Declaration of Performance n° 18/0164

Mechanical Torque Controlled anchors VEX

Intended use of the construction product according to EAD 330232-00-0601	
Generic type	Torque controlled expansion anchor
Base material	Non cracked and cracked concrete C20/25 a C50/60 – EN 206-1:2003
Material	Zincplated steel
Durability	Internal dry condition
Material	Stainless steel A4
Durability	Internal dry condition, structures subject to external atmospheric exposure (including industrial and marine enviroment) and to permanently damp internal condition, if no particular aggressive conditions exist.
Loads	Static, quasi-static – seismic action (category C1 and C2)
Manufacturer information	
VORPA s.r.l. Vial San Leo, 5 – 47838 – Riccione (RN) – ITALY Tel. +39 0541/607111 vorpa@vorpa.com – www.vorpa.com	
Certificate information	
ETA 18/0164 issued by	Deutsches Institut für Bautechnik Anstalt des öffentlichen Rechts Kolonnenstr. 30 L 10829 Berlin Germany
On the basis of	EAD 330232-00-0601
Certificate of conformity **319/10.2020** Issued by	TECHNISCHE UNIVERSITAT DARMSTADT Franziska-Braun-Straße 3 64287 Darmstadt
Under system	1

Declared performance according to EAD 330232-00-0601								
Essential Characteristic			**Performance**					
			M8	**M10**	**M12**	**M16**	**M20**	**M24**
Installation parameters - Standard anchorage depth								
d_0	Nominal diameter of drill bit	[mm]	8	10	12	16	20	24
h_{ef}	Zincplated - Effective anchorage depth	[mm]	46	60	70	85	100	115
h_{ef}	A4SS - Effective anchorage depth	[mm]	46	60	70	85	100	125
h_{min}	Minimum thickness of the concrete member	[mm]	100	120	140	170	200	230
T_{inst}	Zincplated - Setting torque	[Nm]	20	25	45	90	160	200
T_{inst}	A4SS - Setting torque	[Nm]	20	35	50	110	200	290
Installation parameters - Reduced anchorage depth								
$h_{ef,red}$	Effective anchorage depth	[mm]	49	55	70	90	-	-

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Standard thickness of concrete member								
Steel zinc plated								
h_{min}	Minimum thickness of the concrete member	[mm]	100	120	140	170	200	230
Cracked concrete								
s_{min}	Minimum spacing	[mm]	40	45	60	60	95	100
for c ≥		[mm]	70	70	100	100	150	180
c_{min}	Minimum edge distance	[mm]	40	45	60	60	95	100
for s ≥		[mm]	80	90	140	180	200	220
Uncracked concrete								
s_{min}	Minimum spacing	[mm]	40	45	60	65	90	100
for c ≥		[mm]	80	70	120	120	180	180
c_{min}	Minimum edge distance	[mm]	50	50	75	80	130	100
for s ≥		[mm]	100	100	150	150	240	220
Stainless Steel A4								
h_{min}	Minimum thickness of the concrete member	[mm]	100	120	140	160	200	250
Cracked concrete								
s_{min}	Minimum spacing	[mm]	40	50	60	60	95	125
for c ≥		[mm]	70	75	100	100	150	125
c_{min}	Minimum edge distance	[mm]	40	55	60	60	95	125
for s ≥		[mm]	80	90	140	180	200	125
Uncracked concrete								
s_{min}	Minimum spacing	[mm]	40	50	60	65	90	125
for c ≥		[mm]	80	75	120	120	180	125
c_{min}	Minimum edge distance	[mm]	50	60	75	80	130	125
for s ≥		[mm]	100	120	150	150	240	125
Minimum thickness of concrete member								
Steel zinc plated – Stainless steel A4								
h_{min}	Minimum thickness of the concrete member	[mm]	80	100	120	140	-	-
Cracked concrete								
s_{min}	Minimum spacing	[mm]	40	45	60	70	-	-
for c ≥		[mm]	70	90	100	160	-	-
c_{min}	Minimum edge distance	[mm]	40	50	60	80	-	-
for s ≥		[mm]	80	115	140	180	-	-
Uncracked concrete								
s_{min}	Minimum spacing	[mm]	40	60	60	80	-	-
for c ≥		[mm]	80	140	120	180	-	-
c_{min}	Minimum edge distance	[mm]	50	90	75	90	-	-
for s ≥		[mm]	100	140	150	200	-	-
Minimum thickness of concrete member – Reduced anchorage depth								
Steel zinc plated – Stainless steel A4								
h_{min}	Minimum thickness of the concrete member	[mm]	80	80	100	140	-	-
Cracked concrete								
s_{min}	Minimum spacing	[mm]	50	50	50	65	-	-
for c ≥		[mm]	60	100	160	170	-	-
c_{min}	Minimum edge distance	[mm]	40	65	65	100	-	-
for s ≥		[mm]	185	180	250	250	-	-
Uncracked concrete								
s_{min}	Minimum spacing	[mm]	50	50	50	65	-	-
for c ≥		[mm]	60	100	160	170	-	-

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c_{min}	Minimum edge distance	[mm]	40	65	100	170	-	-
for s ≥		[mm]	185	180	185	65	-	-
Tension – Zinc plated Steel failure								
$N_{Rk,s}$	Tension steel characteristic failure	[kN]	16	27	40	60	86	126
$\gamma_{m,sN}$	Partial safety factor	[-]	1.53		1.5		1.6	1.5
Pull-out failure								
Standard anchorage depth								
$N_{Rk,p,ucr}$	Tension characteristic load in non-cracked concrete C20/25	[kN]	12	16	25	35	ND	ND
$N_{Rk,p,cr}$	Tension characteristic load in cracked concrete C20/25	[kN]	5	9	16	25	ND	ND
γ_2	Partial safety factor	[-]	1.0					
ψ_c	Increasing factor for concrete	[-]	$(f_{ck}/20)^{0.5}$					
Reduced anchorage depth								
$N_{Rk,p,ucr}$	Tension characteristic load in non-cracked concrete C20/25	[kN]	7.5	9	ND	ND	-	-
$N_{Rk,p,cr}$	Tension characteristic load in cracked concrete C20/25	[kN]	5	7.5	ND	ND	-	-
γ_2	Partial safety factor	[-]	1.0					
ψ_c	Increasing factor for concrete	[-]	$(f_{ck}/20)^{0.5}$					
Concrete cone failure								
$K_{,ucr\ N}$	Factor K_1 non-cracked concrete C20/25	[-]	11.0					
$K_{,cr\ N}$	Factor K_1 cracked concrete C20/25	[-]	7.7					
Splitting failure								
Standard anchorage depth								
Case 1								
$N^0_{Rk,sp}$	Tension characteristic load in non-cracked concrete C20/25	[kN]	9	12	20	30	40	62.3
$c_{cr,sp}$	Critical edge distance (splitting)	[mm]	1.5 h_{ef}					
Case 2								
$N^0_{Rk,sp}$	Tension characteristic load in non-cracked concrete C20/25	[kN]	12	16	25	35	50.5	62.3
$c_{cr,sp}$	Critical edge distance (splitting)	[mm]	2 h_{ef}				2.2 h_{ef}	1.5 h_{ef}
Splitting for minimum thickness of concrete memeber								
$N^0_{Rk,sp}$	Tension characteristic load in non-cracked concrete C20/25	[kN]	12	16	25	35	-	-
$c_{cr,sp}$	Critical edge distance (splitting)	[mm]	2.5 h_{ef}				-	-
Reduced anchorage depth								
$N^0_{Rk,sp}$	Tension characteristic load in non-cracked concrete C20/25	[kN]	7.5	9	17.9	26.5	-	-
$c_{cr,sp}$	Critical edge distance (splitting)	[mm]	100	100	125	150	-	-
Tension – A4 Stainless Steel Steel failure								
$N_{Rk,s}$	Tension steel characteristic failure	[kN]	16	27	40	64	108	110
$\gamma_{m,sN}$	Partial safety factor	[-]	1.5				1.68	1.5
Pull-out failure								
Standard anchorage depth								
$N_{Rk,p,ucr}$	Tension characteristic load in non-cracked concrete C20/25	[kN]	12	16	25	35	ND	ND
$N_{Rk,p,cr}$	Tension characteristic load in cracked concrete C20/25	[kN]	5	9	16	25	ND	40
γ_2	Partial safety factor	[-]	1.0					
ψ_c	Increasing factor for concrete	[-]	$(f_{ck}/20)^{0.5}$					
Reduced anchorage depth								
$N_{Rk,p,ucr}$	Tension characteristic load in non-cracked concrete C20/25	[kN]	7.5	9	ND	ND	-	-
$N_{Rk,p,cr}$	Tension characteristic load in cracked concrete C20/25	[kN]	5	7.5	ND	ND	-	-
γ_2	Partial safety factor	[-]	1.0					
ψ_c	Increasing factor for concrete	[-]	$(f_{ck}/20)^{0.5}$					

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Concrete cone failure								
$K_{,ucr\ N}$	Factor K_1 non-cracked concrete C20/25	[-]	11.0					
$K_{,cr\ N}$	Factor K_1 cracked concrete C20/25	[-]	7.7					
Splitting failure								
Standard anchorage depth								
Case 1								
$N^0_{Rk,sp}$	Tension characteristic load in non-cracked concrete C20/25	[kN]	9	12	20	30	40	-
$c_{cr,sp}$	Critical edge distance (splitting)	[mm]	1.5 h_{ef}					
Case 2								
$N^0_{Rk,sp}$	Tension characteristic load in non-cracked concrete C20/25	[kN]	12	16	25	35	50.5	70.6
$c_{cr,sp}$	Critical edge distance (splitting)	[mm]	115	125	140	200	220	250
Splitting for minimum thickness of concrete memeber								
$N^0_{Rk,sp}$	Tension characteristic load in non-cracked concrete C20/25	[kN]	12	16	25	35	-	-
$S_{cr,sp}$ (=2$C_{cr,sp}$)	Critical spacing (splitting)	[mm]	5 h_{ef}				-	-
Reduced anchorage depth								
$N^0_{Rk,sp}$	Tension characteristic load in non-cracked concrete C20/25	[kN]	7.5	9	17.9	26.5	-	-
$c_{cr,sp}$	Critical edge distance (splitting)	[mm]	100	100	125	150	-	-
Shear – Steel failure								
$V_{Rk,s}$	Zincplated - Shear characteristic failure	[kN]	12.2	20.1	30	55	69	114
$\gamma_{m,sV}$	Partial safety factor	[-]	1.25				1.33	1.25
$V_{Rk,s}$	A4SS - Shear characteristic failure	[kN]	13	20	30	55	86	123.6
$\gamma_{m,sV}$	Partial safety factor	[-]	1.25				1.4	1.25
$M^0_{Rk,s}$	Zincplated - Bending moment characteristic failure	[Nm]	23	47	82	216	363	898
$\gamma_{m,sV}$	Partial safety factor	[-]	1.25				1.33	1.25
$M^0_{Rk,s}$	A4SS - Bending moment characteristic failure	[Nm]	26	52	92	200	454	785.4
$\gamma_{m,sV}$	Partial safety factor	[-]	1.25				1.4	1.25
Shear – Concrete pry-out								
K_8	Factor	[-]	2.4				2.8	
Characteristic tension resistance in cracked and non-cracked concrete under Fire Exposure								
Steel failure – Characteristic resistance - Zincplated								
$N_{Rk,s,fi}$	R30	[kN]	1.5	2.6	4.1	7.7	9.4	13.6
$N_{Rk,s,fi}$	R60	[kN]	1.1	1.9	3.0	5.6	8.2	11.8
$N_{Rk,s,fi}$	R90	[kN]	0.8	1.4	2.4	4.4	6.9	10.0
$N_{Rk,s,fi}$	R120	[kN]	0.7	1.2	2.2	4.0	6.3	9.1
Steel failure – Characteristic resistance – A4 Stainless steel								
$N_{Rk,s,fi}$	R30	[kN]	3.8	6.9	12.7	23.7	33.5	48.2
$N_{Rk,s,fi}$	R60	[kN]	2.9	5.3	9.4	17.6	25.0	35.9
$N_{Rk,s,fi}$	R90	[kN]	2.0	3.6	6.1	11.5	16.4	23.6
$N_{Rk,s,fi}$	R120	[kN]	1.6	2.8	4.5	8.4	12.1	17.4
Characteristic shear resistance in cracked and non-cracked concrete under Fire Exposure								
Steel failure without lever arm – Characteristic resistance - Zincplated								
$V_{Rk,s,fi}$	R30	[kN]	1.6	2.6	4.1	7.7	11	16
$V_{Rk,s,fi}$	R60	[kN]	1.5	2.5	3.6	6.8	11	15
$V_{Rk,s,fi}$	R90	[kN]	1.2	2.1	3.5	6.5	10	15
$V_{Rk,s,fi}$	R120	[kN]	1.0	2.0	3.4	6.4	10	14
Steel failure without lever arm – Characteristic resistance - A4 Stainless steel								
$V_{Rk,s,fi}$	R30	[kN]	3.8	6.9	12.7	23.7	33.5	48.2
$V_{Rk,s,fi}$	R60	[kN]	2.9	5.3	9.4	17.6	25.0	35.9
$V_{Rk,s,fi}$	R90	[kN]	2.0	3.6	6.1	11.5	16.4	23.6

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$V_{Rk,s,fi}$	R120	[kN]	1.6	2.8	4.5	8.4	12.1	17.4
Steel failure with lever arm – Characteristic resistance - Zincplated								
$M^0_{Rk,s,fi}$	R30	[Nm]	1.7	3.3	6.4	16.3	29	50
$M^0_{Rk,s,fi}$	R60	[Nm]	1.6	3.2	5.6	14	28	48
$M^0_{Rk,s,fi}$	R90	[Nm]	1.2	2.7	5.4	14	27	47
$M^0_{Rk,s,fi}$	R120	[Nm]	1.1	2.5	5.3	13	26	46
Steel failure with lever arm – Characteristic resistance - A4 Stainless steel								
$M^0_{Rk,s,fi}$	R30	[Nm]	3.8	9.0	19.7	50.1	88.8	153.5
$M^0_{Rk,s,fi}$	R60	[Nm]	2.9	6.8	14.6	37.2	66.1	114.3
$M^0_{Rk,s,fi}$	R90	[Nm]	2.1	4.7	9.5	24.2	43.4	75.1
$M^0_{Rk,s,fi}$	R120	[Nm]	1.6	3.6	7.0	17.8	32.1	55.5
Characteristic tension resistance in cracked and non-cracked concrete under Fire Exposure - Reduced anchorage depth								
Steel failure – Characteristic resistance - Zincplated								
$N_{Rk,s,fi}$	R30	[kN]	1.5	2.6	4.1	7.7	-	-
$N_{Rk,s,fi}$	R60	[kN]	1.1	1.9	3.0	5.6	-	-
$N_{Rk,s,fi}$	R90	[kN]	0.8	1.3	1.9	3.5	-	-
$N_{Rk,s,fi}$	R120	[kN]	0.6	1.0	1.3	2.5	-	-
Steel failure – Characteristic resistance – A4 Stainless steel								
$N_{Rk,s,fi}$	R30	[kN]	3.2	6.9	12.7	23.7	-	-
$N_{Rk,s,fi}$	R60	[kN]	2.5	5.3	9.4	17.6	-	-
$N_{Rk,s,fi}$	R90	[kN]	1.9	3.6	6.1	11.5	-	-
$N_{Rk,s,fi}$	R120	[kN]	1.6	2.8	4.5	8.4	-	-
Characteristic shear resistance in cracked and non-cracked concrete under Fire Exposure - Reduced anchorage depth								
Steel failure without lever arm – Characteristic resistance - Zincplated								
$V_{Rk,s,fi}$	R30	[kN]	1.5	2.6	4.1	7.7	-	-
$V_{Rk,s,fi}$	R60	[kN]	1.1	1.9	3.0	5.6	-	-
$V_{Rk,s,fi}$	R90	[kN]	0.8	1.3	1.9	3.5	-	-
$V_{Rk,s,fi}$	R120	[kN]	0.6	1.0	1.3	2.5	-	-
Steel failure without lever arm – Characteristic resistance - A4 Stainless steel								
$V_{Rk,s,fi}$	R30	[kN]	3.2	6.9	12.7	23.7	-	-
$V_{Rk,s,fi}$	R60	[kN]	2.5	5.3	9.4	17.6	-	-
$V_{Rk,s,fi}$	R90	[kN]	1.9	3.6	6.1	11.5	-	-
$V_{Rk,s,fi}$	R120	[kN]	1.6	2.8	4.5	8.4	-	-
Steel failure with lever arm – Characteristic resistance - Zincplated								
$M^0_{Rk,s,fi}$	R30	[Nm]	1.5	3.3	6.4	16.3	-	-
$M^0_{Rk,s,fi}$	R60	[Nm]	1.2	2.5	4.7	11.9	-	-
$M^0_{Rk,s,fi}$	R90	[Nm]	0.8	1.7	3.0	7.5	-	-
$M^0_{Rk,s,fi}$	R120	[Nm]	0.6	1.2	2.1	5.3	-	-
Steel failure with lever arm – Characteristic resistance - A4 Stainless steel								
$M^0_{Rk,s,fi}$	R30	[Nm]	3.2	8.9	19.7	50.1	-	-
$M^0_{Rk,s,fi}$	R60	[Nm]	2.6	6.8	14.6	37.2	-	-
$M^0_{Rk,s,fi}$	R90	[Nm]	2.0	4.7	9.5	24.2	-	-
$M^0_{Rk,s,fi}$	R120	[Nm]	1.6	3.6	7.0	17.8	-	-
Characteristic values of resistance in case of Seismic Performance category C1 – C2 for standard anchorage depth								
Tension loads								
Steel failure - Zincplated								
$N_{Rk,s,seis}$	Characteristic resistance C1	[kN]	16	27	40	60	86	-
$N_{Rk,s,seis}$	Characteristic resistance C2	[kN]	16	27	40	60	86	-
$\gamma_{Ms,seis}$	Partial safety factor	[kN]	1.53		1.5		1.6	-
γ_{inst}	Installation safety factor	[-]	1.0					

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Steel failure - A4 Stainless steel								
$N_{Rk,s,seis}$	Characteristic resistance C1	[kN]	16	27	40	64	108	-
$N_{Rk,s,seis}$	Characteristic resistance C2	[kN]	16	27	40	64	108	-
$\gamma_{Ms,seis}$	Partial safety factor	[kN]	1.5				1.68	-
γ_{inst}	Installation safety factor	[-]	1.0					
Pull-out failure								
$N_{Rk,p,seis}$	Characteristic resistance C1	[kN]	5	9	16	25	36	-
$N_{Rk,p,seis}$	Characteristic resistance C2	[kN]	2.3	3.6	10.2	13.8	24.4	-
Characteristic values of resistance in case of Seismic Performance category C1 – C2 for standard anchorage depth								
Shear loads								
Steel failure without lever arm - Zincplated								
$V_{Rk,s,seis}$	Characteristic resistance C1	[kN]	9.3	20	27	44	69	-
$V_{Rk,s,seis}$	Characteristic resistance C2	[kN]	6.7	14	16.2	35.7	55.2	-
$\gamma_{Ms,seis}$	Partial safety factor	[kN]	1.25				1.33	-
Steel failure without lever arm - A4 Stainless steel								
$V_{Rk,s,seis}$	Characteristic resistance C1	[kN]	9.3	20	27	44	69	-
$V_{Rk,s,seis}$	Characteristic resistance C2	[kN]	6.7	14	16.2	35.7	55.2	-
$\gamma_{Ms,seis}$	Partial safety factor	[kN]	1.25				1.4	-

The above performance apply for the following article numbers:

VEX+SEISMIC (Zincato)		
Codice	**d [mm]**	**Tipo [mm]**
32102	8	8/15-26-80
32103		8/30-41-95
32104		8/50-61-115
32105	10	10/10-30-90
32106		10/15-35-95
32107		10/20-40-100
32108		10/30-50-110
32109		10/50-70-130
32110		10/75-95-155
32111		10/100-120-180
32112	12	12/10-30-105
32113		12/15-35-110
32114		12/20-40-115
32115		12/30-50-125
32116		12/50-70-145
32117		12/65-85-160
32118		12/85-105-180
32119		12/105-125-200
32120	16	16/15-35-135
32121		16/25-45-145
32122		16/50-70-170
32123		16/80-100-200
32124	20	20/30-165
32125		20/60-195

VEX+SEISMIC A4 (Acciaio INOX)		
Codice	**d [mm]**	**Tipo [mm]**
4661	8	8/10-21-75
4250		8/15-26-80
4251		8/30-41-95
4252		8/50-61-115
4662	10	10/10-30-90
4675		10/15-35-95
4676		10/20-40-100
4677		10/30-50-110
4678		10/50-70-130
4679		10/75-95-155
4680		10/100-120-180
4681	12	12/10-30-105
4682		12/15-35-110
4683		12/20-40-115
4684		12/30-50-125
4685		12/50-70-145
4686		12/65-85-160
4687		12/85-105-180
4688		12/105-125-200
4689	16	16/5-25-125
4690		16/15-35-135
4691		16/25-45-145
4692		16/50-70-170
4693		16/80-100-200
4694	20	20/30-165
4695		20/60-195

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The performances of the product identified by above identification code are in conformity with the declared performances.
This declaration of performance is issued on the basis of the European regulation (EU) N. 305/2011, under the sole responsibility of the indicated Manufacturer.

Signed for and in behalf of the manufacturer by:

Name and function	Place and date	Signature
Roberto Vorabbi Legale Rappresentante	Riccione, 28/10/2020