IVK
Industrieverband
Kunststoffbahnen e.V.

Industrieverband
Klebstoffe e.V.

3D-Door Manufacture

Quality Guide

Content

Introduction

Three-dimensional furniture fronts, in short 3D or foil-laminated furniture fronts, are used today all around the world for all types of furniture, mainly for cabinets in the bathroom and kitchen area, but also for living rooms and bedrooms.

Innovative developments with regard to the formulation of the materials used, plus the very high degree of automation in the 3D foil laminating process, including the preparative and finishing steps of the pieces in the manufacturing line – all these factors add up to a highly complex knowledge pool to which processors must have access to enable them to master the handling and manufacturing processes required for these materials.

Top-ranking companies from the entire chain of manufacturing, from the raw materials manufacturer to the processor, have therefore formed an initiative group in which the wealth of information and know-how can be pooled and made available to the processor.

The main objective is to achieve the utmost in quality in these furniture fronts, taking into account the specific properties of the material, while maintaining the correct processing environment and manufacturing procedures, to provide a durable and reliable product to both furniture manufacturers and the final consumer.

Another point of equal importance is the harmonization of the specifications in terms of material properties, storage conditions, processing parameters and test methods.

Accompanied by a consistent documentation of all relevant data gathered throughout the entire process, it facilitates continuous batch traceability and guarantees optimum quality control.

We want to thank all companies involved for their close cooperation and trust, which made it possible to compile the extensive know-how of all participants in this document.

The 3D Initiative Group

Application

Description of application and purpose

Thermoplastic 3D furniture foils* are high-quality finishing materials which are used on thermoforming presses, with and without membranes, to laminate fibreboard (MDF) for kitchen cabinets, living room, bathroom and office furniture.

It can be processed on all standard thermoform presses which operate with heat, pressure and vacuum, and which use a PUD adhesive to achieve a lasting bond on fibreboard (MDF).

(*The following descriptions for materials, specifications and instructions for processing refer exclusively to hard PVC foils).

2 Description of materials - Foils

2.1 Thermoplastic 3D furniture foils

Furniture foils with thermo-forming properties for use on thermoforming presses with or without membranes are impact-resistant hard PVC foils with single or multilayer structures.

Their surfaces are protected by a highly light-resistant lacquer on PUR/acrylate basis.

The reverse side of the foils is coated with primer to ensure a safe and temperature-resistant bond.

The thermoplastic 3D furniture foils mainly consist of

- PVC, fillers such as chalk and pigments
- stabilizers
- minimal percentages of plasticizers (no DEHP!).

In conformance with German Consumer Goods Act (Bedarfsgegenständeverordnung) as amended 8 August 2007 and Chemical Prohibition Order (Chemikalienverbotsverordnung) as amended 3 September 2007, the following substances are not used in the manufacture of these foils:

- Formaldehyde
- Cadmium, lead, mercury and chromium composites (chromium 6)
- Azo dyes or lead-containing pigments

according to the legal requirements on chemicals and limit values applicable in Germany with their latest revisions (Bedarfsgegenständeverordnung 08-08-2007, Chemikalienverbotsverordnung 03-09-2007).

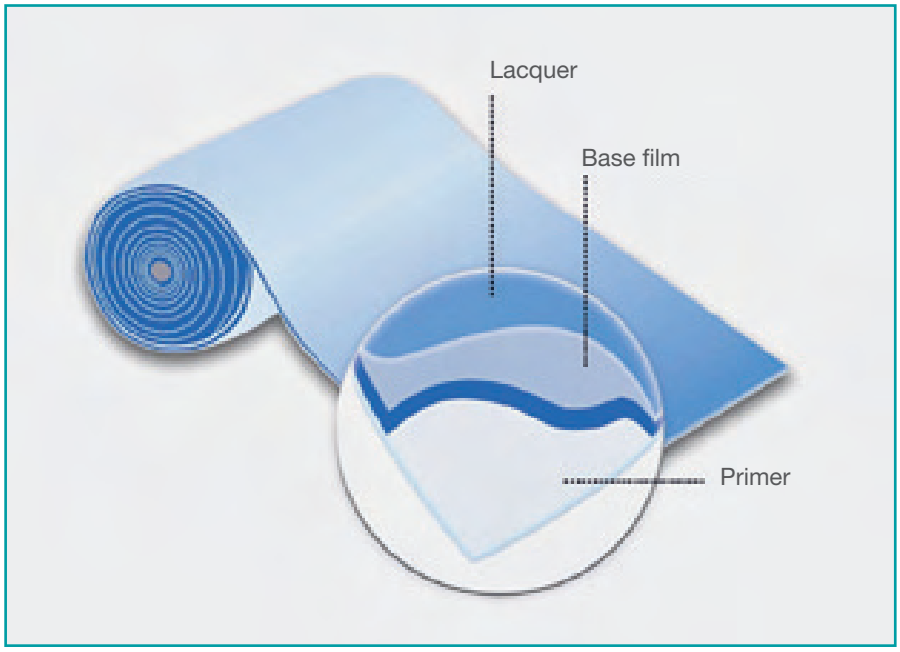
PLEASE OBSERVE!

- **Hard PVC foils with protective lacquer and reverse side primer**
- **No DEHP plasticizers**
- **No components classified as restricted chemicals**

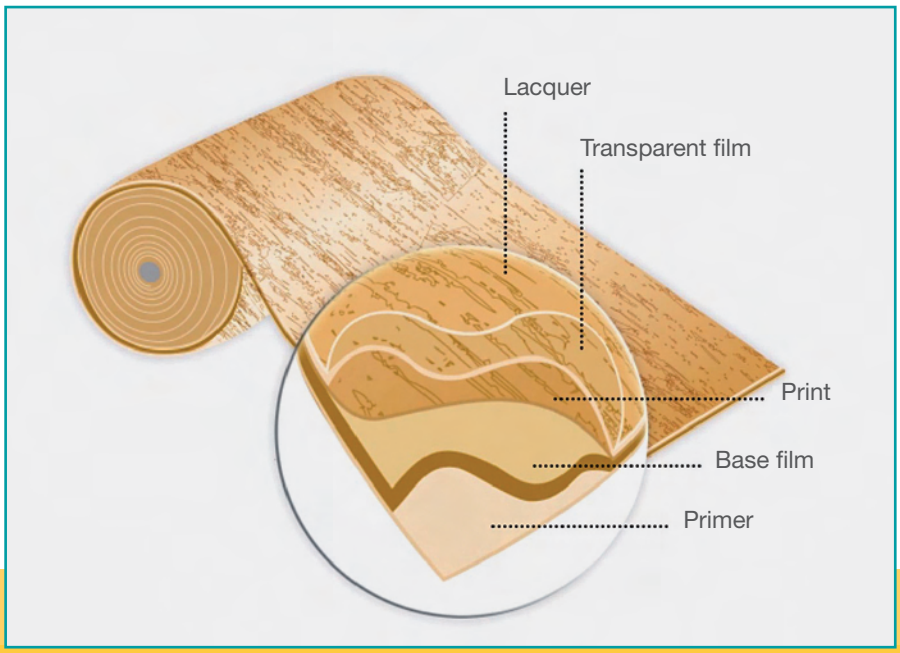
2 Description of materials - Foils

2.1.1 Product structures of single and multilayer foils (standard thickness 0.40 mm)

Single-layer foil



Multilayer (printed décor) foil



2 Description of materials - Foils

2.1.2 Primer

In order to guarantee a durable and lasting bond quality, in the manufacturing process special attention is paid to the reverse side of the foil. This is coated with a special primer system.

- Both the raw materials and the application process are subject to continuous surveillance.
- Constant and optimum application is guaranteed by defined application rollers.
- The applied primer is specially selected to harmonize with the adhesive systems developed by the adhesive manufacturers.
- Other parameters to be strictly controlled during the foil manufacturing process are the mechanical properties, e.g. dimensional and embossing stability and tensile strength.

The respective data and tolerances are specified in the quality guidelines of the German Association of Foil Manufacturers (Industrieverband Kunststoffbahnen – IVK) together with the applicable DIN/EN/ISO standards.

PLEASE OBSERVE!

- **Ongoing checks of raw materials and processes**
- **Primer application with defined rollers only**
- **Primer/adhesive system is harmonized**
- **Mechanical properties control**
- **Specification according to IVK quality guidelines**

2 Description of materials - Foils

2.1.3 IVK quality guidelines

Material specification for 3D foils
Application: Furniture / vertical surfaces

Characteristics / testing procedures	Unit	Data / tolerance
1. Thickness DIN 53353	mm	0.30 – 0.50 ± 7.5 %
2. Dimensional change DIN 53377, 10 min., 100 °C, circul. air	%	longit. max. - 5 % across max. + 2 %
3. Embossing stability 10 min., 120 °C, circul. air	-	no visible change in of gloss,embossment colour compared to standard
4. Light fastness DIN EN ISO 4892-2, Method B ISO 105 B 02	-	≥ 6
5. Chemical stability DIN 68861, Part 1	-	Class 1 B
6. Scratch resistance DIN 68861, Part 4	N	min. Class 4 D ≥ 1.0 N
7. Heat resistance dry heat DIN 68861, Part 7	°C	min. Class 7 C (100 °C)
8. Heat resistance moist heat DIN 68861, Part 8	°C	min. Class 8 B (70 °C)
9. Abrasion resistance DIN 68861, Part 2	Rev.	min. Class 2 D (50 RPM.)
10. Tensile properties ISO 527-3-200	N/mm²	longit. ≥ 40 across ≥ 30

Characteristics / testing procedures	Unit	Data / tolerance
11. Gloss assessment/tolerances DIN 67530, 60° measuring head	-	up to 15 ± 2 up to 30 ± 3 up to 50 ± 5 over 50 ± 7
12. Colour tolerances solid colour foils DIN 53236 B (10 / ≤) DIN 6174 (light colours only)	-	Δ E ≤ 0.50 Δ L ± 0.30 Δ a ± 0.20 Δ b ± 0.30
13. Colour consistency printed foils Comparison prototype	-	Manufacture and visual evaluation of prototype
14. Metamerism index DIN 6172 (D65 – AN 10)		≤ 0.30
15. Opacity over black / white	-	Δ E ≤ 0.35
16. Error definition	-	Optical modifications are errors when visible to the naked eye within 30 seconds at a distance of 50 cm

Remarks: All tests are to be carried out on non-laminated foil.
Exception: Tests 7 and 8 in bonded state.

2 Description of the materials - Adhesives

2.2 Polyurethane Dispersions (PUD)

PU Dispersion adhesives (PUD) are water-based special adhesives on polyurethane basis, especially for lamination of thermoplastic décor foils (based on PVC, ABS blend, polyester, etc.) using presses with or without membranes on MDF panels. These adhesives are available and used in 2 different supply forms.

- Two-component reactive products (with crosslinker added separately).
- Single-component, reactive products (already with integrated crosslinker).

Experience from the field has shown that a major improvement can be reached in several points when the reactive products are used.

- Improved adhesion to the foil.
- Improved adhesion to the base material.
- Higher heat resistance levels.
- Increased resistance levels to water and steam.

The reasons listed above make the reactive adhesives the only possible choice.

PLEASE OBSERVE!

- **Water-based special adhesives based on polyurethane**
- **One-component, reactive (integrated crosslinker)**
- **Two-component, reactive (crosslinker has to be added)**

2 Description of the materials – MDF board

2.3 MDF wood-based panels (medium density fibreboard)

The MDF panel is a wood-based substrate consisting of finest soft- and/or hardwood fibres that is homogenous in longitudinal and transverse direction.

The surface is sanded and polished on both sides during manufacture and is melamine-coated on one side for lamination with 3D furniture foils.

MDF deep-drawing qualities are highly compressed with a fine fibre structure and especially suitable for the manufacture of 3D furniture fronts for all areas of the home.

MDF deepdrawing quality (characterisation)

• Moisture content (EN 322)	6 ± 2 %
• Tensile strength across the panel (EN 319)	≥ 0.75 N/mm²
• Peel resistence (EN 311)	≥ 1.2 N/mm²
• Hydrophobing agents	≤ 2% solids to absolutely dry wood fibre

Remarks:
The deep-drawing quality is also referred to as deep-routing quality. Both terms are commonly used to describe the same MDF panel quality level for manufacturing three-dimensional laminated furniture elements.

PLEASE OBSERVE!

- **Deep-drawing quality/deep-routing quality with highly compressed core**
- **Fine fibre quality, very fine sanding and excellent surface quality**
- **Superior physical properties**

3 Transport, shelf life, storage - Materials

3.1 Storage recommendations for PVC foils

- Store foils dry and indoors
- Protect against direct exposure to sun or frost
- The ideal storage temperature is from 5 to 30 °C and RH approx. 50 % = (ideal conditions)

The manufacturer recommends a shelf life of max. 18 months under ideal conditions; for foils covered with a protective film, the recommended shelf life is max. 6 months. During storage the foils should not be subjected to exterior pressure. Before using, condition the foil at room temperature (minimum 18 °C) and 50 % RH (= ideal conditions) for 3 days.

PLEASE OBSERVE!

• Ideal storage temp.	5 - 30 °C
• Relative humidity	approx. 50 %
• Max storage time	18 months
• With protective film	6 months

3 Transport, shelf life, storage - Materials

3.2 Storage recommendations for polyurethane dispersions (PUD)

- PU dispersion adhesives can be stored in tightly-closed original containers for approx. 6 months, cool and dry (15–25 °C).
- The adhesive may only be exposed to lower temperatures for a short time during transport, with a lowest temperature limit for the adhesive of +6 °C.
- When the products are supplied during the winter months, special attention must be paid to the temperature of the containers and samples taken to test for homogeneity.
  If anything out of the ordinary is noticed, a complaint must be immediately made to the shipping agent, and the adhesives supplier informed.

Adhesives delivered cold (<15 °C) must be warmed up for at least 48 hours at 20 ± 2 °C before use!

Remarks:
In agreement with the adhesives supplier, glues may be transported during the winter months using temperature indicators (coldmarks or data loggers).

PLEASE OBSERVE!

- **Ideal storage temp. 15 - 25 °C**
- **Transport min. +6 °C**
- **Max storage time 6 months**
- **Check the temperature in winter months!**

3 Transport, shelf life, storage - Materials

3.3 Storage recommendations for MDF panels

- The moisture level with which the panels are supplied (6 ± 2 %) is maintained during storage, when the absolute panel moisture matches the conditions at a standard climate of 20 °C and 65 % RH.
- If the relative humidity is higher, the MDF panel will absorb moisture (at 85 % RH to approx. 10 % panel moisture).
- If the relative humidity is lower, the MDF panel dries out (at 30 % RH to approx. 4% panel moisture).
- In general, MDF panels must be protected against moisture. This also requires the appropriate building installations (enclosed halls, no storage under lean-to roofs).
- In the event of climatic changes, the acclimatization of a MDF panel will take 3–6 days depending on its thickness. If the panels are stacked, this may require at least 4 weeks.
- If panels are not correctly stacked, they may warp. The recommendations of the MDF manufacturer must be strictly observed. The number of spacer timbers for level storage varies according to panel shape and thickness, and depends on whether or not additional cover sheets are used

Remarks:
The recommendations of the respective manufacturer with regard to transport and storage conditions must be strictly observed.

PLEASE OBSERVE!

- **Wood moisture level 6+/- 2 % (20 °C, 65 % RH)**
- **No outdoor storage**
- **Protect against direct exposure to sunlight, cold and moisture**
- **Store on a level surface to prevent warping**

4 Preparation of materials – Manufacturing process

4.1 Preparation – General measures

Before processing the materials, they must be checked to ensure that

- they meet individual specifications
- they were stored according to the conditions outlined above (temperature/humidity)
- they were conditioned according to the parameters outlined above (temperature/humidity)
- the climate conditions during manufacturing are controlled and maintained (temperature/humidity).

Particular attention must be paid to ensure that:

- the MDF panels meet the individual specifications.
- the residual moisture content of the MDF panels is correct (6 ± 2 %).
- the MDF panels are not straight from the press and too warm (>18 and <35 °C panel temp.)

- the foils meet the respective specifications.
- décor, colour, degree of gloss and pattern match the prototype.
- the primer has been applied with even coverage (visual check).
- the foils are conditioned at ambient temperature before processing.

- the PU dispersion adhesives match their respective specifications.
- a visual check is made for inhomogeneity (e. g. thickening, separation).
- that the respective crosslinker is added by two-component adhesive systems.

PLEASE OBSERVE!

- **Observe recommendations of the manufacturer concerning storage, mixing, pot life, adhesive applicators and processing**
- **Control/maintain a constant climate in the room**
- **Contact the manufacturer in case of any questions**

4 Preparation of materials – Manufacturing process

4.2 Cutting / Routing

- All tools used on MDF panels must be well-sharpened

  - Cutting on the panel saw
  - Routing on a CNC processing centre
  - Edge profilers
  - Double-end profilers
  - Other finishing tools

- MDF panels or cuts must be worked at the defined speed in order to prevent chafing or cracked edges and profiles.

- No substances such as oil and/or products containing oil/silicone may be sprayed onto the panel or components.

- After routing the parts must be:

  - stored level to prevent warp
  - stored in a dry and temperature-controlled room (observe ideal conditions!).
  - conveyed to the glue station only in a dust-free and clean atmosphere.

PLEASE OBSERVE!

- **Tools must be sharpened**
- **Observe tooling speeds**
- **No use of oily or silicone substances**
- **Store finished parts straight and level, clean and dry to prevent warping**

4 Preparation of materials – Manufacturing process

4.3 Preparation of the PU dispersion adhesive (PUD)

4.3.1 Check the adhesive container before use

- Make a visual check for inhomogeneity, such as thickening or separation, etc. (if found, please contact the adhesive supplier before use).
- Stirring before use is recommended, but normally not required.

4 Preparation of materials – Manufacturing process

4.3.2 Adding the crosslinker and homogenizing when 2-component products are used

- Single-component, reactive PU dispersion adhesives:
  - These products can be used as supplied.

- Two-component, reactive PU dispersions:
  - Before use, the respective crosslinking agent must be added in the required dosage.

The respective technical data sheet indicates which crosslinker must be used.

The crosslinker must be added slowly while stirring, using a mechanical agitator until homogenous. Foaming must be prevented.

In practice, the crosslinker is stirred under with a standard electric drill with rotor attachment and RPM settings (regular mixer attachment).

In order to achieve a perfect blend of 500 g crosslinking agent in 10 kg PU dispersion adhesive, a mixing time of about 4 - 5 minutes is required.

- If the crosslinking agent is added too fast, mixing will be inadequate.

- The crosslinker will not be dispersed adequately if:
  - the mixing unit is unsuitable or inadequate for the batch size
  - the mixing time is too short.

PLEASE OBSERVE!

- **Add second component slowly and stir constantly until homogenous!**
- **Use mechanical stirring attachment on electric drill**
- **Prevent foaming**
- **Make sure crosslinker is dispersed homogeneously**
- **Follow mixing time instructions, approx. 4-5 min. for 500 g of crosslinker into 10 kg of PU adhesive**

4 Preparation of materials – Manufacturing process

4.3.3 Pot life considerations for 2-component products

- The reactivity of the crosslinker (after mixing into the adhesive dispersion) is adjusted to allow the processor a sufficient pot life for processing.
- As a rule, the adhesive mix should be used up within 4–6 hours after adding the crosslinker.
- When the pot life is exceeded, it is possible that the optimum results may not be reached.

PLEASE OBSERVE!

- **Observe pot life!**
  4–6 h after adding the crosslinker
- **Mix only as much as can be used up within the pot life time**
- **Do not exceed the pot life**

5 Processing of materials – Manufacturing process

5.1 Adhesive application

5.1.1 General information on adhesive application units and equipment

- In order to minimize mechanical stress on the PUD adhesives a pressurized vessel should be used to convey the adhesive to the spray gun.

- All parts coming into contact with the dispersion should be made of stainless steel (German standard V4A) or e.g. Teflon®, polyamide, PP or other inert plastics.

- Avoid contact with metals like zinc, brass etc. which may cause the adhesive to coagulate, leading to uneven application and clogging of nozzles and ductwork.

  - Nozzle diameter: 1.5 – 2.2 mm
  - Material pressure: 1.0 – 3.0 bar
  - Atomizer pressure: 3.0 – 7.0 bar
  - Air cap: 2.2 – 2.5 mm

- When the product is processed from a pressurized container, the following recommendations apply:

For a 4 m long hose with an interior diameter of 8 mm, the material pressure should be approx. 1 – 2.5 bar.

5 Processing of the materials - manufacturing process

5.1.2 Adhesive application – MDF substrate, temperature and grammage

The MDF components have to be prepared very carefully.

- The surface must be absolutely clean and free of dust.
- Even the slightest contaminations or inclusions of dust particles may show up on the foil surface after lamination.
- The adhesive is usually sprayed onto the MDF substrate at room temperature (>18 °C).
- Edges and routed areas are surfaces with high absorption, so the PU dispersions may penetrate more easily and become totally absorbed.
  This means that these areas must receive two adhesive coatings, guaranteeing a continuous, closed and smooth adhesive coating.

  - The first coat (gap filling) serves solely to close the pores
  - after an intermediate drying interval (of approx. 1 - 3 min at room temperature),
  - a second coating with the adhesive grammage required for a permanent bond is applied.

5 Processing of materials – Manufacturing process

The minimum temperature for substrates and ambient air is 18 °C, while temperatures above 35–40 °C should also be avoided.

The adhesive grammage depends very much on the quality of the MDF and on their absorbency, and the data below are minimum values:

- Application to the surface: 50–70 g/m² wet (20–30 g/m² dry)
- Application to the edge: 80–130 g/m² wet (35–55 g/m² dry)

Remarks:
In certain cases the application may need to be increased!

The adhesive coating on the substrate must spread easily when wiped with a finger. After drying the film must appear glossy.

As an added precaution, random weight checks are recommended.

PLEASE OBSERVE!

- **Surfaces must be clean and dust-free**
- **Adhesive applied to MDF conditioned to RT (> 18 °C)**
- **Edges and open profiles absorb more adhesive = 2x adhesive coats**
  - 1st for closing the pores
  - allow to dry for 1-3 minutes
  - apply 2nd coat
- **Application depends largely on quality of MDF**

5 Processing of materials - Manufacturing process

5.1.3 Drying of the adhesive coating

After adhesive application the following factors must be observed:

- The adhesive must be allowed to dry sufficiently under dust-free conditions. Only then can thermo-reactivation take place in the press.
- Depending on room conditions (temperature and humidity), the MDF parts will be dry enough to go into the press after about 30 minutes at an ambient climate (approx. 20 °C and 50 % RH).

- Drying times can be reduced substantially if the pre-coated parts are passed through a hot air tunnel.
- When drying in a hot air tunnel, followed by storage, the surface temperature may not exceed 40 °C to prevent premature or accelerated crosslinking of the adhesive.
- The major factor for fast drying is the air flow (volume) and not the temperature. This applies to the reactive two-component as well as for the single-component reactive PU dispersions.

- After drying in a hot air channel, immediate processing/laminating in the press is necessary for the reactive dispersion adhesives.

5 Processing of materials – Manufacturing process

- After drying in a hot air tunnel, immediate processing/laminating in the press is necessary for the reactive dispersion adhesives.
- Extended waiting times after drying must be avoided

Remarks: The recommendations of the adhesive manufacturer must be observed

PLEASE OBSERVE!

- **Sufficient drying under dust-free conditions**
- **Furniture fronts with glue applied are ready for pressing after about 30 minutes (at approx. 20 °C/ 50 % RH) depending on ambient climate**
- **Reduction of drying time using hot air channel**
- **In case of drying in hot air channel followed by storage, the surface temperature should not exceed 40 °C**
- **Air volume (flow) is important, not the actual temperature**
- **After channel drying, finishing (lamination) without delay**
- **Long waiting times before lamination must be avoided**

5 Processing of the materials - Manufacturing process

5.2 Pressing

5.2.1 Press systems / parameters

Below the specific characteristics of the various press systems found in the field are outlined.

- Specific characteristics of presses with membranes:

  - The membrane serves as a medium for the transferral of heat.
  - The foil is formed over the component to be laminated by applying a vacuum and pressure onto the membrane.

- Specific properties of presses without membrane:

  - The heat is transferred directly from the hot platen to the foil.
  - The foil is formed over the component to be laminated exclusively by vacuum and pressure.

5 Processing of the materials - Manufacturing process

5.2.2 Preparing the pressing cycle

The following parameters must be checked before processing:

- Type of foil (raw materials basis, structure, condition)
- Foil thickness
- Colour and type of surface (e.g. standard or high gloss)
- Adjust the press parameters under consideration of type of foil and routing design of the parts
- Condition of the glued components (adequate ventilation and maintenance of time limits for adhesive application, parts temperature and drying time).

5.2.3 The laminating process

Laminating is carried out in two steps:

Step 1: Preheating
Step 2: 3D forming

5.2.4 Temperature of the heating platens and/or membrane

The setting depends on the foil type.

5 Processing of the materials - Manufacturing process

5.2.5 Preheating time and procedure

- The foil is heated by lifting up to the upper heating platen or membrane (contact heat).
- The temperature must be applied to the entire surface of the foil (observe for full contact).
- Due to radiated heat, the temperature level of the work pieces may also be raised.
- Preheating of the foil can also be achieved by heat radiation.
- Preheating of the foil depends on the temperature of the heating platens or membrane and the preheating time.
- The preheating time must be adjusted to accurately match the activation temperature in the glue line as recommended by the adhesive manufacturer for the respective PU adhesive.
- The glue line temperature depends on the temperature setting of the heating platens or of the membrane (surface temperature of the foil) and on the preheating time.
- The required minimum activation temperature varies by adhesive and usually is approx. 55–80 °C (temperature in the glue line).
- To achieve optimum results, the minimum activation temperature in the glue line must be clearly exceeded at a pressure of at least 3 bar.

Remarks
Using a suitable measuring method (temperature strips, contact reading equipment, T-profiler etc.) the surface temperature of the foil respectively the glue line at the edges and at the surface should be monitored and documented with the other process parameters.

If the surface or glue line temperatures are insufficient, the machine parameters (e. g. preheating time, press time, pressure, heating platen/membrane temperature) must be optimized accordingly.

5 Processing of materials – Manufacturing process

5.2.6 3D forming

- The foil is formed by vacuum from below and pressure from above.
- When the vacuum is built up, the foil can be separated from the heating platens, directly or delayed, in order to reduce the air volume already before pressing.
- The 3D-forming is subject to the factors vacuum time, pressure and pressing time.
- The setting of these parameters depend on the foil used and the design of the parts.
- When pressure is applied, the minimum requirements of the adhesive manufacturer must be observed.
- The pressing time has to be adjusted in such a way that at the end of the pressing time, the temperature of the glueline is well below the activation temperature of the adhesive.

Apart from the major parameters listed here, there are also additional parameters which may apply for special applications. These parameters are listed in the manuals of the individual press manufacturers; for the respective information, please contact the individual engineering companies.

PLEASE OBSERVE!

- **Set preheating time accurately to reach activation temperature in the glue line as recommended for the adhesive in use**
- **Ensure full contact between foil and heat source**
- **Press parameters depend on foils and design of the work pieces**
- **Observe minimum requirements of the adhesive manufacturer while applying pressure**
- **Set pressing time to ensure that glue line temperature at the end of the pressing time is below the activation temperature of the adhesive**

5 Processing of the materials - Manufacturing process

5.2.7 Cutting and trimming

- At the end of the pressing process and opening of the press, the pressed parts are cut out of the foil (individually) while still warm and lifted off the press table, leaving an overhang of foil of several centimetres around each piece.
- When the foil is trimmed off immediately after pressing (manually or automatically) this should only be done when the adhesive has sufficient cohesion/strength).
- A sharp tool must be used to prevent mechanical separation of the foil from the adhesive while trimming. The foil excess is cut off in a clean drawn blade movement against the glue line.
- The adhesion of the foil should be checked at regular intervals by a peel test and documented. This is done by cutting a triangular piece of foil from the surface to the edge, then peeling it off and checking its strength characteristics.
- Ideally, the parts should be trimmed only when cooled down to room temperature.
- The front pieces should be stored for 3 days at room temperature before being released for shipping.

5 Processing of the materials - manufacturing process

5.2.8 Crosslinking time

- Final crosslinking for the two-component as well as the single-component reactive PU dispersion adhesives is only reached after about 7 days.

- Depending on the adhesive, type of foil, foil thickness, design and shape of the MDF part and test method used, if all the recommendations previously mentioned are observed it is possible to achieve heat resistance values of between 80 and 100 °C.

6 Glossary

additive	auxiliary agent
adhesion	adhesive force between contact surfaces of two materials
application process	process or method of application/coating
glue line	layer between bonded materials
coagulation	agglomeration, lumping of the adhesive
conditioning	storage until weight is balanced (constant weight) by water absorption in normal climate
crosslinker	component for PU dispersion to increase adhesion
degree of gloss	measurable value of surface gloss
filler	auxiliary in formulation
hard PVC foil	PVC plastic foil with low percentage of/without plasticizer
heat platen	structural component in the thermoforming press developing
heat resistance	measure of bond stability when exposed to heat
homogeneity	perfect mix of different substrates
hydrophobing agent	water-repellent agent
MDF/MDF panel	medium density fibreboard
hetamerism	distinction of equal colours under different light
inhomogeneity	uneven mix of various substances
normal climate (23°C + 50% LF)	defined conditions temperature/humidity
opacity	transparency of materials
peel strength	bond strength between different layers
primer	base coating or adhesion promoter
prototype	original, first or standard sample
PU dispersion = PUD	water-based polyurethane dispersion adhesive
PVC = polyvinylchloride	amorphous, thermoplastic synthetic material
relative humidity (RH)	amount of water vapour in the air at the respective temperature
room/ambient climate	room climate determined by humidity, air temperature, plus surface temperature of the walls
separation	segregation, substances splitting apart
specification	description of a product with defined characteristics
stabilizer	auxiliary providing stability of chemical compounds
thermoplastic material	plastic which, over a certain temperature range, can undergo deformation
T-profiler	temperature reading device especially for thermoform presses
transverse tensile strength	tensile strength across superficial thermal expansion
wood moisture	percentage of water in wood cells related to dry wood mass

7 Legal information

Disclaimer:

The information contained in this Quality Guide has been compiled to the best of our knowledge and based on practical experience. It reflects the actual state of the art.

It does not represent any guarantee of properties and does not infer any liability on our part.

The processor must test the products for suitability before using and processing in his factory.

We reserve the right to improve the material properties and processing parameters.

Any use of the products for other base materials and for other areas of application differing from those listed above must be tested in each case and their suitability must be agreed upon prior to use with the individual supplier/manufacturer.

The recommendations or instructions concerning transport and storage of the materials, including those concerning mixing and processing, as provided by the respective manufacturers of the materials, technologies and services, must absolutely be observed.

We are not liable for completeness and accuracy of the contents.

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