D-1).
- Dismantle the gas-fill valve.

Only at this point can the liquid connection be dismantled.

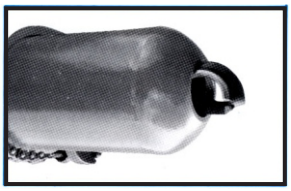


D-3

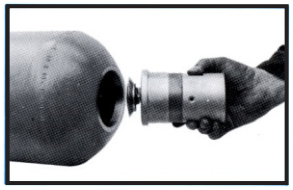


D-4

- Remove the bleed screw. (Fig. D-2)
- Remove the ring nut and the spacer ring. (Fig. D-3)
- Push the fluid port body into the vesse and remove the gasket and 'O'Ring. (Fig. D-4)
- Remove by bending the rubber coated retaining ring. (Fig. D-5)
- Remove the fluid port body. (Fig. D-6)
- Remove the nut holding the gas valve and nameplate. (Fig. D-7)
- Remove the bladder from the liquid side by slightly twisting. (Fig. D-8)



D-5



D-6

Cleaning and inspection

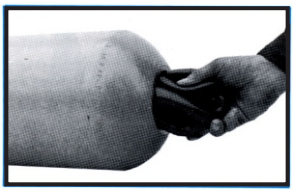
Carefully clean all components including the bladder and the inside of the Accumulator body.

Mainly check that:

- THE BLADDER is not damaged, worn or perished.
- THE POPPET VALVE in High Pressure Range (types - AS / ASHF / ASWP) slides freely and that the spring is undamaged.
- GASKETS AND SEALS are not worn.
- THE INTERIOR of Accumulator body has no cracks or signs of failure.
- THE ANTI EXTRUSION plate in Low Pressure Range (type-ASWD) is not damaged or worn.

REPLACE ALL SUSPECT AND WORN PARTS. THE BLADDER CAN'T BE REPAIRED.

D-7



D-8

WARNING : Before any work is undertaken the gas pressure must be fully relieved.

Bladder Gas Valve Assembly

Should the bladder have to be replaced and the gas valve is in good condition it is possible to fit a new bladder to the old gas valve (or vice-versa) taking care to ensure that the edge of the mouth piece makes a perfect fit with the valve seat. The valve is then put into place, by means of hand pressure on the rubber coated washer until it is no longer possible to remove unless force is used. The bladder can now be inserted into the Accumulator.

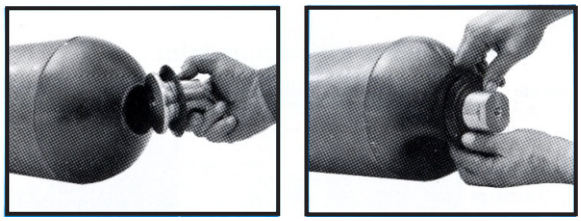
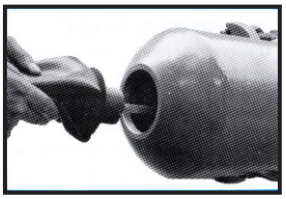
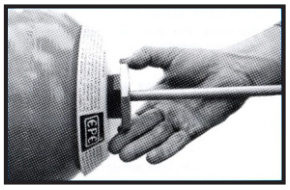


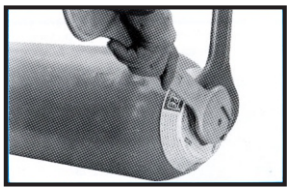
Fig.11



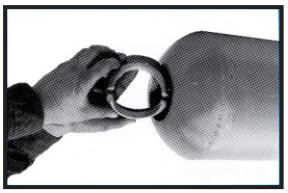
A-1



A-2



A-3

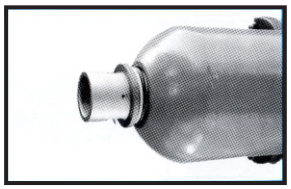


A-4

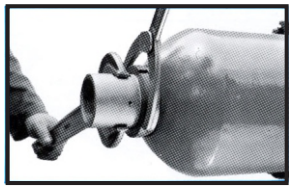
Assembling the Accumulator

Ensure that all components are in good condition and perfectly clean. Assemble in the following order:

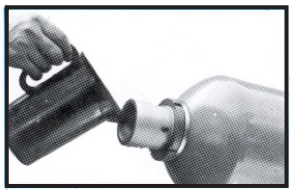
- Insert the bladder (use a threaded tube M 12 x 1.5). (Fig. A-1)
- Mount name plate and nut for the gas valve body. (Fig. A-2)
- Tighten the nut holding the gas valve body with a spanner. (Fig. A-3)
- Insert the fluid port assembly and the rubber coated retaining ring. (Fig. A-4)
- Locate the fluid port on to the support ring, fit gaskets and spacer ring. (Fig. A-5)
- Tighten the ring nut making sure the assembly is centrally located. (Fig. A-6)
- Fit the bleed screw and gasket. Pour a small amount of liquid into the accumulator to lubricate. (Fig. A-7)
- Finally mount the gas-fill valve, charge accordingly to checking & charging - page-10 and again tighten the gas valve nut.



A-5



A-6



A-7

Certification

All hydraulic accumulators are pressure vessels and are subject to the national regulations and directives, valid at the place of installation.

Bladder accumulators type AA are generally designed and manufactured according to ASME Sec.VIII Divn.1.

Safety

All pressure vessels must be protected by means of a pressure relief valve. Safety Blocks are used for this purpose.

The most important elements of the safety-related equipment are the pressure measuring device (pressure gauge), device for the preventing excess pressure (safety valves), non-return valves and shut-off valves and devices for de-pressurising (bleed valves). These functions can be performed with individual components or integrated in the form of a safety block .

Special Instructions

It is strictly forbidden to:
- weld or solder or carry out any mechanical operations on the accumulator.
- engrave or permanently stamp the surfaces of the accumulator shell and / or carry out other operations that could affect or change the mechanical properties of the accumulator
- use the accumulator as a structural element: it should not be subjected to stresses or loads.
- change the data of the nameplate and / or accumulator without the permission of the manufacturer.
- use a different fluid than those designed for.

Installation

Before installation, you must perform a visual check to verify that the accumulator has not suffered any damage during shipping / handling. Verify that the requested type matches with what stamped on the nameplate.

We recommend using the accumulator with a suitable safety valve or a security safety block. This device provides user and equipment protection against possible damage caused by pressure surges, and also makes the maintenance of the accumulator easier, so facilitating the interception and the discharge.

Provide for a clearance of 200 mm above the gas pre-charge valve to allow access to and control of the pre-charge equipment.

These accumulators may be installed in any position from horizontal to vertical (preferably with the pre-charge valve at the top), and the identification details must be visible.

Proceed to the assembly so that no abnormal force affects the pipes connected directly or indirectly to the accumulator, so we recommend the use of supporting components and also fastening to avoid the transmission of vibrations.

Make sure the fluid is compatible with the elastomer of the bladder.

Check that the max. allowed accumulator pressure is equal to or greater than that of the hydraulic circuit and that the temperature during operation is maintained within the range expected.

Make sure the fluid does not contain contaminants and/or abrasive.

Disposal

Before the accumulator is sent for disposal or recycling, it should always be discharged completely of the pre-charge pressure and the gas valve unscrewed. Pre-loading and checking kits are suited for this task.

Environmental Protection

Careless disposal of the accumulator and the residual fluid contained therein can cause environmental pollution.

Dispose the Accumulator in accordance with provisions applicable in the country of use.

Fluid residues are to be disposed according to the respective safety data sheets valid for the specific hydraulic fluids.

EPE/11.002/AA Rev.1/03-2017