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Fiberglass Reinforced Polymer gratings and structures
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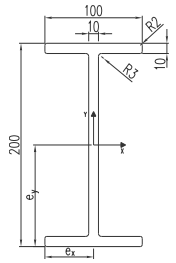
19_53I20010010I
28.11.2018
Rev. 4

PULTRUDED PROFILES

Profile type "I" (53I20010010I)

Height	mm	200	*Area*	*A*	mm²	3.801
Width	mm	100	*Weight*	*P*	Kg/m	6,5
Thickness 1	mm	10	*Moment of inerzia with respect to x - axis*	J_X	mm⁴	22.926.198
Thickness 2	mm	10	*Moment of inerzia with respect to y - axis*	J_Y	mm⁴	1.665.053
Radius 1	mm	3	*Section Modulus with respect to x - axis*	W_X	mm³	229.262
Radius 2	mm	2	*Section Modulus with respect to y - axis*	W_Y	mm³	33.301
Standard Color (RAL approximate)	Gray RAL 7035		*Centroid in x direction*	e_X	mm	50
Standard Length	mm	6000 (±10 mm)	*Centroid in y direction*	e_Y	mm	100



Raw materials	*Isophtalic polyester resin*
	Roving glass fiber type "E" – Continuous strand mat – Polyester surface veil
For other colors, resins or reinforcings contact M.M. S.r.l. directly	

Ageing resistance	**Ageing test made with UV lamp according to ASTM G154-06 and passed with 5 points on the gray range and without evident defects** (test made with 1500 hours of exposure to 4 hours alternate cycles at a UV temperature of 60°C and 4 hours at a condensed temperature of 50°C irradiated by UVB 313 nm lamp, radiance 0,71 W/m²)
	After the exposure to heat, cold and humidity cycles according to UNI EN ISO 9142/04 norm (n° 21 cycles type D3) there are no evidence of defects

Mechanical properties		*Unit*	*Average value*	*Test method*	*Mechanical properties*		*Unit*	*Average value*	*Test method*
Bending effective elastic modulus	E_{eff}	*GPa*	22 ÷ 30	*UNI EN 13706-2*	Longitudinal pin bearing strength	f_{Lr}	*MPa*	100 ÷ 200	*ASTM D953*
Shear effective elastic modulus	G_{eff}	*GPa*	1,2 ÷ 3,8	*UNI EN 13706-2*	Transversal pin bearing strength	f_{Tr}	*MPa*	30 ÷ 70	*ASTM D953*
Longitudinal tensile strength	f_{Lt}	*MPa*	300 ÷ 500	*ASTM D638*	Longitudinal tensile elastic modulus	E_{Lt}	*GPa*	22 ÷ 30	*ASTM D638*
Transversal tensile strength	f_{Tt}	*MPa*	20 ÷ 40	*ASTM D638*	Transversal tensile elastic modulus	E_{Tt}	*GPa*	5 ÷ 10	*ASTM D638*
Longitudinal compressive strength	f_{Lc}	*MPa*	180 ÷ 300	*ASTM D695*	Longitudinal compressive elastic modulus	E_{Lc}	*GPa*	16 ÷ 21	*ASTM D695*
Transversal compressive strength	f_{Tc}	*MPa*	40 ÷ 100	*ASTM D695*	Transversal compressive elastic modulus	E_{Tc}	*GPa*	5 ÷ 9	*ASTM D695*
Longitudinal bending strength	f_{Lf}	*MPa*	300 ÷ 500	*ASTM D790*	Longitudinal Poisson ratio	ν_{LT}	-	0,28	*ASTM D638*
Transversal bending strength	f_{Tf}	*MPa*	40 ÷ 100	*ASTM D790*	Transversal Poisson ratio	ν_{TL}	-	0,12	*ASTM D638*
Longitudinal interlaminar shear strength	f_{LV}	*MPa*	20 ÷ 36	*ASTM D2344*					

The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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Physical properties		Unit	Average value	Test method	Physical properties	Unit	Average value	Test method
Specific weight		g/cm^3	1,75÷1,9	ASTM D792	Surface Resistivity	Ω	$10^9 \div 10^{12}$	EN 61340
Fiberglass weight ratio		%	60	ASTM D2584	Dielectric resistance	kV/mm	3 ÷ 7	ASTM D149
Fiberglass volume ratio		%	42,5	ASTM D2584	Thermal conductivity	W/mk	0,35	EN 12667 EN 12664
Glass transition temperature	T_g	°C	100	ISO 11357	Water absorption (H_2O)	%	0,40	ISO 1172
Linear thermal expansion coefficient		K^{-1}	$8 \div 11x10^{-6}$	ISO 11359-2	Barcol hardness		50	ASTM 2583
Elongation to break		%	1,5	ASTM D638 UNI 5819	Impact strength (Charpy)	kJ/m2	230	ASTM D256 UNI 6062

Advices for design

1. For a correct design of FRP structures, we recommend to pay particular attention to the local and global buckling of the profiles. Contact M.M.'s technical department for further assistance.

2. Avoid to apply tensile/compressive concentrated loads on the flanges of the profiles as illustrated in the below drawings.