AMTROL INC.
Engineered Products

EXTROL® ASME
EXPANSION TANKS

For Closed Hydronic Heating & Chilled Water Systems

AMTROL INC.

Quality ASME Expansion Tanks

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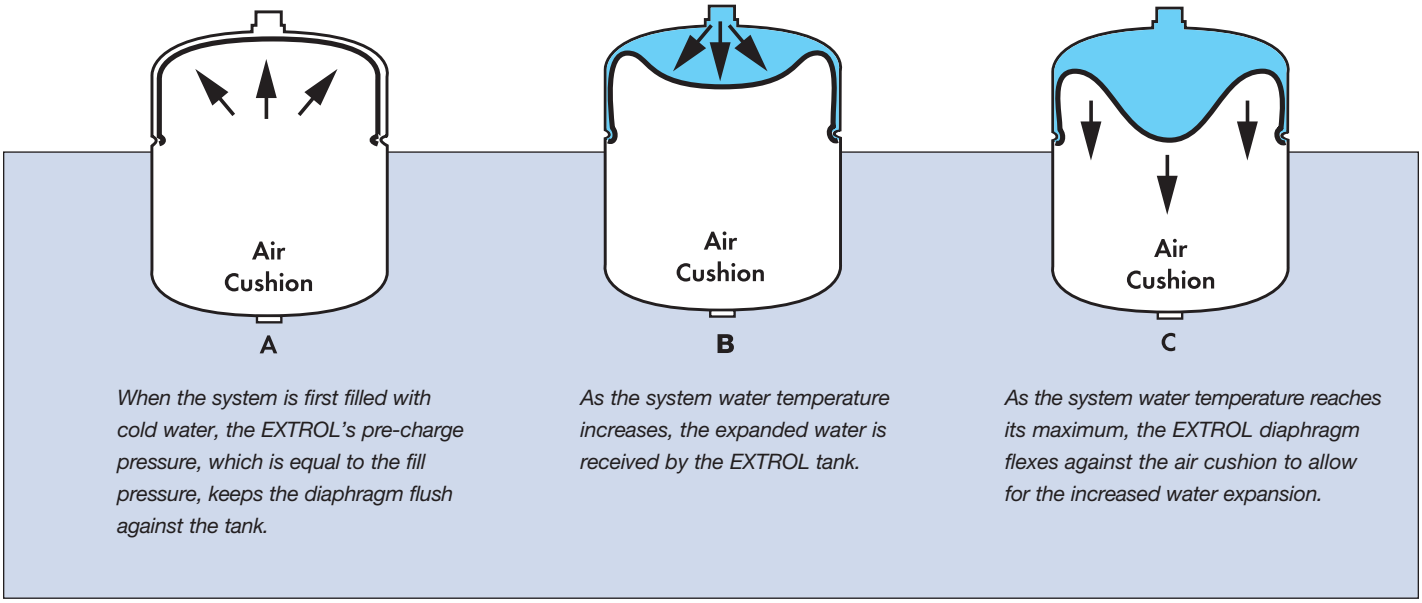
The First in the Industry

AMTROL® designed and patented the first EXTROL® expansion tank in 1954, redefining hydronic heating systems. For over four decades our unique, pre-pressurized, diaphragm-design EXTROL has been the world's leading expansion tank. EXTROL was designed to control system pressure and help reduce energy consumption of heating and circulating operations. Today, AMTROL offers a broad range of both bladder and diaphragm expansion tanks.

The AMTROL Advantage

- AMTROL and its subsidiaries offer a complete line of quality engineered products for heating and water systems throughout the world.
- ISO 9001-2000 Certification reflects AMTROL's worldwide vision and commitment to excellence.
- Full technical support is available.

How AMTROL Expansion Tanks Work



When the system is first filled with cold water, the EXTROL's pre-charge pressure, which is equal to the fill pressure, keeps the diaphragm flush against the tank.

As the system water temperature increases, the expanded water is received by the EXTROL tank.

As the system water temperature reaches its maximum, the EXTROL diaphragm flexes against the air cushion to allow for the increased water expansion.

The EXTROL® System

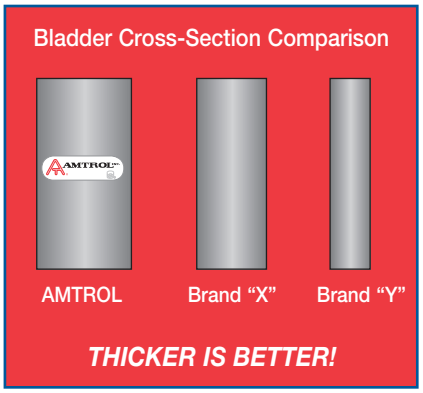
The Function of Hydro-Pneumatic Tank Water Heating and Chilled Water Systems

The primary device in pressurizing and maintaining pressure control in a closed system is the hydro-pneumatic tank, also known, traditionally, as the expansion tank.

Its function in the pressurization process is as follows:

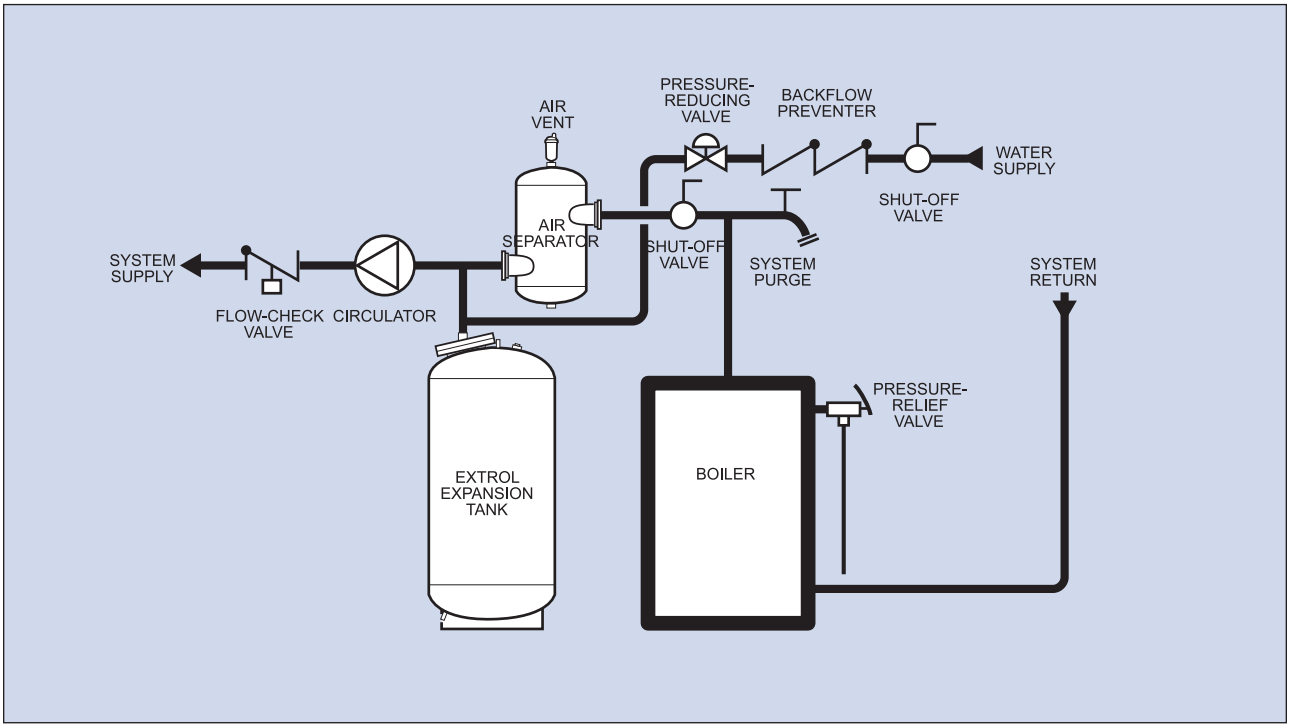
1. Through the use of a pneumatic cushion (air), it maintains positive minimum pressure throughout the system when it is initially filled.
2. As temperature rises, it provides an additional space in the system for the expanded volume of water that results. This is accomplished as the pneumatic cushion is compressed as system pressure increases, creating additional space for the increased volume of water. As the system temperature drops, the compressed pneumatic cushion forces water back into the system, maintaining a positive pressure on the system during all temperatures in the system's operating range.
3. Properly sized, the hydro-pneumatic tank will maintain maximum system pressures within the working pressure limitations of the system equipment and components.
4. By maintaining a positive pressure on the system throughout all the operating temperature range, the hydro-pneumatic tank enables the designer to constantly vent excess air through the use of automatically operating float type air vents.

Superior Performance with AMTROL's Heavy-Duty Butyl Bladder



L-Series and LBC Series (Models 130-600)

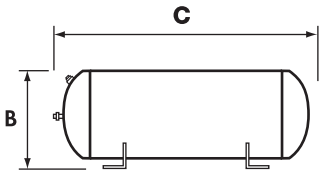
Typical Installation of Commercial Models



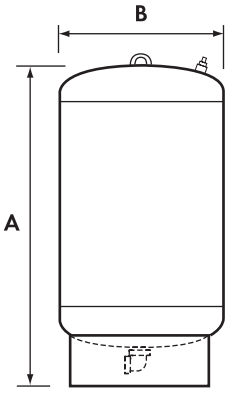
AX-Series EXTROL®

AX-Series EXTROL®
Horizontal & Vertical Models

- Proven diaphragm design since 1954
- Designed and constructed per ASME Section VIII, Division 1 standards
- Horizontal models are available with optional saddles
- Factory pre-charged to 12 psig (0.83 bar)
- Available working pressure: 125 psig (8.6 bar) and 150 psig (10 bar)
- Maximum operating temperature is 240°F (115° C)



AX Horizontal Series



AX Vertical Series

AX-Series Specifications

Model Number	Tank Volume		Max. Accept.		A – Vert. Height		C – Horiz. Length		B Diameter		System Conn.[1]	Ship Weight w/o saddles		Ship Weight w/ saddles		Vertical Ship.Wt.	
	Gallons	Liters	Gallons	Liters	Inches	mm	Inches	mm	Inches	mm	Inches	lbs.	kg	lbs.	kg	lbs.	kg
AX-15(V)*	8.0	30.3	2.4	9.1	19 ½	495	19 ¼	489	12	305	½	37	17	41	19	43	20
AX-20(V)	10.9	41.3	2.4	9.1	26 ½	673	26 ¼	607	12	305	½	46	21	50	23	45	21
AX-40(V)	21.7	82.2	11.3	42.8	29 ½	749	29	737	16 ¼	356	½	82	37	96	44	90	41
AX-60(V)	33.6	127.2	11.3	42.8	45 ⅛	1146	43	1073	16 ¼	356	½	103	47	116	53	110	50
AX-80(V)	44.4	168.1	22.6	85.5	29	737	28 9/16	725	24	610	1	127	58	104	47	146	66
AX-100(V)	55.7	211.8	22.6	85.5	33 11/16	856	33	840	24	610	1	137	62	114	52	167	76
AX-120(V)	68.0	257.4	34.0	128.7	47 ⅜	1203	41 3/16	1051	24	610	1	210	95	235	107	224	102
AX-144(V)	77.0	291.5	34.0	128.7	52 ¼	1327	46	1170	24	610	1	240	109	246	112	244	111
AX-180(V)	90.0	340.7	34.0	128.7	59 ⅝	1514	53 7/16	1357	24	610	1	242	110	248	113	266	121
AX-200(V)	110.0	416.4	34.0	128.7	66 ⅛	1680	64	1624	24	610	1	275	125	306	139	296	134
AX-240(V)	132.0	500.0	46.0	174.0	57 ⅞	1470	51	1295	30	762	1	398	181	428	194	427	194
AX-260(V)	159.0	600.0	56.0	212.0	64 ¾	1645	62 ¼	1581	30	762	1¼	449	204	480	218	476	216
AX-280(V)	211.0	800.0	84.0	318.0	81 ¾	2076	80	2032	30	762	1¼	630	286	660	299	645	293

[1] System Connection for models AX-15 through AX-100 (vertical and horizontal) and models AX-120V through AX-240V are NPTF, models AX-260 through AX-280 (vertical and horizontal) and AX-120 through AX-240 are NPTM.

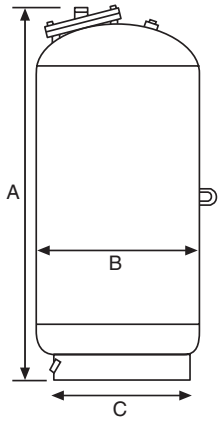
**To specify vertical models AX -15V – AX-280V, include V after the model number; other options available on horizontal models: • Bulls Eye Sight Glass • Seismic Anchor Brackets*

All dimensions and weights are approximate.

L-Series EXTROL®

L-Series EXTROL®

- Replaceable bladder design
- Designed and constructed per ASME Section VIII, Division 1 standards
- Free-standing on integral floor stands
- Easily installed
- Factory pre-charged to 12 psig (0.83 bar)
- Available working pressure: 125 psig (8.6 bar), 150 psig (10 bar), 175 psig (12 bar) and 250 psig (17 bar)
- Maximum operating temperature is 240ºF (115°C)



L-Series Specifications

L Series EXTROL®

Model Number	Tank Volume		A Height		B Diameter		C Standard Diameterr		System Conn.[1]		Shipping Weight	
	Gallons	Liters	Inches	mm	Inches	mm	Inches	mm	Inches	mm	lbs.	kg
200-L	53	200	37⅝	956	24	610	19	483	1	25	192	87
300-L	80	300	51½	1308	24	610	19	483	1	25	268	122
400-L	106	400	65⁷⁄₁₆	1662	24	610	19	483	1	25	309	140
500-L	132	500	79	2006	24	610	19	483	1	25	328	149
600-L	158	600	63¾	1619	30	762	24	610	1½	38	510	231
800-L	211	800	81¾	2076	30	762	24	610	1½	38	565	256
1000-L	264	1000	73½	1867	36	914	30	762	1½	38	691	313
1200-L	317	1200	85⅞	2181	36	914	30	762	1½	38	779	353
1400-L	370	1400	98¼	2496	36	914	30	762	1½	38	905	411
1600-L	422	1600	69⅛	1756	48	1219	42	1067	1½	38	1,183	537
2000-L	528	2000	84	2145	48	1219	42	1067	1½	38	1,264	573
2500-L	660	2500	100⅞	2562	48	1219	42	1067	2	50	1,445	655
3000-L	792	3000	118⅛	3000	48	1219	42	1067	2	50	1,630	739
3500-L	925	3500	111	2820	54	1372	42	1067	2	50	2,110	957
4000-L	1057	4000	125	3175	54	1372	42	1067	2	50	2,230	1,012
5000-L	1321	5000	128	3251	60	1524	42	1067	2	50	2,450	1,111
7500-L	1980	7500	127	3226	72	1829	54	1372	3	76	4,000	1,818
10000-L	2640	10000	159	4039	72	1829	54	1372	3	76	4,900	2,227
15000-L	3963	15000	233	5918	72	1829	54	1372	3	76	6,000	2,727

[1] System Connection is NPTF

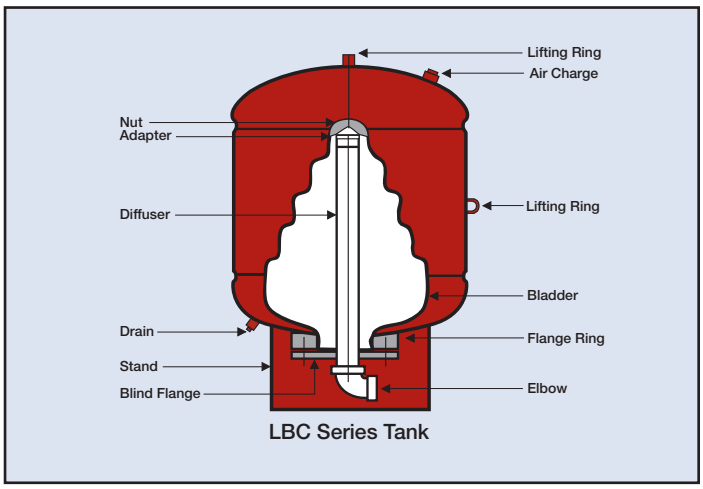
All dimensions and weights are approximate.

LBC-Series EXTROL®

LBC-Series EXTROL®

The LBC bottom connection bladder series incorporates a partial acceptance replaceable bladder made of a heavy-duty butyl material. The seamless bladder construction and contoured bladder design ensures repeatable and predictable long-life expectancy.

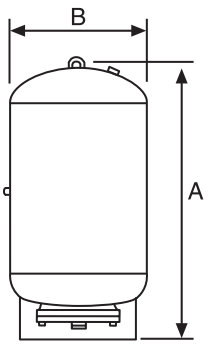
- Designed and constructed per ASME Section VIII, Division 1 standards
- Replaceable bladder design
- Available working pressure: 125 psig (8.6 bar) and 150 psig (10 bar)
- Maximum operating temperature is 240ºF (115° C)
- Broad range of sizes from 10 gal. (35 lit.) to 158 gal. (600 lit.)
- Factory pre-charged to 12 psig (8.6 bar)
- Available with optional seismic restraints and site glass



LBC Series Tank

LBC-Series Specifications

Model Number	Tank Volume		Accept. Volume		A Height		B Diameter		System Conn.[1]		Shipping Weight	
	Gallons	Liters	Gallons	Liters	Inches	mm	Inches	mm	Inches	mm	lbs.	kg
35-LBC	10	35	10	35	38 13/16	985	10	254	1	25	65	29
50-LBC	13	50	11	40	38 13/16	985	12	305	1	25	72	33
85-LBC	22	85	11	40	37 7/16	951	16	406	1	25	88	40
100-LBC	26	100	11	40	42 1/8	1070	16	406	1	25	94	43
130-LBC	34	130	27	100	37 7/8	962	20	508	1	25	130	59
165-LBC	44	165	27	100	42 7/8	1089	20	508	1	25	140	64
200-LBC	53	200	27	100	40 7/8	1039	24	610	1	25	192	87
300-LBC	80	300	27	100	56	1423	24	610	1	25	230	104
400-LBC	106	400	53	200	68 5/8	1743	24	610	1	25	274	124
500-LBC	132	500	53	200	82 1/2	2096	24	610	1	25	308	140
600-LBC	158	600	53	200	67	1702	30	762	1	25	442	200



LBC Series EXTROL®

[1] System Connection is NPTF

All dimensions and weights are approximate.

Sizing Commercial ASME Models

Precise Sizing of AX, L and LBC-Series EXTROL®s

Things you must know:

1. Total System Volume..... (1)_____ gal. (lit.)
2. Minimum System Temperature..... (2)_____ °F (°C)
3. Maximum System Temperature..... (3)_____ °F (°C)
4. Minimum Operating Pressure at EXTROL Tank.... (4)_____ psig (bar)
5. Maximum Operating Pressure at EXTROL Tank... (5)_____ psig (bar)

Selection of EXTROL Model:

6. Find and enter "Net Expansion Factor"..... (6)_____ (see Table 1)
7. Amount of Expanded Water = line (1) x line (6)..... (7)_____ gallon (lit.)
8. Find and enter "Acceptance Factor" ..... (8)_____ (see Table 2)
9. Minimum Total EXTROL Volume = line (7) ÷ line (8) (9)_____ gallons (lit.)
10. Using Specifications, select an EXTROL that is at least equal to line (9) for "Total Volume" and line (7) for Max. Expanded Water Acceptance Gallons.

Table 1. Net Expansion of Water

Max. System Temperature		Minimum System Temperature						
°F	°C	40°F / 4°C	50°F / 10°C	60°F / 16°C	70°F / 21°C	80°F / 27°C	90°F / 32°C	100°F / 38°C
60°F	16	.0005	.0049	–	–	–	–	–
70°F	21	.00149	.00143	.00094	–	–	–	–
80°F	27	.00260	.00254	.00204	.00111	–	–	–
90°F	32	.00405	.00399	.00350	.00256	.00145	–	–
100°F	38	.00575	.00569	.00520	.00426	.00315	.00170	–
110°F	43	.00771	.00765	.00716	.00622	.00511	.00366	.00196
120°F	49	.0100	.0099	.0095	.0086	.0074	.0060	.0043
130°F	54	.0124	.0123	.0118	.0109	.0098	.0083	.0066
140°F	60	.0150	.0149	.0145	.0135	.0124	.0110	.0093
150°F	66	.0179	.0178	.0173	.0164	.0153	.0133	.0121
160°F	71	.0209	.0208	.0204	.0194	.0181	.0165	.0148
170°F	77	.0242	.0241	.0236	.0227	.0216	.0201	.0184
180°F	82	.0276	.0275	.0271	.0261	.0250	.0236	.0219
190°F	88	.0313	.0312	.0307	.0298	.0287	.0272	.0255
200°F	93	.0351	.0350	.0346	.0336	.0325	.0311	.0294
210°F	99	.0391	.0390	.0386	.0376	.0365	.0351	.0334
220°F	104	.0434	.0433	.0428	.0419	.0408	.0393	.0376
230°F	110	.0476	.0475	.0471	.0461	.0450	.0436	.0419
240°F	116	.0522	.0521	.0517	.0507	.0496	.0482	.0465

Note: For 50/50 ethylene glycol and for 50/50 propylene glycol contact AMTROL technical services.

Table 2. Acceptance Factors*

Maximum Operating Pressure at Tank		Minimum Operating Pressure at Tank										
		5 psig/0.34 bar	10 psig/0.68 bar	12 psig/0.82 bar	15 psig/1 bar	20 psig/1.37 bar	30 psig/2 bar	40 psig/2.8 bar	50 psig/3.44 bar	60 psig/4 bar	70 psig/4.8 bar	80 psig/5.5 bar
27 psig	1.8 bar	0.527	0.408	0.360	0.288	0.168	–	–	–	–	–	–
30 psig	2.0 bar	0.560	0.447	0.403	0.336	0.224	–	–	–	–	–	
35 psig	2.4 bar	0.604	0.503	0.463	0.403	0.302	0.101	–	–	–	–	–
40 psig	2.8 bar	0.640	0.548	0.512	0.457	0.366	0.183	–	–	–	–	–
45 psig	3.0 bar	0.670	0.586	0.553	0.503	0.419	0.251	0.084	–	–	–	–
50 psig	3.4 bar	0.696	0.618	0.587	0.541	0.464	0.309	0.155	–	–	–	–
55 psig	3.79 bar	0.717	0.646	0.617	0.574	0.502	0.359	0.215	0.072	–	–	–
60 psig	4.0 bar	0.736	0.669	0.643	0.602	0.536	0.402	0.268	0.134	–	–	–
65 psig	4.4 bar	0.753	0.690	0.665	0.627	0.565	0.439	0.314	0.188	0.062	–	–
70 psig	4.8 bar	0.767	0.708	0.685	0.649	0.590	0.472	0.354	0.236	0.118	–	–
75 psig	5.0 bar	0.780	0.725	0.702	0.669	0.613	0.502	0.390	0.279	0.167	0.056	–
80 psig	5.5 bar	0.792	0.739	0.718	0.686	0.634	0.528	0.422	0.317	0.211	0.106	–
90 psig	6.2 bar	0.812	0.764	0.745	0.716	0.669	0.573	0.478	0.382	0.287	0.191	0.096
100 psig	7.0 bar	0.828	0.785	0.767	0.741	0.698	0.610	0.523	0.436	0.347	0.261	0.174
110 psig	7.5 bar	0.842	0.802	0.786	0.762	0.723	0.642	0.561	0.481	0.401	0.321	0.241

** Acceptance factors based on EXTROL being charged while empty of liquid to minimum operating pressure.*

Typical Specification for Extrol®

Hydronic Expansion Tank "Typical Specification ASME Vessels"

AX Series Expansion Tank (Diaphragm type pre-pressurized)

The pressurization system shall include an EXTROL®, diaphragm-type expansion tank which will accommodate the expanded water of the system generated within the normal operating temperature range, limiting this pressure increase at those components in the system to the maximum allowable pressure at those components. It shall maintain minimum operating pressure necessary to eliminate all air. The only air in the system shall be the permanent sealed-in air cushion contained in the diaphragm-type tank, Model No._____. Dimensions shall be as indicated on the drawings.

The expansion tank shall be welded steel, constructed, tested and stamped in accordance with Section VIII, Division 1 of the ASME Code for a working pressure of (125 psig/8.6 bar) (_____) and air pre-charged.

The tank shall be supported by steel legs or a base (integral ring mount) for a vertical installation or steel saddles for horizontal installations. Each tank will have a heavy- duty butyl/EPDM diaphragm with code approvals ANSI/NSF 61.

The manufacturer shall be AMTROL Inc. The manufacturer shall have at least five years experience in the fabrication of diaphragm-type ASME expansion tanks.

L & LBC Series Expansion Tank (replaceable bladder-type pre-pressurized)

The pressurization system shall include an EXTROL®, replaceable bladder-type expansion tank which will accommodate the expanded water of the system generated within the normal operating temperature range, limiting this pressure increase at those components in the system to the maximum allowable pressure at those components. It shall maintain minimum operating pressure necessary to eliminate all air. The only air in the system shall be the permanent sealed-in air cushion contained in the replaceable bladder-type tank, Model No._____. Dimensions shall be as indicated on the drawings.

The expansion tank shall be welded steel, constructed, tested and stamped in accordance with Section VIII, Division 1 of the ASME Code for a working pressure of (125 psig/86 bar) (175 psig/12 bar) (250 psig/17 bar) (_____) and air pre-charged.

The tank shall be supported by steel legs or a base (integral ring mount) for a vertical installation. Each tank will have a heavy-duty replaceable butyl bladder (ANSI/NSF 61 "L" Series).

The manufacturer shall be AMTROL Inc. The manufacturer shall have at least five years experience in the fabrication of bladder-type ASME expansion tanks.

*Refer to installation manual for warranty information or visit our website at **www.amtrol.com**

AMTROL INC. Engineered Products

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