



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

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SCALE VERTICALI "CE"

MM13

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INSPECTION MANHOLE FRP FIXED DOUBLE STILE LADDERS **- CE MARKED**



COMPOSITE SOLUTION



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SUMMARY

1. USES AND CHARACTERISTICS	3
2. REFERENCE NORMS AND COMPULSORY USES	4
3. FIELDS OF APPLICATION	5
4. MATERIALS	6
4.1 PARTS OF THE INSPECTION MANHOLE FRP FIXED VERTICAL LADDERS	6
4.2 VERTICAL SIDE RAILS TABLE.....	6
4.3 RUNG PROFILES TABLE.....	7
4.4 FIXING CLAMPS TABLE.....	7
4.5 FIXING DEVICES TABLE.....	7
5. LADDERS DESIGN	9
6. TYPES OF LADDERS	10
6.1 INSPECTION MANHOLE VERTICAL LADDER TYPE 1.....	10
6.2 INSPECTION MANHOLE VERTICAL LADDER TYPE 2.....	10
6.3 INSPECTION MANHOLE VERTICAL LADDER TYPE 3.....	10
7. ASSEMBLING INSTRUCTIONS	11

1. USE AND CHARACTERISTICS



M.M. FRP ladders, built assembling isophthalic resin profiles, feature several advantages compared to the metal ones:

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

The FRP ladders are used for fixed and permanent installations inside inspection manholes, in wastewater, rainwater, surface water (except for national norms where requested) and potable water environments.

The main objective is to allow a safe access to people.

The FRP fixed ladders for inspection manholes feature a specific label according to the UE 305/2011 regulation.

2. REFERENCE NORMS

Ladders are designed and built according to the following norms:

<p><u>UNI EN 14396/2004</u></p> <p>Fixed ladders for inspection manholes.</p>	<p>This standard applies to permanent fixed ladders in manholes. It specifies the performance criteria for the mechanical stability and resistance while providing protection against falling.</p> <p>The ladders specified in this European Standard are suitable for use in sewage, rainwater, surface water and, subject to requirements of national regulations, potable water environments.</p> <p>The Norm reports the regulation for the CE marking of the products.</p>
<p><u>(UE) 305/2011 REGULATION</u></p> <p>European Regulation for construction materials (which abrogates the 89/106/CEE directive)</p>	<p>This regulation establishes the conditions for the introduction of construction materials on the market.</p> <p>Also establishes the evaluation criteria of the performances for these products and the CE marking conditions.</p>

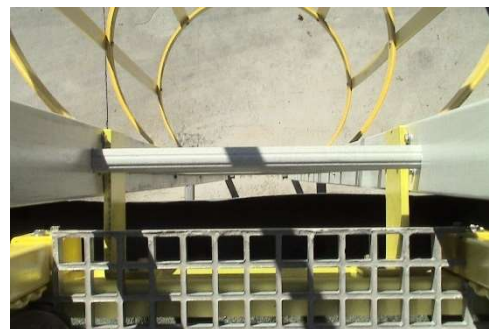
3. EMPLOYMENT FIELDS

M.M. INSPECTION MANHOLES FRP FIXED LADDERS WITH CE MARKING are suitable to fixed and permanent installations inside inspection manholes in wastewater, rainwater, surface water (except if subject to requirements of national regulations) and potable water environments and their main objective is to allow a safe access to people.

Corrosive atmospheres and challenging environments allow to take full advantage of the properties of these structures. These ladders show all their potential in those industrial areas where conventional materials are not long lasting or need continuous retouch of varnishing or protection with high maintenance costs and may not guarantee a continuous safety in the working environment.

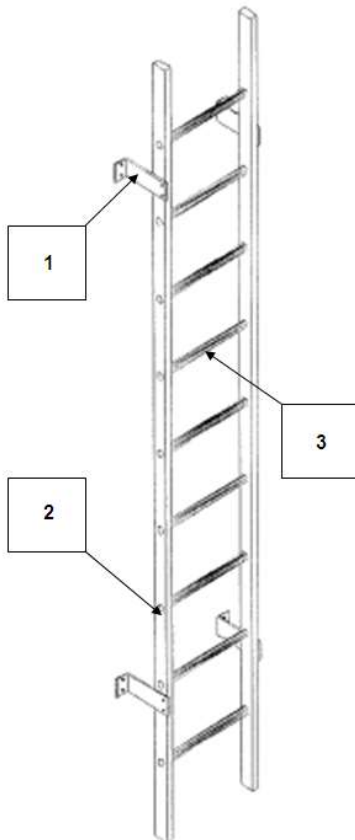
The industries that use MM's FRP ladders for inspection manholes are:

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



4. MATERIALS

4.1 PARTS OF THE INSPECTION MANHOLE FIXED LADDERS



Legend

1. Anchor bracket
2. Side rail
3. Rung

4.2 STILE PROFILES TABLE

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

4.3 RUNG PROFILES TABLE

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
	53R29283I	Rectangular antiskid rung	28x29x3	6	0.46	Grey RAL 7035



4.4 ANCHOR BRACKETS TABLE

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

4.5 FIXING DEVICES TABLE

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	-

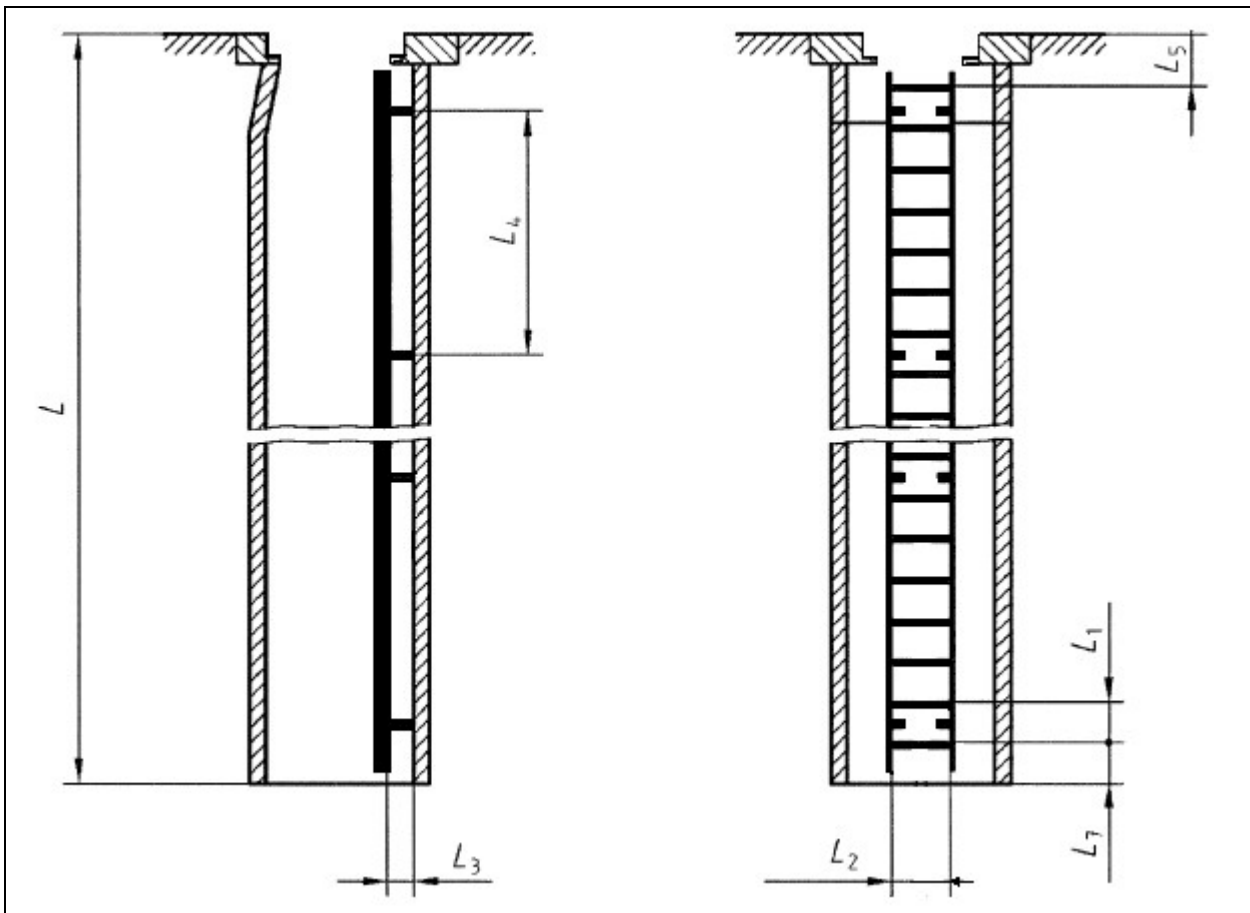
AISI 316 S.S. SCREWS	56	Screw used for the fixing of the FRP bracket to the stile, for ladder type 3	M8x35 screw	-
AISI 316 S.S. SCREWS	56	Screw used for the fixing of the rings to the vertical rod, type 1 and 2	M8x45 screw	-
AISI 316 S.S. SCREWS	56	Screw used for the fixing of the rings to the vertical 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 56	washers	M8 M6	-
AISI 316 BOLTS	56 56	bolts	M8 M6	-

ANCHOR BOLTS	CODE	DESCRIPTION	DIMENSIONS (mm)	-
	HST3-R M8	Stainless steel expansion anchor for cracked concrete	M8x75	-
	HUS-HR M8	Stainless steel screw anchor	M8x75	-

5. LADDERS DESIGN

Key:


- L : maximum climbing height
- L₁ : distance between the top of adjacent rungs
- L₂ : width of the rungs
- L₃ : minimum stand off distance at any point
- L₄ : maximum distance between two anchor brackets
- L₅ : distance from the ground level to the top of the first rung (from the top)
- L₆ : n.a.
- L₇ : distance between the base level and the first rung from the bottom



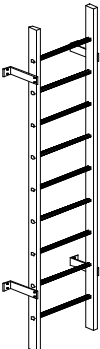
Tolerance	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇
min.	250	300	150	-	-	n.a.	≤ L ₁
max	300	600	170	^b	L ₁ ^a	n.a.	
^a	In special cases (e.g. where the manhole design requires so). The regulations valid in the place of use shall be taken into account for the installation.						
^b	See chapter 7						

6. TYPES OF LADDERS

6.1 INSPECTION MANHOLE LADDER TYPE 1

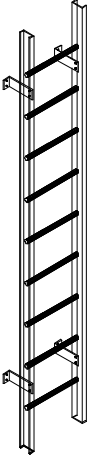
	CSCALA1CE – INSPECTION MANHOLE LADDER TYPE 1		
	Side rail: rectangular profile type 85x25x3 mm		
	Rung: - Circular rung 28x21.3 mm with antiskid surface - Rectangular rung 28x29x3 mm		
	Color of the profiles: grey RAL 7035		
	Usable width of the rung: 300+600 mm		
	Total width of the ladder: 350+650 mm		
	Spacing between rungs: 300 mm		
	Maximum distance between the anchor points: 3000 mm		
	H ladder mm	suggested n. of anchor brackets	
	2000	4	
	3000	4	
4000	6		
5000	6		
6000	6		

6.2 INSPECTION MANHOLE LADDER TYPE 2

	CSCALA2CE – INSPECTION MANHOLE LADDER TYPE 2		
	Side rail: rectangular profile type 58x25x3 mm		
	Rung: - Circular rung 28x21.3 mm with antiskid surface - Rectangular rung 28x29x3 mm		
	Color of the profiles: grey RAL 7035		
	Usable width of the rung: 300+600 mm		
	Total width of the ladder: 350+650 mm		
	Spacing between rungs: 300 mm		
	Maximum distance between the anchor points: 2100 mm		
	H ladder mm	suggested n. of anchor brackets	
	2000	4	
	3000	6	
4000	6		
5000	8		
6000	8		

6.3 INSPECTION MANHOLE LADDER TYPE 3

	CSCALA3CE – INSPECTION MANHOLE LADDER TYPE 3		
	ACS STATEMENT – RED FILIGREE ON THE PROFILE USABLE IN CONTACT WITH POTABLE WATER		
	Side rail: "C" profile type 90x35x8 mm		
	Rung: - Circular rung 28x21.3 mm with antiskid surface - Rectangular rung 28x29x3 mm		
	Color of the profiles: grey RAL 7035		
	Usable width of the rung: 300+600 mm		
	Total width of the ladder 370+670 mm		
	Spacing between rungs: 300 mm		
	Maximum distance between the anchor points: 3000 mm		
	H ladder mm	suggested n. of anchor brackets	

	2000	4	
	3000	4	
	4000	6	
	5000	6	
	6000	6	



7. ASSEMBLING INSTRUCTIONS

The FRP ladders for inspection manholes are fixed 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 anchor brackets (L ₄)
Ladder type 1	mm 3000
Ladder type 2	mm 2100
Ladder type 3	mm 3000

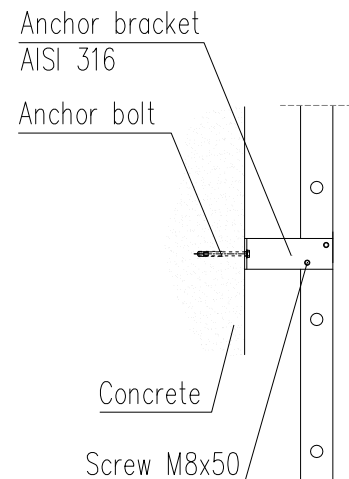
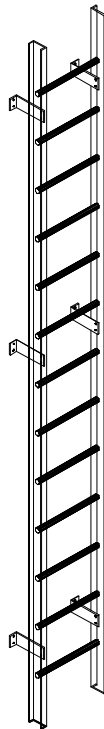
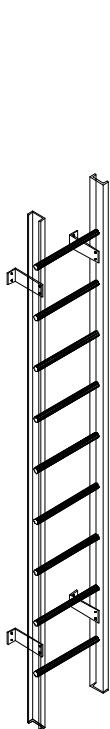


Fig. 1 Ladder with two wall anchor brackets **Fig. 2** Ladder with more anchor points

Fig. 3 Fixing to concrete

The ladder shall be fastened by means of at least 4 anchor brackets. The maximum distance between two anchor brackets could not be more than the maximum distance (L_4) reported in the relevant table.

The minimum spacing between the ladder and the wall (L_3) shall not be less than 150 mm (in each point).

The upper anchor brackets must be placed underneath the highest rung, while the lower anchor brackets must be placed under the second rung from the bottom.

The fixing of each anchor bolt to the side rail is done by means of two M8 DIN933 bolts, flat DIN125 washers and DIN985 self-blocking nuts. AISI 316 fasteners shall be used.

The anchor brackets shall be fastened to the wall using the following anchor bolts (or equivalent ones):

HST3-R M8 (Stainless steel) – $L_{\min} \geq 75$ mm

HUS-HR M8 (Stainless steel) – $L_{\min} \geq 75$ mm

The suggested fixing devices have been considered for non-cracked concrete, shear force 1,5 kN, traction force 0.84 kN.

The instructions of the supplier of the anchor bolts must be carefully followed.