TECHNICAL SALES BULLETIN 014

CONDENSATION ON WINDOWS

WHAT IS CONDENSATION?

Condensation appears as a light coating of water, water droplets, frost or ice, or some combination of these 4, and forms on any surface where the surface temperature is less than its dew point temperature. For example, if a glass has a surface temperature of 10 deg C and the dew point temperature for that glass is 13 deg C, condensation will form on the glass surface. Condensation will form when moist warm air comes into contact with a cold surface. The dew point temperature of a surface is directly related to the amount of moisture in the air i.e. relative humidity, as well as the temperature of the ambient air in the room. As the relative humidity in the room increases, the dew point also increases, which means that the window surface is more likely to exhibit condensation in areas of high relative humidity. When relative humidity levels approach 100% i.e. in kitchens and bathrooms at certain times, it is virtually impossible to prevent condensation forming on ALL surfaces. Conversely, in areas of low relative humidity i.e. cold & dry, the likelihood of condensation is virtually non-existent.

HOW DOES CONDENSATION AFFECT ME?

Apart from the immediately obvious problems of visual obstruction and water damage to window cills & finishes, a far more serious concern is the propagation of mould growth. Recent studies have shown that certain strains of mould can be fatal to humans.

HOW TO REDUCE THE INCIDENCE OF CONDENSATION?

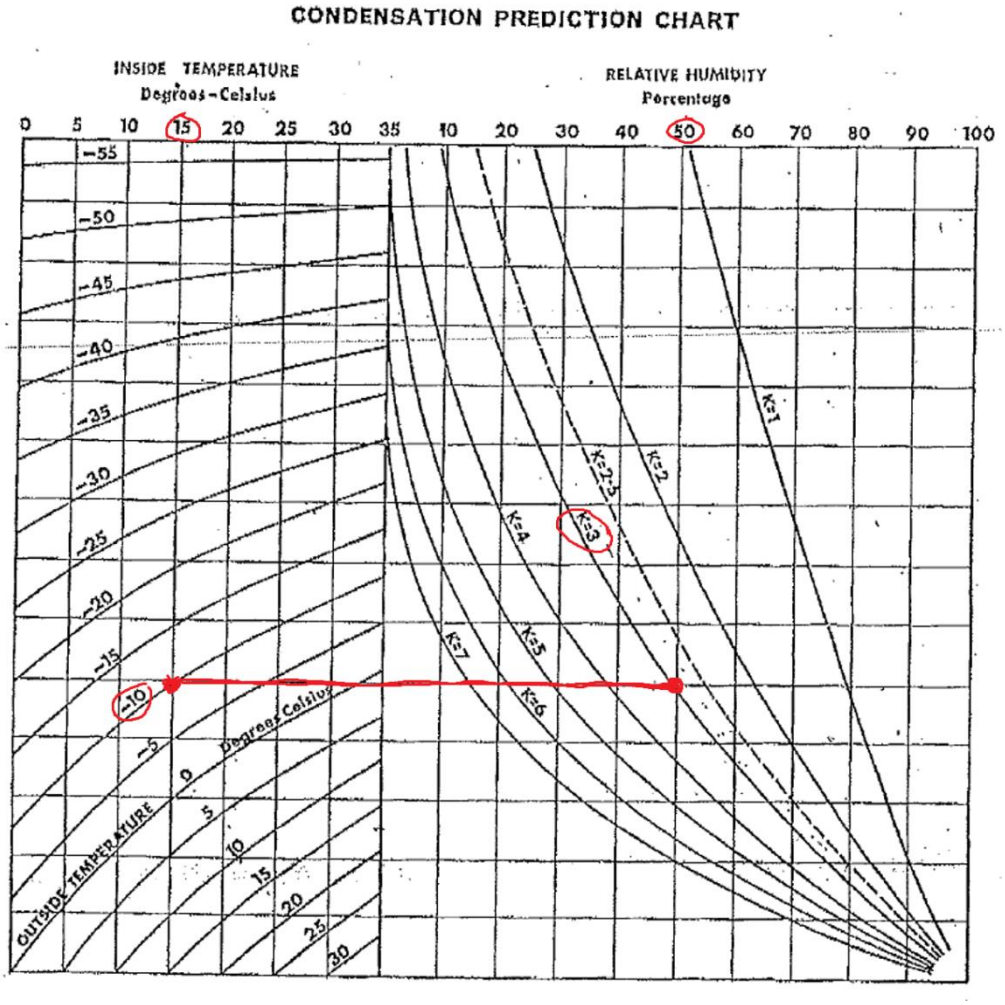
To reduce the risk of condensation, the temperature of the window must be kept above the dew point. This is best accomplished by reducing the heat transfer through the window i.e. reducing the U-value. The higher the U-value, the greater the risk of condensation. As condensation can form on any surface, it is important to ensure that the glass as well as the frame is thermally efficient.

a) Glass:
Changing from single to single Low E, or better yet, from single to double glazing, will greatly reduce the risk of condensation. For extreme climatic conditions, argon gas or triple glazing may be required.

b) Frame:
Switching from highly conductive framing material, such as steel or aluminium, to thermally-broken aluminium, uPvc or timber frames, will greatly reduce the risk of condensation on the frame and/or glass edge area.

HOW TO PREDICT THE RISK OF CONDENSATION ?

The condensation prediction chart below gives a general guideline of when condensation could be expected to occur.



To do a condensation risk assessment you will need to know at least 3 of the 4 values below, thereby enabling you to determine the 4th unknown value:-

a) Inside Temperature (ambient air temp in room).
b) Outside Temperature.
c) Relative Humidity of the air inside the room (if air-conditioned, assume 50% max).
d) U-value of the total window (glass plus frame). Called 'K' on the chart.

EXAMPLE:

Inside Temp: +15 deg C
Outside Temp: - 10 deg C
Relative Humidy: 50% (air-conditioned).
U-value: Unknown

Using the values above, you will find that you need an total maximum U-value of 3, 0 W/m2.K to prevent condensation. If the humidity was reduced to 30%, the total maximum U-value required would be 5, 0 W/m2.K.

Table 6 (below) from SANS 204 gives indicative overall window U-values.

Table 6 — Worst-case whole glazing element performance values

1	2	3	4	5
Glass description	**Performance values**			
	Aluminium/Steel framing		**Timber/PVCu/Aluminium thermal break framing**	
	Total *U*-value $W/m^2 \cdot K$	***SHGC***	**Total *U*-value** $W/m^2 \cdot K$	***SHGC***
Single – Clear	7,9	0,81	5,6	0,77
Single – Tinted	7,9	0,69	5,6	0,65
Single – Low *E*[a]	5,73	0,66	4,06	0,63
Clear double[b] (3/6/3)	4,23	0,72	3,0	0,68
Tinted double[b]	4,23	0,59	3,00	0,56
Clear double[b] low *E*[b]	3,40	0,66	2,41	0,62
Tinted double[b] low *E*[b]	3,40	0,54	2,41	0,51

NOTE 1 Glazing elements require total *U*-values and *SHGC*s and are assessed for the combined effect of glass and frames. The measurements of these total *U*-values and *SHGC*s are specified in the guidelines of the National Fenestration Rating Council (NFRC).

NOTE 2 *U*-value and *SHGC*s, based on the NFRC assessment methods are shown for some simple types of glazing elements in this table. (Smaller numbers indicate better glazing element performance.) This table gives worst case assessments which can be improved by obtaining generic or custom product assessments from suppliers, manufacturers, industry associations (including their online resources) and from competent assessors.

[a] Low *E* assumes emissivity of 0,2, or better.

[b] Low *E* coating to surface 3 of the double glazed unit.

Please do a few examples yourself, to ensure you are able to 'manipulate' the chart to determine the risk correctly. Shout if you need assistance.

Yours sincerely,

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