


ETA TR 023

n° 08/0201

Comportament la foc

See page 26


CSTB

 PV 553 03 0516
 PV 26007642-a

- ▮ Epoxy-acrylate resina
- ▮ Fixarea armaturilor din otel pentru armare beton

Caracteristici mecanice ale barelor din fier beton

Diametrul barei otel Ø	8	10	12	14	16	20	25	32	40
Sectiune bara fier (cm ²)	0.503	0.785	1.13	1.54	2.01	3.14	4.91	8.04	12.57
Rezistenta min la rupere (kN)	Fe E400	21.13	32.97	47.46	64.68	84.42	131.88	206.22	337.68
	Fe E500	25.90	40.43	58.20	79.31	103.52	161.71	252.87	414.06
Incarcare limita maxima N _{Rd} (kN)	Fe E500	21.85	34.15	49.17	66.93	87.42	136.59	213.43	349.56

Caracteristicile mecanice ale barelor din fier-beton striat sunt stabilite in standardele NFA 35-016 si NFA 35-017 .

Norme privind dimensionarea barelor de armare din otel in acord cu reglementarile Eurocode 2 si ETA 08/0201

 Adancimea de ancorare $L_{b,reqd}$ (mm) pentru o incarcare in limita superioara F_{Rd} (N) este aflata urmand ecuatia :

$$L_{b,reqd} = \frac{F_{Rd}}{\Pi \cdot \varnothing \cdot \eta_1 \cdot \eta_2 \cdot f_{bd}}$$

 F_{Rd} : Sarcina de proiectare (N)

 f_{bd} : Valoarea de proiectare a rezistentei fixarii în N / mm²
 \varnothing : Diam barei (mm)

 η_1 : depinde de conditiile fixarii - $\eta_1 = 1$ (good bond conditions). See § 8.4.2 (EN 1992-1-1)

 η_2 : depinde de diametrul barei - $\eta_2 = 1$ for $\varnothing_{bar} \leq 32$ mm

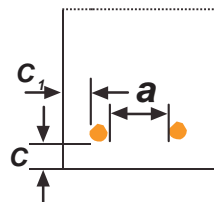
 Adancimea de ancorare de proiectare L_{bd} (mm) se determina astfel :

$$L_{bd} = L_{b,reqd} \cdot \alpha_2 \cdot \alpha_5$$

 unde α_2 : influentat de grosimea minima a stratului de beton.

$$\alpha_2 = 1 - 0.15(Cd - \varnothing_{bar}) / \varnothing_{bar} \geq 0,7$$

$$Cd = \min\left(c; c_1; \frac{a}{2}\right)$$



Concrete class	f_{ck} (Mpa)	f_{bd} (Mpa)
C20/25	20	2,3
C25/30	25	2,7
C30/37	30	3,0
C35/45	35	3,4
C40/50	40	3,7
C45/55	45	4,0
C50/60	50	4,3

 With α_5 : Influence of the confinement by transverse pressure.

 The factor α_5 take into account of the effect of the pressure transverse to the plane of splitting along the design length.

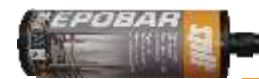
$$\alpha_5 = 1 - 0,04 \cdot p \geq 0,7$$

p (Mpa)	α_5
3	0,88
5	0,8
7	0,72

 where p is the transverse pressure at the ultimate limit state along L_{bd} in MPa.

Limit of this formula

- ▮ The max. anchor depth will be limited to 900 mm


Tabel Eurocode 2 pentru ancorarea dreapta a barelor de armare din otel
CONCRETE C25/30 – gaura facuta cu rotopercutie

ETA 08/0201

Bara fier Ø	Diametrul gaura Ø _{do}	Adancime de ancorare L _{bd}	Ultimate limit load (daN) fara influenta distantei fata de centru si/sau margine ⁽¹⁾ (α ₂ = 0.7)	Ultimate limit load (daN) cu influenta distantei fata de centru si/sau margine ⁽²⁾ (α ₂ = 1)	Numar de fixari pe tubul de Epobar 410ml ⁽³⁾
8mm	10mm	150mm	1454 daN	1018 daN	80,6
		190mm	1842 daN	1289 daN	63,6
		226mm	2185 daN	1534 daN	53,5
		322mm	-	2185 daN	37,5
10mm	12mm	181mm	2193 daN	1535 daN	54,6
		230mm	2787 daN	1951 daN	43,0
		285mm	3415 daN	2417 daN	34,7
		403mm	-	3415 daN	24,5
12mm	15mm	218mm	3170 daN	2219 daN	24,7
		280mm	4072 daN	2850 daN	19,2
		340mm	4917 daN	3461 daN	15,8
		484mm	-	4917 daN	11,1
14mm	18mm	252mm	4275 daN	2993 daN	13,4
		330mm	5598 daN	3919 daN	10,3
		395mm	6693 daN	4691 daN	8,6
		564mm	-	6693 daN	6,0
16mm	20mm	290mm	5623 daN	3936 daN	10,4
		370mm	7174 daN	5022 daN	8,2
		451mm	8742 daN	6121 daN	6,7
		645mm	-	8742 daN	4,7
20mm	25mm	362mm	8773 daN	6141 daN	5,3
		470mm	11391 daN	7973 daN	4,1
		564mm	13659 daN	9568 daN	3,4
		805mm	-	13659 daN	2,4
25mm	32mm	453mm	13723 daN	9606 daN	2,4
		550mm	16662 daN	11663 daN	2,0
		705mm	21342 daN	14950 daN	1,5
		900mm	-	19085 daN	1,2
28mm	35mm	568mm	19272 daN	13490 daN	1,7
		650mm	22054 daN	15438 daN	1,5
		789mm	26770 daN	17613 daN	1,3
		900mm	-	21375 daN	1,1
32mm	40mm	580mm	22490 daN	15743 daN	1,3
		690mm	26756 daN	18729 daN	1,1
		790mm	30633 daN	21443 daN	1,0
		900mm	34899 daN	24429 daN	0,8

(1) Absenta distante fata de hargine se considera daca este mai mare de sapte ori diam barei = 7.Ø

(2) Presence of edge distances and/or centre distances less than 7.Ø

(3) The number of fixings per cartridge is calculated taking into account a wastage factor of 20%

$$1,2 \times (d_o^2 - \varnothing_{rebar}^2) \times \Pi \times L_{bd} / 4$$

**Applications**

- Reinforcement starter bars
- Reinforcement anchors for diaphragm walls

- Epoxy-acrylate resin – high performance
- Fixarea armaturilor din otel pentru armare beton

Norme privind dimensionarea barelor de armare din otel utilizand rezistenta fixarii (cf. p. 15)

Mechanical characteristics of rebar

Nominal steel bar Ø		8	10	12	14	16	20	25	32	40
Sections (cm ²)		0,503	0,785	1,13	1,54	2,01	3,14	4,91	8,04	12,57
Min. resistances to failure (kN)	Fe E400	21,13	32,97	47,46	64,68	84,42	131,88	206,22	337,68	527,94
	Fe E500	25,90	40,43	58,20	79,31	103,52	161,71	252,87	414,06	647,36
Ultimate limit load N _{Rd} (kN)	Fe E500	21,85	34,15	49,17	66,93	87,42	136,59	213,43	349,56	546,36

The mechanical characteristics of the high adhesion rebars are defined in the NFA 35-016 and NFA 35-017 standards.

Anchorage length calculated from the bond strength

From the bond strength of the SPIT EPOBAR Resin, the table below gives the minimum anchorage length for rebar Fe E500, in concrete class ≥ C20/25

Rebar Ø (mm)	8	10	12	14	16	20	25	32	40
Drilling Ø (mm)	10	12	15	18	20	25	32	40	50
Min. anchorage length (mm)	120	150	180	210	245	305	380	485	605
Ultimate limit load (kN)	21,85	34,15	49,17	66,93	87,42	136,59	213,43	349,56	546,36
Nb. anchoring / crt. 410	100	66	30	16	12	6	3	1,6	0,8

Calculation method

- Rezistenta caracteristica a fixarii

T_{Rk} : 17.85 N/mm² issues from confirmed test and from the calculation using the rebar diameter (available for rebar diameter 8 to 40 mm). [$T_{Rk} = T_{Ru'm} \times 0.75$].

- Design bond strength T_{Rd} :

$$\tau_{Rd} = \frac{\tau_{Rk}}{\gamma_M = 2.16} [\gamma_M : \text{safety partial factor}]$$

- Calculation of the minimum anchorage length of the rebar

$$l_s = \frac{A_s \cdot f_{yk}}{\Pi \cdot \phi_{lcr} \cdot \tau_{Rd}}$$