

European Technical Approval ETA-04/0011

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung <i>Trade name</i>	Subex - Einschlaganker <i>Subex - Drop-in anchor</i>
Zulassungsinhaber <i>Holder of approval</i>	Störring + Brückmann GmbH Ringstraße 20 42553 Velbert-Nevigas
Zulassungsgegenstand und Verwendungszweck <i>Generic type and use of construction product</i>	Wegkontrolliert spreizender Dübel aus galvanisch verzinktem oder nichtrostendem Stahl in den Größen M8, M10 und M12 zur Verankerung im ungerissenen Beton <i>Deformation-controlled expansion anchor made of galvanised or stainless steel of sizes M8, M10 and M12 for use in non-cracked concrete</i>
Geltungsdauer: <i>Validity:</i>	vom <i>from</i> bis <i>to</i>
Herstellwerk <i>Manufacturing plant</i>	Störring + Brückmann Werk 1
	6 May 2011 28 January 2014

Diese Zulassung umfasst
This Approval contains

12 Seiten einschließlich 5 Anhänge
12 pages including 5 annexes

Diese Zulassung ersetzt
This Approval replaces

ETA-04/0011 mit Geltungsdauer vom 28.01.2009 bis 28.01.2014
ETA-04/0011 with validity from 28.01.2009 to 28.01.2014

I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
 - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products¹, modified by Council Directive 93/68/EEC² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council³;
 - Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998⁴, as amended by law of 31 October 2006⁵;
 - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC⁶;
 - Guideline for European technical approval of "Metal anchors for use in concrete - Part 4: Deformation controlled expansion anchors", ETAG 001-04.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.
- 3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European technical approval.
- 4 This European technical approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
- 5 Reproduction of this European technical approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Deutsches Institut für Bautechnik. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European technical approval.
- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

¹ Official Journal of the European Communities L 40, 11 February 1989, p. 12
² Official Journal of the European Communities L 220, 30 August 1993, p. 1
³ Official Journal of the European Union L 284, 31 October 2003, p. 25
⁴ *Bundesgesetzblatt Teil I 1998*, p. 812
⁵ *Bundesgesetzblatt Teil I 2006*, p. 2407, 2416
⁶ Official Journal of the European Communities L 17, 20 January 1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product/ products and intended use

1.1 Definition of the construction product

The Subex - Drop-in anchor of sizes M8, M10 and M12 is an anchor made of galvanised or stainless steel which is placed into a drilled hole and anchored by deformation-controlled expansion.

An illustration of the product and the intended use is given in Annex 1.

The fixture shall be fixed with a fastening screw or threaded rod according to Annex 3.

1.2 Intended use

The anchor is intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 of Council Directive 89/106 EEC shall be fulfilled and failure of anchorages made with these products would cause risk to human life and/or lead to considerable economic consequences. The anchor is to be used only for anchorages subject to static or quasi-static loading in reinforced or unreinforced normal weight concrete of strength classes C20/25 at minimum and C50/60 at most according to EN 206-1:2000-12.

It may be anchored in non-cracked concrete only.

Anchor made of galvanised steel:

The anchor made of galvanised steel may only be used in structures subject to dry internal conditions.

Anchor made of stainless steel:

The anchor made of stainless steel may be used in structures subject to dry internal conditions and also in structures subject to external atmospheric exposure (including industrial and marine environment), or exposure in permanently damp internal conditions, if no particular aggressive conditions exist. Such 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).

The provisions made in this European technical approval are based on an assumed intended working life of the anchor of 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.

2 Characteristics of product and methods of verification

2.1 Characteristics of the product

The anchor corresponds to the drawings and provisions given in Annex 2. The characteristic material values, dimensions and tolerances of the anchor not indicated in Annex 2 shall correspond to the respective values laid down in the technical documentation⁷ of this European technical approval.

The characteristic values for the design of anchorages are given in Annexes 3 to 5.

Each anchor is marked with the letters "SB" and the thread size according to Annex 2. Each anchor made of stainless steel is marked with the additional letter "AN".

The anchor shall only be packaged and supplied as a complete unit.

2.2 Methods of verification

The assessment of fitness of the anchor for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 has been made in accordance with the "Guideline for European technical approval of Metal Anchors for use in concrete", Part 1 "Anchors in general" and Part 4 "Deformation-controlled expansion anchors" on the basis of Option 7.

In addition to the specific clauses relating to dangerous substances contained in this European technical approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

3 Evaluation and attestation of conformity and CE marking

3.1 System of attestation of conformity

According to the Decision 89/106/EEC of the European Commission⁸ system 2(i) (referred to as System 1) of the attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 1: Certification of the conformity of the product by an approved certification body on the basis of:

- (a) Tasks for the manufacturer:
 - (1) factory production control;
 - (2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed control plan;
- (b) Tasks for the approved body:
 - (3) initial type-testing of the product;
 - (4) initial inspection of factory and of factory production control;
 - (5) continuous surveillance, assessment and approval of factory production control.

Note: Approved bodies are also referred to as "notified bodies".

⁷ The technical documentation of this European technical approval is deposited at the Deutsches Institut für Bautechnik and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

⁸ Official Journal of the European Communities L 254 of 08.10.1996

3.2 Responsibilities

3.2.1 Tasks for the manufacturer

3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use initial/raw/constituent materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik.⁹

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

3.2.1.2 Other tasks for the manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of anchors in order to undertake the actions laid down in section 3.2.2 For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European technical approval.

3.2.2 Tasks for the approved bodies

The approved body shall perform the

- initial type-testing of the product,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control

in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

3.3 CE marking

The CE marking shall be affixed on each packaging of the anchor. The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacture),
- the last two digits of the year in which the CE marking was affixed,

⁹ The control plan is a confidential part of the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

- the number of the EC certificate of conformity for the product,
- the number of the European technical approval,
- the number of the guideline for European technical approval,
- use category (ETAG 001-1, option 7),
- size.

4 Assumptions under which the fitness of the product for the intended use was favourably assessed

4.1 Manufacturing

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the approval and consequently the validity of the CE marking on the basis of the approval and if so whether further assessment or alterations to the approval shall be necessary.

4.2 Design of anchorages Installation

The fitness of the anchor for the intended use is given under the following conditions:

The anchorages are designed in accordance with the "Guideline for European technical approval of Metal Anchors for Use in Concrete", Annex C, Method A 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).

The minimum strength class and the minimum screwing depth of the fastening screw or the threaded rod for installation of the fixture shall meet the requirements according to Annex 3. The length of the fastening screw shall be defined according to the requirements given in Annex 3, taking into account available thread length, the minimum screwing depth, the thickness of fixture and tolerances of member and fixture.

4.3 Installation of anchors

The fitness for use of the anchor can only be assumed if the anchor is installed as follows:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the anchor only as supplied by the manufacturer without exchanging the components of an anchor.
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools specified in Annex 2;
- Checks before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the range given and is not lower than that of the concrete to which the characteristic loads apply.
- Check of concrete being well compacted, e.g. without significant voids.
- Positioning of the drill holes without damaging the reinforcement.
- Clearing of the hole of drilling dust.

- Edge distance and spacing not less than the specified values without minus tolerances.
- 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 setting depth is complied with. This compliance is ensured, if the expansion sleeve does not exceed the concrete surface.
- Anchor expansion by impact on the cone using the setting tool given in Annex 2. The anchor is properly set if the stop of the pin reaches the expansion sleeve.
- The fastening screw or threaded rod shall correspond to the requirements given in Annex 3.
- Fixing the screw with the recommended torque moment given in Annex 3 using a calibrated torque wrench.

5 Indications to the manufacturer

It is in the responsibility of the manufacturer to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to as well as sections 4.2 and 4.3 is given to those who are concerned. This information may be made by reproduction of the respective parts of the European technical approval. In addition all installation data shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustrations.

The minimum data required are:

- drill bit diameter,
- thread diameter,
- minimum effective anchorage depth,
- available thread length and minimum screwing depth of the fastening screw or threaded rod,
- minimum strength class of the screw or threaded rod according to the specifications given in Annex 3,
- minimum hole depth,
- torque moment,
- information on the installation procedure, including cleaning of the hole, preferably by means of an illustration,
- reference to any special installation equipment needed,
- identification of the manufacturing batch.

All data shall be presented in a clear and explicit form.

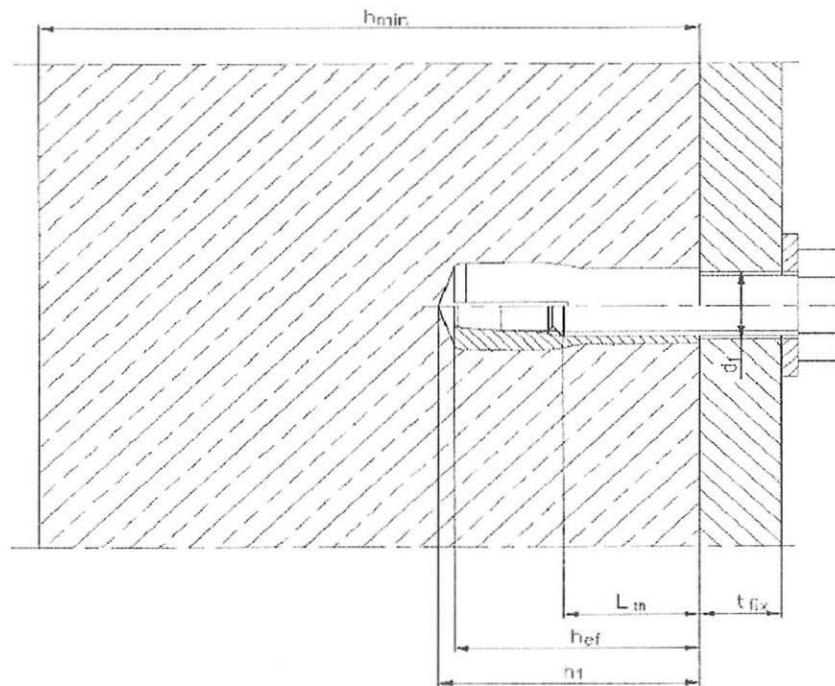
Georg Feistel
Head of Department

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Anchor



Installed condition



Installation instructions



Subex - Drop-in anchor

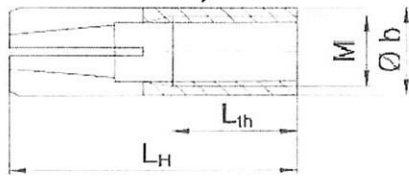
Product and installed condition
Installation instructions

Annex 1

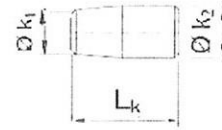
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technical approval
ETA 04/0011

Expansion sleeve

marking: SB ... / SB N ...
e.g.: SB 12 / SB N 12



Cone



Subex setting tool



Table 1: Materials, galvanised steel

Part	designation	Materials, zinc coated $\geq 5 \mu\text{m}$ acc. to EN ISO 4042
1	Expansion sleeve	free-cutting steel 1.0718 acc. to DIN EN 10277
2	Cone	steel for cold forming Q St 36 acc. to DIN EN 10263-2
3	Setting tool	heat-treatable steel C 45 Pb acc. to DIN EN 10278

Table 2: Materials, stainless steel

Part	designation	Materials
1	Expansion sleeve	stainless steel 1.4404/1.4401 acc. to EN 10088
2	Cone	stainless steel 1.4404/1.4401 acc. to EN 10088 zinc coated $\geq 5 \mu\text{m}$
3	Setting tool	heat-treatable steel C 45 Pb acc. to DIN EN 10278

Table 3: Dimensions [mm]

Subex SB (galv.) / SB N (1.4404/1.4401)		M8	M10	M12
Size of internal thread	M	M8	M10	M12
External diameter	$\varnothing b$	10	12	15
Length of the expansion sleeve	L_H	30	40	50
Length of internal thread	L_{th}	13	15	18
Maximum diameter of cone	$\varnothing k_2$	6.5	8.25	10.3
Minimum diameter of cone	$\varnothing k_1$	5.5	7.0	9.25
Length of cone	L_k	12	16	20
Diameter of pin	$\varnothing m$	6	8	10
Length of pin	f_1	17	22	26

Subex - Drop-in anchor

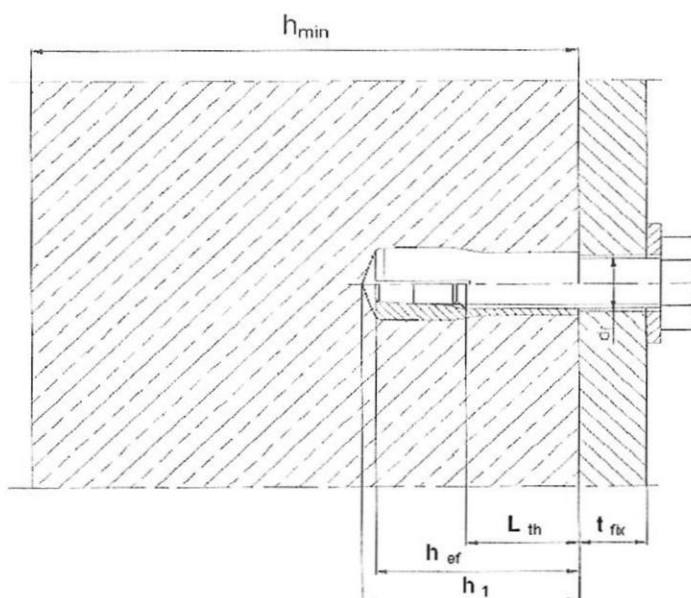
Materials and dimensions

Annex 2

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Table 4: Installation data

Subex SB (galv.) / SB N (1.4404/1.4401)		M8	M10	M12
Drill hole diameter	d_o [mm]	10	12	15
Cutting diameter of drill bit	$d_{cut\leq}$ [mm]	10.45	12.50	15.50
Depth of drill hole	h_1 [mm]	33	44	54
Recommended setting torque	T_{inst} [Nm]	8	15	35
Diameter of clearance hole	$d_{f\leq}$ [mm]	9	12	14
Minimum screwing depth	L_{sd} [mm]	9	11	13
Available thread length	L_{th} [mm]	13	15	18
Minimum spacing	s_{min} [mm]	90	120	150
Minimum edge distance	c_{min} [mm]	90	120	150
Minimum thickness of member	h_{min} [mm]	100	120	150



Requirements for the fastening screw or threaded rod:

- Minimum strength class galvanised 4.8 acc. to EN ISO 898-1 stainless A 4 – 70 1.4404 acc. to EN ISO 898-1
- Minimum screwing depth L_{sd} see Table 4;
- The length of the fastening screw shall be determined depending on thickness of fixture t_{fix} , admissible tolerances, available thread length L_{th} and minimum screwing depth L_{sd} .

Subex - Drop-in anchor

Installation data

Annex 3

of European
technical approval
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Table 5: Design method A - Characteristic values under tension load

Subex SB (galv.) / SB N (1.4404/1.4401)			M8 ¹⁾	M10	M12
Steel failure					
Characteristic resistance	$N_{Rk,s}$ [kN]	⁴⁾	14.4	13.1	30.2
Partial safety factor	γ_{Ms}	²⁾	1.4		
Pull-out failure					
Characteristic resistance in non-cracked concrete	$N_{Rk,p}$ [kN]	C20/25	6	9	16
Increasing factors for $N_{Rk,p}$	ψ_c	C30/37	1.22		
		C40/50	1.41		
		C50/60	1.55		
Partial safety factor	γ_{Mp}	²⁾	1.8		
Concrete failure					
Effective anchorage depth	h_{ef} [mm]		30	40	50
Partial safety factor	γ_{Mc}	²⁾	1.8 ³⁾		
Characteristic spacing	$s_{cr,N}$ [mm]		90	120	150
Characteristic edge distance	$c_{cr,N}$ [mm]		45	60	75
Splitting failure					
Partial safety factor	γ_{Mc}	²⁾	1.8 ³⁾		
Characteristic spacing	$s_{cr,sp}$ [mm]		180	240	300
Characteristic edge distance	$c_{cr,sp}$ [mm]		90	120	150

¹⁾ for application with statically indeterminate structural components only

²⁾ in absence of other national regulations

³⁾ the installation safety factor of $\gamma_2 = 1.2$ is included

⁴⁾ the strength class of fastening screw or threaded rod is not decisive

Table 6: Displacements under tension loading

Subex SB (galv.) / SB N (1.4404/1.4401)			M8	M10	M12
Load in C20/25 to C50/60 non-cracked concrete	N_{Rk}	[kN]	2.40	3.60	6.35
Displacement	δ_{NO}	[mm]	0.4	0.4	0.4
	$\delta_{N_{cr}}$	[mm]	0.6	0.6	0.6

Subex - Drop-in anchor

Design method A
Characteristic values for tension loading,
displacements

Annex 4

of European
technical approval
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Table 7: Design method A - Characteristic values under shear load

Subex SB (galv.) / SB N (1.4404/1.4401)		M8 ¹⁾	M10	M12	
Steel failure without lever arm					
Characteristic resistance $V_{Rk,s}$ [kN]	4.8 ⁴⁾	6.6	10.2	16.9	
	5.6 ⁴⁾	6.6	10.2	21.1	
	8.8 ⁴⁾	6.6	10.2	21.3	
	A4 70 ⁴⁾	6.6	10.2	21.3	
Partial safety factor SB / SB N	γ_{Ms} ²⁾	1.25 / 1.25			
Steel failure with lever arm					
Characteristic resistance $M^0_{Rk,s}$ [Nm]	4.8 ⁴⁾	15	30	52	
	5.6 ⁴⁾	19	37	65	
	8.8 ⁴⁾	30	60	105	
	A4 70 ⁴⁾	26	52	92	
Partial safety factor SB / SB N	γ_{Ms} ²⁾	1.25 / 1.56			
Pry-out failure					
Factor in equation (5.6) acc. to ETAG 001 Annex C, 5.2.3.3	k	[-]			
Partial safety factor	γ_{Mc} ²⁾	1.5 ³⁾			
Concrete edge failure					
Effective anchor length for shear loading	l_f	[mm]	30	40	50
Effective anchor diameter	d_{nom}	[mm]	10	12	15
Partial safety factor	γ_{Mc} ²⁾	1.5 ³⁾			

¹⁾ for application with statically indeterminate structural components only

²⁾ in absence of other national regulations

³⁾ the installation safety factor of $\gamma_2 = 1.0$ is included

⁴⁾ strength class of fastening screw or threaded rod

Table 8: Displacements under shear loading

Subex SB (galv.) / SB N (1.4404/1.4401)		M8	M10	M12	
Load in C20/25 to C50/60 non-cracked concrete	V_{Rk}	[kN]	3.80	5.90	12.20
Displacement	δ_{V0}	[mm]	1.00	0.93	1.12
	$\delta_{V\infty}$	[mm]	1.50	1.40	1.68

Subex - Drop-in anchor

Design method A
Characteristic values for shear loading,
displacements

Annex 5

of European
technical approval
ETA-04/0011