



- ➔ **Making of Roof Flashing - Course: Timberwork techniques. Instruction examples for practical vocational training (Institut für Berufliche Entwicklung, 26 p.)**
  - 📄 **(introduction...)**
  - 📄 **Preliminary Remarks**
  - 📄 **Instruction Example 3.1.: Working of Boards for a Roof Base Facing**
  - 📄 **Instruction Example 3.2.: Making of a Roof Base Facing**
  - 📄 **Instruction Example 3.3.: Template Making for a Rafter Foot**
  - 📄 **Instruction Example 3.4.: Re-proofing of Buildings**



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-  **Instruction Example 3.3.: Template Making for a Rafter Foot**
-  **Instruction Example 3.4.: Re-proofing of Buildings**

**Institut für berufliche Entwicklung e.V.  
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 **Making of Roof Flashing - Course: Timberwork techniques. Instruction examples for practical vocational training (Institut für Berufliche Entwicklung, 26 p.)**


 **(introduction...)**

  **Preliminary Remarks**

 **Instruction Example 3.1.: Working of Boards for a Roof Base Facing**

 **Instruction Example 3.2.: Making of a Roof Base Facing**

 **Instruction Example 3.3.: Template Making for a Rafter Foot**

 **Instruction Example 3.4.: Re-proofing of Buildings**

## Preliminary Remarks

**The present booklet contains 4 selected instruction examples which are exclusively related to eaves flashings. Making of eaves flashings requires work on site and in the workshop as well.**

**The Instruction Examples 3.1. and 3.2. have been selected so that practising of the examples can be done separately or successively, one based on the other one.**

**Instruction Example 3.3. includes the calculations necessary for making the templates required for an eaves flashing to be made on a roof structure to be built.**

**Example 3.4. explains the sequence of operations in template making for re-proofing of buildings.**

**The necessary materials, machines, hand tools, measuring and testing means and auxiliary accessories are specified for each example to facilitate the preparation and execution of the work. Moreover, the previous knowledge, which is necessary in addition to knowledge of the technique Making of Roof Flashings, is also stated for each example and should be recapitulated at the beginning.**

**The order of working steps given in the sequence of operations is to be followed, in order to achieve good quality of work.**

**A working drawing showing the required shapes and dimensions is also attached to each example.**

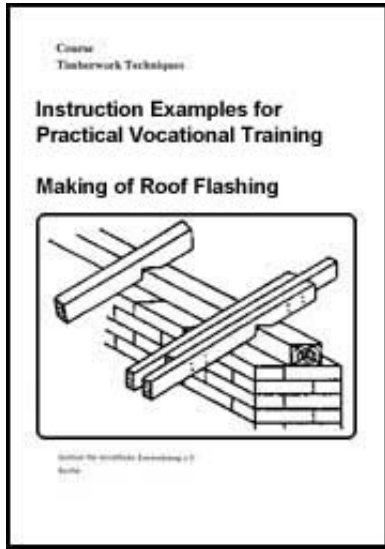
**The working drawings 3.1. and 3.2. are required for the first two examples.**



[Home](#) > [ar](#).[cn](#).[de](#).[en](#).[es](#).[fr](#).[id](#).[it](#).[ph](#).[po](#).[ru](#).[sw](#)

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Instruction examples for practical vocational training  
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 ***(introduction...)***



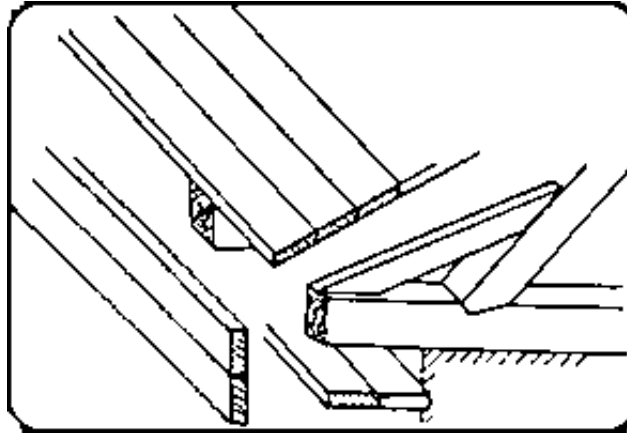
- 📄 **Preliminary Remarks**
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## **Instruction Example 3.1.: Working of Boards for a Roof Base Facing**

**The face and bottom boards for a couple roof base facing are to be worked.**

### **Material**

**Boards with tongue and groove planed on one side, board lengths between 3000 mm and 4100 mm**



**Figure**

## **Hand tools and machines**

**Smoothing plane, circular saw bench**

**Measuring and testing means**

**Folding rule, measuring tape (if necessary)**

**Auxiliary accessories**

**Pencil, work bench (working table)**

**Necessary previous knowledge**

**Reading of drawings, measuring and testing, planing, operation of the circular sawing machine, fundamental arithmetic operations**

**Sequence of operations**

**Comments**

1. Determine the board length.

Use attic framing drawing!

- 4100 mm long boards cover 5 bays

$$5 \bullet 803 \text{ mm} = 4015 \text{ mm}$$

- 20 bays would be 4 board lengths

$$4 \bullet 4015 \text{ mm} = 16060 \text{ mm.}$$

- Initial board

$$3 \cdot 803 \text{ mm} + \frac{160 \text{ mm}}{2} + 20 \text{ mm}$$

$$365 \text{ mm} = 2874 \text{ mm}$$

Length selected: 3000 mm

- Intermediate board  $5 \bullet 803 \text{ mm}$   
= 4015 mm

Length selected: 4100 mm

$$\text{Final board } 2 \cdot 803 \text{ mm} + \frac{160 \text{ mm}}{2} +$$

$$20 \text{ mm} + 365 \text{ mm} = 2071 \text{ mm}$$

Length selected: 3000 mm

2. Determine the board width.

- Lay out eaves flashing in scale 1:1, determine and measure the width:

face boards: 120 mm width

Roof base facing must cover the total length of the building.

Length of building = 16990 mm.

4 board lengths are not feasible!

Use attic framing drawing!

Initial board over 3 bays. Beam distance from centre to centre!

over 5 bays,  
three joints = 15 bays

over 2 bays, since  $3 + 15 + 2 = 20$  bays

The difference of 929 mm is required for closing the roof base facing.

Consider maximum board width.

See drawing of Instruction Example 3.2.

Add about 10 mm for tongue and groove to be cut off.

bottom boards: 130 mm width  
 3. Determine the number of boards.

- Face boards: 120 mm wide  
 2 • 2 = 4 boards 3000 mm long  
 3 • 2 = 6 boards 4100 mm long
- Bottom boards: 130 mm wide  
 2 • 2 = 4 boards 3000 mm long  
 3 • 2 = 6 boards 4100 mm long

- List of boards:

- 8 boards of 3.0 m length and 12 cm width
- 12 boards of 4.1 m length and 12 cm width
- 8 boards of 3.0 m length and 13 cm width
- 12 boards of 4.1 m length and 13 cm width.

4. Select boards of adequate length and width in timber yard.

5. Store boards according to width at the side of the circular saw bench.

6. Saw boards to width.

Board (1) 120 mm

Board (2) 120 mm + tongue

Use laid-out eaves flashing and determination of step 1 above.

Roof base facing is to be provided at both sides of the couple roof.

Consider surface quality, too!

Make sure that there is enough freedom to move!

Use laid-out eaves flashing.

(See drawing of Instruction Example 3.2.).

Think of tongue length.



length

Board (3) 111 mm + tongue length

Board (4) 110 mm

7. Chamfer boards
- Chamfer boards (1) and (4) at the groove side.
  - Chamfer board (2) at the tongue side.
  - Chamfer board (3) at three sides and smooth visible projection.

8. Store boards for transportation.

Use stop at circular saw bench!

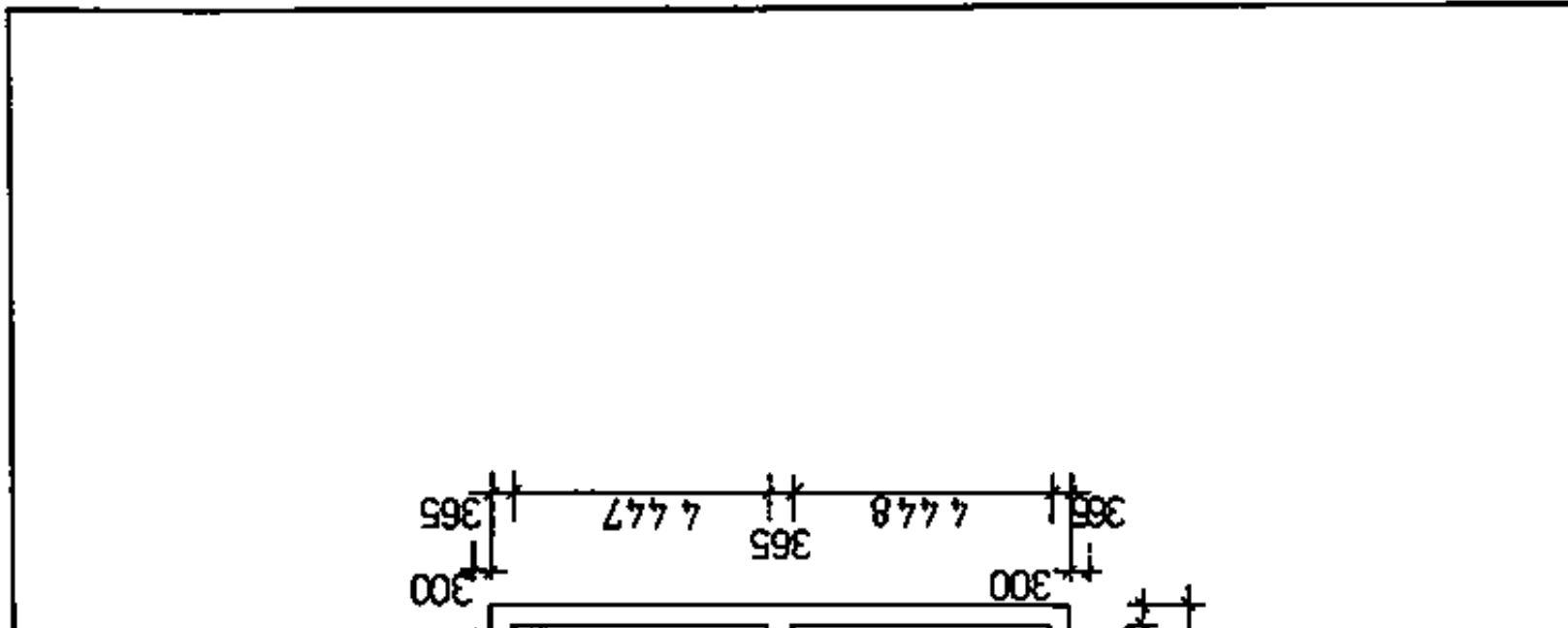
1 mm on board 3 is needed for smoothing of the surface.

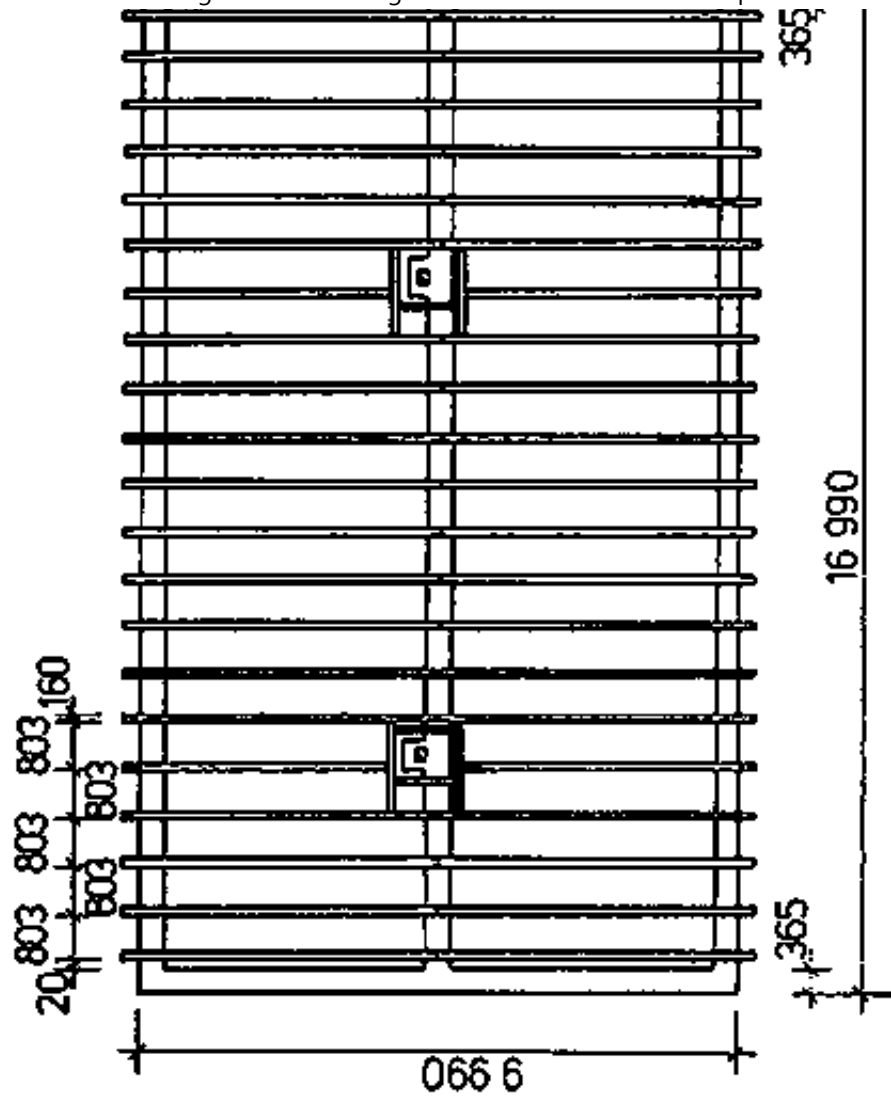
(See drawing of Instruction Example 3.2.)  
Put board flat on work bench.

Maximum chamfer 3 mm. Planed side to be on top. Clamp board edgewise on work bench and plane off to 110 mm. Lay board flat and chamfer at tongue and groove sides.

Turn board over (rough side on top) and smooth visible areas.

Protect stored boards against possible damage during storage!



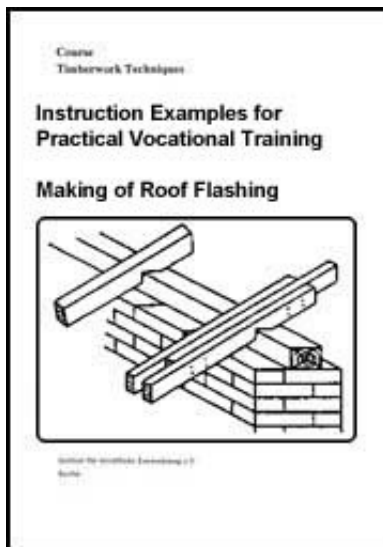


				<b>3.1.</b>
<b>IBE</b>	<b>Attic Framing</b>			<b>3603</b>

## Attic Framing



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### Making of Roof Flashing - Course: Timberwork techniques. Instruction examples for practical vocational training (Institut für Berufliche Entwicklung, 26 p.)


 *(introduction...)*

 Preliminary Remarks

 Instruction Example 3.1.: Working of Boards for a Roof Base Facing

 **➔** Instruction Example 3.2.: Making of a Roof Base Facing

 Instruction Example 3.3.: Template Making for a Rafter Foot

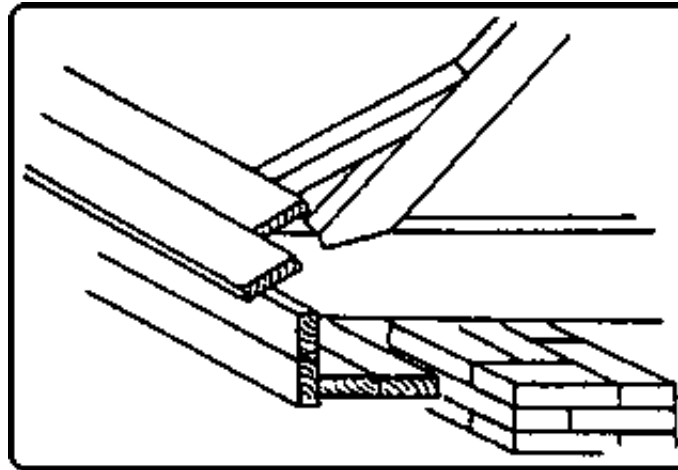
 Instruction Example 3.4.: Re-proofing of Buildings

## Instruction Example 3.2.: Making of a Roof Base Facing

**The wooden beam heads projecting by 300 mm are to be covered by a roof base facing.**

**Material**

**Prepared face and bottom boards**



**Figure**

**Hand tools**

**Hammer, frame saw, wrecking bar with claw, nail punch**

**Measuring and testing means**

**Folding rule, bevel protractor**

**Auxiliary accessories**

## **Pencil, measuring rod 4015 mm long, cleat, nails 3.1/80, 2.8/70**

### **Necessary previous knowledge**

**Reading of drawings, measuring and testing, sawing, scribing, nailing, nail punching.**

### **Sequence of operations**

1. Check the scaffolding.
2. Store boards on scaffolding.  
Store face and bottom board, as well as different lengths separately.
3. Cut square initial board (1) at right end.
4. Place and fasten provisionally board (1).

### **Comments**

Working direction from left to right.  
Stability, bracing, covering of uprights, guard rail.

Ensure freedom of movement!

Use try square.

Saw off only as much as necessary to produce a square section.

Place right end of board centrally at 4th beam head.

Place cleat as stop at cross-grained end of beam head.

Fasten board provisionally on beam heads 1 and 3.

Use nails 2.8/70. Drive nails in only as deep as to permit their removal later on!

Align over gable wall and scribe-mark.

5. Scribe initial board.

6. Take off initial board and scribe angular line.

Use a try square.

Don't remove provisionally fastened nails!  
(Nail holes in beam heads and nails in board guarantee exact fit!)

7. Saw initial board to length.

Saw square!

8. Place measuring rod at initial board (1) and transfer size.

Do it exactly!

9. Nail initial board (1).

Locate points of nails in the board in nail holes in the beam head and drive in the nails.

Do not completely drive in the nail at the groove side of the board to permit insertion of the tongue of board (2).

10. Scribe and saw to length initial boards (2), (3) and (4).

Measuring rod to be placed flush.

Use try square.

Saw exactly square!

11. Nail initial board (2).

Insert tongue in groove of board (1) and press it in with lever pressure.

Place cleat at plasterwork. Exert gentle pressure with wrecking bar.

Drive in two 2.8/70 nails per beam head.

Make sure it is flush with board (1).

12. Nail initial boards (3) and (4).

Insert tongue in groove of boards and place boards.

Set marking gauge for projection (15 mm)

13. Place measuring rod of 4015 mm length over the next beam heads and check the size.

14. Scribe and saw to length all four boards for the other joints of the roof base facing according to the checked size.

15. Nail roof base facing boards.

16. Saw square at left end and fasten provisionally final board (1).

17. Scribe length of board.

18. Take off, scribe and saw to length final board (1).

19. Place measuring rod at final board and transfer length.

20. Scribe and saw to length final boards (2), (3) and (4) according to size taken.

21. Nail final boards.

and adjust board (3).

Make sure it is flush with board (1).

Drive in two 3 1/80 nails per beam head. Place it from centre to centre of beam heads.

Check over the entire facade.

Use a try square.

Saw exactly square.

Nail the boards joint by joint proceeding similarly as with the first joint (initial boards).

Use a try square.

Do not drive in nails completely.

Align over gable wall and scribe size.

Use a try square.

Place flush at one end.

Place measuring rod parallel.

Place measuring rod exactly.

Use a try square.

Do not let the cuttings break off when sawing off!

(Cuttings are to be used for closing the roof base facing)

09 Consider type of nails!

22. Close roof base facing at both ends.

Use the cuttings.

Place, scribe, saw and insert the board pieces individually.

Use 2.8/70 nails.

23. Nail the roof base facing.

Nail in the centre of the beam bays

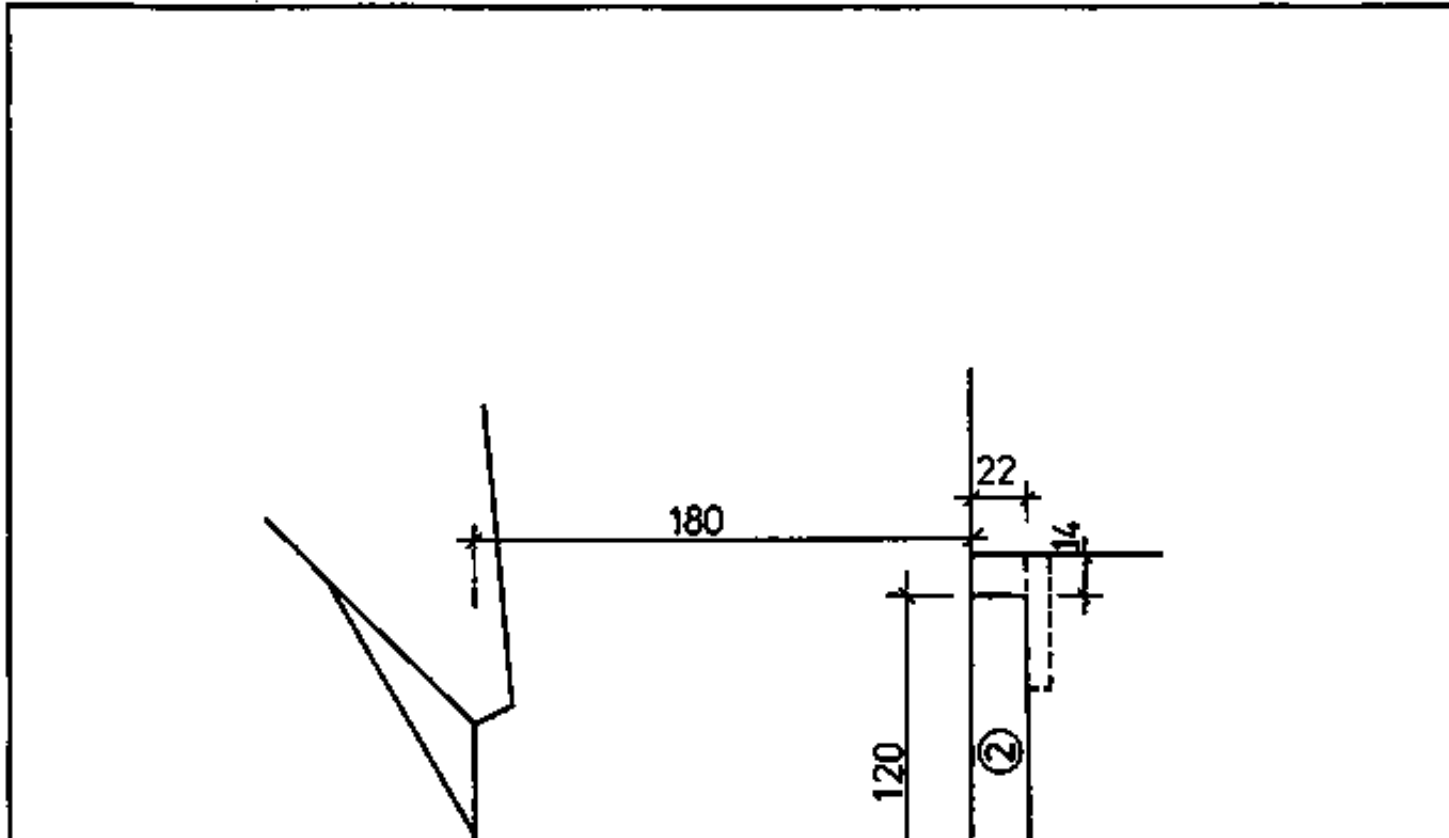
- through board (3) in board (1)

- through eaves board in board (4).

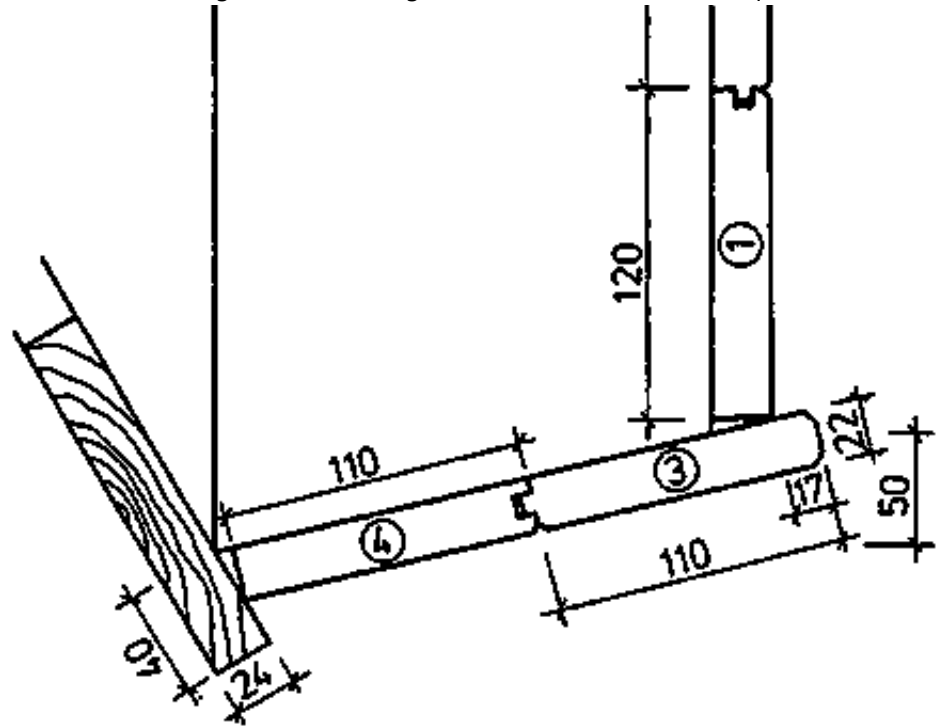
Use 2.8/70 nails.

24. Clean the work place.

Pick up wooden cuttings and clean scaffolding.







				3.2.
<b>IBE</b>	<b>Eaves Flashing</b>			<b>3603</b>

**Eaves Flashing**



[Home](#) > [ar](#).[cn](#).[de](#).[en](#).[es](#).[fr](#).[id](#).[it](#).[ph](#).[po](#).[ru](#).[sw](#)



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Instruction examples for practical vocational training  
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 **Instruction Example 3.3.: Template Making for a Rafter  
Foot**

 **Instruction Example 3.4.: Re-proofing of Buildings**

### **Instruction Example 3.3.: Template Making for a Rafter Foot**

**The template for the rafter foot of a purlin roof to be built shall be made and the real rafter length be determined.**

#### **Dimensions**

**Width of building: 8000 mm**

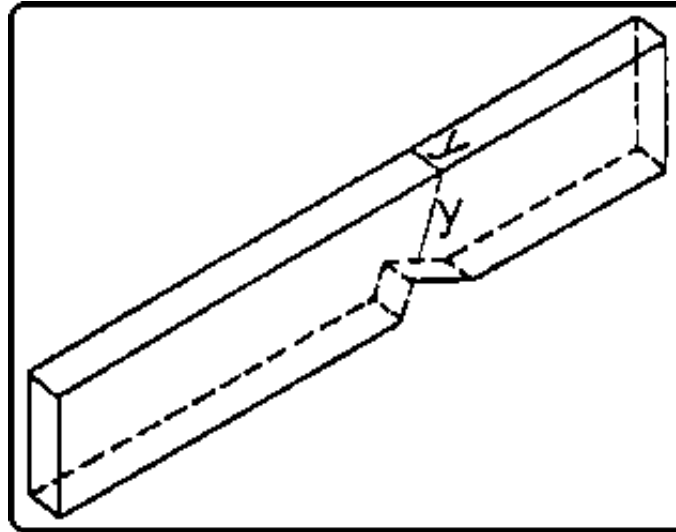
**Height of roof: 3000 mm**

**Cross section of rafter: 80/140 mm<sup>2</sup>**

**z (horizontal distance of eaves flashing) = 500 mm**

**n (height of inferior purlin above surface of attic beam) = 80 mm**

**o (square attachment timber) = 100 mm**



**Figure**

**Hand tools**

**Frame saw**

**Measuring and testing means**

**Folding rule, carpenter's steel square**

**Auxiliary accessories**

**Paper, pencil, hand sketch, abrasive paper, board approx. 1600 mm long and 140 mm wide**

## Necessary previous knowledge

### Reading of drawings, measuring and testing, scribing, sawing, smoothing

#### Sequence of operations

1. Determine real rafter length.

Req.: Spl

Known:  $Spl_R = b^2 + h^2$

$$y = \frac{Spl_R \cdot z}{b}$$

$$y = \frac{8000\text{mm}}{2} = 4000\text{mm}$$

$h = 3000 \text{ mm}$

$z = 500 \text{ mm}$

$$Spl_R = (4^2 + 3^2) \text{ m}^2$$

$Spl_R = 5000 \text{ mm}$

$$y = \frac{5000\text{mm} \cdot 500\text{mm}}{4000\text{mm}}$$

$y = 625 \text{ mm}$

$Spl = 5000 \text{ mm} + 625 \text{ mm}$

$Spl = 5625 \text{ mm}$

2. Determine  $x_0$

Req.:  $x_0$

#### Comments

Formula:  $Spl = Spl_R + y$

(See also Fig. 16 in "Trainees' Handbook of Lessons")

$x_0$  is the size from the inferior purlin line up to the rafter foot, **not the**

Known:  $Spl_R = 5000 \text{ mm}$

$z = 500 \text{ mm}$

$$z_1 = \frac{b(y_1 + n)}{h}$$

$b = 4000 \text{ mm}$

$$y_1 = \frac{Spl_R \cdot o}{b}$$

$n = 80 \text{ mm}$

$h = 3000 \text{ mm}$

$o = 100 \text{ mm}$

$$y_1 = \frac{5000\text{mm} \cdot 100\text{mm}}{4000\text{mm}}$$

$y_1 = 125 \text{ mm}$

$$z_1 = \frac{4000\text{mm}(125\text{mm} + 80\text{mm})}{3000\text{mm}}$$

$z_1 = 273.3 \text{ mm}$

$$x_0 = \frac{5000\text{mm}(500\text{mm} + 273.3\text{mm})}{4000\text{mm}}$$

$x_0 = 966.6 \text{ mm}$

### length for the template!

(See also Fig. 16 in "Trainees' Handbook of Lessons")

Formula:

$$x_0 = \frac{Spl_R(z + z_1)}{b}$$

3. Put straight board of approx. 1600 mm length on Board width to comply exactly with

work bench.

4. Scribe angular line at left end and mark with section mark.

5. Measure in and mark the size  $x_0$  from the angular line.

6. Measure in and scribe square attachment timber.

7. Mark the size  $y_1$  on the long leg of the square.

8. Place square with marked size  $y_1$  at  $x_0$  mark and swivel the square until point of intersection with square attachment timber is reached.

9. Scribe surface of inferior purlin and front face of inferior purlin.

10. Scribe front face of inferior purlin.

11. Scribe template length.

12. Saw out template.

rafter height.

Use steel square.

Go to the right only as far as to produce a square cut.

Scribe only thin and short line.

Do not scribe over the entire length but only scribe thin line in the area of the rafter foot line.

Scribe thin line.

Mark it at the outside of the square.

Place it exactly!

Scribe a thicker line at the short leg of the square and a thin line at the long leg.

Place long leg of square at thin line and scribe bird's mouth depth.

Measure from  $x_0$  line. Use a square. Use maximum length but at least 500 mm!

Saw exactly and perfectly square. Special care is required for sawing

13. Smooth cut surfaces with abrasive paper.

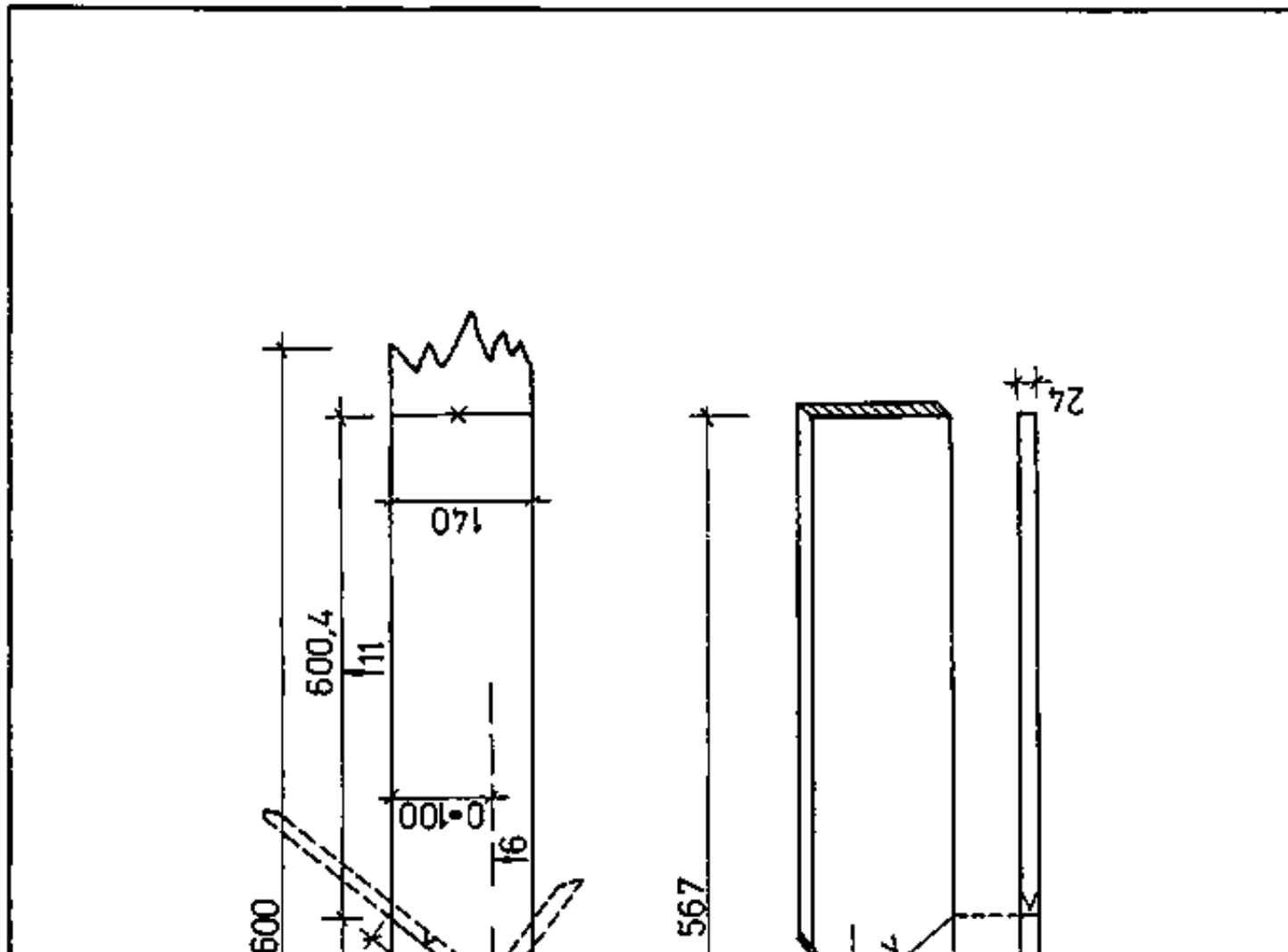
the bird's mouth!

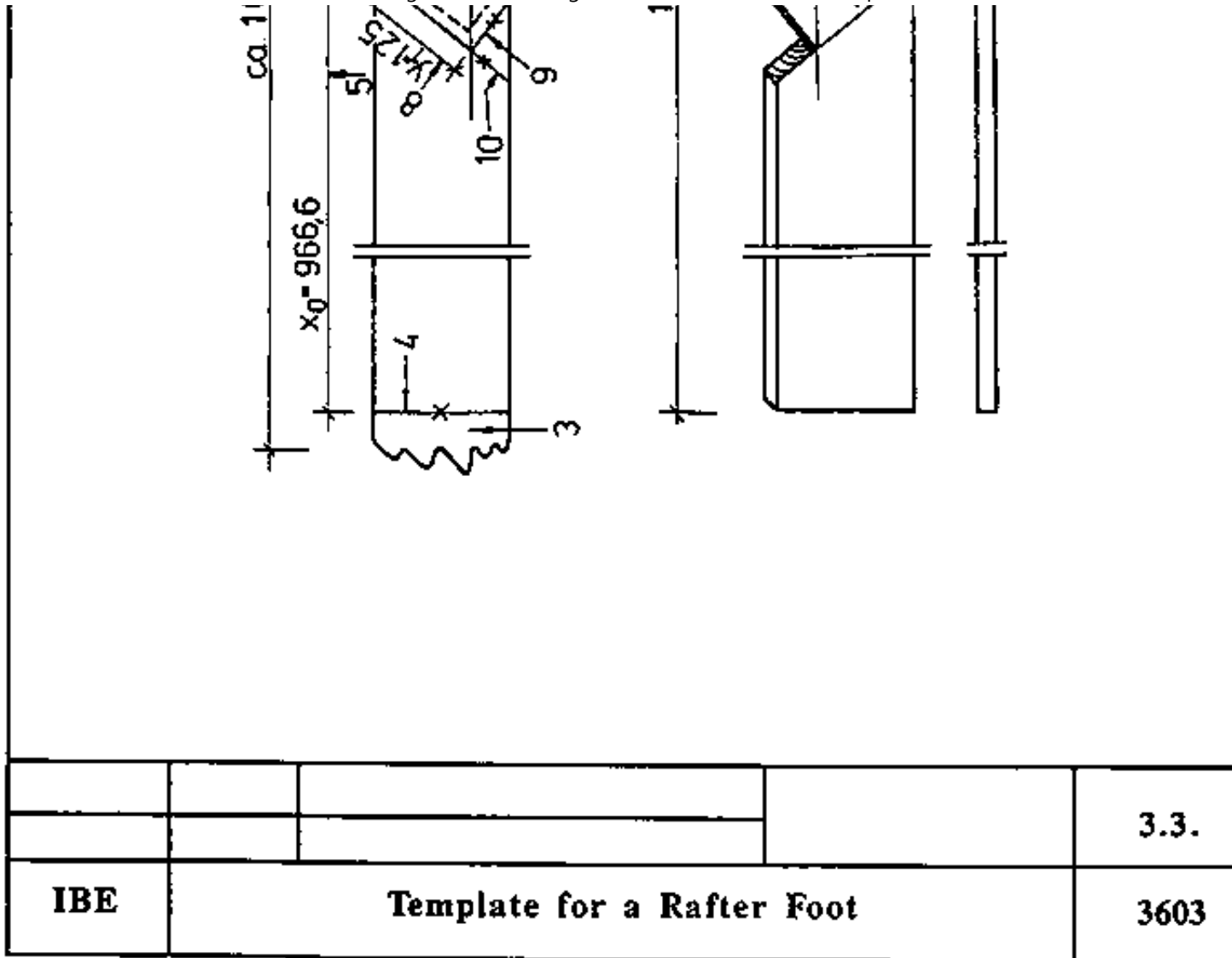
Use fine-grained abrasive paper!

Smooth very gently - no chamfers  
must be produced!

14. Transfer scribed lines of bird's mouth to upper  
narrow side of template.

Scribe thin line.





**Template for a Rafter Foot**







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 **(introduction...)**

 **Preliminary Remarks**

 **Instruction Example 3.1.: Working of Boards for a Roof Base Facing**

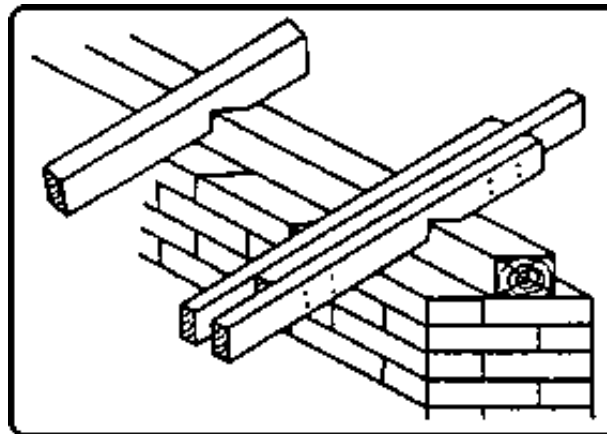
 **Instruction Example 3.2.: Making of a Roof Base Facing**

 **Instruction Example 3.3.: Template Making for a Rafter Foot**

  **Instruction Example 3.4.: Re-proofing of Buildings**

### Instruction Example 3.4.: Re-proofing of Buildings

**The cover straps shall be produced for re-proofing a building by displacement of the rafter foot of a purlin roof.**



**Figure**

## **Dimensions**

**Cross section of roof rafter: 80/140 mm<sup>2</sup>**

**Thickness of cover straps: 40 mm**

**Horizontal distance of eaves flashing: 500 mm**

## **Hand tools and machines**

**Frame saw, hand plane, bevel protractor, band saw**

## **Measuring and testing means**

**Folding rule, carpenter's steel square, water level**

## **Auxiliary accessories**

**Straightedge 2000 mm long, pencil, abrasive paper, board of 140 mm width and 2000 mm length**

## **Necessary previous knowledge**

**Reading of drawings, measuring and testing, plumbing (perpendicularity), scribing, sawing, curving, planing, smoothing**

**(1) scribed straightedge**

**(2) board for template**

**(3) curve of rafter foot**

## **Sequence of operations**

## **Comments**

**Sequence of operations****Comments****Steps 1 to 6 are to be carried out at the building!**

- |  |  |
|--|--|
| 1. Check the scaffolding.  | Stability, bracing, covering of uprights, guard rail.  |
| 2. Insert the straightedge between the roof boards and the inferior purlin and press it against the roof rafter. | Insert it approx. 1000 mm. Make sure that it contacts the roof boards and the roof rafter.               |
| 3. Transfer the front face of the outside wall onto the straightedge by scribing the perpendicular line.         | Use a water level. Check changing of water level. Mark scribing perpendicular line with "PERPENDICULAR". |
| 4. Transfer front face of inferior purlin onto straightedge.   | Mark only!   |
| 5. Remove straightedge and insert it at several roof rafters to check the scribed lines.                         |  |
| 6. Count the roof rafters.   | Is necessary for the number of cover straps required.  |

**All other steps are to be carried out in the workshop**

- |   |   |
|---|---|
| 7. Take perpendicular line from straightedge by means of bevel protractor.                            | Working direction from left to right!<br>Set bevel protractor tongue exactly and firmly tighten the wing nut! |
| 8. Put board for template (approx. 2 m long) on work bench and scribe on it square attachment timber. | Scribe a thin line.   |
| 9. Scribe angular line at right end of board and mark the   | Go only as far as necessary to  |

section to be cut off

10. Measure in and mark 500 mm from angular line to the left. Measure on 8. produce a rectangular cut.

11. Scribe perpendicular line through marking.

Use bevel protractor.  
Perpendicular line is front face of inferior purlin.

12. Scribe surface of inferior purlin.

Place square leg at perpendicular line so as to have point of intersection with 8.!

13. Take from straightedge, measure in on template and mark the size up to front face of outside wall.

Measure on 8.!

14. Scribe perpendicular line through marking and mark with "FW".

Mark only!

"FW" means **f**ront face of outside **w**all.

15. Mark horizontal distance of eaves flashing (500 mm) at long leg of square.

Apply only thin marking.

16. Place tongue of bevel protractor at perpendicular line, displace short leg of square at tongue so as to have point of intersection at upper edge of template board!

Place square and bevel protractor tongue exactly.  
Do not squeeze the tongue of the bevel protractor!  
Apply only thin marking.

17. Scribe template length and mark the section to be cut off.

Use a square.

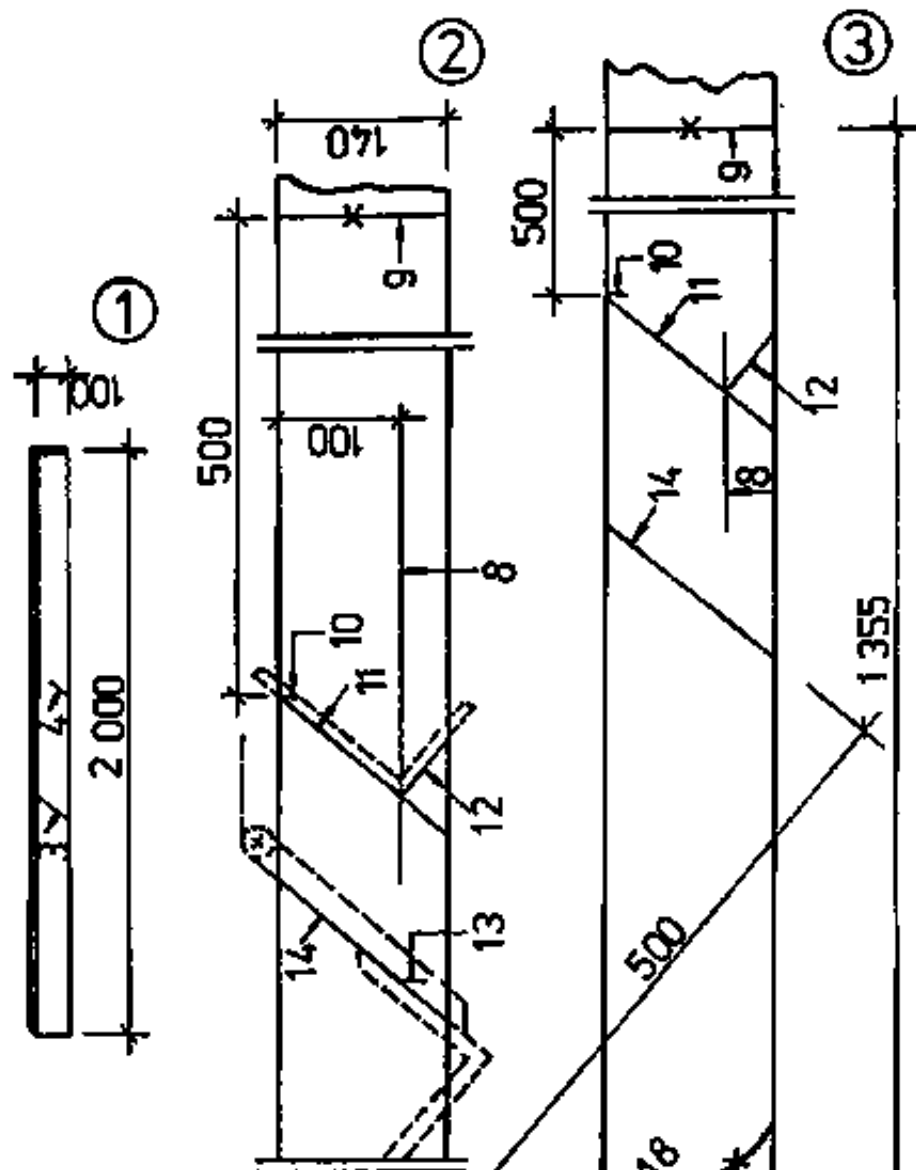
18. Profiling.

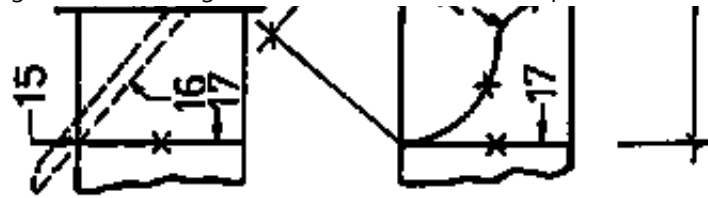
Scribe the curve so that it can be easily sawn out with the band saw!

19. Saw out the template.

Saw it out at exact angles.

- |  |   |
|--|---|
| 20. Smooth the template with abrasive paper.   | Use fine-grained abrasive paper.<br>No chamfers must be ground!   |
| 21. Measure length of cover straps and select timber for cover straps in the timber yard.                | Number of cover straps has been counted on site.  |
| 22. Transport the timber to the work bench and store it.   | Ensure freedom of movement.   |
| 23. Put template successively on the timber for the cover straps to be produced and scribe cover straps. | Scribe cover straps on one side only.<br>Place upper edges of template and cover strap flush with each other! |
| 24. Saw out the cover straps.  | Saw the curve exactly on the band saw!<br>Observe the safety regulations for work on the band saw!            |
| 25. Plane the visible sides of the cover strap foot.   | Use a hand plane.<br>Just smooth-plane, remove small chip.  |
| 26. Smooth curve with abrasive paper.  | Use coarse-grained abrasive paper.  |
| 27. Store cover straps for transportation.   | Store cover straps so that they cannot be damaged or get dirty.   |





				3.4.
<b>IBE</b>	<b>Re-proofing of Buildings</b>			<b>3603</b>

**Re-proofing of Buildings**

