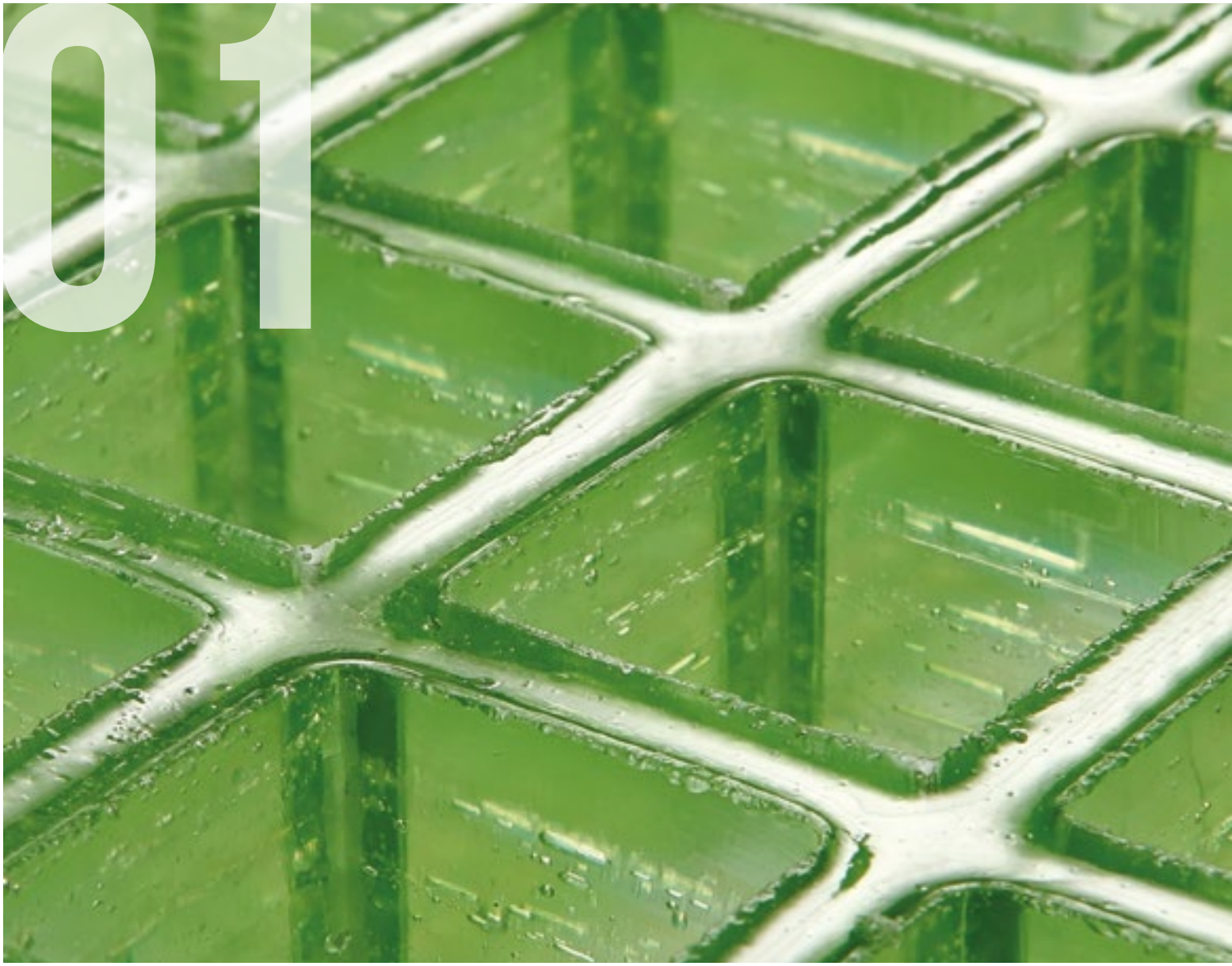
Fiberglass Reinforced Polymer

CATALOGUE

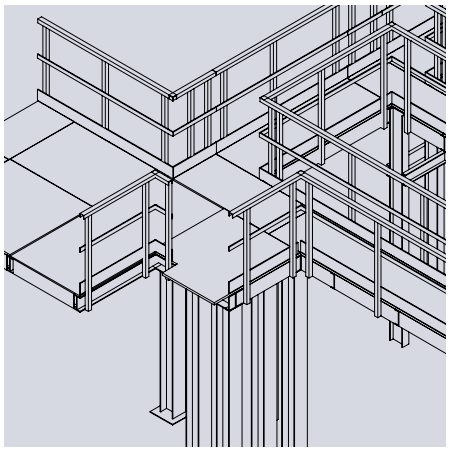
WE SUPPORT YOUR NEEDS

01



SERVICES

ENGINEERING



MECHANICAL TESTS

CHEMICAL RESISTANCE TEST

ABOUT US

Since its inception in 1977, M.M. has been operating in the **glass fibre reinforced plastics (FRP)** industry, producing **high quality gratings and structures** (handrail systems, walkways, stairways, ladders, fences, gates, etc.). The intrinsic properties of FRP allow to create light, resistant and easy to install structures that do not require maintenance and are characterised by great versatility of use.

The company offers **customized solutions and additional services** such as technical design, structural calculation for composite materials, chemical and mechanical resistance tests, any type of cut to size, shaping and finishing.

Every phase of the company process, from design to production, from the quotation to the follow-up service, is focused on **customer satisfaction**.

HIGH QUALITY RAW MATERIALS

CUSTOMIZED SOLUTIONS

RESEARCH AND INNOVATION

CUTTING AND SHAPING

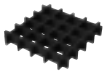
SURFACE TREATMENTS

VERIFICATION OF PRODUCT CONFORMITY

02

HOW TO CHOOSE THE GRATING

The following table details the characteristics of the resins that allows to choose the right type of grating on the basis of their application and the environment in which it is to be installed.

	 STANDARD IFR LINE	 STANDARD VFR LINE	 PREMIUM ISO LINE	 PREMIUM VIN LINE	 CONDUCTIVE FIRE RETARDANT
CHEMICAL CHARACTERISTICS					
TYPE OF RESIN	self-extinguishing polyester	self-extinguishing vinylester	isophthalic	vinylester	self-extinguishing polyester
HDT (ISO 75)	70 °C	105 °C	90 °C	105 °C	70 °C
VITREOUS TRANSITION TEMPERATURE (ASTM D3418)	90 °C	125 °C	110 °C	125 °C	90 °C
PH RANGE	4-10	3-12	3-12	1-14	4-10
TEMPERATURE RANGE	-50 +60 °C	-50 +70 °C	-50 +70 °C	-50 +90 °C	-50 +60 °C
BARCOL HARDNESS (ASTM 2583)	30	30	30	30	30
STANDARD COLOUR	gray RAL 7004	gray RAL 7004	green translucent	natural translucent	black
MECHANICAL CHARACTERISTICS					
DENSITY	1.900 kg/m³	1.900 kg/m³	1.500 kg/m³	1.500 kg/m³	1.900 kg/m³
MODULUS OF ELASTICITY (open mesh)	15.000 MPa	16.500 MPa	12.250 MPa	13.750 MPa	15.000 MPa
ULTIMATE LIMIT TENSION (open mesh)	325 MPa	325 MPa	310 MPa	310 MPa	325 MPa

GRATINGS

Gratings are produced using the **resin transfer moulding technology (RTM)**.

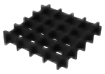
They are available in a **wide range of sizes**, thus ensuring a prompt solution to widely differing tasks, and are made of very simple and quick to install monolithic panels.

Gratings are designed with a high safety factor and produced under the most strict controls according to **DIN 24537-3**.

RESIN TYPES

WIDE RANGE OF SIZES

DIFFERENT FINISHINGS

	 STANDARD IFR LINE	 STANDARD VFR LINE	 PREMIUM ISO LINE	 PREMIUM VIN LINE	 CONDUCTIVE FIRE RETARDANT
THERMAL CONDUCTIVITY K	0,22 W/m °C	0,22 W/m °C	0,22 W/m °C	0,22 W/m °C	0,22 W/m °C
THERMAL EXPANSION COEFFICIENT	1,5 10^{-5} / °C	1,5 10^{-5} / °C	1,5 10^{-5} / °C	1,5 10^{-5} / °C	1,5 10^{-5} / °C
ELECTRICAL CHARACTERISTICS					
ELECTRICAL RESISTIVITY (EN 61340-2.3 norm par. 8.1 and 8.2 with ref. to ISO 1853, IEC 60167, HD 568 S1)	excellent insulator	excellent insulator	excellent insulator	excellent insulator	-
ELECTRICAL CAPACITY (EN 61340-2.3 norm par. 8.1 and 8.2 - IEC 61340-4.1 Par. 5.1.2 ref. ISO 1957 - IEC 61340-4.5 - ASTM D149-97a)	-	-	-	-	excellent conductor
OTHER PROPERTIES					
REACTION TO FIRE	self-extinguishing	self-extinguishing	not determined	not determined	self-extinguishing
REACTION TO FIRE (ASTM E84-98)	Spread ≤ 25	Spread ≤ 25			Spread ≤ 25
REACTION TO FIRE (EN 13501-1)	Level B_{fl}-S1	Level B_{fl}-S1	Level F_{fl}	Level F_{fl}	Level B_{fl}-S1

ANTISTATIC gratings (ESD_LINE) can be produced with different types of resin by means of a special finishing.

CHEMICAL RESISTANCE TEST OF NON-STRESSED THERMOSETTING RESINS

The comparative tests carried out in cooperation with the Tor Vergata University of Rome, consisting in the immersion of the samples in the substances indicated and for the time and at the temperatures specified in the Table below, show that the galvanized steel specimens suffer from widespread corrosion caused by the reactions triggered by the solutions, as opposed to the fibreglass specimens which, only in some cases, show little signs of corrosion.

CHEMICAL AGENT	STANDARD IFR LINE Polyester resin Self-extinguishing	PREMIUM ISO LINE Isophthalic Resin	PREMIUM VIN LINE Vinylester resin	GALVANIZED METAL		
Sea water H2O + 4% NaCl						
Colour variation	Noticeable	Noticeable	Noticeable	The sample remains essentially unchanged, except for an extensive salt deposit.	80°C	350h
Fibre exposure	Low	Low	Low			
Stress corrosion cracking	Scarce	None	None			
Salt deposits	Scarce	None	Scarce			
Surface delamination	Scarce	None	None			
Weight loss	None	None	None			
Viscous precipitates	None	None	None			
Phosphoric acid H2O + 85% H3PO4						
Colour variation	None	None	None	Immediate reaction, even before the thermal treatment, with gas and black particulate. Noticeable surface delamination.	40°C	150h
Fibre exposure	None	None	None			
Stress corrosion cracking	None	None	None			
Salt deposits	Scarce	Scarce	Scarce			
Surface delamination	None	None	None			
Weight loss	Moderate	None	None			
Viscous precipitates	None	None	None			
Hydrochloric acid H_2O + 20% HCl						
Colour variation	Moderate	None	Noticeable	Immediate reaction with production of gas. The sample is destroyed.	40°C	250h
Fibre exposure	Scarce	Scarce	None			
Stress corrosion cracking	Scarce	None	None			
Salt deposits	Scarce	None	Noticeable			
Surface delamination	None	Moderate	None			
Weight loss	Moderate	None	None			
Viscous precipitates	None	None	None			

CHEMICAL AGENT	STANDARD IFR LINE Polyester resin Self-extinguishing	PREMIUM ISO LINE Isophthalic Resin	PREMIUM VIN LINE Vinylester resin	GALVANIZED METAL		
Sulphuric acid $H_2O + 60\% H_2SO_4$						
Colour variation	Moderate	None	None	Violent and immediate reaction with production of gas and drastic decrease of the acid solution.	40°C	150h
Fibre exposure	Moderate	Moderate	None			
Stress corrosion cracking	None	None	None			
Salt deposits	Scarce	None	None			
Surface delamination	None	None	None			
Weight loss	Very moderate	None	None			
Viscous precipitates	None	None	None			
Nitric acid $H_2O + 35\% HNO_3$						
Colour variation	Moderate	Moderate	Noticeable	Flaking of the sample with a thick salt layer on the surface.	40°C	250h
Fibre exposure	Scarce	Moderate	Scarce			
Stress corrosion cracking	Moderate	None	Scarce			
Salt deposits	Noticeable	None	Noticeable			
Surface delamination	None	None	None			
Weight loss	Moderate	Moderate	Moderate increase			
Viscous precipitates	None	None	None			
Sodium hydroxide 30% NaOH						
Colour variation	Noticeable	Noticeable	Moderate	In alkaline environment, there is a loss of 2.9 g. of weight after 250 h. of treatment.	40°C	150h
Fibre exposure	Detected	Detected	Detected			
Stress corrosion cracking	Detected	Detected	Detected			
Salt deposits	Scarce	Scarce	Scarce			
Surface delamination	None	None	None			
Weight loss	Moderate	Moderate	Moderate			
Viscous precipitates	Scarce	Scarce	Scarce			

CHEMICAL RESISTANCE

Table of the chemical resistance of products made with different resins in contact with a selection of chemical agents.
For further information, please contact the technical department.




SUBSTANCE		CONCENTRATION	STANDARD IFR LINE	STANDARD VFR LINE	PREMIUM ISO LINE	PREMIUM VIN LINE
ACIDS						
$C_2H_4O_2$	Acetic acid	5%	O 30	C 30	C 30	C 90
		50%	NR	O 25	NR	C 70
C_6H_5COOH	Benzoic acid	all	O 25	C 40	C 40	C 90
HCl	Hydrochloric acid	<10%	NR	NR	NR	C 80
		20%	NR	NR	NR	C 70
		37%	NR	NR	NR	C 40
$HClO_4$	Perchloridric acid	20%	NR	NR	NR	C 30
H_2CrO_4	Chromic acid	5%	NR	C 30	C 30	C 60
		20%	NR	NR	NR	C 50
HF	Hydrofluoric acid	10%	NR	NR	NR	O 50
H_3PO_4	Phosphoric acid	80%	O 30	C 40	C 40	C 90
HNO_3	Nitric acid	5%	NR	NR	NR	C 70
H_2SO_4	Sulphuric acid	25%	O 20	C 30	C 30	C 90
BASES						
$Al(OH)_3$	Aluminium hydroxide	all	NR	NR	NR	C 70
NH_4OH	Ammonium hydroxide	28%	NR	NR	NR	C 40
NaOH	Sodium hydroxide	5%	O 20	O 20	O 20	C 60
		25%	O 20	O 20	O 20	C 60
		50%	NR	NR	NR	C 60
SALTS						
NH_4HCO_3	Ammonium bicarbonate	all	NR	NR	NR	C 60
NH_4Cl	Ammonium chloride	all	O 40	C 40	C 40	C 80
$(NH_4)_2SO_4$	Ammonium sulphate	all	O 40	C 40	C 40	C 80
$CaCl_2$	Calcium chloride	all	O 30	C 40	C 40	C 80
$Ca(NO_3)_2$	Calcium nitrate	all	O 30	C 40	C 40	C 80
$FeCl_3$	Ferric Chloride	all	O 25	C 30	C 30	C 80
$FeCl_2$	Ferrous Chloride	all	O 30	C 30	C 30	C 80
LiCl	Lithium chloride	all	O 30	C 40	C 40	C 80
$MgCl_2$	Magnesium chloride	all	O 30	C 40	C 40	C 80
$Mg(NO_3)_2$	Magnesium Nitrate	all	O 30	C 40	C 40	C 80
$MnSO_4$	Manganese sulphate	all	O 30	C 40	C 40	C 80
KNO_3	Potassium nitrate	all	O 30	C 40	C 40	C 80
KCl	Potassium chloride	all	O 30	C 40	C 40	C 80
K_2SO_4	Potassium sulphate	all	O 30	C 40	C 40	C 80
CuCN	Copper cyanide	all	NR	NR	NR	C 80
$CuCl_2$	Copper chloride	all	O 30	C 30	C 30	C 80
$Cu(NO_3)_2$	Copper nitrate	all	O 30	C 30	C 30	C 80
$Na_2B_4O_7{\cdot}10H_2O$	Sodium borate	all	O 30	C 30	C 30	C 80
NaCN	Sodium cyanide	15%	NR	NR	NR	C 60
$ZnSO_4$	Zinc sulphate	all	O 30	C 30	C 30	C 80

For further details, the reference standard document can be downloaded from **www.mmgrigliati.com**




SUBSTANCE		CONCENTRATION	STANDARD IFR LINE	STANDARD VFR LINE	PREMIUM ISO LINE	PREMIUM VIN LINE
ALCOHOL						
C_2H_6O	Ethanol	10%	O 20	C 30	C 30	C 50
CH_3OH	Methanol	5%	NR	NR	NR	C 30
SOLVENTS						
C_6H_6	Benzene	100%	NR	NR	NR	NR
	No lead, no methanol gasoline	100%	O 25	O 25	O 25	C 40
	Acetone	5%	NR	NR	NR	C 70
ORGANIC COMPOUNDS						
$C_2H_6O_2$	Ethylene glycol	100%	O 20	C 30	C 30	C 80
$C_6H_{12}O_6$	Glucose	all	O 20	C 30	C 30	C 80
$C_3H_8O_3$	Glycerol	100%	O 20	C 30	C 30	C 80
$C_3H_6O_3$	Lactic acid	10%	O 20	C 30	C 30	C 80
		80%	NR	O 20	O 20	C 80
$C_6H_8O_7$	Citric acid	50%	O 20	C 30	C 30	C 80
		100%	NR	NR	NR	C 80
-	Vinegar	all	O 20	C 20	C 20	C 80
WHITENING AGENTS						
H_2O_2	Hydrogen peroxide	5%	NR	NR	NR	C 60
GAS AND FUMES						
Cl_2	Dry chlorine gas	100%	NR	NR	NR	C 40
Cl_2	Wet chlorine gas	100%	NR	NR	NR	C 40
H_2S	Hydrogen sulphide, gas	5%	O 20	O 30	O 30	C 70
		100%	NR	NR	NR	C 70
OTHER						
CH_2O	Formaldehyde	50%	NR	NR	NR	C 40
	Urea	all	O 20	C 30	C 30	C 50
-	Seawater	100%	O 30	C 40	C 40	C 80

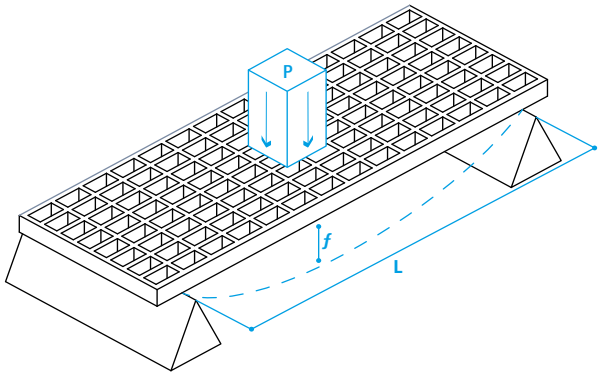
C *- continuous exposure of the gratings to the chemical environment at the specified temperatures*
O *- occasional exposure of the gratings to the chemical environment at the specified temperatures*
NR *- Not recommended*

The information and recommendations shown above are given in good faith and based on our best knowledge.
The Chemical Resistance Table is to be considered as a general guide and not as a guarantee.
For specific applications it is advisable to test the products that we provide in order to ascertain if they are suitable for the applications for which they are intended.
We cannot monitor the conditions of use or how the products are employed.

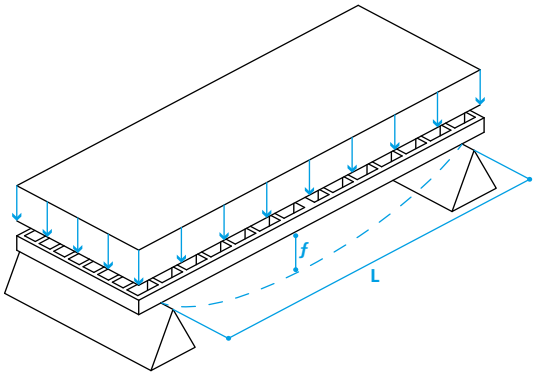
LOAD TABLES BY GRATING TYPE

The following tables show how the loads that vary according to the distance between the supports (L), generating in the grating a deflection of 1/200 of the distance itself (e.g. with distance between the supports (L) 600 mm, load deflection indicated (*f*) 3 mm).

The figures refer to evenly distributed loads and to concentrated loads on a 200 x 200 mm footprint with the gratings simply resting on both ends.



CONCENTRATED LOADS C
(kg)



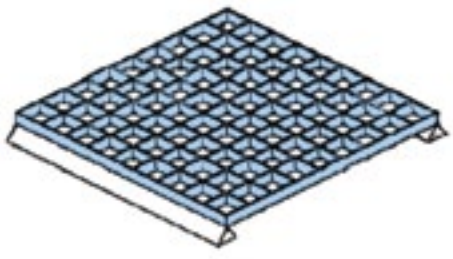
DISTRIBUTED LOADS D
(kg/m²)

TYPES OF SUPPORT FOR GRATINGS

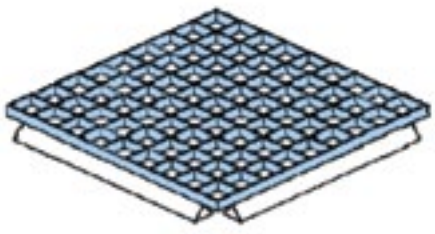
The drawings below show which could be the types of supports.
The gratings support width must be at least 2/3 ot the height of the piece itself.

The stated data in the tables refer to grating placed on two supports.

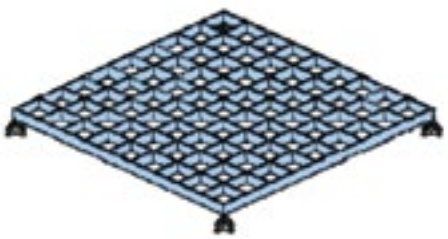
When using square mesh gratings that are load-bearing in both directions, the four support sides increase the mechanical performance.



2 BEARING SIDES



4 BEARING SIDES



4 BEARING POINTS

For further details, the reference standard document can be downloaded from **www.mmgrigliati.com**

STANDARD IFR/CFR LINE GRATINGS LOAD-DEFORMATION

TYPE OF GRATING		L (mm)	300	400	500	600	700	800	900	1.000	1.100	1.200	1.300	1.400
		f (mm)	1,5	2	2,5	3	3,5	4	4,5	5	5,5	6	6,5	7
SQUARE MESH	SCH38/15	C kg	58,5	38	28,7									
		D kg/m²	940	395	203									
	SCH38/25	C kg	269	175	131	105	88	75	66					
		D kg/m²	4.350	1.835	935	543	342	230	160					
	SCH38/30	C kg			227	182	152	131	114	102	92			
		D kg/m²			1.620	940	590	395	278	202	152			
	SCH38/38	C kg			460	370	308	265	230	205	185			
		D kg/m²			3.300	1.900	1.190	800	560	410	300			
	SCH38/60	C					2.150	1.820	1.580	1.400	1.200	1.050	910	
		D					7.900	5.400	3.700	2.700	2.050	1.560	1.240	
	SCH50/50	C kg					573	492	433	387	345	315	291	
		D kg/m²					2.230	1.500	1.050	765	575	440	345	
RECTANGULAR MESH	SCH30/28	C kg			242	190	158	135	119	105	95			
		D kg/m²			2.100	1.200	765	515	360	262	197			
MINI MESH	SCH13/30	C kg			293	235	195	165	148	133	118			
		D kg/m²			2.100	1.200	760	510	355	260	195			
	SCH13/38	C kg			630	500	410	350	305	265	230			
		D kg/m²			4.200	2.500	1.500	1.030	720	520	395			
	SCH52/30	C kg			225	180	151	130	114	102	92			
		D kg/m²			1.610	920	585	395	275	200	150			
	SCH52/40	C kg			530	425	355	305	265	240	215			
		D kg/m²			3.770	2.175	1.375	920	650	475	355			
	SCH52/52	C kg				1.100	930	800	700	625	570	520	475	
		D kg/m²				5.800	3.650	2.450	1.700	1.250	940	720	570	
	SCH52/100	C kg						6.200	5.400	4.850	4.350	3.950	3.650	3.400
		D kg/m²						18.700	13.100	9.550	7.200	5.500	4.350	3.500
MICRO MESH	SCH12/30	C kg			330	265	220	190	168	150	135			
		D kg/m²			2.350	1.350	860	580	405	295	220			
	SCH12/38	C kg			700	550	470	400	340	300	260			
		D kg/m²			4.800	2.700	1.700	1.150	800	600	450			
COVERED	SCH38/17C	C kg	233	153	116	93	78	67	59					
		D kg/m²	3.150	1.300	680	395	250	165	117					
	SCH38/25C	C kg		395	300	240	201	174	152	135	123			
		D kg/m²		3.550	1.830	1.050	665	445	310	225	171			
	SCH38/30C	C kg		620	470	380	315	275	240	215	194			
		D kg/m²		5.700	2.900	1.700	1.050	710	500	360	275			
	SCH38/38C	C kg		1.150	850	680	580	500	440	390	355			
		D kg/m²		10.500	5.400	3.100	1.950	1.300	930	680	510			
	SCH50/50C	C kg					1.020	880	770	690	620	565	520	
		D kg/m²					3.500	2.350	1.650	1.200	900	690	545	
	SCH52/52C	C kg					1.390	1.200	1.050	940	850	770	710	
		D kg/m²					4.900	3.250	2.300	1.650	1.260	970	765	
	SCH52/100C	C kg						7.800	6.900	6.150	5.550	5.050	4.650	4.300
		D kg/m²						22.300	15.700	11.500	8.600	6.600	5.200	4.150
DOUBLE COVERED	SCH38/17DC	C kg	670	450	340	275	231	200	175					
		D kg/m²	8.900	3.750	1.930	1.100	700	470	330					
	SCH38/25DC	C kg	1.430	950	720	580	485	420	370					
		D kg/m²	19.400	8.200	4.150	2.400	1.500	1.020	710					
	SCH38/30DC	C kg			1.050	840	710	610	530	480	435			
		D kg/m²			6.100	3.500	2.230	1.500	1.050	770	575			
	SCH38/38DC	C kg			1.730	1.400	1.170	1.010	890	790	715			
		D kg/m²			10.350	6.000	3.750	2.500	1.770	1.280	970			
	SCH50/50DC	C kg					2.025	1.750	1.535	1.370	1.240	1.130	1.040	
		D kg/m²					6.500	4.350	3.050	2.250	1.680	1.300	1.020	
	SCH52/52DC	C kg					2.530	2.150	1.920	1.710	1.550	1.400	1.300	
		D kg/m²					8.350	5.600	3.930	2.880	2.160	1.650	1.300	
	SCH52/100DC	C kg						11.100	9.700	8.700	7.800	7.150	6.550	6.100
		D kg/m²						30.000	21.000	15.300	11.500	8.900	6.950	5.600

C Concentrated load D Distributed load

STANDARD VFR LINE GRATINGS LOAD-DEFORMATION

TYPE OF GRATING		L (mm)	300	400	500	600	700	800	900	1.000	1.100	1.200	1.300	1.400
		ƒ (mm)	1,5	2	2,5	3	3,5	4	4,5	5	5,5	6	6,5	7
SQUARE MESH	SCH38/15	C kg	64	42	31									
		D kg/m²	1.030	430	220									
	SCH38/25	C kg	295	190	145	115	97	83	73					
		D kg/m²	4.750	2.000	1.030	590	375	250	175					
	SCH38/30	C kg			250	200	165	145	125	110	100			
		D kg/m²			1.750	1.020	650	430	305	220	165			
	SCH38/38	C kg			505	400	340	290	255	230	205			
		D kg/m²			3.600	2.100	1.320	880	620	450	310			
	SCH38/60	C kg					2.350	2.000	1.750	1.500	1.320	1.150	1.000	
		D kg/m²					8.800	5.800	4.100	3.000	2.250	1.750	1.370	
	SCH50/50	C kg					630	540	475	425	383	350	320	
		D kg/m²					2.450	1.650	1.150	840	630	485	383	
RECTANGULAR MESH	SCH30/28	C kg			265	210	173	150	130	116	104			
		D kg/m²			2.300	1.330	845	565	395	290	215			
MINI MESH	SCH13/30	C kg			320	258	215	185	160	145	131			
		D kg/m²			2.300	1.330	840	565	395	288	215			
	SCH13/38	C kg			700	550	450	390	335	290	250			
		D kg/m²			4.650	2.680	1.690	1.140	790	580	430			
	SCH52/30	C kg			247	195	165	140	125	112	101			
		D kg/m²			1.770	1.030	645	430	300	220	165			
	SCH52/40	C kg			580	465	390	335	290	260	235			
		D kg/m²			4.150	2.400	1.500	1.020	710	520	390			
	SCH52/52	C kg				1.230	1.030	880	775	695	625	570	525	
		D kg/m²				6.350	4.000	2.650	1.880	1.380	1.030	800	625	
	SCH52/100	C kg						6.800	5.950	5.300	4.800	4.350	4.000	3.750
		D kg/m²						20.500	14.500	10.500	7.900	6.100	4.800	3.850
MICRO MESH	SCH12/30	C kg			365	290	245	210	185	165	148			
		D kg/m²			2.600	1.500	950	640	445	325	245			
	SCH12/38	C kg			790	620	515	440	380	330	290			
		D kg/m²			5.250	3.000	1.920	1.290	900	650	490			
COVERED	SCH38/17C	C kg	245	163	123	98	83	71	62					
		D kg/m²	3.350	1.430	730	420	265	175	125					
	SCH38/25C	C kg		420	315	250	210	183	160	142	130			
		D kg/m²		3.800	1.950	1.130	710	475	330	240	180			
	SCH38/30C	C kg		650	500	400	335	290	255	225	205			
		D kg/m²		6.100	3.100	1.800	1.140	760	535	390	290			
	SCH38/38C	C kg		1.220	920	740	610	530	465	415	370			
		D kg/m²		11.300	5.850	3.350	2.100	1.420	1.000	730	540			
	SCH50/50C	C kg					1.080	930	820	735	660	600	555	
		D kg/m²					3.750	2.500	1.750	1.275	970	740	580	
	SCH52/52C	C kg					1.490	1.290	1.130	1.000	910	820	760	
		D kg/m²					5.300	3.500	2.490	1.800	1.350	1.050	825	
	SCH52/100C	C kg						8.500	7.400	6.600	6.000	5.400	5.000	4.650
		D kg/m²						24.300	17.000	12.200	9.300	7.200	5.650	4.550
DOUBLE COVERED	SCH38/17DC	C kg	680	455	345	280	234	202	178					
		D kg/m²	9.100	3.850	1.970	1.130	710	480	335					
	SCH38/25DC	C kg	1.460	970	735	595	495	430	378					
		D kg/m²	19.900	8.400	4.250	2.480	1.560	1.050	735					
	SCH38/30DC	C kg			1.070	865	725	628	550	490	444			
		D kg/m²			6.300	3.670	2.300	1.550	1.080	790	590			
	SCH38/38DC	C kg			1.780	1.440	1.200	1.040	910	820	738			
		D kg/m²			10.700	6.200	3.900	2.610	1.830	1.340	1.000			
	SCH50/50DC	C kg					2.080	1.790	1.580	1.410	1.275	1.160	1.070	
		D kg/m²					6.750	4.550	3.170	2.330	1.740	1.340	1.055	
	SCH52/52DC	C kg					2.640	2.280	1.990	1.790	1.610	1.470	1.350	
		D kg/m²					8.750	5.850	4.100	3.010	2.250	1.740	1.360	
	SCH52/100DC	C kg						11.700	10.250	9.200	8.300	7.500	6.950	6.450
		D kg/m²						31.800	22.300	16.300	12.250	9.400	7.400	5.900

C Concentrated load D Distributed load

For further details, the reference standard document can be downloaded from **www.mmgrigliati.com**

PREMIUM ISO LINE GRATINGS LOAD-DEFORMATION

TYPE OF GRATING		L (mm)	500	600	700	800	900	1.000	1.100	1.200	1.300	1.400
		f (mm)	2,5	3	3,5	4	4,5	5	55	6	6,5	7
SQUARE MESH	SCH38/38	C kg	385	305	255	220	190	174	156			
		D kg/m²	2.750	1.550	1.000	670	470	340	255			
	SCH40/30	C kg	180	144	120	103	90	80	73			
		D kg/m²	1.275	745	465	310	220	160	120			
	SCH40/38	C kg	460	370	305	265	233	205	185			
		D kg/m²	3.250	1.900	1.200	800	560	410	305			
	SCH50/50_HDL	C kg			560	480	420	380	340	310	285	
		D kg/m²			2.150	1.450	1.020	750	560	430	340	
RECTANGULAR MESH	SCH30/28	C kg	200	160	132	112	98	88	79			
		D kg/m²	1.750	1.000	640	425	300	220	165			
	SCH30/38	C kg	500	395	325	280	245	215	195			
		D kg/m²	4.370	2.500	1.600	1.050	750	550	410			
	SCH50/28	C kg	225	183	150	130	110	102	91			
		D kg/m²	1.750	1.000	635	420	300	220	163			
	SCH68/50	C kg			385	330	290	260	235	210	195	180
		D kg/m²			1.600	1.050	750	550	410	315	250	200
MINI MESH	SCH52/30	C kg	187	150	125	108	95	85	76			
		D kg/m²	1.330	780	490	320	230	167	125			
	SCH52/40	C kg	440	350	295	255	220	200	180			
		D kg/m²	3.150	1.800	1.150	760	540	390	295			
COVERED	SCH30/28C	C kg	730	580	485	420	365	325	295			
		D kg/m²	4.600	2.700	1.700	1.150	800	580	435			
	SCH30/38C	C kg	1.450	1.150	980	850	740	660	590			
		D kg/m²	9.500	5.600	3.500	2.350	1.650	1.200	900			
	SCH40/30C	C kg	530	430	360	310	270	242	220			
		D kg/m²	3.100	1.750	1.130	750	530	385	290			
	SCH40/38C	C kg	1.290	1.040	870	750	660	590	530			
		D kg/m²	7.800	4.500	2.850	1.900	1.330	980	730			
	SCH50/50C_HDL	C kg			900	780	680	610	550	505	460	
		D kg/m²			3.050	2.050	1.430	1.050	790	600	475	

C Concentrated load D Distributed load

PREMIUM VIN LINE GRATINGS LOAD-DEFORMATION

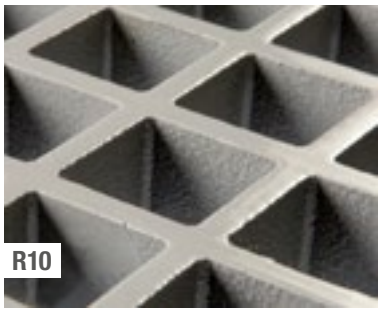
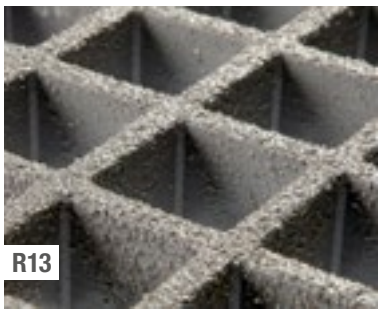
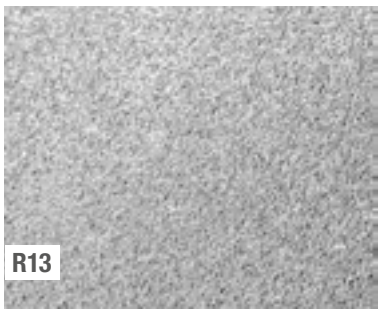
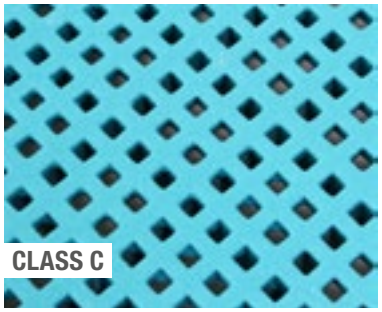
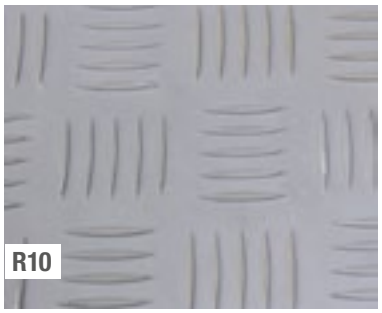
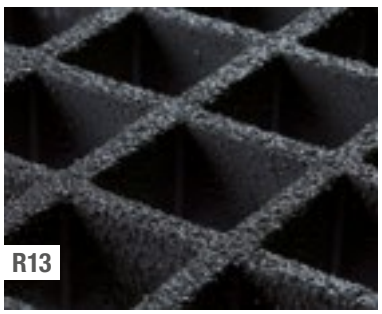
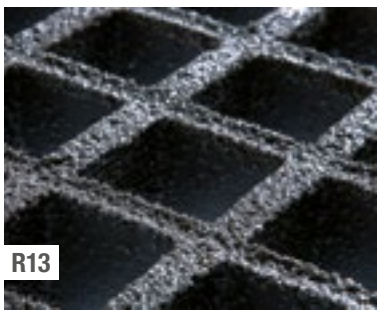
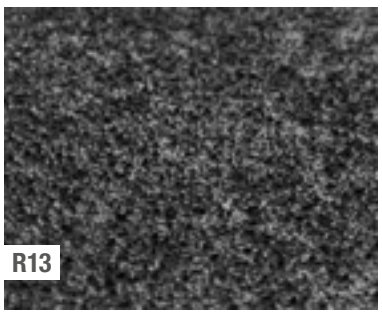
TYPE OF GRATING		L (mm)	500	600	700	800	900	1.000	1.100	1.200	1.300	1.400
		ƒ (mm)	2,5	3	3,5	4	4,5	5	55	6	6,5	7
SQUARE MESH	SCH38/38	C kg	420	340	280	240	210	190	170			
		D kg/m²	3.000	1.750	1.100	740	510	375	280			
	SCH40/30	C kg	195	155	130	115	100	90	80			
		D kg/m²	1.400	820	515	345	240	175	130			
	SCH40/38	C kg	500	410	335	290	255	225	205			
		D kg/m²	3.600	2.100	1.300	880	620	450	335			
	SCH50/50_HDL	C kg			610	535	460	410	375	340	310	
		D kg/m²			2.400	1.600	1.130	820	610	470	370	
RECTANGULAR MESH	SCH30/28	C kg	220	175	145	125	108	97	87			
		D kg/m²	1.930	1.100	700	470	330	240	180			
	SCH30/38	C kg	550	430	360	310	270	240	215			
		D kg/m²	4.800	2.800	1.750	1.150	825	600	450			
	SCH50/28	C kg	250	200	165	142	125	110	100			
		D kg/m²	1.900	1.100	700	470	330	240	180			
	SCH68/50	C kg			425	360	320	285	255	235	215	200
		D kg/m²			1.750	1.175	830	600	455	350	275	220
MINI MESH	SCH52/30	C kg	205	165	138	115	103	93	83			
		D kg/m²	1.450	850	530	360	250	185	135			
	SCH52/40	C kg	480	390	325	280	245	220	197			
		D kg/m²	3.450	2.000	1.250	840	590	435	325			
COVERED	SCH30/28C	C kg	770	610	515	440	385	345	310			
		D kg/m²	4.950	2.850	1.800	1.200	850	620	465			
	SCH30/38C	C kg	1.550	1.250	1.040	890	780	700	630			
		D kg/m²	10.300	5.900	3.750	2.500	1.750	1.250	960			
	SCH40/30C	C kg	560	455	380	330	285	255	230			
		D kg/m²	3.300	1.900	1.200	810	565	415	310			
	SCH40/38C	C kg	1.350	1.100	920	790	690	625	560			
		D kg/m²	8.400	4.850	3.050	2.050	1.430	1.050	780			
	SCH50/50C_HDL	C kg			960	830	730	650	585	535	490	
		D kg/m²			3.250	2.200	1.550	1.120	840	650	510	

- *The above mentioned characteristics must be understood as reference values for standard material in ambient temperature. Even though they should not be taken as guaranteed characteristics, they are based on our experience and provided in good faith.*
- *In accordance with the DIN 24537-3 standard, the safety conversion factor should be 0,75 for internal exposure conditions, 0,65 for external exposure conditions, and 0,50 for aggressive exposure conditions.*
- *Regardless of the type of exposure conditions, chemical resistance must always be verified by contacting M.M. S.r.l. technical department.*
- *In cases of heavy loads and narrow span, the compressive strength must always be verified.*

C Concentrated load D Distributed load

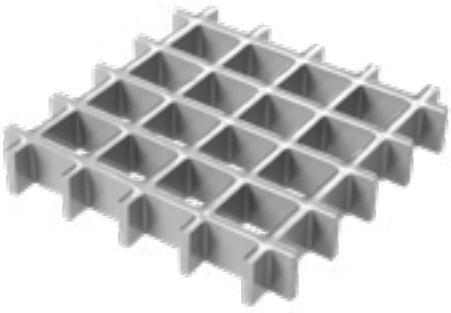
FINISHINGS

Gratings can be supplied with a variety of finishings that provide non-slip characteristics in accordance with DIN 51130 / DIN 51097 standards and surface electrical conductivity.

	SMOOTH	MENISCUS	COVERED SURFACE
WITHOUT QUARTZ **DIN 51130** Antiskid	 R10	 R13	
WITH QUARTZ **DIN 51130** Antiskid	 R13	 R13	 R13
Q-PAINT **UNI EN 13451-1** (swimming pool equipment) class 24 **DIN 51097** Suitable for bare feet	 CLASS C		 CLASS C
CHECKERED SURFACE **DIN 51130** Antiskid			 R10
ESD LINE SURFACE ELECTRICAL CONDUCTIVITY **DIN 51130** Antiskid	 R13	 R13	 R13

02

MESHES

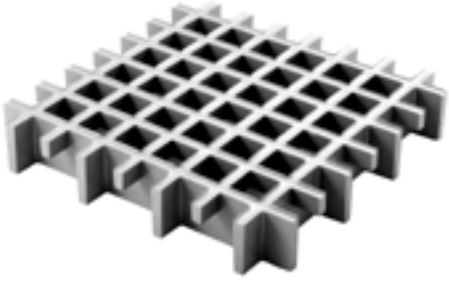


SQUARE MESH

It is characterized by the same bearing capacity in both directions, it stands out for its versatility of use and capacity to support heavy loads.

RECTANGULAR MESH

It is ideal for the construction of industrial and residential fences.



MINI MESH

With safety mesh suitable for raised walkways in compliance with current safety regulations.

For further details, the reference standard document can be downloaded from **www.mmgrigliati.com**

STANDARD LINE

IFR / VFR

The standard line gratings are made of polyester or vinylester resin, fibreglass and inorganic halogen-free fillers that provide the self-extinguishing properties.

They are supplied with different **non-slip** level surfaces, classified and certified according to the DIN 51130 standard (determination of the non-slip properties), as shown in the finishings table (page 15).

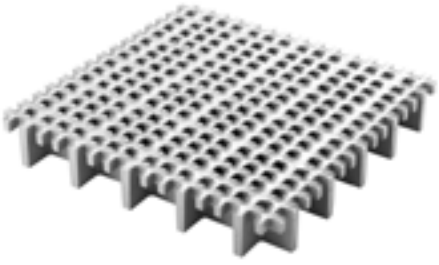
Gratings are certified as long lasting products whose mechanical performance is not affected by the cycles of hot/cold and humidity exposure in accordance with the UNI EN ISO 9142 standard; they have also passed the aging resistance test with cycles of UV exposure in accordance with the ASTM G154 standard; they are supplied with self-extinguishing properties in accordance with EN13501, ASTM E84, ASTM D635, DIN 4102, NFP 92-507 standards.

They are tested and classified as **excellent electrical insulators**.

DIELECTRIC

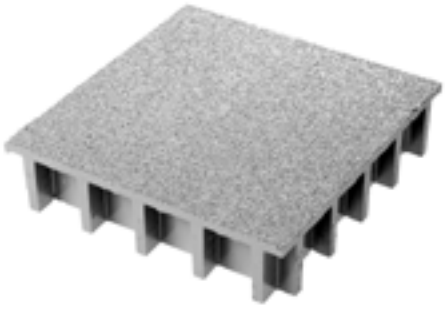
SELF-EXTINGUISHING

RESISTANT TO ATMOSPHERIC AGENTS

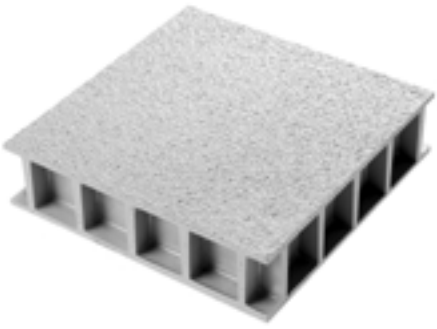


MICRO MESH

"Heelproof" mesh.



COVERED

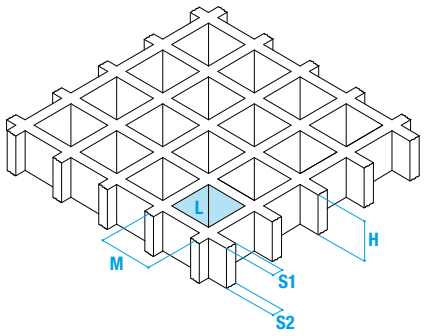


DOUBLE COVERED

Used mainly for covering pipes, tanks or areas where there is the need to prevent objects or dust from falling or the release of vapours.
Ideal for covering cable ducts.

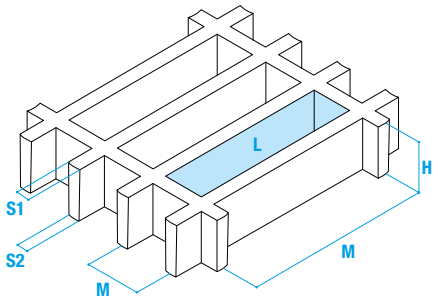
SQUARE MESH

	M	L	H	S1	S2	STANDARD PANELS*	kg/m²
SCH38/15	38x38 mm	31x31 mm	15 mm	7 mm	5 mm	1.220x3.660 mm	5,0
SCH38/25	38x38 mm	31x31 mm	25 mm	7 mm	5 mm	1.000x2.000 mm 1.000x3.000 mm 1.000x4.038 mm 1.220x3.660 mm	11,0
SCH38/30	38x38 mm	31x31 mm	30 mm	7 mm	5 mm	1.000x2.000 mm 1.000x3.000 mm 1.000x4.038 mm 1.220x3.660 mm	15,0
SCH38/38	38x38 mm	31x31 mm	38 mm	7 mm	5 mm	1.000x2.000 mm 1.000x3.000 mm 1.000x4.038 mm 1.220x3.660 mm 1.220x4.038 mm 1.528x4.038 mm	18,0
SCH38/60	38x38 mm	27x27 mm	60 mm	11 mm	9 mm	1.240x3.660 mm	62,0
SCH50/50	50x50 mm	42x42 mm	50 mm	8 mm	5 mm	1.220x3.660 mm	19,5



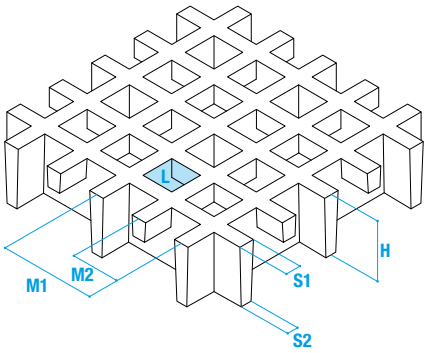
RECTANGULAR MESH

	M	L	H	S1	S2	STANDARD PANELS*	kg/m²
SCH30/28	100x30 mm	92x22 mm	28 mm	8 mm	7 mm	1.000x2.000 mm 1.500x2.000 mm	13,0
SCH60/25	100x60 mm	93x53 mm	25 mm	7 mm	5 mm	1.500x2.000 mm	7,0
SCH60/28	100x60 mm	92x52 mm	28 mm	8 mm	7 mm	1.500x2.000 mm	9,0



MINI MESH

	M1	M2	L	H	S1	S2	STANDARD PANELS*	kg/m²
SCH52/30	52x52 mm	26x26 mm	19x19 mm	30 mm	7 mm	5 mm	1.000x2.000 mm 1.000x3.000 mm 1.000x4.050 mm 1.220x3.660 mm 1.500x2.000 mm	15,0
SCH52/40	52x52 mm	26x26 mm	19x19 mm	40 mm	7 mm	5 mm	1.000x2.000 mm 1.000x3.000 mm 1.000x4.050 mm 1.500x2.000 mm	21,0
SCH52/52	52x52 mm	26x26 mm	19x19 mm	52 mm	8 mm	7 mm	1.000x2.000 mm 1.000x3.000 mm 1.000x4.050 mm	26,5
SCH52/100	52x52 mm	26x26 mm	19x19 mm	100 mm	10 mm	8 mm	1.010x1.495 mm	56,0
SCH13/30	40x40 mm	20x20 mm	13x13 mm	30 mm	7 mm	5 mm	1.007x3.007 mm 1.007x4.047 mm 1.247x4.047 mm	19,0
SCH13/38	40x40 mm	20x20 mm	13x13 mm	38 mm	7 mm	5 mm	1.007x3.007 mm 1.007x4.047 mm 1.247x4.047 mm	23,5

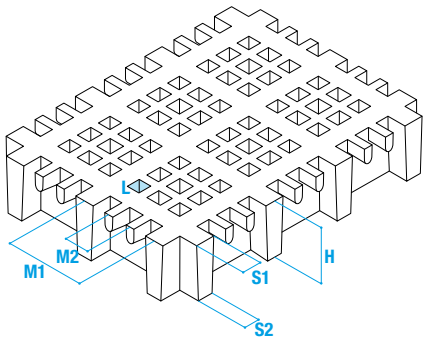


** Tolerance: ± 5 mm panel size / ± 2 mm height*

***M** = mesh*
***M1** = main mesh*
***M2** = secondary mesh*
***L** = clear span*
***H** = height*
***S1** = upper side beam thickness*
***S2** = lower side beam thickness*

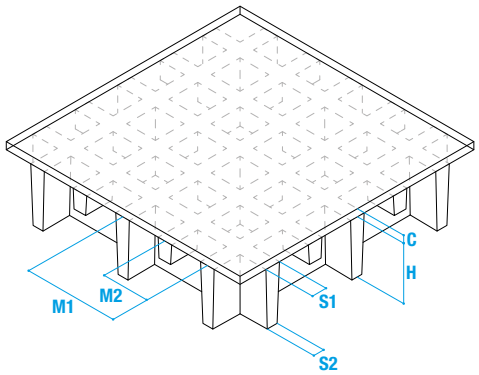
MICRO MESH

	M1	M2	L	H	S1	S2	STANDARD PANELS*	kg/m²
SCH12/30	38x38 mm	12x12 mm	8x8 mm	30 mm	7 mm	5 mm	1000x4038 mm 1220x3660 mm	16,0
SCH12/38	40x40 mm	12x12 mm	8x8 mm	38 mm	7 mm	5 mm	1007x3007 mm 1007x4047 mm 1247x4047 mm	23,5



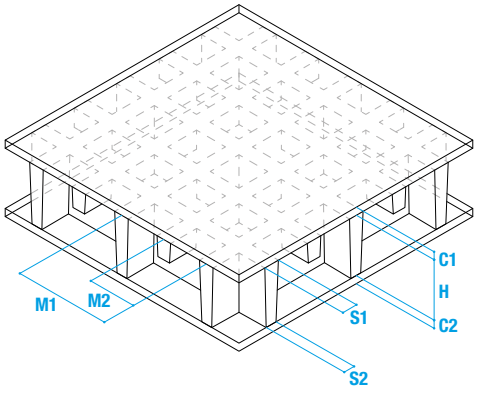
COVERED

	M1	M2	C	H+C	S1	S2	STANDARD PANELS*	kg/m²
SCH38/17C	38x38 mm		3 mm	20 mm	7 mm	5 mm	1.220x3.660 mm	15,0
SCH38/25C	38x38 mm		3 mm	28 mm	7 mm	5 mm	1.000x2.000 mm 1.000x4.038 mm 1.220x3.660 mm	20,0
SCH38/30C	38x38 mm		3 mm	33 mm	7 mm	5 mm	1.000x2.000 mm 1.000x4.038 mm 1.220x3.660 mm	23,0
SCH38/38C	38x38 mm		3 mm	41 mm	7 mm	5 mm	1.000x3.660 mm 1.220x3.660 mm	25,0
SCH50/50C	50x50 mm		3 mm	53 mm	8 mm	5 mm	1.220x3.660 mm	27,5
SCH52/52C	52x52 mm	26x26 mm	3 mm	55 mm	8 mm	5 mm	1.000x2.000 mm 1.000x3.000 mm 1.000x4.050 mm	35,5
SCH52/100C	52x52 mm	26x26 mm	3 mm	103 mm	10 mm	8 mm	1.010x1.495 mm	63,0



DOUBLE COVERED

	M1	M2	C1	C2	H+C1+C2	S1	S2	STANDARD PANELS*	kg/m²
SCH38/17DC	38x38 mm		3 mm	3 mm	23 mm	7 mm	5 mm	1.220x3.660 mm	21,0
SCH38/25DC	38x38 mm		3 mm	3 mm	31 mm	7 mm	5 mm	1.000x2.000 mm 1.000x4.038 mm 1.220x3.660 mm	25,0
SCH38/30DC	38x38 mm		3 mm	3 mm	36 mm	7 mm	5 mm	1.000x2.000 mm 1.000x4.038 mm 1.220x3.660 mm	27,5
SCH38/38DC	38x38 mm		3 mm	3 mm	44 mm	7 mm	5 mm	1.000x1.800 mm 1.000x3.660 mm 1.220x3.660 mm	30,0
SCH50/50DC	50x50 mm		3 mm	3 mm	56 mm	8 mm	5 mm	1.220x3.660 mm	35,5
SCH52/52DC	52x52 mm	26x26 mm	3 mm	3 mm	58 mm	8 mm	5 mm	1.000x2.000 mm 1.000x3.000 mm 1.000x4.050 mm	44,5
SCH52/100DC	52x52 mm	26x26 mm	3 mm	3 mm	106 mm	10 mm	8 mm	1.010x1.495 mm	70,0



***M** = mesh*
***M1** = main mesh*
***M2** = secondary mesh*
***C1** = upper laminate thickness*
***H+C** = total height*
***C2** = lower laminate thickness*
***S1** = upper side beam thickness*
***S2** = lower side beam thickness*

** Tolerance: ± 5 mm panel size / ± 2 mm height*

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