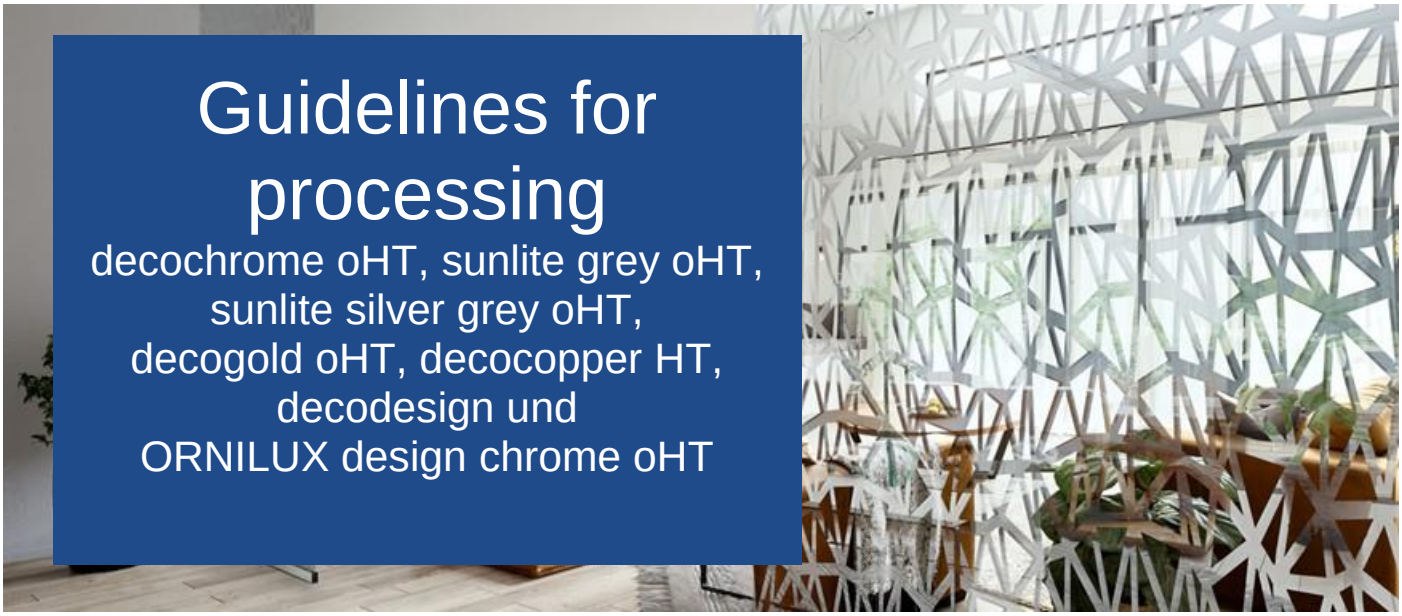
CUSTOMER INFORMATION



Guidelines for processing

decochrome oHT, sunlite grey oHT, sunlite silver grey oHT, decogold oHT, decocopper HT, decodesign und ORNILUX design chrome oHT

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1 Introduction

arcon offers with the *completely covered* coatings

- arcon decochrome oHT
- arcon sunlite grey oHT / sunlite silver grey oHT
- arcon decogold oHT
- arcon decocopper HT

metallically highly reflective coatings.

As *structured* “arcon decodesign” coatings

- arcon decodesign chrome oHT
- arcon decodesign gold oHT
- arcon decodesign copper HT

they offer entirely new possibilities for construction and design of decorative glass for indoor and outdoor use.

In addition, arcon offers ORNILUX design chrome oHT as a structured coated bird protection glass with visible marks.

If not particularly emphasised, in the further course of these guidelines it is generally spoken of *products*.

An innovative process produces these products.

Due to their composition these products are resistant to mechanical and thermal influences (mechanical processing, tempering, laminating).

“HT” (”heat treatable”) marked products need to be tempered.

“oHT” (“optional heat treatable”) marked products can be used either tempered or annealed. Processing is possible by drilling and grinding as well as processing to laminated safety glass.

In order to process these products for their best performance, processing guidelines as detailed in this document must be followed. This document contains processing guidelines including information on specific steps for surface detection, handling and storage, glass cutting, washing, heat-treating and storage.

This document is reviewed and updated. The latest version can be downloaded on the internet at www.arcon-glas.de. Ignoring and non-compliance can result in damage to coated surface.

2 References to standards and guidelines

DIN EN 1096: Glass in the building – coated glass

DIN EN 572: Glass in the building – Basic soda lime silicate glass products

DIN EN 12150: Glass in the building – Thermally toughened soda lime silicate safety glass

DIN EN 1863: Glass in the building – Partially pre-stressed lime soda glass

DIN EN 12543: Glass in the building – Laminated glass and laminated safety glass

Guidelines for processing arcon soft coatings

Guidelines for processing arcon heat treatable coatings

Guideline for accessing the visual quality of enamelled and textured coated glass

Customer information “Cleaning instructions”

3 Package and storage

The products are delivered in all commonly used packages:

- Float glass quality in 3.21m x 6.00m and 3.21m x 2.25m
- Laminated safety glass stock sizes 3.21m x 6.00m and 3.21m x 2.25m
- Monolithic tempered or toughened safety glass in max. 3.21m x 6.00m
- Laminated safety glass cut sizes max. 2.60m x 5.00m

Additional dimensions are possible on request.

The products are available as float and low iron glass. The available thicknesses are 3 to 12mm.

The first pane in the package is an uncoated float pane that is used for protecting the coated surface. The subsequent panes are positioned in a manner that the coated surface faces the first float pane. The position of this float pane is clearly marked on the package label according to the customer's request (on the front or rear side). A special powder (PMMA type with qualified grain size) is applied as a separating agent between the individual panes to avoid damage during the transport.

The glass must be stored in constant conditions. Relative humidity may not exceed 70 per cent. The coated glass must not be exposed to condensation. Open-air storage must be avoided. A sufficient distance to washing machines, external doors and chemicals (e.g. NaCl, HCl intended to be used for water preparation plants) has to be maintained.

The products can be stored in their original package under normal conditions up to 6 months. First in first out principle should be adopted.

4 Labelling and traceability of packaging units

Each packaging unit is labelled with a tag containing a consecutive number, coating name, glass thickness, dimensions, number of jumbos as well as split sizes and the position of cover sheet. The products are CE marked and fulfil the requirements of the European standard EN 1096-2, class A and are therefore resistant to weathering.

The package label must be kept since data are required for any warranty claims.

5 Identification of the coated side

During all processing steps, it is important that the coated side remains towards the air side i.e. not facing cutting pad or conveyor systems. Coating can be clearly identified by using a coating tester or ohmmeter. Coating testers can be purchased from arcon.

6 Handling

Before processing, all plant workers have to be informed about special requirements for arcon products and should be trained in its handling.

During each processing step marking-free, clean gloves must be used. Lubricants, oils, liquid drops or finger and glove prints can cause irreversible imperfections during the thermal process. Therefore, any kind of soiling must be avoided. Glass cutting pads should be frequently cleaned by compressed air to avoid scratches on the glass surface. Scratches that can scarcely be detected with the naked eye before the tempering process can become clearly visible after the glass tempering. Hence, all care must be taken to avoid scratches particularly on coated side.

An additional risk is the use of vacuum cups on the coating. The vacuum cups should not be in contact with the coated surface when unstacking the glass sheets. However, if the manufacturing process requires the use of vacuum suction systems it must be ensured that they are always absolutely clean and silicone free. Therefore, we recommend the use of special clean protective covers for them. Protective covers must be replaced regularly!

Separators (e.g. cork) should be placed in the edge region. The coated side must not be marked or labelled.

All devices and tools that come into contact with coatings must be kept permanently clean.

7 Cutting and cutting fluids

To avoid damages caused by scratches, glass splinters or dirt, the coated glass surface must remain towards the air side during cutting and all other processing steps.

Only soft cutting fluids that can easily be removed during the washing process are to be used for the cutting procedure. Avoid all excess of cutting fluid and remove any residual glass splinters or dust from the cutting table.

The cutting table must be cleaned regularly by using compressed air. Rulers or templates for cutting the glass should be avoided in order to reduce risk of scratches.

Cut sizes are to be processed within 8 hours.

When producing structured decodesign oHT as well as ORNILUX design chrome oHT a circumferential edge cut is necessary. This edge cut (top 20mm, bottom 35mm, left 20mm and right 20mm) must be made during the cutting process.

8 Edge deletion

Edge deletion is not required, if the adhesion of the sealant used is proven in accordance with EN 1279.

9 Edge working

Prior tempering glass edges have to be processed in order to avoid glass breakage during the tempering process. There are different possibilities for edge working.

During automatic edge working all relative movement on the coated surface as well as too much pressure of the up-per belts have to be avoided. The glass surface should remain fully wet during the whole operation and should be washed immediately after edge working. The belts should be cleaned continuously.

The coated side remains always towards the air side on conveyor systems.

Gloves should be checked regularly for cleanness and replaced as necessary.

10 Washing process

When washing the glass the following specific aspects are to be taken into consideration.

- The period between cutting and tempering should not exceed 8 hours. After the washing process, the heat treatment has to be applied immediately.
- The coated glass surface must not be moved directly on the transport rollers.
- It is necessary to use clean demineralized water (conductivity < 30 µS/cm, pH value 6.0 – 7.5). Washing agents must not be used.
- A water temperature of + 30°C is recommended.
- The brushes directly in contact with the coating must be particularly suited for coated glass (bristle diameter of 0.15 – 0.20 mm) to avoid scratches on the coating.
- Ensure the best possible continuous flow of production to avoid scratches on the coated surface if the washing process is stopped and restarted on one pane.
- Leaving the washing machine the panes must be completely drying to avoid remaining water- drip stains on the coating.
- After the washing process, the glass should be visually inspected at the test station using an appropriate illumination in transmittance and reflectance.
- Rubber lips or brush bars must not rub against the coated surface and should be removed if necessary.

The washing machine is to be maintained at regular intervals. During this inspection, particularly the brushes are to be checked for their cleanness and correct adjustment. The washing water must be renewed regularly.

Before the tempering process, the coating must not be soiled (fingerprints, oil) because these impurities will become visible after the tempering procedure. Therefore, the coated surface must not be touched with bare and dirty hands. Clean gloves must be used during all steps of processing.

To remove stains use a mild, quick-drying cleaning agent. For this purpose, dab the surface carefully with a clean, soft cloth without applying any pressure onto the coating. Cleaning agents must not remain on the coated surface.

Recommendations for cleaning agents are given in chapter “production aids”.

Cleaned sizes are to be stacked after washing by using proper separating materials.

11 Heat Treatment

The tempering process should take place within 4 hours after tempering.

Unlike the processing of uncoated glass types, the processing of (optional) heat treatable coatings require proper adjustments in the heating and cooling parameters.

The panes should be heat treated under temperature conditions as low as possible to obtain a high quality surface after the process. On the one hand, temperatures and heating time must be adapted in order to avoid breakage in the quenching zone and on the other hand, requirements for safety glass must be fulfilled.

General parameters for furnaces cannot be given. Higher temperatures and short heating time often lead to better results than lower temperatures and long heating time. Experiences with other coatings are often useful.

The coated side remains toward the air side in order to avoid damages or scratches from the conveyor system.

It is the customer’s responsibility to implement a proper tempering regime in order to fulfil the requirements for valid Standards (e.g. fracture behavior). Therefore, regularly quality control measures should be implemented.

12 Laminating

arcon decodesign oHT can be processed to laminated safety glass. arcon recommends internal tests in advance in order to evaluate the adhesion properties.

13 Transport of monolithic panes

arcon does not recommend the transport of coated monolithic panes outside the processing company because this is an additional risk. However, if such a transport is necessary, the following guidelines need to be followed:

- The panes are to be separated by cork in the edge areas.
- The package should be provided with air-proof foil and drying agents to prevent moisture penetration. The package should only be opened again, if the glass has reached environmental temperature.
- It must be ensured that all coated surfaces are protected within the package. To do this, use “protective panes” of the same size made of clear and clean float glass.
- The panes must be tied down so that they cannot move against each other during their transport

14 Evaluation of defects

The qualitative characteristics of the coating are tested in transmission. The samples to be evaluated are viewed in a vertical position against a white background. The sample to be tested shall be evaluated at a distance of 1.5m, with each test lasting no more than 20s.

14.1 Completely covered coatings

The evaluation of *completely* covered coatings is carried out in accordance with requirements 14.1.1 and 14.1.2

14.1.1 Punctual defects

Punctual defects are local deposits or flakes which can occur due to the influence of heating during tempering process. The criteria for punctual defects are narrower than specified in DIN EN 1096-1 for coated glass. The acceptance criteria are given in Table 1.

Tab. 1: Acceptance criteria for punctual defects

Diameter	Acceptance criteria
≤ 0,3 mm	No limitation
>0,3 mm und ≤ 1,0 mm	Max. 10 defects per m², clusters not allowed[1]
>1,0 mm und ≤ 3,0 mm	Max. 1 defect per m², clusters not allowed[1]
>3,0 mm	Not allowed

14.1.2 Linear defects and scratches

This chapter assesses linear defects and scratches that have arisen as a result of the coating process.

Linear defects with a maximum length of 20mm are permitted as long as no more than 2 per m². Scratches in the edge area of jumbo sizes (30mm circumferential) are not taken into account.

Scratches due to improper manipulation by the customer are not subject to this evaluation.

14.2 Structured coatings

The evaluation of *structured* decodesign coatings is carried out in accordance with „arcon guideline for accessing the visual quality enamelled and screen-printed glass“.

15 Cleaning instructions

Cleaning recommendations are given in customer information “Cleaning instructions”.

[1] cluster: more than 4 defects within a circle with a diameter of 200mm

16 Production Aids

The following list of production aids gives recommendations. arcon recommends testing the suitability of the production aids in advance because arcon cannot guarantee their quality. Production aids from other suppliers can also be suitable.

- **Gloves**

  Type: KCL-Protective cloves
  Supplier: Kächele-Cama Latex GmbH
  36124 Eichenzell
  Germany

- **Cutting Fluids**

  Type: CUTTING FLUID AC PE 5503, 5250
  Supplier: Chemetall GmbH
  41199 Mönchengladbach
  Germany

  Type: DIONOL GT 641, 644-1
  Supplier: MKU-Chemie GmbH
  63322 Rödermark
  Germany

- **Protection Cover**

  Type: Protection cover type MTC
  Supplier: euroTECH Vertriebs GmbH
  72351 Geislingen
  Germany