

THERM-X-TROL[®]

THERMAL EXPANSION ABSORBERS

The Best Solution for
Controlling Thermal Expansion



As Seen On
Ask This Old House



THERM-X-TROL® Expansion Tanks

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What Is Thermal Expansion?

With modern plumbing codes mandating backflow prevention, thermal expansion can cause pressure buildup in domestic water systems. When demand is put upon a potable water system, hot water is drawn from the water heater. Cold water from the supply line enters the water heater to replenish it. The cold water is heated to replace the hot water used. With the installation of a backflow preventer, check valve or pressure reducing valve on the supply line, the water heater and the system piping form a closed plumbing system under pressure.

As the water is heated, thermal expansion occurs. Pressure increases until the relief valve opens and the expanded water spills from the water heater. This spillage results in wasted energy and a potential safety hazard. (See Diagram 1)



Closed Potable Hot Water System without THERM-X-TROL®

Backflow preventer, pressure reducing valve or other one-way device causes expanded (heated) water to build pressure causing the relief valve to open resulting in...

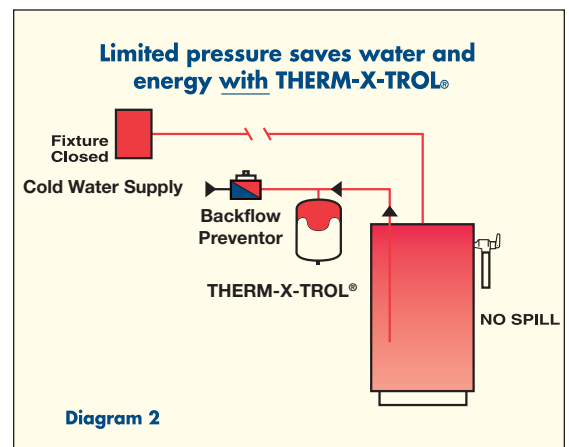
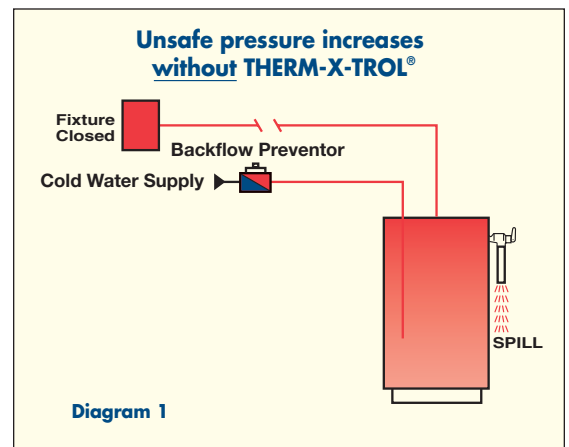
- Wasted energy
- Shortened water heater life
- Wasted municipal water and sewer dollars
- Potential safety hazard

The THERM-X-TROL® is designed to eliminate this problem by providing control of maximum pressures at a level below the relief valve setting. It also provides an additional space in the system to accommodate the increased volume of water created by thermal expansion, returning it to the system when hot water delivery is demanded. Maximum pressure is kept well below the relief valve setting by the THERM-X-TROL®, with its pre-charged air cushion that is separated from system water. The relief valve does not open, therefore spillage is eliminated (Diagram 2).

Closed Potable Hot Water System with THERM-X-TROL®

Expanded (heated) water is absorbed by THERM-X-TROL® which means...

- Water heater and fixtures are protected
- Eliminates energy and water waste, saving money
- No dangerous pressure build up in the system
- Relief valves will not open
- Potential safety hazard reduced



THERM-X-TROL®: The Market Leader

- #1 choice of Professional Installers
- Safest and most cost effective way to control Thermal Expansion
- Easy to install
- The innovator of Thermal Expansion Control in Closed Potable Hot Water Systems
- Broadest line of sizes and models
- Recognized Industry leader in Quality, Design, Manufacturing, Delivery and Service
- Extensive Network of Plumbing & Heating Distributors
- First to obtain NSF/ANSI 61, IAPMO, SBCCI & City of Los Angeles listings
- First to offer 5 year limited warranty

Product Features

High-grade connector

Deep Drawn Steel Domes for maximum strength & pressure rating

Rigid Polypropylene Liner for corrosion resistant reservoir

Butyl diaphragm for long life expectancy

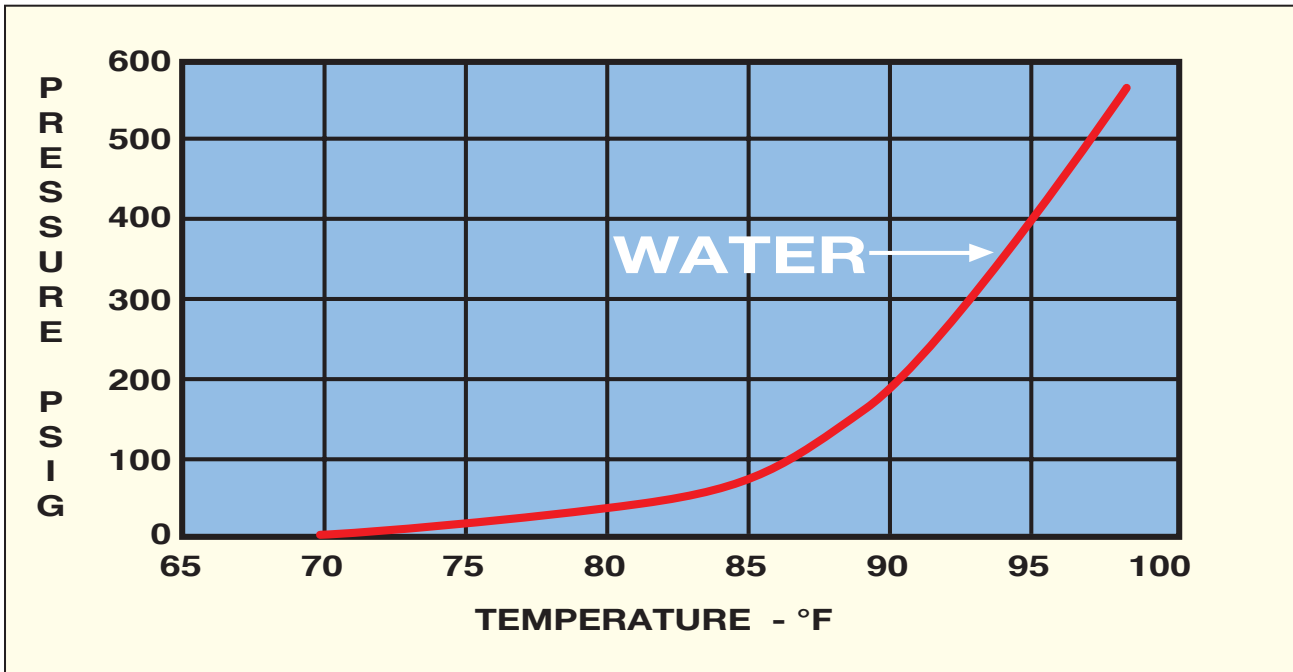
Diaphragm Hoop Ring mechanically grooved for permanent air-tight seal

Welded Steel Construction

Welded Air Charge Fitting with protective plastic cap for corrosion resistance and maximum air-tight seal



Pressure Increase in Closed Piping System



Precise Sizing Procedure - For Special Applications

The procedure for sizing the Therm-X-Trol® for any application depends on four (4) vital pieces of information:

1. ASME or non-ASME requirement
2. Calculated thermally expanded water volume
3. Minimum water pressure experienced at the tank location
4. Maximum water pressure allowable at the tank location

The tank required for any application can be sized with the following equation:

$$Tv = \text{Design Pressure Factor} \times \text{expanded water}$$

Where Tv is the total Thermal-X-Trol® volume required in gallons.

Example: A 240 gallon water heater with a 150°F aquastat setting is installed with a 125 psi maximum pressure requirement. For a static supply line pressure of 60 psi, what Therm-X-Trol® model is required for critical protection?

Critical Sizing AMTROL® Therm-X-Trol®	
1. Total Water Heater Volume (Gallons)	
2. Water Expansion Factor (Table I)	
3. Calculate Expanded Water (Gallons) (Line 1 x Line 2)	
4. Design Pressure Factor (Table II)	
5. Therm-X-Trol Volume Required (Gallons) (Line 3 x Line 4)	
6. Select Therm-X-Trol® Model (pg. 6 & 7)	

Critical Sizing AMTROL® Therm-X-Trol®: EXAMPLE	
1. Total Water Heater Volume (Gallons)	240
2. Water Expansion Factor (Table I)	0.0179
3. Calculate Expanded Water (Gallons) (Line 1 x Line 2) = (240 x .0179)	4.3
4. Design Pressure Factor (Table II)	2.1
5. Therm-X-Trol Volume Required (Gallons) (Line 3 x Line 4) = (4.3 x 2.1)	9.0
6. Select Therm-X-Trol® Model (pg. 6 & 7)	ST-25V ST30V-C

Note: The Therm-X-Trol® air pressure should be equal to static line pressure.

For conditions not shown in table, use equation:

$$DPF = \frac{\text{Max. Allow. Pressure} + 14.7}{\text{Max. Allow. Pressure} - \text{Line Pressure}}$$

TABLE I Expansion Factor		
Operating (Design) Temperature of Water Heater (Tank)	Expansion Factor* (Percentage of Water Volume Increase)	
100°F	0.0062	0.6%
120°F	0.0100	1.0%
130°F	0.0124	1.2%
140°F	0.0150	1.5%
150°F	0.0179	1.8%
160°F	0.0209	2.0%
170°F	0.0242	2.4%
180°F	0.0276	2.8%

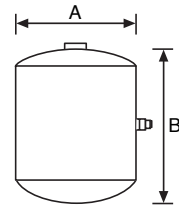
* Based on the initial temperature of 40°F

TABLE II Design Pressure Factor: DPF		
Maximum Allowable Pressure	Line Pressure psi	Design Pressure Factor (DPF)
100	40	1.9
	50	2.3
	60	2.9
	70	3.8
125	80	5.7
	40	1.6
	50	1.9
	60	2.1
150	70	2.5
	80	3.1
	40	1.5
	50	1.6
150	60	1.8
	70	2.1
	80	2.4

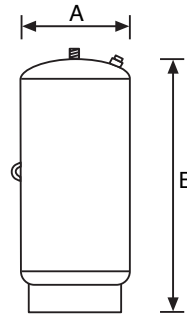
ASME THERM-X-TROL®

Code Applications

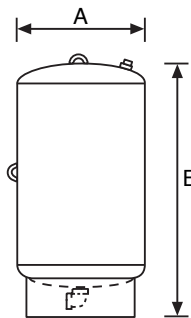
- Commercial Water Heaters
- Laundromats
- Hospitals and Nursing Homes
- Car Washes
- Dishwashers
- Plant Washrooms
- Hotels and Motels
- Restaurants
- Schools and Dormitories
- Other Applications as Required by Code



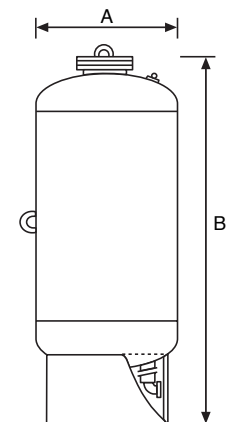
ST-5-C, ST-12-C



ST-20V-C to ST-70V-C



ST-80V-C to ST-210V-C



ST-447-C to ST-457-C

THERM-X-TROL® ASME Specifications

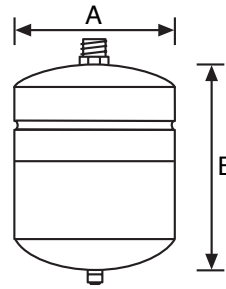
Model No.	Max. Working Pressure (PSIG)	Total Volume (Gals.)	Maximum Acceptance Factor	Diameter (A)	Height (B)	System Connection	Ship Weight (lbs)
ST-5-C	150	2.1	.42	10"	10 3/8"	3/4" NPT	21
ST-12-C	150	6.4	.50	12"	15 5/8"	3/4" NPT	26
ST-20V-C	150	8.0	.40	12"	19 1/2"	3/4" NPT	41
ST-30V-C	150	14.0	.64	16 1/4"	19 1/8"	3/4" NPT	84
ST-42V-C	150	17.5	.64	16 1/4"	24 1/4"	3/4" NPT	90
ST-60V-C	150	25.0	.45	16 1/4"	34"	3/4" NPT	96
ST-70V-C	150	34.0	.33	16 1/4"	45 3/4"	3/4" NPT	123
ST-80V-C	150	53.0	.64	24"	40 1/2"	1 1/4" NPT	229
ST-120V-C	150	66.0	.51	24"	47 3/4"	1 1/4" NPT	258
ST-180V-C	150	77.0	.44	24"	52 5/8"	1 1/4" NPT	288
ST-210V-C	150	90.0	.38	24"	60"	1 1/4" NPT	318
ST-447-C	125	53.0	.65	24"	45 1/4"	2" NPT	263
ST-448-C	125	80.0	.65	24"	59 1/8"	2" NPT	308
ST-449-C	125	106.0	.65	24"	73 1/8"	2" NPT	353
ST-450-C	125	132.0	.65	24"	86 5/8"	2" NPT	391
ST-451-C	125	158.0	.65	30"	73 1/4"	2" NPT	508
ST-452-C	125	211.0	.65	30"	91"	2" NPT	760
ST-453-C	125	264.0	.65	36"	85 5/8"	3" NPT	810
ST-454-C	125	317.0	.65	36"	98"	3" NPT	914
ST-455-C	125	370.0	.65	36"	110 3/8"	3" NPT	1,018
ST-456-C	125	422.0	.65	48"	81 7/8"	3" NPT	1,655
ST-457-C	125	528.0	.65	48"	97 1/4"	3" NPT	1,925

Maximum Allowable Working Temperature: ST-5-C through ST-210V-C: 200°F; ST-447-C through ST-457-C: 240°F Standard Factory Precharge: 55 PSIG.

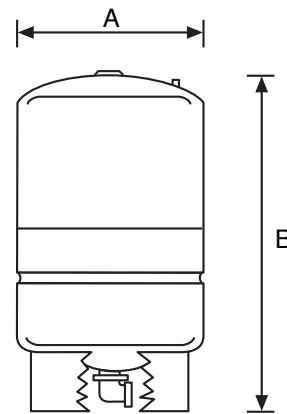
Non-ASME THERM-X-TROL®

General Usage

- Residential Water Heaters
- Office Buildings
- Apartment Buildings
- Dormitories
- Elderly Housing
- Extended Care Facilities
- Condominiums/Multiple Residential
- Food Service
- Laundromats
- Hospitals
- Other General-Use Hot Water Systems



ST-5, ST-8, ST-12



ST-25V through ST-210V

THERM-X-TROL® Non-ASME Specifications

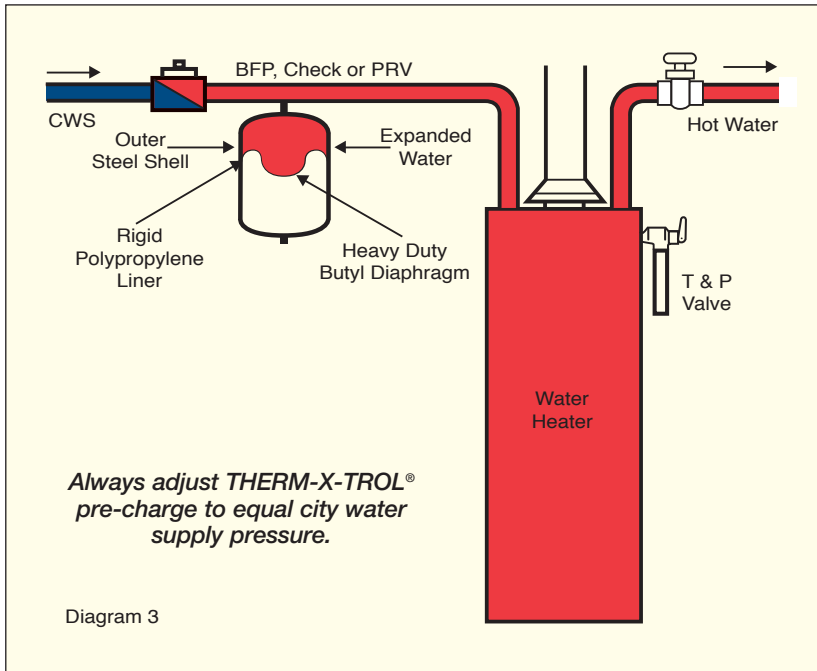
Model No.	Total Volume (Gals.)	Maximum Acceptance Factor	Diameter (A)	Height (B)	System Connection	Ship Weight (lbs)
ST-5	2.0	.45	8"	12 5/8"	3/4" NPT	5
ST-8	3.2	.45	9"	15"	3/4" NPT	7
ST-12	4.4	.55	11"	15"	3/4" NPT	9
ST-25V	10.3	1.0	15 3/8"	19 1/4"	3/4" NPT	23
ST-30V	14.0	.81	15 3/8"	23 7/8"	3/4" NPT	25
ST-42V	20.0	.57	15 3/8"	31 5/8"	3/4" NPT	33
ST-60V	34.0	.35	22"	29 5/8"	1 1/4" NPT	61
ST-80V	44.0	.77	22"	36"	1 1/4" NPT	69
ST-180V	62.0	.55	22"	46 3/4"	1 1/4" NPT	92
ST-200V	81.0	.41	22"	56 3/8"	1 1/4" NPT	103
ST-210V	86.0	.54	26"	47 1/4"	1 1/4" NPT	123
ST-451	158.0	.65	73 1/4"	30"	2" NPT	508
ST-452	211.0	.65	91"	30"	2" NPT	760
ST-453	264.0	.65	85 5/8"	36"	3" NPT	810
ST-454	317.0	.65	98"	36"	3" NPT	914
ST-455	370.0	.65	110 3/8"	36"	3" NPT	1,018
ST-456	422.0	.65	81 7/8"	48"	3" NPT	1,655
ST-457	528.0	.65	97 1/4"	48"	3" NPT	1,925

Maximum Working Pressure: 150 PSI. All Models listed by NSF 61 (excluding ST-451 – ST-457); Maximum Allowable Working Temperature: ST-5 through ST-210V: 200°F; ST-451 through ST-457: 240°F; Standard Factory Precharge: 40 PSIG (ST-5 – ST-210V); 55 PSIG (ST-451 – ST-457)

THERM-X-TROL®

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The THERM-X-TROL® from AMTROL is designed to protect domestic water heaters from the effects of thermal expansion. Installation is easy; just tee it into the cold water inlet (before the water heater) as shown in Diagram 3.



If your Plumbing Code requires a Backflow Preventer, Check Valve or Pressure Reducing Valve... You Need a THERM-X-TROL® on Every Job!

THERM-X-TROL®

Quick-Sizing Chart

Sizing Charts are based on 40°F incoming water temperature and a 150 psi T & P safety relief valve.

Water Heater* Size (gals.)	Static Supply Pressure (psi)**		
	40	60	80
40	ST-5	ST-5	ST-5
50	ST-5	ST-5	ST-5
60	ST-5	ST-5	ST-8
80	ST-8	ST-8	ST-12
120	ST-12	ST-12	ST-25V

Max. Temp. Setting 140°F

Water Heater* Size (gals.)	Static Supply Pressure (psi)**		
	40	60	80
40	ST-5	ST-5	ST-5
50	ST-5	ST-5	ST-8
60	ST-8	ST-8	ST-8
80	ST-8	ST-8	ST-12
120	ST-12	ST-12	ST-25V

Max. Temp. Setting 150°F

Water Heater* Size (gals.)	Static Supply Pressure (psi)**		
	40	60	80
40	ST-8	ST-8	ST-8
50	ST-8	ST-8	ST-12
60	ST-8	ST-12	ST-25V
80	ST-12	ST-25V	ST-25V
120	ST-25V	ST-25V	ST-25V

Max. Temp. Setting 180°F

* For multiple heater, use the total volume of the heaters plus any storage tanks.

** Therm-X-Trol Precharge must be set to equal Static Supply Pressure prior to installation.



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