Deutsches Institut für Bautechnik DIBt

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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European Technical Assessment

ETA-11/0323 of 3 July 2015

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	Index SLRT
Product family to which the construction product belongs	Torque controlled expansion anchor for use in concrete
Manufacturer	INDEX Técnicas Expansivas S. L. Segador 13. P.I. La Portalada II 26006 LOGROÑO-ESPAÑA SPANIEN
Manufacturing plant	INDEX Plant 1
This European Technical Assessment contains	15 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 Index SLRT is an anchor made of galvanised steel of sizes M6, M8, M10, M12 and M16 which is placed into a drilled hole and anchored by torque-controlled expansion.

The 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 static and quasi static action and seismic performance category C1	See Annex C 1
Displacements	See Annex C 4

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 2 / C 3

3.3 Hygiene, health and the environment (BWR 3)

Not applicable.

3.4 Safety in use (BWR 4)

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

3.5 Protection against noise (BWR 5)

Not applicable.

3.6 Energy economy and heat retention (BWR 6)

Not applicable.

3.7 Sustainable use of natural resources (BWR 7)

The sustainable use of natural resources was not investigated.

3.8 General aspects

The verification of durability is part of testing the essential characteristics. Durability is only ensured if the specifications of intended use according to Annex B are taken into account.

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

According to Decision of the Commission of 24 June 1996 (96/582/EC) (OJ L 254 of 08.10.96 p. 62-65), the system of assessment and verification of constancy of performance (see Annex V and Article 65 Paragraph 2 to Regulation (EU) No 305/2011) given in the following table applies.

Product	Intended use	Level or class	System
Metal anchors for use in concrete (heavy-duty type)	For fixing and/or supporting concrete structural elements or heavy units such as cladding and suspended ceilings	—	1

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

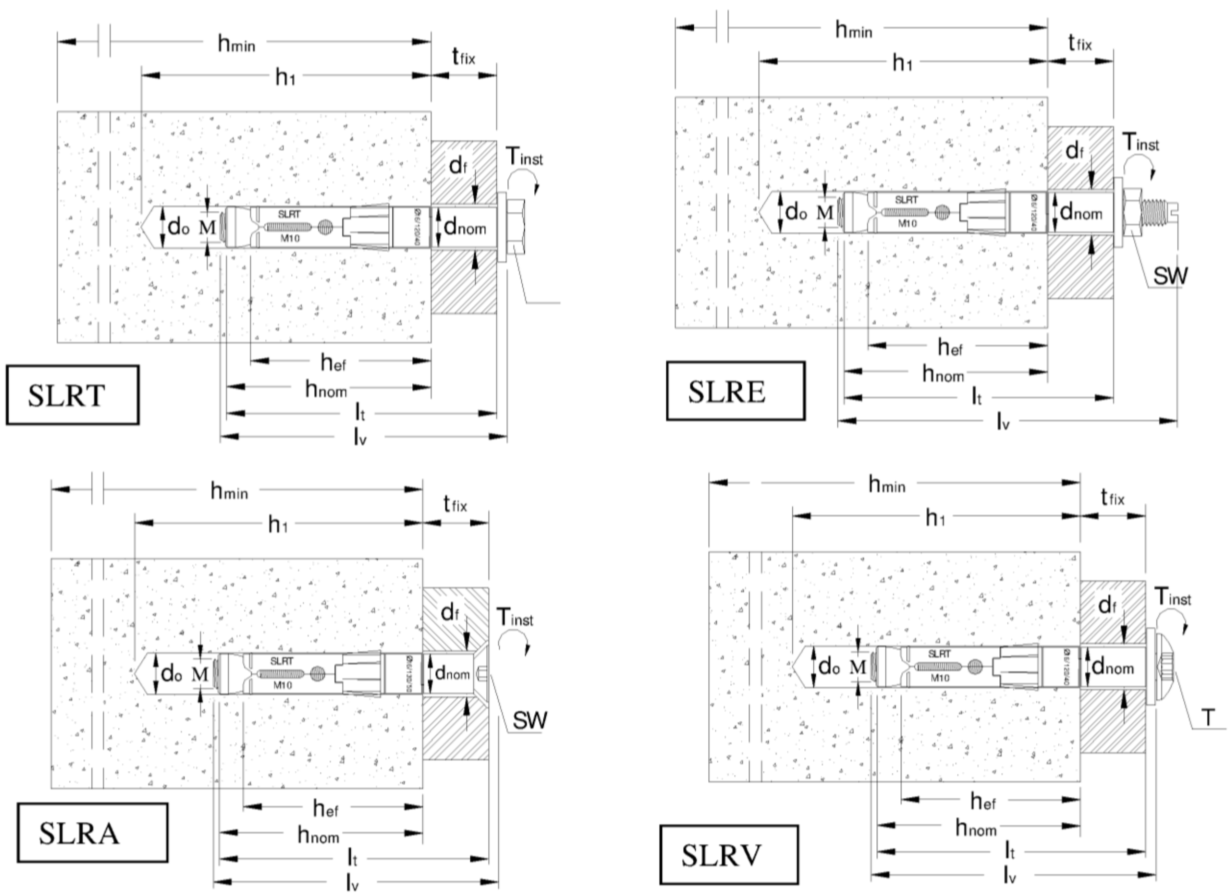
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 3 July 2015 by Deutsches Institut für Bautechnik

Uwe Bender
Head of Department

beglaubigt:
Baderschneider

Installed conditions



Installation details

d_{nom}	Outside diameter of the anchor
T_{inst}	Required torque moment
t_{fix}	Thickness of the fixtures
d_0	Diameter of the drill hole
d_f	Diameter of the clearance hole in the fixture
h_{min}	Minimum thickness of the concrete member
h_{nom}	Overall anchor embedment depth
h_{ef}	Anchorage depth
l_t	Anchor length
l_v	Bolt lenght
T	Hexalobular socket number
SW	Wrench size/Socket size
H	Hexagonal socket

Index SLRT

Product description

Installed condition

Annex A1

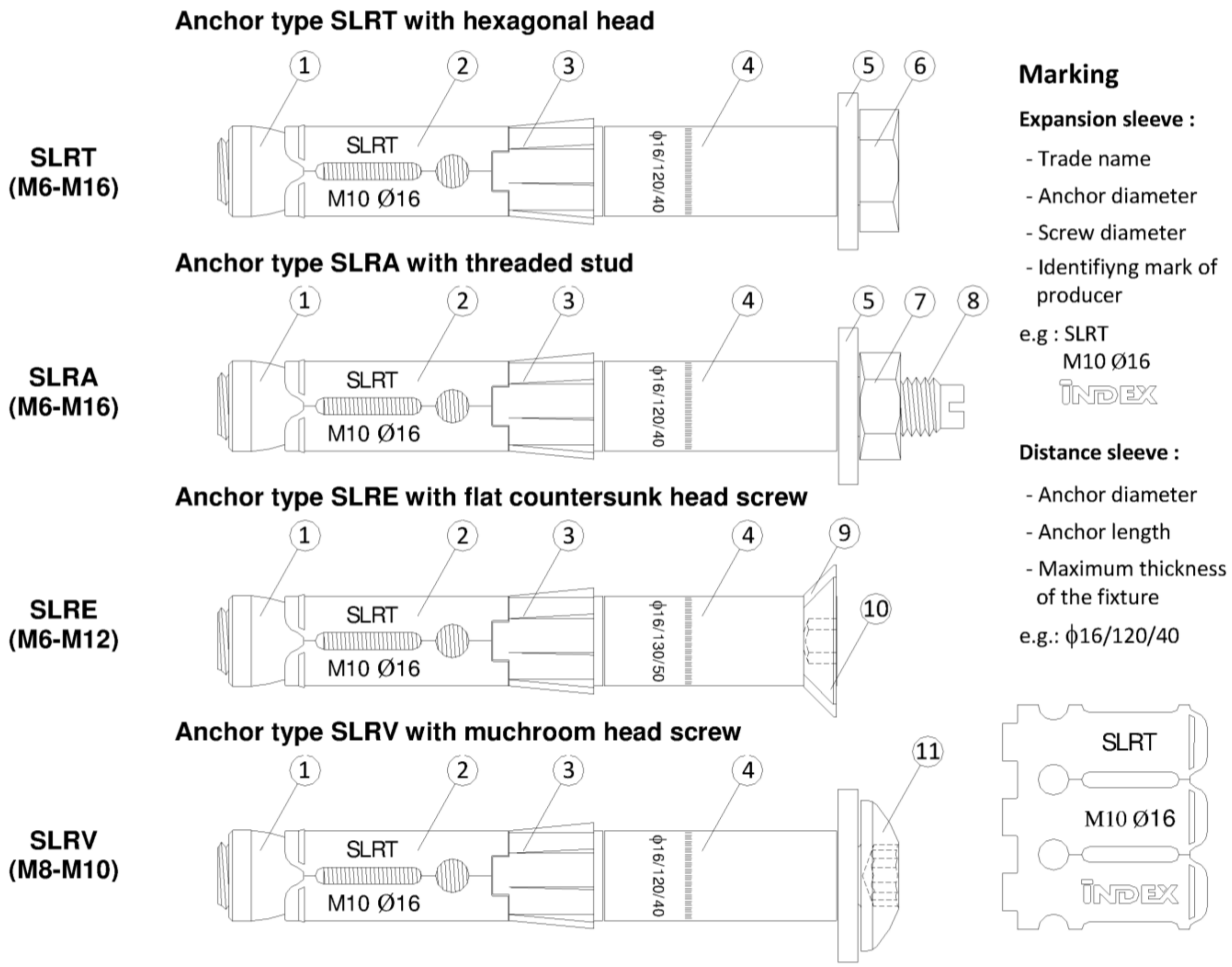


Table A1:Materials

ITEM	Description	Finishing
1	Zinc plated conical steel nut	Materials galvanised ≥ 5 [µm] according to ISO 4042:1999
2	Zinc plated expansion steel sleeve (marking: SLRT / bolt size, e.g. M10)	
3	Nylon 6.6 cylinder with helix, red brick color	
4	Zinc plated steel extension (marking: $d_{nom}/l_t/t_{fix}$, e.g. Ø16/120/40)	
5	Zinc plated steel washer	
6	Zinc plated steel hexagonal head bolt, class 8.8 according to ISO 898-1:2012	
7	Zinc plated steel hexagonal nut, class 8 according to ISO 898-2:2012	
8	Zinc plated steel threaded stud, class 8.8 according to ISO 898-1:2012	
9	Zinc plated steel countersunk washer, according to EN 10083-6:2006	
10	Zinc plated steel flat countersunk head screw, class 8.8 according to ISO 898-1:2012	
11	Zinc plated steel mushroom head screw, class 8.8 according to ISO 898-1:2012	

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Product description
Anchor types and components
Materials

Annex A2

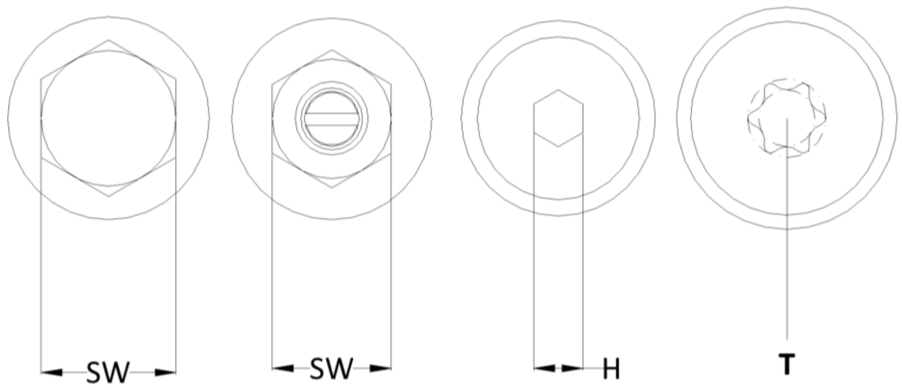


Table A2: SLRT dimensions

Item	Outside diameter of anchor [mm]	Outside diameter of metric thread [mm]	Length range [mm]	Maximum thickness of fixture range [mm]
SLRT-M6	10	6	70 - 120	5 - 15
SLRT-M8	12	8	80 - 140	10 - 70
SLRT -M10	16	10	100 - 160	20 - 80
SLRT -M12	18	12	120 – 200	20 - 100
SLRT -M16	24	16	140 – 220	20 - 100

Table A3: SLRA dimensions

Item	Outside diameter of anchor [mm]	Outside diameter of metric thread [mm]	Length range [mm]	Maximum thickness of fixture range [mm]
SLRA-M6	10	6	70 - 120	5 - 15
SLRA-M8	12	8	80 - 140	10 - 70
SLRA-M10	16	10	100 - 160	20 - 80
SLRA-M12	18	12	120 – 200	20 - 100
SLRA-M16	24	16	140 – 220	20 - 100

Table A4: SLRE dimensions

Item	Outside diameter of anchor [mm]	Outside diameter of metric thread [mm]	Length range [mm]	Maximum thickness of fixture range [mm]
SLRE-M6	10	6	85 - 125	20 - 60
SLRE-M8	12	8	85 - 125	15 - 55
SLRE-M10	16	10	110 - 130	30 - 50
SLRE-M12	18	12	120 - 140	20 - 40

Table A5: SLRV dimensions

Item	Outside diameter of anchor [mm]	Outside diameter of metric thread [mm]	Length range [mm]	Maximum thickness of fixture range [mm]
SLRV -M8	12	8	80 - 120	10 - 50
SLRV -M10	16	10	100 - 120	20 - 40

Index SLRT	**Annex A3**
Product description Anchor's dimensions	

Specifications of intended use

Anchorages subject to:
- Static and quasi-static loads: all sizes
- Seismic action for Performance Category C1: all sizes
- Fire exposure: all sizes

Base materials:
- Reinforced or unreinforced normal weight concrete according to EN 206-1:200.
- Strength classes C20/25 to C50/60 according to EN 206-1:2000.
- Non-cracked or cracked concrete

Use conditions (Environmental conditions):
- Anchorages 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 under static or quasi-static actions and under fire exposure are designed in accordance with:
  - ETAG 001, Annex C, design method A, Edition August 2010;
  - CEN TS CEN/TS 1992-4-1:2009;
- Anchorages under seismic actions (cracked concrete) are designed in accordance with:
  - EOTA Technical Report TR 045, Edition February 2013
  - Anchorages shall be positioned outside of critical regions (e.g. plastic hinges) of the concrete structure
  - Fastening in stand-off installation or with a grout layer are not allowed
- 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
  - CEN/TS 1992-4: 2009, Annex D
  - It must be ensured that local spalling of the concrete cover does not occur

Installation:
- Hole drilling by rotary plus hammer mode
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- 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 hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application.

Index SLRT	**Annex B1**
Intended use Specifications	

Table B1: Installation parameters

Parameter		**SLRT M6**	**SLRT M8**	**SLRT M10**	**SLRT M12**	**SLRT M16**
Nominal drill hole diameter	d_o = [mm]	10	12	16	18	24
Cutting diameter of drill bit	$d_{cut} \leq$ [mm]	10,45	12,50	16,50	18,50	24,55
Effective anchorage depth	h_{ef} = [mm]	55	60	70	90	105
Depth of drill hole	h_1 = [mm]	80	90	100	120	140
Diameter of clearance in the fixture	d_f = [mm]	12	14	18	20	26
Overall anchor embedment depth in the concrete	h_{nom} = [mm]	65	70	80	100	120
Required torque moment	T_{inst} = [Nm]	15	30	50	100	160
Outside diameter of anchor	d_{nom} = [mm]	10	12	16	18	24
Minimum thickness of concrete member	h_{min} = [mm]	110	120	140	180	210
Minimum edge distance	c_{min} = [mm]	70	100	90	175	180
Corresponding spacing	$s \geq$ [mm]	110	160	175	255	290
Minimum spacing	s_{min} = [mm]	55	110	80	135	130
Corresponding edge distance	$c \geq$ [mm]	110	145	120	220	240

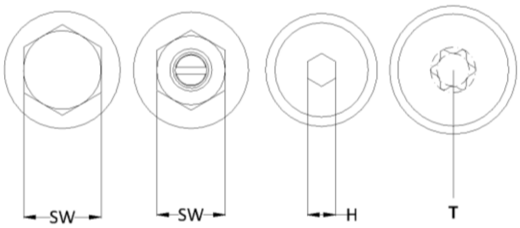


Table B2: Wrenches, sockets and maximum thickness of fixture

Item		**M6**	**M8**	**M10**	**M12**	**M16**
SLRT – Wrench size	SW = [mm]	10	13	17	19	24
SLRT - Thickness of fixture	$t_{fix,max}$ = [mm]	55	70	80	100	100
	$t_{fix,min}$ = [mm]	5	10	20	20	20
SLRA – Wrench size	SW = [mm]	10	13	17	19	24
SLRA - Thickness of fixture	$t_{fix,max}$ = [mm]	55	70	80	100	100
	$t_{fix,min}$ = [mm]	5	10	20	20	20
SLRE – Hexagonal socket size	H = [mm]	4	5	6	8	-
SLRE - Thickness of fixture	$t_{fix,max}$ = [mm]	60	55	50	100	-
	$t_{fix,min}$ = [mm]	20	15	30	20	-
SLRV – Hexalobular socket number	T = [-]	-	40	40	-	-
SLRV - Thickness of fixture	$t_{fix,max}$ = [mm]	-	50	40	-	-
	$t_{fix,min}$ = [mm]	-	10	20	-	-

Index SLRT

Intended use
Installation parameters
Wrenches, sockets and maximum thickness of fixture

Annex B2

Drill bit

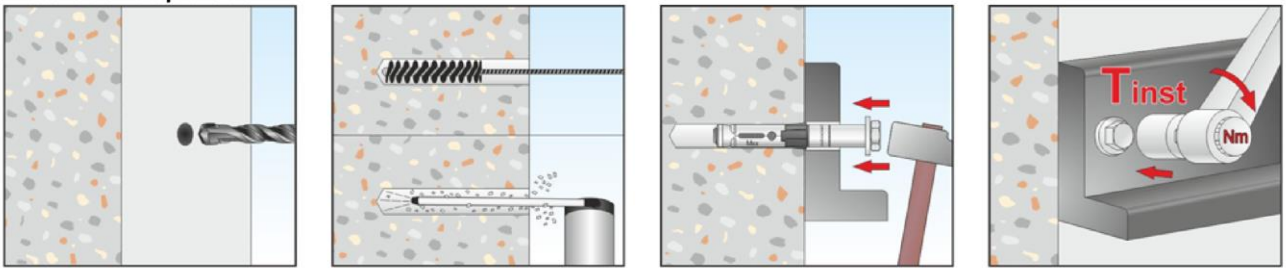
Anchor size	Drill bit item code
M6 / Ø10	**BHDS10160**
M8 / Ø12	**BHDS12160**
M10 / Ø16	**BHDS16210**
M12 / Ø18	**BHDS18210**
M16 / Ø24	**BHDS24210**

Blowing pump

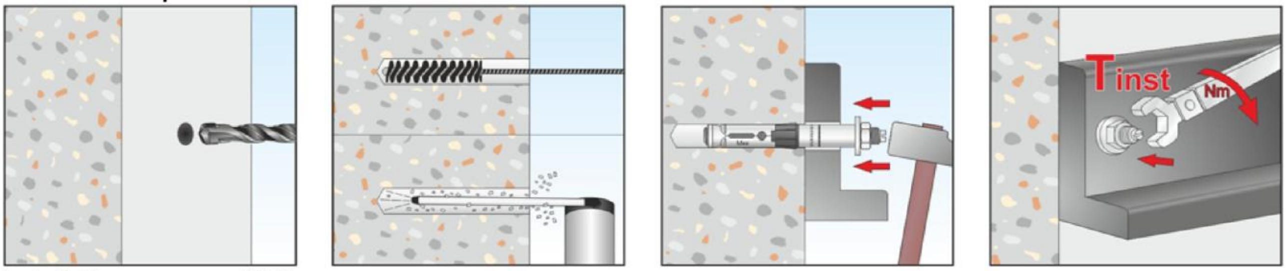
Item code: **MOBOMBA**

Index SLRT	**Annex B3**
Intended use Cleaning and setting tools	

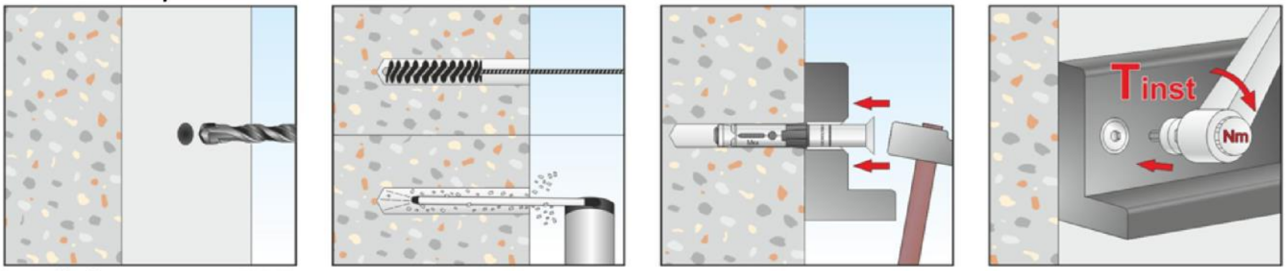
Installation sequence SLRT



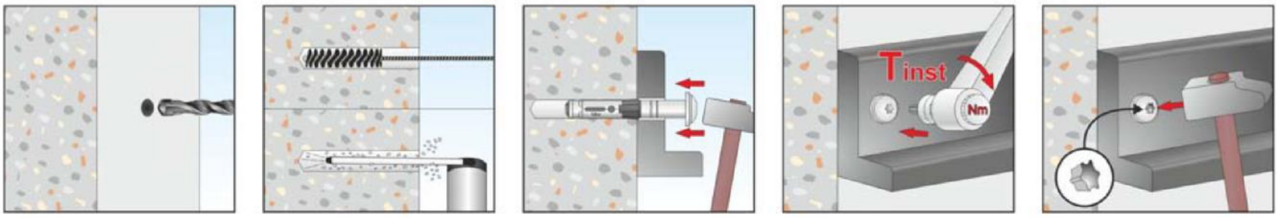
Installation sequence SLRA



Installation sequence SLRE



Installation sequence SLRV



Step 1	Drill a hole into the concrete in rotary plus hammer mode
Step 2	Remove the dust into the hole using a brush and a blowing pump
Step 3	Place the fixture and hammer the anchor in the drill hole
Step 4	Apply the required torque moment

Index SLRT	**Annex B4**
Intended use Installation instructions	

Deutsches Institut für Bautechnik DIBt

Table C1: Performances for design method A (tension)

Type of anchor / Size			SLRT M6	SLRT M8	SLRT M10	SLRT M12	SLRT M16
Steel Failure							
Characteristic Resistance	$N_{Rk,s} = N_{Rk,s,seis,C1}$	[kN]	16	29	46	67	125
Partial safety factor	γ_{Ms} 1)	[-]	1,5				
Pull-out failure							
Effective embedment depth	h_{ef}	[mm]	55	60	70	90	105
Characteristic Resistance in uncracked concrete C20/25	$N_{Rk,p}$	[kN]	16	16	20	35	45
Characteristic Resistance in cracked concrete C20/25	$N_{Rk,p}$	[kN]	5	6	16	25	35
Characteristic Resistance for seismic performance category C1	$N_{Rk,p,seis,C1}$	[kN]	5	4,2	14,4	25	35
Increasing factors for $N_{Rk,p}$ for cracked and uncracked concrete	Ψ_c	C30/37	1,22				
		C40/50	1,41				
		C50/60	1,55				
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0				
Concrete cone failure and splitting failure							
Effective embedment depth	h_{ef}	[mm]	55	60	70	90	105
Spacing	$s_{cr,N}$	[mm]	165	180	210	270	315
Edge distance	$c_{cr,N}$	[mm]	85	90	105	135	160
Spacing(splitting)	$s_{cr,sp}$	[mm]	220	320	240	370	390
Edge distance (splitting)	$c_{cr,sp}$	[mm]	110	160	120	185	195
Factor for uncracked concrete, acc. to CEN/TS 1992-4	k_{ucr}	[-]	10,1				
Factor for cracked concrete, acc. to CEN/TS 1992-4	k_{cr}	[-]	7,2				
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0				

1) In absence of other national regulations.

Table C2: Performances for design method A (shear)

Type of anchor / Size			SLRT M6	SLRT M8	SLRT M10	SLRT M12	SLRT M16
Steel Failure without level arm							
Characteristic Resistance	$V_{Rk,s}$	[kN]	16	25	43	58	107
Characteristic Resistance for seismic performance category C1	$V_{Rk,s,seis,C1}$	[kN]	11,4	17	28	43,5	96,3
Partial safety factor	γ_{Ms} 1)	[-]	1,45				
Steel Failure with level arm							
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	12	30	60	105	266
Partial safety factor	γ_{Ms} 1)	[-]	1,45				
Concrete pryout failure							
Effective embedmen depth	h_{ef}	[mm]	55	60	70	90	105
Factor for pryout failure	$k = k_3$	[-]	1	2	2	2	2
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0				
Concrete edge failure							
Effective achorage legth	l_{ef}	[mm]	55	60	70	90	105
Effective external diameter anchor	d_{nom}	[mm]	10	12	16	18	24
Installation safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,0				

1) In absence of other national regulations.

Index SLRT

Performances

Characteristic resistance to tension loads under static and quasi-static actions and seismic performance category C1

Annex C1

Table C3: Performances under fire exposure in concrete C20/25 to C50/60 (tension)

Duration of fire resistance = 30min			**M6**	**M8**	**M10**	**M12**	**M16**
Steel Failure							
Characteristic Resistance	$N_{Rk,s,fi,30}$	[kN]	0,2	0,4	0,9	1,7	3,1
Pull-out failure							
Characteristic Resistance in concrete C20/25 to C50/60	$N_{Rk,p,fi,30}$	[kN]	1,3	1,5	4,0	6,3	8,8
Concrete cone failure							
Characteristic Resistance in concrete C20/25 to C50/60	$N^0_{Rk,c,fi,30}$	[kN]	4,0	5,0	7,4	13,8	20,3
Duration of fire resistance = 60min			**M6**	**M8**	**M10**	**M12**	**M16**
Steel Failure							
Characteristic Resistance	$N_{Rk,s,fi,60}$	[kN]	0,2	0,3	0,8	1,3	2,4
Pull-out failure							
Characteristic Resistance in concrete C20/25 to C50/60	$N_{Rk,p,fi,60}$	[kN]	1,3	1,5	4,0	6,3	8,8
Concrete cone failure							
Characteristic Resistance in concrete C20/25 to C50/60	$N^0_{Rk,c,fi,60}$	[kN]	4,0	5,0	7,4	13,8	20,3
Duration of fire resistance = 90min			**M6**	**M8**	**M10**	**M12**	**M16**
Steel Failure							
Characteristic Resistance	$N_{Rk,s,fi,90}$	[kN]	0,1	0,3	0,6	1,1	2,0
Pull-out failure							
Characteristic Resistance in concrete C20/25 to C50/60	$N_{Rk,p,fi,90}$	[kN]	1,3	1,5	4,0	6,3	8,8
Concrete cone failure							
Characteristic Resistance in concrete C20/25 to C50/60	$N^0_{Rk,c,fi,90}$	[kN]	4,0	5,0	7,4	13,8	20,8
Duration of fire resistance = 120min			**M6**	**M8**	**M10**	**M12**	**M16**
Steel Failure							
Characteristic Resistance	$N_{Rk,s,fi,120}$	[kN]	0,1	0,2	0,5	0,8	1,6
Pull-out failure							
Characteristic Resistance in concrete C20/25 to C50/60	$N_{Rk,p,fi,120}$	[kN]	1,0	1,2	3,2	5,0	7,0
Concrete cone failure							
Characteristic Resistance in concrete C20/25 to C50/60	$N^0_{Rk,c,fi,120}$	[kN]	3,2	4,0	5,9	11,1	16,3
Spacing	$s_{cr,N}$	[mm]	**4 x h_{ef}**				
	s_{min}		55	110	80	135	130
Edge distance	$c_{cr,N}$		**2 x h_{ef}**				
	c_{min}		c_{min} = 2xh_{ef}; If fire attack comes from more than one side, the edge distance of the anchor has to be ≥ 300mm or ≥ 2 x h_{ef}				

Index SLRT

Performances

Characteristic values for tension loads under fire exposure

Annex C2

Table C4: Performances under fire exposure in concrete C20/25 to C50/60 (shear)

Duration of fire resistance = 30min			**M6**	**M8**	**M10**	**M12**	**M16**
Shear load without lever arm							
Characteristic resistance	$V_{Rk,s,fi,30}$	[kN]	0,3	0,5	1,2	2,1	3,9
Shear load with lever arm							
Characteristic bending resistance	$M^0_{Rk,s,fi,30}$	[Nm]	0,2	0,4	1,1	2,6	6,7
Duration of fire resistance = 60min			**M6**	**M8**	**M10**	**M12**	**M16**
Shear load without lever arm							
Characteristic resistance	$V_{Rk,s,fi,60}$	[kN]	0,3	0,4	1,0	1,6	2,9
Shear load with lever arm							
Characteristic bending resistance	$M^0_{Rk,s,fi,60}$	[Nm]	0,1	0,3	1,0	2,0	5,0
Duration of fire resistance = 90min			**M6**	**M8**	**M10**	**M12**	**M16**
Shear load without lever arm							
Characteristic resi stance	$V_{Rk,s,fi,90}$	[kN]	0,2	0,3	0,8	1,4	2,5
Shear load with lever arm							
Characteristic bending resistance	$M^0_{Rk,s,fi,90}$	[Nm]	0,1	0,3	0,8	1,7	4,3
Duration of fire resistance = 120min			**M6**	**M8**	**M10**	**M12**	**M16**
Shear load without lever arm							
Characteristic resistance	$V_{Rk,s,fi,120}$	[kN]	0,2	0,2	0,6	1,0	1,9
Shear load with lever arm							
Characteristic bending resistance	$M^0_{Rk,s,fi,120}$	[Nm]	0	0,2	0,6	1,3	3,3
Concrete pryout failure							
The characteristic resistance $V_{Rk,cp,fi,Ri}$ in concrete C20/25 to C50/60 is determined by:							
$\mathbf{V_{Rk,cp,fi(90)} = k \times N_{Rk,c,fi(90)}}$ (≤ R90) and $\mathbf{V_{Rk,cp,fi(120)} = k \times N_{Rk,c,fi(120)}}$ (up to R120)							
Concrete edge failure							
The characteristic resistance $V_{Rk,c,fi,Ri}$ in concrete C20/25 to C50/60 is determined by: $\mathbf{V^0_{Rk,c,fi(90)} = 0,25 \times V^0_{Rk,c}}$ (R30, R60, R90) and $\mathbf{V^0_{Rk,c,fi(120)} = 0,20 \times V^0_{Rk,c}}$ (R120) with $V^0_{Rk,c}$ as an initial value of the characteristic resistance of a single anchor in cracked concrete C20/25							

Index SLRT	**Annex C3**
Performances Characteristic values for shear loads under fire exposure	

Table C5 : Displacements

Tension loads in cracked and uncracked concrete			**M6**	**M8**	**M10**	**M12**	**M16**
Service tension load in uncracked concrete C20/25	N	[kN]	7,6	7,6	9,5	16,7	21,4
Displacements	δ_{N0}	[mm]	1,3	1,5	1,0	1,3	1,8
	$\delta_{N\infty}$	[mm]	1,3	1,5	1,0	1,3	1,8
Service tension load in cracked concrete C20/25	N	[kN]	2,4	2,9	7,6	11,9	16,7
Displacements	δ_{N0}	[mm]	1,0	0,7	1,0	1,2	1,5
	$\delta_{N\infty}$	[mm]	1,6	1,3	1,6	1,7	1,5
Shear loads in cracked and uncracked concrete			**M6**	**M8**	**M10**	**M12**	**M16**
Service shear load in cracked and uncracked concrete C20/25	V	[kN]	7,7	12,3	21,0	23,3	52,5
Displacements	δ_{N0}	[mm]	2,4	2,6	2,5	3,0	4,0
	$\delta_{N\infty}$	[mm]	3,6	3,9	3,8	4,5	6,0

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Performances
Displacements

Annex C4