Evergrip GRP Pultruded Sections - Technical Specification

Identification of the Product & Company

Product: **GRP Pultruded Sections**
- Glass Reinforced Plastic structural products. A composite of glass fibre reinforcement with isophthalic polyester resins, colour pigments, fire-retardant and other additives and an applied synthetic surface overlay veil. The product is moulded under temperature and pressure in a continuous process known as pultrusion.

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Quality

The products covered by this specification are manufactured under a system accredited to meet the requirements of **ISO-9001:2015**

Manufactured in accordance with European Standard of Mechanics EN13706-E23

EN 13706 is the European standard valid for pultruded profiles for construction purposes and is defined according to the standard as 'where the load-bearing characteristics are the major criterion of design and where the product is part of a load-bearing system'.

The standard broadly consists of three parts:

EN 13706-1: Specifying the designation/labelling/marking of structural profiles with regard to selection of materials, selection of reinforcement, surface treatments, etc.

EN 13706-2: Indicating test methods and tolerances for pultruded structural profiles. Guidance for quality and quality assurance are also given.

EN 13706-3: Indicating minimum values for the technical properties of structural profiles in relation to the standard's two classes; E17 and E23.

Structural profiles supplied by Evergrip meet or exceed the highest quality level in the standard, E23.

Composition and Colour

Standard products incorporate isophthalic polyester resin to provide a combination of resistance to a range of inorganic/organic chemicals, general durability including impact and external environments with concomitant temperature variations and to ultraviolet light.

E Glass: fibre roving, woven fabric & filament mat approx. 60% by weight

Standard - Steel Grey, typically: RAL 7040, RAL 7045 or RAL 7001

To order* - Safety Yellow, typically: RAL 1023, RAL 1003 or RAL 1004

Please contact us to establish suitability for more extreme environments. Other colours and formulations are available to order. * Minimum production quantities may apply.

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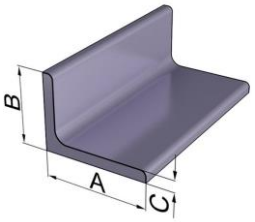
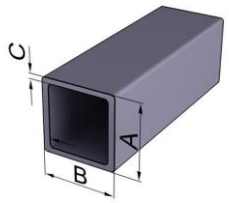
Section Data

Many other section sizes, including bespoke-made products, are available. Contact us for further details.

Article	Section	Size (mm)				Weight	Section	Moment of inertia	
		A	B	C		kg/m	mm²	Ixx mm⁴	Iyy mm⁴
Angle		50	50	6		1.06	568	128,000	128,000
		60	60	8		1.69	910	296,000	296,000
		80	80	8		2.30	1236	736,000	736,000

Article	Section	Size (mm)				Weight	Section	Moment of inertia	
		A	B	C		kg/m	mm²	Ixx mm⁴	Iyy mm⁴
Square tube		50	50	5.95		2.20	1048	340,000	340,000
		50.8	50.8	6.35		2.26	1129	375,000	375,000
		75	75	6		3.27	1668	1,334,000	1,334,000
		100	100	8		5.49	2950	4,192,000	4,192,000

Article	Section	Size (mm)				Weight	Section	Moment of inertia	
		A	B	C		kg/m	mm²	Ixx mm⁴	Iyy mm⁴
Channel		120	50	6		2.32	1254	2,595,000	276,000
		200	60	10		5.89	3005	15,729,000	820,500
		240	72	12	*	8.47	4342	32,669,076	1,698,350

* limited UK stock available – factory order lead times typically 10 weeks

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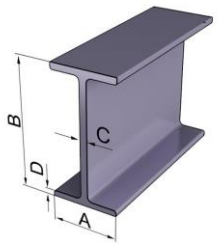
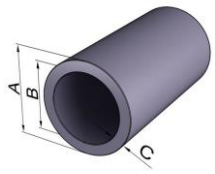
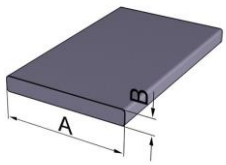
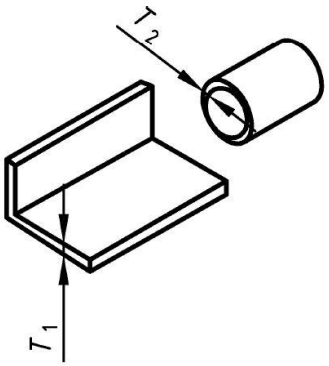
Article	Section	Size (mm)				Weight	Section	Moment of inertia	
		A	B	C	D	kg/m	mm²	Ixx mm⁴	Iyy mm⁴
I Beam		60	120	6	6	2.57	1387	3,030,000	217,000
		75	150	8	8	4.24	2292	7,745,000	566,000
		100	200	10	10	7.07	3820	23,080,000	1,680,00

Article	Section	Size (mm)				Weight	Section	Moment of inertia	
		A	B	C		kg/m	mm²	Ixx mm⁴	Iyy mm⁴
Round tube		40	34	3		0.65	350	60,000	-
		50	40	5		1.32	707	181,000	-

Article	Section	Size (mm)				Weight	Section	Moment of inertia	
		A	B			kg/m	mm²	Ixx mm⁴	Iyy mm⁴
Plate		76	6.4			0.89	482	1,700	234,000
		228	12.5			5.41	2850	37,000	12,346,000

Dimensional Tolerances to EN13706-2:2002

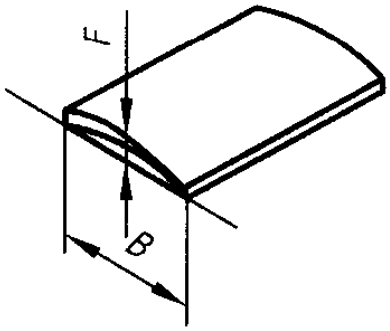
Wall thickness of open and closed profiles



Nominal dimensions (mm)

Thickness	T_1	T_2
0 to 2	± 0,15	± 10 %
2 to 5	± 0,20	with
5 to 10	± 0,35	minimum
	± 0,45	of ± 0,30

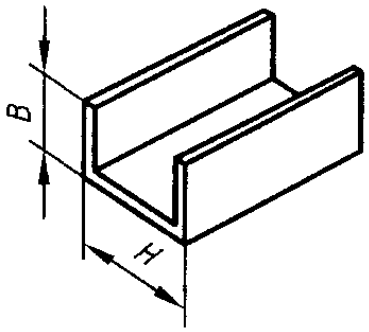
Flatness in transverse direction



Tolerance

F < 0.008 x B mm

Profile height & width of flange

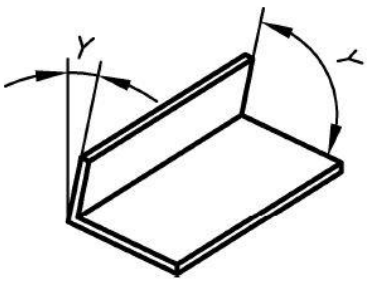


Nominal dimensions (mm)

B and *H*: ± 0.5% with minimum ± 0.20 mm

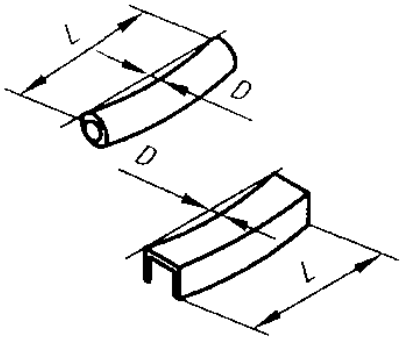
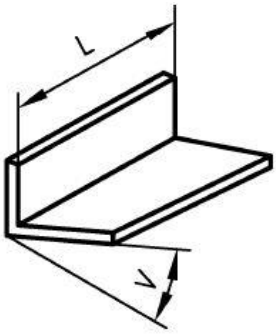
and maximum ± 0.75 mm

Size of angle



Tolerance

Y ± 1.5 °

Straightness 	Tolerance (*B* and *H* are overall breadth and height dimensions) *D* < 0,002 x L² for sections with *B* or *H* < 50 mm *D* < 0,001 x L² for sections with *B* or *H* ≥ 50 and < 100 mm *D* < 0,0005 x L² for sections with *B* or *H* ³ 100 mm where D and L are in metres
Twist 	Tolerance V < 1.5° per metre maximum for thickness < 5 mm V < 1.0° per metre maximum for thickness ≥ 5 mm

Material Mechanical Properties - meeting EN 13706-3 E23

Property	Unit	Minimum strength/stiffness value
Tensile Strength – axial (A)	MPa	240
Modulus of elasticity – (A)	GPa	23
Tensile Strength – transverse (T)	MPa	50
Modulus of elasticity – (T)	GPa	7
Compressive Strength (A)	MPa	240
Compressive Strength – (T)	MPa	70
Flexural Strength (A)	MPa	240
Flexural Strength (T)	MPa	100
Interlaminar Shear Strength (A)	MPa	25
Pin Bearing Strength (A)	MPa	150
Pin Bearing Strength (T)	MPa	70

Typical Electrical Characteristics

Property	Unit of Measure	Testing Method	Value
Volume Resistivity	Ω cm	ASTM D257	10^{12} - 10^{15}
Surface Resistivity	Ω	ASTM D257	10^{12} - 10^{15}
Dielectric Constant	(@ 60Hz)	ASTM D150	5.2
Dissipation Factor		ASTM D150	0.03
Dielectric Strength	kV / mm	ASTM D149	1.38
Arc Resistance	s	ASTM D495	120

General Physical Characteristics

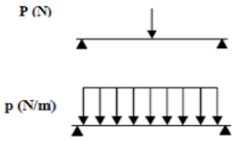
Property	Unit of Measure	Testing Method	Value
Coefficient of Thermal Expansion - axial	10^{-6} / °K	ASTM D696	8
Density	tonne / m^3	-	1.72 – 1.98
24HR Water absorption	% max. by wt.	EN ISO 62	≤ 0.6
Barcol Hardness	B	NF T 57-106	≥ 40

Reaction to fire

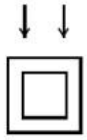
Profiles are available in a non-fire retardant (NFR) version, or with resin/additive mix to meet the requirements of the following standards:

Origin	Test	Classification
United States of America	ASTM E-84	Class 1 (A) – Flame spread rating index of 25 or less
	UL 94	V-0
European Union	EN 13501-1:2007	Bfl-s1
United Kingdom	BS 476-7, 20 & 21	Further information available on request

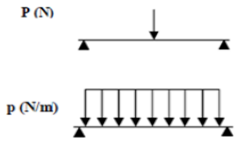
Detailed Loading and Deflection Data

Section Type	Loading deflection / 200 = 0.5% Flexural modulus: **23 GPa**		Concentrated load P (N) Uniform load p (N/m)

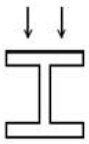
Angle	Span (mm)	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000
	Deflection (mm)	2.5	3.75	5	6.25	7.5	8.75	10	11.25	12.5	13.75	15	16.25	17.5	18.75	20
50 x 50 x 6mm	P (N)	2,900	1,289	725	464	322	237	181	143	116	96	81	69	59	52	45
	p (N/m)	9,280	2,750	1,160	594	344	216	145	102	74	56	43	34	27	22	18
60 × 60 × 8mm	P (N)	6,564	2,917	1,641	1,050	729	536	410	324	263	217	182	155	134	117	103
	p (N/m)	21,008	6,225	2,626	1,345	778	490	328	231	168	126	97	76	61	50	41
80 × 80 × 8mm	P (N)	16,464	7,317	4,116	2,634	1,829	1,344	1,029	813	659	544	457	390	336	293	257
	p (N/m)	52,688	15,611	6,586	3,372	1,951	1,229	823	578	422	317	244	192	154	125	103
100 × 100 × 10mm	P (N)	39,984	17,771	9,996	6,397	4,443	3,264	2,499	1,975	1,599	1,322	1,111	946	816	711	625
	p (N/m)	126,848	37,585	15,856	8,118	4,698	2,959	1,982	1,392	1,015	762	587	462	370	301	248



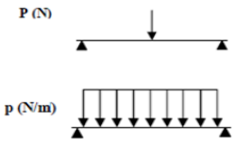
Box	Span (mm)	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000
	Deflection (mm)	2.5	3.75	5	6.25	7.5	8.75	10	11.25	12.5	13.75	15	16.25	17.5	18.75	20
50 × 50 × 5.95mm	P (N)	7,564	3,362	1,891	1,210	840	617	473	374	303	250	210	179	154	134	118
	p (N/m)	24,200	7,170	3,025	1,549	896	564	378	266	194	145	112	88	71	57	47
50.8 × 50.8 × 6.35mm	P (N)	8,268	3,675	2,067	1,323	919	675	517	408	331	273	230	196	169	147	129
	p (N/m)	26,456	7,839	3,307	1,693	980	617	413	290	212	159	122	96	77	63	52
75 × 75 × 8mm	P (N)	36,064	16,028	9,016	5,770	4,007	2,944	2,254	1,781	1,443	1,192	1,002	854	736	641	564
	p (N/m)	115,405	34,194	14,426	7,386	4,274	2,692	1,803	1,266	923	694	534	420	336	274	225
100 × 100 × 8mm	P (N)	92,512	41,116	23,128	14,802	10,279	7,552	5,782	4,568	3,700	3,058	2,570	2,190	1,888	1,645	1,446
	p (N/m)	296,032	87,713	37,004	18,946	10,964	6,905	4,626	3,249	2,368	1,779	1,371	1,078	863	702	578

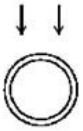
Section Type	Loading deflection / 200 = 0.5% Flexural modulus: **23 GPa**		Concentrated load P (N) Uniform load p (N/m)

Channel	Span (mm)	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000
	Deflection (mm)	5	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30
120 × 50 × 6mm	P (N)	14,327	6,368	3,582	2,292	1,592	1,170	895	708	573	474	398
	p (N/m)	22,933	6,796	2,867	1,468	849	535	358	252	183	138	106
200 × 60 × 10mm	P (N)	86,828	38,590	21,707	13,892	9,648	7,088	5,427	4,288	3,473	2,870	2,412
	p (N/m)	138,694	41,095	17,337	8,876	5,137	3,235	2,167	1,522	1,110	834	642
240 x 72 x 12mm	P (N)	181,300	80,578	45,325	29,008	20,144	14,800	11,331	8,953	7,252	5,993	5,036
	p (N/m)	290,080	85,950	36,260	18,565	10,744	6,766	4,533	3,183	2,321	1,744	1,343



I Beam	Span (mm)	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000
	Deflection (mm)	5	7.5	10	12.5	15	17.5	20	22.5	25	27.5	30
120 x 60 x 6mm	P (N)	16,689	7,417	4,172	2,670	1,854	1,362	1,043	824	668	552	464
	p (N/m)	26,702	7,912	3,338	1,709	989	623	417	293	214	160	124
100 x 100 x 8mm	P (N)	21,658	9,626	5,415	3,465	2,406	1,768	1,354	1,070	866	716	602
	p (N/m)	34,653	10,267	4,332	2,218	1,283	808	541	380	277	208	160
150 x 75 x 8mm	P (N)	42,728	18,990	10,682	6,836	4,748	3,488	2,671	2,110	1,709	1,412	1,187
	p (N/m)	68,364	20,256	8,546	4,375	2,532	1,594	1,068	750	547	411	317
150 x 100 x 8mm	P (N)	54,090	24,040	13,523	8,654	6,010	4,416	3,381	2,671	2,164	1,788	1,503
	p (N/m)	86,544	25,643	10,818	5,539	3,205	2,019	1,352	950	692	520	401
200 x 100 x 10mm	P (N)	130,340	57,929	32,585	20,854	14,482	10,640	8,146	6,437	5,214	4,309	3,621
	p (N/m)	208,544	61,791	26,068	13,347	7,724	4,864	3,259	2,289	1,668	1,253	965

Section Type	Loading deflection / 200 = 0.5% Flexural modulus: **23 GPa**		Concentrated load P (N) Uniform load p (N/m)



Round Tube	Span (mm)	400	500	600	800	1000	1500	2000	2500	3000
	Deflection (mm)	2	2.5	3	4	5	7.5	10	12.5	15
40 x 34 x 3mm	P (N)	2,081	1,332	925	520	333	148	83	53	37
	p (N/m)	8,325	4,262	2,467	1,041	533	158	67	34	20
50 x 40 x 5mm	P (N)	6,244	3,996	2,775	1,561	999	444	250	160	111
	p (N/m)	24,975	12,787	7,400	3,122	1,598	474	200	102	59