DECLARATION of PERFORMANCE

No 01/MKE/0922/2020

CE

1. *Unique identification code of the product-type*: **MKE**
2. *Intended use:* **Post-installed rebar connection in cracked or uncracked, reinforced or unreinforced normal weight concrete C12/15 ÷ C50/60 according EN 206:2013 (with maximum chloride concrete 0.40%) in dry or wet condition and not-carbonated concrete under static or quasi-static loads**
3. *Name, registered trade name or registered trade mark and contact address of the manufacturer:* **Marcopol Sp. z o.o. Producer of Bolts str. Oliwska 100, 80-209 Chwaszczyno Poland manufacturing plant 1**
4. *System of assessment verification of constancy of performance of the construction product:* **System "1" of assessment**
5. *European Technical Assessment:* **ETA 20/0922 issued 25.11.2020**
   Technical Assessment Body: **Technical and Test Institute for Construction Prague**
   Notified Body: **Number: 1020 - Technical and Test Institute for Construction Prague**
   Certificate number: **1020-CPR-090-049718**
6. *Declared performance:*

	Essential characteristics	Performance	Technical specification
3.1 BWR 1: Mechanical resistance and stability			
Static and quasi-static loading			
3.1.1.	Bond strength of post-installed rebar	see Annex C1, C2 below	ETA 20/0922
3.1.2.	Reduction factor	see Annex C1,C2 below	ETA 20/0922
3.1.3	Amplification factor for minimum anchorage length	see Annex C1, C2 below	ETA 20/0922
3.2 BRW 2: Safety in case of fire			
3.1.13	Reaction to fire	Class A1	EN 13501-1
3.1.14	Resistance to fire	NPD	ETA 20/0922
3.3 General aspect relating to fitness for use			
3.3.1	Durability and serviceability	See Annex B1 below	ETA 20/0922

Design bond strength of post-installed rebar $f_{bd,PIR}$

$f_{bd,PIR} = k_b \bullet f_{bd}$

k_b = reduction factor

f_{bd} = design bond strength of cast-in rebar according to EN 1992-1-1

Table C1: Values of the design bond strength of post installed rebar $f_{bd,PIR}$ for hammer drilling methods for good bond conditions

Rebar Ø 8 to Ø 28									
Concrete class	**C12/15**	**C16/20**	**C20/25**	**C25/30**	**C30/37**	**C35/45**	**C40/50**	**C45/55**	**C50/60**
k_b [-]	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
$f_{bd,PIR}$ [N/mm²]	**1,6**	**2,0**	**2,3**	**2,7**	**3,0**	**3,4**	**3,7**	**4,0**	**4,3**
Rebar Ø 32									
Concrete class	**C12/15**	**C16/20**	**C20/25**	**C25/30**	**C30/37**	**C35/45**	**C40/50**	**C45/55**	**C50/60**
k_b [-]	1,0	1,0	1,0	1,0	1,0	1,0	1,0	0,92	0,86
$f_{bd,PIR}$ [N/mm²]	**1,6**	**2,0**	**2,3**	**2,7**	**3,0**	**3,4**	**3,7**		

Tabulated values are valid for good bond conditions according to EN 1992-1-1.
For all other bond conditions multiply the values by 0,7.

Table C2: Amplification factor for minimum anchorage length for hammer drilling methods

Rebar	**Amplification factor**	**Concrete class**								
		C12/15	**C16/20**	**C20/25**	**C25/30**	**C30/37**	**C35/45**	**C40/50**	**C45/55**	**C50/60**
Ø 8	α_{lb}	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
Ø 10		1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
Ø 12		1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
Ø 14		1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
Ø 16		1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
Ø 20		1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
Ø 25		1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
Ø 28		1,0	1,0	1,0	1,0	1,0	1,0	1,5	1,5	1,5
Ø 32		1,0	1,0	1,0	1,0	1,0	1,0	1,5	1,5	1,5

MKE for rebar connection	
Performances Design values of the ultimate bond resistance for hammer drilling	**Annex C1**

Design bond strength of post-installed rebar $f_{bd,PIR}$

$f_{bd,PIR} = k_b \bullet f_{bd}$

k_b = reduction factor

f_{bd} = design bond strength of cast-in rebar according to EN 1992-1-1

Table C3: Values of the design bond strength of post installed rebar $f_{bd,PIR}$ for diamond core drilling methods for good bond conditions

Rebar Ø 8 to Ø 25									
Concrete class	**C12/15**	**C16/20**	**C20/25**	**C25/30**	**C30/37**	**C35/45**	**C40/50**	**C45/55**	**C50/60**
k_b [-]	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
$f_{bd,PIR}$ [N/mm²]	**1,6**	**2,0**	**2,3**	**2,7**	**3,0**	**3,4**	**3,7**	**4,0**	**4,3**
Rebar Ø 28									
Concrete class	**C12/15**	**C16/20**	**C20/25**	**C25/30**	**C30/37**	**C35/45**	**C40/50**	**C45/55**	**C50/60**
k_b [-]	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	0,93
$f_{bd,PIR}$ [N/mm²]	**1,6**	**2,0**	**2,3**	**2,7**	**3,0**	**3,4**	**3,7**	**4,0**	
Rebar Ø 32									
Concrete class	**C12/15**	**C16/20**	**C20/25**	**C25/30**	**C30/37**	**C35/45**	**C40/50**	**C45/55**	**C50/60**
k_b [-]	1,0	1,0	1,0	1,0	1,0	1,0	0,91	0,84	0,79
$f_{bd,PIR}$ [N/mm²]	**1,6**	**2,0**	**2,3**	**2,7**	**3,0**	**3,4**			

Tabulated values are valid for good bond conditions according to EN 1992-1-1.
For all other bond conditions multiply the values by 0,7.

Table C4: Amplification factor for minimum anchorage length for diamond core drilling methods

Rebar	**Amplification factor**	**Concrete class C12/15 to C50/60**
Ø 8 to Ø 32	**α_{lb}**	1,5

MKE for rebar connection	**Annex C2**
Performances Design values of the ultimate bond resistance for diamond core drilling	

Specifications of intended use

Anchorages subject to:

- Static and quasi-static load.

Base materials

- Reinforced or unreinforced normal weight concrete according to EN 206:2013
- Strength classes C12/15 to C50/60 according to EN 206:2013.
- Maximum chloride concrete of 0,40% (CL 0.40) related to the cement content according to EN 206:2013.
- Non-carbonated concrete.
  Note: In case of a carbonated surface of the existing concrete structure the carbonated layer shall be removed in the area of the post installed rebar connection (with a diameter d_s + 60 mm) prior to the installation of the new rebar. The depth of concrete to be removed shall correspond to at least minimum concrete cover in accordance with EN 1992-1-1:2004.
  The foregoing may be neglected if building components are new and not carbonated.

Temperature range:

- -40°C to +80°C (max. short. term temperature +80°C and max. long term temperature +50°C)

Use conditions (Environmental conditions)

- The rebars may be used in dry or wet concrete.

Design:

- The anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the forces to be transmitted.
- Design according to EN 1992-1-1 and EN 1992-1-2.
- The position of the reinforcement in the existing structure shall be determined on the basis of the construction documentation and taken into account when designing.

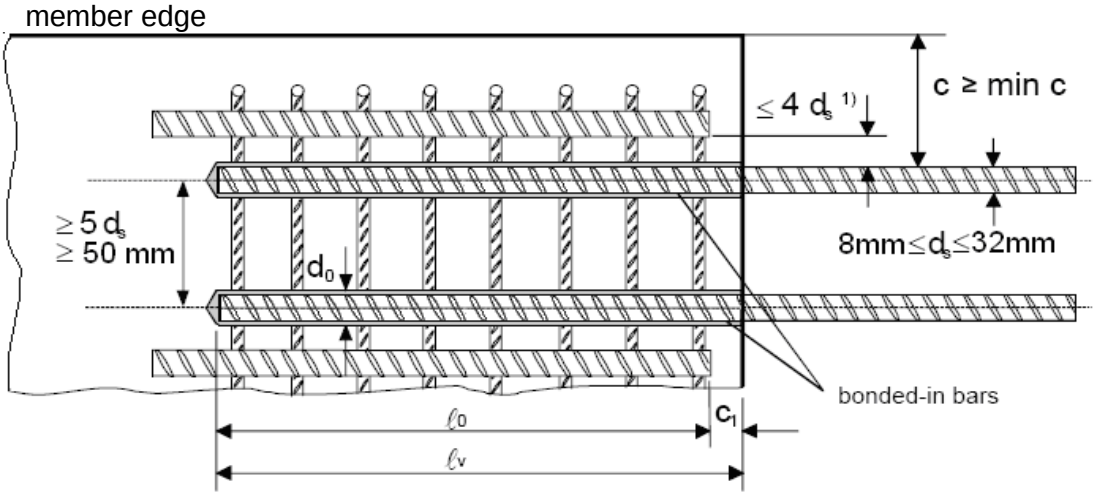
Installation:

- Dry or wet concrete.
- It must not be installed in flooded holes.
- Hole drilling by hammer drill, compressed air drill mode or diamond core drilling.
- The installation of post-installed rebars shall be done only by suitable trained installer and under supervision on site. The conditions under which an installer may be considered as suitable trained and the conditions for supervision on site are up to the Member States in which the installation is done.
- Check the position of the existing rebars (if the position is not known, it shall be determined using a rebar detector suitable for this purpose).

MKE for rebar connection	**Annex B1**
Intended use - Specifications	

Figure B1: General design rules of construction for bonded-in rebars

- Only tension forces in the axis of the rebar may be transmitted
- The transfer of shear forces between new concrete and existing structure shall be designed additionally according to EN 1992-1-1.
- The joints for concreting must be roughened to at least such an extent that aggregate protrude.



[1)] If the clear distance between lapped bars exceeds $4d_s$ then the lap length shall be increased by the difference between the clear bar distance and $4d_s$

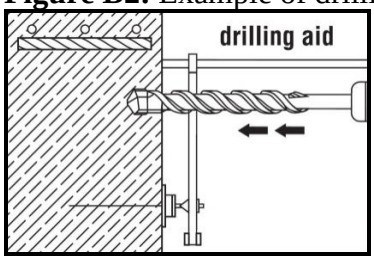
c	concrete cover of bonded-in bar
c_1	concrete cover at end-face of bonded-in bar
min c	minimum concrete cover acc. Table B1 of this assessment
d_s	diameter of bonded-in bar
ℓ_0	lap length acc. to EN 1992-1-1:2004
ℓ_v	effective embedment depth $\geq \ell_0 + c_1$
d_0	nominal drill bit diameter, see Table B2

MKE for rebar connection	**Annex B2**
Intended use - General design rules of construction	

Table B1: Minimum concrete cover c_{min} depending on drilling method

Drilling method	Bar diameter ϕ	Without drilling aid c_{min}	With drilling aid c_{min}
Hammer drilling or diamond drilling	< 25 mm	30 mm + 0,06 $\ell_v \geq 2\ \phi$	30 mm + 0,02 $\ell_v \geq 2\ \phi$
	≥ 25 mm	40 mm + 0,06 $\ell_v \geq 2\ \phi$	40 mm + 0,02 $\ell_v \geq 2\ \phi$
Compressed air drilling	< 25 mm	50 mm + 0,08 ℓ_v	50 mm + 0,02 ℓ_v
	≥ 25 mm	60 mm + 0,08 $\ell_v \geq 2\ \phi$	60 mm + 0,02 $\ell_v \geq 2\ \phi$

Figure B2: Example of drilling aid



Minimum anchorage length $\ell_{bd,PIR}$ and minimum anchorage lap length $\ell_{0,PIR}$

Minimum anchorage length

$\ell_{b,PIR} = \alpha_{lb} \bullet \ell_{b,min}$

α_{lb} = amplification factor for minimum anchorage length
(see Annex C 1, Table C2 for hammer drilling method)
(see Annex C 2, Table C4 for diamond core drilling method)

$\ell_{b,mi}$ = minimum anchorage length of cast-in rebar according to EN 1992-1-1, eq. 8.6

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Minimum lap length

$\ell_{0,PIR} = \alpha_{lb} \bullet \ell_{0,min}$

α_{lb} = amplification factor for minimum anchorage length
(see Annex C 1, Table C2 for hammer drilling method)
(see Annex C 2, Table C4 for diamond core drilling method)

$\ell_{b,mi}$ = minimum lap length of cast-in rebar according to EN 1992-1-1, eq. 8.11

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Table B2: Drilling diameter and maximum anchorage depth

Rebar diameter d_{nom} [1)]	Nominal drilling diameter d_{cut}	Max permissible embedment depth ℓ_v
[mm]	[mm]	[mm]
8	12	400
10	14	500
12	16	600
14	18	700
16	20	800
20	25	1000
25	32	1000
28	35	1000
32	40	1000

[1)] The maximum outer rebar diameter over the ribs shall be:
nominal diameter of the bar d_{nom} + 0,20 d_{nom}

MKE for rebar connection	**Annex B3**
Intended use Minimum concrete cover Minimum anchorage length Maximum embedment length	

Table B3: Processing and Cure time

Base Material Temperature °C	Cartridge Temperature °C	T Gel (mins)	T load (hrs)
+5°C	Minimum +10°C	300	24
+5°C to +10°C		150	
+10°C to +15°C	+10°C to +15°C	40	18
+15°C to +20°C	+15°C to +20°C	25	12
+20°C to +25°C	+20°C to +25°C	18	8
+25°C to +30°C	+25°C to +30°C	12	6
+30°C to +35°C	+30°C to +35°C	8	4
+35°C to +40°C	+35°C to +40°C	6	2
Ensure cartridge is > 10°C			

MKE for rebar connection
Intended use - Processing and load time **Annex B4**

Values given in table C1÷C2 are valid only if were passing rules given in Annex B1- B4

7. **The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point *6***
This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 3.

Signed by:

Chwaszczyno, 10.12.2020

R&D Director

Janusz Kabała

Dyrektor Działu Rozwoju Produktów

Janusz Kabała