



# Döllken 3D Edgebands Processing Information

**DÖLKEN**  
A SURTECO BRAND

# Contents

<b>1. The special features of Döllken 3D edgebands</b>	<b>3</b>
<b>2. Acrylic material characteristics</b>	<b>3</b>
<b>3. Application areas of Döllken 3D edgebands</b>	<b>3</b>
<b>4. Machine processing</b>	<b>3</b>
Through-feed technique	3
Stationary technique	3
Bonding	4
Working temperature	4
Wood moisture	4
Feed rate	4
Pressure rollers	4
Cross-cut knives	4
Cross-cut saws	4
Flush or radius milling	4
Scraping	4
Polishing	4
Extraction	5
<b>5. Manual processing</b>	<b>5</b>
Thermoforming radii areas	5
<b>6. Seam appearance</b>	<b>5</b>
<b>7. Mechanical properties</b>	<b>5</b>
Wear resistance	5
Ball indentation hardness/Shore hardness D	5
<b>8. Thermal properties</b>	<b>5</b>
Heat distortion resistance	5
<b>9. Chemical properties</b>	<b>5</b>
<b>10. Resistance to fading</b>	<b>5</b>
<b>11. Surface quality</b>	<b>5</b>
<b>12. Cleaning</b>	<b>6</b>
<b>13. Storage</b>	<b>6</b>
<b>14. Disposal</b>	<b>6</b>
<b>15. Quality/tolerances</b>	<b>6</b>
<b>16. Overview of technical details</b>	<b>7</b>
<b>17. Problem diagnostics</b>	<b>8</b>
<b>18. Other product variants of the 3D edgeband</b>	<b>9</b>

## 1. The special features of Döllken 3D edgebands

A unique new process developed specially by Döllken is used in the manufacture of 3D edgebands, resulting in a whole new generation of edgebanding materials for furniture manufacturers.

Döllken 3D edgebands are manufactured from ultra transparent<sup>1</sup> 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 within the milled edgeband radius, resulting in a uniform all-round appearance without frame effect. The matt silk surface of the edgeband can be polished to more or less any sheen desired. Polishing is unnecessary for the premium 3D edgeband variants as they are already provided with finishing varnish.

The positioning of the decorative finish on the rear of the edgeband means that it is fully protected against abrasion and damage, even when subjected to high levels of wear and tear. Mechanical damage to the acrylic surface (such as scratches and pressure marks) can be rectified easily with rebuffering.<sup>2</sup>

The Döllken 3D edgeband is impact-resistant, hygienic and resistant to all normal room humidity levels.

## 2. Acrylic material characteristics

Acrylic (PMMA = polymethyl methacrylate) is a well-established, high quality thermoplast synthetic which, when used in Döllken edgebands, sets new technical and aesthetic standards for furniture edgebands. The transparency of the acrylic<sup>1</sup> is also better than that of glass.

## 3. Application areas of Döllken 3D edgebands

Döllken 3D edgebands are suitable for practically any application – such as on furniture doorfronts in the kitchen and living areas, in bathrooms, for kitchen worktops, for office desks, and for shop fittings and interior design applications.

## 4. Machine processing

The particularly process-friendly raw material characteristics mean Döllken 3D edgebands can be processed manually and by machine.

### Through-feed technique

Straight-line processing of Döllken 3D edgebands is possible without problem on all popular edgeband glueing machines. Ensure that the edgeband conveyor and guide rollers cannot cause any damage to the edgebands. Rubberised roller variants for the edge strip feeder have proven to be useful on the

machines. Clean joint milling is required for 3D edgebands. This applies in particular to the DC 7XXR.

### Stationary technique

Döllken has developed a new material formulation specially for processing curved moulded parts on CNC-controlled machining centres and semi-automatic manual edgeband processing machines – the Döllken 3D BAZ edgeband.<sup>3</sup>

A special process-friendly material formulation, specially designed for working with tight radii contours, is a stand-out feature of Döllken 3D BAZ edgebands. As with every thermoplastic synthetic, it is important to always ensure adequate material through-heating for the generation of radii. The decoration colour finish of the Döllken 3D edgeband plays a key role here. Standard colours such as unicouours and wood finishes absorb well thermal energy from the infrared radiation of processing machines. Metallic colours on the other hand can reflect most infrared radiation. Working with additional heating options is therefore recommended. Hot-air units and/or edgeband preparation ovens represent excellent aids to the process here.

For stationary edgeband processing, many machine manufacturers (such as IMA and HOMAG) recommend applying hot-melt adhesive directly to the edgeband. To prevent damage to the edgeband finish, Döllken has developed special glue applicator rollers in conjunction with machine manufacturers. These rubberised glueing rollers are in effect a modification of the otherwise standard steel rollers. Edgeband processing, including that of all other primed edgeband materials, has proved particularly successful using these special glue applicator rollers. Machining centres on which hotmelt adhesive is applied directly to the board (such as BIESSE and MORBIDELLI) do not need special glue applicator rollers.

As a rule, rubberised rollers should be used to convey and guide Döllken 3D edgebands through processing machines.

<sup>1</sup> This does not apply for product variants 3D Frosted and 3D through-coloured.

<sup>2</sup> This does not apply for varnished premium variants.

<sup>3</sup> The Döllken DC 7XXR 3D edgeband is not approved for machining centre processing.

### **Bonding**

Döllken 3D edgebands and Döllken 3D BAZ edgebands are fully coated with a universal bonding agent - guaranteeing perfect bonding with all suitable hot-melt adhesives. For manual glueing, special dispersion adhesives can be used provided a certain pressing time is observed (see manual processing). Most hot-melt adhesives (based on EVA, PA, APAO or PUR<sup>4</sup>) can be used with Döllken 3D edgebands. Generally speaking, adhesion quality is best with adhesives which are unfilled or only filled to a low level. Together with highly heat resistant glue types, including PUR, APAO and PA hot-melt adhesives, the low-shrinkage material formulation of Döllken 3D edgebands guarantees reliable adhesion even when application temperatures are high. This feature is of particular benefit for instance near cooking appliances and ovens in kitchens, and when exporting furniture in containers.

Even before being glued, Döllken 3D edgebands have good shrinkage values. The dimensional stability of Döllken 3D edgebands is also positive here - in Vicat B 50 testing, material softening does not occur until above 90 (± 3) °C.

For machine glueing, it is important to ensure there is always sufficient glue in the container. The application of adhesive should be uniform and liberal enough such that no small beads are pressed out at the edges of the freshly bonded edgebands, and that the cavities between wood splints are filled and glueing over the whole surface is guaranteed. The amount of glue required depends on the density of the chipboard and other parameters - the lower the density, the greater the amount of hot-melt adhesive required.

The directions for use recommended by adhesive manufacturers must be observed. The working temperature specified by a particular manufacturer can vary between 90 and 220 °C depending on adhesive type and composition. Please note that the thermostats in the hot-melt container are often inaccurate, and can vary considerably from the actual temperature at the applicator roller. We will be glad to provide you on request with suitable hot-melt adhesives for machining centre processing.

Using the edge glueing process to bond Döllken 3D edgebands with PVAC glue is not possible.

### **Working temperature**

To achieve best possible results in edgeband coating, boards and edgebands should be at room temperature (not below 18°C). When material is stored outside, it should be warmed up overnight. When boards or edgebands are too cold, the hot-melt adhesive applied sets before the edgeband is applied. Draughts should therefore be avoided for this reason.

### **Wood moisture**

The optimum wood moisture of the board material for processing is between 7 and 10 %.

### **Feed rate**

Speeds up to 30 m/min are possible without problem.

### **Pressure rollers**

The correct number and setting of pressure rollers is critical for optimum seam appearance - with the specifics of the machine having to be taken into account. To prevent the formation of gaps and cavities, the pressure of the rollers must be set high enough for full-surface adhesion of the edgebands on the boards. The pressure rollers themselves must be absolutely 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 simplifying final milling off.

### **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 have proven to be preferential because they give a neater cut through the edgeband material than, for example, cross-cut saw blades with alternating "WS"-type teeth.

### **Flush or radius milling**

The projection for cutting should be the same on each side and not protrude by more than 1.5 mm. The preference is that the protruding edgeband excess does not exceed the actual edgeband thickness. An excessive protrusion increases the risk of splintering. Using chamfer bits on the Döllken 3D edgeband allows special design effects to be attained. As a rule, multi-blade tools with at least 4 to 6 blades and an operating speed of 12,000 to 18,000 rpm are recommended for chamfering.

### **Scraping**

Döllken 3D edgebands are highly suitable for scraping without whitening occurring. To counter whitening beforehand, the scraper blade size should not exceed 0.2 mm.

### **Polishing**

After cutting and machining, the material can then be polished with a soft polishing wheel to more or less any sheen desired. A high sheen can easily be achieved with polishing paste. We will be glad to provide you a list of types on request. Some machine manufacturers offer mechanical polishing units. Please contact your machine manufacturer for this. In addition, left-over glue can be removed with electronically controlled separating agent spray units. When using process auxiliaries (such as separating agents), it is essential to first check they contain no solvents or alcohol (because PMMA may not come into contact with these).

<sup>4</sup> We will be glad to send an adhesive list on request.

### **Extraction**

Thermoplastic edgebands generally require higher extraction power than duroplastic edgebands and elamine edgebands. The lower static charging compared to other thermoplastic edgeband materials is a benefit of Döllken 3D edgebands.

## **5. Manual processing**

Döllken 3D edgebands can also be processed manually at room temperature without any problems. Equipment recommended includes glueing presses and edgeband clamps. For the processing of edgebands without any machines at all, adhesive manufacturers offer special dispersion glues. We will be glad to provide you on request a type list for manual glueing.

### **Contact adhesives containing solvents may generally not be used.**

For special requirements, such as kitchen worktops (needing to be waterproof and have good resistance to warping under heat), PUR adhesives are preferred, or systems having similar characteristic profiles. For manual processing, the recommendation is to mask off the chipboard at the join to prevent staining from excessive glue.

### **Thermoforming radii areas**

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 manufacturer's instructions). This procedure can be used for BAZ coded items as well as standard edgebands.

The excess edgeband can be removed with a manual router for example. Diamond-edged tools or carbide cutters should be used because of their durability. If any smears occur, the rotation speed needs to be adjusted in most cases, or possibly the direction of rotation of the cutter. Best results are generally achieved in the counter direction.

Any chatter marks remaining after milling can be removed or smoothed out with emery paper or abrasive sponges (240 to 400 grain). The very best results are achieved with 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 Döllken 3D edgebands are supplied from the factory with defined pre-tension, they are always given a compact, visually perfect seam appearance. The pre-tension also ensures

best possible bonding with inclusion of excessive adhesive in the centre of the back of the edgeband.

## **7. Mechanical properties**

### **Wear resistance**

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

### **Ball indentation hardness/Shore hardness D**

Döllken 3D edgebands also attain very good results for surface hardness in line with DIN EN ISO 2039-1 and DIN EN ISO 868. Surface damage to the base material (such as scratches and abrasion) can easily be buffed away.

## **8. Thermal properties**

### **Heat distortion resistance**

With a value of 90 ( $\pm 3$ ) °C (to DIN EN ISO 306), Döllken 3D edgebands are excellently suited for use in the furniture industry and for internal fittings.

Döllken 3D edgebands are inflammable, just like derived timber products. Pyrolysis does not start until about 300 °C.

## **9. Chemical properties**

Döllken 3D edgebands in conjunction with a number of standard household cleaners have been tested to DIN 68861. Contact with aggressive substances, such as alcohol and solvent additives, must be prevented in any form (refer to the cleaning instructions). Also, Döllken 3D edgebands have been tested by the state trade agency (LGA) in Nuremberg.

## **10. Resistance to fading**

Using a special process in the Döllken laboratory, 3D edgebands undergo continual testing as regards resistance to fading. The resistance to fading of 3D edgebands has been assessed as "excellent" to "outstanding". This corresponds to a value of 7 to 8 on the wool colour scale.

## **11. Surface quality**

Döllken 3D edgebands are also silk to high gloss. This can be achieved by buffing with soft polishing wheels made of cotton or similar materials. Polishing agents suitable for acrylic may also be used without any problems. Applying an appropriate finishing varnish lends premium variants a matt to high gloss finish.

## 12. Cleaning

The use of ordinary soapy water, or special cleaners designed specifically for acrylic materials, are recommended for cleaning Döllken 3D edgebands.

**Substances containing solvents or alcohol may generally not be used.**

## 13. Storage

Döllken 3D edgebands are resistant to rotting, and so can be stored virtually indefinitely in an environment protected from the weather and at room temperature.

## 14. Disposal

Left-over Döllken 3D edgebands can be incinerated together with other wood shavings. No chlorine compounds are produced. Other TA-Luft<sup>5</sup> thresholds must be observed during the incineration process.

## 15. Quality/tolerances

Comprehensive quality assurance measures, such as continual improvement of raw material properties in the technical centre, ensure the constantly high quality of Döllken 3D edgebands and 3D BAZ edgebands. The production tolerances for 3D edgeband production are tight and are checked regularly during 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
1.0 - 2.0 mm	+ 0.15 mm - 0.20 mm
2.1 - 4.0 mm	+ 0.20 mm - 0.25 mm

### c. Pre-tension tolerances

Thickness	Width To 30 mm	Width > 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 parallelism

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 distortion

Over 1 m length, max. 3 mm distortion.

Custom tolerances are possible on request.

<sup>5</sup> TA-Luft (Technical Instructions on Air Quality Control) is the "first general administrative provision for the Federal Pollution Control Act" from the German government. It lays down nationally standard, binding requirements for installations requiring approval as specified in the 4th Federal Pollution Control Act.

## 16. Overview of technical details

Properties	Test standard	Döllken 3D edgeband/Döllken 3D BAZ edgeband
<b>Usage properties</b>		
Light resistance for indoor use	DIN EN ISO 4892-3 DIN EN 15187	7 to 8 on wool colour scale The very good colour stability means it is excellently suited to use indoors.
Ball indentation hardness	DIN EN ISO 2039-1	≥ 70 [N/mm <sup>2</sup> ]
Shore hardness D (sensitivity to mechanical factors)	DIN EN ISO 868	83 (± 3) Good scratch resistance and good surface hardness. Mechanical damage can be polished without problem.
Linear thermal expansion coefficient	DIN ISO 7991	90 - 110 [1/K × 10 <sup>-6</sup> ] Dimensional stability of glued edgeband is good (when appropriate bonding systems are used).
Heat distortion resistance Vicat B 50	DIN EN ISO 306	90 (± 3) °C Excellently suited for use in the furniture industry.
Shrinkage [in %]	SURTECO factory standard	< 1.5 %
Chemical resistance	DIN 68 861 1-8	Good – LGA tested. Resistant to most standard household cleaners. Limited resistance to substances containing solvents or alcohol.
Fire characteristics		Inflammable
Surface quality		Silk to high gloss. This can be achieved by buffing with polishing wheels. Polishing substances suitable for acrylic materials can also be used. Matt to high gloss with finishing varnish on premium variants.
Static charge		Low
<b>Working properties <sup>6</sup></b>		
• Cutting		Good
• Milling direction <sup>7</sup>		SD/CD
• Roughening		Good
• Radius cutting		Good
• Contour milling		Good
• Scraping		Good
• Buffing		Very good
• Radii bonding		Good
• Bonding with hot-melt adhesive		All standard types (EVA, PA, PUR, APAO)
• Polishing capability		Very good
• Stress whitening tendency		Low
• Machining centre capability		Very good with 3D BAZ quality
<b>Disposal properties</b>		
		Left-over edgebands can be incinerated with chippings at suitable plants. TA-Luft thresholds must be observed.
<b>Physiological properties</b>		
		Harmless in contact with food. No harm to general health known.

<sup>6</sup> Machine optimisation may be necessary.

<sup>7</sup> Counter direction is recommended for all thermoplastic materials:  
SD = Same direction, CD = Counter direction

If not explicitly specified otherwise, the values given were determined on standardised test specimens at room temperature. The figures are to be regarded as guideline values, not binding minimum values. Please note that properties can be influenced greatly by tool design, working processes and colouring (also refer to the previous page).

## 17. Problem diagnostics Tips and instructions for process step problems

Problem	Problem diagnosis and suggestions
1. The edgeband can easily be peeled off by hand. Hot-melt adhesive remains on the chipboard. The raster pattern of the glue applicator roller is visible.	<ul style="list-style-type: none"> <li>• Application of adhesive not sufficient</li> <li>• Room temperature too low</li> <li>• Edgeband material too cold (storage outdoors)</li> <li>• Hot-melt temperature too low</li> <li>• Feed rate too low</li> <li>• Contact pressure of applicator rollers too low</li> </ul>
2. The edgeband can easily be peeled off by hand. Hot-melt adhesive remains on the chipboard. The hot-melt adhesive surface is completely smooth (edgeband slides off).	<ul style="list-style-type: none"> <li>• Board and/or edgeband too cold <ul style="list-style-type: none"> <li>- Check hot-melt adhesive type</li> <li>- Check adhesive agent application</li> </ul> </li> </ul>
3a. The edgeband can be peeled off by hand. Most of the hot-melt adhesive remains on the edgeband.	<ul style="list-style-type: none"> <li>• Temperature of board material too high due to previous process step (e.g. veneering)</li> </ul>
3b. Glued joint is not closed (edge glueing machine).	<ul style="list-style-type: none"> <li>• Contact pressure too low</li> <li>• Adhesive too cold <ul style="list-style-type: none"> <li>- Raise application temperature, pre-warm board or increase feed rate</li> </ul> </li> <li>• Edgebands have no, or inverse, pre-tension</li> </ul>
3c. Glued joint is not closed (machining centre).	<ul style="list-style-type: none"> <li>• Contact pressure too low</li> <li>• Edgeband has become too cold and cannot be squeezed</li> <li>• Restoring forces of edgeband material too high <ul style="list-style-type: none"> <li>- Increase heater power or reduce feed rate</li> <li>- Increase geometry or use thinner edgeband material</li> </ul> </li> <li>• Adhesive not machining centre compatible, heat adhesiveness too low</li> <li>• Adhesive does not harden quickly enough <ul style="list-style-type: none"> <li>- Reduce the glue application temperature</li> </ul> </li> <li>• Edgebands have no, or inverse, pre-tension</li> </ul>
3d. Edgebands are only bonded in edge area.	<ul style="list-style-type: none"> <li>• Contact pressure too low</li> <li>• Joint milling on board part hollow</li> <li>• Pre-tension of edgebands too high</li> </ul>
4. The edgeband bonded does not have enough glue on the front edge of the board/the board is splintered at the front as the result of an incorrectly positioned glue applicator roller.	<ul style="list-style-type: none"> <li>• Application of adhesive not sufficient as a result of incorrectly positioned glue applicator roller <ul style="list-style-type: none"> <li>- Increase the quantity applied</li> </ul> </li> </ul>
5. Milling waves are visible.	<ul style="list-style-type: none"> <li>• Feed rate too quick</li> <li>• Cut speed of milling cutters too low <ul style="list-style-type: none"> <li>- Rework with draw blades and buffing station</li> <li>- Mill in counter direction</li> <li>- Increase number of blades on miller cutters</li> <li>- Increase speed</li> </ul> </li> </ul>
6. For thick edgebands, the colour in the milling area lightens a little (stress whitening).	<ul style="list-style-type: none"> <li>• Heat the milling area using a hot-air station (can be retrofitted)</li> <li>• Draw blade is too thick <ul style="list-style-type: none"> <li>- Rework with buffing station</li> <li>- Reduce draw blade size (max. 0.1 - 0.2 mm)</li> </ul> </li> </ul>
7. Stress whitening indications for machining centre processing within radius.	<ul style="list-style-type: none"> <li>• Edgeband has become too cold <ul style="list-style-type: none"> <li>- Increase heater power or reduce feed rate</li> <li>- Increase geometry or use thinner edgeband material</li> </ul> </li> </ul>



Problem	Problem diagnosis and suggestions
8. Strong stringing of adhesive after application	<ul style="list-style-type: none"> <li>• Lower application temperature <ul style="list-style-type: none"> <li>- Clean glue part</li> <li>- Test other adhesive</li> </ul> </li> </ul>
9. "Mouse teeth" in the joint	<ul style="list-style-type: none"> <li>• Increase quantity applied <ul style="list-style-type: none"> <li>- Increase application temperature</li> <li>- Pre-warm board</li> </ul> </li> </ul>
10. Rupturing of the long edgebands after the cross-edging	<ul style="list-style-type: none"> <li>• Only format and insert the MDF board <ul style="list-style-type: none"> <li>- Check the miller cutter to see if the penetration depth is OK</li> <li>- Reduce the amount of material removed or use other chipboards</li> </ul> </li> </ul>
11. Damage to the decor of the 3D edgeband for machining centre processing	<ul style="list-style-type: none"> <li>• Use special rubber rollers</li> </ul>
12. "Dents" or "scratches" in the edgeband	<ul style="list-style-type: none"> <li>• Clean the edgeband feeder <ul style="list-style-type: none"> <li>- Clean the contact rollers and spray them with separating agent</li> <li>- Clean the scan shoes; if not better, inspect the scan shoes for damage and renew them if necessary</li> </ul> </li> </ul>
13. Rupturing or luting at ends of edgeband	<ul style="list-style-type: none"> <li>• Have the mitre saw sharpened <ul style="list-style-type: none"> <li>- Ask the tool supplier for a suitable tool</li> </ul> </li> </ul>
14. Rupturing at the top and bottom of edgeband	<ul style="list-style-type: none"> <li>• Lower edgeband projection <ul style="list-style-type: none"> <li>- Adjust temperature (to above 18 °C) of boards and edgebands the day before</li> <li>- Increase the room temperature and prevent draughts</li> </ul> </li> </ul>
15. Edgeband luted on copying	<ul style="list-style-type: none"> <li>• Lower the number of blades <ul style="list-style-type: none"> <li>- Regulate the speed</li> <li>- Mill edgebands in counter direction</li> <li>- Increase feed rate</li> </ul> </li> </ul>
16. 3D 2-in-1 offset in corner area	<ul style="list-style-type: none"> <li>• Precise adjustment of the edgeband holding down clamp <ul style="list-style-type: none"> <li>- Set edgeband projections to the minimum</li> <li>- Check edgeband for sabre shape</li> </ul> </li> </ul>

## 18. Other product variants of the 3D edgeband

- FUSION-EDGE

The information specified, as well as application-related advice in verbal and written form, and obtained through testing, are provided in good faith but are not applicable as binding instructions, neither in relation to any property rights claims on the part of third parties. The advice provided does not release you from checking our current advice, our safety data sheets and technical information in particular, nor from checking our products as regards suitability for the procedures and purposes intended. Application of, use of and working with our products, and the products made by yourself on the basis of our application-specific advice, are beyond our control and so exclusively within your area of responsibility. Our products are sold in line with our applicable general terms of delivery and payment.

**SURTECO**  
GmbH

.....  
we create.  
we innovate.

**SURTECO GmbH**  
Am Brühl 6  
86647 Buttenwiesen  
Germany  
T: +49 8274 51-0  
F: +49 8274 51-512  
info@surteco.com  
www.surteco.com