... eine starke Verbindung

DÉCLARATION DES PERFORMANCES

DoP No: **MKT-1.4-101**_fr

✧ **Code d'identification unique du produit type:** **Boulon d'ancrage BZ3 dynamic**

✧ **Usage(s) prévu(s):** Fixations post-installées dans le béton sous chargement cyclique lié à la fatigue, voir l'annexe / Annex B

✧ **Fabricant:** MKT Metall-Kunststoff-Technik GmbH & Co.KG
Auf dem Immel 2
67685 Weilerbach

✧ **Système(s) d'évaluation et de vérification de la constance des performances:** 1

✧ **Document d'évaluation européen:** **EAD 330250-00-0601**
Évaluation technique européenne: **ETA-20/0117, 20.02.2023**
Organisme d'évaluation technique: DIBt, Berlin
Organisme(s) notifié(s): NB 2873 – Technische Universität Darmstadt

✧ **Performance(s) déclarée(s):**

Caractéristiques essentielles	Performances
Résistance mécanique et stabilité (BWR 1)	
Résistance caractéristique sous contrainte de traction (charges statiques et quasi-statiques)	Annexe/Annex B3, C2, C3
Résistances caractéristiques sous chargement transversal (charges statiques et quasi-statiques)	Annexe/Annex C4
Décalage	Annexe/Annex C8, C9
Résistances caractéristiques et déplacements pour les catégories de performance sismique C1 + C2	Annexe/Annex C5
Durabilité	Annexe/Annex B1
Résistance à la fatigue caractéristique sous contrainte cyclique de traction	Annexe/Annex C1
Résistance à la fatigue caractéristique sous des charges transversales cycliques	
Résistance caractéristique à la fatigue sous des charges cycliques et transversales combinées	
Facteur de transfert de charge pour la traction cyclique, la traction transversale et combinée et contrainte transversale	
Sécurité en cas d'incendie (BWR 2)	
Le comportement du feu	Classe A1
Résistance au feu	Annexe/Annex C6, C7

Les performances du produit identifié ci-dessus sont conformes aux performances déclarées. Conformément au règlement (UE) no 305/2011, la présente déclaration des performances est établie sous la seule responsabilité du fabricant mentionné ci-dessus.

Signé pour le fabricant et en son nom par:

Stefan Weustenhagen
(Directeur général)
Weilerbach, 20.02.2023

p.p.
Dipl.-Ing. Detlef Bigalke
(Directeur du développement de produits)

ETA CE

L'original de cette déclaration d'exécution a été rédigé en allemand. En cas de divergences dans la traduction, la version allemande fait foi.

Specifications of intended use

Anchorages subject to:

- Fatigue cyclic loading
- Static and quasi-static action, fire exposure and seismic performance according to ETA-19/0619

Base materials:

- Cracked or uncracked concrete
- Compacted, reinforced or unreinforced normal weight concrete without fibres according to EN 206:2013+A1:2016
- Strength classes C20/25 to C50/60 according to EN 206:2013+A1:2016

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions
- For all other conditions according to EN 1993-1-2006+A1:2015-10, corresponding to corrosion resistance classes CRC according to Annex A2, Table A2

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the fastener is indicated on the design drawings (e.g. position of the fastener relative to reinforcement or to supports, etc.).
- Design method EN 1992-4:2018, TR 055:2018 and TR 061:2020 (design method II)

Installation:

- Hole drilling by hammer drill bit or vacuum drill bit
- Use of the fastener only as supplied by the manufacturer without exchanging the components of the fastener

Table B1: Installation parameters

Anchor size			M10	M12	M16
Nominal drill hole diameter	d_0 =	[mm]	10	12	16
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10,45	12,5	16,5
Effective anchorage depth[1)]	$h_{ef} \geq$	[mm]	60	70	85
Depth of drill hole	$h_0 \geq$	[mm]	h_{ef} + 9	h_{ef} + 10	h_{ef} + 14
	$h_1 \geq$	[mm]	h_{ef} + 11	h_{ef} + 13	h_{ef} + 17
Diameter of clearance hole in the fixture	d_f =	[mm]	12	14	18
Minimum fixture thickness	$t_{fix,min}$ =	[mm]	5	6	8
Installation torque vz	T_{inst} =	[Nm]	40	60	110
Installation torque A4 / HCR	T_{inst} =	[Nm]	40	55	100
Overstand	$h_p \leq$	[mm]	21,5 + t_{fix}	25,5 + t_{fix}	29,5 + t_{fix}
Length of fastener	L	[mm]	h_{ef} + t_{fix} + 30,5	h_{ef} + t_{fix} + 35,5	h_{ef} + t_{fix} + 43
Hexagon nut	width across nut	[mm]	17	19	24
Locknut	width across nut	[mm]	17	19	24

[1)] End of thread must be above the concrete surface

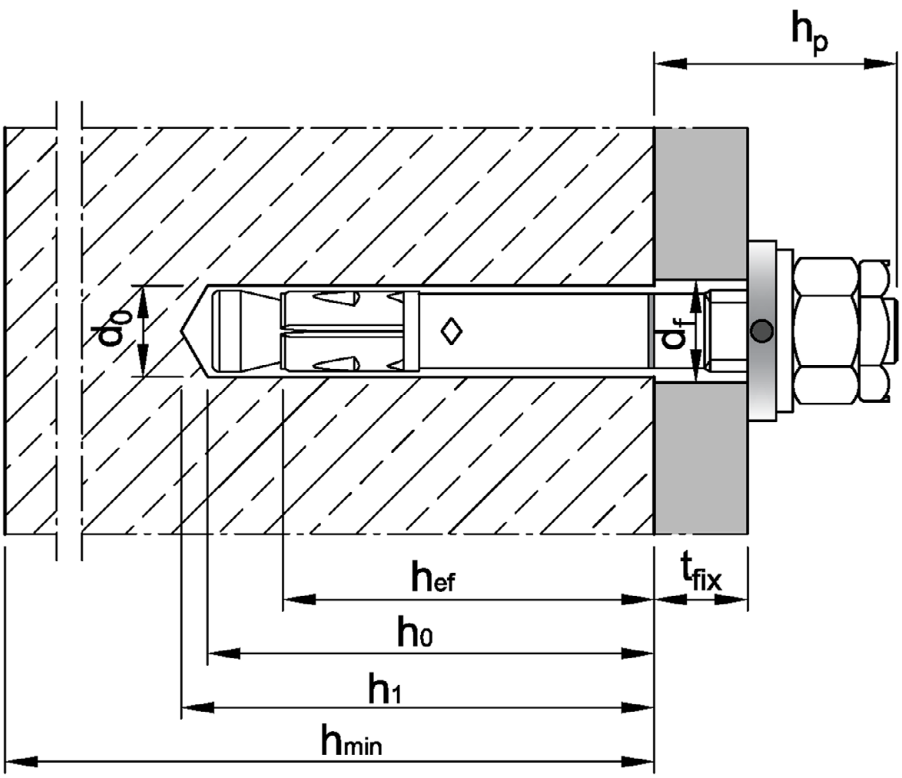


Table B2: Minimum thickness of concrete member, minimum spacings, edge distances and required area

Anchor size			**M10**	**M12**	**M16**
Minimum member thickness depending on h_{ef}	$h_{min} \geq$	[mm]	$1,5 \cdot h_{ef}$		
Minimum edge distances and spacings					
Minimum edge distance	c_{min}	[mm]	45	55	65
	for s ≥	[mm]	see Table B4		
Minimum spacings	s_{min}	[mm]	40	50	65
	for c ≥	[mm]	see Table B4		
The following equation must be fulfilled for the calculation of the minimum spacing and edge distance during installation in connection with the anchorage depth and the member thickness:					
$\mathbf{A_{sp,rqd} \leq A_{sp,ef}}$ Required splitting area $A_{sp,rqd}$ and idealized splitting area $A_{sp,ef}$ acc. to Table B4.					

Table B3: Applicable concrete thickness h_{sp} and area A_{sp} to determine characteristic edge distance $c_{cr,sp}$

Anchor size				**M10**	**M12**	**M16**
Applicable concrete thickness		h_{sp}	[mm]	$\min(h\,;\; h_{ef} + 1{,}5 \cdot c \cdot \sqrt{2})$		
Area to determine $c_{cr,sp}$	vz	A_{sp}	[mm²]	$\frac{N^0_{Rk,sp} + 2{,}040}{0{,}000693}$	$\frac{N^0_{Rk,sp} + 3{,}685}{0{,}000692}$	$\frac{N^0_{Rk,sp} + 3{,}738}{0{,}000875}$
	A4 HCR	A_{sp}	[mm²]	$\frac{N^0_{Rk,sp} + 7{,}235}{0{,}000967}$	$\frac{N^0_{Rk,sp} + 7{,}847}{0{,}000951}$	$\frac{N^0_{Rk,sp} + 11{,}415}{0{,}000742}$

Table B4: Areas to determine spacings and edge distances for installation

Anchor size				M10	M12	M16
The following equation must be fulfilled for the calculation of the minimum spacing and edge distance during installation in combination with variable anchorage depth and member thickness: $A_{sp,rqd} \leq A_{sp,ef}$						
Idealized splitting area $A_{sp,ef}$ The spacings and edge distances shall be selected or rounded in steps of 5 mm.						
Member thickness: $h > h_{ef} + 1{,}5 \cdot c$						
Single anchor or anchor group with $s \geq 3 \cdot c$						
Effective anchorage depth	$h_{ef} < 1{,}5 \cdot c$			$A_{sp,ef} = (6 \cdot c) \cdot (1{,}5 \cdot c + h_{ef})$ [mm²]		
Effective anchorage depth	$h_{ef} \geq 1{,}5 \cdot c$			$A_{sp,ef} = (6 \cdot c) \cdot (3 \cdot c)$ [mm²]		
Anchor group ($s < 3 \cdot c$)						
Effective anchorage depth	$h_{ef} < 1{,}5 \cdot c$			$A_{sp,ef} = (3 \cdot c + s) \cdot (1{,}5 \cdot c + h_{ef})$ [mm²]		
Effective anchorage depth	$h_{ef} \geq 1{,}5 \cdot c$			$A_{sp,ef} = (3 \cdot c + s) \cdot (3 \cdot c)$ [mm²]		
Member thickness: $h \leq h_{ef} + 1{,}5 \cdot c$						
Single anchor or anchor group with $s \geq 3 \cdot c$						
Effective anchorage depth	$h_{ef} < 1{,}5 \cdot c$			$A_{sp,ef} = (6 \cdot c) \cdot h$ [mm²]		
Effective anchorage depth	$h_{ef} \geq 1{,}5 \cdot c$			$A_{sp,ef} = (6 \cdot c) \cdot (h - h_{ef} + 1{,}5 \cdot c)$ [mm²]		
Anchor group ($s < 3 \cdot c$)						
Effective anchorage depth	$h_{ef} < 1{,}5 \cdot c$			$A_{sp,ef} = (3 \cdot c + s) \cdot h$ [mm²]		
Effective anchorage depth	$h_{ef} \geq 1{,}5 \cdot c$			$A_{sp,ef} = (3 \cdot c + s) \cdot (h - h_{ef} + 1{,}5 \cdot c)$ [mm²]		
Required splitting area $A_{sp,rqd}$						
vz	cracked concrete	$A_{sp,rqd}$	[mm²]	23 700	31 500	42 300
	uncracked concrete	$A_{sp,rqd}$	[mm²]	34 700	41 300	50 200
A4 HCR	cracked concrete	$A_{sp,rqd}$	[mm²]	25 900	29 800	44 300
	uncracked concrete	$A_{sp,rqd}$	[mm²]	35 700	35 300	54 800

Installation instructions

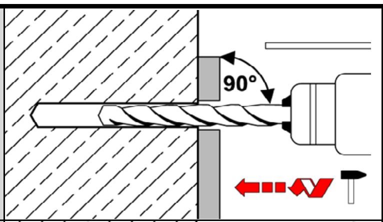
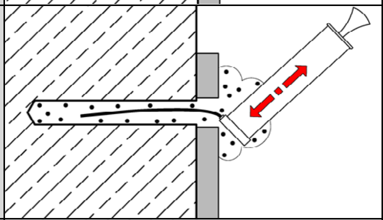
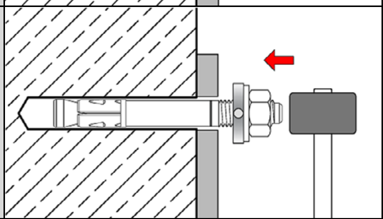
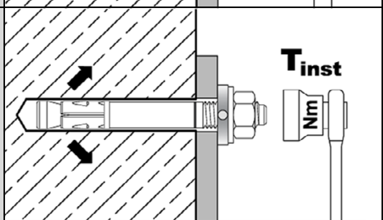
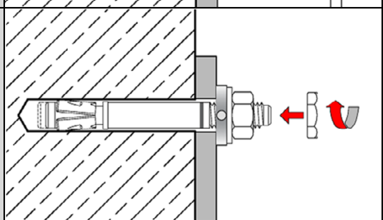
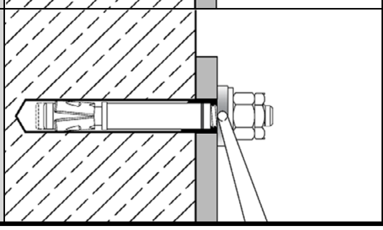
1		Drill hole perpendicular to concrete surface. If using a vacuum drill bit, proceed with step 3.
2		Blow out dust. Alternatively, vacuum clean down to the bottom of the hole.
3		Drive in fastener with filling washer until effective anchorage depth is reached.
4		Apply installation torque T_{inst} according to Table B1 by using torque wrench.
5		Screw on locknut until hand tight then tighten $^{1}/_{4}$ to ½ turn.
6		Fill the annular gap between anchor and fixture with mortar (compressive strength ≥ 40 N/mm², e.g. MKT Injection System VMH, VMZ or VMU plus). Use enclosed reducing adapter. Observe the processing information of the mortar! The annular gap is completely filled, when excess mortar seeps out.

Table C1: Characteristic values of fatigue resistance

Anchor size				M10	M12	M16
Tension load						
Steel failure						
Characteristic fatigue resistance	vz	$\Delta N_{Rk,s,0,\infty}$	[kN]	4,6	6,2	9,7
	A4		[kN]	3,2	5,3	9,2
	HCR		[kN]	2,8	5,5	9,7
Load-transfer factor for fastener groups		ψ_{FN}	[-]	0,5		
Pull-out						
Characteristic fatigue resistance		$\Delta N_{Rk,p,0,\infty}$	[kN]	0,5 $N_{Rk,p}$		
Concrete cone and splitting failure						
Characteristic fatigue resistance		$\Delta N_{Rk,c,0,\infty}$	[kN]	0,5 $N_{Rk,c}$		
		$\Delta N_{Rk,sp,0,\infty}$	[kN]	0,5 $N_{Rk,sp}$		
Effective anchorage depth		h_{ef}	[mm]	60	70	85
Shear load						
Steel failure without lever arm						
Characteristic fatigue resistance	vz	$\Delta V_{Rk,s,0,\infty}$	[kN]	2,5	4,0	7,5
	A4		[kN]	1,5	2,8	6,0
	HCR		[kN]	2,3	2,8	5,0
Load-transfer factor for fastener groups		ψ_{FV}	[-]	0,5		
Concrete pry-out failure						
Characteristic fatigue resistance		$\Delta V_{Rk,cp,0,\infty}$	[kN]	0,5 $V_{Rk,cp}$		
Concrete edge failure						
Characteristic fatigue resistance		$\Delta V_{Rk,c,0,\infty}$	[kN]	0,5 $V_{Rk,c}$		
Effective length of anchor		l_f	[mm]	60	70	85
Diameter of anchor		d_{nom}	[mm]	10	12	16
Tension and shear load						
Partial factor [1)]		$\gamma_{Ms,fat}$	[-]	1,35		
		$\gamma_{Mc,fat}$	[-]	1,5		
		$\gamma_{Msp,fat}$	[-]	1,5		
		$\gamma_{Mp,fat}$	[-]	1,5		
Exponents for combined loading		α_s	[-]	0,5	0,5	0,7
		α_c	[-]	1,5		

[1)] In absence of other national regulations

Table C2: Characteristic values for **tension loads** under static and quasi-static action, **steel, zinc plated**

Anchor size			**M10**	**M12**	**M16**
Installation factor	γ_{inst}	[-]	1,0		
Steel failure					
Characteristic resistance	$N_{Rk,s}$	[kN]	30,4	44,9	79,3
Partial factor [1)]	γ_{Ms}	[-]	1,5		
Pull-out					
Characteristic resistance in cracked concrete C20/25	$N_{Rk,p,cr}$	[kN]	15	22	30
Increasing factor $N_{Rk,p,cr} = \psi_C \cdot N_{Rk,p,cr}$ (C20/25)	ψ_C	[-]	$\left(\frac{f_{ck}}{20}\right)^{0,265}$	$\left(\frac{f_{ck}}{20}\right)^{0,5}$	$\left(\frac{f_{ck}}{20}\right)^{0,339}$
Characteristic resistance in uncracked concrete C20/25	$N_{Rk,p,ucr}$	[kN]	24	30	50
Increasing factor $N_{Rk,p,ucr} = \psi_C \cdot N_{Rk,p,ucr}$ (C20/25)	ψ_C	[-]	$\left(\frac{f_{ck}}{20}\right)^{0,448}$	$\left(\frac{f_{ck}}{20}\right)^{0,5}$	$\left(\frac{f_{ck}}{20}\right)^{0,203}$
Splitting					
Characteristic resistance	$N^0_{Rk,sp}$	[kN]	min ($N_{Rk,p}$; $N^0_{Rk,c}$ [3)])		
Characteristic edge distance [2)]	$c_{cr,sp}$	[mm]	$\frac{A_{sp} + 0{,}8 \cdot (h_{sp} - h_{ef})^2}{(3{,}41 \cdot h_{sp} - 0{,}59 \cdot h_{ef})}$		
Characteristic spacing	$s_{cr,sp}$	[mm]	$2 \cdot c_{cr,sp}$		
Concrete cone failure					
Effective anchorage depth	h_{ef}	[mm]	60	70	85
Characteristic edge distance	$c_{cr,N}$	[mm]	$1{,}5 \cdot h_{ef}$		
Characteristic spacing	$s_{cr,N}$	[mm]	$2 \cdot c_{cr,N}$		
Factor – cracked concrete	$k_{cr,N}$	[-]	7,7		
Factor – uncracked concrete	$k_{ucr,N}$	[-]	11,0		

1) In absence of other national regulations

2) Applicable concrete thickness h_{sp} and area A_{sp} to determine characteristic edge distance $c_{cr,sp}$ according to Table B3

3) $N^0_{Rk,c}$ according to EN 1992-4:2018

Table C3: Characteristic values for **tension loads** under static or quasi-static action, **A4** and **HCR**

Anchor size			**M10**	**M12**	**M16**
Installation factor	γ_{inst}	[-]	1,0		
Steel failure					
Characteristic resistance	$N_{Rk,s}$	[kN]	30,4	44,9	74,6
Partial factor [1]	γ_{Ms}	[-]	1,5		
Pull-out					
Characteristic resistance in cracked concrete C20/25	$N_{Rk,p,cr}$	[kN]	17	22	35
Increasing factor $N_{Rk,p,cr} = \psi_C \cdot N_{Rk,p,cr}$ (C20/25)	ψ_C	[-]	$\left(\frac{f_{ck}}{20}\right)^{0,5}$	$\left(\frac{f_{ck}}{20}\right)^{0,435}$	$\left(\frac{f_{ck}}{20}\right)^{0,350}$
Characteristic resistance in uncracked concrete C20/25	$N_{Rk,p,ucr}$	[kN]	25	42	50
Increasing factor $N_{Rk,p,ucr} = \psi_C \cdot N_{Rk,p,ucr}$ (C20/25)	ψ_C	[-]	$\left(\frac{f_{ck}}{20}\right)^{0,364}$	$\left(\frac{f_{ck}}{20}\right)^{0,213}$	$\left(\frac{f_{ck}}{20}\right)^{0,196}$
Splitting					
Characteristic resistance	$N^0_{Rk,sp}$	[kN]	min ($N_{Rk,p}$; $N^0_{Rk,c}$ [3])		
Characteristic edge distance [2]	$c_{cr,sp}$	[mm]	$\frac{A_{sp} + 0{,}8 \cdot (h_{sp} - h_{ef})^2}{(3{,}41 \cdot h_{sp} - 0{,}59 \cdot h_{ef})}$		
Characteristic spacing	$s_{cr,sp}$	[mm]	$2 \cdot c_{cr,sp}$		
Concrete cone failure					
Effective anchorage depth	h_{ef}	[mm]	60	70	85
Characteristic edge distance	$c_{cr,N}$	[mm]	$1{,}5 \cdot h_{ef}$		
Characteristic spacing	$s_{cr,N}$	[mm]	$2 \cdot c_{cr,N}$		
Factor — cracked concrete	$k_{cr,N}$	[-]	7,7		
Factor — uncracked concrete	$k_{ucr,N}$	[-]	11,0		

[1] In absence of other national regulations

[2] Applicable concrete thickness h_{sp} and area A_{sp} according to Table B3 to determine characteristic edge distance $c_{cr,sp}$

[3] $N^0_{Rk,c}$ according to EN 1992-4:2018

Table C4: Characteristic values for **shear loads** under static and quasi-static action

Anchor size				**M10**	**M12**	**M16**
Installation factor		γ_{inst}	[-]	1,0		
Steel failure without lever arm						
Characteristic resistance	vz	$V^0_{Rk,s}$	[kN]	26,8	38,3	60,0
	A4 / HCR	$V^0_{Rk,s}$	[kN]	27,8	39,8	69,5
Partial factor [1)]		γ_{Ms}	[-]	1,25		
Ductility factor		k_7	[-]	1,0		
Steel failure with lever arm						
Characteristic bending resistance	vz	$M^0_{Rk,s}$	[Nm]	60	105	240
	A4 / HCR	$M^0_{Rk,s}$	[Nm]	55	99	223
Partial factor [1)]		γ_{Ms}	[-]	1,25		
Concrete pry-out failure						
Pry-out factor	vz	k_8	[-]	3,1	3,0	3,6
	A4 / HCR	k_8	[-]	2,8	3,3	3,4
Concrete edge failure						
Effective length of fastener in shear loading		l_f	[mm]	h_{ef}		
Outside diameter of fastener		d_{nom}	[mm]	10	12	16

[1)] In absence of other national regulations

Table C5: Characteristic values for **seismic loading,** performance category **C1**

Anchor size				**M10**	**M12**	**M16**
Effective anchorage depth		$h_{ef} \geq$	[mm]	60	70	85
Tension load						
Installation factor		γ_{inst}	[-]	1,0		
Steel failure						
Characteristic resistance	vz	$N_{Rk,s,C1}$	[kN]	30,4	44,9	79,3
	A4 / HCR	$N_{Rk,s,C1}$	[kN]	30,4	44,9	74,6
Pull-out						
Characteristic resistance	vz	$N_{Rk,p,C1}$	[kN]	15,0	22,0	30,0
	A4 / HCR	$N_{Rk,p,C1}$	[kN]	17,0	22,0	35,0
Shear load						
Steel failure without lever arm						
Characteristic resistance	vz	$V_{Rk,s,C1}$	[kN]	24,4	33,8	52,3
	A4 / HCR	$V_{Rk,s,C1}$	[kN]	22,2	33,2	64,3
Factor for anchorages without annular gap		α_{gap}	[-]	1,0		

Table C6: Characteristic values for **seismic loading,** performance category **C2**

Anchor size				**M10**	**M12**	**M16**
Effective anchorage depth		$h_{ef} \geq$	[mm]	60	70	85
Tension load						
Installation factor		γ_{inst}	[-]	1,0		
Steel failure						
Characteristic resistance	vz	$N_{Rk,s,C2}$	[kN]	30,4	44,9	79,3
	A4 / HCR	$N_{Rk,s,C2}$	[kN]	30,4	44,9	74,6
Pull-out						
Characteristic resistance	vz	$N_{Rk,p,C2}$	[kN]	12,5	19,0	35,2
	A4 / HCR	$N_{Rk,p,C2}$	[kN]	7,7	13,8	29,4
Shear load						
Steel failure without lever arm						
Characteristic resistance	vz	$V_{Rk,s,C2}$	[kN]	19,0	28,0	43,3
	A4 / HCR	$V_{Rk,s,C2}$	[kN]	15,9	25,6	46,1
Factor for anchorages without annular gap		α_{gap}	[-]	1,0		

Table C7: Characteristic values **for tension and shear load** under **fire exposure, steel, zinc plated**

Anchor size				M10	M12	M16
Tension load						
Steel failure						
Characteristic resistance	R30	$N_{Rk,s,fi}$	[kN]	2,6	4,6	7,7
	R60			1,9	3,3	5,6
	R90			1,3	2,1	3,5
	R120			1,0	1,5	2,5
Shear load						
Steel failure without lever arm						
Characteristic resistance	R30	$V_{Rk,s,fi}$	[kN]	7,5	12,3	20,7
	R60			5,1	8,5	14,2
	R90			2,7	4,6	7,7
	R120			1,6	2,7	4,5
Steel failure with lever arm						
Characteristic resistance	R30	$M^0_{Rk,s,fi}$	[Nm]	9,6	19,1	43,8
	R60			6,6	13,1	30,1
	R90			3,5	7,2	16,4
	R120			2,0	4,2	9,6

$N_{Rk,p,fi}$ and $N_{Rk,c,fi}$ according to EN 1992-4:2018

Table C8: Characteristic values **for tension and shear load** under **fire exposure, A4** and **HCR**

Anchor size				**M10**	**M12**	**M16**
Tension load						
Steel failure						
Characteristic resistance	R30	$N_{Rk,s,fi}$	[kN]	6,9	11,0	18,1
	R60			5,0	8,0	13,1
	R90			3,1	4,9	8,1
	R120			2,1	3,4	5,6
Shear load						
Steel failure <u>without</u> lever arm						
Characteristic resistance	R30	$V_{Rk,s,fi}$	[kN]	17,6	32,0	52,6
	R60			12,6	22,6	37,1
	R90			7,5	13,1	21,5
	R120			5,0	8,4	13,8
Steel failure <u>with</u> lever arm						
Characteristic resistance	R30	$M^0_{Rk,s,fi}$	[Nm]	22,7	49,8	111,5
	R60			16,2	35,1	78,6
	R90			9,7	20,4	45,6
	R120			6,5	13,0	29,2

$N_{Rk,p,fi}$ and $N_{Rk,c,fi}$ according to EN 1992-4:2018

Table C9: Displacements under **tension load, steel, zinc plated**

Anchor size			**M10**	**M12**	**M16**
Displacements under static or quasi-static action $\delta_{N0} = \delta_{N0\text{-factor}} * N$ N: acting tension load $\delta_{N\infty} = \delta_{N\infty\text{-factor}} * N$					
Cracked concrete					
Factor for displacement	$\delta_{N0\text{-factor}}$	[mm/kN]	0,05	0,04	0,03
	$\delta_{N\infty\text{-factor}}$	[mm/kN]	0,20	0,15	0,11
Uncracked concrete					
Factor for displacement	$\delta_{N0\text{- factor}}$	[mm/kN]	0,01	0,004	0,005
	$\delta_{N\infty\text{- factor}}$	[mm/kN]	0,03	0,03	0,03
Displacement under seismic action C2					
Displacements for DLS	$\delta_{N,C2(DLS)}$	[mm]	4,7	4,2	4,5
Displacements for ULS	$\delta_{N,C2(ULS)}$	[mm]	16,1	12,9	12,8

Table C10: Displacements under **tension load, A4** and **HCR**

Anchor size			**M10**	**M12**	**M16**
Displacements under static or quasi-static action $\delta_{N0} = \delta_{N0\text{-factor}} * N$ N: acting tension load $\delta_{N\infty} = \delta_{N\infty\text{-factor}} * N$					
Cracked concrete					
Factor for displacement	$\delta_{N0\text{-factor}}$	[mm/kN]	0,06	0,05	0,02
	$\delta_{N\infty\text{-factor}}$	[mm/kN]	0,17	0,16	0,08
Uncracked concrete					
Factor for displacement	$\delta_{N0\text{- factor}}$	[mm/kN]	0,00	0,001	0,00
	$\delta_{N\infty\text{- factor}}$	[mm/kN]	0,05	0,05	0,05
Displacement under seismic action C2					
Displacements for DLS	$\delta_{N,C2(DLS)}$	[mm]	4,1	5,7	5,1
Displacements for ULS	$\delta_{N,C2(ULS)}$	[mm]	16,8	18,0	13,9

Table C11: Displacements under **shear load, steel, zinc plated**

Anchor size			**M10**	**M12**	**M16**
Displacements under static or quasi-static action $\delta_{V0} = \delta_{V0\text{-factor}} * V$ V: acting shear load $\delta_{V\infty} = \delta_{V\infty\text{-factor}} * V$					
Factor for displacement	$\delta_{V0\text{- factor}}$	[mm/kN]	0,09	0,09	0,07
	$\delta_{V\infty\text{- factor}}$	[mm/kN]	0,13	0,14	0,11
Displacement under seismic action C2					
Displacements for DLS	$\delta_{V,C2(DLS)}$	[mm]	3,1	3,7	3,8
Displacements for ULS	$\delta_{V,C2(ULS)}$	[mm]	5,5	9,9	9,6

Table C12: Displacements under **shear load, A4** and **HCR**

Anchor size			**M10**	**M12**	**M16**
Displacements under static or quasi-static action $\delta_{V0} = \delta_{V0\text{-factor}} * V$ V: acting shear load $\delta_{V\infty} = \delta_{V\infty\text{-factor}} * V$					
Factor for displacement	$\delta_{V0\text{- factor}}$	[mm/kN]	0,14	0,12	0,09
	$\delta_{V\infty\text{- factor}}$	[mm/kN]	0,20	0,17	0,14
Displacement under seismic action C2					
Displacements for DLS	$\delta_{V,C2(DLS)}$	[mm]	3,5	4,2	4,4
Displacements for ULS	$\delta_{V,C2(ULS)}$	[mm]	8,4	11,8	11,1