

# **Doellken PP Edgebands Processing Information**

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**DÖLLKEN**

**KUNSTSTOFFVERARBEITUNG**

A SURTECO COMPANY

## 1. What is PP?

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PP stands for polypropylene and is a semi-crystalline plastic, primarily used in pipe extrusion and the packaging industry. For about 10 years now, this chlorine-free material has also been used in the furniture industry as an alternative to the proven materials of PVC and ABS. The main advantage of polypropylene is that it is easily disposed of, but it does require optimisation of machine settings in processing.

## 2. Applications for Doellken PP edgebands

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Doellken PP edgebands can be used in many different areas – the office, bathrooms, kitchens, exhibition stand and shop fitting, general living areas and general interior design. Because of their excellent resistance to solvents, however, Doellken PP edgebands are used in particular for laboratory fittings.

Doellken PP edgebands can be processed on any straight-processing edgeband gluing machines, as well as on BAZ machining centres, and are suitable for internal and external radii.

## 3. Doellken PP Edgebands

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Doellken PP edgebands are extrusion-manufactured and throughcoloured to give a consistent overall effect. The impact resistance of the Doellken PP material results in processing that is problem free.

On the rear of the Doellken PP edgebands is a universal bonding agent giving perfect adhesion when used with any suitable standard hot melt adhesive.

## 4. Machining

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Doellken PP 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 buffing with polishing wheels or processing with indentation machines 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:

Doellken PP edgebands can be processed using any standard hot melt adhesives (e.g. EVA, PA, APAO, PUR). Used in combination with the low-shrink formula of Doellken PP, highly heat-resistant hot melt adhesives give good bonding even on edgebands of higher than average thickness. Adhesives that are particularly heat resistant are recommended for applications involving high temperatures, in the vicinity of cooking appliances in kitchens or for exporting furniture in containers, for instance.

Even before gluing, Doellken PP edgebands have very low shrinkage characteristics. Another good feature of PP edgebands in this

regard is their resistance to warping under heat. Softening of the material only occurs above 90 °C (Vicat B50).

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. Viscosity and exerted pressure must be so adjusted to ensure the glue is uniformly pressed out across the glued surface.

The working temperature of the hot melt adhesive varies between 90 and 220 °C depending on type.

It should be borne in mind that the thermostats for reading the temperature in the hot melt container can often be inaccurate and may vary considerably from the actual temperature on the pressure rollers. It is recommended that the temperature be taken on the hot melt adhesive application roller.

Doellken PP 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 are stored outdoors, they should be warmed up over night. At temperatures that are too low, 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 formulation of Doellken PP edgebands is designed for feed rates both in low volume processing and in major manufacturing situations. Speeds of 10 to 100 m/min 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 (approx. 2.5 m<sup>3</sup>/s) than duroplastic edgebands, depending on the design and type of the machine. PP chips tend to have high electrostatic charge when being milled. To achieve better chip

extraction, the use of tools with internal extraction is recommended for such cases.

#### **Milling:**

Doellken PP edgebands must be conventionally milled on edgeband gluing machines. If possible, you should use 3- to 6-edge cutters, at speeds of between 12 and 18,000 r.p.m. Incorrect speeds or blunt tools can damage the edgebands. If any smears should occur, the speed of the cutter should be reduced or routers should have a larger shaft angle.

#### **Scraping:**

Because PP as a material tends to fade in colour after scraping, the thickness of the scraping 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.

Where the colour quality is critical, using post-processing units (e.g. indentation machine units) might become necessary under certain circumstances. Please enquire of your machine manufacturer.

#### **Buffing/Polishing:**

Because of their materials characteristics, PP edgebands can only be polished under certain conditions. In straight processing, the glue remnants can 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. It is recommended that the rotation speed is reduced by around 50 % to 1,400 r.p.m. In addition the pressure exerted on the edgeband surface of the Doellken PP edgeband must not be set too high. This prevents unnecessary smearing and excessive heat build-up. The polishing wheel should be set in both axes at a slight angle to the edgeband surface.

#### **General requirements for PP processing:**

- Conventional milling
- Reduced r.p.m. of the polishing wheels

If all the processing parameters are optimised, Doellken PP edgebands can be used in the furniture industry without any need for post-processing. Finally, any of the other alternative thermoplastic edgeband materials such as Doellken PVC, Doellken ABS or Doellken 3D edgebands may be used without resetting the machines.

### **5. Manual processing**

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

Recommended adhesives here are special lacquer adhesives, contact adhesives or PU adhesives. On request, we will be glad to supply you with a list of suitable types. Please contact your adhesive manufacturer direct. Ordinary white glues cannot be used.

Gluing should be carried out at room temperature.

When using contact adhesives, care needs to be taken to en-

sure 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 tapped on. When using dispersion glues the heat tracks are not used.

After the bond has set (up to 6 hours depending on the adhesive) further processing can be undertaken. PP edgebands are more likely to smear when processed manually and also have a limited processing range as a result.

### **6. Seam appearance**

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Because the Doellken PP 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. Varnishing**

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Doellken PP edgebands may only be varnished with special varnishes or after being treated with a special primer. For good results from varnishing, the board material must be accurately masked off to avoid blemishes in the final surface finish. For optimum varnish adhesion, primer should be applied consistently in the milled radius as well. You can get the varnish for this kind of application from your varnish and paints supplier. In addition, on request we can also supply you with a list of varnish types.

### **8. Mechanical characteristics**

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#### **Resistance to abrasion:**

The surface of printed Doellken PP 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.

#### **Shore hardness D/Indentation hardness:**

Doellken PP edgebands give good results with shore hardness to DIN 53 505. Indentation hardness to DIN 53 456 is just slightly below that of other thermoplastic edgeband materials. To prevent scratches and pressure marks occurring on the edgeband surface we recommend using embossed surfaces. In addition, final varnishing can be carried out at extra cost.

#### **Resistance to warp under heat:**

With a resistance value of 90 ( $\pm 5$ ) °C Doellken PP edgebands are ideally suited for use in the furniture industry. The results are based on Vicat B 50. In addition the low shrink characteristics of Doellken PP edgebands have a positive effect on the item of furniture that is being subjected to high temperatures.

### **9. Chemical characteristics**

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Doellken PP edgebands are DIN 68 861 resistant to all standard domestic cleaning agents and substances, as well as solvents. Doellken PP edgebands have also been tested at the LGA in Nuremberg and are classified under Stress Group 1B. Doellken PP edgebands are also combustible just as any other wood materials. Thermal decomposition does not start until around 300 °C.

## 10. Lightfastness

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Doellken PP edgebands are constantly tested for lightfastness within the Doellken Technical Department. With lightfastness of wool colour scale 7-8, Doellken PP edgebands are very suitable for use indoors.

## 11. Storage

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Doellken PP edgebands do not rot and can therefore be stored for almost unlimited periods at room temperature in an area protected from the weather. Insulating strips made from hard or soft materials should not be stored for more than 6 months. The same applies to edgebands precoated with hot melt adhesive.

## 12. Disposal

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Doellken PP edgeband remnants can be incinerated with other wood shavings in authorised plants. Strict TA-Luft limits (Technical Guidelines on Air Quality) must be met. Waste chipboard on which Doellken PP edgeband processing has been started can also be disposed of by your chipboard manufacturer. There is no need for time-consuming sorting or separation of the edgebands and boards.

## 13. Quality/tolerances

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The consistently high quality of Doellken PP 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.

### a. Width tolerances:

Width	PP
0 - 30 mm	± 0,5 mm
>30 mm	± 0,5 mm

### b. Thickness tolerances:

Thickness	PP
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 - 2,0 mm	0,10 - 0,30 mm	0,15 - 0,35 mm
2,1 - 4,0 mm	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
> 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	Doellken PP Edgebands
<b>Useful characteristics</b>		
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	80–90 ( N/mm <sup>2</sup> )
Shore hardness D (Sensitivity to mechanical forces)	DIN 53 505/ISO 868	70 (± 3) Good scratch resistance and surface hardness. Physical damage can be easily rectified by buffing.
Linear thermal expansion coefficient	DIN 52 328	140 ( 1/K × 10 <sup>-6</sup> ) Dimensional stability of the glued edgeband is good (if the appropriate adhesive systems are used).
Resistance to warpage under heat - Vicat B 50	DIN 53 460/ISO 306	90 (± 5) °C
Shrinkage	Doellken factory standard	< 0,2 % 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	Good – classification 1B. Resistant to all standard domestic cleansing products. Good resistance to solvents. Tested by LGA Nuremberg
Behaviour in fire		Combustible
Surface quality		Matt to gloss
Static charge		Medium
<b>Processing characteristics<sup>1</sup></b>		
<ul style="list-style-type: none"> <li>• Cross cutting</li> <li>• Milling direction</li> <li>• Roughing</li> <li>• Radius milling</li> <li>• Profiling</li> <li>• Scraping</li> <li>• Buffing</li> <li>• Gluing radii</li> <li>• Bonding with hot melt adhesives</li> <li>• Buffability<sup>1</sup></li> <li>• Susceptibility to stress whitening</li> <li>• Varnish capability<sup>2</sup></li> <li>• CNC compatibility</li> </ul>		<p>Good</p> <p>Conventional milling</p> <p>Good</p> <p>Good</p> <p>Good</p> <p>Satisfactory</p> <p>Satisfactory</p> <p>Good</p> <p>All standard types (EVA, APAO, PA, PUR)</p> <p>Moderate<sup>1</sup></p> <p>Low</p> <p>Poor<sup>2</sup></p> <p>Good</p>
<b>Disposal characteristics</b>		Edgeband remnants can be incinerated with shavings in suitable plant. TA-Luft limits (Technical Guidelines on Air Quality) must be observed.
<b>Physiological characteristics</b>		Safe in contact with food. No known source of harm to general health.

<sup>1</sup>Requires optimum machine setting

<sup>2</sup>Special varnishes and use of primer required.

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

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