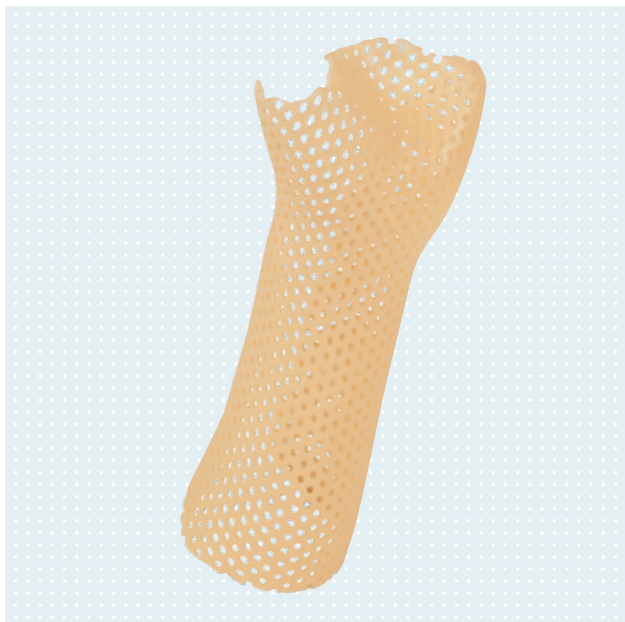


# Materials

Thermoplastics in orthopedic technology



Quality for life



# Thermoplastics

Thermoplastics are finding ever wider use in the production of orthopaedic aids because of their special properties, including quick and easy processing, minimum weight and excellent hygienic characteristics as well as outstanding strength, stiffness and shape retention. Thermoplastics can also be reshaped at any time.


Thermoplastic sheet materials have left their mark on the entire development of orthopaedics technology. Changing the material properties and adapting them to the requirements and processing possibilities found in technical orthopaedics has resulted in an increase in the number of application fields for thermoplastic sheet materials. The group of polyethylenes (PE) and polypropylenes (PP) are particularly well suited for the fabrication of prostheses and orthoses. These materials are very lightweight, physiologically neutral and skin-friendly and offer long-term functionality in orthopaedics technology.

Furthermore, it can be expected that the use of transparent copolyesters (PETG) will increase –

particularly in the fabrication of self-supporting check sockets. The reason for this lies in the excellent vacuum-forming properties combined with high transparency.

The following pages of this product information provide you with a comprehensive overview of the thermoplastic sheeting available from Ottobock.

The following overview describes the areas of application for thermoplastics and recommends ideal heating temperatures (heating plate, convection oven and infrared oven) for each sheet material.

 646F265=GB



## Practice recommendations for processing thermoplastics in prosthetics:

- Place wet plaster cast in the oven.
- Set oven to recommended processing temperature for the thermoplastic sheet material.
- After approx. 1 hour (infrared oven) – 1½ hours (convection oven) place the thermoplastic sheet material in the oven next to the wet plaster cast.
- Allow the sheet to sag by at least 1/3 of the model.
- Take out the plaster model, immediately clamp it into the vacuum suction device and prepare it for vacuum forming. (e.g., apply 633F23=1 silicone grease to the dummy/plaster model)
- Vacuum-form the sheet as usual.
- Only turn off the vacuum after cooling to room temperature and then demould it.
- Do not use aids such as compressed air or water to accelerate the cooling process.

## Practice recommendations for processing thermoplastics in orthotics:

- Slowly and evenly cool to room temperature while maintaining the vacuum in order to reduce shrinkage.

# Notes\* on the areas of application and temperature recommendations\*\* for thermoplastics

This table shows the ideal heating temperature for each type of plastic.  
 \* This information applies only to thermoplastic from Otto Bock HealthCare GmbH in Duderstadt, Germany.  
 \*\* The temperatures specified here are only recommendations of Otto Bock HealthCare GmbH and must be adjusted for your individual heating devices.  
 \*\*\* ThermoLyn Pedilon must be heated in a water bath at 60 °C/140 °F.  
 For more information, please consult the Ottobock Materials Catalogue (646K1=GB) and the Ottobock Technical Product Information – SKINGUARD Thermoplastics and Lamination Resins for Prosthetics and Orthotics (646D119=GB).

| Application examples / Product names                    | Chemical composition |    |             |     |                  |           |      |                |                |                         |                        |              |                |   |   |  | Special characteristics / Areas of application | Heating plate   | Convection oven | Infrared oven   |                 |
|---|----------------------|----|-------------|-----|------------------|-----------|------|----------------|----------------|-------------------------|------------------------|--------------|----------------|---|---|--|--|---|-----------------|-----------------|-----------------|
|   |                      | FO | Dynamic AFO | AFO | Nighttime splint | Test KAFO | KAFO | Orthosis strap | Wrist orthosis | Corset with pads (TLSO) | Prosthetic test socket | Soft sockets | Harmony socket | Definitive inner socket for lower limb prosthesis | Definitive inner socket for upper limb prosthesis |  |  |   |                 |                 |                 |
| ThermoLyn Pedilon 616T73                                | LTT polyester        |    |             |     |                  |           |      |                |                |                         |                        |              |                |   |   |  |  | <ul style="list-style-type: none"> <li>ideal for clinical deployment!</li> <li>mobile,</li> <li>thermoformable at low temperatures,</li> <li>ready for use on the body,</li> <li>eliminates the time-consuming tasks of fabricating casts and models,</li> <li>high adhesive strength,</li> <li>high restoring capacity when reheated</li> </ul>  | ***             |                 |                 |
| ThermoLyn Trolene 616T3                                 | PE-LD                |    |             |     |                  |           |      |                |                |                         |                        |              |                |   |   |  |  | <ul style="list-style-type: none"> <li>good transparency,</li> <li>good formability and flexibility,</li> <li>low molecular weight, especially suitable for orthosis components that require little stiffness,</li> <li>but high flexibility,</li> <li>suitable for fabrication of straps for sockets</li> </ul>  | 125 °C / 257 °F | 125 °C / 257 °F | 125 °C / 257 °F |
| ThermoLyn PP-C 616T120                                  | PP-C                 |    |             |     |                  |           |      |                |                |                         |                        |              |                |   |   |  |  | <ul style="list-style-type: none"> <li>good stiffness, low weight,</li> <li>increased impact strength at low temperatures,</li> <li>low tendency to white crack,</li> <li>good shaping to orthotic joints,</li> <li>good welding characteristics,</li> <li>minor shrinkage,</li> <li>easy to dye with Ottobock thermopapers</li> </ul>  | 215 °C / 419 °F | 185 °C / 365 °F | 185 °C / 365 °F |
| ThermoLyn PP-H 616T20, 616T56                           | PP-H                 |    |             |     |                  |           |      |                |                |                         |                        |              |                |   |   |  |  | <ul style="list-style-type: none"> <li>high strength and stiffness,</li> <li>high thermoplastic dimensional stability,</li> <li>reduced impact strength,</li> <li>easy to dye with Ottobock thermopapers,</li> <li>especially suitable for highly stressed orthotic components, e.g. paralysis orthoses</li> </ul>  | 215 °C / 419 °F | 185 °C / 365 °F | 185 °C / 365 °F |
| ThermoLyn PE 200 616T19, 616T58, 616T60, 616T61, 616T95 | PE-HD 200            |    |             |     |                  |           |      |                |                |                         |                        |              |                |   |   |  |  | <ul style="list-style-type: none"> <li>hard polyethylene,</li> <li>good vacuum-forming capability,</li> <li>good welding characteristics,</li> <li>good sanding characteristics,</li> <li>easy to dye with Ottobock thermopapers,</li> <li>minor shrinkage,</li> <li>can be combined with, e.g., Plastazote</li> </ul>  | 180 °C / 356 °F | 165 °C / 329 °F | 165 °C / 329 °F |
| ThermoLyn RCH 500 616T22, 616T43, 616T44                | PE-HD 500            |    |             |     |                  |           |      |                |                |                         |                        |              |                |   |   |  |  | <ul style="list-style-type: none"> <li>homogeneous thermoplastic material,</li> <li>high stiffness,</li> <li>sufficient welding characteristics,</li> <li>good heating characteristics,</li> <li>good antifriction properties,</li> <li>minor shrinkage,</li> <li>can be used with 501A33 Joint Screws and 505L1 Joint Bolts as an overlapped joint with orthosis bushings</li> </ul>                   | 195 °C / 383 °F | 185 °C / 365 °F | 185 °C / 365 °F |
| ThermoLyn RCH 1000 616T16                               | PE-HD 1000           |    |             |     |                  |           |      |                |                |                         |                        |              |                |   |   |  |  | <ul style="list-style-type: none"> <li>high-strength material,</li> <li>high abrasion resistance,</li> <li>requires high forces for deformation in a thermoplastic state,</li> <li>can also be reshaped when cold,</li> <li>shaping is facilitated through use of vacuum-forming devices with rubber membranes,</li> <li>frequently used as stiffening insoles for inner shoes</li> </ul>               | 215 °C / 419 °F | 195 °C / 383 °F | 195 °C / 383 °F |
| ThermoLyn Europlex 616T70                               | Polyamide            |    |             |     |                  |           |      |                |                |                         |                        |              |                |   |   |  |  | <ul style="list-style-type: none"> <li>good transparency,</li> <li>smooth surface,</li> <li>low hardness at increased toughness,</li> <li>for fabrication of dimensionally stable components, inserts and pads for torso orthoses</li> </ul>  | –               | 135 °C / 275 °F | 135 °C / 275 °F |
| ThermoLyn PETG clear 616T183                            | Copolyester          |    |             |     |                  |           |      |                |                |                         |                        |              |                |   |   |  |  | <ul style="list-style-type: none"> <li>very high impact strength,</li> <li>excellent vacuum-forming characteristics,</li> <li>outstanding socket adhesion,</li> <li>protects the liner,</li> <li>used as the first layer in a definitive socket,</li> <li>easy to put on with liner/soft socket, for example as part of the Harmony fitting</li> </ul>  | –               | 170 °C / 338 °F | 160 °C / 320 °F |
| ThermoLyn® clear 616T83                                 | Copolyester          |    |             |     |                  |           |      |                |                |                         |                        |              |                |   |   |  |  | <ul style="list-style-type: none"> <li>good transparency,</li> <li>high impact strength,</li> <li>excellent vacuum-forming characteristics,</li> <li>reshaping possible upon heating, e.g. using a hot air gun,</li> <li>can be over-laminated to secure adapters,</li> <li>minor shrinkage,</li> <li>for fabrication of self-supporting test sockets and trial orthoses (for temporary use)</li> </ul> | 165 °C / 329 °F | 165 °C / 329 °F | 165 °C / 329 °F |
| ThermoLyn rigid 616T52                                  | Styrene-butadiene    |    |             |     |                  |           |      |                |                |                         |                        |              |                |   |   |  |  | <ul style="list-style-type: none"> <li>high stiffness,</li> <li>high thermoplastic dimensional stability,</li> <li>high resistance to the formation of stress cracks,</li> <li>extremely high impact strength,</li> <li>good vacuum-forming characteristics,</li> <li>can be over-laminated to secure adapters,</li> <li>for fabrication of self-supporting test sockets (for temporary use)</li> </ul> | –               | 170 °C / 338 °F | 170 °C / 338 °F |
| ThermoLyn soft (EVA), clear 616T53                      | EVA                  |    |             |     |                  |           |      |                |                |                         |                        |              |                |   |   |  |  | <ul style="list-style-type: none"> <li>high surface quality,</li> <li>can be subsequently thermoformed,</li> <li>comfortable to wear,</li> <li>readily washable,</li> <li>high shrinkage if cooling rate is too high,</li> <li>for fabrication of flexible inner sockets for lower limb prosthetics</li> </ul>  | –               | 160 °C / 320 °F | 160 °C / 320 °F |
| ThermoLyn soft (EVA), skin colour 616T69                | EVA                  |    |             |     |                  |           |      |                |                |                         |                        |              |                |   |   |  |  | <ul style="list-style-type: none"> <li>translucent,</li> <li>high surface quality,</li> <li>can be subsequently thermoformed,</li> <li>comfortable to wear,</li> <li>readily washable,</li> <li>high shrinkage if cooling rate is too high,</li> <li>for fabrication of flexible sockets for upper limb prosthetics</li> </ul>  | –               | 160 °C / 320 °F | 160 °C / 320 °F |

This table shows the ideal heating temperature for each type of plastic.  
 \* This information applies only to thermoplastic from Otto Bock HealthCare GmbH in Duderstadt, Germany.  
 \*\* The temperatures specified here are only recommendations of Otto Bock HealthCare GmbH and must be adjusted for your individual heating devices.  
 \*\*\* ThermoLyn Pedilin must be heated in a water bath at 60°C/140°F.  
 For more information, please consult the Ottobock Materials Catalogue (646K1=GB) and the Ottobock Technical Product Information – SKINGUARD Thermoplastics and Lamination Resins for Prosthetics and Orthotics (646D119=GB).

| Application examples / Product names       | Chemical composition | FO | Dynamic AFO | AFO | Nighttime splint | Test KAFO | KAFO | Orthosis strap | Wrist orthosis | Corset with pads (TLSO) | Prosthetic test socket | Soft sockets | Harmony socket | Definitive inner socket for lower limb prosthesis | Definitive inner socket for upper limb prosthesis | Special characteristics / Areas of application   | Heating plate         | Convection oven      | Infrared oven         |
|--|----------------------|----|-------------|-----|------------------|-----------|------|----------------|----------------|-------------------------|------------------------|--------------|----------------|---|---|--|-----------------------|----------------------|-----------------------|
| ThermoLyn supra soft (EVA) 616T59          | EVA                  |    |             |     |                  |           |      |                |                |                         |                        |              |                | •   |   | comfortable to wear, readily washable, for fabrication of highly flexible transfemoral soft-walled inner sockets   | –                     | 155°C / 311°F        | 155°C / 311°F         |
| ThermoLyn supra soft plus Silicone 616T111 | EVA with Silicone    |    |             |     |                  |           |      |                |                |                         |                        |              |                |   | •   | very high flexibility, facilitates more comfortable socket brim design, high surface quality, comfortable to wear, good sanding characteristics, washable  | –                     | 150°C / 302°F        | 150°C / 302°F         |
| ThermoLyn flexible 616T39, 5Z3             | Ionomer              |    |             |     |                  |           |      |                |                |                         |                        |              |                |   | •   | proven classic material for frame sockets! insensitive to cold and damp plaster models, high surface quality, high dimensional stability, comfortable to wear, readily washable, minor shrinkage, for fabrication of flexible inner sockets for lower limb prosthetics | –                     | 165°C / 329°F        | 165°C / 329°F         |
| ThermoLyn supra flexible 616T112, 616T113  | EVA                  |    |             |     |                  |           |      | •              | •              |                         |                        |              |                |   | •   | high friction, permanently elastic, available in many different colours, dimensionally stable, easy, convenient processing   | 100–130°C / 212–266°F | 80–130°C / 176–266°F | 100–120°C / 212–266°F |

**Thermoplastics with antibacterial effectiveness | SKINGUARD technology**

|   |                            |   |   |   |   |   |   |  |   |   |   |   |   |   |   |   |                       |                       |               |
|---|----------------------------|---|---|---|---|---|---|--|---|---|---|---|---|---|---|---|-----------------------|-----------------------|---------------|
| Antibacterial ThermoLyn PP-H 616T420                    | PP-H                       | • | • | • |   |   | • |  |   |   |   |   |   |   |   | high strength and stiffness, high thermoplastic dimensional stability, reduced impact strength, easy to dye with Ottobock thermopapers, especially suitable for highly stressed orthotic components, e.g. paralysis orthoses  | 215°C / 419°F         | 185°C / 365°F         | 185°C / 365°F |
| Antibacterial ThermoLyn PE 200 616T495                  | PE-HD 200                  |   |   |   | • |   | • |  | • | • |   |   |   |   |   | hard polyethylene, good vacuum-forming capability, good welding characteristics, good sanding characteristics, easy to dye with Ottobock thermopapers, minor shrinkage, can be combined with, e.g., Plastazote  | 180°C / 356°F         | 165°C / 329°F         | 165°C / 329°F |
| Antibacterial ThermoLyn PETG clear 616T483              | Copolyester                |   |   |   |   |   |   |  |   |   |   |   | • |   |   | very high impact strength, excellent vacuum-forming characteristics, outstanding socket adhesion, protects the liner, used as the first layer in a definitive socket, easy to don with liner/soft socket, for example as part of a Harmony fitting  | –                     | 170°C / 338°F         | 160°C / 320°F |
| Antibacterial ThermoLyn clear 616T283                   | Copolyester                |   |   |   |   | • |   |  |   |   | • |   |   |   |   | good transparency, high impact strength, excellent vacuum-forming characteristics, reshaping possible upon heating, e.g. using a hot air gun, can be over-laminated to secure adapters, minor shrinkage, for fabrication of self-supporting test sockets and trial orthoses (for temporary use)               | 165°C / 329°F         | 165°C / 329°F         | 165°C / 329°F |
| Antibacterial ThermoLyn rigid 616T252                   | Styrene-butadiene          |   |   |   |   |   |   |  |   |   | • |   |   |   |   | SKINGUARD technology – Advantages at a glance:<br>+ high and long-lasting effectiveness of the antibacterial substances<br>+ effective against a wide range of pathogenic bacteria such as Staphylococcus aureus (gram-positive) and Escherichia coli (gram-negative) as specified by the JIS Z 2801 standard | –                     | 170°C / 338°F         | 170°C / 338°F |
| Antibacterial ThermoLyn soft (EVA), clear 616T253       | EVA                        |   |   |   |   |   |   |  |   |   |   |   |   | • |   | high surface quality, can be subsequently thermoformed, comfortable to wear, readily washable, high shrinkage if cooling rate is too high, for fabrication of flexible inner sockets for lower limb prosthetics   | –                     | 150°C / 302°F         | 150°C / 302°F |
| Antibacterial ThermoLyn soft (EVA), skin colour 616T269 | EVA                        |   |   |   |   |   |   |  |   |   |   |   |   |   | • | translucent, high surface quality, can be subsequently thermoformed, comfortable to wear, readily washable, high shrinkage if cooling rate is too high, for fabrication of flexible sockets for upper limb prosthetics  | –                     | 150°C / 302°F         | 150°C / 302°F |
| ThermoLyn EVA/LDPE SilverShield® 616T200                | EVA/LDPE                   |   |   |   |   |   |   |  |   |   |   |   |   | • |   | flexible material, pleasant wearing characteristics and good compatibility with skin, low shrinkage due to pressed plastic, for fabrication of flexible inner prosthetic sockets  | –                     | 150°C / 302°F         | 150°C / 302°F |
| Pedilin SilverShield® 617S203                           | PE foam, closed-cell       |   |   |   |   |   |   |  |   |   |   | • |   |   |   | non-perforated, density of 140 kg/m³, hardness approx. shore A 35 for fabrication of soft-walled inner sockets and redression helmets   | –                     | 130°C / 266°F         | 130°C / 266°F |
| Antibacterial Nora® Lunairmed 617S229                   | EVA copolymer, closed-cell | • |   | • |   | • | • |  |   |   | • |   |   | • |   | density of 80 kg/m³, hardness approx. shore A 18, good padding characteristics, highly elastic, good adhesion, good sanding characteristics, washable, for padding FOs, individual padding when indicated for heel spur, for fitting diabetics  | 120–130°C / 248–266°F | 120–130°C / 248–266°F | –             |

Please note that the actual colours of the individual thermoplastics may differ from the colours shown in the table.

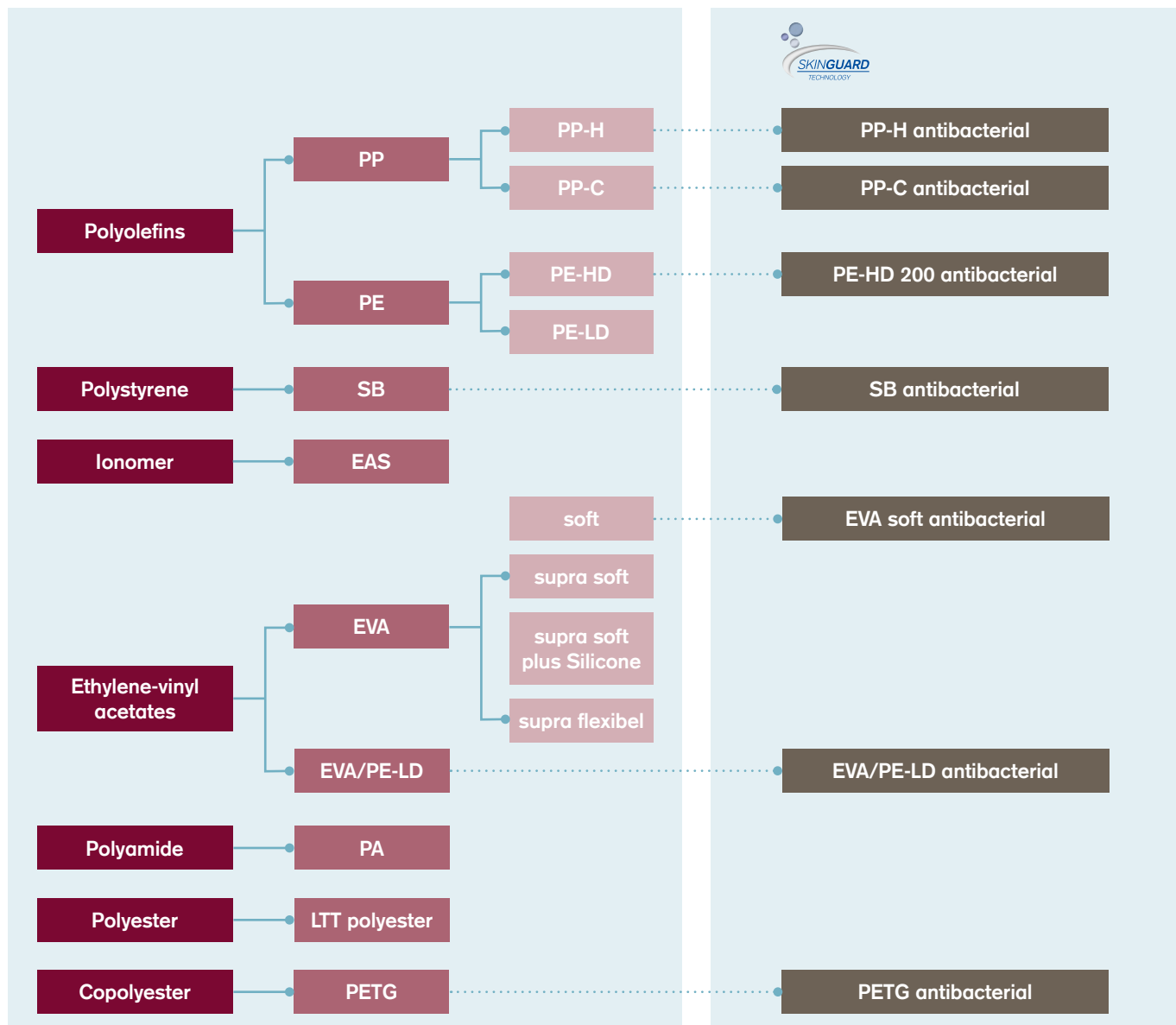
SilverShield® is a registered trademark of North Sea Plastics, Nora® is a registered trademark of Freudenberg.

# Overview of Thermoplastics

The thermoplastics are listed and described according to their chemical compositions:

## Ottobock thermoplastics

## Ottobock antibacterial thermoplastics



The symbols (body diagrams) used in the material description refer to the various applications for the individual thermoplastics. Shown from left to right are: lower extremity orthoses, spinal orthoses, upper extremity orthoses, lower limb prostheses and upper limb prostheses.



# Heating thermoplastics in infrared ovens

The performance characteristics of infrared ovens (701E20, 701E21, 701E22 and 701E23) differ from those of convection ovens.

Unlike convection ovens, infrared ovens can heat thermoplastics up to 300% faster. Also, because no preheating is required, most thermoplastics can be placed directly in a 'cold' infrared oven. Infrared ovens also have the added advantage of using very little energy. Heating the thermoplastic from the inside out makes it more flexible and therefore easier to mould, fold around edges and insert into undercuts.

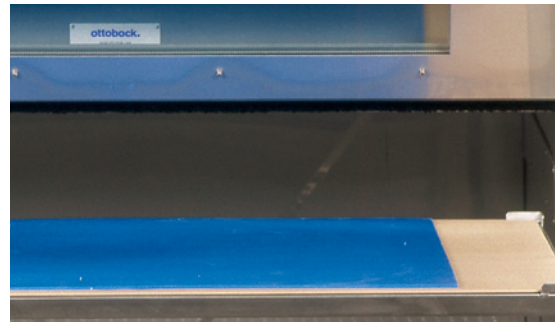
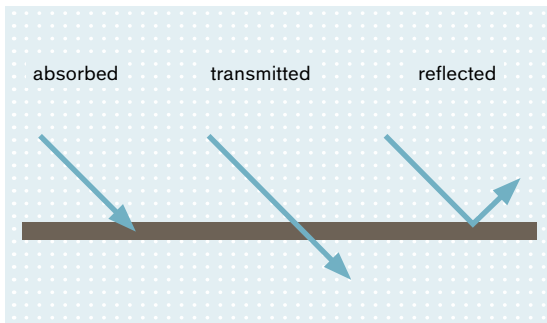
Certain criteria must be observed when heating thermoplastics in an infrared oven.

The infrared oven should be set to the temperature specified for the material being heated.

The instructions for use for the infrared ovens (646A185) describe how to adjust the digital temperature control.



# Heating Times for Thermoplastics



Heating times for thermoplastics are dependent upon the following factors:

- Material type
- Material thickness
- Material sheet size
- Initial temperature in the infrared oven (cold or preheated)
- Turn-on times of the infrared elements

Make sure the thermoplastics are not heated in the infrared oven longer than necessary. Exceeding the heating time, even for only a short time, will overheat the plastic material. Overheating will make the plastic material too 'soft'. During further processing, the plastic material will begin to 'drop down from the model'.

Unlike convection ovens, in which an object is heated by ambient heat in a closed compartment, infrared ovens generate infrared or thermal radiation in the form of electromagnetic waves. The material is heated by the absorption of this electromagnetic energy.

All materials are characterised by specific absorption curves that describe the relationship between wave length and absorption (degree of absorption).

For determination of the ideal infrared radiation for an infrared oven with respect to wave length and frequency, the absorption spectra of the materials to be heated must be known. In orthopaedic technology, plastic materials from the group of thermoplastic polyolefins such as PE or PP are mainly used. The absorption curves of these materials show that the ideal absorption of infrared radiation energy lies in the mid-infrared region of the spectrum at a wave length of approx. 3.5  $\mu\text{m}$ .

As a rule of thumb, heating times for plastic materials can be calculated as follows: '1 minute of heating time per 1 mm of material thickness'. The actual heating time, however, depends on the factors mentioned above. New plastic materials must be tested using a material sample for ascertaining the heating time.

In order to ensure optimum material heating for subsequent processing, observe how the plastic material behaves in the oven.

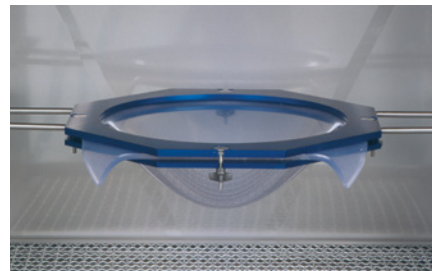
Depending on the material type, changes in discoloration (e.g. transparency) should be even when plastic sheet materials are heated. The illustration shows material which has not been heated through evenly.



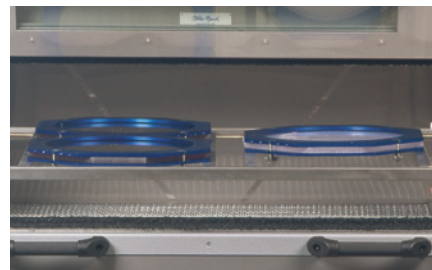
Coloured plastic material must be heated approx. 30%–40% longer than clear or white material of the same thickness.



When the plastic material is heated for vacuum forming the material should sag 10–12 cm. If the material sags more than this, it will overheat and flow from the model during vacuum forming or the wall of the inner socket will become uneven and have different thicknesses.



If using a single vacuum forming frame in the 701E20/701E21 infrared oven (remove the Teflon-coated support plate from the base frame), put the frame in the centre of the rear section of the trolley.



During heating of thin sheet materials and ThermoLyn rigid or flexible, the infrared oven must be preheated to the specified temperature for the given material. Wait until the pre-selected temperature has been reached and then place the thin sheet material or ThermoLyn (rigid or flexible) into the infrared oven for heating. Be sure

not to leave the door open too long when placing the plastic material into the oven.

Standard material heating times and temperatures for Ottobock polyethylene (PE 200) and polypropylene (PP-H and PP-C) sheet materials in Infrared Oven 701E20 are as follows:

| Thickness | Synthetic material |                 | Heating time |
|-----------|--------------------|-----------------|--------------|
|           | PE 200             | PP-H/PP-C       |              |
| 3 mm      | 165 °C / 329 °F    | 185 °C / 365 °C | 3 – 5 min.   |
| 4 mm      | 165 °C / 329 °F    | 185 °C / 365 °C | 4 – 6 min.   |
| 5 mm      | 165 °C / 329 °F    | 185 °C / 365 °C | 5 – 8 min.   |
| 6 mm      | 165 °C / 329 °F    | 185 °C / 365 °C | 6 – 9 min.   |
| 8 mm      | 165 °C / 329 °F    | 185 °C / 365 °C | 8 – 12 min.  |
| 10 mm     | 165 °C / 329 °F    | 185 °C / 365 °C | 10 – 15 min. |
| 12 mm     | 165 °C / 329 °F    | 185 °C / 365 °C | 12 – 18 min. |
| 15 mm     | 165 °C / 329 °F    | 185 °C / 365 °C | 15 – 22 min. |

# Polyolefins

These are pure hydrocarbon bonds. Polyolefins constitute the plastic materials most frequently processed by orthopaedic technicians. Polypropylenes and polyethylenes are the most important types of thermoplastics in the polyolefin group.

## Polypropylene (PP)

Polypropylene is characterised by a low specific gravity and excellent stiffness. Thanks to its high elasticity and good strength, this type of plastic material is used very frequently (e.g. in dorsiflexion-assisting orthoses). However, it is difficult to process because of its narrow temperature range and sensitive surface in a thermoplastic state. To achieve good results, high-performance heating devices and precision application techniques are required. Polypropylene can be used to produce very thin-walled, lightweight and stable orthotic components, especially when used with profiling elements. Splinting elements can also be inserted.



### ThermoLyn Polypropylene Homopolymer (PP-H)

PP is a homopolymer, meaning its polymers (chains of molecules) are created from a monomer bond only. It features high strength and stiffness combined with a reduced impact strength. This means great care must be taken during machining in order for brittle fracture (stress concentration) to be avoided. This plastic material is preferred for manufacturing highly stressed orthotic components (e.g., paralysis orthoses). Sheets with dimensions 400 × 400 mm are suitable for fabricating definitive prosthetic sockets.

#### Properties (convection oven):

|                            |   |
|----------------------------|---|
| <b>Forming temperature</b> | 185 °C / 365 °F   |
| <b>Heating time</b>        | 2–3 min/mm  |
| <b>Density</b>             | 0.91 g/cm <sup>3</sup>  |
| <b>Shrinkage</b>           | approx. 7 %   |
| <b>Bonding</b>             | inseparably bonded, even with wire and hot air at 250°C/482°F |

#### Forms as supplied:



### ThermoLyn Polypropylene Homopolymer (PP-H)

Processing temperature 215 °C / 419 °F (heating plate), 185 °C / 365 °F (convection oven), 185 °C / 365 °F (infrared oven)

| Reference number | 616T20              | 616T20  | 616T420*  | 616TS6           |
|------------------|---------------------|---|---|------------------|
| <b>Length</b>    | 400 mm              | 2000 mm   | 2000 mm   | 2000 mm          |
| <b>Width</b>     | 400 mm              | 1000 mm   | 1000 mm   | 1000 mm          |
| <b>Thickness</b> | 10 mm, 12 mm, 15 mm | 2 mm, 3 mm, 4 mm, 5 mm, 6 mm, 8 mm, 10 mm, 12 mm, 15 mm | 2 mm, 3 mm, 4 mm, 5 mm, 6 mm, 8 mm, 10 mm, 12 mm, 15 mm | 3 mm, 4 mm, 5 mm |
| <b>Colour</b>    | natural colour      | natural colour  | natural colour  | brown            |

\* Antibacterial effect!



## ThermoLyn Polypropylene Copolymer (PP-C)

The ThermoLyn PP copolymer is a thermoplastic sheet material that uses copolymerisation to combine the good properties of polypropylene and the toughness of polyethylene. The polypropylene copolymer (PP-C) obtained in this way shows considerably increased impact strength in comparison with a homopolymer polypropylene (PP-H), especially at low temperatures. The PP copolymer is easily thermoformed and heat-sealed and is ideal for placing around orthotic joints. ThermoLyn PP copolymer has a wide variety of applications.



### Potential areas of application include:

- AFOs (Ankle-Foot Orthoses)
- KAFOs (Knee-Ankle-Foot Orthoses)
- FFOs (Functional Foot Orthoses)
- TLSOs (Thoracolumbosacral Orthoses)

### Properties (convection oven):

|                            |  |
|----------------------------|--|
| <b>Forming temperature</b> | 185 °C / 365 °F  |
| <b>Heating time</b>        | 2–3 min/mm   |
| <b>Density</b>             | 0.90 g/cm <sup>3</sup>   |
| <b>Shrinkage</b>           | approx. 5 %  |
| <b>Bonding</b>             | inseparably bonded<br>(cannot be bonded with 616T20 PP Homopolymer not possible) |

### Forms as supplied:

#### ThermoLyn Polypropylene Copolymer (PP-C)

|                         |                                 |
|-------------------------|---------------------------------|
| <b>Reference number</b> | <b>616T120</b>                  |
| <b>Length</b>           | 2000 mm                         |
| <b>Width</b>            | 1000 mm                         |
| <b>Thickness</b>        | 2 mm, 3 mm,<br>4 mm, 5 mm, 6 mm |
| <b>Colour</b>           | natural colour                  |



## Polyethylene (PE)

PE has the simplest molecular structure of all plastic materials. In orthopaedic technology a distinction is made between PE-HD (high-density polyethylene) and PE-LD (low-density polyethylene). PE-HD is a high-density PE and PE-LD is a low-density PE. Another distinguishing feature is molecular weight (e.g. ThermoLyn RCH 500: high molecular weight, very good stiffness and impact strength, high resistance to deformation during vacuuming forming). The terms PE-HMW (high molecular weight, e.g. RCH 500) and PE-UHMW (ultra high molecular weight, e.g. RCH 1000) are also commonly used to refer to molecular weight.



### ThermoLyn PE 200 (PE-HD 200)

ThermoLyn PE 200 is a PE-HD with a low molecular weight. Thanks to its good processing characteristics and a large choice of colours, this thermoplastic material enjoys an especially wide range of applications (e.g. for corsets (TLSOs) and positioning shells).

#### Properties (convection oven):

|                            |                        |
|----------------------------|------------------------|
| <b>Forming temperature</b> | 165 °C / 329 °F        |
| <b>Heating time</b>        | 2 – 3 min/mm           |
| <b>Density</b>             | 0.96 g/cm <sup>3</sup> |
| <b>Shrinkage</b>           | approx. 8 %            |
| <b>Bonding</b>             | inseparably bonded     |

#### Forms as supplied:



#### ThermoLyn Polyethylene 200 (PE-HD 200)

Hard polyethylene with low shrinkage, processing temperature 180 °C/356 °F (heating plate), 165 °C/329 °F (convection oven), 165 °C/329 °F (infrared oven)

| Reference number | 616T95   | 616T495*   | 616T19                          |
|------------------|--|--|---------------------------------|
| <b>Length</b>    | 2000 mm  | 2000 mm  | 2000 mm                         |
| <b>Width</b>     | 1000 mm  | 1000 mm  | 1000 mm                         |
| <b>Thickness</b> | 2 mm, 3 mm, 4 mm,<br>5 mm, 6 mm, 8 mm,<br>10 mm, 12 mm | 2 mm, 3 mm, 4 mm,<br>5 mm, 6 mm, 8 mm,<br>10 mm, 12 mm | 2 mm, 3 mm, 4 mm,<br>5 mm, 6 mm |
| <b>Colour</b>    | natural colour   | natural colour   | skin colour                     |

| Reference number | 616T58                    |
|------------------|---------------------------|
| <b>Length</b>    | 2000 mm                   |
| <b>Width</b>     | 1000 mm                   |
| <b>Thickness</b> | 3 mm, 4 mm, 5 mm,<br>6 mm |
| <b>Colour</b>    | blue                      |

\* Antibacterial effect!



## ThermoLyn RCH 500 (PE-HD 500)



ThermoLyn RCH 500 is a trade name describing a PE-HD with a medium molecular weight. The material has a homogenous structure, consistent quality, high strength and low shrinkage tendency. Because of its good mechanical characteristics, this material is not as easy to shape in a thermoplastic state as 616T95 ThermoLyn PE 200.

However, it features adequate welding characteristics and exhibits good heating behaviour, thus ensuring satisfactory processing. Thanks to its high strength and good friction characteristics, this plastic material can be used along with 501A33 Joint Screws and 505L1 Joint Bolts as an overlapped joint for orthosis bushings. It comes in a variety of colours for orthosis customisation.

### Properties (convection oven):

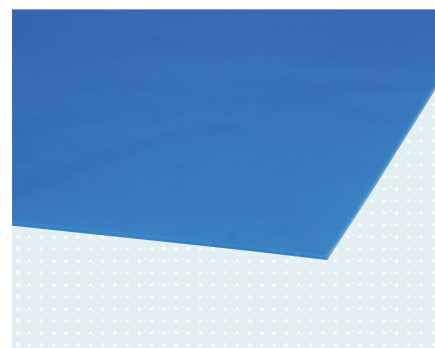
|                            |                        |
|----------------------------|------------------------|
| <b>Forming temperature</b> | 185 °C / 365 °F        |
| <b>Heating time</b>        | 3 min/mm               |
| <b>Density</b>             | 0.95 g/cm <sup>3</sup> |
| <b>Shrinkage</b>           | approx. 2 %            |
| <b>Bonding</b>             | Not permanently bonded |

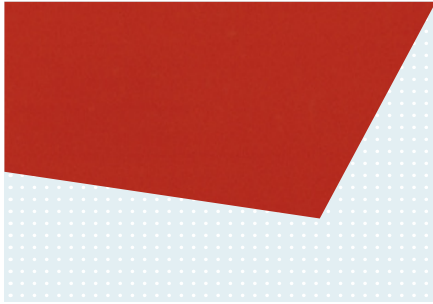
### Forms as supplied:

#### ThermoLyn RCH 500 (PE-HD 500)

Homogenous thermoplastic material with high stiffness, processing temperature 195 °C/383 °F (heating plate), 185 °C/365 °F (convection oven), 185 °C/365 °F (infrared oven)

|                         |                        |                              |
|-------------------------|------------------------|------------------------------|
| <b>Reference number</b> | <b>616T44</b>          |                              |
| <b>Length</b>           | 950 mm                 | 1910 mm                      |
| <b>Width</b>            | 910 mm                 | 910 mm                       |
| <b>Thickness</b>        | 2 mm, 3 mm, 4 mm, 5 mm | 2 mm, 3 mm, 4 mm, 5 mm, 6 mm |
| <b>Colour</b>           | blue                   | blue                         |

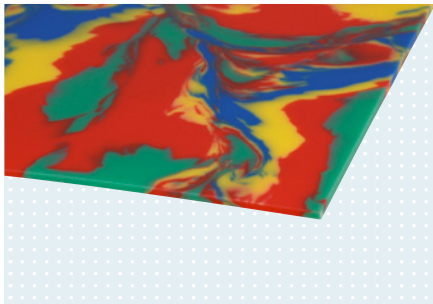




|                         |                              |                              |
|-------------------------|------------------------------|------------------------------|
| <b>Reference number</b> | <b>616T43</b>                |                              |
| <b>Length</b>           | 950 mm                       | 1910 mm                      |
| <b>Width</b>            | 910 mm                       | 910 mm                       |
| <b>Thickness</b>        | 2 mm, 3 mm, 4 mm, 5 mm, 6 mm | 2 mm, 3 mm, 4 mm, 5 mm, 6 mm |
| <b>Colour</b>           | red                          | red                          |

|                         |   |   |
|-------------------------|---|---|
| <b>Reference number</b> | <b>616T22</b>                                   |   |
| <b>Length</b>           | 950 mm  | 1910 mm   |
| <b>Width</b>            | 910 mm  | 910 mm  |
| <b>Thickness</b>        | 1 mm, 2 mm, 3 mm, 4 mm, 5 mm, 6 mm, 8 mm, 10 mm | 1 mm, 2 mm, 3 mm, 4 mm, 5 mm, 6 mm, 8 mm, 10 mm |
| <b>Colour</b>           | natural colour (N)                              | natural colour (N)                              |

|                         |                                    |                                    |
|-------------------------|------------------------------------|------------------------------------|
| <b>Reference number</b> | <b>616T22</b>                      |                                    |
| <b>Length</b>           | 950 mm                             | 1910 mm                            |
| <b>Width</b>            | 910 mm                             | 910 mm                             |
| <b>Thickness</b>        | 2 mm, 3 mm, 4 mm, 5 mm, 6 mm, 8 mm | 2 mm, 3 mm, 4 mm, 5 mm, 7 mm, 8 mm |
| <b>Colour</b>           | skin colour (H)                    | skin colour (H)                    |



|                         |                  |  |
|-------------------------|------------------|--|
| <b>Reference number</b> | <b>616T22</b>    |  |
| <b>Length</b>           | 1910 mm          |  |
| <b>Width</b>            | 910 mm           |  |
| <b>Thickness</b>        | 3 mm, 4 mm, 5 mm |  |
| <b>Colour</b>           | graffiti (G)     |  |

## ThermoLyn RCH 1000 (PE-HD 1000)



ThermoLyn RCH 1000 is a trade name describing a PE-HD with a high molecular weight. This material features a high toughness and good abrasion resistance. Processing of the plastic material requires high forces for deformation in the thermoplastic state. The material is frequently used as a stiffening insole for inner shoes. The shaping process is facilitated when vacuum-forming devices with rubber membranes are used.

### Properties (convection oven):

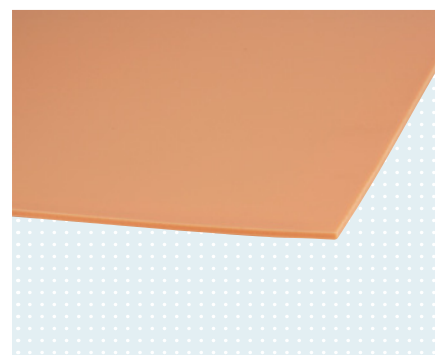
|                            |   |
|----------------------------|---|
| <b>Forming temperature</b> | 195 °C / 383 °F   |
| <b>Heating time</b>        | 3.5 min/mm  |
| <b>Density</b>             | 0.96 g/cm <sup>3</sup>                                  |
| <b>Shrinkage</b>           | none  |
| <b>Bonding</b>             | not permanently bonded (only friction welding possible) |

### Forms as supplied:

#### ThermoLyn RCH 1000 (PE-HD 1000)

High-strength material with high abrasion resistance, can also be reshaped cold, processing temperature 215 °C / 419 °F (heating plate), 195 °C / 383 °F (convection oven), 195 °C / 383 °F (infrared oven)

|                         |                              |                        |
|-------------------------|------------------------------|------------------------|
| <b>Reference number</b> | <b>616T16</b>                |                        |
| <b>Length</b>           | 950 mm                       | 1910 mm                |
| <b>Width</b>            | 910 mm                       | 910 mm                 |
| <b>Thickness</b>        | 2 mm, 3 mm, 4 mm, 5 mm, 6 mm | 2 mm, 3 mm, 5 mm, 6 mm |
| <b>Colour</b>           | skin colour                  | skin colour            |





## ThermoLyn Trolene (PE-LD)

This material is a PE-LD with good workability and flexibility. Low molecular weight and good transparency are additional characteristics. This material is particularly suitable for orthotic components with low stiffness, but high flexibility, requirements. It is also used to make brackets for sockets.

### Properties (convection oven):

|                            |  |
|----------------------------|--|
| <b>Forming temperature</b> | 125 °C / 257 °F                          |
| <b>Heating time</b>        | 1 mm = 5 min, 2 mm = 6 min, 3 mm = 7 min |
| <b>Density</b>             | 0.92 g/cm <sup>3</sup>                   |
| <b>Shrinkage</b>           | approx. 10 %                             |
| <b>Bonding</b>             | only slight adhesion                     |

### Forms as supplied:



### ThermoLyn Trolene (PE-LD)

Flexible polyethylene, opaque, processing temperature 125 °C / 257 °F for heating plates, convection ovens and infrared ovens

| Reference number | 616T3          |                |                |
|------------------|----------------|----------------|----------------|
| <b>Length</b>    | 1000 mm        | 2000 mm        | 40 mm          |
| <b>Width</b>     | 500 mm         | 1000 mm        | 32 mm          |
| <b>Thickness</b> | 1 mm, 2 mm     | 2 mm, 3 mm     | 2 mm           |
| <b>Colour</b>    | natural colour | natural colour | natural colour |



# Polystyrene

## ThermoLyn rigid (SB)



ThermoLyn rigid is a styrene-butadiene (SB). This material is characterised by high stiffness and good fracture strength. Other features of this plastic material include good vacuum-forming characteristics and transparency. If a high-quality surface finish is required or if the welding seam must be reopened processing with a protective foil is possible. ThermoLyn rigid is used mainly in self-supporting check sockets (for temporary use).

### Properties (convection oven):

|                            |                        |
|----------------------------|------------------------|
| <b>Forming temperature</b> | 170 °C                 |
| <b>Heating time</b>        | 2 min/mm               |
| <b>Density</b>             | 1.01 g/cm <sup>3</sup> |
| <b>Shrinkage</b>           | approx. 1 %            |
| <b>Bonding</b>             | inseparably bonded     |

### Forms as supplied:

#### ThermoLyn rigid (styrene-butadiene)

For fabricating self-supporting check sockets (for temporary use), processing temperature 170 °C/338 °F in convection and infrared ovens



|                         |                           |            |
|-------------------------|---------------------------|------------|
| <b>Reference number</b> | <b>616T52</b>             |            |
| <b>Length</b>           | 400 mm                    | 1235 mm    |
| <b>Width</b>            | 400 mm                    | 1235 mm    |
| <b>Thickness</b>        | 8 mm, 10 mm, 12 mm, 15 mm | 6 mm, 8 mm |
| <b>Colour</b>           | colourless                | colourless |

|                         |                           |              |
|-------------------------|---------------------------|--------------|
| <b>Reference number</b> | <b>616T252*</b>           |              |
| <b>Length</b>           | 400 mm                    | 600 mm       |
| <b>Width</b>            | 400 mm                    | 600 mm       |
| <b>Thickness</b>        | 8 mm, 10 mm, 12 mm, 15 mm | 12 mm, 15 mm |
| <b>Colour</b>           | colourless                | colourless   |

\* Antibacterial effect!



# Ionomer



## ThermoLyn flexible (EAS)

ThermoLyn flexible is an ionomer. Ionomers are copolymers of ethylene and acrylic acid (EAA) that contain active ionic groups. This material exhibits high flexibility and good transparency. Low shrinkage and outstanding processing properties allow for a wide range of applications. It is slightly stiffer than 616T53 ThermoLyn soft.

This material is extremely useful for prosthetic sockets because it is highly flexible even at body temperature. The material is insensitive to cold and damp plaster models, ensuring a consistently high surface quality during processing.

### Properties (convection oven):

|                            |                        |
|----------------------------|------------------------|
| <b>Forming temperature</b> | 165 °C / 329 °F        |
| <b>Heating time</b>        | 2 min/mm               |
| <b>Density</b>             | 0.95 g/cm <sup>3</sup> |
| <b>Shrinkage</b>           | approx. 3 %            |
| <b>Bonding</b>             | inseparably bonded     |

### Forms as supplied:



### ThermoLyn flexible (ionomer)

For fabricating flexible inner sockets in lower limb prosthetics, processing temperature 165 °C/329 °F in convection and infrared ovens

| Reference number | 5Z3                             | 616T39                          |
|------------------|---------------------------------|---------------------------------|
| <b>Length</b>    | 400 mm                          | 1200 mm                         |
| <b>Width</b>     | 400 mm                          | 800 mm                          |
| <b>Thickness</b> | 4.7 mm, 6.3 mm, 8.5 mm, 11.5 mm | 4.7 mm, 6.3 mm, 8.5 mm, 11.5 mm |
| <b>Colour</b>    | clear                           | clear                           |

# Ethylene-vinyl acetates

ThermoLyn soft (EVA), ThermoLyn supra soft (EVA),  
ThermoLyn supra soft plus Silicone (EVA with Silicone)



This material is a copolymer of ethylene and vinyl acetate (EVA). It exhibits a higher shrinkage if the cooling rate is too high. The good flexibility and transparency of ThermoLyn soft are especially useful for fabricating flexible inner prosthetic sockets. The skin-coloured (translucent) material is used mainly for upper limb prostheses. The material's benefits are high surface quality and wearer comfort.

ThermoLyn supra soft and ThermoLyn supra soft plus silicone, on the other hand, have proven to be excellent choices for highly flexible transfemoral soft-walled inner sockets.

## Properties (convection oven):

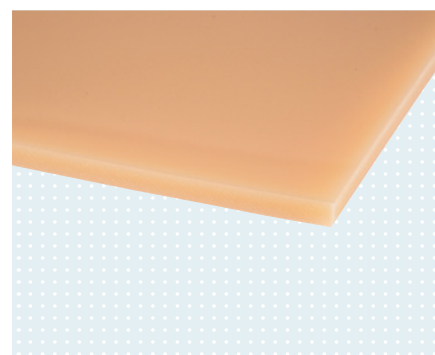
| Reference number           | 616T53/69              | 616T253*/269*          | 616T59                 | 616T111                         |
|----------------------------|------------------------|------------------------|------------------------|---------------------------------|
| <b>Forming temperature</b> | 160 °C / 320 °F        | 150 °C / 311 °F        | 155 °C / 311 °F        | 150 °C / 302 °F                 |
| <b>Heating time</b>        | 2 min/mm               | 2 min/mm               | 2 min/mm               | 2 mm = 11 min<br>12 mm = 14 min |
| <b>Density</b>             | 0.94 g/cm <sup>3</sup> | 0.94 g/cm <sup>3</sup> | 0.94 g/cm <sup>3</sup> | 0.94 g/cm <sup>3</sup>          |
| <b>Shrinkage</b>           | approx. 3 %            | approx. 3 %            | approx. 3 %            | approx. 3 %                     |
| <b>Bonding</b>             | inseparably bonded     | inseparably bonded     | inseparably bonded     | inseparably bonded              |

## Forms as supplied:

### ThermoLyn soft (EVA), skin colour

For fabricating flexible inner sockets for upper limb prostheses, high shrinkage if cooling rate too high, translucent (colour depends on skin colour), processing temperature 160 °C / 320 °F (616T69) or 150 °C / 302 °F (616T269\*) in convection and infrared ovens

| Reference number | 616T69                   | 616T269*                 |
|------------------|--------------------------|--------------------------|
| <b>Length</b>    | 400 mm                   | 400 mm                   |
| <b>Width</b>     | 400 mm                   | 400 mm                   |
| <b>Thickness</b> | 6 mm, 8 mm, 10 mm, 12 mm | 6 mm, 8 mm, 10 mm, 12 mm |
| <b>Colour</b>    | skin colour              | skin colour              |



\* Antibacterial effect!





### ThermoLyn soft (EVA), colourless

For fabricating flexible inner sockets for lower limb prostheses, high shrinkage if cooling rate too high, colourless, processing temperature 160 °C/320 °F (616T53) or 150 °C/302 °F (616T253\*) in convection and infrared ovens

| Reference number | 616T53                    | 616T253*                  |
|------------------|---------------------------|---------------------------|
| Length           | 400 mm                    | 400 mm                    |
| Width            | 400 mm                    | 400 mm                    |
| Thickness        | 8 mm, 10 mm, 12 mm, 15 mm | 8 mm, 10 mm, 12 mm, 15 mm |
| Colour           | colourless                | colourless                |

\* Antibacterial effect!



### ThermoLyn supra soft (EVA)

For fabricating highly flexible transfemoral soft-walled inner sockets, processing temperature 155 °C/311 °F in convection and infrared ovens

| Article number | 616T59=10  | 616T59=12  | 616T59=15  |
|----------------|------------|------------|------------|
| Length         | 400 mm     | 400 mm     | 400 mm     |
| Width          | 400 mm     | 400 mm     | 400 mm     |
| Thickness      | 10 mm      | 12 mm      | 15 mm      |
| Colour         | colourless | colourless | colourless |



### ThermoLyn supra soft plus Silicone (EVA with Silicone)

For fabricating highly flexible transfemoral soft-walled inner sockets, processing temperature 150 °C/302 °F in convection and infrared ovens.

| Article number | 616T111=9  | 616T111=12 | 616T111=800x800x12 |
|----------------|------------|------------|--------------------|
| Length         | 400 mm     | 400 mm     | 800 mm             |
| Width          | 400 mm     | 400 mm     | 800 mm             |
| Thickness      | 9 mm       | 12 mm      | 12 mm              |
| Colour         | colourless | colourless | colourless         |



### ThermoLyn supra flexible

For fabricating highly flexible diagnostic/definitive sockets for foot prostheses, for fabricating highly flexible diagnostic sockets for lower and upper limb prostheses, processing temperature 80–130 °C/176–266 °F in convection oven and 100–120 °C/212–248 °F in infrared oven

| Reference number | 616T112   |   |                             | 616T113                     |   |
|------------------|---|---|-----------------------------|-----------------------------|---|
| Length           | 1000 mm   | 1000 mm   | 5000 mm                     | 5000 mm                     | 5000 mm   |
| Width            | 1000 mm   | 1000 mm   | 1000 mm                     | 1000 mm                     | 1000 mm   |
| Thickness        | 2 mm, 4 mm  | 2 mm, 3 mm,<br>4 mm, 5 mm,<br>6 mm, 9 mm,<br>12 mm, 15 mm | 1.5 mm, 2 mm,<br>3 mm, 4 mm | 5 mm                        | 2 mm, 3 mm,<br>4 mm, 5 mm,<br>6 mm, 9 mm,<br>12 mm, 15 mm |
| Colour           | transparent (99), white (6), black (7), blue (5), light blue (5.3), dark blue translucent (5.5), red (2), light red translucent (2.4), bordeaux (2.5), green (3), neon pink (12.1), neon yellow (4.1), neon green (4.3), gold (17), silver (16) | skin colour (0)   | transparent (99)            | transparent (99), black (7) | skin colour (0)   |

## ThermoLyn (EVA/LPDE) SilverShield®



ThermoLyn EVA/LPDE SilverShield® is supplied in the form of 'pressed' sheets. This material is a soft polyethylene (76 % PE-LD) and an ethylene-vinyl acetate copolymer (24 % EVA) with good formability and high flexibility. Low shrinkage, long-term resistance to volume changes and outstanding processing characteristics facilitate the production of very flexible inner prosthetic sockets.

In SilverShield® technology, silver is used during the manufacturing process to create the antibacterial properties of the plastic material. The silver ions integrated into the plastic material is effective against a wide range of pathogenic bacteria and is guaranteed to be extremely skin-friendly. The antibacterial properties of the material are also excellent for reducing odour formation.



### Properties (convection oven):

|                            |                        |
|----------------------------|------------------------|
| <b>Forming temperature</b> | 150 °C / 302 °F        |
| <b>Heating time</b>        | 2–3 min/mm             |
| <b>Density</b>             | 0.95 g/cm <sup>3</sup> |
| <b>Shrinkage</b>           | approx. 1 %            |
| <b>Bonding</b>             | inseparably bonded     |

### Forms as supplied:

#### ThermoLyn EVA/LDPE SilverShield®

Antibacterial effect thanks to SilverShield® technology, for the fabrication of flexible inner prosthetic sockets, extremely low shrinkage due to pressed plastic material, very flexible, dermatologically tested, processing temperature 150 °C / 302 °F in a convection oven or infrared oven

| Article number   | 616T200=9      | 616T200=12     | 616T200=16     |
|------------------|----------------|----------------|----------------|
| <b>Length</b>    | 400 mm         | 400 mm         | 400 mm         |
| <b>Width</b>     | 400 mm         | 400 mm         | 400 mm         |
| <b>Thickness</b> | 9 mm           | 12 mm          | 16 mm          |
| <b>Colour</b>    | natural colour | natural colour | natural colour |



# Polyamide



## ThermoLyn Europlex

ThermoLyn Europlex is a partially aromatic polyamide (PA) and was developed especially for orthopaedic technology applications. It is a yellowish, translucent material. Compared with its predecessor Plexidur O, this material features slightly reduced hardness and increased toughness. Familiar properties such as transparency and a smooth surface have been retained.

A forming temperature of 135 °C/275 °F must be strictly maintained, since the material becomes milky and difficult to thermoform in response to excessive heating. The material is used for shape-retaining components, insoles and pads for trunk orthoses.

### Properties (convection oven):

|                            |                        |
|----------------------------|------------------------|
| <b>Forming temperature</b> | 170 °C / 275 °F        |
| <b>Heating time</b>        | 1.5 min/mm             |
| <b>Density</b>             | 1.08 g/cm <sup>3</sup> |
| <b>Shrinkage</b>           | approx. 1 %            |
| <b>Bonding</b>             | no                     |

### Forms as supplied:



### ThermoLyn Europlex (polyamide)

For fabricating insoles, thermoformable at 135 °C/275 °F in convection and infrared ovens

|                         |                  |
|-------------------------|------------------|
| <b>Reference number</b> | <b>616T70</b>    |
| <b>Length</b>           | 2050 mm          |
| <b>Width</b>            | 1200 mm          |
| <b>Thickness</b>        | 2 mm, 3 mm, 4 mm |
| <b>Colour</b>           | colourless       |

# LTT Polyester

## ThermoLyn Pedilon



ThermoLyn Pedilon is a low-temperature thermoplastic (LTT). This material is a linear polyester compound.

The material is heated in a water bath at 55 – 60 °C/131 – 140 °F and thermoplastically moulded right on the patient's body. It features a particularly high adhesive force and high springback upon reheating. The special properties of the material allow orthoses to be fabricated without the need for taking a plaster cast and making a model.

### Properties (convection oven):

|                            |  |
|----------------------------|--|
| <b>Forming temperature</b> | 60 °C/140 °F (in water)                    |
| <b>Heating time</b>        | 1 min/mm (finished when transparent)       |
| <b>Density</b>             | 1.10 g/cm <sup>3</sup>                     |
| <b>Shrinkage</b>           | none                                       |
| <b>Bonding</b>             | yes, through pressure, better with hot air |

### Forms as supplied:

#### ThermoLyn Pedilon (LTT polyester)

Low-temperature polyester, can be stretched when heated, heat to 60 °C/140 °F in water bath.

The low forming temperature enables this material to be moulded right on the patient's body. This eliminates the need for fabricating casts or models, a time-consuming process. This sheet material is especially well suited to clinical use where the patient must be treated immediately.



| Reference number | 616T73    |        |       |           |       |             |        |        |            |        |        |       |
|------------------|-----------|--------|-------|-----------|-------|-------------|--------|--------|------------|--------|--------|-------|
| Perforation      | none (NP) |        |       | fine (FP) |       | medium (MP) |        |        | rough (RP) |        |        |       |
|                  |           |        |       |           |       |             |        |        |            |        |        |       |
| <b>Length</b>    | 60 cm     | 90 cm  | 90 cm | 60 cm     | 60 cm | 60 cm       | 60 cm  | 60 cm  | 60 cm      | 60 cm  | 60 cm  | 90 cm |
| <b>Width</b>     | 43 cm     | 60 cm  | 60 cm | 43 cm     | 43 cm | 43 cm       | 45 cm  | 45 cm  | 43 cm      | 45 cm  | 45 cm  | 60 cm |
| <b>Thickness</b> | 2 mm      | 3.2 mm | 4 mm  | 1.6 mm    | 2 mm  | 2 mm        | 2.5 mm | 3.2 mm | 2 mm       | 3.2 mm | 3.2 mm | 4 mm  |



### Practical recommendation

#### Application example for a hand positioning orthosis made of 616T73=450x600x2 ThermoLyn Pedilon

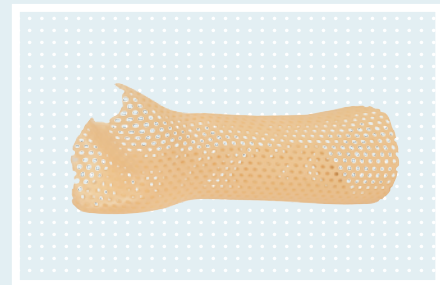
Place the pre-cut ThermoLyn Pedilon into warm water at approx. 60°C/140 °F in the 759P1=220 Water Pan. The material becomes transparent when it reaches its moulding temperature. Remove the pre-cut material with a wooden spatula and allow the water to drip off.



Moisten hand and forearm well with cold water. Place the warm ThermoLyn Pedilon over the hand and forearm.



Final product: Hand positioning orthosis





# Copolyester

## ThermoLyn clear / ThermoLyn PETG clear

ThermoLyn clear and ThermoLyn PETG clear are fracture-proof and highly transparent copolyesters made of polyethylene terephthalate (PETG). This material features excellent impact strength and outstanding vacuum-forming properties.



ThermoLyn clear is ideal for fabricating self-supporting check sockets and trial orthoses (for temporary use). On the other hand, ThermoLyn PETG clear is used as a first layer in definitive sockets, for example for Harmony fittings.

### Properties (convection oven):

| Reference number    | 616T83/283*            | 616T183/483*                 |
|---------------------|------------------------|------------------------------|
| Forming temperature | 165 °C / 329 °F        | 170 °C / 338 °F              |
| Heating time        | 3–4 min/mm             | 3 mm = 12 min, 5 mm = 13 min |
| Density             | 1.27 g/cm <sup>3</sup> | 1.27 g/cm <sup>3</sup>       |
| Shrinkage           | approx. 1 %            | approx. 1 %                  |
| Bonding             | inseparably bonded     | inseparably bonded           |

\* Antibacterial effect!



### Forms as supplied:

#### ThermoLyn clear (copolyester)

The processing temperature for heating plates, convection and infrared ovens is 165 °C/329 °F.

The transparency of the check socket made of ThermoLyn clear facilitates precise verification of the fit and skin discolouration on the residual limb. Heating the socket allows this thermoplastic material to be reshaped – for example at pressure points.

| Article number         | 616T83                 |         |                |
|------------------------|------------------------|---------|----------------|
| Length                 | 1250 mm                | 1250 mm | 1250 mm        |
| Width                  | 1025 mm                | 1025 mm | 1025 mm        |
| Thickness              | 3 mm                   | 4 mm    | 6 mm           |
| Colour                 | clear                  | clear   | clear          |
| For the fabrication of | Scar compression masks |         | Trial orthoses |

| Article number         | 616T83         |   |        |        |        |
|------------------------|----------------|---|--------|--------|--------|
| Length                 | 400 mm         | 400 mm  | 400 mm | 400 mm | 400 mm |
| Width                  | 400 mm         | 400 mm  | 400 mm | 400 mm | 400 mm |
| Thickness              | 8 mm           | 10 mm   | 12 mm  | 15 mm  | 20 mm  |
| Colour                 | clear          | clear   | clear  | clear  | clear  |
| For the fabrication of | Trial orthoses | Self-supporting check sockets (for temporary use) |        |        |        |



| Article number         | 616T283=8*     | 616T283=10*                                       | 616T283=12* | 616T283=15* | 616T283=20* |
|------------------------|----------------|---|-------------|-------------|-------------|
| Length                 | 400 mm         | 400 mm  | 400 mm      | 400 mm      | 400 mm      |
| Width                  | 400 mm         | 400 mm  | 400 mm      | 400 mm      | 400 mm      |
| Thickness              | 8 mm           | 10 mm   | 12 mm       | 15 mm       | 20 mm       |
| Colour                 | clear          | clear   | clear       | clear       | clear       |
| For the fabrication of | Trial orthoses | Self-supporting check sockets (for temporary use) |             |             |             |

\* Antibacterial effect!



### ThermoLyn PETG clear (copolyester)

For use as the first layer in definitive sockets, e.g. for Harmony fittings

| Article number | 616T183=3 | 616T483=3* | 616T183=5 | 616T483=5* |
|----------------|-----------|------------|-----------|------------|
| Length         | 400 mm    | 400 mm     | 400 mm    | 400 mm     |
| Width          | 400 mm    | 400 mm     | 400 mm    | 400 mm     |
| Thickness      | 3 mm      | 3 mm       | 5 mm      | 5 mm       |
| Colour         | clear     | clear      | clear     | clear      |

\* Antibacterial effect!

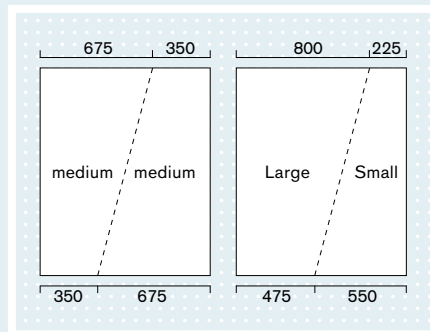




**Practical recommendation**

**Cutting suggestions for 616T83 ThermoLyn clear 6 mm (sheet: 1250 × 1025 mm):**

- Extremely little waste with trial orthoses (KAFOs)



**Practical recommendation**

**Application example for 616T183 ThermoLyn PETG clear**

Preheat infrared oven (e.g. 701E20) to 160 °C/320 °F:

- for residual limb lengths of up to 21 cm:  
Clamp the 3-mm PETG in the smaller 755X84=260x8 Frame (diameter 260) in combination with 755T4=360 and heat for 2:45 min
- for residual limb lengths of 21 cm and greater:  
Clamp the 5-mm PETG in the 755T4=360 Vacuum-Forming Device (diameter 360) and heat for 4:10 min



Preheat convection oven (e.g. 701E7) to 170 °C/338 °F:

- for residual limb lengths of up to 21 cm:  
Clamp the 3-mm PETG in the small 755X84=260x8 Frame (diameter 260) in combination with 755T4=360 and heat for 12 min
- for residual limb lengths of 21 cm and greater:  
Clamp the 5-mm PETG in the small 755T4=360 Vacuum-Forming Device (diameter 360) and heat for 13 min



Select as small a vacuum-sealing disc as possible

We recommend that you use the following aids:

- 755X104=180 Vacuum Pipe with Vacuum Sealing Disc (diameter 180) or
- 755X104=260 Vacuum Pipe with Vacuum Sealing Disc (diameter 260)

Remove the PETG sheet from the oven very quickly and vacuum-form it immediately with high vacuum (if required, shape undercuts with hot air gun, e.g. 756E9).

Auxiliary devices:

- 755E9 Vacuum Pump
- 641H13 Heat Protection Gloves





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