ETA-Danmark A/S
Göteborg Plads 1
DK-2150 Nordhavn
Tel. +45 72 24 59 00
Fax +45 72 24 59 04
Internet www.etadanmark.dk

Authorised and notified according to Article 29 of the Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011

MEMBER OF EOTA

# European Technical Assessment ETA-22/0229 of 2025/11/28

I General Part

**Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011:** ETA-Danmark A/S

| | |
|---|---|
| **Trade name of the construction product:** | CELO ResiTHERM® 12<br>CELO ResiTHERM® 16 |
| **Product family to which the above construction product belongs:** | Distance fixing system |
| **Manufacturer:** | CELO Befestigungssysteme GmbH<br>Industriestraße 6<br>DE-86551 Aichach<br>Tel + 49 8251 90 485 0<br>Internet: www.celofixings.com |
| **Manufacturing plant:** | CELO Befestigungssysteme GmbH<br>Industriestraße 6<br>DE-86551 Aichach |
| **This European Technical Assessment contains:** | 28 pages including 23 annexes which form an integral part of the document |
| **This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:** | EAD 331985-00-0604 – Distance fixing system |
| **This version replaces:** | The ETA with the same number issued on 2022-10-21 |

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (except the confidential Annexes referred to above). However, partial reproduction may be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

# II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

## 1 Technical description of product

CELO ResiTHERM® 12 and CELO ResiTHERM® 16 are post-installed anchor systems placed into predrilled holes in concrete, in masonry and autoclaved aerated concrete and anchored by bonding.

CELO ResiTHERM® 12 and CELO ResiTHERM® 16 distance fixing system consists of a M12 or M16 threaded rod respectively, which are made from carbon steel or stainless steel and a thermal separation module made from polyamide. The fixing system is placed into a pre-drilled hole perpendicular to the surface (maximum deviation 5°) in masonry or concrete and anchored by bonding the threaded rod element to the wall of the drilled hole.

The product description is given in Annex A.

## 2 Specification of the intended use in accordance with the applicable European Assessment Document (hereinafter EAD)

The intended use is fixings through an ETICS into the loadbearing wall of heavy-duty fixtures such as awnings, French balconies, canopies, satellite dishes, etc.
The system is used for distance installations in the following insulated base materials:

- Normal weight cracked or non-cracked concrete (base material group a)
- Solid masonry bricks (base material group b)
- Perforated or hollow bricks (base material group c)
- autoclaved aerated concrete (base material group d)

Reference to base material group in EAD 330499-02-0604 and EAD 330076-00-0604.

Anchorages subject to: Static or quasi-static loads
Temperature range:

- T1: -40°C to +40°C (max. short term temperature +40°C and max. long-term temperature +24°C)
- T2: -40 °C to +80 °C (max long term temperature +50 °C and max short term temperature +80 °C)

The minimum and the maximum installation temperature are specified by the manufacturer within the above range.

Use categories in respect of use:
Category d/d: Use in dry masonry and concrete
Category w/w: Use in wet masonry only

This ETA applies only where concrete or masonry members in which the distance fixing systems are embedded are subject to static or quasi static actions in tension, pressure, shear or combined tension and shear or pressure and shear or bending.

In case of a product use in ETICS or façade insulation systems, it must be ensured that no ETICS or façade insulation systems influence the loadbearing capacity in the base material.

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B1 to B5

The provisions made in this European Technical Assessment 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 or Assessment Body, 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.

# 3 Performance of the product and references to the methods used for its assessment

## 3.1 Characteristics of product

**Safety in case of fire (BWR 2):**
No Performance assessed

**Safety in use (BWR4):**
Resistance of the M12 and M16 anchor rods respectively fixed with injection mortar in the base material masonry, and autoclaved aerated concrete:
The M12 and M16 rods respectively with material specification as stated in annex A5 are covered by the following ETA's based on EAD 330076-00-0604 which provides the relevant performances:
- ETA-15/0320 (ResiFIX VYSF)
- ETA-20-0065 (ResiFIX VY Eco)
- ETA-14/0101 (ResiFIX EYSF)
- ETA-17/0720 (ResiFIX PYSF)

Resistance of the M12 and M16 anchor rods respectively fixed with injection mortar in the base material concrete:
The M12 and M16 rods respectively with material specification as stated in annex A5 are covered by the following ETA's based on EAD 330499-01-0601 which provides the relevant performances:
For cracked and uncracked concrete
- ETA-10/0134 (ResiFIX VY)
- ETA-20/0066 (ResiFIX VY Eco)

For uncracked concrete:
- ETA-12/0107 (ResiFIX EYSF)
- ETA-17/0721 (ResiFIX PYSF)
- ETA-12/0112 (ResiFIX EY)
- ETA-17/0805 (ResiFIX PY)

Resistance of the plastic part
- Characteristic resistance of the plastic part transferring load to failure under tension loading
- Characteristic resistance of the plastic part transferring load to failure under pressure loading
- Characteristic resistance of the plastic part transferring load to failure under shear loading
- Characteristic resistance to failure under pressure load and displacement (buckling of cantilever arm)
- Characteristic resistance to failure under combined shear and pressure load and displacements (buckling of cantilever arm)
- Characteristic resistance under shear loads and displacements (failure of plastic part transferring load, cantilever arm)
- Maximum installation torque moment

The above essential characteristics are detailed in Annex C.

**Durability**
The verification of durability is part of testing of the essential characteristics. Durability is only ensured if the specifications of intended use according to Annex B are taken into account.

## 3.2 Methods of assessment

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 Basic Requirements 4 has been made in accordance with the EAD 331985-00-0604 – Distance fixing system.

# 4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

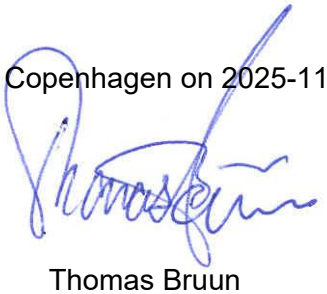
### 4.1 AVCP system

According to the decision 97/463/EC of the European Commission, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 2+.

# 5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

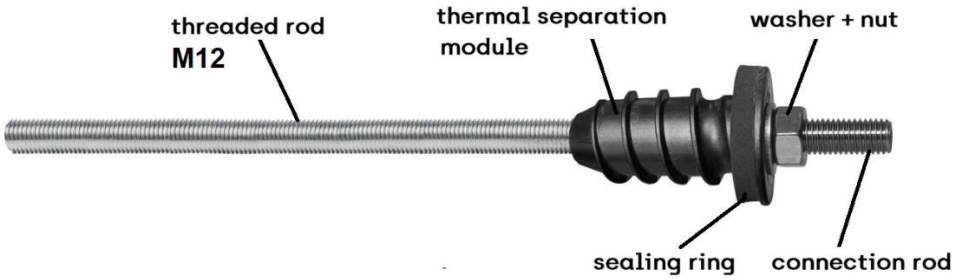
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking.

Issued in Copenhagen on 2025-11-28 by

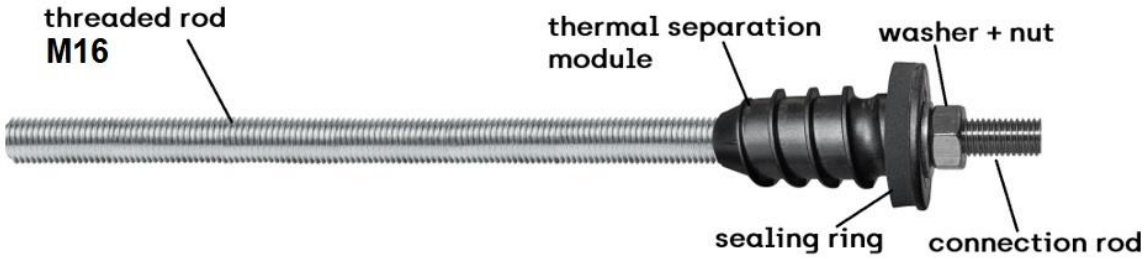


Thomas Bruun
Managing Director, ETA-Danmark

**Distance fixing system ResiTHERM® 12**



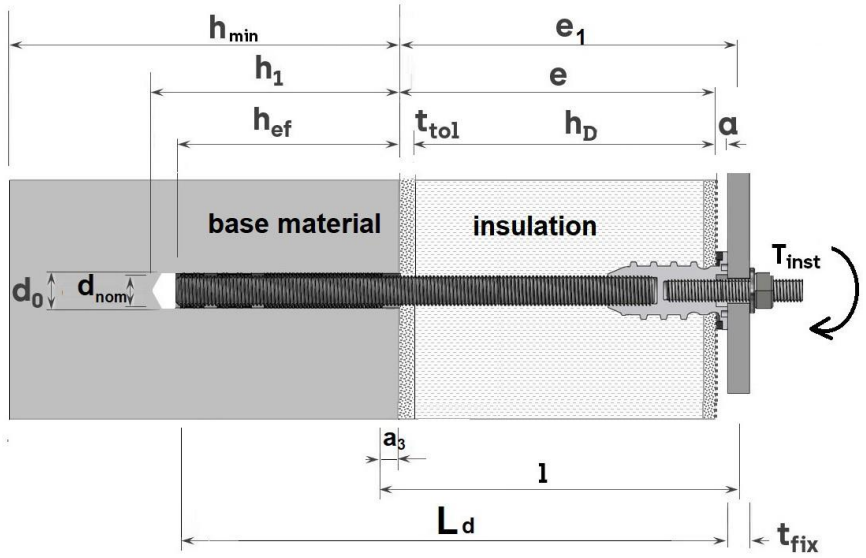

**Distance fixing system ResiTHERM® 16**



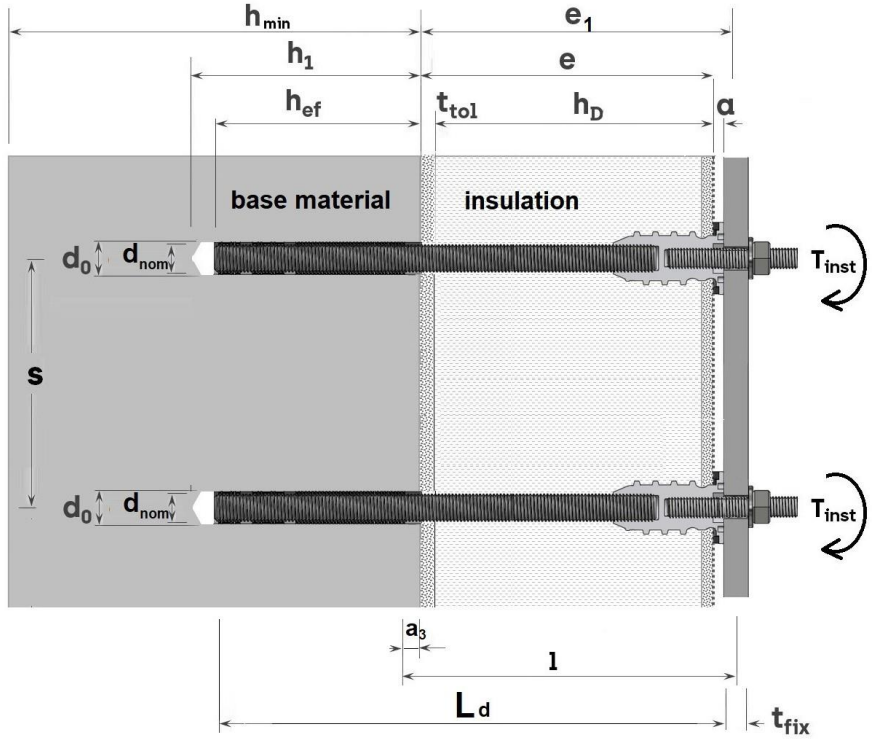
| | |
|---|---|
| ResiTHERM® 12, ResiTHERM® 16 | **Annex A1** |
| **Product description**<br>View and profile of the products | |

**ResiTHERM® 12, ResiTHERM® 16 installed conditions**

**Single fixing – anchor's free end is rotatable under an acting shear load**

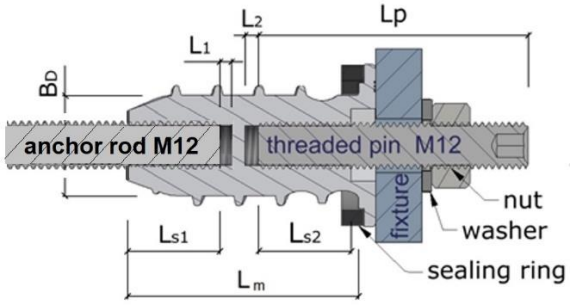



**Multiple fixing – anchor's free end is not rotatable under an acting shear load, provided that the fixed baseplate is sufficiently rigid**




| | |
|---|---|
| ResiTHERM® 12, ResiTHERM® 16 | **Annex A2** |
| **Product description**<br>Installed conditions single fixing and multiple fixings | |

**ResiTHERM® 12 installed conditions**




**ResiTHERM® 16 installed conditions**

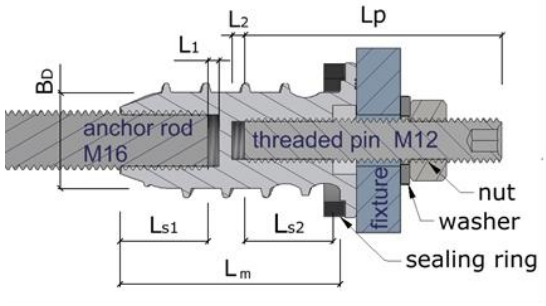
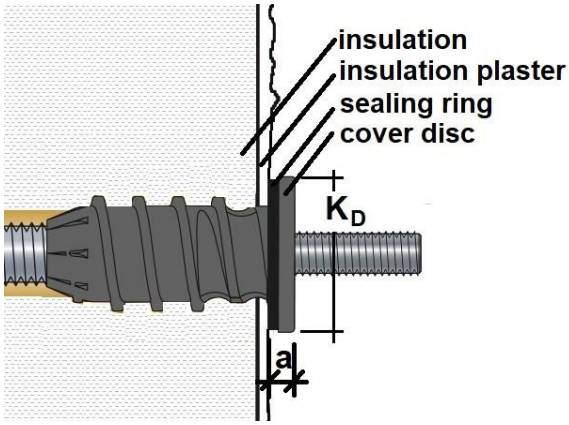
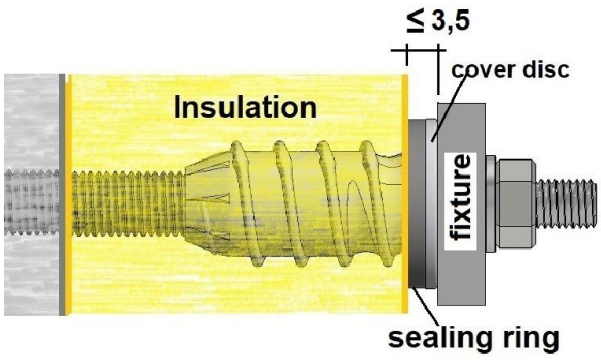



**Table A3.1: Specifications for the installation**

| | | | ResiTHERM® 12 | ResiTHERM® 16 |
|---|---|---|---|---|
| Total length incl. anchor rod | $L_d$ | [mm] | ≤ 302 | ≤ 392 |
| Length of the thermal separation module | $L_m$ | [mm] | 60 | |
| Core diameter of the thermal separation module | $B_D$ | [mm] | 26 | |
| Diameter cover disc | $K_D$ | [mm] | 42 | |
| Diameter of anchor rod | $d_{nom}$ | [mm] | 12 | 16 |
| Thickness of non-load bearing plaster, adhesive or similar materials | $t_{tol}$ | [mm] | optional | optional |
| Insulation thickness (incl. insulation plaster) | $h_D$ | [mm] | 60 - 220 | 60 - 300 |
| Lever arm for shear load for calculation of shear load with lever arm | l | [mm] | $a_3 + e_1$ | |
| Distance between surface of base material to the plaster surface (non bearing materials) | e | [mm] | $h_D + t_{tol}$ | |
| Distance between shear load and surface of the base material | $e_1$ | [mm] | $e + a + t_{fix} / 2$ | |
| Gap between plaster surface and fixture | a | [mm] | 3 – 3,5 | |
| Additional length for lever arm | $a_3$ | [mm] | $0,5 * d_{nom}$ | |
| Min. screw-in depth M12 resp. M16 anchor rod | $L_{s1}$ | [mm] | 24 | |
| Min. screw-in depth M12 (pin) | $L_{s2}$ | [mm] | 24 | |
| Adjusting length M12 resp. M16 anchor rod (base material side) | $L_1$ | [mm] | 3 | |
| Adjusting length M12 pin (fixture side) | $L_2$ | [mm] | 3,5 | |
| Spacing between anchor rods | s | [mm] | in accordance with ETA of anchor adhesive | |

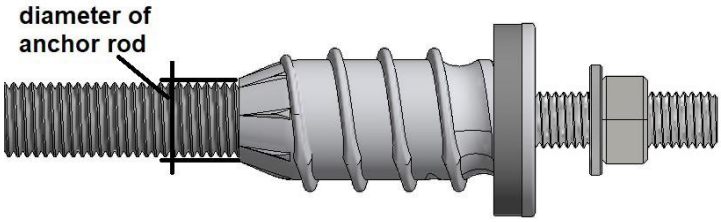
**ResiTHERM® 12, ResiTHERM® 16 installed conditions to ensure sealing against driving rain (watertightness in accordance with EN 1027 – method 1A)**




Installation with max. distance of plaster to fixture to ensure water tightness (a ≤ 3,5 mm)

**Marking:**



| Marking: | Brand | Type | diameter of anchor rod |
|---|---|---|---|
| **Example:** | **CELO** | **ResiTHERM®** | **16 resp. 12** |

**ResiTHERM® 12, ResiTHERM® 16 single parts and materials**

**Accessories:**

**Pos 3a**

**Pos 7**

**Table A 5.1: Parts and Materials**

| Pos | Designation | Material |
|---|---|---|
| 1 | **Anchor rod M12 or Anchor rod M16** | Steel zinc plated galvanised ≥ 5µm in accordance with EN ISO 4042:2018 Property class EN-ISO 898-1 (2013) $f_{yk}$ ≥ 640 N/mm², $f_{uk}$ ≥ 800 N/mm² or stainless steel A4 in accordance with EN 10088-3:2014) material 1.4401 or 1.4571 ( $f_{yk}$ ≥ 450 N/mm² , $f_{uk}$ ≥ 700 N/mm² , strength class 70 ) |
| 2 | **Thermal separation module** | Polyamide PA 6 with glass fiber |
| 3 | **Threaded pin M12** | Stainless steel A4 in accordance with EN 10088-3:2014 material 1.4401 or 1.4571 $f_{yk}$ ≥ 450 N/mm², $f_{uk}$ ≥ 700 N/mm² |
| | **or alternative** | |
| 3a | **reduction threaded pin M12/M10** | |
| 3b | **or M12 screw** | |
| 4 | **sealing ring** | Material: EPDM (min. 41,5 x 37,5 x 6 mm³) |
| 5 | **Hexagon nut M12** | Stainless steel A4 in accordance with EN 10088-3:2014 material 1.4401 or 1.4571 in accordance with DIN EN ISO 4032 |
| 6 | **Washer** | Stainless steel A4 in accordance with DIN 125 or 440 |
| 7 | **Optional: distance washer for M12, in accordance with DIN 9021** | Polyamide, 37 x 13 x 3 mm (white or black) |

**Specification of intended use**

**Anchorages subject to:**

- Static and quasi-static actions in tension, pressure, shear or combined tension and shear or combined pressure and shear load. The anchor shall not be used for the transmission of dead loads of the thermal insulation composite system.

**Base material:**

**Masonry and autoclaved aerated concrete –** in accordance with ETA's

- ETA-15/0320 (ResiFIX VYSF)
- ETA-20-0065 (ResiFIX VY Eco)
- ETA-14/0101 (ResiFIX EYSF)
- ETA-17/0720 (ResiFIX PYSF)

**Cracked and uncracked concrete** – in accordance with ETA's

- ETA-10/0134 (ResiFIX VY)
- ETA-20/0066 (ResiFIX VY Eco)

**uncracked concrete** – in accordance with ETA's for uncracked concrete

- ETA-12/0107 (ResiFIX EYSF)
- ETA-17/0721 (ResiFIX PYSF)
- ETA-12/0112 (ResiFIX EY)
- ETA-17/0805 (ResiFIX PY)

**Temperature Range for use - if not restricted by injection adhesive ETA:**

**Masonry**

- $T_a$: **-** 40°C to **+** 40°C (max. temperature: short-term **+**40°C and long-term **+**24°C)
- $T_b$: **-** 40°C to **+** 80°C (max. temperature: short-term **+**80°C and long-term **+**50°C)

**Concrete**

- T1: **-** 40°C to **+** 40°C (max. temperature: short-term **+**40°C and long-term **+**24°C)
- T2: **-** 40°C to **+** 80°C (max. temperature: short-term **+**80°C and long-term **+**50°C)

**Use conditions (Environmental conditions)**

The use conditions for the base materials are given in the above-mentioned ETA's for the respective substrates.

**Steel parts in respect of installation and application conditions:**

The intended use regarding environmental conditions of anchors with components made of stainless steel, results from their corrosion resistance class in accordance with (CRC) to EN 1993-1-4:2006+A1:2015, Table A.3 in connection with EN 1993-1-4:2006+A1:2015, Table A.2 and A.1.

- The fastener consisting of exterior and interior parts made of stainless-steel class A4 in accordance with Annex A5, table A5.1: CRC III.
- The fastener consisting of exterior parts made of stainless-steel class A4 in accordance with Annex A5, table A5.1 and interior parts made of galvanized carbon steel in accordance with Annex A5, table A5.1: CRC III, provided that the anchor and sealing ring is installed in accordance with Annex A4 and with displacement less than 1.0 mm under tension loads and less than 3.0 mm under shear loads, and with a render with a maximum grain size K3.
- Furthermore, it is required that the ETICS or insulation is designed to avoid accumulation of humidity. The fastener consisting of exterior parts made of stainless-steel class A4 according to Annex A5, table A5.1 and interior parts made of galvanized carbon steel in accordance with Annex A5, table A5.1: CRC III, provided that other suitable sealing measures are taken, such as a hybrid joint compound or e.g., a sheet metal cover is applied.

**Use conditions in respect of installation and use**

**Masonry and aerated autoclaved concrete base material - if not restricted by base material ETA:**

- Category d/d: Installation and use in dry masonry
- Category w/w: Installation and use in wet or dry masonry (incl. w/d installation in wet masonry and use in dry masonry)

**Concrete base material - if not restricted by base material ETA:**

- I1: installation in dry or wet (water saturated) concrete and use in dry or wet concrete
- I2: installation in water-filled drill holes (not sea water) and use in dry or wet concrete
- D3: downward and horizontal and upwards (e.g. overhead) installation

**Design:**

- The anchorages are to be designed under the responsibility of an engineer experienced in anchorages and masonry work with the applicable safety factors.
- Verifiable calculation notes and drawings shall be prepared taking account of the loads to be anchored, the nature and strength of the base materials and the dimensions of the anchorage members as well as of the relevant tolerances. The position of the anchor is indicated on the design drawings.
- The fastener is anchored in the substrate of concrete, masonry or autoclaved aerated concrete. Any other layer, e.g., tolerance levelling layers, adhesives, plaster covering the substrate or outside plasters are considered as to be non-load bearing.
- Anchorages in concrete under static or quasi-static actions are designed in accordance with EN 1992-4:2018-09
- Anchorages in masonry under static or quasi-static actions are designed in accordance with EOTA TR 054:2016
- The anchorage design outside the base material shall be done in accordance with EOTA TR 077:2021
- $\alpha_{pressure}$ = 1 for compression load for solid base material and for hollow base material with more than 4 penetrated webs.

**Installation:**

- Dry or wet structures
- Anchor Installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Hole drilling in concrete by hammer or compressed air drill mode
- Temperature of the anchor system at installation from -20°C to + 40°C.
- Exposure to UV due to solar radiation of the plastic part not protected ≤ 6 weeks.

**Table B 2.1: Installation parameters in base material (see drawing in Annex A2)**

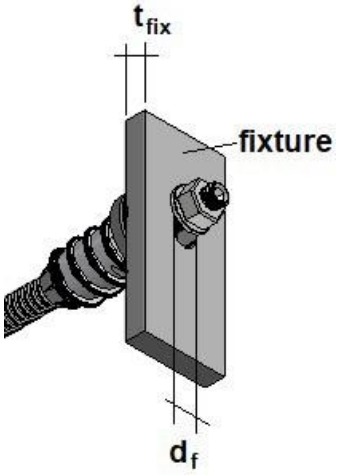
| **Anchor type** | | | **ResiTHERM® 12** | **ResiTHERM® 16** |
|---|---|---|---|---|
| Insulation thickness incl. insulation plaster | $h_D$ | [mm] | 60 - 220 | 60 - 300 |
| Min. thickness of member | $h_{min}$ | [mm] | in accordance with anchor adhesive ETA | |
| Effective anchorage depth | $h_{ef} \geq$ | [mm] | | |
| Drill hole diameter | $d_0$ | [mm] | | |
| Depth of drill hole in the base material | $h_1 \geq$ | [mm] | | |
| Diameter of clearance hole in the fixture for the M12 threaded pin | $d_f \geq$ | [mm] | 13 | 13 |
| Diameter of clearance hole in the fixture for the M12/M10 threaded pin | $d_f \geq$ | [mm] | 11 | 11 |
| Length of threaded pin | Lp ≥ | [mm] | 50 | 50 |
| Thickness of fixture | $t_{fix}$ | [mm] | 0 – 24 [a)] max. 200 [b)] | 0 – 24 [a)] max. 200 [b)] |
| Installation torque to fix the fixture * | $T_{inst} \leq$ | [Nm] | 19 | 25 |

For hollow base material perforated sleeves must be used for the anchor adhesive, in accordance with ETA of anchor adhesive.

* $T_{inst}$ = 19 Nm resp. 25 Nm are valid for the thermal separation module. Max. $T_{inst}$ given in ETAs of anchor adhesive must also be observed.

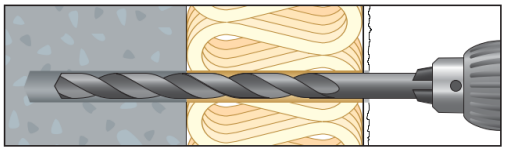
[a)] as delivered with threaded pin M12 or with reduction threaded pin M12/M10

[b)] with any longer threaded rod, washer and nut which complies to the specifications given in table A 5.1 position 3 and 3a. The introduction of bending moment is not allowed. Constructive measures must be applied to exclude any bending moment



## ResiTHERM® 12, ResiTHERM® 16: Installation instruction (in concrete or solid masonry)

### Installation in concrete or solid brick:



**1. Drill a hole**

Observe the drilling method of the ETA of the ResiFIX injection mortar.

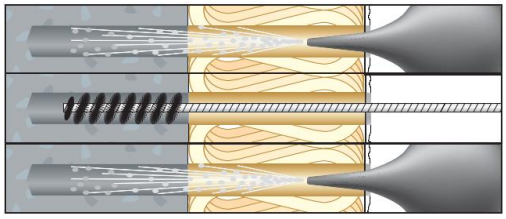
Concrete/solid brick: hammer drilling

Aerated concrete: Rotary drilling - without impact

**ResiTHERM® 12**: Drill hole diameter $d_0$ = 14 mm,
concrete: drill hole depth $h_1 \geq 80$ mm + e,
solid brick & aerated concrete: $h_1 \geq 110$ mm + e

**ResiTHERM® 16**: Drill hole diameter $d_0$ = 18 mm,
concrete: drill hole depth $h_1 \geq 90$ mm + e,
solid brick & aerated concrete: $h_1 \geq 110$ mm + e

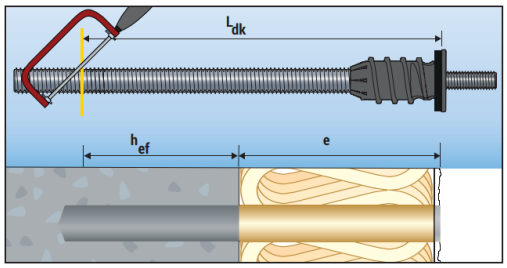
(e = insulation thickness incl. plaster & $t_{tol}$)



**2. Clean the drill hole**

The drill hole must be cleaned properly
(see ETA of the ResiFIX injection mortar)

4x blow – 4x brush – 4x blow




**3. Cut the ResiTHERM® to length**

The pre-assembled threaded rod M12 or M 16 is already completely screwed into the thermal separation module.

Correct length $L_{dk}$ from the tip of the threaded rod to the lower edge of the cover plate of the thermal separation module (see table):

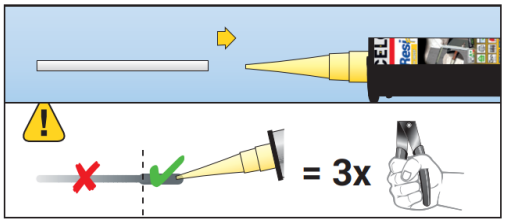
**ResiTHERM® 12**

| Correct length $L_{dk}$ = Anchorage depth $h_{ef}$ + insulation thickness e | Anchoring in concrete | Anchoring in aerated concrete/solid brick |
|---|---|---|
| $L_{dk} = h_{ef} + e$ | $L_{dk} = 70$ mm + e | $L_{dk} = 100$ mm + e |

**ResiTHERM® 16**:

| Correct length $L_{dk}$ = Anchorage depth $h_{ef}$ + insulation thickness e | Anchoring in concrete | Anchoring in aerated concrete/solid brick |
|---|---|---|
| $L_{dk} = h_{ef} + e$ | $L_{dk} = 80$ mm + e | $L_{dk} = 100$ mm + e |

After determining the correct length, cut the threaded rod to length with a metal saw or similar.

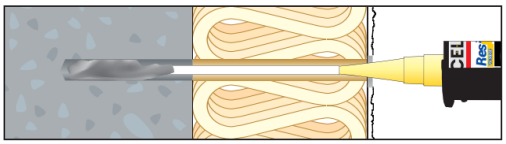



**4. Injection mortar**

Attach the mixing nozzle extension to the mixing nozzle.

Squeeze out the injection mortar until the mortar has a uniform grey mixing colour - discard the pre-run of at least 3 pumps.

## ResiTHERM® 12, ResiTHERM® 16: Installation instruction (in concrete or solid masonry)



**5. Fill the drill hole with injection mortar**
(start from the bottom of drill hole):

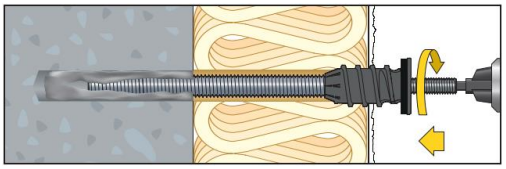
**ResiTHERM® 12**:

| Drill hole depth $h_1$ [mm] | ResiFIX 165/280/300 ml Number of pumps | ResiFIX 345 ml Number of pumps | ResiFIX 410 ml Number of pumps |
|---|---|---|---|
| **Concrete:** 80 | 5 | 5 | 4-5 |
| **Solid brick/aerated concrete:** 110 | 6 | 6 | 5-6 |

**ResiTHERM® 16**

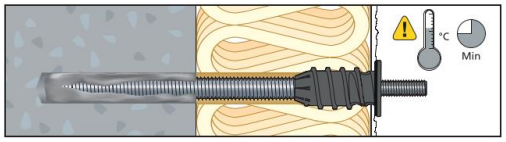
| Drill hole depth $h_1$ [mm] | ResiFIX 165/280/300 ml Number of pumps | ResiFIX 345 ml Number of pumps | ResiFIX 410 ml Number of pumps |
|---|---|---|---|
| **Concrete:** 90 | 5 | 5 | 4-5 |
| **Solid brick/aerated concrete:** 110 | 6 | 6 | 5-6 |

**Important:** Follow the installation instructions and processing time of the ETA of the ResiFIX injection mortar used.

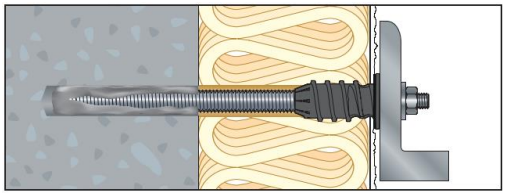


**6. Installation of the ResiTHERM® 12 or 16**
Insert the hexagon bit (included in the set) into the M12 threaded stud and screw in the ResiTHERM® 12 or 16 using a cordless screwdriver until the sealing ring is pressed firmly against the plaster. A standard cordless screwdriver is sufficient for this.

**Note:** The thermal separation module drills itself through the insulation. The foamed EPDM sealing ring ensures optimum sealing and prevents the entry of driving rain into the insulation (installation conditions see Annex B1, B2)




**7. Curing time**
Observe the curing time of the injection system, see cartridge label of the ResiFIX injection mortar.



**8. Mounting of the fixture**
Afterwards, the attachment can be mounted (**ResiTHERM® 12**: max. torque $T_{inst}$ = 19 Nm, **ResiTHERM® 16**: max. torque $T_{inst}$ = 25 Nm, see annex B4).

**Note:** Observe an eventually varying installation torque in the ETA of the used ResiFIX injection system.

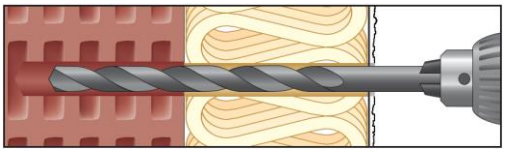
**Note:** The screw insertion depth of the M12 threaded stud in the ResiTHERM® 12 or 16 is min. 30 mm, max. 34 mm (measured from outside of the cover plate).

This means, that it can be unscrewed by max. 4 mm, this corresponds to approx. 2 turns.

## ResiTHERM® 12, ResiTHERM® 16: Installation instruction (in hollow masonry)

**Installation in hollow base material:**

The mounting instruction uses as an example a sleeve 20-130 (diameter 20 mm with length 130 mm). Any sleeve according to the ETA of the ResiFIX injection mortar from Annex B1 can be used.



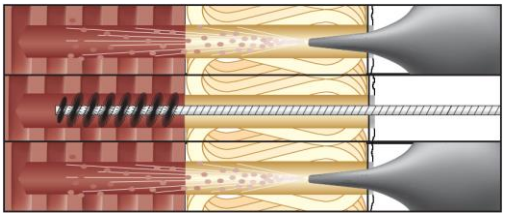
**1. Drill a hole**

Observe the drilling method of the ETA of the ResiFIX injection mortar.
Perforated bricks: Rotary drilling without impact.

**ResiTHERM® 12 and ResiTHERM® 16:**

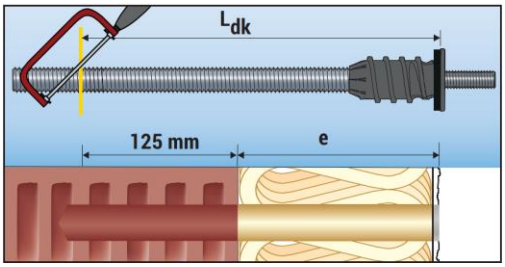
Drill hole diameter $d_0$ = 20 mm

Drill hole depth h1 ≥ 140 mm + e
(e = insulation thickness incl. plaster & $t_{tol}$)



**2. Clean the drill hole**

The drill hole must be cleaned properly
(see ETA of the ResiFIX injection mortar)
2x blow – 2x brush – 2x blow

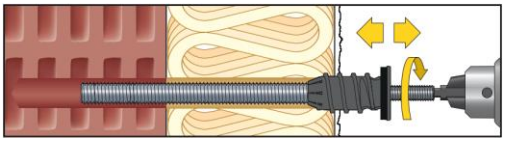



**3. Cut the ResiTHERM® to length**

The pre-assembled threaded rod M12 or M16 is already completely screwed into the thermal separation module. Correct length $L_{dk}$ from the tip of the threaded rod to the lower edge of the cover plate of the thermal separation module:

Anchorage depth in plastic sleeve (125 mm) + e (insulation thickness incl. plaster & $t_{tol}$)

After determining the correct length, cut the threaded rod M12 or M16 to length with a metal saw or similar.

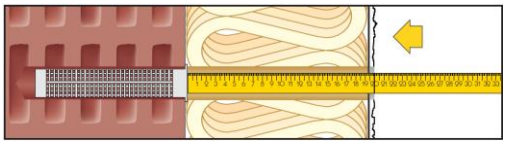


**4. Enlarge the opening in the plaster**

for the collar of the plastic sleeve to 26 mm.

To do this:

Screw the thermal separation module only approx. 2 thread turns through the plaster using a cordless screwdriver and the bit included in the set. Then screw it out again.

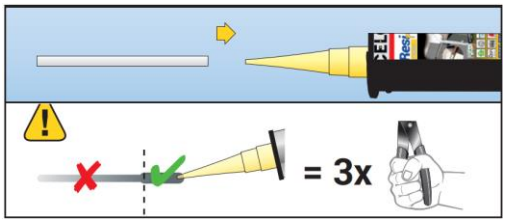


**5. Insert plastic sleeve**

Push the plastic sleeve into the drill hole with the help of a folding ruler or similar. Then remove the folding ruler or similar from the drill hole.

**Note:** This is an ideal way to ensure that the perforated sleeve SH 20x130 is correctly positioned in the drill hole.

## ResiTHERM® 12, ResiTHERM® 16: Installation instruction (in hollow masonry)




**6. Injection mortar**

Attach the mixing nozzle extension to the mixing nozzle.

Squeeze out the injection mortar until the mortar has a uniform grey mixing colour - discard the pre-run of at least three full strokes.

**7. Fill the plastic sleeve**

completely with injection mortar (start from the bottom/back of the sleeve):

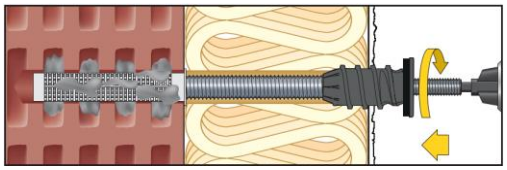
**ResiTHERM® 12**

| ResiFIX 165/280/300 ml | ResiFIX 345 ml | ResiFIX 410 ml |
|---|---|---|
| 13 pumps = 38 mm Scale shares | 12 pumps = 34 mm Scale shares | 13 pumps = 24 mm Scale shares |

**ResiTHERM® 16**

| ResiFIX 165/280/300 ml | ResiFIX 345 ml | ResiFIX 410 ml |
|---|---|---|
| 13 pumps = 38 mm Scale shares | 12 pumps = 34 mm Scale shares | 13 pumps = 24 mm Scale shares |

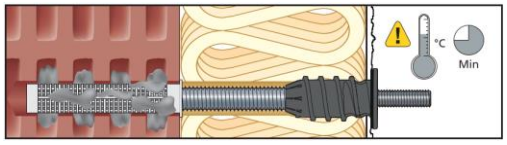
**Important:** Follow the installation instructions and processing time of the ResiFIX injection mortar.



**8. Installation of the ResiTHERM® 12 or 16**

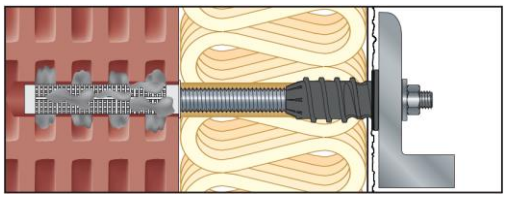
Insert the hexagon bit (included in the set) into the M12 threaded stud and screw in the ResiTHERM® 12 or 16 using a cordless screwdriver until the sealing ring is pressed firmly against the plaster. A standard cordless screwdriver is sufficient for this.

**Note:** The thermal separation module drills itself through the insulation. The foamed EPDM sealing ring ensures optimum sealing and prevents the entry of driving rain into the insulation (installation conditions see Annex B1, B2).




**9. Curing time**

Observe the curing time of the injection system, see cartridge label of the ResiFIX injection mortar.



**10. Mounting of the fixture**

Afterwards, the attachment can be mounted (**ResiTHERM® 12**: max. torque $T_{inst}$ = 19 Nm, **ResiTHERM® 16**: max. torque $T_{inst}$ = 25 Nm, see annex B4).

**Note:** Observe an eventually varying installation torque in the ETA of the used ResiFIX injection system.

**Note:** The screw insertion depth of the M12 threaded stud in the ResiTHERM® 12 or 16 is min. 30 mm, max. 34 mm (measured from outside of the cover plate).

This means, that it can be unscrewed by max. 4 mm, this corresponds to approx. 2 turns.

**Table B9.1: Conditions for proper installation and additional advice for installation**
Note: Driving rain resistance must be designed in accordance with the provisions given in Annex B2 for fasteners with an interior part made of galvanized steel.

<table>
<tr><th colspan="6">ResiTHERM® 12, ResiTHERM® 16</th></tr>
<tr><th colspan="6">ETICS* with insulation panels made of</th></tr>
<tr><th colspan="2"></th><th>XPS<br>EPS</th><th>Mineral wool, compression strength ≥ 5 kPa**</th><th>wood fiber, raw density ≤230kg/m³ and compression strength ≤ 100 kPa</th><th>wood fiber, raw density >230kg/m³ or compression strength > 100 kPa</th></tr>
<tr><td rowspan="2">ETICS rendered with plaster</td><td>≤8 mm rendering thickness</td><td colspan="3">Standard installation in accordance with annex B5, B6, B7 and B8</td><td rowspan="2">Drill the hole through the insulation and in the base material with a regular drill bit. Afterwards, enlarge the hole in the plaster and insulation to diameter 26 mm to a depth of 60 mm. For this purpose a wood drill bit may be used.</td></tr>
<tr><td>>8 mm rendering thickness</td><td colspan="3">Drill the hole through the insulation and in the base material with a regular drill bit. Afterwards, enlarge the hole in the plaster to d=26 mm by using e.g., a wood drill bit.</td></tr>
</table>

* External Thermal Insulations Composite Systems (ETICS) or rendered insulation with reinforced plaster which are glued only or glued and mechanically fixed.

** ≥ 5 kPa is a guideline value that the thermal separation module can apply sufficient pre-tensioning force in the insulation panel to ensure the compression of the sealing ring.

The values stated are to be understood as guideline values in order to give the user the highest possible application safety.

**Table C1.1: Characteristic tensile load resistance $N_{Rk,s}$ of the anchor rods**

| ResiTHERM® 12, ResiTHERM® 16 | | | | |
|---|---|---|---|---|
| **Type** | **Cross section of anchor rod** | **Nominal tensile strength of anchor rod** | **Char. tensile load resistance** | **safety factor** |
| | $A_s$ | $f_{uk}$ | $N_{Rk,s}$ | $\gamma_{Ms}$* |
| | [mm²] | [N/mm²] | [kN] | [-] |
| ResiTHERM® 12 (M12 rod 8.8, carbon steel) | 84,3 | 800 | 67,4 | 1,50 |
| ResiTHERM® 12 (M12 rod A4-70) | 84,3 | 700 | 59,0 | 1,87 |
| ResiTHERM® 16 (M16 rod 8.8, carbon steel) | 157,0 | 800 | 125,6 | 1,50 |
| ResiTHERM® 16 (M16 rod A4-70) | 157,0 | 700 | 109,9 | 1,87 |

$N_{Rk,s} = A_s * f_{uk}$

*In absence of other national regulations

**Table C1.2: Characteristic shear load resistance $V_{Rk,s}$ without lever arm and characteristic bending resistance $M_{Rk,s}$ of the anchor rods**

| ResiTHERM® 12, ResiTHERM® 16 | | | |
|---|---|---|---|
| **Type** | **Char. shear load resistance** | **Char. bending resistance** | **safety factor** |
| | $V_{Rk,s}$ | $M_{Rk,s}$ | $\gamma_{Ms}$* |
| | [kN] | [Nm] | [-] |
| ResiTHERM® 12 (M12 rod 8.8, carbon steel) | 33,7 | 104,7 | 1,25 |
| ResiTHERM® 12 (M12 rod A4-70) | 29,5 | 91,6 | 1,56 |
| ResiTHERM® 16 (M16 rod 8.8, carbon steel) | 62,8 | 265,5 | 1,25 |
| ResiTHERM® 16 (M16 rod A4-70) | 55,0 | 232,3 | 1,56 |

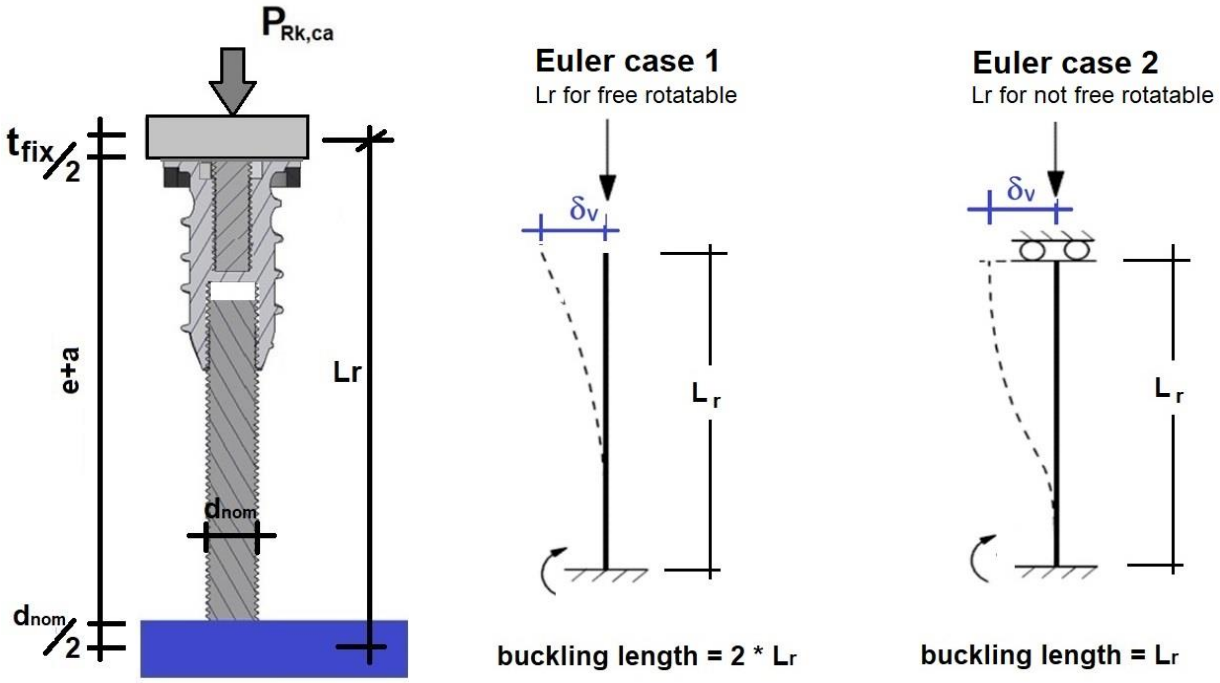
$V_{Rk,s} = 0,5 * A_s * f_{uk}$

$M_{Rk,s} = 1,2 * W_{el} * f_{uk}$ with $W_{el} = \pi * d_s^3 / 32$

for M16: $d_s$ = 14,14 mm for M12: $d_s$ = 10,36 mm

*In absence of national regulations

**Table C2.1: Characteristic buckling load resistance $P_{Rk,ca}$ for the system of threaded rod and thermal separation module under pressure load with or without shear load displacement ($\delta_V$)**




| ResiTHERM® 12, ResiTHERM® 16 | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Free rotatable (Euler case 1) | Not free rotatable (Euler case 2) | |
| Type | Insulation thickness (incl. insulation plaster and $t_{tol}$) | Max. shear load displacement | | Char. buckling load resistance | Char. buckling load resistance | Safety factor |
| | $h_D$ | $\delta_V$ | Lr | $P_{Rk,ca}$ | $P_{Rk,ca}$ | $\gamma_{Mca}$ * |
| | [mm] | [mm] | [mm] | [kN] | [kN] | [-] |
| ResiTHERM 12 | 60 - 120 | 5 | 136,4 | ≥ 15,8** | ≥ 25,2 | 1,3 |
| ResiTHERM 12 | 121 - 160 | 5 | 176,4 | ≥ 9,4** | ≥ 25,2 | 1,3 |
| ResiTHERM 12 | 161 - 220 | 5 | 236,4 | ≥ 5,2** | ≥ 21,0** | 1,3 |
| ResiTHERM 16 | 60 - 220 | 5 | 238,4 | ≥ 17,9** | ≥ 22,7 | 1,3 |
| ResiTHERM 16 | 221 - 300 | 5 | 318,4 | ≥ 10,0** | ≥ 22,7 | 1,3 |

* $\gamma_{Mca}$ for buckling in accordance with TR 077

** calculated values in accordance with Euler cases were decisive for the determination of performance

**Table C3.1: Characteristic tensile load resistance $N_{Rk}$ against short- and long-term acting loads for the thermal separation module**

| ResiTHERM® 12, ResiTHERM® 16 | | |
|---|---|---|
| **Type** | **24°C/40°C and 50°C/80°C** | **safety factor** |
| | **$N_{Rk}$** | **$\gamma_{Mtk}$*** |
| | **[kN]** | **[-]** |
| ResiTHERM® 12 | 18 | 2,5 |
| ResiTHERM® 16 | 16 | 2,5 |

* $\gamma_{Mtk}$ for plastic material Polyamide in accordance with TR 077
The min. screw in depths of the rods ($L_{s1}$, $L_{s2}$) must be observed

**Table C3.2: Characteristic pressure load resistance $P_{Rk}$ against short- and long-term acting loads for thermal separation module**

| ResiTHERM® 12, ResiTHERM® 16 | | |
|---|---|---|
| **Type** | **24°C/40°C and 50°C/80°C** | **safety factor** |
| | **$P_{Rk}$** | **$\gamma_{Mtk}$*** |
| | **[kN]** | **[-]** |
| ResiTHERM® 12 | 18 | 2,5 |
| ResiTHERM® 16 | 18 | 2,5 |

* $\gamma_{Mtk}$ for plastic material Polyamide in accordance with TR 077
Pressure load in base material must be considered

**Table C4.1: Characteristic shear load resistance $V_{Rk,pol}$ against short- and long-term acting loads for a single thermal separation module - free end rotatable**

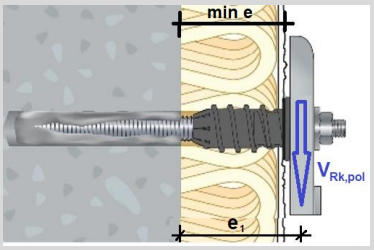
| ResiTHERM® 12, ResiTHERM® 16 | | | | | |
|---|---|---|---|---|---|
|  free end rotatable | | | | | |
| **Type** | **short-term 24°C/40°C** | **long-term 24°C/40°C** | **short-term 50°C/80°C** | **long-term 50°C/80°C** | **Safety factor** |
| | **$V_{Rk,pol}$** | **$V_{Rk,pol}$** | **$V_{Rk,pol}$** | **$V_{Rk,pol}$** | **$\gamma_{Mtk}$** |
| | **[kN]** | **[kN]** | **[kN]** | **[kN]** | **[-]** |
| ResiTHERM® 12 | 5,0 | 5,0 | 5,0 | 3,5 | 2,5 |
| ResiTHERM® 16 | 6,5 | 6,5 | 6,5 | 4,5 | 2,5 |

**Table C4.2: Characteristic shear load resistance $V_{Rk,pol}$ against short- and long-term acting loads for a single thermal separation module - free end not rotatable**

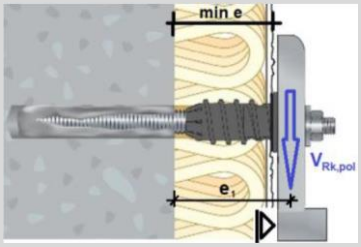
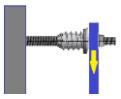
| ResiTHERM® 12, ResiTHERM® 16 | | | | | |
|---|---|---|---|---|---|
|  free end not rotatable | | | | | |
| **Type** | **short-term 24°C/40°C** | **long-term 24°C/40°C** | **short-term 50°C/80°C** | **long-term 50°C/80°C** | **Safety factor** |
| | **$V_{Rk,pol}$** | **$V_{Rk,pol}$** | **$V_{Rk,pol}$** | **$V_{Rk,pol}$** | **$\gamma_{Mtk}$** |
| | **[kN]** | **[kN]** | **[kN]** | **[kN]** | **[-]** |
| ResiTHERM® 12 | 5,0 | 5,0 | 5,0 | 3,5 | 2,5 |
| ResiTHERM® 16 | 7,5 | 7,5 | 7,5 | 5,0 | 2,5 |

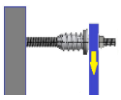
**Table C5.1: Shear load V values for single ResiTHERM® 12 for displacements w = 1, 2, 3, 4 or 5 mm, free end rotatable, under short-term acting load**



| ResiTHERM® 12 (free end rotatable; short-term acting load) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| For insulation thickness incl. insulation's plaster and $t_{tol}$ if applicable | Temp. 24°C / 40°C Shear load V [kN] | | | | | Temp. 50°C / 80°C Shear load V [kN] | | | | |
| | Deviation w | | | | | Deviation w | | | | |
| [mm] | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm |
| 60 | 0,55 | 0,90 | 1,25 | 1,43 | 1,43 | 0,55 | 0,90 | 1,25 | 1,43 | 1,43 |
| 80 | 0,35 | 0,60 | 0,85 | 1,10 | 1,35 | 0,35 | 0,60 | 0,85 | 1,10 | 1,35 |
| 100 | 0,24 | 0,42 | 0,61 | 0,78 | 0,96 | 0,24 | 0,42 | 0,61 | 0,78 | 0,96 |
| 120 | 0,12 | 0,24 | 0,36 | 0,46 | 0,56 | 0,12 | 0,24 | 0,36 | 0,46 | 0,56 |
| 140 | 0,10 | 0,20 | 0,31 | 0,39 | 0,48 | 0,10 | 0,20 | 0,31 | 0,39 | 0,48 |
| 160 | 0,08 | 0,17 | 0,25 | 0,32 | 0,40 | 0,08 | 0,17 | 0,25 | 0,32 | 0,40 |
| 180 | 0,07 | 0,13 | 0,20 | 0,26 | 0,31 | 0,07 | 0,13 | 0,20 | 0,26 | 0,31 |
| 200 | 0,05 | 0,10 | 0,14 | 0,19 | 0,23 | 0,05 | 0,10 | 0,14 | 0,19 | 0,23 |
| 220 | 0,03 | 0,06 | 0,09 | 0,12 | 0,15 | 0,03 | 0,06 | 0,09 | 0,12 | 0,15 |

Intermediate values can be interpolated. Data are limited due to ultimate limit state verifications of the performance given in Annex C4 under consideration of $\gamma_M$=2.5 and $\gamma_F$=1.4

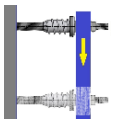
**Table C5.2: Shear load V values for single ResiTHERM® 12 for displacements w = 1, 2, 3, 4 or 5 mm, free end rotatable, under long-term acting load**



| ResiTHERM® 12 (free end rotatable; long-term acting load) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| For insulation thickness incl. insulation's plaster and $t_{tol}$ if applicable | Temp. 24°C / 40°C Shear load V [kN] | | | | | Temp. 50°C / 80°C Shear load V [kN] | | | | |
| | Deviation w | | | | | Deviation w | | | | |
| [mm] | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm |
| 60 | 0,55 | 0,90 | 1,25 | 1,43 | 1,43 | 0,39 | 0,63 | 0,88 | 1,00 | 1,00 |
| 80 | 0,35 | 0,60 | 0,85 | 1,10 | 1,35 | 0,25 | 0,42 | 0,60 | 0,77 | 0,95 |
| 100 | 0,24 | 0,42 | 0,61 | 0,78 | 0,96 | 0,16 | 0,29 | 0,42 | 0,55 | 0,67 |
| 120 | 0,12 | 0,24 | 0,36 | 0,46 | 0,56 | 0,08 | 0,17 | 0,25 | 0,32 | 0,39 |
| 140 | 0,10 | 0,20 | 0,31 | 0,39 | 0,48 | 0,07 | 0,14 | 0,21 | 0,27 | 0,33 |
| 160 | 0,08 | 0,17 | 0,25 | 0,32 | 0,40 | 0,06 | 0,12 | 0,18 | 0,23 | 0,28 |
| 180 | 0,07 | 0,13 | 0,20 | 0,26 | 0,31 | 0,05 | 0,09 | 0,14 | 0,18 | 0,22 |
| 200 | 0,05 | 0,10 | 0,14 | 0,19 | 0,23 | 0,03 | 0,07 | 0,10 | 0,13 | 0,16 |
| 220 | 0,03 | 0,06 | 0,09 | 0,12 | 0,15 | 0,02 | 0,04 | 0,06 | 0,08 | 0,11 |

Intermediate values can be interpolated/ Data are limited due to ultimate limit state verifications of the performance given in Annex C4 under consideration of $\gamma_M$=2.5 and $\gamma_F$=1.4

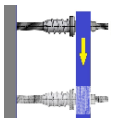
**Table C6.1: Shear load V values for a single ResiTHERM® 12 for displacements w = 1, 2, 3, 4 or 5 mm, free end not rotatable, under short-term acting load**



| ResiTHERM® 12 (free end not rotatable; short-term acting load) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| For insulation thickness incl. insulation's plaster and $t_{tol}$ if applicable | Temp. 24°C / 40°C Shear load V [kN] | | | | | Temp. 50°C / 80°C Shear load V [kN] | | | | |
| | Deviation w | | | | | Deviation w | | | | |
| [mm] | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm |
| 60 | 1,30 | 1,43 | 1,43 | 1,43 | 1,43 | 1,30 | 1,43 | 1,43 | 1,43 | 1,43 |
| 80 | 0,77 | 1,43 | 1,43 | 1,43 | 1,43 | 0,77 | 1,43 | 1,43 | 1,43 | 1,43 |
| 100 | 0,57 | 1,09 | 1,43 | 1,43 | 1,43 | 0,57 | 1,09 | 1,43 | 1,43 | 1,43 |
| 120 | 0,36 | 0,70 | 1,01 | 1,27 | 1,43 | 0,36 | 0,70 | 1,01 | 1,27 | 1,43 |
| 140 | 0,31 | 0,59 | 0,85 | 1,07 | 1,29 | 0,31 | 0,59 | 0,85 | 1,07 | 1,29 |
| 160 | 0,25 | 0,48 | 0,69 | 0,88 | 1,06 | 0,25 | 0,48 | 0,69 | 0,88 | 1,06 |
| 180 | 0,20 | 0,37 | 0,54 | 0,68 | 0,82 | 0,20 | 0,37 | 0,54 | 0,68 | 0,82 |
| 200 | 0,14 | 0,27 | 0,38 | 0,48 | 0,59 | 0,14 | 0,27 | 0,38 | 0,48 | 0,59 |
| 220 | 0,08 | 0,16 | 0,22 | 0,29 | 0,35 | 0,08 | 0,16 | 0,22 | 0,29 | 0,35 |

Intermediate values can be interpolated/ Data are limited due to ultimate limit state verifications of the performance given in Annex C4 under consideration of $\gamma_M$=2.5 and $\gamma_F$=1.4

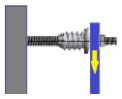
**Table C6.2: Shear load V values for a single ResiTHERM® 12 for displacements w = 1, 2, 3, 4 or 5 mm, free end not rotatable, under long-term acting load**



| ResiTHERM® 12 (free end not rotatable; long-term acting load) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| For insulation thickness incl. insulation's plaster and $t_{tol}$ if applicable | Temp. 24°C / 40°C Shear load V [kN] | | | | | Temp. 50°C / 80°C Shear load V [kN] | | | | |
| | Deviation w | | | | | Deviation w | | | | |
| [mm] | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm |
| 60 | 1,30 | 1,43 | 1,43 | 1,43 | 1,43 | 0,91 | 1,00 | 1,00 | 1,00 | 1,00 |
| 80 | 0,77 | 1,43 | 1,43 | 1,43 | 1,43 | 0,54 | 1,00 | 1,00 | 1,00 | 1,00 |
| 100 | 0,57 | 1,09 | 1,43 | 1,43 | 1,43 | 0,40 | 0,76 | 1,00 | 1,00 | 1,00 |
| 120 | 0,36 | 0,70 | 1,01 | 1,27 | 1,43 | 0,25 | 0,49 | 0,71 | 0,89 | 1,00 |
| 140 | 0,31 | 0,59 | 0,85 | 1,07 | 1,29 | 0,21 | 0,41 | 0,60 | 0,75 | 0,91 |
| 160 | 0,25 | 0,48 | 0,69 | 0,88 | 1,06 | 0,18 | 0,34 | 0,49 | 0,61 | 0,74 |
| 180 | 0,20 | 0,37 | 0,54 | 0,68 | 0,82 | 0,14 | 0,26 | 0,38 | 0,48 | 0,58 |
| 200 | 0,14 | 0,27 | 0,38 | 0,48 | 0,59 | 0,10 | 0,19 | 0,27 | 0,34 | 0,41 |
| 220 | 0,08 | 0,16 | 0,22 | 0,29 | 0,35 | 0,06 | 0,11 | 0,16 | 0,20 | 0,25 |

Intermediate values can be interpolated/ Data are limited due to ultimate limit state verifications of the performance given in Annex C4 under consideration of $\gamma_M$=2.5 and $\gamma_F$=1.4

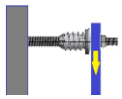
**Table C7.1: Shear load V values for a single ResiTHERM® 16 for displacements w = 1, 2, 3, 4 or 5 mm, free end rotatable, under short-term acting load**



| ResiTHERM® 16 (free end rotatable; short-term acting load) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| For insulation thickness incl. insulation's plaster and $t_{tol}$ if applicable | Shear load V Temp. 24°C / 40°C [kN] | | | | | Shear load V Temp. 50°C / 80°C [kN] | | | | |
| | Deviation w | | | | | Deviation w | | | | |
| [mm] | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm |
| 60 | 0,58 | 1,06 | 1,59 | 1,86 | 1,86 | 0,58 | 1,06 | 1,59 | 1,86 | 1,86 |
| 80 | 0,50 | 0,96 | 1,38 | 1,76 | 1,86 | 0,50 | 0,96 | 1,38 | 1,76 | 1,86 |
| 100 | 0,39 | 0,74 | 1,06 | 1,37 | 1,66 | 0,39 | 0,74 | 1,06 | 1,37 | 1,66 |
| 120 | 0,29 | 0,52 | 0,75 | 0,97 | 1,19 | 0,29 | 0,52 | 0,75 | 0,97 | 1,19 |
| 140 | 0,24 | 0,44 | 0,63 | 0,82 | 1,00 | 0,24 | 0,44 | 0,63 | 0,82 | 1,00 |
| 160 | 0,20 | 0,36 | 0,52 | 0,67 | 0,82 | 0,20 | 0,36 | 0,52 | 0,67 | 0,82 |
| 180 | 0,15 | 0,28 | 0,41 | 0,52 | 0,64 | 0,15 | 0,28 | 0,41 | 0,52 | 0,64 |
| 200 | 0,13 | 0,25 | 0,36 | 0,46 | 0,56 | 0,13 | 0,25 | 0,36 | 0,46 | 0,56 |
| 220 | 0,11 | 0,22 | 0,31 | 0,40 | 0,49 | 0,11 | 0,22 | 0,31 | 0,40 | 0,49 |
| 240 | 0,10 | 0,18 | 0,26 | 0,34 | 0,42 | 0,10 | 0,18 | 0,26 | 0,34 | 0,42 |
| 250 | 0,09 | 0,17 | 0,24 | 0,31 | 0,38 | 0,09 | 0,17 | 0,24 | 0,31 | 0,38 |
| 260 | 0,08 | 0,15 | 0,21 | 0,28 | 0,34 | 0,08 | 0,15 | 0,21 | 0,28 | 0,34 |
| 280 | 0,06 | 0,12 | 0,17 | 0,22 | 0,27 | 0,06 | 0,12 | 0,17 | 0,22 | 0,27 |
| 300 | 0,05 | 0,08 | 0,12 | 0,16 | 0,19 | 0,05 | 0,08 | 0,12 | 0,16 | 0,19 |

Intermediate values can be interpolated/ Data are limited due to ultimate limit state verifications of the performance given in Annex C4 under consideration of $\gamma_M$=2.5 and $\gamma_F$=1.4

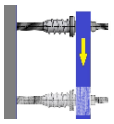
**Table C7.2: Shear load V values for a single ResiTHERM® 16 for displacements w = 1, 2, 3, 4 or 5 mm, free end rotatable, under long-term acting load**



| ResiTHERM® 16 (free end rotatable; long-term acting load) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| For insulation thickness incl. insulation's plaster and $t_{tol}$ if applicable | Shear load V Temp. 24°C / 40°C [kN] | | | | | Shear load V Temp. 50°C / 80°C [kN] | | | | |
| | Deviation w | | | | | Deviation w | | | | |
| [mm] | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm |
| 60 | 0,58 | 1,06 | 1,59 | 1,86 | 1,86 | 0,41 | 0,75 | 1,11 | 1,30 | 1,30 |
| 80 | 0,50 | 0,96 | 1,38 | 1,76 | 1,86 | 0,35 | 0,67 | 0,97 | 1,23 | 1,30 |
| 100 | 0,39 | 0,74 | 1,06 | 1,37 | 1,66 | 0,27 | 0,52 | 0,74 | 0,96 | 1,16 |
| 120 | 0,29 | 0,52 | 0,75 | 0,97 | 1,19 | 0,20 | 0,36 | 0,52 | 0,68 | 0,83 |
| 140 | 0,24 | 0,44 | 0,63 | 0,82 | 1,00 | 0,17 | 0,31 | 0,44 | 0,58 | 0,70 |
| 160 | 0,20 | 0,36 | 0,52 | 0,67 | 0,82 | 0,14 | 0,25 | 0,36 | 0,47 | 0,57 |
| 180 | 0,15 | 0,28 | 0,41 | 0,52 | 0,64 | 0,10 | 0,20 | 0,28 | 0,37 | 0,45 |
| 200 | 0,13 | 0,25 | 0,36 | 0,46 | 0,56 | 0,09 | 0,17 | 0,25 | 0,32 | 0,39 |
| 220 | 0,11 | 0,22 | 0,31 | 0,40 | 0,49 | 0,08 | 0,15 | 0,22 | 0,28 | 0,34 |
| 240 | 0,10 | 0,18 | 0,26 | 0,34 | 0,42 | 0,07 | 0,13 | 0,18 | 0,24 | 0,29 |
| 250 | 0,09 | 0,17 | 0,24 | 0,31 | 0,38 | 0,06 | 0,12 | 0,17 | 0,22 | 0,27 |
| 260 | 0,08 | 0,15 | 0,21 | 0,28 | 0,34 | 0,06 | 0,10 | 0,15 | 0,19 | 0,24 |
| 280 | 0,06 | 0,12 | 0,17 | 0,22 | 0,27 | 0,04 | 0,08 | 0,12 | 0,15 | 0,19 |
| 300 | 0,05 | 0,08 | 0,12 | 0,16 | 0,19 | 0,03 | 0,06 | 0,08 | 0,11 | 0,14 |

Intermediate values can be interpolated/ Data are limited due to ultimate limit state verifications of the performance given in Annex C4 under consideration of $\gamma_M$=2.5 and $\gamma_F$=1.4

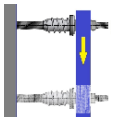
**Table C8.1: Shear load V values for a single ResiTHERM® 16 for displacements w = 1, 2, 3, 4 or 5 mm, free end not rotatable, under short-term acting load**



| ResiTHERM® 16 (free end not rotatable; short-term acting load) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| For insulation thickness incl. insulation's plaster and $t_{tol}$ if applicable | Shear load V Temp. 24°C / 40°C [kN] | | | | | Shear load V Temp. 50°C / 80°C [kN] | | | | |
| | Deviation w | | | | | Deviation w | | | | |
| [mm] | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm |
| 60 | 1,94 | 2,14 | 2,14 | 2,14 | 2,14 | 1,94 | 2,14 | 2,14 | 2,14 | 2,14 |
| 80 | 1,30 | 2,14 | 2,14 | 2,14 | 2,14 | 1,30 | 2,14 | 2,14 | 2,14 | 2,14 |
| 100 | 0,99 | 1,82 | 2,14 | 2,14 | 2,14 | 0,99 | 1,82 | 2,14 | 2,14 | 2,14 |
| 120 | 0,68 | 1,28 | 1,84 | 2,14 | 2,14 | 0,68 | 1,28 | 1,84 | 2,14 | 2,14 |
| 140 | 0,55 | 1,04 | 1,49 | 1,89 | 2,14 | 0,55 | 1,04 | 1,49 | 1,89 | 2,14 |
| 160 | 0,42 | 0,79 | 1,15 | 1,46 | 1,76 | 0,42 | 0,79 | 1,15 | 1,46 | 1,76 |
| 180 | 0,29 | 0,55 | 0,80 | 1,04 | 1,27 | 0,29 | 0,55 | 0,80 | 1,04 | 1,27 |
| 200 | 0,25 | 0,49 | 0,71 | 0,92 | 1,12 | 0,25 | 0,49 | 0,71 | 0,92 | 1,12 |
| 220 | 0,22 | 0,42 | 0,61 | 0,79 | 0,97 | 0,22 | 0,42 | 0,61 | 0,79 | 0,97 |
| 240 | 0,18 | 0,35 | 0,51 | 0,67 | 0,82 | 0,18 | 0,35 | 0,51 | 0,67 | 0,82 |
| 250 | 0,17 | 0,32 | 0,47 | 0,60 | 0,74 | 0,17 | 0,32 | 0,47 | 0,60 | 0,74 |
| 260 | 0,15 | 0,29 | 0,42 | 0,54 | 0,67 | 0,15 | 0,29 | 0,42 | 0,54 | 0,67 |
| 280 | 0,12 | 0,22 | 0,32 | 0,42 | 0,51 | 0,12 | 0,22 | 0,32 | 0,42 | 0,51 |
| 300 | 0,08 | 0,15 | 0,22 | 0,29 | 0,36 | 0,08 | 0,15 | 0,22 | 0,29 | 0,36 |

Intermediate values can be interpolated/ Data are limited due to ultimate limit state verifications of the performance given in Annex C4 under consideration of $\gamma_M$=2.5 and $\gamma_F$=1.4

**Table C8.2: Shear load V values for a single ResiTHERM® 16 for displacements w = 1, 2, 3, 4 or 5 mm, free end not rotatable, under long-term acting load**



| ResiTHERM® 16 (free end not rotatable; long-term acting load) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| For insulation thickness incl. insulation's plaster and $t_{tol}$ if applicable | Shear load V Temp. 24°C / 40°C [kN] | | | | | Shear load V Temp. 50°C / 80°C [kN] | | | | |
| | Deviation w | | | | | Deviation w | | | | |
| [mm] | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm | 1 mm | 2 mm | 3 mm | 4 mm | 5 mm |
| 60 | 1,94 | 2,14 | 2,14 | 2,14 | 2,14 | 1,36 | 1,43 | 1,43 | 1,43 | 1,43 |
| 80 | 1,30 | 2,14 | 2,14 | 2,14 | 2,14 | 0,91 | 1,43 | 1,43 | 1,43 | 1,43 |
| 100 | 0,99 | 1,82 | 2,14 | 2,14 | 2,14 | 0,69 | 1,27 | 1,43 | 1,43 | 1,43 |
| 120 | 0,68 | 1,28 | 1,84 | 2,14 | 2,14 | 0,48 | 0,90 | 1,29 | 1,43 | 1,43 |
| 140 | 0,55 | 1,04 | 1,49 | 1,89 | 2,14 | 0,39 | 0,73 | 1,04 | 1,32 | 1,43 |
| 160 | 0,42 | 0,79 | 1,15 | 1,46 | 1,76 | 0,29 | 0,56 | 0,80 | 1,03 | 1,23 |
| 180 | 0,29 | 0,55 | 0,80 | 1,04 | 1,27 | 0,20 | 0,39 | 0,56 | 0,73 | 0,89 |
| 200 | 0,25 | 0,49 | 0,71 | 0,92 | 1,12 | 0,18 | 0,34 | 0,50 | 0,64 | 0,78 |
| 220 | 0,22 | 0,42 | 0,61 | 0,79 | 0,97 | 0,15 | 0,29 | 0,43 | 0,55 | 0,68 |
| 240 | 0,18 | 0,35 | 0,51 | 0,67 | 0,82 | 0,13 | 0,25 | 0,36 | 0,47 | 0,57 |
| 250 | 0,17 | 0,32 | 0,47 | 0,60 | 0,74 | 0,12 | 0,22 | 0,33 | 0,42 | 0,52 |
| 260 | 0,15 | 0,29 | 0,42 | 0,54 | 0,67 | 0,11 | 0,20 | 0,29 | 0,38 | 0,47 |
| 280 | 0,12 | 0,22 | 0,32 | 0,42 | 0,51 | 0,08 | 0,15 | 0,22 | 0,29 | 0,36 |
| 300 | 0,08 | 0,15 | 0,22 | 0,29 | 0,36 | 0,06 | 0,11 | 0,16 | 0,20 | 0,25 |

Intermediate values can be interpolated/ Data are limited due to ultimate limit state verifications of the performance given in Annex C4 under consideration of $\gamma_M$=2.5 and $\gamma_F$=1.4

**Table C9.1: Displacements of the fixing system under tension load, temp. range 24°C/ 40°C**

| Fixing system | Tension load | Displacement | Displacement |
|---|---|---|---|
| | N | $\delta_{NO}$ | $\delta_{N\infty}$ |
| | [kN] | [mm] | [mm] |
| ResiTHERM® 12 (M12 anchor rod) | 5,14 | 0,47 | 0,94 |
| ResiTHERM® 16 (M16 anchor rod) | 4,57 | 0,32 | 0,64 |

The displacement in the base material must be added

**Table C9.2: Displacements of the fixing system under pressure load, temp. range 24°C/40°C**

| Fixing system | Pressure load | Displacement | Displacement |
|---|---|---|---|
| | P | $\delta_{PO}$ | $\delta_{P\infty}$ |
| | [kN] | [mm] | [mm] |
| ResiTHERM® 12 (M12 anchor rod) | 5,14 | 0,31 | 0,62 |
| ResiTHERM® 16 (M16 anchor rod) | 5,14 | 0,31 | 0,62 |

The displacement in the base material must be added

**Table C9.3: Displacements of the fixing system under tension load, temp. range 50°C/ 80°C**

| Fixing system | Tension load | Displacement | Displacement |
|---|---|---|---|
| | N | $\delta_{NO}$ | $\delta_{n\infty}$ |
| | [kN] | [mm] | [mm] |
| ResiTHERM® 12 (M12 anchor rod) | 5,14 | 0,47 | 0,94 |
| ResiTHERM® 16 (M16 anchor rod) | 4,57 | 0,32 | 0,64 |

The displacement in the base material must be added

**Table C9.4: Displacements of the fixing system under pressure load, temp. range 50°C/ 80°C**

| Fixing system | Pressure load | Displacement | Displacement |
|---|---|---|---|
| | P | $\delta_{PO}$ | $\delta_{P\infty}$ |
| | [kN] | [mm] | [mm] |
| ResiTHERM® 12 (M12 anchor rod) | 5,14 | 0,31 | 0,62 |
| ResiTHERM® 16 (M16 anchor rod) | 5,14 | 0,31 | 0,62 |

The displacement in the base material must be added