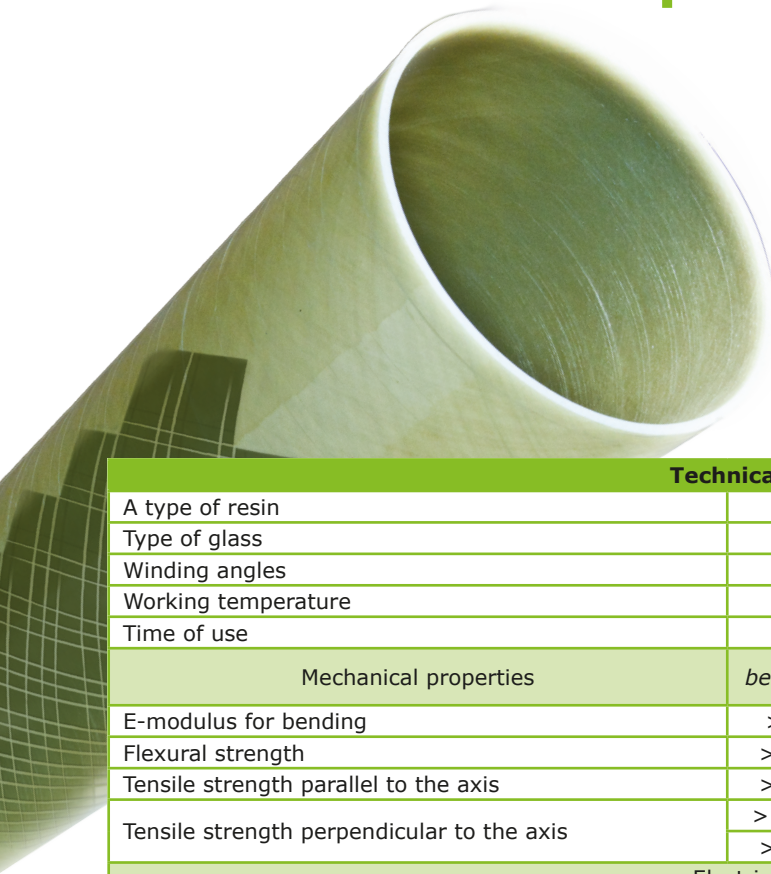




## Pipes Glass-Epoxy Tubes for Insulator Housings

At the customer's request, the pipes can be made with diameters other than those specified

# Glass-Epoxy Tubes for Insulator Housings



Glass-epoxy FRP (Fiber Reinforced Polymer) pipes are made by winding on metal cores saturated with an epoxy composition of glass fiber. The structure of the pipe is programmed. It consists of successively superimposed layers of fiber, each of which has an appropriate winding angle. The direction in which the fibers are arranged in the layers depends on the type of loads transferred by the pipe. Most often it is bending and internal pressure or both bending and internal

pressure and in some cases torsion. Due to the directional properties of the glass fiber, glass-epoxy pipes are characterized by a very high anisotropy of mechanical properties. Very high mechanical strength and very good electrical insulating properties of glass-epoxy composites have made them widely used in the power industry as insulating and structural elements in AC and DC outdoor and indoor electrical devices.

Glass-epoxy pipes meet the requirements of PN-EN 61462.

The production offer includes pipes with internal diameters:

Ø 60 mm, Ø 63 mm, Ø 80 mm, Ø 86 mm, Ø 98 mm, Ø 110 mm, Ø 120 mm, Ø 122 mm, Ø 130 mm, Ø 150 mm, Ø 153,7 mm, Ø 160 mm, Ø 180 mm, Ø 198 mm, Ø 200 mm, Ø 202 mm, Ø 220 mm, Ø 228 mm, Ø 240 mm, Ø 248 mm, Ø 250 mm, Ø 254,4 mm, Ø 288 mm, Ø 300 mm, Ø 315 mm, Ø 328 mm, Ø 340 mm, Ø 350 mm, Ø 440 mm, Ø 500 mm

At the customer's request, pipes with diameters other than those specified above can be made.

## Technical parameters

A type of resin	Epoxy resin				
Type of glass	E, ECR				
Winding angles	Combination: from 10° to 90°				
Working temperature	-50°C... + 100°C				
Time of use	> 30 years				
Mechanical properties	<i>bending</i>	<i>pressure</i>	<i>bending / pressure</i>	<i>Unit</i>	<i>Standard</i>
E-modulus for bending	>21	>11	>19	GPa	PN-EN 61462
Flexural strength	>300	>100	>250	MPa	PN-EN 61462
Tensile strength parallel to the axis	>250	>160	>220	MPa	PN-EN ISO 527-4
Tensile strength perpendicular to the axis	>1900	>2800	>2400	N/mm	PN-EN 1394
	>150	>220	>190	MPa	
Electrical properties					
Puncture strength parallel to the axis (50Hz)	≥3			kV/mm	PN-EN 60243-1
Puncture strength perpendicular to the axis (50Hz)	≥8			kV/mm	PN-EN 60243-1
Water diffusion testing	<1			mA	PN-EN 62217
Partial discharges level	<2			pC	PN-EN 60270
Dielectric permittivity $\epsilon_r$ (20°C, 50Hz)	<5,3				IEC 60250
Dielectric loss factor $\tan\delta$ (20°C, 50Hz)	<20			10 <sup>-3</sup>	IEC 60250
Physical properties					
Glass content in the plastic (by weight)	>77			%	PN-EN ISO 1172
Density	2,05			g/cm <sup>3</sup>	PN-EN ISO 1183-1
Glass transition temperature T <sub>g</sub>	>130			°C	PN-EN 61006
Dye penetration test	>15			min	PN-EN 62217
Water absorption	<0,1			%	PN-EN ISO 62
Tightness	<5·10 <sup>-6</sup>			bar·cm <sup>3</sup> /s	PN-EN 60068-2-17
Combustibility	31,7			%	PN-EN ISO 4589-2
Colour	Natural				