Class A. For uses where a high degree of water vapor resistance is required.
Class B. For uses where a lower degree of water vapor resistance and of water resistance is required.
Class C. For uses where a moderate degree of water resistance is required.
Class D. For uses where low resistance to water vapor is required.

It may be noted that a paper may be *water-proof, i.e.* possess water resistance, and still have low water vapor resistance.

Detail requirements in these specifications are given as follows, the specified WVT Test being a dry method at 73 F:

Class A paper shall have a minimum tensile strength in each direction of either 35 lb per inch width, or 20 lb per inch width, as specified in the invitation for bids. Paper of both strengths shall have a minimum water resistance of 24 hr, and a maximum water vapor permeability (WVT) of 4 grams per (square meter) (24 hr) *i.e.* 0.576 perm.

Class B paper shall have a minimum tensile strength in each direction of either 35 lb per inch width, or 20 lb per inch width, as specified in the invitation for bids. Paper of both strengths shall have a minimum water resistance of 16 hr, and a maximum water vapor permeability (WVT) of 6 grams per (square meter) (24 hr) *i.e.* 0.864 perm.

Class C paper shall have a minimum tensile strength in each direction of either 35 lb per inch width, or 20 lb per inch width, as specified in the invitation for bids. Paper of both strengths shall have a minimum water resistance of 8 hr.

Class D paper shall have a minimum tensile strength in each direction of 20 lb per inch width. The paper shall have a minimum water resistance of 10 min., a minimum water vapor permeability (WVT) of 35 grams per (square meter) (24 hr) *i.e.* 5.04 perms.

TABLE 2. CONVERSION FACTORS FOR VAPOR TRANSFER UNITS

To Obtain ↓ / Multiply Number of → / By		WVT Units: grams / (24 hrs) (sq m)	WVT Units: grains / (hr) (sq ft)
grams / (24 hrs) (sq m)	by same method*	1	16.7
grains / (hr) (sq ft)	by same method*	0.0597	1
Perms by same method*	method A & B, 73.4 F	0.144	2.41
	method C & D, 90 F	0.084	1.41
	method E, 100 F	0.0344	0.575

Nominal Test Conditions		% Relative Humidity on the Two Sides of Specimen:	
Method	Temperature-F	In cup	Outside cup
A	73.4	0	50
B	73.4	100	50
C	90	0	50
D	90	100	50
E	100	0	90

* Data obtained by one method cannot be reliably converted to another method.

To convert $\frac{\text{grams}}{(24\text{ hr})\ (\text{sq m})\ (\text{mm Hg})}$ to *perms* multiply by 1.52.

VISIBLE CONDENSATION

Just as moisture collects on the outer surface of a glass of cold water, so does it also condense on other cold materials. In winter, visible condensation may collect on cold closet walls and attic roofs and is commonly observed on frosted window panes. Although condensation, if liquid, may enter an unpainted surface as fast as it forms and thus be unseen, any condensation on a visible surface will for convenience here be called *visible condensation* to distinguish it from *concealed condensation*. Within residences and public buildings, visible condensation occurs in winter and may damage decorative finishes and window sash.

Interior visible condensation occurs when any surface is colder than the dew point of the near-by air. The temperature of any such surface—wall, roof, or glass—is dependent upon the air temperature inside and outside the building and the heat transfer coefficient U of the surface structure. Based on a value of 1.65 for the inside surface conductance, Fig. 4 shows the relative humidity in a room at 70 F when visible condensation will appear at various U-values. The curves for single and double glass at their usual U-values are included. It should be noted that U-values as commonly used are an average for a large area within which there may be spots, such as the studs in an insulated wall, where the transmittance is higher. The inside surface temperature of a wall will, in general, be lower at the bottom due to such things as stratification of inside air and the effects of air leakage and of convection in walls with air spaces. Since condensation seeks the coldest spot, values from Fig. 4 can be applied only with caution. As a result, the limit of relative humidity for a non-homogeneous wall is lower than might be inferred from its average U-value.

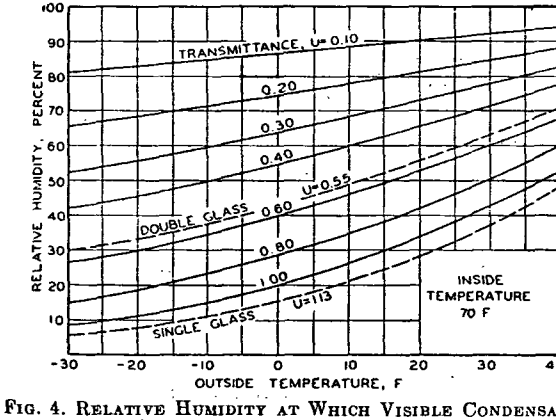

FIG. 4. RELATIVE HUMIDITY AT WHICH VISIBLE CONDENSATION WILL APPEAR ON INSIDE SURFACE

Normally, glass is the most likely spot in a heated room for appearance of condensation, but an uninsulated wall surface shielded from radiation by furniture, may be equally cold. In some cases where condensation is barely avoided, the surface, being but little warmer than the dew-point tempera-