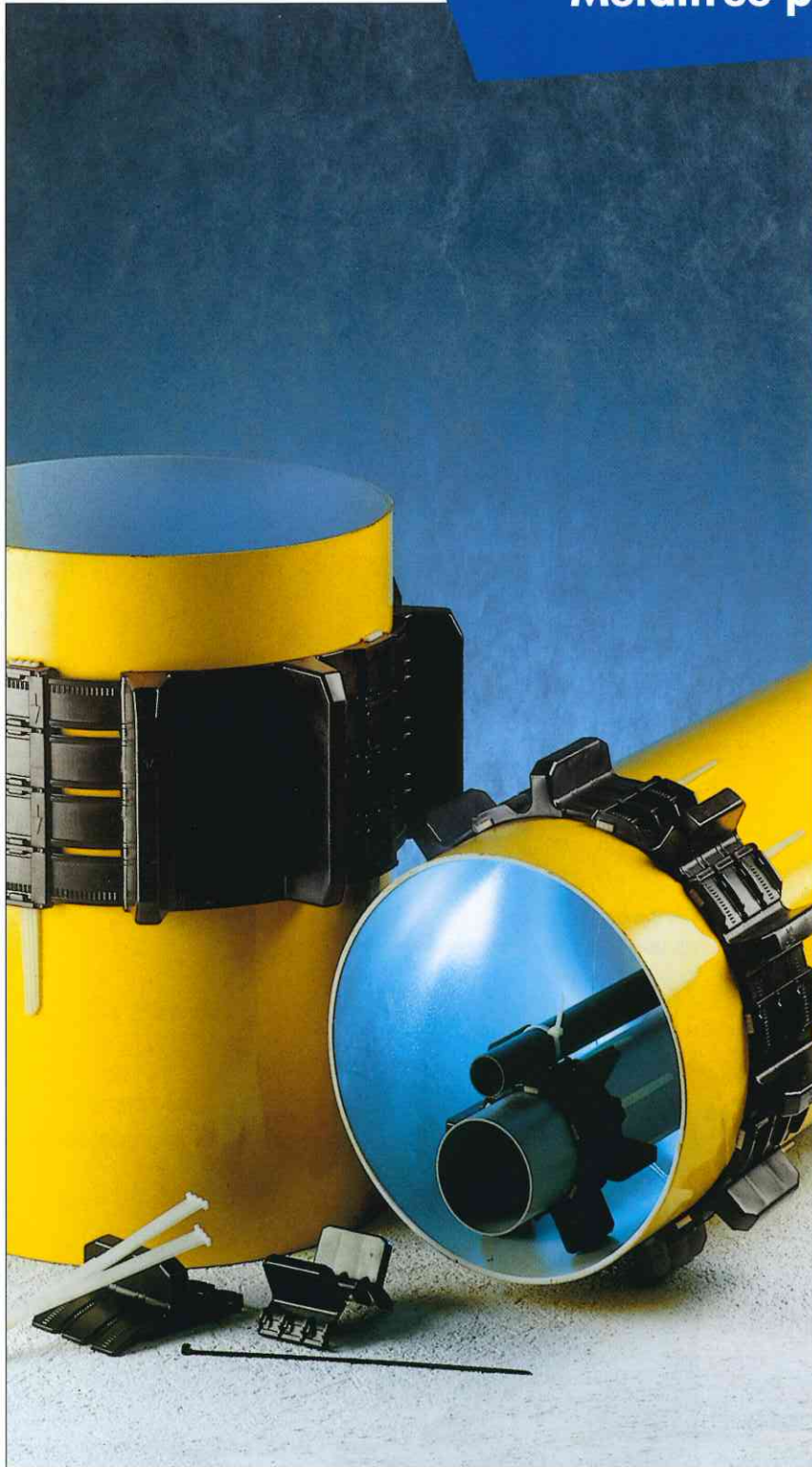


Metalfree plastic insulators (MF)



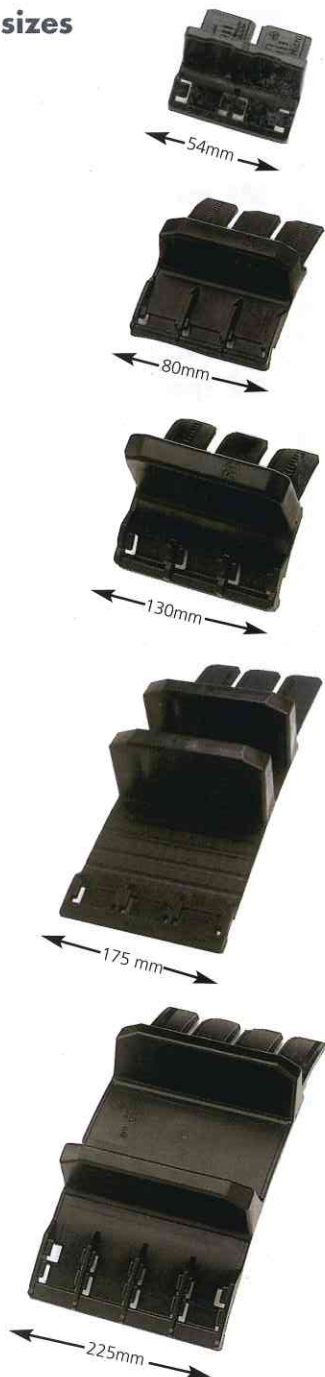
MF micro
MF mini
MF midi
MF medi
MF maxi
MF maxi 0,5

In brief...

- **MF insulators (MF = metalfree)** are ideally suited for cathodically protected pipelines.
- Their patented construction means **speedier assembly times** – no more tooling around with screwdrivers or supplementary clamping implements!
- Only 6 different segment sizes – micro, mini, midi, medi, maxi and maxi 0,5 – can cope with **all pipe diameters from ND 15 upwards**.
- The segments are linked and tightened by means of plastic pins. The flush fit of their corresponding shapes guarantees extreme endurance.



Segment sizes



MF micro

arc length 23-33mm, width 54mm, 1 skid per segment.
For small pipe diameters from 21mm (3 segments) to ca. 80mm (8 segments).

Skid heights (in mm) :
8, 12,5, 16,5, 21, 28, 33, 44, 50, 65, 75, 90, 100

MF mini

arc length 49-65mm, width 80mm, 1 skid per segment.
For small pipe diameters from 40mm (3 segments) to ca. 140mm (7 segments).

Skid heights (in mm) :
9, 12,5, 16,5, 21, 28, 33, 38, 44, 50, 65, 75, 90, 100, 125

MF midi

arc length 110-150mm, width 130mm, 1 skid per segment.
For medium pipe diameters from ca. 110mm (3 segments) to ca. 460mm (10 segments).

Skid heights (in mm) :
12,5, 16,5, 21, 28, 33, 38, 44, 50, 65, 75, 80, 90, 100, 110, 125, 135, 150, 165, 175

MF medi

arc length 305-410mm, width 175mm, 2 skids per segment.
For large pipe diameters from ca. 400mm (4 segments) to ca. 650mm.

Skid heights (in mm) :
21, 28, 38, 50, 65, 75, 90, 100, 125, 135, 150, 165, 175

MF maxi

arc length 339-435mm, width 225mm, 2 skids per segment.
For large pipe diameters from ca. 400mm (4 segments) to as large as they come.

Skid heights (in mm) :
21, 28, 38, 50, 65, 75, 90, 100, 125, 135, 150, 165, 175

MF maxi 0,5 (half segment of MF maxi)

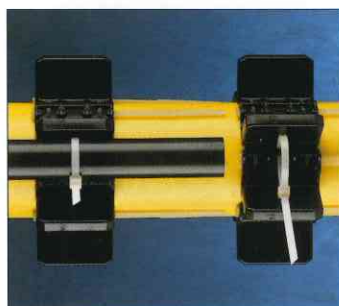
arc length 180-276mm, width 225mm, 1 skid per segment.
For in-between sizes, 390-550mm (1 additional segment for Maxi).

Skid heights (in mm) :
21, 28, 38, 50, 65, 75, 90, 100, 125



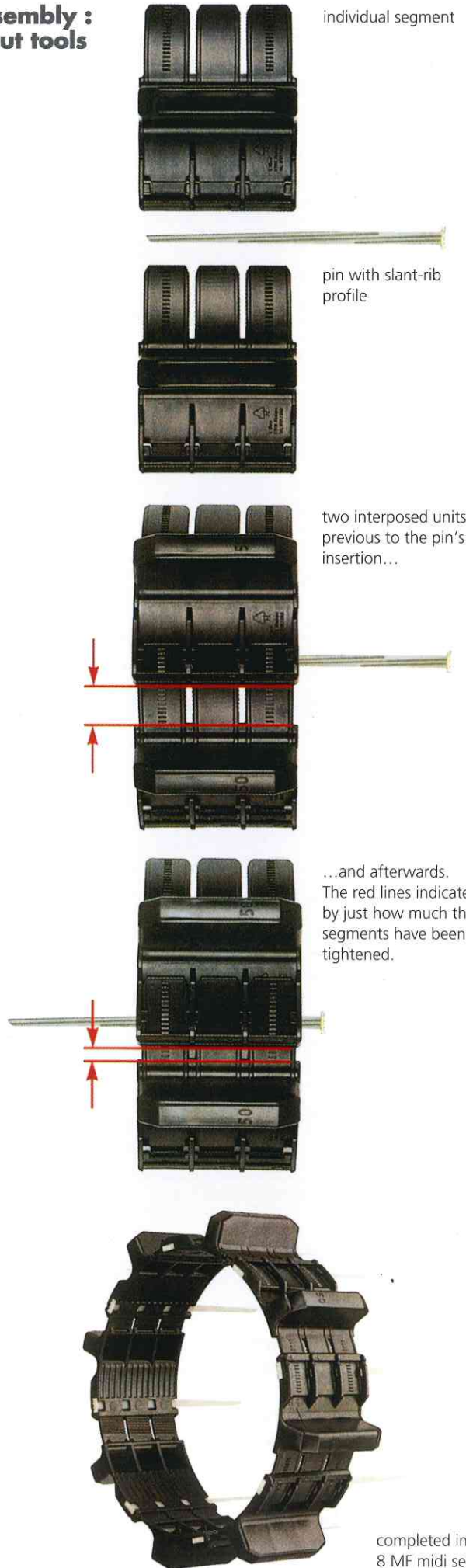
To find out the necessary number of segments per pipe diameter use the table two pages on.

Protective pipe for cable can be attached



A cable pipe can be attached to all segments using quick-lock-binders (metalfree) or steel tightening clamps.

**Segment assembly :
speed without tools**



individual segment

pin with slant-rib profile

two interposed units previous to the pin's insertion...

...and afterwards. The red lines indicate by just how much the segments have been tightened.

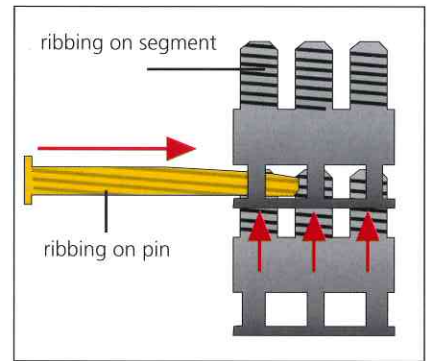
completed insulator ring consisting of 8 MF midi segment units for diameter 276-376mm.

MF insulators : assembled without fuss or additional tools – a straightforward affair.

Procedure :

1. The individual units are interposed until an insulator ring is completed around the pipe.
2. The segment units are connected and tightened using a plastic pin.

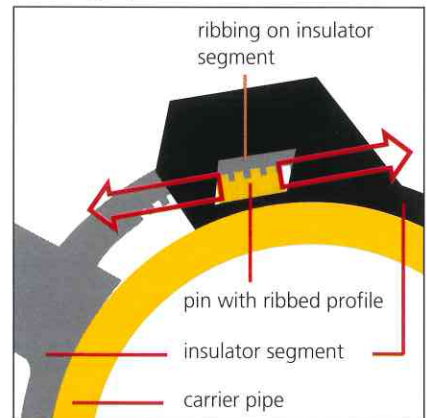
What happens is that the slant rib profile of the pin slots into the ribbing of the segments, pulling both together on the pin's insertion (see drawing 1).



drawing 1 : the inside view

3. Final tension is achieved by withdrawing the pin and reinserting it until the complete ring grips the pipe tightly.

The **corresponding shapes** fit exactly to **ensure an enduring connection** i.e. an high load-bearing capacity (see drawing 2)



drawing 2 : cross section view

Material

MF insulators are made from very high quality original material (no recycling material). We use Polypropylene block copolymer PP. This polymer type has a much better resistance against stress cracking in comparison to PE and in addition excellent sliding characteristics.

The technical details are as follows:

- Tensile modulus 1100 Mpa
- Tensile yield stress 23 Mpa
- Sharp notched impact strength 60 kJ/m²

- Hardness 44 Mpa
- Friction factor 0,7 μ
- Abrasion 15 μ m/km
- Temperature resistance from -30° up to 100° C for short-term peaks up to 120° C
- Dielectric strength 140 kV/mm

MF insulators are black an the UV resistance is 15 times higher as for the white material.

Diameters table

number of segments	diameter in mm						
	micro	mini	midi	medi	maxi	maxi + maxi 0,5	maxi 0,5
3	21-29	46-62	104-141		325-395		195-235
3 + 1 x 0,5						390-460	
4	29-40	62-83	138-188	390-494	426-546		235-300
4 + 1 x 0,5						450-550	
5	38-49	77-104	172-235	495-625	532-682		275-365
6	46-60	92-125	207-282	600-750	638-819		
7	55-69	107-145	241-329	700-890	745-955		
8	61-80	123-166	276-376	800-1000	851-1092		
9		138-187	310-423	900-1140	957-1228		
10		153-205	344-470	1000-1290	1064-1365		
11		169-228	379-517		1170-1502		
12		184-249	413-564		1276-1838		
13					1383-1775		
14					1489-1911		
15					1595-2048		
16					1702-2184		
17					1808-2321		
18					1914-2457		
19					2020-2594		
20					2127-2731		
21					2233-2867		

Standards measurements in **bold type**

Maximum load-bearing capacity...

(insulators spacing)

1.000 N 3.000 N 7.500 N 20.000 N 30.000N

...a complex and difficult problem influenced by factors such as (for example) skid height.

Increasing skid height reduces the load-bearing capacity as follows :

- From 50 mm up : by 20 %
- From 80 mm up : by 30 %
- From 100 mm up : by 50 %

Coupler-connected pipes need (independent of weight) at least 3 rings per pipelength to relieve the couplers.

In the case of polyethylene pipes, the manufacturer's instructions on maximum support spacing **must** be observed.