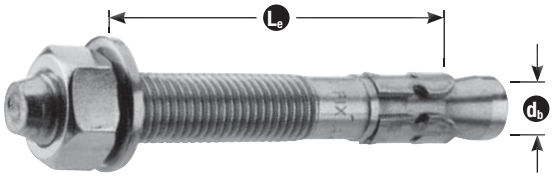
41.1 GENERAL INFORMATION

PERFORMANCE RELATED	MATERIAL	INSTALLATION RELATED
		

Designed for use in concrete structures requiring protection under fire conditions, A Heavy duty, torque controlled expansion anchor for use in Cracked and Non-Cracked concrete.


Fire Tested



Benefits, Advantages and Features

Fire tested to TR020
- Fire rated Performance up to 120 minutes
- Anchor diameters M8 to M16
- Variable concrete strengths & embedments
- A4 316 Stainless Steel

European Technical Approval (option 1) for mechanical anchoring - ETA-04/0010
- Heavy duty performance in cracked concrete
- Maximum tensile & shear load in cracked concrete
- Approved for all directions (floor,wall,overhead)

Suitable for structural loads:
- "True to size" through fixture anchor
- A4-80 Stainless Steel Hexagonal Nut

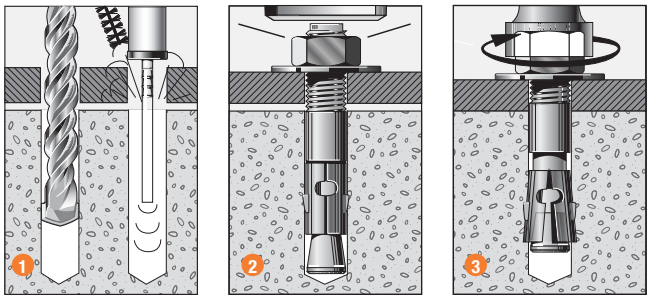
Improved security:
- Torque induced pull down closes gaps and induces preload.

Resistant to cyclic loading:
- Heavy duty sleeve with pull-down of fixture
- Anti rotation expansion sleeve

Fast installation:
- Anchor diameter equals hole diameter
- Shallow embedment depths
- Through fixing eliminates marking out and repositioning of fixtures.

Principal Applications
- Complies with European fire test standards
- Anchoring into cracked & non cracked concrete
- Structural Steel columns & beams
- Road barrier hold down
- Bridge refurbishment
- Road & Rail tunnel construction
- Wall Plates
- Safety barriers
- Stadium seating
- Pallet racking
- Shallow embedment depths from 50mm
- Intended working life of the anchor of 50 years

Installation



1. Drill or core a hole to the recommended diameter (same as the TruBolt™ A4 316 SS) and depth using the fixture as a template. Clean the hole thoroughly with a hole cleaning brush. Remove the debris with a hand pump, compressed air, or vacuum.
2. Insert the anchor through the fixture and drive with a hammer until the washer contacts the fixture.
3. Tighten the nut with a torque wrench to the specified assembly torque.

Installation Details

Anchor size, d_b	Drilled hole diameter, d_h (mm)	Fixture hole diameter, d_f (mm)	Anchor effective depth, h (mm)	Depth of drill hole, h_1 (mm)	Tightening torque, Tr (Nm)	Optimum dimensions		Concrete substrate thickness, b_m (mm)
						Anchor* spacing, a_c (mm)	Edge** distance, e_c (mm)	
M8	8	9	35	52	20	140	70	100
			48	65		192	96	100
M10	10	12	42	62	35	168	84	100
			58	78		232	116	116
M12	12	14	50	75	50	200	100	100
			70	95		280	140	140
M16	16	18	64	95	100	256	128	128
			86	117		344	172	172

* For anchor spacings less than the optimum, please contact your local Ramset Engineer.
** If the fire attack is from more than one side,the edge distance of the anchor has to be ≥ 300mm and ≥ 2xh.

41.2 DESCRIPTION AND PART NUMBERS

Anchor size, d_b	Drilled hole diameter, d_h (mm)	Effective Length, L_e (mm)	ETA Designation Number	Part Number 316 A4 SS
M8	8	40	M8/5	T08055SSA
		55	M8/20-7	T08070SSA
		75	M8/40-27	T08090SSA
		115	M8/80-67	T08130SSA
M10	10	47	M10/5	T10065SSA
		57	M10/15	T10075SSA
		78	M10/35-20	T10095SSA
		103	M10/60-45	T10120SSA
M12	12	55	M12/5	T12080SSA
		76	M12/25-6	T12100SSA
		91	M12/40-21	T12115SSA
		116	M12/65-46	T12140SSA
M16	16	94	M16/30-8	T16125SSA
		119	M16/55-33	T16150SSA
		139	M16/75-53	T16170SSA

Effective depth, h (mm)
$h = L_e - t$
t = total thickness of material(s) being fixed

41.3 ENGINEERING PROPERTIES - Stainless Steel

Anchor size, d_b	Stress area threaded section, A_s (mm2)	Minimum diameter reduced section, d_s (mm)	Threaded section		Reduced section		Section modulus Z (mm^2)
			Yield strength, f_y (MPa)	UTS, f_u (MPa)	Yield strength, f_y (MPa)	UTS, f_u (MPa)	
M8	36.6	5.6	420	620	780	900	31.2
M10	58.0	7.3	420	620	780	900	62.3
M12	84.3	8.6	420	620	780	900	109.2
M16	157.0	11.7	420	620	780	900	277.5

Design Case 1 Fire resistance duration = 30 minutes

Table 1a Characteristic values of resistance to tension loads in 20 MPa to 50 MPa concrete strength for Fire resistance duration = 30 minutes

Anchor size, d_b		M8	M10	M12	M16
Drilled hole dia., d_h (mm)		8	10	12	16
Effective depth, h (mm)	Characteristic Resistance				
35	Steel Failure - $N_{Rk,s,fi,30}$ (kN)	4.9			
	Pull-out failure concrete - $N_{Rk,p,fi,30}$ (kN)	**0.8**			
	Concrete cone failure - $N_{Rk,c,fi,30}$ (kN)	1.3			
48	Steel Failure - $N_{Rk,s,fi,30}$ (kN)	4.9			
	Pull-out failure - $N_{Rk,p,fi,30}$ (kN)	**1.0**			
	Concrete cone failure - $N_{Rk,c,fi,30}$ (kN)	2.9			
42	Steel Failure - $N_{Rk,s,fi,30}$ (kN)		7.7		
	Pull-out failure concrete - $N_{Rk,p,fi,30}$ (kN)		**1.5**		
	Concrete cone failure - $N_{Rk,c,fi,30}$ (kN)		2.1		
58	Steel Failure - $N_{Rk,s,fi,30}$ (kN)		7.7		
	Pull-out failure - $N_{Rk,p,fi,30}$ (kN)		**1.9**		
	Concrete cone failure - $N_{Rk,c,fi,30}$ (kN)		4.6		
50	Steel Failure - $N_{Rk,s,fi,30}$ (kN)			11.3	
	Pull-out failure concrete - $N_{Rk,p,fi,30}$ (kN)			**1.9**	
	Concrete cone failure - $N_{Rk,c,fi,30}$ (kN)			3.2	
70	Steel Failure - $N_{Rk,s,fi,30}$ (kN)			11.3	
	Pull-out failure - $N_{Rk,p,fi,30}$ (kN)			**2.3**	
	Concrete cone failure - $N_{Rk,c,fi,30}$ (kN)			7.4	
64	Steel Failure - $N_{Rk,s,fi,30}$ (kN)				21.0
	Pull-out failure concrete - $N_{Rk,p,fi,30}$ (kN)				**3.0**
	Concrete cone failure - $N_{Rk,c,fi,30}$ (kN)				5.9
86	Steel Failure - $N_{Rk,s,fi,30}$ (kN)				21.0
	Pull-out failure - $N_{Rk,p,fi,30}$ (kN)				**4.0**
	Concrete cone failure - $N_{Rk,c,fi,30}$ (kN)				12.3

NOTE: Bold values indicate limiting load. Data in table lists all possible failure mechanism due to fire.

Table 1b Characteristic values of resistance to shear loads in 20 MPa concrete strength for Fire resistance duration = 30 minutes

Anchor size, d_b		M8	M10	M12	M16
Drilled hole dia., d_h (mm)		8	10	12	16
Edge distance, e_c (mm)	Characteristic Resistance				
70	Steel Failure without lever arm - $V^0_{Rk,s,fi,30}$ (kN)	4.9			
	Steel Failure with lever arm - $M^0_{Rk,s,fi,30}$ (N.m)	5.0			
	Concrete edge failure - $V^0_{Rk,c,fi,30}$ (kN)	**1.3**			
96	Steel Failure without lever arm - $V^0_{Rk,s,fi,30}$ (kN)	4.9			
	Steel Failure with lever arm - $M^0_{Rk,s,fi,30}$ (N.m)	5.0			
	Concrete edge failure - $V^0_{Rk,c,fi,30}$ (kN)	**2.1**			
84	Steel Failure without lever arm - $V^0_{Rk,s,fi,30}$ (kN)		7.7		
	Steel Failure with lever arm - $M^0_{Rk,s,fi,30}$ (N.m)		9.9		
	Concrete edge failure - $V^0_{Rk,c,fi,30}$ (kN)		**1.8**		
116	Steel Failure without lever arm - $V^0_{Rk,s,fi,30}$ (kN)		7.7		
	Steel Failure with lever arm - $M^0_{Rk,s,fi,30}$ (N.m)		9.9		
	Concrete edge failure - $V^0_{Rk,c,fi,30}$ (kN)		**3.2**		
100	Steel Failure without lever arm - $V^0_{Rk,s,fi,30}$ (kN)			11.3	
	Steel Failure with lever arm - $M^0_{Rk,s,fi,30}$ (N.m)			17.5	
	Concrete edge failure - $V^0_{Rk,c,fi,30}$ (kN)			**2.6**	
140	Steel Failure without lever arm - $V^0_{Rk,s,fi,30}$ (kN)			11.3	
	Steel Failure with lever arm - $M^0_{Rk,s,fi,30}$ (N.m)			17.5	
	Concrete edge failure - $V^0_{Rk,c,fi,30}$ (kN)			**4.6**	
128	Steel Failure without lever arm - $V^0_{Rk,s,fi,30}$ (kN)				21.0
	Steel Failure with lever arm - $M^0_{Rk,s,fi,30}$ (N.m)				44.5
	Concrete edge failure - $V^0_{Rk,c,fi,30}$ (kN)				**4.3**
172	Steel Failure without lever arm - $V^0_{Rk,s,fi,30}$ (kN)				21.0
	Steel Failure with lever arm - $M^0_{Rk,s,fi,30}$ (N.m)				44.5
	Concrete edge failure - $V^0_{Rk,c,fi,30}$ (kN)				**7.1**

NOTE: Bold values indicate limiting load. Data in table lists all possible failure mechanism due to fire.
Note: Concrete edge failure values are based on 20 MPa concrete strength. For values in higher concrete strengths, please multiply $V^0_{Rk,c,fi,30}$ by the concrete compressive strength effect X_{nc}, as follows;

f'_c (MPa)	20	30	40	50
X_{nc}	1	1.22	1.41	1.55

Design Case 2 Fire resistance duration = 60 minutes

Table 2a Characteristic values of resistance to tension loads in 20 MPa to 50 MPa concrete strength for Fire resistance duration = 60 minutes

Anchor size, d_b		M8	M10	M12	M16
Drilled hole dia., d_h (mm)		8	10	12	16
Effective depth, h (mm)	Characteristic Resistance				
35	Steel Failure - $N_{Rk,s,fi,60}$(kN)	3.2			
	Pull-out failure concrete - $N_{Rk,p,fi,60}$ (kN)	**0.8**			
	Concrete cone failure - $N_{Rk,c,fi,60}$ (kN)	1.3			
48	Steel Failure - $N_{Rk,s,fi,60}$ (kN)	3.2			
	Pull-out failure - $N_{Rk,p,fi,60}$ (kN)	**1.0**			
	Concrete cone failure - $N_{Rk,c,fi,60}$ (kN)	2.9			
42	Steel Failure - $N_{Rk,s,fi,60}$(kN)		5.1		
	Pull-out failure concrete - $N_{Rk,p,fi,60}$ (kN)		**1.5**		
	Concrete cone failure - $N_{Rk,c,fi,60}$ (kN)		2.1		
58	Steel Failure - $N_{Rk,s,fi,60}$ (kN)		5.1		
	Pull-out failure - $N_{Rk,p,fi,60}$ (kN)		**1.9**		
	Concrete cone failure - $N_{Rk,c,fi,60}$ (kN)		4.6		
50	Steel Failure - $N_{Rk,s,fi,60}$(kN)			8.2	
	Pull-out failure concrete - $N_{Rk,p,fi,60}$ (kN)			**1.9**	
	Concrete cone failure - $N_{Rk,c,fi,60}$ (kN)			3.2	
70	Steel Failure - $N_{Rk,s,fi,60}$ (kN)			8.2	
	Pull-out failure - $N_{Rk,p,fi,60}$ (kN)			**2.3**	
	Concrete cone failure - $N_{Rk,c,fi,60}$ (kN)			7.4	
64	Steel Failure - $N_{Rk,s,fi,60}$(kN)				15.2
	Pull-out failure concrete - $N_{Rk,p,fi,60}$ (kN)				**3.0**
	Concrete cone failure - $N_{Rk,c,fi,60}$ (kN)				5.9
86	Steel Failure - $N_{Rk,s,fi,60}$ (kN)				15.2
	Pull-out failure - $N_{Rk,p,fi,60}$ (kN)				**4**
	Concrete cone failure - $N_{Rk,c,fi,60}$ (kN)				12.3

NOTE: Bold values indicate limiting load. Data in table lists all possible failure mechanism due to fire.

Table 2b Characteristic values of resistance to shear loads in 20 MPa concrete strength for Fire resistance duration = 60 minutes

Anchor size, d_b		M8	M10	M12	M16
Drilled hole dia., d_h (mm)		8	10	12	16
Edge distance, e_c (mm)	Characteristic Resistance				
70	Steel Failure without lever arm - $V^0_{Rk,s,fi,60}$ (kN)	3.2			
	Steel Failure with lever arm - $M^0_{Rk,s,fi,60}$ (N.m)	3.3			
	Concrete edge failure - $V^0_{Rk,c,fi,60}$ (kN)	**1.3**			
96	Steel Failure without lever arm - $V^0_{Rk,s,fi,60}$ (kN)	3.2			
	Steel Failure with lever arm - $M^0_{Rk,s,fi,60}$ (N.m)	3.3			
	Concrete edge failure - $V^0_{Rk,c,fi,60}$ (kN)	**2.1**			
84	Steel Failure without lever arm - $V^0_{Rk,s,fi,60}$ (kN)		5.1		
	Steel Failure with lever arm - $M^0_{Rk,s,fi,60}$ (N.m)		6.5		
	Concrete edge failure - $V^0_{Rk,c,fi,60}$(kN)		**1.8**		
116	Steel Failure without lever arm - $V^0_{Rk,s,fi,60}$ (kN)		5.1		
	Steel Failure with lever arm - $M^0_{Rk,s,fi,60}$ (N.m)		6.5		
	Concrete edge failure - $V^0_{Rk,c,fi,60}$ (kN)		**3.2**		
100	Steel Failure without lever arm - $V^0_{Rk,s,fi,60}$ (kN)			8.2	
	Steel Failure with lever arm - $M^0_{Rk,s,fi,60}$ (N.m)			12.7	
	Concrete edge failure - $V^0_{Rk,c,fi,60}$(kN)			**2.6**	
140	Steel Failure without lever arm - $V^0_{Rk,s,fi,60}$ (kN)			8.2	
	Steel Failure with lever arm - $M^0_{Rk,s,fi,60}$ (N.m)			12.7	
	Concrete edge failure - $V^0_{Rk,c,fi,60}$ (kN)			**4.6**	
128	Steel Failure without lever arm - $V^0_{Rk,s,fi,60}$ (kN)				15.2
	Steel Failure with lever arm - $M^0_{Rk,s,fi,60}$ (N.m)				32.3
	Concrete edge failure - $V^0_{Rk,c,fi,60}$(kN)				**4.3**
172	Steel Failure without lever arm - $V^0_{Rk,s,fi,60}$ (kN)				15.2
	Steel Failure with lever arm - $M^0_{Rk,s,fi,60}$ (N.m)				32.3
	Concrete edge failure - $V^0_{Rk,c,fi,60}$ (kN)				**7.1**

NOTE: Bold values indicate limiting load. Data in table lists all possible failure mechanism due to fire.
Note: Concrete edge failure values are based on 20 MPa concrete strength. For values in higher concrete strengths, please multiply $V^0_{Rk,c,fi,60}$ by the concrete compressive strength effect X_{nc}, as follows;

f'_c (MPa)	20	30	40	50
X_{nc}	1	1.22	1.41	1.55

Design Case 3 Fire resistance duration = 90 minutes

Table 3a Characteristic values of resistance to tension loads in 20 MPa to 50 MPa concrete strength for Fire resistance duration = 90 minutes

Anchor size, d_b		M8	M10	M12	M16
Drilled hole dia., d_h (mm)		8	10	12	16
Effective depth, h (mm)	**Characteristic Resistance**				
35	Steel Failure - $N_{Rk,s,fi,90}$ (kN)	1.5			
	Pull-out failure concrete - $N_{Rk,p,fi,90}$ (kN)	**0.8**			
	Concrete cone failure - $N_{Rk,c,fi,90}$ (kN)	1.3			
48	Steel Failure - $N_{Rk,s,fi,90}$ (kN)	1.5			
	Pull-out failure - $N_{Rk,p,fi,90}$ (kN)	**1.0**			
	Concrete cone failure - $N_{Rk,c,fi,90}$ (kN)	2.9			
42	Steel Failure - $N_{Rk,s,fi,90}$ (kN)		2.4		
	Pull-out failure concrete - $N_{Rk,p,fi,90}$ (kN)		**1.5**		
	Concrete cone failure - $N_{Rk,c,fi,90}$ (kN)		2.1		
58	Steel Failure - $N_{Rk,s,fi,90}$ (kN)		2.4		
	Pull-out failure - $N_{Rk,p,fi,90}$ (kN)		**1.9**		
	Concrete cone failure - $N_{Rk,c,fi,90}$ (kN)		4.6		
50	Steel Failure - $N_{Rk,s,fi,90}$ (kN)			5.1	
	Pull-out failure concrete - $N_{Rk,p,fi,90}$ (kN)			**1.9**	
	Concrete cone failure - $N_{Rk,c,fi,90}$ (kN)			3.2	
70	Steel Failure - $N_{Rk,s,fi,90}$ (kN)			5.1	
	Pull-out failure - $N_{Rk,p,fi,90}$ (kN)			**2.3**	
	Concrete cone failure - $N_{Rk,c,fi,90}$ (kN)			7.4	
64	Steel Failure - $N_{Rk,s,fi,90}$ (kN)				9.5
	Pull-out failure concrete - $N_{Rk,p,fi,90}$ (kN)				**3.0**
	Concrete cone failure - $N_{Rk,c,fi,90}$ (kN)				5.9
86	Steel Failure - $N_{Rk,s,fi,90}$ (kN)				9.5
	Pull-out failure - $N_{Rk,p,fi,90}$ (kN)				**4**
	Concrete cone failure - $N_{Rk,c,fi,90}$ (kN)				12.3

NOTE: Bold values indicate limiting load. Data in table lists all possible failure mechanism due to fire.

Table 3b Characteristic values of resistance to shear loads in 20 MPa concrete strength for Fire resistance duration = 90 minutes

Anchor size, d_b		M8	M10	M12	M16
Drilled hole dia., d_h (mm)		8	10	12	16
Edge distance, e_c (mm)	**Characteristic Resistance**				
70	Steel Failure without lever arm - $V^0_{Rk,s,fi,90}$ (kN)	1.5			
	Steel Failure with lever arm - $M^0_{Rk,s,fi,90}$ (N.m)	1.6			
	Concrete edge failure - $V^0_{Rk,c,fi,90}$ (kN)	**1.3**			
96	Steel Failure without lever arm - $V^0_{Rk,s,fi,90}$ (kN)	**1.5**			
	Steel Failure with lever arm - $M^0_{Rk,s,fi,90}$ (N.m)	1.6			
	Concrete edge failure - $V^0_{Rk,c,fi,90}$ (kN)	2.1			
84	Steel Failure without lever arm - $V^0_{Rk,s,fi,90}$ (kN)		2.4		
	Steel Failure with lever arm - $M^0_{Rk,s,fi,90}$ (N.m)		3.1		
	Concrete edge failure - $V^0_{Rk,c,fi,90}$ (kN)		**1.8**		
116	Steel Failure without lever arm - $V^0_{Rk,s,fi,90}$ (kN)		**2.4**		
	Steel Failure with lever arm - $M^0_{Rk,s,fi,90}$ (N.m)		3.1		
	Concrete edge failure - $V^0_{Rk,c,fi,90}$ (kN)		3.2		
100	Steel Failure without lever arm - $V^0_{Rk,s,fi,90}$ (kN)			5.1	
	Steel Failure with lever arm - $M^0_{Rk,s,fi,90}$ (N.m)			7.9	
	Concrete edge failure - $V^0_{Rk,c,fi,90}$ (kN)			**2.6**	
140	Steel Failure without lever arm - $V^0_{Rk,s,fi,90}$ (kN)			5.1	
	Steel Failure with lever arm - $M^0_{Rk,s,fi,90}$ (N.m)			7.9	
	Concrete edge failure - $V^0_{Rk,c,fi,90}$ (kN)			**4.6**	
128	Steel Failure without lever arm - $V^0_{Rk,s,fi,90}$ (kN)				9.5
	Steel Failure with lever arm - $M^0_{Rk,s,fi,90}$ (N.m)				20.1
	Concrete edge failure - $V^0_{Rk,c,fi,90}$ (kN)				**4.3**
172	Steel Failure without lever arm - $V^0_{Rk,s,fi,90}$ (kN)				9.5
	Steel Failure with lever arm - $M^0_{Rk,s,fi,90}$ (N.m)				20.1
	Concrete edge failure - $V^0_{Rk,c,fi,90}$ (kN)				**7.1**

NOTE: Bold values indicate limiting load. Data in table lists all possible failure mechanism due to fire.
Note: Concrete edge failure values are based on 20 MPa concrete strength. For values in higher concrete strengths, please multiply $V^0_{Rk,c,fi,90}$ by the concrete compressive strength effect X_{nc}, as follows;

f'_c (MPa)	20	30	40	50
X_{nc}	1	1.22	1.41	1.55

Design Case 4 Fire resistance duration = 120 minutes

Table 4a Characteristic values of resistance to tension loads in 20 MPa to 50 MPa concrete strength for Fire resistance duration = 120 minutes

Anchor size, d_b		M8	M10	M12	M16
Drilled hole dia., d_h (mm)		8	10	12	16
Effective depth, h (mm)	Characteristic Resistance				
35	Steel Failure - $N_{Rk,s,fi,120}$ (kN)	0.7			
	Pull-out failure concrete - $N_{Rk,p,fi,120}$ (kN)	**0.6**			
	Concrete cone failure - $N_{Rk,c,fi,120}$ (kN)	1.0			
48	Steel Failure - $N_{Rk,s,fi,120}$ (kN)	**0.7**			
	Pull-out failure - $N_{Rk,p,fi,120}$ (kN)	0.8			
	Concrete cone failure - $N_{Rk,c,fi,120}$ (kN)	2.3			
42	Steel Failure - $N_{Rk,s,fi,120}$ (kN)		**1.1**		
	Pull-out failure concrete - $N_{Rk,p,fi,120}$ (kN)		1.2		
	Concrete cone failure - $N_{Rk,c,fi,120}$ (kN)		1.6		
58	Steel Failure - $N_{Rk,s,fi,120}$ (kN)		**1.1**		
	Pull-out failure - $N_{Rk,p,fi,120}$ (kN)		1.5		
	Concrete cone failure - $N_{Rk,c,fi,120}$ (kN)		3.7		
50	Steel Failure - $N_{Rk,s,fi,120}$ (kN)			3.5	
	Pull-out failure concrete - $N_{Rk,p,fi,120}$ (kN)			**1.5**	
	Concrete cone failure - $N_{Rk,c,fi,120}$ (kN)			2.5	
70	Steel Failure - $N_{Rk,s,fi,120}$ (kN)			3.5	
	Pull-out failure - $N_{Rk,p,fi,120}$ (kN)			**1.8**	
	Concrete cone failure - $N_{Rk,c,fi,120}$ (kN)			5.9	
64	Steel Failure - $N_{Rk,s,fi,120}$ (kN)				6.6
	Pull-out failure concrete - $N_{Rk,p,fi,120}$ (kN)				**2.4**
	Concrete cone failure - $N_{Rk,c,fi,120}$ (kN)				4.7
86	Steel Failure - $N_{Rk,s,fi,120}$ (kN)				6.6
	Pull-out failure - $N_{Rk,p,fi,120}$ (kN)				**3.2**
	Concrete cone failure - $N_{Rk,c,fi,120}$ (kN)				9.9

NOTE: Bold values indicate limiting load. Data in table lists all possible failure mechanism due to fire.

Table 4b Characteristic values of resistance to shear loads in 20 MPa concrete strength for Fire resistance duration = 120 minutes

Anchor size, d_b		M8	M10	M12	M16
Drilled hole dia., d_h (mm)		8	10	12	16
Edge distance, e_c (mm)	Characteristic Resistance				
70	Steel Failure without lever arm - $V^0_{Rk,s,fi,120}$ (kN)	**0.7**			
	Steel Failure with lever arm - $M^0_{Rk,s,fi,120}$ (N.m)	0.7			
	Concrete edge failure - $V^0_{Rk,c,fi,120}$ (kN)	1.0			
96	Steel Failure without lever arm - $V^0_{Rk,s,fi,120}$ (kN)	**0.7**			
	Steel Failure with lever arm - $M^0_{Rk,s,fi,120}$ (N.m)	0.7			
	Concrete edge failure - $V^0_{Rk,c,fi,120}$ (kN)	1.7			
84	Steel Failure without lever arm - $V^0_{Rk,s,fi,120}$ (kN)		**1.1**		
	Steel Failure with lever arm - $M^0_{Rk,s,fi,120}$ (N.m)		1.5		
	Concrete edge failure - $V^0_{Rk,c,fi,120}$ (kN)		1.5		
116	Steel Failure without lever arm - $V^0_{Rk,s,fi,120}$ (kN)		**1.1**		
	Steel Failure with lever arm - $M^0_{Rk,s,fi,120}$ (N.m)		1.5		
	Concrete edge failure - $V^0_{Rk,c,fi,120}$ (kN)		2.5		
100	Steel Failure without lever arm - $V^0_{Rk,s,fi,120}$ (kN)			3.5	
	Steel Failure with lever arm - $M^0_{Rk,s,fi,120}$ (N.m)			5.5	
	Concrete edge failure - $V^0_{Rk,c,fi,120}$ (kN)			**2.1**	
140	Steel Failure without lever arm - $V^0_{Rk,s,fi,120}$ (kN)			**3.5**	
	Steel Failure with lever arm - $M^0_{Rk,s,fi,120}$ (N.m)			5.5	
	Concrete edge failure - $V^0_{Rk,c,fi,120}$ (kN)			3.7	
128	Steel Failure without lever arm - $V^0_{Rk,s,fi,120}$ (kN)				6.6
	Steel Failure with lever arm - $M^0_{Rk,s,fi,120}$ (N.m)				14.0
	Concrete edge failure - $V^0_{Rk,c,fi,120}$ (kN)				**3.4**
172	Steel Failure without lever arm - $V^0_{Rk,s,fi,120}$ (kN)				6.6
	Steel Failure with lever arm - $M^0_{Rk,s,fi,120}$ (N.m)				14.0
	Concrete edge failure - $V^0_{Rk,c,fi,120}$ (kN)				**5.7**

NOTE: Bold values indicate limiting load. Data in table lists all possible failure mechanism due to fire.
Note: Concrete edge failure values are based on 20 MPa concrete strength. For values in higher concrete strengths, please multiply $V^0_{Rk,c,fi,120}$ by the concrete compressive strength effect X_{nc}, as follows;

f'_c (MPa)	20	30	40	50
X_{nc}	1	1.22	1.41	1.55