

DISC FLAT

REMOVABLE CONCEALED CONNECTOR

UNIVERSAL

Resistant to forces in all directions due to clamping of elements by through-rod. It can be installed on any timber surface and attached to any support by means of a bolt.

PREFABRICATION

Simple to install thanks to the possibility of being tightened after the assembly. The connector can be mounted off-site and fastened on-site with a simple bolt.

DISASSEMBLED

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



USA, Canada and more design values available online.



VIDEO



SERVICE CLASS

SC1

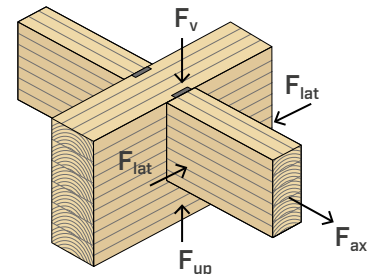
SC2

MATERIAL

S235
Fe/Zn5c

S235 bright zinc plated Fe/Zn5c carbon steel.

EXTERNAL LOADS



VIDEO

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



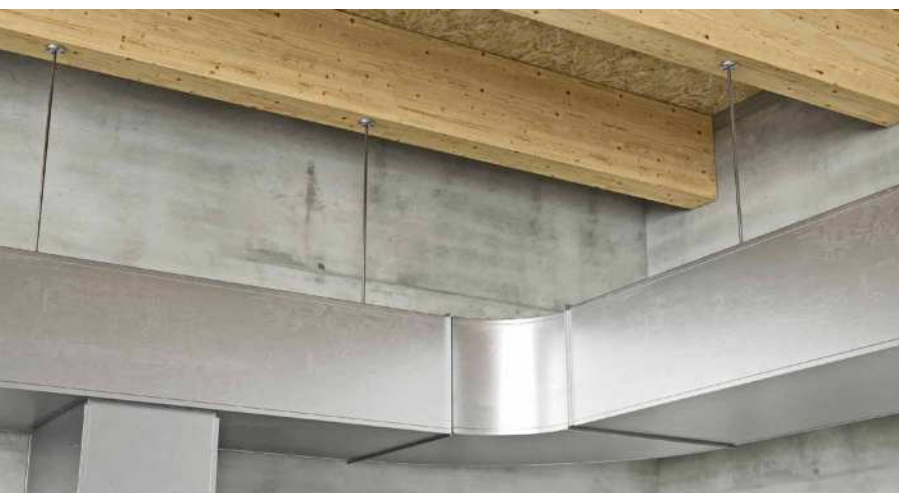
DISCF120



DISCF80



DISCF55



FIELDS OF USE

Concealed joints for beams and columns in timber-to-timber, timber-to-steel or timber-to-concrete configuration, suitable for hybrid structures, non-standard situations or special requirements.

Can be applied to:

- solid timber softwood and hardwood
- glulam, LVL



DISASSEMBLED

Completely concealed joint to ensure a pleasant aesthetic appearance. It can be disassembled by removing the bolt.

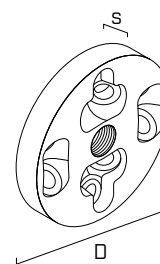
OUTDOOR

On special request and depending on quantities, available in a painted version or with increased zinc thickness for better corrosion resistance for outdoor applications.

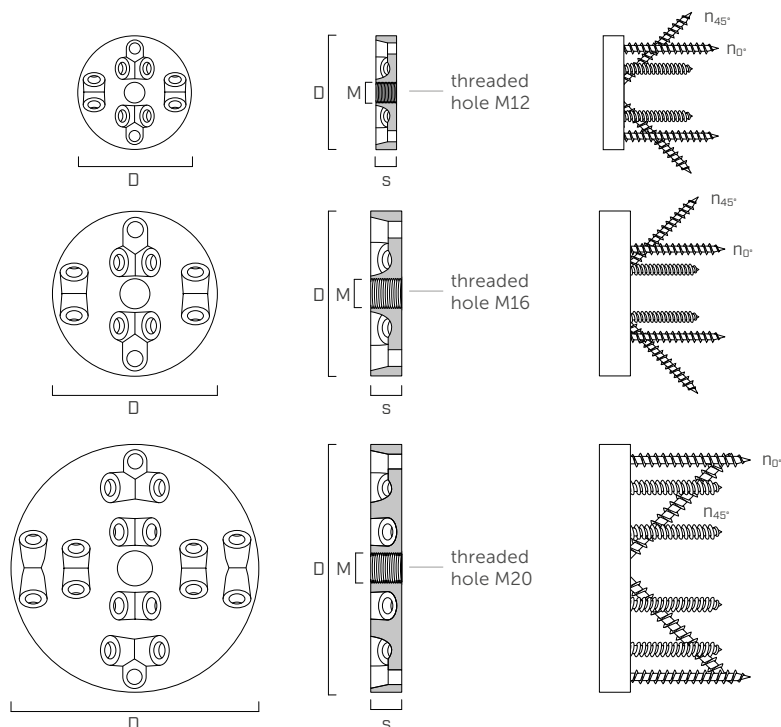
CODES AND DIMENSIONS

CODE	D [mm]	s [mm]	M [mm]	D [in]	s [in]	M [in]	n _{45°} - Ø	n _{0°} - Ø	pcs
DISCF55	55	10	12	2 3/16	0.40	0.48	8 - Ø5 0.20	2 - Ø5 0.20	16
DISCF80	80	15	16	3 1/8	0.60	0.63	8 - Ø7 0.28	2 - Ø7 0.28	8
DISCF120	120	15	20	4 3/4	0.60	0.79	16 - Ø7 0.28	2 - Ø7 0.28	4

Screws not included in the box.



GEOMETRY



FASTENERS

type	description		d [mm]	connector	page
LBS LBS EVO	round head screw for plates		5 7 7	DISCF55 DISCF80 DISCF120	571
LBSH LBSH EVO	round head screw on hardwoods		5 7 7	DISCF55 DISCF80 DISCF120	572
KOS	hexagonal head bolt		12 16 20	DISCF55 DISCF80 DISCF120	168
ULS1052	washer		12 16 20	DISCF55 DISCF80 DISCF120	176

CODE	secondary beam-timber		main element-timber			
	screws	n _{45°} + n _{0°}	bolts	n	washer	n
DISCF55	LBS LBS EVO Ø5	8 + 2	KOS M12	1	ULS14586 - M12	1
DISCF80	LBS LBS EVO Ø7	8 + 2	KOS M16	1	ULS18686 - M16	1
DISCF120	LBS LBS EVO Ø7	16 + 2	KOS M20	1	ULS22808 - M20	1

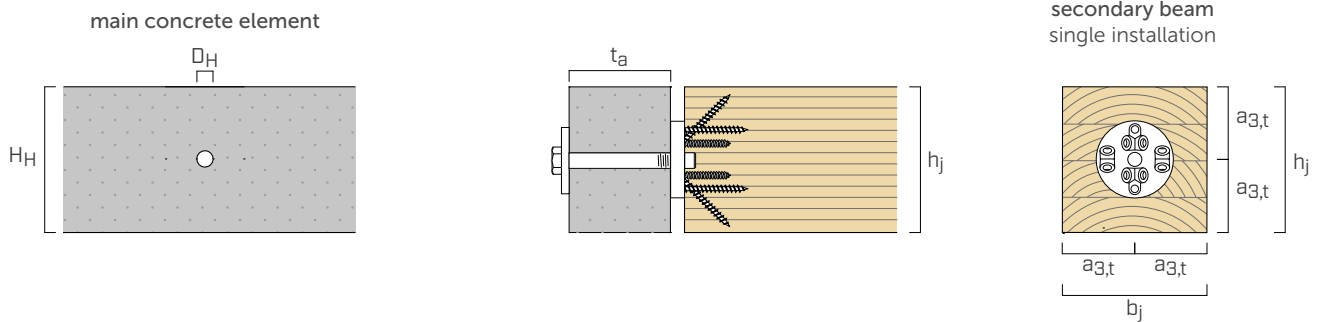
MINIMUM DIMENSIONS AND SPACING

CODE	LBS LBS EVO	secondary beam $b_j \times h_j$ [mm]	main element				spacing		
	$\varnothing \times L$ [mm]		$H_H^{(1)}$ [mm]	D_H [mm]	S_F [mm]	D_F [mm]	a_1 [mm]	$a_{3,t}$ [mm]	$a_{4,t}$ [mm]
DISCF55	$\varnothing 5 \times 50$	100 x 100	110	13	11	56	90	50	60
	$\varnothing 5 \times 60$	110 x 110	115	13	11	56	105	55	60
	$\varnothing 5 \times 70$	130 x 130	130	13	11	56	120	65	60
DISCF80	$\varnothing 7 \times 60$	120 x 120	150	17	16	81	110	60	90
	$\varnothing 7 \times 80$	150 x 150	165	17	16	81	140	75	90
	$\varnothing 7 \times 100$	180 x 180	180	17	16	81	170	90	90
DISCF120	$\varnothing 7 \times 80$	160 x 160	200	21	16	121	150	80	120
	$\varnothing 7 \times 100$	190 x 190	215	21	16	121	180	95	120

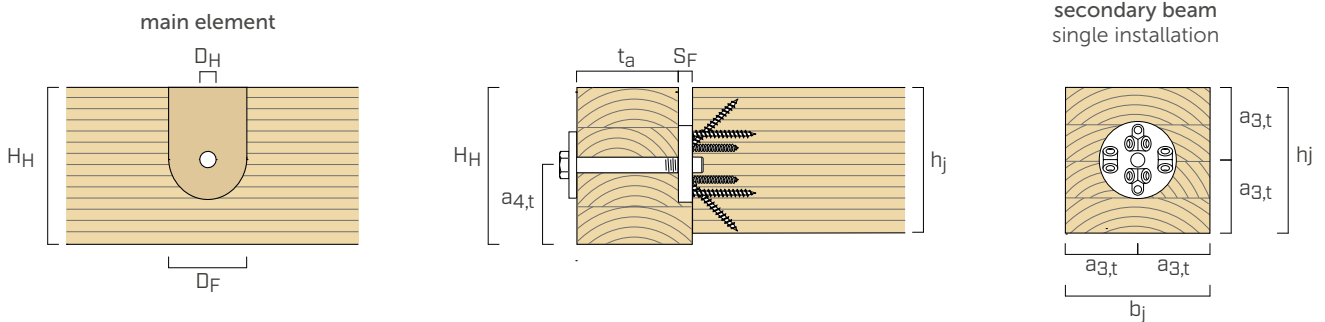
⁽¹⁾ H_H is only valid in case of installation with routing. For installation without routing, the minimum bolt distances according to EN 1995-1-1:2014 apply.

INSTALLATION

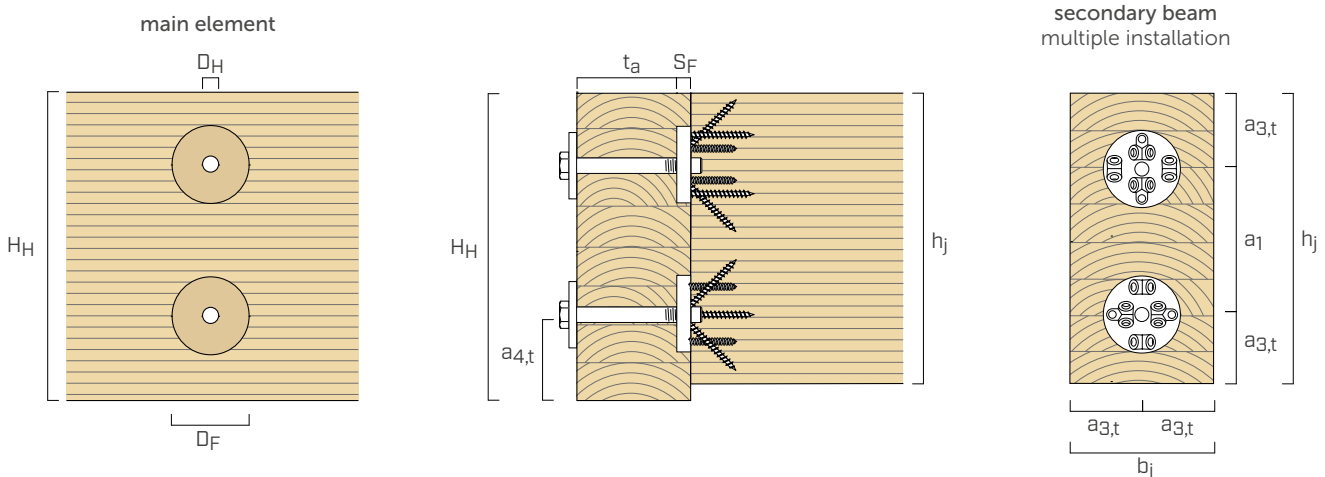
WITHOUT SLOT



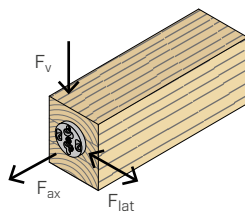
WITH OPEN SLOT



WITH ROUND SLOT

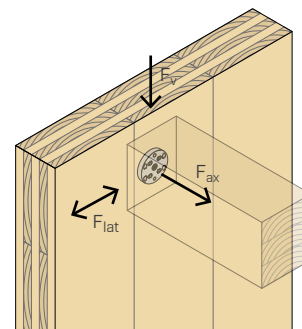
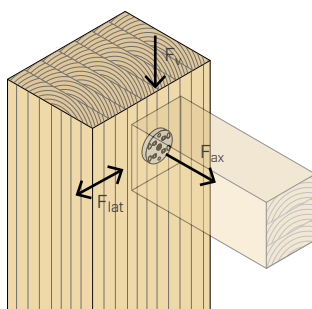
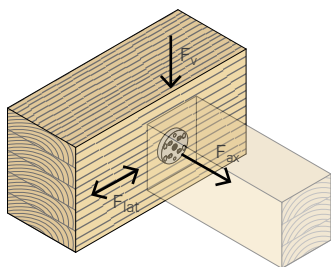


STRENGTHS - SECONDARY BEAM



connector	LBS LBS EVO $\varnothing \times L$ [mm]	$b_j \times h_j$ [mm]	$R_{v,k \text{ joist}} = R_{lat,k \text{ joist}}$		$R_{ax,k \text{ joist}}$	
			GL24h [kN]	LVL [kN]	GL24h [kN]	LVL [kN]
DISCF55	$\varnothing 5 \times 50$	100 x 100	9,6	8,0	17,0	11,6
	$\varnothing 5 \times 60$	110 x 110	11,8	9,9	21,0	14,3
	$\varnothing 5 \times 70$	130 x 130	14,1	11,8	24,9	17,0
DISCF80	$\varnothing 7 \times 60$	120 x 120	14,7	12,3	26,1	17,9
	$\varnothing 7 \times 80$	150 x 150	20,9	17,5	37,2	25,5
	$\varnothing 7 \times 100$	180 x 180	27,2	22,7	48,2	33,0
DISCF120	$\varnothing 7 \times 80$	160 x 160	41,9	48,1	70,7	81,2
	$\varnothing 7 \times 100$	190 x 190	54,4	62,5	91,7	105,5

SHEAR STRENGTHS - MAIN ELEMENT



connector	$R_{v,k \text{ main}}$								
	WITHOUT SLOT					WITH ROUTING			
	beam		column		wall	beam		column	
	GL24h [kN]	LVL [kN]	GL24h [kN]	LVL [kN]	CLT [kN]	GL24h [kN]	LVL [kN]	GL24h [kN]	LVL [kN]
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

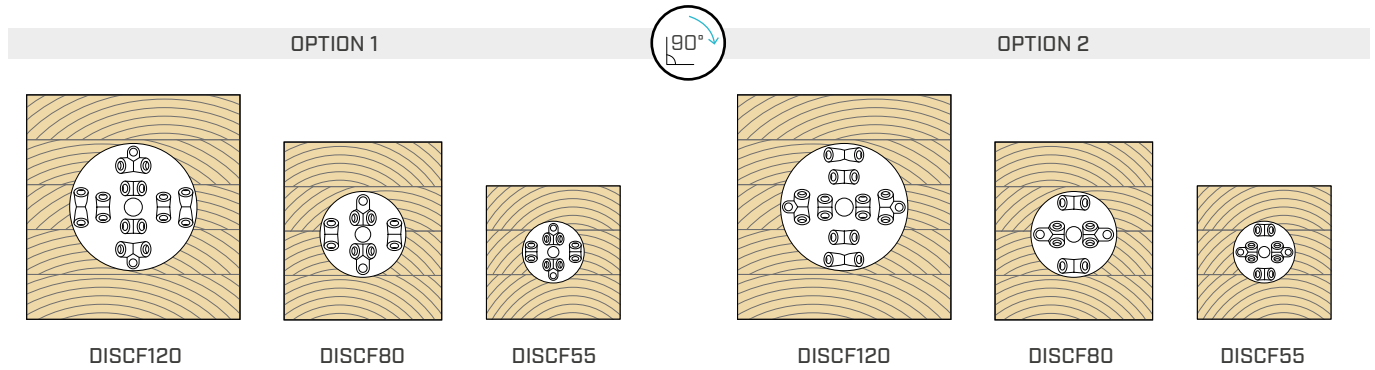
connector	$R_{lat,k \text{ main}}$								
	WITHOUT SLOT					WITH ROUTING			
	beam		column		wall	beam		column	
	GL24h [kN]	LVL [kN]	GL24h [kN]	LVL [kN]	CLT [kN]	GL24h [kN]	LVL [kN]	GL24h [kN]	LVL [kN]
DISCF55	19,9	23,0	13,9	14,3	17,5	35,6	42,5	25,1	28,3
DISCF80	31,0	37,5	21,2	21,7	23,8	58,6	71,9	40,8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

TENSILE STRENGTHS - MAIN ELEMENT

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

INSTALLATION OPTIONS

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



CONNECTION STIFFNESS

Connection stiffness can be calculated according to ETA-19/0706, with the following equation:

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

$$K_{v,ser} = K_{lat,ser} = \frac{\rho_m^{1.5} \cdot d}{23} \text{ N/mm} \quad \text{for shear stressed connectors in timber-to-timber joints}$$

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

where:

- d is the bolt diameter in mm;
- ρ_m is the average density of the main element, in kg/m³.

GENERAL PRINCIPLES

- Characteristic values comply with the EN 1995-1-1:2014 standard in accordance with ETA-19/0706.
- The calculation process used a timber characteristic density of $\rho_k = 385 \text{ kg/m}^3$ for GL24h, $\rho_k = 480 \text{ kg/m}^3$ for LVL and $\rho_k = 350 \text{ kg/m}^3$ for CLT.
- Screws with the same length must be used in all holes.
- Dimensioning and verification of timber and concrete elements must be carried out separately.
- There are two options of installation on secondary beam (option 1/option 2). The strengths do not vary in both cases.
- The following verification shall be satisfied for combined loading:

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

STRUCTURAL VALUES

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

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

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

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

- The $R_{v,k \text{ main}}$ and $R_{lat,k \text{ main}}$ strengths are calculated for a useful bolt length of:
 - $t_a = 100 \text{ mm}$ for DISCF55 on beam or column;
 - $t_a = 120 \text{ mm}$ for DISCF80 on beam or column;
 - $t_a = 180 \text{ mm}$ for DISCF120 on beam or column;
 - $t_a = 100 \text{ mm}$ 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.

- The $R_{ax,k}$ main strengths are calculated according to ETA-19/0706 with DIN1052 washers. In the calculation, $f_{c,90,k} = 2.5 \text{ MPa}$ for GL24h, $f_{c,90,k} = 3.0 \text{ MPa}$ for LVL and $f_{c,90,k} = 2.4 \text{ MPa}$ for CLT were considered. The calculations must be carried out again if other washers are used.
- Design values can be obtained from characteristic values as follows:

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

The coefficients k_{mod} and γ_M should be taken according to the current regulations used for the calculation.

MULTIPLE CONNECTORS

- In case of installation with multiple connectors, it is recommended to install alternate connectors with installation option 1 and installation option 2.
- The strength of the screws in the secondary beam is the sum of the strength of the screws in the individual connectors.
- The calculation of the strength in the main element of a connection consisting of multiple connectors must be carried out by the designer, according to chapters 8.5 and 8.9 EN 1995-1-1:2014.

TIMBER-TO-CONCRETE | TIMBER-TO-STEEL

- The calculation of $R_{v,k \text{ main}}$, $R_{ax,k \text{ main}}$ and $R_{lat,k \text{ main}}$ must be executed by the designer. The calculation of the relative design values must be carried out using the γ_M coefficients to be assumed according to the regulations in force used for the calculation.

INTELLECTUAL PROPERTY

- DISC FLAT connectors are protected by the following Registered Community Designs:
 - RCD 008254353-0003;
 - RCD 008254353-0004.