Deutsches Institut für Bautechnik

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Bautechnisches Prüfamt

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European Technical Assessment ETA-22/0186 of 21 February 2024

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	fischer frame fixing DuoXpand 10: seismic action
Product family to which the construction product belongs	Plastic anchors for fixing facade claddings through angle brackets in masonry and concrete under seismic action
Manufacturer	fischerwerke GmbH & Co. KG Klaus-Fischer-Straße 1 72178 Waldachtal DEUTSCHLAND
Manufacturing plant	fischerwerke
This European Technical Assessment contains	14 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 331151-00-0604, Edition: 03/2022

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Specific part

1 Technical description of the product

The fischer frame fixing DuoXpand 10 is a plastic anchor consisting of a plastic sleeve made of polyamide and polyoxymethylene and an accompanying specific screw of galvanised steel, of galvanised steel with an additional organic layer or of stainless steel.

The plastic sleeve is expanded by screwing in the specific screw which presses the sleeve against 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

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 verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchors of at least 25 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, 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 Mechanical resistance and stability (BWR 1)

Essential characteristic	**Performance**
Characteristic seismic resistance to tension loading in **concrete**	No performance assessed
Displacement in tension for serviceability limit state	see Annex C 2
Characteristic seismic resistance to shear loading in **concrete**	No performance assessed
Displacement in shear for serviceability limit state	see Annex C 2
Characteristic seismic resistance in any load direction without lever arm for **masonry**	see Annex C 3

3.2 Safety in case of fire (BWR 2)

Essential characteristic	**Performance**
Reaction to fire	Class A1

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

In accordance with European Assessment Document EAD 331151-00-0604 the applicable European legal act is: 97/463/EC.

The system to be applied 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 with Deutsches Institut für Bautechnik.

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

- EOTA European Assessment Document EAD 331151-00-0604, March 2022: Plastic anchors for fixing façade claddings through angle brackets in masonry and concrete under seismic action
- EOTA Technical Report TR 080, 2022-07: Design of plastic anchors for fixing façade claddings through angle brackets in masonry and concrete under seismic action
- EN 771-1:2011+A1:2015: Specification for masonry units – Part 1: Clay masonry units
- EN 771-3:2011+A1:2015: Specification for masonry units – Part 3: Aggregate concrete masonry units (dense and lightweight aggregates)
- EN 998-2:2017: Specification for mortar for masonry - Part 2: Masonry mortar
- EN 1993-1-4:2006 + A1:2015: Eurocode 3: Design of steel structures - Part 1-4: General rules - Supplementary rules for stainless steels
- EN ISO 4042:2018: Fasteners – Electroplated coating systems

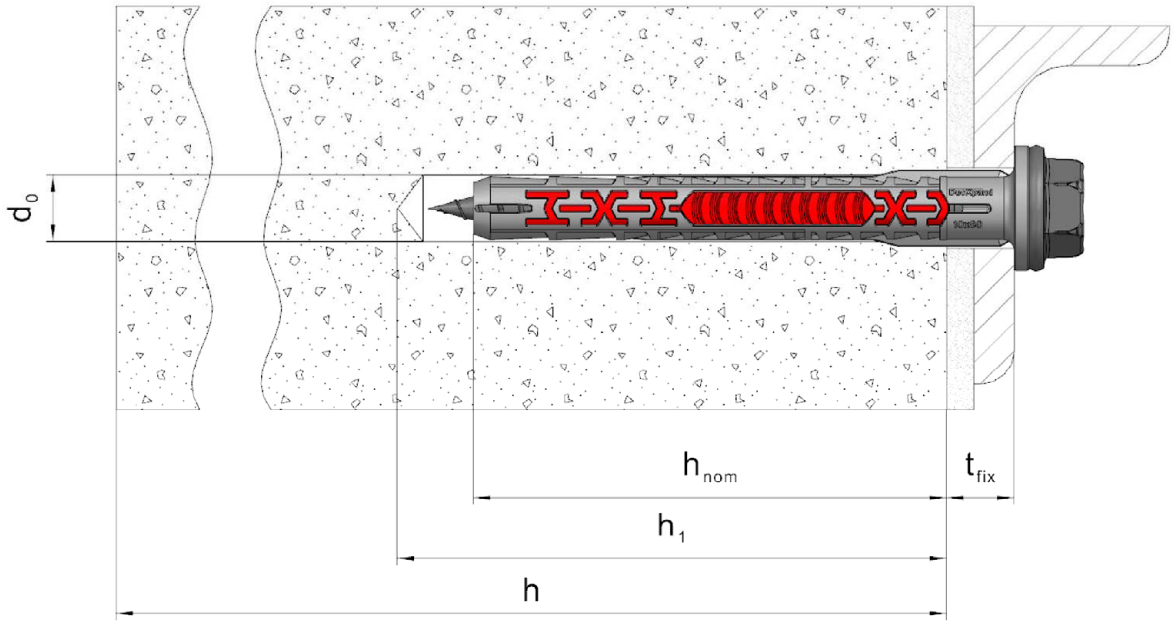
Issued in Berlin on 21 February 2024 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Ziegler

Deutsches Institut für Bautechnik DIBt

Installed anchor DuoXpand 10



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

Figure not to scale

fischer frame fixing DuoXpand 10: seismic action	**Annex A 1**
Product description Installed anchor	

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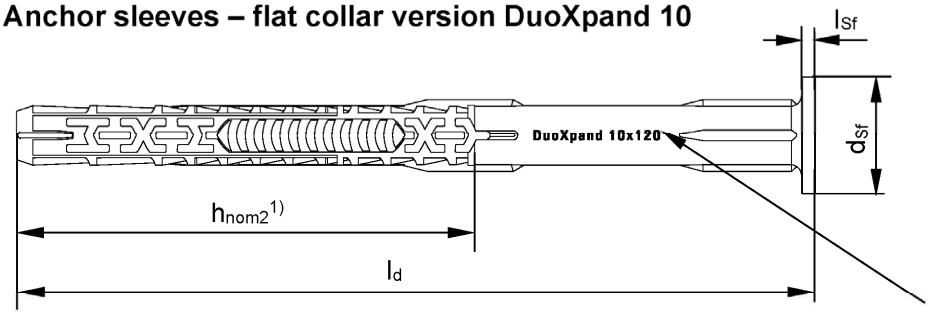
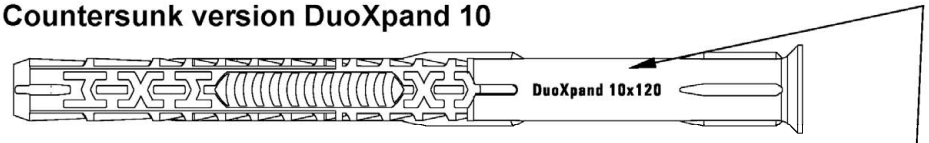
Anchor sleeves – flat collar version DuoXpand 10

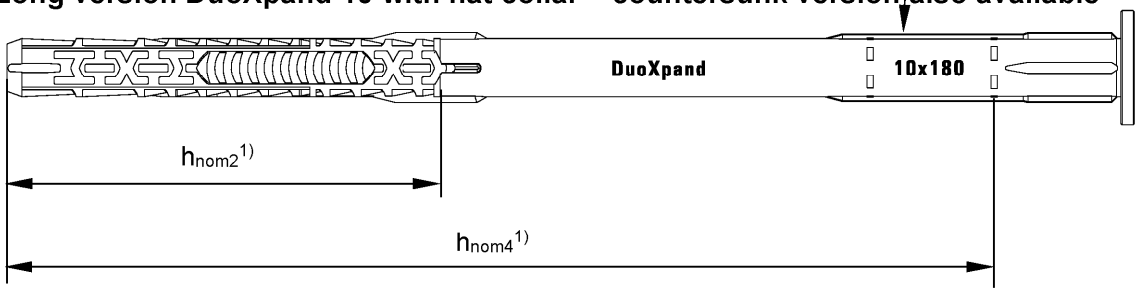


Marking:
Brand
Anchor type
Size
e.g. DuoXpand 10x120
e.g. DuoXpand 10x180

Countersunk version DuoXpand 10



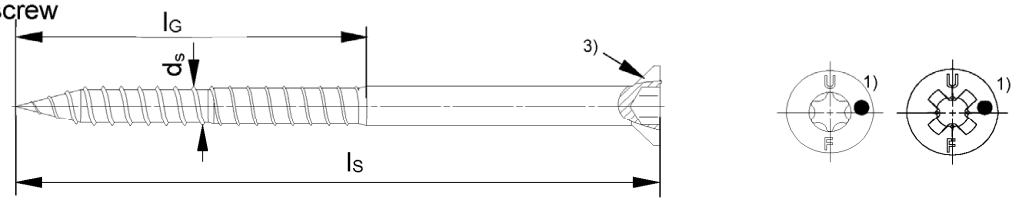
Long version DuoXpand 10 with flat collar – countersunk version also available



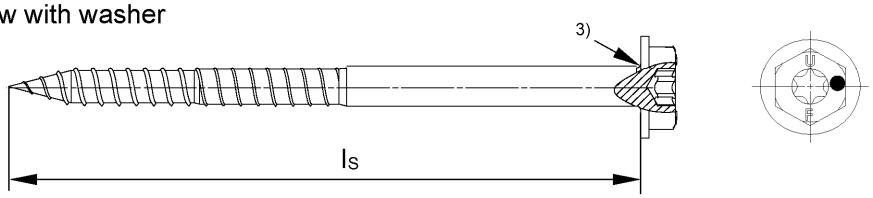
1) Embedment depths h_{nom1} and h_{nom3} from ETA-21/0324 are not relevant for this ETA.

Special screws

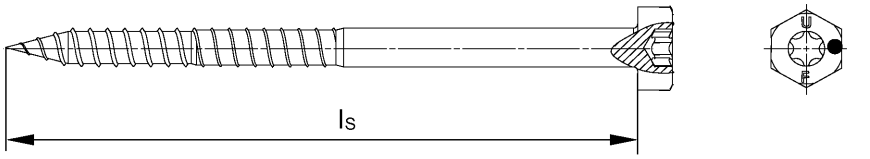
Countersunk screw



Hexagonal screw with washer



Hexagonal screw



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

Figures not to scale

fischer frame fixing DuoXpand 10: seismic action	**Annex A 2**
Product description Anchor type, special screws Marking and dimensions	

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Table A3.1: Dimensions

Anchor type	Anchor sleeve							Special screw		
	$h_{nom2/4}$ [mm]	d_{nom} [mm]	t_{fix} [mm]	min. l_d [mm]	max. l_d [mm]	l_{Sf} [1)] [mm]	d_{Sf} [1)] [mm]	d_s [mm]	l_G [mm]	l_s [mm]
DuoXpand 10	70	10	≤ 30	80	100	2,2	18,5	7,0	77	$l_d + d_s$
	160 [2)]	10	≤ 40	180	200	2,2	18,5	7,0	77	$l_d + d_s$

1) Only valid for flat collar version.
2) For base material Sepa Parpaing (see Annex C 3), additional h_{nom} available at $l_d \geq 180$ mm.

Table A3.2: Materials

Name	Material
Anchor sleeve	- Polyamide, PA6, colour grey - Polyoxymethylene, POM, colour red
Special screw	- Galvanised steel gvz with Zn5/Ag or Zn5/An in accordance with EN ISO 4042 **or** - 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, respectively) in three layers (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

fischer frame fixing DuoXpand 10: seismic action

Product description
Dimensions and materials

Annex A 3

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Specifications of intended use

Anchorages subject to:

- Redundant non-structural systems.
- Use as statically indeterminate fixing with more than two supports under static or seismic loading for the anchorage of façade claddings through angle brackets. Examples of arrangements for brackets to base material connection see Figure B1.1 and B1.2.
- The anchors subjected to seismic actions are intended to be in tension, shear or combined tension and shear load but not to bending.
- Fasteners used to connect angle brackets with bending stiffness in the range (0,03 / 0,10) kN/mm and for claddings subjected to a maximum in plane acceleration equal to 16,5 m/s^2.

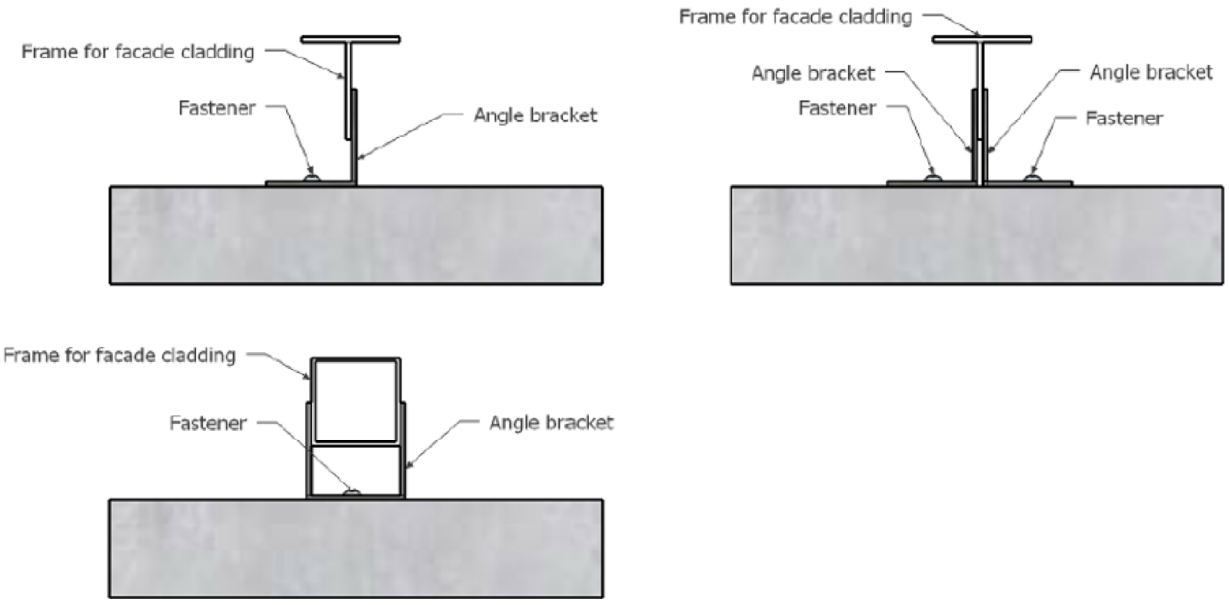

Figure B1.1: Examples of façade cladding to masonry connections

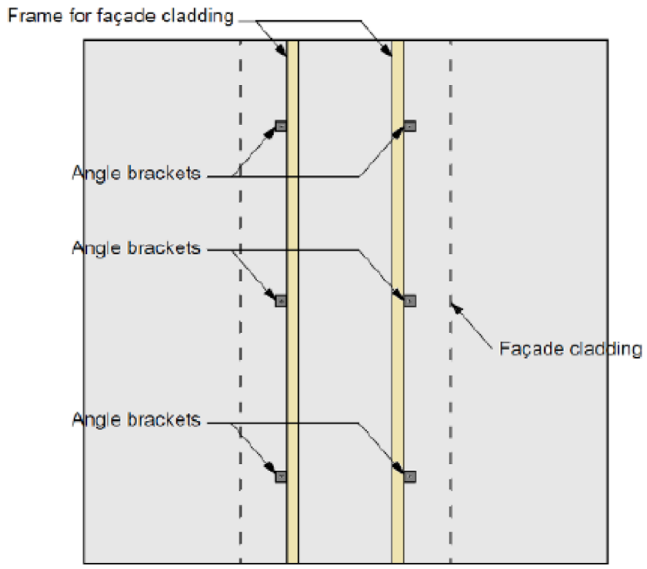

Figure B1.2: Example of statically indeterminate fixing for the anchorage of façade claddings

Figures not to scale

fischer frame fixing DuoXpand 10: seismic action	**Annex B 1**
Intended use Specifications	

Base materials:
- Hollow brick masonry (base material group “c”), as per EN 771-1 or EN 771-3, see Annex C 1 and C 3.
- Mortar strength class of the masonry ≥ M2,5 in accordance with EN 998-2.

Temperature Range:
- c: - 40 °C to 50 °C (max. short term temperature + 50 °C and max long term temperature + 30 °C)
- b: - 40 °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 080 under the responsibility of an engineer experienced in anchorages and masonry work.
- The plastic anchors shall be previously assessed according to EAD 330284-00-0604 for the selected bricks.
- The behaviour of anchors in regions of masonry structures, where cracks are expected (e.g. along the diagonals of shear walls) is not covered in this ETA. If the considered design situation accounts for cracking in masonry prior to member failure, anchors shall be placed outside of these regions.
- 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 Annexes C 3 for base material group “c”.
- 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 unprotected anchor ≤ 6 weeks.
- No ingress of water in the borehole at temperatures < 0°C.

fischer frame fixing DuoXpand 10: seismic action	**Annex B 2**
Intended use Specifications	

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Table B3.1: Installation parameters

Anchor type				DuoXpand 10
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_{nom2}		[mm]	70
	h_{nom4} [1)]		[mm]	160
Depth of drill hole to deepest point	$h_{1,2}$	≥	[mm]	80
	$h_{1,4}$ [1)]	≥	[mm]	170
Diameter of clearance hole in the fixture	d_f	≤	[mm]	10,50

1) Only valid for Sepa Parpaing (see Annex C 3) at anchor length l_d ≥ 180 mm.

Table B3.2: Minimum thickness of member, edge distances and spacing in hollow or perforated masonry – base material group "c"

Anchor Type			DuoXpand 10
Minimum thickness of member[1)]	h_{min}	[mm]	120
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 C 1.

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

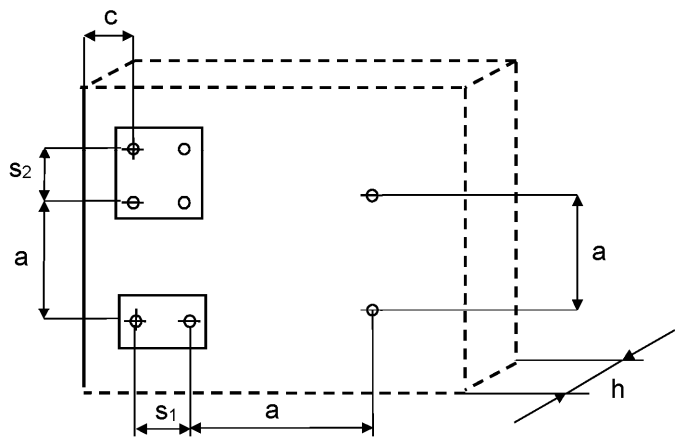

Figure not to scale

fischer frame fixing DuoXpand 10: seismic action

Annex B 3

Intended use
Installation parameters; minimum thickness of member, edge distances and spacing for use in hollow or perforated masonry

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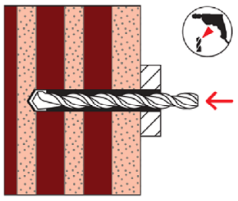
Installation instructions

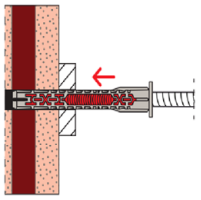
The following pictures show fixing through the angle bracket in hollow brick – Summary of all kind of masonry bricks see Annex C 1.

Hollow or perforated bricks

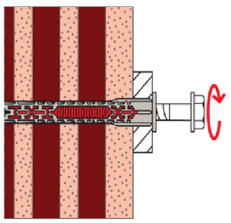


1. Drill the bore hole as per Table B3.1 using the drilling method described in the corresponding Annex C 3.

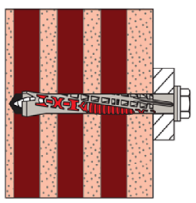
2. For use in base material group “c“ hollow or perforated bricks, removal of bore dust is not necessary.



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.

fischer frame fixing DuoXpand 10: seismic action

Intended use
Installation instructions

Annex B 4

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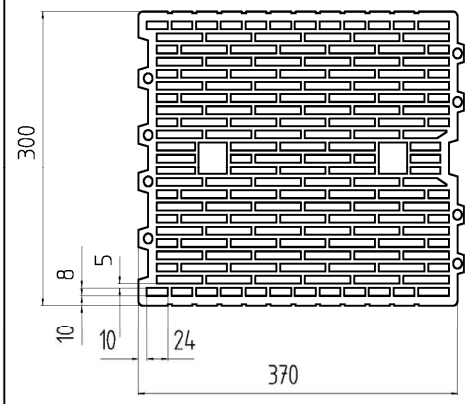
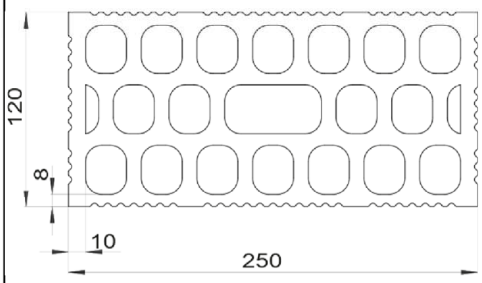
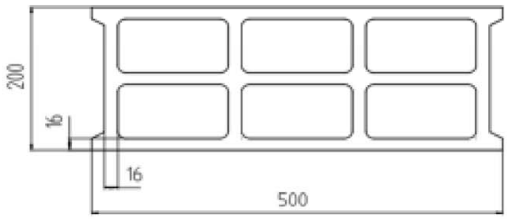
Table C1.1: Summary of hollow or perforated bricks – base material group "c"[1)]

Base material	Format/ Dimensions (L x W x H) [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 Porotherm 30 R, FR*	370x300x250		≥ 7,75 ρ ≥ 0,70	C 3
Perforated clay brick HLz, as per EN 771-1, *e.g. Doppio Uni IT Wienerberger, IT*	250x120x190		≥ 19,73 ρ ≥ 0,90	C 3
Hollow brick lightweight concrete Hbl, as per EN 771-3, *e.g. Sepa Parpaing, FR*	500x200x200		≥ 4,92 ρ ≥ 1,00	C 3

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

Figures not to scale

fischer frame fixing DuoXpand 10: seismic action	**Annex C 1**
Performances Summary of base materials hollow or perforated bricks	

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Table C2.1: Displacements[1] under tension and shear loading for serviceability limit state in hollow or perforated bricks

Displacements under		DuoXpand 10		
		Tension load	Shear load	
Base material	h_{nom} [mm]	$\delta_{sf,N,DLS}$ [mm]	$\delta_{sf,V,DLS,+}$ [mm]	$\delta_{sf,V,DLS,-}$ [mm]
Perforated clay brick HLz, as per EN 771-1, *e.g. Wienerberger Porotherm 30 R, FR*	**70**	**0,184**	**1,011**	**-6,176**
Perforated clay brick HLz, as per EN 771-1, *e.g. Doppio Uni IT Wienerberger, IT*	**70**	**0,155**	**1,100**	**-2,994**
Hollow brick lightweight concrete Hbl, as per EN 771-3, *e.g. Sepa Parpaing, FR*	**70**	**0,354**	**-0,315**	**-0,686**
	160[2]	**0,489**	[3]	[3]

1) Valid for all ranges of temperatures.
2) Only valid for Sepa Parpaing (see Annex C 3) at anchor length $l_d \geq 180$ mm.
3) No performance assessed.

fischer frame fixing DuoXpand 10: seismic action

Performances
Displacements for serviceability limit state in hollow or perforated bricks

Annex C 2

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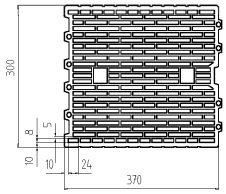
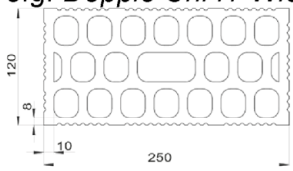
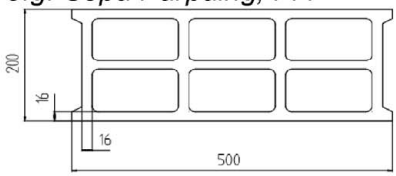
Table C3.1: Characteristic resistance $F_{Rk,sf}$ in [kN] including seismic for use in hollow or perforated masonry - base material group "c"

Base material; bulk density [kg/dm³] [*Supplier Title, country*] Geometry, DF or nominal size (L x W x H) [mm] and drilling method	Mean compressive strength as per EN 771 [N/mm²]	Characteristic resistance $F_{Rk,sf}$[1] [kN] Temperature range 30/50 °C and 50/80 °C	
		DuoXpand 10	
		h_{nom} [mm]	
		70	160
Perforated clay brick HLz; ρ ≥ 0,7 as per EN 771-1 *e.g. Wienerberger Porotherm 30 R, FR*  370x300x250 Rotary drilling	7,75	**0,22**	[2]
Perforated clay brick HLz; ρ ≥ 0,9 as per EN 771-1 *e.g. Doppio Uni IT Wienerberger, IT*  250x120x190 Rotary drilling	19,73	**0,33**	[2]
Hollow brick lightweight concrete Hbl; ρ ≥ 1,0 as per EN 771-3 *e.g. Sepa Parpaing, FR*  500x200x200 Rotary drilling	4,92	**0,20**	**0,39**[4]
Partial factor	γ_{Mm}[3] [-]	**2,5**	

1) Including k_{alea} = 1,5: coefficient taking into account of uncertainties in the load distribution.
2) No performance assessed.
3) In absence of other national regulations.
4) Only valid for tension loading $N_{Rk,sf}$, not valid for $F_{Rk,sf}$.

fischer frame fixing DuoXpand 10: seismic action	**Annex C 3**
Performances Characteristic resistance including seismic for use in hollow or perforated masonry	