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European Technical Assessment ETA-18/0649 of 2018/09/18

General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the
construction product:

Tecnaria CTL BASE, CTL MAXI and CVT 40 OMEGA
connectors

Product family to which the
above construction product
belongs:

Fasteners for use in wood-concrete slab kits

Manufacturer:

TECNARIA SpA
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Manufacturing plant:

TECNARIA SpA
Manufacturing Plant I

This European Technical
Assessment contains:

10 pages including 3 annexes which form an integral
part of the document

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

European Assessment Document (EAD) no EAD
130090-00-0303 "Wood-concrete composite slab with
dowel-type fasteners"

This version replaces:

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II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product

This ETA is an assessment of the Tecnaria CTL BASE, CTL MAXI and CVT 40 OMEGA connectors for wood-concrete composite slab kits. The assessment concerns use of the screws in composite slab kits, however, the holder of this ETA only delivers the complete connectors (stud and screw).

Shape and tolerances of the connectors are given in Annex 3.

The kits are individually designed to meet the requirements put on the works.

Tecnaria S.p.A. delivers the connectors for the composite action to be used as kit components. The composite members may be prefabricated at factory, or they may be composed at the building site. The proper function of the wood-concrete composite slabs provides for the following components to be added in the factory or at the building site:

- Concrete slab, according to EN 206-1, and reinforcement according to EN 10080 and national regulations either prefabricated or cast at the building site.
- In the case of concrete cast at the building site: formwork, e.g. timber boards or wood based panel. This is an optional intermediate layer between the concrete and the timber. When the concrete slabs are prefabricated, no intermediate layer between timber and concrete is needed.
- In the case of concrete cast at the building site: lateral moulding along the edges of the slab.
- Timber members, e.g. glulam according to EN 14080, sawn softwood timber according to EN 14081-1, LVL according to EN 14374 or cross laminated timber according to ETA.

The concrete slab is generally stressed at combined compression and bending while the timber beam is stressed at combined tension and bending..

This ETA covers connectors for composite members with minimum concrete flange depths of 20 mm and minimum timber member depths of 70 mm. The maximum concrete flange depth is 1.5 times the timber member depth. Typical span widths for the construction are up to 8 m with sawn softwood timber members, 10 m with LVL members and 14 m with glulam members but larger span widths also are possible.

A typical composite member is shown in figure 1.1a of Annex 1. The connectors are shown in figure 1.1b.

Specification of the intended use in accordance with the applicable European Assessment Document

Tecnaria CTL BASE, CTL MAXI and CVT 40 OMEGA connectors are intended to be used in structural composite members such as floor, roof, or wall constructions in service classes 1 and 2 as defined in EN 1995-1-1 subject to static or quasi static loading. In addition, use class 3.1 as defined in EN 335-1 (exterior, above ground, protected) may be possible, as balconies depending on national provisions.

The verification and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of at least 50 years for connectors.

The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer, but are to be regarded only as a means for choosing the right product in relation to the expected economically reasonable working life of the works.

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

Characteristic	Assessment of characteristic
3.1 Mechanical resistance and stability (BWR 1)*)	
Material and geometry	See Annex 3
Mechanical strength	No performance assessed
Mechanical stiffness and shear resistance	<p>Wood-concrete composite slabs including Tecnaria's Connectors CTL BASE, CTL MAXI and CVT 40 OMEGA are used and manufactured according to an individual design made by a structural engineer responsible for the design of works on a case by case basis. Wood-concrete composite floors may function as directly load bearing and structural bracing members. The structural performance of them shall be considered in accordance with the limit state design principles specified in Eurocodes.</p> <p>The performance of the composite slab is outside of this ETA.</p> <p>Mechanical properties of Tecnaria's Connectors CTL BASE, CTL MAXI and CVT 40 OMEGA and applicable creep and duration of load factors for composite members are given in Annex 2.</p>
Corrosion protection	The screws are made of case hardened steel as specified in the control plan and corrosion protected with a zinc coating.
3.2 Safety in case of fire (BWR 2)	
Reaction to fire	Tecnaria's Connectors CTL BASE, CTL MAXI and CVT 40 OMEGA including the zinc coating are classified non-combustible in accordance with EC Decision 2000/147/EC and fulfil the requirements of class A1 according to EN 13501-1: 2002.
*) See additional information in section 3.9 – 3.10.	
3.9 General aspects	
<p>Tecnaria S.p.A delivers connectors intended to be component in wood-concrete composite slabs in accordance with the provisions of this European Technical Assessment. The CTL BASE, CTL MAXI and CVT 40 OMEGA connectors are manufactured in the factory in accordance with the provisions of this European Technical Assessment.</p> <p>CTL BASE, CTL MAXI and CVT 40 OMEGA connectors shall be installed on the basis of a specific structural design for each composite slab installation.</p>	<p>Load bearing capacities to be used in the design are given in Annex 2.</p> <p>The design also shall take into account any aspects regarding installation of the kit components, as any temporary bracing and supporting. Wood-concrete composite slabs shall be installed by appropriately qualified personnel, following the installation plan. Only CTL BASE, CTL MAXI and CVT 40 OMEGA connectors without any defects are allowed to be used. Before concrete is poured, the person responsible for the design of the works shall check the set of the CTL BASE, CTL MAXI and CVT 40 OMEGA connectors to be in accordance with the design. The manufacturer</p>

shall ensure that the information of these provisions is given to those concerned.

3.10 Aspects related to the performance of the product

3.10.1 Corrosion protection in service class 1 and 2.
Durability of the finished composite slab is not covered by this ETA.

Durability of the CTL BASE, CTL MAXI and CVT 40 OMEGA connectors is provided for by the protective zinc coating for a mean thickness of 5 µm.

4 Assessment and verification of constancy of performance (AVCP)

4.1 AVCP system

According to the decision 2000/447/EC of the European Commission, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 1.

5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking

Issued in Copenhagen on 2018-09-18 by



Thomas Bruun
Managing Director, ETA-Danmark

ANNEX 1
WOOD-CONCRETE COMPOSITE SLAB COMPOSED WITH TECNARIA CONNECTORS

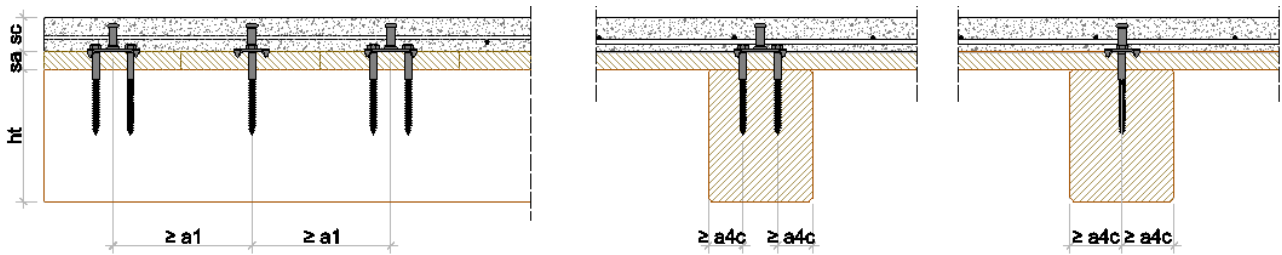


Figure 1.1a
Elevation on (left) and cross-section through (right) a composite member with Tecnar CTL MAXI 040 connector.

CTL BASE 060

CTL MAXI 040

CVT 40 OMEGA

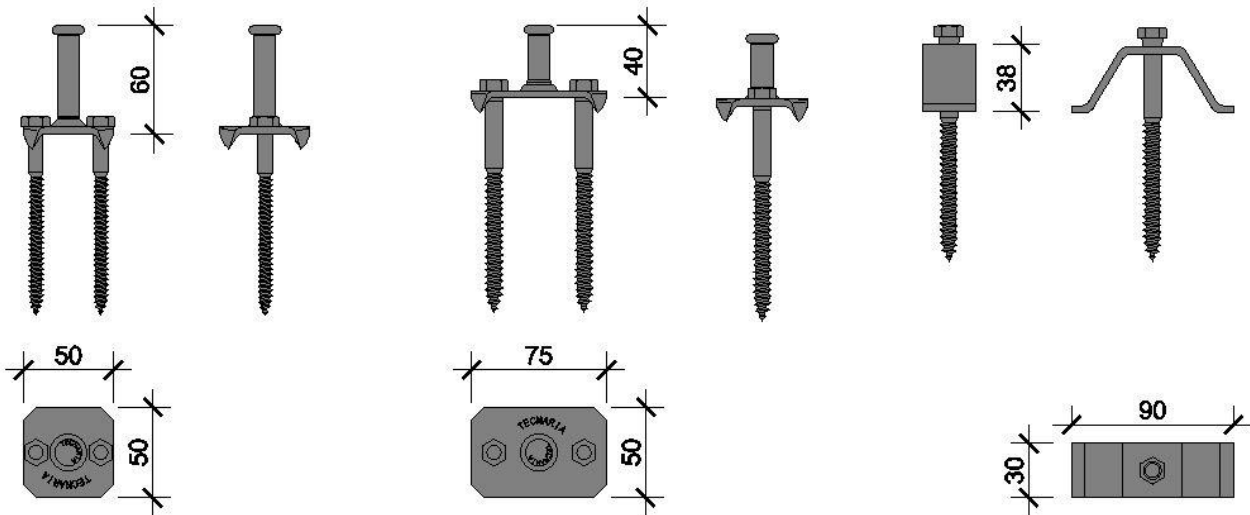


Figure 1.1.b
CTL BASE 060, CTL MAXI 040, CVT 40 OMEGA connectors. These are only some of the possible heights of the connectors (for the complete set see Annex 3).

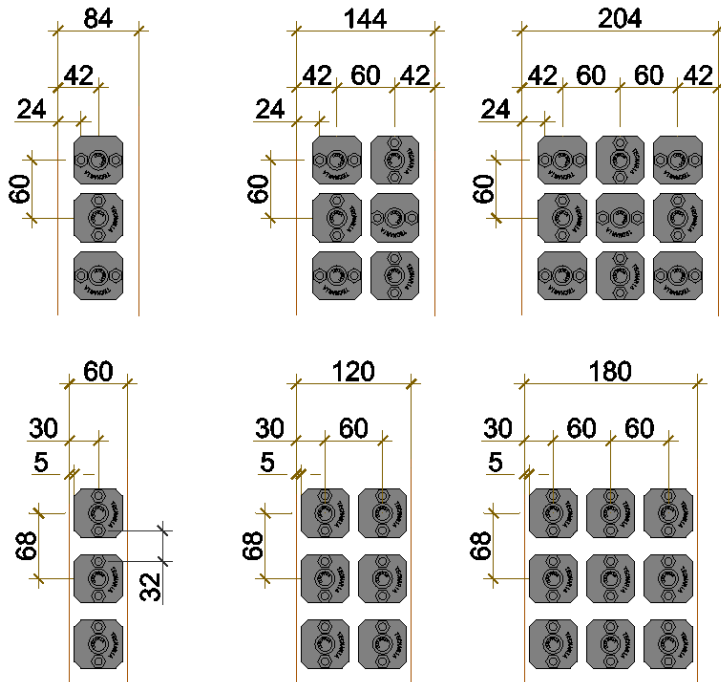


Figure 1.1. c Minimum distances and dispositions for BASE connectors

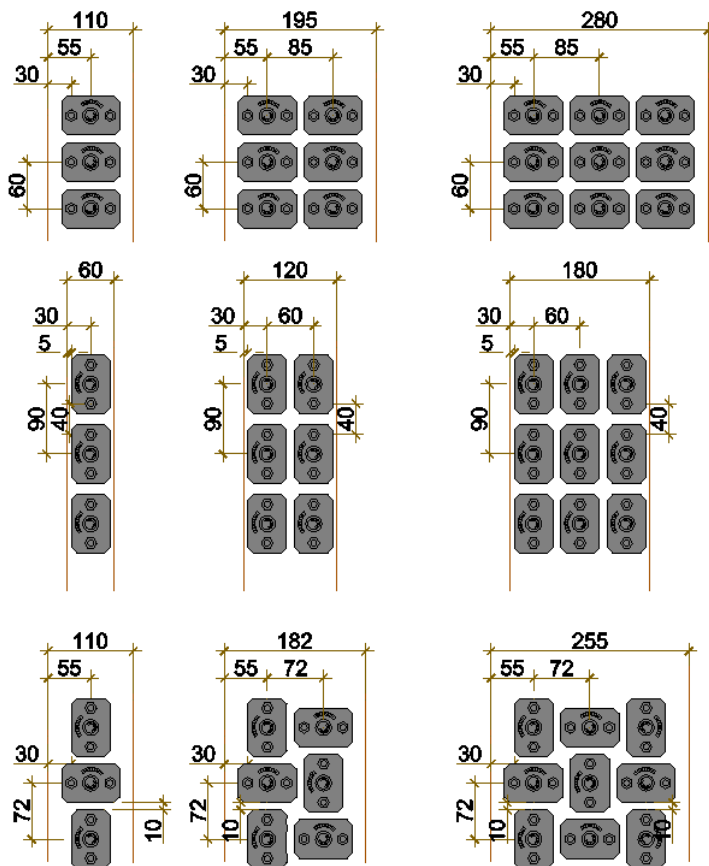


Figure 1.1. d Minimum distances for MAXI connectors

The composition of the screw materials is deposited at ETA-Danmark.

The length and diameter of the screws is given in Annex 3. More exact description of the shape and tolerances of the screws are referred to under 3.2.2.1 in the Control plan.

ANNEX 2

MECHANICAL PROPERTIES

Resistance and stiffness

Structural model

Composite members with Tecnaria Connectors are to be designed taking into account the influence of the slip occurring in the joints. A method for the calculation of the load bearing capacity and the deformation of mechanically jointed beams or columns is given in Annexes B and C of Eurocode 5 Part 1-1: General – Common rules and rules for buildings. Calculations should be carried out assuming a linear relationship between force and slip. Alternative methods for the calculation based on numerical models are also applicable.

For the determination of the internal forces and moments an elastic behaviour of the concrete may be assumed if the tensile stress in the concrete does not exceed twice the concrete tensile strength.

Apart from the design of the composite member, the load-carrying-capacity of the concrete layer spanning between the timber beams should be checked. If the floor is supported by the timber beams, the shear capacity of the timber should also be checked, otherwise, if the floor is supported by the concrete slab, the shear capacity of the slab should be checked..

The support of the wood concrete composite elements shall be carried out via the lower cross-sectional part either directly by contact or by appropriate connections.

Design of the wood-concrete composite slab

The long-term effects (e.g. shrinkage of the concrete, dimensional changes of timber, creep) shall be verified by calculation. Concrete and timber properties and models as used in verifications of long-term effects should be based on EN 1992 1-1 and EN 1995-1-1 considering the environmental and climatic conditions in place of use. 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 and with EN1992-1-1.

The values of the deformation factors k_{def} for timber and Tecnaria connectors should be taken from EN 1995-1-1. The values of the deformation factor φ for concrete should be taken from EN 1992-1-1. For floors in service class = 1, φ for concrete can be taken = 2.5. For prefabricated concrete slabs, the concrete shrinkage may be disregarded.

Table 2.1. Values of characteristic shear resistance $F_{v,Rk}$, slip modulus K_{ser} and K_u of the connectors

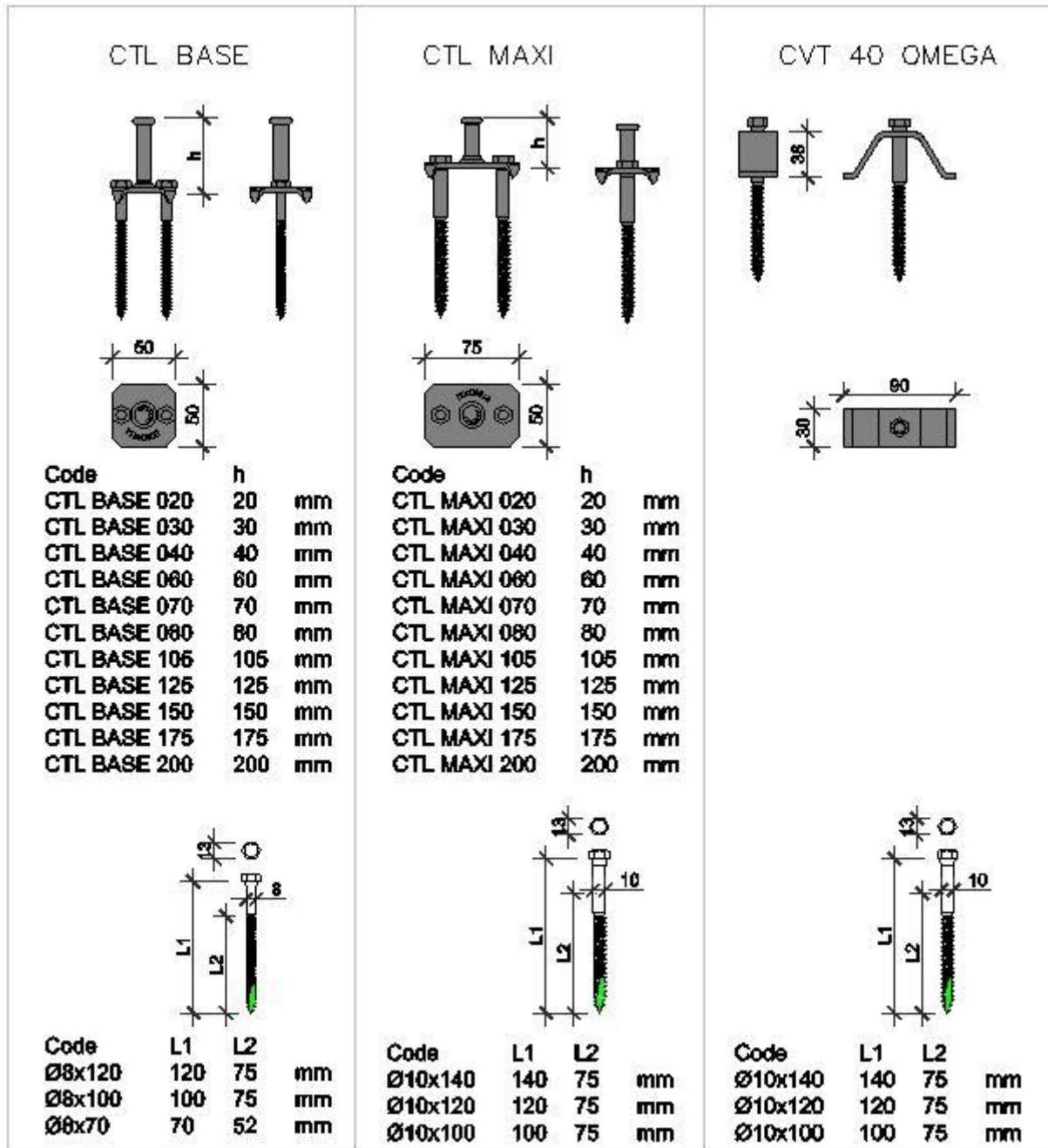
Connector	Decking	Wood	$F_{v,Rk}$	K_{ser}	K_u
			kN	kN/mm	kN/mm
BASE	absent	C16 and + GL24 and + D24 and D27	17,2	17,9	9,99
		D30 and +	19,5	16,5	9,87
	20mm	C16 and + GL24 and + D24 and D27	8,96	4,00	2,49
		D30 and +			
	40mm	C16 and + GL24 and + D24 and D27	5,86	1,43	1,20
		D30 and +			
MAXI	absent	C16 and + GL24 and + D24 and D27	19,3	18,6	10,4
		D30 and +	24,5	21,2	13,6
	20mm	C16 and + GL24 and + D24 and D27	15,0	7,68	4,35
		D30, GL24 and +			
	40mm	C16 and + GL24 and + D24 and D27	11,3	3,06	2,66
		D30 and +			
CVT 40 OMEGA	20mm	C16 and + GL24 and + D24 and +	7,89	2,09	1,48
	40mm	C16 and + GL24 and + D24 and +	6,64	1,89	1,32

Resistance to fire

Simplified rules in EN 1995-1-2 for calculation of resistance to fire in case of screws are applicable for constructions made by Tecnar's Connectors.

Thus, in design of works, fire resistance of the timber members may be determined according to EN 1995-1-2 and the fire resistance of the concrete flange according to EN 1992-1-2, if the national rules allow for calculation.

**ANNEX 3
DRAWINGS OF THE TECNARIA'S CONNECTORS**



Tolerances and materials held on file by ETA-Danmark A/S