LOADS

Stand-off installation Thermax 12 and 16 with load-bearing anchor rod made of zinc-plated steel 8.8 and a displacement of 1 mm

The below load table is valid for short-term loading (e.g. wind load). If the sealing of the annular gap between Thermax and plaster is assured by fischer all-round sealing KD, the Thermax version with an anchor rod on base substrate side made of zinc-plated steel may be used.

Highest permissible loads[1) 5) 7)] of a Thermax within an anchor group[2)] in concrete with the injection mortars FIS V or FIS SB and in masonry with the injection mortar FIS V.

Type	Minimum effective anchorage depth h_{ef} [4)8)] [mm]	Permissible tensile load N_{perm} [3)] [kN]	Permissible shear load at e = 62 mm V_{perm} [3)] [kN]	Permissible shear load at e = 100 mm V_{perm} [3)] [kN]	Permissible shear load at e = 120 mm V_{perm} [3)] [kN]	Permissible shear load at e = 140 mm V_{perm} [3)] [kN]	Permissible shear load at e = 160 mm V_{perm} [3)] [kN]	Permissible shear load at e = 180 mm V_{perm} [3)] [kN]	Permissible shear load at e = 200 mm V_{perm} [3)] [kN]	Permissible shear load at e = 250 mm V_{perm} [3)] [kN]	Permissible shear load at e = 300 mm V_{perm} [3)] [kN]	Minimum member thickness h_{min} [mm]	Minimum spacing s_{min} ∥ / s_{min} ⊥ [9)] [mm]	Minimum edge distance c_{min} [mm]
Concrete, cracked and non-cracked, strength class ≥ C20/25														
Thermax 12[8)]	70	3,40[6)]	1,07	0,69	0,58	0,42	0,32	0,24	0,18	0,08	0,04	100	55	55
Thermax 16[8)]	80	3,40[6)]	1,51	0,98	0,83	0,71	0,63	0,48	0,34	0,16	0,08	116	65	65
Solid brick, Mz, EN 771-1; f_b ≥ 12 N/mm²; ρ ≥ 1,8 kg/dm³; LxWxH ≥ 240x115x71 mm, NF														
Thermax 12[8)]	200	2,71	0,85	0,55	0,47	0,40	0,32	0,24	0,18	0,08	0,04	240	80/80	60
Thermax 16[8)]	200	2,71	1,29	0,98	0,83	0,71	0,63	0,48	0,34	0,16	0,08	240	80/80	60
Solid sand-lime brick, KS, EN 771; f_b ≥ 20 N/mm²; ρ ≥ 2,0 kg/dm³; LxWxH ≥ 250x240x240 mm, 8DF														
Thermax 12[8)]	50	2,86	0,85	0,55	0,47	0,40	0,32	0,24	0,18	0,08	0,04	240	80/80	60
Thermax 16[8)]	50	2,14	1,51	0,98	0,83	0,71	0,63	0,48	0,34	0,16	0,08	240	80/80	60
Vertically perforated brick type B, HLz, EN 771-1; f_b ≥ 12 N/mm²; ρ ≥ 1,0 kg/dm³; LxWxH = 370x240x237 mm resp. 500x175x237 mm														
Thermax 12[4)]	110	1,14	0,57	0,55	0,47	0,40	0,32	0,24	0,18	0,08	0,04	175	100/100	100
Thermax 16[4)]	110	1,14	0,57	0,57	0,57	0,57	0,57	0,48	0,34	0,16	0,08	175	100/100	100
Perforated sand-lime brick, KSL, EN 771-2; f_b ≥ 12 N/mm²; ρ ≥ 1,4 kg/dm³; LxWxH = 240x175x113 mm, 3DF														
Thermax 12[4)]	85	1,00	0,85	0,55	0,47	0,40	0,32	0,24	0,18	0,08	0,04	175	100/115	80
Thermax 16[4)]	85	1,00	1,14	0,98	0,83	0,71	0,63	0,48	0,34	0,16	0,08	175	100/115	80
Hollow block made of light weight concrete, Hbl, EN 771-3; f_b ≥ 2 N/mm²; ρ ≥ 1,0 kg/dm³; LxWxH = 362x240x240 mm														
Thermax 12[4)]	110	0,43	0,26	0,26	0,26	0,26	0,26	0,24	0,18	0,08	0,04	240	100/240	60
Thermax 16[4)]	180	0,71	0,26	0,26	0,26	0,26	0,26	0,26	0,26	0,16	0,08	240	100/240	60
Aerated concrete (cylindrical drill hole), EN 771-4; f_b ≥ 2 N/mm²; ρ ≥ 0,35 kg/dm³; LxWxH ≥ 599x240x249 mm														
Thermax 12[8)]	200	1,43	0,43	0,43	0,43	0,40	0,32	0,24	0,18	0,08	0,04	240	80/80	100
Thermax 16[8)]	200	1,43	0,43	0,43	0,43	0,43	0,43	0,43	0,34	0,16	0,08	240	80/80	100

For the design the complete approval Z-21.8-1837 as well as the European Technical Assessments ETA-10/0383, ETA-02/0024 or ETA-12/0258 have to be considered.

1) The required partial safety factors for material resistance as well as a partial safety factor for load actions of γ_L = 1,4 are considered.

2) Set-up of one or more Thermax in a row in direction of shear, for which the clamping of the attachment prevents a torsion on attachment side due to a sufficient stiffness of the attachment or connecting construction. For a clamping on base substrate side only, see approval.

3) For combinations of tensile and shear loads as well as reduced edge distances or spacings (anchor groups) see approval. The values for tensile loads in masonry are valid only, if the joints of the masonry is completely filled with masonry mortar. If the joints are not filled with masonry mortar are not filled with masonry mortar and the edge distance towards the joints is less than c_{min}, the loads have to be reduced by the factor a_j = 0,75. The values for shear loads are valid only, if the joints are filled with masonry mortar. For not completely filled joints they have to be handled like a free edge and a minimum edge distance c_{min} of the anchors to the joints has to be observed. For compression loads and perforated bricks or hollow blocks see approval. Calculative assumed thickness of the attachment t_{fix} = 6 mm.

4) In vertically perforated bricks HLz, perforated sand-lime bricks KSL as well as hollow blocks made of light weight concrete Hbl the Thermax 12 (standard version) can bridge non-load bearing layers up to 110 mm and the Thermax 16 can bridge them up to 170 mm. Larger usable lengths up to 300 mm are possible, if other perforated sleeves and where required longer anchor rods are used and again the anchorage depth gets reduced - see approval.

5) The stated permissible loads are valid for anchorages in dry base substrates - use category d/d - and for temperatures up to +50 °C (resp. short-term up to +80 °C) in the area of the injection mortar and during drill hole cleaning in accordance with the approval. The load values apply to anchor rods on base substrate side made of zinc-plated steel grade 8.8 - for other steel grades or stainless steel see approval.

6) Complies with the permissible tensile load of the Thermax Cone.

7) Intermediate values of the shear load may be linearly interpolated in dependence of "e", if nothing else is mentioned in the approval.

8) In solid bricks Mz and solid sand-lime bricks KS the Thermax 12 (standard version) can bridge non-load bearing layers up to 190 mm (140 mm in aerated concrete) and the Thermax 16 can bridge them up to 300 mm (270 mm in aerated concrete) - but in solid brick Mz and aerated concrete the above load values have to be reduced. In concrete the Thermax 12 (standard version) can bridge non-loadbearing layers up to 170 mm and the Thermax 16 can bridge them up to 290 mm. Larger usable lengths up to 300 mm are possible, if longer anchor rods are used and again in solid bricks Mz if the anchorage depth (compared to above values) gets reduced where required - see approval.

9) Minimum spacings for at the same time reduced permissible loads, where required.

LOADS

Stand-off installation Thermax 12 and 16 with load-bearing anchor rod made of stainless steel A4-70 and a displacement of 3 mm

The below load table is valid for short-term loading (e.g. wind load). Measures for sealing see approval, section 3.2.4.
Highest permissible loads[1) 5) 7)] of a Thermax within an anchor group[2)] in concrete with the injection mortars FIS V or FIS SB and in masonry with the injection mortar FIS V.

Type	Minimum effective anchorage depth h_{ef}[4)8)] [mm]	Permissible tensile load N_{perm}[3)] [kN]	Permissible shear load at e = 62 mm V_{perm}[3)] [kN]	Permissible shear load at e = 100 mm V_{perm}[3)] [kN]	Permissible shear load at e = 120 mm V_{perm}[3)] [kN]	Permissible shear load at e = 140 mm V_{perm}[3)] [kN]	Permissible shear load at e = 160 mm V_{perm}[3)] [kN]	Permissible shear load at e = 180 mm V_{perm}[3)] [kN]	Permissible shear load at e = 200 mm V_{perm}[3)] [kN]	Permissible shear load at e = 250 mm V_{perm}[3)] [kN]	Permissible shear load at e = 300 mm V_{perm}[3)] [kN]	Minimum member thickness h_{min} [mm]	Minimum spacing $s_{min\parallel}$ / $s_{min\perp}$[9)] [mm]	Minimum edge distance c_{min} [mm]
Concrete, cracked and non-cracked, strength class ≥ C20/25														
Thermax 12[8)]	70	3,40[6)]	1,07	0,69	0,58	0,50	0,44	0,39	0,35	0,24	0,12	100	55	55
Thermax 16[8)]	80	3,40[6)]	1,51	0,98	0,83	0,71	0,63	0,56	0,51	0,41	0,24	116	65	65
Solid brick, Mz, EN 771-1; f_b ≥ 12 N/mm²; ρ ≥ 1,8 kg/dm³; LxWxH ≥ 240x115x71 mm, NF														
Thermax 12[8)]	200	2,71	0,59	0,39	0,33	0,28	0,25	0,22	0,20	0,16	0,12	240	80/80	60
Thermax 16[8)]	200	2,71	1,29	0,96	0,81	0,70	0,62	0,56	0,50	0,41	0,24	240	80/80	60
Solid sand-lime brick, KS, EN 771; f_b ≥ 20 N/mm²; ρ ≥ 2,0 kg/dm³; LxWxH ≥ 250x240x240 mm, 8DF														
Thermax 12[8)]	50	2,86	0,59	0,39	0,33	0,28	0,25	0,22	0,20	0,16	0,12	240	80/80	60
Thermax 16[8)]	50	2,14	1,46	0,96	0,81	0,70	0,62	0,56	0,50	0,41	0,24	240	80/80	60
Vertically perforated brick type B, HLz, EN 771-1; f_b ≥ 12 N/mm²; ρ ≥ 1,0 kg/dm³; LxWxH = 370x240x237 mm resp. 500x175x237 mm														
Thermax 12[4)]	110	1,14	0,57	0,39	0,33	0,28	0,25	0,22	0,20	0,16	0,12	175	100/100	100
Thermax 16[4)]	110	1,14	0,57	0,57	0,57	0,57	0,57	0,56	0,50	0,41	0,24	175	100/100	100
Perforated sand-lime brick, KSL, EN 771-2; f_b ≥ 12 N/mm²; ρ ≥ 1,4 kg/dm³; LxWxH = 240x175x113 mm, 3DF														
Thermax 12[4)]	85	1,00	0,59	0,39	0,33	0,28	0,25	0,22	0,20	0,16	0,12	175	100/115	80
Thermax 16[4)]	85	1,00	1,14	0,96	0,81	0,70	0,62	0,56	0,50	0,41	0,24	175	100/115	80
Hollow block made of light weight concrete, Hbl, EN 771-3; f_b ≥ 2 N/mm²; ρ ≥ 1,0 kg/dm³; LxWxH = 362x240x240 mm														
Thermax 12[4)]	110	0,43	0,26	0,26	0,26	0,26	0,25	0,22	0,20	0,16	0,12	240	100/240	60
Thermax 16[4)]	180	0,71	0,26	0,26	0,26	0,26	0,26	0,26	0,26	0,26	0,24	240	100/240	60
Aerated concrete (cylindrical drill hole), EN 771-4; f_b ≥ 2 N/mm²; ρ ≥ 0,35 kg/dm³; LxWxH ≥ 599x240x249 mm														
Thermax 12[8)]	200	1,43	0,43	0,39	0,33	0,28	0,25	0,22	0,20	0,16	0,12	240	80/80	100
Thermax 16[8)]	200	1,43	0,43	0,43	0,43	0,43	0,43	0,43	0,43	0,41	0,24	240	80/80	100

For the design the complete approval Z-21.8-1837 as well as the European Technical Assessments ETA-10/0383, ETA-02/0024 or ETA-12/0258 have to be considered.

1) The required partial safety factors for material resistance as well as a partial safety factor for load actions of γ_L = 1,4 are considered.

2) Set-up of one or more Thermax in a row in direction of shear, for which the clamping of the attachment prevents a torsion on attachment side due to a sufficient stiffness of the attachment or connecting construction. For a clamping on base substrate side only, see approval.

3) For combinations of tensile and shear loads as well as reduced edge distances or spacings (anchor groups) see approval. The values for tensile loads in masonry are valid only, if the joints of the masonry is completely filled with masonry mortar. If the joints are not filled with masonry mortar are not filled with masonry mortar and the edge distance towards the joints is less than c_{min}, the loads have to be reduced by the factor a_j = 0,75. The values for shear loads are valid only, if the joints are filled with masonry mortar. For not completely filled joints they have to be handled like a free edge and a minimum edge distance c_{min} of the anchors to the joints has to be observed. For compression loads and perforated bricks or hollow blocks see approval. Calculative assumed thickness of the attachment t_{fix} = 6 mm.

4) In vertically perforated bricks HLz, perforated sand-lime bricks KSL as well as hollow blocks made of light weight concrete Hbl the Thermax 12 (standard version) can bridge non-load bearing layers up to 110 mm and the Thermax 16 can bridge them up to 170 mm. Larger usable lengths up to 300 mm are possible, if other perforated sleeves and where required longer anchor rods are used and again the anchorage depth gets reduced - see approval.

5) The stated permissible loads are valid for anchorages in dry base substrates - use category d/d - and for temperatures up to +50 °C (resp. short-term up to +80 °C) in the area of the injection mortar and during drill hole cleaning in accordance with the approval. The load values apply to anchor rods on base substrate side made of stainless steel of the grade A4-70.

6) Complies with the permissible tensile load of the Thermax Cone.

7) Intermediate values of the shear load may be linearly interpolated in dependence of "e", if nothing else is mentioned in the approval.

8) In solid bricks Mz and solid sand-lime bricks KS the Thermax 12 (standard version) can bridge non-load bearing layers up to 190 mm (140 mm in aerated concrete) and the Thermax 16 can bridge them up to 300 mm (270 mm in aerated concrete) - but in solid brick Mz and aerated concrete the above load values have to be reduced. In concrete the Thermax 12 (standard version) can bridge non-loadbearing layers up to 170 mm and the Thermax 16 can bridge them up to 290 mm. Larger usable lengths up to 300 mm are possible, if longer anchor rods are used and again in solid bricks Mz if the anchorage depth (compared to above values) gets reduced where required - see approval.

9) Minimum spacings for at the same time reduced permissible loads, where required.