



# Thermofforming

# Thermoforming technique

The instructions in this brochure are the suggestions of the Development Team of Erkodent.

The fields of use as well as the fabrication procedures in Thermoforming Technique are not limited to the instructions that are shown and may vary.

Please do not hesitate to contact us if you have any suggestions.

Please find videos to the fabrication of several applications at: [www.erkodent.com](http://www.erkodent.com) > Service/Download > Videos



## Basic principles of thermoforming:

- The **models** should consist of **hard plaster** (class 3).
- For thermoforming the **hard plaster** can contain residual moisture but **must not be wet**.
- For a good adaptation the **hard plaster** must be **permeable to air**, especially hard plasters for the orthodontic field do not always ensure this. Like when using plastic models or varnished models that are impermeable to air, this leads to incomplete adaptation because in most cases air cannot escape completely between the model and the foil.
- 3d print models are placed centrally on the model plate for the adaptation (pressure and vacuum forming units). Please ensure that the model base entirely fits all around to the model plate. If necessary, close not fitting areas with Erkogum. 3d print models with socle can also be adapted in granules. Further auxiliaries for the use of 3d print models are Occ3-4p and Occ3-aM.
- The removal of hard materials very often leads to a **break of models**. The use of super hard plaster does not solve this problem, it is better to thermoform on a duplicated model.
- It is useful to **embed the models** for thermoforming as far into the **high grade steel granules** that only the area that has to be thermoformed plus 3 mm is visible.
- The **granules** allow a **quick adaptation** of the thermoforming materials and a very simple limitation of the model height.
- When working on the **model disc** ensure that the **model base is trimmed flat**.
- **Model preparation:** Areas of the model (exterior vestibulum, oral floor) which obstruct the thermoforming process have to be removed. Remove sharp plaster edges.



Fill narrow gaps between the teeth with Erkogum (transparent 110 844 / lilac 110 847).



Remove positive plaster bubbles.



Fill negative plaster bubbles and small defects with blocking out wax (transparent 725 080 / lilac 725 055).



If the splint covers the gingival margin, relieve it with Erkoskin (625 050).



When there are large undercuts, mark the prosthetic equator to limit the height.

- The adaptation of thermoforming materials always means a **stretching** respectively a thinning of the original material thickness. A rough orientation is: **1 cm model height corresponds to 20 - 25 % loss of thickness**. For this reason it is expedient to embed the models into the granules.
- All **Erkodent thermoforming materials** are tested on their biocompatibility and are **physiologically harmless** in their intended use. They are CE marked based on the EU regulation 2017/745 concerning medical products, the directive 93/42/EEC concerning medical products and the EU regulation 2016/425 concerning personal protective equipment (Playsafe triple sports mouthguard). Up to now (2022) there is no knowledge of confirmed allergic reactions on the materials, but allergic reactions cannot be excluded.
- Pay attention to the regulations for operational safety.



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Info + Video

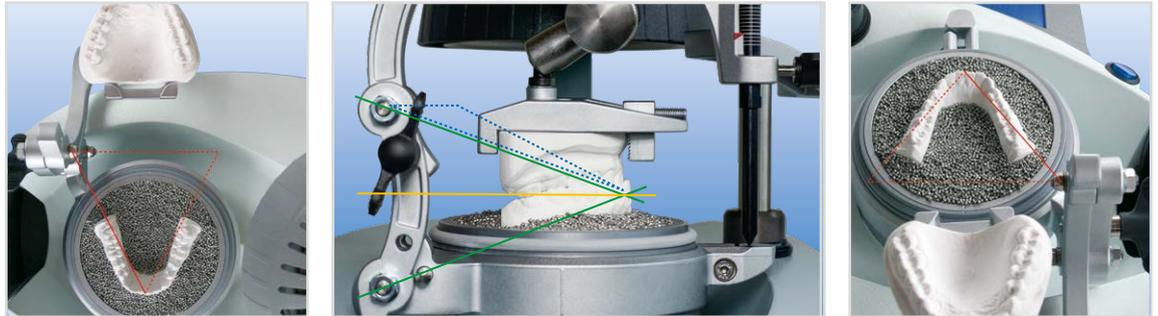
# The function of the Occluform device

## Occluform-3

The Occluform is an occludator that can be integrated in a thermoforming unit to **imprint the opposing bite** (pat. 19915567).

- The Occluform-3 can only be installed at the Erkoform units serie 3.
- It allows to directly imprint the opposing bite in the Erkoform units serie 3 during the thermoforming process!
- Plaster-free model fixation.
- The single column construction enables best model accessibility.
- The articulation of the models is ensured by a hydraulic system that can be fixed in every position.
- The construction of the Occluform-3 device is based on a Bonwill triangle with a side length of 11.5 cm and a Balkwill angle of 20°. That way it allows a median elevation of the bite.

The Erkoform units serie 3 are prepared for the simple installation of the Occluform-3, the device will only be mounted with a single clamping screw on the thermoforming unit.



- Hints**
- **Please note:** the upper joint of the Occluform-3 is fixed when thermoformed on the upper jaw model, the lower joint is fixed when thermoformed on the lower jaw model (see also Occluform-3 instructions).
  - Reduce models that exceed the inner dimensions of the retainer jaws in the model pot and that are too high for the total inner dimensions (both models articulated) by trimming.
  - For very small models turn the retainer jaw to the marking point at the edge of the model pot in order to avoid the incisal point moving backwards.

### Accessories:

**Occ3-4p:** Special device and construction data for fixation of 3d print models in the Occluform-3 device. Occ3-4p set 188 595, 4p-special model disc, 4p counter bite fixation, construction software (download).



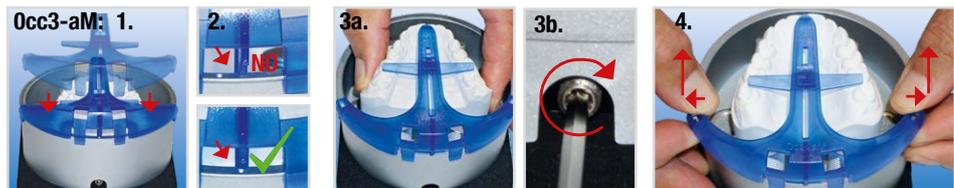
**Occ3-aM:** Device for mean value alignment of a model in the Occluform-3 model pot to the incisal point and to the occlusal plane. The positioning and articulation then corresponds to that of a mean value articulator. Occ3-aM 188 589, 1 piece with model pot support



## Working with the Occluform-3

All thermoforming materials can be adjusted with the Occluform-3. However, thin foils cool off very fast and are less suitable. The thicker the thermoforming material used the more time there will be for the imprint (adjustment).

1. If available, place the lower or upper jaw model in the model pot using the **Occ3-aM** and tighten. The area that has to be thermoformed should protrude the edge of the pot. (**Occ3-aM 1. - 4.**)



1. If Occ3-aM is not available fix the lower or upper jaw model in the model pot, the area that has to be thermoformed should protrude the edge of the pot.



3. Point the supporting pin on the 0-line (arrow), open the arrest joint and articulate the models.



The bite can be elevated to a median value.

5. Hold the upper model plate in position and firmly close the arrest joint. Open the Occluform.

Fill as many high grade steel granules in the pot that only the ...



2. Fix the antagonistic jaw onto the upper model plate. Prefix the model in a preferably high position with the arrest joint. Close the Occluform. **Occ3-4p (188 595) for fixation of 3d print models!**



4. If a construction bite is available the models are articulated in the same way (3).

That way the imprint corresponds exactly to the bite registration.

6. ... thermoforming area plus 3 mm is visible. Ensure that also the hollow spaces under the model are filled with granules. Insulate the opposing bite (alginate based insulation).

Now it can be thermoformed.



# Occlusal splints with and without adjusted occlusion

## Materials & Accessories

### Fabrication:

- Hard splints: Erkodur, adjusted splints 1.5 - 5.0 mm, stabilization splints 0.8 - 1.5 mm
- Hard/soft splints: Erkoloc-pro, adjusted splints 2.0 - 5.0 mm, stabilization splints 1.0 mm/1.3 mm (2-layered)
- Semi-soft splints: Erkoflex-95, adjusted splints (biting) 2.5 and 4.0 mm
- Tough-hard splints: Erkolign, 1.0 and 2.0 mm (at extreme stress, most resistant, but only limitedly adjustable)
- For adjustment by addition: auto-polymerizing resin for Erkodur and Erkoloc-pro, Erkoflexsticks-95 (177 006) with commercially available fusing gun,  $\geq 500$  W with screw-top (special top for fusing gun 177 010) for Erkoflex-95. If necessary, hot air burner (177 540) for the adjustment of Erkoflex-95.
- For adjustment by grinding (biting): Erkoform units serie 3 / Occluform-3
- For model insulation and shrinkage compensation thermoform the ex works applied insulating foil together with the desired plate, in doing so the insulating/shrinkage compensation foil has to show towards the model (otherwise alginate based insulation, only insulation).
- Cover templates (110 900) to cover the granules when using Erkoloc-pro and Erkoflex-95 (less loss of granules).

### Model preparation:

- With large undercuts and hard splint material, parallelometer for marking the prosthetic equator.
- Erkogum (110 844) for blocking out, high-fusing wax (725 080) to fill bubbles in the plaster.
- Erkoskin (625 050) to relieve the gingival margin.

### Finishing:

- Recommendation: Finishing set Quick 3 (110 830) with fissure bur, rightward cutting, left spiral (110 836) for rough cutting out, HSS-twist drill (110 876) to cut out the desired form, crosscut tungsten carbide bur (110 837 for fine grinding, Liskosil-l (223 240) to prepolish the edges and Liskosil-m (223 230) to prepolish narrow interdental spaces and Liskosil-s (223 220) for treatment of occlusal premature contacts and insides of splints.
- Pear-shaped tungsten carbide bur (110 835) for grinding-in.
- Take-off pliers (110 880) for taking off the splints of the model.
- Polishing set (110 878) to polish Erkodur and Erkoloc-pro, hot air burner (177 540) to shine Erkoflex-95.

## Hints

- This instruction is limited to the general fabrication of splints. Functional individualizations as required for the therapy with **reflex, repositioning, distraction, centric (Michigan) and many other types of splints** can be realized except for a few types of splints only with materials that are at least in the occlusal area hard.
- Areas of the model (exterior vestibulum, oral floor), which obstruct the thermoforming process have to be removed. Remove sharp plaster edges.
- In order to have transparent splints out of Erkoloc-pro or Erkoflex-95 **without** insulating foil, the model should be insulated with alginate insulation.
- For splints that exceed the gingival margin apply a layer of Erkoskin to the margin to relieve tension.
- In order to avoid the creation of tension cracks brush the area that has to be built up with autopolymerizing resin with little monomer before the splint is cut out or taken off the model.
- For splints out of Erkoloc-pro the hard layer may be ground through.

## Occlusal splints without adjustment, for ex. stabilization splints

Thermoforming material: Erkodur, 0.8 - 1.5 mm, hard • Erkodur-0M1/-A1/-A2/-A3, 1.0 - 2.0 mm, hard • Erkoloc-pro, 1.0 - 1.3 mm, hard/soft • Erkolign, 1.0 mm, tough-hard. In regard to fabrication the materials do not differ, in regard to finishing only slightly.

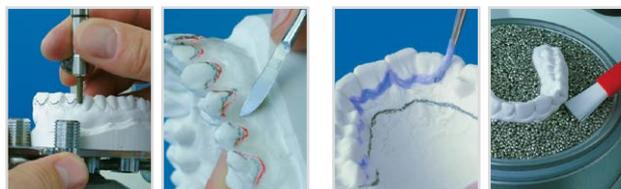
1. Pay attention to the hints for model preparation at page 1.

When there are thick undercuts, mark the prosthetic equator with a parallelometer and block out large undercuts.

3. If applicable, cover granules with a cover template (Erkoloc-pro / Erkoflex-95).

Thermoform.

5. Use the twist drill HSS without pressure ( $> 20\ 000$  rev/min) to cut out the desired shape.



2. If necessary (see hints), apply Erkoskin on the gingival margin.

Embed the models so far into the high grade steel granules that only the thermoforming area plus 3 mm protrude from the granules.

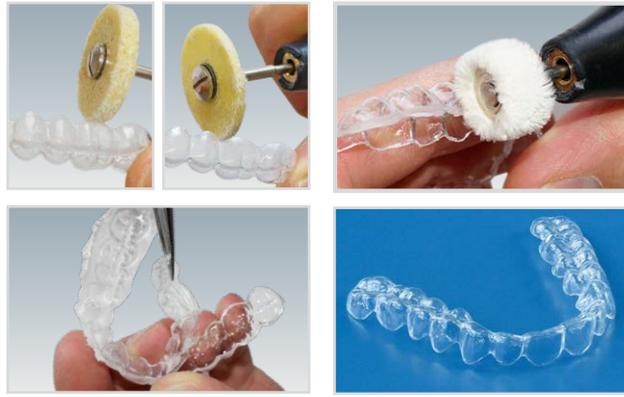
4. Cut in the thermoformed plate with the fissure bur ( $> 20\ 000$  rev/min) for an easier removal of the model and take off the model with take-off pliers.

6. If necessary, grind the edges with the crosscut tungsten carbide bur ( $> 20\ 000$  rev/min).

**7.** Smooth the edges with Liskosil-I (10 000 rev/min). Smooth narrow interdental spaces with Liskosil-m or -s (10 000 rev/min).

Erkolign: smooth with Liskosil-m and -l and white silicone polishers.

**9.** It would be best to now take off the insulating foil.



**8.** If necessary, polish the matt areas with the polishing set using a lab hand-piece, however, for these relatively thin splints a polish is mostly superfluous.

**10.** Finished stabilization splint.

Pay attention to the cleaning and maintenance instructions on page 34.

## Occlusal splint with adjustment by reduction (grinding), for ex. centric splint

Thermoforming material: Erkodur, 1.5-5.0 mm, hard • Erkodur-OM1/-A1/-A2/-A3, 2.0 mm, hard • Erkoloc-pro, 2.0-5.0 mm, soft/hard • Erkolign, 2.0 mm, tough-hard. In regard to fabrication the materials do not differ, in regard to finishing only slightly.

**9.** Same procedure as up to point 6.

Grind the splint as per the usual manner in the articulator according to the prescriptions. Recommendation: pear-shaped crosscut tungsten carbide bur (110 835).

**11.** Polish the matt areas with the polishing set using a lab hand-piece.

Or polish at the polishing lathe according to the technique for plastics.



**10.** Smooth and pre-polish the edges with Liskosil-I and -m (10 000 rev/min) and the grinding areas with Liskosil-s.

**12.** Finished splint, adjusted by grinding.

Pay attention to the cleaning and maintenance instructions on page 34.

## Occlusal splint with adjustment by addition and grinding, for ex. Michigan splint

Thermoforming material: Erkodur, 1.5-5.0 mm, hard • Erkoloc-pro, 2.0-5.0 mm, soft/hard  
In regard to fabrication the materials do not differ, in regard to finishing only slightly.

**13.** Same procedure as up to step 6.

Brush areas that have to be adjusted with an autopolymer resin with little monomer.

See also next to last point of the hints!

**15.** Close the articulator and cure in the polymerisation pot at 40-50 °C. After curing open the articulator carefully (model may break!) and remove the splint.

**17.** Finished adjusted Michigan splint produced by addition, with restored cuspid guidance.

Pay attention to the cleaning and maintenance instructions on page 34.

**18.** ... for this purpose it would be best to work with an Occluform installed at the Erkoform units (also see other chapters).

Take the bite with the Occluform ...



**14.** Insulate the opposing bite (alginate insulation), put the splint back on the model, apply the mixed autopolymerising resin and brush the plate with monomer. Put the models in the articulator.

**16.** Finish the area that has been adjusted by addition and the splint (9 to 12).

Hot foil material (Erkodur, Erkoloc-pro, 4.0/5.0 mm) can also be formed to a cuspid guidance in the unit by a manual moulding ...

**19.** ... and immediately press the hot plastic foil material in the cuspid area with a suitable instrument against the antagonistic jaw.



20. After cooling take it off the unit and finish as described in step 9 to 12.



21. Finished adjusted Michigan splint without addition, the splint consists in the occlusal area only of one material type.

Pay attention to the cleaning and maintenance instructions on page 34.

## Soft occlusal splint with imprinted adjustment, for ex. relief splint

Thermoforming material: Erkoflex-95, 2.5 and 4.0 mm, Shore A 95

22. **Addition:** Erkoflex-95, 2.5 mm  
Embed the models so far into the high grade steel granules that only the thermoforming area plus 5 mm protrude from the granules. Cover the granules with the cover template.



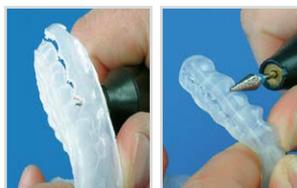
24. Pull the insulating foil off.

Put the splint back onto the model and degrease well with degreasing agent (613 050). Put the models into the articulator. Insulate the opposing bite (Isolac).



26. In the articulator immediately imprint the opposing bite ...

... or build up all areas step by step and later on imprint the opposing bite as shown in step 31.



28. Smooth with Liskosil-I and -m (10 000 rev/min).

Carefully shine with the hot air burner.



30. **Imprint:** Erkoflex-95, 4.0 mm

Same procedure as step 22 to 24, however, without degreasing.



32. The imprint can also be done in the mouth. Therefore put the splint finished up to step 23 on the model into a flat bath with cool water. The occlusal area has to protrude from the water, ...



23. Thermoform, after cooling take it off the model and roughly cut out the shape with the fissure bur or the scissors, leave the shape longer than the final splint.

25. Apply material onto the required areas using the Erkoflexsticks-95 and a fusing gun (max. 2 cm length per application). Hold the point of the fusing gun very close to the splint.

27. Cut out the final shape of the splint with the HSS twist drill (> 20 000 rev/min). Work the built-up with the crosscut tungsten carbide bur (> 20 000 rev/min).

29. Finished adjusted splint by addition.

Pay attention to the cleaning and maintenance instructions on page 34.

31. Warm occlusal area with the hot air burner until it becomes clear and imprint the opposing bite, see also step 26.

Finish as shown in step 27 and 28.

33. ... warm the occlusal area, see 31. Briefly pour cool water over it, immediately remove the splint from the model and place it into the mouth. Obtain an occlusal registration. Allow to cool for 2 min. in the mouth and finish as shown in step 24.

## Imprint of the opposing bite in the Erkoform units serie 3 and Occluform-3

Thermoforming materials: all types of materials that are listed in "Materials & Accessories" from 0.8\* mm thickness and more, in the example Erkodur. The thinner the material is the quicker the Occluform-3 device has to be closed after adaptation. \*0.8/1.0 mm, fast proceeding required

34. In the example, fix the upper jaw in the model pot.

For the fabrication of an adjusted occlusal splint the model only has to protrude of the model pot by height of the teeth plus 3 mm.



35. Put the model pot that way into the unit that the markings (arrows) are opposite.

**36.** Fix the antagonistic jaw onto the upper model plate. Prefix the model in a preferably high position with the arrest joint.

Close the Occluform.

**38.** If a construction bite is available the models are articulated in the same way (3).

That way the imprint corresponds exactly to the bite registration.

**40.** Fill as many high grade steel granules in the pot that only the thermoforming area plus 3 mm is visible. Ensure that also the hollow spaces under the model are filled with granules.

**42.** After the thermoforming material has cooled down open the Occluform. The imprint corresponds to the bite elevation or the construction bite.



**37.** Point the supporting pin on the 0-line (arrow), open the arrest joint and articulate the models.

The bite can be elevated to a median value.

**39.** Hold the upper model plate in position and firmly close the arrest joint. Open the Occluform.

**41.** Insulate the opposing bite.

Now it can be thermoformed.

**Immediately** after adaptation close the Occluform until the supporting pin gets contact.

**43.** Open the foil securing ring, lift the foil frame of the unit together with the model pot and take off the foil frame with the foil.

Finish as described in step 9 to 12.

## Imprint of the opposing bite with plane occlusion in the Erkoform units serie 3 and Occluform-3

Thermoforming material: Erkodur, 3.0 - 5.0 mm, hard • Erkoloc-pro, 3.0 - 5.0 mm, soft/hard  
In the example: Erkoloc-pro. The working steps have to be carried out quickly one after the other.

**44.** The plane occlusal surface will be pressed on with an Erkolen-foil, 0.8 mm or 1.0 mm and the Occluform. Thereto pull the insulating foil off (the Erkolen-foil can be used several times).



**46.** ... and **immediately** close the Occluform so far that the supporting pin does not have contact yet (app. 3 mm opening) ...



**45.** Carry out working steps 34 - 41 analogically.

The Erkolen-foil and foil frame should possibly be held and operated with one hand. Apply the Erkolen-foil **immediately** after the adaptation ...

**47.** ... **immediately** open the Occluform a little again, remove the Erkolen-foil and ...

**48.** ... **immediately** close the Occluform until the supporting pin gets contact.

By this mode of operation a plane occlusal surface with imprint of the cuspid tips will be obtained.



**49.** Take it out of the unit after cooling down and finish as described in step 9 to 12.

Pay attention to the cleaning and maintenance instructions on page 34.



# Temporary appliances

## Materials & Accessories

### Fabrication:

- Moulding as negative mould without bonding to acrylics for temporaries: Erkolen, 0.8 and 1.0 mm
- Moulding with bonding to acrylics for temporaries by a primer: Erkodur, 0.6 - 1.0 mm, Erkodur-0M1/-A1/-A2/-A3, 0.6 and 1.0 mm
- Primer for a durable combination of cartridge acrylics and liquid/powder acrylics with the foil types Erkodur.
- For model insulation and shrinkage compensation thermoform the ex works applied insulating foil together with the desired plate, in doing so the insulating/shrinkage compensation foil has to show towards the model (otherwise primer, only insulation).
- Cover templates (110 900) to cover the granules when using Erkolen (less loss of granules) (not absolutely necessary for the Erkodur types).

### Model preparation:

- Erkogum (110 844) for blocking out, high-fusing wax (725 080) for filling bubbles in the plaster.

### Finishing:

- Moulding: HSS twist drill (110 876) or scissors (220 300/220 301)
- Temporary appliance: crosscut tungsten carbide bur (110 837) for fine grinding, Liskosil-I (223 240) or Lisko-S (223 200) for prepolishing the edges and Liskosil-m (223 230) or Liskoid (223 205) for prepolishing narrow interdental spaces, polishing set (110 878) for polishing

## Hints

- If the temporary appliance consists of a compound of foil and acrylic this leads to a considerable reinforcement of the temporary appliance.
- In the interdental gaps of the anatomic cast ready-made teeth or plaster teeth taken from other models can be fixed with Erkogum or high-fusing wax.
- Model areas (exterior vestibulum, oral floor) which obstruct the thermoforming process have to be removed. Remove sharp plaster edges.
- With suitable acrylics the adaptation can be done in the mouth, otherwise on the prepared model (described here).
- Inject the cartridge acrylic onto the still humid primer into the mould.

## Temporary appliance combined of foil and acrylic

Thermoforming material: Erkodur, 0.6 - 1.0 mm, Erkodur-0M1/-A1/-A2/-A3, 0.6 and 1.0 mm.

In regard to fabrication and finishing the materials do not differ.

### 1. Fixed ready-made teeth.

Embed the models so far into the high grade steel granules that only the thermoforming area plus 3 mm protrude from the granules. If necessary, cover the granules (cover templates).



### 2. Thermoform and allow to cool down.

### 3. Cut in several times with the scissors towards the model for an easier removal. Remove the foil from the model and roughly cut it out.



### 4. Cut the desired shape with the HSS twist drill (> 20 000 rev/min). To avoid raising the bite, the cervical border should be shortened by app. 1 mm.

### 5. Pull the insulating foil off.

Finished mould out of Erkodur.

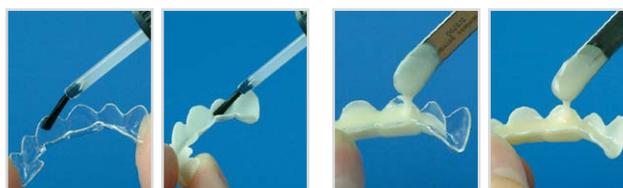


### 6. Finished mould out of Erkodur-A1.

Place the models into the articulator and articulate.

Insulate (alginate based) the model for the temporary appliance.

### 7. For a durable combination the inner surface of Erkodur and Erkodur-0M1/-A1/-A2/-A3 have to be brushed with Primer.



### 8. Pour in the acrylics in tough-flowing condition or inject with the cartridge (9).

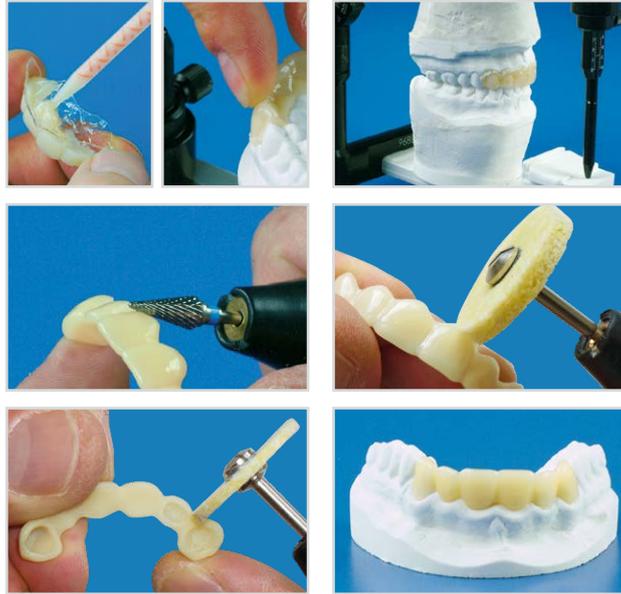
**9.** Press the mould onto the edentulous area.

With suitable, mostly cartridge acrylics, the adaptation can also be done in the mouth.

**11.** Grind the edges with the crosscut tungsten carbide bur (> 20 000 rev/min).

**13.** Smooth and prepolish narrow areas with Liskosil-m (10 000 rev/min).

If desired, polish the prepolished areas with the polishing set.



**10.** To avoid a raised bite and to compensate for the thickness of the foil, put the temporary appliance into occlusion with the opposing bite.

**12.** Smooth and prepolish the edges with Liskosil-I (10 000 rev/min).

**14.** Finished, break-stable temporary appliance out of a compound of foil (Erkodur or Erkodur-0M1/-A1/-A2/-A3) and acrylic.

## Temporary appliance, only made of acrylic, fabricated with a negative mould

Thermoforming material: Erkolen, 0.8 und 1.0 mm  
Erkolen does not bond to acrylics for temporary appliances

**15.** Proceed as described in step 1 and 2.

Cut out the negative mould in a way that the edentulous area and at least one adjacent tooth on each side are included, see also step 16.

**17.** ... and firmly press the negative mould onto the edentulous area. To avoid a raised bite no acrylic may remain on the adjacent teeth.

After hardening take the blank off ...



**16.** Pull off the insulating foil. Finished negative mould out of Erkolen. Insulate the model (alginate). Pour in the acrylics in tough-flowing condition ...

**18.** ... the negative mould. Finish as described in step 11 - 13. Finished temporary appliance.

# Radiation protection splints

## Materials & Accessories

### Fabrication:

- Erkoflex, 4.0 and 5.0 mm, Erkoflex-95, 4.0 mm

### Model preparation:

- When using plaster models: Erkogum (110 844) for blocking out, high-fusing wax (725 080) for filling bubbles in the plaster.

### Finishing:

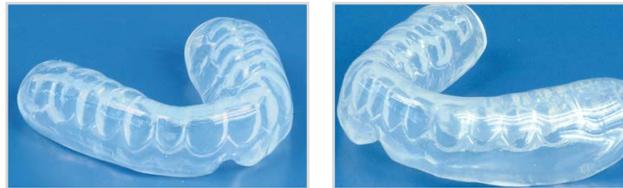
- Special scissors XL (220 301), tungsten carbide bur (110 837) for grinding, Liskosil-I (223 240) or Lisko-S (223 200) for prepolishing, hot air burner (177 540) and if necessary, FG-sheets (177 400) for shining

## Hints

- Areas of the model (exterior vestibulum, oral floor) which obstruct the adaptation have to be removed. Remove sharp plaster edges.
- Radiation protection splints reduce the implications of scattered radiation caused by materials of high density. This happens on the base of the distance-square-law of the radiation physics. The splints keep for ex. cheek and tongue in distance to the material of high density. The literature requires a distance of at least 3 mm.

1. The fabrication and finishing see page 21, 1.-6. and 24, 17.

The final shape is determined by the odontogram and the therapist.



2. Necessary adaptations can be effected with the strong scissors.

Radiation protection splint for upper jaw and lower jaw.

# Cosmetic splints

## Materials & Accessories

### Fabrication:

- Erkodur-0M1/-A1/-A2/-A3, 1.0 mm (2.0 mm, if the splint has to be adjusted)
- For a possible bite imprint: Erkoform units serie 3/Occluform-3

### Model preparation:

- Modelling wax to restore the tooth alignment

### Finishing:

- Recommendation: see occlusal splints page 4
- A fine, flexible grinding disc to shape the interdental spaces. Polishing set (110 878) to polish

## Hints

- Model areas (exterior vestibulum, oral floor) which obstruct the thermoforming process have to be removed. Remove sharp plaster edges.
- For model insulation and shrinkage compensation thermoform the ex works applied insulating foil showing towards the model together with the desired plate.
- Fabrication see stabilization splint, page 4 and 5. The splints can be put on cosmetically unfavourable teeth.

1. Cosmetically unfavourable initial situation, for ex. after an accident. The splint then also serves for stabilization.



2. The tooth alignment will be best restored with modelling wax.

3. For thermoforming the model should be duplicated.



4. To obtain a better aesthetic view the interdental spaces are more clearly accentuated ...

Thermoforming and finishing see page 4 and 5, stabilization splint.

5. ... best with a fine flexible grinding disc.



6. Finished cosmetic splint out of Erkodur-A1.

Pay attention to the cleaning and maintenance instructions on page 34.

# Bleaching and fluoride trays (gingival dressing)

## Materials & Accessories

### Fabrication:

- Recommendation: Erkoflex-bleach, 1.0 mm, Erkoloc-pro 1.0 mm and Erkoflex-95, 1.5 mm (all with insulating foil)
- Erkoskin (625 050) as spacer for bleaching trays (brush or spatula for application)
- Erkolen, 1.0 mm as spacer for fluoride trays

### Model preparation:

- Erkogum (110 844) for blocking out, high-fusing wax (725 080) for filling bubbles in the plaster.

### Finishing:

- HSS twist drill (110 876) or scissors (220 300/220 301) to precisely cut out the desired shape. Liskosil-I (223 240) or Lisko-S (223 200) and Liskosil-m (223 230) or Liskoid (223 205) to smooth the edges.

## Hints

- Model areas (exterior vestibulum, oral floor) which obstruct the thermoforming process have to be removed. Remove sharp plaster edges.
- Erkoskin as spacer results per application in an app. 0.2 mm thick layer. Erkoskin has to be dry before thermoforming (app. 5 min. on plaster).
- If Erkoskin is applied with a brush, immediately rinse the brush with water.

## Bleaching tray

Thermoforming material: Erkoflex-bleach, 1.0 mm, Erkoloc-pro 1.0 mm

**Always** thermoform together with the ex works applied insulating foil showing towards the model.

1. Apply Erkoskin as spacer with a fine brush (afterwards immediately rinse the brush) or with a small spatula.



3. Remove the plate from the model and roughly cut it out using the scissors.



5. Pull off the insulating foil, in order to avoid deformations again and again follow up the splint.



2. Embed the model so far into the high grade steel granules that the tooth alignment plus 3 mm protrude from the granules. Cover the granules with a cover template.

Thermoform and allow to cool down.

4. Precisely cut out the bleaching tray along the gingival margin using the HSS twist drill (> 20 000 rev/min).

If necessary, smooth the edges with Liskosil-m (10 000 rev/min).

6. Finished bleaching tray out of Erkoflex-bleach, 1.0 mm.

Pay attention to the cleaning and maintenance instructions on page 34.

## Fluoride tray

Thermoforming material: see above, Materials & Accessories.

7. Thermoform Erkolen, 1.0 mm as spacer. Embed the model so far into the high grade steel granules that the tooth alignment plus 3 mm protrude from the granules. Cover the granules with a cover template.



9. Put the finished spacer back onto the model and thermoform the fluoride tray onto it.



8. Precisely cut out the spacer along the gingival margin using the scissors or the HSS twist drill (> 20 000 rev/min).

10. Embed the model so far into the high grade steel granules that the tooth alignment plus 10 mm protrude from the granules. Cover the granules with a cover template.

**11.** Thermoform and allow to cool down.

The fluoride tray passes the gingival margin with 6 - 8 mm, cut out accordingly with the scissors.



**13.** Pull off the insulating foil, in order to avoid deformations again and again follow up the splint.

**12.** If necessary, smooth the edges with Liskosil-I (10 000 rev/min).

Remove spacer out of Erkolen, in order to avoid deformations, again and again follow up the splint.

**14.** Finished fluoride tray out of Erkoflex-bleach, 1.0 mm.

Pay attention to the cleaning and maintenance instructions on page 34.

## Individual impression trays (functional trays), base plates (bite plates)

### Materials & Accessories

#### Fabrication:

- Recommendation for individual impression trays: Erkoplast PLA-W, white and Erkoplast PLA-T, transp., 3.0 mm (upper jaw), 4.0 mm (lower jaw)
- Recommendation for base plates: Erkoplast PLA-R, 1.5
- Erkoplast PLA-T, transparent, allows to recognize pressure areas at the tray.
- As spacer Erkopor black, 8 mm (110 901) for Erkopress- and 3 mm (110902) for Erkoform-units.
- PLA-handles (222 500 high/222 550 flat) out of plastic.
- Wax bite rims for bite plates (hard 75 63 00, medium 75 63 02, soft 75 63 03).

#### Model preparation:

- Erkogum (110 844) for blocking out and for covering the residual teeth, high-fusing wax (725 080) for filling bubbles in the plaster.

#### Finishing:

- Fissure bur, rightward cutting, left spiral (110 836), coarsely crosscut tungsten carbide bur (110 833) for grinding and Liskosil-I (223 240) or Lisko-B (223 300) for smoothing the edges. Liskosil-m (223 230) or Liskoid (223 205) for smoothing the areas around the PLA-handle.
- Erkogum (110 844) for blocking out and for covering the residual teeth, high-fusing wax (725 080) for filling bubbles in the plaster.

### Hints

- Model areas (exterior vestibulum, oral floor) which obstruct the thermoforming process have to be removed. Remove sharp plaster edges.
- Carefully block out residual teeth and undercuts.
- If stops are required, cut holes into the spacer (Erkopor black) in the area of the ridges (using punch pliers).
- If the models are placed into the granules, trimming the models is not necessary.
- The impression of the Erkopor black and the smoothing of the edges with Liskosil-I improves the retention for impression materials at the tray.
- Tray handles out of plastic reinforce the lower jaw tray when there is a flat ridge.

## Individual impression tray

Thermoforming material: Erkoplast PLA-W, white und Erkoplast PLA-T, transparent 3.0 mm (upper jaw), 4.0 mm (lower jaw)

**1.** Block out residual teeth and undercuts with Erkogum.

Recommendation: Embed the model so far into the high grade steel granules that the tooth alignment plus 3 mm protrude from the granules.



**3.** Place the Erkopor black spacer directly onto the model.



**2.** If the model is placed onto the model disc, put the black rubber spacing ring around the flat trimmed model base. For better removal put some Erkogum to the rubber ring.

**4.** Thermoform and allow to cool down.

Before finishing, the application of the PLA-handle during or after thermoforming will be shown.

**5.** The PLA-handle bonds reliably by heat with the tray material.

PLA-handle and ridge should roughly fit together ...



**6.** ... if necessary, adapt handle by heating with the hot air burner.

**7. Immediately** after adaptation press the PLA-handle ...



**8. ...** into the hot, plastic tray material.

**9.** Later application of the PLA-handle after the thermoforming process. For heating the thermoformed plate with the spacer have to be left on the model!



**10.** Heat with hot air burner and press the PLA-handle into the hot, plastic tray material.

**11.** Remove thermoformed plate and pull the spacer off.

Cut out the desired shape with a fissure bur, possibly mark it before.



**12.** Use the coarsely crosscut tungsten carbide bur (110 833), (> 15 000 rev/min) to work on the final shape and the edges.

Smooth the edges with Liskosil-I (10 000 rev/min).

**13.** Finished, individual impression tray with PLA-handle high.



Finished, individual impression tray with PLA-handle flat.

## Base plate (Bite plate)

Thermoforming material: Erkoplast PLA-R, rose, 1.5 mm

**14.** Procedure as described in step 1 - 4, however, without spacer.



Finishing as described in step 11 and 12.

**15.** Finished base plate (bite plate) with wax bite rim.

# Denture bases, interim dentures

## Materials & Accessories

### Fabrication:

- Erkocryl rose 2.0 mm or, if desired, also transparent 1.5/2.0/2.5 mm

### Model preparation:

- Erkogum (110 844) for blocking out and for covering the residual teeth, high-fusing wax (725 080) for filling bubbles in the plaster

### Finishing:

- Fissure bur, rightward cutting, left-spiral (110 836), crosscut tungsten carbide bur (110 837) for grinding and Liskosil-l (223 240) and Liskosil-m (223 230) or Lisko-S (223 200) for smoothing the edges.

## Hints

- Model areas (exterior vestibulum, oral floor) which obstruct the thermoforming process have to be removed. Remove sharp plaster edges.
- Carefully block out residual teeth and undercuts.
- Not predried Erkocryl has to be dried before thermoforming in order to avoid the generation of bubbles, see trouble shooting, page 33.
- Erkocryl bonds seamlessly with acrylic for temporary appliances, it can be relined, adjusted and polished like acrylic for temporary appliances.
- Ready-made teeth and clasps for the fabrication of **interim dentures** can be prepolymerised with autopolymerising resin.

**1.** Embed the model so far into the high grade steel granules that the tooth alignment plus 3 mm protrude from the granules. Thermoform Erkocryl.

Cut out with the fissure bur (> 20 000 rev/min) (see page 13, 11).



**2.** Smooth and prepolish the edges with Liskosil-l and -m.

The denture base out of Erkocryl bonds to cold and hot curing acrylic resins.

# Duplication moulds

## Materials & Accessories

### Fabrication:

- Erkoflex, 3.0 - 5.0 mm

### Model preparation:

- High-fusing wax (725 080) for filling bubbles in the plaster

## Hints

- The duplication with Erkoflex is not as precise as the duplication with duplicating compounds. But this very low-cost method is suitable for demonstration, training and planning models.

**1.** Trim the model flat, put it onto the model plate in the thermoforming unit and thermoform.

Allow to completely cool down.



**2.** Put the formed Erkoflex as shown onto a ring or a pot in a way that the negative has contact only at the outside.

Put in plaster while form is standing on the vibrating slab.

# Dressing plates

## Materials & Accessories

### Fabrication:

- Erkodur, 1.0 - 2.0 mm
- Erkocryl, 1.5 and 2.0 mm

### If required:

- For prepolymerisation of clasps: autopolymerising resin.
- For fabrication of the opposing bite imprint: Erkoform units serie 3/Occluform-3.
- For model insulation and shrinkage compensation thermoform the ex works applied insulating foil together with the desired plate, in doing so the insulating/shrinkage compensation foil has to show towards the model (Erkodur).

### Model preparation:

- Erkogum (110 844) for blocking out, high-fusing wax (725 080) for filling bubbles in the plaster.
- Erkoskin (625 050) to relieve the gingival margin.

### Finishing:

- Recommendation: Finishing set Quick 3 (110 830) with fissure bur, rightward cutting, left spiral (110 836) for rough cutting out, HSS-twist drill (110 876) to cut out the desired form, crosscut tungsten carbide bur (110 837 for fine grinding, Liskosil-l (223 240) to prepolish the edges, Liskosil-m (223 230) to prepolish narrow interdental spaces and Liskosil-s (223 220) for treatment of occlusal premature contacts and insides of splints.
- Polishing set (110 878)

## Hints

- The fabrication and finishing is equal to the one for stabilization splints, page 4 - 5.
- Model areas (exterior vestibulum, oral floor) which obstruct the thermoforming process have to be removed. Remove sharp plaster edges.
- For splints that pass the gingival margin this one should be relieved by application of one Erkoskin layer.

1. If necessary (see hints), apply Erkoskin on the gingival margin.

Embed the model so far into the high grade steel granules that the tooth alignment plus 3 mm protrude from the granules.

3. Cut in the thermoformed plate several times with the fissure bur (> 20 000 rev/min) for an easier removal of the model.

5. Thicker compression plates (2.0 mm) mostly have enough retention when covering only the palatal side of the teeth.



2. Thermoform.



4. Use the twist drill HSS without pressure (> 20 000 rev/min) to cut out the final shape.



6. Thin compression plates (1.0 and 1.5 mm) cover the tooth alignment scarcely beyond the vestibular border.

Pay attention to the cleaning and maintenance instructions on page 34.

# Casting objects, copings

## Materials & Accessories

### Fabrication:

- Erkolen, soft, 0.5/0.6/0.7/0.8 mm, with shrinkage compensation foil 0.1 mm applied ex works
- Erkodur, hard, 0.5/0.6/0.8 mm, with shrinkage compensation foil 0.05 mm applied ex works
- Possibly, UZF-Cast spacer foil red, 0.1 mm or brown 0.15 mm
- Erkopor black foam rubber discs (110 901) • granules, fine (110 861) • die disc for 7 dies (188 029)

### Model preparation:

- High-fusing wax (725 080) for filling bubbles in the plaster, die spacer

### Finishing:

- HSS twist drill (110 876), scalpel

## Hints

- The applied spacer foils compensate shrinkage of the foils which arises during the cooling procedure. Additional space for cement needs to be created extra (die-spacer).
- For dies with pins the die model disc is used, Erkopor black serves for better ventilation and helps to avoid creases in the material.
- Some pin and model systems do not fit into the holes of the die model disc. These dies are embedded into the fine granules. The distance between the dies should be at least 2 mm and the margin should be at least 5 mm above the level of the granules.
- Scalpels, rolling knives or scissors crush the material when cutting. This can lead to deformations. Recommendation: cut out along a marked line with the HSS twist drill.
- The perforation of the possibly used UZF-Cast spacer foil avoids air bubbles between the foils.
- It is controversial whether the extension of the copings should be until the preparation limit or shorter, therefore we do not give any recommendation.

**1.** The die model disc has 7 holes filled with silicone mass to put the pins in.

If this is not possible ...



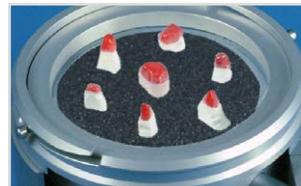
**2.** ... the dies are put into granules (granules, fine 110 861). Compress the granules well to avoid holes in the foils and to avoid that the dies sink during thermoforming.

**3.** Only die model disc: Put the dies through the Erkopor black disc into the silicone mass.



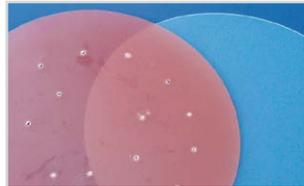
**4.** Ensure that the dies are put in a vertical position. Oblique dies with undercuts may cause creases.

**5.** Erkodur and Erkolen are ex works provided with a shrinkage compensation foil.



**6.** Thermoform, allow to cool down and continue at step 9.

**7.** Foils without shrinkage compensation foil: Perforate the UZF-Cast spacer foil several times between the dies using a scalpel or a needle.



**8.** ... insert both foils into the foil frame and thermoform. After thermoforming it does not matter if there is air between the foils. Here Erkolen with UZF-Cast red.

With the spacer foil towards the dies ...

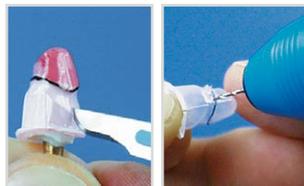
**9.** Remove the Erkopor black foam rubber disc cautiously. The Erkopor black is reusable.



**10.** Cut out the dies. Mark the preparation limit ...

**11.** ... cut several times with the scalpel nearly up to the preparation limit and remove the copings.

Cut out the final form with the HSS twist drill.



**12.** Finished coping (see last point of the hints).

# Planning-, drilling-, and X-ray templates, orientation splints

## Materials & Accessories

### Fabrication:

- Erkodur, 1.0 - 5.0 mm
- Autopolymerising acrylic to polymerise the drilling tubes
- Alginate based insulation for model insulation

### Model preparation:

- If necessary, parallelometer to mark the prosthetic equator.
- Erkogum (110 844) for blocking out, high-fusing wax (725 080) for filling bubbles in the plaster.

### Finishing:

- Recommendation: Finishing set Quick 3 (110 830) with fissure bur, rightward cutting, left spiral (110 836) for rough cutting out, HSS-twist drill (110 876) to cut out the desired form, crosscut tungsten carbide bur (110 837 for fine grinding, Liskosil-l (223 240) to prepolish the edges and Liskosil-m (223 230) to prepolish narrow interdental spaces and Liskosil-s (223 220) for treatment of occlusal premature contacts and insides of splints.
- Polishing set (110 878) to polish.

## Hints

- Areas of the model (exterior vestibulum, oral floor) that obstruct the adaptation have to be removed. Remove sharp plaster edges.
- In order to avoid the creation of tension cracks brush the area that has to be built up with autopolymerising acrylic with little monomer before the splint is cut out or taken off the model.
- Finishing and thermoforming as described in page 4 and 5, stabilization splints etc.

## Drilling template

Thermoforming material: Erkodur, 2.0 mm

**1.** Place ready-made teeth onto the edentulous space. Duplicate the model. Embed the duplicate into the granules according to the size of the desired splint and thermoform, see page 4.



**2.** In this case, finish according to the illustration as described on page 4 and 5.

**3.** Cut out the space for the drilling tubes (or balls) as shown on the picture, the complete incisal and palatal part of the respective frontal teeth.



**4.** Apply the autopolymerising acrylic on the adjustable area using only little monomer.

Fill the desired free area between the splint and the mucosa with Erkogum.

**5.** Place the drilling tubes into the Erkogum material. For the alignment customary devices can be used.



**6.** It is necessary that Erkogum seals the area that will be filled with acrylate, if necessary, add Erkogum. Now fill in the acrylate and polymerise in a polymerisation unit.

**7.** Finished drilling template.



Pay attention to the cleaning, maintenance and sterilisation instructions on page 34.

## X-ray template

Thermoforming material: Erkodur, 1.5 mm

**9.** Thermoforming and finishing as described on page 4 - 5.

Fix balls or similar with quick-acting glue onto the desired position at the model.



**10.** Thermoform over the balls. This way the balls are firmly integrated in the splint.

Finish as described on page 4 - 5.

# Bracket transfer splints, etching masks for bracket transfer

## Materials & Accessories

### Fabrication:

Bracket transfer splints:

- Erkoflex, transparent, 1.5 or 2.0 mm, soft, flexible material
- Erkodur, clear, 1.0 mm, hard material
- water soluble adhesive for brackets (also commercial water soluble universal adhesive without solvents)
- Alginate based insulation

Etching masks for bracket transfer:

- Erkolen, 0.8 - 1.0 mm, only recommended when using a pressure forming unit (Erkopress)

### Model preparation:

- High-fusing wax (725 080) for filling bubbles in the plaster

### Finishing:

- Special scissors XL (220 301) for cutting out the desired shape, Liskosil-I (223 240) or Lisko-S (223 200) for smoothing the edges

## Hints

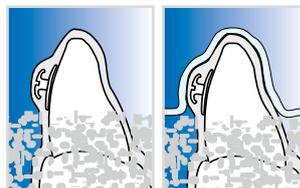
- Areas of the model (exterior vestibulum, oral floor) that obstruct the adaptation have to be removed. Remove sharp plaster edges.
- The Erkoflex-types have a very high memory, they bound to original shape.
- **Remove the ex works applied insulating foil before thermoforming**, (attention: changed heating time resp. thermoforming temperature for Erkoflex), insulate the models after glueing the brackets.
- When producing **bracket transfer/etching masks**, the places where the brackets should be glued (bracket base) are cut out with a scalpel. The etching agent will be applied through these holes and then the brackets will be glued on.

### 1. Bracket transfer splints:

Glue brackets with water-soluble adhesive onto the model). If the model has a flat trimmed base, it can be placed onto the model disc ...



3. ... cut the plate in and cut it out vestibularly and palatally / lingually at about 3-4 mm below the teeth. Because of the flexibility of the material the scissors can thereby be pushed underneath the material.



2. ... for thermoforming, otherwise embed the model that way into the granules that the tooth alignment plus app. 7 mm are visible. Do not remove the Erkoflex foil from the model ...

5. Cut the Erkodur foil out with the HSS twist drill (110 876) directly underneath the brackets.



4. Embed the model to the lower edge of the brackets into the granules and thermoform a foil Erkodur 1.0 mm.

7. Take the foils off, separate them and shorten the Erkodur foil up to the middle of the brackets. If after the plates have been taken off still adhesive residues are visible again water Erkoflex with the brackets.



6. Water the model with the foils for at least half an hour. If afterwards the foils still cannot be taken off, do not use strong power but water again.

9. With the Erkoflex foil the brackets will be put in place in the patient's mouth using a glue. Then the Erkodur will be put on for exact positioning and adhesion.



8. If necessary, remove adhesive residues with a brush.

### 1. Etching mask for bracket transfer:

Glue the brackets with water soluble adhesive onto the model. Thermoform Erkolen 0.8 - 1.0 mm. Shorten Erkolen to the model.



2. Afterwards cut out the bracket base with a scalpel. Water the model for at least 30 min. and take the brackets off the model. Through the windows that are created this way in the foil the tooth will be etched and the brackets afterwards be glued on.

# Aligner/correction splints and retainer

## Materials & Accessories

### Fabrication:

- Erkodur-al, hard, 0.6 - 1.0 mm
- Erkoloc-pro, hard/soft, 1.0 and 1.3 mm
- Erkodur, hard, 0.5 - 1.0 mm (0.5 - 1.0 mm aligner/correction splints/ 0.6 - 1.0 mm retainer/0.6 and 0.8 mm Essix retainer)
- Pliers to camber correction splints

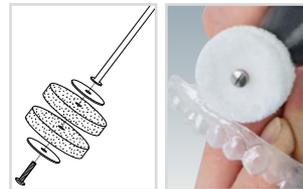
### Finishing:

- Take-off pliers (110 880) to lift splints from the model, HSS-twist drill (110 876) or Special scissors XL (220 301) for cutting out the desired shape, Liskosil-I (223 240) for prepolishing, Liskosil-m (223 230) for narrow areas Liskosil-s (223 220) for occlusal interferences and inner surfaces of a splint.
- Two times Lisko white (223 100) for smoothing the edges of the aligners.

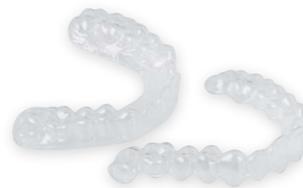
**1. Aligner:** Place print models centrally onto the model disc and thermoform according to the unit instructions with e.g. Erkodur/Erkodur-al 1.0 mm.



**3.** Recommendation for cutting out: The scissors if the final shape of the aligner shall have a rather straight line at the gingiva. The HSS twist drill if the final shape shall follow the gingival margin.



**5.** Smooth borders that follow the gingival margin especially in the interdental areas with Liskosil-m or -s. Latest now remove the insulating foil.



**2.** Lift the foil if necessary using the take-off pliers from the model and roughly cut with the special scissors XL (220 301). Then cut out the final shape of the aligner with the scissors or with the HSS twist drill (> 20 000 rev/min).

**4.** Splint borders with a rather straight line shall be smoothed best with Lisko polishing discs, fine, white (10 000 rev/min). Therefore 2 Lisko white discs are mounted on a mandrel with the supporting discs.

**6.** Finished retainer.

Pay attention to the cleaning and maintenance instructions on page 34.

**1. Correction splint:** The teeth that have to be moved are blocked out in direction of the movement (Erkogum or high-fusing wax). Thermoform Erkodur/Erkodur-al 1.0 mm with insulating foil, finish.



**2.** To create an impulse for movement, camber the splint with the pliers at the appropriate part. Neither Erkodur nor the pliers have to be heated for cambering.

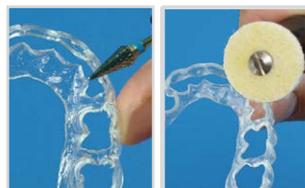
## Hints

- There are many ways of fabricating a retainer, here is only a small selection. Most can be fabricated with the thermoforming technique and correspond mostly to stabilization splints. Example, a retainer that does not have a negative effect on the occlusion (Erkodur 1.5 mm).
- With the help of the Occluform it is possible to imprint the opposing bite in Erkoform units during thermoforming. Proceeding very fast this is even possible from material thicknesses of 0.8 mm and more. Such retainers will not interfere the occlusion negatively.

**1. Retainer:** Mark the dimensions of the retainer. Before, determine in the articulator where the bars between the vestibular and palatal area can be placed without interfering with the occlusion.



**3.** Finish the edges with the tungsten carbide bur (if clasps are included: Attention, the tungsten carbide bur may damage the clasps).



Smooth the edges with Liskosil-I and -m (10 000 rev/min).

**5.** Finished retainer with bars out of wire that does not have a negative effect on the occlusion.



**2.** Cut out the splint, the occlusal surfaces and the bars using the HSS twist drill without pressure (> 20 000 rev/min).

**4.** Finished retainer with bars out of thermoforming material, not influencing the occlusion.

Pay attention to the cleaning and maintenance instructions on page 34.

**6.** The Essix retainer is a thin splint reduced to the frontal area. The fabrication is analogical to the fabrication of stabilization splints.

# Expansion-, orthodontic- and retention plates

## Materials & Accessories

### Fabrication:

- Erkocryl, clear, 2.0 and 2.5 mm or coloured on request
- Autopolymerizing resin to polymerise clasps

### Model preparation:

- Erkogum (110 844) for blocking out, high-fusing wax (transparent 725 080/lilac 725 055) for filling bubbles in the plaster, alginate for model insulation.

### Finishing:

- Recommendation: Finishing set Quick 3 with: fissure bur, rightward cutting, left spiral (110 836) for cutting out the desired shape, crosscut tungsten carbide bur (110 837) for grinding, HSS twist drill (110 876) to uncover the clasps. Liskosil-I (223 240) or Lisko-S (223 200) for smoothing the edges and Liskosil-m (223 230) or Liskoid (223 205) for polishing the interdental spaces.

## Hints

- The model has to be well degreased with alginate for model insulation, only then the autopolymer can polymerise transparently and free of bubbles in the pressure forming unit (Erkopress).
- The HSS twist drill does not damage the clasps. Use the HSS twist drill without any pressure (> 20.000 rev/min).

**1.** At first bend the clasps and mill a slot into the model to position the expansion screw.

Well insulate the model.

**3.** Fix the clasps onto the buccal surfaces with sticky wax.

**5.** Warm the Erkocryl plate in the thermoforming unit. During this the model is embedded into the granules. The palatal area remains visible and the granules should cover the vestibular area to the occlusal border.

**7.** To ensure the complete polymerisation of the acrylic, leave under pressure for at least 5 minutes. Then remove the plate from the model. The model will break in most cases.

**9.** Separate the plate using the HSS twist drill. The material can also be sawed or worked with a separating disc.

**11.** Smooth the edges with Liskosil-I and -m (app. 10 000 rev/min). Erkocryl can be polished in the common manner.



**2.** Cut the holding part of the expansion screw and put the screw into the slot milled into the model.

**4.** For easier removal and finishing cover the occlusal and vestibular surfaces of the teeth with Erkogum.

**5-7.** Thermoform in the pressure forming unit (Erkopress).

**6.** Shortly before thermoforming (20 sec.) apply a few drops of autopolymerizing resin onto the retention areas of the clasps and the expansion screw. Afterwards thermoform.

**8.** Roughly cut out the plate with the fissure bur. The HSS twist drill is used for fine cutting out and for uncovering the clasps.

**10.** Finish the edges with the tungsten carbide bur (attention in the area of the clasps, the tungsten carbide bur may damage the clasps).

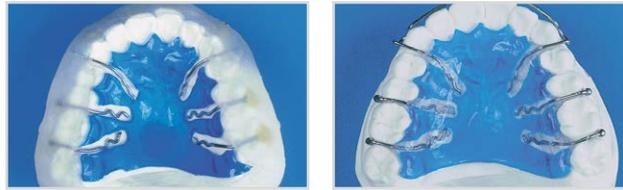
**12.** Finished expansion plate out of Erkocryl, transparent 2.0 mm.

Pay attention to the cleaning and maintenance instructions on page 34.

**13.** Fabrication of a retention plate in a vacuum forming unit (Erkoform units). In addition to the preparation in step 4 a thick layer of Erkoskin (625 050) will be applied onto the retention ends of the clasps.



**15.** Finish the plate and use the fissure bur to cut the imprints of the clasps free. Reput the plate onto the model and fill the free spaces around the end of the clasps with autopolymerizing resin.



**14.** Embed as shown on the picture in step 13 and thermoform.

Because of the Erkoskin the plate can be easily removed without clasps and their positions are clearly imprinted.

**16.** The polymerisation can be done classically in a polymerisation pot.

Finished retention plate out of Erkocryl, blue, 2.0 mm.

## Positioners

### Materials & Accessories

#### Fabrication:

- Erkoflex transparent or coloured, 3.0 - 5.0 mm
- Cover templates (110 900), degreasing agent (613 050), Erkoflexsticks-82 (177 005) with commercially available fusing gun  $\geq 500$  W with screw-top (special top for fusing gun 177 010), hot-air burner (177 540)

#### Model preparation:

- High-fusing wax (725 080) for filling bubbles in the plaster and for fixing the set-up model if no duplicate is used.

#### Finishing:

- Special scissors XL (220 301) • FG-sheets (177 400) • Tungsten carbide bur (110 837)
- Liskosil-I (223 240) or Lisko-S (223 200) • Liskosil-m (223 230) or Liskoid (223 205)
- Hot-air burner (177 540)

### Hints

- Areas of the model (exterior vestibulum, oral floor) that obstruct the adaptation have to be removed. Remove sharp plaster edges.
- Normally the desired spacing of the positioner is smaller than the spacing that results after thermoforming in the molar area. Therefore the combination of upper and lower splint by heat is normally possible. This method has optical advantages compared to bonding the two splints with the fusing gun.

**1.** Embed the model that way into the granules that the tooth alignment plus app. 7 mm are visible. Cover the granules with a cover template.



**2.** Always thermoform the plate together with the ex works applied insulating foil and allow to cool down.

**3.** Cut the splint with the special scissors to the requested length.



**4.** Use the tungsten carbide bur ( $> 20\ 000$  rev/min) to roughly grind the edges.

**5.** Smooth with Liskosil-I (10 000 rev/min).



**6.** Pull the insulating foil off.

**7.** Produce a splint for the other jaw in the same manner.



**8.** In the articulator the splints normally touch in the molar area. Remove on both sides that much material that only 1 - 2 mm are missing to the desired spacing.

Place the models in the articulator and adjust the desired spacing at the supporting pin.

**9.** Remove the material equally on both sides in the occlusal area. If a lot of material has to be removed, the tungsten carbide bur has to be used.



**11.** Warm only the occlusal area of both splints with the hot-air burner. Do not remain on one spot too long.



**13.** Open areas and areas that do not have enough material can be filled with Erkoflexsticks-82 (original Erkoflex) and a fusing gun.



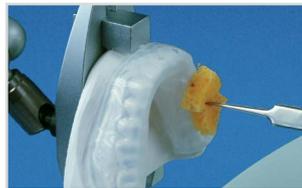
**15.** If the positioner should have a high elevation, both splints can be bonded by application of Erkoflexsticks-82 material.



**17.** Bonding of the upper and lower jaw splints in the **Occluform**: Procedure as described in step 1 - 4. Only one splint will be fabricated. Grind the splint thin especially in the molar area (Liskosil-I).



**19.** Articulate the models according to the construction bite, arrest the Occluform, open it and put the splint onto the model.



Degrease splint and the foil next to thermoform with degreasing agent.

**21.** ... press on until the supporting pin gets contact and allow to cool down.



**10.** Degrease the occlusal surface of both splints with degreasing agent.

**12.** Press both heated splints rapidly until it stops together. The combination can no longer be separated.

**14.** The stick material and the positioner can be smoothed with Liskosil-I and polished with the hot-air burner. The hot surface can be polished by shortly pressing a FG-sheet onto it (page 24, 16).

**16.** Finished positioner out of Erkoflex, 4.0 mm.

Pay attention to the cleaning and maintenance instructions on page 34.

**18.** How much material has to be removed depends on the desired bite elevation. Fix this model without splint in the upper model plate.

**20.** Now thermoform an Erkoflex plate onto the model in the model pot and close the Occluform and ...

**22.** Both splints bond safely to a monobloc. Finish as described in step 13 and 14.

# Sports mouthguard

## Materials & Accessories

### Fabrication:

- Erkoflex, flexible, transparent and coloured, 2.0 and 4.0 mm
- Erkodur-S, hard, 0.8 mm as hard insert for sports mouthguard heavy-pro and light-pro
- Degreasing agent (613 050)
- Alginate based insulation
- Commercially available fusing gun,  $\geq 500$  W with screw-top (special top for fusing gun 177 010)
- Erkoflexsticks-95/-82 (177 006/177 005)
- Cover templates (110 900)

### Model preparation:

- Erkogum (110 844) for blocking out, high-fusing wax (725 080) for filling bubbles in the plaster.

### Finishing:

- Finishing set Quick 3 (110 830)
- Special scissors XL (220 301)
- Hot air burner (177 540)
- FG sheets (177 400)

## Hints

- For an optimum mouthguard the upper jaw model should represent the vestibulum completely.
- For determining the bite situation, ideally a construction bite (prebite Dott. Pelosi up, 85 10 16) with a spacing of 4 - 5 mm should be available.
- If the model is insulated, the insulating material must be washed off before using the hot-air burner in order to avoid black stains.
- If Erkoflex transparent shall be used as second layer, remove the insulating foil before thermoforming.
- With **Playsafe 4u** almost each favorite design on all Playsafe triple types and on Erkoflex based sports-mouthguards is possible ([www.erkodent.com](http://www.erkodent.com)).

## Sport mouthguard types:

### light:

Erkoflex 2.0 mm + Erkoflex 2.0 mm

### medium:

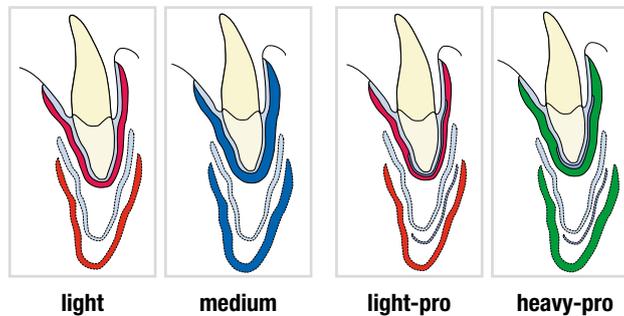
Erkoflex 2.0 mm + Erkoflex 4.0 mm

### light-pro:

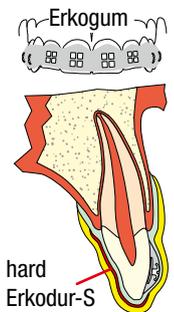
Erkoflex 2.0 mm + Erkodur-S 0.8 mm + Erkoflex 2.0 mm

### heavy-pro:

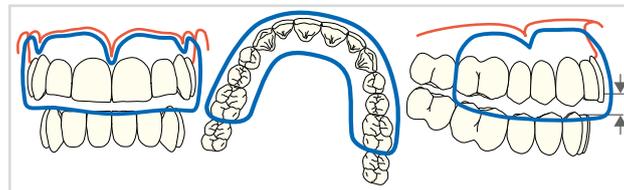
Erkoflex 2.0 mm + Erkodur-S 0.8 mm + Erkoflex 4.0 mm



Heavy-pro can for a short period of wear also be fabricated for patients with brackets. Impression without wiring, block out bracket and wire area with Erkogum.



A multi-layered sports-mouthguard is always fabricated for the upper jaw. To protect the root zone, it covers as much as possible of the vestibulum.



The sports-mouthguard covers the first molar.

The increase of occlusion is 4 - 5 mm at the incisal point. In most cases the blockage is done on average values.

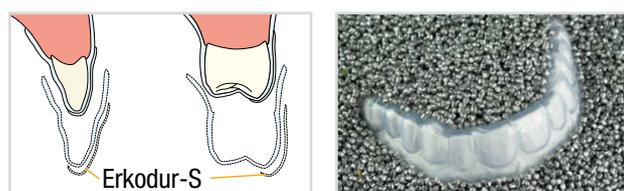
**1.** Model preparation: Fill plaster bubbles with blocking out wax. Block out undercuts of a possible gap (special case) with Erkogum.

**2.** Embed the model in a way that the entire vestibulum remains visible.

**4.** Special case: On the first layer the gap is filled with Erkoflexsticks-95/-82 (fusing gun). Smooth applied stick material with Liskosil-I.

**6. - 11. only light-pro / heavy-pro:** The hard Erkodur-S (0.8 mm) completely covers the vestibular area and just barely the incisal edge and the vestibular/buccal edge.

**8.** Degrease visible area (degreasing agent 613 050, ensures a reliable bond of the layers).



**3.** Always thermoform the first layer (Erkoflex 2.0 mm) together with the ex works applied insulating foil and allow to cool down. Cut out with special scissors, leaving the first layer a little bit larger than the final mouthguard.

**5.** Do not attach type labels near to the fraenulums. The labels are readable from the inside. For a transparent sport mouthguard there are labels available that are readable from the outside.

**7.** Embed model with the first layer into the granules, only the area of the later hard Erkodur-S layer plus 2 mm remain visible.

**9. \*** Position of the hard layer at patients with vestibular brackets.

Additionally degrease the side of the Erkodur-S that has to be applied onto the first layer and thermoform.

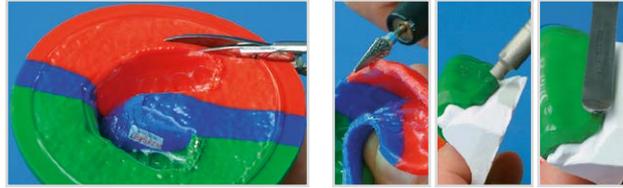
**10.** Take the foil compound off the model and roughly cut out with the scissors.



**12. Without Occluform/-3:** ... embed the model (2) and apply a cover template. Degrease well the first layer(s) and the model side of the second plate. Pay attention to the alignment of model and multi-coloured plates.



**14.** Cut out the mouthguard with special scissors as per the extensions described formerly, exposing the area around the fraenulums well.



**16.** ... in case of larger air pockets press on with a FG-sheet.

Smooth with Liskosil-I and narrow spaces with Liskosil-m (10 000 rev/min). Inner side only with Liskosil-s.



**18. Imprint opposing bite in the articulator:**

Fix model with the worked mouth-guard in the articulator. Block 4 - 5 mm with the supporting pin. Insulate (alginate) opposing bite (lower jaw teeth).



**20.** Make imprint of the opposing bite and allow to cool down.



**22.** Finished sports-mouthguard.

Pay attention to the cleaning and maintenance instructions on page 34.



**24. With Occluform-3:** Imprint the opposing bite during thermoforming: \*

Fix the model in the model pot that high that the first layer can be put back onto the model.

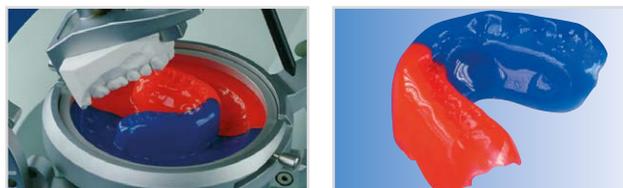


**26.** Insulate the opposing bite (alginate based insulation). Cover the granules with a cover template. Degrease well the first layer and the model side of the second layer.



**28.** After cooling down open the Occluform and take out the model together with the model pot.

\* The imprint can also be made using the bite spacer according to the Playsafe triple instructions.



**11.** First with the tungsten carbide bur, then with Liskosil-I grind and smooth the hard protruding edge.

The limitation of Erkodur-S is visible as a line. Reput the first layer onto the model and ...

**13.** Take the foil off the model, then firstly remove the cover template, secondly the insulating foil.

**15.** Roughly work out with the tungsten carbide bur (> 20 000 rev/min) and repute the mouthguard onto the model. Heat the cut-open air pockets with the hot-air burner and seal with the blunt end of a wax knife or ...

**17.** Reput onto the model and shine with the hot-air burner, thereby do not remain for too long in one position. The hot surface can be smoothed and polished by shortly pressing on the FG-sheet.

**19.** Heat occlusal surface of the mouth-guard. Thereby stroke the hot-air burner slowly about 20 times over the occlusal surface.

**21.** For a much better wearing comfort grind away the details of the impression with Liskosil-I whilst retaining a vestibular wall. Heat occlusal surface one more time and close the articulator.

**23.** With Playsafe 4 u almost each favorite design on all sport mouthguard types is possible ([www.erkodent.com](http://www.erkodent.com)). On page 26, 12.-15. the application at the sports mouthguard will be described.

**25.** Articulate the models with a construction bite in the Occluform or, like shown here, at average values\* by lifting the supporting pin at 3 - 4 scale-lines and arrest the joint.

\*only Occluform-3

**27.** Thermoform the second foil and immediately close the Occluform until the supporting pin gets contact.

**29.** Finish as described in step 13 - 17. Finished sports mouthguard.

Pay attention to the cleaning and maintenance instructions on page 34.

# PLAYSAFE® triple-light sports mouthguard

## Materials & Accessories

### Fabrication:

- Playsafe triple (-light) start set 177 810 (177 850): 1 Playsafe triple (-light) set, transparent, 1 Playsafe bite spacer, 1 Playsafe face chuck
- 1 Playsafe triple (-light) set 177 820 (177 860): 1 Playsafe triple (-light) foil (colour has to be indicated), 1 label, 1 Erkobox, 1 sample FG-sheet, instructions
- 5 Playsafe triple (-light) foils 177 825 (177 865), colour has to be indicated, 5 labels

### Model preparation:

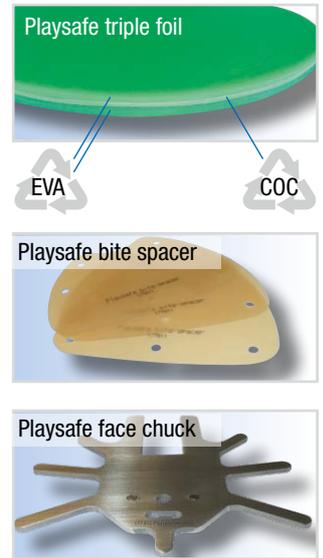
- Erkogum (110 844) for blocking-out, high-fusing wax (725 080) to fill bubbles in the plaster

### Finishing:

- Finishing set Quick 3 (110 830) • Special scissors XL (220 301) • Hot air burner (177 540) • FG sheets (177 400)

## Hints

- For an optimal mouthguard, the upper jaw model should represent the entire vestibule.
- To determine the bite proportions there is ideally a construction bite available with a spacing of 3 - 4 mm (2 - 3 mm, triple light).
- The easiest and quickest way to fabricate a Playsafe triple is with the **Erkoform** units as of **serie 3** with **Occluform-3**.
- With some additional efforts the fabrication is also possible with the **Erkpress** units.
- With **Playsafe 4u** almost each favorite design on all Playsafe triple types and on Erkoflex based sports-mouthguards is possible ([www.erkodent.com](http://www.erkodent.com)).



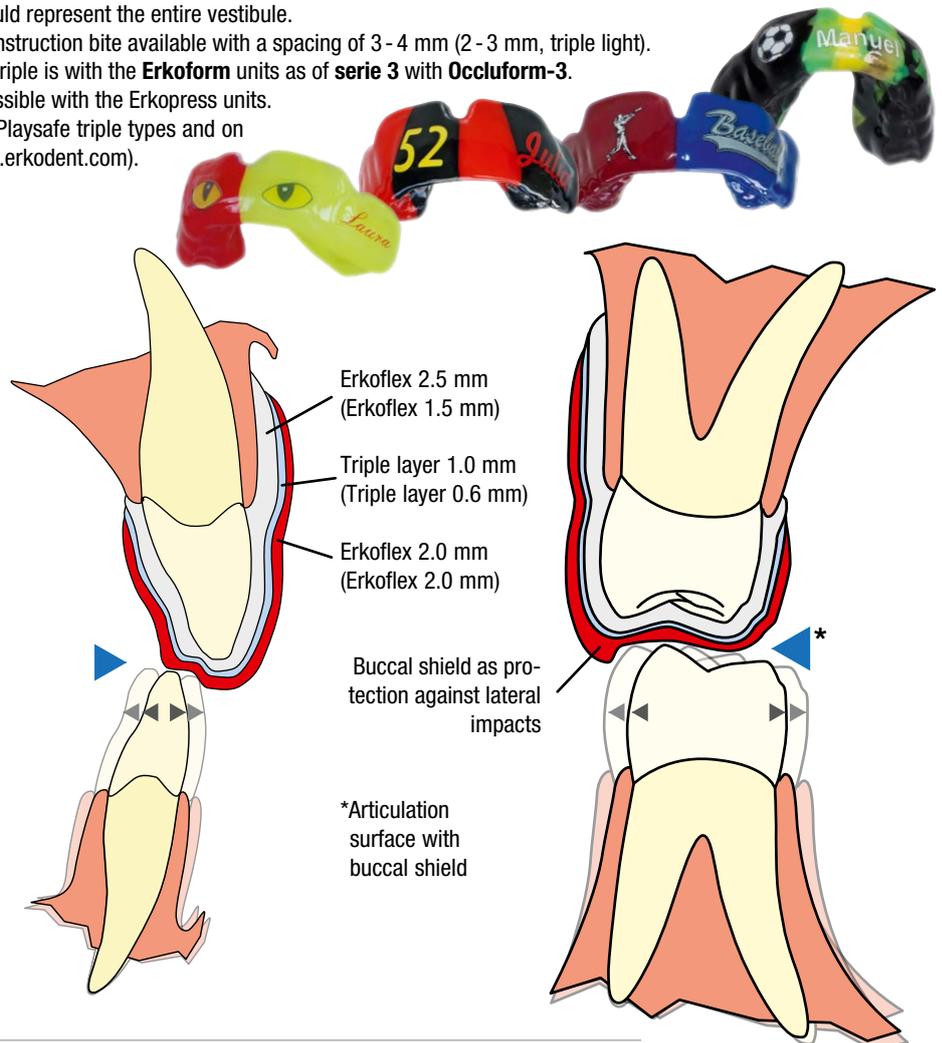
## Playsafe triple (-light):

The better protective effect of laminated sports mouthguards in comparison to single-layered mouthguards is sufficiently known. However, the fabrication of laminated sports-mouthguards is much more complex.

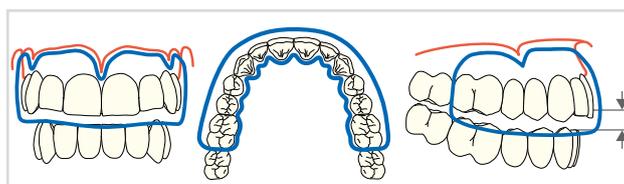
A Playsafe triple can be fabricated in about the same time as a single-layered sports-mouthguard but provides at least the same protective effect at smaller proportions than the laminated top version heavy-pro.

The Playsafe triple plate is already three-layered, inside and outside soft and in between hard. Thermoform once and imprint the articulation surface in a tricky way, allow to cool off and elaborate, if desired, also apply the label, finished.

The surface that allows movement for the athlete automatically shows a lateral stop (buccal shield) by the imprinting. This can absorb lateral impacts.



A Playsafe triple sports-mouthguard is always fabricated for the upper jaw. It covers as much as possible of the vestibule and ends palatally about 1 mm in the gingival area.



The Playsafe triple includes the first molar. Depending on the bite proportion the bite-lifting is 3 - 4 mm (2 - 3 mm, triple light) at the incisal point. Mostly it has to be lifted at average values.

Model preparation: Fill plaster bubbles with blocking out wax. Block-out undercuts of a possibly existing gap (special case) with Erkogum.



Trim the lower jaw model near to the teeth row. The lower jaw model can be used even if only half of the tooth height is represented.

# Fabrication with the Erkoform units as of serie 3 \* and Occluform-3

\* if required program the Playsafe triple foil information (see foil packaging) as new foil.

1. Fix the upper jaw model in the Occluform-3 model pot, the vestibule has to protrude from the edge of the pot. Fill the pot with granules, shake the pot to ensure that the granules will get underneath the model as well.

3. ... only for the fabrication way shown here block the lower joint. This leads to more free moving space of the lower jaw on the articulation surface.

5. Clamp the Playsafe triple foil into the foil reception, the isolating foil showing towards the model.

7. Thermoform, do not close the Occluform-3 yet. **Wait for one minute of the cooling time** (9:00 on the display) **and only then close the Occluform-3 until the supporting pin gets contact!**

9. Lift the foil reception, loosen the foil securing ring and remove the foil together with the model pot through the foil reception. Loosen model and remove it.

11. Cut out the Playsafe triple (light) with the fissure bur and grind it with the tungsten carbide bur. Smooth with Liskosil-I resp. at narrow spaces with Liskosil-m/-s.

13. The name can also be ordered at **Playsafe 4 u** in design letters. (Or write the name on paper (or similar) and fix it with quick-acting glue that way that the writing shows towards the printed side of the label.)

15. If necessary, heat the edge of the label again and press it on with the FG sheet. Allow to cool down and smooth it with Liskosil-I or -m (10 000 rev/min). Take it off the model and remove the isolating foil.



2. Put the Playsafe face chuck into the upper model disc and fix the lower jaw model onto it.

Recommendation for the adjustment of the Occluform-3 in deep bites: ...

4. Occlude the models in the Occluform-3 in the final bite position or with a construction bite. If working with-out construction bite lift the bite for 3-4 (2-3, triple light) scale marks. Open the Occluform-3.

6. While the foil gets heated clip the Playsafe bite spacer onto the face chuck as shown.

8. Before opening the Occluform-3 again, wait the **entire** cooling time.

10. Best take the foil with the take-off pliers (110 880) off the model.

12. Reput the sports-mouthguard on the model and fix the label. Also **Playsafe 4 u** favorite design will be applied in the same way. Perhaps provide the label with the name of the athlete.

14. Heat the label area with the hot air burner (respectively first practice with a leftover foil) and put the label on top, **attention**, it cannot be removed anymore. Press on the label with the FG sheet.

16. Break and smooth the vestibular inner edge (Liskosil-I or -m and -s).

Put it back onto the model and shine the Playsafe triple with the hot air burner, finished.

## Fabrication with the Erkoopress units

Thermoform the Playsafe triple foil with the entire vestibule. Best take the foil off the model with the take-off pliers (110 880) and finish it (see 10., 11. and 12.).

2. Clamp in the Playsafe bite spacer. Properly heat the occlusal surface of the Playsafe triple with the hot air burner (stroke the hot-air burner slowly about 40 times! at a short distance over the occlusal surface).



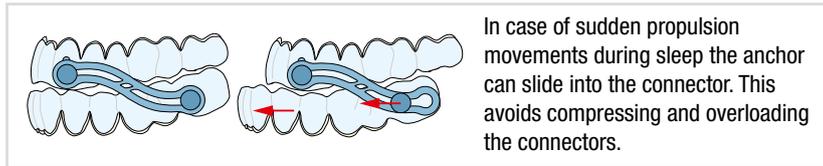
1. Fix the models with plaster into an articulator, in doing so insert 7 suitable clamping pins (e.g. old drill shafts) underneath the lower jaw model into the still soft plaster.

3. Block the bite at about 3-4 mm (2-3 mm, triple light) and imprint the articulation surface.

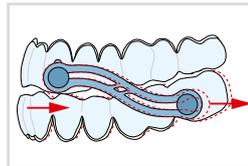
All further working steps as described above.

# Silensor-sl

Please find a video showing the fabrication under: [www.erkodent.com](http://www.erkodent.com) > Service/Download > Videos



In case of sudden propulsion movements during sleep the anchor can slide into the connector. This avoids compressing and overloading the connectors.



The light flexing of the double-S shaped connectors improves the wearing comfort and reduces load in the connecting area of all parts.

## Materials & Accessories

### Fabrication:

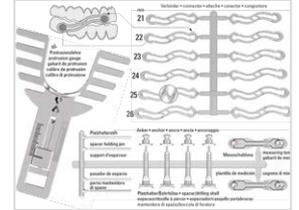
- Silensor-sl Set (59 60 11, foil Ø 120 mm, EN) or single components.
- Erkodur/ *freeze*, 2.5 mm, hard, necessary for the fabrication of the lower jaw splint in case of poor retention.
- Erkoloc-pro/ *blu/green/pink*, 3.0 mm, soft/hard, 2-layered, high wearing comfort, can always be used for the upper jaw and for the lower jaw only in case of enough retention. • If available, construction bite with the sl-protrusion-gauge.
- Aton-Lab 80 (410 700, 2 x 400 ml) for the working steps **16-19** page 28.

### Model preparation:

- Erkogum lilac (110 847) for blocking out, high-fusing wax (725 055 lilac) for filling bubbles in the plaster, Erkoskin (625 050) to relieve the gingival margin.

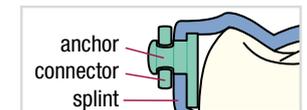
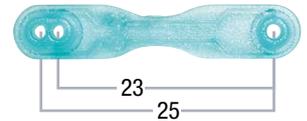
### Finishing:

- Finishing set Quick 3 (110 830) with: Fissure bur for rough cutting out (110 836), HSS-twist drill to cut out the desired form (110 876), cross-cut tungsten carbide bur for fine grinding (110 837), Liskosil-l (223 240) for prepolishing, Liskosil-m (223 230) for interdental areas, Liskosil-s (223 220) for treatment of occlusal premature contacts and inside of a splint. • Polishing set (110 878) to polish hard thermoforming materials.



## Important hints

- The **most** far-reaching consequences of all lower jaw protrusion splints, thus also of the Silensor-sl, is tooth migration. It is therefore mandatory to integrate all existing teeth in the splints. It is recommended to keep a duplicate of the initial situation to counteract, if necessary, a possible tooth migration with a simple correction splint.
- If a construction bite with the sl-protrusion-gauge is available, the models will be articulated with it, otherwise in the final bite position.
- The Silensor-sl can be fabricated in normal bite position or as in most cases with protruded lower jaw. The results of the questionnaire (Silensor-sl flyer) will help in finding a solution.
- The measuring template can be used with 23 or 25 mm length. The length of 25 mm should be preferred as in this case longer connectors with a better wearing comfort can be used. Only in case of very small jaws the 23 mm length is used for measuring.
- If a construction bite with the sl-protrusion-gauge is available, it is measured with 25 mm and the 25 mm long connectors are used. If the patient, after a construction bite, still cannot tolerate the advancement, then the 26 mm connectors can be put in. Without construction bite it is measured in the normal bite position with 25 mm and the 24 mm long connectors are used. (If 23 mm are used for measuring, the connectors with 22 mm length are attached.)
- The ready-made Silensor-sl shall offer balance contact points. If this is not possible by grinding, it should be adjusted by addition with autopolymerising resin.
- The connectors are easily exchangeable, for example if more protrusion is required for a sufficient effect.



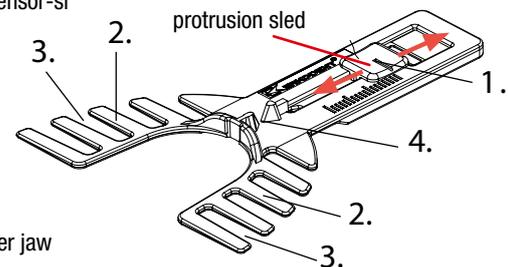
**sl-protrusion gauge** allows a simple registration on the patient of the lower jaw protrusion for the Silensor-sl

### Recommendation for mandibular advancement splints:

The advancement of the lower jaw shall correspond to the half of the maximum protrusion achievable by the patient. Or an already known effective advancement will be adjusted.

The features of the sl-protrusion-gauge:

1. protrusion sled
2. elastic registration areas
3. conical registration retentions
4. frontal teeth bite area for upper and lower jaw



1. Insert the sl-protrusion-gauge. Watch the centre of the frontal teeth.
  2. Mark the habitual bite situation. Push the lower jaw forward to the maximum without ...
  3. ... lateral deviations. Mark the maximum protrusion. Remove the gauge.
  4. Mark the desired protrusion and adjust the gauge to it.
  5. Insert the gauge and register.
- Gauge with removed registration.

If a construction bite taken with the sl-protrusion gauge is available the measuring length (25 or 23 mm) and the connector length are the same. The sl-protrusion gauge thereby also compensates the opening rotation of the connectors caused by the foil thickness. Deviations to the registration are thus largely avoided.

If no construction bite is available the models are measured in the final bite position, the advancement of 2-3 mm will be achieved by a different measuring length (25 or 23 mm) and connector length (24 or 22 mm) plus opening rotation (bite elevation caused by foil thickness).

## Model preparation



In case of a very retentive teeth situation, the marking of the prosthetic equator is recommended (1.).

With the exception of the fixation points, the splint ends in case of large undercuts at the equator, otherwise 1 - 2 mm below.

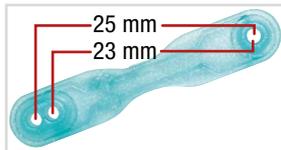
In case of using Erkodur (hard), relieve tension from the four upper front teeth by applying Erkoskin (2.).

Block out undercuts and spaces with Erkogum, block out bubbles in the plaster with high-fusing wax. Relieve tension from the gingival margin in the area where the splint possibly has contact (3.).

If the measuring point is located on an edentulous area, this must be filled with plaster (4.).

In case of a free-end situation, a plaster wall is put on the ridge (5.).

## Fabrication with construction bite



1. Separate the measuring templates.

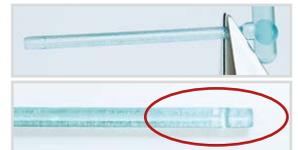
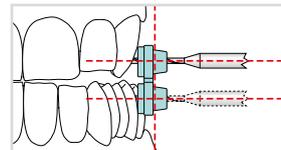
25 mm or 23 mm ?,  
see hints, page 27, paragraph  
4 + 5.



2. Articulate the models using a rubber band and the construction bite that has been taken off the sl-protrusion gauge and cut to shape.



3. Fix measuring template as near as possible to the occlusal plane with Erkogum. Initial point is the upper canine or canine area. The lower pivot point results from the measurement (see hints).



4. Cut the spacer holding pins.

Put the marked end in the drilled holes, see 7.



5. Drill with the 1.4 mm drill (**10 000 rev/min!**) through the drilling shell into the model, first in the canine area (3 mm depth of drilled hole or more).



6. Immediately insert a spacer holding pin through the drill guide. Only now drill the second hole. Drill the other side in the same way. Remove pins and templates ...



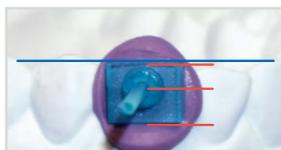
7. ... the models can now be separated. Now put all 4 spacer holding pins into the drilling holes. Strongly diverging spacer holding pins have to be adjusted.



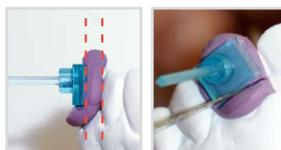
**Hint for drilling:** If the model has been drilled through, fix the spacer holding pin with Erkogum. Fix chipped plaster pieces and the pin with quick-acting glue.



8. Put a poor quantity of Erkogum lilac onto the pins. Cut the spacers without overhang.

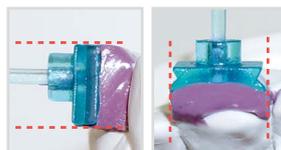


9. Push a spacer holder as illustrated onto the spacer holding pin and press it on as near as possible. The small side always points towards the **occlusal plane**.



10. Pay attention to a parallelism of the modelling pads.

Remove excessive Erkogum with a knife.



11. Undercuts between spacer holding pin and model have to be filled up.



12. Marked areas have to be free of Erkogum. Cut all pins. Now mark the outermost surface of each spacer with an appropriate pen.



13. Articulate the models with the construction bite (Erkoform units serie 3 with Occluform-3). Leave the area below the spacer at least 6 mm free of granules.



14. Keep the construction bite. Lower the bite at the supporting pin to a gap of approx. 2 mm between the front teeth. Pull off the insulating foil of the Erkolen foil (1.0 mm) and keep it.



15. Now thermoform, immediately put the Erkolen foil (reusable) onto the model and close the Occluform. The result is a plane occlusal surface.



16. Now take a silicone key for the opposing bite (Aton-Lab 80). Put the modelling silicone in the unit onto the splint and imprint the opposing bite with the Occluform, if necessary, slightly adapt.



17. Take model with foil out of the Occluform model pot and roughly cut out (fissure bur > 20 000 rev/min)



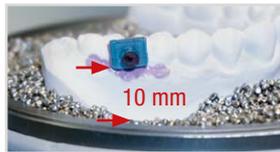
18. Lock the lower joint of the Occluform with the swivel screw. Fix lower jaw model in the Occluform model pot, fill up with granules and put the silicone key onto it. (Instructions Occluform)



**19.** Fix upper jaw model on the Occluform model plate. Articulate the models using the silicone key. Open the Occluform and remove the silicone key.



**20.** Press the cut insulating foil of the Erkolen foil with the adhesive side down on the occlusal surface of the splint.



**21.** Pay attention that at least 10 mm around the spacers are free of granules.



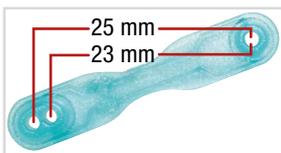
**22.** Now execute the second thermoforming process. As soon as the foil is adapted, close the Occluform. Allow to cool completely. Uncover all spacers before taking the splints off the model. Thereto, **carefully** grind through the plate ...



**23.** ... until the coloured marking on the spacers is just abraded, **not more and not less** (tungsten carbide bur > 20 000 rev/min). **Ensure a level surface.** Take the splints off the models.

➔ Continue at Finishing

## Fabrication without construction bite



**1.** Separate the measuring templates.

25 mm or 23 mm ?, see hints, page 27, paragraph 4 + 5.

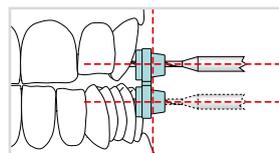


**2.** Articulate the models using a rubber band.



**3.** Fix measuring template as near as possible to the occlusal plane with Erkogum. Initial point is the upper canine or canine area. The lower pivot point results from the measurement (see hints).

Fix the measuring template with the drilling shells that way that a parallel drilling is possible.



**4.** Cut off the spacer holding pins.

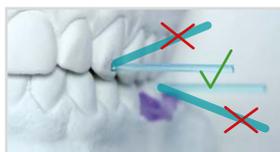
Put the marked end in the drilled holes, see 7.



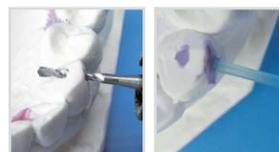
**5.** Drill with the 1.4 mm drill (**10 000 rev/min!**) through the drilling shell into the model, first in the canine area (3 mm depth of drilled hole or more).



**6.** Immediately insert a spacer holding pin through the drill guide. Only now drill the second hole. Drill the other side in the same way. Remove pins and templates ...



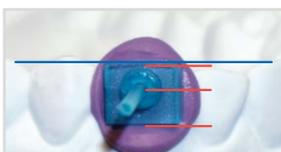
**7.** ... the models can now be separated. Now put all 4 spacer holding pins into the drilled holes. Strongly diverging spacer holding pins have to be adjusted.



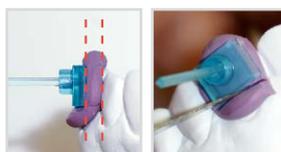
**Hint for drilling:** If the model has been drilled through, fix the spacer holding pin with Erkogum. Fix chipped plaster pieces and the pin with quick-acting glue.



**8.** Press a small quantity of Erkogum lilac onto the pins. Cut the spacers without overhang.

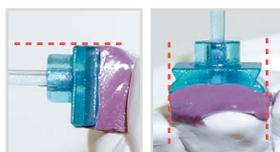


**9.** Push a spacer holder as illustrated onto the spacer holding pin and press it on as near as possible. The small side always points to the **occlusal plane**.



**10.** Pay attention to a parallelism of the modelling pads.

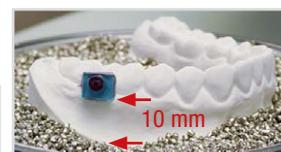
Remove excessive Erkogum with a knife.



**11.** Undercuts between spacer holding pin and model have to be filled up.



**12.** Marked areas have to be free of Erkogum. Now mark the outermost surface of each spacer with an appropriate pen.



**13.** Embed the models into the granules, leave the area below the spacer at least 10 mm free of granules. Thermoform the models one after the other.



**14.** Immediately after the adaptation apply the Erkolen foil (1 mm) without insulating foil and press it on along the teeth row especially in the area of the front teeth, in doing so run with the ...



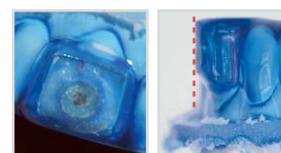
**15.** ... finger back and forth. Do not stay too long at one place, **hot!** The result is a plane occlusal surface.



**16.** Take the models out of the unit and roughly cut out before removing the splint from the model (fissure bur > 20 000 rev/min).



**17.** Uncover all spacers before taking the splints off the model. Thereto, **carefully** grind through the plate until the coloured marking on the spacers is just abraded, ...



**18.** ... **not more and not less!** (tungsten carbide bur > 20 000 rev/min) **Ensure a level surface.** Take the splints off the models.

➔ Continue at Finishing



**1.** Cut the final form with the HSS twist drill (> 20 000 rev/min, without pressure), leave sufficient material (min. 2 mm) around the fixation points.



**2.** Grind the borders with the tungsten carbide bur (> 20 000 rev/min). Smooth the borders, ...



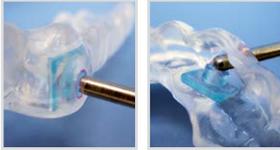
**3.** ... grinded areas with Liskosil-I, narrow zones and interdental spaces with Liskosil-m. Liskosil-s for treatment of occlusal premature contacts and the inside of a splint (10 000 rev/min).



**4.** Polish Erkodur with polishing agent for plastics (polishing set, 110 878).



**5.** Erkoloc-pro can be shined with the hot air burner (177 540), thereby only work on the model and do not heat the holes for the anchors (risk of deformation).



**6.** Press spacers inwards out of the splint (for ex. with the Liskosil mandrel shank), it might be necessary to firmly press.



**7.** Remove the insulating/shrinkage compensation foil.



**8.** Cut the anchors as shown on the picture.

Take the anchors at the retaining lip and ...



**9.** ... put them into the splint as replacement for the spacers.



**10.** Firmly press into position, if necessary, also carefully with suitable pliers.

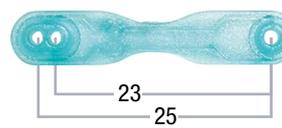


**11.** Cut the connectors, always opposing connectors have the same length.

**Choose the connector length:**

The connectors are exchangeable, for example if more protrusion is necessary for a sufficient effect.

The shorter the connector is chosen in comparison to the measurement, the larger is the advancement of the lower jaw.

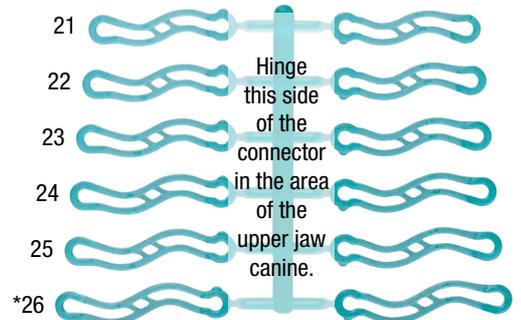


**without** construction bite: measured, 23 / 25 mm

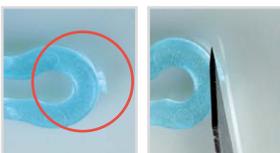
connector, 22 / 24 mm

**with** construction bite: measured, 23 / 25 mm

connector, 23 / 25 mm



\*The 26 mm connector is used when the patient, after a construction bite, still does not tolerate the advancement.



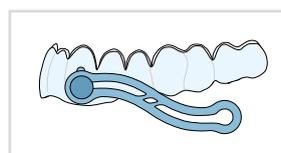
**12.** Remove sharp cutting edges!



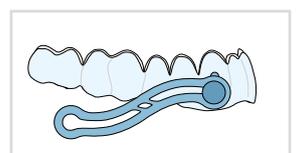
**13.** Hinge the connector into the long slot and pull it into its final position.



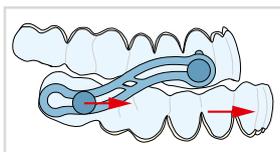
**14.** Observe upper jaw canine side of the connector.



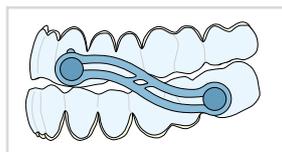
Upper jaw, obligatory run of the connectors, on the left and right.



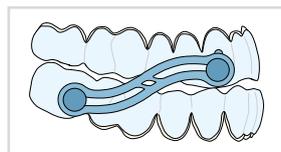
**15.** Hinge the connector into the other splint. Please check correct positioning of the splint. In case of propulsion movements (feed) the ...



**16.** ... connector shall slide out of the anchor of the lower jaw, see picture, if not, hinge the connector about-face.



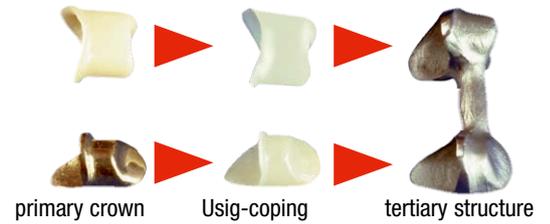
Connected splints, obligatory run of the connectors, on the left and right.



**17.** Now cut the retaining lips off the anchor. Finished.

# USIG friction-generating coping

Thermoformed plastic friction-generating coping out of special plastic for the telescope and attachment technique:



Placement of the Usig friction-generating coping:

## Materials & Accessories

### Fabrication:

- Usig-foils, 20 pieces, (650 005), Ø 120 mm, thickness 0.5 mm
- Commercial attachment glue and metal primer
- Filling granules, fine, 1.3 kg, (110 861)
- Erkoskin, 50 ml, (625 050)

### Finishing:

- Usig-die disc (650 030)
- HSS-twist drill, 3 pieces, (110 876)
- Liskoid polishing discs, 6 pieces, (223 205)
- Usig-HM spherical bur, 1 piece, (650 015)

## Important hints

The required conditions for a good result are:

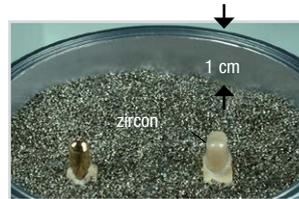
Milling angle 0 - 1°

- Per telescope at least 2 parallel surfaces (approximal 3 mm, lingual resp. palatal 2 mm height).
- For even wall thicknesses of the friction-generating coping a vertical adaptation in the thermoforming unit is required.
- If the Usig-foil is thermoformed without spacer foil the friction is considerably increased. In case of more than 5 pillars, very long primary crowns, loose pillars and implants the foil should be thermoformed together with the spacer foil.
- The Usig-foil bonds to denture resin (for ex. for replacement / travel dentures).
- Do not steam the friction-generating copings or expose to other heat (if so, only with inserted primary crown or filled with kneadable silicone).
- To avoid wrinkles in the foil the model pot must only be filled up to 1 cm below the edge with granulate (1.), work with the Usig-die disc and place the discs correctly (avoid center).

**Instructions:** (exemplary representation of the fabrication)

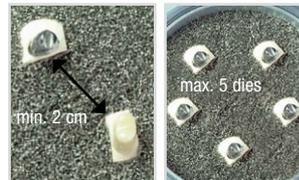
## Thermoforming of the friction-generating copings:

Same way of fabrication of Usig friction-generating copings on primary crowns out of metal or zircon.



1. Place primary crowns as illustrated and align vertically ...

... below the primary crown edge keep approx. 3 mm free from granules.



Without Usig-die disc use fine granules (110 861).

The Usig-die disc (650 030) provides for a better fixation of the dies in standard or fine granules ...



... resulting in thicker walls and less wrinkling.

2. Thermoform the Usig-foil with the isolation foil showing towards the primary parts.

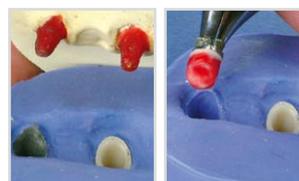
3. Cut out the coping area with the HSS twist drill (110 876) and below the preparation area with the spherical bur.



4. Finish the edges with Liskoid (223 205).

## Duplication of the primary parts with Usig friction-generating copings for the classical fabrication of the tertiary structure

5. Wax-up a thin layer (approx. 0.2 mm) as spacer onto the copings for the later needed glue. (Do not use Erkoskin, bonds to the duplicating compound.)

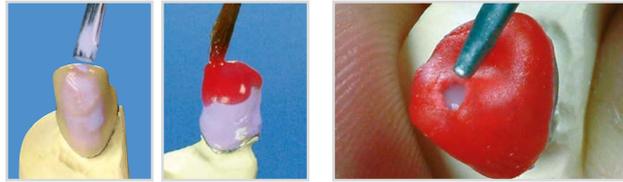


6. Duplicate. Take off the primary parts with the copings. Fabricate the tertiary structure in common manner on the duplicate.

## Fabrication of the tertiary structure with Erkoskin and modelling resin

7. Apply a single layer of Erkoskin (625 050) on the coping and after complete hardening (approx. 5 min.) ...

8. ... apply modelling resin.



9. To take it off the coping work incisally or occlusally a hole into resin. Remove Erkoskin and grind the modelling resin coping thin ... Fabricate the tertiary structure in the usual way.

## Glueing of the Usig friction-generating copings into the tertiary structure

10. Insulate the Usig copings at the inside with Vaseline and put them on the primary crowns.

11. Cut glue exit slots into the tertiary structure.

12. Apply primer at the inside of the tertiary structure, allow to well flash off.

13. Apply primer at the outside of the friction-generating copings. It should still be humid when glueing.

14. Fill a little glue into the tertiary structure using the mixing tip.

15. Press the tertiary structure onto the primary parts where the Usig copings are positioned.

16. Remove residual glue.

The primary crowns can be taken off with the telescope crown pliers.

17. Finished patient case with Usig friction-generating copings glued in.

**Do not steam the copings.** If necessary, clean with alcohol.



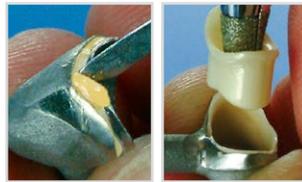
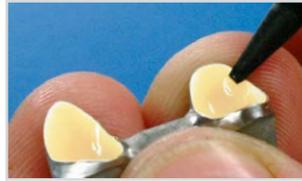
### Metal primer:

**Application:** Sandblast the telescope inner surfaces with aluminium oxide (50 µm, 2 bar) and blow out with oil-free compressed-air, allow to completely dry. Generously apply metal primer with a brush and allow to flash off for approx. 1 min.



**Attachment glue:** to glue the Usig friction-generating coping in the tertiary part. There has to be a slot (0.2 mm) for the glue. This slot guarantees a tension-free fit and will be filled by the glue.

**Observe processing instructions.**



## Restoration of the friction

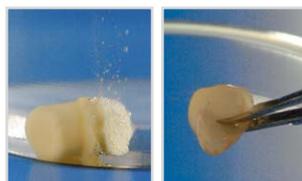
18. For a later restoration of the friction produce a duplicate of the primary situation in the mouth and single dies.

19. Thermoform as described in point 1 and 2.

21. Remove plaster with plaster removing agent.



20. Finish the copings as shown in point 3 and 4. The copings can also be cut out with the scalpel. Separate the plaster die.



22. Take the old copings off and glue the new copings in as described in point 10 to 15 without glue exit slot.

# Trouble-shooting

## failure

## possible reason

## possible elimination

**incomplete adaptation:**  
(clear fizzling and blowing noise)

- sharp-edged model
- selected foil is too thin for the model height, foil thins out too much
- hole in the foil in the area of the granules
- foil has been overheated
- foreign particles in the area of the sealing or defect sealing

- remove sharp edges at the model
- per cm model height there is a loss in thickness of up to 25%, choose thicker foils
- well condense granules
- does foil thickness comply with heating time/temperature (only units with electric control)?
- take care that the area of the sealings is clean before thermoforming, if necessary, change sealing

**incomplete adaptation:**  
(no noticeable noise)

- defect cylinder, only pressure units (seldom)
- foil not hot enough
- heating element partially defect (unequal glowing), too old (foil temperature is not reached)
- airtight model
- insufficient vacuum
- insufficient pressure (only pressure units)

- have the unit repaired by an authorised shop
- does foil thickness comply with heating time/temperature (only units with electric control)?
- have the heating element replaced by an authorised shop
- use model out of hard plaster (class 3)
- have the unit checked by an authorised shop
- check pressure air supply cable (break), adjust manometer on factory setting, 4.5 bar power supply has to be at least 5 bar
- have the unit checked by an authorised shop

**bubbles in the foil:**

- foil overheated
- too much humidity in the thermoforming material, the steam that arises during heating cannot evaporate in time

- does foil thickness comply with heating time/temperature (only units with electric control)?
- clean sensor window
- predry thermoforming material in a drying cupboard or a baking oven, see below

**creases in the foil:**

- foil overheated

- does foil thickness comply with heating time/temperature (only units with electric control)?
- clean sensor window

**unfavourable spreading of the foil thickness:**

- not enough distance to the edge of the model pot or between the dies (copings)
- model too high
- model has not been embedded in an inclined way

- place model as far as possible in the middle
- use die model disc
- trim models more flat or embed into the granules
- incline model: thicker material desired labially lower model distally, thicker material desired on the palatinal/lingual side, lift model distally

## Predrying:

### Erkocryl:

1.5 mm, 3 hrs., 90 °C  
2.0 mm, 5 hrs., 90 °C  
2.5 mm, 7 hrs., 90 °C

### Erkodur:

0.5-2.0 mm, 5 hrs., 60 °C  
2.5-5.0 mm, 8 hrs., 60 °C

### Erkoloc-pro:

1.0-5.0 mm, 48 hrs., 60 °C

## Selection of the right material thickness

To select the right material thickness note that the thermoforming material loses 20 - 25 % of its original thickness when forming a model area of 1 cm height, for 2 cm height the loss is 30 - 40 %. For occlusal splints, the thickness is selected according to the desired verticalisation that possibly still allows a grinding-in without additional adjustment.

## Plastification

in units without time or temperature control.

- For most materials please proceed as follows: Check softness with instrument. If permanent impressions result, thermoform.
- Erkolen, Erkoflex-bleach and Erkoflex-95 become clear upon heating, then thermoform. Heat Erkoflex until the foil sags approx. 2 cm, afterwards thermoform.

Please also pay attention to the indications in the respective operating instructions.

## Biocompatibility • allergic reactions

All Erkodent thermoforming materials are tested on their biocompatibility and are physiologically harmless in their intended use. They are CE marked based on the EU regulation 2017/745 concerning medical products, the directive 93/42/EEC concerning medical products and the EU regulation 2016/425 concerning personal protective equipment (Playsafe triple sports mouthguard). Up to now (2022) there is no knowledge of confirmed allergic reactions on the materials, but allergic reactions cannot be excluded.

## Instructions for cleaning and maintenance

The appliances (splints) fabricated out of thermoforming materials should be cleaned and maintained as follows:

- Best results are achieved with **Oxydens** cleansing tablets for dental splints (280 030, Oxydens Clean-set, 280 032, 32 cleansing tablets). Further cleaning agents: Soap, curd soap, liquid soap and dish-washers.

Do not use any strongly perfumed soaps. Not suited are: tooth-paste (contains abrasive particles), mouth-wash (can cause discolouring) and water that is hotter than 50 °C (deformation). Solvent-based cleaning agents cause delamination of multi-layered splints.

After use:

- Wash well with water.
- Best is to thoroughly clean the inner and exterior side of the splint with a tooth brush and soap.
- Again, wash well with water.
- Shake off the water or dry with a towel.
- Never blow-dry - deformation!
- Very important: Allow the splint to completely dry! Keep at a dry place, at best in a box like the Erkobox (215 030) or Splintbox (214 020) that has aeration holes.
- Again, wash with water before using it.

## Generation of bad smells

If after some time the splint has adopted a strong smell, additionally put the splint for one hour in a non-perfumed, concentrated soap solution, afterwards thoroughly wash with water. Such soap suds remove most of the smell generating bacteria.

## Discolouring

Soft thermoforming materials have the tendency to discolour. This intake of colour pigments can be reduced or avoided by careful maintenance, but it cannot be reversed. Mouth-washes and amalgam fillings can also cause discolouring.

## Disinfection

With the exception of Erkoloc-pro types all thermoforming materials can be disinfected with disinfection alcohol and other commercial liquids. Erkoloc-prototypes have to be stored for approx. 5 hours at a dry place without any pressure on it after having contact with alcohol in order to ensure that the alcohol can evaporate completely. Otherwise a bonding of the hard and soft layer is no longer guaranteed.

## Sterilisation

A sterilisation with gaz and plasma (< 50 °C) is possible. As a result of the thermolability the materials are not autoclavable.

# Thermoforming materials

Thermoforming materials		Colour	Material characteristics
<b>Erkocryl</b>		clear or coloured	Stable, hard, acrylate based material. Bonds to acrylate autopolymerizing resin.
<b>Erkodur-al</b>		clear	Crystal-clear, viscoelastic-hard and break-resistant material with excellent dimensional stability. Aprox. 35 % softer as Erkodur.
<b>Erkodur / Erkodur freeze</b>		clear / turquoise-transparent	Very tough, hard material. Burns without residues. Bonds to autopolymerezing resin.
<b>Erkodur-0M1/-A1/-A2/-A3</b>		tooth colour	Colour shade is equivalent to 0M1/A1/A2/A3, colour density depends on the thickness, otherwise like Erkodur.
<b>Erkodur-S</b>		clear	Tough-hard material. Burns without residues. Bonds to autopolymerizing resin. Bonds with heat to Erkoflex.
<b>Erkoflex</b>		transparent or coloured	Flexible, soft-elastic material. Can be bonded by heating or a fusing gun with Erkoflexsticks-82. Hardness Shore A: 82.
<b>Erkoflex-95</b>		transparent	Flexible-elastic material. Can be adjusted by heating or a fusing gun with Erkoflex-sticks-95 (not bonded). Hardness Shore A: 95.
<b>Erkoflex-bleach</b>		transparent	Flexible material with high elasticity. Hardness Shore A: 95.
<b>Erkolen</b>		transparent	Elastic material, burns without residues, low form memory.
<b>Erkolign</b>		transparent	Extremely resistant, break-stable material.
<b>Erkoloc-pro/- blu/green/pink</b>		transparent/ blu / green / pink	Double-layer plate hard/soft. Resistant material with high wearing comfort. Hard side bonds to autopolymerizing resin.
<b>Erkoplast PLA-R</b>		rose	Impact resistant, very rigid material, bonds by heat and with autopolymerizing resin.
<b>Erkoplast PLA-T</b>		transparent	Impact resistant, very rigid material. Accessory: PLA tray handle. PLA material bonds by heat and with autopolymerizing resin.
<b>Erkoplast PLA-W</b>		white	Impact resistant, very rigid material. Accessory: PLA tray handle. PLA material bonds by heat and with autopolymerizing resin.
<b>Playsafe triple foil</b>		transparent or coloured	Triple-layer plate soft/hard/soft.
<b>Usig-Foil</b>		tooth colour-opaque	Abrasion-resistant, very tough material. Glueable, bonds to autopolymerizing resin.
<b>UZF-Cast</b>		red / brown	Spacer foils (shrinkage compensation) for the casting technique.
			Insulating foil for insulating and shrinkage compensation

# Erkoflex-color

Thickness 2 mm, order number (contents)				Thickness 4 mm, order number (contents)				
Colour	Ø 120 mm	125 x 125 mm	Ø 125 mm	Colour number	Colour	Ø 120 mm	125 x 125 mm	Ø 125 mm
bright red	58 12 21 (5)	58 17 21 (5)	58 19 21 (5)		bright red	58 12 41 (5)	58 17 41 (5)	58 19 41 (5)
bright yellow	58 12 22 (5)	58 17 22 (5)	58 19 22 (5)		bright yellow	58 12 42 (5)	58 17 42 (5)	58 19 42 (5)
bright blue	58 12 23 (5)	58 17 23 (5)	58 19 23 (5)		bright blue	58 12 43 (5)	58 17 43 (5)	58 19 43 (5)
bright green	58 12 24 (5)	58 17 24 (5)	58 19 24 (5)		bright green	58 12 44 (5)	58 17 44 (5)	58 19 44 (5)
bright pink	58 12 25 (5)	58 17 25 (5)	58 19 25 (5)		bright pink	58 12 45 (5)	58 17 45 (5)	58 19 45 (5)
deep red	58 12 26 (5)	58 17 26 (5)	58 19 26 (5)		deep red	58 12 46 (5)	58 17 46 (5)	58 19 46 (5)
night blue	58 12 27 (5)	58 17 27 (5)	58 19 27 (5)		night blue	58 12 47 (5)	58 17 47 (5)	58 19 47 (5)
light blue	58 12 28 (5)	58 17 28 (5)	58 19 28 (5)		light blue	58 12 48 (5)	58 17 48 (5)	58 19 48 (5)
maroon	58 12 31 (5)	58 17 31 (5)	58 19 31 (5)		maroon	58 12 51 (5)	58 17 51 (5)	58 19 51 (5)
deep green	58 12 32 (5)	58 17 32 (5)	58 19 32 (5)		deep green	58 12 52 (5)	58 17 52 (5)	58 19 52 (5)
pure white	58 12 33 (5)	58 17 33 (5)	58 19 33 (5)		pure white	58 12 53 (5)	58 17 53 (5)	58 19 53 (5)
deep black	58 12 34 (5)	58 17 34 (5)	58 19 34 (5)		deep black	58 12 54 (5)	58 17 54 (5)	58 19 54 (5)
gold	58 12 35 (5)	58 17 35 (5)	58 19 35 (5)		gold	58 12 55 (5)	58 17 55 (5)	58 19 55 (5)
silver	58 12 36 (5)	58 17 36 (5)	58 19 36 (5)		silver	58 12 56 (5)	58 17 56 (5)	58 19 56 (5)
<b>Colour set, plain colours, 15 pieces (incl. transparent)</b>					<b>Colour set, plain colours, 15 pieces (incl. transparent)</b>			
	58 12 29 (15)	58 17 29 (15)	58 19 29 (15)	7 (transparent)*		58 12 49 (15)	58 17 49 (15)	58 19 49 (15)

Freestyle	Ø 120 mm	125 x 125 mm	Ø 125 mm		Freestyle	Ø 120 mm	125 x 125 mm	Ø 125 mm
camouflage	58 12 60 (5)	58 17 60 (5)	58 19 60 (5)		camouflage	58 12 80 (5)	58 17 80 (5)	58 19 80 (5)
lava	58 12 61 (5)	58 17 61 (5)	58 19 61 (5)		lava	58 12 81 (5)	58 17 81 (5)	58 19 81 (5)
tie-dye	58 12 62 (5)	58 17 62 (5)	58 19 62 (5)		tie-dye	58 12 82 (5)	58 17 82 (5)	58 19 82 (5)
rainbow	58 12 63 (5)	58 17 63 (5)	58 19 63 (5)		rainbow	58 12 83 (5)	58 17 83 (5)	58 19 83 (5)
confetti	58 12 64 (5)	58 17 64 (5)	58 19 64 (5)		confetti	58 12 84 (5)	58 17 84 (5)	58 19 84 (5)
<b>Freestyle Set**</b>	58 12 69 (5)	58 17 69 (5)	58 19 69 (5)		<b>Freestyle Set**</b>	58 12 89 (5)	58 17 89 (5)	58 19 89 (5)
zebra	58 12 65 (5)	58 17 65 (5)	58 19 65 (5)		zebra	58 12 85 (5)	58 17 85 (5)	58 19 85 (5)
goldflakes	58 12 66 (5)	58 17 66 (5)	58 19 66 (5)		goldflakes	58 12 86 (5)	58 17 86 (5)	58 19 86 (5)
silverflakes	58 12 67 (5)	58 17 67 (5)	58 19 67 (5)		silverflakes	58 12 87 (5)	58 17 87 (5)	58 19 87 (5)
camouflagestrip	58 12 68 (5)	58 17 68 (5)	58 19 68 (5)		camouflagestrip	58 12 88 (5)	58 17 88 (5)	58 19 88 (5)
lavastrip	58 12 70 (5)	58 17 70 (5)	58 19 70 (5)		lavastrip	58 12 90 (5)	58 17 90 (5)	58 19 90 (5)
<b>Freestyle-blackline Set**</b>	58 12 79 (5)	58 17 79 (5)	58 19 79 (5)		<b>Freestyle-blackline Set**</b>	58 12 99 (5)	58 17 99 (5)	58 19 99 (5)

\* Order numbers for Erkoflex transparent, see Erkoflex next page

\*\* Freestyle Set und Freestyle-blackline Set (assorted, 5 pcs)

## PLAY SAFE® triple

**Thickness 5.5 mm**, Erkoflex 2.5 mm (soft), triple layer 1.0 mm (hard), Erkoflex 2.0 mm (soft) (heating time: 3.45 min., thermoforming temperature: 110 °C, cooling time: 9.59 min.)

<b>Playsafe triple start set, Ø 120 mm, 177 810:</b> 1 Playsafe triple set with transparent foil, 1 Playsafe bite spacer, 1 Playsafe face chuck			
<b>Playsafe triple set, Ø 120 mm</b> , 1 Playsafe triple foil (colour has to be indicated), 1 label, 1 Erkobox, 1 sample FG-sheet, instructions		<b>Playsafe triple foils, Ø 120 mm</b> , 5 triple foils of the same colour (colour has to be indicated), 5 labels, 1 sample FG-sheet, instructions	
<b>177 820</b> single coloured (1 - 15)	<b>177 823</b> four-coloured (1 - 15)	<b>177 825</b> single coloured (1 - 15)	<b>177 828</b> four-coloured (1 - 15)
<b>177 821</b> two-coloured (1 - 15)	<b>177 824</b> freestyle (16 - 23)	<b>177 826</b> two-coloured (1 - 15)	<b>177 829</b> freestyle (16 - 23)
<b>177 822</b> three-coloured (1 - 15)	<b>177 819</b> freestyle strip (24 + 25)	<b>177 827</b> three-coloured (1 - 15)	<b>177 830</b> freestyle strip (24 + 25)

## PLAY SAFE® triple-light

**Thickness 4.1 mm**, Erkoflex 1.5 mm (soft), triple layer 0.6 mm (hard), Erkoflex 2.0 mm (soft) (heating time: 2.50 min., thermoforming temperature: 120 °C, cooling time: 9.59 min.)

<b>Playsafe triple light start set, Ø 120 mm, 177 850:</b> 1 Playsafe triple light set with transparent foil, 1 Playsafe bite spacer, 1 Playsafe face chuck			
<b>Playsafe triple light set, Ø 120 mm</b> , 1 Playsafe triple light foil (colour has to be indicated), 1 label, 1 Erkobox, 1 sample FG-sheet, instructions		<b>Playsafe triple light foils, Ø 120 mm</b> , 5 triple light foils of the same colour (colour has to be indicated), 5 labels, 1 sample FG-sheet, instructions	
<b>177 860</b> single coloured (1 - 15)	<b>177 863</b> four-coloured (1 - 15)	<b>177 865</b> single coloured (1 - 15)	<b>177 868</b> four-coloured (1 - 15)
<b>177 861</b> two-coloured (1 - 15)	<b>177 864</b> freestyle (16 - 23)	<b>177 866</b> two-coloured (1 - 15)	<b>177 869</b> freestyle (16 - 23)
<b>177 862</b> three-coloured (1 - 15)	<b>177 859</b> freestyle strip (24 + 25)	<b>177 867</b> three-coloured (1 - 15)	<b>177 870</b> freestyle strip (24 + 25)

\* only for Erkodent units with programmable heating time

Material					Order number (Contents)	Order number (Contents)	Order number (Contents)
	mm	°C	min	min	Ø 120 mm	125 x 125 mm	Ø 125 mm
Erkocryl clear	1.50	195	2:00	1:55	57 12 15 (10) • 57 42 15 (50)		
	2.00	195	2:30	2:20	57 12 20 (10) • 57 42 20 (50)		
	2.50	195	3:00	2:55	57 12 25 (10) • 57 42 25 (50)		
Erkocryl rose	2.00	195	2:30	2:20	57 22 20 (10)		
Erkodur-al clear, with insulating foil	0.60	195	0:45	0:50	52 41 06 (20) • 52 46 06 (100)		52 20 06 (20) • 52 30 06 (100)
	0.80	195	1:00	0:55	52 41 08 (20) • 52 46 08 (100)		52 20 08 (20) • 52 30 08 (100)
	1.00	195	1:30	1:00	52 41 10 (20) • 52 46 10 (100)		52 20 10 (20) • 52 30 10 (100)
Erkodur clear, with insulating foil	0.50	160	0:30	0:35	52 12 05 (20) • 52 42 05 (100)	52 14 05 (20) • 52 44 05 (100)	52 15 05 (20) • 52 45 05 (100)
	0.60	160	0:30	0:40	52 12 06 (20) • 52 42 06 (100)	52 14 06 (20) • 52 44 06 (100)	52 15 06 (20) • 52 45 06 (100)
	0.80	160	0:45	0:45	52 12 08 (20) • 52 42 08 (100)	52 14 08 (20) • 52 44 08 (100)	52 15 08 (20) • 52 45 08 (100)
	1.00	160	0:45	0:50	52 12 10 (20) • 52 42 10 (100)	52 14 10 (20) • 52 44 10 (100)	52 15 10 (20) • 52 45 10 (100)
	1.50	160	1:00	1:05	52 12 15 (10) • 52 42 15 (50)	52 14 15 (10) • 52 44 15 (50)	52 15 15 (10) • 52 45 15 (50)
	2.00	155	1:30	1:25	52 12 20 (10) • 52 42 20 (50)	52 14 20 (10) • 52 44 20 (50)	52 15 20 (10) • 52 45 20 (50)
	2.50	155	2:00	1:55	52 12 25 (10) • 52 42 25 (50)	52 14 25 (10) • 52 44 25 (50)	52 15 25 (10) • 52 45 25 (50)
	3.00	155	2:00	2:05	52 12 30 (10) • 52 42 30 (50)	52 14 30 (10) • 52 44 30 (50)	52 15 30 (10) • 52 45 30 (50)
	4.00	155	3:00	2:40	52 12 40 (10) • 52 42 40 (50)		52 15 40 (10) • 52 45 40 (50)
	5.00	155	4:00	3:40	52 12 50 (10) • 52 42 50 (50)		
Erkodur freeze turquoise-transparent, with insulating foil	1.00	160	0:45	0:50	52 91 10 (20) • 52 94 10 (100)	52 86 10 (20) • 52 88 10 (100)	52 75 10 (20) • 52 76 10 (100)
	1.50	160	1:00	1:05	52 91 15 (10) • 52 94 15 (50)	52 86 15 (10) • 52 88 15 (50)	52 75 15 (10) • 52 76 15 (50)
	2.00	155	1:30	1:25	52 91 20 (10) • 52 94 20 (50)	52 86 20 (10) • 52 88 20 (50)	52 75 20 (10) • 52 76 20 (50)
	2.50	155	2:00	1:55	52 91 25 (10) • 52 94 25 (50)	52 86 25 (10) • 52 88 25 (50)	52 75 25 (10) • 52 76 25 (50)
	3.00	155	2:00	2:05	52 91 30 (10) • 52 94 30 (50)	52 86 30 (10) • 52 88 30 (50)	52 75 30 (10) • 52 76 30 (50)
Erkodur-0M1 tooth colour, with insulating foil	0.60	170	0:30	0:40	52 61 06 (20)	52 28 06 (20)	52 26 06 (20)
	1.00	165	0:45	0:50	52 61 10 (20)	52 28 10 (20)	52 26 10 (20)
	1.50	160	1:00	1:05	52 61 15 (10)	52 28 15 (10)	52 26 15 (10)
	2.00	155	1:30	1:25	52 61 20 (10)	52 28 20 (10)	52 26 20 (10)
Erkodur-A1 tooth colour, with insulating foil	0.60	170	0:30	0:40	52 22 06 (20)	52 24 06 (20)	52 19 06 (20)
	1.00	165	0:45	0:50	52 22 10 (20)	52 24 10 (20)	52 19 10 (20)
	1.50	160	1:00	1:05	52 22 15 (10)	52 24 15 (10)	52 19 15 (10)
	2.00	155	1:30	1:25	52 22 20 (10)	52 24 20 (10)	52 19 20 (10)
Erkodur-A2 tooth colour, with insulating foil	0.60	170	0:30	0:40	52 23 06 (20)	52 68 06 (20)	52 64 06 (20)
	1.00	165	0:45	0:50	52 23 10 (20)	52 68 10 (20)	52 64 10 (20)
	1.50	160	1:00	1:05	52 23 15 (10)	52 68 15 (10)	52 64 15 (10)
	2.00	155	1:30	1:25	52 23 20 (10)	52 68 20 (10)	52 64 20 (10)
Erkodur-A3 tooth colour, with insulating foil	0.60	170	0:30	0:40	52 62 06 (20)	52 69 06 (20)	52 65 06 (20)
	1.00	165	0:45	0:50	52 62 10 (20)	52 69 10 (20)	52 65 10 (20)
	1.50	160	1:00	1:05	52 62 15 (10)	52 69 15 (10)	52 65 15 (10)
	2.00	155	1:30	1:25	52 62 20 (10)	52 69 20 (10)	52 65 20 (10)
Erkodur-S clear	0.80	160	0:45	0:40	52 13 08 (20)	52 18 08 (20)	52 29 08 (20)
Erkoflex transparent, with insulating foil	1.00	130	1:30	0:40	58 12 10 (20) • 58 42 10 (100)	58 17 10 (20) • 58 47 10 (100)	58 19 10 (20) • 58 49 10 (100)
	1.50	130	2:00	0:55	58 12 15 (10) • 58 42 15 (50)	58 17 15 (10) • 58 47 15 (50)	58 19 15 (10) • 58 49 15 (50)
	2.00	130	3:00	1:25	58 12 20 (10) • 58 42 20 (50)	58 17 20 (10) • 58 47 20 (50)	58 19 20 (10) • 58 49 20 (50)
	3.00	130	5:00	2:25	58 12 30 (10) • 58 42 30 (50)	58 17 30 (10) • 58 47 30 (50)	58 19 30 (10) • 58 49 30 (50)
	4.00	120	7:00	3:05	58 12 40 (10) • 58 42 40 (50)	58 17 40 (10) • 58 47 40 (50)	58 19 40 (10) • 58 49 40 (50)
	5.00	120	8:00	3:30	58 12 50 (10) • 58 42 50 (50)	58 17 50 (10) • 58 47 50 (50)	58 19 50 (10) • 58 49 50 (50)
Erkoflex-bleach transparent with insulating foil	1.00	175	1:30	0:55	58 13 10 (20) • 58 43 10 (100)	58 18 10 (20) • 58 48 10 (100)	58 15 10 (20) • 58 45 10 (100)
Erkoflex-95 transparent, with insulating foil	1.50	155	1:50	1:15	58 92 15 (10) • 58 94 15 (50)	58 69 15 (10) • 58 67 15 (50)	58 59 15 (10) • 58 54 15 (50)
	2.50	140	2:20	1:55	58 92 25 (10) • 58 94 25 (50)	58 69 25 (10) • 58 67 25 (50)	58 59 25 (10) • 58 54 25 (50)
	4.00	130	3:30	2:45	58 92 40 (10) • 58 94 40 (50)	58 69 40 (10) • 58 67 40 (50)	58 59 40 (10) • 58 54 40 (50)
Erkolen transparent, with insulating foil	0.50	175	0:30	0:35	51 12 05 (20) • 51 42 05 (100)	51 13 05 (20) • 51 43 05 (100)	51 15 05 (20) • 51 45 05 (100)
	0.60	175	0:30	0:40	51 12 06 (20) • 51 42 06 (100)	51 13 06 (20) • 51 43 06 (100)	51 15 06 (20) • 51 45 06 (100)
	0.70	170	0:45	0:45	51 12 07 (20) • 51 42 07 (100)	51 13 07 (20) • 51 43 07 (100)	51 15 07 (20) • 51 45 07 (100)
	0.80	170	0:50	0:55	51 12 08 (20) • 51 42 08 (100)	51 13 08 (20) • 51 43 08 (100)	
	1.00	165	1:30	1:00	51 12 10 (20) • 51 42 10 (100)	51 13 10 (20) • 51 43 10 (100)	51 15 10 (20) • 51 45 10 (100)
	1.50	160	2:00	1:35	51 12 15 (10) • 51 42 15 (50)	51 13 15 (10) • 51 43 15 (50)	

\* only for Erkodent units with programmable heating time

Material					Bestellnummer (Inhalt)	Bestellnummer (Inhalt)	Bestellnummer (Inhalt)
	mm	°C	min	min	Ø 120 mm	125 x 125 mm	Ø 125 mm
Erkolen transparent, with insulating foil	2.00	150	3:00	2:05	51 12 20 (10) • 51 42 20 (50)	51 13 20 (10) • 51 43 20 (50)	51 15 20 (10) • 51 45 20 (50)
	3.00	140	4:00	2:55	51 12 30 (10) • 51 42 30 (50)	51 13 30 (10) • 51 43 30 (50)	
Erkolgen transparent, with insulating foil	1.00	180	1:30	1:25	54 12 10 (20) • 54 42 10 (100)		54 15 10 (20) • 54 45 10 (100)
	2.00	190	3:30	2:20	54 12 20 (10) • 54 42 20 (50)		54 15 20 (10) • 54 45 20 (50)
Erkoloc-pro transparent, mit Isolierfolie	1.00	160	2:00	1:00	59 51 10 (20) • 59 54 10 (100)	59 52 10 (20)	59 55 10 (20)
	1.30	160	2:00	1:10	59 51 13 (20) • 59 54 13 (100)	59 52 13 (20)	59 55 13 (20)
	2.00	170	2:00	1:55	59 51 20 (10) • 59 54 20 (50)	59 52 20 (10)	59 55 20 (10)
	3.00	165	3:00	2:40	59 51 30 (10) • 59 54 30 (50)	59 52 30 (10)	59 55 30 (10)
	4.00	160	4:00	3:25	59 51 40 (10) • 59 54 40 (50)		59 55 40 (10)
	5.00	160	5:00	4:30	59 51 50 (10) • 59 54 50 (50)		59 55 50 (10)
Erkoloc-pro blu blue-transparent, with insulating foil	2.00	170	2:00	1:55	59 56 20 (10) • 59 58 20 (50)	59 76 20 (10)	59 66 20 (10)
	3.00	165	3:00	2:40	59 56 30 (10) • 59 58 30 (50)	59 76 30 (10)	59 66 30 (10)
	4.00	160	4:00	3:25	59 56 40 (10) • 59 58 40 (50)		59 66 40 (10)
	5.00	160	5:00	4:30	59 56 50 (10) • 59 58 50 (50)		59 66 50 (10)
Erkoloc-pro green green-transparent, with insulating foil	2.00	170	2:00	1:55	59 72 20 (10) • 59 74 20 (50)	59 65 20 (10)	59 82 20 (10)
	3.00	165	3:00	2:40	59 72 30 (10) • 59 74 30 (50)	59 65 30 (10)	59 82 30 (10)
	4.00	160	4:00	3:25	59 72 40 (10) • 59 74 40 (50)		59 82 40 (10)
	5.00	160	5:00	4:30	59 72 50 (10) • 59 74 50 (50)		59 82 50 (10)
Erkoloc-pro pink pink-transparent, with insulating foil	2.00	170	2:00	1:55	59 59 20 (10) • 59 69 20 (50)	59 70 20 (10)	59 75 20 (10)
	3.00	165	3:00	2:40	59 59 30 (10) • 59 69 30 (50)	59 70 30 (10)	59 75 30 (10)
	4.00	160	4:00	3:25	59 59 40 (10) • 59 69 40 (50)		59 75 40 (10)
	5.00	160	5:00	4:30	59 59 50 (10) • 59 69 50 (50)		59 75 50 (10)
Erkoplast PLA-R, rose	1.50	130	1:30	1:00	56 46 15 (10) • 56 47 15 (50)	56 66 15 (10) • 56 67 15 (50)	56 56 15 (10) • 56 57 15 (50)
Erkoplast PLA-T, transparent	3.00	130	2:30	2:00	56 82 30 (10) • 56 84 30 (50)	56 22 30 (10) • 56 24 30 (50)	56 92 30 (10) • 56 94 30 (50)
	4.00	125	4:00	2:35	56 82 40 (10) • 56 84 40 (50)	56 22 40 (10) • 56 24 40 (50)	56 92 40 (10) • 56 94 40 (50)
Erkoplast PLA-W, white	3.00	130	2:30	1:50	56 52 30 (10) • 56 54 30 (50)	56 62 30 (10) • 56 64 30 (50)	56 72 30 (10) • 56 74 30 (50)
	4.00	125	4:00	2:30	56 52 40 (10) • 56 54 40 (50)	56 62 40 (10) • 56 64 40 (50)	56 72 40 (10) • 56 74 40 (50)
Usig-Folie tooth colour-opaque, with insulating foil	0.50	160	0:30	0:30	65 00 05 (20)		

Material		Order number (Contents)
	mm	Ø 240 mm
Erkodur-al 240 clear, with insulating foil	0.60	52 11 06 (20)
	0.80	52 11 08 (20)
	1.00	52 11 10 (20)
Erkodur 240 clear, with insulating foil	0.50	52 95 05 (20)
	0.60	52 95 06 (20)
	0.80	52 95 08 (20)
	1.00	52 95 10 (20)
Erkoflex-bleach 240 transparent, with insulating foil	1.00	58 95 10 (20)
Erkoloc-pro 240 transparent, with insulating foil	1.00	59 95 10 (20)
	1.30	59 95 13 (20)
	2.00	59 95 20 (10)

For Erkomini, 182 200 (manual coping production)		Order number (Contents)
Material	mm	Ø 42 mm
Erkolen-A transparent (harder than Erkolen)	0.60	51 14 66 (100) • 51 24 66 (500)
Erkolen-AW transparent (like Erkolen)	0.60	51 14 06 (100) • 51 24 06 (500)
UZF-A clear	0.10	53 14 01 (200) • 53 24 01 (500)

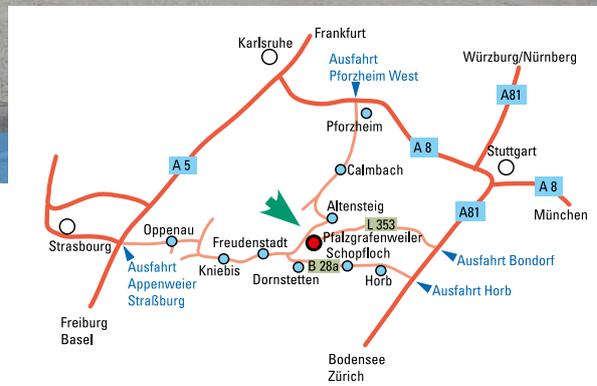
Shrinkage compensation foil for Erkolen-A and -AW

Material		Order number (Contents)	
	mm	Ø 120 mm	Ø 125 mm
UZF-Cast	red	0.10	53 11 01 (100) 53 25 01 (100)
	brown	0.15	53 11 15 (100)

UZF-Cast spacer foil for the casting technique

	Foil thickness (mm)
	Thermoforming temperature (°C), only for Erkodent units with temperature sensor
	Cooling time (min.sec.), only for Erkodent units with temperature sensor
	Heating time (min.sec.), only for Erkodent units with programmable heating time





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