

# TECHNICAL TERMS AND CONDITIONS

## TEGLA® NONFLEX.

### INTENTION

Overview of the quality requirements and specifications for etched glass products of EuropTec GmbH & Co. KG (in the following EuropTec).

Determination of the exact criteria for the definition, classification and evaluation of quality characteristics associated with etched glass products.

### SCOPE

The following technical terms and conditions of delivery apply to single and double-sided etched glass products of the brand **TEGLA® Nonflex**.

### DEFINITIONS

#### Surface defects

Surface defects are local defects which change the visual quality of the glass. These are point and linear/elongated defects.

Surface defects are for example scratches, chips, chafe marks and punctiform etching defects.

The designation for the number and size of surface defects is specified according to ISO 10110-7.

#### Etching defects

Etching defects are areas with a modified etching structure unlike the actual etching.

Etching defects are for example bright (black) and dark (white) bands, unetched (blank) areas/points and defects due to acid inlets.

#### Glass defects

Glass defects are defects that result from the manufacturing process of the float glass.

Glass defects are local defects such as bubbles, inclusions and tin spots as well as linear or elongated defects like drawmarks/-scratches and tin lines/-stains on the float side. The conditions for evaluation of number and size of allowable glass defects are specified within DIN EN 572-2.

#### Defect sizes

The definition of defect sizes according to DIN ISO 10110-7 is: defect size [mm] = square root (defect length [mm] x defect width [mm]).

For example, defect size 0.40 mm corresponds to a square with an edge length of 0.40 mm or a circle with a diameter of 0.45 mm.

### Stock sheets and customized sizes

Stock sheets are dimensions which are cut from (split) ribbon sizes for further processing at Berliner Glas.

Pre-cut sizes are dimensions that are cut from (split) ribbon sizes or already further processed products on customers request.

### GEOMETRY

#### Maximum length and width

The maximum size for the etching of BG-Nonflex is 2,130 x 1,250 mm.

#### Tolerances for length and width dimensions

| Glass product | Glass thickness (mm) | Edge length (mm) | Tolerance (mm) |
|---------------|----------------------|------------------|----------------|
| Pre-cut       | 1,0-3,15             | ≤ 1.000          | ±0,5           |
| Pre-cut       | 1,0-3,15             | > 1.000          | ±1,0           |
| Pre-cut       | 4,0-6,0              | alle             | ±1,0           |
| Stock sheet   | 1,0-6,0              | alle             | ±0,5           |

Further length and width tolerance requirements have to be agreed on in each case.

#### Tolerances for glass thickness

| Thickness (mm) | Tolerance (mm) | Thickness (mm) | Tolerance (mm) |
|----------------|----------------|----------------|----------------|
| 1,0            | +0,05/-0,15    | 2,6            | +0,1/-0,2      |
| 1,1            | +0,1/-0,2      | 3,0            | +0,0/-0,3      |
| 1,3            | +0,1/-0,2      | 3,15           | +0,05/-0,15    |
| 1,6            | +0,1/-0,2      | 4,0            | +0,2/-0,3      |
| 2,0            | +0,0/-0,3      | 5,0            | +0,2/-0,3      |
| 2,3            | +0,1/-0,2      | 6,0            | +0,2/-0,3      |
| 2,5            | +0,1/-0,2      |                |                |

#### Angular tolerance for pre-cut sizes

Maximum angular deviation: ±0.10°

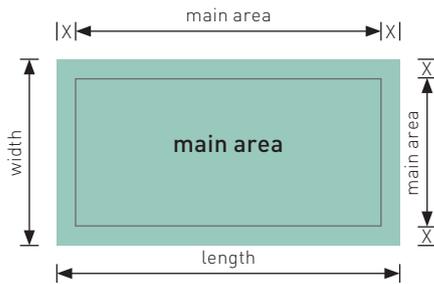
#### Measuring equipment geometry

| Charateristic           | Measuring device |
|-------------------------|------------------|
| Length/width ≤ 1.500 mm | Calliper         |
| Length/width > 1.500 mm | Tape measure     |
| Thickness               | Micrometer       |
| Angle                   | Angulometer      |

## QUALITY

### Edge zone for stock sheets

For stock sheets, surface and glass defects (with exception of fracture causing edge defects) as well as deviations of optical properties within a circumferential edge zone of x mm (non-quality area) are unrestricted admissible.



| Gloss value 20° | Width of edge zone x (mm) |
|-----------------|---------------------------|
| > 30 to 120     | 20                        |
| > 4,0 to 30     | 30                        |
| bis 4,0         | 40                        |

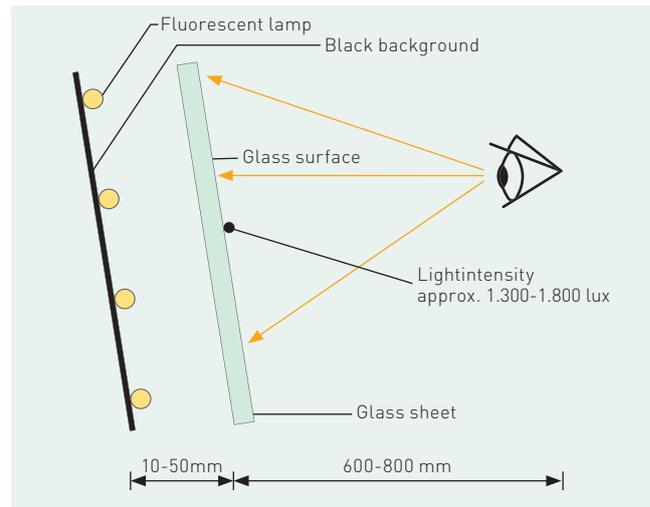
### Conditions of evaluation

The inspection for surface and glass defects is performed under the following conditions:

|                          | Description  |
|--------------------------|--|
| Inspection equipment     | naked eye  |
| Inspection in            | transmission   |
| Lighting                 | Rear illumination with four fluorescent lamps with a length of 1,200 mm, arranged one above the other at a distance of 350 mm in front of a black background at the washing machine outlet.  |
| Light intensity          | intensity of illumination 1,300–1,800 lux  |
| Incidence angle of light | 85–90° to the evaluating area  |
| Evaluation side          | blank or etched side   |
| Evaluation angle         | 40–90° to the evaluating surface   |
| Evaluation time          | The inspection time for the entire area is about ten seconds. Basically the following applies: all errors and discrepancies which are not identified within that given time will be ignored. |
| Evaluation distance      | 600–800 mm from the glass surface  |

Basically the following applies: all errors and discrepancies which are not identified according to the given conditions and within the given time will be ignored.

### Schematic test assembly



### Surface defects

The following numbers and sizes of surface defects are permitted in the main area of stock sheets and on the whole area for pre-cut sizes:

| Area up to m <sup>2</sup> | Permissible point defects max. number x max. defect size (mm) | Permissible scratches max. number x max. scratch width (mm)/ cumulated length (mm) |
|---------------------------|---|--|
| 0,04                      | 1 x 0,63  | 2 x 0,063/5  |
| 0,16                      | 2 x 0,63  | 2 x 0,10/10  |
| 0,36                      | 3 x 0,63  | 3 x 0,10/15  |
| 0,64                      | 4 x 0,63  | 4 x 0,10/20  |
| 1,00                      | 6 x 0,63  | 6 x 0,10/30  |
| > 1,0                     | 8 x 0,63  | 8 x 0,10/40  |

- Defect sizes  $\leq 0.25$  mm will not be regarded
- Point defects and scratches are cumulative, i. e. point defects and scratches are allowed together
- No accumulation of surface defects allowed, definition according to ISO 10110-7
- Removable residues (dust, paper marks etc.) will not be considered as a defect

Further demands on surface quality have to be agreed on in each case.

**Edge defects**

For pre-cut sizes, edge damages of a maximum length x width x depth of 2 mm x 1 mm x 1/3 glass thickness are permitted. Fracture causing edge defects are not permitted.

**PROPERTIES****Gloss measurement**

For the measurement of the gloss values, EuropTec uses only measurement devices of the type BYK micro-TRI-gloss of the production series 4430 i. e. 4446. The measurement can be performed under an angle of 20°, 60° or 85° (measurement device geometry).<sup>1</sup>

For the gloss measurement, the glass sheet has to be placed on a black, non-reflectant background (black felt is used at EuropTec) with the etched side facing frontwards. The measurement device is placed on the glass at an angle of 45° to the outer edges inside the main area.

<sup>1</sup> If using other measurement devices, there can be distinct deviations in the measured gloss values

**Tolerances gloss values**

| Product           | Tolerance GW 20° in main zone |
|-------------------|-------------------------------|
| Nonflex GW 20-120 | ±10                           |
| Nonflex GW < 20   | ±5,0                          |
| Nonflex GW 4,0*   | ±2,0                          |
| Nonflex GW 1,5*   | ±1,0                          |

\* nur für Glashöhen bis 620 mm

Further demands on gloss values and their tolerances have to be agreed on in each case and can lead to an enlarging of the edge zone.

**Further optical characteristics**

Besides the gloss values, further optical and mechanical parameters (like roughness, haze, clarity, transmission, sparkling) can be determined on customer's demand.

Based on the raw materials, glass products have characteristic colors, these become more evident with increasing glass thickness. Therefore different color appearance is possible for the same products.

**WARRANTY**

In terms of warranty, please pay attention to our delivery and payment conditions – point 11.

**Return of rejected goods**

For the assessment of complaints, EuropTec can request the entire disputed goods from the customer.

The redelivery costs go at the expense of EuropTec. The customer has to ensure proper packaging so that the goods may not be damaged on the backhaul. Unauthorized complaints will be returned to the customer and partial transportation and sorting costs will be invoiced.

**Storage conditions**

The storage of refined glass products has to be done properly, as is common in the glass industry. This includes in particular the prevention of moisture and temperature changes. EuropTec is not liable for damages caused by improper storage.

**EuropTec GmbH & Co. KG**

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