Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-13/0440 of 21 October 2016

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	SFS intec expansion anchor SFS EX, SFS EX-S, SFS EX-S-H
Product family to which the construction product belongs	Torque controlled expansion anchor for use in concrete
Manufacturer	SFS intec OY Ratastie 18 03100 NUMMELA FINNLAND
Manufacturing plant	Plant Germany
This European Technical Assessment contains	13 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	Guideline for European technical approval of "Metal anchors for use in concrete", ETAG 001 Part 2: "Torque controlled expansion anchors", April 2013, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.

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Specific Part

1 Technical description of the product

The SFS intec expansion anchor SFS EX, SFS EX-S and SFS EX-S-H is an anchor in the sizes M8, M10, M12 and M16 made of galvanised steel (SFS EX), stainless steel (SFS EX-S) or high corrosion resistant steel (SFS EX-S-H). The anchor is placed into a drilled hole and anchored by torque-controlled expansion.

Product and product description is given in Annex A.

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

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

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 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 and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for tension and shear loads as well as bending moments in concrete	See Annex C 1 and C 2
Edge distances and spacing	See Annex C 1
Displacements under tension and shear loads	See Annex C 1 and C 2

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 C 3

3.3 Safety in use (BWR 4)

The essential characteristics regarding Safety in use are included under the Basic Works Requirement Mechanical resistance and stability.

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

In accordance with guideline for European technical approval ETAG 001, April 2013, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011, the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Uwe Bender
Head of Department

beglaubigt:
Baderschneider

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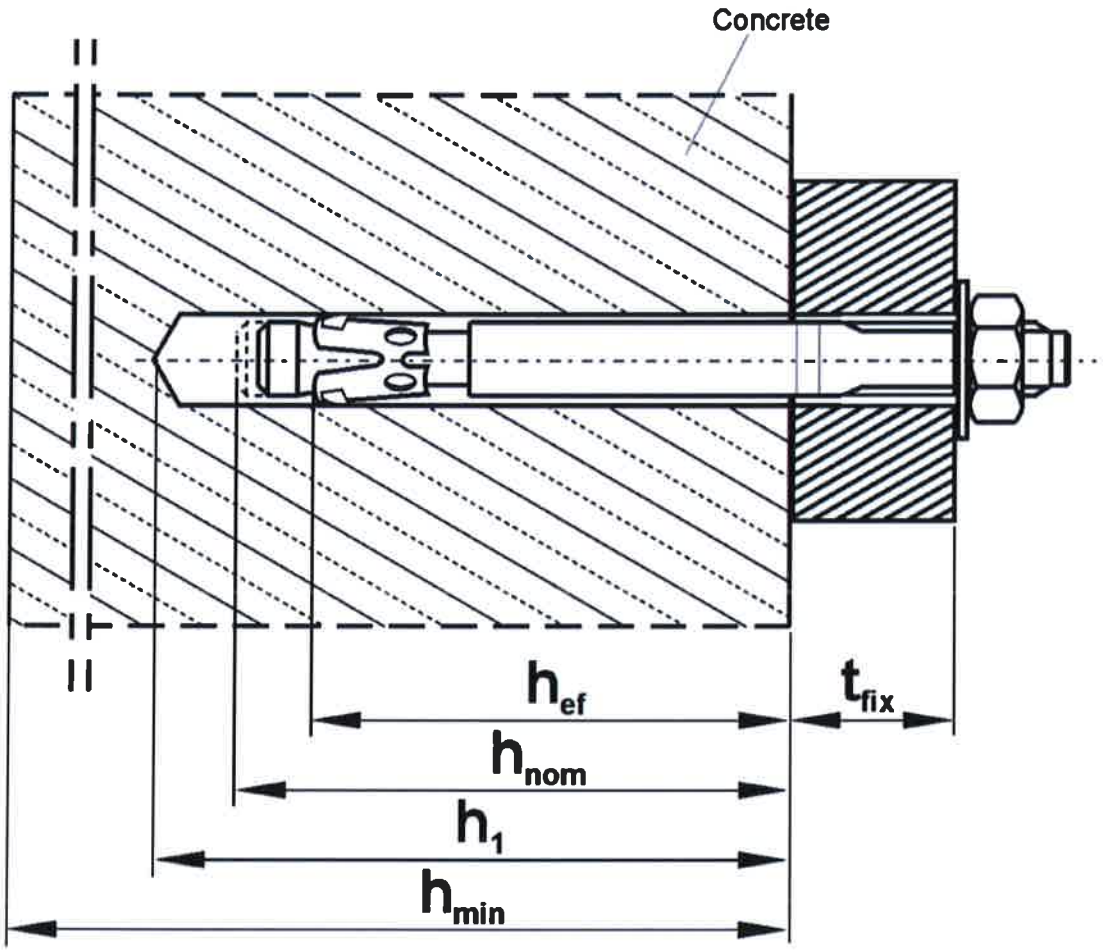
Installed condition of the anchor



SFS intec Wedge anchor SFS EX, SFS EX-S, SFS EX-S-H	Annex A 1
Product description Installed condition of the anchor	

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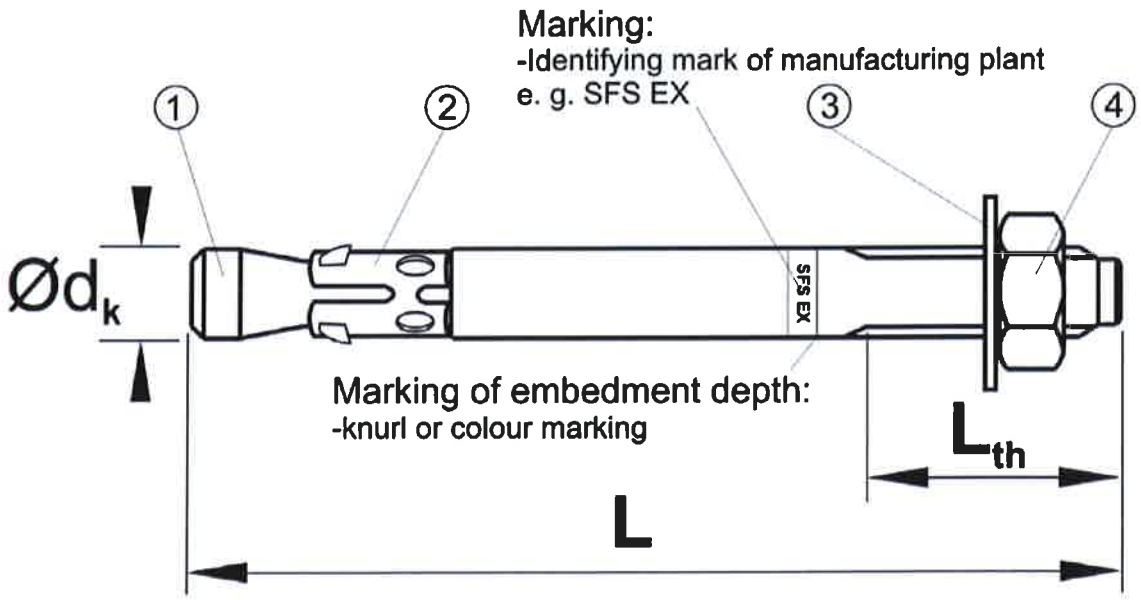

Table A1: Dimensions

Anchor Size	L [mm] min.	L [mm] max.	Threat Size	Threat L_{th}	Ø dk
M8	65	350	M8	25-120	8
M10	70	410	M10	30-120	10
M12	95	555	M12	35-120	12
M16	115	515	M16	40-120	16

SFS intec Wedge anchor SFS EX, SFS EX-S, SFS EX-S-H

Product description
Marking, Dimensions

Annex A 2

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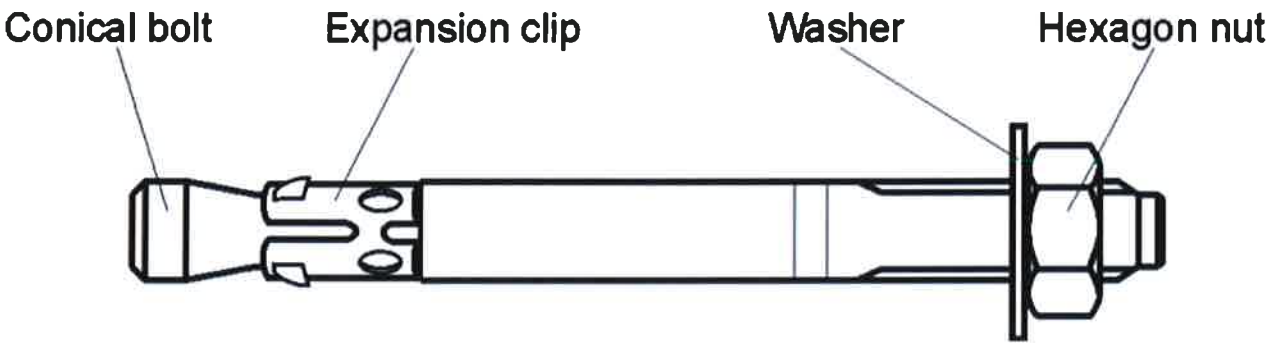
Table A2: Materials

Part	Designation	Material
Version SFS EX – Zinc coated Steel ≥ 5µm (galvanized) EN ISO 4042:1999		
1	Conical Bolt	Steel according to EN 10277-3:2008 or EN 10263-4:2001
2	Expansion Clip	Steel according to EN 10149-2:2013
3	Washer	Steel according to EN 10025-2:2004
4	Hexagon nut ((EN ISO 4032:2012)	Property Class 8 according to EN ISO 898-2:2012
Version SFS EX-S – Stainless Steel A4		
1	Conical Bolt	Stainless Steel 1.4401; 1.4404; 1.4571, 14578 according to EN 10088:2014; Property Class 70 according to EN ISO 3506-1:2009
2	Expansion Clip	Stainless Steel 1.4401; 1.4404; 1.4571 according to EN 10088:2014
3	Washer	Stainless Steel 1.4401; 1.4404; 1.4571 according to EN 10088:2014
4	Hexagon nut	Stainless Steel 1.4401; 1.4404; 1.4571 according to EN 10088:2014; Property Class 70 according to EN ISO 3506-2:2009
Version SFS EX-S-H – High Corrosion Resistant Steel (HCR)		
1	Conical Bolt	Stainless Steel 1.4529; 1.4565 according to EN 10088:2014; Property Class according to 70 EN ISO 3506-1:2009
2	Expansion Clip	Stainless Steel 1.4401; 1.4404; 1.4571 according to EN 10088:2014;
3	Washer	Stainless Steel 1.4529 according to EN 10088:2014
4	Hexagon nut	Stainless Steel 1.4529 according to EN 10088:2014; Property Class 70 according to EN ISO 3506-2:2009



Anchor Size			M 8	M 10	M 12	M 16
Nominal characteristic steel ultimate strength	f_{uk} [N/mm²]	SFS-EX	740	740	740	740
		SFS-EX-S, SFS-EX-H	700	700	700	700
Nominal characteristic steel yield strength	f_{yk} [N/mm²]	SFS-EX	620	620	620	620
		SFS-EX-S, SFS-EX-H	450	450	450	450

SFS intec Wedge anchor SFS EX, SFS EX-S, SFS EX-S-H

Product description
Materials

Annex A 3

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Specification of Intended Use

Anchorages subject to:

- Static or Quasi-static load
- Fire exposure

Base Materials:

- Reinforced or Unreinforced normal weight concrete according to EN 206-1:2000-12
- Strength Class C20/25 to C50/60 according to EN 206-1:2000-12
- Cracked and Non-Cracked concrete

Use Condition (Environmental Conditions):

- Structures Subject to dry internal conditions
  (zinc coated steel, Stainless Steel, High Corrosion resistant Steel)
- Structures Subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist
  (Stainless Steel, High Corrosion resistant Steel)
- Structures Subject to external atmospheric exposure and to permanently damp internal condition, if particular aggressive conditions exist
  (High Corrosion resistant Steel)

Note: 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 Installation:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work
- 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 (e.g. position of the anchor relative to the reinforcement or to supports, etc.)
- Anchorages under static or quasi-static actions are designed in accordance with:
  - ETAG001, Annex C, Design Method A, August 2010
- Anchorages under fire exposure are designed in accordance with:
  - ETAG 001, Annex C, design method A, Edition August 2010 and EOTA Technical Report TR 020, Edition May 2004 or
  - It must be ensured that local spalling of the concrete cover does not occur

Installation:

- Hole drilling by Hammer drilling
- Anchor installation carried out by appropriately qualified person and the supervision of the person responsible for technical matters of the side
- Use of the anchor only as supplied by the manufacturer without exchanging the components of the anchor,

SFS intec Wedge anchor SFS EX, SFS EX-S, SFS EX-S-H	Annex B 1
Intended Use Specifications	

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Table B1: Installation Parameters

Anchor Size			M8	M10	M12	M16
Nominal drill hole diameter	d_0 =	mm	8	10	12	16
Cutting Diameter of the drill bit	$d_{cut} \leq$	mm	8,45	10,45	12,5	16,5
Depth of drill hole	$h_1 \geq$	mm	65	70	90	110
Anchor embedment depth	h_{nom}	mm	55	60	80	100
Effective anchorage depth	h_{ef}	mm	45	50	65	80
Thickness of the Fixture	t_{fix}	mm	1-285	1-340	1-460	1-400
Diameter of clearance hole in the fixture	$d_f \leq$	mm	9	12	14	18
Torque moment for non-cracked concrete	T_{inst} =	Nm	15	30	50	100
Torque moment for cracked concrete	T_{inst} =	Nm	20	40	65	130

Table B2: Minimum thickness of the concrete member, minimum spacing and minimum edge distance

Anchor Size			M8	M10	M12	M16
Non cracked concrete						
Minimum thickness of the concrete member	h_{min}	mm	100	100	120	160
Minimum spacing	s_{min}	mm	50	55	100	90
Minimum edge distance	c_{min}	mm	60	100	150	110

SFS intec Wedge anchor SFS EX, SFS EX-S, SFS EX-S-H

Intended Use
Installation parameters, minimum thickness, minimum spacing and edge distance

Annex B 2

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Blow pump ABK

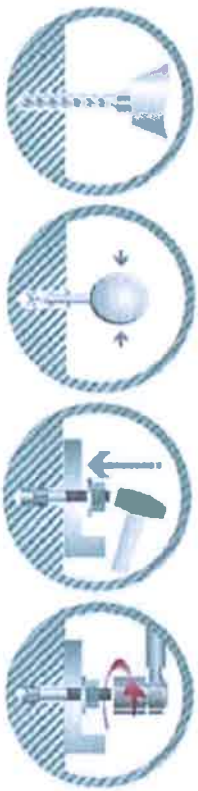
Installation Instructions

- Drill the hole

- Clean the drill hole.

- Set KDK through the fixture and hit it into the drill hole.

- Tight the nut with a torque moment wrench



SFS intec Wedge anchor SFS EX, SFS EX-S, SFS EX-S-H	Annex B 3
Intended Use Installation Instructions	

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Table C1: Characteristic values for tension loads

Anchor Size				M8	M10	M12	M16
Steel Failure – Version SFS EX							
Characteristic resistance	$N_{Rk,S}$		[kN]	18	29	39	73
Steel Failure – Version SFS EX-S / SFS EX-S-H							
Characteristic resistance	$N_{Rk,S}$		[kN]	17	28	40	74
Pullout Failure							
Characteristic resistance $N_{Rk,p}$ In cracked concrete	C20/25		[kN]	3	6	7,5	12
Characteristic resistance $N_{Rk,p}$ In non-cracked concrete	C20/25		[kN]	9	12	16	20
Installation Safety Factor	γ_2		[-]	1,2			
Increasing Factors for $N_{Rk,p}$ for Cracked and non-cracked concrete	ψ_c	C30/37	[-]	1,22			
		C40/50		1,41			
		C50/60		1,55			
Concrete Cone and Splitting Failure							
Effective anchorage depth	h_{ef}		[mm]	45	50	65	80
Spacing	$s_{cr,N}$		[mm]	$3 \times h_{ef}$			
	$s_{cr,sp}$		[mm]	220	240	320	400
Edge Distance	$c_{cr,N}$		[mm]	$1,5 \times h_{ef}$			
	$c_{cr,sp}$		[mm]	110	120	160	200
Installation safety Factor	γ_2		[-]	1,2			

Table C2: Displacement under tension loads

Anchor Size			M8	M10	M12	M16
Tension Load in non-cracked concrete	N	[kN]	1,6	3,0	3,6	6,3
Displacement	δ_{N0}	[mm]	0,4	0,5	0,7	0,7
	$\delta_{N\infty}$	[mm]	0,5	1,0	1,5	1,4

SFS intec Wedge anchor SFS EX, SFS EX-S, SFS EX-S-H

Performance
Characteristic values for tension loads and displacements

Annex C 1

Deutsches Institut für Bautechnik DIBt

Table C3: Characteristic values for shear loads

Anchor Size			M8	M10	M12	M16
Steel Failure without lever arm – Version SFS EX						
Characteristic resistance	$V^0_{Rk,s}$	[kN]	7	15	20	36
Steel Failure without lever arm – Version SFS EX-S / SFS EX-S-H						
Characteristic resistance	$V^0_{Rk,s}$	[kN]	8	14	20	37
Steel Failure with lever arm – Version SFS EX						
Characteristic Bending Moment	$M^0_{Rk,s}$	[Nm]	28	55	90	229
Steel Failure with lever arm – Version SFS EX-S / SFS EX-S-H						
Characteristic Bending Moment	$M^0_{Rk,s}$	[Nm]	26	52	92	233
Concrete Pryout Failure						
Factor k in equation (5.6) of ETAG 001, Annex C, Section 5.2.3.3	k	[-]	1,0		2,0	
Installation Safety Factor	γ_2	[-]	1,0			
Concrete Edge Failure						
Effective length of anchor in shear loading	l_f	[mm]	45	50	65	80
Effective outside Diameter of the anchor	d_{nom}	[mm]	8	10	12	16
Installation Safety Factor	γ_2	[-]	1,0			

Table C4: Displacement under shear load

Anchor Size			M8	M10	M12	M16
Shear Load in non-cracked concrete	V	[kN]	3,2	7,0	9,3	17,4
Displacement	δ_{V0}	[mm]	0,8	1,3	1,5	3,1
	$\delta_{V\infty}$	[mm]	1,2	2,0	2,3	4,7

SFS intec Wedge anchor SFS EX, SFS EX-S, SFS EX-S-H

Performance
Characteristic values for shear loads and displacements

Annex C 2

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Table C5: Characteristic tension loads under fire exposure in cracked and non-cracked concrete C20/25 to C50/60

Anchor Size	SFS EX, SFS EX-S, SFS EX-S-H															
	M8				M10				M12				M16			
Fire Resistance duration R... [min]	30	60	90	120	30	60	90	120	30	60	90	120	30	60	90	120
Steel Failure																
Characteristic Resistance [kN] $N_{Rk,fi} = N_{Rk,s,fi} = N_{Rk,p,fi}$	0,2	0,2	0,2	0,1	0,6	0,5	0,4	0,3	1,1	0,8	0,7	0,6	2,1	1,6	1,4	1,0
Spacing $s_{cr,N,fi}$ [mm]	$4 \times h_{ef}$															
Edge Distance $c_{cr,N,fi}$ [mm]	$2 \times h_{ef}$															
	If fire attack is form more than one side, the edge distance of the anchor has to be ≥300mm.															

SFS intec Wedge anchor SFS EX, SFS EX-S, SFS EX-S-H

Performance
Characteristic values for tension loads under fire exposure

Annex C 3