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Fan Coil Demo Installation Report

The building address and unit numbers are replaced by Building X, Y and unit#00 for the confidentiality of our client's information. The project took place in a 2 building condominium complex built in 1978 located in Greater Toronto Area.

Over the last year, WT&A was asked to investigate the problems in the in-suite fan coil units. We have inspected the condition of many fan coils and the associated piping at *Building X*.

We identified some key problems that put the building at high risk of flooding, effecting the occupants' comfort, health and safety, and reducing the system's energy efficiency. We had also suspected potential riser problems since some units did not get sufficient heating and cooling. The key problems are listed below.

- **Fan-coils:** Copper coil tubings in coils are highly corroded and create a risk of pinhole leaks. Constant flow through the coil causes excessive condensation in summer operation and shortens the life in winter operation. The condensate drain trays are prone to bacteria growth and rust and leaking/
- **Run-out Pipes** are deeply corroded and show signs of erosion and pitting on the pipe surface. The pipe wall thickness of the pipe is thin and brittle and carries a big risk of flooding.
- **Fancoil isolation valves** are corroded and seized. Many of the fan coils can't be isolated from the riser. In case of a fancoil leak, the whole riser has to be shut down.
- **Pipe and Case Insulation** have deteriorated over the years and fail to create a condensation barrier. In the summer operation, condensation occurs between casing and insulation which can cause mildew and bacteria growth

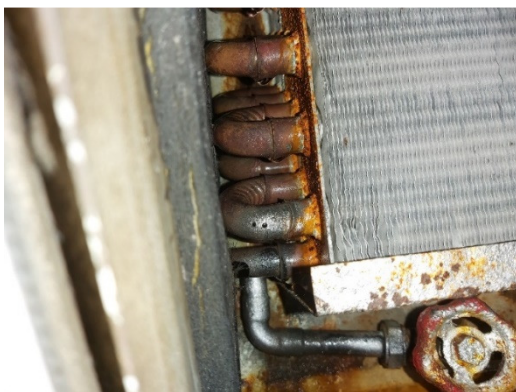


Figure 2 Coil Copper Tube Corrosion



Figure 1 Rusty drip tray and bacterial growth



Figure 3 Corroded run-out pipes



Figure 4 Runout piping

After identifying these key problems, we proposed to install 3 new 'Unilux' fancoil insert units replacing the selected old fan coils. The problems exist throughout the building and all the fancoils and associated piping have reached the end of their service life spans. With the 3 trial installations, we aimed to fine tune the installation process, identifying any possible problems that may arise.

Installation

We worked with Unilux, the manufacturer of the fancoil inserts, as an installer, investigating various options to test the installation and how well they match the occupant's needs and the building conditions. Run-out pipes, for the test installation, were replaced by New Water Plumbing including the installation of new shut-off valves in each fancoil supply and return runout pipes.

We selected the board meeting room at *Building X*, lobby at *Building Y* and unit #00 at *Building Y* as trial installation locations. In all three locations, installations are successfully completed and final air balancing and adjustments have been done by Unilux.

The installation started with setting up a “tent” covering the fan-coil unit and the working area, to avoid the spread of fibreglass and/or construction debris during the dismantling of the unit. Contractors will protect flooring and carpets inside the suites with proper covering sheets to avoid dirt and damage.



Plumbers accessed the unit’s existing supply and return runout pipes and remove them from the riser. Then, they proceeded to install the new runout pipe with shut-off valves.

This process required access to the risers located next to the fan-coil units behind the wall. In some cases, plumbers might be able to perform the work within the fan-coil casing, without breaking any drywall. In these 3 installations, however plumbers had to cut a section of the drywall due to the unique situation of each unit.



For future installations, we believe this may be avoided in the majority of the units. This will be discussed with the bidders during the tendering process.

Figure 5 New runout with isolation valve

After the plumbers were done, the fan-coil unit installer proceeded to remove the existing fan-coil from the cabinet. All the existing insulation was stripped from the cabinet, ductwork, grilles and louvres and thoroughly cleaned by vacuuming and disinfected with biocides. New closed-cell thermal insulation was installed within the entire cabinet.

A new fan-coil unit with the new thermostat were installed and all piping and electrical connections were made.

After testing all the equipment, air and water flows were balanced and the unit were fully commissioned.

In the future, installations will be done on a riser-by-riser basis. Crews can work on multiple risers at a time but a total building heating/cooling shut down will not be required.

Issues We Have Addressed

Run-out pipes were replaced with new copper piping and shut-off valves. This will address the high flood risk in the building and will provide water flow to the fan-coil units that were lacking due to clogged runout pipes.



Figure 7 Old riser take off



Figure 6 new riser take off

New fan coil inserts fit seamlessly into the existing cabinets. Some of the major advantages of the new fan-coil units to existing units are listed below:

- The stainless steel drain pan is significantly more resistant to corrosion and bacteria growth than the original pans.
- Overflow float switch: In case clogging happens in the drain stack, each drain pan has a condensate sensor that senses the accumulating water and will shut down the fan-coil to prevent the risk of flooding.
- Fans: New ECM fans are more energy-efficient and quieter. Fan speed can be adjusted on-site with a computer for required airflow rates.
- Insulation: The new 1/2" thick closed-cell insulation liner has a longer life span, better noise dampening and more resistant to mould growth
- 3-way valve: It will shut off the water going into the coil when the unit is not in use. This will prevent constant condensation in the summer months and prolongs coils' life span.
- Aquastat temperature sensor: Senses the water temperature in the pipe and prevents occupants from setting for heating when the system is in cooling or vice versa. Helps to reduce unnecessary energy consumption.

- **Thermostat:** New thermostats are installed near the fancoils and the remote thermostat are installed at the existing thermostat location. There are 3 options available for the new thermostat. Basic non-programmable that has auto and on/off modes with 3 fan speeds. Programmable upgrade option that lets occupants implement a schedule and Ecobee+ smart thermostats with fully programable and smartphone access and wireless remote sensor options. We recommend specifying a non-programmable thermostat and provide upgrade options to each resident at their own expense.
- **Filter:** The new pleated 1", min. MERV 8 will have a better filtering capability and will improve indoor air quality.



Figure 8 Fan-coil Unit Before



Figure 9 Fan-coil unit After

We measured the sound levels for the new fan-coil units and observed a significant noise reduction. The board room fan-coil unit measured 39dbA, 49.5dbA and 51.3dbA at low medium and high settings respectively. This value is on average 5dbA lower than the previously measured noise level. The new fan-coil unit thermostat allows a high-speed setting to be bypassed on the auto setting for residents who desires even quieter operation for bedroom units.

Issues we found out

In *unit #00* installation, we found the riser to be fully clogged with sediment on both the supply and return riser. The sediment had solidified over the years and it was not possible to remove it by power flushing. When the risers are clogged, it is not possible to remove existing runout pipes to replace with new ones. We proceeded to replace the supply and return riser at unit #00. Going forward we believe

The best practice to replace risers in the first 2 floors in each building. We suspect the sediment blockage does not extend to floors above the 2nd floor. After replacing the risers at the bottom 2 floors, we will be able to power flush the system to remove any non-solidified sediment. This will improve the system efficiency and ensure adequate water flow to each fan coil unit. This work will require breaking the drywall section near the fan coil units and patching after the work is completed.

Options

There are some options available from Unilux for future installations. New supply grilles and fan coil cover grilles are available if the board decides to replace them. We left a sample cover and installed a new grille in the meeting room at *Building X*.



Figure 10 new fancoil supply grille



Figure 11 New fancoil cover

Thermostat options as we mentioned before can be specified as factory standard thermostats and an upgrade option can be given to each owner at their own expense. More information on upgrade options is enclosed with this report and additional upgrade prices will be listed in the bid documents.

Next Steps

We will modify our specifications based on on-site findings and the feedback on the options from the board. We will add the replacement of the risers for the first 2 floor units in both buildings, the power flushing fan-coil risers to the scope and finalize the tender documents.

We will Invite 3-5 contractors to the tender and organize a site walk-through meeting, collect the bids and prepare a bid summary for the board's decision. We will prepare a CCDC-2 contract between the owner and the approved bidder. WT&A will coordinate the project start meeting, monthly progress meetings, will certify the contractor's progress payments and oversee the installation to make sure specifications are followed. We will provide our quotation for these services.

We are aiming to start the project towards the end of the summer to minimize occupants' discomfort.

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