The new degree of comfort.™

THERMAL EXPANSION TANKS

Therm-X-Guard:

Expanded (hot) water is absorbed by the Rheem-Ruud Therm-X-Guard expansion tank

- Water heater and fixtures are protected
- No dangerous pressure build up in the system
- Relief valves will not be triggered
- Potential safety hazard reduced
- Eliminated Btu/h and water waste, saving money and energy

THERM X GUARD™

Therm-X-Guard

- Available in 2, 4.4 and 10.3 gallon models.
- Suitable with water heaters up to 120 gallon capacity and supply pressure to 80 P.S.I.
- Easy to install – and are maintenance free.
- The safest and most cost effective way to eliminate problems associated with thermal expansion in closed loop systems.
- Protect water heater and plumbing fixtures from premature failure.
- Offer a 5 year limited warranty.
- Made in the U.S.A.

Therm-X-Guard Product Features

Brass system connection (in-line models)
(stainless steel elbow for vertical model)

Deep drawn steel domes for maximum strength & pressure rating

Rigid polypropylene liner for corrosion resistant reservoir

Butyl diaphragm for long life expectancy tested to over 250,000 cycles

Diaphragm hoop ring mechanically grooved for air-tight seal

Welded steel construction

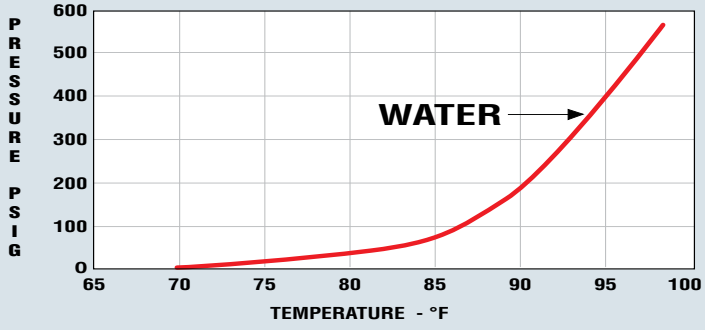
Brass air charge fitting with protective plastic cap for corrosion resistance, brazed for strength and maximum air-tight seal

For vertical model RRT-25 - integral floor mounting stand and stainless steel elbow bottom system connection

What is Thermal Expansion?

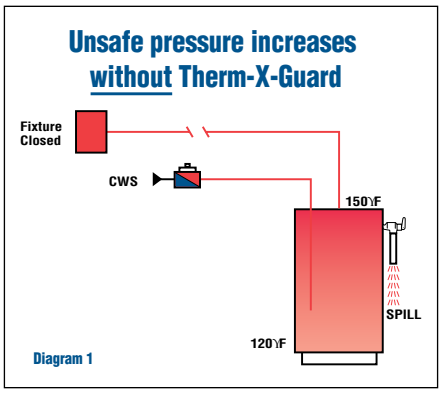
- Hot water is drawn from a water heater upon demand. Cold Water from the supply line then enters the water heater and is heated to replace the hot water used.
- With a backflow preventer and a pressure reducing valve on the supply line, the water heater and piping form a closed plumbing system under pressure.
- Thermal expansion occurs as the water is heating. Increasing pressure opens the relief valve and the expanded water “spills” from the water heater.
- This “spillage” results in wasted Btu/h and a potential safety hazard for the homeowner.

Pressure vs. Temperature Increase in Closed Piping Systems



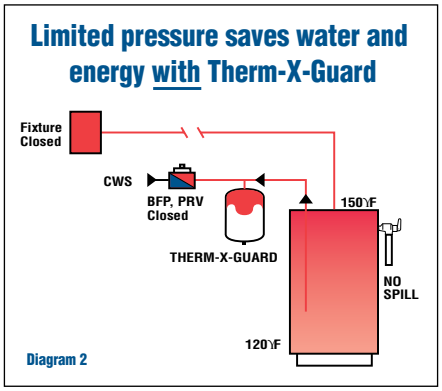
Closed Potable Hot Water System Without Therm-X-Guard (see diagram 1)

- Wasted Btu/h
- Shortened water heater life
- Wasted municipal water and sewer dollars
- Potential safety hazard for the homeowner



Closed Potable Hot Water System With Therm-X-Guard (see diagram 2)

- Water heater and fixtures are protected
- No dangerous pressure buildup in the system
- Relief valves are not triggered
- Potential safety hazard reduced
- Eliminates Btu/h and water waste, saving money and energy

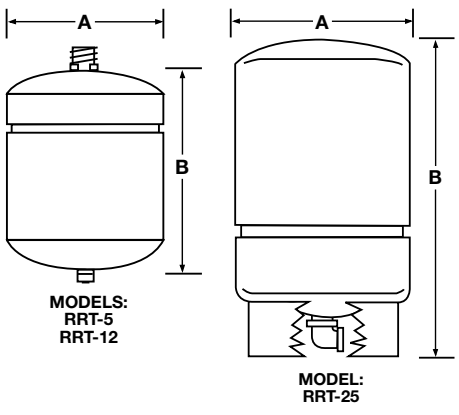


The Therm-X-Guard is designed to provide control of maximum pressures at a level below the relief valve setting. Therefore, the relief valve does not open and "spillage" is eliminated. It also provides additional space in the system to accommodate the increased volume of water created by thermal expansion, returning it to the system upon demand.

Therm-X-Guard Specifications

Model Number	Total Volume (Gallons)	Maximum Acceptance (Gals.)	Operating Temperature	Working Pressure (PSIG)	Diameter (A)	Height (B)	Ship. Wt.	System Connection (Brass)	Standard Factory Pre-Charge (2.8 kg/cm²)	Diaphragm Material	Liner Material
RRT-5	2.0	.9	200°F (93°C)	150 (10.5kg/cm²)	8"	12-5/8"	5	3/4" NPTM	40 PSIG	BUTYL RUBBER	POLYPROPYLENE
RRT-12	4.4	3.2	200°F (93°C)	150 (10.5kg/cm²)	11"	15"	9	3/4" NPTM	40 PSIG	BUTYL RUBBER	POLYPROPYLENE
RRT-25	10.3	10.3	200°F (93°C)	150 (10.5kg/cm²)	15-3/8"	19-1/4"	23	1" NPTF	40 PSIG	BUTYL RUBBER	POLYPROPYLENE

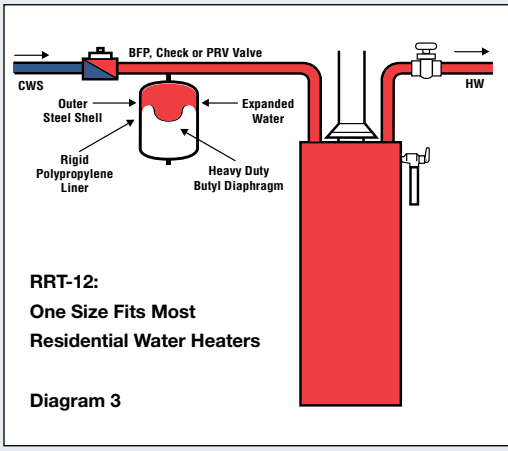
Maximum Working Pressure: 150 PSI. All Models listed by NSF 61; Maximum Allowable Working Temperature: 200°F; Standard Factory Precharge: 40 PSIG



SBCCI NSF (RRT-5, RRT-12 Liner only)

Therm-X-Guard Installation

Installation is easy! Before the water heater, tee it into the cold water inlet as shown in Diagram 3. For best performance, adjust the Therm-X-Guard pre-charge to equal city water supply pressure. If your plumbing code requires a backflow preventer, check valve or pressure reducing valve, you need a Therm-X-Guard on every job!



RRT-12:
One Size Fits Most
Residential Water Heaters

Diagram 3

Typical Installations

- Residential water heaters
- Hospitals
- Nursing homes
- Dishwashers
- Laundromats
- Car washes
- Plant washrooms
- Restaurants
- Other general use hot water systems

Sizing

The procedure for sizing the Therm-X-Guard for any application depends on three (3) vital pieces of information:

1. **Calculated thermally expanded water volume**
2. **Minimum water pressure experienced at the tank location**
3. **Maximum water pressure allowable at the tank location**

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

Tv = Design Pressure Factor X expanded water

Where Tv is the total Therm-X-Guard volume required in gallons.

Critical Sizing Therm-X-Guard

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-Guard Volume Required (Gallons) (Line 3 x Line 4)
6. Select Therm-X-Guard Model

Critical Sizing Therm-X-Guard: 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-Guard Volume Required (Gallons) (Line 3 x Line 4) = (4.3 x 2.1)	9.0
6. Select Therm-X-Guard Model	RRT-25
7. Using the specifications, select a Therm-X-Guard that is at least equal to line (5) for "Total Volume" and line (3) for "Maximum Acceptance".	

Note: The Therm-X-Guard 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

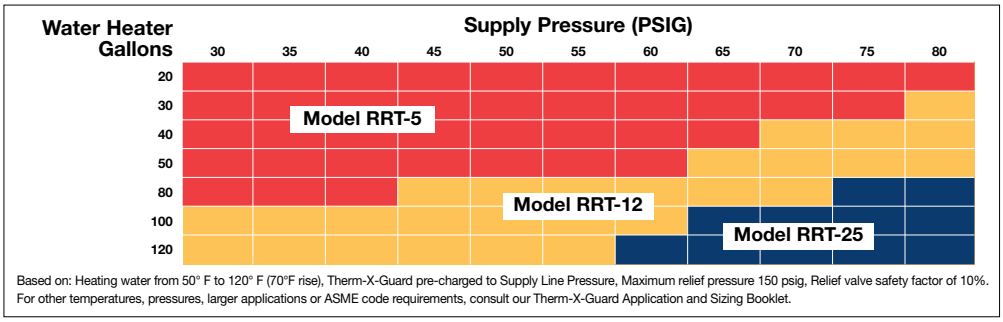
OPERATING (DESIGN) TEMPERATURE OF WATER HEATER (TANK)	EXPANSION FACTOR* (PERCENTAGE OF WATER VOLUME INCREASE)	
100˚ F	0.0062	0.6%
120˚ F	0.0100	1.0%
130˚ F	0.0124	1.2%
140˚ F	0.0150	1.5%
150˚ F	0.0179	1.8%
160˚ F	0.0209	2.0%
170˚ F	0.0242	2.4%
180˚ F	0.0276	2.8%

*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
	80	5.7
125	40	1.6
	50	1.9
	60	2.1
	70	2.5
	80	3.1
150	40	1.5
	50	1.6
	60	1.8
	70	2.1
	80	2.4

Therm-X-Guard Quick Sizing Chart



Based on: Heating water from 50° F to 120° F (70°F rise), Therm-X-Guard pre-charged to Supply Line Pressure, Maximum relief pressure 150 psig, Relief valve safety factor of 10%. For other temperatures, pressures, larger applications or ASME code requirements, consult our Therm-X-Guard Application and Sizing Booklet.

In keeping with its policy of continuous progress and product improvement, Rheem reserves the right to make changes without notice.

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