

Introduction

By their nature insulated glazing units have a sealed cavity containing air or other gas. At the time of manufacture the pressure of the gas in the cavity will be the same as the external pressure. Changes in the external pressure after manufacture due to changes in altitude or weather conditions will therefore set up pressure differences across the glass panes.

The volume, pressure and temperature of a fixed quantity of gas are interdependent hence changes in the temperature of the gas within the cavity will cause changes in its volume or pressure or both.

This technical note considers the significance of the potential effect of pressure on insulated glazing units.

Causes of Pressure change

The three causes of pressure differences between the cavity and the external air are as follows:

1 Atmospheric pressure

Atmospheric pressure varies according to the weather between about 960mbar and 1040mbar. Unless the pressure is controlled during manufacture, the units could be sealed at any point within this range. A unit sealed at a pressure of 960mbar would always be subject to an external pressure at least as great as the internal pressure with a maximum pressure differential of 80mbar or 8000Pa. A unit sealed at a pressure of

1040mbar would always be subject to an external pressure less than or equal to the internal pressure with a maximum pressure differential of 80mbar or 8000Pa. Most units would be sealed at an intermediate pressure and subject to a varying external pressure which will sometimes exceed and sometimes be less than the internal pressure. Unless the pressure is controlled at the time of sealing, the most adverse pressure differential should be considered in design.

2 Temperature

The pressure, temperature and volume of a fixed quantity of gas are related by the formula

$$\frac{PV}{T} = K$$

where

P is the pressure

V is the volume

T is the absolute temperature

K is a constant

Thus if the temperature increases the pressure or volume will also increase. Assuming the volume does not change the rate of change of pressure is 340Pa/K.

Under normal conditions in the UK the temperature of the gas in the cavity of an IGU could be expected to vary between 5°C and 45°C giving a potential pressure change of 13600Pa. If solar control glasses are used higher temperatures are likely to occur when