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GUIDELINE FOR EUROPEAN TECHNICAL APPROVAL

of

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

Annex B (informative):

**RECOMMENDATIONS FOR TESTS
TO BE CARRIED OUT ON CONSTRUCTION WORKS**

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ANNEX B (informative):

RECOMMENDATIONS FOR TESTS TO BE CARRIED OUT ON CONSTRUCTION WORKS

1. GENERAL

This Annex is valid for plastic anchors with an ETA only.

In the absence of national requirements the characteristic resistance of the plastic anchor may be determined by the following so-called "job site tests" in use category a, b, c and d, if the plastic anchor has already an ETA with characteristic values for the equivalent base material (of the corresponding use category) as is present on the construction works.

The characteristic resistances given in the ETAs for use in solid masonry are valid for the base material and the bricks which have been used in the tests or larger brick sizes and higher compressive strengths of the masonry unit.

The characteristic resistances given in the ETAs for use in hollow or perforated masonry are valid for the bricks and blocks only which have been used in the tests regarding base material, size of the units, compressive strength and configuration of the voids.

The characteristic resistance of the plastic anchor has to be determined by "job site tests" to evaluate the influence of hammer or impact drilling, if drill holes in the approval tests have been drilled using the rotary drill but hammer or impact drilling shall be used for anchor installation on the construction site.

This characteristic resistance to be applied to a plastic anchor shall be determined by means of at least 15 pull-out tests carried out on the construction works with a concentric tension load acting on the plastic anchor. These tests may also be performed in a laboratory under equivalent conditions as used on construction works.

Execution and evaluation of the tests as well as issue of the test report and determination of the characteristic resistance shall be supervised by the person responsible for execution of works on site and be carried out by a competent person.

The number and position of the plastic anchors to be tested shall be adapted to the relevant special conditions of the construction works in question and, for example, in the case of blind and larger areas be increased such that reliable information about the characteristic resistance of the plastic anchor embedded in the base material in question can be derived. The tests shall take account of the unfavourable conditions of practical execution.

2. ASSEMBLY

The plastic anchor to be tested shall be installed (e.g. preparation of drill hole, drilling tool to be used, drill bit, type of drilling hammer or rotation, thickness of fixture) and as far as spacing and edge distances are concerned be distributed in the same way as foreseen for the intended use.

Depending on the drilling tool hard metal hammer-drill bits or hard metal percussion drill bits according to ISO 5468 [15] shall be used. New drill bits shall be used for one test series or drill bits with $d_{cut} \geq d_{cut,m}$.

3. EXECUTION OF TEST

The test rig used for the pull-out tests shall allow a continuous slow increase of load recorded by a calibrated measuring equipment.

The load shall act perpendicular to the surface of the base material and be transmitted to the plastic anchor via a hinge. The reaction forces shall be transmitted to the base material such that possible breakout of the masonry is not restricted. This condition is considered as fulfilled, if the support reaction forces are transmitted either in adjacent masonry units or at a distance of at least 150mm from the plastic anchors.

The load shall be progressively increased so that the ultimate load is achieved after not less than about 1 minute. Recording of load is carried out when the ultimate load is achieved.

If no pull-out failure occurs, then other test methods are needed, e.g. proof-loading.

4. TEST REPORT

The test report shall include all information necessary to assess the resistance of the tested plastic anchor. It shall be given to the person responsible for the design of the fastening. The following information is necessary e.g.:

- Name of product
- Construction works
- Building owner
- Date and place of tests
- Test rig
- Type of structure to be fixed
- Masonry (type of brick, strength class, all dimensions of bricks and mortar group if possible); visual assessment of masonry (flush joints, joint clearance, regularity)
- Plastic anchors and screws or nails
- Cutting diameter of hard metal hammer-drill bits, value measured before and after drilling if no new drill bits are used
- Results of tests including indication of value N_1 ; mode of failure
- Tests carried out or supervised by; Signature

5. EVALUATION OF TEST RESULTS

The characteristic resistance F_{Rk1} is obtained from the measured values of N_1 as follows

$$F_{Rk1} = 0,5 \cdot N_1$$

The characteristic resistance F_{Rk1} has to be equal or smaller than the characteristic resistance F_{Rk} which is given in the ETA for equivalent base material (according to use category a, b, c and d)

with:

$$N_1 = \text{the mean value of the five smallest measured values at the ultimate load}$$

In absence of national regulations the partial safety factors for the resistance of the plastic anchor shall be taken as $\gamma_{Mc} = 1,8$ for use in concrete, $\gamma_{Mm} = 2,5$ for use in masonry and $\gamma_{MAAC} = 2,0$ for use in autoclaved aerated concrete.