sistemi di fissaggio BOSSONG®
BOSSONG S.p.A. Via Enrico Fermi, 51 (Z.I.2) - 24050 GRASSOBBIO (Bergamo) Italy
Tel +39 035 3846 011 - Fax +39 035 3846 012 - www.bossong.com - info@bossong.com
FASTENING SYSTEMS SYSTEMES DE FIXATION BEFESTIGUNGSSYSTEME SISTEMAS DE FIJACIÒN

CE

DECLARATION OF PERFORMANCE
According to Construction Products Regulation n ° 305/2011

DoP N°17/0506

1. Unique identification code of the product-type:

NWS-CE1

2. Number of type, batch or serial number or any other element allowing identification of the product to be built in accordance with Article 11, paragraph 4:

NWS-CE1 +Anchor diameter + t_{fix} + anchor length
Example NWS-CE1 8-10-21/75

3. Intended use or uses of the construction product, in accordance with the applicable harmonized technical specification, as foreseen by the manufacturer:

Generic type and use	Torque controlled expansion anchor						
Size [mm]	M8	M10	M12	M16	M20	M24	M27
hef [mm] galvanized	46	60	70	85	100	115	125
hef [mm] sherardized	-	60	70	85	100	-	-
hef [mm] inox A4/HCR	46	60	70	85	100	125	-
hef reduced [mm] galvanized	35	40	56	65	-	-	-
hef reduced [mm] sherardized	-	40	56	65	-	-	-
hef reduced [mm] inox A4/HCR	35	40	56	65	-	-	-
Type and strength of the support	Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206-1.						
Condition of the base material	Cracked and non-cracked concrete.						
Anchor metallic material and relative environmental exposure condition	1. Galvanized carbon steel and sherardized for dry and internal conditions. 2. Stainless steel A4 for dry internal conditions, external atmospheric exposure (including industrial and marine environment) or exposure in permanently damp internal conditions if no particular aggressive conditions exist; 3. High corrosion resistance for all conditions						
Type of load	• Static and quasi-static load; • Used for anchorages with requirements related to resistance for fire; • Used for anchorages with seismic actions category C1 and C2 (from M8 to M20, standard anchorage depth).						

Cap.Soc. € 520.000
S.V. € 260.000
P.IVA IT 00227840162
R.E.A. BG n.98000
Iscr.Reg.Impr. BG n. 00227840162

BPU – Banca Popolare di Bergamo
Agenzia di Longuelo Via Mattioli, 69
ABI 5428 CAB 11103 C/C 220
IBAN:
IT70 C054 2811 1030 0000 0000 220

Deutsche Bank S.p.A.
Sede Bergamo Via Camozzi,82
ABI 3104 CAB 11100 C/C13030
IBAN:
IT 76 J 03104 11100 000000013030

ASSOCIATO MEMBER OF ECAP assorestauro

Numero Verde 800121962

4. Name, registered trade name or trademark and address of the manufacturer under Article 11, paragraph 5:

Bossong S.p.A. - via Enrico Fermi 49-51- 24050 Grassobbio (Bg) – Italy – www.bossong.com

5. If appropriate, the name and address of the authorized representative whose mandate covers the tasks specified in Article 12, paragraph 2:

Not applicable

6. Systems of assessment and verification of constancy of performance of the construction product systems in Annex V:

System 1

7. In the case of a declaration of performance concerning a construction product falls within the scope of a harmonized standard:

Not applicable

8. In the case of a declaration of performance concerning a construction product for which a European Technical Assessment has been issued:

DIBt releases the ETA-17/0506 on the base of the EAD 330232-00-0601.
IFSW (n°2873) performed:
Product-type determination on the basis of type tests (including sampling), type calculations, table values or descriptive documentation of the product; Initial inspection of the production plant and factory production control; Monitoring, evaluation and ongoing verification of factory production control, with attestation system 1 and issued the certificate of conformity No. 2873-CPR-317-1

9. Declared performance:

TECHNICAL SPECIFICATION HARMONIZED: EAD 330232-00-0601							
ESSENTIAL CHARACTERISTICS	**PERFORMANCE ACCORDING TO ETA-17/0506 Designing according to ANNEX B2 of ETA-17/0506**						
Installation parameters	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
d_0 [mm]	8	10	12	16	20	24	28
d_{fix} [mm]	9	12	14	18	22	26	30
h_{min} [mm] galvanized	100	120	140	170	200	230	250
h_{min} [mm] inox A4/HCR	100	120	140	160	200	250	-
h_{min} reduced [mm] all type of steel	80	80	100	140	-	-	-
h_1 [mm] galvanized	60	75	90	110	125	145	160
h_1 [mm] inox A4/HCR	60	75	90	110	125	155	-
h_1 reduced [mm] all type of steel	49	55	70	90	-	-	-
h_{nom} [mm] galvanized	52	68	80	97	114	133	146
h_{nom} [mm] inox A4/HCR	52	68	80	97	114	140	-
h_{nom} reduced [mm] all type of steel	41	48	60	77	-	-	-
T_{inst} [Nm] galvanized	20	25	45	90	160	200	300
T_{inst} [Nm] sherardized	-	22	40	90	160	-	-
T_{inst} [Nm] inox A4/HCR	20	35	50	110	200	290	-
t_{fix} [mm] (max. from ÷ to)	10 ÷ 100	10 ÷ 150	10 ÷ 190	15 ÷ 180	30 ÷ 150	30 ÷ 100	30 ÷ 150
Cracked concrete galvanized steel for standard depth							
s_{min} [mm]	40	45	60	60	95	100	125
for c ≥ [mm]	70	70	100	100	150	180	300
c_{min} [mm]	40	45	60	60	95	100	180
for s ≥ [mm]	80	90	140	180	200	220	540
Uncracked concrete galvanized steel for standard depth							
s_{min} [mm]	40	45	60	65	90	100	125
for c ≥ [mm]	80	70	120	120	180	180	300
c_{min} [mm]	50	50	75	80	130	100	180
for s ≥ [mm]	100	100	150	150	240	220	540

TECHNICAL SPECIFICATION HARMONIZED: EAD 330232-00-0601							
ESSENTIAL CHARACTERISTICS	**PERFORMANCE ACCORDING TO ETA-17/0506 Designing according to ANNEX B2 of ETA-17/0506**						
Installation parameters	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Cracked concrete inox A4/HCR for standard depth							
s_{min} [mm]	40	50	60	60	95	125	-
for c ≥ [mm]	70	75	100	100	150	125	
c_{min} [mm]	40	55	60	60	95	125	
for s ≥ [mm]	80	90	140	180	200	125	
Uncracked concrete inox A4/HCR for standard depth							
s_{min} [mm]	40	50	60	65	90	125	-
for c ≥ [mm]	80	75	120	120	180	125	
c_{min} [mm]	50	60	75	80	130	125	
for s ≥ [mm]	100	120	150	150	240	125	
γ_2 [-]	1,00						
Cracked concrete all steel type for reduced anchorage depth							
s_{min} [mm]	50	50	50	65	-	-	-
for c ≥ [mm]	60	100	160	170			
c_{min} [mm]	40	65	65	100			
for s ≥ [mm]	185	180	250	250			
Uncracked concrete all steel type for reduced anchorage depth							
s_{min} [mm]	50	50	50	65	-	--	-
for c ≥ [mm]	60	100	160	170			
c_{min} [mm]	40	65	100	170			
for s ≥ [mm]	185	180	185	65			
Resistance for tensile load Resistance for steel failure (galvanized)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
$N_{Rk,s}$ [kN]	16	27	40	60	86	126	196
γ_{Ms} [-]	1,53		1,5		1,6	1,5	
Resistance for tensile load Resistance for steel failure (inox A4/HCR)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
$N_{Rk,s}$ [kN]	16	27	40	64	108	110	NPD
γ_{Ms} [-]	1,5				1,68	1,5	NPD
Resistance for tensile load Resistance for pull-out failure standard depth (galvanized)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
$N_{Rk,p}$ [kN] uncracked concrete C20/25	12	16	25	35	Not decisive	Not decisive	Not decisive
$N_{Rk,p}$ [kN] cracked concrete /25	5	9	12	25	Not decisive	Not decisive	Not decisive
Resistance for tensile load Resistance for pull-out failure reduced depth (galvanized)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
$N_{Rk,p}$ [kN] uncracked concrete C20/25	7.5	9	Not decisive	Not decisive	NPD	NPD	NPD
$N_{Rk,p}$ [kN] cracked concrete /25	5	7.5	Not decisive	Not decisive	NPD	NPD	NPD
Resistance for tensile load Resistance for pull-out failure standard depth (inox A4/HCR)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
$N_{Rk,p}$ [kN] uncracked concrete C20/25	12	16	25	35	Not decisive	Not decisive	NPD
$N_{Rk,p}$ [kN] cracked concrete C20/25	5	9	16	25	Not decisive	40	NPD

TECHNICAL SPECIFICATION HARMONIZED: EAD 330232-00-0601							
ESSENTIAL CHARACTERISTICS	**PERFORMANCE ACCORDING TO ETA-17/0506 Designing according to ANNEX B2 of ETA-17/0506**						
Resistance for tensile load Resistance for pull-out failure reduced depth (inox A4/HCR)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
$N_{Rk,p}$ [kN] uncracked concrete C20/25	7.5	9	Not decisive	Not decisive	NPD	NPD	NPD
$N_{Rk,p}$ [kN] cracked concrete C20/25	5	7.5	Not decisive	Not decisive	NPD	NPD	NPD
$\psi_{c,uc/cr}$ C30/37 [-]	1,22						
$\psi_{c,ucr/cr}$ C40/50 [-]	1,41						
$\psi_{c,ucr/cr}$ C50/60 [-]	1,55						
Resistance for tensile load Resistance for concrete cone failure standard depth (galvanized)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
h_{ef} [mm]	46	60	70	85	100	115	125
$S_{cr,N}$ [mm]	138	180	210	255	300	345	375
$C_{cr,N}$ [mm]	69	90	105	128	150	172	188
Resistance for tensile load Resistance for concrete cone failure reduced depth all type of steel	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
h_{ef} [mm]	35	40	56	65	-	-	-
$S_{cr,N}$ [mm]	105	120	168	195	-	-	-
$C_{cr,N}$ [mm]	52.5	60	84	97.5	-	-	-
Factor k_1 cracked	7,7						
Factor k_1 uncracked	11,0						
Resistance for tensile load Resistance for concrete cone failure standard depth (inox A4/HCR)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
h_{ef} [mm]	46	60	70	85	100	125	-
$S_{cr,N}$ [mm]	138	180	210	255	300	375	-
$C_{cr,N}$ [mm]	69	90	105	128	150	188	-
Resistance for tensile load Resistance for splitting failure standard depth (galvanized)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
$N^0_{Rk,sp}$ [kN]	9	12	20	30	40	62.3	70.6
$S_{cr,sp}$ [mm]	138	180	210	255	300	345	375
$C_{cr,sp}$ [mm]	69	90	105	128	150	172	188
Resistance for tensile load Resistance for splitting failure reduced depth all type of steel	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
$N^0_{Rk,sp}$ [kN]	7.5	9	17.9	26.5	-	-	-
$S_{cr,sp}$ [mm]	200	200	250	300	-	-	-
$C_{cr,sp}$ [mm]	100	100	125	150	-	-	-
Resistance for tensile load Resistance for splitting failure standard depth (inox A4/HCR)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
$N^0_{Rk,sp}$ [kN]	9	12	20	30	40	Not decisive	NPD
$S_{cr,sp}$ [mm]	138	180	210	255	300	375	-
$C_{cr,sp}$ [mm]	69	90	105	128	150	188	-
Resistance for shear load Resistance for steel failure without lever-arm (galvanized)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
$V_{Rk,s}$ [kN]	12,2	20,1	30	55	69	114	169,4
γ_{Ms} [-]	1,25				1,33	1,25	1,25
k_7	1,00						
Resistance for shear load Resistance for steel failure without lever-arm (inox A4/HCR)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
$V_{Rk,s}$ [kN]	13	20	30	55	86	123,6	-
γ_{Ms} [-]	1,25				1,4	1,25	

k_7	1,00

TECHNICAL SPECIFICATION HARMONIZED: EAD 330232-00-0601							
ESSENTIAL CHARACTERISTICS	**PERFORMANCE ACCORDING TO ETA-17/0506 Designing according to ANNEX B2 of ETA-17/0506**						
Resistance for shear load Resistance for steel failure with lever-arm (galvanized)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
$M^0_{Rk,s}$ [Nm]	23	47	82	216	363	898	1331,5
γ_{Ms} [-]	1,25				1,33	1,25	1,25
Resistance for shear load Resistance for steel failure with lever-arm (inox A4/HCR)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
$M^0_{Rk,s}$ [Nm]	26	52	92	200	454	785,4	
γ_{Ms} [-]	1,25				1,4	1,25	
Resistance for shear load Resistance for concrete pry-out failure	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
k_8 [-]	2,4				2,8		
Resistance for shear load Resistance for concrete edge failure	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
d_{nom} [mm]	8	10	12	16	20	24	27
l_f [mm] (galvanized) standard depth	46	60	70	85	100	115	125
l_f [mm] (inox A4/HCR) standard depth	46	60	70	85	100	125	-
l_f [mm] (all type of steel) reduced depth	35	40	50	65	-	-	-
Displacement under service load Tensile load (galvanized)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
F_{cr} [kN]	2,4	4,3	7,6	11,9	17,1	21,1	24
$\delta_{0,cr}$ [mm]	0,6	1,0	0,4	1,0	0,9	0,7	0,9
$\delta_{\infty,cr}$ [mm]	1,4	1,2	1,4	1,3	1,0	1,2	1,4
F_{cur} [kN]	5,7	7,6	11,9	16,7	23,8	29,6	34
$\delta_{0,ucr}$ [mm]	0,4	0,5	0,7	0,3	0,4	0,5	0,3
$\delta_{\infty,ucr}$ [mm]	0,8		1,4	0,8			1,4
Displacement under service load for cracked and un-cracked concrete Shear load (galvanized)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
F_{unc} [kN]	6,9	11,4	17,1	31,4	36,8	64,9	96,8
$\delta_{0,unc}$ [mm]	2,0	3,2	3,6	3,5	1,8	3,5	3,6
$\delta_{\infty,unc}$ [mm]	3,0	4,7	5,5	5,3	2,7	5,3	5,4
Displacement under service load Tensile load (inox A4/HCR)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
F_{cr} [kN]	2,4	4,3	7,6	11,9	17,1	19,0	
$\delta_{0,cr}$ [mm]	0,7	1,8	0,4	0,7	0,9	0,5	-
$\delta_{\infty,cr}$ [mm]	1,2	1,4	1,4	1,4	1,0	1,8	
F_{cur} [kN]	5,8	7,6	11,9	16,7	23,8	33,5	
$\delta_{0,ucr}$ [mm]	0,6	0,5	0,7	0,2	0,4	0,5	-
$\delta_{\infty,ucr}$ [mm]	1,2	1,0	1,4	0,4	0,8	1,1	
Displacement under service load for cracked and un-cracked concrete Shear load (inox A4/HCR)	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
F_{unc} [kN]	7,3	11,4	17,1	31,4	43,8	70,6	
$\delta_{0,unc}$ [mm]	1,9	2,4	4,0	4,3	2,9	2,8	-
$\delta_{\infty,unc}$ [mm]	2,9	3,6	5,9	6,4	4,3	4,2	

TECHNICAL SPECIFICATION HARMONIZED: ETAG 001 PART 1 ANNEX E	
ESSENTIAL CHARACTERISTICS	**PERFORMANCE**
Assessment for seismic action	C1 e C2

CHARACTERISTIC VALUES IN CATEGORY C1 and C2					
ESSENTIAL CHARACTERISTICS for standard depth	**PERFORMANCE ACCORDING TO ETA-17/0506 Designing according to ANNEX B2 of ETA-17/0506**				
Anchor size	**M8**	**M10**	**M12**	**M16**	**M20**
$\gamma_2 = \gamma_{inst}$	1,0				
Steel failure side in tensile (galvanized)					
$N_{Rk,s,seis,C1}$ [kN]	16	27	40	60	86
$N_{Rk,s,seis,C2}$ [kN]	16	27	40	60	86
$\gamma_{Ms,seis}$ [-]	1,53		1,5		1,6
Steel failure side in tensile (inox A4/HCR)					
$N_{Rk,s,seis,C1}$ [kN]	16	27	40	64	108
$N_{Rk,s,seis,C2}$ [kN]	16	27	40	64	108
$\gamma_{Ms,seis}$ [-]	1, 5				1,68
Pull-out (galvanized and inox A4/HCR)					
$N_{Rk,p,seis,C1}$ [kN]	5	9	16	25	36
$N_{Rk,p,seis,C2}$ [kN]	2,3	3,6	10,2	13,8	24,4
Ψ_C [-]	1,0				
Steel failure side in shear (galvanized)					
$V_{Rk,s,seis,C1}$ [kN]	9,3	20	27	44	69
$V_{Rk,s,seis,C2}$ [kN]	6,7	14	16,2	35,7	55,2
$\gamma_{Ms,seis}$ [-]	1, 25				1,33
Steel failure side in shear (inox A4/HCR)					
$V_{Rk,s,seis,C1}$ [kN]	9,3	20	27	44	69
$V_{Rk,s,seis,C2}$ [kN]	6,7	14	16,2	35,7	55,2
$\gamma_{Ms,seis}$ [-]	1, 25				1,4

TECHNICAL SPECIFICATION HARMONIZED: EAD 330232-00-0601	
ESSENTIAL CHARACTERISTICS	**PERFORMANCE**
Reaction to fire	Class A1 according to EN 13501-1

TECHNICAL SPECIFICATION HARMONIZED: EAD 330232-00-0601and TECHNICAL REPORT TR020							
ESSENTIAL CHARACTERISTICS for galvanized steel standard depth	**PERFORMANCE ACCORDING TO ETA-17/0506 Designing according to ANNEX B2 of ETA-17/0506**						
Fire resistance at 30 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure $N_{Rk,s,fi,30}$ [kN]	1,5	2,6	4,1	7,7	9,4	13,6	17,6
Resistance for pull-out failure $N_{Rk,p,fi,30}$ [kN] concrete from C20/25 to C50/60	1,25	2,25	4	6.25	9	11	12.6
Fire resistance at 60 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure $N_{Rk,s,fi,60}$ [kN]	1,1	1,9	3,0	5,6	8,2	11,8	15,3
Resistance for pull-out failure $N_{Rk,p,fi,60}$ [kN] concrete from C20/25 to C50/60	1,25	2,25	4	6.25	9	11	12.6
Fire resistance at 90 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure $N_{Rk,s,fi,90}$ [kN]	0,8	1,4	2,4	4,4	6,9	10,0	13,0
Resistance for pull-out failure $N_{Rk,p,fi,90}$ [kN] concrete from C20/25 to C50/60	1,25	2,25	4	6.25	9	11	12.6
Fire resistance at 120 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure $N_{Rk,s,fi,120}$ [kN]	0,7	1,2	2,2	4,0	6,3	9,1	11,8
Resistance for pull-out failure $N_{Rk,p,fi,120}$ [kN] concrete from C20/25 to C50/60	1,0	1,8	3,2	5,0	7.2	8.9	10
Fire resistance: spacing and edge distance	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
$S_{cr,N}$ [mm]	138	180	210	255	300	345	375
$C_{cr,N}$ [mm]	69	90	105	128	150	172	188
Fire resistance at 30 minutes for shear loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure without lever arm $V_{Rk,s,fi,30}$ [kN]	1,6	2,6	4,1	7,7	11	16	20,6
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,30}$ [Nm]	1,7	3,3	6,4	16,3	29	50	75
Fire resistance at 60 minutes for shear loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure without lever arm $V_{Rk,s,fi,60}$ [kN]	1,5	2,5	3,6	6,8	11	15	19,8
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,60}$ [Nm]	1,6	3,2	5,6	14	28	48	72
Fire resistance at 90 minutes for shear loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure without lever arm $V_{Rk,s,fi,90}$ [kN]	1,2	2,1	3,5	6,5	10	15	19,0
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,90}$ [Nm]	1,2	2,7	5,4	14	27	47	69
Fire resistance at 120 minutes for shear loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure without lever arm $V_{Rk,s,fi,120}$ [kN]	1,0	2,0	3,4	6,4	10	14	18,6
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,120}$ [Nm]	1,1	2,5	5,3	13	26	46	68

TECHNICAL SPECIFICATION HARMONIZED: EAD 330232-00-0601and TECHNICAL REPORT TR020							
ESSENTIAL CHARACTERISTICS for INOX A4 standard depth	**PERFORMANCE ACCORDING TO ETA-17/0506 Designing according to ANNEX B2 of ETA-17/0506**						
Fire resistance at 30 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure $N_{Rk,s,fi,30}$ [kN]	3,8	6,9	12,7	23,7	33,5	48,2	NPD
Resistance for pull-out failure $N_{Rk,p,fi,30}$ [kN] concrete from C20/25 to C50/60	1,25	2,25	4	6.25	9	10	NPD
Fire resistance at 60 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure $N_{Rk,s,fi,60}$ [kN]	2,9	5,3	9,4	17,6	25,0	35,9	NPD
Resistance for pull-out failure $N_{Rk,p,fi,60}$ [kN] concrete from C20/25 to C50/60	1,25	2,25	4	6.25	9	10	NPD
Fire resistance at 90 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure $N_{Rk,s,fi,90}$ [kN]	2,0	3,6	6,1	11,5	16,4	23,6	NPD
Resistance for pull-out failure $N_{Rk,p,fi,90}$ [kN] concrete from C20/25 to C50/60	1,25	2,25	4	6.25	9	10	NPD
Fire resistance at 120 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure $N_{Rk,s,fi,120}$ [kN]	1,6	2,8	4,5	8,4	12,1	17,4	NPD
Resistance for pull-out failure $N_{Rk,p,fi,120}$ [kN] concrete from C20/25 to C50/60	1,0	1,8	3,2	5,0	7.2	8	NPD
Fire resistance: spacing and edge distance	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
$S_{cr,N}$ [mm]	138	180	210	255	300	375	NPD
$C_{cr,N}$ [mm]	69	90	105	128	150	188	NPD
Fire resistance at 30 minutes for shear loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure without lever arm $V_{Rk,s,fi,30}$ [kN]	3,8	6,9	12,7	23,7	33,5	48,2	NPD
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,30}$ [Nm]	3,8	9,0	19,7	50,1	88,8	153,5	NPD
Fire resistance at 60 minutes for shear loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure without lever arm $V_{Rk,s,fi,60}$ [kN]	2,9	5,3	9,4	17,6	25,0	35,9	NPD
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,60}$ [Nm]	2,9	6,8	14,6	37,2	66,1	114,3	NPD
Fire resistance at 90 minutes for shear loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure without lever arm $V_{Rk,s,fi,90}$ [kN]	2,0	3,6	6,1	11,5	16,4	23,6	NPD
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,90}$ [Nm]	2,1	4,7	9,5	24,2	43,4	75,1	NPD
Fire resistance at 120 minutes for shear loads	**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**
Resistance for steel failure without lever arm $V_{Rk,s,fi,120}$ [kN]	1,6	2,8	4,5	8,4	12,1	17,4	NPD
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,120}$ [Nm]	2,1	4,7	9,5	24,2	43,4	75,1	NPD

TECHNICAL SPECIFICATION HARMONIZED: EAD 330232-00-0601and TECHNICAL REPORT TR020				
ESSENTIAL CHARACTERISTICS for galvanized steel with reduced depth	**PERFORMANCE ACCORDING TO ETA-17/0506 Designing according to ANNEX B2 of ETA-17/0506**			
Fire resistance at 30 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure $N_{Rk,s,fi,30}$ [kN]	1,5	2,6	4,1	7,7
Resistance for pull-out failure $N_{Rk,p,fi,30}$ [kN] concrete from C20/25 to C50/60	1,25	1.87	4.4	6.6
Fire resistance at 60 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure $N_{Rk,s,fi,60}$ [kN]	1,1	1,9	3,0	5,6
Resistance for pull-out failure $N_{Rk,p,fi,60}$ [kN] concrete from C20/25 to C50/60	1,25	1.87	4.4	6.6
Fire resistance at 90 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure $N_{Rk,s,fi,90}$ [kN]	0,8	1,3	1,9	3,5
Resistance for pull-out failure $N_{Rk,p,fi,90}$ [kN] concrete from C20/25 to C50/60	1,25	1.87	4.4	6.6
Fire resistance at 120 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure $N_{Rk,s,fi,120}$ [kN]	0,6	1,0	1,3	2,5
Resistance for pull-out failure $N_{Rk,p,fi,120}$ [kN] concrete from C20/25 to C50/60	1,0	1,5	3.6	5,3
Fire resistance: spacing and edge distance	**M8**	**M10**	**M12**	**M16**
$S_{cr,N}$ [mm]	105	120	168	195
$C_{cr,N}$ [mm]	52.5	60	84	97.5
Fire resistance at 30 minutes for shear loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure without lever arm $V_{Rk,s,fi,30}$ [kN]	1,5	2,6	4,1	7,7
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,30}$ [Nm]	1,5	3,3	6,4	16,3
Fire resistance at 60 minutes for shear loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure without lever arm $V_{Rk,s,fi,60}$ [kN]	1,1	1,9	3,0	5,6
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,60}$ [Nm]	1,2	2,5	4,7	11,9
Fire resistance at 90 minutes for shear loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure without lever arm $V_{Rk,s,fi,90}$ [kN]	0,8	1,3	1,9	3,5
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,90}$ [Nm]	0,8	1,7	3,0	7,5
Fire resistance at 120 minutes for shear loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure without lever arm $V_{Rk,s,fi,120}$ [kN]	0,6	1,0	1,3	2,5
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,120}$ [Nm]	0,6	1,2	2,1	5,3

TECHNICAL SPECIFICATION HARMONIZED: EAD 330232-00-0601and TECHNICAL REPORT TR020				
ESSENTIAL CHARACTERISTICS for INOX A4/HCR with reduced depth	**PERFORMANCE ACCORDING TO ETA-17/0506 Designing according to ANNEX B2 of ETA-17/0506**			
Fire resistance at 30 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure $N_{Rk,s,fi,30}$ [kN]	3,2	6,9	12,7	23,7
Resistance for pull-out failure $N_{Rk,p,fi,30}$ [kN] concrete from C20/25 to C50/60	1,25	1.87	4.4	6.6
Fire resistance at 60 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure $N_{Rk,s,fi,60}$ [kN]	2,5	5,3	9,4	17,6
Resistance for pull-out failure $N_{Rk,p,fi,60}$ [kN] concrete from C20/25 to C50/60	1,25	1.87	4.4	6.6
Fire resistance at 90 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure $N_{Rk,s,fi,90}$ [kN]	1,9	3,6	6,1	11,5
Resistance for pull-out failure $N_{Rk,p,fi,90}$ [kN] concrete from C20/25 to C50/60	1,25	1.87	4.4	6.6
Fire resistance at 120 minutes for tensile loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure $N_{Rk,s,fi,120}$ [kN]	1,6	2,8	4,5	8,4
Resistance for pull-out failure $N_{Rk,p,fi,120}$ [kN] concrete from C20/25 to C50/60	1,0	1,5	3.6	5,3
Fire resistance: spacing and edge distance	**M8**	**M10**	**M12**	**M16**
$S_{cr,N}$ [mm]	105	120	168	195
$C_{cr,N}$ [mm]	52.5	60	84	97.5
Fire resistance at 30 minutes for shear loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure without lever arm $V_{Rk,s,fi,30}$ [kN]	3,2	6,9	12,7	23,7
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,30}$ [Nm]	3,2	8,9	19,7	50,1
Fire resistance at 60 minutes for shear loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure without lever arm $V_{Rk,s,fi,60}$ [kN]	2,5	5,3	9,4	17,6
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,60}$ [Nm]	2,6	6,8	14,6	37,2
Fire resistance at 90 minutes for shear loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure without lever arm $V_{Rk,s,fi,90}$ [kN]	1,9	3,6	6,1	11,5
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,90}$ [Nm]	2,0	4,7	9,5	24,2
Fire resistance at 120 minutes for shear loads	**M8**	**M10**	**M12**	**M16**
Resistance for steel failure without lever arm $V_{Rk,s,fi,120}$ [kN]	1,6	2,8	4,5	8,4
Resistance for steel failure with lever arm $M^0_{Rk,s,fi,120}$ [Nm]	1,6	3,6	7,0	17,8

TERMINOLOGY AND SYMBOLS	
d_{nom}	Diameter of anchor bolt or thread diameter
d_0	Drill hole diameter
d_{fix}	Diameter of clearance hole in the fixture
h_{ef}	Effective anchorage depth
h_1	Depth of the drilling hole
h_{min}	Minimum thickness of concrete member
T_{inst}	Torque moment to installation
t_{fix}	Thickness to be fixed
S_{min}	Minimum allowable spacing
C_{min}	Minimum allowable edge distance
N_{Rk}	Characteristic tensile resistance for concrete cone failure for single anchor
$N_{Rk,p}$	Characteristic tensile resistance for pull-out failure for single anchor
$N_{Rk,s}$	Characteristic tensile resistance for steel failure for single anchor
$V_{Rk,s}$	Characteristic shear resistance for steel failure for single anchor
$M^0_{Rk,s}$	Characteristic bending resistance of an individual anchor
γ_{inst} or γ_2	Partial safety factors for installation
γ_{Ms}	Partial safety factors for steel failure mode
$S_{cr,N}$	Spacing for ensuring the transmission of the characteristic tensile resistance of a single anchor without spacing and edge effects in case of concrete cone failure
$C_{cr,N}$	Edge distance for ensuring the transmission of the characteristic tensile resistance of a single anchor without spacing and edge effects in case of concrete cone failure
$S_{cr,sp}$	Spacing for ensuring the transmission of the characteristic tensile resistance of a single anchor without spacing and edge effects in case of splitting failure
$C_{cr,sp}$	Edge distance for ensuring the transmission of the characteristic tensile resistance of a single anchor without spacing and edge effects in case of splitting failure
$\psi_{c,ucr}$	Increasing factor for un-cracked concrete
$\psi_{c,cr}$	Increasing factor for cracked concrete
k_1	Factor for concrete cone failure with cracked and uncracked concrete
k_8	Factor for concrete pry-out failure
k_7	Ductility steel factor
l_f	Effective anchorage depth
F	Service load in un-cracked (ucr) or cracked concrete (cr)
δ_0	Short term displacement under service load in un-cracked (uncr) or cracked concrete (cr)
δ_∞	Long term displacement under service load in un-cracked (uncr) or cracked concrete (cr)
NPD	No performance declared

Regulamentation REACH n°1907/2006

Estimate customer,
We inform you that in the REACH supply chain our company is classified as DU: Downstream-user.
About the product detailed in the point 1 we confirm you that we don't use in our production substances classified as SVHC according to the Candidate List published on ECHA site web:
http://echa.europa.eu/chem_data/candidate_list_table_en.asp.

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10. The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 9. This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4. Signed for and on behalf of the manufacturer by:

Name and function	Place and date of issue	Signature
Andrea Taddei **General Manager**	**Grassobbio (Bg) - Italy** **01.02.2021**