



Processing Information For 3D - PMMA – Polymethyl Methacrylate Edgebands

1. The characteristic features of 3D edgebands

A uniquely new process has been developed and is used in the manufacture of 3D edgebands, resulting in a whole new generation of edgebanding materials for furniture manufacturers.

3D edgebands are manufactured from ultra transparent¹ acrylic. Their special three-dimensional effect is achieved by applying the decorative finish to the back of the edgeband.

Because the decorative finish is applied to the back of the edgeband, it is retained intact in the milled edge radius resulting in all-round uniform appearance. This means there is no frame-like effect, just a seamless transition between the edgeband and the board. The matt silk surface of the edgeband can be polished to more or less any desired sheen.

The positioning of the decorative finish on the rear of the edgeband means that it is fully protected against abrasion or damage, even when subjected to high levels of wear and tear. Physical damage to the acrylic surface, in the form of scratches or small pressure marks is easily rectified by rebuffering.

3D edgeband is impact resistant, hygienic and resistant to normal room humidity levels.

2. Acrylic material characteristics

Acrylic (PMMA = polymethyl methacrylate) is a well-established high-grade thermoplastic which, when used in 3D edgebands, sets new technical and aesthetic standards for furniture edgebands. In addition, the transparency of Acrylic¹ exceeds that of glass.

3. Applications for Döllken 3D edgebands

3D edgebands are suitable for practically all applications - e.g. on furniture facings in the kitchen and living areas, in bathrooms, on kitchen worktops, on office desks, as well as for shop fittings and interior design applications.

4. Machining

Given their special material formula with excellent processing characteristics, Döllken 3D edgebands are easily processed either by hand or machine.

Throughfeed processing

3D edgebands can be straight-processed on all standard edgeband gluing machines. It is important to prevent any damage to the edgeband from the edgeband conveyor or feed rollers. For this reason, specially designed rubber-fitted edgeband feed rollers have turned out to be very successful on these machines. The 3D edgebands have to be cleanly milled at the join. This is particularly true for DC XXXF and DC 7XXR.

Stationary processing

3D BAZ edgeband, specially suited for the processing of curved boards and panels on CNC-controlled machining centres (BAZ) or semi-automatic manual edgeband processing machines.²

3D BAZ edgebands feature a material formula that is particularly suitable for machining, and in particular on tight radii. As for every thermoplastic material, it is essential to make sure that the material is properly warmed to ensure a good radius. The colour finish of the 3D edgeband plays an essential role in this. Standard colours, such as unicolours or wood finishes, for instance, easily absorb heat through the infrared radiation of the machining centres. Metallic colours, on the other hand, tend to reflect much of this infrared radiation. For this reason it is recommended that additional ways of supplying heat be available when machining. Hot air units and/or edgeband preparation ovens are excellent aids to processing.

For stationary edgeband processing, many machine manufacturers (such as IMA or HOMAG) recommend applying hot melt adhesive directly to the edgeband. To avoid damage to the edgeband finish, a special gluing rollers in tandem with the machine manufacturers. These gluing rollers are in effect a modification of the standard steel rollers. Edgeband processing, including that of any other primed edgeband materials, has proved particularly successful using these special rollers. Machining centres on which hot melt adhesive is applied to the board or panel (such as the BIESSE Millennium or MORBIDELLI Planet) do not need special gluing rollers. As a rule, rubber-fitted rollers should be used for conveying and feeding the 3D edgebands through the processing machines.

Bonding

3D edgebands and 3D BAZ edgebands are fully coated with a universal bonding agent giving perfect bonding with all suitable hot melt adhesives.

For gluing by hand, special dispersion adhesives can be used, provided the given pressing time is adhered to (see manual processing).

3D edgebands can be processed with most EVA, PA, APAO or PUR3 based hot melt adhesives. Generally speaking, adhesion is best when using unfilled or partially filled adhesives. We strongly recommend the use of these adhesives.

Together with highly heat resistant glue types, such as PUR¹, APAO and PA hot melt adhesives, the low shrinkage material formulae of 3D edgebands give good adhesion even if higher temperatures are encountered in use. This feature is of particular benefit, for instance, in the vicinity of cooking appliances and ovens in kitchens, or for exporting furniture in containers.

Even before gluing, 3D edgebands have good shrinkage values. Another good point here is the dimensional stability of 3D edgebands - on Vicat B 50 testing, softening of the material only occurs above 90 (± 3)°C.

When machine gluing, checks need to be carried out that there is sufficient glue in the container. It is essential that the adhesive is applied evenly and in sufficiently small quantities so that no beads of adhesive get pressed out from the edges of the freshly glued edgebands, and that any gaps in the wood of the boards or panels are filled and equally that full-surface adhesion takes place. The amount of glue required depends on the density of the chipboard - the lower it is, the greater the amount of hot melt adhesive required.

The adhesive manufacturers' recommended processing guidelines should be followed.

Depending on adhesive type and composition, the application temperature recommended by the manufacturer can vary between 90 and 210°C. It should be borne in mind that the thermostats in the hot melt container are often inaccurate and may vary considerably from the actual temperature on the application roller.

On request, we will be glad to supply you with a list of adhesive types suitable for machine centre working.

3D edgebands cannot be glued using ordinary white glues.

Working temperature

For best results when applying edgebands, boards or panels and the edgebands should be processed at room temperature (not below 18°C).

If the materials have been stored outdoors, they should be warmed up over night. If the boards or edgebands are too cold, the hot melt adhesive will set before the edgeband is applied to the board. For this reason draughts should also be avoided.

Wood moisture

For processing, optimum wood moisture in the boards is between 7 and 10%.

Feed rate

No problems occur with speeds up to 30 m/min.

Press rollers

Depending on the specifics of the machine, the correct number and setting of the press rollers is critical for optimum seam appearance on bonding. To prevent formation of gaps or cavities, the pressure of the rollers should be set high enough for full-surface adhesion of the edgebands on the boards. The press rollers themselves must always be completely clean to prevent pressure marks occurring on the edgebands.

Cross-cut knives

Cross-cut knives should have a sharp blade to separate the edgeband material without splintering, leaving a minimum of excess material behind for cross-cut milling and thereby making the final milling off easier.

Cross-cut saws

Cross-cut saws should have their cutting rate properly adjusted so that they can cut into the edgeband material without causing splintering. Single-edged fine-toothed "ES" type saws are to be preferred, because they give a neater cut through the edgeband material than cross-cut saw blades with "WS" type alternating teeth.

Flush or radius milling

The excess length for cutting should be the same on each side and not protrude for more than 1.5 mm. If possible the protruding edgeband excess should not exceed the actual edgeband thickness. Excessive protrusions increase the risk of splintering. Using chamfer bits on the 3D edgeband allows special design effects to be achieved. As a rule, multiblade tools with at least 4 to 6 blades and an operating speed of 12,000-18,000 r.p.m. are recommended for chamfering.

Scraping

3D edgebands are highly suitable for scraping without crazing occurring. To further prevent any possibility of crazing, the scraper blade should not exceed 0.1 mm.

Polishing

After cutting and machining, the material can then be polished with a soft polishing wheel to more or less any desired sheen. A high sheen can be easily achieved with polishing paste. On request, we will be glad to supply you with a list of suitable types. Some machine manufacturers have mechanical polishing units on offer. Please contact your machine manufacturer for this. In addition, glue remnants can be removed with electronically controlled separating agent spray units. When using separating agents it is essential that they be checked first for the absence of solvents and alcohols, because PMMA should not be allowed to come into contact with these.

Extraction

Thermoplastic edgebands generally require higher extraction power than duroplastic edgebands or melamine edgebands. One advantage of 3D edgebands is their lower static charge compared to other thermoplastic edgeband materials.

5. Manual processing

3D edgebands can also be processed manually at room temperature without any problems. The equipment needed would include gluing presses or edgeband clamps. For processing of edgebands without using any machines at all, adhesive manufacturers have special dispersion glues on offer. On request, we will be glad to supply you with a list of suitable types.

IN GENERAL, SOLVENT-BASED CONTACT ADHESIVES SHOULD NOT BE USED

For special requirements, for example on kitchen worktops (needing to be waterproof and to have good resistance to warp under heat), PUR3 adhesives are preferred, or else systems that have similar adhesive characteristics. Generally speaking, for manual processing, it is recommended that the chipboard be masked off at the join to prevent staining from excess glue.

Thermoforming the radii

The areas for forming are carefully heated up with hot air or infrared heaters to the thermoelastic temperature range (100°C to 120°C). While still soft, the edgeband is smoothed to fit the board shape using a block of wood and fixed with a positioning device. Care needs to be taken not to overstretch the material. The edgeband must be held in shape until it cools down. Once completely cool, it can be bonded in the usual way (pressing time according to the manufacturer's instructions). This procedure can be used both for BAZ coded items as well as standard edgebands.

The excess edgeband can be removed, for example with a manual router. Due to their durability, diamond-edged tools or carbide cutters should be used. If any smears occur, generally the r.p.m needs to be adjusted, or possibly the direction of rotation of the cutter. Generally best results are achieved with reverse rotation or climb milling.

Any chatter marks remaining after milling can be removed or smoothed out with emery paper or abrasive sponge (240 to 400 grain). The very best results are achieved by subsequent buffing with a polishing wheel, and, if required, using polishing agents as well. This makes it easy to obtain the level of sheen required both on the milled edge and on the facing itself.

6. Seam appearance

Because 3D edgebands are supplied with factory-set pretensioning, the seam will always be tight and as good as invisible to the eye.

Pretensioning also ensures optimum bonding in that any excess adhesive is taken up at the midpoint of the back of the edgeband.

7. Mechanical characteristics

Resistance to abrasion

Because the printed finish is applied to the back of 3D edgebands, they are protected against all external mechanical wear (such as abrasion and scratches).

Indentation hardness/Shore hardness D

Based on DIN 53 456/DIN 53 505, 3D edgebands also feature excellent surface hardness. Surface damage to the base material (such as scratches or abrasion) can easily be buffed away.

Resistance to warp under heat

With a value of 90 (± 3)°C (as per Vicat B 50), 3D edgebands are superbly suited to applications in the furniture industry and interior design.

8. Chemical characteristics

3D edgebands have been tested to DIN 68 861 in conjunction with many standard household cleaners. However, contact with aggressive substances such as alcohol or solvent additives in any form should be avoided (see cleaning instructions). 3D edgebands have also been tested at the LGA in Nuremberg. 3D edgebands are also combustible just as any other wood materials. Thermal decomposition starts at around 300°C.

9. Lightfastness

3D edgebands are subjected to continual testing for lightfastness using a special process at the laboratory. Results for lightfastness on 3D edgebands range from excellent to outstanding. This corresponds to wool colour scale 7 to 8.

10. Surface quality

Silk matt to high sheen. This can be achieved by buffing with soft polishing wheels of cotton or similar material. Equally, polishing agents that are suitable for acrylic may be used without any problems.

11. Cleaning

3D edgebands should be cleaned in ordinary soapy water or using special cleaners that are designed specifically for use on acrylic materials.

Solvent-based substances or those containing alcohol should not generally be used

12. Storage

3D edgebands do not rot and can therefore be stored for almost unlimited periods at room temperature in an area protected from the weather.

13. Disposal

Any remnants of 3D edgebands can be incinerated with other wood shavings. No chlorine compounds are produced. Other TA-Luft (Technical Guidelines on Air Quality) limits should be observed during incineration.

14. Quality / Tolerances

The consistently high quality of 3D edgebands and 3D BAZ edgebands is due to comprehensive quality assurance procedures, such as ongoing improvements to raw materials characteristics by our own Technical Department. Manufacturing tolerances of the 3D edgebands are precisely defined and regularly checked in every production run.

a. Width tolerances:

Width	3D edgebands
0 - 30 mm	±0.5 mm
>30 mm	±0.5 mm

b. Thickness tolerances:

Thickness	3D edgebands
0 - 1.0 mm	+ 0.10 mm – 0.15 mm
1.1 - 2.0 mm	+0.15 mm – 0.25 mm
2.1 - 4.0 mm	+0.20 mm – 0.30 mm

c. Pretensioning tolerances:

Thickness	Width to 30 mm	Width from 30 mm
0 - 1.0 mm	0.20 - 0.50 mm	0.30 - 0.70 mm
1.1 - 2.0mm	0.10 - 0.30 mm	0.15 - 0.35 mm
2.1 - 4.0mm	0.10 - 0.20 mm	0.10 - 0.30 mm

d. Plane-parallelity:

Thickness	Maximum deviation
0 - 1.0 mm	max. 0.10 mm
1.1 - 2.0 mm	max. 0.10 mm
2.1 - 4.0 mm	max. 0.15 mm

e. Longitudinal warpage:

3.00 mm distortion maximum per 1 m length.

The information as supplied, and our advice with regard to applications, both verbal, written and as a result of trialling, are given according to the best of our knowledge, but they are not binding, especially with regard to eventual property rights of third parties. The advice we give here does not remove the need for you to check our current items of advice, particularly with regard to our safety data sheets and technical information, nor obviate the need to check our products with regard to their suitability for the procedures and purposes envisaged. Application, use and processing of our products and of the products manufactured by you based on our technical advice regarding applications are outside the scope of our own control, and responsibility for these is therefore solely in your hands. Sale of our products is subject to our current General Terms and Conditions of supply and payment (please see next page also).

15. Summary of technical data

Characteristics	Test standard	3D edgeband / 3D BAZ edgeband
Useful characteristics		
Lightfastness for indoor applications	DIN 53 384 c/ DIN 53 388	7-8 on wool colour scale Due to its excellent colour fastness, ideal for indoor applications.
Indentation hardness	DIN 53 456	> 70 (N/mm ²)
Shore hardness D (Sensitivity to mechanical forces)	DIN 53 505/ISO 868	83 (±3) Good scratch resistance and surface hardness. Physical damage can be easily rectified by buffing.
Linear thermal expansion coefficient	DIN 52 328	90 - 110(1/K x 10 ⁻⁶) Dimensional stability of the glued edgeband is good (If the appropriate adhesive systems are used).
Resistance to warp under heat - Vicat B 50	DIN 53 460/ISO 306	90 (± 3)°C Ideally suited to applications in the furniture industry.
Shrinkage	Döllken factory standard	< 1.5 %
Resistance to chemicals	DIN 68 861	Good – LGA tested. Resistant to most standard household cleansing products. Limited resistance to substances containing solvents and alcohol.
Behaviour in fire		Combustible
Surface quality		Silk matt to high sheen, achieved by buffing with polishing wheels, or alternatively using polishing agents suited to acrylic materials.
Static charge		Low
Processing characteristics¹		
<ul style="list-style-type: none"> • Cross cutting • Milling direction² • Roughing • Radius milling • Profiling • Scraping • Buffing • Gluing radii • Bonding with hot melt adhesives • Buffability¹ • Susceptibility to crazing • CNC compatibility³ 		Good Climb milling/Ordinary milling ² Good Good Good Good Good Good Good All standard types (EVA, PA, PUR ⁴ , APAO) Very good ¹ Low Good for 3D BAZ quality ³
Disposal characteristics		Edgeband remnants can be incinerated with shavings in suitable plant. TA-Luft limits (Technical Guidelines on Air Quality) must be observed.
Physiological characteristics		Safe in contact with food. No known source of harm to general health.

¹ Optimisation of machines may be required.

² Climb milling is recommended.

³ The adhesive must be applied to the board. If HOMAG or IMA machines are used, then a special gluing roller is needed.

⁴ Except for those 3D edgebands marked DC XXX F and DC 7XX R, which are not suitable for bonding with PUR adhesives

Unless otherwise indicated, the data specified were taken from standardised test items at room temperature. The data serve as a guide, but not as binding minima. Please remember that characteristics may vary considerably under certain circumstances due to the tool used, specific processing and colour (please see previous page as well).



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