DECLARATION OF PERFORMANCE
DoP no. 1404-CPR-2659 EN

Version: 2 print date: 18.04.2016

1. Unique identification code of the product-type: **SFIX 1 A4**
2. Intended use/es:

Product	**Intended use**
Metal anchors for use in concrete	For fixing and/or supporting to concrete structural elements (which contributes to the stability of the works) or heavy units

3. Manufacturer: **TOX-Dübel-Technik GmbH, Brunnenstraße 31, D-72505 Krauchenwies Ablach**
4. Authorised representative: **--**
5. System/s of AVCP: **1**

6. a) Harmonised standard: **--**
Notified body/ies: --

6. b) European Assessment Document: **ETAG 001-part 1 and 2; edition 2013**
European Technical Assessment: **ETA-13/0825; 11.08.2015**
Technical Assessment Body: **ZAG ZAVOD ZA GRADBENISTVO SLOVENIJE**
Notified body/ies: **ZAG**

7. Declared performance/s:

Mechanical resistance and stability (BWR1)

Essential characteristics	**Performances**
Characteristic resistance for static and quasistatic action and displacements	See Annex C1 - C2
Characteristic resistance for seismic performance category C1	See Annex C3
Characteristic resistance for seismic performance category C2 and displacements	See Annex C4

Safety in case of fire (BWR 2)

Essential characteristics	**Performances**
Reaction to fire	Anchorages satisfy requirements for Class A1
Resistance to fire	See Annex C5

8. Appropriate Technical Documentation and/or Specific Technical Documentation: **--**

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:

i.A. Daniel Wilhelm (Applications Engineering)
Krauchenwies-Ablach, 18.04.2016

Table C1: **Characteristic values for Tension loads in case of static and quasi-static loading for design method A acc. ETAG 001-Annex C or CEN/TS1992-4-4**

Essential characteristics			Performance			
			M8	M10	M12	M16
Installation parameters						
d_0	Nominal diameter of drill bit	[mm]	8	10	12	16
h_{nom}	Anchorage depth	[mm]	54	67	81	97
h_{ef}	Effective anchorage depth	[mm]	48	60	72	86
h_{min}	Minimum thickness of concrete member	[mm]	100	120	150	170
T_{inst}	Torque moment	[Nm]	20	40	60	120
s_{min}	Minimum spacing	[mm]	50	55	60	70
for c ≥	Edge distance	[mm]	50	70	80	100
c_{min}	Minimum edge distance	[mm]	50	50	60	70
for s ≥	Spacing	[mm]	50	110	120	130
Tension steel failure mode						
$N_{Rk,s}$	Characteristic tension steel failure	[kN]	21	34	49	88
γ_{MsN}	Partial safety factor	[-]	1,5			
Pull-out failure mode						
$N_{Rk,p}$	Characteristic pull-out failure in non-cracked concrete	[kN]	9	16	20	35
$N_{Rk,p}$	Characteristic pull-out failure in cracked concrete	[kN]	5	9	12	25
γ_2	Partial safety factor	[-]	1,0			
γ_{Mp}		[-]	1,5			
$s_{cr,N}$	Characteristic spacing	[mm]	3 x h_{ef}			
$c_{cr,N}$	Characteristic edge distance	[mm]	1,5 x h_{ef}			
ψ_C **C30/37**	Increasing factor for $N_{Rk,p}$ in non-cracked concrete	[-]	1,22			
ψ_C **C40/50**		[-]	1,41			
ψ_C **C50/60**		[-]	1,55			
Concrete Cone failure mode						
k_{cr}	Factor for cracked concrete CEN/TS 1992-4-4 §. 6.2.1.4	[-]	7,2			
k_{ucr}	Factor for un-cracked concrete CEN/TS 1992-4-4 §. 6.2.1.4	[-]	10,1			
γ_{Mc}	Partial safety factor	[-]	1,5			
Splitting failure mode						
$s_{cr,sp}$	Characteristic spacing	[mm]	3 x h_{ef}			
$c_{cr,sp}$	Characteristic edge distance	[mm]	1,5 x h_{ef}			
γ_{Msp}	Partial safety factor	[-]	1,5			
Displacement under tension load						
Non-cracked concrete C20/25						
N	Service tension load	[kN]	4,3	7,6	9,5	16,7
δ_{N0}	Short term displacement	[mm]	0,3	0,4	0,4	0,3
$\delta_{N\infty}$	Long term displacement	[mm]	1,4	1,5	0,9	1,4
Cracked concrete C20/25						
N	Service tension load	[kN]	2,4	4,3	5,7	11,9
δ_{N0}	Short term displacement	[mm]	0,7	0,6	0,7	0,7
$\delta_{N\infty}$	Long term displacement	[mm]	1,4	1,5	0,9	1,4

[1] The pull-out is not decisive

SFIX 1 A4

Design acc. to ETAG 001-Annex C or CEN/TS 1992-4-4
Characteristic resistance under Tension loads – BWR 1

Annex C1

Table C2: **Characteristic values for Shear loads in case of static and quasi-static loading for design method A acc. ETAG 001-Annex C or CEN/TS 1992-4-4**

Essential characteristics			Performance			
			M8	M10	M12	M16
Shear steel failure						
$V_{Rk,s}$	Characteristic shear steel failure	[kN]	11,9	18,8	27,4	51,0
$M^0_{Rk,s}$	Bending moment characteristic failure	[Nm]	24	49	85	216
γ_{MsV}	Partial safety factor	[-]	1,3			
K_2	Factor considering ductility	[-]	0,8			
Shear concrete pry-out and edge failure						
K	Factor in equation (5.6) of ETAG 001 Annex C § 5.2.3.3	[mm]	1,0	2,0		
K_3	Factor in equation (16) of CEN/TS 1992-4-4 § 6.2.2.3	[mm]	1,0	2,0		
l_{ef}	Effective anchorage depth	[mm]	48	60	72	86
d_{nom}	Diameter of anchor	[mm]	8	10	12	16
γ_{Mc}	Partial safety factor	[-]	1,5			
Displacement under shear load						
V	Service shear load	[kN]	6,5	10,4	15,1	28,0
δ_{V0}	Short term displacement	[mm]	0,8	0,9	1,2	2,5
$\delta_{V\infty}$	Long term displacement	[mm]	1,3	1,3	1,8	3,8

SFIX 1 A4

Design acc. to ETAG 001-Annex C or CEN/TS 1992-4-4
Characteristic resistance under Shear loads – BWR 1

Annex C2

Table C3: **Characteristic values for resistance in case of Seismic performance category C1 acc. TR045 "Design of Metal anchor under Seismic Actions"**

Essential characteristics			Performance			
			M8	M10	M12	M16
Tension steel failure						
$N_{Rk,s,seis\ C1}$	Characteristic tension steel failure	[kN]	21	34	49	88
$\gamma_{MsN,seis}$ 1)	Partial safety factor	[-]	1,5			
Pull-out failure mode $N_{Rk,p,seis} = \psi_C \times N^0_{Rk,p,seis}$						
$N_{Rk,p,seis\ C1}$	Characteristic pull-out failure in concrete C20/25	[kN]	4,1	9,0	12,0	25,0
$\gamma_{Mp,seis}$ 1)	Partial safety factor	[-]	1,5			
Shear steel failure						
$V_{Rk,s,seisC1}$	Characteristic shear steel failure	[kN]	8,0	12,3	15,8	36,6
$\gamma_{MsV,seis}$ 1)	Partial safety factor	[-]	1,3			

1) The recommended partial safety factors under seismic action ($\gamma_{M,seis}$) are the same as for static loading

SFIX 1 A4

Design according to TR 045
Characteristic resistance under Seismic actions – BWR 1

Annex C3

Table C4: **Characteristic values for resistance in case of Seismic performance category C2 acc. TR045 "Design of Metal anchor under Seismic Actions"**

Essential characteristics			Performance			
			M8	M10	M12	M16
Tension steel failure						
$N_{Rk,s,seis\ C2}$ [2)]	Characteristic tension steel failure	[kN]	21	34	49	88
γ_{MsN} [3)]	Partial safety factor	[-]	1,5			
Pull-out failure $N_{Rk,p,seis} = \psi_C \times N^0_{Rk,seis}$						
$N_{Rk,s,seis\ C2}$ [2)]	Characteristic pull-out failure in concrete C20/25	[kN]	-	2,4	8,8	21,9
γ_{MpN} [3)]	Partial safety factor	[-]	1,5			
$\delta_{N,sei(DLS)}$ [1)2)]	Displacement at DLS	[mm]	-	2,9	4,9	6,3
$\delta_{N,sei(ULS)}$ [1)2)]	Displacement at ULS	[mm]	-	15,8	15,7	21,0
Shear steel failure						
$V_{Rk,s,seis\ C2}$ [2)]	Characteristic shear failure	[kN]	-	12,3	15,8	36,6
γ_{MsV} [3)]	Partial safety factor	[-]	1,3			
$\delta_{V,sei(DLS)}$ [1)2)]	Displacement at DLS	[mm]	-	2,4	5,2	6,0
$\delta_{V,sei(ULS)}$ [1)2)]	Displacement at ULS	[mm]	-	4,1	9,7	10,7

1) The listed displacement represent mean values

2) A smaller displacement may be required in the design in the case of displacement sensitive fastenings or "rigid" supports. The characteristic resistance associated with such smaller displacement may be determined by linear interpolation or proportional reduction.

3) The recommended partial safety factors under seismic action ($\gamma_{M,seis}$) are the same as for static loading

SFIX 1 A4

Design according to TR 045
Characteristic resistance under Seismic actions - BWR 1

Annex C4

Table C5: **Characteristic resistance under Fire exposure for design acc. to TR020**

Essential characteristics			Performance			
			M8	M10	M12	M16
Tension steel failure mode						
$F_{Rk,s,fi,30}$	Duration = 30 minutes	[kN]	0,5	1,1	1,8	3,3
$F_{Rk,s,fi,60}$	Duration = 60 minutes	[kN]	0,4	0,9	1,5	2,7
$F_{Rk,s,fi,90}$	Duration = 90 minutes	[kN]	0,3	0,7	1,2	2,2
$F_{Rk,s,fi,120}$	Duration = 120 minutes	[kN]	0,3	0,6	1,0	1,8
Pull-out failure mode						
$F_{Rk,p,fi,30}$	Duration = 30 minutes	[kN]	1,3	2,3	3,0	6,3
$F_{Rk,p,fi,60}$	Duration = 60 minutes	[kN]	1,3	2,3	3,0	6,3
$F_{Rk,p,fi,90}$	Duration = 90 minutes	[kN]	1,3	2,3	3,0	6,3
$F_{Rk,p,fi,120}$	Duration = 120 minutes	[kN]	1,0	1,8	2,4	5,0
Concrete cone failure mode						
$F_{Rk,c,fi,30}$	Duration = 30 minutes	[kN]	2,9	5,0	7,9	12,3
$F_{Rk,c,fi,60}$	Duration = 60 minutes	[kN]	2,9	5,0	7,9	12,3
$F_{Rk,c,fi,90}$	Duration = 90 minutes	[kN]	2,9	5,0	7,9	12,3
$F_{Rk,c,fi,120}$	Duration = 120 minutes	[kN]	2,3	4,0	6,3	9,9
$s_{cr,N}$	Characteristic spacing	[mm]	$4 \times h_{ef}$			
$c_{cr,N}$	Characteristic edge distance	[mm]	$2 \times h_{ef}$			
s_{min}	Minimum spacing	[mm]	50	50	60	70
c_{min}	Minimum edge distance	[mm]	$c_{min} = 2\ h_{ef}$; if fire attack from more than one side, the edge distance of the anchor has to be $\geq$ 300 mm and $\geq 2\ h_{ef}$			
$\gamma_{M,fi}$	Partial safety factor	[-]	1,0[1)]			
Shear steel failure without lever arm						
$V_{Rk,s,fi,30}$	Duration = 30 minutes	[kN]	0,7	1,5	2,5	4,7
$V_{Rk,s,fi,60}$	Duration = 60 minutes	[kN]	0,6	1,2	2,1	3,9
$V_{Rk,s,fi,90}$	Duration = 90 minutes	[kN]	0,4	0,9	1,7	3,1
$V_{Rk,s,fi,120}$	Duration = 120 minutes	[kN]	0,4	0,8	1,4	2,5
Shear steel failure with lever arm						
$M^0_{Rk,s,fi,30}$	Duration = 30 minutes	[Nm]	0,7	1,9	3,9	10,0
$M^0_{Rk,s,fi,60}$	Duration = 60 minutes	[Nm]	0,6	1,5	3,3	8,3
$M^0_{Rk,s,fi,90}$	Duration = 90 minutes	[Nm]	0,4	1,2	2,6	6,7
$M^0_{Rk,s,fi,120}$	Duration = 120 minutes	[Nm]	0,4	1,0	2,1	5,3
Shear concrete pry-out failure						
k	Factor in equation (5.6) of ETAG Annex C § 5.2.3.3	[mm]	1,0	2,0		
Shear concrete edge failure						
The characteristic resistance $V^0_{Rk,c,fi}$ in C 20/25 to C 50/60 concrete is determined by: $V^0_{Rk,c,fi} = 0,25 \times V^0_{Rk,c}$ ($\leq$ R90) and $V^0_{Rk,c,fi} = 0,20 \times V^0_{Rk,c}$ (R120) with $V^0_{Rk,c}$ initial value of the characteristic resistance in cracked concrete C20/25 under normal temperature acc. ETAG 001, Annex C, 5.2.3.4.						

[1)] In absence of other national regulations

SFIX 1 A4

Design according to TR020
Characteristic resistance under Fire exposure - BWR 2

Annex C5