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European Technical Assessment

ETA-13/0058 of 01/02/2018

English translation prepared by CSTB - Original version in French language

General Part

Nom commercial *Trade name*	**PTB-SS-ETA 1-PRO**
Famille de produit *Product family*	Cheville métallique en acier inoxydable à expansion par vissage à couple contrôlé, de fixation dans le béton fissuré et non fissuré: diamètres M8 , M10, M12 et M16. **Torque-controlled expansion anchor made of stainless steel for use in cracked and uncracked concrete: sizes M8, M10, M12 and M16**
Titulaire *Manufacturer*	DEWALT / Powers Stanley Black & Decker Deutschland GmbH Richard-Klinger-Str. 11 65510 Idstein Germany
Usine de fabrication *Manufacturing plants*	Plant 2
Cette evaluation contient: *This Assessment contains*	12 pages incluant 9 annexes qui font partie intégrante de cette évaluation 12 *pages including 9 annexes which form an integral part of this assessment*
Base de l'ETE *Basis of ETA*	EAD 330232-00-0601 Mechanical Fasteners for use in concrete
Cette évaluation remplace: *This Assessment replaces*	ETE 13/0058 du 01/02/2013 au 01/02/2013 to 31/01/2018 ETA 13/0058 with validity from 01/02/2013 to 31/01/2018 ETE 10/0230 du 01/02/2013 au 01/02/2013 to 31/01/2018 ETA 10/0230 with validity from 01/02/2013 to 31/01/2018

Specific Part

1 Technical description of the product

The DeWalt Throughbolt PTB-SS-ETA1-PRO anchor is an anchor made of stainless steel which is placed into a drilled hole and anchored by torque-controlled expansion.

An illustration of the product is provided in Annexes A.

2 Specification of the intended use

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

The provisions made in this European technical assessment are based on an assumed working life of the fastener of 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

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for static and quasi static loads, Displacements	See Annex C1 to C2
Characteristic resistance for seismic performance category C1, Displacements	No performance assessed

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1
Resistance to fire	See Annex C3 to C4

3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances contained in this European technical approval, there may be requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions).

3.4 Safety in use (BWR 4)

For Basic requirement Safety in use the same criteria are valid as for Basic Requirement Mechanical resistance and stability BWR1.

3.5 Protection against noise (BWR 5)

Not relevant.

3.6 Energy economy and heat retention (BWR 6)

Not relevant.

3.7 Sustainable use of natural resources (BWR 7)

For the sustainable use of natural resources no performance was determined for this product.

3.8 General aspects relating to fitness for use

Durability and Serviceability are only ensured if the specifications of intended use according to Annex B1 are kept.

4 Assessment and verification of constancy of performance (AVCP)

According to the Decision 96/582/EC of the European Commission[1], as amended, the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table apply.

Product	Intended use	Level or class	System
Metal fasteners for use in concrete	For fixing and/or supporting to concrete, structural elements (which contributes to the stability of the works) or heavy units	-	1

5 Technical details necessary for the implementation of the AVCP system

Technical details necessary for the implementation of the Assessment and verification of constancy of performance (AVCP) system are laid down in the control plan deposited at Centre Scientifique et Technique du Bâtiment.

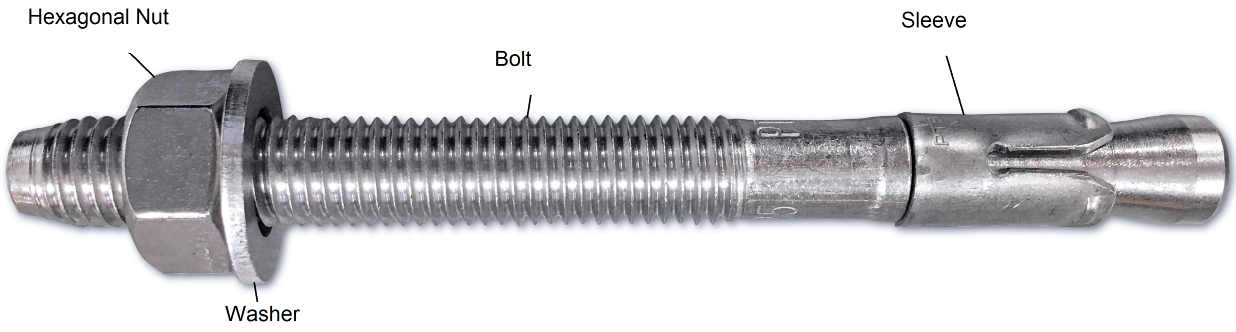
The manufacturer shall, on the basis of a contract, involve a notified body approved in the field of fasteners for issuing the certificate of conformity CE based on the control plan.

The original French version is signed by

Charles Baloche
Technical Director

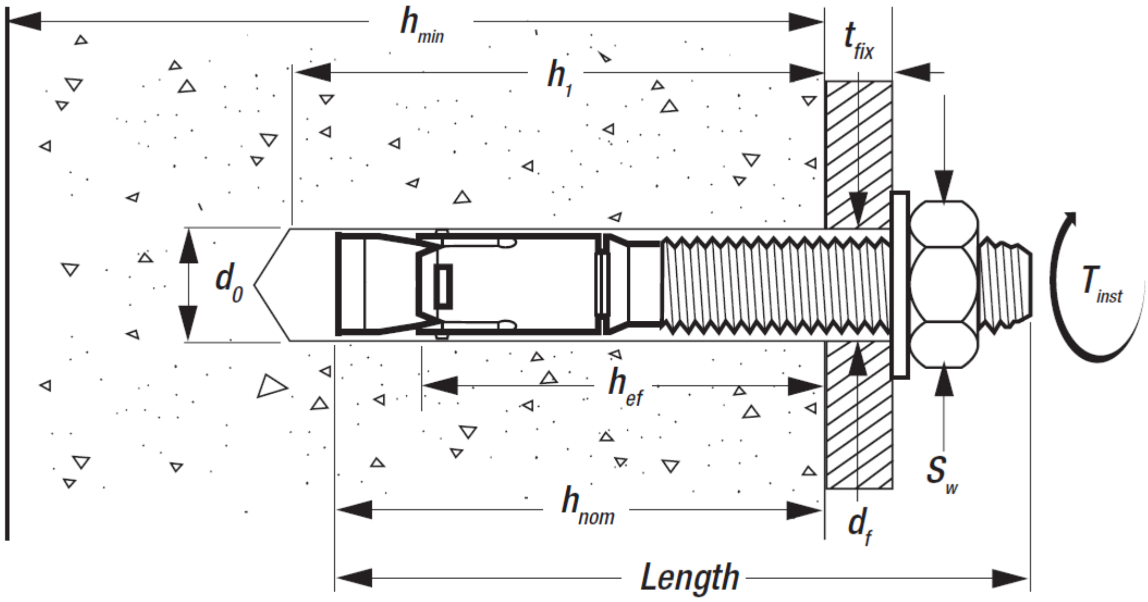
[1] Official Journal of the European Communities L 254 of 08.10.1996

Assembled anchor:



Marking on the bolt: PTB1 SS (product name) followed by X / Y, where
X= nominal diameter,
Y= total length of the anchor

Anchor in use:



PTB-SS-ETA1-PRO	Annex A1
Product description Installation condition	

Different parts of the anchor:

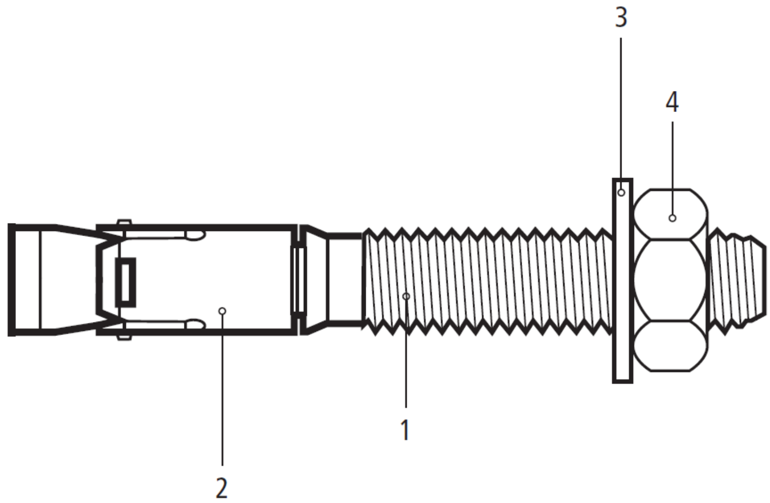


Table 1: Materials

Part	Designation	Material	Protection
1	Bolt M8 to M16	machined stainless SS316 (A4[1])	-
2	Expansion clip	Stainless steel SS316 (A4[1])	coated
3	Washer	ISO 3506-1 stainless steel SS316 (A4[1])	-
		DIN 125, DIN 9021 or EN ISO 7089	-
4	Hexagonal nut	ISO 3506-2 stainless steel SS316 (A4-70) DIN 934 or DIN EN ISO 4032, SS316 (A4-70) acc. to ISO 3506	coated

[1] Mat. No.: 1.4401, 1.4404, 1.4571, 1.4362, 1.4578

Specifications of intended use

Anchorages subject to:

- Static and quasi-static loading.
- Fire exposure.

Base materials:

- Cracked and non-cracked concrete.
- Reinforced or unreinforced normal weight concrete according to EN 206:2013.
- Strength classes C20/25 to C50/60 according to EN 206:2013.

Use conditions (Environmental conditions):

- The anchor 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. Such 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. in desulphurization plants or road tunnels where de-icing materials are used).

Design:

- The anchorages are designed in accordance with the ETAG001 Annex C “Design Method for Anchorages” or CEN/TS 1992-4-4:2009 " Design of fastenings for use in concrete” under the responsibility of an engineer experienced in anchorages and concrete work.
- For application with resistance under fire exposure the anchorages are designed in accordance with method given in TR020 “Evaluation of Anchorage in Concrete concerning Resistance to Fire”.
- 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.

Installation:

- 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 the components of an anchor.
- Anchor installation in accordance with the manufacturer’s specifications and drawings and using the appropriate tools.
- Effective anchorage depth, edge distances and spacing not less than the specified values without minus tolerances.
- Hole drilling by hammer drill with conventional carbide bit or hollow drill bit.
- Cleaning of the hole of drilling dust. This step can be omitted if a hollow drill bit has been used.
- Application of specified torque moment using a calibrated torque wrench.
- 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 mortar and no shear or oblique tension loads in the direction of aborted hole.

Table 2: Anchor dimensions

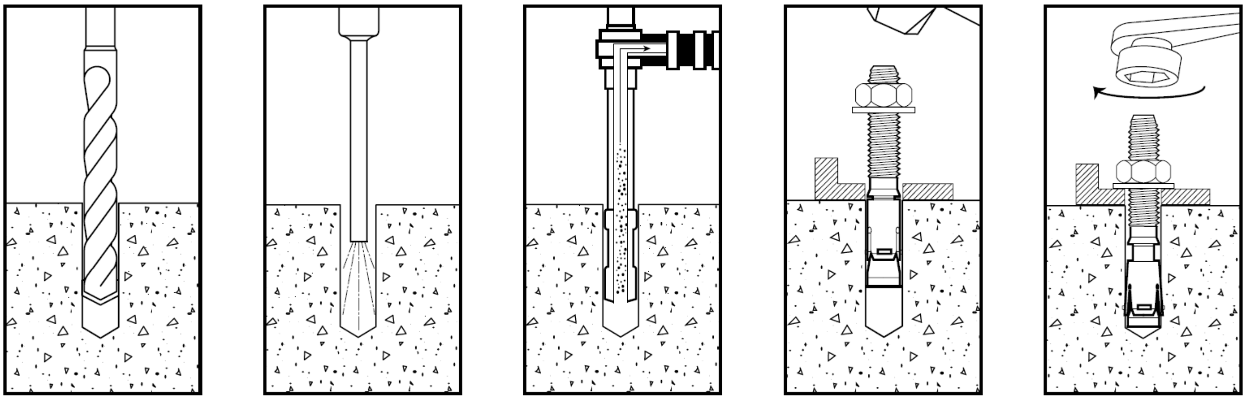
				M8	M10	M12	M16
Length of the anchor	Min.	L	[mm]	60	80	85	115
	Max.			240	240	240	240
Fixture thickness	Min.	t_{fix}	[mm]	1	1	1	1
	Max.			185	160	145	130
Length expansion clip		l_{clip}	[mm]	14	18	22	26
Width torque wrench		SW	[mm]	13	17	19	24

Table 3: Installation data

			M8	M10	M12	M16
Drill hole diameter	d_{cut}	[mm]	≤ 8.45	≤ 10.45	≤ 12.5	≤ 16.5
Drill hole depth for $h_{ef,min}$	$h_{1,min}$	[mm]	55	75	75	100
Drill hole depth for $h_{ef,max}$	$h_{1,max}$	[mm]	-	-	95	120
Minimum embedment depth	$h_{ef,min}$	[mm]	40	60	60	80
Maximum embedment depth	$h_{ef,max}$	[mm]	-	-	80	100
Installation torque	T_{inst}	[Nm]	25	45	70	120
Diameter through hole fixture	d_f	[mm]	9	12	14	16
Min. member thickness for $h_{ef,min}$	$h_{min,1}$	[mm]	100	120	120	160
Min. member thickness for $h_{ef,max}$	$h_{min,2}$	[mm]	-	-	160	200
Minimum edge distance	c_{min}	[mm]	55	60	65	85
Corresponding spacing	s ≥	[mm]	120	150	190	160
Minimum spacing	s_{min}	[mm]	50	55	60	70
Corresponding edge distance	c ≥	[mm]	90	90	100	130

Installation: PTB-SS-ETA 1-PRO

Standard Drill Bit **Hollow Drill Bit**



1.) Using the proper drill bit size, drill a hole into the base material to the required depth.

2.) Remove dust and debris from the hole using a hand pump or compressed air.

1. & 2.) Connect the hollow drill bit of proper size to a vacuum, and drill a hole into the base material to the required depth while the vac is running. The dust is removed during the drilling process.

3.) Drive the anchor into the hole at least to the minimum required embedment depth.

4.) Tighten the anchor with a torque wrench by applying the required installation torque T_{inst}.

PTB-SS-ETA1-PRO

Intended Use
Installation instructions

Annex B3

Table 4: Characteristic values for tension loads

				M8	M10	M12	M16
Steel failure							
Char. resistance		$N_{Rk,s}$	[kN]	20	29	41	75
Partial safety factor		γ_{Ms} 1)	[-]	1.9			
Pullout failure							
Characteristic resistance in *cracked* concrete C20/25							
Embedment depth	Minimum	$N_{Rk,p}$	[kN]	3	7.5	12	20
	Maximum	$N_{Rk,p}$	[kN]	-	-	12	20
Partial safety factor *cracked* concrete		$\gamma_2=\gamma_{inst}$ 1)	[-]	1.2	1.2	1.2	1.2
Characteristic resistance in *non-cracked* concrete C20/25							
Embedment depth	Minimum	$N_{Rk,p}$	[kN]	7.5	12	15	20
	Maximum	$N_{Rk,p}$	[kN]	-	-	20	30
Partial safety factor *non-cracked* concrete		$\gamma_2=\gamma_{inst}$ 1)	[-]	1.0	1.0	1.0	1.0
Increasing factor for N_{RK}	concrete C30/37	Ψ_c	[-]	1.22			
	concrete C40/50		[-]	1.41			
	concrete C50/60		[-]	1.55			
Concrete cone failure and splitting failure							
Effective embedment depth	Minimum	$h_{ef,min}$	[mm]	40	60	60	80
	Maximum	$h_{ef,max}$	[mm]	-	-	80	100
Partial safety factor *cracked* concrete		$\gamma_2=\gamma_{inst}$ 1)	[-]	1.2	1.2	1.2	1.2
Partial safety factor non-cracked concrete		$\gamma_2=\gamma_{inst}$ 1)		1.0	1.0	1.0	1.0
Increasing factor for N_{RK}	concrete C30/37	Ψ_c	[-]	1.22			
	concrete C40/50		[-]	1.41			
	concrete C50/60		[-]	1.55			
Char. spacing concrete cone failure	*($h_{ef,min}$)*	$s_{cr,N,min}$	[mm]	120	180	180	240
	($h_{ef,max}$)	$s_{cr,N,max}$	[mm]	-	-	240	300
Char. spacing splitting failure	*($h_{ef,min}$)*	$s_{cr,sp,min}$	[mm]	200	300	300	400
	($h_{ef,max}$)	$s_{cr,sp,max}$	[mm]	-	-	400	500
Char. edge distance concrete cone failure	*($h_{ef,min}$)*	$c_{cr,N,min}$	[mm]	60	90	90	120
	($h_{ef,max}$)	$c_{cr,N,max}$	[mm]	-	-	120	150
Char. edge distance splitting failure	*($h_{ef,min}$)*	$c_{cr,sp,min}$	[mm]	100	150	150	200
	($h_{ef,max}$)	$c_{cr,sp,max}$	[mm]	-	-	200	250

1) In absence of other national regulations

Table 5: Displacements under tension loads

			M8	M10	M12		M16	
			$h_{ef,min}$	$h_{ef,min}$	$h_{ef,min}$	$h_{ef,max}$	$h_{ef,min}$	$h_{ef,max}$
Tension load in *non-cracked* concrete C20/25		[kN]	3.6	5.7	7.1	9.5	9.5	14.3
Displacement	δ_{N0}	[mm]	0.1	0.1	0.1	0.1	0.1	0.1
	$\delta_{N\infty}$	[mm]	1.4	1.6	1.0	1.0	1.2	1.2
Tension load in *non-cracked* concrete C50/60		[kN]	5.5	8.9	11.1	14.8	14.8	22.1
Displacement	δ_{N0}	[mm]	0.1	0.1	0.1	0.1	0.1	0.1
	$\delta_{N\infty}$	[mm]	1.4	1.6	1.0	1.0	1.2	1.2
Tension load in *cracke*d concrete C20/25		[kN]	1.2	3.0	4.8	4.8	7.9	7.9
Displacement	δ_{N0}	[mm]	0.1	0.3	0.4	0.4	0.5	0.5
	$\delta_{N\infty}$	[mm]	1.9	4.6	7.4	7.4	12.3	12.3
Tension load in *cracked* concrete C50/60		[kN]	1.9	4.6	7.4	7.4	12.3	12.3
Displacement	δ_{N0}	[mm]	0.2	0.5	0.6	0.6	0.7	0.7
	$\delta_{N\infty}$	[mm]	1.4	1.6	1.0	1.0	1.2	1.2

Table 6: Characteristic values for shear loads

			M8	M10	M12	M16
Steel failure without lever arm						
Char. resistance	$V_{Rk,s}$	[kN]	11	18	26	49
Partial safety factor	γ_{Ms} 1)	[-]	1.6			
Ductility factor	k_7		1.0			
Steel failure with lever arm						
Char. bending resistance	$M^0_{Rk,s}$	[Nm]	23	46	81	206
Partial safety factor	γ_{Ms} 1)	[-]	1.6			
Concrete pry-out failure						
Factor for determination of resistance to pry-out failure	k_3	[-]	1	2	2	2
Partial safety factor	$\gamma_2=\gamma_{inst}$ 1)	[-]	1.0			
Concrete edge failure						
Effective length of anchor under shear loading *($h_{ef,min}$)*	$l_{f,min}$	[mm]	40	60	60	80
Effective length of anchor under shear loading *($h_{ef,max}$)*	$l_{f,max}$	[mm]	-	-	80	100
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	16
Partial safety factor	$\gamma_2=\gamma_{inst}$ 1)	-	1.0			

1) In absence of other national regulations

Table 7: Displacements under shear loads

			M8	M10	M12	M16
Shear load in concrete C20/25 to C50/60 [kN]			5.0	8.0	11.7	21.5
Displacement	δ_{V0}	[mm]	0.2	2.0	2.2	2.6
	$\delta_{V\infty}$	[mm]	0.3	3.0	3.3	3.9

Displacement under shear loading: additional displacements due to through hole in the fixture shall be considered

Table 8: Characteristic tension resistance in cracked and non-cracked concrete under fire exposure for design method A according to TR020

			M8	M10	M12	M16
Steel failure						
Char. resistance	R30 $N_{Rk,s,fi}$	[kN]	0.7	1.5	2.5	4.7
	R60 $N_{Rk,s,fi}$	[kN]	0.6	1.2	2.1	3.9
	R90 $N_{Rk,s,fi}$	[kN]	0.4	0.9	1.7	3.1
	R120 $N_{Rk,s,fi}$	[kN]	0.4	0.8	1.3	2.5
Pullout failure (cracked and non-cracked concrete)						
Char. resistance in concrete ≥ C20/25						
Minimum embedment depth	R30 $N_{Rk,p,fi}$	[kN]	0.8	1.9	3.0	5.0
	R60 $N_{Rk,p,fi}$	[kN]	0.8	1.9	3.0	5.0
	R90 $N_{Rk,p,fi}$	[kN]	0.8	1.9	3.0	5.0
	R120 $N_{Rk,p,fi}$	[kN]	0.6	1.5	2.4	4.0
Maximum embedment depth	R30 $N_{Rk,p,fi}$	[kN]	-	-	3.0	5.0
	R60 $N_{Rk,p,fi}$	[kN]	-	-	3.0	5.0
	R90 $N_{Rk,p,fi}$	[kN]	-	-	3.0	5.0
	R120 $N_{Rk,p,fi}$	[kN]	-	-	2.4	4.0
Concrete cone and splitting failure[2] (cracked and uncracked concrete)						
Char. resistance in concrete ≥ C20/25						
Minimum embedment depth	R30 $N^0_{Rk,c,fi}$	[kN]	1.8	5.0	5.0	10.3
	R60 $N^0_{Rk,c,fi}$	[kN]	1.8	5.0	5.0	10.3
	R90 $N^0_{Rk,c,fi}$	[kN]	1.8	5.0	5.0	10.3
	R120 $N^0_{Rk,c,fi}$	[kN]	1.5	4.0	4.0	8.2
Maximum embedment depth	R30 $N^0_{Rk,c,fi}$	[kN]	-	-	10.3	18.0
	R60 $N^0_{Rk,c,fi}$	[kN]	-	-	10.3	18.0
	R90 $N^0_{Rk,c,fi}$	[kN]	-	-	10.3	18.0
	R120 $N^0_{Rk,c,fi}$	[kN]	-	-	8.2	14.4
Char. spacing *($h_{ef,min}$)*	$s_{cr,N,min,fi}$	[mm]	160	240	240	320
Char. spacing *($h_{ef,max}$)*	$s_{cr,N,max,fi}$	[mm]	-	-	320	400
Char. edge distance *($h_{ef,min}$)*	$c_{cr,N,min,fi}$	[mm]	80	120	120	160
Char. edge distance *($h_{ef,max}$)*	$c_{cr,N,max,fi}$	[mm]	-	-	160	200

[1] Design under fire exposure is performed according to the design method given in TR 020. Under fire exposure usually cracked concrete is assumed. The design equations are given in TR 020, Section 2.2.1.

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

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 $\geq 2 \cdot h_{ef}$.

Table 9: Characteristic shear resistance in cracked and non-cracked concrete under fire exposure for design method A according to TR020

			M8	M10	M12	M16
Steel failure without lever arm						
Char. resistance	R30 $V_{Rk,s,fi}$	[kN]	0.7	1.5	2.5	4.7
	R60 $V_{Rk,s,fi}$	[kN]	0.6	1.2	2.1	3.9
	R90 $V_{Rk,s,fi}$	[kN]	0.4	0.9	1.7	3.1
	R120 $V_{Rk,s,fi}$	[kN]	0.4	0.8	1.3	2.5

Steel failure with lever arm						
Char. bending resistance	R30 $M^0_{Rk,s,fi}$	[Nm]	0.75	1.9	3.9	10.0
	R60 $M^0_{Rk,s,fi}$	[Nm]	0.60	1.5	3.3	8.3
	R90 $M^0_{Rk,s,fi}$	[Nm]	0.45	1.2	2.6	6.7
	R120 $M^0_{Rk,s,fi}$	[Nm]	0.37	1.0	2.1	5.3

Concrete pry-out failure						
Factor for determination of resistance To pry-out failure	k_3	[-]	1.0	2.0	2.0	2.0
Char. resistance (min. embedment, $h_{ef,min}$)	R30 $V_{Rk,s,fi}$	[kN]	1.8	10.0	10.0	20.6
	R60 $V_{Rk,s,fi}$	[kN]	1.8	10.0	10.0	20.6
	R90 $V_{Rk,s,fi}$	[kN]	1.8	10.0	10.0	20.6
	R120 $V_{Rk,s,fi}$	[kN]	1.5	8.0	8.0	16.5
Char. resistance (max. embedment, $h_{ef,max}$)	R30 $V_{Rk,s,fi}$	[kN]	-	-	20.6	36.0
	R60 $V_{Rk,s,fi}$	[kN]	-	-	20.6	36.0
	R90 $V_{Rk,s,fi}$	[kN]	-	-	20.6	36.0
	R120 $V_{Rk,s,fi}$	[kN]	-	-	16.5	28.8

Concrete edge failure						
Effective length of anchor under shear loading ($h_{ef,min}$)	$l_{f,min}$	[mm]	40	60	60	80
Effective length of anchor under shear loading ($h_{ef,max}$)	$l_{f,max}$	[mm]	-	-	80	100
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	16

1) Design under fire exposure is performed according to the design method given in TR 020. Under fire exposure usually cracked concrete is assumed. The design equations are given in TR 020, Section 2.2.2.

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 $\geq 2 \cdot h_{ef}$.