HECO®-WB

German National Technical Approval Z-9.1-777

HECO®-WB Threaded rods with wood threads as timber fasteners

Deutsches Institut für Bautechnik

DIBt

Allgemeine bauaufsichtliche Zulassung

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

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Z-9.1-777

Validity
from: **1 December 2015**
to: **1 December 2020**

Applicant:
SFS intec GmbH
In den Schwarzwiesen 2
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Subject of approval:
Threaded rods with wood threads as timber fasteners

The subject of approval named above is herewith granted a national technical approval (*allgemeine bauaufsichtliche Zulassung*).
This national technical approval (*allgemeine bauaufsichtliche Zulassung*) has seven pages and two annexes.
This national technical approval (*allgemeine bauaufsichtliche Zulassung*) replaces the national technical approval (*allgemeine bauaufsichtliche Zulassung*) no. Z-9.1-777 from 30 November 2010.
The subject of approval was granted the first national technical approval (*allgemeine bauaufsichtliche Zulassung*) on 30 November 2010.

Translation authorised by DIBt

I GENERAL PROVISIONS

1 With the national technical approval (*allgemeine bauaufsichtliche Zulassung*), the fitness for use and the applicability of the subject of approval in accordance with the Building Codes of the federal states (*Landesbauordnungen*) have been verified.

2 If in the national technical approval (*allgemeine bauaufsichtliche Zulassung*) requirements are made concerning the special expertise and experience of persons entrusted with the manufacture of construction products and types of construction in accordance with the relevant provisions of the *Land* following Section 17 Sub-section 5 of the German Model Building Code (*Musterbauordnung*), it shall be noted that this expertise and experience can also be proven by equivalent verifications from other Member States of the European Union. If necessary, this also applies to verifications presented within the framework of the Agreement on the European Economic Area (EEA) or other bilateral agreements.

3 The national technical approval (*allgemeine bauaufsichtliche Zulassung*) does not replace the permits, approvals and certificates prescribed by law for carrying out building projects.

4 The national technical approval (*allgemeine bauaufsichtliche Zulassung*) is granted without prejudice to the rights of third parties, in particular private property rights.

5 Notwithstanding further provisions in the 'Special Provisions', manufacturers and distributors of the subject of approval shall make copies of the national technical approval (*allgemeine bauaufsichtliche Zulassung*) available to the user and point out that the national technical approval (*allgemeine bauaufsichtliche Zulassung*) shall be available at the place of use. Upon request, copies of the national technical approval (*allgemeine bauaufsichtliche Zulassung*) shall be placed at the disposal of the authorities involved.

6 The national technical approval (*allgemeine bauaufsichtliche Zulassung*) may be reproduced in full only. Partial publication requires the consent of Deutsches Institut für Bautechnik. Texts and drawings in advertising literature may not be in contradiction to the national technical approval (*allgemeine bauaufsichtliche Zulassung*). In cases where the German version differs from the English translation of the national technical approval (*allgemeine bauaufsichtliche Zulassung*), the German version shall always take precedence over the English version.

7 The national technical approval (*allgemeine bauaufsichtliche Zulassung*) is granted on a revocable basis. The provisions of the national technical approval (*allgemeine bauaufsichtliche Zulassung*) can subsequently be supplemented and amended, in particular if this is required by new technical findings.

II SPECIAL PROVISIONS

1 Subject of approval and field of application

1.1 Subject of approval

The threaded rods with wood threads are timber fasteners made from galvanised carbon steel from the company SFS Intec GmbH. They are used to withstand transverse tensile loads in reinforcements for timber members made from solid timber (softwood), glued laminated timber (softwood), glued solid timber (softwood) and cross-laminated timber (softwood) and as timber fasteners for timber members made from solid timber (softwood), glued laminated timber (softwood), glued solid timber (softwood) and cross-laminated timber (softwood).

1.2 Field of application

The threaded rods with wood threads may be used as reinforcements for timber members subjected to transverse tensile loading with dimensioning and execution in accordance with DIN EN 1995-1-1[1] in connection with DIN EN 1995-1-1/NA[2] unless otherwise specified in this national technical approval (*allgemeine bauaufsichtliche Zulassung*).

The threaded rods with wood threads may also be used as timber fasteners for load-bearing timber structures with dimensioning and execution in accordance with DIN EN 1995-1-1 in connection with DIN EN 1995-1-1/NA unless otherwise specified in this national technical approval (*allgemeine bauaufsichtliche Zulassung*).

The threaded rods with wood threads may only be used for predominantly static loads (see DIN 1055-3[3]) or for static or quasi-static loads (see DIN EN 1990[4] and DIN EN 1991-1-1[5] in connection with DIN EN 1991-1-1/NA[6]).

The threaded rods with wood threads may be screwed into timber members at an angle of $45° \leq \alpha \leq 90°$ (α = angle between threaded rod axis and wood grain).

For the application area related to corrosion protection the standard DIN EN 1995-1-1 in connection with DIN EN 1995-1-1/NA shall apply.

2 Provisions for the threaded rods

2.1 Properties and composition

2.1.1 The shape, dimensions and tolerances of the threaded rods with wood threads shall correspond to the information given in Annexes 1 and 2.

2.1.2 The threaded rods with wood threads shall be made from quenched and tempered carbon steel in accordance with the product specifications deposited with Deutsches Institut für Bautechnik. The threaded rods with wood threads are galvanised and undergo a chromate chemical passivation treatment (blue protective chromate coating). The average thickness of the zinc layer is 5 µm.

1	DIN EN 1995-1-1: 2010-12+A2:2014-07	Eurocode 5: Design of timber structures – Part 1-1: General – Common rules and rules for buildings
2	DIN EN 1995-1-1/NA:2013-08	National Annex – Nationally determined parameters – Eurocode 5: Design of timber structures – Part 1-1: General – Common rules and rules for buildings
3	DIN 1055-3:2006-03	Actions on structures – Part 3: Self-weight and imposed loads in buildings
4	DIN EN 1990:2010-12	Eurocode: Basis of structural design
5	DIN EN 1991-1-1:2010-12	Eurocode 1: Actions on structures – Part 1-1: General actions – Densities, self-weight, imposed loads for buildings
6	DIN EN 1991-1-1/NA:2010-12	National Annex – Nationally determined parameters – Eurocode 1: Actions on structures – Part 1-1: General actions – Densities, self-weight, imposed loads for buildings

2.1.3 The threaded rods with wood threads shall exhibit characteristic values for tensile strength $R_{t,u,k}$ at least corresponding to the values given in Table 1.

Table 1: Characteristic tensile strength $R_{t,u,k}$

Outer diameter of thread d_r mm	Characteristic tensile strength $R_{t,u,k}$ kN
16.0	91.5
20.0	145.0

2.2 Marking

The packaging for the threaded rods with wood threads or the delivery note for the threaded rods with wood threads 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 mark shall only be applied if the requirements given in Section 2.3 are met.

Furthermore, the packaging or the delivery note shall contain the following information:

- name of the subject of approval:
  'Threaded rods with wood threads as timber fasteners'
- diameter and length of the threaded rods
- information pertaining to corrosion protection.

2.3 Attestation of conformity

2.3.1 General

The attestation of conformity of the threaded rods with wood threads to the provisions of this national technical approval (*allgemeine bauaufsichtliche Zulassung)* shall be issued for every manufacturing plant in the form of a certificate of conformity based on factory production control and regular external surveillance, including initial type-testing of the threaded rods, in accordance with the following provisions.

To issue the certificate of compliance and for external surveillance, including the associated product testing to be carried out in the process, the manufacturer of the threaded rods with wood threads shall use an appropriately recognised certification body and an appropriately recognised inspection body.

The declaration that a certificate of conformity has been granted shall be given by the manufacturer by marking of the construction products with the national conformity mark (*Ü-Zeichen*) with reference to the intended use.

The certification body shall send a copy of the certificate of conformity issued by the same to Deutsches Institut für Bautechnik.

2.3.2 Factory production control

A factory production control system shall be set up and implemented in each manufacturing plant. Factory production control is understood to be continuous surveillance of production by the manufacturer to ensure that the manufactured construction products satisfy the provisions of this national technical approval (*allgemeine bauaufsichtliche Zulassung*).

The factory production control shall at least include the following measures:

- The blank rod purchased shall at least have DIN EN 10204[7] 3.1 certification; the information on the inspection certificate shall be checked for the purposes of ensuring compliance with the requirements given in section 2.1.2.
- A tensile strength test shall be performed on the threaded rods.
- A bending test shall be performed on the threaded rods. The threaded rods shall not break at a bending angle of $\alpha = (45/d^{0.7}+20)$ degrees (d in mm).
- The dimensions of the threaded rods shall be checked.

Other details of internal control are to be determined in the surveillance agreement.

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

- subject of tests
- type of check or tests
- date of manufacture
- date and result of inspections and tests as well as (if applicable) comparison with 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 Deutsches Institut für Bautechnik 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 manner that they cannot be confused with compliant products. After the deficiencies have been remedied, the relevant test shall be repeated immediately where this is technically possible and necessary to demonstrate that the deficiencies have been remedied.

2.3.3 External surveillance

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

Initial type-testing of the threaded rods with wood threads shall be carried out within the scope of external surveillance. Samples for random testing may also be taken. Sampling and testing shall be the responsibility of the respective recognised inspection bodies. At least the tensile strength and the dimensions of the threaded rods with wood threads shall be checked.

The results of certification and external surveillance shall be kept for at least five years. The certification body or inspection body shall present them to Deutsches Institut für Bautechnik and the competent supreme building authority upon request.

3 Provisions for the dimensioning

3.1 General

Unless otherwise specified below, section NCI NA. 6.8 of DIN EN 1995-1-1/NA:2013-08 shall apply for the dimensioning of reinforcements for timber structures under transverse tensile loads using the threaded rods with wood threads. Unless otherwise specified below, section 8 of DIN EN 1995 1-1:2010-12+A2:2014-07 shall apply for the dimensioning of timber structures with use of the threaded rods with wood threads as timber fasteners. Where required, the official verifications for fitness for use shall be observed for the timber members.

Load-bearing connections to the threaded rods with wood threads shall each contain at least two threaded rods with wood threads.

For screwing of the threaded rods with wood threads into regions of timber members under tension the cross-sectional weakening of the timber members resulting from the drilled holes shall be taken into consideration in the calculations (see section 5.2 of DIN EN 1995-1-1:2010-12+A2:2014-07 and section NCI NA. 6.8.1 (NA.3) of DIN EN 1995-1-1/NA:2013-08.

3.2 Laterally loaded threaded rods

DIN EN 1995-1-1 in connection with DIN EN 1995-1-1/NA shall apply to the dimensioning of timber structures with loading perpendicular to the threaded rod axis using the threaded rods with wood threads.

The outer thread diameter d_r in accordance with Annexes 1 and 2 may be applied as the nominal size d for dimensioning in accordance with DIN EN 1995-1-1 in connection with DIN EN 1995-1-1/NA.

3.3 Axially loaded threaded rods

The following may be applied for the characteristic withdrawal resistance for threaded rods screwed in at an angle of $45° \le \alpha \le 90°$ (α = angle between threaded rod axis and wood grain):

$$R_{ax,k} = n_{ef} \cdot f_{ax,k} \cdot \ell_{ef} \cdot d_r \quad \text{(in N)} \qquad (1)$$

where:

n_{ef} effective number of threaded rods in accordance with section 8.7.2 (8) of DIN EN 1995-1-1:2010-12

d_r outer thread diameter of threaded rod in mm

ℓ_{ef} penetration length in mm

Penetration length ℓ_{ef} less than $4 \cdot d_r$ and greater than 1000 mm may not be applied.

$f_{ax,k}$ characteristic withdrawal strength in N/mm²

$$f_{ax,k} = 0{,}52 \cdot d_r^{-0{,}5} \cdot \ell_{ef}^{-0{,}1} \cdot \rho_k^{0{,}8} \qquad (2)$$

where:

ρ_k = characteristic density in kg/m³

The design value $R_{t,u,d}$ determined from the characteristic tensile strength of the threaded rod with wood thread $R_{t,u,k}$ in accordance with Table 1 may not be exceeded.

4 Provisions for execution

4.1 Unless otherwise specified below, DIN EN 1995-1-1 in connection with DIN EN 1995-1-1/NA shall apply to the execution. Where required, the official verifications for fitness for use shall be observed for the timber members.

4.2 For cross-laminated timber the threaded rods with wood threads may be screwed into the wide, edge and end faces at an angle of 45° to 90° (angle between the rod axis and the wood grain). The thickness of the loaded cross-laminated layer may not be less than the outer thread diameter.

4.3 The penetration length for the threaded rods with wood threads into timber members shall be at least $4 \cdot d_r$ (d_r = outer thread diameter of the respective threaded rod).

4.4 The holes in the timber members shall be pre-drilled with the following hole diameter:

$d_{core} \leq d_b \leq d_{core} + 1$ mm

where:

d_{core} = core diameter of threaded rod with wood thread in mm

d_b = bored hole diameter in mm.

4.5 The values specified in section NCI NA. 6.8 of DIN EN 1995-1-1/NA:2013-08 shall be adhered to as a minimum spacing for the threaded rods with wood threads used for reinforcement of timber members. For minimum spacings not regulated in this section, the values specified in section 8.3.1.2 of DIN EN 1995-1-1:2010-12+A2:2014-07 as for nails with pre-drilled pilot holes shall apply. The outer thread diameter d_r in accordance with Annexes 1 and 2 shall be applied as the nominal size.

For all other uses of the threaded rods with wood threads the values for minimum spacing specified in section 8.3.1.2 of DIN EN 1995-1-1:2010-12+A2:2014-07 as for nails with pre-drilled pilot holes shall be adhered to, whereby the nominal size shall be taken as the outer thread diameter d_r in accordance with Annexes 1 and 2.

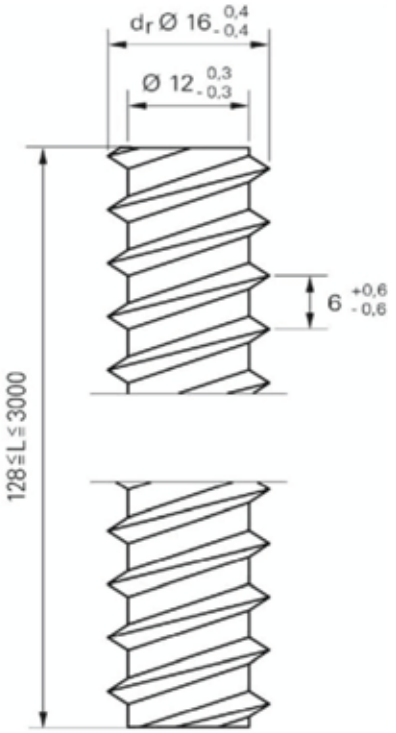
For the minimum spacings for timber members in accordance with national technical approvals (*allgemeine bauaufsichtliche Zulassungen*) or European technical approvals or assessments the provisions of the respective approval or assessment shall apply.

For a timber thickness of less than $5 \cdot d_r$ the distance from the loaded and unloaded edge parallel to the wood grain shall be at least $15 \cdot d_r$.

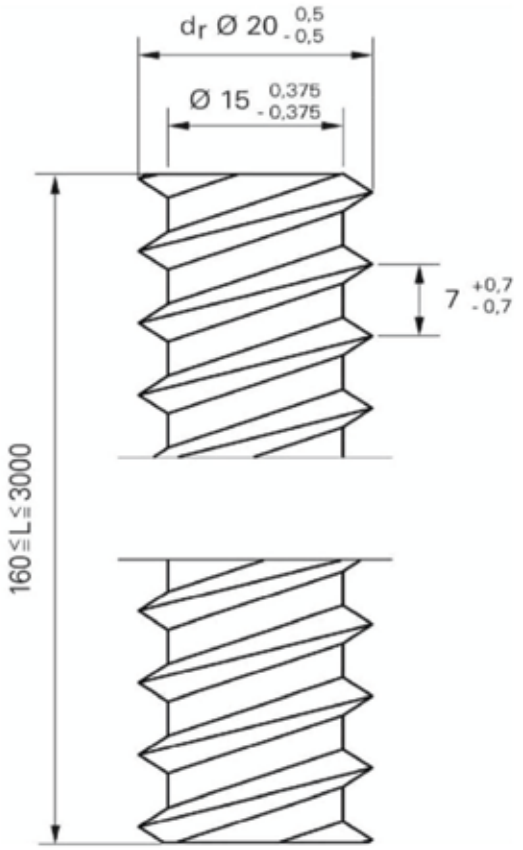
4.6 The total penetration length of the threaded rods may not exceed 3000 mm.

Reiner Schäpel
Head of Section

Beglaubigt



Threaded rods with wood threads as timber fasteners	Annex 1
SFS fastener WB-T-16	



Threaded rods with wood threads as timber fasteners	Annex 2
SFS fastener WB-T-20	

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