

**NC Department of Insurance
Office of the State Fire Marshal - Engineering Division
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Thermal Expansion Tanks

Code: 2012 NC Plumbing Code

Date: June 29, 2018

Section: 305.6, 301.7, 504.4, 607.3

Question 1:

Where is a thermal expansion tank required?

Answer 1:

Per section 607.3 of the 2012 NC Plumbing Code a device for controlling thermal expansion is required between the water heater and any device that can stop water from flowing back to the cold water source. These devices can include the cold water shutoff valve, the pressure reducing valve, a check valve or a backflow preventer; whichever is closest to the water heater. Residential water well tanks can serve as the thermal expansion tank if there are no other flow limiting devices between the well tank and the hot water heater.

Question 2:

Is a pan required under a thermal expansion tank?

Answer 2:

If a pan is required by the manufacturer's installation instructions, then a pan is required by code as per the exception under section 301.7 of the 2012 NC Plumbing Code. As an alternate method the thermal expansion tank, if required, can be located over the water heater pan instead of installing a separate pan for the thermal expansion tank. There is no requirement in the plumbing code to install a pan under a thermal expansion tank although it is recommended where leakage of the tank could cause structural damage.

Question 3:

The insulation value of insulation varies based on ambient temperature. What is the mean temperature required for determination of a code-referenced insulation value?

Answer 3:

The code referenced insulation values are based on a mean temperature of 75°F per section 305.6 of the 2012 NC Plumbing Code.

Per the 2012 NC Plumbing Code

305.6 Freezing. The top of water pipes, installed below grade outside the building, shall be below the frost line or a minimum of 12 inches (305 mm) below finished grade, whichever is greater. Water pipes installed in a wall exposed to the exterior shall be located on the heated side of the wall insulation. Water piping installed in an unconditioned attic or unconditioned utility room shall have insulation with a minimum R-factor of 6.5 determined at 75°F (24°C) in accordance with ASTM C-177.

Thermal expansion tanks**Section:** 305.6, 301.7, 504.4, 607.3

2012 NC Plumbing Code

Date: June 29, 2018**Question 4:**

What level of insulation are acceptable for insulating thermal expansion tanks that are exposed to freezing conditions?

Answer 4:

Thermal expansion tanks are required to be insulated where subjected to freezing temperatures in unconditioned spaces. The minimum insulation required by the NC Plumbing Code is R6.5 as determined at 75°F (24°C) in accordance with ASTM C 177.

Question 5:

What types of insulation are acceptable for insulating thermal expansion tanks that are exposed to freezing conditions?

Answer 5:

Any type of insulation can be used to produce the minimum insulation levels required by code. The local inspector will approve any alternate methods of providing this insulation

Question 6:

Is a vapor retarder or insulation jacket required on the outside of the thermal expansion tank insulation?

Answer 6:

Yes. The insulation shall be covered with a vapor retarder having a maximum permeance of 0.05 perm or aluminum foil having a minimum thickness of 2 mils. Insulations having a permeance of 0.05 perm or less shall not be required to be covered. All joints and seams shall be sealed to maintain the continuity of the vapor retarder.

Question 7:

If there are safety warning labels on the thermal expansion tank can they be covered by the insulation and how will the inspector verify the existence of a label on the tank if it is covered by the insulation?

Answer 7:

A copy of the manufacturer's installation instructions which include safety warnings will be left within three feet of the thermal expansion tank for use by the owner. The warning labels are primarily for the installer and will be visible when the tank is installed. The warning information is also included in the manufacturer's installation instructions.

Question 8:

Is there a recommended orientation for installation of the thermal expansion tank?

Answer 8:

The preferred method of installation is to install the tank vertically so it hangs from the pipe. Installation shall be in accordance with the manufacturer's installation instructions. If the thermal expansion tank is installed horizontally it shall be supported.

Thermal expansion tanks**Section:** 305.6, 301.7, 504.4, 607.3

2012 NC Plumbing Code

Date: June 29, 2018**Question 9:**

What thickness of insulation is recommended for insulation of thermal expansion tanks?

Answer 9:

Insulation wrapping thermal expansion tanks shall have a minimum thickness of two (2) inches. The code does not dictate how to insulate the thermal expansion tank. A list of acceptable insulation materials is shown below. The insulation used to wrap the thermal expansion tank can be one of these materials or a product that is manufactured from these materials as long as the required thickness is maintained. If the installer wishes to use a different material or method than shown below, it should be approved as an alternate method by the local plumbing inspector.

Material

1. Elastomeric Closed-Cell Foam grade 2
2. Elastomeric Closed-Cell Foam grades 1 and 3
3. Expanded Polystyrene Foam (EPS) Closed-Cell
4. Extruded Polystyrene Foam (XPS) Closed-Cell Type IV
5. Extruded Polystyrene Foam (XPS) Closed-Cell Type XIII
6. Fiberglass Pipe and Tank insulation
7. Fiberglass Batt
8. Melamine Low Density Semi-Rigid Open-Cell
9. Mineral Fiber blanket type II
10. SSL II pipe wrap

Question 10:

Can the temperature and pressure relief valve on the water heater be used to control thermal expansion?

Answer 10:

No. Per section 504.4 of the 2012 NC Plumbing Code the temperature and pressure relief valve on the water heater cannot be used to control thermal expansion.

Keywords:

Freezing, insulation, thermal expansion tank, water heater

P0305.6 Thermal expansion tanks.doc