PRODUCT DATA SHEET TCC MAX

PRODUCT DESCRIPTION

TCC MAX is an innovative type of connector for creating composite action between timber and concrete in a structural element such as a beam or slab. In this technique, both materials work together with their best strengths, concrete in compression and timber in tension.

TCC MAX comprises of a steel cylinder fixed to the timber member with six 6,5 mm x 100 mm KonstruX fully threaded screws around its perimeter, and one M14 x 60 mm 8.8 bolt inserted above anchoring in the concrete member. The screws bring withdrawal resistance and high initial stiffness. The upper bolt and cylindrical part contribute with bearing strength.

Timber-Concrete Composite (TCC) elements are ideal for new projects comprising big structural grid sizes while maintaining a slender slab. Moreover, TCC can be exploited in antique timber buildings with wooden beams needing reinforcement, or when a change of use requires improved strength and stiffness.

ADVANTAGES

- Very high initial stiffness
- Ductile failure mode ensured
- Few connectors needed
- Improved soundproofing due to concrete layer
- Improved fire resistance due to concrete layer

MATERIAL

- Galvanized hardened carbon steel

SERVICE CLASS

- SC1, SC2

APLICATIONS

- Solid timber
- Glued laminated timber
- CLT, LVL
- Conventional concrete and lightweight concrete with a minimum strength class of C20/C25 and maximum grain size of 8 mm.

APPLICATION IMAGE

TCC MAX application for connecting CLT.

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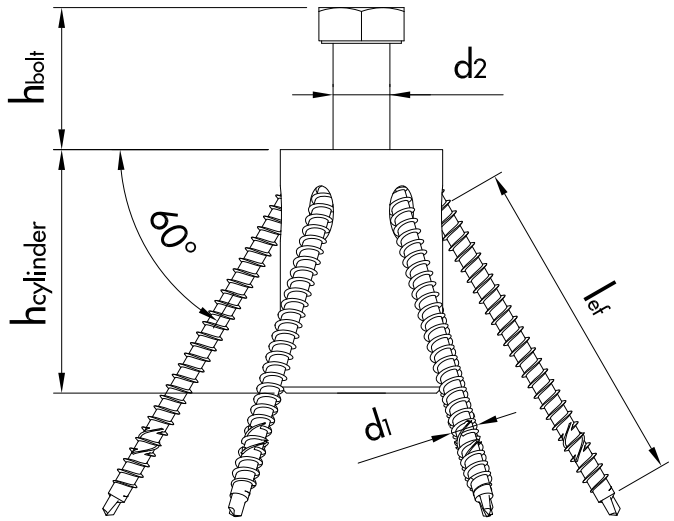
GEOMETRY AND MECHANICAL PROPERTIES



CONNECTOR GEOMETRY

Height of steel cylinder $h_{cylinder}$ [mm]	60
Height of bolt after assembly h_{bolt} [mm]	40
Nominal diameter of screws d_1 [mm]	6,5
Nominal diameter of shear bolt d_2 [mm]	14
Effective threaded length of screws l_{ef} [mm]	60

MECHANICAL PROPERTIES

Characteristic shear resistance F_{Rk} [kN]w	60,2
Slip modulus under serviceability state k_{ser} [kN/mm]	77,6
Slip modulus under ultimate state k_u [kN/mm]	51,7

Calculated considering glue laminated timber beams of class GL24h. See ETA-16/0864 for other materials.

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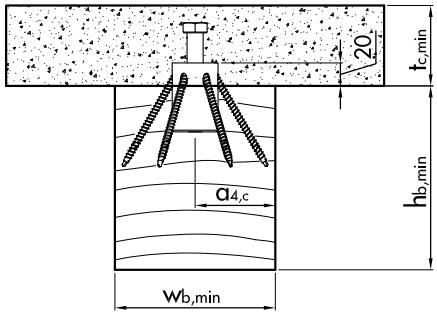
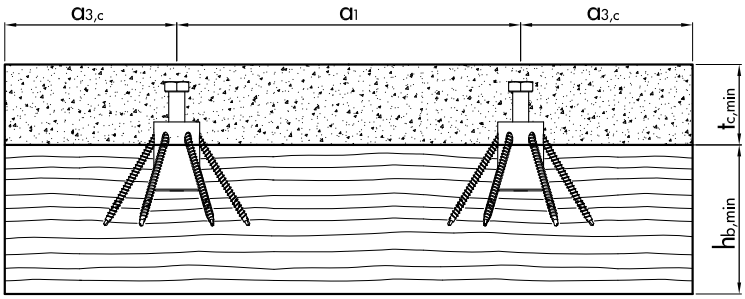
Transversal section



Longitudinal section



CONNECTION MINIMUM SPACINGS, DISTANCES, AND DIMENSIONS

Spacing between connectors (parallel to grain) a_1 [mm]	300
Spacing between row of connectors (perpendicular to grain) a_2 [mm]	180
End distance $a_{3,c}$ [mm]	200
Edge distance $a_{4,c}$ [mm]	70
Minimum width of timber beam $w_{b,min}$ [mm]	140
Minimum height of timber beam $h_{b,min}$ [mm]	200
Minimum concrete layer thickness $t_{c,min}$ [mm]	80
Maximum concrete layer thickness $t_{c,max}$ [mm]	0,7·wb

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USE IN SERVICE CLASS 2

When TCC members are subjected to service class 2 conditions (for ex., in covered timber bridges), larger deformations are to be expected due to varying climate compared to service class 1 (creep effects are more pronounced). These larger deformations influence the internal stress distribution in the composite members. Generally, the stresses in the timber and concrete members increase. The following prescriptions regarding creep coefficients "k_{def}" and stiffness reduction must be adopted:

Use in Service class 2

- Creep coefficients k_{def}

Material	Service class	
	1	2
Solid timber (EN 14081-1)	0,6	2,0
Glued laminated timber (EN 14080)	0,6	2,0
Laminated veneer lumber (EN 14374)	0,6	2,0
Cross-laminated timber (ETA)	0,8	2,0
Concrete, EN 206-1	2,5	2,5
TCC MAX (ETA)	0,6	4,0

- Stiffness reduction
  - Timber → Moduli of elasticity for t= ∞ → **1/3** of respective value in:
    - EN 14081 (Structural timber)
    - EN 14080 (Glulam)
    - EN 14374 (LVL)
  - Connection → Slip moduli for t= ∞ → **1/5** of respective value for t= 0

STRUCTURAL FIRE DESIGN

The prescriptions of EN 1995-1-2 "Eurocode 5: Design of timber structures – Part 1-2: General – Structural fire design" for axially loaded screws should be taken.

PRODUCT TABLE

Art.-No.	Product description	VPE
944906	TCC MAX	10

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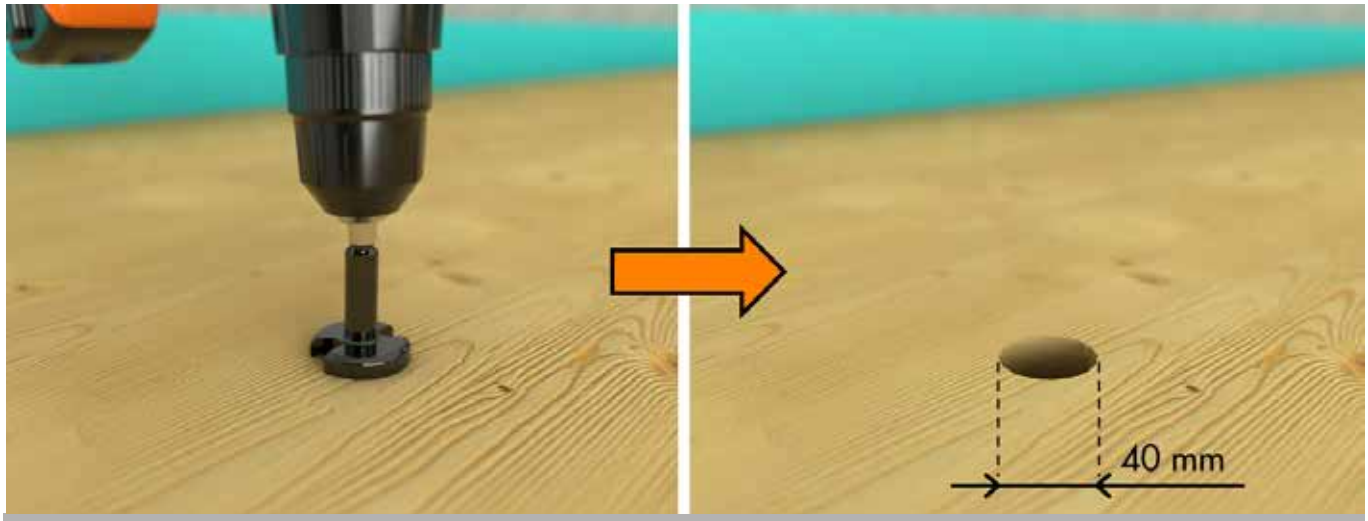
ASSEMBLY INSTRUCTIONS

The installation of TCC MAX is easily done following the next steps.

Tools needed: electric drill, ⌀40mm forstner bit, TX30 bit, M14 hex socket drill bit or wrench



Step 1: Make the hole in the timber component using the electric drill equipped with the ⌀ 40 mm forstner bit. Drill to a depth of 40 mm.

Step 2: Rigorously clean the hole in the timber, and then insert the steel cylinder part of the connector in it ensuring that the 20 mm collar mark is flush with the timber surface.

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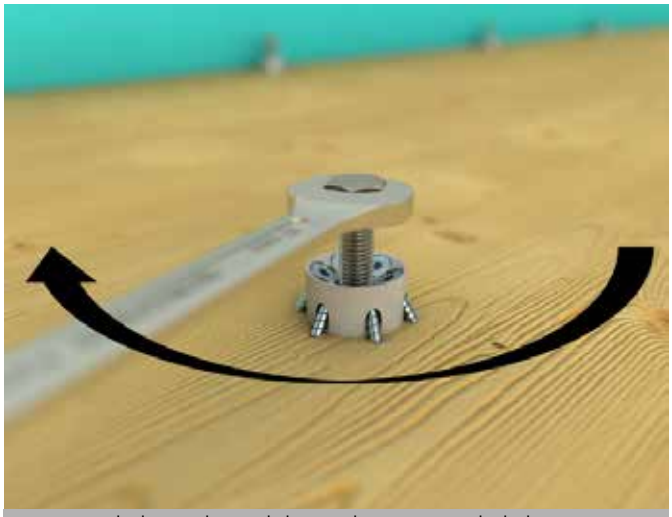
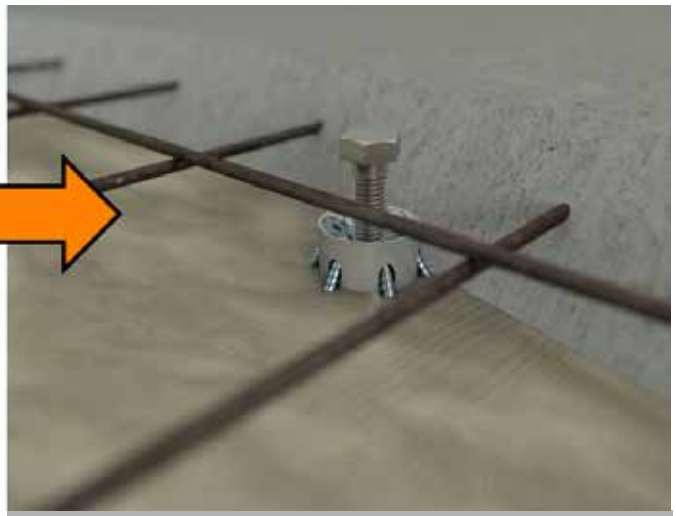
Step 3: Install the six KonstruX screws 6,5 mm x 100 mm in each hole of the steel cylinder, tightening one by one uniformly to prevent moving the cylinder out of position.



Step 4: Completely insert the M14 bolts on each connector's steel cylinder using an appropriate tool.

Step 5: Place a 200-micron (0,2 mm) polyethylene film on the timber component with openings for each shear connector. The holes must be just big enough for a shear connector to pass through (approx. 45 mm).



Step 6: With TCC shear connectors already completely installed, concrete work can begin (installation of formwork, steel reinforcement, and concrete pouring).

If you are not familiar with how this product is used, and particularly with the product's intended use, please contact our Application Technology department (Technik@eurotec.team).

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