

National technical approval / General construction technique permit

Zulassungsstelle für Bauprodukte und Bauarten

Bautechnisches Prüfamt

Eine vom Bund und den Ländern
gemeinsam getragene Anstalt des öffentlichen Rechts

Mitglied der EOTA, der UEAtc und der WFTAO

Date:

27 Aug 2020

Reference:

I 25-1.21.8-45/20

Number:

Z-21.8-2090

Validity

from: **27 August 2020**

to: **21 June 2023**

Applicant:

Adolf Würth GmbH & Co. KG

Reinhold-Würth-Straße 12-17

74653 Künzelsau, Germany

Subject of decision:

Würth concrete screws W-BS and 'W-BS-T temporary' for temporary use in concrete

The subject named above is herewith granted a national technical approval (*allgemeine bauaufsichtliche Zulassung*) / general construction technique permit (*allgemeine Bauartgenehmigung*). This decision contains seven pages and six annexes.

This national technical approval / general construction technique permit replaces national technical approval / general construction technique permit no. Z-21.8-2090 of 21 June 2018. The subject concerned was granted the first national technical approval on 21 June 2018.

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 Deutsches Institut für Bautechnik. 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

This decision covers the Würth concrete screw 'W-BS-T temporary' with a hexagon head in sizes 10, 12 and 14 mm. The screw is made of galvanised steel or zinc-flake-coated steel.

The subject of the permit is the planning, design and execution of temporary anchorages for use in concrete using the Würth concrete screw 'W-BS-T temporary' or the Würth concrete screw W-BS as specified in the European Technical Assessment ETA-16/0043 of 29 July 2019.

The Würth concrete screw 'W-BS-T temporary' or W-BS (hereinafter referred to as 'anchor') is screwed into a pre-drilled cylindrical hole. In this process, the special thread of the anchor cuts a thread into the base material. The anchor is installed by form-fit of the special thread in the concrete.

The installed anchor is shown in Annex 1.

1.2 Field of use and application

The anchor may be installed in reinforced and unreinforced normal weight concrete with a minimum strength class of C20/25 and a maximum strength class of C50/60 in accordance with DIN EN 206-1:2001-07 'Concrete; Part 1: Specification, performance, production and conformity' as well as in cracked and uncracked concrete.

The anchor may be installed and loaded before the required characteristic compressive strength of the concrete has been reached subject to verification in accordance with Section 3.3.1.

The temporary anchorages are intended for mounting construction site equipment, such as shoring props, fall protection devices and scaffolds.

After the anchor has been unscrewed, it may be reused in other drill holes. However, a drilled hole shall not be reused after the anchor has been removed. Reusability of the anchor shall be checked prior to every use, both visually as well as with a sleeve setting jig in accordance with Section 3.3.3. Installed anchors shall be regularly checked for visible damage (e.g. caused by corrosion).

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

2 Provisions for the construction product

2.1 Properties and composition

The Würth concrete screw 'W-BS-T temporary' shall correspond to the drawings and specifications given in the annexes. The material characteristics, dimensions and tolerances of the screws 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 Marking

The packaging, accompanying leaflet or delivery note of the Würth concrete screw 'W-BS-T temporary' 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. In addition, the factory identifying mark, the approval number and the complete designation of the concrete screw shall be specified.

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

The concrete screw is referred to as Würth concrete screw W-BS-T 10, W-BS-T 12 or W-BS-T 14.

Each concrete screw shall be marked with the type, size and screw length in accordance with Annex 2.

2.3 Confirmation of conformity

2.3.1 General

The manufacturer shall confirm for each manufacturing plant that the Würth concrete screw 'W-BS-T temporary' 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 to be carried out in the process, the manufacturer of the concrete screw 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 concrete screw with the national conformity mark (*Ü-Zeichen*) 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.

The test plan deposited with DIBt and the external surveillance body shall be decisive for the scope, type and frequency of the factory production control.

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 and 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 for the Würth concrete screw 'W-BS-T temporary' 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 concrete screw 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.

The test plan deposited with DIBt and the external surveillance body shall be decisive for the scope, type and frequency of external surveillance.

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 taking into account the loads to be anchored.

The design drawings shall contain the exact positions as well as size of the Würth concrete screw 'W-BS-T temporary' or W-BS.

3.2 Design

The present design provides the verification of the immediate local transmission of the anchor loads into the concrete. The transfer of the loads to be anchored in the concrete member shall be verified.

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

The minimum spacings (spacings, edges distances) between the anchors and the thickness of the member shall not fall below the values given in Annex 5.

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

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

The design values for resistance shall apply to all load directions (except at right angles to the prop axis), irrespective of the failure mode. The resistances F_{Rd} are listed in Annex 6, Table 5, depending on the anchor size, the embedment depth and the concrete strength $f_{ck, cube}$.

3.3 Execution

3.3.1 General

The anchor shall be installed in accordance with the design drawings prepared in accordance with Section 3.1.

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

3.3.2 Drilling and cleaning of drilled hole

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

The hole shall be drilled perpendicular to the concrete surface using carbide masonry drill bits. The carbide masonry drill bit shall meet the specifications of the January 2002 version of the DIBt leaflet 'Characteristic values, requirements and tests for masonry drills with carbide drill bits used for drilling holes for anchoring' (*Kennwerte, Anforderungen und Prüfungen von Mauerbohrern mit Schneidkörpern aus Hartmetall, die zur Herstellung der Bohrlöcher von Dübelverankerungen verwendet werden*). Compliance with the drill bit characteristic values shall be verified by means of an inspection certificate 3.2 (in accordance with DIN EN 10204:2005-01) or by means of a certification mark of the PMG Masonry Drill Bit Certification Board, Remscheid, Germany (see leaflet, Section 5).

The nominal diameter of the drill bit, cutting diameter and hole depth shall correspond to the values given in Annex 4. The drilling dust shall be removed from the drilled hole.

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

3.3.3 Installation of the anchor

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

Prior to every reuse, the wear of the thread shall be checked with an associated sleeve setting jig in accordance with Annex 3. The anchor may only be reused if no more than 3 threads can enter the sleeve setting jig. Anchors which are visibly damaged, e.g. due to corrosion, shall not be reused.

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

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

The anchor is installed correctly if

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

3.3.4 Inspection of execution

During installation of the anchors, the contractor commissioned to install them 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 installation of the anchors, the site manager or the site manager's representative shall document the verification of the existing concrete compressive strength in accordance with Section 3.3.1 and the proper installation of the anchor. The site manager or the site manager's representative shall regularly check the installed anchors for visible damage (e.g. caused by corrosion) and the results shall be documented.

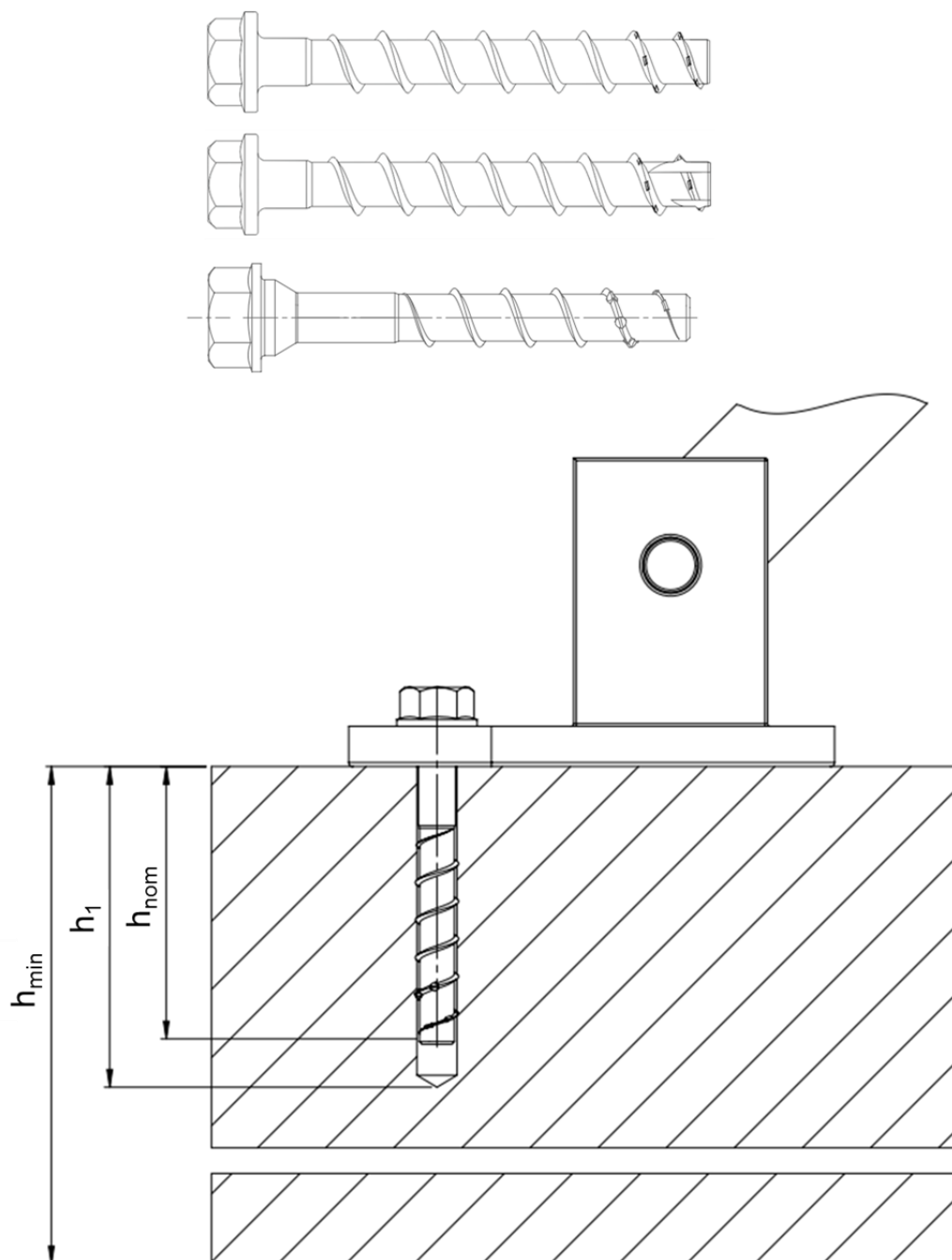
The records shall be available at the construction site during the construction period and shall be submitted to the inspection supervisor upon request. Like the delivery notes, they shall be kept by the company for a minimum of 5 years after completion of the project.

Beatrix Wittstock
Head of Section

Drawn up by

Installed product

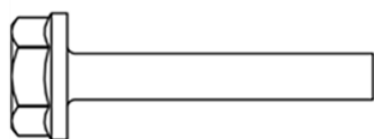
Würth Concrete screw W-BS
Würth Concrete screw W-BS-T temporary



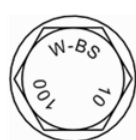
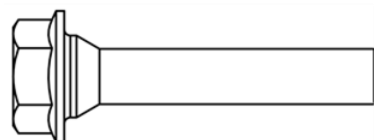
Würth concrete screw W-BS or W-BS-T

Product description
Installed product

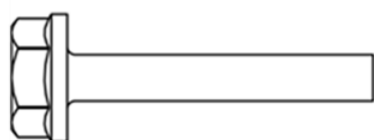
Annex 1



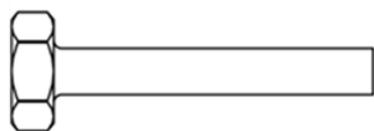
1. Configuration with washer and hexagon head e.g. W-BS type S SW13 8x80



2. Configuration with washer, hexagon head and collar e.g. W-BS-T BND SW24 14x130



3. Configuration with washer, hexagon head and TX drive e.g. W-BS type S SW13 TX 40 10x100



4. Configuration with hexagon head e.g. W-BS-T SW 22 12x105

Table 1: Material

Part	Product name	Material
All configurations	Concrete screw W-BS or W-BS-T temporary	Steel DIN EN 10263-4:2018-02 galvanized in accordance with DIN EN ISO 4042:2018-11 or zinc-flake coating in accordance with DIN EN ISO 10683:2018-11 ($\geq 5\mu\text{m}$)

Marking:

Würth concrete screw W-BS or W-BS-T

Screw type: W-BS or W-BS-T
TSM or TSM BC ST
Anchor size: 10
Anchor length: 100



Würth concrete screw W-BS or W-BS-T

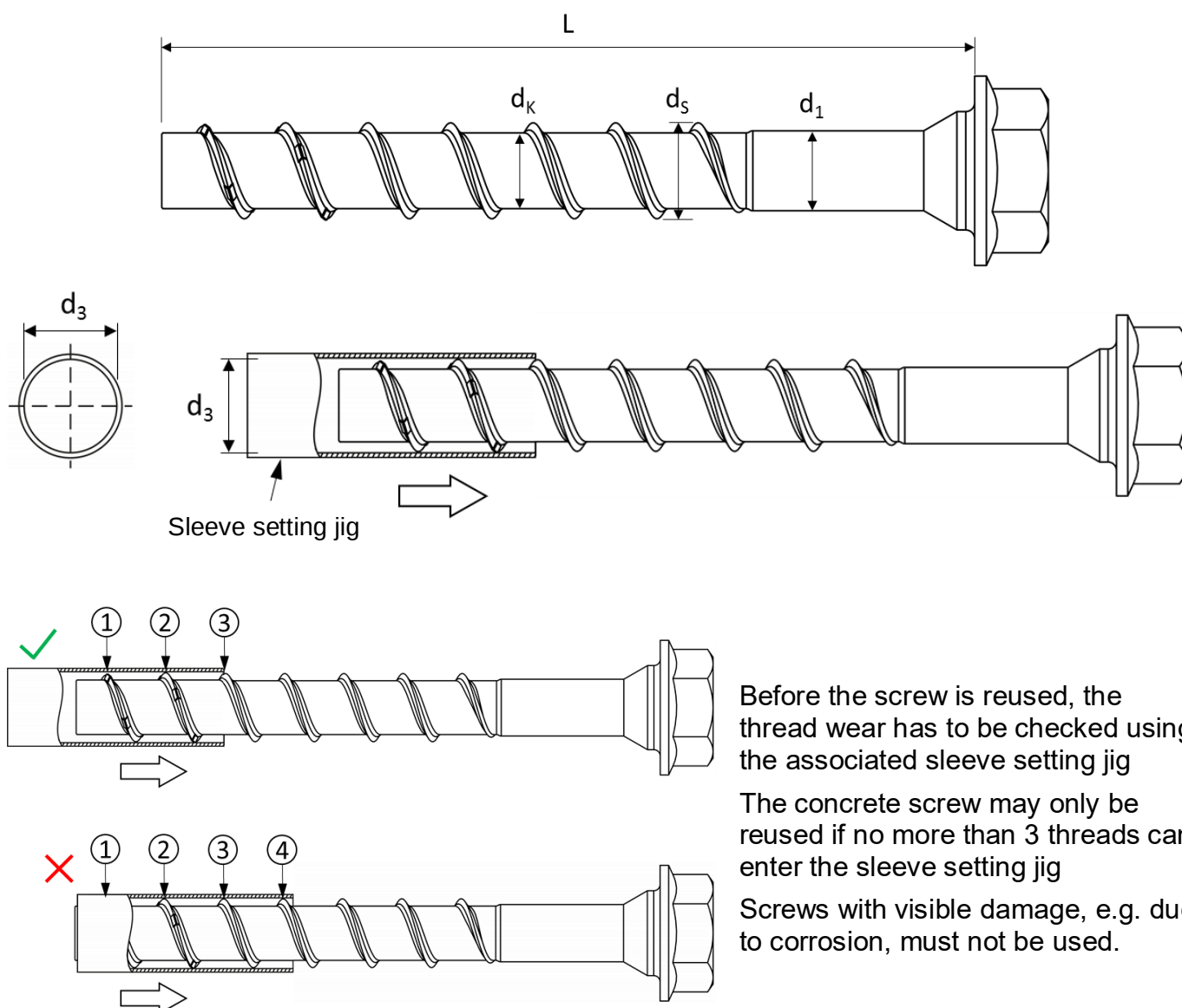
Product description

Configurations, marking and materials

Annex 2

Table 2: Dimensions

Anchor size			10	12	14
Anchor length	$\geq L$	[mm]	80	80	80
	$\leq L$	[mm]	310	310	310
Core diameter	d_k	[mm]	8.8	10.8	12.8
Thread outer diameter	d_s	[mm]	12.6	14.6	16.6
Shaft diameter	d_1	[mm]	9.9	11.7	13.7
Sleeve setting jig inner diameter	d_3	[mm]	12	14	16



Before the screw is reused, the thread wear has to be checked using the associated sleeve setting jig

The concrete screw may only be reused if no more than 3 threads can enter the sleeve setting jig

Screws with visible damage, e.g. due to corrosion, must not be used.

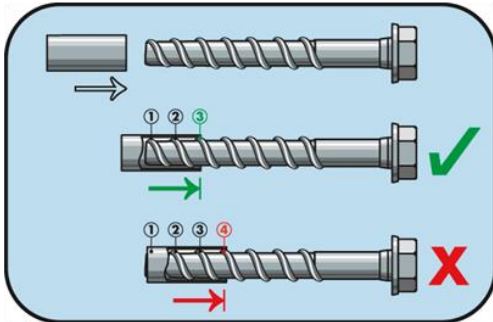
Würth concrete screw W-BS or W-BS-T

Product description

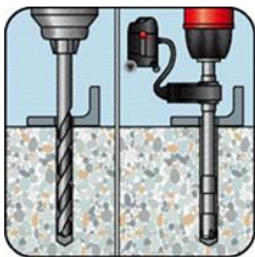
Dimensions and use of the sleeve setting jig

Annex 3

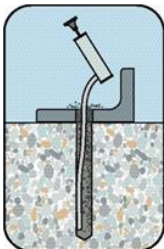
Installation Instruction



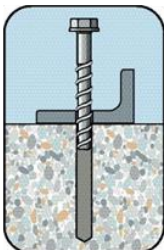
Before the screw is reused, the thread wear has to be checked using the associated sleeve setting jig
The concrete screw may only be reused if no more than 3 threads can enter the sleeve setting jig
Screws with visible damage, e.g. due to corrosion, must not be used.



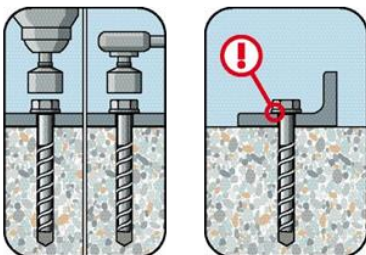
Create hammer drilled or hollow drilled borehole



Remove drill dust by vacuuming or blowing of. If using a hollow drill, an additional cleaning of the borehole is not necessary.



Set the screw



Install the screw by hand or using an impact screw driver.
Consider $T_{imp,max}$.

Installation was successful when the anchor head is fully supported and in contact with the fixture without being damaged.

Würth concrete screw W-BS or W-BS-T

Installation parameters

Minimum thicknesses of member, min. spacings and min. edge

Annex 4

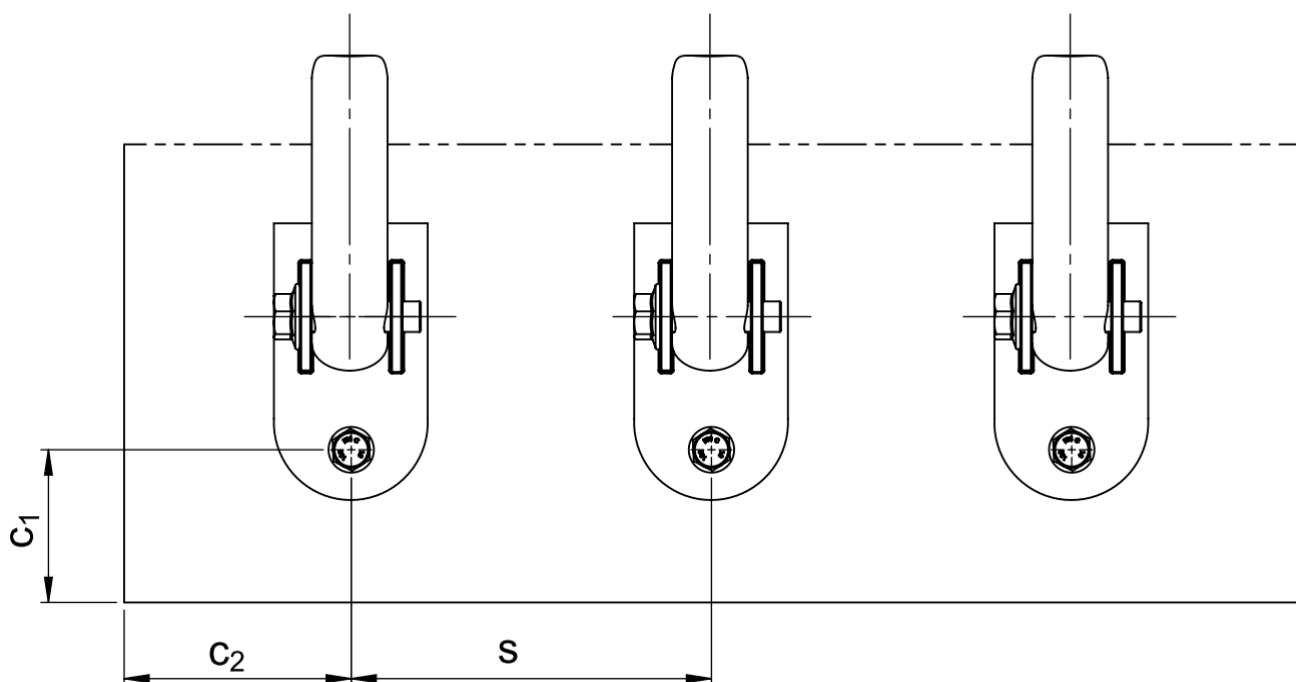


Table 3: Installation parameters

Anchor size			10	12		14		
Nominal embedment depth	h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}
			75	75	90	75	90	115
Nominal drill hole diameter	d_0	[mm]	10	12		14		
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	10.45	12.5		14.5		
Drill hole depth	$h_1 \geq$	[mm]	85	85	100	85	100	125
Torque impact screw driver	$T_{imp,max}$	[Nm]	Max. torque in accordance with manufacturer's instructions					
			400		650		650	

Table 4: Minimum thickness of member, minimum spacing and minimum edge distance

Anchor size			10	12		14		
Nominal embedment depth	h_{nom}	[mm]	h_{nom1}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}
			75	75	90	75	90	115
Min. thickness of member	h_{min}	[mm]	150	150	195	150	195	200 225
Min. spacing	s	[mm]	320	320	390	320	390	500 500
Min. edge distance in load direction	c_1	[mm]	105	105	130	105	130	165 165
Min. edge distance across load direction	c_2	[mm]	160	160	195	160	195	250 250

Würth concrete screw W-BS or W-BS-T

Installation parameters

Minimum thicknesses of member, min. spacings and min. edge distances

Annex 5

Table 5: Design resistances in cracked and uncracked concrete C20/25 to C50/60 in all load directions

Anchor size			10	12		14			
Nominal embedment depth	h_{nom} [mm]	h_{nom1}	h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}		
Minimum member thickness	h_{min}	[mm]	150	150	195	150	195	200	225
Design resistance in concrete with compressive strength $f_{ck,cube} \geq 10$ [N/mm ²]	F_{Rd}	[kN]	6	6	12	6	12	15	17
Design resistance in concrete with compressive strength $f_{ck,cube} \geq 15$ [N/mm ²]	F_{Rd}	[kN]	7	7	13	7	13	18	21
Design resistance in concrete with compressive strength $f_{ck,cube} \geq 20$ [N/mm ²]	F_{Rd}	[kN]	8	8	14	8	14	20	24

Würth concrete screw W-BS or W-BS-T

Performances
Characteristic load-bearing capacity

Annex 6