Deutsches Institut für Bautechnik

DIBt

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

National technical approval / General construction technique permit

Date: 22 April 2021

Reference: I 26-1.21.2-14/21

Number:
Z-21.2-1956

Validity
from: **22 April 2021**
to: **22 April 2026**

Applicant:

fischerwerke GmbH & Co. KG
Klaus-Fischer-Straße 1
72178 Waldachtal, Germany

Subject of decision:

'fischer remedial wall tie VBS-M' for subsequent anchorage of outer masonry leaf

The subject named above is herewith granted a national technical approval (*allgemeine bauaufsichtliche Zulassung*) / general construction technique permit (*allgemeine Bauartgenehmigung*).
This decision contains nine pages and seven annexes.
This national technical approval / general construction technique permit replaces national technical approval / general construction technique permit No. Z-21.2-1956 of 15 April 2020. The subject concerned was granted the first national technical approval on 26 March 2012.

Translation authorised by DIBt

DIBt

I GENERAL PROVISIONS

1 This decision confirms the fitness for use and 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 user and installer of the subject concerned. The user and installer of the subject concerned shall also be made aware that this decision must be made available at the place of use or 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. Alterations to this basis 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 use and application

1.1 Subject concerned

The subject of approval is the 'fischer remedial wall tie VBS-M' (hereinafter referred to as 'anchor'). The anchor consists of a polyamide anchor sleeve and a corresponding special screw made of galvanised or stainless steel. The anchor sleeve has two slotted expansion zones. The anchor's first expansion zone expands the anchor into the base material (load-bearing inner leaf) and its second expansion zone expands into the outer masonry leaf when the screw is screwed into the anchor sleeve.

The subject of the permit is the planning, design and execution of the anchorage of outer masonry leaf to a load-bearing inner leaf using the 'fischer remedial wall tie VBS-M'.
The installed anchor is shown in Annex 1.

1.2 Field of use and application

The anchorage may be executed in the following base materials of the load-bearing inner leaf:

- Normal weight concrete of strength class ≥ C12/15 and ≤ C50/60 in accordance with DIN EN 206-1:2001-07
- Solid clay masonry units of compressive strength class ≥ Mz 12 in accordance with DIN EN 771-1:2015-11 in conjunction with DIN 20000-401:2017-01
- Solid calcium silicate masonry units of compressive strength class ≥ KS 12 in accordance with DIN EN 771-2:2015-11 in conjunction with DIN 20000-402:2017-01
- Lightweight concrete solid units of compressive strength class ≥ V 4 in accordance with DIN EN 771-3:2005-05 in conjunction with DIN V 20000-403:2005-06
- Lightweight concrete solid blocks of compressive strength class ≥ Vbl 4 in accordance with DIN EN 771-3:2015-11 in conjunction with DIN 20000-403:2005-06
- Vertically perforated clay masonry units of compressive strength class ≥ Hlz 12 in accordance with DIN EN 771-1:2015-11 in conjunction with DIN 20000-401:2017-01
- Perforated calcium silicate masonry units of compressive strength class ≥ KSL 12 in accordance with DIN EN 771-2:2015-11 in conjunction with DIN 20000-402:2017-01
- Lightweight concrete hollow blocks of compressive strength class ≥ Hbl 2 in accordance with DIN EN 771-3:2005-05 in conjunction with DIN V 20000-403:2005-06
- Autoclaved aerated concrete masonry units of compressive strength class ≥ 4 in accordance with DIN EN 771-4:2015-11 in conjunction with DIN 20000-404:2018-04

The anchorage may be executed in the following base materials of the outer masonry leaf:

- Thin skins (weather-resistant skins) of external wall panels made of normal weight concrete of strength class ≥ C 20/25 in accordance with DIN EN 206-1:2001-07
- Facing clay masonry units of compressive strength class ≥ KMz 12 in accordance with DIN EN 771-1:2015-11 in conjunction with DIN 20000-401:2017-01
- Facing clay masonry units of compressive strength class ≥ KHLz 12 in accordance with DIN EN 771-1:2015-11 in conjunction with DIN 20000-401:2017-01
- Calcium silicate facing bricks of compressive strength class ≥ KS Vb 20 in accordance with DIN EN 771-2:2015-11 in conjunction with DIN 20000-402:2017-01
- Vertically perforated clinker bricks of compressive strength class ≥ KHLz 28 in accordance with DIN EN 771-1:2015-11 in conjunction with DIN 20000-401:2017-01 (medium thick bricks for use in masonry in accordance with DIN 18515-1:2017-08)

The masonry mortar shall at least correspond to mortar class M 5 in accordance with DIN EN 998-2:2017-02 in conjunction with DIN 20000-412:2019-06.

The anchorage shall be executed only when there are no fire resistance requirements to be met by the entire structure including the anchor.

If the minimum strength class specified for the load-bearing inner masonry leaf or the minimum strength class of the outer masonry leaf cannot be adhered to or mortar class M 5 cannot be adhered to when installing the anchor through the bed joint, the load-bearing capacity of the anchor may be determined by means of job site tests (see Section 3.2.2). A suitable test kit from fischer shall be used for the job site tests in the outer masonry leaf.

The anchor with the galvanised steel screw featuring the additional head marking shall only be used if a facade system with thermal insulation (e.g. ETICS, ventilated external wall cladding) is attached to the outer masonry leaf. The insulation shall have a thickness of at least 60 mm and there shall be no ventilation between the outer masonry leaf and this insulation.

The anchor with the stainless steel screw without head marking may be used in accordance with its corrosion resistance class (CRC) III in accordance with DIN EN 1993-1-4:2015-10 in conjunction with DIN EN 1993-1-4/NA:2017-01.

2 Provisions for the construction product

2.1 Properties and composition

The anchor shall correspond to the specifications in the annexes in terms of its dimensions and material properties.

The material characteristics, dimensions and tolerances of the anchor which are not specified in this decision shall comply with the specifications deposited with DIBt, the certification body and the external surveillance body.

2.2 Packaging, storage and marking

The anchor shall only be supplied as a compiled unit.

The anchor sleeve shall be stored under normal climate conditions. It shall not be extremely dry or frozen prior to installation.

The packaging, accompanying leaflet or delivery note for the anchor shall be marked by the manufacturer with the national conformity mark (*Ü-Zeichen*) in accordance with the Conformity Marking Ordinances (*Übereinstimmungszeichen-Verordnungen*) of the federal states. The factory identifying mark, the approval number and the complete designation of the anchor shall also be stated on the packaging.

The mark shall only be applied if the requirements given in Section 2.3 are met.

The anchor is designated in accordance with the type and the anchor size, e.g. 'fischer VBS-M 8x125'.

Each anchor sleeve shall be marked with the factory identifying mark, the anchor type and the anchor length in accordance with Annex 2. The nominal embedment depth shall be marked.

2.3 Confirmation of conformity

2.3.1 General

The manufacturer shall confirm for each manufacturing plant that the anchor complies with the provisions of the national technical approval included in this decision by way of a declaration of conformity based on factory production control and a certificate of conformity issued by a certification body recognised for these purposes as well as on regular external surveillance carried out by a recognised inspection body in accordance with the following provisions:

To issue the certificate of conformity and for external surveillance including the associated product testing, the manufacturer of the anchor shall use a certification body and an inspection body recognised for these purposes.

The declaration of conformity shall be submitted by the manufacturer through marking of the construction product with the national conformity mark, including statement of the intended use.

The certification body shall send a copy of the certificate of conformity issued by it to DIBt.

2.3.2 Factory production control

A factory production control system shall be set up and implemented in each manufacturing plant. Factory production control shall be understood to be continuous surveillance of production by the manufacturer to ensure that the manufactured construction products meet the provisions of the national technical approval included in this decision.

Scope, type and frequency of factory production control shall be in accordance with the test plan deposited with DIBt and the external surveillance body.

The results of factory production control shall be recorded and evaluated. The records shall at least include the following information:

- designation of the construction product or the starting material or the components,
- type of check or test,
- date of manufacture and testing of the construction product or the starting material or the components,
- results of check and tests and, where applicable, comparison with the requirements,
- signature of the person responsible for factory production control.

The records shall be kept for at least five years and submitted to the inspection body used for external surveillance. They shall be submitted to DIBt and the competent supreme building authority upon request.

If the test result is unsatisfactory, the manufacturer shall immediately take the necessary measures to resolve the defect. Construction products which do not meet the requirements shall be handled in such a way that they cannot be confused with compliant products. After the defect has been remedied, the relevant test shall be repeated immediately, where technically feasible and necessary to show that the defect has been eliminated.

2.3.3 External surveillance

The factory production control system shall be inspected regularly, i.e. at least once a year, by means of external surveillance at each manufacturing plant.

Initial type-testing of the anchor shall be carried out within the scope of external surveillance. Samples for random testing shall also be taken. Sampling and testing shall be the responsibility of the recognised inspection body.

Scope, type and frequency of factory production control shall be in accordance with the test plan deposited with DIBt and the external surveillance body.

The results of certification and external surveillance shall be kept for at least five years. They shall be submitted by the certification or inspection body to DIBt and the competent supreme building authority upon request.

3 Provisions for planning, design and execution

3.1 Planning

The anchorages shall be planned in line with good engineering practice. Verifiable calculations and design drawings shall be prepared in consideration of the loads to be anchored, the dimensions of the members and the tolerances.

The verification of the immediate local force transmission into the base material (load-bearing inner leaf and outer masonry leaf) has been provided with the following verifications.

The anchor shall be positioned in the outer masonry leaf in the bed joint or in the centre of the brick.

The anchor parameters, dimensions of the member and spacings/edge distances specified in Annex 5, Table 4, shall be observed.

For determination of the anchor length l_d, the thickness of the outer masonry leaf h_a as well as the thickness of the air space layer (leaf spacing a_z) shall be determined by means of drilled test holes. Annex 4, Table 3, shows the leaf spacings a_z for different anchor lengths depending on the outer masonry leaf thickness.

3.2 Design

3.2.1 General

The provisions of DIN EN 1996-1-1:2013-02 in conjunction with DIN EN 1996-1-1/NA:2012-05 shall apply to wire anchors as shown in Figure NA.9 and DIN EN 1996-2:2010-12 in conjunction with DIN EN 1996-2/NA:2012-01, NCI Annex NA.D, for wire anchors as shown in Figure NA.D.1. By way of deviation from these provisions, the remedial wall ties and leaf spacings specified in this decision may be used.

The number of anchors per m² of wall area shall be determined in accordance with Clause 6.5 of DIN EN 1996-1-1 using the following formula:

$$\text{Number of anchors } n_t = \frac{w_{Ed}\ [kN/m^2]}{N_{Rd}[kN]} \geq n_{tmin} \qquad (3.1)$$

where

- w_{Ed} design horizontal load to be transmitted per unit area
- N_{Rd} design load-bearing capacity for tension and compression in accordance with Annex 5, Table 5 and Annex 6, Tables 6 and 7, with the smaller value being decisive
- n_{tmin} minimum number of anchors in accordance with DIN EN 1996-1-1/NA:2012-05, Table NA.18, or DIN EN 1996-2/NA:2012-01, Table NA.D.1

If deviations from the base materials or joint qualities specified in Annexes 5 and 6 occur with respect to the strength class, the load-bearing capacity of the anchor in the load-bearing inner leaf and the outer masonry leaf may be determined through job site tests in accordance with Section 3.2.2.

The load-bearing capacities given in Annex 5, Table 5, and Annex 6, Table 6, shall only apply if a rotary drill is used to produce the drilled hole in the masonry made of vertically perforated clay masonry units (Hlz) or autoclaved aerated concrete masonry units (AAC). If the drilled holes are produced using impact or hammer action, the load-bearing capacity of the anchor shall be determined via job site tests in accordance with Section 3.2.2.

3.2.2 Verification of anchor through job site tests

The job site tests may be carried out in accordance with method A (load criterion) or method B (deformation criterion).

For each base material, at least fifteen pull-out tests for test method A and at least five pull-out tests with a centric load acting on the anchor for test method B shall be carried out.

Testing, test evaluation and test report preparation shall be carried out by the test supervisor or testing laboratories or under the supervision of the construction site supervisor.

Section 3.3 shall apply to the installation of the anchor.

The test report shall contain all the information necessary for evaluating the load-bearing capacity of the base material. It shall be included in the building files.

At least the following information is required:

- structure, building owner
- date and location of tests
- temperature
- company installing the anchors
- testing device
- results of tests
- testing carried out or supervised by ...
- signature.

3.2.2.1 Test method A (verification of characteristic load)

The pull-out device shall ensure a continuous and slow increase in load with calibrated force indication. The tensile load shall act perpendicular to the surface of the base material and be transmitted to the screw by means of a hinge.

The reaction forces shall be introduced into the base material at a distance of at least 15 cm from the anchor. The test load shall be increased continuously in such a way that the maximum load is reached after about one minute. The tensile load is read when the failure load N_1 is achieved.

The characteristic load-bearing capacity N_{Rk1} is determined as follows:

$$N_{Rk1} = 0.6 \times N_1 \quad \leq 1.5 \text{ kN} \quad \leq 2.0 \times N_{Rd} \tag{3.2}$$

where

N_1 mean value of the five smallest measurements at failure load

N_{Rd} load-bearing capacity specified in Annex 5, Table 5, and Annex 6, Tables 6 and 7, for the respective base material

The number of anchors per m² of wall area shall be determined using the following formula:

$$\text{Number of anchors } n_t = \frac{2.0 \cdot w_{Ed}\ [\text{kN/m}^2]}{N_{Rk1}[\text{kN}]} \geq n_{tmin} \tag{3.3}$$

where

w_{Ed} design value of the horizontal load to be transmitted per unit area.

N_{Rk1} characteristic load-bearing capacity from the tests in accordance with (3.2)

n_{tmin} minimum number of wire anchors in accordance with DIN EN 1996-1-1/NA:2012-05, Table NA.18, or DIN EN 1996-2/NA:2012-01, Table NA.D.1

A check shall also be carried out to ensure that the displacement of each anchor does not exceed the value of 1 mm at a test load of 1 kN.

If this requirement cannot be met, the minimum number of anchors shall be increased in accordance with (3.4):

$$n_{t,increased} = n_t \cdot 1.0 \text{ kN} / \min N_{1mm} \quad (3.4)$$

where

$\min N_{1mm}$ measured load in kN for a deformation of 1 mm, minimum value from all tests

n_t in accordance with (3.3)

3.2.2.2 Test method B (verification of deformation criterion)

For each base material, at least five pull-out tests with a centric load acting on the anchor shall be carried out. At a test load N_1 of 1.5 kN, slip shall not exceed 0.5 mm in at least 5 individual tests on each anchor or 1.0 mm in at least 10 individual tests on each anchor.

If this requirement cannot be met, the test load N_1 shall be reduced until the deformation criterion is met.

The number of anchors per m² of wall area shall be determined in accordance with Section 3.3 for the corresponding base material. The following value shall be used for the characteristic load-bearing capacity N_{Rk1}:

$$N_{Rk1} = 0.6 \times N_1 \quad \leq 2.0 \times N_{Rd} \quad (3.5)$$

where

N_1 test load 1.5 kN; or in case of reduced loads, the mean value of the five smallest test loads

3.3 Execution

3.3.1 General

The anchors shall only be delivered as a mass-produced compiled unit (pre-assembled or packaged together).

The anchor shall be installed in accordance with the design drawings prepared in accordance with Section 3.1 and the installation instructions of the applicant.

3.3.2 Drilling of the holes

The hole shall be drilled in the bed joint or in the centre of the brick through the outer masonry leaf into the load-bearing base material. The hole shall be drilled at a right angle to the surface of the base material with a hard metal hammer drill bit or a hard metal impact drill bit.

Holes in masonry made of vertically perforated clay masonry units (Hlz) shall only be drilled with rotary drills (no impact or hammer drilling). Deviations from this provision shall only be permitted if the effect of impact or hammer drilling on the structural behaviour of the anchor in the perforated masonry is evaluated through job site tests in accordance with Section 3.2.2. Holes in masonry made of autoclaved aerated concrete masonry units shall be drilled only with rotary drills (no impact or hammer drilling).

The carbide masonry drill bits shall meet the specifications given in the January 2002 version of the leaflet "Characteristic values, requirements and tests for masonry drill bits with carbide cutting bodies which are used for the manufacture of drilled holes for anchoring" of DIBt and the Association of the German Tool Industry (Fachverband Werkzeugindustrie e.V.). Compliance of the drill bit characteristic values shall be verified in accordance with Section 5 of the leaflet.

The nominal drill hole diameter, drill bit cutting diameter and drill hole depth shall comply with Annex 5, Table 4.

The total drill hole depth t_s shall exceed the anchor sleeve length l_d by at least 20 mm. In addition, the total drill hole depth t_s shall be increased by the recessed depth h_{vers} in case of recessed installation.

If a hole is drilled incorrectly, a new hole shall be drilled at a distance of at least 1 x the depth of the incorrect hole in the respective brick. 5 x the outer diameter of the anchor is sufficient as the maximum distance. Holes drilled incorrectly shall be sealed with mortar.

3.3.3 Installation of the anchor

The temperature of the base material shall not fall below -5 °C when the screw is being inserted.

In case of flush installation, the anchor sleeve shall be inserted into the drilled hole until the sleeve collar is flush with the brick surface. In case of recessed installation, the sleeve collar shall be positioned 20 mm at maximum below the brick surface.

When the anchor is installed in the thin skins (weather-resistant skins) of external wall panels made of concrete only flush installation shall be possible.

The specific screw shall be screwed in tightly to the collar of the anchor sleeve in such a way that the screw tip penetrates the anchor sleeve.

The anchor is properly installed when the screw has been completely screwed in (it may not protrude) so that neither the anchor sleeve nor the screw can rotate.

The anchor sleeve shall only be installed once.

3.3.4 Inspection of execution

During installation of the anchors, the contractor commissioned to install the anchors or the site manager assigned by the contractor or a competent representative of the site manager shall be present at the construction site. They shall ensure that the work is carried out properly.

During the installation of the anchors, records of the verification of the base material (concrete strength class or type of masonry and strength class) and the proper installation of the anchors shall be maintained by the site manager or the site manager's representative. The records shall be available at the construction site during the construction period and shall be handed over to the construction site supervisor upon request. Like the delivery notes, they shall be kept by the contractor for a minimum of 5 years after completion of the project.

Beatrix Wittstock
Head of Section

Drawn up by
Ziegler

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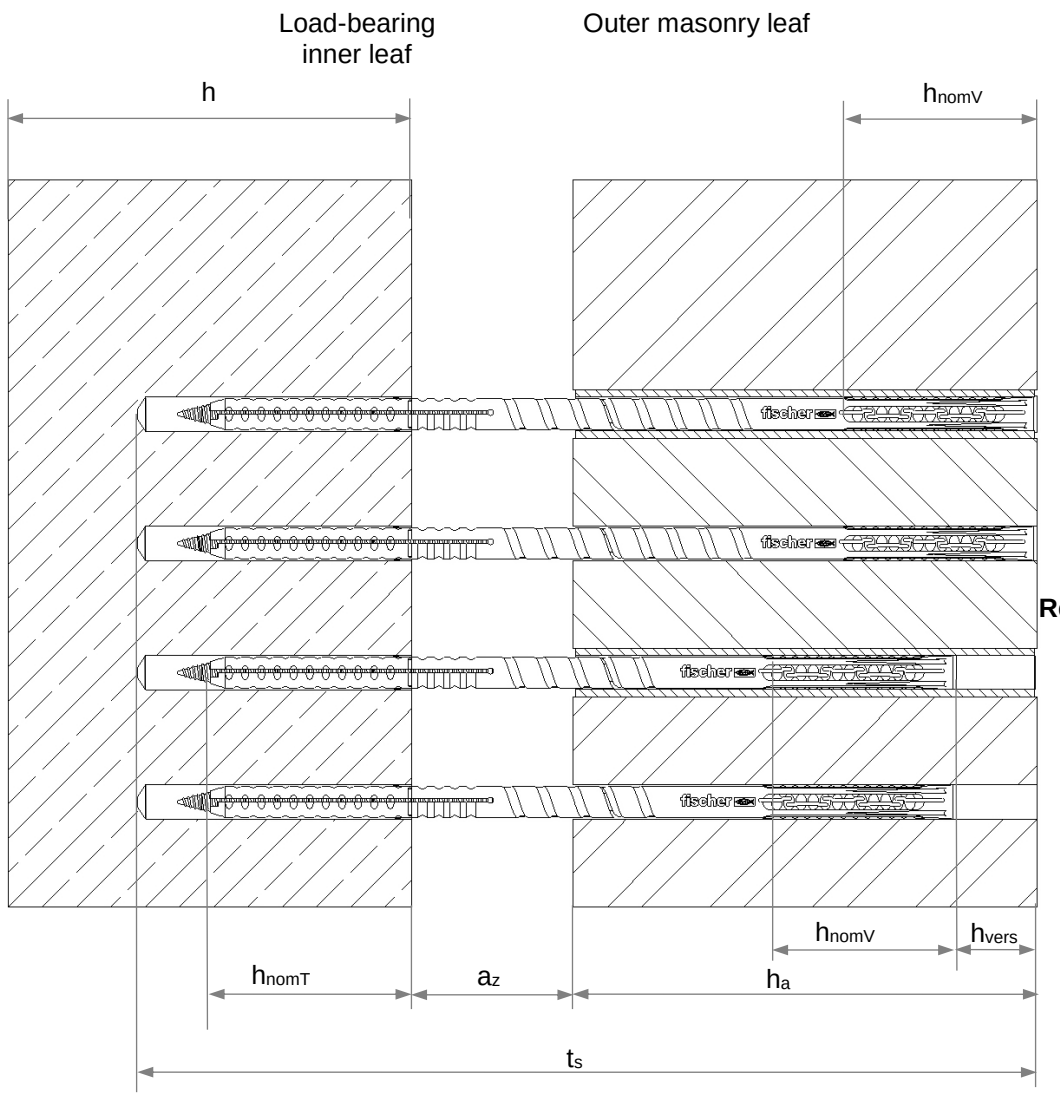
Installed anchor (illustration without insulation)



Flush installation

- in bed joint

- in centre of brick

Recessed installation

- in bed joint

- in centre of brick

Legend:

h	=	member thickness of load-bearing inner leaf
h_{nomT}	=	nominal embedment depth in load-bearing inner leaf
h_{nomV}	=	nominal embedment depth in outer masonry leaf
h_{vers}	=	recessed depth
h_a	=	thickness of outer masonry leaf
a_z	=	leaf spacing
t_s	=	total drill hole depth

Figures not to scale

'fischer remedial wall tie VBS-M' for subsequent anchorage of outer masonry leaf	Annex 1
Installed condition	

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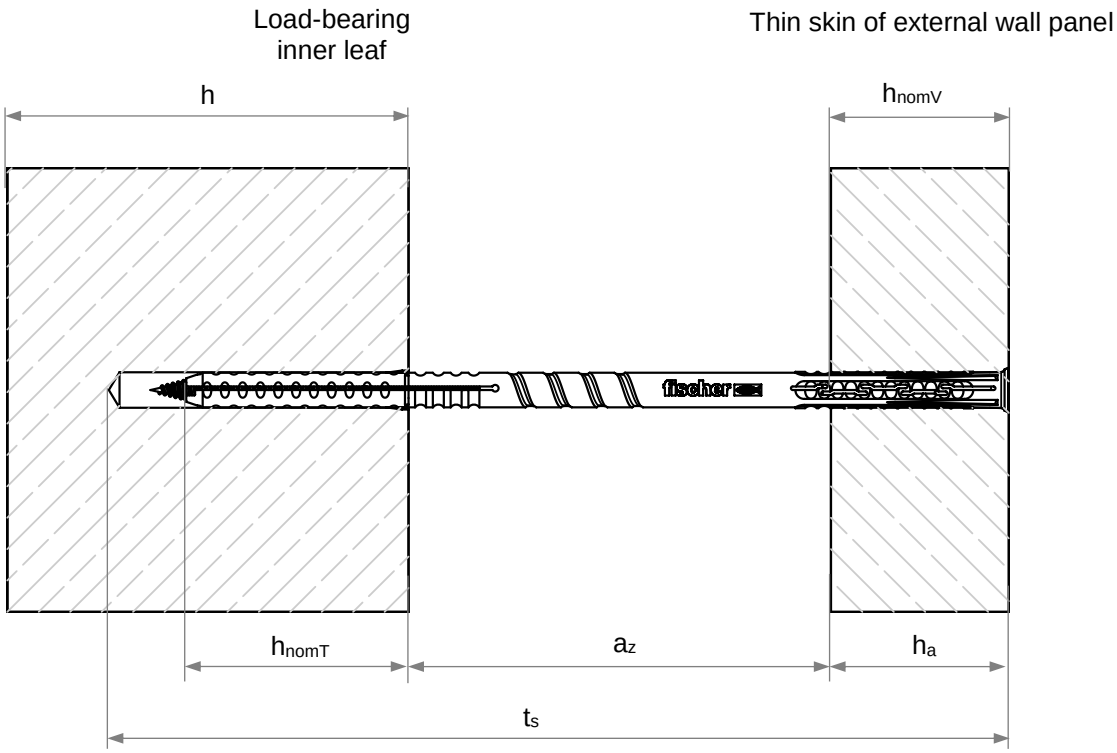
Installed anchor (illustration without insulation)



Legend:

h	=	member thickness of load-bearing inner leaf
h_{nomT}	=	nominal embedment depth in load-bearing inner leaf
h_{nomV}	=	nominal embedment depth in thin skin
ha	=	thickness of thin skin
a_z	=	leaf spacing
t_s	=	total drill hole depth

Figures not to scale

'fischer remedial wall tie VBS-M' for subsequent anchorage of outer masonry leaf	Annex 2
Installed condition combined with thin skin of external wall panel	

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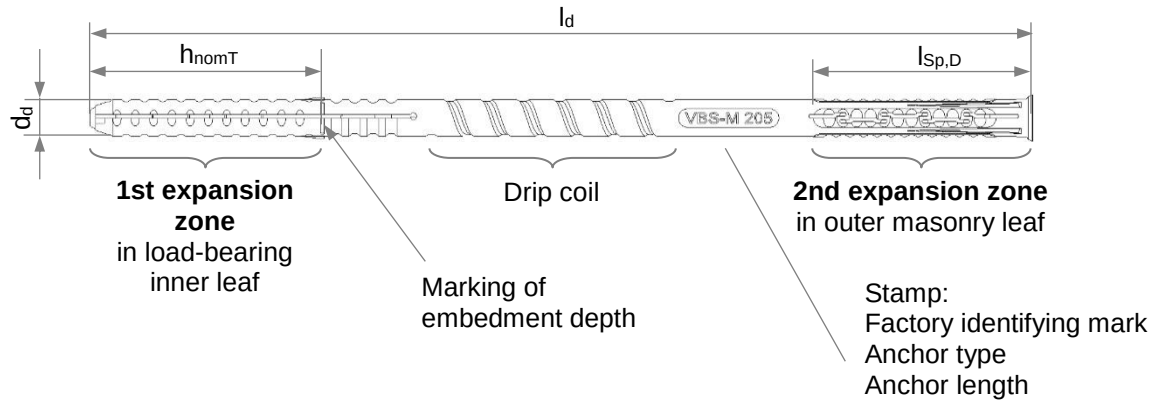
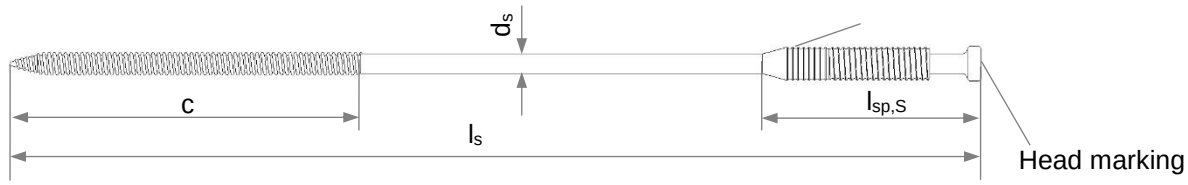
Anchor sleeve



Special screw

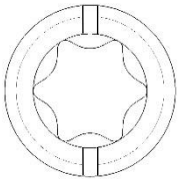
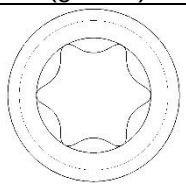


Figures not to scale

Table 1: Dimensions

Anchor size	Colour	Anchor sleeve				Corresponding special screw			
		d_d [mm]	h_{nomT} [mm]	$l_{SP,D}$ [mm]	l_d [mm]	d_s [mm]	c [mm]	$l_{sp,S}$ [mm]	l_s [mm]
VBS-M 8	grey	8	50	48	see Table 3	4.2	75	48	l_d + 8

Table 2: Materials

Designation	Material	Head marking
Anchor sleeve	polyamide PA6	-
Screw coating	PA6, fibreglass reinforced	-
Special screw	Steel[1)] Galvanised Zn5/Ag or Zn5/An in accordance with DIN EN ISO 4042:2018-11	 (groove)
	Stainless steel R of corrosion resistance class CRC III in accordance with EN 1993-1-4:2015 in conjunction with DIN EN 1993-1-4/NA:2017-01	 (without marking)

[1)] The anchor with the galvanised steel screw featuring the additional head marking shall only be used if a facade system with thermal insulation (e.g. ETICS, ventilated external wall cladding) is attached to the outer masonry leaf. The insulation shall have a thickness of at least 60 mm and there shall be no ventilation between the outer masonry leaf and this insulation.

'fischer remedial wall tie VBS-M' for subsequent anchorage of outer masonry leaf	Annex 3
Dimensions Materials	

Anchor installed **flush** (brick and joint)

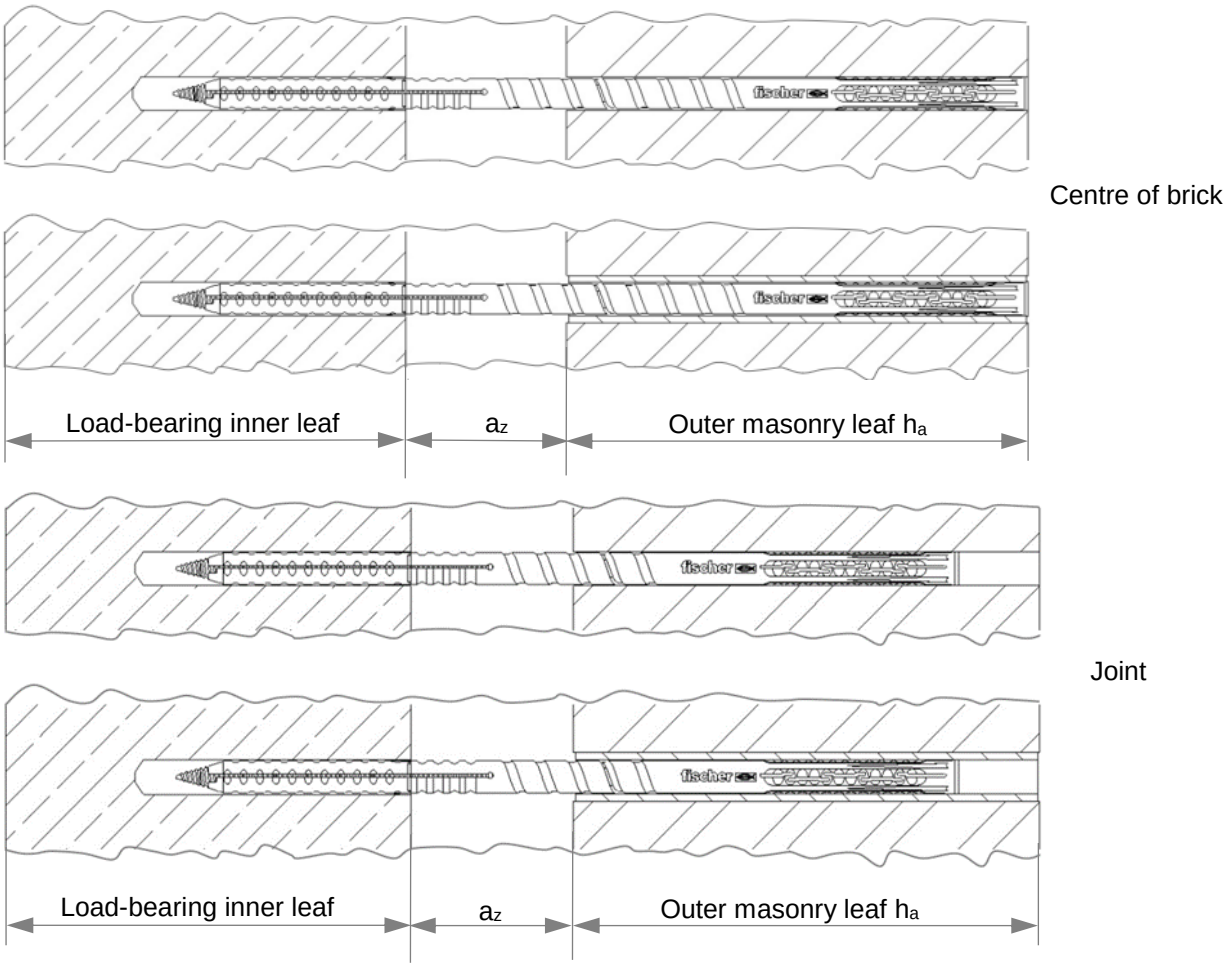


Table 3: Anchor length and common leaf spacings[1)2)]

VBS-M	Leaf spacing a_z [mm] at h_a [mm]										
h_a[3)4)]	40[5)]	50	60	70	70	80	80	100	100	115	115
8 x l_d	flush			flush	recessed	flush	recessed	flush	recessed	flush	recessed
8 x 120	≤ 30	≤ 20	≤ 10	-	-	-	-	-	-	-	-
8 x 185	-	-	≤ 75	≤ 65	≤ 85	≤ 55	≤ 75	≤ 35	≤ 55	≤ 20	≤ 40
8 x 205	-	-	≤ 95	≤ 85	≤ 105	≤ 75	≤ 95	≤ 55	≤ 75	≤ 40	≤ 60
8 x 225	-	-	≤ 115	≤ 105	≤ 125	≤ 95	≤ 115	≤ 75	≤ 95	≤ 60	≤ 80
8 x 245	-	-	≤ 135	≤ 125	≤ 145	≤ 115	≤ 135	≤ 95	≤ 115	≤ 80	≤ 100
8 x 265	-	-	≤ 155	≤ 145	≤ 165	≤ 135	≤ 155	≤ 115	≤ 135	≤ 100	≤ 120
8 x 285	-	-	≤ 175	≤ 165	≤ 185	≤ 155	≤ 175	≤ 135	≤ 155	≤ 120	≤ 140

[1)] Formula for flush installation: $a_z = l_d - h_{nomT} - h_a$
[2)] Formula for recessed installation: $a_z = l_d - h_{nomT} - h_a + h_{vers}$
[3)] Recessed installation not permitted with "medium thick bricks" and thin skins made of concrete
[4)] Other leaf spacings and recesses less than 20 mm shall be interpolated
[5)] Only permitted when thin skins made of concrete are applied

Dimensions in [mm]

Figures not to scale

'fischer remedial wall tie VBS-M' for subsequent anchorage of outer masonry leaf	Annex 4
Leaf spacing	

Table 4: Installation and anchor parameters[1)]

Anchor type				VBS-M Installation condition	
				flush	recessed h_{vers} = 0 – 20 mm
Nominal drill hole diameter	d_0		[mm]	8	
Drill bit cutting diameter	d_{cut}	≤	[mm]	8.45	
Embedment depth in load-bearing inner leaf	h_{nomT}	≥	[mm]	50	
Embedment depth in facing masonry	h_{nomV}	=	[mm]	50	
Embedment depth in thin skin (concrete)	h_{nomV}	=	[mm]	40	
Total drill hole depth	t_s	≥	[mm]	l_d + 20	l_d + 20 + h_{vers}
Thickness of outer masonry leaf	h_a	≥	[mm]	50	50 + h_{vers}
Thickness of thin skin (concrete)	h_a	≥	[mm]	40	-
Base material				Concrete	Masonry
Spacing	a	≥	[mm]	100	100 (250)[2)]
Edge distance with superimposed load	c	≥	[mm]	100	
Edge distance without superimposed load	c	≥	[mm]	250	
Thickness of load-bearing inner leaf	h	≥	[mm]	100	100

[1)] The borehole shall always be drilled through the facing masonry in the centre of the brick/joint into the load-bearing inner leaf (see Annex 1).
[2)] In the case of anchorage in a load-bearing inner leaf made of Hlz, KSL (h > 113 mm, perforation share > 15 %) and lightweight concrete hollow blocks, the spacing shall be ≥ 250 mm.

Table 5: Design load-bearing capacity for tension and compression N_{Rd} in [kN] per anchor in the load-bearing inner leaf – 1st expansion zone

Base material	Density class [-]	Minimum compressive strength class [-]	Dimensions ≥ format or L x W x H [mm]	Drilling method[1)]	Load-bearing capacity N_{Rd} [kN]
Concrete in accordance with DIN EN 206-1:2001-07	-	C12/15	150 (H)	H	**0.75**
Solid clay masonry units Mz in accordance with DIN EN 771-1:2015-11 / DIN 20000-401:2017-01	≥ 1.8	20	NF (normal size)	H	**0.75**
		12			**0.45**
Solid calcium silicate masonry units KS in accordance with DIN EN 771-2:2015-11 / DIN 20000-402:2017-01	≥ 1.8	12	2 DF (thin size)	H	**0.75**
Lightweight concrete solid units V in accordance with DIN EN 771-3:2005-05 / DIN V 20000-403:2005-06	≥ 1.2	6	2 DF	H	**0.4**
		4			**0.3**
Lightweight concrete solid blocks Vbl in accordance with DIN EN 771-3:2005-05 / DIN V 20000-403:2005-06	≥ 1.4	8	8 DF	H	**0.75**
		6			**0.6**
		4			**0.4**
Vertically perforated clay masonry units HLz in accordance with DIN EN 771-1:2015-11 / DIN 20000-401:2017-01	≥ 1.0	12	2 DF	D	**0.5**
Perforated calcium silicate masonry units KSL, in accordance with DIN EN 771-2:2015-11 / DIN 20000-402:2017-01	≥ 1.4	12	3 DF	H	**0.5**

[1)] H = impact or hammer drilling, D = rotary drilling

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Installation and anchor parameters Design load-bearing capacity for tension and compression – 1st expansion zone	

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Table 6: Design load-bearing capacity for tension and compression N_{Rd} in [kN] per anchor in the load-bearing inner leaf – 1st expansion zone

Base material	Density class [-]	Minimum compressive strength class [-]	Dimensions ≥ format or L x W x H [mm]	Drilling method[1]	Load-bearing capacity N_{Rd} [kN]
Perforated calcium silicate masonry units KSL in accordance with DIN EN 771-2:2015-11 / DIN 20000-402:2017-01	≥ 1.4	20	2 DF	H	**0.75**
Lightweight concrete hollow blocks Hbl[2] in accordance with DIN EN 771-3:2005-05 / DIN V 20000-403:2005-06	≥ 0.7	4	16 DF	H	**0.4**
		2			**0.2**
Autoclaved aerated concrete masonry units (AAC) in accordance with DIN EN 771-4:2015-11 / DIN 20000-404:2018-04	≥ 0.5	4	-	D	**0.45**
	≥ 0.6	6			**0.75**

[1] H = impact or hammer drilling, D = rotary drilling
[2] The front expansion part shall include the 1st web.

Table 7: Design load-bearing capacity for tension and compression N_{Rd} in [kN] per anchor in the outer masonry leaf / thin skins of external wall panels – 2nd expansion zone

Base material	Density class [-]	Minimum compressive strength class [-]	Dimensions ≥ format or L x W x H [mm]	Drilling method[1]	Load-bearing capacity N_{Rd} [kN]
Thin skins of external wall panels made of concrete in accordance with DIN EN 206-1:2001-07	-	C20/25	40 (H)	H	**0.3**
Facing clay masonry units KMz in accordance with DIN EN 771-1:2015-11 / DIN 20000-401:2017-01	≥ 2.2	28	NF	H	**0.6**
		20			**0.4**
		12			**0.25**
Calcium silicate facing bricks KS Vb in accordance with DIN EN 771-2:2015-11 / DIN 20000-402:2017-01	≥ 1.8	20	NF	H	**0.6**
Vertically perforated clinker bricks KHLz in accordance with DIN EN 771-1:2015-11 / DIN 20000-401:2017-01	≥ 1.8	28	NF: Cross-section reduced by more than 15 % due to perforations vertical to bed face	H	**0.6**
		20			**0.4**
		12			**0.25**
Vertically perforated clinker bricks KHLz in accordance with DIN EN 771-1:2015-11 / DIN 20000-401:2017-01 *"Medium thick bricks"*	≥ 2.0	28	240x52x71	H	**0.2**

[1] H = impact or hammer drilling, D = rotary drilling

'fischer remedial wall tie VBS-M' for subsequent anchorage of outer masonry leaf	Annex 6
Installation and anchor parameters Design load-bearing capacity for tension and compression – 1st and 2nd expansion zone	

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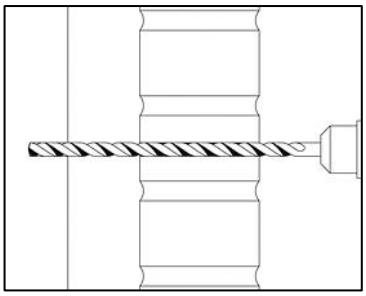
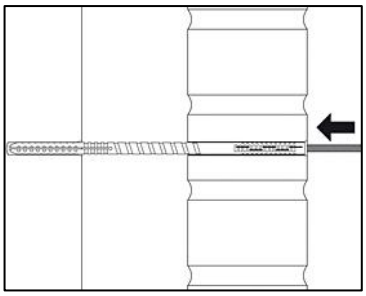
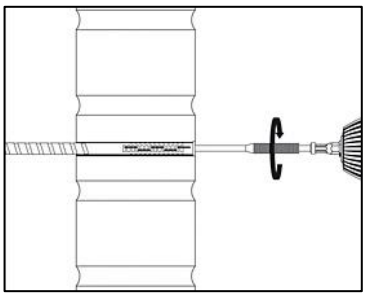
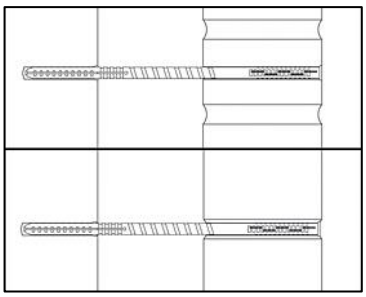
Table 8: fischer VBS-M installation instructions

	**Drilling the through-hole and anchoring hole** • Drill diameter and drilling depth: see **Table 4** "Installation and anchor parameters" • **<u>Drilling method:</u>** In the load-bearing inner leaf and in the outer masonry leaf: - impact or hammer drilling Exception: Hlz and AAC in load-bearing inner leaf shall be drilled only using rotary drilling. • Drilling at a right angle to surface Illustration: installation through centre of brick
	**Installation of assembled anchor** • Press in the remedial wall tie until the sleeve collar is flush with the surface of the brick. • Recessed installation is possible with a recessed depth not exceeding 20 mm (except for thin skins of external wall panels and medium thick bricks).
	**Screwing in the special screw** • Screw in the special screw using the screwing-in method until the screw is flush with the sleeve collar.
	**Installation position I: centre of brick** • Anchor set flush in the centre of the brick. **Installation position II: bed joint** • Anchor set flush in the bed joint.