

BASALT FIBRE



SUSTAINABLE BASALT

Basalt is a relatively new entrant among fiber-reinforced polymers and structural composites. Its chemical composition is similar to that of glass fiber, but it has better strength properties, and unlike glass fiber, its alkali, acid, and salt resistance is very high. Thanks to its properties, basalt fiber is excellently suited for concrete, bridge and coastal structures.

Basalt is a volcanic rock species that has emerged from lava that has cooled rapidly on the surface of the earth. It is the most common type of rock in the earth's crust. The properties of basalt stone vary depending on the origin of the lava, the rate of cooling, and how the lava has been exposed to other elements over time.

Basalt fiber is made from chemically homogeneous basalt rock formations. Basalt rock reserves are virtually inexhaustible. Basalt fiber is environmentally friendly and recyclable. In terms of its features, it is of a high standard, but at the same time inexpensive. Basalt fiber has been named the new material of the millennium.

Basalt fiber is the material of the future, which is why our daily activities include developing the basalt industry, providing high-quality products and services, developing production technology and sourcing partners who strive for high quality standards.



Basalt fiber made of volcanic stone is a unique material, its properties combine high strength, lightness, non-combustibility, acid and base resistance and environmental friendliness.

CONTINUOUS BASALT FIBRE

Continuous basalt fibre is manufactured naturally, without chemical additives:



Basalt reserves are unlimited and the raw material is inexpensive, with costs less than 5% of the total cost of production.

Basalttikivisulasta saatuja valmisteita ovat esim.:










Basalt Fiber - raw continuous basalt fiber.

Basalt Fibre Roving – twisted raw fiber strands. The roving is used in the manufacture of basalt fiber textiles and in composite products.

Chopped Basalt Fibre – cut basalt fiber. Basalt fiber, which has been shredded to varying degrees, is used as a property-modifying additive / filler, for example in the manufacture of concrete, asphalt, etc.

BENEFITS

-  Application temp. -260 to +700 °C
-  High mechanical strength
-  High chemical strength
-  Sustainability and safety

-  Compatibility with all resins and fibres
-  High sound absorption
-  Low water absorption

BASALT COMPOSITE REBAR

Basalt composite rebar is a continuously threaded rod. The factory length can be any and the diameter ≤ 36 mm. It is made of basalt plastic composite material; it is very strong and stainless. The tensile strength of a basalt composite bar is three times that of a steel bar. In terms of corrosion resistance, the basalt composite bar corresponds to good stainless steel, but in terms of weight, strength ratio, it is 9 times lighter.



BENEFITS

- Resistance to alkaline acid, nitric oxide, carbon dioxide and sulfur gases
- Hygroscopic
- Tensile strength higher than steel (2–6 times)
- Four times lighter than steel - lighter construction, and savings in logistics and installation costs
- Passes X-rays and radio waves
- Dielectric
- Does not conduct heat, does not form a cold bridge, reduces the heat loss of the structure
- The degree of expansion is in the same range as concrete, which makes the structures and products reliable and durable in terms of use.

PROPERTIES COMPARED TO OTHER MATERIALS

PROPERTY	STEEL REBAR CLASS A	GLASS FIBRE REBAR	BASALT COMPOSITE REBAR
MATERIAL	Steel, 35GS, 25G2S	Fiberglass yarn treated with thermosetting polymer	Basalt fiber roving treated with thermosetting polymer
TENSILE STRENGTH MPa	590	1200	1400
FLEXURAL STRENGTH MPa	200000	42000	55000
ELONGATION COEFFICIENT, %	14	2,2	2,2
DENSITY, g/cm ³	7,85	1,8	1,9–2
LINEAR THERMAL EXPANSION AX*10-5/°C	13–15	9 – 12	9–12
CORROSION RESISTANCE	Corrosive	Corrosion resistant	Corrosion resistant
THERMAL CONDUCTIVITY	Conductive	Non conductive	Non conductive
ELECTRICAL CONDUCTIVITY	Conductive	Dielectric (non conductive)	Dielectric (non conductive)
MAGNETICITY	Magnetic	Non magnetic	Non magnetic
PROFILES AVAILABLE, Ø - mm	6–80	4–32	4–32
LENGTH	6–12 m	Length according to customer's requirements (standard: 6–12 m bars, any diameter, or in a ball Ø 4–10 mm)	Length according to customer's requirements (standard: 6–12 m bars, any diameter, or in a ball Ø 4–10 mm)
ECO-FRIENDLINESS	yes	yes	yes
LIFE SPAN	Building regulation compliant	Estimate of at least 50 years	Estimate of at least 50 years

The Ø 8 mm composite bar has the same technical properties as the Ø 10 mm metal bar. A kilometer Ø 8 mm composite bar weighs 65 kg / km, a metal bar of the same strength weighs 400 kg/km.

APPLICATIONS

The composite bar is used as a flexible reinforcement in three-layer wall structures in residential, industrial and agricultural construction sites. It is suitable for use in load-bearing, facade cladding and fixed insulation layers in both heavy and light-weight concrete structures (siporex, floor tiles, roof

tiles, uniform foundations). It is also used in road construction to reinforce asphalt and concrete sidewalks. Structures exposed to stray currents and facilities requiring X-ray transmission are also suitable applications for basalt composite bars.



STRENGTH EQUIVALENCES

BASALT COMPOSITE REBAR				STEEL REBAR CLASS A-III (A400c)			
PRODUCT	Ø, mm	Weight, kg/m	Meters/1000 kg	PRODUCT	Ø, mm	Weight, kg/m	Meters/1000 kg
BASALT/GLASSFIBRE	4	0,02	50 000	A-III (A400c)	6	0,22	4 504,5
BASALT/GLASSFIBRE	6	0,04	25 000	A-III (A400c)	8	0,40	2 531,7
BASALT/GLASSFIBRE	7	0,06	16 667	A-III (A400c)	10	0,62	1 620,8
BASALT/GLASSFIBRE	8	0,08	12 500	A-III (A400c)	12	0,89	1 126,1
BASALT/GLASSFIBRE	10	0,20	5 000	A-III (A400c)	14	1,21	826,5
BASALT/GLASSFIBRE	12	0,23	4 348	A-III (A400c)	16	1,58	632,9
BASALT/GLASSFIBRE	14	0,30	3 333	A-III (A400c)	20	2,00	404,9
BASALT/GLASSFIBRE	16	0,35	2 857	A-III (A400c)	22	2,47	335,6
BASALT/GLASSFIBRE	18	0,43	2 326	A-III (A400c)	25	2,98	259,7
BASALT/GLASSFIBRE	20	0,60	1 667	A-III (A400c)	28	4,83	207,0



CHOPPED BASALT FIBRE

Chopped basalt fibre is a cut basalt filament. It is used as a reinforcing material in residential and industrial construction to reinforce concrete and plastic. Chopped basalt fibre is an ecological material. It is very resistant to mechanical wear, water and chemicals. Basalt fibre-reinforced concrete is therefore widely used in floors, construction work on roads and thoroughfares. The use of chopped basalt fibre reduces cement and water consumption by 15%.



BENEFITS OF BASALT FIBRE REINFORCED CONCRETE*

- Up to five times the durability of concrete
- Frost resistance up to 500 cycles higher
- 20–50 % higher compressive strength
- Double the tensile strength
- 30–40 % higher flexural tensile strength
- Five times the impact resistance
- 50 % higher water resistance
- 15 % lower cement consumption and 15% lower water consumption

** compared to unreinforced concret*

PROPERTIES

Basalt fibre is stronger than steel and polypropylene fibre. Compared to glass fibre, the elongation of basalt fibre is lower, as a result of which the concrete exposed to the load breaks less and / or shrinks less.

PROPERTY	BASALT FIBRE	POLYPROPYLENE FIBRE	GLASS FIBRE	STEEL FIBRE
Material	BASALT FIBRE	Polypropylene	Glass fibre	Carbon steel wire
Tensile strength, MPa	3500	150 - 600	1500 - 3500	600 - 1500
Fibre diameter	13 - 17 µm	10 - 25 µm	13 - 15 µm	0,5 - 1,2 mm
Fibre length	3,2 - 15,7 mm	6 - 18 mm	4,5 - 18 mm	30 - 50 mm
Elasticity, GPa	NOT BELOW 75	35	75	190
Elongation, %	3,2	20 - 150	4,5	3 - 4
Melting point, °C	1450	160	860	1550
Alkali/corrosion resistance	HIGH	High	Alkali resistant only	Low
Tiheys, g/cm ³	2,60	0,91	2,60	7,80

CONSUPTION IN CONCRETE MANUFACTURE

CONCRETE TYPE, APPLICATION	CHOPPED BASALT FIBRE CONSUPTION	RECOMMENDED LENGTH AND DIAMETER
Floor masses, industrial floors with a solid treated base	1% of cement weight (instead of metal rebar)	12–24 mm 16–17 µm
Industrial floors exposed to heavy loads untreated substrate	1% of cement weight (with rebar and mesh)	12–24 mm 16–23 µm
Spacers, columns, reinforced concrete frame	1, 5 kg / m ³	12–24 mm 16–23 µm
Buildings and structures foundations	1,5–2 kg / m ³	12–24 mm 16–23 µm
Road construction	1% of cement weight (instead of metal rebar)	12–24 mm 16–23 µm
Render applications	0,6 % of cement weight	6 mm 16 µm
Aerated concrete products (foam concrete, siporex)	0,25–0,4 % of cement weight	6–12 mm 16 µm

APPLICATIONS

Basalt fiber is very resistant to mechanical wear, which is why basalt fiber-reinforced concrete is widely used in floors and high-load construction sites on highways. Basalt fiber concrete is used in earthquake-resistant structures, military bases and concrete pipes carrying liquids containing corrosive substances and abrasive components. The durability and hygroscopic properties of very strong materials make basalt fiber invaluable in the manufacture of hydraulic structures and breakwaters. Fiber treated



with a “dry” water-repellent adhesive is used in the manufacture of brake pads and needled fabric.

BASALT FIBRE MESH

Basalt fiber mesh is an efficient and inexpensive alternative to conventional metal mesh. It is suitable for use in infrastructure, mining and building construction, renovation and reconstruction work. Basalt fiber mesh is easy to handle and install. In road construction, the network distributes the surface load evenly over the entire surface area and improves the tensile strength of the surface structure. In the mines, the basalt / polyester network enhances and facilitates the fixing of walls and roofs during excavation. A light-weight mesh is also safer than a heavier steel mesh. In building construction as a plaster and reinforcement mesh, basalt mesh is a light, durable and environmentally friendly option. The density, mesh size and composition of the net will vary depending on the application.



TECHICAL DATA

MESH TYPE	GEO MESH ROAD CONSTRUCTION			BASALT MESH MINE WALL REINFORCEMENT				POLYESTER MINE- NING MESH WALL STABILIZATION L->2,5 m		POLYESTER MESH MINE DOME STABILIZATION			BASALT CONSTRUCTION MESH		
	50(25)	100(40)	150(40)	SBS 100/100 - 50(380)	SBS 70/70 - 50(380)	SBS 40/40 - 45(250)	SBS 50/50 - 45(250)	SPS 50/50 - 45(250)	SPS 80/80 - 45(250)	SPS 200/200	SPS 800/800	SPS 600/4	50/25	100/25	
WEIGHT g/m ²	250	500	750	950	750	350	370	380	450	1700	5500	3000	250	250	
BREAKING LOAD ≥ kN/m	LENGTH- WISE	50	100	150	100	70	40	50	50	80	200	800	600	50	100
	CROSSWISE	50	100	150	100	70	40	50	50	80	200	800	400	50	100
ELONGATION AT BREAK ≤, %	LENGTH- WISE	3	3	3	4	4	4	4	11	11	11	11	11	3	3
	CROSSWISE	3	3	3	4	4	4	4	11	11	11	11	11	3	3
ACCEPTABLE TENSILE ST- RENGTH DETERIORATION AFTER 25 FREEZE-THAW CYCLES ≤, %	5	5	5											5	5
MASS FRACTION OF SUB- STANCES LOST IN THE AT IG- NITION ≥, %	18	18	18												
DIMENSIONS OF CELL WALLS ALONG THE OPEN AREA (±2 %), mm (±2 %), mm	25	40	40	50	50	45	45	45	45	30	40	40	25 x 12 25 x 25 (14 x 8) (4 x 4)	25 x 25 50 x 50	
MAX. ROLL WIDTH (±2 %), cm	540	540	540	380	470	250	250	250	250	ALLE	ALLE	ALLE	540	540	

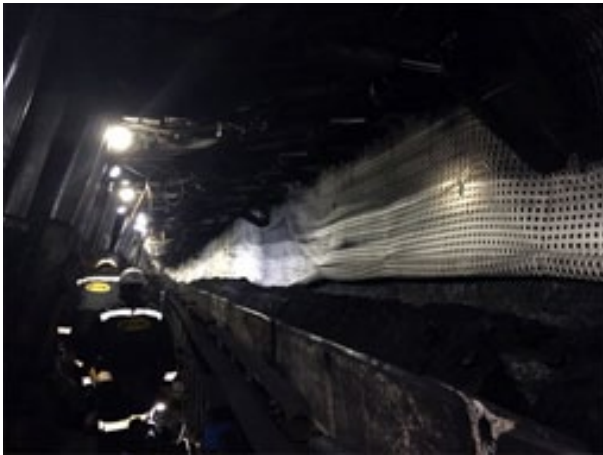
BENEFITS

- High strength, tensile and fracture resistance under heavy load
- Even load distribution over the entire surface area
- Impact resistance at high loads

- Totally environmentally friendly
- Resistant to chemicals and other strong substances
- Waterproof, does not store water, water flows freely through the net
- Fireproof and refractory
- Rejects microbial growth and small rodents
- Easy to install and disassemble
- Inexpensive for road construction
- Withstands weather and temperature fluctuations as well as extreme temperatures during installation
- Long life cycle, 35–40 years.

APPLICATIONS

Basalt mesh is used in road construction and the mining industry. As an additional component in the reinforcement of foam blocks, aerated concrete wall blocks and shaped bricks. As a plaster net for facade work under surface cladding. In the manufacture of panels with low thermal conductivity. In stone structures for reinforcing horizontal joints. For reinforcing floor castings regardless of weather conditions. Between large stone or block cladding and the base as a fastening element.



BASALT FIBRE TEXTILE

The properties of basalt textiles are diverse: it is an environmentally friendly material - it is made of natural basalt stone, it does not emit any carcinogens (unlike asbestos), the uses are diverse. Basalt textile is one of the best thermal insulation materials, its highest heat resistance and operating temperature is +700 ° C. Such woven materials have a high alkali-acid resistance, they also repel molds and other microorganisms. The life cycle of basalt textiles is 50 years.



BENEFITS

- Good adhesion
- Suitable for use with all types of resins
- Non-combustible and fire suppressant
- Excellent tensile strength
- Withstands high temperatures
- Resistant to electromagnetic radiation
- Resistant to very strong substances
- Resistant to vibration
- Durable (life cycle at least 50 years)
- Environment friendly
- Operating temperature -260 to +700 °C
- High chemical resistance to acid-alkali, seawater and salt.

APPLICATIONS

- Reinforcement of composite materials and structural plastics impregnated with epoxy, polyester and other resins
- Fire protection, sound and heat insulation of various structures, encapsulation of thermal insulation materials, etc.
- Reinforcement of concrete and reinforced concrete structures
- Protection of hot surfaces (protection of floor surfaces from hot pipes, protection of walls near stoves and fireplaces)

- Thermal insulation in welding work
- Manufacture of fire-resistant clothing, curtains and blinds
- Tuulienergiageneraattoreiden aerodynaamiset siivet ja putket
- Aerodynamic blades and tubes for wind turbines
- Aircraft and helicopter fuselages, rotors, wings, protective profiles, seats
- Hulls of watercraft
- Vehicle parts, refrigerated tanks
- Tanks and pipes containing corrosive substances
- Sports equipment
- Limb prostheses, treatment equipment

TECHNICAL DATA

PRODUCT	TEXTILE TYPE	SURFACE DENSITY g/m ²			THREAD NR / INCH		THREAD OF SEWING	ROLL WIDTH cm
		WARP	WEFT	TOTAL	WARP	WEFT		
ONPP-B-10-380-KV41	Unidirectional	315	55	380	10	12	Polyester 76 dtex	125
ONPP-B-10-540-KV41	Unidirectional	475	55	540	10	12	Polyester 76 dtex	125
BNPP-B-10-400-KV41	Biaxial	200	190	400	10	12	Polyester 76 dtex	125
BNPP-B-10-610-KV41	Biaxial	315	285	610	10	12	Polyester 76 dtex	125

PRODUCT	TEXTILE TYPE	WEAVING	BREAKING LOAD ON WARP / WEFT, H		SURFACE WEIGHT g/m ²	THICKNESS, mm	WIDTH, cm
BT-100	Structural	satin 5/3	1715	980	380 (+/- 25)	0,29 +/- 0,03	100
TBK-100	Strukturaalinen	tavallinen	784	784	210 (+/- 20)	0,19 +/- 0,025	100



BASALT FIBRE ROVING

BASALT FIBRE



BASALT FIBRE FILLER

