

A public agency supported jointly by the German federal government and states

Approval and certification office for
construction products and design types

Date: 29/04/2025 Reference: I 25-1.21.1-36/25

**General national
certificate / general
design type approval**

**Number:
Z-21.1-2074**

Requested by:
TOGE Dübel GmbH & Co. KG
Illesheimer Straße 10
90431 Nuremberg
Germany

Period of validity
from: **16 April 2025**
until: **16 April 2030**

Subject of this notification:

TOGE TSM high performance concrete screw as an adhesive screw anchor for anchoring in concrete

The regulation item specified above is hereby granted general building control approval.
This notification comprises seven pages and ten appendices.
The item first received general national approval on 20 October 2016.

DIBt

I GENERAL PROVISIONS

- 1 This notification verifies the usability/applicability of the regulation item in the sense of the state building regulations.
- 2 This notification does not replace the approvals, consents and certifications legally required for implementing building projects.
- 3 This notification is issued irrespective of the rights of third parties, in particular private intellectual property rights.
- 4 The user of the regulation item must be provided with copies of this notification irrespective of further regulations in the "Special provisions". In addition, the user of the regulation item must be informed that this notification must be available at the place of use. On request, the authorities involved must also be provided with copies.
- 5 This notification may only be copied in its entirety. Publication of excerpts requires approval from the Deutsches Institut für Bautechnik (German Institute for Construction Engineering – DIBt). Text and drawings in advertising brochures must not contradict this notification. Translations must contain the note "Translation of the German original; not verified by the Deutsches Institut für Bautechnik".
- 6 This notification is issued subject to revocation. The provisions may be supplemented and changed subsequently, in particular if required based on new technical findings.
- 7 This notification refers to the information and documents provided by the requester. This notification does not cover any changes to these general provisions and all changes must be disclosed to the DIBt without delay.

II SPECIAL PROVISIONS

1 Regulation item and area of use/application

1.1 Certification item and area of use

The certification item is Chemofast injection mortar CFT 300V.

The adhesive screw anchor (in the following referred to as the “anchor”) is a concrete screw set in mortar, in the sizes 10, 12 and 14 mm. Before the concrete screw is screwed in, the injection mortar is injected into the pre-drilled and cleaned hole.

1.2 Approval item and area of application

The approval item is the planning, design and execution of anchoring in concrete using the TOGE TSM high performance concrete screw in accordance with European Technical Assessment ETA-15/0514 dated 15 September 2021 and Chemofast injection mortar CFT 300V, combined as an adhesive screw anchor.

Appendix 1 shows the anchor in its installed condition.

The anchor may be used for anchorings under static and quasi-static load in reinforced and non-reinforced standard concrete with a strength class between C20/25 and C50/60 as per DIN EN 206-1 “Concrete – Specification, performance, production and conformity – Part 1”.

The anchor may be used for anchorings with requirements for verification of the load bearing capacity for fire resistance.

The anchor may be used in cracked and non-cracked concrete.

The anchor may be installed in wet or dry concrete, but not in holes filled with water.

The anchor may be used in the following temperature range:

Temperature range: -40 °C to $+80\text{ °C}$ (max. short-term temperature $+80\text{ °C}$ and max. long-term temperature $+50\text{ °C}$)

Steel parts made of electrogalvanised steel or of steel with zinc-flake coating:

The TSM concrete screw may be used only in the conditions of dry indoor rooms.

Steel parts made of stainless steel (material 1.4401, 1.4404, 1.4571, 1.4578):

The TSM A4 concrete screw may be used in accordance with corrosion resistance class CRC III as per DIN EN 1993-1-4:2015-10 in connection with DIN EN 1993-1-4:2020-11.

Steel parts made of stainless steel (material 1.4529):

The TSM HCR concrete screw may be used in accordance with corrosion resistance class CRC V as per DIN EN 1993-1-4:2015-10 in connection with DIN EN 1993-1-4:2020-11.

2 Provisions for the construction product

2.1 Properties and composition

Chemofast injection mortar CFT 300V must correspond to the specifications in Appendix 2.

The characteristic values of the injection mortar not specified in this notification must correspond to the information filed with the DIBt, the certification body and the external monitoring body.

2.2 Packaging, storage and labelling

2.2.1 Packaging and storage

The two components of the injection mortar are supplied unmixed in cartridges for mixing in accordance with Appendix 2.

The injection mortar cartridges must be protected against sunlight and heat and stored dry at temperatures between +5 °C and +25 °C in accordance with the installation instructions.

2.2.2 Labelling

The packaging, product leaflet or delivery note of Chemofast injection mortar CFT 300V must be labelled by the manufacturer with the conformity mark ("Ü mark") in accordance with the conformity mark directives of the states.

The labelling may be applied only when the prerequisites as per section 2.3 are met.

The injection mortar cartridge must be labelled in accordance with the regulation on hazardous work materials and with the text "Chemofast injection mortar CFT 300V" as well as information about shelf life, hazard marking and processing. The installation instructions supplied with the adhesive screw anchor system must contain information about safety measures for handling hazardous materials.

2.3 Confirmation of conformity

2.3.1 General information

The confirmation of conformity of Chemofast injection mortar CFT 300V with the provisions of this general national certificate must be implemented for each production facility by means of a declaration of conformity by the manufacturer based on in-house production monitoring and a certification of conformity from an appropriately recognised certification body as well as regular third-party monitoring by a recognised monitoring body in line with the following provisions:

For issuing of the certificate of conformity and the third-party monitoring, including the associated product tests, the manufacturer of the construction products must bring in an appropriately recognised certification body and an appropriately recognised monitoring body.

The manufacturer must issue the declaration of conformity by labelling the construction product with the conformity mark (Ü mark) with reference to the intended use.

The certification body must provide the DIBt with a copy of the conformity certificate issued by it for information purposes.

2.3.2 In-house production monitoring

In-house production monitoring must be established and conducted at each production facility. In-house production monitoring is the continuous monitoring of production conducted by the manufacturer, which the manufacturer uses to ensure that manufactured construction products correspond to this general national certificate.

The test plan filed with the DIBt and the third-party monitoring body is decisive for the extent, type and frequency of in-house production monitoring.

The results of the in-house production monitoring must be recorded and evaluated. The records must contain at least the following information:

- designation of the construction product or raw material and the components
- type of check/test
- date of manufacture and check of the construction product or raw material or the components

- result of the checks and tests and, if applicable, comparison to the requirements
- signature of the person responsible for in-house production monitoring at the facility

The records must be retained for at least five years and submitted to the monitoring body commissioned with third-party monitoring. They must be submitted to the DIBt and the responsible top-level building supervisory authority on request. If the test result is unsatisfactory, the manufacturer must immediately take the required measures for eliminating the fault. Construction products that do not meet the requirements must be handled in such a way that any confusion with compliant products is excluded. The existing check/test must be repeated immediately upon elimination of the fault, in as far as this is technically possible and is required for verifying elimination of the fault.

2.3.3 Third-party monitoring

At each production facility for the Chemofast injection mortar CFT 300V, in-house production monitoring must be checked by third-party monitoring regularly, but at least once a year.

Third-party monitoring must include an initial check/test and random samples must be taken. The recognised monitoring body is responsible for taking samples and conducting the checks/tests.

The test plan filed with the DIBt and the third-party monitoring body is decisive for the extent, type and frequency of third-party monitoring.

The results of the certification and the third-party monitoring must be retained for at least five years. They must be submitted to the DIBt and the responsible top-level building supervisory authority by the certification body / third-party monitoring body on request.

3 Provisions for planning, design and installation

3.1 Planning

The anchorings must be planned using the rules of engineering. Verifiable calculations and design drawings must be produced, taking into account the loads to be anchored.

3.2 Design

3.2.1 General information

The anchorings must be designed as per DIN EN1992-4:2019-04.

This design provides verification of the direct local force application in the concrete. The further transmission of the loads to be anchored in the element must be verified.

Additional loads which can arise from restricted changes in shape (e.g. due to temperature changes) in the anchor, in the element to be connected or in the element in which the anchor is placed must be taken into account.

If the edge distance of the anchor is less than the characteristic edge distance $c_{cr,N}$, lengthwise reinforcement with a diameter of at least 6 mm must be present at the edge of the element in the area of the anchoring depth.

3.2.2 Cold design

The characteristic anchor values for verification according to design method A as per DIN EN1992-4:2019-04 are listed in Appendix 8, table 6.

3.2.3 Displacement behaviour

Appendix 10 lists the expected displacement. These apply to the associated loads. For a shear load, the existing hole play between the anchor and the attached part must be taken into account.

3.2.4 Verification for fire resistance

The provisions as per DIN EN1992-4:2019-04, section 10, must be taken into account when designing anchorings under the influence of fire. The characteristic anchor values are listed in Appendix 9, table 7. The design method applies to a one-sided fire load on the element. For fire load from multiple sides, the design method can be used only if the edge distance of the anchor is $c \geq 300$ mm.

3.3 Installation

3.3.1 General information

The anchor may be used only as a fastener that is supplied as a standard product. Exchanging/replacing individual parts is not permissible.

The anchor must be installed in line with the design drawings produced in accordance with section 3.1, taking into account the installation instructions in Appendices 6 and 7. Before the anchor is installed, the concrete strength class of the anchoring ground must be determined. The concrete strength must not be less than C20/25 and must not exceed C50/60.

To confirm compliance of the design type with the general design type approval covered by this notification, the responsible construction company must issue a declaration of conformity as per sect. 16a(5) in connection with sect. 21(2) of the German Model Building Code (MBO).

3.3.2 Drilling and cleaning the hole

The position of the drilled hole must be coordinated so as to avoid damage to the reinforcement.

The hole must be drilled at a right angle to the concrete surface using TCT masonry drill bits or diamond core drill bits. The TCT masonry drill bit must comply with the information in the information leaflet from the Institut für Bautechnik and the Fachverband Werkzeugindustrie e.V. "Kennwerte, Anforderungen und Prüfungen von Mauerbohrern mit Schneidkörpern aus Hartmetall, die zur Herstellung der Bohrlöcher von Dübelverankerungen verwendet werden" (Characteristic values, requirements and tests for masonry drills with TCT cutting elements which are used for producing holes intended for screw anchoring) in the version dated January 2002.

Compliance with the characteristic values of the drill bit must be verified with an acceptance test certificate A (as per DIN EN 10204:2005-01) or with the test mark from the Prüfgemeinschaft Mauerbohrer e.V., Remscheid (see information leaflet).

The nominal diameter of the drill and the diameter of the drill bit must correspond to the values in Appendix 5.

If a faulty hole is drilled, a new hole must be drilled at a distance of at least twice the depth of the faulty hole.

The hole must be cleaned thoroughly in accordance with the manufacturer's installation instructions by at least 1 x air blasting, 4 x brushing and 1 x air blasting.

The associated steel wire cleaning brush as per Appendix 5, with an outer diameter as per table 4, must be used for brushing out the holes. Before use of the brush, it must be verified that the brush still has a sufficient diameter.

3.3.3 Installing the anchor

The anchor must not be installed in holes that are filled with water.

The processing temperature of the mortar must be at least +5 °C.

The temperature of the anchor during installation must be at least +5 °C. The temperature in the anchoring ground must not fall below -5 °C while the injection mortar is curing.

The mortar components are mixed during pressing in the static mixer of the individual injection mortar cartridges as per Appendix 2. The injection mortar is sufficiently mixed when it has an evenly grey colour. The first 10 cm of the injection mortar of each container must be discarded and must not be used for anchoring. The permissible processing time of a cartridge, including screwing in the anchor, must be taken from the installation instructions and depends on the temperature in the cartridge and in the anchoring ground.

The hole must be filled with the minimum quantity of injection mortar as stated in the installation instructions and then the anchor must be screwed in immediately afterwards.

The anchor can be installed with an impulse wrench with tangential impact.

To prevent the anchor from spinning, the wrench must be equipped with an automatic shut-off device for the power output in the upper range, e.g. using the depth stop.

Depending on the anchor length and the existing fastening thickness, the effective anchoring depth (length of the anchor in the hole) in accordance with Appendix 5, table 4, must be observed.

The anchor is installed correctly when:

- excess mortar is emitted on the concrete surface
- the element to be fastened is screwed against the concrete across the entire surface without any intermediate layer
- slight further turning of the anchor is not possible
- the effective anchoring depth has been complied with.

The wait time (minimum curing time) until a load can be applied in accordance with Appendix 2 must be complied with. Installation torques are not required for the load bearing capacity of the anchor. The tightening torques listed in Appendix 5, table 4 for nuts regarding the variant with connecting thread, however, must not be exceeded during installation.

3.3.4 Checking installation

The company tasked with the anchoring, the construction site manager commissioned by them or a competent representative of the construction site manager must be present at the construction site during installation of the anchors. They must ensure correct execution of the work.

During installation of the anchors, the construction site manager or their representative must document verification of the existing concrete strength class and correct installation of the anchors.

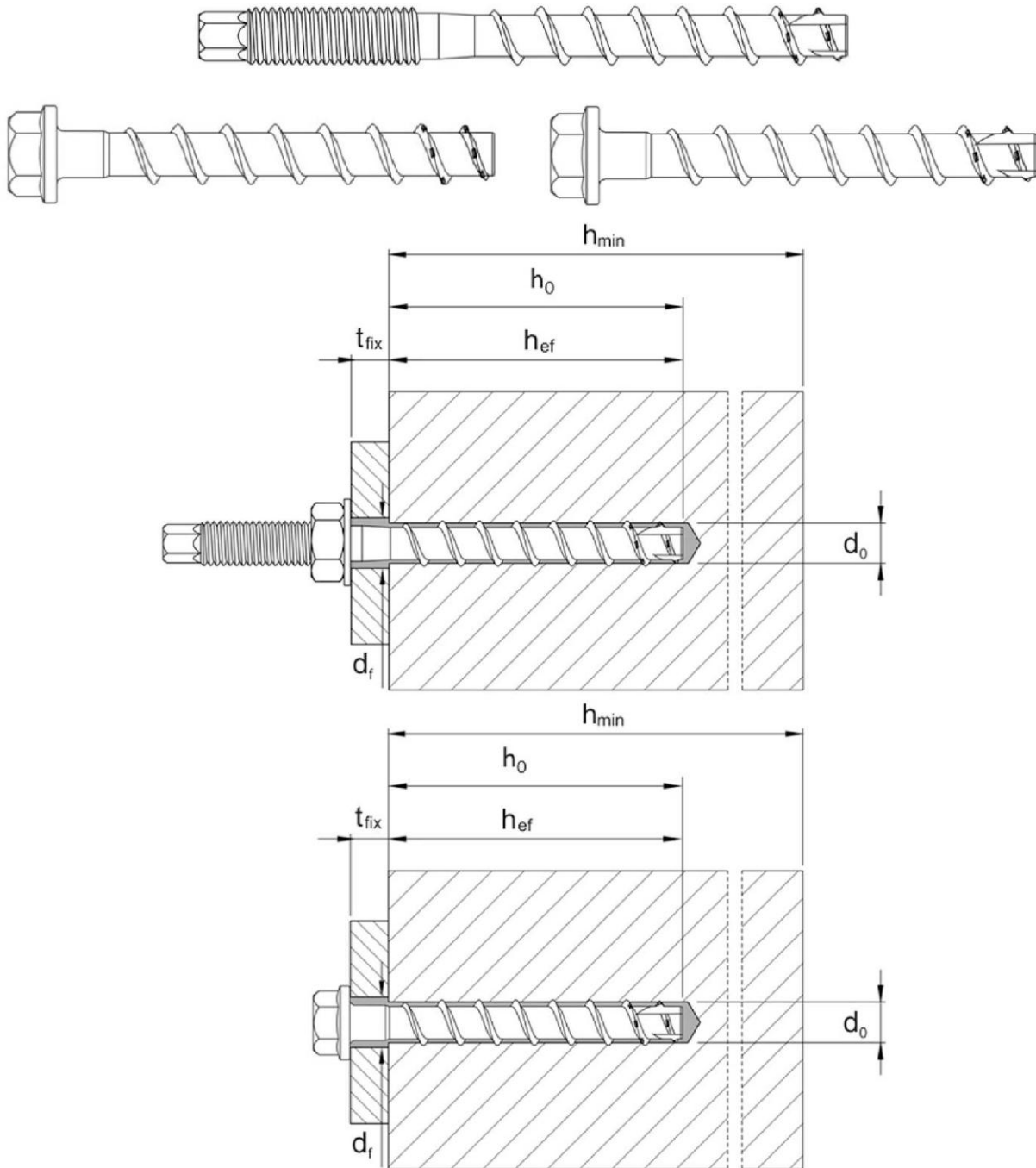
For this purpose, the respective documents must be available at the construction site during the construction period and must be submitted to the person responsible for verification on request. As well as the delivery notes, these documents must be retained by the company for at least 5 years after completion of the work.

Dipl.-Ing. Beatrix Wittstock
Head of Department

Certified
Tempel

Installed product

TOGE TSM high performance concrete screw as adhesive screw anchor



d_0 = nominal diameter of the drilled hole
 t_{fix} = thickness of the element to be fastened
 d_r = through-hole in the element to be fastened

h_{min} = minimum element thickness
 h_{ef} = effective anchoring depth
 h_0 = depth of drilled hole

TOGE TSM high performance concrete screw as an adhesive screw anchor for anchoring in concrete

Product description

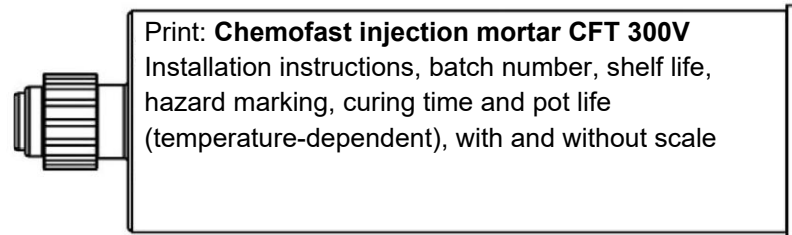
Product and installed condition

Appendix 1

Injection mortar



Injection mortar



Static mixer



Application gun

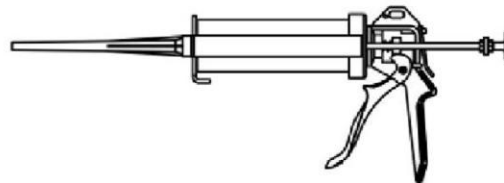


Table 1: Temperature table

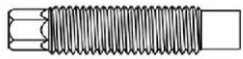
| Substrate and mortar temperature [°C] | Maximum processing time t_{work} [min] | Minimum curing time in dry substrate t_{cure} [min] | Minimum curing time in wet substrate t_{cure} [min] |
|---------------------------------------|--|---|---|
| ≥ -5 | 60 | 360 | 720 |
| ≥ 0 | 60 | 180 | 360 |
| ≥ 5 | 60 | 120 | 240 |
| ≥ 10 | 45 | 80 | 160 |
| ≥ 20 | 15 | 45 | 90 |
| ≥ 30 | 5 | 25 | 50 |
| 35 | 4 | 20 | 40 |

Installation in dry or damp concrete, but not in holes filled with water
 Temperature range: -40 °C to +80 °C
 (max. short-term temperature +80 °C and max. long-term temperature +50 °C)

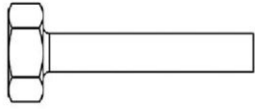
TOGE TSM high performance concrete screw as an adhesive screw anchor for anchoring in concrete

Product description
 Injection mortar and temperature table

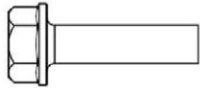
Appendix 2



Version with metric connecting thread and hexagon socket, e.g. TSM 10x120 M12 WAF9



Version with hexagon head, e.g. TSM 10x100 WAF15 OS



Version with hexagon head, attached washer, e.g. TSM 10x100 WAF15 VZ 40

Stamping:

TSM

Screw type: TSM
 Screw diameter: 10
 Screw length: 100

TSM A4

Screw type: TSM
 Screw diameter: 10
 Screw length: 100
 Material: A4

TSM HCR

Screw type: TSM
 Screw diameter: 10
 Screw length: 100
 Material: HCR

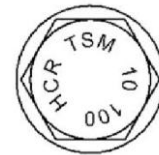
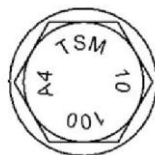
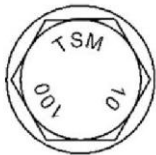


Table 2: Material for TOGE TSM high performance concrete screw

| Part | Designation | Material | | |
|--------------|-------------|--|--|--|
| All versions | TSM | - Steel EN 10263-4:2018-02, electrogalvanised as per DIN EN ISO 4042:2022-11 - Zinc-flake coated as per DIN EN ISO 10683: 2018-11(≥ 5 µm) | | |
| | TSM A4 | 1.4401; 1.4404; 1.4571; 1.4578 | | |
| | TSM HCR | 1.4529 | | |
| Part | Designation | Nominal characteristic | | elongation at break A ₅ [%] |
| | | Yield strength f _{yk} [N/mm ²] | Tensile strength f _{uk} [N/mm ²] | |
| All versions | TSM | 560 | 700 | ≤ 8 |
| | TSM A4 | | | |
| | TSM HCR | | | |

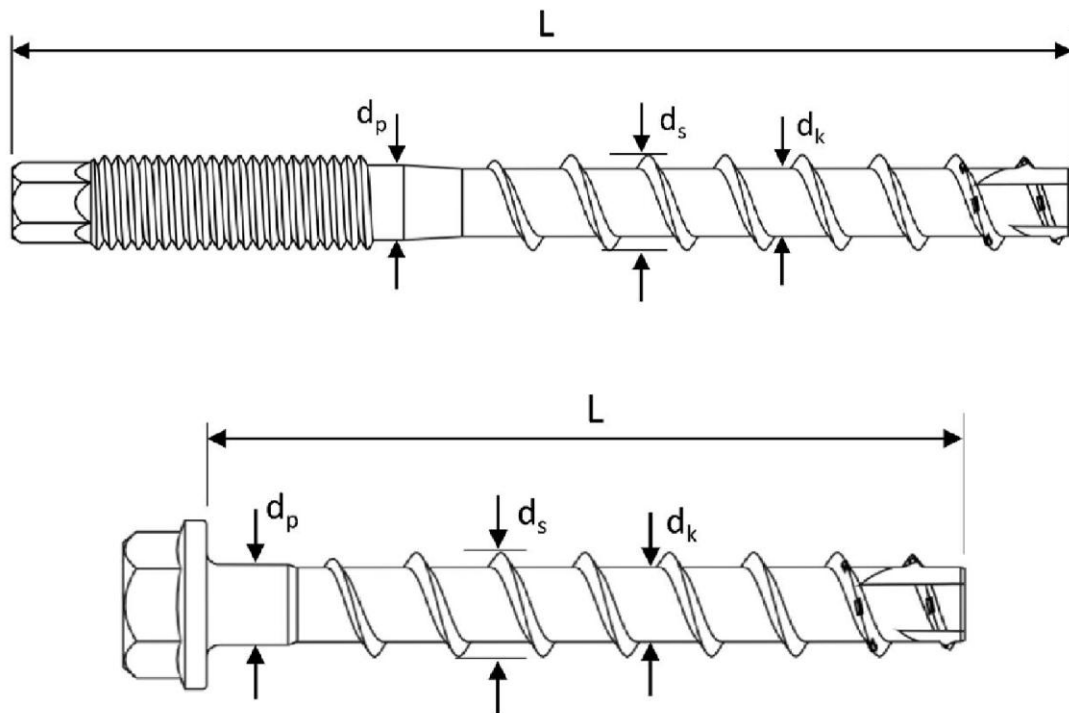
TOGE TSM high performance concrete screw as an adhesive screw anchor for anchoring in concrete

Product description
 Versions, stamping and materials

Appendix 3

Table 3: Anchor dimensions, TOGE TSM high performance concrete screw

| TOGE TSM high performance concrete screw | | | 10 | 12 | 14 |
|--|----------|------|------|------|------|
| Screw length | $L \geq$ | [mm] | 85 | 105 | 120 |
| | $L \leq$ | | 310 | 310 | 310 |
| Core diameter | d_k | [mm] | 9.1 | 11.1 | 13.1 |
| Outer thread diameter | d_s | [mm] | 12.6 | 14.6 | 16.6 |
| Shank diameter | d_p | [mm] | 9.9 | 11.7 | 13.7 |



TOGE TSM high performance concrete screw as an adhesive screw anchor for anchoring in concrete

Product description
 Anchor dimensions

Appendix 4

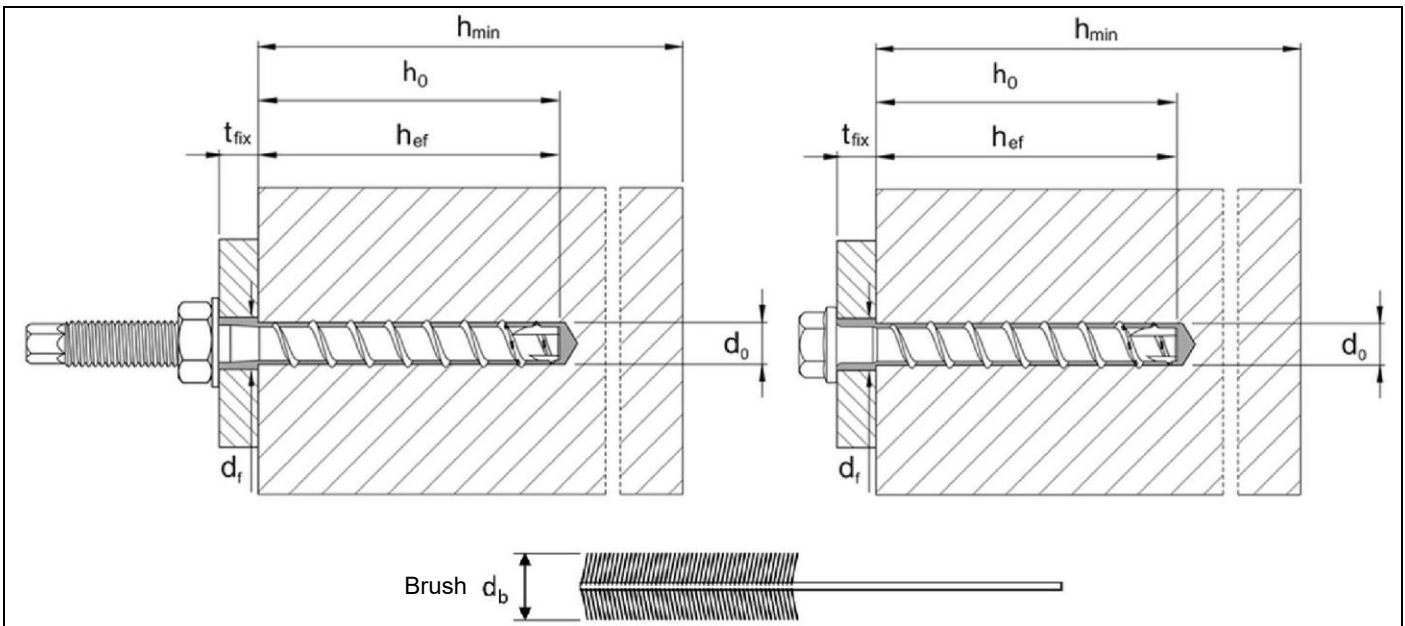


Table 4: Installation parameters

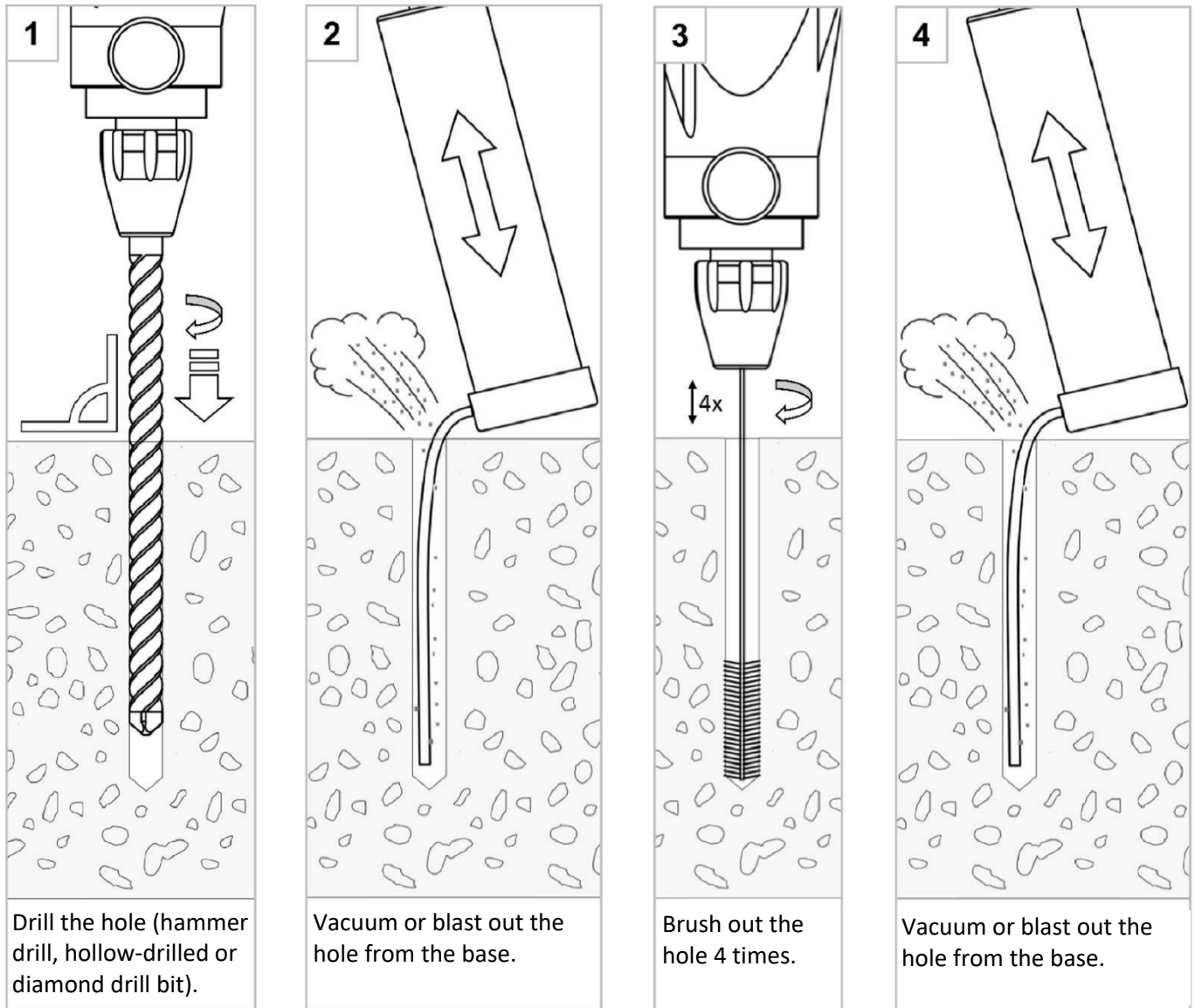
| TOGE TSM high performance concrete screw | | | 10 | 12 | 14 |
|---|-----------------|---|-------|-------|-------|
| Effective anchoring depth | $h_{ef,min}$ | [mm] | 80 | 100 | 100 |
| Nominal drill diameter | d_0 | [mm] | 10 | 12 | 14 |
| Drill bit diameter | $d_{cut} \leq$ | [mm] | 10.45 | 12.50 | 14.50 |
| Hole depth | $h_0 \geq$ | [mm] | 80 | 100 | 100 |
| Brush diameter | d_b | [mm] | 11 | 13 | 15 |
| Through-hole in the element to be fastened | $d_r \leq$ | [mm] | 14 | 16 | 18 |
| Tightening torque for variant with connector thread | $T_{inst} \leq$ | [Nm] | 40 | 60 | 80 |
| Tangential impact wrench | [Nm] | Max. rated torque as per manufacturer's information | | | |
| | | 400 | 650 | 650 | |

Table 5: Minimum element thickness, minimum centre distance and edge distance

| TOGE TSM high performance concrete screw | | | 10 | 12 | 14 |
|--|-----------|------|---------------|----|---------------|
| Minimum element thickness | h_{min} | [mm] | $h_{ef} + 60$ | | $h_{ef} + 70$ |
| Min. centre distance | s_{min} | [mm] | 40 | 50 | 60 |
| Min. edge distance | c_{min} | [mm] | 40 | 50 | 60 |

| | |
|---|-------------------|
| TOGE TSM high performance concrete screw as an adhesive screw anchor for anchoring in concrete | Appendix 5 |
| Product description Installation parameters, minimum element thickness, minimum centre distance and edge distance | |

Installation instructions – drilling and cleaning the hole



Note:

1. Hollow-drilled (with vacuum extraction) holes do not need to be cleaned.
3. Brush out the hole 4 times by hand or with a machine. The brush has to reach all the way to the bottom of the hole and then back up to concrete surface.
4. The hole must be free of all dust, dirt and oil. If the hole remains open for an extended period, it must be protected against dirt or the cleaning process must be repeated.

TOGE TSM high performance concrete screw as an adhesive screw anchor for anchoring in concrete

Intended use

Installation instructions – drilling and cleaning the hole

Appendix 6

Installation instructions – injection and screwing in

1

Discard 3 full strokes (until the colour is constant).

2

Fill the hole with injection mortar to about 2/3 of the depth, without bubbles.

3

Screw, with impact wrench

4

Screw, installed

5

The element to be fastened can be installed immediately after the screw has been installed.

Note:

- 2. For deep holes, the use of a mixer extension and filler necks is recommended.
- 4. When the insertion depth has been reached, injection mortar must have been emitted at the concrete surface.
- 5. T_{inst} as per table 4 (Appendix 5)

TOGE TSM high performance concrete screw as an adhesive screw anchor for anchoring in concrete

Intended use
 Installation instructions – injection and screwing in

Appendix 7

Table 6: Load bearing capacity under static and quasi-static load

| TOGE TSM high performance concrete screw | | | | 10 | 12 | 14 |
|--|-----------------|-------------|----------|----------------|------|----|
| Steel failure for tensile load and shear load | | | | | | |
| Characteristic resistance | $N_{Rk,s}$ | [kN] | 45 | 67 | 94 | |
| Partial safety factor | $\gamma_{Ms,N}$ | [-] | 1.5 | | | |
| Characteristic resistance | $V_{Rk,s}$ | [kN] | 34 | 42 | 56 | |
| Partial safety factor | $\gamma_{Ms,V}$ | [-] | 1.25 | | | |
| Factor for ductility | k_7 | [-] | 0.8 | | | |
| Characteristic bending moment | $M^0_{Rk,s}$ | [Nm] | 56 | 113 | 185 | |
| Pulling out | | | | | | |
| Characteristic resistance in cracked and uncracked concrete C20/25 | $N_{Rk,p}^{1)}$ | [kN] | 39.7 | 59.0 | 65.9 | |
| Increasing factors for $N_{Rk,p} = N_{Rk,p(C20/25)} * \psi_c$ | C30/37 | ψ_c | [-] | 1.22 | | |
| | C40/50 | | | 1.41 | | |
| | C50/60 | | | 1.58 | | |
| Concrete breakout and gaps; concrete breakout on the side away from the load (pryout) | | | | | | |
| Minimum effective anchoring depth | $h_{ef,min}$ | [mm] | 80 | 100 | 100 | |
| k factor | Non-cracked | k_{ucr} | [-] | 7.7 | 8.9 | |
| | Cracked | k_{cr} | [-] | | | |
| Concrete failure | Centre distance | $s_{cr,N}$ | [mm] | 3 x h_{ef} | | |
| | Edge distance | $c_{cr,N}$ | [mm] | 1.5 x h_{ef} | | |
| Gaps | Centre distance | $s_{cr,Sp}$ | [mm] | 4 x h_{ef} | | |
| | Edge distance | $c_{cr,Sp}$ | [mm] | 2 x h_{ef} | | |
| Factor for pryout failure | k_8 | [-] | 2.0 | | | |
| Installation coefficient | γ_{inst} | [-] | 1.0 | | | |
| Concrete edge failure | | | | | | |
| Effective length in concrete | l_f | | h_{ef} | | | |
| Nominal screw diameter | d_{nom} | | 10 | 12 | 14 | |

¹⁾ The values apply to all anchoring depths $\geq h_{ef,min}$.

| | |
|---|-------------------|
| TOGE TSM high performance concrete screw as an adhesive screw anchor for anchoring in concrete | Appendix 8 |
| Performance characteristics Load bearing capacity under static and quasi-static load | |

Table 7: Load bearing capacity under influence of fire

| TOGE TSM high performance concrete screw | | | | 10 | 12 | 14 |
|--|--------|--------------------|------|--------------|------------|------|
| Steel failure for tensile and shear load ($F_{Rk,s,fi} = N_{Rk,s,fi} = V_{Rk,s,fi}$) | | | | | | |
| Characteristic resistance | R30 | $F_{Rk,s,fi30}$ | [kN] | 4.4 | 7.3 | 10.3 |
| | R60 | $F_{Rk,s,fi60}$ | [kN] | 3.3 | 5.8 | 8.2 |
| | R90 | $F_{Rk,s,fi90}$ | [kN] | 2.3 | 4.2 | 5.9 |
| | R120 | $F_{Rk,s,fi120}$ | [kN] | 1.7 | 3.4 | 4.8 |
| | R30 | $M^0_{Rk,s,fi30}$ | [Nm] | 5.9 | 12.3 | 20.4 |
| | R60 | $M^0_{Rk,s,fi60}$ | [Nm] | 4.5 | 9.7 | 15.9 |
| | R90 | $M^0_{Rk,s,fi90}$ | [Nm] | 3.0 | 7.0 | 11.6 |
| | R120 | $M^0_{Rk,s,fi120}$ | [Nm] | 2.3 | 5.7 | 9.4 |
| Pulling out | | | | | | |
| Characteristic resistance | R30-90 | $N_{Rk,p,fi}$ | [kN] | 4.8 | 6.2 | 7.6 |
| | R120 | $N_{Rk,p,fi}$ | [kN] | 3.9 | 4.9 | 6.1 |
| Verification for concrete breakout must be provided as per DIN EN 1992-4:2019-04 Annex D. | | | | | | |
| Edge distance | | | | | | |
| R30 to R120 | | $C_{cr,fi}$ | [mm] | 2 x h_{ef} | | |
| For load applied from multiple sides, the edge distance is ≥ 300 mm. | | | | | | |
| Centre distance | | | | | | |
| R30 to R120 | | $S_{cr,fi}$ | [mm] | 4 x h_{ef} | | |
| In wet concrete, the anchoring depth must be increased by at least 30 mm compared to the value stated. | | | | | | |
| TOGE TSM high performance concrete screw as an adhesive screw anchor for anchoring in concrete | | | | | Appendix 9 | |
| Performance characteristics Load bearing capacity under influence of fire | | | | | | |

Table 8: Displacement under static and quasi-static load

| TOGE TSM high performance concrete screw | | | | 10 | 12 | 14 |
|--|--------------|--------------------|------|------|------|------|
| Displacement under tensile load | | | | | | |
| Cracked and non-cracked concrete | Tensile load | N | [kN] | 23.3 | 30.0 | 33.5 |
| | Displacement | δ_{N0} | [mm] | 0.6 | 0.7 | 0.8 |
| | | $\delta_{N\infty}$ | [mm] | 0.6 | 0.7 | 0.8 |
| Displacement under shear load | | | | | | |
| Cracked and non-cracked concrete | Shear load | V | [kN] | 16.2 | 20.0 | 30.5 |
| | Displacement | δ_{V0} | [mm] | 2.7 | 4.1 | 4.6 |
| | | $\delta_{V\infty}$ | [mm] | 4.3 | 6.2 | 7.0 |

TOGE TSM high performance concrete screw as an adhesive screw anchor for anchoring in concrete

Performance characteristics
 Displacement under static and quasi-static load

Appendix 10