

MASTERFLOW[®] 935

Pure epoxy resin based anchoring mortar for fixing heavy loads in critical situations.

Description

Masterflow[®] 935 is a two-component, thixotropic, pure epoxy resin based chemical anchoring mortar. The product is specially designed for applications where heavy loads under critical conditions are to be fixed in concrete. Both components of Masterflow[®] 935, packed in a single cartridge with separate compartments, are correctly mixed in the mixing nozzle during application.

Fields of application

Masterflow[®] 935 is typically used in highly technical fixing situations like:

- Anchoring of rebars in preformed holes in concrete
- Fixing of anchoring bolts exposed to heavy loads
- Installation of bonded rebars / shear reinforcement

Masterflow[®] 935 can also be used as a structural adhesive to glue metal elements onto concrete or to glue concrete elements together.

Advantages

- High adhesive power
- Fast curing time – saves time and money
- Easy to extrude
- Styrene free formulation – low odour
- High mechanical strengths
- Can be used in diamond drilled holes
- Applicable in slightly damp conditions
- Can be used at high temperatures
- Very low shrinkage, even on big diameters
- For interior and exterior use
- Specially suitable for technical applications
- For fixing in solid material like concrete or brickwork

Notes

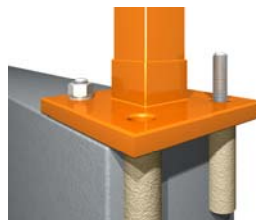
Masterflow[®] 935 conforms to the norms NF P18-831 and NF P18-836, and is backed by the technical document “Cahier des clauses techniques du système de scellement d’armatures Masterflow[®] 935”, issued by BASF Construction Chemicals France and controlled by SOCOTEC.

Recommendations

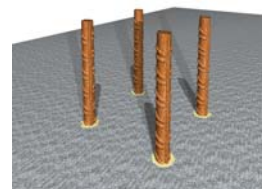
The performance, durability and safety of the installed product used for anchoring steel (rebar) strongly depends on the substrate, the dimensions of the element, the drilling and cleaning of holes, the substrate temperature and the type of anchoring bolt or bar.

It is therefore important that a proper structural assessment of the structural elements to be repaired is carried out by qualified engineers, and that the choice of products, anchor types etc... is based upon such assessment.

Guideline information on performance data and dimensioning is given in the tables hereafter.



Fixing in concrete according to the method described in ETAG N° 001



Rebar applications according to BAEL 91

Application guidelines

Preparation

The substrate must be clean, structurally sound, and without substances which can have a negative effect on the adhesion of the chemical anchoring mortar.

Concrete or mortars in which bolts or rods are to be fixed should be at least 28 days old.

Holes

Holes can be made using diamond or hammer drilling machines. Depth and diameter of the holes are to be determined by the substrate, effective loads and the diameter of the anchor bolts or rebars.

The drilled holes need to be cleaned with round brushes and oil-free compressed air directly from a compressor or using special hand pumps.

The substrate can be damp, but must be without free standing water.

Using the cartridges

It is advised to store the cartridges in a warmer environment, since squeezing the Masterflow[®] 935 requires more effort at temperatures below 10°C. Remove the sealing plug and fix the mixing unit onto the cartridge. Place the cartridge in the extrusion gun and squeeze.

Do not use the first few centimetres of material, until the mixed material is of uniform colour.

During longer application interruptions, remove the mixing unit and put back the sealing plug.

Application in solid material

Insert the mixing unit of the Masterflow[®] 935 cartridge into the back of the hole and squeeze sufficient material while slowly pulling out. Ensure that no air is entrapped while filling the hole.

Introduce the anchoring bolt or rebar by pressing and turning till the back of the hole is reached.

An excess of material needs to be visible.

Respect the waiting times as shown in the tables hereafter, before the anchors or rebars are exposed to loads,.

Application as structural adhesive

Before adhering metal plates, guardrails etc...

prepare the substrate leaving a clean and slightly rough surface. Clean the metal parts to bright steel and remove oil or grease from the surface of these elements. Apply sufficient Masterflow[®] 935 for complete bonding. Spread with a combed trowel on both surfaces and hold firmly in place until full cure is achieved (ca. 12 hours at +20°C).

Cleaning of tools

Residual material must be mechanically removed after hardening, or by brush and with plenty of soapy water or solvent when still uncured.

Packaging

Masterflow[®] 935 is available in cartridges of 400 ml side by side for use with a special gun.

Storage

12 months in original unopened cartridges.

Store at +5°C to + 30°C

Watch points

- When cured, Masterflow[®] 935 is resistant to many chemicals. A list of chemicals can be found hereafter.
- Material can be applied at temperatures from +5°C to +35°C, but cartridges have to be stored at +10°C or above for ease of extrusion.
- Masterflow[®] 935 can in unhardened conditions be a pollutant for water or soil. Take the necessary precautions and clean according to local guidelines.

Handling and transport

Avoid contact with skin by using protective gloves and/or protective cream. Should skin contact occur, wash immediately with soap and water. Protect eyes with safety goggles.

Harmful if swallowed. Use only with adequate ventilation.

Specific information on handling and transport can be found in the Material Safety Data Sheet of Masterflow[®] 935.

Dispose empty packaging and unused, hardened material according to local regulations.

Technical data

A. Curing times

Cartridge temperature	Minimum cartridge temperature = +10°C				
	+5°C	10°C	+20°C	+25°C	+35°C
Substrate temperature	+5°C	10°C	+20°C	+25°C	+35°C
Working time	30 min.	15 min.	10 min.	6 min.	3 min.
Curing time on dry concrete	8 h	6 h 30	3 h 30	2 h 45	1 h 45

B. Chemical resistance

Chemical	permanent immersion	temporary immersion	not recommended
Water	X		
Salty water	X		
Hot water < 60°C	X		
Petrol	X		
Kerosene	X		
Gasoline	X		
Methanol		X	
Acetone		X	
White spirit		X	
Sodium hydroxide (50 %)		X	
Hydrochloric acid (10 % at 20°C)		X	
Sulphuric acid (50 % at 30°C)			X
Citric acid		X	

C. Effect of temperature

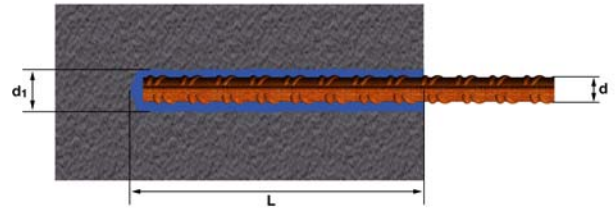
Reduction factor for working loads. Please note that Masterflow® 935 is advised for applications at +5°C to +35°C.

Temperature (°C)	20	40	60	80	100
Reduction factor	1	0.9	0.9	0.4	0.3

D. Consumption

	M8	M10	M12	M16	M20
Drill bit / hole diameter (mm)	10	12	14	20	25
Drill depth (mm)	80	100	120	160	200
Consumption (ml)	2.3	3.5	4.9	18.1	35.3

E. Rebar anchoring according BAEL 91



d = rebar diameter
d1 = drill bit / hole diameter
L = effective anchoring depth

Properties of bar Fe E500:

d (mm)	min. resistance at breaking point (kN)	Elasticity limit Fe (kN)	Max. Load Fe/1.15 (kN)
8	27.7	25.2	21.9
10	43.27	39.3	34.1
12	62.2	56.5	49.1
14	84.7	77.0	66.9
16	110.6	100.5	87.4
20	172.7	157.0	136.5

Pull-out working loads according BAEL 91 for Masterflow® 935 based upon the properties of steel bar HA Fe E500 shown in the table above:
The working loads are derived from the equation:

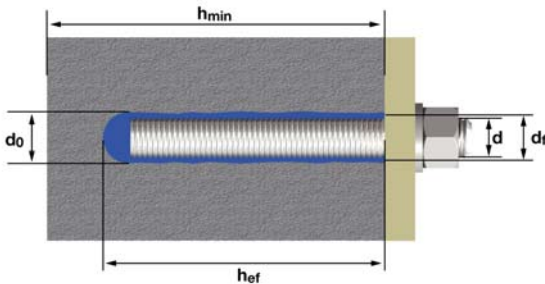
$$L = \beta * (F/d1)$$

where: L = depth (mm)
F = max. load possible on the bar (kN)
d1 = drill bit / hole diameter (mm)
 β = parameter linked to the concrete quality

β	C20/25	C35/45
Steel Fe E500	1.51	1

d (mm)	d1 (mm)	Concrete 20/25		Concrete 35/45	
		L min. / max. (mm)	F min. / max. (kN)	L min. / max. (mm)	F min. / max. (kN)
8	10	80 / 330	5.3 / 21.9	80 / 219	8.0 / 21.9
10	12	100 / 429	7.9 / 34.1	100 / 284	12.0 / 34.1
12	16	120 / 463	12.7 / 49.1	120 / 307	19.2 / 49.1
14	18	140 / 561	16.7 / 66.9	140 / 372	25.2 / 66.9
16	20	160 / 660	21.2 / 87.4	160 / 437	32.0 / 87.4
20	25	200 / 824	33.1 / 136.5	200 / 546	50.0 / 136.5

F. Anchoring in concrete according method described in ETAG N°001



- d = diameter of threaded rod
- d₀ = drill bit / hole diameter
- d_r = diameter of hole in anchor plate
- h_{ef} = effective anchoring depth
- T_{inst} = tightening torque
- h_{min} = minimum thickness of concrete

Installation data - minimum and maximum embedment depth:

Nominal diameter	d ₀ (mm)	d _r (mm)	h _{ef} (mm) Effective anchor length		T _{inst} (N.m)	h _{min} (mm) Min. concrete thickness	
			h _{ef} 8 x d	h _{ef} 12 x d		h _{ef} 8 x d	h _{ef} 12 x d
M8	10	9	64	96	10	100	125
M10	12	12	80	120	20	110	150
M12	14	14	96	144	40	125	175
M16	18	18	128	192	80	160	225
M20	22	22	160	240	150	200	280

One of the most important limiting factors for the effective use of anchoring systems, apart from the concrete quality, quality and cleanliness of the drilled hole, is the positioning of the holes in relation to the edges of the concrete element and to each other.

Nominal diameter d	h _{ef} 8 x d		h _{ef} 12 x d	
	S _{min}	C _{min}	S _{min}	C _{min}
M8	35	35	48	48
M10	40	40	60	60
M12	48	48	72	72
M16	64	64	96	96
M20	80	80	120	120

- S_{min} = minimum spacing
- C_{min} = minimum edge distance

Pull-out and concrete cone failure in non cracked concrete C20 / 25 to C 50 / 60

	M8	M10	M12	M16	M20
h _{ef} (8 x d) (in mm)	64	80	96	128	160
Concrete cone failure (in kN)	25	30	40	60	75
h _{ef} (12 x d) (in mm)	96	120	144	192	240
Concrete cone failure (in kN)	35	40	60	95	115
Partial safety factor	1.5				

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NOTE:

Similar to all the other recommendations and technical information, this technical data sheet serves only as a description of the product characteristics, mode of use and applications. The data and information given are based on our technical knowledge obtained in the bibliography, laboratory tests and in practice. The data on consumption and dosage contained in this data sheet are based on our own experience and are therefore subject to variations due to different work conditions. Real consumption and dosage should be determined on the job by means of prior tests and are the liability of the client. Our Technical Service is at your disposal for any additional advice.

BASF Construction Chemicals reserves the right to modify the composition of the products provided these continue to comply with the characteristics described in the data sheet. Other applications of the product not covered by those indicated shall not be our liability. In the case of defects in the manufacturing quality of our products we provide a guarantee, any additional claims being exempt and our liability being only to return the value of the goods supplied. The possible reservations with respect to patents or third party rights should be noted.

Edition 08/08

The present data sheet becomes null and void on issuance of a new edition.