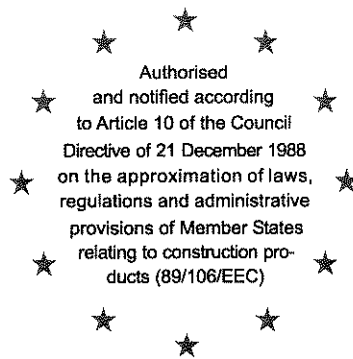


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Mitglied der EOTA
Member of EOTA

European Technical Approval ETA-05/0070

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung

Trade name

mungo Stahlbolzen m2, m2C

mungo Throughbolt m2, m2C

Zulassungsinhaber

Holder of approval

Mungo Befestigungstechnik AG

Bornfeldstrasse 2

4603 Olten

SCHWEIZ

Zulassungsgegenstand und Verwendungszweck

*Generic type and use
of construction product*

Kraftkontrolliert spreizender Dübel aus galvanisch
verzinktem Stahl in den Größen M6, M8, M10, M12, M16
und M20 zur Verankerung im ungerissenen Beton

*Torque-controlled expansion anchor made of galvanised steel of sizes
M6, M8, M10, M12, M16 an M20 for use in non-cracked concrete*

Geltungsdauer: vom

Validity:

from

bis

to

26 April 2005

26. April 2010

Herstellwerk

Manufacturing plant

Mungo Befestigungstechnik AG

Bornfeldstrasse 2

4603 Olten

SCHWEIZ

Diese Zulassung umfasst
This Approval contains

12 Seiten einschließlich 5 Anhänge
12 pages including 5 annexes



Europäische Organisation für Technische Zulassungen
European Organisation for Technical Approvals

I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European Technical Approval is issued by the 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, zuletzt geändert durch Gesetz vom 06.01.2004⁵.
 - 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" ETAG 001, edition 1997, Part 1 "Anchors in general" and Part 2 "Torque-controlled expansion anchors".
- 2 The 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 part. 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 the 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 the 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 in EOTA. Translations into other languages have to be designated as such.

1 Official Journal of the European Communities N° L 40, 11.2.1989, p. 12
2 Official Journal of the European Communities N° L 220, 30.8.1993, p. 1
3 Official Journal of the European Union N° L 284, 31.10.2003, p. 1
4 Bundesgesetzblatt I, p. 812
5 Bundesgesetzblatt I, p.2, 15
6 Official Journal of the European Communities N° L 17, 20.1.1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

1.1 Definition of product

The mungo Throughbolt m2, m2C in the range of M 6, M 8, M 10, M 12, M 16 and M 20 is an anchor made of galvanised steel which is placed into a drilled hole and anchored by torque-controlled expansion.

For the installed anchor see Figure given in Annex 1.

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 206:2000-12. It may be anchored in non-cracked concrete only.

The anchor may only be used in structures subject to dry internal conditions.

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

Each anchor is marked with the identifying mark of the producer included the anchor identity, the thread size, the length of the anchor and the maximum thickness of fixture corresponding Annex 1.

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 2 "Torque-controlled expansion anchors" on the basis of Option 7.

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.

3 Evaluation of Conformity and CE marking

3.1 Attestation of Conformity system

The system of attestation of conformity 2(i) (referred to as System 1) according to Council Directive 89/106/EEC Annex III laid down by the European Commission provides:

- 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 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.

3.2 Responsibilities

3.2.1 Tasks of the manufacturer; factory production control

The manufacturer has a factory production control system in the plant and exercises permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. The production control system ensures that the product is in conformity with the European Technical Approval.

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the control plan⁸. The incoming raw materials shall be subject to controls and tests by the manufacturer before acceptance. Check of materials such as nuts, washers, wire for bolts and metal band for expansion sleeves shall include control of the inspection documents presented by suppliers (comparison with nominal values) by verifying dimensions and determining material properties, e.g. tensile strength, hardness, surface finish.

The manufactured components of the anchor shall be subjected to the following tests:

- dimensions of component parts:
 - conical bolt (diameter, length, angle of the cone, thread),
 - expansion sleeve (length, thickness),
 - hexagon nut (well running, wrench size across flats),
 - washer (diameter, thickness);
- material properties:
 - conical bolt (tensile strength, yield limit, hardness),
 - expansion sleeve (tensile strength, yield limit),
 - hexagon nut (strength test),
 - washer (hardness);
- thickness of the zinc coating;
- visual control of correct assemblage and of completeness of the anchor.

⁸ The control plan has been deposited at the Deutsches Institut für Bautechnik and is handed over only to the approved bodies involved in the conformity attestation procedure.

- The frequency of controls and tests conducted during production and on the assembled anchor is laid down in the control plan taking account of the automated manufacturing process of the anchor.

The results of factory production control are recorded and evaluated. The records include at least the following information:

- designation of the product, basic material and components;
- type of control or testing;
- date of manufacture of the product and date of testing of the product or basic material and components;
- result of control and testing and, if appropriate, comparison with requirements;
- signature of person responsible for factory production control.

The records shall be presented to the inspection body involved in the continuous surveillance. On request they shall be presented to the Deutsches Institut für Bautechnik.

Details of the extent, nature and frequency of testing and controls to be performed within the factory production control shall correspond to the control plan which is part of the technical documentation of this European Technical Approval.

3.2.2 Tasks of approved bodies

3.2.2.1 Initial type-testing of the product

For initial type-testing the results of the tests performed as part of the assessment for the European Technical Approval shall be used unless there are changes in the production line or plant. In such cases the necessary initial type-testing has to be agreed between the Deutsches Institut für Bautechnik and the approved bodies involved.

3.2.2.2 Initial inspection of factory and of factory production control

The approved body shall ascertain that, in accordance with the control plan, the factory, in particular the staff and equipment, and the factory production control are suitable to ensure a continuous and orderly manufacturing of the anchor with the specifications mentioned in 2.1 as well as in the Annexes to the European Technical Approval.

3.2.2.3 Continuous surveillance

The approved body shall visit the factory at least once a year for surveillance. It has to be verified that the system of factory production control and the specified automated manufacturing process are maintained taking account of the control plan.

Continuous surveillance and assessment of factory production control have to be performed according to the control plan.

The results of product certification and continuous surveillance shall be made available on demand by the certification body or inspection body, respectively, to the Deutsches Institut für Bautechnik.

In cases where the provisions of the European Technical Approval and the control plan are no longer fulfilled the conformity certificate shall be withdrawn.

3.3 CE marking

The CE marking shall be affixed on each packaging of anchors. The symbol "CE" shall be accompanied by the following information:

- identification number of the certification body,
- name or identifying mark of the producer and manufacturing plant,
- the last two digits of the year in which the CE marking was affixed,

- number of the EC certificate of conformity,
- number of the European Technical Approval,
- use category (ETAG 001-1 Option 7),
- anchor size.

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

4.1 Manufacturing

The anchor is manufactured in accordance with the provisions of the European Technical Approval using the automated manufacturing process as identified in the inspection of the plant by the Deutsches Institut für Bautechnik and the approved body and laid down in the technical documentation.

4.2 Installation

4.2.1 Design of anchorages

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, for torque controlled expansion anchors 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).

4.2.2 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,
- 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,
- cleaning of the hole of drilling dust,
- anchor installation such that the effective anchorage depth is complied with. This compliance is ensured, if the exist thickness of fixture is not greater than the maximum thickness of fixture marked on the anchor,
- keeping of the edge distance and spacing to the specified values without minus tolerances,
- positioning of the drill holes without damaging the reinforcement,

- 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,
- application of the torque moment given in Annex 3 using a calibrated torque wrench.

4.2.3 Responsibility of 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 and 4.2.1 and 4.2.2 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 illustration(s).

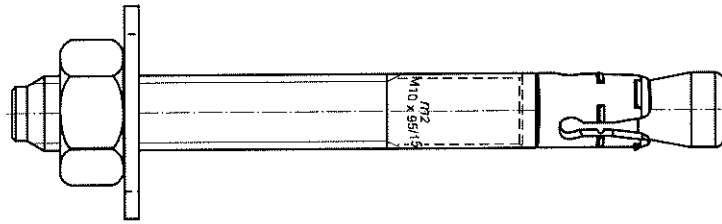
The minimum data required are:

- drill bit diameter;
- thread diameter;
- maximum thickness of the fixture;
- minimum effective anchorage depth;
- 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.

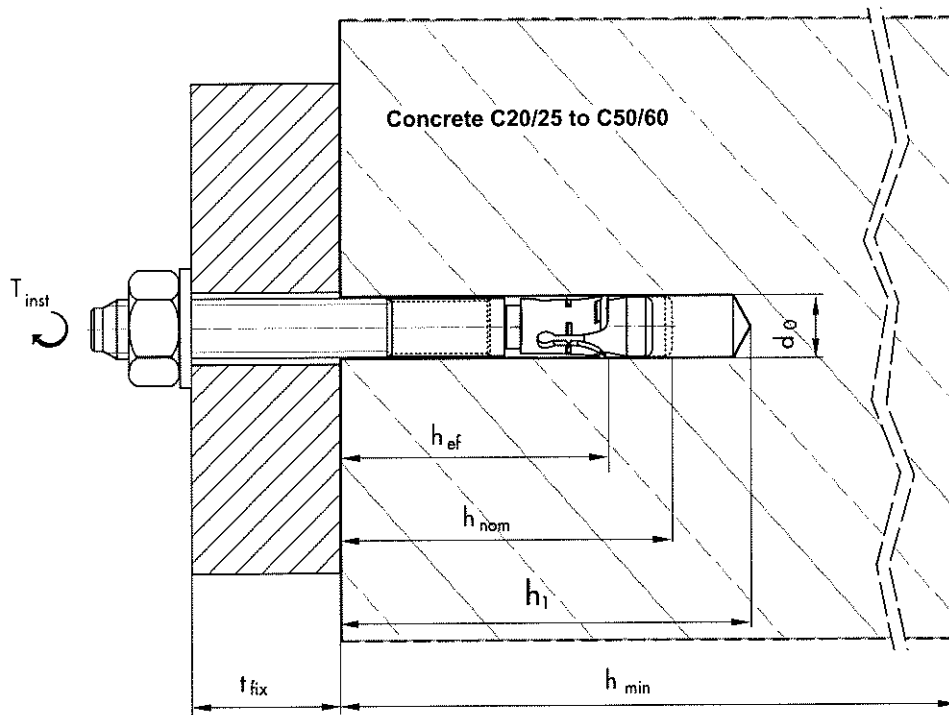
All data shall be presented in a clear and explicit form.

Dipl.-Ing. Jasch

Beglaubigt:
Müller



	Marking	Designation
Example:	<i>m2</i>	m2 Steel galvanised, Washer DIN 125 / m2C Steel galvanised, Washer DIN 9021
	M6...M20	Nominal diameter
	x 65...440	Length of anchor
	/ 10...325	Maximum fixture thickness



mungo Throughbolt m2, m2C

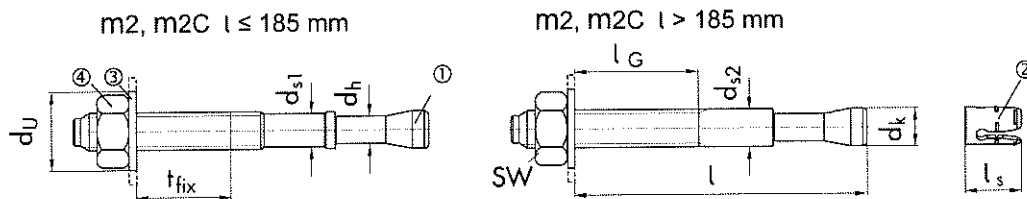
Product and intended use

Annex 1

of European Technical Approval
ETA-05/0070

Table 1: Dimensions

		M6	M8	M10	M12	M16	M20
Bolt	d_k [mm]	6	8	10	12	16	20
	d_h [mm]	4	5.6	7.3	8.7	11.5	15.2
	d_{s1} [mm]	5.25	7.05	8.9	10.7	14.5	-
	d_{s2} [mm]	-	-	-	12	16	20
	t_{fix} min [mm]	10	10	15	15	15	30
	t_{fix} max [mm]	40	95	100	265	325	140
	l_G min [mm]	32	43	52	62	73	100
	l_G max [mm]	62	120	120	120	120	120
	l min [mm]	65	80	95	110	130	160
l max [mm]	95	165	180	360	440	270	
Expansion sleeve	l_s [mm]	9.5	12	14.2	16.8	19.3	21.6
Washer	DIN 125 d_u [mm]	12	16	20	24	30	37
	DIN 9021 d_u [mm]	18	24	30	37	50	60
Hexagonal nut	SW [mm]	10	13	17	19	24	30

**Table 2: Materials**

Part	Designation	Material
1	Bolt	Cold formed or machined steel galvanised $\geq 5 \mu\text{m}$ DIN 50961
2	Expansion sleeve	Steel according to EN10088 1.4016 -
3	Washer m2	DIN 125; Steel galvanised $\geq 5 \mu\text{m}$ ISO4042
	m2C	DIN 9021; Steel galvanised $\geq 5 \mu\text{m}$ ISO4042
4	Hexagonal nut	Steel strength grade 8 acc. EN20989-2 galvanised $\geq 5 \mu\text{m}$ ISO4042

mungo Throughbolt m2, m2C

Materials and dimensions of anchors**Annex 2**of European Technical Approval
ETA-05/0070

Table 3: Installation data

		M6	M8	M10	M12	M16	M20
Nominal drill hole diameter	d_o [mm]	6	8	10	12	16	20
Cutting diameter of drill bit	$d_{cut} \leq$ [mm]	6.4	8.45	10.45	12.5	16.5	20.55
Torque moment	T_{inst} [Nm]	5	15	30	50	100	200
Depth of drill hole	$h_1 \geq$ [mm]	60	65	80	90	110	130
Anchor embedment depth	h_{nom} [mm]	46.9	58.5	68.8	79.6	96.4	118
Effective anchorage depth	h_{ef} [mm]	40	50	58	68	80	100
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	7	9	12	14	18	22

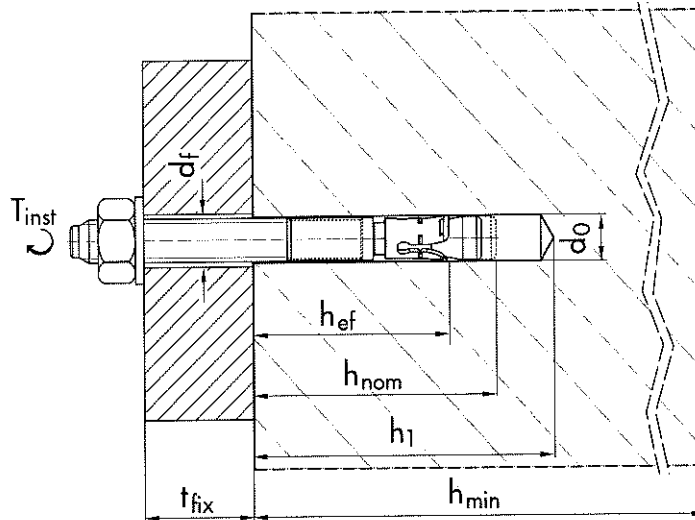


Table 4: Minimum thickness of concrete member, minimum spacing and minimum edge distances

Non-cracked concrete only		M6	M8	M10	M12	M16	M20
Minimum member thickness	h_{min} [mm]	100	100	120	140	160	200
Minimum spacing	s_{min} [mm]	40	50	60	110	120	200
	for $c \geq$ [mm]	70	90	115	200	320	400
Minimum edge distance	c_{min} [mm]	40	50	60	150	240	300
	for $s \geq$ [mm]	80	100	120	210	240	350

mungo Throughbolt m2, m2C

Installation data , minimum thickness of member, minimum spacing and edge distances

Annex 3

of European Technical Approval
ETA-05/0070

Table 5: Characteristic values of resistance to tension loads of design method A

			M6	M8	M10	M12	M16	M20
Steel failure								
Characteristic resistance	$N_{Rk,s}$	[kN]	9.6	19.0	32.6	43.6	76.6	123.8
Partial safety factor	$\gamma_{Ms}^{1)}$	-	1.4					

Pull-out failure								
Characteristic resistance in non-cracked concrete C20/25	$N_{Rk,p}$	[kN]	7.5	12	16	25	30	50
Partial safety factor	γ_2	-	1.0			1.2		
	$\gamma_{Mp}^{1)}$	-	1.5			1.8		
Increasing factors for non-cracked concrete for $N_{Rk,p}$	ψ_C	C30/37	1.17					
		C40/50	1.32					
		C50/60	1.42					

Concrete cone failure and splitting failure								
Effective anchorage depth	h_{ef}	[mm]	40	50	58	68	80	100
Spacing	$s_{cr,N}$	[mm]	120	150	174	204	240	300
	$s_{cr,sp}$	[mm]	200	250	290	340	400	500
Edge distances	$c_{cr,N}$	[mm]	60	75	87	102	120	150
	$c_{cr,sp}$	[mm]	100	125	145	170	200	250
Partial safety factor	γ_2	-	1.0			1.2		
	$\gamma_{Mc} = \gamma_{M,sp}^{1)}$	-	1.5			1.8		

¹⁾In absence of other national regulations

Table 6: Displacements under tension loads

			M6	M8	M10	M12	M16	M20
Tension load in non-cracked concrete C20/25 to C50/60		[kN]	3.6	5.7	7.6	9.9	11.9	19.8
Displacement	δ_{N0}	[mm]	0.3					
	δ_{Nsp}	[mm]	1.3					

mungo Throughbolt m2, m2C

Design method A, characteristic values of resistance to tension loads; displacements

Annex 4

of European Technical Approval
ETA-05/0070

Tabelle 7: Characteristic values of resistance to shear loads of design method A

		M6	M8	M10	M12	M16	M20
Steel failure without lever arm							
Characteristic resistance	$V_{Rk,s}$ [kN]	4.5	8.2	13.0	17.7	32.9	51.4
Partial safety factor	$\gamma_{Ms}^{1)}$ -	1.5					

Steel failure with lever arm							
Characteristic resistance	$M_{Rk,s}$ [Nm]	12.2	30.0	59.8	98.2	249	486
Partial safety factor	$\gamma_{Ms}^{1)}$ -	1.5					

Concrete pryout failure							
Factor in equation (5.6) of ETAG Annex C, § 5.2.3.3	k -	1.0			2.0		
Partial safety factor	$\gamma_{Mc}^{1)}$ -	1.5					

Concrete edge failure							
Effective length of anchor in shear loading	l_f [mm]	40	50	58	68	80	100
Diameter of anchor	d_{nom} [mm]	6	8	10	12	16	20
Partial safety factor	$\gamma_{Mc}^{1)}$ -	1.5					

¹⁾In absence of other national regulations

Table 8: Displacement under shear load

		M6	M8	M10	M12	M16	M20
Shear load in non-cracked concrete C20/25 to C50/60	[kN]	1.9	3.5	5.5	7.5	14.0	21.9
Displacement	δ_{v0} [mm]	1.6	2.2	2.4	2.7	3.3	3.8
	$\delta_{v\infty}$ [mm]	2.4	3.2	3.6	4.1	4.9	5.7

mungo Throughbolt m2, m2C

Design method A, characteristic values of resistance for shear load; displacements

Annex 5

of European Technical Approval
ETA-05/0070