

Case study: Temperature & Humidity mapping study & qualification of a cold room in Qatar

Asset type : Cold room used for storage of medicines

Detailed scope of study:

1. Temperature mapping study (also known as Temperature distribution analysis)
2. Humidity mapping study (also known as Humidity distribution analysis)
3. Qualification study for the cold room

Qualification criteria:

1. Satisfactory execution of qualification protocol
2. Temperature should be always maintained between 2 and 8 Degree Centigrade
3. Humidity should be always maintained below 60%



Temperature qualification of cold room

Execution of the Procedure

1. Mapping study:

Temperature mapping and humidity mapping were carried out by installing 30 temperature & humidity data loggers and collecting data for one week. During the study, various operational parameters were noted down. Other tests including door opening test and power failure tests were carried out.

The mapping study was carried out under two conditions viz. 30% loaded condition and 90% loaded condition

All the data was analyzed separately and detailed report were produced.

2. Qualification study

Temperature qualification study was carried out by executing relevant segments protocol. The procedures carried out were installation qualification and operational qualification.



Temperature mapping study of cold room

Results of qualification study

1. Installation and operation verifications were satisfactory

2. Temperature of a certain area was below 2°C at certain times
3. Humidity of the entire cold room was above 70% for most of the time

Reasons for failure of temperature distribution study

The reason was Low temperature at certain areas

One area was always going below 2 Degree Centigrade in spite of trying different temperature settings for the cooling unit. We tried different settings from 5 degree to 7 Degree centigrade. However this area had a direct air throw from the fan units and hence was going below 2 Degree Centigrade many times. Sometimes it reached even zero degree centigrade.

As per the protocol for the temperature mapping study and qualification, the entire area should remain within 2 to 8 Degree Centigrade at all times. Since there were temperature excursions, the cold room was not qualified and corrective actions need to be implemented.

Reasons for failure of Humidity distribution study

The reason was High humidity in the cold room

It was observed that the humidity inside the cold room was between 80-80% RH for most of the duration. This has to be brought down to 55-60%

Corrective action for qualifying the cold room

1. Correcting temperature distribution

The challenge was that the air blower of both the cooling units were facing a common area in the cold room and hence was getting over cooled. In order to correct the problem, we had to redirect the air flow and there were no other options. Physically relocating the fan units will involve huge investment of time and money and the cold room will have to be shut down for couple of weeks.



Air diffuser for distributing air uniformly

Hence we suggested to diffuse the air through a custom built diffuser duct made of cloth as per the image to the right. This air diffuser was fitted at the mouth of the air blower. The diameter and length of the diffuser is calculated based on the capacity of the cooling units and the size of the opening. The diffuser was routed to different corners of the cold room to equalize the air distribution. The diffuser is fitted just below the ceiling of the cold room. This prevented the direct air throw producing a cold area.

2. Reducing humidity

The humidity can be reduced by installing desiccant type dehumidifiers. For determining the required capacity of the dehumidifier, necessary calculations were carried out and a model which could reduce the humidity up to 50% was selected.

Retesting after corrective actions

After installation of the diffuser ducts, the cold room was retested at different settings and achieved uniform condition at 4.5 Degree Centigrade and was qualified.

The dehumidifier could bring the humidity under 60% and hence the cold room was qualified for humidity distribution as well



Dehumidifier for cold room

Conclusion of the mapping study and qualification

After implementing the corrective actions, the temperature and humidity distribution across the entire cold room was within the permitted levels and hence was satisfactorily qualified.

Notes on terminology:

Various other terminology generally used are:

- Thermal mapping
- temperature distribution study
- temperature distribution analysis
- temperature certification of cold room
- temperature validation of cold room

Should you require free consultation on temperature mapping study and qualification please provide your details at : <http://www.vackerglobal.com/tempearture-mapping-evaluation.html>