

## Replacing Fan Coil Units

### Fancoil Unit Replacement or Refurbishment

Fancoil units (FCUs) are simple machines. They are well named; essentially it is a fan that blows air through a coil that looks like a car radiator. Heated water, or chilled water in the summer, flows through the coil – heating or cooling the air. A lot of condensation forms on the coil, so there is a drip tray to catch the condensate. There are 3 different valve arrangements:

- Isolation valves that just turn water off to the FCU so it can be serviced. Water normally flows through the coil all of the time and the fan is cycled on and off, controlled by the thermostat.
- Isolation valves plus a motorized 3-way valve to bypass the water around coil when the fan is not working. This reduces the amount of condensate developed.
- Isolation valves plus a 2-way motorized valve that shuts off the water to the coil rather than bypasses it when the fan is not running. This arrangement is not very common. This will partially deadhead the main circulation pumps - a bad thing. But when combined with a pressure sensor and variable frequency drives (VFDs) on the pump motors, the motor speed will adjust to the number of FCUs that are actually operating. This will save energy. However, not all motors can be fitted with VFDs and not all chillers and chiller pumping arrangements will accept variable flow. Some engineering is involved to determine the feasibility of using 2-way valves.

### When to Replace or Refurbish Your Fancoil.

Most building managers become aware of the poor condition of their fan coils because of leaks or mould within the fancoils. This is often caused by leaking drip pans, blocked condenser piping or wet insulation on the riser pipes. This will generally initiate a visual survey of the fancoils to determine their overall condition.

If the FCU's were the only issue, then replacing or refurbishing the FCUs would be relatively straightforward. However, there are a few things that complicate things:

***Rusty and deteriorated Risers.*** In older buildings, the risers (the pipes that carry the hot or chilled water) run beside the FCUs. They are generally made of steel. In our experience, although the riser can look alarmingly corroded, there is usually sound metal under the rust. We can test the risers non-destructively with an ultrasonic thickness tester. A piece of one riser, however, should be cut to ensure



**Figure 1: Unilux Fancoil Insert Kit**

the accuracy of the thickness tester and to look for a buildup of scale on the inside of the pipe. The ultrasonic thickness tester will determine the remaining thickness of sound metal of the pipe. By comparing the actual remaining metal thickness with the original thickness of the pipe, we can estimate its remaining lifespan.

**Riser Insulation.** Riser piping is generally insulated with preformed fiberglass with an 'all-service jacket' (ASJ) vapour barrier. ASJ is made of foil backed paper. The seams are taped. Over time, this vapour barrier deteriorates, causing condensate to form on the riser during the cooling season. This rusts the riser and the condensate saturates the insulation. The water will flow down the insulation, following the strands of fiberglass and will often cause leaks on the lower floors. In the majority of cases, the insulation and vapour barrier will have to be replaced. This means cutting out drywall in the resident's suites to expose the risers.

**Runouts.** The runouts are small diameter pipes, usually ½" steel, that carry heated or chilled water from the supply riser to the fan coil and from the fan coil back to the return riser. These have much thinner walls than the risers and are often poorly insulated. They are prone to deterioration and leaking, sometimes catastrophically. This can cause a great deal of damage. In most cases, when the risers are exposed, the runouts should be replaced. Sometimes the runouts are screwed into the riser, but could also be welded. If they are welded, then they should be converted to a screwed fitting by welding on fitting called a threadolet or weldolet.

### Refurbish or Replace

Fan coils can be refurbished. There are replacement parts available for most fan coils – cabinet insulation, coils, drip or condensate pans, fans, fan motors, etc. Most refurbishments include:

- New stainless-steel drip pan and condensate tubing
- New cabinet insulation
- New fan motor
- New thermostat
- New shutoff valves
- Temporary removal and cleaning of coil, motor and fan housing.

There may also be an electrical resistance coil in the fan coil unit. This provides a little heat for those times that the apartment is cold but the system is in cooling mode.

The downside of refurbishment is that it can take more time than replacement with an insert (see below), is more disruptive for the residents and, of course, everything is not brand new.



**Figure 21: The corrosion looks alarming, but there is 90% sound metal in this riser pipe**



The most common brand of fancoil unit that we see in older buildings is Unilux. They seemed to have had the market to themselves in the 70's and 80's. Unilux make an 'insert', which is essentially a new fan coil unit sized to fit into the existing cabinet. There are other manufacturers of inserts also. This is a faster installation than refurbishing the existing fancoil unit. These inserts may be suitable to replace other brands of fancoils also. This will also require the replacement of the runouts.

There may also be reason to consider replacing the fan coil entirely and installing a more modern style of fan coil. These often have the supply and return risers built in – so the replacement would also include the supply and return risers, the condensate riser and the runouts. However, one entire rise of suites (from top to bottom) has to be done at one time. We don't know of anyone that has done this full replacement, but in some cases, it might be worth consideration.

END OF REPORT