

European Technical Approval ETA-03/0004

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung
Trade name

Hilti-Dämmstoff-Befestigungselement XI-FV
Hilti fixing element XI-FV

Zulassungsinhaber
Holder of approval

Hilti Aktiengesellschaft
Business Unit Direktmontage
9494 Schaan
FÜRSTENTUM LIECHTENSTEIN

Zulassungsgegenstand
und Verwendungszweck

Hilti-Dämmstoff-Befestigungselement XI-FV
zur Verankerung von verklebten Wärmedämm-Verbundsystemen in
unbeschichtetem Beton

*Generic type and use
of construction product*

*Powder actuated fastener for the fixing of bonded thermal insulation
composite systems in uncoated concrete*

Geltungsdauer:
Validity: vom
from
bis
to

1 March 2013
1 March 2018

Herstellwerke
Manufacturing plants

Hilti AG, Herstellwerk 1, FL-9494 Schaan
Hilti Kunststofftechnik GmbH, Martin-Hilti-Weg 1, D-89278 Nersingen

Diese Zulassung umfasst
This Approval contains

14 Seiten einschließlich 6 Anhänge
14 pages including 6 annexes

Diese Zulassung ersetzt
This Approval replaces

ETA-03/0004 mit Geltungsdauer vom 29.02.2008 bis 28.02.2013
ETA-03/0004 with validity from 29.02.2008 to 28.02.2013

I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
 - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products¹, modified by Council Directive 93/68/EEC² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council³;
 - *Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998⁴, as amended by Article 2 of the law of 8 November 2011⁵;*
 - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC⁶.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.
- 3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European technical approval.
- 4 This European technical approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
- 5 Reproduction of this European technical approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Deutsches Institut für Bautechnik. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European technical approval.
- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

¹ Official Journal of the European Communities L 40, 11 February 1989, p. 12
² Official Journal of the European Communities L 220, 30 August 1993, p. 1
³ Official Journal of the European Union L 284, 31 October 2003, p. 25
⁴ *Bundesgesetzblatt Teil I 1998*, p. 812
⁵ *Bundesgesetzblatt Teil I 2011*, p. 2178
⁶ Official Journal of the European Communities L 17, 20 January 1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

1.1 Definition of the construction product

The Hilti fixing element XI-FV for the fixing of thermal insulation materials (referred to in the following only as fixing element) consists of a plastic part made of polyethylene and a pre-assembled powder actuated fastener which is driven into the concrete using a setting tool with a cartridge as propelling charge.

The powder actuated fastener X-CPH 72 consists of steel with a Delta-Tone coating.

The plastic part is provided with an elastic element (Top Hat) which serves to resist to the dynamic loads applied during setting and to compensate any unevenness (tolerances) of the concrete.

The fixing element may in addition be combined with a plate of size T 90 or HDT 90 made of polyethylene and a plate of size HDT 140 made of polyamide which can be slipped-on.

The installed fixing element is shown in Annex 1.

1.2 Intended use

The fixing element is intended to be used for anchorages for which requirements for safety in use in the sense of the Essential Requirement 4 of Council Directive 89/106/EEC shall be fulfilled and failure of anchorages made with these products would cause risk to human life and/or lead to considerable economic consequences. The fixing element is to be used only as multiple fixing exposed to predominantly static or quasi-static loading for the anchorage of bonded thermal insulation composite systems (ETICS) according ETAG 004 in uncoated concrete (without rendering, tiles, etc.) for transmission of wind suction loads. The base material shall consist of reinforced or unreinforced normal weight concrete of strength class C12/15 at minimum and C35/45 at maximum according to EN 206-1:2000:

The fixing element shall not be used for the anchorage in prestressed concrete members, in weather-beaten concrete or exposed aggregate concrete.

The fixing element shall not be used for the transmission of dead loads of the thermal insulation composite system or of other loads. These loads have to be transmitted by the bonding of the thermal insulation composite system.

The fixing element with the powder actuated fastener X-CPH 72 with a Delta-Tone coating may be used in industrial atmosphere, if these conditions are not particularly aggressive.

The provisions made in this European technical approval are based on an assumed working life of the fixing element of 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.

2 Characteristics of product and methods of verification

2.1 Characteristics of product

The fixing element corresponds to the drawings and information given in Annexes 2 and 3. The characteristic material values, dimensions and tolerances of the fixing element not indicated in these Annexes shall correspond to the respective values laid down in the technical documentation⁷ of this European technical approval.

The characteristic values for the design of anchorages are given in Annex 5.

Each fixing element is to be marked with the identifying mark of the producer, the commercial name and the thickness of insulation material to be fixed.

The fixing element shall only be packaged and supplied as a complete unit.

The fixing element shall be stored under normal climatic conditions in its original light-proof packaging. Before installation, it shall not be extremely dried nor frozen.

On each packaging, information shall be affixed giving the type of powder actuated fastener as well as a clear description of the field of application.

In addition to the specific clauses relating to dangerous substances contained in this European technical approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

2.2 Methods of verification

The assessment of the fitness of the fixing element for the intended use in relation to the requirements for safety in use in the sense of the Essential Requirement 4 has been made

- according to the Guideline for European technical approval of Metal Anchors for Use in Concrete, ETAG 001 and
- on the basis of the following tests:
 - (1) Axial tension tests
 - (2) Tests on functioning during installation
 - (3) Tests on functioning after relaxation
 - (4) Tests on functioning of plastic parts (shaft/plate)
 - (5) Tests on functioning under non-static loading
 - (6) Tests on functioning in carbonated concrete
 - (7) Tests on functioning in concrete with equalising layer
 - (8) Tests for determining characteristic spacings and edge distances

and also in compliance with

- the EOTA Technical Report TR 025 "Determination of point thermal transmittance of plastic anchors for the anchorage of external thermal insulation composite systems (ETICS)" and
- the EOTA Technical Report TR 026 "Evaluation of plate stiffness from plastic anchors for fixing of external thermal insulation composite systems with rendering (ETICS)".

⁷ The technical documentation of this European technical approval is deposited at the Deutsches Institut für Bautechnik and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

3 Evaluation of Conformity of the Product and CE marking

3.1 Attestation of Conformity System

According to the communication of the European Commission⁸ the system 2 (ii) (allocated to system 2+) of attestation of conformity applies.

These systems of attestation of conformity are defined as follows:

System 2+: Declaration of conformity of the product by the manufacturer on the basis of:

- (a) Tasks for the manufacturer:
 - (1) initial type-testing of the product;
 - (2) factory production control;
 - (3) testing of samples taken at the factory in accordance with a prescribed test plan.
- (b) Tasks for the approved body:
 - (4) certification of factory production control on the basis of:
 - initial inspection of factory and of factory production control;
 - continuous surveillance, assessment and approval of factory production control.

3.2 Responsibilities

3.2.1 Tasks of the manufacturer

3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use raw materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at Deutsches Institut für Bautechnik.⁹

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

3.2.1.2 Other tasks of manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of anchors in order to undertake the actions laid down in section 3.2.2. For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European technical approval.

3.2.2 Tasks of approved bodies

The approved body shall perform the

- initial inspection of factory and of factory production control,

⁸ Letter of the European Commission of 28/04/1999 to EOTA

⁹ The control plan is a confidential part of the documentation of the European technical approval, but not published together with the ETA and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

- continuous surveillance, assessment and approval of factory production control, in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the factory production control stating the conformity with the factory production control of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

3.3 CE-marking

The CE-marking shall be affixed on each packaging of the fixing element. The letters „CE“ shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacturer),
- the number of the EC certificate for the factory production control,
- the last two digits of the year in which the CE-marking was affixed;
- number of the European technical approval.

4 Assumptions under which the fitness of the product for the intended use was favourably assessed

4.1 Manufacturing

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, 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 Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik 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.

4.2 Design of anchorages

4.2.1 General

The ETA only applies to the manufacture and use of the fixing element. Verification of stability of the external thermal insulation composite system including application of loads on the fixing element is not subject of this European technical approval.

Fitness for the intended use of the fixing element is given under the following conditions:

- The design of anchorages is carried out in accordance with the information given in Annex 5 under the responsibility of an engineer experienced in anchorages and in concrete work.
- Verifiable calculation notes and drawings shall be prepared taking account of the loads to be anchored, the dimensions of the concrete members as well as of the relevant tolerances.
- Proof of direct local application of load on the concrete has been delivered.
- The fixing element shall only be used for the transmission of wind suction loads. All other loads such as dead load and restraints shall be transmitted by the relevant external thermal insulation composite system.

- Any additional stresses due to imposed deformations (e.g. in case of temperature variations) occurring in the fixing element, in the element to be fixed or in the concrete member in which the fixing element is anchored, have to be taken into account.
- By means of this fixing element it is possible to compensate tolerances (equalising mortar) in the base material of 20 mm at maximum.
- It shall be verified that the load resistance of the concrete member will not be adversely affected by a possible contact of the powder actuated fastener with reinforcement.

4.2.2 Load resistance

The characteristic tension resistance of the fixing element is given in Annex 5, Table 5.

A permanent tension load acting on the fixing element (e.g. due to dead loads) is not admissible.

4.2.3 Characteristic values, spacings and dimensions of concrete member

The control dimension "X" determined in the control tests according to Annex 4, the minimum spacings and minimum dimensions of concrete member according to Annex 5 shall be observed.

4.2.4 Displacement behaviour

When loaded to the design value of resistance a displacement of 0,8 mm can be expected.

4.2.5 Point thermal transmittance according EOTA Technical Report TR 025

The point thermal transmittance (CHI-value) of the fixing element according EOTA Technical Report TR 025 "Determination of point thermal transmittance of plastic anchors for the anchorage of external thermal insulation composite systems (ETICS)" is given in the following table.

Table 4.1: Point thermal transmittance

Anchor type	Insulation thickness h_D [mm]	Point thermal transmittance χ [W/K]
Hilti fixing element XI-FV with powder actuated fastener X-CPH 72	$60 \leq h_D < 140$	0.002
Hilti fixing element XI-FV with powder actuated fastener X-CPH 72	$140 \leq h_D \leq 200$	0.001

4.2.6 Plate stiffness according EOTA Technical Report TR 026

The plate stiffness of the fixing element according EOTA Technical Report TR 026 "Evaluation of plate stiffness from plastic anchors for fixing of external thermal insulation composite systems with rendering (ETICS)" is given in the following table.

Table 4.2: Plate stiffness

Anchor type	Diameter of the anchor plate [mm]	Load resistance of the anchor plate [kN]	Plate stiffness [kN/mm]
Hilti fixing element XI-FV	60	1.6	0.4

4.3 Installation of fixing element

The fitness for use of the fixing element can only be assumed if the following conditions of installation are met:

- Installation carried out by appropriately qualified personnel under the supervision of the person responsible for technical matters on site.
- Use of the fixing element only as supplied by the manufacturer without exchanging the components of a fixing element.
- Installation in accordance with the manufacturer's specifications and drawings using the tools indicated in this European technical approval. The relevant European and national rules for the working with setting tools shall be observed.
- Checks before placing the fixing element to ensure that the strength class of the concrete in which the fixing element is to be placed is not lower nor higher than the concrete strength class to which the characteristic loads apply.
- Check of mean anchorage depth being observed in the control tests.
- For each base material the energy necessary for driving in the fixing element shall be verified before installation by means of 10 control tests such that the mean value of anchorage depth will be equal to 30 mm. These control tests shall only be carried out on the uncoated concrete without equalising layer. Control of the anchorage depth is carried out by measuring the dimension "X". The values given in Annex 4, Table 4, shall be observed in this respect.

After every 500 installations or at the beginning of a new phase of construction, respectively, the above-mentioned control tests shall be repeated.

- In case of defective settings a new fixing element shall be installed.
- The temperature during installation of the fixing element shall not be less than 5 °C.
- Exposure to UV due to solar radiation of the fixing element not protected by rendering shall not exceed the time of 6 weeks.

5 Responsibility of the manufacturer

It is in the responsibility of the manufacturer to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to and 4.2.1 and 4.2.2 is given to those who are concerned. This information may be made by reproduction of the respective parts of the European technical approval. In addition, all installation data shall be shown clearly on the packaging and/or on an enclosed instruction sheet, preferably using illustrations.

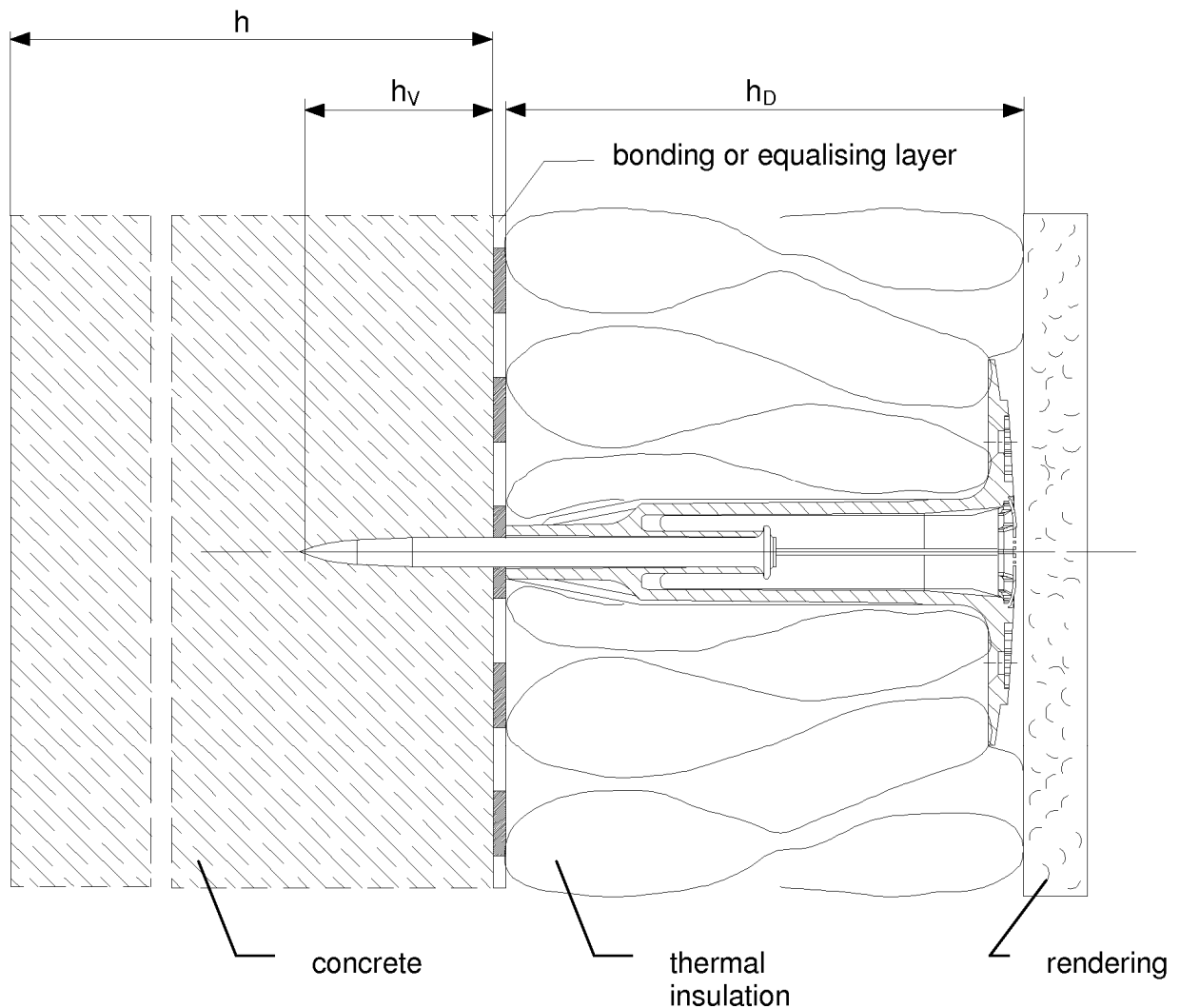
The minimum data required are:

- precise designation of fixing element,
- setting tools and cartridges required,
- mean anchorage depth,
- description of control tests and corresponding illustration,
- control dimension "X" for each type of powder actuated fastener,
- illustration of installation.

All data shall be presented in a clear and explicit form.

Georg Feistel
Head of Department

beglaubigt:
Bürger



Field of application

Anchorage of bonded thermal insulation composite systems in uncoated concrete (without rendering, tiles, etc.).

The fixing element shall not be used for the anchorage in prestressed concrete members, in weather-beaten concrete, exposed aggregate concrete or coated concrete.

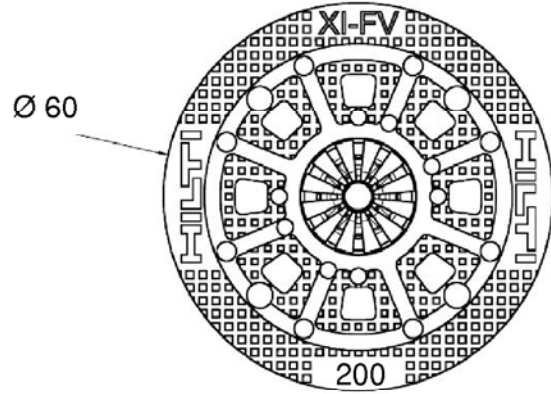
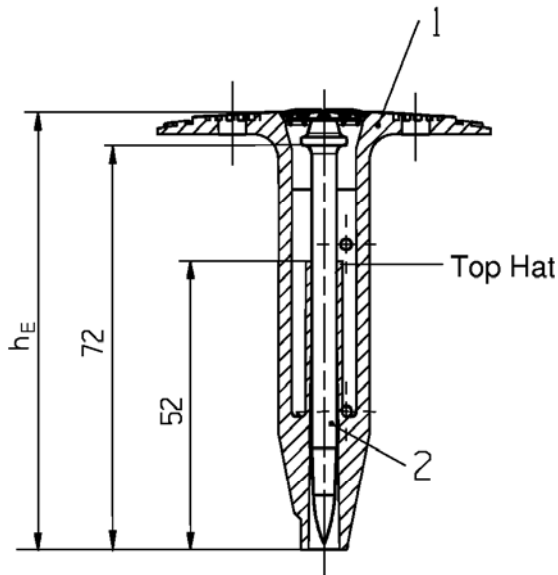
Legend :

- h_D = thickness of thermal insulation
- h_v = anchorage depth
- h = thickness of concrete member

Hilti fixing element XI-FV

Product and intended use

Annex 1



Length of plastic part h_E see Annex 3

Marking:

Manufacturer
Type of fixing element
Thickness of insulation
e.g.: Hilti XI-FV 200

Powder actuated fastener: X-CPH 72

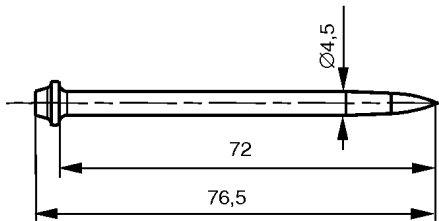


Table 1 : Components and materials

Component	Disignation	Materials
1	Plastic part	Polyethylene PE-HD (High-Density), colour: orange
2	Powder actuated fastener X-CPH 72	Tempering steel in compliance with EN 10083-2:1991+A1:1996, with heat treatment, Delta-Tone coated, colour: grey, hardness = 58 HRc

Hilti fixing element XI-FV

Dimensions, components, materials

Annex 2

Table 2 : Dimensions of plastic part (see Annex 2)

Fixing element	h_E [mm]	Fixing element	h_E [mm]
XI-FV 60	59	XI-FV 140	139
XI-FV 80	79	XI-FV 160	159
XI-FV 100	99	XI-FV 180	179
XI-FV 120	119	XI-FV 200	199

Table 3 : Setting tools

Setting tools ¹⁾	DX 460			DX A 40	DX 36M
Maximum length h_E [mm] of fixing element	100	140	200	100	100
Piston	X-460 PIEA	X-460 PIE-L	X-460 PIE-XL	X-AP IE72	36 / IE
Fastener guide	X-460 FIE	X-460 FIE-L	X-460 FIE-XL	X-AF IE	
Cartridges	red 6.8/11M yellow 6.8/11M				

- 1) For every new phase of construction or after every 500 installations, respectively, the energy necessary for driving in the fixing element shall be determined by control tests carried out on the uncoated concrete without equalising layer, in order to obtain the mean anchorage depth (see also 4.2.2).



Example of setting tool: DX 460 with fastener guide X-460 FIE-XL

Hilti fixing element XI-FV

Dimensions of plastic part, setting tools

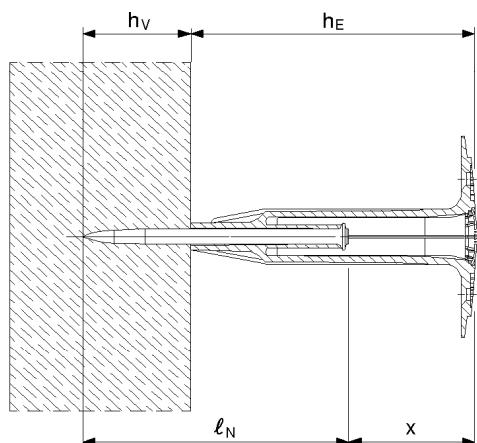
Annex 3

Table 4 : Control dimension "X" for the fixing element to be used for control, tests carried out on uncoated concrete without equalising layer

Designation	X ≥
XI-FV 60 CPH 72	12.5 mm
XI-FV 80 CPH 72	32.5 mm
XI-FV 100 CPH 72	52.5 mm
XI-FV 120 CPH 72	72.5 mm
XI-FV 140 CPH 72	92.5 mm
XI-FV 160 CPH 72	112.5 mm
XI-FV 180 CPH 72	132.5 mm
XI-FV 200 CPH 72	152.5 mm

For the control tests, the manufacturer's installation instructions as well as the corresponding installation protocol have to be taken into account.

By means of the control tests the energy required for driving in the fixing element for achieving the mean anchorage depth is determined (see 4.2.2).



$$h_v = (l_N + X) - h_E = 30 \text{ mm}$$

- Legend :**
- h_v = mean anchorage depth (see Annex 5)
 - h_E = length of plastic part (see Annex 3)
 - l_N = length of powder actuated fastener (see Annex 2)
 - X = control dimension

Table 5 : Characteristic tension resistance per fixing element as well as characteristic spacings and dimensions of concrete member (Restriction concerning permanent tension loads see 4.2.1.2)

Fixing element		XI-FV
Characteristic tension resistance in concrete \geq C12/15, \leq C35/45	$N_{Rk,c} =$	1.0 kN
Related partial safety factor	$\gamma_{Mc} =$	2.52
Partial safety factor for variable action of wind suction forces	$\gamma_Q =$	1.5
Mean anchorage depth	$h_V =$	30 mm
Spacing	$s_{cr} \geq$	100 mm
Edge distance	$c_{cr} \geq$	75 mm
Corner distance	$c_e \geq$	100 mm
Minimum thickness of concrete member	$h \geq$	100 mm

Design value of resistance

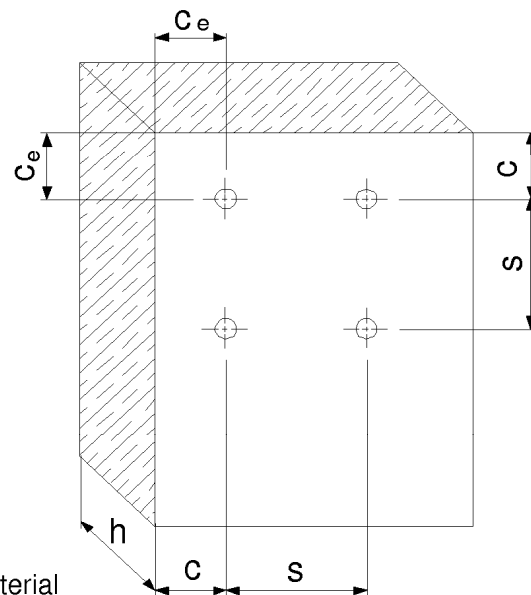
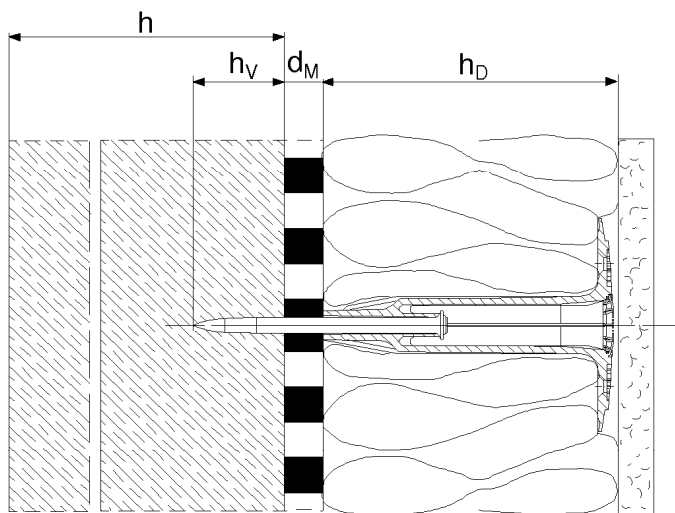
$N_{Rd} = N_{Rk,c} / \gamma_{Mc}$

Design value of action

$N_{Sd} = N_{Sk} \cdot \gamma_Q$

$N_{Sd} \leq N_{Rd}$

Schematic illustration of spacings of fixing elements



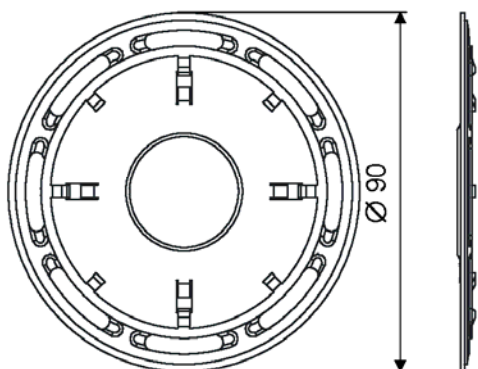
- Legend :**
- h_D = thickness of thermal insulation material
 - h_V = anchorage depth
 - d_M = bonding or equalising layer, \leq 20 mm

Hilti fixing element XI-FV

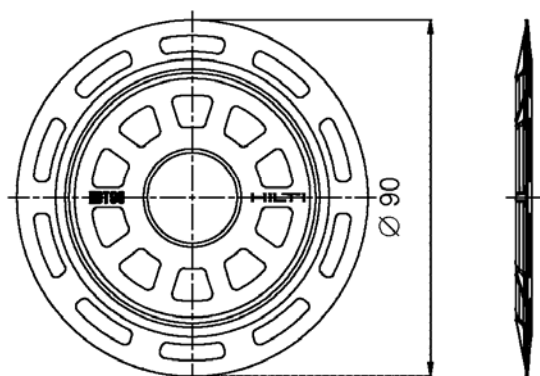
Characteristic tension resistance
Characteristic spacings and dimensions of concrete member

Annex 5

Slip-on plate T90



Slip-on plate HDT90



Slip-on plate HDT140

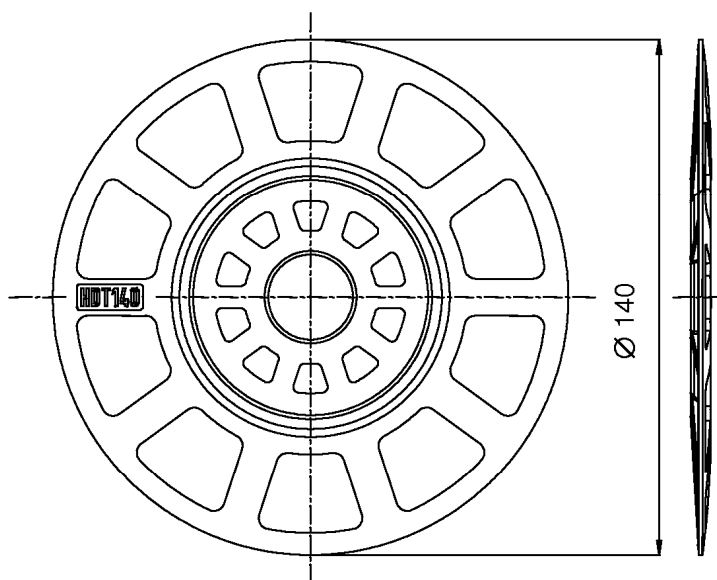


Plate	External diameter	Material
T 90	90 mm	PE – HD (High-Density-polyethylene), colour: orange
HDT 90	90 mm	PE – HD (High-Density-polyethylene), colour: orange
HDT 140	140 mm	Polyamide, fibre reinforced > 30 % colour: orange

Hilti fixing element XI-FV

Additional slip-on plate
T 90 / HDT 90 / HDT 140

Annex 6