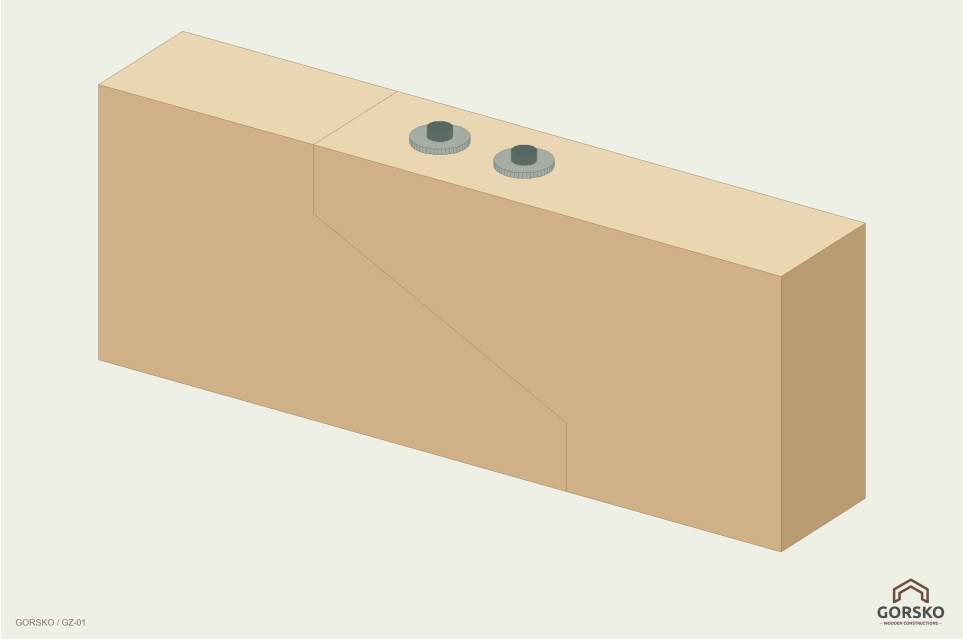
TIMBER JOINTS

GORSKO catalogue of timber joints

Practical reference for timber construction partnerships. This edition contains two joints with consistent references, revision, geometry and technical sources.



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Free · no form

> Geometry proposal · capacity not verified

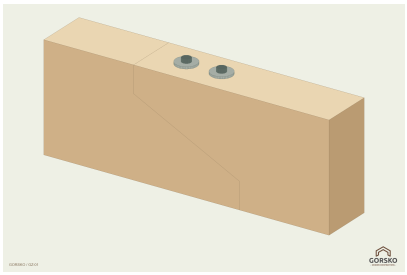
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GZ-01 / Timber joint technical sheet

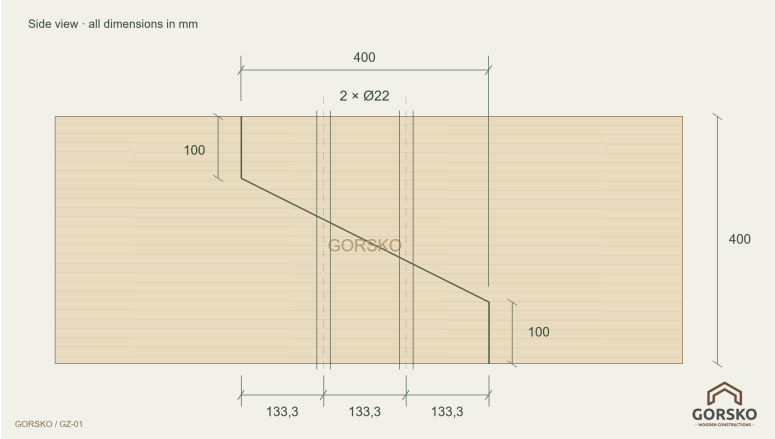
Gerber joint

Geometry, function and assembly in one place. The example uses a 200 × 400 mm section and a 400 mm long joint.

Geometry proposal · capacity not verified



03 / Timber machining

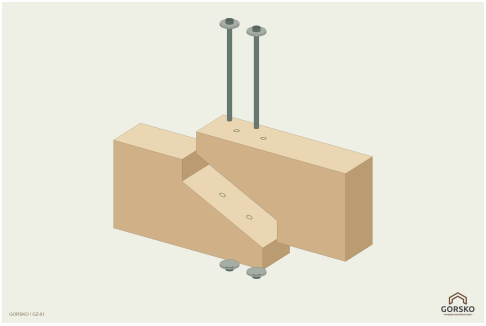


Section b × h	200 × 400 mm
Joint length	400 mm
Top / bottom notch	100 / 100 mm
Holes in timber	2 × Ø22 mm
Axes from start of joint	133,3 / 266,7 mm
Axis across width	100 mm
Contact plane angle	26,6°

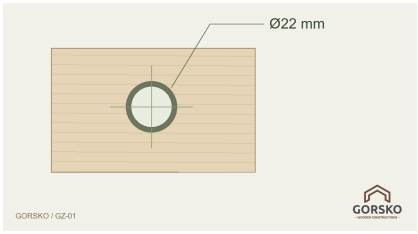
All dimensions are in mm.

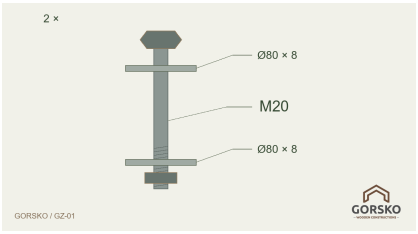
GZ-01 / Geometry

Hardware



Exploded assembly · assembly principle





Ø22 mm hole

Two vertical through-holes in the assembled joint. Their axes are at the thirds of the joint length and centred across the member width.

M20 bolt with washers and nut

Each of the two holes is shown with one M20 bolt, two large washers and one nut. Bolt length and steel grade must be specified by the designer.

Component	Quantity	Size
Bolts	2	M20
Washers	4	Ø80 × 8 mm
Nuts	2	M20

> Ø80 × 8 mm washers are an illustrative proposal. The 8 mm thickness has not been verified by calculation. Bolt length, grades, standards and protection are to be specified after checking.

The Ø22 mm hole and M20 bolt are separate specifications. The illustrated 2 mm diameter clearance must be checked for the selected bolt type and loading.

Where is it used?

The Gerber joint is used for hinged splicing of timber beams away from a direct support, particularly in Gerber beam and purlin systems. It can also be used in beam repairs. [1, 3]

It allows shorter members to be used. The joint position follows the structural model, normally at the intended zero-moment location. There is no universal offset from a support for every system and loading pattern. [1]

Key application requirements

1. Orient the upper and lower members correctly in relation to supports and shear direction; incorrect arrangement increases the risk of splitting. [1]

2. Shear transfer involves bolts and large washers or bearing plates. Possible load reversal must also be considered. [1]

3. Accurately machine mating faces; protect the joint from moisture and provide access for installing and inspecting the hardware.

A starting point for project-specific design.

The 200 × 400 mm section, 400 mm length and 0.25h = 100 mm notches are the supplied initial geometry. The inclined plane joins heights of 300 and 100 mm, giving an angle of 26.6°. These are not universal recommended proportions for all loads.

1. Structural system, hinge position, design shear, any axial forces and reversal of loading.

2. Timber shear, local bending, net sections and splitting at notches and holes.

3. Bolt tension, compression perpendicular to grain beneath washers, and washer or plate bending and effective bearing area.

4. Distances, tolerances, timber and steel grades, load duration, moisture, corrosion protection and fire requirements.

> Without loads, spans, supports, timber and steel grades and service conditions, capacity and hardware adequacy cannot be confirmed. Use the applicable Eurocode 5 edition and national annex, together with relevant steel component standards. This illustration is not a verified structural calculation or fabrication drawing.

GZ-01 / Technical references and scope

Your project. Our shared detail.

Send us your proposed joint and design inputs. Together we can coordinate the detail, fabrication preparation and CNC machining of the timber members.

- Drawing or model with the joint reference
- Section, material and quantities
- Structural system, forces and execution requirements

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https://www.gorsko.si/Gorsko/ponudba/

Technical references and scope

[1] BUBIZA: Holz-Holz-Verbindungen, pp. 16-21

www.bubiza.de

[2] Harzer Software: Gerber-Gelenk Holz, example calculation

www.harzerstatik.de

[3] Material-Archiv / ETH Material Hub: Gerberstoss

materialarchiv.ch

Reference [1] explains use, orientation and checks for timber, washers and bolts. It is based on the older DIN 1052 and is not a current normative basis.

Example [2] concerns a different joint variant. Its capacity and selected hardware do not apply to this detail. Reference [3] describes Gerber joint applications.

> Without loads, spans, supports, timber and steel grades and service conditions, capacity and hardware adequacy cannot be confirmed. Use the applicable Eurocode 5 edition and national annex, together with relevant steel component standards. This illustration is not a verified structural calculation or fabrication drawing.

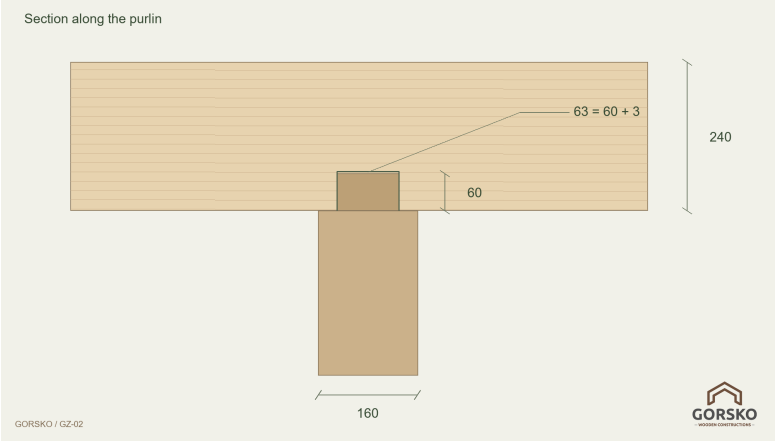
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GZ-02 / Timber joint technical sheet

Post tenon

Post 160 × 160 mm and purlin 160 × 240 mm. Tenon: 100 mm overall length along the purlin, 60 mm across it, 60 mm engagement and rounded ends R30.

Geometry proposal · capacity not verified



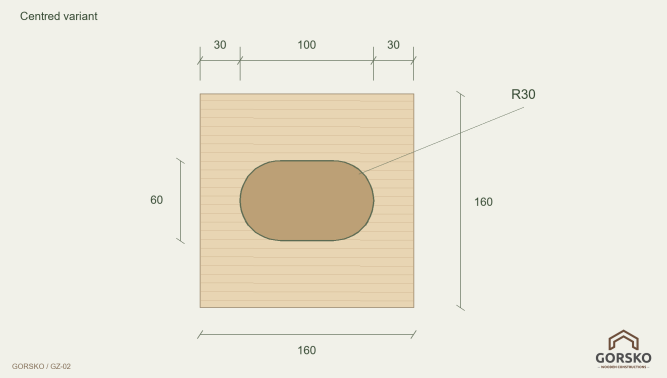
Post	160 × 160 mm
Purlin b × h	160 × 240 mm
Tenon L × b × d	100 × 60 × 60 mm
Rounded-end radius	R30
Setbacks: centred / offset	30 / 30 mm | 50 / 10 mm
Minimum width / maximum length	40 mm | 120 mm

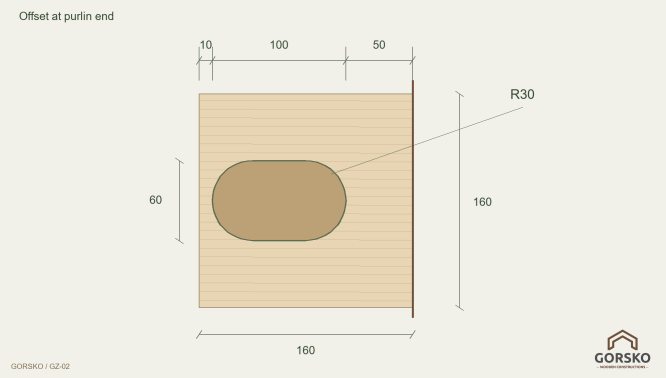
> The tenon engages 60 mm into the purlin. The mortise should be a few millimetres deeper to allow shoulder bearing [1]; this model uses an illustrative 63 mm (3 mm bottom clearance). Timber remaining above the pocket is 177 mm. Specify side fit and final depth in the fabrication drawing.

All dimensions are in mm.

GZ-02 / Two variants, the same bearing principle.

Two variants, the same bearing principle.





Centred variant

The tenon is centred on the post: 30 + 100 + 30 = 160 mm along the purlin. Across the purlin, each shoulder is 50 mm wide.

Offset at purlin end

Where the purlin ends flush with the post edge, move the tenon 20 mm towards the purlin interior. From the purlin end: 50 mm setback, 100 mm tenon and 10 mm to the opposite post edge.

> GORSKO recommends the 50 mm end setback to retain more timber between the mortise and the purlin end and reduce breakout risk during assembly or service. It is not a universally verified structural edge distance.

Adjustments and machining limits

Width may be reduced below 60 mm, but GORSKO specifies a minimum 40 mm for the Ø40 cutter. Length may be up to 120 mm. For an obround profile R = width/2: a 40 mm width requires R20, not R30. Length includes both rounded ends.

> Dimensions interact. A 120 mm centred tenon gives 20 + 120 + 20 mm; the 50 mm end setback cannot fit a 160 mm post (50 + 120 > 160). Change the tenon length, detail or post section.

Where is it used?

Connection of posts to intermediate or ridge purlins above. The tenon guides assembly and locates the members; post shoulders provide bearing for the vertical support force. [1]

The intended compression path is through the purlin bearing on the shoulders, not through the tenon tip. Avoid water accumulation in the mortise. [1]

Key requirements

1. Machine shoulders in one plane. The mortise bottom must not prevent full shoulder contact. [1]

2. Check remaining timber, splitting and force direction at the purlin end; 50 mm is a GORSKO execution recommendation.

3. The tenon alone is not verified restraint against wind uplift, withdrawal or global lateral instability. The designer specifies any additional fixings.

What must the calculation cover?

Geometric shoulder area for a 100 × 60 mm, R30 tenon is approximately 20,373 mm²: $160^2 - [60 \times (100 - 60) + \pi \times 30^2]$. This is not the code-effective bearing area or a capacity.

1. Compression perpendicular to grain in the purlin and parallel to grain in the post; determine actual and code-effective bearing areas for the project.

2. Post capacity and stability, purlin bending and shear, and section reduction by the mortise.

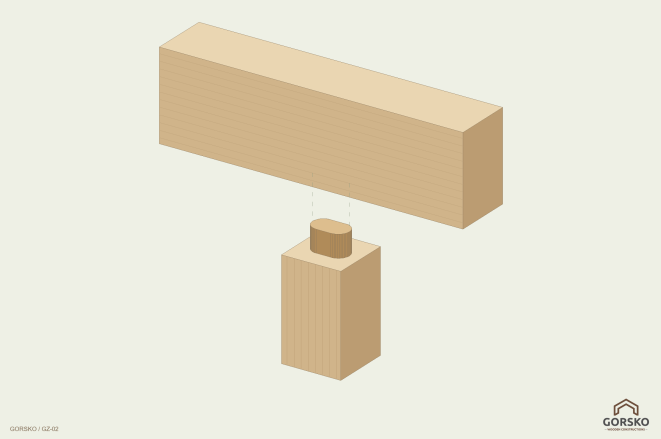
3. Lateral forces, splitting near the pocket, purlin end distance, uplift and any additional anchorage.

4. Timber grade and moisture, load duration, tolerances, timber protection and fire requirements.

> Without loads, spans, supports, timber and steel grades and service conditions, capacity and hardware adequacy cannot be confirmed. Use the applicable Eurocode 5 edition and national annex, together with relevant steel component standards. This illustration is not a verified structural calculation or fabrication drawing.

GZ-02 / Assembly

Assembly



Align the purlin above the tenon and lower it vertically until it bears fully on the shoulders. The tenon must not wedge into the mortise. Install any additional hardware specified for the project.

Technical references and scope

[1] BUBIZA: Holz-Holz-Verbindungen, pp. 51-59

[1] BUBIZA: vertical tenons, pp. 51-59. Based on the older DIN 1052, it explains positioning, bottom clearance and reduced bearing area; it is not a current normative basis.

The 160/160 and 160/240 sections, 100/60/60 tenon, 50 mm recommendation and 40/120 mm machining limits are GORSKO inputs, not dimensions structurally validated by this source.

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Send us your proposed joint and design inputs. Together we can coordinate the detail, fabrication preparation and CNC machining of the timber members.

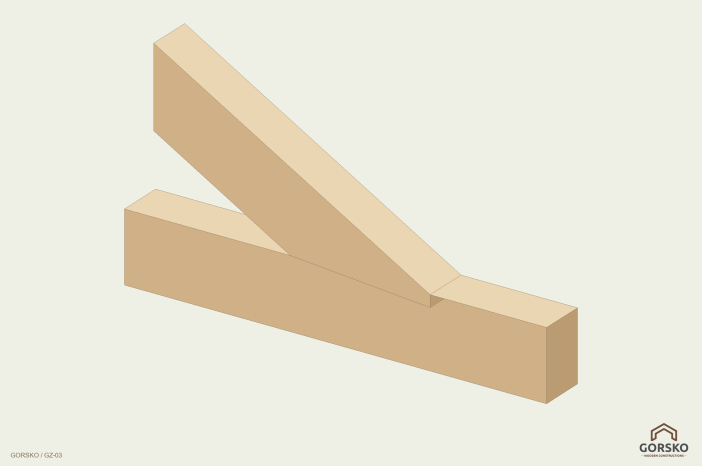
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GZ-03 / Timber joint technical sheet

Front notched joint

Both members have a 160 × 240 mm cross-section. The inclined member meets the beam at 30°. Notch depth is 40 mm; the timber length from the bearing face to the beam end is 400 mm.

Geometry proposal · capacity not verified



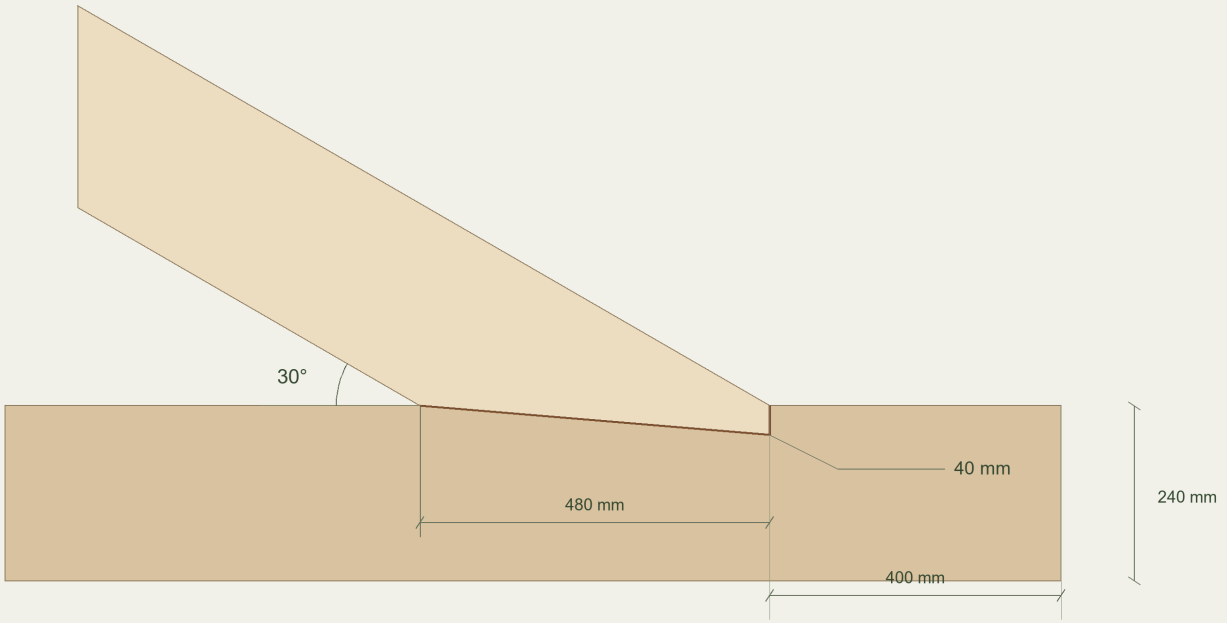
Horizontal beam b × h	160 × 240 mm
Inclined member b × h	160 × 240 mm
Member angle α	30°
Vertical notch depth t_v	40 mm
End shear length l_v	400 mm
Remaining beam depth	200 mm
Horizontal bearing projection	480 mm

Shape approved by GORSKO: a long shallow bearing surface and a short vertical front step. With 160 × 240 mm sections at 30°, the horizontal bearing projection is 480 mm. Step depth is 40 mm; step-to-beam-end distance is 400 mm.

GZ-03 / Front notch geometry

Front notch geometry

Side section · dimensions in mm



b × h = 160 × 240 mm · α = 30° · t_v = 40 mm · l_v = 400 mm

GORSKO / GZ-03

> The physical end distance is 400 mm. The cited method limits effective shear length to 8 · t_v = 320 mm. The extra 80 mm therefore does not automatically increase the design shear area. The cited construction minimum is 200 mm. [1, 2]

Shape approved by GORSKO: a long shallow bearing surface and a short vertical front step. With 160 × 240 mm sections at 30°, the horizontal bearing projection is 480 mm. Step depth is 40 mm; step-to-beam-end distance is 400 mm.

Where is it used?

For inclined compression members in timber trusses and roof frames, such as a rafter or strut bearing into a horizontal tie beam. The notch transfers compression directly through timber contact. [1, 2]

The front face carries bearing force; the timber ahead of the notch resists its horizontal component. The connection must match the structural model of the whole frame. [2]

Essential requirements

1. Provide accurate, fully contacting bearing faces; cracks and gaps change the actual force transfer.

2. Check compression at an angle to grain, shear in the timber ahead of the notch and the reduced beam section. [1, 2]

3. The notch alone does not provide a verified tension or uplift connection. Design position restraint, lateral stability and erection conditions.

Design starting points

For α = 30° and h = 240 mm, the literature depth limit h/4 is 60 mm. The illustrated 40 mm is below this geometric limit; this does not prove load capacity. [1, 2]

1. Determine design axial compression NEd and its components, timber strength class, moisture, load duration and safety factors.

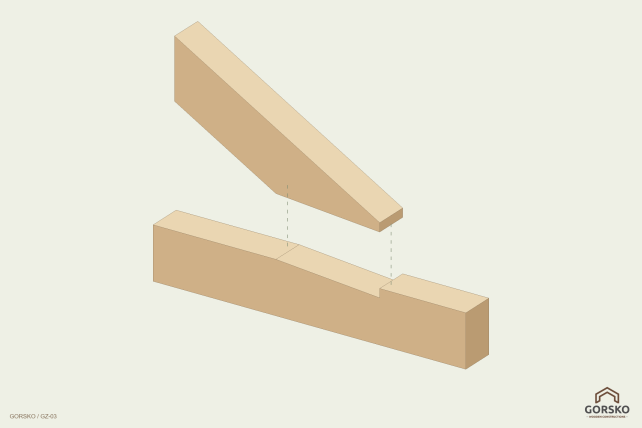
2. Check compression on the actual contact surfaces, grain direction and distribution of contact forces. This shape does not use a bisector front face; the structural engineer must verify the calculation model.

3. Check shear ahead of the notch. Starting point: HEd = NEd · cos 30°; determine effective shear length and width under the adopted design method. [2]

4. Check the remaining 200 mm depth, axial force with bending, eccentricity, splitting, stability and any required restraints.

GZ-03 / Assembly

Assembly



Align the members across their width. Lower the inclined member into the notch until full bearing is achieved; check the front face and seat. Install the specified restraints afterwards. The animation shows timber assembly and is not a lifting plan.

> No capacity has been calculated: loads, timber grade and project conditions are missing. These are literature-based starting points. The structural engineer must check the current Eurocode 5, applicable National Annex and suitability of the selected method.

Technical references and scope

[1] BUBIZA: Bemessung und Konstruktion im Holzbau, 2023, Versätze 4-12

[2] D.I.E. Statik Software: Stirnversatz (DIN 1052:2004-08)

[1] BUBIZA 2023, Versätze 4-12: geometry, bearing and end shear checks.

[2] D.I.E. based on the older DIN 1052:2004-08 explains basic checks. Its bisector configuration differs from the approved GORSKO shape. Equations must not be transferred without verifying the model.

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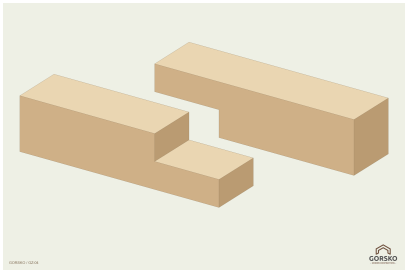
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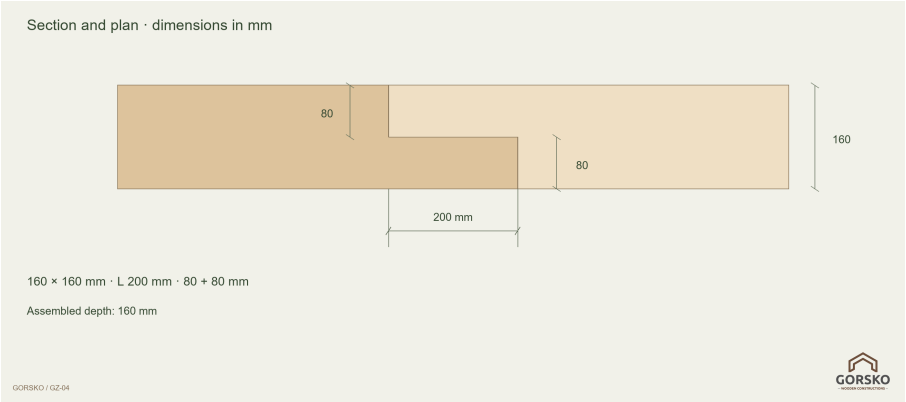
GZ-04 / Longitudinal half-lap

Half-lap joint (BLATT)

Both plates have a 160 × 160 mm section. Half the depth, 80 mm, is removed from each member; assembled depth remains 160 mm.

Geometry proposal · capacity not verified





For extending eaves plates; overlap length 200 mm with complementary 80 mm cuts.

Essential requirements

1. Provide full contact and support consistent with the structural system. This is not a verified unsupported moment-resisting splice.

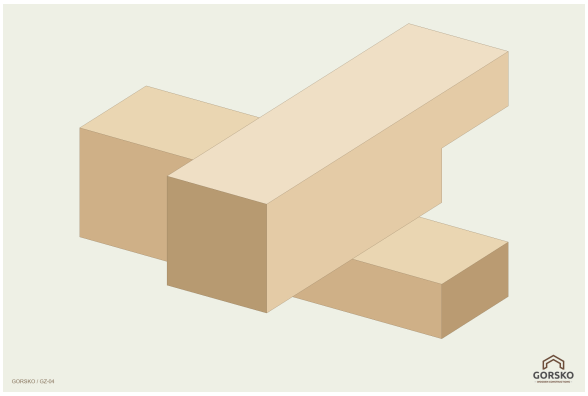
2. The shape alone does not verify restraint against axial separation, uplift or lateral movement. Specify fasteners and erection restraints by design.

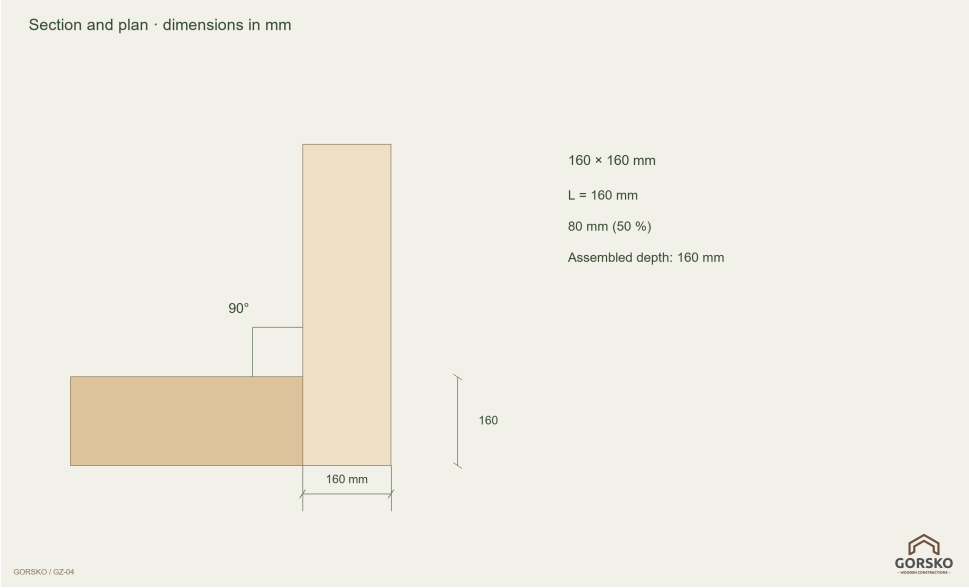
3. On the post, transfer load through the shoulders; the tenon must not bottom out. Check the mortise, splitting and remaining timber.

GZ-04 / 90° corner half-lap

90° corner half-lap

Right-angle connection between two eaves plates. Overlap 160 × 160 mm, lap length 160 mm, cuts 80 mm in each member.





Application and support

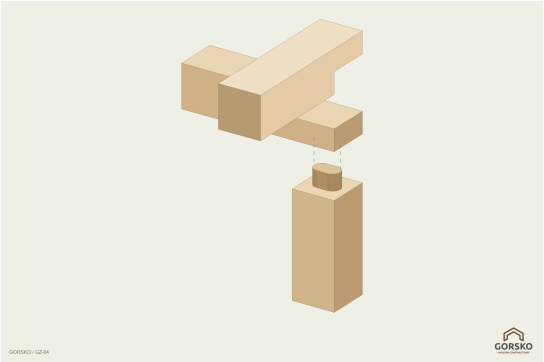
Mainly longitudinal eaves-plate connections over suitable support, such as a loadbearing wall. The designer sets joint position and actual support length. [1, 2]

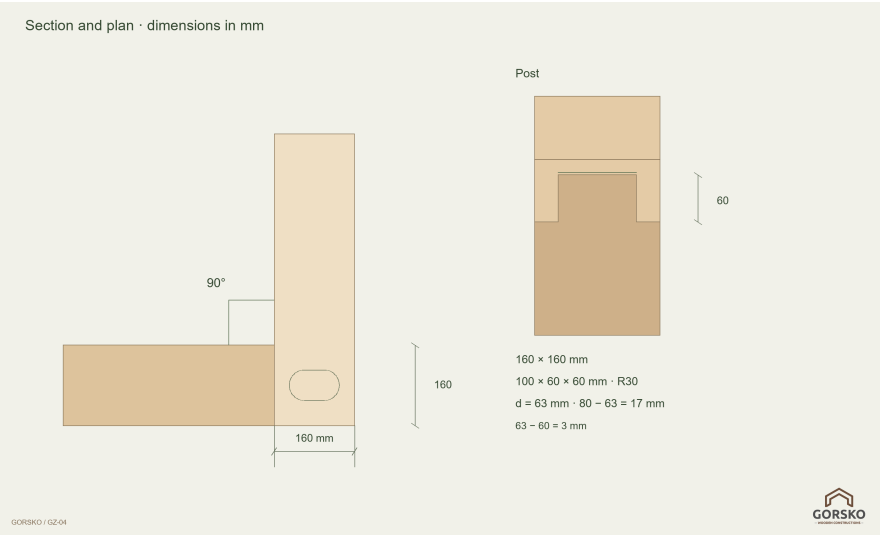
For right-angle eaves-plate corners, including direct support on a post with a locating tenon. The approved 200/160 mm dimensions are GORSKO geometry, not declared capacities.

GZ-04 / Corner half-lap on a tenoned post

Corner half-lap on a tenoned post

A 160 × 160 mm corner lap on a 160 × 160 mm post. Approved tenon: 100 mm long, 60 mm wide and 60 mm engagement into the lower lap member, rounded ends R30.





> Centred tenon: 30 + 100 + 30 mm, and 50 + 60 + 50 mm across. The illustrated blind mortise in the lower lap member is 63 mm deep (3 mm bottom clearance), leaving 17 mm below the lap plane at 80 mm. Check the reduced section. The upper member has no tenon mortise.

Align both members and assemble to full bearing. For the post variant, first lower the bottom member onto the tenon, then place the upper lap member. Install specified restraints.

Design starting points

The half-depth cut leaves each member at 160 × 80 mm. Geometric overlap areas are 32,000 mm² longitudinally and 25,600 mm² at the corner; these are not code-effective bearing areas or capacities.

1. Determine forces, timber species and grade, moisture, load duration and support conditions.

2. Check bearing, shear, bending and reduced sections at the steps, including eccentricities and actual contact.

3. At the post, check compression perpendicular to grain in the lower plate, post compression, shoulders and tenon mortise.

4. Design tension, lateral and uplift restraints separately; check edge distances, stability and fire requirements.

> No load capacity has been calculated. Sketch approval confirms shape and dimensions; the responsible engineer must prepare shop details and structural checks to the applicable design basis.

Technical references and scope

[1] BUBIZA: Holz-Holz-Verbindungen, Gerades Blatt / Eckverbindungen / Zapfen

[2] Eurotec: Grundlagen Holzbautechnik, Gerades Blatt

[1] explains traditional joints and includes references to the older DIN 1052. It does not certify this detail.

Lap and tenon dimensions and all three shapes follow approved GORSKO sketches. Fasteners have not been specified.

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