

**General building approval  
No. Z-21.2-2052**

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**English translation of the German national technical approval. Original version in German language.**

**Z-21.2-2052**

**September 23, 2016  
April 14, 2020**

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**Fröwis Screwed-in anchor for fixing of external thermal insulation composite systems with rendering in concrete and masonry.**

This national technical approval comprises eight pages and no annexes.  
This national technical approval replaces the national technical approval No. Z 21.2 2052 of April 11, 2016. The object was approved for the first time on December 21, 2015.

## I. GENERAL PROVISIONS

- 1 With the *allgemeine bauaufsichtliche Zulassung* ('national technical approval') the fitness for use and the applicability of the subject of approval according to the Landesbauordnungen ('Building Regulations of the Land') has been verified.
- 2 If, in the *allgemeine bauaufsichtliche Zulassung* ('national technical approval') requirements are made concerning the special expertise and experience of persons entrusted with the manufacture of construction products and types of construction according to the relevant regulations of the Land following section 17, sub-section 5 *Musterbauordnung* ('Model Building Code'), it is to be noted that this expertise and experience can also be proven by equivalent verifications from other Member States of the European Union. If necessary, this also applies to verifications presented within the framework of the Agreement on the European Economic Area (EEA) or other bilateral agreements.
- 3 The *allgemeine bauaufsichtliche Zulassung* ('national technical approval') does not replace the permits, approvals and certificates prescribed by law for carrying out building projects.
- 4 The *allgemeine bauaufsichtliche Zulassung* ('national technical approval') will be granted without prejudice to the rights of third parties, in particular private property rights.
- 5 Notwithstanding further regulations in the "Specific Provisions" manufacturers and distributors of the subject of approval shall make copies of the *allgemeine bauaufsichtliche Zulassung* ('national technical approval') available to the user and point out that the *allgemeine bauaufsichtliche Zulassung* ('national technical approval') has to be available at the place of use. Upon request copies of the *allgemeine bauaufsichtliche Zulassung* ('national technical approval') shall be placed at the disposal of the authorities involved.
- 6 The *allgemeine bauaufsichtliche Zulassung* ('national technical approval') may be reproduced in full only. Publication in the form of extracts requires the consent of *Deutsches Institut für Bautechnik*. Texts and drawings of advertising brochures may not be in contradiction to the *allgemeine bauaufsichtliche Zulassung* ('national technical approval'). Translations of the *allgemeine bauaufsichtliche Zulassung* ('national technical approval') have to contain the note "Translation of the German original, not checked by *Deutsches Institut für Bautechnik*".
- 7 The *allgemeine bauaufsichtliche Zulassung* ('national technical approval') is granted until revoked. The provisions of the *allgemeine bauaufsichtliche Zulassung* ('national technical approval') can subsequently be supplemented and amended in particular, if this is required by new technical findings.

## II. SPECIFIC PROVISIONS

### 1. Subject of approval and field of application

This national technical approval regulates the use of the Fröwis screwed-in anchor Gecko U8 as per the European technical authorisation ETA-15/0305 in insulation composite systems with national technical approval. The insulation composite system must consist of one of the following insulating materials:

- flame retardant insulation boards of EPS rigid foam certified to DIN EN 131163 with the following characteristics as per the designation code laid down in:  
T1 - L2 - W2 - S2 – P5 – BS50 - DS(70,-)2 - DS(N)2  
also tested for transverse tensile strength in accordance with DIN EN 1607 of at least 100 kPa<sup>1)</sup>, tested for bulk density in accordance with DIN EN 1602 of 15 - 20 kg/m<sup>3</sup> and of building material classification DIN 4102-B1, or
- normally flammable insulation boards with the trade name "Kooltherm K5" from the manufacturer Kingspan Insulation b.v. of phenolic resin rigid foam certified to DIN EN 13166 with the following characteristics as per the designation code laid down in:  
PF - EN 13166 – T1 - DS(T+) - DS(TH) - DS(T-) - CS(Y)100 - CV  
also tested for transverse tensile strength in accordance with DIN EN 1607 of at least 60 kPa<sup>1)</sup> and tested for bulk density in accordance with DIN EN 1602 of 40 kg/m<sup>3</sup> ± 5 kg/m<sup>3</sup>.
- normally flammable insulating boards with the trade name "purenotherm WDVS (puren-PIR NE)" from manufacturer puren gmbh made of polyurethane rigid foam with properties and composition according to national technical approval Z 33.4-1455

The insulation composite system that is used is not the object of this national technical approval.

### 2. Provisions for the construction product

The anchor must comply with the regulations in ETA-15/0305.

1) Every single test result value must adhere to the values specified here.

### 3 Provisions for design and calculation

#### 3.1 General

The Fröwis screwed-in anchor Gecko U8 with anchor plate may be built into insulation composite systems that are approved by national technical approval regulations. The requirement for an anchor plate diameter of at least 60 mm is met. The insulation material thickness  $h_D$  (see Fig. 1) must be at least 100 mm.

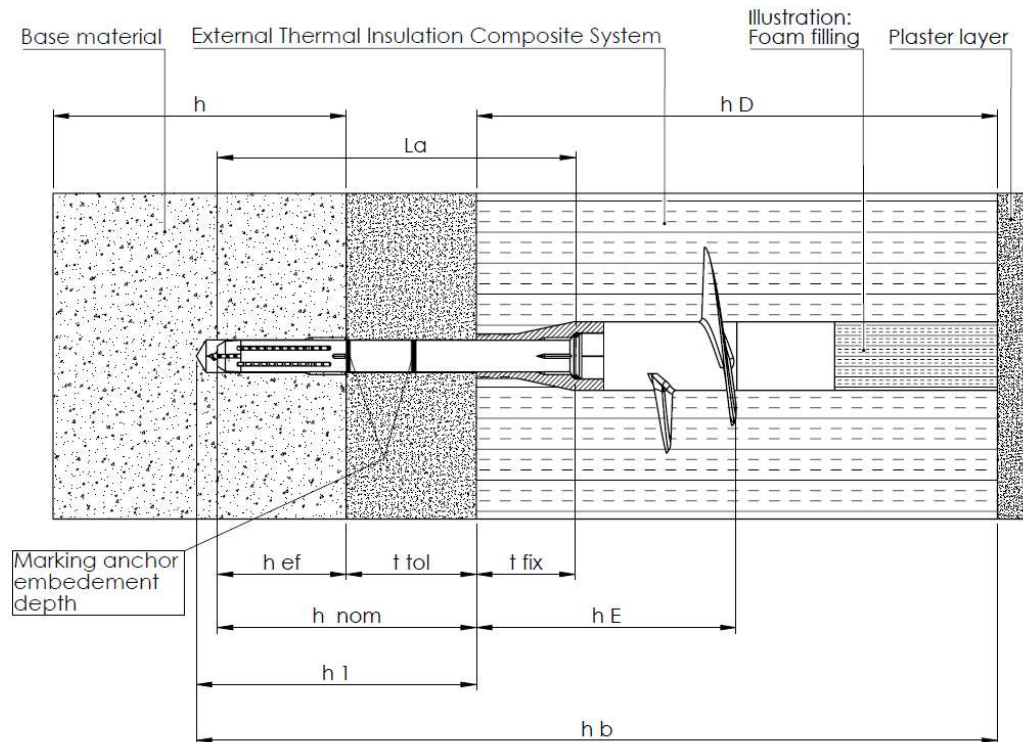


Fig. 1: Anchor in installed state

- $h_{nom}$  = overall plastic anchor embedment depth in the base material with non-load-bearing layer ( $t_{tol}$ )
- $h_{ef}$  = effective anchorage depth
- $h_1$  = depth of drilled hole to deepest point
- $h$  = thickness of member (wall)
- $h_D$  = thickness of insulation material
- $t_{tol}$  = thickness of equalizing layer and/or non-load-bearing layer (0 - 40 mm)
- $t_{fix}$  = position of screw plate
- $h_E$  = embedment depth
- $h_b$  = total borehole depth
- $L_{d, anchor}$  = total length of anchor

### 3.2 Calculation

It must be proven that the rated value of wind load does not exceed the rated value of the load bearing capacity of the insulation material (WDVS).

$$W_{ed} \leq W_{Rd,WDVS}$$

and

$$W_{ed} \leq n \cdot N_{Rd,anchor}$$

with

$W_{ed}$  = rated value of wind load:

$$W_{ed} = W_{ek} \cdot \gamma_F$$

$W_{ek}$  = typical impact of wind as per EN 1991-1-4

$\gamma_F$  = safety factor for the impact (wind loads  $\gamma_F = 1.5$ )

$W_{Rd,WDVS}$  = rated value of the load bearing capacity of the insulation  
see Table 1 and Table 2

$n$  = anchor quantity per  $m^2$

$N_{Rd,anchor}$  = rated value of the load bearing capacity of the anchor in the  
anchor base, see ETA-15/0305:

$$N_{Rd,anchor} = N_{Rk,anchor} / \gamma_M$$

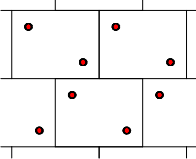
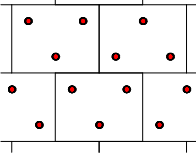
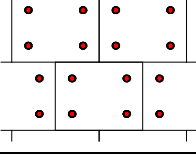
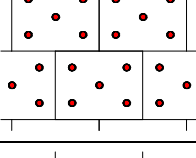
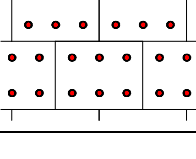
$\gamma_M$  = material safety factor for the anchor base

The following quantities of anchors per  $m^2$  may not be exceeded or fallen short of:

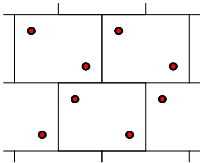
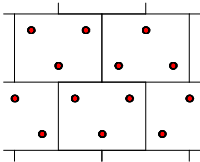
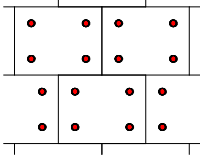
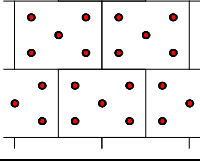
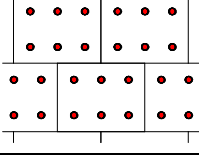
- minimum number of anchors  $n_{min} \geq 4$
- maximum number of anchors  $n_{max}$ : see information in the approvals for insulation materials and insulation composite systems.

The rated value of the load bearing capacity of the insulation material depending on the insulation material type is indicated in Table 1 and Table 2. The material safety factor  $\gamma_M = 1.5$  for EPS and  $\gamma_M = 2.0$  for phenolic resin rigid foam boards is contained therein. The minimum anchoring depth in the insulation material  $h_E$  is represented in paragraph 3.1, Fig. 1. The distance between the anchors and the edge of the insulation board is at least 150 mm.

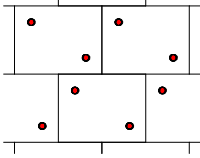
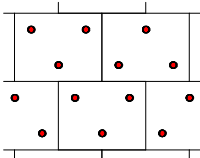
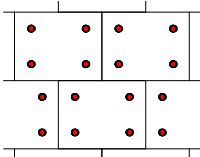
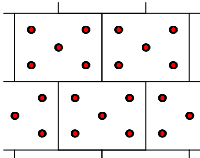
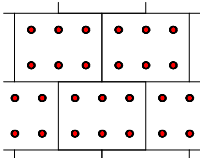
**Table 1: Load capacity for EPS boards as per paragraph 1 with minimum transverse tensile strength = 100 kPa, board dimensions 1000 mm x 500 mm, built in wall plug anchoring with Gecko U8 in the board surface, minimum anchoring depth in the insulation material  $h_E = 80$  mm**

Quantity of wall plugs per m <sup>2</sup>	Fixing pattern	Insulation board thickness [mm]	Load bearing capacity of insulation material $W_{Rd,WDVS}$ [kN/m <sup>2</sup> ]
4		> 100	1,2
6		> 100	1,8
8		> 100	2,3
10		> 100	2,7
12		> 100	3,2

**Table 2: Load capacity for phenolic resin rigid foam boards as per paragraph 1 with minimum transverse tensile strength = 60 kPa, built in wall plug anchoring with Gecko U8 in the board surface, minimum anchoring depth in the insulation material  $h_E = 80$  mm**

Quantity of wall plugs per m <sup>2</sup>	Fixing pattern	Insulation board thickness [mm]	Load bearing capacity of insulation material $W_{Rd,WDVS}$ [kN/m <sup>2</sup> ]
4		> 100	1,1
6		> 100	1,6
8		> 100	2,1
10		> 100	2,5
12		> 100	2,9

**Table 3: Load capacity for polyurethane rigid foam boards as per paragraph 1 with minimum transverse tensile strength = 100 kPa, built in wall plug anchoring with Gecko U8 in the board surface, minimum anchoring depth in the insulation material  $h_E = 80$  mm**

Quantity of anchors per m <sup>2</sup>	Fixing pattern	Insulation board thickness [mm]	Load bearing capacity of insulation material $W_{Rd,WDVS}$ [kN/m <sup>2</sup> ]
4		> 100	1,2
6		> 100	1,8
8		> 100	2,3
10		> 100	2,8
12		> 100	3,2

#### 4. Provisions for execution

The anchor and its installation must comply with the provisions in ETA-15/0305. The wall plug may only be installed in insulation composite systems with insulation boards as per paragraph 1.