

Fiberglass Reinforced Polymer
gratings and structures



**M.M. S.R.L.**

Fiberglass Reinforced Polymer
gratings and structures

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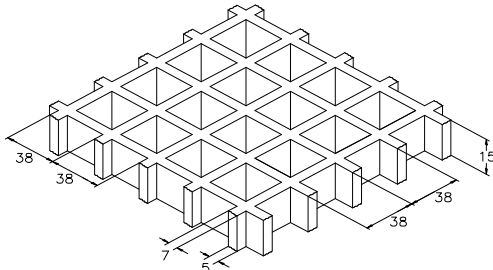
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SCH 38/15_IFR

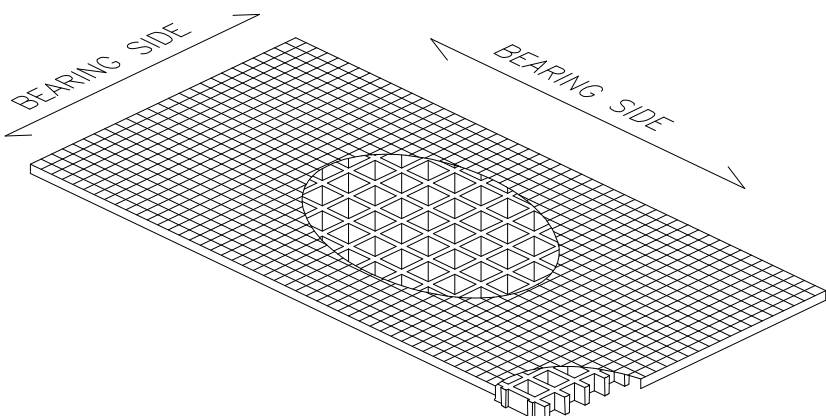
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 38 x 38	
Clear span	mm 31 x 31	
Height	mm 15	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1220 x 3660	
Weight kg/m² 5	
tolerance	
	± mm 5 panel dimensions
	± mm 2 height

Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

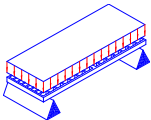
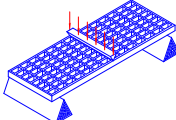
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects

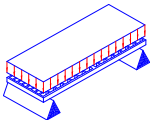
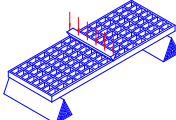
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
30	950	1900	30	150	350
50	200	400	50	50	100
70	50	150	70	0	50
90	0	50	90	0	0
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

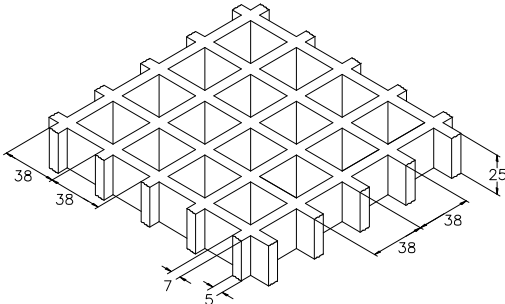
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
30	3250	30	450
50	1150	50	250
70	600	70	200
90	350	90	150
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M. technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 38/25_IFR

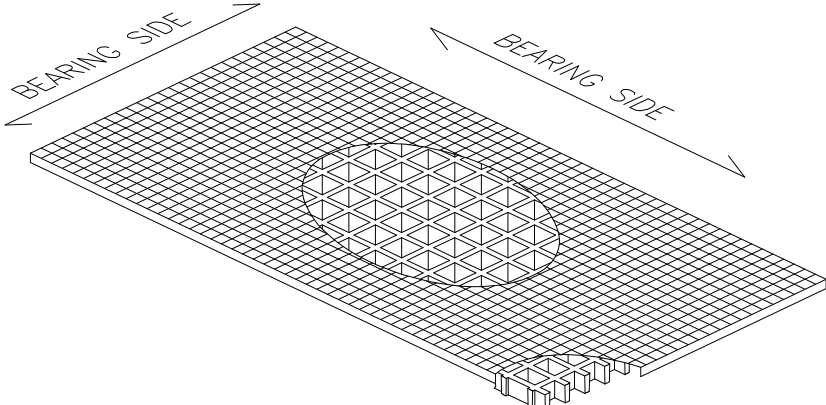
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 38 x 38	
Clear span	mm 31 x 31	
Height	mm 25	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1000 x 2000	
mm 1000 x 3000	
mm 1000 x 4038	
mm 1220 x 3660	
Weight kg/m² 11	
tolerance	<div>± mm 5 panel dimensions</div> <div>± mm 2 height</div>

Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

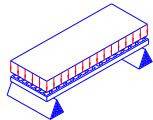
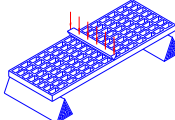
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_{fl}-S1 norm EN 13501-1

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 is no evidence of defects

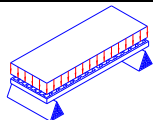
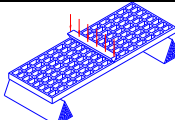
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
30	4450	8900	30	800	1650
50	950	1900	50	300	600
70	350	700	70	150	300
90	150	300	90	50	150
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

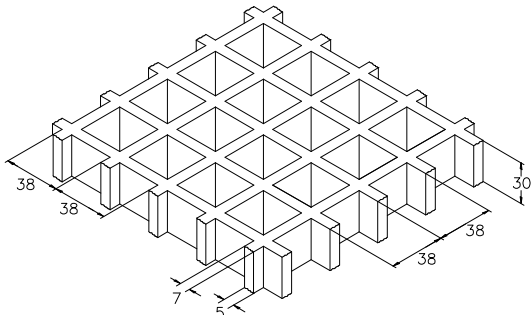
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
30	9100	30	1350
50	3250	50	800
70	1650	70	550
90	1000	90	450
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M. technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 38/30_IFR

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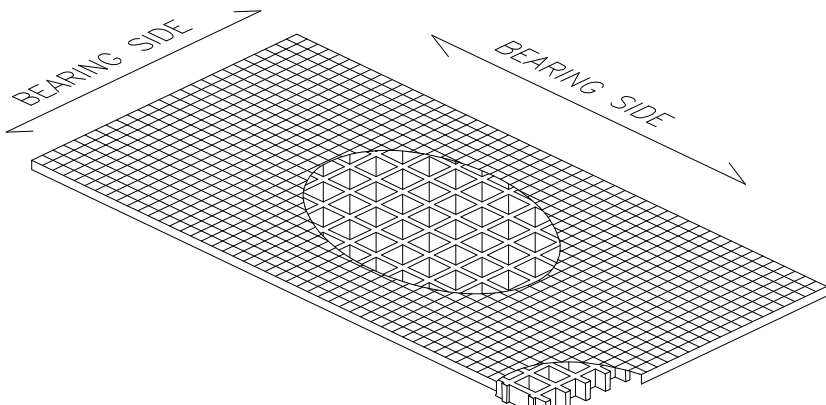
MOLDED GRATINGS

Mesh	mm 38 x 38	
Clear span	mm 31 x 31	
Height	mm 30	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1000 x 2000	
mm 1000 x 3000	
mm 1000 x 4038	
mm 1220 x 3660	
Weight kg/m ² 15	
tolerance	± mm 5 panel dimensions
	+ mm 2 height



The diagram illustrates a rectangular grating panel with a grid of square openings. Two arrows labeled "BEARING SIDE" point towards the center of the panel from opposite ends. A circular inset on the panel's surface provides a magnified view of the grid pattern. At the bottom right corner, a cross-section of the panel is shown, revealing the raised, interlocking structure of the grating.

Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

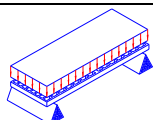
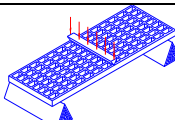
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_s-S1 norm EN 13501-1

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 is no evidence of defects		

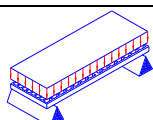
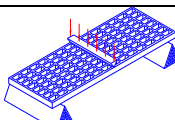
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	1650	3300	50	500	1000
70	600	1200	70	250	500
90	250	550	90	150	300
110	150	300	110	100	200
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

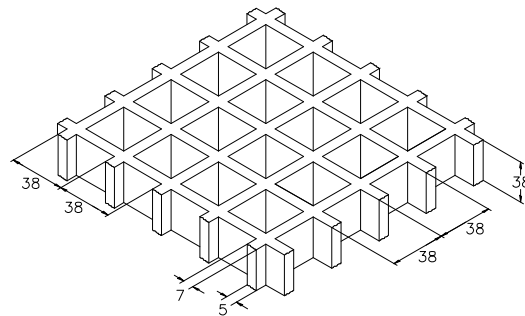
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
50	4700	50	1150
70	2400	70	800
90	1450	90	650
110	950	110	500
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 38/38_IFR

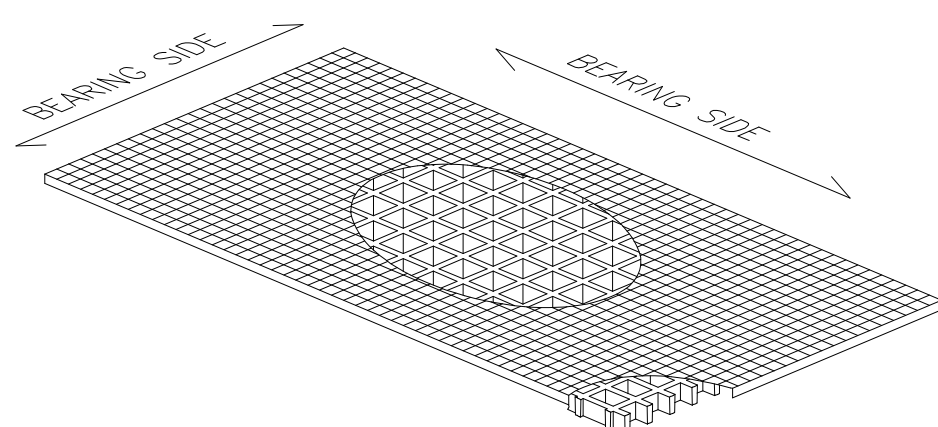
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 38 x 38	
Clear span	mm 31 x 31	
Height	mm 38	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1000 x 2000	
mm 1000 x 3000	
mm 1000 x 4038	
mm 1220 x 3660	
mm 1220 x 4038	
Weight kg/m² 18	
tolerance	± mm 5 panel dimensions ± mm 2 height

Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

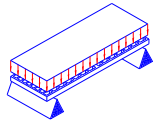
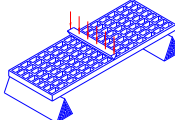
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects

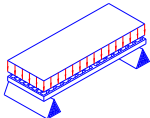
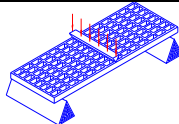
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	3350	6750	50	1050	2100
70	1200	2450	70	500	1050
90	550	1150	90	300	650
110	300	600	110	200	400
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

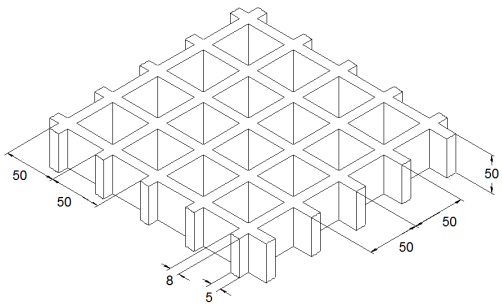
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m²]	[cm]	[kg/m]
50	7600	50	1900
70	3850	70	1350
90	2300	90	1050
110	1550	110	850
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 50/50_IFR

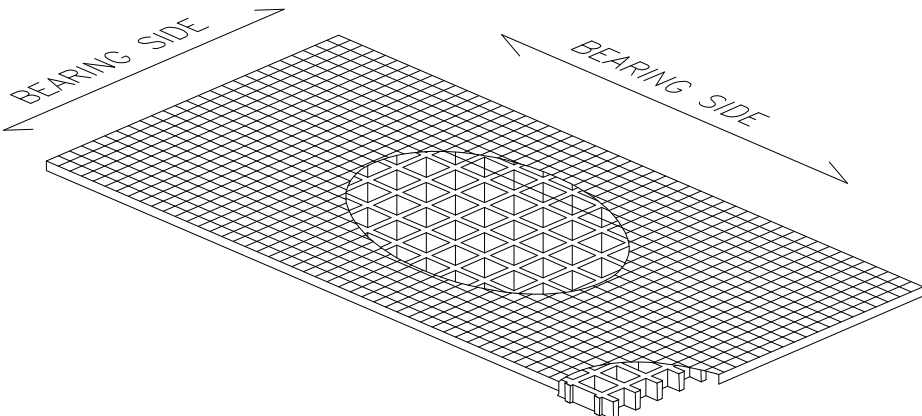
20.07.2015 - Rev. 5

MOLDED GRATINGS

Mesh	mm 50 x 50	
Clear span	mm 42 x 42	
Height	mm 50	
Bearing bar thickness	mm 8 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1220 x 3660	
Weight kg/m² 19,5	
tolerance	
	± mm 5 panel dimensions
	± mm 2 height

Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

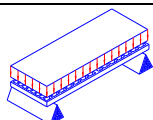
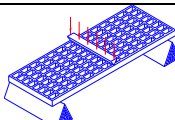
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects

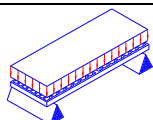
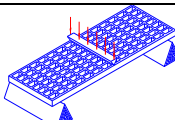
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
70	2300	4650	70	1000	2050
90	1100	2200	90	600	1200
110	600	1200	110	400	800
130	350	700	130	250	550
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

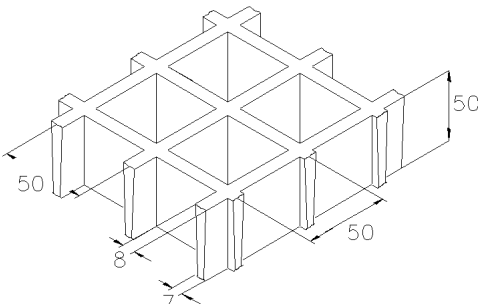
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
70	5500	70	1900
90	3300	90	1450
110	2200	110	1200
130	1550	130	1000
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 50/50_IFR_HDL

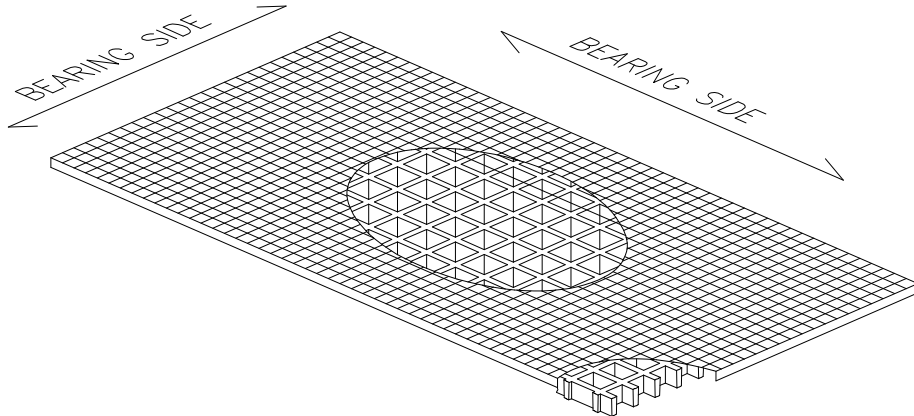
20.07.2015 - Rev. 5

MOLDED GRATINGS

Mesh	mm 50 x 50	
Clear span	mm 42 x 42	
Height	mm 50	
Bearing bar thickness	mm 8 upper part	
	mm 7 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1100 x 2000	
Weight kg/m² 23	
tolerance	
	± mm 5 panel dimensions
	± mm 2 height

Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

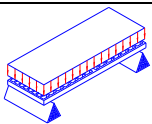
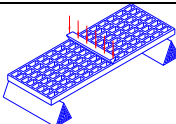
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_s-S1 norm EN 13501-1

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 is no evidence of defects

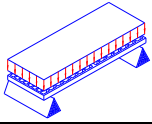
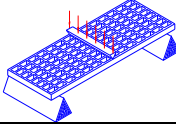
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
70	2750	5500	70	1200	2400
90	1250	2550	90	700	1450
110	700	1400	110	450	950
130	400	850	130	300	650
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
70	6800	70	2350
90	4100	90	1850
110	2750	110	1500
130	1950	130	1250
All lighter loads are admitted			

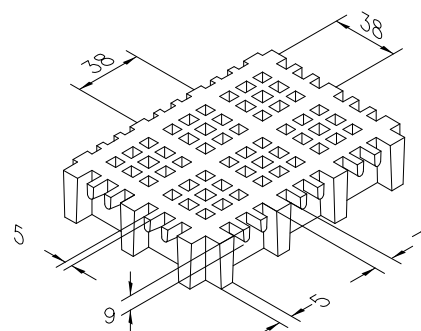
- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 12/30_IFR

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MOLDED GRATINGS

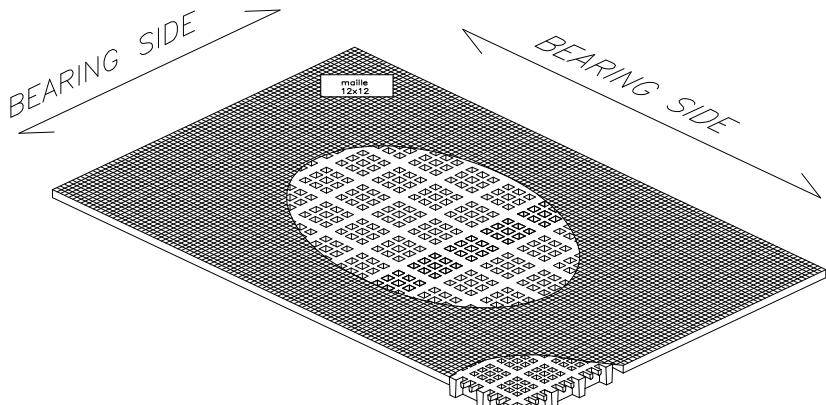
Mesh	mm 38 x 38	main
	mm 12 x 12	secondary
Clear span	mm 8 x 8	
Height	mm 30	
Bearing bar thickness	mm 7	upper part
	mm 5	bottom part
Color	Grey RAL 7004 <i>indicative RAL reference</i>	



Raw materials	Polyester Resin	
	Roving glass fiber type "E"	
	Inorganic fillers without halogens	

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1220 x 3660	
mm 1000 x 4038	
Weight kg/m² 16	
tolerance	± mm 5 panel dimensions + mm 2 height



A 3D perspective view of a rectangular panel. The panel has a grid of small square holes. A central circular area is highlighted with a larger grid of square holes. Two arrows point from the top corners towards the center, labeled "BEARING SIDE". A small label "moile 12x12" is placed on the grid near the top center. The bottom edge of the panel shows a series of raised rectangular tabs.

Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

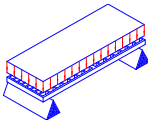
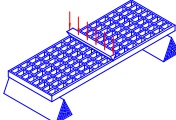
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects		

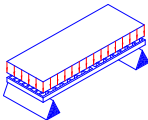
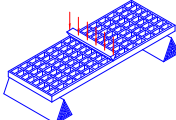
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	2200	4400	50	650	1350
70	800	1600	70	350	700
90	350	750	90	200	400
110	200	400	110	100	250
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

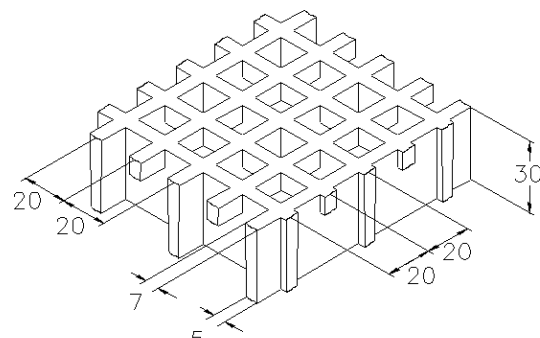
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
50	5350	50	1300
70	2700	70	950
90	1650	90	700
110	1100	110	600
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M. technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 13/30_IFR

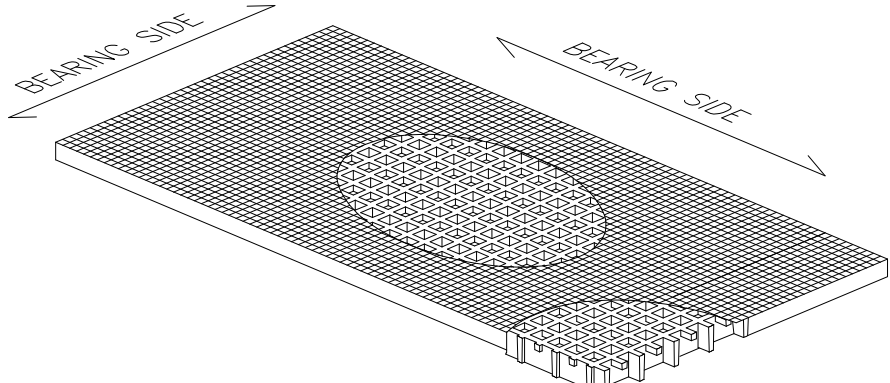
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 40 x 40 main	
	mm 20 x 20 secondary	
Clear span	mm 13 x 13	
Height	mm 30	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1007 x 3007	
Weight kg/m² 19	
tolerance	
	± mm 5 panel dimensions
	± mm 2 height

Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

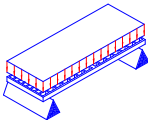
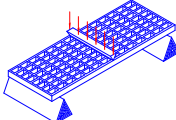
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects

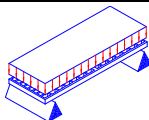
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	2250	4500	50	700	1400
70	800	1650	70	350	700
90	350	750	90	200	400
110	200	400	110	100	250
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

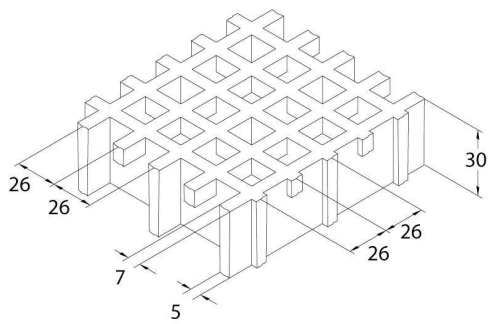
DISTRIBUTED LOAD			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m²]	[cm]	[kg/m]
50	5250	50	1300
70	2650	70	900
90	1600	90	700
110	1050	110	550
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M. technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 52/30_IFR

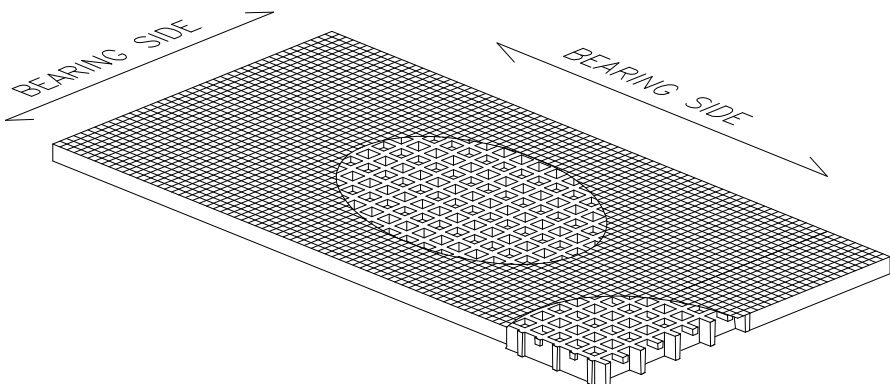
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 52 x 52 main	
	mm 26 x 26 secondary	
Clear span	mm 19 x 19	
Height	mm 30	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1000 x 2000	
mm 1000 x 3000	
mm 1000 x 4050	
mm 1220 x 3660	
mm 1500 x 2000	
Weight kg/m² 15	
tolerance	± mm 5 panel dimensions ± mm 2 height

Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

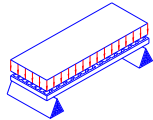
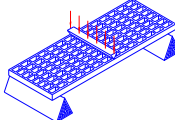
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects

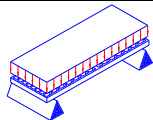
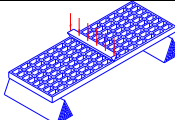
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	1600	3250	50	500	1000
70	550	1150	70	250	500
90	250	550	90	150	300
110	150	300	110	100	200
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

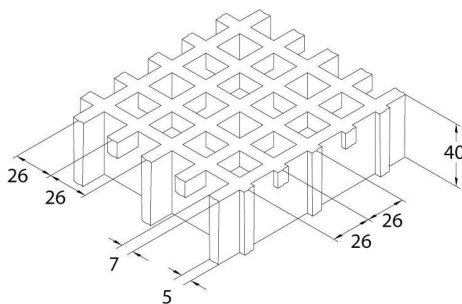
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
50	3900	50	950
70	1950	70	650
90	1200	90	500
110	800	110	400
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 52/40_IFR

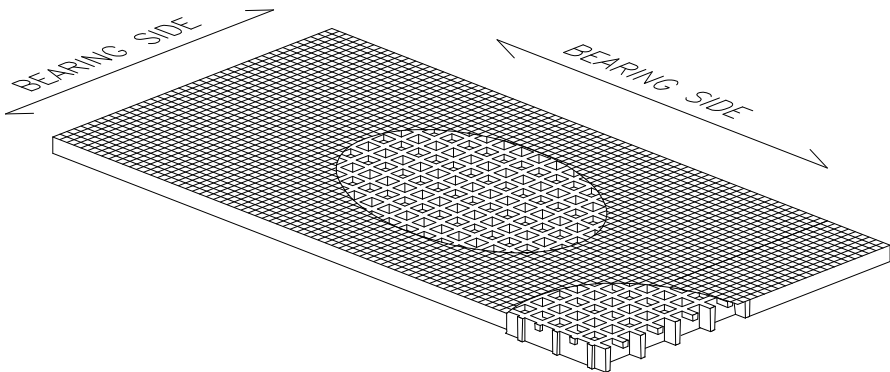
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 52 x 52 main	
	mm 26 x 26 secondary	
Clear span	mm 19 x 19	
Height	mm 40	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1000 x 2000	
mm 1000 x 3000	
mm 1000 x 4050	
mm 1500 x 2000	
Weight kg/m² 21	
tolerance	± mm 5 panel dimensions ± mm 2 height

Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

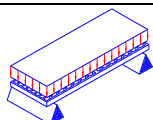
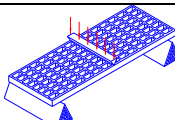
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects

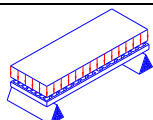
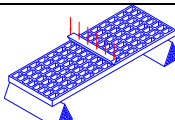
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m²]		[cm]	[kg/m]	
50	3800	7600	50	1150	2350
70	1350	2750	70	600	1200
90	650	1300	90	350	700
110	350	700	110	200	450
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

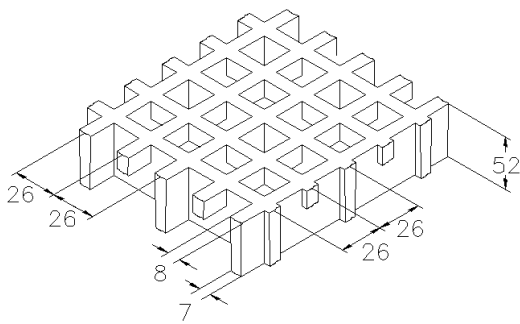
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m²]	[cm]	[kg/m]
50	6950	50	1700
70	3550	70	1200
90	2150	90	950
110	1400	110	750
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 52/52_IFR

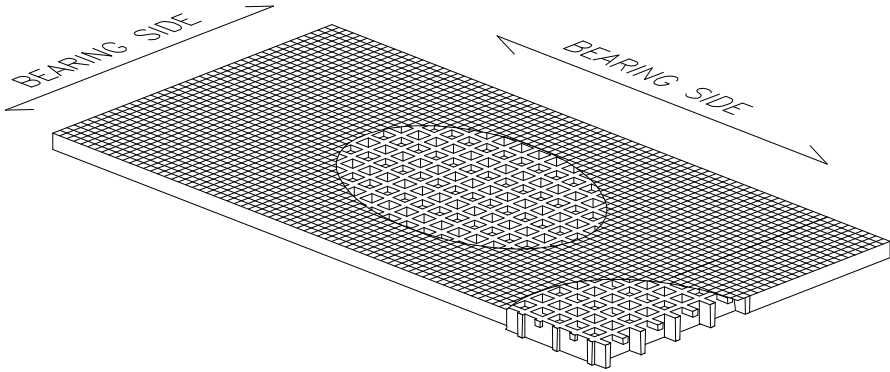
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 52 x 52 main	
	mm 26 x 26 secondary	
Clear span	mm 19 x 19	
Height	mm 52	
Bearing bar thickness	mm 8 upper part	
	mm 7 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1000 x 2000	
mm 1000 x 3000	
mm 1000 x 4050	
Weight kg/m² 26,5	
tolerance	
	± mm 5 panel dimensions
	± mm 2 height

Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

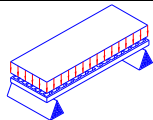
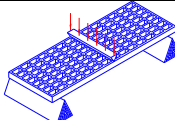
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_F-S1 norm EN 13501-1

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 is no evidence of defects

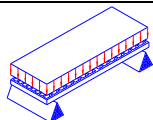
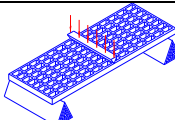
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
70	3700	7450	70	1600	3250
90	1750	3500	90	950	1950
110	950	1900	110	650	1300
130	550	1150	130	450	950
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

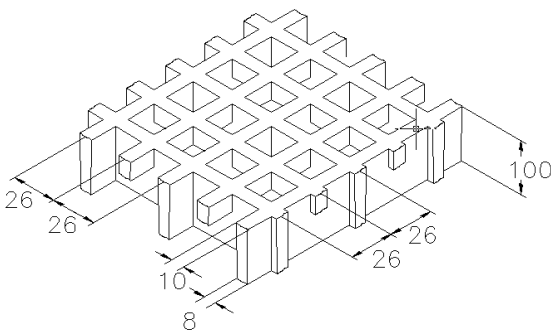
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
70	7900	70	2750
90	4800	90	2150
110	3200	110	1750
130	2300	130	1450
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 52/100_IFR

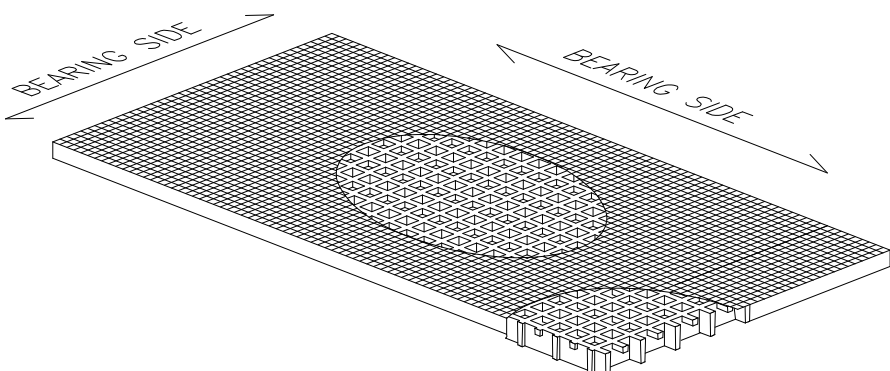
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MOLDED GRATINGS

Mesh	mm 52 x 52 main	
	mm 26 x 26 secondary	
Clear span	mm 19 x 19	
Height	mm 100	
Bearing bar thickness	mm 10 upper part	
	mm 8 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1005 x 1510	
Weight kg/m² 56	
tolerance	± mm 5 panel dimensions ± mm 2 height

Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

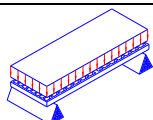
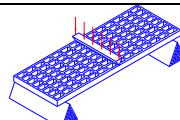
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_s-S1 norm EN 13501-1

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 is no evidence of defects

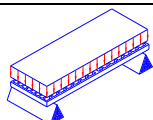
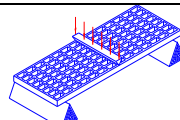
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[Kg/m]	
80	18700	37400	80	9350	18700
100	9550	19150	100	5950	11950
120	5500	11050	120	4150	8300
140	3450	6950	140	3050	6100
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

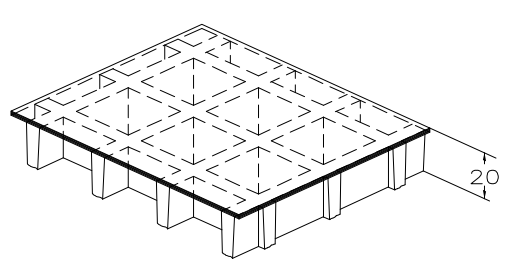
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
80	24750	80	9900
100	15800	100	7900
120	11000	120	6600
140	8050	140	5650
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 38/17C_IFR

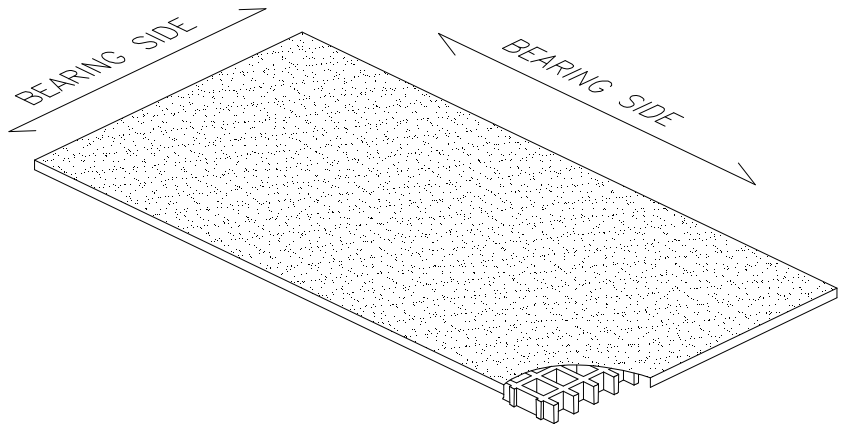
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MOLDED GRATINGS

Mesh	mm 38 x 38	
Thickness	mm 20	
Cover thickness	mm 3	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber + Mat and Woven Fabric type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	250 MPa

Standard panels	
mm 1220 x 3660	
Weight kg/m² 15	
tolerance	± mm 5 panel dimensions
	± mm 2 height

Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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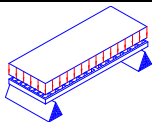
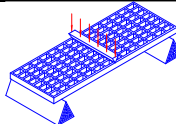
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects

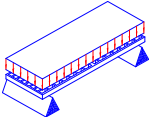
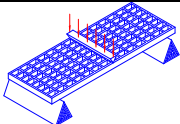
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
30	4550	9100	30	850	1700
50	950	1950	50	300	600
70	350	700	70	150	300
90	150	300	90	50	150
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

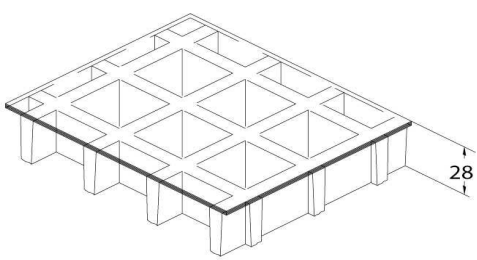
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m²]	[cm]	[kg/m]
30	6850	30	1000
50	2450	50	600
70	1250	70	400
90	750	90	300
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M. technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 38/25C_IFR

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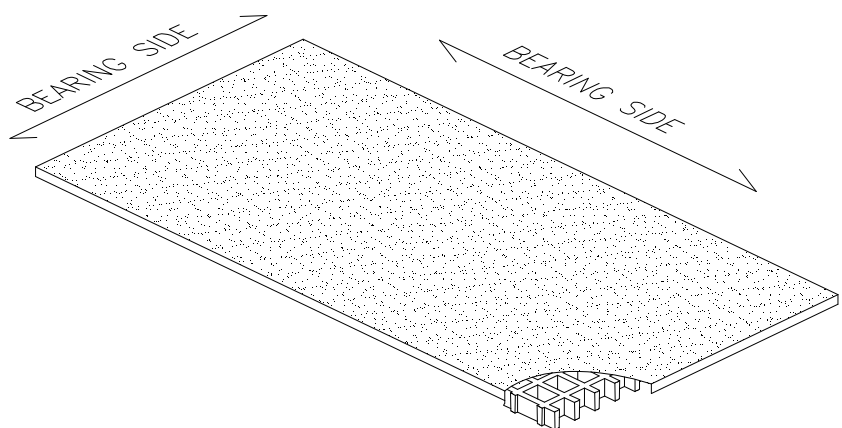
MOLDED GRATINGS

Mesh	mm 38 x 38	
Thickness	mm 28	
Cover thickness	mm 3	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber + Mat and Woven Fabric type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	250 MPa

Standard panels		
mm 1000 x 2000		
mm 1000 x 4038		
mm 1220 x 3660		
Weight kg/m² 20		
tolerance	± mm 5 panel dimensions	
	± mm 2 height	



Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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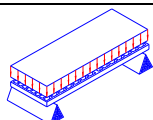
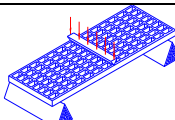
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects		

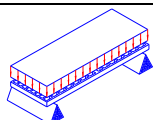
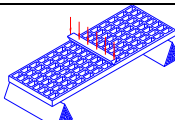
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
30	11850	23700	30	2200	4400
50	2550	5100	50	800	1600
70	900	1850	70	400	800
90	400	850	90	200	450
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

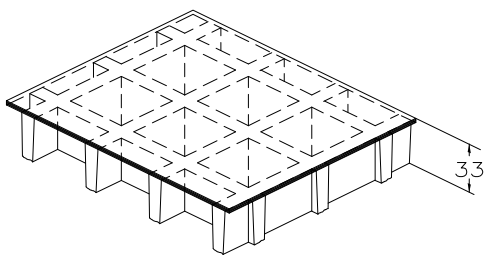
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
30	13300	30	2000
50	4800	50	1200
70	2400	70	850
90	1450	90	650
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M. technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 38/30C_IFR

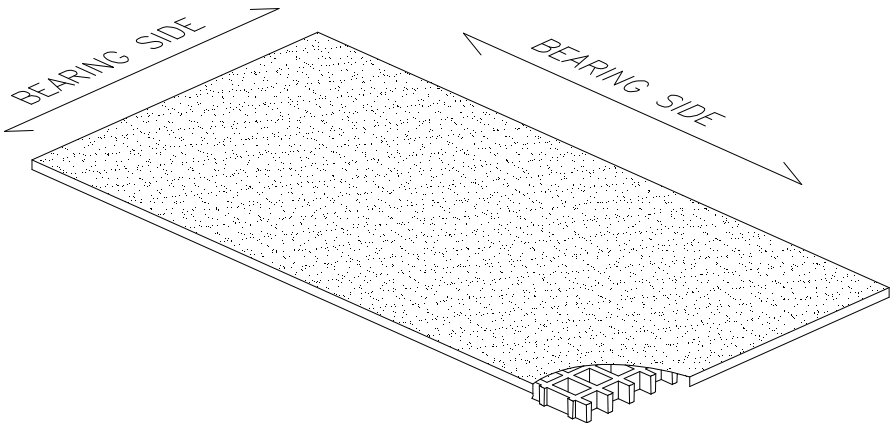
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MOLDED GRATINGS

Mesh	mm 38 x 38	
Thickness	mm 33	
Cover thickness	mm 3	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber + Mat and Woven Fabric type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	250 MPa

Standard panels	
mm 1000 x 2000	
mm 1000 x 4038	
mm 1220 x 3660	
Weight kg/m ² 23	
tolerance	± mm 5 panel dimensions
	± mm 2 height

Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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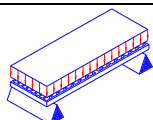
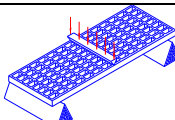
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects

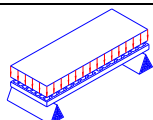
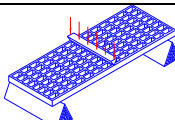
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	4050	8100	50	1250	2500
70	1450	2950	70	600	1250
90	650	1350	90	350	750
110	350	750	110	250	500
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

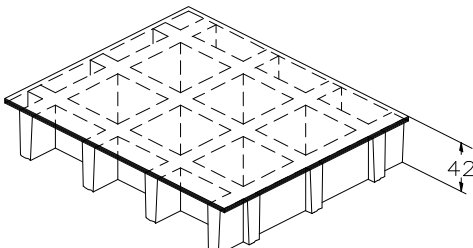
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
50	6550	50	1600
70	3350	70	1150
90	2000	90	900
110	1350	110	700
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M. technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 38/38C_IFR

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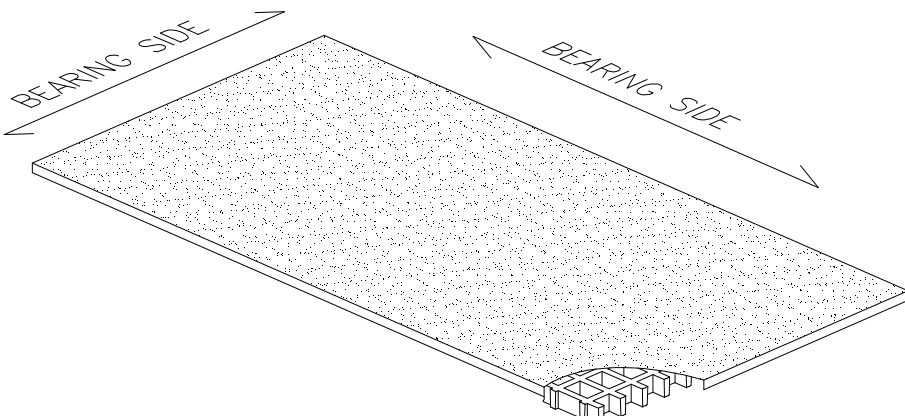
MOLDED GRATINGS

Mesh	mm 38 x 38	
Thickness	mm 42	
Cover thickness	mm 3	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber + Mat and Woven Fabric type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	250 MPa

Standard panels	
mm 1000 x 3660	
mm 1225 x 3660	
Weight kg/m² 25	
tolerance	± mm 5 panel dimensions
	± mm 2 height



Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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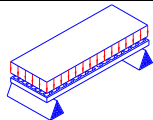
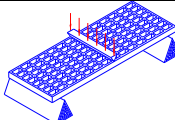
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects

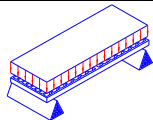
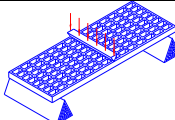
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	7900	15800	50	2450	4900
70	2850	5750	70	1250	2500
90	1350	2700	90	750	1500
110	700	1450	110	500	1000
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

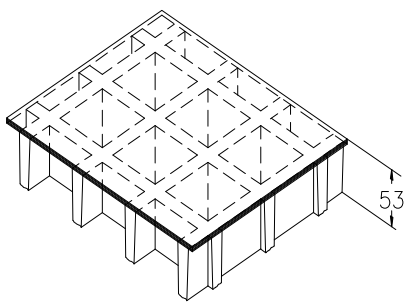
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
50	10400	50	2600
70	5300	70	1850
90	3200	90	1400
110	2100	110	1150
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 50/50C_IFR

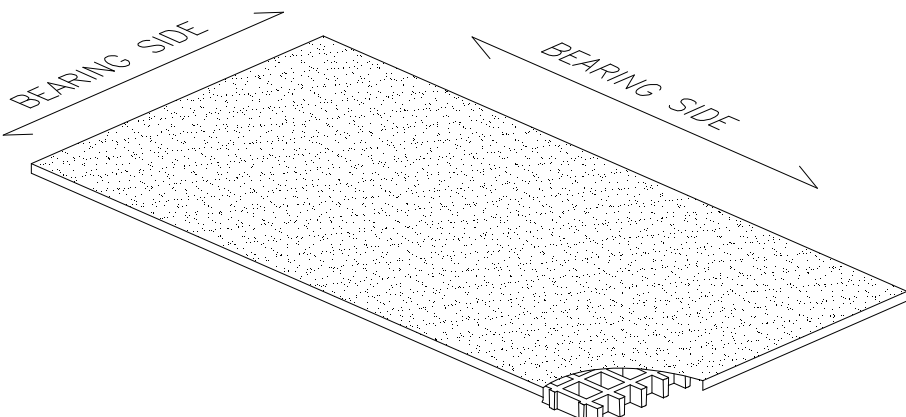
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 50 x 50	
Thickness	mm 53	
Cover thickness	mm 3	
Bearing bar thickness	mm 8 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber + Mat and Woven Fabric type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	250 MPa

Standard panels	
mm 1220 x 3660	
Weight kg/m² 27,5	
tolerance	± mm 5 panel dimensions
	± mm 2 height

Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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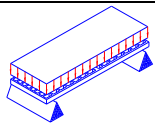
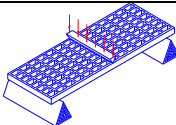
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects

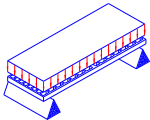
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
70	4900	9850	70	2150	4300
90	2300	4600	90	1300	2600
110	1250	2500	110	850	1700
130	750	1500	130	600	1250
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

DISTRIBUTED LOAD			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
70	7150	70	2500
90	4300	90	1950
110	2900	110	1600
130	2050	130	1350
All lighter loads are admitted			

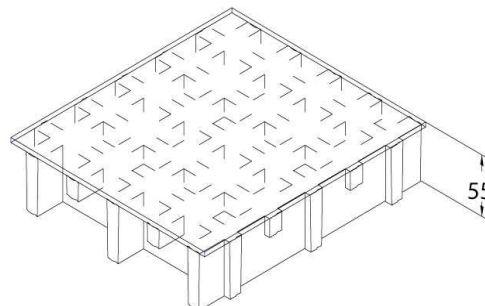
- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 52/52C_IFR

06.05.2011 - Rev. 4

MOLDED GRATINGS

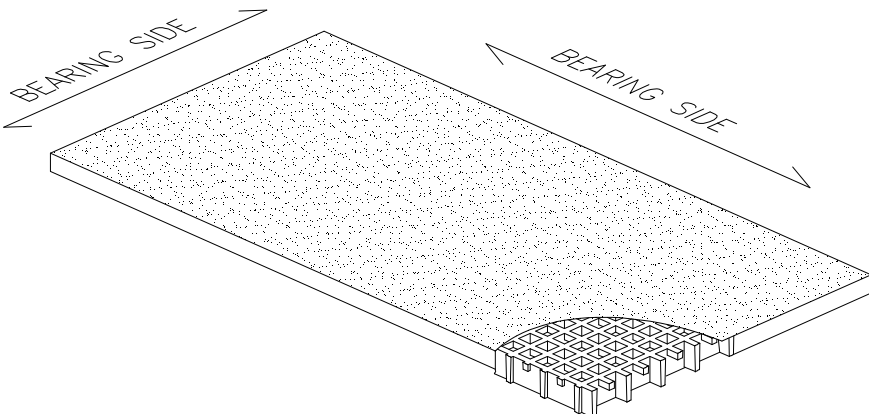
Mesh	mm 52 x 52	main
	mm 26 x 26	secondary
Thickness	mm 55	
Cover thickness	mm 3	
Bearing bar thickness	mm 8	upper part
	mm 7	bottom part
Color	Grey RAL 7004 <i>indicative RAL reference</i>	



Raw materials	Polyester Resin	
	Roving glass fiber + Mat and Woven Fabric type "E"	
	Inorganic fillers without halogens	

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	250 MPa

Standard panels	
mm 1000 x 3000	
mm 1000 x 4050	
Weight kg/m² 35,5	
tolerance	± mm 5 panel dimensions
	± mm 2 height



Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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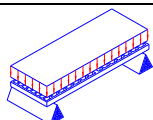
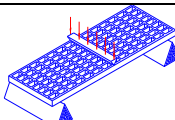
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_s-S1 norm EN 13501-1

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 is no evidence of defects	

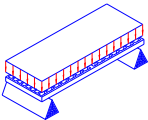
LOADS

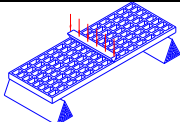
MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
70	5750	11550	70	2500	5050
90	2700	5400	90	1500	3050
110	1450	2950	110	1000	2000
130	900	1800	130	700	1450
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

DISTRIBUTED LOAD		
Distance between supports	Maximum admitted load	
[cm]	[kg/m²]	
70	8300	
90	5000	
110	3350	
130	2400	

CONCENTRATED LOAD		
Distance between supports	Maximum admitted load	
[cm]	[kg/m]	
70	2900	
90	2250	
110	1850	
130	1550	

All lighter loads are admitted

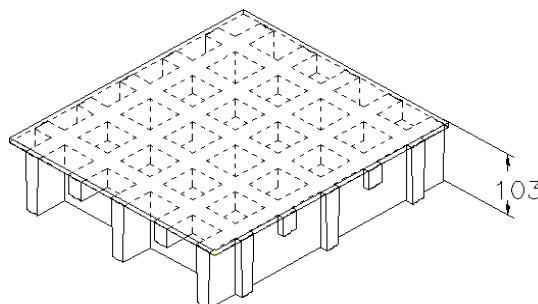
- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 52/100C_IFR

06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 52 x 52	main
	mm 26 x 26	secondary
Thickness	mm 103	
Cover thickness	mm 3	
Bearing bar thickness	mm 10	upper part
	mm 8	bottom part
Color	Grey RAL 7004 <i>indicative RAL reference</i>	



Raw materials	Polyester Resin	
	Roving glass fiber + Mat and Woven Fabric type "E"	
	Inorganic fillers without halogens	

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	250 MPa

Standard panels	
mm 1005 x 1510	
Weight kg/m ² 63	
tolerance	± mm 5 panel dimensions
	± mm 2 height

Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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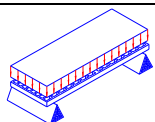
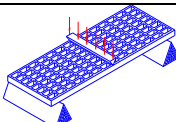
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_s-S1 norm EN 13501-1

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 is no evidence of defects	

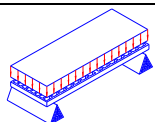
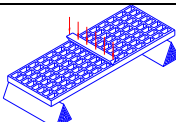
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
80	24800	49600	80	12400	24800
100	12700	25400	100	7900	15850
120	7350	14700	120	5500	11000
140	4600	9250	140	4050	8100
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

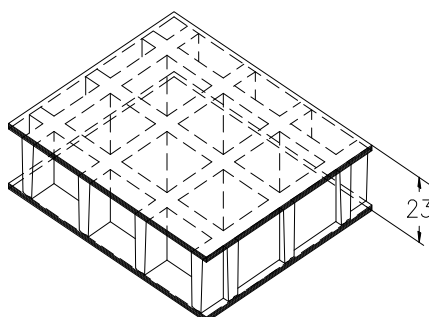
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
80	23900	80	9550
100	15300	100	7650
120	10600	120	6350
140	7800	140	5450
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 38/17DC_IFR

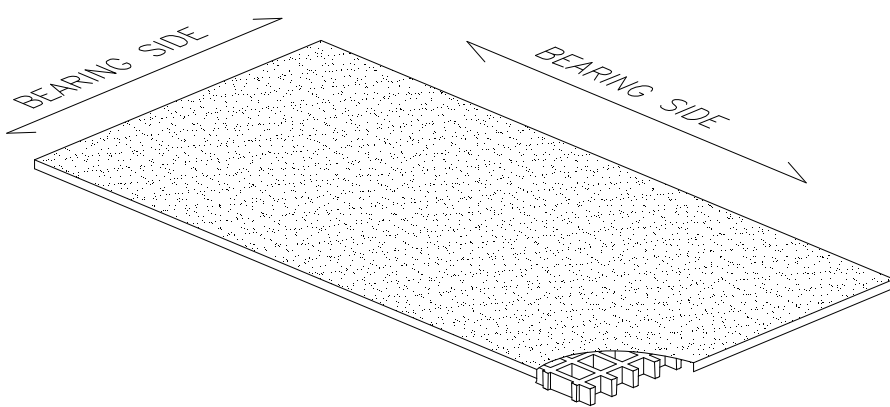
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 38 x 38	
Thickness	mm 23	
Cover thickness	mm 3 upper cover	
	mm 3 bottom cover	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber + Mat and Woven Fabric type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	130 MPa

Standard panels	
mm 1220 x 3660	
Weight kg/m² 21	
tolerance	± mm 5 panel dimensions ± mm 2 height

Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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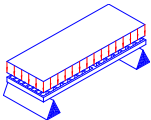
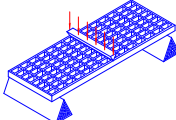
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects

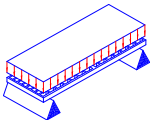
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
30	14650	29300	30	2700	5450
50	3150	6300	50	950	1950
70	1150	2300	70	500	1000
90	500	1050	90	300	600
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

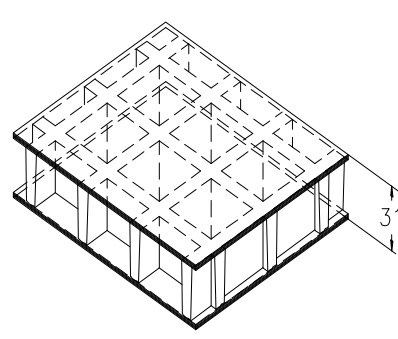
DISTRIBUTED LOAD			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m²]	[cm]	[kg/m]
30	13750	30	2050
50	4950	50	1200
70	2500	70	850
90	1500	90	650
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M. technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 38/25DC_IFR

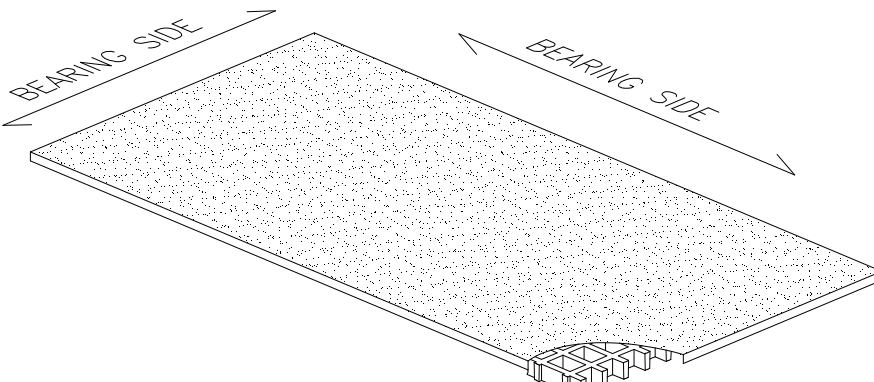
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 38 x 38	
Thickness	mm 31	
Cover thickness	mm 3 upper cover	
	mm 3 bottom cover	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber + Mat and Woven Fabric type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	130 MPa

Standard panels	
mm 1000 x 2000	
mm 1000 x 4038	
mm 1220 x 3660	
Weight kg/m² 25	
tolerance	± mm 5 panel dimensions ± mm 2 height

Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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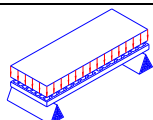
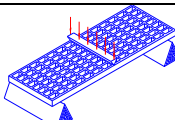
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_s-S1 norm EN 13501-1

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 is no evidence of defects

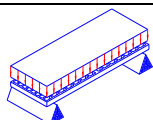
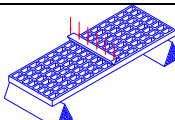
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
30	30300	60650	30	5650	11350
50	6550	13100	50	2000	4050
70	2350	4750	70	1000	2050
90	1100	2200	90	600	1250
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

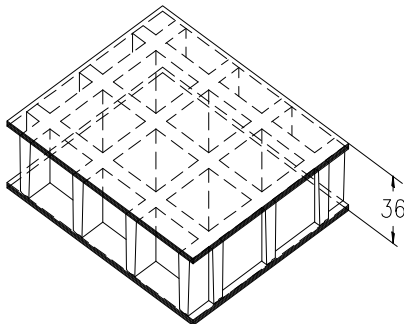
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
30	21200	30	3150
50	7600	50	1900
70	3850	70	1350
90	2350	90	1050
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M. technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 38/30DC_IFR

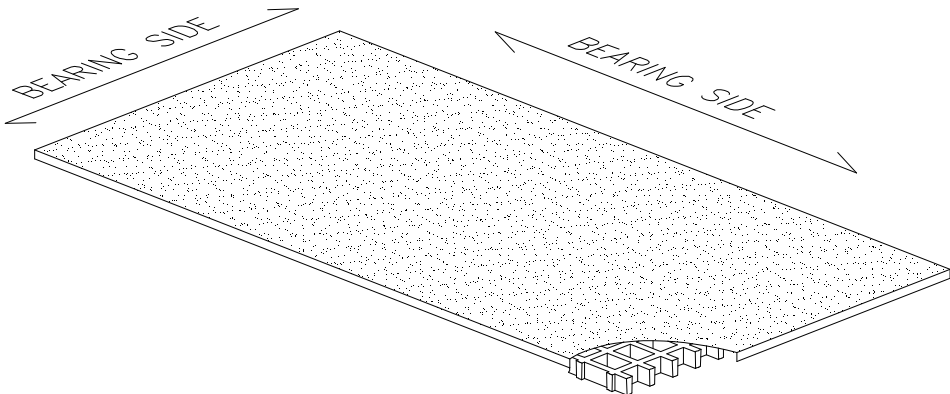
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 38 x 38	
Thickness	mm 36	
Cover thickness	mm 3 upper cover	
	mm 3 bottom cover	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber + Mat and Woven Fabric type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	130 MPa

Standard panels	
mm 1000 x 2000	
mm 1000 x 4038	
mm 1220 x 3660	
Weight kg/m² 27,5	
tolerance	
	± mm 5 panel dimensions ± mm 2 height

Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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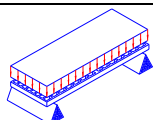
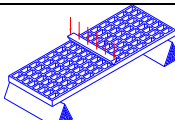
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_s-S1 norm EN 13501-1

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 is no evidence of defects

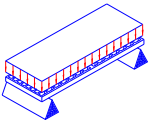
LOADS

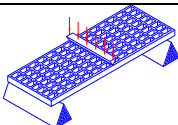
MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	9400	18800	50	2900	5850
70	3400	6850	70	1500	3000
90	1600	3200	90	900	1800
110	850	1750	110	600	1200
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

DISTRIBUTED LOAD		
Distance between supports	Maximum admitted load	
[cm]	[kg/m²]	
50	9450	
70	4800	
90	2900	
110	1950	

CONCENTRATED LOAD		
Distance between supports	Maximum admitted load	
[cm]	[kg/m]	
50	2350	
70	1650	
90	1300	
110	1050	

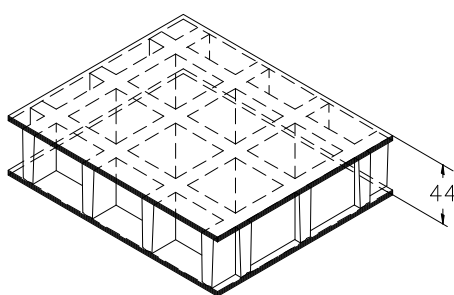
| All lighter loads are admitted | | |

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 38/38DC_IFR

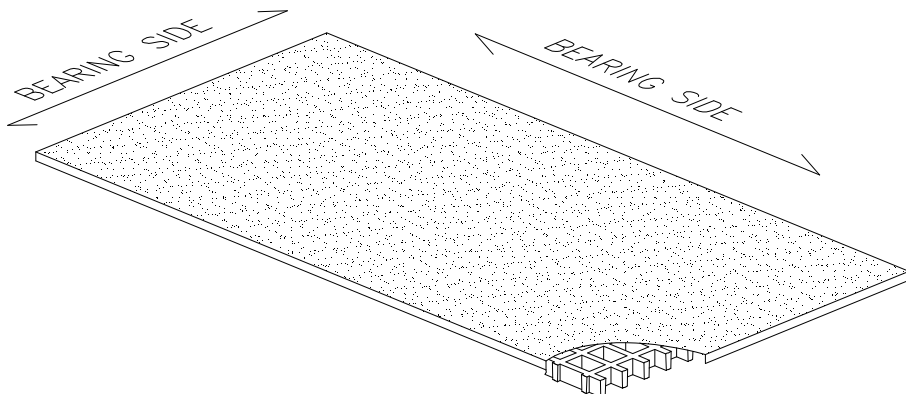
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MOLDED GRATINGS

Mesh	mm 38 x 38	
Thickness	mm 44	
Cover thickness	mm 3 upper cover	
	mm 3 bottom cover	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber + Mat and Woven Fabric type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	130 MPa

Standard panels	
mm 1000 x 1800	
mm 1000 x 3660	
mm 1220 x 3660	
Weight kg/m² 30	
tolerance	± mm 5 panel dimensions ± mm 2 height

Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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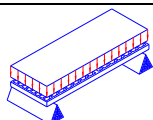
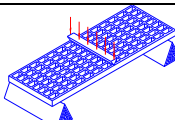
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_s-S1 norm EN 13501-1

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 is no evidence of defects

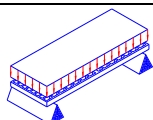
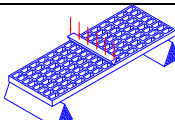
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	15350	30700	50	4750	9550
70	5550	11150	70	2400	4850
90	2600	5250	90	1450	2950
110	1400	2850	110	950	1950
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

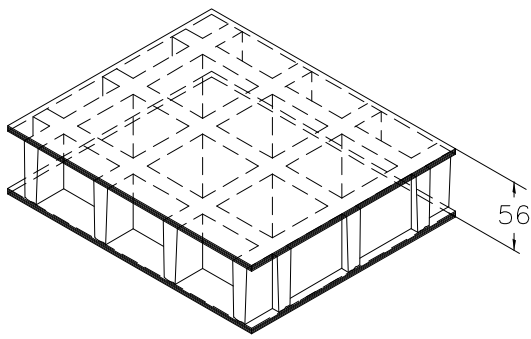
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
50	12600	50	3150
70	6400	70	2250
90	3850	90	1750
110	2600	110	1400
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 50/50DC_IFR

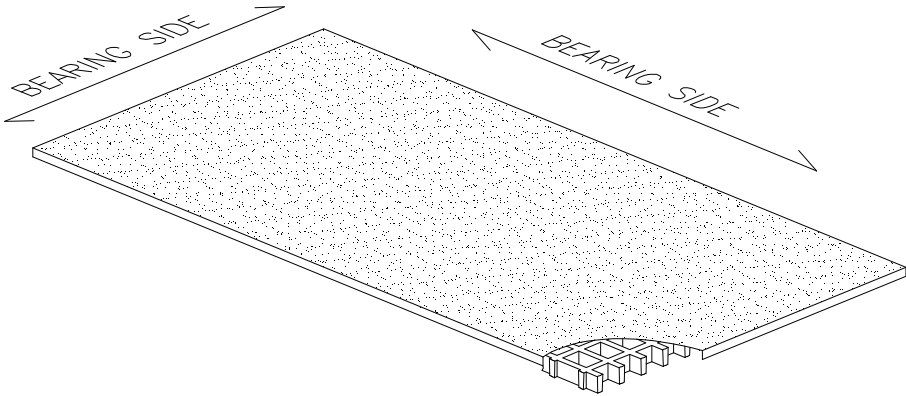
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MOLDED GRATINGS

Mesh	mm 50 x 50	
Thickness	mm 56	
Cover thickness	mm 3 upper cover	
	mm 3 bottom cover	
Bearing bar thickness	mm 8 upper part	
	mm 5 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber + Mat and Woven Fabric type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	130 MPa

Standard panels	
mm 1220 x 3660	
Weight kg/m² 35,5	
tolerance	± mm 5 panel dimensions ± mm 2 height

Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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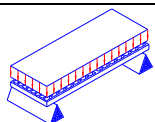
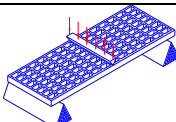
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_s-S1 norm EN 13501-1

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 is no evidence of defects

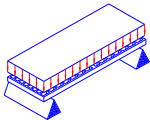
LOADS

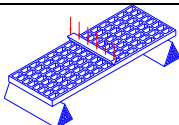
MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
70	9800	19650	70	4250	8550
90	4600	9200	90	2600	5200
110	2500	5050	110	1700	3450
130	1500	3050	130	1200	2450
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

DISTRIBUTED LOAD		
Distance between supports	Maximum admitted load	
[cm]	[kg/m²]	
70	8850	
90	5350	
110	3550	
130	2550	

CONCENTRATED LOAD		
Distance between supports	Maximum admitted load	
[cm]	[kg/m]	
70	3100	
90	2400	
110	1950	
130	1650	

All lighter loads are admitted

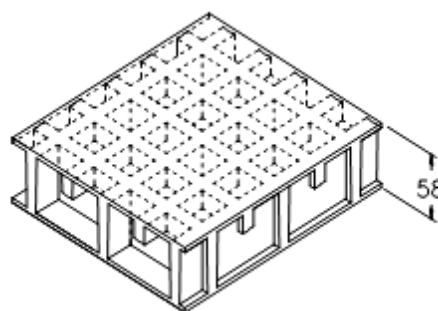
- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 52/52DC_IFR

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MOLDED GRATINGS

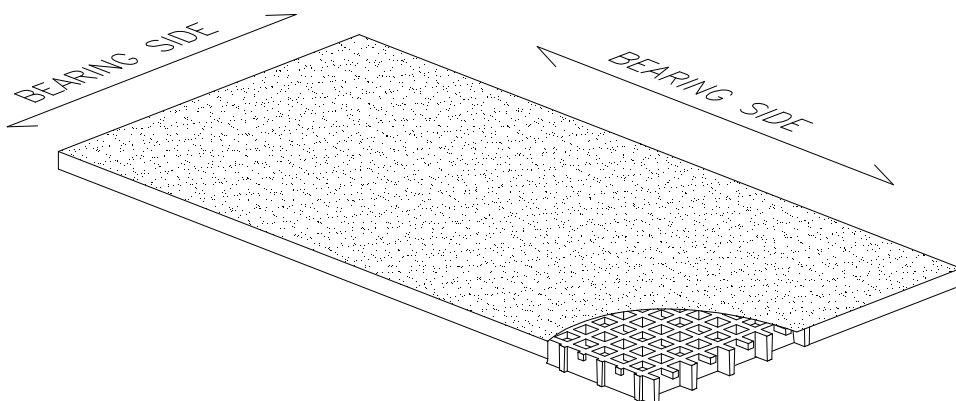
Mesh	mm 52 x 52	main
	mm 26 x 26	secondary
Thickness	mm 58	
Cover thickness	mm 3	upper cover
	mm 3	bottom cover
Bearing bar thickness	mm 8	upper part
	mm 7	bottom part
Color	Grey RAL 7004 <i>indicative RAL reference</i>	



Raw materials	Polyester Resin	
	Roving glass fiber + Mat and Woven Fabric type "E"	
	Inorganic fillers without halogens	

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	130 MPa

Standard panels	
mm 1000 x 3000	
mm 1000 x 4050	
Weight kg/m² 44,5	
tolerance	<div>± mm 5 panel dimensions</div> <div>± mm 2 height</div>



Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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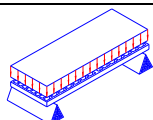
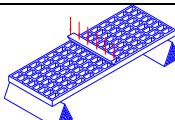
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects	

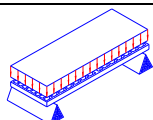
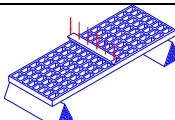
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m²]		[cm]	[kg/m]	
70	10850	21750	70	4750	9500
90	5100	10200	90	2850	5750
110	2800	5600	110	1900	3850
130	1650	3350	130	1350	2750
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m²]	[cm]	[kg/m]
70	9450	70	3300
90	5700	90	2550
110	3800	110	2100
130	2750	130	1750
All lighter loads are admitted			

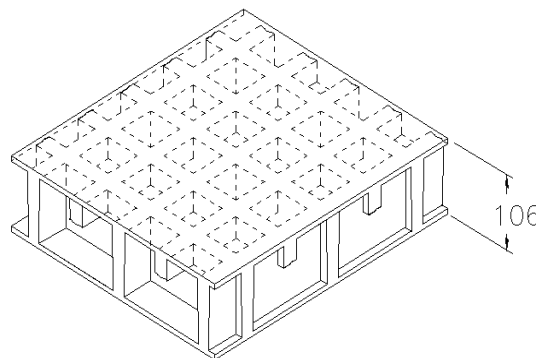
- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 52/100DC_IFR

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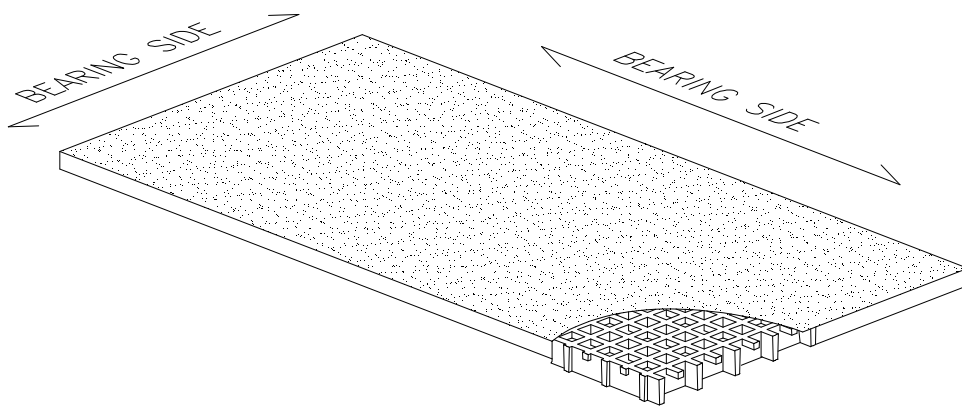
MOLDED GRATINGS

Mesh	mm 52 x 52	main
	mm 26 x 26	secondary
Thickness	mm 106	
Cover thickness	mm 3	upper cover
	mm 3	bottom cover
Bearing bar thickness	mm 10	upper part
	mm 8	bottom part
Color	Grey RAL 7004 <i>indicative RAL reference</i>	



Raw materials	Polyester Resin	
	Roving glass fiber + Mat and Woven Fabric type "E"	
	Inorganic fillers without halogens	

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	130 MPa

Standard panels		
mm 1005 x 1510		
Weight kg/m² 70		
tolerance		

Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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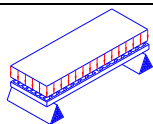
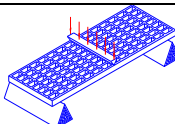
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects	

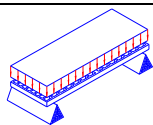
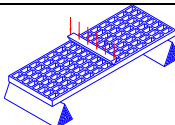
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
80	35450	70950	80	17700	35450
100	18150	36350	100	11350	22700
120	10500	21000	120	7850	15750
140	6600	13200	140	5750	11550
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

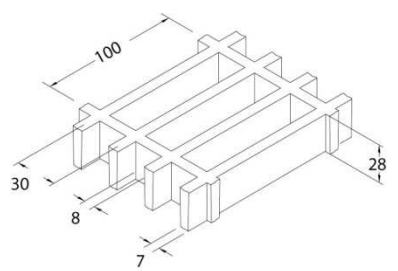
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
80	19350	80	7700
100	12350	100	6150
120	8600	120	5150
140	6300	140	4400
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 30/28_IFR

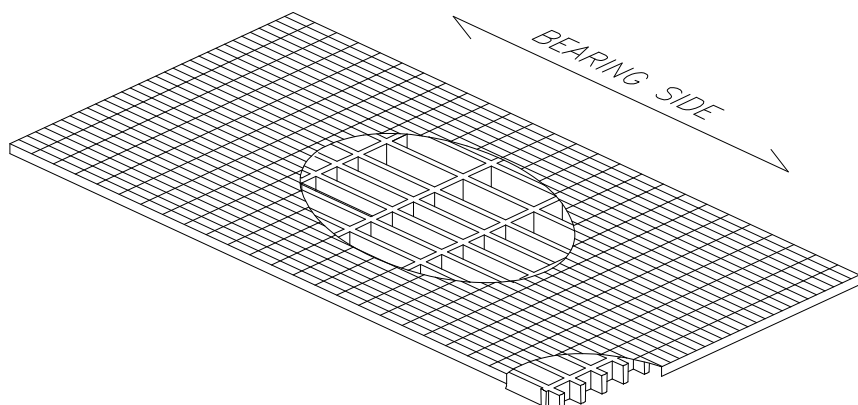
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 100 x 30	
Clear span	mm 92 x 22	
Height	mm 28	
Bearing bar thickness	mm 8 upper part	
	mm 7 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1000 x 2000	
mm 1500 x 2000	
Weight kg/m² 13	
tolerance	± mm 5 panel dimensions ± mm 2 height

Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

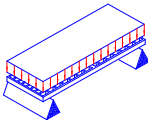
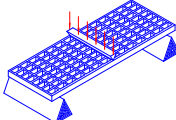
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_{fl}-S1 norm EN 13501-1

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 is no evidence of defects

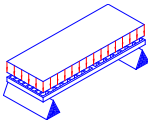
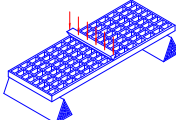
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	2100	4250	50	650	1300
70	750	1550	70	300	650
90	350	700	90	200	400
110	200	400	110	100	250
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

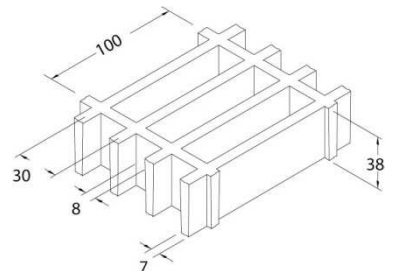
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
50	6750	50	1650
70	3400	70	1200
90	2050	90	900
110	1350	110	750
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M. technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 30/38_IFR

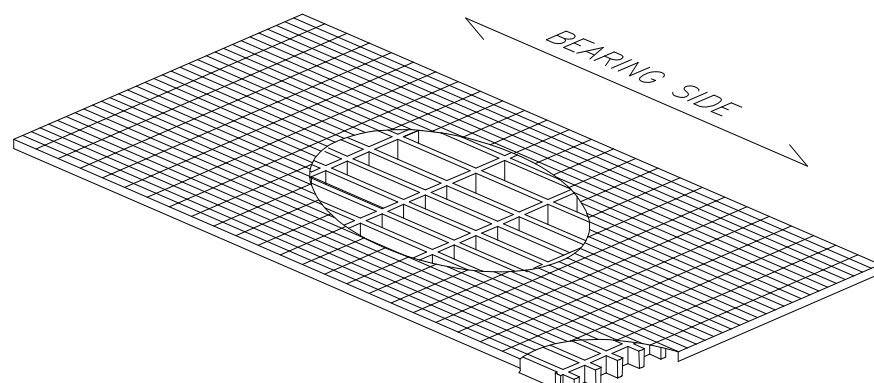
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 100 x 30	
Clear span	mm 92 x 22	
Height	mm 38	
Bearing bar thickness	mm 8 upper part	
	mm 7 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1200 x 3000	
Weight kg/m² 18	
tolerance	
	± mm 5 panel dimensions
	± mm 2 height

Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

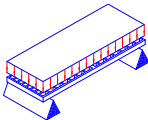
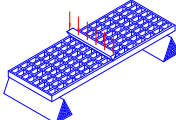
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects

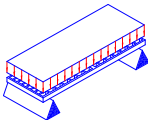
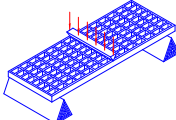
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	5350	10700	50	1650	3350
70	1950	3900	70	850	1700
90	900	1800	90	500	1000
110	500	1000	110	300	650
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

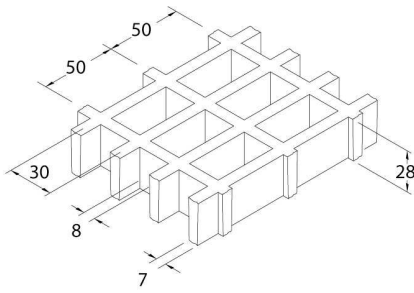
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
50	12450	50	3100
70	6350	70	2200
90	3800	90	1700
110	2550	110	1400
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M. technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 50/28_IFR

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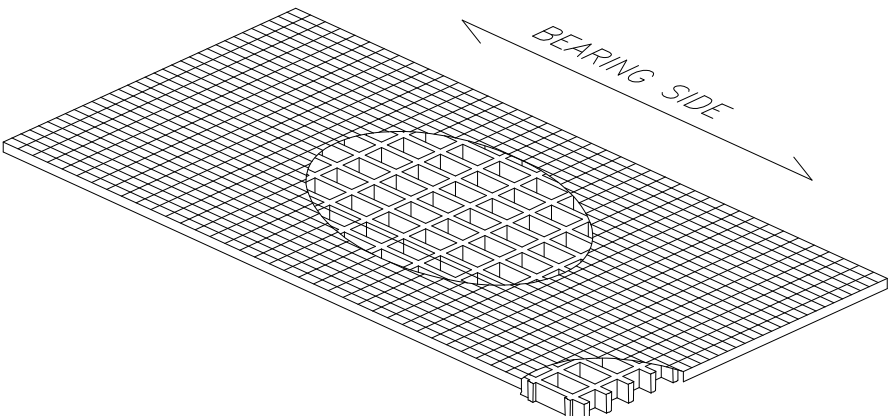
MOLDED GRATINGS

Mesh	mm 50 x 30	
Clear span	mm 42 x 22	
Height	mm 28	
Bearing bar thickness	mm 8 upper part	
	mm 7 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1000 x 2000	
Weight kg/m² 16	
tolerance	± mm 5 panel dimensions
	± mm 2 height



Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

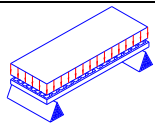
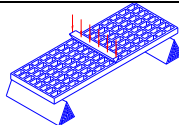
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_{fl}-S1 norm EN 13501-1

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 is no evidence of defects

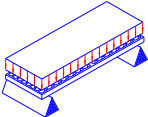
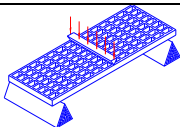
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	2100	4250	50	650	1300
70	750	1550	70	300	650
90	350	700	90	200	400
110	200	400	110	100	250
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

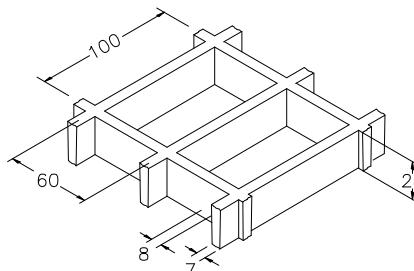
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
50	6750	50	1650
70	3400	70	1200
90	2050	90	900
110	1350	110	750
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 60/28_IFR

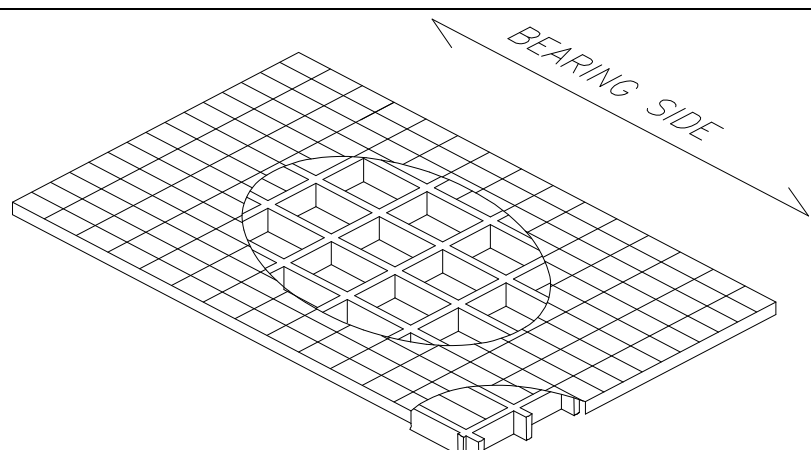
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 100 x 60	
Clear span	mm 92 x 52	
Height	mm 28	
Bearing bar thickness	mm 8 upper part	
	mm 7 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	

Raw materials	Polyester Resin
	Roving glass fiber type "E"
	Inorganic fillers without halogens

Resin type	Modulus of elasticity	Ultimate stress
IFR	15000 MPa	325 MPa

Standard panels	
mm 1500 x 2000	
Weight kg/m² 9	
tolerance ± mm 5 panel dimensions	
± mm 2 height	

Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
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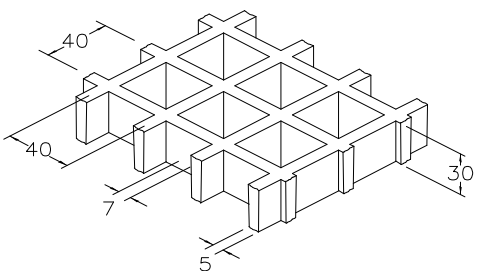
Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		Level B_f-S1 norm EN 13501-1

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 is no evidence of defects

SCH 40/30_ISO

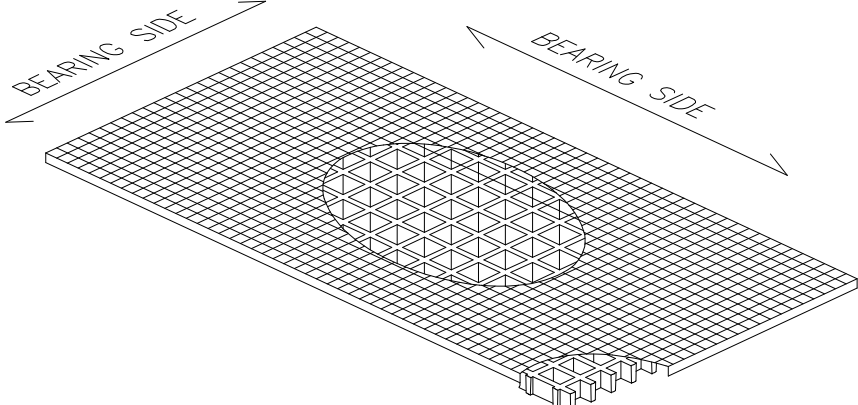
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 40 x 40	
Clear span	mm 33 x 33	
Height	mm 30	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Translucent green	

Raw materials	ISOPHTALIC Polyester Resin
	Roving glass fiber type "E"
	Without inorganic fillers

Resin type	Modulus of elasticity	Ultimate stress
ISO	12250 MPa	310 MPa

Standard panels	
mm 1000 x 2000	
mm 1200 x 3000	
Weight kg/m² 12	
tolerance	± mm 5 panel dimensions ± mm 2 height

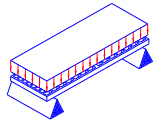
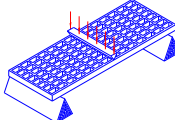
Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

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 is no evidence of defects

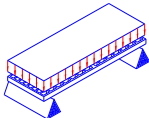
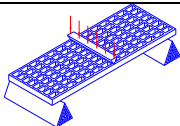
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	1300	2600	50	400	800
70	450	950	70	200	400
90	200	400	90	100	250
110	100	200	110	50	150
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

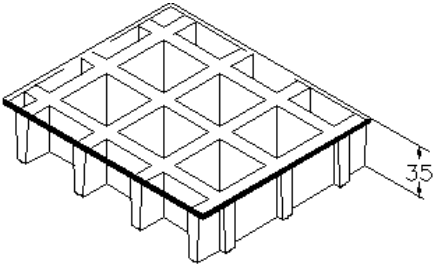
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m²]	[cm]	[kg/m]
50	4350	50	1050
70	2200	70	750
90	1300	90	600
110	900	110	450
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 40/30C_ISO

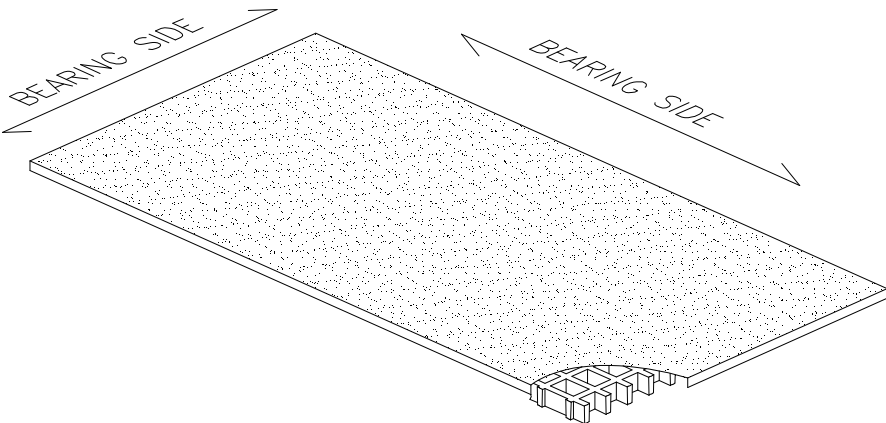
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MOLDED GRATINGS

Mesh	mm 40 x 40	
Thickness	mm 35	
Cover thickness	mm 5	
Bearing bar thickness	mm 7 upper part	
	mm 5 bottom part	
Color	Translucent green	

Raw materials	ISOPHTALIC Polyester Resin
	Roving glass fiber + Mat and Woven Fabric type "E"
	Without inorganic fillers

Resin type	Modulus of elasticity	Ultimate stress
ISO	12250 MPa	250 MPa

Standard panels	
mm 1000 x 2000	
mm 1200 x 3000	
Weight kg/m² 18	
tolerance	± mm 5 panel dimensions
	± mm 2 height

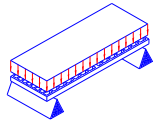
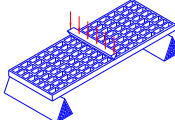
Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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Ageing resistance	Ageing test made with UV lamp according to ASTM G154-06 and passed with 5 points on the gray range and without evident defects (test made with 1500 hours of exposure to 4 hours 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 is no evidence of defects

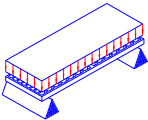
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	4150	8350	50	1300	2600
70	1500	3050	70	650	1300
90	700	1400	90	400	800
110	350	750	110	250	500
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

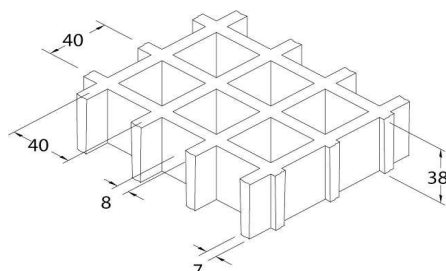
DISTRIBUTED LOAD			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m²]	[cm]	[kg/m]
50	7350	50	1800
70	3750	70	1300
90	2250	90	1000
110	1500	110	800
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 40/38_ISO

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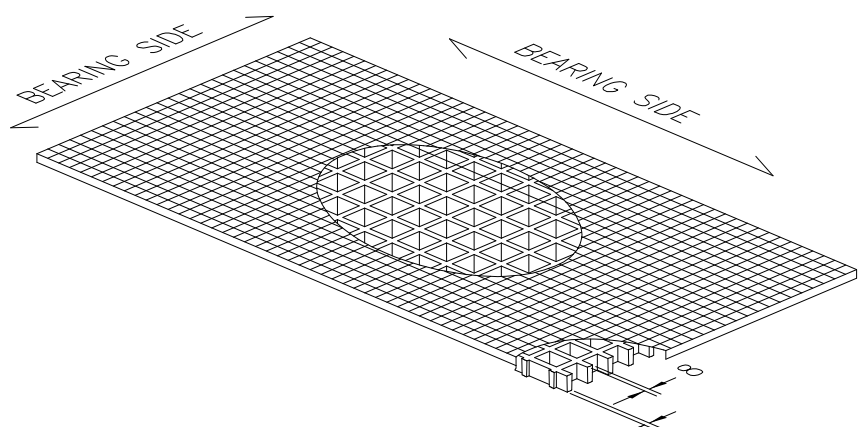
MOLDED GRATINGS

Mesh	mm 40 x 40	
Clear span	mm 32 x 32	
Height	mm 38	
Bearing bar thickness	mm 8 upper part	
	mm 7 bottom part	
Color	Translucent green	

Raw materials	ISOPHTALIC Polyester Resin
	Roving glass fiber type "E"
	Without inorganic fillers

Resin type	Modulus of elasticity	Ultimate stress
ISO	12250 MPa	310 MPa

Standard panels	
mm 1000 x 2000	
mm 1200 x 3000	
Weight kg/m² 19	
tolerance	± mm 5 panel dimensions
	± mm 2 height



A 3D perspective diagram of a rectangular grating panel. The top surface is labeled 'BEARING SIDE' with arrows pointing towards the corners. The underside shows a grid of square openings. A circular area on the underside is highlighted with a dashed line. At the bottom right corner, the panel's profile is shown with dimensions: a width of 1000 mm and a height of 19 mm.

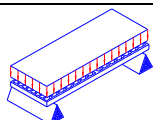
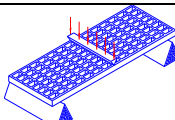
Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

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 is no evidence of defects

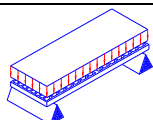
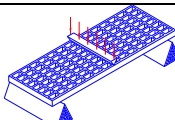
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	3300	6650	50	1000	2050
70	1200	2400	70	500	1050
90	550	1100	90	300	600
110	300	600	110	200	400
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

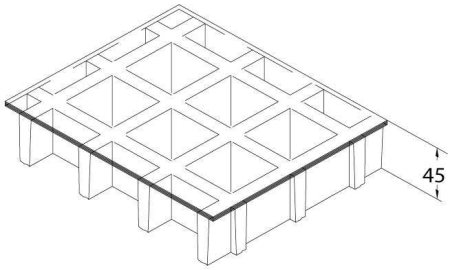
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
50	9050	50	2250
70	4600	70	1600
90	2800	90	1250
110	1850	110	1000
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 40/38C_ISO

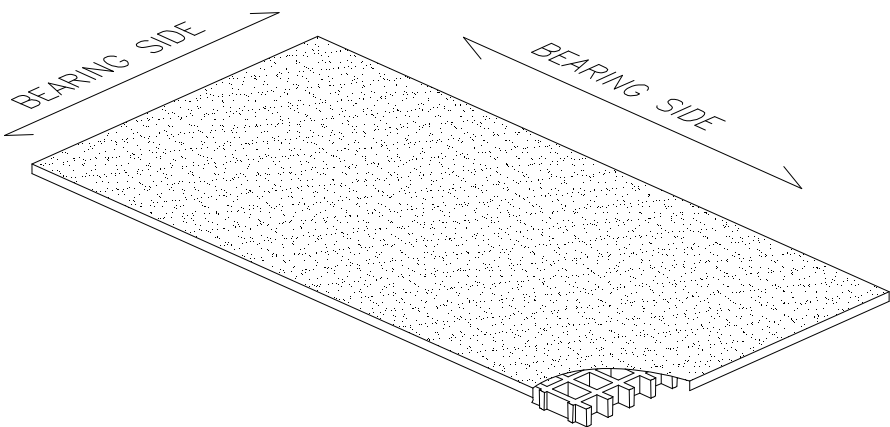
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 40 x 40	
Thickness	mm 45	
Cover thickness	mm 5	
Bearing bar thickness	mm 8 upper part	
	mm 7 bottom part	
Color	Translucent green	

Raw materials	ISOPHTALIC Polyester Resin
	Roving glass fiber + Mat and Woven Fabric type "E"
	Without inorganic fillers

Resin type	Modulus of elasticity	Ultimate stress
ISO	12250 MPa	250 MPa

Standard panels	
mm 1000 x 2000	
mm 1200 x 3000	
Weight kg/m² 27	
tolerance	± mm 5 panel dimensions
	± mm 2 height

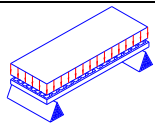
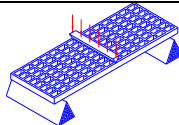
Surface	A	Quartz	Antiskid level R13 V4 norm DIN 51130
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Ageing resistance	Ageing test made with UV lamp according to ASTM G154-06 and passed with 5 points on the gray range and without evident defects (test made with 1500 hours of exposure to 4 hours 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 is no evidence of defects

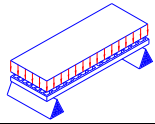
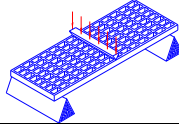
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	9850	19750	50	3050	6150
70	3600	7200	70	1550	3150
90	1650	3350	90	950	1900
110	900	1850	110	600	1250
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

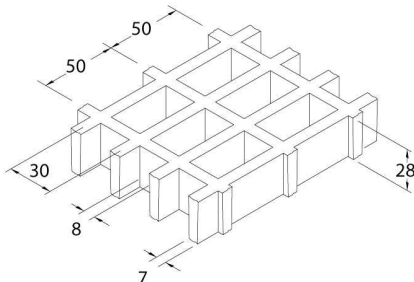
DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m ²]	[cm]	[kg/m]
50	14500	50	3600
70	7400	70	2550
90	4450	90	2000
110	2950	110	1600
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 50/28_ISO

06.05.2011 - Rev. 4

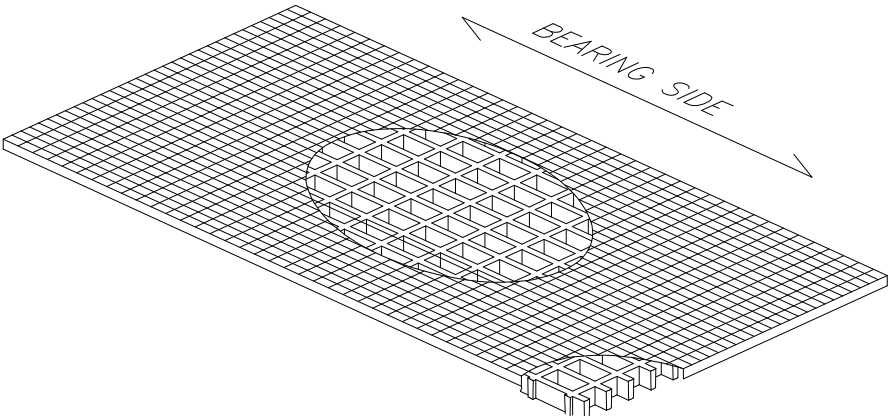
MOLDED GRATINGS

Mesh	mm 50 x 30	
Clear span	mm 42 x 22	
Height	mm 28	
Bearing bar thickness	mm 8 upper part	
	mm 7 bottom part	
Color	Translucent green	

Raw materials	ISOPHTALIC Polyester Resin
	Roving glass fiber type "E"
	Without inorganic fillers

Resin type	Modulus of elasticity	Ultimate stress
ISO	12250 MPa	310 MPa

Standard panels	
mm 1000 x 2000	
Weight kg/m² 15	
tolerance	± mm 5 panel dimensions
	± mm 2 height



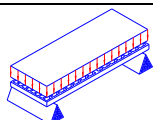
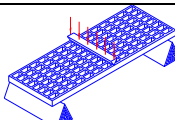
Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	M	Meniscus	Antiskid level R13 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

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 is no evidence of defects

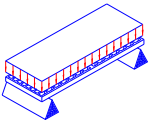
LOADS

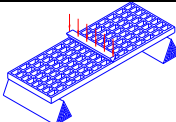
MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
50	1750	3500	50	500	1050
70	600	1250	70	250	550
90	300	600	90	150	300
110	150	300	110	100	200
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

DISTRIBUTED LOAD		
Distance between supports	Maximum admitted load	
[cm]	[kg/m²]	
50	6400	
70	3250	
90	1950	
110	1300	

CONCENTRATED LOAD		
Distance between supports	Maximum admitted load	
[cm]	[kg/m]	
50	1600	
70	1150	
90	850	
110	700	

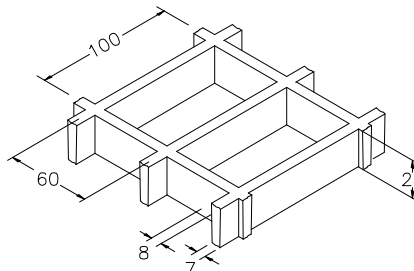
All lighter loads are admitted

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

SCH 60/28_ISO

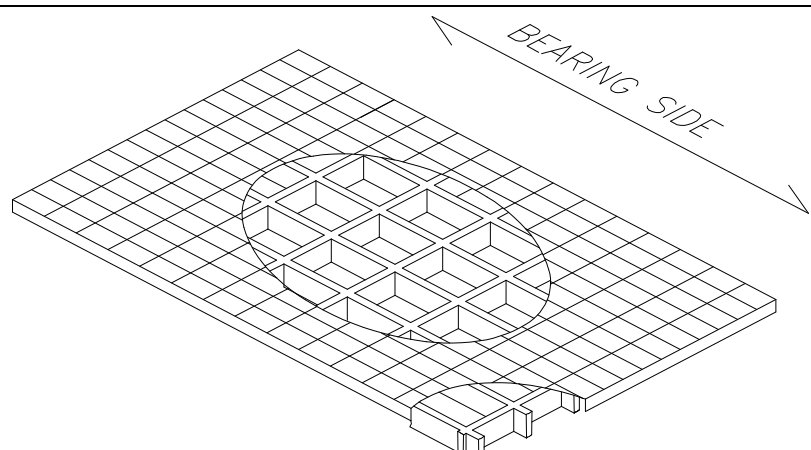
06.05.2011 - Rev. 4

MOLDED GRATINGS

Mesh	mm 100 x 60	
Clear span	mm 92 x 52	
Height	mm 28	
Bearing bar thickness	mm 8 upper part	
	mm 7 bottom part	
Color	Translucent green	

Raw materials	ISOPHTALIC Polyester Resin
	Roving glass fiber type "E"
	Without inorganic fillers

Resin type	Modulus of elasticity	Ultimate stress
ISO	12250 MPa	310 MPa

Standard panels	
mm 1500 x 2000	
Weight kg/m² 8	
tolerance	± mm 5 panel dimensions ± mm 2 height

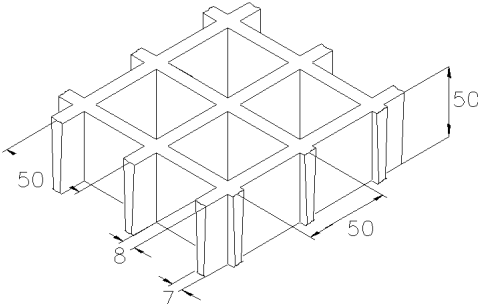
Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
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Ageing resistance	Ageing test made with UV lamp according to ASTM G154-06 and passed with 5 points on the gray range and without evident defects (test made with 1500 hours of exposure to 4 hours 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 is no evidence of defects

SCH 50/50_ISO_HDL

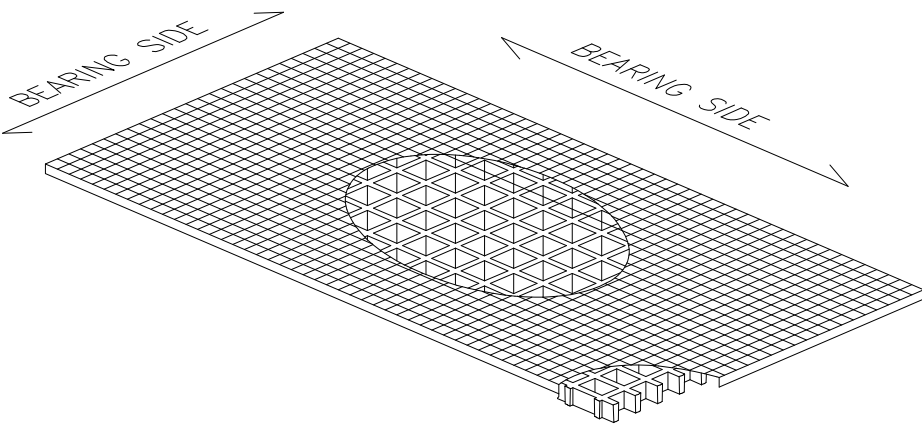
20.07.2015 - Rev. 5

MOLDED GRATINGS

Mesh	mm 50 x 50	
Clear span	mm 42 x 42	
Height	mm 50	
Bearing bar thickness	mm 8 upper part	
	mm 7 bottom part	
Color	Translucent green	

Raw materials	ISOPHTALIC Polyester Resin
	Roving glass fiber type "E"
	Without inorganic fillers

Resin type	Modulus of elasticity	Ultimate stress
ISO	12250 MPa	310 MPa

Standard panels	
mm 1100 x 2000	
Weight kg/m² 21	
tolerance	
± mm 5 panel dimensions ± mm 2 height	

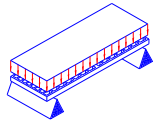
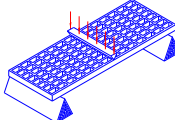
Surface	S	Smooth	Antiskid level R10 V10 norm DIN 51130
	A	Quartz	Antiskid level R13 V10 norm DIN 51130

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 is no evidence of defects

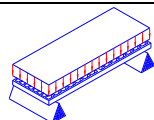
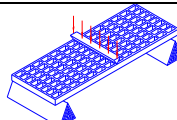
LOADS

MAXIMUM SUGGESTED LOADS

Type of support	On the line of the two ends of the panel
Limits determined by	Deflection (load sagging)
the maximum deflection admitted , is 1/200 of the distance between the supports	
According to the standard DIN 24537-3 deviation due to the load may be no more than 1/200 of the land width and the difference in height between neighbouring joints between loaded and unloaded floor coverings may be no more than 4 mm.	

DISTRIBUTED LOAD			CONCENTRATED LOAD		
					
Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100	Distance between supports	Load with deflection equal to 1/200	Load with deflection equal to 1/100
[cm]	[kg/m ²]		[cm]	[kg/m]	
70	2200	4450	70	950	1950
90	1050	2100	90	550	1150
110	550	1150	110	350	750
130	350	700	130	250	550
All lighter loads are admitted					

Limits determined by	Admitted stresses (stress determined by the load)
the maximum admitted stress is 1/5 of the ultimate stress (safety factor is equal to 0.20 – the ultimate stress is 5 times the specified load)	

DISTRIBUTED LOAD		CONCENTRATED LOAD	
			
Distance between supports	Maximum admitted load	Distance between supports	Maximum admitted load
[cm]	[kg/m²]	[cm]	[kg/m]
70	6450	70	2250
90	3900	90	1750
110	2600	110	1400
130	1850	130	1200
All lighter loads are admitted			

- The above characteristics are meant as reference values for standard material in ambient working temperature. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.
- According to the standard DIN 24537-3 the conversion safety factor should be 0.75 for internal environmental exposure conditions, 0.65 for external exposure conditions, and 0.50 for aggressive exposure conditions.
- No matter which are the exposure conditions, chemical resistance must be always verified by contacting M.M.technical department.
- In case of heavy duty load compressive strength must be verified.

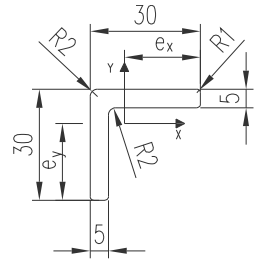
01_53A30305I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "A" ANGULAR (53A30305I)

Height	mm	30	Area	A	mm ²	274	
Width	mm	30	Weight	P	Kg/m	0,4	
Thickness 1	mm	5	Moment of inerzia with respect to x - axis	J _x	mm ⁴	21.907	
Thickness 2	mm	5	Moment of inerzia with respect to y - axis	J _y	mm ⁴	21.907	
Radius 1	mm	2	Section Modulus with respect to x - axis	W _x	mm ³	1.059	
Radius 2	mm	1	Section Modulus with respect to y - axis	W _y	mm ³	1.059	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	20,7	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	20,7	

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					

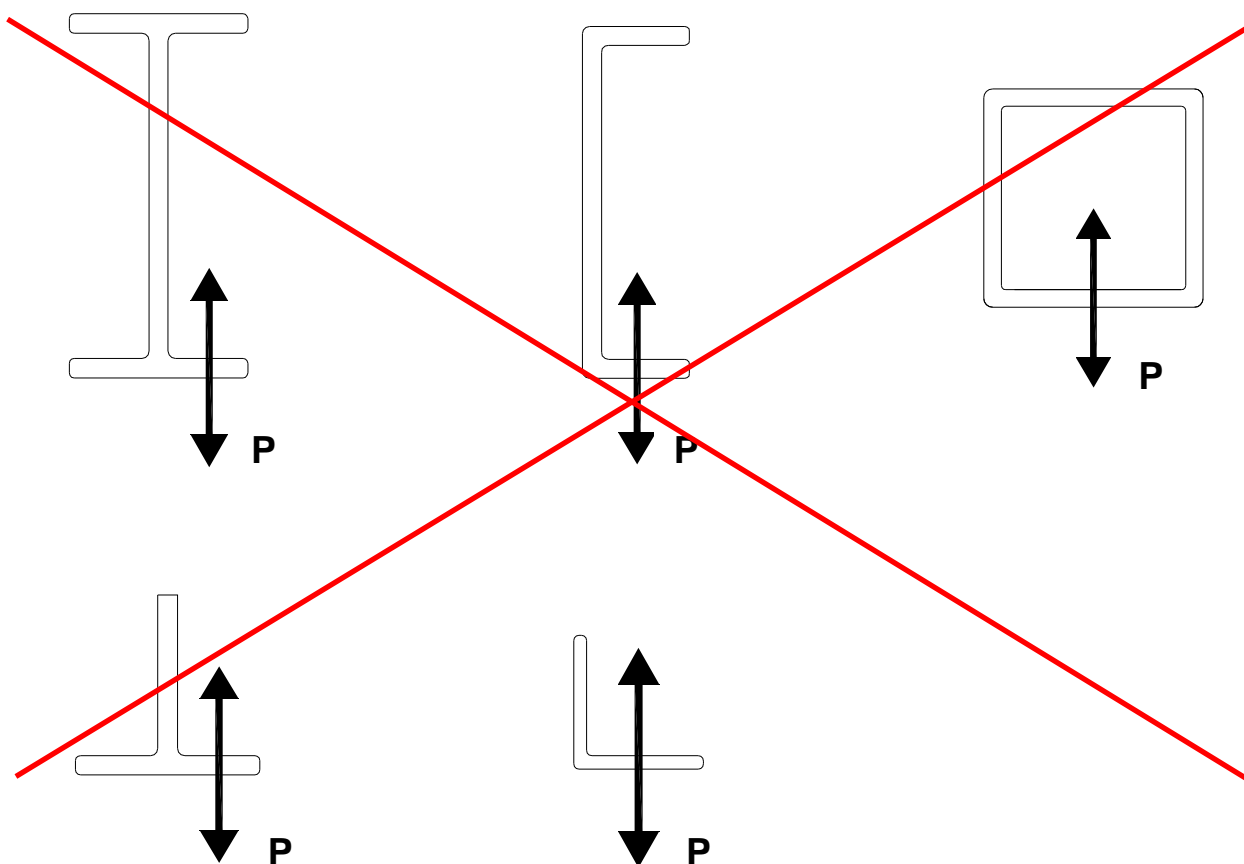
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



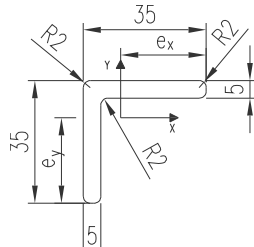
02_53A35355I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "A" ANGULAR (53A35355I)

Height	mm	35	Area	A	mm ²	312	
Width	mm	35	Weight	P	Kg/m	0,5	
Thickness 1	mm	5	Moment of inerzia with respect to x - axis	J _x	mm ⁴	35.176	
Thickness 2	mm	5	Moment of inerzia with respect to y - axis	J _y	mm ⁴	35.176	
Radius 1	mm	2	Section Modulus with respect to x - axis	W _x	mm ³	1.440	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	1.440	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	24,4	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	24,4	

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					

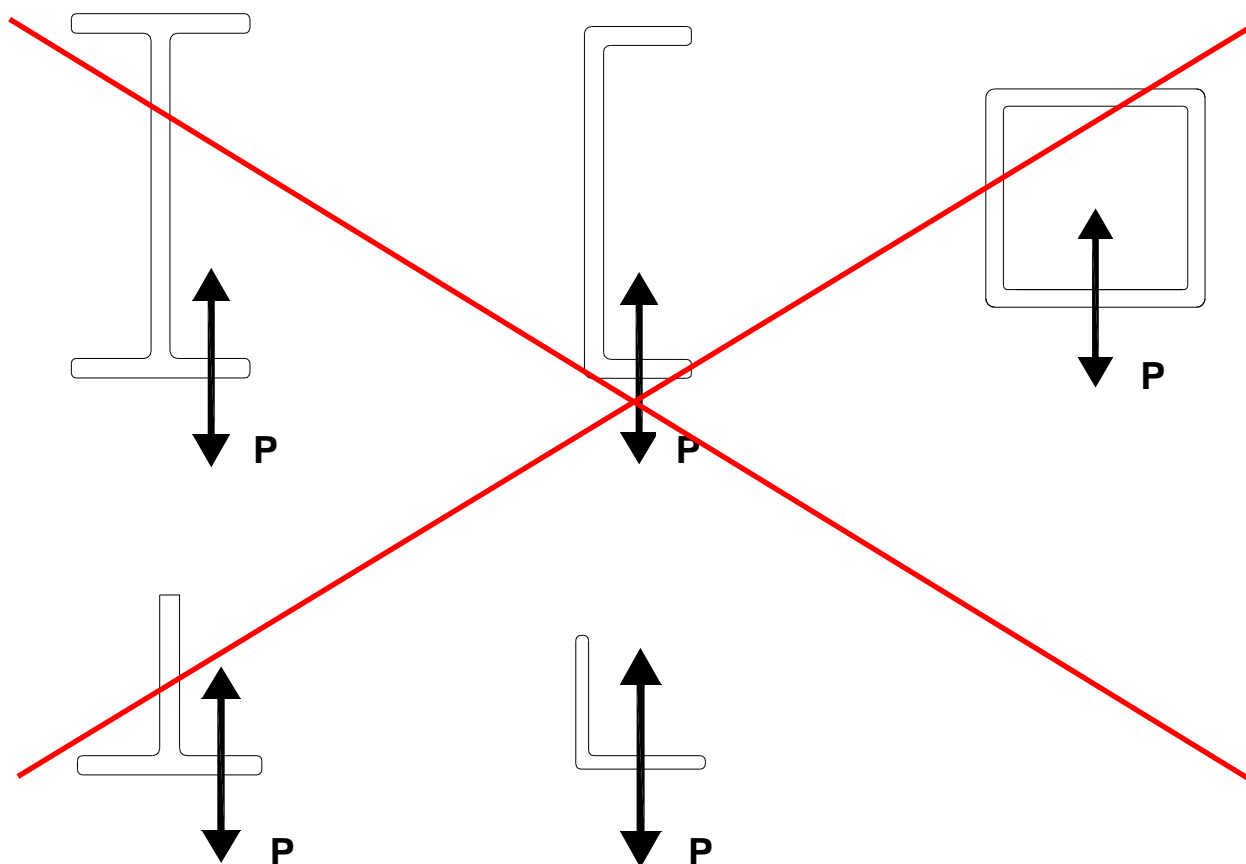
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



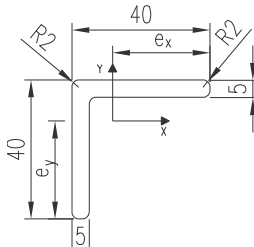
03_53A40405I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "A" ANGULAR (53A40405I)

Height	mm	40	Area	A	mm ²	371	
Width	mm	40	Weight	P	Kg/m	0,6	
Thickness 1	mm	5	Moment of inerzia with respect to x - axis	J _x	mm ⁴	54.059	
Thickness 2	mm	5	Moment of inerzia with respect to y - axis	J _y	mm ⁴	54.059	
Radius 1	mm	2	Section Modulus with respect to x - axis	W _x	mm ³	1.919	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	1.919	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	ex	mm	28,2	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	ey	mm	28,2	

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	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					

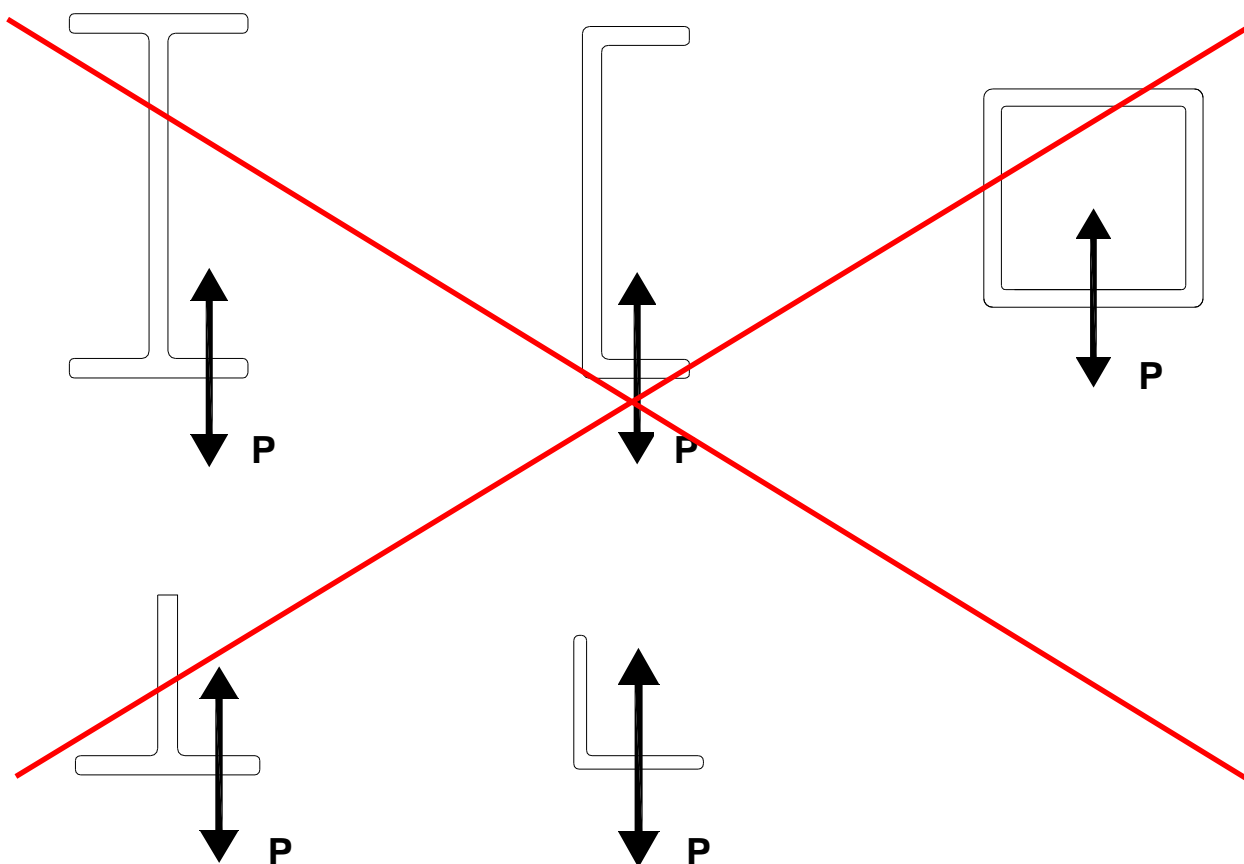
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



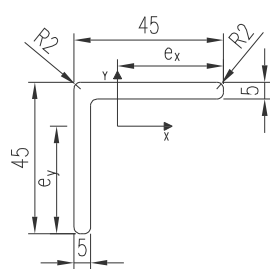
04_53A454551

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Rev. 3

PULTRUDED PROFILES

Profile type "A" ANGULAR (53A454551)

Height	mm	45	Area	A	mm ²	421	
Width	mm	45	Weight	P	Kg/m	0,7	
Thickness 1	mm	5	Moment of inerzia with respect to x - axis	J _x	mm ⁴	78.749	
Thickness 2	mm	5	Moment of inerzia with respect to y - axis	J _y	mm ⁴	78.749	
Radius 1	mm	2	Section Modulus with respect to x - axis	W _x	mm ³	2.469	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	2.469	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	ex	mm	31,9	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	ey	mm	31,9	

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	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					

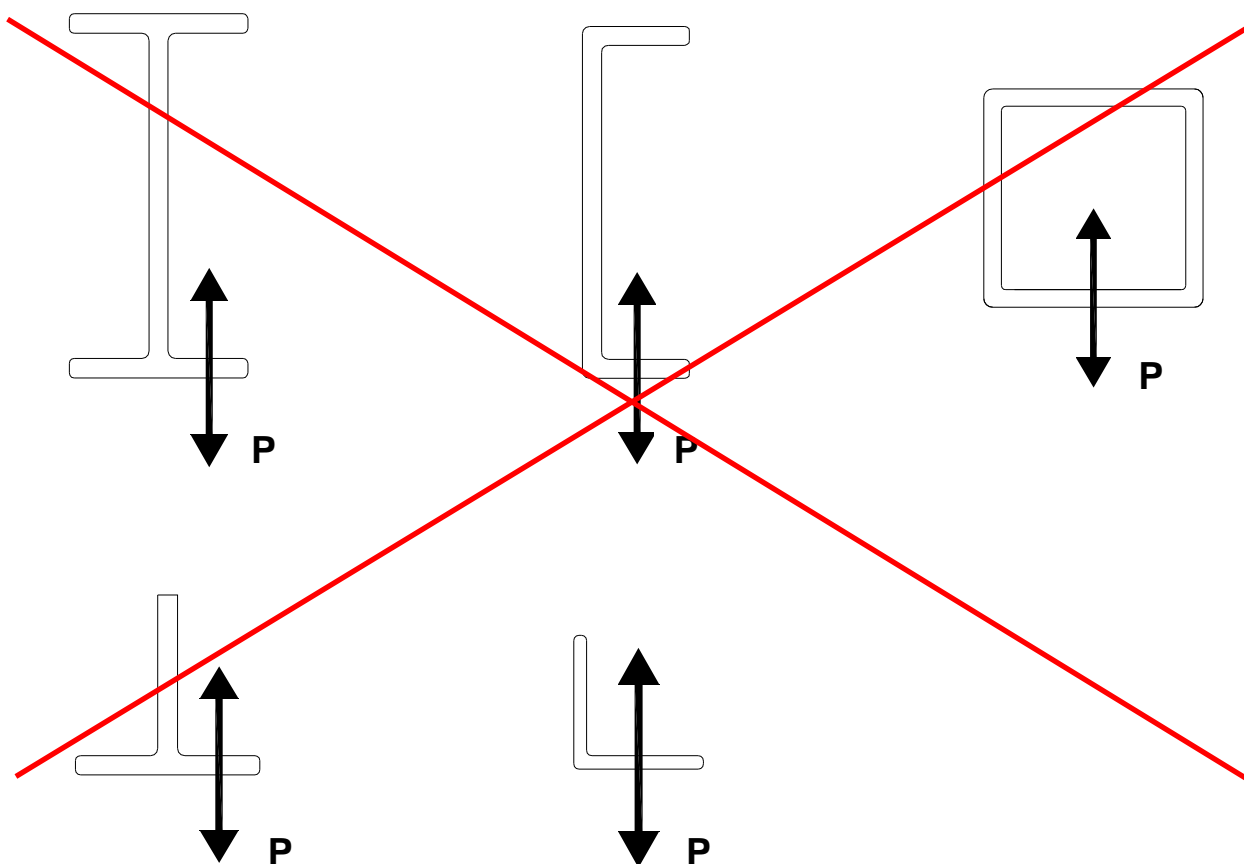
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Physical properties		Unit	Average value	Test method	Physical properties		Unit	Average value	Test method
Specific weight		g/cm ³	1,75÷1,9	ASTM D792	Surface Resistivity		Ω	10 ⁹ ÷ 10 ¹²	EN 61340
Fiberglass weight ratio		%	60	ASTM D2584	Dielectric resistance		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.

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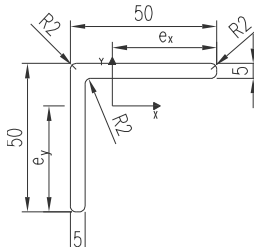
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07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "A" ANGULAR (53A50505I)

Height	mm	50	Area	A	mm ²	471	
Width	mm	50	Weight	P	Kg/m	0,8	
Thickness 1	mm	5	Moment of inerzia with respect to x - axis	J _x	mm ⁴	110.025	
Thickness 2	mm	5	Moment of inerzia with respect to y - axis	J _y	mm ⁴	110.025	
Radius 1	mm	2	Section Modulus with respect to x - axis	W _x	mm ³	3.085	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	3.085	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	35,7	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	35,7	

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	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					

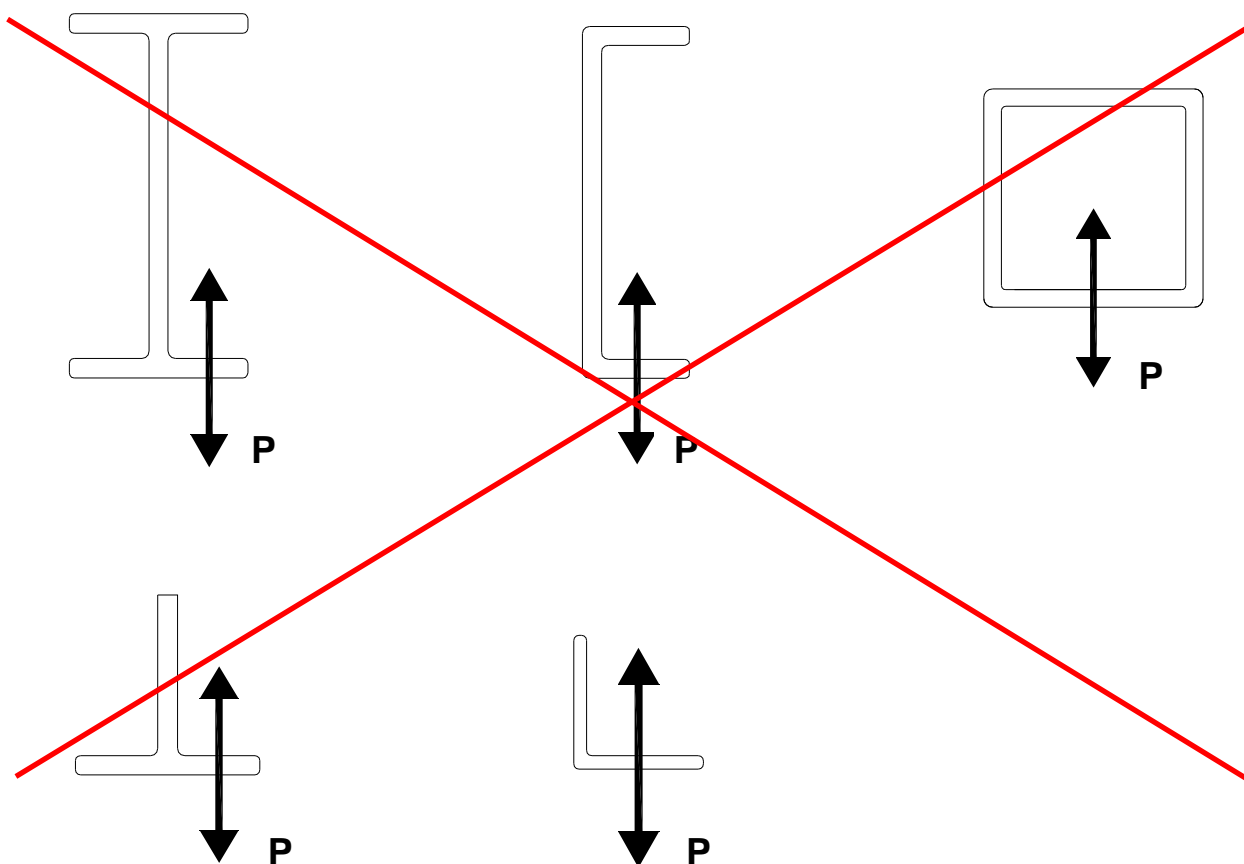
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Physical properties		Unit	Average value	Test method	Physical properties		Unit	Average value	Test method
Specific weight		g/cm ³	1,75÷1,9	ASTM D792	Surface Resistivity		Ω	10 ⁹ ÷ 10 ¹²	EN 61340
Fiberglass weight ratio		%	60	ASTM D2584	Dielectric resistance		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.

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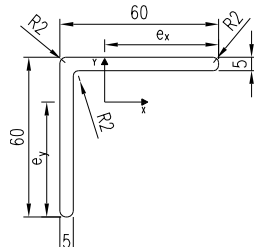
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07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "A" ANGULAR (53A60605I)

Height	mm	60	Area	A	mm ²	571	
Width	mm	60	Weight	P	Kg/m	1	
Thickness 1	mm	5	Moment of inerzia with respect to x - axis	J _x	mm ⁴	195.463	
Thickness 2	mm	5	Moment of inerzia with respect to y - axis	J _y	mm ⁴	195.463	
Radius 1	mm	2	Section Modulus with respect to x - axis	W _x	mm ³	4.535	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	4.535	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	ex	mm	43,1	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	ey	mm	43,1	

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					

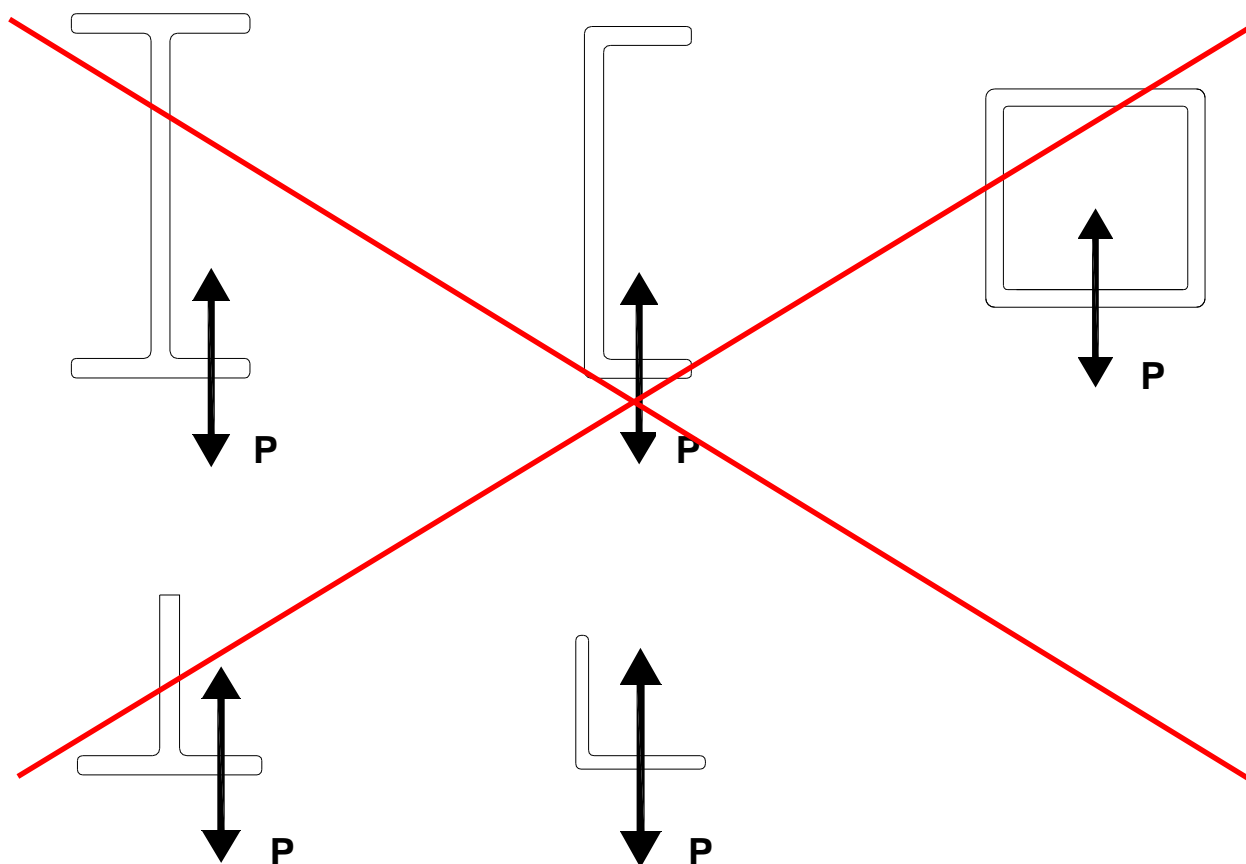
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For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



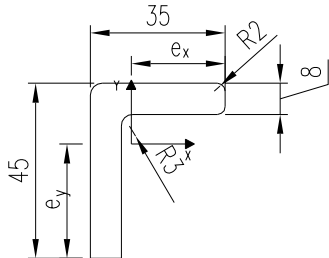
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07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "A" ANGULAR (53A45358I)

Height	mm	45	Area	A	mm ²	574	
Width	mm	35	Weight	P	Kg/m	1	
Thickness 1	mm	8	Moment of inerzia with respect to x - axis	J _x	mm ⁴	107.515	
Thickness 2	mm	8	Moment of inerzia with respect to y - axis	J _y	mm ⁴	55.214	
Radius 1	mm	3	Section Modulus with respect to x - axis	W _x	mm ³	3.652	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	2.259	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	ex	mm	24,4	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	ey	mm	29,4	

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					

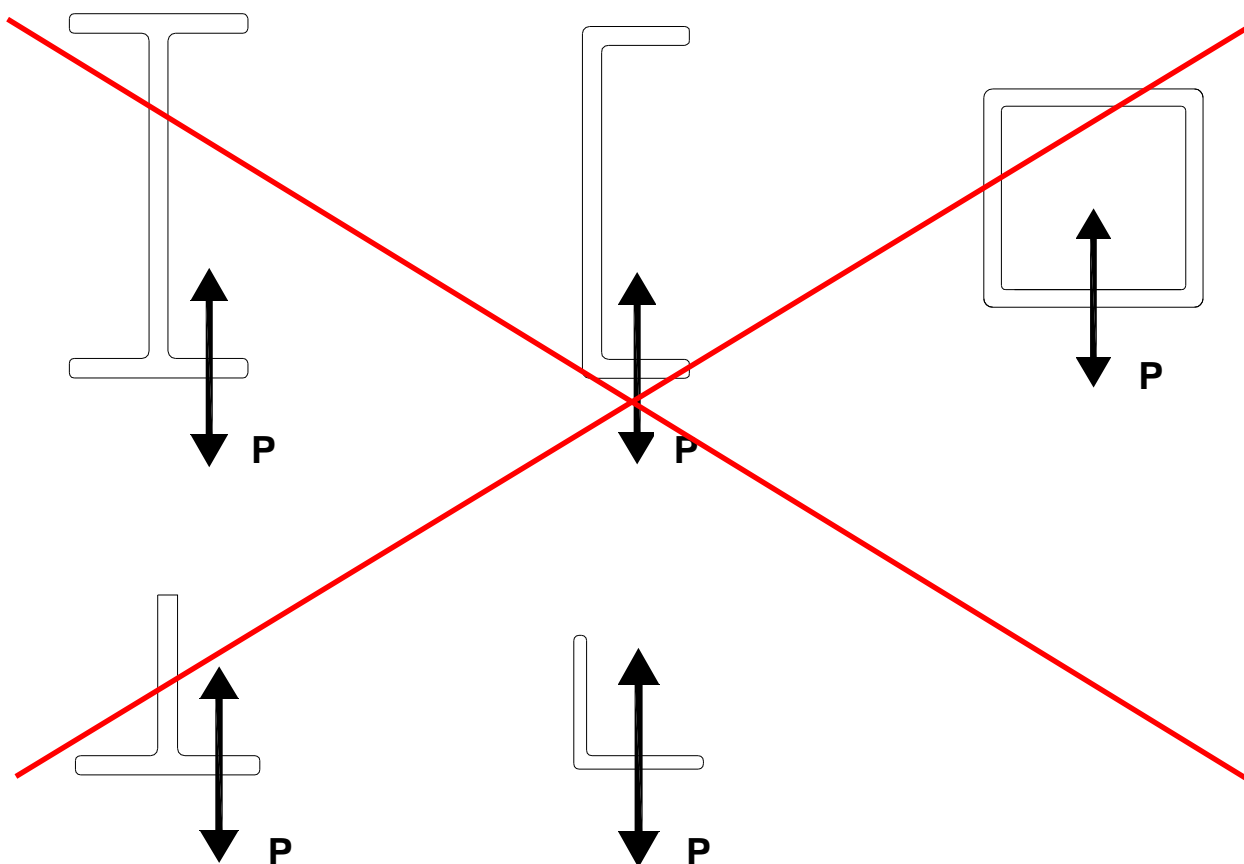
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Physical properties		Unit	Average value	Test method	Physical properties		Unit	Average value	Test method
Specific weight		g/cm ³	1,75÷1,9	ASTM D792	Surface Resistivity		Ω	10 ⁹ ÷ 10 ¹²	EN 61340
Fiberglass weight ratio		%	60	ASTM D2584	Dielectric resistance		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.



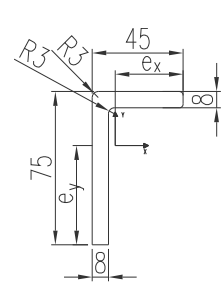
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07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "A" ANGULAR (53A75458I)

Height	mm	75	Area	A	mm ²	894	
Width	mm	45	Weight	P	Kg/m	1,6	
Thickness 1	mm	8	Moment of inerzia with respect to x - axis	J _x	mm ⁴	503.712	
Thickness 2	mm	8	Moment of inerzia with respect to y - axis	J _y	mm ⁴	135.220	
Radius 1	mm	3	Section Modulus with respect to x - axis	W _x	mm ³	10.371	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	4.029	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	33,6	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	48,6	

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					

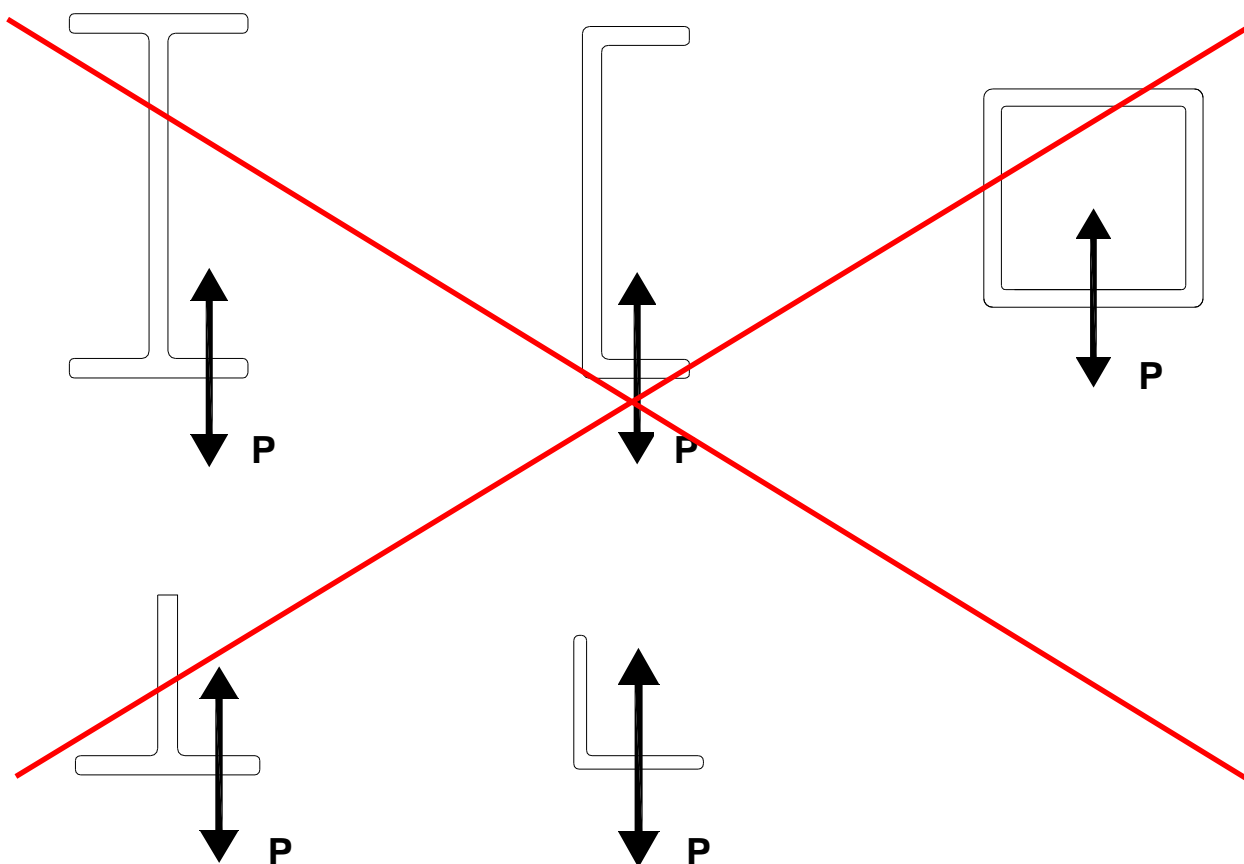
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



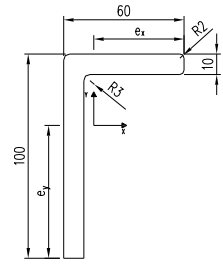
09_53A1006010I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "A" ANGULAR (53A1006010I)

Height	mm	100	Area	A	mm ²	1.498	
Width	mm	60	Weight	P	Kg/m	2,7	
Thickness 1	mm	10	Moment of inerzia with respect to x - axis	J _x	mm ⁴	1.509.782	
Thickness 2	mm	10	Moment of inerzia with respect to y - axis	J _y	mm ⁴	408.729	
Radius 1	mm	3	Section Modulus with respect to x - axis	W _x	mm ³	23.227	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	9.083	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	45	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	65	

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					

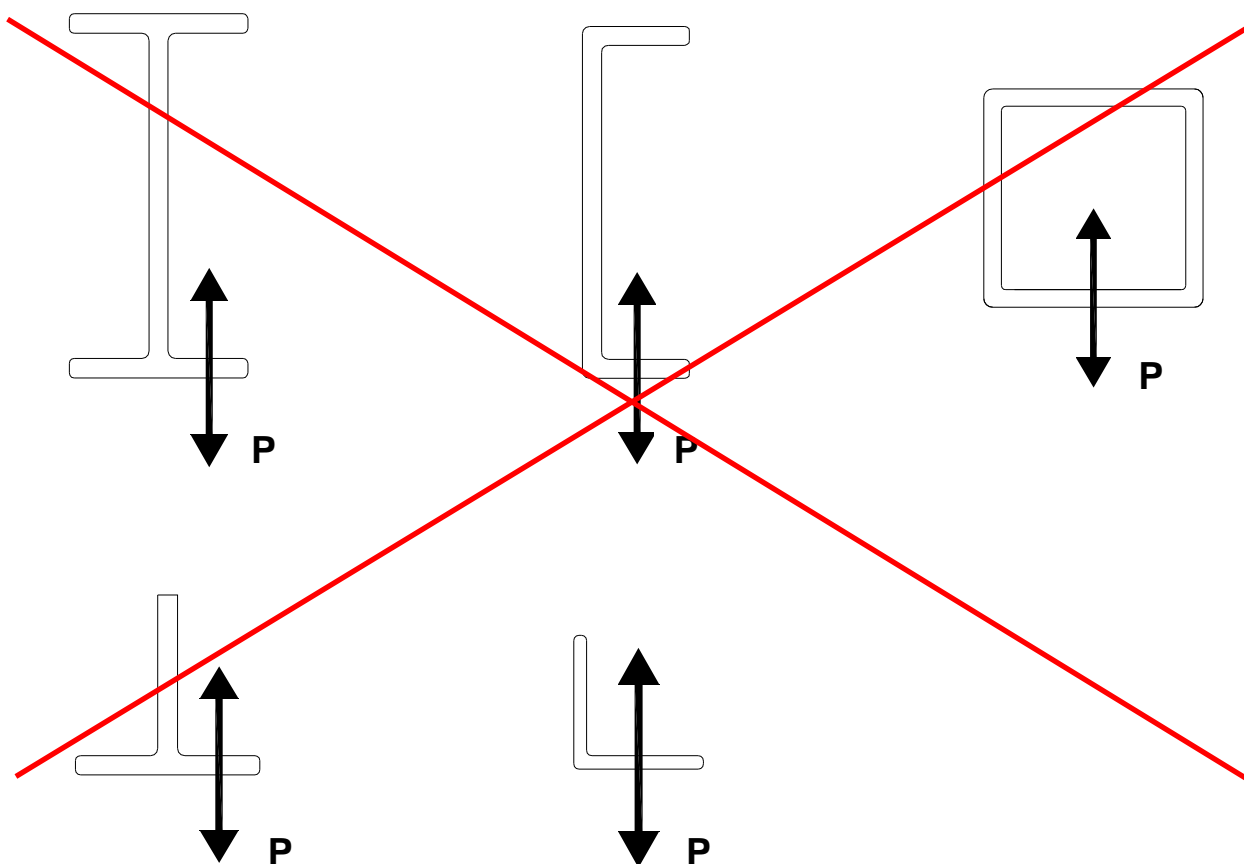
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



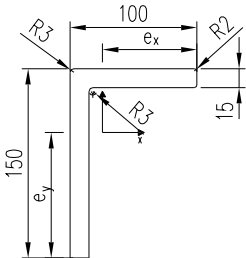
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Rev. 3

PULTRUDED PROFILES

Profile type "A" ANGULAR (53A150100151)

Height	mm	150	Area	A	mm ²	3.523	
Width	mm	100	Weight	P	Kg/m	6,2	
Thickness 1	mm	15	Moment of inerzia with respect to x - axis	J _x	mm ⁴	8.014.405	
Thickness 2	mm	15	Moment of inerzia with respect to y - axis	J _y	mm ⁴	2.836.032	
Radius 1	mm	3	Section Modulus with respect to x - axis	W _x	mm ³	80.628	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	38.119	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	74,4	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	99,4	

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					

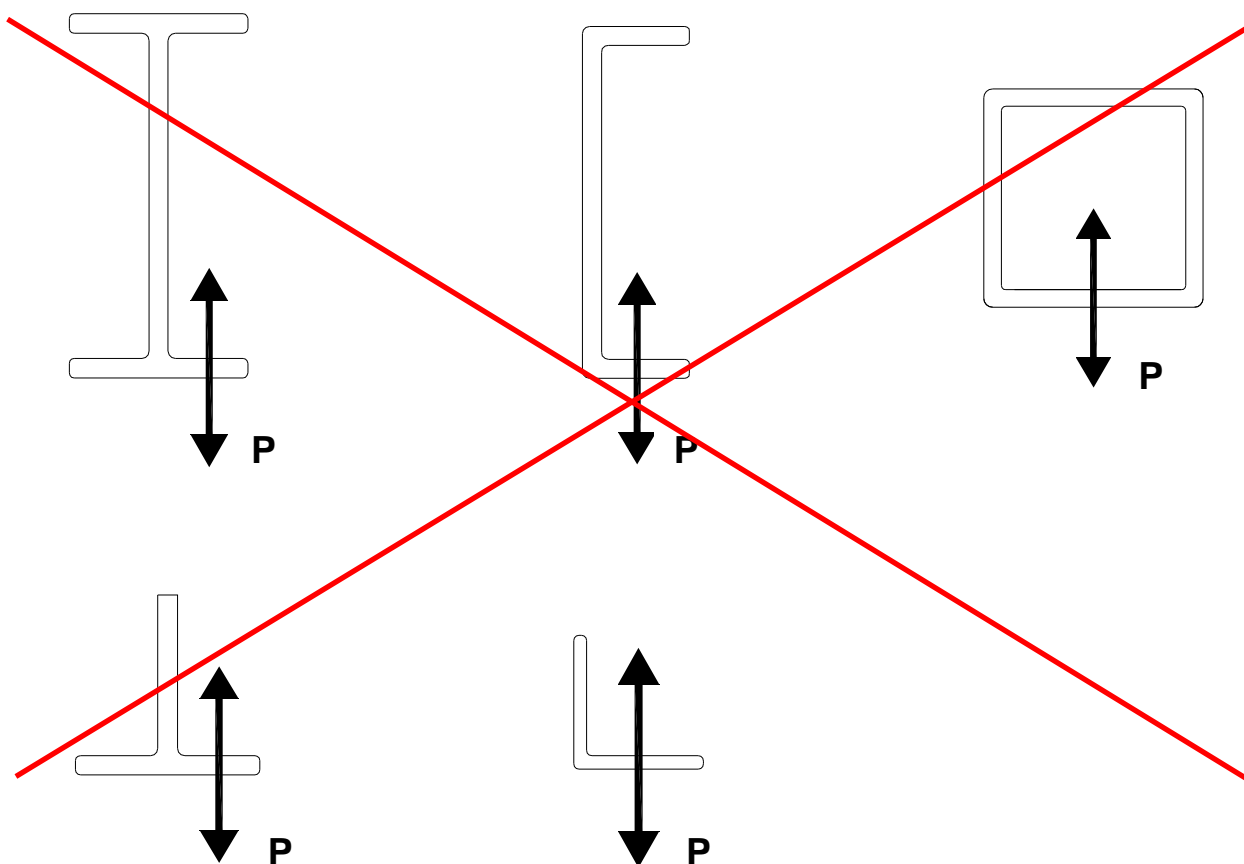
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.

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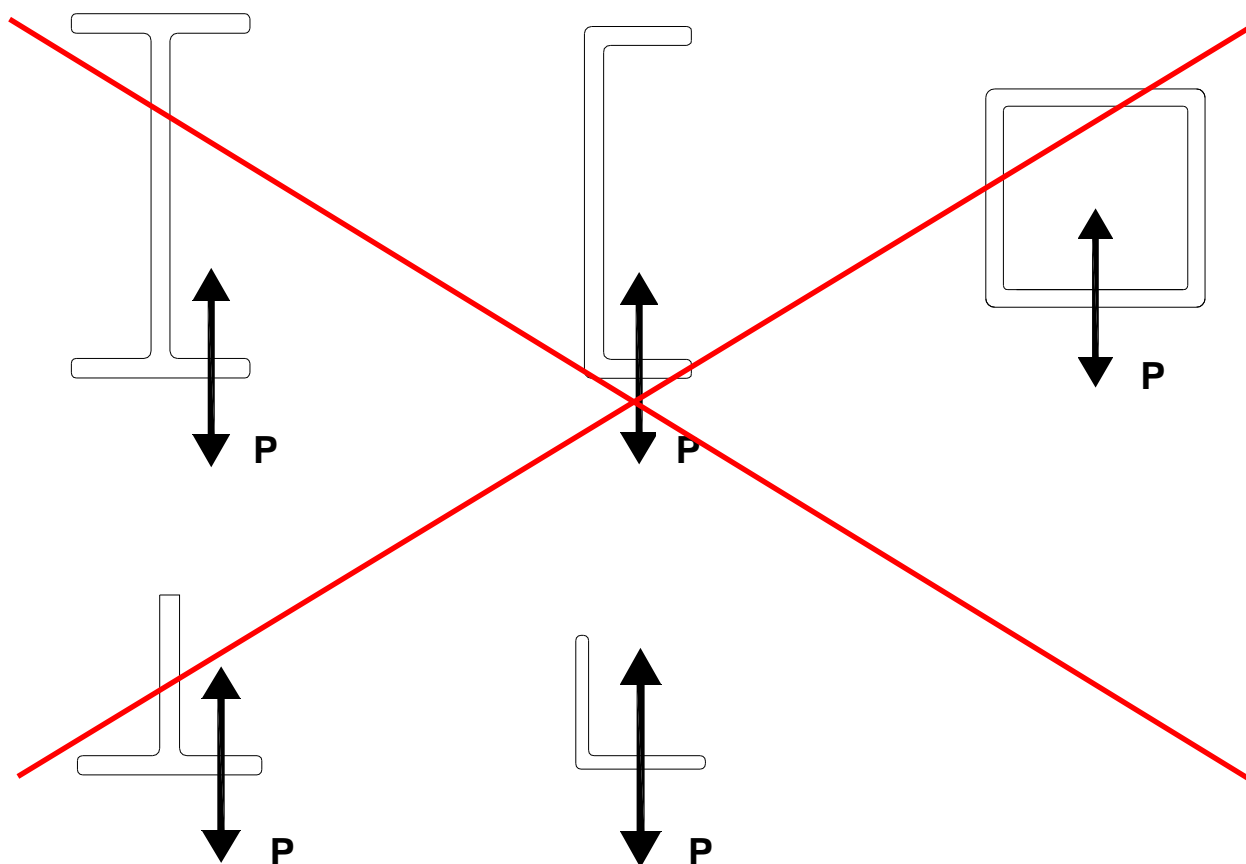
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Physical properties		Unit	Average value	Test method	Physical properties		Unit	Average value	Test method
Specific weight		g/cm ³	1,75÷1,9	ASTM D792	Surface Resistivity		Ω	10 ⁹ ÷ 10 ¹²	EN 61340
Fiberglass weight ratio		%	60	ASTM D2584	Dielectric resistance		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

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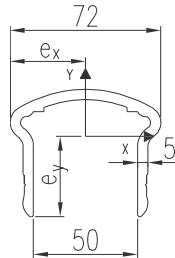
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Rev. 3

PULTRUDED PROFILES

Profile type "C" (53C60605I)

Height	mm	60	Area	A	mm ²	845	
Width	mm	60	Weight	P	Kg/m	1,2	
Thickness 1	mm	5	Moment of inerzia with respect to x - axis	J _x	mm ⁴	278.214	
Thickness 2	mm	5	Moment of inerzia with respect to y - axis	J _y	mm ⁴	539.396	
Radius 1	mm		Section Modulus with respect to x - axis	W _x	mm ³	7.134	
Radius 2	mm		Section Modulus with respect to y - axis	W _y	mm ³	14.983	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	ex	mm	36,2	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	ey	mm	39,2	

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					

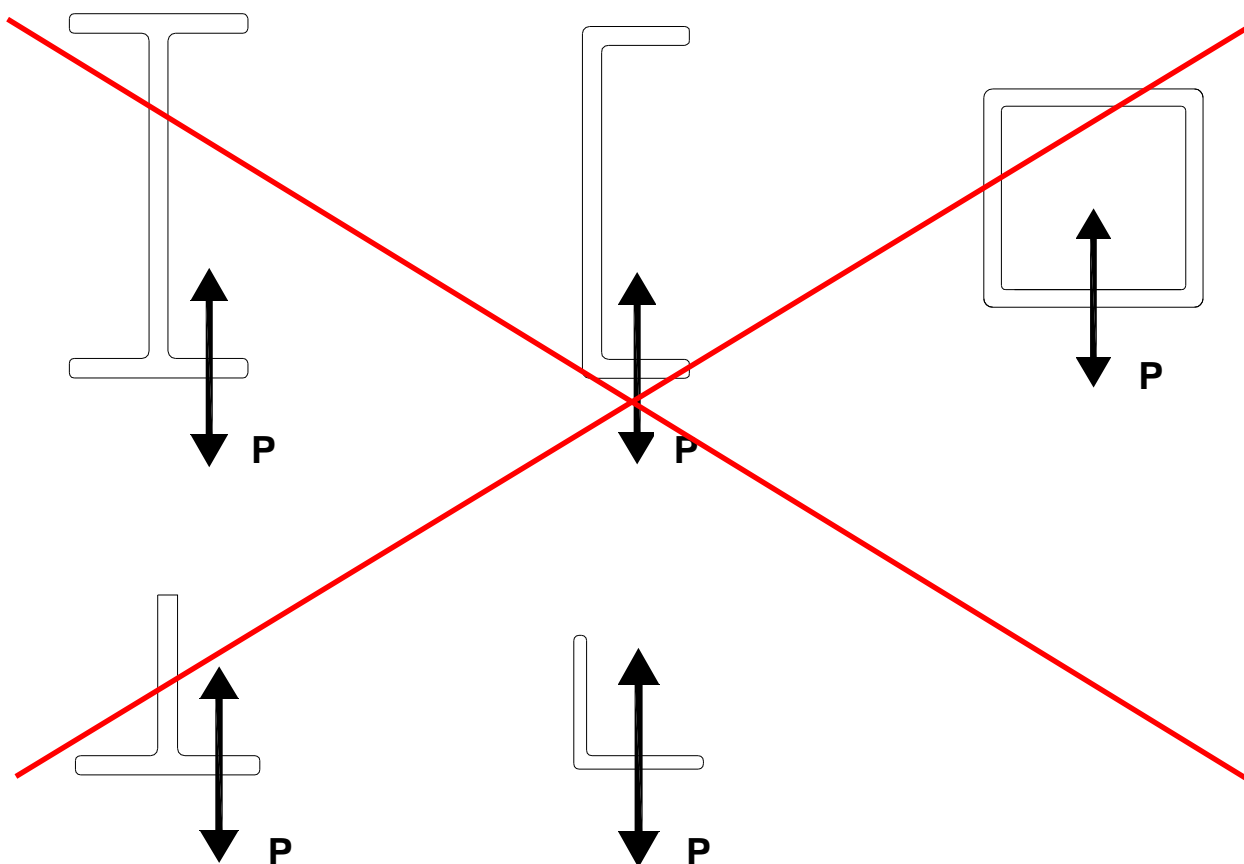
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Physical properties		Unit	Average value	Test method	Physical properties		Unit	Average value	Test method
Specific weight		g/cm ³	1,75÷1,9	ASTM D792	Surface Resistivity		Ω	10 ⁹ ÷ 10 ¹²	EN 61340
Fiberglass weight ratio		%	60	ASTM D2584	Dielectric resistance		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.



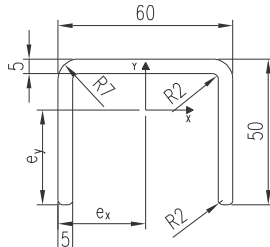
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Rev. 3

PULTRUDED PROFILES

Profile type "C" (53C60505I)

Height	mm	60	Area	A	mm ²	729	
Width	mm	50	Weight	P	Kg/m	1,3	
Thickness 1	mm	5	Moment of inerzia with respect to x - axis	J _x	mm ⁴	4.137.723	
Thickness 2	mm	5	Moment of inerzia with respect to y - axis	J _y	mm ⁴	181.848	
Radius 1	mm	2	Section Modulus with respect to x - axis	W _x	mm ³	13.792	
Radius 2	mm	7	Section Modulus with respect to y - axis	W _y	mm ³	5.595	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	30	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	32,5	

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					

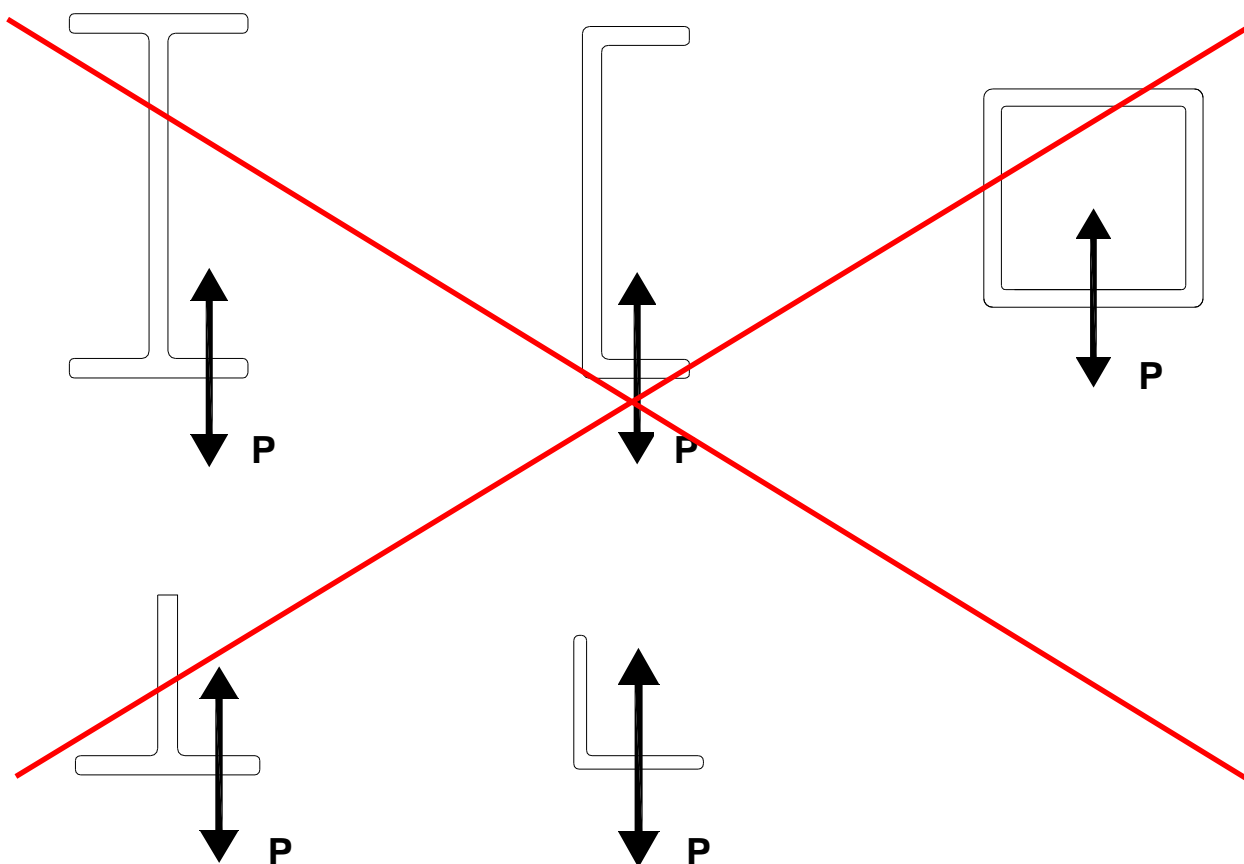
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Physical properties		Unit	Average value	Test method	Physical properties		Unit	Average value	Test method
Specific weight		g/cm ³	1,75÷1,9	ASTM D792	Surface Resistivity		Ω	10 ⁹ ÷ 10 ¹²	EN 61340
Fiberglass weight ratio		%	60	ASTM D2584	Dielectric resistance		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.

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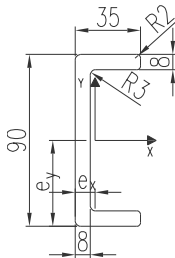
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Rev. 3

PULTRUDED PROFILES

Profile type "C" (53C90358I)

Height	mm	90	Area	A	mm ²	1.149	
Width	mm	35	Weight	P	Kg/m	2,1	
Thickness 1	mm	8	Moment of inerzia with respect to x - axis	J _x	mm ⁴	1.206.187	
Thickness 2	mm	8	Moment of inerzia with respect to y - axis	J _y	mm ⁴	110.428	
Radius 1	mm	3	Section Modulus with respect to x - axis	W _x	mm ³	26.804	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	4.519	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	24,4	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	45	

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					

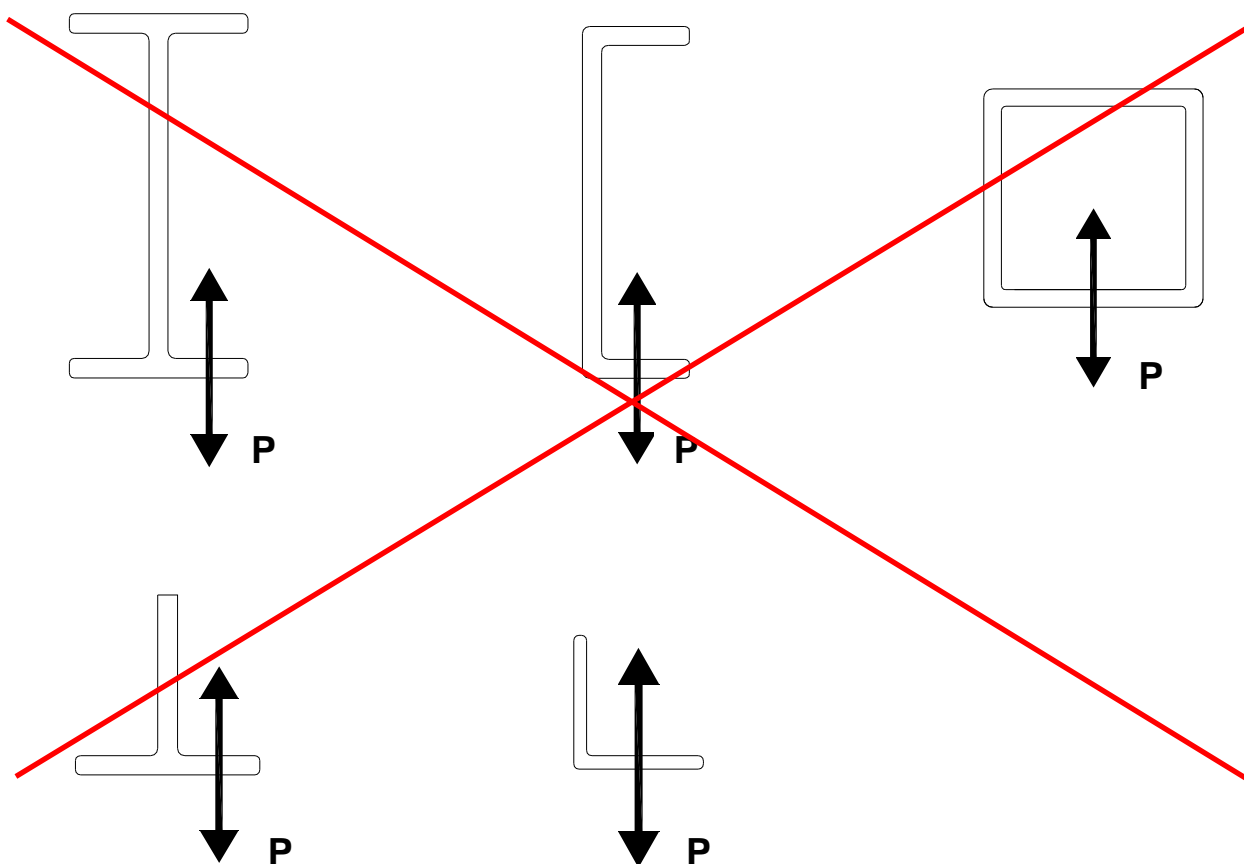
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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.



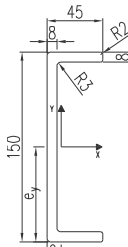
15_53C150458I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "C" (53C150458I)

Height	mm	150	Area	A	mm ²	1.789	
Width	mm	45	Weight	P	Kg/m	3,2	
Thickness 1	mm	8	Moment of inerzia with respect to x - axis	J _x	mm ⁴	5.215.729	
Thickness 2	mm	8	Moment of inerzia with respect to y - axis	J _y	mm ⁴	270.440	
Radius 1	mm	3	Section Modulus with respect to x - axis	W _x	mm ³	69.543	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	8.057	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	33,6	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	75	

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					

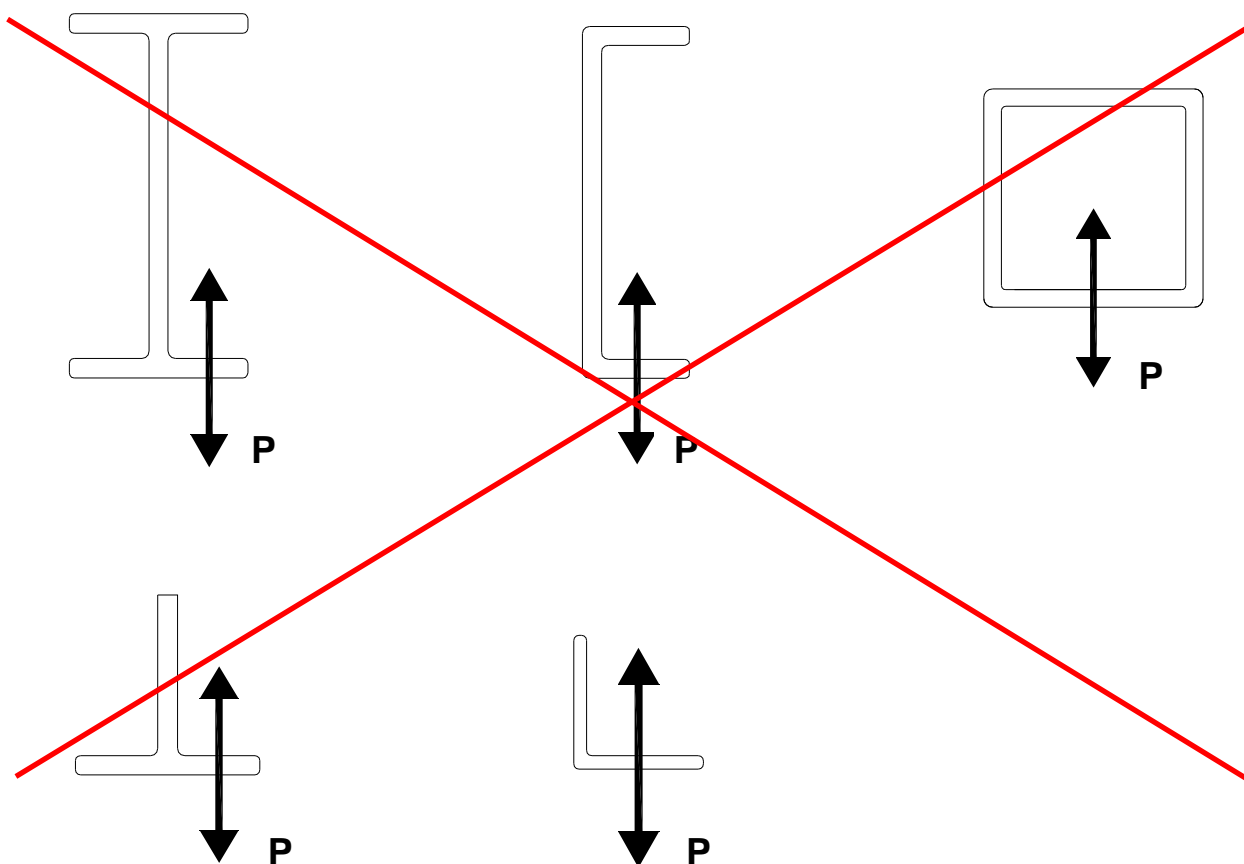
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For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



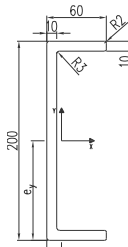
16_53C2006010I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "C" (53C2006010I)

Height	mm	200	Area	A	mm ²	2.967	
Width	mm	60	Weight	P	Kg/m	5,3	
Thickness 1	mm	10	Moment of inerzia with respect to x - axis	J _x	mm ⁴	15.661.652	
Thickness 2	mm	10	Moment of inerzia with respect to y - axis	J _y	mm ⁴	817.458	
Radius 1	mm	3	Section Modulus with respect to x - axis	W _x	mm ³	156.617	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	18.166	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	45	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	100	

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					

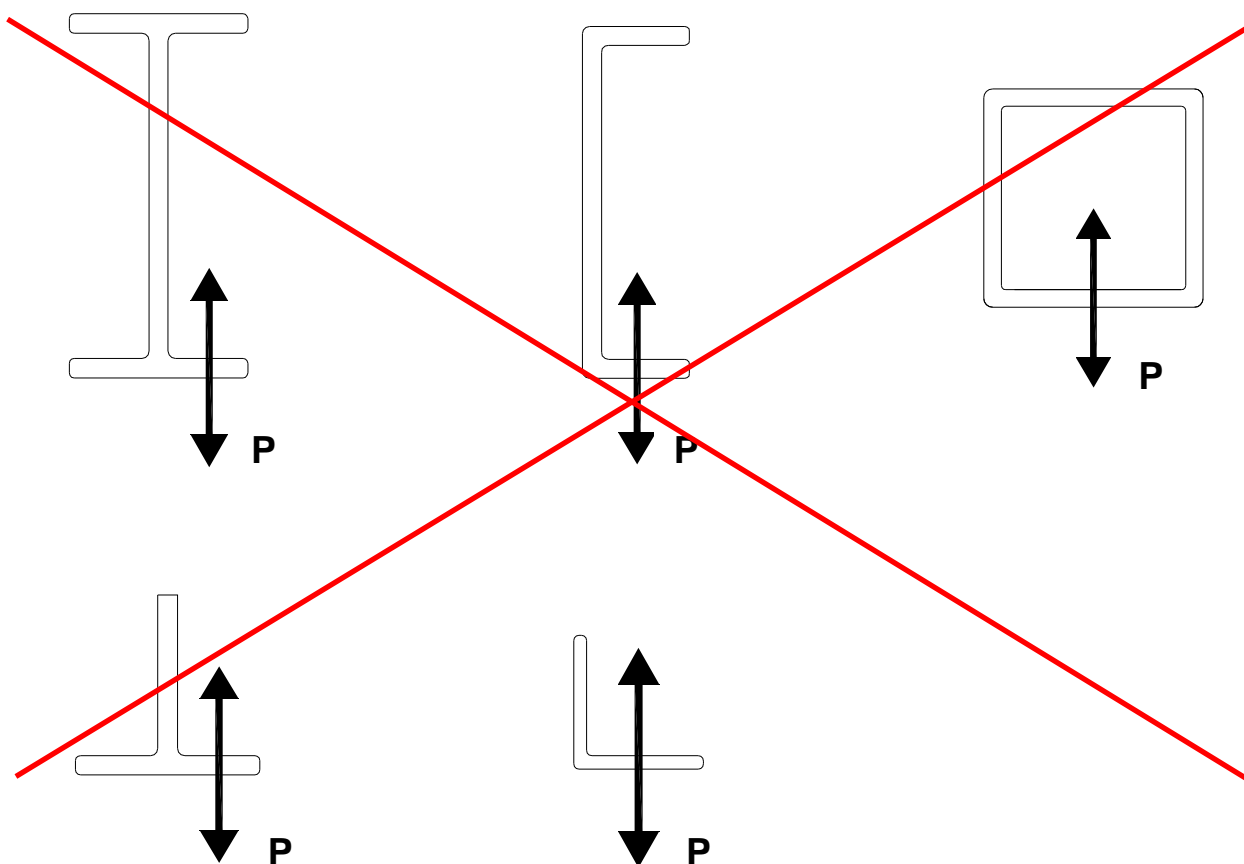
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Physical properties		Unit	Average value	Test method	Physical properties		Unit	Average value	Test method
Specific weight		g/cm ³	1,75÷1,9	ASTM D792	Surface Resistivity		Ω	10 ⁹ ÷ 10 ¹²	EN 61340
Fiberglass weight ratio		%	60	ASTM D2584	Dielectric resistance		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.



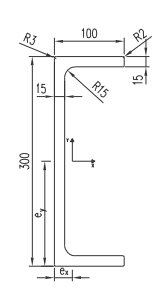
17_53C300100151

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "C" (53C300100151)

Height	mm	300	Area	A	mm ²	7.047	
Width	mm	100	Weight	P	Kg/m	12,5	
Thickness 1	mm	15	Moment of inerzia with respect to x - axis	J _x	mm ⁴	87.097.204	
Thickness 2	mm	15	Moment of inerzia with respect to y - axis	J _y	mm ⁴	5.673.366	
Radius 1	mm	3	Section Modulus with respect to x - axis	W _x	mm ³	580.648	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	76.255	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	74,4	
Standard Length	mm	8000 (±10 mm)	Centroid in y direction	e _y	mm	150	

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					

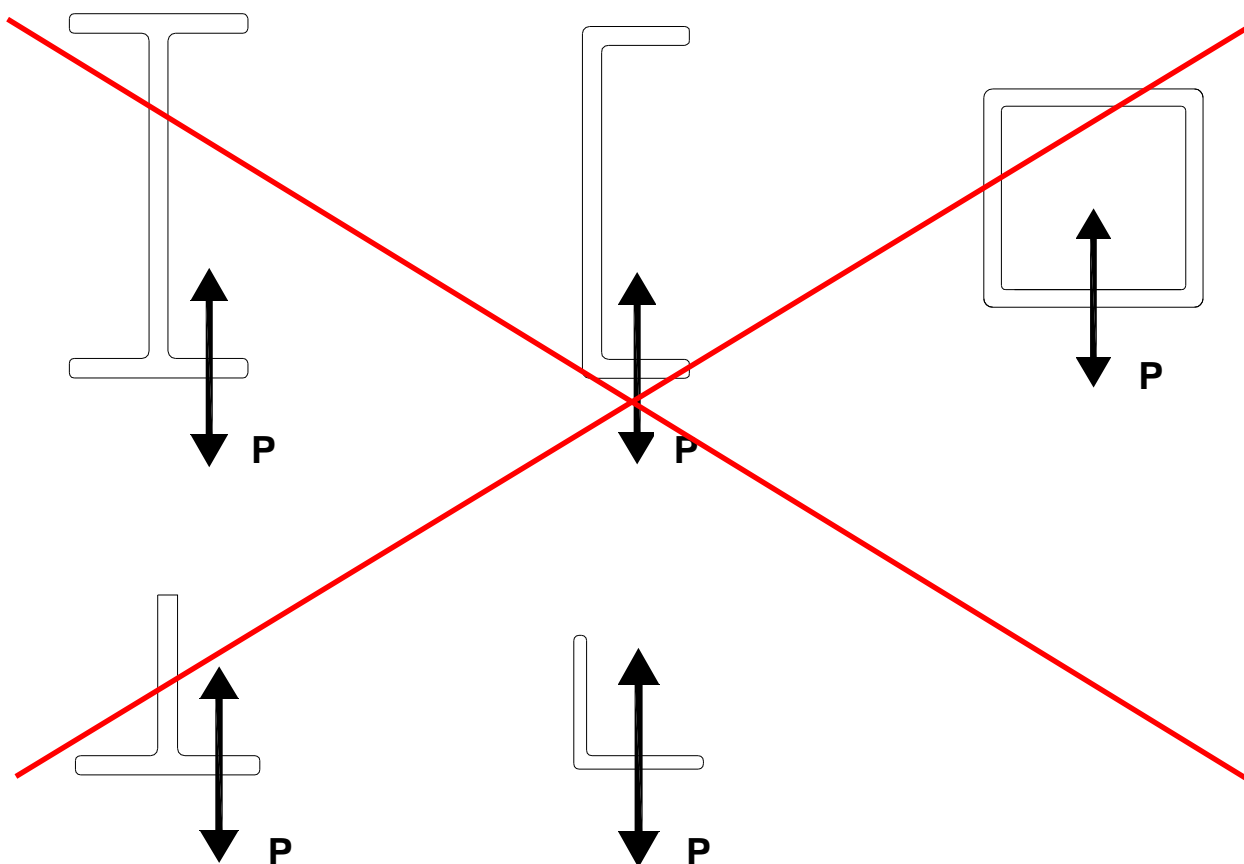
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



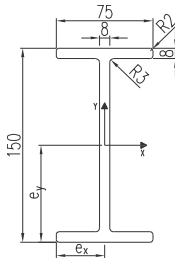
18_531150758I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "I" (531150758I)

Height	mm	150	Area	A	mm ²	2.273	
Width	mm	75	Weight	P	Kg/m	4,1	
Thickness 1	mm	8	Moment of inerzia with respect to x - axis	J _x	mm ⁴	7.658.956	
Thickness 2	mm	8	Moment of inerzia with respect to y - axis	J _y	mm ⁴	558.958	
Radius 1	mm	3	Section Modulus with respect to x - axis	W _x	mm ³	102.119	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	14.906	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	37,5	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	75	

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					

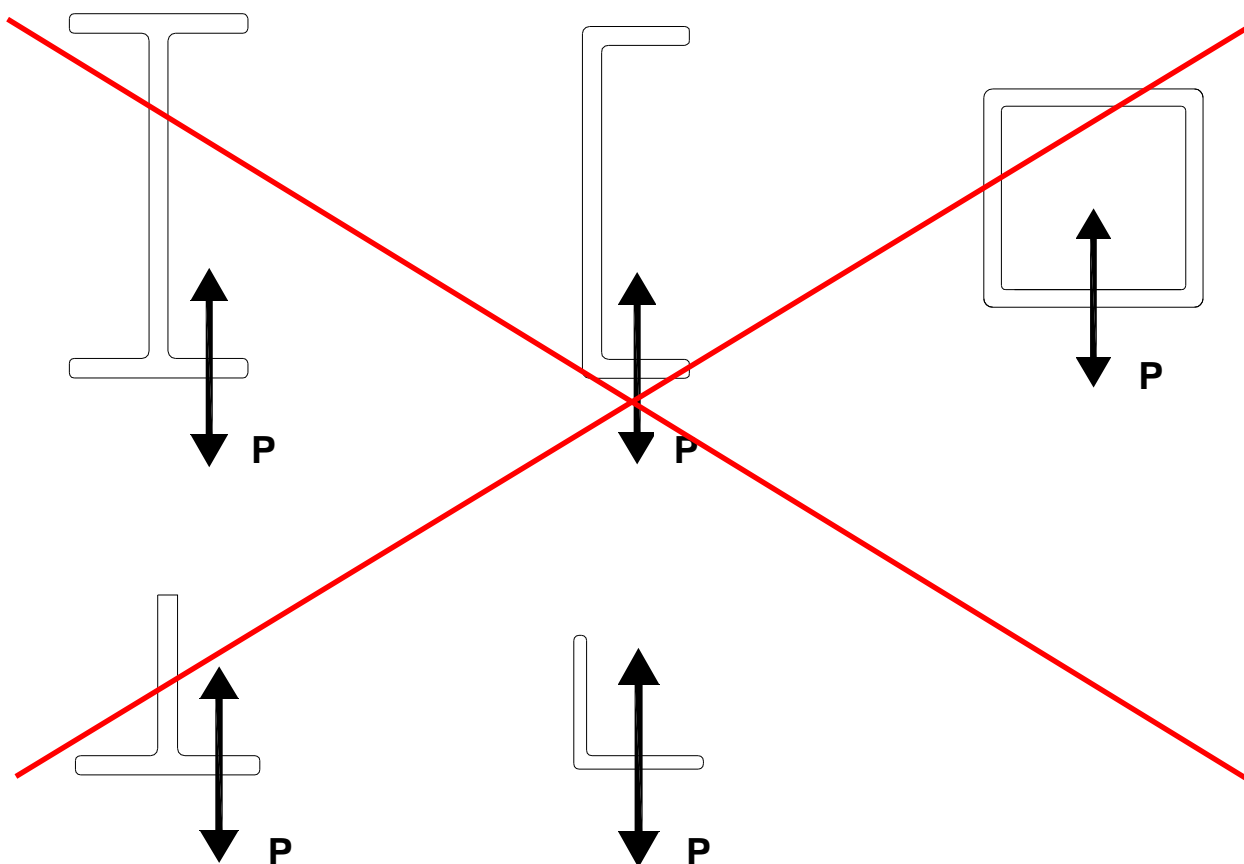
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Physical properties		Unit	Average value	Test method	Physical properties		Unit	Average value	Test method
Specific weight		g/cm ³	1,75÷1,9	ASTM D792	Surface Resistivity		Ω	10 ⁹ ÷ 10 ¹²	EN 61340
Fiberglass weight ratio		%	60	ASTM D2584	Dielectric resistance		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.



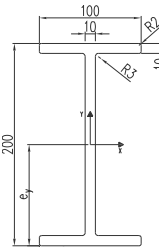
19_53I20010010I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "I" (53I20010010I)

Height	mm	200	Area	A	mm ²	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	mm ⁴	22.926.198	
Thickness 2	mm	10	Moment of inerzia with respect to y - axis	J _y	mm ⁴	1.665.053	
Radius 1	mm	3	Section Modulus with respect to x - axis	W _x	mm ³	229.262	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	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	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					

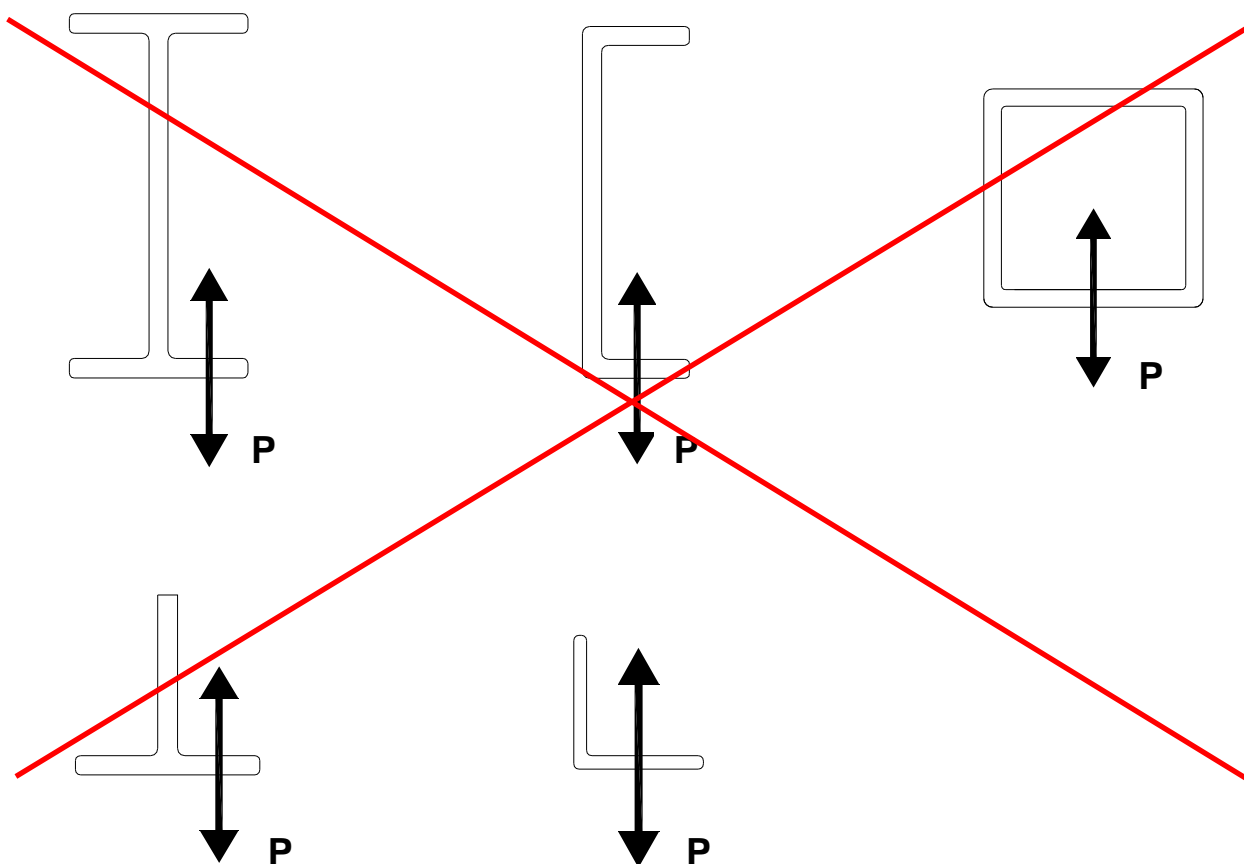
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Physical properties		Unit	Average value	Test method	Physical properties		Unit	Average value	Test method
Specific weight		g/cm ³	1,75÷1,9	ASTM D792	Surface Resistivity		Ω	10 ⁹ ÷ 10 ¹²	EN 61340
Fiberglass weight ratio		%	60	ASTM D2584	Dielectric resistance		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.



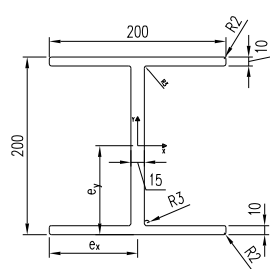
20_53H200200151

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "H" (53H200200151)

Height	mm	200	Area	A	mm ²	6.701	
Width	mm	200	Weight	P	Kg/m	12,3	
Thickness 1	mm	15	Moment of inerzia with respect to x - axis	J _x	mm ⁴	43.422.865	
Thickness 2	mm	10	Moment of inerzia with respect to y - axis	J _y	mm ⁴	13.316.415	
Radius 1	mm	3	Section Modulus with respect to x - axis	W _x	mm ³	434.229	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	133.164	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	100	
Standard Length	mm	8000 (±10 mm)	Centroid in y direction	e _y	mm	100	

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					

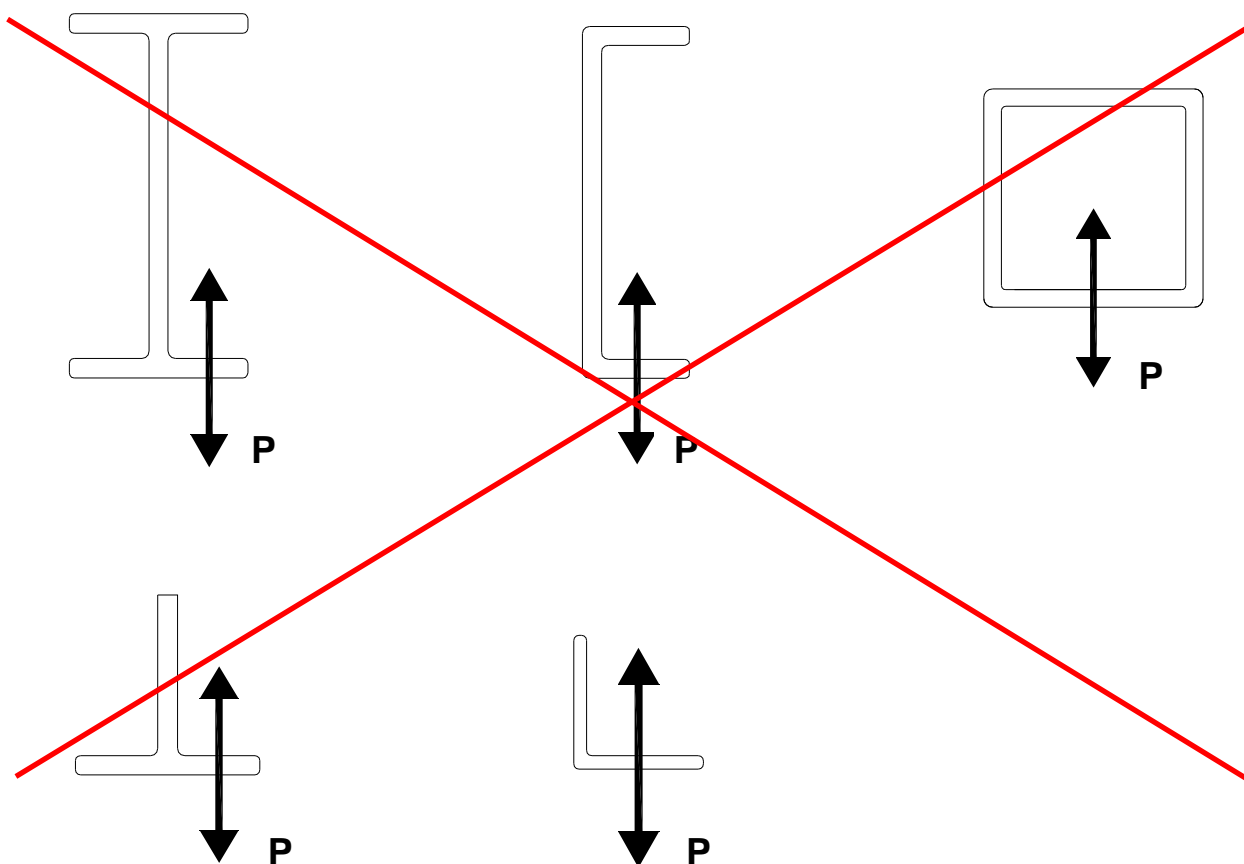
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



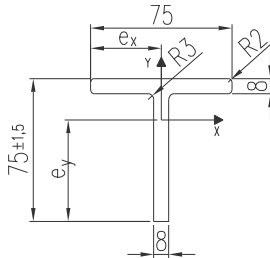
21_53T75758I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "T" (53T75758I)

Height	mm	75	Area	A	mm ²	1.136	
Width	mm	75	Weight	P	Kg/m	2	
Thickness 1	mm	8	Moment of inerzia with respect to x - axis	J _x	mm ⁴	601.353	
Thickness 2	mm	8	Moment of inerzia with respect to y - axis	J _y	mm ⁴	279.479	
Radius 1	mm	3	Section Modulus with respect to x - axis	W _x	mm ³	11.282	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	7.453	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	37,5	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	53,3	

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					

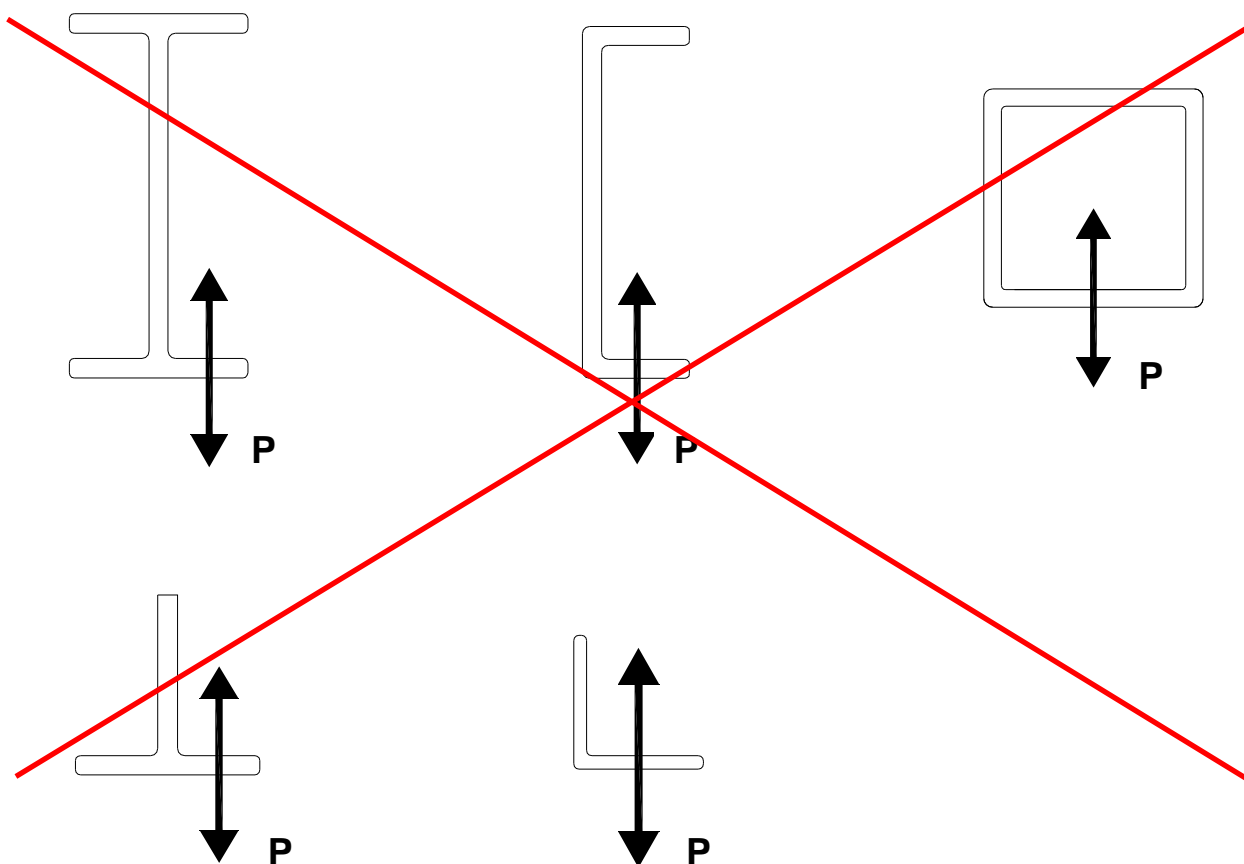
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



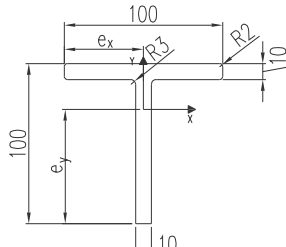
22_53T10010010I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "T" (53T10010010I)

Height	mm	100	Area	A	mm ²	1.900	
Width	mm	100	Weight	P	Kg/m	3,4	
Thickness 1	mm	10	Moment of inerzia with respect to x - axis	J _x	mm ⁴	1.799.300	
Thickness 2	mm	10	Moment of inerzia with respect to y - axis	J _y	mm ⁴	832.527	
Radius 1	mm	3	Section Modulus with respect to x - axis	W _x	mm ³	25.236	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	16.817	
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	71,3	

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					

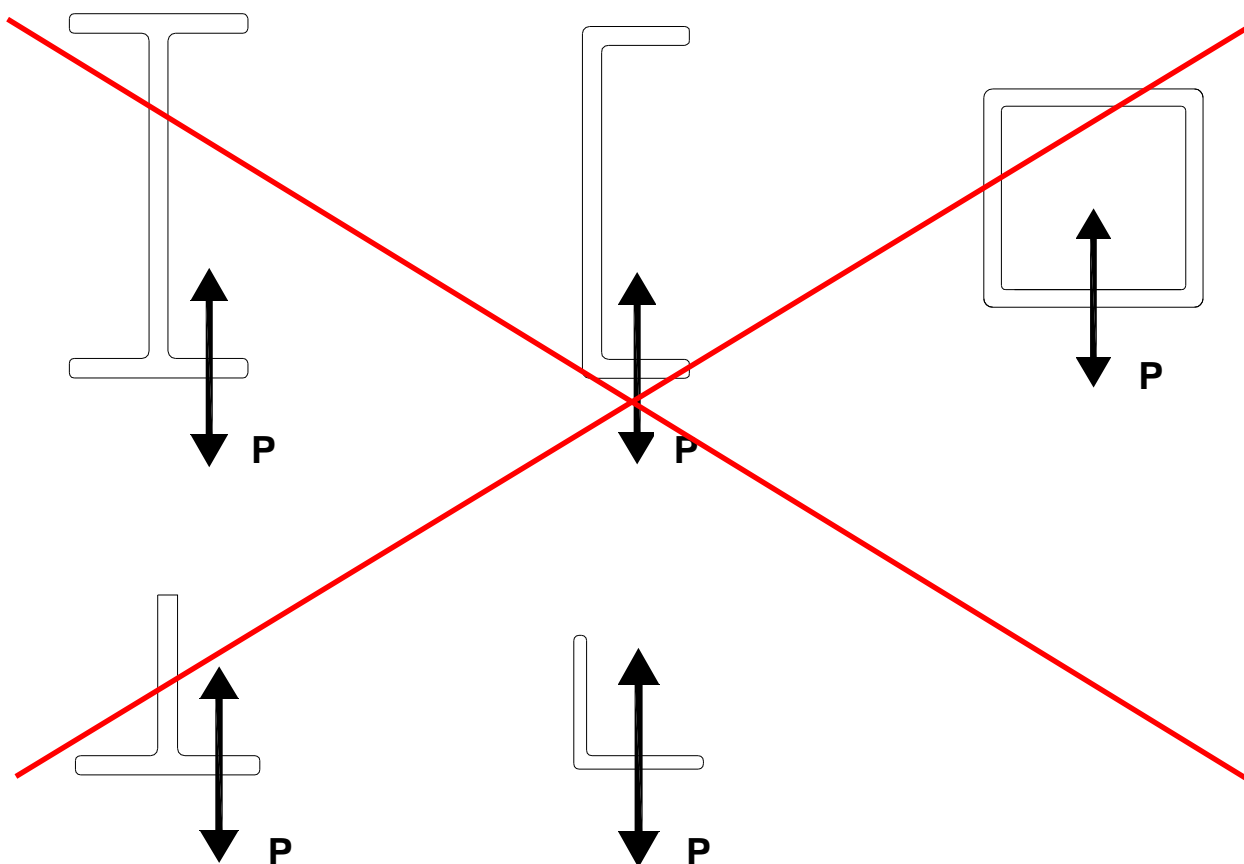
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



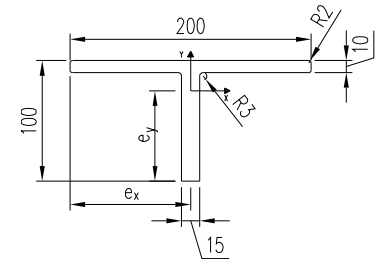
23_53T200100151

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "T" (53T200100151)

Height	mm	100	Area	A	mm ²	3.350	
Width	mm	200	Weight	P	Kg/m	6,1	
Thickness 1	mm	10	Moment of inerzia with respect to x - axis	J _x	mm ⁴	2.942.187	
Thickness 2	mm	15	Moment of inerzia with respect to y - axis	J _y	mm ⁴	6.658.207	
Radius 1	mm	3	Section Modulus with respect to x - axis	W _x	mm ³	39.308	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	66.582	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	100	
Standard Length	mm	8000 (±10 mm)	Centroid in y direction	e _y	mm	74,9	

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					

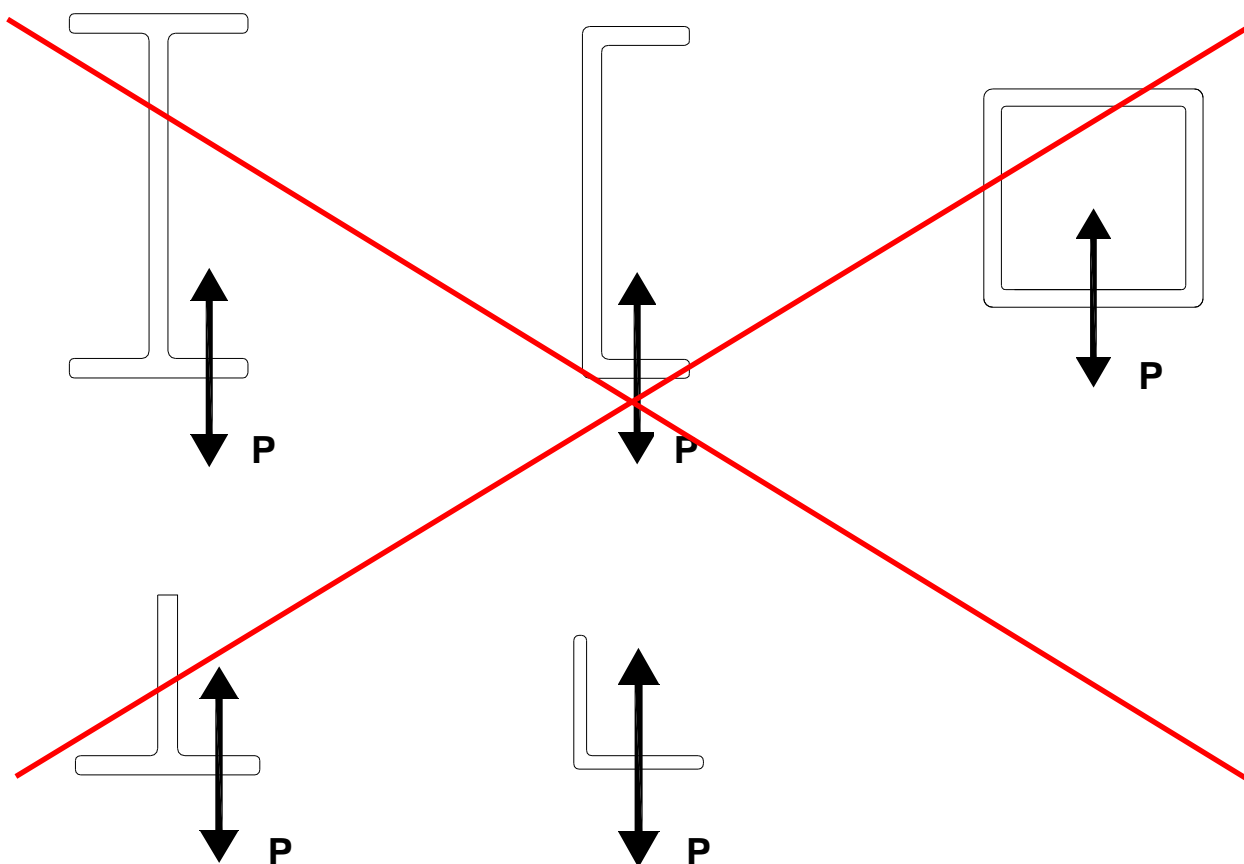
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Physical properties		Unit	Average value	Test method	Physical properties		Unit	Average value	Test method
Specific weight		g/cm ³	1,75÷1,9	ASTM D792	Surface Resistivity		Ω	10 ⁹ ÷ 10 ¹²	EN 61340
Fiberglass weight ratio		%	60	ASTM D2584	Dielectric resistance		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.



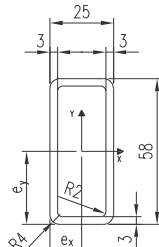
24_53R58253I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "R" (53R58253I)

Height	mm	58	Area	A	mm ²	444	
Width	mm	25	Weight	P	Kg/m	0,8	
Thickness 1	mm	3	Moment of inerzia with respect to x - axis	J _x	mm ⁴	175.239	
Thickness 2	mm	3	Moment of inerzia with respect to y - axis	J _y	mm ⁴	44.223	
Radius 1	mm	2	Section Modulus with respect to x - axis	W _x	mm ³	6.043	
Radius 2	mm	4	Section Modulus with respect to y - axis	W _y	mm ³	3.538	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	12,5	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	29	

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	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					

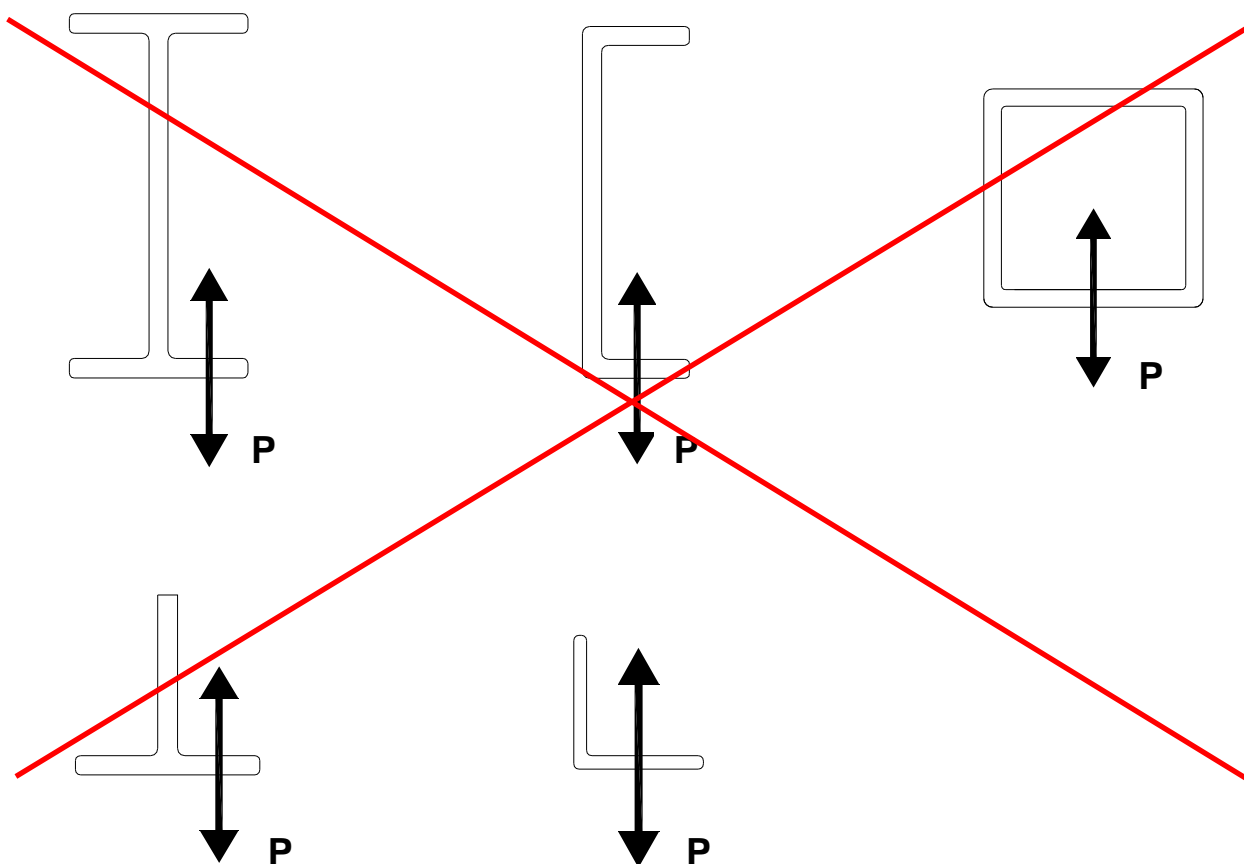
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Physical properties		Unit	Average value	Test method	Physical properties		Unit	Average value	Test method
Specific weight		g/cm ³	1,75÷1,9	ASTM D792	Surface Resistivity		Ω	10 ⁹ ÷ 10 ¹²	EN 61340
Fiberglass weight ratio		%	60	ASTM D2584	Dielectric resistance		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.



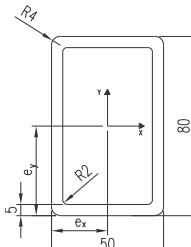
25_53R80505I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "R" (53R80505I)

Height	mm	80	Area	A	mm ²	1.189	
Width	mm	50	Weight	P	Kg/m	2	
Thickness 1	mm	5	Moment of inerzia with respect to x - axis	J _x	mm ⁴	973.087	
Thickness 2	mm	5	Moment of inerzia with respect to y - axis	J _y	mm ⁴	453.324	
Radius 1	mm	2	Section Modulus with respect to x - axis	W _x	mm ³	24.327	
Radius 2	mm	2	Section Modulus with respect to y - axis	W _y	mm ³	18.134	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	25	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	40	

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					

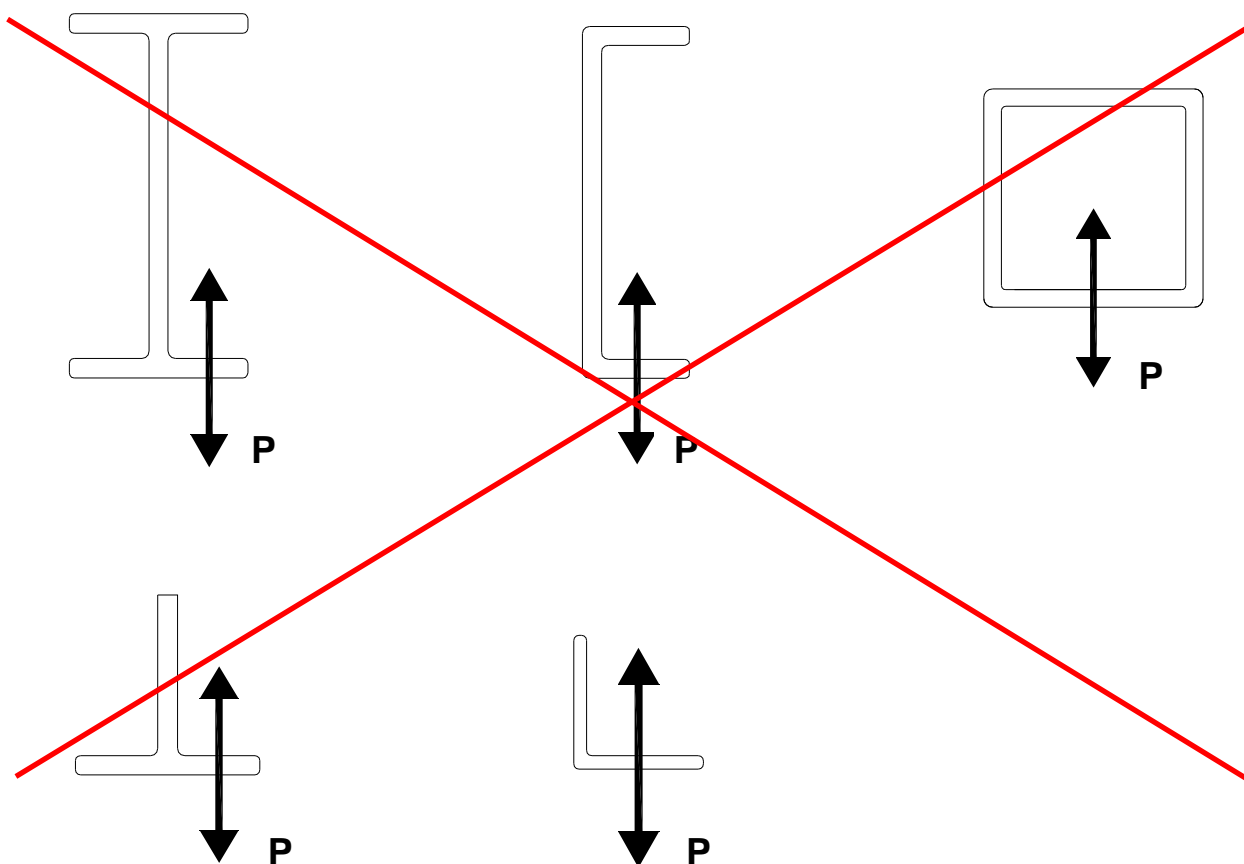
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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.



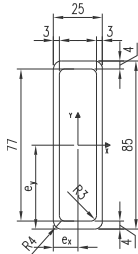
26_53R85253I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "R" (53R85253I)

Height	mm	85	Area	A	mm ²	656	
Width	mm	25	Weight	P	Kg/m	1,1	
Thickness 1	mm	3	Moment of inerzia with respect to x - axis	J _x	mm ⁴	543.858	
Thickness 2	mm	4	Moment of inerzia with respect to y - axis	J _y	mm ⁴	65.412	
Radius 1	mm	3	Section Modulus with respect to x - axis	W _x	mm ³	12.797	
Radius 2	mm	4	Section Modulus with respect to y - axis	W _y	mm ³	5.233	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	12,5	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	42,5	

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	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					

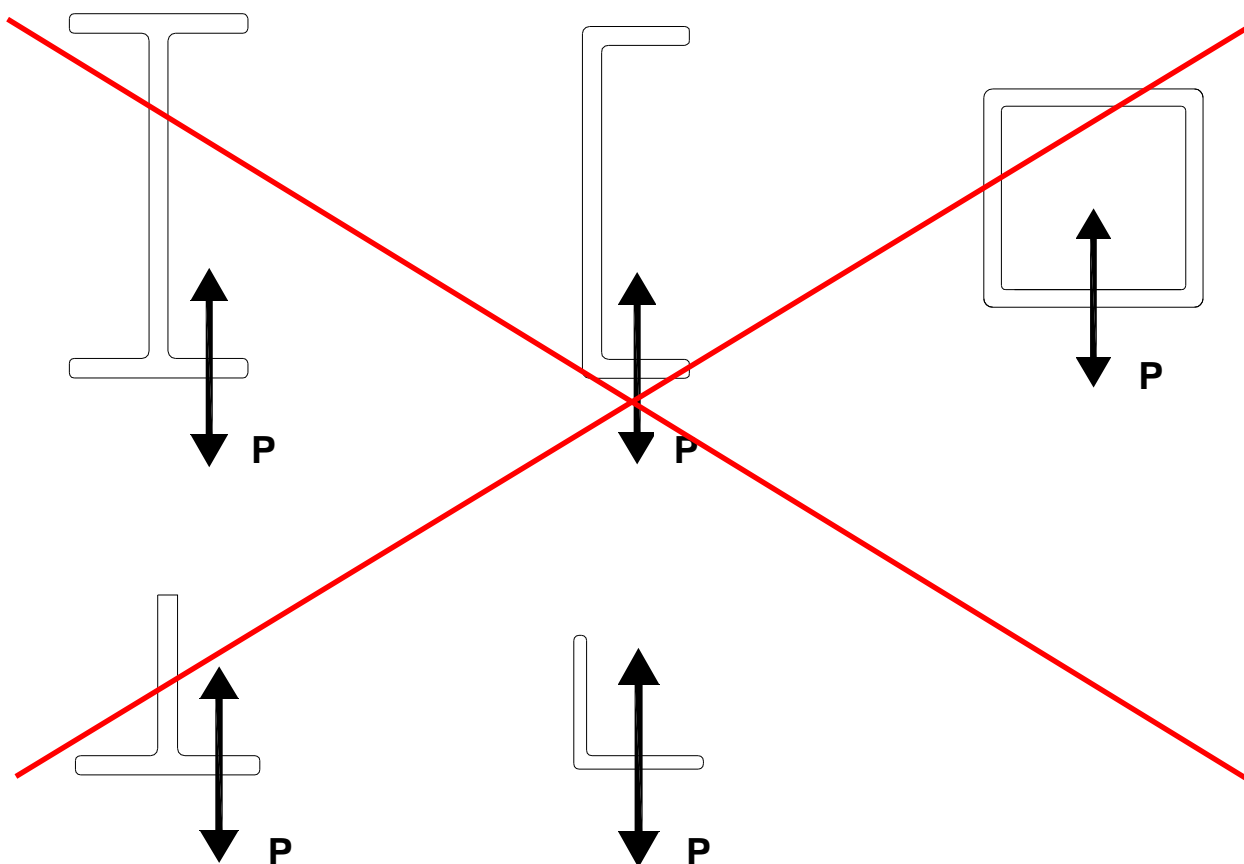
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



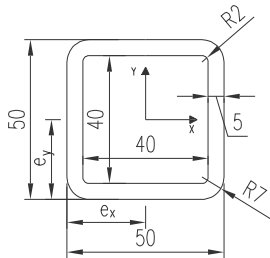
27_53Q50505I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "Q" (53Q50505I)

Height	mm	50	Area	A	mm ²	861,37	
Width	mm	50	Weight	P	Kg/m	1,5	
Thickness 1	mm	5	Moment of inerzia with respect to x - axis	J _x	mm ⁴	285.637	
Thickness 2	mm	5	Moment of inerzia with respect to y - axis	J _y	mm ⁴	285.637	
Radius 1	mm	2	Section Modulus with respect to x - axis	W _x	mm ³	11.426	
Radius 2	mm	7	Section Modulus with respect to y - axis	W _y	mm ³	11.426	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	25	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	25	

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	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					

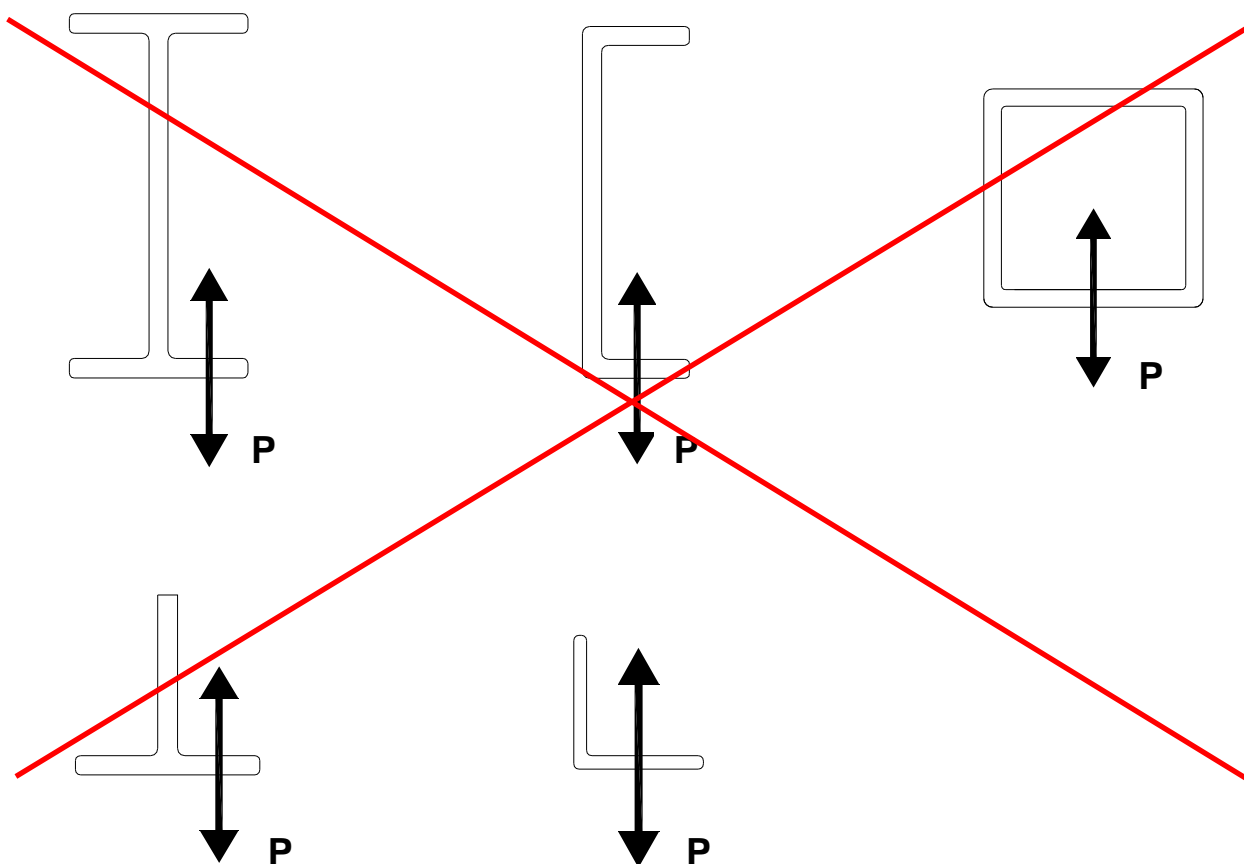
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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.



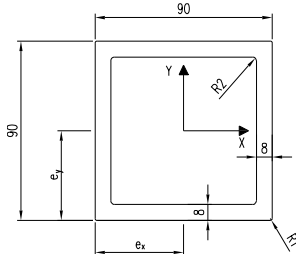
28_53Q90908I

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Rev. 3

PULTRUDED PROFILES

Profile type "Q" (53Q90908I)

Height	mm	90	Area	A	mm ²	2.627	
Width	mm	90	Weight	P	Kg/m	4,8	
Thickness 1	mm	8	Moment of inerzia with respect to x - axis	J _x	mm ⁴	2.971.486	
Thickness 2	mm	8	Moment of inerzia with respect to y - axis	J _y	mm ⁴	2.971.486	
Radius 1	mm	2	Section Modulus with respect to x - axis	W _x	mm ³	66.033	
Radius 2	mm	1	Section Modulus with respect to y - axis	W _y	mm ³	66.033	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	45	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	45	

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					

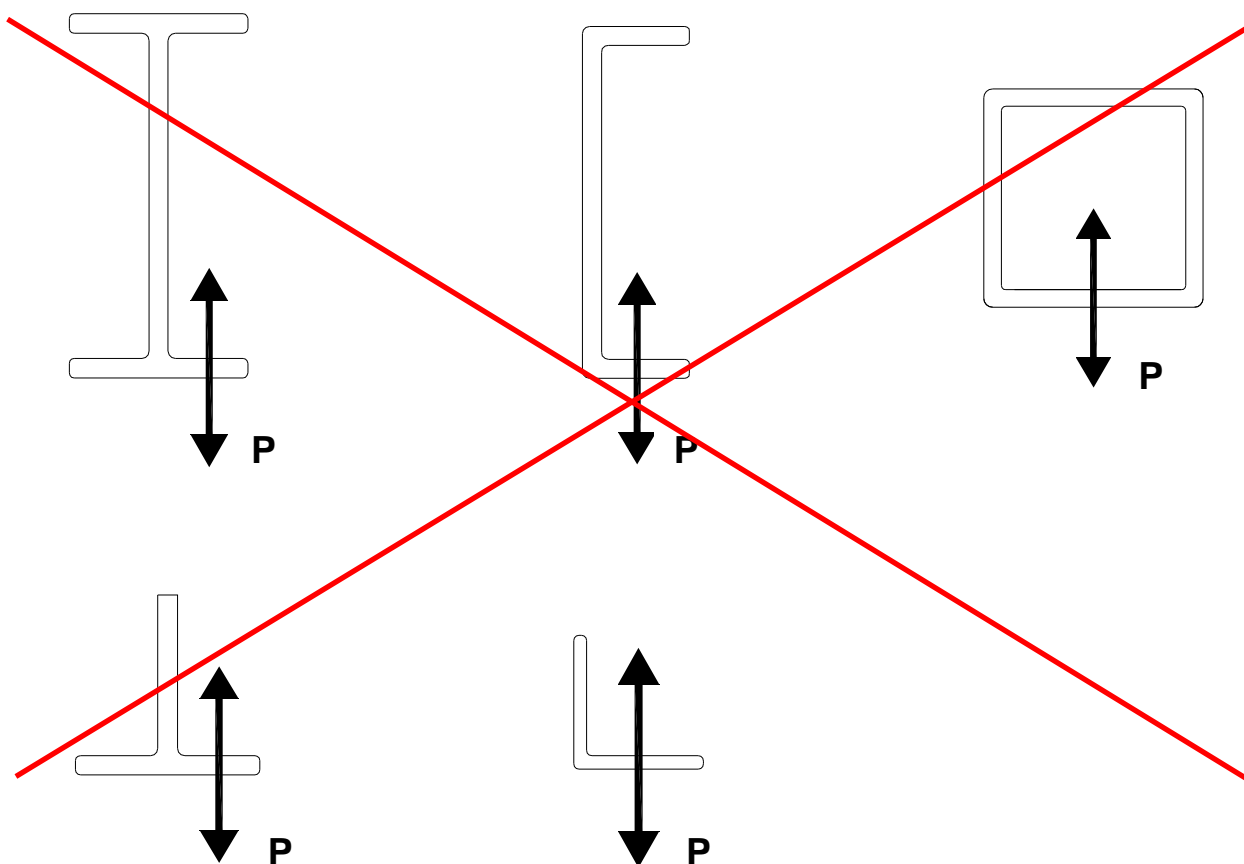
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
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Physical properties		Unit	Average value	Test method	Physical properties		Unit	Average value	Test method
Specific weight		g/cm ³	1,75÷1,9	ASTM D792	Surface Resistivity		Ω	10 ⁹ ÷ 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.



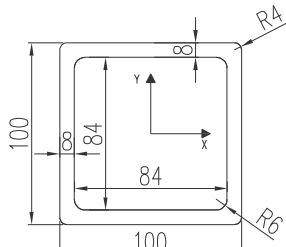
29_53Q1001008I

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Rev. 3

PULTRUDED PROFILES

Profile type "Q" (53Q1001008I)

Height	mm	100	Area	A	mm ²	2.961	
Width	mm	100	Weight	P	Kg/m	5,4	
Thickness 1	mm	8	Moment of inerzia with respect to x - axis	J _x	mm ⁴	4.157.207	
Thickness 2	mm	8	Moment of inerzia with respect to y - axis	J _y	mm ⁴	4.157.207	
Radius 1	mm	6	Section Modulus with respect to x - axis	W _x	mm ³	83.144	
Radius 2	mm	4	Section Modulus with respect to y - axis	W _y	mm ³	83.144	
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	50	

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					

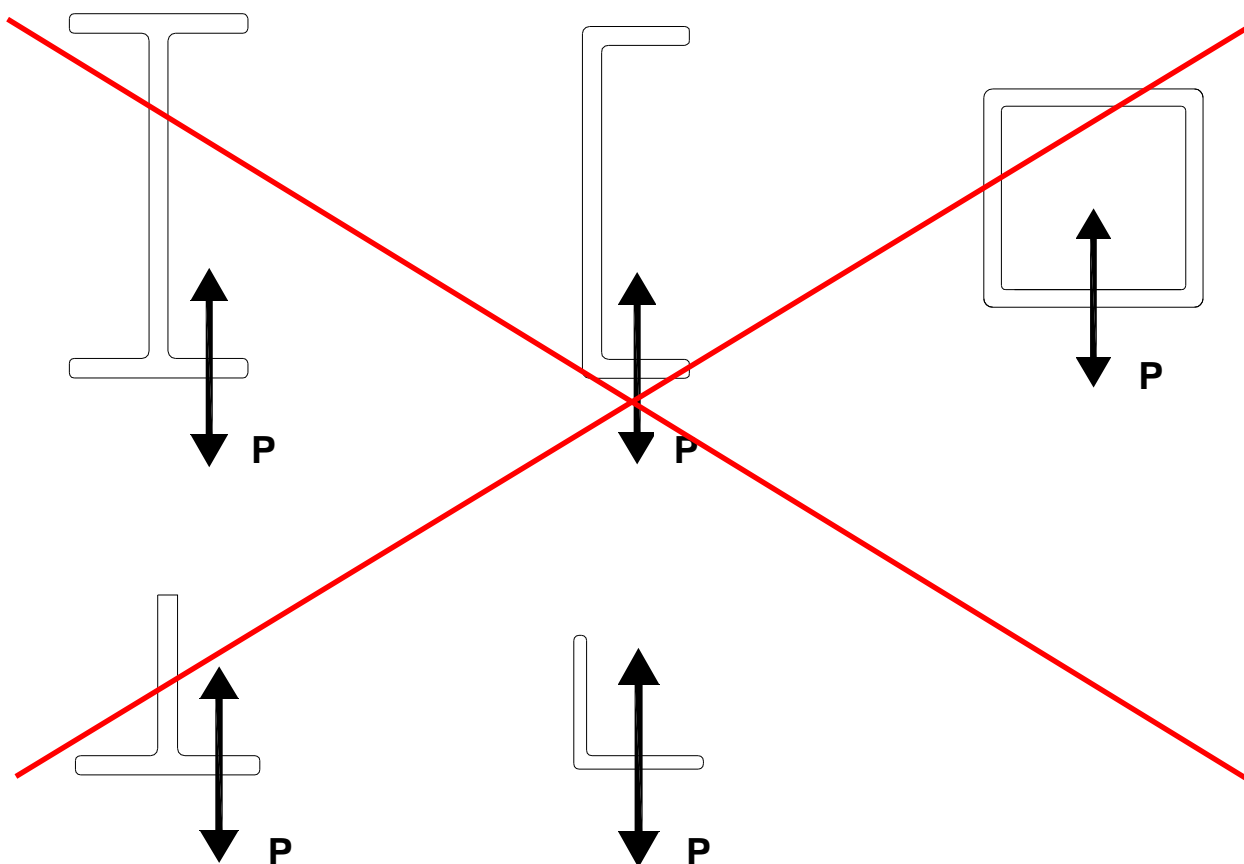
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Physical properties		Unit	Average value	Test method	Physical properties		Unit	Average value	Test method
Specific weight		g/cm ³	1,75÷1,9	ASTM D792	Surface Resistivity		Ω	10 ⁹ ÷ 10 ¹²	EN 61340
Fiberglass weight ratio		%	60	ASTM D2584	Dielectric resistance		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.



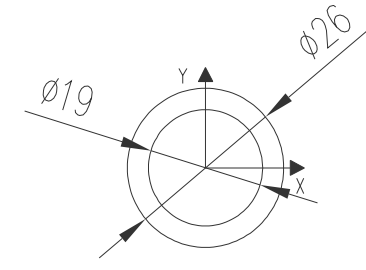
30_53O2619I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "O" (53O2619I)

Diameter 1	mm	19	Area	A	mm ²	247	
Diameter 2	mm	25,4	Weight	P	Kg/m	0,6	
Thickness 1	mm	3,2	Moment of inerzia with respect to x - axis	J _x	mm ⁴	16.034	
Thickness 2	mm		Moment of inerzia with respect to y - axis	J _y	mm ⁴	16.034	
	mm		Section Modulus with respect to x - axis	W _x	mm ³	1.263	
	mm		Section Modulus with respect to y - axis	W _y	mm ³	1.263	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	12,7	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	12,7	

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					

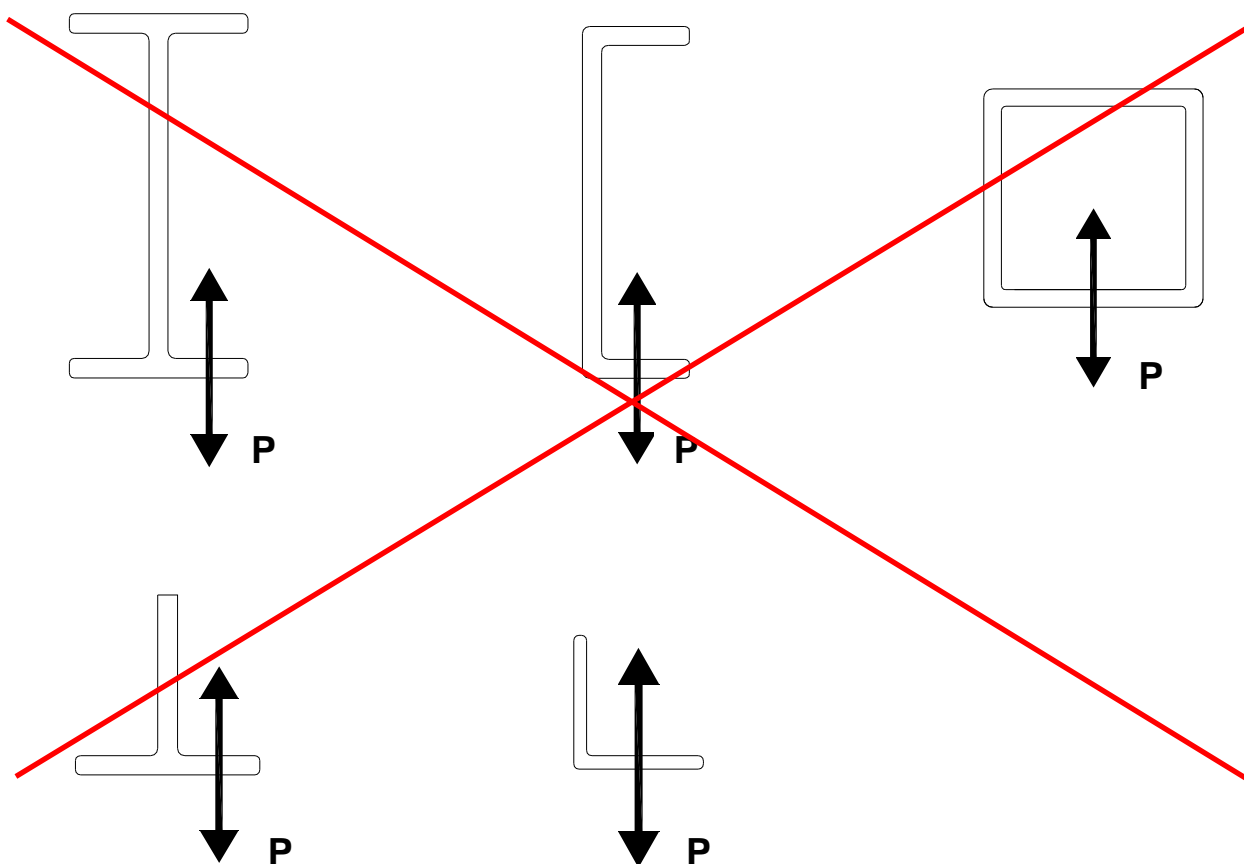
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



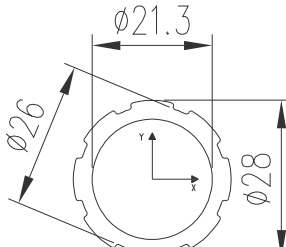
31_53O2821.3I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "O" (53O2821.3I)

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					

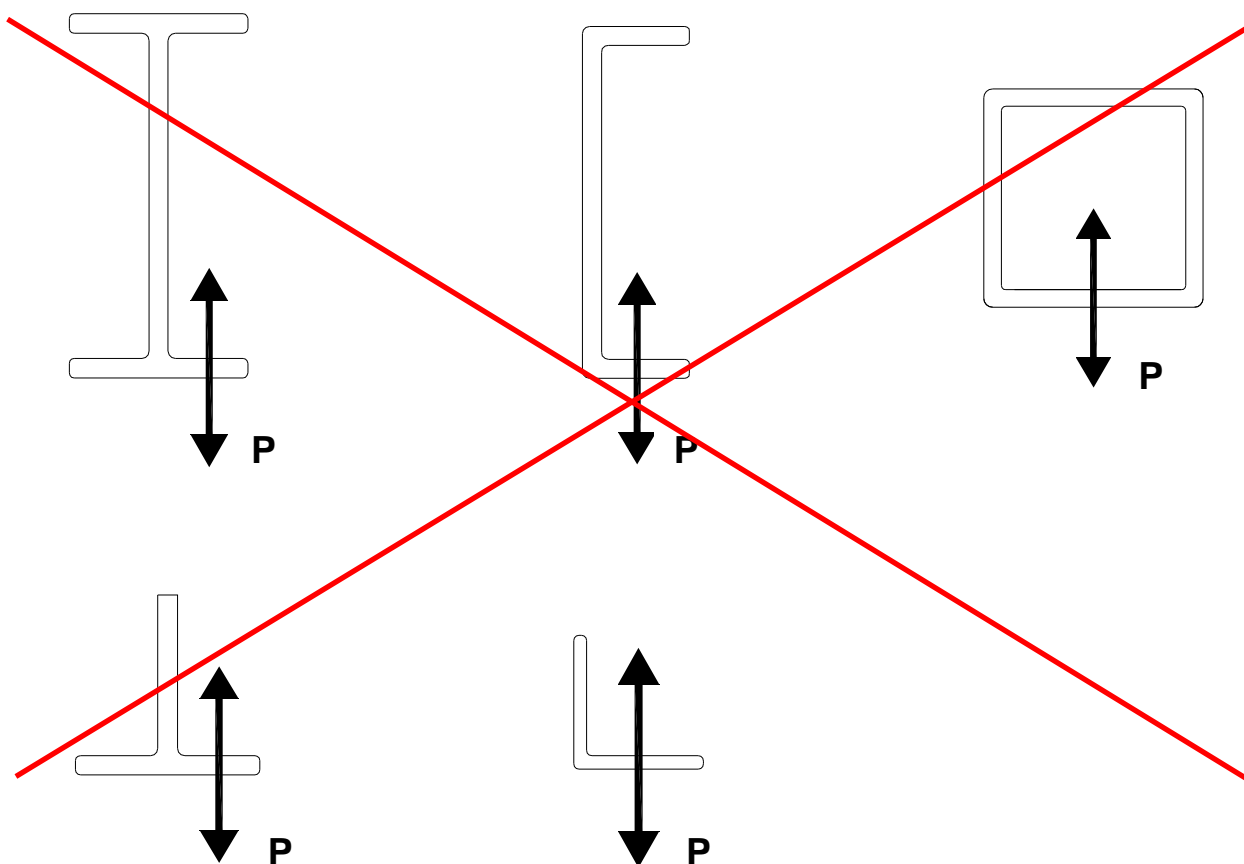
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



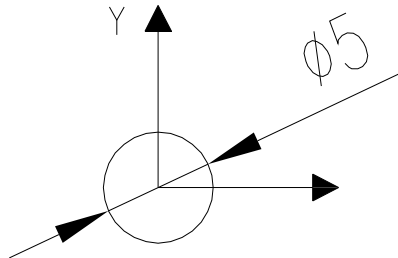
37_5305I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "O" (5305I)

Diameter 1	mm	5	Area	A	mm ²	19	
Diameter 2	mm		Weight	P	Kg/m	0,025	
Thickness 1	mm		Moment of inerzia with respect to x - axis	J _x	mm ⁴	31	
Thickness 2	mm		Moment of inerzia with respect to y - axis	J _y	mm ⁴	31	
	mm		Section Modulus with respect to x - axis	W _x	mm ³	12	
	mm		Section Modulus with respect to y - axis	W _y	mm ³	12	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	2,5	
Standard Length	mm	2000 (±10 mm)	Centroid in y direction	e _y	mm	2,5	

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					

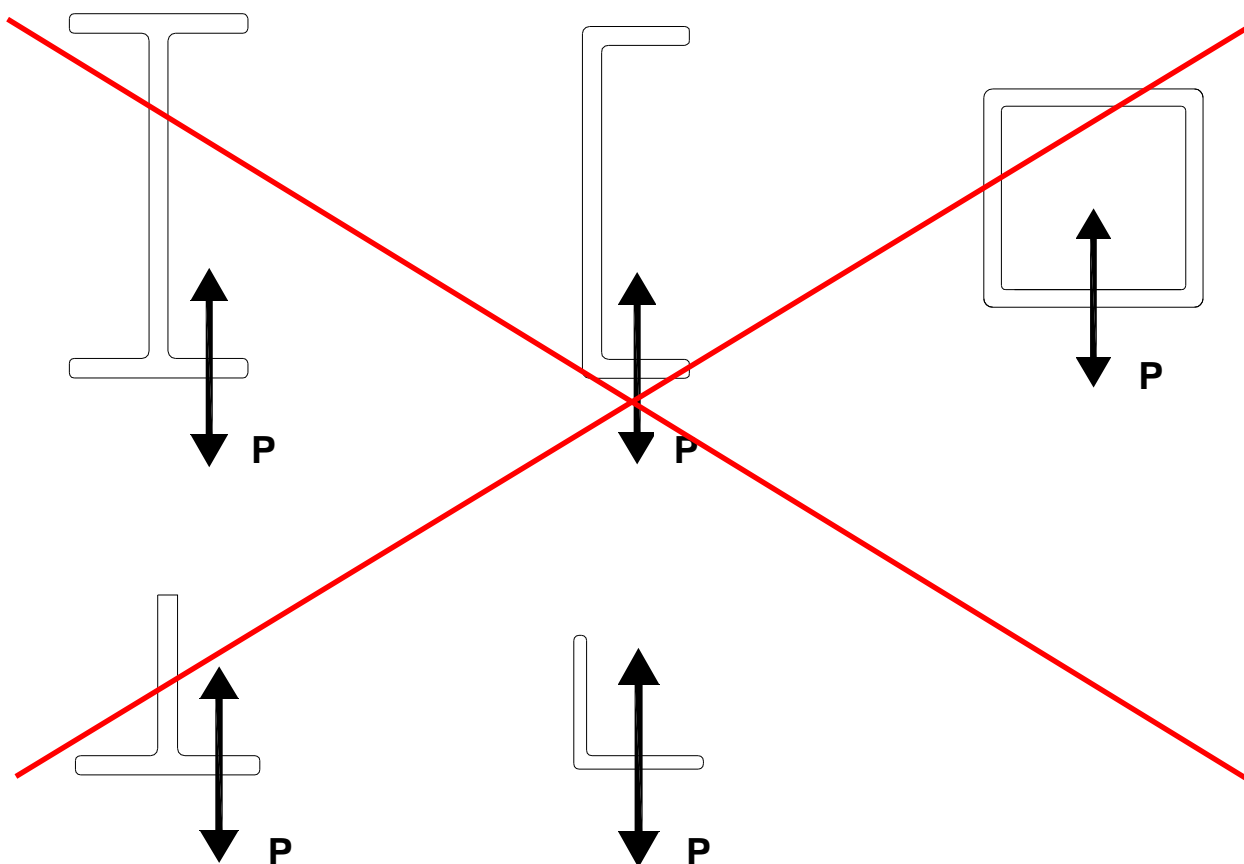
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



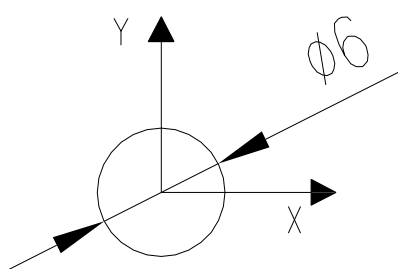
38_5306I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "O" (5306I)

Diameter 1	mm	6	Area	A	mm ²	28	
Diameter 2	mm		Weight	P	Kg/m	0,04	
Thickness 1	mm		Moment of inerzia with respect to x - axis	J _x	mm ⁴	63	
Thickness 2	mm		Moment of inerzia with respect to y - axis	J _y	mm ⁴	63	
	mm		Section Modulus with respect to x - axis	W _x	mm ³	21	
	mm		Section Modulus with respect to y - axis	W _y	mm ³	21	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	3	
Standard Length	mm	2000 (±10 mm)	Centroid in y direction	e _y	mm	3	

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	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					

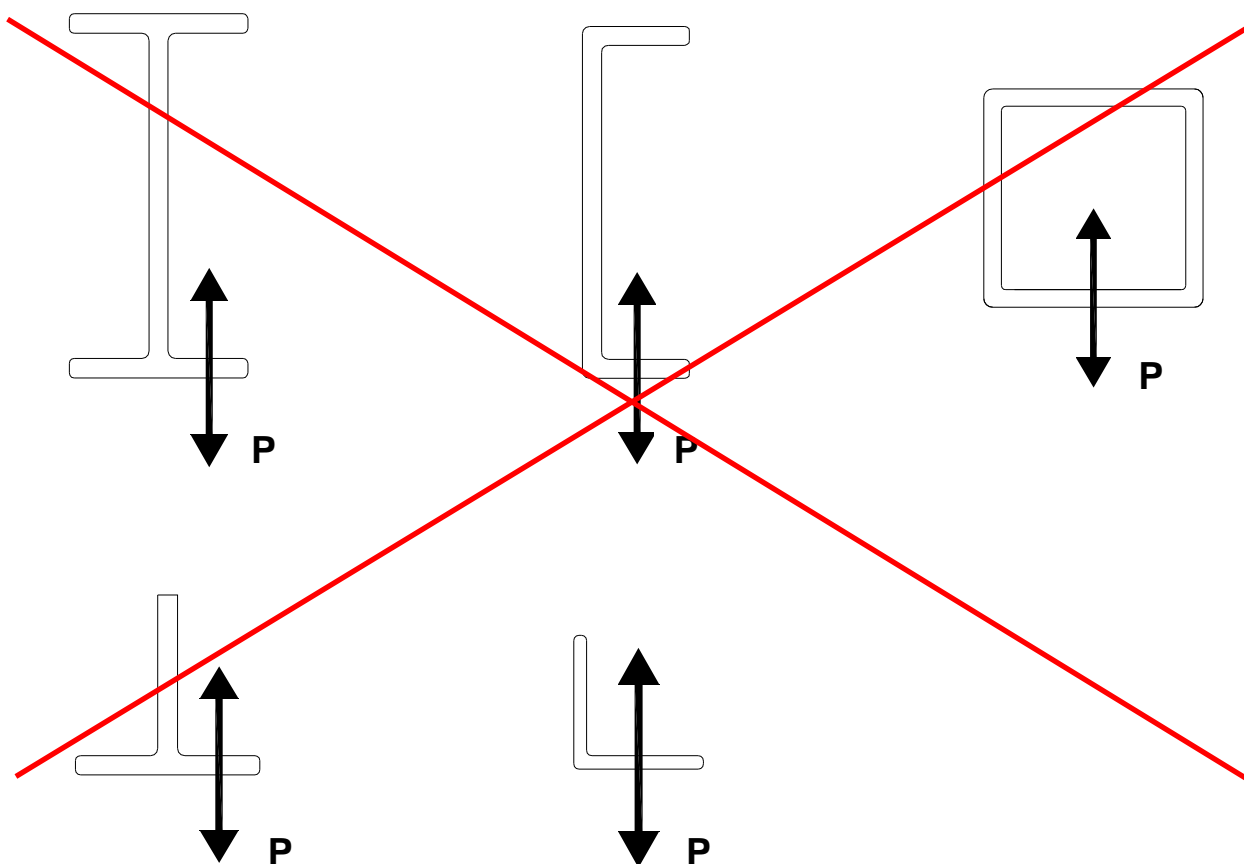
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



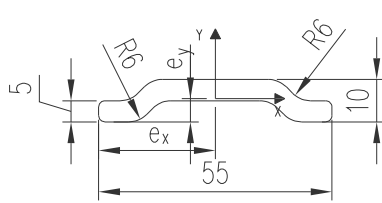
32_53G555I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "G" (53G555I)

Height	mm	5-10	Area	A	mm ²	294	
Width	mm	55	Weight	P	Kg/m	0,5	
Thickness 1	mm	5	Moment of inerzia with respect to x - axis	J _x	mm ⁴	2.101	
Thickness 2	mm		Moment of inerzia with respect to y - axis	J _y	mm ⁴	73.596	
Radius 1	mm	6	Section Modulus with respect to x - axis	W _x	mm ³	383	
Radius 2	mm		Section Modulus with respect to y - axis	W _y	mm ³	2.676	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	27,5	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	5,5	

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					

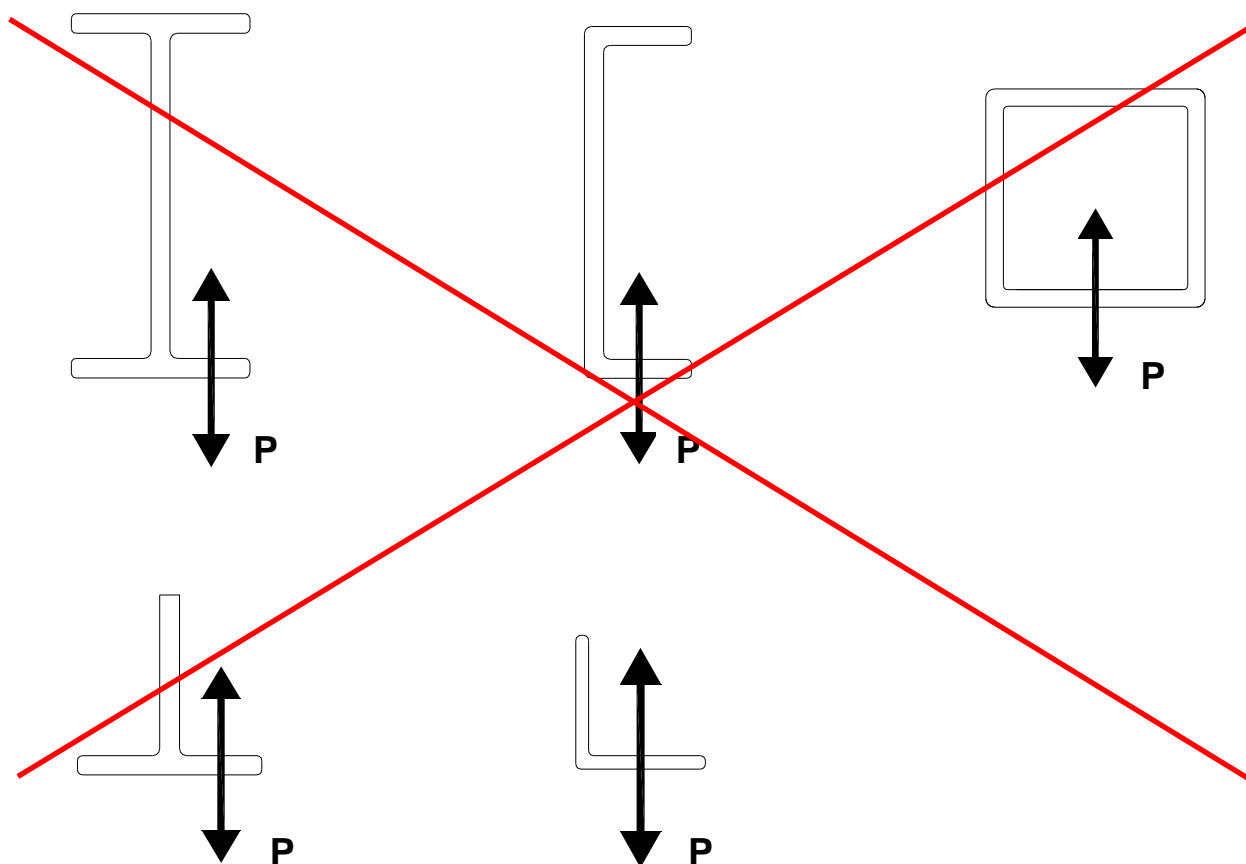
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For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



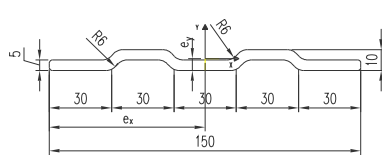
33_53G1505I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "G" (53G1505I)

Height	mm	5-10	Area	A	mm ²	789	
Width	mm	150	Weight	P	Kg/m	1,3	
Thickness 1	mm	5	Moment of inerzia with respect to x - axis	J _x	mm ⁴	5.686	
Thickness 2	mm		Moment of inerzia with respect to y - axis	J _y	mm ⁴	1.440.519	
Radius 1	mm	6	Section Modulus with respect to x - axis	W _x	mm ³	1.006	
Radius 2	mm		Section Modulus with respect to y - axis	W _y	mm ³	19.207	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	75	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	4,3	

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					

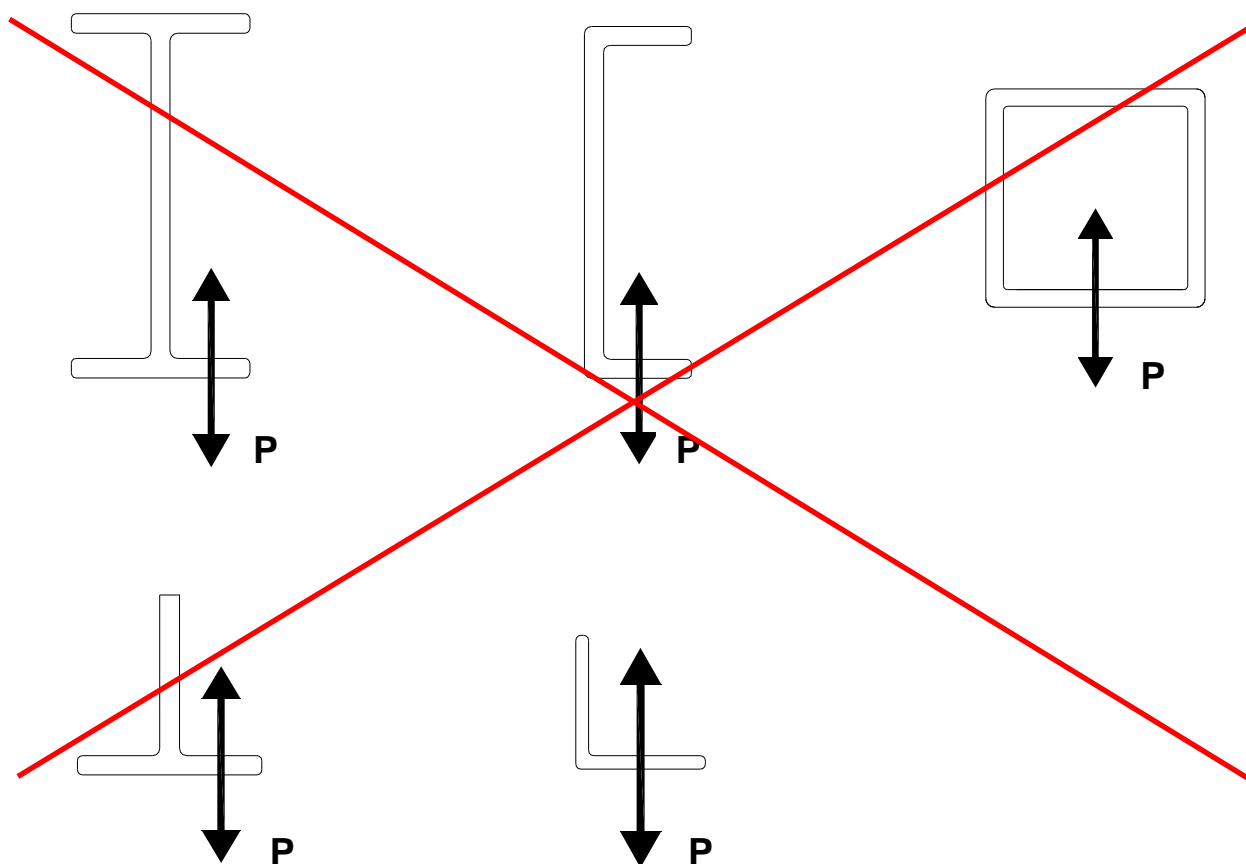
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Physical properties		Unit	Average value	Test method	Physical properties		Unit	Average value	Test method
Specific weight		g/cm ³	1,75÷1,9	ASTM D792	Surface Resistivity		Ω	10 ⁹ ÷ 10 ¹²	EN 61340
Fiberglass weight ratio		%	60	ASTM D2584	Dielectric resistance		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.



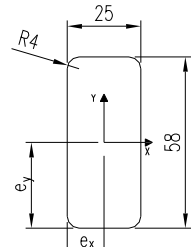
34_53P5825I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "P" (53P5825I)

Height	mm	58	Area	A	mm ²	1.436	
Width	mm	25	Weight	P	Kg/m	2,8	
Thickness 1	mm		Moment of inerzia with respect to x - axis	J _x	mm ⁴	395.625	
Thickness 2	mm		Moment of inerzia with respect to y - axis	J _y	mm ⁴	73.662	
Radius 1	mm	4	Section Modulus with respect to x - axis	W _x	mm ³	13.642	
Radius 2	mm		Section Modulus with respect to y - axis	W _y	mm ³	5.893	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	12,5	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	29	

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	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					

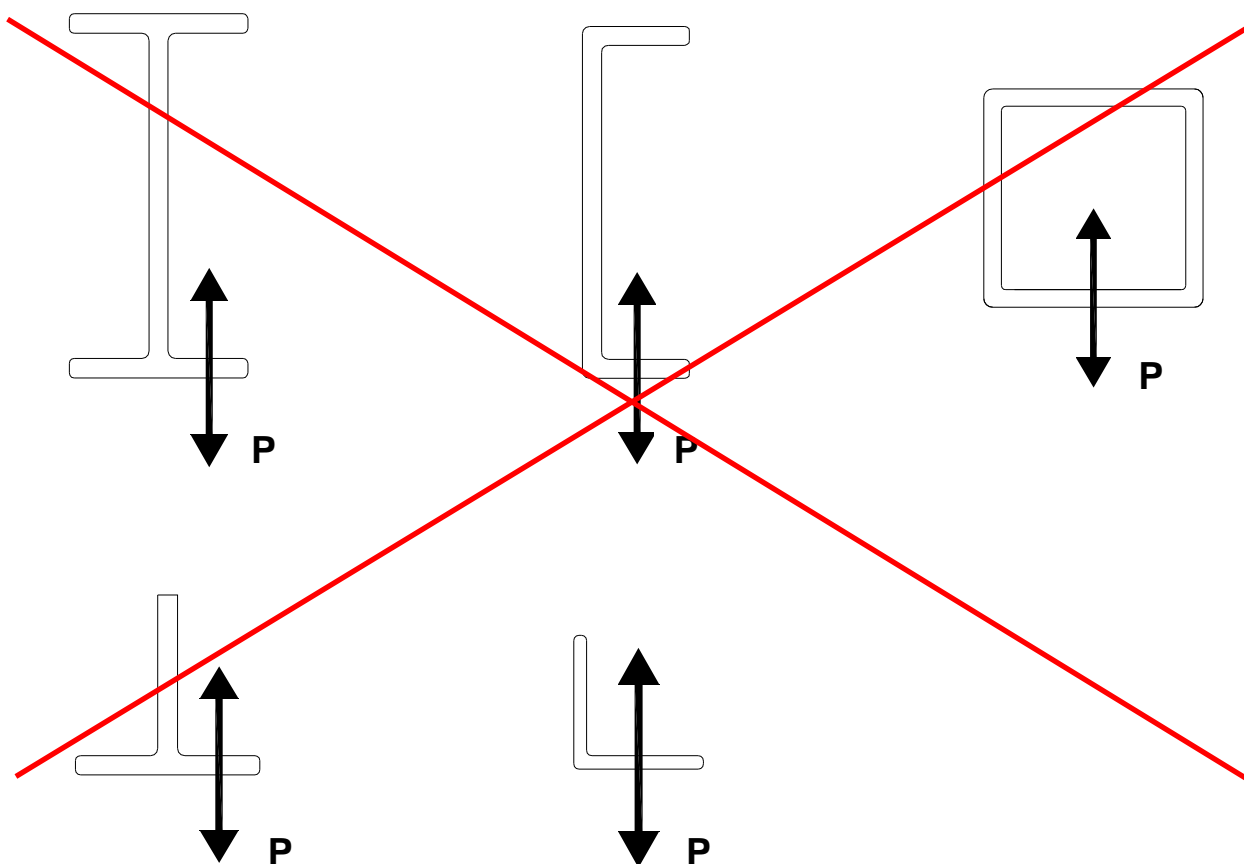
The values are referred to tests made on different thickness and resin types – given values are reliable but we refuse any responsibility of their use.
For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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/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.



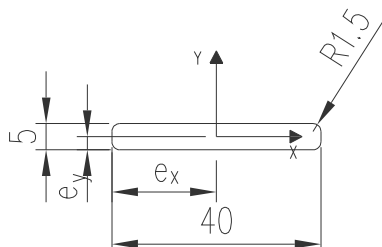
35_53P405I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "P" (53P405I)

Height	mm	5	Area	A	mm ²	198	
Width	mm	40	Weight	P	Kg/m	0,3	
Thickness 1	mm		Moment of inerzia with respect to x - axis	J _x	mm ⁴	407	
Thickness 2	mm		Moment of inerzia with respect to y - axis	J _y	mm ⁴	25.919	
Radius 1	mm	1,5	Section Modulus with respect to x - axis	W _x	mm ³	163	
Radius 2	mm		Section Modulus with respect to y - axis	W _y	mm ³	1.296	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	20	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	2,5	

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/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
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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					

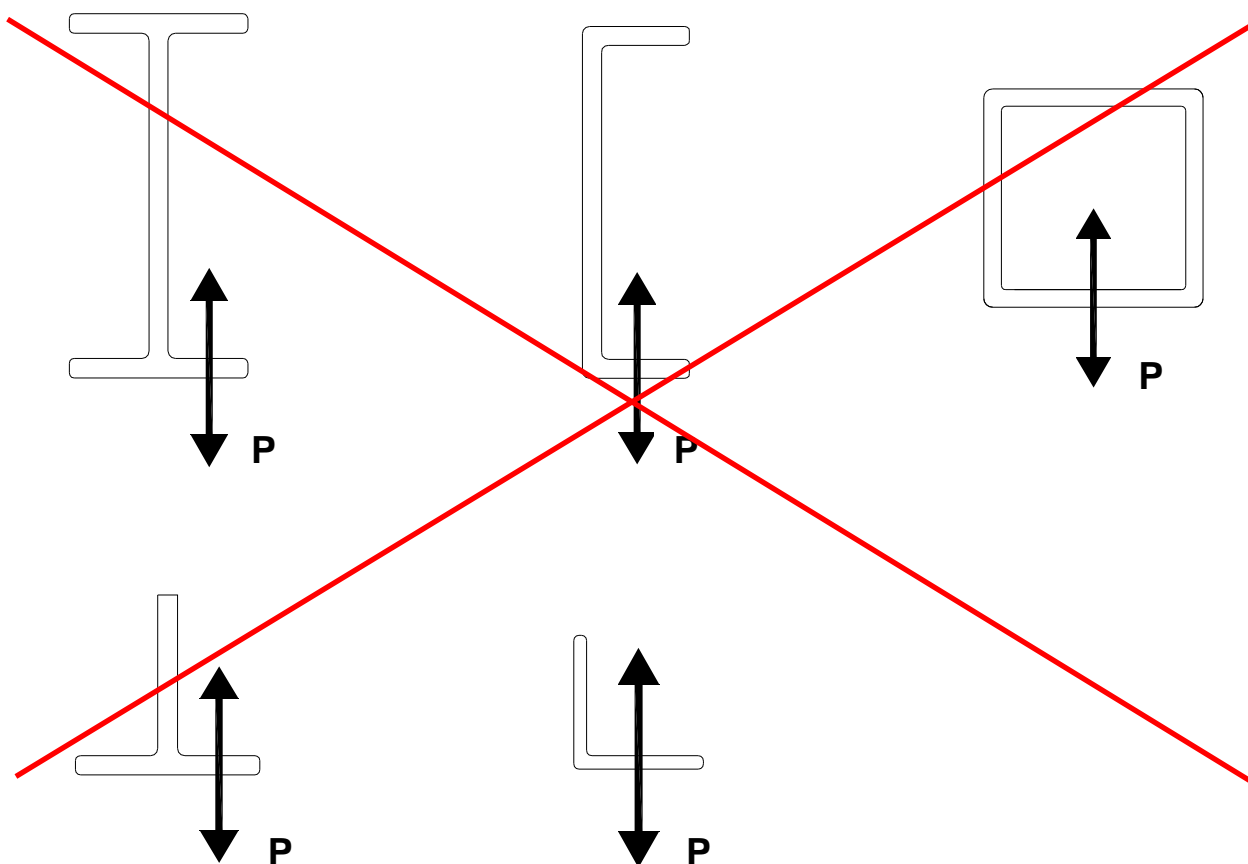
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For further information and support to the use of values for design please contact M.M. S.r.l. offices.

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.



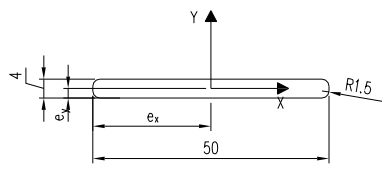
36_53P504I

07.04.2016

Rev. 3

PULTRUDED PROFILES

Profile type "P" (53P504I)

Height	mm	4	Area	A	mm ²	198	
Width	mm	50	Weight	P	Kg/m	0,3	
Thickness 1	mm		Moment of inerzia with respect to x - axis	J _x	mm ⁴	261	
Thickness 2	mm		Moment of inerzia with respect to y - axis	J _y	mm ⁴	40.492	
Radius 1	mm	1,5	Section Modulus with respect to x - axis	W _x	mm ³	130	
Radius 2	mm		Section Modulus with respect to y - axis	W _y	mm ³	1.620	
Standard Color (RAL approximate)	Gray RAL 7035		Centroid in x direction	e _x	mm	25	
Standard Length	mm	6000 (±10 mm)	Centroid in y direction	e _y	mm	2	

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
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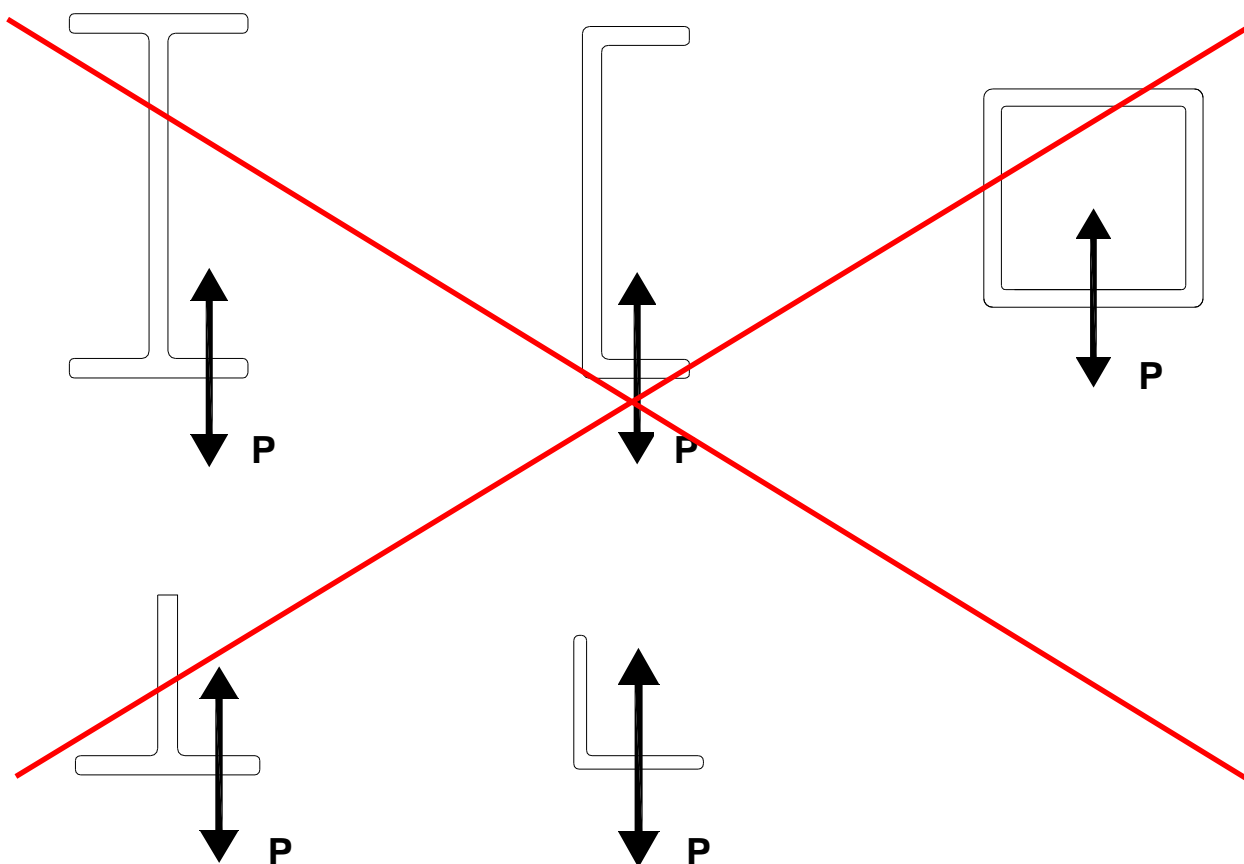
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Linear thermal expansion coefficient		K ⁻¹	8 ÷ 11x10 ⁻⁶	ISO 11359-2	Barcol hardness			50	ASTM 2583
Elongation to break		%	1,5	ASTM D638 UNI 5819	Impact strength (Charpy)		kJ/m2	230	ASTM D256 UNI 6062

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.





M.M. S.R.L.

Fiberglass Reinforced Polymer
gratings and structures

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FRP HANDRAIL SYSTEMS

MM09

26.11.2015 Rev. 3

FRP HANDRAIL SYSTEMS



COMPOSITE SOLUTION

SUMMARY

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1. USE AND CHARACTERISTICS



The FRP handrail systems are built by assembling fiberglass and polyester resin profiles, they assure several advantages compared to the normal metal ones:

- a. High resistance to chemical and atmospheric aggressions
- b. High mechanical/weight ratio peso
- c. Long-lasting
- d. Lightness
- e. Dimensional stability
- f. High dielectric properties
- g. No maintenance
- h. Easy to install

Handrail systems are designed and built accordingly to the **UNI EN ISO 14122-3** norm.

2. EMPLOYMENT FIELDS

MM's HANDRAIL SYSTEMS can be installed in any plant, but they are mainly used in **corrosive environments** where their characteristics are emphasized, as in those plants where conventional materials are not long lasting or need continuous varnishing or protection with high maintenance costs and even so, the working environment may in any case not be completely safe.



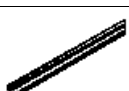




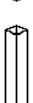


The industries that use MM's PARAPETS are:

- **Chemical industries**
- **Galvanic plants**
- **Mineral industries**
- **Textile industries**
- **Food industries**
- **Electric stations**
- **Electric distribution cabins**
- **Oil plants**
- **Tanneries**
- **Water treatment plants**
- **Marine field**
- **Paper factories**

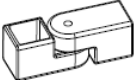
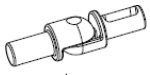



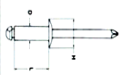







3. MATERIALS

3.1 PROFILES

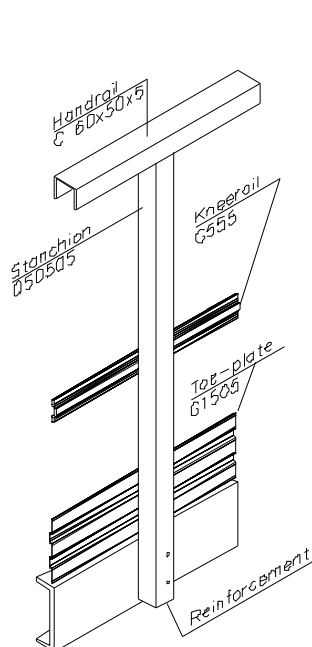
HORIZONTAL PROFILES						
PROFILE	CODE	DESCRIPTION	DIMENSIONS (mm)	BAR LENGTH (m)	WEIGHT (Kg/m)	COLOR
	53C60505I	Handrail	60x50x5	6	1.27	Yellow/Grey
	53C60605I	Ergonomic handrail	60x60x5	6	1.24	Yellow/Grey
	53G555I	Kneerail	shaped 55x5	6	0.5	Yellow/Grey
	5302619I	Tubular kneerail	Ø 26x19	6	0.5	Yellow/Grey
	53G1505I	Toe-plate	shaped 150x5	6	1.35	Yellow/Grey
VERTICAL PROFILES						
PROFILE	CODE	DESCRIPTION	DIMENSIONS (mm)	BAR LENGTH (m)	WEIGHT (Kg/m)	COLOR
	53Q50505I	Stanchion POST01	square 50x50x5	1.10	1.53	Yellow/Grey
	53Q50505I	Stanchion POERG01 with Ø 26 mm hole	square 50x50x5	1.10	1.53	Yellow/Grey
	53Q50505I	Stanchion PVST01	square 50x50x5	1.33	1.53	Yellow/Grey
	53Q50505I	Stanchion PVERG01 with Ø 26 mm hole	square 50x50x5	1.33	1.53	Yellow/Grey
	53Q50505I	STANDARD Stanchion	square 50x50x5	6.00	1.53	Yellow/Grey

3.2 ACCESSORIES FOR FIXING AND JOINTS

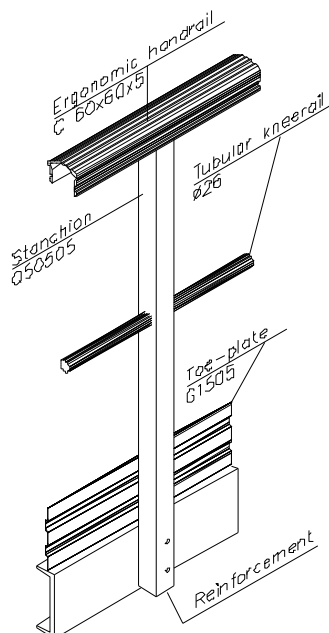
ACCESSORY	CODE	DESCRIPTION	COLOR
	58PA66SCE17035	Adjustable handrail junction in recycled plastic Specific for angle junctions different from 90°	Yellow/Grey
	58PA66STI17035	Adjustable tubular kneerail junction in recycled plastic Specific for angle junctions different from 90°	Yellow/Grey
	58PA66FPQ50505	Reinforcement for vertical fixing stanchion	Black
	58PA66TCE17035	Ergonomic handrail cap	Yellow/Grey
	58PA66TTI17035	Tubular kneerail 26x19mm cap	Yellow/Grey
	57RIVCUNI416	Cu-Ni 4x12 mm rivets	-
	56ASTAFFA8	Stainless Steel AISI 304 stanchion base plate	-
	56A40404012	90° handrail junction Stainless Steel angle type L40x40x40 mm thickness 1.2 mm	-
	56P501512	Linear junction for toe-plate Stainless Steel plate 50x15mm, thickness 1.2 mm	-
	56A40401512	90° toe-plate junction Stainless Steel angle type L40x40x15 mm thickness 1.2 mm	-
	53Q50505I	Linear junction for ergonomic handrail 100mm long square Q50x50x5mm	Yellow/Grey

4. TYPES

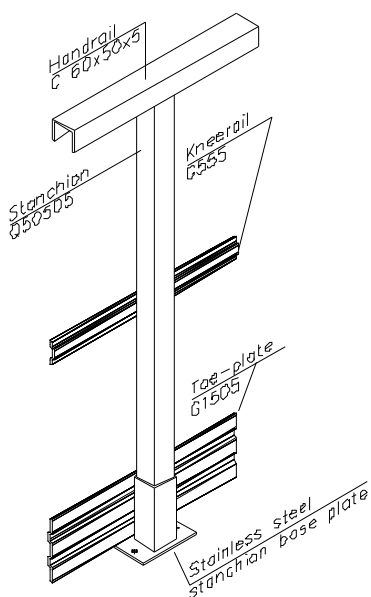
MM's standard parapets have been studied and built according to the **UNI EN ISO 14122-3** norm.



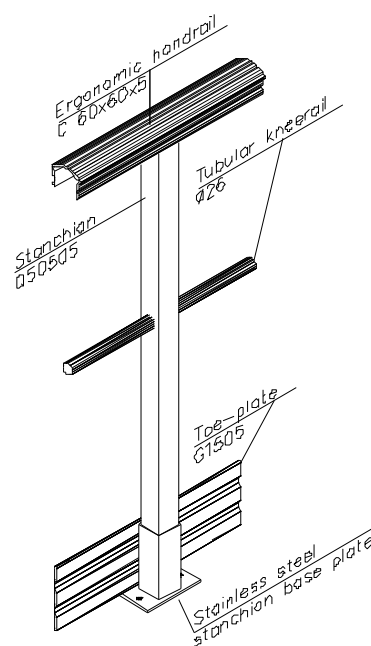
PVST01
Handrail system with lateral
fixing **STANDARD** type



PVERG01
Handrail system with lateral
fixing **ERGONOMIC** type



POST01
Handrail system with horizontal
fixing **STANDARD** type



POERG01
Handrail system with horizontal
fixing **ERGONOMIC** type

5. INSTRUCTIONS FOR DESIGN ENGINEER

1. When the height of the possible fall exceeds 500 mm, a handrail system shall be installed (ref. UNI EN ISO 14122-3 norm)
2. Minimum height of the handrail system shall be 1100 mm (ref. UNI EN ISO 14122-3 norm).
3. The handrail system shall include at least one intermediate kneerail. The clear space between the handrail and the kneerail, as well as between the kneerail and the toe-plate, shall not exceed 500 mm.
4. A toe-plate with a minimum upstand of 100 mm shall be placed at 10 mm maximum from the walking level and the edge of the platform.
5. The distance between the axes of the stanchions shall be:
 - limited to **1300 mm** for handrail system type **POST01** (horizontally fixed)
 - limited to **1300 mm** for handrail system type **POERG01** (horizontally fixed)
 - limited to **1300 mm** for handrail system type **PVST01** (vertically fixed)
 - limited to **1300 mm** for handrail system type **PVERG01** (vertically fixed)

All handrail systems have been tested according to UNI EN ISO 14122-3 norm.

Ask for Bureau Veritas tests made on MM handrail systems at info@mmgrigliati.it.

6. ASSEMBLING INSTRUCTIONS

6.1 VERTICAL FIXING

The stanchions could be fixed to the load bearing structure in two ways.

i. Completely adherent stanchion fixing

When the support beam of the structure is a C or tubular profile or a concrete beam the fixing is very simple. On the bottom part of the stanchion, a plastic reinforcement is inserted in order to ease screws or anchor bolts fixing (Figg. 1-2).

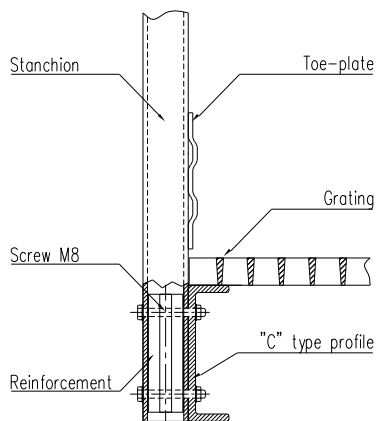


Fig. 1: fixing on profile

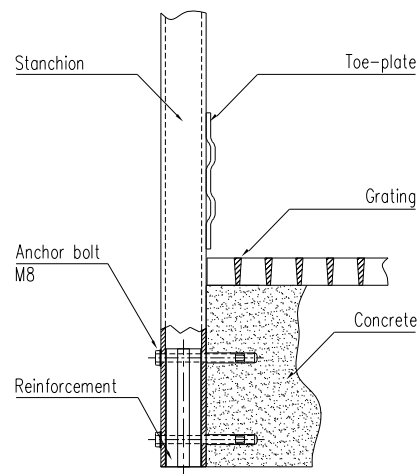


Fig. 2: fixing on concrete structure

ii. Incompletely adherent stanchion fixing

This is the case when fixing has to be made on an I or H type beam or whichever beam with wings. A steel plate has to be welded (if the beam is made of steel) or a spacer shall be fit into the recess (for FRP beams) in order to produce a flat surface (Figg. 3 e 4); then fixing has to follow as the above point i.

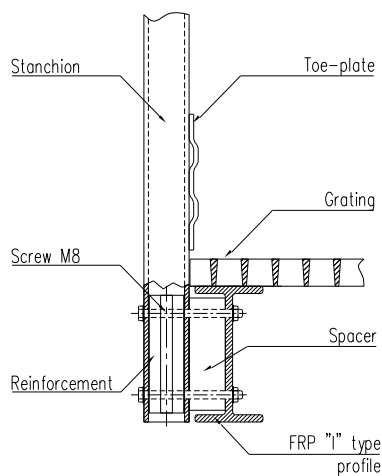


Fig. 3: fixing on an FRP beam

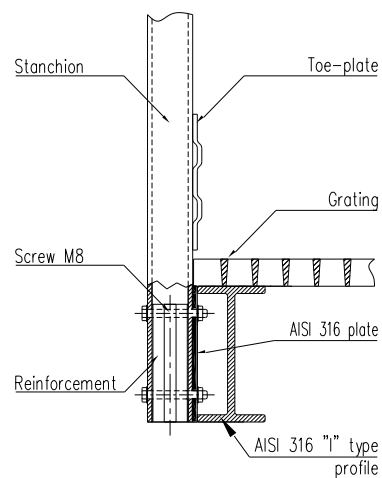


Fig. 4: fixing on a steel beam

6.2 HORIZONTAL FIXING

i. Base-plate permanent fixing

Stainless steel base-plate has to be fixed on a flat surface by using four M8/75-165 expansion anchor bolts. Then the stanchion is fit into the slot and fixed to the base-plate (Fig. 5) by an M6x70mm screw.

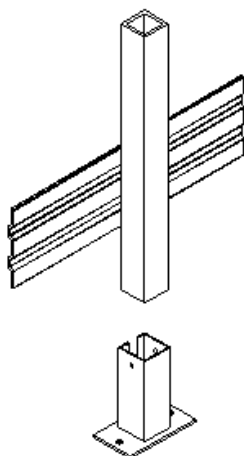


Fig. 5: Assembling illustration

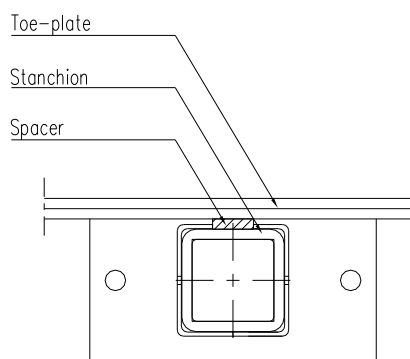


Fig. 6: 5mm spacer stanchion/toe-plate fixing for handrail system removal

ii. Base-plate removable fixing

It may be possible that the handrail system must be partially or totally removed: in this case the toe-plate, stanchion and a 5mm spacer, placed in a ... of the base-plate, shall have to be fixed by rivets. The gap created by the spacer between the outer face of the base plate and the toe-plate eases the removal of the handrail system (Fig. 6).

6.3 HADRAIL APPLICATION

After the fixing of the stanchions, the installation of the handrail can follow-up. The C profile 60x50x5 mm or the Ergonomic C60x60x5 mm are placed on the top of the stanchion and pressed at level and until leaning on it. All stanchions must be perfectly straight before fixing the handrails. Fixing is made with alloy rivets suitable for the specific environment but generally are in cupronickel. Two rivets are fit diagonally in the inside part of the handrail system and one on the outside part (Fig. 7).

6.4 KNEERAIL APPLICATION

The handrail system shall have at least one kneerail. The shaped kneerail profile of 55x5 mm or the tubular kneerail, supplied in 6 m long bars, shall be placed in the middle of the clear span. The shaped profile must touch the inside surface of the handrail system and be blocked by clamps. When they are perfectly horizontal, they could be definitively fixed with two rivets on each stanchion. The tubular profile will pass through a 26mm drilled hole in the middle of the stanchion and needs no fixing (Fig. 7).

6.5 TOE-PLATE APPLICATION

The shaped toe-plate profile 150x5 mm is placed on the bottom part of the structure at 1 cm from the walking level. When it is in the required position it is fixed to the stanchion with clamp blocking systems and when it is perfectly horizontal it could be definitively fixed with three rivets for each stanchion (Fig. 7).

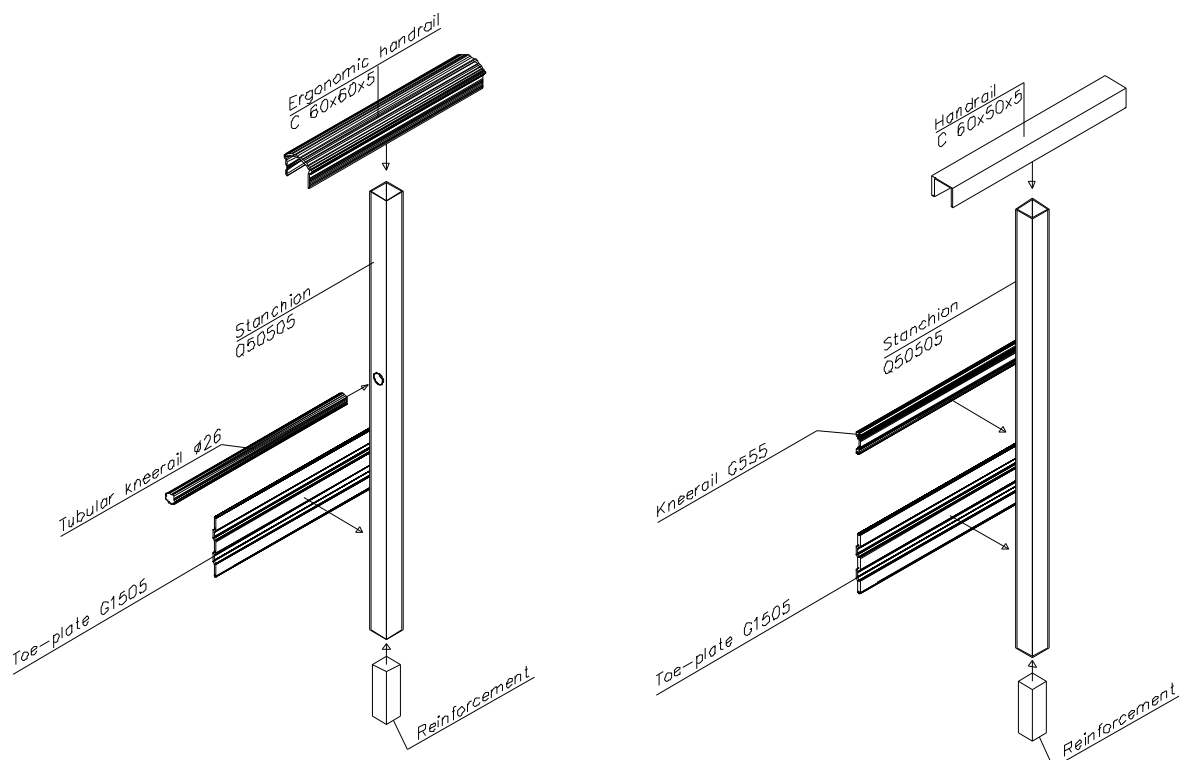


Fig. 7: fixing of handrail system components

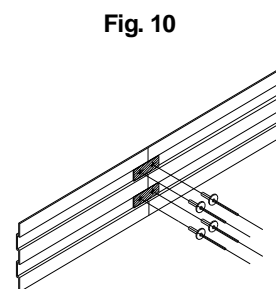
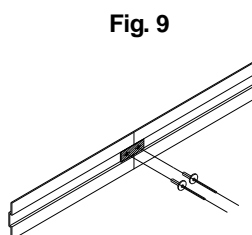
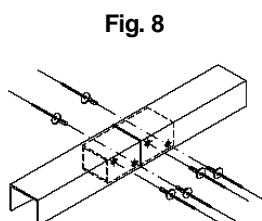
6.6 JUNCTIONS

Shall the handrail system be over 6 m long it will be necessary to connect all the profiles in order to have a continuous structure.

i. Linear junctions distant from stanchions

If the junction is not on the stanchion, profiles are connected as follows:

- N. 1 square profile of 50x50x5 mm piece (approx. 10 cm long) shall be used for handrail (Fig. 8)
- N. 1 Stainless Steel plate 40x15mm, thickness 1.2 mm shall be used for shaped kneerail type G55x5 (Fig. 9)
- N. 2 Stainless Steel plates 40x15mm, thickness 1.2 mm shall be used for shaped toe-plate type G150x5 (Fig. 10)



ii. 90° junctions

For 90° angle connections, it is necessary to use:

- n. 2 stainless steel angles 40x40x40 mm thickness 1.2mm to fit in the handrail and fixed with M6 flathead screws (Fig. 16)
- n. 1 stainless steel angle 40x40x15 thickness 1.2mm and two M4 rivets for the connection of the kneerail type G55x5 (Fig. 17)
- n. 2 stainless steel angles 40x40x15 thickness 1.2mm and four M4 rivets for the connection of the toe-plate type G150x5 (Fig. 18)

It is suggested to use two stanchions in a 90° corner at a distance of approximately 100 mm (Fig. 19-20).

Fig. 16

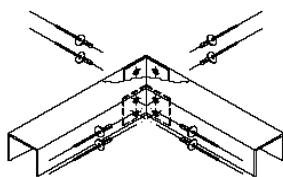


Fig. 17

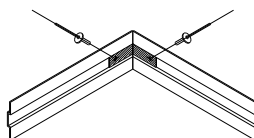


Fig. 18

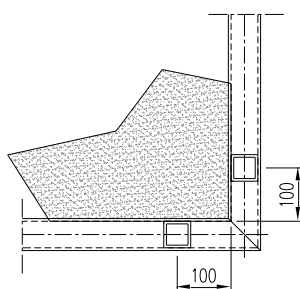
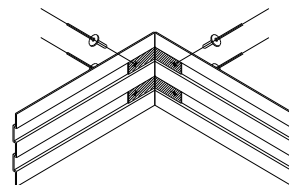


Fig. 19: Top view: stanchion's position for lateral fixing

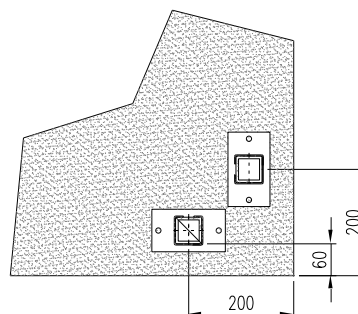


Fig. 20: Top view: stanchion's position for horizontal fixing

**M.M. S.R.L.**

Fiberglass Reinforced Polymer
gratings and structures

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**FRP WALKWAYS****MM10**

30.07.2015 Rev. 2

FRP WALKWAYS**COMPOSITE SOLUTION**

SUMMARY

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1. USES AND CHARACTERISTICS



The FRP walkways are built by assembling fiberglass and polyester resin pultruded profiles and gratings; they assure several advantages compared to the normal metal ones:

- a. High resistance to chemical and atmospheric aggressions
- b. High mechanical/weight ratio
- c. Long-lasting
- d. Lightness
- e. Dimensional stability
- f. High dielectric properties
- g. No maintenance
- h. Easy to install



Structures are designed and built accordingly to the **UNI EN ISO 14122-2-3** norm.

2. EMPLOYMENT FIELDS

MM's walkways can be installed in any plant, but they are mainly used in **corrosive environments** where their characteristics are emphasized, in those plants where conventional materials are not long-lasting or need continuous varnishing or protection with high maintenance costs and in any case safety in the working environment is not guaranteed.

The industries that use MM's walkways are:

- **Chemical Industries**
- **Galvanic plants**
- **Mineral industries**
- **Textile industries**
- **Food industries**
- **Electric stations**
- **Electric distribution cabins**
- **Oil plants**
- **Tanneries**
- **Water treatment plants**
- **Marine field**
- **Paper factories**



3. MATERIALS

3.1 WALKWAY

Self-bearing structures

These structures are built with C and/or I profiles fixed together with secondary beams of the same type, which are chosen accordingly to the specific load request. In any case, the minimum considered load capacity is 2kN/m² (distributed load) accordingly to the UNI EN ISO 14122-2 norm. The junctions are made with stainless steel plates and bolts & nuts as described below.

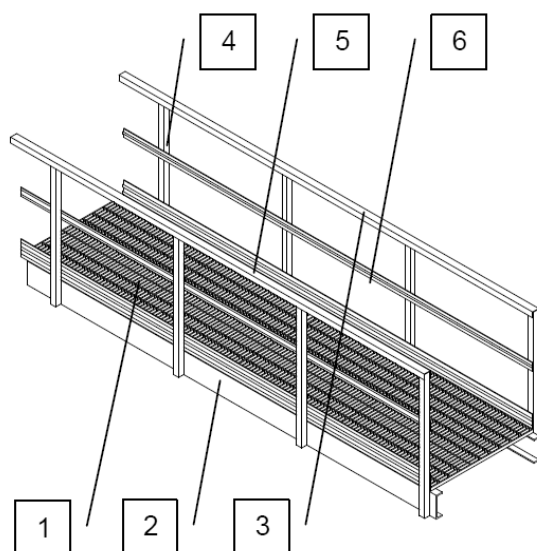
Walking surface

The floor is built with a choice of FRP gratings accordingly to the required load. In any case the minimum considered load capacity is 1,5 kN (concentrated load) accordingly to the UNI EN ISO 14122-2 norm. Shall the structure be subject to the UNI EN ISO 14122-2 norm, the walking surface must fulfill the following conditions:

- If there is an occasional transit of people underneath the walkway, the floor grating must have a maximum opening that does not allow a 35 mm diameter ball to fall through (grating type SCH38/30);
- If the walkway is placed over working areas, the floor grating must have a maximum opening that does not allow a 20 mm diameter ball to fall through (grating type SCH52/30).

Handrail system

The handrails are built by assembling the profiles described in table 3.3 with cupronickel rivets. The stanchions are placed approximately every 120 cm (max 130 cm) and are fixed to the structural profiles with two bolts.



1. Walking surface

- FRP Grating type "SCH38/30"
 - FRP Grating type "SCH52/30"
- (different grating types can be used if required)

2. Structure

- FRP C profile 300x100 mm thickness 15 mm
- FRP C profile 200x60 mm thickness 10 mm
- FRP C profile 150x45 mm thickness 8 mm
- FRP I profile 200x100 mm thickness 10 mm
- FRP I profile 150x75 mm thickness 8 mm

3. Handrail

- FRP C profile 60x50 mm thickness 5 mm
- FRP C ergonomic profile 60x60 mm thickness 5 mm

4. Stanchion

- FRP SQUARE profile 50x50 mm thickness 5 mm

5. Toe-plate

- FRP FLAT SHAPED profile 150 mm thickness 5 mm

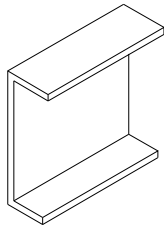
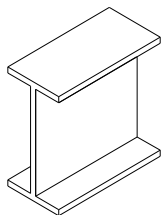
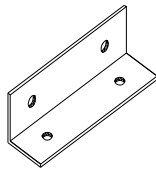
6. Kneerail

- FRP FLAT SHAPED profile 55 mm thickness 5 mm
- FRP tubular profile Ø 26 mm thickness 5 mm

Accessories

Stainless steel bolt & nuts and clamps.
Cu-Ni alloy rivets.





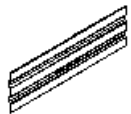

3.2 STRUCTURE PROFILES SHEET

PROFILES	DESCRIPTION	DIMENSIONS (mm)	BAR LENGTH (m)	WEIGHT (Kg/m)	COLOR
	C PROFILE TYPE IN FRP	300x100x15 200x60x10 150x45x8	6	12,5 5,3 3,2	Yellow/grey
	IPE PROFILE TYPE IN FRP	200x100x10 150x75x8	6	6,5 4,1	Yellow/grey
	S.S. ANGULAR	45x45x170x3 45x45x120x3			

Accessories

- M8 screws
- M8 nuts and washers

3.3 HANDRAIL SYSTEM PROFILES SHEET

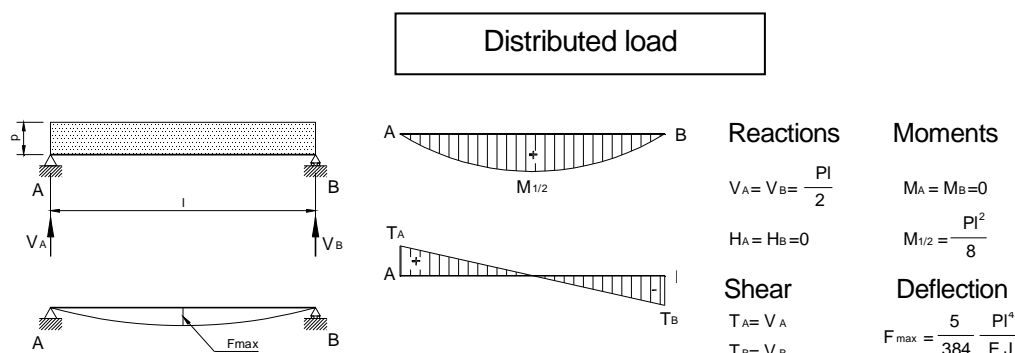
PROFILES	DESCRIPTION	DIMENSIONS (mm)	BAR LENGTH (m)	WEIGHT (Kg/m)	COLOR
HORIZONTAL PROFILES					
	Handrail	60x50x5	6	1.27	Yellow/grey
	Ergonomic handrail	60x60x5	6	1.24	Yellow/grey
	Kneerail	shaped 55x5	6	0.50	Yellow/grey
	Tubular kneerail	Ø 26x19	6	0.50	Yellow/grey
	Toe-plate	shaped 150x5	6	1.35	Yellow/grey
VERTICAL PROFILES					
	Rod	square 50x50x5	1,00 – 1,33 or 6	1.53	Yellow/grey

Accessories

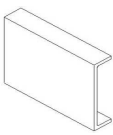
- M8 screws
- M8 nuts and washers
- Stainless steel mm 40x40 h mm 40 angle
- Stainless steel mm 40x40 h mm 15 angle
- M4x 16 Cu-Ni alloy rivets
- PA reinforcement
- Adjustable junctions for handrail
- Adjustable junctions for tubular kneerail

4. INSTRUCTIONS FOR DESIGN ENGINEER

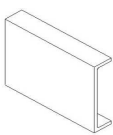
The design of the walkway is determined by the calculation of the maximum span, which corresponds to the most restraining of the two conditions: maximum action on main profiles ($\sigma \leq \sigma_{adm.}$) or the maximum deflection ($f \leq 1/200$ span), as shown in the table below. Walkway is considered as a simply supported beam (isostatic structure) uniformly loaded.



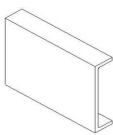
UNIFORMLY DISTRIBUTED LOAD 200 kg/m² WIDTH of the WALKWAY 100 cm

PROFILE	DIMENSIONS mm	A _v cm ²	E daN/cm ²	J _x cm ⁴	W _x cm ³	MAX SPAN cm
	300x100x15	45	230000	8549	570	830
	200x60x10	20	230000	1570	157	480
	150x45x8	12	230000	524	70	340
	90x35x8	7,2	230000	121	27	200

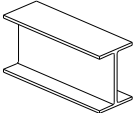
UNIFORMLY DISTRIBUTED LOAD 400 kg/m² WIDTH of the WALKWAY 100 cm

PROFILE	DIMENSIONS mm	A _v cm ²	E daN/cm ²	J _x cm ⁴	W _x cm ³	MAX SPAN cm
	300x100x15	45	230000	8549	570	680
	200x60x10	20	230000	1570	157	390
	150x45x8	12	230000	524	70	270
	90x35x8	7,2	230000	121	27	165

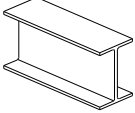
UNIFORMLY DISTRIBUTED LOAD 600 kg/m² WIDTH of the WALKWAY 100 cm

PROFILE	DIMENSIONS mm	A _v cm ²	E daN/cm ²	J _x cm ⁴	W _x cm ³	MAX SPAN cm
	300x100x15	45	230000	8549	570	600
	200x60x10	20	230000	1570	157	340
	150x45x8	12	230000	524	70	240
	90x35x8	7,2	230000	121	27	145

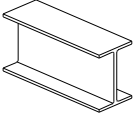
UNIFORMLY DISTRIBUTED LOAD 200 kg/m² WIDTH of the WALKWAY 100 cm

PROFILE	DIMENSIONS mm	A _v cm ²	E daN/cm ²	J _x cm ⁴	W _x cm ³	MAX SPAN cm
	200x100x10	20	230000	2293	229	550
	150x75x8	12	230000	766	102	385

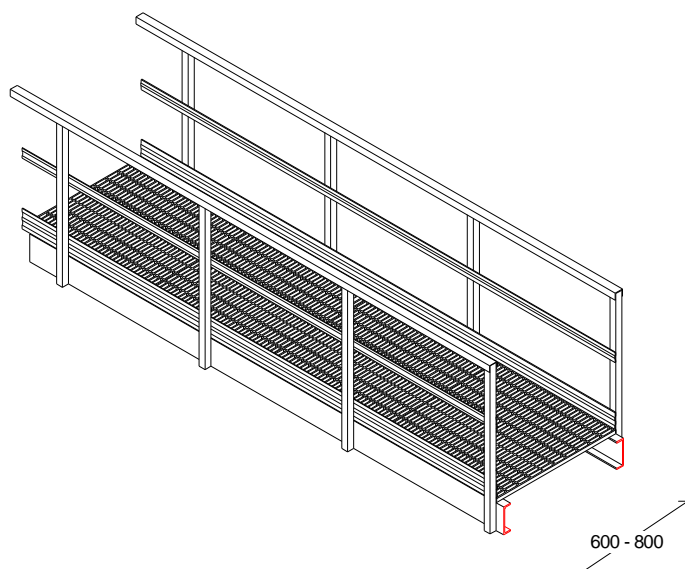
UNIFORMLY DISTRIBUTED LOAD 400 kg/m² WIDTH of the WALKWAY 100 cm

PROFILE	DIMENSIONS mm	A _v cm ²	E daN/cm ²	J _x cm ⁴	W _x cm ³	MAX SPAN cm
	200x100x10	20	230000	2293	229	445
	150x75x8	12	230000	766	102	310

UNIFORMLY DISTRIBUTED LOAD 600 kg/m² WIDTH of the WALKWAY 100 cm

PROFILE	DIMENSIONS mm	A _v cm ²	E daN/cm ²	J _x cm ⁴	W _x cm ³	MAX SPAN cm
	200x100x10	20	230000	2293	229	390
	150x75x8	12	230000	766	102	270

- Accordingly to EN 547 and EN 547-3 values, unless exceptional circumstances, the free minimum height over the walkways and the passage corridors must be of 2100 mm.
- Unless exceptional circumstances the free width of a passage corridor must be at least 600 mm but preferably 800 mm. Shall the passage corridor be used for the passage of more than one person at a time, width increases to 1000 mm.



5. ASSEMBLING INSTRUCTIONS

5.1 FIXING THE GRATING TO THE WALKWAY

The gratings are cut on size and are fixed to the structure with stainless steel standard fixing clamps and screws.

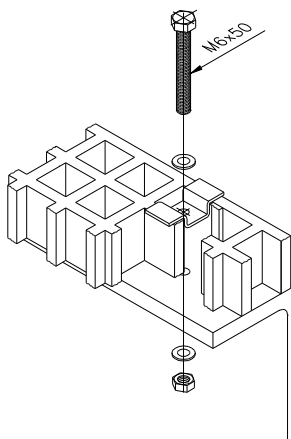


Fig. 1

5.2 HANDRAIL SYSTEM ASSEMBLING

Usually the handrail system is supplied pre-assembled; some parts may be disassembled for transport necessities. The fixing of the handrail system to the walkway is made as shown in the drawings Fig. 2. and Fig. 3. The structure is already drilled for the assembling. All the accessories are included.

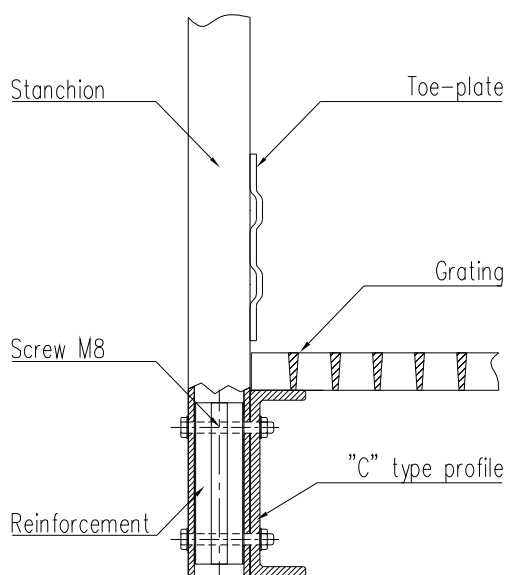


Fig. 2

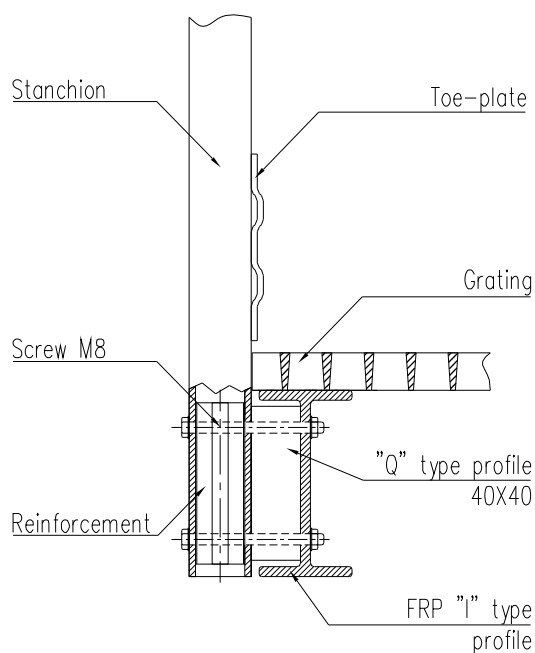


Fig. 3

5.3 FASTENING A WALKWAY TO A WALL WITH ANCHORS BOLTS

When the structure is assembled, it could be fixed to the wall with minimum M8 dimensions anchor bolts (**not included in the supply**).

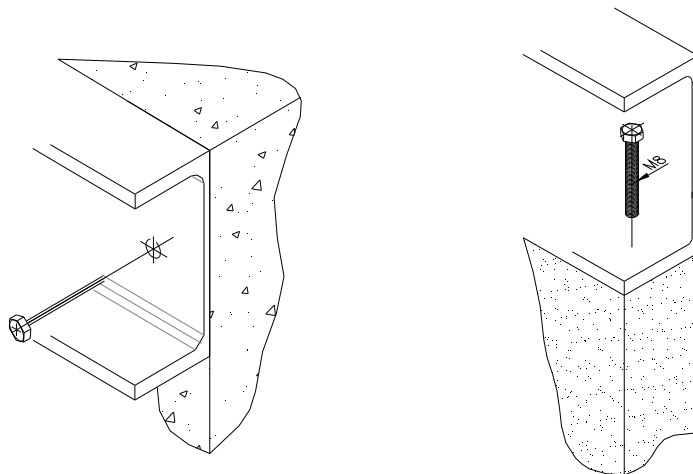
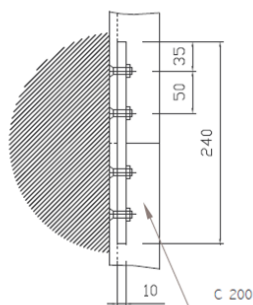


Fig. 4

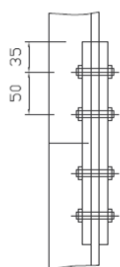
5.4 JUNCTION BETWEEN WALKWAYS

The junction between walkways could be made by using FRP or Stainless steel connecting plates (fig.5), or just by drilling the support C profiles (fig.6).

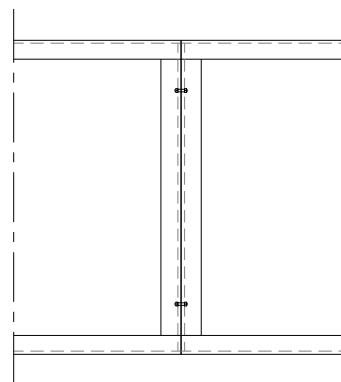
The connecting screws and the nuts are type M8.



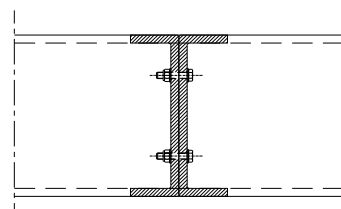
Top view



Front view



Top view



Front view

Fig. 5 Connection between walkways with plates

Fig. 6 Walkway junctions with secondary beams



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FRP STAIRWAYS

MM07

23.12.2015 Rev. 4

FRP STAIRWAYS

COMPOSITE SOLUTION

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1. USE AND CHARACTERISTICS



The FRP stairways are built by assembling the fiberglass and polyester resin profiles and gratings, they assure several advantages compared to the normal metal ones:

- a. High resistance to chemical and atmospheric aggressions
- b. High mechanical/weight ratio peso
- c. Heat resistant
- d. Long-lasting
- e. Lightness
- f. Dimensional stability
- g. High dielectric properties
- h. No maintenance

Stairways are designed and built accordingly to the **UNI EN ISO 14122-3** norm.

2. EMPLOYMENT FIELD

MM's stairways can be installed in any plant, but they are mainly used in **corrosive environments** where their characteristics are emphasized, in those plants where conventional materials are not long-lasting or need continuous varnishing or protection with high maintenance costs and in any case safety in the working environment is not guaranteed.

The industries that use MM's STAIRWAYS are:

- **Chemical industries**
- **Galvanic plants**
- **Mineral industries**
- **Textile industries**
- **Food industries**
- **Electric stations**
- **Electric distribution cabins**
- **Oil plants**
- **Tanneries**
- **Water treatment plants**
- **Marine field**
- **Paper factories and others**



3. MATERIALS

3.1 STAIRWAY

Main structure

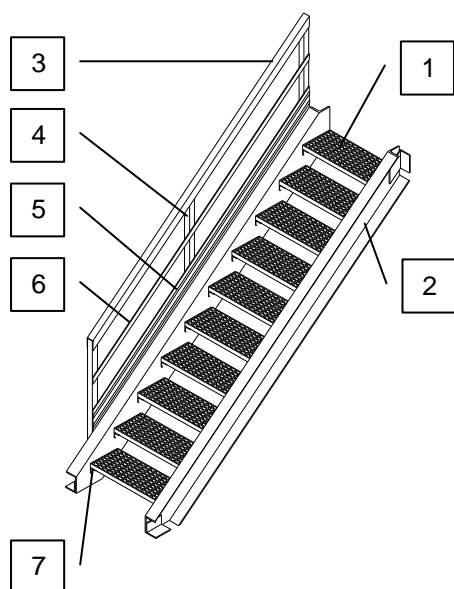
Made by two stringers, connected to the landing and the ground floor with steel plates.

Handrail system

The handrail system is made of the profiles described in table 3.2 connected to each other by cupronickel rivets. The distance between stanchions is of approximately 120cm and they are fixed to the stringers with two S.S. bolts.

Steps

Made of at least 38 mm height FRP antiskid surface grating. Steps are supported by FRP "L" angle profiles directly connected to the stringers by S.S. bolts.



1. Steps
 - Minimum 38mm thickness grating
2. Stringers
 - FRP C profile mm 300x100 thickness 15 mm
 - FRP C profile mm 200x60 thickness 10 mm
 - FRP C profile mm 150x45 thickness 8 mm
3. Handrail
 - FRP C profile mm 60x50 thickness 5 mm
 - FRP C ergonomic profile mm 60x60 thickness 5 mm
4. Stanchion
 - FRP square profile mm 50x50 thickness 5 mm
5. Toe-plate
 - FRP flat shaped profile mm 150 thickness 5 mm
6. Kneerail
 - FRP flat shaped profile mm 55 thickness 5 mm
 - FRP tubular profile Ø 26 mm thickness 5 mm
7. Step support
 - FRP angle 50x50 mm thickness 5 mm

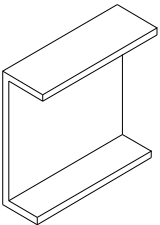
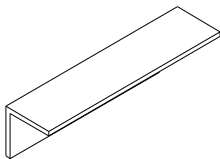
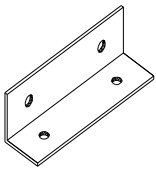
Accessories

Stainless steel bolt & nuts and clamps.

Cu-Ni alloy rivets.

All M.M. S.r.l. stairways are made by FRP gratings, FRP pultruded profiles, and Stainless Steel accessories according to **UNI EN ISO 14122-2-3** norms. Stairways can be manufactured in different slopes, pre-assembled and complete of handrail systems.

3. STRUCTURAL PROFILES SHEET

PROFILES	DESCRIPTION	DIMENSIONS (mm)	BAR LENGTH (m)	WEIGHT (Kg/m)	COLOR
	Stringer	300x100x15 200x60x10 150x45x8	6	12,5 5,3 3,2	Yellow/grey
	FRP angle profile	50x50x5	6	0,79	Yellow/grey
	S.S. angle	45x45x160x3 45x45x170x3			

Accessories







For FRP angle profiles

- M6 screws
- M6 self-blocking nuts
- M6 washers

For S.S. angles

- M8 screws
- M8 self-blocking nuts
- M8 washers

3.3 HANDRAIL SYSTEM PROFILES SHEET

PROFILES	DESCRIPTION	DIMENSIONS (mm)	BAR LENGTH (m)	WEIGHT (Kg/m)	COLOR
HORIZONTAL PROFILES					
	Handrail	60x50x5	6	1.27	Yellow/grey
	Ergonomic handrail	60x60x5	6	1.24	Yellow/grey
	Kneerail	shaped 55x5	6	0.50	Yellow/grey
	Tubular kneerail	Ø 26x19	6	0.50	Yellow/grey
	Toe-plate	shaped 155x5	6	1.35	Yellow/grey
VERTICAL PROFILES					
	Stanchion	square 50x50x5	1,00 – 1,33 or 6	1.53	Yellow/grey

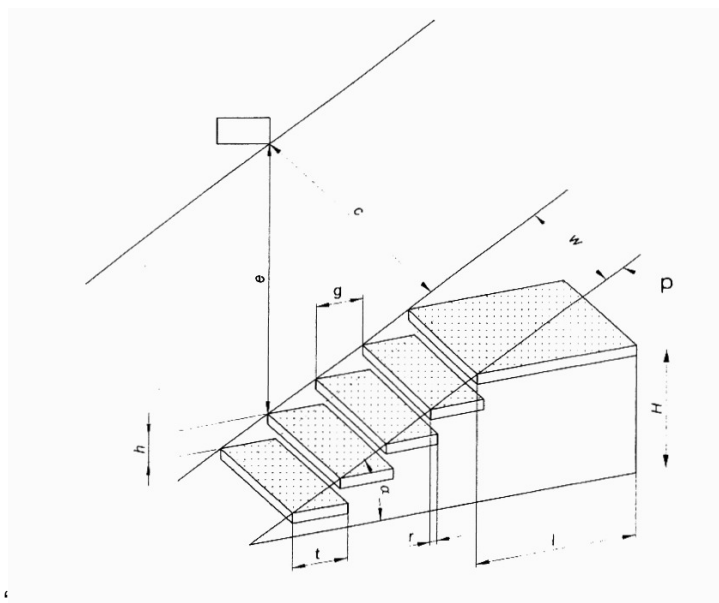
Accessories

- M8 screws
- M8 nuts and washers
- Rivets
- PA reinforcement
- Adjustable junction for handrail
- S.S. plate 50x15 mm
- Adjustable junction for tubular kneerail

4. INSTRUCTIONS FOR DESIGN ENGINEER

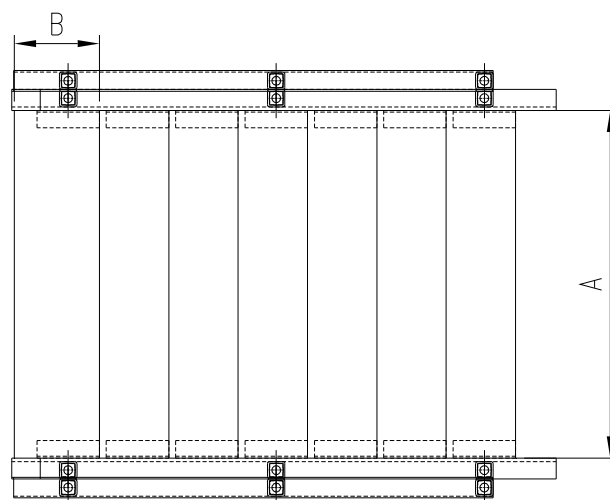
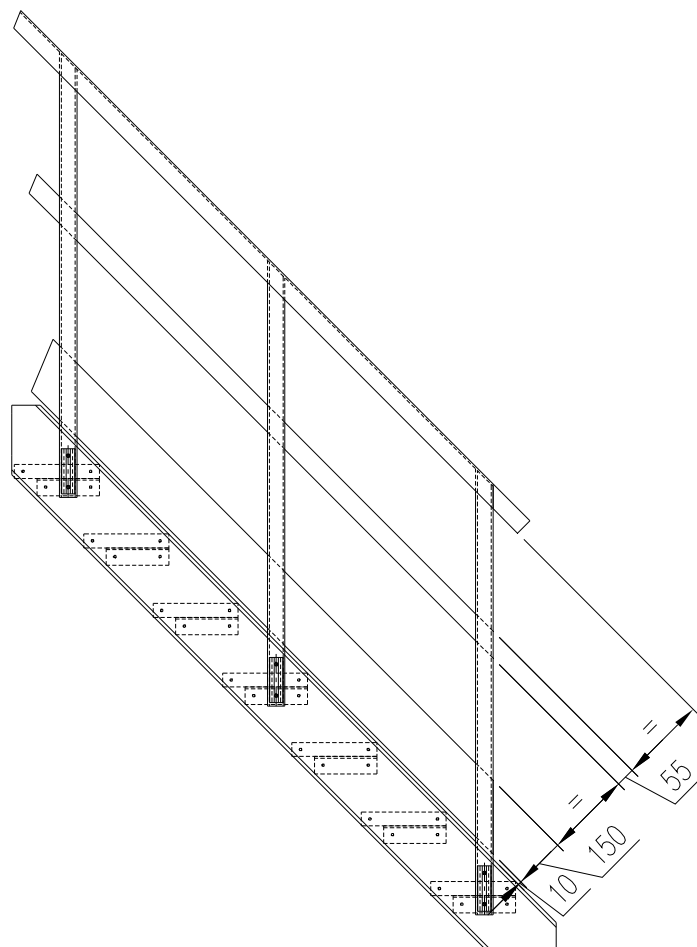
Stairways are designed and built accordingly to the **UNI EN ISO 14122-2-3** norm.

The essential criteria that a design engineer must consider for their construction are listed here below:



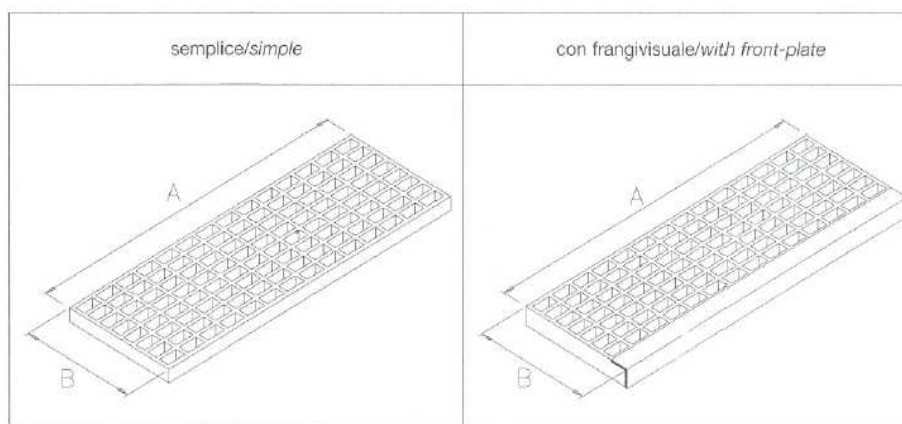
1. slope shall be included between 20° e 45° (30°-40° suggested)
2. going, g , and rise, h , shall meet the formula: $600 \leq g+2h \leq 660$
3. the overlap, r , of the step shall be ≥ 10 mm
4. the clear width of the stair, w , shall be a minimum of 600 mm but preferably 800 mm
5. the vertical height of the handrail shall be at least 900 mm above the walking level
6. the handrail system is not required whenever the height to climb is less than 500 mm
7. if the stair width is greater or equal to 1200 mm, there shall be two handrails

4.1 STAIRWAY DIMENSIONS

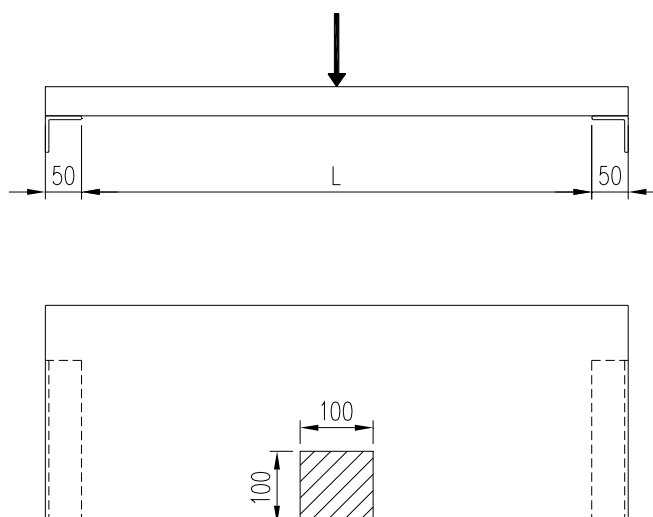


4.2 STANDARD STEPS TABLE

Steps are provided with closed borders on all sides and with our without front-plate.



Every step is supported by a 50 mm wide FRP profile on both sides. The maximum value of the step's clear span L corresponding to an admissible deflection of $1/200 L$ under a punctual load of 150 Kg are shown in the following table. The load is concentrated on a 100x100 mm area in the middle of the step close to the front border, in accordance to the UNI EN 14122-3 norm.



GRATING			MINIMUM DIMENSION GOING B * (mm)	MAX CLEAR SPAN L (mm)	MAX CONCENTRATED LOAD CORRESPONDING TO A L/200 DEFLECTION (Kg)	COLOUR
Type 1	SCH38/38	PLAIN	245	650	150	Grey RAL 7004
		WITH FRONT-PLATE	245	830	150	
Type 2	SCH52/40	PLAIN	270	685	155	Grey RAL 7004
		WITH FRONT-PLATE	270	850	150	
Type 3	SCH52/52	PLAIN	270	970	155	Grey RAL 7004
		WITH FRONT-PLATE	270	1200	155	

* The tolerance of the dimension shown in table is of +/- 2 mm.

Shall the steps' dimensions exceed the values shown in the table, M.M.'s Technical Department is available for customized solutions.

All steps are antislip, and reach level R13 V10 in accordance to the DIN 51130 norm.

5. ASSEMBLING INSTRUCTIONS

5.1 STAIRWAY FIXING

S.S. angles, screws, bolts & nuts are used to fix the stairway on the top and the ground (Fig. 1 and 2).

The fixing of the structure to the concrete is made by using standard angles and anchor bolts (Fig.3).

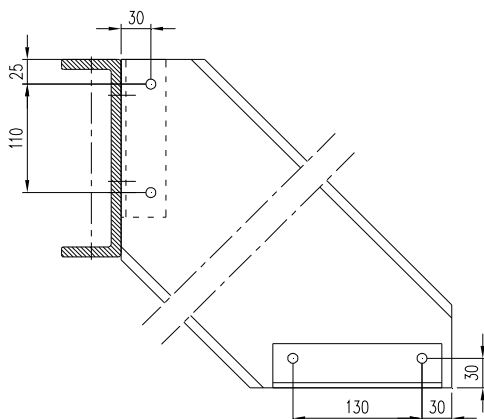


Fig. 1 Stringer fixing to FRP structure

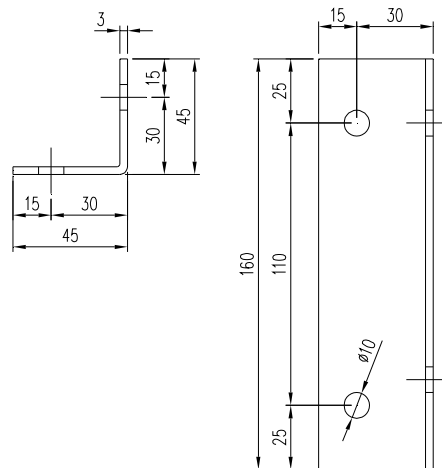


Fig. 2 S.S. angle

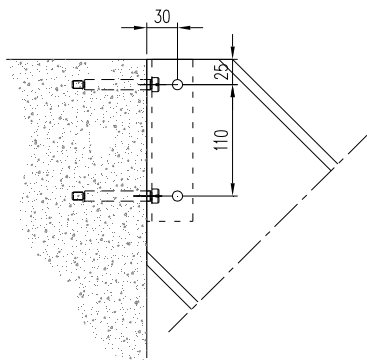


Fig. 3 Stringer fixing to concrete

5.2 STEPS ASSEMBLING

The steps are fastened to the stringers by using S.S. M6 screws and supported by FRP angles, which are fastened as well to the stringers with S.S. M6 screws (Fig.4).

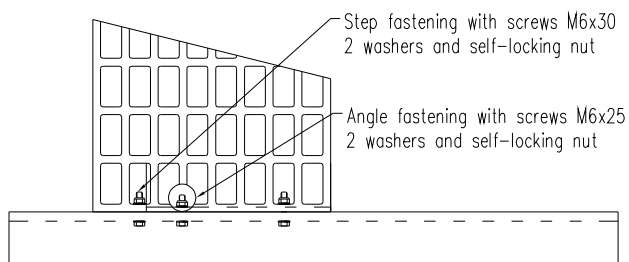


Fig. 4 Step fastening

5.3 HANDRAIL SYSTEM ASSEMBLING

The handrail system, cut accordingly to the stair slope, is fastened to the stringers by fitting a square profile 50x50x5 into the C stringer and screwing them together (Fig. 5 shows a C200 stringer case). Connections are made by S.S. M8 screws. The handrail system can be installed on one or both sides of the stairway.

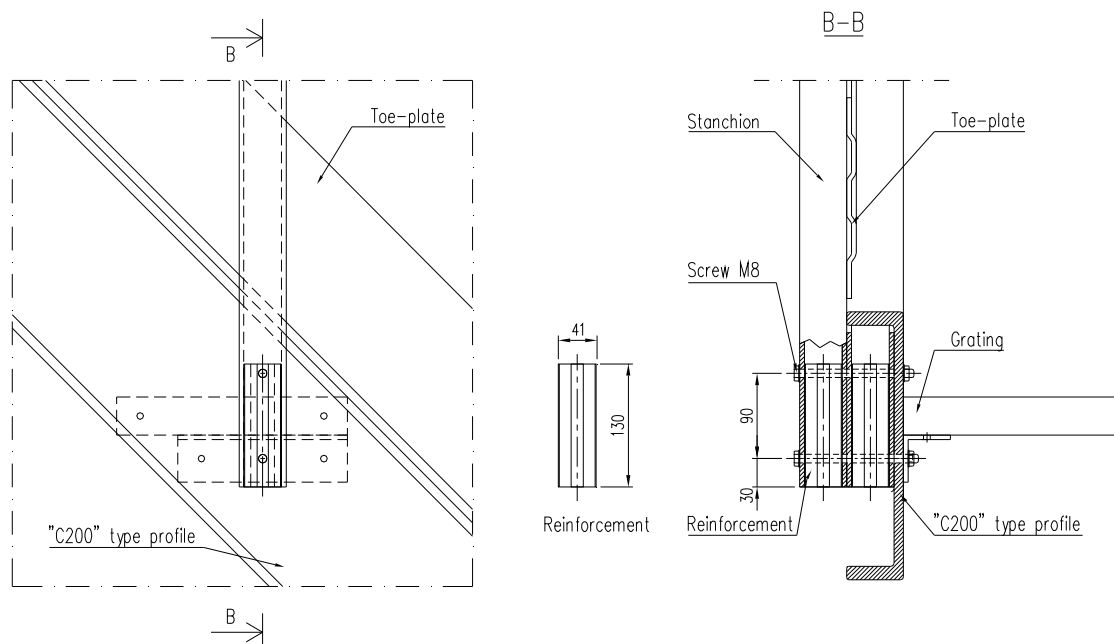


Fig. 5

5.4 FASTENING STRINGERS TO CONCRETE

Whit an alongside wall stairway, the stringer can be fastened to the concrete by using S.S. angles 45x45x170 mm and M8 anchor bolts. (Fig. 6)

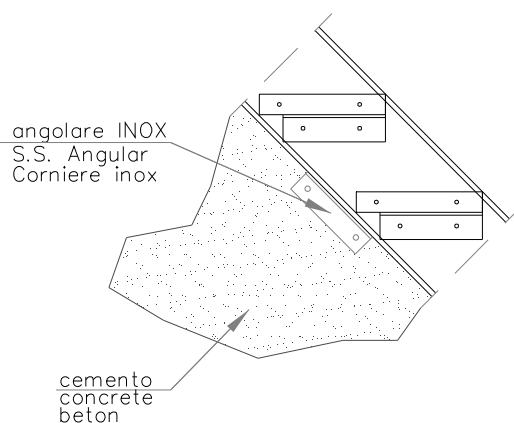


Fig. 6

5.5 STAIRWAY INTERMEDIATE SUPPORTS

If a stairway has an over 4 m span, an intermediate support is required (Fig.7).

These supports can be made of the following profiles:

- C profile mm 300x100 thickness 15 mm
- C profile mm 200x60 thickness 10 mm
- C profile mm 150x45 thickness 8 mm

Support columns can be braced by FRP angles and C profiles:

- L 45x45 mm thickness 5 mm
- L 50x50 mm thickness 5 mm
- L 75x45 mm thickness 8 mm
- C profile mm 90x35 thickness 8 mm

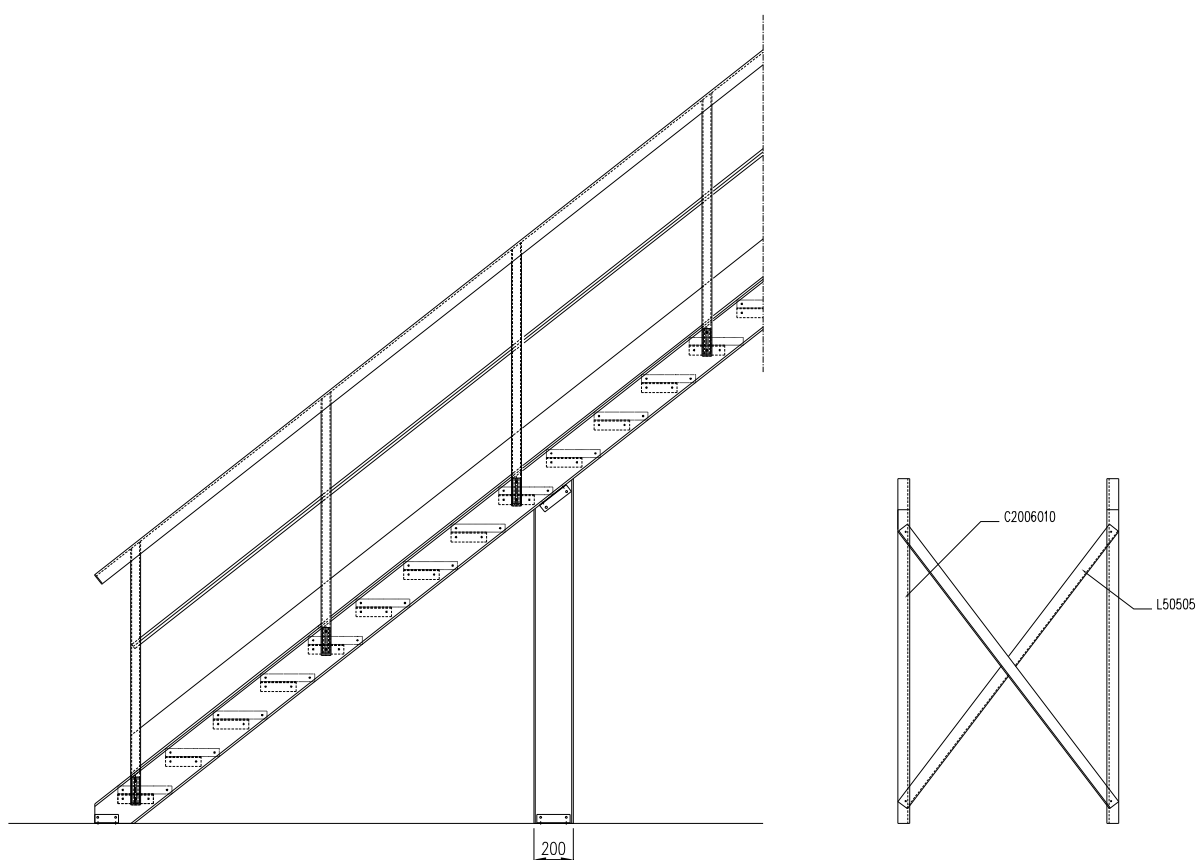


Fig. 7



M.M. S.R.L.

Fiberglass Reinforced Polymer
gratings and structures

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FRP LADDERS

MM06

30.07.2015 Rev. 3

FRP LADDERS

COMPOSITE SOLUTION

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1. USE AND CHARACTERISTICS



The FRP ladders are built by assembling the fiberglass and polyester resin profiles, they assure several advantages compared to the normal metal ones:

- a. High resistance to chemical and atmospheric aggressions
- b. High mechanical/weight ratio peso
- c. Long-lasting
- d. Lightness
- e. Dimensional stability
- f. High dielectric properties
- g. No maintenance
- h. Easy to install

2. REFERENCE NORMS

Ladders are designed and built accordingly to the following norms:

<p><u>UNI EN ISO 14122-1</u></p> <p>Safety of machinery Permanent means of access to machinery. Part 1: choice of a fixed means of access between two levels</p>	<p>This norm defines the general requirements for safe access to machines, defined according to UNI EN 12100-2, and gives advice about the correct choice of access means when the necessary access to the machine is not possible directly from the ground level or from a floor.</p> <p>This norm applies to:</p> <ul style="list-style-type: none"> – all machinery (stationary and mobile) where fixed means of access are necessary; – means of access which are a part of a machine; – means of access to that part of the building (e.g. working platforms, walkways, ladders) where the machine is installed, providing the main function of that part of the building is to provide a means of access to the machine; – access means specific to the machine which are not permanently fixed to the machine and which may be removed or moved to the side for some operations of the machine (e.g. changing tools in a large press). <p>This norm doesn't apply to:</p> <ul style="list-style-type: none"> – lifts; – lifting platforms; – any other machine designed in order to displace people between two levels.
<p><u>UNI EN ISO 14122-4</u></p> <p>Safety of machinery Permanent means of access to machinery. Part 4: fixed ladders</p>	<p>This norm applies to:</p> <ul style="list-style-type: none"> – all machinery (stationary and mobile) where fixed means of access are necessary; – fixed ladders which are a part of a machine; – fixed ladders to that part of the building (e.g. working platforms, walkways, ladders) where the machine is installed, providing the main function of that part of the building is to provide a means of access to the machine; – ladders which are not permanently fixed to the machine and which may be removed or moved to the side or pivoted (swivel-mounted) for some operations of the machine (e.g. changing tools in a large press). <p>This norm doesn't apply to:</p> <ul style="list-style-type: none"> – machines which are manufactured before the date of publication of this standard by CEN.
<p><u>UNI EN 131-2</u></p>	<p>The norm determines the general project features, the requirements and the test methods for the ladders.</p> <p>This norm is applies to:</p> <ul style="list-style-type: none"> – portable ladders. <p>This norm doesn't apply to:</p> <ul style="list-style-type: none"> – ladders with specific use as fire department ladders or extension ladders.



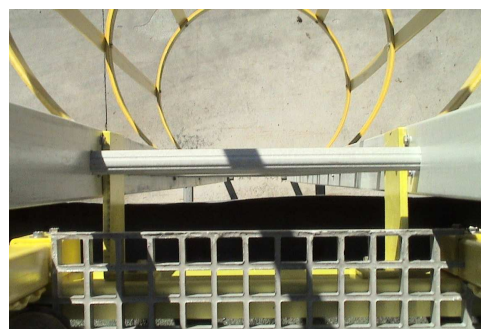
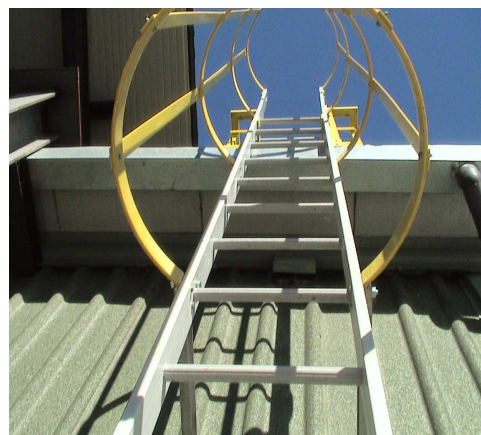
Products showing this symbol are declared suitable to be used in contact with potable water by Italian and France Health Ministry.

3. EMPLOYMENT FIELDS

MM's LADDERS can be installed in any plant, but they are mainly used in **corrosive environments** where their characteristics are emphasized, in plants where conventional materials are not long lasting or need continuous varnishing or protection with high maintenance costs and, in any case, do not guarantee safety in the working environment.

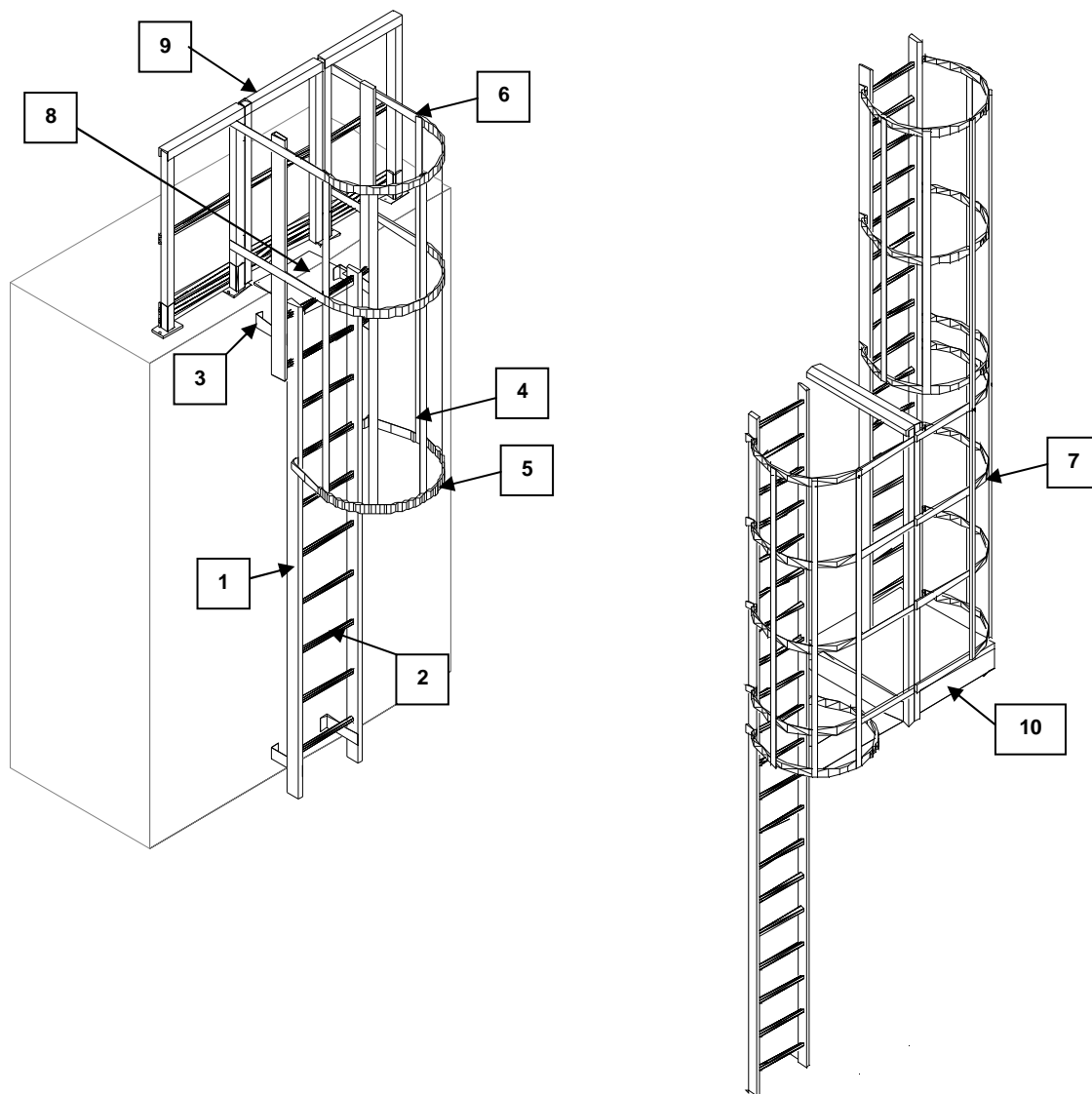
The industries that use MM's LADDERS are:

- **Chemical Industries**
- **Galvanic plants**
- **Mineral industries**
- **Textile industries**
- **Food industries**
- **Electric stations**
- **Electric distribution cabins**
- **Oil plants**
- **Tanneries**
- **Water treatment plant**
- **Surge tanks**
- **Marine field**
- **Paper factories**



4. MATERIALS

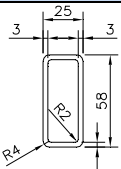
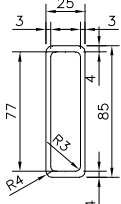
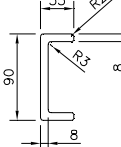
4.1 PARTS OF THE LADDERS



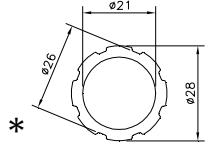
Legend

1. Stile (see table 4.2).
2. Rung (see table 4.3).
3. Anchor bracket (see table 4.5).
4. Safety cage vertical members (see table 4.4).
5. Standard safety cage hoop (see table 4.4).
6. Safety cage hoop for front exit section (see table 4.4).
7. Safety cage hoop for lateral exit section (see table 4.4).
8. Platform step (see point 7.1).
9. Safety gate (see point 7.1).
10. Rest platform.

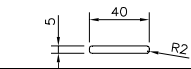
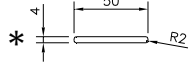
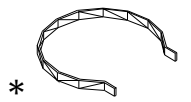
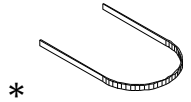

4.2 STILE PROFILES

PROFILES	CODE	DESCRIPTION	DIMENSIONS (mm)	BARS LENGTH (m)	WEIGHT (Kg/m)	COLOR
	53R58253I	Stile Ladder type 02	58x25x3	6	0.80	Grey RAL 7035
	53R85253I	Stile Ladder type 01	85x25x3	6	1.17	Grey RAL 7035
	53C90358I	Stile Ladder type 03	90x35x8	6	2.10	Grey RAL 7035

4.3 RUNG PROFILES

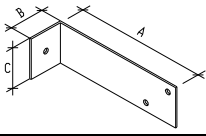
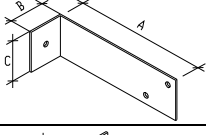
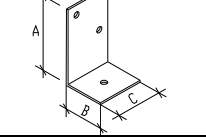
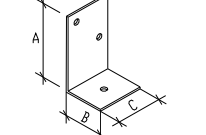
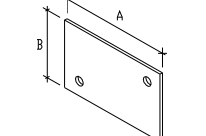
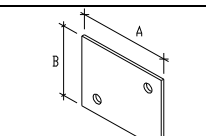
PROFILES	CODE	DESCRIPTION	DIMENSIONS (mm)	BARS LENGTH (m)	WEIGHT (Kg/m)	COLOR
	53O2821.3I	Antiskid rung	Ø 28x21.3	6	0.50	Grey RAL 7035

4.4 SAFETY CAGE PROFILES



PROFILES	CODE	DESCRIPTION	DIMENSIONS (mm)	BARS LENGTH (m)	WEIGHT	COLOR
	53P405I	Flat profile	40x5	6	0.36 Kg/m	Grey RAL 7035
	53P504I	Flat profile	50x4	6	0.36 Kg/m	Grey RAL 7035
	5504CERCHIO70 35 also made with flat profile	Standard hoop	Ø: 700 width: 50 thickness:10	-	0,90 Kg	Grey RAL 7035
	5506CERCHIO70 35 also made with flat profile	Front exit section hoop	Ø: 700 width: 50 thickness:10	-	1,50 Kg	Grey RAL 7035
	5505CERCHIO70 35 also made with flat profile	Lateral exit section hoop	Ø: 700 width: 50 thickness:10	-	1,00 Kg	Grey RAL 7035

* available also in

4.5 ANCHOR BRACKETS

CLAMPS	CODE	DESCRIPTION	DIMENSIONS (mm)	COLOR
	56ASTAFFA5	S.S. AISI 316 wall and floor anchor bracket	A: 228 B: 50 C: 70 Thk. 3	-
	CSTAFFA12	FRP E23 pultruded wall anchor brackets	A: 285 B: 100 C: 60 Thk. 15	Grey RAL 7035
	CSTAFFA13	FRP E23 pultruded floor anchor brackets	A: 100 B: 100 C: 60 Thk. 15	Grey RAL 7035
	CSTAFFA14	FRP E23 pultruded floor anchor brackets	A: 300 B: 100 C: 80 Thk. 15	Grey RAL 7035
	CPIASTRA1	FRP counter-plate for bracket fixing on ladder type 1	A: 85 B: 70 Thk. 3	Grey RAL 7035
	CPIASTRA2	FRP counter-plate for bracket fixing on ladder type 2	A: 58 B: 70 Thk. 3	Grey RAL 7035

4.6 FIXING DEVICES

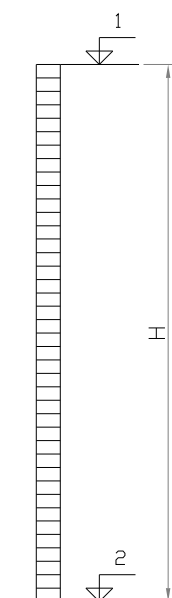
PROFILES	CODE	DESCRIPTION	DIMENSIONS (mm)	COLOR
	53P5825I	FRP rung fixing block	70X58 Th. 25	Grey RAL 7035
	5306I	FRP rung fixing pin	Ø 6 mm	Grey RAL 7035
S.S. BOLTS & NUTS	CODE	DESCRIPTION	DIMENSIONS	-
AISI 316 S.S. SCREWS	56	Screw used for the fixing of the S.S. bracket to the stile, for ladder types 1 and 2	M8x40 screw	-
AISI 316 S.S. SCREWS	56	Screw used for the fixing of the S.S. bracket to the stile, for ladder type 3	M8x25 screw	-
AISI 316 S.S. SCREWS	56	Screw used for the fixing of the FRP bracket to the stile, for ladder types 1 and 2	M8x50 screw	-
AISI 316 S.S. SCREWS	56	Screw used for the fixing of the FRP bracket to the stile, for ladder type 3	M8x35 screw	-
AISI 316 S.S. SCREWS	56	Screw used for the fixing of the rings to the vertical rod, types 1 and 2	M8x45 screw	-
AISI 316 S.S. SCREWS	56	Screw used for the fixing of the rings to the vertical rod, type 3	M8x30 screw	-
AISI 316 S.S. SCREWS	56	Button head screw for the fixing of the flat profiles on the rings	M6x25 screw	-
AISI 316 WASHERS	56	washers	M8	-
AISI 316 BOLTS	56	bolts	M6	-
	56		M8	-
	56		M6	-

5. DIMENSIONS OF THE LADDERS

5.1 HEIGHT OF THE LADDERS

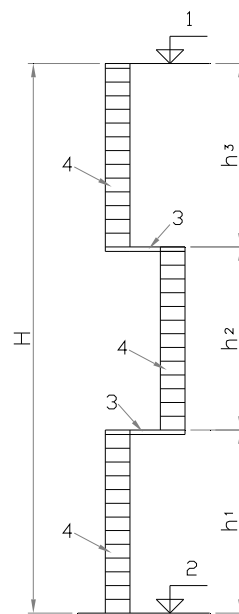
Legend:

1. Walking surface of the arrival area
2. Walking surface of the departure area
3. Rest platform
4. Ladder flight



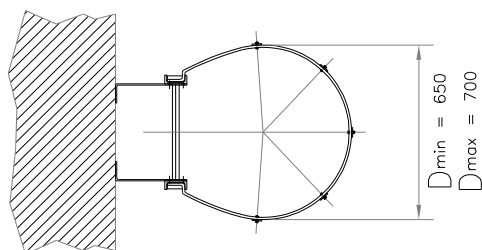
$H_{\max} = \text{mm } 10000$

Ladder without rest platform (single flight)

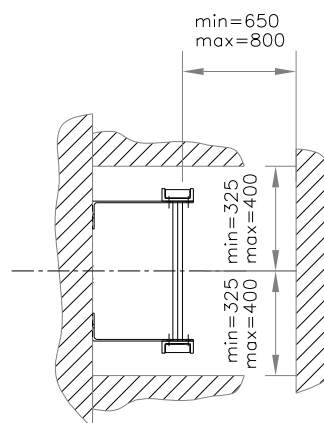


$h_{\max} = \text{mm } 6000$

Ladder with staggered flights

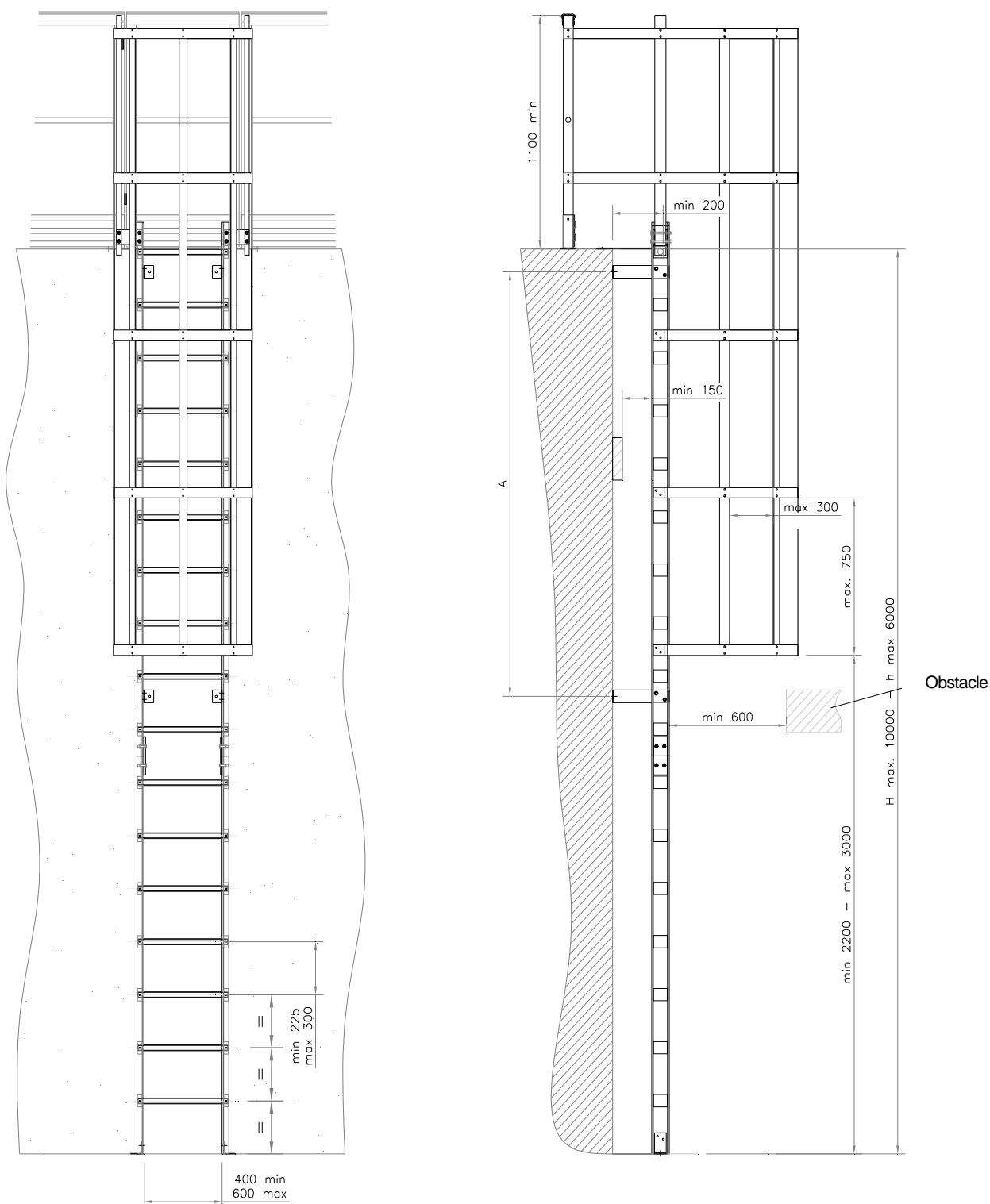


View of the ladder with safety cage



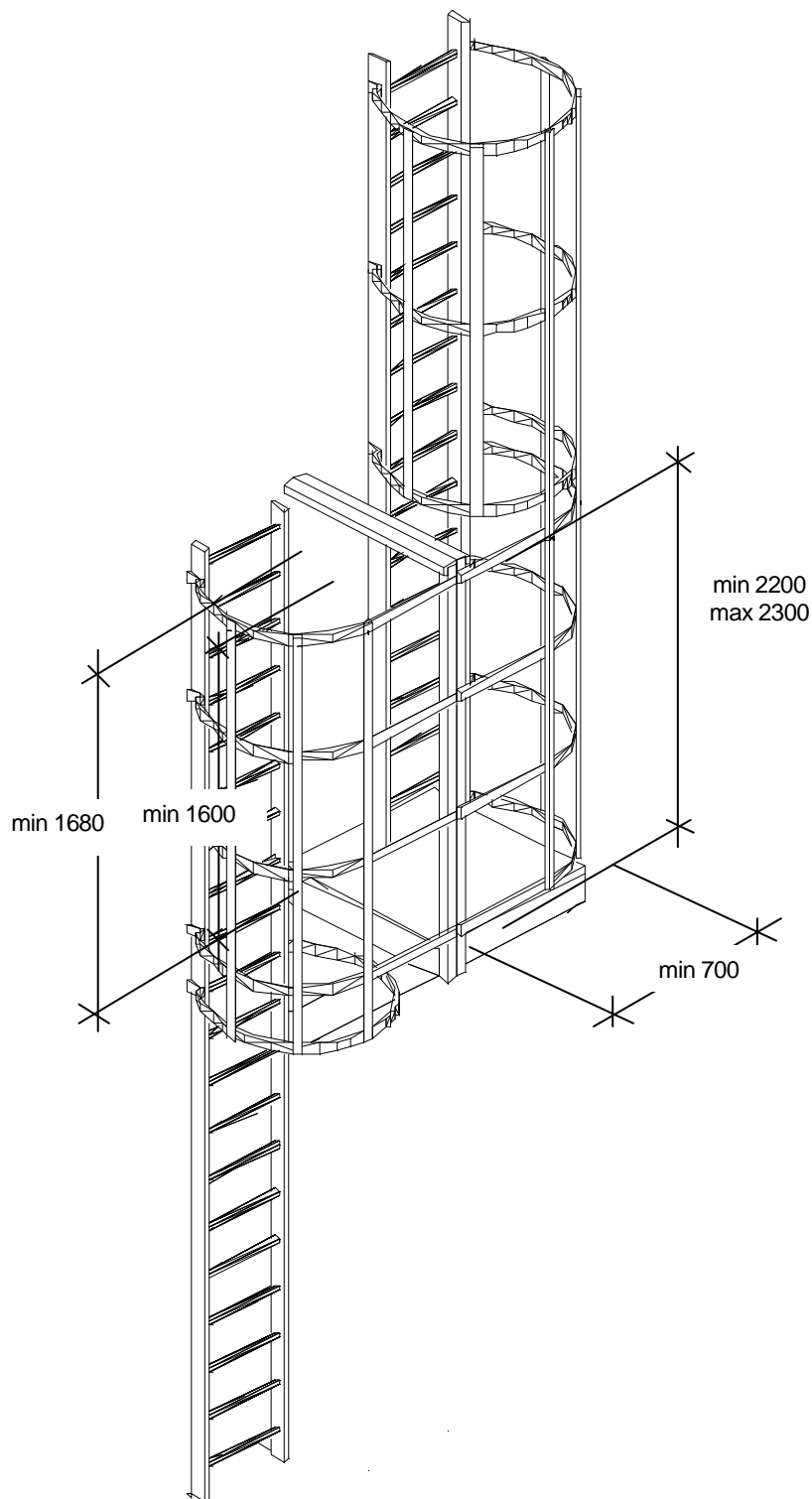
View of the ladder without safety cage

5.2 MAIN DIMENSIONS OF THE LADDER AND THE SAFETY CAGE



	Type of ladder	Max distance between anchor brackets
A	Ladder type 1	mm 2000
A	Ladder type 2	mm 1200
A	Ladder type 3	mm 5000

5.3 MAIN DIMENSIONS OF THE LADDER WITH A REST PLATFORM




6. TYPES OF LADDERS


6.1 STANDARD LADDER

The ladders are supplied prefabricated. FRP pins are used for the fixing of the rungs to the stiles. The safety cage is entirely made with FRP profiles, assembled with S.S. screws.

6.1.1 STANDARD LADDER TYPE 1

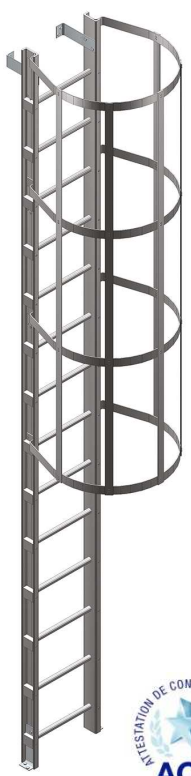
	CSCALA1 – STANDARD LADDER TYPE 1			
	This type of ladder is used for the access to manhole-closed areas. To ease the access and exit it is advisable to use a safety extension (see point 7.1).			
	Stile: rectangular profile type 85x25x3 mm			
	Rung: diameter of profile 28x21.3 mm with antiskid surface			
	Safety cage hoop : diameter of 700 mm			
	Safety cage vertical members: flat profile 40x5 mm			
	Color of the profiles and of the safety cage is grey RAL 7035			
	Usable width of the rung: 400 mm			
	Total width of the ladder: 450 mm			
	Spacing between rungs: 300 mm			
	The total height of the safety cage*: calculated on the whole height minus 2500 mm (h = H-2500)			
	Maximum distance between hoops: 1000 mm			
	Maximum distance between the anchor points: 2000 mm			
	H ladder mm	*h safety cage	suggested n. of anchor brackets	
2000	NN		4	
3000	NN		6	
4000	1500		6	
5000	2500		8	
6000	3500		8	
7000 ¹	4500		10	
8000 ¹	5500		10	
9000 ¹	6500 ²		12	
10000 ¹	7500 ²		12	
1. For this height it is necessary to divide the ladder in two parts. Junction parts will be supplied (see point 8.1)				
2. For this height it is necessary to divide in two the cage, add a hoop and supply junction devices.				

6.1.2 STANDARD LADDER TYPE 2



CSCALA2 – STANDARD LADDER TYPE 2			
This type of ladder is used for a maximum height of 3000 mm .			
Stile: rectangular profile type 58x25x3 mm			
Rung: diameter of profile 28x21.3 mm with antiskid surface			
Color of the profiles and of the safety cage is grey RAL 7035			
Usable width of the rung: 400 mm			
total width of the ladder:450 mm			
Spacing between rungs: 300 mm			
Maximum distance between the anchor points: 1200 mm			
H ladder mm	h safety cage	suggested n. of anchor brackets	
2000	NN	6	
3000	NN	6	


6.1.3 STANDARD LADDER TYPE 3

	CSCALA3 – STANDARD LADDER TYPE 3			
	This type of ladder is used for the access to manhole-closed areas. To ease the access and exit it is advisable to use a safety extension (see point 7.1).			
	ACS STATEMENT – RED FILAGREE ON THE PROFILE			
	USABLE IN CONTACT WITH POTABLE WATER			
	Stile: "C" profile type 90x35x8 mm			
	Rung: diameter of profile 28x21.3 mm with antiskid surface			
	Safety cage hoop : diameter of 700 mm			
	Safety cage vertical members: flat profile 40x5 mm or 50x4 (ACS)			
	Color of the profiles and of the safety cage is grey RAL 7035			
	Usable width of the rung: 400 mm			
	Total width of the ladder: 470 mm			
	Spacing between rungs: 300 mm			
	The total height of the safety cage*: calculated on the whole height minus 2500 mm (h = H-2500)			
	Maximum distance between hoops: 1000 mm			
	Maximum distance between the anchor points: 5000 mm			
	H ladder mm	*h safety cage	suggested n. of anchor brackets	
	2000	NN	4	
	3000	NN	4	
	4000	1500	4	
	5000	2500	4	
	6000	3500	6	
	7000 ¹	4500	6	
	8000 ¹	5500	6	
	9000 ¹	6500 ²	6	
	10000 ¹	7500 ²	6	
	1. For this height it is necessary to divide the ladder in two parts. Junction parts will be supplied (see point 8.1)			
	2. For this height it is necessary to divide in two the cage, add a hoop and supply junction devices.			

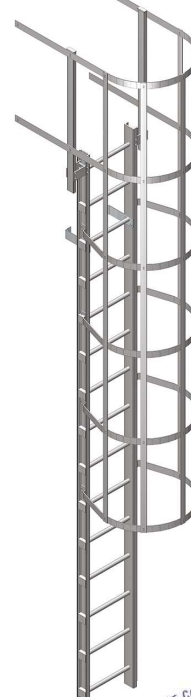


6.2 LADDER WITH FRONT EXIT

6.2.1 LADDER TYPE 1 WITH FRONT EXIT


	CSCALA1UF – LADDER TYPE 1 WITH FRONT EXIT			
	This type of ladder is provided with a widening on the top that eases the exit and has no rungs on the last 1100 mm (see point 7.4). For this type of ladder we strongly recommend the supply of a safety step and a safety gate (see point 7.1 and 7.2)			
	Stile: rectangular profile type 85x25x3 mm			
	Rung: diameter of profile 28x21.3 mm with antiskid surface			
	Safety cage hoop: diameter of 700 mm			
	Front exit safety cage: diameter of 700 mm			
	Safety cage vertical members: flat profile 40x5 mm			
	Color of the profiles and of the safety cage is grey RAL 7035			
	Usable width of the rung: 400 mm			
	Total width of the ladder: 450 mm			
	Spacing between rungs: 300 mm			
	Maximum distance between hoops: 1000 mm			
	Maximum distance between the anchor points: 2000 mm			
	DIMENSIONS OF THE EXIT: height 1100 mm from the last rung, usable width 680 mm			
	H ladder mm	h safety cage	suggested n. of anchor brackets	
	1000+1100	NN	4	
	2000+1100	NN	4	
	3000+1100	1600	6	
	4000+1100	2600	6	
	5000+1100	3600	8	
	6000+1100 ¹	4600	8	
	7000+1100 ¹	5600	10	
	8000+1100 ¹	6600 ²	10	
	9000+1100 ¹	7600 ²	12	
	10000+1100 ¹	8600 ²	12	
1. For this height it is necessary to divide the ladder in two parts. Junction parts will be supplied (see point 8.1)				
2. For this height it is necessary to divide in two the cage, add a hoop and supply junction devices.				

6.2.2 LADDER TYPE 3 WITH FRONT EXIT


	CSCALA3UF - LADDER TYPE 3 WITH FRONT EXIT			
	This type of ladder is provided with a widening on the top that eases the exit and has no rungs on the last 1100 mm (see point 7.4). For this type of ladder we strongly recommend the supply of a safety step and a safety gate (see point 7.1 and 7.2)			
	ACS STATEMENT – RED FILAGREE ON THE PROFILE			
	USABLE IN CONTACT WITH POTABLE WATER			
	Stile: "C" profile type 90x35x8 mm			
	Rung: diameter of profile 28x21.3 mm with antiskid surface			
	Safety cage hoop : diameter of 700 mm			
	Front exit safety cage: diameter of 700 mm			
	Safety cage vertical members: flat profile 40x5 mm or 50x4 mm (ACS)			
	Color of the profiles and of the safety cage is grey RAL 7035			
	Usable width of the rung: 400 mm			
	Total width of the ladder: 470 mm			
	Spacing between rungs: 300 mm			
	Maximum distance between hoops: 1000 mm			
	Maximum distance between the anchor points: 5000 mm			
	DIMENSIONS OF THE EXIT: height 1100 mm from the last rung, usable width 680 mm			
	H ladder mm	h safety cage	suggested n. of anchor brackets	
	1000+1100	NN	4	
	2000+1100	NN	4	
	3000+1100	1600	4	
	4000+1100	2600	4	
	5000+1100	3600	4	
	6000+1100 ¹	4600	6	
	7000+1100 ¹	5600	6	
	8000+1100 ¹	6600 ²	6	
	9000+1100 ¹	7600 ²	6	
	10000+1100 ¹	8600 ²	6	
1. For this height it is necessary to divide the ladder in two parts. Junction parts will be supplied (see point 8.1)				
2. For this height it is necessary to divide in two the cage, add a hoop and supply junction devices.				

6.3 LADDER WITH LATERAL EXIT

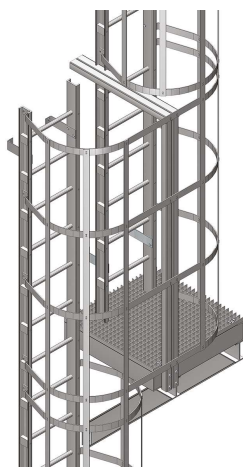
6.3.1 LADDER TYPE 1 WITH LATERAL EXIT

	CSCALA1UL - LADDER TYPE 1 WITH LATERAL EXIT			
	This type of ladder is necessary in case of left or right ladder exit			
	Stile rectangular profile type 85x25x3			
	Rung: diameter of profile 28x21.3 with antiskid surface			
	Safety cage hoop: diameter of 700 mm			
	Lateral exit safety cage hoop: diameter of 700 mm partial hoop			
	Safety cage vertical members: flat profile 40x5 mm			
	Color of the profiles and of the safety cage is grey RAL 7035			
	Usable width of the rung: 400 mm			
	Total width of the ladder: 450 mm			
	Spacing between rungs: 300 mm			
	Maximum distance between hoops: 1000 mm			
	Maximum distance between the anchor points: 2000 mm			
	HEIGHT OF THE EXIT: 1680 mm from the last rung			
	H total mm	h safety cage	suggested n. of anchor brackets	
	1000+1680	NN	6	
	2000+1680	1180	6	
	3000+1680	2180	8	
	4000+1680	3180	8	
	5000+1680 ¹	4180	10	
	6000+1680 ¹	5180	10	
	7000+1680 ¹	6180 ²	12	
	8000+1680 ¹	7180 ²	12	
	9000+1680 ¹	8180 ²	14	
	10000+1680 ¹	9180 ²	14	
	1. For this height it is necessary to divide the ladder in two parts. Junction parts will be supplied (see point 8.1)			
	2. For this height it is necessary to divide in two the cage, add a hoop and supply junction devices.			

6.3.2 LADDER TYPE 3 WITH LATERAL EXIT

	CSCALA3UL - LADDER TYPE 3 WITH LATERAL EXIT			
	This type of ladder is necessary in case of left or right ladder exit			
	ACS STATEMENT – RED FILAGREE ON THE PROFILE			
	USABLE IN CONTACT WITH POTABLE WATER			
	Stile: "C" profile type 90x35x8 mm			
	Rung: diameter of profile 28x21.3 mm with antiskid surface			
	Safety cage hoop : diameter of 700 mm			
	Lateral exit safety cage hoop: diameter of 700 mm partial hoop			
	Safety cage vertical members: flat profile 40x5 mm or 50x4 mm (ACS)			
	Color of the profiles and of the safety cage is grey RAL 7035			
	Usable width of the rung: 400 mm			
	Total width of the ladder: 470 mm			
	Spacing between rungs: 300 mm			
	Maximum distance between hoops: 1000 mm			
	Maximum distance between the anchor points: 5000 mm			
	HEIGHT OF THE EXIT: 1680 mm from the last rung			
	H total mm	h safety cage	suggested n. of anchor brackets	
	1000+1680	NN	4	
	2000+1680	1180	4	
	3000+1680	2180	4	
	4000+1680	3180	6	
	5000+1680 ¹	4180	6	
	6000+1680 ¹	5180	6	
	7000+1680 ¹	6180 ²	6	
	8000+1680 ¹	7180 ²	6	
	9000+1680 ¹	8180 ²	8	
	10000+1680 ¹	9180 ²	8	
	1. For this height it is necessary to divide the ladder in two parts. Junction parts will be supplied (see point 8.1)			
	2. For this height it is necessary to divide in two the cage, add a hoop and supply junction devices.			

6.4 REST PLATFORMS



CPIATTAFORMA - REST PLATFORM

This platform is necessary whenever ladder height is over 10 meters.

Minimum length: 700mm

Structure: FRP profile "C" 150x45x8 mm, grating type "SCH 52/30"

Structural brackets: minimum nr. 2, profile type "I" 150x75x8 mm

Safety gate structure: profile type "Q" 50x50x5 mm

Safety cage vertical members: flat profile 40x5 mm

Color of the profiles and of the safety cage is grey RAL 7035

Maximum distance between hoops: 1000 mm

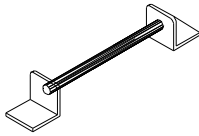
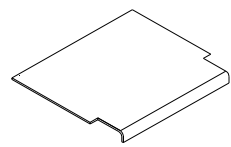
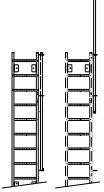
HEIGHT OF THE EXIT: height 2000 mm from the last rung

Maximum height of each flight: 6000 mm

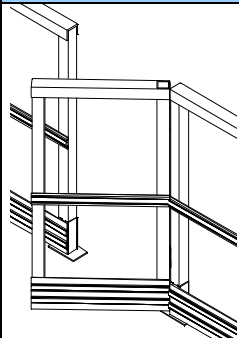
H total mm	N of flights	n. of intermediate platforms	
11000	2	1	
12000	2	1	
13000	3	2	
14000	3	2	
15000	3	2	
16000	3	2	
17000	3	2	
18000	3	2	

7. ACCESSORIES TO BE COMBINED WITH THE LADDERS


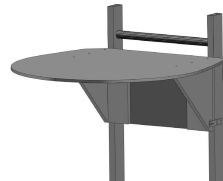
7.1 SAFETY ACCESSORIES

	CODE	DESCRIPTION	COLOR
	CMANIGLIAPRFV	Wall bar made with FRP profiles, maximum length 440 mm	Grey RAL7035
	55STCN40	Safety step used for the connection between the last rung and the landing floor. Dimensions 470x345 mm, Thk. 4 mm	Grey RAL7035
	CPROLUNGAMENTO	S.S. Safety extension pole	-

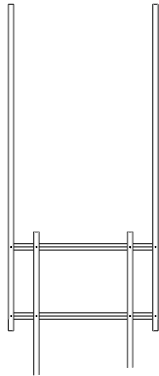
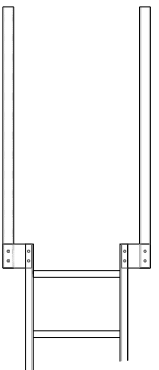
7.2 SAFETY GATE

	CODE	DESCRIPTION	COLOR
	CPORELLO	Safety gate in FRP with spring hinge. Maximum width 800 mm (the two stanchions for the fixing of the gate are not included)	Grey RAL7035

7.3 SAFETY CLOSING DEVICE

	CODE	DESCRIPTION	COLOR
	CCHIUSURASCALA1	Vertical safety closing device for FRP ladders. Dimensions of the board mm 2000x450 mm.	Grey RAL7035
	CCHIUSURASCALA2	Horizontal safety closing device for FRP ladders.	Grey RAL7035

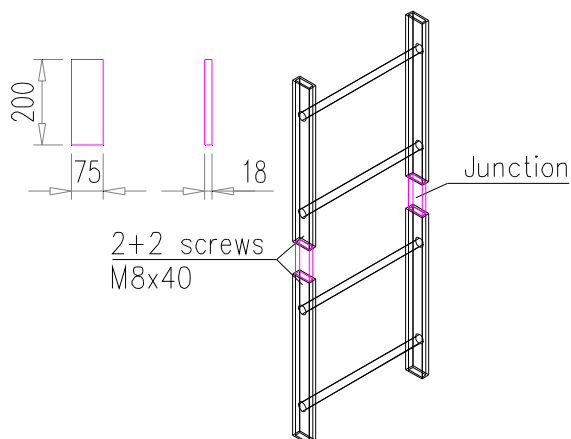
7.4 WIDENING

	CODE	DESCRIPTION	COLOR
	CSLARGO1	Ladder type 1 widening with junction kit	Grey RAL7035
	CSLARGO2	Ladder type 3 widening	Grey RAL7035

8. ASSEMBLING INSTRUCTIONS

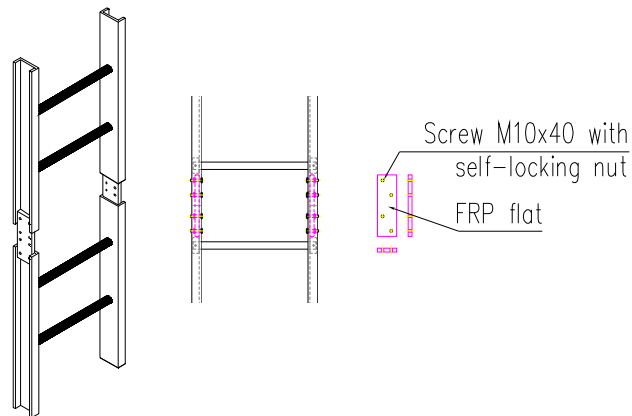
8.1 LADDER EXTENSION

For ladders that are over 6 m long you must use stiles junctions made with specific solid FRP profiles which are fixed to the stiles with pins (fig. 1).



TYPE 1 LADDER JUNCTIONS

FRP flat profile dimensions 200x78 mm thk. 18 mm
hand laminated



TYPE 3 LADDER JUNCTIONS

FRP flat 230x72 mm thk. 15 mm
Pultruded E23 class

Fig. 1 Junctions between ladders

8.2. LADDER FIXING

The FRP ladders are fastened with S.S. or FRP anchor brackets. The following table shows the maximum anchor point spacing accordingly to the type of ladder.

Type of ladder	Max distance between clamps
Ladder type 1	mm 2000
Ladder type 2	mm 1200
Ladder type 3	mm 5000

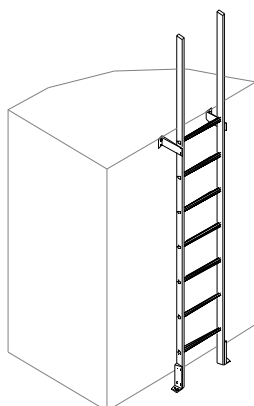


Fig. 2 Ladder with two wall anchor brackets

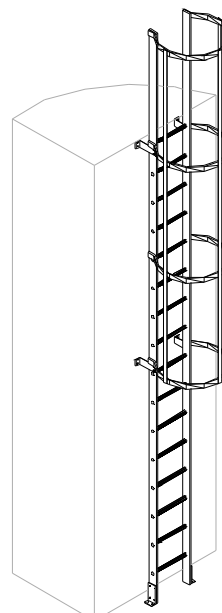


Fig. 3 Ladder with more anchor points

8.2.1 FIXING TO CONCRETE

For the fixing of a ladder to concrete, you must use S.S. or FRP anchor brackets (see table 4.5). Fixing is made by using S.S. screws with minimum diameter M8 mm length 60 mm anchoring dowels (Fig. 4).

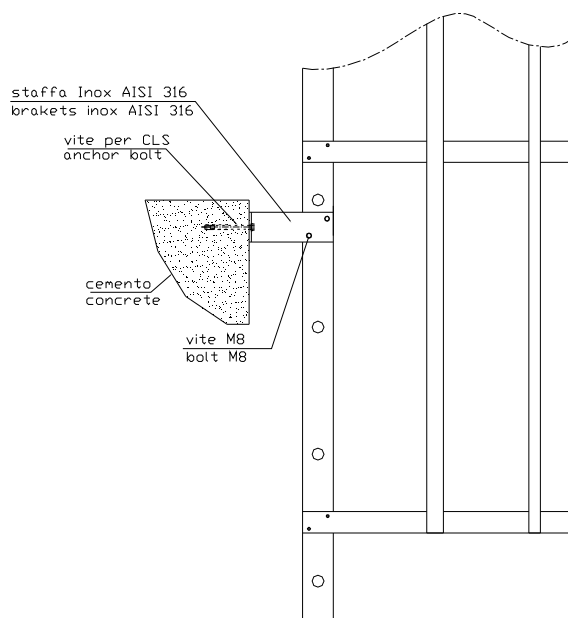


Fig. 4 Fixing to concrete

8.2.2 FIXING TO FRP WALKWAY

For the fixing of a ladder to an FRP walkway you must use S.S. or FRP anchor brackets (see table 4.5). Fixing is made by using S.S. AISI 316 screws and self-blocking nuts (Fig. 5).

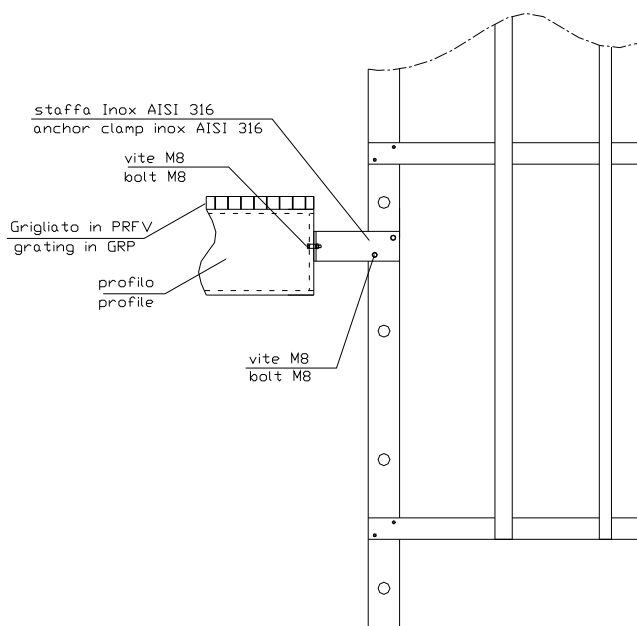


Fig. 5 Fixing to FRP walkway

8.3. ASSEMBLING THE SAFETY CAGE

The safety cage has to be used for ladders which reach an arrival level higher than 3m from the departing floor. The safety cage is supplied pre-assembled and complete with all the devices to allow a fast and easy assembling (Fig. 6). The drilled holes must be of the same diameter of the screws, this avoids backlash.

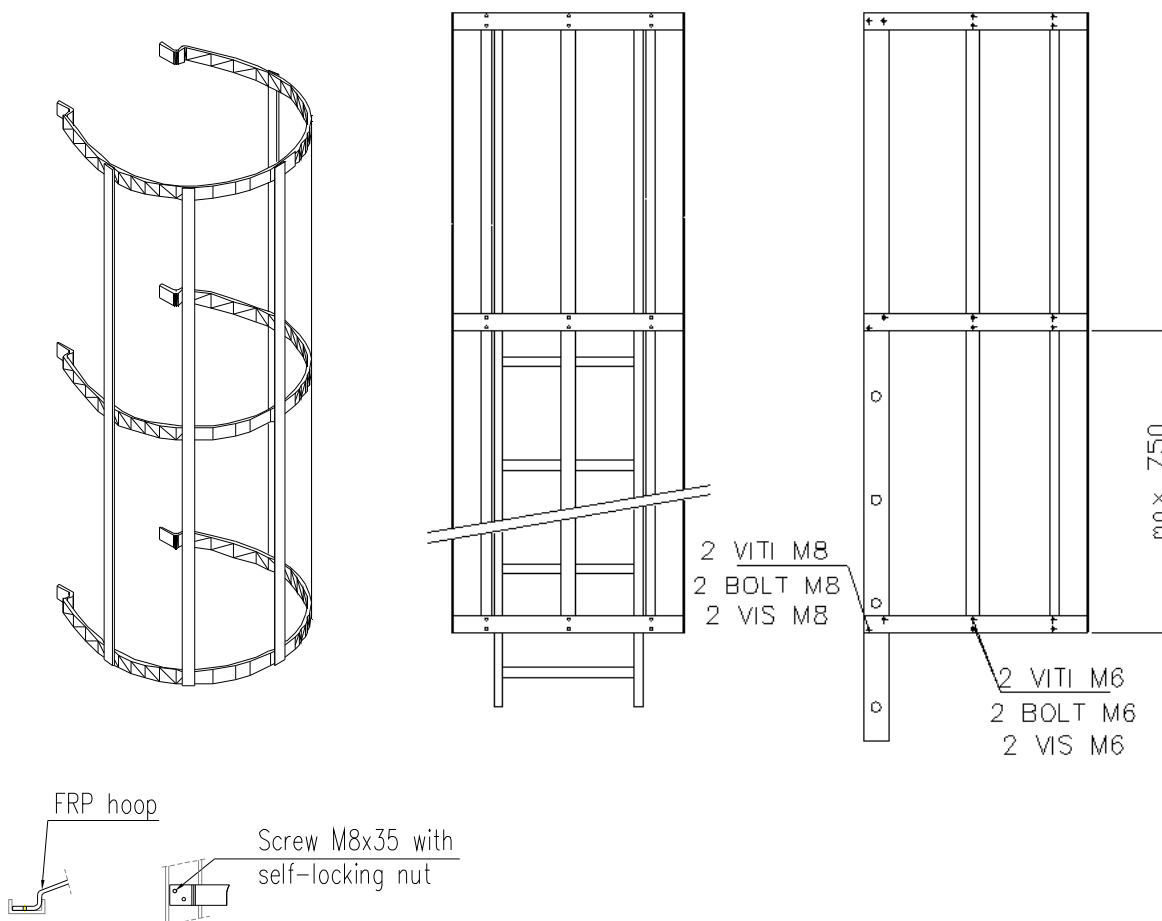


Fig. 6: safety cage assembling



M.M. S.R.L.

Fiberglass Reinforced Polymer
gratings and structures

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FRP FENCES

MM05

30.07.2015 Rev. 3

FRP FENCES

COMPOSITE SOLUTION



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SUMMARY

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1. USE AND CHARACTERISTICS



The FRP fences are built with fiberglass and polyester resin gratings and profiles, they assure several advantages compared to the normal metal ones:

- a. High resistance to chemical and atmospheric aggressions
- b. High mechanical/weight ratio peso
- c. Long-lasting
- d. Lightness
- e. Dimensional stability
- f. High dielectric properties
- g. No maintenance
- h. radio transparency
- i. Easy to install

Fences are preassembled and supplied with all the necessary fixing accessories.

2. EMPLOYMENT FIELDS

MM's FENCES can be installed in any type of plant, but they are mainly used in areas where it's necessary to have corrosion resistance and electric insulation. The FRP fences are not only installed outdoors, they are also used to surround under-tension equipments in industrial plants or power stations.

The industries and sectors that use MM's FENCES are:

- **Chemical industries**
- **Galvanic plants**
- **Mineral industries**
- **Textile industries**
- **Food industries**
- **Electric stations**
- **Electric distribution cabins**
- **Oil plants**
- **Tanneries**
- **Water treatment plants**
- **Marine field**
- **Paper factories and others**




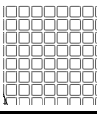

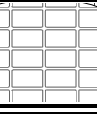
3. MATERIALS

MM fences are built with FRP pultruded profiles and molded FRP gratings as described in tables 4.2 and 4.3. The distance between the posts changes accordingly to the used grating type. The posts can be embedded directly into concrete or fixed with Stainless Steel base-plates.

High wind loads or particular customer needs can be arranged and designed by the technical department.

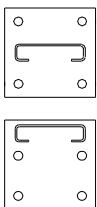
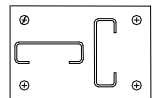
3.1 PROFILES

PROFILE	DESCRIPTION	DIMENSIONS (mm)	BAR LENGTH (m)	WEIGHT (Kg/m)	COLOR
	standard post	85x25x3	6	1.17	grey

GRATING	TYPE	MESH (mm)	OPEN SPAN (mm)	HEIGHT (mm)	BEAM THICKNESS (mm)	STANDARD PANELS (mm)	WEIGHT (Kg/m²)
	SCH 38/25	38x38	31x31	25	5/7	1000x2000 - 1000 x3000 - 1000x4038 - 1220x 3660	11
	SCH 30/28	100x30	92x22	28	7/8	1000x2000 - 1500x2000	13
	SCH 60/25	100X60	93X53	25	5/7	1500x2000	7

3.2 GRATINGS

3.3 BASE PLATES

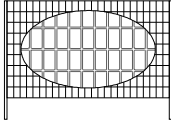
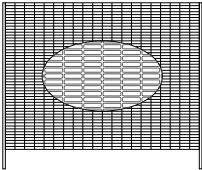
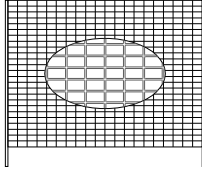
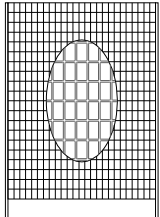
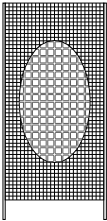
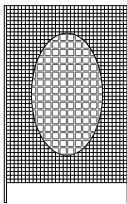
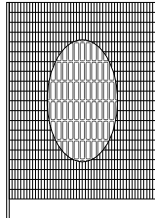
BASE PLATES	DESCRIPTION	DIMENSIONS (mm)	MATERIAL	WEIGHT (Kg)	COLOR
	Post base plate PR8525	100X100X250	S.S. AISI 304	0.96	*
	Post corner base plate PR8525	square 100x150x250	S.S. AISI 304	1.73	*

3.4 ACCESSORIES

- Stainless steel M6 x 55 screws
- M6 self-locking bolts
- Profile caps

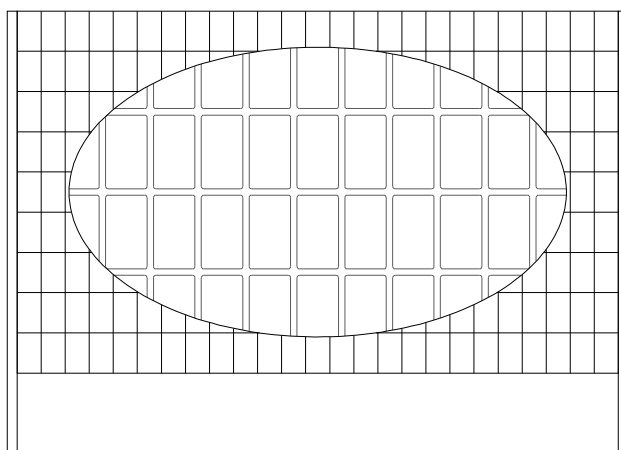
4. TYPES

4.1 FENCES' SUMMARY TABLE

TYPE*	GRATING	PANEL DIMENSIONS	POST	DISTANCE BETWEEN POSTS
TYPE 1	 SCH 60/25 Mesh mm 100X60 thickness 25 mm	1500X900 mm	85x25x3 mm	1525 mm
TYPE 7	 SCH 30/28 Mesh mm 100X30 thickness 28 mm	2000x1500 mm	85x25x3 mm	2025 mm
TYPE 9	 SCH 60/25 Mesh mm 100X60 thickness 25 mm	2000x1500 mm	85x25x3 mm	2025 mm
TYPE 10	 SCH 60/25 Mesh mm 100X60 thickness 25 mm	1500x2000 mm	85x25x3 mm	1525 mm
TYPE 11	 SCH 38/25 Mesh mm 38X38 thickness 25 mm	1000x2000 mm	85x25x3 mm	1025 mm
TYPE 12	 SCH 38/25 Mesh mm 38X38 thickness 25 mm	1220x1800 mm	85x25x3 mm	1245 mm
TYPE 13	 SCH 30/28 Mesh mm 100X30 thickness 28 mm	1500x2000 mm	85x25x3 mm	1525 mm

4.2 TYPES OF FENCES

TYPE 1



- Grating type “SCH 60/25” in polyester resin reinforced with continuous glass fibers, mesh mm 100x60, flat finishing.
- Post type “53R85253I” in isophthalic polyester resin reinforced with continuous glass fibers, rectangular section 85x25 mm thickness 3 mm.

Grating dimensions	mm 1500 length mm 900 height
--------------------	---------------------------------

Distance between posts	mm 1525
------------------------	---------

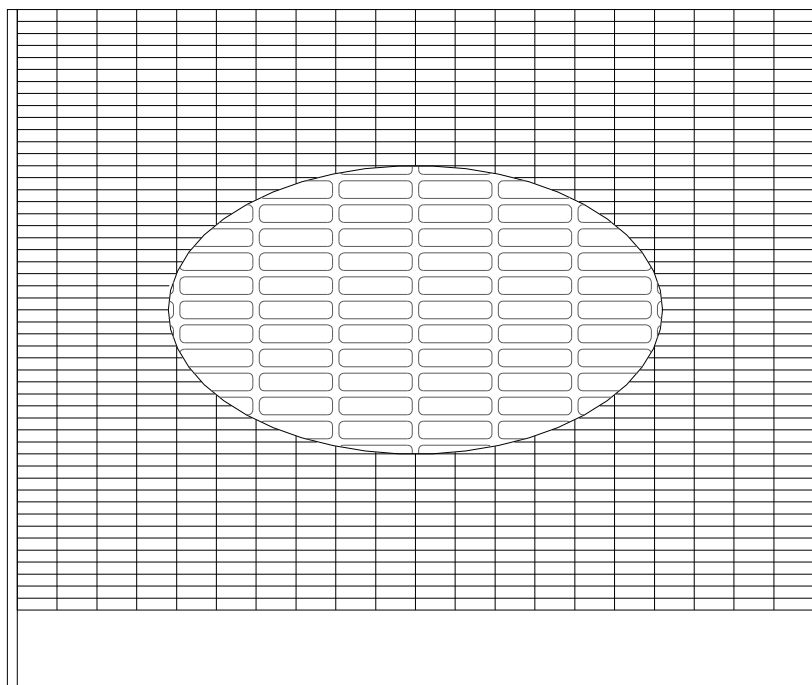
Fixing between grating and post is made with M6 Stainless steel screws.

Standard grating color	Grey RAL 7004
------------------------	---------------

Standard post color	Grey RAL 7035
---------------------	---------------

Other colors are available, conditioned to quantity.

TYPE 7



- Grating type “SCH 30/28” in polyester resin reinforced with continuous glass fibers, mesh mm 100x30, “meniscus” finishing.
- Post type “53R85253I” in isophthalic polyester resin reinforced with continuous glass fibers, rectangular section 85x25 mm thickness 3 mm.

Grating dimensions	mm 2000 length mm 1500 height
--------------------	----------------------------------

Distance between posts	mm 2025
------------------------	---------

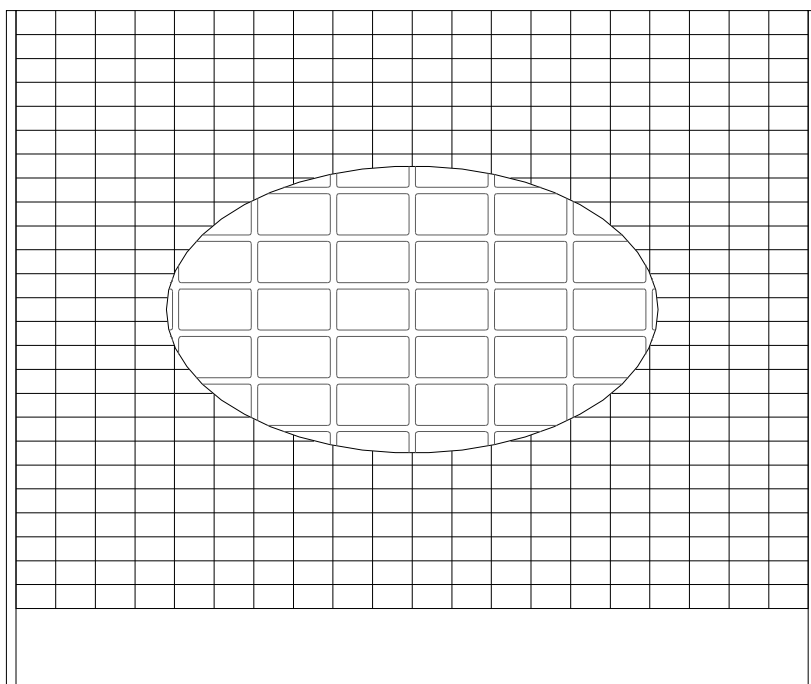
Fixing between grating and post is made with M6 Stainless steel screws.

Standard grating color	Grey RAL 7004
------------------------	---------------

Standard post color	Grey RAL 7035
---------------------	---------------

Other colors are available, conditioned to quantity.

TYPE 9



- Grating type "SCH 60/25" in polyester resin reinforced with continuous glass fibers, mesh mm 100x60, flat finishing.
- Post type "53R85253I" in isophthalic polyester resin reinforced with continuous glass fibers, rectangular section 85x25 mm thickness 3 mm.

Grating dimensions	mm 2000 length mm 1500 height
--------------------	----------------------------------

Distance between posts	mm 2025
------------------------	---------

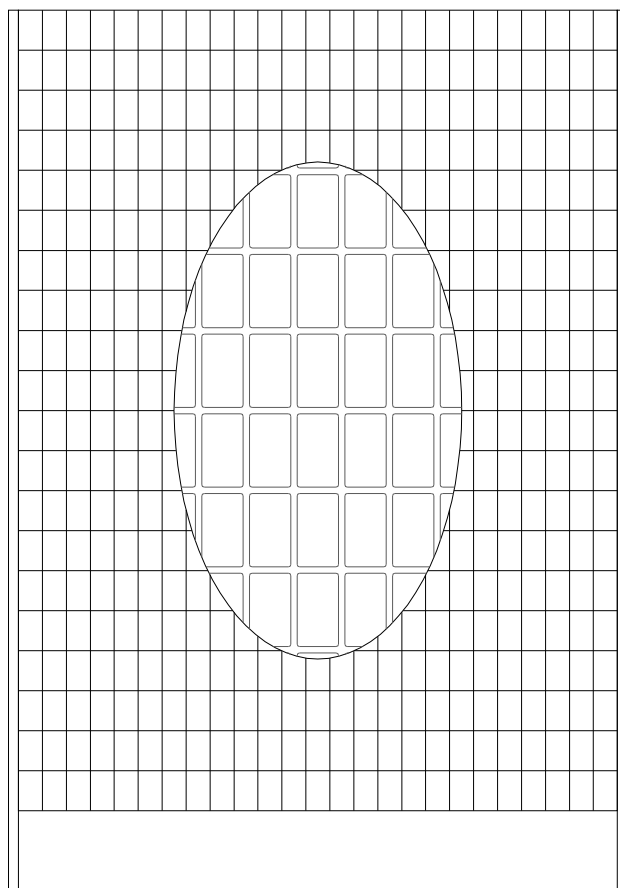
Fixing between grating and post is made with M6 Stainless steel screws.

Standard grating color	Grey RAL 7004
------------------------	---------------

Standard post color	Grey RAL 7035
---------------------	---------------

Other colors are available, conditioned to quantity.

TYPE 10



- Grating type “SCH 60/25” in polyester resin reinforced with continuous glass fibers, mesh mm 100x60, flat finishing.
- Post type “53R85253I” in isophthalic polyester resin reinforced with continuous glass fibers, rectangular section 85x25 mm thickness 3 mm.

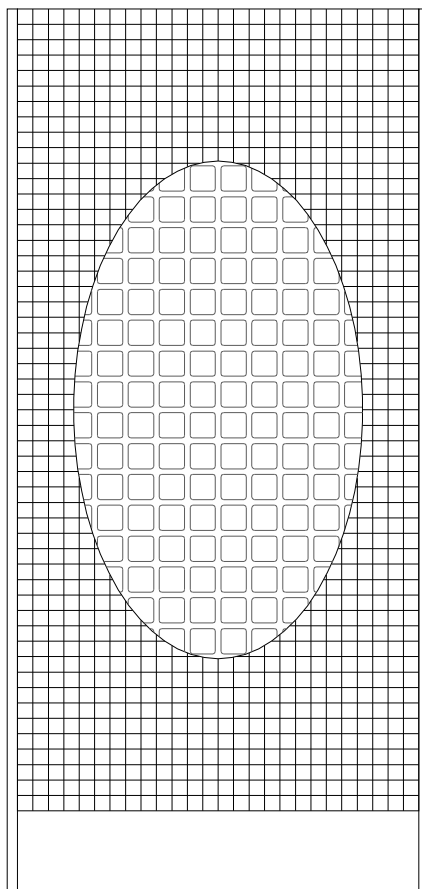
Grating dimensions	mm 1500 length mm 2000 height
Distance between posts	mm 1525

Fixing between grating and post is made with M6 Stainless steel screws

Standard grating color	Grey RAL 7004
Standard post color	Grey RAL 7035

Other colors are available, conditioned to quantity.

TYPE 11



- Grating type "SCH 38/25" in polyester resin reinforced with continuous glass fibers, mesh mm 38x38, "meniscus" finishing.
- Post type "53R85253I" in isophthalic polyester resin reinforced with continuous glass fibers, rectangular section 85x25 mm thickness 3 mm.

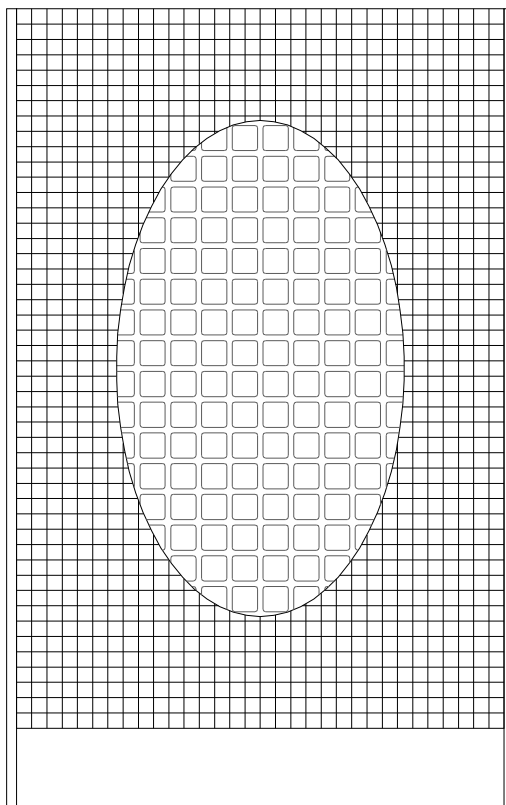
Grating dimensions	mm 1000 length mm 2000 height
Distance between posts	mm 1025

Fixing between grating and post is made with M6 Stainless steel screws

Standard grating color	Grey RAL 7004
Standard post color	Grey RAL 7035

Other colors are available, conditioned to quantity.

TYPE 12



- Grating type "SCH 38/25" in polyester resin reinforced with continuous glass fibers, mesh mm 38x38, "meniscus" finishing.
- Post type "53R85253I" in isophthalic polyester resin reinforced with continuous glass fibers, rectangular section 85x25 mm thickness 3 mm.

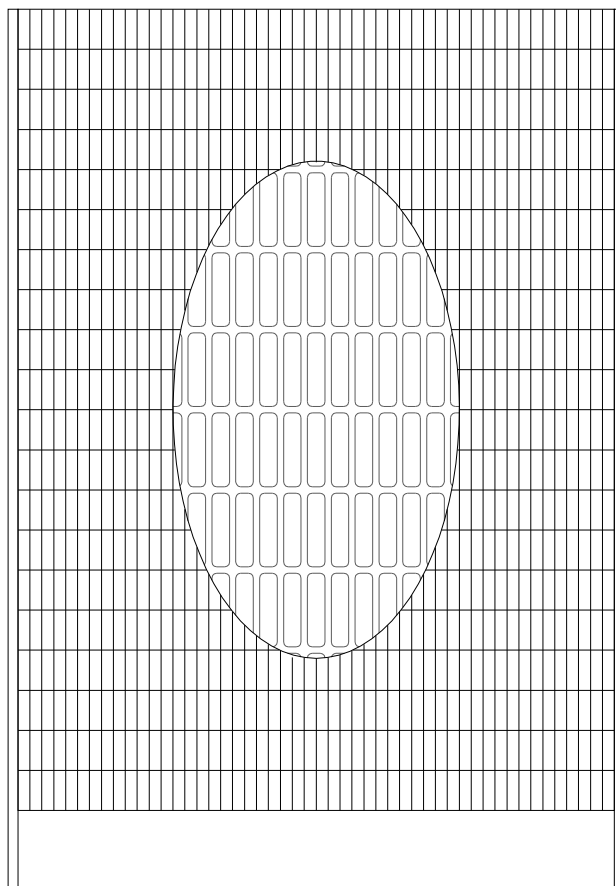
Grating dimensions	mm 1220 length mm 1800 height
Distance between posts	mm 1245

Fixing between grating and post is made with M6 Stainless steel screws.

Standard grating color	Grey RAL 7004
Standard Post color	Grey RAL 7035

Other colors are available, conditioned to quantity.

TYPE 13



- Grating type "SCH 30/28" in polyester resin reinforced with continuous glass fibers, mesh mm 100x30, "meniscus" finishing.
- Post type "53R85253I" in isophthalic polyester resin reinforced with continuous glass fibers, rectangular section 85x25 mm thickness 3 mm.

Grating dimensions	mm 1500 length mm 2000 height
--------------------	----------------------------------

Distance between posts	mm 1525
------------------------	---------

Fixing between grating and post is made with M6 Stainless steel screws

Standard grating color	Grey RAL 7004
------------------------	---------------

Standard post color	Grey RAL 7035
---------------------	---------------

Other colors are available, conditioned to quantity.

5. INSTRUCTIONS FOR DESIGN ENGINEER

The posts can be either embedded into concrete for a 30 cm depth or fixed to Stainless Steel base-plates (Fig. 1-2). The top is closed by a plastic cap (Fig. 3). Grating is fastened to the post with Stainless Steel AISI 314 screws and self-locking nuts or inviolable nuts (Fig. 4).

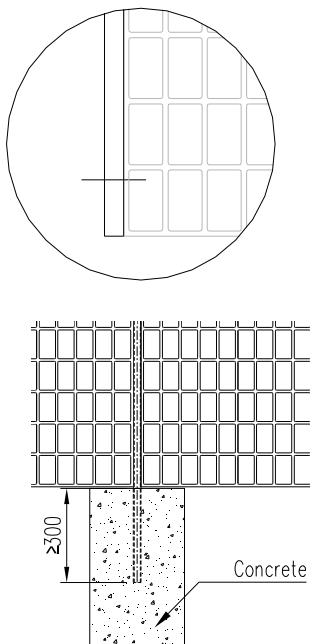


Fig. 1 Embedding in to concrete

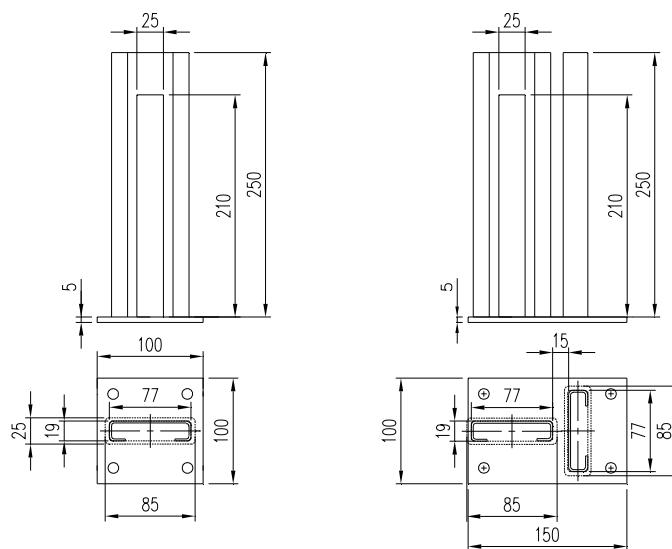


Fig. 2 horizontal fixing with S.S. base-plates

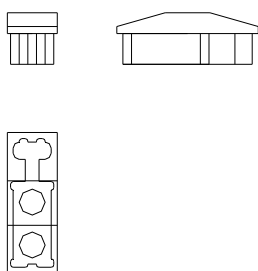


Fig. 3 Cap

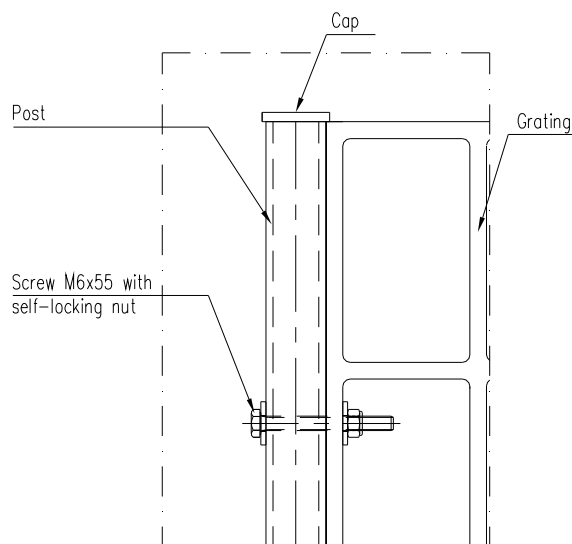


Fig. 4 grating/post fixing

**M.M. S.R.L.**

Fiberglass Reinforced Polymer
gratings and structures

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**FRP GATES****MM08**

08.02.2016 Rev. 3

FRP GATES**COMPOSITE SOLUTION**

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1. USES AND CHARACTERISTICS

Gates



M.M. gates are made with FRP profiles and gratings, they assure several advantages compared to normal metal ones:

- a. High resistance to chemical and atmospheric aggressions
- b. High mechanical/weight ratio
- c. Long-lasting
- d. Lightness
- e. Dimensional stability
- f. High dielectric properties
- g. No maintenance
- h. Easy to install

Gates are supplied preassembled and complete of all necessary fixing accessories.



**MM gates are CE marked according to the UE 305/2011 regulation.
Tested under the UNI EN 13241-1 norm.**



2. EMPLOYMENT FIELDS

M.M. GATES can be installed in any plant, but they are mainly used in **corrosive environments** where their characteristics are emphasized, as:

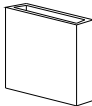

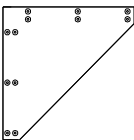
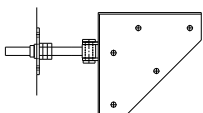
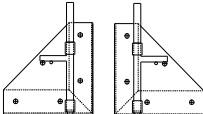
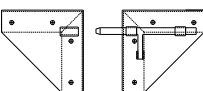
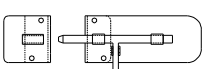
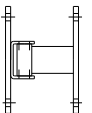
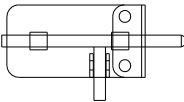
1. In **corrosive environments**, mainly in plants where conventional materials are not long lasting or need continuous varnishing or protection with high maintenance costs and, in any case, do not guarantee safety in the working environment.
2. In the **electric industry**, particularly where the safety of the workers is determined by the electric insulation.
3. In **airports** for the transparent radio frequency property.

Industries and sectors that use M.M. gates are:

- **Mineral industries**
- **Electric stations**
- **Electric distribution cabins**
- **Transport field**
- **Construction industry**
- **Others.**

3. MATERIALS

3.1. TABLE OF PROFILES AND STRUCTURAL ACCESSORIES

PROFILES	DESCRIPTION	USE (D=driveway P=pedestrian)	DIMENSIONS (mm)	BAR LENGTH (m)	WEIGHT (Kg/m)	COLOR
	rectangular structural profile	D/P	80x50x5	6	2.04	grey
	rectangular structural profile	D/P	85x25x3	6	1.17	grey
	FRP corner reinforcing	D/P	400x400 (C) 200x200 (P)			grey
	S.S. AISI 304 upper and lower pockets with S.S. adjustable hinge and M18 dowel	D				
	S.S. AISI 304 lower pockets for drop rod	D				
	S.S. AISI 304 upper pockets with slide bolt latch	D				
	S.S. AISI 304 intermediate pocket with slide bolt latch	D				
	Stainless steel hinge for single swing gate	P				
	S.S. slide bolt latch and plate for wall fixing	P				

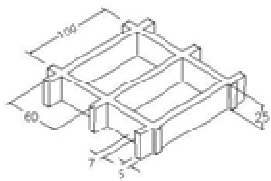
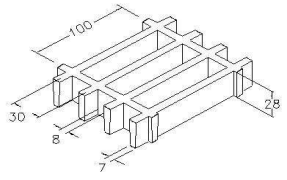
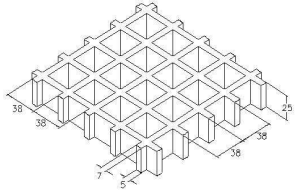
Stainless steel accessories

- M8X100 screws with nut
- M6X25 screws with fender or washer
- 4x12mm rivets


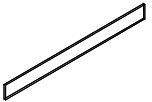
3.2 TABLE OF STRUCTURAL GRATINGS AND PROFILES FOR GATE CLADDING

The gate is built by using FRP gratings, profiles, and laminated plates.

3.2.1. TABLE OF FRP GRATINGS FOR GATE CLADDING

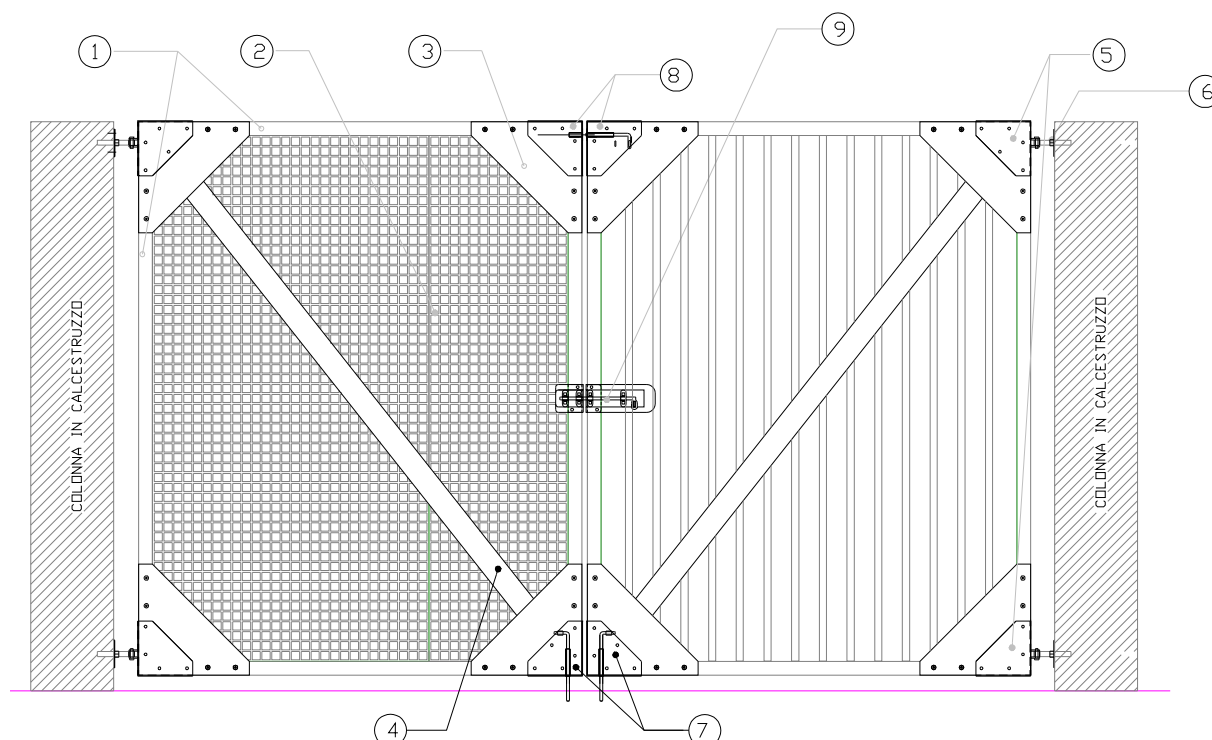
GRATINGS	DESCRIPTION	MESH (mm)	PANELS DIMENSIONS (mm)	WEIGHT (Kg/m ²)	COLOR
	Grating SCH60/25	100x60	1500x2000	7	Grey
	Grating SCH30/28	100x30	1000 x 2000 1500 x 2000	12	Grey
	Grating SCH38/25	38x38	1000 x 2000 1000 x 3000 1000 x 4038 1225 x 3660	11	Grey

3.2.2. TABLE OF FRP PROFILES FOR GATE CLADDING

PROFILES	DESCRIPTION	DIMENSIONS (mm)	BAR LENGTH (m)	WEIGHT (Kg/m)	COLOR
	Tubular profile	Ø 26x19	6	0.5	Yellow/grey
	Flat profile	40x5	6	0.36	Yellow/grey

4. INSTRUCTIONS FOR DESIGN ENGINEER

4.1 DOUBLE SWING DRIVEWAY GATE



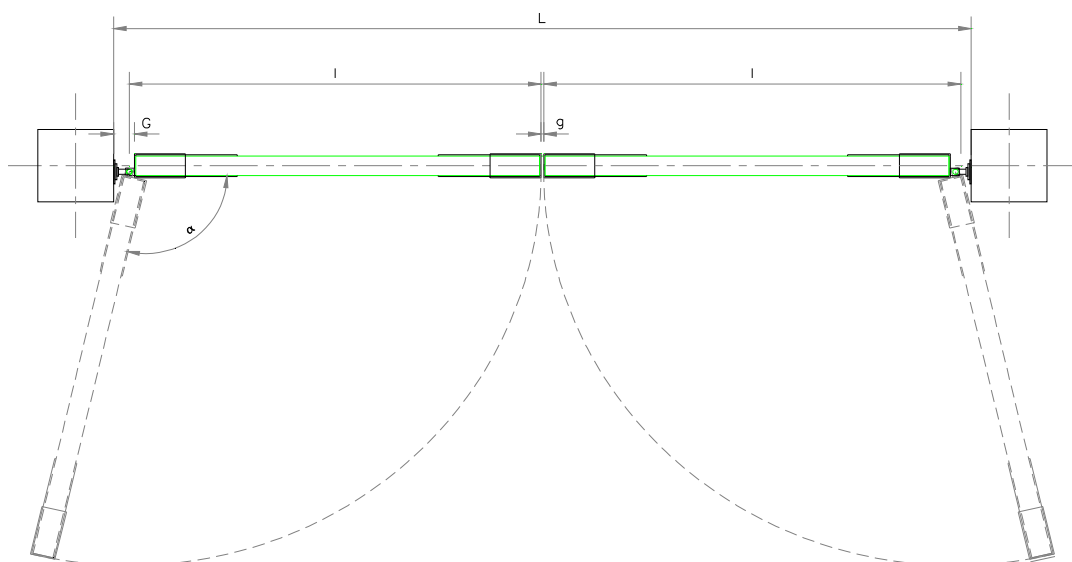
Legend

1. Rectangular structural profile in reinforced polyester resin with continuous glass fibers section mm 80x50 thickness mm 5;
2. Cladding (see point 3.2);
3. Corner reinforcing in polyester resin reinforced with continuous glass fibers;
4. Bracing profile in polyester resin reinforced with continuous glass fibers, rectangular section mm 80x25 thickness mm 3;
5. S.S. triangular pocket block with hinge for gate;
6. Galvanized steel threaded plate for dowel fixing;
7. Ground locking device with drop rod;
8. Upper locking device with steel latch;
9. Intermediate manual locking device with latch.

4.1.1 OVERALL DIMENSIONS

The type of cladding and the dimensions specified in the drawing determine the dimensions of M.M.'s double swing gates.

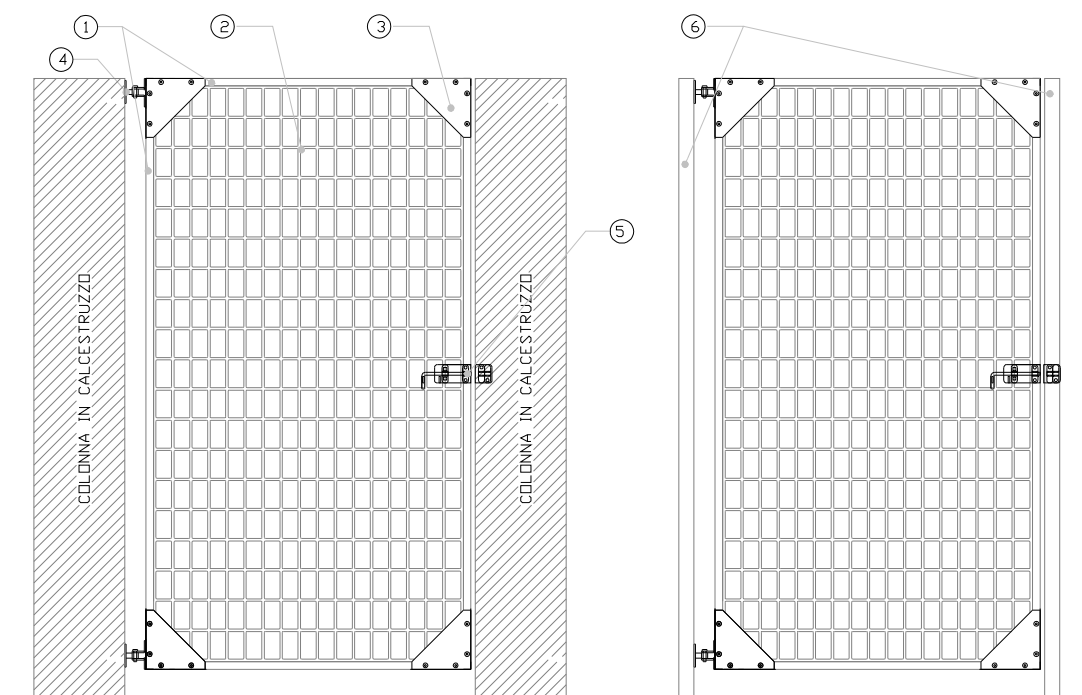
A "SCH60/25" type grating cladding gate has been considered in the following table.



1. Clear span (L)
2. Free space between column and swing (G)
3. Swing net dimension (l)
4. Free space between the two swings (g)

L gate (mm)	g (mm)	G (mm)	l (mm)	L grating (mm)	H grating (mm)	H _{max} gate (mm)
3000	14	126	1367	1261	1800	2000
4000	14	141	1852	1746	1800	2000
5000	14	104	2389	2283	1800	2000
6000	14	126	2867	2761	1800	2000

4.2 SINGLE SWING PEDESTRIAN GATE



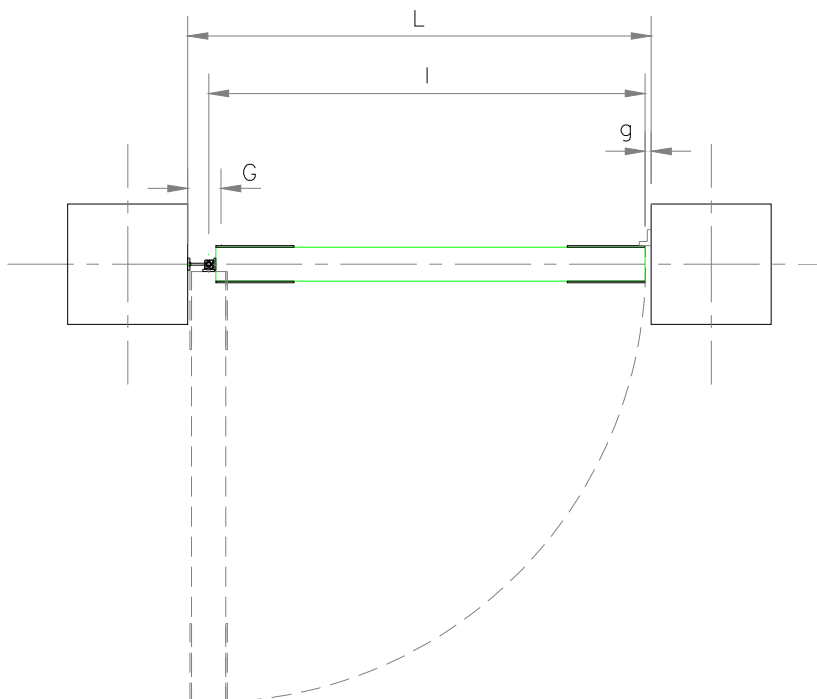
Legend

1. Rectangular structural profile in reinforced polyester resin with continuous glass fibers section 85x25 mm thickness 3 mm;
2. Cladding (see point 3.2);
3. Corner reinforcing in polyester resin reinforced with continuous glass fibers;
4. S.S. gate hinge;
5. Central manual locking devise with latch;
6. Rectangular gate stanchion in polyester resin reinforced with continuous glass fibers section 80x50 mm thickness 5 mm.

4.2.1 OVERALL DIMENSIONS

The type of cladding and the dimensions specified in the drawing determine the dimensions of M.M.'s single swing gates.

A "SCH60/25" type grating cladding gate has been considered in the following table.



1. Clear span (L)
2. Free space between column and swing (G)
3. Swing net dimension (I)
4. Free space between column and swing (g)

L gate (mm)	g (mm)	G (mm)	I (mm)	L grating (mm)	H grating (mm)	H _{max} gate (mm)
1516	15	70	1449	1381	1900	1950
1216	15	70	1150	1082	1900	1950
1037	15	70	971	903	1900	1950

5. ASSEMBLING INSTRUCTIONS

5.1 ADJUSTABLE PLATE FIXING FOR DOUBLE SWING GATES

The adjustable hinges must be fixed to the bearing concrete column with expansion bolts. It is necessary to drill a 20 mm diameter hole with a varying depth in the concrete for the adjustment of the pivots. After the hole is done it is very simple to adjust the pivot hinge's threaded bar to the plate. The dowel must fit into the concrete for at least 30 mm. (Fig. 1)

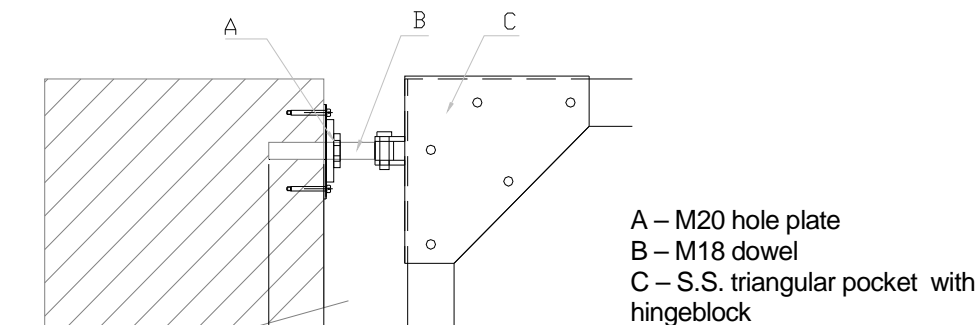


Fig. 1

5.2 PIVOT FIXING FOR SINGLE SWING GATES

The pivot is fixed to concrete with 4 M8 anchor bolts and to FRP stanchions with M8 screws (Ffig. 2).

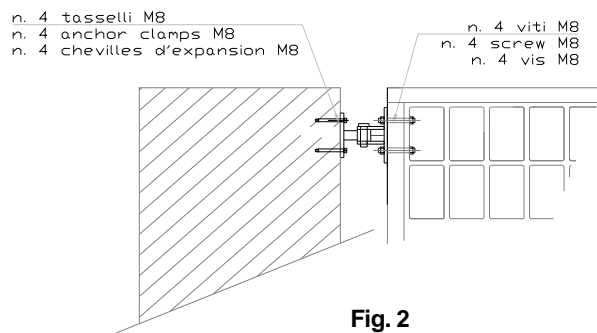
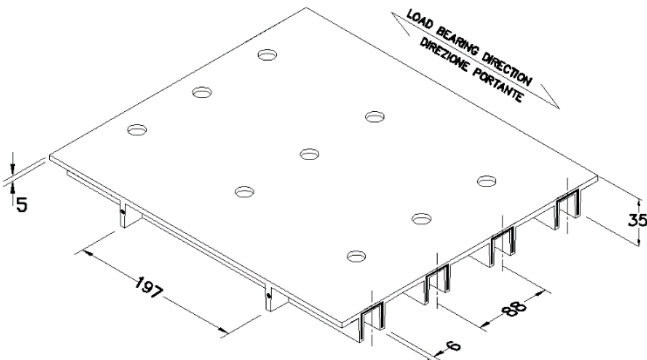


Fig. 2

SCH 30(60)/35_AFR

15.12.2015 - Rev. 2

MOLDED GRATINGS

Mesh	mm 200x30(200x60)	
Height	mm 35	
Bearing bar thickness	mm 8 upper part	
	mm 7 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	
Surface	Cover/With drainage system	

Raw materials	Acrylic Polyester Resin
	Roving glass fiber + Mat type "E"
	AISI 316L SS "U"-type longitudinal reinforcements and 5 mm-dia. transversal round tie-bars
	Inorganic fillers without halogens

Standard panels		<i>FRP COMPOSITE DECK GRATING</i> <i>“COMPODECK”</i>
mm 1000 x 2000		
Weight kg/m² 29		
tolerance	± mm 5 panel dimensions	
	± mm 2 height	

Surface	A	Moulded rough	Antiskid level R13 V4 norm DIN 51130
----------------	---	---------------	--------------------------------------

Reaction to fire	Fire retardant	Spread < 20 norm ASTM E84-98
		Smoke and Toxicity IMO Fire Test Procedures Code (FTPC), Resolution MSC.61(67), Part 2

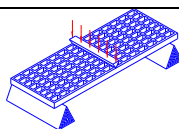
Structural fire integrity	L1	USCG Memorandum, PFM 2-98 Use of Fiber Reinforced Plastic (FRP) Gratings and Cable Trays
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LOADS

Type of support

On the line of the two ends of the panel

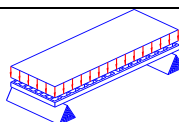
CONCENTRATED LOAD



Sample dimension mm 400x1300

Deflection (mm)		Load (kg)									
		100	200	300	400	500	600	700	800	900	1000
Span (mm)	500	0.10	0.20	0.20	0.60	1.00	1.00	1.20	1.40	1.60	1.60
	750	0.10	0.20	0.20	1.00	1.40	1.80	2.20	2.80	3.20	3.80
	1000	0.20	1.40	2.40	3.60	4.60	5.80	6.80	8.00	9.00	10.00

DISTRIBUTED LOAD



Sample dimension mm 400x1300

Deflection (mm)		Load (kg)									
		100	200	300	400	500	600	700	800	900	1000
Span (mm)	500	0.04	0.08	0.12	0.16	0.21	0.25	0.29	0.33	0.37	0.41
	750	0.04	0.21	0.31	0.42	0.52	0.63	0.73	0.84	0.94	1.04
	1000	0.42	0.84	1.25	1.67	2.09	2.51	2.93	3.35	3.76	4.18

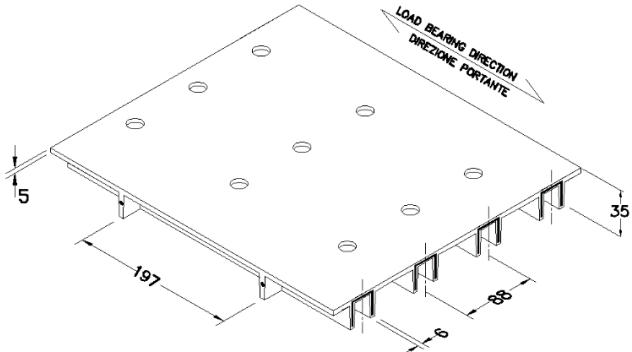
The information specified in the above table is to be considered as an average value and variations may reach a $\pm 15\%$.

The above characteristics are meant as reference values for standard material. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.

SCH 30(60)/35_CFR

15.12.2015 - Rev. 2

MOLDED GRATINGS

Mesh	mm 200x30(200x60)	
Height	mm 35	
Bearing bar thickness	mm 8 upper part	
	mm 7 bottom part	
Color	Natural Black	
Surface	Cover/With drainage system	

Raw materials	Polyester Resin
	Roving glass fiber + Mat type "E"
	AISI 316L SS "U"-type longitudinal reinforcements and 5 mm-dia. transversal round tie-bars
	Inorganic fillers without halogens + Carbon black conductive powder

Standard panels	<p>FRP COMPOSITE DECK GRATING "COMPODECK"</p>
mm 1000 x 2000	
Weight kg/m² 29	
tolerance	± mm 5 panel dimensions
	± mm 2 height

Surface	A	Moulded rough	Antiskid level R13 V4 norm DIN 51130
----------------	---	---------------	--------------------------------------

Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		ASTM D635 Elapsed time and burned length < 25 mm

Structural fire integrity	L1	USCG Memorandum, PFM2-98 Use of Fiber Reinforced Plastic (FRP) Gratings and Cable Trays
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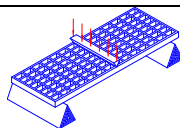
Surface and Volume electrical resistivity	Excellent Conductivity	EN 61340-2.3 Par. 8.1 e 8.2 IEC 61340-4.1 Par. 5.1.2 ref. ISO 1957 IEC 61340-4.5
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LOADS

Type of support

On the line of the two ends of the panel

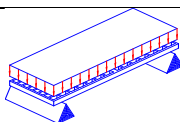
CONCENTRATED LOAD



Sample dimension mm 400x1300

Deflection (mm)		Load (kg)									
		100	200	300	400	500	600	700	800	900	1000
Spam (mm)	500	0.10	0.20	0.20	0.60	1.00	1.00	1.20	1.40	1.60	1.60
	750	0.10	0.20	0.20	1.00	1.40	1.80	2.20	2.80	3.20	3.80
	1000	0.20	1.40	2.40	3.60	4.60	5.80	6.80	8.00	9.00	10.00

DISTRIBUTED LOAD



Sample dimension mm 400x1300

Deflection (mm)		Load (kg)									
		100	200	300	400	500	600	700	800	900	1000
Spam (mm)	500	0.04	0.08	0.12	0.16	0.21	0.25	0.29	0.33	0.37	0.41
	750	0.04	0.21	0.31	0.42	0.52	0.63	0.73	0.84	0.94	1.04
	1000	0.42	0.84	1.25	1.67	2.09	2.51	2.93	3.35	3.76	4.18

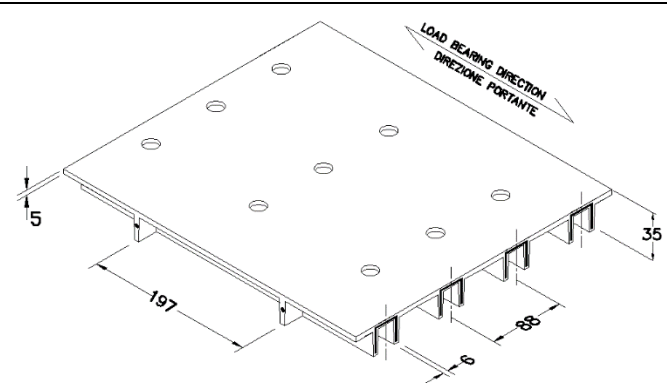
The information specified in the above table is to be considered as an average value and variations may reach a $\pm 15\%$.

The above characteristics are meant as reference values for standard material. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.

SCH 30(60)/35_IFR

15.12.2015 - Rev. 2

MOLDED GRATINGS

Mesh	mm 200x30(200x60)	
Height	mm 35	
Bearing bar thickness	mm 8 upper part	
	mm 7 bottom part	
Color	Grey RAL 7004 <i>indicative RAL reference</i>	
Surface	Cover/With drainage system	

Raw materials	Polyester Resin
	Roving glass fiber + Mat type "E"
	AISI 316L SS "U"-type longitudinal reinforcements and 5 mm-dia. transversal round tie-bars
	Inorganic fillers without halogens

Standard panels		
mm 1000 x 2000		
Weight kg/m² 29		
tolerance	± mm 5 panel dimensions	
	± mm 2 height	

FRP COMPOSITE DECK GRATING

“COMPODECK”

Surface	A	Moulded rough	Antiskid level R13 V4 norm DIN 51130
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Reaction to fire	Fire retardant	Spread ≤ 25 norm ASTM E84-98
		ASTM D635 Elapsed time and burned length < 25 mm

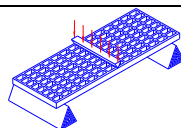
Structural fire integrity	L1	USCG Memorandum, PFM 2-98 Use of Fiber Reinforced Plastic (FRP) Gratings and Cable Trays
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LOADS

Type of support

On the line of the two ends of the panel

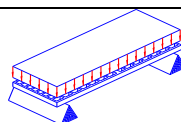
CONCENTRATED LOAD



Sample dimension mm 400x1300

Deflection (mm)		Load (kg)									
		100	200	300	400	500	600	700	800	900	1000
Spam (mm)	500	0.10	0.20	0.20	0.60	1.00	1.00	1.20	1.40	1.60	1.60
	750	0.10	0.20	0.20	1.00	1.40	1.80	2.20	2.80	3.20	3.80
	1000	0.20	1.40	2.40	3.60	4.60	5.80	6.80	8.00	9.00	10.00

DISTRIBUTED LOAD



Sample dimension mm 400x1300

Deflection (mm)		Load (kg)									
		100	200	300	400	500	600	700	800	900	1000
Spam (mm)	500	0.04	0.08	0.12	0.16	0.21	0.25	0.29	0.33	0.37	0.41
	750	0.04	0.21	0.31	0.42	0.52	0.63	0.73	0.84	0.94	1.04
	1000	0.42	0.84	1.25	1.67	2.09	2.51	2.93	3.35	3.76	4.18

The information specified in the above table is to be considered as an average value and variations may reach a $\pm 15\%$.

The above characteristics are meant as reference values for standard material. Even if they are not to be considered as guaranteed characteristics they are based on our experience and are supplied in good faith.

ACCESSORI E APPLICAZIONI

LA SERIETÀ E LA PROFESSIONALITÀ DI UN'AZIENDA SI VEDONO SPECIALMENTE NEI PICCOLI PARTICOLARI CHE QUALCHE VOLTA SEMBRANO TRASCURABILI MA DI SOLITO RAPPRESENTANO L'ANELLO DEBOLE DI TUTTA LA CATENA. PER QUESTO MOTIVO LA MM HA DEDICATO CURA ED ATTENZIONE A TUTTI I PARTICOLARI AUSILIARI (ACCESSORI E BULLONERIA) CHE SONO PARTE INTEGRANTE DELL'IMPIANTISTICA COMPOSTA DAI GRIGLIATI E DALLE STRUTTURE.

Accessories and applications

Accessoires et applications

The reliability of a company is also shown by the care in looking after details that may seem negligible but often represent the weak link of the chain. This is why MM has studied alternative solutions regarding all auxiliary particulars (as accessories and bolts & nuts) that are included in the construction equipment of the GRATINGS and STRUCTURES.

1

La confiance et le professionnalisme de une entreprise est démontrée surtout par des petits particuliers que quelque fois semblent négligeables mais habituellement représentent le maillon faible de la chaîne. C'est pour cela que la MM a recherché des solutions alternatives pour accessoires et boulonnerie qui font partie intégrante des techniques des installations des CAILLEBOTIS et des STRUCTURES.

SISTEMI DI FISSAGGIO

Fixing devices

Systèmes de fixation

CLIP DI FISSAGGIO TIPO D30/7

- Clip di fissaggio in acciaio inossidabile AISI 316 fornita completa di bulloneria.
- Viti come da tabella a pagina 4.
- La messa in opera richiede la foratura della carpenteria di supporto.

FIXING CLAMP TYPE D30/7

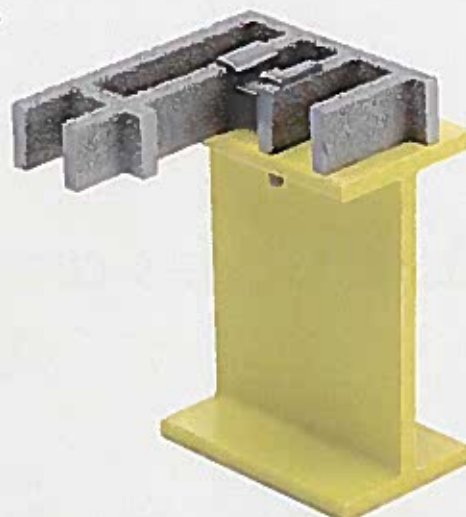
- Stainless steel AISI 316 fixing clamp complete of bolts and nuts.
- Screws accordingly to table on page 4.
- For their use it is not necessary to drill the support structure.

CLIP DE FIXATION TYPE D30/7

- Clip de fixation en inox AISI 316 complète de boulonnerie.
- Vis selon table à page 4.
- La charpente de support doit être percée.

UTILIZZABILE SU GRIGLIATI: / TO BE USED ON GRATINGS TYPE:
A' UTILISER AVEC CAILLEBOTIS TYPE:

SCH 30/28	SCH 50/28
SCH 30/38	SCH 50/38



CLIP DI FISSAGGIO TIPO D40/7

- Clip di fissaggio in acciaio inossidabile AISI 316 fornita completa di bulloneria.
- Viti come da tabella a pagina 4.
- La messa in opera richiede la foratura della carpenteria di supporto.

FIXING CLAMP TYPE D40/7

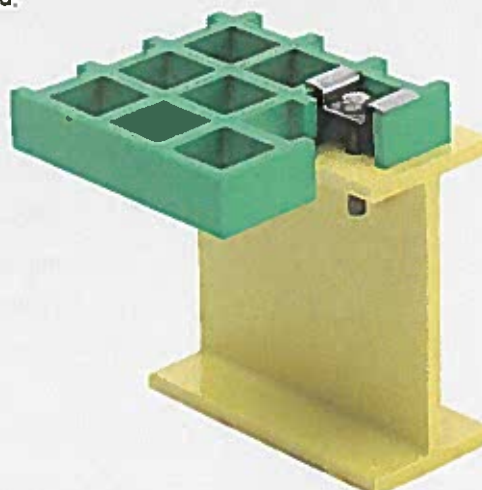
- Stainless steel AISI 316 fixing clamp complete of bolts and nuts.
- Screws accordingly to table on page 4.
- For their use it is necessary to drill the support structure.

CLIP DE FIXATION TYPE D40/7

- Clip de fixation en inox AISI 316 complète de boulonnerie
- Vis selon table à page 4.
- La charpente de support doit être percée.

UTILIZZABILE SU GRIGLIATI: / TO BE USED ON GRATINGS TYPE:
A' UTILISER AVEC CAILLEBOTIS TYPE:

SCH 40/28	SCH 38/25	
SCH 40/38	SCH 38/30	SCH 38/38



CLIP DI FISSAGGIO TIPO DS30/9

- Clip di fissaggio in acciaio inossidabile AISI 316 fornita completa di bulloneria e staffa.
- Viti come da tabella a pagina 4.
- La messa in opera non richiede la foratura della carpenteria di supporto.

FIXING CLAMP TYPE DS30/9

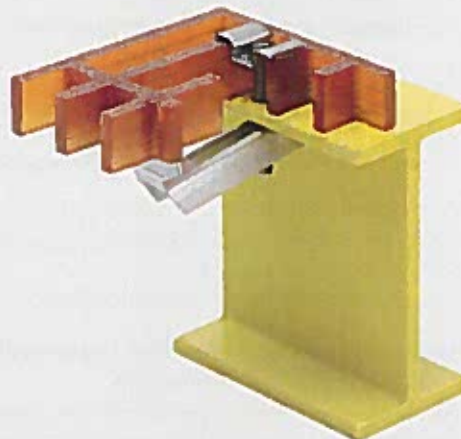
- *Stainless steel AISI 316 fixing clamp complete of bolts, nuts and anchor clamp.*
- *Screws accordingly to table on page 4.*
- *For their use it is not necessary to drill the support structure.*

CLIP DE FIXATION TYPE DS30/9

- *Clip de fixation en inox AISI 316 complète de boulonnerie et étrier de ancrage.*
- *Vis selon table à page 4.*
- *La charpente de support ne doit pas être percée.*

UTILIZZABILE SU GRIGLIATI: / TO BE USED ON GRATINGS TYPE:
A' UTILISER AVEC CAILLEBOTIS TYPE:

SCH 30/28	SCH 50/28
SCH 30/38	SCH 50/38



CLIP DI FISSAGGIO TIPO DS40/9

- Clip di fissaggio in acciaio inossidabile AISI 316 fornita completa di bulloneria e staffa.
- Viti come da tabella a pagina 4.
- La messa in opera non richiede la foratura della carpenteria di supporto.

FIXING CLAMP TYPE DS40/9

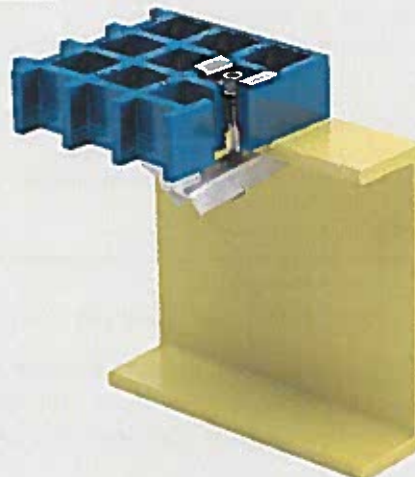
- *Stainless steel AISI 316 fixing clamp complete of bolts, nuts and anchor clamp.*
- *Screws accordingly to table on page 4.*
- *For their use it is not necessary to drill the support structure.*

CLIP DE FIXATION TYPE DS40/9

- *Clip de fixation en inox AISI 316 complète de boulonnerie et étrier de ancrage.*
- *Vis selon table à page 4.*
- *La charpente de support ne doit pas être percée.*

UTILIZZABILE SU GRIGLIATI: / TO BE USED ON GRATINGS TYPE:
A' UTILISER AVEC CAILLEBOTIS TYPE:

SCH 40/28	SCH 38/25	
SCH 40/38	SCH 38/30	SCH 38/38



CLIP DI FISSAGGIO TIPO 19T7 e 19T9

- Clip di fissaggio in acciaio inossidabile AISI 316 fornita completa di bulloneria.
- Viti come da tabella a pagina 4.
- La messa in opera richiede la foratura della carpenteria di supporto.

FIXING CLAMP TYPE 19T7 AND 19T9

- *Stainless steel AISI 316 fixing clamp complete of bolts and nuts.*
- *Screws accordingly to table on page 4.*
- *For their use it is necessary to drill the support structure.*

CLIP DE FIXATION TYPE 19T7 ET 19T9

- *Clip de fixation en inox AISI 316 complète de boulonnerie.*
- *Vis selon table à page 4.*
- *La charpente de support doit être percée.*

Utilizzabile su tutti i grigliati a maglia mm 19x19 spessori mm 30, 40 e 52. / To be used on all gratings mesh mm 19x19 thicknesses mm 30, 40 and 52. / Utilisable sur tous les caillebotis à maille mm 19x19 épaisseurs mm 30, 40 et 52.

UTILIZZABILE SU GRIGLIATI: / TO BE USED ON GRATINGS TYPE: / A' UTILISER AVEC CAILLEBOTIS TYPE:

SCH 50/30	SCH 52/52
SCH 50/40	



CLIP DI FISSAGGIO TIPO T7 e T9

- Clip di fissaggio in acciaio inossidabile AISI 316 fornita completa di bulloneria.
- Viti come da tabella a pagina 4.
- La messa in opera richiede la foratura della carpenteria di supporto.

FIXING CLAMP TYPE T7 AND T9

- Stainless steel AISI 316 fixing clamp complete of bolts and nuts.
- Screws accordingly to table on page 4.
- For their use it is necessary to drill the support structure.

CLIP DE FIXATION TYPE 19T7 et 19T9

- Clip de fixation en inox AISI 316 complète de boulonnerie.
- Vis selon table à page 4.
- La charpente de support doit être percée.

Utilizzabile su tutti i grigliati in particolare se a superficie chiusa tranne le micromaglie.

To be used on all gratings particularly on covered surfaces, not on micromeshes.

Utilisable sur tous les caillebotis en particulier avec les surfaces couvertes sauf les micromailles.



CLIP DI FISSAGGIO TIPO TS9

- Clip di fissaggio in acciaio inossidabile AISI 316 fornita completa di bulloneria.
- Viti come da tabella a pagina 4.
- La messa in opera non richiede la foratura della carpenteria di supporto.

FIXING CLAMP TYPE TS9

- Stainless steel AISI 316 fixing clamp complete of bolts and nuts.
- Screws accordingly to table on page 4.
- For their use it is not necessary to drill the support structure.

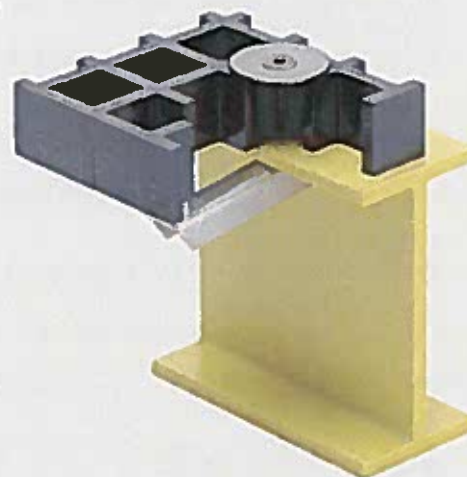
CLIP DE FIXATION TYPE TS9

- Clip de fixation en inox AISI 316 complète de boulonnerie.
- Vis selon table à page 4.
- La charpente de support ne doit pas être percée.

Utilizzabile su tutti i grigliati aperti e coperti tranne le micromaglie.

To be used on all covered and open surface gratings except micromeshes.

Utilisable sur tous les caillebotis ouverts et couverts sauf les micromailles.



SPESSORE GRIGLIATO / GRATING THICKNESS / ÉPAISSEUR CAILLEBOTIS

CLIP:	25/28/30 mm			38/40 mm			50 mm		
	vite screw / vis	rondella washer/rondelle	dado nut / écrou	vite screw / vis	rondella washer/rondelle	dado nut / écrou	vite screw / vis	rondella washer/rondelle	dado nut / écrou
D30/7	M6x50 DIN 933	M6 DIN 125	M6 DIN 981	M6x70 DIN 933	M6 DIN 125	M6 DIN 981			
D30/9	M8x50 DIN 933	M8 DIN 125	M8 DIN 981	M8x70 DIN 933	M8 DIN 125	M8 DIN 981			
D40/9	M8x50 DIN 933	M8 DIN 125	M8 DIN 981	M8x70 DIN 933	M8 DIN 125	M8 DIN 981			
D40/7	M6x50 DIN 933	M6 DIN 125	M6 DIN 981	M6x70 DIN 933	M6 DIN 125	M6 DIN 981			
DS409	M8x50 DIN 933		M8 6,5x13	M8x70 DIN 933		M8 6,5x13			
DS309	M8x50 DIN 912		M8 6,5x13	M8x70 DIN 912		M8 6,5x13			
	M8x70 DIN 84		M8 6,5x13	M8x70 DIN 84		M8 6,5x13			
T7	M6x50 DIN 7991	M6 DIN 125	M6 DIN 981	M6x70 DIN 7991	M6 DIN 125	M6 DIN 981			
T9	M8x50 DIN 7991	M8 DIN 125	M8 DIN 981	M8x70 DIN 7991	M8 DIN 125	M8 DIN 981	M8x90 DIN 7991	M6 DIN 125	M6 DIN 981
19T7	M6x50 DIN 7991	M6 DIN 125	M6 DIN 981	M6x70 DIN 7991	M6 DIN 125	M6 DIN 981			
19T9	M8x50 DIN 7991	M8 DIN 125	M8 DIN 981	M8x70 DIN 7991	M8 DIN 125	M8 DIN 981	M8x90 DIN 7991	M6 DIN 125	M6 DIN 981
TS9	M8x50 DIN 7991		M8 6,5x13	M8x70 DIN 7991		M8 6,5x13	M8x90 DIN 7991		M8 6,5x13
19TS9	M8x50 DIN 7991		M8 6,5x13	M8x70 DIN 7991		M8 6,5x13	M8x90 DIN 7991		M8 6,5x13
A25	M6x30 DIN 933								
A28	M6x35 DIN 933								
A38				M6x45 DIN 933					
A30	M5x50 DIN 933								
A40				M5x50 DIN 933					
A52							M5x70 DIN 933		

CLIP DI COLLEGAMENTO

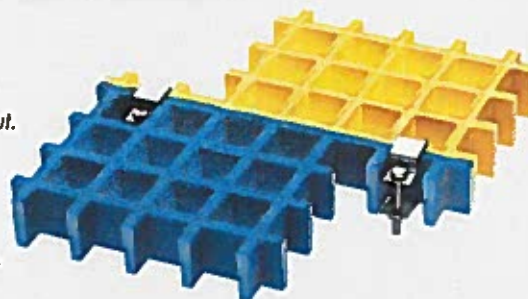
- Clip di collegamento in acciaio inossidabile AISI 316 fornita completa di bullone e dado soldato.
- Viti come da tabella a pagina 4.
- La clip serve per collegare tra loro due pannelli adiacenti.

CONNECTING CLAMP

- Stainless steel AISI 316 connecting clamp complete of bolt and welded nut.
- Screws accordingly to table on page 4.
- The clamp is used for the connection of two close panels.

CLIP DE CONNEXION

- Clip de connexion en inox AISI 316 complète de boulon et écrou soudée.
- Vis selon table à page 4.
- La clip est utilisée pour joindre deux panneaux contigus



TIPO / TYPE / TYPE	SPESSORE GRIGLIATO: / GRATING THICKNESS: ÉPAISSEUR CAILLEBOTIS:
A25	25 mm
A28	28 mm
A30	30 mm (19x19)
A38	38 mm
A40	40 mm (19x19)
A52	52 mm (19x19)

