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Processing Information For PVC – Polyvinyl Chloride Edgebands

1. What is PVC

PVC (polyvinyl chloride) is today one of the best known and most common plastics. For more than 40 years edgebands for the furniture industry have also been manufactured from this material and have turned out to be very successful due to their outstanding materials characteristics. In particular, it is the excellent processing characteristics of PVC for specific applications that have contributed to its breakthrough in the furniture manufacturing market.

2. Applications for PVC edgebands

There is an almost unlimited range of applications for PVC edgebands - from the office to bathrooms and kitchens, exhibition stand and shop fitting, general living areas and general interior design. The material formula of PVC, which is particularly suitable for machining and processing, means that it can be used in straight processing, as well as on any curved furniture items, on both internal and external radii.

3. PVC Edgebands

PVC edgebands are extrusion-manufactured and coloured throughout. Consistent through colouring of the material means that clean rounding of the edgeband does not pose any problems. The impact resistance of PVC material means that the life of milling and other types of cutting tools is not unnecessarily shortened.

On the rear of the PVC edgeband is a universal bonding agent giving perfect adhesion when used with any suitable hot melt or solvent-based adhesive.

4. Working with the edgebands

Machining

PVC edgebands can be processed on all edgeband gluing machines (straight-processing and BAZ machining centres) using hot melt adhesive techniques. Gluing, cross-cutting, milling, scraping and post-process buffing with polishing wheels or processing with hot air dryers to give a high quality surface finish can all be done without any problems.

To ensure a clean and permanently robust application of the edgeband, some major processing parameters must be adhered to, these being partly dependent on the materials used (edgebands, glue, boards/panels), the edgeband gluing machine and the ambient temperature. It is therefore recommended that trials be undertaken to determine the relevant optimum settings in each case. The guidelines issued by the manufacturers for the intended application in question should also be followed.

Adhesives:

PVC edgebands can be processed using any standard hot melt adhesives (EVA, PA, APAO, PUR). Adhesives resistant to high temperatures, in tandem with the low-shrink materials formula of PVC give good adhesion, even on edgebands of thickness in excess of 3 mm. Adhesives that are particularly heat resistant are recommended for high applications involving high temperatures, in the vicinity of cooking appliances in kitchens or for exporting furniture in containers, for instance.

Even before gluing, PVC edgebands have very low shrinkage characteristics. Another good feature of PVC edgebands in this regard is their resistance to warping (dimensional stability). Softening of the material only occurs above 80 (± 2)°C (Vicat B 50).

When gluing, checks always need to be carried out that there is sufficient glue in the container to ensure constant temperature as it is being applied.

The working temperature of the adhesive varies between 90 and 220°C depending on type. 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. It is recommended that the temperature be taken on the adhesive application roller.

PVC 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:

The particular material formula of PVC edgebands is designed for feed rates both in low volume processing and in major manufacturing situations. Speeds of 10 to 100 m/minute are possible using edgeband gluing machines. On modern portal-type machining centres, speeds of 30 m/min are feasible depending on the geometry.

Rates of glue application:

Please follow the adhesive manufacturer's instructions. The adhesive should be 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. The amount of glue required depends on the density of the chipboard and the type of adhesive.

Pressure rollers:

Bearing in mind the specifics of the machine, check that these are of the correct number and check the pressure setting, so that optimum seam appearance can be obtained.

Extraction:

Thermoplastic edgebands require higher extraction power than duroplastic edgebands. One advantage of the PVC edgebands is their lower static charge compared to other thermoplastic materials.

Milling:

If possible, you should use 3- to 6-edge cutters, at speeds of between 12 and 18,000 rpm. Incorrect speeds or blunt tools can damage the edgebands. If any smears should occur, the speed of the cutter should be reduced or the edgebands should be conventionally milled (if necessary increase the rate of feed).

Scraping:

Because PVC as a material tends to fade in colour after scraping, the scraper blade should be a maximum of 0.1 to 0.2 mm. The milling needed for this, which should be as free as possible of chatter marks, must be carried out using cutters with high true-running characteristics. The use of diamond-edged cutters is of help here.

To optimise scraping, particularly where colour quality is critical, hot-air units can be used.

Buffing/Polishing:

PVC edgebands are easily buffed in the radius with a polishing wheel. Any colour fading resulting from scraping can easily be buffed away using polishing wheels, and the colour on the radius will match that of the edgeband surface. On through-feed edgeband gluing machines, the glue remnants can also be removed with a polishing wheel. In addition, glue remnants can also be removed using electronically controlled separating agent spray units, which are in standard industrial use. This also gives better scraper blade finish.

5. Manual processing

Manual processing of PVC edgebands is also unproblematic, by using a gluing press or edgeband press for instance.

Recommended adhesives here are acrylic-based two-component dispersion glues or suitable contact adhesives. Please contact your adhesive manufacturer direct. Ordinary single-component white wood glues cannot be used. When gluing by hand, special PVC adhesives, solvent-based adhesives and cartridge glues (PU) can be used. On request, we will be glad to supply you with a list of suitable types.

Gluing should be carried out at room temperature.

When using contact adhesives, care needs to be taken to ensure that the curing time after applying adhesive to the board and edgeband is adhered to, so as to give optimum edgeband bonding. Once this has happened, the edgeband is applied.

When using dispersion glues there should not be any heat applied to accelerate bonding (e.g. heat tracks). After the bond has set (up to 6 hours depending on the adhesive) further processing can be undertaken (See item 4a for this).

6. Seam appearance

Because PVC edgebands are supplied with factory-set pretensioning and plane-parallelity, 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 and the anchor points of the adhesive to the chipboard.

7. Mechanical characteristics

Resistance to abrasion

The surface of printed PVC edgebands is sealed with UV-hardened acrylic varnish to give a scratch-resistant finish. The printed patterns also have excellent resistance to scratching and abrasion.

Indentation hardness/Shore hardness D

Based on DIN 53456 and DIN 53505, PVC edgebands also feature excellent surface hardness.

Resistance to warping under heat

With a value of 80 (± 2)°C (as per Vicat B 50), PVC edgebands are superbly suited to applications in the furniture industry and interior design.

Varnishing

PVC edgebands in unicolours can easily be varnished in the colour of your choice without any need for pretreating. You can get more detailed information on the most suitable type of varnish from your own varnish manufacturer.

8. Chemical characteristics

PVC edgebands are DIN 68861 Part 1 resistant to all standard domestic cleaning agents and substances (e.g. food acids). In addition PVC edgebands have been tested by the LGA in Nuremberg and are classified under Stress Group 1 B.

PVC edgebands are flame-retardant.

9. Lightfastness

PVC edgebands are subjected to continual testing for lightfastness in the Technical Department using a special process. With lightfastness of wool colour scale 7-8, PVC edgebands are very suitable for use indoors (DIN 53388).

10. Cleaning

PVC edgebands should be cleaned with special plastics cleaners. Highly solvent-based substances should not be used.

11. Storage

PVC edgebands do not rot and can therefore be stored for almost unlimited periods at room temperature in an area protected from the weather. Insulation and sealing strips can be stored for approximately six months.

12. Disposal

PVC processing offcuts should be separated out. There is a returns disposal system for the off-cuts in question.

13. Quality / Tolerances

The consistently high quality of PVC edgebands is due to comprehensive quality assurance procedures, such as ongoing improvements to raw materials characteristics by our own Technical Department.

Manufacturing tolerances for edgebands are narrowly defined and are regularly checked during each manufacturing run.

Width tolerances:

Width	PVC
0 - 30mm	± 0.5 mm
> 30mm	± 0.5 mm

b. Thickness tolerances:

Thickness	PVC
0 - 1.0 mm	+ 0.10 mm – 0.15 mm
1.1 - 2.0 mm	+ 0.10 mm – 0.20 mm
2.1 - 4.0 mm	+ 0.15 mm – 0.25 mm
> 4.0 mm	+ 0.20 mm – 0.30 mm

c. Pretensioning tolerances:

Thickness	Width to 30 mm
0 - 1.0 mm	0.20 - 0.50 mm
1.1 - 2.0 mm	0.10 - 0.30 mm
2.1 - 4.0 mm	0.10 - 0.20 mm
4.1 - 6.0 mm	0.00 - 0.20 mm
> 6.0 mm	0.00 - 0.10 mm

Thickness	Width from 30 mm
0 - 1.0 mm	0.30 - 0.70 mm
1.1 - 2.0 mm	0.15 - 0.35 mm
2.1 - 4.0 mm	0.10 - 0.30 mm
4.1 - 6.0 mm	0.00 - 0.25 mm
> 6.0 mm	0.00 - 0.15 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
> 4.0 mm	max. 0.20 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).

14. Summary of technical data

Characteristics	Test standard	PVC edgebands
Useful characteristics		
Lightfastness for indoor applications	DIN 53 384 c/ DIN 53 388	7-8 on wool colour scale Ideal for indoor applications.
Indentation hardness	DIN 53 456	110 - 130 (N/mm ²)
Shore hardness D (Sensitivity to mechanical forces)	DIN 53 505/ISO 868	81 (±3) Good surface hardness and scratch resistance. 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 warping under heat - Vicat B 50	DIN 53 460/ISO 306	80 (± 2)°C
Shrinkage	factory standard	< 1.5% Ideally suited to applications in the furniture industry. In critical temperature ranges, the use of a highly heat resistant adhesive is critical for the dimensional stability and temperature resistance of the finished furniture item.
Resistance to chemicals	DIN 68 861	Very good - classification 1B. Resistant to all standard domestic cleaning agents. Limited resistance to solvents. Tested by LGA Nuremberg.
Surface quality		Super matt to high sheen
Static charge		Low
Processing characteristics ¹ <ul style="list-style-type: none"> • Cross cutting • Milling direction² • Roughing • Radius milling • Profiling • Scraping • Buffing • Gluing radii • Bonding with hot melt adhesives <ul style="list-style-type: none"> • Buffability¹ • Susceptibility to crazing • Varnish capability • CNC compatibility³ 		Good GLL /GGL 2 Good Good Good Good Good Good Good All standard edgeband thermoplastic adhesives (EVA, PA, APAO, PUR) can be used, depending on heat resistance of the adhesive. Good ¹ Low Good (acrylic/PUR varnish) Very good
Disposal characteristics		Return system for milling and cutting offcuts.
Physiological characteristics		No known source of harm to general health.

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).

15. Trouble-shooting: Tips and information for problems encountered in processing

Problem	Problem diagnosis and suggested solutions
1. Edgeband can be easily pulled away by hand. Hot melt adhesive remains on the chipboard. The grid pattern of the gluing roller is visible.	<ul style="list-style-type: none"> • Not enough glue applied • Room temperature too low • Edgeband material too cold (stored outdoors) • Hot melt adhesive temperature too low • Feed rate too low • Pressure exerted by the press rollers too low
2. Edgeband can be easily pulled away by hand. Hot melt adhesive remains on the chipboard. Hot melt adhesive surface smooth all over (edgeband slips off).	<ul style="list-style-type: none"> • Board and/or edgeband too cold -> Check hot melt adhesive type -> Check application of bonding agent
3a. Edgeband can be pulled away by hand. Hot melt adhesive remains on the edgeband for the most part.	<ul style="list-style-type: none"> • Temperature of the board material too high as a result of previous processing steps (e.g. veneering)
3b. Glue seam is not closed (edgeband gluing machine)	<ul style="list-style-type: none"> • Pressure exerted too low • Adhesive too cold -> Increase application temperature or preheat board or increase feed rate • Edgebands either have no pretensioning or pretensioning is askew
3c. Glue seam is not closed (machining centre)	<ul style="list-style-type: none"> • Pressure exerted is too low • Edgeband was fed in too cold and cannot be squeezed. • Restoring forces of edgeband material too high -> Increase heater power or reduce feed rate -> Increase geometry or use a thinner edgeband material • Material not suitable for use on machining centres – adhesion under heat too low • Adhesive does not set quickly enough -> Reduce adhesive application temperature
3d. Edgebands are only bonded at the edges	<ul style="list-style-type: none"> • Pressure exerted too low • Milled seam at the join on the board has gaps • Pretensioning of edgebands too high
4. Inadequate bonding of the glued edgeband at the front edge of the board, or the edgeband is split at the front edge.	<ul style="list-style-type: none"> • Not enough adhesive applied due to gluing roller being incorrectly laid out -> Increase adhesive application quantity
5. Milling marks are visible.	<ul style="list-style-type: none"> • Feed rate too high • Cutting speed of the cutters too low -> Post-process with scrapers and buffing -> Conventional milling -> Increase number of cutters on router -> Increase r.p.m.
6. On thick edgebands the colour fades slightly in the milled areas (stress whitening).	<ul style="list-style-type: none"> • Warm up the milled area on the hot-air station (can be post-processed) • Scraper blade is too thick -> Post-process on buffing station -> Reduce scraper blade (max. 0.1 – 0.2 mm)
7. Evidence of stress whitening in the radius during machine centre processing.	<ul style="list-style-type: none"> • Edgeband fed in too cold -> Increase heater power or reduce feed rate -> Increase geometry or use a thinner edgeband material