KEM-V

STYRENE FREE
VINYLOESTER RESIN

PRODUCT DESCRIPTION

Two-component vinyloester anchoring mass (resin and hardener) for the installation of threaded rods and rebars in cracked and uncracked concrete and masonry and post-installation of rebars.

APPLY

Designed for fastening light and heavy components (steel structures, poles, brackets and consoles, railings and handrails, backyard elements, gazebos, porches, fences sanitary equipment, fixing of machine and equipment) in cracked and un-cracked concrete and masonry. Suitable for water flooded holes in concrete. Direct application in concrete and solid clay bricks, while aplly in hollow bricks use special mesh sleeve. Available in two different cartridges, 280 ml capacity for designed for use with single-piston dispenser and 380 ml capacity, designe for use with special chemical anchor dispenser. Each cartridge comes with two mixers.

CAPACITY

About the importance of	Capacity [ml]	Unit /Quantity/Bulk [pcs]
KEM V	280	1/12/12
KEM V	380	1/10/10

CURING TIME

Substrate temperature [°C]	Gelling/machining time [min]	Minimum curing time
-10 do -6	90	24 h
-5 do -1	90	14 h
0 do +4	45	7 h
+5 do +9	25	2 h
+10 do +19	15	80 min
+20 do +29	15	45 min
+30 do +34	4	25 min
+35 do +39	2	20 min
+40	1,5	15 min
cartridge temperature		**+5°C do +40°C**

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EUROPEAN TECHNICAL ASSESSMENT ETA-12/0383

CHARACTERISTIC TENSION LOADS FOR TREADED ROD IN CRACKED AND UN-CRACKED CONCRETE											
ESSENTIAL CHARACTERISTICS				**PERFORMANCE**							
d	**THREADED ROD**			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
d_0	Nominal diameter of drill bit		[mm]	10	12	14	18	24	28	32	35
h_{ef}	Effective embedment depth	$h_{ef,min}$	[mm]	60	60	70	80	90	96	108	120
		$h_{ef,std}$	[mm]	80	90	110	125	170	210	240	270
		$h_{ef,max}$	[mm]	160	200	240	320	400	480	540	600
h_{min}	Minimum thickness of the concrete member		[mm]	$h_{ef} + 30 \geq 100$			$h_{ef} + 2d_0$				
T_{inst}	Torque moment (max)		[Nm]	10	20	40	80	120	160	180	200
s_{min}	Minimum spacing		[mm]	40	50	60	80	100	120	135	150
c_{min}	Minimum edge distance		[mm]	40	50	60	80	100	120	135	150
TENSION Steel failure											
$N_{Rk,s}$	Tension Steel charact. failure	cl. 4.6-4.8	[kN]	15	23	34	63	98	141	184	224
		cl. 5.6-5.8	[kN]	18	29	42	78	122	176	230	280
		cl. 8.8	[kN]	29	46	67	125	196	282	368	449
		A4-70 (50)	[kN]	26	41	59	110	171	247	(230)	(281)
$N_{Rk,s,eq,C1}$	Tension Steel charact. failure Cat. Seismic **C1**		[kN]	$1,0 \times N_{Rk,s}$							
$\gamma_{Ms,N}$ [1)]	Partial safety factor	cl. 4.6-5.6	[-]	2,0							
		cl. 4.8-5.8-8.8	[-]	1,5							
		A4-70 (50)	[-]	1,87						(2,86)	
Combined pull-out and concrete failure: "DRY-WET"											
$\tau_{Rk,ucr}$	Characteristic bond resistance for **un-cracked concrete** C20/25	40°/24°C	[MPa]	10	12	12	12	12	11	10	9
		80°/50°C	[Mpa]	7,5	9	9	9	9	8,5	7,5	6,5
		120°/72°C	[MPa]	5,5	6,5	6,5	6,5	6,5	6,5	5,5	5
$\tau_{Rk,cr}$	Characteristic bond resistance for **Cracked concrete** C20/25	40°/24°C	[MPa]	4	5	5,5	5,5	5,5	5,5	6,5	6,5
		80°/50°C	[Mpa]	2,5	3,5	4	4	4	4	4,5	4,5
		120°/72°C	[MPa]	2	2,5	3	3	3	3	3,5	3,5
$\tau_{Rk,eq,C1}$	Characteristic bond resistance for **Cat. Seismic C1** C20/25	40°/24°C	[MPa]	2,5	3,1	3,7	3,7	3,7	3,8	4,5	4,5
		80°/50°C	[MPa]	1,6	2,2	2,7	2,7	2,7	2,8	3,1	3,1
		120°/72°C	[MPa]	1,3	1,6	2	2	2	2,1	2,4	2,4
Combined pull-out and concrete failure: "FLOODED HOLES"				M8	M10	M12	M16	M20	M24	M27	M30
$\tau_{Rk,ucr}$	Characteristic bond resistance for **un-cracked concrete** C20/25	40°/24°C	[MPa]	7,5	8,5	8,5	8,5	(NPD)			
		80°/50°C	[MPa]	5,5	6,5	6,5	6,5				
		120°/72°C	[MPa]	4	5	5	5				
$\tau_{Rk,cr}$	Characteristic bond resistance for **Cracked concrete** C20/25	40°/24°C	[MPa]	4	4	5,5	5,5	(NPD)			
		80°/50°C	[MPa]	2,5	3	4	4				
		120°/72°C	[MPa]	2	2,5	3	3				
$\tau_{Rk,eq,C1}$	Characteristic bond resistance for **Category Seismic C1** C20/25	40°/24°C	[MPa]	2,5	2,5	3,7	3,7	(NPD)			
		80°/50°C	[MPa]	1,6	1,9	2,7	2,7				
		120°/72°C	[MPa]	1,3	1,6	2	2				
ψ_c	Increasing factor for concrete	C30/37	[-]	1,04							
		C40/50	[-]	1,08							
		C50/60	[-]	1,10							
ψ^0_{sus}	Reduction factor for C20/25 cracked, un-cracked concrete and Seismic Category	40°/24°C	[-]	0,73							
		80°/50°C	[-]	0,65							
		120°/72°C	[-]	0,57							
ψ_c	Increasing factor for concrete (Seismic Category)	da C25/30 a C50/60	[-]	1,0							

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Concrete Cone failure											
$K_{cr,N}$	Factor acc. to EN 1992-4 § 7.2.1.4 cracked		[-]	7,7							
$K_{ucr,N}$	Factor acc. to EN 1992-4 § 7.2.1.4 un-cracked		[-]	11,0							
$c_{cr,N}$	Critical edge distance		[mm]	1,5 *x* h_{ef}							
$s_{cr,N}$	Critical spacing		[mm]	2,0 *x* $C_{cr,N}$							
Splitting failure											
$c_{cr,sp}$	Critical edge distance for Splitting	$h/h_{ef} \geq 2,0$	[mm]	1,0 *x* h_{ef}							
		$2,0 > h/h_{ef} > 1,3$	[mm]	2 *x* h_{ef} $(2,5 - h/h_{ef})$							
		$h/h_{ef} \leq 1,3$	[mm]	2,4 *x* h_{ef}							
$s_{cr,sp}$	Critical spacing for Splitting		[mm]	2,0 *x* $C_{cr,sp}$							
γ_{inst}	Installation safety factor for dry and wet concrete		[-]	1,0	1,2						
γ_{inst}	Installation safety factor for flooded holes		[-]	1,4				(NPD)			

1) In absence of other national regulations.

CHARACTERISTIC SHEAR LOADS FOR TREADED ROD IN CRACKED AND UN-CRACKED CONCRETE											
ESSENTIAL CHARACTERISTICS				**PERFORMANCE**							
d	**THREADED ROD**			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
SHEAR Steel failure											
$V_{Rk,s}$	Shear Steel charact. failure	cl. 4.6-4.8	[kN]	9	14	20	38	59	85	110	115
		cl. 5.6-5.8	[kN]	11	17	25	47	74	106	138	168
		cl. 8.8	[kN]	15	23	34	63	98	141	184	224
		A4-70 (50)	[kN]	13	20	30	55	86	124	(115)	(140)
$V_{Rk,eq,C1}$	Shear Steel charact. failure Cat. Sismica **C1**		[kN]	0,70 x $V_{Rk,s}$							
$M^0_{Rk,s}$	Charact. Bending Moment	cl. 4.6-4.8	[Nm]	15	30	52	133	260	449	666	900
		cl. 5.6-5.8	[Nm]	19	37	65	166	324	560	833	1123
		cl. 8.8	[Nm]	30	60	105	266	519	896	1333	1797
		A4-70 (50)	[Nm]	26	52	92	232	454	784	(832)	(1125)
$M^0_{Rk,s,eq,C1}$	Charact. Bending Moment Cat. Sismica **C1**		[Nm]	(NPD)							
$\gamma_{Ms,V}$ [2)]	Partial safety factor	cl. 4.6-5.6	[-]	1,67							
		cl. 4.8-5.8-8.8	[-]	1,25							
		A4-70 (50)	[-]	1,56						(2,38)	
K_7	Ductility factor acc. to EN 1992-4 § 7.2.2.3.1		[-]	1,0							
Concrete Pry-out failure											
K_8	Factor acc. to EN 1992-4 § 7.2.2.4		[-]	2,0							
γ_{inst}	Installation safety factor		[-]	1,0							
Concrete Edge failure											
l_f	Effective length of anchor		[-]	min (h_{ef}; 12xd_{nom})						min(h_{ef}; 300mm)	
d_{nom}	Outside diameter of anchor		[mm]	8	10	12	16	20	24	27	30
γ_{inst}	Installation safety factor		[-]	1,0							
α_{gap}	Factor for anular gap		[-]	0,5 (1,0) [1)]							

[1)] Value in brackets valid for filled annular gab between anchor and clearance hole in the fixture. Use of special filling washer Annex A3 of ETA-08/0383 is required;

[2)] In absence of other national regulations.

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Displacements under TENSION load (threaded rod) [1]				M8	M10	M12	M16	M20	M24	M27	M30
$\delta_{N0,ucr}$	Short term displacement in **Normal Concrete**	40°/24°C	[mm/MPa]	0,021	0,023	0,026	0,031	0,036	0,041	0,045	0,049
		80°/50°C		0,050	0,056	0,063	0,075	0,088	0,100	0,110	0,119
		120°/72°C		0,050	0,056	0,063	0,075	0,088	0,100	0,110	0,119
$\delta_{N\infty,ucr}$	Long term displacement in **Normal Concrete**	40°/24°C	[mm/MPa]	0,030	0,033	0,037	0,045	0,052	0,060	0,065	0,071
		80°/50°C		0,072	0,081	0,090	0,108	0,127	0,145	0,159	0,172
		120°/72°C		0,072	0,081	0,090	0,108	0,127	0,145	0,159	0,172
$\delta_{N0,cr}$	Short term displacement in **Cracked Concrete**	40°/24°C	[mm/MPa]	0,090	0,070						
		80°/50°C		0,219	0,170						
		120°/72°C		0,219	0,170						
$\delta_{N\infty,cr}$	Long term displacement in **Cracked Concrete**	40°/24°C	[mm/MPa]	0,105	0,105						
		80°/50°C		0,255	0,245						
		120°/72°C		0,255	0,245						

[1] Calculation of the displacement: $\delta N0 = \delta_{N0}$- factor · τ; $\delta N\infty = \delta_{N\infty}$- factor · τ. τ: action bond stress for tension

Displacements under SHEAR load (threaded rod) [1]			M8	M10	M12	M16	M20	M24	M27	M30
$\delta_{V0,ucr}$	Short term displacement in **Normal Concrete**	[mm/kN]	0,06	0,06	0,05	0,04	0,04	0,03	0,03	0,03
$\delta_{V\infty,ucr}$	Long term displacement in **Normal Concrete**		0,09	0,08	0,08	0,06	0,06	0,05	0,05	0,05
$\delta_{V0,cr}$	Short term displacement in **Cracked Concrete**	[mm/kN]	0,12	0,12	0,11	0,10	0,09	0,08	0,08	0,07
$\delta_{V\infty,cr}$	Long term displacement in **Cracked Concrete**		0,18	0,18	0,17	0,15	0,14	0,13	0,12	0,10

[1] Calculation of the displacement: $\delta V0 = \delta_{V0}$- factor · V ; $\delta V\infty = \delta_{V\infty}$- factor · V. V: action shear load

CHARACTERISTIC TENSION LOADS FOR REBAR IN CRACKED AND UN-CRACKED CONCRETE											
ESSENTIAL CHARACTERISTICS				**PERFORMANCE**							
d	**REBAR**			**Ø8**	**Ø 10**	**Ø 12**	**Ø 14**	**Ø 16**	**Ø 20**	**Ø 25**	**Ø 28**	**Ø 32**
d_0	Nominal diameter of drill bit		[mm]	12	14	16	18	20	24	32	35	40
h_{ef}	Effective embedment depth	$h_{ef,min}$	[mm]	60	60	70	75	80	90	100	112	128
		$h_{ef,std}$	[mm]	80	90	110	115	125	170	210	250	270
		$h_{ef,max}$	[mm]	160	200	240	280	320	400	500	580	640
h_{min}	Minimum thickness of the concrete member		[mm]	h_{ef} + 30 ≥ 100		h_{ef} + 2d_0						
s_{min}	Minimum spacing		[mm]	40	50	60	70	80	100	125	140	160
c_{min}	Minimum edge distance		[mm]	40	50	60	70	80	100	125	140	160
TENSION Steel failure											
$N_{Rk,s}$	Tension Steel charact. failure		[kN]	A_s *x* f_{uk} [1]							
$N_{Rk,s,eq,C1}$	Tension Steel charact. failure Cat. Seismic **C1**		[kN]	1,0 *X* A_s *x* f_{uk} [1]							
A_s	Area resistant		[mm²]	50	79	113	154	201	314	491	616	804
$\gamma_{Ms,N}$ [2]	Partial safety factor		[-]	1,4							

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Combined pull-out and concrete failure: "DRY-WET"				Ø8	Ø 10	Ø 12	Ø 14	Ø 16	Ø 20	Ø 25	Ø 28	Ø 32
$\tau_{Rk,ucr}$	Characteristic bond resistance for **un-cracked concrete** C20/25	40°/24°C	[MPa]	10	12	12	12	12	12	11	10	8,5
		80°/50°C	[MPa]	7,5	9	9	9	9	9	8	7	6
		120°/72°C	[MPa]	5,5	6,5	6,5	6,5	6,5	6,5	6	5	4,5
$\tau_{Rk,cr}$	Characteristic bond resistance for **Cracked concrete** C20/25	40°/24°C	[MPa]	**4**	**5**	**5,5**	**5,5**	**5,5**	**5,5**	**5,5**	**6,5**	**6,5**
		80°/50°C	[MPa]	**2,5**	**3,5**	**4**	**4**	**4**	**4**	**4**	**4,5**	**4,5**
		120°/72°C	[MPa]	**2**	**2,5**	**3**	**3**	**3**	**3**	**3**	**3,5**	**3,5**
$\tau_{Rk,seis,C1}$	Characteristic bond resistance for **Cat. Seismic C1** C20/25	40°/24°C	[MPa]	**2,5**	**3,1**	**3,7**	**3,7**	**3,7**	**3,7**	**3,8**	**4,5**	**4,5**
		80°/50°C	[MPa]	**1,6**	**2,2**	**2,7**	**2,7**	**2,7**	**2,7**	**2,8**	**3,1**	**3,1**
		120°/72°C	[MPa]	**1,3**	**1,6**	**2**	**2**	**2**	**2**	**2,1**	**2,4**	**2,4**
Combined pull-out and concrete failure: "FLOODED HOLES"												
$\tau_{Rk,ucr}$	Characteristic bond resistance for **un-cracked concrete** C20/25	40°/24°C	[MPa]	7,5	8,5	8,5	8,5	8,5	(NPD)			
		80°/50°C	[MPa]	5,5	6,5	6,5	6,5	6,5				
		120°/72°C	[MPa]	4	5	5	5	5				
$\tau_{Rk,cr}$	Characteristic bond resistance for **Cracked concrete** C20/25	40°/24°C	[MPa]	4	4	5,5	5,5	5,5	(NPD)			
		80°/50°C	[MPa]	2,5	3	4	4	4				
		120°/72°C	[MPa]	2	2,5	3	3	3				
$\tau_{Rk,eq,C1}$	Characteristic bond resistance for **Cat. Seismic C1** C20/25	40°/24°C	[MPa]	2,5	2,5	3,7	3,7	3,7	(NPD)			
		80°/50°C	[MPa]	1,6	1,9	2,7	2,7	2,7				
		120°/72°C	[MPa]	1,3	1,6	2	2	2				
ψ^0_{sus}	Reduction factor for C20/25 cracked, un-cracked concrete and Seismic Category	40°/24°C	[-]	0,73								
		80°/50°C	[-]	0,65								
		120°/72°C	[-]	0,57								
ψ_c	Increasing factor for concrete (Seismic Category)	C25/30 - C50/60	[-]	1,0								
Concrete Cone failure												
$K_{cr,N}$	Factor acc. to EN 1992-4 § 7.2.1.4 cracked		[-]	7,7								
$K_{ucr,N}$	Factor acc. to EN 1992-4 § 7.2.1.4 un-cracked		[-]	11,0								
$c_{cr,N}$	Critical edge distance		[mm]	$1,5 \times h_{ef}$								
$s_{cr,N}$	Critical spacing		[mm]	$2,0 \times C_{cr,N}$								
Splitting failure												
$c_{cr,sp}$	Critical edge distance for Splitting	$h/h_{ef} \geq 2,0$	[mm]	$1,0 \times h_{ef}$								
		$2,0 > h/h_{ef} > 1,3$	[mm]	$2 \times h_{ef} (2,5 - h/h_{ef})$								
		$h/h_{ef} \leq 1,3$	[mm]	$2,4 \times h_{ef}$								
$s_{cr,sp}$	Critical spacing for Splitting			$2,0 \times C_{cr,sp}$								
γ_{inst}	Installation safety factor for dry and wet concrete			1,2								
γ_{inst}	Installation safety factor for flooded holes			1,4					(NPD)			

[1] f_{uk} shall be taken from the specifications of reinforcing bars;
[2] In absence of other national regulations.

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CHARACTERISTIC SHEAR LOADS FOR REBAR IN CRACKED AND UN-CRACKED CONCRETE											
ESSENTIAL CHARACTERISTICS			**PERFORMANCE**								
d	**REBAR**		**Ø8**	**Ø 10**	**Ø 12**	**Ø 14**	**Ø 16**	**Ø 20**	**Ø 25**	**Ø 28**	**Ø 32**
SHEAR Steel failure											
$V_{Rk,s}$	Shear Steel charact. failure	[kN]	0,5 x A_s x f_{uk} [1]								
$V_{Rk,s,seis,C1}$	Shear Steel charact. failure Cat. Seismic **C1**	[kN]	0,35 x A_s x f_{uk} [1]								
A_s	Area resistant	[mm²]	50	79	113	154	201	314	491	616	804
$M^0_{Rk,s}$	Charact. Bending Moment	[Nm]	1,2 x W_{el} x f_{uk} [1]								
$M^0_{Rk,s\ seis,C1}$	Charact. Bending Moment Cat. Seismic **C1**	[Nm]	(NPD)								
W_{el}	Elastic section modulus	[mm³]	50	98	170	269	402	785	1534	2155	3217
$\gamma_{m,sV}$ [2]	Partial safety factor	[-]	1,5								
Concrete Pryout failure											
k_8	Factor acc. to EN 1992-4 § 7.2.2.4	[-]	2,0								
γ_{inst}	Installation safety factor	[-]	1,0								
Concrete Edge failure											
l_f	Effective length of anchor	[-]	min (h_{ef}; 12xd_{nom})						min (h_{ef}; 300mm)		
d_{nom}	Outside diameter of anchor	[mm]	8	10	12	14	16	20	25	28	32
γ_{inst}	Installation safety factor	[-]	1,0								
α_{gap}	Factor for anular gap	[-]	0,5 (1,0) [3]								

[1] f_{uk} shall be taken from the specifications of reinforcing bars;
[2] In absence of other national regulations;
[3] Value in brackets valid for filled annular gab between anchor and clearance hole in the fixture. Use of special filling washer Annex A3 of ETA-08/0383 is required

Displacements under TENSION load (rebar) [1]				**Ø8**	**Ø 10**	**Ø 12**	**Ø 14**	**Ø 16**	**Ø 20**	**Ø 25**	**Ø 28**	**Ø 32**
$\delta_{N0,ucr}$	Short term displacement in **Normal Concrete**	40°/24°C	[mm/MPa]	0,021	0,023	0,026	0,028	0,031	0,036	0,043	0,047	0,052
		80°/50°C		0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,126
		120°/72°C		0,050	0,056	0,063	0,069	0,075	0,088	0,104	0,113	0,126
$\delta_{N\infty,ucr}$	Long term displacement in **Normal Concrete**	40°/24°C	[mm/MPa]	0,030	0,033	0,037	0,041	0,045	0,052	0,061	0,071	0,075
		80°/50°C		0,072	0,081	0,090	0,099	0,108	0,127	0,149	0,163	0,181
		120°/72°C		0,072	0,081	0,090	0,099	0,108	0,127	0,149	0,163	0,181
$\delta_{N0,cr}$	Short term displacement in **Cracked Concrete**	40°/24°C	[mm/MPa]	0,090		0,070						
		80°/50°C		0,219		0,170						
		120°/72°C		0,219		0,170						
$\delta_{N\infty,cr}$	Long term displacement in **Cracked Concrete**	40°/24°C	[mm/MPa]	0,105		0,105						
		80°/50°C		0,255		0,245						
		120°/72°C		0,255		0,245						

[1] Calculation of the displacement: $\delta N0 = \delta_{N0}$- factor · τ; $\delta N\infty = \delta_{N\infty}$- factor · τ. τ: action bond stress for tension

Displacements under SHEAR load (rebar) [1]			**Ø8**	**Ø 10**	**Ø 12**	**Ø 14**	**Ø 16**	**Ø 20**	**Ø 25**	**Ø 28**	**Ø 32**
$\delta_{V0,ucr}$	Short term displacement in **Normal Concrete**	[mm/kN]	0,06	0,05	0,05	0,04	0,04	0,04	0,03	0,03	0,03
$\delta_{V\infty,ucr}$	Long term displacement in **Normal Concrete**		0,09	0,08	0,08	0,06	0,06	0,05	0,05	0,04	0,04
$\delta_{V0,cr}$	Short term displacement in **Cracked Concrete**	[mm/kN]	0,12	0,12	0,11	0,11	0,10	0,09	0,08	0,08	0,07
$\delta_{V\infty,cr}$	Long term displacement in **Cracked Concrete**		0,18	0,18	0,17	0,16	0,15	0,14	0,12	0,11	0,10

[1] Calculation of the displacement: $\delta V0 = \delta_{V0}$- factor · V ; $\delta V\infty = \delta_{V\infty}$- factor · V. V: action shear load

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EUROPEAN TECHNICAL ASSESSMENT ETA-12/0553

CHARACTERISTIC LOADS FOR POST-INSTALLED REBAR

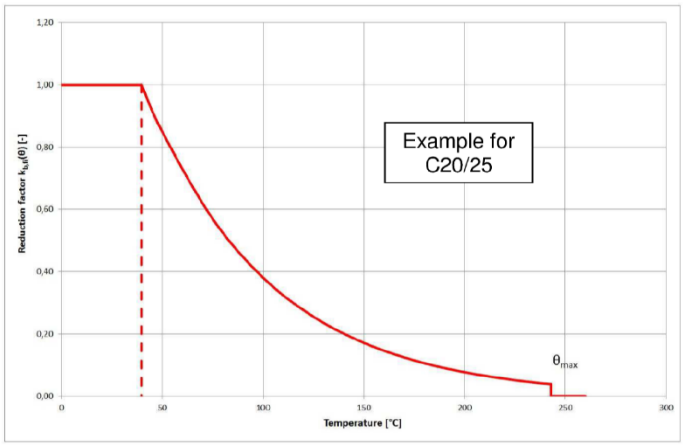
ESSENTIAL CHARACTERISTICS					PERFORMANCE										
d	**POST-INSTALLED REBAR**				**Ø8**	**Ø10**	**Ø12**	**Ø14**	**Ø16**	**Ø20**	**Ø22**	**Ø24**	**Ø25**	**Ø28**	**Ø32**
d_0	Nominal diameter of drill bit			[mm]	12	14	16	18	20	25	28	32	32	35	40
$\ell_{v,MAX}$	Maximum embedment depth			[mm]	see table B2 of ETA-12/0553										
$\ell_{b,min}$	Minimum anchorage length			[mm]	§ 8.6 - § 8.7 EN 1992-1-1:2004+AC2010										
$\ell_{0,min}$	Lap length			[mm]	§ 8.11 EN 1992-1-1:2004+AC2010										
α_{lb}	Amplification Factor for $\ell_{b,min}$ and $\ell_{0,min}$			[-]	1,0										
c [1) 2)]	Minimum concrete cover min c	Without drilling Aid	hammer drilling HD	[mm]	30 mm + 0,06·l_v ≥ 2·Ø								40 mm + 0,06·l_v ≥ 2·Ø		
			compr. air drilling CD	[mm]	50 mm + 0,08·l_v								60 mm + 0,08·l_v		
		With drilling Aid	hammer drilling HD	[mm]	30 mm + 0,02·l_v ≥ 2·Ø								40 mm + 0,02·l_v ≥ 2·Ø		
			compr. air drilling CD	[mm]	50 mm + 0,02·l_v								60 mm + 0,02·l_v		
s_{min}	Minimum spacing			[mm]	≥ 5·Ø ≥ 50 mm										
Design values of ultimate bond resistance															
f_{bd}	**Bond design value resistance** ***"for all drilling methods for good conditions"***		C12/15	[N/mm²]	1,6										
			C16/20	[N/mm²]	2,0										
			C20/25	[N/mm²]	2,3										
			C25/30	[N/mm²]	2,7										
			C30/37	[N/mm²]	3,0										
			C35/45	[N/mm²]	3,4										
			C40/50	[N/mm²]	3,7										
			C45/55	[N/mm²]	4,0 (3,7 for Ø28÷32)										
			C50/60	[N/mm²]	4,3 (3,7 for Ø28÷32)										
$f_{bd,c}$	***"for all other bond conditions"***			[N/mm²]	f_{bd} · 0,7										
FIRE EXPOSURE Design method as EN 1992-1-1:2004+AC:2008															
$f_{bd,fi}$	**Bond design value resistance Under fire exposure**			[N/mm²]	[3)] $f_{bd,fi} = k_{fi}(\theta) \cdot f_{bd} \cdot \gamma_c / \gamma_{Mfi}$										

1) Not allowed Diamond Drilling

2) The minimum concrete cover acc. EC 1992-1-1:2004+AC:2010 must be observed

3) With: $k_{b,fi}(\theta)$ = reduction factor under fire exposure (see graphics below)
f_{bd} = see table above
γ_c = partial safety factor acc.to EN 1992-1-1
$\gamma_{M,fi}$ = partial safety factor acc.to EN 1992-1-2 under fire exposure

Example graph of Reduction factor $k_{b,fi}(\theta)$ for concrete classes C20/25 for good bond conditions:



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EUROPEAN TECHNICAL ASSESSMENT ETA-12/0543

CHARACTERISTIC LOADS FOR TREADED ROD IN MASONRY

ESSENTIAL CHARACTERISTICS					PERFORMANCE					
Installation parameters			**SOLID MASONRY**		**M8**		**M10**		**M12**	
d_0	Nominal diameter of drill bit			[mm]	10		12		14	
h_{ef}	Effective embedment depth			[mm]	80		90		100	
T_{inst}	Torque moment (max)			[Nm]	2					
Characteristic resistance to TENSILE and SHEAR loads [2]					M8		M10		M12	
Type[3]	density [Kg/dm³]	compress. [N/mm²]	Range temperature		$N_{Rk,b}$ (tensile)	$V_{Rk,b}$ (shear)	$N_{Rk,b}$ (tensile)	$V_{Rk,b}$ (shear)	$N_{Rk,b}$ (tensile)	$V_{Rk,b}$ (shear)
Solid Brick [3]	ρ ≥ 1,6	**f_b ≥ 10**	40°/24°C	[kN]	3,5	3,5	3,5	3,5	4,0	3,5
			80°/50°C	[kN]	3,5		3,5		4,0	
			120°/72°C	[kN]	2,5		3,0		3,5	
	ρ ≥ 1,6	**f_b ≥ 28**	40°/24°C	[kN]	5,5	5,5	6,0	5,5	7,0	5,5
			80°/50°C	[kN]	5,5		6,0		7,0	
			120°/72°C	[kN]	4,5		5,0		6,0	
γ_M [1]	Partial safety factor			[-]	2,5					
Installation parameters			**HOLLOW MASONRY "with bussola"**		**M8**		**M10**		**M12**	
d_0	Nominal diameter of drill bit			[mm]	12		16		20	
h_{ef}	Effective embedment depth			[mm]	80		85		85	
T_{inst}	Torque moment (max)			[Nm]	2					
Characteristic resistance to TENSILE and SHEAR loads [2]					M8		M10		M12	
Type[3]	density [Kg/dm³]	compress. [N/mm²]	Range temperature		$N_{Rk,b}$ (tensile)	$V_{Rk,b}$ (shear)	$N_{Rk,b}$ (tensile)	$V_{Rk,b}$ (shear)	$N_{Rk,b}$ (tensile)	$V_{Rk,b}$ (shear)
Brick Doppio UNI[3]	ρ ≥ 1,2	**f_b ≥ 28**	40°/24°C	[kN]	1,2	2,5	1,2	2,5	1,2	2,5
			80°/50°C	[kN]	1,2		1,2		1,2	
			120°/72°C	[kN]	0,9		0,9		0,9	
Brick Forato leggero[3]	ρ ≥ 0,8	**f_b ≥ 6**	40°/24°C	[kN]	0,5	2,5	0,5	2,5	0,5	2,5
			80°/50°C	[kN]	0,5		0,5		0,5	
			120°/72°C	[kN]	0,4		0,4		0,4	
γ_M [1]	Partial safety factor			[-]	2,5					

[1] In absence of other national regulations;
[2] Resistance values valid with Ccr edge distances, see ETA-12/0543 even for shorter distances;
[3] See ETA-12/0543 for the description of bricks and for use on other types of bricks

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OTHER PERFORMANCE FEATURES

SUBSTRATE MATERIAL:	REINFORCED OR UNREINFORCED CONCRETE C20/25 TO C50/60 CONCRETE UNCRACKED/CRACKED SOLID AND HOLLOW BRICKS
LIVESTOCK CAPACITY:	*280, 380 [ml]*
TEMPERATURE RANGE:	*I: -40°C to +40°C* *II: -40°C to +80°C*
INSTALLATION IN HOLES:	*DRY&WET* *FLOODED HOLE*
ACCESSORIES:	*THREADED BARS* *PLASTIC MESH* *PUMP FOR BLOWING* *BRUSH TO CLEAN THE HOLE* *MIXER* *EXTENSION* *DISPENSER 280/380*

ETA-08/0383 - op. 7

ETA-08/0383 - op. 1

ETA-08/0383 - TR 029

ETA-12/0553 - TR 023

ETA-12/0553 - ETAG029

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