ARMSTRONG

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DATE:	Feb. 20, 2006
SUPERSEDES:	37.10
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Expansion Tanks - Series AX and L

PRODUCT DATA SHEET

Manufactured in accordance with ASME Section VIII for unfired pressure vessels, the pre-charged diaphragm and bladder type tanks separate the air and water within the tank providing the following benefits.

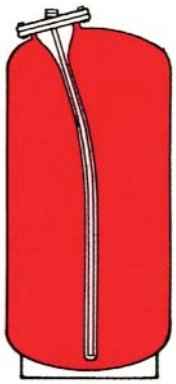
- Tanks can be size up to 80% smaller than a conventional tank
- Improved system performance
- Reduced system corrosion
- Reduced requirement for chemical treatment
- Eliminates water-logged Expansion Tanks
- Stabilizes system pressure
- Dampens pressure transients (Water Hammer)
- Prevents Air Ingress

Importance of Air Pre-Charge

When a tank is pre-charged to the minimum system operating pressure (P_{MIN}), it accepts only the expanded system water as the temperature increases. The highest temperature condition will have compressed the pre-charge to the maximum system operating pressure (P_{MAX}). As the temperature decreases, the expanded water is pushed back into the system by the tank pressure. This design allows for a smaller tank, since space for charge water to compress air at atmospheric pressure to P_{MIN} is no longer necessary, as it is when using a conventional expansion tank.

Understanding how a Bladder Style Expansion Tank functions

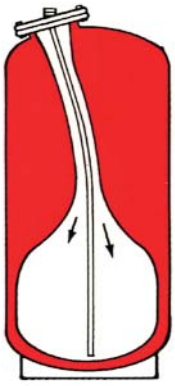
Condition 1: **System Pressure at 12 psi (83 kPa) Cold Water, P_{MIN}**



System filled to minimum operating pressure, P_{MIN}. In this example, 12 psi also equals the pre-charge condition of tank as shipped from factory. Always check air pressure with tire gauge. If low add air.

Minimum system operating pressure (P_{MIN}). Bladder is empty.

Condition 2: **System Pressure at 20 psi (138 kPa) Heated Water**

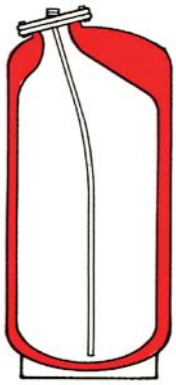


System water heated to about half of maximum system temperature.

Expanded water enters bladder and compresses air.

Air pressure in tank now equals system pressure, or 20 psi.

Condition 3: **System Pressure at 25 psi (172 kPa) at Maximum Temperature**

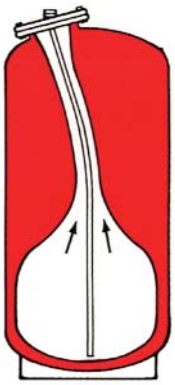


System water heated to maximum system temperature.

Expanded water fills bladder and further compresses the air.

Air pressure in tank now equals maximum system pressure of 25 psi (P_{MAX}).

Condition 4: **System Pressure at 20 psi (138 kPa) Heated Water**



System water cools down to about half of maximum temperature.

Expanded water in bladder now is drawn back into systems.

Air pressure in tank now equals system pressure of 20 psi.

Determining Total System Volume

Add the total pipe water volume in gallons (from Tables) to the total water volume of all system components in gallons. Boilers, Heat Exchangers, etc.:

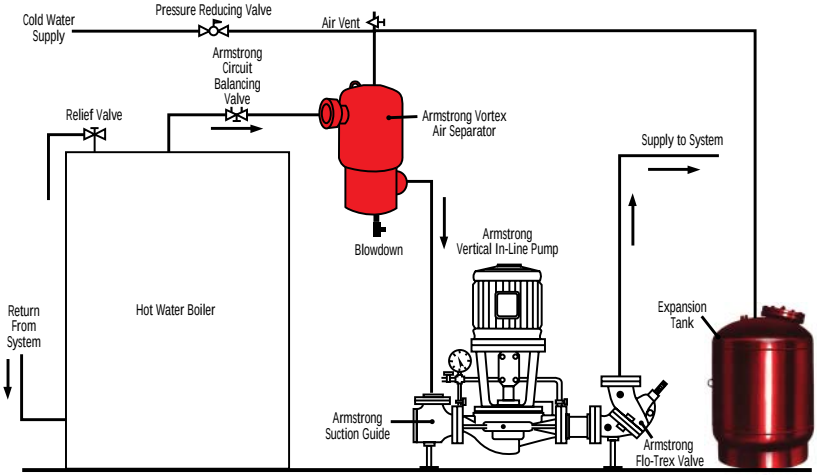
Pipe Volume in Gallons per Foot

Pipe Diameter	½"	¾"	1"	1¼"	1½"	2"	2½"
Steel Pipe (Sch. 40)	0.0158	0.0277	0.0449	0.0779	0.1060	0.1740	0.2488
Copper Tube 18	N/A	0.0173	N/A	N/A	N/A	N/A	N/A
Copper Tube 20	N/A	0.0201	N/A	N/A	N/A	N/A	N/A

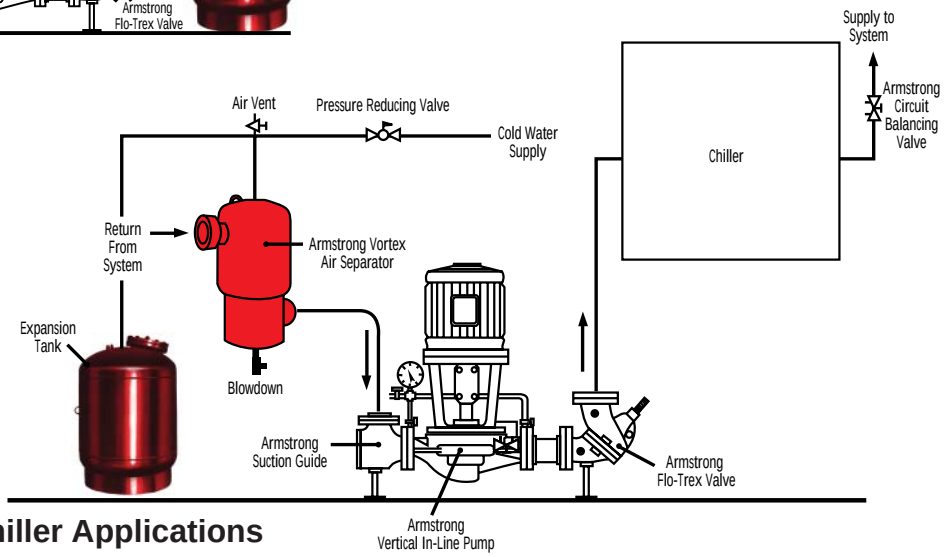
Pipe Diameter	3"	4"	5"	6"	8"	10"	12"
Steel Pipe (Sch. 40)	0.384	0.66	1.04	1.51	2.61	4.11	5.82
Copper Tube	0.354	0.622	0.971	1.39	2.43	3.78	5.46

Water Content in Heat Exchangers

Shell Diameter	Gallons per Foot for Shell Length	
	In Shell	In Tubes
4"	0.425	0.225
6"	1.00	0.50
8"	1.85	1.00
10"	2.40	1.20
12"	4.00	2.20
14"	5.00	2.50
16"	6.50	3.50
18"	8.00	4.50
20"	10.0	5.50
24"	15.0	7.50



For Boiler Applications



For Chiller Applications

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