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European Technical Assessment

ETA-13/0422 of 05/12/2018

General Part

Technical Assessment Body issuing the European Technical Assessment	Instytut Techniki Budowlanej
Trade name of the construction product	SLP-H4
Product family to which the construction product belongs	Torque controlled expansion anchor of sizes M8, M10, M12 and M16 for use in non-cracked and cracked concrete
Manufacturer	P.H. HAMAR Sp. J. B. i H. Grzesiak ul. Hutnicza 7 81-061 Gdynia Poland
Manufacturing plants	Manufacturing Plant 2 Manufacturing Plant 3
This European Technical Assessment contains	14 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	European Assessment Document (EAD) 330232-00-0601 “Mechanical fasteners for use in concrete”
This version replaces	ETA-13/0422 issued on 27/06/2013

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Specific Part

1 Technical description of the product

The SLP-H4 anchors in the sizes M8, M10, M12 and M16 are the anchors made of steel which are placed into a drill hole and anchored by torque-controlled expansion.

An illustration and the description of the product are given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document (EAD)

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

The provisions made in this European Technical Assessment are based on an assumed working life of the anchor of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer or Technical Assessment Body, 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 Performance of the product

3.1.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for tension loads, displacements	Annex C1
Characteristic resistance for shear loads, displacements	Annex C2

3.1.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchors satisfy requirements for Class A1
Resistance to fire	Annex C3 – C5

3.2 Methods used for the assessment

The assessment of anchors has been made in accordance with the EAD 330232-00-0601 "*Mechanical fasteners for use in concrete*".

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

According to Decision 96/582/EC of the European Commission the system 1 of assessment and verification of constancy of performance applies (see Annex V to Regulation (EU) No 305/2011).

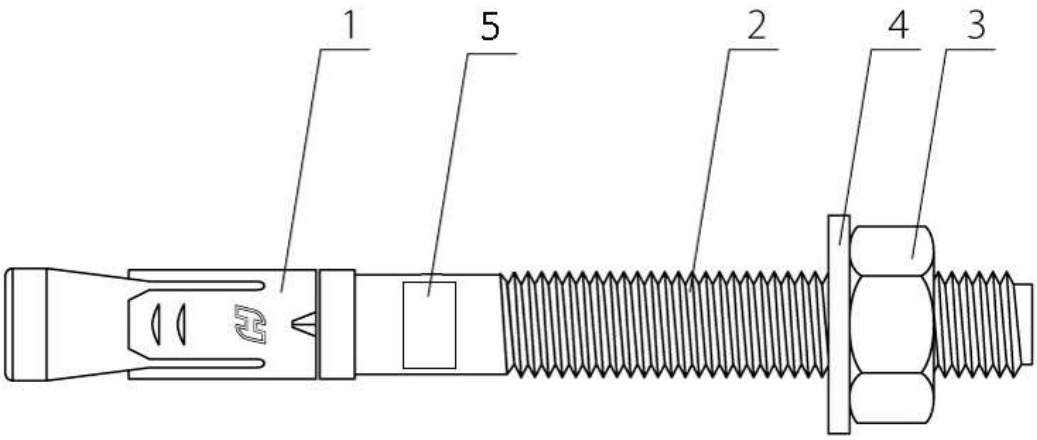
5 Technical details necessary for the implementation of the AVCP system, as provided in the applicable European Assessment Document (EAD)

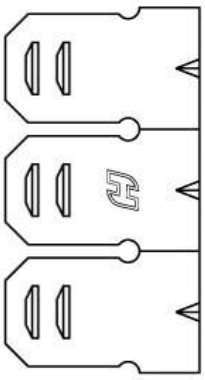
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited in Instytut Techniki Budowlanej.

For the type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

Issued in Warsaw on 05/12/2018 by Instytut Techniki Budowlanej

Anna Panek, MSc
Deputy Director of ITB





1 – expansion sleeve
2 – threaded bolt with conical end
3 – hexagonal nut
4 – washer
5 – marking: SLP-H4 M8..M16 × L

Anchor sizes: M8, M10, M12, M16

SLP-H4	**Annex A1** of European Technical Assessment ETA-13/0422
Product description Anchor	

Table A1: SLP-H4 anchor dimensions

Type of anchor			d_{nom} [mm]	L [mm]	S [mm]
Size	Marking	t_{fix} (1) [mm]			
M8	SLP-H4-M8 × L	1 - 140	8	60 - 200	13
M10	SLP-H4-M10 × L	1 - 150	10	75 - 235	17
M12	SLP-H4-M12 × L	1 - 210	12	90 - 300	19
M16	SLP-H4-M16 × L	1 - 190	16	100 - 300	24
(1) – thickness of the fixture					

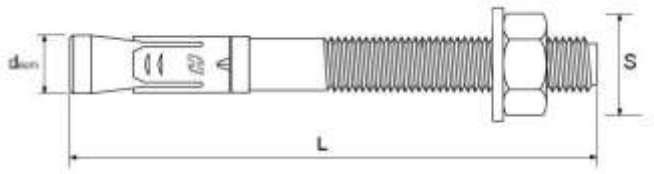


Table A2: Materials

Designation	Material	Protection
Expansion sleeve	Stainless steel SAE 316L (A4)	-
Threaded bolt	Cold-formed carbon steel f_{uk} ≥ 680 MPa f_{yk} ≥ 550 MPa	Zinc plated ≥ 5 µm EN ISO 4042
Hexagonal nut	Carbon steel property class 8 acc. to EN ISO 898-2	Zinc plated ≥ 5 µm EN ISO 4042
Washer	Carbon steel HV 200	Zinc plated ≥ 5 µm EN ISO 4042

SLP-H4	**Annex A2** of European Technical Assessment ETA-13/0422
Product description Dimensions and materials	

Specification of intended use

Anchorages subject to:

- Static and quasi-static loads.
- Anchorages with requirements related to resistance to fire.

Base material:

- Reinforced or unreinforced normal weight concrete of strength classes C20/25 at minimum and C50/60 at maximum according to EN 206.
- Non-cracked and cracked concrete.

Use conditions (environmental conditions):

- Structures subject to dry internal conditions.

Design:

- The anchorages under static loads, quasi-static loads and fire exposure are designed in accordance with Technical Report TR 055.
- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- The position of the anchor is indicated on the design drawings.
- Verifiable calculation notes and drawings are taking account of the loads to be transmitted.

Installation of anchors:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the anchor only as supplied by the manufacturer without exchanging any component of the 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 range given and is not lower than that of the concrete to which the characteristic loads apply.
- Check of concrete being well compacted, e.g. without significant voids.
- Effective anchorage depth, edge distances and spacings not less than the specified values without minus tolerances.
- Positioning of the drill holes without damaging the reinforcement.
- Hole drilling by hammer drill.
- Cleaning of the hole of drilling dust.
- Application of the torque moment using a calibrated torque wrench.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance it the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load if is not in the direction of load application.

SLP-H4	**Annex B1** of European Technical Assessment ETA-13/0422
Intended use Specifications	

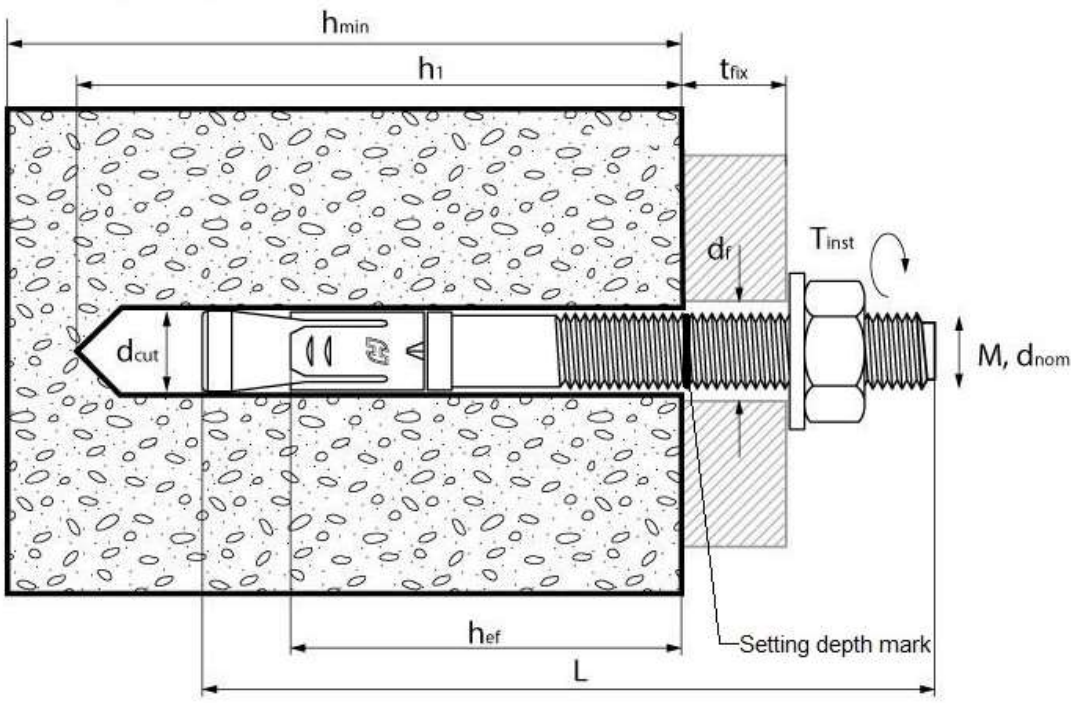
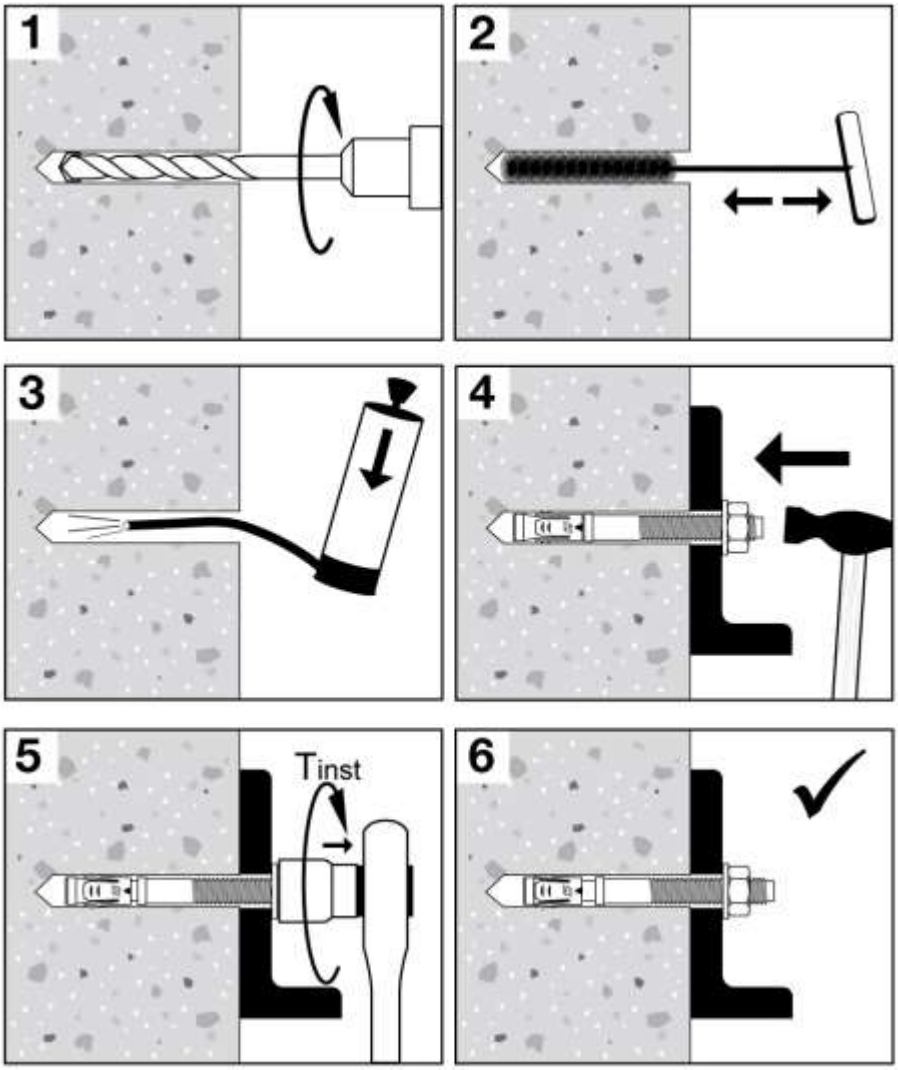


Table B1: Installation parameters

Anchor size		M8	M10	M12	M16
Effective anchorage depth	h_{ef} [mm]	40	45	70	80
Nominal diameter	d_{nom} = [mm]	8	10	12	16
Cutting diameter of drill bit	d_{cut} = [mm]	8,45	10,50	12,50	16,50
Depth of drill hole	$h_1 \geq$ [mm]	45	50	75	85
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	9	11	13	17
Installation torque	T_{inst} = [Nm]	20	30	50	120
Minimum thickness of member	h_{min} [mm]	100	100	150	170
Minimum spacing	s_{min} [mm]	40	45	70	80
Minimum edge distance	c_{min} [mm]	60,0	67,5	105,0	120,0

SLP-H4	**Annex B2** of European Technical Assessment ETA-13/0422
Intended use Installation parameters	



1. Make a drill hole with a hammer drilling
2. Clean the dril hole with a brush
3. Blow out the dril hole
4. Put the anchor into the drill hole
5. Placing the fixture
6. Apply the required instalation torque

SLP-H4	**Annex B3** of European Technical Assessment ETA-13/0422
Intended use Installation instruction	

Table C1: Characteristic values for tension loads (static and quasi-static loading)

Anchor size			M8	M10	M12	M16
Steel failure						
Characteristic resistance		$N_{Rk,s}$ [kN]	24,9	39,4	57,3	106,8
Partial safety factor		γ_{Ms} [1)]	1,5			
Pull-out failure						
Characteristic resistance in non-cracked concrete C20/25		$N_{Rk,p}$ [kN]	9	12	25	35
Characteristic resistance in cracked concrete C20/25		$N_{Rk,p}$ [kN]	6	9	20	25
Installation safety factor		γ_2 [2)] = γ_{inst} [3) 4)]	1,2			
Increasing factor	concrete C30/37	ψ_c	1,22			
	concrete C40/50		1,41			
	concrete C50/60		1,55			
Concrete cone failure and splitting failure						
Effective anchorage depth		h_{ef} [mm]	40	45	70	80
Factor for non-cracked concrete		k_1 [2)] = k_{ucr} [3)]	10,1	10,1	10,1	10,1
		k_1 [2)] = $k_{ucr,N}$ [4)]	11,0	11,0	11,0	11,0
Factor for cracked concrete		k_1 [2)] = k_{ucr} [3)]	7,2	7,2	7,2	7,2
		k_1 [2)] = $k_{ucr,N}$ [4)]	7,7	7,7	7,7	7,7
Installation safety factor		γ_2 [2)] = γ_{inst} [3) 4)]	1,2			
Increasing factor	concrete C30/37	ψ_c	1,22			
	concrete C40/50		1,41			
	concrete C50/60		1,55			
Characteristic resistance for splitting		$N^0_{Rk,sp}$ [4)] [kN]	9	12	25	35
Characteristic spacing	concrete cone failure	$s_{cr,N}$ [mm]	120	135	210	240
	splitting failure	$s_{cr,sp}$ [mm]	120	135	210	240
Characteristic edge distance	concrete cone failure	$c_{cr,N}$ [mm]	60	67,5	105	120
	splitting failure	$c_{cr,sp}$ [mm]	60	67,5	105	120

[1)] in absence of other national regulations
[2)] parameter for design according to ETAG-001 Annex C
[3)] parameter for design according to CEN/TS 1992-4-4:2009
[4)] parameter for design according to EN 1992-4:2018

Table C2: Displacements under tension loads

Anchor size		M8	M10	M12	M16
Non-cracked concrete					
Tension load	N [kN]	3,57	4,76	11,90	16,67
Displacement	δ_{N0} [mm]	0,89	0,90	3,36	2,69
	$\delta_{N\infty}$ [mm]	0,38	0,38	0,38	0,38
Cracked concrete					
Tension load	N [kN]	2,38	3,57	9,52	11,90
Displacement	δ_{N0} [mm]	1,88	1,29	4,56	5,34
	$\delta_{N\infty}$ [mm]	2,00	2,00	2,00	2,00

Table C3: Characteristic values for shear loads (static and quasi-static loading)

Anchor size		M8	M10	M12	M16
Steel failure without lever arm					
Characteristic resistance	$V_{Rk,s}$ [2)3)] = $V^0_{Rk,s}$ [4)] [kN]	12,4	19,7	28,7	53,4
Ductility factor	k [2)] = k_2 [3)] = k_7 [4)]	0,8	0,8	0,8	0,8
Partial safety factor	γ_{Ms} [1)]	1,25			
Steel failure with lever arm					
Characteristic bending resistance	$M^0_{Rk,s}$ [Nm]	25,5	50,8	89,1	226,5
Partial safety factor	γ_{Ms} [(1)]	1,25			
Concrete pry-out failure					
Factor	k [2)] = k_3 [3)] = k_8 [4)]	1,0	1,0	2,0	2,0
Partial safety factor	γ_{Ms} [1)]	1,5	1,5	1,5	1,8
Concrete edge failure					
Outside diameter of anchor	d_{nom} [mm]	8	10	12	16
Effective length of anchor under shear loading	l_f [mm]	40	45	70	80
Partial safety factor	γ_{Mc} [1)]	1,8	1,8	1,8	1,8

[1)] in absence of other national regulations
[2)] parameter for design according to ETAG-001 Annex C
[3)] parameter for design according to CEN/TS 1992-4-4:2009
[4)] parameter for design according to EN 1992-4:2018

Table C4: Displacements under shear loads

Anchor size		M8	M10	M12	M16
Shear load	V [kN]	4,94	7,83	13,65	25,42
Displacement	δ_{V0} [mm]	4,50	1,07	1,40	3,60
	$\delta_{V\infty}$ [mm]	6,75	1,60	2,11	5,40

Table C5: Characteristic values of resistance to tension loads under fire exposure for non-cracked concrete

Fire resistance class R30		**M8**	**M10**	**M12**	**M16**
Characteristic resistance (steel failure)	$N_{Rk,s,fi,30}$ [kN]	0,4	0,9	1,7	3,1
Characteristic resistance in concrete C20/25 to C50/60 (pull-out failure)	$N_{Rk,p,fi,30}$ [kN]	2,3	3,0	6,3	8,8
Characteristic resistance in concrete C20/25 to C50/60 (concrete cone failure)	$N^0_{Rk\ c,fi,30}$ [kN]	2,6	3,4	10,4	14,5
Fire resistance class R60		**M8**	**M10**	**M12**	**M16**
Characteristic resistance (steel failure)	$N_{Rk,s,fi,60}$ [kN]	0,3	0,8	1,3	2,4
Characteristic resistance in concrete C20/25 to C50/60 (pull-out failure)	$N_{Rk,p,fi,60}$ [kN]	2,3	3,0	6,3	8,8
Characteristic resistance in concrete C20/25 to C50/60 (concrete cone failure)	$N^0_{Rk\ c,fi,60}$ [kN]	2,6	3,4	10,4	14,5
Fire resistance class R90		**M8**	**M10**	**M12**	**M16**
Characteristic resistance (steel failure)	$N_{Rk,s,fi,90}$ [kN]	0,3	0,6	1,1	2,0
Characteristic resistance in concrete C20/25 to C50/60 (pull-out failure)	$N_{Rk,p,fi,90}$ [kN]	2,3	3,0	6,3	8,8
Characteristic resistance in concrete C20/25 to C50/60 (concrete cone failure)	$N^0_{Rk,c,fi,90}$ [kN]	2,6	3,4	10,4	14,5
Fire resistance class R120		**M8**	**M10**	**M12**	**M16**
Characteristic resistance (steel failure)	$N_{Rk,s,fi,120}$ [kN]	0,2	0,5	0,8	1,6
Characteristic resistance in concrete C20/25 to C50/60 (pull-out failure)	$N_{Rk,p,fi,120}$ [kN]	1,8	2,4	5,0	7,0
Characteristic resistance in concrete C20/25 to C50/60 (concrete cone failure)	$N^0_{Rk,c,fi,120}$ [kN]	2,0	2,7	8,3	11,6

		M8	**M10**	**M12**	**M16**
Spacing	$s_{cr,N}$ [mm]	$4 \times h_{ef}$			
Edge distance	$c_{cr,N}$ [mm]	$4 \times h_{ef}$			

Table C5: Characteristic values of resistance to tension loads under fire exposure for cracked concrete

Fire resistance class R30		**M8**	**M10**	**M12**	**M16**
Characteristic resistance (steel failure)	$N_{Rk,s,fi,30}$ [kN]	0,4	0,9	1,7	3,1
Characteristic resistance in concrete C20/25 to C50/60 (pull-out failure)	$N_{Rk,p,fi,30}$ [kN]	1,5	2,3	5,0	6,3
Characteristic resistance in concrete C20/25 to C50/60 (concrete cone failure)	$N^0_{Rk\ c,fi,30}$ [kN]	1,8	2,4	7,4	10,3
Fire resistance class R60		**M8**	**M10**	**M12**	**M16**
Characteristic resistance (steel failure)	$N_{Rk,s,fi,60}$ [kN]	0,3	0,8	1,3	2,4
Characteristic resistance in concrete C20/25 to C50/60 (pull-out failure)	$N_{Rk,p,fi,60}$ [kN]	1,5	2,3	5,0	6,3
Characteristic resistance in concrete C20/25 to C50/60 (concrete cone failure)	$N^0_{Rk\ c,fi,60}$ [kN]	1,8	2,4	7,4	10,3
Fire resistance class R90		**M8**	**M10**	**M12**	**M16**
Characteristic resistance (steel failure)	$N_{Rk,s,fi,90}$ [kN]	0,3	0,6	1,1	2,0
Characteristic resistance in concrete C20/25 to C50/60 (pull-out failure)	$N_{Rk,p,fi,90}$ [kN]	1,5	2,3	5,0	6,3
Characteristic resistance in concrete C20/25 to C50/60 (concrete cone failure)	$N^0_{Rk,c,fi,90}$ [kN]	1,8	2,4	7,4	10,3
Fire resistance class R120		**M8**	**M10**	**M12**	**M16**
Characteristic resistance (steel failure)	$N_{Rk,s,fi,120}$ [kN]	0,2	0,5	0,8	1,6
Characteristic resistance in concrete C20/25 to C50/60 (pull-out failure)	$N_{Rk,p,fi,120}$ [kN]	1,2	1,8	4,0	5,0
Characteristic resistance in concrete C20/25 to C50/60 (concrete cone failure)	$N^0_{Rk,c,fi,120}$ [kN]	1,5	2,0	5,9	8,2

		M8	**M10**	**M12**	**M16**
Spacing	$s_{cr,N}$ [mm]	$4 \times h_{ef}$			
Edge distance	$c_{cr,N}$ [mm]	$4 \times h_{ef}$			

Table C6: Characteristic values of resistance to shear loads under fire exposure for non-cracked and cracked concrete

Fire resistance class R30		**M8**	**M10**	**M12**	**M16**
Characteristic resistance	$V_{Rk,s,fi,30}$ [kN]	0,4	0,9	1,7	3,1
Characteristic bending resistance	$M^0_{Rk,s,fi,30}$ [Nm]	0,6	1,8	4,1	9,7
Characteristic resistance (concrete pry-out failure)	$V_{Rk,cp,fi,30}$ [kN]	1,8	2,5	7,6	10,9
Characteristic resistance (concrete edge failure)	$V^0_{Rk,cp,fi,30}$ [kN]	2,0	3,0	11,3	17,3
Fire resistance class R60		**M8**	**M10**	**M12**	**M16**
Characteristic resistance	$V_{Rk,s,fi,60}$ [kN]	0,3	0,8	1,3	2,4
Characteristic bending resistance	$M^0_{Rk,s,fi,60}$ [Nm]	0,5	1,5	3,1	7,2
Characteristic resistance (concrete pry-out failure)	$V_{Rk,cp,fi,60}$ [kN]	1,8	2,5	7,6	10,9
Characteristic resistance (concrete edge failure)	$V^0_{Rk,cp,fi,60}$ [kN]	2,0	3,0	11,3	17,3
Fire resistance class R90		**M8**	**M10**	**M12**	**M16**
Characteristic resistance	$V_{Rk,s,fi,90}$ [kN]	0,3	0,6	1,1	2,0
Characteristic bending resistance	$M^0_{Rk,s,fi,90}$ [Nm]	0,4	1,2	2,6	6,3
Characteristic resistance (concrete pry-out failure)	$V_{Rk,cp,fi,90}$ [kN]	1,8	2,5	7,6	10,9
Characteristic resistance (concrete edge failure)	$V^0_{Rk,cp,fi,90}$ [kN]	2,0	3,0	11,3	17,3
Fire resistance class R120		**M8**	**M10**	**M12**	**M16**
Characteristic resistance	$V_{Rk,s,fi,120}$ [kN]	0,2	0,5	0,8	1,6
Characteristic bending resistance	$M^0_{Rk,s,fi,120}$ [Nm]	0,3	0,9	2,0	4,8
Characteristic resistance (concrete pry-out failure)	$V_{Rk,cp,fi,120}$ [kN]	1,4	2,0	6,1	8,7
Characteristic resistance (concrete edge failure)	$V^0_{Rk,cp,fi,120}$ [kN]	1,6	2,4	9,0	13,8

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