

DEKLARACJA WŁAŚCIWOŚCI UŻYTKOWYCH

DoP 0416

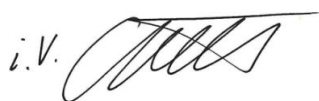
dla fischer HybridPower (Kotwy metalowe do stosowania w betonie)

PL

1. Niepowtarzalny kod identyfikacyjny typu wyrobu: **DoP 0416**
2. Zamierzone zastosowanie: **Mocowanie w betonie niezarysowanym., zobacz załącznik, w szczególności aneksy B1 - B3.**
3. Producent: **fischerwerke GmbH & Co. KG, Klaus-Fischer-Str. 1, 72178 Waldachtal, Niemcy**
4. Upoważniony przedstawiciel: **–**
5. System(-y) oceny i weryfikacji stałości właściwości użytkowych: **1**
6. Europejski dokument oceny: **EAD 330232-02-0601**
Europejska ocena techniczna: **ETA-26/0167; 2026-06-23**
Jednostka ds. oceny technicznej: **ETA-Danmark A/S**
Jednostka lub jednostki notyfikowane: **2873 TU Darmstadt**
7. Deklarowane właściwości użytkowe:
Wytrzymałość mechaniczna i stabilność osadzenia (BWR 1)
Nośność charakterystyczna na wrywanie (nośności statyczne i quasi-statyczne) Metoda A:
1 Nośność do uszkodzenia stali: Aneksy C1
2 Nośność na wrywanie: Aneksy C1
3 Nośność do wyrwania stożka betonu: Aneksy C2
4 Solidność: Aneksy C1
5 Minimalne odstępki osiowe i krawędziowe: Aneksy B2
6 Odległość od krawędzi zapobiegająca pękaniu pod obciążeniem: Aneksy C2
Nośność charakterystyczna na ścinanie (nośności statyczne i quasi-statyczne):
7 Nośność do uszkodzenia stali (obciążenie ścinające): Aneksy C3
8 Nośność do uszkodzenia wyważenia: Aneksy C3
Charakterystyczna wytrzymałość dla uproszczonego projektu:
9 Metoda B: NPD
10 Metoda C: NPD
Przesunięcia:
11 Przemieszczenia przy obciążeniu statycznym i quasi-statycznym: Aneksy C5
Sztywność:
12 Sztywność w zakresie sprężystym pod obciążeniem rozciągającym: NPD
13 Charakterystyki sztywności dla obciążenia rozciągającego dla nieliniowych modeli sprężynowych: NPD
Charakterystyczna wytrzymałość dla kategorii wydajności sejsmicznej C1:
14 Nośność na wrywanie: NPD
15 Nośność na ścinanie, Współczynnik szczeliny pierścieniowej: NPD
Nośność charakterystyczna i przemieszczenia w warunkach sejsmicznych dla kategorii C2:
16 Nośność na wrywanie: NPD
17 Nośność na ścinanie, Współczynnik szczeliny pierścieniowej: NPD
Ochrona przeciwpożarowa (BWR 2)
18 Reakcja na ogień: Klasy (A1)
Odporność na działanie ognia:
19 Odporność ogniowa do zniszczenia stali (obciążenie rozciągające): Aneksy C4
20 Odporność ogniowa na wrywanie (obciążenie rozciągające): Aneksy C4
21 Odporność ogniowa na zniszczenie stali (obciążenie ścinające): Aneksy C4
Trwałość:
22 Trwałość: Aneksy B1
8. Odpowiednia dokumentacja techniczna lub specjalna dokumentacja techniczna: **–**

Właściwości użytkowe określonego powyżej wyrobu są zgodne z zestawem deklarowanych właściwości użytkowych. Niniejsza deklaracja właściwości użytkowych wydana zostaje zgodnie z rozporządzeniem (UE) nr 305/2011 na wyłączną odpowiedzialność producenta określonego powyżej.

W imieniu producenta podpisał(-a):



Dr. Christian Weber, Kierownik Działu Rozwoju
Tumlingen, 2026-08-01



Dieter Pfaff, Kierownik Międzynarodowej Federacji Produkcji i Zarządzania Jakością

Niniejsza Deklaracja Właściwości Użytkowych została przygotowana w różnych językach. W razie wątpliwości w interpretacji, wersja angielska jest zawsze miarodajna. Załącznik zawiera dobrowolne i uzupełniające informacje w języku angielskim (neutralne językowo), a wykraczające poza wymagania prawne.

Translation guidance Essential Characteristics and Performance Parameters for Annexes

Wytyczne dotyczące tłumaczenia zasadniczych właściwości oraz parametrów użytkowych dla załączników

Mechanical resistance and stability (BWR 1)		
Wytrzymałość mechaniczna i stabilność osadzenia (BWR 1)		
Characteristic resistance under static and quasi-static loading, Method A		
Nośność charakterystyczna na wyrywanie (nośności statyczne i quasi-statyczne) Metoda A:		
1	Resistance to steel failure: Nośność do uszkodzenia stali:	$N_{Rk,s}$ [kN], E_s [N/mm ²]
2	Resistance to pull-out failure: Nośność na wyrywanie:	$N_{Rk,p}$ [kN], ψ_c
3	Resistance to concrete cone failure: Nośność do wyrwania stożka betonu:	$k_{cr,N}$, $k_{ucr,N}$ [-], h_{ef} , $c_{cr,N}$ [mm]
4	Robustness: Solidność:	γ_{inst} [-]
5	Minimum edge distance and spacing: Minimalne odstępki osiowe i krawędziowe:	c_{min} , s_{min} , h_{min} [mm]
6	Edge distance to prevent splitting under load: Odległość od krawędzi zapobiegająca pękaniu pod obciążeniem:	$N^0_{Rk,sp}$ [kN], $c_{cr,sp}$ [mm]
Characteristic resistance to shear load (static and quasi-static loading), Method A		
Nośność charakterystyczna na ścinanie (nośności statyczne i quasi-statyczne):		
7	Resistance to steel failure under shear load: Nośność do uszkodzenia stali (obciążenie ścinające):	$V^0_{Rk,s}$ [kN], $M^0_{Rk,s}$ [Nm], k_7 [-]
8	Resistance to pry-out failure: Nośność do uszkodzenia wyważenia:	k_8 [-]
Characteristic Resistance for simplified design:		
Charakterystyczna wytrzymałość dla uproszczonego projektu:		
9	Method B: Metoda B:	F^0_{Rk} [kN], $M^0_{Rk,s}$ [Nm] ψ_c [-], c_{cr} , s_{cr} , c_{min} , s_{min} , h_{min} [mm]
10	Method C: Metoda C:	F_{Rk} [kN], $M^0_{Rk,s}$ [Nm], c_{cr} , s_{cr} , h_{min} [mm]
Displacements		
Przesunięcia:		
11	Displacements under static and quasi-static loading: Przemieszczenia przy obciążeniu statycznym i quasi-statycznym:	δ_{N0} , $\delta_{N50years}$, $\delta_{N100years}$, δ_{V0} , $\delta_{V\infty}$ [mm]
12	Stiffness characteristics for tension loading for non-linear spring models: Sztywność:	$k_{1,cr}$, $k_{2,cr}$, $k_{3,cr}$, $k_{4,cr}$ [kN/mm]
12	Stiffness in the elastic range under tension loading Sztywność w zakresie sprężystym pod obciążeniem rozciągającym:	$k_{A,ucr}$, $k_{A,cr}$ [N/mm]
13	Stiffness characteristics for tension loading for non-linear spring models Charakterystyki sztywności dla obciążenia rozciągającego dla nieliniowych modeli	$k_{A,ucr}$, $k_{B,ucr}$, $k_{C,ucr}$, $k_{D,ucr}$ [N/mm] $k_{A,cr}$, $k_{B,cr}$, $k_{C,cr}$, $k_{D,cr}$ [N/mm]
Characteristic resistance for seismic performance category C1:		
Charakterystyczna wytrzymałość dla kategorii wydajności sejsmicznej C1:		
14	Resistance to tension load: Nośność na wyrywanie:	$N_{Rk,s,C1}$ [kN], $N_{Rk,p,C1}$ [kN]
15	Resistance to shear load:, Factor annular gap: Nośność na ścinanie:, Współczynnik szczeliny pierścieniowej:	$V_{Rk,s,C1}$ [kN]
Characteristic resistance and displacements for seismic performance categorie C2:		
Nośność charakterystyczna i przemieszczenia w warunkach sejsmicznych dla kategorii C2:		
16	Resistance to tension load, displacements: Nośność na wyrywanie:	$N_{Rk,s,C2}$ [kN], $N_{Rk,p,C2}$ [kN] $\delta_{N,C2(0,5)}$, $\delta_{N,C2(0,8)}$ [mm]
17	Resistance to shear load and displacements, factor annular gap: Nośność na ścinanie, Współczynnik szczeliny pierścieniowej:	$V_{Rk,s,C2}$ [kN], $\delta_{V,C2(0,5)}$, $\delta_{V,C2(0,8)}$ [mm]
Safety in case of fire (BWR 2)		
Ochrona przeciwpożarowa (BWR 2)		
18	Reaction to fire: Reakcja na ogień:	Class
Resistance to fire:		
Odporność na działanie ognia:		
19	Fire resistance to steel failure (tension load): Odporność ogniowa do zniszczenia stali (obciążenie rozciągające):	$N_{Rk,s,fi}$ [kN]
20	Fire resistance to pull-out failure (tension load): Odporność ogniowa na wyrywanie (obciążenie rozciągające):	$N_{Rk,p,fi}$ [kN]
21	Fire resistance to steel failure (shear load): Odporność ogniowa na zniszczenie stali (obciążenie ścinające):	$V_{Rk,s,fi}$ [kN], $M^0_{Rk,s,fi}$ [Nm]
Aspects of durability		
Trwałość:		
22	Durability: Trwałość:	Class

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 skeleton (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 both cracked and uncracked concrete of strength classes ranging from C20/25 to C50/60.

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
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3.1 Mechanical resistance and stability (BWR1)

Characteristic resistance to tension load (static and quasi-static loading) Method A

Resistance to steel failure under tension load	Annex C1
Resistance to pull-out failure	Annex C1
Resistance to concrete cone failure	Annex C2
Robustness	Annex C1
Minimum edge distance and spacing	Annex B2
Edge distance to prevent splitting under load	Annex C2

Characteristic resistance to shear load (static and quasi-static loading)

Resistance to steel failure under shear load	Annex C3
Resistance to pry-out failure	Annex C3

Characteristic resistance for simplified methods

Method B	Not relevant
Method C	Not relevant

Displacements

Displacements under static and quasi-static loading	Annex C5
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Stiffness

Stiffness in the elastic range under tension loading	No performance assessed
Stiffness characteristics for tension loading for non-linear spring models	No performance assessed

Characteristic resistance for seismic performance category C1

Resistance to tension load	No performance assessed
Resistance to shear load	No performance assessed

Characteristic resistance and displacements for seismic performance category C2

Resistance to tension load and displacements	No performance assessed
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Characteristic	Assessment of characteristic
Resistance to shear load and displacements	No performance assessed

3.2 Safety in case of fire (BWR2)

Reaction to fire	Class A1
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Resistance to fire

Fire resistance to steel failure under tension load	Annex C4
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Fire resistance to pull-out failure	Annex C4
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Fire resistance to steel failure under shear load	Annex C4
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3.3 Aspects of durability

Durability	Annex B1
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See additional information in section 3.9

3.9 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 (AVCP) (hereinafter AVCP) system applied, with reference to its legal base.

4.1 AVCP system

According to the decision 1996/582/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 1.

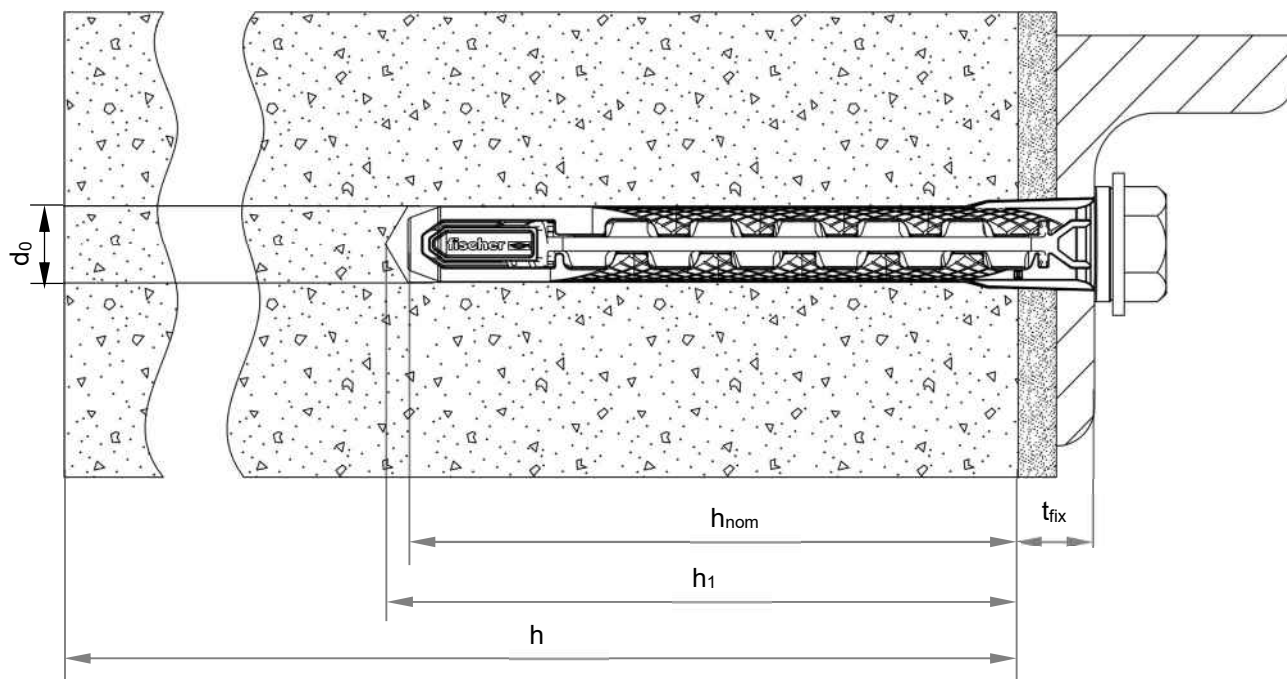
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

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 Assessment:

- EOTA European Assessment Document EAD 330232-02-0601: Mechanical fasteners for use in concrete
- EN 206:2013+A2:2021: Concrete – Specification, performance, production and conformity
- EN 1992-4:2019-04: Eurocode 2 - Design of concrete structures - Part 4: Design of fastenings for use in concrete; German version EN 1992-4:2018
- 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

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

Figure not to scale

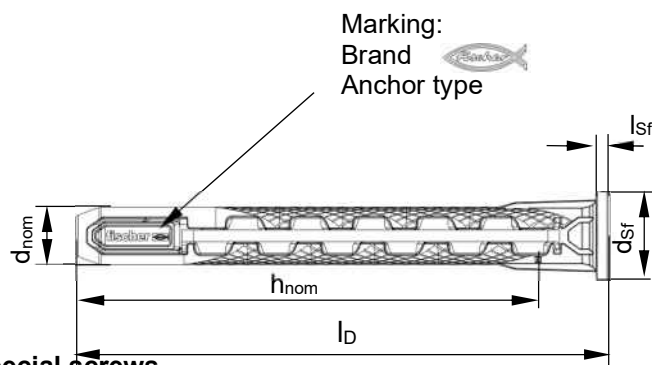
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Product description
Installed anchor

Annex A1

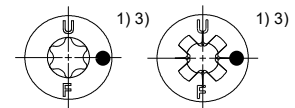
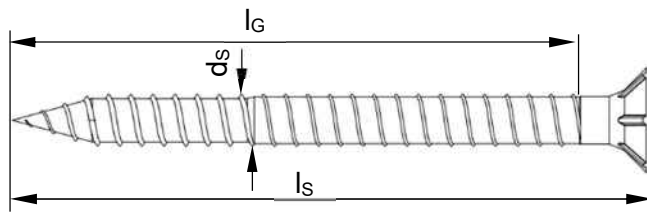
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Anchor sleeve – HybridPower

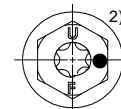
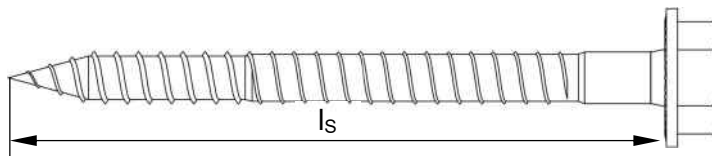


Special screws

Countersunk screw



Hexagonal screw with washer



- 1) Additional marking for the special screw, stainless steel version: e.g. "A4" or "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]	l_D [mm]	l_{sf} [mm]	d_{sf} [mm]	d_s [mm]	l_G [mm]	l_s [mm]
HybridPower FUS	80	10	90-230	2,5	15	7,0	77	l_D
HybridPower T	80	10	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
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 and special screws
Marking and dimensions

Annex A2

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Table A3.1: Materials

Name	Material
HybridPower anchor sleeve	- Polyamide, PA6, colour: red
HybridPower skeleton	- 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 $\geq 6 \mu\text{m}$) <u>or</u> - Stainless steel "A2" of corrosion resistance class CRC II in accordance with EN 1993-1-4 <u>or</u> - Stainless steel "A4" or "R" of corrosion resistance class CRC III in accordance with EN 1993-1-4

fischer HybridPower**Product description**
Materials**Annex A3**

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Specifications of intended use

Anchorage subject to:

- Static and quasi-static loads.
- Fire exposure.

Base materials:

- Reinforced or unreinforced compacted normal weight concrete without fibres (cracked or uncracked) in accordance with EN 206-1.
- Strength classes C20/25 to C50/60 in accordance with EN 206-1.

Use conditions (Environmental conditions):

- Temperature Range: - 20 °C to + 50 °C.
- Structures subject to dry internal conditions (HybridPower, HybridPower A2, HybridPower A4, HybridPower R).
- For all other conditions according to EN 1993-1-4 corresponding to corrosion resistance class (CRC):
 - for CRC II: for HybridPower A2
 - for CRC III: for HybridPower A4 or HybridPower R

Design:

- The structural design is conducted under responsibility of a designer experienced in the field of anchorages and concrete works.
- Verifiable calculation notes and drawings are to be prepared taking account of the loads to be anchored. The position of the fastener is indicated on the design drawings (e.g. position of the fastener relative to reinforcement or to supports, etc.).
- Design of fastenings according to EN 1992-4.

Installation:

- Fastener installation is to be carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on the site.
- Use of the fastener only as supplied by the manufacturer without exchanging the components of the fastener.
- Hammer drilling.
- Drill hole created perpendicular +/- 5° to concrete surface, positioning without damaging the reinforcement.
- In case of aborted hole: new drilling at a minimum distance twice the depth of the aborted drill hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not in the direction of load application.
- 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.

fischer HybridPower

Intended use
Specifications

Annex B1

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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⁾
Thickness of fixture and / or non-load bearing layer	t_{fix}	≥ [mm]	1

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

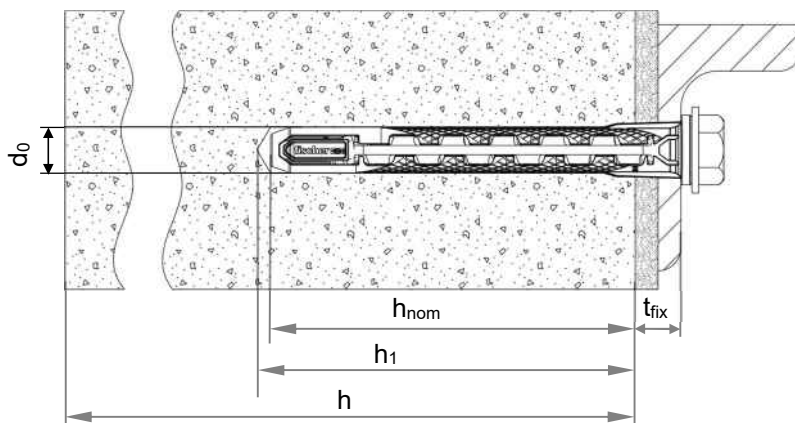


Table B2.2: Minimum thickness of concrete members, minimum edge distances and minimum spacing

Anchor type		HybridPower, HybridPower A2, HybridPower A4, HybridPower R
		10
Minimum edge distance and spacing		
Uncracked concrete	c_{min}	50
Cracked concrete		
Uncracked concrete	s_{min} [mm]	50
Cracked concrete		
Minimum thickness of concrete member	h_{min}	100

Figure not to scale

fischer HybridPower

Intended use

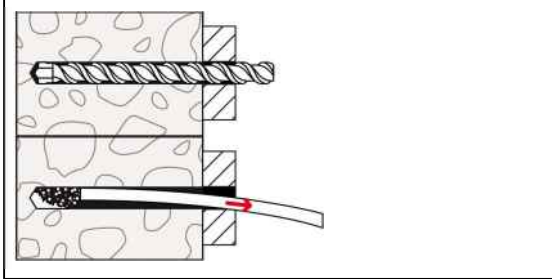
Installation parameters
Minimum thickness of member, edge distances and spacing

Annex B2

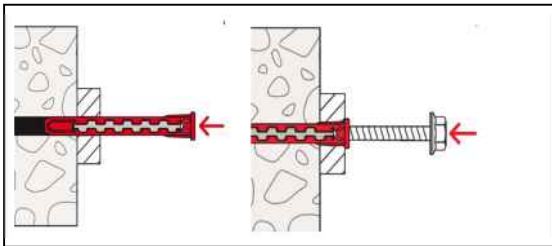
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Installation instructions

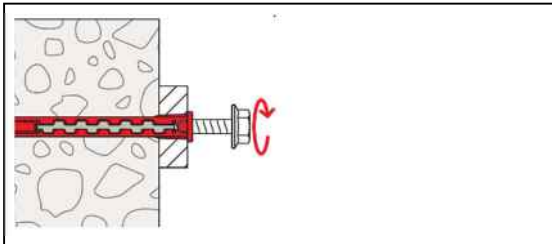
The following pictures show fixing through timber in concrete.



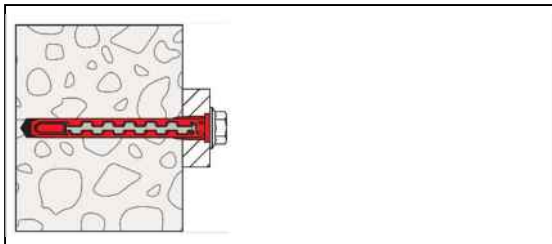
1. Drill the bore hole as per Table B2.1 using hammer drilling.
2. Remove dust from borehole.



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.

Figures not to scale

fischer HybridPower

Intended use
Installation instructions

Annex B3

Appendix 11 / 16

Table C1.1: Characteristic values of tension resistance under static and quasi-static action

Anchor type		HybridPower, HybridPower A2, HybridPower A4, HybridPower R	
		10	
Overall plastic anchor embedment depth in the base material	$h_{nom} \geq$ [mm]	80	
Steel failure			
Characteristic tension resistance	HybridPower	$N_{Rk,s}$ [kN]	21,70
	HybridPower A2		
	HybridPower A4		
	HybridPower R		
Partial factor for steel failure	HybridPower	$\gamma_{Ms}^{1)}$ [-]	1,55
	HybridPower A2		
	HybridPower A4		
	HybridPower R		
Pullout failure			
Characteristic resistance in cracked concrete C20/25	$N_{Rk,p,cr}$ [kN]	2,00 ²⁾	
Increasing factor ψ_c for cracked concrete $N_{Rk,p,cr} = \psi_c \times N_{Rk,p,cr}$ (C20/25)	C25/30	[-]	1,00
	C30/37		
	C35/45		
	C40/50		
	C45/55		
	C50/60		
Installation sensitivity factor for cracked concrete	$\gamma_{inst,cr}$ [-]	1,00	
Characteristic resistance in uncracked concrete C20/25	$N_{Rk,p,ucr}$ [kN]	10,50	
Increasing factor ψ_c for uncracked concrete $N_{Rk,p,ucr} = \psi_c \times N_{Rk,p,ucr}$ (C20/25)	C25/30	[-]	1,05
	C30/37		1,08
	C35/45		1,12
	C40/50		1,15
	C45/55		1,18
	C50/60		1,20
Installation sensitivity factor for uncracked concrete	$\gamma_{inst,ucr}$ [-]	1,00	

¹⁾ In absence of other national regulations.

²⁾ If it is ensured that the temperature during working life does not exceed + 30°C, the values may be increased by 1,08.

fischer HybridPower

Performances

Characteristic values of tension resistance under static and quasi-static action

Annex C1

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Table C2.1: Characteristic values of tension resistance under static and quasi-static action

Anchor type			HybridPower, HybridPower A2, HybridPower A4, HybridPower R
			10
Overall plastic anchor embedment depth in the base material			80
Concrete cone and splitting failure			
Effective embedment depth for calculation	cracked concrete	$h_{ef,cr} \geq$ [mm]	35
	uncracked concrete	$h_{ef,ucr} \geq$ [mm]	53
Factor for cracked concrete		$k_{cr,N}$	7,7
Factor for uncracked concrete		$k_{ucr,N}$	11,0
Characteristic spacing	cracked concrete	$s_{cr,N,cr}$	105
	unracked concrete	$s_{cr,N,ucr}$	159
Characteristic edge distance	cracked concrete	$c_{cr,N,cr}$	53
	unracked concrete	$c_{cr,N,ucr}$	80
Characteristic spacing for splitting failure	cracked concrete	$s_{cr,sp,cr}$	2 x $c_{cr,sp}$
	unracked concrete	$s_{cr,sp,ucr}$	
Characteristic edge distance for splitting failure	cracked concrete	$c_{cr,sp,cr}$	49
	unracked concrete	$c_{cr,sp,ucr}$	53
Characteristic resistance to splitting		$N_{Rk,sp}^0$ [kN]	$\min \{N_{Rk,c}^0; N_{Rk,p}\}^{1)}$

¹⁾ $N_{Rk,c}^0$ according to EN 1992-4.

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Characteristic values of tension resistance under static and quasi-static action

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Table C3.1: Characteristic values of shear resistance under static and quasi-static action

Anchor type		HybridPower, HybridPower A2, HybridPower A4, HybridPower R	
		10	
Steel failure without lever arm			
Characteristic resistance	HybridPower	$V_{Rk,s}^0$ [kN]	10,80
	HybridPower A2		
	HybridPower A4		
	HybridPower R		
Partial factor for steel failure		$\gamma_{Ms}^{1)}$	1,29
Factor for ductility	HybridPower	k_7 [-]	0,80
	HybridPower A2		
	HybridPower A4		1,00
	HybridPower R		
Steel failure with lever arm and Concrete pryout failure			
Characteristic bending resistance	HybridPower	$M_{Rk,s}^0$ [Nm]	20,60
	HybridPower A2		
	HybridPower A4		
	HybridPower R		
Factor for pryout failure		k_8	1,00
Partial factor for steel failure		$\gamma_{Ms}^{1)}$	1,25
Concrete edge failure			
Effective embedment depth for calculation in cracked concrete		$l_{f,cr}$	35
Effective embedment depth for calculation in uncracked concrete		$l_{f,ucr}$ [mm]	53
Nominal diameter of a fastener		d_{nom}	10

¹⁾ In absence of other national regulations.

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Characteristic values of shear resistance under static and quasi-static action

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Table C4.1: Characteristic values of tension and shear resistance under fire exposure				
Anchor type			HybridPower, HybridPower A2, HybridPower A4, HybridPower R	
			10	
Overall plastic anchor embedment depth in the base material	h_{nom}	$\geq$ [mm]	80	
Tension loading				
Characteristic resistance steel failure	$N_{Rk,s,fi}$	R30	0,45	
		R60	0,35	
		R90	0,25	
		R120	0,20	
Characteristic resistance Concrete cone failure	$N_{Rk,c,fi}$	R30 [kN]	1,20	
		- R90		
		R120	1,00	
Characteristic resistance pullout failure	$N_{Rk,p,fi}$	R30	0,45	
		R60	0,35	
		R90	0,25	
		R120	0,20	
Shear loading				
Characteristic resistance steel failure	$V_{Rk,s,fi}$	R30	2,00	
		R60	1,50	
		R90	1,00	
		R120	0,80	
Characteristic resistance pryout failure	$V_{Rk,cp,fi}$	R30 [kN]	1,20	
		- R90		
		R120	1,00	
Characteristic resistance concrete edge failure	$V_{Rk,c,fi}$	R30	5,60	
		- R90		
Characteristic resistance steel failure	$M^0_{Rk,s,fi}$	R120	4,50	
		R30 [Nm]	2,09	
		R60	1,62	
		R90	1,07	
		R120	0,80	

Table C4.2: Characteristic spacings and characteristic edge distances of fasteners under fire exposure for tension and shear load				
Anchor type			HybridPower, HybridPower A2, HybridPower A4, HybridPower R	
			10	
Spacing	$S_{cr,fi}$	[mm]	140	
Edge distance	$C_{cr,fi}$		70	
			for fire exposure from more than one side $c_{min} \geq 300$ mm.	

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Table C5.1: Displacements under static and quasi static tension loads

Anchor type	HybridPower, HybridPower A2, HybridPower A4, HybridPower R
	10
Displacement – factor for tensile load¹⁾	
δ_{N0} - factor in cracked concrete	0,20
$\delta_{N\infty}$ - factor [mm/kN]	0,30
δ_{N0} - factor in uncracked concrete	0,60
$\delta_{N\infty}$ - factor	1,10

1) Calculation of effective displacement:

$$\delta_{N0} = \delta_{N0} - \text{factor} \times N$$

$$\delta_{N\infty} = \delta_{N\infty} - \text{factor} \times N$$

N = Action tension loading

Table C5.2: Displacements under static and quasi static shear loads

Anchor type	HybridPower, HybridPower A2, HybridPower A4, HybridPower R
	10
Displacement – factor for shear load²⁾	
δ_{V0} - factor in cracked and uncracked concrete [mm/kN]	6,50
$\delta_{V\infty}$ - factor	9,80

2) Calculation of effective displacement:

$$\delta_{V0} = \delta_{V0} - \text{factor} \times V$$

$$\delta_{V\infty} = \delta_{V\infty} - \text{factor} \times V$$

V = Action shear loading

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Displacements under tension and shear loads

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