DECLARATION OF PERFORMANCE

Nr DoP-21/0243-R-KEM-II

1. Unique identification code of the product type: **Bonded anchors R-KEM-II**
2. Intended use: **Bonded anchor R-KEMII, R-KEMII-S, R-KEMII-W, RM50, RM50-S, RM50-W with threaded rod for use in non-cracked concrete. The anchors shall be used in accordance with the conditions set out in Annex B ETA-21/0242. Assumption of an anticipated 50 and/or 100 year service life.**
3. Producer: **RAWLPLUG S.A., ul. Kwidzyńska 6, 51-416 Wrocław, Polska**
4. System(s) of assessment and verification of constancy of performance: **System 1**
5. European Assessment Document: **EAD 330499-02-0601; September 2022**
6. European Technical Assessment: **ETA-21/0243; 2024-12-30**
   Technical Assessment Unit: **Building Research Institute**
   Notified body or bodies: **1488**
   Certificate number and type: **1488-CPR-0947/W**
7. Declared performance characteristics:

Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance to tension load and shear load (static and quasi static loading), displacements	See Tabele C1 to6; ETA-21/0243

Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	No performance assessed

Hygiene, health and environment (BWR 3)

Essential characteristic	Performance
No performance assessed	

Table C1: Characteristic resistance under tension load in uncracked concrete – static and quasi-static loads

Size			M8	M10	M12	M16	M20	M24	M30
Steel failure									
Steel failure with standard threaded rod grade 5.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	18	29	42	78	122	176	280
Partial safety factor	γ_{Ms} [1]	[-]	1,50						
Steel failure with standard threaded rod grade 8.8									
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	126	196	282	449
Partial safety factor	γ_{Ms} [1]	[-]	1,50						
Steel failure with standard threaded rod grade 10.9									
Characteristic resistance	$N_{Rk,s}$	[kN]	37	58	84	157	245	353	561
Partial safety factor	γ_{Ms} [1]	[-]	1,40						
Steel failure with standard threaded rod grade 12.9									
Characteristic resistance	$N_{Rk,s}$	[kN]	44	70	101	188	294	424	673
Partial safety factor	γ_{Ms} [1]	[-]	1,40						
Steel failure with standard stainless steel threaded rod A4-70									
Characteristic resistance	$N_{Rk,s}$	[kN]	26	41	59	110	171	247	393
Partial safety factor	γ_{Ms} [1]	[-]	1,87						
Steel failure with standard stainless steel threaded rod A4-80									
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	126	196	282	449
Partial safety factor	γ_{Ms} [1]	[-]	1,60						
Steel failure with standard high corrosion threaded rod grade 70									
Characteristic resistance	$N_{Rk,s}$	[kN]	26	41	59	110	171	247	393
Partial safety factor	γ_{Ms} [1]	[-]	1,87						
Combined pull-out and concrete cone failure (working life 50 and/or 100 years)									
Characteristic bond resistance in uncracked concrete C20/25, working life 50 years									
Temperature range I: 40°C/24°C	$\tau_{Rk,ucr,50}$	[N/mm²]	9,3	9,3	8,8	8,1	7,8	6,3	5,3
Temperature range II: 80°C/50°C	$\tau_{Rk,ucr,50}$	[N/mm²]	7,7	7,7	7,3	6,7	6,5	5,2	4,4
Sustained load factor for $\tau_{Rk,ucr,50}$ in uncracked concrete	$\psi^0_{sus,50}$	40°C/24°C	0,74						
		80°C/50°C	0,69						
Characteristic bond resistance in uncracked concrete C20/25, working life 100 years									
Temperature range I: 40°C/24°C	$\tau_{Rk,ucr,100}$	[N/mm²]	9,3	9,3	8,8	8,1	7,8	6,3	5,3
Temperature range II: 80°C/50°C	$\tau_{Rk,ucr,100}$	[N/mm²]	7,7	7,7	7,3	6,7	6,5	5,2	4,4
Sustained load factor for $\tau_{Rk,ucr,100}$ in uncracked concrete	$\psi^0_{sus,100}$	40°C/24°C	0,83						
		80°C/50°C	0,78						
Increasing factors	ψ_c	C30/37	1,04				1,0		
		C40/50	1,07				1,0		
		C50/60	1,09				1,0		

1) In the absence of national regulations
2) h – concrete member thickness

Table C1: (continuation)

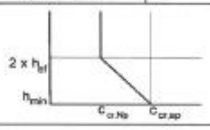
Concrete cone failure					
Factor for uncracked concrete	$k_{ucr,N}$	[-]	11,0		
Edge distance	$c_{cr,N}$	[mm]	$1,5 \cdot h_{ef}$		
Spacing	$s_{cr,N}$	[mm]	$3,0 \cdot h_{ef}$		
Splitting failure					
Edge distance	$c_{cr,sp}$ for h_{min}	[mm]	$2,5 \cdot h_{ef}$	$2,0 \cdot h_{ef}$	$1,5 \cdot h_{ef}$
	$c_{cr,sp}$ for $h_{min} < h^{1)} < 2 \cdot h_{ef}$ ($c_{cr,sp}$ from linear interpolation)	[mm]			
	$c_{cr,sp}$ for $h^{1)} \geq 2 \cdot h_{ef}$	[mm]	$c_{cr,Np}$		
Spacing	$s_{cr,sp}$	[mm]	$2,0 \cdot c_{cr,sp}$		
Installation safety factors for combined pull-out, concrete cone and splitting failure					
Installation safety factors for category I1 + I2	γ_{inst}	[-]	1,4	1,2	
1) h – concrete member thickness					

Table C2: Characteristic resistance under shear loads in uncracked concrete – steel failure without lever arm

Size				**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M30**
Characteristic resistance		$V^0_{Rk,s}$	[kN]	$k_6 \cdot A_s^{2)} \cdot f_{uk}^{3)}$						
Factor considering ductility	carbon steel with $f_{uk} \leq 500$ N/mm²	k_6	[-]	0,6						
	carbon steel with $500 < f_{uk} \leq 1000$ N/mm² or stainless steel			0,5						
Factor considering ductility		k_7		1,0						
Partial safety factor 1)										
Threaded rod grade 5.8		γ_{Ms}	[-]	1,25						
Threaded rod grade 8.8				1,25						
Threaded rod grade 10.9				1,50						
Threaded rod grade 12.9				1,50						
Stainless steel threaded rod A4-70				1,56						
Stainless steel threaded rod A4-80				1,33						
High corrosion stainless steel grade 70				1,56						

1) In the absence of other national regulation
2) Stressed cross section of the steel
3) According to EN 1992-1-1

Table C3: Characteristic values for shear load in uncracked concrete – steel failure with lever arm

Size			M8	M10	M12	M16	M20	M24	M30
Steel failure with standard threaded rod grade 5.8									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561	1124
Partial safety factor	γ_{Ms}	[-]	1,25						
Steel failure with standard threaded rod grade 8.8									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1799
Partial safety factor	γ_{Ms}	[-]	1,25						
Steel failure with standard threaded rod grade 10.9									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	37	75	131	333	649	1123	2249
Partial safety factor	γ_{Ms}	[-]	1,50						
Steel failure with standard threaded rod grade 12.9									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	45	90	157	400	779	1347	2699
Partial safety factor	γ_{Ms}	[-]	1,50						
Steel failure with standard stainless steel threaded rod A4-70									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Partial safety factor	γ_{Ms}	[-]	1,56						
Steel failure with standard stainless steel threaded rod A4-80									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898	1799
Partial safety factor	γ_{Ms}	[-]	1,33						
Steel failure with high corrosion stainless steel threaded rod grade 70									
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786	1574
Partial safety factor	γ_{Ms}	[-]	1,56						

Table C4: Concrete pry out failure and concrete edge failure

Size			M8	M10	M12	M16	M20	M24	M30
Pry out failure									
Pry-out factor	k_8	[-]	2						
Concrete edge failure									
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	16	20	24	30
Effective length of anchor shear loading	l_f	[mm]	$\min(h_{ef}; 12d_{nom})$						$\min(h_{ef}; 300)$

Table C5: Displacement under tension loads

Size			M8	M10	M12	M16	M20	M24	M30
Characteristic displacement in uncracked C20/25 to C50/60 concrete									
Displacement [1]	δ_{N0}	[mm/N/mm²]	0,046	0,057	0,073	0,094	0,108	0,128	0,169
	$\delta_{N\infty}$	[mm/N/mm²]	0,130	0,130	0,130	0,130	0,130	0,130	0,130

[1] These values are suitable for each temperature range and categories specified in Annex B1
Calculation of the displacement: $\delta_{N0} = \delta_{N0}$-factor · N; $\delta_N = \delta_{N\infty}$-factor · N; (N – applied tension load)

Table C6: Displacement under shear loads

Size			M8	M10	M12	M16	M20	M24	M30
Characteristic displacement in uncracked C20/25 to C50/60 concrete									
Displacement [1]	δ_{V0}	[mm/kN]	0,228	0,144	0,099	0,053	0,034	0,024	0,015
	$\delta_{V\infty}$	[mm/kN]	0,342	0,216	0,148	0,080	0,051	0,035	0,022

[1] These values are suitable for each temperature range and categories specified in Annex B1
Calculation of the displacement: $\delta_{N0} = \delta_{N0}$-factor · V; $\delta_N = \delta_{N\infty}$-factor · V; (V – applied shear load)

The performance of the product identified above is in conformity with the set of declared performance characteristics. This declaration of performance is issued in accordance with Regulation (EU) No 305/2011 under the sole responsibility of the manufacturer identified above.

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Wrocław, 2025-05-06