IZJAVA O SVOJSTVIMA

DoP 0417

za fischer tiplu HybridPower (Plastične tiple za korištenje u betonu i zidanim konstrukcijama) HR

1. Jedinstveni identifikator tipa proizvoda: **DoP 0417**

2. Namjena korištenja: **Plastična tipla za višestruku uporabu u betonu i zidovima za nekonstrukcijske primjene (osnovna skupina materijala a b, c, d), vidi dodatak, posebno priloge B1 - B5.**

3. Proizvođač: **fischerwerke GmbH & Co. KG, Klaus-Fischer-Str. 1, 72178 Waldachtal, Njemačka**

4. Ovlašteni zastupnik: **–**

5. Sistem/i od AVCP: **2+**

6. Europski dokument za ocjenjivanje: **EAD 330284-00-0604-v01**
   Europska tehnička ocjena: **ETA-26/0168; 2026-06-23**
   Tijelo za tehničko ocjenjivanje: **ETA-Danmark A/S**
   Prijavljeno tijelo/prijavljena tijela: **2873 TU Darmstadt**

7. Objavljena svojstva:
   Sigurnost u slučaju požara (BWR 2)
   1) Reakcija na vatru: Klasa A1
   2) Otpornost na vatru (skupina osnovnog materijala a): Prilog C14
   3) Otpornost na vatru (skupina osnovnog materijala b) c) i d)): Prilog C15

   Mehanička otpornost i stabilnost (BWR 4)
   4) Otpornost na lom čelika pri opterećenju vlakom: Prilog C1
   5) Otpornost na otkazivanje čelika ili polimera pri posmičnom opterećenju: Prilog C1
   6) Otpornost na izvlačenje ili pucanje betona ili pucanje polimera pri naprezanju pod naponom (osnovna skupina materijala a): Prilog C1

   7) Otpornost u bilo kojem smjeru opterećenja bez poluge (skupina osnovnog materijala b, c, d): vidi dodatak, posebno priloge C7 - C13

   8) Udaljenost i razmak od ruba (skupina osnovnog materijala a): Prilog B2
   9) Udaljenost i razmak od ruba (skupina osnovnih materijala b, c, d): Priloge B3, B4
   10) Pomaci pod kratkoročnim i dugoročnim opterećenjem: Prilog C1

   Trajnost:
   11) Trajnost: Prilog B1

8. Odgovarajuća tehnička dokumentacija i/ili specifična tehnička dokumentacija: **–**

Svojstva gore navedenog proizvoda su u skladu sa skupom izjava o svojstvima.Ova izjava o svojstvima se izdaje, u skladu sa Europskom regulativom (EU) Br. 305/2011, pod punom odgovornošću gore navedenog proizvođača.

Za proizvođača i u njegovo ime potpisao:

i.V.

Dr. Christian Weber, Voditelj razvoja

Dieter Pfaff, Voditelj Međunarodne federacije za proizvodnju i upravljanje kvalitetom

Tumlingen, 2026-08-01

Ovaj DoP je pripremljen u različitim jezicima. U slučaju da postoji spor u tumačenju, engleska verzija će uvijek prevladati.
U aneksu se nalaze dodatni podaci na engleskom jeziku, koji ne podliježu zakonskoj regulativi.

Translation guidance Essential Characteristics and Performance Parameters for Annexes
Smjernice za prijevod. Bitne karakteristike i parametri izvedbe za dodatke

Safety in case of fire (BWR 2) **Sigurnost u slučaju požara (BWR 2)**		
1	Reaction to fire: **Reakcija na vatru:**	-
2	Resistance to fire (base material group a): **Otpornost na vatru (skupina osnovnog materijala a):**	$N_{Rk,s,fi}$ [kN], $N_{Rk,s,fi}$ [kN], $F_{Rk,fi,90}$ [kN]; $F_{Rk,fi}$ (α) [kN]; $M_{Rk,s,fi}$ [Nm]; $c_{min,fi}$, $s_{min,fi}$ [mm]
3	Resistance to fire (base material group b, c and d): **Otpornost na vatru (skupina osnovnog materijala a):**	$F_{Rk,fi\,(\alpha)}$ [kN]; $M_{Rk,s,fi}$ [Nm]; $c_{min,fi}$ [mm] $s_{min,fi}$ [mm]
Mechanical resistance and stability (BWR 4) **Mehanička otpornost i stabilnost (BWR 4)**		
3	Resistance to steel failure under tension loading: **Otpornost na lom čelika pri opterećenju vlakom:**	$N_{Rk,s}$ [kN]
4	Resistance to steel or polymer failure under shear loading: **Otpornost na otkazivanje čelika ili polimera pri posmičnom opterećenju:**	$V_{Rk,s}$ [kN]; $M_{Rk,s}$ [Nm]; $V_{Rk,pol}$ [kN]
5	Resistance to pull-out or concrete failure or polymer failure under tension loading (base material group a) **Otpornost na izvlačenje ili pucanje betona ili pucanje polimera pri naprezanju pod naponom (osnovna skupina materijala a):**	$N_{Rk,p}$ [kN] / $N_{Rk,pol}$ [kN]
6	Resistance in any load direction without lever arm (base material group b,c,d): **Otpornost u bilo kojem smjeru opterećenja bez poluge (skupina osnovnog materijala b, c, d):**	F_{Rk} [kN]
7	Edge distance and spacing (base material group a) **Udaljenost i razmak od ruba (skupina osnovnog materijala a):**	$c_{cr;}$ $s_{cr;}$ $c_{min;}$ $s_{min;}$ $a_{;}$ h_{min} [mm]
8	Edge distance and spacing (base material group b,c,d): **Udaljenost i razmak od ruba (skupina osnovnih materijala b, c, d):**	$c_{min;}$ $s_{min;}$ h_{min} [mm]
9	Displacements under short-term and long-term loading: **Pomaci pod kratkoročnim i dugoročnim opterećenjem:**	δ_0; δ_∞ [mm]
Aspects of durability **Trajnost:**		
10	Durability: **Trajnost:**	-

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product

The fischer HybridPower is a plastic anchor consisting of a plug sleeve made of polyamide combined with a metal sceleton (power wedge), and a special screw made of either galvanized steel with an additional organic coating or stainless steel according to Annex A3. The anchor is available with two different head types; a hexagon head (type FUS) and a countersunk head (type T).

The anchors are intended for use in several base materials; cracked and uncracked concrete of strength classes ranging from C12/15 to C50/60, masonry units (solid and hollow or perforated) and unreinforced or reinforced auto aerated concrete.

The following service temperature ranges are applied for:
- T1: -20°C/50°C
- T2: -20°C/80°C

The anchor is screwed into a predrilled cylindrical drill hole, and the power wedges interlock with the base material ensuring a secure anchorage.

The product description is given in Annex A and the intended use specifications of the product are detailed in Annex B.

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

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

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

Characteristic	Assessment of characteristic
3.1 Safety in case of fire (BWR2)	
Reaction to fire	Class A1
Resistance to fire (base material group a)	Annex C14
Resistance to fire (base material group b, c and d)	Annex C15
3.2 Mechanical resistance and stability (BWR4)	
Resistance to steel failure under tension loading	Annex C1
Resistance to steel failure under shear loading	Annex C1
Resistance to pull-out or concrete failure or polymer failure under tension loading (base material group a)	Annex C1
Resistance in any load direction without lever arm (base material group b, c and d)	Annex C7 to C13
Edge distance and spacing (base material group a)	Annex B2
Edge distance and spacing (base material group b, c and d)	Annex B3 and B4
Displacements under short-term and long-term loading	Annex C1
3.3 Aspects of durability	
Durability	Annex B1

See additional information in section 3.4

3.4 General aspects related to the performance of the product

The European Technical Assessment is issued for the product on the basis of agreed data/information, deposited with ETA-Danmark, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to ETA-Danmark before the changes are introduced. ETA-Danmark will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

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 1997/463/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+**.

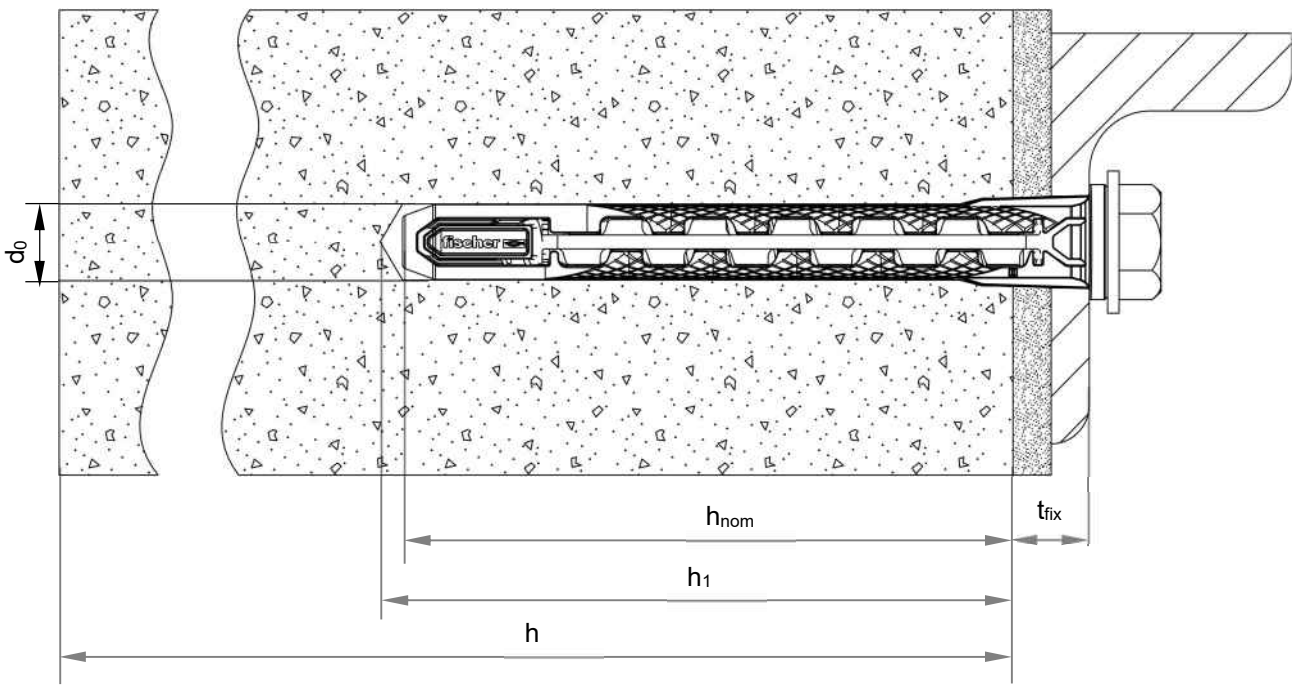
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

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.

The following standards and documents are referred to in this European Technical Assesment:

− EOTA European Assessment Document EAD 330284-00-0604-v01: Plastic anchors for redundant non-structural systems for use in concrete and masonry under fire exposure
− EOTA Technical Report TR 051, 2018-04: Recommendations for job site tests of plastic anchors and screws
− EOTA Technical Report TR 064, 2018-05, amended 01/2023: Design of plastic anchors in concrete and masonry
− EN 206:2013+A1:2016: Concrete – Specification, performance, production and conformity
− EN 771-1:2011+A1:2015: Specification for masonry units – Part 1: Clay masonry units
− EN 771-2:2011+A1:2015: Specification for masonry units – Part 2: Calcium silicate
− EN 771-3:2011+A1:2015: Specification for masonry units – Part 3: Aggregate concrete masonry units (dense and lightweight aggregates)
− EN 771-4:2011+A1:2015: Specification for masonry units – Part 4: autoclaved aerated concrete masonry units
− EN 998-2:2010: Specification for mortar for masonry - Part 2: Masonry mortar
− EN 12602:2016: Prefabricated reinforced components of autoclaved aerated concrete
− EN 1993-1-4:2025: Design of steel structures - Part 1-4: General rules -
− EN ISO 4042:2022: Fasteners – Electroplated coating systems

fischer HybridPower



Legend

d_0 = Nominal drill hole diameter

h_{nom} = Overall plastic anchor embedment depth in the base material

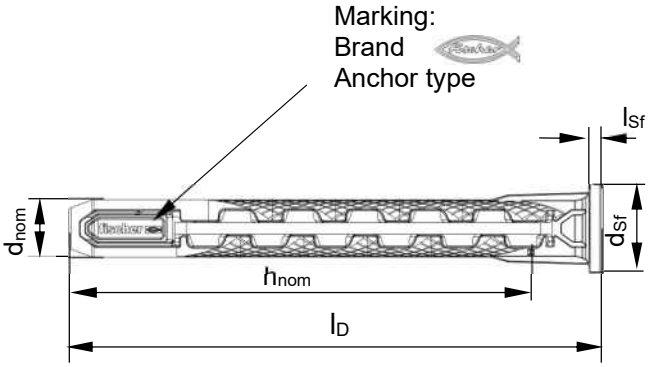
h_1 = Depth of drill hole to deepest point

h = Thickness of member (wall)

t_{fix} = Thickness of fixture and / or non-load bearing layer

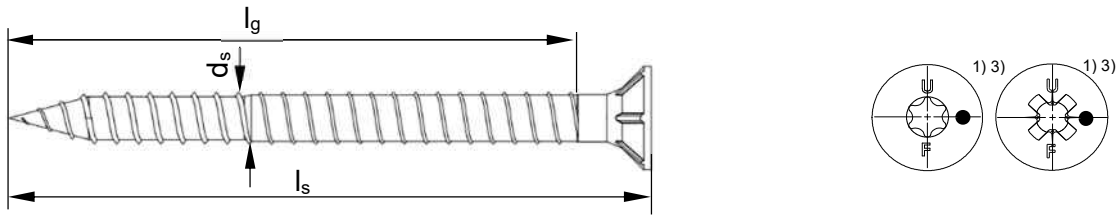
Figure not to scale

Anchor sleeve – HybridPower

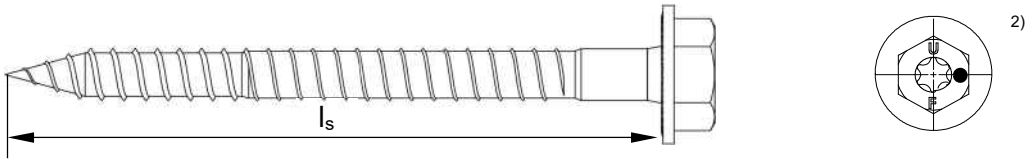


Special screws

Countersunk screw



Hexagonal screw with washer



1) Additional marking for the special screw, stainless steel version: e.g. "A4" resp. "R" or "A2".
2) Internal driving feature for Torx bit is optional for hexagonal head.
3) Optional additional version with underhead ribs.

Table A2.1: Dimensions

Anchor type	Anchor sleeve						Special screw		
	h_{nom} [mm]	d_{nom} [mm]	t_{fix} [mm]	l_D [mm]	l_{Sf} [mm]	d_{Sf} [mm]	d_s [mm]	l_G [mm]	l_s [mm]
HybridPower FUS	80	10	≥ 1	90-230	2,5	15	7,0	77	l_D
HybridPower T	80	10	≥ 1	90-230	2,5	15	7,0	77	l_D

Legend

h_{nom} = Overall plastic anchor embedment depth in the base material
d_{nom} = Nominal diameter of the anchor sleeve
t_{fix} = Thickness of fixture and / or non-load bearing layer
l_D = Length of the anchor sleeve
l_{Sf} = Thickness of the anchor sleeve collar
d_{Sf} = Diameter of the anchor sleeve collar
d_S = Diameter of the screw
l_G = Thread length of the screw
l_S = Length of the screw

Figures not to scale

fischer HybridPower

Product description
Anchor type, special screws
Marking and dimensions

Annex A2
Appendix 6 / 27

Table A3.1: Materials

Name	Material
Hybrid anchor sleeve	- Polyamide, PA6, colour: red
Sceleton	- Ferritic stainless steel
Special screw	- Galvanised steel gvz with Zn5/Ag or Zn5/An in accordance with EN ISO 4042 with additional organic layer (Zn5/Ag/T7 or Zn5/An/T7, resp. total layer thickness ≥ 6 µm) **or** - Stainless steel “A2” of corrosion resistance class CRC II in accordance with EN 1993-1-4 **or** - Stainless steel “A4” or “R” of corrosion resistance class CRC III in accordance with EN 1993-1-4

Specifications of intended use

Anchorages subject to:

- Static and quasi-static loads.
- Redundant non-structural systems.
- Fire exposure in reinforced or unreinforced compacted normal weight concrete without fibres, strength classes ≥ C20/25 as per EN 206 and solid brick masonry with mean compressive strength ≥ 5 N/mm² as per EN 771, see Annex C14 and Annex C15.

Base materials:

- Reinforced or unreinforced compacted normal weight concrete without fibres, strength classes ≥ C12/15 (base material group “a”), in accordance with EN 206-1, see Annex C1 and C2.
- Solid brick masonry (base material group “b”) as per EN 771-1, EN 771-2 or EN 771-3, see Annex C2, C7 and C8.
  Note: The characteristic resistance is also valid for larger brick sizes and higher compressive strength of the masonry unit.
- Hollow or perforated brick masonry (base material group “c”), as per EN 771-1, EN 771-2 or EN 771-3, see Annex C3 – C6 and C8 – C12.
- Unreinforced autoclaved aerated concrete (base material group “d”) as per EN 771-4 and reinforced autoclaved aerated concrete (base material group “d”) as per EN 12602, see Annex C2 and C13.
- Mortar strength class of the masonry ≥ M2,5 in accordance with EN 998-2.
- For other comparable base materials of the base material group “a”, “b”, “c” and “d” the characteristic resistance of the anchor may be determined by job site tests in accordance with TR 051.

Temperature Range:

- c: - 20 °C to 50 °C (max. short term temperature + 50 °C and max. long term temperature + 30 °C)
- b: - 20 °C to 80 °C (max. short term temperature + 80 °C and max. long term temperature + 50 °C)

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions: Special screw made of zinc coated steel or stainless steel.
- The specific screw made of galvanised steel or galvanised steel with an additional organic layer may also be used in structures subject to external atmospheric exposure, if the area of the head of the screw is protected against moisture and driving rain after mounting of the fixing unit in this way, that intrusion of moisture into the anchor shaft is prevented. Therefore, there shall be an external cladding or a ventilated rainscreen mounted in front of the head of the screw and the head of the screw itself shall be coated with a soft plastic, permanently elastic bitumen-oil-combination coating (e.g. undercoating or body cavity protection for cars).
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist: Special screw made of stainless steel of corrosion resistance class CRC III.
  Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

Design:

- The anchorages are to be designed in accordance with TR 064 under the responsibility of an engineer experienced in anchorages and masonry work.
- 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.

Installation:

- Hole drilling by the drilling method in accordance with Annex C1 for base material group “a”, and in accordance with Annexes C7 – C13 for base material group “b”, “c” and “d”.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Installation temperature: - 20 °C to + 40 °C.
- Exposure to UV due to solar radiation of the anchor not protected by rendering ≤ 6 weeks.
- No ingress of water in the borehole at temperatures < 0 °C.

Table B2.1: Installation parameters

Anchor type				HybridPower, HybridPower A2, HybridPower A4, HybridPower R
Nominal drill hole diameter	d_0	=	[mm]	10
Cutting diameter of drill bit	d_{cut}	≤	[mm]	10,45
Overall plastic anchor embedment depth in the base material	h_{nom}	≥	[mm]	80
Depth of drill hole to deepest point	h_1	≥	[mm]	90
Diameter of clearance hole in the fixture	d_f	≤	[mm]	10,50[1)]

1) In combination of hexagon screw with washer and anchor sleeve, use in elongated hole under tensile load is allowed.

Table B2.2: Minimum thickness of member, spacing and edge distances in concrete – base material group "a"

Anchor Type [-]	Embed-ment depth h_{nom} [mm]	Strength class [-]	Minimum thickness of member h_{min} [mm]	Charac-teristic edge distance $c_{cr,N}$ [mm]	Charac-teristic spacing $s_{cr,N}$ [mm]	Minimum spacing and edge distances[1)] s_{min}, c_{min} [mm]
HybridPower, HybridPower A2, HybridPower A4, HybridPower R	80	C12/15	100	70	105	s_{min} = 70 for c ≥ 70 c_{min} = 70 for s ≥ 70
		≥ C16/20		50	75	s_{min} = 50 for c ≥ 50 c_{min} = 50 for s ≥ 50

1) Intermediate values by linear interpolation.

Fixing points with spacing a ≤ $s_{cr,N}$ are considered as a group with a maximum characteristic resistance $N_{Rk,p}$ as per Table C1.2. For a spacing a > $s_{cr,N}$ the anchors are considered as single anchors, each with characteristic resistance $N_{Rk,p}$ as per Table C1.2.

Scheme of spacing and edge distances in concrete, base material group "a"

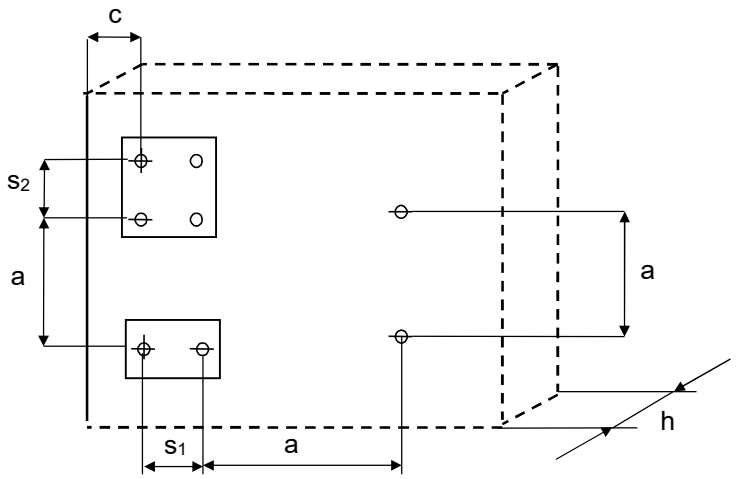


Figure not to scale

Table B3.1: Minimum thickness of member, spacing and edge distances in solid and hollow or perforated masonry – base material group "b" and "c"

Anchor Type			HybridPower, HybridPower A2, HybridPower A4, HybridPower R
Minimum thickness of member[1)]	h_{min}	[mm]	115
Minimum spacing between anchor groups and / or single anchors	a_{min}	[mm]	250
Single anchor			
Minimum edge distance	c_{min}	[mm]	100
Anchor group			
Minimum spacing perpendicular to free edge	$s_{1,min}$	[mm]	100
Minimum spacing parallel to free edge	$s_{2,min}$	[mm]	100
Minimum edge distance	c_{min}	[mm]	100

1) Member thickness according to Annex C2 – C6.

Scheme of spacing and edge distances in solid and hollow or perforated masonry – base material group "b" and "c"

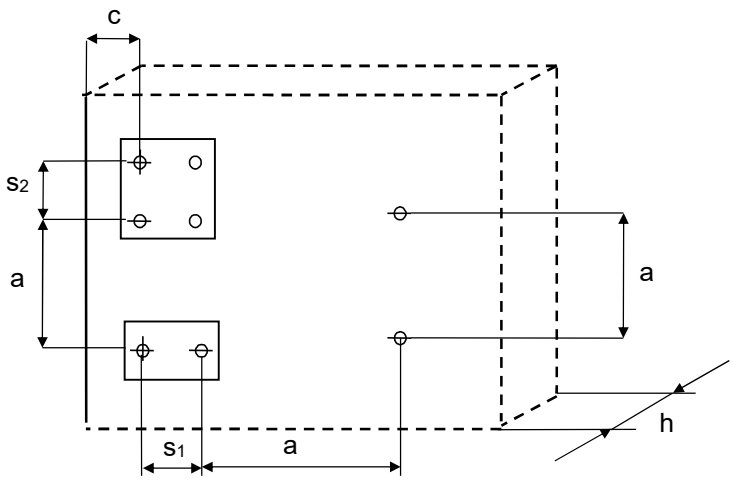


Figure not to scale

fischer HybridPower

Intended use
Minimum thickness of member, spacing and edge distances for use in solid, hollow or perforated masonry

Annex B3

Table B4.1: Minimum thickness of member, spacing and edge distances in unreinforced and reinforced autoclaved aerated concrete – base material group "d"

Anchor type			HybridPower, HybridPower A2, HybridPower A4, HybridPower R	
Compressive strength[1)]	$f_{cm,decl}$ f_{ck}	[N/mm²]	≥ 2	> 3
Minimum thickness of member	h_{min}	[mm]	115	175
Minimum spacing between anchor groups and / or single anchors	a_{min}	[mm]	250	250
Single anchor				
Minimum edge distance	c_{min}	[mm]	100	100
Anchor group				
Minimum spacing perpendicular to free edge	$s_{1,min}$	[mm]	100	100
Minimum spacing parallel to free edge	$s_{2,min}$	[mm]	100	100
Minimum edge distance	c_{min}	[mm]	100	100

1) See Table C13.1 and C13.2.

Scheme of spacing and edge distances in unreinforced and reinforced autoclaved aerated concrete – base material group "d"

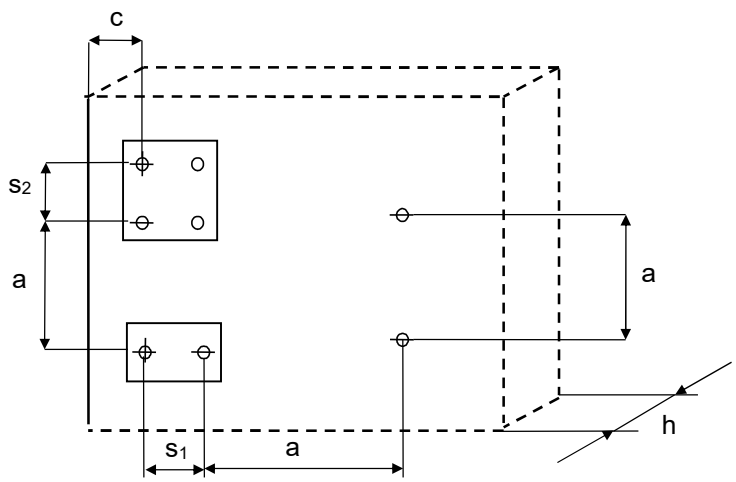


Figure not to scale

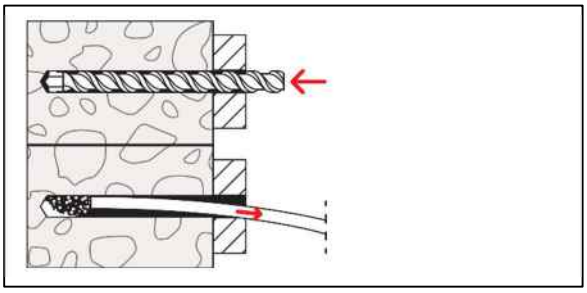
fischer HybridPower

Intended use
Minimum thickness of member, spacing and edge distances for use in autoclaved aerated concrete

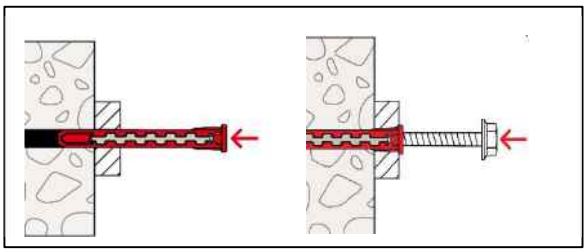
Annex B4

Installation instructions

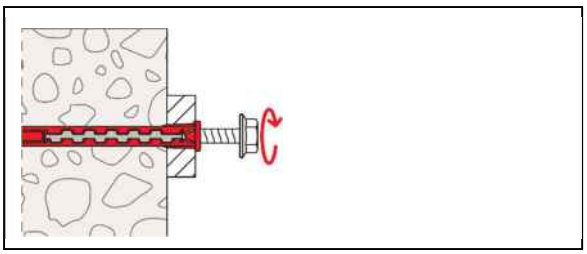
The following pictures show fixing through timber in concrete.
Summary of all kind of masonry bricks see Annex C2 – C6.



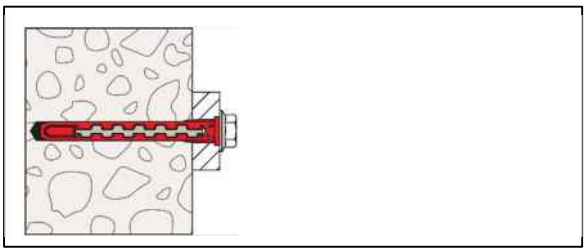
1. Drill the bore hole as per Table B2.1 using the drilling method described in the corresponding Annex C1 and C7 to C13.
2. For use in base material group “a“ (concrete), “b“ (solid bricks), “d” (autoclaved aerated concrete):
   Remove dust from borehole.
   Not necessary for base material group “c”.



3. Insert anchor (screw and sleeve) by using a hammer until the collar of the plastic sleeve is flush with the surface of the fixture.



4. The screw is screwed-in until the head of the screw touches the sleeve. The anchor is correctly installed, if the head of the screw fits tight on the surface and nor the anchor sleeve neither the screw cannot be turned-in any further.



5. Correctly installed anchor, shown in concrete.

Figures not to scale

Table C1.1: Characteristic resistance of the screws

Failure of expansion element (special screw)			HybridPower, HybridPower A2, HybridPower A4, HybridPower R	
			galvanised steel	stainless steel
Characteristic tension resistance	$N_{Rk,s}$	[kN]	**21,70**	**21,70**
Partial safety factor	γ_{Ms} 1)	[-]	**1,55**	**1,55**
Characteristic shear resistance	$V_{Rk,s}$	[kN]	**10,80**	**10,80**
Partial safety factor	γ_{Ms} 1)	[-]	**1,29**	**1,29**
Characteristic bending resistance of the screw				
Characteristic bending resistance	$M_{Rk,s}$	[Nm]	**20,60**	**20,60**
Partial safety factor	γ_{Ms} 1)	[-]	**1,29**	**1,29**

1) In absence of other national regulations.

Table C1.2: Characteristic resistance due to pullout-failure for use in cracked and uncracked concrete base material group "a"1)

Pull-out failure (plastic sleeve)			HybridPower, HybridPower A2, HybridPower A4, HybridPower R
Embedment depth h_{nom}	≥	[mm]	**80**
Concrete ≥ C16/20			
Characteristic tension resistance (30/50 °C)	$N_{Rk,p}$	[kN]	**4,50 / 3,00**2)
Characteristic tension resistance (50/80 °C)	$N_{Rk,p}$	[kN]	**4,00 / 3,00**2)
Partial safety factor	γ_{Mc} 3)	[-]	**1,80**

1) Drilling method: hammer drilling.
2) Valid for concrete C12/15.
3) In absence of other national regulations.

Table C1.3: Displacements1) under tension and shear loading in cracked and uncracked concrete, base material group "a" and in masonry, base material group "b" and "c"

Displacements under			Tension load2)		Shear load2)	
Anchor type	h_{nom} [mm]	F [kN]	δ_{NO} [mm]	$\delta_{N\infty}$ [mm]	δ_{VO} [mm]	$\delta_{V\infty}$ [mm]
HybridPower, HybridPower A2, HybridPower A4, HybridPower R	80	2,50	0,90	0,90	4,90	1,35

1) Valid for all ranges of temperatures.
2) Intermediate values by linear interpolation.

Table C1.4 Displacements1) under tension and shear loading in unreinforced and reinforced autoclaved aerated concrete, base material group "d"

Displacements under				Tension load2)		Shear load2)	
Anchor type	$f_{cm,decl}$ / f_{ck} [N/mm²]	h_{nom} [mm]	F [kN]	δ_{NO} [mm]	$\delta_{N\infty}$ [mm]	δ_{VO} [mm]	$\delta_{V\infty}$ [mm]
HybridPower, HybridPower A2, HybridPower A4, HybridPower R	**≥ 2**	80	0,14	0,20	0,39	0,29	0,43
	≥ 6	80	0,57	0,11	0,21	1,14	1,71

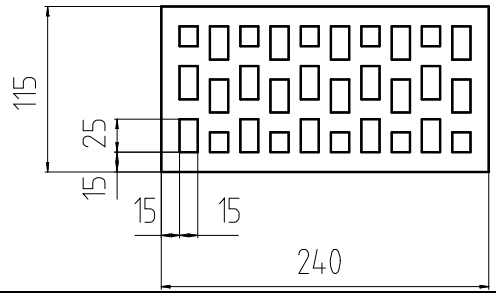
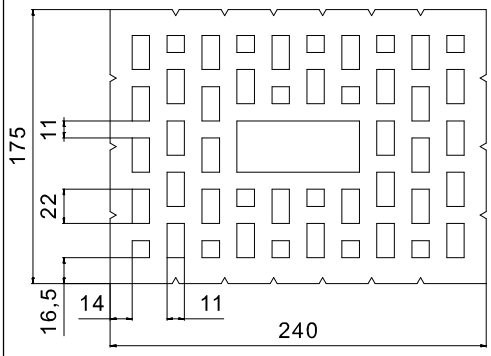
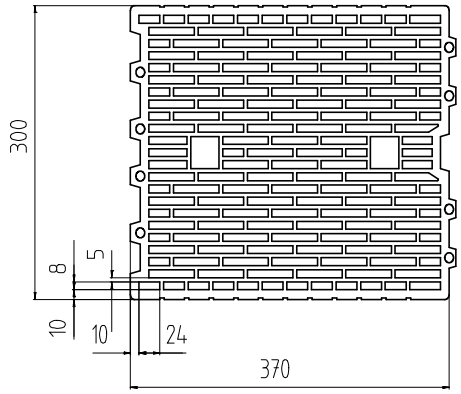
1) Valid for all ranges of temperatures. 2) Intermediate values by linear interpolation.

Table C2.1: Summary of concrete - base material group "a", solid bricks – base material group "b"[1] and autoclaved aerated concrete – base material group "d"

Base material	Format	Dimensions [mm]	Mean compressive strength as per EN 771 [N/mm²]	Bulk density ρ [kg/dm³]	See Annex
Concrete ≥ **C12/15** as per EN 206					C1
Autoclaved aerated concrete, AAC as per EN 771-4					C13
Reinforced autoclaved aerated concrete, AAC as per EN 12602					C13
Clay brick Mz, as per EN 771-1 *e.g. Ziegelwerk Nordhausen, DE*	≥ NF	≥ 240x115x71	≥ 7,5	≥ 2,0	C7
Clay brick Mz, as per EN 771-1 *e.g. Wienerberger DE*	≥ 2 DF	≥ 240x115x113	≥ 10,0	≥ 1,8	C7
Calcium silicate solid brick KS, as per EN 771-2 *e.g. KS Wemding, DE*	≥ NF	≥ 240x115x71	≥ 7,5	≥ 2,0	C7
Calcium silicate solid brick KS, as per EN 771-2 *e.g. Hermann Peter, DE*	≥ 2 DF	≥ 240x115x113	≥ 7,5	≥ 2,0	C7
Calcium silicate solid brick KS, as per EN 771-2 *e.g. Hermann Peter, DE*	≥ 12 DF	≥ 498x175x248	≥ 7,5	≥ 2,0	C8
Lightweight solid brick Vbl, as per EN 771-3 *e.g. KLB, DE*	≥ 2 DF	≥ 240x115x113	≥ 2,5	≥ 1,2	C8

[1] Vertically perforation ≤ 15%; cross section reduced by perforation vertically to the resting area.

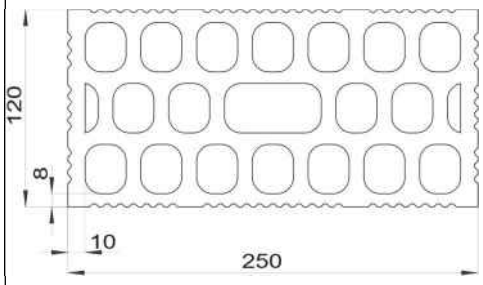
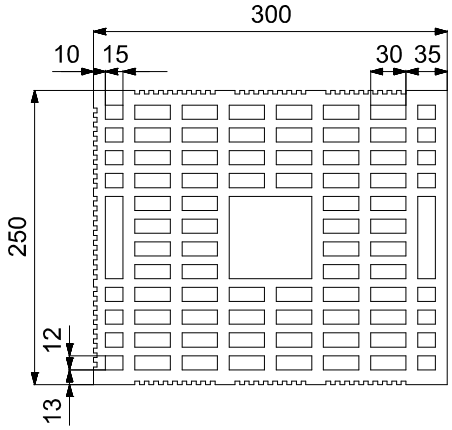
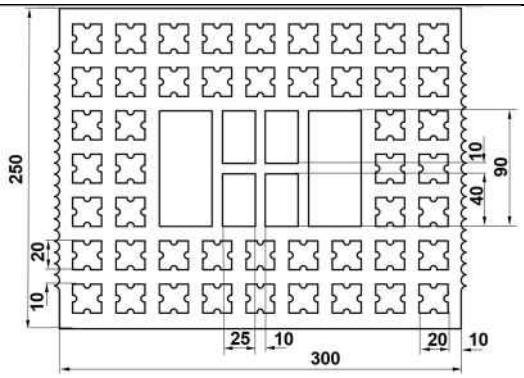
Table C3.1: Summary of hollow or perforated bricks – base material group "c"[1)]

Base material	Format/ Dimensions [mm]	Brick drawing [mm]	Mean compressive strength as per EN 771 [N/mm²] / bulk density ρ [kg/dm³]	See Annex
Perforated clay brick Hlz, as per EN 771-1 *e.g. Wienerberger, DE*	2 DF 240x115x113		≥ 7,5 / ≥ 0,9	C8
Perforated clay brick Hlz, as per EN 771-1 *e.g. Schlagmann, DE*	3 DF 240x175x113		≥ 7,5 / ≥ 1,2	C9
Perforated clay brick Hlz, as per EN 771-1 *e.g. Wienerberger Porotherm 30 R, FR*	370x300x250		≥ 5,0 / ≥ 0,8	C9

[1)] Vertically perforation > 15% and ≤ 50%; cross section reduced by perforation vertically to the resting area.

Figures not to scale

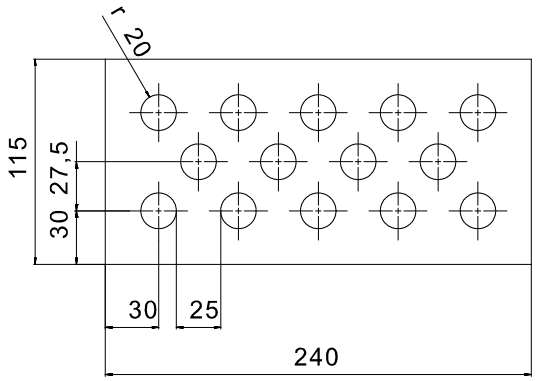
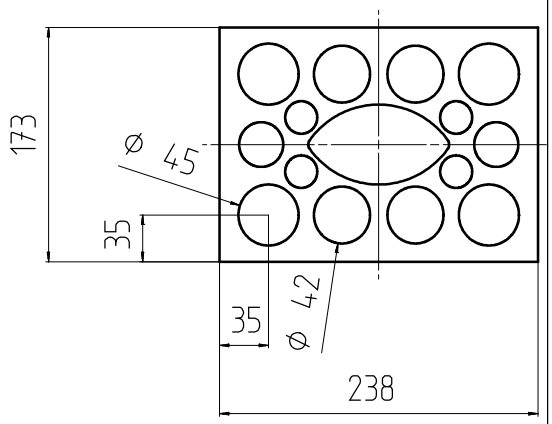
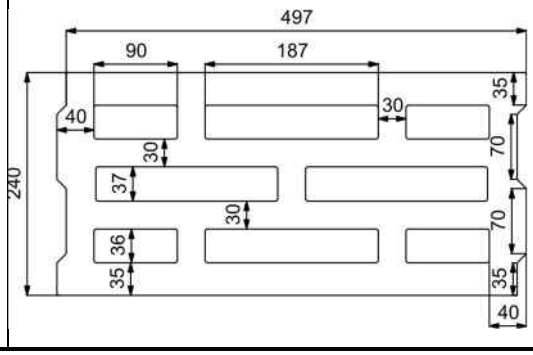
Table C4.1: Summary of hollow or perforated bricks – base material group "c"[1)]

Base material	Format/ Dimensions [mm]	Brick drawing [mm]	Mean compressive strength as per EN 771 [N/mm²] / bulk density ρ [kg/dm³]	See Annex
Perforated clay brick Hlz, as per EN 771-1 *e.g. Doppio Uni Wienerberger, IT*	250x120x190		≥ 7,5 / ≥ 0,8	C9
Perforated clay brick Hlz, as per EN 771-1 *e.g. Wienerberger Pth Bio Modulare, IT*	300x250x190		≥ 7,5 / ≥ 1,0	C10
Perforated clay brick Hlz, as per EN 771-1 *e.g. Danesi Poroton P700, IT*	300x250x190		≥ 5,0 / ≥ 0,9	C10

[1)] Vertically perforation > 15% and ≤ 50%; cross section reduced by perforation vertically to the resting area.

Figures not to scale

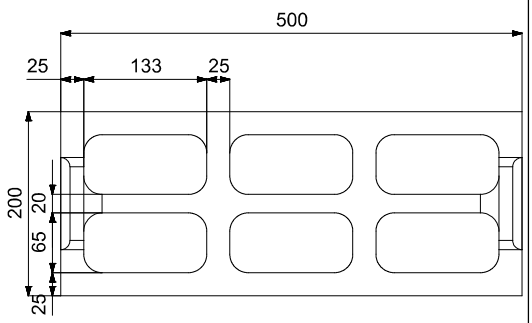
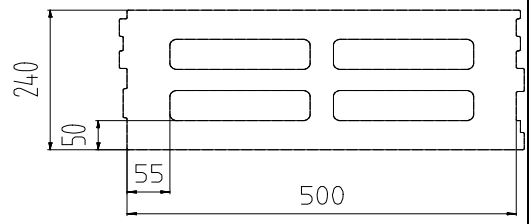
Table C5.1: Summary of hollow or perforated bricks – base material group "c"[1)]

Base material	Format/ Dimensions [mm]	Brick drawing [mm]	Mean compressive strength as per EN 771 [N/mm²] / bulk density ρ [kg/dm³]	See Annex
Calcium silicate hollow brick KSL, as per EN 771-1 *e.g. Bösel, DE*	2 DF 240x115x113		≥ 7,5 / ≥ 1,6	C11
Calcium silicate hollow brick KSL, as per EN 771-1 *e.g. KS Wemding, DE*	3 DF 240x175x113		≥ 7,5 / ≥ 1,4	C11
Hollow brick lightweight concrete Hbl, as per EN 771-3 *e.g. Knobel, DE*	16 DF 495x240x248		≥ 2,5 / ≥ 0,7	C12

[1)] Vertically perforation > 15% and ≤ 50%; cross section reduced by perforation vertically to the resting area.

Figures not to scale

Table C6.1: Summary of hollow or perforated bricks – base material group "c"[1)]

Base material	Format/ Dimensions [mm]	Brick drawing [mm]	Mean compressive strength as per EN 771 [N/mm²] / bulk density ρ [kg/dm³]	See Annex
Hollow brick lightweight concrete Hbl, as per EN 771-3 *e.g. Indelasa, ES*	500x200x200		≥ 2,5 / ≥ 1,0	C12
Hollow brick lightweight concrete Hbl, as per EN 771-3 *e.g. Knobel, DE*	500x240x240		≥ 2,5 / ≥ 0,9	C12

[1)] Vertically perforation > 15% and ≤ 50%; cross section reduced by perforation vertically to the resting area.

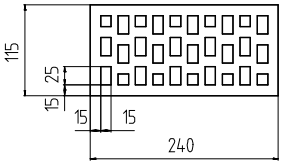
Figures not to scale

Table C7.1: Characteristic resistance F_{Rk} in [kN] for use in solid masonry – base material group "b"

Base material [*Supplier Title, country*] Geometry, DF or nom. Size (L x W x H) [mm] and drilling method	Mean compressive strength as per EN 771 / Minimum compressive strength single brick[1)] [N/mm²]	Characteristic resistance F_{Rk} [kN]	
		Temperature range 30/50 °C	Temperature range 50/80 °C
		h_{nom} [mm] ≥ 80	
Clay brick Mz; ρ ≥ 2,0 as per EN 771-1 *e.g. Mz Ziegelwerk Nordhausen, DE* ≥ NF (≥ 240x115x71) Hammer drilling	≥ 7,5 / 6,0	**1,50**	**1,50**
	≥ 10,0 / 8,0	**2,00**	**2,00**
	≥ 12,5 / 10,0	**2,50**	**2,50**
	≥ 15,0 / 12,0	**3,00**	**3,00**
	≥ 20,0/ 16,0	**3,50 / 4,00[3)]**	**3,50 / 4,00[3)]**
	≥ 25,0 / 20,0	**4,00 / 5,00[3)]**	**4,00 / 4,50[3)]**
	≥ 25,3 / -	**4,00 / 5,00[3)]**	**4,00 / 5,00[3)]**
Clay brick Mz; ρ ≥ 1,8 as per EN 771-1 *e.g. Mz Wienerberger, DE* ≥ 2DF (≥ 240x115x113) Hammer drilling	≥ 10,0 / 8,0	**1,50**	**1,50**
	≥ 12,5 / 10,0	**2,00**	**1,50**
	≥ 15,0 / 12,0	**2,50**	**2,00**
	≥ 20,0/ 16,0	**3,00**	**3,00**
	≥ 25,0 / 20,0	**4,00**	**3,50**
	≥ 35,0 / 28,0	**4,50 / 5,50[3)]**	**4,50 / 5,00[3)]**
Calcium silicate solid brick KS; ρ ≥ 2,0 as per EN 771-2 *e.g. KS Wemding, DE* ≥ NF (≥ 240x115x71) Hammer drilling	≥ 7,5 / 6,0	**0,40**	**0,40**
	≥ 10,0 / 8,0	**0,60**	**0,60**
	≥ 12,5 / 10,0	**0,75**	**0,75**
	≥ 15,0 / 12,0	**0,90**	**0,90**
	≥ 20,0/ 16,0	**1,20**	**1,20**
	≥ 25,0 / 20,0	**1,50**	**1,50**
Calcium silicate solid brick KS; ρ ≥ 2,0 as per EN 771-2 *e.g. Hermann Peter, DE* ≥ 2 DF (≥ 240x115x113) Hammer drilling	≥ 7,5 / 6,0	**2,00**	**1,50**
	≥ 10,0 / 8,0	**2,50**	**2,00**
	≥ 12,5 / 10,0	**2,50 / 3,00[3)]**	**2,50 / 3,00[3)]**
	≥ 15,0 / 12,0	**3,00 / 3,50[3)]**	**3,00 / 3,50[3)]**
	≥ 18,8 / -	**3,50 / 4,00[3)] / 4,50[4)]**	**3,50 / 4,00[3)]**
Partial safety factor	γ_{Mm}[2)] [-]	**2,50**	

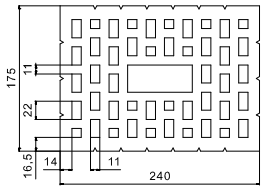
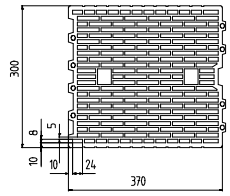
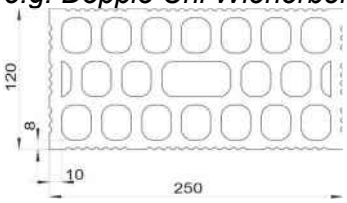
1) The compressive strength of the single brick must not be less than 80% of the mean compressive strength.
2) In absence of other national regulations.
3) Only valid for c ≥ 125 mm.
4) Only valid for c ≥ 150 mm.

Table C8.1: Characteristic resistance F_{Rk} in [kN] for use in solid and in hollow or perforated masonry – base material group "b" and "c"

Base material [*Supplier Title, country*] Geometry, DF or nom. Size (L x W x H) [mm] and drilling method	Mean compressive strength as per EN 771 / Minimum compressive strength single brick[1)] [N/mm²]	Characteristic resistance F_{Rk} [kN]	
		Temperature range 30/50 °C	Temperature range 50/80 °C
		h_{nom} [mm] ≥ 80[3)]	
Calcium silicate solid brick KS; ρ ≥ 2,0 as per EN 771-2 *e.g. KS Wemding, DE* ≥ 12 DF (≥ 498x175x248) Hammer drilling	≥ 7,5 / 6,0	**2,50 / 3,00[4)]**	**2,50**
	≥ 10,0 / 8,0	**3,00 / 4,00[4)]**	**3,00/ 3,50[4)]**
	≥ 12,5 / 10,0	**3,00 / 5,00[4)]**	**3,00 / 4,50[4)]**
	≥ 15,0 / 12,0	**3,50 / 5,50[4)]**	**3,50 / 5,50[4)]**
	≥ 20,0 / 16,0	**4,00 / 6,50[4)] / 7,50[7)]**	**4,00 / 6,50[4)] / 7,00[7)]**
	≥ 25,0 / 20,0	**4,50 / 7,50[4)] / 9,50[7)]**	**4,50 / 7,50[4)] / 9,00[7)]**
	≥ 34,6 / -	**5,00 / 8,50[4)] / 11,00[7)] / 12,50[8)]**	**5,00 / 8,50[4)] / 11,00[7)] / 12,00[8)]**
Lightweight solid brick Vbl; ρ ≥ 1,2 as per EN 771-3 *e.g. Vbl KLB, DE* ≥ 2 DF (≥ 240x115x113) Rotary drilling	≥ 2,5 / 2,0	**1,20 / 1,50[4)]**	**1,20**
	≥ 5,0 / 4,0	**1,50 / 2,50[4)] / 3,00[5)]**	**1,50 / 2,50[4)]**
	≥ 6,0 / -	**2,00 / 2,50[4)] / 3,00[5)] / 3,50[6)]**	**2,00 / 2,50[4)] / 3,00[5)]**
Perforated clay brick Hlz; ρ ≥ 0,9 as per EN 771-1 *e.g. Wienerberger, DE*  2 DF (240x115x113) Rotary drilling	≥ 7,5 / 6,0	**0,30**	**0,30**
	≥ 10,0 / 8,0	**0,40**	**0,40**
	≥ 12,5 / 10,0	**0,50**	**0,50**
	≥ 15,0 / 12,0	**0,60**	**0,60**
	≥ 16,7 / -	**0,75**	**0,75**
Partial safety factor	γ_{Mm}[2)] [-]	**2,50**	

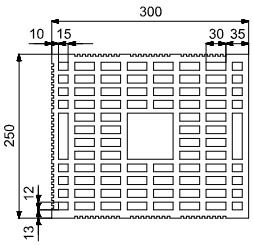
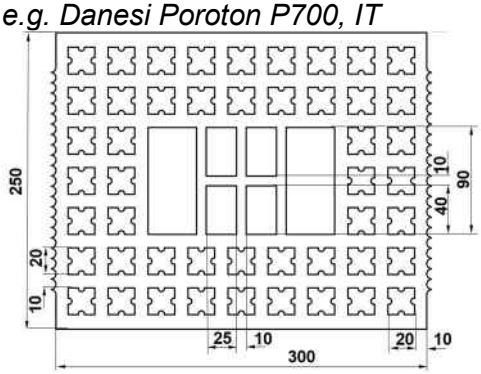
1) The compressive strength of the single brick must not be less than 80% of the mean compressive strength.
2) In absence of other national regulations.
3) Exception "Perforated clay brick Hlz; ρ ≥ 0,9": only valid h_{nom} = 80mm.
4) Only valid for c ≥ 150 mm.
5) Only valid for c ≥ 170 mm.
6) Only valid for c ≥ 175 mm.
7) Only valid for c ≥ 200 mm.
8) Only valid for c ≥ 240 mm.

Table C9.1: Characteristic resistance F_{Rk} in [kN] for use in hollow or perforated masonry – base material group "c"

Base material [*Supplier Title, country*] Geometry, DF or nom. Size (L x W x H) [mm] and drilling method	Mean compressive strength as per EN 771 / Minimum compressive strength single brick[1)] [N/mm²]	Characteristic resistance $\mathbf{F_{Rk}}$ [kN]	
		Temperature range 30/50 °C	Temperature range 50/80 °C
		h_{nom} [mm] = 80	
Perforated clay brick Hlz; ρ ≥ 1,2 as per EN 771-1 *e.g. Schlagmann, DE*  3 DF (240x175x113) Rotary drilling	≥ 7,5 / 6,0	**0,50**	**0,50**
	≥ 10,0 / 8,0	**0,75**	**0,75**
	≥ 12,5 / 10,0	**0,90**	**0,90**
	≥ 15,0 / 12,0	**0,90**	**0,90**
	≥ 19,8 / -	**1,20**	**1,20**
Perforated clay brick Hlz; ρ ≥ 0,8 as per EN 771-1 *e.g. Wienerberger Porotherm 30 R, FR*  370x300x250 Rotary drilling	≥ 5,0 / 4,0	**0,40**	**0,40**
	≥ 7,5 / 6,0	**0,60**	**0,60**
	≥ 10,0 / 8,0	**0,75**	**0,75**
	≥ 12,5 / 10,0	**0,90**	**0,90**
	≥ 15,0 / 12,0	**1,20**	**1,20**
Perforated clay brick Hlz; ρ ≥ 0,8 as per EN 771-1 *e.g. Doppio Uni Wienerberger, IT*  250x120x190 Rotary drilling	≥ 7,5 / 6,0	**0,40**	**0,40**
	≥ 10,0 / 8,0	**0,60**	**0,50**
	≥ 12,5 / 10,0	**0,75**	**0,60**
	≥ 15,0 / 12,0	**0,90**	**0,75**
	≥ 20,0 / 16,0	**1,20**	**0,90**
	≥ 25,0 / 20,0	**1,50**	**1,20**
	≥ 26,5 / -	**1,50**	**1,50**
Partial safety factor	γ_{Mm}[2)] [-]	**2,50**	

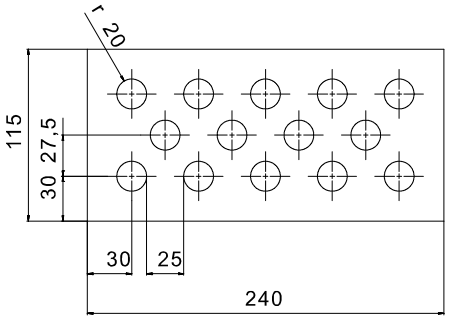
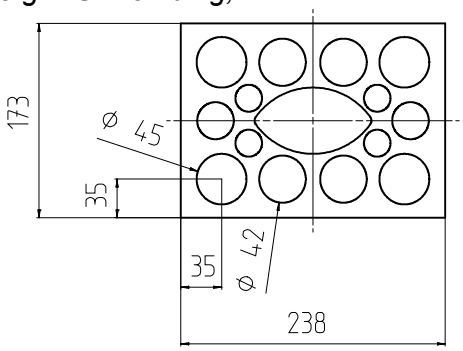
1) The compressive strength of the single brick must not be less than 80% of the mean compressive strength.
2) In absence of other national regulations.

Table C10.1: Characteristic resistance F_{Rk} in [kN] for use in hollow or perforated masonry – base material group "c"

Base material [*Supplier Title, country*] Geometry, DF or nom. Size (L x W x H) [mm] and drilling method	Mean compressive strength as per EN 771 / Minimum compressive strength single brick[1)] [N/mm²]	Characteristic resistance F_{Rk} [kN]	
		Temperature range 30/50 °C	Temperature range 50/80 °C
		h_{nom} [mm] = 80	
Perforated clay brick Hlz; ρ ≥ 1,0 as per EN 771-1 *e.g. Wienerberger Pth Bio Modulare, IT*  300x250x190 Rotary drilling	≥ 7,5 / 6,0	**0,30**	**-**[3)]
	≥ 10,0 / 8,0	**0,50**	**0,30**
	≥ 12,5 / 10,0	**0,60**	**0,40**
	≥ 15,0 / 12,0	**0,60**	**0,50**
	≥ 20,0 / 16,0	**0,90**	**0,60**
	≥ 25,0 / 20,0	**1,20**	**0,90**
	≥ 35,0 / 28,0	**1,50**	**1,20**
Perforated clay brick Hlz; ρ ≥ 0,9 as per EN 771-1 *e.g. Danesi Poroton P700, IT*  300x250x190 Rotary drilling	≥ 5,0 / 4,0	**0,50**	**0,50**
	≥ 7,5 / 6,0	**0,75**	**0,75**
	≥ 10,0 / 8,0	**0,90**	**0,90**
	≥ 12,5 / 10,0	**1,20**	**1,20**
	≥ 15,0 / 12,0	**1,50**	**1,50**
Partial safety factor	γ_{Mm}[2)] [-]	**2,50**	

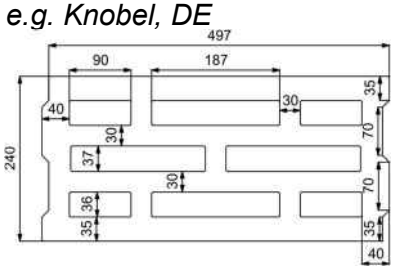
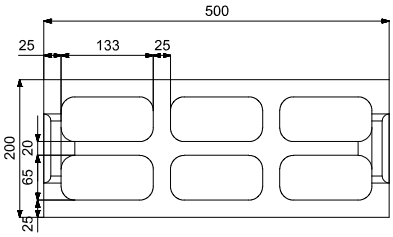
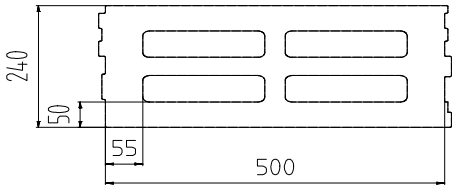
1) The compressive strength of the single brick must not be less than 80% of the mean compressive strength.
2) In absence of other national regulations.
3) No performance assessed.

Table C11.1: Characteristic resistance F_{Rk} in [kN] for use in hollow or perforated masonry – base material group "c"

Base material [*Supplier Title, country*] Geometry, DF or nom. Size (L x W x H) [mm] and drilling method	Mean compressive strength as per EN 771 / Minimum compressive strength single brick[1)] [N/mm²]	Characteristic resistance F_{Rk} [kN]	
		Temperature range 30/50 °C	Temperature range 50/80 °C
		h_{nom} [mm] = 80	
Calcium silicate hollow brick KSL; ρ ≥ 1,6 as per EN 771-1 *e.g. Bösel, DE*  2 DF (240x115x113) Hammer drilling	≥ 7,5 / 6,0	**0,90**	**0,90**
	≥ 10,0 / 8,0	**1,20**	**1,20**
	≥ 12,5 / 10,0	**1,50**	**1,50**
	≥ 15,0 / 12,0	**2,00**	**2,00**
	≥ 20,0 / 16,0	**2,50**	**2,50**
	≥ 25,0 / 20,0	**3,00**	**3,00**
Calcium silicate hollow brick KSL; ρ ≥ 1,4 as per EN 771-1 *e.g. KS Wemding, DE*  3 DF (240x175x113) Hammer drilling	≥ 7,5 / 6,0	**0,40**	**0,40**
	≥ 10,0 / 8,0	**0,60**	**0,50**
	≥ 12,5 / 10,0	**0,75**	**0,60**
	≥ 15,0 / 12,0	**0,90**	**0,75**
	≥ 20,0 / 16,0	**1,20**	**0,90**
	≥ 20,2 / -	**1,20**	**1,20**
Partial safety factor	γ_{Mm}[2)] [-]	**2,50**	

1) The compressive strength of the single brick must not be less than 80% of the mean compressive strength.
2) In absence of other national regulations.

Table C12.1: Characteristic resistance F_{Rk} in [kN] for use in hollow or perforated masonry – base material group "c"

Base material [*Supplier Title, country*] Geometry, DF or nom. Size (L x W x H) [mm] and drilling method	Mean compressive strength as per EN 771 / Minimum compressive strength single brick[1)] [N/mm²]	Characteristic resistance F_{Rk} [kN]	
		Temperature range 30/50 °C	Temperature range 50/80 °C
		h_{nom} [mm] = 80	
Hollow brick lightweight concrete Hbl; ρ ≥ 0,7 as per EN 771-3 *e.g. Knobel, DE*  16 DF (495x240x248) Rotary drilling	≥ 2,5 / 2,0	**1,20**	**0,90**
	≥ 5,0 / 4,0	**2,00**	**2,00**
	≥ 5,4 / 2,0	**2,50**	**2,00**
Hollow brick lightweight concrete Hbl; ρ ≥ 1,0 as per EN 771-3 *e.g. Indelasa, ES*  500x200x200 Rotary drilling	≥ 2,5 / 2,0	**0,30**	**0,30**
	≥ 5,0 / 4,0	**0,60**	**0,60**
Hollow brick lightweight concrete Hbl; ρ ≥ 0,9 as per EN 771-3 *e.g. Knobel, DE*  500x240x240 Rotary drilling	≥ 2,5 / 2,0	**0,90**	**0,90**
	≥ 5,0 / 4,0	**2,00**	**1,50**
Partial safety factor	γ_{Mm}[2)] [-]	**2,50**	

[1)] The compressive strength of the single brick must not be less than 80% of the mean compressive strength.
[2)] In absence of other national regulations.

fischer HybridPower

Performances
Characteristic resistance for use in hollow or perforated bricks

Annex C12
Appendix 24 / 27

Table C13.1: Characteristic resistance F_{Rk} in [kN] for use in unreinforced autoclaved aerated concrete – base material group "d"

Base material [*Supplier Title, country*] Geometry, DF or nom. Size (L x W x H) [mm] and drilling method	Mean compressive strength as per EN 771-4 $f_{cm,decl}$ / Minimum compressive strength single brick[1] [N/mm²]	Characteristic resistance F_{Rk} [kN] Temperature range 30/50 °C and 50/80 °C
		h_{nom} [mm] ≥ 80
Unreinforced autoclaved aerated concrete, AAC as per EN 771-4 e.g. (500x120x300)[2] e.g. (500x250x300)[2] Hammer drilling	≥ 2,90 / 2,32	**0,50**
	≥ 3,75 / 3,00	**0,90**
	≥ 4,00 / 3,20	**0,90**
	≥ 5,00 / 4,0	**1,20**
	≥ 6,00 / 4,80	**1,50**
	≥ 7,50 / 6,00	**2,00**
Partial safety factor	γ_{MAAC}[3] [-]	**2,00**

1) The compressive strength of the single brick must not be less than 80% of the mean compressive strength.
2) For $f_{cm,decl}$ > 3 N/mm²: h_{min} = 175 mm.
3) In absence of other national regulations.

Table C13.2: Characteristic resistance F_{Rk} in [kN] for use in reinforced autoclaved aerated concrete – base material group "d"

Base material [*Supplier Title, country*] minimum member thickness h_{min} and drilling method	Compressive strength f_{ck} (compressive strength class) as per EN 12602 [N/mm²]	Characteristic resistance F_{Rk} [kN] Temperature range 30/50 °C and 50/80 °C
		h_{nom} [mm] ≥ 80
Reinforced autoclaved aerated concrete, AAC as per EN 12602 h_{min} = 115 mm[1] Hammer drilling	≥ 2,0 (AAC2)	**0,40**
	≥ 2,5 (AAC2,5)	**0,60**
	≥ 3,0 (AAC3)	**0,75**
	≥ 3,5 (AAC3,5)	**0,90**
	≥ 4,0 (AAC4)	**1,20**
	≥ 4,5 (AAC4,5)	**1,50**
	≥ 5,0 (AAC5)	**1,50**
	≥ 6,0 (AAC6)	**2,00**
Partial safety factor	γ_{MAAC}[2] [-]	**2,00**

1) For > AAC3: h_{min} = 175 mm.
2) In absence of other national regulations.

Figure C14.1: Characteristic fire resistance under inclined loading, load direction α, in concrete – base material group "a" and solid brick masonry – base material group "b"

The characteristic fire resistance for each fire resistance class shall be interpolated for load direction α between 45° and 90° according to following equation:

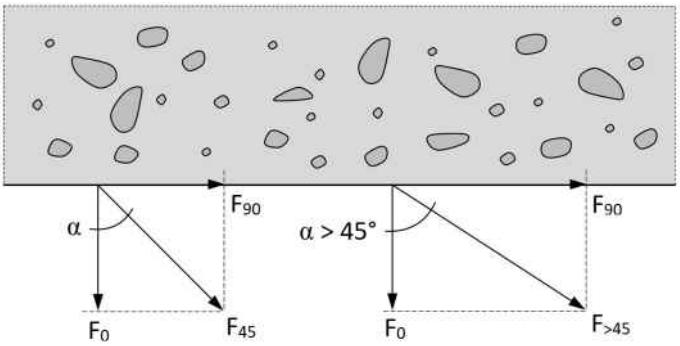


Figure not to scale

Equation C14.1:

$$F_{Rk,fi}\ (\alpha) = \frac{0{,}71 \cdot F_{Rk,fi(45°)}}{\cos\alpha} \leq F_{Rk,fi(90°)}$$

Table C14.1: Characteristic fire resistance in concrete – base material group "a"

Anchor type			HybridPower, HybridPower A2, HybridPower A4, HybridPower R			
			R30	R60	R90	R120
Embedment depth	h_{nom} ≥	[mm]	80			
Characteristic fire resistance under inclined loading for selected load directions α						
Characteristic resistance under 45°	$F_{Rk,fi(45°)}$	[kN]	1,58	1,10	0,62	0,37
Characteristic resistance under 60°	$F_{Rk,fi(60°)}$	[kN]	1,99	1,54	0,88	0,53
Characteristic resistance under 75°	$F_{Rk,fi(75°)}$	[kN]	1,99	1,54	1,02	0,76
Partial factor	$\gamma_{Mm,fi}$ [1)]	[-]	1,00			
Characteristic fire resistance for shear load without lever arm						
Characteristic shear resistance	$F_{Rk,fi(90°)}$	[kN]	1,99	1,54	1,02	0,76
Partial factor	$\gamma_{Mm,fi}$ [1)]	[-]	1,00			
Characteristic fire resistance for shear load with lever arm						
Characteristic bending resistance	$M_{Rk,s,fi}$	[Nm]	0,47	0,37	0,26	0,21
Partial factor	$\gamma_{Mm,fi}$ [1)]	[-]	1,00			
Minimum edge distances under fire exposure	$c_{min,fi}$	[mm]	2 x h_{nom}			
Minimum spacing under fire exposure	$s_{min,fi}$	[mm]	4 x h_{nom}			

[1)] In absence of other national regulations.

Table C14.2: Values under fire exposure in concrete C20/25 to C50/60 in load direction α (no permanent centric tension load, only for shear load without lever arm) Fastening of façade systems

Anchor type	Fire resistance class	Load direction α	$F_{Rk,fi,90}$	$\gamma_{M,fi}$ [1)]
HybridPower, HybridPower A2, HybridPower A4, HybridPower R	R90	≥ 57°	**0,8 kN**	**1,00**

[1)] In absence of other national regulations.

Table C15.1: Characteristic fire resistance in solid brick masonry – base material group "b"

Anchor type				**HybridPower, HybridPower A2, HybridPower A4, HybridPower R**			
Base material; bulk density [kg/dm³] / mean compressive strength as per EN 771 [N/mm²] [*Supplier Title, country*] Geometry, DF or nominal size (L x W x H) [mm] drilling method				**R30**	**R60**	**R90**	**R120**
Embedment depth		h_{nom} ≥	[mm]	**80**			
Characteristic fire resistance under inclined loading for selected load directions α							
Calcium silicate solid brick KS; ρ ≥ 2,0 / 25 as per EN 771-2 *e.g. KS Wemding, DE;* NF (≥ 240x115x71) Hammer drilling		Characteristic resistance under 45° $F_{Rk,fi(45°)}$	[kN]	**0,62**	**0,62**	**0,62**	**0,37**
		Characteristic resistance under 60° $F_{Rk,fi(60°)}$	[kN]	**0,88**	**0,88**	**0,88**	**0,53**
		Characteristic resistance under 75° $F_{Rk,fi(75°)}$	[kN]	**1,54**	**1,54**	**1,02**	**0,76**
		Characteristic shear load **fire resistance without lever arm** $F_{Rk,fi(90°)}$	[kN]	**1,54**	**1,54**	**1,02**	**0,76**
Partial factor		$\gamma_{Mm,fi}$ [1)]	[-]	**1,00**			
Characteristic fire resistance under inclined loading for selected load directions α							
Calcium silicate solid brick KS; ρ ≥ 2,0 / 15 as per EN 771-2 *e.g. KS Wemding, DE;* 2 DF (≥ 240x115x113) Hammer drilling	**Lightweight solid brick Vbl; ρ ≥ 1,2 / 5** as per EN 771-3 *e.g. Vbl KLB, DE;* 2 DF (≥ 240x115x113) Rotary drilling	Characteristic resistance under 45° $F_{Rk,fi(45°)}$	[kN]	**1,10**	**1,10**	**0,62**	**0,37**
		Characteristic resistance under 60° $F_{Rk,fi(60°)}$	[kN]	**1,02**	**1,02**	**0,88**	**0,53**
		Characteristic resistance under 75° $F_{Rk,fi(75°)}$	[kN]	**1,02**	**1,02**	**1,02**	**0,76**
		Characteristic shear load **fire resistance without lever arm** $F_{Rk,fi(90°)}$	[kN]	**1,02**	**1,02**	**1,02**	**0,76**
Partial factor		$\gamma_{Mm,fi}$ [1)]	[-]	**1,00**			
Characteristic fire resistance for shear load with lever arm, valid for all above mentioned base materials							
Characteristic bending resistance		$M_{Rk,s,fi}$	[Nm]	**0,47**	**0,37**	**0,26**	**0,21**
Partial factor		$\gamma_{Mm,fi}$ [1)]	[-]	**1,00**			
Minimum edge distances under fire exposure		$c_{min,fi}$	[mm]	**2 x h_{nom}**			
Minimum spacing under fire exposure		$s_{min,fi}$	[mm]	**4 x h_{nom}**			

[1)] In absence of other national regulations.