DISC FLAT

REMOVABLE CONCEALED CONNECTOR

VIDEO

DESIGN REGISTERED

CE ETA-19/0706

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.

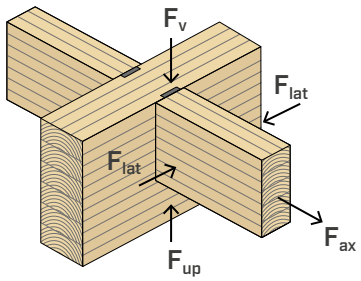
USA, Canada and more design values available online.

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.

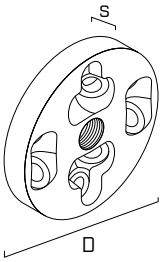
OUTDOOR

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

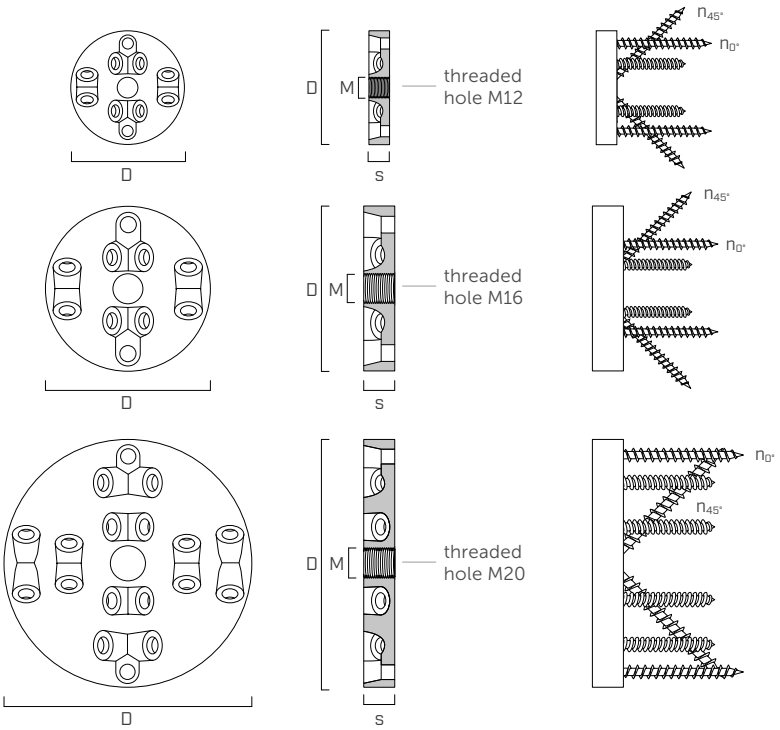
CODES AND DIMENSIONS

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

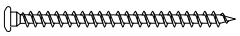
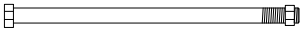
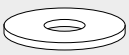
Screws not included in the box.



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

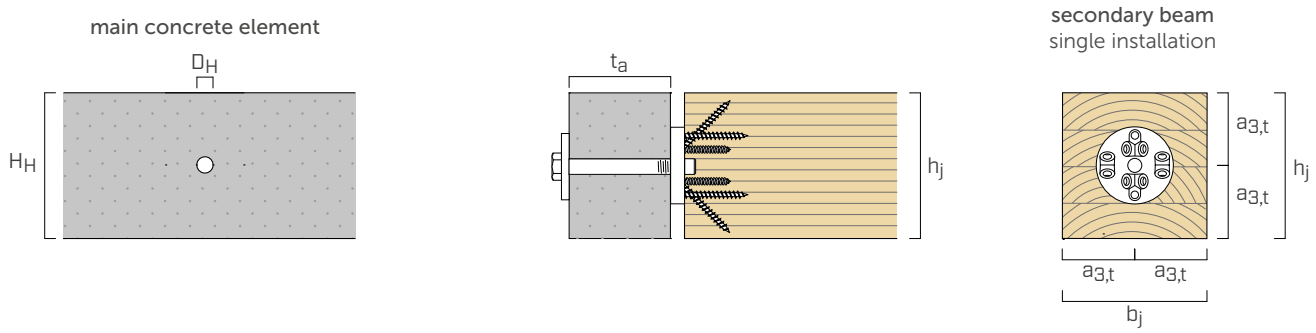
MINIMUM DIMENSIONS AND SPACING

CODE	LBS | LBS EVO	secondary beam	main element				spacing		
	Ø x L	b_j x h_j	H_H[(1)]	D_H	S_F	D_F	a_1	$a_{3,t}$	$a_{4,t}$
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
DISCF55	Ø5 x 50	100 x 100	110	13	11	56	90	50	60
	Ø5 x 60	110 x 110	115	13	11	56	105	55	60
	Ø5 x 70	130 x 130	130	13	11	56	120	65	60
DISCF80	Ø7 x 60	120 x 120	150	17	16	81	110	60	90
	Ø7 x 80	150 x 150	165	17	16	81	140	75	90
	Ø7 x 100	180 x 180	180	17	16	81	170	90	90
DISCF120	Ø7 x 80	160 x 160	200	21	16	121	150	80	120
	Ø7 x 100	190 x 190	215	21	16	121	180	95	120

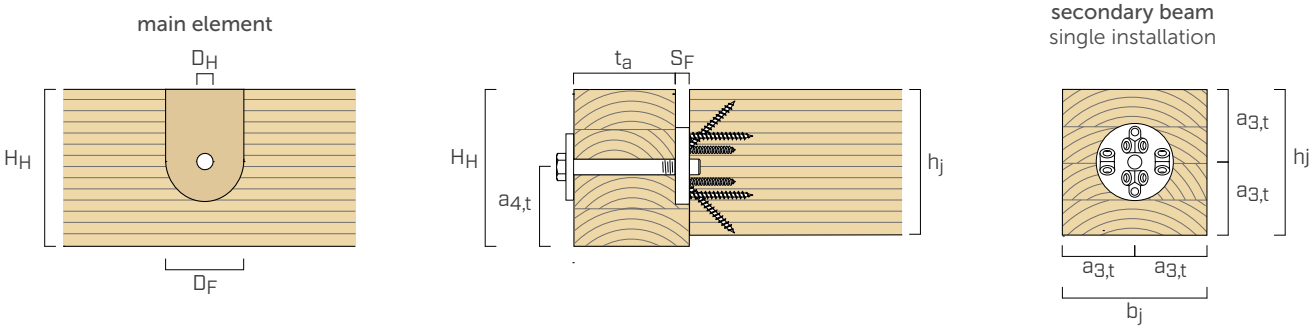
(1) H_H is only valid in case of installation with routing. For installation without routing, the minimum bolt distances according to EN 1995-1-1:2014 apply.

INSTALLATION

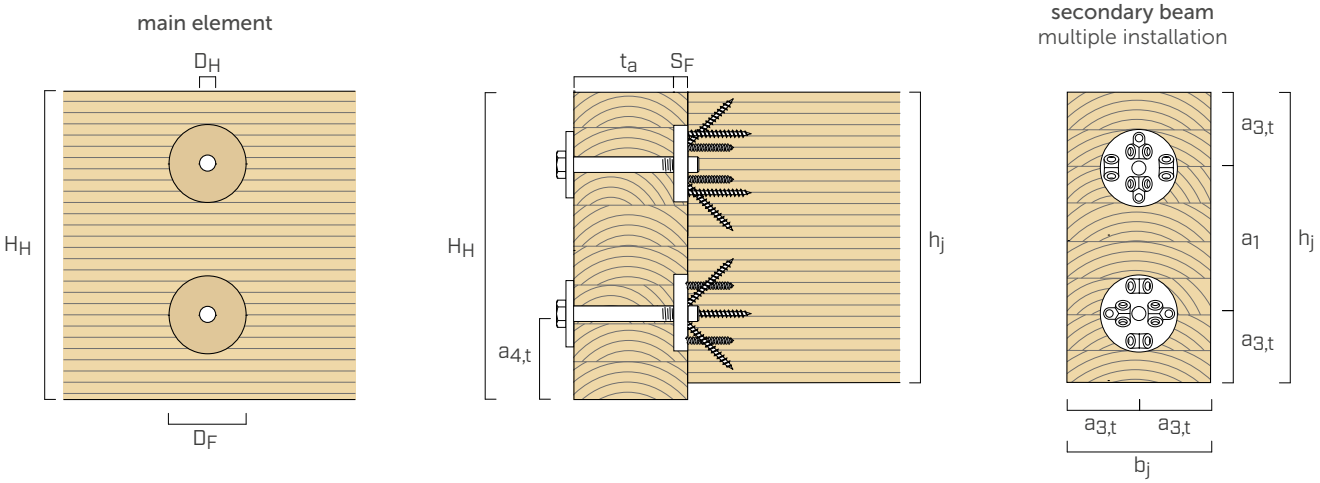
WITHOUT SLOT



WITH OPEN SLOT

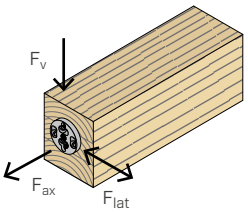


WITH ROUND SLOT



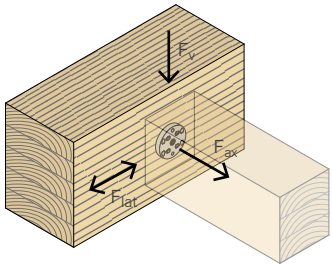
STRUCTURAL VALUES | TIMBER-TO-TIMBER | F_v | F_{lat} | F_{ax}

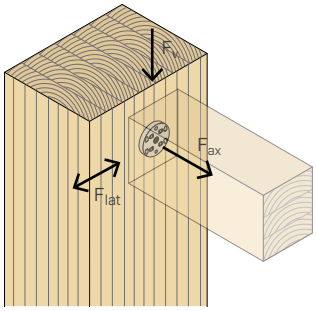
STRENGTHS - SECONDARY BEAM

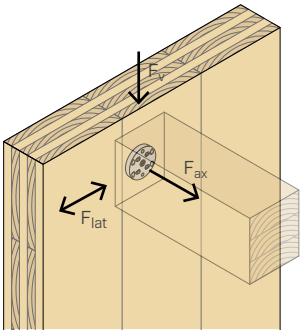


connector	LBS | LBS EVO		$R_{v,k\ joist} = R_{lat,k\ joist}$		$R_{ax,k\ joist}$	
	Ø x L	b_j x h_j	GL24h	LVL	GL24h	LVL
	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]
DISCF55	Ø5 x 50	100 x 100	9,6	8,0	17,0	11,6
	Ø5 x 60	110 x 110	11,8	9,9	21,0	14,3
	Ø5 x 70	130 x 130	14,1	11,8	24,9	17,0
DISCF80	Ø7 x 60	120 x 120	14,7	12,3	26,1	17,9
	Ø7 x 80	150 x 150	20,9	17,5	37,2	25,5
	Ø7 x 100	180 x 180	27,2	22,7	48,2	33,0
DISCF120	Ø7 x 80	160 x 160	41,9	48,1	70,7	81,2
	Ø7 x 100	190 x 190	54,4	62,5	91,7	105,5

SHEAR STRENGTHS - MAIN ELEMENT







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

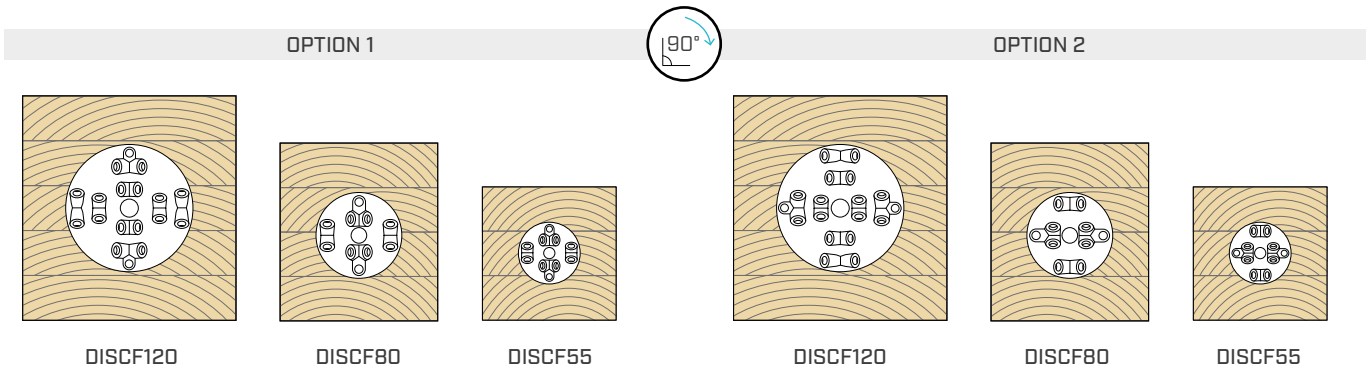
connector	$R_{lat,k\ main}$								
	WITHOUT SLOT					WITH ROUTING			
	beam		column		wall	beam		column	
	GL24h	LVL	GL24h	LVL	CLT	GL24h	LVL	GL24h	LVL
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
DISCF55	19,9	23,0	13,9	14,3	17,5	35,6	42,5	25,1	28,3
DISCF80	31,0	37,5	21,2	21,7	23,8	58,6	71,9	40,8	46,2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

TENSILE STRENGTHS - MAIN ELEMENT

connector	$R_{ax,k\ main}$		
	GL24h	LVL	CLT
	[kN]	[kN]	[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:

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

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

$$K_{v,ser} = K_{lat,ser} = 70 \cdot d^2 \text{ N/mm}$$ 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 ρ_k = 385 kg/m³ for GL24h, ρ_k = 480 kg/m³ for LVL and ρ_k = 350 kg/m³ 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 or 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:

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

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

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

- The $R_{v,k\ main}$ and $R_{lat,k\ main}$ strengths are calculated for a useful 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.
- 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 MPa for GL24h, $f_{c,90,k}$ = 3.0 MPa for LVL and $f_{c,90,k}$ = 2.4 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 $R_{v,k\ main}$, $R_{ax,k\ main}$ and $R_{lat,k\ main}$ 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.