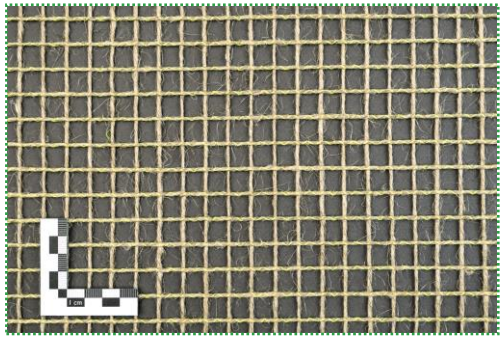
powerRibs

Art. No. 5019

0°/90°



Product description

powerRibs, suitable for manufacturing fiber reinforced composite products with high performance and low environmental impact. This special reinforcement fabric is used to create a rib structure on one surface of the composite layer, significantly increasing the flexural stiffness and damping properties of thin composite shells with little additional weight.

Fabric construction

Fibre type: Flax (EU)

Construction: 0°/90°

Fibre tex: 1500 TEX

Fabric weight: 215 gsm +/- 5%

Architecture: Grid-like fabric with 14 mm mesh size

Measurements

Standard width: 1150 mm

Standard roll length: 50 m

Mechanical composite properties

Due to the discontinuous 3D structure, the mechanical properties of the powerRibs cannot be described in a generic way. The mechanical properties of powerRibs applied to a base layer can be represented by an equivalent homogeneous layer added to the laminate. The equivalent layer represents the “smeared” effect of the powerRibs over the part’s surface.

Note that the equivalent modulus is not identical in both in-plane directions. This is due to the ribs being bonded flat to the base in one direction. However, in the other direction the ribs have to “travel” over the flat ribs at each of their intersections (see modeling FE & 3D guide for illustration).

Due to its grid structure with big tough yarns, powerRibs provides a very high damage tolerance to the part, also ensuring that it stays in one part even when crashed.

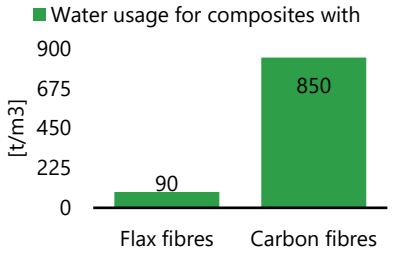
	Technical specifications	Composite*
	Young’s modulus in the wavy ribs direction	3.45 GPa
	Young’s modulus in the flat ribs direction	2.65 GPa
	Shear modulus	280 MPa
	Poisson's ratio	0.04
	Density	363.6 kg/m^3
	Thickness	1.21 mm

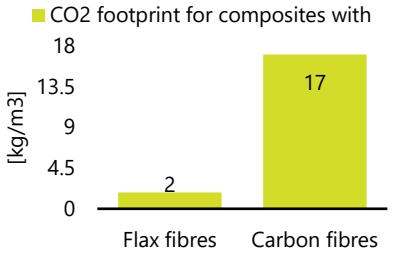
*These are the properties of the equivalent composite layer which can be used to simulate the effect of a powerRibs layer infused with R&G resin L and GL2 hardener, 45% Vf of fibres

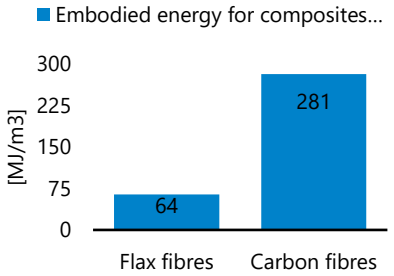
Ecological aspects

Compared to carbon fibre reinforced plastics, powerRibs composite material (flax fibre reinforced plastics) has significantly lower environmental impact due to its weight advantages and lower material input.

Water usage, CO_2 footprint and embodied energy, is about 85% lower while using flax fibre reinforced plastics.







Important facts

- PowerRibs are well compatible with epoxy, polyester or PP matrix
- Flax fibers always contain some humidity at ambient conditions. Some resins (especially polyesters) are sensitive to moisture and may badly polymerize or create bubbles. In that case, dry the fabrics before use (110°C for 15 minutes)
- The key factor to optimize the effect of the powerRibs is to create a good rib structure. Therefore a very flexible vacuum bag, or bladder has to be used, so that the bag matches as well as possible the yarns of the ribs.
- The ribs are normally used as last layer on the surface. However, it is possible to put another fabric layer on the top of it. It creates a composite material similar to a sandwich just with higher stiffness properties. However good compaction is difficult to achieve.
- Near-zero CTE, hence the fabric has good processing compatibility with carbon fibers.

Processing guidelines

The principle of powerRibs is to create a rib structure on the surface of the composite part. Therefore it only works with an open mould process, i.e. with the mold on one face and a flexible membrane on the other. For this reason, different processes are recommended:

Manufacturing with wet lay-up:

Laminate your fabrics in the mold as usual
Be sure that there is a little excess resin quantity on the fabrics (~200-250g/m2)
Place dry powerRibs on the top of impregnated fabrics
Place vacuum bag (very flexible, self-releasing) directly on the fabrics, without peel-ply or flow media.
Pull vacuum: at first the ribs act as air circulation media. Later they get impregnated with excess resin (usage of low viscosity resin is highly recommended).

Manufacturing with prepreg:

Place your prepreg fabrics in the mold as usual
Be sure that there is excess resin quantity in the prepregs (~150-200g/m2), otherwise place a resin film on top of it
Place dry powerRibs on top of the prepreg fabrics
Place vacuum bag (very flexible, self-releasing) directly on the fabrics, without peel-ply or flow media.
Pull vacuum: the ribs act first as air circulation media and then get impregnated by excess resin from the prepreg.
It is also possible to pre-impregnate ribs before placing them on the fabric.
Check the video “How to make parts with powerRibs prepreg” on our website.

Manufacturing with vacuum infusion:

Place your fabrics in the mould as usual
Place the powerRibs fabric as last layer on the top of other fabrics
Place vacuum bag (very flexible, self-releasing) directly on the fabrics, without peel-ply or flow media.
Infuse the fabrics with the resin.
Check the video “How to use the powerRibs” on our website.

Manufacturing with bladder inflation molding:

Place dry or pre-impregnated ribs over the bladder (elastic bladder)
Place other fabrics over the ribs. If the ribs are placed dry, use excess resin in the fabrics)
Place bladder and fabrics in the mould
Inflate the bladder and cure the resin. If the ribs were placed dry, the excess resin in the fabric impregnates them.

Thermoplastic manufacturing by compression moulding:

PowerRibs preimpregnated with PP as well as preforms with powerRibs and a base material of your choice already bonded together are available. Contact the Bcomp team for further information. To compression mould parts with powerRibs while still conserving the 3D rib effect, a silicon insert is placed on the powerRibs side of the mould. Therefore your tool will need a larger gap size to accommodate the silicon stamp. A 3-4 mm silicon with Shore A hardness between 20 and 30 is recommended. See the video “How to make thermoplastic parts with powerRibs” for more details.

For further details please contact us on: t +41 (0)26 558 84 02 | email : contact@bcomp.ch