

ESG Switchable™ LCD Glass

5 Year Laminated Glass Warranty

This Warranty is issued by ESG Group Ltd (ESG) to (Customer) in respect of ESG Switchable™ LCD laminated glass supplied under order (order number) for the purpose of glazing as purchased from ESG for installation in (Location of glass).

ESG warrants that the product covered by this document will not suffer delamination caused by workmanship or defects in materials or loss of switching after installation for a period of 5 years from ESG's delivery date. This Warranty does not cover product defects due to improper use or handling, other abuse, glass breakage, installation by persons who are not qualified electricians etc.

ESG warrants that ESG Switchable Controllers are supplied with a 12 month warranty.

If any breach of the Warranty is reported to ESG before the end of the 5 years from the date of delivery ESG must have the opportunity to view the alleged defective product 'in-situ', as failure to adhere to this procedure will result in the Warranty unconditionally becoming null and void.

If this breach is found to be ESGs responsibility, the Company will by its sole option either:-

- a) Provide a replacement product or;
- b) Refund to the Customer 100% of ESG's original selling price for such defective product or;
- c) If the product is found to be partially defective but not wholly contributable to any failures then ESG will determine the percentage of blame and refund this to the Customer.

If ESG elects to supply a replacement product, the Warranty thereon will extend to the balance of the original 5 year period.

ESG shall not be liable to any other person for incidental or consequential damages of any sort. Only ESG has any authority to amend this Warranty.

This Warranty is only valid if payment in full has been received by the Company in respect of all goods that have been supplied.

Scott Sinden
Managing Director

On Behalf of ESG Group Ltd

Author:	Gavin Gunn	Position:	HSQ & Technical Manager	Date:	20/2/15
Reference:	QF86	Title:	ESG Switchable™ LCD Glass 5 Year Glass Warranty	Version:	03

**ESG Switchable™ LCD Glass Laminate and Glass/Polycarbonate In
Architectural Applications
Limited 5 Year Warranty**

Who is covered and for how long

ESG Group Ltd (ESG), subject to the conditions and limitations set forth below, warrants to the original purchaser ("Buyer") of the glass/laminate and/or glass/polycarbonate for architectural applications ("product"), and to no other person or entity, that for a period of 5 years from the date of manufacture, the product will be free from manufacturing defects, including material discolouration, delaminating, or cracking of the product.

In the event of a manufacturing defect covered by this warranty, buyer's sole and exclusive remedy and ESG's sole obligation shall be limited to the replacement of the defective product, F.O.B. shipping point, or the repair of the defective product, or a refund of the actual purchase price paid by the original buyer of the product, at the option of ESG. In no event shall ESG be liable or responsible for any labour costs or other expenses incurred in connection with the installation of the product, removal of defective product, or installation of replacement product. The original warranty shall continue with the repaired or replacement product and shall extend for the balance of the warranty period in effect at the time the product proves defective.

Limitations

This warranty shall not apply to:

a) failure of product caused by abuse, improper cleaning, mishandling, or improper installation, including but not limited to improper fixing or fastening of product to or within framing or other materials, inadequate edge engagement, use of fasteners of insufficient size to withstand design impact, use of sealants or other chemical materials which are incompatible with good glazing practice, or the plastic layers of the armoured glass, or installation otherwise not in strict adherence with ESG's written instructions

(b) failure of product which has been exposed to temperatures below 0°Celsius or above +30°Celsius during storage, before fixing on site and air humidity content upper to 80% (or condensation effect)(see clause (d)),

(II) exposed to temperatures below -20°Celsius or above +60° Celsius after fixing on site;

(III) Corrosive chemical agents.

(c) failure of product caused by heat trapped on the glass surface, whether resulting from covering the glass with paper, paint or reflective-type covers, or any other cause

(d) failure of product caused by improper storage, including but not limited to not storing product in its original packaging and not storing product in a dry and ventilated room with a room temperature between 0° Celsius and +30° Celsius.

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(e) failure of product switching due to incorrect installation of the electrical supply. In this event the customer must provide a copy of the electrical installation certificate, relating specifically to the installation of ESG Polyvision™, which meets all local legislation, regulations and codes of practice.

Delaminating shall not be considered a manufacturing defect under this warranty unless:

- (a) It becomes apparent prior to installation; or
- (b) visibility is no more assured.

Delaminating on the edge of the glass will be permitted in the case of penetration of humidity into the PVB interlayer of operable side door glazing (polished edges). If bubbles appear within the interlayer as a consequence of temperatures in excess of +65° Celsius, the warranty will not apply.

ESG reserves the right to discontinue or modify any of its products without giving notice. If ESG replaces any product under this warranty, it may substitute products that are designated by ESG to be of comparable quality in the event the product initially installed has been discontinued or modified.

Other conditions

This warranty is expressly in place of all other oral or written warranties, liabilities or obligations of ESG. In no event shall ESG be liable under the implied warranties of merchantability or of fitness for a particular purpose. In no event shall ESG be liable for consequential or incidental damages of any kind, including any damage to the architectural application, its contents or any person therein, resulting from the breach of any warranty set forth herein. No field representative of ESG or any distributor or dealer is authorized to make any change or modification to this warranty.

How to make a claim

The Buyer must promptly notify ESG in writing of any manufacturing defect and provide proof of the date of purchase and installation. All notifications should be sent to: ESG Group Ltd, 1 Freebournes Road, Witham, Essex, CM8 3UN.

The Buyer may be required to submit a sample of the defective material to ESG for analysis. ESG will then investigate the claim and examine the material claimed to be defective. If a defect covered by this warranty is confirmed, ESG within a reasonable amount of time after the inspection will either repair or replace the defective product or refund that amount paid by the Buyer for the product, per the terms of this warranty.

Storage, Handling & Cleaning Instructions

Glass laminates and glass/polycarbonate laminates must always be stored in an upright position, on an appropriate rack with suitable protection to prevent damage.

All panels must be stored using the packaging supplied during delivery if supplied. Each panel must be fully interleaved as supplied.

All panels must be stored in a dry environment and protected from extreme weather conditions at an ambient temperature.

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Do not remove surface protection film until the product is in position for glazing.

Shield the product from all possible contact with solvents, chemicals, paint splashed, overspray etc.

Glass is a brittle material and will break if subjected to excessive impact or pressure conditions.

Where polycarbonate is part of the glazing and exposed it will scratch if subjected to abrasive materials or sharp objects, which can be impossible to remove.

If vacuum lifting equipment is used, then the vacuum suckers must always be applied to the glass face.

Failure to follow the handling and cleaning procedures that are recommended by ESG, particularly where polycarbonate is exposed, may result in damage to the glazing.

Furthermore, this transparency may have exposed painted glass (black print) surfaces. Should this be the case, the exposed painted surfaces must be treated with the same care that is given to the interior polycarbonate surface.

Do not allow any sharp, rough or hard objects to come in to contact with the glazing. Remove all jewellery such as rings, watches and necklaces before handling. In addition, cover belt buckles, zippers, buttons and any other item of personal attire that could cause damage.

This product, when shipped, has a protective film on the polycarbonate surface. When installing the glazing, peel back the film from the edges only enough so that the frame, gaskets or other hardware does not cover the film. Do not fully remove the protective film until installation is completed.

Clean the glass surface using a commercially available glass cleaner and a soft, clean cloth or paper-towel.

Clean the polycarbonate and painted surfaces with a water solution of mild soap or a glass cleaner such as Windex or Glass Plus. Wipe lightly with a new sponge, soft cloth or a chamois. If necessary, rinse with a second sponge or soft cloth soaked with water.

Dry the exposed polycarbonate or painted surfaces by lightly wiping with a soft, damp cloth. Use straight strokes starting at top of the panel and work toward the bottom.

Never use a dry or dirty sponge or cloth on the polycarbonate or painted surfaces.

Do not clean with products including, but not limited to, Ammonia, Lacquer thinner, Methanol, Acetone, Gasoline or Turpentine, or any products that may contain traces of these materials. Contact the customer service department at ESG if you have any concerns with your in-house handling and cleaning methods.

Certain sealants and adhesives may not be compatible with the EVA/PVB/TPU interlayers and polycarbonate material. Crazing of polycarbonate may result when improper adhesive or sealant materials are in contact with, or close to the polycarbonate, edges and surfaces included. Edge sealants applied by ESG on glass edges are not a protection against non-compatible sealants and adhesives.

One-part urethane adhesives and sealants are usually not recommended.

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Polycarbonate may crack if allowed to come into contact with the fumes of certain solvents, e.g. Cellulose Thinners, Toluene, MEK, Benzene, Ammonia etc. Appropriate care should therefore be taken.

Mirror buttons or other attachments to the polycarbonate must be made by trained fabricators at ESG. Warranties are voided if attachments are made by persons other than employees of ESG.

If you need assistance on this matter, please contact our Customer Service or Technical Department for a list of recommended materials.

Painted Surfaces / Lacquers

Our glass obtains its colour *from* paints, lacquers and inter-layers supplied by third parties. When trying to find the colour you require please refer to the below links:

www.ralcolor.com

www.pantone.co.uk

Vanceva Interlayers

Although these websites give you a close representation of colour, please remember that computers screens cannot represent colour in the same way as they are seen naturally to the eye.

In addition to this, these are solely examples of the spot colours NOT colour once applied to your chosen glass product. Once applied the colour may change in appearance. To be certain you have picked the colour you require, especially when colour matching, we recommend you obtain a sample.

www.saflex.com

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PHYSICAL TOLERANCES FOR LAMINATED GLASS

All tolerances comply with the minimum requirements pertained within BS EN 12543 : 2011. Though ESG Ltd aims to surpass Industry Standards it reserves the right to defer from these improved tolerances and instead refer and supply in line with relevant industry standards. This applies to both new and existing contracts.

PHYSICAL TOLERANCES – LAMINATED GLASS SUPPLIED BY ESG LTD			
Thickness	No. Plies	Tolerance (mm)	
	3 Ply	±0.5	
	5 ply	±0.8	
	7 Ply	±1.0	
	9 Ply	±1.4	
	11 Ply	±1.7	
	13 Ply	±2.0	
	15 Ply	±2.3	
	>15 Ply	±2.5	
Length & Width	Nominal Dimension	Laminated Glass Thick.	
	L or H	≤30mm	>30mm
	≤2000	±2.0	±2.0
	≤3000	±2.5	±3.0
	>3000	±3.0	±4.0
Max Displacement for Cut and Stock Sizes	Nominal Dimension		Max Permissible Displacement
	L or H		Mm
	L,H ≤1000		2.0
	L <1000, H≤2000		3.0
	L <2000, H≤4000		4.0
	L, H >4000		6.0
Holes & Notch Alignment	All Products & Thicknesses		±2mm
Bow	L & W <1000		2mm
	L & W 1000 ≥2000		4mm
	L & W 2000 ≥3000		6mm
	L & W >3000		9mm
	Polycarbonate Laminates		5mm/Linear Metre
Quality Marking	All laminate products are to be stamped with a quality mark where information displayed on them will be in accordance with relevant standards, third party certifications and manufacturing licences.		
Edges	All standard laminates to be edge trimmed to ensure uniform finish. Steps on laminates can be polished out but the interlayer must not be touched. Thermally treated glasses shall not be cut, sawn, drilled or edge worked after laminating. Cut edges must be ground off or edge worked so to minimise the risk of cuts when handling. Possible edge working techniques include arrissing, ground edged, smooth ground edged, polished edged, bevel edged, sawn edged, and water jet cut edged, and bevel edged with angle no greater than 60°±3°.		
LCD	General Appearance	Haze is acceptable when viewing LCD switchable glass other than perpendicular, with levels of haze increasing as the viewing angle becomes more acute.	
	Borders	Optical distortions, creases and any other defect, including those to the film are permitted along all edges up to 5mm inwards.	
	Holes/Notches/Cut-Outs	Visual distortions are permitted up to 10mm from edges of holes, notches and cut-outs.	
Coloured Surfaces & Interlayers	Colour Variances	Visual colour differences are permitted between samples and finished product where lighting, background conditions and panel size can create subtle changes.	

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VISUAL APPEARANCE TOLERANCES FOR LAMINATED GLASS

All tolerances comply with the minimum requirements pertained within BS EN 12543 : 2011.

PRINCIPLE

The laminated glass is put in a vertical position, in front of and parallel to a matt grey screen, and is lit by diffuse daylight or equivalent. The laminated glass is visually inspected perpendicularly at a distance of 2m from the glass, (except for ESG Switchable LCD Privacy Glass which is 1m), with the matt screen on the other side of the glass. Any visible defects that are disturbing shall be marked. Vents are not permitted, nor are creases and streaks allowed in the visual area (Exceptions to this rule exist for ESG Switchable LCD Privacy Glass as detailed below).

Where no defects are visible from the specified distance the panel is deemed acceptable. If defects are observed from within the specified distance, the extent of such defects are to be within the tolerances detailed below and if not, then the panel may be rejected.

PERMISSIBLE SPOT DEFECTS IN THE VISION AREA

Spot defects include opaque spots, bubbles and foreign bodies. Defects less than 0.5mm are permitted. Defects greater than 3mm are not permitted.

*For laminates consisting of two panes the maximum size of defect is 2mm.

For ESG Switchable LCD Glass products, bubbles of any size are not permitted and any defect both spot or linear type which can be observed from a distance of 1 metre away should be rejected.

Size of Defect		0.5	0.5-1mm	1.0≤3.0mm		
Size of Laminate		Any Size	Any Size	≤1m ²	1≤2m ²	>2m ²
No. or Density of Permissible Defects	2 Panes	Max. 4 defects. Must be further than 200mm apart from each other.	Max. 2 defects. Must be further than 100mm apart from each other.	0	*1	*1
	3 Panes			1	2	2
	4 Panes			2	3	3
	5 Panes			2	3	4

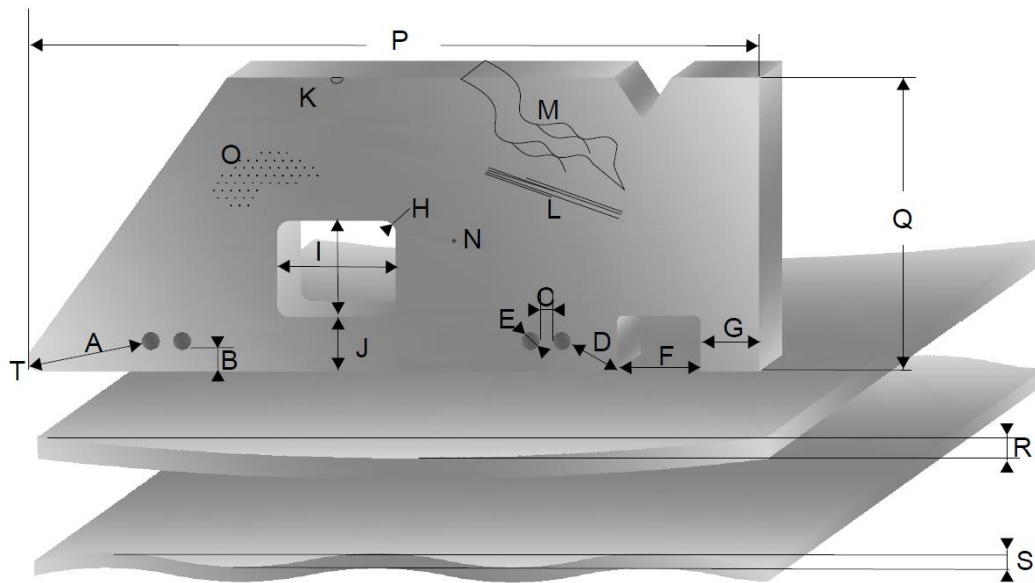
PERMISSIBLE LINEAR DEFECTS IN LAMINATES

Linear defects include foreign bodies, hairs, scratches or grazes.

Linear defects are permitted so long as they cannot be observed from a distance of 2 metres.

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SINGLE PANE QUALITY & PROCESSING TOLERANCES



QUALITY TOLERANCES			
No.	CATEGORY	FLOAT GLASS	TOUGHENED GLASS
A	HOLES FROM ACUTE CORNERS	Min. Glass Thickness	Min. 6X Glass Thickness
B	HOLES FROM EDGES	Min. Glass Thickness	Min. 1.5 X Glass Thickness
C	HOLE TO HOLE DISTANCE	Min. 5mm	Min. 1.5 X Glass Thickness
D	HOLES TO CORNERS	Min. 5mm	Min. 3.5 X Glass Thickness
E	HOLE DIAMETER	Any Hole Size (Same hole diameter and position tolerances)	Min. 1 X Glass Thickness 4≥20mm hole diameter = ±1.0mm 20≥100+ hole diameter = ±2.0mm Hole position on Glass = ±2.0mm
F	NOTCH WIDTH	Same	Min. 25mm if cut or arrissed Min. 40mm if Polished Edge
G	NOTCH DISTANCE TO CORNER	Same	Min. 3 X Glass Thickness or 40mm whichever is greatest
H	INTERNAL RADIUS	1. Ground Edges – Internal radius 7mm min. 2. Polished Edge – Internal radius 18mm min.	1. Ground Edges – Internal radius must be equal to ½ glass thickness or 7mm whichever is the greater. 2. Polished Edges – Internal radius of 18mm min.
I	MINIMUM CUT-OUT	Same	Min. 20 X 20 if Ground Finish Min. 40 X 40 if Polished Edge
J	CUT-OUT TO EDGE DISTANCE	Same	Min. 3 X Glass Thickness if Cut Min. 45mm if Polished Edge if 4mm to 10mm Thickness is processed. 12mm Thickness and above 100mm Min.
K	SHELLS	Same	Glass ≤8mm Thick Max 2mm if Glass Arrissed. Glass >8mm Thick Max 4mm if Glass Arrissed.
L	SCRATCHES	Same	Not Permitted if seen from 2m distance
M	CRACKS	Same	Not Permitted
N	SEEDS	Same	Max 3 No. If ≤1mm. Seeds >1mm not permitted
O	PITTING	N/A	Not Permitted When Observed from 2m
P	OVERALL LENGTH	Same	+2mm Unless Label States Otherwise
Q	OVERALL HEIGHT	Same	+2mm Unless Label States Otherwise
R	OVERALL BOW	Same	Max. 3mm/Linear Metre for Non Laminated Laminated L or W <1m = Max 2mm Laminated L or W 1m≥2m = Max 4mm Laminated L or W 2m≥3m = Max 6mm Laminated L or W >3m = Max 9mm
S	ROLLERWAVE	Same	Glass 3-5mm =Max 0.5mm, Glass 6-10mm = Max 0.3mm Glass 12-19mm = Max 0.15mm
T	RADIUS CORNERS	+2mm	+2mm Unless label states otherwise
U	MECHANICAL STRENGTH	N/A	Min. 120 N/mm ²

* For visual quality tolerances view glass in a vertical position at right angles and lit by diffuse daylight or equivalent.

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