Quality Guideline

CONTRAFLAM® / SWISSFLAM® / CONTRAFLAM® Structure

Quality Guideline for the assessment of
CONTRAFLAM® / SWISSFLAM® / CONTRAFLAM® Structure

1 INTRODUCTION

CONTRAFLAM / SWISSFLAM / CONTRAFLAM STRUCTURE are fire-resistant glass types for construction elements meeting the requirements of EN 1363-1 and e.g. 1364-1, EN 1634-1. Construction elements with CONTRAFLAM / SWISSFLAM / CONTRAFLAM STRUCTURE or its insulating glass products (SGG Climalit, SGG Climaplus and SGG Climatop) are transparent with high light transmission and are impervious to smoke and flames. In the event of a fire, all CONTRAFLAM and SWISSFLAM products form an additional heat shield and protect against heat radiation.

CONTRAFLAM / SWISSFLAM / CONTRAFLAM STRUCTURE products are generally subject to the EN ISO 12543 and EN 14449 standards (laminated glass and laminated safety glass) upon which the CE marking of this product family is based.

The particular basic standards for the types of glass which may be used in addition will apply to special structures and insulating glass types, e.g. coated glass (EN 1096-1), patterned glass (EN 572-5), insulating glass units (EN 1279-5), etc. incl. characteristics specific to these products, together with the features determined by the manufacturing process.

2 SCOPE OF APPLICATION

This directive is used to assess the characteristics of all types of the CONTRAFLAM / SWISSFLAM / CONTRAFLAM STRUCTURE product family and its insulating glass units (IGU). The assessment is carried out in accordance with the test methods described below.

3 ASSESSMENT METHOD

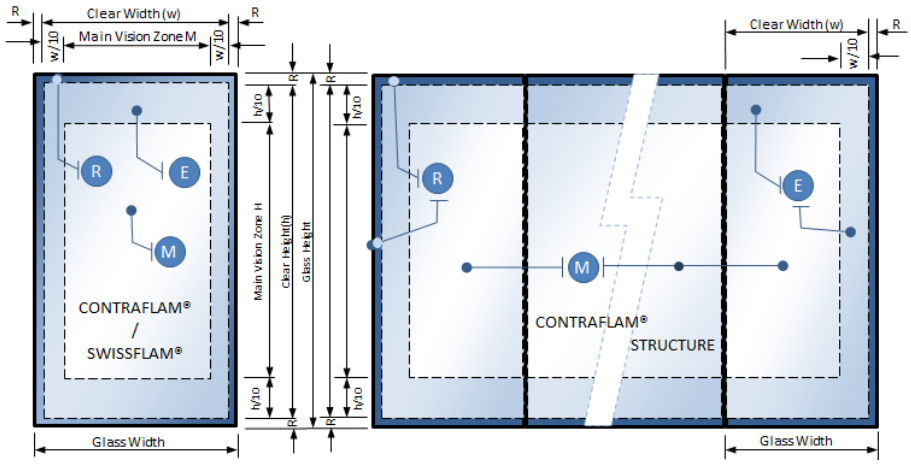
Viewing Conditions for Blemish Detection:

- The glass is being inspected while looking through the glass, focusing on the background; a focus of the glass surface or its reflection is not relevant
- Blemishes shall not be marked in advance
- The viewer must be neutral, meaning not previously in close range of the glass or involved in cleaning and set-up for inspection
- All visual inspections shall be made with 20/20 vision (naked eye or corrected)
- Use diffuse daylight conditions without direct sunlight, spot light or strip lights only, or alternatively other uniform diffused background lighting that simulates daylight, see EN ISI 12543-6:2011, §4
- Basis for the table of Permissible Defects in section 4 below is a glass with one fire-resistant interlayer
- For combinations with pattern glass, security glass, coated glass, heated glass, etc., each of the specific product standards and guidelines are to be added

Inspection Process:

- View samples (monolithic or insulated fire-rated glass) in 90° vertical position, parallel to the light source
- The viewer shall be positioned at a distance of 2 meters perpendicular to the glass surface
- A blemish shall be readily apparent to the viewer, meaning a pattern or defect that is visible to the neutral observer within 20 seconds
- After its detection, use table of Permissible Defects per section 4 below for assessment

4 PERMISSIBLE DEFECTS

ZONE	Permissible Defects Per Glass Pane
Rebate Zone R	Where applicable, the optically covered area in installed state, though at least 20 mm away from the edge of the glass. No assessment of visual quality is made in this zone: • Unlimited point and areal blemishes or scratches • Edge damage which does not impair structural strength
Edge Zone E	**CONTRAFLAM** und **SWISSFLAM:** Circumferentially 10% of the daylight width and height dimensions **CONTRAFLAM STRUCTURE**: 10% of the daylight width and height measurements along the respective framed glass edge **Optical irregularities** up to 3 mm in diameter, such as inclusions, streaks, bubbles, discoloration and inhomogeneities in the fire protection interlayer, that do not significantly obstruct the view through the glass. **Scratches:** Sum of individual lengths max. 90 mm – individual length: max. 30 mm **Hairline scratches:** Not permissible in 'high concentration'
Main Vision Zone M	**Inclusions, spots, marks, bubbles, etc.** in the fire protection interlayer that do not significantly obstruct the view through the glass: • Glass area ≤ 1 m^2: max. qty. 2 of ≤ 2 mm ø • Glass area ≤ 2 m^2: max. qty. 3 of ≤ 2 mm ø • Glass area > 2 m^2: max. qty. 5 of ≤ 2 mm ø **Scratches:** Sum of individual lengths max. 45 mm – individual length: max. 15 mm **Hairline scratches:** Not permissible in 'high concentration'
Zones E + M	Max. number of permissible discrepancies as in zone E Inclusions, bubbles, spots, marks, etc. of ≥ 0.5 and ≤ 1.0 mm are permissible without any area-related limitation unless they appear in a 'high concentration'. A 'high concentration' constitutes at least 4 defects of described kind in a circular area measuring ≤ 200 mm.
	
Permissible Defects for Insulating Glass Units (IGU)	Impurities in the **cavity** between the panes of a double glazing unit (DGU): **Punctiform impurities / blemishes:** • Glass area ≤ 1 m^2: max. qty. 4 of ≤ 3 mm ø • Glass area > 1 m^2: max. qty. 1 of ≤ 3 mm ø per linear meter of glass perimeter **Laminar impurities / blemishes:** max. qty. 1 of ≤ 3 cm^2 **Permissible Defects for Triple Glazing Units (TGU), Laminated Glass (VG) and Laminated Safety Glass (VSG):** The permissible defects of zones E and M increase by 25% of the DGU values per additional glass layer. The result is always rounded up.

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4.1 Other Quality Characteristics

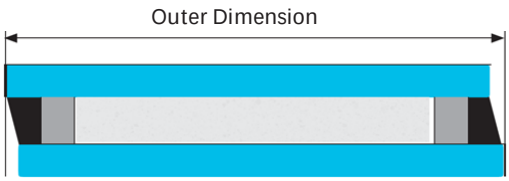
General	If there is more than one fire-resistance rated and/or plastic interlayer (> 2 mm), the permitted number of defects increases by one defect per layer. Defects ≤ 0.5 mm are not taken into account. The optically distorted fields they may cause (corona) must not exceed 3 mm.
Optical Characteristics	Excessive ambient temperatures (e.g. heating, IR radiators, direct sun- light, heat traps in louvers or blinds, curtains, awnings, etc.) can cause negligible signs of hazing in the product – depending on the number of fire-resistant and other interlayers as well as the lighting conditions and the conditions in which the glass is viewed – though a threshold of 5% per fire-protection layer (in accordance with ISO 13468, ISO 14782) is usually not exceeded. Optical phenomena do not affect the fire-protection function / property.
Characteristics of Fire Protection Interlayer	If activation or foaming of the fire-protection interlayer(s) outside a fire incident occurs in the product due to an excessively high heat exposure, it does not constitute reason for complaint. In such case, a proper fire-protection function will no longer be provided and requires the immediate replacement of all fire protection glass units affected. If, during the cold season of the year, an optically perceptible freezing phenomenon occurs in the fire-protection interlayer(s) during transport, storage or after installation, it must be assumed that the threshold temperature of -10 °C was exceeded. This does not constitute reason for complaint. In case of only short time exposure to the limit temperature, this phenomenon may be reversible by uniform and gentle heating of the glass to room temperature.
Product and Production Characteristics	Micro-bubbles in the fire-protection interlayer of up to 3 mm in size are production process related and dissolve completely within a few weeks or months after delivery. Due to the production process there are occasional instances in which the seal of the fire-protection interlayer fill opening(s) can be visible in case the glass edge cover is less than 15 mm from the edge. The different materials used for sealing and butyl spacer may exhibit slight color variances along the glass perimeter. The overall width of the edge seal in relation to the edge of the glass is a nominal $12^{\pm 2}$ mm for machine-produced glass. In the case of manual fabrication (e.g. over- / undersize lites, extra thick glass, glass with shapes or curves, bent/radius glass, etc.), a locally wavy appearance of the edge composite and a tolerance of $12^{+4/-2}$ mm from the edge of the glass is usual and shall be accepted on account of the process.

5 TOLERANCES

5.1 Dimensions and Offset

The dimensional tolerances for all CONTRAFLAM / SWISSFLAM / CONTRAFLAM STRUCTURE types are listed in the table below:

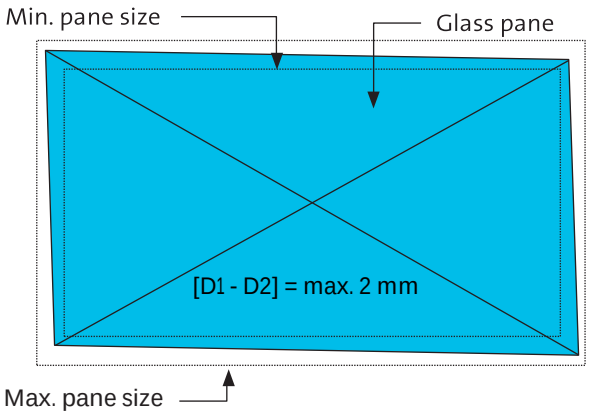
Nominal dimension of glass edge	≤ 1'000 mm	± 2,0 mm
	≤ 2'000 mm	± 2,5 mm
	> 2'000 mm	± 3,0 mm



For Insulating Glass Units (IGU) with CONTRAFLAM / SWISSFLAM / CONTRAFLAM STRUCTURE, the dimensional tolerance of 0/+1 mm for DGU (Double Glazing Units) or 0/+1.5 mm for TGU (Triple Glazing Units) must be added to the respective dimensional tolerance. For non-rectangle formats (shapes), 0/+1 mm of additional dimensional tolerance must be considered.

5.2 Rectangularity

The dimensional accuracy and angularity of CONTRAFLAM / SWISSFLAM / CONTRAFLAM STRUCTURE is determined in compliance with EN 572-2. A rectangular pane must be enclosed by a rectangle, whose sides comply with the largest and smallest permissible dimensions.



The angularity is verified by measuring diagonals D1 and D2. The absolute difference must not exceed 2 mm. This limit value also applies to insulating glass units.

5.3 Corner Radii

The radius tolerance is + 4 mm / - 3 mm

5.4 Deformation / Waviness / Edge Lift

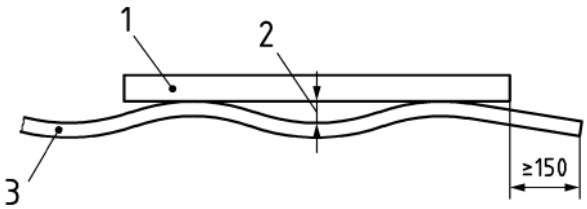
CONTRAFLAM / SWISSFLAM / CONTRAFLAM STRUCTURE products consist of several layers of toughened and/or laminated glass panes. By the very nature of the toughening and laminating processes, it is not possible to obtain a product as flat as annealed float glass, thus the finished product shows minor optical irregularities. This deviation in the straightness depends on the type of glass, its dimensions, its aspect ratio, the toughening process used as well as the number of layers in the final product make-up, which can multiply the deviation in planarity.

5.4.1 General Deformation (Overall Bow)

Measuring method: Glass must be positioned vertically. The deformation must be measured at room temperature along the glass edges and along the diagonals as the largest distance between a straightedge or a tensioned wire and the concave or convex surface of the glass panel. The permissible distance, divided by the measured length of the glass edge or the diagonals, must not exceed 3 mm/m in each case. Each glass surface is measured separately.

5.4.2 Deformation Due To Roller Waves (Local Bow)

Measuring method: The straight edge (1) shall be placed at right angles to the roller wave and bridging from peak to peak of the waves. The thickness of the feeler gauge shall be recorded to an accuracy of 0.05 mm and the deformation (2) must not exceed the maximum value of 0.3 mm. Each glass surface (3) is measured separately.



The roller wave cannot be measured in an exclusion area of up to 150 mm from the edges of the glass pane (see «Edge Lift»).

5.4.3 Edge Lift

Measuring method: The glass (3) must be placed on a flat support with the edge lift overhanging the edge of the support by between 50 mm and 100 mm. Place the straight edge (1) on the peaks of the roller waves and measure the gap (2) using a feeler gauge. The gap must not exceed 0.5 mm.

5.5 Glass Thickness

The thickness tolerances are dependent on the exact product make-up and may be taken from the respective data sheet. Generally, the tolerance of the glass thickness refers to the glass perimeter / rebate zone R only, accessible with a standard caliper.

Double glazing units (DBU or SGG Climalit or SGG Climaplus) and triple glazing units (TGU or SGG Climatop) based on CONTRAFLAM / SWISSFLAM / CONTRAFLAM STRUCTURE have an additional thickness tolerance of ± 1.0 mm and ± 1.5 mm than its basic fire-resistant glass type.

6 ASSESSMENT OF VISIBLE AREA OF EDGE SEAL IN FIRE-RESISTANT GLASS AND FIRE-RESISTANT INSULATING GLASS

In the visible area of the edge seal, and as such outside the visible daylight area of the glass, production-related characteristics of the spacer frames may be noticeable. These characteristics may be visible where the edge seal is not covered along one or more glass edges due to the application design, e.g. at CONTRAFLAM STRUCTURE and its insulating glass version.

The permissible deviation of parallelism for the spacer(s) to the straight glass edge or to further spacers (e.g. on triple glazing units) is 4 mm in total for an edge length of up to 2.5 m; for a longer edge length, the deviation is 6 mm in total. For double glazing units, the spacer tolerance is 4 mm for an edge length of up to 3.5 m; for a longer edge length, the deviation is 6 mm.

If the spacer and edge seal of the fire-resistant glass and fire-resistant insulating glass is not covered due to the application design, typical characteristics of the edge seal may be visible, e.g. waviness, which are regulated in this directive under 4.1 Production Characteristics. This also applies to manually fabricated product make-ups, e.g. shape glass and curved glass.

Particular frame systems and edge seal designs, including material compatibilities, require a manufacturer's written release for the relevant glazing system.

7 GENERAL INFORMATION

This guideline applies to the assessment of the visible quality of architectural glass units. When evaluating an installed glass product, it is assumed that, in addition to the visual quality, additional features of the product, needed to fulfil all functions, are also taken into account.

Properties and values for glass products, such as noise-reduction, heat insulation and light transmission, which are specified for defined functions, refer to the test panes in accordance with the relevant test standard or calculation methods used. Specified values and optical impressions may vary for differing pane formats and combinations, as a result of the installation or other outside influences.

When evaluating particular characteristics, their specific properties should be noted, e.g.:

- Combinations with coated glass
- Material-related properties, e.g. refractive index of glass to fire-resistant interlayer
- Manufacturer-related and / or batch-related color variances and light scattering, e.g. in the fire-resistant interlayer, intermediate films or coatings
- Color difference in ornamental glass / coated glass / etc.
- For physical reasons, the transmission, color depth and light scattering depend upon the glass pane thickness.

7.1 Physical Characteristics

A number of inevitable physical phenomena that may be noticeable in the clear glass surface are excluded from the evaluation of the visual quality, such as:

- Interference phenomena
- Insulation glass effect
- Anisotropy
- Condensation on the outer pane surface (condensation formation)
- Wettability of glass surfaces

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7.1.1 Definition of Terms

7.1.1.1 Interference Phenomena

For insulating glass units made from float glass, spectral color interferences may occur. Optical interference is observed when two or more light waves are superposed when meeting in one point. It can be observed through more or less brightly colored areas, which change when pressure is applied to the pane. This physical effect is enhanced by the plane parallelism of the opposing glass surfaces. This plane parallelism ensures distortion-free view through the glass. Interference phenomena occur randomly and cannot be influenced.

7.1.1.2 Insulating Glass Effect

Insulating glass units have an air/gas volume enclosed by the perimeter edge seal, whose state is essentially determined by the barometric air pressure, the altitude of the production site above sea level and the air temperature at the manufacturing time and place. Installing insulation glass at different altitudes, with temperature differences and fluctuations in the barometric air pressure (high and low pressure) relative to the manufacturing site, inevitably results in concave or convex curvatures in the individual pane surface and optical distortions. Furthermore, multiple reflections may appear on glass surfaces at different intensities. These reflections may be more noticeable if the glazing unit background is dark, for example. This phenomenon is a law of physics.

7.1.1.3 Anisotropy

Anisotropy is a physical effect on heat-treated glass, resulting from internal stress distribution inside the glass. Depending on the viewing angle, it is possible that fuscous rings or streaks are perceived in polarized light and/or when viewed through polarized panes.

Polarized light is present in normal daylight. The polarization level is dependent on the weather and the position of the sun. Double refraction is more noticeable at flat viewing angles or when glass surfaces are positioned next to one another in a corner.

7.1.1.4 Condensation on the Outer Pane Surface (Condensation Formation)

Condensate may form on the outer glass surfaces if the glass surface is colder than the surrounding air (e.g. fogged vehicle windscreens). Condensation formation on the outer surfaces of a glass pane is determined by the Ug-value, the relative air humidity, the air flow and the interior and exterior temperature.

Condensation forms on the room-side pane surface when air circulation is restricted, e.g. due to low soffits, curtains, flower pots, window boxes, blinds, radiators being poorly positioned or lack of ventilation, among other issues.

On insulating glass units with a high level of heat insulation, condensation may form temporarily on the exterior glass surface if the relative outside humidity is high and the air temperature is higher than the temperature of the pane surface.

7.1.1.5 Wettability of Glass Surfaces

The wettability of glass surfaces may be different due to imprints from rollers, fingers, labels, paper residue, suction cups, sealant residue, silicone components, smoothing agents, lubricants or environmental influences. If the glass surface is damp due to condensation, rain or cleaning water, the different levels of wettability may become visible.

7.2 Visual Properties of Glass Products

7.2.1 Glass Color

All materials used for glass products have inherent colors based on the raw materials and their purity, which may become more apparent with an increased glass thickness. For functional reasons, coated panes are used. Coated panes also have an inherent color which may be noticeable to varying degrees in transmission or reflection. The color impression may vary due to the pane's iron oxide content, the coating process, the coating type, and changes to the glass thickness and pane make-up, and cannot be prevented.

7.2.2 Color Variation of Coatings

For sunlight protection and heat reflection glazing, high vacuum sputtered metal and metal oxide coatings are used. The thicknesses of these coatings measure just a few nanometers and can be perceived differently from one person to the next both in transmission and reflection depending on the angle of view, shade, lighting and weather conditions or other site- or project- specific circumstances in terms of their appearance and color effects from glass to glass or even within the same glazing panel. Due to the complexity of the production and coating processes there may be slight batch-related differences in terms of the color effect and perception. This must be taken into account; particularly if coated glass needs to be resupplied within a warranty period or glazing panels are replaced after a longer period of time. Color differences within the measuring procedure and tolerance thresholds described in ISO 11479-2 will not be accepted as a reason for complaint.

7.2.3. Optical Characteristics of Toughened Glass

As the glass is placed on rollers in the furnace during the toughening process, slight surface changes may occasionally occur. This waviness is caused by a physical processes; it is not always avoidable and in certain cases can lead to changes of the images in reflection. As a result of the thermal tempering process, chemical and mechanical changes to the surface finish may occur, such as dot formation and roller imprints.

7.3 Exterior Surface Damage

The cause must be determined if mechanical or chemical exterior surface damage, which is noticed after glazing, has occurred. These complaints can also be evaluated in accordance with section 3.

In addition to this document, the following local guidelines apply:

- VETROTECH Application Guidelines
- Technical guidelines issued by local glazing trades
- Product standards for additional glass products incorporated in the glass make-up
- The glass units must be installed with setting blocks in such a way that the load is transferred across the entire glass thickness.

8 GLASS MARKING / IDENTIFICATION

8.1 Stamp

Each pane of CONTRAFLAM / SWISSFLAM / CONTRAFLAM STRUCTURE is permanently marked in accordance with the respective General Type Approval or the Construction Products Regulation

Minimum information shown in the stamp

- Name or factory number of manufacturer, e.g. ID 26
- Type designation, e.g. "CONTRAFLAM 30“
- Applicable Standards, e.g. "EN ISO 12543 / EN 14449"

8.2 Labels / Shipping Documents

Each glass delivery is accompanied by CE-relevant information. Further information about CE markings can be found under www.vetrotech.com.

Additional surveillance markings may be applied according to national requirements, e.g. the Ü-mark for Germany.

8.3 Positioning of Setting Block Edge

Every CONTRAFLAM / SWISSFLAM / CONTRAFLAM STRUCTURE pane bears an adhesive label marking of the setting edge. Correct positioning must be followed during installation.