



Sheets and Pre-Cut Bands

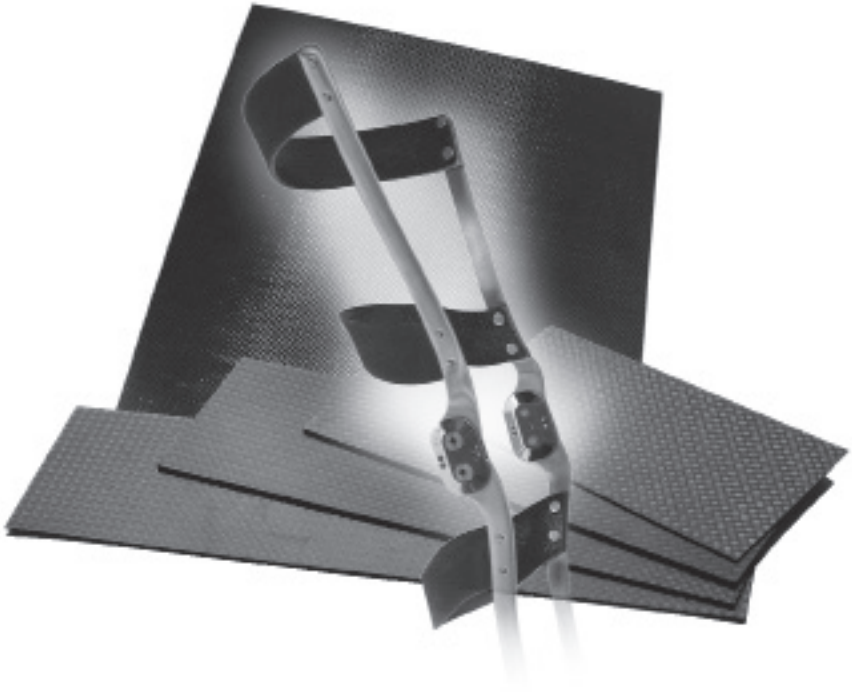


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1. Warranty

The warranty applies only if the product has been used under the described conditions and for the intended applications. Furthermore, we do not accept a multi-use of the material.

2. Application

CTC BIDIREKTIONAL is used for fabricating bands for side bars / bands orthoses (fig. 1) and to reinforce profiles.

3. Safety Information

This manual is addressed to orthotists. That is why the content basically confines to features of the product. It does not contain any notes about dangers which are obvious to orthotists.

For information reasons and for safety of your patients, please note all information provided in this manual including notes, tables and illustrations. Please note especially the safety instructions indicated by ATTENTION! CAUTION! WARNING! and DANGER! which are listed and explained in the following paragraph. Ignoring this information may lead to property damage.



Fig. 1

4. Safety Instructions

4.1 Classification of the Safety Instructions



DANGER!

➔ Important information about a possible dangerous situation which, if not avoided, leads to death or irreversible injuries.



WARNING!

➔ Important information about a possible dangerous situation which, if not avoided, leads to reversible injuries that need medical treatment.



CAUTION!

➔ Important information about a possible dangerous situation which, if not avoided, leads to light injuries that do not need medical treatment.




ATTENTION!

➔ Important information about a possible dangerous situation which, if not avoided, leads to damage of the product.


4.2 Structure of the Safety Instructions


The following example demonstrates the structure of the safety instructions:


Attention symbol	Signal word	ATTENTION!
	Type of danger	<i>Mechanical load is too high!</i>
	Possible consequences for components	➔ <i>Wear of the joint parts.</i>
	Possible consequences for the patient	➔ <i>Maintenance intervals shorten.</i>
	Measures	Explain the patient correct use of the joint and possible dangers.


4.3 Overview of all Safety Instructions for CTC BIDIREKTIONAL


There is detailed information to some of the safety instructions in the course of this manual. Respect the following safety instructions to avoid property damage:



ATTENTION!
Material is 3D thermoformed!
 ➔ *Material can break.*
 ➔ *Goal of treatment is maybe not achieved.*
Thermoform the material only two-dimensionally.


ATTENTION!
Fibre orientation is not respected when placing the paper pattern for an individual pre-cut!
 ➔ *Material can break.*
 ➔ *Goal of treatment is maybe not achieved.*
Make sure that the fibre orientation corresponds to the desired stiffness.


ATTENTION!
Material is heated only from one side when using a heating plate.
 ➔ *Material can break.*
To heat the material use a convection or infrared oven.


ATTENTION!
Material is overheated!
 ➔ *Material loses strength and can break.*
 ➔ *Goal of treatment is maybe not achieved.*
Heat the material as described in the manual.


ATTENTION!
Material cools down before forming!
 ➔ *Material can break.*
Form the material before it is cooled down.


ATTENTION!
Surface of the pre-cut is ground!
 ➔ *The structure of the material is destroyed and material can break.*
 ➔ *Goal of treatment is maybe not achieved.*
Grind only the edge of the pre-cut and not the surface.

**ATTENTION!**

Surfaces are cleaned with commercial regreasing solvent!

- ➔ *Material can break.*
- ➔ *Goal of treatment is maybe not achieved.*

For cleaning the surfaces only use a solvent that does not leave grease on it.

**ATTENTION!**

When adhering the workpieces, air can be trapped between the surfaces!

- ➔ *Durability of the adhesion is reduced.*
- ➔ *Goal of treatment is maybe not achieved.*

To prevent air being trapped adhere the workpieces as described in the manual.

**ATTENTION!**

Squeezed-out adhesive is being removed with solvent!

- ➔ *Durability of the adhesion is reduced.*
- ➔ *Goal of treatment is maybe not achieved.*

Remove squeezed-out adhesive only with a dry cloth.

**ATTENTION!**

Workpieces are not adhered but only riveted!

- ➔ *Material can break.*
- ➔ *Goal of treatment is maybe not achieved.*

Always make sure to adhere carbon fibre materials.

**ATTENTION!**

Load is too high!

- ➔ *Material can break.*
- ➔ *Goal of treatment is maybe not achieved.*

Select the appropriate material thickness.

5. Material Properties

5.1 Deformability

The acrylic resin metcore® is used as basis for manufacturing CTC BIDIREKTIONAL. It can be easily 2D thermoformed (fig. 2) and adhered to metal, leather and several sorts of plastic.

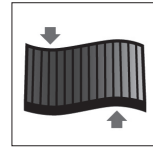


Fig. 2



ATTENTION!

Material is 3D thermoformed!

➔ *Material can break.*

➔ *Goal of treatment is maybe not achieved.*

Thermoform the material only two-dimensionally.

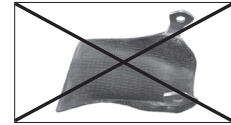




Fig. 3

CTC BIDIREKTIONAL is **not** suitable for medium to strong 3D formings such as foot pieces with heel cap (fig. 3).

5.2 Strength and Stiffness

CTC BIDIREKTIONAL has a very high fibre content of 55% and, therefore, ideally combines strength and stiffness. The fibre orientation of the pre-cut influences the stiffness and the deformability (torsion). The sheet's fibre orientation can be determined by placing a paper pattern in the desired position on the sheet. The pre-cut bands, in contrast, already have a fibre orientation of 45°.

Fibre orientation	Tensile strength	Bending stiffness	Torsional stiffness
0° / 90° 	high	high	low
45° / 45° 	low	low	high

5.3 Production Tolerances

Each pre-cut band has its own fabric layer structure and according to that its own thickness. Since the fabric layer structure is subject to production tolerances, the indicated thicknesses are only reference values. The stiffness of the pre-cut is determined by the fabric layer structure. But the production tolerances have minor effects on the stiffness. The production tolerances can lead to an overlapping within the thicknesses.

6. Choose the Right CTC Sheets and Pre-Cut Bands

Choose the desired material thickness of the sheets.

CTC BIDIREKTIONAL, Carbon Fibre Sheet			
Article number	Dimensions [mm]	Thickness [mm]	Compared strength
PL1206-XS	500 x 500	Approx. 0.8	Used for sandwich constructions
PL1232-S	500 x 500	Approx. 1.0	Used for sandwich constructions
PL1206-M	500 x 500	Approx. 1.2	Approx. like 1.50mm duralumin
PL1246-H	500 x 500	Approx. 2.3	Approx. like 1.75mm duralumin
PL1246-XH	500 x 500	Approx. 3.0	Approx. like 2.00mm duralumin
PL1246-XXH	500 x 500	Approx. 3.7	Approx. like 2.25mm duralumin or 1.50mm V2A steel

Depending on the field of application, the pre-cut bands are available in different dimensions and thicknesses.

CTC BIDIREKTIONAL Carbon Fibre Pre-Cut Bands

Article number	Dimensions [mm]	Application	Thickness [mm]	Compared strength
PL1230-S	150 x 80	Ankle band	Approx. 1.0	Used for sandwich constructions
PL1200-M	150 x 80	Ankle band	Approx. 1.2	Approx. like 1.50mm duralumin
PL1231-S	200 x 80	Ankle / calf band	Approx. 1.0	Used for sandwich constructions
PL1201-M	200 x 80	Ankle / calf band	Approx. 1.2	Approx. like 1.50mm duralumin
PL1202-M	250 x 80	Calf band	Approx. 1.2	Approx. like 1.50mm duralumin
PL1240-H	250 x 80	Calf band	Approx. 2.3	Approx. like 1.75mm duralumin
PL1240-XH	250 x 80	Calf band	Approx. 3.0	Approx. like 2.00mm duralumin
PL1203-M	300 x 80	Calf / thigh band	Approx. 1.2	Approx. like 1.50mm duralumin
PL1241-H	300 x 80	Calf / thigh band	Approx. 2.3	Approx. like 1.75mm duralumin
PL1241-XH	300 x 80	Calf / thigh band	Approx. 3.0	Approx. like 2.00mm duralumin
PL1204-M	350 x 80	Thigh band	Approx. 1.2	Approx. like 1.50mm duralumin
PL1242-H	350 x 80	Thigh band	Approx. 2.3	Approx. like 1.75mm duralumin
PL1242-XH	350 x 80	Thigh band	Approx. 3.0	Approx. like 2.00mm duralumin
PL1242-XXH	350 x 80	Thigh band	Approx. 3.7	Approx. like 2.25mm duralumin or 1.50mm V2A steel
PL1205-M	400 x 80	Thigh band	Approx. 1.2	Approx. like 1.50mm duralumin
PL1243-H	400 x 80	Thigh band	Approx. 2.3	Approx. like 1.75mm duralumin
PL1243-XH	400 x 80	Thigh band	Approx. 3.0	Approx. like 2.00mm duralumin
PL1243-XXH	400 x 80	Thigh band	Approx. 3.7	Approx. like 2.25mm duralumin or 1.50mm V2A steel
PL1244-H	350 x 130	Ischial band	Approx. 2.3	Approx. like 1.75mm duralumin
PL1244-XH	350 x 130	Ischial band	Approx. 3.0	Approx. like 2.00mm duralumin
PL1245-H	525 x 150	Ischial band	Approx. 2.3	Approx. like 1.75mm duralumin
PL1245-XH	525 x 150	Ischial band	Approx. 3.0	Approx. like 2.00mm duralumin

For fabricating a Strong Light orthosis you can also order a set of pre-cut bands. This basically consists of an upper and lower thigh band and an upper and lower leg band.

Sets of CTC Pre-Cut Bands

Article number	System width	Scope of delivery	Recommendation for fabricating a foot piece with CTS KNITTED FABRIC
PL1902	14mm	1 x PL1242-XH, 2 x PL1241-XH, 1 x PL1240-H	PL1456-M
PL1903	16mm	1 x PL1243-XH, 2 x PL1242-XH, 1 x PL1241-H	PL1456-M
PL1905	20mm	1 x PL1243-XXH, 2 x PL1242-XXH, 1 x PL1241-XH	PL1456-H

7. Tools for Processing

Description
Temperature marker 175°C
Band saw
Jig saw
Drum sander
Lamellar flap grinding disc
Heat protection gloves
Rubber band
Contact adhesive
Bolts for trial

8. Preparing the Model

1. Use a high-resistance foam model or, if possible, a dry plaster model. Since padding material acts as a separating layer between the model and CTC **BIDIREKTIONAL**, first apply the padding material. Therefore, the heat extraction of the model is reduced and the material remains thermoformable for longer which increases the processing time.
2. Mark the future positions of the pre-cut bands on the model (fig. 4).
3. To facilitate the forming procedure fix a rubber band (e.g. motorcycle inner tube) on the model.

Note:

Apply contact adhesive to the plaster model and to the smooth side of CTC **BIDIREKTIONAL** before forming the bands so that they do not shift on the model.



Fig. 4

9. Processing the Material

ATTENTION!
Fibre orientation is not respected when placing the paper pattern for an individual pre-cut!
➡ *Material can break.*
➡ *Goal of treatment is maybe not achieved.*
Make sure that the fibre orientation corresponds to the desired stiffness.

If you individually cut to size a sheet use a corresponding pattern. The fibre orientation has to point in the direction of the absorption of the appearing forces. To ensure a better adhesion of CTC **BIDIREKTIONAL** the smooth side should face the model.

9.1 Cutting

For individual pre-cuts and to adapt prefabricated pre-cuts you can change CTC **BIDIREKTIONAL** by cutting.

1. To saw out a pre-cut with a **band saw** use preferably blades with a tooth pitch of 14 teeth/inch (fig. 5).
2. To saw out a pre-cut with a **jig saw** use preferably blades with a tooth pitch of 2.5 - 3mm teeth/inch (fine woodcut).

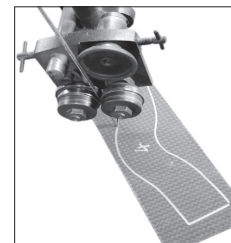


Fig. 5

9.2 Heating



ATTENTION!

Material is heated only from one side when using a heating plate.

➔ *Material can break.*

To heat the material use a convection or infrared oven.



ATTENTION!

Material is overheated!

➔ *Material loses strength and can break.*

➔ *Goal of treatment is maybe not achieved.*

Heat the material as described in the manual.

1. Set the convection oven or heating cabinet to a temperature of 175°C (fig. 6) or the infrared oven to 140°C. Do not use a heating plate to avoid that the material is heated only from one side.
2. Always wear heat protection gloves when working at heating sources.
3. When heating the material in the convection oven, **always** use the temperature marker (article no.: ZM1000) to ensure the proper processing temperature.
4. Place several marks on both sides of the pre-cut to verify that the material is thoroughly heated (fig. 7).
5. When the marks have disappeared from the upper side, turn the pre-cut so that the underside points upwards.
6. When these marks also have disappeared, the proper processing temperature is achieved.
7. CTC BIDIREKTIONAL can be heated several times in compliance with the processing temperature.



Fig. 6

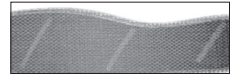


Fig. 7

9.3 Forming



ATTENTION!

Material cools down before forming!

➔ *Material can break.*

Form the material before it is cooled down.

1. In order that the material does not cool down, form it directly after removing it from the oven. Therefore, the high-resistance foam model or plaster model should be close to the oven.
2. Large pieces of material should be thermoformed with the assistance of another person.
3. Lay the smooth side of the material towards the model. The rough side ensures later a better adhesion to system side bars or other materials such as metal, leather, cork or padding.
4. To obtain the necessary even and high pressure for forming the bands on the model use a rubber band (fig. 8).

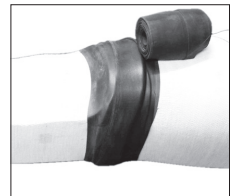


Fig. 8

9.4 Grinding



ATTENTION!

Surface of the pre-cut is ground!

- *The structure of the material is destroyed and material can break.*
 - *Goal of treatment is maybe not achieved.*
- Grind only the edge of the pre-cut and not the surface.**

For individual pre-cuts and to adapt prefabricated pre-cuts you can change CTC **BIDIREKTIONAL** by grinding.

1. Grind the edges (not the surface) of the pre-cuts on a drum sander with a coarse-grained (40/60) abrasive and after that with a fine-grained (100/120) abrasive (fig. 9).
2. Additionally, the edges can be polished with a lamellar flap grinding disc at low speed.



Fig. 9

Note:

Respect the **general safety instructions during grinding of carbon fibre materials** (extraction, breathing mask, gloves, etc.).

9.5 Screwing or Riveting (for Trial Fitting)

1. For trial fitting it is sufficient to screw together or rivet the pre-cuts with the system side bars (fig. 10).
2. When finishing the orthosis the pre-cuts must be adhered to the system side bars (see paragraph 10.6).
3. Under no circumstances may a patient leave the orthopaedic workshop with a trial orthosis (pre-cuts only riveted or screwed).



Fig. 10

9.6 Adhering and Riveting



ATTENTION!

Surfaces are cleaned with commercial regreasing solvent!

- *Material can break.*
- *Goal of treatment is maybe not achieved.*

For cleaning the surfaces only use a solvent that does not leave grease on it.



ATTENTION!

When adhering the workpieces, air can be trapped between the surfaces!

- *Durability of the adhesion is reduced.*
- *Goal of treatment is maybe not achieved.*

To prevent air being trapped adhere the workpieces as described in the manual.



ATTENTION!

Squeezed-out adhesive is being removed with solvent!

- *Durability of the adhesion is reduced.*
- *Goal of treatment is maybe not achieved.*

Remove squeezed-out adhesive only with a dry cloth.

1. Use AGOMET F330 adhesive (article no.: KL1100) to adhere CTC BIDIREKTIONAL with each other or with metals.
2. Use a commercial contact adhesive to adhere CTC BIDIREKTIONAL with padding or similar materials. Follow the instructions given with the adhesive of choice for this.
3. Before adhering the workpieces clean both surfaces with a **non-greasy** solvent such as acetone.
4. For obtaining a good adhesion between the workpieces apply a thin layer of adhesive that is appropriate to the material to both surfaces (fig. 11).
5. Make sure that the entire surface is covered with adhesive and that no air is being trapped when adhering.
6. To put the surfaces under pressure fix the workpieces against each other with a clamping device such as bolts for trial (fig. 12) or small clamps. The larger the surface is, the higher the pressure must be.
7. Remove squeezed-out adhesive with a dry cloth. Do not use a solvent since it could flow into the adhesion and wash out the adhesive.
8. Depending on the room temperature, AGOMET F330 adhesive requires 1-1.5 hours to be fully hardened. Only then you can remove the clamping device.



Fig. 11

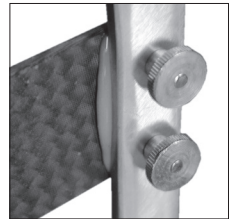


Fig. 12

ATTENTION!

Workpieces are not adhered but only riveted!

➔ *Material can break.*

➔ *Goal of treatment is maybe not achieved.*

Always make sure to adhere carbon fibre materials.

9. After having adhered the workpieces you can rivet them for additional safety. For this purpose, the adhesive should not be completely hardened so that the bond is not damaged or completely destroyed by riveting.

10. Storage and Handling

Store CTC BIDIREKTIONAL in horizontal position at a dry place at room temperature. Avoid direct sunlight and excessive pressure because it can affect the material.

11. Accessory Parts

The following table shows all articles for the processing of CTC BIDIREKTIONAL from our range. You will find further information about the individual articles in our latest product catalogue **System joints and Articulated system side bars**.

Article number	Description	Unit
KL1100	AGOMET F330 adhesive, 800g	Tin
KL1100-H	AGOMET F330 hardener, 30g	Tube
ZM1000	Temperature marker 175°C	Piece
PS2000-010	Bolt for trial with knurled nut	Piece

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