European Organisation for Technical Approvals
Europäische Organisation für Technische Zulassungen
Organisation Européenne pour l'Agrément Technique

ETAG 020

Edition March 2006

amended version March 2012

GUIDELINE FOR EUROPEAN TECHNICAL APPROVAL

of

PLASTIC ANCHORS FOR MULTIPLE USE IN CONCRETE AND MASONRY FOR NON-STRUCTURAL APPLICATIONS

Part three:

PLASTIC ANCHORS FOR USE IN SOLID MASONRY

EOTA©
Kunstlaan 40 Avenue des Arts
B – 1040 Brussels

..

TABLE OF CONTENTS

PART THREE:

PLASTIC ANCHORS FOR USE IN SOLID MASONRY

Foreword

FOREWORD

In this Part of ETAG "Plastic Anchors for Multiple Use in Concrete and Masonry for Non-Structural Applications" the methods of verification and the assessments required for the use of plastic anchors in solid masonry materials (clay or calcium silicate or normal weight concrete or lightweight concrete) with a minimum mortar strength class of M2,5 are given. For a general assessment of plastic anchors, on principle, Part 1 applies.

In general, solid masonry units do not have any holes or cavities other than those inherent in the material. However, solid units may have a vertical perforation of up to 15 % of the cross section.

The required tests for suitability are given in Table 5.1 and the tests for admissible service conditions are given in Table 5.2. The determination of admissible service conditions and determination of characteristic resistances for plastic anchors to be used in solid masonry materials are completely given in 6.4.3.

The same numbering of paragraphs as in Part 1 is used.

The plastic anchors for use in solid masonry materials shall be used for multiple fixings. By multiple anchor use it is assumed that in the case of excessive slip or failure of one anchor the load can be transmitted to neighbouring anchors without significantly violating the requirements on the fixture in the serviceability and ultimate limit state.

Therefore the design of the fixture shall specify the number n_1 of fixing points to fasten the fixture and the number n_2 of anchors per fixing point. Furthermore the design value of actions N_{Sd} on a fixing point to a value $\leq n_3$ (kN) is specified up to which the strength and stiffness of the fixture are fulfilled and the load transfer in the case of excessive slip or failure of one anchor need not be taken into account in the design of the fixture.

The following default values for n_1, n_2 and n_3 may be taken:

$\mathbf{n_1 \geq 4}$; $\mathbf{n_2 \geq 1}$ and $\mathbf{n_3 \leq 4{,}5\ kN}$ or

$\mathbf{n_1 \geq 3}$; $\mathbf{n_2 \geq 1}$ and $\mathbf{n_3 \leq 3{,}0\ kN}$.

Section two:

GUIDANCE FOR THE ASSESSMENT OF THE FITNESS FOR USE

5. METHODS OF VERIFICATION

5.4. Safety in use

5.4.2. Tests for suitability

The tests shall be performed in single units or in a wall. If test are done in a wall, the thickness of the joints should be about 10 mm and the joints shall be completely filled with mortar of strength class M2,5 with a strength $\leq$ 5 N/mm^2. If tests have been performed in walls with a mortar strength higher than M2,5 then the minimum mortar strength shall be given in the ETA. The walls may be lightly prestressed in vertical direction to allow handling and transportation of the wall.

The tests shall be carried out in the base material for which the plastic anchor is intended to be used:

- In general solid clay bricks and sand-lime solid bricks with a compressive strength between 20 and 40 N/mm^2 shall be used in the tests.
- Tests performed in solid masonry units made of lightweight concrete with compressive strength $f_{b,test}$ shall be converted to the nominal compressive strength f_b of the tested bricks or blocks using a linear conversion rule.

The determined characteristic resistances for the ETA are valid only for the brick sizes which are used in the tests or larger brick sizes; therefore the information about the brick sizes shall be given in the ETA.

The types of suitability tests, test conditions, the number of required tests and the criteria applied to the results are given in Table 5.1.

If there are existing tests for suitability carried out in concrete (according to Part 2, Table 5.1) for the plastic anchors, then the results of these suitability tests (minα_1, minα_2 and minα_V) may be taken for the determination of the characteristic values of the plastic anchors to be used in solid masonry.

Table 5.1: Suitability tests for plastic anchors for use in solid masonry

	1	2	3	4	5	6			7	8
	Purpose of test	**Base material: solid masonry**	**Drill bit**	**Ambient temperature** **(1)**	**Condition of polymeric sleeve** **(6)**	**Minimum number of tests per anchor sizes (9)**			**Criteria ultimate load** **req.α**	**Remarks to the test procedure described in Part 1**
						s	**m**	**l**		
1	Setting capacity for nailed-in anchors only	**(10)**	$d_{cut,m}$	min T **(2)**	standard	5	5	5	≥ 0,9	5.4.2.2
2	Functioning, depending on the diameter of hole	**(10)**	$d_{cut,min}$ **(13)** $d_{cut,max}$ **(12)**	normal normal	standard standard	5 5	5 5	5 5	≥ 1,0 ≥ 0,8	5.4.2.3
4	Functioning under conditioning	**(10)**	$d_{cut,m}$ $d_{cut,m}$	normal normal	dry wet	- -	5 5	- -	≥ 0,8 ≥ 0,8	5.4.2.5
5	Functioning, effect of temperature	**(10)**	$d_{cut,m}$ $d_{cut,m}$ $d_{cut,m}$ $d_{cut,m}$	min T **(3)** 0 °C **(4)** LT: +50 °C **(5)** ST: +80 °C **(5)**	standard standard standard standard	- - - -	5 5 5 5	- - - -	≥ 1,0 ≥ 1,0 ≥ 1,0 ≥ 0,8 **(8)**	5.4.2.6
6	Functioning sustained loads	**(10)**	$d_{cut,m}$ $d_{cut,m}$	normal LT: +50 °C **(5)**	standard standard	5 5	5 5	5 5	≥ 0,9 ≥ 0,9	5.4.2.7 **(11)**
7	Functioning 24 h Relaxation 500 h	**(10)**	$d_{cut,m}$ $d_{cut,m}$	normal normal	standard standard	- -	5 5	- -	≥ 0,9 ≥ 1,0	5.4.2.8 **(7)**
8	Maximum torque moment	**(10)**	$d_{cut,m}$	normal	standard	5	5	5		5.4.2.9

(1) Normal ambient temperature: +21 ± 3 °C (plastic anchor and base material),

(2) Minimum installation temperature as specified by the manufacturer; normally 0 °C to + 5 °C.

(3) Tests with lowest temperature (min T) as specified by the manufacturer

(4) Installation at minimum installation temp. as specified by the manufacturer; normally 0 °C to + 5 °C.

(5) These values apply for temperature range b) according to Part 1, 4.4.2.6 (**LT** = maximum **long** term temperature +50 °C; **ST** = maximum **short** term temperature +80 °C). For temperature range a) and c) see Part 1, 4.4.2.6.

(6) Conditioning of plastic anchor sleeve according to Part 1, 5.4.2.5

(7) This test is not required for screwed-in plastic anchors with polyamide PA 6 polymeric sleeve.

(8) Reference values from the tests with maximum long term temperature +50 °C

(9) Anchor size: s = small; m = medium; l = large

If more than 3 sizes shall be assessed the intermediate sizes shall not be tested if the tests from line 1 of Table 5.2 show regularity in failure mode and ultimate load.

If more than one embedment depth of any one size shall be assessed, the tests according to line 4, 5 and 7 shall be carried out only with the shortest embedment depth.

[For footnotes (10), (11), (12) and (13) see the following page]

(10) Base material for the tests see 5.4.2

(11) N_{Rk} Part 1, 5.4.2.8 (5.3); characteristic resistance N_{Rk} as given in the ETA evaluated according to 6.4.3.3

(12) The test series with $d_{cut,max}$ may be omitted if the test series according to Table 5.2, line 1 are carried out with $d_{cut,max}$

(13) If more than one embedment depth of any one size shall be assessed, these tests shall be carried out with the maximum embedment depth.

5.4.3. Tests for admissible service conditions

The tests shall be performed in single units or in a wall. If test are done in a wall, the thickness of the joints should be about 10mm and the joints shall be completely filled with mortar of strength class M2,5 with a strength ≤ 5 N/mm^2. If tests have been performed in walls with a mortar strength higher than M2,5 then the minimum mortar strength shall be given in the ETA. The walls may be lightly prestressed in vertical direction to allow handling and transportation of the wall.

The tests shall be carried out in the base material for which the plastic anchor is intended to be used:

- In general solid clay bricks and sand-lime solid bricks with a compressive strength between 20 and 40 N/mm^2 shall be used in the tests.
- Tests performed in solid masonry units made of lightweight concrete with compressive strength $f_{b,test}$ shall be converted to the nominal compressive strength f_b of the tested bricks or blocks using a linear conversion rule.

The determined characteristic resistances for the ETA are valid only for the brick sizes which are used in the tests or larger brick sizes; therefore the information about the brick sizes shall be given in the ETA.

For determination of the admissible service conditions the tests given in Table 5.2 shall be carried out.

If existing information is available from the manufacturer and the corresponding test report contains all relevant data, then the Approval Body may reduce the number of tests for admissible service conditions, making use of this existing information. However, it will be considered in the assessment only if the results are consistent with the Institute's test results or experience.

All tests for determination of admissible service conditions shall be carried out according to Annex A in the base material for which the plastic anchor is intended to be used at normal ambient temperature (+21°C $\pm$ 3°C) and standard conditioning of the polymeric sleeve. The drill holes shall be drilled using $d_{cut,m}$ drill bits.

The minimum edge distance c_{min} and minimum spacing s_{min} shall be given by the manufacturer and shall be confirmed by the tests according to Table 5.2, line 2.

Table 5.2: Tests for admissible service conditions for plastic anchors for use in solid masonry

	1	2	3	4	5	6	7
	Purpose of test	**Load direc tion**	**Distances**	**Member thickness h**	**Remarks**	**Minimum number of tests for s, m, l (4)**	**Test procedure described in Annex A**
1	Characteristic resistance for tension loading not influenced by edge and spacing effects	N	$s > s_{min}$ $c > c_{min}$	$\geq h_{min}$	test with single anchor **(1)**	5	Annex A 5.2
2	Minimum edge distance for characteristic tension resistance	N	$s > s_{min}$ **(3)** $c = c_{min}$	$= h_{min}$	test with single anchor **(2)**	5	Annex A 5.2

(1) Tension tests with a single anchor in the centre of the brick

(2) Tension tests with a single anchor near the free edge to determined the characteristic resistance depending on the minimum edge distance c_{min}

(3) Tension tests with double anchor group with $s = s_{min}$ near the free edge ($c = c_{min}$) to determine the characteristic resistance for the minimum spacing s_{min} and the minimum edge distance c_{min} are required if the chosen minimum spacing is lower than the following values:

$s_{min} < 4 \cdot c_{min}$ (groups with spacing parallel to the edge)

$s_{min} < 2 \cdot c_{min}$ (groups with spacing perpendicular to the edge)

If there is a wide range of solid masonry units to be stated in the ETA [e.g. 2 or more different solid clay bricks/solid sand-lime bricks/lightweight concrete solid bricks or blocks - different in respect of compressive strength, brick size and/or vertical perforation of up to 15 % of the cross section (compare Part 1, 2.1.3.3)], tension tests with the double anchor group have only to be performed for the most unfavourable solid clay bricks/solid sand-lime bricks/lightweight concrete solid bricks.

<u>Example:</u> *There are 3 lightweight concrete solid bricks only different with respect to the brick size. In this case tension tests with the double anchor group have to be performed only with the smallest brick size, since according to experience this brick size will bring the lowest characteristic resistance for the plastic anchor.*

(4) Anchor sizes small (s), medium (m) and large (l) of an anchor system shall be tested; intermediate sizes need not to be tested

6. ASSESSING AND JUDGING THE FITNESS FOR USE

6.4. Safety in use

6.4.1.2. Conversion of ultimate loads to take account of concrete-, masonry- and steel strength

In contrast to Equation (6.0b) the conversion of the test results in solid masonry shall be carried out according to 6.4.3.2.

6.4.1.3. Criteria for all tests

In all tests the following criteria shall be met:

(2) In general, in each test series, the coefficient of variation of the ultimate load shall be smaller than v = 20 % in the **suitability tests** and v = 15 % in the **admissible service condition tests**.

If the coefficient of variation of the ultimate load in the **suitability test** is greater than 20 %, then the following α_V-value has to be taken into account:

$$\alpha_V = \frac{1}{1+0{,}03(v[\%]-20)} \leq 1{,}0 \qquad \textbf{(6.6a)}$$

If the coefficient of variation of the ultimate load in the **admissible service condition test** is greater than 15 %, then the following α_V-value has to be taken into account:

$$\alpha_V = \frac{1}{1+0{,}03(v[\%]-15)} \leq 1{,}0 \qquad \textbf{(6.6b)}$$

6.4.2. Criteria valid for suitability tests

In the suitability tests according to Table 5.1 the criteria described in Part 1, 6.4 shall be met. The values of the reference tests are taken from the tests according to Table 5.2, line 1 for the corresponding solid masonry material.

If there are existing tests for suitability carried out in concrete (according to Part 2, Table 5.1) for the plastic anchors, then the results of these suitability tests (minα_1, minα_2 and minα_V) may be taken for the determination of the characteristic values of the plastic anchors to be used in solid masonry. In case this option is exercised the results of these suitability tests (specifically Table 5.1, line 5) may also be used to determine the reference value for the comparison with the pullout tests subsequent to the sustained loading at maximum long term temperature (Table 5.1, line 6).

6.4.3. Admissible service conditions

6.4.3.1. General

In all tension tests the requirement for the load/displacement curves shall satisfy the requirements laid down in Part 1, 6.4.1.3 (1). The requirements on the coefficient of variation of the ultimate loads are given in 6.4.1.3 (2) and Equation (6.6b).

6.4.3.2. Characteristic resistance of single anchor for the different conditions

(1) Tension loading not influenced by edge and spacing effects (Table 5.2, line 1)

The characteristic resistances of single anchors without edge and spacing effects under tension loading shall be calculated as follows:

$$\mathbf{N_{Rk} = N_{Rk1,0} \cdot min^{1)} (min\ \alpha_1 ; min\ \alpha_{2,\ line\ 1,2,6,7}) \cdot min\ \alpha_{2,\ line\ 4,5} \cdot min\ \alpha_V} \quad \mathbf{(6.7)}$$

[1)] *The lowest value of min α_1 or min $\alpha_{2,\text{ line }1,2,6,7}$ is governing.*

with:

$N_{Rk1,0}$ = characteristic resistance evaluated from the results of tests according to Table 5.2, line 1

For solid masonry units with a compressive strength 10 N/mm² ≤ f_b < 20 N/mm² the characteristic resistance is determined by multiplying the characteristic resistance evaluated from the results of tests according to Table 5.2, line 1 by a reduction factor of 0,7.

For solid masonry units made of lightweight concrete the characteristic resistance evaluated from tests according to Table 5.2, line 1 performed with compressive strength $f_{b,test}$ shall be converted to the nominal compressive strength f_b of the tested bricks or blocks using the following linear conversion:
$N_{Rk1,0}' = N_{Rk1,0} \cdot (f_b / f_{b,test})$

min α_1 = minimum value α_1 (reduction factor from the load/displacement behaviour) according to Part 1, Equation (6.2) of all tests

≤ **1,0**

min $\alpha_{2,\text{ line }4,5}$ = minimum value α_2 (reduction factor from the ultimate loads in the suitability tests) according to Part 1,Equation (6.5) of suitability tests according to Table 5.1, line 4 and 5 (conditioning and temperature)

≤ **1,0**

min $\alpha_{2,\text{ line }1,2,,6,7}$ = minimum value α_2 (reduction factor from the ultimate loads in the suitability tests) according to Part 1, Equation (6.5) of suitability tests according to Table 5.1, line 1, 2, 6 and 7

≤ **1,0**

min α_V = minimum value α_V to consider a coefficient of variation of the ultimate loads in the suitability and admissible service condition tests larger than 20 % and 15 %, respectively; see Equations (6.6a) and (6.6b).

(2) Tension loading influenced by minimum edge effects (Table 5.2, line 2)

The characteristic resistances of single anchors near the free edge under tension loading shall be calculated as follows:

$$\mathbf{N_{Rk2} = N_{Rk2}^{t} \cdot \frac{f_b}{f_{b,test}} \cdot \min \alpha_1 \cdot \min \alpha_V}\ ^{1)} \qquad \mathbf{(6.8)}$$

1) If pull-out failure is observed in tests according to Table 5.2, line 2, then the evaluation shall be done according to Equation (6.7).

with:

N_{Rk2}^{t}	=	characteristic resistance evaluated from the results of tests according to Table 5.2, line 2
f_b	=	normalised mean compressive strength of the chosen masonry unit in the ETA
$f_{b,test}$	=	mean compressive strength of the test masonry unit
$\min \alpha_1$	=	minimum value α_1 (reduction factor from the load/displacement behaviour) according to Part 1, Equation (6.2) of all tests
	$\leq$	1,0
$\min \alpha_V$	=	minimum value α_V to consider a coefficient of variation of the ultimate loads in the suitability and admissible service condition tests larger than 20 % or 15 %, respectively; see Equations (6.6a) and (6.6b).

(3) Tension loading influenced by minimum spacing effects (Table 5.2, footnote (3))

In the design concept it is assumed that a group with 2 or 4 anchors with $s \geq s_{min}$ has the same characteristic resistance as a single anchor with a large spacing to neighbouring anchors. Therefore the characteristic resistances of single anchors N_{Rk3} with minimum spacing near the free edge under tension loading shall be calculated according to 6.4.3.2 (2), however as value N_{Rk2}^{t} the characteristic resistance evaluated from the results of tests according to Table 5.2, footnote (3) shall be taken.

If pull-out failure is observed in tests according to Table 5.2, footnote (3), then the evaluation shall be done according to Equation (6.7).

(4) Shear loading

If no shear tests are available, the characteristic shear resistances $V_{Rk,b}$ for brick edge failure may be calculated according to Annex C for concrete edge failure $V_{Rk,c}$ as follows:

$$V_{Rk,b} = 0{,}5 \cdot V_{Rk,c} \quad \text{(shear loading in direction to the free edge)}$$

$$V_{Rk,b} = 1{,}0 \cdot V_{Rk,c} \quad \text{(shear loading in other directions)}$$

The concrete strength $f_{ck,cube}$ has to be replaced by the brick normalised mean compressive strength f_b in the relevant Equation of Annex C.

If shear tests towards the edge are performed and brick edge failure occurs the characteristic shear resistance shall be calculated as follows:

$$V_{Rk,b} = V_{Ru}^{t} \cdot \frac{f_b}{f_{b,test}} \cdot \min \alpha_V \quad \textbf{(6.9)}$$

with:

V_{Ru}^{t} = characteristic resistance evaluated from the results of tests

f_b = normalised mean compressive strength of the chosen masonry unit in the ETA

$f_{b,test}$ = mean compressive strength of the test masonry unit

$\min \alpha_V$ = minimum value α_V to consider a coefficient of variation of the ultimate loads in the suitability and admissible service condition tests larger than 20 % and 15 %, respectively; see Equations (6.6a) and (6.6b).

The characteristic shear resistances $V_{Rk,s}$ of the metal expansion element for single anchors may be calculated as follows:

$$V_{Rk,s} = 0{,}5 \cdot A_s \cdot f_{uk} \quad \textbf{(6.10)}$$

with:

A_s = stressed cross section of steel

f_{uk} = characteristic steel ultimate tensile strength (nominal value)

6.4.3.3. Characteristic resistance of single anchor in the ETA

For the determination of the characteristic resistance $\mathbf{F_{Rk}}$ the design values for N_{Rk1}, N_{Rk2} , N_{Rk3} , $V_{Rk,b}$ and $V_{Rk,s}$ have to be calculated under consideration of the appropriated partial safety factors. The corresponding partial safety factors are given in 7.1.2.

The minimum design value is decisive for the characteristic resistance $\mathbf{F_{Rk}}$ given in the ETA.

The value of the characteristic resistance $\mathbf{F_{Rk}}$ shall be rounded to the following numbers:

$\mathbf{F_{Rk}}$ = 0,3 / 0,4 / 0,5 / 0,6 / 0,75 / 0,9 / 1,2 / 1,5 / 2 / 2,5 / 3 / 3,5 / 4 / 4,5 / 5 / 5,5 / 6 / 6,5 / 7 / 7,5 / 8 / 8,5 / 9 / 9,5 / 10 / 10,5 / 11 / 11,5 / … kN

$\leq \mathbf{N_{Sd} \cdot \gamma_{Mm}}$

6.4.3.4. Displacement behaviour

As a minimum, the displacements under short and long term tension and shear loading shall be given in the ETA for a load F which corresponds approximately to the value according to Equation (6.11)

$$F = \frac{F_{Rk}}{\gamma_F \cdot \gamma_M} \qquad \textbf{(6.11)}$$

with:

F_{Rk} = characteristic resistance according to 6.4.3.3

γ_F = 1,4

γ_M = corresponding material partial safety factor

The displacements under short term tension loading (δ_{NO}) are evaluated from the tests with single anchors without edge or spacing effects according to Table 5.2, line 1. The value derived shall correspond approximately to the 95 %-fractile for a confidence level of 90 %.

The long term tension loading displacements $\delta_{N\infty}$ may be assumed to be approximately equal to 2,0-times the value δ_{NO}.

The displacements under short term shear loading (δ_{VO}) are evaluated from the corresponding shear tests with single anchors. The value derived shall correspond approximately to the 95 %-fractile for a confidence level of 90 %.

If no shear tests are performed the displacements under short term shear loading (δ_{VO}) for a plastic anchor with metal expansion element may be determined for the load according to Equation (6.11) with a shear stiffness of 1200 N/mm.

The long term shear loading displacements $\delta_{V\infty}$ may be assumed to be approximately equal to 1,5-times the value δ_{VO}.

Under shear loading the displacements might increase due to a gap between fixture and anchor. The influence of this gap shall be taken into account in the design.

7. ASSUMPTIONS AND RECOMMENDATIONS UNDER WHICH THE FITNESS FOR USE OF THE PRODUCTS IS ASSESSED

7.1. Design methods for anchorage in solid masonry

7.1.1. Multiple use

The plastic anchors for use in solid masonry materials shall be used for multiple fixings. By multiple anchor use it is assumed that in the case of excessive slip or failure of one anchor the load can be transmitted to neighbouring anchors without significantly violating the requirements on the fixture in the serviceability and ultimate limit state.

Therefore the design of the fixture shall specify the number n_1 of fixing points to fasten the fixture and the number n_2 of anchors per fixing point. Furthermore the design value of actions N_{Sd} on a fixing point to a value $\leq n_3$ (kN) is specified up to which the strength and stiffness of the fixture are fulfilled and the load transfer in the case of excessive slip or failure of one anchor need not be taken into account in the design of the fixture.

The following default values for n_1, n_2 and n_3 may be taken:

$\mathbf{n_1 \geq 4}$; $\mathbf{n_2 \geq 1}$ and $\mathbf{n_3 \leq 4{,}5\ kN}$ or

$\mathbf{n_1 \geq 3}$; $\mathbf{n_2 \geq 1}$ and $\mathbf{n_3 \leq 3{,}0\ kN}$.

7.1.2. Design and safety concept

The design concept with partial safety factors shall be used for anchorages in solid masonry.

In the absence of national regulations the following partial safety factors for resistances γ_M may be used:

Steel failure:

- Tension loading:

$$\gamma_{Ms} = \frac{1{,}2}{f_{yk} / f_{uk}} \geq 1{,}4 \qquad (7.1)$$

- Shear loading of the anchor with and without lever arm:

$$\gamma_{Ms} = \frac{1{,}0}{f_{yk} / f_{uk}} \geq 1{,}25 \qquad f_{uk} \leq 800\ N/mm^2 \quad \text{and} \quad f_{yk} / f_{uk} \leq 0{,}8 \qquad (7.2)$$

$$\gamma_{Ms} = 1{,}5 \qquad f_{uk} > 800\ N/mm^2 \quad \text{or} \quad f_{yk} / f_{uk} > 0{,}8 \qquad (7.3)$$

Other failure modes:

$$\gamma_{Mm} = 2{,}5 \qquad (7.4)$$

7.1.3. Specific conditions for the design method in masonry

(1) The ETA shall contain only <u>one</u> characteristic resistance $\mathbf{F_{Rk}}$ independent of the load direction and the mode of failure. The appropriated partial safety factor and the corresponding values c_{min} and s_{min} for this characteristic resistance shall also be given.

(2) The characteristic resistance $\mathbf{F_{Rk}}$ for a single plastic anchor shall also be taken for a group of two or four plastic anchors with a spacing equal or larger than the minimum spacing s_{min}.

The distance between single plastic anchors or a group of anchors is a ≥ 250mm.

(3) See also Annex C, 5.3 (3).

Section four:
ETA CONTENT

---

9. THE ETA CONTENT

9.1.4. Characteristics of the anchor with regard to safety in use and methods of verification

- Characteristic values to be used for the calculation of the ultimate limit state:

  The ETA shall contain only one characteristic resistance $\mathbf{F_{Rk}}$ for one base material independent of the load direction and the mode of failure. The appropriated partial safety factor and the corresponding values c_{min} and s_{min} for this characteristic resistance shall also be given.

  The determined characteristic resistances for the ETA are valid only for the brick sizes which are used in the tests or larger brick sizes; therefore the information about the brick sizes has to be given in the ETA. Furthermore, if the tests have been performed in walls with a mortar strength higher than M2,5 then the minimum mortar strength shall also be given in the ETA.

  If smaller brick sizes are present on the construction site or if the mortar strength is smaller than the required value, the characteristic resistance of the plastic anchor may be determined by "job site tests" according to Annex B.

9.1.6. Assumptions under which the fitness of the anchor for the intended use was favourably assessed

The specific conditions (2) and (3) for the design method according to 7.1.3 shall be given in the ETA as well.