

The laminate structure of HOBAS GRP Pipes may vary, depending on the requirements such as pressure class (PN), stiffness (S) longitudinal tensile strength. The material data in the table is therefore simply to be regarded as a guideline.

We can provide more accurate material data for specific pipes on request.

### Properties/long-term values:

The properties of the pipes manufactured, such as stiffness, ring deflection and longitudinal tensile strength are routinely checked as part of quality assurance. Geometric properties, such as wall thickness, outside diameter and liner thickness, are measured and checked to internal quality standards.

Test procedures and regulations are defined in the applicable standards. You will find more detailed information about them and other material tests, such as abrasion, long-term values, hydraulic properties, chemical resistance, etc. in our brochure CC-GRP Pipes Features, Tests and Benefits.

Material data	Unit	Orientation	
		Circumferential	Longitudinal
Density	kg/m <sup>3</sup>		~ 2000
Tensile elastic modulus (at 23°C)	MPa	10000 - 15000	10000 - 12000
Tensile strength (standard)	MPa	90 - 130	15 - 40
Tensile strength (locked design)	MPa	200	80 - 100
Tensile strain (at break): < PN 10	%	1.2 - 1.5	0.25
Tensile strain (at break): ≥ PN 10	%	1.8 - 2.0	1.0 - 1.4
Poisson's ratio	-	~ 0.3	~ 0.25
Compressive elastic modulus (at 23°C)	MPa	12000 - 18000	12000 - 18000
Compressive strength	MPa	130 - 140	90 - 100
Compressive strain (at break)	%	1.2 - 1.5	1.8 - 2.0
Flexural modulus	MPa	10000 - 15000	-
Flexural strength	MPa	120 - 140	15 - 40
Flexural strain (at break)	%	1.6 - 2.2	1.0
Circumferential strain at PN	%	0.2 - 0.3	-
Circumferential strain at 1.5 x PN	%	0.3 - 0.4	-
Temperature resistance	°C		≤ 40 *
Chemical resistance (pH range)	pH		1 - 10 **
Temperature expansion coefficient	1/K		26 - 30 x 10 <sup>-6</sup>
Thermal conductivity	W/m/K		0.5 - 1.0
Heat capacity	kJ/kg/K		1.0 - 1.4
Pressure wave propagation rate	m/s		~ 450
Roughness (to Colebrook White) k	mm		0.01 - 0.016

\*Temperature up to 80°C on request

\*\*Higher/lower pH on request