1. **Codice identificativo unico del prodotto tipo / Unique identification code of the product-type:**
   VITE E PIASTRA PER CALCESTRUZZO CONNETTORE TECNARIA CTCEM-E
   VITE PER CALCESTRUZZO CONNETTORE TECNARIA VCEM-E
   VITE PER CALCESTRUZZO CONNETTORE TECNARIA MINICEM-E
   VITE PER CALCESTRUZZO CONNETTORE TECNARIA NANOCEM-E

   CONCRETE SCREW + PLATE TECNARIA CONNECTOR CTCEM-E
   CONCRETE SCREW TECNARIA CONNECTOR VCEM-E
   CONCRETE SCREW TECNARIA CONNECTOR MINICEM-E
   CONCRETE SCREW TECNARIA CONNECTOR NANOCEM-E

2. **Uso previsto / Intended use:**
   I prodotti per calcestruzzo CONNETTORE TECNARIA CTCEM-E, CONNETTORE TECNARIA VCEM-E, CONNETTORE TECNARIA MINICEM-E e CONNETTORE TECNARIA NANOCEM-E sono ancoranti in acciaio al carbonio. Sono avvitati in un foro cilindrico. L'apposito filetto dell'ancorante taglia una filettatura interna nel calcestruzzo mentre si inserisce. L'ancoraggio è caratterizzato dall'ingranamento meccanico nell'apposito filetto. Il connettore Tecnaria CTCEM-E ha inoltre una piastra di ancoraggio meccanico.

   The CTCEM-E TECNARIA CONNECTOR, VCEM-E TECNARIA CONNECTOR, MINICEM-E TECNARIA CONNECTOR and NANOCEM-E TECNARIA CONNECTOR concrete screws are anchors made of carbon steel. They are screwed into a predrilled cylindrical drill hole. The special thread of the anchor cuts an internal thread into the member while setting. The anchorage is characterised by mechanical interlock in the special thread. The Tecnaria CTCEM-E connector also has a mechanical anchor plate.

3. **Fabbricante / Manufacturer:**
   Tecnaria S.p.A. Viale Pecori Giraldi 55 – 36061 Bassano del Grappa VI Italy

4. **Rappresentate autorizzato / Authorised representative:**
   Non applicabile / Not relevant

5. **Sistema VVCP / System of AVCP:**
   1

6. **Documento per la Valutazione Europea / European Assessment Document:**
   EAD-330232-00-0601
   Valutazione Tecnica Europea / European Technical Assessment:
   ETA-20/0831 of 2023/09/18
   Organismo di Valutazione Tecnica / Technical Assesment Body:
   IETcc
   Organismo Notificato / Notified body:
   IETcc n 1219

7. **Prestazione dichiarata / Declared performances:**

CTCME-E = CT-CEM-E
VCEM-E = 12.5 h_{nom}= 70 mm
MINICEM-E = 10.5 h_{nom}= 60 mm
NANOCEM-E = 7.5 h_{nom}= 55 mm

Table C1: Characteristic values to tension loads for Carbon Steel

Characteristic values of resistance to tension loads of design method A			Performance						
			7.5		10.5		12.5		
h_{nom}	Overall anchor embedment depth in the concrete:	[mm]	40	55	50	60	60	70	85
Tension loads: steel failure									
$N_{Rk,s}$	Tension steel characteristic resistance:	[kN]	18.7		32.7		51.2		
γ_{Ms}	Partial safety factor: [1]	[-]	1.5		1.5		1.5		
Tension loads: pull-out failure in concrete									
$N_{Rk,p,ucr}$	Tension characteristic resistance in C20/25 uncracked concrete:	[kN]	6.0	9.0	12.5 [2]	12.0 [2]	22.0 [2]	20.0 [2]	34.0 [2]
$N_{Rk,p,cr}$	Tension characteristic resistance in C20/25 cracked concrete:	[kN]	3.0	6.0	6.0	9.0	14.0 [2]	12.0	24.0 [2]
ψ_c	C30/37	[-]	1.16	1.22	1.16	1.08	1.14	1.04	1.18
ψ_c	C40/45	[-]	1.29	1.41	1.28	1.15	1.25	1.07	1.33
ψ_c	C50/60	[-]	1.40	1.55	1.39	1.19	1.34	1.09	1.46
Tension loads: concrete cone and splitting failure									
γ_{inst}	Installation safety factor: [1]	[-]	1.2	1.2	1.2	1.2	1.2	1.2	1.0
h_{ef}	Effective embedment depth:	[mm]	29	42	37	45	44	52	65
$k_{ucr,N}$	Factor for uncracked concrete:	[-]	11.0						
$N^0_{Rk,c,ucr}$	Tension characteristic resistance in C20/25 uncracked concrete: [3]	[kN]	7.7	13.4	11.1	14.8	14.4	18.4	25.8
$k_{cr,N}$	Factor for cracked concrete:	[-]	7.7						
$N^0_{Rk,c,cr}$	Tension characteristic resistance in C20/25 cracked concrete: [3]	[kN]	5.4	9.4	7.8	10.4	10.1	12.9	18.0
$s_{cr,N}$	Critical spacing:	[mm]	3.0 x h_{ef}						
$c_{cr,N}$	Critical edge distance:	[mm]	1.5 x h_{ef}						
$s_{cr,sp}$	Critical spacing (splitting):	[mm]	3.0 x h_{ef}						
$c_{cr,sp}$	Critical edge distance (splitting):	[mm]	1.5 x h_{ef}						

[1] In absence of other national regulations
[2] Pull-out failure is not decisive ($N^0_{Rk,c} < N_{Rk,p}$)
[3] Equation 7.2 from EN 1992-4:2018

Note: 12.5 CT-CEM-E made of carbon steel and tested for h_{nom}=70 works under tension loads as regular 12.5 with h_{nom}=70.

Table C5: Characteristic values to shear loads for Carbon Steel

Characteristic values of resistance to shear loads			Performance						
			7.5		10.5		12.5		
h_{nom}	Overall anchor embedment depth in the concrete:	[mm]	40	55	50	60	60	70	85
Shear loads: steel failure without lever arm									
$V_{Rk,s}$	Shear steel characteristic resistance:	[kN]	9.3	7.5	16.3		25.6		
k_7	k_7 factor:[1)]	[-]	0.8		0.8		0.8		
γ_{Ms}	Partial safety factor: [2)]	[-]	1.25		1.25		1.25		
Shear loads: steel failure with lever arm									
$M^0_{Rk,s}$	Characteristic bending moment:	[Nm]	15.2		35.3		69.3		
γ_{Ms}	Partial safety factor: [2)]	[-]	1.25		1.25		1.25		
Shear loads: concrete pryout failure									
k_8	k_8 factor:	[-]	1.0	1.0	1.2	1.0	1.0	1.0	2.0
γ_{inst}	Installation safety factor: [2)]	[-]	1.0		1.0		1.0		
Shear loads: concrete edge failure									
l_f	Effective anchorage depth under shear loads:	[mm]	29	42	37	45	44	52	65
d_{nom}	Nominal outer diameter of screw:	[mm]	6	6	8	8	10	10	10
γ_{inst}	Installation safety factor: [2)]	[-]	1.0		1.0		1.0		

[1)] The diameter of the clearance hole does not meet the values given in EN 1992-4 Table 6.1. However, the group resistance under shear loading has been verified in the assessment through testing and accounted for in the factor k_7.
[2)] In absence of other national regulations.

Characteristic values of resistance to shear loads			Performance				
			12.5 CT-CEM-E	14.2		16.5	
h_{nom}	Overall anchor embedment depth in the concrete:	[mm]	70	75	105	75	110
Shear loads: steel failure without lever arm							
$V_{Rk,s}$	Shear steel characteristic resistance:	[kN]	53.5	40.3		57.9	
k_7	k_7 factor:[1)]	[-]	0.8	0.8		0.8	
γ_{Ms}	Partial safety factor: [2)]	[-]	1.25	1.25		1.25	
Shear loads: steel failure with lever arm							
$M^0_{Rk,s}$	Characteristic bending moment:	[Nm]	69.3	137.1		235.9	
γ_{Ms}	Partial safety factor: [2)]	[-]	1.25	1.25		1.25	
Shear loads: concrete pryout failure							
k_8	k_8 factor:	[-]	4.5	1.5	2.0	1.6	2.0
γ_{inst}	Installation safety factor: [2)]	[-]	1.0	1.0		1.0	
Shear loads: concrete edge failure							
l_f	Effective anchorage depth under shear loads:	[mm]	52	57	82	56	86
d_{nom}	Nominal outer diameter of screw:	[mm]	10	12	12	14	14
γ_{inst}	Installation safety factor: [2)]	[-]	1.0	1.0		1.0	

[1)] The diameter of the clearance hole does not meet the values given in EN 1992-4 Table 6.1. However, the group resistance under shear loading has been verified in the assessment through testing and accounted for in the factor k_7.
[2)] In absence of other national regulations.

Note: 12.5 CT-CEM-E made of carbon steel and tested for h_{nom}=70 works under shear loads better than regular 12.5 with h_{nom}=70 and, in this line, its assessment values are updated in the table above.

Table D1: Characteristic values to fire resistance for Carbon Steel

Fire resistance duration = 30 minutes			Performances									
			7.5		10.5		12.5			14.2		16.5	
h_{nom}	Overall anchor embedment depth in the concrete:	[mm]	40	55	50	60	60	70	85	75	105	75	110
Tension loads, steel failure													
$N_{Rk,s,fi,30}$	Characteristic resistance:	[kN]	0.23	0.23	0.41	0.41	0.95	0.95	0.95	2.02	2.02	2.91	2.91
Pull-out failure													
$N_{Rk,p,fi,30}$	Character. resistance in concrete:	[kN]	0.77	1.43	1.58	2.28	3.66	3.60	6.09	4.85	8.38	5.04	7.43
Concrete cone failure [1)]													
$N_{Rk,c,fi,30}$	Character. resistance in concrete:	[kN]	0.78	1.97	1.43	2.34	2.21	3.36	5.86	4.22	10.48	4.04	11.81
Shear loads steel failure without lever arm													
$V_{Rk,s,fi,30}$	Characteristic resistance	[kN]	0.23	0.23	0.41	0.41	0.95	0.95	0.95	2.02	2.02	2.91	2.91
Shear loads, steel failure with lever arm													
$M_{Rk,s,fi,30}$	Characteristic bending resistance:	[Nm]	0.19	0.19	0.44	0.44	1.29	1.29	1.29	3.43	3.43	5.93	5.93

Fire resistance duration = 60 minutes			Performances									
			7.5		10.5		12.5			14.2		16.5	
h_{nom}	Overall anchor embedment depth in the concrete:	[mm]	40	55	50	60	60	70	85	75	105	75	110
Tension loads, steel failure													
$N_{Rk,s,fi,60}$	Characteristic resistance:	[kN]	0.21	0.21	0.37	0.37	0.83	0.83	0.83	1.51	1.51	2.18	2.18
Pull-out failure													
$N_{Rk,p,fi,60}$	Character. resistance in concrete:	[kN]	0.77	1.43	1.58	2.28	3.66	3.60	6.09	4.85	8.38	5.04	7.43
Concrete cone failure [1)]													
$N_{Rk,c,fi,60}$	Character. resistance in concrete:	[kN]	0.78	1.97	1.43	2.34	2.21	3.36	5.86	4.22	10.48	4.04	11.81
Shear loads steel failure without lever arm													
$V_{Rk,s,fi,60}$	Characteristic resistance:	[kN]	0.21	0.21	0.37	0.37	0.83	0.83	0.83	1.51	1.51	2.18	2.18
Shear loads, steel failure with lever arm													
$M_{Rk,s,fi,60}$	Characteristic bending resistance:	[Nm]	0.17	0.17	0.40	0.40	1.12	1.12	1.12	2.57	2.57	4.45	4.45

[1)] As a rule, splitting failure can be neglected when cracked concrete and reinforcement is assumed.

Note: In absence of other national regulations, the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1.0$ is recommended for steel failure and concrete related failure modes under shear loading. In case of concrete related failure modes under tension $\gamma_{M,fi} = \gamma_{inst}$..

Table D1: Characteristic values to fire resistance for Carbon Steel (continuation)

Fire resistance duration = 90 minutes			Performances									
			7.5		10.5		12.5			14.2		16.5	
h_{nom}	Overall anchor embedment depth in the concrete:	[mm]	40	55	50	60	60	70	85	75	105	75	110
Tension loads, steel failure													
$N_{Rk,s,fi,90}$	Characteristic resistance:	[kN]	0.16	0.16	0.29	0.29	0.64	0.64	0.64	1.31	1.31	1.89	1.89
Pull-out failure													
$N_{Rk,p,fi,90}$	Character. resistance in concrete:	[kN]	0.77	1.43	1.58	2.28	3.66	3.60	6.09	4.85	8.38	5.04	7.43
Concrete cone failure [1)]													
$N_{Rk,c,fi,90}$	Character. resistance in concrete:	[kN]	0.78	1.97	1.43	2.34	2.21	3.36	5.86	4.22	10.48	4.04	11.81
Shear loads steel failure without lever arm													
$V_{Rk,s,fi,90}$	Characteristic resistance:	[kN]	0.16	0.16	0.29	0.29	0.64	0.64	0.64	1.31	1.31	1.89	1.89
Shear loads, steel failure with lever arm													
$M_{Rk,s,fi,90}$	Characteristic bending resistance:	[Nm]	0.13	0.13	0.31	0.31	0.86	0.86	0.86	2.23	2.23	3.85	3.85

Fire resistance duration = 120 minutes			Performances									
			7.5		10.5		12.5			14.2		16.5	
h_{nom}	Overall anchor embedment depth in the concrete:	[mm]	40	55	50	60	60	70	85	75	105	75	110
Tension loads, steel failure													
$N_{Rk,s,fi,120}$	Characteristic resistance:	[kN]	0.11	0.11	0.20	0.20	0.51	0.51	0.51	1.01	1.01	1.45	1.45
Pull-out failure													
$N_{Rk,p,fi,120}$	Character. resistance in concrete:	[kN]	0.62	1.14	1.27	1.82	2.93	2.88	4.87	3.88	6.70	4.03	5.94
Concrete cone failure [1)]													
$N_{Rk,c,fi,120}$	Character. resistance in concrete:	[kN]	0.62	1.57	1.15	1.87	1.77	2.69	4.69	3.38	8.39	3.23	9.45
Shear loads steel failure without lever arm													
$V_{Rk,s,fi,120}$	Characteristic resistance:	[kN]	0.11	0.11	0.20	0.20	0.51	0.51	0.51	1.01	1.01	1.45	1.45
Shear loads, steel failure with lever arm													
$M_{Rk,s,fi,120}$	Characteristic bending resistance:	[Nm]	0.09	0.09	0.22	0.22	0.69	0.69	0.69	1.71	1.71	2.96	2.96

[1)] As a rule, splitting failure can be neglected when cracked concrete and reinforcement is assumed.

Note: In absence of other national regulations, the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1.0$ is recommended for steel failure and concrete related failure modes under shear loading. In case of concrete related failure modes under tension $\gamma_{M,fi} = \gamma_{inst.}$

Table D2: Spacing and edge distances for Carbon Steel

			Performances										
			7.5		10.5		12.5			14.2		16.5	
h_{nom}	Overall anchor embedment depth in the concrete:	[mm]	40	55	50	60	60	70	85	75	105	75	110
h_{ef}	Effective anchorage depth:	[mm]	29	42	37	45	44	52	65	57	82	56	86
$S_{cr,N}$	Spacing	[mm]	116	168	148	180	176	208	260	228	328	224	344
S_{min}	Minimum spacing	[mm]	35	45	35	50	50	60	70	70	70	75	100
$C_{cr,N}$	Edge distance	[mm]	58	84	74	90	88	104	130	114	164	112	172
C_{min}	Minimum edge distance (one side fire)	[mm]	35	45	35	50	40	60	60	45	45	45	100
C_{min}	Minimum edge distance (two sides fire)	[mm]	300	300	300	300	300	300	300	300	300	300	300
γ_{Msp}	Partial safety factor*)	[-]	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

*) In absence of other national regulations

Concrete pry-out failure

k_8 factor values for Concrete Screw made of Carbon Steel in Table C5
According EN 1992-4:2018, these values of k_8 factor and the relevant values of $N_{Rk,c,fi}$ given in the above tables have to be considered in design.

Concrete edge failure

The characteristic resistance $V^0_{RK,c,fi}$ in C20/25 to C50/60 concrete is determined by:
$V^0_{RK,c,fi} = 0.25 \times V^0_{RK,c}$ ($\leq$ R90) and $V^0_{RK,c,fi} = 0.20 \times V^0_{RK,c}$ (R120)
With $V^0_{RK,c}$ initial value of the characteristic resistance in cracked concrete C20/25 under normal temperature according to EN 1992-4:2018.

Le prestazioni dei prodotti identificati al punto 1 sono in conformità con le caratteristiche dichiarate al punto 7. Questa dichiarazione di prestazione è emessa in accordo al Regolamento UE N 305/2011 sotto la responsabilità esclusiva del produttore identificato al punto 3.

The performance of the product identified at point 1 is in conformity with the set of declared performances at point 7. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified at point 3.

Firmato per e in rappresentanza del produttore da: / Signed for and on behalf of the manufacturer by:

Marco Guazzo

Bassano del Grappa (Italy) on 2/10/2023

TECNARIA S.p.A. con unico azionista

Viale Pecori Giraldi, 55

36061 Bassano del Grappa (VI) - Italia

Tel. +39 0424 502029

www.tecnaria.com