



## Declaration of performance: No. 0035-CPR-2020/06/20

1) Unique identification code of the product-type:

**BI FIX**

2) Intended use or uses of the construction product, in accordance with the applicable harmonised technical specification, as foreseen by the manufacturer

Generic type and use		Chemical anchoring for threaded rods							
Size		M8	M10	M12	M16	M20	M24	M27	M30
hef [mm]	min	60	70	80	100	120	145	145	145
	max	160	200	240	320	400	480	540	600

Generic type and use		Chemical anchoring for reinforcing bars								
Size		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
hef [mm]	min	60	70	80	80	100	120	150	180	200
	max	160	200	240	280	320	400	500	560	640

<b>Type and strength of the substrate</b>	Reinforced or unreinforced concrete of normal weight, strength class from C20/25 minimum to C50/60 maximum in accordance with EN 206-1.
<b>Base material condition</b>	Not cracked from M8 to M30 and from Ø8 to Ø32, cracked from M10 to M20. Seismic category C1 from M12 to M20 and seismic category C2 for M12 and M16.
<b>Anchor metal material and corresponding environmental exposure</b>	<p>Threaded rods:</p> <p>X1) Structures subject to dry internal conditions: elements made of galvanised steel (galvanised or hot-dip galvanised) and stainless steel A2, A4 or high corrosion resistance (HCR).</p> <p>X2) Structures subject to outdoor atmospheric exposure (including industrial and marine environments) and permanently wet indoor conditions if no aggressive conditions exist: Elements made of A4 stainless steel or high corrosion resistance (HCR) steel.</p> <p>X3) Structures subject to outdoor atmospheric exposure (including industrial and marine environments) and permanently wet indoor conditions if other special aggressive conditions exist. Such special aggressive conditions are e.g. permanent immersion, alternating in the sea water or sea water spray area, chloride atmosphere in swimming pools or indoor environments with chemical pollution (e.g. in desulphurisation plants or road tunnels where anti-ice materials are used): Elements made of corrosion resistant steel (HCR).</p> <p>Improved grip bars class B or C according to EN 1992-1-1</p>



<b>Type of loading</b>	Static, quasi-static and seismic load category C1 and C2.
<b>Service temperature range</b>	a) from -40°C to +40°C (max. short-term temperature +40°C and max. long-term continuous temperature +24°C). b) from -40°C to +80°C (max. short-term temperature +80°C and max. long-term continuous temperature +50°C). c) from -40°C to +120°C (max. short-term temperature +120°C and max. long-term continuous temperature +72°C).
<b>Use category</b>	Category I1 and I2: dry, wet and flooded concrete. Overhead installation permitted. Drilling with standard drill or with suction bits.

3) Name, registered trade name or registered trade mark and contact address of the manufacturer as required under Article 11(5)

*VOLTECO S.p.A. - Via delle Industrie, 47 - Ponzano Veneto (Italy) www.volteco.com*

4) System or systems of assessment and verification of constancy of performance (AVCP) of the construction product as set out in annex V

*System 1*

5) In case of the Declaration of Performance concerning a construction product covered by a harmonised standard

*Not applicable*

6) Declared performance:

*ITB issued l'ETA-20/0532 on the basis of EAD 330499-01-0601.*

*ITB (n°1488) performed:*

*The determination of the product type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product; the initial inspection of the factory and of the factory production control; the continuous surveillance; assessment and approval of the factory production control; under system 1 and issue the certificate of conformity n° 1488-CPR-0119/W.*



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.

HARMONIZED TECHNICAL SPECIFICATION: EAD 330499-01-0601								
ESSENTIAL CHARACTERISTICS	PERFORMANCE ACCORDING TO ETA-20/0532							
<b>Installation parameters</b>	<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>	<b>M24</b>	<b>M27</b>	<b>M30</b>
d [mm]	8	10	12	16	20	24	27	30
d <sub>0</sub> [mm]	10	12	14	18	24	28	30	35
d <sub>fix</sub> [mm]	9	12	14	18	22	26	30	33
h <sub>1</sub> [mm]	hef +5 mm							
h <sub>min</sub> [mm]	MAX {hef + 30 mm; ≥ 100 mm; hef + 2d <sub>0</sub> }							
T <sub>fix</sub> [Nm]	10	20	40	80	130	200	250	280
t <sub>fix</sub> [mm]	da 0 a 1500 mm							
S <sub>min</sub> e C <sub>min</sub> [mm]	40	50	60	75	100	115	120	140
γ <sub>inst</sub> [-] Category  1	1,00							
γ <sub>inst</sub> [-] Category  2	1,20							
<b>Resistance for tensile loads</b> <b>Characteristic resistance on steel side</b>	<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>	<b>M24</b>	<b>M27</b>	<b>M30</b>
Steel Class 4.8 N <sub>Rk,s</sub> [kN]	15	23	34	63	98	141	183	224
Steel Class 5.8 N <sub>Rk,s</sub> [kN]	18	29	42	78	122	176	229	280
Steel Class 8.8 N <sub>Rk,s</sub> [kN]	29	46	67	126	196	282	367	449
Steel Class 10.9 N <sub>Rk,s</sub> [kN]	37	58	84	157	245	353	459	561
Stainless Steel A2, A4, HCR Class 50 N <sub>Rk,s</sub> [kN]	18	29	42	78	122	176	229	280
Stainless Steel A2, A4, HCR Class 70 N <sub>Rk,s</sub> [kN]	26	41	59	110	171	247	321	392
Stainless Steel A2, A4, HCR Class 80 N <sub>Rk,s</sub> [kN]	29	46	67	126	196	282	367	449

HARMONIZED TECHNICAL SPECIFICATION: EAD 330499-01-0601								
ESSENTIAL CHARACTERISTICS	PERFORMANCE ACCORDING TO ETA-20/0532							
<b>Resistance for shear loads</b> <b>Characteristic resistance on steel side</b> <b>without lever arm</b>	<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>	<b>M24</b>	<b>M27</b>	<b>M30</b>
Steel Class 4.8 V <sub>ORk,s</sub> [kN]	7	12	17	31	49	71	92	112
Steel Class 5.8 V <sub>ORk,s</sub> [kN]	9	14	21	39	61	88	115	140
Steel Class 8.8 V <sub>ORk,s</sub> [kN]	15	23	34	63	98	141	184	224
Steel Class 10.9 V <sub>ORk,s</sub> [kN]	18	29	42	78	122	176	230	280
Stainless Steel A2, A4, HCR Class 50 V <sub>ORk,s</sub> [kN]	9	14	21	39	61	88	115	140
Stainless Steel A2, A4, HCR Class 70 V <sub>ORk,s</sub> [kN]	13	20	29	55	86	124	160	196
Stainless Steel A2, A4, HCR Class 80 V <sub>ORk,s</sub> [kN]	15	23	34	63	98	141	184	224
k <sub>7</sub>	1,0							

HARMONIZED TECHNICAL SPECIFICATION: EAD 330499-01-0601									
ESSENTIAL CHARACTERISTICS		PERFORMANCE ACCORDING TO ETA-20/0532							
<b>Resistance for shear loads</b> <b>Characteristic resistance on steel side with lever arm</b>		<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>	<b>M24</b>	<b>M27</b>	<b>M30</b>
Steel Class 4.8 $M_{0Rk,s}$ [kN]		15	30	52	133	260	449	666	900
Steel Class 5.8 $M_{0Rk,s}$ [kN]		19	37	66	166	324	561	832	1125
Steel Class 8.8 $M_{0Rk,s}$ [kN]		30	60	105	266	519	898	1331	1799
Steel Class 10.9 $M_{0Rk,s}$ [kN]		37	75	131	333	649	1123	1664	2249
Stainless Steel A2, A4, HCR Class 50 $M_{0Rk,s}$ [kN]		19	37	66	166	324	561	832	1125
Stainless Steel A2, A4, HCR Class 70 $M_{0Rk,s}$ [kN]		26	52	92	233	454	768	1165	1574
Stainless Steel A2, A4, HCR Class 80 $M_{0Rk,s}$ [kN]		30	60	105	266	519	898	1331	1799
<b>Resistance for tensile loads</b> <b>Characteristic combined pull-out and concrete cone resistance</b>		<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>	<b>M24</b>	<b>M27</b>	<b>M30</b>
$\tau_{Rk,ucr}$ [N/mm <sup>2</sup> ] concrete C20/25 Range of temperature -40°C/+40°C ( $T_{mlp} = 24^\circ\text{C}$ )		16,0	12,0	12,0	12,0	9,5	9,5	8,0	8,0
$\tau_{Rk,ucr}$ [N/mm <sup>2</sup> ] concrete C20/25 Range of temperature -40°C/+80°C ( $T_{mlp} = 50^\circ\text{C}$ )		11,0	8,5	8,5	8,5	7,0	7,0	6,0	6,0
$\tau_{Rk,ucr}$ [N/mm <sup>2</sup> ] concrete C20/25 Range of temperature -40°C/+120°C ( $T_{mlp} = 72^\circ\text{C}$ )		6,0	4,5	4,5	4,5	4,0	4,0	3,0	3,0
$\tau_{Rk,ucr}$ [N/mm <sup>2</sup> ] cracked concrete C20/25 Range of temperature -40°C/+40°C ( $T_{mlp} = 24^\circ\text{C}$ )		-	9,0	9,0	9,0	6,5	-	-	-
$\tau_{Rk,ucr}$ [N/mm <sup>2</sup> ] cracked concrete C20/25 Range of temperature -40°C/+80°C ( $T_{mlp} = 50^\circ\text{C}$ )		-	6,5	6,5	6,5	4,5	-	-	-
$\tau_{Rk,ucr}$ [N/mm <sup>2</sup> ] cracked concrete C20/25 Range of temperature -40°C/+120°C ( $T_{mlp} = 72^\circ\text{C}$ )		-	3,5	3,5	3,5	2,5	-	-	-
$\Psi_{c,uc/ucr}$ C30/37 [-]		1,12							
$\Psi_{c,uc/ucr}$ C40/50 [-]		1,23							
$\Psi_{c,uc/ucr}$ C50/60 [-]		1,30							
<b>Resistance for tensile loads</b> <b>Characteristic resistance for concrete cone</b>		<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>	<b>M24</b>	<b>M27</b>	<b>M30</b>
$k_{ucr,N}$		11,0							
$k_{cr,N}$		7,7							
$C_{cr,N}$		1,5 $h_{ef}$							
$S_{cr,N}$		3,0 $h_{ef}$							
<b>Resistance for tensile loads</b> <b>Characteristic resistance for concrete cone</b>		<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>	<b>M24</b>	<b>M27</b>	<b>M30</b>
$C_{cr,sp}$ [mm]	se $h = h_{min}$	2,5 $h_{ef}$		2,0 $h_{ef}$		1,5 $h_{ef}$			
	se $h_{min} = < h < 2 h_{min}$	interpolated value							
	se $h \geq 2 h_{min}$	$C_{cr,Np}$							
$S_{cr,sp}$ [mm]		2,0 $C_{cr,Sp}$							

HARMONIZED TECHNICAL SPECIFICATION: EAD 330499-01-0601								
ESSENTIAL CHARACTERISTICS	PERFORMANCE ACCORDING TO ETA-20/0532							
<b>Resistance for shear loads</b> <b>Characteristic resistance for undermining from concrete</b>	<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>	<b>M24</b>	<b>M27</b>	<b>M30</b>
k <sub>8</sub> [-]	2,0							
<b>Resistance for shear loads</b> <b>Characteristic resistance to edge breakage of concrete</b>	<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>	<b>M24</b>	<b>M27</b>	<b>M30</b>
l <sub>f</sub> [mm]	l <sub>f</sub> = h <sub>ef</sub> and ≤ 12 d <sub>nom</sub>				l <sub>f</sub> = h <sub>ef</sub> and ≤ max 8d <sub>nom</sub> ; 300 mm			
<b>Displacement under service conditions</b> <b>Traction loads</b>	<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>	<b>M24</b>	<b>M27</b>	<b>M30</b>
F <sub>unc</sub> [kN] for C20/25 to C50/60 concrete	9,6	10,8	14,3	23,8	29,6	42,4	40,4	44,4
δ <sub>0,unc</sub> [mm]	0,30	0,30	0,35	0,35	0,35	0,40	0,40	0,45
δ <sub>∞,unc</sub> [mm]	0,85							
F <sub>cr</sub> [kN] for C20/25 to C50/60 concrete	-	9,5	14,3	21,4	23,8	-	-	-
δ <sub>0,cr</sub> [mm]	-	0,50	0,50	0,70	0,60	-	-	-
δ <sub>∞,cr</sub> [mm]	-		0,85		-			
<b>Moving under service conditions</b> <b>Cutting loads</b>	<b>M8</b>	<b>M10</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>	<b>M24</b>	<b>M27</b>	<b>M30</b>
F <sub>unc,cr</sub> [kN] for C20/25 to C50/60 concrete	3,7	5,8	8,4	15,7	24,5	35,3	45,5	55,6
δ <sub>0,unc</sub> [mm]	2,00							
δ <sub>∞,unc</sub> [mm]	3,00							

HARMONIZED TECHNICAL SPECIFICATION: EAD 330499-01-0601									
ESSENTIAL CHARACTERISTICS	PERFORMANCE ACCORDING TO ETA-20/0532								
<b>Installation parameters</b>	<b>Ø8</b>	<b>Ø10</b>	<b>Ø12</b>	<b>Ø14</b>	<b>Ø16</b>	<b>Ø20</b>	<b>Ø25</b>	<b>Ø28</b>	<b>Ø32</b>
d [mm]	8	10	12	14	16	20	25	28	32
d <sub>0</sub> [mm]	10*-12	12*-14	14*-16	18	20	25	30	35	40
h <sub>1</sub> [mm]	h <sub>ef</sub> + 5mm								
h <sub>min</sub> [mm]	MAX {h <sub>ef</sub> + 30 mm; ≥ 100 mm; h <sub>ef</sub> + 2d <sub>0</sub> }								
S <sub>min</sub> e C <sub>min</sub> [mm]	50	60	65	75	80	100	120	140	160
γ <sub>inst</sub> [-] Category  1	1,00								
γ <sub>inst</sub> [-] Category  2	1,20								
<b>Resistance for tensile loads</b> <b>Characteristic resistance on steel side</b>	<b>Ø8</b>	<b>Ø10</b>	<b>Ø12</b>	<b>Ø14</b>	<b>Ø16</b>	<b>Ø20</b>	<b>Ø25</b>	<b>Ø28</b>	<b>Ø32</b>
N <sub>Rk,s</sub> [kN]	A <sub>s</sub> x F <sub>uk</sub>								
A <sub>s</sub> [N/mm <sup>2</sup> ]	50	79	113	154	201	314	491	616	804
<b>Resistance for tensile loads</b> <b>Combined characteristic pull-out and concrete cone resistance</b>	<b>Ø8</b>	<b>Ø10</b>	<b>Ø12</b>	<b>Ø14</b>	<b>Ø16</b>	<b>Ø20</b>	<b>Ø25</b>	<b>Ø28</b>	<b>Ø32</b>
T <sub>Rk,ucr</sub> [N/mm <sup>2</sup> ] concrete C20/25 Range of temperature -40°C/+40°C (T <sub>mlp</sub> = 24°C)	14,0	13,0	13,0	12,0	10,0	9,5	9,5	8,5	7,5
T <sub>Rk,ucr</sub> [N/mm <sup>2</sup> ] concrete C20/25 Range of temperature -40°C/+80°C (T <sub>mlp</sub> = 50°C)	10,0	9,5	9,0	9,0	7,5	7,0	7,0	6,0	5,5
T <sub>Rk,ucr</sub> [N/mm <sup>2</sup> ] concrete C20/25 Range of temperature -40°C/+120°C (T <sub>mlp</sub> = 72°C)	5,5	5,0	5,0	5,0	4,0	4,0	4,0	3,5	3,0

HARMONIZED TECHNICAL SPECIFICATION: EAD 330499-01-0601										
ESSENTIAL CHARACTERISTICS		PERFORMANCE ACCORDING TO ETA-20/0532								
<b>Resistance for tensile loads Combined characteristic pull-out and concrete cone resistance</b>		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
$\Psi_{c,uc/ucr}$ C30/37 [-]		1,12								
$\Psi_{c,uc/ucr}$ C40/50 [-]		1,23								
$\Psi_{c,uc/ucr}$ C50/60 [-]		1,30								
<b>Resistance for tensile loads Characteristic resistance for concrete cone</b>		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
$K_{ucr,N}$		11,0								
$C_{cr,N}$		1,5 $h_{ef}$								
$S_{cr,N}$		3,0 $h_{ef}$								
<b>Resistance for tensile loads Characteristic resistance for splitting (concrete cracking)</b>		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
$C_{cr,sp}$ [mm]	se $h = h_{min}$	2,5 $h_{ef}$		2,0 $h_{ef}$			1,5 $h_{ef}$			
	se $h_{min} = < h < 2 h_{min}$	interpolated value								
	se $h \geq 2 h_{min}$	$C_{cr,Np}$								
$S_{cr,sp}$ [mm]		2,0 $C_{cr,Sp}$								
<b>Resistance for shear loads Characteristic resistance on steel side without lever arm</b>		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
$V_{Rk,s}$ [kN]		0,5 x $A_s$ x $f_{uk}$								
$K_7$		1,00								
<b>Resistance for shear loads Characteristic resistance on steel side with lever arm</b>		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
Characteristic bending moment $M_{ORk,s}$ [Nm]		1,2 x $W_{el}$ x $f_{uk}$								
Elastic resistance modulus $W_{el}$ [mm <sup>3</sup> ]		50	98	170	269	402	785	1534	2155	3217
<b>Resistance for shear loads Characteristic resistance for shearing off concrete</b>		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
$K_8$ [-]		2,0								
<b>Resistance for shear loads Characteristic resistance for concrete edge breakage</b>		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
$l_f$ [mm]		$l_f = h_{ef}$ and $\leq 12 d_{nom}$					$l_f = h_{ef}$ and $\leq \max(8 d_{nom}; 300 \text{ mm})$			

HARMONIZED TECHNICAL SPECIFICATION: EAD 330499-01-0601									
CARATTERISTICHE ESSENZIALI	PERFORMANCE ACCORDING TO ETA-20/0532								
<b>Displacement under service conditions Tensile loads</b>	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
$F_{unc}$ [kN] for C20/25 to C50/60 concrete	10,1	13,6	17,2	20,1	23,9	41,2	53,3	64,1	67,3
$\delta_{0,unc}$ [mm]	0,33	0,33	0,40	0,41	0,42	0,45	0,45	0,47	0,48
$\delta_{\infty,unc}$ [mm]	0,85								
<b>Moving under service conditions Shear loads</b>	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø28	Ø32
$F_{unc,cr}$ [kN] for C20/25 to C50/60 concrete	13,2	20,6	29,6	40,3	52,7	82,3	128,6	161,3	210,6
$\delta_{0,unc,cr}$ [mm]	2,00								
$\delta_{\infty,unc}$ [mm]	3,00								

\* Drilling with reduced diameter

HARMONIZED TECHNICAL SPECIFICATION: TR049 QUALIFIED FOR SEISMIC CATEGORY C1			
ESSENTIAL CHARACTERISTICS	PERFORMANCE ACCORDING TO ETA-20/0532		
<b>Resistance for tensile loads Characteristic resistance on steel side (threaded rods Class 10.9 are not qualified for seismic category C1)</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>
$N_{Rk,s}$ [kN]	1,0 x $N_{Rk,s}$		
<b>Resistance for tensile loads Combined characteristic pull-out and concrete cone resistance</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>
$\tau_{Rk,C1}$ [N/mm <sup>2</sup> ] for C20/25 concrete Range of temperature -40°C/+40°C ( $T_{mlp} = 24^\circ\text{C}$ )	4,2	3,7	3,7
$\tau_{Rk,C1}$ [N/mm <sup>2</sup> ] for C20/25 concrete Range of temperature -40°C/+80°C ( $T_{mlp} = 50^\circ\text{C}$ )	3,0	2,7	2,7
$\tau_{Rk,C1}$ [N/mm <sup>2</sup> ] for C20/25 concrete Range of temperature -40°C/+120°C ( $T_{mlp} = 72^\circ\text{C}$ )	1,6	1,4	1,4
$\Psi_{c,cr}$ C30/37 [-]	1,00		
$\Psi_{c,cr}$ C40/50 [-]	1,00		
$\Psi_{c,cr}$ C50/60 [-]	1,00		
$\gamma_{inst}$ [-] Category  1	1,0		
$\gamma_{inst}$ [-] Category  2	1,2		
<b>Resistance for shear loads Characteristic resistance on steel side without lever arm (threaded rods Class 10.9 are not qualified for seismic category C1)</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>
$V_{Rk,s,C1}$ [kN]	0,7 x $V_{Rk,s}^0$		
<b>Hole filling factor</b>	<b>M12</b>	<b>M16</b>	<b>M20</b>
$\alpha_{gap}$ [-]	0,5 (1,0) <sup>2)</sup>		

2) The value in brackets is valid in case there is no hole-bolt clearance

HARMONIZED TECHNICAL SPECIFICATION: TR049 QUALIFIED FOR SEISMIC CATEGORY C2		
ESSENTIAL CHARACTERISTICS	PERFORMANCE ACCORDING TO ETA-20/0532	
<b>Resistance for tensile loads</b> <b>Characteristic resistance on steel side</b> <b>(threaded rods Class 10.9 are not</b> <b>qualified for seismic category C2)</b>	<b>M12</b>	<b>M16</b>
$N_{Rk,s}$ [kN]	1,0 x $N_{Rk,s}$	
<b>Resistance for tensile loads</b> <b>Combined characteristic pull-out and</b> <b>concrete cone resistance</b>	<b>M12</b>	<b>M16</b>
$\tau_{Rk,C2}$ [N/mm <sup>2</sup> ] concrete C20/25 Range of temperature -40°C/+40°C ( $T_{mlp} = 24^{\circ}C$ )	1,6	1,7
$\tau_{Rk,C2}$ [N/mm <sup>2</sup> ] concrete C20/25 Range of temperature -40°C/+80°C ( $T_{mlp} = 50^{\circ}C$ )	1,2	1,2
$\tau_{Rk,C2}$ [N/mm <sup>2</sup> ] concrete C20/25 Range of temperature -40°C/+120°C ( $T_{mlp} = 72^{\circ}C$ )	0,6	0,7
$\Psi_{c,cr}$ C30/37 [-]	1,00	
$\Psi_{c,cr}$ C40/50 [-]	1,00	
$\Psi_{c,cr}$ C50/60 [-]	1,00	
$\gamma_{inst}$ [-] Category  1	1,0	
$\gamma_{inst}$ [-] Category 2	1,2	
<b>Resistance for shear loads</b> <b>Characteristic resistance on steel</b> <b>side without lever arm (threaded</b> <b>rods Class 10.9 are not qualified for</b> <b>seismic category C2)</b>	<b>M12</b>	<b>M16</b>
$V_{Rk,C2}$ [kN]	$0,53 \times V_{Rk,s}^0$	$0,46 \times V_{Rk,s}^0$
$A_5$ [kN]	>19%	
<b>Hole filling factor</b>	<b>M12</b>	<b>M16</b>
$\alpha_{gap}$ [-]	0,5 (1,0) <sup>2)</sup>	

<sup>2)</sup> The value in brackets is valid in case there is no hole-bolt clearance

HARMONIZED TECHNICAL SPECIFICATION: TR049 QUALIFIED FOR SEISMIC CATEGORY C2		
ESSENTIAL CHARACTERISTICS	PERFORMANCE ACCORDING TO ETA-20/0532	
<b>Tensile and shear displacement by</b> <b>seismic category C2</b>	<b>M12</b>	<b>M16</b>
Displacements under service condition Tensile loads $\delta_{N,seis}$ (DLS) [mm]	0,20	0,23
Displacements under ultimate conditions Tensile loads $\delta_{N,seis}$ (DLS) [mm]	0,33	1,04
Displacements under service condition Shear loads $\delta_{V,seis}$ (DLS) [mm]	2,01	0,70
Displacements under ultimate conditions Shear loads $\delta_{V,seis}$ (ULS) [mm]	4,68	2,12



**HARMONIZED TECHNICAL SPECIFICATION: EAD 330499-01-0601**

<b>ESSENTIAL CHARACTERISTICS</b>	<b>PERFORMANCE</b>
<b>Reaction to fire</b>	In the final application the thickness of the mortar layer is about 1 to 2 mm and most of the mortar is material classified class A1 according to EC Decision 96/603/EC. Therefore it may be assumed that the bonding material (synthetic mortar or a mixture of synthetic mortar and cementitious mortar) in connection with the metal anchor in the end use application do not make any contribution to fire growth or to the fully developed fire and they have no influence to the smoke hazard.
<b>Fire resistance</b>	NPD

**TERMINOLOGY AND SYMBOLS**

d	Rod diameter
$d_0$	Drill hole diameter
$d_{fix}$	Hole diameter of the object to be fixed
$h_{ef}$	Effective anchorage depth
$h_1$	Hole depth
$h_{min}$	Minimum thickness of base material
$T_{Fix}$	Installation torque
$t_{fix}$	Fixture thickness
$S_{min}$	Minimum allowable spacing
$C_{min}$	Minimum allowable edge distance
$N_{Rk,s}$	Characteristic tensile strength on steel side in case of static load
$N_{Rk,s,C1}$	Characteristic tensile strength on steel side for seismic category C1
$N_{Rk,s,C2}$	Characteristic tensile strength on steel side for seismic category C2
$V_{Rk,s}$	Characteristic shear strength on steel side in case of static load
$V_{Rk,s,C1}$	Characteristic shear strength on steel side for seismic category C1
$V_{Rk,s,C2}$	Characteristic shear strength on steel side for seismic category C2
$\tau_{Rk}$	Characteristic adhesion in non-cracked (uncr), cracked (cr), seismic category C1 and C2 concrete
$A_s$	Cross section area
$A_5$	Fracture elongation
$M^0_{Rk,s}$	Characteristic bending moment
$W_{el}$	Modulus of elastic resistance
$\alpha_{gap}$	Hole filling factor
$k_7$	Ductility factor
$k_8$	Coefficient for concrete undermining
$N_{Rk}$	Characteristic resistance for pull-out and concrete cone formation for single anchorage

**TERMINOLOGY AND SYMBOLS**

$\gamma_{inst}$	Partial safety factor related to the anchoring installation
$S_{cr,Np}$	Interaxle spacing to ensure characteristic pull-out load transmission for a single anchorage
$C_{cr,Np}$	Distance from the edge to ensure the transmission of the characteristic pull-out load for a single anchorage
$k_{uncr,N}$	Non-cracked concrete coefficient
$k_{cr,N}$	Cracked concrete coefficient
$S_{cr,N}$	Interaxle spacing to ensure the transmission of the characteristic load due to formation of the concrete cone for a single anchoring
$C_{cr,N}$	Distance from the edge to ensure the transmission of the characteristic load due to formation of the concrete cone for a single anchoring
$S_{cr,sp}$	Interaxle spacing to ensure the transmission of the characteristic load for concrete splitting for a single anchorage
$C_{cr,sp}$	Distance from the edge to ensure characteristic load transmission by splitting the concrete for a single anchorage
$\Psi_{c,ucr}$	Increment factor for classes of non-cracked concrete
$\Psi_{c,cr}$	Increment factor for classes of cracked concrete
$l_f$	Actual length
$F$	Service load in non-cracked concrete (ucr) or cracked concrete (cr)
$\delta_0$	Short-term displacement under service load in non-cracked concrete (uncr) or cracked concrete (cr)
$\delta_\infty$	Long-term displacement under service load in non-cracked concrete (uncr) or cracked concrete (cr)
NPD	No performance declared

8)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 for and on behalf of the manufacturer by

Ruzzier Marco – Laboratory Manager

(name and function)

Ponzano Veneto, 15/06/2020