

# Guidelines for processing ORNILUX Mikado HT for usage in the North American Market

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## 1 Introduction

arcon is the coating division of Arnold Glas.

ORNILUX Mikado HT is a structure-coated glass. It is produced by using the serigraphy process, printing on glass surfaces with a water-soluble marking. Subsequently, a thin-film coating (produced with the magnetron process) is applied to the masked panes. After removal of the masking a structured thin-film coating remains on the glass surface.

ORNILUX Mikado HT can be used either annealed or tempered, but in order to improve the desired mechanical (bending strength) and thermal (thermal shock resistance) properties of the glass, the coated glass should be thermally treated.

In order to process ORNILUX Mikado HT for their best performance processing guidelines as detailed in this document must be followed.

The finished product is used in insulating glass units (coating facing the inside of the insulating glass unit).

The period between cutting – tempering – IGU assembling should be as short as possible and must not exceed 10 business days.

The present document contains processing guidelines including information on specific steps for surface detection, handling and storage, glass cutting, washing, heat-treating, insulating and storage. Ignoring and non-compliance can result in damage to coated surface.

This document is permanently reviewed and updated. The latest version can be downloaded on the internet at [www.arnold-glas.com](http://www.arnold-glas.com).

## 2 Package and storage

ORNILUX Mikado HT glass is delivered in split sizes of 7.38' x 10.53' (2250 mm x 3210 mm). The sizes can be adjusted. The available thicknesses are 4, 6, 8, 10 and 12 mm on clear glass substrates. Low-iron glass is available on request.

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

All heat treatable glass products by arcon must be stored in constant conditions. Relative humidity may not exceed 70 per cent. All heat treatable glass products by arcon must not be exposed to condensation. Open air storage must be avoided.

Heat treatable glass products by arcon are sealed to avoid condensation on the exposed glass surface and inside a glass pack during transport. Moisture will affect the coating immediately and the coated surface will become corroded. Hence the seal should remain closed until the product is used for processing. If not all glass sheets will be used after opening it is recommended to seal the package again. 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.

ORNILUX Mikado HT can be stored in their original package under normal conditions up to 12 months.

Opened stacks should be processed within 3 month. However, first in first out principle should be adopted.

All boxes must be inspected for any damage on arrival and damages reported and recorded for potential insurance claims etc. Damages and defects should be reported and this glass should be stored for inspection by Arnold Glas or arcon representative.

### **3 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. The uncoated surface can be detected by a tin side detector. (Tin side is always uncoated.)

### **4 Handling**

Before processing all plant workers have to be informed about special requirements for ORNILUX Mikado HT as well as 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) can leave irreversible prints on the coated surface. The coated side must not be marked or labeled.

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

### **5 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. Rulers or templates for cutting the glass should be avoided in order to reduce risk of scratches.

The cutting table must be cleaned regularly by using compressed air.

### **6 Edge deletion**

Edge deletion is not required for arcon ORNILUX Mikado HT.

### **7 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.

### **Automatic**

During automatic edge working all relative movement on the coated surface as well as too much pressure of the upper 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.

### **Manual**

Manual edge working increases the risk of having scratches due to soiled washing machine brushes, rollers and water. The surface is more sensitive for scratches even when wearing gloves. Gloves should be checked and changed regularly. Wet in wet processing is recommended.

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

## **8 Washing process**

Horizontal washing machines as well as washing machines normally used for the insulation glass production can be used for cleaning purposes. When washing the glass the following specific aspects are to be taken into consideration.

- The period between cutting and tempering should be as short as possible. After the washing process the heat treatment has to be applied immediately. Longer storage of the coated and washed glass can cause stains after heat treatment.
- 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 86 °F (30°C) is recommended.
- The brushes which are 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 (e. g. cardboard stripes).

## **9 Heat Treatment**

ORNILUX Mikado HT requires similar parameter settings as uncoated glass.

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. If the heat is too high when processing HT coatings the scratch resistance of the coating is affected. This may result in problems during IGU assembling.

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

The use of sulphur dioxide is at own risk.

arcon engineers will assist in setting up the furnace parameters.

## **10 Heat Soak Test**

All float glass contains some level of imperfection. One type of imperfection is nickel sulfide (NiS) inclusions. Most NiS inclusions are stable and cause no problems. There is, however, the potential for NiS inclusions that may cause spontaneous breakage in tempered glass without any load or thermal stress being applied.

Heat-soaking is a process that may expose NiS inclusions in tempered glass. The process involves placing the tempered glass inside a chamber and raising the temperature to approximately 554°F (290°C to accelerate nickel sulfide expansion. This causes glass containing nickel sulfide inclusions to break in the heat soak chamber, thus reducing the risk of potential field breakage. The heat soaking-process is not 100 per cent effective, adds cost and carries the risk of reducing the compressive stress in tempered glass.

Heat-strengthened glass has much lower potential incidence of spontaneous breakage than tempered glass. For applications where additional glass strength is required due to thermal stress, and safety glass is not mandated, Arnold Glas recommends heat-strengthened glass to reduce the potential for spontaneous breakage.

If heat-soaking is required, the processor has to ensure that appropriate spacers are used to avoid marks on the coated side.

## **11 IGU assembling**

When ORNILUX Mikado HT is used in an IGU assembly, the coating must face the space between the panes. The inner space is filled with dry air or an inert gas. Their monolithic use is not allowed. The IGU configuration is determined by Arnold Glas. Only the market approved ORNILUX Mikado IGU configurations shall be produced and sold in North America. Arnold Glas will provide a list with the approved glass types during the certification process.

The edge seal of an IGU consists basically of a two-stage sealing system – the butyl as the primary sealant, and a secondary sealant. This permanently elastic edge seal must take up the strain exerted upon the IGU and ensure that the IGU remains airtight and gastight respectively throughout its lifetime.

The processing guidelines of the sealant manufacturer are to be followed.

Insulating glass units using ORNILUX Mikado HT must fulfil mandatory local market standards and requirements. The processor is fully responsible for proper IGU production.

Ensure the best possible continuous flow of production to avoid scratches or abrasions on the coated surface if the washing process is stopped and restarted on one pane.

A water temperature of 86 °F (30°C) is recommended.

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After assembling, the glass should be visually inspected at the test station using an appropriate illumination in transmittance and reflectance.

## 12 Quality features of ORNILUX Mikado HT

The coating or other defects of coated glass are based on US standard C1376.

Coated glass may be examined in cut sizes ready for installation. The examination may be undertaken in the factory or at site when glazed.

The pane of coated glass being examined is viewed in transmission at a viewing angle of 90° from a minimum distance of 10 ft (3 m) for cut size coated vision glass and 15 ft (4.6 m) for cut size coated overhead glass in accordance with C1376. A bright uniform background is required.

The examination of the coated glass in transmission is performed by the observer looking at the side which will be the inside of the glazing.

For ORNILUX Mikado HT (structure coated glass) additional acceptance criteria for defects are described in Table 1.

TABLE 1: Additional acceptance criteria for structure coated glass defects

Type of flaw	Acceptance criteria
defects in the structured coating	Surface: max. 9 cm <sup>2</sup> / glass sheet (3210 mm x 2000 mm)  Number: No restriction  but total ≤ 9 cm <sup>2</sup> / glass sheet (3210 mm x 2000 mm)

Flaws ≤ 2 mm (“starry sky” or “pin holes” or spot coating on the previously masked glass pane areas) are permissible and are generally not taken into consideration.

## 13 Quality Assurance

The processor of ORNILUX Mikado HT has to ensure that the requirements of those guidelines are permanently fulfilled. It's glass processor's responsibility to implement a quality assurance system. Attention should be paid to visual inspection of tempered glass panes.

The processor of ORNILUX Mikado HT has to implement a system of product identification and traceability. ISO 9000 certified processors usually fulfil these requirements.

## 14 Warranty

Compliance with aforesaid processing guidelines will ensure the production of high quality insulating glass units. Failure to comply with the aforesaid processing guidelines and other procedures introduced by Arnold Glas or arcon will render product warranty in-valid.

If there is a cause for complaint, Arnold Glas or arcon reserve the right to control all claims.

## **15 Production Aids**

The following list of production aids gives recommendations for processing of coated glass into insulating glass units.

arcon emphasizes that only materials checked for their compatibility are used in IGU production.

arcon cannot guarantee the quality of the recommended production aids.

Production aids from other suppliers can also be suitable.

- **Gloves**

Type: KCL-Protective gloves

Supplier: Kächele-Cama Latex GmbH  
36124 Eichenzell  
Germany

- **Cutting Fluids**

Type: CUTTING FLUID AC PE 5503, 5250

Supplier: Aachener Chemische Werke GmbH  
52146 Würselen  
Germany

Type: DIONOL GT 641, 644-1

Supplier: MKU-Chemie GmbH  
63322 Rödermark  
Germany

- **Protection Cover**

Type: Protection cover type MTC

Supplier: Euro Tech Vakuum-, Hebe- und Transporttechnik

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72348 Rosenfeld

Germany

- **Separating agent**

Type: AC Separol type F, G, TN

Supplier: Aachener Chemische Werke GmbH

52146 Würselen

Germany

- **Glass Cleaner**

Type: ACECLEAN 6147

Supplier: Aachener Chemische Werke GmbH

52146 Würselen

Germany

Type: Mixture 50 per cent by volume Isopropanol and 50 per cent by volume demineralised water

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## Confirmation

The customer certifies by the following signature that they have taken note of the contents of these guidelines for processing ORNILUX Mikado HT and that they understood aforesaid guidelines.

Name: .....

Position: .....

Signature: .....

Date: .....

Company stamp:

Please return this page by fax or email to:

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