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# European Technical Assessment

# ETA-17/0353 of 07.07.2017

General part

| | |
|---|---|
| **Technical Assessment Body issuing the European Technical Assessment** | Österreichisches Institut für Bautechnik (OIB)<br>Austrian Institute of Construction Engineering |
| **Trade name of the construction product** | Solaio Compound |
| **Product family to which the construction product belongs** | Wood-concrete composite slab kit |
| **Manufacturer** | Coperlegno s.r.l.<br>Via Ardeatina, 933<br>00178 Roma<br>Italy |
| **Manufacturing plant** | Coperlegno s.r.l.<br>Via Ardeatina, 933<br>00178 Roma<br>Italy |
| **This European Technical Assessment contains** | 15 pages including 3 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<br>EAD 130018-00-0303 “Wood-concrete composite slab kit”, Edition April 2017 |

**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 the wood-concrete composite slab kit "Solaio Compound". Solaio Compound is composed of partially milled timber members with lattice girders used for composite action. Hereby, the lattice girder is placed into a partially milled timber member equipped with teeth in the central portion and fixed with cement mortar. Between the timber members, different kinds of permanent moulding are used.
The following components are used:

Prefabricated in the factory and part of the kit

- Glued laminated timber according to EN 14080 which is particular milled.
- Lattice girder according to standards and regulations in force at the place of use.
- Cement mortar according to EN 1504-3 for the composite action of the lattice girder and the particular milled structural timber members.

Components added on site and part of the kit

- Permanent moulding, of extruded polystyrene foam products according to EN 13164.

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

- Reinforced concrete slab (concrete strength class C25/30 acc. to EN 206, steel Ø ≥ 6 mm and $f_{y,k}$ ≥ 450 MPa) according to standards and regulations in force at the place of use.

Floorings and 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, Figure 1, and the lattice girder used for composite action between the timber member and concrete is shown in Annex 1, Figure 2.

Solaio Compound and the components for its manufacturing correspond to the specifications given in the Annexes 1 and 2. The material characteristics, dimensions and tolerances of Solaio Compound, not indicated in these Annexes, are given in the technical file[1] of the 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 Glued laminated timber

Glued laminated timber according to EN 14080 which is particular milled according to the specifications given in Annex 1, Figure 3. The characteristics of the glued laminated timber are given in Annex 2, Table 4. Wood species is European spruce or equivalent softwood.

[1] 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.

1.2.2 Lattice girder

The specification of the lattice girder is given in Annex 2, Table 4. Lattice girder are produced according to standards and regulations in force at the place of use.

1.2.3 Cement mortar

The cement mortar for the composite action of the lattice girder and the particular milled structural timber members shall conform to EN 1504-3.

1.2.1 Additional components added at site

Permanent moulding of extruded polystyrene foam products according to EN 13164.

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

### 2.1 Intended use

The wood-concrete composite slab kit is used as floor construction for interior use.

The wood-concrete composite slab kit shall be subjected to static and quasi-static actions only. The product shall not be subjected to fatigue loading.

The wood-concrete composite slab kit is intended to be used in service classes 1 and 2 according to EN 1995-1-1[2].

### 2.2 General assumptions

The wood-concrete composite slab kit is 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 wood-concrete composite slab kit. 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 Annex 2 of the European Technical Assessment.

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

[2] Reference documents are listed in Annex 3.

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.

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 Solaio Compound of 50 years, when installed in the works. These provisions are based upon the current state of the art and the available knowledge and experience[3].

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**

| № | Essential characteristic | Product performance |
|---|---|---|
| Basic Works Requirement 1: Mechanical resistance and stability [1)] | | |
| 1 | Mechanical resistance | Annex 2, Table 5 |
| 2 | Dimensional stability | Annex 2, Table 5 |
| 3 | Stiffness | Annex 2, Table 5 |
| 4 | Corrosion protection | Annex 2, Table 5 |
| Basic Works Requirement 2: Safety in case of fire | | |
| 5 | Reaction to fire | Annex 2, Table 5 |

[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.

| | | |
|---|---|---|
| Basic Works Requirement 3: Hygiene, health and the environment | | |
| 6 | Water vapour permeability | Annex 2, Table 5 |
| Basic Works Requirement 4: Safety and accessibility in use | | |
| – | Same as BWR 1 | |
| Basic Works Requirement 6: Energy economy and heat retention | | |
| 7 | Thermal resistance | Annex 2, Table 5 |
| 8 | Air permeability | No performance assessed. |
| 9 | Thermal inertia | Annex 2, Table 5 |
| 1) | These characteristics also relate to BWR 4. | |

**Table 2: Essential characteristics of the prefabricated timber members and methods and criteria for assessment of the performance of the product in relation to those essential characteristics**

| № | Essential characteristic | Product performance |
|---|---|---|
| Basic Works Requirement 1: Mechanical resistance and stability 1) | | |
| 1 | Mechanical resistance | Product specification acc. to Annex 2, Table 4 |
| 2 | Dimensional stability | Annex 2, Table 5 |
| 3 | Stiffness | Product specification acc. to Annex 2, Table 4 |
| 4 | Durability and serviceability | Annex 2, Table 5 |
| Basic Works Requirement 2: Safety in case of fire | | |
| 5 | Reaction to fire | Annex 2, Table 5 |
| Basic Works Requirement 3: Hygiene, health and the environment | | |
| 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 2, Table 5 |
| 7 | Thermal inertia | Annex 2, Table 5 |
| 1) | These characteristics also relate to BWR 4. | |

**Table 3: Essential characteristics of the mortar and methods and criteria for assessment of the performance of the product in relation to those essential characteristics**

| № | Essential characteristic | Product performance |
|---|---|---|
| Basic Works Requirement 1: Mechanical resistance and stability [1)] | | |
| 1 | Mechanical resistance | Product specification acc. to Annex 2, Table 4 |
| 2 | Dimensional stability | Annex 2, Table 5 |
| Basic Works Requirement 3: Hygiene, health and the environment | | |
| 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 wood-concrete composite slab kit 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 130018-00-0303, Wood-concrete composite slab kit, edition April 2017.

3.2.2 Identification

The European Technical Assessment for Solaio Compound 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 Solaio Compound is 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 plan[4];

[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.

(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).

## 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 Solaio Compound 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 Solaio Compound 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

5.2.2 Continuous surveillance, assessment and evaluation of factory production control

The notified product certification body shall visit the factory at least once a year for routine inspection. In particular the following items shall be appropriately considered

- The manufacturing process including personnel and equipment
- The factory production control
- The implementation of the control plan

The results of continuous surveillance are made available on demand by the notified product certification body to Österreichisches Institut für Bautechnik. When the provisions of the European Technical Assessment and the control plan are no longer fulfilled, the certificate of constancy of performance is withdrawn by the notified product certification body.

Issued in Vienna on 07.07.2017
by Österreichisches Institut für Bautechnik

The original document is signed by:

Rainer Mikulits

Managing Director

**Figure 1:** Principle structure of the wood-concrete composite slab kit.

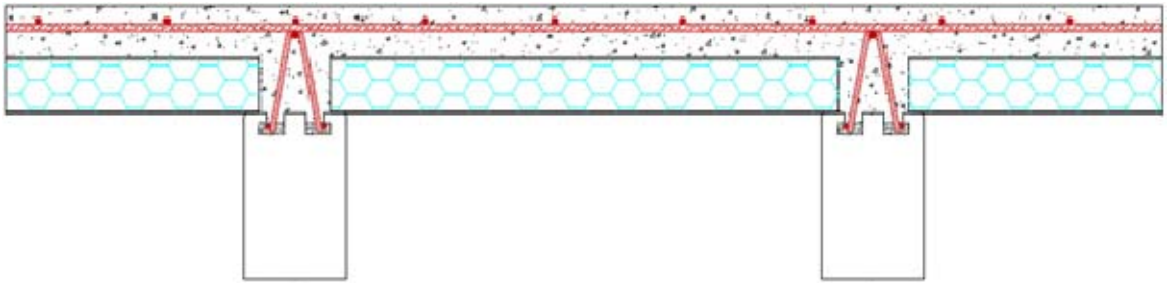
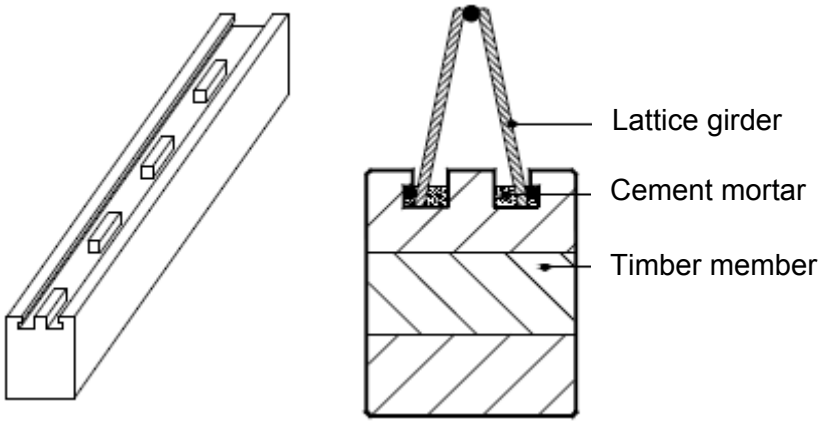


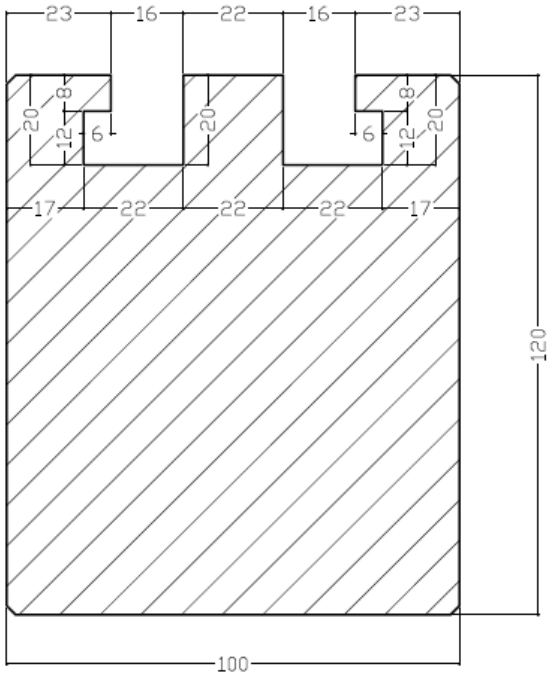
**Figure 2**: Lattice girder used for composite action between the timber member and concrete



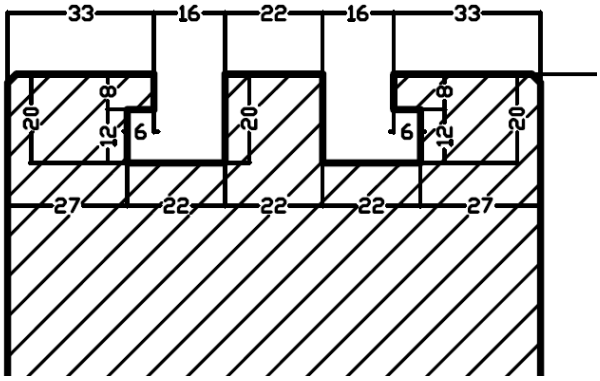

Timber teeth length / space: 50/100 mm or 100/150 mm

| **Solaio Compound** | Annex 1 |
|---|---|
| Structure of the wood-concrete composite slab kit | of European Technical Assessment ETA-17/0353 of 07.07.2017 |

**Figure 3**: Specification of the particular milling of the glued laminated timber




Milling profile for beam with width 100 mm




Milling profile for beam with width 120 mm

| **Solaio Compound** | Annex 1 |
|---|---|
| Structure of the wood-concrete composite slab kit | of European Technical Assessment ETA-17/0353 of 07.07.2017 |

**Table 4:** Dimensions and specifications

| Item | | Dimension / Specification |
|---|---|---|
| **Wood-concrete composite slab kit** | | |
| Thickness | mm | 220 to 420 |
| Width | m | acc. to manufacturer's specification |
| Length | m | ≤ 10 |
| **Components** | | |
| Lattice girder | mm | steel Ø = 5 and 7<br>h = 95 or 125<br>acc. to standards and regulations in force at the place of use |
| Cement mortar | — | Class R4 acc. to EN 1504-3 |
| Glued laminated timber | mm | 100 x 120 to 120 x 280<br>class GL24h acc. to EN 14080 |
| Permanent moulding<br>- Extruded polystyrene | — | acc. to EN 13164<br>$\sigma_{10} = \sigma_m \geq 200$ kPa<br>b = 600 mm |

| | |
|---|---|
| **Solaio Compound** | Annex 2 |
| Design considerations for the wood-concrete composite slab kit | of European Technical Assessment ETA-17/0353 of 07.07.2017 |

**Table 5:** Product characteristics of the wood-concrete composite slab kit

| BWR | Essential characteristic | Assessment method | Level / Class / Description |
|---|---|---|---|
| 1 | **Mechanical resistance and stability** | | |
| | Mechanical resistance | | |
| | Exemplary load bearing capacity | EN 1995-1-1 and EN 1992-1-1 | Example see Figures 4 |
| | Exemplary deflection | | Examples see Figure 5 and 6 |
| | Dimensional stability<br>Moisture content during service shall not change to such an extend that adverse deformation will occur. | | |
| | Stiffness (t = 0)<br>– Slip modulus $k_{ser}$<br>– Slip modulus $k_u$ | <br>EAD 130018-00-0303<br>EAD 130018-00-0303 | <br>1 000 MPa<br>550 MPa |
| | Corrosion protection / Durability and serviceability | | |
| | Service classes | EN 1995-1-1 | 1 in any case<br>2 in case of lattice girder of stainless steel |
| 2 | **Safety in case of fire** | | |
| | Reaction to fire | | |
| | Plywood | Commission Decision 2003/43/EC | Density ≥ 400 kg/m³<br>t ≥ 9 mm<br>Euroclass D-s2, d0 |
| | Steel, mortar, concrete blocks and clay blocks | Commission Decision 96/603/EC | Euroclass A1 |
| | Glued laminated timber products | Commission Decision 2005/610/EC | Mean density of wood ≥ 380 kg/m³<br>Euroclass D-s2, d0 |
| 3 | **Hygiene, health and environment** | | |
| | Vapour permeability, μ | acc. to EN ISO 10456 for the respective material | |
| 6 | **Energy economy and heat retention** | | |
| | Thermal conductivity, λ | acc. to EN ISO 10456 for the respective material | |
| | Thermal inertia, specific heat capacity $c_p$ | acc. to EN ISO 10456 for the respective material | |

**Figure 4**: Exemplary load bearing capacity for Solaio Compound

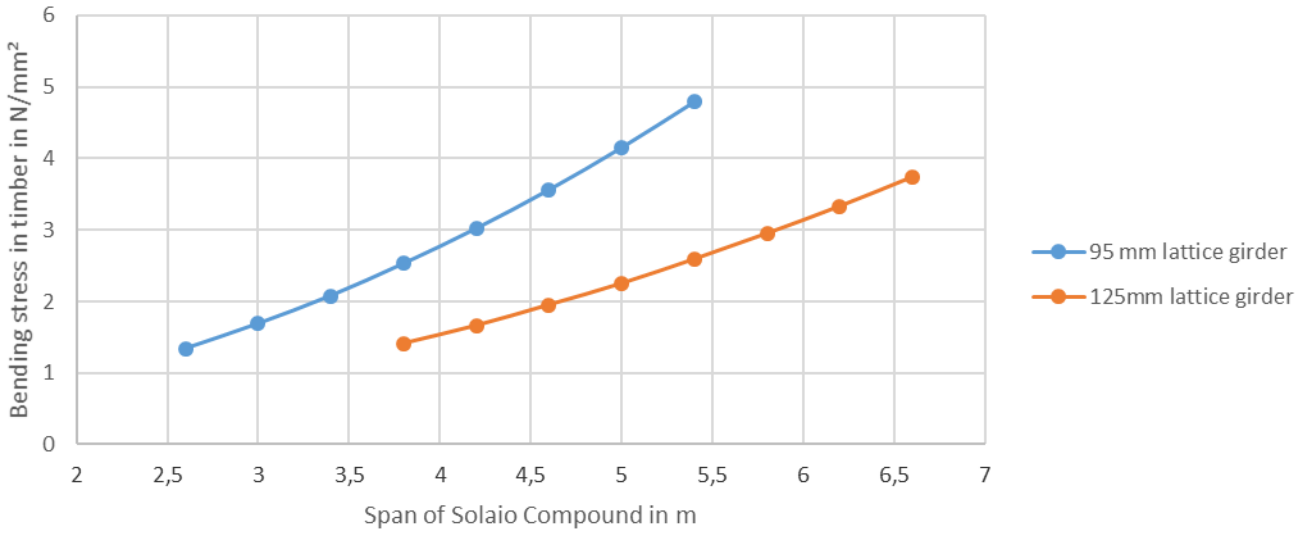
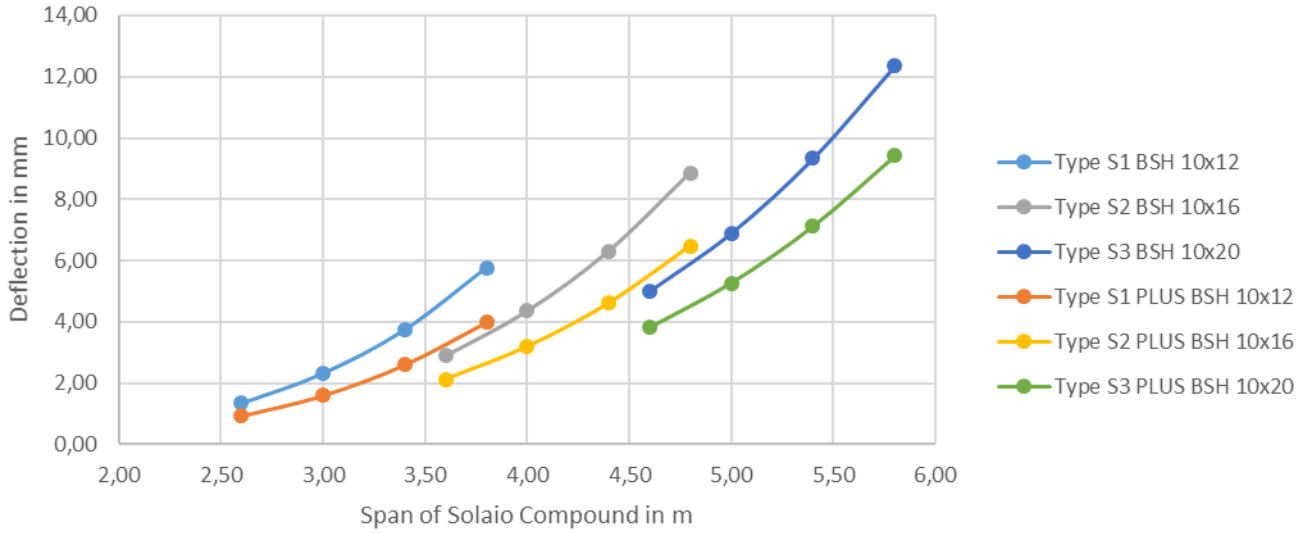
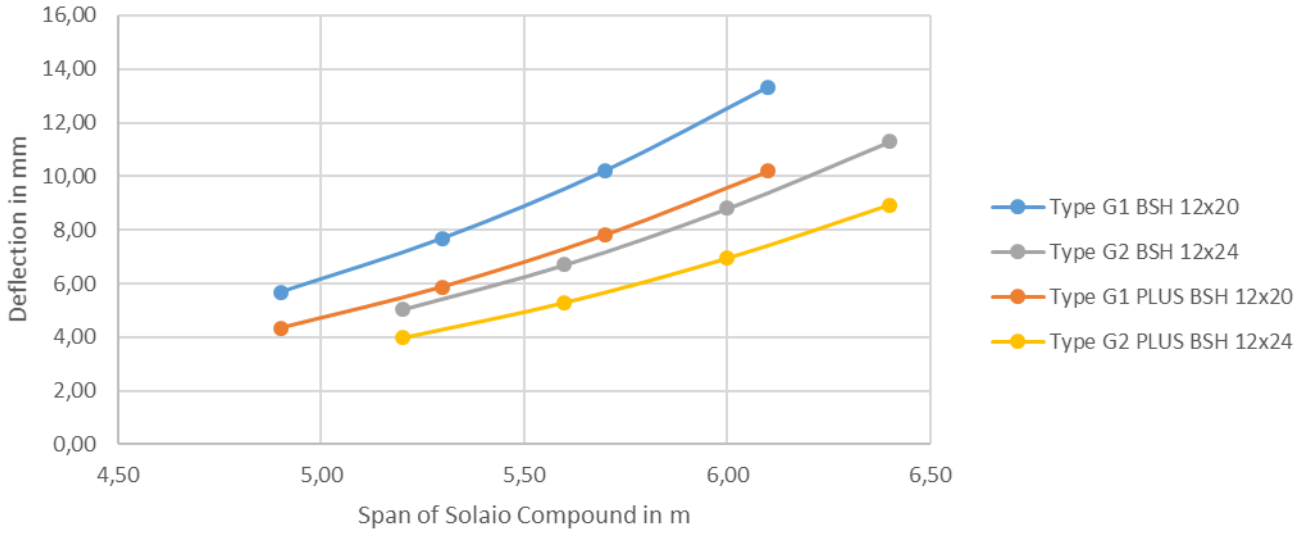



**Figure 5**: Exemplary deflection for different types S of Solaio Compound




| **Solaio Compound** | Annex 2 |
|---|---|
| Design considerations for the wood-concrete composite slab kit | of European Technical Assessment ETA-17/0353 of 07.07.2017 |

**Figure 6**: Exemplary deflection for different types G of Solaio Compound




| **Solaio Compound** | Annex 2 |
|---|---|
| Design considerations for the wood-concrete composite slab kit | of European Technical Assessment ETA-17/0353 of 07.07.2017 |

EAD 130018-00-0303, European Assessment Document for “Wood-concrete composite slab kit”, Edition April 2017

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

EN 1504-3 (12.2005), Products and systems for the protection and repair of concrete structures – Definitions, requirements, quality control and evaluation of conformity – Part 3: Structural and non-structural repair

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 13164:2012+A1 (02.2015), Thermal insulation products for buildings – Factory made extruded polystyrene foam (XPS) products – Specification

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