

HIGH-MODULUS HIGH-STRENGTH GLASS FIBERS



BMI HIGH-MODULUS HIGH-STRENGTH GLASS FIBERS developed by OJSC "NPO Stekloplastic" are unique reinforcements to meet the development composite constructions. As for now the system of glass fibers is completely GMP based and BMI-fibers are much higher superior to conventional reinforcements with traditional E-glass or borosilicate glass fibers by their optimum chemical composition. Advantages of GMP fibers are specified by their optimum chemical composition.

Chemical Composition of BMI Glass

Components	SiO ₂	Al ₂ O ₃	MgO	TiO ₂	Fe ₂ O ₂	ZrO ₂	Na ₂ O+K ₂ O
Content of components, % - weight	56-60	20-27	10-15	2.20-7	0.1-0.8	0.1-0.2	0.3-1.0

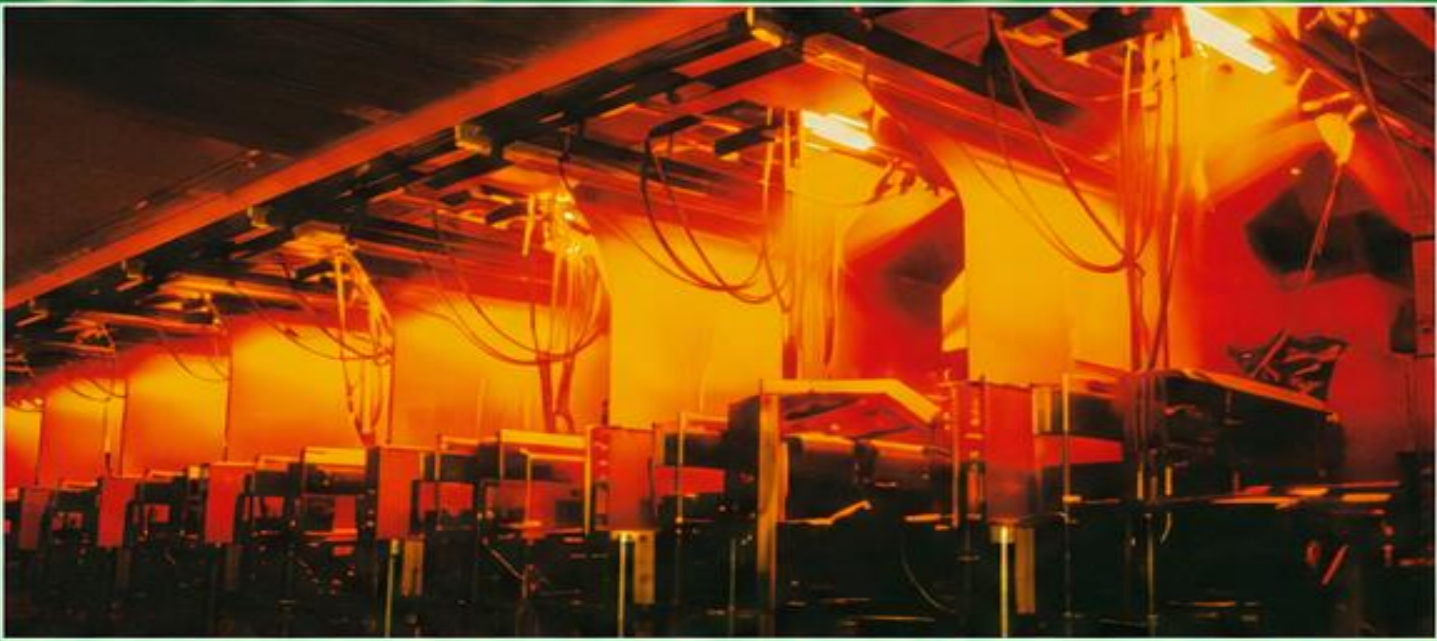


Properties	Units	Typical Values of BMI Fibers
Density	g/cm ³	2.68
Tensile Strength	MPa	2800-3500
Tensile Modulus	GPa	140-160
Elongation at Break	%	1.8-2.2
Filament Diameter	µm	8-15
Operating Temperature	°C	-200 to +700
Moisture Content	%	< 0.10
Sizing Content	%	0.8-1.2

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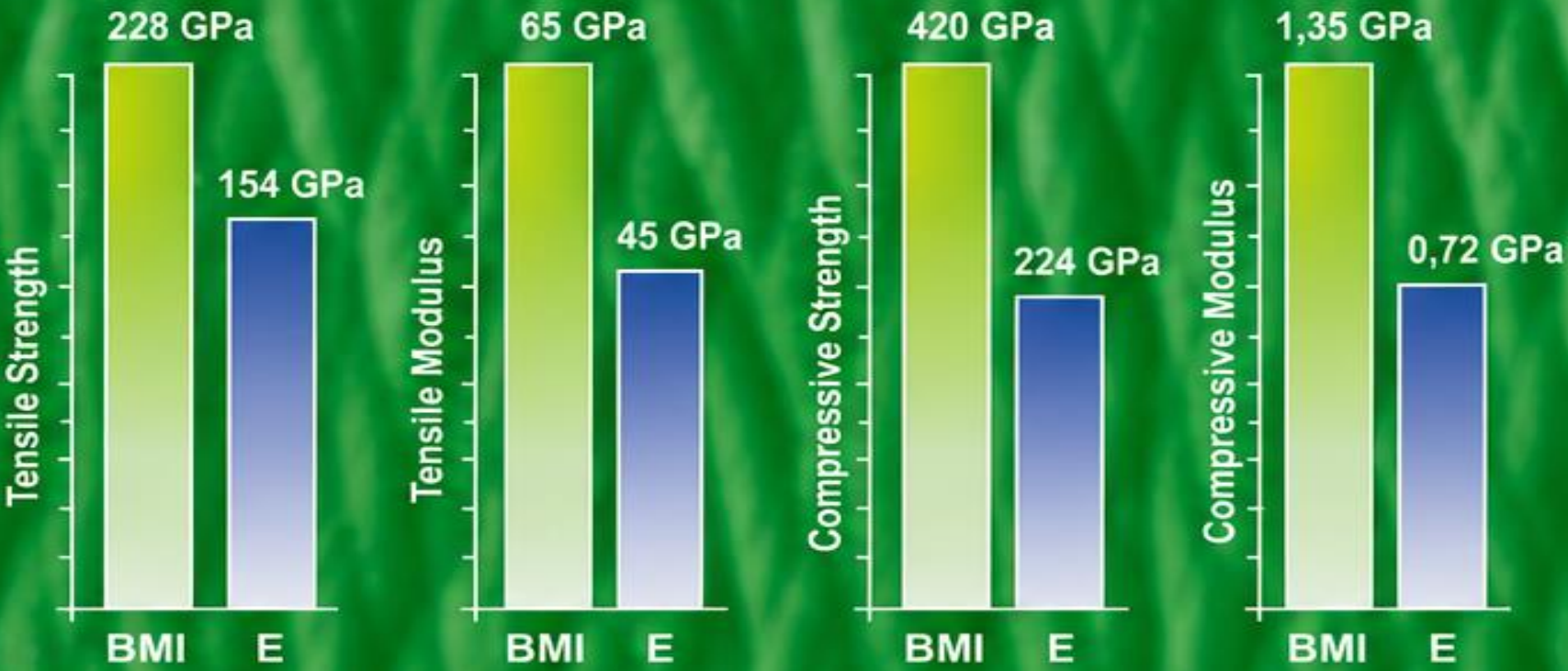
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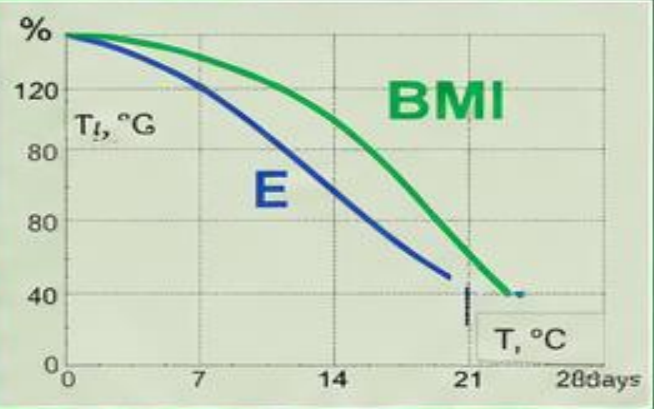
Comparative Characteristics of Glass Fibers

Characteristic	BMI	E
Tensile strength, GPa	4.2	3.2
Tensile modulus, GPa	140	72
Elongation at break, %	2.6	3.2
Density, g/cm ³	2.68	2.54
Diameter, μm	8-15	9-15
Temperature index (working), °C	-200 to +700	-200 to +450
Water absorption, %	0.2	0.3
Diameter deviation (distribution), %	±15	±20
Reel weight (package), kg	67.2	62.5

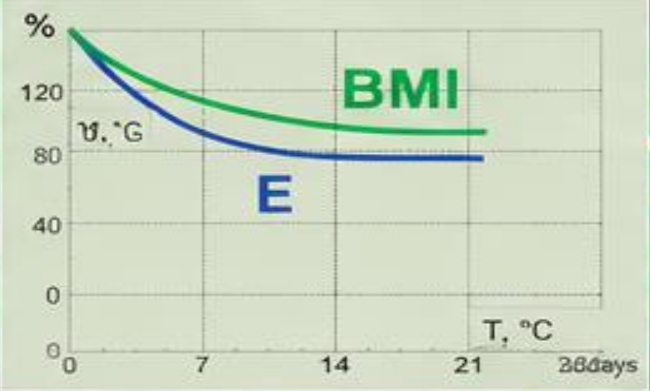
Comparative Elasticity and Strength Properties of Unidirectional Epoxy Glass Reinforced Plastics



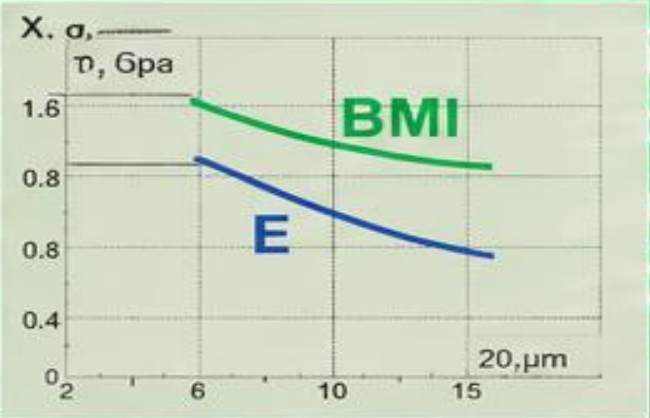
Strength retention of Resin (σ_b) after immersion (7D) action



Strength retention of Resin (σ_b) after water effect (7D)



Dependence of Resin'E' tensile strength (σ_b) of Unifilial Yarn upon the Filum Diameter [d]



Long-term Strength of Resin (σ_b) of Unifilial Yarn in air to reference strength of Filums basic E- for 20°C , 65%RH (t)



Technical Characteristics of Resin

Properties	BMI	E
Tensile strength , GPa	2.8	3.2
Tensile modulus , GPa	140	72
Elongation at break , %	2.6	3.2
Density , g/cm ³	2.68	2.54
Heat resistance , °C	250	150
Moisture absorption , %	0.2	0.3
Chemical resistance	Excellent	Good

Characteristics of Filums

Properties	Filum Diameter, μm						
	2.5	5.0	7.5	10	12.5	15	17
Filum Density, g/cm ³	2.68	2.68	2.68	2.68	2.68	2.68	2.68
Filum Tensile Strength, GPa	3.8	3.6	3.4	3.3	3.1	2.9	2.7
Filum Tensile Modulus, GPa	150	140	130	125	115	110	100
Filum Elongation at Break, %	2.6	2.6	2.5	2.5	2.4	2.4	2.3
Filum Moisture Content, %	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Filum Moisture Recovery, %	0.3	0.3	0.3	0.3	0.3	0.3	0.3

Technical Characteristics of Twisted Yarns Made from BMI Glass Fibers

Yarn designation	Nominal linear density, tex	Breaking strength, N, not less than	Number of twists per 1 m of yarn
BMI/TC6 14.4x1 Z 100	57.6	34.3	100
BMI/TC6 14.4x2 Z 100	28.8	16.6	100
BMI/TC6 14.4 S 50	14.4	9.8	50
BMI/TC6 17x2 Z 100	108.0	76.0	100
BMI/TC6 28x4 Z 100	112.0	58.8	100
BMI/TC6 28x2 Z 100	56.0	37.2	100
BMI/TC6 28x2 Z 100	58.0	41.0	100
BMI/TC6 29x2 Z 100	58.0	41.0	100



Technical Characteristics of Rovings Made from BMI Glass Fibers

Roving designation	Fiber diameter, μm	Nominal linear density, tex	Breaking strength, N, not less than
PBM/TH10-400	10	400	250
PBM/TH10-1200	10	1200	600
PBM/TH10-2400	10	2400	1200
PBM/TH13-450	13	450	250
PBM/TH13-900	13	900	500
PBM/TH13-1200	13	1200	600

Technical Characteristics of the Glass Fabrics Made from High-Modulus High-Strength Fibers

BMN



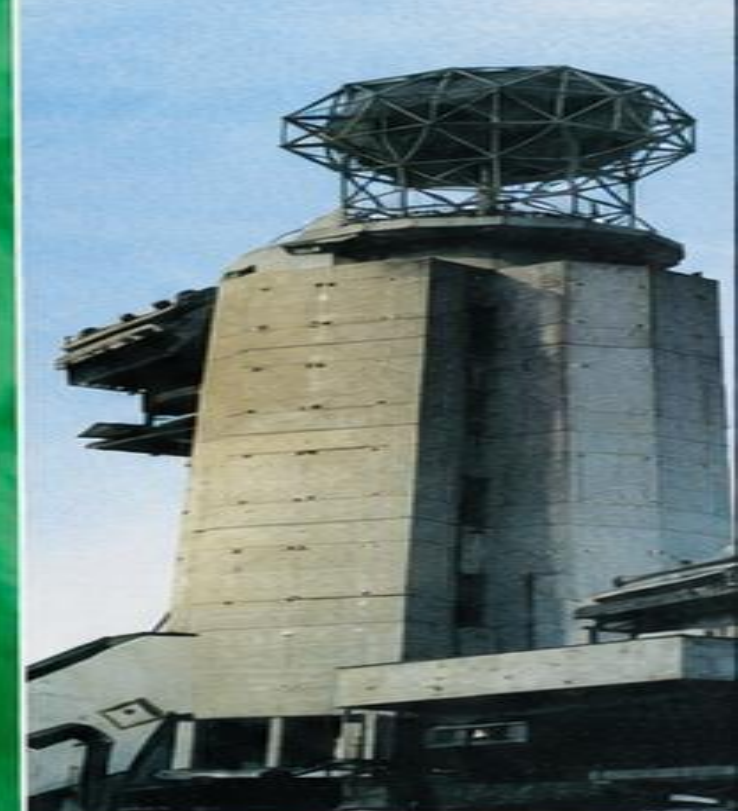
	Twisted yarn glass fabrics							
	T-25 (BMN)	T-26 (BMN)	TCY-8/3 (BMN)	T-10 (BMN)	T-53 (BMN)	combined		
						T-60/2 (BMN)	T-42/11 (BMN)	T-42 (BMN)
Weave	Plain	Plain	Satin 8/3	Satin 8/3	Crowfoot Satin	Plain	Satin 5/3	Satin 5/3
Surface density, g/m ²	365	280	320	310	270	215	150	280
Thickness, mm	0.30	0.22	0.27	0.25	0.22	0.22	0.26	0.26
Breaking strength, N, Warp/Weft	4410/343	3430/196	2155/2842	3136/1764	3040/490	3136/-	2943/784.8	3237/1952

According to customer requirements fabrics of various structures can be produced.





High elasticity and strength properties of composites based on glass fibers of type BMN determined their wide application not only in aerospace but automotive and shipbuilding industries. Reinforced materials based on BMN fibers are used for manufacturing high pressure bottles, pipes and vessels; for moulding ballistic proof materials; for heavy loaded building structures and elements of wind power plants; for sports as well as for recreation items.



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