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European Technical Assessment

ETA-18/0829
 of 15.02.2019

General part

Technical Assessment Body issuing the European Technical Assessment

Österreichisches Institut für Bautechnik (OIB)
 Austrian Institute of Construction Engineering

Trade name of the construction product

Schmid Schrauben RAPID® T-Con

Product family to which the construction product belongs

Self-tapping screws for use in wood-concrete composite slab kits

Manufacturer

Schmid Schrauben Hainfeld GmbH
 Landstal 10
 3170 Hainfeld
 Austria

Manufacturing plants

Schmid Schrauben Hainfeld GmbH
 Landstal 10
 3170 Hainfeld
 Austria

This European Technical Assessment contains

35 pages including 4 Annexes which form an integral part of this assessment.

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of

European Assessment Document
 EAD 130090-00-0303 "Wood-concrete composite slab kit with dowel-type fasteners"

Remarks

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

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Specific parts

1 Technical description of the product

1.1 Description of the product

This European Technical Assessment (ETA) applies to wood-concrete composite slab kits with self-tapping screws "Schmid Schrauben RAPID® T-Con" as fasteners.

The following components are used:

Base materials and part of the kit

- Sawn timber according to EN 14081-1¹, or
- Glued laminated timber according to EN 14080, or
- Laminated veneer lumber according to EN 14374, or
- Cross laminated timber according to a European Technical Assessment.

Components added on site and part of the kit

- Optional permanent moulding of wood-based panels with thickness $t_s \geq 12$ mm according to EN 13986 for load-bearing applications in exterior use or boards according to EN 14081-1. Friction between the concrete and timber members can be taken into account.
- There may be a foil above the base material or moulding to prevent leakage of water when the concrete is poured on the construction. In this case, friction between the concrete and timber members cannot be taken into account.

Dowel-type fasteners for shear resistant connection between base materials and the concrete material and part of the kit

- "Schmid Schrauben RAPID® T-Con": special screws made of steel installed under an angle of $\pm 45^\circ$ and/or 90° into the timber members.

Finalisation of wood-concrete composite slab kit on site and not part of the kit

- Reinforced concrete slab with thickness $d_{\text{Concrete}} \geq 50$ mm ($d_{\text{Concrete}} \geq 70$ mm for base material LVL) according to standards and regulations in force at the place of use. Concrete strength class min. C20/25 acc. to EN 206, grain size ≤ 16 mm, reinforced by steel $\varnothing \geq 5$ mm with min. 1.88 cm²/m in longitudinal direction and min. 1.13 cm²/m in transverse direction and $f_{y,k} \geq 450$ MPa.

Finished floor or ceiling covering as well as possible sound reducing courses are not part of the kit.

The principle structure of the wood-concrete composite slab kit is shown in Annex 1 and the self-tapping screws for shear resistant connection between base materials and the concrete material are shown in Annex 2.

The wood-concrete composite slab kit and the components for its manufacturing correspond to the specifications given in the Annexes 1 to 3. The material characteristics, dimensions and tolerances

¹ Reference documents are listed in Annex 4.

of the wood-concrete composite slab kit, not indicated in these Annexes, are given in the technical file² of this European Technical Assessment.

Timber which is treated or will be treated with wood preservatives or flame retardants is not subject of the European Technical Assessment. No recycled materials are used.

1.2 Components of the kit

1.2.1 Base materials

Sawn timber according to EN 14081-1, or glued laminated timber according to EN 14080, or laminated veneer lumber according to EN 14374, or cross laminated timber according to a European Technical Assessment.

The characteristics of the base materials are given in Annex 3, Table 5.

1.2.2 Dowel-type fasteners

“Schmid Schrauben RAPID® T-Con” special screws made of steel installed under an angle of $\pm 45^\circ$ and/or 90° into the timber members.

The specifications of the dowel-type fasteners “Schmid Schrauben RAPID® T-Con” are given in Annex 2, Table 4.

1.2.3 Additional components added at site

Optional permanent moulding of wood-based panels with thickness $t_s \geq 12$ mm according to EN 13986 for load-bearing applications in exterior use or boards according to EN 14081-1. Friction between the concrete and timber members can be taken into account.

There may be a foil above the moulding to prevent leakage of water when the concrete is poured on the construction. In this case, friction between the concrete and timber members cannot be taken into account.

The characteristics of the permanent moulding are given in Annex 3, Table 5.

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (thereafter EAD)

2.1 Intended use

Schmid Schrauben RAPID® T-Con are used for shear resistant connection between base materials and the concrete material in load-bearing wood-concrete composite slab kits.

The product shall be subjected to static and quasi-static actions only. The product shall not be subjected to fatigue loading.

The product is intended to be used in service classes 1 and 2 according to EN 1995-1-1.

² The technical file of the European Technical Assessment is deposited at Österreichisches Institut für Bautechnik and, in so far as is relevant to the tasks of the notified product certification body involved in the assessment and verification of constancy of performance procedure, is handed over to the notified product certification body.

2.2 General assumptions

The self-tapping screws for use in wood-concrete composite slab kits are manufactured in accordance with the provisions of the European Technical Assessment using the manufacturing process as identified in the inspection of the manufacturing plant by Österreichisches Institut für Bautechnik and laid down in the technical file.

The manufacturer shall ensure that the requirements in accordance with the Clauses 1, 2 and 3 as well as with the Annexes of the European Technical Assessment are made known to those who are concerned with planning and execution of the works.

Design

The European Technical Assessment only applies to the manufacture and use of the self-tapping screws for use in wood-concrete composite slab kits. Verification of stability of the works including application of loads on the products is not subject to the European Technical Assessment.

The following conditions shall be observed:

- Design of the wood-concrete composite slab kit is carried out under the responsibility of an engineer experienced in such products.
- Design of the works shall account for the protection of the wood-concrete composite slab kit.
- The wood-concrete composite slab kit is installed correctly.

Design of the wood-concrete composite slab kit can be according to EN 1995-1-1 and EN 1992-1-1 taking into account of Annexes 2 and 3 of the European Technical Assessment. Hereby, the outer thread diameter d is used as nominal diameter d or rather effective diameter d_{ef} and l_{ef} is the threaded part in the timber member including point.

Standards and regulations in force at the place of use shall be considered.

Packaging, transport, storage, maintenance, replacement and repair

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

Installation

It is assumed that the product will be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals.

Relevant items to be considered are e.g.

- definition and verification of the size, spacing and minimum length of support, and demands of serviceability
- fastening of components and eventual restrictions on the application of fixings to the product
- temporary bracing for temporary loads on the construction site during erection, if necessary.

Damaged products shall not be installed.

The safety-at-work and health protection regulations have to be observed.

2.3 Assumed working life

The provisions made in the European Technical Assessment (ETA) are based on an assumed intended working life of Schmid Schrauben RAPID® T-Con of 50 years, when installed in the works. These provisions are based upon the current state of the art and the available knowledge and experience³.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA nor by the Technical Assessment Body, but are regarded only as a means for choosing the appropriate products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and reference to the methods used for its assessment

3.1 Essential characteristics of the product

Table 1: Essential characteristics of the wood-concrete composite slab kit and methods and criteria for assessment of the performance of the product in relation to those essential characteristics

No	Essential characteristic	Product performance
Basic Works Requirement 1: Mechanical resistance and stability ¹⁾		
1	Mechanical resistance	Annex 3, Table 6
2	Dimensional stability	Annex 3, Table 6
3	Stiffness	Annex 3, Table 6
Basic Works Requirement 2: Safety in case of fire		
4	Reaction to fire	Annex 3, Table 6
Basic Works Requirement 3: Hygiene, health and the environment		
5	Water vapour permeability	Annex 3, Table 6
Basic Works Requirement 4: Safety and accessibility in use		
–	Same as BWR 1	
Basic Works Requirement 6: Energy economy and heat retention		
6	Thermal resistance	Annex 3, Table 6
7	Air permeability	No performance assessed.
8	Thermal inertia	Annex 3, Table 6
¹⁾ These characteristics also relate to BWR 4.		

³ The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, and the particular conditions of the design, execution, use and maintenance of that works may be outside this ETA. Therefore, it cannot be excluded that in these cases the real working life of the product may also be shorter than the assumed working life.

Table 2: Essential characteristics of the base materials and methods and criteria for assessment of the performance of the product in relation to those essential characteristics

No	Essential characteristic	Product performance
Basic Works Requirement 1: Mechanical resistance and stability ¹⁾		
1	Mechanical resistance	Product specification acc. to Annex 3, Table 5
2	Dimensional stability	Annex 3, Table 6
3	Stiffness	Product specification acc. to Annex 3, Table 5
4	In-service environment	Annex 3, Table 6
Basic Works Requirement 2: Safety in case of fire		
5	Reaction to fire	Annex 3, Table 6
Basic Works Requirement 4: Safety and accessibility in use		
–	Same as BWR 1	
Basic Works Requirement 6: Energy economy and heat retention		
6	Thermal resistance	Annex 3, Table 6
7	Thermal inertia	Annex 3, Table 6
¹⁾ These characteristics also relate to BWR 4.		

Table 3: Essential characteristics of the dowel-type fasteners and methods and criteria for assessment of the performance of the product in relation to those essential characteristics

No	Essential characteristic	Product performance
Basic Works Requirement 1: Mechanical resistance and stability ¹⁾		
1	Material	Annex 2, Table 4
2	Geometry	Annex 2, Figure 5 to 13
3	Mechanical strength	Annex 2, Table 4
4	Mechanical stiffness	Annex 2, Table 4
5	Corrosion protection	Annex 2, Table 4
6	Shear resistance	Annex 2, Table 4
Basic Works Requirement 4: Safety and accessibility in use		
–	Same as BWR 1	
¹⁾ These characteristics also relate to BWR 4.		

3.2 Assessment methods

3.2.1 General

The assessment of the essential characteristics in Clause 3.1 of the self-tapping screws for use in wood-concrete composite slab kits for the intended use, and in relation to the requirements for mechanical resistance and stability, for safety in case of fire, for hygiene, health and the environment, for safety and accessibility in use and for energy economy and heat retention in use in the sense of the basic requirements for construction works № 1, 2, 3, 4 and 6 of Regulation (EU) № 305/2011 has been made in accordance with the European Assessment Document EAD 130090-00-0303, Wood-concrete composite slab with dowel-type fasteners.

3.2.2 Identification

The European Technical Assessment for Schmid Schrauben RAPID® T-Con is issued on the basis of agreed data that identify the assessed product. Changes to materials, to composition, to characteristics of the product, or to the production process could result in these deposited data being incorrect. Österreichisches Institut für Bautechnik should be notified before the changes are implemented, as an amendment of the European Technical Assessment is possibly necessary.

4 Assessment and verification of constancy of performance (thereafter AVCP) system applied, with reference to its legal base

4.1 System of assessment and verification of constancy of performance

According to Commission Decision 2000/447/EC the system of assessment and verification of constancy of performance to be applied to Schmid Schrauben RAPID® T-Con is System 1. System 1 is detailed in Commission Delegated Regulation (EU) № 568/2014 of 18 February 2014, Annex, 1.2., and provides for the following items

- (a) the manufacturer shall carry out:
 - (i) factory production control;
 - (ii) further testing of samples taken at the manufacturing plant by the manufacturer in accordance with a prescribed test plan⁴;
- (b) the notified product certification body shall decide on the issuing, restriction, suspension or withdrawal of the certificate of constancy of performance of the construction product on the basis of the outcome of the following assessments and verifications carried out by that body:
 - (i) an assessment of the performance of the construction product carried out on the basis of testing (including sampling), calculation, tabulated values or descriptive documentation of the product;
 - (ii) initial inspection of the manufacturing plant and of factory production control;
 - (iii) continuous surveillance, assessment and evaluation of factory production control.

4.2 AVCP for construction products for which a European Technical Assessment has been issued

Notified bodies undertaking tasks under System 1 shall consider the European Technical Assessment issued for the construction product in question as the assessment of the performance of that product. Notified bodies shall therefore not undertake the tasks referred to in point 4.1 (b)(i).

⁴ The prescribed test plan has been deposited with Österreichisches Institut für Bautechnik and is handed over only to the notified product certification body involved in the procedure for the assessment and verification of constancy of performance. The prescribed test plan is also referred to as control plan.

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

5.1 Tasks for the manufacturer

5.1.1 Factory production control

In the manufacturing plant the manufacturer shall establish and continuously maintain a factory production control. All procedures and specification adopted by the manufacturer shall be documented in a systematic manner. The factory production control shall ensure the constancy of performances of Schmid Schrauben RAPID® T-Con with regard to the essential characteristics.

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the control plan. The incoming raw materials shall be subject to controls by the manufacturer before acceptance. Check of incoming materials shall include control of inspection documents presented by the manufacturer of the raw materials.

The frequencies of controls conducted during manufacturing and on the assembled product are defined by taking account of the manufacturing process of the product and are laid down in the control plan.

The results of factory production control are recorded and evaluated. The records include at least the following data:

- Designation of the product, basic materials and components
- Type of control or test
- Date of manufacture of the product and date of testing of the product or basic materials or components
- Results of controls and tests and, if appropriate, comparison with requirements
- Name and signature of person responsible for factory production control

The records shall be kept at least for ten years time after the construction product has been placed on the market and shall be presented to the notified product certification body involved in continuous surveillance. On request they shall be presented to Österreichisches Institut für Bautechnik.

5.1.2 Declaration of performance

The manufacturer is responsible for preparing the declaration of performance. When all the criteria of the assessment and verification of constancy of performance are met, including the certificate of conformity issued by the notified product certification body, the manufacturer shall draw up a declaration of performance.

5.2 Tasks for the notified product certification body

5.2.1 Initial inspection of the manufacturing plant and of factory production control

The notified product certification body shall verify the ability of the manufacturer for a continuous and orderly manufacturing of Schmid Schrauben RAPID® T-Con according to the European Technical Assessment. In particular the following items shall be appropriately considered

- Personnel and equipment
- The suitability of the factory production control established by the manufacturer
- Full implementation of the control plan

Figure 2a: Cross section of wood-concrete composite slab kit with one or more rows of Schmid Schrauben RAPID® T-Con

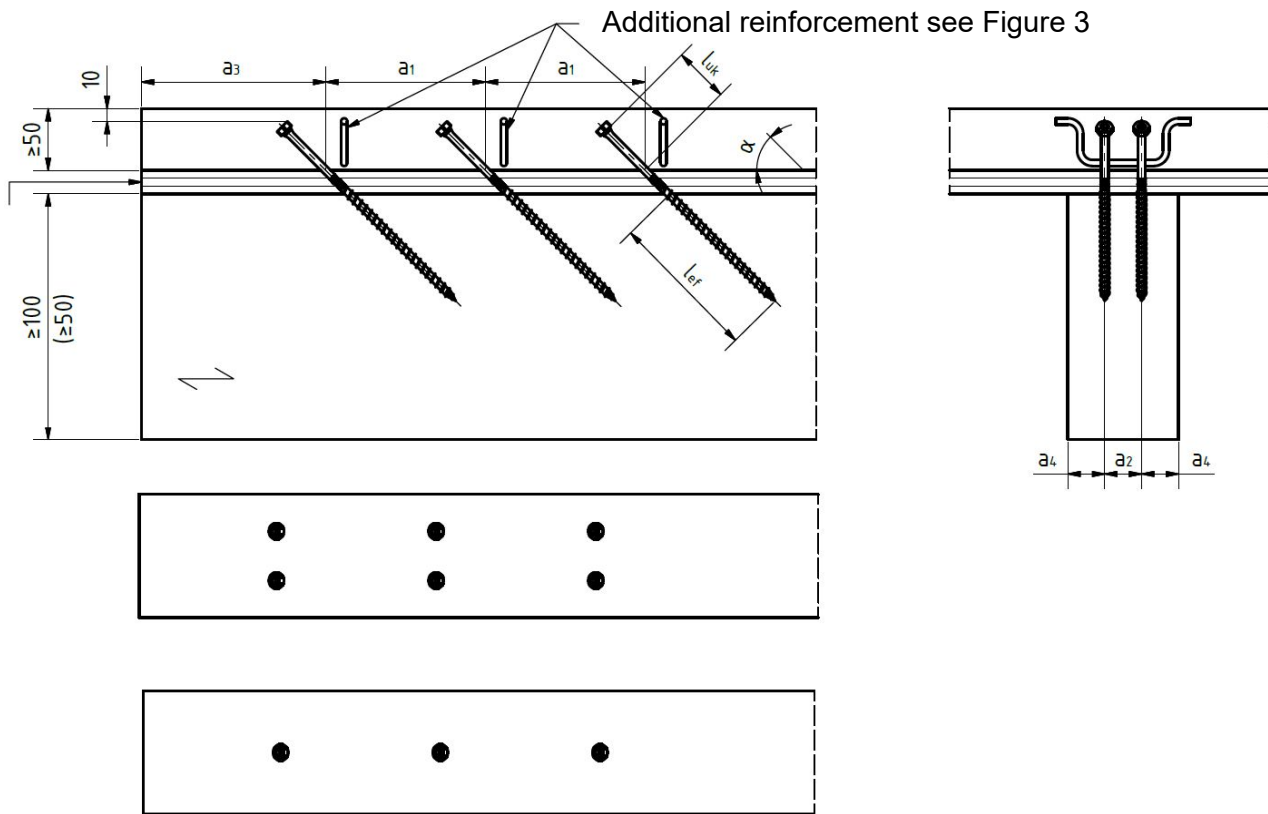
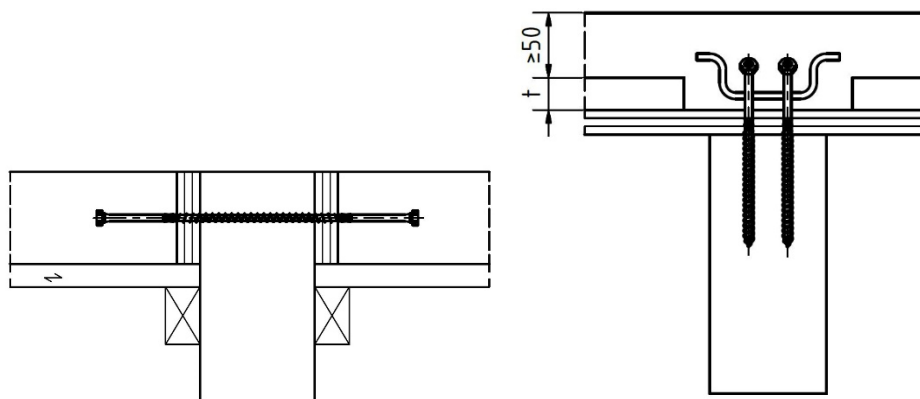


Figure 2b: Alternative cross sections of the wood-concrete composite slab kit – exemplary



Additional vertical loads carried by moulding.

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Structure of the wood-concrete composite slab kit	

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Figure 4b: Cross section with load distribution – exemplary for 45° / 135° screw arrangement – pair of crossed screws

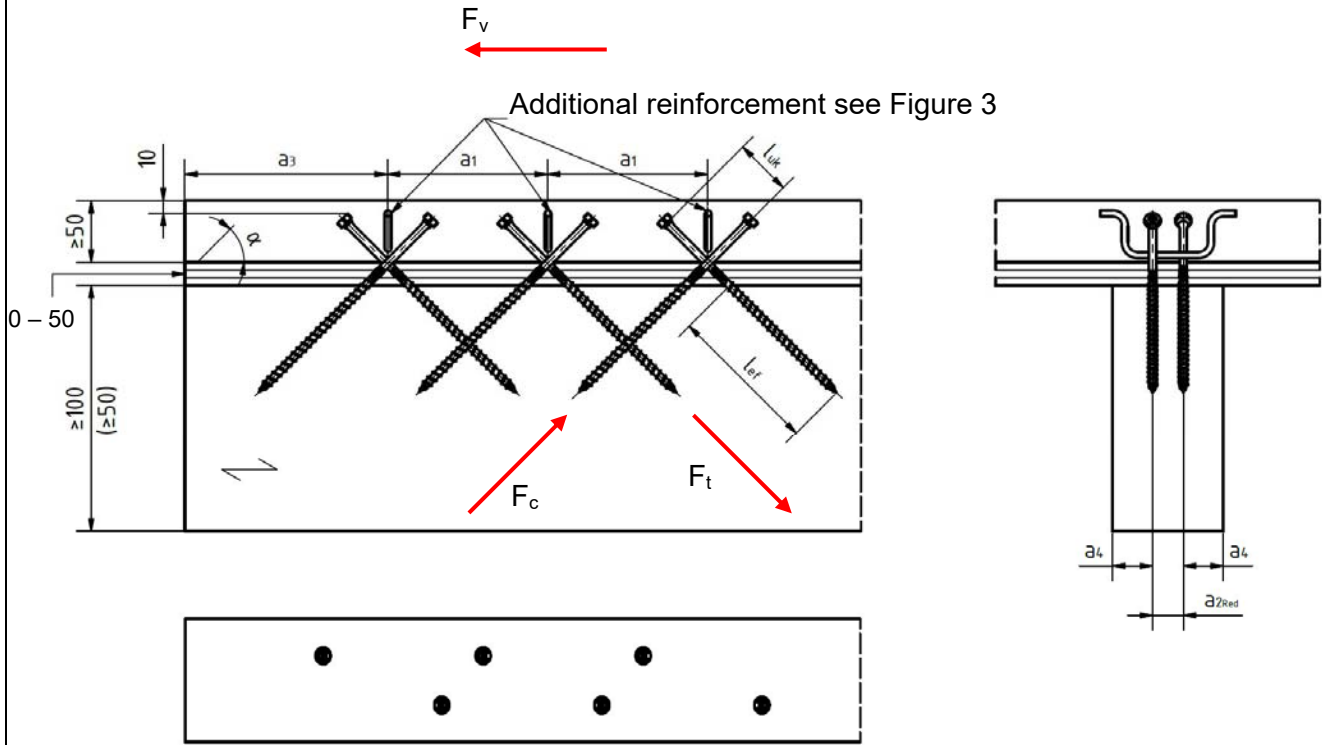
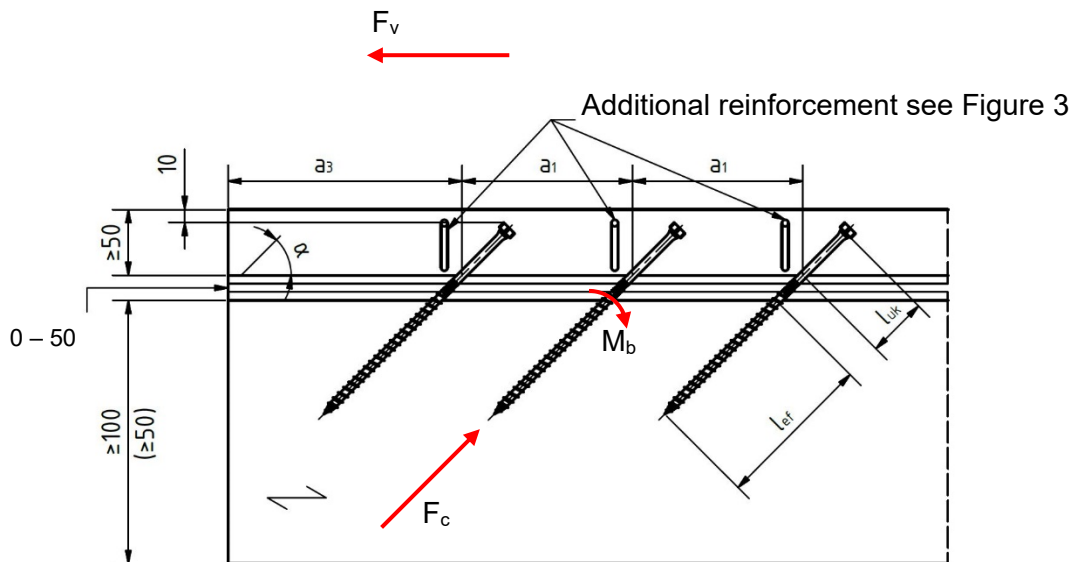


Figure 4c: Cross section with stress distribution – exemplary for 135° screw arrangement – compression shear load, e.g. middle support



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Figure 5a: Schmid Schrauben RAPID® T-Con

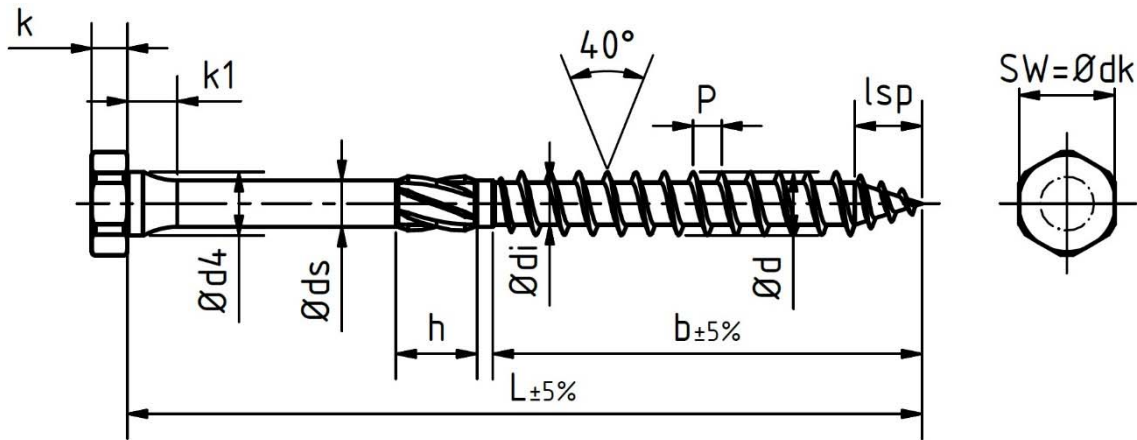
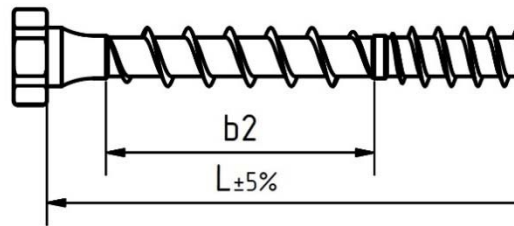


Figure 5b: Schmid Schrauben RAPID® T-Con with threaded shaft



Dim	L	Tolerance	b _{min} in softwood	b _{min} in hardwood
mm	mm	mm	mm	mm
8.0	100 ≤ L < 180	-4.0	60	32
	180 ≤ L < 250	-4.6		
	250 ≤ L ≤ 300	-5.2		

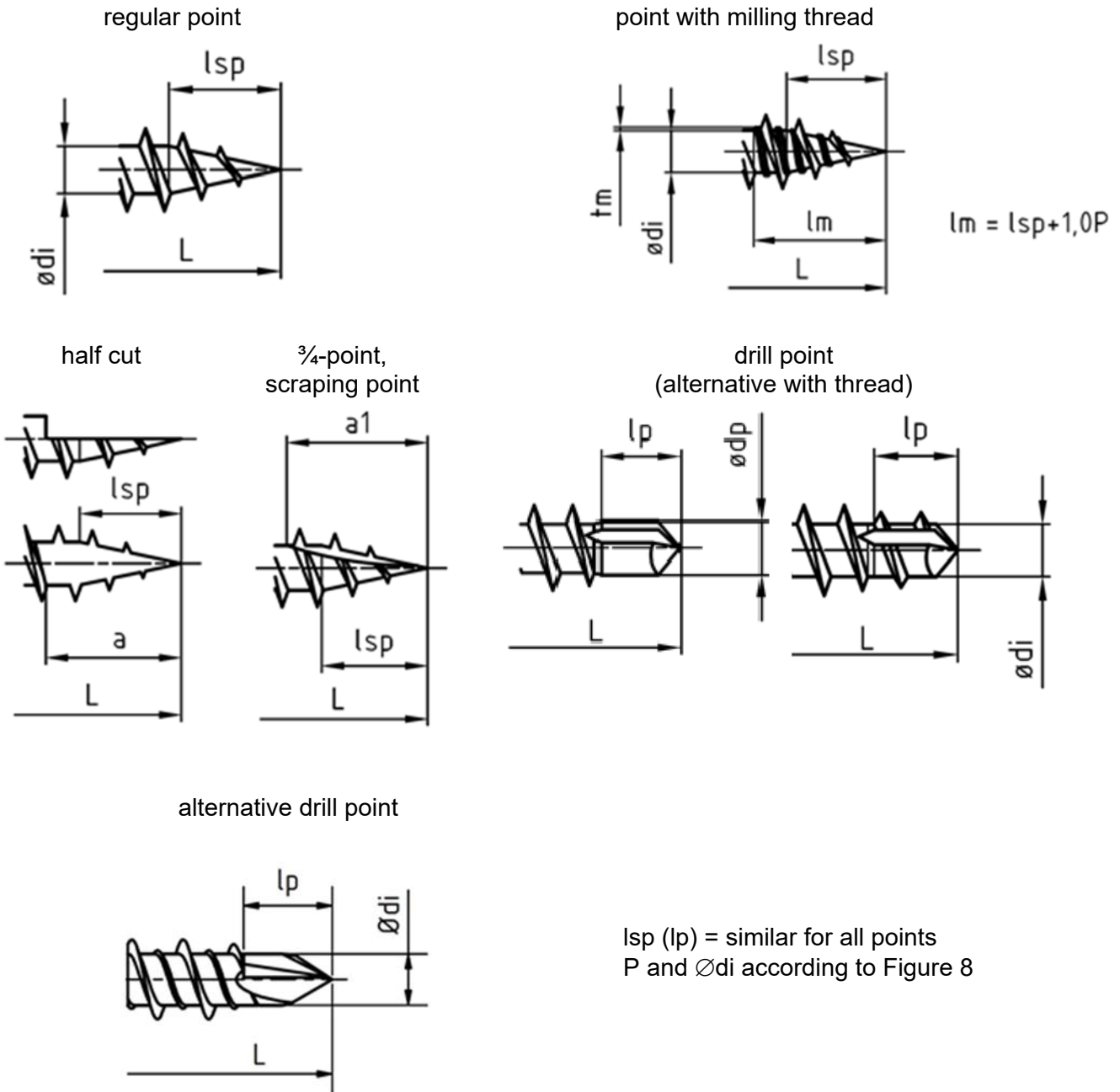
Schmid Schrauben RAPID® T-Con

Specification of the dowel-type fasteners

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Figure 6: Optional point geometries of Schmid Schrauben RAPID® T-Con



Dim	l_{sp}	a	a_1	t_m	l_p	\varnothing_{dp}
mm	mm	mm	mm	mm	mm	mm
8.0	8.20 ± 2.1	$11.0 \pm 2,5$	16.5 ± 3.0	0.60 ± 0.12	6.0 ± 3.0	6.0 ± 0.60

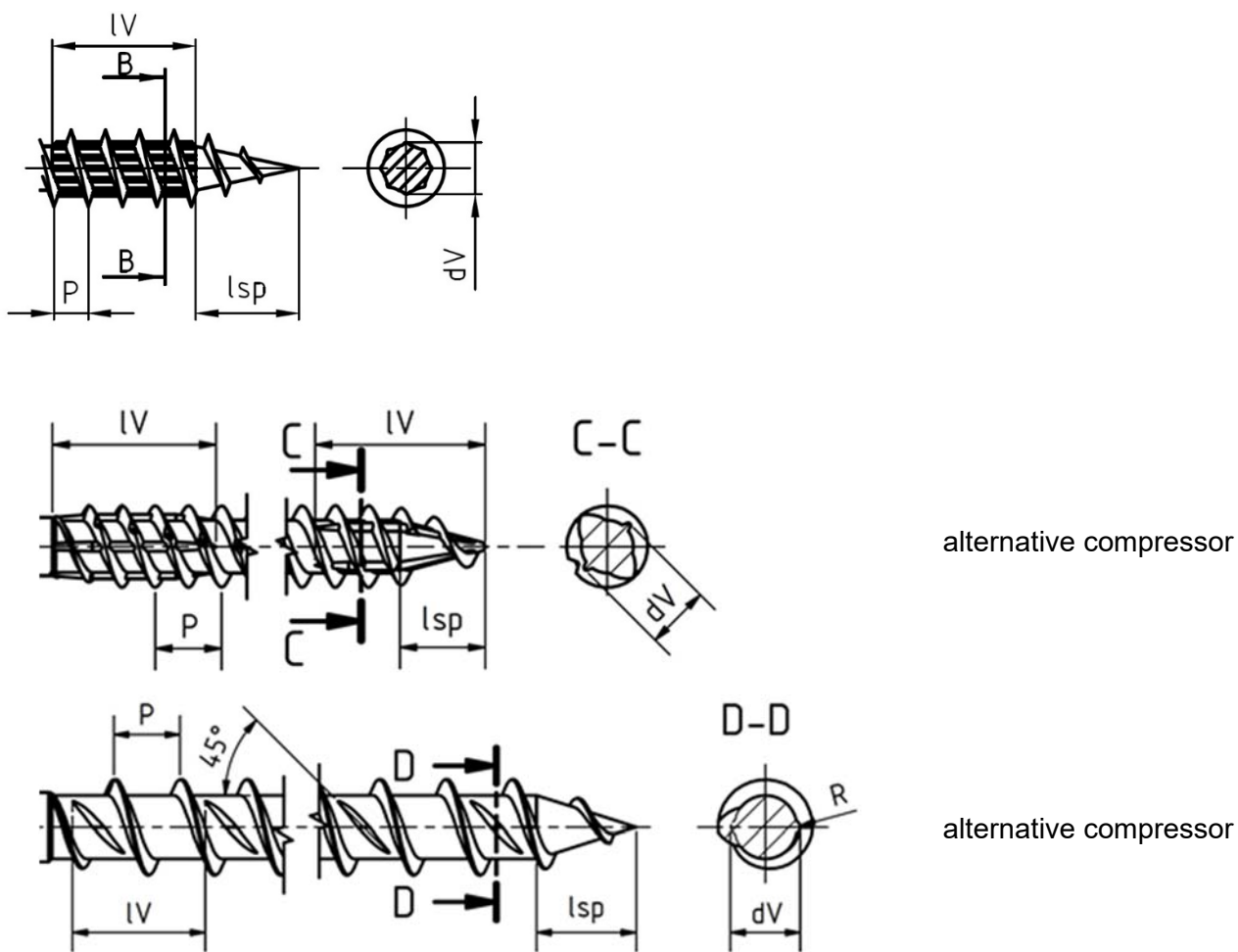
Schmid Schrauben RAPID® T-Con

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Figure 7: Optional compressor geometries of Schmid Schrauben RAPID® T-Con



Dim	dV
mm	mm
8.0	6.0 ±0.59

number of flanks: 4-8
 $IV = 2P$ to $4P$ (1P for $l = 100$)

thread types according to Figure 8
 l_{sp} (l_p) according to Figure 6

alternative compressor

alternative compressor

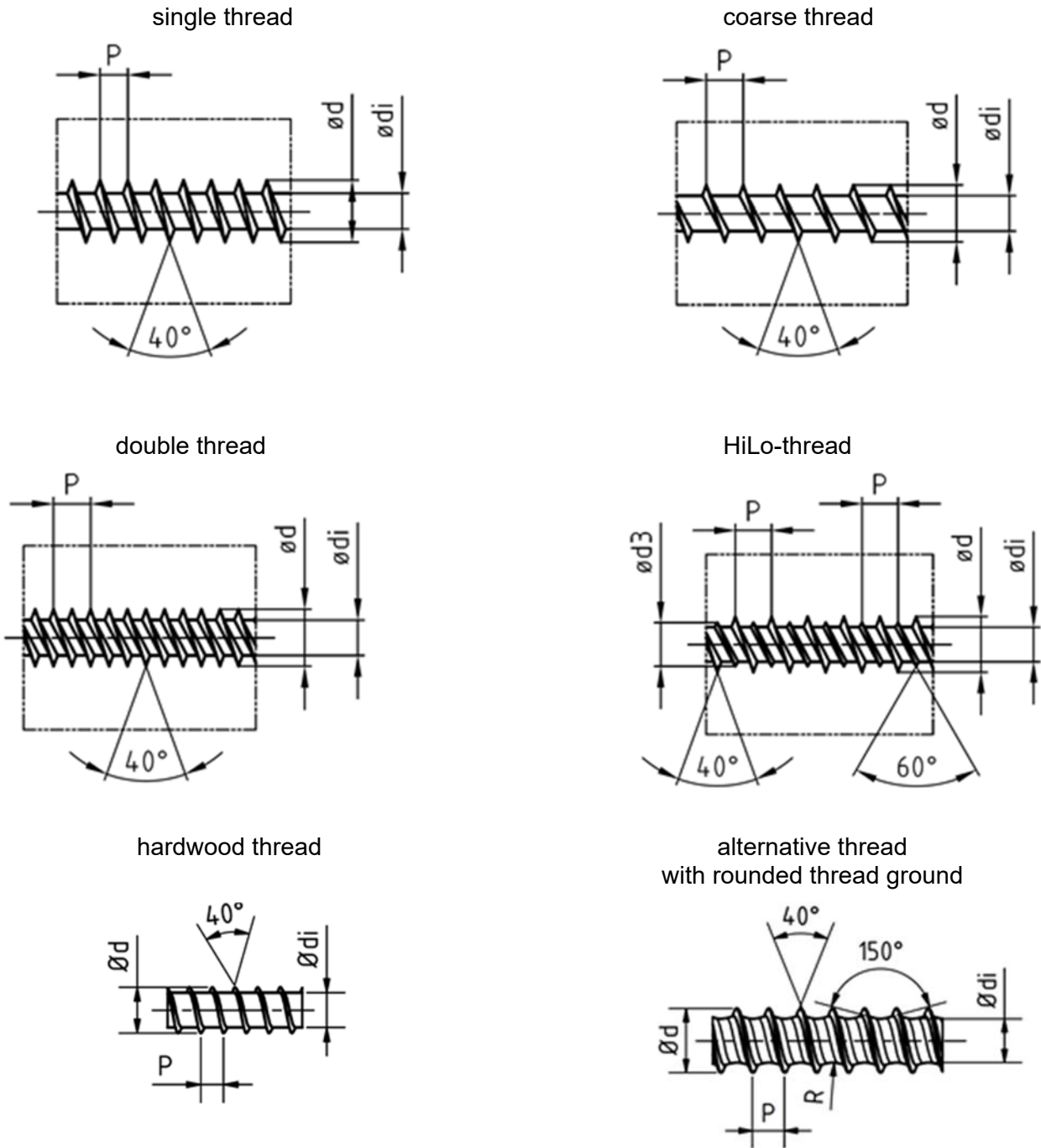
Schmid Schrauben RAPID® T-Con

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Figure 8: Optional thread geometries of Schmid Schrauben RAPID® T-Con



Ød...similar for all threads

Schmid Schrauben RAPID® T-Con

Specification of the dowel-type fasteners

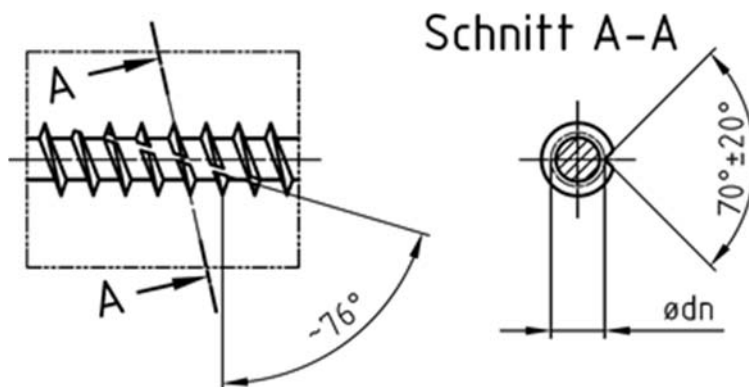
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Dim	Ød	single thread		coarse thread		double thread	
		Ødi	P	Ødi	P	Ødi	P
mm	mm	mm	mm	mm	mm	mm	mm
8.0	8.0 ±0.40	5.20 ±0.26	3.8 ±0.38	5.30 ±0.26	5.6 ±0.56	5.20 ±0.26	7.8 ±0.78

Dim	HiLo- thread			hardwood thread alternativ thread with rounded thread ground		cutting groove (Figure 9)
	Ødi	Ød3	P	Ødi	P	Ødn
mm	mm	mm	mm	mm	mm	mm
8.0	5.30 ±0.27	6.6 ±0.33	6.7 ±0.67	6.10 ±0.31	4.0 ±0.40	7.1 ±0.73

Figure 9: Optional thread with cutting groove of Schmid Schrauben RAPID® T-Con



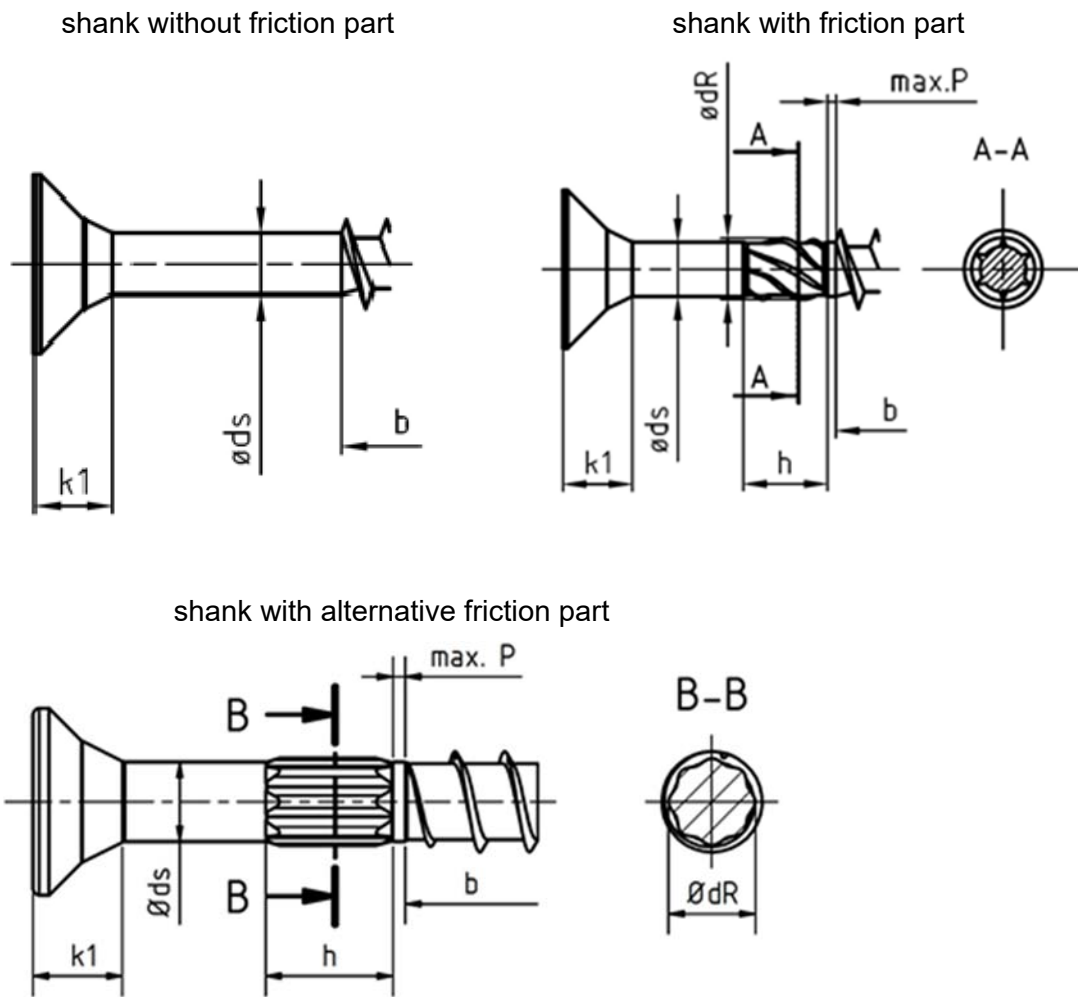
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Figure 11: Optional friction part of Schmid Schrauben RAPID® T-Con



Number of flanks: 5-8

Dim	$\varnothing ds$	$\varnothing dR$	h
mm	mm	mm	mm
8.0	5.9 ± 0.29	6.8 ± 0.6	10.2 ± 1.0

hardwood thread with $d=8$ mm: $\varnothing ds = 6.4 \pm 0.29$

Schmid Schrauben RAPID® T-Con

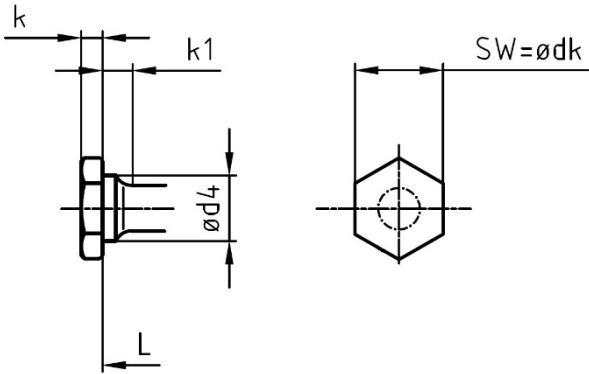
Specification of the dowel-type fasteners

Annex 2

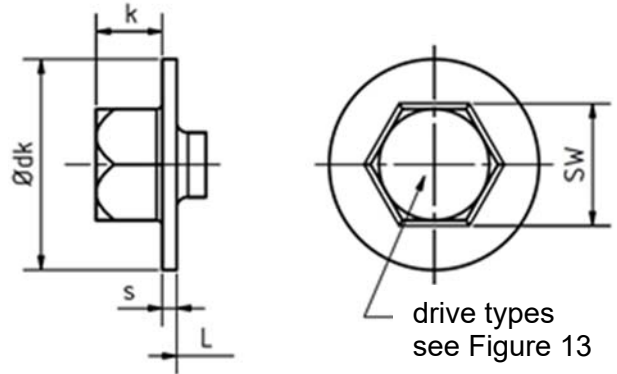
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Figure 12: Optional head geometries of Schmid Schrauben RAPID® T-Con

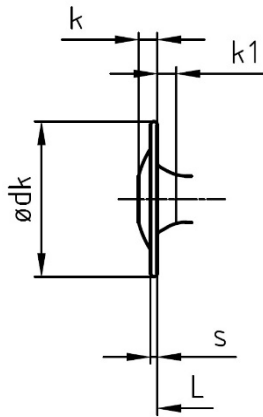
kombi hexagonal head
with thick shaft $SW \geq 12$ mm
alternative with T-drive $\geq T30$



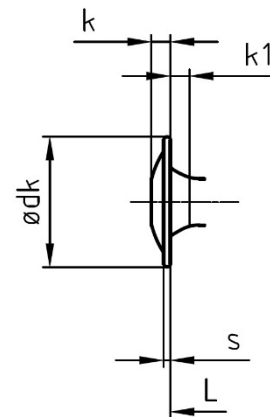
hexagonal head
with small/large washer $SW \geq 12$ mm
alternative with T-drive $\geq T30$



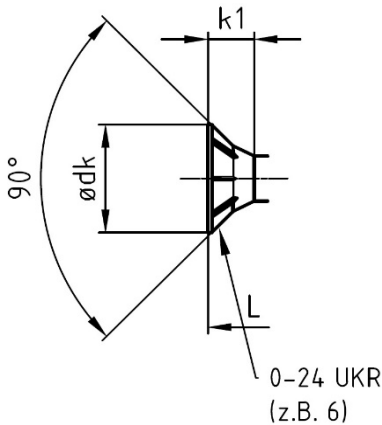
washer head



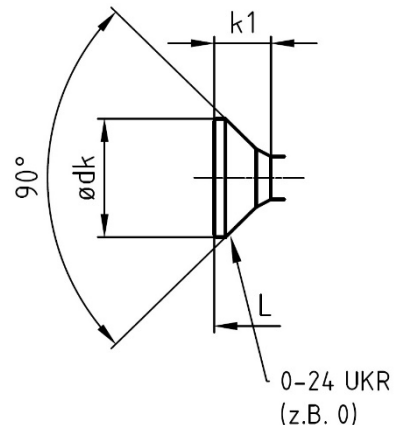
small washer head



countersunk head
with raise or ribs



countersunk head



UKR...cutter ribs

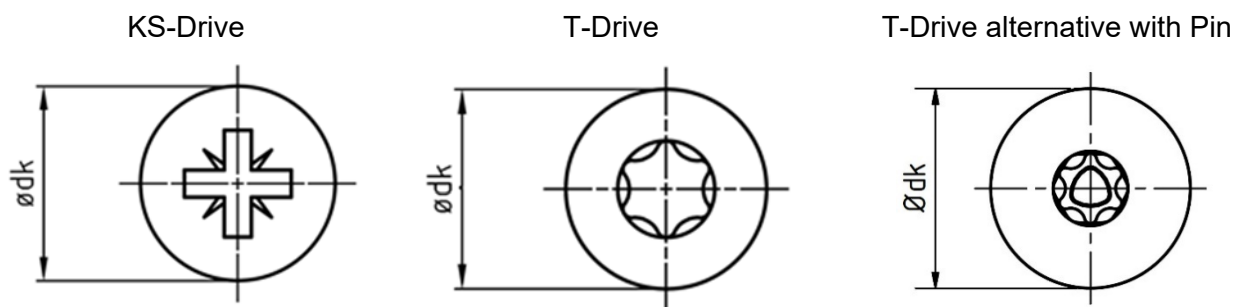
Schmid Schrauben RAPID® T-Con

Specification of the dowel-type fasteners

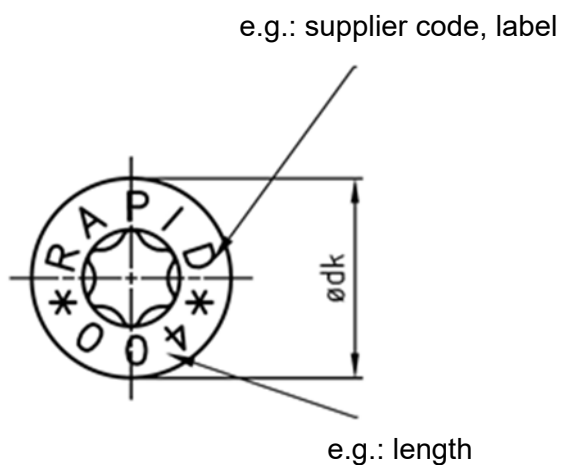
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Figure 13: Drive types and head labelling of Schmid Schrauben RAPID® T-Con



Dim	KS	T / special T
mm	-	-
8.0	KS 4	T30 / T40



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Table 4: Product characteristics of the dowel-type fasteners

Item	Dimension / Specification	
Schmid Schrauben RAPID® T-Con		
Material	–	Material no. 1.5502 or similar or better according to EN 10263-4
Geometry	–	see Figure 5 to 13
Mechanical strength and stiffness		
- char. tensile strength $f_{tens,k}$	kN	22.7
- char. fracture torque moment $M_{T,k}$	Nm	25.6
- bending angle α_b	°	≥ 45
- char. insertion moment $R_{tor,k}$	Nm	$\geq 1.5 * M_{T,k}$
- char. yield moment $M_{y,k}$	Nm	22.6
Corrosion protection	–	EN 1995-1-1, EN 1992-1-1
Shear resistance	–	see Annex 3

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Table 5: Dimensions and specifications

Item	Dimension / Specification	
Wood-concrete composite slab kit		
Thickness h_{HBV}	mm	≥ 120
Width a_H	m	acc. to manufacturer's specification
Length L_S	m	Typical span: up to 8 m with sawn timber, 10 m with LVL members and 14 m with glulam members
Base materials		
Sawn timber acc. to EN 14081-1	mm	$b_H \geq 60$ mm and $h_H \geq 100$ mm
	–	min. strength class C16 according to EN 338
Glued laminated timber GLT acc. to EN 14080	mm	$b_H \geq 60$ mm and $h_H \geq 100$ mm
	–	min. strength class GL20c acc. to EN 14080
Laminated veneer lumber LVL acc. to EN 14374	mm	$t \geq 21$ mm
	–	$f_{m,0,k,panel} \geq 24$ MPa $E_{0,mean} \geq 11\,000$ MPa
Cross laminated timber CLT according to a European Technical Assessment	mm	$d_H \geq 60$ mm und $b_H \geq 60$ mm
	–	Raw material lamellae with min. strength class C16 according to EN 338
Moulding		
Permanent moulding (if necessary) Wood-based panels of spruce according to EN 13986 and EN 636 for load-bearing applications in exterior use Boards	mm	12 mm $\leq t_s \leq 50$ mm (including foil)
	–	$b \geq 300$ mm
	–	min. strength class C16 according to EN 338

Schmid Schrauben RAPID® T-Con

Annex 3

Design considerations for the wood-concrete composite slab kit

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Table 6: Product characteristics of the wood-concrete composite slab kit

BWR	Essential characteristic	Assessment method	Level / Class / Description
1	Mechanical resistance and stability		
	Mechanical resistance		
	Shear strength F_v	EAD 130090-00-0303	See Table 7
	Exemplary deflection	EN 1995-1-1 and EN 1992-1-1	Example see Figure 15
	Dimensional stability		
	Thermal expansion coefficient	EN 1995-1-1 and EN 1992-1-1	EN 1991-1-5
	Moisture content during service shall not change to such an extent that adverse deformation will occur.		
	Stiffness		
	Slip modulus k_{ser}	EAD 130090-00-0303	See Table 8
	In-service environment		
Service classes	EN 1995-1-1	1 and 2	
2	Safety in case of fire		
	Reaction to fire		
	Wood-based panels	EN 13986	acc. to EN 13986 for the respective material
	Steel, mortar	Commission Decision 96/603/EC, as amended	Euroclass A1
	Structural timber	Commission Decision 2003/43/EC, as amended	Density $\geq 350 \text{ kg/m}^3$ $t \geq 22 \text{ mm}$ Euroclass D-s2, d0
	Glued laminated timber products and cross laminated timber	Commission Decision 2005/610/EC	Density $\geq 380 \text{ kg/m}^3$ $t \geq 40 \text{ mm}$ Euroclass D-s2, d0
	Laminated veneer lumber	acc. to manufacturers declaration	

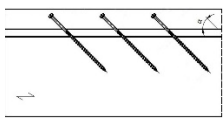
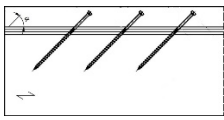
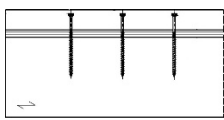

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Table 7: Shear strength F_v for Schmid Schrauben RAPID® T-Con

Screw arrangement	Shear strength F_v in N	
	Sawn timber, GLT, CLT	LVL
45° 	$113 \cdot l_{ef} \cdot \left(\frac{\rho_k}{350}\right)^{0.8}$ ¹⁾	$109 \cdot l_{ef} \cdot \left(\frac{\rho_k}{520}\right)^{0.8}$
135° 	$37 \cdot l_{ef} \cdot \left(\frac{\rho_k}{350}\right)^{0.8}$	–
90° without interlayer 	$\sqrt{4 \cdot M_{y,k} \cdot f_{h,2,k} \cdot d}$	–
90° with interlayer 	$f_{h,2,k} \cdot d \cdot t \cdot \sqrt{1 + \frac{4 \cdot M_{y,k}}{f_{h,2,k} \cdot d \cdot t^2} + \frac{f_{h,1,k}}{2 \cdot f_{h,2,k}}} - 1$	–

¹⁾ also applicable for screws with ring (see Figure 10) in crosswise screw arrangement 45°/135°.

with

l_{ef} length of the threaded part of the screw in the base material in mm

t thickness of the interlayer $0 \leq t \leq 50 \text{ mm}$

$f_{h,1,k}$ char. embedment strength in the interlayer in N/mm² acc. to EN 1995-1-1

$f_{h,2,k}$ char. embedment strength in the base material in N/mm² acc. to EN 1995-1-1

d outer thread diameter of the screw in mm

$M_{y,k}$ char. yield moment of the screw in Nmm acc. to Table 4

ρ_k char. density of the base material in kg/m³

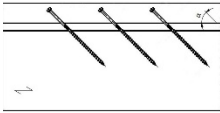
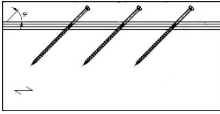
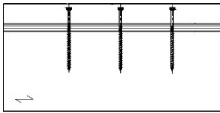
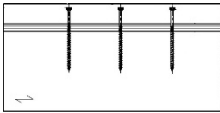
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Table 8: Slip modulus k_{ser} for Schmid Schrauben RAPID® T-Con

Screw arrangement	Slip modulus k_{ser} in N/mm	
	Sawn timber, GLT, CLT	LVL
45° 	$72 \cdot l_{ef}$	$144 \cdot l_{ef}$
135° 	$24 \cdot l_{ef}$	–
90° without interlayer 	$\frac{\rho_m^{1.5} \cdot d^{0.8}}{23}$	–
90° with interlayer 	$0.35 \cdot \frac{\rho_m^{1.5} \cdot d^{0.8}}{23}$	–

with

 l_{ef} length of the threaded part of the screw in the base material in mm t thickness of the interlayer $0 \leq t \leq 50 \text{ mm}$ $f_{h,1,k}$ char. embedment strength in the interlayer in N/mm² acc. to EN 1995-1-1 $f_{h,2,k}$ char. embedment strength in the base material in N/mm² acc. to EN 1995-1-1 d outer thread diameter of the screw in mm $M_{y,k}$ char. yield moment of the screw in Nmm acc. to Table 4 ρ_k char. density of the base material in kg/m³ ρ_m mean density of the base material in kg/m³**Schmid Schrauben RAPID® T-Con**

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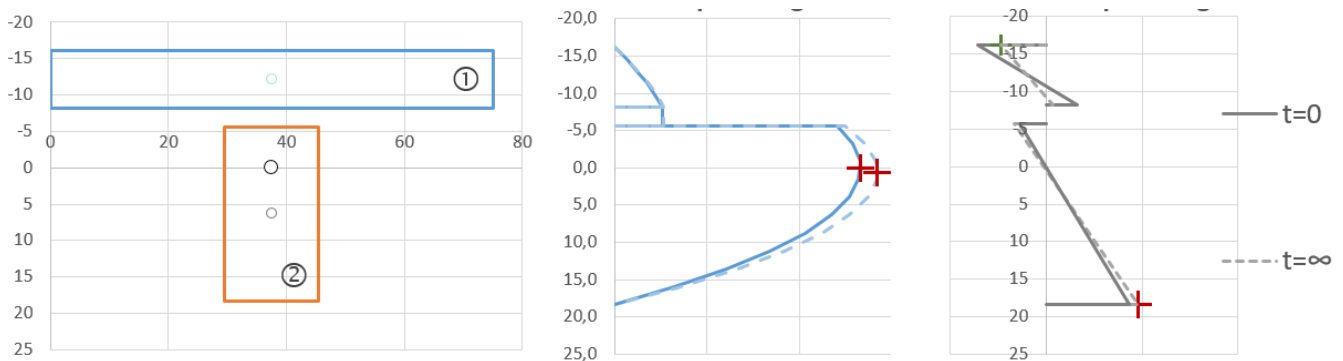
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Design of the wood-concrete composite slab kit

Schmid Schrauben RAPID® T-Con may be used in service class 1 and 2 according to Eurocode 5. The design of the wood-concrete composite slab kit in the ultimate and the serviceability limit states shall take into account the influence of creep, concrete shrinkage and moisture changes. The verification of the limit states is to be performed both for the initial state ($t = 0$) and the final state ($t = \infty$). Exemplary stress distribution is shown in Figure 14.

Figure 14: Exemplary stress distribution for a wood-concrete composite slab kit with Schmid Schrauben RAPID® T-Con



The influence of creep and moisture changes may be taken into account by reducing the modulus of elasticity of the timber and concrete and the slip modulus to be used in calculations analogous with EN 1995-1-1. The following deformation factors k_{def} shall be used:

Material	Service class	
	1	2
Sawn timber	0.6	2.0
Glued laminated timber	0.6	2.0
Laminated veneer lumber 14374	0.6	2.0
Cross laminated timber	0.8	2.0
Concrete	2.5	2.5
Connection with Schmid Schrauben RAPID® T-Con	0.6	4.0

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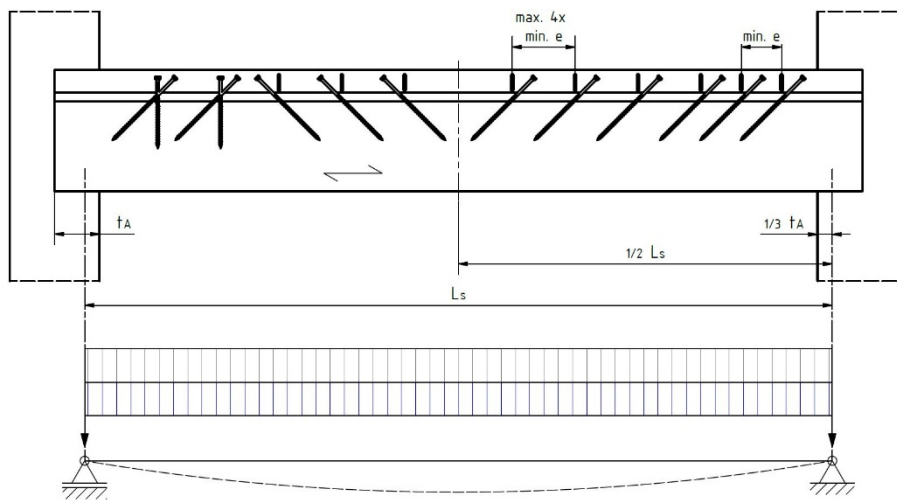
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Spacing, end and edge distances

in direction of grain		perpendicular to direction of grain	
a_1	$a_{3,c}$	$a_2^{1)}$	$a_{4,c}$
100 mm	40 mm	30 mm	30 mm

¹⁾ For mainly axially loaded screws spacing a_2 can be reduced till $2.5 d$ ($3 d$) if the product of spacing a_1 times $a_2 = 25 d^2$ ($21 d^2$) can be kept for every screw.

Figure 15: Exemplary deflection for a wood-concrete composite slab kit with Schmid Schrauben RAPID® T-Con



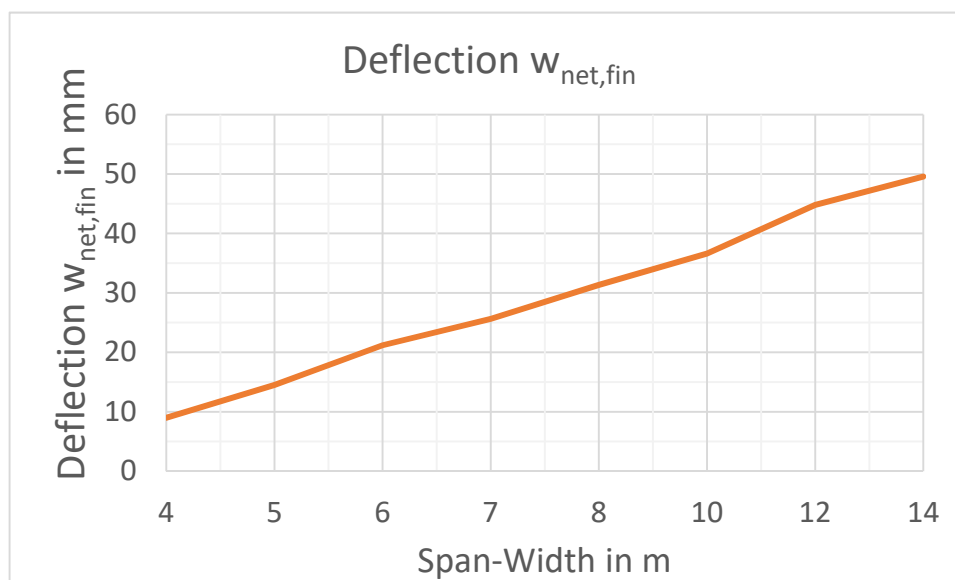
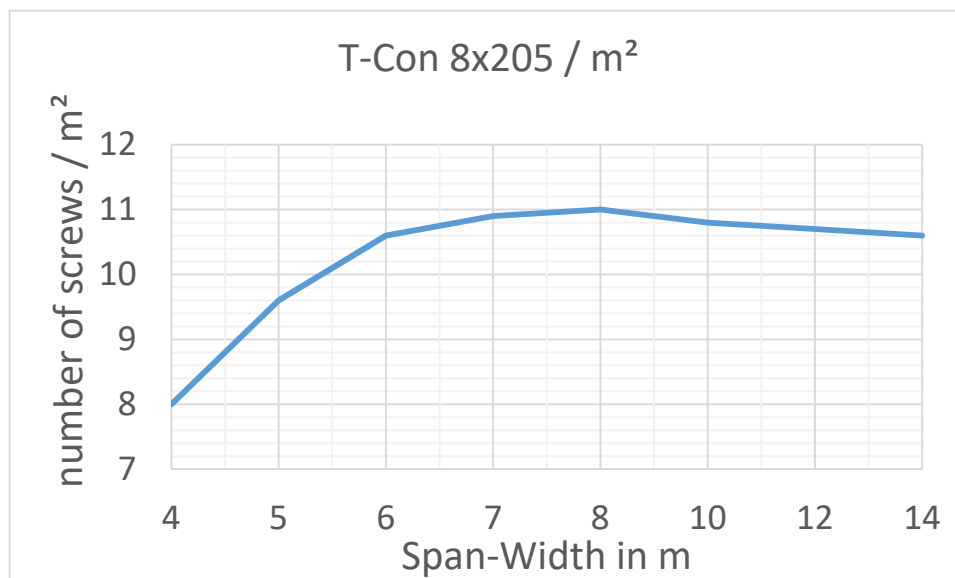
Distance of beams GL 24h $a_H \leq 1.0$ m
 Height of concrete $h_c = 70$ mm
 $g = 2$ kN/m², $q = 2$ kN/m²

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EAD 130090-00-0303, European Assessment Document for “Wood-concrete composite slab kit with dowel-type fasteners”

EN 206:2013+A1 (11.2016), Concrete – Specification, performance, production and conformity

EN 338 (04.2016), Structural timber – Strength classes

EN 636 (09.2012), Plywood – Specifications

EN 1991-1-5 (11.2003), +AC (03.2009), Eurocode 1: Actions on structures – Part 1-5: General actions – Thermal actions

EN 1992-1-1 (12.2004), +AC (01.2008), +AC (11.2010), +A1 (12.2014), Design of concrete structures – Part 1-1: General rules and rules for buildings

EN 1995-1-1 (11.2004), +AC (06.2006), +A1 (06.2008), +A2 (05.2014), Eurocode 5 – Design of timber structures – Part 1-1: General – Common rules and rules for buildings

EN 13986:2004+A1 (04.2015), Wood-based panels for use in construction – Characteristics, evaluation of conformity and marking

EN 14080 (06.2013), Timber structures – Glued laminated timber and glued solid timber – Requirements

EN 14081-1 (02.1016), Timber structures – Strength graded structural timber with rectangular cross section – Part 1: General requirements

EN 14374 (11.2004), Timber structures – Structural laminated veneer lumber – Requirements

EN ISO 10456 (12.2007), +AC (12.2009), Building materials and products – Hygrothermal properties – Tabulated design values and procedures for determining declared and design thermal values

EN ISO 16120-2 (02.2017), Non-alloy steel wire rod for conversion to wire – Part 2: Specific requirements for general-purpose wire rod

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Reference documents	of European Technical Assessment ETA-18/0829 of 15.02.2019

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