IPEX by aliaxis

BULLETIN

System 15® & System XFR® DWV

Movement within Multi-Story Wood-Frame Buildings

Recommendations for Drain, Waste and Vent Stacks

This bulletin describes the primary contributing factors of movement in vertical stacks of multi-story, wood-framed buildings, and their recommended solutions.

Factors Include:

- Temperature change (thermal expansion and contraction)
- Building settlement (movement of soil)
- Building shrinkage (dried out wood)

The National Plumbing Code states in article 3.3.10., Expansion and Contraction, that:

> *The design and installation of every piping system shall, where necessary, include means to accommodate expansion and contraction of the piping system caused by temperature change or movement of the soil.*

Although the National Plumbing Code states that movement must be accommodated, it does not give clear guidance as to how this can or should be accomplished. Therefore, as a manufacturer of thermoplastic piping systems, we are often asked for recommendations on this issue.

Temperature Change

Thermal expansion and contraction depend on temperature change and the length of the installed piping. Both expansion and contraction of a piping system is independent of pipe size (i.e. the rate of expansion would be the same in 1-1/2" System 15® as it would be in 12" System 15).

The rate of thermal expansion for System 15 and System XFR® is 0.36"/10°F/100 ft of pipe.

Compare this to the rate of thermal expansion for ABS pipe, which is 0.60"/10°F/100 ft of pipe.

Example of a Typical Installation:

A 3" System 15 stack is installed in a four-story building and runs vertically 50 feet. The temperature at the time of installation is 30°F. Once the building is occupied, the temperature that the system will be exposed to is 80°F.

What is the total thermal expansion in the stack?

ΔL = expansion (in)

Y = thermal expansion factor, 0.36 for PVC (in/10°F/100ft)

T = maximum temperature (°F)

F = minimum temperature (°F)

L = length of pipe run (ft)

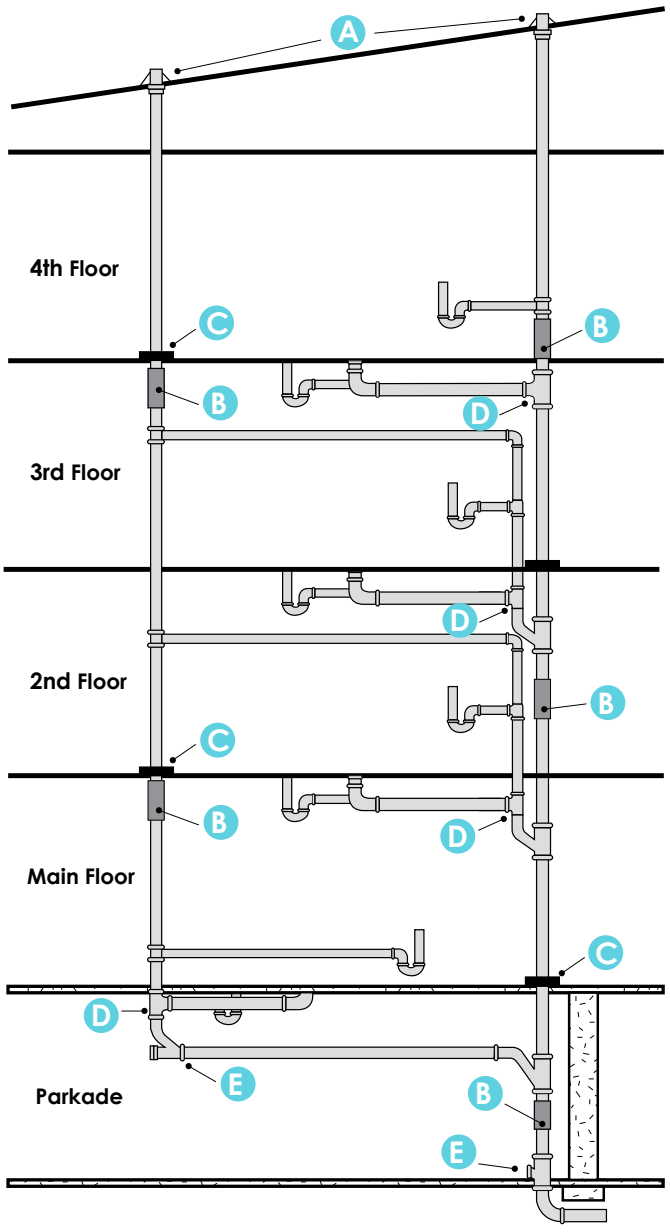
$$\Delta L = \frac{Y\,(T - F)}{10} \times \frac{L}{100} = \frac{0.36\,(80-30)}{10} \times \frac{50}{100}$$

= 0.90 inches of expansion from temperature change in the whole stack.

Thermal Expansion (ΔL) of System 15 and System XFR (inches)

Temp. Change ΔT°F	Length of Run in Feet									
	10	20	30	40	50	60	70	80	90	100
20	0.07	0.14	0.22	0.29	0.36	0.43	0.50	0.58	0.65	0.72
30	0.11	0.22	0.32	0.43	0.54	0.65	0.76	0.86	0.97	1.08
40	0.14	0.29	0.43	0.58	0.72	0.86	1.01	1.15	1.30	1.44
50	0.18	0.36	0.54	0.72	0.90	1.08	1.26	1.40	1.62	1.80
60	0.22	0.43	0.65	0.86	1.08	1.30	1.51	1.73	1.94	2.16
70	0.25	0.50	0.76	1.01	1.26	1.51	1.76	2.02	2.27	2.52
80	0.29	0.58	0.86	1.15	1.44	1.73	2.02	2.30	2.59	2.88
90	0.32	0.65	0.97	1.30	1.62	1.94	2.27	2.59	2.92	3.24
100	0.36	0.72	1.03	1.44	1.80	2.16	2.52	2.88	3.24	3.60

Addressing Movement in a DWV Stack



Building Settlement & Building Shrinkage

Although it is very easy to determine the thermal expansion in a stack, it is extremely difficult to accurately predict the amount of settlement or shrinkage that will take place.

In many cases, building settlement and shrinkage can be greater than that of thermal expansion or contraction. In some cases, shrinkage alone can be 3/4" per floor depending on the moisture content and height of wood framing.

The following installation recommendations are based on years of experience and have proved to be successful in most installations:

- Install a rubber mechanical joint coupling or CSA-certified expansion joint at every second floor of the building.
- Rigidly support the stack pipe on alternating floors to direct any movement into the appropriate expansion compensator.
- Remember to always check with the local authority having jurisdiction for approval, prior to installing your DWV system.

The illustration 'Addressing Movement in a DWV Stack' indicates the proper location for the devices to be installed.

Using this method of installation will limit movement between any two floors of the building. If you require additional information, please contact your local IPEX representative.

- **A** Neoprene flashing may be considered to be an expansion compensator
- **B** Expansion fitting
- **C** Pipe anchor and/or support
- **D** Side inlet, TY
- **E** Pipe anchor and/or support at the base of all stacks

Note: This is an example only and may not be appropriate for all installations.

Contact us

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