YALODOMI

QUALITY CRITERIA

For IGU's Inspection

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Introduction

The observation guide teaches you how to perform properly a visual check of glass for the possible occurrence of defects regulations and aims to help to answer many of the common questions which arise before, during and once glazing has been installed.

All Yalodomi products are manufactured according to the highest quality standards – the most notably European Norms EN 1279. However, the nature of the glass, and the many different processes which it goes through to deliver the final performance characteristics, can sometimes affect the appearance of the installed product.

European Standard (EN 1279) for IGU's is the main standard that represents the mandatory requirements and refers to the criteria according to which glazing should be monitored visually; The harmonized European Norms (hEN), such as hEN 572 - float glass / hENs 1096 - coated glass / hEN 12150 - tempered glass and hENs 12543/14449 laminated safety glass - include the criteria.

That's why we have created this simple observation guide concerning to conduct a visual inspection of glass, based on extracts from European Norms.

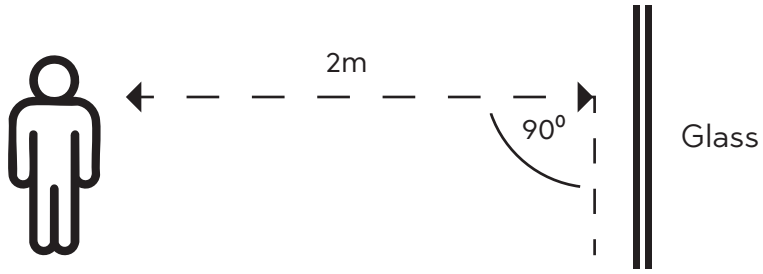
Here we explain the most common scenarios, the phenomenon and explanations – when you should contact your supplier or installer.

Our products are verified by Notified Laboratories and our Production Plants are submitted to external Certification Audits.

Contents

How to Perform a Visual Inspection

- Look through the glass in a vertical plane and at right angles (90°) to the glass surface from the room side.
- Stand 2m away from the unit which be inspected.
- Do inspection in natural daylight, but not in the direct sunlight. The glass must be completely dry.



Recommendations

When performing visual inspection, you look through the glass, not at the glass. Any defects should be identified within 20 seconds. If the defect is not visible when checking the glass at the specified distance, or it takes longer than the time limit to identify it, then it is judged that it does not stand out or do not bother the viewer. Not every visible defect qualifies the glass for replacement.

Inspection Practices That Are Not Allowed

- Magnifying devices and strong light sources are not permitted during the observation and inspection (eg. halogen lamps and flashlights).
- Evaluation should not be made also with strong sunlight or sun behind the window.
- All defects must first be identified at a distance of 2m and not within a closer range.
- If a defect is noticed – it has to be measured by an appropriate measuring device (scale with mm / linear meter etc.) and compare with the table in this booklet.

Safety glass marking

Individual panels of glass certified as safety products will each carry the appropriate mark relevant to the product – on the surface or on the edge of the glass. Yalodomi do not guarantee that these marks will all be in the same corner of the unit or that they will align through the unit.

Cases That Are Not Considered Defects

Reflections

Due to the number of panels involved in the construction of an IGU, multiple reflections might be visible. This effect will increase in triple glazed units. It is not a defect of the glass.

Distortion

The hermetically sealed cavity between the glasses has a fixed volume of air/gas due to the temperature and barometric conditions at the time of sealing. After installation, changes in external temperature and barometric pressure will result in expansion or contraction of the air/gas within the cavity, and this resulting in deflection of the unit panes which is visible as distortion in the reflected image. This distortion indicates the unit is sealed correctly and is not indicative of a defect.

Toughened glass may show visual and colour distortions, which are accentuated by reflections in double glazing. Such surface colourations and patterns do not indicate a change in physical performance and they are not indicative of a defect.

Small transitory rainbow effects are sometimes produced by the glass refraction of light. Their appearance is due to high quality flat glass sheets being placed parallel to each other or different orientation of tempered glass.

The glazing technology is continually evolving; therefore, new units installed alongside existing units may not exactly match. This situation does not arise from defects in the glass.

Low-emissivity coating may produce transient visual effects. In some lighting conditions the coating may look like a transparent film or can cause some hazy glass surface. When light, coloured objects, such as net curtains, are placed close to the glazing, they may look slightly darker. The differences in structure adjacent glasses, can also cause visual effects; that are acceptable.

Georgian and Duplex bars

Under the influence of weather conditions Georgian and Duplex bars can sometimes deflect out of line, appear to be discoloured or rattle against the glass. None of these cases are not classified as defects. This phenomenon increases along with dimensions of the insulating glass units.

When the temperature returns to normal, the bars will revert to their original position.

Any apparent discolouration of the bars is normally due to the coated glass. As for bars rattling against the glass, this should only be noticeable under specific weather conditions where the unit is subject to external vibration – i.e. strong wind blow.

The use of so-called “bumpons” aims to protect the glass from being damaged, but do not eliminate vibration. Duplex bars and Georgian are manufactured with a positional tolerance of +/-2mm

External Scratches

Defects below 0,5mm are not considered and assessed during IGU Visual Inspection.

Defects on the outside IGU, which may arise after delivery of the insulating glass unit, are not eligible for filing a complaint.

Advice
Outside scratches are perceptible under the nail.

Other Defects

Uniformity defects and stains e.g. scuff marks, heavy scratches, lines, deposits, impressions, trails and dirts etc. are allowed as long as they are not visually disturbing.

Water Condensation

1. Indoor. Condensation forming on the glass surface facing the room is due to warm, moist air trapped in the building. This indicates a problem with the building itself suggesting that increased air ventilation is required – the condensation on the glass is asymptom, not a fault.

2. External Condensation. Condensation forming on the outdoor face is a positive indicator of the thermal efficiency of the glazing. This is not an IGU defect.

3. Condensation Patterning. Patterns forming in condensation/moisture on the glass face is known as 'condensation patterning' and does not representany fault. It is caused by microscopic deposits of silicone on the glass face which breaks down over time.

Where the new unit is installed next to an old unit, the surface of the glass will have different aged, so condensation/moisture may create them the different patterns.

Roller Wave (toughened glass only)

The toughening furnace rollers may also cause a slight unevenness in the glass surface. According to EN 572 – the maximum distortion (wave) value is 0.3mm / 300mm.

Broken Glass / Outside defects

Broken Glass / Outside defects / Scratches and chemical faults on the outside of the products which can occur outside the producer's plant –they are not subject for warranty.

Thermal breakages

Thermal stress breaks occur when there is a temperature variance in the body of the glass. The risk of thermal fracture is increased in installations with deep partial shadow, where the glass is an element of support (e.g. posters, furniture against the glass), blinds, applied films, heaters or air conditioners directed onto the glass. Thermal breakages can also occur when the glass delivered on the rack is exposed to strong sunlight – this is not subject for warranty.

Advice

Insulating glass, which has not been mounted in window frames yet (glass on the rack) must not be stored in direct sunlight.

Roller Marks (toughened glass only)

The process of heat strengthening of glass is associated with the arrangement of the heated glass on the rollers in the furnace. This can give rise to small prints on the glass surface. They may be more noticeble for thicker types of glass.

Haze

Under certain lighting conditions and viewing angles, some coatings or laminated products may exhibit a phenomenon known as haze (a cloudy/dusty appearance). This is not a defect of glass.

Color Difference

Color difference phenomena which can appear between adjacent IGU is acceptable as long as it matches criteria of GEPVP (www.glassforeurope.com) for Measurement and Evaluation of the Color of Coated Glass used in Facades.

Cases That Are Considered Defects

Dirt in The Space Between The Glasses

If the space between the glasses can be seen too much loose material, such a case should be classified as a defect point and assessed accordingly. This defect also includes leaks from desiccant spacer, insects, acrylic glass or shavings from the cutting of bars.

Coating Defects

Dirt and pores in the coating of glass must be measured and considered as a defect point.

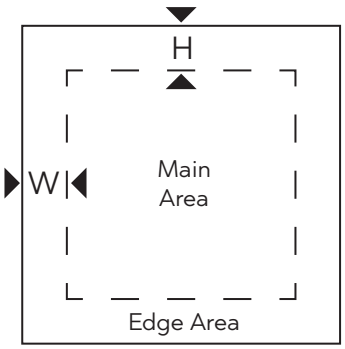
Water Condensation

Condensation Inside the cavity of the glasses. Condensation inside the cavity of glasses, indicates the IGU seal has broken down; this is a defect of the IGU/.

Acceptable Evaluation Values for Defects Points

Defect Points

This type of defect includes bubbles (gas inclusions), stones and „seed" and are assessed to prescribe the amount and size of inclusions. Permissible limits are given in the table below:



H = 5% of height or 50mm whichever is the greater.

W = 5% of width or 50mm whichever is the greater.

Area	Acceptable defects inside the package for float glass and coated glass
Edge	Defect of the edge and flaking which does not have any effect on the durability of the glazed unit and does not interfere with the edge sealing, butyl leakages (up to 5mm) – with no effect on the function of the insulated glass unit. Internal flaking / leakages without any loose spatters, which have been filled with the sealant / butyl. Flat spot stains and scratches on the surface.
Edge Area	Inclusions, bubbles, flaws, stains: Surface area of the sheet > 1 m2: max 4 defects < Ø 3 Surface area of the sheet ≤ 1 m2: max 1 defect < Ø 3 mm/LM of the edge; Flat stains: white and grey or transparent– max 1 defect ≤ 3 cm2
Main Area	Spot defects (dots, punctures, bubbles, inclusions, pits, flaws, etc.): > 3mm unacceptable > 2 and ≤3 mm acceptable if not more than 1/m2 > 1 and ≤2 mm acceptable if not more than 2/m2 Scuffs, scratches > 75 mm unacceptable < 75 mm acceptable, provided that their local concentration does not constitute a visible disturbance Scratch width / thickness 0.15mm and lower – Hairlike scratch – not subject to evaluation Higher than 0.15mm - Scratch subject to evaluation

Acceptable defects inside the package for laminated glass

Size of the defect d [mm]	Number of glass panes in the laminate	0,5<d≤1,0		1,0<d≤3,0		
Size of the glass panel A [m2]	-	For all sizes	A≤1	1<A≤2	2<A≤8	A>8
Number of acceptable defects	2 sheets	Without limits, but the defects must not be concentrated in one place	1	2	1/m2	1,2/m2
	3 sheets		2	3	1,5/m2	1,8/m2
	4 sheets		3	4	2/m2	2,4/m2
	≥5 sheets		4	5	2,5/m2	3/m2

Cleaning Best Practice

Use mild, non-abrasive glass cleaner. Uniformly apply the solution to surfaces by spraying or with a clean brush, grit-free cloth or grit-free sponge. Using a circular motion and light to medium pressure, wipe the cleaning solution on the glass. Rinse the glass immediately with generous amounts of clean water making sure to remove all the cleaning solution. Use a clean lint-free cloth or a squeegee to dry the glass surface. Care should be taken to ensure that no metal parts of the cleaning equipment, e.g. blades, make contact with the glass surface and that no abrasive particles are trapped between the glass and cleaning materials. If residues are still present on the glass the steps above should be repeated. Abrasive cleaners, powder based cleaners, scouring pads or other harsh materials, should not be used to clean the glass or frame surrounds.

YALODOMI Glass Experts

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