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Technical Resource Center

Part Three

Construction of a Controlled Space

To prepare any space for humidity control, certain precautions are necessary, regardless of the type of air drying equipment or the method used to do the drying.

Satisfactory moisture control — better known as customer satisfaction — depends on the many variables. Some are listed below.

The Nature of Water Vapor

Consider two closed rooms, adjacent to one another. If the partial pressure of the water vapor in room #1 are greater than the partial pressure of the water vapor in room #2, then the water vapor will travel through the wall into room #2 regardless of the composition of the wall.

Let's take the hypothetical example a step further. If the absolute humidity of the air in room #1 is greater than that of the air in room #2, then the water vapor pressure will be higher in room #1. Therefore, when drying room #2, the problem of new water coming through the wall from room #1 must be considered.

A vapor barrier can slow down the passage of vapor from wet to drier areas, but it cannot keep water out; it can only slow the rate of penetration.

The choice of vapor barrier is based on the degree of dryness required in the controlled space, the efficiency of the equipment being used for drying, and the cost of construction.

Commercial vapor barriers—moisture resistant construction material, paints, and other coatings—offer a variety of design alternatives. Manufacturers of vapor barrier materials can supply specific information on their products.

In addition to the vapor barrier, certain aspects of construction must be given careful attention.

Construction Considerations

Several techniques control the permeation of water vapor:

1. Any vapor barrier must be continuous, without breaks or tears.
2. All lap joining must be tightly closed (this is particularly critical when mechanical or caulked joints are used).
3. Insulation between vapor barriers can be a potential problem: if construction occurs in humid weather, water can be "sealed in" between the two vapor barriers.

Sealed-in vapor will travel into the controlled space and impose an extra drying load on the drying equipment. This extra load lasts only until the insulation dries out, but meanwhile, humidity control is difficult.

If a heat source is present (even heat from the sun), serious damage can be caused by the expanding trapped vapor. There have been cases when so-called "non-permeable" materials have split open at a joint because of vapor pressure. Examples include a floor or tiled wall that has literally lifted from its mounting surface because the surface was wet during application.



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4. Final inside vapor barriers should be applied only after the enclosed area has been dried. Drying equipment should be used to withdraw as much moisture as possible before the final barrier is applied. Of course, without a barrier in place equipment cannot dry the air to design specifications, but a significant amount of moisture can and should be removed before all the vapor barrier material is in place.

(Although this strategy runs counter to most industrial planning suggestions, the concept of drying the structure before applying the final vapor barrier is a precaution that is often overlooked and can help prevent customer dissatisfaction.)

5. All doors-service or personnel-should be weather-stripped or air-locked through vestibules if the desired dryness warrants it. Any crack or opening around a door will admit vapor.

6. When conveyor openings or similar elements are used, a drop curtain, shroud, or tunnel can restrain the movement of water vapor.