M.M. S.R.L.
Fiberglass Reinforced Polymer gratings and structures

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DNV·GL
ISO 9001

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PULTRUDED PROFILES

Profile type "C" (53C30010015I)

Height	mm	300	**Area**	A	mm²	7.139	
Width	mm	100	**Weight**	P	Kg/m	12,5	
Thickness 1	mm	15	**Moment of inerzia with respect to x - axis**	J_X	mm⁴	87.097.204	
Thickness 2	mm	15	**Moment of inerzia with respect to y - axis**	J_Y	mm⁴	5.673.366	
Radius 1	mm	3	**Section Modulus with respect to x - axis**	W_X	mm³	580.648	
Radius 2	mm	15	**Section Modulus with respect to y - axis**	W_Y	mm³	76.255	
Standard Color (RAL approximate)	Gray RAL 7035		**Centroid in x direction**	e_X	mm	25,6	
Standard Length	mm	8000 (±10 mm)	**Centroid in y direction**	e_Y	mm	150	
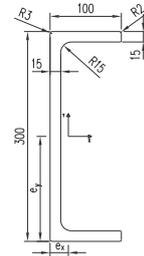
Raw materials	*Isophtalic polyester resin*
	Roving glass fiber type "E" – Continuous strand mat – Polyester surface veil
	For other colors, resins or reinforcings contact M.M. S.r.l. directly

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$_2$O)	%	0,40	ISO 1172
Linear thermal expansion coefficient		K^{-1}	8 ÷ 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.