TECHNICAL REPORT

PLATE STIFFNESS OF PLASTIC ANCHORS FOR ETICS

TR 026

May 2016

EUROPEAN ORGANISATION FOR TECHNICAL ASSESSMENT
WWW.EOTA.EU

Contents

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1 SCOPE OF THE TECHNICAL REPORT

1.1 General

The assessment for external thermal insulation composite systems with rendering (ETICS) is specified in EAD 040083-00-04.04 [1]. The load resistance of the ETICS fixed by anchors is determined according to EAD 040083-00-04.04 [1] and is particularly linked to the mechanical properties of the anchor plate and the insulation material. The minimum requirements to the properties of the anchor plate are given in the ETAs according to EAD 040083-00-04.04 [1].

These properties are
• the load resistance and
• the plate stiffness.
of the anchor plate

This Technical Report covers pull-through tests to evaluate the pull-through resistance of the anchor plate and the plate stiffness of plastic anchors for fixing of external thermal insulation composite systems with rendering according to EAD 040083-00-04.04 [1]. The pull-through test shall be carried out according to section 2.

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1.2 Specific terms used in this technical report

Plastic anchor	=	a manufactured, assembled component for achieving anchorage between the base material and the fixture.
Fixture	=	component to be fixed to the base material, in this case external thermal insulation composite system.
Anchorage	=	an assembly comprising base material, plastic anchor and fixture.
c	=	tangent stiffness [kN/mm]
N	=	normal tension force [kN]
s	=	displacement [mm]

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2 DETAILS OF METHOD AND CRITERIA FOR ASSESSMENT

The failure load of the anchor plate shall be determined from at least 5 tests using the product type to be assessed only. During the tests the anchor plate shall rest on a solid support ring with a clear inside diameter of 30 mm. A preload can be applied for determination of the stiffness for curved anchor plates in a way, that the tension load is be transmitted at the inside edge of the support ring. If the anchor plate is stiffened by ribs, recesses, which prevent a contact between the ribs and the supporting ring and the load transmission is not effected by the ribs, shall be designed in the steel ring.
A principle test setup is shown in Figure 2.1.

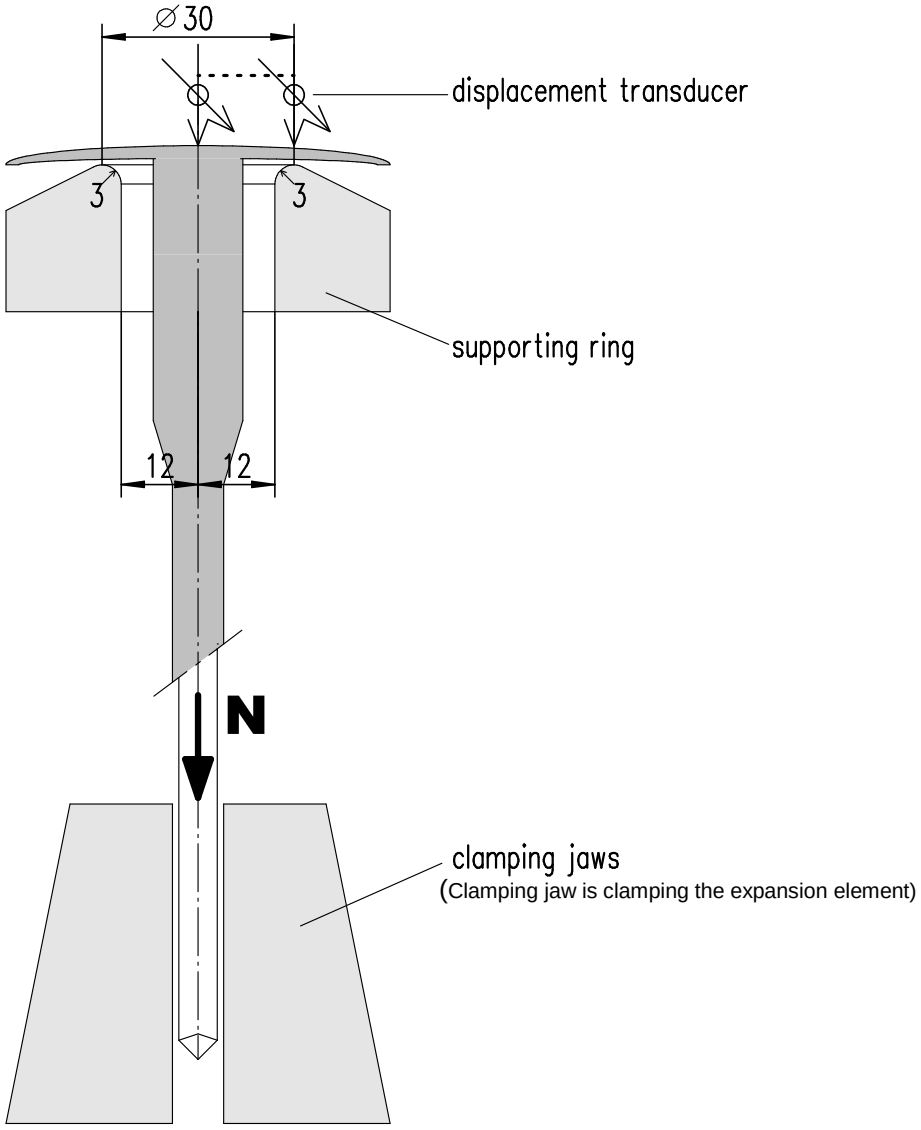

Figure 2.1 Principle description of the test for determination of the plate stiffness

For plastic anchor plates, which change their mechanical properties under influence of humidity, the tests shall be carried out using air-humid conditioned anchors but always in ambient temperature (standard conditions: equilibrium water content at T = +23 °C and 50 % relative humidity). The tension load is transmitted over the anchor shaft with a loading rate of 1 kN/min ± 20 %.

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3 ASSESSING OF PLATE STIFFNESS

3.1 Load resistance

The characteristic resistance has to be determined from the 5%-quantile of the ultimate loads for a confidence level of 90 %. This value has to be stated in the ETA. The characteristic resistance shall at least comply with the characteristic resistance in the ETICS according to EAD 040083-00-04.04 [1]. If the characteristic resistance amounts at least 1,0 kN, the universal application mentioned above can be ensured. The reduction of the resistance of the anchor plate caused by increased temperature is included in this value.

3.2 Plate stiffness

For getting a comparable dimension for the plate stiffness, the tangent stiffness has to be determined for every test. This tangent stiffness states the gradient of an idealised straight line between the points s_u with the appropriate tension force $N_u = 0$ kN and $s_o = 1$ mm with the appropriate tension force N_o in the load-displacement-diagram (see Figure 3.1).

The plate stiffness and the diameter of the anchor plate shall be stated in the ETA.

Tangents stiffness:

$$\mathbf{c} = \frac{\mathbf{N_o} - \mathbf{N_u}}{\mathbf{s_o} - \mathbf{s_u}} = \frac{\mathbf{N_o}}{\mathbf{1mm} - \mathbf{s_u}} \qquad (3.1)$$

with

with $s_u \leq 0{,}3\ s_o$

The evaluated values should be rounded upward expediently to $^1/_{10}$ kN and be stated related to 1 mm deformation (e.g. 0,3 kN/mm / 0,4 kN/mm / 0,5 kN/mm / 0,6 kN/mm / 0,7 kN/mm).

For characterising the plate stiffness the mean value has to be stated. The coefficient of variation shall not exceed 20 %.

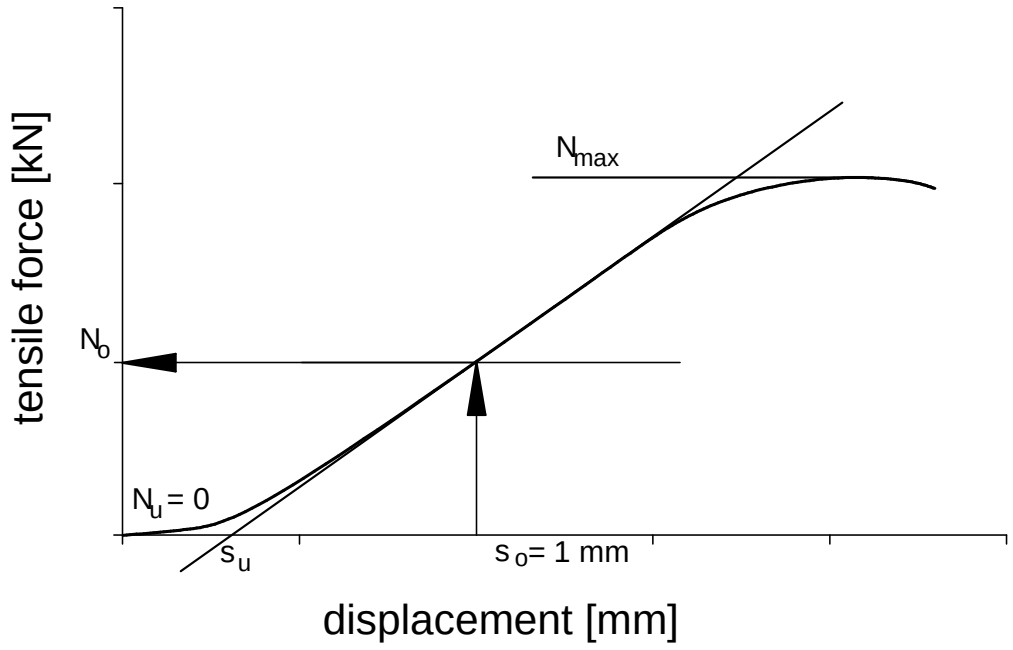

Figure 3.1 Load-displacement-diagram with the idealized straight line

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4 REFERENCE DOCUMENTS

As far as no edition date is given in the list of standards thereafter, the standard in its current version at the time of issuing the Technical Report is of relevance.

[1] EAD 040083-00-04.04:
EXTERNAL THERMAL INSULATION COMPOSITE SYSTEMS WITH RENDERING

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