

GGF Datasheet: Recommendations for Adhesive Backed Polymeric Film Applied to Glass: - Guidelines for Installation onto Existing Glazing

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Introduction

The application of adhesive backed polymeric film to already installed glass has been taking place in the U.K. for over 40 years. The early adhesive backed polymeric films were being used for 'solar control' and as such they were highly metallised/dyed and a few problems of thermal breakage were experienced.

However, since that time the types of adhesive backed polymeric films available and the number of applications has grown enormously. In the U.K. the market expanded to include 'human impact safety', i.e. converting annealed glass into a 'safety glass'.

Unfortunately, the early experience has not been forgotten. This has led to a position whereby if an adhesive backed polymeric film is applied to a glass product, then it is not unknown for the supplier of the glass product to state that the "warranty is now void". This is an untenable position as the majority of adhesive backed polymeric films will have no detrimental affect what so ever on the existing glass product.

1. Scope

This GGF Datasheet explains the influences of adhesive backed polymeric film on installed glass products. It details the checks that need to be under taken to ensure that the application has no detrimental effect, i.e. increase risk of thermal breakage on the glass product.

Thermal stress is explained and a design methodology outlined.

A list of glass product types together with their possible vulnerability to adverse performance resulting from the application of adhesive backed polymeric film is given.

2. Definitions

The definitions contained within GGF Datasheet 5.18.1 together with the following apply:

2.1 External film

A type of adhesive backed polymeric film that is designed to be applied to the external surface of the installed glazing.

2.2 Internal film

A type of adhesive backed polymeric film that is designed to be applied to the internal surface of the installed glazing.

2.3 Safe temperature difference

Maximum temperature difference that a glass can resist without the likelihood of thermal breakage.

NOTE: This is dependent on glass type and the quality of the glass edge.

2.4 Thermal breakage

Breakage of a glass pane caused by excessive thermal stress.

NOTE: Thermal breakage always originates at a glass edge.

2.5 Thermal stress

Stress produced in the edge of a glass pane as the result of centre of pane to edge of pane temperature difference.



3. Check List

3.1 General

The factors that influence the acceptable performance of an adhesive backed polymeric film when installed on a glazed glass pane depend upon both the film and the glass together with the details of the glazing.

For the purpose of this checklist the term 'acceptable performance' relates to the integrity of the glass pane, i.e. remaining unbroken and on-going durability of the glass product.

3.2 Details of film

The influence of the adhesive backed polymeric film on 'acceptable performance' is dependent upon the following factors:

- Position of installed film, e.g. internally or externally;
- Spectrophotometric properties of the film, i.e. solar heat reflectance, transmittance, absorbance and emissivity;

3.3 Details of installed glass

The influence of the glass on 'acceptable performance' is dependent upon the following factors:

- Glass type, e.g. float, sheet, patterned, wired, etc.
- Type of glazing
- Single Glazed
- Double Glazed
- Triple Glazed
- Processing the glass has received, e.g. heat strengthening, thermal toughening, laminating, insulating glass unit manufacture;
- Glass thickness and pane size have an influence on final combination choices.
- Type and quality of the glass edge.

With respect to the influence on thermal stress, the ideal situation is a clean, as-cut edge on the glass. However, there is always the possibility of glass edges being produced to a lesser standard.

The glass industry has available documents that define the acceptable edge. They also define unacceptable edges e.g. shelled, vented etc.

The safe temperature difference, see 4, always relates to a glass edge that is acceptable.

3.4 Details of glazing system

3.4.1 General

The following is a non-exhaustive list of the factors that need to be taken into account when the risk of thermal breakage is being considered.

3.4.2 Framing and glazing method

The frame material, construction and the glazing method must be taken into account when considering film to glass compatibility.

Examples of framing and glazing materials include;

- Metal
- PVC-u
- Timber
- Frameless
- Concrete
- Rubber gasket
- Silicone

3.4.3 Heating and cooling sources

It is important to identify the presence of both heating and cooling sources that can create a sudden temperature differential across the glazing.

3.4.4 Internal shading

Consideration must be given to any internal structure or other system that may create an increased build-up of heat. The most common examples of internal shading are:

- Window blinds
- Curtains
- Shutters
- Grilles
- Painted signs, labels and decals

It is imperative to identify both the colour of any internal shading and its proximity to the glass. Additionally the presence of a structural pocket (such as a void created by a suspended ceiling close to the window) must also be considered.

3.4.5 External shading

Consideration must be given to any external structure, system or object that may create a shadow line across the glazing creating a temperature

differential across the glass. The most common examples of shading are: -

- Building overhang
- Adjacent building structures
- Brise soleil
- External shutters
- External blinds
- Pillars and columns
- Painted signs, labels and decals
- External grilles
- Landscape

3.4.6 Location

It is important to identify the building orientation including the elevation and altitude together with winter and summer design temperatures.

4. Thermal Stress Determination

It is expected that any adhesive backed polymeric film installer will be able to offer to undertake an appropriate design calculation.

THE RESULT OF THE DESIGN CALCULATION SHALL BE CHECKED AND APPROVED BY THE ADHESIVE BACKED POLYMERIC FILM MANUFACTURER.

The calculation method consists, in principle, of the following: -

- Determination of the basic temperature difference for the glass/film combination based on location, environmental factors, etc.
- Increase temperature difference taking account of blinds, back-ups, etc.
- Modify by frame factor and external shading.
- Compare the total temperature difference with the safe temperature difference.
- If total temperature difference is less than or equal to the safe temperature difference then there is no risk of thermal breakage.

As stated in 3.3 and providing the above points have been followed and then the risk of thermal breakage is dependent upon type and quality of the glass edge.

It should be recognised that this does not exclude the possibility of thermally propagated fractures.

The glass edge may be subjected to damage during manufacture, transportation or installation. However, the

condition of the glass edge cannot be determined at the time of film application

5. Recommendations

The following is a list of applications where the addition of an adhesive backed polymeric film will not cause a breakage risk:

- Clear safety film on ANY glass type.
- ANY film type on a 'thermally treated glass', i.e. heat strengthened glass, thermally toughened safety glass, heat soaked thermally toughened safety glass (see GGF Datasheet 4.4.1).
- ANY film type on a laminated glass/laminated safety glass manufactured from 'thermally treated glass' (see GGF Datasheet 4.11).
- ANY glass/film combination glazed 'frameless', i.e. bolt fixed thermally treated glass, or structural sealant glazing.

NOTE: Both frameless glazing methods ensure that the edges of the glass are not covered up and therefore there is no possibility of a centre/edge temperature differential.

6. Other Considerations

Whilst this GGF Datasheet deals with the risk of breakage due to thermal stress there are a number of other points that need consideration:

- The application of an adhesive backed polymeric film to an insulating glass unit, assuming that the film is not within the glazing system, should not affect the IGU lifetime.
- Care should be taken when applying any adhesive backed polymeric film to a laminated glass/laminated safety glass as there is a possibility that the mechanical loading associated with the application may cause breakages from poorly cut glass edges.
- Care should be taken when applying adhesive backed polymeric film to laminated glass incorporating an intumescent interlayer as the increase in temperature of the interlayer may produce changes, i.e. opaque spots, changes in colour/clarity/haze.

7. References

7.1 GGF Datasheets

For information on all of the 5.18 series of Datasheets see 5.18.