DECLARATION of PERFORMANCE

No 01/MKW/0872/2020

CE

1. *Unique identification code of the product-type*: **MKW**
2. *Intended use:* post installed rebar connections with injection mortal
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 20/0872 issued 19.11.2020**
   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-090-049716**
6. *Declared performance:*

	Essential characteristics	Performance	Technical specification
3.1 BWR 1: Mechanical resistance and stability			
3.1.1.	Bond strength of post-installed rebar	see annex C1 below	ETA 20/0872
3.1.2.	Reduction factor	see annex C1 below	ETA 20/0872
3.1.3	Amplification factor for minimum	see annex C1 below	ETA 20/0872
3.2 BWR 2: Safety in case of fire			
3.2.1.	Reaction to fire	The performance of the product is class A1	EN 13501-1
3.2.2	Resistance to fire	NPD	

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 all drilling methods for good bond conditions

Rebar Ø 8 to 12									
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	0,90	0,82	0,76	0,71
$f_{bd,PIR}$ [N/mm²]	**1,6**	**2,0**	**2,3**	**2,7**	**3,0**				
Rebar Ø 14 to 16									
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	0,89	0,90	0,82	0,76	0,71
$f_{bd,PIR}$ [N/mm²]	**1,6**	**2,0**	**2,3**	**2,7**		**3,0**			
Rebar Ø 18									
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	0,89	0,80	0,73	0,76	0,71
$f_{bd,PIR}$ [N/mm²]	**1,6**	**2,0**	**2,3**	**2,7**				**3,0**	
Rebar Ø 20 to 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	0,89	0,80	0,73	0,67	0,63
$f_{bd,PIR}$ [N/mm²]	**1,6**	**2,0**	**2,3**	**2,7**					

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.

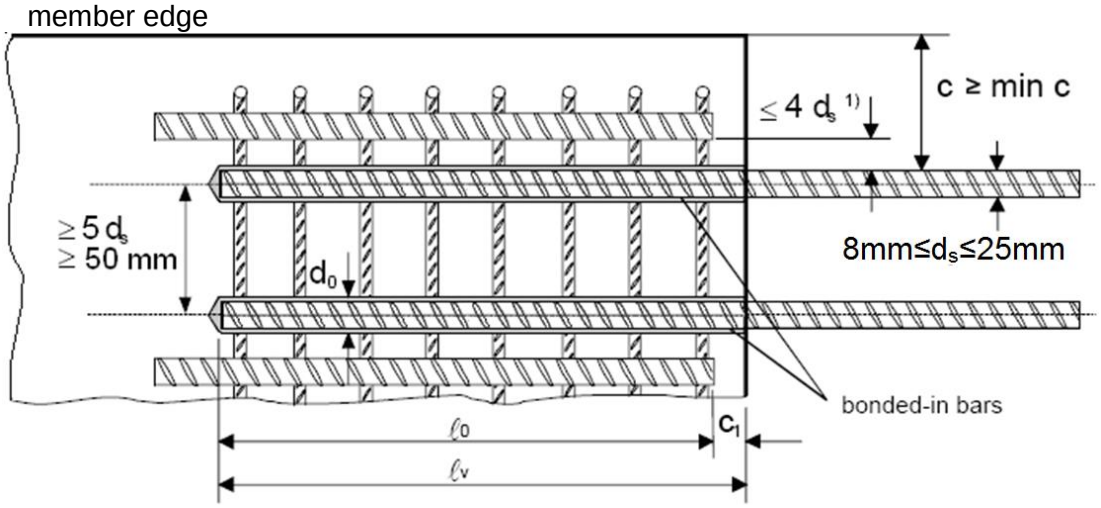
Table C2: Amplification factor for minimum anchorage length

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	1,1	1,0	1,0	1,0	1,0
Ø 10		1,0	1,0	1,0	1,0	1,1	1,0	1,0	1,0	1,0
Ø 12		1,0	1,0	1,0	1,0	1,1	1,1	1,0	1,0	1,0
Ø 14		1,0	1,0	1,0	1,0	1,0	1,1	1,0	1,0	1,0
Ø 16		1,0	1,0	1,0	1,0	1,0	1,1	1,1	1,0	1,0
Ø 18		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 24		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	1,1	1,0	1,0	1,0	1,0	1,0

MKW for rebar connection – Values given in table C1 and C2 are valid only if were passing rules given in Annex B1÷B8

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 $4d_s$

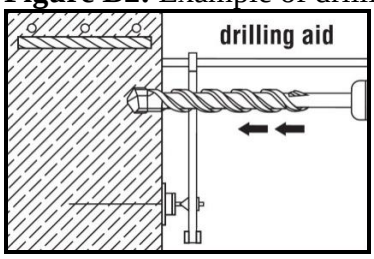
c	concrete cover of bonded-in bar
c_1	concrete cover at end-face of bonded-in bar
min c	minimum concrete cover acc. Table B1 of this assessment
d_s	diameter of bonded-in bar
ℓ_0	lap length acc. to EN 1992-1-1:2004
ℓ_v	effective embedment depth $\geq \ell_0 + c_1$
d_0	nominal drill bit diameter, see Table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

MKW 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	< 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 $\ell_{0,PI}$

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)

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

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)

$\ell_{0,min}$ = minimum lap length of cast-in rebar according to EN 1992-1-1, eq. 8.11

Table B2: Drilling diameter and maximum embedment depth

Rebar diameter d_{nom} [1)]	Nominal drilling diameter d_{cut}	Max permissible embedment depth $\ell_{v,max}$
[mm]	[mm]	[mm]
8	12	400
10	14	500
12	16	600
14	18	700
16	20	800
18	22	900
20	25	1000
24	32	1000
25	32	1000

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

Table B3: Processing and Load time

Resin cartridge temperature [°C]	T Work [mins]	Base material Temperature [°C]	T Load [mins]
min +5	18	min +5	145
+5 to +10	10	+5 to +10	
+10 to +20	6	+10 to +20	85
+20 to +25	5	+20 to +25	50
+25 to +30	4	+25 to +30	40
+30		+30	35

T work is typical gel time at highest temperature T load is set at the lowest temperature

MKW for rebar connection	**Annex B4**
Intended use Processing and Load time	

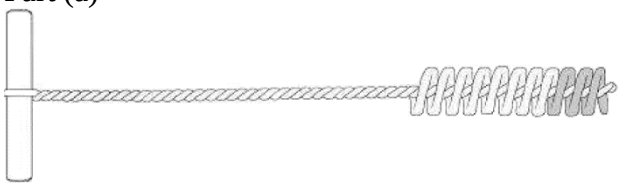
Table B5: Brush

Sizes		Ø8	Ø10	Ø12	Ø14	Ø16	Ø18	Ø20	Ø24	Ø25
Drill hole diameter d_0	[mm]	12	14	16	18	20	22	25	32	32
Brushes head diameter	[mm]	14	14	20	22	22	24	30	40	40
Brushes head length	[mm]	75								

If required use additional accessories and extension for air nozzle and brush to reach back of hole.

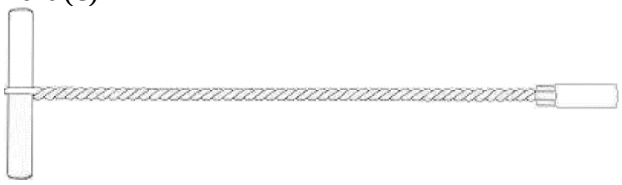
Max. hole depth	Brush / extension configuration	Part
280 mm	Standard brush	(a)
400 mm	Brush head unit + handle unit	(b)+(c)
700 mm	Brush head unit + extension piece + handle unit	(b)+(d)+(c)
1000 mm	Brush head unit + 2x extension piece + handle unit	(b)+(d)+(d)+(c)

Part (a)



Part (b)

Part (c)



Part (d)

Table B6: Extension hose for deep holes

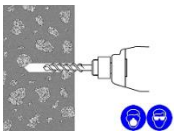
Sizes		Ø8	Ø10	Ø12	Ø14	Ø16	Ø18	Ø20	Ø24	Ø25
Hole diameter	[mm]	10	12	16	18	20	22	25	32	32
Extension hose	[mm]	9		14						
Resin stopper	[mm]	-	-	-	-	18	18	22	30	30

MKW for rebar connection

Intended use
Brush, Extension hose for deep holes

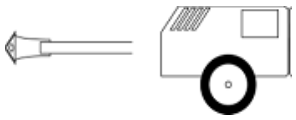
Annex B5

Drilling the hole



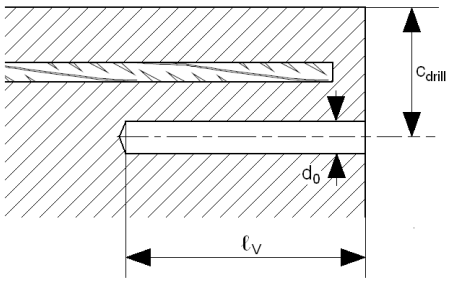
Drill hole to the required embedment depth using a hammer-drill with carbide drill bit set in rotation hammer mode, or a compressed air drill.

Rotary hammer drilling



Compressed air drill

Before drilling remove carbonized concrete.
In case of aborted drill hole the drill hole shall be filled with mortar.



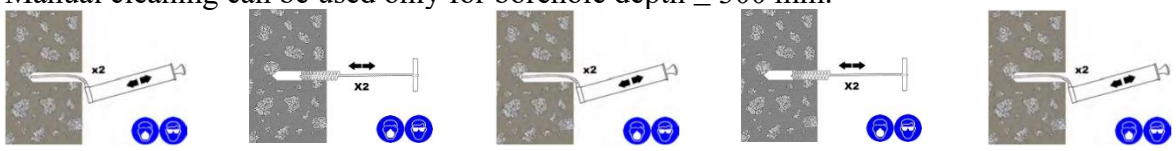
- Observe concrete coverage c, as per setting plan and Table B1
- Drill parallel to the edge and to existing rebar

Cleaning the hole

The borehole must be free of dust, debris, water, ice, oil, grease and other contaminants prior to mortar injection.

a) Manual cleaning

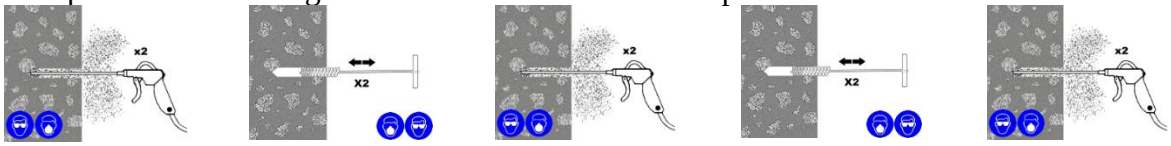
Manual cleaning can be used only for borehole depth ≤ 300 mm.



- Blowing at least 2 times from the back of the hole with the hand pump.
- Brushing 2 times with the special brush size (brush Ø ≥ borehole Ø) by inserting the brush to the back of the hole in a twisting motion. The brush shall produce natural resistance as it enters the anchor hole. If this is not the case, please use a new brush or a brush with a larger diameter.
- Repeat operation 1 and 2.
- Blowing at least 2 times again with the hand pump.

b) Compressed air cleaning

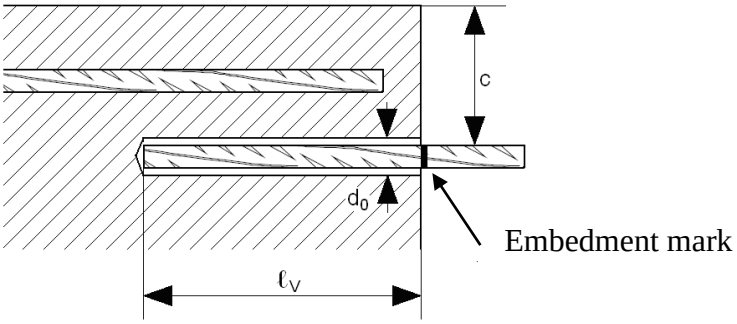
Compressed air cleaning can be used for all borehole depths.



- Blowing 2 times from the back of the hole with oil-free compressed air (min. 6 bar) until return air stream is free of noticed dust.
- Brushing 2 times with the special brush size (brush Ø ≥ borehole Ø) by inserting the brush to the back of the hole in a twisting motion. The brush shall produce natural resistance as it enters the anchor hole. If this is not the case, please use a new brush or a brush with a larger diameter.
- Repeat operation 1 and 2.
- Blowing 2 times again with compressed air until return air stream is free of noticeable dust.

Mortar injection

If the hole collects water after initial cleaning,
this water must be removed before injecting the resin.



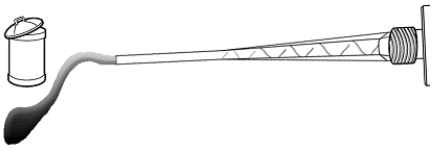
Before use, make sure the rebar is dry and free of oil or other residue.

Mark embedment depth on the rebar (e.g. with tape) ℓ_v

Insert rebar in borehole, to verify hole and setting depth ℓ_v

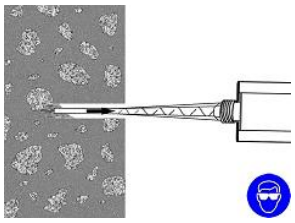
- Check expiration date: See imprint on cartridge. Do not use an expired product
- Foil pack temperature:
  Must be between +5°C and +30°C when in use
- Base material temperature at time of installation:
  Must be between +5°C and +30°C
- Instructions for transport and storage:
  Keep in a cool, dry and dark place at +5°C to +20°C achieve maximum shelf life

Select the appropriate static mixer nozzle for the installation, open the cartridge/foil and screw onto the mouth of the cartridge. Insert the cartridge into the correct applicator gun.



Extrude the first part of the cartridge to waste until an even colour has been achieved without streaking in the resin

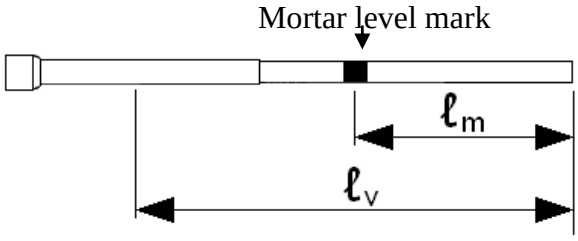
If necessary, cut the extension tube to the depth of the hole and push onto the end of the mixer nozzle, and (for rebars 16 mm dia. or more) fit the correct resin stopper to the other end. Attach extension tubing and resin stopper.



Insert the mixer nozzle (resin stopper / extension tube if applicable) to the bottom of the hole. Begin to extrude the resin and slowly withdraw the mixer nozzle from the hole ensuring that there are no air voids as the mixer nozzle is withdrawn. Fill the hole to approximately ½ to ¾ full and remove the mixer nozzle completely

Annex B7

Inserting the rebar

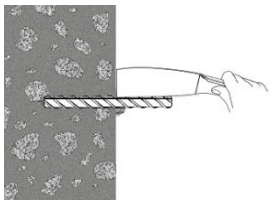


Mark the required mortar level ℓ_m and embedment depth ℓ_v with tape or marker on the injection extension.

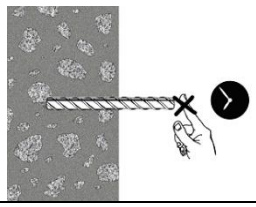
Quick estimation: $\ell_m = 1/2 \bullet \ell_v$

Continue injection until the mortar level mark ℓ_m becomes visible.

Insert the rebar, free from oil or other release agents, to the bottom of the hole using a back and forth twisting motion ensuring all the threads are thoroughly coated. Adjust to the correct position within the stated working time.



Any excess resin should be expelled from the hole evenly around the steel element showing that the hole is full.
This excess resin should be removed from around the mouth of the hole before it sets.



Leave the anchor to cure.

Do not disturb the anchor until the appropriate loading/curing time has elapsed depending on the substrate conditions and ambient temperature.

MKW for rebar connection	**Annex B8**
Intended use Installation instructions III	

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