Temperature And Condensation

DDB Unlimited
8445 Highway 77 North
Wynnewood, OK 73098
800-753-8459
405-665-2876
www.ddbunlimited.org
sales@ddbunlimited.com

TEMPERATURE AND CONDENSATION

Temperature can be either a friend or foe depending on the conditions. Extremely high temperature is normally responsible for equipment failure and in reality the use of extended temperature is used to accelerate life cycle testing so that we do not have to wait for 20 years to see how a product performs in the short term. One of the major concerns in Telecommunication equipment is moisture or condensation that can form on circuit assemblies. The current trend today is smaller packaging and with the smaller packages the distance between the pins gets more critical and is subject to condensation at much lower levels than before. Contamination of the condensation with environment components such as salt and corrosive acids can also be a failure method with connectors as well as circuit assemblies.

There are two basic methods of mitigating the formation of condensation in the cabinet which are air conditioners and direct air cooling (DAC).

The air conditioner essentially draws the cabinet air over the evaporator coil which has been chilled to a temperature at or below the dew point of the air and in this process the moisture condenses on the evaporator and is directed to the drip pan and exhausted out of the cabinet by the air conditioners drip tube. With a closed loop air conditioning system after about 3 to 4 hours of operation the humidity in the cabinet while the compressor is running will be typically 30 to 40% and will drift up to about 60% while the compressor is off. This will be consistent independent of the humidity outside the cabinet as long as the cabinet remains closed loop.

The direct air cooling method uses filters to remove salt, fog, dust and major contaminates from the outside air. This filter has no effect on moisture since moisture is a gas similar to air it passes right through the filter. The critical control of the DAC approach is to maintain the cabinet temperature above the dew point otherwise condensation will form inside the cabinet. This is especially critical in the early morning hours with cool moist air outside the cabinet. This must be accomplished by a combination of equipment heat and if necessary heaters to maintain the air temperature above the dew point. This is typically done by thermostats on the fans and heaters.

The air conditioner approach has an initially higher cost and operating expense than a DAC approach which uses fans in place of a mechanical gas conversion system and the operation of the fan is much lower than the air conditioner. Typically the selection of the air conditioner or DAC approach is determined by the average outside ambient conditions. If the outside average ambient conditions are in excess of 100 degrees F it is recommended that the air conditioner be used and below 100 degrees F the DAC may be used.

Heat exchangers are like the air conditioner a closed loop system; however the same conditions that affect the DAC approach are required to maintain the temperature above the dew point. Temperature control of the heat exchanger using a thermostat and a combination of equipment heat and auxiliary heaters is also required.