MAXFIX® -E

EPOXY RESIN FOR FASTENING OF THREADED RODS AND REBARS IN CONCRETE AND MASONRY

DESCRIPTION

MAXFIX® -E is a two component, methacrylate free, epoxy resin-based system, packed in a cartridge for use by injection means. It can be used on concrete, solid brick and stone. Application of the resin is made in an easy and quick way by a hand gun.

APPLICATIONS

- Fastening of rebars for end supports and structural connections (stairscases, manholes, corbels).
- Fastening for structural repairs: bridge deck renovation, structural upgrading,…
- Placing of heavy machinery, cranes and bridge cranes.
- Fastening of heavy facilities
- Fastening of cantilever connections: balcony, access platforms, landings, etc.
- Fastening of stud anchors for concrete slab-beam or wall-beam connections: construction joints, structural extension and horizontal starter bars.
- Anchoring of supports, posts, and road signs.
- Anchoring of anchor plates, angles and profiles of metal structures to concrete and masonry.

ADVANTAGES

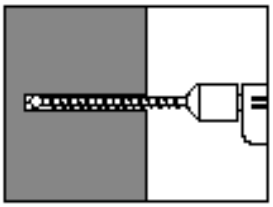
- Styrene/methacrylate-free, pure epoxy resin.
- Packed resin into injection cartridge for use directly with a hand gun.
- Easy and handy application, it does not need premixing.
- Holes can be drilled with a diamond core equipment or pneumatic hammer drill.
- Its good thixotropy allows the application on walls and ceilings.
- Short embedment withstands large loads.
- Long pot life for placing of rods with big sizes.

- It does not produce expansion tensile into base material.
- It allows short distances from edges and anchor spacing.
- Good adherence, even on wet supports.
- It withstands dynamic loads
- Suitable cartridge for many applications.

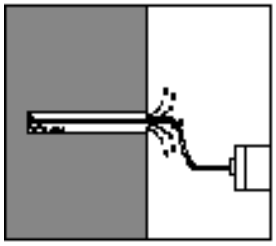
APPLICATION INSTRUCTIONS

Surface preparation

Make sure that base material is sound and also is not deteriorated. Drill a hole into base material with a rotary electric or pneumatic hammer drill.



According to the characteristics of the anchored object, the hole should have the suitable diameter and depth (see Table 1).

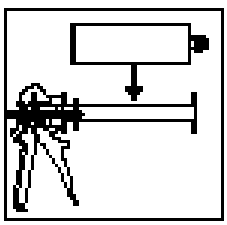


For removing the dust, clean the hole by brushes and blowing-out devices. Make sure that threaded rods or rebars are free of any contaminants, oils, greases, dust, etc.

Table1. Fastening data in solid materials

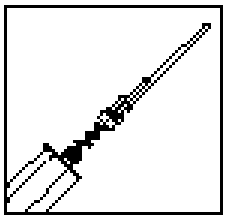
Threaded Rods	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
Hole diameter (mm)	10	12	14	18	24	28
Standard hole depth (mm)	90	100	120	130	170	210
Minimum thickness for base material (mm)	120	130	150	165	210	250
Rebars	**ϕ8**	**ϕ 10**	**ϕ 12**	**ϕ 16**	**ϕ 20**	**ϕ 25**
Hole diameter (mm)	10	12	16	20	25	30
Minimum base material thickness (mm)	**Depending on use**					

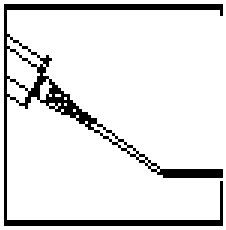
Procedure for the injection system



Pressing the release lever and then, pull back the piston of the hand gun. Unscrew the protection top and insert the cartridge into the hand gun.

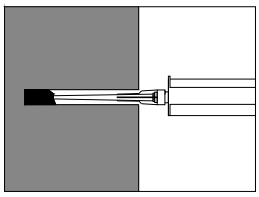
Before screwing the mixing nozzle, make sure that both component A and component B are coming out accurately from the cartridge. Finally, screw the mixing nozzle.



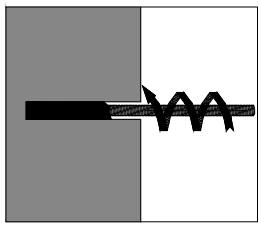


In order to get a suitable mixing, squeeze out resin until the product becomes uniform in colour. A couple of trigger pulls could be necessary (5 cm). Once all these steps have been done, system is ready for use. Proceed in the same way for each change in the mixing nozzle.

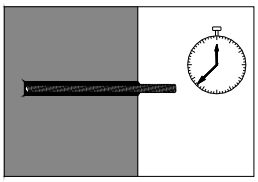
Application



Inject ***MAXFIX®*** ***-E*** into the hole, making sure insert the mixing nozzle at the end of the hole. As hole is full of resin the hand gun should be removed.



In order to get a good impregnation of the anchors, threaded rods or rebars with epoxy-based resin into the hole, a light twisting motion should be done while those are placed. Make sure that metal objects are free of grease, rust and dust. Before loading the threaded rods/rebar, wait the curing time.



Once resin has cured totally, any object can be placed on the anchor and then, a tightening torque should be applied. When all anchors have been done, remove the mixing nozzle and screw the protection top. For new applications, a new mixing nozzle must be used.

Conditions of application

During application, both the ***MAXFIX®*** ***-E*** cartridge and the base material should be in the temperature range from +5 ºC to + 40 ºC.

Curing

The curing time depends on application temperature. In this way, high temperatures speed up the reaction while low temperatures slow down the process. Before applying the torque tight on the fastening, the curing time must be observed. The pot life matches with the initial curing time in which

the resin has not still begun to harden, allowing rectifications (working time in which anchors or rods can be inserted and adjusted). In order to harden completely, resin employs the curing time.

Substrate temperature (ºC)	Pot life (min)	Curing time (h)
5	150	36
10	120	24
20	30	6
30	20	5
40	12	4

Cleaning

Before pot life finishes, all tools and equipments should be cleaned with a duster. Once ***MAXFIX®* -*E*** hardens, it can only be removed by mechanical means.

CONSUMPTION

Depending on the metrics and depth, a large number of anchors can be done with a ***MAXFIX®* -*E*** cartridge of 385 ml.

- Number of anchors = 385 / V

$V = 0,6 * d^2 * h$

d: hole diameter (cm)

h: hole depth (cm)

PACKAGING

MAXFIX®* -*E is supplied in two-component cartridge of 385 ml.

STORAGE

Twelve months in its original unopened packaging. It should be stored in a dry, fresh and covered place, protected from sun light and temperatures between 5 ºC and 30 ºC.

IMPORTANT INDICATIONS

- If resin cures into the mixing nozzle, a new one must be used for more applications.
- Technical data are from numerous laboratory tests on common materials. If in doubt about base material, some previous tests should be done. These tests will indicate the suitability for the system.
- In order to avoid the presence of air bubbles into the hole when epoxy-resin is injected, remove the mixing nozzle as the hole is filled.
- Fastenings can be done on damp surfaces, but running water is not allowed.
- Follow the instructions given herein for correct applications. If in doubt or any other further information, consult the Technical Department.

SAFETY AND HEALTH

Epoxy-based resin can irritate to skin, so that protective rubber gloves and goggles must be used to handle and apply the resin. In case of skin contact, wash affected areas with soap and water, but do not rub. If irritation continues, seek medical attention. In case of eye contact, rinse thoroughly with clean water for at least 15 min, but do not rub and seek medical attention. In case of inhalation, supply fresh air.

For further information, Safety Data Sheet of ***MAXFIX®* -*E*** is available by request.

Disposal of the product and its empty containers must be made according to official regulations. This disposal must be made by the final use.

TECHNICAL DATA

Longitudes básicas de anclaje según método de cálculo de barras corrugadas

Table 2. Lengths of anchors for reinforced concrete. Concrete HA25						
Base material: Uncracked concrete HA25						
Rebars for reinforced concrete B 500 S	**ϕ8**	**ϕ10**	**ϕ12**	**ϕ16**	**ϕ20**	**ϕ25**
Hole diameter (mm)	10	12	15	20	25	32
Anchoring length to develop yield of bar: 25ϕ (mm)	200	250	300	400	500	600
Design strength (F_d) (kN)	21,8	34,2	49,2	87,4	136,6	213,4
Rebars for reinforced concrete B 400 S	**ϕ8**	**ϕ10**	**ϕ12**	**ϕ16**	**ϕ20**	**ϕ25**
Rebard diameter (mm)	80	10	12	16	20	25
Drill diameter (mm)	10	12	15	20	25	32
Anchoring length to develop yield of bar: 20ϕ (mm)	160	200	240	320	400	500
Design strength (F_d) (kN)	17,5	27,3	39,3	69,9	109,3	170,7

* For tensile load the safety coefficient is □ = 2,16. In presence of water, loads have to be cut by 20%. Data for a fastening in the centre of a base material without influence factors such as edges and the distance between anchors.

In the case of the proximity between anchors and/or proximity to concrete edges, the length of anchorage are increased following the same criteria that expressed for rebars and rods, calculated as anchorage. In case of better concrete than HA25 the lengths diminish, but keeping in mind the minimum anchorage length for threaded rods to tensile, expressed in the "Instruction of Structural Concrete" EHE.

Table 3. Recommended loads of the anchors (F_{rec})													
Base material: Uncracked concrete HA25													
Threaded rods Quality 5.8	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**Rebars B 500S**	**ϕ8**	**ϕ10**	**ϕ12**	**ϕ16**	**ϕ20**	**ϕ25**
Hole diameter (mm)	10	12	14	18	24	28	Hole diameter (mm)	10	12	15	20	25	32
Standard hole depth (mm)	90	100	120	130	170	210	Standard hole depth (mm)	90	110	130	170	220	270
Recommended load* (F_{rec})							**Recomended load*** (F_{rec})						
N_{rec}: Tensile (kN)	6,8	9,2	13,1	19,1	32,6	47,5	N_{rec}: Tensile (kN)	6,8	10,2	15,9	27,1	44,5	70,6
V_{rec}: Shear (kN)	5,2	8,0	12,0	21,7	34,3	42,2	V_{rec}: Shear (kN)	5,6	9,0	13,1	24,7	38,6	55,6

* For tensile load and shear load, the applied safety coefficients are ν = 4 and ν = 3 respectively. In presence of water, loads have to be cut by 20%. Data for a fastening in the centre of a base material without influence factors such as edges and the distance between anchors.

Admissible loads

For anchor design, the admissible load (F_{adm}) results in multiply the recommended load (F_{rec}) by both reduction factors such as distance between anchor centres (f_a) and edge distance (f_b) and correction factors such as concrete type (f_c) and anchoring depth (f_d).

$$F_{adm} = F_{rec} * f_a * f_b * f_c * f_d$$

Reduction factors:

- Anchor spacing f_a

$$f_a = \frac{S}{40 * d} + 0{,}5 \le 1$$

$$f_a = 1 \; for \quad S \ge 20 * d$$

- Edge distance, f_b

Tensile Loads

$$f_{b,N} = \frac{C}{13{,}6 * d} + 0{,}25 \le 1$$

Shear Loads

$$f_{b,V} = \frac{C}{13{,}6 * d} \le 1$$

$$f_b = 1 \; for \quad C \ge 10 * d$$

S: Distance between anchor centres (mm).
C: Distance from an edge (mm).
d: Anchor diameter (mm).
h_{st}: Standard depth (mm).
h: Real depth (mm).

Correction factors:

- Type of concrete f_c

Above strength data are suitable for anchors on HA25 (C25/30) concrete. For concrete with different strengths, a correction factor must be applied.

Type of concrete		C20/25	C25/30	C30/37	C35/45	C40/50
fc	**Shear loads**	0,90	1,00	1,12	1,22	1,34
	Tensile loads	0,90	1,00	1,04	1,08	1,12

- Anchoring depth f_d

The tensile strength of anchors is directly proportional to anchoring depth. The shear strength does not vary if an anchoring depth, h (mm), longer than standard anchoring depth, h_{st}, is used.

GUARANTEE

The information contained in this leaflet is based on our experience and technical knowledge, obtained through laboratory testing and from bibliographic material. ***DRIZORO®, S.A.*** reserves the right to introduce changes without prior notice. Any use of this data beyond the purposes expressly specified in the leaflet will not be the Company's responsibility unless authorised by us. We shall not accept responsibility exceeding the value of the purchased product. The data shown on consumptions, measurement and yields are for guidance only and based on our experience. These data are subject to variation due to the specific atmospheric and jobsite conditions so reasonable variations from the data may be experienced. In order to know the real data, a test on the jobsite must be done, and it will be carried out under the client responsibility. We shall not accept responsibility exceeding the value of the purchased product. For any other doubt, consult our Technical Department. This version of bulletin replaces the previous one.

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