



Thermal and Humidity Barrier

A leading cooperative dairy faced severe temperature issues at their cold rooms resulting in conditioned air losses due to which end quality of dairy products stored were affected. Subsequently as a result of conditioned air losses, a longer cooling time was required to cool the room, which in turn led to higher power consumption.

Problem

Cold rooms for storage of dairy products had doors open for considerable time during loading and unloading periods. This resulted in heavier cold air escaping out from near around floor level whereas warm humidity laden air from outside entered cold room from topside of the opening to take place of cold air.

Further, air curtains supplied by turnkey contractor were not of appropriate size and correct air draft specifications to cover the entire width & height of the sliding doors. Moreover, we also found the installation position of the unit incorrect.

This leads to refrigeration system working for longer duration in trying to retain desired cooling and overcoming frost formation on cooling tubes.

Buyer had attempted to solve this issue by installing PVC strip curtains, which though not a solution slowed the air transfer rate by 10-20% but did not prevent it entirely. Since this physical barrier of PVC strip was hindering material movement, workers tied up the loose end of strips to ease their inconvenience, thereby defeating the very purpose of strip installation.

Site Conditions

For a 60" wide x 96" high opening with sliding doors problem experienced was – 4C conditioned air escapes cold room through lower part of opening due to high outside temperatures of 40C+, instead high humidity outside air [due to usage of water for hygiene purpose*] enters cold room from top of opening. Further being a loading and unloading bay, outside wind conditions also played a role in aggravating these unfavorable conditions.

These developments create a double whammy situation for client – energy used to cool the cold room air is wasted as a lot of air escapes out whereas outside air, entering inside, being warmer and laden with humidity creates frosting on cooling coils over a period of time – this results in longer working of power consuming refrigeration systems as well as frequent defrosting is required.

Solution

Acme Air Curtains designed a set of air curtains, EHV-72 wherein unit secured the complete width of the door with an effective air barrier. Air flow was specifically designed to provide extended length cover all the way through the free end of the door, because the air curtain was installed almost 8 inches away from actual opening – parallel to sliding door mechanism on warmer side – to prevent air leaks and infiltration from the sides of air curtain's air draft.

Secondly, the air draft speed was considered 13-15 m/sec average speed to counter differential pressures arising due to temperature variance and outside wind conditions so as to allow the air draft to be evenly formed all across the opening from top to bottom with a gradual reduction in speed as it travels from top to bottom. After striking the floor at 1.0-1.5 m/sec air speeds this air draft with a trifle tilt on outwards.

End result

With a correct air curtain model installed at the right place, buyer was successful in preventing outside air ingress into the cold room which was very evident with near negligible frosting developing over long stretches of loading and unloading activity at the cold room.

The secondary benefit experienced with this air curtain installation was that of virtual frost free, dry floors which were not slippery and hence added to the safe working environment for their team. Their team could manage and control material handling trolleys more efficiently.

Further efficacy of unit's air draft led to removal of PVC strips from cold room doors, which brought in ease and total visibility during material loading and unloading activity.

Final testimony of this buyer's delight was replacing all 15 cold room air curtains with Acme Air Curtain's EHV-72 air curtain model.