APPLICATIONS NOTICE

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Form NS 006

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APPLICATION NOTICE GENERAL LIST

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FROM : T KING/K EDWARDS

SUBJECT : CARRY-OVER AND FREE WATER INSIDE INDOOR UNIT

UNITS : VARIOUS

There are many reasons why water may be found inside the indoor section of an air conditioning system. By far the largest number of issues, probably about 80% relate to poor or inadequate trapping of the drain line that leads to water being held up in the drain tray and whipped up by the fan. The next most likely source is from Water Carry-Over from the moisture on the cooling coil and then lastly rare incidences of rainwater being dragged in to the unit through fresh air dampers or panel seals.

It is important to identify the cause before a remedy can be found. Always investigate the pipe trap first, it is the most likely cause and usually the easiest to fix.

Poor or Inadequate Pipe Trapping

temperzone publish a pipe trap detail drawing on the Installation and Maintenance sheet for every Indoor Unit and Packaged Unit that must have a trap fitted (some indoor units and HWP units do not need traps fitted usually because they are 'blow thru' units).

The trap must have a vent pipe after the trap before the pipe drains away.

The trap must achieve a water seal **during operation** well in excess of the negative static pressure. We would suggest for systems with up to 300 Pa that the seal be 50mm and for systems up to 600Pa that the seal be 100mm.

Water Carry-Over

This is a very subjective issue, hard to define, and people's expectations vary considerably. It is very dependant on the application and moisture content of the air on to the coil.

At **normal** return air conditions, say 21.0° to 24.0°C and at 50% RH, and with a nominal room sensible heat ratio of say 0.75 to 0.85 the **maximum air velocity across a cooling coil should be approximately 2.5 m/s**. This should pretty well insure no water carry over would occur. Exceeding this can be problematic and because it is influenced greatly by the number of fans, space between them and the ease of fan entry it can vary from unit to unit.

With High Sensible Heat Applications the velocity could be around 2.8 m/s without water carry over as so little moisture is condensed on the coil.

However, the addition of fresh air load will gradually raise the %RH of the air on to the coil and add more moisture load therefore the air flow/velocity should proportionally decrease until **for a 'Full Fresh Air' system** we would recommend **the cooling coil face velocity be no more than 2.0 m/s**. This should be considered also (along with protection for the compressor) on units with economisers fitted especially if the fresh air is controlled by a CO2 sensor and the compressors could remain operational with high/full fresh air. It is also a good reason why enthalpy/wet bulb control of the economisers' free cooling is far superior to simple temperature control.

Please note that temperzone strongly recommends that compressors should be locked out from operation when the economiser is in the free cooling mode and the fresh air damper is open more than 15% of air flow.

Water Ingress Through Panel Seals

Often this is as a result of the system negative static pressure exceeding the design capability of the unit structure. Generally panel seals are designed for approximately 500Pa to 600Pa negative pressure. We have had reported incidences of leakage into units where the negative static has been found to be upwards of 800Pa.

Water Ingress Through Fresh Air Dampers and Weatherhoods

temperzone takes great care in designing fresh air dampers and accompanying weatherhoods to try to prevent air velocities at the entries that would manage to entrap passing falling raindrops. However units are often located in situations where localised wind velocities can be extreme, raindrops hitting the ground can bounce back and of course there is no accounting for almost horizontal rain in storms. It becomes an almost impossible task to design something that is 100% for every situation.

It may be necessary under some circumstances to discard the standard weatherhood and replace this with something more suitable for the site and its localised conditions.

Another interesting issue that some contractors seem to forget; when the system is being commissioned and the air flow balanced and set, this is usually done with full return air and minimum fresh air. The fresh air damper then needs to be set so that its maximum open position achieves the same air flow quantity as with full return air. Ignoring this step results in the air volume and velocity increasing substantially and again a possible cause for rainwater to become entrained leading to water carry-over.