

## European Technical Assessment

**ETA-14/0216  
of 17/07/2014**

English translation prepared by CSTB - Original version in French language

### General Part

Nom commercial  
*Trade name*

HD-H, HD-U, HD-W, HD-L hold down  
S-2A, S-2B, S-3A, S-3B, S-V1, S-V2 Concealed beam hangers

Famille de produit  
*Product family*

*Etriers à âmes intérieures pour assemblage d'éléments bois lamellé collé sur des supports bois lamellé collé. Ancrages pour assemblages d'éléments bois lamellé collé sur support métal ou béton.*

**Concealed beam hangers for connection of glulam wood elements to glulam - Hold down for connection of glulam wood elements to steel or concrete support.**

Titulaire  
*Manufacturer*

**SUTEKI EUROPE N.V / POWERBUILD**  
Pegasuslaan  
5 1831 Diegem Brussels  
BELGIUM

Usine de fabrication e  
*Manufacturing plants*

ZHONGSHAN KINGDOM FLOW CONTROL CO,LTD  
23 Nanhe West Road, Nan-Tou, Zhongshan, Guangdong  
528427, China

Cette évaluation contient:  
*This Assessment contains*

47 pages incluant 3 annexes qui font partie intégrante de cette évaluation  
*47 pages including 3 annexes which form an integral part of this assessment*

Base de l'ETE  
*Basis of ETA*

ETAG 015, Version April 2013, utilisée en tant que DEE  
*ETAG 015, Edition April 2013 used as EAD*

## Specific part

### 1 Technical description of the product

The HD connectors are holddown connectors made of steel plate HR1 graded according to ISO 3573:2008 with tensile strength  $Re \geq 270 \text{ N/mm}^2$  and  $Rm \geq 440 \text{ N/mm}^2$  evaluated according to ISO 6892-1. They are used in combination with cylindrical bolts Fe 360 B graded according to ISO 630 in order to connect glulam-wood column to glulam beam or sill connected to a rigid type support in like concrete or steel support.

The glulam are pre cutted in factories with specific dimensions and tolerances.

The commercial references of the products assessed, their geometries and implementation are indicated in Annex A1 to A5.

The S connectors are concealed beam hangers made of casted carbon steel 230-475W graded according to ISO 3755:2008 with  $Re \geq 225 \text{ N/mm}^2$  and  $Rm \geq 450 \text{ N/mm}^2$ . They are used in order to connect glulam beam on a glulam support.

The commercial references of the products assessed, their geometries and implementation are indicated in Annex B1 to B6.

Both HD and S connectors are coated with non-electrolytic zinc flake coatings according to EN ISO 10683 applied with a minimum target value of  $20 \text{ g/m}^2$  tested according to ISO 9227 and which provide an appropriated protection for utilization in service class 1 and 2.

### 2 Specification of the intended use

The SUTEKI HD and S connectors are intended to be used for connections of beam and post or Sill and post with square or rectangular cross sections. The beam, sills and posts are of glulam according to EN 14080 with a minimum strength grade of GL24. This support are glulam elements for S type concealed beam hangers and concrete or steel rigid support for holddown. With regard to moisture behavior of the support and/or beam, the use is possible in service classes 1 and 2 as defined in EN 1995-1-1:2004 for the hangers and holddown made out of zinc coated steel.

The use in areas where they might support seismic actions has not been examined in this ETA. They are supposed to be used with specified fasteners mentioned in Annex A and B.

The performances given in tables of Annex C are only valid if the hangers and holddown are used in compliance with the specifications and conditions given in Annexes C.

The provisions made in this European technical assessment are based on an assumed working life of the anchor of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

### 3 Performance of the product

This ETA covers the range of concealed beam hangers which are represented in Annex B and the range of holddown types presented in Annex A. The characteristic load-carrying capacities are based on the characteristic values obtained by testing. To obtain design values the capacities have to be divided by different partial factors for the material properties in addition multiplied with the coefficient  $k_{mod}$ . According to EN 1990 (Eurocode – Basis of design) paragraph 6.3.5 the design value of load-carrying capacity may be determined by reducing the characteristic values of the load-carrying capacity with different partial factors.

Thus, the characteristic values of the load-carrying capacity are determined also for excessive deflection of assemble which can include both timber failure (obtaining the embedment strength of bolts and pins subjected to shear or crack failure type) as well as for steel failure.

As the failure is mainly obtained by wood cracking more than steel failure, it is mandatory to take apply the Modification factor for duration of load and moisture content ( $k_{mod}$ ) the partial factor  $\gamma_M$  for glulam and for the corresponding service class as defined into EN 1995-1-1.

### **3.1 Mechanical resistance and stability (BWR 1)**

See annex C for characteristic load-carrying capacities of holddown type connectors and for concealed beam hangers.

The characteristic capacities of the holddown and hangers are determined by testing only as described in the EOTA Guideline 015 clause 2.4.1.1.2.3. They should be used for designs in accordance with Eurocode 5 or a similar national Timber Code.

The design values are to be used only for implementation and types of the bolts and pins described in the table in Annex A and B.

No performance has been determined in relation to ductility of connectors under cyclic testing. The contribution to the performance of structures in seismic zones, therefore, has not been assessed.

No performance has been determined in relation to the joint's stiffness properties - to be used for the analysis of the serviceability limit state.

### **3.2 Safety in case of fire (BWR 2)**

The HD and S connector types are made of steel which can be rate A1 in reaction to fire

No performance determined (NPD) for resistance to fire.

### **3.3 Hygiene, health and the environment (BWR 3)**

Based on the declaration of the manufacturer, the connectors do not contain harmful or dangerous substances as defined in the EU database.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, 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 EU Construction Product Directive, these requirements need also to be complied with, when and where they apply.

**3.4 Safety in use (BWR 4)**

For Basic requirement Safety in use the same criteria are valid as for Basic Requirement Mechanical resistance and stability.

**3.5 Protection against noise (BWR 5)**

Not relevant.

**3.6 Energy economy and heat retention (BWR 6)**

Not relevant.

**3.7 Sustainable use of natural resources (BWR 7)**

For the sustainable use of natural resources no performance was determined for this product.

**3.8 General aspects relating to fitness for use**

Serviceability of the connectors is understood as their ability to resist loads without unacceptable deformations.

**4 Assessment and verification of constancy of performance (AVCP)**

According to the Decision 97/638/EC of the European Commission, as amended, the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table apply.

Product	Intended use	Level or class	System
<i>STRUCTURAL TIMBER PRODUCTS/ELEMENTS AND ANCILLARIES</i>	For fixing and/or supporting to concrete or wood, structural elements which contributes to the stability of the works.	—	2+

**5 Technical details necessary for the implementation of the AVCP system**

Technical details necessary for the implementation of the Assessment and verification of constancy of performance (AVCP) system are laid down in the control plan deposited at Centre Scientifique et Technique du Bâtiment.

The manufacturer shall, on the basis of a contract, involve a notified body approved in the field of three dimensional nailing plates for issuing the certificate of conformity CE based on the control plan.

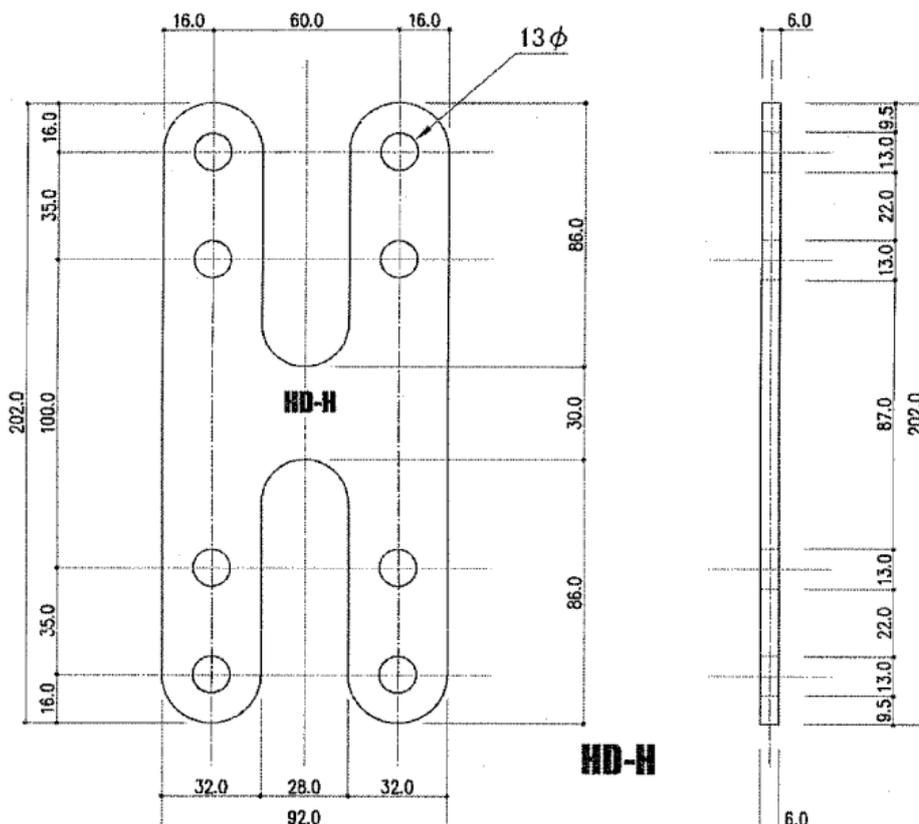
Issued in Marne La Vallée on 17/07/2014 by  
Charles Baloche  
Directeur technique

*The original French version is signed*

## HD-H connector

The HD-H connector is available in one single dimension as described below

Plate:



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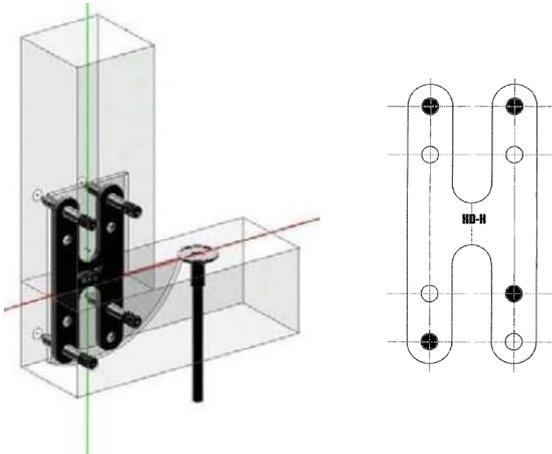
HD-H4 type connector description

Annex A1

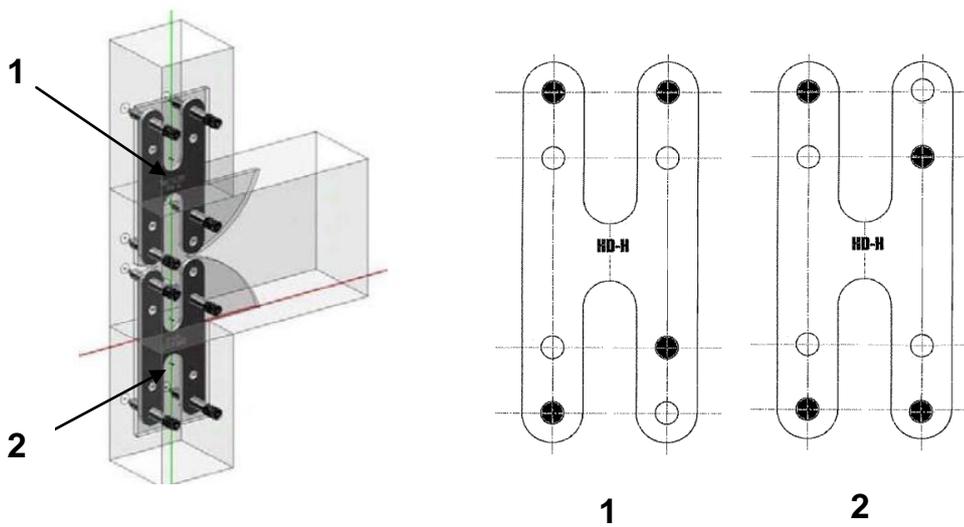
**HD-H4 version (4 pins by plates).**

Only the implementation described below are covered for 4 pins versions by this ETA

For ground beam-to-column connexions



For column to beam connexions



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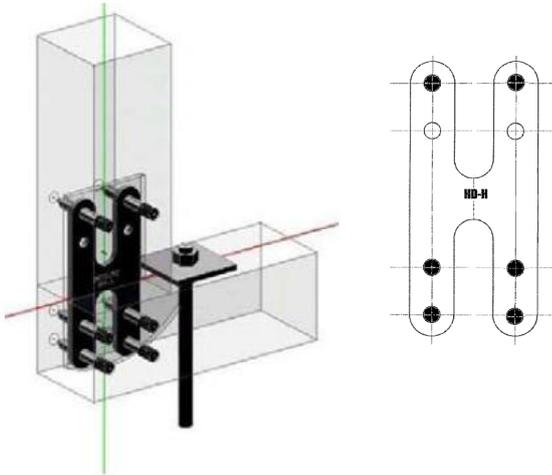
HD-H4 type connector implementation

Annex A1

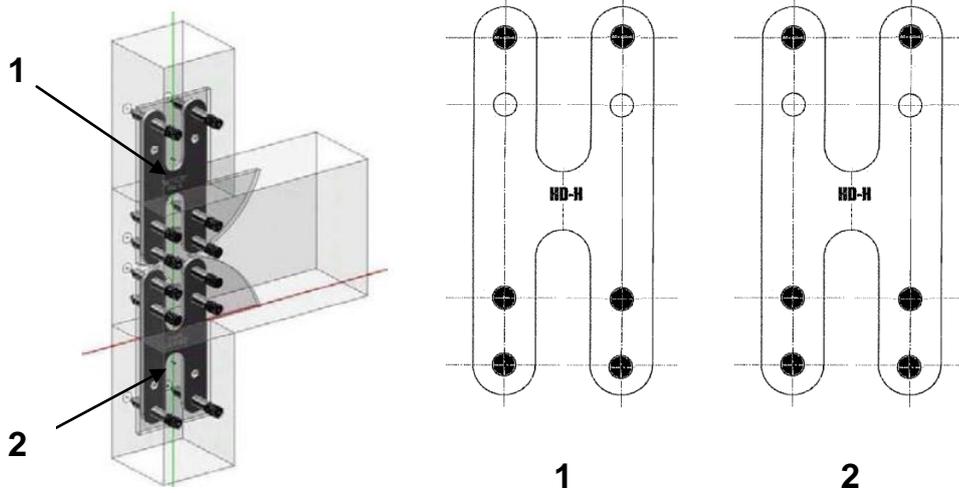
**HD-H6 version (6 pins by plates).**

Only the implementation described below are covered for 6 pins versions by this ETA

For ground beam-to-column connexions



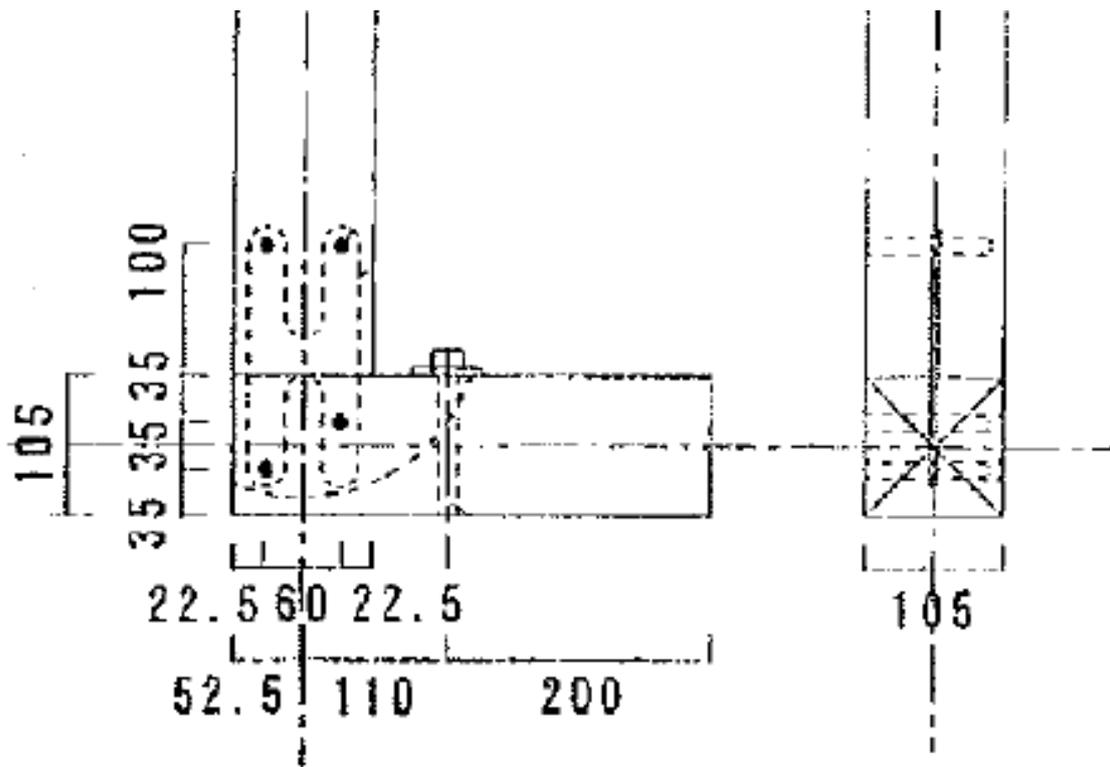
For column to beam connexions



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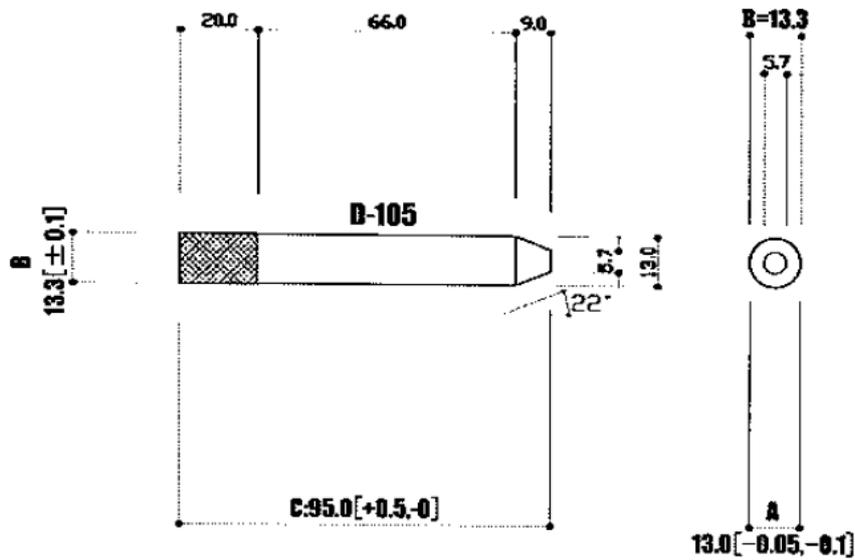
HD-H6 type connector description

Annex A1



D-105

for wood section 105 mm x 105 mm

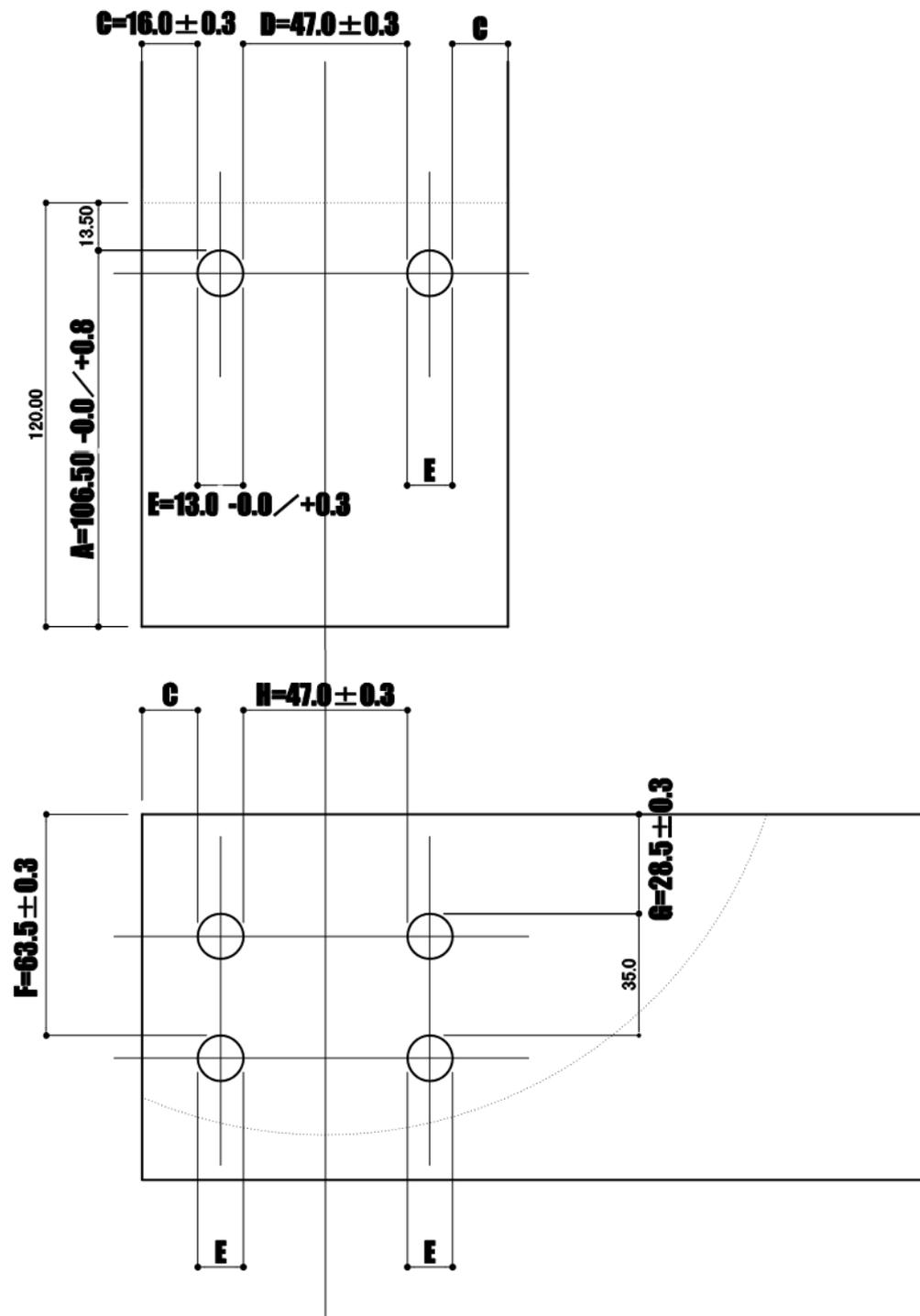


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HD-H6 type connector implementation

Annex A1

# HD-H



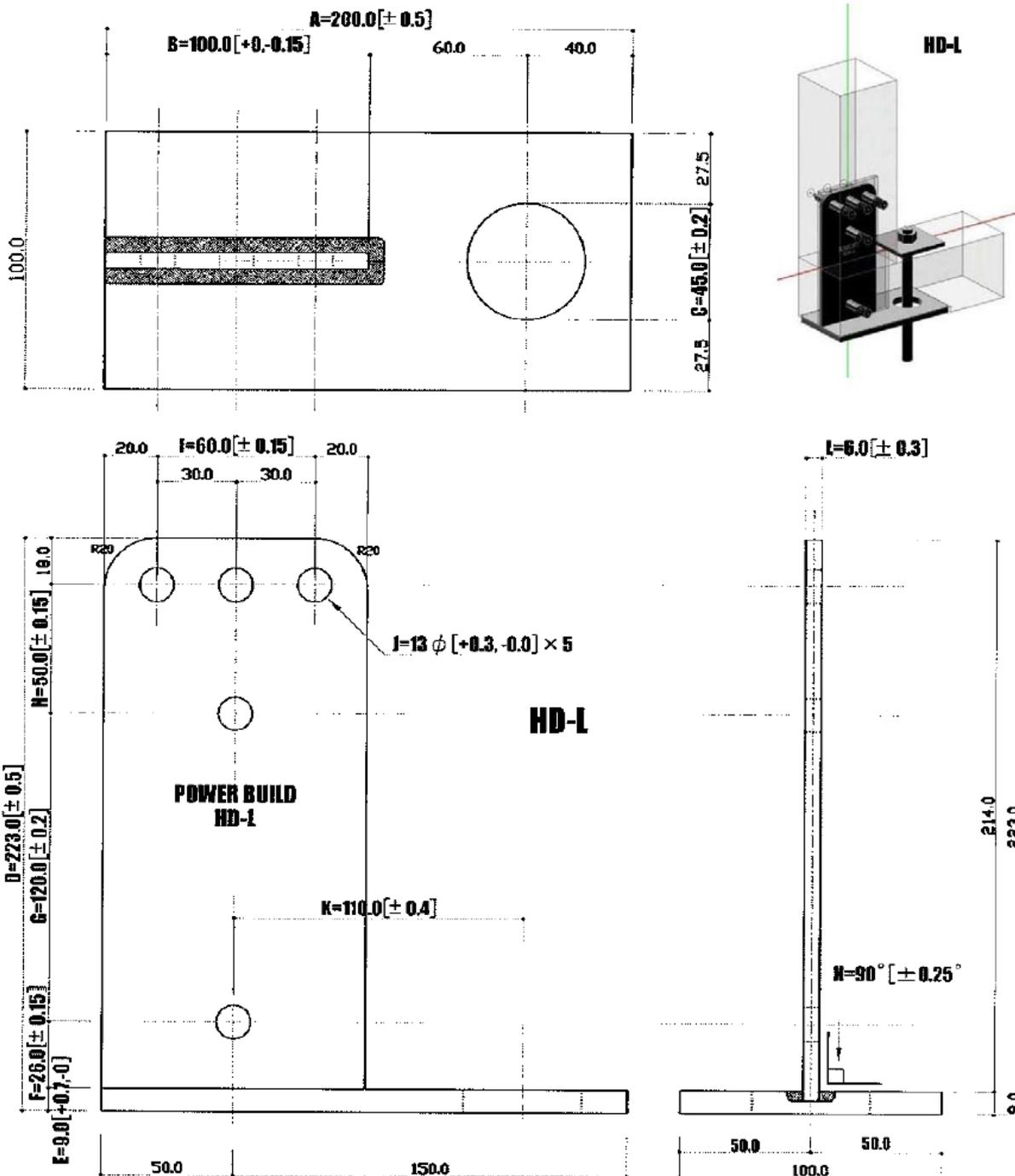
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HD-H type connector. Wood tolerances

Annex A1

## HD-L connector

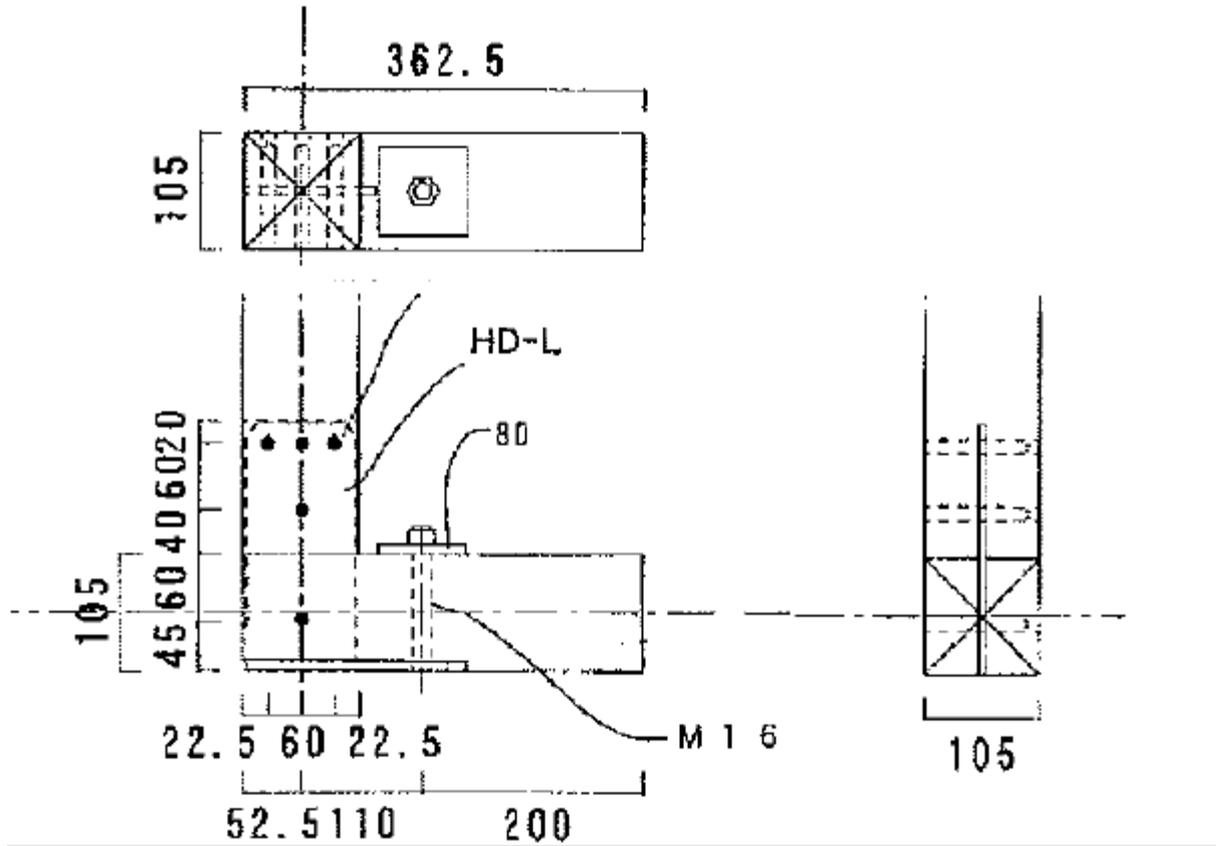
The HD-L connector is available in one single dimension as described below. Only the full holes implementation is covered by this ETA.



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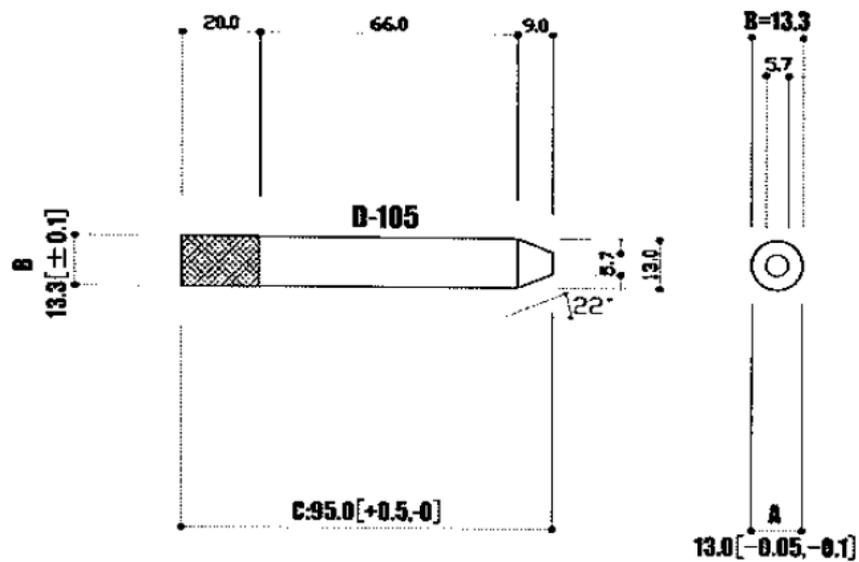
HD-L connector description

Annex A2



D-105

for wood section 105 mm x 105 mm

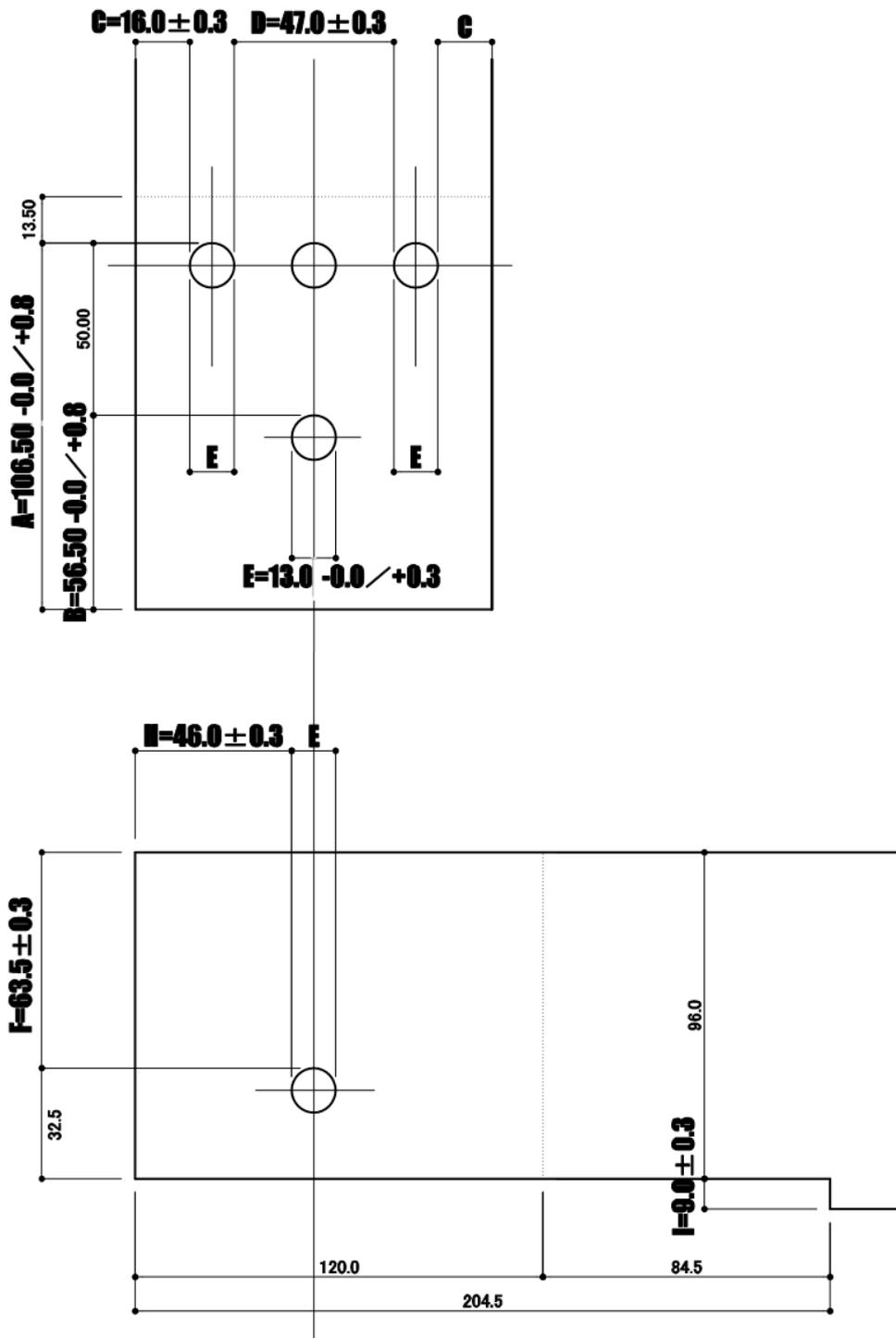


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HD-L connector implementation

Annex A2

# HD-L

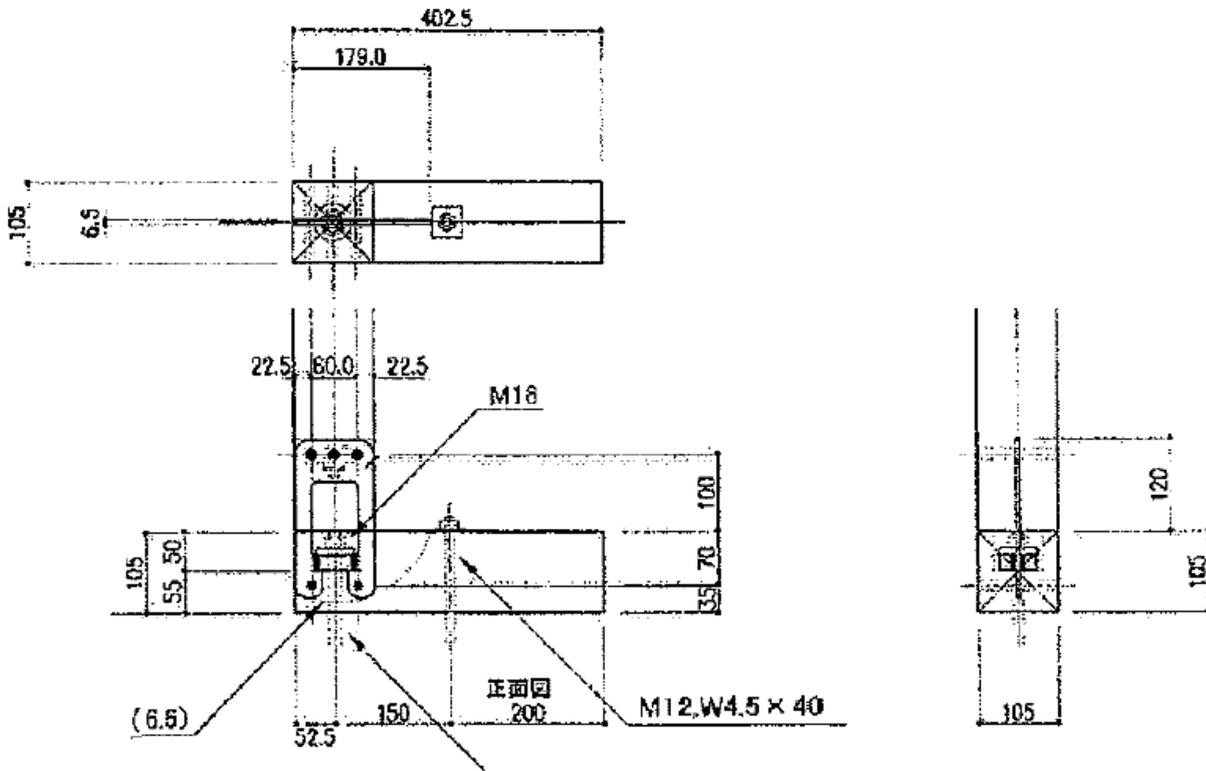


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HD-L connector. Wood tolerances

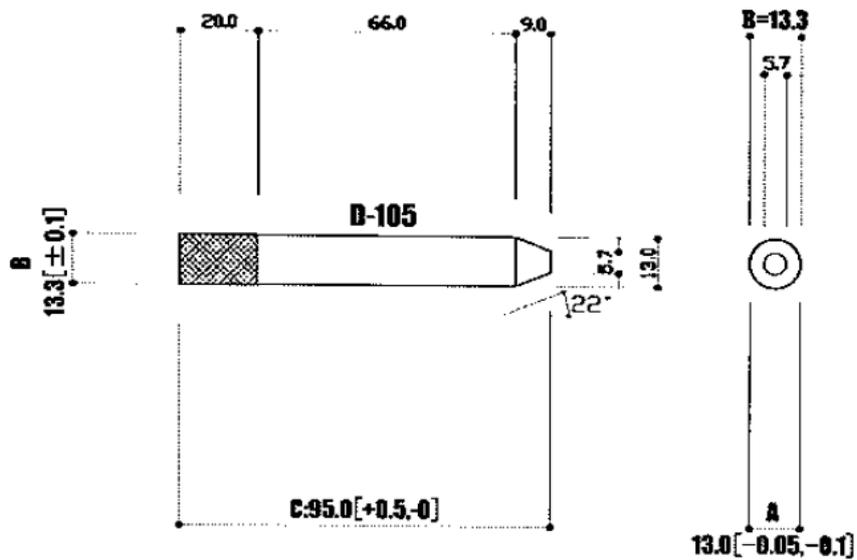
Annex A2





D-105

for wood section 105 mm x 105 mm



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HD-U connector implementation

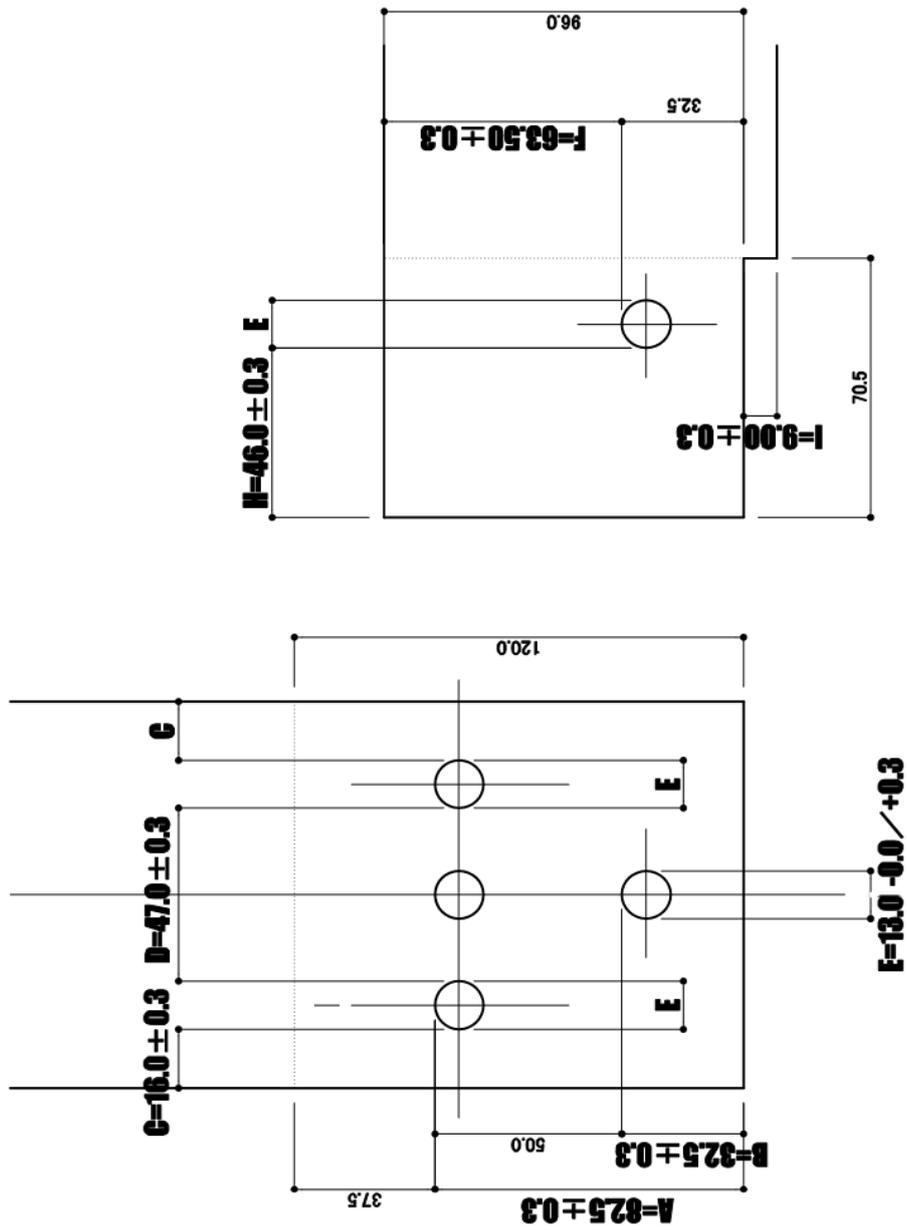
Annex A3







**HD-W**

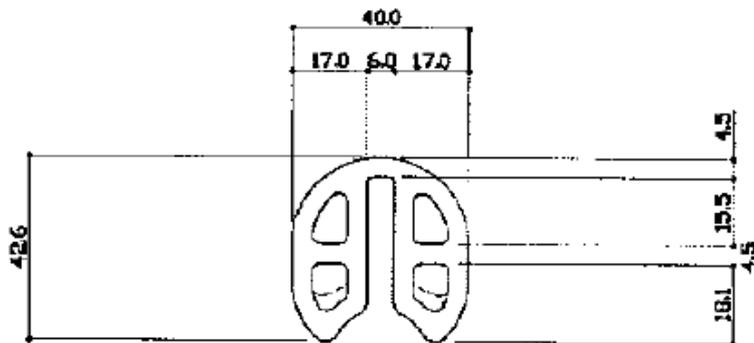
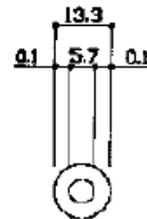
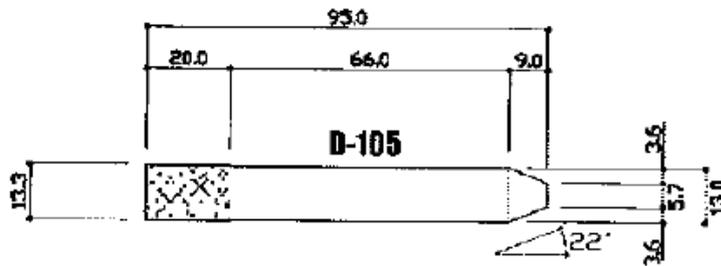
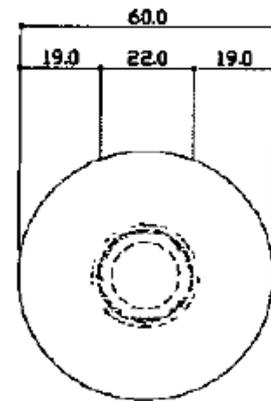
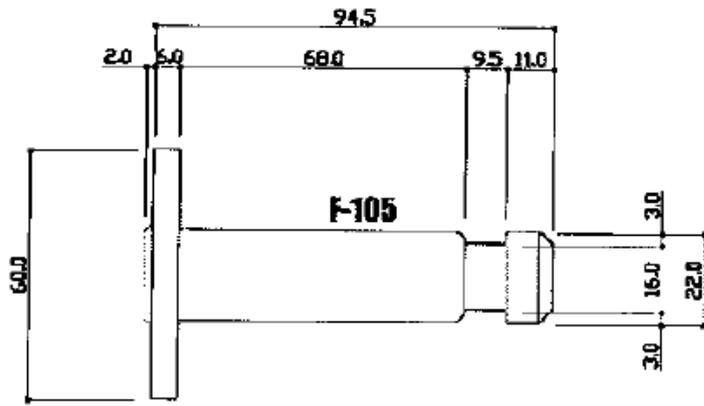


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HD-W connector. Wood tolerance

Annex A4

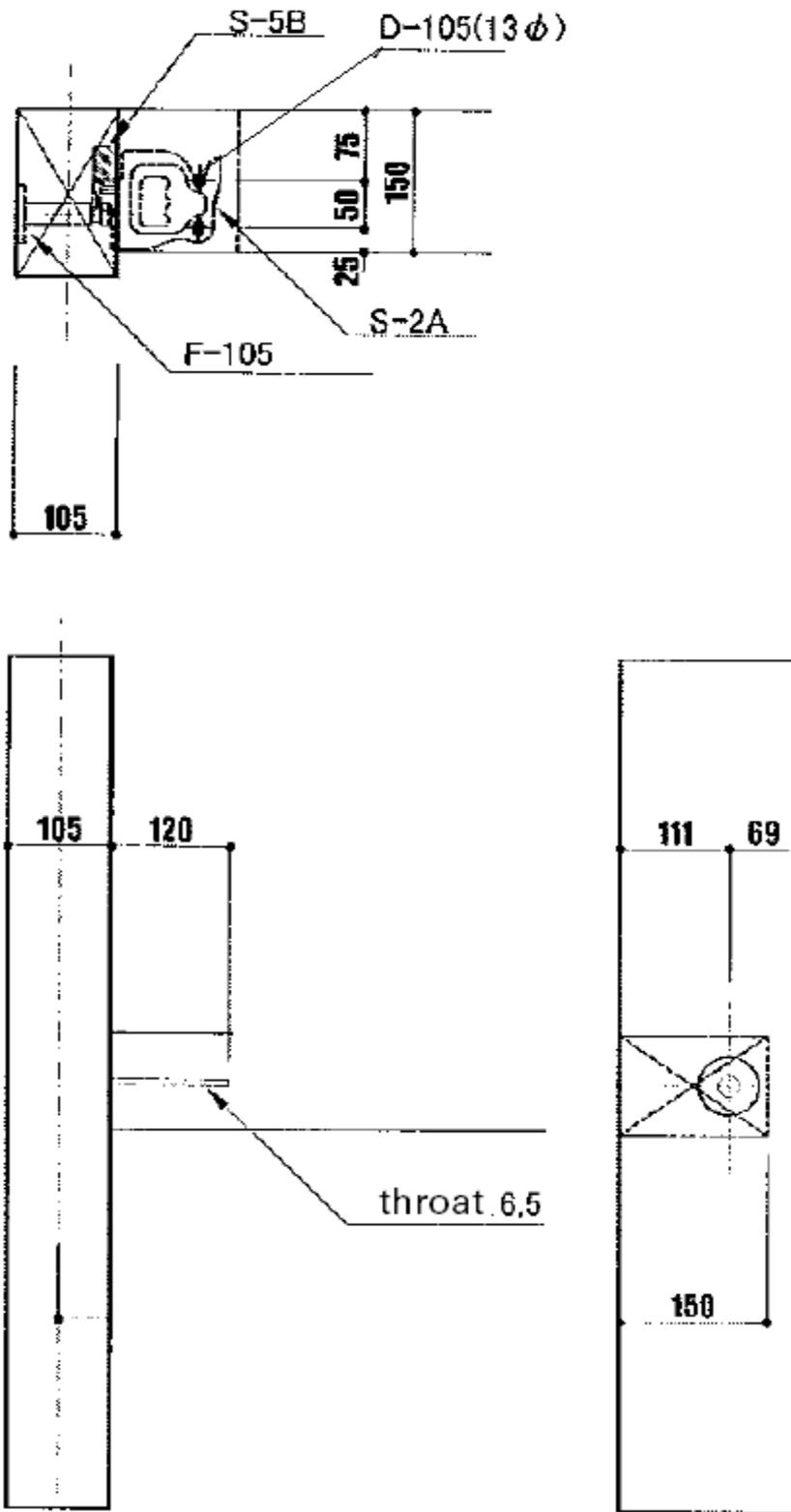




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S2-A type connector. Description

Annex B1

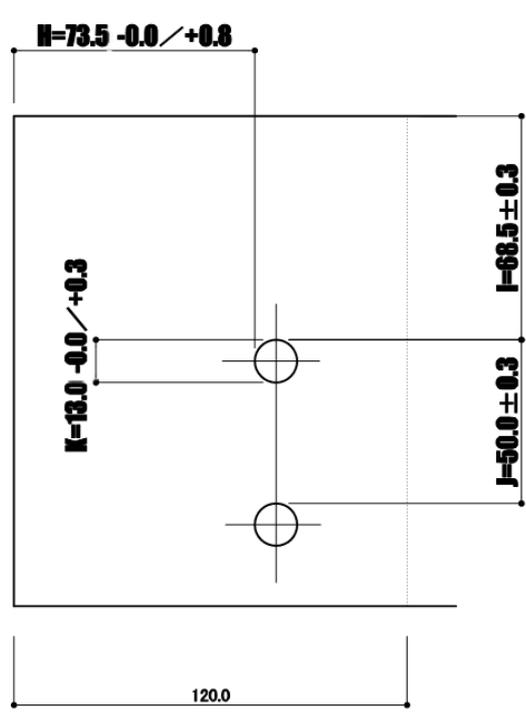
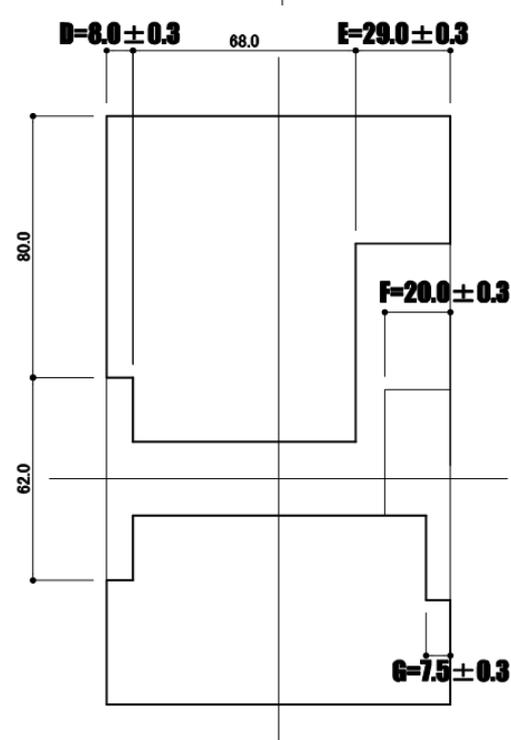
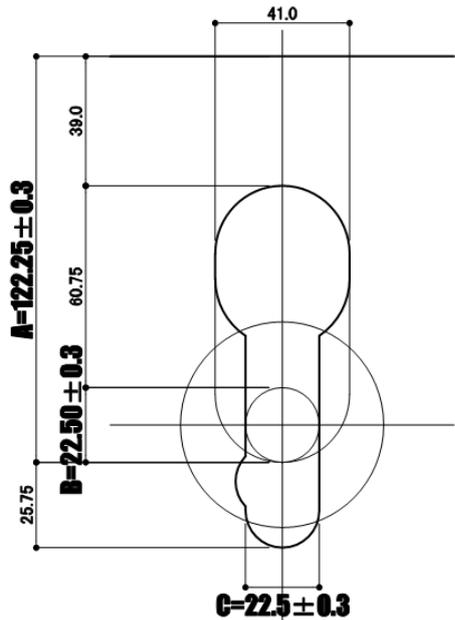


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S-2A type connectors implementation

Annex B1

# S-2A

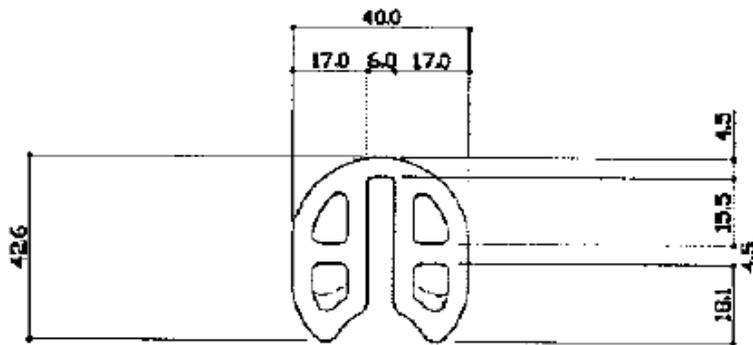
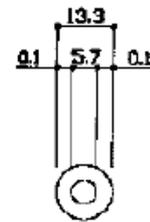
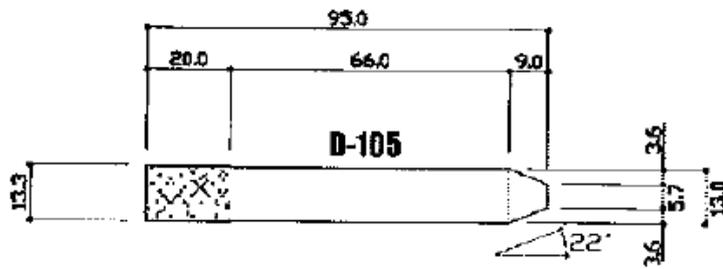
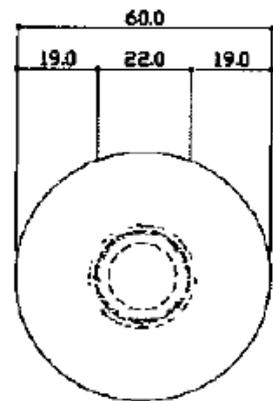
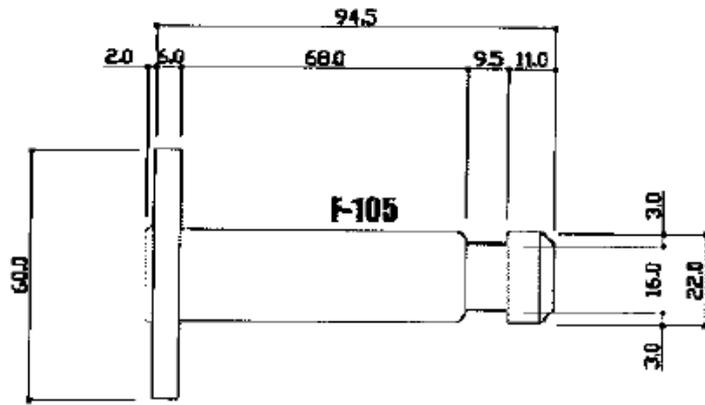


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S-2A type connectors. Wood tolerances

Annex B1

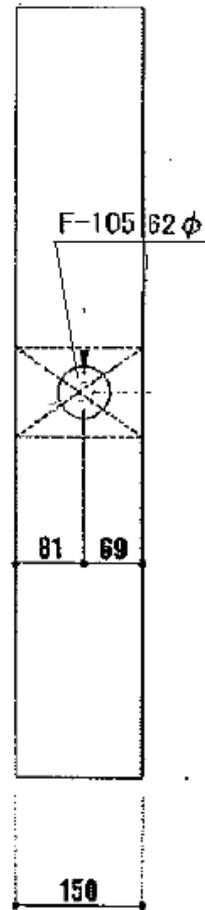
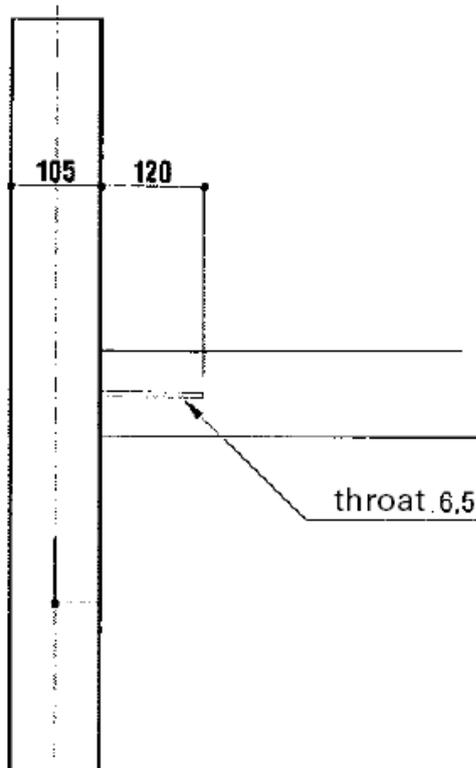
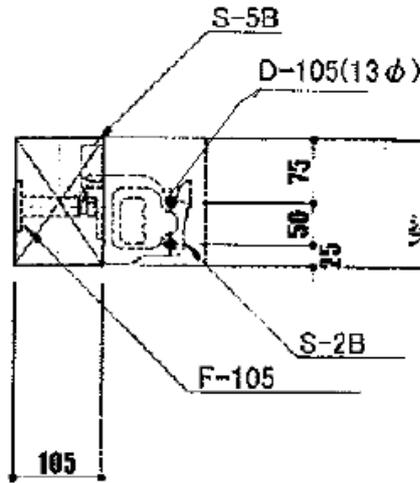




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S-2B type connector. Description

Annex B2

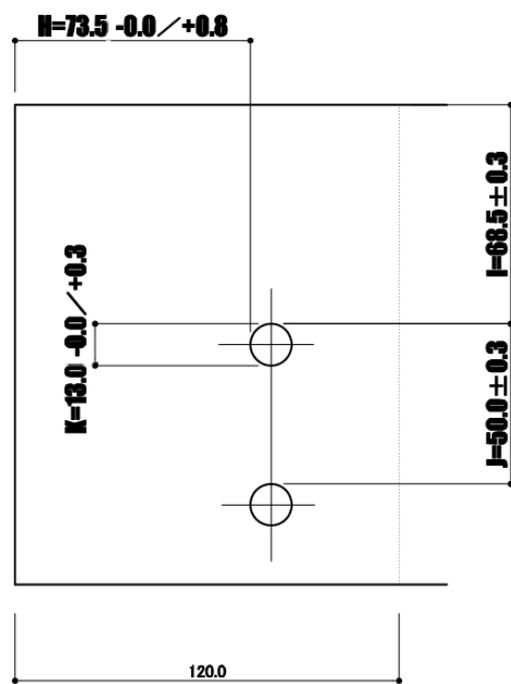
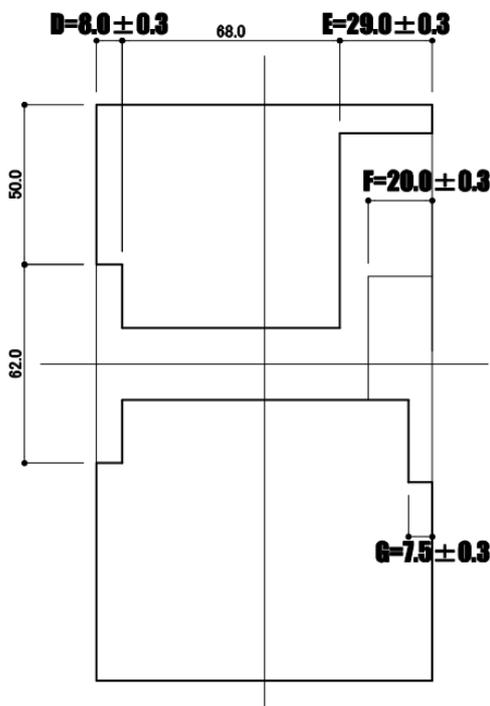
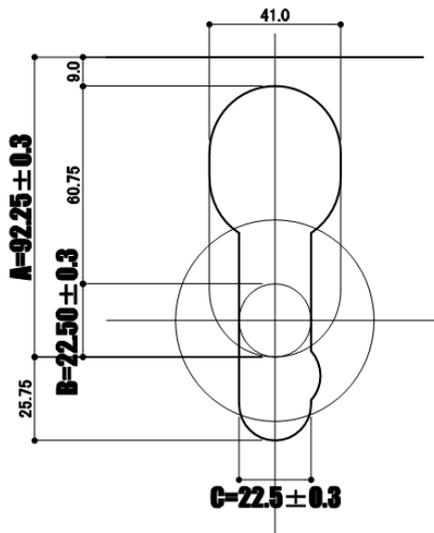


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S-2B type connectors. Implementation

Annex B2

# S-2B



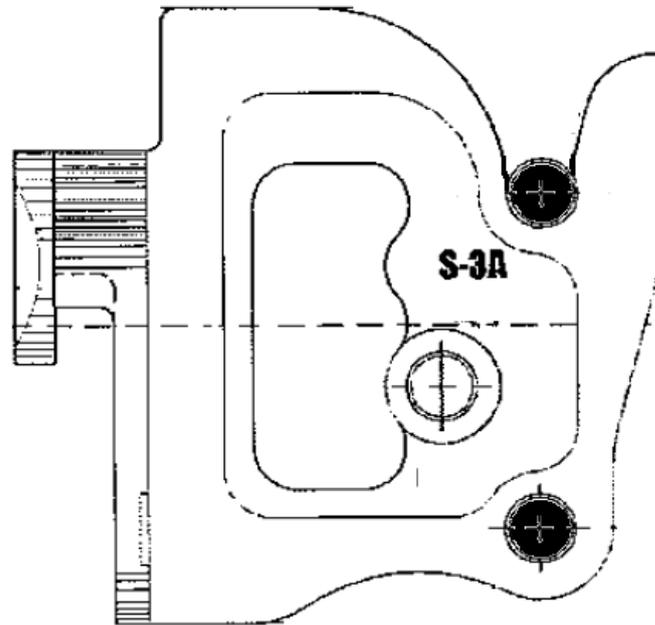
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S-2B type connectors. Wood tolerances

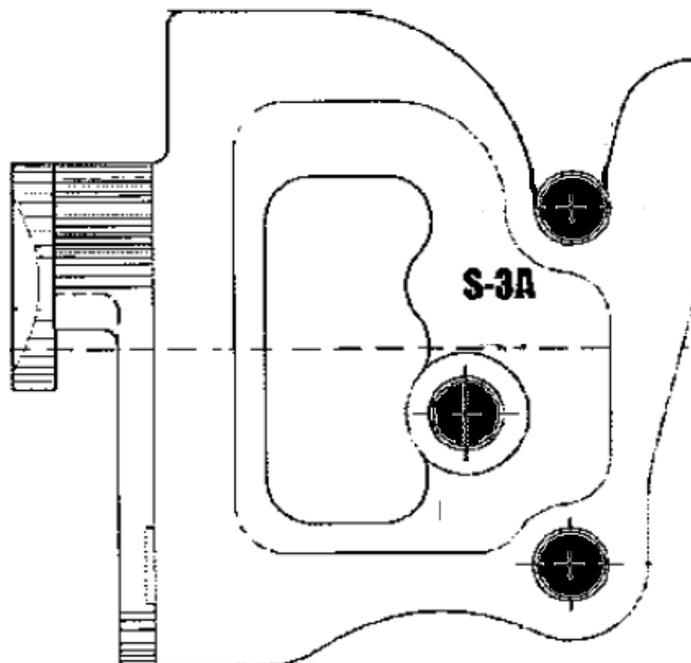
Annex B2



**Partial holes filling implementation (2 pins)**



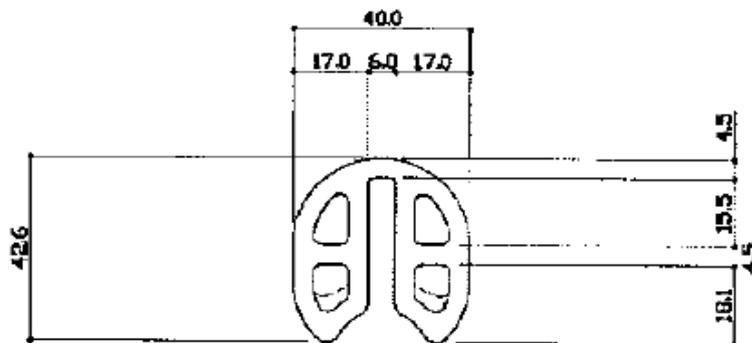
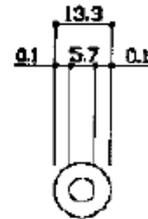
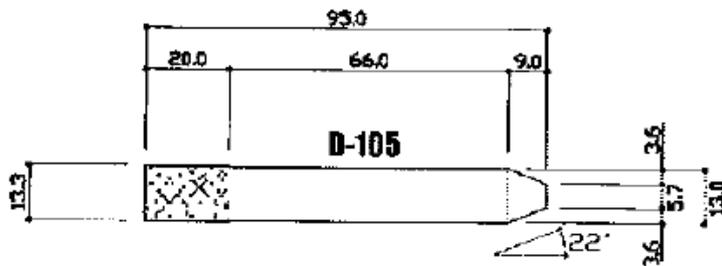
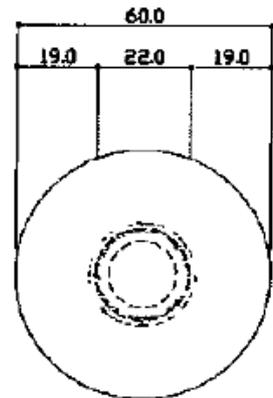
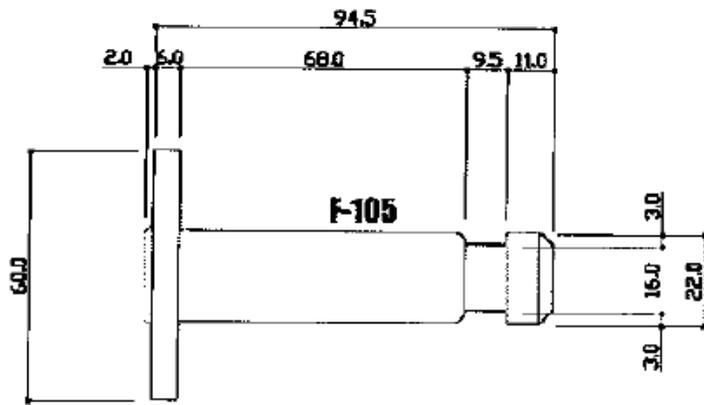
**Full filling implementation (3 pins)**



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S-3A type connectors description

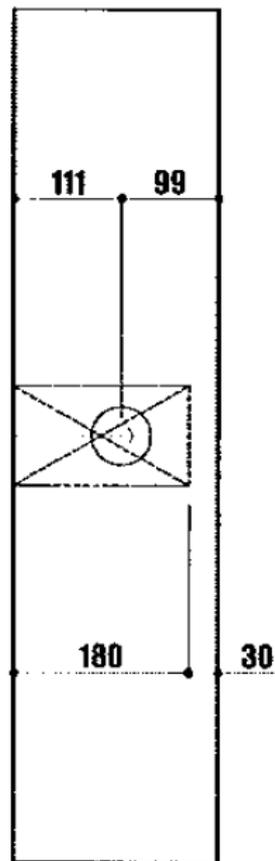
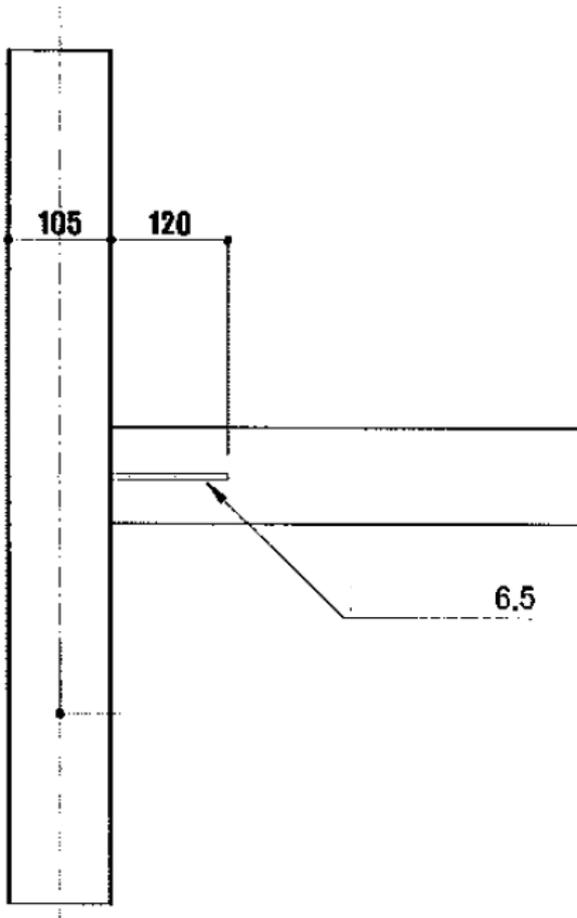
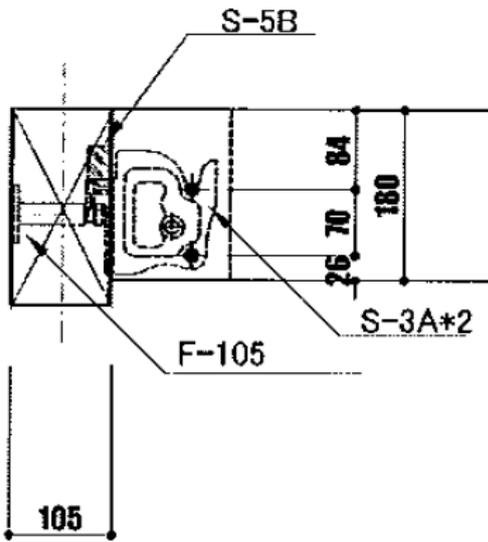
Annex B3



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S-3A type connectors description

Annex B3

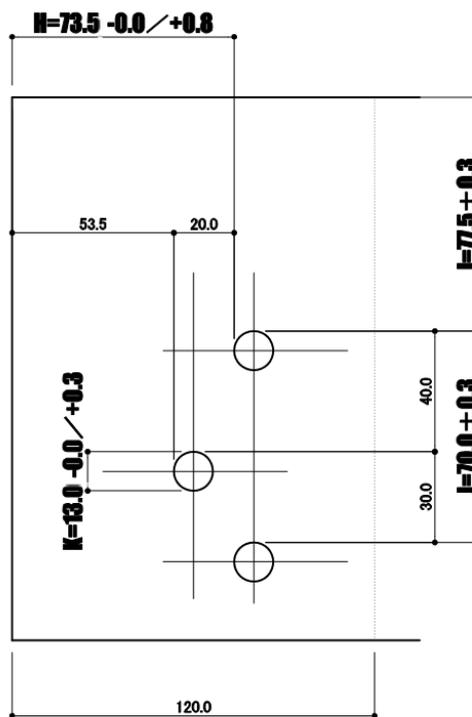
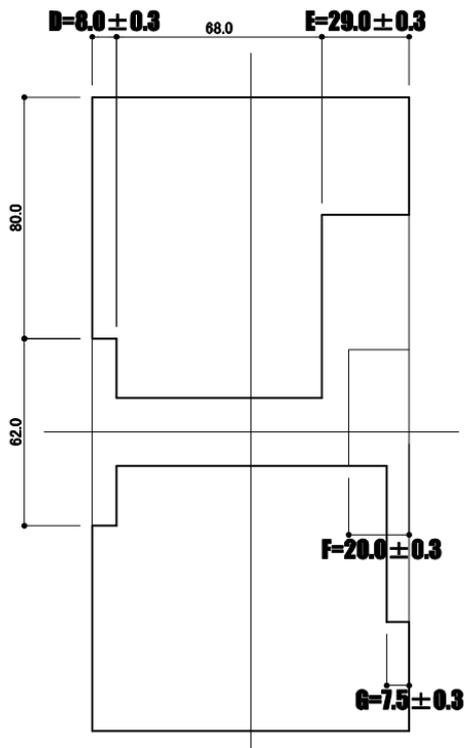
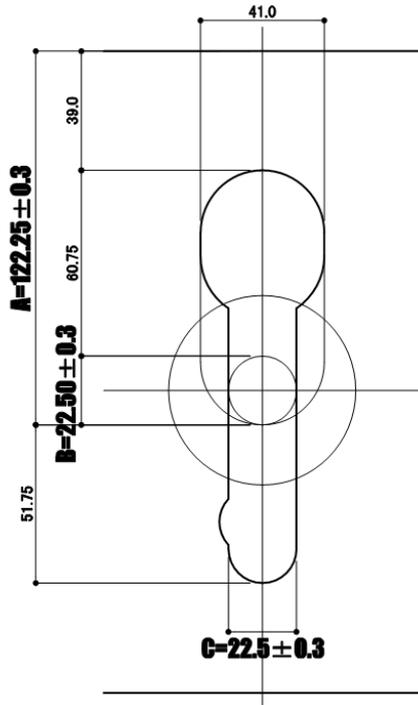


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S-3A type connectors implementation

Annex B3

# S-3A



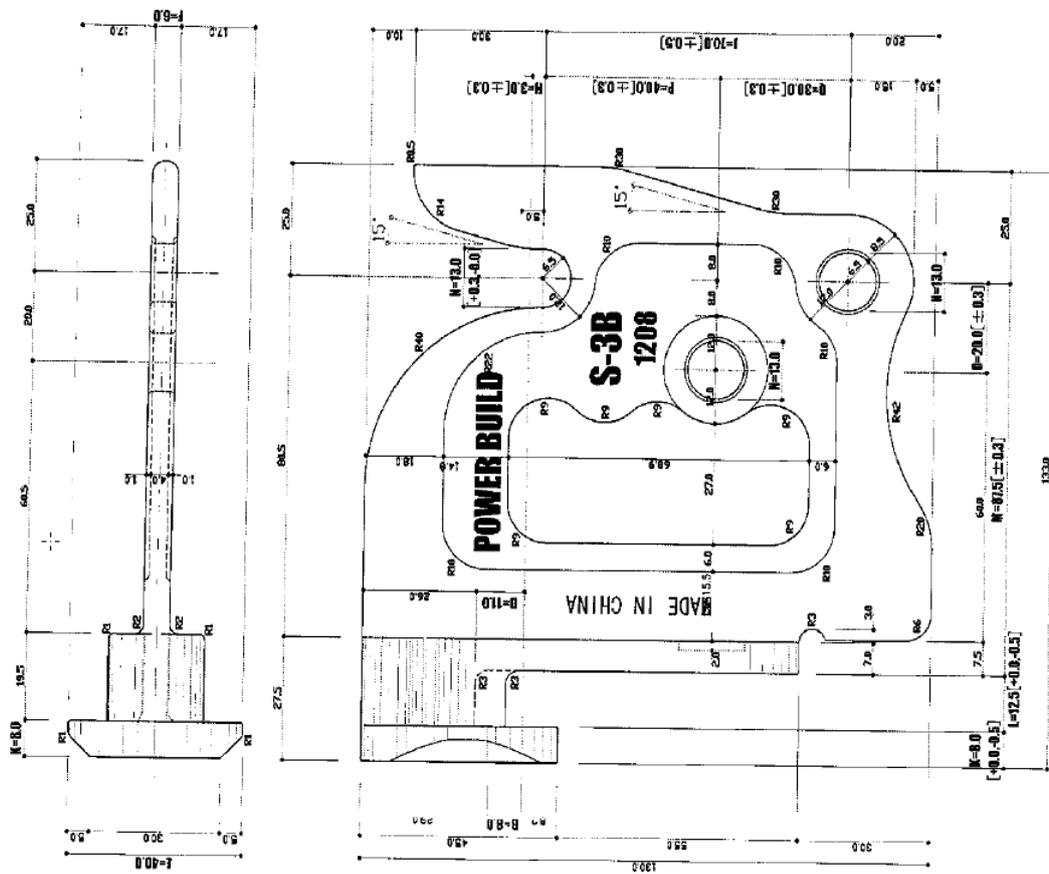
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S-3A type connectors. Wood tolerances

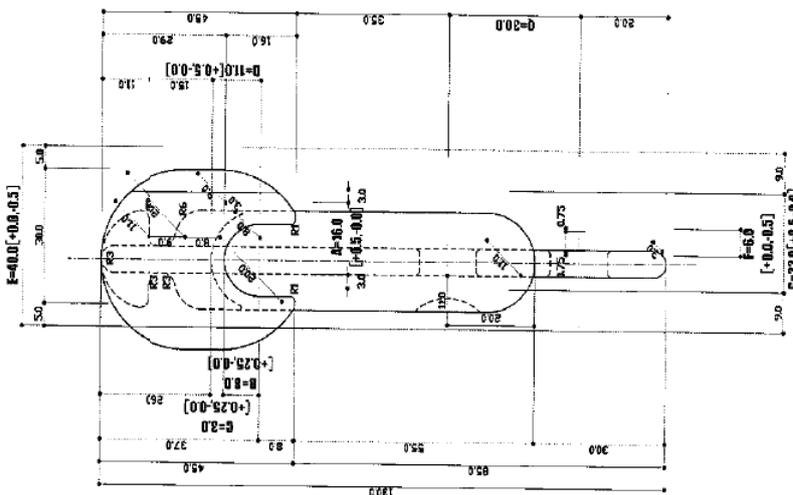
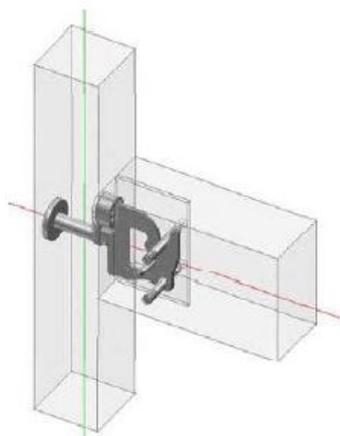
Annex B3

### S-3B

The S-3B concealed beam hanger is available in one single dimension as described below. The two implemntations possibilities described below are covered by this ETA



### S-3B

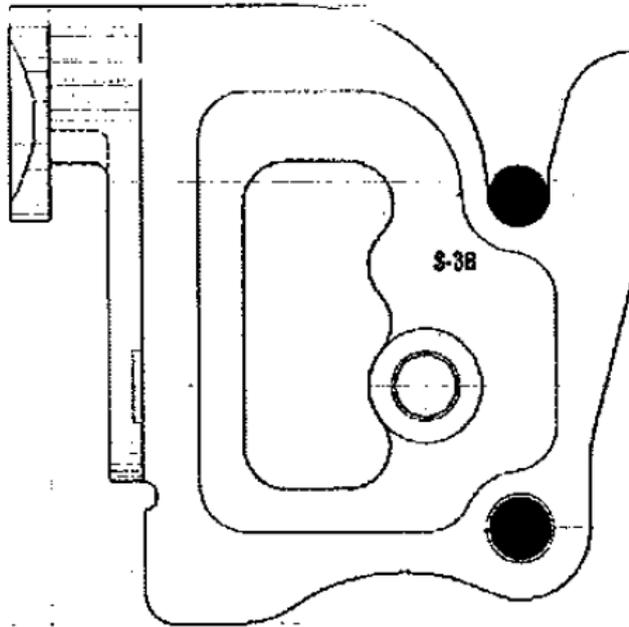


SUTEKI Europe N.V / POWERBUILD

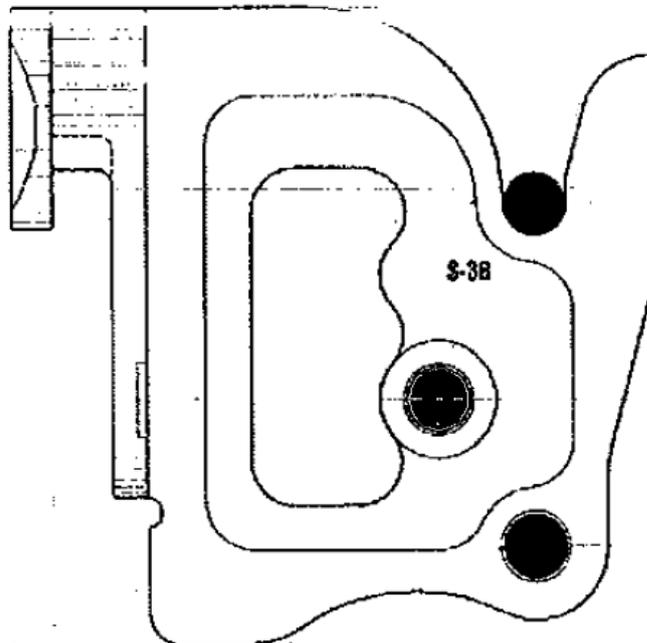
S-3B type connectors description

Annex B4

**Partial holes filling implementation (2 pins)**



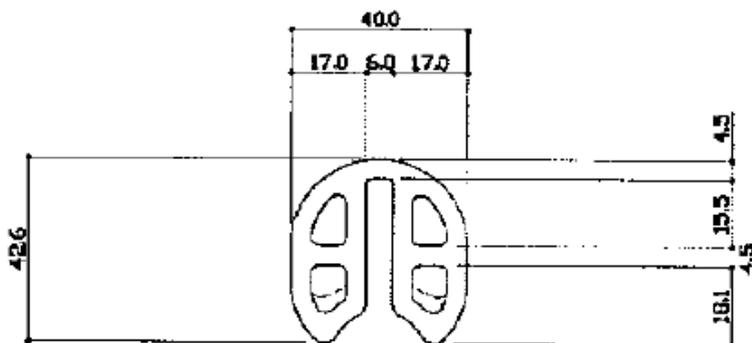
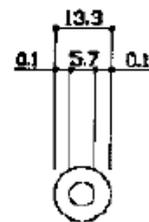
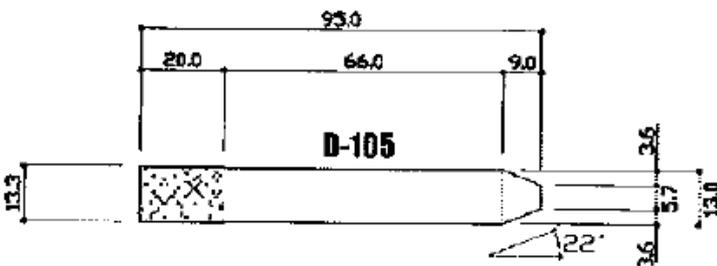
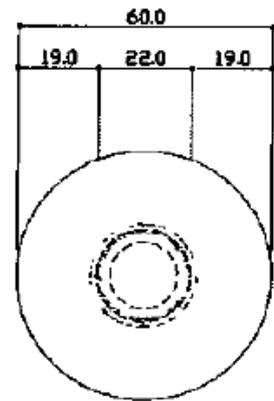
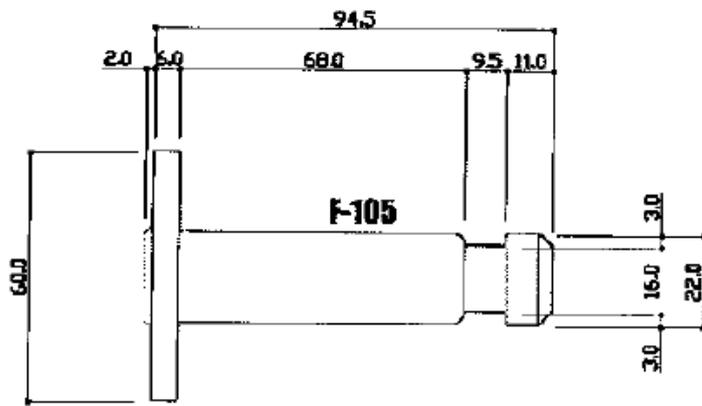
**Full filling implementation (3 pins)**



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S-3B type connectors description

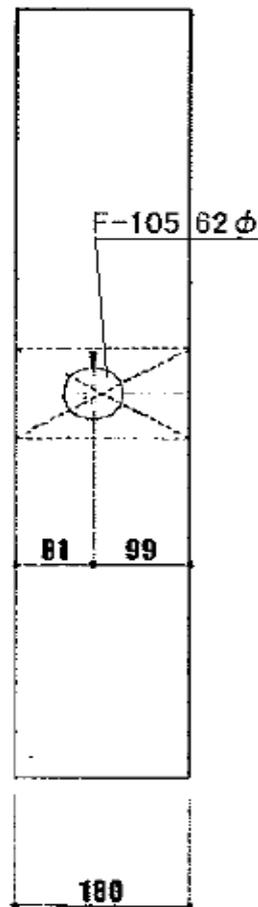
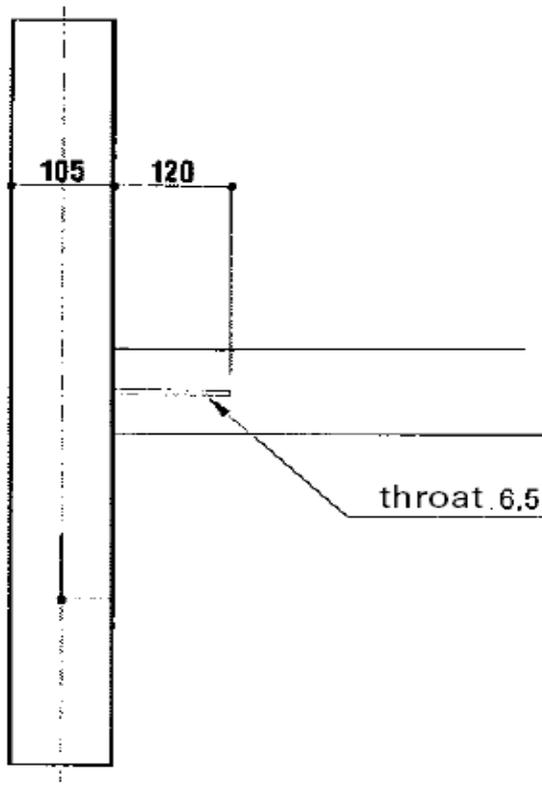
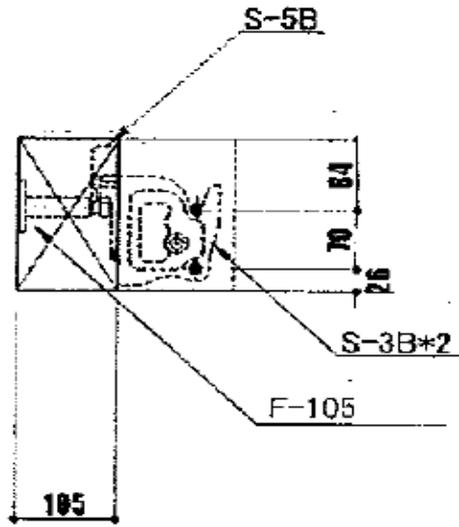
Annex B4



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S-3B type connectors description

Annex B4



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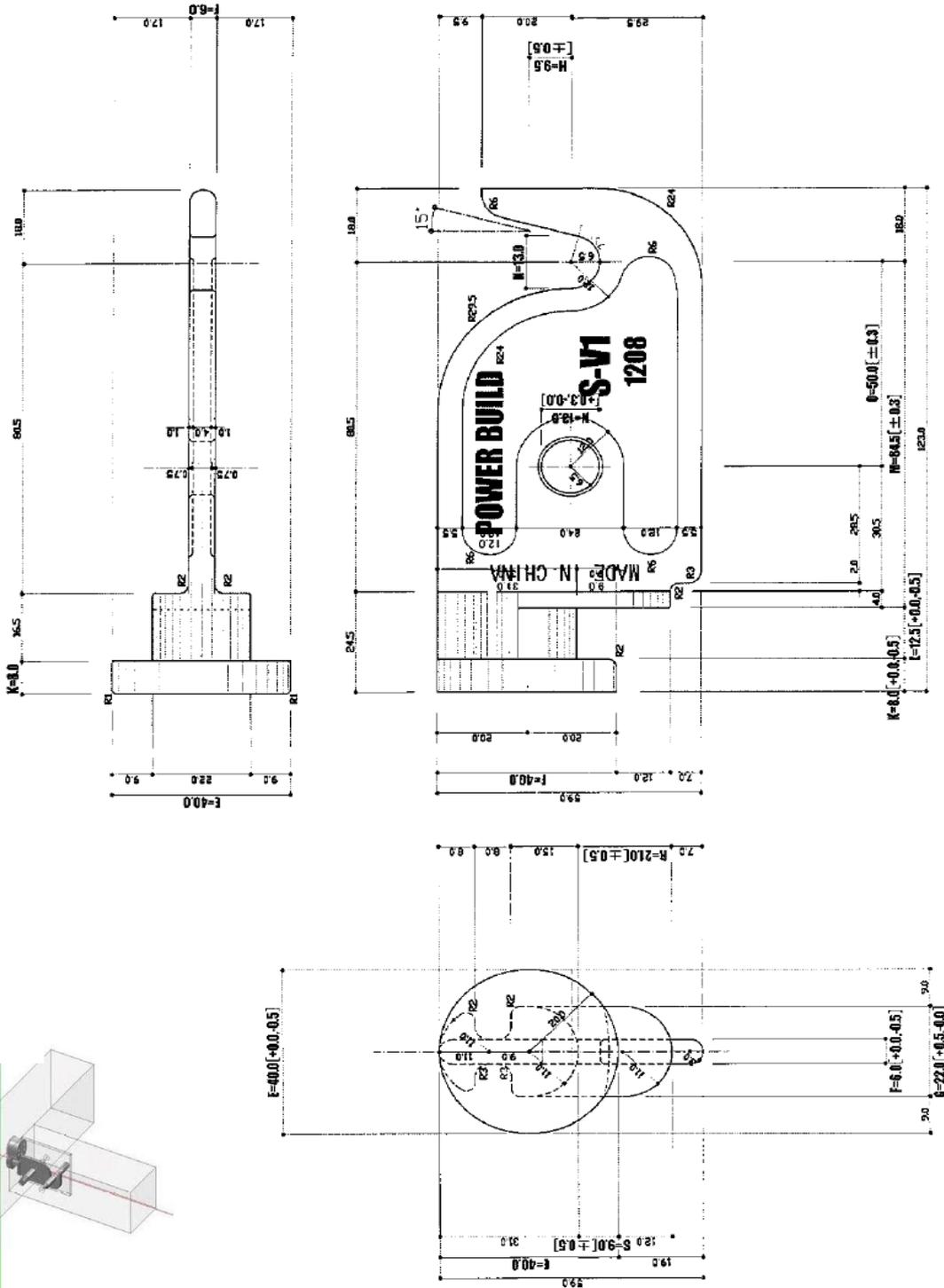
S-3B type connectors. Implementation

Annex B4

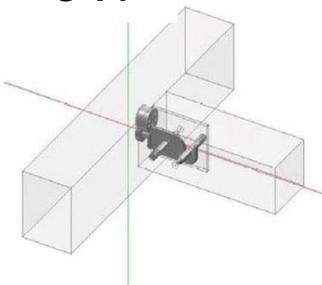


## S-V1

The S-V1 concealed beam hanger is available in one single dimension as described below. Only the full holes implementation is covered by this ETA



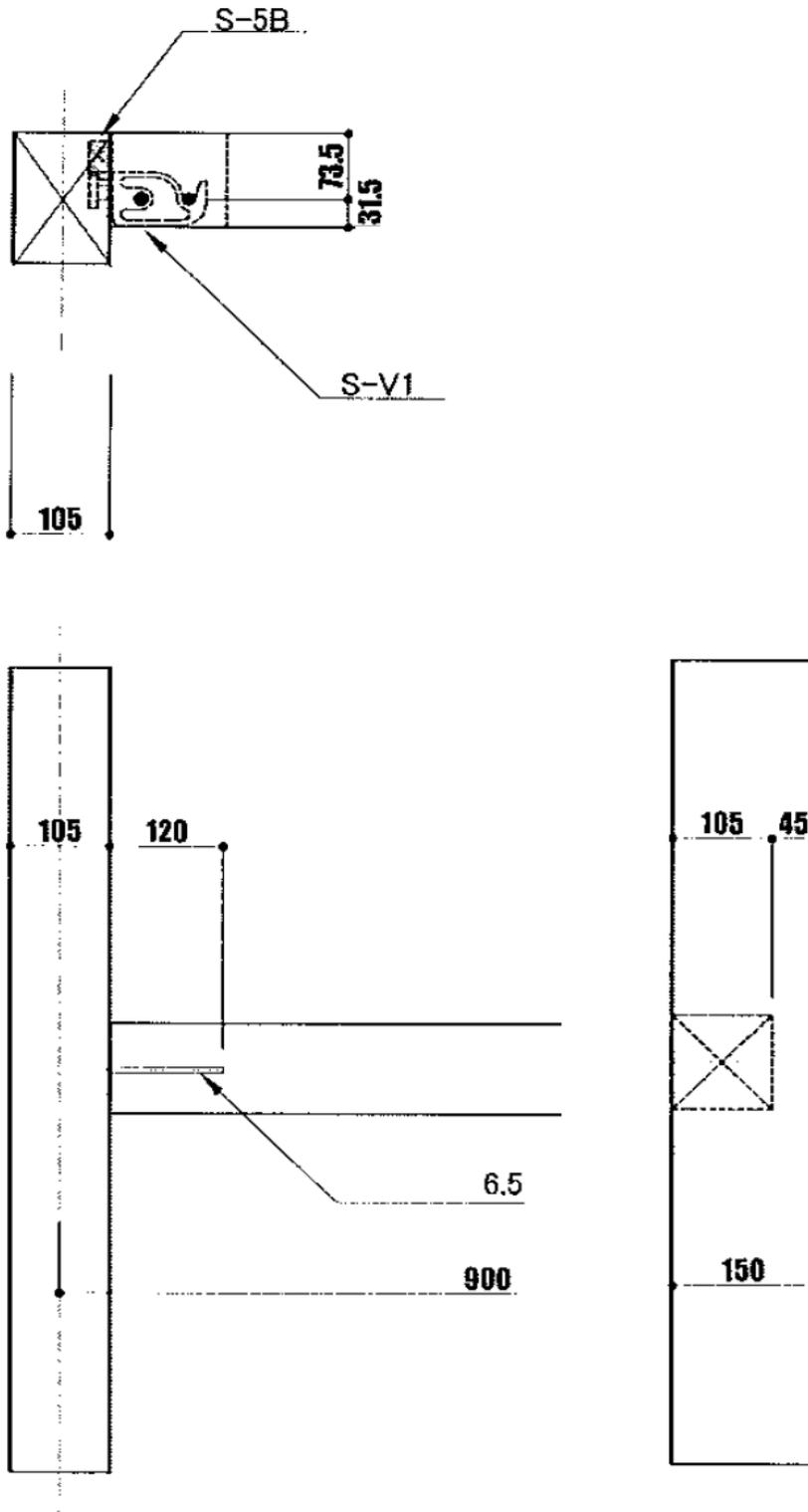
S-V1



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S-V1 type connector description

Annex B5

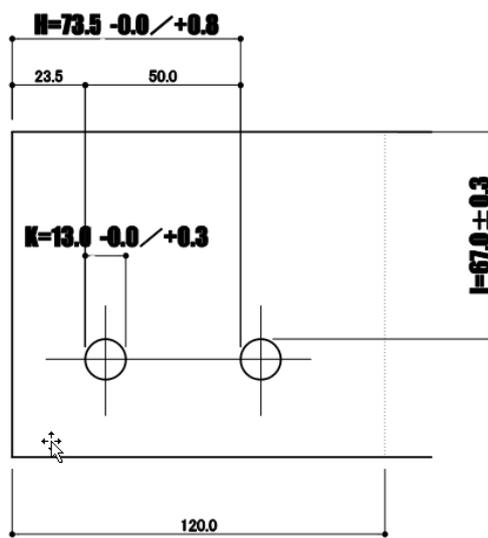
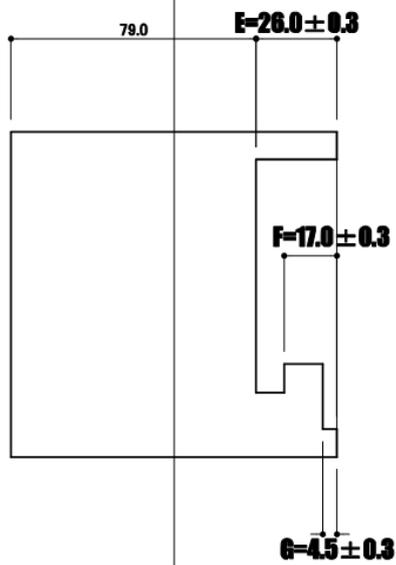
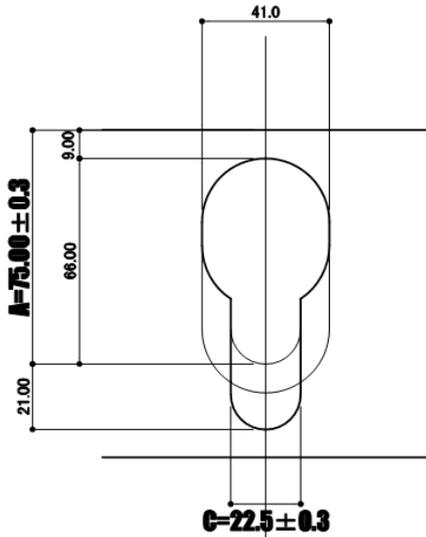


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S-V1 type connector implementation

Annex B5

# S-V1



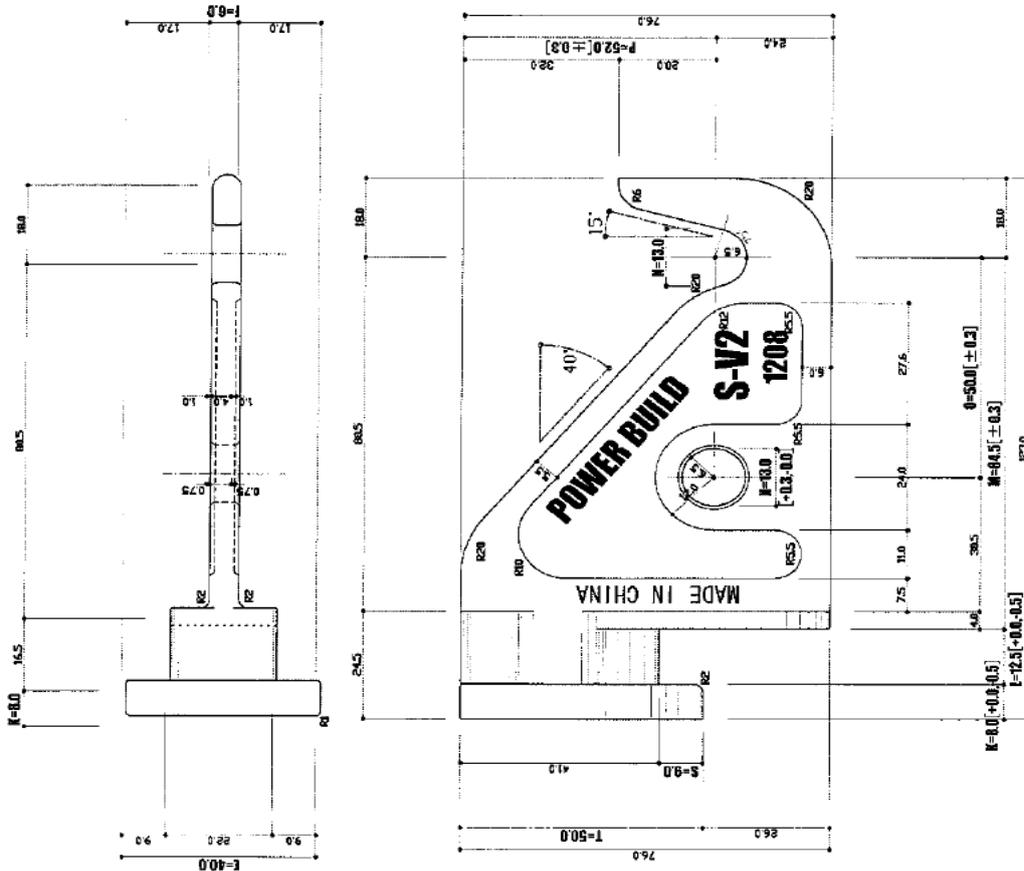
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S-V1 type connector. Wood tolerance

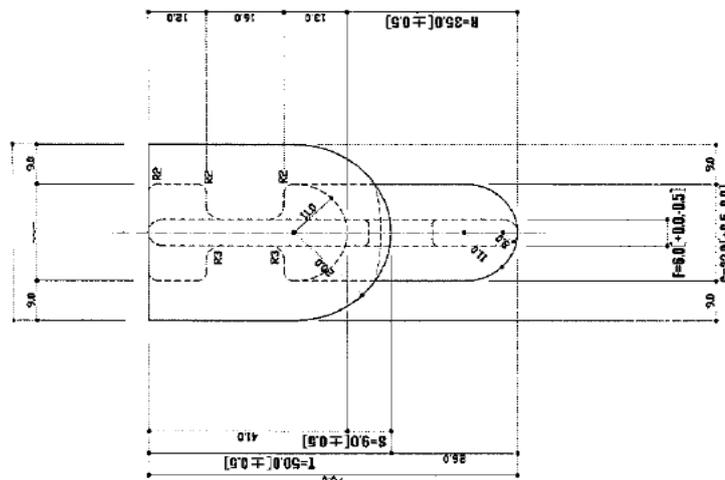
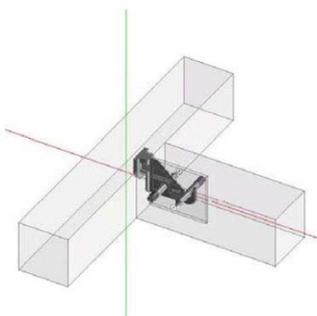
Annex B5

## S-V2

The S-V2 concealed beam hanger is available in one single dimension as described below. Only the full holes implementation is holes implementation is covered by this ETA



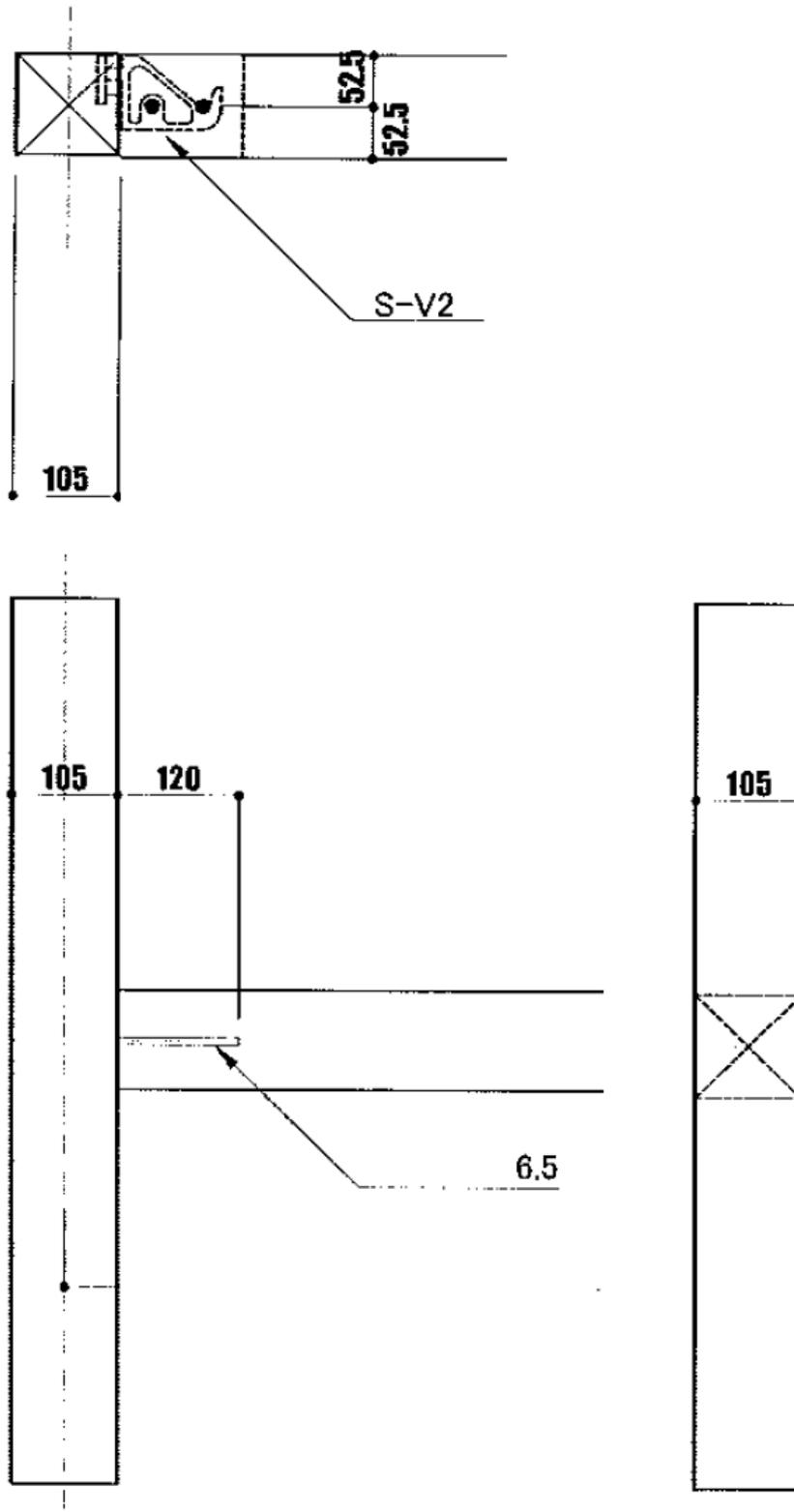
## S-V2



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S-V2 type connector description

Annex B6

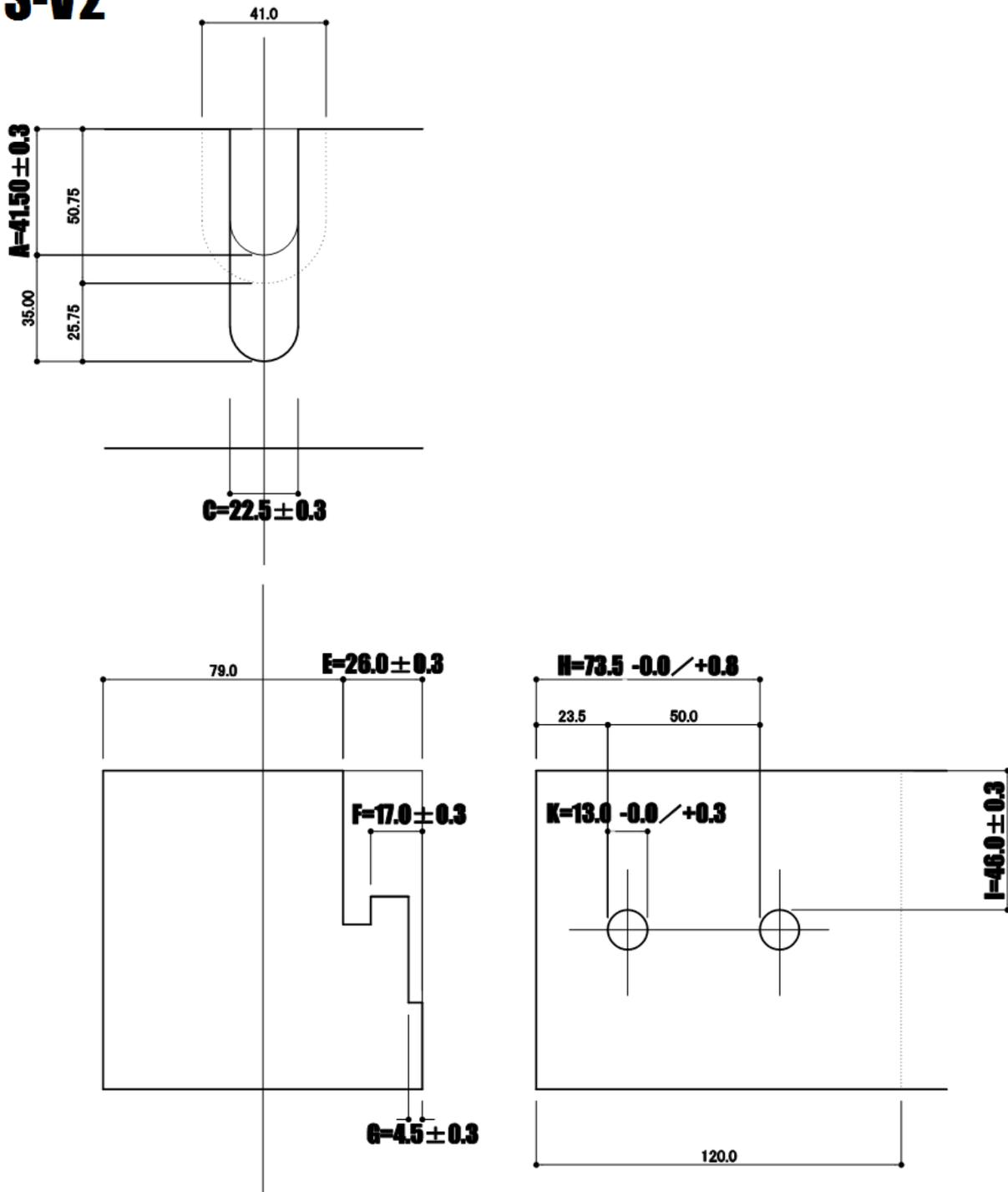


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S-V2 type connector. Implementation

Annex B6

# S-V2



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S-V2 type connector. Wood tolerances

Annex B6

## Specifications of intended use

### **Hold down and concealed beam hangers subject to:**

Static or quasi-static loads only.

### **Requirements for the post, beam and sills**

The wood members can only be of glued laminated timber classified as GL24 or a higher grade according to EN 14080 and made with European Red or white Pine.

The characteristic density of the wood members shall be at least  $350 \text{ kg/m}^3$ .

Glulam pieces are pre-cutted in factories; All the tolerances for wood and connectors installation as described in Annex A and B have to be strictly respected to warrantee the performance level given in the following tables.

The following characteristic resistance values are to be taken as they are indicated into the following table. The use of  $K_h$  dimension factor as indicated in § 3.3 of EN 1995-1-1 is not permitted.

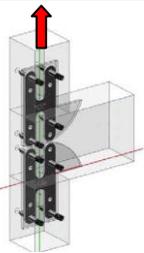
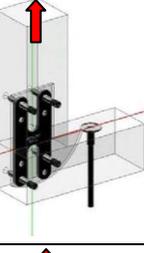
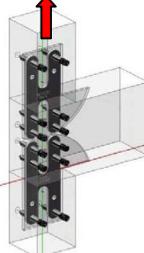
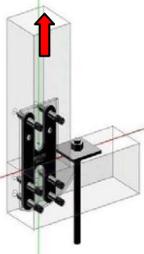
The resistance values given in this ETA have been evaluated by realizing full testing campaign. The results have shown a hundred percent of wood failure for both hold down and concealed beam hangers.

In case of use with concrete support (hold down), concrete shall be specified according to EN 206-1 with a resistance class allowing to get a wood failure. Failure of concrete anchorage part of the hold down connexion is not permitted. The fixation device into the concrete shall have been subjected to an ETA. The wood part of this device ( diameter of bar, dimensions of plates and washer..) shall comply with specifications of Annex A and B.

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**Load characteristic values**

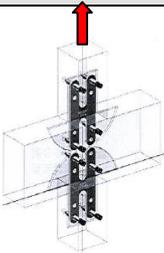
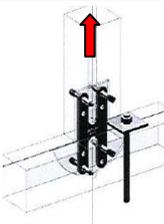
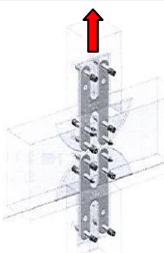
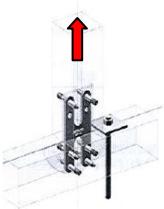
**Annex C**

N°	Type	Pins number diameter and length	Post section	Beam or Sill section	Characteristic elastic resistance ( $R_{y,k}$ ) values for load direction <u>UP</u> (KN)
1	HD-H4	 8 x $\varnothing$ 13-105 or 120 mm	105 mm x 105 mm OR 120 mm x 120 mm	105 mm or 120 mm x 150 to 450 mm	$R_{y,k}= 8,58$
2	HD-H4	 4 x $\varnothing$ 13-105 or 120mm	105 mm x 105 mm OR 120 mm x 120 mm	105 mm x 105 mm OR 120 mm x 120 mm	$R_{y,k}= 10,2$
3	HD-H6	 12 x $\varnothing$ 13-105 or 120mm	105 mm x 105 mm OR 120 mm x 120 mm	105 mm or 120 mm x 150 to 450 mm	$R_{y,k}=13,8$
4	HD-H6	 12 x $\varnothing$ 13-105 or 120mm mm	105 mm x 105 mm OR 120 mm x 120 mm	105 mm x 105 mm OR 120 mm x 120 mm	$R_{y,k}=14,9$

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Load characteristic values

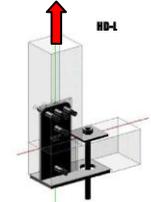
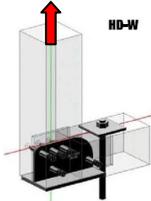
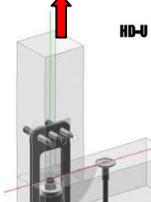
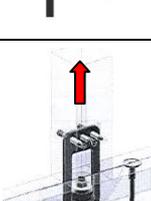
Annex C

N°	Type	Pins number diameter and length	Post section	Beam section	Characteristic elastic resistance ( $R_{y,k}$ ) values for load direction <u>UP</u> (KN)	
5	HD-H4		4 x Ø13-105 or 120mm	105 mm x 105 mm OR 120 mm x 120 mm	105 mm or 120 mm x 150 to 450 mm	$R_{y,k}=16,0$
6	HD-H4		4 x Ø13-105 or 120mm	105 mm x 105 mm OR 120 mm x 120 mm	105 mm x 105 mm OR 120 mm x 120 mm	$R_{y,k}=20,1$
7	HD-H6		6 x Ø13-105 or 120mm	105 mm x 105 mm OR 120 mm x 120 mm	105 mm or 120 mm x 150 to 450 mm	$R_{y,k}=19,1$
8	HD-H6		6 x Ø13-105 or 120mm	105 mm x 105 mm OR 120 mm x 120 mm	105 mm x 105 mm OR 120 mm x 120 mm	$R_{y,k}=27,7$

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Load characteristic values

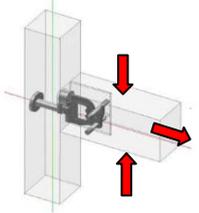
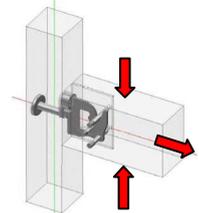
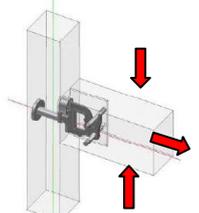
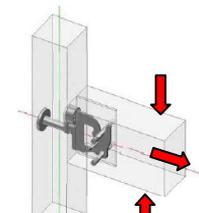
Annex C

	N°	Type	Pins diameter and length	Post section	Sill section	Characteristic elastic resistance ( $R_{y,k}$ ) values for load direction <u>UP</u> (KN)
9	HD-L		Ø13-105 or 120 mm	105 mm x 105 mm OR 120 mm x 120 mm	105 mm x 105 mm OR 120 mm x 120 mm	$R_{y,k} = 24,3$
10	HD-W		Ø13-105 or 120 mm	105 mm x 105 mm OR 120 mm x 120 mm	105 mm x 105 mm OR 120 mm x 120 mm	$R_{y,k} = 24,1$
11	HD-U		Ø13-105 or 120 mm	105 mm x 105 mm OR 120 mm x 120 mm	105 mm x 105 mm OR 120 mm x 120 mm	$R_{y,k} = 53,5$
12	HD-U		Ø13-105 or 120 mm	105 mm x 105 mm OR 120 mm x 120 mm	105 mm x 105 mm OR 120 mm x 120 mm	$R_{y,k} = 53,5$

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Load characteristic values

Annex C

N°	Type	Pins number diameter and length	Post/header section	Beam section	Characteristic Ultimate ( $R_k$ ) and elastic ( $R_{y,k}$ ) resistance values for each load direction (KN)			
					UP	DOWN	TRACTION (horizontale)	
13	S-2A		2 x $\varnothing$ 13-105 mm or 120 mm	105 mm x 105 mm Or 120 mm x 120 mm	105 mm or 120 mm x 150 to 240 mm	$R_{y,k} = 5,69$	$R_{y,k} = 12,5$	$R_{y,k} = 18,2$
14	S-3A		2 x $\varnothing$ 13-105 mm or 120 mm	105 mm x 105 mm Or 120 mm x 120 mm	105 mm or 120 mm x 180 to 450 mm	$R_{y,k} = 4,24$	$R_{y,k} = 17,6$	$R_{y,k} = 19,5$
			3 x $\varnothing$ 13-105 mm or 120 mm	105 mm x 105 mm Or 120 mm x 120 mm	105 mm or 120 mm x 180 to 450 mm	$R_{y,k} = 6,58$	$R_{y,k} = 22,0$	$R_{y,k} = 19,5$
15	S-2B		2 x $\varnothing$ 13-105 mm or 120 mm	105 mm x 150 mm to 450 Or 120 mm x 120 mm	105 mm or 120 mm x 150 to 240 mm	$R_{y,k} = 5,69$	$R_{y,k} = 12,5$	$R_{y,k} = 18,8$
16	S-3B		2 x $\varnothing$ 13-105 mm or 120 mm	105 mm x 180 mm to 450 Or 120 mm x 120 mm	105 mm or 120 mm x 180 to 450 mm	$R_{y,k} = 4,24$	$R_{y,k} = 17,6$	$R_{y,k} = 19,5$
			3 x $\varnothing$ 13-105 mm or 120 mm	105 mm x 180 mm to 450 Or 120 mm x 120 mm	105 mm or 120 mm x 180 to 450 mm	$R_{y,k} = 6,58$	$R_{y,k} = 22,0$	$R_{y,k} = 19,5$

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Load characteristic values

Annex C