Pilkington IGP processed glass manufacturing standards

Item	Critical feature	Standard arrangements	Deviations from Standards which must be communicated to Pilkington IGP upon request for proposal and/or product purchase.
1	2	3	4
1.	Intended use of product	To be used in civil engineering and construction works	In other applications, e.g. in lift glazing, furniture, ship's windows, automotive, household appliances, it may be necessary to satisfy other or additional requirements for the product (e.g. marking, quality, certificates).
2.	Use venue	Depending on design, intended use and size of insulating glass units (IGU), generally it is not recommended to install glass panels at the height of more than 650 m a.s.l., as for double chamber glass panes - exceeding 400 m a.s.l may require consulting.	Use of IGUs at higher levels than manufacturing venue raises cracking or glass tightness loss risk - in such cases it is advisable to analyze correct choice of thickness and size of glass panels. Upon order, at glass manufacturing stage, it is possible to adapt internal pressure of glass panel to anticipated final location.
3.	Type of transport	Road transport up to 1000 m a.s.l; transport by sea or air - not recommended.	If IGUs are to be transported by air or sea, it is necessary to consult it with Pilkington IGP beforehand.
4.	Glass panel position when in use	Vertical - as fixed, tilt or turn window.	Sloping position (roof skylights, canopies, winter gardens, glass ceilings) usually requires customized adaptation of glass designs to loads and requirements related to safety of use.
5.	Elements raising glass cracking risk when using, or reducing glass durability	When using, there should be no elements limiting free flow of heat through glass panels directly on glass panels or near them. It applies particularly to IGUs based on annealed glass or laminates.	Presence of elements which permanently diversify flow of heat through glass, e.g. blinds, stick-on foils, glass decoration, suspended ceilings, furniture and structural elements covering part of glass panels - it may entail a need to use of tempered glass or heat-strengthened glass.
6.	Glass panel fixing method	All edges mechanically fixed along the whole length, coverage of edges of IGUs with external strip at the depth of 12-30 mm.	Other fixing methods (two-edge, spot-like, structural gluing, glass corners, fixing with glazing bar not more than 30 mm deep) - require use of silicone in IGUs, endurance calculations, selection of glass panels on a case-by-case basis.

	feature	standard	deviations
7.	Design of IGUs	Exterior glass: colorless glass, colored glass, with Pilkington **Activ™** coating in position #1, with glare shields or LowE-type coatings in position #2; laminated glass, tempered glass, tempered with HST, heat strengthened with glare shield; ornamental glass, flameproof glass. Interior glass: colorless glass, with low-emission coating in position #3 or #5, laminated glass, tempered glass, tempered with HST, heat strengthened with these coatings, ornament glass, fireproof glass. Central glass (in double chamber glass panes): colorless glass.	Use of other than listed kinds of glass for exterior panels, central panels or interior panels – is a non-standard solution and requires consultation regarding suitable selection, also with regard to possibility and period of guarantee.
8.	Use of textured glass in IGUs	It is advisable to use in position in which smooth side of the textured glass is directed towards distance frame.	As for colored textured glass (yellow, honeyed, brown), it is advisable to temper them in order to eliminate cracking risk during use.
9.	Compatibility of sealing compounds for IGUs with silicone and assembly adhesives	Pilkington IGP provides clients with information on assembly adhesives and silicone tested for no reaction/compatibility/to sealing compounds used for production of IGUs.	Before starting assembly of IGUs in window frames or facade, the contractor must confirm at the IGUs supplier's compatibility of assembly adhesive and silicone which may directly react to IGU sealing compounds. See also „Instructions on transporting, storing, assembling, using and maintaining glass items by Pilkington IGP Sp. z o.o."
10.	Sealing compounds for IGUs	Butyl + polyurethane, polysulfide or *other.*	*other* is a two-component silicone – see point 6 non-standard fixing method.

	feature	standard	*deviations*
11.	Product guarantee	By default Pilkington IGP Sp. z o.o. grants a guarantee for tightness of IGU for the period of 5 years for rectangular panels or 2 years for non-rectangular panels, on the terms specified in the „General terms of standard guarantee for IGUs". We do not grant the guarantee for: float glass panels or laps with coating or without coating, ornament glass, tempered glass, enameled glass, with screen printing, laminated glass, fireproof glass, because their declared parameters should not deteriorate during use, except for features accompanying regular wear of glass product.	Granting longer guarantee for tightness of glass panels or guarantee for glass panels other than specified in „General terms of standard guarantee" - requires arrangement before the order is placed. „General terms of standard guarantee for IGUs" are available on www.pilkington.pl .
12.	Glass panel dimensions	*See* - „Standard size limits for IGUs of Pilkington IGP" available on www.pilkington.pl. The size limits included in the Table are for reference only, the maximum sizes may be different - depending on specific design of glass panels and their application. *Production capabilities of* Pilkington IGP allow production of larger glass panels than specified in the size limits table. *Pilkington IGP is not held responsible for correct adaptation of glass design and its size, thickness and type of glass to the place and conditions of use.*	Manufacturing glass panels whose parameters exceed values in size limits table, manufacturing IGUs and tempered glass with diameters below 250 x 350 mm or ratio bigger than 8:1 - requires arrangement before accepting the order.
13.	Nominal distance of distance frame from edge of IGU	Distance < 15 mm.	As for glass panels for nonstandard applications/ see p.6/, thicker sealing compound/silicone may be required; simultaneously it may be necessary to move the distance frame farther from the edge of glass panel. In effect the transparent area of glass panels is reduced.

	feature	standard	deviations
14.	Filling glass panels with mix of gases	Argon or krypton – selection depending on required U coefficient; filling rate: 90 $^{+10}/_{-5}$ %.	Gas SF_6 – not used. Mixtures Ar/Kr - upon special request of the client. Depending on shape and design, some IGUs are filled with gas through holes drilled in the distance frame. Sleeves and hole plugs may be visible for glass user.
15.	Type of spacer bars	The standard offer includes the following spacer bars: aluminum, galvanized steel, stainless steel, plastic or glass fiber combined with aluminum foil or steel foil. For rectangular glass panels, the standard is to bend spacer bars in corners, assuring longer life and tightness of multiple glazed panels.	Spacer bars are available in natural colors and colors provided by particular suppliers. The spacer bar's color must be clearly specified in the client's order.
16.	Content of overprint on spacer bar	Pilkington IGP, unit number, manufacture date, order number and position	Depending on technical capabilities, upon the client's request, we may print additional information on distance frame.
17.	Quantity and location of connecting points of spacer bar	We do not guarantee existence of only one connecting points of spacer bar on the perimeter of the IGU. Additionally, connecting points of spacer bar may be located on various sides of the IGU	Special requirements regarding quantity or location of connecting points of spacer bar - require customized arrangements before the order is accepted.
18.	Color of overprint on spacer bar	Black *Note:* legibility of overprint is dependent on color of spacer and texture of its surface, in extreme cases it may require the use of strong source of light, UV lamp or disassembling the glass panel.	Blue, yellow or other color after the client has approved the sample.
19.	Ground coatings in position #2 or #3 in single chamber glass panes, or in position #2, #3, #4 or #5 in double chamber glass pane	*Standard width of removing the coating (grinding) - 10 mm.* By default the coating is removed along the perimeter of the glass in case of low-emission coatings and solar control; both in annealed and tempered versions and in laminates. on-line coatings are not ground, as per suppliers' recommendations	As for IGUs requiring thicker layer of sealing compounds (e.g. corner glass, structural glass, some kinds of single- and double chamber glass panes), the required coating grinding width may be higher than 10 mm.

	feature	standard	deviations
20.	Decorative items inside the multiple glazed panel: mullions	Type, arrangement - as per client's drawing. In order to limit vibrations risk and mullions knocking, in decorative muntin linking points we stick minor transparent silicone disks/bumpons/. In Vienna type mullions we use minor silicone ribbons, felt disks or plugs. For avoidance of frost penetration of glass panel with mullion, the minimum width of distance frame must be 12 mm.	If a single section of muntin is longer than 0,7 m, elements which dampen vibrations are stuck in half of its length. Glass panels with mullions with Teflon veneer/e.g. „Renolit" type/ are manufactured without dampening pieces; glass panels with these mullions are more exposed to unfavorable effects, such as vibrations, knocking of mullion. Generally speaking the width of distance frame must be higher than ca. 4 mm from mullion thickness.
21.	Blinds mounted in IGUs.	There is a wide range of blinds (colors, drive and control systems) mounted during production of IGU	Every time the order for IGU with blinds must be preceded by detailed arrangements covering the type of drive and control equipment.
22.	Same size of both glass in IGU (step present)	Both glass with identical size, no step.	Manufacturing IGUs in which one of glass is larger than the other (on one or several sides) - possible but requires detailed information at order placing stage. The standard is to manufacture such glass panels with silicone sealing 6 mm thick.
23.	Appearance of step	As per intended use of glass panel and arrangement with client; step may be blackened with silicone or clear.	If the type of glass used requires grinding the coating on step, it is necessary to expect barely visible traces of grinding wheel on the surface. When the step blackens, this effect may get more visible.
24.	Marking of location of base edges of IGU, useful when assembling window opening	*yes* – on glass panels in one size > 2,5 m a special sticker is placed near the edges based when integrating glass panels.	The glass panel must be fixed in a way that one of based edges marked with sticker is the lower edge of glass in the window.
25.	Edge treatment method	*By default* – no edge treatment except for: ● tempered glass, heat strengthened or heat-soaked glass is mechanically blunted on all edges, ● some laminated glass laps have manually blunted edges for engineering reasons.	Pilkington IGP provides a wide range of other edge treatment methods (e.g. grinding, polishing, C-edge, etc.) and hole drilling, undercutting, cut-outs, cutting shapes with water-jet method - requires arrangement at order arrangement stage.

	feature	*standard*	deviations
26.	Size tolerances	As per „Criteria for Quality Assessment of Glass Items by *Pilkington IGP"* available on www.pilkington.pl and relevant product standards.	The above-stated quality requirements require case-by-case arrangement, before glass panels are ordered.
27.	Flatness tolerances		
28.	Visual assessment, permissible flaws		
29.	Scope of testing glass panels and declared parameters	Each product is assigned the Performance Declaration to be downloaded from www.pilkington.pl. The declarations contain a full list of declared parameters.	Performing these tests, other way of declaring parameters or other scope of declared parameters - require arrangements at order arrangement stage.
30.	Intended use of enameled tempered glass	Application as facade coating: single glass or combined with enameled coating in position #2, #3 or #4; with nontransparent, balanced background located directly behind glass; no contact between coating and other materials.	Positioning of enameled glass panels in the way allowing watching them in the transmitted light (partition walls, facade glazing) and application of enamel in position #1 - require case-by-case selection of manufacture method and approval of model samples.
31.	Intended use of tempered glass with screen printing	Applications in spots in which glass is watched in the transmitted light and when it is necessary to mark a specific pattern on the glass.	Screen process is made in accordance with client's unique pattern and on the basis of client's sample approval. As for patterns whose elements size is <3 mm, standard quality assessment criteria do not apply.
32.	Approval of color of enameled glass and with screen printing	Basic colors on colorless float glass - see Pilkington IGP glass templets.	For other colors of coating and/or other types of glass used as surface - the client is expected to approve the models.
33.	Tempering direction	No standard	Depending on glass size, it is possible to arrange the tempering direction as per glass height.
34.	Enameling direction	No standard	Under normal conditions we do not record any differences arising from application direction.
35.	Additional heat soak test (HST) for tempered glass	The standard is to provide this service for all tempered glass. Whether HST test is conducted depends on client's order	HST test is recommended to minimize theoretically possible spontaneous cracking of tempered glass arising from inclusion of nickel sulphide in molten glass.
36.	Way of preparing drawings, description of design of glass ordered	*View from the outside of the building* – applies to glass drawings, description of glass design.	

	feature	*standard*	deviations
37.	Position of label on glass panel	Main sticker + side sticker with bar code. Location of main sticker depends on arrangements with client/on exterior glass or from the room side. Exception - glass with Pilkington **Activ™** coating, sticker solely on interior glass.	When assembling glass panels, it is necessary to follow the content of sticker: „glaze this side outside" or „glaze this side to the inside of the building". Labels are easily removable, within first dozen weeks from delivery.
38.	Position of solar coatings	In position #2, inside the multiple glazed panel.	We do not recommend the use of reflecting coatings in position #1.
39.	Placement of identification marking on safety glass panes	By default on all pieces of tempered glass, heat strengthened glass, heat-soaked tempered glass, enameled glass or with screen printing - permanent marks identifying type of safe glass and manufacturer are placed in one of the corners.	Repeatable positioning of mark in the corner specified by the client - requires arrangements before the order is placed.
40.	Packing method	Metal racks, for unloading with fork lifts.	As for very large or heavy glass panels - unloading must be arranged.
41.	Type of car	As per arrangements with client, a car with self-unloading device is possible.	
42.	Packing, storing, assembling, using	In accordance with „Instructions for transporting, storing, assembling, using and maintaining glass items by Pilkington IGP Sp. z o.o." and other available on www.pilkington.pl	

March 2021

elaborated by:
Krzysztof Skarbiński
Quality Director
Pilkington IGP Sp. z o.o.
phone: +48 601 506 051
e-mail: Krzysztof.Skarbinski@pl.nsg.com