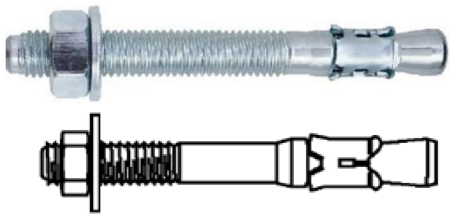
TECHNICAL DATA SHEET

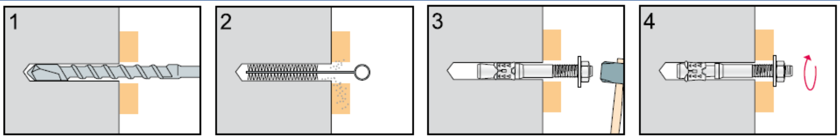
FM753
FM753 CRACK
OPTION 1

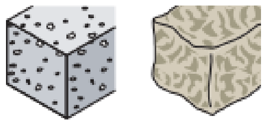


PRODUCT DESCRIPTION

Heavy duty through anchor for cracked and un-cracked concrete.

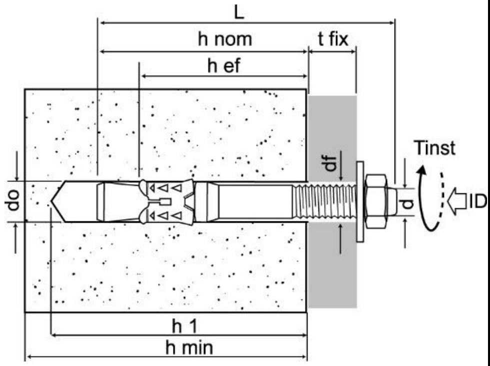
APPLICATION





LENGTH OF SCREWS

d	*size* d x L	ID	tfix [mm]	do [mm]	h1 [mm]	hnom [mm]	hef [mm]	df [mm]	hmin [mm]	Tinst [Nm]	Sw
M8	M8x68	A	4	8	70	54	48	9	100	20	13
	M8x75	B	10								
	M8x90	C	25								
	M8x115	D	50								
	M8x135	E	70								
	M8x165	G	100								
M10	M10x90	A	10	10	80	67	60	12	120	40	17
	M10x105	B	25								
	M10x115	C	35								
	M10x135	D	55								
	M10x155	E	75								
	M10x185	F	105								
M12	M12x110	A	10	12	100	81	72	14	150	60	19
	M12x120	B	20								
	M12x145	C	45								
	M12x170	D	70								
	M12x200	E	100								
M16	M16x130	A	10	16	115	97	86	18	170	120	24
	M16x150	B	30								
	M16x185	C	60								
	M16x220	D	100								



tfix = *fixture thickness*
do = *hole diameter*
h1 = *minimum hole depth*
hnom = *nominal embedment depth*
hef = *minimum depth of anchorage*
df = *hole diameter of fixing element*
hmin = *minimum support thickness*
Tinst = *torque*
d = *screw diameter*
L = *anchor length*
sw = *wrench*
ID = *ident. mark, product length*

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Anchor body characteristics

Anchor diameter			M8	M10	M12	M16
Tensile stressed cross-section	$A_{s,N}$	[mm²]	26,4	43,0	60,8	109,4
Shear stressed cross-section	$A_{s,V}$	[mm²]	36,6	58	84,3	157
Bending moment - Galvanized steel anchor body grade 9.8	M	[Nm]	16	32	56	143
Bending moment - Stainless steel A4 anchor body	M	[Nm]	13	27	47	120

EUROPEAN TECHNICAL APPROVAL ETA-09/0056

FM-753 CRACK 3DG

DESIGN[1)] and RECOMMENDED[2)] LOADS

Single anchor with large anchor spacing and edge distances in concrete C20/25

Anchor diameter				M8	M10	M12	M16
Depth of anchorage		h_{ef}	[mm]	48	60	72	86
Tensile - cracked concrete		$N_{rd,cr}^{(1)}$	[kN]	**4,0**	**8,0**	**10,7**	**13,3**
		$N_{cr}^{(2)}$	[kN]	**2,9**	**5,7**	**7,6**	**9,5**
Tensile - un-cracked concrete		$N_{rd,ucr}^{(1)}$	[kN]	**6,0**	**10,7**	**13,3**	**23,3**
		$N_{ucr}^{(2)}$	[kN]	**4,3**	**7,6**	**9,5**	**16,7**
Increasing factor for tensile load	*concrete C30/37* $\psi_{c\,c,C30/37}$		[-]	1,22			
	concrete C40/50 $\psi_{c\,c,C40/50}$		[-]	1,41			
	concrete C50/60 $\psi_{c\,c,C50/60}$		[-]	1,55			
Spacing		$S_{cr,N}$	[mm]	140	180	220	260
Edge distance		$C_{cr,N}$	[mm]	70	90	110	130
Shear $^{(3)}$ ***C ≥ 10xh***$_{ef}$		$V_{rd}^{(1)}$	[kN]	**8,6**	**16,1**	**22,5**	**44,3**
		$V^{(2)}$	[kN]	**6,1**	**11,5**	**16,1**	**31,6**

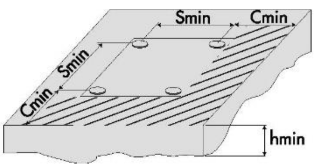
1kN = 100 kgf

(1) *The design loads N_{rd} and V_{rd} derive from the characteristic loads on the ETA-09/0056 certification and are inclusive of the partial safety factors γ_m proportional to each diameter (see ETA).*

(2) *The recommended loads N and V derive from the characteristic loads on the ETA-09/0056 certification and are inclusive of the partial safety factors γ_f=1,4 and γ_m proportional to each diameter (see ETA).*

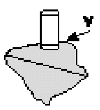
(3) *Shear values valid with distance from the edge C ≥10xhef.*

Minimum installation distances



Anchor diameter			M8	M10	M12	M16
Minimum distance from edge	C_{min}	[mm]	50	60	70	85
	per / for S ≥	[mm]	75	120	150	170
Minimum distance between anchors	S_{min}	[mm]	50	60	70	80
	per / for C ≥	[mm]	65	80	90	120

Example (according to annex C of the ETAG 001)of shear load across the C20/25 concrete edge at a distance of Cmin



Anchor diameter			M8	M10	M12	M16
Shear C = C$_{min}$ *cracked concrete*	$V_{rd,cmin}$	[kN]	3,2	4,4	5,8	8,1
	V_{cmin}	[kN]	2,3	3,2	4,1	5,8

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FIRE RESISTANCE

Characteristic Fire Resistance (all direction)

Anchor diameter			**M8**	**M10**	**M12**	**M16**
Characteristic Fire Resistance = **30 min.**	$F_{Rk,s,fi,30}$	[kN]	0,4	0,9	1,7	3,1
Characteristic Fire Resistance = **60 min.**	$F_{Rk,s,fi,60}$	[kN]	0,3	0,8	1,3	2,4
Characteristic Fire Resistance = **90 min.**	$F_{Rk,s,fi,90}$	[kN]	0,3	0,6	1,1	2,0
Characteristic Fire Resistance = **120 min.**	$F_{Rk,s,fi,120}$	[kN]	0,2	0,5	0,8	1,6
Spacing	$S_{cr,N,fi}$	[mm]	192	240	288	384
Edge distance	$C_{cr,N,fi}$	[mm]	96	120	144	192

SEISMIC RESISTANCE

Seismic Resistance for Category C1

Anchor diameter			M8	M10	M12	M16
Tensile in concrete for C20/25 Seismic Category C1	$N_{rd,seis\ C1}$ (1)	[kN]	4,0	8,0	10,7	13,3
	$N_{seis\ C1}$ (2)	[kN]	2,9	5,7	7,6	9,5
Shear for Seismic Category C1	$V_{rd,s,seis\ C1}$ (1)	[kN]	5,1	11,3	20,3	38,4
	$V_{s,seis\ C1}$ (2)	[kN]	3,7	8,1	14,5	27,4

Seismic Resistance for Category C2

Anchor diameter			M8	M10	M12	M16
Tensile in concrete for C20/25 Seismic Category C1	$N_{rd,seis\ C1}$ (1)	[kN]	-	2,2	7,9	13,3
	$N_{seis\ C1}$ (2)	[kN]	-	1,6	5,6	9,5
Shear for Seismic Category C1	$V_{rd,s,seis\ C1}$ (1)	[kN]	-	7,9	12,9	20,8
	$V_{s,seis\ C1}$ (2)	[kN]	-	5,7	9,2	14,9

(1) $N_{rd,seis}$ e $V_{rd,seis}$ = *Design loads under seismic action (included γ_m=1,5 see ETA)*

(2) N_{seis} e V_{seis} = *Recommended loads under seismic action (included $\gamma_m x \gamma_f$=1,5x1,4 see ETA)*

CALCULATION OF DESIGN SEISMIC RESISTANCE

Tensile load $N_{d,seis} = \alpha_{gap} \cdot \alpha_{seis} \cdot N^0_{rd,seis}$

Shear load $V_{d,seis} = \alpha_{gap} \cdot \alpha_{seis} \cdot V^0_{rd,seis}$

α_{gap} - α_{se} = *see reduction factors on the table under;*

$N^0_{rd,seis}$ - $V^0_{rd,seis}$ = *lowest value among the tables above and other failure modes see ETA-09/0056 and CEN/TS 1992-4.*

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Reduction factors for resistance under seismic actions		***Tension failure***					***Shear failure***		
		Steel [$N_{Rk,s}$]	*Pull-out* [$N_{Rk,p}$]	*Comb.* [$N_{Rk,p-c}$]	*Concr. cone* [$N_{Rk,c}$]	*Splitting* [$N_{Rk,sp}$]	*Steel* [$V_{Rk,s}$]	*Concr. Edge* [$V_{Rk,c}$]	*Pry-out* [$V_{Rk,cp}$]
α_{gap}	*Reduction factor for gap hole fixture and fasteners*	1,00	1,00	1,00	1,00	1,00	0,50*	0,50*	0,50*
α_{seis}	*Reduction factor for single fasteners*	1,00	1,00	1,00	0,85	1,00	1,00	1,00	0,85
	Reduction factor for fasteners group	1,00	0,85	0,85	0,75	0,85	0,85	0,85	0,75

* α_{gap} *= 1,0 in case of no clearance between fastener and fixture.*

Recommended seismic performance categories for anchors

Seismicity level [a)]		***Importance Class acc. to EN 1998-1:2004, 4.2.5***			
	$a_g \cdot S$ [c)]	**I**	**II**	**III**	**IV**
Very low [b)]	$a_g \cdot S \leq 0{,}05$ g	*No additional requirement*			
Low [b)]	$0{,}05$ g $< a_g \cdot S \leq 0{,}1$ g	C1	C1 [d)] or C2 [e)]		C2
> Low [b)]	$a_g \cdot S > 0{,}1$ g	C1	C2		

[a)] The values defining the seismicity levels may be found in the National Annex of EN 1998-1 (Eurocode 8)
[b)] Definition according to EN 1998-1:2004, 3.2.1.
[c)] a_g = Design ground acceleration on type A ground (EN 1998-1:2004, Table 3.2.1)
S = Soil factor (see e.g. EN 1998-1:2004, 3.2.2)
[d)] C1 for fixing non-structural elements to structure
[e)] C2 for fixing structural elements to structure

For additional information see ETA certifications.
The load values are only valid if the installation has been carried out correctly. The design engineer is responsible for the designing and calculation of the fixing.

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EUROPEAN TECHNICAL APPROVAL ETA-10/0293

FM-753 CRACK A4

DESIGN[1)] and RECOMMENDED[2)] LOADS

Single anchor with large anchor spacing and edge distances in concrete C20/25

Anchor diameter				M8	M10	M12	M16
Depth of anchorage		h_{ef}	[mm]	48	60	72	86
Tensile - cracked concrete		$N_{rd,cr}^{(1)}$	[kN]	**3,3**	**6,0**	**8,0**	**16,7**
		$N_{cr}^{(2)}$	[kN]	**2,4**	**4,3**	**5,7**	**11,9**
Tensile - un-cracked concrete		$N_{rd,ucr}^{(1)}$	[kN]	**6,0**	**10,7**	**13,3**	**23,3**
		$N_{ucr}^{(2)}$	[kN]	**4,3**	**7,6**	**9,5**	**16,7**
Increasing factor for tensile load	*concrete C30/37* $\psi_{c\,c,C30/37}$		[-]	1,22			
	concrete C40/50 $\psi_{c\,c,C40/50}$		[-]	1,41			
	concrete C50/60 $\psi_{c\,c,C50/60}$		[-]	1,55			
Spacing		$S_{cr,N}$	[mm]	144	180	216	258
Edge distance		$C_{cr,N}$	[mm]	72	90	108	129
Shear [(3)] $C \geq 10xh_{ef}$		$V_{rd}^{(1)}$	[kN]	**9,1**	**14,5**	**21,1**	**39,2**
		$V^{(2)}$	[kN]	**6,5**	**10,4**	**15,1**	**28,0**

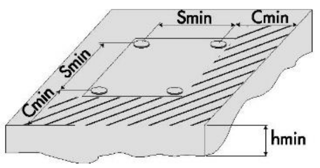
1kN = 100 kgf

(1) *The design loads N_{rd} and V_{rd} derive from the characteristic loads on the ETA-10/0293 certification and are inclusive of the partial safety factors y_m proportional to each diameter (see ETA).*

(2) *The recommended loads N and V derive from the characteristic loads on the ETA-10/0293 certification and are inclusive of the partial safety factors $\gamma_{f\,f}$=1,4 and $\gamma_{f\,m}$ proportional to each diameter (see ETA).*

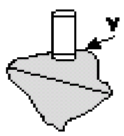
(3) *Shear values valid with distance from the edge C $\geq$10xhef.*

Minimum installation distances



Anchor diameter			M8	M10	M12	M16
Minimum distance from edge	C_{min}	[mm]	50	50	60	70
	per / *for* S ≥	[mm]	50	110	120	130
Minimum distance between anchors	S_{min}	[mm]	50	55	60	70
	per / *for* C ≥	[mm]	50	70	80	100

Example (according to annex C of the ETAG 001)of shear load across the C20/25 concrete edge at a distance of Cmin



Tipo ancorante / *Anchor diameter*			M8	M10	M12	M16
***Shear C = C_{min}** cracked concrete*	$V_{rd,cmin}$	[kN]	3,2	3,5	4,7	6,3
	V_{cmin}	[kN]	2,3	2,5	3,4	4,5

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FIRE RESISTANCE

Characteristic Fire Resistance (all direction)

Anchor diameter			M8	M10	M12	M16
Characteristic Fire Resistance = 30 min.	$F_{Rk,s,fi,30}$	[kN]	0,5	1,1	1,8	3,3
Characteristic Fire Resistance = 60 min.	$F_{Rk,s,fi,60}$	[kN]	0,4	0,9	1,5	2,7
Characteristic Fire Resistance = 90 min.	$F_{Rk,s,fi,90}$	[kN]	0,3	0,7	1,2	2,2
Characteristic Fire Resistance = 120 min.	$F_{Rk,s,fi,120}$	[kN]	0,3	0,6	1,0	1,8
Spacing	$S_{cr,N,fi}$	[mm]	192	240	288	384
Edge distance	$C_{cr,N,fi}$	[mm]	96	120	144	192

SEISMIC RESISTANCE

Seismic Resistance for Category C1

Anchor diameter			M8	M10	M12	M16
Tensile in concrete for C20/25 Seismic Category C1	$N_{rd,seis\ C1}$ (1)	[kN]	**2,7**	**6,0**	**8,0**	**16,7**
	$N_{seis\ C1}$ (2)	[kN]	**2,0**	**4,3**	**5,7**	**11,9**
Shear for Seismic Category C1	$V_{rd,s,seis\ C1}$ (1)	[kN]	**6,2**	**9,5**	**12,2**	**28,2**
	$V_{s,seis\ C1}$ (2)	[kN]	**4,4**	**6,8**	**8,7**	**20,1**

Seismic Resistance for Category C2

Anchor diameter			M8	M10	M12	M16
Tensile in concrete for C20/25 Seismic Category C1	$N_{rd,seis\ C1}$ (1)	[kN]	-	**1,6**	**5,9**	**14,6**
	$N_{seis\ C1}$ (2)	[kN]	-	**1,1**	**4,2**	**10,4**
Shear for Seismic Category C1	$V_{rd,s,seis\ C1}$ (1)	[kN]	-	**9,5**	**12,2**	**28,2**
	$V_{s,seis\ C1}$ (2)	[kN]	-	**6,8**	**8,7**	**20,1**

(1) *Design loads under seismic action (included γ_m=1,5 see ETA)*
(2) *Recommended loads under seismic action (included γ_mxγ_f =1,5x1,4 see ETA)*

CALCULATION OF DESIGN SEISMIC RESISTANCE

Tensile load $N_{d,seis} = \alpha_{gap} \cdot \alpha_{seis} \cdot N^0_{rd,seis}$

Shear load $V_{d,seis} = \alpha_{gap} \cdot \alpha_{seis} \cdot V^0_{rd,seis}$

α_{gap} - α_{se} = *see reduction factors on the table under;*

$N^0_{rd,seis}$ - $V^0_{rd,seis}$ = *lowest value among the tables above and other failure modes see ETA-09/0056 and CEN/TS 1992-4.*

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Reduction factors for resistance under seismic actions		*Tension failure*					*Shear failure*		
		Steel $[N_{Rk,s}]$	*Pull-out* $[N_{Rk,p}]$	*Comb.* $[N_{Rk,p-c}]$	*Concr. cone* $[N_{Rk,c}]$	*Splitting* $[N_{Rk,sp}]$	*Steel* $[V_{Rk,s}]$	*Concr. Edge* $[V_{Rk,c}]$	*Pry-out* $[V_{Rk,cp}]$
α_{gap}	*Reduction factor for gap hole fixture and fasteners*	1,00	1,00	1,00	1,00	1,00	0,50*	0,50*	0,50*
α_{seis}	*Reduction factor for single fasteners*	1,00	1,00	1,00	0,85	1,00	1,00	1,00	0,85
	Reduction factor for fasteners group	1,00	0,85	0,85	0,75	0,85	0,85	0,85	0,75

* α_{gap} *= 1,0 in case of no clearance between fastener and fixture.*

Recommended seismic performance categories for anchors					
Seismicity level [a)]		***Importance Class acc. to EN 1998-1:2004, 4.2.5***			
	$a_g \cdot S$ [c)]	**I**	**II**	**III**	**IV**
Very low [b)]	$a_g \cdot S \leq 0{,}05$ g	*No additional requirement*			
Low [b)]	$0{,}05$ g $< a_g \cdot S \leq 0{,}1$ g	C1	C1 [d)] or C2 [e)]		C2
> Low [b)]	$a_g \cdot S > 0{,}1$ g	C1	C2		

[a)] *The values defining the seismicity levels may be found in the National Annex of EN 1998-1 (Eurocode 8)*
[b)] Definizione secondo EN 1998-1:2004, 3.2.1 / *Definition according to EN 1998-1:2004, 3.2.1.*
[c)] *a_g = Design ground acceleration on type A ground (EN 1998-1:2004, Table 3.2.1)*
S = Soil factor (see e.g. EN 1998-1:2004, 3.2.2)
[d)] *C1 for fixing non-structural elements to structure*
[e)] *C2 for fixing structural elements to structure*

For additional information see ETA certifications.
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OTHER FEATURES

Type	*3DG Brilliant **	*Stainless steel A4*
Anchor body	*Steel grade 9.8*	*Stainless steel AISI 316 (A4* 70)
Clip	*Stainless steel AISI 316 (A4)*	
Hex nut	*DIN 934 grade 8*	DIN 934 A4 80
Washer	DIN 125/1	DIN 125/1 A4
Coating*	10 µm ISO 4042 (*white-brillant*)	-

**Resistance salt spray test 1000 hours ISO 9227 (see technical data sheet of coating)*

FM-753 CRACK 3DG

FM-753 CRACK INOX A4

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