

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-09/0175**  
**of 22 August 2014**

### General Part

Technical Assessment Body issuing the  
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

Vorpa Heavy-duty anchor TOP

Product family  
to which the construction product belongs

Torque controlled expansion anchor for use in  
non-cracked concrete

Manufacturer

VORPA srl  
Via S. Leo 5  
47838 Riccione (RN)  
ITALIEN

Manufacturing plant

VORPA srl  
Via dell'Artigianato, 10  
47838 RICCIONE (RN)  
ITALIEN

This European Technical Assessment  
contains

12 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 Vorpa heavy-duty Anchor TOP (type TOP/TOP A4, type TOP BU/TOP BU A4, type TOP BP) in the range of M6, M8, M10 and M12 is an anchor made of galvanised steel or stainless steel 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 and Displacements under tension loads	See Annex C 1
Characteristic resistance and Displacements under shear loads	See Annex C 2

#### 3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A1
Resistance to fire	No performance determined (NPD)

#### 3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances there may be requirements (e.g. transposed European legislation and national laws, regulations and administrative provisions) applicable to the products falling within the scope of this European Technical Assessment. In order to meet the provisions of Regulation (EU) No 305/2011, these requirements need also to be complied with, when and where they apply.

#### 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.

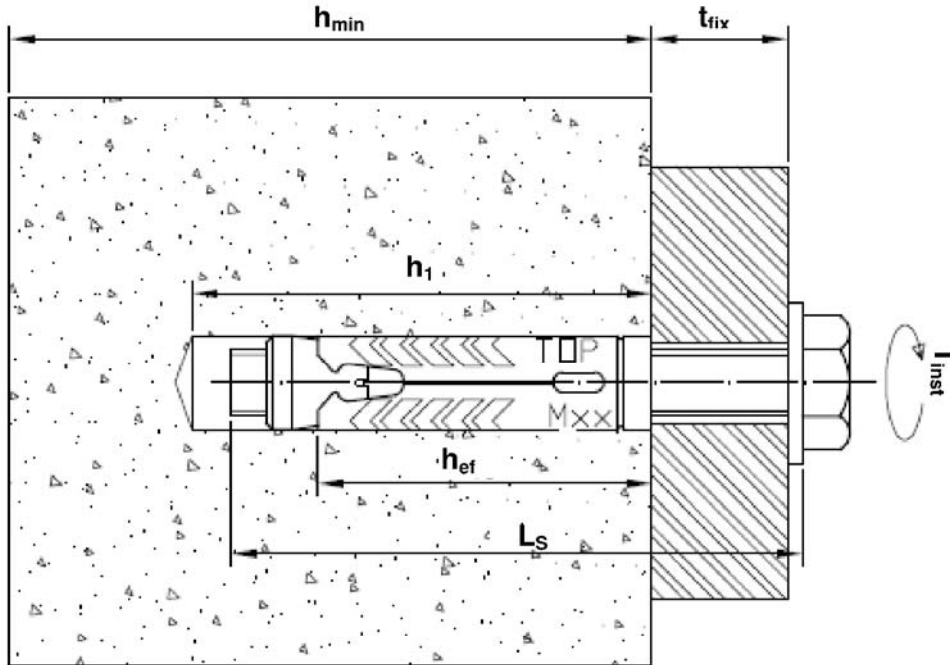
Issued in Berlin on 22 August 2014 by Deutsches Institut für Bautechnik

Uwe Bender  
Head of Department

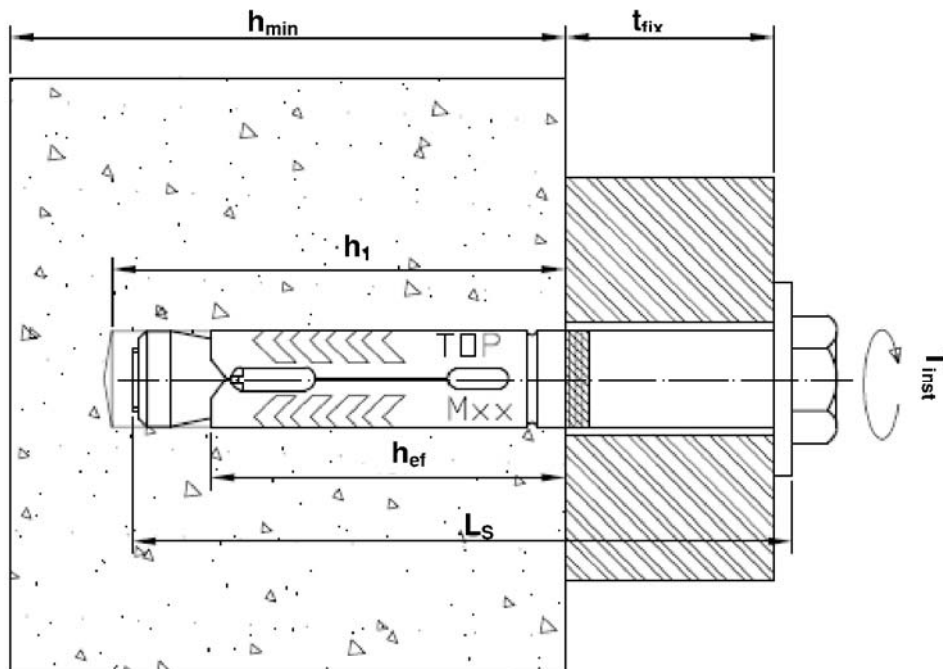
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### Installed conditions

#### Pre-setting Installation Type TOP (A4) and Type TOP BU (A4):



#### Through-setting installation Type TOP BP:

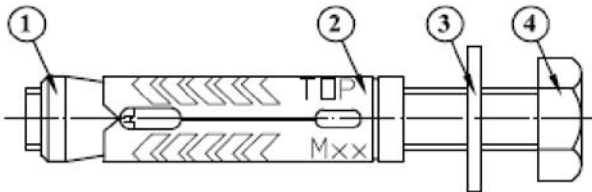


Vorpa Heavy-duty anchor TOP

Product description  
Installed condition

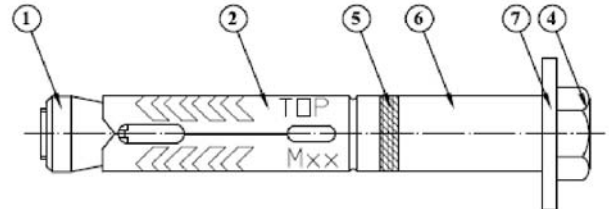
Annex A 1

Type TOP (A4) <sup>1)</sup> and Type TOP BU (A4) <sup>2)</sup>



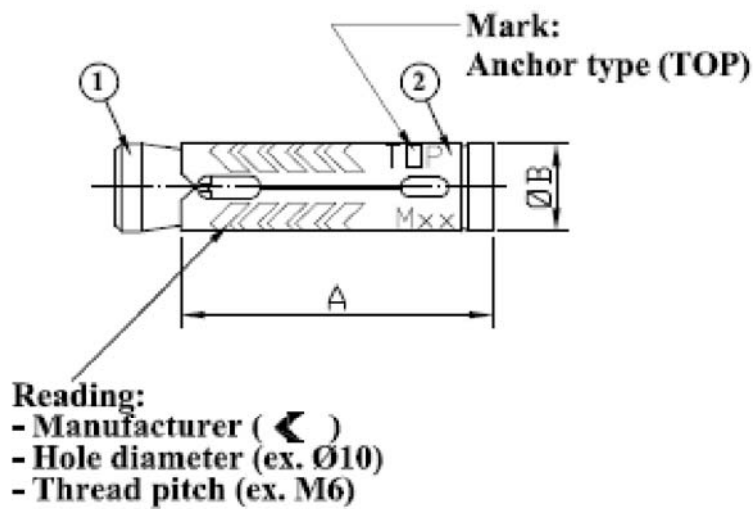
- ① Conical nut
- ② Expander
- ③ Washer
- ④ Hexagonal head bolt

Type TOP BP



- ① Conical nut
- ② Expander
- ④ Hexagonal head bolt
- ⑤ Spacer ring
- ⑥ Distance sleeve
- ⑦ Washer

- <sup>1)</sup> The hexagon head bolt and the washer according to Table A1 and B1 must be purchased by the user.
- <sup>2)</sup> The hexagon head bolt and the washer is provided by the manufacturer together with the anchor.



- Reading:**
- Manufacturer ( <img alt='\"/>
  - Hole diameter (ex. Ø10)
  - Thread pitch (ex. M6)

Vorpa Heavy-duty anchor TOP

Product description  
Marking and denomination

Annex A 2

**Table A1: Materials**

Comp.	Denomination	Type	Material
1	Conical nut	TOP TOP BU TOP BP	Steel, EN 10139:1997 Electrolytic zinc plated, EN ISO 4042:1999 min. 5 µm
		TOP A4 TOP BU A4	Stainless steel 1.4401, 1.4404 or 1.4571 EN 10088-1:2005
2	Expander	TOP TOP BU TOP BP	Cold formed steel, EN 10111:2008 Electrolytic zinc plated, EN ISO 4042:1999 min. 5 µm
		TOP A4 TOP BU A4	Stainless steel 1.4401, 1.4404 or 1.4571 EN 10088-1:2005
3 / 7	Washer	TOP TOP BU TOP BP	Steel min. 140 HV Electrolytic zinc plated, EN ISO 4042:1999 min. 5 µm
		TOP A4 TOP BU A4	Stainless steel 1.4401, 1.4404 or 1.4571 EN 10088-1:2005
4	Hexagonal head bolt	TOP TOP BU TOP BP	Steel, property class 8.8 EN ISO 898-1:2012 Electrolytic zinc plated, EN ISO 4042:1999 min. 5 µm
		TOP A4 TOP BU A4	Stainless steel 1.4401, 1.4404 or 1.4571 EN 10088-1:2005
5	Spacer ring	TOP BP	Polypropylene
6	Distance sleeve	TOP BP	Cold formed steel, EN 10111:2008 or Drawn pipe E235+C, EN 10305-2:2010 Electrolytic zinc plated, EN ISO 4042:1999 min. 5 µm

**Vorpa Heavy-duty anchor TOP**

**Product description**  
Materials

**Annex A 3**

## Specifications of intended use

### Anchorage subject to:

- Static and quasi-static loads.

### 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.
- Non-cracked concrete.

### Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (zinc coated steel or stainless 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).

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:

- 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 designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Anchorages are designed in accordance with ETAG 001, Annex C, design method A Edition August 2010.

### Installation:

- Hole drilling by hammer drilling only.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- hexagonal head bolt and washer for type TOP / TOP A4 may be used if the following requirements are fulfilled:
  - material, dimensions and mechanical properties of the metal parts according to the specifications given in Annex A 3 and B 2,
  - confirmation of material and mechanical properties of the metal parts by inspection certificate 3.1 according to EN 10204:2004, the documents should be stored,
  - Length of hexagonal head bolt according to Table B1 shall be complied with.
- 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 if under shear or oblique tension load it is not in the direction of load application.
- anchor installation such that the effective anchorage depth is complied with. This compliance is ensured, if the leading edge of expander does not more exceed the concrete surface.

**Vorpa Heavy-duty anchor TOP**

**Intended Use  
Specifications**

**Annex B 1**



**Table B1: Installation Parameters**

Anchor size			M6	M8	M10	M12	
Effective anchorage depth	$h_{ef}$	[mm]	39,5	44,5	51,5	63,0	
Nominal drill hole diameter	$d_0$	[mm]	10	12	14	18	
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10,45	12,50	14,50	18,50	
Drill hole depth	$h_1 \geq$	[mm]	$L_S - t_{fix} + 10$	$L_S - t_{fix} + 10$	$L_S - t_{fix} + 10$	$L_S - t_{fix} + 10$	
Clearance hole diameter in the fixture	TOP (A4)	$d_f \leq$	[mm]	7	9	12	14
	TOP BU (A4)						
	TOP BP	$d_f \leq$	[mm]	12	14	18	20
Torque moment	$T_{inst}$	[Nm]	10	25	40	75	
Min. fixture thickness	TOP (A4)	$t_{fix,min}$	[mm]	1	1	1	1
	TOP BU (A4)						
	TOP BP						
Max. fixture thickness	TOP	$t_{fix,max}$	[mm]	150	200	250	300
	TOP A4	$t_{fix,max}$	[mm]	50	65	85	70
	TOP BU (A4)	$t_{fix,max}$	[mm]	10	14	20	25
	TOP BP	$t_{fix,max}$	[mm]	30	35	38	43
Hexagonal head bolt length	TOP (A4)	$L_S \geq$	[mm]	$t_{fix}+45$	$t_{fix}+51$	$t_{fix}+60$	$t_{fix}+75$
	TOP BU (A4)	$L_S$	[mm]	55	65	80	100
	TOP BP	$L_S$	[mm]	80	90	100	120

**Table B2: Minimum thickness of concrete member, minimum spacing and edge distances**

Anchor size			M6	M8	M10	M12
Minimum thickness member	$h_{min}$	[mm]	135	135	140	160
Minimum spacing	$s_{min}$	[mm]	65	90	135	165
Minimum edge distance	$c_{min}$	[mm]	45	70	85	115

**Vorpa Heavy-duty anchor TOP**

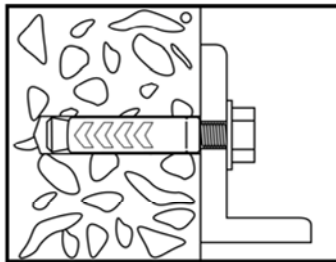
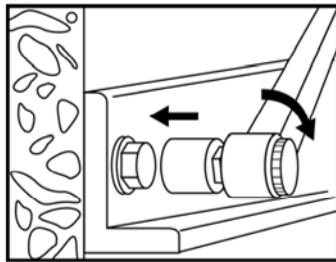
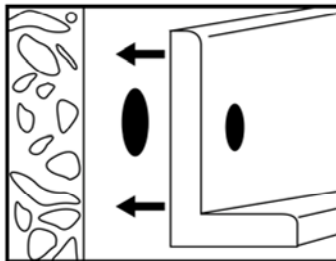
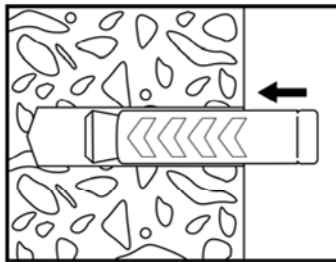
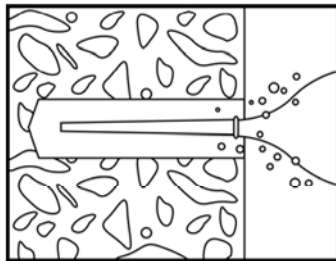
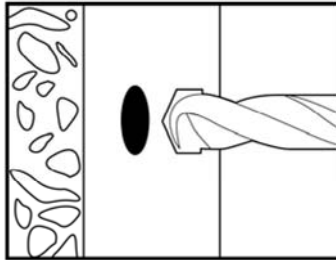
**Intended Use**

Installation parameters

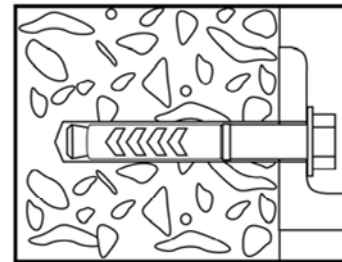
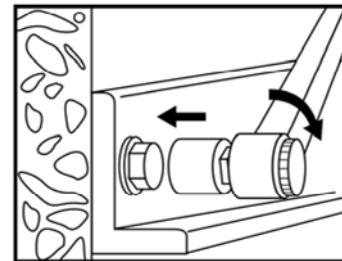
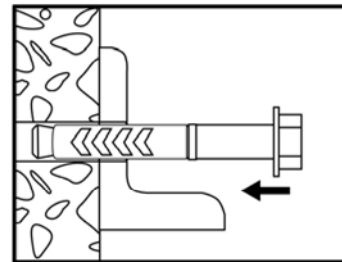
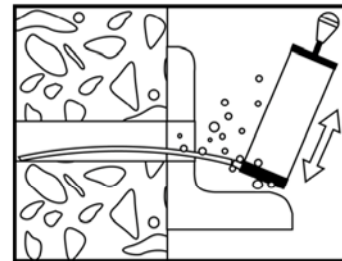
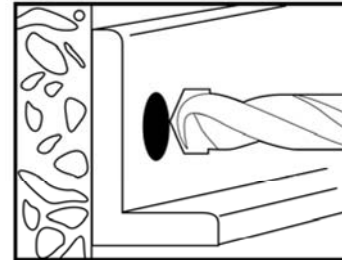
Minimum thickness of concrete member, minimum spacing and edge distances

**Annex B 2**

**Pre-setting installation instruction for:  
Type TOP (A4) / TOP BU (A4)**



**Through-setting installation instruction for  
Type TOP BP**



Electronic copy of the ETA by DIBt: ETA-09/0175

**Vorpa Heavy-duty anchor TOP**

**Intended Use**  
Installation instructions

**Annex B 3**

**Table C1: Design method A, Characteristic values for tension loads**

Anchor size			M6	M8	M10	M12
<b>Steel failure</b>						
Characteristic resistance, Anchor type TOP, TOP BU, TOP BP	$N_{Rk,s}$	[kN]	16,1	29,3	46,4	67,4
Partial safety factor	$\gamma_{Ms}$		1,5			
Characteristic resistance, Anchor type TOP A4, TOP BU A4	$N_{Rk,s}$	[kN]	14,1	25,6	40,6	59,0
Partial safety factor	$\gamma_{Ms}$		1,87			
<b>Pullout failure</b>						
Characteristic resistance in non-cracked concrete C20/25, Anchor type TOP, TOP BU, TOP BP	$N_{Rk,p}$	[kN]	9	12	16	20
Characteristic resistance in non-cracked concrete C20/25, Anchor type TOP A4, TOP BU A4	$N_{Rk,p}$	[kN]	7,5	9	12	16
Increasing factors for concrete	$\psi_c$	C30/37	[-]	1,17	1,08	1,22
		C40/50	[-]	1,33	1,15	1,41
		C50/60	[-]	1,50	1,23	1,55
<b>Concrete cone failure</b>						
Effective anchoring depth	$h_{ef}$	[mm]	39,5	44,5	51,5	63,0
Spacing	$s_{cr,N}$	[mm]	3 $h_{ef}$			
Edge distance	$c_{cr,N}$	[mm]	1,5 $h_{ef}$			
<b>Splitting failure</b>						
Spacing	$s_{cr,sp}$	[mm]	160	200	260	280
Edge distance	$c_{cr,sp}$	[mm]	80	100	130	140
Installation safety factor, Anchor type TOP, TOP BU, TOP BP	$\gamma_2$	[-]	1,2	1,4	1,4	1,0
Installation safety factor, Anchor type TOP A4, TOP BU A4	$\gamma_2$	[-]	1,0	1,2	1,2	1,2

**Table C2: Displacements under tension loads**

Anchor size			M6	M8	M10	M12
Tension load	N	[kN]	3,6	4,1	5,4	9,5
Displacement	$\delta_{N0}$	[mm]	0,4	0,3	0,3	0,3
	$\delta_{N\infty}$	[mm]	1,2			

**Vorpa Heavy-duty anchor TOP**

**Performances**

Design method A, Characteristic values of resistance under tension loads  
Displacements under tension loads

**Annex C 1**

**Table C3: Design method A, Characteristic values for shear loads**

Anchor size			M6	M8	M10	M12
<b>Steel failure without level arm</b>						
Characteristic resistance, Anchor type TOP, TOP BU, TOP BP	$V_{Rk,s}$	[kN]	8,0	14,6	23,2	33,7
Partial safety factor	$\gamma_{Ms}$		1,5			
Characteristic resistance, Anchor type TOP A4, TOP BU A4	$V_{Rk,s}$	[kN]	7,0	12,8	20,3	29,5
Partial safety factor	$\gamma_{Ms}$		1,87			
<b>Steel failure with level arm</b>						
Characteristic bending moment, Anchor type TOP, TOP BU, TOP BP	$M_{Rk,s}$	[Nm]	12,2	30,0	59,8	104,8
Partial safety factor	$\gamma_{Ms}$		1,5			
Characteristic bending moment, Anchor type TOP A4, TOP BU A4	$M_{Rk,s}$	[Nm]	10,7	26,2	52,3	91,7
Partial safety factor	$\gamma_{Ms}$		1,87			
<b>Concrete pry out failure</b>						
Factor in equation (5.6), ETAG 001, Annex C, 5.2.3.3	k	[-]	1,0	1,0	1,0	2,0
Installation safety factor	$\gamma_2$	[-]	1,0			
<b>Concrete edge failure</b>						
Effective length of anchor in shear loading	$l_f$	[mm]	39,5	44,5	51,5	63,0
Effective external diameter of anchor	$d_{nom}$	[mm]	10	12	14	18
Installation safety factor	$\gamma_2$	[-]	1,0			

**Table C4: Displacements under shear loads**

Anchor size			M6	M8	M10	M12
Shear load	V	[kN]	5,1	6,9	7,6	9,5
Displacement	$\delta_{V0}$	[mm]	6,0	5,3	5,3	5,0
	$\delta_{V\infty}$	[mm]	9,0	8,0	8,0	7,5

**Vorpa Heavy-duty anchor TOP**

**Performances**

Design method A, Characteristic values of resistance under shear loads  
Displacements under shear loads

**Annex C 2**