Austrian Institute of Construction Engineering
Schenkenstrasse 4 | T +43 1 533 65 50
1010 Vienna | Austria | F +43 1 533 64 23
www.oib.or.at | mail@oib.or.at

Designated according to Article 29 of Regulation (EU) No 305/2011

Member of EOTA
www.eota.eu

European Technical Assessment

ETA-19/0700
of 17.01.2020

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	SPIDER Connector and PILLAR Connector
Product family to which the construction product belongs	Three dimensional nailing plate
Manufacturer	Rotho Blaas srl Via Dell'Adige 2/1 39040 Cortaccia (BZ) Italy
Manufacturing plant	Manufacturing plant T3 Manufacturing plant SP1 Manufacturing plant SP2
This European Technical Assessment contains	98 pages including 5 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	ETAG 015 "Three-dimensional nailing plates", Edition November 2012, used as European Assessment Document acc. to Article 66 (3) of Regulation (EU) No 305/2011.

Remarks

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

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may be made with the written consent of Austrian Institute of Construction Engineering. Any partial reproduction has to be identified as such.

Specific parts

1 Technical description of the product

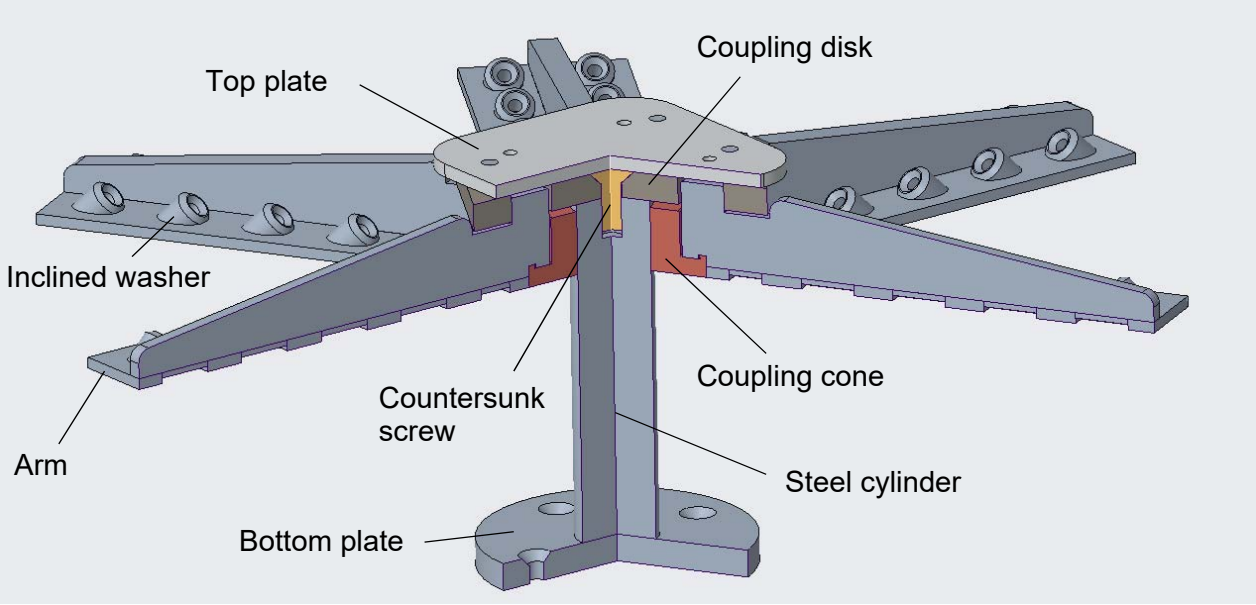
1.1 General

This European Technical Assessment (ETA) applies to the three dimensional nailing plates **SPIDER Connector** and **PILLAR Connector**.

The **SPIDER Connector** consists of a bottom plate acting as support connected to a steel cylinder for load transfer, a coupling cone and a coupling disk connected to six arms with inclined washers as well as a top plate and a spread plate, if necessary. The connection between coupling disk and steel cylinder is provided by a countersunk screw whereas the connection between coupling disk and the top plate is provided by four bolts. Installation of the six arms into the cross laminated timber element is carried out with eight inclined screws per arm. Vertical screws are used to connect the bottom plate and the top plate to the columns as well as for additional reinforcement of the cross laminated timber members.

The **PILLAR Connector** consists of a bottom plate acting as support connected to a steel cylinder for load transfer, a coupling disk, a fixing plate as well as a top plate and a spread plate, if necessary. The connection between coupling disk and steel cylinder is provided by a countersunk screw whereas the connection between coupling disk and the top plate is provided by four bolts. Vertical screws are used to connect the bottom plate and the top plate to the columns and the fixing plate to the cross laminated timber as well as for additional reinforcement of the cross laminated timber members.

Installation of the bottom plate and the top plate to the columns made of steel or concrete is carried out with suitable anchors / screws.



The Connectors may be provided with an acoustic profile in combination with a spread plate. The acoustic profile does not contribute to the structural characteristics of the Connectors.

The Connectors correspond to the specifications given in the Annexes 1, 2 and 4. The material characteristics, dimensions and tolerances of the Connectors, not indicated in these Annexes, are given in the technical file[1] of the European Technical Assessment.

1.2 Components

1.2.1 Top plate, bottom plate and steel cylinder

The top plate and the bottom plate are produced of steel grade S235J0/S355J0 according to EN 10025-2[2], steel grade S460Q/S690Q according to EN 10025-6 or material no. 1.6582/1.7225 according to EN ISO 683-2 and galvanized according to EN ISO 2081 at the end of production. The minimum thickness of the coating is 12 µm.

The shape of the top plate and the bottom plate is either rectangular or circular. Both shapes are produced in three different thicknesses (20, 30 and 40 mm) with three different dimensions (200, 240 and 280 mm), leading to 18 different sizes:

→ “20020R”, “24020R” and “28020R”

→ “20020C”, “24020C” and “28020C”

→ “20030R”, “24030R” and “28030R”

→ “20030C”, “24030C” and “28030C”

→ “20040R”, “24040R” and “28040R”

→ “20040C”, “24040C” and “28040C”

The bottom plate is welded with the steel cylinder.

The steel cylinder is produced of steel grade S235J0/S355J0 according to EN 10025-2, steel grade S460Q/S690Q according to EN 10025-6 or material no. 1.6582/1.7225 according to EN ISO 683-2 and galvanized according to EN ISO 2081 at the end of production. The minimum thickness of the coating is 12 µm.

The steel cylinder is provided with outer thread according to ISO 2904 for the coupling cone as well as an inner thread for the countersunk screw on the top. The steel cylinder is produced in four different diameters (60, 80, 100 and 120 mm) with a length depending on the nominal thickness of the CLT panel. The correlations between the length of the steel cylinder H and the thickness of the CLT panel t_{CLT} are given in the Annex 2.

The steel cylinder for the **PILLAR Connector** may be produced without the outer thread.

The top plate, the bottom plate and the steel cylinder together with their most important dimensions are shown in Annex 2.

1.2.2 Coupling cone

The coupling cone is produced of steel grade S355JR according to EN 10025-2 or equivalent or better and galvanized according to EN ISO 2081 at the end of production. The minimum thickness of the coating is 12 µm.

The coupling cone is produced in four different nominal inner thread diameters (60, 80, 100 and 120 mm):

→ “60”, “80”, “100” and “120”

The coupling cone together with its most important dimensions is shown in Annex 2.

---

[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 factory production control certification body involved in the assessment and verification of constancy of performance procedure, is handed over to the notified factory production control certification body.

[2] Reference documents are listed in Annex 5.

1.2.3 Arms and inclined washers

The arms are produced of steel grade S355JR according to EN 10025-2 or steel grade S460Q according to EN 10025-6 or equivalent or better and galvanized according to EN ISO 2081 at the end of production. The minimum thickness of the coating is 12 µm.

The arms are produced in two different lengths “short” (341 mm) and “long” (366 mm):

→ “long” for steel cylinder of diameter 60 and 80 mm

→ “short” for steel cylinder of diameter 100 and 120 mm

The inclined washers are produced of steel grade S235JR according to EN 10025-2 or equivalent or better and galvanized according to EN ISO 2081 at the end of production. The minimum thickness of the coating is 12 µm. They are welded with the arms; no load-bearing function is assigned to the welds.

The arms and inclined washers together with their most important dimensions are shown in Annex 2.

1.2.4 Coupling disk

The coupling disk is produced of steel grade S235JR/S355JR according to EN 10025-2, steel grade S460Q/S690Q according to EN 10025-6 or material no. 1.6582/1.7225 according to EN ISO 683-2 or equivalent or better and galvanized according to EN ISO 2081 at the end of production. The minimum thickness of the coating is 12 µm.

The coupling disk is produced in two different widths “small” (230 mm) and “large” (280 mm):

→ “small” for steel cylinder of diameter 60 and 80 mm

→ “large” for steel cylinder of diameter 100 and 120 mm

The reduced coupling disk for the **PILLAR Connector** is produced of steel grade S235JR/S355JR according to EN 10025-2, steel grade S460Q/S690Q according to EN 10025-6 or material no. 1.6582/1.7225 according to EN ISO 683-2 and galvanized according to EN ISO 2081 at the end of production. The minimum thickness of the coating is 12 µm.

The coupling disk together with its most important dimensions is shown in Annex 2.

1.2.5 Countersunk screw

The countersunk screw used for connection of the coupling disk to the steel cylinder are described in Annex 1. The standard countersunk screws of M16 (for steel cylinder Ø60 and 80 mm) and M20 (for steel cylinder Ø100 and 120 mm) strength class 8.8 or better are produced according to EN ISO 10642.

1.3 Additional components for connection

1.3.1 Bolts

The bolts used for connection of the coupling disk to the top plate are described in Annex 1. The standard bolts of M12 strength class 8.8 are produced according to EN 15048.

1.3.2 Fully threaded VGS screws

The VGS screws for installation of the six arms into the cross laminated timber element, for the connection of the bottom plate and the top plate to the columns as well as for additional reinforcement are described in Annex 1. They are CE-marked according to ETA-11/0030.

Screw diameter is 9 mm for the inclined screws and for the vertical screws of additional reinforcement. Screw diameter is 11 mm for the vertical screws for installation of the bottom and top plate to the columns. They are made of carbon steel.

The diameter of the fixing screws used in the **PILLAR Connector** is 8 mm.

1.3.3 Spread plate

The spread plate is produced of steel grade S235JR according to EN 10025-2 or equivalent or better and galvanized according to EN ISO 2081 at the end of production. The minimum thickness of the coating is 12 µm.

The shape of the spread plate is either rectangular or circular. Both shapes are produced in four different nominal inner diameters (60, 80, 100 and 120 mm) with three different outer dimensions (200, 240 and 280 mm), leading to 20 different sizes:

→ “20060R”, “24060R” and “28060R”

→ “20060C”, “24060C” and “28060C”

→ “20080R”, “24080R” and “28080R”

→ “20080C”, “24080C” and “28080C”

→ “240100R” and “280100R”

→ “240100C” and “280100C”

→ “240120R” and “280120R”

→ “240120C” and “280120C”

The spread plate together with its most important dimensions is shown in Annex 2.

1.3.4 Fixing plate

The fixing plate for the **PILLAR Connector** is produced of steel grade S235JR according to EN 10025-2 or equivalent or better and galvanized according to EN ISO 2081 at the end of production. The minimum thickness of the coating is 12 µm.

The fixing plate is produced with four different nominal inner hole diameters (60, 80, 100 and 120 mm).

The fixing plate together with its most important dimensions is shown in Annex 2.

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

2.1 Intended use

The three dimensional nailing plates are intended to be used in load bearing connections between timber, steel or concrete columns and cross laminated timber floors.

For the timber columns the following wood-based members are used:

- Solid timber of softwood of strength class C24 or better according to EN 338 and EN 14081-1,
- Glued laminated timber and glued solid timber of softwood of strength class GL24c or better according to EN 14080,
- Laminated veneer lumber LVL according to EN 14374 or according to European Technical Assessments or national provisions that apply on the installation site,
- Strand lumber (e.g. Laminated Strand Lumber - Intrallam, Parallalel Strand Lumber - Parallam) according to European Technical Assessments or national provisions that apply on the installation site.

The nominal width of the timber columns shall be greater than the dimensions of the top plate and the bottom plate. The timber columns shall have plane surfaces against the Connector.

For the cross laminated timber floors the following applies:

- **SPIDER Connector:** Cross laminated timber floors of softwood according to European Technical Assessments or national provisions that apply on the installation site. Min. strength class of lamellae is C24/T14 according to EN 338 and maximum thickness of lamellae is 40 mm. The minimum thickness of the cross laminated timber is 160 mm. The nominal thickness of the cross laminated timber corresponds to the nominal length of the steel cylinder. The stiffness characteristics according to Table 1 apply.

Table 1: Stiffness characteristics of cross-laminated timber elements

Characteristic	**160 mm ≤ h_{total} < 200 mm**	**h_{total} ≥ 200 mm**
EI_x / EI_y	0.68 – 1.46	0.84 – 1.19
$GA_{z,x}$ / $GA_{z,y}$	0.71 – 1.40	0.76 – 1.31
Min(EI_x, EI_y)	1525 kNm²/m	3344 kNm²/m
Max(EI_x, EI_y)	2229 kN/m²/m	3989 kNm²/m
Min($GA_{z,x}$, $GA_{z,y}$)	11945 kN/m	17708 kN/m
Max($GA_{z,x}$, $GA_{z,y}$)	16769 kN/m	23261 kN/m
Thickness t_l of lamellae	≤ 40 mm	
Ratio width to thickness b/t	≥ 3.5	
EI_x, EI_y	Bending stiffness for x- and y-direction of the cross-laminated timber element for an one-meter-stripe	
$GA_{z,x}$, $GA_{z,y}$	Shear stiffness for x- and y-direction of the cross-laminated element timber cross section for an one-meter-stripe	
x	Direction parallel to the orientation of the upper lamellas	
y	Direction perpendicular to the orientation of the upper lamellas	

- **PILLAR Connector:** Cross laminated timber floors of softwood according to European Technical Assessments or national provisions that apply on the installation site. Min. strength class of lamellae is C24/T14 according to EN 338 and maximum thickness of lamellae is 40 mm. The minimum thickness of the cross laminated timber is 160 mm. The nominal thickness of the cross laminated timber corresponds to the nominal length of the steel cylinder.

The typical installation of the three dimensional nailing plates is shown in Annex 2.

The three dimensional nailing plates shall be subjected to static and quasi static actions only.

The three dimensional nailing plates are intended to be used in service classes 1 and 2 according to EN 1995-1-1.

2.2 General assumptions

The Connector 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 design and execution of the works.

Design

The European Technical Assessment only applies to the manufacture and use of the Connector. Verification of stability of the works including application of loads on the product is not subject to the European Technical Assessment.

The following conditions shall be observed:

- Design of connections with the three dimensional nailing plates is carried out under the responsibility of an engineer experienced in timber structures.
- Design of the works shall account for the protection of the connections to maintain service class 1 or 2 according to EN 1995-1-1.
- The three dimensional nailing plates are installed correctly.
- It shall be checked in accordance with EN 1995-1-1 that splitting will not occur.

Design of connections with the three dimensional nailing plates may be according to EN 1995-1-1 and EN 1995-1-2 taking into account the Annexes of the European Technical Assessment. Standards and regulations in force at the place of use shall be considered.

Design of connections with the three dimensional nailing plates in wood to concrete or steel connections in accordance with Eurocode 2, 3, or 5 and Annex 4.

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.

The three dimensional nailing plates shall be installed as specified in Annex 2.

The structural members which are connected with the Connector shall be

- Of strength class as specified in Clause 2.1;
- Free from wane under the three dimensional nailing plates;
- The timber members shall have plane surfaces against the three dimensional nailing plates;
- Minimum spacing and edge distances are to be considered.

2.3 Working life/Durability

The provisions made in the European Technical Assessment (ETA) are based on an assumed intended working life of the SPIDER Connector / PILLAR Connector of 50 years, when installed in the works, provided that the product is subject to appropriate installation, use and maintenance (see Clause 2.2). 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 2: Essential characteristics of the product and product performance

№	Essential characteristic	Product performance
Basic requirement for construction works 1: Mechanical resistance and stability [1)]		
1	Characteristic load bearing capacity	3.1.1
2	Stiffness	No performance assessed.
3	Ductility in cyclic testing	No performance assessed.
Basic Requirement 2: Safety in case of fire		
4	Reaction to fire	3.1.2
5	Resistance to fire	No performance assessed.
Basic requirement for construction works 3: Hygiene, health and the environment		
6	Content, emission and/or release of dangerous substances	3.1.3
Basic requirement for construction works 4: Safety and accessibility in use		
7	Same as basic requirement for construction works 1	
Basic requirement for construction works 5: Protection against noise		
–	Not relevant. No characteristic assessed.	
Basic requirement for construction works 6: Energy economy and heat retention		
–	Not relevant. No characteristic assessed.	
Basic requirement for construction works 7: Sustainable use of natural resources		
–	No characteristic assessed.	

[3] The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product can also be shorter than the assumed working life.

№	Essential characteristic	Product performance
General aspects		
8	Resistance to corrosion and deterioration	3.1.4
9	Dimensional stability	3.1.5
[1)] These characteristics also relate to basic requirement for construction works 4.		

3.1.1 Characteristic load bearing capacity

The characteristic load bearing capacities of the connectors are determined by calculation assisted by testing. The connectors are installed with a defined number of screws with respective nominal diameter as specified in Annex 1 and Annex 2.

The values of the characteristic load bearing capacities are given in Annex 4.

Installation of the bottom plate and the top plate to the columns made of steel or concrete is carried out with suitable anchors / screws.

3.1.2 Reaction to fire

The three dimensional nailing plates and the screws and bolts are made of steel, all classified as Euroclass A1 in accordance with Commission Decision 96/603/EC as amended.

3.1.3 Content, emission and/or release of dangerous substances

The release of dangerous substances is determined according to ETAG 015. No dangerous substances is the performance of the product in this respect.

NOTE In addition to the specific clauses relating to dangerous substances contained in the European Technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.1.4 Resistance to corrosion and deterioration

The product is intended to be used in service classes 1 and 2 according to EN 1995-1-1. The product and each member of the connection should at least be suitable for service classes 1 and 2, but not for service class 1 only.

In accordance with ETAG 015 and EN 1995-1-1 the connectors and the screws and bolts are made of hardened carbon steel and zinc coated.

3.1.5 Dimensional stability

The effects of dimensional changes on the structural timber members being jointed due to varying moisture content was considered by the determination of the characteristic load bearing capacity of the joints. Moisture content during service shall not change to such an extent that adverse deformation will occur. The conditions of Clause 2.2 shall be observed.

3.2 Assessment methods

3.2.1 General

The assessment of the essential characteristics in Clause 3.1 of the Connector 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 and for safety and accessibility in use in the sense of the basic requirements for construction works № 1, 2, 3 and 4 of Regulation (EU) № 305/2011 has been made in accordance with Guideline for European Technical Approval ETAG № 015 “Three-dimensional nailing plates”, edition November 2012, used as European Assessment Document.

3.2.2 Identification

The European Technical Assessment for the connectors 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 97/638/EC the system of assessment and verification of constancy of performance to be applied to the SPIDER Connector / PILLAR Connector is System 2+. System 2+ is detailed in Commission Delegated Regulation (EU) № 568/2014 of 18 February 2014, Annex, 1.3, and provides for the following items

(a) The manufacturer shall carry out:

(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 that product;

(ii) factory production control;

(iii) testing of samples taken at the manufacturing plant by the manufacturer in accordance with a prescribed test plan[4].

(b) The notified factory production control certification body shall decide on the issuing, restriction, suspension or withdrawal of the certificate of conformity of the factory production control on the basis of the outcome of the following assessments and verifications carried out by that body:

(i) initial inspection of the manufacturing plant and of factory production control;

(ii) continuing surveillance, assessment and evaluation of factory production control.

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

Manufacturers undertaking tasks under Systems 2+ shall consider the European Technical Assessment issued for the construction product in question as the assessment of the performance of that product. Manufacturers shall therefore not undertake the tasks referred to in point 4.1 (a)(i).

[4] The prescribed test plan has been deposited with Österreichisches Institut für Bautechnik and is handed over only to the notified factory production control 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 the product 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 and tests 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 presented to the notified factory production control certification body involved in continuous surveillance. On request the records 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 of the factory production control issued by the notified factory production control certification body, the manufacturer shall draw up a declaration of performance.

5.2 Tasks for the notified factory production control certification body

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

The notified factory production control certification body shall verify the ability of the manufacturer for a continuous and orderly manufacturing of the Connector 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 factory production control 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 shall be made available on demand by the notified factory production control 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 conformity of the factory production control shall be withdrawn.

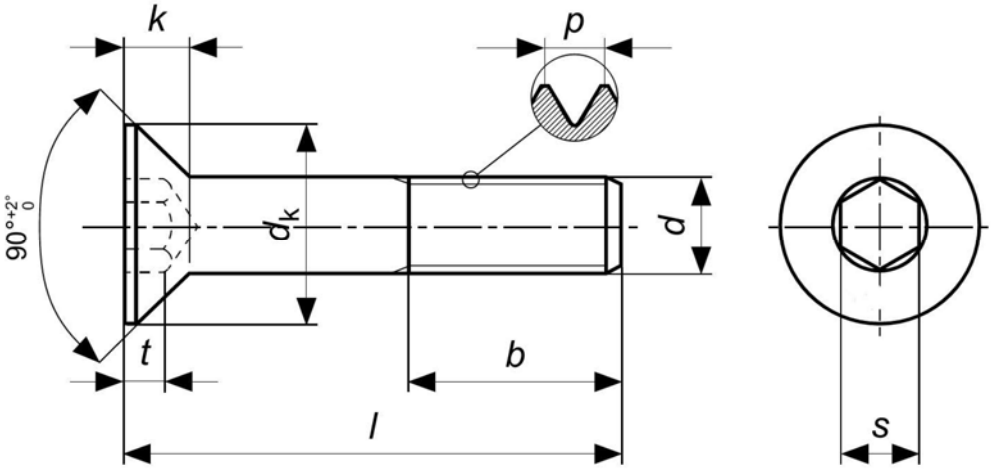
Issued in Vienna on 17.01.2020
by Österreichisches Institut für Bautechnik

The original document is signed by:

Rainer Mikulits

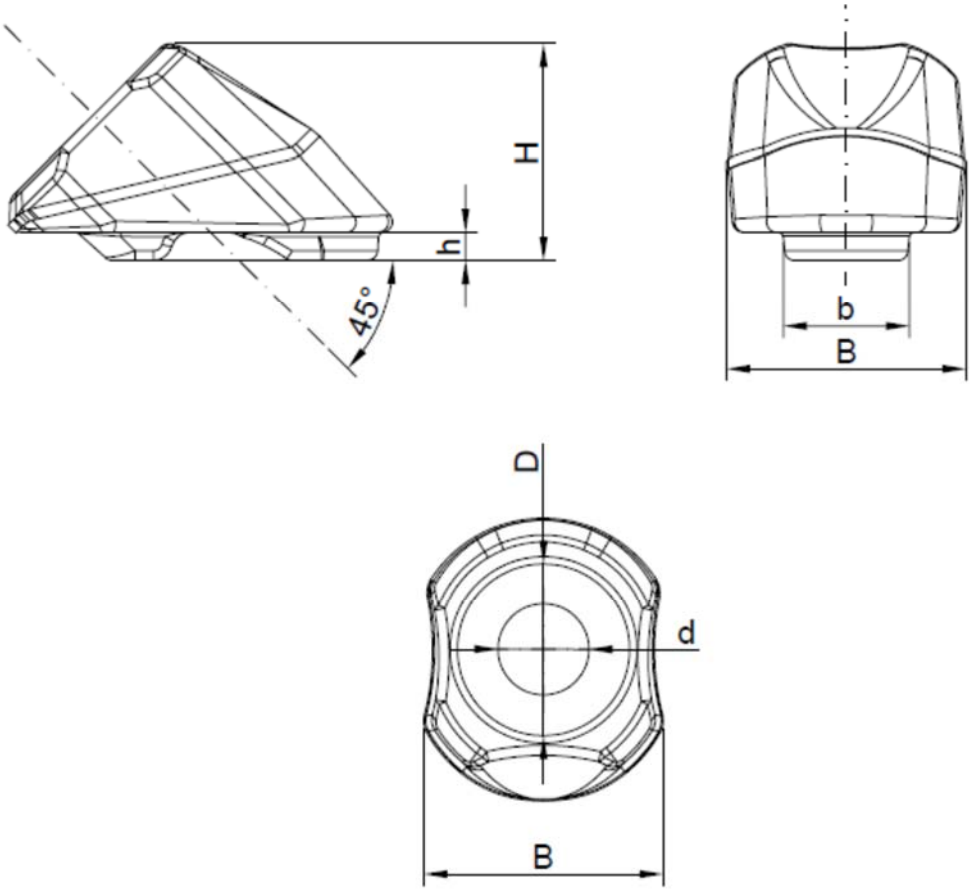
Managing Director

Hexagon socket countersunk head screw		
	M16	M20
Char. yield strength $f_{y,k}$	640 N/mm²	640 N/mm²
Mean tensile strength $f_{u,m}$	800 N/mm²	800 N/mm²
E-modulus	210 000 N/mm²	210 000 N/mm²
Nominal thread diameter d	16 mm	20 mm
Head diameter d_k	30 mm	36 mm
Head thickness k	8.8 mm	10.16 mm
Pitch p	2.0 mm	2.5 mm
Length l	45 mm	45 mm
Hexagon socket width s	10 mm	12 mm
Threaded length b	38 mm	46 mm
Depth of internal drive t	4.8 mm	5.6 mm



Spider Connector	Annex 1
Fastener specification – countersunk screw	of European Technical Assessment ETA-19/0700 of 17.01.2020

Inclined washer VGU945	
Char. yield strength $f_{y,k}$	235 N/mm²
E-modulus	210 000 N/mm²
Inner diameter d	9.7 mm
Base width b	13.4 mm
Width B	25.5 mm
Base height h	3.0 mm
Height H	23.0 mm

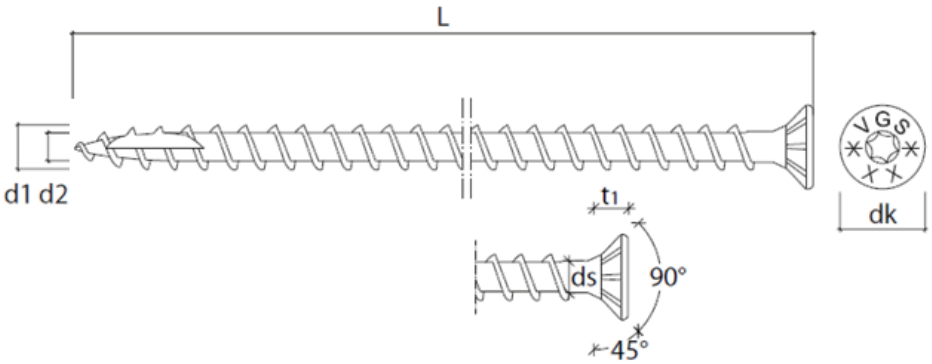


Spider Connector	Annex 1
Fastener specification – inclined washer	of European Technical Assessment ETA-19/0700 of 17.01.2020

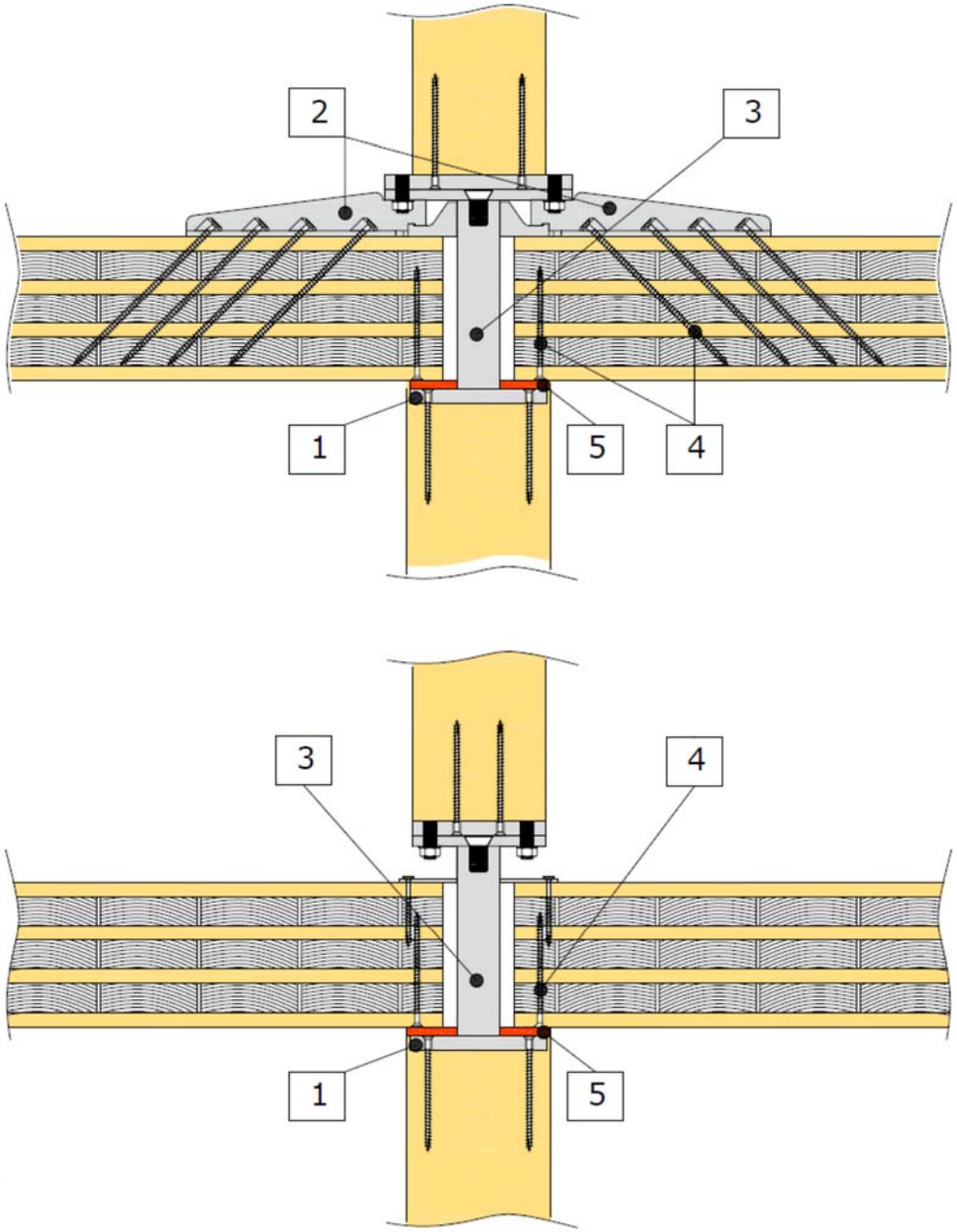
Fully threaded VGS screws according to ETA-11/0030		
	VGS9100 to VGS9520	VGS11100 to VGS11800
Tensile strength of screws	1 000 N/mm²	1 000 N/mm²
E-modulus	210 000 N/mm²	210 000 N/mm²
Char. tensile strength $f_{tens,k}$	25.4 kN	38.0 kN
Torsional strength $f_{tor,k}$	35.0 Nm	60.0 Nm
Head diameter d_k	16.00 mm	19.30 mm
Outer thread diameter d_1	9.00 mm	11.00 mm
Inner thread diameter d_2	5.90 mm	6.60 mm
Flange diameter d_s	6.50 mm	7.70 mm
Length L	100 to 520 mm	100 to 800 mm
Head thickness t_1	6.50 mm	8.2 mm

Nominal thickness of the CLT panel in mm*	Overall length of inclined fully threaded screws L in mm	Overall length of vertical fully threaded screws L in mm
160	200	100
180	240	100
200	280	100
220	280	120
240	320	120
280	360	140
320	400	160

*For deviating nominal thicknesses the screw lengths for the next higher thickness shall be used for the vertical screws and the screw lengths for the next lower thickness shall be used for the inclined screws.

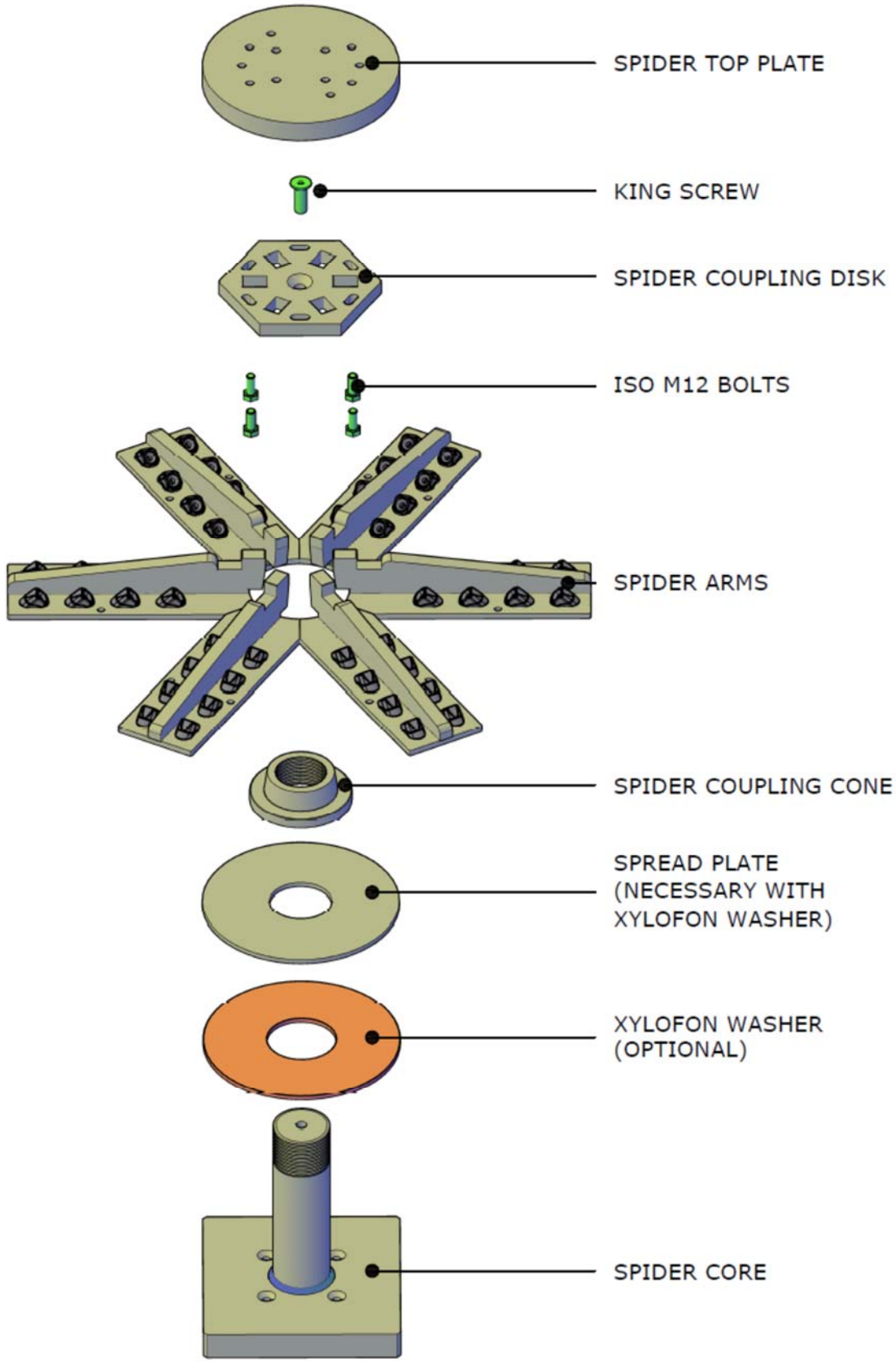


Spider Connector	Annex 1
Fastener specification – fully threaded screws	of European Technical Assessment ETA-19/0700 of 17.01.2020

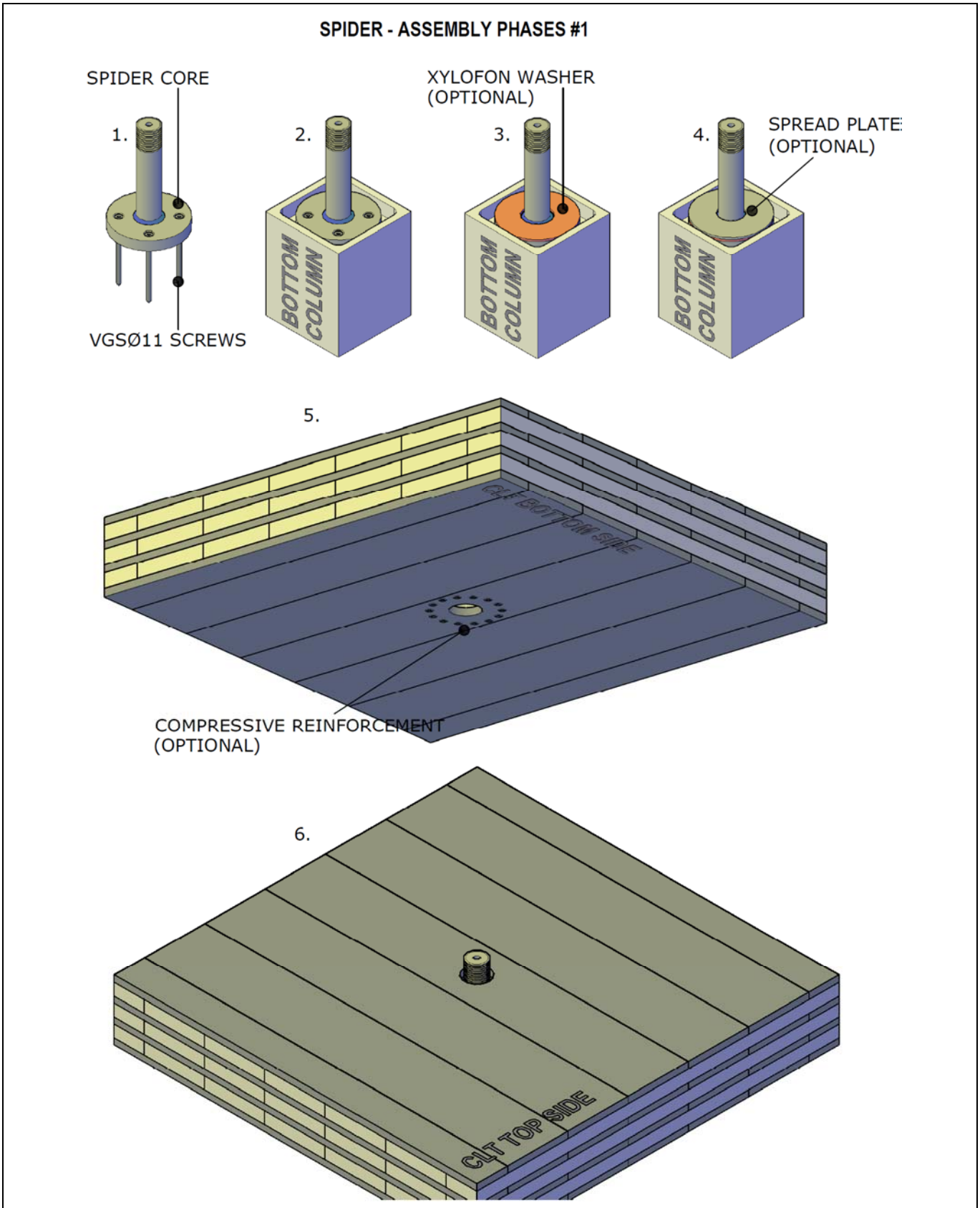


[1] Support
[2] Suspension
[3] Load transfer
[4] Reinforcement
[5] Possible acoustic decoupling

SPIDER Connector	Annex 2
Typical installation of the three dimensional nailing plate	of European Technical Assessment ETA-19/0700 of 17.01.2020



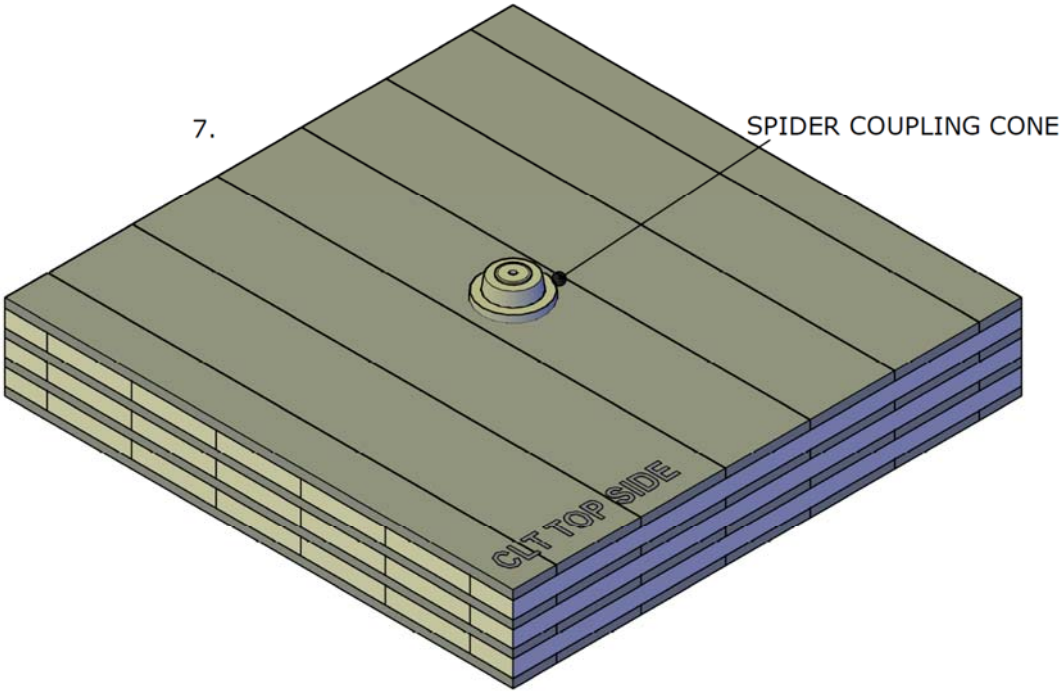
SPIDER Connector	Annex 2
Components of the **SPIDER Connector**	of European Technical Assessment ETA-19/0700 of 17.01.2020



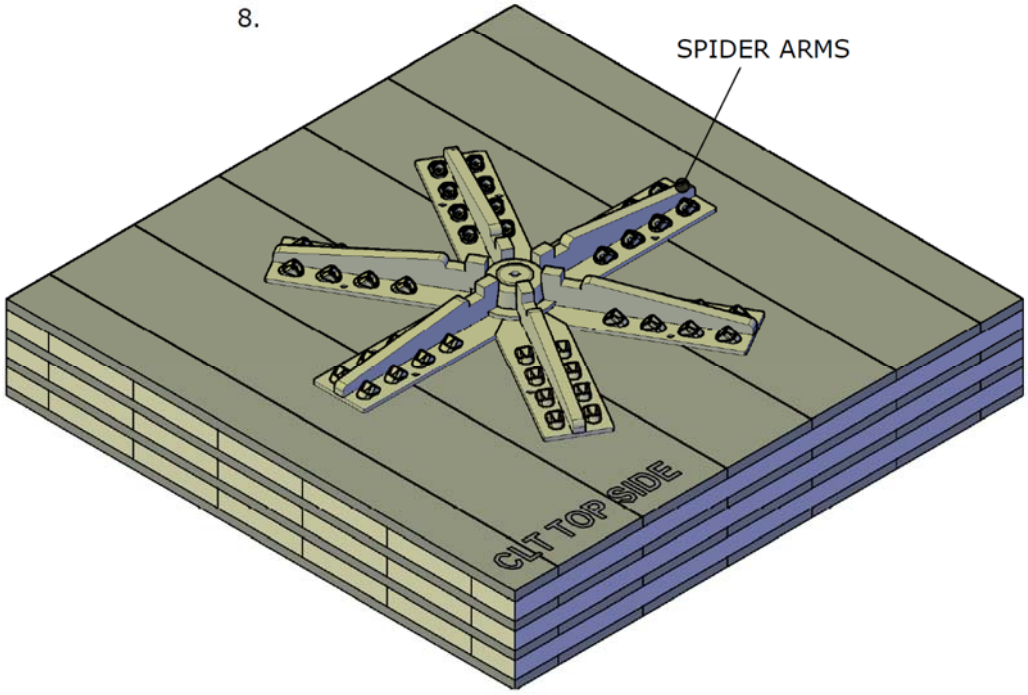
SPIDER Connector	Annex 2
Assembly of the **SPIDER Connector**	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER - ASSEMBLY PHASES #2

7.



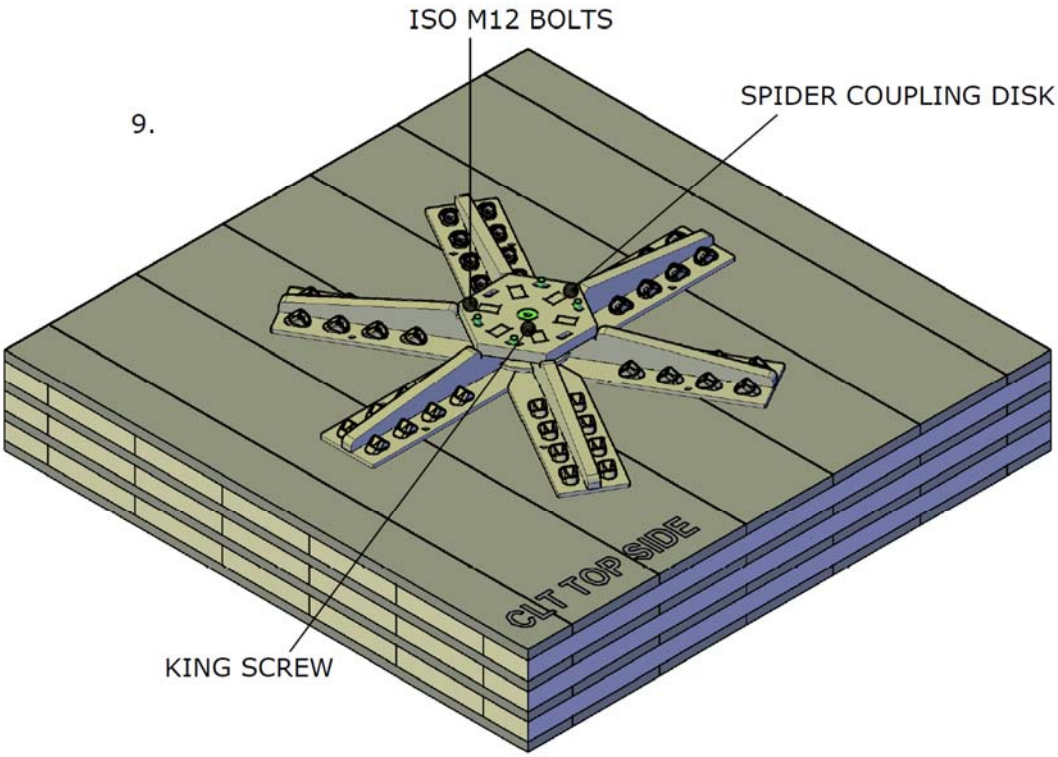
8.



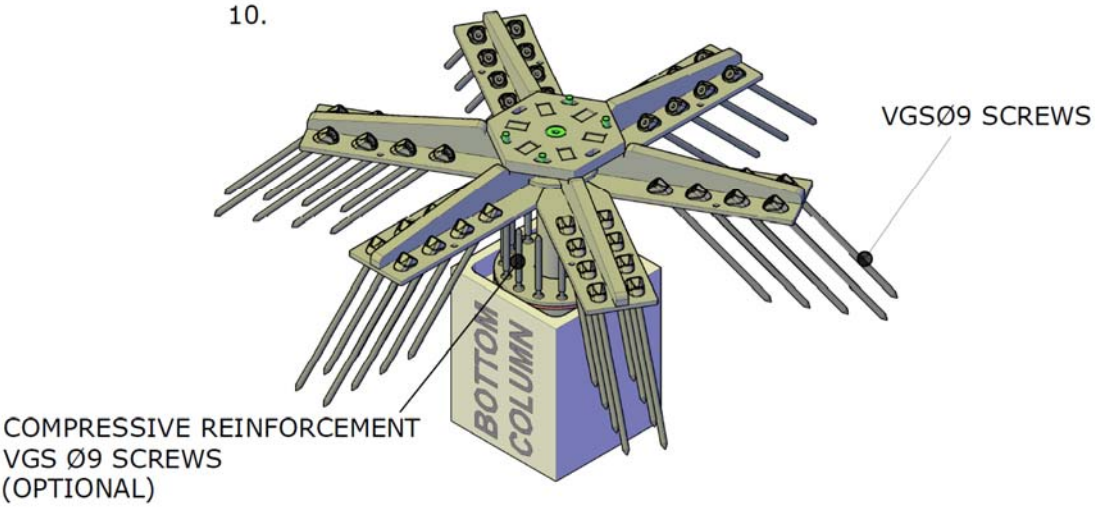
SPIDER Connector	Annex 2
Assembly of the **SPIDER Connector**	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER - ASSEMBLY PHASES #3

9.

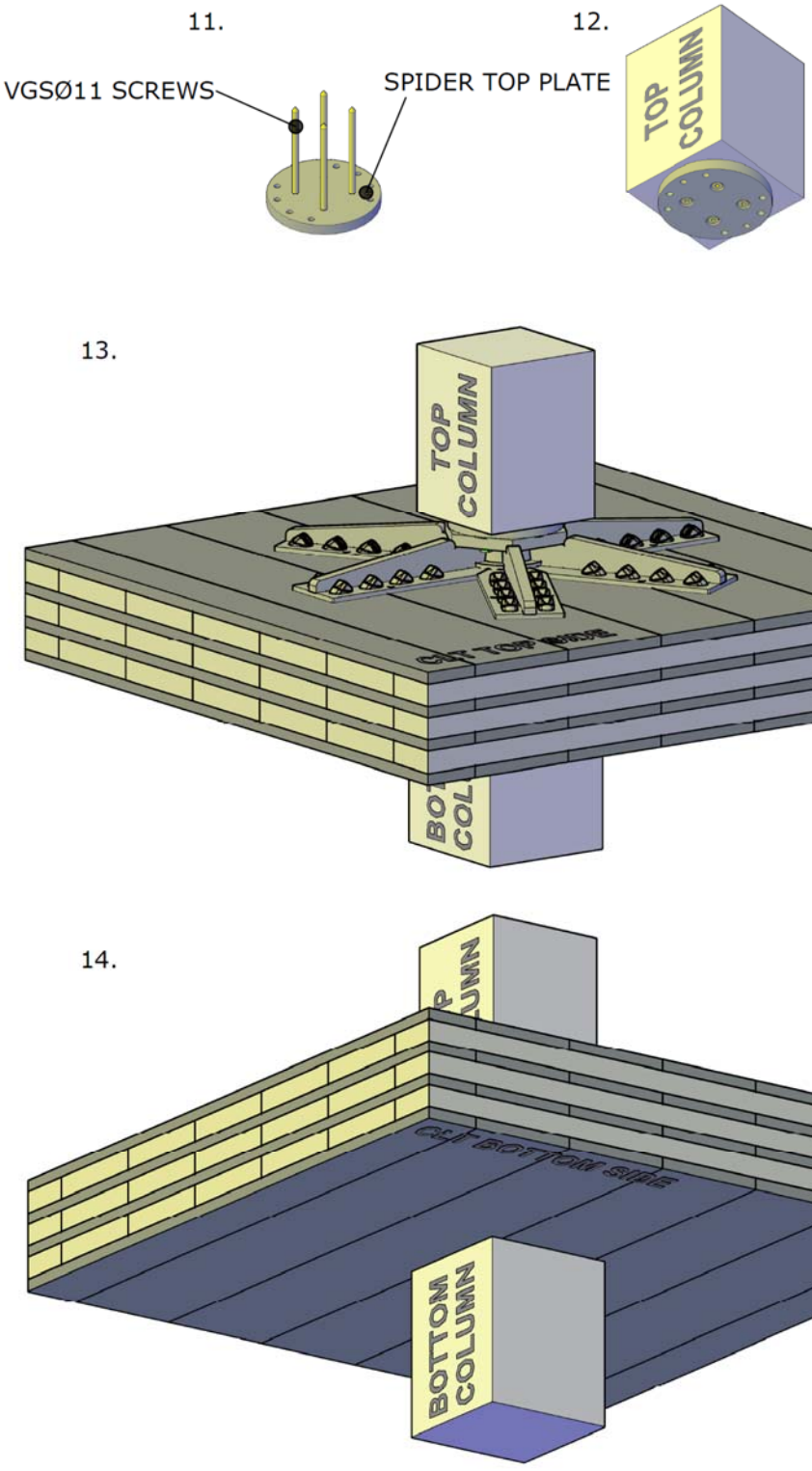


10.



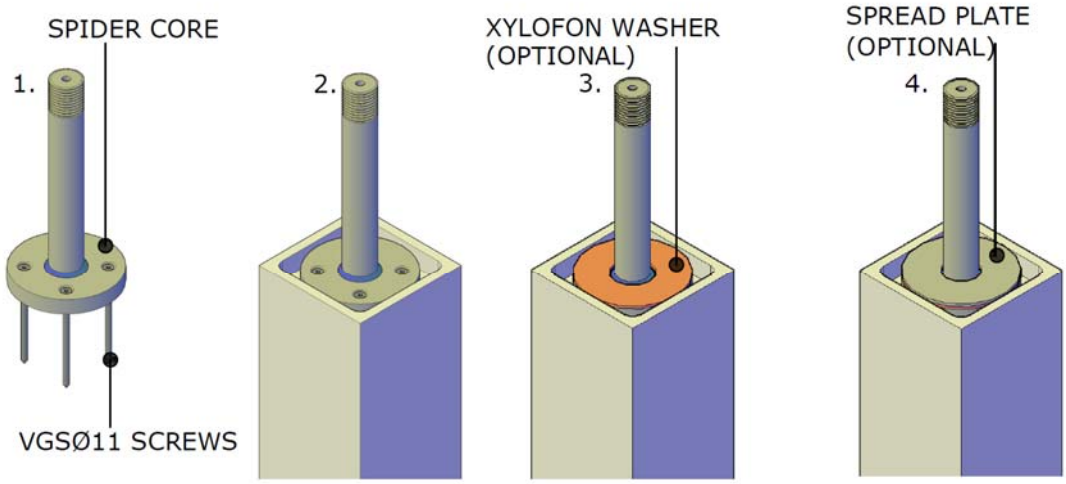
SPIDER Connector	Annex 2
Assembly of the **SPIDER Connector**	of European Technical Assessment ETA-19/0700 of 17.01.2020

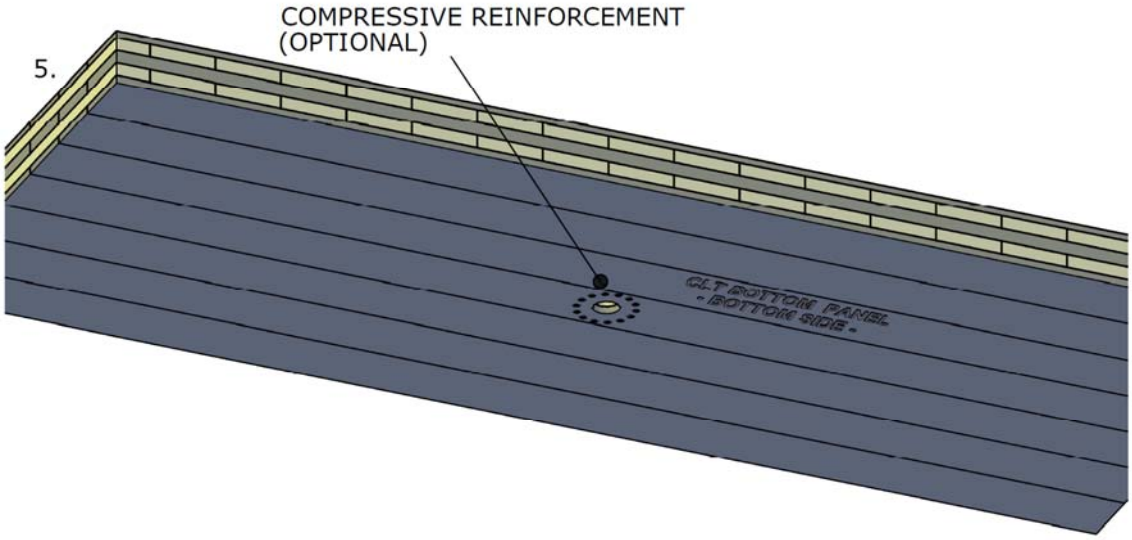
SPIDER - ASSEMBLY PHASES #4

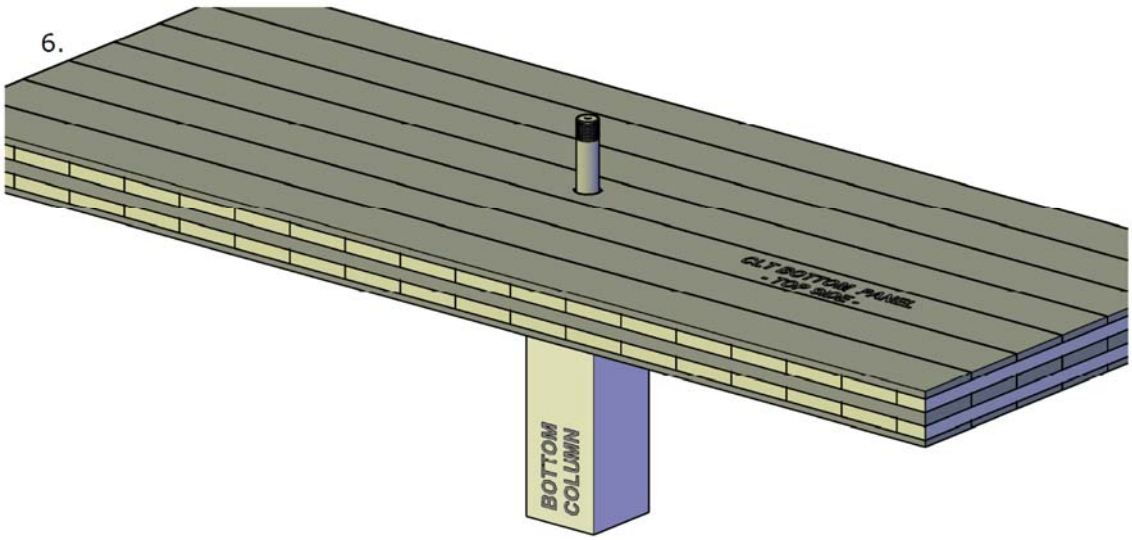


SPIDER Connector	Annex 2
Assembly of the **SPIDER Connector**	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER WITH CROSSED CLT PANELS - ASSEMBLY PHASES #1



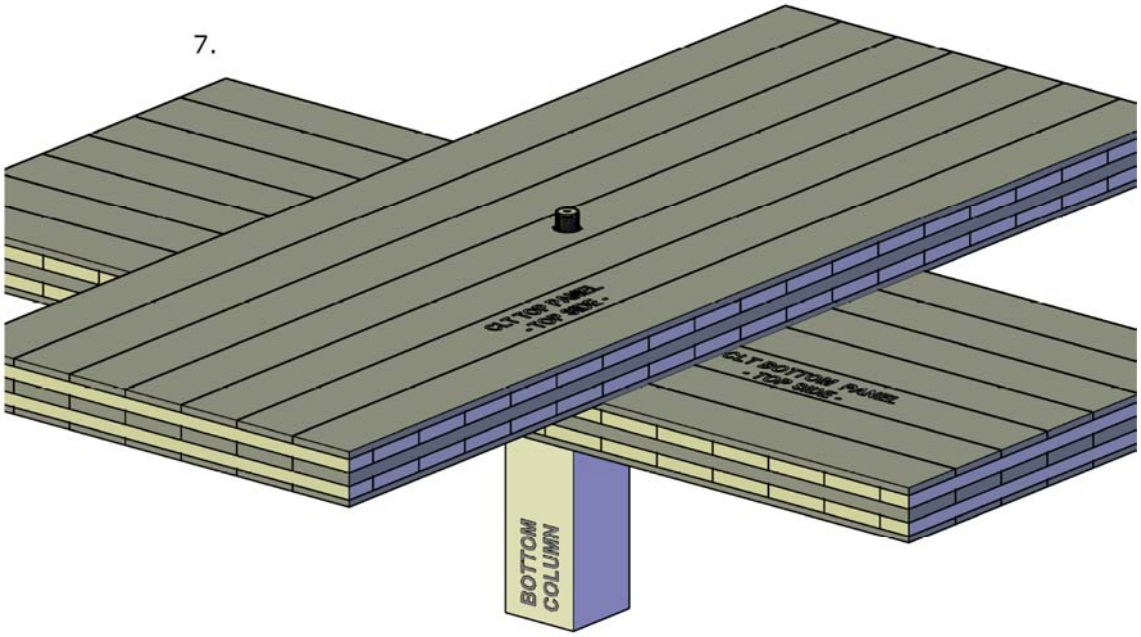




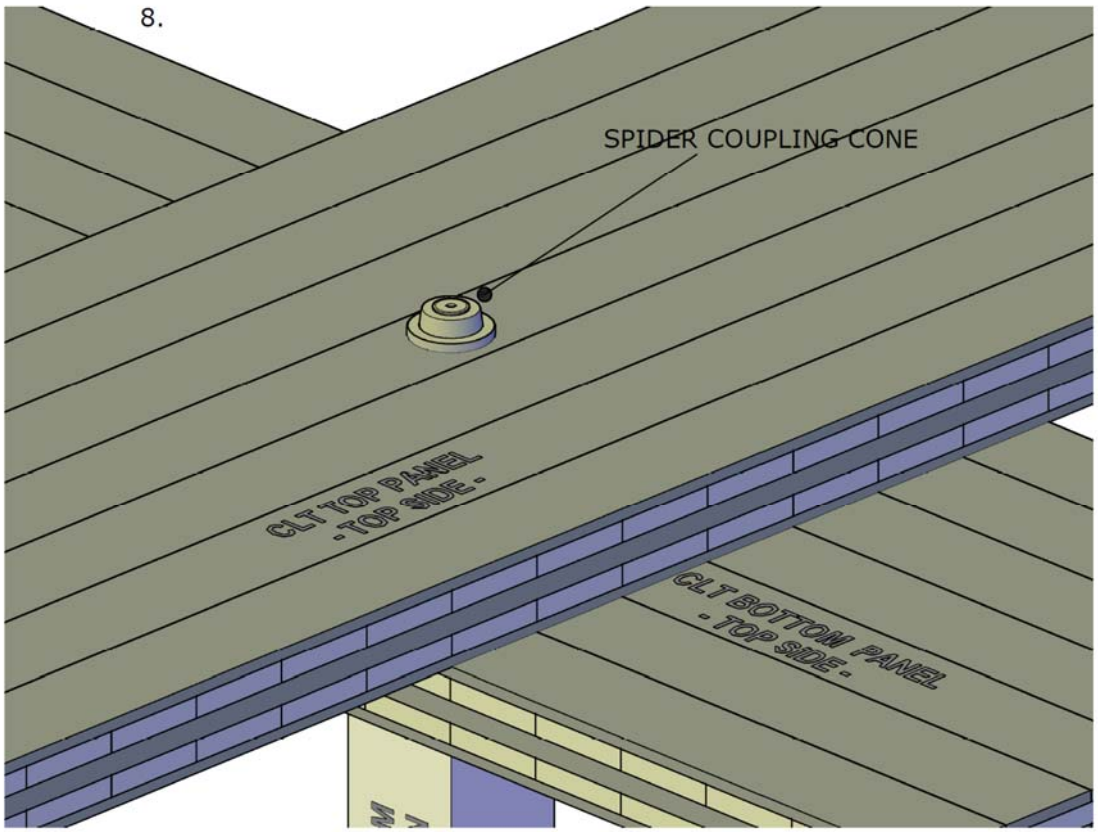
SPIDER Connector	Annex 2
Assembly of the **SPIDER Connector**	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER WITH CROSSED CLT PANELS - ASSEMBLY PHASES #2

7.



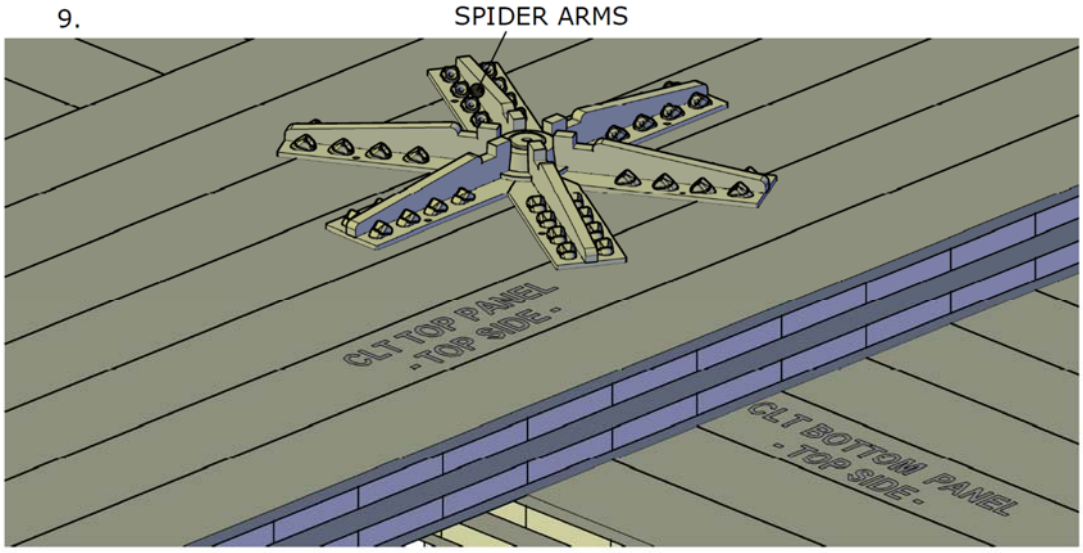
8.



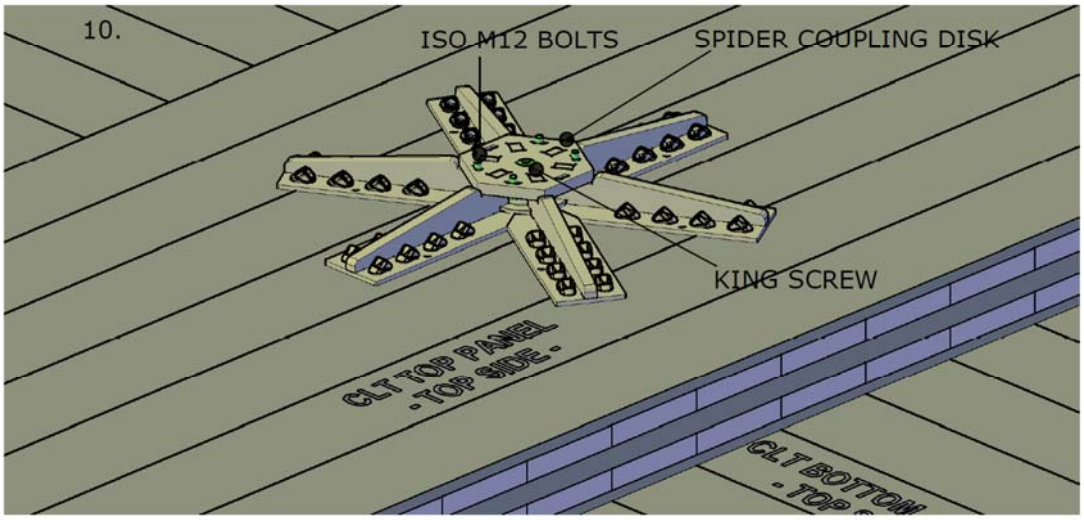
SPIDER Connector	Annex 2
Assembly of the **SPIDER Connector**	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER WITH CROSSED CLT PANELS - ASSEMBLY PHASES #3

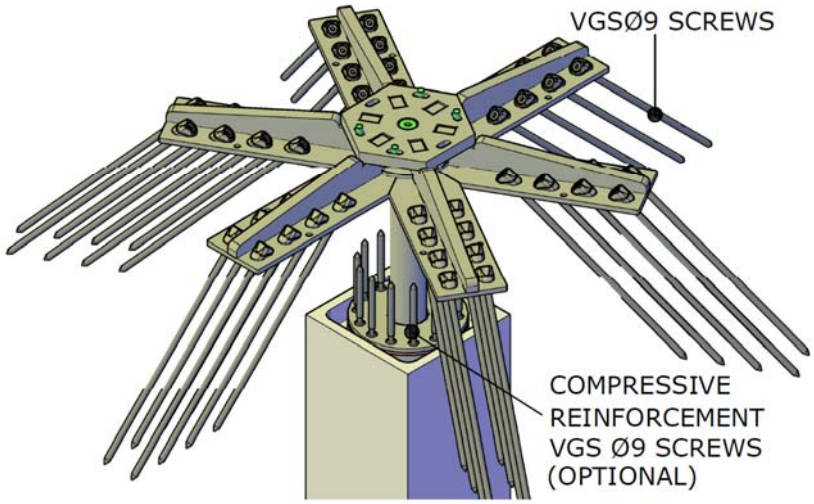
9.



10.

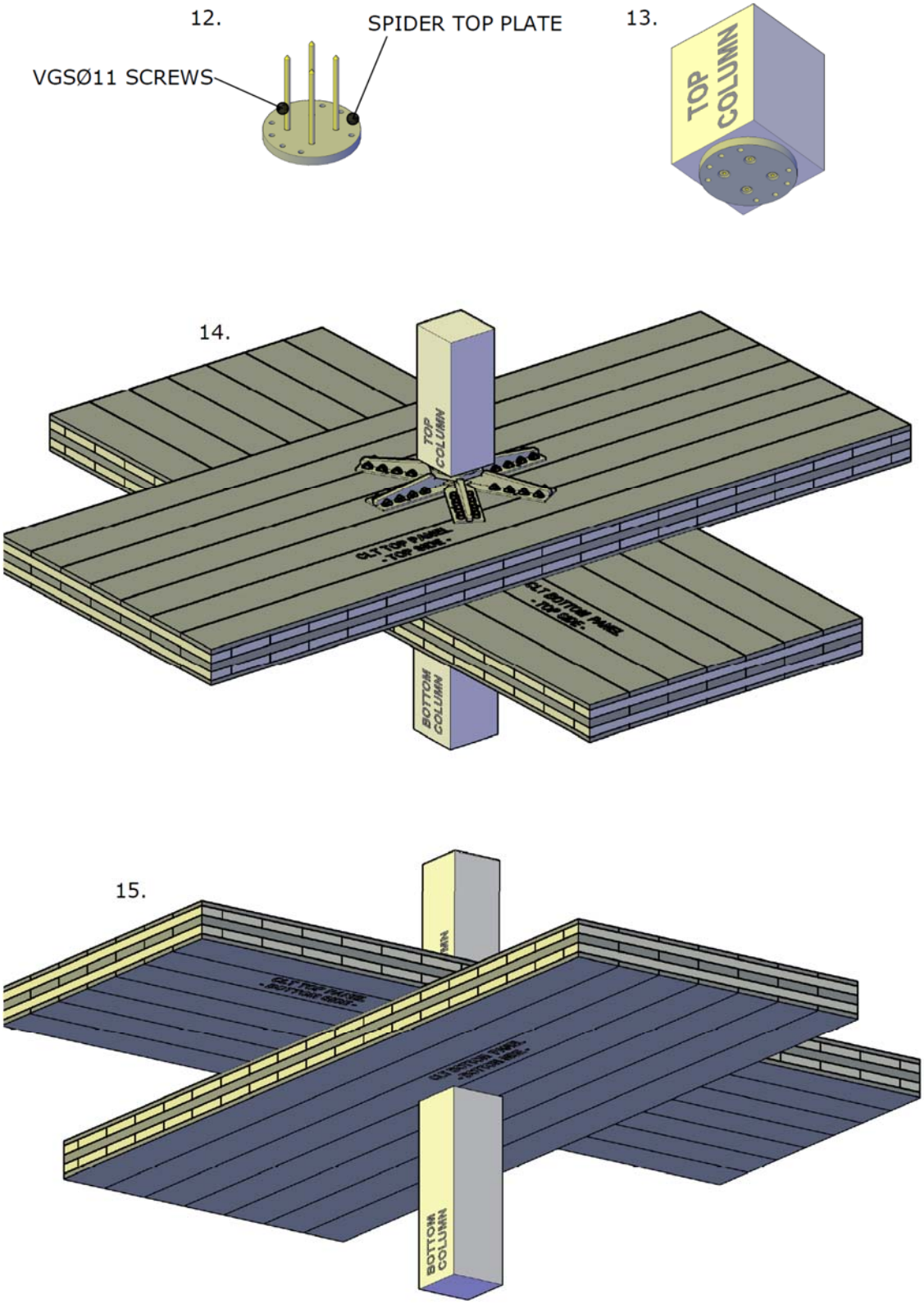


11.



SPIDER Connector	Annex 2
Assembly of the **SPIDER Connector**	of European Technical Assessment ETA-19/0700 of 17.01.2020

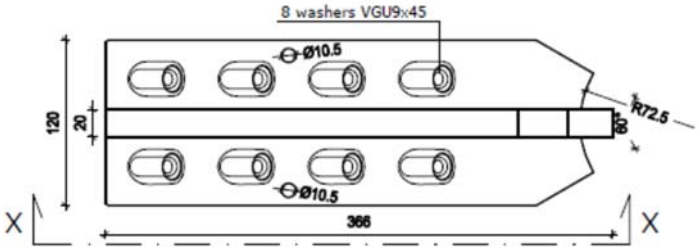
SPIDER WITH CROSSED CLT PANELS - ASSEMBLY PHASES #4



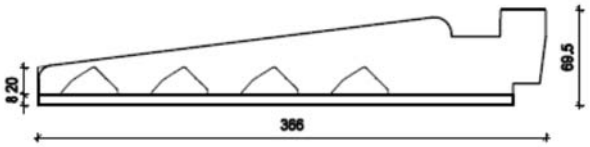
SPIDER Connector	Annex 2
Assembly of the **SPIDER Connector**	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER ARM 6080

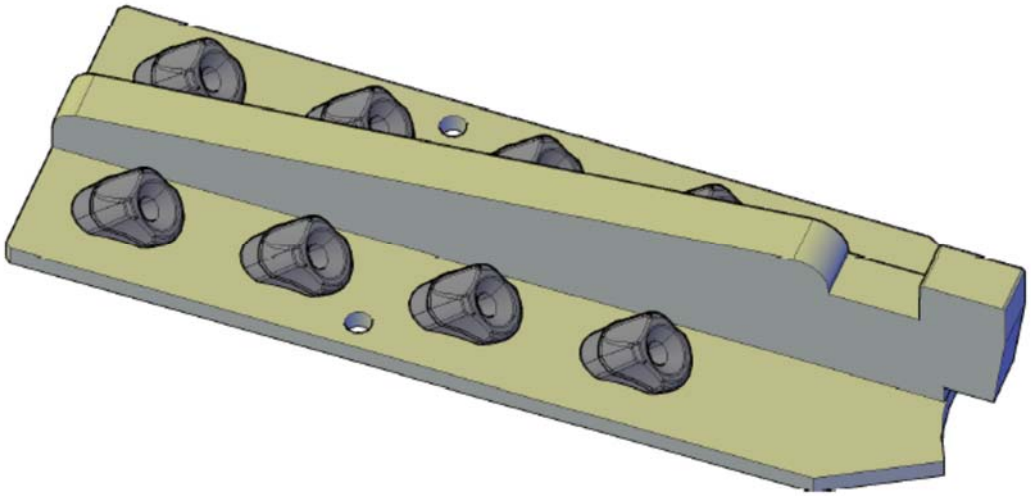
TOP VIEW



X-X VIEW



3D VIEW

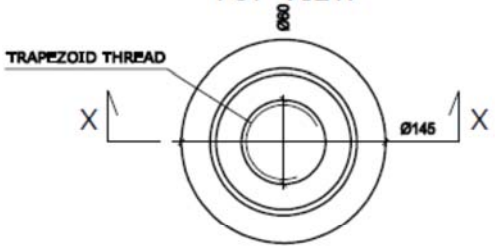


Dimensions in mm

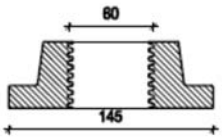
SPIDER Connector	Annex 2
Product details: Arm for SPIDER Connector 60-80	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER COUPLING CONE 60

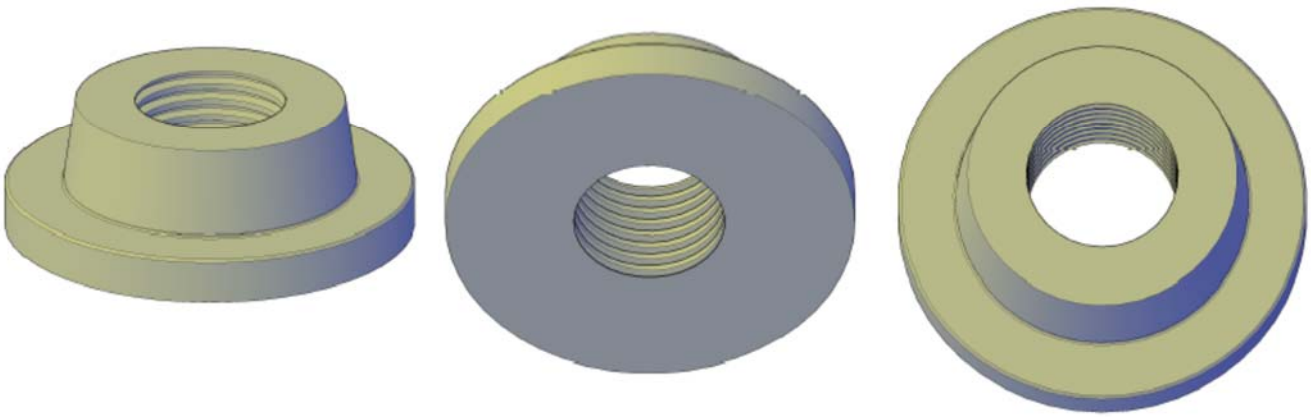
TOP VIEW



X-X VIEW



3D VIEW

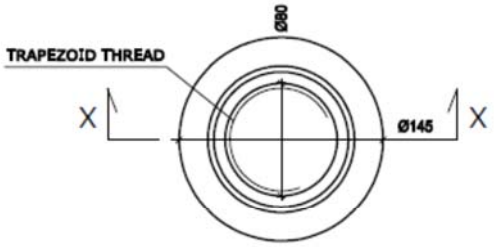


Dimensions in mm

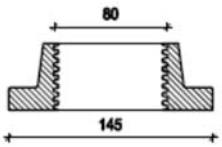
SPIDER Connector	Annex 2
Product details: Coupling Cone for SPIDER Connector 60	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER COUPLING CONE 80

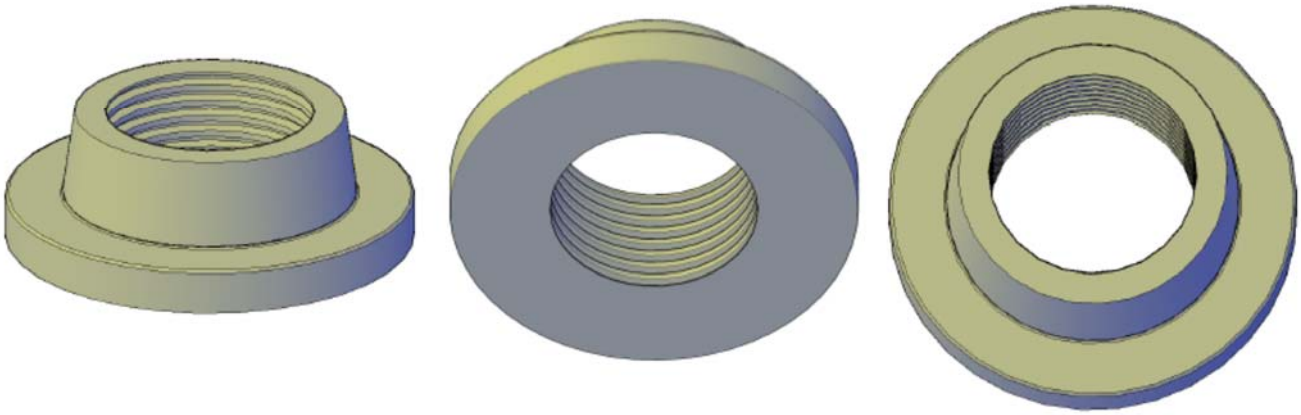
TOP VIEW



X-X VIEW



3D VIEW

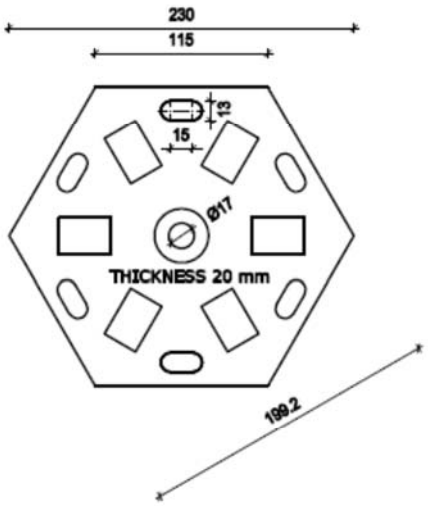


Dimensions in mm

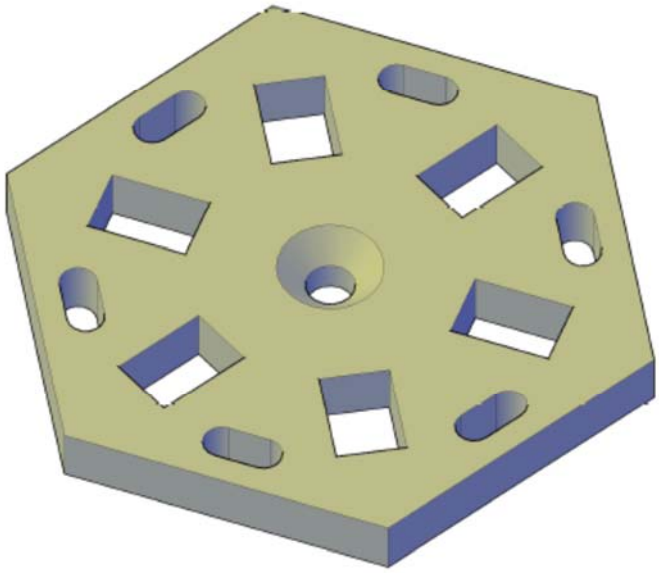
SPIDER Connector	Annex 2
Product details: Coupling Cone for SPIDER Connector 80	of European Technical Assessment ETA-19/0700 of 17.01.2020

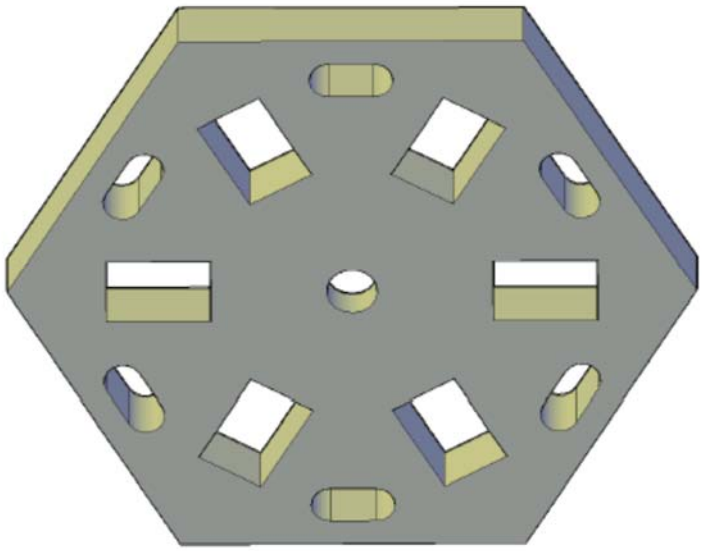
SPIDER COUPLING DISK 6080

TOP VIEW



3D VIEW

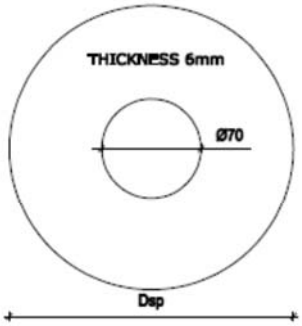




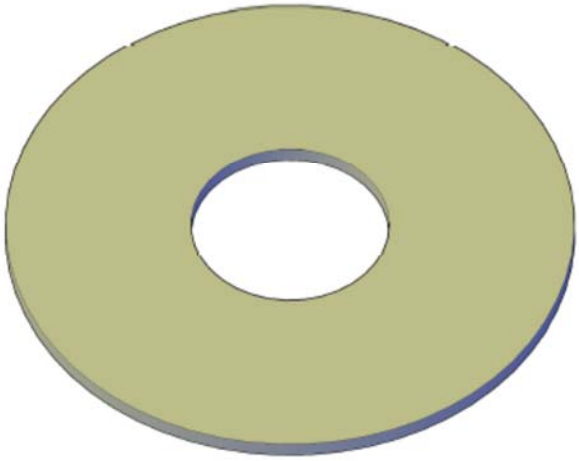
Dimensions in mm

SPIDER Connector	Annex 2
Product details: Coupling Disk for SPIDER Connector 60-80	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPREAD PLATE 60 CIRCULAR

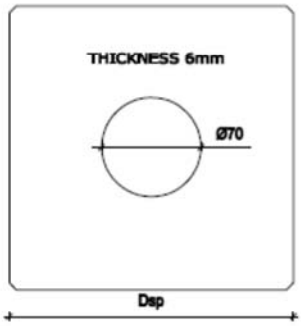


3D VIEW

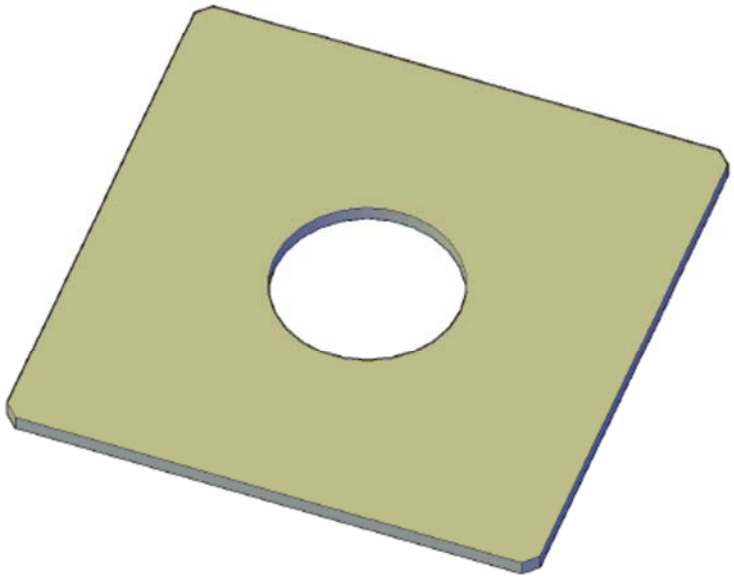


VARIATIONS	
CODE	DIAMETER (Dsp)
SP20060C	200
SP24060C	240
SP28060C	280

SPREAD PLATE 60 RECTANGULAR



3D VIEW

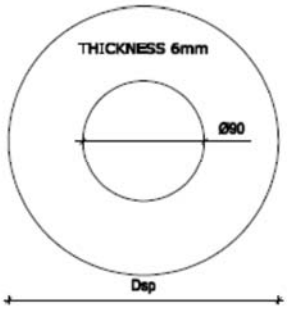


VARIATIONS	
CODE	DIAMETER (Dsp)
SP20060R	200
SP20060R	240
SP28060R	280

Dimensions in mm

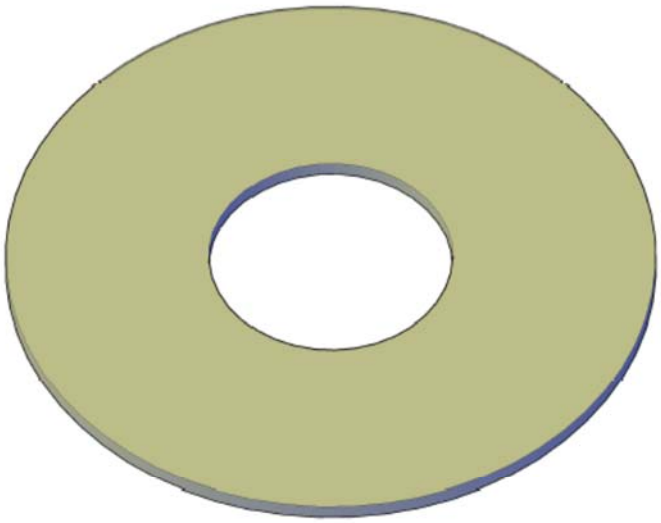
SPIDER Connector	Annex 2
Product details: Spread plate for SPIDER Connector 60	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPREAD PLATE 80 CIRCULAR

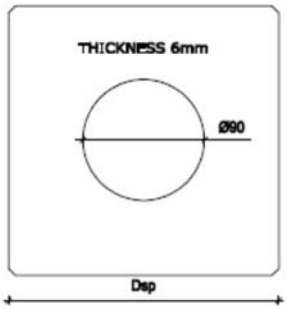


VARIATIONS	
CODE	DIAMETER (Dsp)
SP20080C	200
SP24080C	240
SP28080C	280

3D VIEW

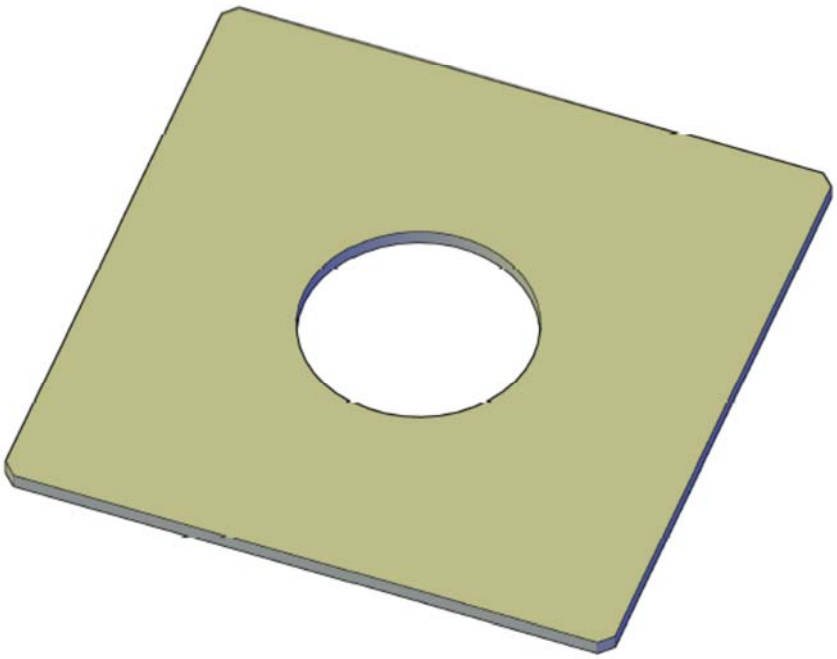


SPREAD PLATE 80 RECTANGULAR



VARIATIONS	
CODE	DIAMETER (Dsp)
SP20080R	200
SP24080R	240
SP28080R	280

3D VIEW

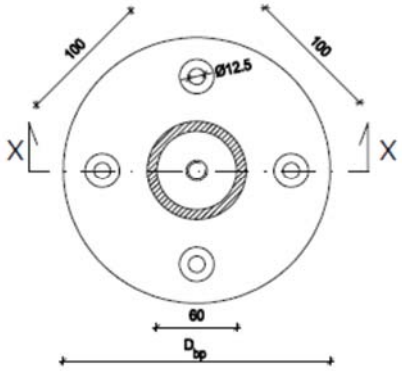


Dimensions in mm

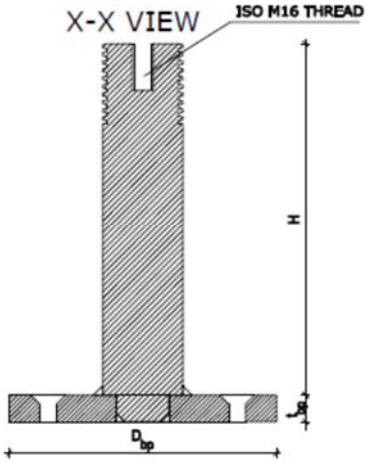
SPIDER Connector	Annex 2
Product details: Spread plate for SPIDER Connector 80	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER CORE 60 CIRCULAR

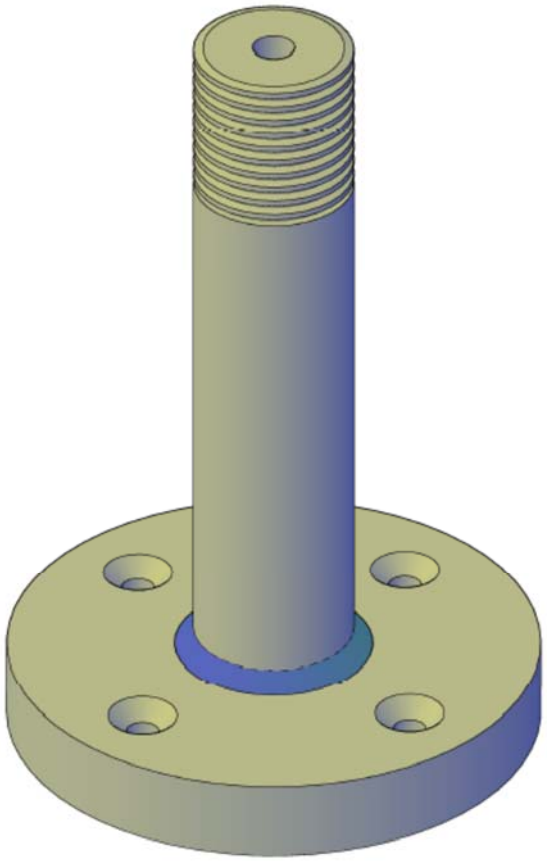
TOP VIEW



X-X VIEW



3D VIEW



VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	200
	240
	280
t_{bp}	20
	30
	40

The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

$H=t_{CLT}$ + 64mm for use with acoustic profile and spread plate

$H=t_{CLT}$ + 54mm for use without acoustic profile and spread plate

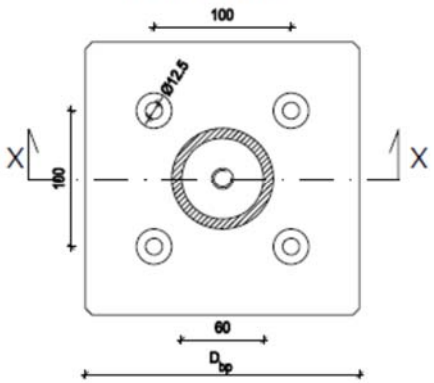
All the combinations of D_{bp}, t_{bp} and H are possible

Dimensions in mm

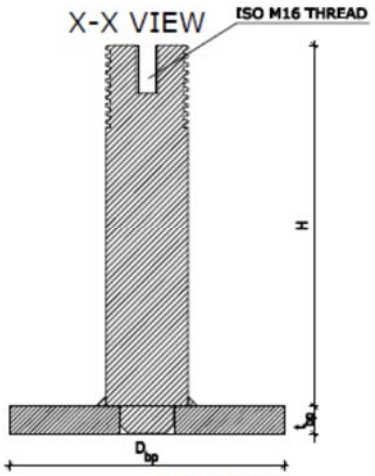
SPIDER Connector	Annex 2 of European Technical Assessment ETA-19/0700 of 17.01.2020
Product details: Steel cylinder and circular bottom plate for SPIDER Connector 60	

SPIDER CORE 60 RECTANGULAR

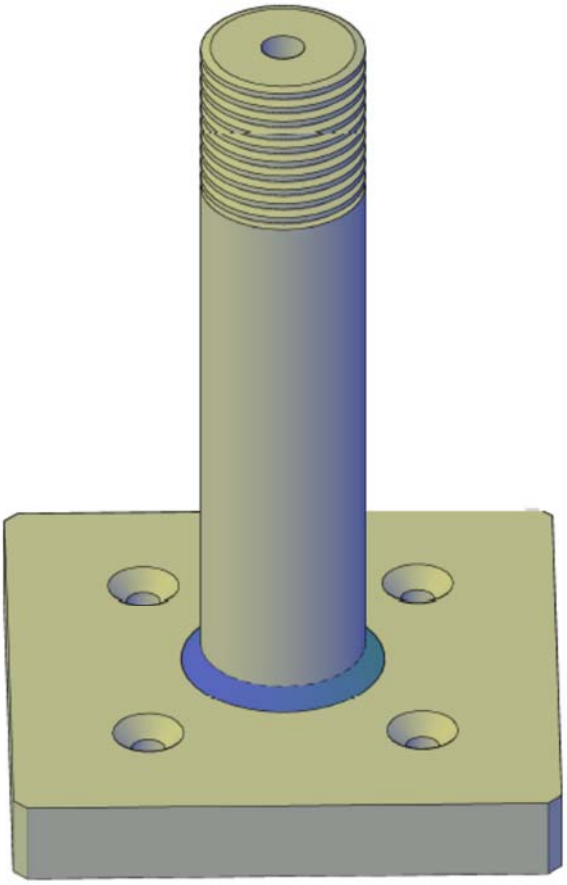
TOP VIEW



X-X VIEW



3D VIEW



VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	200
	240
	280
t_{bp}	20
	30
	40

The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

$H=t_{CLT}$ + 64mm for use with acoustic profile and spread plate

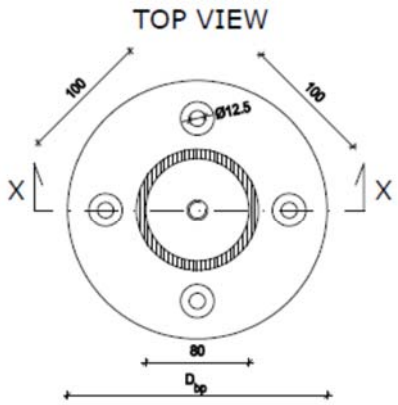
$H=t_{CLT}$ + 54mm for use without acoustic profile and spread plate

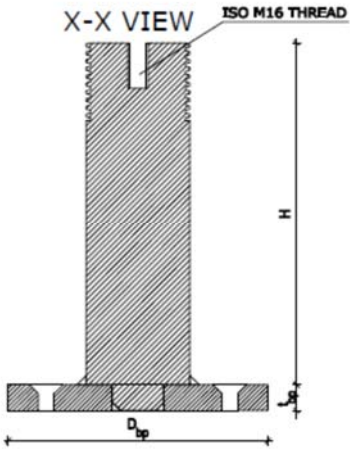
All the combinations of D_{bp}, t_{bp} and H are possible

Dimensions in mm

SPIDER Connector	Annex 2
Product details: Steel cylinder and rectangular bottom plate for SPIDER Connector 60	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER CORE 80 CIRCULAR





3D VIEW

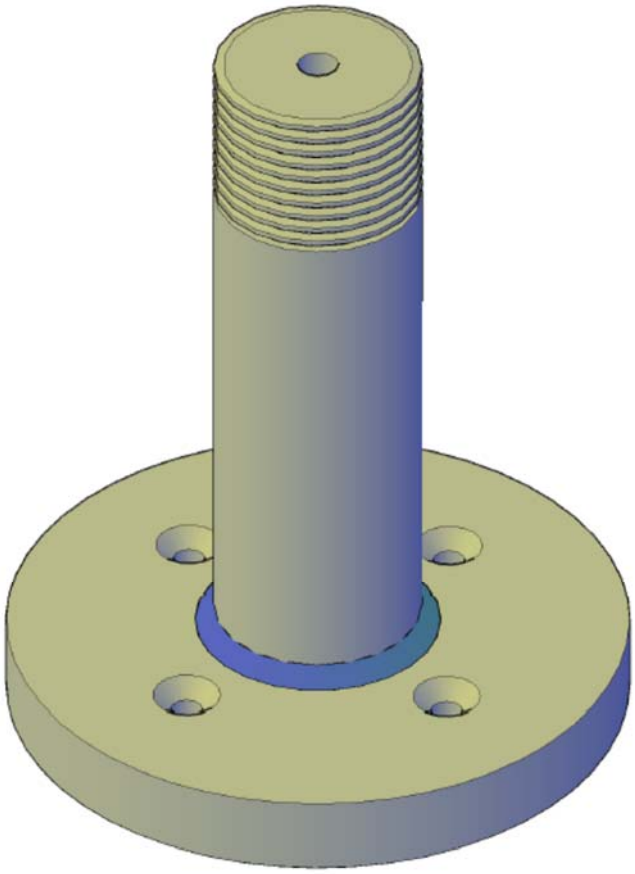
VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	200
	240
	280
t_{bp}	20
	30
	40

The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

$H=t_{CLT}$ + 64mm for use with acoustic profile and spread plate

$H=t_{CLT}$ + 54mm for use without acoustic profile and spread plate

All the combinations of D_{bp}, t_{bp} and H are possible

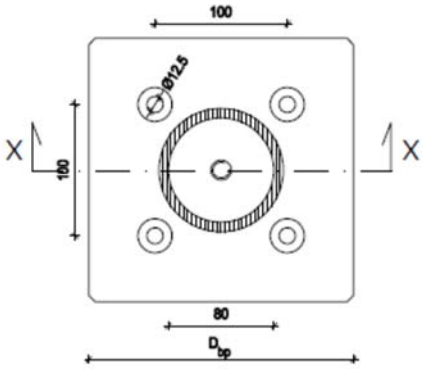


Dimensions in mm

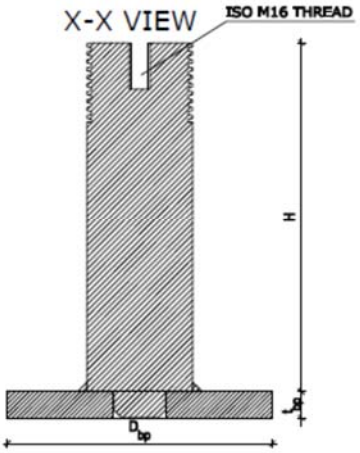
SPIDER Connector	Annex 2 of European Technical Assessment ETA-19/0700 of 17.01.2020
Product details: Steel cylinder and circular bottom plate for SPIDER Connector 80	

SPIDER CORE 80 RECTANGULAR

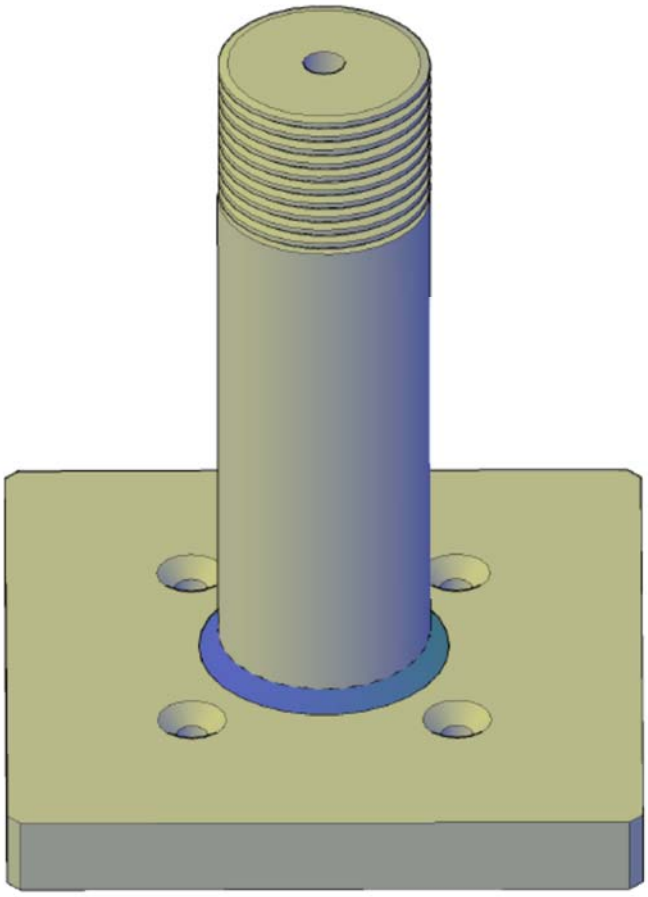
TOP VIEW



X-X VIEW



3D VIEW



VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	200
	240
	280
t_{bp}	20
	30
	40

The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

$H=t_{CLT}$ + 64mm for use with acoustic profile and spread plate

$H=t_{CLT}$ + 54mm for use without acoustic profile and spread plate

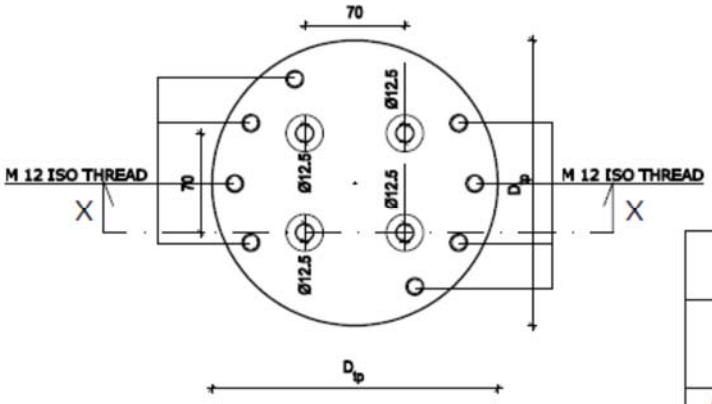
All the combinations of D_{bp}, t_{bp} and H are possible

Dimensions in mm

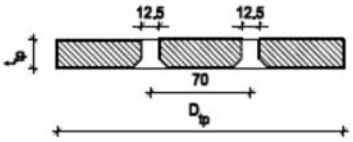
SPIDER Connector	Annex 2 of European Technical Assessment ETA-19/0700 of 17.01.2020
Product details: Steel cylinder and rectangular bottom plate for SPIDER Connector 80	

SPIDER TOP PLATE CIRCULAR

TOP VIEW

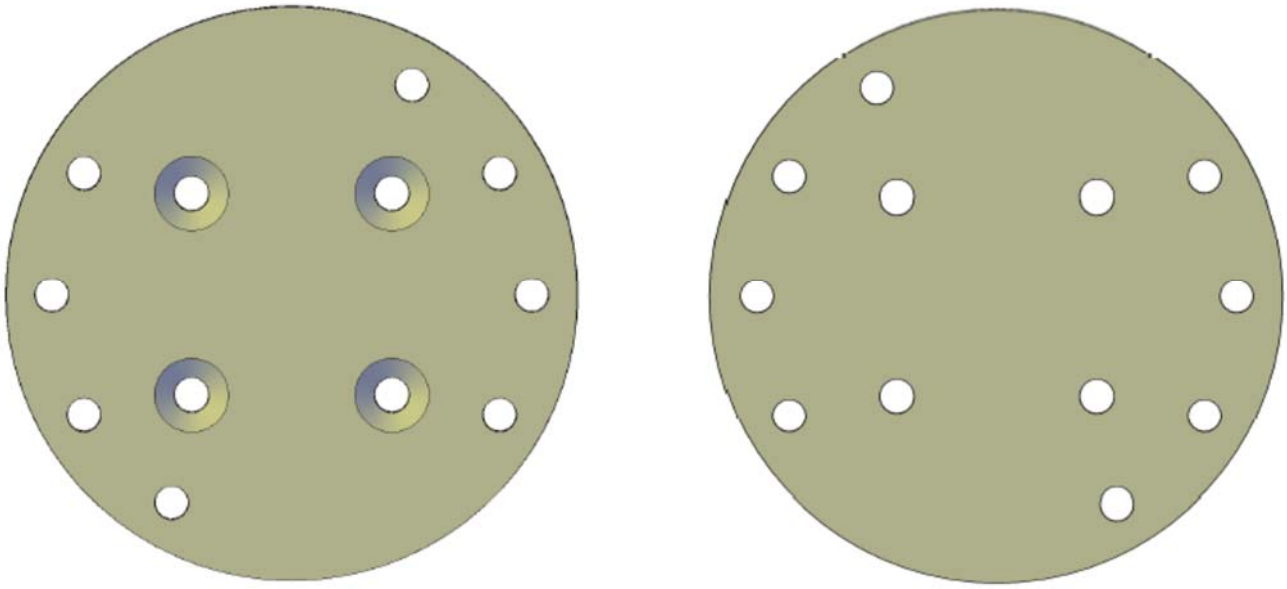


X-X VIEW



VARIATIONS		
CODE	WIDTH (Dtp)	THICKNESS (ttp)
STP20020C	200	20
STP24020C	240	20
STP28020C	280	20
STP20030C	200	30
STP24030C	240	30
STP28030C	280	30
STP20040C	200	40
STP24040C	240	40
STP28040C	280	40

3D VIEW

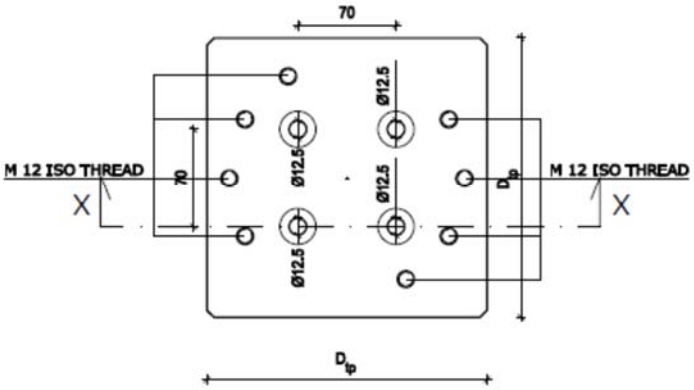


Dimensions in mm

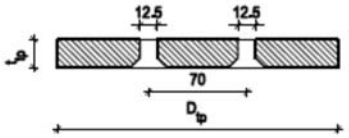
SPIDER Connector	Annex 2
Product details: Circular top plate for SPIDER Connector 60-80	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER TOP PLATE RECTANGULAR

TOP VIEW

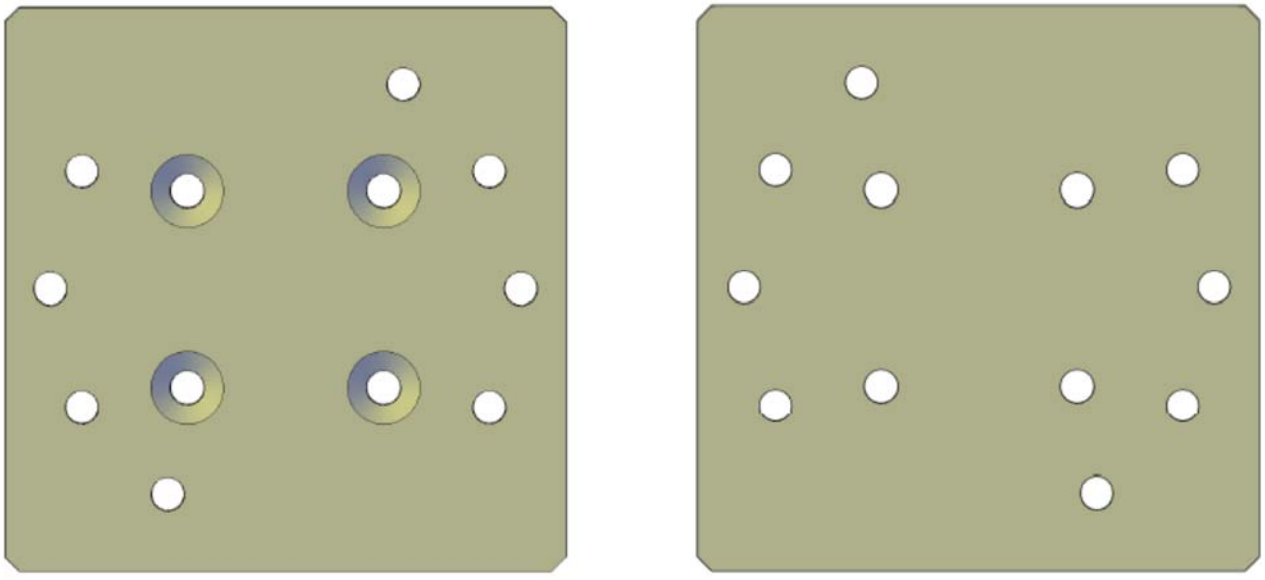


X-X VIEW



VARIATIONS		
CODE	WIDTH (Dtp)	THICKNESS (ttp)
STP20020R	200	20
STP24020R	240	20
STP28020R	280	20
STP20030R	200	30
STP24030R	240	30
STP28030R	280	30
STP20040R	200	40
STP24040R	240	40
STP28040R	280	40

3D VIEW

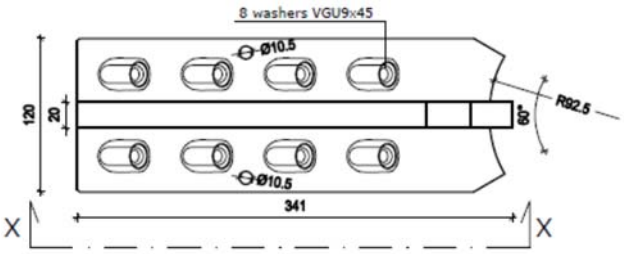


Dimensions in mm

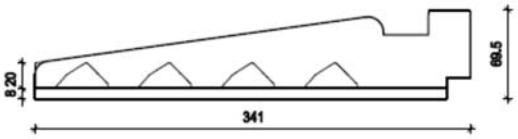
SPIDER Connector	Annex 2
Product details: Rectangular top plate for SPIDER Connector 60-80	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER ARM 100120

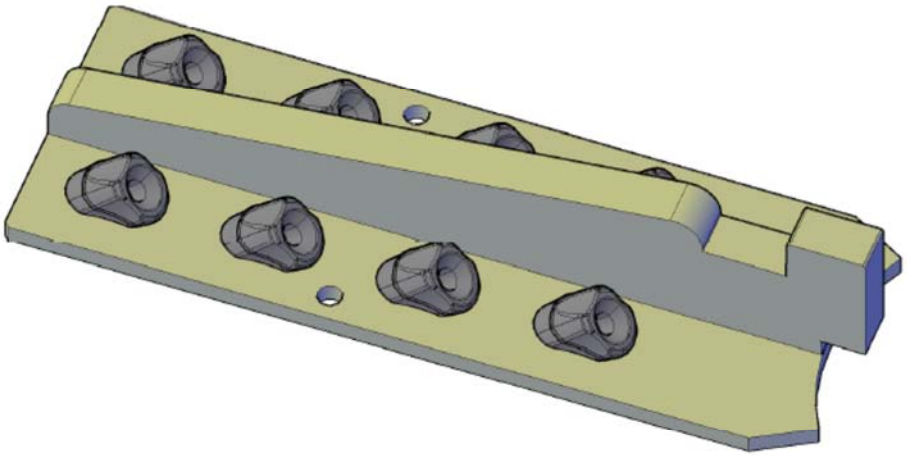
TOP VIEW



X-X VIEW

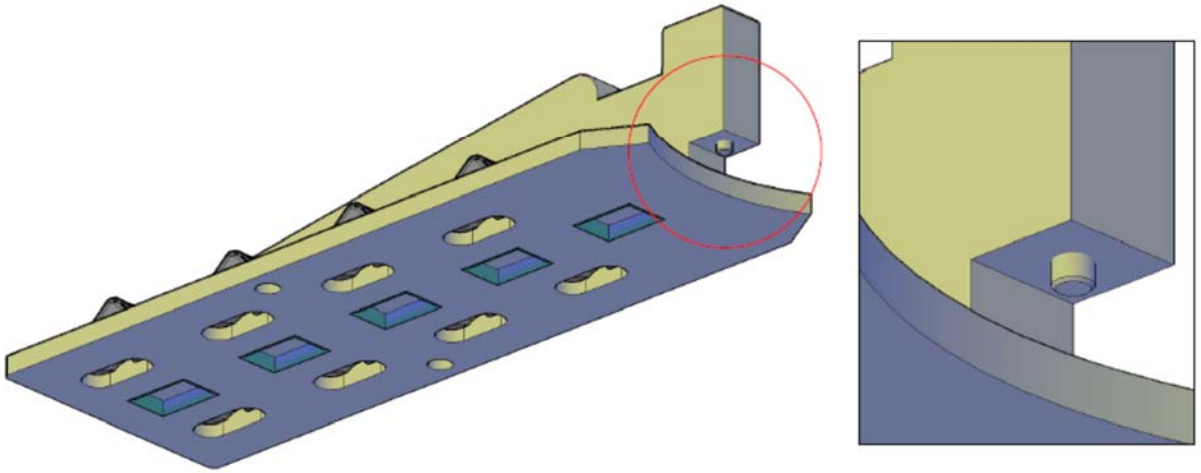


3D VIEW



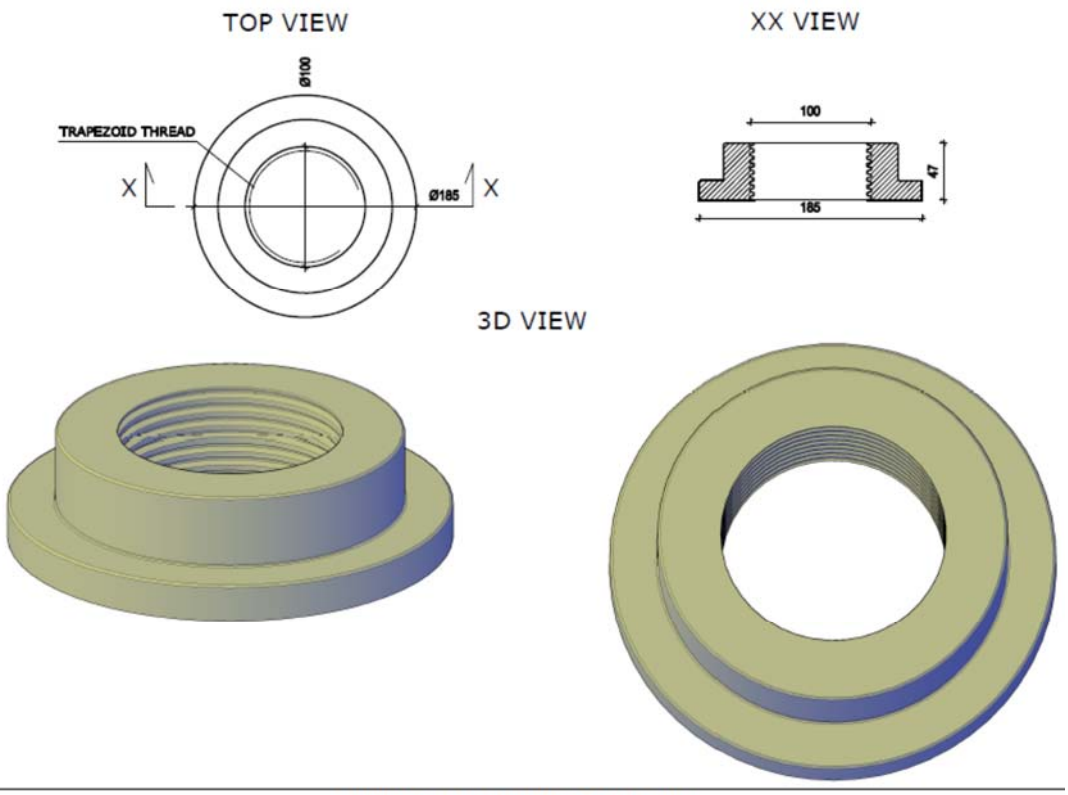
Dimensions in mm

CYLINDRICAL PIN FOR ASSEMBLY (OPTIONAL)

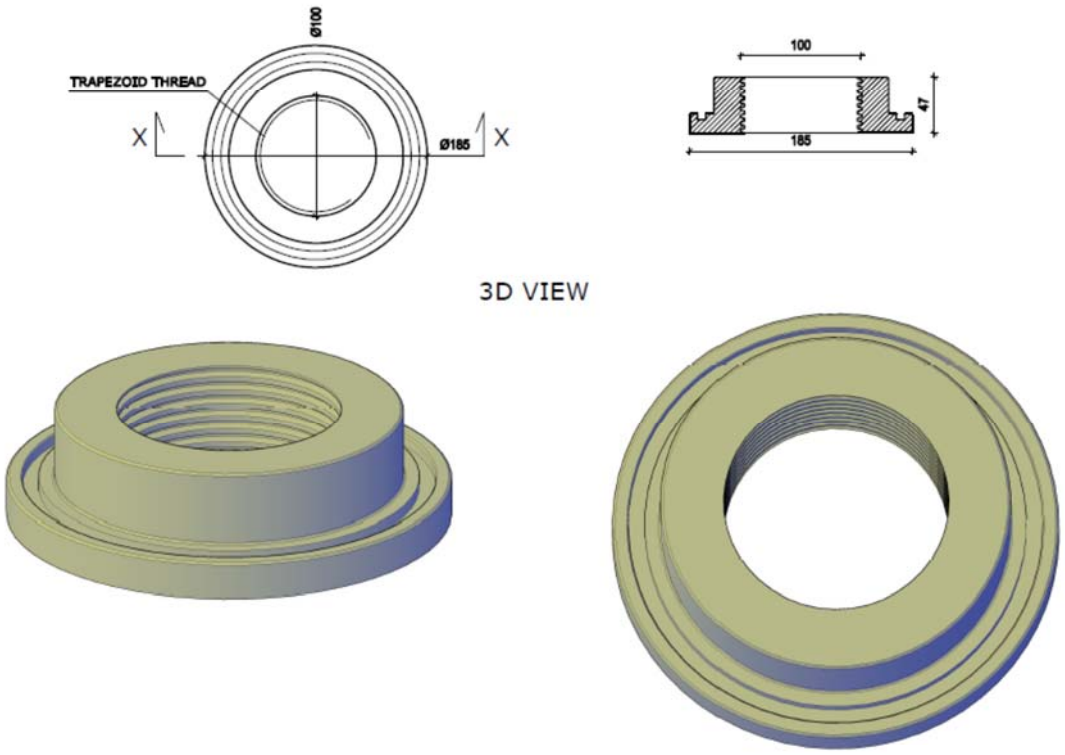


SPIDER Connector	Annex 2
Product details: Arm for SPIDER Connector 100-120	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER COUPLING CONE 100



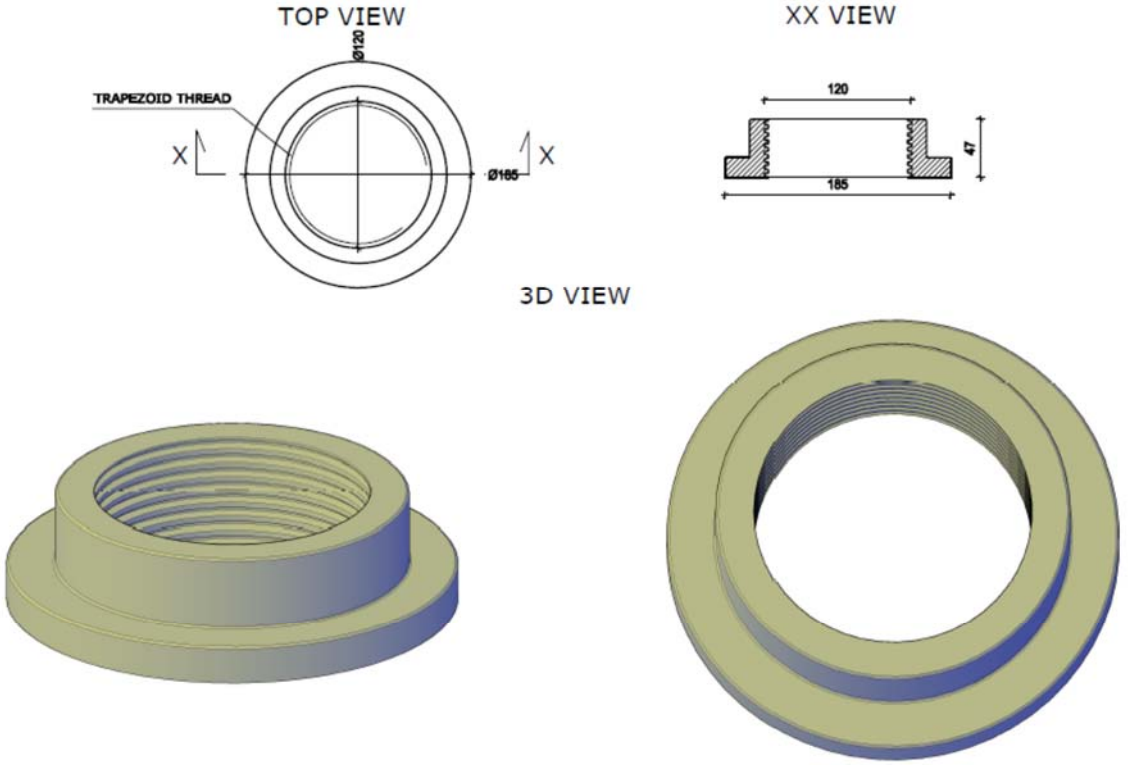
SPIDER COUPLING CONE 100A



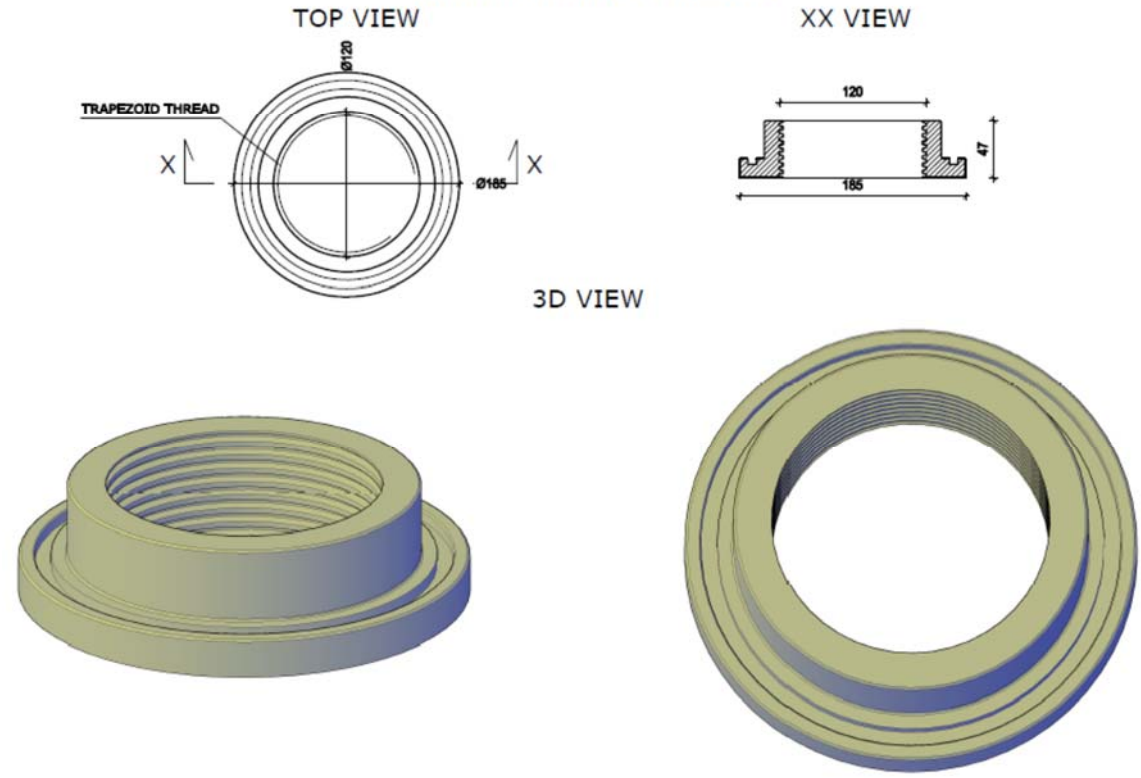
Dimensions in mm

SPIDER Connector	Annex 2
Product details: Coupling Cone for SPIDER Connector 100	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER COUPLING CONE 120



SPIDER COUPLING CONE 120A

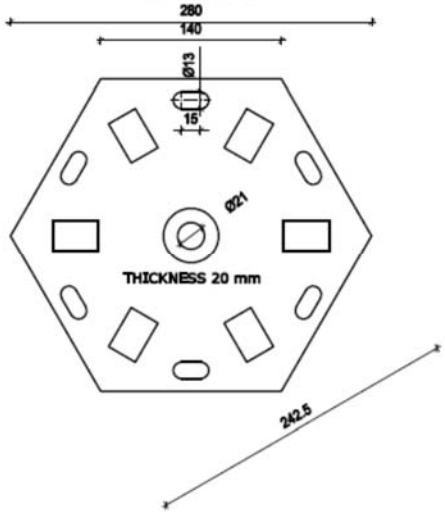


Dimensions in mm

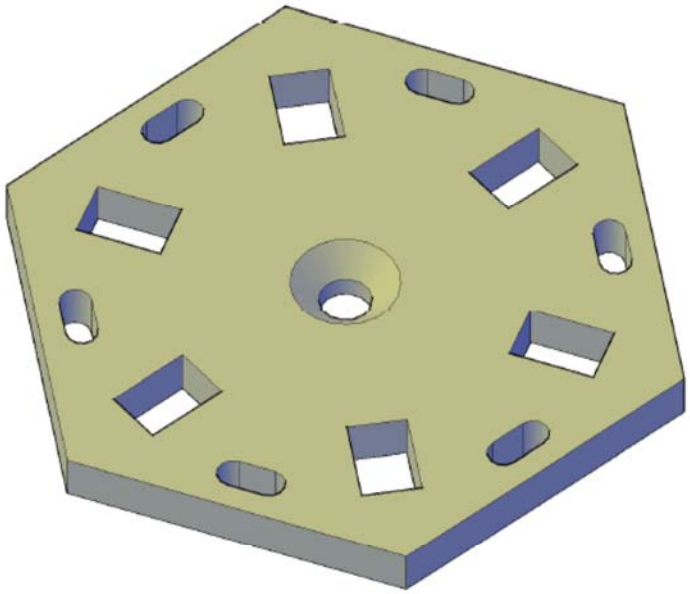
SPIDER Connector	Annex 2
Product details: Coupling Cone for SPIDER Connector 120	of European Technical Assessment ETA-19/0700 of 17.01.2020

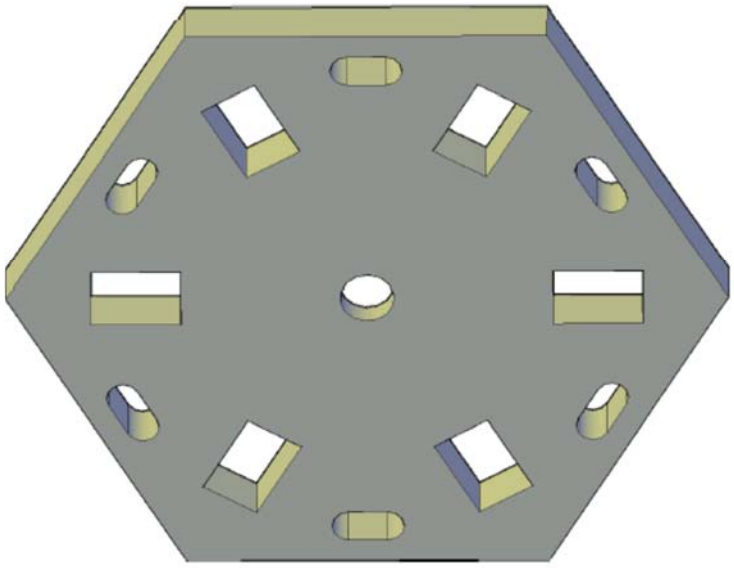
SPIDER COUPLING DISK 100120

TOP VIEW



3D VIEW



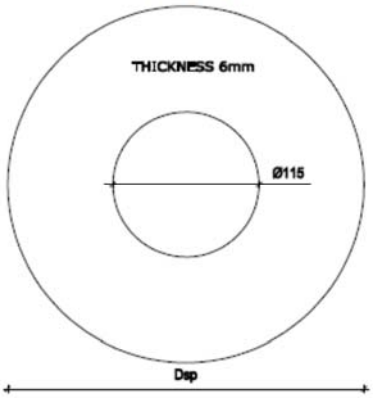


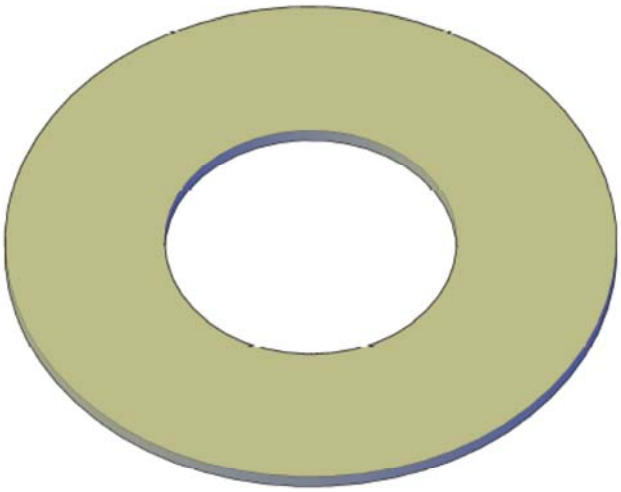
Dimensions in mm

SPIDER Connector	Annex 2
Product details: Coupling Disk for SPIDER Connector 100-120	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPREAD PLATE 100 CIRCULAR

TOP VIEW

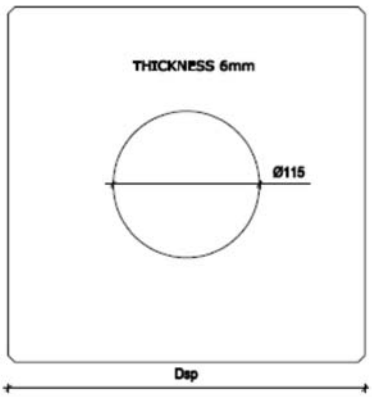


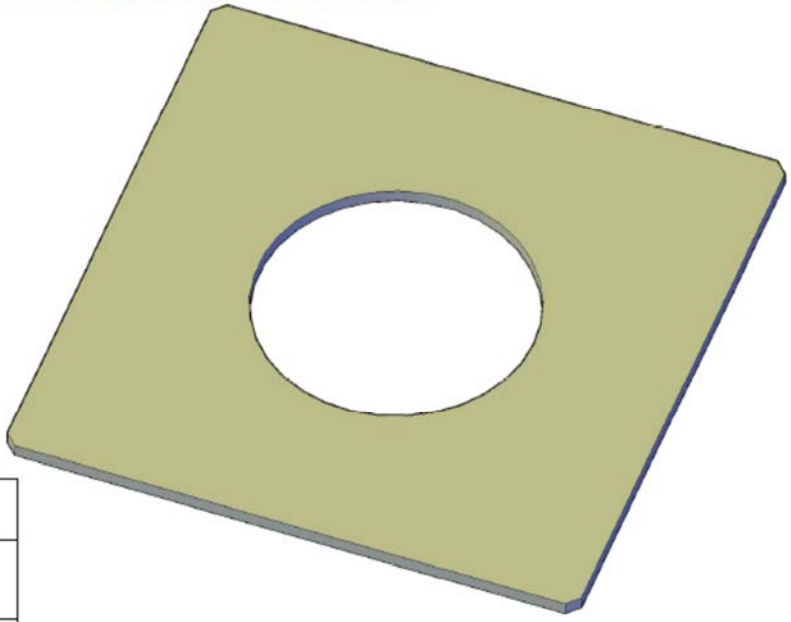


VARIATIONS	
CODE	DIAMETER (Dsp)
SP240100C	240
SP280100C	280

SPREAD PLATE 100 RECTANGULAR

TOP VIEW





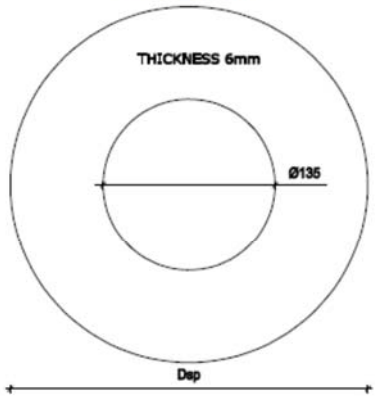
VARIATIONS	
CODE	DIAMETER (Dsp)
SP240100R	240
SP280100R	280

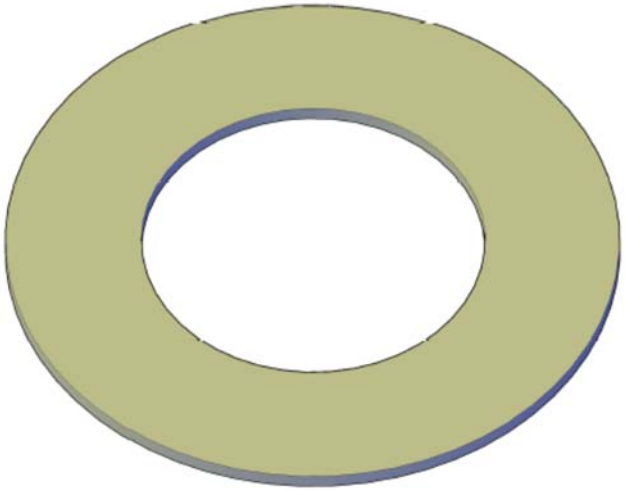
Dimensions in mm

SPIDER Connector	Annex 2
Product details: Spread plate for SPIDER Connector 100	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPREAD PLATE 120 CIRCULAR

TOP VIEW

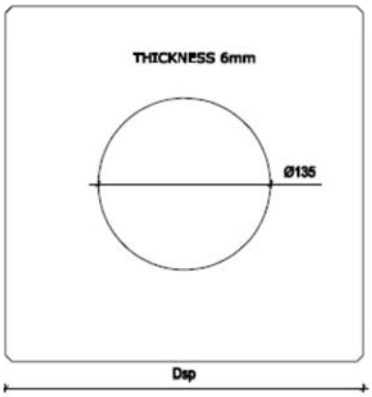


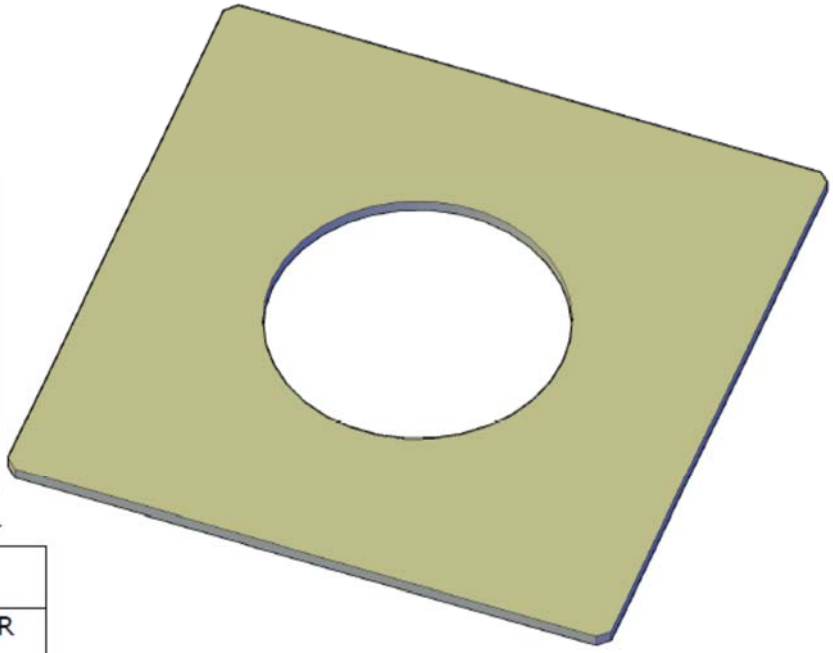


VARIATIONS	
CODE	DIAMETER (Dsp)
SP240120C	240
SP280120C	280

SPREAD PLATE 120 RECTANGULAR

TOP VIEW





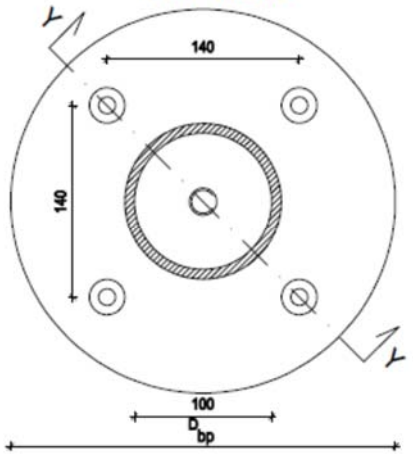
VARIATIONS	
CODE	DIAMETER (Dsp)
SP240120R	240
SP280120R	280

Dimensions in mm

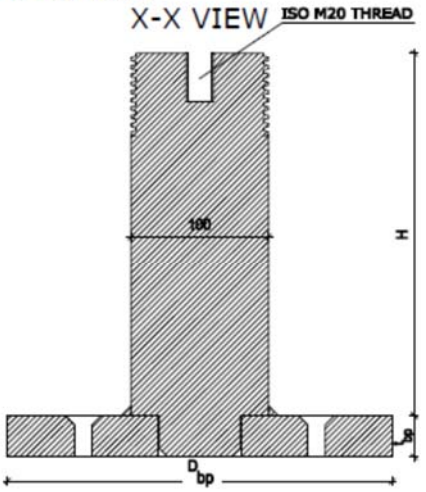
SPIDER Connector	Annex 2
Product details: Spread plate for SPIDER Connector 120	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER CORE 100 CIRCULAR

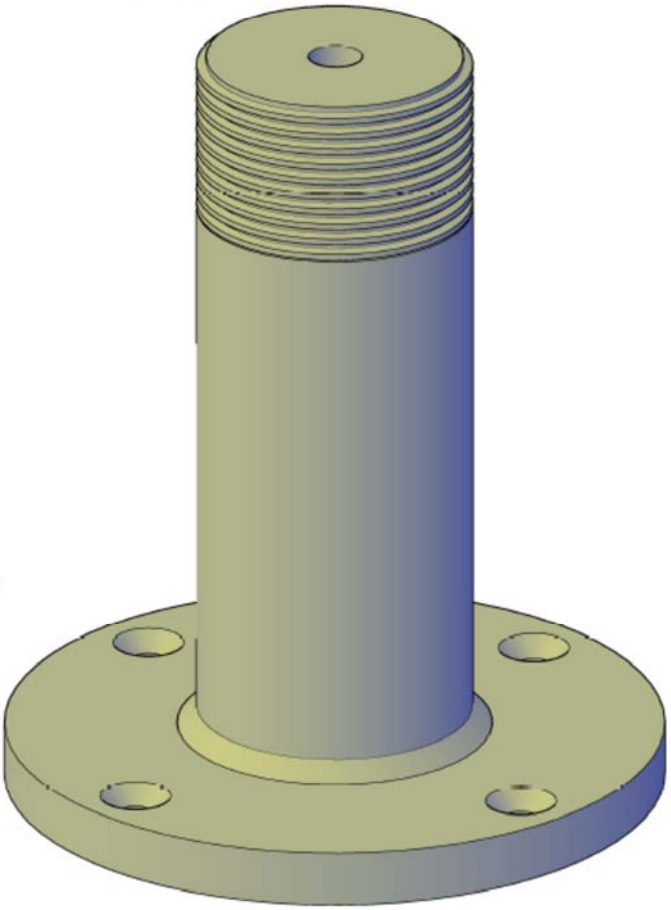
TOP VIEW



X-X VIEW



3D VIEW



VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	240
	280
t_{bp}	20
	30
	40

The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

$H=t_{CLT}$ + 64mm for use with acoustic profile and spread plate

$H=t_{CLT}$ + 54mm for use without acoustic profile and spread plate

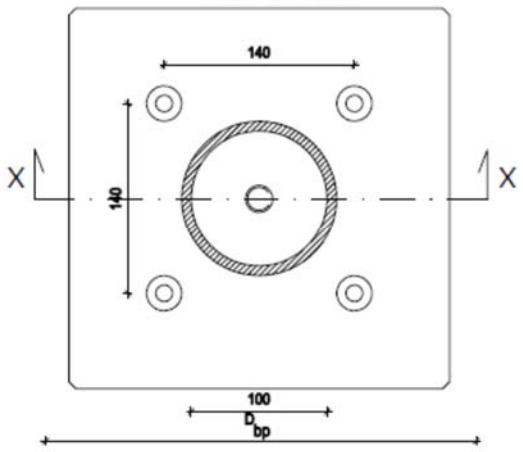
All the combinations of D_{bp}, t_{bp} and H are possible

Dimensions in mm

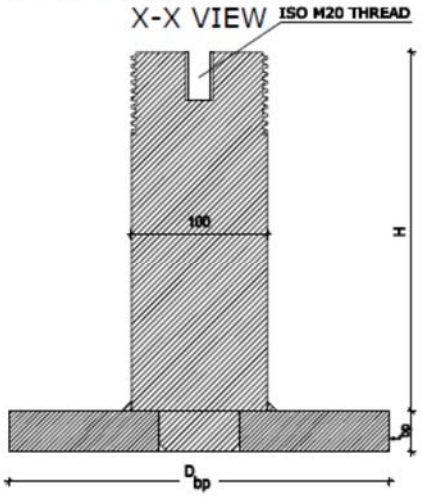
SPIDER Connector	Annex 2 of European Technical Assessment ETA-19/0700 of 17.01.2020
Product details: Steel cylinder and circular bottom plate for SPIDER Connector 100	

SPIDER CORE 100 RECTANGULAR

TOP VIEW



X-X VIEW



VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	240
	280
t_{bp}	20
	30
	40

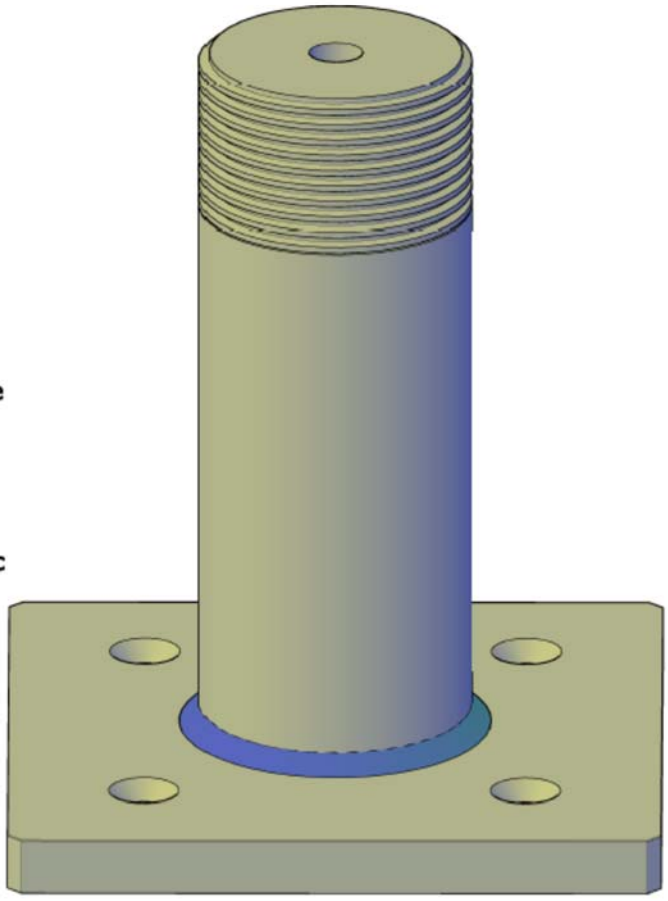
The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

$H=t_{CLT}$ + 64mm for use with acoustic profile and spread plate

$H=t_{CLT}$ + 54mm for use without acoustic profile and spread plate

All the combinations of D_{bp}, t_{bp} and H are possible

3D VIEW

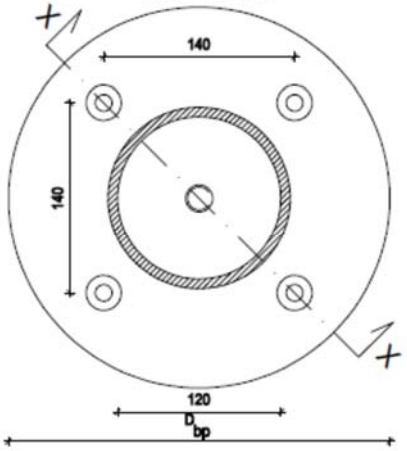


Dimensions in mm

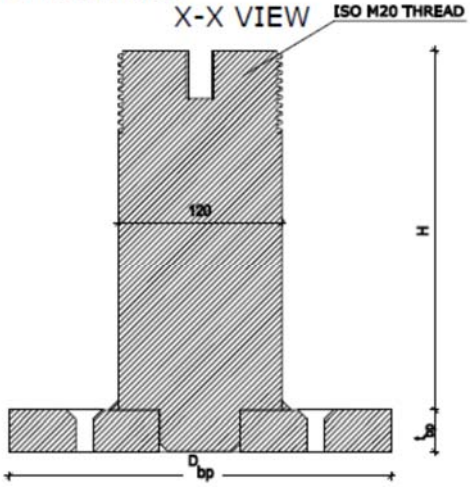
SPIDER Connector	Annex 2
Product details: Steel cylinder and rectangular bottom plate for SPIDER Connector 100	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER CORE 120 CIRCULAR

TOP VIEW



X-X VIEW



VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	240
	280
t_{bp}	20
	30
	40

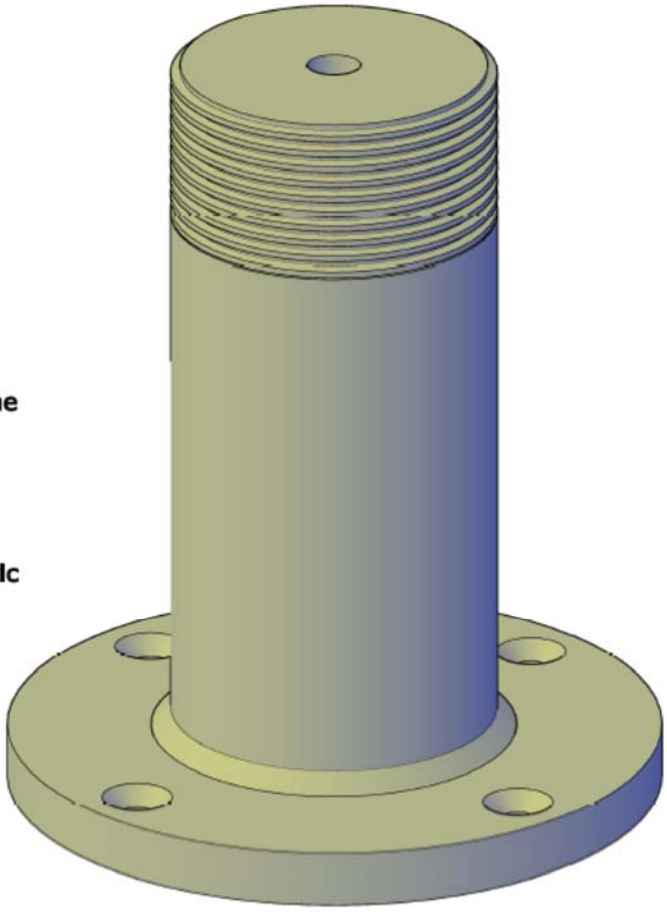
The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

H=t_{CLT} + 64mm for use with acoustic profile and spread plate

H=t_{CLT} + 54mm for use without acoustic profile and spread plate

All the combinations of D_{bp}, t_{bp} and H are possible

3D VIEW

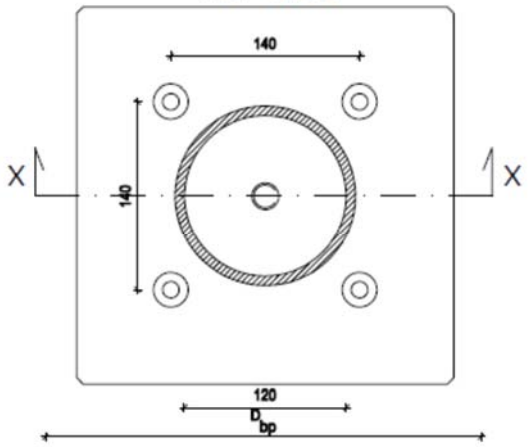


Dimensions in mm

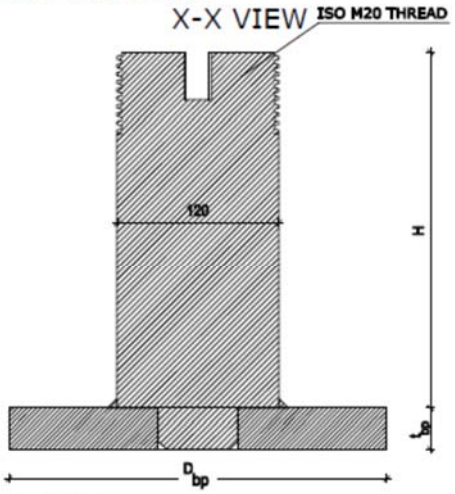
SPIDER Connector	Annex 2 of European Technical Assessment ETA-19/0700 of 17.01.2020
Product details: Steel cylinder and circular bottom plate for SPIDER Connector 120	

SPIDER CORE 120 RECTANGULAR

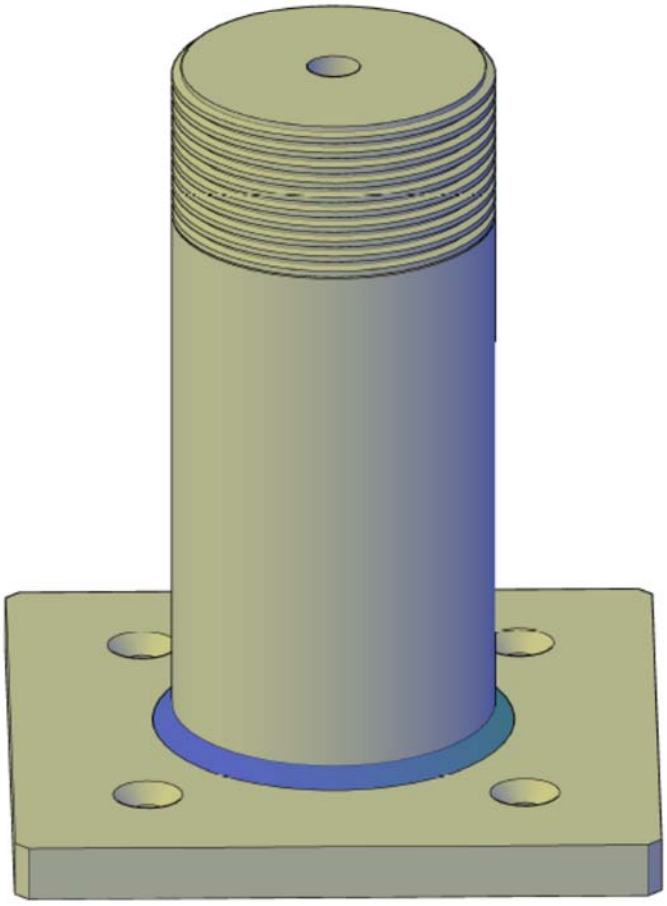
TOP VIEW



X-X VIEW



3D VIEW



VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	240
	280
t_{bp}	20
	30
	40

The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

H=t_{CLT} + 64mm for use with acoustic profile and spread plate

H=t_{CLT} + 54mm for use without acoustic profile and spread plate

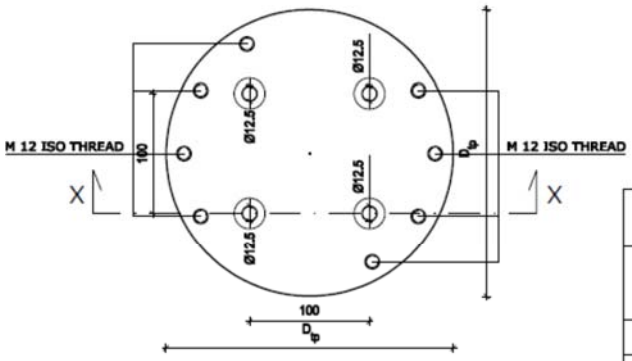
All the combinations of D_{bp}, t_{bp} and H are possible

Dimensions in mm

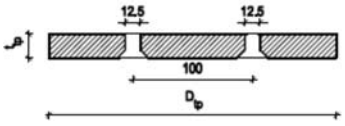
SPIDER Connector	Annex 2
Product details: Steel cylinder and rectangular bottom plate for SPIDER Connector 120	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER TOP PLATE CIRCULAR LARGE

TOP VIEW

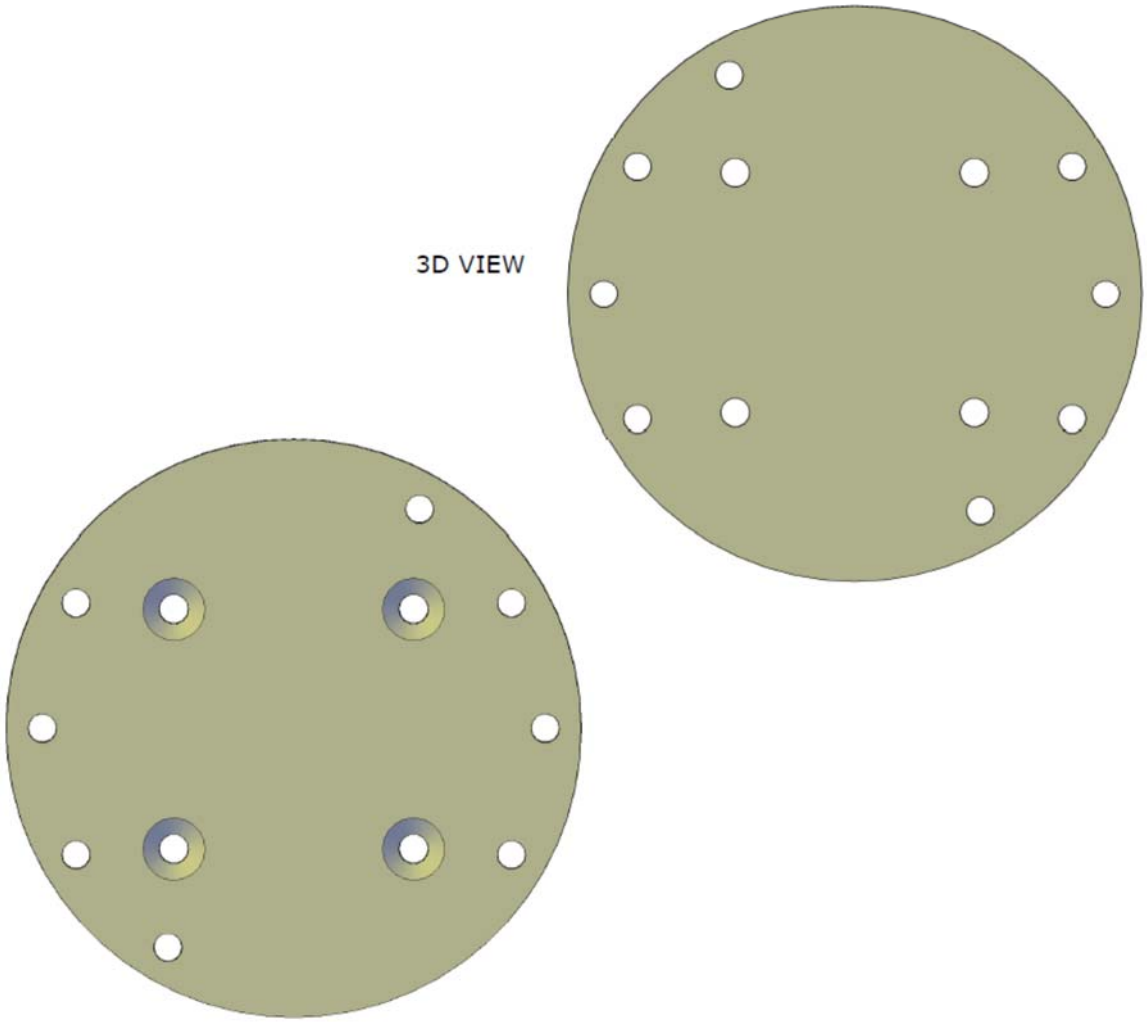


X-X VIEW



VARIATIONS		
CODE	WIDTH (Dtp)	THICKNESS (ttp)
STP24020CL	240	20
STP28020CL	280	20
STP24030CL	240	30
STP28030CL	280	30
STP24040CL	240	40
STP28040CL	280	40

3D VIEW

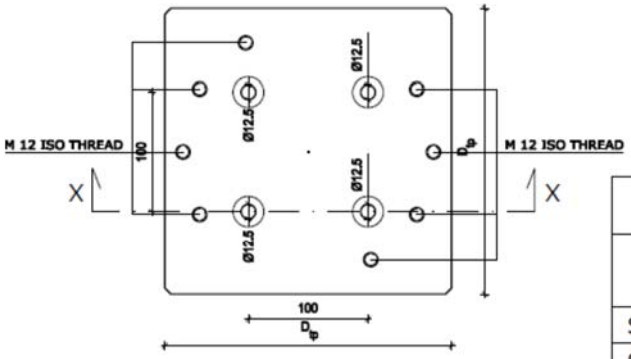


Dimensions in mm

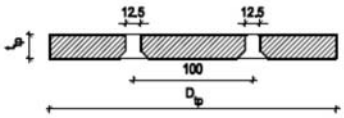
SPIDER Connector	Annex 2
Product details: Circular top plate for SPIDER Connector 100-120	of European Technical Assessment ETA-19/0700 of 17.01.2020

SPIDER TOP PLATE RECTANGULAR LARGE

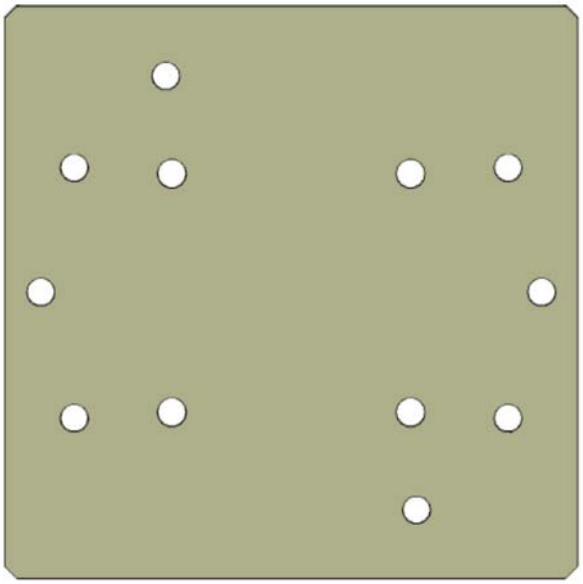
TOP VIEW



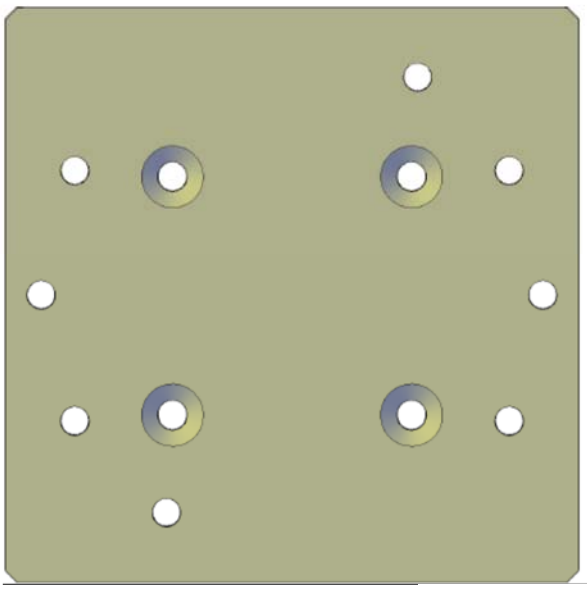
X-X VIEW



VARIATIONS		
CODE	WIDTH (Dtp)	THICKNESS (ttp)
STP24020RL	240	20
STP28020RL	280	20
STP24030RL	240	30
STP28030RL	280	30
STP24040RL	240	40
STP28040RL	280	40

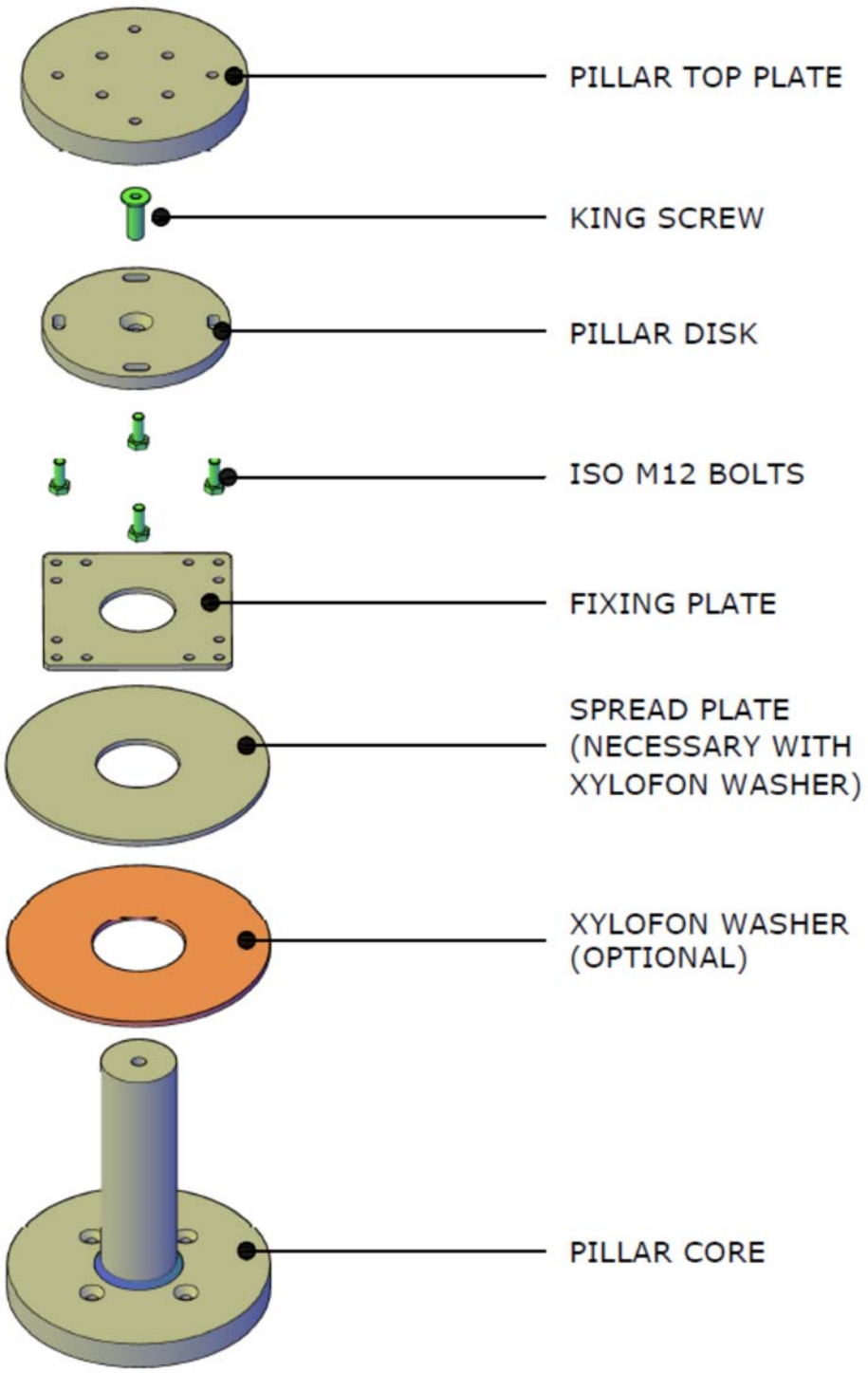


3D VIEW

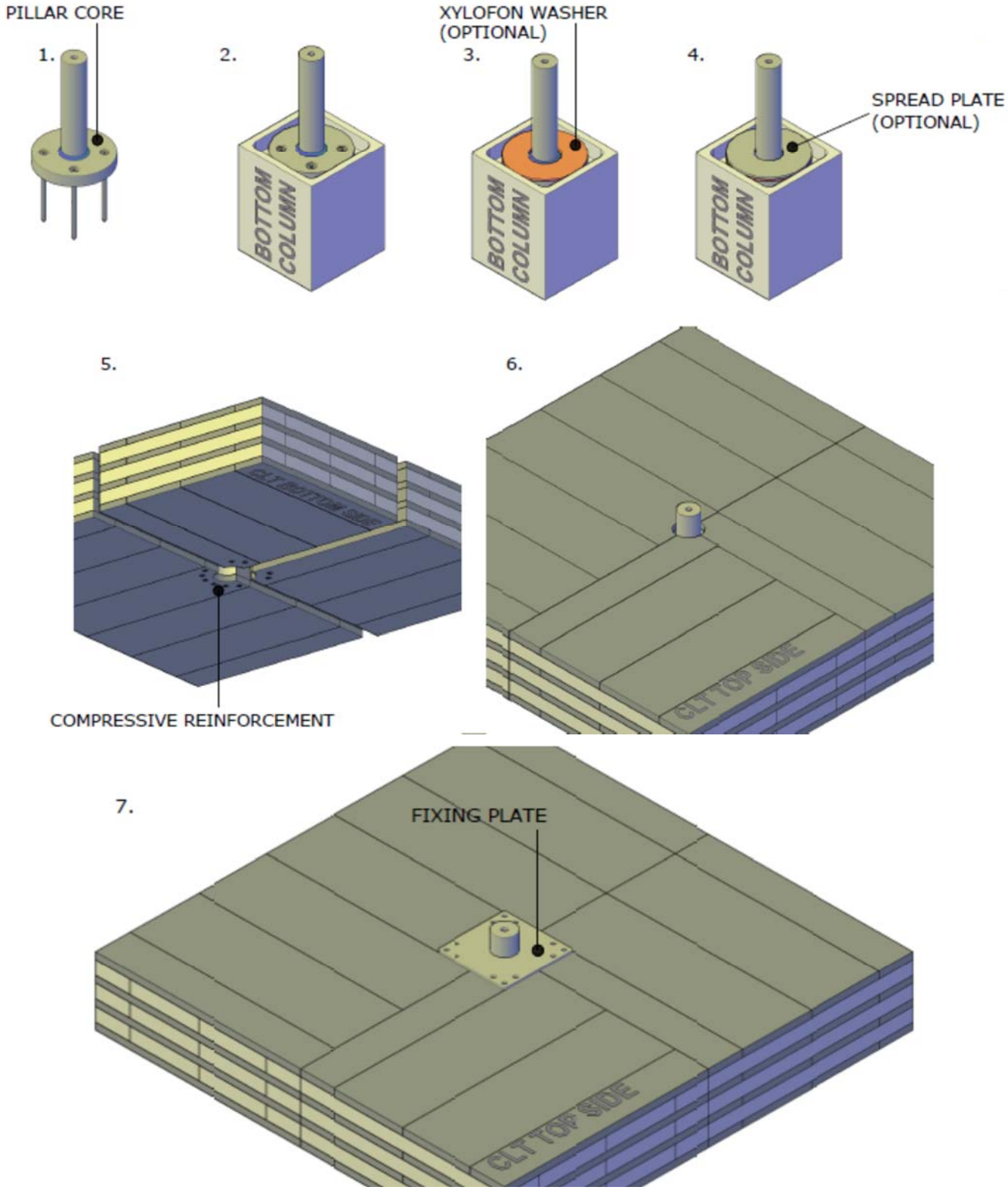


Dimensions in mm

SPIDER Connector	Annex 2
Product details: Rect. top plate for SPIDER Connector 100-120	of European Technical Assessment ETA-19/0700 of 17.01.2020

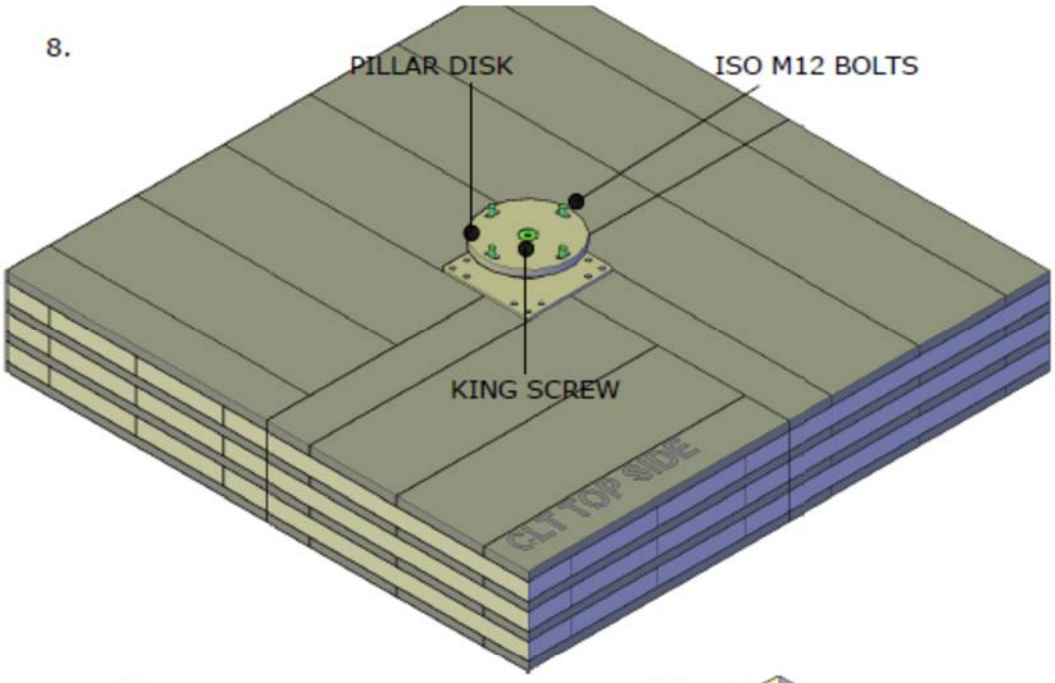


PILLAR Connector	Annex 2
Components of the **PILLAR Connector**	of European Technical Assessment ETA-19/0700 of 17.01.2020



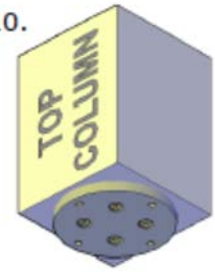
PILLAR Connector	Annex 2
Assembly of the **PILLAR Connector**	of European Technical Assessment ETA-19/0700 of 17.01.2020

8.

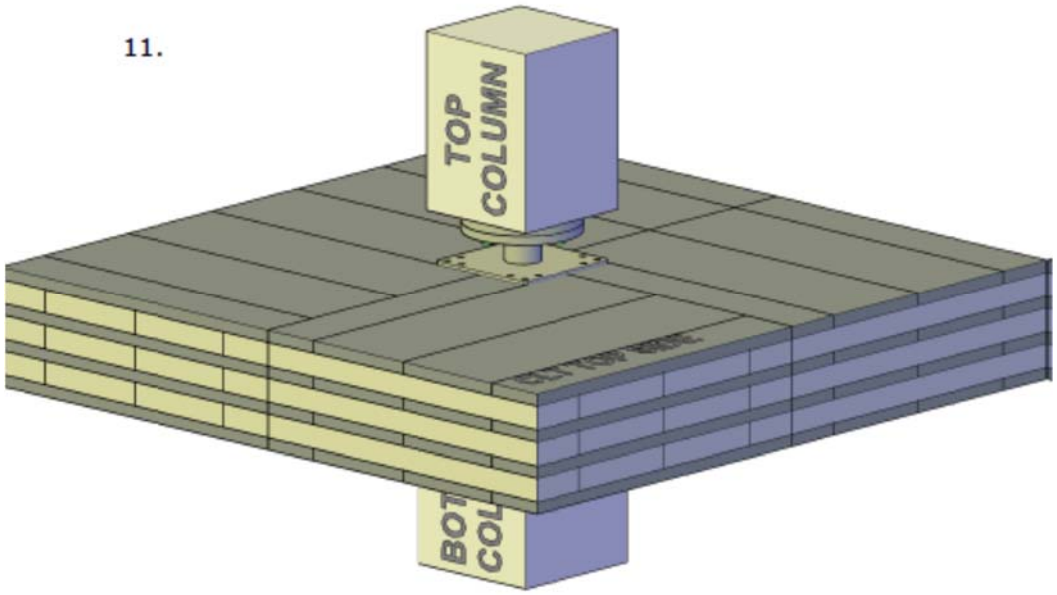


9.

10.



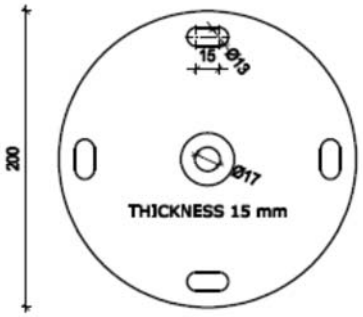
11.



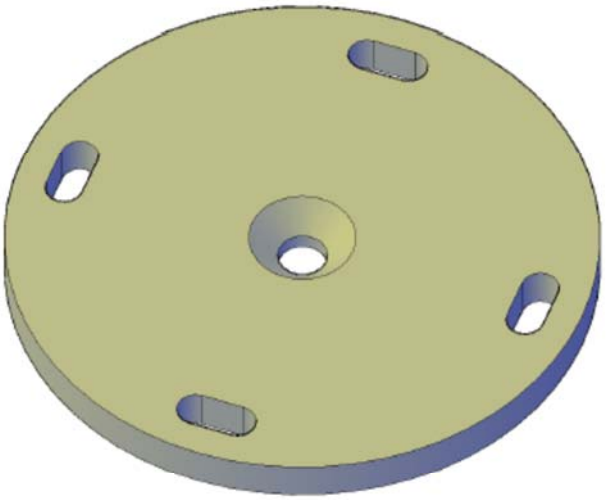
PILLAR Connector	Annex 2
Assembly of the **PILLAR Connector**	of European Technical Assessment ETA-19/0700 of 17.01.2020

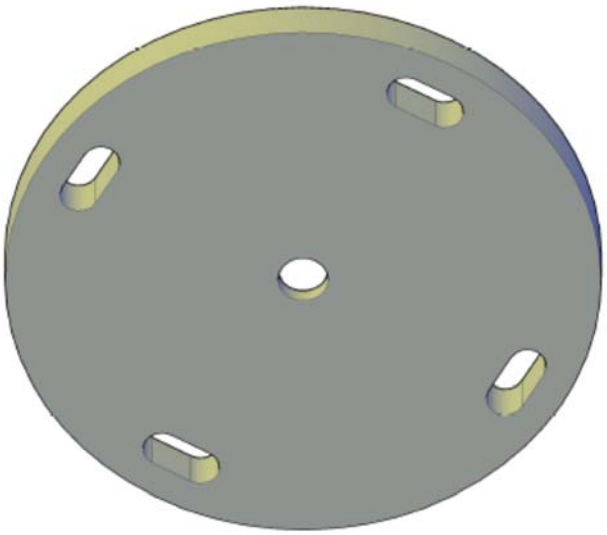
PILLAR DISK 6080

TOP VIEW



3D VIEW



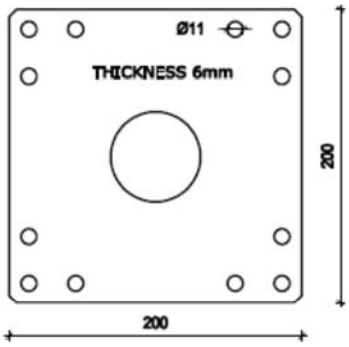


Dimensions in mm

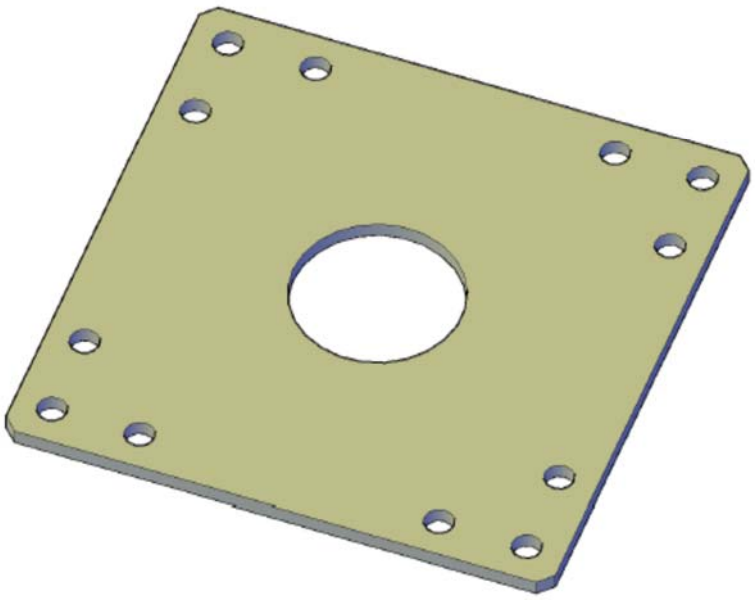
PILLAR Connector	Annex 2
Product details: Coupling Disk for PILLAR Connector 60-80	of European Technical Assessment ETA-19/0700 of 17.01.2020

FIXING PLATE 60

TOP VIEW



3D VIEW

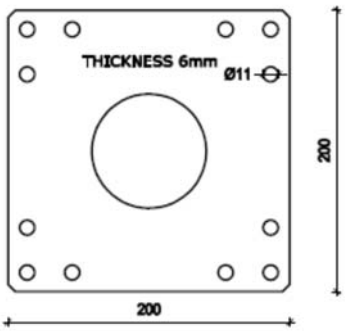


Dimensions in mm

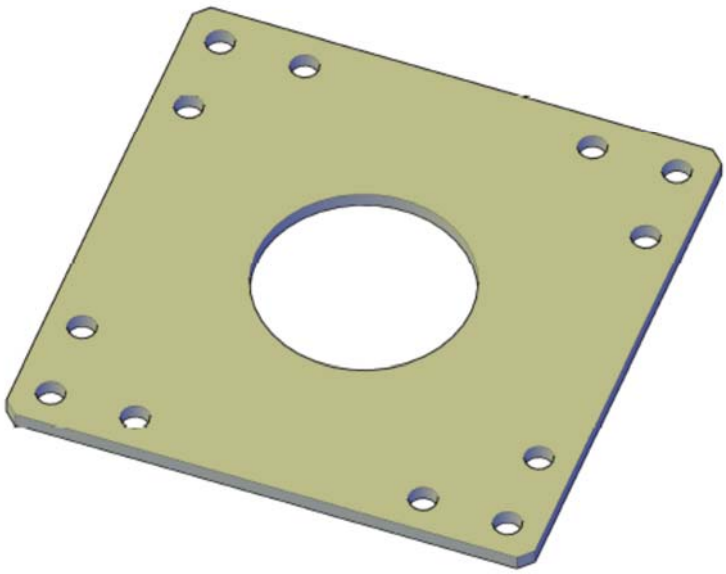
PILLAR Connector	Annex 2
Product details: Fixing plate for PILLAR Connector 60	of European Technical Assessment ETA-19/0700 of 17.01.2020

FIXING PLATE 80

TOP VIEW



3D VIEW

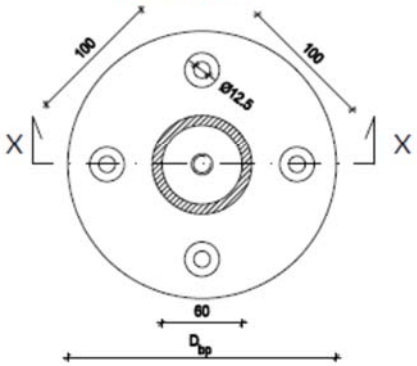


Dimensions in mm

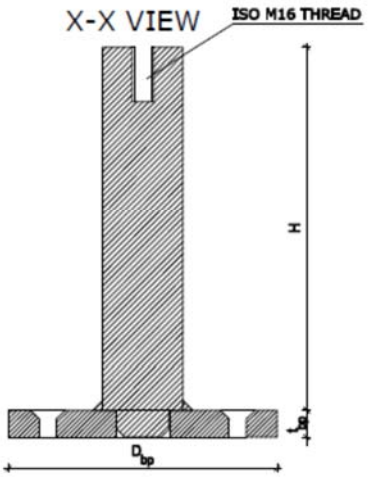
PILLAR Connector	Annex 2
Product details: Fixing plate for PILLAR Connector 80	of European Technical Assessment ETA-19/0700 of 17.01.2020

PILLAR CORE 60 CIRCULAR

TOP VIEW



X-X VIEW



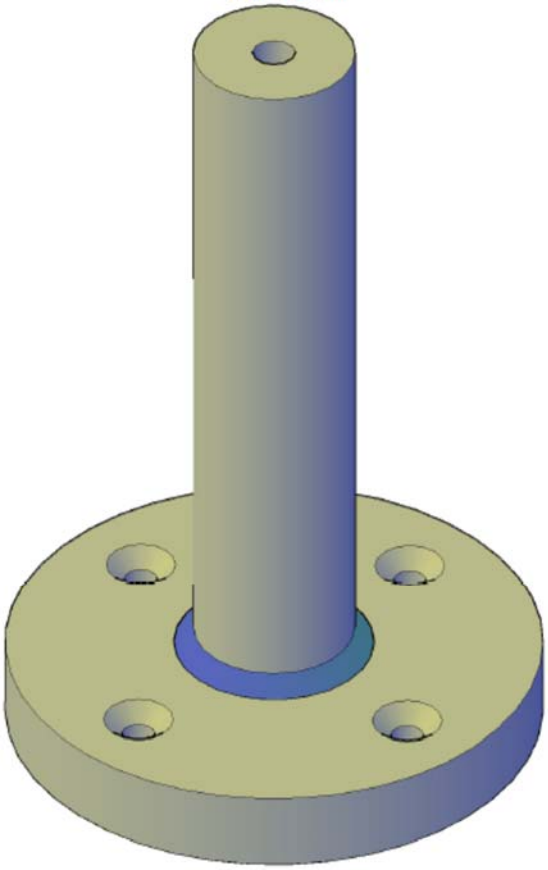
VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	200
	240
	280
t_{bp}	20
	30
	40

The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

$H=t_{CLT}$ + 70mm

All the combinations of D_{bp}, t_{bp} and H are possible

3D VIEW

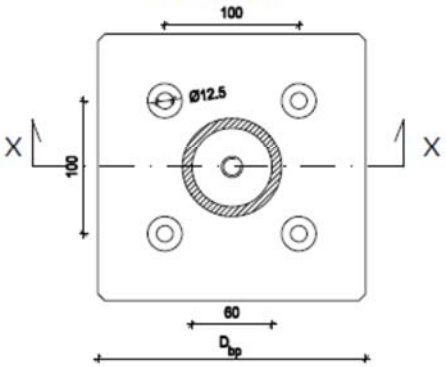


Dimensions in mm

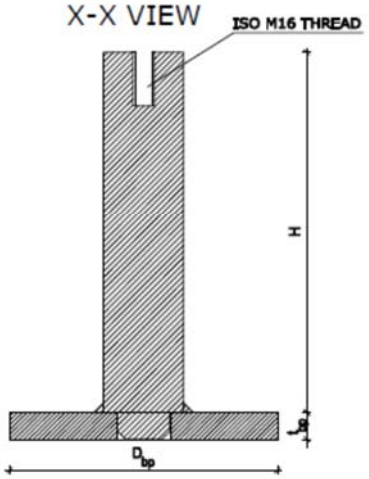
PILLAR Connector	Annex 2
Product details: Steel cylinder and circular bottom plate for PILLAR Connector 60	of European Technical Assessment ETA-19/0700 of 17.01.2020

PILLAR CORE 60 RECTANGULAR

TOP VIEW



X-X VIEW



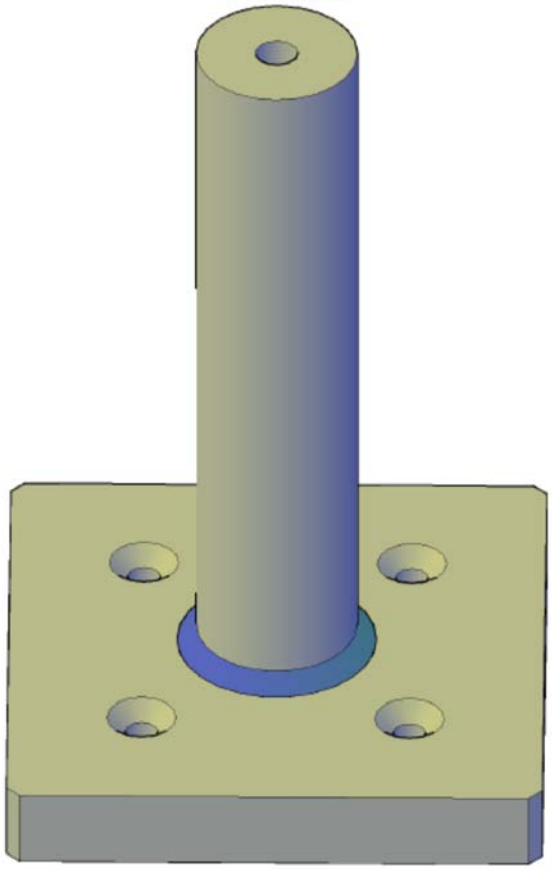
VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	200
	240
	280
t_{bp}	20
	30
	40

The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

$H=t_{CLT}$ + 70mm

All the combinations of D_{bp}, t_{bp} and H are possible

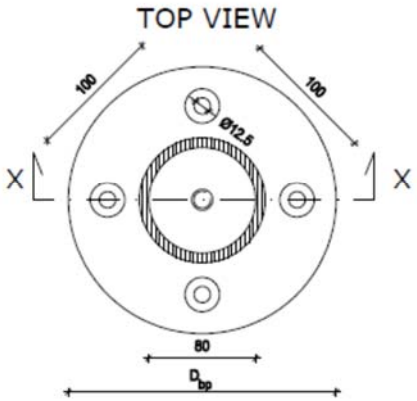
3D VIEW

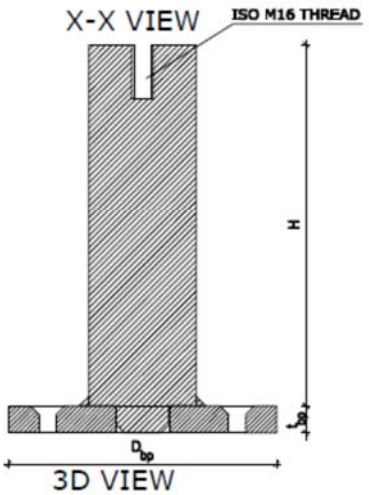


Dimensions in mm

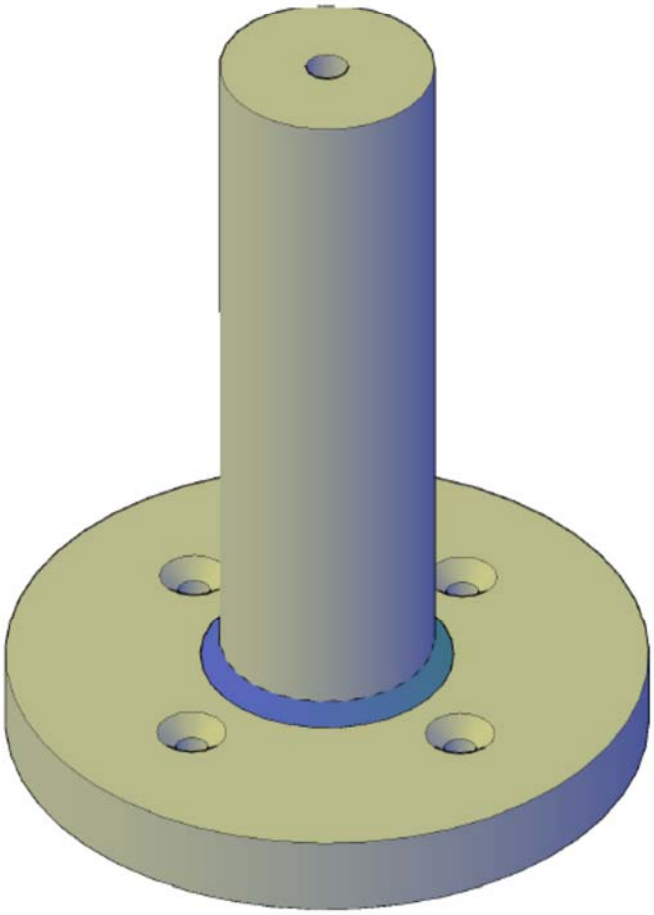
PILLAR Connector	Annex 2
Product details: Steel cylinder and rectangular bottom plate for PILLAR Connector 60	of European Technical Assessment ETA-19/0700 of 17.01.2020

PILLAR CORE 80 CIRCULAR





3D VIEW



VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	200
	240
	280
t_{bp}	20
	30
	40

The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

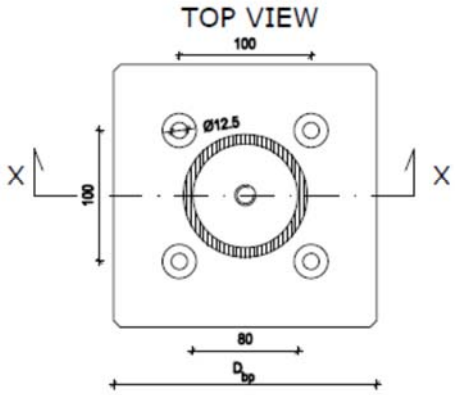
$H=t_{CLT}$ + 70mm

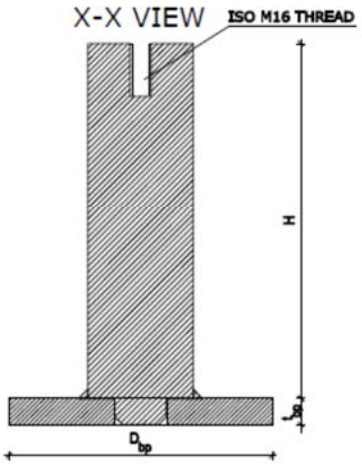
All the combinations of D_{bp}, t_{bp} and H are possible

Dimensions in mm

PILLAR Connector	Annex 2
Product details: Steel cylinder and circular bottom plate for PILLAR Connector 80	of European Technical Assessment ETA-19/0700 of 17.01.2020

PILLAR CORE 80 RECTANGULAR





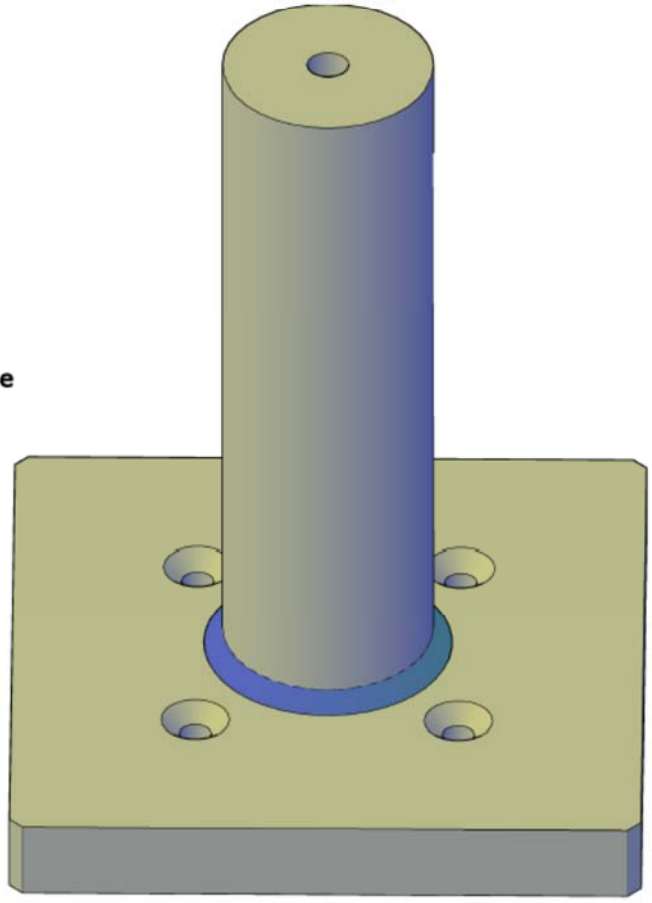
VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	200
	240
	280
t_{bp}	20
	30
	40

The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

$H=t_{CLT}$ + 70mm

All the combinations of D_{bp}, t_{bp} and H are possible

3D VIEW

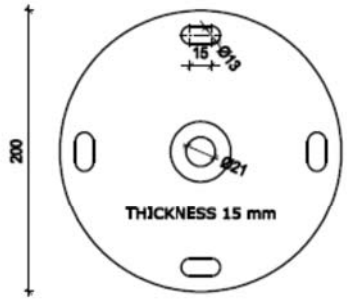


Dimensions in mm

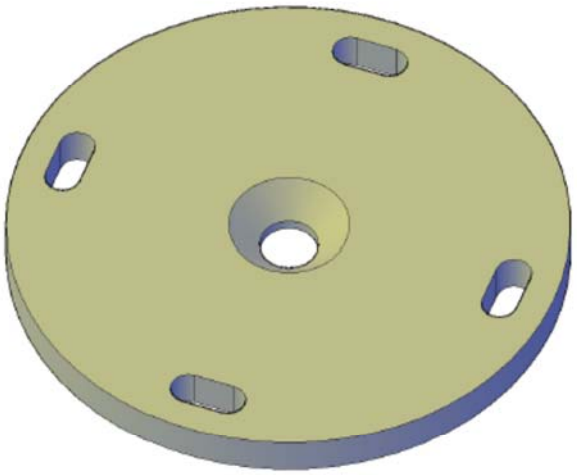
PILLAR Connector	Annex 2
Product details: Steel cylinder and rectangular bottom plate for PILLAR Connector 80	of European Technical Assessment ETA-19/0700 of 17.01.2020

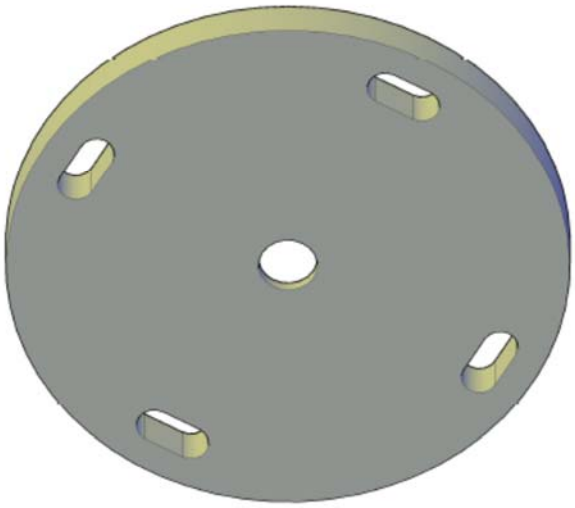
PILLAR DISK 100120

TOP VIEW



3D VIEW



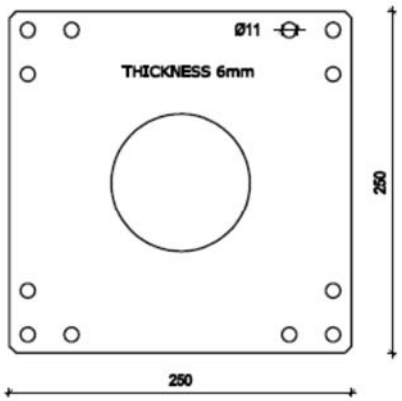


Dimensions in mm

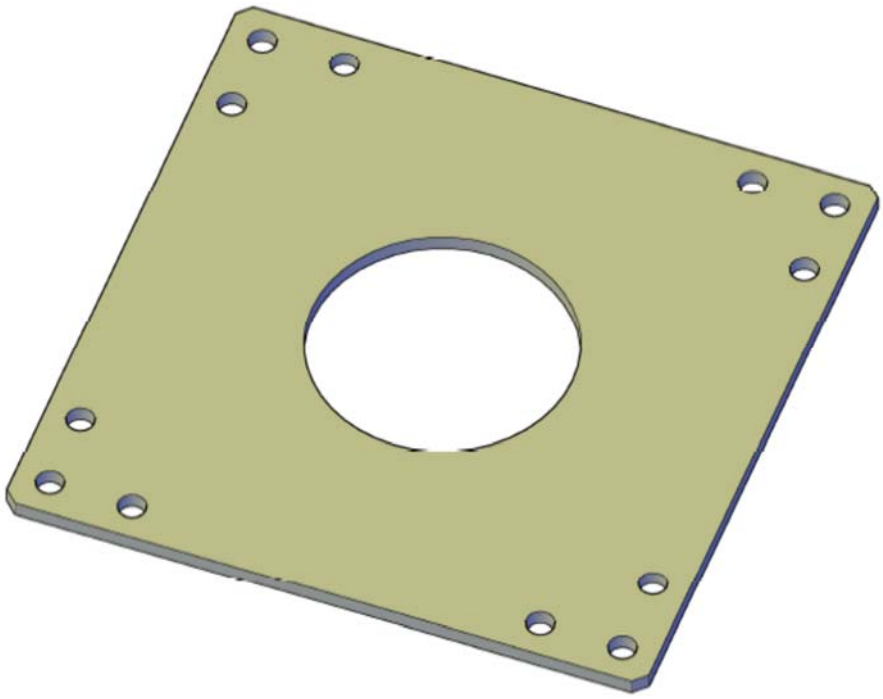
PILLAR Connector	Annex 2
Product details: Coupling disk for PILLAR Connector 100-120	of European Technical Assessment ETA-19/0700 of 17.01.2020

FIXING PLATE 100

TOP VIEW



3D VIEW

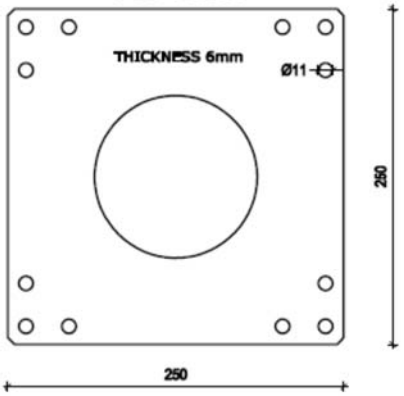


Dimensions in mm

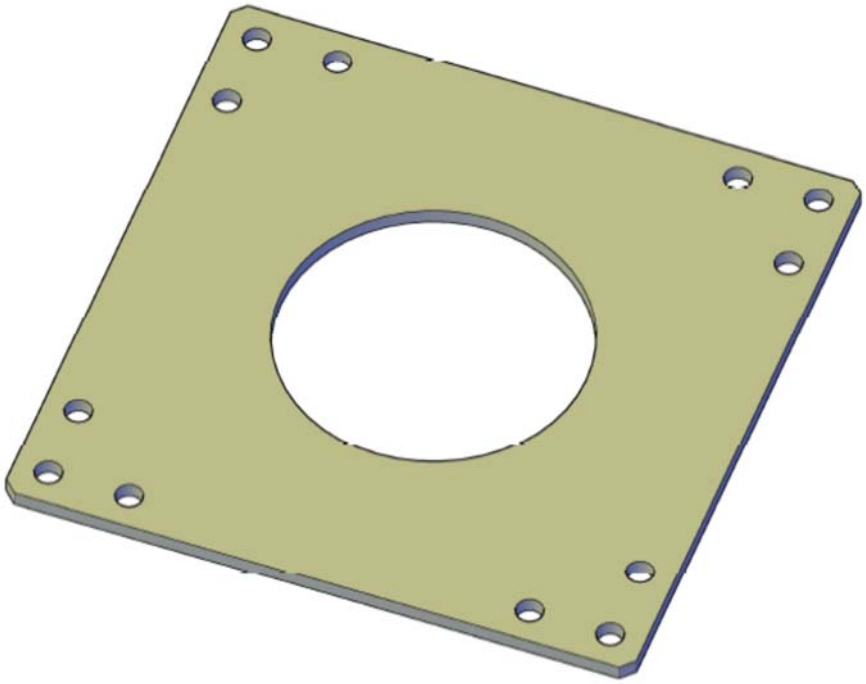
PILLAR Connector	Annex 2
Product details: Fixing plate for PILLAR Connector 100	of European Technical Assessment ETA-19/0700 of 17.01.2020

FIXING PLATE 120

TOP VIEW



3D VIEW

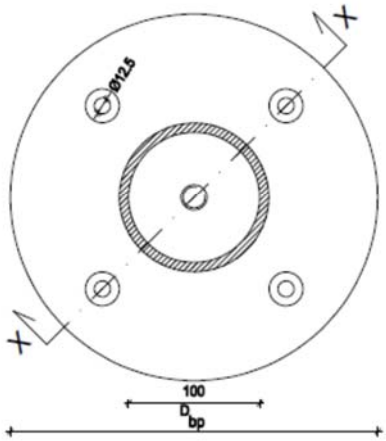


Dimensions in mm

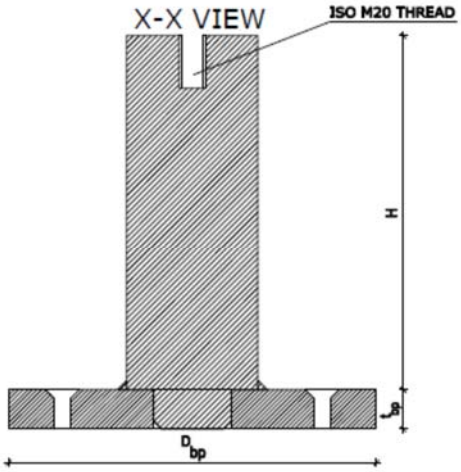
PILLAR Connector	Annex 2
Product details: Fixing plate for PILLAR Connector 120	of European Technical Assessment ETA-19/0700 of 17.01.2020

PILLAR CORE 100 CIRCULAR

TOP VIEW



X-X VIEW



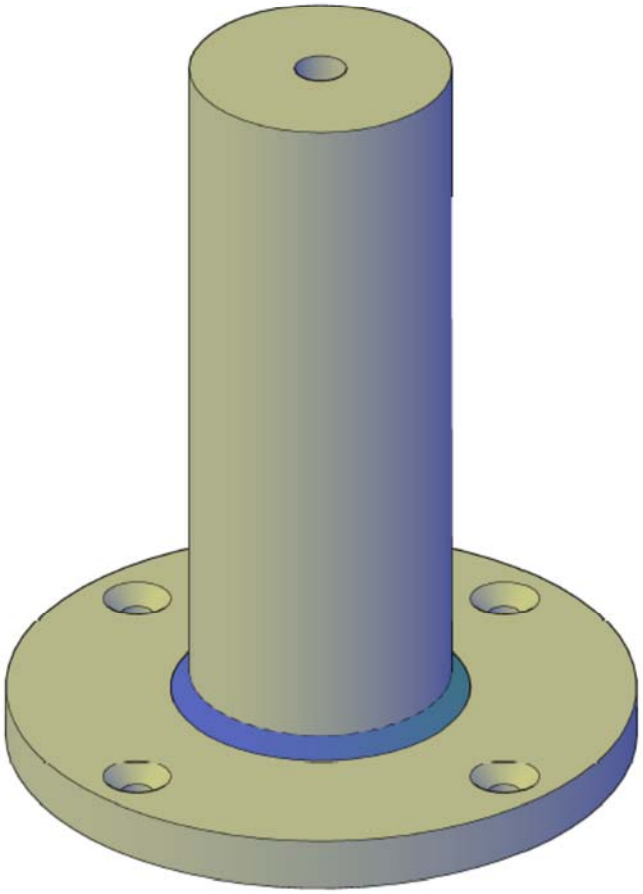
VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	240
	280
t_{bp}	20
	30
	40

The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

$H=t_{CLT}$ + 70mm

All the combinations of D_{bp}, t_{bp} and H are possible

3D VIEW

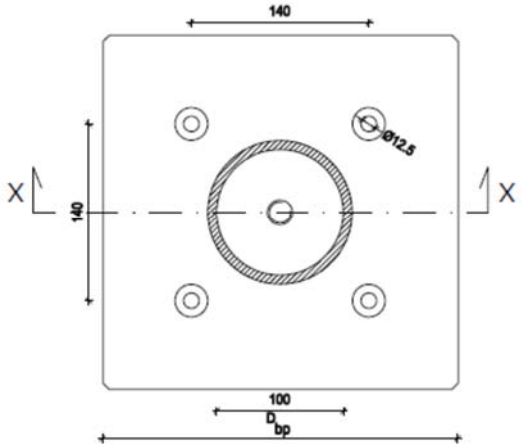


Dimensions in mm

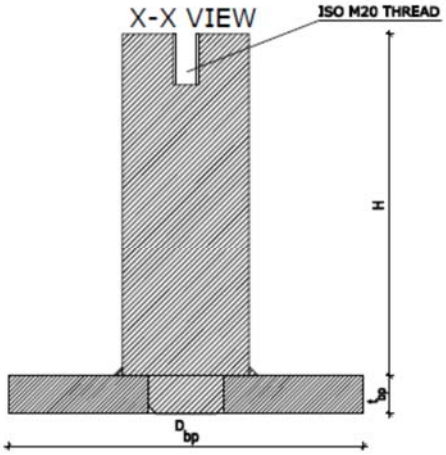
PILLAR Connector	Annex 2
Product details: Steel cylinder and circular bottom plate for PILLAR Connector 100	of European Technical Assessment ETA-19/0700 of 17.01.2020

PILLAR CORE 100 RECTANGULAR

TOP VIEW



X-X VIEW



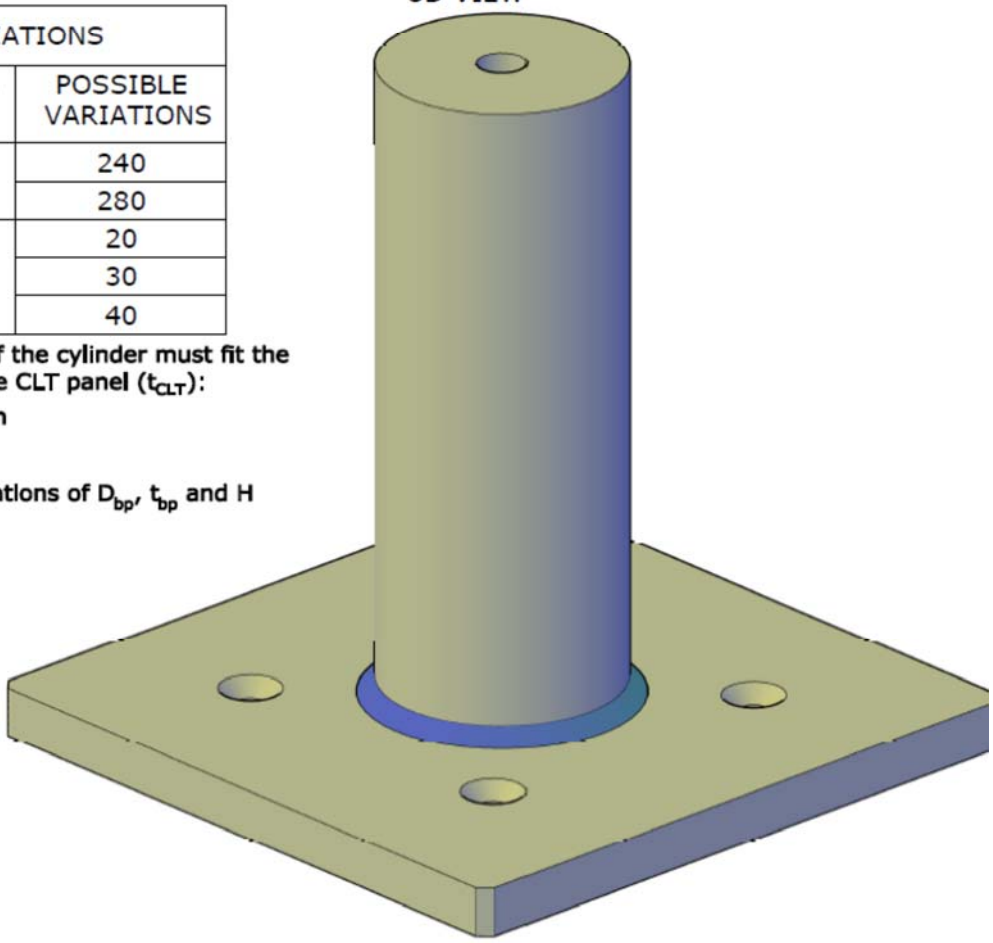
VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	240
	280
t_{bp}	20
	30
	40

The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

$H=t_{CLT}$ + 70mm

All the combinations of D_{bp}, t_{bp} and H are possible

3D VIEW

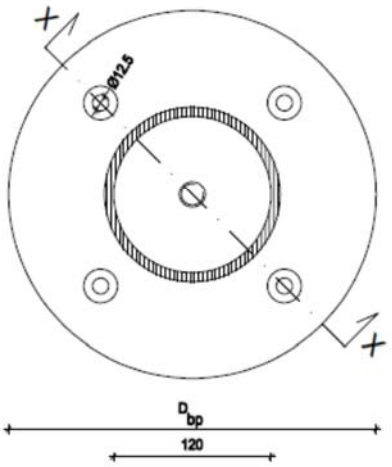


Dimensions in mm

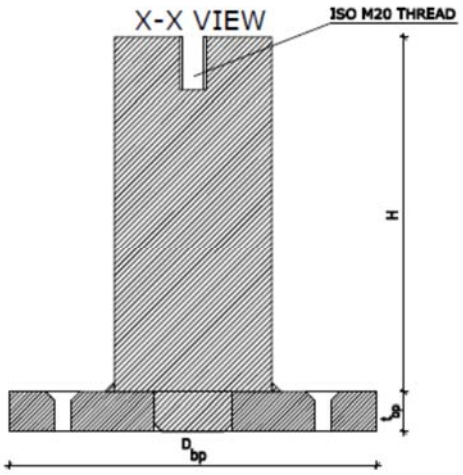
PILLAR Connector	Annex 2
Product details: Steel cylinder and rectangular bottom plate for PILLAR Connector 100	of European Technical Assessment ETA-19/0700 of 17.01.2020

PILLAR CORE 120 CIRCULAR

TOP VIEW



X-X VIEW



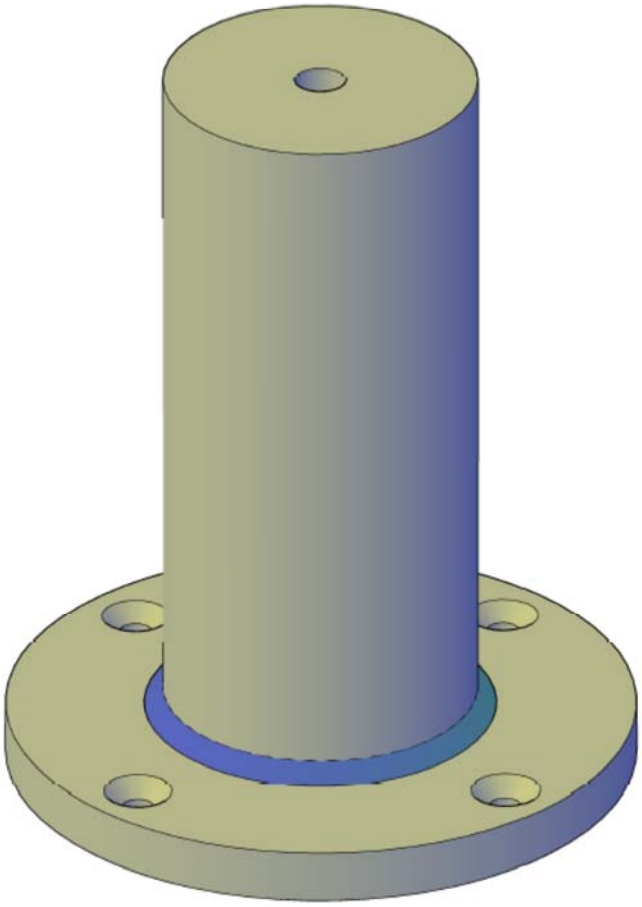
VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	240
	280
t_{bp}	20
	30
	40

The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

$H=t_{CLT}$ + 70mm

All the combinations of D_{bp}, t_{bp} and H are possible

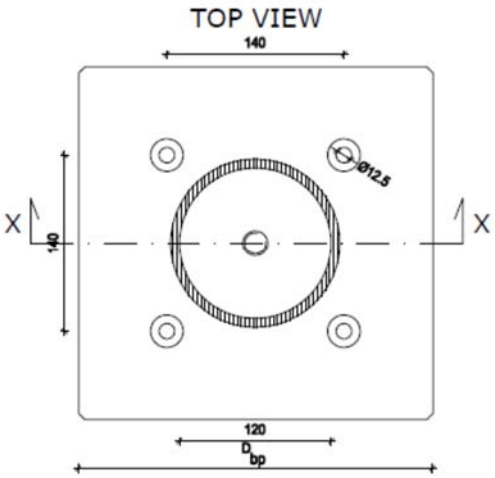
3D VIEW

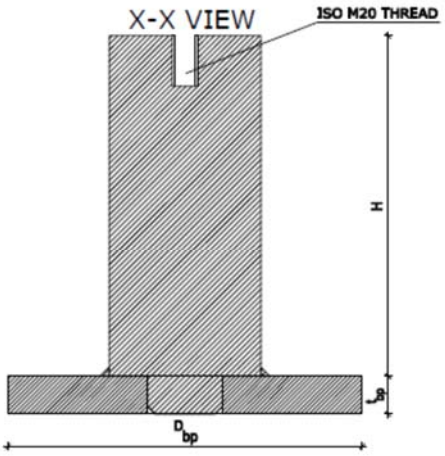


Dimensions in mm

PILLAR Connector	Annex 2
Product details: Steel cylinder and circular bottom plate for PILLAR Connector 120	of European Technical Assessment ETA-19/0700 of 17.01.2020

PILLAR CORE 120 RECTANGULAR





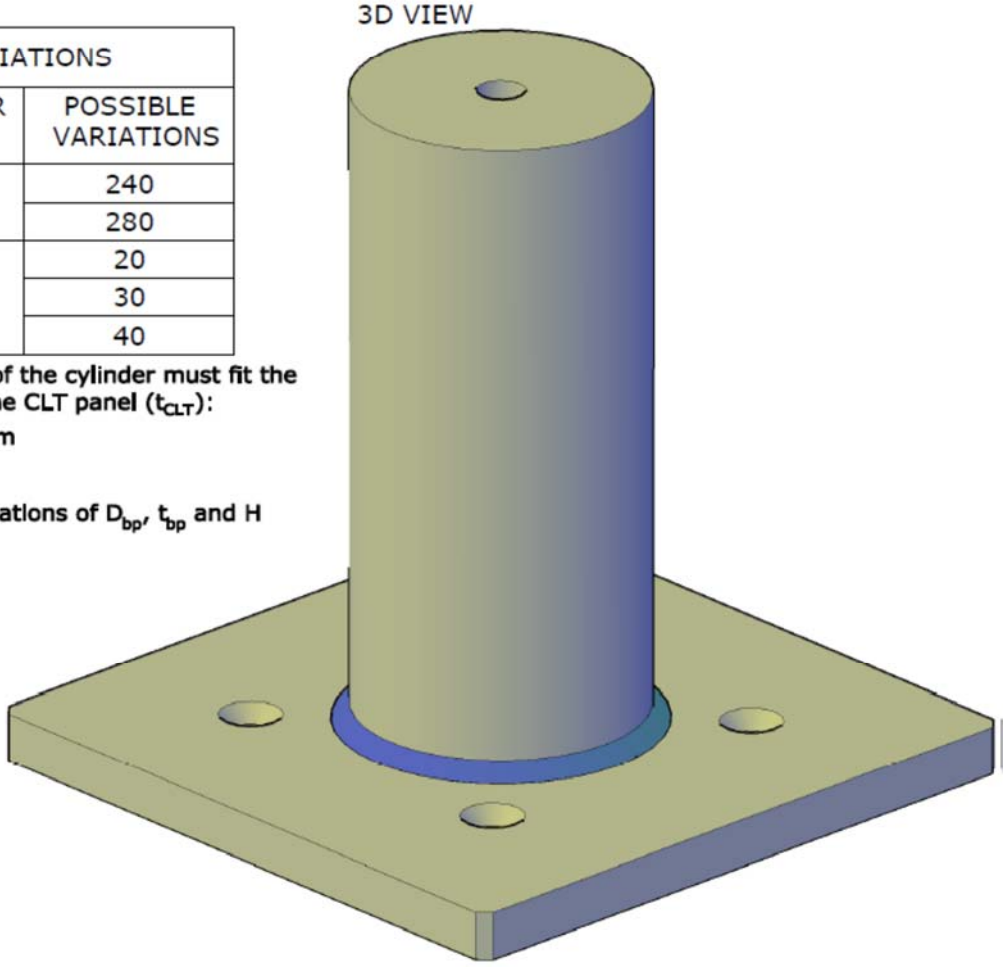
VARIATIONS	
PARAMETER	POSSIBLE VARIATIONS
D_{bp}	240
	280
t_{bp}	20
	30
	40

The height H of the cylinder must fit the thickness of the CLT panel (t_{CLT}):

$H=t_{CLT}$ + 70mm

All the combinations of D_{bp}, t_{bp} and H are possible

3D VIEW

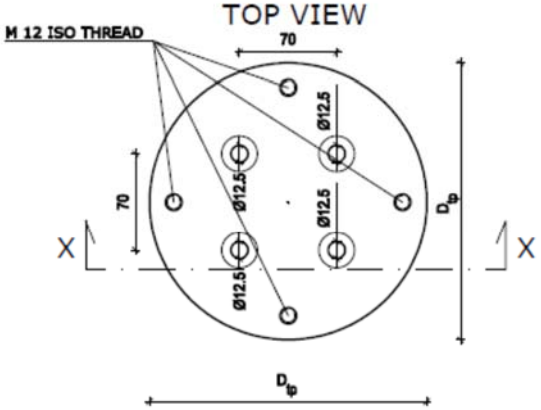


Dimensions in mm

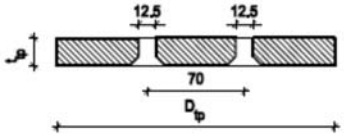
PILLAR Connector	Annex 2
Product details: Steel cylinder and rectangular bottom plate for PILLAR Connector 120	of European Technical Assessment ETA-19/0700 of 17.01.2020

PILLAR TOP PLATE CIRCULAR

TOP VIEW

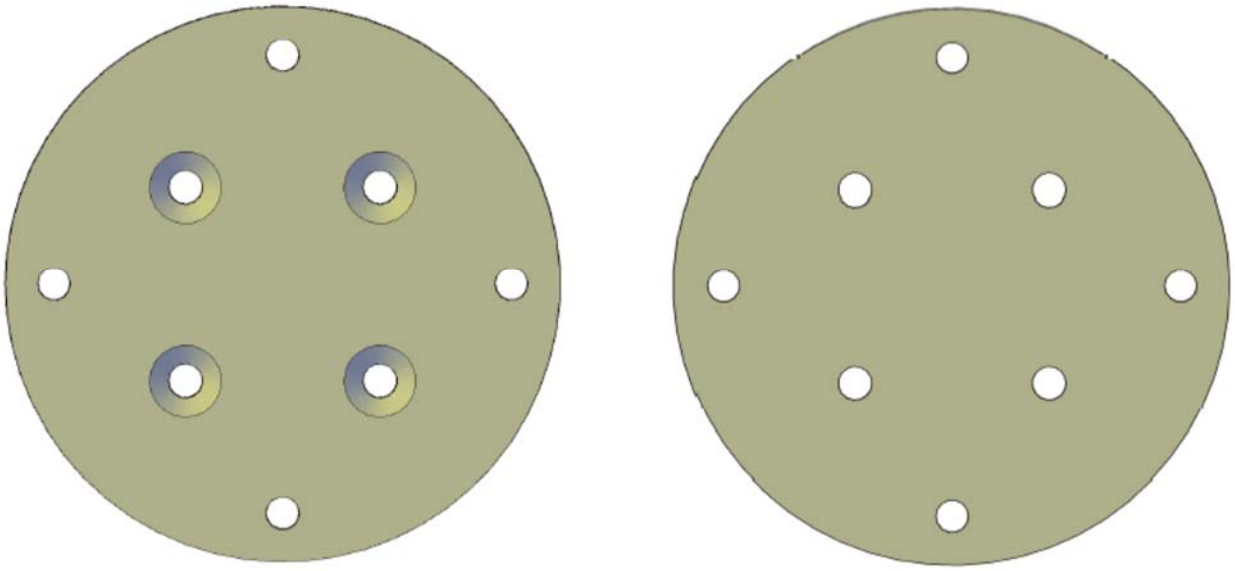


X-X VIEW



VARIATIONS		
CODE	WIDTH (Dtp)	THICKNESS (ttp)
PTP20020C	200	20
PTP24020C	240	20
PTP28020C	280	20
PTP20030C	200	30
PTP24030C	240	30
PTP28030C	280	30
PTP20040C	200	40
PTP24040C	240	40
PTP28040C	280	40

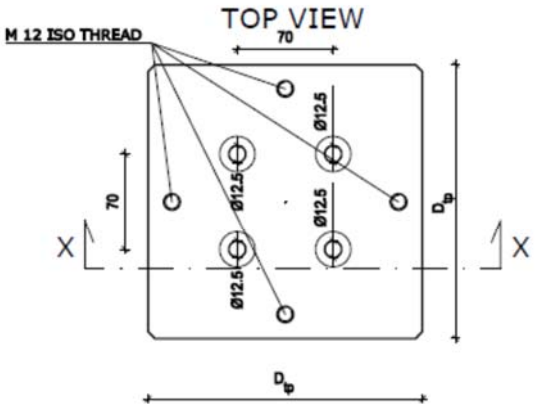
3D VIEW

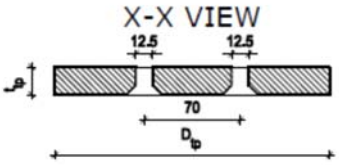


Dimensions in mm

PILLAR Connector	Annex 2
Product details: Circular top plate for PILLAR Connector 60-80-100-120	of European Technical Assessment ETA-19/0700 of 17.01.2020

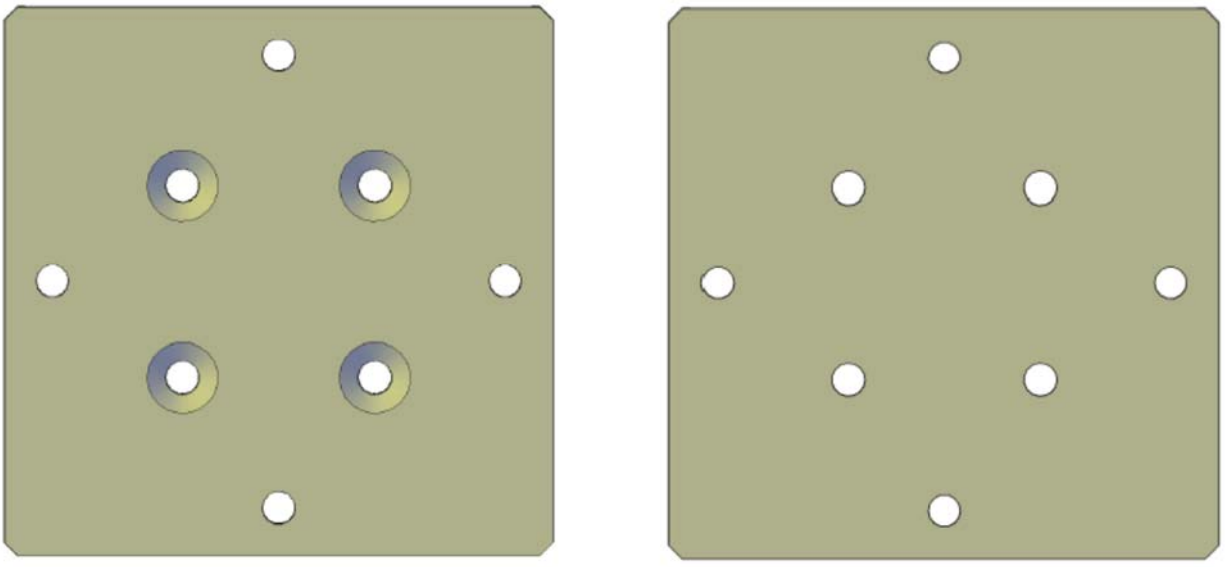
PILLAR TOP PLATE RECTANGULAR





VARIATIONS		
CODE	WIDTH (Dtp)	THICKNESS (ttp)
PTP20020R	200	20
PTP24020R	240	20
PTP28020R	280	20
PTP20030R	200	30
PTP24030R	240	30
PTP28030R	280	30
PTP20040R	200	40
PTP24040R	240	40
PTP28040R	280	40

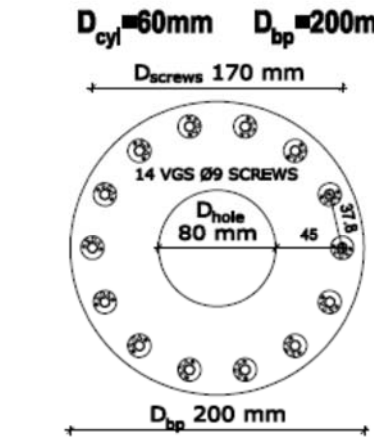
3D VIEW

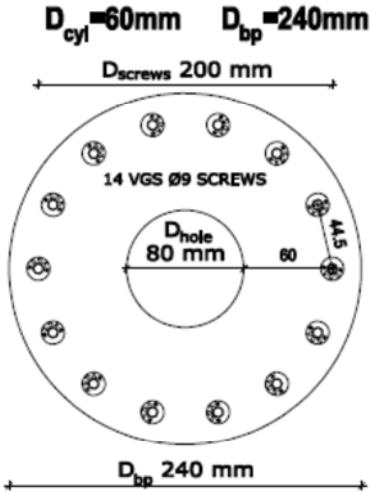


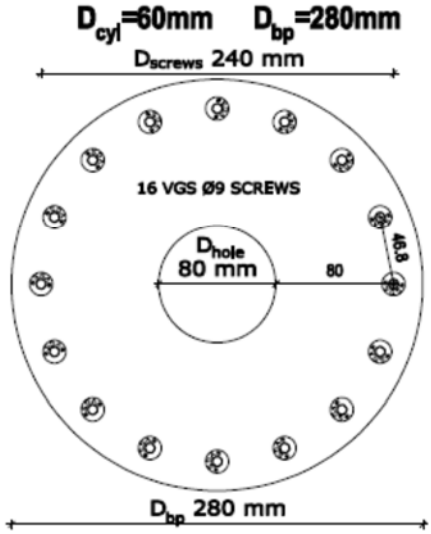
Dimensions in mm

PILLAR Connector	Annex 2
Product details: Rectangular top plate for PILLAR Connector 60-80-100-120	of European Technical Assessment ETA-19/0700 of 17.01.2020

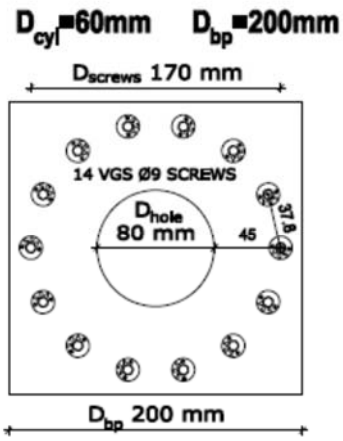
CIRCULAR BOTTOM PLATE

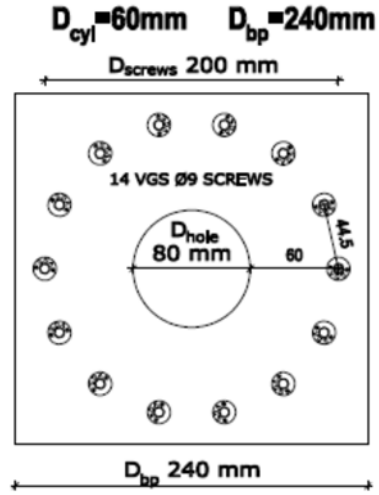


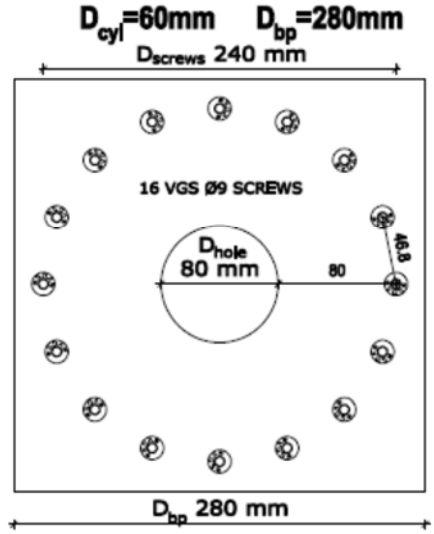




RECTANGULAR BOTTOM PLATE





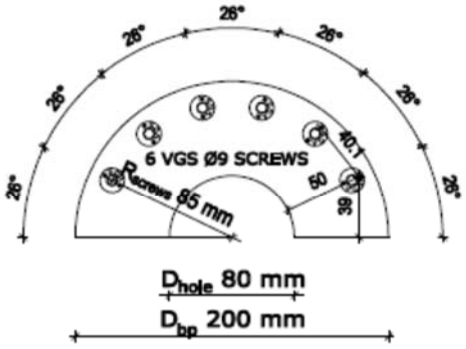


Dimensions in mm

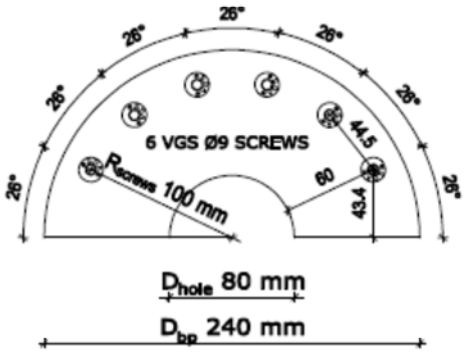
SPIDER and PILLAR Connector	Annex 2
Compressive reinforcement in central position D_{cyl} = 60 mm	of European Technical Assessment ETA-19/0700 of 17.01.2020

CIRCULAR BOTTOM PLATE

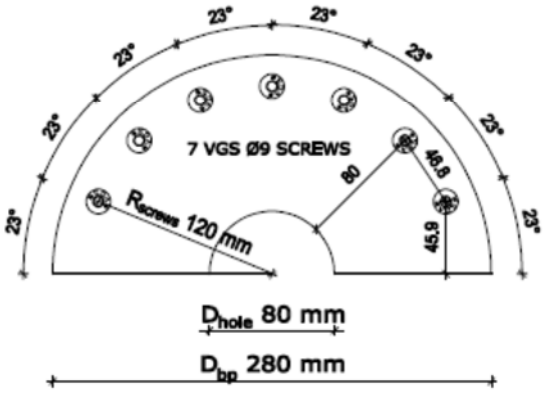
D_{cyl}=60mm D_{bp}=200mm



D_{cyl}=60mm D_{bp}=240mm

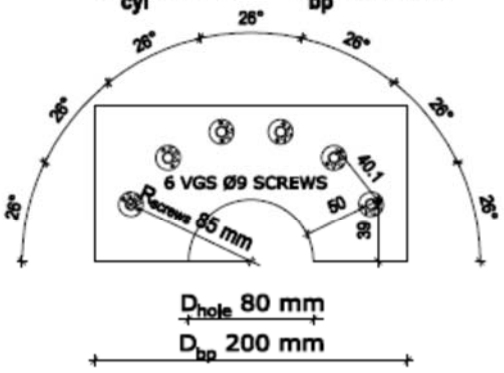


D_{cyl}=60mm D_{bp}=280mm

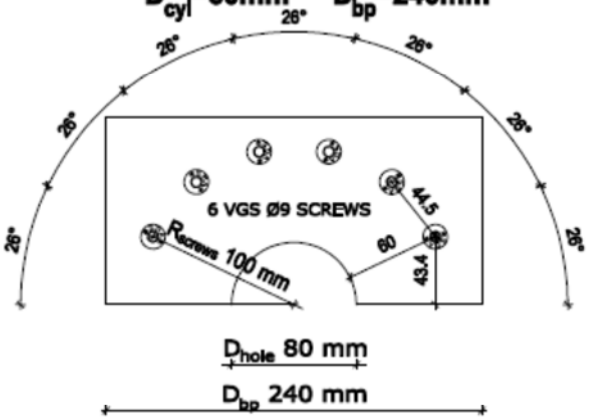


RECTANGULAR BOTTOM PLATE

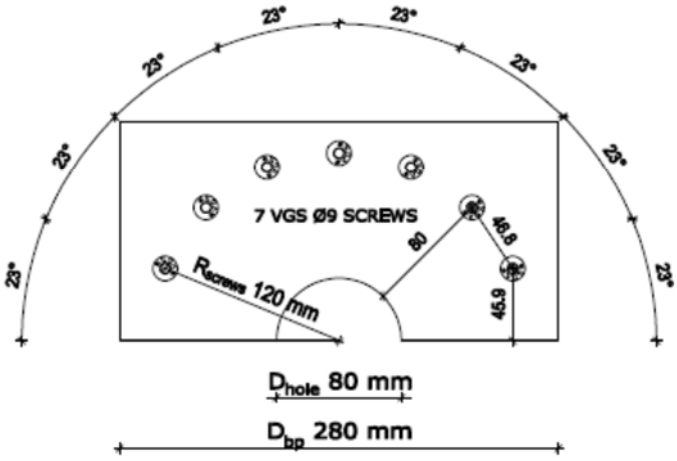
D_{cyl}=60mm D_{bp}=200mm



D_{cyl}=60mm D_{bp}=240mm



D_{cyl}=60mm D_{bp}=280mm

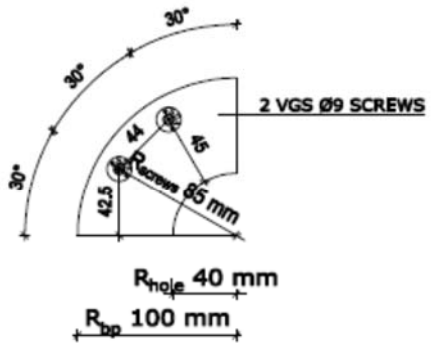


Dimensions in mm

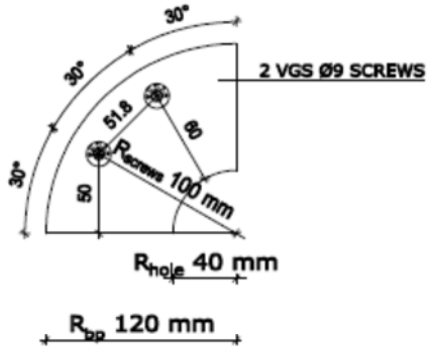
PILLAR Connector	Annex 2
Compressive reinforcement in edge position D_{cyl} = 60 mm	of European Technical Assessment ETA-19/0700 of 17.01.2020

CIRCULAR BOTTOM PLATE

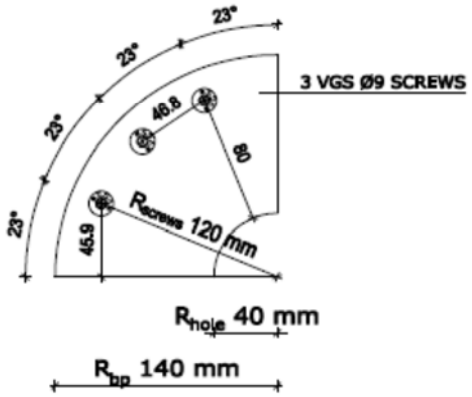
D_{cyl}=60mm D_{bp}=200mm



D_{cyl}=60mm D_{bp}=240mm

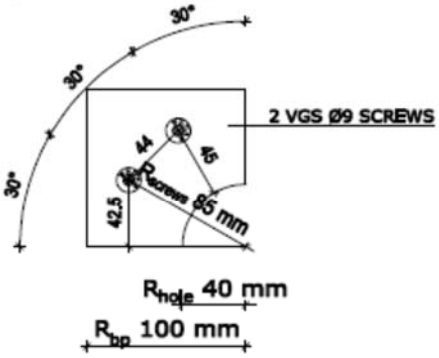


D_{cyl}=60mm D_{bp}=280mm

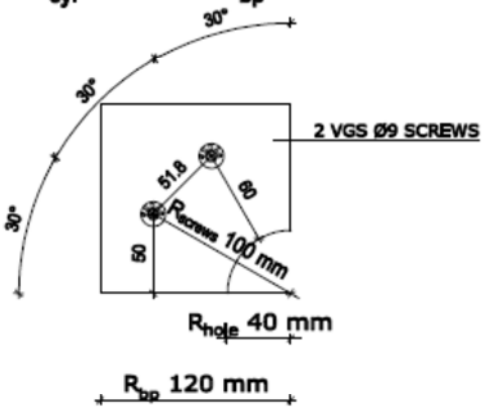


RECTANGULAR BOTTOM PLATE

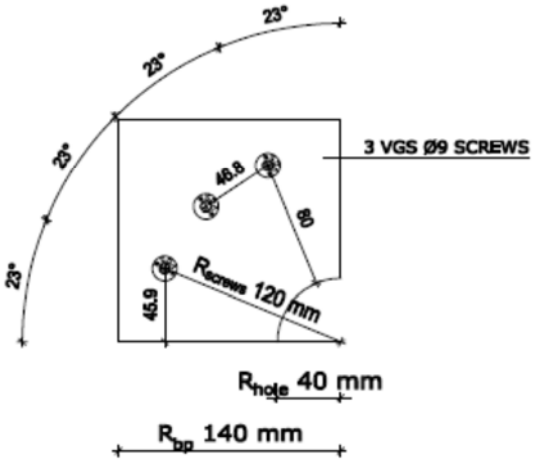
D_{cyl}=60mm D_{bp}=200mm



D_{cyl}=60mm D_{bp}=240mm



D_{cyl}=60mm D_{bp}=280mm

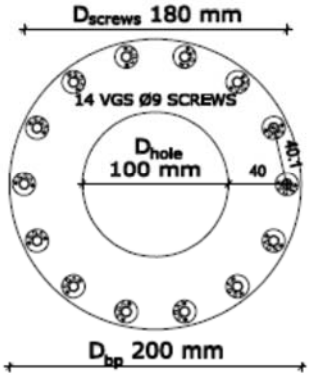


Dimensions in mm

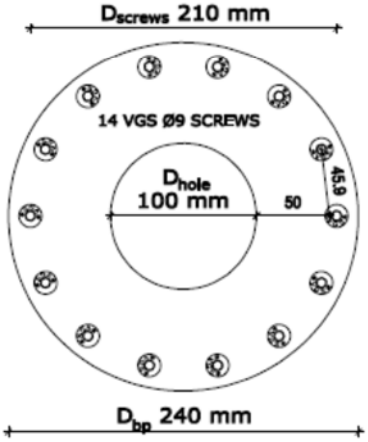
PILLAR Connector	Annex 2
Compressive reinforcement in corner position D_{cyl} = 60 mm	of European Technical Assessment ETA-19/0700 of 17.01.2020

CIRCULAR BOTTOM PLATE

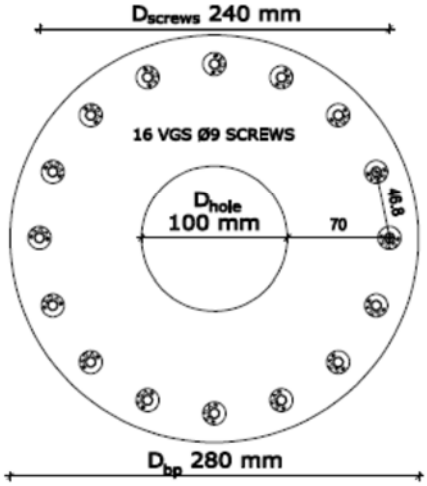
D_{cyl}=80mm D_{bp}=200mm



D_{cyl}=80mm D_{bp}=240mm

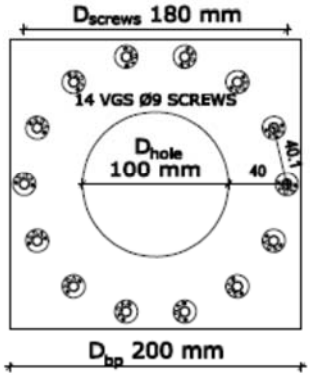


D_{cyl}=80mm D_{bp}=280mm

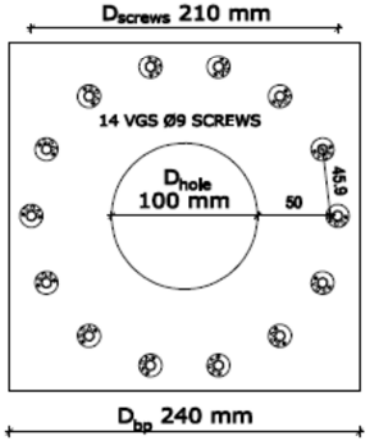


RECTANGULAR BOTTOM PLATE

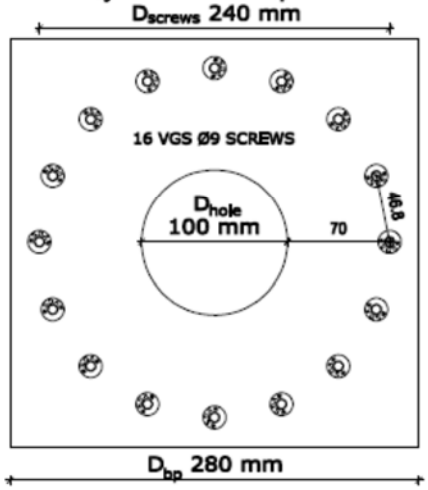
D_{cyl}=80mm D_{bp}=200mm



D_{cyl}=80mm D_{bp}=240mm



D_{cyl}=80mm D_{bp}=280mm

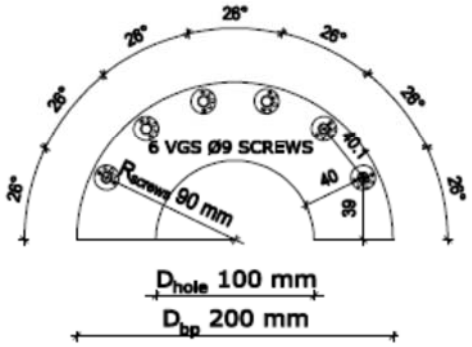


Dimensions in mm

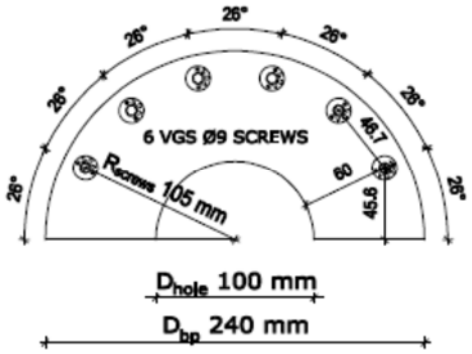
SPIDER and PILLAR Connector	Annex 2
Compressive reinforcement in central position D_{cyl} = 80 mm	of European Technical Assessment ETA-19/0700 of 17.01.2020

CIRCULAR BOTTOM PLATE

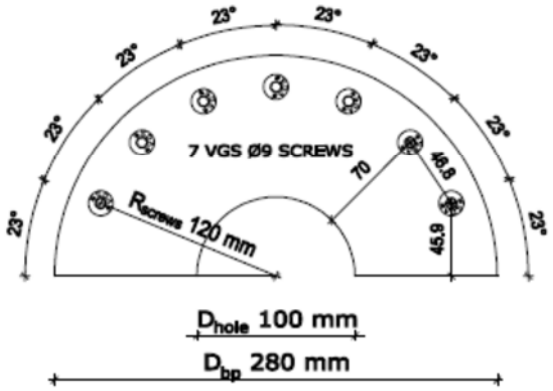
D_{cyl}=80mm D_{bp}=200mm



D_{cyl}=80mm D_{bp}=240mm

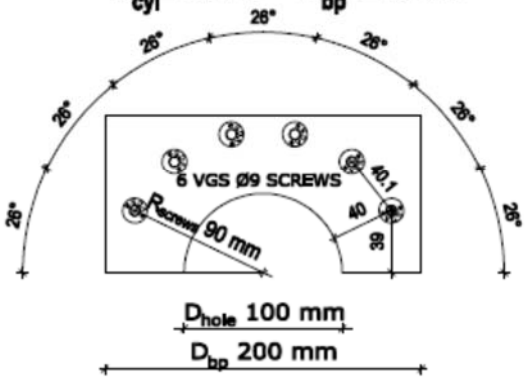


D_{cyl}=80mm D_{bp}=280mm

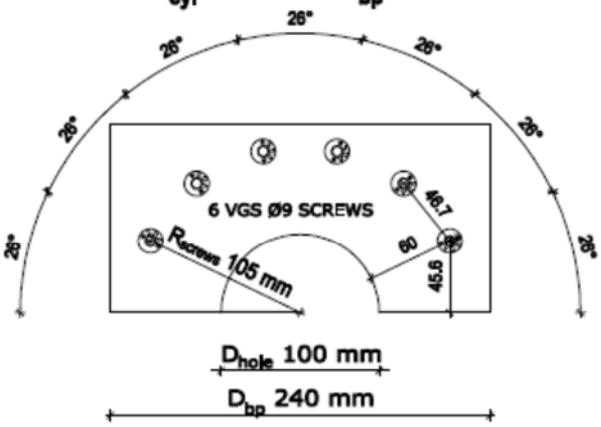


RECTANGULAR BOTTOM PLATE

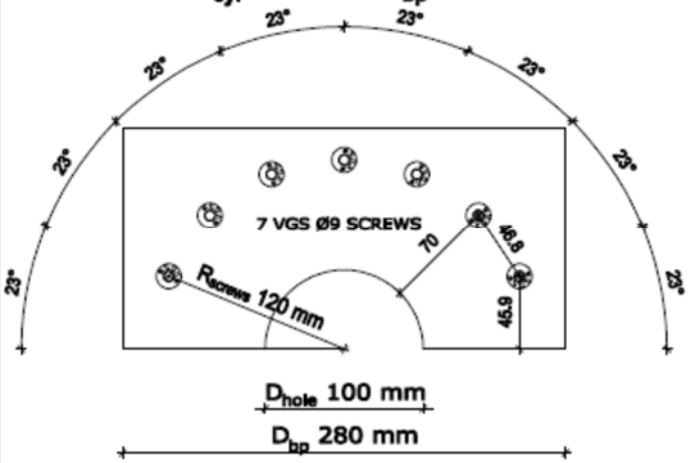
D_{cyl}=80mm D_{bp}=200mm



D_{cyl}=80mm D_{bp}=240mm



D_{cyl}=80mm D_{bp}=280mm

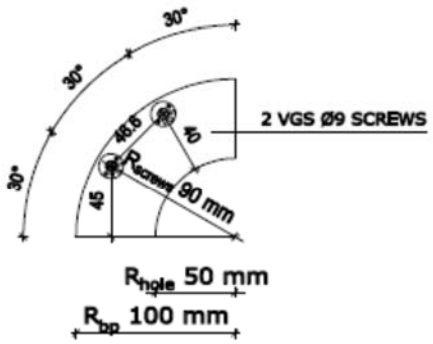


Dimensions in mm

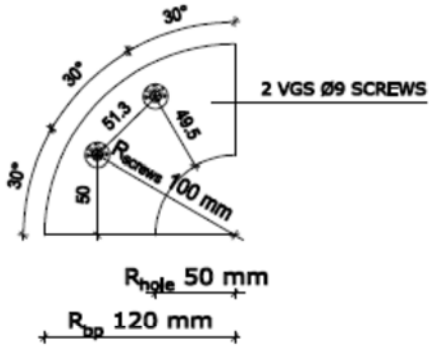
PILLAR Connector	Annex 2
Compressive reinforcement in edge position D_{cyl} = 80 mm	of European Technical Assessment ETA-19/0700 of 17.01.2020

CIRCULAR BOTTOM PLATE

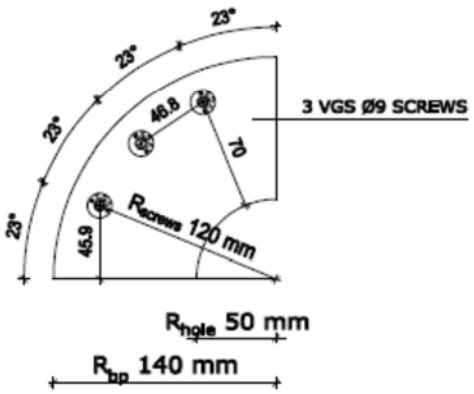
D_{cyl}=80mm D_{bp}=200mm



D_{cyl}=80mm D_{bp}=240mm

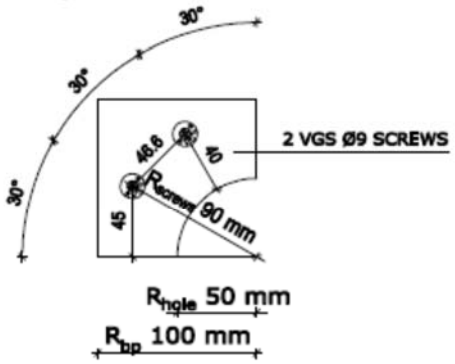


D_{cyl}=80mm D_{bp}=280mm

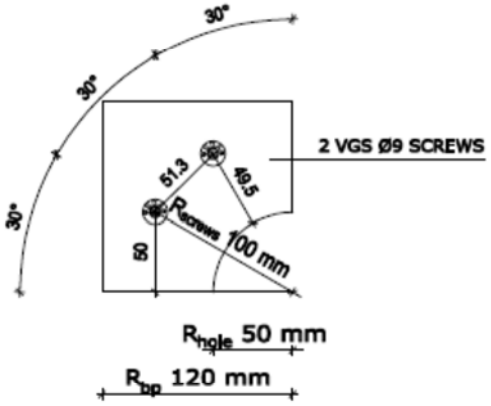


RECTANGULAR BOTTOM PLATE

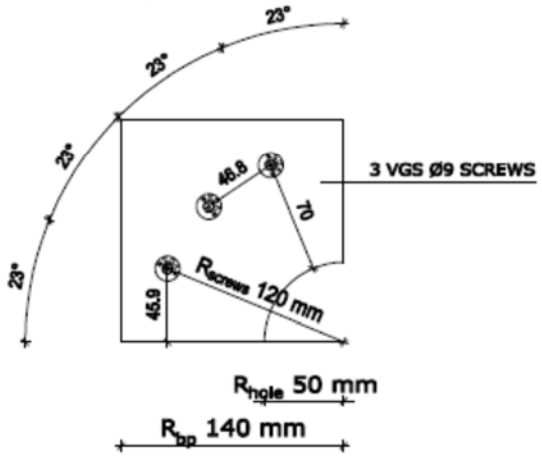
D_{cyl}=80mm D_{bp}=200mm



D_{cyl}=80mm D_{bp}=240mm



D_{cyl}=80mm D_{bp}=280mm

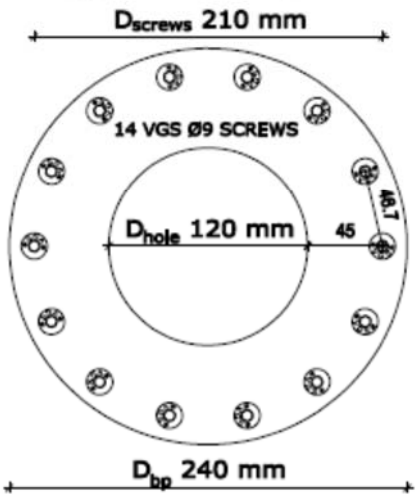


Dimensions in mm

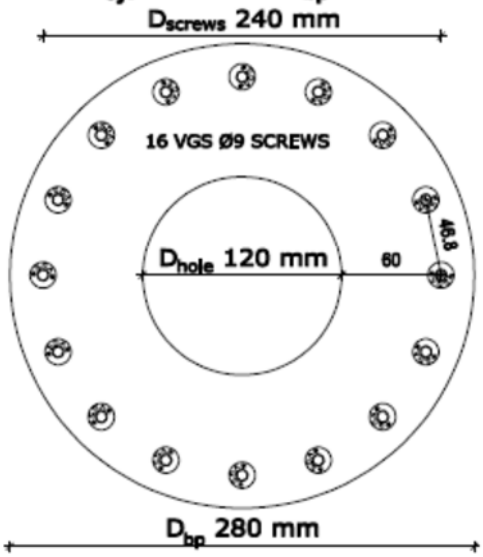
PILLAR Connector	Annex 2
Compressive reinforcement in corner position D_{cyl} = 80 mm	of European Technical Assessment ETA-19/0700 of 17.01.2020

CIRCULAR BOTTOM PLATE

D_{cyl}=100mm D_{bp}=240mm

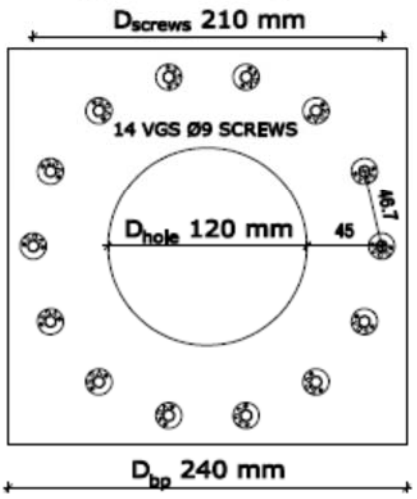


D_{cyl}=100mm D_{bp}=280mm

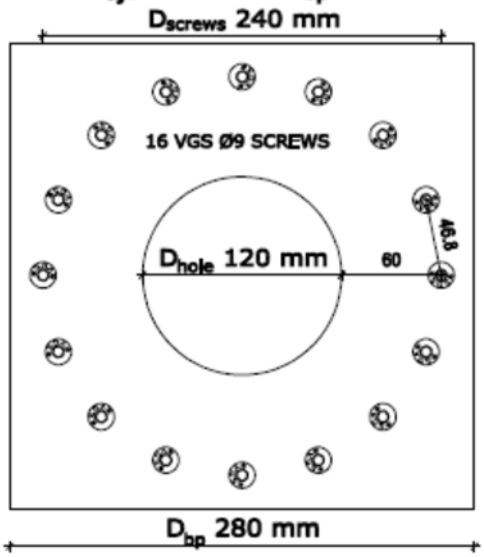


RECTANGULAR BOTTOM PLATE

D_{cyl}=100mm D_{bp}=240mm



D_{cyl}=100mm D_{bp}=280mm

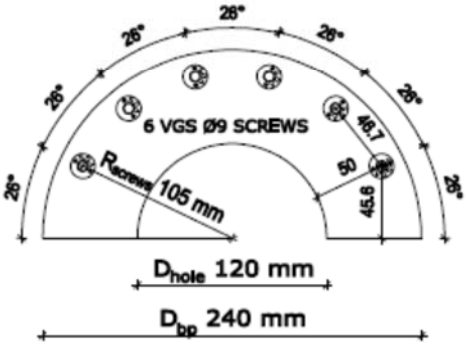


Dimensions in mm

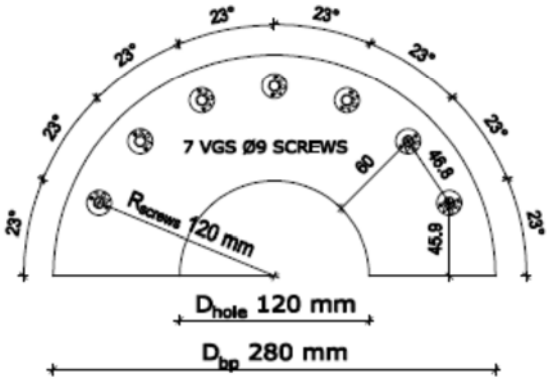
SPIDER and PILLAR Connector	Annex 2
Compressive reinforcement in central position D_{cyl} = 100 mm	of European Technical Assessment ETA-19/0700 of 17.01.2020

CIRCULAR BOTTOM PLATE

D_{cyl}=100mm D_{bp}=240mm

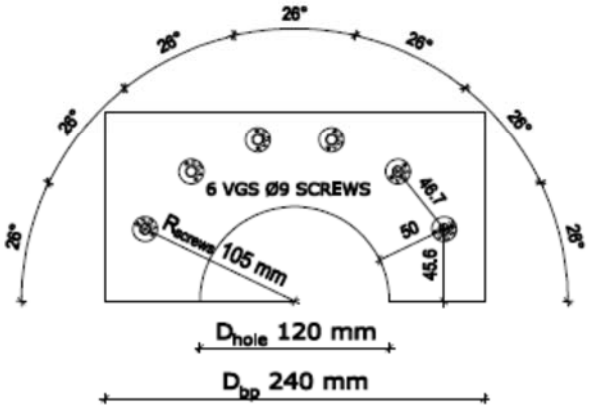


D_{cyl}=100mm D_{bp}=280mm

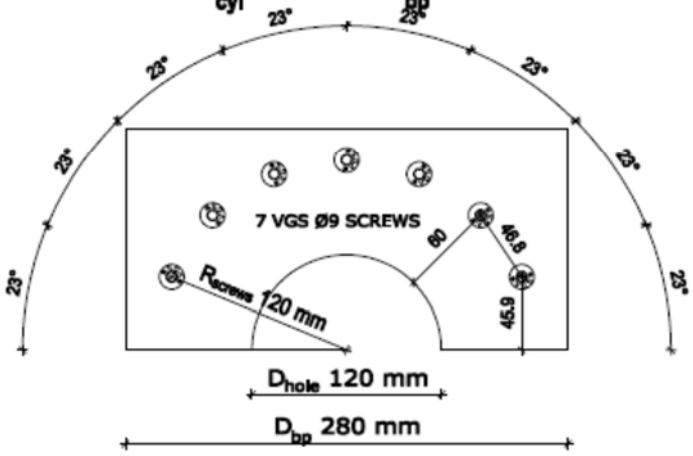


RECTANGULAR BOTTOM PLATE

D_{cyl}=100mm D_{bp}=240mm



D_{cyl}=100mm D_{bp}=280mm

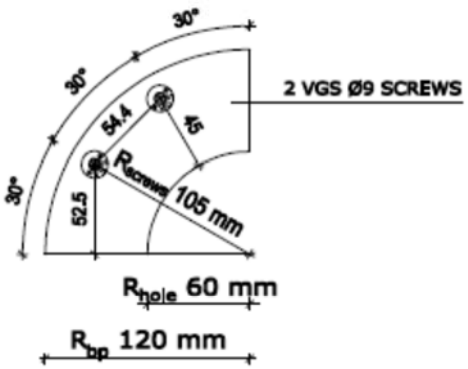


Dimensions in mm

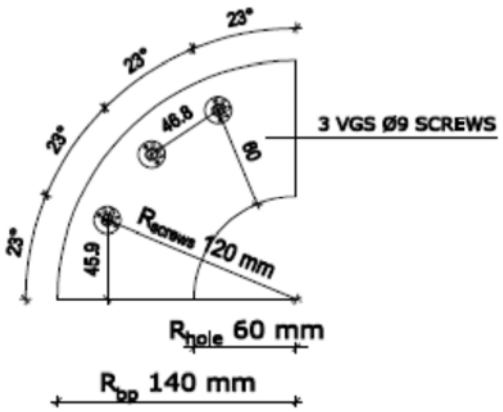
PILLAR Connector	Annex 2
Compressive reinforcement in edge position D_{cyl} = 100 mm	of European Technical Assessment ETA-19/0700 of 17.01.2020

CIRCULAR BOTTOM PLATE

D_{cyl}=100mm D_{bp}=240mm

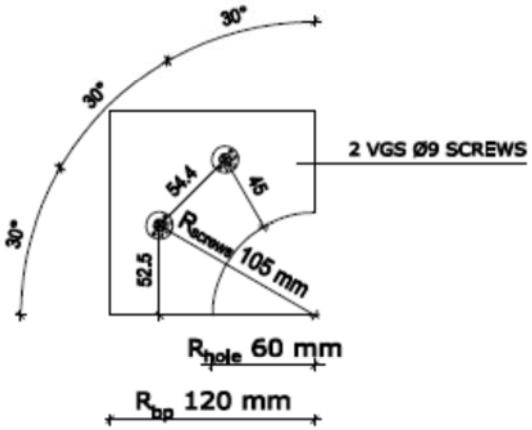


D_{cyl}=100mm D_{bp}=280mm

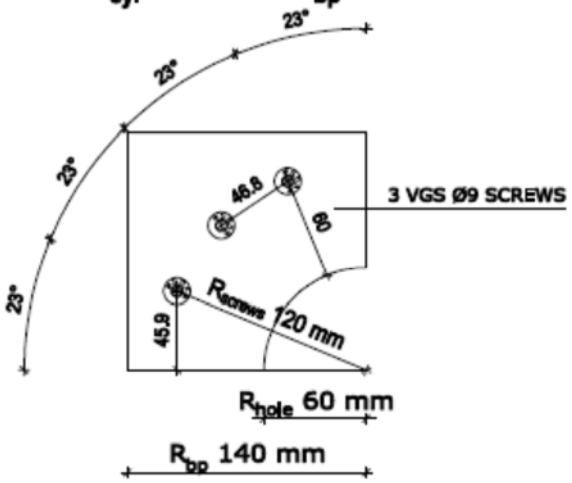


RECTANGULAR BOTTOM PLATE

D_{cyl}=100mm D_{bp}=240mm



D_{cyl}=100mm D_{bp}=280mm

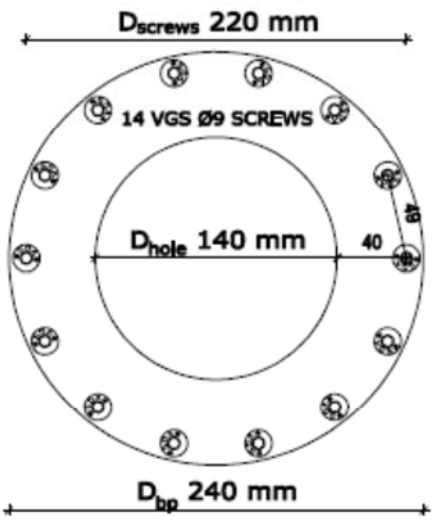


Dimensions in mm

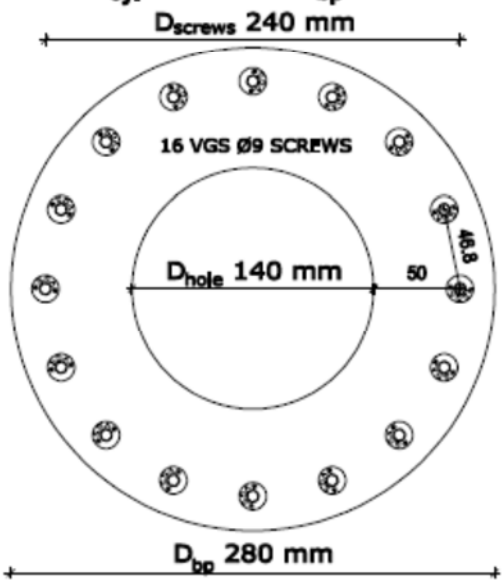
PILLAR Connector	Annex 2
Compressive reinforcement in corner position D_{cyl} = 100 mm	of European Technical Assessment ETA-19/0700 of 17.01.2020

CIRCULAR BOTTOM PLATE

D_{cyl}=120mm D_{bp}=240mm

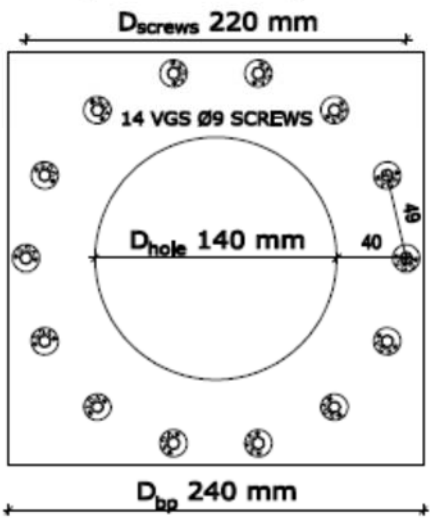


D_{cyl}=120mm D_{bp}=280mm

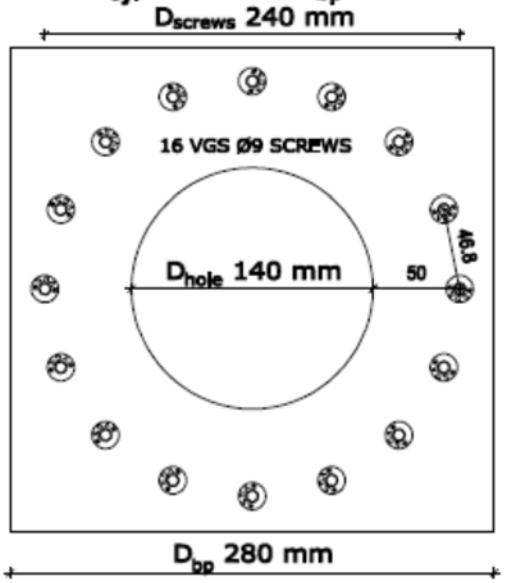


RECTANGULAR BOTTOM PLATE

D_{cyl}=120mm D_{bp}=240mm



D_{cyl}=120mm D_{bp}=280mm

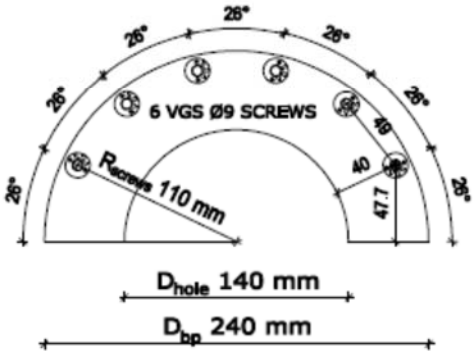


Dimensions in mm

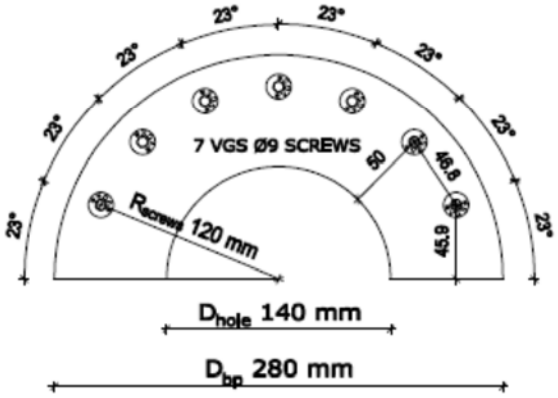
SPIDER and PILLAR Connector	Annex 2
Compressive reinforcement in central position D_{cyl} = 120 mm	of European Technical Assessment ETA-19/0700 of 17.01.2020

CIRCULAR BOTTOM PLATE

D_{cyl}=120mm D_{bp}=240mm

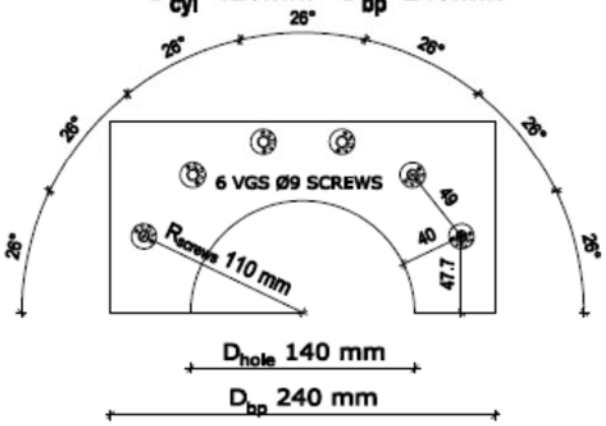


D_{cyl}=120mm D_{bp}=280mm

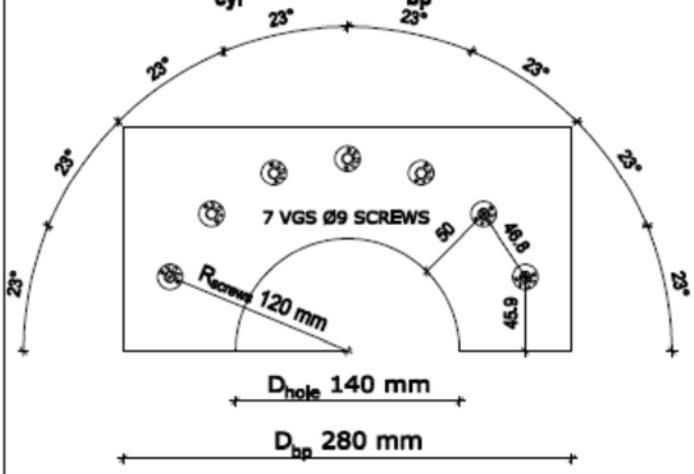


RECTANGULAR BOTTOM PLATE

D_{cyl}=120mm D_{bp}=240mm



D_{cyl}=120mm D_{bp}=280mm

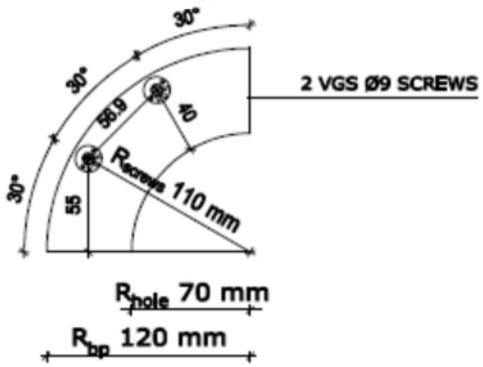


Dimensions in mm

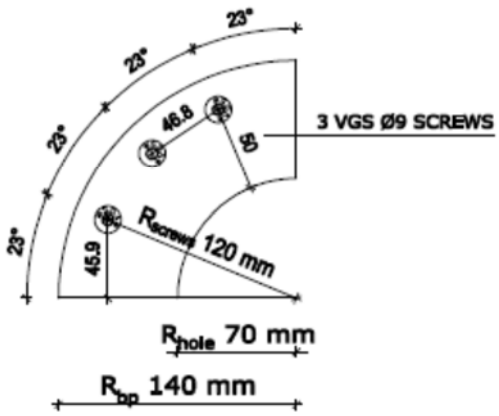
PILLAR Connector	Annex 2
Compressive reinforcement in edge position D_{cyl} = 120 mm	of European Technical Assessment ETA-19/0700 of 17.01.2020

CIRCULAR BOTTOM PLATE

D_{cyl}=120mm D_{bp}=240mm

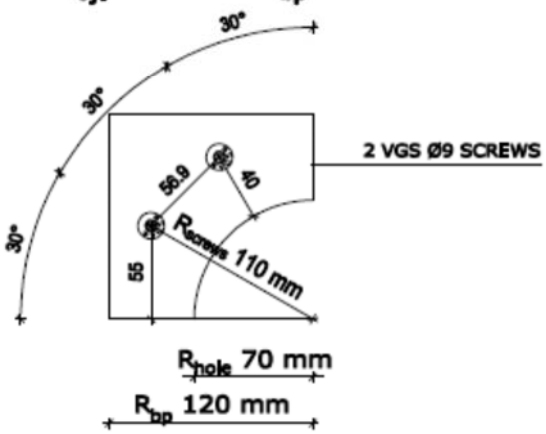


D_{cyl}=120mm D_{bp}=280mm

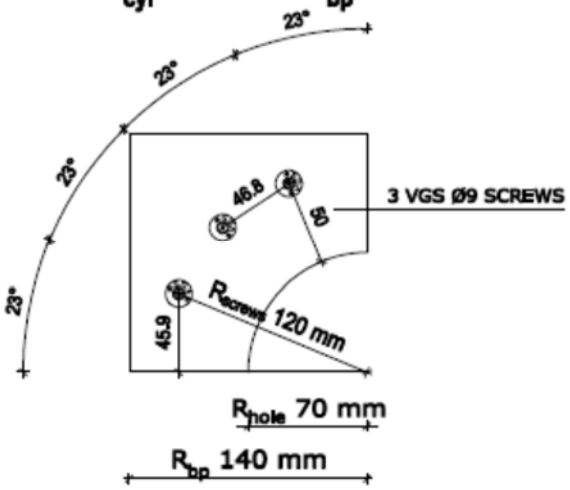


RECTANGULAR BOTTOM PLATE

D_{cyl}=120mm D_{bp}=240mm



D_{cyl}=120mm D_{bp}=280mm



Dimensions in mm

PILLAR Connector	Annex 2
Compressive reinforcement in corner position D_{cyl} = 120 mm	of European Technical Assessment ETA-19/0700 of 17.01.2020

Figure A3.1: Forces and loads on the SPIDER Connector

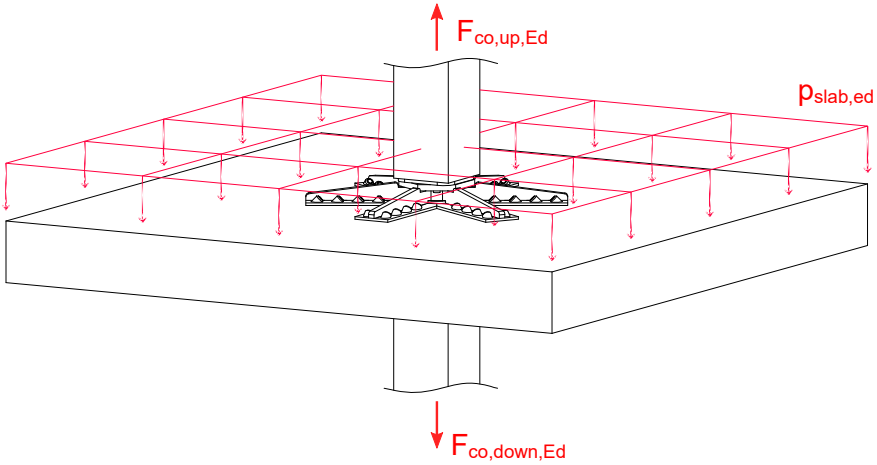


Table A3.1: Description of forces $F_{1,Ed}$ to $F_{6,Ed}$

Force	Description	Calculation and tolerances
$F_{1,Ed}$	Between top plate and top of the countersunk screw	Elasto-plastic calculation for all tolerance conditions
$F_{2,Ed}$	Between top plate and coupling disk	Elasto-plastic calculation for all tolerance conditions
$F_{3,Ed}$	Between coupling disk and steel cylinder	$F_3 = F_2$ for $\Delta h = 0$ mm and $\Delta h = -2$ mm Elasto-plastic calculation for $\Delta h = +2$ mm
$F_{4,Ed}$	Between top plate and arm	$F_4 = 0$ for $\Delta h = 0$ mm and $\Delta h = -2$ mm Elasto-plastic calculation for $\Delta h = +2$ mm
$F_{5,Ed}$	Between coupling disk and arm	$F_5 = 0$ for $\Delta h = 0$ mm and $\Delta h = -2$ mm Elasto-plastic calculation for $\Delta h = +2$ mm
$F_{6,Ed}$	Between arm and coupling cone	$F_6 = 0$ for $\Delta h = 0$ mm and $\Delta h = -2$ mm $F_6 = F_4 + F_5$ for $\Delta h = +2$ mm

Spider Connector	Annex 3
Definition of forces and their directions	of European Technical Assessment ETA-19/0700 of 17.01.2020

Figure A3.2: Load case 1 – Forces from $p_{slab,ed}$ on the CLT

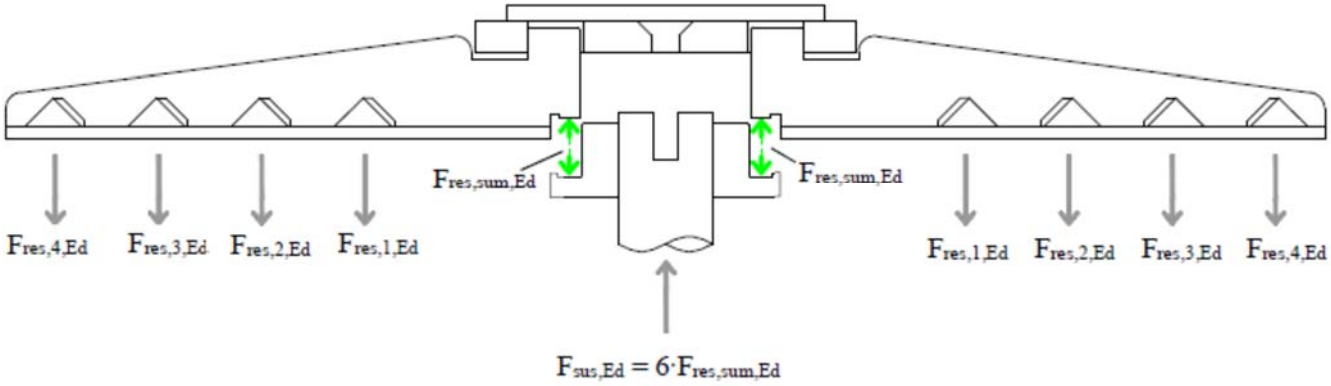
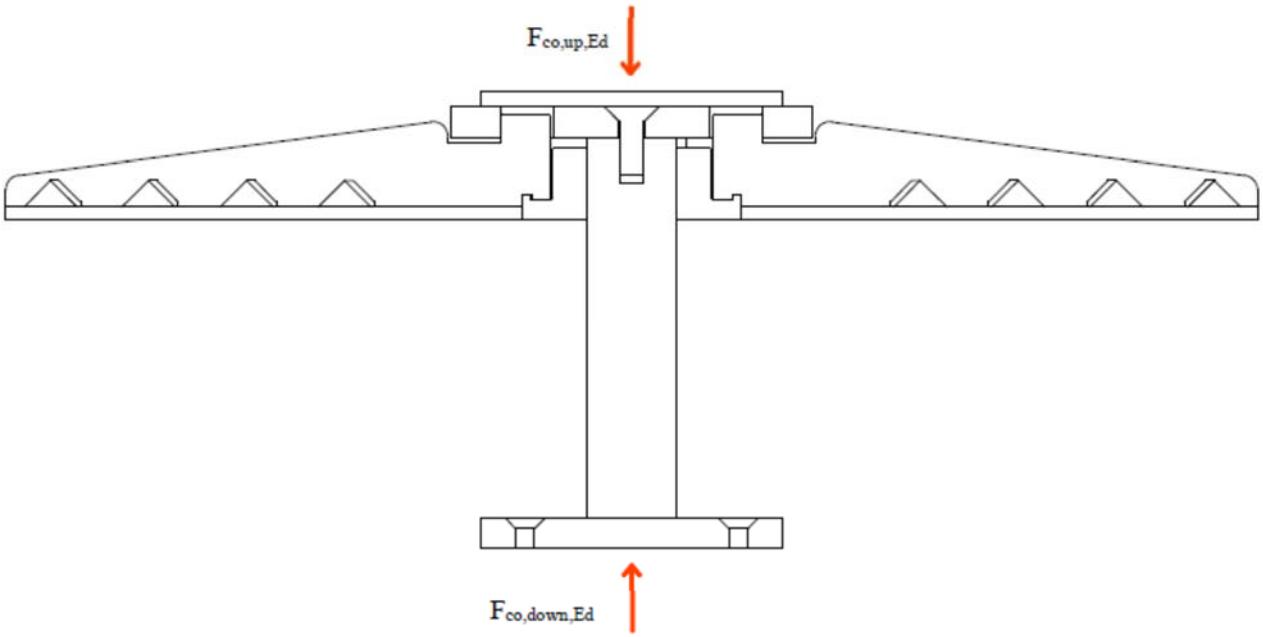
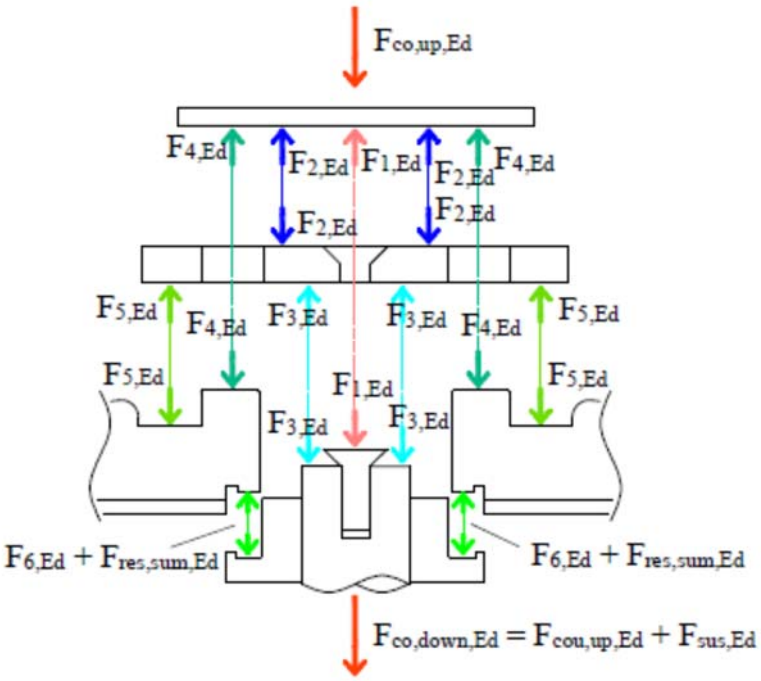


Figure A3.2: Load case 2 – Forces in the column



Spider Connector	Annex 3
Definition of forces and their directions	of European Technical Assessment ETA-19/0700 of 17.01.2020

Figure A3.2: Superposition of load case 1 and 2 – Forces in the center of the SPIDER Connector



Spider Connector	Annex 3
Definition of forces and their directions	of European Technical Assessment ETA-19/0700 of 17.01.2020

Table A4.1: Verification for the SPIDER Connector

№	Labelling	Load	Load-bearing capacity	Verification
1	SPIDER Connector on timber element	$F_{SPIDER,Ed} = F_{slab,Ed}$	$F_{SPIDER,Rd} = k_{mod} \frac{F_{SPIDER,Rk}}{\gamma_{MC}}$ $F_{SPIDER,Rk}$ see Table A4.5	$\frac{F_{SPIDER,Ed}}{F_{SPIDER,Rd}} \le 1,00$
2	Compression of the cylinder	$N_{Ed} = F_{co,up,Ed} + k_{sus} \cdot F_{slab,Ed}$	$N_{b,Rd} = \frac{N_{b,Rk}}{\gamma_{M0}}$ $N_{b,Rk}$ see Table A4.7	$\frac{N_{Ed}}{N_{b,Rd}} \le 1,00$
3	Load transmission	$F_{lt,Ed} = F_{co,up,Ed}$	$F_{lt,Rd} = \frac{F_{lt,Rk}}{\gamma_{M0}}$ $F_{lt,Rk}$ see Table A4.8	$\frac{F_{lt,Ed}}{F_{lt,Rd}} \le 1,00$
4	Bottom plate on timber element	$F_{bp,Ed} = F_{co,up,Ed} + k_{sus} \cdot F_{slab,Ed}$	$F_{bp,Rd} = k_{steel} \frac{f_{yk}}{\gamma_{M0}}$ in $[kN]$ for f_{yk} in $[N/mm^2]$ k_{steel} see Table A4.10	$\frac{F_{bp,Ed}}{F_{bp,Rd}} \le 1,00$
5	Top plate under timber element	$F_{tp,Ed} = F_{co,up,Ed}$	$F_{tp,Rd} = k_{steel} \frac{f_{yk}}{\gamma_{M0}}$ in $[kN]$ for f_{yk} in $[N/mm^2]$ k_{steel} see Table A4.10	$\frac{F_{tp,Ed}}{F_{tp,Rd}} \le 1,00$
6	Face side of lower timber element	$F_{timber,down,Ed} = F_{co,down,Ed}$	$F_{timber,down,Rd} = k_{timber} f_{c,0,d}$ in $[kN]$ for $f_{c,0,d} = k_{mod} \frac{f_{c,0,k}}{\gamma_M}$ in $\left[\frac{N}{mm^2}\right]$ k_{timber} see Table A4.11	$\frac{F_{co,down,Ed}}{F_{timber,Rd}} \le 1,00$
7	Face side of the upper timber element	$F_{timber,up,Ed} = F_{co,up,Ed}$	$F_{timber,up,Rd} = k_{timber} f_{c,0,d}$ in $[kN]$ for $f_{c,0,d} = k_{mod} \frac{f_{c,0,k}}{\gamma_M}$ in $\left[\frac{N}{mm^2}\right]$ k_{timber} see Table A4.11	$\frac{F_{timber,up,Ed}}{F_{timber,up,Rd}} \le 1,00$

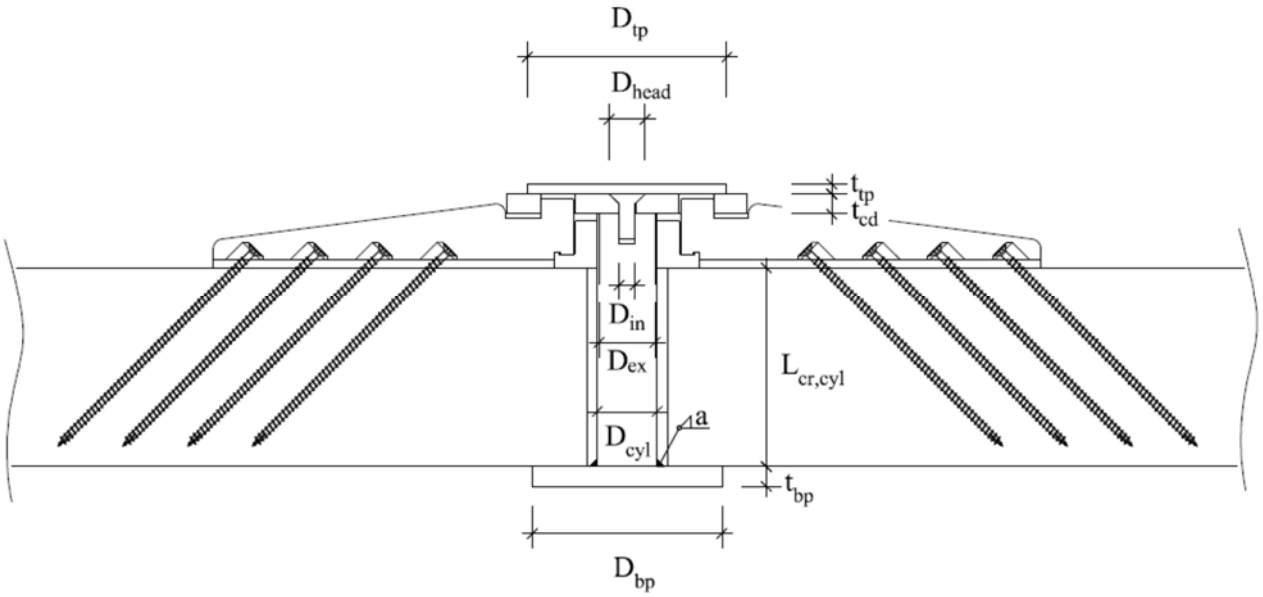
Table A4.2:Verification for the PILLAR Connector

№	Labelling	Load	Load-bearing capacity	Verification
1	PILLAR Connector on timber element	$F_{PILLAR,Ed} = F_{slab,Ed}$	$F_{PILLAR,Rd} = k_{mod} \frac{F_{PILLAR,Rk}}{\gamma_M}$ $F_{PILLAR,Rk}$ see Table A4.6	$\frac{F_{PILLAR,Ed}}{F_{PILLAR,Rd}} \le 1,00$
2	Compression of the reduced cylinder	$N_{Ed} = F_{co,up,Ed}$	$N_{b,Rd} = \frac{N_{b,Rk}}{\gamma_{M0}}$ $N_{b,Rk}$ see Table A4.7	$\frac{N_{Ed}}{N_{b,Rd}} \le 1,00$
3	Load transmission	$F_{lt,PIL,Ed} = F_{co,up,Ed}$	$F_{lt,PIL,Rd} = \frac{F_{lt,PIL,Rk}}{\gamma_{M0}}$ $F_{lt,PIL,Rk}$ see Table A4.9	$\frac{F_{lt,PIL,Ed}}{F_{lt,PIL,Rd}} \le 1,00$
4	Bottom plate on timber beam	$F_{bp,Ed} = F_{co,up,Ed}$	$F_{bp,Rd} = k_{steel} \frac{f_{yk}}{\gamma_{M0}}$ in $[kN]$ for f_{yk} in $\left[N/mm^2\right]$ k_{steel} see Table A4.10	$\frac{F_{bp,Ed}}{F_{bp,Rd}} \le 1,00$
5	Top plate under timber beam	$F_{tp,Ed} = F_{co,up,Ed}$	$F_{tp,Rd} = k_{steel} \frac{f_{yk}}{\gamma_{M0}}$ in $[kN]$ for f_{yk} in $\left[N/mm^2\right]$ k_{steel} see Table A4.10	$\frac{F_{tp,Ed}}{F_{tp,Rd}} \le 1,00$
6	Face side of lower timber beam	$F_{timber,down,Ed} = F_{co,down,Ed}$	$F_{timber,down,Rd} = k_{timber} f_{c,0,d}$ in $[kN]$ for $f_{c,0,d} = k_{mod} \frac{f_{c,0,k}}{\gamma_M}$ in $\left[\frac{N}{mm^2}\right]$ k_{timber} see Table A4.11	$\frac{F_{co,down,Ed}}{F_{timber,Rd}} \le 1,00$
7	Face side of the upper timber beam	$F_{timber,up,Ed} = F_{co,up,Ed}$	$F_{timber,up,Rd} = k_{timber} f_{c,0,d}$ in $[kN]$ for $f_{c,0,d} = k_{mod} \frac{f_{c,0,k}}{\gamma_M}$ in $\left[\frac{N}{mm^2}\right]$ k_{timber} see Table A4.11	$\frac{F_{timber,up,Ed}}{F_{timber,up,Rd}} \le 1,00$

Spider Connector	Annex 4
Design considerations and characteristic load bearing capacities	of European Technical Assessment ETA-19/0700 of 17.01.2020

$F_{co,up,Ed}$ ...	Design load in the upper column according to Annex 3
$F_{co,down,Ed}$ ...	Design load in the lower column according to Annex 3
$F_{slab,Ed} = \lvert F_{co,down,Ed} - F_{co,up,Ed} \rvert$	
γ_{MC} ...	Partial safety factor for steel-to-timber connections according to EN 1995-1-1; recomm. γ_{MC} = 1.30 and 1.25 for CLT)
γ_{M} ...	Partial safety factor for timber cross-section according to EN 1995-1-1
k_{mod} ...	Modification factor according to EN 1995-1-1
$f_{c,0,k}$ ...	Characteristic compressive strength parallel to the grain
f_{yk} ...	Characteristic yield strenght of the bottom plate or top plate according to Table A4.4
γ_{M0} ...	Partial safety factor for steel cross-section according to EN 1993-1-1; recomm. γ_{M0} = 1.00 (for S235/S355/S460) and 1.1 for better steel
k_{sus} ...	Calculation factor from Table A4.3

Figure A4.1: Definition of relevant dimensions for design



D_{tp} ... Diameter or width/length of the top plate
D_{head} ... Outer diameter of the upper part of the countersunk drilling of the coupling disk
t_{tp} ... Thickness of the top plate
t_{cd} ... Thickness of the coupling disk
D_{in} ... Inner diameter of the ISO metric fine thread on the upper part of the steel cylinder
D_{ex} ... Diameter of the ISO 2904 thread on the steel cylinder
$L_{cr,cyl}$ ... (Buckling) length of the cylinder (from the bottom plate to the coupling cone)
D_{cyl} ... Outer diameter of the cylinder
a ... Nominal length of the weld
D_{bp} ... Diameter or width/length of the bottom plate
t_{bp} ... Thickness of the bottom plate

Spider Connector	Annex 4
Design considerations and characteristic load bearing capacities	of European Technical Assessment ETA-19/0700 of 17.01.2020

Table A4.3: Values for suspension factor k_{sus}

Installation	k_{sus}	
	flat slab	crosswise assembly
without reinforcement	0.70	0.46
with reinforcement	0.60	0.36

Table A4.4: Characteristic yield strength of the bottom plate or top plate

Steel grade	f_{yk} [N/mm²]
S235J0	235
S355J0	355
S460Q	460
S690Q	690

Table A4.5: Characteristic load-bearing capacity of the SPIDER Connector on the cross-laminated timber element

Nominal thickness of the CLT panel in mm [2)]	$F_{SPIDER,Rk}$ [kN]	
	without reinforcement	with reinforcement
160	419	463
180	494	545
200	568	627
220	642	709
240	717	791
2x160[1)]	558	616

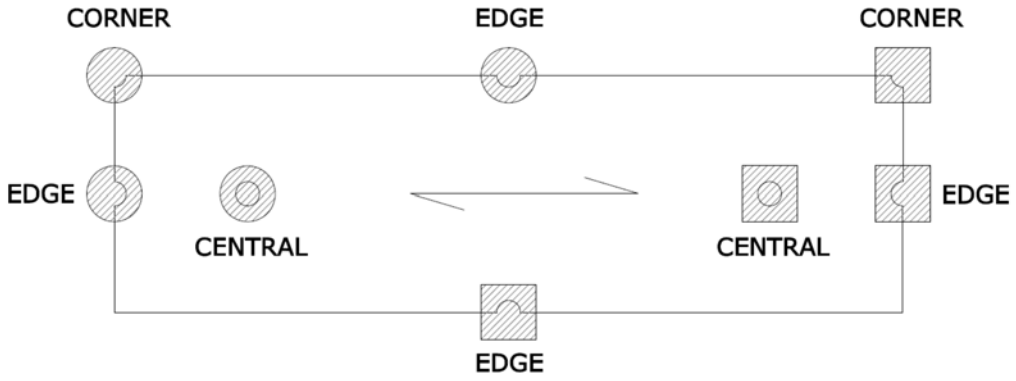
[1)] Crosswise assembled CLT

[2)] For deviating nominal thicknesses the values for the next lower thickness shall be used.

Spider Connector	Annex 4
Design considerations and characteristic load bearing capacities	of European Technical Assessment ETA-19/0700 of 17.01.2020

Table A4.6: Characteristic load-bearing capacity of the PILLAR Connector on the cross-laminated timber element

D_{cyl} / D_{bp}	$F_{PILLAR,Rk}$ [kN] without reinforcement											
	CENTRAL				EDGE				CORNER			
	CLT 5l		CLT 7l		CLT 5l		CLT 7l		CLT 5l		CLT 7l	
	○	□	○	□	○	□	○	□	○	□	○	□
120/240	140	183	179	235	61	80	75	99	26	34	30	40
120/280	216	270	278	346	95	118	116	145	40	50	47	59
100/240	159	203	204	260	70	89	85	109	30	38	35	44
100/280	236	289	302	370	103	127	127	155	44	54	51	63
80/200	110	141	142	180	48	62	59	76	21	26	24	31
80/240	175	219	225	281	77	96	94	118	33	41	38	48
80/280	252	305	323	391	110	134	135	164	47	57	55	66
60/200	124	154	159	197	54	68	66	83	23	29	27	33
60/240	188	232	242	298	83	102	101	125	35	43	41	50
60/280	265	318	340	408	116	140	142	171	49	59	58	69



Spider Connector	Annex 4
Design considerations and characteristic load bearing capacities	of European Technical Assessment ETA-19/0700 of 17.01.2020

D_{cyl} / D_{bp}	$F_{PILLAR,Rk}$ [kN] with reinforcement							
	CENTRAL							
	VGS 9x100 CLT 5l 160 mm		VGS 9x100 CLT 5l 180 mm		VGS 9x100 CLT 7l 200 mm		VGS 9x120 CLT 7l 240 mm	
	○	□	○	□	○	□	○	□
120/240	205	242	225	264	245	286	288	333
120/280	263	306	285	330	308	354	356	406
100/240	215	253	235	274	255	297	299	343
100/280	273	316	295	340	318	365	366	416
80/200	172	200	189	219	207	239	246	280
80/240	224	261	243	283	264	305	307	352
80/280	282	325	304	349	327	373	375	425
60/200	179	207	196	226	214	246	253	288
60/240	231	268	251	290	271	312	314	359
60/280	289	332	311	356	334	380	382	432

D_{cyl} / D_{bp}	$F_{PILLAR,Rk}$ [kN] with reinforcement							
	EDGE							
	VGS 9x100 CLT 5l 160 mm		VGS 9x100 CLT 5l 180 mm		VGS 9x100 CLT 7l 200 mm		VGS 9x120 CLT 7l 240 mm	
	○	□	○	□	○	□	○	□
120/240	102	121	112	132	123	143	144	167
120/280	132	153	143	165	154	177	178	203
100/240	108	126	117	137	128	148	149	172
100/280	137	158	148	170	159	182	183	208
80/200	86	100	95	109	104	119	123	140
80/240	112	131	122	141	132	153	154	176
80/280	141	162	152	174	163	187	187	212
60/200	89	103	98	113	107	123	127	144
60/240	115	134	125	145	136	156	157	180
60/280	145	166	156	178	167	190	191	216

D_{cyl} / D_{bp}	$F_{PILLAR,Rk}$ [kN] with reinforcement							
	CORNER							
	VGS 9x100 CLT 5l 160 mm		VGS 9x100 CLT 5l 180 mm		VGS 9x100 CLT 7l 200 mm		VGS 9x120 CLT 7l 240 mm	
	○	□	○	□	○	□	○	□
120/240	43	51	45	53	51	61	56	65
120/280	66	76	69	79	77	89	85	96
100/240	47	55	49	57	56	65	60	69
100/280	68	79	72	82	80	91	89	101
80/200	37	43	40	45	45	52	49	56
80/240	50	58	52	60	59	69	63	73
80/280	71	81	75	85	82	93	93	104
60/200	40	46	42	48	48	55	52	59
60/240	52	60	54	62	62	71	66	76
60/280	72	83	78	88	83	95	95	107

Table A4.7: Characteristic compressive load-bearing capacity of the cylinder of the SPIDER Connector and PILLAR Connector

Nominal thickness of the CLT panel in mm *	$N_{b,Rk}$ [kN] for S235J0				$N_{b,Rk}$ [kN] for S355J0			
	Nominal diameter of the cylinder [mm]							
	60	80	100	120	60	80	100	120
160	608	1081	1689	2205	947	1684	2474	3336
180	608	1081	1689	2205	947	1684	2474	3336
200	608	1081	1689	2205	947	1684	2474	3336
220	608	1081	1689	2205	947	1684	2474	3336
240	608	1081	1689	2205	940	1684	2474	3336
280	608	1081	1689	2205	923	1684	2474	3336
320	600	1081	1689	2205	907	1673	2474	3336
Nominal thickness of the CLT panel in mm *	$N_{b,Rk}$ [kN] for 1.6582				$N_{b,Rk}$ [kN] for 1.7225			
	Nominal diameter of the cylinder [mm]							
	60	80	100	120	60	80	100	120
160	2230	4021	6283	7917	1833	3267	5105	6220
180	2200	4021	6283	7917	1811	3267	5105	6220
200	2170	4000	6283	7917	1789	3267	5105	6220
220	2139	3960	6283	7917	1767	3255	5105	6220
240	2109	3920	6283	7917	1744	3226	5105	6220
280	2047	3840	6184	7917	1700	3167	5084	6220
320	1984	3759	6084	7898	1655	3108	5010	6220
Nominal thickness of the CLT panel in mm *	$N_{b,Rk}$ [kN] for S460Q				$N_{b,Rk}$ [kN] for S690Q			
	Nominal diameter of the cylinder [mm]							
	60	80	100	120	60	80	100	120
160	1244	2212	3456	4524	1833	3267	5105	7125
180	1244	2212	3456	4524	1811	3267	5105	7125
200	1239	2212	3456	4524	1789	3267	5105	7125
220	1227	2212	3456	4524	1767	3255	5105	7125
240	1215	2212	3456	4524	1744	3226	5105	7125
280	1190	2196	3456	4524	1700	3167	5084	7125
320	1165	2163	3456	4524	1655	3108	5010	7125

* For deviating nominal thicknesses the values for the next higher thickness shall be used.

Table A4.8: Characteristic load-bearing capacity in transmission of the SPIDER Connector

Steel grade of the coupling disk or top plate	$F_{3,cd,Rk}$ [kN]				$F_{2,tp,Rk}$ [kN]			
	Nominal diameter of the cylinder [mm]							
	60	80	100	120	60	80	100	120
S235J0	465	930	1515	2275	1357	2118	2924	3979
S355J0	703	1405	2289	3437	2050	3199	4416	6011
S460Q	910	1821	2965	4454	2657	4145	5723	7789
S690Q	1366	2731	4448	6681	3985	6218	8584	11684
1.6582	1781	3563	5802	8714	5198	8110	11197	15240
1.7225	1484	2969	4835	7262	4331	6758	9331	12700

Steel grade of the cylinder	$F_{3,cyl,Rk}$ [kN]			
	Nominal diameter of the cylinder in mm			
	60	80	100	120
S235J0	426	851	1386	1888
S355J0	663	1326	2031	2856
S460Q	871	1742	2836	3873
S690Q	1286	2573	4190	6100
1.6582	1583	3167	5157	6778
1.7225	1286	2573	4190	5325

$F_{3,cd,Rk}$ ... Characteristic load-bearing capacity of transmission through the coupling disk

$F_{2,tp,Rk}$ ... Characteristic load-bearing capacity of transmission through the top plate

$F_{3,cyl,Rk}$ ... Characteristic load-bearing capacity of transmission through the steel cylinder

$F_{lt,Rk} = \min(F_{3,cd,Rk}; F_{2,tp,Rk}; F_{3,cyl,Rk})$

Table A4.9: Characteristic load-bearing capacity in transmission of the PILLAR Connector

Steel grade of the coupling disk or top plate	$F_{3,PIL,cd,Rk}$ [kN]				$F_{2,PIL,tp,Rk}$ [kN]			
	Nominal diameter of the cylinder [mm]							
	60	80	100	120	60	80	100	120
S235J0	611	1128	1764	2576	1256	1994	2778	3812
S355J0	923	1704	2665	3892	1897	3012	4196	5758
S460Q	1196	2208	3454	5043	2458	3903	5438	7461
S690Q	1794	3312	5180	7565	3687	5855	8157	11191
1.6582	2340	4320	6757	9867	4809	7637	10639	14597
1.7225	1950	3600	5631	8223	4008	6364	8866	12164

Steel grade of the cylinder	$F_{3,PIL,cyl,Rk}$ [kN]			
	Nominal diameter of the cylinder in mm			
	60	80	100	120
S235J0	559	1032	1614	2138
S355J0	871	1608	2365	3234
S460Q	1144	2112	3303	4385
S690Q	1690	3120	4880	6907
1.6582	2080	3840	6006	7674
1.7225	1690	3120	4880	6030

$F_{3,PIL,cd,Rk}$ … Characteristic load-bearing capacity of transmission through the coupling disk

$F_{2,PIL,tp,Rk}$ … Characteristic load-bearing capacity of transmission through the top plate

$F_{3,PIL,cyl,Rk}$ … Characteristic load-bearing capacity of transmission through the steel cylinder

$F_{lt,PIL,Rk} = \min(F_{3,PIL,cd,Rk}; F_{2,PIL,tp,Rk}; F_{3,PIL,cyl,Rk})$

Table A4.10 part 1: Factor k_{steel} for different shapes of bottom or top plate and wooden members

t_p	D_{cyl}	D_p	C24		GL24c		GL24h		ETA-14/0354	
[mm]	[mm]	[mm]	R	C	R	C	R	C	R	C
20	60	200	1.269	1.269	1.269	1.269	1.271	1.272	1.399	1.388
30	60	200	1.943	1.989	1.942	1.991	1.944	1.991	2.037	2.068
40	60	200	2.615	2.736	2.616	2.736	2.616	2.735	2.688	2.785
20	60	240	1.253	1.237	1.253	1.237	1.257	1.242	1.392	1.377
30	60	240	1.875	1.878	1.874	1.878	1.877	1.880	2.000	1.988
40	60	240	2.494	2.534	2.493	2.535	2.495	2.535	2.594	2.610
20	60	280	1.255	1.235	1.254	1.235	1.258	1.241	1.394	1.379
30	60	280	1.835	1.821	1.835	1.821	1.841	1.827	1.976	1.955
40	60	280	2.407	2.429	2.407	2.429	2.410	2.432	2.528	2.530
20	80	200	1.763	1.778	1.763	1.778	1.765	1.780	1.957	1.949
30	80	200	2.741	2.863	2.741	2.863	2.744	2.865	2.899	2.977
40	80	200	3.767	3.999	3.765	3.997	3.769	4.005	3.867	4.069
20	80	240	1.701	1.672	1.702	1.673	1.707	1.679	1.919	1.891
30	80	240	2.537	2.577	2.536	2.572	2.542	2.579	2.728	2.749
40	80	240	3.463	3.613	3.464	3.615	3.469	3.615	3.630	3.723
20	80	280	1.670	1.656	1.671	1.656	1.678	1.667	1.895	1.879
30	80	280	2.469	2.466	2.469	2.452	2.476	2.472	2.700	2.670
40	80	280	3.323	3.374	3.325	3.375	3.330	3.382	3.520	3.543
20	100	200	2.346	2.441	2.348	2.441	2.353	2.446	2.627	2.651
30	100	200	3.704	4.063	3.704	4.059	3.709	4.058	3.924	4.201
40	100	200	5.130	5.632	5.128	5.636	5.137	5.639	5.273	5.710
20	100	240	2.188	2.186	2.187	2.185	2.195	2.196	2.477	2.448
30	100	240	3.327	3.420	3.329	3.418	3.334	3.426	3.620	3.650
40	100	240	4.576	4.867	4.577	4.871	4.581	4.875	4.814	5.016
20	100	280	2.163	2.129	2.163	2.129	2.176	2.142	2.481	2.456
30	100	280	3.186	3.173	3.189	3.170	3.198	3.177	3.520	3.469
40	100	280	4.278	4.409	4.273	4.408	4.283	4.412	4.560	4.639
20	120	200	3.117	3.508	3.115	3.510	3.118	3.506	3.486	3.743
30	120	200	5.005	5.785	5.012	5.779	5.012	5.777	5.298	5.926
40	120	200	6.867	7.763	6.867	7.772	6.876	7.752	7.002	7.843
20	120	240	2.759	2.832	2.759	2.833	2.772	2.840	3.164	3.155
30	120	240	4.229	4.540	4.230	4.541	4.234	4.546	4.621	4.805
40	120	240	5.799	6.441	5.801	6.437	5.807	6.441	6.081	6.616
20	120	280	2.673	2.652	2.672	2.670	2.689	2.674	3.095	3.095
30	120	280	3.970	4.017	3.969	4.017	3.986	4.018	4.445	4.397
40	120	280	5.381	5.637	5.379	5.636	5.391	5.651	5.762	5.918

t_p …	Thickness of the top plate or bottom plate
D_{cyl} …	Nominal diameter of the steel cylinder
D_p …	Diameter or length and width of the top plate or bottom plate
R …	Rectangular shape of the top plate or bottom plate
C …	Circular shape of the top plate or bottom plate

Spider Connector	Annex 4
Design considerations and characteristic load bearing capacities	of European Technical Assessment ETA-19/0700 of 17.01.2020

Table A4.10 part 2: Factor k_{steel} for different shapes of bottom or top plate and wooden members

t_p	D_{cyl}	D_p	GL28c		GL28h		GL32c		GL32h	
[mm]	[mm]	[mm]	R	C	R	C	R	C	R	C
20	60	200	1.266	1.263	1.297	1.291	1.291	1.290	1.324	1.318
30	60	200	1.937	1.986	1.959	2.002	1.958	2.002	1.979	2.021
40	60	200	2.613	2.732	2.628	2.742	2.625	2.741	2.645	2.751
20	60	240	1.246	1.230	1.280	1.266	1.278	1.263	1.312	1.300
30	60	240	1.867	1.872	1.897	1.897	1.896	1.896	1.927	1.921
40	60	240	2.490	2.530	2.511	2.548	2.510	2.547	2.535	2.562
20	60	280	1.247	1.228	1.283	1.268	1.280	1.265	1.316	1.302
30	60	280	1.827	1.816	1.865	1.851	1.863	1.847	1.897	1.888
40	60	280	2.401	2.424	2.430	2.448	2.429	2.447	2.457	2.473
20	80	200	1.750	1.769	1.796	1.808	1.794	1.806	1.840	1.846
30	80	200	2.732	2.856	2.770	2.883	2.765	2.876	2.801	2.908
40	80	200	3.761	3.997	3.785	4.007	3.782	4.011	3.806	4.019
20	80	240	1.689	1.663	1.744	1.718	1.741	1.713	1.794	1.770
30	80	240	2.527	2.565	2.573	2.603	2.570	2.603	2.615	2.646
40	80	240	3.455	3.606	3.493	3.630	3.493	3.630	3.530	3.655
20	80	280	1.660	1.647	1.717	1.708	1.713	1.705	1.771	1.762
30	80	280	2.459	2.456	2.516	2.509	2.513	2.506	2.575	2.552
40	80	280	3.315	3.370	3.363	3.411	3.360	3.404	3.406	3.449
20	100	200	2.332	2.432	2.399	2.472	2.394	2.469	2.460	2.516
30	100	200	3.692	4.049	3.744	4.081	3.739	4.077	3.788	4.108
40	100	200	5.124	5.631	5.155	5.651	5.153	5.638	5.186	5.658
20	100	240	2.171	2.173	2.243	2.241	2.238	2.222	2.310	2.305
30	100	240	3.309	3.418	3.385	3.469	3.379	3.465	3.446	3.517
40	100	240	4.565	4.864	4.622	4.896	4.619	4.889	4.674	4.928
20	100	280	2.149	2.116	2.234	2.199	2.228	2.196	2.308	2.280
30	100	280	3.171	3.155	3.255	3.230	3.255	3.225	3.337	3.299
40	100	280	4.257	4.401	4.331	4.453	4.325	4.450	4.396	4.504
20	120	200	3.093	3.494	3.181	3.547	3.176	3.549	3.264	3.600
30	120	200	4.989	5.766	5.063	5.797	5.056	5.795	5.125	5.827
40	120	200	6.865	7.769	6.896	7.767	6.895	7.786	6.924	7.779
20	120	240	2.741	2.814	2.840	2.897	2.834	2.892	2.933	2.975
30	120	240	4.214	4.529	4.301	4.584	4.298	4.589	4.387	4.642
40	120	240	5.787	6.431	5.852	6.474	5.850	6.465	5.910	6.512
20	120	280	2.654	2.630	2.762	2.752	2.755	2.744	2.863	2.871
30	120	280	3.950	3.997	4.069	4.091	4.059	4.087	4.178	4.182
40	120	280	5.361	5.628	5.450	5.697	5.448	5.694	5.539	5.754

t_p …	Thickness of the top plate or bottom plate
D_{cyl} …	Nominal diameter of the steel cylinder
D_p …	Diameter or length and width of the top plate or bottom plate
R …	Rectangular shape of the top plate or bottom plate
C …	Circular shape of the top plate or bottom plate

Table A4.10 part 3: Factor k_{steel} for different shapes of bottom or top plate for other members

t_p	D_{cyl}	D_p	Concrete C25/30		Total stiff foundation	
[mm]	[mm]	[mm]	R	C	R	C
20	60	200	2.156	1.994	3.293	3.287
30	60	200	2.597	2.556	3.746	3.736
40	60	200	3.157	3.152	4.456	4.436
20	60	240	2.175	1.974	3.315	3.310
30	60	240	2.664	2.564	3.773	3.768
40	60	240	3.189	3.117	4.497	4.486
20	60	280	2.151	1.990	3.328	3.325
30	60	280	2.566	2.553	3.791	3.786
40	60	280	3.135	3.107	4.521	4.513
20	80	200	3.104	2.913	5.467	5.443
30	80	200	3.820	3.715	5.797	5.774
40	80	200	4.523	4.540	6.385	6.345
20	80	240	3.097	2.860	5.524	5.510
30	80	240	3.816	3.678	5.867	5.849
40	80	240	4.492	4.427	6.474	6.453
20	80	280	3.072	2.849	5.559	5.549
30	80	280	3.931	3.668	5.909	5.896
40	80	280	4.472	4.395	6.528	6.511
20	100	200	4.314	3.974	8.151	8.111
30	100	200	5.329	5.142	8.366	8.314
40	100	200	6.193	6.308	8.808	8.732
20	100	240	4.327	3.897	8.268	8.239
30	100	240	5.346	4.932	8.506	8.467
40	100	240	6.248	5.983	8.989	8.946
20	100	280	4.331	3.885	8.340	8.319
30	100	280	5.181	4.898	8.591	8.563
40	100	280	6.041	5.863	9.090	9.060
20	120	200	5.924	5.347	11.338	11.267
30	120	200	7.175	6.963	11.377	11.286
40	120	200	7.952	8.478	11.651	11.512
20	120	240	5.519	5.151	11.536	11.485
30	120	240	6.697	6.451	11.622	11.559
40	120	240	7.904	7.812	11.963	11.882
20	120	280	5.579	5.066	11.663	11.624
30	120	280	6.729	6.315	11.776	11.729
40	120	280	7.756	7.518	12.140	12.085

t_p …	Thickness of the top plate or bottom plate
D_{cyl} …	Nominal diameter of the steel cylinder
D_p …	Diameter or length and width of the top plate or bottom plate
R …	Rectangular shape of the top plate or bottom plate
C …	Circular shape of the top plate or bottom plate

Table A4.11: Factor k_{timber} for different shapes of bottom or top plate and wooden members

t_p	D_{cyl}	D_p	R		C	
[mm]	[mm]	[mm]	ETA-14/0354	Other wood	ETA-14/0354	Other wood
20	60	200	22.698	28.353	22.698	28.353
30	60	200	36.285	39.194	31.416	31.416
40	60	200	39.992	40.000	31.416	31.416
20	60	240	22.698	28.353	22.698	28.353
30	60	240	39.761	49.337	39.761	45.239
40	60	240	53.766	57.215	45.239	45.239
20	60	280	22.698	28.353	22.698	28.353
30	60	280	39.761	51.071	39.761	51.071
40	60	280	61.575	72.053	61.575	61.575
20	80	200	28.353	33.778	28.353	31.416
30	80	200	38.484	39.938	31.416	31.416
40	80	200	40.000	40.000	31.416	31.416
20	80	240	28.353	34.636	28.353	34.636
30	80	240	46.815	53.046	45.239	45.239
40	80	240	55.971	57.600	45.239	45.239
20	80	280	28.353	34.636	28.353	34.636
30	80	280	47.144	59.396	47.144	59.396
40	80	280	67.794	75.068	61.575	61.575
20	100	200	33.778	36.942	31.416	31.416
30	100	200	39.674	40.000	31.416	31.416
40	100	200	40.000	40.000	31.416	31.416
20	100	240	34.636	41.548	34.636	41.548
30	100	240	51.372	55.515	45.239	45.239
40	100	240	57.215	57.600	45.239	45.239
20	100	280	34.636	41.548	34.636	41.548
30	100	280	55.155	66.482	55.155	61.575
40	100	280	72.053	77.059	61.575	61.575
20	120	200	36.942	38.869	31.416	31.416
30	120	200	40.000	40.000	31.416	31.416
40	120	200	40.000	40.000	31.416	31.416
20	120	240	41.548	48.150	41.548	45.239
30	120	240	54.415	56.988	45.239	45.239
40	120	240	57.600	57.600	45.239	45.239
20	120	280	41.548	49.087	41.548	49.087
30	120	280	63.439	71.118	61.575	61.575
40	120	280	75.068	78.141	61.575	61.575

t_p …	Thickness of the top plate or bottom plate
D_{cyl} …	Nominal diameter of the cylinder
D_p …	Diameter respectively length and width of the top plate or bottom plate
R …	Rectangular shape of the top plate or bottom plate
C …	Circular shape of the top plate or bottom plate
Other wood…	C24, GL24c, GL24h, GL28c, GL28h, GL32c and GL32h

Spider Connector	Annex 4
Design considerations and characteristic load bearing capacities	of European Technical Assessment ETA-19/0700 of 17.01.2020

Guideline for European Technical Approval ETAG 015 “Three-dimensional nailing plates”, Edition November 2012, used as European Assessment Document

ETA-11/0030, European Technical Assessment of 08.10.2019 for „Rotho Blaas Self-tapping screws“ of Rotho Blaas s.r.l, Via dell’Adige 2/1, 38040 Cortaccia (BZ), Italy

ETA-14/0354, European Technical Assessment of 11.07.2018 for “Träger BauBuche GL75, Beam BauBuche GL75, Poutre BauBuche GL75, Trave BauBuche GL75, Viga BauBuche GL75, Belka BauBuche GL75, Draagbalk BauBuche GL75” of Pollmeier Furnierwerkstoffe GmbH, Pferdsdorfer Weg 6, 99831 Creuzburg, Germany.

EN 338 (04.2016), Structural timber – Strength classes

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

EN 1995-1-2 (11.2004) +AC (06.2006) +A1 (03.2009), Eurocode 5: Eurocode 5: Design of timber structures – Part 1-2: General – Structural fire design

EN 10025-2 (08.2019), Hot rolled products of structural steels – Part 2: Technical delivery conditions for non-alloy structural steels

EN 10025-6:2004+A1 (05.2009), Hot rolled products of structural steels – Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition

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

EN 14081-1:2016+A1 (08.2019), 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 15048 (07.2016), Non-preloaded structural bolting assemblies – Part 1: General requirements

EN 1992, Eurocode 2: Eurocode 2: Design of concrete structures

EN 1993, Eurocode 3: Eurocode 3: Design of steel structures

EN ISO 683-2 (06.2018), Heat-treatable steels, alloy steels and free-cutting steels – Part 2: Alloy steels for quenching and tempering

EN ISO 2081 (03.2018), Metallic and other inorganic coatings – Electroplated coatings of zinc with supplementary treatments on iron or steel

EN ISO 10642 (03.2004) +A1 (12.2012), Hexagon socket countersunk head screws

ISO 2904 (12.1983), ISO metric trapezoidal screw threads – Basic dimensions

Spider Connector	Annex 5
Reference documents	of European Technical Assessment ETA-19/0700 of 17.01.2020