

2

02

CONCEALED CONNECTORS





# CONCEALED CONNECTORS

## (Invisible connectors)

### TOP UV CONCEALED CONNECTORS

- Invisible dovetail connection
  - Safety catch
  - Optimised hole pattern
  - For loading in 4 load directions
  - Quick assembly of secondary beams
  - Conical dovetail guide pulls together
  - Milling radii
- up to 72 kN**



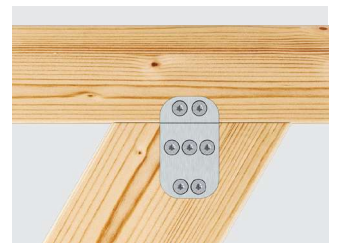
Basics of statics **from page 68** / Products & statics **from page 66**

### CONCEALED CONNECTORS TOP OV

„Simple and ingenious“

More flexibility in connection technology

- **In the factory:** Simply mill out the connection form or attach and mount on the secondary beam with a maximum of 4 tensile and 2 pressure screws.
  - **On the building site:** Insert the secondary beam in the recess of the main beam or only place it down. Turn 2 pressure screws into the main beam/support.
- up to 27 kN**



Basics of statics **from page 84** / Products & statics **from page 82**

### BEAM HANGER

- Connection to timber, concrete and masonry
  - Type alu combi without holes for rod dowels. By drilling through the secondary beam and connector, you receive a connection with a perfect fit.
  - Type alu SD 12 and SD 16 with assembly fix tab.
- up to 258 kN**



Basics of statics **from page 90** / Products & statics **from page 88**

### INTEGRAL CONNECTORS

- GH integral connectors type M, 2- and 4-row with assembly fix tab for concealed connections with connections between the main/secondary beam and connections to the columns. For both versions, the secondary beam with pre-fitted rod dowel is suspended in the assembly fix tab.
  - 2-row integral connectors with embossed reinforcement studs. This gives you the necessary accuracy of fit and the same slot width as with a 4-row integral connector.
  - 4-row integral connections with even higher load-bearing capacities!
- up to 58 kN**



Basics of statics **from page 90** / Products & statics **from page 88**

# CONCEALED CONNECTORS

## 2 ASSORTMENT

|                                      |                                                                                     |                                                                                     |                                                                                     |                                                                                       | Basics<br>Statics &<br>Diagrams<br>from page                                                                                                                            | Products &<br>Statics<br>from page |
|--------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| TOP UV CONNECTORS TIMBER/TIMBER      |    |    |    |    |                                                                                      | 65 66                              |
| TOP UVB CONNECTORS TIMBER/CONCRETE   |    |    |    |    |                                                                                      | 65 / 68 78                         |
| TOP OV CONNECTORS                    |    |    |    |    |                                                                                      | 65 / 84 82                         |
| BEAM HANGER TYPE ALU COMBI           |    |    |    |    |   | 65 / 90 88                         |
| BEAM HANGER TYPE ALU COMBI SD 12     |    |    |    |    |   | 65 / 90 88                         |
| BEAM HANGER TYPE ALU COMBI SD 16     |    |    |    |    |   | 65 / 90 88                         |
| INTEGRAL CONNECTOR 2-ROW TYPE M      |   |   |   |   |                                                                                     | 65 / 90 88                         |
| INTEGRAL CONNECTOR 4-ROW TYPE M      |  |  |  |  |                                                                                    | 65 / 90 88                         |
| INTEGRAL CONNECTOR ANGLED CONNECTION |                                                                                     |                                                                                     |  |  |                                                                                    | 102                                |



CE symbol



Steel with indication of the steel quality and galvanisation



Aluminium



Timber/timber connection



Timber/concrete-connection

**Usage class 1**

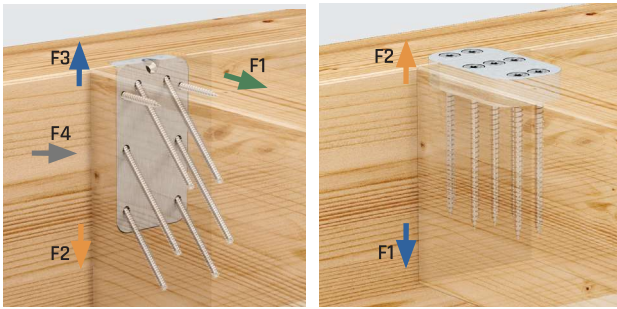
Moisture content in the building materials that corresponds to a temperature of 20° C and a relative humidity of the ambient air that only exceeds a value of 65% for a few weeks per year, e.g. in the case of buildings that are closed on all sides and heated. Comment: In UC 1, the average moisture content of most softwoods does not exceed 12 %.

**Usage class 2**

Moisture content in the building materials that corresponds to a temperature of 20° C and a relative humidity of the ambient air that only exceeds a value of 85% for a few weeks per year, e.g. in the case of open buildings covered by a roof. Comment: In UC 2, the average moisture content of most softwoods does not exceed 20 %.

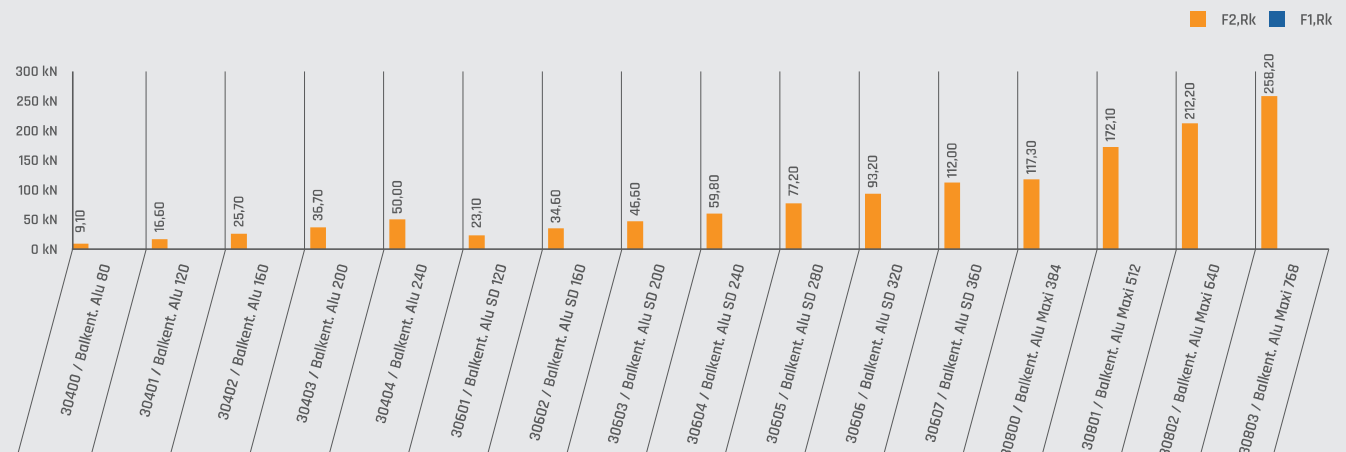
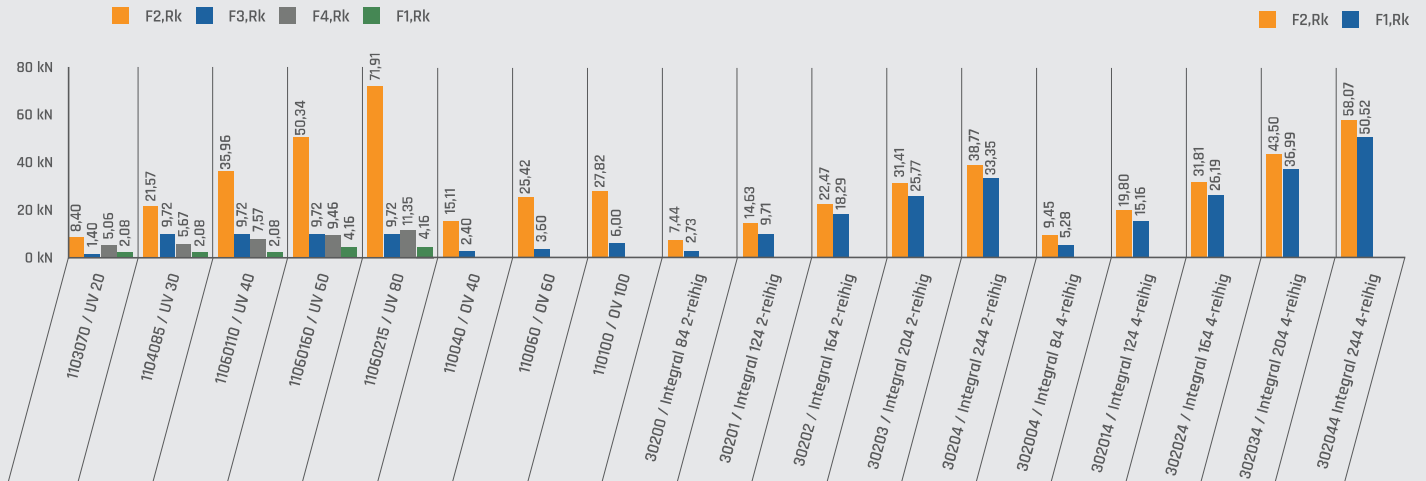
**Usage class 3**

Includes climatic conditions that lead to higher moisture contents than in UC 2, e.g. structures that are exposed to the weather without protection. Eurocode 5 / DIN EN 1995-1-1 section 2.3.1.3



# CONCEALED CONNECTORS

## STATICS DIAGRAM 2





# TOP UV CONNECTORS

2

1. For invisible connections in timber/timber and timber/concrete
2. Optimised hole pattern in 5 different sizes
3. Dovetail guide with conical guide
4. From timber cross-sections 45 mm x 100 mm
5. Time-saving quick assembly



## ADVANTAGES

- Invisible dovetail connection
- Connection of secondary beams made of timber to timber, concrete
- For loading in up to 4 load directions
- With safety catch in all connection variants
- Quick assembly of secondary beams
- Connectors pull together with the large conical gliding surfaces
- The connection can be removed again as required
- The load capacity is determined by the number of screws on the main beam and the screw length on the secondary beam



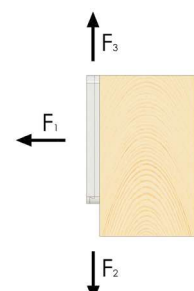
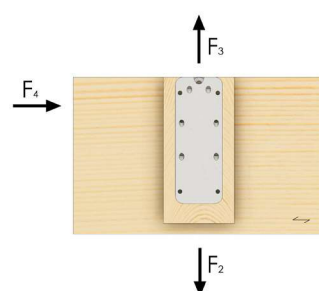
## APPLICATIONS

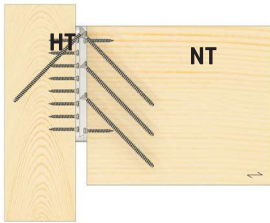
- Right-angled
- Titled at right angles - upwards +90° / downwards -30°
- Angled connections - to the left +45° / to the right -45°
- Bar connections
- Column connections, with and without shadow joint
- Connections over the intermediate layer
- Connections possible directly to the timber board materials such as OSB



## LOAD DIRECTIONS

- $F_2$  for pressure (in push-in direction, Z-axis)
- $F_3$  for lifting (opposite to push-in direction, Z-axis)
- $F_4$  2-axis (angled installation, Y-axis)
- $F_1$  for pull-out (X-axis)





# TOP UV CONNECTORS



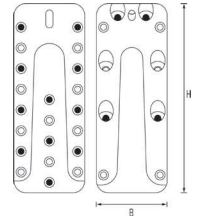
## TOP UV

| Art. No. | Type  | Dimensions [mm] |   |     |   |      | nH     | nN         | EAN     | Weight | Pallet | PU |
|----------|-------|-----------------|---|-----|---|------|--------|------------|---------|--------|--------|----|
|          |       | W(B)            | x | H   | x | T(S) |        |            |         |        |        |    |
|          |       |                 |   |     |   |      | Ø 5    | Ø 6.2      | 4019346 | kg     |        |    |
| 1103070  | UV 20 | 30              | x | 70  | x | 16,0 | 6(8)   | 6(7)x Ø4,0 | 018910  | 0.071  | 2400   | 25 |
| 1104085  | UV 30 | 40              | x | 85  | x | 16,0 | 9(11)  | 4(5)       | 018927  | 0.123  | 2400   | 25 |
| 11060110 | UV 40 | 60              | x | 115 | x | 16,0 | 15(17) | 6(7)       | 018903  | 0.260  | 2400   | 25 |
| 11060160 | UV 60 | 60              | x | 160 | x | 16,0 | 21(25) | 6(7)       | 018941  | 0.384  | 960    | 10 |
| 11060215 | UV 80 | 60              | x | 215 | x | 16,0 | 30(34) | 8(9)       | 018965  | 0.515  | 960    | 10 |

### Number of screws required:

nH = maximum number of connecting elements in the main beam

nN = maximum number of connecting elements in the secondary beam



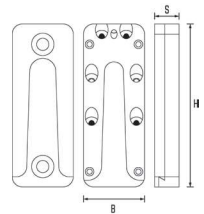
## TOP UVB

| Art. No. | Type   | Dimensions [mm] |   |     |   |      | nH   | nN  | nN  | EAN     | Weight | Pallet | PU |
|----------|--------|-----------------|---|-----|---|------|------|-----|-----|---------|--------|--------|----|
|          |        | W(B)            | x | H   | x | T(S) |      |     |     |         |        |        |    |
|          |        |                 |   |     |   |      | Ø 12 | Ø 6 | Ø 5 | 4019346 | kg     |        |    |
| 12060115 | UVB 40 | 60              | x | 115 | x | 24,0 | 2    | 6   | 2   | 018934  | 0.400  | 2400   | 10 |
| 12060160 | UVB 60 | 60              | x | 160 | x | 24,0 | 2    | 6   | 4   | 018958  | 0.574  | 960    | 10 |
| 12060215 | UVB 80 | 60              | x | 215 | x | 24,0 | 3    | 8   | 4   | 018972  | 0.774  | 960    | 10 |

### Number of screws required:

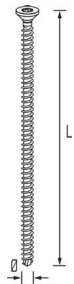
nH = maximum number of connecting elements in the main beam

nN maximum number of connecting elements in the secondary beam



## TOP UV full thread screw for UV connectors type 30 - type 80

| Art. No. | Dimensions [mm] |   |     | TX   | EAN     | Weight | Pallet | PU  |
|----------|-----------------|---|-----|------|---------|--------|--------|-----|
|          | Ø               | x | L   |      |         |        |        |     |
|          |                 |   |     |      | 4019346 | kg     |        |     |
| 116100   | 6,0             | x | 100 | TX30 | 019009  | 1.178  | 39000  | 100 |
| 116120   | 6,0             | x | 120 | TX30 | 019016  | 1.387  | 39000  | 100 |
| 116140   | 6,0             | x | 140 | TX30 | 019023  | 1.629  | 39000  | 100 |
| 116160   | 6,0             | x | 160 | TX30 | 019030  | 1.851  | 26800  | 100 |
| 116200   | 6,0             | x | 200 | TX30 | 019047  | 2.313  | 26800  | 100 |



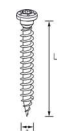
## GH S Drive screw for UV connector type 20

| Art. No. | Dimensions [mm] |   |       | TX   | EAN     | Weight | Pallet | PU  |
|----------|-----------------|---|-------|------|---------|--------|--------|-----|
|          | Ø               | x | L     |      |         |        |        |     |
|          |                 |   |       |      | 4019346 | kg     |        |     |
| 90140050 | 4,0             | x | 50/30 | TX20 | 521533  | 0.255  | 145000 | 500 |
| 90140060 | 4,0             | x | 60/35 | TX20 | 521540  | 0.302  | 110000 | 500 |
| 90140070 | 4,0             | x | 70/35 | TX20 | 521557  | 0.349  | 72000  | 200 |



## GH screw

| Art. No. | Dimensions [mm] |   |    | TX   | EAN     | Weight | Pallet | PU  |
|----------|-----------------|---|----|------|---------|--------|--------|-----|
|          | Ø               | x | L  |      |         |        |        |     |
|          |                 |   |    |      | 4019346 | kg     |        |     |
| 505050   | 5,0             | x | 50 | TX20 | 400029  | 0.427  | 72000  | 200 |
| 505060   | 5,0             | x | 60 | TX20 | 400036  | 0.480  | 58000  | 200 |
| 505070   | 5,0             | x | 70 | TX20 | 400043  | 0.554  | 58000  | 200 |





# TOP UV CONNECTORS

## 2 TECHNICAL FEATURES

### Geometry

|   |                         |
|---|-------------------------|
| W | Width (mm)              |
| H | Height (mm)             |
| T | Material thickness (mm) |

### Tables

|          |                                                         |
|----------|---------------------------------------------------------|
| $n_{HT}$ | Number of holes in main beam                            |
| $n_{NT}$ | Number of holes in secondary beam                       |
| $n_v$    | Number of connecting elements for full screw fitting    |
| $n_t$    | Number of connecting elements for partial screw fitting |
| HT       | Main beam                                               |
| NT       | Secondary beam                                          |
| $H_{HT}$ | Minimum height of main beam                             |
| $B_{HT}$ | Minimum width of main beam                              |
| $H_{NT}$ | Minimum height of secondary beam                        |
| $B_{NT}$ | Minimum width of secondary beam                         |

### Verbindungsmittel Beton/Stahl

|    |              |
|----|--------------|
| Bo | Dowels/bolts |
|----|--------------|

### Timber connecting element

|                                                                                    |                                |
|------------------------------------------------------------------------------------|--------------------------------|
| $\emptyset$ [mm]                                                                   | Diameter of connecting element |
| L [mm]                                                                             | Length of connecting element   |
|  | Grain direction of component   |

### Force directions

|                                                                                         |                                                                                  |
|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| $F_1$  | Force at a right angle to the connector level                                    |
| $F_2$  | Force in insertion direction (main load)                                         |
| $F_3$  | Force against insertion direction (lifting load)                                 |
| $F_4$  | Force at right-angle to insertion direction in Connector level (horizontal load) |

### Design

|            |                                       |
|------------|---------------------------------------|
| $F_{i,Ed}$ | Design value of impact                |
| $F_{i,Rd}$ | Design value of load capacity         |
| $F_{i,Rk}$ | Characteristic value of load capacity |
| i          | Index of force direction              |
| $k_{mod}$  | Modification factor                   |
| $\gamma_M$ | Partial safety factor                 |

### Dowel measurement

|              |                                                   |
|--------------|---------------------------------------------------|
| $F_{Bo,lat}$ | Force at right angles to the bolt axis (shearing) |
| $F_{Bo,ax}$  | Force in bolt axis                                |
| H            | Spacing of the two outer bolts/dowels             |
| $f_{2/3}$    | Spacing of the two outer bolts/dowels             |
| $f_4$        | Spacing of the two outer bolts/dowels             |
| $n_{Bo}$     | Spacing of the two outer bolts/dowels             |



Aluminium

User video  
for our TOP UV connectors



#### Usage class 1

Moisture content in the building materials that corresponds to a temperature of 20° C and a relative humidity of the ambient air that only exceeds a value of 65% for a few weeks per year, e.g. in the case of buildings that are closed on all sides and heated. Comment: In UC 1, the average moisture content of most softwoods does not exceed 12 %.



#### Usage class 2

Moisture content in the building materials that corresponds to a temperature of 20° C and a relative humidity of the ambient air that only exceeds a value of 85% for a few weeks per year, e.g. in the case of open buildings covered by a roof. Comment: In UC 2, the average moisture content of most softwoods does not exceed 20 %.



#### Usage class 3

Includes climatic conditions that lead to higher moisture contents than in UC 2, e.g. structures that are exposed to the weather without protection. Eurocode 5 / DIN EN 1995-1-1 section 2.3.1.3

# TOP UV CONNECTORS

## APPLICATIONS 2

### Application:

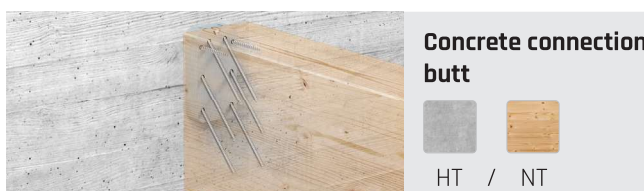
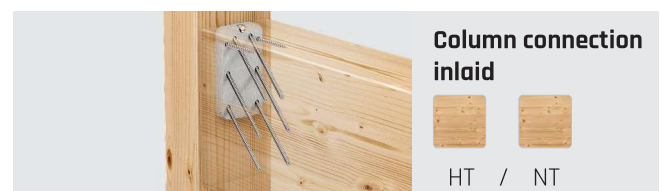
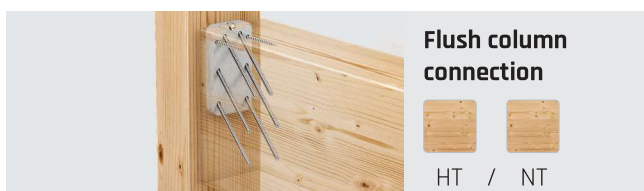
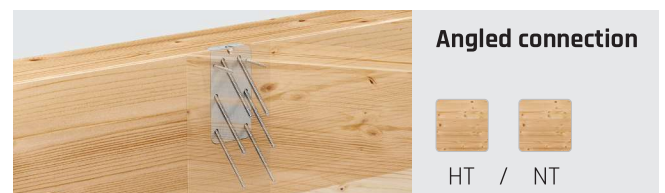
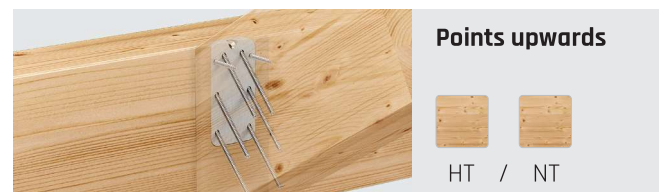
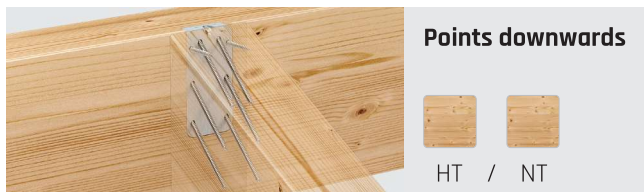
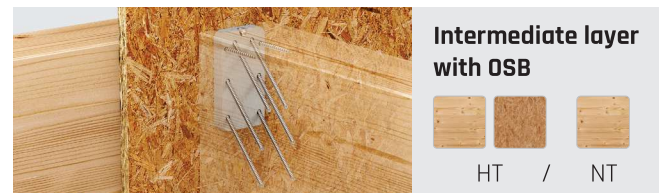
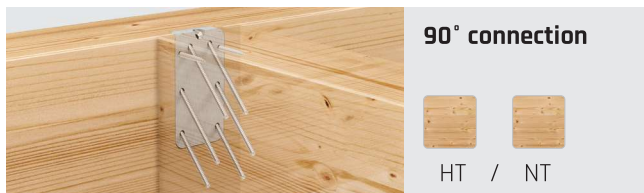
Timber-timber/steel/concrete connection  
Construction beech and other materials according to the approval

### Materials:



### Material thicknesses:

16 / 24 mm



### For use in usage classes



### Connecting element

Timber - timber

Main beam: GH screws Ø 5.0 x 50 / 60 / 70 mm

Secondary beam: UV VG Ø 6.0 x 100 / 120 / 140 / 160 / 200 mm

UV 20: GHS Drive Ø 4.0 mm

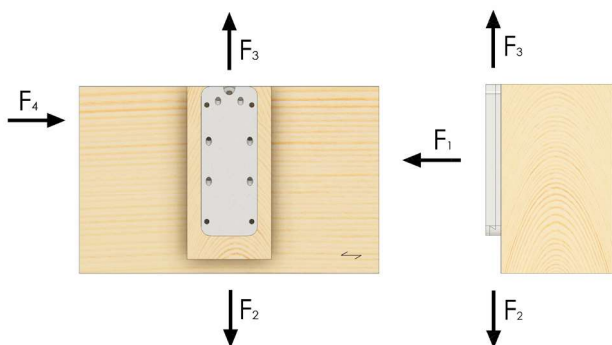
Timber - concrete/ steel

Main beam: Dowel or bolt M10 or Ø 10 with countersunk head

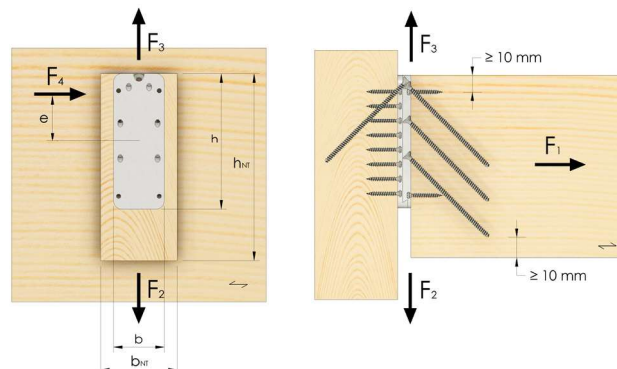
Secondary beam: UV VG Ø 6.0 x 100 / 120 / 140 / 160 / 200 mm



## Load directions



## Load attack points



$F_1$  takes effect in the centre of the TOP UV connector.

$F_2$  and  $F_3$  take effect in the centre of the TOP UV connector.

$F_4$  takes effect at spacing  $e$  from the centre of the TOP UV connector. In the design tables, the values for  $e = 0 \text{ mm}$  and  $e = h/2$  are indicated. Load capacities for other spacing  $e$  can be calculated according to ETA-11/0036.

## Timber/timber connection

Load case  $F_3$ 

When connecting timber to timber, an additional UV fully threaded screw is always required after hanging the connector.

When connecting wood - concrete/steel, always use 2 M6 x 20 locking screws with washers.

## One-sided connection

With one-sided connection to a main beam, the moment  $M_{ec} = F_{2/3,E} \times (B_{HT} / 2 + e)$  must be considered for the load capacity proof of the main beam. With  $F_{2/3}$  support force of the secondary beam,  $B_{HT}$  - width of the main beam and  $e$  - spacing of support force from the component edge,  $e = 9 \text{ mm}$  for connection timber/timber with screws,  $e = 17 \text{ mm}$  for connection timber/concrete or timber/steel with dowels/bolts

## Two-sided connection

In the case of connections on both sides with different loads on the secondary beam connections (difference in forces  $> 20 \%$ ), the moment from the differential forces of the secondary beam connections should be applied when designing the main beam.

## Connection over intermediate layers

If there is an intermediate layer between the joist hangers and the main beam, the length of the connecting centre must be selected so that the fastener is anchored to the main beam at the lengths given above.

## Proof of load capacity

$$\left( \frac{F_{1,Ed}}{F_{1,Rd}} + \frac{F_{2/3,Ed}}{F_{2/3,Rd}} \right)^2 + \left( \frac{F_{4,Ed}}{F_{4,Rd}} \right)^2 \leq 1$$

## Connection timber/concrete, steel

## Dowel design

Stress on the dowel/bolt for connection timber - concrete/ steel

Forces in most stressed dowel/bolt

| Load case   | $F_1$       | $F_2$ and $F_3$          | $F_4$                                       |
|-------------|-------------|--------------------------|---------------------------------------------|
| $F_{B,lat}$ | 0           | $F_{2/3} / n_B$          | $F_4 \times (1/n_B + e/H) = f_4 \times F_4$ |
| $F_{B,ax}$  | $F_1 / n_B$ | $f_{2/3} \times F_{2/3}$ | $1,2 \times F_4 / n_B$                      |

## Design value of load capacity

Full and partial screw fitting

$$F_{i,Rd} = F_{i,Rk} \times k_{mod} / \gamma_{M,Holz} \text{ mit } \gamma_{M,Holz} = 1,3$$

Load case  $F_3$  timber-concrete/steel:  $F_{3,Rd} = 6 / 1,25 = 4,8 \text{ kN}$

Factors for connection timber-concrete/steel

| Type      | UV-B 40            | UV-B 60 | UV-B 80 |       |
|-----------|--------------------|---------|---------|-------|
| $n_B$     | 2                  | 2       | 3       | 2     |
| $f_{2/3}$ | 0,299              | 0,192   | 0,106   | 0,133 |
| $f_4$     | $e = 0 \text{ mm}$ | 0,500   | 0,333   | 0,500 |
|           | $e = h/2$          | 1,267   | 1,167   | 0,948 |

## Proof of load capacity

$$\left( \frac{F_{1,Ed}}{F_{1,Rd}} + \frac{F_{2/3,Ed}}{F_{2/3,Rd}} \right)^2 + \left( \frac{F_{4,Ed}}{F_{4,Rd}} \right)^2 \leq 1$$

## General information

The load capacities in the table apply to timbers with a characteristic raw density of  $\rho_s 350 \text{ kg/m}^3$ .

For timber with a high raw density, the values in the table can be used to be on the safe side.

The height of the secondary beam must be selected so that the top screw  $\varnothing 5 \text{ mm}$  in the secondary beam is at least 10 mm below the top of the secondary beam and the lowest screw tip in the secondary beam is at least 10 mm above the underside of the secondary beam.

The spacing between a TOP UV connector and a component surface may be max. 1 mm.



### Design example timber/timber connection UV 80

Main beam: BSH GL24h 14/40; secondary beam: NH C24 10/28

Connection forces:

$F_{2,Ed} = 32.0$  kN;  $F_{4,Ed} = 1.20$  kN; NKL 1, KLED mittel bzw.  $k_{mod} = 0.8$ ; Last  $F_{4,Ed}$

Attacks the secondary beam top edge.

Determination of spacing "e" between the connector's centre of gravity and the attack point of load  $F_4$   
 $e = h / 2 = 215 / 2 = 108$  mm, with connector top edge flush with the top edge of the secondary beam

### Necessary characteristic load capacities of a connector

$$F_{2,Rk,erf} = F_{2,Ed} / k_{mod} \times \gamma_M = 32.0 / 0.8 \times 1.3 = 52.0 \text{ kN}$$

$$F_{4,Rk,erf} = F_{4,Ed} / k_{mod} \times \gamma_M = 1.20 / 0.8 \times 1.3 = 1.95 \text{ kN}$$

A higher load-bearing capacity is selected due to the biaxial load.

TOP UV 80 fully screw fitted with screws 5.0 x 60 mm and 6.0 x 160 mm

### Design value of load capacities from the table values

$$F_{2,Rd} = F_{2,Rk} \times k_{mod} / \gamma_M = 68.0 \times 0.8 / 1.3 = 41.8 \text{ kN}$$

$$F_{4,Rd} = F_{4,Rk} \times k_{mod} / \gamma_M = 3.53 \times 0.8 / 1.3 = 2.17 \text{ kN}$$

### Proof of load capacity

$$\left( \frac{F_{1,Ed}}{F_{1,Rd}} + \frac{F_{2/3,Ed}}{F_{2/3,Rd}} \right)^2 + \left( \frac{F_{4,Ed}}{F_{4,Rd}} \right)^2 \leq 1 \quad \left( \frac{32,0}{41,8} \right)^2 + \left( \frac{1,20}{2,17} \right)^2 = 0.89$$

### Connecting element:

|                 |                     |          |
|-----------------|---------------------|----------|
| Main beam:      | GH screws 5.0 x 60  | 30 units |
|                 | VG screws 6.0 x 160 | 1 units  |
| Secondary beam: | GH screws 5.0 x 60  | 4 units  |
|                 | VG screws 6.0 x 160 | 8 units  |

### Design example timber/concrete connection UV-B 80

Main beam: Reinforced concrete wall; secondary beam: NH C24 10/28

Proof of load capacity same as timber-timber connection

### Determination of forces for the concrete with the maximum stress

Anchor forces from load  $F_{2,Ed}$ :  $F_{B,2,lat,Ed} = F_{2/3,Ed} / n_B = 32.0 / 3 = 10.7$  kN

$$F_{B,2,ox,Ed} = f_{2/3} \times F_{2/3,Ed} = 0.106 \times 32.0 = 3.39 \text{ kN}$$

Anchor forces from load  $F_{4,Ed}$ :  $F_{B,4,lat,Ed} = f_4 \times F_{4,Ed} = 0.948 \times 1.20 = 1.14$  kN

$$F_{B,4,ox,Ed} = 1.2 \times F_{4,Ed} / n_B = 1.2 \times 1.20 / 3 = 0.48 \text{ kN}$$

Addition of anchor forces:  $F_{B,lat,Ed} = 10.7 + 1.14 = 11.8$  kN

$$F_{B,ox,Ed} = 3.39 + 0.48 = 3.87 \text{ kN}$$

The load capacity of the concrete anchor must be verified for the impacts  $F_{B,lat,Ed} = 11.8$  kN and  $F_{B,ox,Ed} = 3.87$  kN.

### Connecting element:

|                 |                     |         |
|-----------------|---------------------|---------|
| Concrete:       | Concrete anchor M10 | 3 units |
| Secondary beam: | GH screws 5.0 x 60  | 4 units |
|                 | VG screws 6.0 x 160 | 8 units |





2



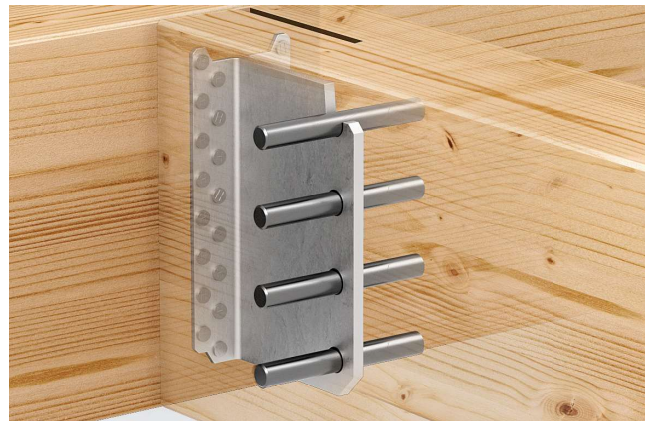


# INTEGRAL CONNECTORS/BEAM HANGERS

2

## ADVANTAGES OF INTEGRAL CONNECTORS

- Assembly fix tab for simple, quick assembly
- Invisible, attractive look
- Customised angled connection of 30° to 90°.



## ADVANTAGES OF BEAM HANGERS

- For connection to timber and concrete
- Simple, quick assembly
- Invisible, attractive look
- Narrow geometry
- Angled connections possible
- Fire resistant requirements are met





# INTEGRAL CONNECTORS/BEAM HANGERS

## 2 TECHNICAL FEATURES

### Geometry

|      |                         |
|------|-------------------------|
| H    | Height (mm)             |
| D(T) | Depth (mm)              |
| W(B) | Width (mm)              |
| T(S) | Material thickness (mm) |

### Tables

|                  |                                      |
|------------------|--------------------------------------|
| HT               | Main beam                            |
| H <sub>NT</sub>  | Minimum height of secondary beam     |
| NT               | Secondary beam                       |
| B <sub>NT</sub>  | Minimum width of secondary beam      |
| n <sub>HT</sub>  | Number of holes in main beam         |
| n <sub>NT</sub>  | Number of holes in secondary beam    |
| n <sub>a</sub>   | Number of connecting elements        |
| n <sub>o Ø</sub> | Number of connecting elements with Ø |
| L <sub>s</sub>   | Length of self-drilling rod dowels   |

### Timber connecting element

|                                                                                   |                                |
|-----------------------------------------------------------------------------------|--------------------------------|
| Ø [mm]                                                                            | Diameter of connecting element |
| L [mm]                                                                            | Length of connecting element   |
|  | Grain direction of component   |

### Connecting element concrete/ steel

|    |            |
|----|------------|
| Bo | Dowel/bolt |
|----|------------|

### Force directions

|                     |                                                  |
|---------------------|--------------------------------------------------|
| F <sub>2,Rk</sub> ↓ | Force in insertion direction (main load)         |
| F <sub>1,Rk</sub> ↑ | Force against insertion direction (lifting load) |



**Aluminium**



**Steel with indication of the steel quality and galvanisation**



**Timber/timber connection**



**Timber/concrete connection**



### Usage class 1

Moisture content in the building materials that corresponds to a temperature of 20° C and a relative humidity of the ambient air that only exceeds a value of 65% for a few weeks per year, e.g. in the case of buildings that are closed on all sides and heated. Comment: In UC 1, the average moisture content of most softwoods does not exceed 12 %.



### Usage class 2

Moisture content in the building materials that corresponds to a temperature of 20° C and a relative humidity of the ambient air that only exceeds a value of 85% for a few weeks per year, e.g. in the case of open buildings covered by a roof. Comment: In UC 2, the average moisture content of most softwoods does not exceed 20 %.



### Usage class 3

Includes climatic conditions that lead to higher moisture contents than in UC 2, e.g. structures that are exposed to the weather without protection. Eurocode 5 / DIN EN 1995-1-1 section 2.3.1.3

# INTEGRAL CONNECTORS/BEAM HANGERS

## APPLICATIONS 2

**Application:**

Connection timber-timber/concrete\*/ steel\*

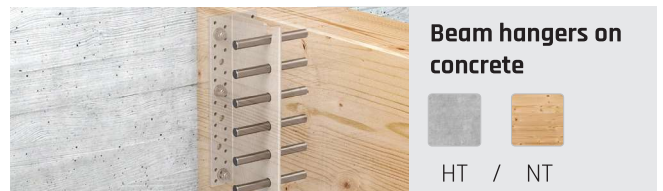
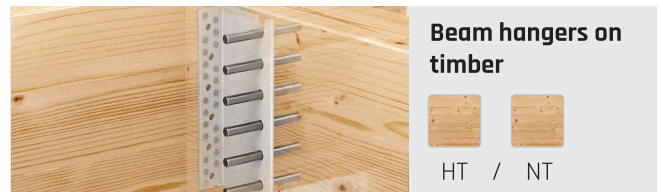
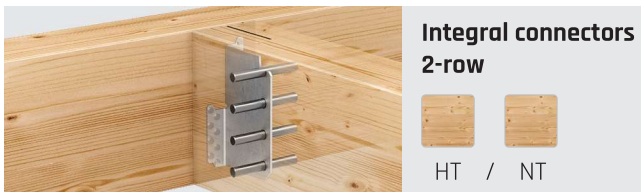
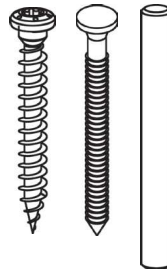
\*Beam hangers only

**Materials:**

**Material thickness:**

Integral connectors 3,0/6,0 mm

Beam hangers 6,0/10,0 mm


**For use in usage classes**

**Connecting element:**

GH threaded nails Ø 4,0 X 35 / 40 / 50 / 60 / 75 / 100 mm

Ø 6,0 x 60 / 80 / 100 mm\*

GH screws

Ø 5,0 x 25 / 35 / 40 / 50 / 60 / 70 mm

Rod dowels

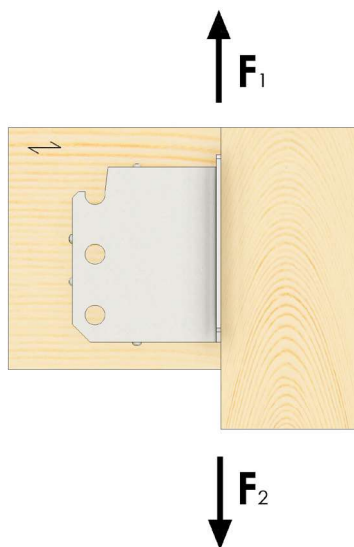
Bolts, dowels, concrete anchors Ø8, Ø 16\*

\*Only joist hanger type Combi Maxi SD 16

**Connecting elements from page 274**

# INTEGRAL CONNECTORS/BEAM HANGERS

## 2 LOAD DIRECTIONS

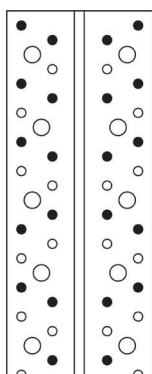


### Timber/timber connection

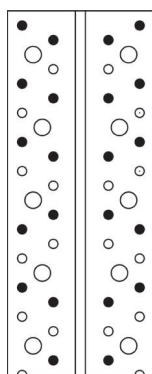
Partial and full nail fitting or partial and full screw fitting

## Nail patterns

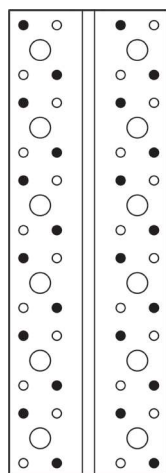
Beam hanger  
Alu Combi



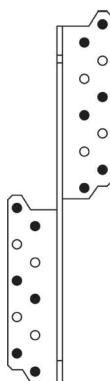
Beam hanger  
Alu Combi SD



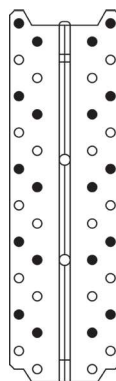
Beam hanger  
Alu Combi Maxi SD



Integral connectors  
2-row



Integral connectors  
4-row



### Connection over intermediate layers

The characteristic load capacities for the connection indicated in the tables also apply to an intermediate layer.

### The following conditions must be met:

The intermediate layer must be connected to the timber component without being able to be moved.

The integration depth of the connecting element in the timber component must be the same or greater.

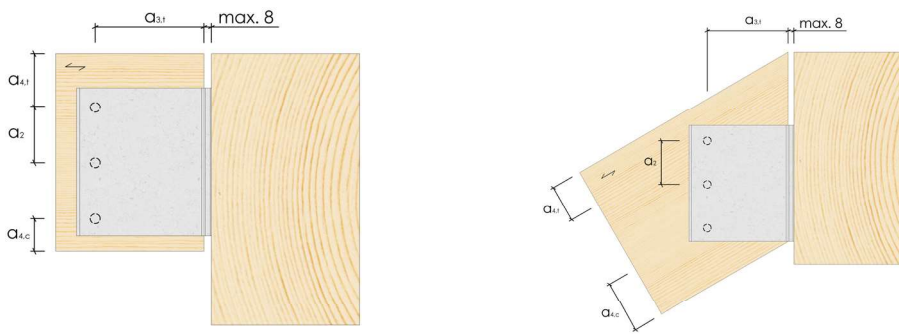
For this, a correspondingly long connecting element must be used.

The characteristic perforation strength  $f_{h,k}$  of the connecting element in the intermediate layer must be the same or greater.



# INTEGRAL CONNECTORS/BEAM HANGERS

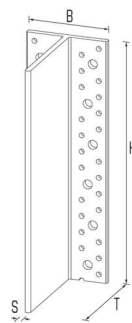
## MINIMUM AND EDGE SPACING 2



|           |                                    |                                | Rod dowels Ø 12 mm |
|-----------|------------------------------------|--------------------------------|--------------------|
| $a_2$     | Right angle to the grain direction | $3d$                           | 36 mm              |
| $a_{3,t}$ | End grain with stress              | $\max (7d; 80 \text{ mm})$     | 84 mm              |
| $a_{4,t}$ | Loaded edge                        | $\max [(2+2\sin\alpha) d; 3d]$ | 48 mm              |
| $a_{4,c}$ | Unloaded edge                      | $3d$                           | 36 mm              |

### Connection to masonry, concrete or steel

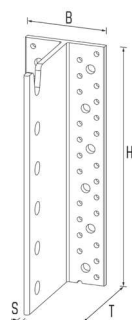
Proof of the dowel's load-bearing capacity must be provided separately in accordance with the manufacturer's specifications.



# BEAM HANGERS

## 2 TYPE ALU COMBI

| Art. No. | Dimensions [mm] |   |      |   |       |   |      | nH  |     | EAN    | Weight<br>kg | Pallet | PU |   |   |
|----------|-----------------|---|------|---|-------|---|------|-----|-----|--------|--------------|--------|----|---|---|
|          | H               | x | W(B) | x | D(T)  | x | T(S) | Ø 5 | Ø 9 |        |              |        |    |   |   |
| 30400    | 80              | x | 80   | x | 109,4 | x | 6,0  | 14  | 4   | 105207 | 0.232        | 750    | 25 | ■ | ■ |
| 30401    | 120             | x | 80   | x | 109,4 | x | 6,0  | 22  | 6   | 105214 | 0.337        | 750    | 25 | ■ | ■ |
| 30402    | 160             | x | 80   | x | 109,4 | x | 6,0  | 30  | 8   | 105221 | 0.454        | 750    | 25 | ■ | ■ |
| 30403    | 200             | x | 80   | x | 109,4 | x | 6,0  | 38  | 10  | 105238 | 0.562        | 450    | 15 | ■ | ■ |
| 30404    | 240             | x | 80   | x | 109,4 | x | 6,0  | 46  | 12  | 105245 | 0.674        | 450    | 15 | ■ | ■ |
| 30422    | 2200            | x | 80   | x | 109,4 | x | 6,0  | 362 | 110 | 105252 | 6.178        | 48     | 1  | ■ | ■ |



# BEAM HANGERS

## TYPE ALU COMBI SD Ø12

| Art. No. | Dimensions [mm] |   |      |   |       |   |      | nH  |     | nBo | EAN    | Weight<br>kg | Pallet | PU |   |   |
|----------|-----------------|---|------|---|-------|---|------|-----|-----|-----|--------|--------------|--------|----|---|---|
|          | H               | x | W(B) | x | D(T)  | x | T(S) | Ø 5 | Ø 9 |     |        |              |        |    |   |   |
| 30601    | 120             | x | 80   | x | 109,4 | x | 6,0  | 22  | 6   | 3   | 104309 | 0.350        | 600    | 25 | ■ | ■ |
| 30602    | 160             | x | 80   | x | 109,4 | x | 6,0  | 30  | 8   | 4   | 104316 | 0.460        | 600    | 25 | ■ | ■ |
| 30603    | 200             | x | 80   | x | 109,4 | x | 6,0  | 38  | 10  | 5   | 104323 | 0.570        | 360    | 15 | ■ | ■ |
| 30604    | 240             | x | 80   | x | 109,4 | x | 6,0  | 46  | 12  | 6   | 104330 | 0.690        | 360    | 15 | ■ | ■ |
| 30605    | 280             | x | 80   | x | 109,4 | x | 6,0  | 54  | 14  | 7   | 104347 | 0.770        | 360    | 15 | ■ | ■ |
| 30606    | 320             | x | 80   | x | 109,4 | x | 6,0  | 62  | 16  | 8   | 104354 | 0.850        | 192    | 8  | ■ | ■ |
| 30607    | 360             | x | 80   | x | 109,4 | x | 6,0  | 70  | 18  | 9   | 104361 | 0.920        | 192    | 8  | ■ | ■ |

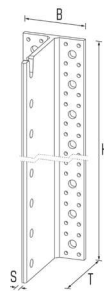
TYPE ALU COMBI 2

| Timber / Timber |                 |      |       |      |                 |                 |                   |                |                |         |                   |
|-----------------|-----------------|------|-------|------|-----------------|-----------------|-------------------|----------------|----------------|---------|-------------------|
| Art. No.        | Dimensions [mm] |      |       |      | Secondary beam  |                 |                   |                | Main beam      |         |                   |
|                 | H               | W(B) | D(T)  | T(S) | H <sub>NT</sub> | B <sub>NT</sub> | n <sub>a,Ø7</sub> | L <sub>s</sub> | n <sub>a</sub> | 4.0x60  | F <sub>2,rk</sub> |
| 30400           | 80              | 80   | 109,4 | 6,0  | 120             | 120             | 3                 | 113            | 14             | Full    | 9,10              |
|                 |                 |      |       |      |                 |                 |                   |                | 10             | Partial | 7,40              |
| 30401           | 120             | 80   | 109,4 | 6,0  | 160             | 120             | 4                 | 113            | 22             | Full    | 16,60             |
|                 |                 |      |       |      |                 |                 |                   |                | 14             | Partial | 14,60             |
| 30402           | 160             | 80   | 109,4 | 6,0  | 200             | 120             | 5                 | 113            | 30             | Full    | 25,70             |
|                 |                 |      |       |      |                 |                 |                   |                | 18             | Partial | 20,60             |
| 30403           | 200             | 80   | 109,4 | 6,0  | 240             | 120             | 7                 | 113            | 38             | Full    | 36,70             |
|                 |                 |      |       |      |                 |                 |                   |                | 22             | Partial | 27,20             |
| 30404           | 240             | 80   | 109,4 | 6,0  | 280             | 120             | 9                 | 113            | 46             | Full    | 50,00             |
|                 |                 |      |       |      |                 |                 |                   |                | 26             | Partial | 34,40             |

TYPE ALU COMBI SD Ø12

| Timber / Timber |                 |      |       |      |                 |                 |                    |                |         |                   |
|-----------------|-----------------|------|-------|------|-----------------|-----------------|--------------------|----------------|---------|-------------------|
| Art. No.        | Dimensions [mm] |      |       |      | Secondary beam  |                 |                    | Main beam      |         | F <sub>2,rk</sub> |
|                 | H               | W(B) | D(T)  | T(S) | H <sub>NT</sub> | B <sub>NT</sub> | n <sub>a,Ø12</sub> | n <sub>a</sub> | 4.0x60  |                   |
| 30601           | 120             | 80   | 109,4 | 6,0  | 160             | 120             | 3                  | 22             | Full    | 23,10             |
|                 |                 |      |       |      |                 |                 |                    | 14             | Partial | 18,10             |
| 30602           | 160             | 80   | 109,4 | 6,0  | 200             | 120             | 4                  | 30             | Full    | 34,60             |
|                 |                 |      |       |      |                 |                 |                    | 18             | Partial | 26,20             |
| 30603           | 200             | 80   | 109,4 | 6,0  | 240             | 120             | 5                  | 38             | Full    | 46,60             |
|                 |                 |      |       |      |                 |                 |                    | 22             | Partial | 34,60             |
| 30604           | 240             | 80   | 109,4 | 6,0  | 280             | 120             | 6                  | 46             | Full    | 59,80             |
|                 |                 |      |       |      |                 |                 |                    | 26             | Partial | 43,70             |
| 30605           | 280             | 80   | 109,4 | 6,0  | 320             | 140             | 7                  | 54             | Full    | 77,20             |
|                 |                 |      |       |      |                 |                 |                    | 30             | Partial | 53,50             |
| 30606           | 320             | 80   | 109,4 | 6,0  | 360             | 140             | 8                  | 62             | Full    | 93,20             |
|                 |                 |      |       |      |                 |                 |                    | 34             | Partial | 63,70             |
| 30607           | 360             | 80   | 109,4 | 6,0  | 400             | 160             | 9                  | 70             | Full    | 112,00            |
|                 |                 |      |       |      |                 |                 |                    | 38             | Partial | 79,40             |





# BEAM HANGERS



## 2 TYPE ALU COMBI MAXI SD Ø16

| Art. No. | Dimensions [mm] |   |      |   |      |   |      | nH    |      | nN   | EAN     | Weight | Pallet | PU |   |   |
|----------|-----------------|---|------|---|------|---|------|-------|------|------|---------|--------|--------|----|---|---|
|          | H               | x | W(B) | x | D(T) | x | T(S) | Ø 7,5 | Ø 17 | Ø 17 | 4019346 | kg     |        |    |   |   |
| 30800    | 384             | x | 130  | x | 172  | x | 10,0 | 48    | 12   | 6    | 104378  | 3.160  | 96     | 1  | ■ | ■ |
| 30801    | 512             | x | 130  | x | 172  | x | 10,0 | 64    | 16   | 8    | 104385  | 4.200  | 80     | 1  | ■ | ■ |
| 30802    | 640             | x | 130  | x | 172  | x | 10,0 | 80    | 20   | 10   | 104392  | 5.220  | 64     | 1  | ■ | ■ |
| 30803    | 768             | x | 130  | x | 172  | x | 10,0 | 96    | 24   | 12   | 104408  | 6.280  | 48     | 1  | ■ | ■ |
| 30822    | 2176            | x | 130  | x | 172  | x | 10,0 | 272   | 68   | 34   | 104415  | 17.400 |        | 1  | ■ | ■ |





TYPE ALU COMBI MAXI SD Ø16

2

| Timber / Timber |                 |      |      |      |                 |                 |                    |                |         |                   |
|-----------------|-----------------|------|------|------|-----------------|-----------------|--------------------|----------------|---------|-------------------|
| Art. No.        | Dimensions [mm] |      |      |      | Secondary beam  |                 |                    | Main beam      |         |                   |
|                 | H               | W(B) | D(T) | T(S) | H <sub>NT</sub> | B <sub>NT</sub> | n <sub>ø,Ø16</sub> | n <sub>a</sub> | 6.0x100 | F <sub>2,rk</sub> |
| 30800           | 384             | 130  | 172  | 10,0 | 432             | 160             | 6                  | 48             | Full    | 117,30            |
|                 |                 |      |      |      |                 |                 |                    | 24             | Partial | 58,60             |
| 30801           | 512             | 130  | 172  | 10,0 | 560             | 160             | 8                  | 64             | Full    | 172,10            |
|                 |                 |      |      |      |                 |                 |                    | 32             | Partial | 95,90             |
| 30802           | 640             | 130  | 172  | 10,0 | 688             | 160             | 10                 | 80             | Full    | 212,20            |
|                 |                 |      |      |      |                 |                 |                    | 40             | Partial | 136,70            |
| 30803           | 768             | 130  | 172  | 10,0 | 816             | 160             | 12                 | 96             | Full    | 258,20            |
|                 |                 |      |      |      |                 |                 |                    | 48             | Partial | 179,30            |

