

GGF Datasheet: Recommendations for Adhesive Backed Polymeric Film Applied to Glass: Definitions, Descriptions and Components

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Introduction

This GGF Datasheet is part of the 5.18 series.

1. Scope

This GGF Datasheet provides definitions and descriptions of common terms used in all GGF Datasheets relating to adhesive backed polymeric film applied to glass.

Specific terms will be found with the appropriate part of the 5.18 series.

2. Definitions and Description

2.1 Adhesive backed polymeric film

One or more layers of polymeric film laminated together, with an adhesive on one external face. It may also incorporate one or more of the following: Colouring, UV absorbers, UV inhibitors, metal layer(s), metal alloy layer(s), metal oxide layer(s), scratch or abrasion resistant surface, release liner.

Details on adhesive backed polymeric film can be found in EN 15752-1: Glass in building - *Adhesive backed polymeric film – Part 1: Definitions and requirements.*

2.2 Safety film

Adhesive backed polymeric film designed so that when applied to a glass pane the final product can be classified in accordance with EN 12600 Glass in Building – *Pendulum*

test – Impact method test and classification for flat glass. Safety film is also known as 'Anti-Shatter film' or ASF since it is intended to retain broken glass fragments and hence reduce shattering of glass over a wide area.

2.3 Security film

Adhesive backed polymeric film designed so that when applied to a glass pane the final product can be classified in accordance with an appropriate standard for security glazing, such as: -

EN 356 Glass in building: *Security glazing: Testing and classification of resistance against manual attack*

EN 13541 Glass in building: *Security glazing: Testing and classification of resistance against explosion pressure.*

Security film is also known as 'Anti-Shatter film' or 'ASF' since it is intended to retain broken glass fragments and hence reduce the spreading of shattered glass over a wide area.

2.4 Thickness

The total thickness of the safety film is the sum of the thicknesses of its polyester film layers, excluding the thicknesses of adhesive and other coatings.

2.5 Cure time

The time required for the adhesive backed polymeric film to achieve its expected adhesion level and for visual effects due to water haze/water bubbles/etc. to disappear.

NOTE: Cure time should not be confused with performance time. Safety film will, with the correct installation procedures, achieve good performance before complete cure.

2.6 Containment system

A system designed to attach safety film to the glazing system in order to reduce the risk of the 'glass + safety film' exiting the frame, thereby enhancing the protective effect of the safety film. The 'safety film + containment system' may be used for blast mitigation and for containment of glass in the overhead position in the event of glass failure.



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NOTE: Containment systems should not be confused with the containment characteristics for personal safety given in EN 12600.

2.7 Risk assessment

An assessment made by a trained and experienced professional in order to identify the potential risks: -

1. to glass due to thermal stress,
2. to people:
 - a. from unsafe glazing.
 - b. from lack of containment with overhead glazing.
 - c. from glazing broken in an explosion.

NOTE: The GGF has a list of approved manufacturers and installers who offer professional risk assessments.

2.8 Non-vertical overhead glazing

Glazing which is above head height where there is general access to the areas beneath and has a slope of > 15° from the vertical.

2.9 Vertical glazing

Glazing which is truly vertical or has a slope of ≤ 15° from the vertical.

2.10 Machine Edges

These are the two edges running along the length of a roll of film as supplied by the manufacturer.

3. Components – Substrates

Adhesive backed polymeric film can be applied to any of the glass substrate as described below:

- 3.1 Basic soda lime silicate glass products in accordance with EN 572-1
- 3.1.1 Float glass in accordance with EN 572-2
- 3.1.2 Polished wired glass in accordance with EN 572-3
- 3.1.3 Drawn sheet glass in accordance with EN 572-4
- 3.1.4 Patterned glass in accordance with EN 572-5
- 3.1.5 Wired patterned glass in accordance with EN 572-6
- 3.1.6 Wired or unwired channel shaped glass in accordance with EN 572-7
- 3.1.7 Supplied and final cut sizes in accordance with EN 572-8

3.2 Special basic products

- 3.2.1 Borosilicate glasses in accordance with EN 1748-1-1
- 3.2.2 Glass ceramics in accordance with EN 1748-2-1
- 3.2.3 Basic alkaline earth silicate glass – Float glass in accordance with EN 14178-1
- 3.2.4 Basic alumino silicate glass products in accordance with EN 15681-1

3.3 Mirrors – manufactured from silvered float glass in accordance with EN 1036-1

3.4 Painted glass for internal use in accordance with prEN 16477-1

3.5 Thermally and chemically toughened / strengthened

- 3.5.1 Thermally toughened soda lime silicate safety glass in accordance with EN 12150-1
- 3.5.2 Heat soaked thermally toughened soda lime silicate safety glass in accordance with EN 14179-1
- 3.5.3 Thermally toughened borosilicate safety glass in accordance with EN 13024-1
- 3.5.4 Thermally toughened alkaline earth silicate safety glass in accordance with EN 14321-1
- 3.5.5 Heat soaked thermally toughened alkaline earth silicate safety glass in accordance with EN 15682-1
- 3.5.6 Heat strengthened soda lime silicate glass in accordance with EN 1863-1
- 3.5.7 Chemically strengthened soda lime silicate glass in accordance with EN 12337-1

3.6 Laminated glass and laminated safety glass in accordance with EN ISO 12543-1

3.12 Coated glass in accordance with EN 1096-1.

4. Components – Adhesive Backed Polymeric Film

4.1 Components typically used in the manufacture of adhesive polymeric film are:

- Biaxially oriented polyethylene terephthalate (polyester) film as the base film
- Laminating adhesive
- Mounting adhesive
- Hard surface coating, e.g. Scratch Resistant (SR) or Abrasion Resistant (AR)

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- UV absorbers/inhibitors
- Pigments and dyes
- Metal coatings
- Release liner

4.2 Polyester base film

Biaxially oriented polyethylene terephthalate film is used in the manufacture of adhesive backed polymeric films due to its excellent tensile properties, glass-like visible light transmission, low haze, and good dimensional stability. The exact type of polyester base film used depends upon the end use requirements of the adhesive backed polymeric film.

The properties of the polyester base film, especially for safety and security films, must be carefully balanced in order to obtain the required end-use performance for the final product.

Further information on the manufacture and properties of polyester film can be obtained from polyester film manufacturers such as Hoechst, Mitsubishi and DuPont, Teijin Films.

4.3 Laminating adhesive

Appropriate laminating adhesives are selected for their durability, performance and optical qualities, and are used to laminate layers of polyester film together.

NOTE: Not all adhesive backed polymeric films have laminated structures, but most do.

Different layers of polyester films are used to either enhance the main property of the final product or, more usually, so that the final product has a combination of properties. A variety of different adhesive types are used including acrylic pressure sensitive and polyester adhesives.

For all types of adhesive backed polymeric films, the laminating adhesive must have high optical transmission, low optical haze, good adhesion to the two polyester film surfaces (included coated surfaces), and long durability. For adhesive backed polymeric films other than safety and security films, the laminating adhesive merely needs to hold the polyester film layers together over the life of the product, so is usually a fairly thin coating of a few microns thickness.

For safety and security films the laminating adhesive is usually much thicker and of higher adhesive strength; the increased adhesive thickness and strength improves the safety/security performance of the final product.

4.4 Mounting adhesive

An adhesive is added to one surface of the single or multi-ply structure to allow the film to be installed onto a glass surface

As with laminating adhesives, the mounting adhesive must have high optical transmission, low optical haze, good adhesion to the polyester film surface, good adhesion to glass, and long durability. UV absorbers and/or UV inhibitors are often added to add extra durability.

Adhesive backed polymeric films use either acrylic pressure sensitive mounting adhesives or so-called 'dry water activated' mounting adhesives. The 'dry' adhesives may have improved clarity, effectively zero distortion, and enhanced durability.

Acrylic pressure sensitive adhesives are sticky to the touch and generally adhere to any surface on contact. 'Dry water activated' adhesives are not sticky to the touch but are chemically activated upon contact with moisture. Normally, a soapy water solution is used to install the adhesive backed polymeric film onto the required glass surface; the soapy water allows the film to be positioned on the glass, prevents unwanted adhesion of pressure sensitive adhesives, and activates 'dry' adhesives.

Some manufacturers add a 'de-tackifying' coating onto pressure sensitive mounting adhesive; this coating acts as a lubricant during installation, allowing low soap or soap free installation if desired. This system should not be confused with 'dry water activated' adhesives.

4.5 Hard surface coating

A coating is added to the surface of the laminated film opposite to the mounting adhesive coated side. This coating provides scratch or abrasion resistance to the adhesive backed polymeric film, giving many years of useful life with minimal surface damage when used and maintained correctly.

4.6 UV absorbers/inhibitors

UV absorbers/inhibitors are used within an adhesive backed polymeric film to enhance its durability and UV filtering properties. The UV absorbers/inhibitors are added to the mounting adhesive and/or the laminated structure. When used within the laminated structure, the UV absorbers/inhibitors are either added as a coating or are deep dyed into one or more layers of polyester film.

4.7 Pigments/dyes

Pigments and dyes are used to impart colour and tint to the adhesive backed polymeric film. Some films use colour/tint in the mounting adhesive, the laminating adhesive, the

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hard surface coating, or as a coating; more often the colour/tint is deep dyed into one or more layers of polyester film.

4.8 Metal coatings

One or more layers of polyester film are metallised or sputtered with metals or metal alloys; occasionally metal oxides and/or other metal containing materials may be used. These coatings are designed to add solar control, low 'E' or other properties to the adhesive backed polymeric film.

NOTE: For discussions of metallizing and sputtering processes, refer to the various on-line encyclopaedias available.

4.9 Release liner

A polymeric film used to cover the mounting adhesive and prevent contamination before installation of the adhesive backed polymeric film to a glass surface. Some adhesive backed polymeric films use a 'de-tackifying' coating rather than a release liner.

5. Standards and References

5.1 Standards for adhesive backed polymeric film

Standards for adhesive backed polymeric film/filmed glass have been prepared by CEN TC129/WG 18. The published titles are: -

EN 15752-1: Glass in Building-Adhesive Backed Polymeric Film-Part1: Definitions and Requirements

EN 15755-1: Glass in Building-Adhesive Backed Polymeric Filmed Glass-Part1. Definitions and Requirements

NOTE: Other standards for adhesive backed polymeric film will also be developed e.g. Evaluation of Conformity.

5.2 Other standards

Standards relevant to adhesive backed polymeric film (apart from those in Section 3) include: -

European Standards

EN 356: Glass in building: Security glazing - Testing and classification of resistance against manual attack

EN 410: Glass in building: Determination of luminous and solar characteristics of glazing

EN 673: Glass in building: Determination of Thermal Transmittance (U value) - Calculation method

EN 1063: Glass in Building: Security Glazing - Testing

and classification of resistance against bullet attack*

EN 12600: Glass in building: Pendulum test - Impact test method and classification for flat glass

EN 12898: Glass in Building: Determination of the Emissivity

International Standards

EN 50147-1: Anechoic Chambers: Shield Attenuation - Measurement

EN 50147-2: Anechoic Chambers: Alternative Test Site Suitability with Respect to Site Attenuation

EN ISO 527-3: Plastic - Determination of tensile properties - Test conditions for films and sheets

EN ISO 4892-1: Plastics - Methods of exposure to laboratory light sources - General guidance

EN ISO 4892-2: Plastics - Methods of exposure to laboratory light sources - Xenon-arc sources

ISO 16933: Glass in building - Explosion resistant security glazing - Test and classification for arena air-blast loading

ISO 16934: Glass in building - Explosion resistant security glazing - Test and classification by shock-tube loading

GGF Datasheets

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