

insulating glass units and thermal insulation

Low Emissivity

Low emissivity coated glass is designed to reflect heat back into the building, trapping the warmth inside the room. When low emissivity coated glass is included in an insulating glass unit, the thermal insulation is significantly improved when compared to using uncoated glass.

What is Emissivity?

Emissivity is a surface property, so coating one material with another material is a method of changing the emissivity of that surface. So, if glass, which has an emissivity of 0.89, which is good at absorbing heat, is subsequently coated with a thin layer of gold, that has an emissivity of 0.1, then the surface emissivity of the coated glass becomes 0.1, and the surface becomes very poor at absorbing heat. Emissivity provides a relative measure of the extent to which a surface will absorb or emit radiation (heat). Numerically, emissivity has a value between 0 and 1. If a layer of plastic is applied to the coated surface, i.e. when laminating a coating against the interlayer, the emissivity will change, and no longer has the benefits of a low emissivity surface.

U value

The U value of an insulating glass unit may be calculated using the method in EN 673: Glass in building – Determination of thermal transmittance (U value) – Calculation method. This method calculates the centre pane U value of the glass and does not take into account the effects of spacer profile, sealants or frame. The calculation includes a number of variables, one of which is the emissivity of all the glass surfaces. Glazing U values are normally measured in W/m²K, which is the amount of heat transferred through one square metre of glazing, where there is a temperature difference of one degree Kelvin, between one side of the glazing and the other. This means that the lower the U value, the lower the heat loss through the glass. A typical double glazing unit made with two 6mm thick, uncoated clear glass panes, the emissivity of which is 0.89, and a 16 mm argon gas filled cavity has a U value of 2.6 W/m²K, whereas a double glazing unit made with 6mm clear glass in one pane and a 6mm low emissivity coated glass in the other, with an emissivity of 0.01, together with a 16mm argon filled cavity, has a U value of 1.0 W/m²K. It can be seen that the heat loss has reduced from 2.6 to 1.0 W/m²K by the addition of a low emissivity coating. A reduction in heat loss of more than 60%. Low emissivity coatings are normally positioned on surface 2 or 3 of a double glazing unit. The U value is the same when positioned on either of these surfaces, although the transmission properties and appearance of the glazing may be affected. Overleaf are a number of tables containing the U values for either air or argon filled cavities, in insulating glass units containing a low emissivity coating on one surface with the emissivity at the top of each table. Low emissivity coatings are usually positioned on surface 3. Solar control coatings are normally most effective positioned on surface 2.

Insulating Glass Units and Thermal Insulation

Low Emissivity Coated Glass		
E _n = 0.01, Planitherm One T		
Spacer (mm)	Air	Argon (90%)
10	1.8	1.4
12	1.5	1.2
14	1.4	1.1
16	1.3	1.0
18	1.3	1.1
20	1.3	1.1
22	1.3	1.1
24	1.3	1.1

Low Emissivity Coated Glass		
E _n = 0.03, Planitherm Ultra N		
Spacer (mm)	Air	Argon (90%)
10	1.8	1.4
12	1.6	1.3
14	1.5	1.1
16	1.4	1.1
18	1.4	1.1
20	1.4	1.1
22	1.4	1.2
24	1.4	1.2

Low Emissivity Coated Glass		
$E_n = 0.05$, Planitherm Total +		
Spacer (mm)	Air	Argon (90%)
10	1.9	1.5
12	1.7	1.3
14	1.5	1.2
16	1.4	1.2
18	1.4	1.2
20	1.5	1.2
22	1.5	1.2
24	1.5	1.2

Solar Control Coated Glass		
$E_n = 0.01$, Cool-lite SKN 176ii, SKN 154ii Cool-lite Xtreme 50/22ii SunGuard SN 70/37, SN 51/28, SN 40/23		
Spacer (mm)	Air	Argon (90%)
10	1.8	1.4
12	1.5	1.2
14	1.4	1.1
16	1.3	1.0
18	1.3	1.1
20	1.3	1.1
22	1.3	1.1
24	1.3	1.1

Solar Control Coated Glass		
$E_n = 0.03$, Cool-lite SKN 174ii, SKN 144ii SunGuard SN 70/41, SN 29/18		
Spacer (mm)	Air	Argon (90%)
10	1.8	1.4
12	1.6	1.3
14	1.5	1.1
16	1.4	1.1
18	1.4	1.1
20	1.4	1.1
22	1.4	1.2
24	1.4	1.2

Solar Control Coated Glass		
$E_n = 0.89$, Stopsol Classic, Supersilver		
Spacer (mm)	Air	Argon (90%)
10	2.9	2.8
12	2.8	2.7
14	2.8	2.6
16	2.7	2.6
18	2.7	2.6
20	2.7	2.6
22	2.7	2.6
24	2.7	2.6

Uncoated Clear, ExtraClear, Low Iron and self-cleaning coatings Activ and Bioclean all have a surface emissivity of 0.89.

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