



Basalt Yarns

Technical Data Sheet

19th August 2014

1. Nomenclature. Example:

BY110.068*2*4Z100.12:	BY	110	068	*2*4	Z100	12
Basalt yarn						
Filament diameter 11.0 µm						
Single yarn count 68 tex (g/km)						
8-ply cabled yarn (count 68 x 2 x 4 = 544 tex)						
100 twists per m in Z direction						
Number of sizing						

2. Basalt fiber

Fiber	Basalt continuous filament
Specific weight (without sizing) , g/cm ³	2.67

3. Types of sizings

Sizing	Type	Compatibility	Sizing content, % weight	Moisture content, % weight	Processing and applications
Nr.12	Silane	EP, PF	0,4 - 0,8	<0,5	Weaving, braiding, knits, etc.
Nr.11	Silane	UP, VE, EP	0,4 - 0,8	<0,5	Weaving, braiding, knits, etc.

4. Standard yarns (sizing no. 12 default)

a. Single yarns

Filament diameter, µm	Count, tex (±5%)	Twists per m (TPM) in Z or S direction
10	68	28-100
10	90	28-100
11	100	28-100
11	110	28-100
13	150	28-100

b. Ply yarns

Single yarns	Twist		Ply yarns
	Number of ply	Twists per m (TPM) in S or Z direction	
10 µm, 68 tex	2-ply	28-100	10 µm, 68*2 (136 tex) 2-ply yarn
10 µm, 90 tex	2-ply	28-100	10 µm, 90*2 (180 tex) 2-ply yarn
10 µm, 90 tex	3-ply	28-100	10 µm, 90*3 (270 tex) 3-ply yarn
11 µm, 100 tex	2-ply	28-100	11 µm, 100*2 (200 tex) 2-ply yarn
11 µm, 100 tex	3-ply	28-100	11 µm, 100*3 (300 tex) 3-ply yarn
13 µm, 150 tex	2-ply	28-100	13 µm, 150*2 (300 tex) 2-ply yarn

c. Cabled yarns

Ply yarns	Twist		Cabled yarns
	Number of ply	Twists per m (TPM) in S or Z direction	
10 µm, 68*2	4-ply	28-100	10 µm, 68*2*4 (544 tex) 8-ply cabled yarn
11 µm, 100*2	3-ply	28-100	11 µm, 100*2*3 (600 tex) 6-ply cabled yarn

5. Twists per meter (TPM)

Twists per m in Z or S direction	Tolerance for twist per meter, %
28 - 50 TPM	± 20 %
51 - 100 TPM	± 15 %
101 - 150 TPM	± 10 %

6. Mechanical properties

Filament diameter	Specific tensile strength of the twisted yarn, mN/tex
10 µm with tex 68 and tex 136	> 700
10 µm	> 650
11 µm	> 600
> 11 µm	> 550

7. Packaging information

Type of packaging: cardboard box on pallet.

Flange spool	Tex	Net weight, kg	Spool amount in the box
	68	2 - 3 kg	
	68*2	4 - 6 kg	
	other	5 - 7 kg	66 or 88 pieces

8. **Properties of basalt fiber**

a) **Mechanical properties**

Monofilament diameter, μm	10	13	17
Tensile test according ASTM D-3822 (dry fiber), tensile strength, mN/tex	≥ 700	≥ 650	≥ 600
Tensile test according ASTM D-2343 (in epoxy impregnated strand), tensile strength, MPa	3200	3100	2900
Tensile test according ASTM D-2343 (in epoxy impregnated strand), tensile modulus, GPa	90-94	88-92	86-90
Tensile test according ASTM D-2101 (Basalt monofilament), tensile strength, MPa	4300	4200	4000
Tensile test according ASTM D-2101 (Basalt monofilament), tensile modulus, GPa	95	93	92

b) **Tensile strength change by the heating of the basalt fiber**

Temperature	+20°C	+200°C	+400°C
Tensile strength change	100%	95%	80%

c) **Thermal operating range of basalt fiber**

Thermal load duration	Temperature range
Permanent	From -260 up to +400 °C
(1) Stage 1: amorphous fiber with sizing on the fiber surface	Up to +200 °C
(2) Stage 2: burning of sizing (10-15 minutes), amorphous fiber	From +200 up to +350 °C
(3) Stage 3: amorphous fiber without sizing on the fiber surface	From +350 up to +400 °C
Short term (few minutes)	From +400 up to +850 °C
(4) Stage 4: transition of FeO into Fe ₂ O ₃ and beginning of crystallization of Fe ₂ O ₃ . The fiber is becoming less and less amorphous and more and more brittle	From +400 up to +850 °C
Short term (few seconds)	From +850 up to +1250 °C
(5) Stage 5: all the Fe ₂ O ₃ is in crystal form, the material is extremely brittle, its mechanical properties are extremely poor but without stress and vibration it continues working as thermo insulation pretty good	From +850 up to +1050 °C
(6) Stage 6: sintering temperature	From +1050 up to +1250 °C

d) **Thermal properties of basalt**

Melting range	1460-1500 °C
Crystallization temperature	1250 °C
Sintering temperature	1050 °C
Thermal conductivity, W/(m · K)	0.031-0.038

e) **Chemical stability**

	Cem FIL	Basalt	E-glass
Weightlessness in 3-hour boiling in water	-	0.2%	-
Weightlessness in 3-hour boiling in saturated cement solution (pH 12,9)	0.15%	0.35%	4.5%
Weightlessness in 3-hour boiling in 2N solution HCl (hydrochloric acid)	-	2-7%	38.5%
Weightlessness in 3-hour boiling in 2N solution NaOH (sodium hydroxide)	-	6%	-
Weightlessness in 30 minutes and in 180 minutes in H ₂ SO ₄ (sulfuric acid)	-	2% and 6%	14% and 22%

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