APPLICATIONS NOTICE

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Form NS 006

TO: AUTHORISED DEALERS/DISTRIBUTORS
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APPLIC. NOTICE GENERAL LIST

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FROM : T King/K Edwards

SUBJECT: PROBLEMS ASSOCIATED WITH STANDARD HEAT PUMP AIR CONDITIONERS APPLIED TO HIGH PERCENTAGE FRESH AIR SYSTEMS

UNITS: ALL SPLIT AND PACKAGED UNITS

This Notice Supersedes The Now Obsolete Issue 01/93.

It has been our experience that a number of customers try to apply standard packaged and split system units on high percentage fresh air applications, including 100%. This is a dangerous practice. Standard air conditioners and heat pumps are designed to operate either with a full return air or small proportions (10-20%) of fresh air only. Operating a unit on high fresh air places undue load on the unit, upsets its design balance and may lead to any number of several problems. The two most common problems and their possible solutions are :

(1) Extreme Icing of the Outdoor Coil and Poor System Operation on Heating
As the air temperature onto the indoor coil falls the condensing temperature reduces. This tends to also depress the evaporating temperature on the outdoor coil even lower causing icing to occur prematurely and rapidly at a higher ambient temperature than it would normally, e.g. at 10°C instead of about 4°C. The standard de-ice cycle may not be sufficient to remove all the ice build up. Also the system differential pressure will be too low for TX valves and distributors to function properly.

Best Solution:
Pre-heat the air so that the mixed air onto indoor coil is no less than 15°C for any sustained length of time utilising electric pre-heat. Boost heaters after the evaporator coil don't achieve the necessary effect.

(2) Freeze Up of the Indoor Coil On Cooling
A standard unit, built to one of the international standards, is designed to cool in ambients typically ranging from 19°C to 45°C. If still required to cool during lower ambient conditions the systems head pressure can get too low. This, plus the low indoor coil entering air temperature, results in a very low evaporating pressure and then icing on the indoor coil. If the unit runs for any length of time in this condition the coil could become a ball of ice. There is no de-ice thermostat protection on the indoor coil on standard equipment.

Solutions :

a. Fit Head Pressure Condenser Fan Speed Control any time when fresh air is above 20%
This controller will modulate the condenser fan speed and even stop it altogether to maintain a reasonable head pressure even under low ambient conditions, this helps to keep the suction pressure up. This control runs the outdoor fan on full speed on the heating cycle.

b. Automatic hot gas bypass valve whenever above 50% fresh air that will keep the suction pressure up by bypassing small amounts of hot gas to the indoor coil (introduced between the TX valve and distributor) as required. An insulated hot gas line is required between indoor and outdoor units.

c. Indoor coil freeze protection thermostat to either shut down compressors or ideally reverse the cycle to defrost the indoor coil as a last line of defence.

d. If possible the evaporator coil should have multiple intermeshed indoor coil circuits and multiple compressors to facilitate as many stages of capacity control as possible.

e. Possibly a low entering air safety thermostat to shut down all compressors when the air temperature onto the indoor coil is 15°C db or below.

CONCLUSION

It can be seen from the above that there are some remedies that can be applied to enable a standard unit to operate reasonably well on high percentage fresh air system. However, insufficient capacity may still be a problem. If in doubt please contact your nearest friendly temperzone sales office.