Trutek Fasteners Polska Sp. z o.o.
Al. Krakowska 38, Janki
05-090 Raszyn
NIP: PL 5342256188 REGON: 015722173

Declaration of Performance

Nr: TX/TX_SS/01/20210526/1404-CPR-3405

Revision No:	1
Revision carried out by:	Tomasz Golon
Revision date:	26.05.2021

1.	**Unique identyfiaction code of product-type:**	
	Throughbolt TX/TX SS	
2.	**Indended use/es:**	
	Torque controlled expansion anchor made of sizes M8, M10, M12 and M16 for use in cracked and non-cracked concrete	
3.	**Manufacturer:**	
	Name:	Trutek Fasteners Polska Sp. z o.o.
	Address:	Al. Krakowska 38, Sękocin Janki 05-090 Raszyn, Polska
4.	**System/s of AVCP:**	
	System:	1
5.	**European Assessment Document:**	
	In accordance with regulation (EU) No 305/2011 on the basis of European Assessment Document EAD 330232-00-0601 „Metal fasteners for use in concrete”	
	European Technical Assessment	ETA-20/0933 of 21st of December 2020
	Issued by:	ZAG, ZAVOD ZA GRADBENIŠTVO SLOVENIJE / Slovenian National Building and Civil Engineering Institute
6.	**Notyfied body/ies:**	
	Name:	ZAG, ZAVOD ZA GRADBENIŠTVO SLOVENIJE / Slovenian National Building and Civil Engineering Institute
	Notified body/ies No:	1404
	No of Certificate of Constancy of Performance:	1404-CPR-3405
7.	**Declared performance/es:**	
	Mechanical resistance and stability (BWR 1)	
	Essential chracteristic	**Performance**
	Characteristic resistance under tension loads in case of static and quasi-static loading	Annex C1
	Characteristic resistance under shear loads in case of static and quasi-static loading	Annex C2
	Safety in case of fire (BWR 2)	
	Essential chracteristic	**Performance**
	Characteristic resistance under tension loads in case of fire exposure	Annex C3
	Characteristic resistance under shear loads in case of fire exposure	Annex C4

The performance of the product indentified above is in conformity with the set of declared performance/es. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Janki, 26th of May 2021
Signed for and on behalf of the manufacturer by:

Tomasz Golon

Kierownik Produktu / Product Manager

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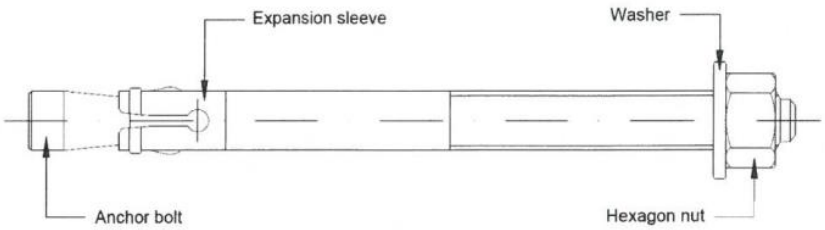
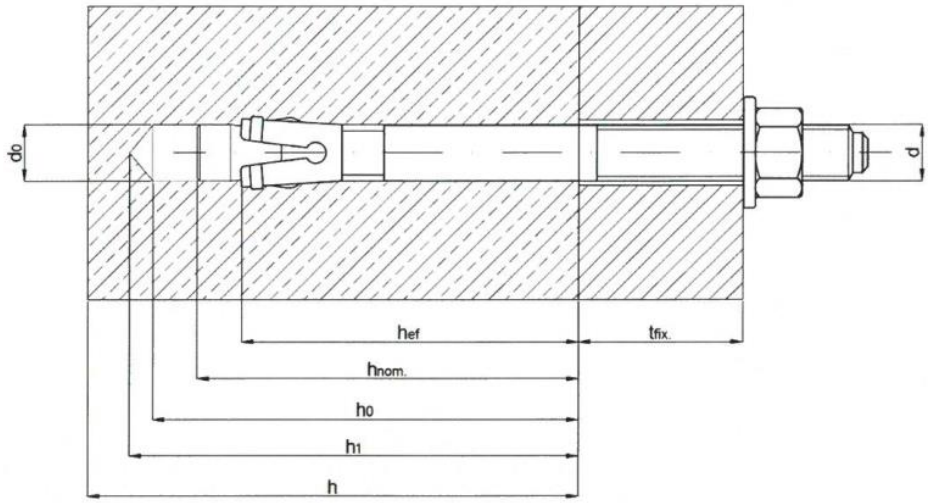


Marking on the sleeve: Product name: (TX or TX SS)
Diameter of an anchor: (e.g. M12)



h_{ef}	effective anchorage depth
h_{nom}	anchor embedment depth
h_0	depth of cylindrical drill hole at shoulder
h_1	hole depth
h	thickness of concrete member
d_0	drill hole diameter
d	anchor bolt/thread diameter
t_{fix}	thickness of the fixture

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Throughbolt TX/TX SS	
Product description Product and intended use	**Annex A1**

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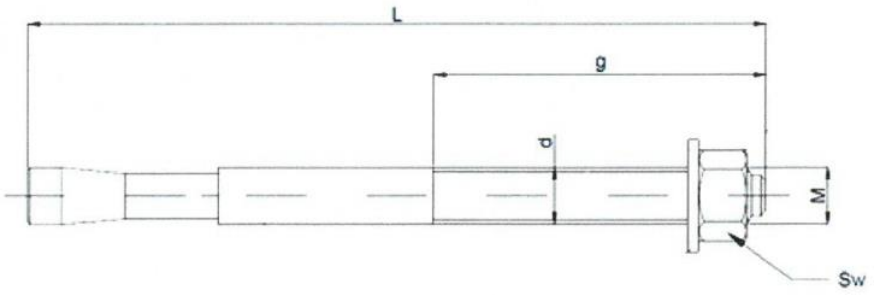

Table A1: **Dimensions**

			M8	M10	M12	M16
Bolt	L_{min}	[mm]	50	60	70	90
	L_{max}	[mm]	300	400	400	700
	d	[mm]	8	10	12	16
	g_{min}	[mm]	10	30	20	40
	g_{max}	[mm]	70	100	100	100
Hexagonal nut	S_w	[mm]	13	17	19	24

Throughbolt TX/TX SS	
Intended use Dimensions of an anchor	**Annex A2**

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Table A2: **Materials**

Part	Designation	Material	
		TX	TX SS
1	Bolt	Galvanised steel, thickness of galvanisation ≥ 5µm	Stainless steel
2	Expansion sleeve	Galvanised steel, thickness of galvanisation ≥ 5µm	Carbon steel with Zn-Ni coating
3	Washer	Galvanised steel acc. to DIN 125 / EN ISO 7089, DIN 9021 / EN ISO 7093 or DIN 440 / EN ISO 7094	Stainless steel acc. to DIN 125 / EN ISO 7089, DIN 9021 / EN ISO 7093 or DIN 440 / EN ISO 7094
4	Hexagon nut	Galvanised steel acc. to DIN 934	Stainless steel acc. to DIN 934

ZAVOD ZA GRADBENIŠTVO SLOVENIJE LJUBLJANA 17

Throughbolt TX/TX SS	
Product description Materials	**Annex A3**

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Specifications of intended use

Anchorages subjected to:

- Static and quasi static load.
- Fire exposure.

Base materials:

- Cracked and non-cracked concrete.
- Reinforced and unreinforced normal weight concrete of strength class C20/25 at minimum and C50/60 at maximum according to EN 206:2013+A1:2016.

Use conditions (Environmental conditions):

- The TX anchors may be used in concrete subject to dry internal conditions.
- The TX SS anchors may be used in concrete subject to dry internal conditions and also in concrete subject to external atmospheric exposure (including industrial and marine environment), or exposure in permanently damp internal conditions, if no particular aggressive conditions exist.

  Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. desulphurization plants or road tunnels where de-icing materials are used).

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Anchorages under static and quasi-static actions are designed in accordance with EOTA TR 055, Edition December 2016 or EN 1992-4:2018.
- For application with resistance under fire exposure the anchorages are designed in accordance with the method given in EOTA TR 020, Edition May 2004.
- Verifiable calculation notes and drawings are prepared taking into account of the load to be anchored. The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.).

Installation:

- Anchor installation carried out by appropriately qualified personnel and under supervision of the person responsible for technical matters of the site.
- Use of the anchor only supplied by the manufacturer without exchanging the components of an anchor.
- Anchor installation in accordance with the manufacturer's specification and drawings and using the appropriate tools.
- Checks before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the rang given and is not lower that of the concrete to which the characteristic loads apply for.
- Check of concrete being well compacted, e.g. without significant voids.
- Cleaning of the hole of drilling dust.
- Anchor installation ensuring the specified embedment depth.
- Keeping of the edge distance and spacing to the specified values without minus tolerances.
- Positioning of the drill holes without damaging the reinforcement.
- In case of aborted hole, drilling of new hole at a minimum distance of twice the depth of the aborted hole, or smaller distance provided the aborted drill hole is filled with high strength non-shrinkage mortar. No shear or oblique tension loads are allowed in the direction of a not filled aborted hole.
- Application of the torque moment given in Annex B2 using a calibrated torque wrench.

Throughbolt TX/TX SS	ZAVOD ZA GRADBENIŠTVO SLOVENIJE LJUBLJANA 17
Intended use Specification	**Annex B1**

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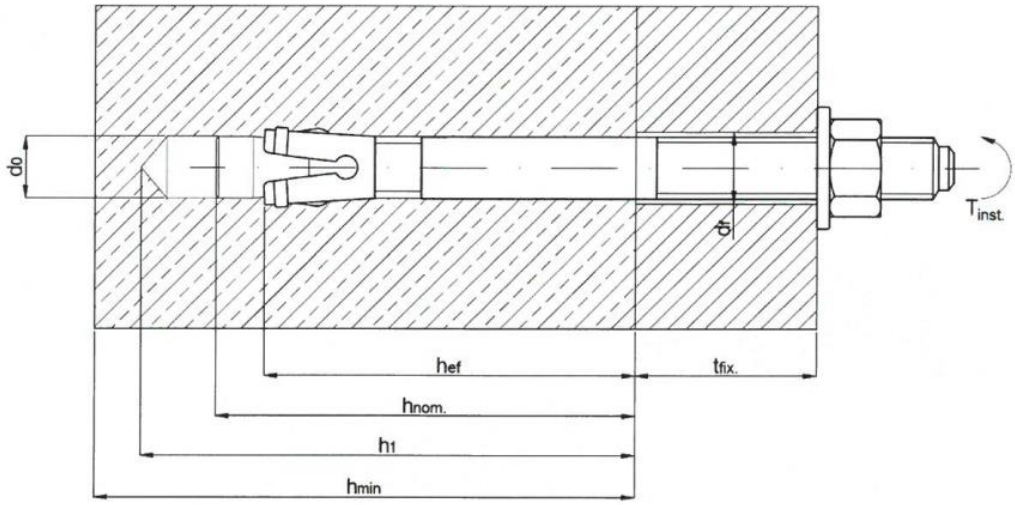
Table B1: **Installation data**

			M8	M10	M12	M16
Nominal drill hole diameter	d_0	[mm]	8	10	12	16
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	8,45	10,45	12,50	16,5
Diameter of clearance hole of the fixture	d_f	[mm]	9	12	14	18
Depth of drill hole	$h_1 \geq$	[mm]	65	70	90	120
Embedment depth	h_{nom}	[mm]	55	60	80	100
Minimum thickness of the concrete member	h_{min}	[mm]	100	120	140	160
Effective embedment	h_{ef}	[mm]	41	45	62	88
Torque moment	T_{inst}	[Nm]	15	25	65	110
Thickness of the fixture - minimum	$t_{fix,min}$	[mm]	0	0	0	0
Thickness of the fixture - maximum	$t_{fix,max}$	[mm]	245	340	320	600



Non cracked concrete only			M8	M10	M12	M16
Effective anchorage depth	h_{ef}	[mm]	41	45	62	88
Minimum spacing	s_{min}	[mm]	45	60	70	60
Minimum edge distance	c_{min}	[mm]	45	70	85	70

Throughbolt TX/TX SS

Intended use
Installation data

ZAVOD ZA GRADBENIŠTVO SLOVENIJE LJUBLJANA 17

Annex B2

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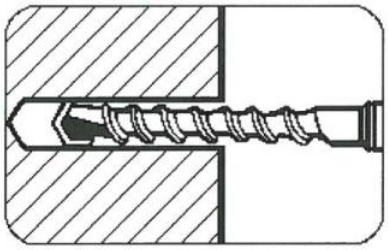
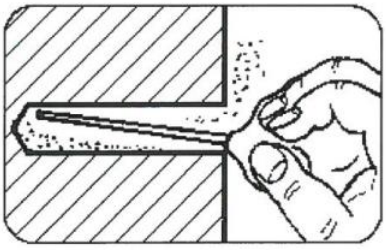
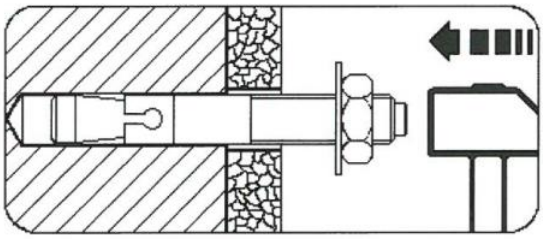
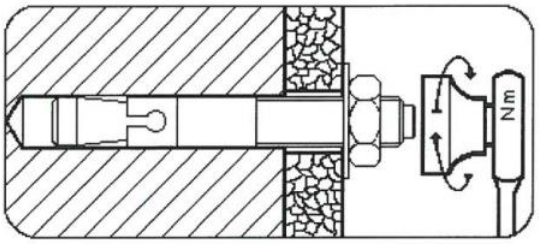
	Dril a hole with until prescribed depth (h_1).
	Clean hole with air pump.
	Set the anchor with hammer ensuring of minimum embedment depth (h_{nom}).
	Apply prescribed installation torque (T_{inst}).

Throughbolt TX/TX SS

Intended use

Installation instructions

Annex B3

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Table C1: **Characteristic resistances under tension loads in case of static and quasi-static loading for design according EOTA TR 055 or EN 1992-4**

Essential characteristics				Performance			
				M8	M10	M12	M16
Installation parameters							
d_0	Nominal diameter of drill bit		[mm]	8	10	12	16
h_{nom}	Anchorage depth		[mm]	55	60	80	100
h_{ef}	Effective anchorage depth		[mm]	41	45	62	88
h_{min}	Minimum thickness of concrete member		[mm]	100	120	140	160
T_{inst}	Torque moment		[Nm]	15	25	65	110
s_{min}	Minimum spacing		[mm]	45	60	70	60
c_{min}	Minimum edge distance		[mm]	45	70	85	70
Tension steel failure mode							
$N_{Rk,s}$	Characteristic tension steel failure	TX	[kN]	15	22	45	68
		TX SS	[kN]	15	25	47	79
γ_{MsN} [2)]	Partial safety factor	TX	[-]	1,4			
		TX SS	[-]	1,4			
Pull-out failure mode							
$N_{Rk,p}$	Characteristic pull-out failure in non-cracked concrete		[kN]	/[1)]	11	18	25
$N_{Rk,p}$	Characteristic pull-out failure in cracked concrete		[kN]	4	6	8	18
γ_2 [2)]	Partial safety factor		[-]	1,0			
γ_{Mp} [3)]			[-]	1,5			
$s_{cr,N}$	Characteristic spacing		[mm]	3 x h_{ef}			
$c_{cr,N}$	Characteristic edge distance		[mm]	1,5 x h_{ef}			
ψ_C C30/37	Increasing factor for $N_{Rk,p}$		[-]	1,00	1,08	1,22	1,21
ψ_C C40/50			[-]	1,00	1,14	1,41	1,39
ψ_C C50/60			[-]	1,00	1,20	1,58	1,55
Concrete cone failure mode							
k_{cr}	Factor for cracked concrete EN 1992-4 §. 7.2.1.4		[-]	7,7			
k_{ucr}	Factor for un-cracked concrete EN 1992-4 §. 7.2.1.4		[-]	11,0			
γ_{Mc} [2)]	Partial safety factor		[-]	1,5			
Splitting failure mode							
$s_{cr,sp}$	Characteristic spacing		[mm]	3 x h_{ef}			
$c_{cr,sp}$	Characteristic edge distance		[mm]	1,5 x h_{ef}			
γ_{Mc} [2)]	Partial safety factor		[-]	1,5			
Displacement under tension load							
Non-cracked concrete C20/25							
N	Service tension load		[kN]	6,2	5,2	8,6	11,9
δ_{N0}	Short term displacement		[mm]	0,12	0,06	0,05	0,17
$\delta_{N\infty}$	Long term displacement		[mm]	1,56	1,59	1,73	1,65
Cracked concrete C20/25							
N	Service tension load		[kN]	1,9	2,9	3,8	8,6
δ_{N0}	Short term displacement		[mm]	0,83	0,80	0,49	1,40
$\delta_{N\infty}$	Long term displacement		[mm]	1,56	1,59	1,73	1,65

[1)] The pull-out is not decisive

[2)] In absence of other national regulations

[3)] The installation safety factor γ_{inst} = 1,0 is included

ZAVOD ZA GRADBENIŠTVO SLOVENIJE LJUBLJANA 17

Throughbolt TX/TX SS

Design acc. EOTA TR 055 or EN 1992-4

Characteristic resistance under Tension loads – BWR 1

Annex C1

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Table C2: **Characteristic resistances under shear loads in case of static and quasi-static loadingfor design according EOTA TR 055 or CEN/TS 1992-4**

Essential characteristics				Performance			
				M8	M10	M12	M16
Shear steel failure mode							
$V_{Rk,s}$	Characteristic shear steel failure	TX	[kN]	9,6	15,4	21,3	37,0
		TX SS	[kN]	18,7	28,1	52,0	70,6
$M^0_{Rk,s}$	Bending moment characteristic failure	TX	[Nm]	25	51	92	200
		TX SS	[Nm]	26	52	95	233
γ_{MsV}[1)]	Partial safety factor	TX	[-]	1,5			
		TX SS	[-]	1,5			
Shear concrete pry-out and edge failure							
k_8	Factor for equations in EN 1992-4 § 7.2.2.4		[-]	1,0		2,0	
l_{ef}	Effective anchorage depth		[mm]	41	45	62	88
d_{nom}	Diameter of anchor		[mm]	8	10	12	16
Displacement under shear load							
V	Service shear load		[kN]	4,6	7,3	10,1	17,6
δ_{V0}	Short term displacement		[mm]	0,85	1,43	1,12	1,35
$\delta_{V\infty}$	Long term displacement		[mm]	1,28	2,15	1,67	2,03

[1)] In absence of other national regulations

ZAVOD ZA GRADBENIŠTVO SLOVENIJE LJUBLJANA 17

Throughbolt TX/TX SS

Design acc. to EOTA TR 055 or EN 1992-4
Characteristic resistance under Shear loads – BWR 1

Annex C2

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Table C3: **Characteristic resistance under tension loads in case of fire exposure for design acc. to EOTA TR 020 or EN 1992-4**

Essential characteristics			Performance			
			M8	M10	M12	M16
Tension steel failure mode						
TX						
$N_{Rk,s,fi,30}$	Duration = 30 minutes	[kN]	0,22	0,48	1,33	2,26
$N_{Rk,s,fi,60}$	Duration = 60 minutes	[kN]	0,20	0,42	1,00	1,70
$N_{Rk,s,fi,90}$	Duration = 90 minutes	[kN]	0,15	0,32	0,86	1,47
$N_{Rk,s,fi,120}$	Duration = 120 minutes	[kN]	0,11	0,26	0,66	1,13
TX SS						
$N_{Rk,s,fi,30}$	Duration = 30 minutes	[kN]	0,44	0,81	2,00	3,39
$N_{Rk,s,fi,60}$	Duration = 60 minutes	[kN]	0,35	0,65	1,33	2,26
$N_{Rk,s,fi,90}$	Duration = 90 minutes	[kN]	0,26	0,52	1,07	1,81
$N_{Rk,s,fi,120}$	Duration = 120 minutes	[kN]	0,22	0,31	0,93	1,58
Pull-out failure mode						
$N_{Rk,p,fi,30}$	Duration = 30 minutes	[kN]	1,00	1,50	2,00	4,5
$N_{Rk,p,fi,60}$	Duration = 60 minutes	[kN]	1,00	1,50	2,00	4,5
$N_{Rk,p,fi,90}$	Duration = 90 minutes	[kN]	1,00	1,50	2,00	4,5
$N_{Rk,p,fi,120}$	Duration = 120 minutes	[kN]	0,80	1,20	1,60	3,6
Concrete cone failure mode[1)]						
$N_{Rk,c,fi,30}$	Duration = 30 minutes	[kN]	1,85	2,34	5,21	12,51
$N_{Rk,c,fi,60}$	Duration = 60 minutes	[kN]	1,85	2,34	5,21	12,51
$N_{Rk,c,fi,90}$	Duration = 90 minutes	[kN]	1,85	2,34	5,21	12,51
$N_{Rk,c,fi,120}$	Duration = 120 minutes	[kN]	1,48	1,87	4,17	10,01
$s_{cr,N}$	Characteristic spacing	[mm]	$4 \times h_{ef}$			
$c_{cr,N}$	Characteristic edge distance	[mm]	$2 \times h_{ef}$			
s_{min}	Minimum spacing	[mm]	45	60	70	60
c_{min}	Minimum edge distance	[mm]	$c_{min} = 2\ h_{ef}$; if fire attack from more than one side, the edge distance of the anchor has to be ≥ 300 mm and $\geq 2\ h_{ef}$			

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

Under fire exposure usually cracked concrete is assumed. The design equations are given in EOTA TR 020 § 2.2.1.

In the absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1,0$ is recommended.

Throughbolt TX/TX SS

Design according to EOTA TR 020

Characteristic tension resistance under fire exposure - BWR 2

Annex C3

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Table C4: **Characteristic resistance under shear loads in case of fire exposure for design acc. to EOTA TR 020 or EN 1992-4**

Essential characteristics			Performance			
			M8	M10	M12	M16
Shear steel failure without lever arm						
TX						
$V_{Rk,s,fi,30}$	Duration = 30 minutes	[kN]	0,22	0,48	1,33	2,26
$V_{Rk,s,fi,60}$	Duration = 60 minutes	[kN]	0,20	0,42	1,00	1,70
$V_{Rk,s,fi,90}$	Duration = 90 minutes	[kN]	0,15	0,32	0,86	1,47
$V_{Rk,s,fi,120}$	Duration = 120 minutes	[kN]	0,11	0,26	0,66	1,13
TX SS						
$V_{Rk,s,fi,30}$	Duration = 30 minutes	[kN]	0,44	0,81	2,00	3,39
$V_{Rk,s,fi,60}$	Duration = 60 minutes	[kN]	0,35	0,65	1,33	2,26
$V_{Rk,s,fi,90}$	Duration = 90 minutes	[kN]	0,26	0,52	1,07	1,81
$V_{Rk,s,fi,120}$	Duration = 120 minutes	[kN]	0,22	0,31	0,93	1,58
Shear steel failure with lever arm						
TX						
$M^0_{Rk,s,fi,30}$	Duration = 30 minutes	[Nm]	0,37	1,12	2,71	6,66
$M^0_{Rk,s,fi,60}$	Duration = 60 minutes	[Nm]	0,34	0,97	2,04	5,00
$M^0_{Rk,s,fi,90}$	Duration = 90 minutes	[Nm]	0,26	0,75	1,76	4,33
$M^0_{Rk,s,fi,120}$	Duration = 120 minutes	[Nm]	0,19	0,60	0,68	3,33
TX SS						
$M^0_{Rk,s,fi,30}$	Duration = 30 minutes	[Nm]	0,75	1,87	4,07	10,00
$M^0_{Rk,s,fi,60}$	Duration = 60 minutes	[Nm]	0,60	1,50	3,39	8,32
$M^0_{Rk,s,fi,90}$	Duration = 90 minutes	[Nm]	0,45	1,20	2,71	6,66
$M^0_{Rk,s,fi,120}$	Duration = 120 minutes	[Nm]	0,37	1,05	2,17	5,33
Shear concrete pry-out failure						
k_8		[-]	1,0		2,0	
$V_{Rk,cp,fi,30}$	Duration = 30 minutes	[kN]	1,85	2,34	10,42	25,02
$V_{Rk,cp,fi,60}$	Duration = 60 minutes	[kN]	1,85	2,34	10,42	25,02
$V_{Rk,cp,fi,90}$	Duration = 90 minutes	[kN]	1,85	2,34	10,42	25,02
$V_{Rk,cp,fi,120}$	Duration = 120 minutes	[kN]	1,48	1,87	8,34	20,02
Concrete edge failure						
The characteristic resistance $V^0_{Rk,c,fi}$ in concrete C 20/25 to C50/60 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 $V^0_{Rk,c}$, which is initial value of the characteristic resistance in cracked concrete C20/25 under normal temperature						

Under fire exposure usually cracked concrete is assumed. The design equations are given in EOTA TR 020 § 2.2.1.

EOTA TR 020 covers design for fire exposure from one side. For fire attack from more than one side the edge distance must be increased to $c_{min} \geq 300$ mm and $\geq 2 \times h_{ef}$.

In the absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1,0$ is recommended

Throughbolt TX/TX SS

Design according to EOTA TR 020

Characteristic shear resistance under fire exposure - BWR 2

ZAVOD ZA GRADBENIŠTVO SLOVENIJE LJUBLJANA 17

Annex C4

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