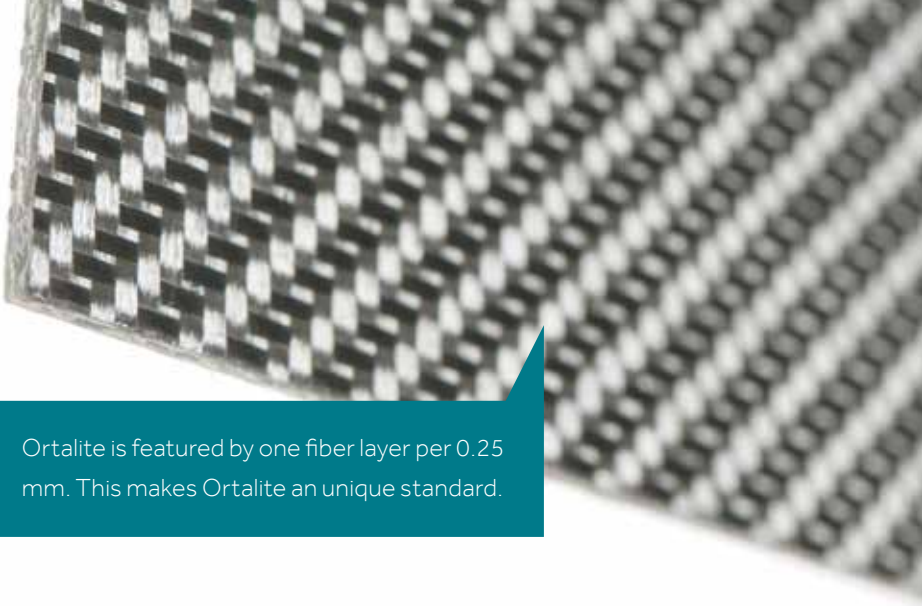




Frecoma is a Dutch based supplier of products and components for the orthopaedics-, orthotics- and shoe industry with customers all over the world. The strong focus on developing and marketing of unique materials, guarantees a range that is in line with the latest market developments and trends. Ortalite is one of those unique materials.



Ortalite is featured by one fiber layer per 0.25 mm. This makes Ortalite an unique standard.

Ortalite performance composites is the leading supplier of high performance fiber reinforced thermoplastic composite materials for the construction of orthopaedic and orthotic components. Ortalite proprietary technology has advantages over other thermoplastic technologies in the method that the materials are produced, which leads to greater consistency and accuracy. Ortalite composites have high durability with excellent damping and shock attenuation and resiliency which results in enhanced energy return and response. The composites provide superior stability and support, yet are lightweight and thin to reduce fatigue and stress.

THE MATERIAL EDGE

Ortalite Performance Composite materials are used to enhance footwear performance. Ortalite materials have unique attributes that, when used strategically, can reduce the weight of footwear substantially while increasing biomechanical stability. Our materials are used in combination with other components to create footwear which is truly engineered. The 'resilience' (spring or responsiveness) effect of Ortalite composite materials means they return to their original shape through millions of cycles thus contributing to reduced foot fatigue and injury prevention. Ortalite materials have performance and weight advantages. Similar to a continuous 'bridge'. Ortalite materials provides engineered strength from one end of the component to the other.

MANUFACTURING OVERVIEW

Products are offered in a variety of materials including:

Glass Fiber

The most cost effective woven composite.

Glass fiber products are the most cost effective composite materials with all woven glass fiber reinforcement. Similar performance characteristics compared to the carbon/glass options but slightly thicker and heavier (glass weights more than carbon fiber) The glass fiber products are available in different thicknesses (see material selection guide overview).

Carbon Fiber

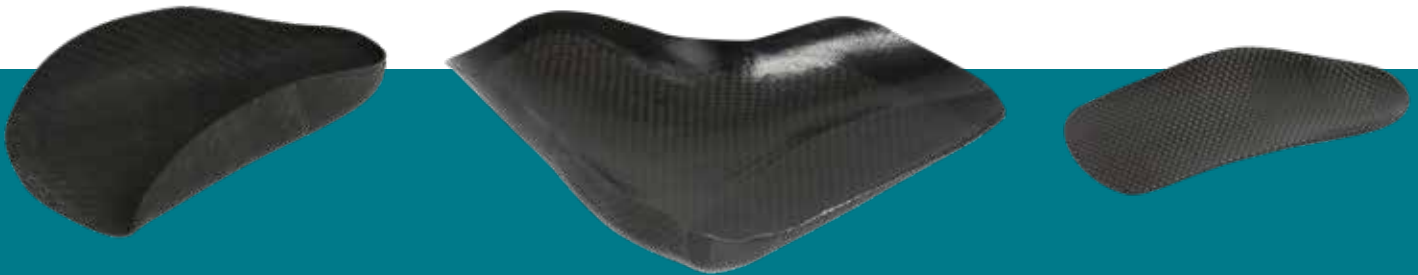
The greatest strength to weight option available.

The carbon fiber products are the lightweight and resilient products for improved performance.

Carbon/Glass Fiber

The most efficient carbon product.

Carbon/Glass fiber products blend the optimal performance, aesthetics and cost effectiveness with glass replacing of carbon fibers on the outside. Carbon fibers are orientated 90 degrees to the glass fibers for bi-directional mechanical properties.



Our woven series materials are offered in a variety of fiber (carbon and glass) combinations. Each is chosen for its own unique performance, aesthetic and economic attributes.






MATERIAL SELECTION GUIDE

Ortalite is built up out of carbon or glass fiber layers or a combination of both with a thermoplastic artificial resin. The high percentage of fiber layers (one fiber layer per 0.25 mm of material volume) makes Ortalite one of the most durable composite materials. An increasing percentage of carbon fibers ensures a higher stiffness at a lower material weight.

Ortalite offers excellent mechanical properties and good chemical resistance. At a temperature of 100°C, Ortalite is already slightly deformable and at 210-230°C it is fully thermoplastic. After deformation and compression the material stiffness and stability increases by a factor of eight. The sheets may be sawn, die cutting, snipped or punched.

Ortalite is available in three compositions:

	ortalite GLASS	100% glass fiber	1 fiber layer	290 gr/m ² 66 oz/in²	86 x 100 cm 33,86 x 39,37 in	0,25 mm
			2 fiber layers			0,50 mm
			3 fiber layers			0,75 mm
			4 fiber layers			1,00 mm
			6 fiber layers			1,50 mm
			8 fiber layers			2,00 mm
	ortalite MIX	carbon-/ glass fiber	3 fiber layers	245 gr/m ² 55,76 oz/in²	86 x 100 cm 33,86 x 39,37 in	0,75 mm
			4 fiber layers			1,00 mm
			6 fiber layers			1,50 mm
			8 fiber layers			2,00 mm
			10 fiber layers			2,50 mm
			12 fiber layers			3,00 mm
	ortalite CARBON	carbon fiber	1 fiber layer	200 gr/m ² 45,51 oz/in²	86 x 100 cm 33,86 x 39,37 in	0,25 mm
			2 fiber layers			0,50 mm
			3 fiber layers			0,75 mm
			4 fiber layers			1,00 mm
SILICONE VACUUM FORM SHEETS		100% silicones			100 x 120 cm 39,37 x 47,24 in	2,00 mm

BASIC PRINCIPLES OF SHAPING

Ortalite is already slightly deformable at a temperature of 100°C. By heating the Ortalite material to a temperature of 210 to 230°C it becomes fully deformable. It is important that Ortalite is processed within 15 to a maximum of 30 seconds once it is in an activated state. This causes the fiber layers to melt together so that the structure becomes firmer and its original stiffness is increased. After cooling the shaped sheet recovers its original aesthetic appearance.

- **Using a press** Within a few seconds place the activated sheet (210-230°C) into the preheated press (175°C). Press the sheet material for 20 seconds at an applied pressure of approximately 6 bar. In this time the temperature is reduced to approximately 60°C, so that the material cools down and retains the shape imposed. This means of shaping is ideal for batch production.
- **Using Vacutherm machine** Probably the most-used method. Applicable to all thickness versions and compositions of Ortalite. To prevent adhesion the component to be formed may be enclosed between two sheets of silicone. Sufficient applied pressure is essential to obtain a stable and homogeneous final result.
- **Using an industrial hot air blower** Post-processing is simple to achieve by reactivating the material locally using an industrial hot air blower.

Ortalite Composites are easy to weld and glued. We can provide you with tailored advice on this.



PROCESSING

The fiber layers in a sheet of Ortalite are woven at an angle of 45 degrees. In this way components may be processed out of a sheet in both the longitudinal and transverse directions.

Components may be produced in various ways:

- Sawing with a band saw (though with risk of rough edges)
- Snipping and/or die cutting (only for straight lines, standard method for panels, ideal for thin panels up to 0,75 mm thick)
- Waterjet cutting (extremely precise, smooth, clean edges, recommended)
- Punching (efficient for larger batches, not recommended for sheets over 1.5 mm thick)

To attain the required stiffness with minimal torsion diagonal processing is not recommended.

When processing, take the necessary safety precautions into account. Protect eyes and hands (see personal protection).

MATERIAL SAFETY DATA INFORMATION

FIRST-AID MEASURES

Inhalation If decomposition products are inhaled, remove person to fresh air.

If irritation develops or persists, obtain medical attention.

Skin contact Cool skin rapidly with cold water after contact with molten polymer do not peel polymer from the skin get medical attention if necessary.

Eye contact In case of contact with eyes, rinse immediately with plenty of water, seek medical advice.

FIRE-FIGHTING MEASURES

Combustion products Under fire conditions, composite decomposes and generates smoke and toxic/ irritating compounds (see section 10).

Extinguish media Water, foam, dry chemical, CO₂.

Fire fighter instructions Fire fighters should wear positive pressure self-contained breathing apparatus and should be equipped with protective clothing. Keep people away and isolate fire area.

ACCIDENTAL RELEASE

Personal precautions Safety requirements, see section 8

Environmental None

Cleaning/disposal Pick up the remainders mechanically and dispose

HANDLING AND STORAGE

Handling Maintain recommended processing temperatures. Provide appropriate exhaust ventilation at machinery and at places where dust is formed. Take precautionary measures against static discharges Carbon fibers conduct electricity

Storage Keep sheets dry and dust-free

EXPOSURE CONTROLS/ PERSONAL PROTECTION

Respiratory protection In case of dust and/or fumes use breathing apparatus

Eye protection Use safety glasses if there is a potential risk

Hand protection Wear heat insulating gloves when handling hot material

Hygiene measure Wash hands before breaks and at the end of the working day

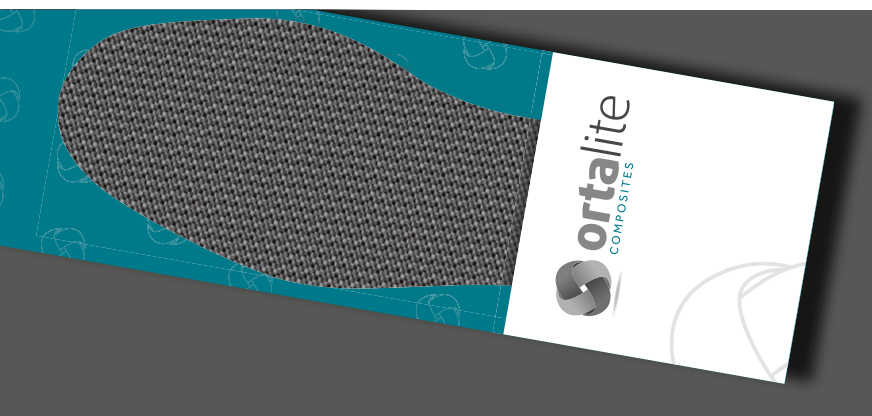


FOOTWEAR COMPONENTS

Already, many manufactures of orthopaedic and orthotic components, podology use Ortalite.

The normal sheets of 86 and 100 cm, special sole blanks are available in various thicknesses (1.5, 2, 2.5 and 3 mm) in the quality Ortalite Mix, in sizes S, M, L and XL.

Article number	Shoe size	Thickness	Article number	Shoe size	Thickness
Sole plate	35-37 S	1,5 mm	Sole plate	35-37 S	2,5 mm
Sole plate	38-40 M	1,5 mm	Sole plate	38-40 M	2,5 mm
Sole plate	41-43 L	1,5 mm	Sole plate	41-43 L	2,5 mm
Sole plate	44-46 XL	1,5 mm	Sole plate	44-46 XL	2,5 mm
Sole plate	35-37 S	2,0 mm	Sole plate	35-37 S	3,0 mm
Sole plate	38-40 M	2,0 mm	Sole plate	38-40 M	3,0 mm
Sole plate	41-43 L	2,0 mm	Sole plate	41-43 L	3,0 mm
Sole plate	44-46 XL	2,0 mm	Sole plate	44-46 XL	3,0 mm



Sole pattern XL

44-46 | 1,5 - 2 - 2,5 - 3 mm

Sole pattern L

41-43 | 1,5 - 2 - 2,5 - 3 mm

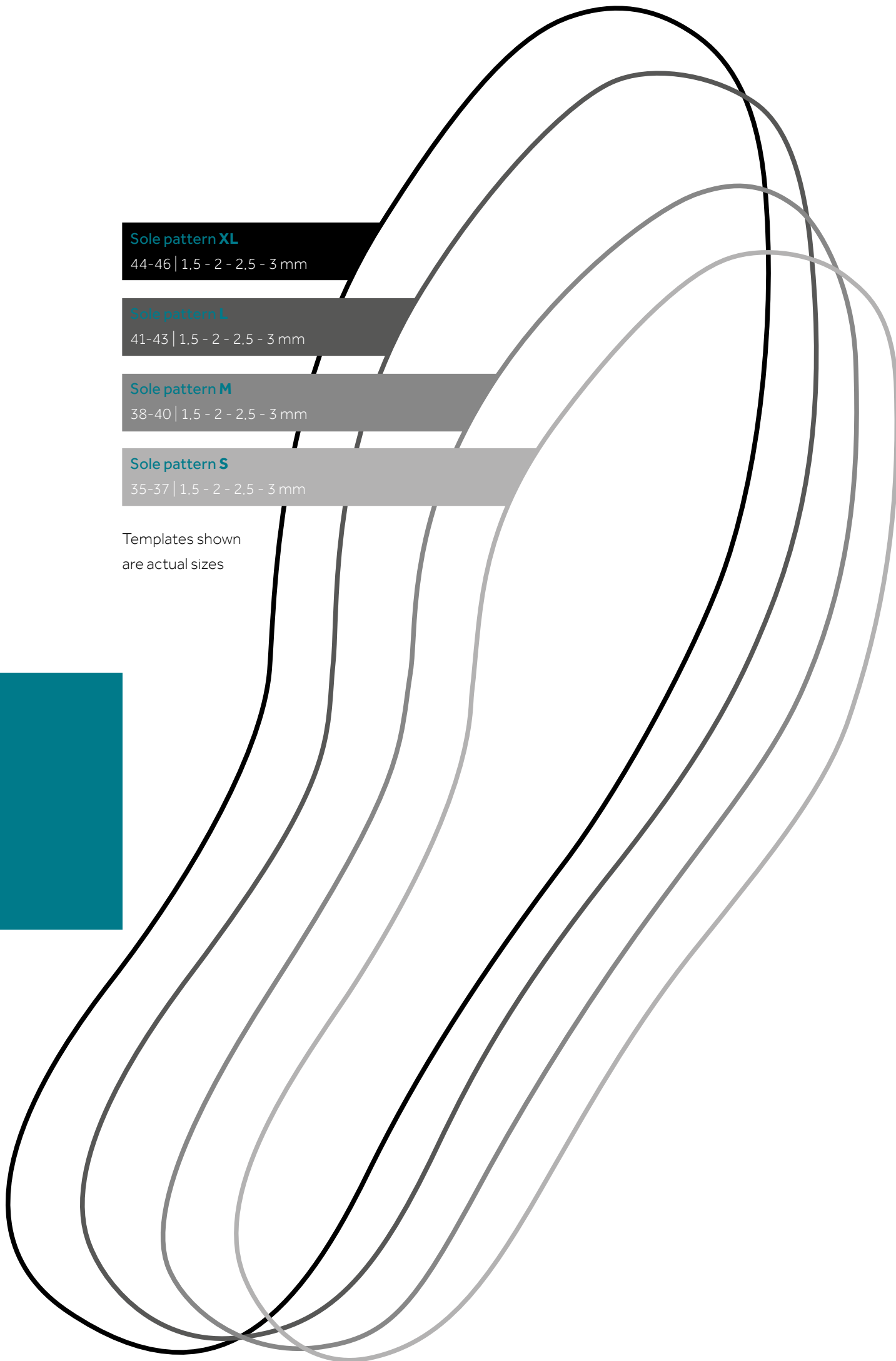
Sole pattern M

38-40 | 1,5 - 2 - 2,5 - 3 mm

Sole pattern S

35-37 | 1,5 - 2 - 2,5 - 3 mm

Templates shown
are actual sizes

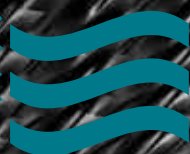


CARBON	200 GRAM/M ²
MIX	245 GRAM/M ²
GLASS FIBRE	290 GRAM/M ²



**AT LEAST
40%
LIGHTER**
COMPARING TO
CONVENTIONAL
MATERIALS

**210°C
/230°C
FULLY
DEFORMABLE**



**AT LEAST
50%
STRONGER**
COMPARING TO
CONVENTIONAL
MATERIALS

**EXTREMELY
DURABLE
AND SOLID**



**SIMPLE
FINISHED**

**RANGE
SOLE
PATTERNS**



FRECOMA COMPANY PROFILE

Frecoma is a Dutch based supplier of products and components for the orthopaedics-, orthotics- and shoe industry with customers all over the world.



Ortalite Performance Composites participates in applications ranging from footwear, orthopedics to orthotics with the most complete line of thermoplastic advanced composites.

www.ortalite.com provides our customers with easy access to product data, sheets, components and suppliers.



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Supplier