

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-16/0204**  
**of 14 June 2016**

English translation prepared by DIBt - Original version in German language

### General Part

Technical Assessment Body issuing the  
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

Concrete screw BSZ

Product family  
to which the construction product belongs

Concrete screw of sizes 6, 8, 10, 12 and 14 mm for use in  
concrete

Manufacturer

MKT  
Metall-Kunststoff-Technik GmbH & Co. KG  
Auf dem Immel 2  
67685 Weilerbach  
DEUTSCHLAND

Manufacturing plant

MKT Werk 5, D

This European Technical Assessment  
contains

16 pages including 3 annexes which form an integral part  
of this assessment

This European Technical Assessment is  
issued in accordance with Regulation (EU)  
No 305/2011, on the basis of

Guideline for European technical approval of "Metal  
anchor for use in concrete", ETAG 001 Part 3: "Undercut  
anchors", April 2013,  
used as European Assessment Document (EAD)  
according to Article 66 Paragraph 3 of Regulation (EU)  
No 305/2011 and European Assessment Document  
(EAD) 330011-00-0601.

**European Technical Assessment  
ETA-16/0204**

English translation prepared by DIBt

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**Specific Part****1 Technical description of the product**

The concrete screw BSZ is an anchor in size 6, 8, 10, 12 and 14 mm made of galvanised steel respectively steel with zinc flake coating, made of stainless or high corrosion resistant steel. The anchor is 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.

Product and product description is given in Annex A.

**2 Specification of the intended use in accordance with the applicable European Assessment Document**

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

**3 Performance of the product and references to the methods used for its assessment****3.1 Mechanical resistance and stability (BWR 1)**

Essential characteristic	Performance
Characteristic values for static and quasi static action	See Annex C 1 and C 2
Characteristic values for seismic category C1	See Annex C 3
Displacements under tension and shear loads	See Annex C 5

**3.2 Safety in case of fire (BWR 2)**

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A1
Resistance to fire	See Annex C 4

**3.3 Safety in use (BWR 4)**

The essential characteristics regarding Safety in use are included under the Basic Works Requirement Mechanical resistance and stability.

**4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base**

In accordance with guideline for European technical approval ETAG 001, April 2013 used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011, and European Assessment Document EAD 330011-00-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

**5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document**

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 14 June 2016 by Deutsches Institut für Bautechnik

Andreas Kummerow  
p. p. Head of Department

*beglaubigt:*  
Tempel

Product and installation situation

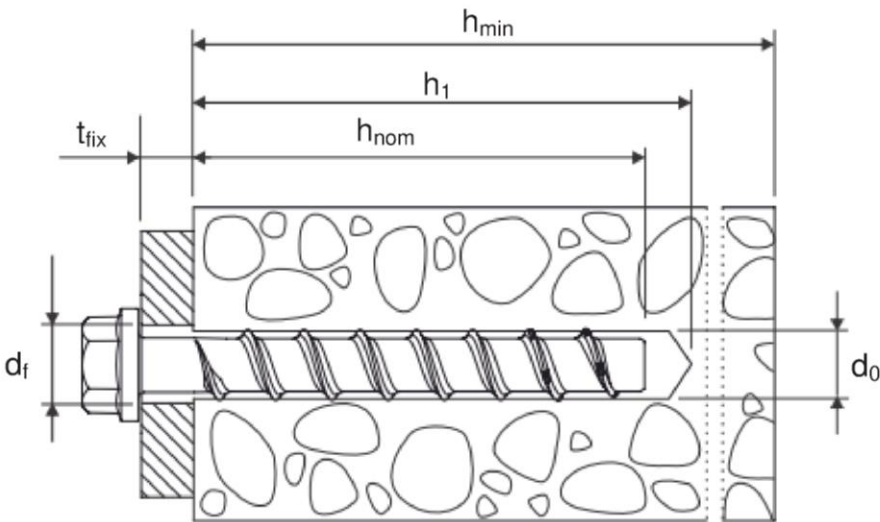
Concrete screw BSZ



BSZ zinc plated



BSZ A4  
BSZ HCR














- |           |   |   |
|-----------|---|---|
| $d_0$     | = | nominal drill hole diameter               |
| $h_{nom}$ | = | nominal embedment depth                   |
| $h_1$     | = | depth of the drill hole                   |
| $h_{min}$ | = | minimum thickness of member               |
| $t_{fix}$ | = | thickness of fixture                      |
| $d_f$     | = | diameter of clearance hole in the fixture |

Concrete Screw BSZ

Product description  
Product and installation situation

Annex A1

**Table A1: Anchor types and description**

Anchor type		BSZ -	Description
1		BI	Anchor version with metric connection thread and hexagon socket
2		B	Anchor version with metric connection thread and hexagon drive
3		SU...TX	Anchor version with washer, hexagon head and TORX drive
4		SU	Anchor version with hexagon head and pressed-on washer
5		S	Anchor version with hexagon head
6		SK	Anchor version with countersunk head and TORX drive
7		LK	Anchor version with pan head and TORX drive
8		GLK	Anchor version with large pan head and TORX drive
9		BSK	Anchor version with countersunk head and metric connection thread
10		BS	Anchor version with hexagon drive and metric connection thread
11		M	Anchor version with internal thread and hexagon drive

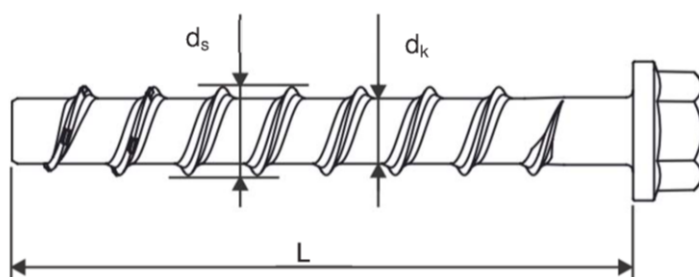
**Concrete Screw BSZ**

**Product description**  
Anchor types and description

**Annex A2**

**Table A2: Dimensions**

Anchor size			BSZ 6		BSZ 8			BSZ 10			BSZ 12			BSZ 14		
Nominal embedment depth	$h_{nom}$	[mm]	40	55	45	55	65	55	75	85	65	85	100	75	100	115
Length of the anchor	$L \leq$	[mm]	500													
Thread	Core diameter	$d_k$	5,1		7,1			9,1			11,1			13,1		
	Outside diameter	$d_s$	7,5		10,6			12,6			14,6			16,6		



**Marking** e.g.:  $\diamond$  BSZ 10 100  
or TSM 10 100

$\diamond$  BSZ Trade name (optional with manufacturer identification  $\diamond$ )  
or TSM  
10 Anchor size  
100 Length of anchor  
A4 additional marking of stainless steel  
HCR additional marking of high corrosion resistant steel

**Table A3: Materials**

Version	Steel, zinc plated BSZ	Stainless steel BSZ A4	High corrosion resistant steel BSZ HCR
Material	Steel EN 10263-4 galvanized acc. to EN ISO 4042 or zinc flake coating acc. to EN ISO 10683 ( $\geq 5\mu\text{m}$ )	1.4401, 1.4404, 1.4571, 1.4578	1.4529
Nominal characteristic steel yield strength $f_{yk}$	560 N/mm <sup>2</sup>		
Nominal characteristic steel ultimate strength $f_{uk}$	700 N/mm <sup>2</sup>		
Elongation at fracture $A_s$	$\leq 8\%$		

**Concrete Screw BSZ**

**Product description**  
Dimensions, marking and materials

**Annex A3**



## Intended use

### Anchorage subject to:

- Static and quasi-static loads,
- Used for anchorages with requirements related to resistance of fire
- Used for anchorages with seismic actions category C1, sizes 8-14 for maximum embedment depth per anchor size

### Base materials:

- Reinforced and unreinforced concrete acc. to EN 206-1:2000-12,
- Strength classes C20/25 to C50/60 acc. to EN 206-1:2000-12,
- Cracked and uncracked concrete

### Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (zinc plated steel, stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure including industrial and marine environment or exposure to permanently damp internal condition, if no particular aggressive conditions exist (stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure and to permanently damp internal condition. If other particular aggressive conditions exist (high corrosion resistant steel)

Note: Particular aggressive conditions are e.g. permanent, alternation immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor pools or atmosphere with extreme chemical pollution (e.g. in 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.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative of reinforcement or to supports, etc.).
- Anchorages under static and quasi-static actions are designed in accordance with:
  - ETAG 001, Annex C, design method A, Edition August 2010 or
  - CEN/TS 1992-4:2009, design method A.
- Anchorages under fire exposure are designed in accordance with:
  - EOTA Technical Report TR 020, Edition May 2004 or
  - CEN/TS 1992-4:2009, Annex D

(It must be ensured that local spalling of the concrete cover does not occur)
- Anchorages under seismic actions are designed in accordance with:
  - EOTA Technical Report TR 045, Edition February 2013
  - Anchorages shall be positioned outside of critical regions (e.g. plastic hinges) of the concrete structure.
  - Fastenings in stand-off installation or with a grout layer are not allowed.
- The design method according to ETAG 001, Annex C also applies for the specified diameter  $d_f$  of clearance hole in the fixture in Annex B2, Table B1.
- The design method according to CEN/TS 1992-4 applies for the specified diameter  $d_f$  of clearance hole in the fixture in Annex B2, Table B1.
- In CEN/TS 1992-4-1, section 5.2.3.1 the 3. indent will be replaced as follow: only the most unfavorable anchors of an anchor group take up shear loads, if diameter of the clearance hole  $d_f$  is larger than given in CEN/TS 1992-4-1, Table 1.
- The condition according to CEN/TS 1992-4-1, Section 5.2.3.3, no. 3) is also fulfilled for the specified diameter  $d_f$  of clearance hole in the fixture in Annex B2, Table B1.

### Installation:

- Making of drill hole by hammer drilling,
- Anchor installation carried out by appropriately qualified personal and under the supervision of the person responsible for technical matters of the site,
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of aborted hole or smaller distance if the aborted hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application.
- After installation further turning of the anchor is not possible. The head of the anchor is supported on the fixture and is not damaged.
- The drill hole may be filled with injection mortar MKT BSZ-FM.
- Adjustability according to Annex B4, sizes 8-14, all anchorage depths.

## Concrete Screw BSZ

Intended use  
Specifications

Annex B1

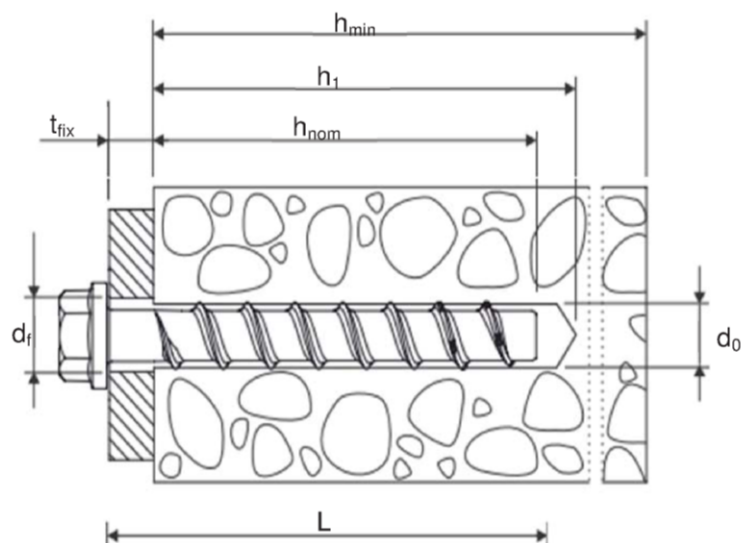


**Table B1: Installation parameters**

Anchor size			BSZ 6		BSZ 8			BSZ 10		
Nominal embedment depth	$h_{nom}$	[mm]	40	55	45	55	65	55	75	85
Nominal drill hole diameter	$d_0$	[mm]	6		8			10		
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,4		8,45			10,45		
Depth of drill hole	$h_1 \geq$	[mm]	45	60	55	65	75	65	85	95
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	8		12			14		
Thickness of fixture	$t_{fix}$	[mm]	$t_{fix} = L - h_{nom}$							
Max. Installation torque for screws with metric connection thread	$T_{inst} \leq$	[Nm]	10		20			40		
Tangential impact screw driver <sup>1)</sup>	$T_{imp,max}$	[Nm]	160		300			400		

Anchor size			BSZ 12			BSZ 14		
Nominal embedment depth	$h_{nom}$	[mm]	65	85	100	75	100	115
Nominal drill hole diameter	$d_0$	[mm]	12			14		
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	12,5			14,5		
Depth of drill hole	$h_1 \geq$	[mm]	75	95	110	85	110	125
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	16			18		
Thickness of fixture	$t_{fix}$	[mm]	$t_{fix} = L - h_{nom}$					
Max. Installation torque for screws with metric connection thread	$T_{inst} \leq$	[Nm]	60			80		
Tangential impact screw driver <sup>1)</sup>	$T_{imp,max}$	[Nm]	500			500		

<sup>1)</sup> Installation with tangential impact screw driver, with maximum power output  $T_{imp,max}$  acc. to manufacturers instructions is possible.



**Concrete Screw BSZ**

**Intended use**  
Installation parameters

**Annex B2**

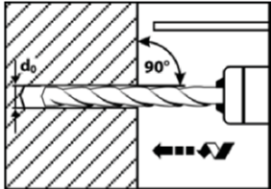
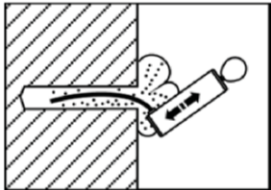
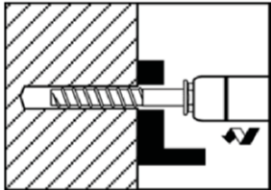
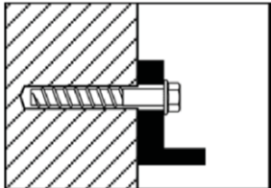
**Table B2: Minimum thickness of concrete member, minimum spacing and edge distance**

Anchor size			BSZ 6		BSZ 8			BSZ 10		
Nominal embedment depth	$h_{nom}$	[mm]	40	55	45	55	65	55	75	85
Minimum thickness of member	$h_{min}$	[mm]	100		100	100	120	100	130	130
Minimum spacing	$s_{min}$	[mm]	40		40	50		50		
Minimum edge distance	$c_{min}$	[mm]	40		40	50		50		

Anchor size			BSZ 12			BSZ 14		
Nominal embedment depth	$h_{nom}$	[mm]	65	85	100	75	100	115
Minimum thickness of member	$h_{min}$	[mm]	120	130	150	130	150	170
Minimum spacing	$s_{min}$	[mm]	50			70	50	70
Minimum edge distance	$c_{min}$	[mm]	50			70	50	70

### Installation instruction

1		Drill hole perpendicular to concrete surface.
2		Blow out dust or alternatively vacuum clean down to the bottom of the hole.
3		Screw in anchor, e.g. with tangential impact screw driver.
4		After installation, the head of the anchor is supported on the fixture.

### Concrete Screw BSZ

#### Intended use

Minimum thickness of concrete member, minimum spacing and edge distance, installation instruction

### Annex B3

## Installation instruction for adjustment M8-M14

1		6	
2		7	
3		8	
4		9	
5		10	

- The anchor may be adjusted at most two times while the anchor may be turned back at most 10 mm.
- The total allowed thickness of shims added during the adjustment process is 10 mm.
- The required setting depth  $h_{nom}$  must be maintained after the adjustment. ( $h_{nom} = L - t_{fix}$ ).

### Concrete Screw BSZ

Intended use  
Installation instruction for adjustment

Annex B4

**Table C1:** Characteristic values for **tension loads**

Anchor size				BSZ 6		BSZ 8			BSZ 10		
Nominal embedment depth		$h_{nom}$	[mm]	40	55	45	55	65	55	75	85
Installation safety factor		$\gamma_2 = \gamma_{inst}$	[-]	1,0							
Steel failure											
Characteristic load		$N_{Rk,s}$	[kN]	14		27			45		
Pull-out failure											
Characteristic tension load in concrete C20/25	cracked	$N_{Rk,p}$	[kN]	2	4	5	9	12	9	1)	
	uncracked	$N_{Rk,p}$	[kN]	4	9	7,5	12	16	12	20	25
Increasing factor for $N_{Rk,p}$ for strength classes > C20/25		$\psi_C$	[-]	$\left(\frac{f_{ck,cube}}{25}\right)^{0,5}$							
Concrete cone failure											
Effective anchorage depth		$h_{ef}$	[mm]	31	44	35	43	52	43	60	68
Spacing (Edge distance)		$s_{cr,N}$ ( $c_{cr,N}$ )	[mm]	3 $h_{ef}$ (1,5 $h_{ef}$ )							
Factor for concrete (acc. to CEN/TS 1992-4)	cracked	$k_{cr}$	[-]	7,2							
	uncracked	$k_{ucr}$	[-]	10,1							
Splitting											
Spacing		$s_{cr,sp}$	[mm]	120	160	120	140	150	140	180	210
Edge distance		$c_{cr,sp}$	[mm]	60	80	60	70	75	70	90	105
Anchor size				BSZ 12				BSZ 14			
Nominal embedment depth		$h_{nom}$	[mm]	65	85	100	75	100	115		
Installation safety factor		$\gamma_2 = \gamma_{inst}$	[-]	1,0							
Steel failure											
Characteristic load		$N_{Rk,s}$	[kN]	67				94			
Pull-out failure											
Characteristic tension load in concrete C20/25	cracked	$N_{Rk,p}$	[kN]	12	1)			1)			
	uncracked	$N_{Rk,p}$	[kN]	16							
Increasing factor for $N_{Rk,p}$ for strength classes > C20/25		$\psi_C$	[-]	$\left(\frac{f_{ck,cube}}{25}\right)^{0,5}$							
Concrete cone failure											
Effective anchorage depth		$h_{ef}$	[mm]	50	67	80	58	79	92		
Spacing (Edge distance)		$s_{cr,N}$ ( $c_{cr,N}$ )	[mm]	3 $h_{ef}$ (1,5 $h_{ef}$ )							
Factor for concrete (acc. to CEN/TS 1992-4)	cracked	$k_{cr}$	[-]	7,2							
	uncracked	$k_{ucr}$	[-]	10,1							
Splitting											
Spacing		$s_{cr,sp}$	[mm]	150	210	240	180	240	280		
Edge distance		$c_{cr,sp}$	[mm]	75	105	120	90	120	140		

1) Pull-out is not decisive

### Concrete Screw BSZ

**Performance**  
Characteristic values for **tension loads**

**Annex C1**

**Table C2:** Characteristic values for **shear loads**

Anchor size			BSZ 6		BSZ 8			BSZ 10		
Nominal embedment depth	$h_{nom}$	[mm]	40	55	45	55	65	55	75	85
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0							
Steel failure without lever arm										
Characteristic load	$V_{Rk,s}$	[kN]	7		17			34		
Factor of ductility acc. to CEN/TS 1992-4	$k_2$	[-]	0,8							
Steel failure with lever arm										
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	10,9		26			56		
Concrete pry-out failure										
Factor k acc. to ETAG 001, Annex C or $k_3$ acc. to CEN/TS 1992-4	$k_{(3)}$	[-]	1,0		1,0			1,0	2,0	
Concrete edge failure										
Effective length of anchor	$l_f = h_{ef}$	[mm]	31	44	35	43	52	43	60	68
Outside diameter of anchor	$d_{nom}$	[mm]	6		8			10		

Anchor size			BSZ 12			BSZ 14		
Nominal embedment depth	$h_{nom}$	[mm]	65	85	100	75	100	115
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0					
Steel failure without lever arm								
Characteristic load	$V_{Rk,s}$	[kN]	42			56		
Factor of ductility acc. to CEN/TS 1992-4	$k_2$	[-]	0,8					
Steel failure with lever arm								
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	113			185		
Concrete pry-out failure								
Factor k acc. to ETAG 001, Annex C or $k_3$ acc. to CEN/TS 1992-4	$k_{(3)}$	[-]	1,0	2,0		1,0	2,0	
Concrete edge failure								
Effective length of anchor	$l_f = h_{ef}$	[mm]	50	67	80	58	79	92
Outside diameter of anchor	$d_{nom}$	[mm]	12			14		

**Concrete Screw BSZ**

**Performance**  
Characteristic values for **shear loads**

**Annex C2**

**Table C3:** Characteristic resistance for **seismic loading**, Category **C1**

Anchor size			BSZ 8	BSZ 10	BSZ 12	BSZ 14
Nominal embedment depth	$h_{nom}$	[mm]	65	85	100	115
Installation safety factor	$\gamma_2$	[-]	1,0			
Tension load						
Steel failure						
Characteristic resistance	$N_{Rk,s,seis}$	[kN]	27	45	67	94
Pull-out failure						
Characteristic resistance in concrete C20/25 to C50/60	$N_{Rk,p,seis}$	[kN]	12	1)		
Concrete cone failure						
Effective anchorage depth	$h_{ef}$	[mm]	52	68	80	92
Spacing	$s_{Cr,N}$	[mm]	3 $h_{ef}$			
Edge distance	$c_{Cr,N}$	[mm]	1,5 $h_{ef}$			
Shear load						
Steel failure without lever arm						
Characteristic resistance	$V_{Rk,s,seis}$	[kN]	8,5	15,3	21,0	22,4
Concrete pry-out failure						
Factor k acc. to ETAG 001, Annex C	k	[-]	1,0	2,0		
Concrete edge failure						
Effective length of anchor	$l_f = h_{ef}$	[mm]	52	68	80	92
Outside diameter of anchor	$d_{nom}$	[mm]	8	10	12	14

1) Pull-out is not decisive

#### Concrete Screw BSZ

#### Performance

Characteristic values for **seismic loading**, Category **C1**

**Annex C3**



**Table C4:** Characteristic values under fire exposure

Anchor size			BSZ 6		BSZ 8			BSZ 10			BSZ 12			BSZ 14		
Nominal embedment depth	$h_{\text{nom}}$	[mm]	40	55	45	55	65	55	75	85	65	85	100	75	100	115
Steel failure (tension and shear load)																
Characteristic resistance	R30	$N_{Rk,s,fi}$ = $V_{Rk,s,fi}$	[kN]	0,9	2,4	4,4	7,3	10,3								
	R60			0,8	1,7	3,3	5,8	8,2								
	R90			0,6	1,1	2,3	4,2	5,9								
	R120			0,4	0,7	1,7	3,4	4,8								
Steel failure with lever arm																
Characteristic bending moment	R30	$M^0_{Rk,s,fi}$	[Nm]	0,7	2,4	5,9	12,3	20,4								
	R60			0,6	1,8	4,5	9,7	15,9								
	R90			0,5	1,2	3,0	7,0	11,6								
	R120			0,3	0,9	2,3	5,7	9,4								
Spacing	$s_{cr,fi}$	[mm]	4 $h_{ef}$													
Edge distance	$c_{cr,fi}$	[mm]	2 $h_{ef}$													

The characteristic resistance for pull-out, concrete cone failure, concrete pry-out and concrete edge failure shall be calculated according to TR 020 / CEN/TS 1992-4. If no value for  $N_{Rk,p}$  is given, in Eq. 2.4 and Eq. 2.5, TR 020 (or Eq. D1 and D.2, CEN/TS 1992-4)  $N_{Rk,p}$  must be replaced by the value of  $N^0_{Rk,c}$ .

## Concrete Screw BSZ

**Performance**  
Characteristic values under fire exposure

**Annex C4**

**Table C5:** Displacements under tension load

Anchor size				BSZ 6		BSZ 8			BSZ 10		
Nominal embedment depth		$h_{nom}$	[mm]	40	55	45	55	65	55	75	85
Cracked concrete	Tension load	N	[kN]	0,95	1,9	2,4	4,3	5,7	4,3	7,9	9,6
	Displacement	$\delta_{N0}$	[mm]	0,3	0,6	0,6	0,7	0,8	0,6	0,5	0,9
		$\delta_{N\infty}$	[mm]	0,4	0,4	0,6	1,0	0,9	0,4	1,2	1,2
Uncracked concrete	Tension load	N	[kN]	1,9	4,3	3,6	5,7	7,6	5,7	9,5	11,9
	Displacement	$\delta_{N0}$	[mm]	0,4	0,6	0,7	0,9	0,5	0,7	1,1	1,0
		$\delta_{N\infty}$	[mm]	0,4	0,4	0,6	1,0	0,9	0,4	1,2	1,2

Anchor size				BSZ 12			BSZ 14		
Nominal embedment depth		$h_{nom}$	[mm]	65	85	100	75	100	115
Cracked concrete	Tension load	N	[kN]	5,7	9,4	12,3	7,6	12,0	15,1
	Displacement	$\delta_{N0}$	[mm]	0,9	0,5	1,0	0,5	0,8	0,7
		$\delta_{N\infty}$	[mm]	1,0	1,2	1,2	0,9	1,2	1,0
Uncracked concrete	Tension load	N	[kN]	7,6	13,2	17,2	10,6	16,9	21,2
	Displacement	$\delta_{N0}$	[mm]	1,0	1,1	1,2	0,9	1,2	0,8
		$\delta_{N\infty}$	[mm]	1,0	1,2	1,2	0,9	1,2	1,0

**Table C6:** Displacements under shear load

Anchor size				BSZ 6		BSZ 8			BSZ 10			BSZ 12			BSZ 14		
Nominal embedment depth		$h_{nom}$	[mm]	40	55	45	55	65	55	75	85	65	85	100	75	100	115
Shear load		V	[kN]	3,3		8,6			16,2			20,0			30,5		
Displacement		$\delta_{V0}$	[mm]	1,55		2,7			2,7			4,0			3,1		
		$\delta_{V\infty}$	[mm]	3,1		4,1			4,3			6,0			4,7		

Concrete Screw BSZ

Performance  
Displacements

Annex C5