Installation of ROOCO® Column Shoe

Identification of the product

ROOCO® Column Shoes are available in standard models (16, 20, 24, and 30) analogous to the M-thread sizes of HPM® Rebar Anchor Bolts. The model of the column shoe can be identified by the name on the product's label and the color on the bottom side of the bottom plate of the ROOCO® Column Shoe. The color codes are shown in *Table 12*.

Table 12. ROOCO® Column Shoe color codes.

Column Shoe	Color code
ROOCO 16	Yellow
ROOCO 20	Blue
ROOCO 24	Gray
ROOCO 30	Green

Installation of glued-in rods

1. Holes shall be drilled in the timber column to install glue and bars. Hole diameter and length according to the design drawings.

   The installation tolerance of glued-in rod in the crosswise direction of the column is ±2 mm.

   In the context of installing laminated veneer lumber (LVL), it is imperative to exercise particular caution or special care. It is essential to incorporate insulation between the grout and the LVL material, so no moisture is able to interact with LVL.

2. Glue-in rod protrusion h_{sc} from the column bottom shall be according to *Table 6*.

   Protrusion from the column top shall be according to design drawings and it is derived from the thickness of the structure above and a needed protrusion for the column shoe.

3. Gluing shall be executed according to the glue manufacturer's technical specification and local regulations.

4. In case of plywood panel application, prior to points 1 – 3, the plywood panel itself shall be glued on the bottom surface of the column. The glue between surface of the timber column and plywood panel, shall be applied on the whole contact area, correspondingly to glue manufacturer's technical specification and local regulations. Both surfaces must fulfill the requirement of flatness to secure complete adhesion between materials. After gluing the plywood panel, the procedure of drilling and gluing the rods inside the holes, which is defined above, shall be applied.

Installation of column shoes

After glued-in rod installation and glue curing, column shoes can be installed. Installation is done by placing column shoes on the glued-in rods, followed by installation of special washers and nuts (*Figure 24*).

Figure 24. Installation of ROOCO® Column Shoes on the column

Special washers are part of the ROOCO® Column Shoe delivery, and nuts shall be part of the threaded bar assembly. Nuts placed on the bottom side of the top plate of the ROOCO® Column Shoe shall be snug-tightened. The contact surface between the column shoe and timber shall be flat and clean from the glue residue that would prevent the full contact area.

Installation in special situations with base plates, shear dowels, or dry connections shall be done according to design drawings and are outside of this manual's scope.

Erection of timber column on base structure (with vertical adjustment)

1. To level a timber column

Before erecting a column, the upper nuts and washers are removed from the anchor bolts. The lower nuts and washers are adjusted to the correct level. The column is erected directly onto the pre-leveled washers and nuts.

2. To align timber columns

The upper nuts and washers are screwed onto the bolts, and the column is aligned in the vertical position using leveling nuts. It is practical to use two theodolites from different directions to ensure verticality. The nuts can be tightened to the torque given in *Table 9* (Chapter 2 – Resistances) and *Table 13*. Greater values of T_{req} shall be specified by designer.

Table 13. T_{req} torque values of nuts connecting ROOCO® Column Shoe to a concrete foundation or steel flange of DELTABEAM®.

	ROOCO 16	ROOCO 20	ROOCO 24	ROOCO 30
T_{req} [Nm]	140	260	410	720

3. To grout joint and recesses

Before loading the column with any other structures, such as beams or columns, the joint underneath the column and bolt recesses should be grouted by following the instructions provided by the grout supplier. The grout must be non-shrink grade and with strength according to the design. To avoid air being trapped in the joint, it is recommended that grout is poured from one side of the column only. Grouting formwork is made to ensure adequate concrete cover for column shoes and anchor bolts (*Figure 25*).

After the grout has reached sufficient strength, the connection is finalized, and joining structures may be erected on the column.

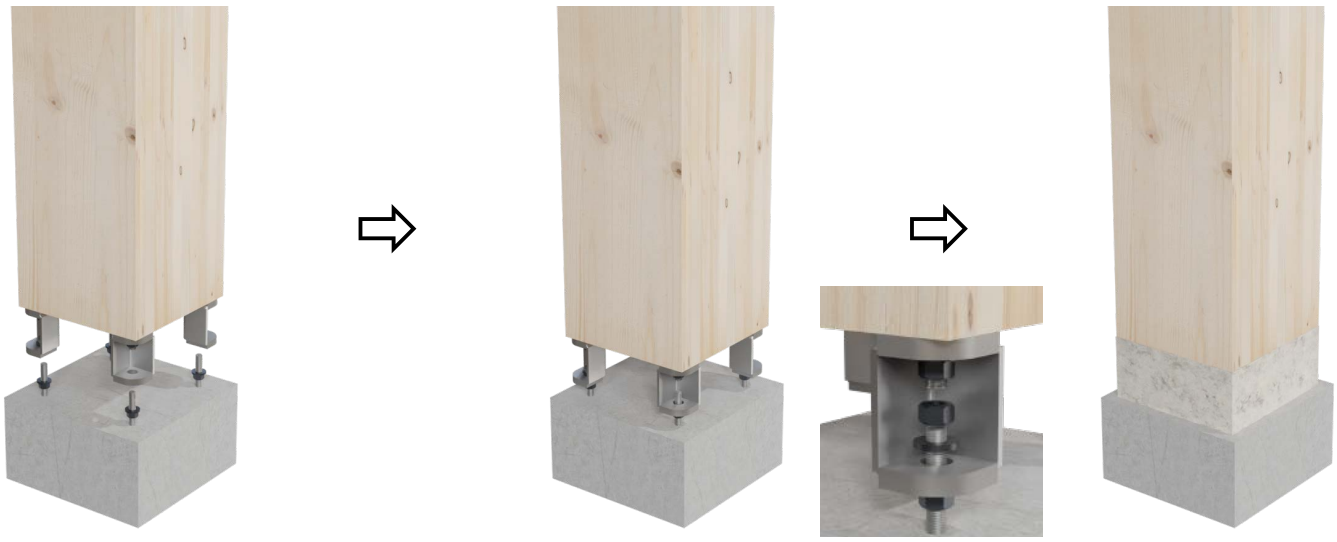

Figure 25. Installation of ROOCO® Column Shoes on foundation with vertical adjustment.

Erection of timber column on base structure (without vertical adjustment)

1. To install a timber column

Before erecting a column, the upper nuts and washers are removed from the threaded bars. Check the surface flatness of the support surface and column bottom to confirm compliance with design requirements. The column is erected directly onto the support surface.

The upper nuts and washers are screwed onto the threaded bars. The nuts are tightened to the torque given in *Table 13*. Greater values of T_{req} shall be specified by designer.

2. To grout joint and recesses

A column before grouting can take axial force and bending moment as specified in the design, and loading with other structures before grouting is only allowed if specified and allowed by the responsible structural engineer.

In all other cases, before loading the column with any other structures, such as beams or columns, the joint underneath the column and bolt recesses should be grouted by following the instructions provided by the grout supplier. The grout must be non-shrink grade and with strength according to the design. To avoid air being trapped in the joint, it is recommended that grout is poured from one side of the column only.

Grouting formwork is made to ensure adequate concrete cover for column shoes and threaded bars (*Figure 26*). After the grout has reached sufficient strength, the connection is finalized, and joining structures may be erected on the column.

Figure 26. Installation of ROOCO® Column Shoe on foundation without vertical adjustment.

Erection of timber column with dry connection

For dry connections, there can be different solutions that require different installation instructions. Thus, if a dry connection is chosen, then the designer and manufacturer should specify the installation procedure. ROOCO® Column Shoes installation requirements are the same as defined above.

Note:
Moisture protection of timber column is not part of this manual and shall be considered separately.