

General construction technique permit

Zulassungsstelle für Bauprodukte und Bauarten Bautechnisches Prüfamt

Eine vom Bund und den Ländern
gemeinsam getragene Anstalt des öffentlichen Rechts
Mitglied der EOTA, der UEAtc und der WFTAO

Date:

Reference:

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Number:

Z-21.8-2018

Applicant:

Hilti Deutschland AG
Hiltistraße 2
86916 Kaufering

Validity

from: **2 April 2019**

to: **2 April 2024**

Subject of decision:

Hilti screw anchor HUS3-H for temporary fastening in concrete

The subject named above is herewith granted a general construction technique permit (*allgemeine Bauartgenehmigung*). This decision contains five pages and five annexes. The subject was granted the first national technical approval on 1 April 2014.

Translation authorised by DIBt

DIBt

I GENERAL PROVISIONS

- 1 The general construction technique permit (*allgemeine Bauartgenehmigung*) confirms the fitness for application of the subject concerned within the meaning of the Building Codes of the federal states (*Landesbauordnungen*).
- 2 This decision does not replace the permits, approvals and certificates required by law for carrying out construction projects.
- 3 This decision is granted without prejudice to the rights of third parties, in particular private property rights.
- 4 Notwithstanding further provisions in the 'Special Provisions', copies of this decision shall be made available to the installer of the subject concerned. Furthermore, the installer of the subject concerned shall be made aware of the fact that this decision must be made available at the place of application. Upon request, copies of the decision shall be provided to the authorities involved.
- 5 This decision shall be reproduced in full only. Partial publication requires the consent of DIBt. Texts and drawings in promotional material shall not contradict this decision. In the event of a discrepancy between the German original and this authorised translation, the German version shall prevail.
- 6 This decision may be revoked. The provisions contained herein may subsequently be supplemented and amended, in particular if this is required by new technical findings.
- 7 This decision is based on the information and documents provided by the applicant on the subject concerned during the permit process. Alterations to the information on which this general construction technique permit was based are not covered by this decision and shall be notified to DIBt without delay.
- 8 The general construction technique permit included in this decision also serves as a national technical approval for the construction technique.

II SPECIAL PROVISIONS

1 Subject concerned and field of application

1.1 Subject concerned

The subject concerned is the Hilti screw anchor (concrete screw) HUS3-H (hereinafter referred to as anchor) in sizes $\varnothing 10$ and $\varnothing 14$ in accordance with European Technical Assessment ETA-13/1038. The Hilti screw anchor HUS3-H is a special screw with a hexagon head made of galvanised steel.

For anchoring, the anchor is screwed into a pre-drilled cylindrical hole. In the process, the special thread of the anchor cuts a thread into the base material. The anchoring is created by form-fit of the special thread in the concrete.

The installed anchor is shown in Annex 1.

1.2 Field of application

The anchor may be used for anchoring in reinforced and unreinforced normal weight concrete with a minimum strength class of C20/25 and a maximum strength class of C50/60 in accordance with DIN EN 206-1:2001-07 "Concrete – Part 1: Definition, properties, production and conformity". The anchor may be anchored and loaded before the required characteristic compressive strength of the concrete has been reached subject to verification in accordance with Section 2.3.1.

The anchor may only be applied for temporary fastening of construction site equipment, such as shoring props, fall protection devices and scaffolds. After it has been unscrewed, the anchor may be reused in other drill holes. However, a drilled hole shall not be reused after the anchor has been removed. Reusability of the anchor shall be checked prior to every use, both visually as well as with a sleeve setting jig in accordance with Section 2.3.3. Installed anchors shall be checked for visible damage (for example due to corrosion) on an ongoing basis and replaced if required.

The anchor may be used in cracked and uncracked concrete.

The anchor is intended for temporary use in internal and external conditions.

2 Provisions for planning, design and execution

2.1 Planning

The anchorages shall be planned in line with good engineering practice. Verifiable calculations and design drawings shall be prepared taking into account the loads to be anchored.

The design drawings shall contain the exact positions as well as size of the anchor.

2.2 Design

The verification of the immediate local transmission of the anchor loads into the concrete has been provided. The transfer of the loads to be anchored in the concrete member shall be verified.

Additional loads which may arise in the anchor, in the attachment part or in the member in which the anchor is anchored due to constraint (e.g. due to temperature fluctuations) shall be considered.

The minimum spacing and edge distances of the anchors and the minimum thicknesses of the member given in Annex 5 shall be respected.

It shall be verified that the design value for the action F_{Ed} does not exceed the design resistance F_{Rd} :

$$F_{Ed} \leq F_{Rd}$$

The design resistance values shall apply to all load directions irrespective of the failure mode. The resistances are listed in Annex 5 depending on the anchor size, the embedment depth and the concrete strength $f_{ck,cube}$.

2.3 Execution

2.3.1 General

The anchor shall be installed in accordance with the design drawings prepared in accordance with Section 2.1.

The anchor may be used in young concrete before the characteristic concrete compressive strength $f_{ck,cube}$ has been reached. However, a concrete compressive strength of $f_{c,cube} \geq 10 \text{ N/mm}^2$ must have been reached.

2.3.2 Drilling and cleaning of drilled hole

The drill hole shall be positioned taking into account the position of the reinforcement to ensure that the latter remains undamaged.

The hole shall be drilled perpendicular to the concrete surface using carbide masonry drill bits. The carbide masonry drill bit shall meet the specifications of the DIBt leaflet 'Characteristic values, requirements and tests for masonry drills with carbide drill bits used for drilling holes for anchoring' (*Kennwerte, Anforderungen und Prüfungen von Mauerbohrern mit Schneidkörpern aus Hartmetall, die zur Herstellung der Bohrlöcher von Dübelverankerungen verwendet werden*), January 2002. Compliance with the drill bit characteristic values shall be verified by means of a certification mark of the PMG Masonry Drill Bit Certification Board, Remscheid, Germany (see leaflet, Section 5).

The nominal diameter of the drill bit, cutting diameter and hole depth shall correspond to the values given in Annex 3. The drilling dust shall be removed from the drilled hole.

If a hole is drilled incorrectly, a new hole shall be drilled at a distance of at least twice the depth of the incorrect hole from the incorrect hole.

2.3.3 Anchor installation

The anchor is only intended for temporary application in a single drilled hole. After it has been removed, it may be reused in other drilled holes. However, it may not be screwed into the same drilled hole for a second time.

Prior to every reuse, the wear of the thread shall be checked with an appropriate sleeve setting jig in accordance with Annex 2. The anchor shall only be reused if it can penetrate the sleeve only so far that it does not protrude at the rear of the sleeve (see Annex 4). Anchors which are visibly damaged, e.g. due to corrosion, shall not be reused.

The anchor may be screwed in using an impact wrench with tangential impact.

To prevent the anchor from spinning, the screw driver with a power output in the upper range shall be equipped with an automatic cut-off device, e.g. via the depth stop.

The anchor is installed correctly if

- the base plate (fixture) is screwed flush against the concrete without an intermediate layer,
- the anchor head is fully in contact with the base plate,
- the anchor cannot easily be turned further,
- the embedment depth h_{nom} is adhered to.

2.3.4 Inspection of execution

During the installation of the anchor, the contractor commissioned with the anchoring or the site manager assigned by him or her or a competent representative of the site manager shall be present at the construction site. He or she shall ensure that the work is carried out properly.

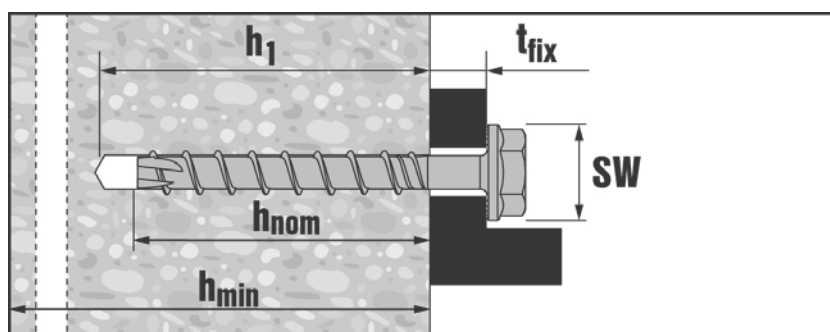
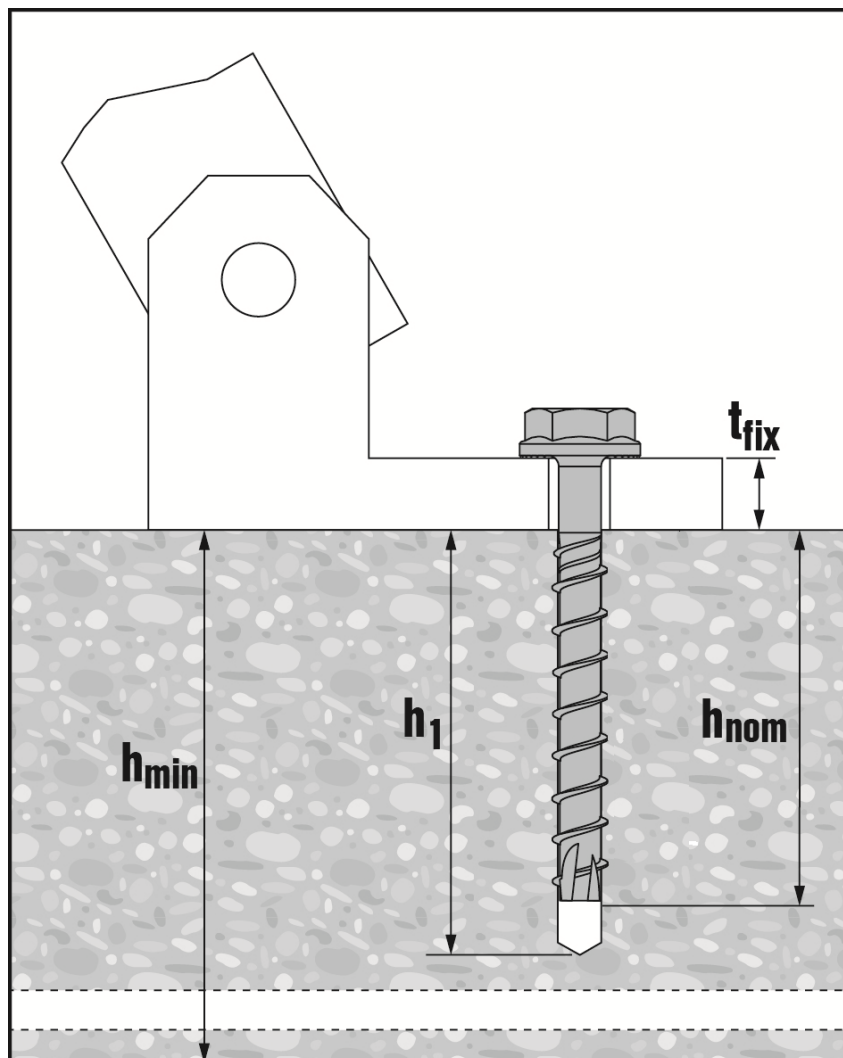
During the installation of the anchors, the site manager or his or her representative shall document the verification of the existing concrete compressive strength in accordance with Section 2.3.1 and the proper installation of the anchor. The installed anchor shall be checked in accordance with Section 1.2 by the site manager or his or her representative regularly. The results shall be documented.

The records shall be available at the construction site during the construction period and shall be submitted to the person in charge of inspection / supervision upon request. Like the delivery notes, they shall be kept by the executing company for a minimum of 5 years after completion of the project.

Beatrix Wittstock
Head of Section

Drawn up by

Product and installed condition



Screw anchor HUS3-H 10, HUS3-H 14 (hexagonal head)

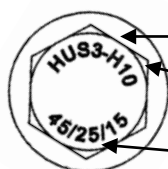
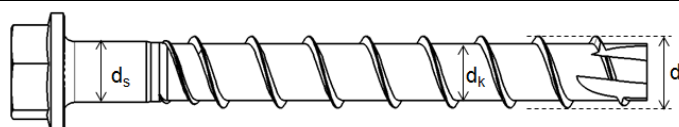
Hilti screw anchor HUS3-H for temporary fastening in concrete

Product description
Installed condition

Anlage 1

Table 1: Fastener dimension and marking

Screw anchor size			HUS3-H10			HUS3-H14		
Nominal embedment depth	h_{nom}	[mm]	h_{nom1} 55	h_{nom2} 75	h_{nom3} 85	h_{nom1} 65	h_{nom2} 85	h_{nom3} 115
Threaded outer diameter	d_t	[mm]	12,4			16,85		
Core diameter	d_k	[mm]	9,90			12,95		
Shaft diameter	d_s	[mm]	10,55			13,80		
Stressed section	A_s	[mm ²]	77,0			131,7		



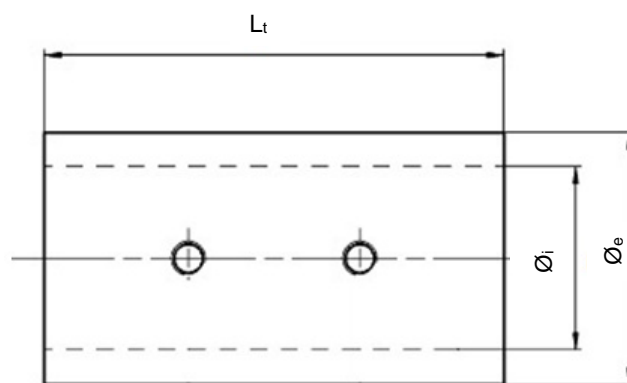
HUS3 : Hilti Universal Screw 3, Generation

H : Hex head. **10** : nominal screw diameter

45/25/15 : Maximum fixture thickness t_{fix1} / t_{fix2} / t_{fix3} related to the embedment depth of screw in concrete h_{nom1} / h_{nom2} / h_{nom3}

Table 2: Sleeve setting jig specification

Screw anchor			HUS3-H10	HUS3-H14
Inner tube diameter	\varnothing_i	[mm]	11,7	16,0
Outer tube diameter	\varnothing_e	[mm]	17,0	22,0
Tube length	L_t	[mm]	28,0	40,3



Hilti screw anchor HUS3-H for temporary fastening in concrete

Anlage 2

Product description

Dimensions, head marking, tube specification

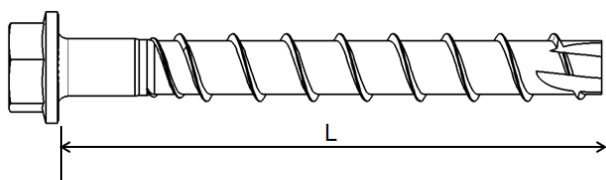
Table 3: Installation parameters

Screw anchor			HUS3-H10			HUS3-H14		
Nominal embedment depth	h_{nom}	[mm]	h_{nom1} 55	h_{nom2} 75	h_{nom3} 85	h_{nom1} 65	h_{nom2} 85	h_{nom3} 115
Nominal drill hole diameter	d_0	[mm]	10			14		
Cutting diameter of the drill bit	$d_{cut} \leq$	[mm]	10,45			14,50		
Clearance hole diameter	d_f	[mm]	14			18		
Wrench size	SW	[mm]	15			21		
Depth of the drill hole	$h_1 \geq$	[mm]	65	85	95	75	95	125
Setting tool	-	-	Hilti SIW 22 T-A ¹⁾					

1) Installation with other screwdriver of equivalent power is possible

Table 4: Standard screw lengths and maximum thickness of fixture t_{fix}

Screw anchor		HUS3-H10			HUS3-H14		
Nominal embedment depth [mm]	Length of screw L [mm]	h_{nom1} 55	h_{nom2} 75	h_{nom3} 85	h_{nom1} 65	h_{nom2} 85	h_{nom3} 115
		Thickness of fixture [mm]					
		t_{fix1}	t_{fix2}	t_{fix3}	t_{fix1}	t_{fix2}	t_{fix3}
60		5	-	-	-	-	-
70		15	-	-	-	-	-
75		-	-	-	10	-	-
80		25	5	-	-	-	-
90		35	15	5	-	-	-
100		45	25	15	35	15	-
110		55	35	25	-	-	-
130		75	55	45	65	45	15
150		95	75	65	85	65	35

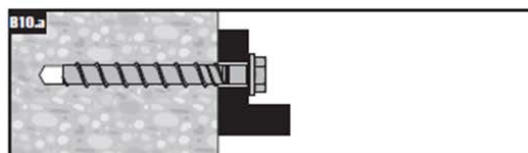
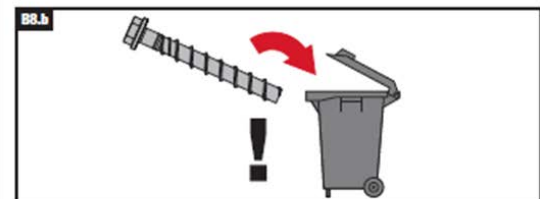
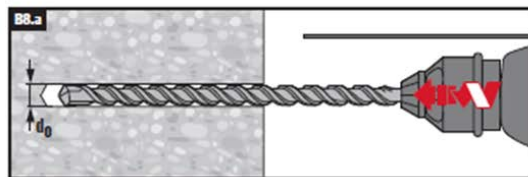
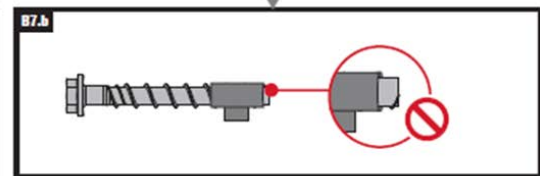
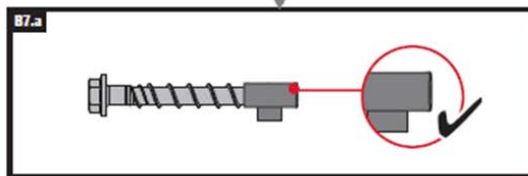
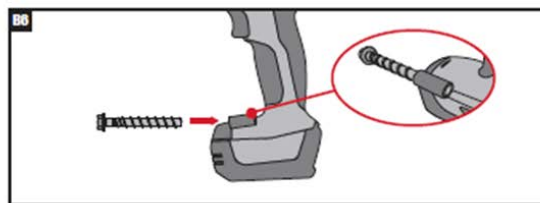
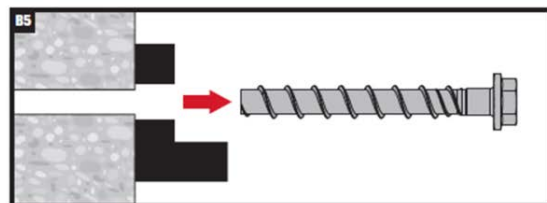
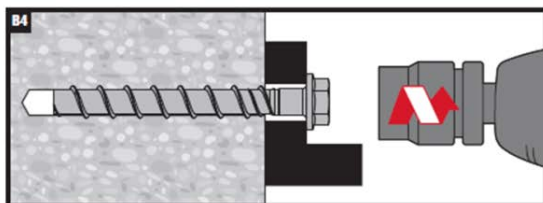
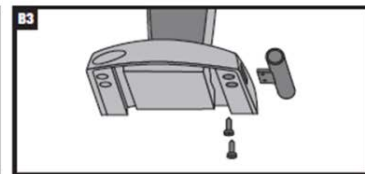
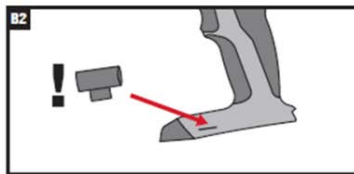
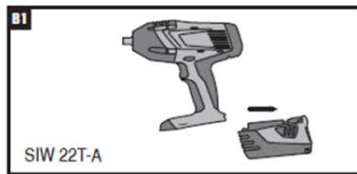
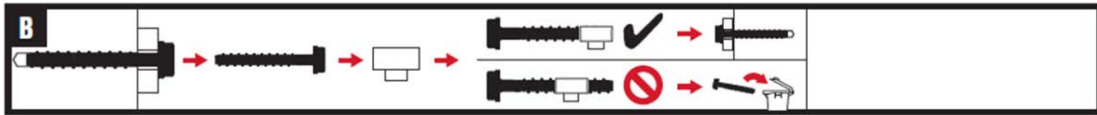


Hilti screw anchor HUS3-H for temporary fastening in concrete

Annex 3

Intended use
Installation parameters

Setting instructions for the reusability of the concrete screws for temporary fastening



Hilti screw anchor HUS3-H for temporary fastening in concrete

Intended use
Setting instructions for the reusability in temporary fastening

Annex 4

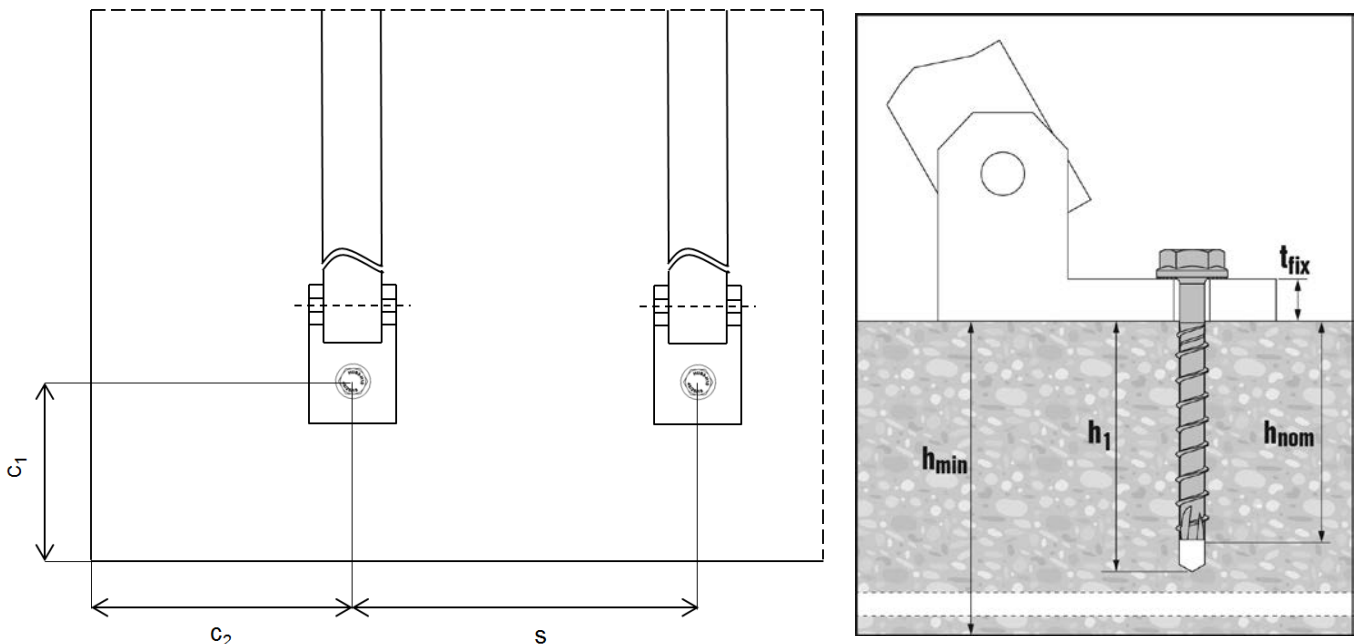
Table 5: Minimum base material thickness and minimum spacing and edge distance in cracked and non-cracked concrete

Screw anchor			HUS3-H10			HUS3-H14			
			h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}	
Nominal anchorage depth	h_{nom}	[mm]	55	75	85	65	85	115	
Minimum base material thickness	h_{min}	[mm]	115	150	175	130	175	200	255
Minimum spacing	s	[mm]	225	300	345	255	345	900	510
Minimum edge distance (Direction 1)	c_1	[mm]	75	100	115	85	115	300	170
Minimum edge distance (Direction 2)	c_2	[mm]	115	150	175	130	180	450	260

Table 6: Design resistance for all load directions in cracked and non-cracked concrete

Screw anchor			HUS3-H10			HUS3-H14		
			h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
Nominal anchorage depth	h_{nom}	[mm]	55	75	85	65	85	115
Concrete strength class $f_{ck,cube} \geq 10$ N/mm ²	$F_{Rd}^{1)}$	[kN]	3,3	5,3	6,3	4,4	7,0	12,3
Concrete strength class $f_{ck,cube} \geq 15$ N/mm ²	$F_{Rd}^{1)}$	[kN]	4,0	6,4	7,8	5,4	8,5	15,0
Concrete strength class $f_{ck,cube} \geq 20$ N/mm ²	$F_{Rd}^{1)}$	[kN]	4,7	7,4	9,0	6,2	9,9	17,3

1) Partial safety factor is included



Hilti Screw anchor HUS3-H for temporary fastening in concrete

Performance

Base material thickness, minimum edge and spacing, design resistance

Annex 5