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-13/0442 of 17 September 2018

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	Sormat Drop in anchor LA+ and LAL+
Product family to which the construction product belongs	Deformation-controlled expansion anchor of sizes M8, M10, M12 and M16 for use in uncracked concrete
Manufacturer	Sormat Oy Harjutie 5 21290 RUSKO FINNLAND
Manufacturing plant	Sormat Plant 7
This European Technical Assessment contains	14 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	EAD 330232-00-0601

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Specific Part

1 Technical description of the product

The Sormat Drop in anchor LA+ and LAL+ in the sizes M8, M10, M12 and M16 is an anchor made of zinc-plated steel which is placed into a drilled hole and anchored by deformation-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 to tension load (static and quasi-static loading)	See Annex C 1
Characteristic resistance to shear load (static and quasi-static loading)	See Annex C 2
Displacements (static and quasi-static loading)	See Annex C 3
Characteristic resistance and displacements for seismic performance categories C1 and C2	No performance assessed

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	No performance assessed

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

In accordance with the European Assessment Document EAD No. 330232-00-0601 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.

Issued in Berlin on 17 September 2018 by Deutsches Institut für Bautechnik

Dr.-Ing. Lars Eckfeldt
p. p. Head of Department

beglaubigt:
Tempel

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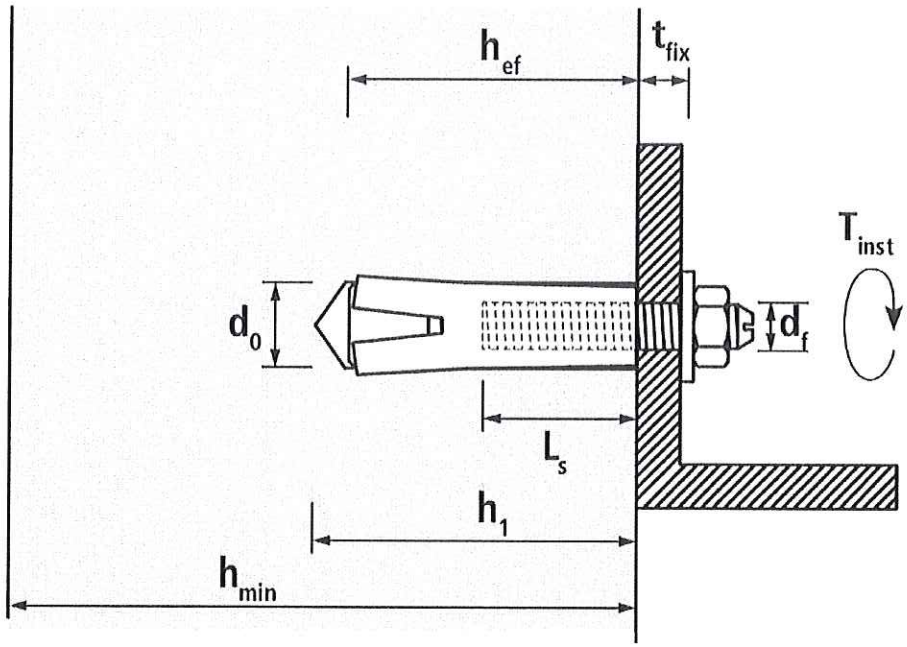
Installation situation in uncracked concrete C20/25 – C50/60



h_1	=	depth of drill hole
h_{ef}	=	effective anchorage depth
t_{fix}	=	thickness of fixture
L_s	=	length of thread inside of the anchor
T_{inst}	=	max. installation torque

Sormat Drop in anchors LA+ and LAL+	**Annex A1**
Product description Installed condition	

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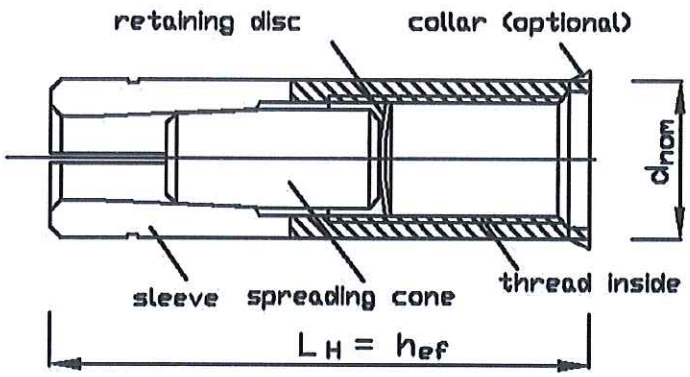
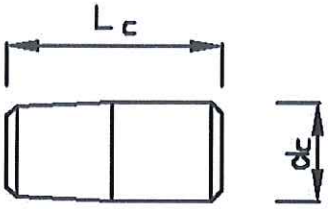
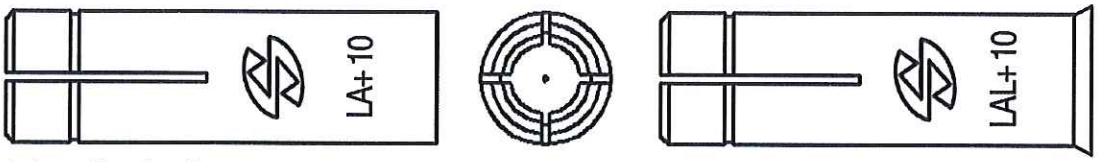
Sormat Drop in anchors LA+ and LAL+



assembled anchor



spreading cone



LA+ without collar

LAL+ with collar

marking:	brand marking type size	Logo or company LA+ / LAL+ i.e. 10
Example:	LA+ 10 LAL+ 10	

Table A2: Dimensions of the anchor

Anchor		Sleeve		Cone	
Type	Thread inside	Length	Outer-ø sleeve	Length	Outer-ø sleeve
LA(L)+		L_H	d_{nom}	L_C	d_C
		[mm]	[mm]	[mm]	[mm]
M 8 x 30	M8	30	10	12	6
M10 x 40	M10	40	12	16	7,5
M12 x 50	M12	50	15	21	9,5
M16 x 65	M16	65	20	26	13

Sormat Drop in anchors LA+ and LAL+	**Annex A2**
Procuct description Product, marking and dimensions	

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Table A3.1: Designation and materials

Designation	Material
Sleeve M8 M10 M12 M16	Steel for cold forming C1008-C1012 or EN 10277 C1015 or EN 10277 C1008-C1012 or EN 10277 C1008-C1012 or EN 10277
Spreading cone	Steel for cold forming C1006-1008
Retaining disc	Paper or plastics

all parts zinc plated and blue passivated ≥ 5 µm acc. EN ISO 4042

Table A3.2: Strength of the sleeve

Sormat Drop in anchors LA(L)+			Size			
			M8	M10	M12	M16
Nominal characteristic steel ultimate strength	f_{uk}	[N/mm²]	535	535	430	430
Nominal characteristic steel yield strength	f_{yk}	[N/mm²]	485	485	390	390

Sormat Drop in anchors LA+ and LAL+	Annex A3
Product description Materials	

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Handsetting tool

Optional: setting tool with size marking and/or rubber grip possible

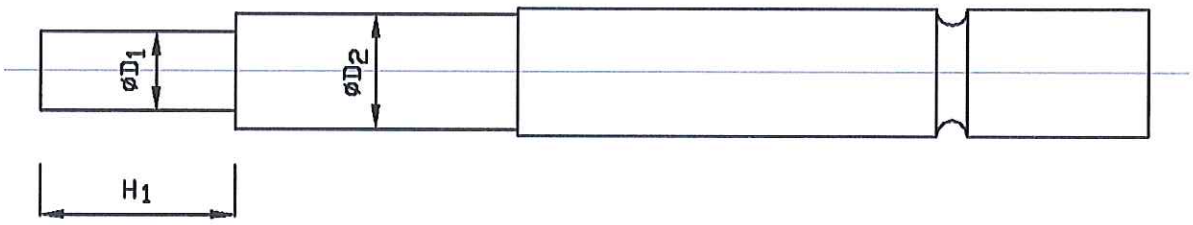

Table A4: Geometry of the setting tool

Setting tool	Setting pin		
Steel HRc 38-42	Dimension		
Type	D_1	D_2	H_1
	[mm]	[mm]	[mm]
ESW 8	6,6	9,5	17,5
ESW 10	8,3	12	23,5
ESW 12	10,2	14	29
ESW 16	13,9	19	39

Sormat Drop In anchors LA+ and LAL+	Annex A4
Product description Setting tools	

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Specifications of Intended use

Anchorages subject to:

- Static and quasi-static loading,

Base materials:

- Reinforced or unreinforced normal weight concrete according to EN 206-1:2000.
- Strength classes C20/25 to C50/60 according to EN 206-1:2000.
- Only in uncracked concrete.

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions.

Design:

- 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 reinforcement or to supports, etc.).
- Anchorages are to be designed in accordance with FprEN 1992-4:2016 and EOTA Technical Report TR 055.

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Create drill hole with hammer drill only.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted drill hole is filled with high strength mortar and only if the hole is not in the direction of the oblique tensile or shear load.
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools.

Sormat Drop in anchors LA+ and LAL+	**Annex B1**
Intended use Specifications	

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Table B2.1: Installation parameters

Fixing screws or anchor rods:
It can be used the strength categories 4.6, 5.6, 5.8 or 8.8 acc. EN ISO 898-1.

Minimal screwing depth:
The lenght of the fixing screw depends on the thickness t_{fix} on the fixed part, permissible tolerances and usable thread length $L_{s,max}$ as well as on the minimal screwing depth $L_{s,min}$.

Sormat Drop in anchors LA(L)+			Size			
			M8	M10	M12	M16
Nominal driller diameter	d_o	[mm]	10	12	15	20
Cutting diameter of drillbit	$d_{cut} \leq$	[mm]	10,45	12,50	15,50	20,55
Diameter of thread	M	[mm]	8	10	12	16
Depth of drill hole (deepest point)	$h_1 \geq$	[mm]	32	43	54	70
Effective anchorage depth	h_{ef}	[mm]	30	40	50	65
Maximum screwing depth	$L_{s,max}$	[mm]	13	16	23	32
Minimum screwing depth	$L_{s,min}$	[mm]	8	10	12	16
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	9	12	14	18
Maximum installation torque moment	max T_{inst}	[Nm]	8	15	35	60

Table B2.2: Minimum thickness of concrete member, spacing and edge distance

Sormat Drop in anchors LA(L)+			Size			
			M8	M10	M12	M16
Minimum thickness of member	h_{min}	[mm]	100	100	120	160
Minimum spacing	s_{min}	[mm]	105	105	125	180
Minimum edge distance	c_{min}	[mm]	105	140	175	230

Sormat Drop in anchors LA+ and LAL+	**Annex B2**
Intended use Installation parameters	

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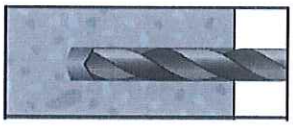
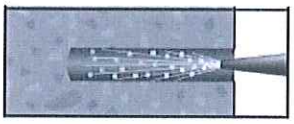
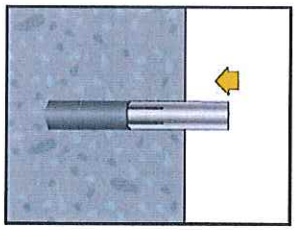
Installation instruction:



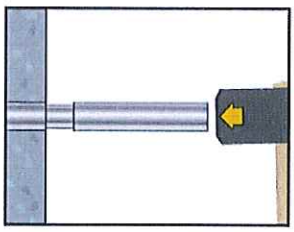
1. Drill the hole with a hammer drill



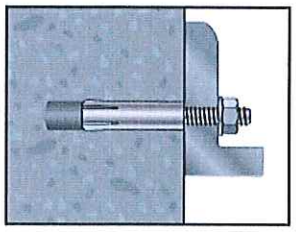
2. Clean the borehole



3. To set the anchor by hand or by hammer blows, anchor should be flush to the concrete edge



4. To spread the anchor with the setting tool. The anchor is installed correctly, if the setting pin is completely inside



5. To fix the fixture, not allowed to pass over the max. installation torque T_{inst}

Sormat Drop In anchors LA+ and LAL+	**Annex B3**
Intended use Installation instruction	

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Table C1: Design method A - Characteristic values for tension loads

Sormat Drop in anchors LA(L)+				size			
Steel failure				**M8**	**M10**	**M12**	**M16**
Characteristic resistance	$N_{Rk,s}$	[kN]	steel 4.6	14,6	23,2	33,7	62,7
Partial safety factor	γ_{Ms}	[-]		2,0			
Characteristic resistance	$N_{Rk,s}$	[kN]	steel 5.6	18,3	29,0	42,1	78,3
Partial safety factor	γ_{Ms}	[-]		2,0			
Characteristic resistance	$N_{Rk,s}$	[kN]	steel 5.8	18,3	22,5	30,8	51,5
Partial safety factor	γ_{Ms}	[-]		1,5			
Characteristic resistance	$N_{Rk,s}$	[kN]	steel 8.8	17,8	22,5	30,8	51,5
Partial safety factor	γ_{Ms}	[-]		1,5			
Pull out failure							
Characteristic resistance in uncracked concrete C 20/25	$N_{Rk,p}$	[kN]		7,5	12	16	30
Increasing factors for $N_{Rk,p}$	Ψ_C	C30/37		1,22	1,11	1,22	
		C40/50		1,41	1,21	1,41	
		C50/60		1,58	1,28	1,58	
Installation safety factor	γ_{inst}	[-]		1,0	1,2		
Concrete cone failure							
Effective anchorage depth	h_{ef}	[mm]		30	40	50	65
Factor k_1	$k_{ucr,N}$	[-]		11,0			
Spacing	$s_{cr,N}$	[mm]		$3 \times h_{ef}$			
Edge distance	$c_{cr,N}$	[mm]		$1,5 \times h_{ef}$			
Installation safety factor	γ_{inst}	[-]		1,0	1,2		
Concrete splitting failure							
Spacing (splitting)	$s_{cr,sp}$	[mm]		210	280	350	460
Edge distance (splitting)	$c_{cr,sp}$	[mm]		105	140	175	230
Installation safety factor	γ_{inst}	[-]		1,0	1,2		

Sormat Drop in anchors LA+ and LAL+	**Annex C1**
Performances Design method A, characteristic values for tension loads	

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Table C2: Design method A - Characteristic values for shear load

Sormat Drop in anchors LA(L)+				size			
Steel failure without lever arm				**M8**	**M10**	**M12**	**M16**
Characteristic shear load resistance	$V^0_{Rk,s}$	[kN]	steel 4.6	7,3	9,5	15,4	25,7
Partial safety factor	γ_{Ms}	[-]		1,67	1,5		
Characteristic shear load resistance	$V^0_{Rk,s}$	[kN]	steel 5.6	8,9	9,5	15,4	25,7
Partial safety factor	γ_{Ms}	[-]		1,5			
Characteristic shear load resistance	$V^0_{Rk,s}$	[kN]	steel 5.8	8,9	9,5	15,4	25,7
Partial safety factor	γ_{Ms}	[-]		1,5			
Characteristic shear load resistance	$V^0_{Rk,s}$	[kN]	steel 8.8	8,9	9,5	15,4	25,7
Partial safety factor	γ_{Ms}	[-]		1,5			
Steel failure with lever arm							
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	steel 4.6	15,0	29,9	52,4	132,8
Partial safety factor	γ_{Ms}	[-]		1,67			
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	steel 5.6	18,7	37,4	65,5	165,9
Partial safety factor	γ_{Ms}	[-]		1,67			
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	steel 5.8	18,7	37,4	65,5	165,9
Partial safety factor	γ_{Ms}	[-]		1,25			
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	steel 8.8	30,0	59,8	104,7	265,5
Partial safety factor	γ_{Ms}	[-]		1,25			
Concrete pryout failure							
Factor	k_8	[-]		1,0			2,0
Installation safety factor	γ_{inst}	[-]		1,0			
Concrete edge failure							
Effective anchor length under shear load	l_f	[mm]		30	40	50	65
Effective external diameter of anchor	d_{nom}	[mm]		10	12	15	20
Installation safety factor	γ_{inst}	[-]		1,0			

Sormat Drop in anchors LA+ and LAL+	**Annex C2**
Performances Design method A, Characteristic values for shear load	

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Table C3.1: Displacements of the anchors under tension loads

Sormat Drop in anchors LA(L)+			M8	M10	M12	M16
Tension load	N	[kN]	3,5	4,8	6,3	11,9
Displacements	δ_{No}	[mm]	0,2			
Displacements	$\delta_{N\infty}$	[mm]	1,3			

Table C3.2: Displacements under shear loads

Sormat Drop in anchors LA(L)+			M8	M10	M12	M16
Shear load	V	[kN]	4,2	4,5	7,3	12,2
Displacements	δ_{Vo}	[mm]	1,4	1,6	2,3	1,0
Displacements	$\delta_{V\infty}$	[mm]	2,1	2,4	3,5	1,5

Sormat Drop in anchors LA+ and LAL+	**Annex C3**
Performances Displacement under tension and shear loads	