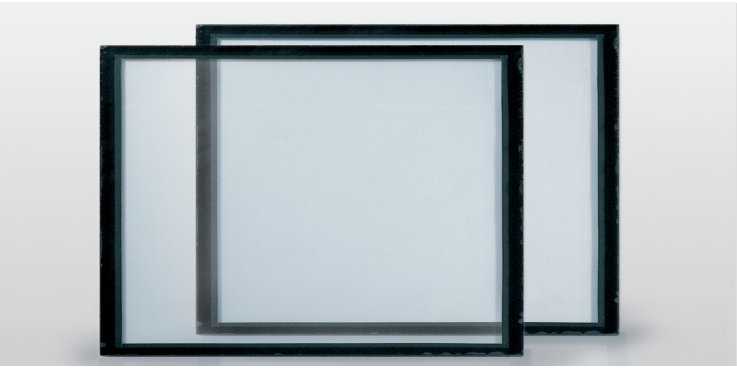
HEMA
MASCHINEN- UND APPARATESCHUTZ GMBH

Operating instructions

Machine Safety Windows HEMA Window



OPERATING MANUAL

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With reference to
"Guideline to Assess the Visible Qualty of Glass... (Bulletin 006/2009) Bundesband Flachglas,
lizensed by 006/2009-18931704

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Content

1. IMPORTANT INSTRUCTIONS

This operating manual serves for the trouble-free use of machine safety window and is a prerequisite for the fulfillment of any warranty claims. Please read these operating instructions before using the machine safety window.

- Be sure to follow the installation and cleaning recommendations in this manual.
- Only use the machine safety windows with a confirmed class specification in machines where they can be observed.
- Remove all transport measures such as paper, foils, etc. before the initial assembly. The legally prescribed disposal of the individual materials (in recycling collection containers) must be observed.
- Installation and commissioning must only be carried out by qualified specialist personnel in accordance with these operating instructions.
- Wear during handling, installation and removal, cut-resistant and non-slip gloves, as well as safety glasses for intrinsic safety. Avoid working overhead.

Symbols and their meaning

Warning
Note

2. GENERAL DESCRIPTION

Machine safety windows are protective devices on machine tools. They prevent the ejection of tools, workpieces and fragments from the working area of the machine and thus protect persons from injury by flying parts.

3. TYPES

Machine safety windows (composite ESG / VSG and polycarbonate)
Machine safety windows are equipped with polycarbonate on the operator side and with tempered safety glass (ESG) or laminated glass (VSG), depending on requirements, on the inside of the machine. These two elements are encapsulated with a special sealant. The retention capacity of the polycarbonate is restricted by the glass from the influence of the machine, e.g. coolant fluid, protected against embrittlement.

Machine safety discs (ESG / VSG and polycarbonate composite) with frame
The version with VA or sheet steel frame is made on customer request and receives the same components as a frameless version.

Machine safety windows (ESG / VSG and polycarbonate composite) with spin window

For a clear view into the machine room during the manufacturing process, the machine safety windows can be equipped with spin windows. The attachment of the spin windows on the tempered safety glass / laminated safety glass can be done in screwed or glued form.

Further information on the proper installation can be found in the separate instructions for the spin windows.

Optionally, the machine safety window can already be equipped ex works with spin windows.

4. Intended use and function of machine safety windows

Polycarbonate (PC) glass (ESG / VSG) panes are used in machine tools as part of guards. In this application they can fulfill different functions:

- Preventing access to dangerous areas (separating function)
- Protection against flying out parts (restrained function)

Material recommendations and necessary strengths depending on the required retention capacity, see DIN EN ISO 23125 (lathes), DIN EN 12417 (machining centers) and DIN EN 16089 (grinding machines). If your obtained machine safety glass is subject to a bulletproof class and has been confirmed by HEMA, this is valid and suitable for the intended use.

Polycarbonate (PC) is subject to an aging process and are to be classified as wearing parts, the consequences for the use of PC panes.

The aging of PC can not be detected by visual inspection. It is therefore necessary for the machine manufacturer to set a time limit for the replacement of PC windows with a safety-critical restraint function. Prolonged stress on PC windows by coolants can lead to accelerated aging, e.g. deterioration of mechanical properties (embrittlement), lead. Also, from the operator side, refrigerant vapors, detergents, greases and oils, or other aggressive media can cause deterioration of the PC disks, resulting in reduced PC retention. If this is not taken into account, there may be a critical, too low level in the event of damage.

5. Misuse and warnings

- Machine safety windows must not be loaded additionally when installed or under mechanical or electrical tension.
- Machine safety window may only be installed on machines or systems where the execution of the specific requirements for retention and impact classes can be maintained. In case of non-compliance there is a risk of death in case of damage!

- The classification given in the order confirmation is deemed to have been tested and approved by HEMA. Before use, this must be compared with the requirements.
- Improper use can lead to breakage of the glass side, especially when installing the machine safety window. This can lead to cuts, even when using safety glass. We recommend using suitable protective clothing during installation.
- Never use the machine safety disc after a glass breakage.

6. Residual risks

- Machine safety discs are provided with an edge seal (sealing), which can damage the improper operation during installation. This can result in damage to the PC by cooling lubricants or other substances.
- The polycarbonate side of a machine safety window must be inspected for damage before installation and during operation.
- Pay attention to the right-hand installation (polycarbonate pane on operator side - never vice versa). If the label is to be read on the operator side of the composite gap (not mirrored), the machine safety window is correctly installed.
- Please pay attention that the materials have a reflective surface that can cause eye irritation/glare. A direct view of light sources in the version with integrated LED lighting is to be avoided.
- When removing and disposing of the machine, make sure that the machine safety window is clean and dry (risk of slipping).
- When cleaning and during maintenance of the glass pane in the interior of the machine, make sure to use suitable personal protective equipment that is specified by the manufacturer for handling the coolant used.
- Due to the possible deformation of the polycarbonate (when parts are ejected), keep a safety distance of at least 15 cm to the machine safety window.

7. Tolerances in the materials glass and polycarbonate

In the case of the materials glass, in the form of toughened safety glass, laminated glass or other versions as well as polycarbonate, it may happen that small air pockets or fine streaks that are not noticeable under normal ambient light can occur during the production process.
The limits described below are within tolerance and therefore not subject to revision or exchange by HEMA.

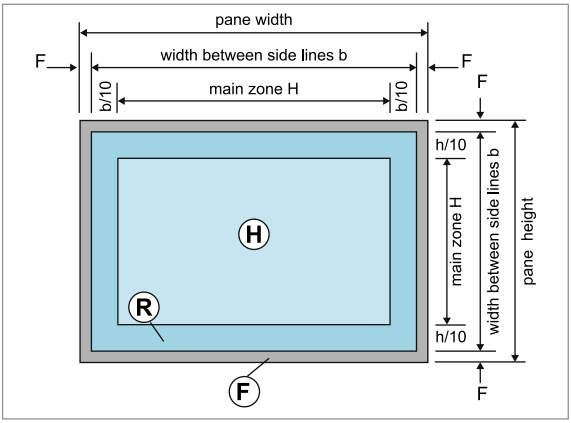
Scope

This guideline applies to assessment of the visible quality of machine safety windows. The assessment is made according to the following testing principles with the help of the allowable discrepancies specified in the table in section 3. The glass surfaces of the machine safety windows which remain visible after installation are subject of assessment. Machine safety windows constructed of coated glass, tinted glass, laminated sheet or tempered glass (thoughened safety glass, heat-strengthened glass) can also be assessed with the help of the table in section 3.
Furthermore this guideline applies for the assessment of possible tolarances (permissible deviation of perpenducularity, rejection of the complete structure as well as edge offset).

Testing

In testing, the **visibility through the pane**, i.e. the view of the background, is the generally applicable criterion, not the appereance in reflection. The discrepancies may not be specially marked. The glazing units are to be tested according to the table in section 3 from a distance of about 1 metre from the inside to the outside and at a viewing angle which corresponds to the normal usage. The test is carried out under diffuse daylight conditions (e.g. overcast sky), without direct sunlight or artifical lighting.

Allowance Discrepancies for the Visible Quality



F = rebate zone
Width 18 mm
With the exception of
mechanical damages
no limits on discrepancies

R = edge zone
Area around edge with of 10%
of the respective width
or height between sight lines
less stringend assessment

H = main zone
most stringent assessment

Zone	The following are allowable per unit	
F	External shallow damage to the edge or conchoidal fractures which do not affect the glass strength and which do no project beyond the widht of the edge seal	
	Internal conchoidal fractures without loose shards, which are filled be the sealant	
	Unlimited spots or patches of residue or scratches	
R	Inclusions, bubbles, spots, stains, etc.: Pane area ≤ 1m² Pane area ≥ 1m²	 max. 4 cases, each ≤ 3 mm Ø max. 4 cases, each ≤ 3 mm Ø per metre of perimeter
	Residues (spots) in the gas-filled cavity: pane area ≤ 1m² pane area ≥ 1m²	 max. 4 cases, each ≤ 3 mm Ø max. 4 cases, each ≤ 3 mm Ø per metre of perimeter
	Residue (patches) in the gas-filled cavity:	white-grey or transparent, max. 1 case ≤ 3 cm²
	Scratches: total of individual lengths:	max. 90 mm - individual length max. 30 mm
	Hairline scratches:	not allowed in higher concentration
R+H	Maximum number of allowable discrepancies as in zone R Inclusions, bubbles, spots, stains etc. of dimensions 0.5 <1.0 mm are allowable without any area-related limitation, except when they appear in higher concentration. »Higher concentration« means that at least 4 inclusions, bubbles, sports, stains ec. are located within a circle with a diameter of ≤ 20 cm.	

Comments:
Discrepances of dimensions ≤ 0.5 mm will not be taken into account. The optically distorted fields they cause may not be more than 3 mm.

Laminated glass:
1. The allowable frequency of discrepancies in the zones R and H is increased per laminated glass by 50%.
2. Floated glass may show waviness due the production process.

Tempered Glass:
1. The local roller waves on the glass surface may not exceed 0.3 mm relative to a length of 300 mm.
2. With a nominal thickness of 6 mm to 15 mm, the curvature relative to the glass edge length may not be greater than 3 mm per 1000 mm glass edge length in the case of toughened safety glass made of float glass.

General comments / References

Intrinsic Colour

All materials used in glass manufactured products have an intrinsic colour, which is determined by the raw materials and becomes increasingly evident with increasing thickness. Coated glass is used for functional reasons, such as meeting the legal requirements for energy savings.
Coated glass also has its intrinsic colour. This intrinsic colour can differ for transmittance and/or reflectance. Fluctuations in the colour impression are possible due to the iron oxide content of the glass, the coating process, the coating itself, variation in the glass thickness and the unit construction and cannot be avoided.

Assessment of the Visible Section of the Edge seal of the Insulated Glass Unit

Features on the glass, polycarbonate and spacer resulting from the production process can be recognized in machine safety windows in the visible section of the edge seal.

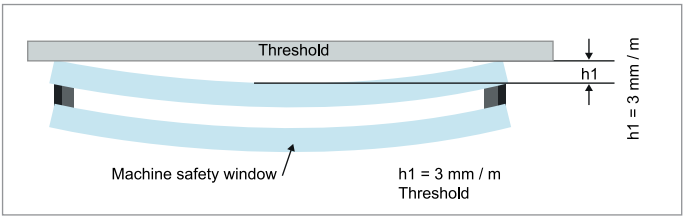
Physical properties

Some inevitable phenomena that occor in the visible glass surface may not be taken into account when assessing the visual quality. These phenomena are:
anisotropy
condensation on the external surfaces of the panes
wetting of glass surfaces

Toleration of Warping, Edge-Offset and Perpendicularity

Warping

Flatness in relation to the lower edge of the machine safety window:

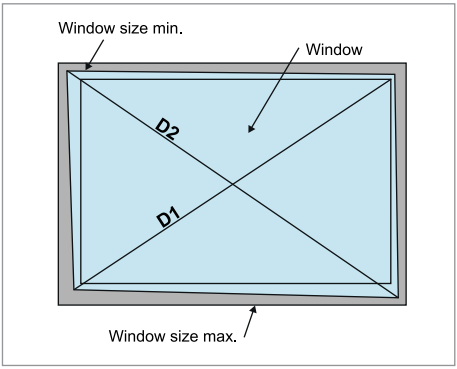


Edge-Offset of Panes

Due to the production process the indivudial panes of the machine safety windows may move. Permissable offsets are:

Dimension of pane	< 1.000 mm	± 2 mm
	≥ 1.000 mm up to < 2.000 mm	± 3 mm
	≥ 2.000 mm	± 4 mm

Perpendicularity



Calculation of perpendicularity:

D1 - D2 = max. 2 mm

The rectangularity is verified by measuring the diagonals D1 and D2.

The absolute difference must not exceed 2 mm.

Explanation of terms

Anisotropien

Anisotropy is a physical property of heat-treated glass resulting from the internal distribution of stress. It is possible that dark rings or stripes can be perceived, which vary with the viewing angle, if the glass is viewed in polarised light and/or through polarised glasses.
Polarised light is present in normal daylight. The extend of polarisation depends on the weather condition and the position of the sun. The effect of birefringence is more evidend at an oblique viewing angle or for glass panes mounted at right angles to each other across a façade corner.

Condensation on the External Surfaces of the Panes

Condensation can occur on the external surfaces when the glass surface is colder than the adjacent air (e.g condensation on car windows).
The condensation on the external surfaces of the machine safety windows is determind by the U-value, the air humidity, air movement and the indoor and outdoor temperatures.

Wetting of Glass Surfaces

The wetting of glass surfaces can differ due to the effect of rollers, fingers, labels, paper grain, vacuum suction holders, sealent residues, silicone compounds, smoothing agents, lubricants or environmental influences. This can become evident when the glass surfaces are wet by condensation, rain or cleaning water.

8. Commissioning & replacement

- It must be ensured that the circumferential clamping on the machine side complies with the requirements of the underlying standard (eg according to DIN EN ISO 23125) or the statutory provisions. This value corresponds to the value of the standard test.
  If the value falls below, there is a risk that the disc can not fully guarantee the retention capacity.
- During installation, make sure that the label is read by the operator, then the correct installation situation has been selected and the tempered safety glass or LSG side is in the machine.
- The machine safety glass must be free of tension and installed on a circumferentially flat surface.

Replacement

In the following cases immediate replacement is strongly recommended:

- Deformation (bulging) due to previous impact stress
- Cracks
- Damage to the edge seal
- Damage to or destruction of the tempered safety glass or laminated safety glass (machine interior side)
- Cooling lubricant in composite construction
- Destroyed or damaged machine safety window (coating) on machine inner side or worker side

Our seals on machine safety windows have been tested and approved for the following emulsions:

- Emulsion BETRONOL EP 215-1 (Cutting concentrate)
- Emulsion ROTEX KS 262 (Grinding concentrate)

If you use other, in particular aggressive materials in your machines or systems and are unsure whether this has an influence on the circumferential seal on our machine safety glass, we will gladly test the resistance on request.

9. Maintenance and Care

A soft cloth should be used to clean the machine safety glass.
The following cleaning agents were tested and approved by us:

- Hahnerol Glasreiniger (Hahnerol)
- Sidolin Streifenfrei (Henkel)
- Aktiv-Scheiben-Reiniger (Neumann)

10. WARRANTY FOR MACHINE SAFETY WINDOWS

The general terms and conditions as well as the product warranties of HEMA Maschinen- und Apparateschutz GmbH apply, in each case in the current version and issue upon conclusion of the contract. Valid is the date of manufacture, visible on the sticker in the window.
In case of warranty we deliver an equivalent, free replacement. Further claims are excluded. The machine safety discs, which have a safety-critical retention function against flying parts, must be visually inspected by the customer's personnel at regular intervals to guarantee the operational safety of machine tools.

We expressly point out that a machine safety disc can only fulfill its retention function in the medium and long term if the polycarbonate is protected from external influences by an ESG or laminated safety glass and the operator-side polycarbonate pane is not chemically or mechanically stressed.

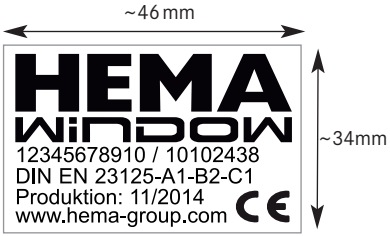
If specifiation have been confirmed in accordance with the applicable standards, they have been tested and approved. In this context, costly bombardment tests were carried out for the individual classes and classifications at the IWF of the TU Berlin and thus form an integral part of our risk assessment.

11. TRANSPORT / STORAGE / TEMPORARY STORAGE

Machine safety windows consist of a composite structure with an intermediate air layer. During transport, storage and intermediate storage lying, especially with multiple quantities, it may come to the fact that the composite structure squeezed and touched in the middle due to its own weight. This creates a bubble that is difficult to remove - but with no effect on retention.
We generally recommend a vertical storage and transport for machine safety windows in normal ambient temperature (10 - 25°C). Direct sunlight and storage below 0°C should be avoided. If you have any questions, feel free to contact us at any time.

12. Type designation

We provide all machine safety windows with an indissoluble semi-transparent sticker in the machine safety compound. The information includes our order number for traceability, the specification (if available and stated on our order confirmation), optionally with your drawing no. or article no. as well as the production date.



Example type designation / product identification

13. Particularities

Depending on the structure of the assembly and the area of the machine safety windows, the ESG / VSG and polycarbonate panes may come into contact with each other due to production reasons, which results in unsightly blistering. To prevent this, semi-transparent intermediate spacers are mounted centrally. These are visible but have no security-relevant influence.

The decision as to when additional spacers are necessary is shown in the following table:

Length or width	Polycarbonate thickness	Air cap	Additional spacer
< 700 mm	5, 6 und 8 mm	≤ 3 mm	no
> 700 mm	5, 6 und 8 mm	≤ 3 mm	yes
< 900 mm	10, 12 und 15 mm	≤ 3 mm	no
> 900 mm	10, 12 und 15 mm	≤ 3 mm	yes
For larger sizes or other air gaps the use and amount of additional transparent spaces will defined individually.			

Please note that the polycarbonate pane on machine safety windows has the restraining effect, especially for confirmed decision classes.

A weakening due to coolant, additional drilling or other processing can influence and destroy this function.

14. CE Marking

The machine safety discs, designed as a composite disc with ESG / VSG and polycarbonate, meet the requirements of the Machine Directive 2006/42/EC and are marked with the CE symbol.

15. EC declaration of conformity

In accordance with the Machinery Directive 2006/42/EC of 17 May 2006, Annex II No1 A
We hereby declare that the design and type of the structurally identical safety components named in the following and the version we market comply with the fundamental safety and health requirements in the Machinery Directive 2006/42/EC. This declaration becomes void when any change is made without our consent to these safety components.

Manufacturer
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Harmonized standards:
DIN EN ISO 23125:2015-04
DIN EN 12417:2001 + A2:2009
DIN EN ISO 16089:2016-06

Description of the safety component

Function: Separating and catching protection devices
Type: Machine safety windows in composite design
Polycarbonate and tempered safety glass or composite glass

HEMA Maschinen- und Apparateschutz GmbH

Steffen Walter
Managing Director

Philipp Sendelbach
CE authorized person

Seligenstadt, 01.04.2019

16. Causes of errors - solutions

Interruption	Possible causes	Remedy
Liquid in the composite gap	Unsuitable coolant or damage to the edge seal	Immediate exchange necessary
Destruction of the ESG / VSG glass at installation	no level surface or glass braced during installation	Immediate exchange necessary
Polycarbonate pane becomes opaque	Wrong detergents were used	Immediate exchange necessary
Blistering in the composite	Composite structure touches	No functional defect. For optimization contact HEMA service
LED lighting fails	LED lighting or power source defect	Check power source

17. Use in eX areas

The use according to the ATEX product directive has not been tested and justified, therefore we exclude the use in hazardous areas.
The use in such areas is not suitable for the product group machine safety windows.