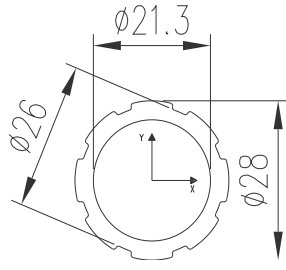


31_5302821.3I
28.11.2018
Rev. 4

PULTRUDED PROFILES

Profile type "O" (5302821.3I)

Diameter 1	mm	21,3	Area	A	mm ²	235,5	
Diameter 2	mm	28	Weight	P	Kg/m	0,4	
Thickness 1	mm	3,3	Moment of inerzia with respect to x - axis	J _x	mm ⁴	17.874	
Thickness 2	mm	2,5	Moment of inerzia with respect to y - axis	J _y	mm ⁴	17.874	
Relief	mm	2	Section Modulus with respect to x - axis	W _x	mm ³	1.277	
	mm		Section Modulus with respect to y - axis	W _y	mm ³	1.277	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	14	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	14	

Raw materials	Isophthalic polyester resin
	Roving glass fiber type “E” – Continuous strand mat – Polyester surface veil
For other colors, resins or reinforcements 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/m ²)	
	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	v _{LT}	-	0,28	ASTM D638
Transversal bending strength	f _{Tf}	MPa	40 ÷ 100	ASTM D790	Transversal Poisson ratio	v _{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.

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 ÷ 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/m ²	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.

