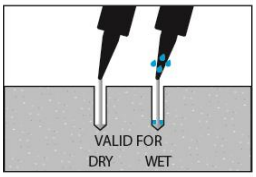
MOPUR3

CERTIFICATES

BASE MATERIAL

DRILL HOLE CONDITION



CHARACTERISTICS

- Assessed for structural applications in cracked and non-cracked concrete, M8 to M30. Rebar used as stud from Ø8 to Ø32.
- Assessed for post-installed rebar connections Ø8 to Ø32.
- Certificate of contact with drinking water (WRAS).
- Fire resistance certificate for post-installed rebar (CSTB).
- Pure Epoxy 3:1 red colored.
- LEED and A+ certificates.
- Use for high loads, static or quasi-static. Seismic loads C1&C2.
- Working life of 50 and/or 100 years.
- Valid for dry, wet and flooded holes.
- Valid for zinc plated steel, hot-dip galvanized, stainless steel A2, A4 and HCR.
- Temperature range: from -40ºC to +70ºC (long term maximum temperature +50ºC).

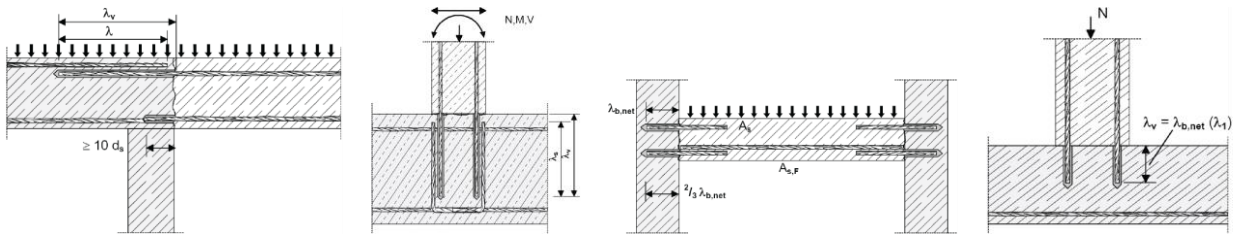
VALID FOR

ø8 – ø32 Rebar

APPLICATIONS

- Use in indoor and outdoor environments.
- Structural applications.
- Fixing of building substructures.
- Rebar and start rebar.
- For fixing enginery, balconies, awnings, shelving units, billboards, catenaries, safety barriers, railings, handrails, etc.
- Large metric sizes, retaining walls.

APPLICATION EXAMPLES



1. RANGE

ITEM	CODE	SIZE	PHOTO	COMPONENT	MATERIAL	
1	**MOPUR30385** **MOPUR30585**	385 ml. 585 ml.		PURE EPOXY MORTAR	Pure epoxy resin. Format: cartridges of 385 and 585 ml.	12

2. ACCESORIES

ITEM	CODE	PHOTO	COMPONENT	MATERIAL
1	**MOPISP3385**		APPLICATION GUNS	Gun for 385 ml cartridges
	MOPISP3585			Gun for 585 ml cartridges
2	**MORCEPKIT**		CLEANING BRUSHES	3 Cleaning brushes kit of ø14, ø20 and ø29 mm.
3	**MOBOMBA**		CLEANING PUMP	Pump for cleaning dust and drill hole fragments
4	**MORCAPU**		MIXING NOZZLE	Plastic. Helix static mixer.

3. PRODUCT SET UP

3.1. SETTING UP PROCEDURE

0. PROTECT YOURSELF

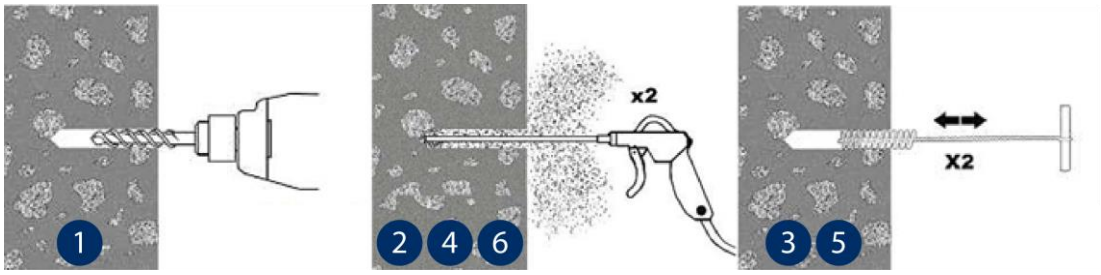
Always use and wear your personal protective equipment (PPE).

1. DRILLING THE HOLE

Check the concrete base is compact and porosity is insignificant. Suitable for wet or dry drill holes.
Cartridge installation temperature: ≥ 5 ºC.
Base material installation temperature: MOPUR3 ≥ +5 ºC.
Use drill in hammer mode.
Drill to the specified diameter and depth values.

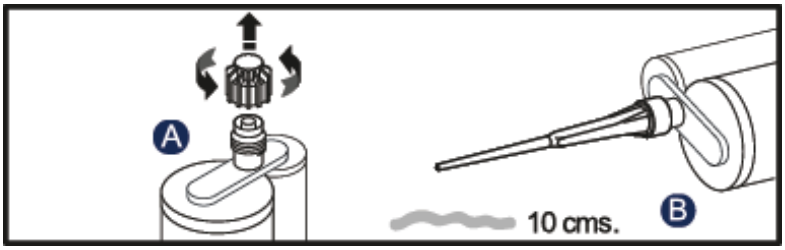
2 - 6. BLOW AND CLEAN

Clear the drill holes completely of dust and fragments by following the procedure shown in the picture. If the drill hole is flooded, the water must be removed before mortar is injected.



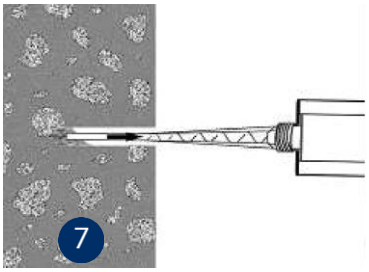
A – B. OPEN CARTRIDGE

Screw the nozzle into the cartridge and place the assembly in the application gun. Squeeze on the trigger repeatedly until the mortar comes out of the nozzle in a uniform red color. Any iridescence indicates improper mixing. Always discard the first two doses of each cartridge: these are never to be used for fixing.



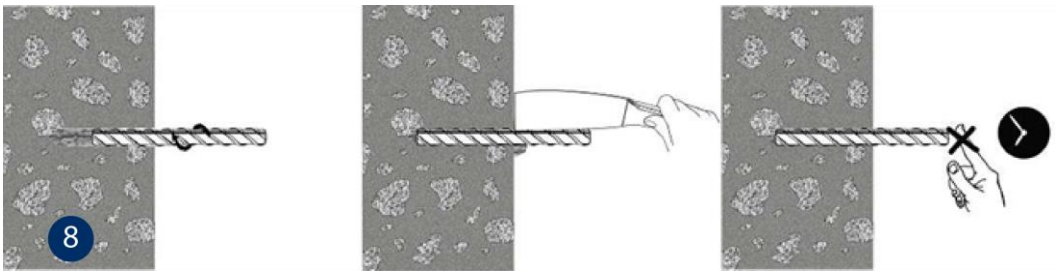
7. INJECT MORTAR

Insert the nozzle to the bottom of the drill hole and apply mortar: gradually remove the nozzle, ensuring there are no air bubbles.
Fill the hole to ½ and ¾ of its depth.
In the event of not fully using the cartridge, leave nozzle attached. Only change if using again and handling time has expired, remembering to discard the first two doses of mortar.



8. INSERT THE REBAR

Introduce the rebar to be installed by screwing it lightly down to the installation depth value manually; ensuring the mortar covers the rebar rivet. The introduction of the anchor must take place within the handling time. The mortar must seep from the top of the drill hole to ensure it is completely full and there are no gaps between the rebar and the drill hole.



3.2 TEMPERATURE AND CURING TIME

TYPE	Base material temperature [ºC]	Handling time [min]	Curing time [hrs]
MOPUR3	+5	300	24
	+5 a +10	150	24
	+10 a +15	40	18
	+15 a +20	25	12
	+20 a +25	18	8
	+25 a +30	12	6
	+30 a +35	8	4
	+35 a +40	6	2

4. STORAGE CONDITIONS

Keep the product stored in a cool, dry place, away from direct sunlight and heat sources, at an average temperature between +5 ºC and +25 ºC.

Shelf life of unopened cartridge: 18 months from the date of manufacture. The expiration date is indicated on the cartridge.

The tables below are referred to EN 1992-1-1 Annex C Table C.1 and C.2N Properties of reinforcement:

5. REBAR PROPERTIES

Product form		**Bars and de-coiled rods**	
Class		B	C
Characteristic yield strength fyk or f0,2k (MPa)		400 to 600	
Minimum value of k = (ft / fy)k		≥ 1,08	≥ 1,15
			< 1,35
Characteristic strain at maximum force εuk (%)		≥ 5,0	≥ 7,5
Bendability		Bend / Rebend test	
Maximum deviation from nominal mass (individual bar) (%)	Nominal bar size (mm) ≤ 8 > 8	± 6,0 ± 4,5	
Bond: Minimum relative rib area, $f_{R,min}$	Nominal bar size (mm) 8 to 12 > 12	0,040 0,056	

6. MINIMUM/MAXIMUM LENGTHS

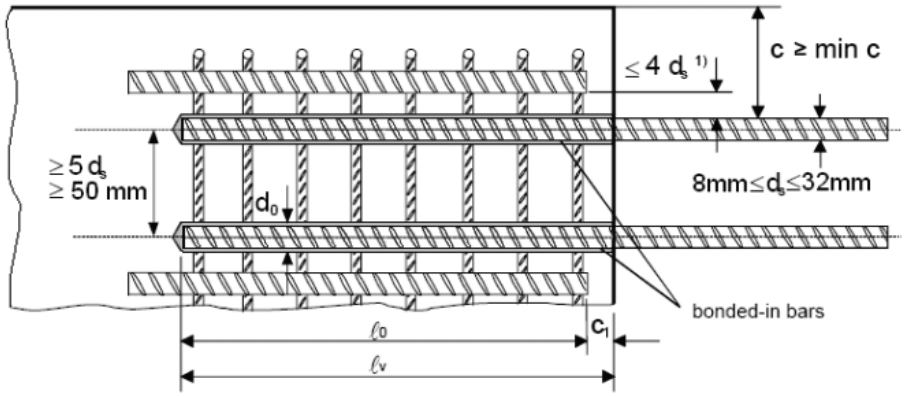
Rebar		**Minimum**		**Maximum**
Ød$_s$ [mm]	**$f_{y,k}$ [N/mm2]**	**Anchorage ℓ$_{b,min}$ [mm]**	**Overlap ℓ$_{0,min}$ [mm]**	**ℓ$_{max}$ [mm]**
8	500	113	200	400
10	500	142	200	500
12	500	170	200	600
14	500	198	210	700
16	500	227	240	800
20	500	284	300	1000
25	500	354	375	1000
28	500	397	420	1000
32	500	454	480	1000

7. DESIGN BOND RESISTANCE [N/mm²]

Rebar Ø d_s [mm]	Concrete class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
8 a 26	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3
28									4,0
32							3,4		

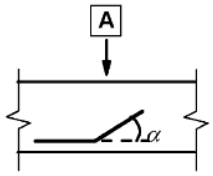
8. PRECALCULATED VALUE TABLES

- **Design Load Approach according to Eurocode 2 and EOTA technical report 023.**
- **Data information according to ETA 17/0658.**
- **Non-cracked concrete, dry or wet conditions**
- **Temperature range: -40ºC to +80ºC (long term maximum temperature +50ºC).**
- **Minimum spacing conditions ≥5d_s, min 50 mm:**

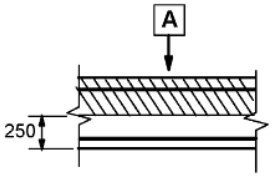


- **Minimum concrete covering**
  - **compressed air drilling ≥ 50 + 0,06 L_b**
  - **hammer drilling ≥ 30 + 0,08 L_b ≥ 2ϕ**

- **Good bond Conditions (EU2, figure 8.2):**

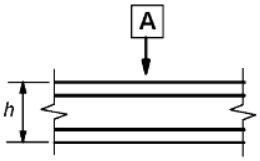


a) 45º ≤ α ≤ 90º

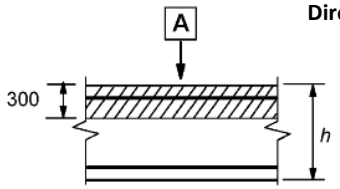


c) *h* > 250 mm

A - Concreting Direction



b) *h* ≤ 250 mm



d) *h* > 600 mm

a) y b) "good" bond conditions for all types of rebars

c) y d) no shaded area – "good" bond conditions
shaded area – "poor" bond contidions

*** For other bond conditions, multiply resistance by 0,7.**

Resistances values can be increased in the following scenarios:

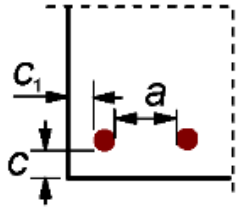
- **In case of transverse tension / compression pressure (α_2)**
- **In case of concreting cover (α_5)**
- **In case of overlapping (α_6)**

VALUES FOR α_2 , α_5 AND α_6

INFLUENCING FACTOR	REINFORCEMENT BAR	
	IN TENSION	IN TENSION
Concrete Cover	$\alpha_2 = 1 - 0{,}15\,(c_d - Ø)/Ø$ $\geq 0{,}7$ $\leq 1{,}0$	$\alpha_2 = 1 - 0{,}15\,(c_d - Ø)/Ø$ $\geq 0{,}7$ $\leq 1{,}0$
Confinement by transverse pressure	$\alpha_5 = 1 - 0{,}004p$ $\geq 0{,}7$ $\leq 1{,}0$	$\alpha_5 = 1 - 0{,}004p$ $\geq 0{,}7$ $\leq 1{,}0$
Overlapping length	$\alpha_6 = (p_1/25)^{0{,}25}$ $\geq 1{,}0$ $\leq 1{,}5$	

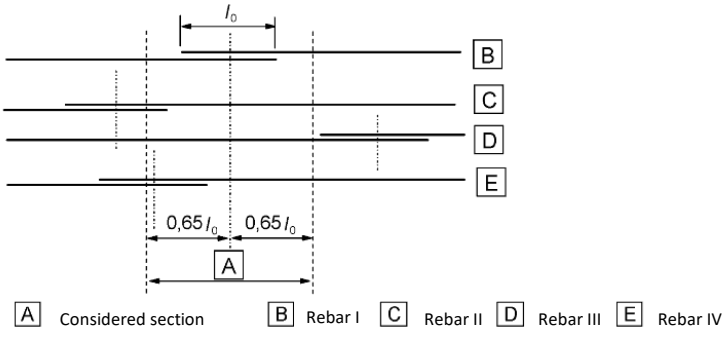
Where:

c_d = min (a/2, c_1, c)



p: transverse pressure [MPa] at ultimate limit state along l_{bd}

p_1 is the percentage of reinforcement lapped within 0,65 10 from the centre of the lap length considered



CONCRETE CLASS 20/25

Concrete compressive strength [$f_{ck,cube}$]: 25 N/mm²

Rebar Ø	d_s	[mm]	**Ø8**	**Ø10**	**Ø12**	**Ø14**	**Ø16**	**Ø20**	**Ø25**	**Ø28**	**Ø32**
Rebar Size	d_s	[mm]	8	10	12	14	16	20	25	28	32
Cross-sectional area	A_s	[mm²]	50,3	78,5	113,1	153,9	201,1	314,2	490,9	615,8	804,2
Steel Yield	f_{yd}	[kN]	500	500	500	500	500	500	500	500	500
Partial safety factor	$\gamma_{M,s}$	[mm²]	1,15	1,15	1,15	1,15	1,15	1,15	1,15	1,15	1,15
Design steel resistance	$N_{Rd,s}$	[kN]	21,9	34,1	49,2	66,9	87,4	136,6	213,4	267,7	349,7
Bond stress	$f_{bd,PIR}$	[N/mm²]	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30
Drilled hole diameter	d_h	[mm]	12	14	16	18	20	25	32	35	40
Bar spacing ≥	s	[mm]	50	50	60	70	80	100	125	140	160
Edge distance (compressed air drilling) ≥	c	[mm]	$50 + 0{,}06\ L_b$								
Edge distance (hammer drilling) ≥	c	[mm]	$30 + 0{,}08\ L_b \geq 2\phi$								

Anchorage length, L_b [mm]	**Design tensile pull-out bond resistance, N_{Rd} [kN]**								
113	6,5								
142	8,2	10,3							
170	9,8	12,3	14,7						
198	11,4	14,3	17,2	20,0					
200	11,6	14,5	17,3	20,2					
210	12,1	15,2	18,2	21,2					
227	13,1	16,4	19,7	23,0	26,2				
240	13,9	17,3	20,8	24,3	27,7				
284	16,4	20,5	24,6	28,7	32,8	41,0			
300	17,3	21,7	26,0	30,3	34,7	43,4			
354	20,5	25,6	30,7	35,8	40,9	51,2	63,9		
375	21,7	27,1	32,5	37,9	43,4	54,2	67,7		
397	**21,9**	28,7	34,4	40,2	45,9	57,4	71,7	80,3	
400	**21,9**	28,9	34,7	40,5	46,2	57,8	72,3	80,9	
420		30,3	36,4	42,5	48,6	60,7	75,9	85,0	
454		32,8	39,4	45,9	52,5	65,6	82,0	91,9	105,0
480		**34,1**	41,6	48,6	55,5	69,4	86,7	97,1	111,0
500		**34,1**	43,4	50,6	57,8	72,3	90,3	101,2	115,6
600			**49,2**	60,7	69,4	86,7	108,4	121,4	138,7
700				**66,9**	80,9	101,2	126,4	141,6	161,9
800					**87,4**	115,6	144,5	161,9	185,0
1000						**136,6**	180,6	202,3	231,2
Length to develop steel yield, $L_{b,rqd}$ [mm]	**378**	**473**	**567**	**662**	**756**	**945**	**1.181**	**1.323**	**1.512**

NOT ALLOWED AREA

REBAR YIELDING AREA

Values shaded in grey are not allowed for overlapping joints

CONCRETE CLASS 30/37

Concrete compressive strength [$f_{ck,cube}$]: 37 N/mm²

Rebar Ø	d_s	[mm]	**Ø8**	**Ø10**	**Ø12**	**Ø14**	**Ø16**	**Ø20**	**Ø25**	**Ø28**	**Ø32**
Rebar Size	d_s	[mm]	8	10	12	14	16	20	25	28	32
Cross-sectional area	A_s	[mm²]	50,3	78,5	113,1	153,9	201,1	314,2	490,9	615,8	804,2
Steel Yield	f_{yd}	[kN]	500	500	500	500	500	500	500	500	500
Partial safety factor	$\gamma_{M,s}$	[mm²]	1,15	1,15	1,15	1,15	1,15	1,15	1,15	1,15	1,15
Design steel resistance	$N_{Rd,s}$	[kN]	21,9	34,1	49,2	66,9	87,4	136,6	213,4	267,7	349,7
Bond stress	$f_{bd,PIR}$	[N/mm²]	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00
Drilled hole diameter	d_h	[mm]	12	14	16	18	20	25	32	35	40
Bar spacing ≥	s	[mm]	50	50	60	70	80	100	125	140	160
Edge distance (compressed air drilling) ≥	c	[mm]	$50 + 0{,}06\ L_b$								
Edge distance (hammer drilling) ≥	c	[mm]	$30 + 0{,}08\ L_b \geq 2\phi$								

Anchorage length, L_b [mm]	**Design tensile pull-out bond resistance, N_{Rd} [kN]**								
113	8,5								
142	10,7	13,4							
170	12,8	16,0	19,2						
198	14,9	18,7	22,4	26,1					
200	15,1	18,8	22,6	26,4					
210	15,8	19,8	23,8	27,7					
227	17,1	21,4	25,7	30,0	34,2				
240	18,1	22,6	27,1	31,7	36,2				
284	21,4	26,8	32,1	37,5	42,8	53,5			
300	**21,9**	28,3	33,9	39,6	45,2	56,5			
354	**21,9**	33,4	40,0	46,7	53,4	66,7	83,4		
375	**21,9**	**34,1**	42,4	49,5	56,5	70,7	88,4		
397	**21,9**	**34,1**	44,9	52,4	59,9	74,8	93,5	104,8	
400	**21,9**	**34,1**	45,2	52,8	60,3	75,4	94,2	105,6	
420		**34,1**	47,5	55,4	63,3	79,2	99,0	110,8	
454		**34,1**	**49,2**	59,9	68,5	85,6	107,0	119,8	136,9
480		**34,1**	**49,2**	63,3	72,4	90,5	113,1	126,7	144,8
500		**34,1**	**49,2**	66,0	75,4	94,2	117,8	131,9	150,8
600			**49,2**	**66,9**	**87,4**	113,1	141,4	158,3	181,0
700				**66,9**	**87,4**	131,9	164,9	184,7	164,9
800					**87,4**	**136,6**	188,5	211,1	188,5
1000						**136,6**	**213,4**	263,9	301,6
Length to develop steel yield, $L_{b,rqd}$ [mm]	**290**	**362**	**435**	**507**	**580**	**725**	**906**	**1.014**	**1.159**

NOT ALLOWED AREA

REBAR YIELDING AREA

Values shaded in grey are not allowed for overlapping joints

CONCRETE CLASS 40/50

Concrete compressive strength [$f_{ck,cube}$]: 50 N/mm²

Rebar Ø	d_s	[mm]	**Ø8**	**Ø10**	**Ø12**	**Ø14**	**Ø16**	**Ø20**	**Ø25**	**Ø28**	**Ø32**
Rebar Size	d_s	[mm]	8	10	12	14	16	20	25	28	32
Cross-sectional area	A_s	[mm²]	50,3	78,5	113,1	153,9	201,1	314,2	490,9	615,8	804,2
Steel Yield	f_{yd}	[kN]	500	500	500	500	500	500	500	500	500
Partial safety factor	$\gamma_{M,s}$	[mm²]	1,15	1,15	1,15	1,15	1,15	1,15	1,15	1,15	1,15
Design steel resistance	$N_{Rd,s}$	[kN]	21,9	34,1	49,2	66,9	87,4	136,6	213,4	267,7	349,7
Bond stress	$f_{bd,PIR}$	[N/mm²]	3,70	3,70	3,70	3,70	3,70	3,70	3,70	3,70	3,40
Drilled hole diameter	d_h	[mm]	12	14	16	18	20	25	32	35	40
Bar spacing ≥	s	[mm]	50	50	60	70	80	100	125	140	160
Edge distance (compressed air drilling) ≥	c	[mm]	$50 + 0{,}06\ L_b$								
Edge distance (hammer drilling) ≥	c	[mm]	$30 + 0{,}08\ L_b \geq 2\phi$								

Anchorage length, L_b [mm]	**Design tensile pull-out bond resistance, N_{Rd} [kN]**								
113	10,5								
142	13,2	16,5							
170	15,8	19,8	23,7						
198	18,4	23,0	27,6	32,2					
200	18,6	23,2	27,9	32,5					
210	19,5	24,4	29,3	34,2					
227	21,1	26,4	31,7	36,9	42,2				
240	**21,9**	27,9	33,5	39,1	44,6				
284	**21,9**	33,0	39,6	46,2	52,8	66,0			
300	**21,9**	**34,1**	41,8	48,8	55,8	69,7			
354	**21,9**	**34,1**	**49,2**	57,6	65,8	82,3	102,9		
375	**21,9**	**34,1**	**49,2**	61,0	69,7	87,2	109,0		
397	**21,9**	**34,1**	**49,2**	64,6	73,8	92,3	115,4	129,2	
400	**21,9**	**34,1**	**49,2**	65,1	74,4	93,0	116,2	130,2	
420		**34,1**	**49,2**	**66,9**	78,1	97,6	122,1	136,7	
454		**34,1**	**49,2**	**66,9**	84,4	105,5	131,9	147,8	155,2
480		**34,1**	**49,2**	**66,9**	**87,4**	111,6	139,5	156,2	164,1
500		**34,1**	**49,2**	**66,9**	**87,4**	116,2	145,3	162,7	170,9
600			**49,2**	**66,9**	**87,4**	**136,6**	174,4	195,3	205,1
700				**66,9**	**87,4**	**136,6**	203,4	227,8	260,4
800					**87,4**	**136,6**	**213,4**	260,4	297,6
1000						**136,6**	**213,4**	**267,7**	341,8
Length to develop steel yield, $L_{b,rqd}$ [mm]	**235**	**294**	**352**	**411**	**470**	**587**	**734**	**822**	**940**

NOT ALLOWED AREA

REBAR YIELDING AREA

Values shaded in grey are not allowed for overlapping joints

CONCRETE CLASS 50/60

Concrete compressive strength [$f_{ck,cube}$]: 60 N/mm²

Rebar Ø	d_s	[mm]	**Ø8**	**Ø10**	**Ø12**	**Ø14**	**Ø16**	**Ø20**	**Ø25**	**Ø28**	**Ø32**
Rebar Size	d_s	[mm]	8	10	12	14	16	20	25	28	32
Cross-sectional area	A_s	[mm²]	50,3	78,5	113,1	153,9	201,1	314,2	490,9	615,8	804,2
Steel Yield	f_{yd}	[kN]	500	500	500	500	500	500	500	500	500
Partial safety factor	$\gamma_{M,s}$	[mm²]	1,15	1,15	1,15	1,15	1,15	1,15	1,15	1,15	1,15
Design steel resistance	$N_{Rd,s}$	[kN]	21,9	34,1	49,2	66,9	87,4	136,6	213,4	267,7	349,7
Bond stress	$f_{bd,PIR}$	[N/mm²]	4,30	4,30	4,30	4,30	4,30	4,30	4,30	4,00	3,40
Drilled hole diameter	d_h	[mm]	12	14	16	18	20	25	32	35	40
Bar spacing ≥	s	[mm]	50	50	60	70	80	100	125	140	160
Edge distance (compressed air drilling) ≥	c	[mm]	$50 + 0{,}06\ L_b$								
Edge distance (hammer drilling) ≥	c	[mm]	$30 + 0{,}08\ L_b \geq 2\phi$								

Anchorage length, L_b [mm]	**Design tensile pull-out bond resistance, N_{Rd} [kN]**								
113	12,2	NOT ALLOWED AREA							
142	15,3	19,2							
170	18,4	23,0	27,6						
198	21,4	26,7	32,1	37,4					
200	21,6	27,0	32,4	37,8					
210	**21,9**	28,4	34,0	39,7					
227	**21,9**	30,7	36,8	42,9	49,1				
240	**21,9**	32,4	38,9	45,4	51,9				
284	**21,9**	**34,1**	46,0	53,7	61,4	76,7			
300	**21,9**	**34,1**	48,6	56,7	64,8	81,1			
354	**21,9**	**34,1**	**49,2**	**66,9**	76,5	95,6	119,6		
375	**21,9**	**34,1**	**49,2**	**66,9**	81,1	101,3	126,6		
397	**21,9**	**34,1**	**49,2**	**66,9**	85,8	107,3	134,1	139,7	
400	**21,9**	**34,1**	**49,2**	**66,9**	86,5	108,1	135,1	140,7	
420		**34,1**	**49,2**	**66,9**	**87,4**	113,5	141,8	147,8	
454		**34,1**	**49,2**	**66,9**	**87,4**	122,7	153,3	159,7	155,2
480		**34,1**	**49,2**	**66,9**	**87,4**	129,7	162,1	168,9	164,1
500		**34,1**	**49,2**	**66,9**	**87,4**	135,1	168,9	175,9	170,9
600			**49,2**	**66,9**	**87,4**	**136,6**	202,6	211,1	205,1
700		REBAR YIELDING AREA		**66,9**	**87,4**	**136,6**	**213,4**	264,8	260,4
800					**87,4**	**136,6**	**213,4**	**267,7**	297,6
1000						**136,6**	**213,4**	**267,7**	341,8
Length to develop steel yield, $L_{b,rqd}$ [mm]	**202**	**253**	**303**	**354**	**404**	**505**	**632**	**761**	**1023**

Values shaded in grey are not allowed for overlapping joints

9. OFFICIAL DOCUMENTATION

The following documents are available through our Sales Department or on our official website: www.indexfix.com:

- MOPUR3 Safety Data Sheet.
- European Technical Assessment ETA 17/0659 for use in cracked and non-cracked concrete according to EAD 330232-00-0601 Guide, option 1, for M8 to M30.
- European Technical Approval ETA 17/0658 for the installation of post-installed rebar with diameters from 8 to 32 mm according to technical report EAD 330087-01-0601.
- Classified A+ according to French Regulation DEVL11044875A relative to the emission of volatile pollutants for indoor use.
- LEED MOPUR3 Certification of sustainability
- WRAS certificate - 1506532 of material admitted for use in contact with drinking water.
- CSTB certificate (MRF 26072903 _ SP0363-1) of 14/12/2017 of the material's behavior in contact with fire for post-installed rebar connections.
- Declaration of Performance DoP MOPUR3.
- INDEXcal anchor calculation software.
- INDEXmor cartridge calculation needs software.