

the passage of vapor, and should be so applied that they are continuous and unbroken.

The interior construction of the wall may also be made of vapor resistant material, or some vapor resistant coating may be applied to the inner or warm surface of the wall.

In applying vapor resistance to a wall, there are certain fundamental principles which should be followed. First, the vapor barrier should be placed as near to the warm surface of the wall as practicable. Second, it should be continuous with no direct openings through the barrier. Good workmanship and application are very important. Openings between spaces which may be at only slightly different temperatures, offer a path for transfer of large amounts of water vapor. If membrane barriers are used back of the plaster of interior finish, the joints should be lapped over some solid framing member, and not between the studs or in similar places. Usually a two-inch lap over a framing member will make a sufficiently tight joint when the interior finish is applied. Such a lap, however, without backing would not be adequate. Barriers attached to the warm side of insulation should form a continuous unbroken membrane over the entire insulated area. Edges should be lapped over framing members; ends of strips should be fastened to plates or headers. All openings for electrical fixtures and joints around window and door casings should be carefully sealed. Holes accidentally made in the barrier should be sealed.

The limiting permeance for a vapor barrier material will depend upon the requirements. For ordinary residential work, it has generally been considered that a material having a permeability of 1 grain of moisture per (sq ft) (hr) (in. Hg vapor pressure) difference across the barrier is adequate. There are cases, however, in residential construction where a barrier having a permeability of 1.00 would not be sufficient, and there are also many industrial applications in which a very much higher vapor resistance is required. The best time to vapor-proof a building is during its construction. After the building is completed, the remedies are limited largely to operational control and surface treatment of the structure.

Ventilation of Structure

Condensation difficulties may often be eliminated by lowering the dew-point temperature or the relative humidity by ventilation. It is much more practicable to apply ventilation in open spaces than it is in interior parts of the structure. For a wall construction it is far better to seal the warm surface so that the vapor cannot enter, than it is to try to ventilate the vapor out of the wall once it has entered. It is always preferable to eliminate the moisture at its source rather than to rely on ventilation.

Condensation on the interior surface of cold attic walls and roofs may be eliminated by ventilation. However, in new construction and in other places where practicable, it is far better to use vapor barriers and other means to prevent the vapors from entering the attic space. Ventilation is often uncertain in its effect and, furthermore, it is a source of some heat loss. Where ventilation is used for attics or other parts of a building, precautions must be taken to see that the air is adequately distributed throughout the space to be ventilated. No fixed amount can be given for the ventilation required, but for the ordinary home with gravity attic ventilation, the inlet and outlet openings should be well distributed, and the total free opening area of each should be one-quarter square inch per square foot of floor. These openings should be distributed with due re-

gard to the type of construction, outside wind velocities, and all factors which affect the circulation of air. The conditions are so varied that no hard and fast rules can be set down to cover all cases. The best defense against condensation on attic walls and other similar surfaces, is to prevent the vapors from entering these spaces. Ventilation is a precaution, but not the best direct solution of most condensation problems.

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