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Fan Coil Riser Systems: What to Take in Consideration

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Many condominiums have fan coil units to maintain a comfortable living environment for the building occupants. The fan coil riser system consists of a supply and return header at the top and bottom of each zone, connected by a series of vertical risers that distribute the heating/chilled (conditioned) water to the in-suite fan coil units. The coil and fan within the fan coil cabinet use this conditioned water to heat or cool the air that is blown into the suite.

The fan coil unit not only regulates the temperature within each suite, but it also plays a crucial role in controlling the humidity levels during the summer months. Proper humidity control is essential for preventing the growth of mold and mildew, both of which can have detrimental effects on the structural integrity of the surrounding components and the health of its occupants.

The piping is subject to significant variations in fluid temperature. During the change-over from winter to summer, this temperature change can be as much as 135°F but even in the winter, the change between warmer and colder days could result in loop temperature changes of 50°F. The piping materials, such as copper, steel, and other similar alloys, expand and contract due to these temperature changes. To minimize any adverse impact on the integrity of the piping system, an expansion and support system is typically installed to provide sufficient flexibility for the piping to expand and contract in response to temperature changes without damaging the pipes or the connections to the fan coil units. Figure 1 shows a typical anchor. Figure 2 shows two expansion compensators with guides.

If not designed properly, these elements can fail prematurely due to the forces and stresses generated during the expansion and contraction of piping. When the expansion and support system fails or is improperly designed, the branch pipes that supply water to the in-suite fan coil unit can buckle, or they can drop and rest on the metal sheet cabinet. Over time, the weight of the riser piping and water can cause one of these branch pipes, which are typically ½" in diameter, to snap and potentially lead to catastrophic flooding. This occurrence is often an indication of a "dropping" riser. Figure 3 shows a buckled pipe caused by inadequate anchorage and expansion compensation.

A failed expansion and support system may also manifest in the form of a "ticking" noise in the fan coil area. This noise typically indicates that the expansion and support system is experiencing undue stress and is at risk of imminent failure.

It is important to note that expansion and support system elements, like all equipment and materials, are susceptible to failure over time. Despite the crucial role played by expansion and support systems, they are often overlooked. They are difficult to locate due to their concealed location behind drywall and the fact that they aren't present on every floor. This can result in the lack of regular monitoring and maintenance, leading to potential problems with the piping system over time. If drawings were not provided to show the locations of these elements, we recommend locating them early in the life of the building so they can be monitored over time.

If properly designed and in compliance with industry best practices, fan coil riser expansion and support systems typically have a similar life expectancy to that of the fan coil riser piping, which is estimated to be approximately 30 to 60 years provided that appropriate chemical treatment is always kept up. However, we have recently observed a significant increase in the number of newly constructed condominiums where fan coil riser piping failures and drops are occurring due to an inadequate expansion system, and more specifically, a lack of components, such as guides.

To avoid unforeseen floods and associated crisis management expenses, it is essential to ensure that the riser expansion and support system is adequately designed and adheres to best practices. During the first two years, we recommend engaging engineering professionals to review these systems and assess their adequacy so that concerns can be claimed under warranty. A similar review should also be completed when an older building is planning an in-suite fan coil refurbishment to know if pipe repairs are needed in conjunction with the fan coil work.

This proactive approach can help prevent potential issues and reduce the risk of catastrophic pipe failures.



Figure 1: Newly installed and designed anchors.



Figure 2: Newly installed and designed expansion compensators with guides.



Figure 3: Bowed/bent piping due to failed expansion and support system