# DISC FLAT

VIDEO

CE ETA 19/0706

## REMOVABLE CONCEALED CONNECTOR

### COMBINED LOADS
Combined shear-tensile load bearing capacity due to tightening provided by the pass-through rod. CE mark according to ETA.

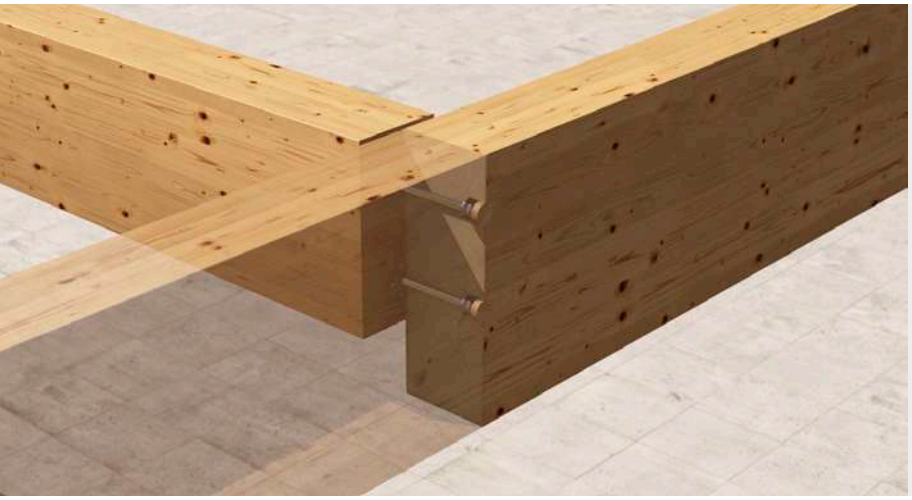
### PRACTICAL
Simple to install thanks to the possibility of being tightened after the assembly. Fast and precise fastening thanks to LBS screws.

### DISASSEMBLED
Usable for temporary structures, it can be easily removed thanks to the pass-through rod.

## CHARACTERISTICS

| | |
|---|---|
| **FOCUS** | universal joints |
| **TIMBER SECTIONS** | from 100 x 100 mm to 280 x 280 mm |
| **STRENGTH** | $R_v$ over 60 kN, $R_{ax}$ over 100 kN |
| **FASTENERS** | LBS, KOS |

VIDEO
Scan the QR Code and watch the video on our YouTube channel



## MATERIAL
Bright zinc plated carbon steel, three dimensional perforated plate.

## FIELDS OF USE
Timber-to-timber shear joints along all directions of the secondary beam
- solid timber and glulam
- CLT, LVL
- timber based panels


## AESTHETICS

Completely concealed joint to ensure a pleasant aesthetic appearance.

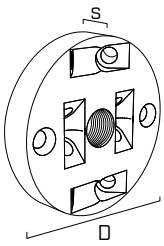
## VERSATILITY

Usable in various applications, allowing to realize shear and tensile joints among the timber elements.

## CODES AND DIMENSIONS

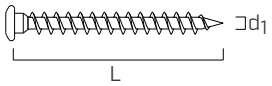
| CODE | D [mm] | s [mm] | M [mm] | $n_{0°} + n_{45°}$ | pcs |
|---|---|---|---|---|---|
| **DISCF55** | 55 | 10 | 12 | 10 | 16 |
| **DISCF80** | 80 | 15 | 16 | 10 | 8 |
| **DISCF120** | 120 | 15 | 20 | 18 | 4 |

Screws not included in the box.



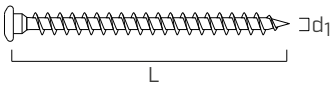

### LBS for DISCF55

| CODE | $d_1$ [mm] | L [mm] | b [mm] | TX | pcs |
|---|---|---|---|---|---|
| **LBS550** | 5 | 50 | 46 | TX20 | 200 |
| **LBS560** | 5 | 60 | 56 | TX20 | 200 |
| **LBS570** | 5 | 70 | 66 | TX20 | 200 |




### LBS for DISCF80 and DISCF120

| CODE | $d_1$ [mm] | L [mm] | b [mm] | TX | pcs |
|---|---|---|---|---|---|
| **LBS760** | 7 | 60 | 55 | TX30 | 100 |
| **LBS780** | 7 | 80 | 75 | TX30 | 100 |
| **LBS7100** | 7 | 100 | 95 | TX30 | 100 |



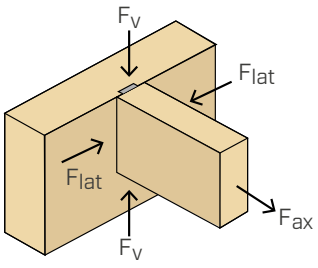

### MATERIAL AND DURABILITY

DISC FLAT: bright zinc plated carbon steel.
To be used in service classes 1 and 2 (EN 1995-1-1).

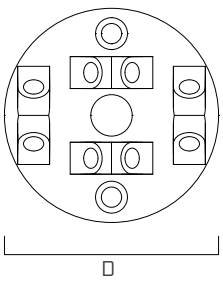
### FIELDS OF USE

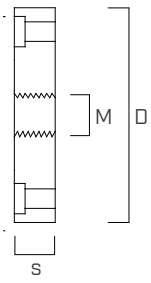
- Timber-to-timber joints between solid timber, glulam, LVL and CLT structural elements
- Timber-to-steel joints
- Timber to concrete joints

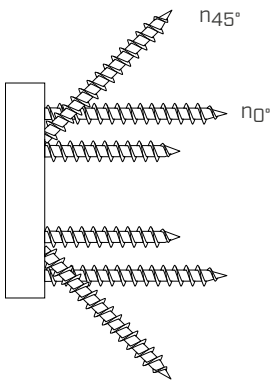
### EXTERNAL LOADS




## GEOMETRY



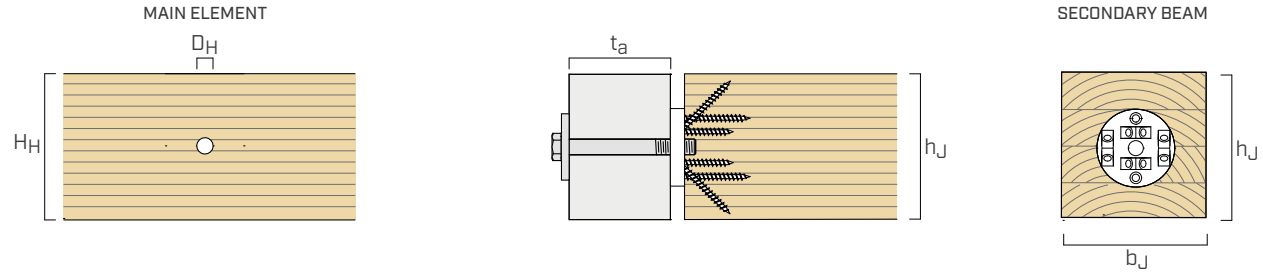
## MINIMUM DIMENSIONS

| DISC FLAT CONNECTOR | SCREWS | SECONDARY BEAM | | MAIN ELEMENT | | | |
|---|---|---|---|---|---|---|---|
| | Ø x L [mm] | $b_{J,min}$ [mm] | $h_{J,min}$ [mm] | $H_{H,min}$* [mm] | $D_H$ [mm] | $S_F$ [mm] | $D_F$ [mm] |
| **DISCF55** | LBS Ø5 x 50 | 100 | 100 | 110 | 13 | 11 | 56 |
| | LBS Ø5 x 60 | 110 | 110 | 115 | | | |
| | LBS Ø5 x 70 | 130 | 130 | 130 | | | |
| **DISCF80** | LBS Ø7 x 60 | 120 | 120 | 150 | 17 | 16 | 81 |
| | LBS Ø7 x 80 | 150 | 150 | 165 | | | |
| | LBS Ø7 x 100 | 180 | 180 | 180 | | | |
| **DISCF120** | LBS Ø7 x 80 | 160 | 160 | 200 | 21 | 16 | 121 |
| | LBS Ø7 x 100 | 190 | 190 | 215 | | | |

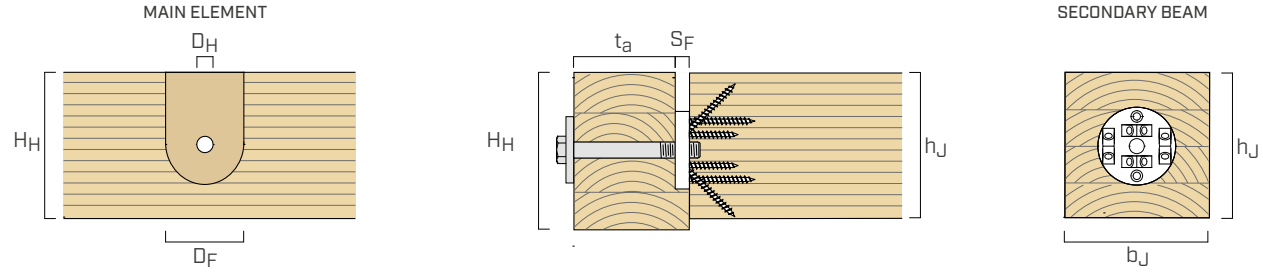
* $H_{H,min}$ is only valid in case of installation with grooving. For installation without grooving, the minimum bolt distances according to EN 1995-1-1 apply.

## INSTALLATION

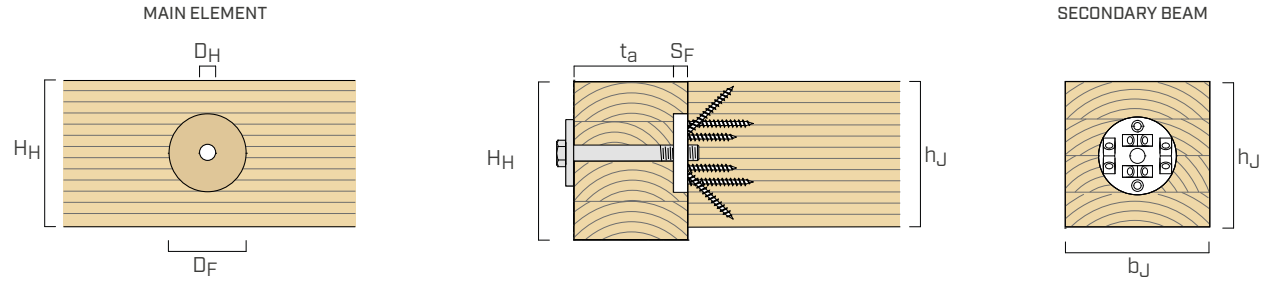
### WITHOUT SLOT




### WITH OPEN SLOT



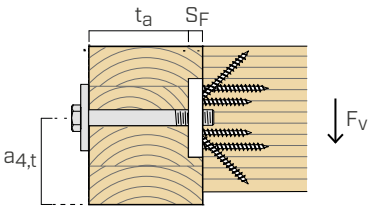

### WITH ROUND SLOT



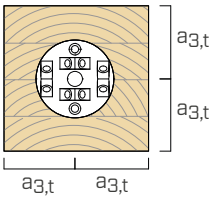
## SPACING

| connector | screws Ø x L [mm] | $a_1$ [mm] | $a_{3,t}$ [mm] | $a_{4,t}$ [mm] |
|---|---|---|---|---|
| DISCF55 | LBS Ø5 x 50 | 90 | 50 | 60 |
| | LBS Ø5 x 60 | 105 | 55 | |
| | LBS Ø5 x 70 | 120 | 65 | |
| DISCF80 | LBS Ø7 x 60 | 110 | 60 | 90 |
| | LBS Ø7 x 80 | 140 | 75 | |
| | LBS Ø7 x 100 | 170 | 90 | |
| DISCF120 | LBS Ø7 x 80 | 150 | 80 | 120 |
| | LBS Ø7 x 100 | 180 | 95 | |

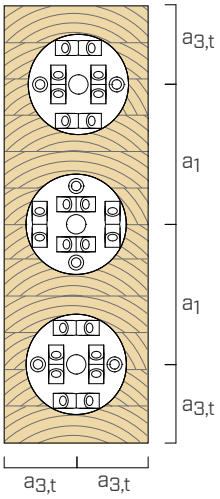
MAIN ELEMENT
INSTALLATION WITH GROOVING




SECONDARY BEAM
SINGLE INSTALLATION




SECONDARY BEAM
MULTIPLE INSTALLATION

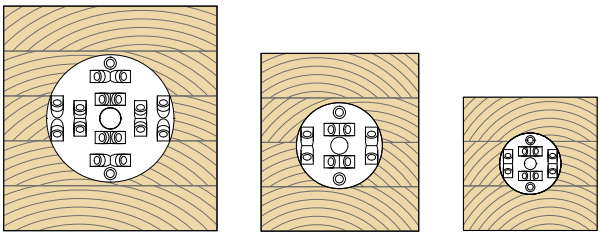



## INSTALLATION OPTIONS

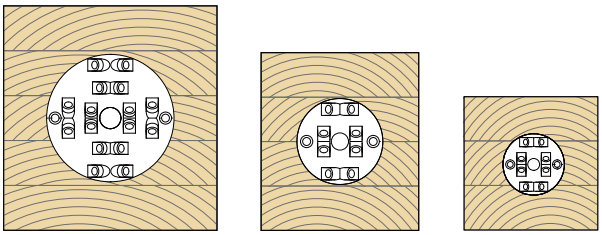
The direction of the connector makes no difference. It can be installed according to OPTION 1 or OPTION 2.

DISCF120 DISCF80 DISCF55

OPTION 1



OPTION 2



## FASTENERS

| DISC FLAT CONNECTOR | SCREWS | | | |
|---|---|---|---|---|
| | $n_{45°}$ [pcs - Ø] | $n_{0°}$ [pcs - Ø] | bolts for fastening on timber [pcs - Ø] | washers for timber [pcs - Ø] |
| DISCF55 | 8 - LBS Ø5 | 2 - LBS Ø5 | 1 - KOS M12 | 1 - ULS1052 M12 |
| DISCF80 | 8 - LBS Ø7 | 2 - LBS Ø7 | 1 - KOS M16 | 1 - ULS1052 M16 |
| DISCF120 | 16 - LBS Ø7 | 2 - LBS Ø7 | 1 - KOS M20 | 1 - ULS1052 M20 |

## STATIC VALUES

### SECONDARY BEAM SIDE STRENGTHS

| connector | screws Ø x L [mm] | $b_{J,min}$ x $h_{J,min}$ [mm] | $R_{v,screws,k} = R_{lat,screws,k}$ [kN] | | $R_{ax,screws,k}$ [kN] | |
|---|---|---|---|---|---|---|
| | | | GL24h (1) | LVL (2) | GL24h (1) | LVL (2) |
| DISCF55 | LBS Ø5 x 50 | 100 x 100 | 9,60 | 8,03 | 17,01 | 11,64 |
| | LBS Ø5 x 60 | 110 x 110 | 11,83 | 9,89 | 20,96 | 14,34 |
| | LBS Ø5 x 70 | 130 x 130 | 14,06 | 11,76 | 24,91 | 17,04 |
| DISCF80 | LBS Ø7 x 60 | 120 x 120 | 14,69 | 12,28 | 26,10 | 17,91 |
| | LBS Ø7 x 80 | 150 x 150 | 20,94 | 17,51 | 37,16 | 25,47 |
| | LBS Ø7 x 100 | 180 x 180 | 27,19 | 22,73 | 48,22 | 33,03 |
| DISCF120 | LBS Ø7 x 80 | 160 x 160 | 41,88 | 48,15 | 70,66 | 81,24 |
| | LBS Ø7 x 100 | 190 x 190 | 54,38 | 62,52 | 91,72 | 105,46 |

### SHEAR STRENGTH ON MAIN ELEMENT SIDE

| connector | $R_{v,main,k}$ (8) [kN] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | WITHOUT SLOT | | | | | WITH GROOVING | | | |
| | beam | | column | | wall | beam | | column | |
| | GL24h (1) | LVL (2) | GL24h (1) | LVL (2) | CLT (3) | GL24h (1) | LVL (2) | GL24h (1) | LVL (2) |
| DISCF55 | 13,9 | 14,3 | 19,9 | 23,0 | 19,0 | 25,1 | 28,3 | 35,6 | 42,5 |
| DISCF80 | 21,2 | 21,7 | 31,0 | 37,5 | 25,7 | 40,8 | 46,2 | 58,6 | 71,9 |
| DISCF120 | 34,1 | 35,0 | 48,1 | 54,4 | 32,8 | 71,1 | 80,0 | 98,7 | 117,5 |

| connector | $R_{lat,main,k}$ (8) [kN] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | WITHOUT SLOT | | | | | WITH GROOVING(7) | | | |
| | beam | | column | | wall | beam | | column | |
| | GL24h (1) | LVL (2) | GL24h (1) | LVL (2) | CLT (3) | GL24h (1) | LVL (2) | GL24h (1) | LVL (2) |
| DISCF55 | 19,9 | 23,0 | 13,9 | 14,3 | 17,5 | 35,6 | 42,5 | 25,1 | 28,3 |
| DISCF80 | 31,0 | 37,5 | 21,2 | 21,7 | 23,8 | 58,6 | 71,9 | 40,8 | 46,2 |
| DISCF120 | 48,1 | 54,4 | 34,1 | 35,0 | 30,7 | 98,7 | 117,5 | 71,1 | 80,0 |

### TENSILE STRENGTH ON MAIN ELEMENT SIDE

| connector | $R_{ax,main,k}$ [kN] | | |
|---|---|---|---|
| | GL24h (4) | LVL (5) | CLT(6) |
| DISCF55 | 18,7 | 22,4 | 17,9 |
| DISCF80 | 25,3 | 30,4 | 24,3 |
| DISCF120 | 34,8 | 41,8 | 33,5 |

## CONNECTION STIFFNESS

The sliding module can be calculated according to ETA-19/0706, with the following expressions:

$K_{ax,ser} = 150\ kN/mm$

$K_{v,ser} = K_{lat,ser} = \frac{\rho_m^{1,5} \cdot d}{23}\ kN/mm$ For shear stressed connectors in timber-to-timber joints

$K_{v,ser} = K_{lat,ser} = 70 \cdot d^2\ kN/mm$ For shear stressed connectors in steel-to-timber joints

where:
- d is the bolt diameter in mm;
- $\rho_m$ is the average density of the main element, in kg/m$^3$.

## NOTES:

(1) Values calculated according to ETA-19/0706. $\rho_k$=385 kg/m$^3$ has been taken in consideration in the calculation.

(2) Values calculated according to ETA-19/0706. $\rho_k$=480kg/m$^3$ has been taken in consideration in the calculation.

(3) Values calculated according to ETA-19/0706. $\rho_k$=350kg/m$^3$ has been taken in consideration in the calculation.

(4) Values calculated according to ETA-19/0706 with DIN1052 washers, they must be recalculated if other washers are used. $f_{c,90,k}$=2.5 MPa has been considered in the calculation.

(5) Values calculated according to ETA-19/0706 with DIN1052 washers, they must be recalculated if other washers are used. $f_{c,90,k}$=3,0 MPa has been considered in the calculation.

(6) Values calculated according to ETA-19/0706 with DIN1052 washers, they must be recalculated if other washers are used. $f_{c,90,k}$=2,4 MPa has been considered in the calculation.

(7) When using the connector with grooving in the main beam, if a $F_{lat}$ stress is applied, it is necessary to perform a closed circular grooving.

(8) The strength values have been calculated for a usable bolt length of:
- $t_a$ = 100 mm for DISCF55 on beam or column;
- $t_a$ = 120 mm for DISCF80 on beam or column;
- $t_a$ = 180 mm for DISCF120 on beam or column;
- $t_a$ = 100 mm for DISCF55, DISCF80 and DISCF120 on wall.

In the case of longer or shorter lengths, the strengths can be calculated according to ETA-19/0706.

## GENERAL PRINCIPLES:

- The characteristic strength values of the connection are obtained as follows:

$$R_{v,k} = min \begin{cases} R_{v,screws,k} \\ R_{v,main,k} \end{cases}$$

$$R_{ax,k} = min \begin{cases} R_{ax,screws,k} \\ R_{ax,main,k} \end{cases}$$

$$R_{lat,k} = min \begin{cases} R_{lat,screws,k} \\ R_{lat,main,k} \end{cases}$$

- The design values are obtained from the characteristic values as follows: The coefficients $\gamma_M$ and $k_{mod}$ should be taken according to the current regulations used for the calculation.

$$R_d = \frac{R_k \cdot k_{mod}}{\gamma_M}$$

- In case of combined $F_v$, $F_{ax}$ and $F_{lat}$ stress the following expression must be fulfilled:

$$\left(\frac{F_{ax,d}}{R_{ax,d}}\right)^2 + \frac{F_{v,d}}{R_{v,d}} + \frac{F_{lat,d}}{R_{lat,d}} \leq 1$$

- Dimensioning and verification of the timber elements must be carried out separately.
- In case of steel or concrete main element, the calculation of $R_{v,main,k}$ , $R_{ax,main,k}$ and $R_{lat,main,k}$ must be performed by the designer. The calculation of the relative design values must be carried out using the $\gamma_M$ coefficients to be assumed according to the regulations in force used for the calculation.
- There are two options or installation on secondary beam (option 1/option 2). The strengths do not vary in both cases. In case of multiple installation, it is recommended to install the connectors alternating them with option 1 and option 2.
- If several connector are used, the strengths on screw side ($F_{v,screw}$s,$F_{ax,screws}$,$F_{lat,screws}$) can be multiplied by the number of connectors.
- If several connectors are used, the calculation of the connection on the main element side must be carried out by the designer in accordance with chapters 8.5 and 8.9 EN 1995-1-1.
- Screws with the same length must be used in all holes.