

# LOCK T EVO TIMBER



## OUTDOOR CONCEALED HOOK TIMBER-TO-TIMBER CONNECTOR

### ALLUMINIO EVO

Thanks to the special painting it can be used outdoors in service class 3. Easy and quick to install, it can be fastened with a single type of screw.

### OUTDOOR

The joint can be easily disassembled, ideal for the construction of temporary structures exposed to weather.

### AGGRESSIVE WOODS

Ideal for applications with woods containing tannin or treated with impregnating agents and other chemical processes.



## CHARACTERISTICS

|                 |   |
|-----------------|---|
| FOCUS           | outdoor joints that can be disassembled |
| TIMBER SECTIONS | from 53 x 80 mm to 160 x 280 mm         |
| STRENGTH        | $R_{v,k}$ up to 35 kN                   |
| FASTENERS       | HBS PLATE EVO, KKF AISI410              |

### VIDEO

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



## MATERIAL

Aluminium alloy with special paint in graphite black colour.

## FIELDS OF USE

- Outdoor timber-to-timber shear joints
- solid timber and glulam
  - CLT, LVL
  - aggressive woods (containing tannin)
  - chemically treated woods



### SERVICE CLASS 3

The specially painted aluminium alloy together with the C4 EVO coated screws or martensitic stainless steel screws allow the joint to be used in service class 3.

### OAK FRAME

Ideal for fastening aggressive woods containing tannin, such as chestnut and oak. Assembly with KKF AISI410 outdoor screws.

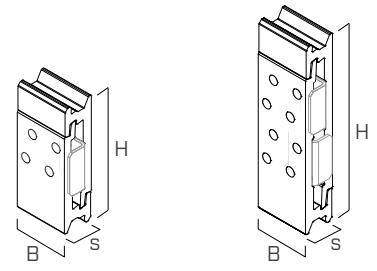
## CODES AND DIMENSIONS

### LOCK T EVO Ø5

| CODE          | B<br>[mm] | H<br>[mm] | s<br>[mm] | n <sub>screws</sub> - Ø | n <sub>LOCKSTOP</sub> - type | pcs * |
|---------------|-----------|-----------|-----------|-------------------------|------------------------------|-------|
| LOCKTEVO3580  | 35        | 80        | 20        | 8 - Ø5                  | 2 LOCKSTOP5                  | 50    |
| LOCKTEVO35120 | 35        | 120       | 16 - Ø5   | 4 LOCKSTOP5             | 25                           |       |

Screws and LOCK STOP not included in the package.

\* number of connector pairs



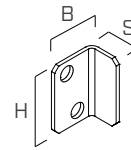
LOCKTEVO3580

LOCKTEVO35120

### LOCK STOP Ø5

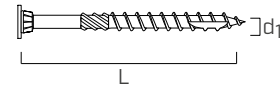
| CODE      | B<br>[mm] | H<br>[mm] | s<br>[mm] | pcs |
|-----------|-----------|-----------|-----------|-----|
| LOCKSTOP5 | 19        | 27,5      | 13        | 100 |

The use of LOCK STOP is optional and does not affect structural performance.



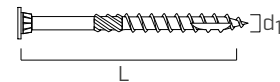
### HBS PLATE EVO

| CODE       | d <sub>1</sub><br>[mm] | L<br>[mm] | b<br>[mm] | TX   | pcs |
|------------|------------------------|-----------|-----------|------|-----|
| HBSPEVO550 | 5                      | 50        | 30        | TX25 | 200 |
| HBSPEVO570 | 5                      | 70        | 40        | TX25 | 100 |



### KKF AISI410

| CODE   | d <sub>1</sub><br>[mm] | L<br>[mm] | b<br>[mm] | TX   | pcs |
|--------|------------------------|-----------|-----------|------|-----|
| KKF550 | 5                      | 50        | 30        | TX25 | 200 |
| KKF570 | 5                      | 70        | 40        | TX25 | 100 |



### MATERIAL AND DURABILITY

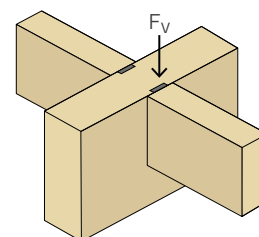
LOCK T EVO: EN AW-6005A aluminium alloy.

To be used in service classes 1, 2 and 3 (EN 1995-1-1).

### FIELD OF USE

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

### EXTERNAL LOADS



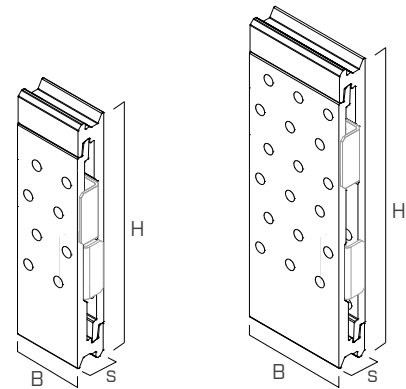
## CODES AND DIMENSIONS

### LOCK T EVO Ø6

| CODE          | B<br>[mm] | H<br>[mm] | s<br>[mm] | n <sub>screws</sub> - Ø | n <sub>LOCKSTOP</sub> - type | pcs* |
|---------------|-----------|-----------|-----------|-------------------------|------------------------------|------|
| LOCKTEVO50175 | 50        | 175       | 22        | 16 - Ø6                 | 4 LOCKSTOP 7                 | 18   |
| LOCKTEVO75215 | 75        | 22        | 36 - Ø6   | 4 LOCKSTOP 7            | 12                           |      |

Screws and LOCK STOP not included in the package.

\* number of connector pairs



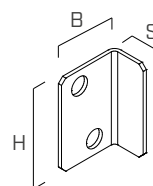
LOCKTEVO50175

LOCKTEVO75215

### LOCK STOP Ø6

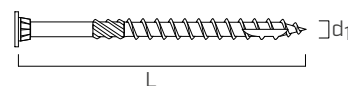
| CODE      | B<br>[mm] | H<br>[mm] | s<br>[mm] | pcs |
|-----------|-----------|-----------|-----------|-----|
| LOCKSTOP7 | 26,5      | 38        | 15        | 50  |

The use of LOCK STOP is optional and does not affect structural performance.



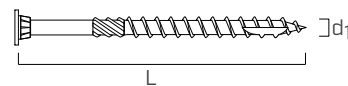
### HBS PLATE EVO

| CODE       | d <sub>1</sub><br>[mm] | L<br>[mm] | b<br>[mm] | TX   | pcs |
|------------|------------------------|-----------|-----------|------|-----|
| HBSPEVO680 | 6                      | 80        | 50        | TX30 | 100 |



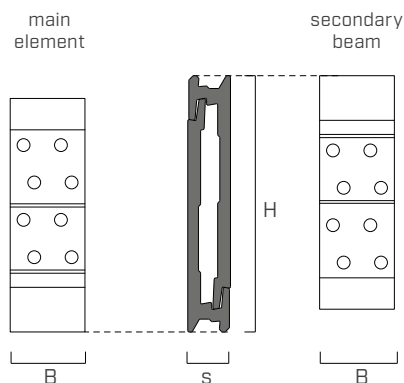
### KKF AISI410

| CODE   | d <sub>1</sub><br>[mm] | L<br>[mm] | b<br>[mm] | TX   | pcs |
|--------|------------------------|-----------|-----------|------|-----|
| KKF680 | 6                      | 80        | 50        | TX30 | 100 |



## PERGOLAS AND GAZEBOS

Ideal for the construction of wooden structures placed outdoors and in service class 3. Possibility to uninstall the joint for seasonal needs.



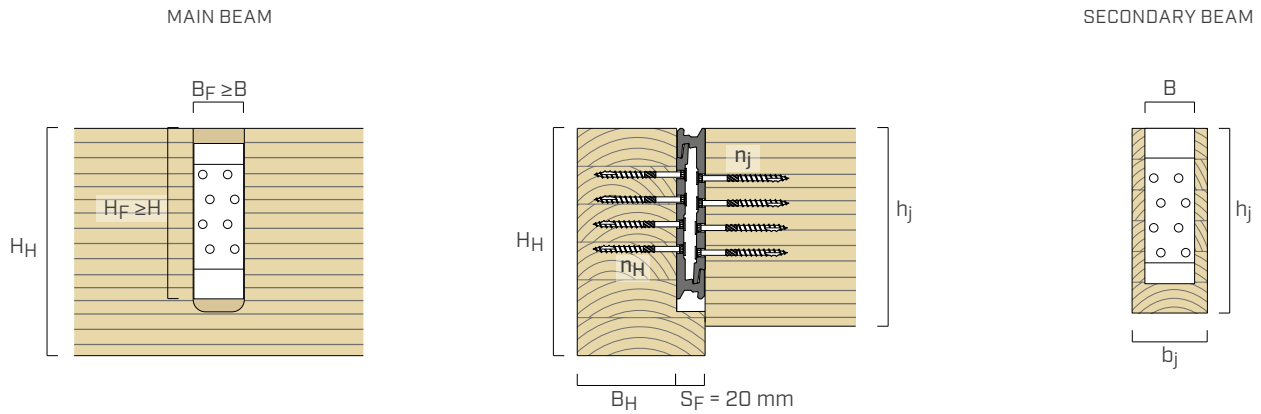
SINGLE CONNECTOR

| LOCK T EVO CONNECTOR |                   | SCREWS   | MAIN ELEMENT  |  | SECONDARY BEAM                                  |                           |
|----------------------|-------------------|--|---|--|---|---------------------------|
| type                 | B x H x s<br>[mm] | HBS PLATE EVO<br>KKF AISI410<br>n <sub>H</sub> +n <sub>J</sub> - ØxL<br>[mm] | column  | beam   | b <sub>J,min</sub> x h <sub>J,min</sub><br>[mm] |                           |
|                      |                   |  | B <sub>S,min</sub> x H <sub>S,min</sub><br>[mm]<br>with pre-drilling hole | B <sub>H,min</sub> x H <sub>H,min</sub><br>[mm]<br>without pre-drilling hole | with pre-drilling hole                          | without pre-drilling hole |
| LOCKTEVO3580         | 35 x 80 x 20      | 4+4 - Ø5x50<br>4+4 - Ø5x70   | 53 x 50<br>53 x 70  | 50 x 95<br>70 x 95   | 53 x 80   | 61 x 80                   |
| LOCKTEVO35120        | 35 x 120 x 20     | 8+8 - Ø5x50<br>8+8 - Ø5x70   | 53 x 50<br>53 x 70  | 50 x 135<br>70 x 135   | 53 x 120  | 61 x 120                  |

COUPLED CONNECTORS

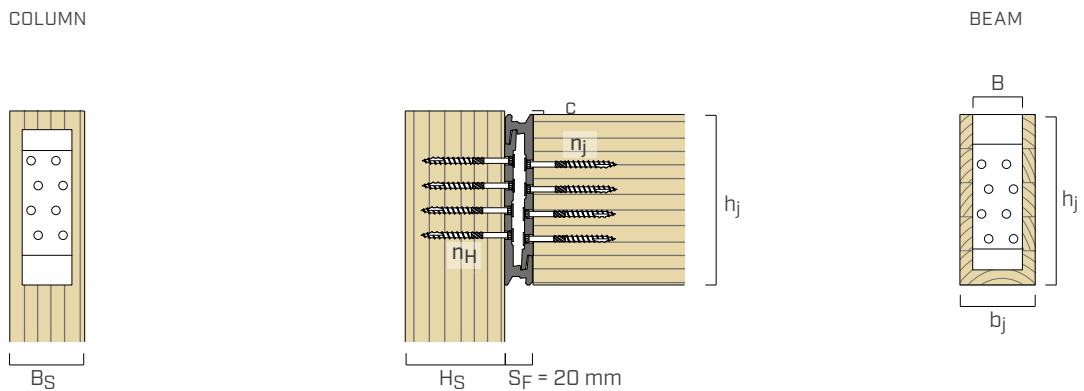
| LOCK T EVO CONNECTOR   |                   | SCREWS   | MAIN ELEMENT  |  | SECONDARY BEAM                                  |                           |
|------------------------|-------------------|--|---|--|---|---------------------------|
| type                   | B x H x s<br>[mm] | HBS PLATE EVO<br>KKF AISI410<br>n <sub>H</sub> +n <sub>J</sub> - ØxL<br>[mm] | column  | beam   | b <sub>J,min</sub> x h <sub>J,min</sub><br>[mm] |                           |
|                        |                   |  | B <sub>S,min</sub> x H <sub>S,min</sub><br>[mm]<br>with pre-drilling hole | B <sub>H,min</sub> x H <sub>H,min</sub><br>[mm]<br>without pre-drilling hole | with pre-drilling hole                          | without pre-drilling hole |
| LOCKTEVO 35120 + 35120 | 70 x 120 x 20     | 16+16 - Ø5x50<br>16+16 - Ø5x70   | 88 x 50<br>88 x 70  | 50 x 135<br>70 x 135   | 88 x 120  | 96 x 120                  |

## INSTALLATION ON BEAM | LOCK T EVO Ø5



The  $H_F$  dimension refers to the minimum height of the grooving at constant width. The rounded part must be taken into account when grooving.

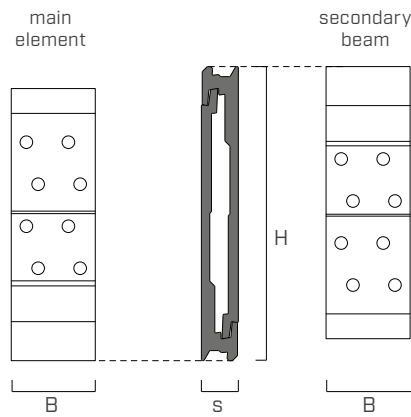
## INSTALLATION ON COLUMN | LOCK T EVO Ø5



## CONNECTOR POSITIONING | LOCK T EVO Ø5

| connector     | $c_{min}$<br>[mm] |
|---------------|-------------------|
| LOCKTEVO3580  | 7,5               |
| LOCKTEVO35120 | 2,5               |

For installation on column, respecting the minimum distance of the screw from the unloaded end of the column, requires to lower the connector by a quantity  $c$ , compared to the end of the column. This can be achieved either by raising the column with respect to the top of the beam (as in the image) or by lowering the connector with respect to the top of the beam by a  $c$  amount.



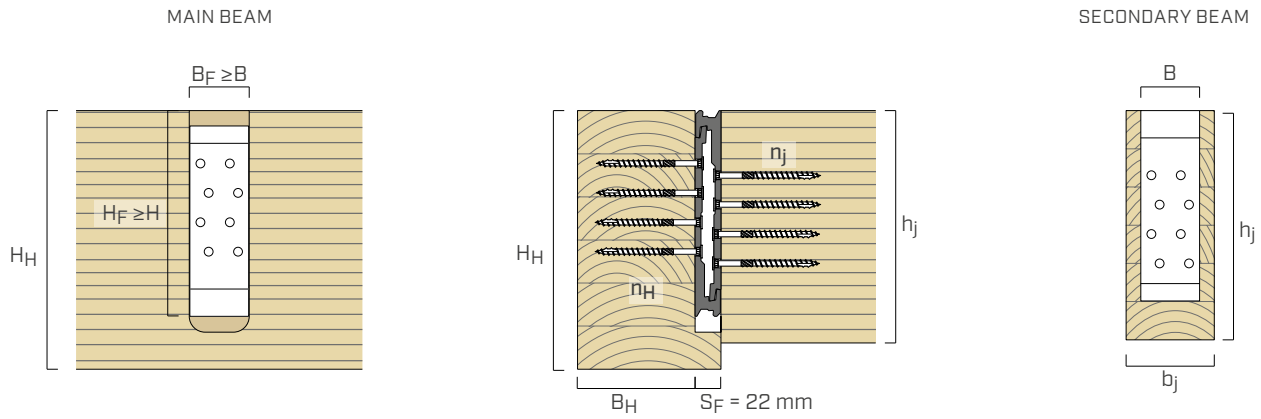
SINGLE CONNECTOR

| LOCK T EVO CONNECTOR |                   | SCREWS   | MAIN ELEMENT   |   | SECONDARY BEAM                       |                           |
|----------------------|-------------------|--|--|---|--------------------------------------|---------------------------|
| type                 | B x H x s<br>[mm] | HBS PLATE EVO<br>KKF AISI410<br>$n_H+n_j - \varnothing \times L$<br>[mm] | column   | beam  | $b_{j,min} \times h_{j,min}$<br>[mm] |                           |
|                      |                   |  | $B_{S,min} \times H_{S,min}$<br>[mm]<br>with pre-drilling hole | $B_{H,min} \times H_{H,min}$<br>[mm]<br>without pre-drilling hole | with pre-drilling hole               | without pre-drilling hole |
| LOCKTEVO50175        | 50 x 175 x 22     | 8+8 - Ø6x80  | 68 x 80  | 80 x 180  | 68 x 175                             | 80 x 175                  |
| LOCKTEVO75215        | 75 x 215 x 22     | 18+18 - Ø6x80  | 93 x 80  | 80 x 220  | 93 x 215                             | 105 x 215                 |

COUPLED CONNECTORS

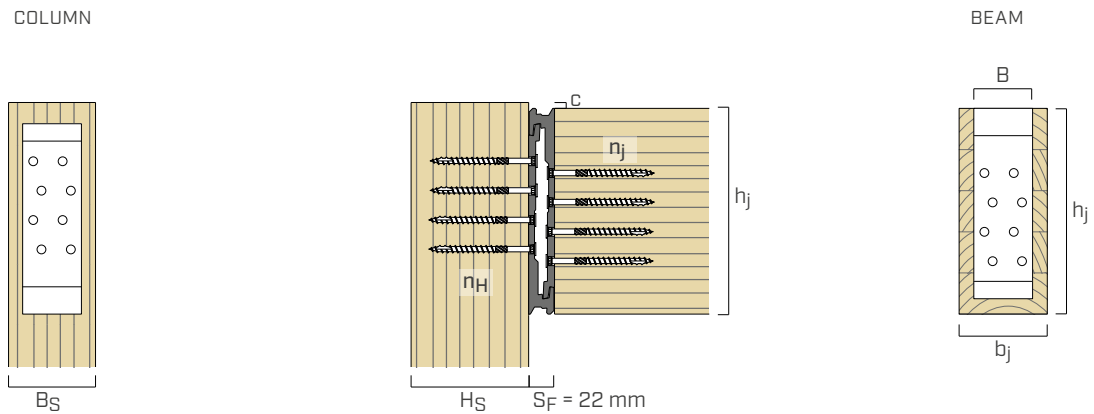
| LOCK T EVO CONNECTOR   |                   | SCREWS   | MAIN ELEMENT   |   | SECONDARY BEAM                       |                           |
|------------------------|-------------------|--|--|---|--------------------------------------|---------------------------|
| type                   | B x H x s<br>[mm] | HBS PLATE EVO<br>KKF AISI410<br>$n_H+n_j - \varnothing \times L$<br>[mm] | column   | beam  | $b_{j,min} \times h_{j,min}$<br>[mm] |                           |
|                        |                   |  | $B_{S,min} \times H_{S,min}$<br>[mm]<br>with pre-drilling hole | $B_{H,min} \times H_{H,min}$<br>[mm]<br>without pre-drilling hole | with pre-drilling hole               | without pre-drilling hole |
| LOCKTEVO 50175 + 50175 | 100 x 175 x 22    | 16+16 - Ø6x80  | 118 x 80   | 80 x 180  | 118 x 175                            | 130 x 175                 |
| LOCKTEVO 75215 + 75215 | 150 x 215 x 22    | 36+36 - Ø6x80  | 168 x 80   | 80 x 220  | 168 x 215                            | 180 x 215                 |

## INSTALLATION ON BEAM | LOCK T EVO Ø6



The  $H_F$  dimension refers to the minimum height of the grooving at constant width. The rounded part must be taken into account when grooving.

## INSTALLATION ON COLUMN | LOCK T EVO Ø6



## CONNECTOR POSITIONING | LOCK T EVO Ø6

| connector     | $c_{min}$<br>[mm] |
|---------------|-------------------|
| LOCKTEVO50175 | 5                 |
| LOCKTEVO75215 | 15                |

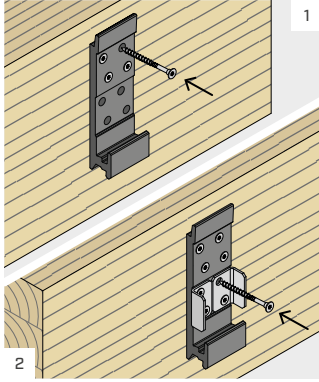
For installation on column, respecting the minimum distance of the screw from the unloaded end of the column, requires to lower the connector by a quantity  $c$ , compared to the end of the column. This can be achieved either by raising the column with respect to the top of the beam (as in the image) or by lowering the connector with respect to the top of the beam by a  $c$  amount.



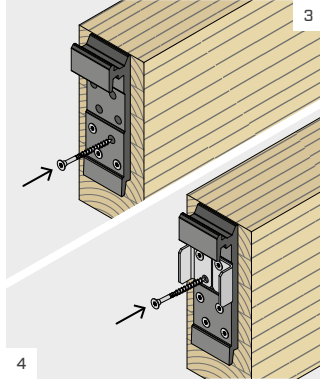
## INSTALLATION



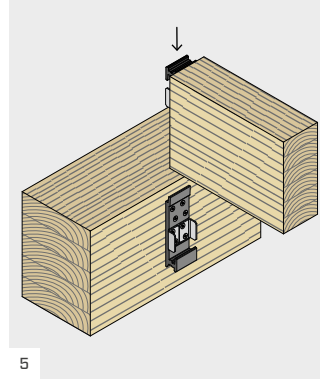
### EXPOSED INSTALLATION WITH LOCK STOP



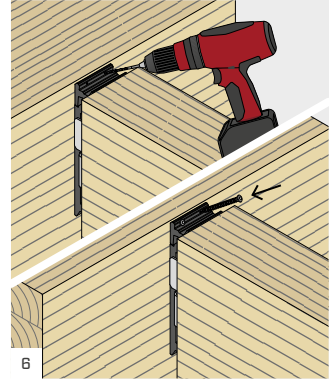
Place the connector on the main element and fasten the first screws. When using LOCK STOP (optional) position LOCK STOP and fasten the remaining screws.



Place the connector on the secondary beam and fasten the first screws. When using LOCK STOP (optional) position LOCK STOP and fasten the remaining screws.

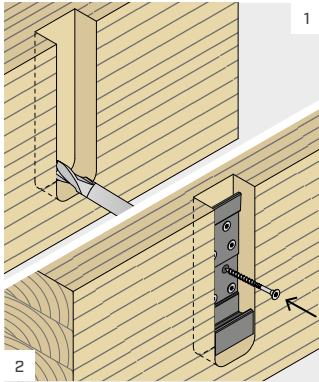


Hook the secondary beam fitting it from the top to the bottom.

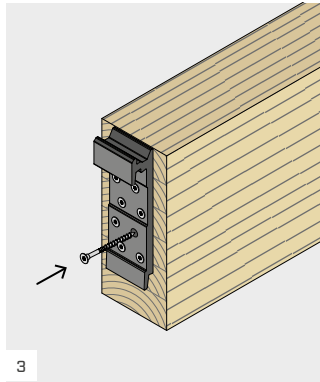


It is possible to insert anti-slip screws without structural function, by drilling one hole  $\varnothing 5$  inclined at  $45^\circ$  in the upper part of the connector. A  $\varnothing 5$  screw must be inserted in the hole.

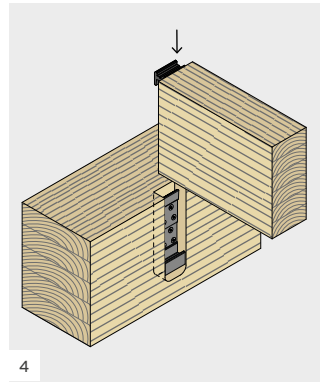
### CONCEALED INSTALLATION



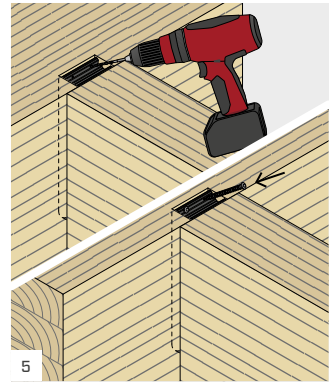
Carry out the grooving on the main element. Place the connector on the main element and fasten all screws.



Place the connector on the secondary beam and fasten all screws.

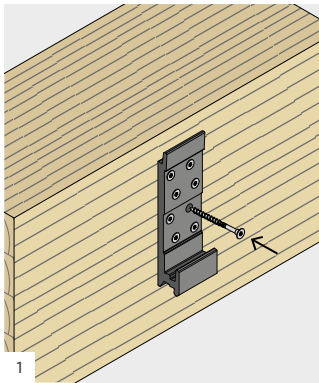


Hook the secondary beam fitting it from the top to the bottom.

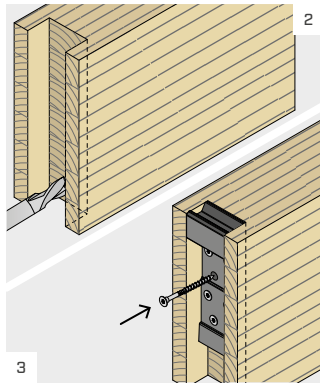


It is possible to insert anti-slip screws without structural function, by drilling one or more holes  $\varnothing 5$  inclined at  $45^\circ$  in the upper part of the connector. A  $\varnothing 5$  screw must be inserted in the holes.

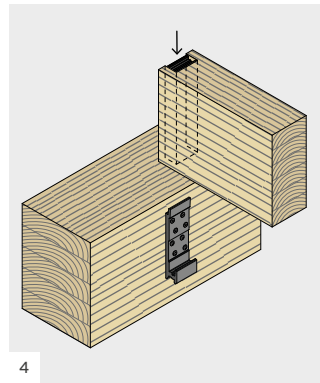
### SEMI-CONCEALED INSTALLATION



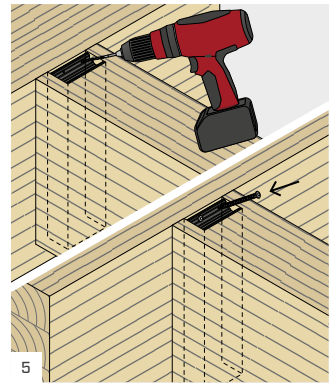
Place the connector on the main element and fasten all screws.



Perform full grooving on the secondary beam. Position the connector and fasten all screws.



Hook the secondary beam fitting it from the top to the bottom.



It is possible to insert anti-slip screws without structural function, by drilling one or more holes  $\varnothing 5$  inclined at  $45^\circ$  in the upper part of the connector. A  $\varnothing 5$  screw must be inserted in the holes.

NOTE: for the geometry of the holes for the optional inclined screws see the "OPTIONAL INCLINED SCREWS" page 70.

## STATIC VALUES

### LOCK T EVO Ø5

| LOCK T EVO CONNECTOR   |                   |  | TIMBER                          |                    | ALUMINIUM                    |
|------------------------|-------------------|--|---------------------------------|--------------------|------------------------------|
| type                   | B x H x s<br>[mm] | HBS PLATE EVO<br>screws<br>KKF AISI410<br>n <sub>H</sub> +n <sub>J</sub> - ØxL<br>[mm] | R <sub>v,timber,k</sub><br>[kN] |                    | R <sub>v,alu,k</sub><br>[kN] |
|                        |                   |  | C24 <sup>(1)</sup>              | C50 <sup>(2)</sup> |                              |
| LOCKTEVO3580           | 35 x 80 x 20      | 4+4 - Ø5x50<br>4+4 - Ø5x70   | 3,97                            | 5,66               | 20,0                         |
|                        |                   |  | 4,81                            | 6,23               |                              |
| LOCKTEVO35120          | 35 x 120 x 20     | 8+8 - Ø5x50<br>8+8 - Ø5x70   | 7,94                            | 11,31              | 20,0                         |
|                        |                   |  | 9,62                            | 12,46              |                              |
| LOCKTEVO 35120 + 35120 | 70 x 120 x 20     | 16+16 - Ø5x50<br>16+16 - Ø5x70   | 15,88                           | 22,62              | 40,0                         |
|                        |                   |  | 19,23                           | 24,92              |                              |

### LOCK T EVO Ø6

| LOCK T EVO CONNECTOR   |                   |  | TIMBER                          |                    | ALUMINIUM                    |
|------------------------|-------------------|--|---------------------------------|--------------------|------------------------------|
| type                   | B x H x s<br>[mm] | HBS PLATE EVO<br>screws<br>KKF AISI410<br>n <sub>H</sub> +n <sub>J</sub> - ØxL<br>[mm] | R <sub>v,timber,k</sub><br>[kN] |                    | R <sub>v,alu,k</sub><br>[kN] |
|                        |                   |  | C24 <sup>(1)</sup>              | C50 <sup>(2)</sup> |                              |
| LOCKTEVO50175          | 50 x 175 x 22     | 8+8 - Ø6x80  | 13,92                           | 18,24              | 40,0                         |
| LOCKTEVO75215          | 75 x 215 x 22     | 18+18 - Ø6x80  | 31,31                           | 41,04              | 60,0                         |
| LOCKTEVO 50175 + 50175 | 100 x 175 x 22    | 16+16 - Ø6x80  | 27,83                           | 36,48              | 80,0                         |
| LOCKTEVO 75215 + 75215 | 150 x 215 x 22    | 36+36 - Ø6x80  | 62,62                           | 82,07              | 120,0                        |

#### CONNECTION STIFFNESS:

- The sliding module can be calculated according to ETA-19/0831, with the following expression:

$$K_{v,ser} = \frac{n \cdot \rho_m^{1,5} \cdot d^{0,8}}{30} \frac{kN}{mm}$$

where:

d is the diameter of the screw thread in the secondary beam, in mm;

$\rho_m$  is the average density of the secondary beam, in kg/m<sup>3</sup>;

n is the number of screws in the secondary beam.

#### NOTES:

<sup>(1)</sup> Values calculated according to ETA-19/0831, ETA-11/0030 and EN 1995-1-1 for screws without pre-drilling hole. The strength value can be accepted as valid, for higher safety standards, even in the presence of pre-drill.  $\rho_k=350$  kg/m<sup>3</sup> has been taken in consideration in the calculation.

<sup>(2)</sup> Values calculated according to ETA-19/0831, ETA-11/0030 and EN 1995-1-1 for screws with pre-drilling hole.  $\rho_k=430$  kg/m<sup>3</sup> has been taken in consideration in the calculation.

#### GENERAL PRINCIPLES:

- The design values are obtained from the characteristic values as follows:
- The coefficient  $\gamma_{M2}$  is the partial coefficient for aluminium sections subject to tension, to be taken according to the current regulations used for the calculation. If there are no other provisions, it is suggested to use the value provided by EN 1999-1-1, equal to  $\gamma_{M2}=1,25$ .
- The coefficient  $\gamma_M$  the relevant safety coefficient, on the timber connection side, to be taken according to the current regulations used for the calculation.
- The design strength is obtained from the characteristic values as follows:

$$R_{v,d} = \min \begin{cases} R_{v,timber,d} = \frac{R_{v,timber,k} \cdot k_{mod}}{\gamma_M} \\ R_{v,alu,d} = \frac{R_{v,alu,k}}{\gamma_{M2}} \end{cases}$$

- Dimensioning and verification of the timber elements must be carried out separately. In particular, for loads perpendicular to the beam axis, it is recommended to perform a splitting check in both wooden elements.
- If coupled connectors are used, special care must be taken in alignment during installation to avoid different stresses in the two connectors.
- Screws with the same length must be used in all holes, separately for each side of the connector. It is possible to use screws of different length in the two connectors, main element side and secondary beam side.
- The connector must always be fully fastened using all the holes.
- The pre-drill is not required for screws on main or secondary beam, with characteristic density  $\rho_k \leq 420$  kg/m<sup>3</sup>. The pre-drill is mandatory on main or secondary beam with characteristic density  $\rho_k > 420$  kg/m<sup>3</sup>.
- For screws on column, pre-drilling is always mandatory.