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SOLAR DRYER CONSTRUCTION GUIDELINE

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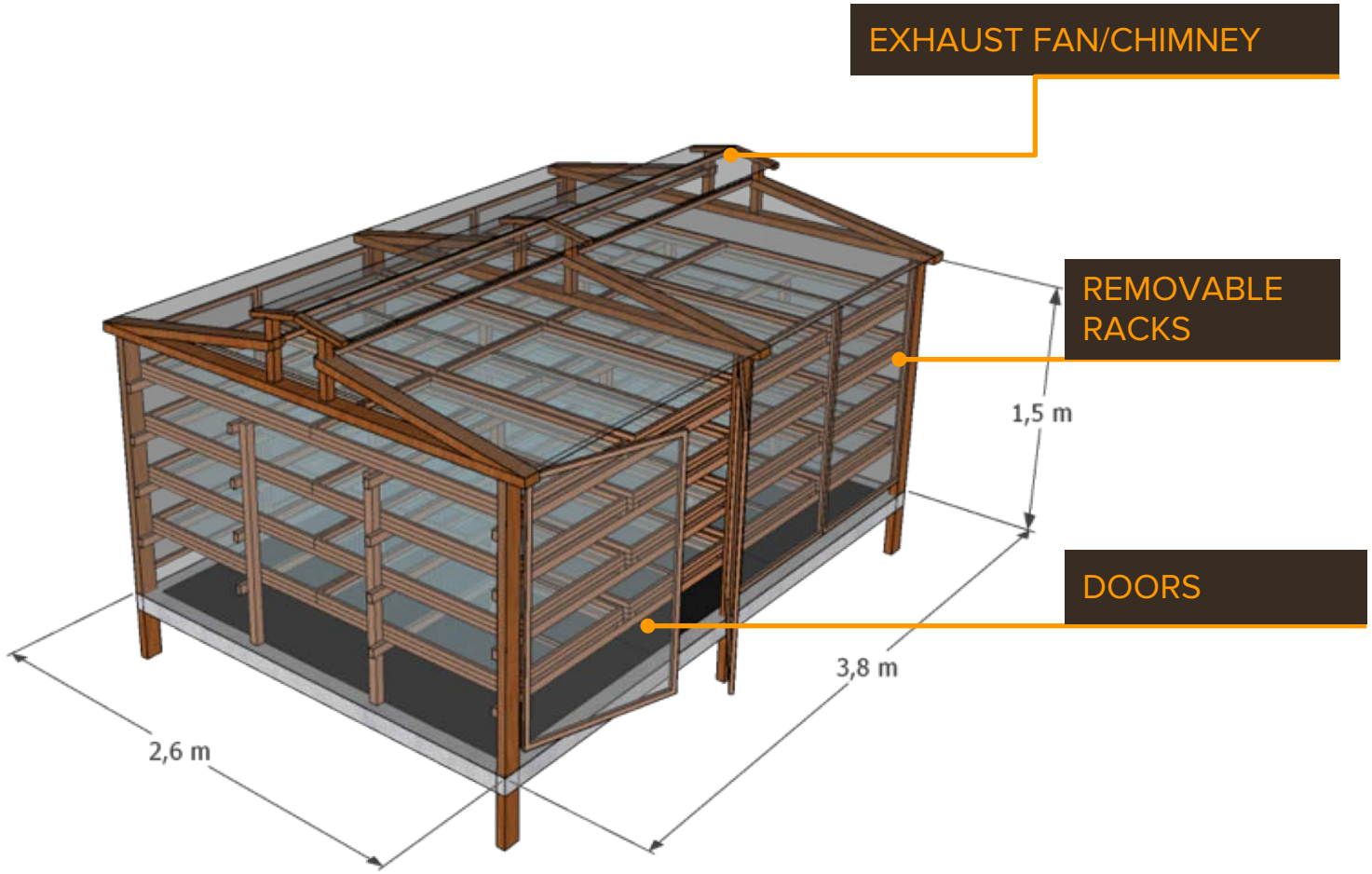
THE SOLAR DRYER HAS THREE MAIN FEATURES INCLUDING EXHAUST FANS, REMOVABLE RACKS AND LATERAL DOORS TO MAXIMIZE DRYING EFFICIENCY

Solar dryer model



Main advantages

- The solar dryer is equipped with a chimney to increase air circulation for passive drying and heat distribution. A more expensive (but optional) alternative is to use an automatic exhaust fan to force air out of the drying – active drying.
- Removable racks are installed to ease the mixing of commodities.
- Doors are built to easily spread out the commodity on the racks and inspect the drying process, while maximizing the available space.

THE LIST BELOW INCLUDES THE MATERIALS NEEDED TO BUILD THE SOLAR DRYER

PURPOSE	ITEM	SIZE	QUANTITY
Frame	Ironwood/Light Steel	5 cm x 10 cm – 185 cm	6 units
		5 cm x 5 cm – 280 cm	3 units
		5 cm x 5 cm – 122 cm	6 units
		5 cm x 5 cm – 32 cm	6 units
		3 cm x 5 cm – 60 cm	6 units
Binder structure	Ironwood/Light Steel	3 cm x 5 cm – 380 cm	8 units
	Kaso wood/Light Steel	2 cm x 3 cm – 183 cm	12 units
Floor	Ironwood/Light Steel	3 cm x 5 cm – 360 cm	5 units
	Ironwood/Light Steel	3 cm x 5 cm – 240 cm	5 units
Rack	Ironwood/Light Steel	5 cm x 5 cm – 145 cm	10 units
	Ironwood/Light Steel	3 cm x 5 cm – 380 cm	8 units
Rail	Ironwood/Light Steel	2 cm x 5 cm – 240 cm	32 units
Door	Kaso wood/Light Steel	2 cm x 3 cm – 150 cm	16 units
		2 cm x 3 cm – 85 cm	16 units
Tray	Kaso wood/Light Steel	2 cm x 3 cm – 120 cm	128 units
		2 cm x 3 cm – 84 cm	128 units
		2 cm x 3 cm – 116 cm	32 units
	Net	130 cm x 100 cm	32 sheets

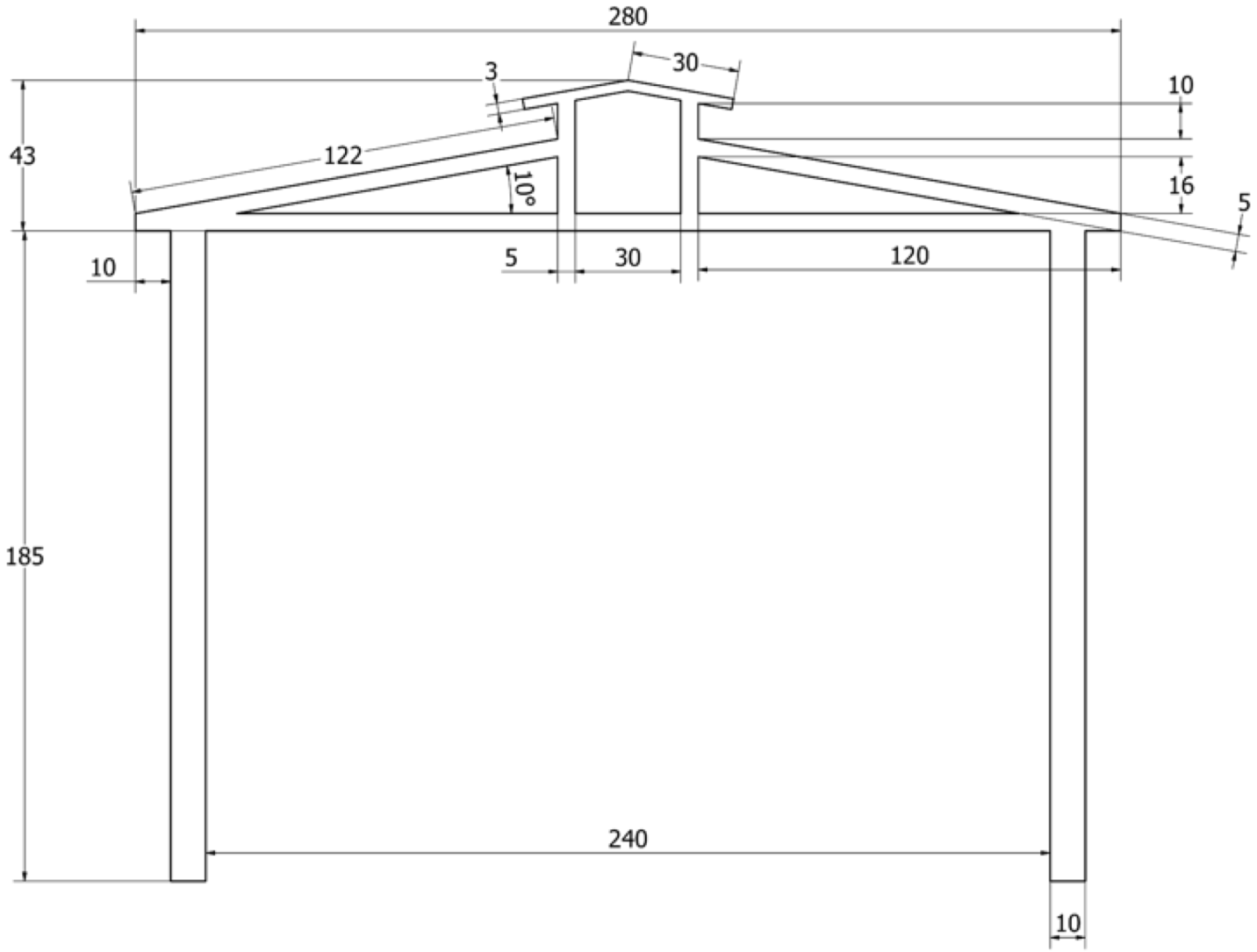
STEP 1: BUILD THE MAIN FRAME (3X) AS THE STRUCTURE OF THE SOLAR DRYER

Series of main frames

Roof section
- There are two levels 10 cm apart that function as air outlet;
- The angle of both roofs is 10°.

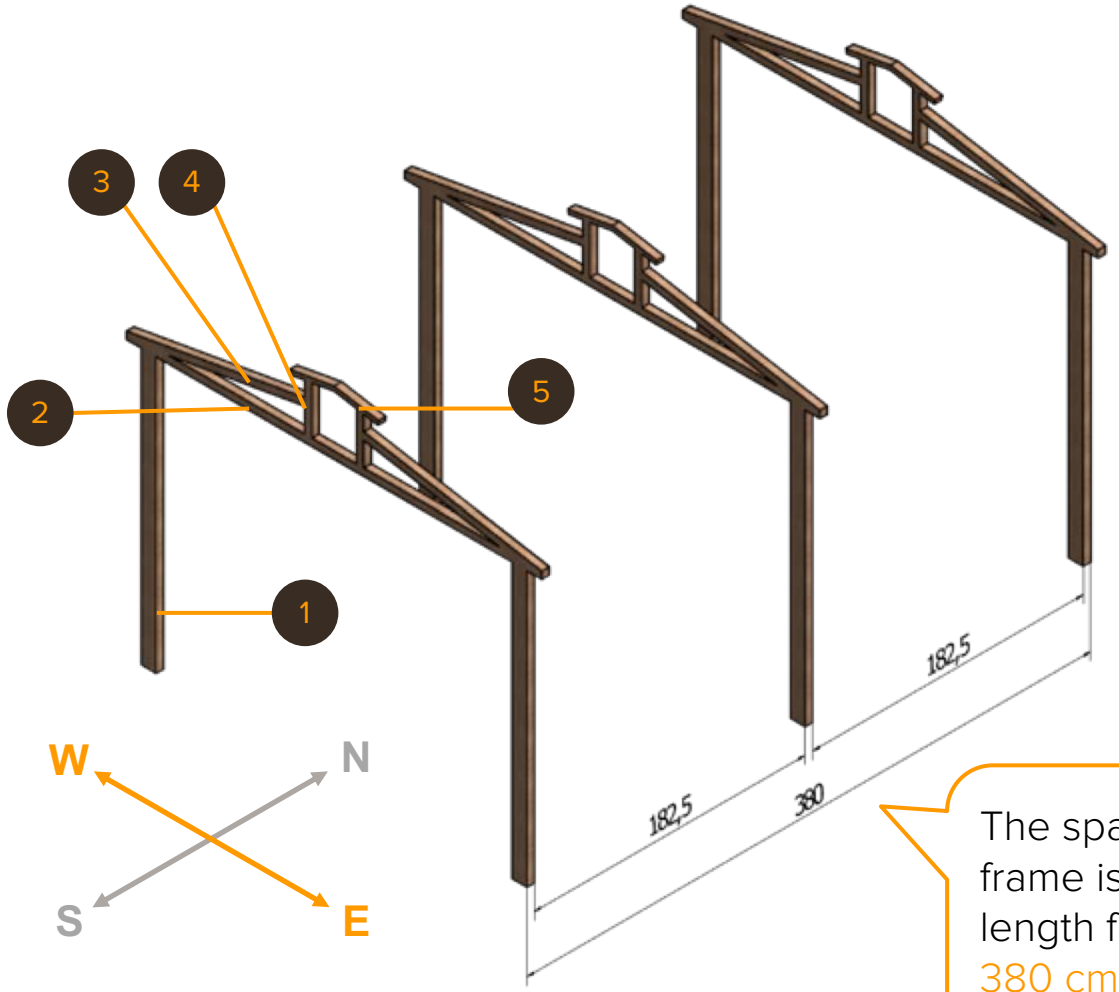
Poles
- The Poles are embedded 20 cm deep;
- The embedded part is covered with stones and tightened with concrete.

Detailed size (cm)



STEP 2: ARRANGEMENT OF THREE MAIN FRAMES WITH ROOF SECTION FACING EAST-WEST.

Series of frame sections with spacing (cm)



List of materials for the main frame

No	Material	Qty.
1	Ironwood/Light Steel 5 cm x 10 cm – 185 cm	6 units
2	Ironwood/Light Steel 5 cm x 5 cm – 280 cm	3 units
3	Ironwood/Light Steel 5 cm x 5 cm – 122 cm	6 units
4	Ironwood/Light Steel 5 cm x 5 cm – 32 cm	6 units
5	Ironwood/Light Steel 3 cm x 5 cm – 60 cm	6 units

The spacing between each frame is 182,5 cm and the total length for three main frames is 380 cm

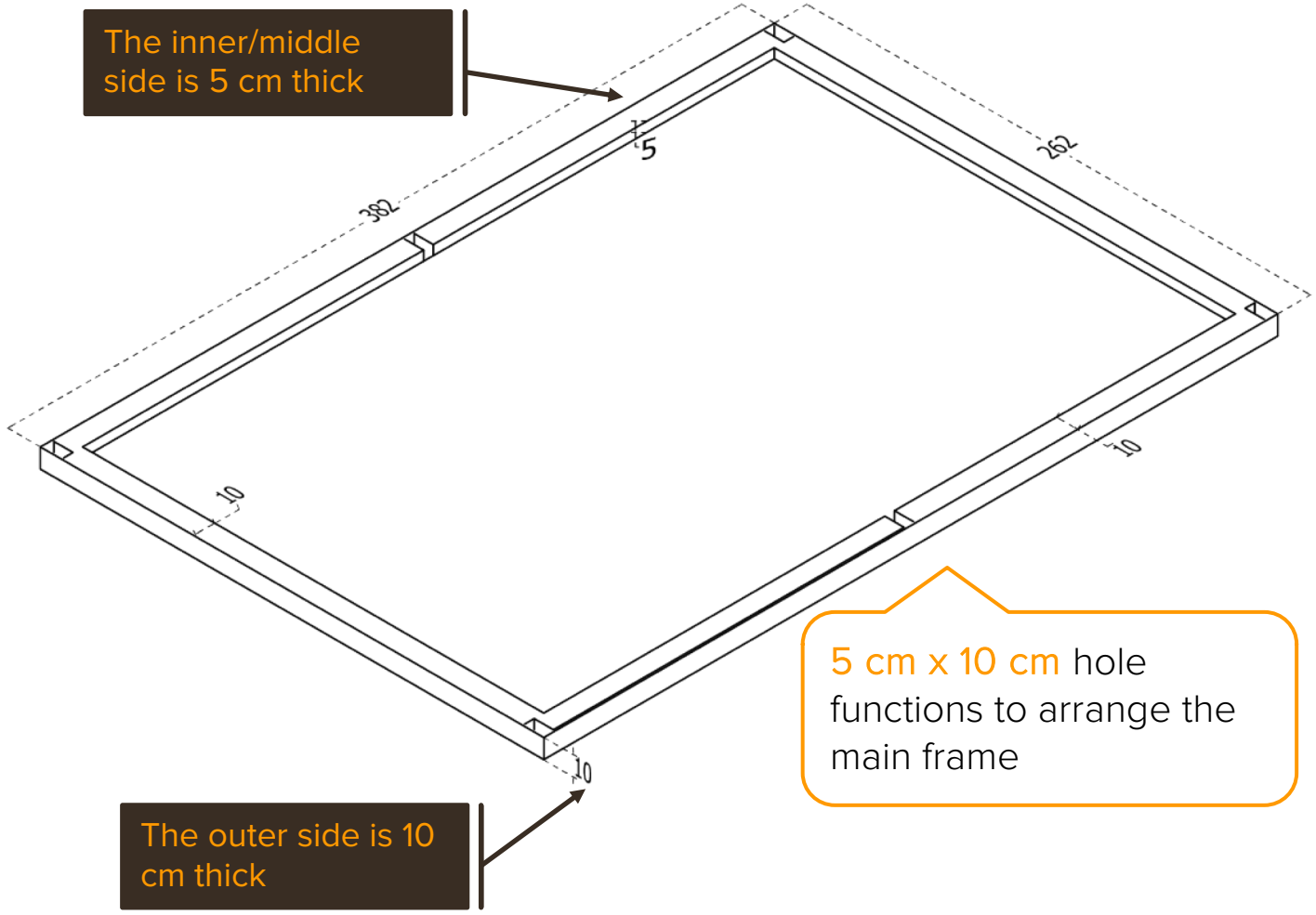
STEP 3: FLOOR CASTING

Series of base pieces for casting

Floor section

- The outer side is flattened with the width of the wood (10 cm);
- Concrete bricks are placed on the outer side and embedded in the ground;
- The outer side is 5 cm higher than the middle one;
- A mixture of concrete and construction sand without gravel is used for the base.

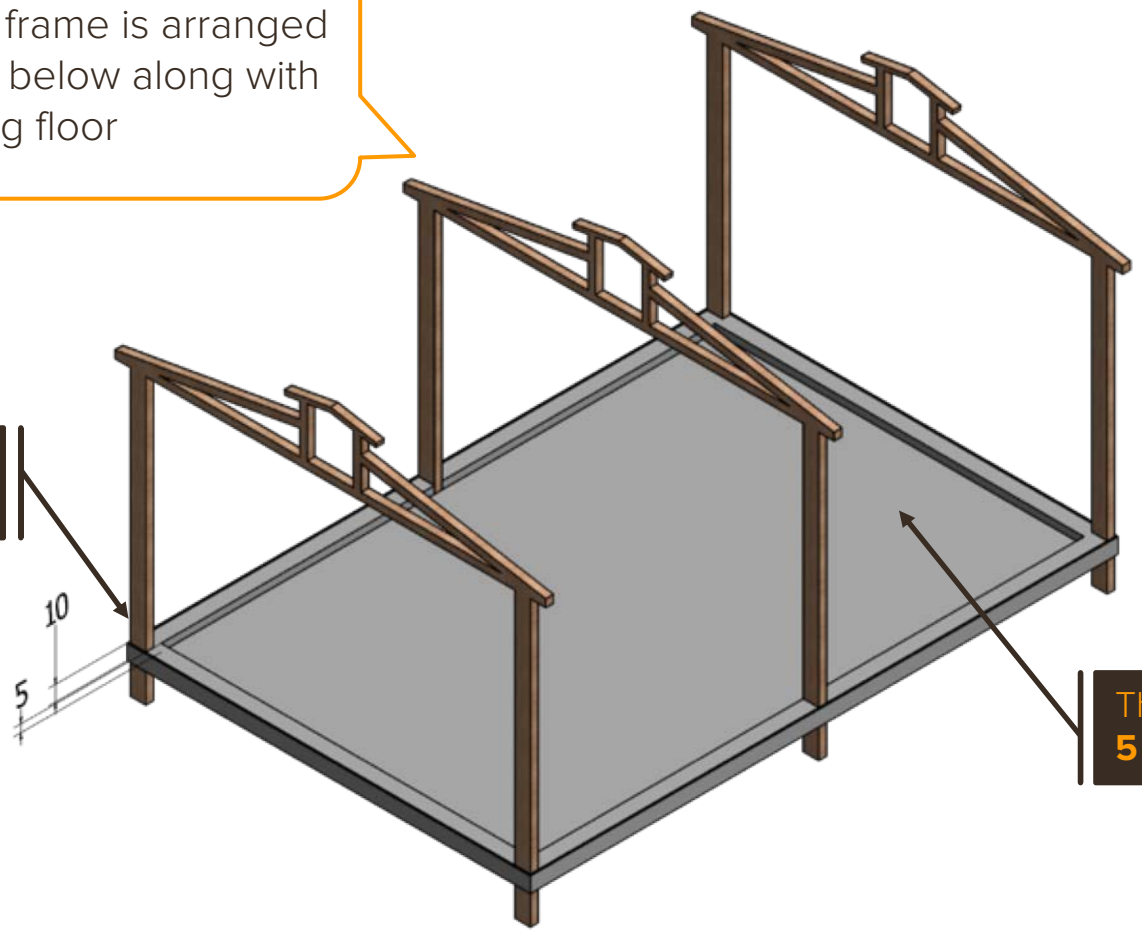
Detailed size (cm)



STEP 4: FLOOR AND MAIN FRAME CASTING

Illustration of floor and main frame casting

The main frame is arranged as shown below along with the casting floor



The outer side is **10 cm** thick

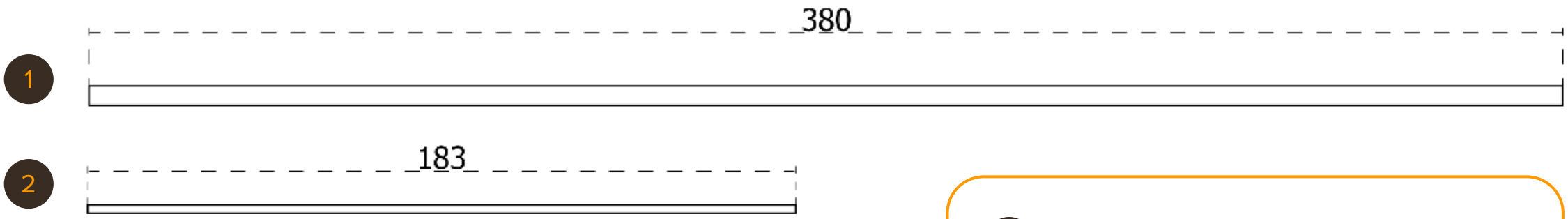
The inner side is **5 cm** thick

List of materials for floor casting

No	Material	Qty.
1	Sand	1 m^3
2	Cement	4 sacks
3	Nail	8 units
5	Yarn	30 m

STEP 5: BUILDING OF WOODEN FRAME AS BINDING MEDIA TO SUPPORT THE SHELVES AND ROOF

Size of binding wood (cm)



1. Placed on the wall as a main frame binder and shelf support structure;
2. Support for roof section.

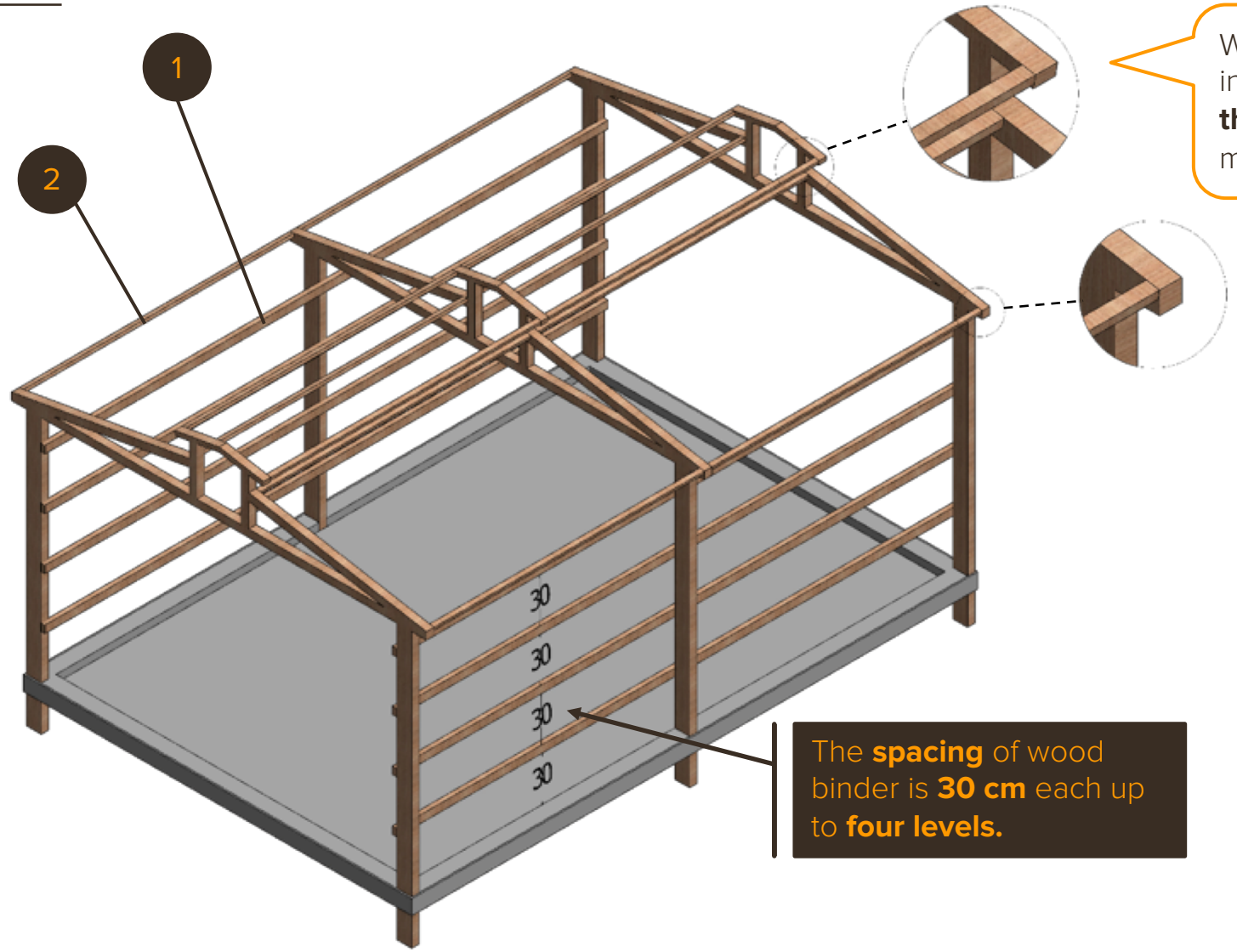
List of materials

No	Material	Qty.
1	Ironwood 3 cm x 5 cm – 380 cm	8 units
2	Kaso wood 2 cm x 3 cm – 183 cm	12 units

STEP 6: INSTALLATION OF BINDING WOOD WITH FOUR LEVELS 30 CM APART

Installation of wood binders

1. Wood binder on the wall as a main frame and shelf support;
2. Support roof section.



Wood binder installation **follow the slope** of the main frame

The **spacing** of wood binder is **30 cm** each up to **four levels.**

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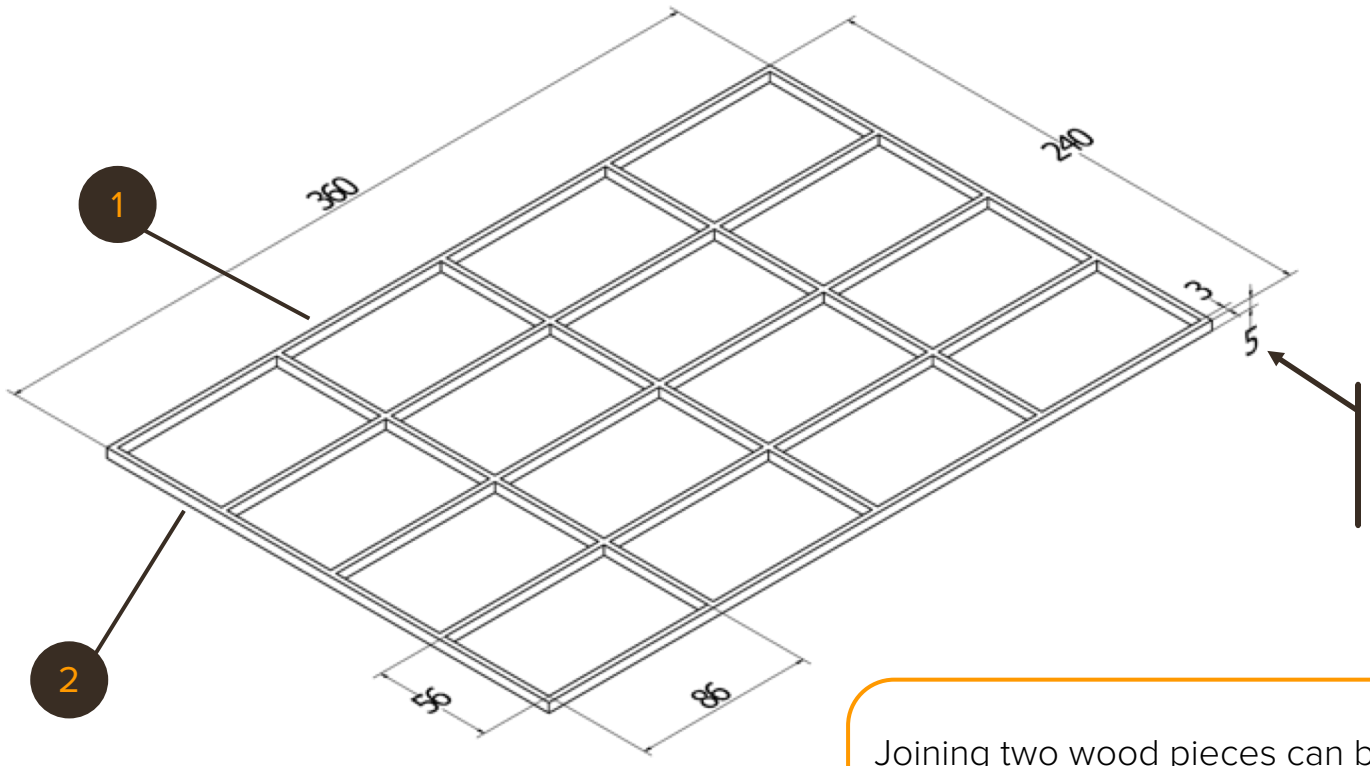
STEP 7: SERIES OF WOOD PIECES FOR THE DRYER BASE

Series of wood pieces for base (cm)



The height of the base is **5 cm**

List of materials for base

No	Material	Qty.
1	Ironwood/Light Steel 3 cm x 5 cm – 360 cm	5 units
2	Ironwood/Light Steel 3 cm x 5 cm – 240 cm	5 units

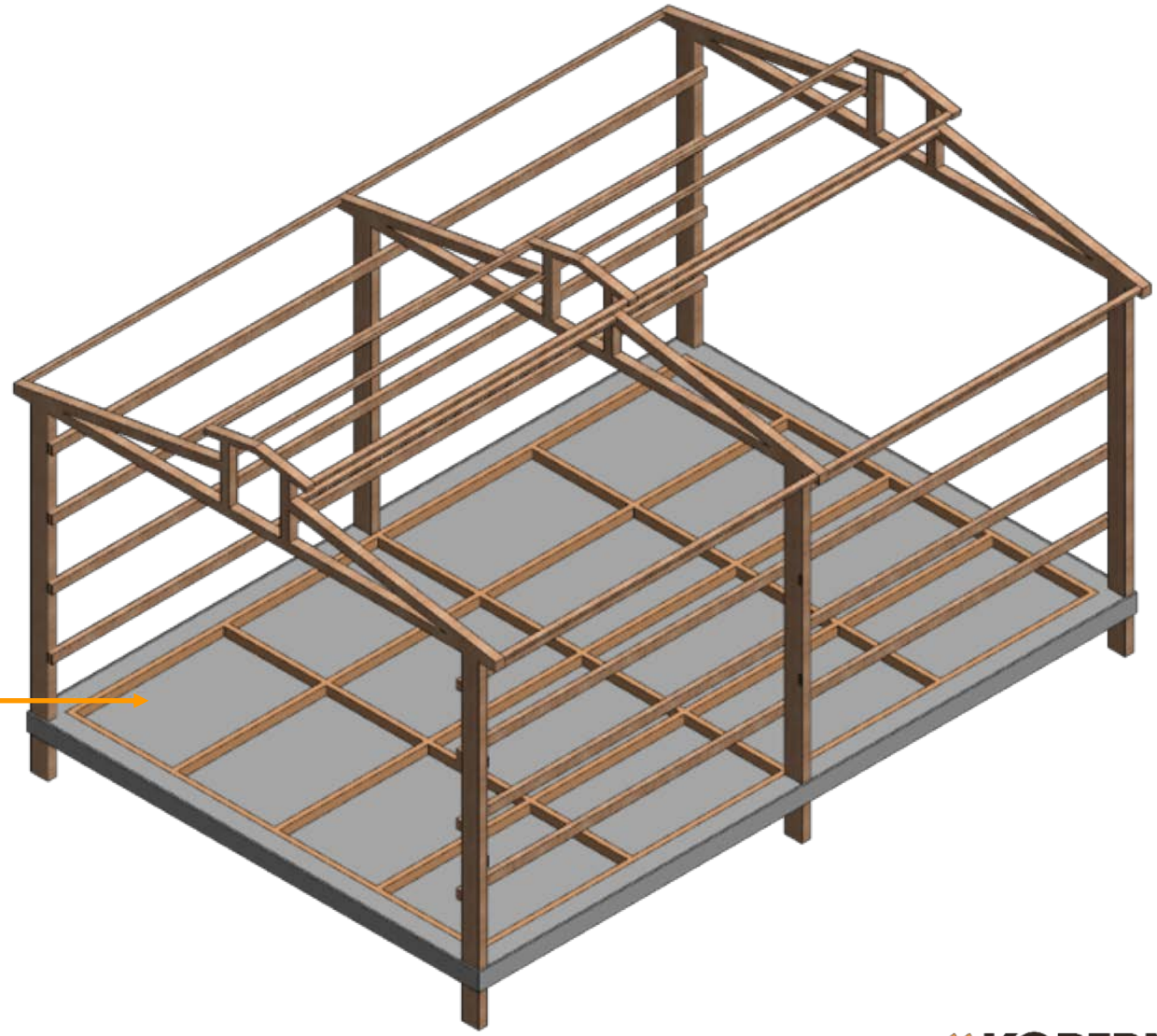
Joining two wood pieces can be done by **sculpting two parts** of wood or cut according to the size of **56 cm x 86 cm.**

STEP 8: BASE INSTALLATION IS FOLLOWED BY PLACING GRAVEL IN THE CAVITIES UP TO 5 CM OR FLAT TO THE SURFACE

Wood base installation and gravel

Series of wood pieces and base section

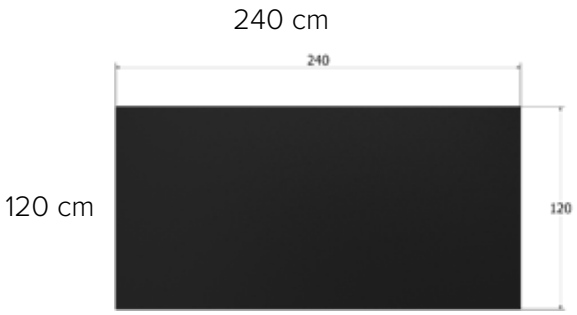
- Floor section is filled with gravel until it is flat with the surface or 5 cm



STEP 9: IRON PLATE IS USED AS THE FLOOR FOR THE SOLAR DRYER

Iron plate as floor

Iron plate
Fastened to the series of wood (step 7) using nuts with the drill



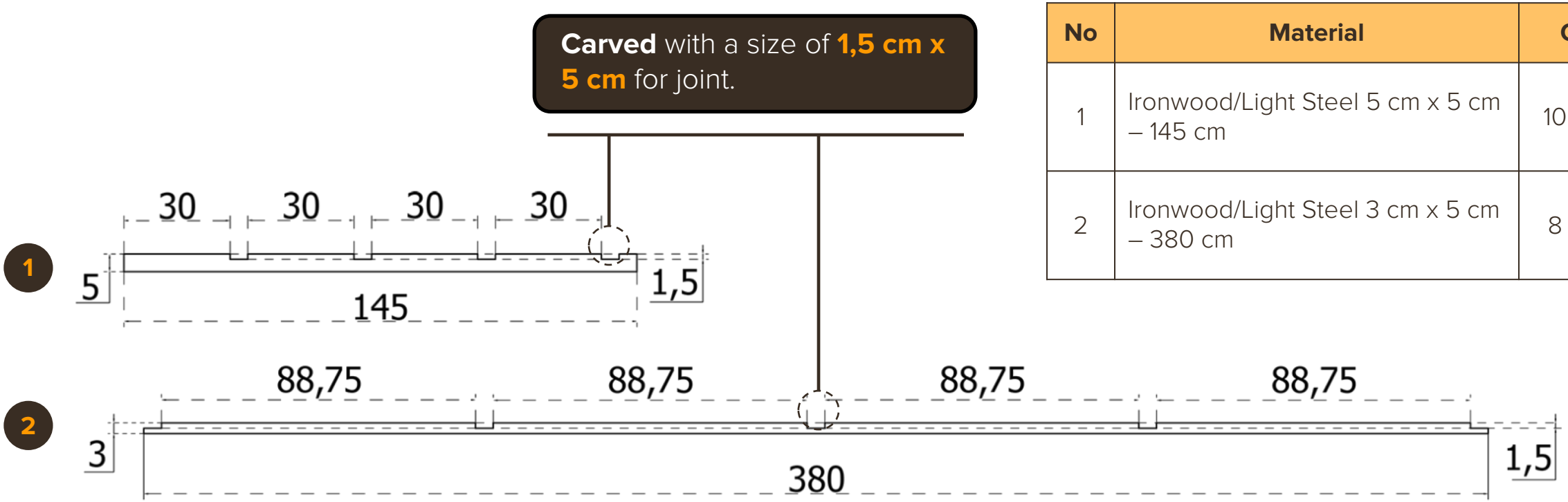
Iron sheet size 240 cm x 120 cm

List of materials for floor

No	Material	Qty.
1	Iron plate (240 cm x 120 cm x 1.5 mm)	3 sheets
2	Nut M8	50 units

STEP 10: WOODEN LEG AND HORIZONTAL FRAME ARE CARVED FOR RACK FRAME

Wooden rack size (cm)

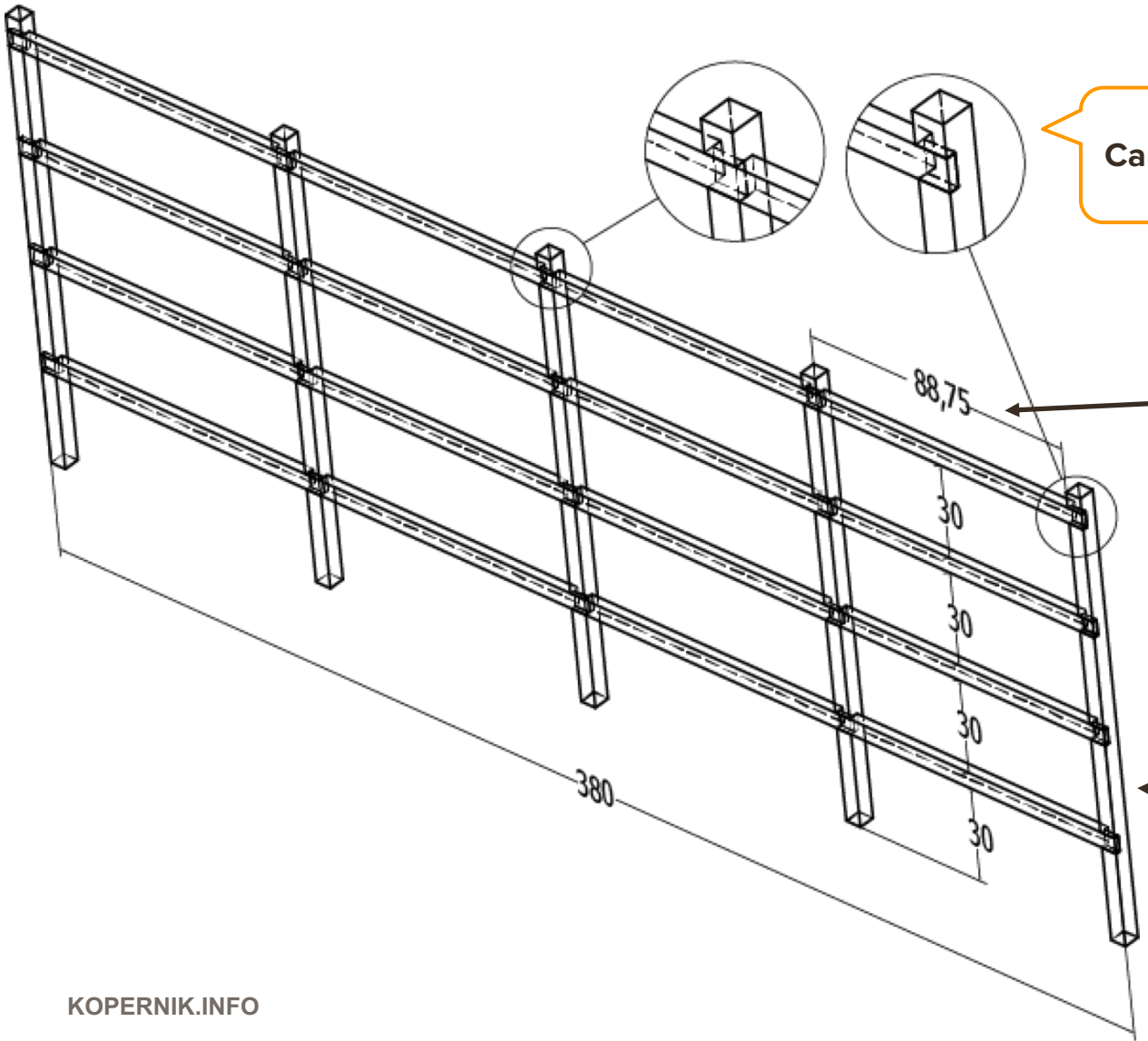


List of materials for rack frame

No	Material	Qty.
1	Ironwood/Light Steel 5 cm x 5 cm – 145 cm	10 units
2	Ironwood/Light Steel 3 cm x 5 cm – 380 cm	8 units

STEP 11: TWO RACK UNITS ASSEMBLY

Wooden rack size (cm)



Carved wooden joints

The spacing of series is **88,75 cm**

Level spacing is **30 cm**

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STEP 12: ARRANGEMENT OF TWO RACK UNITS IN THE DRYER

Rack arrangement dimensions (cm)

The spacing between shelves is 77 cm.

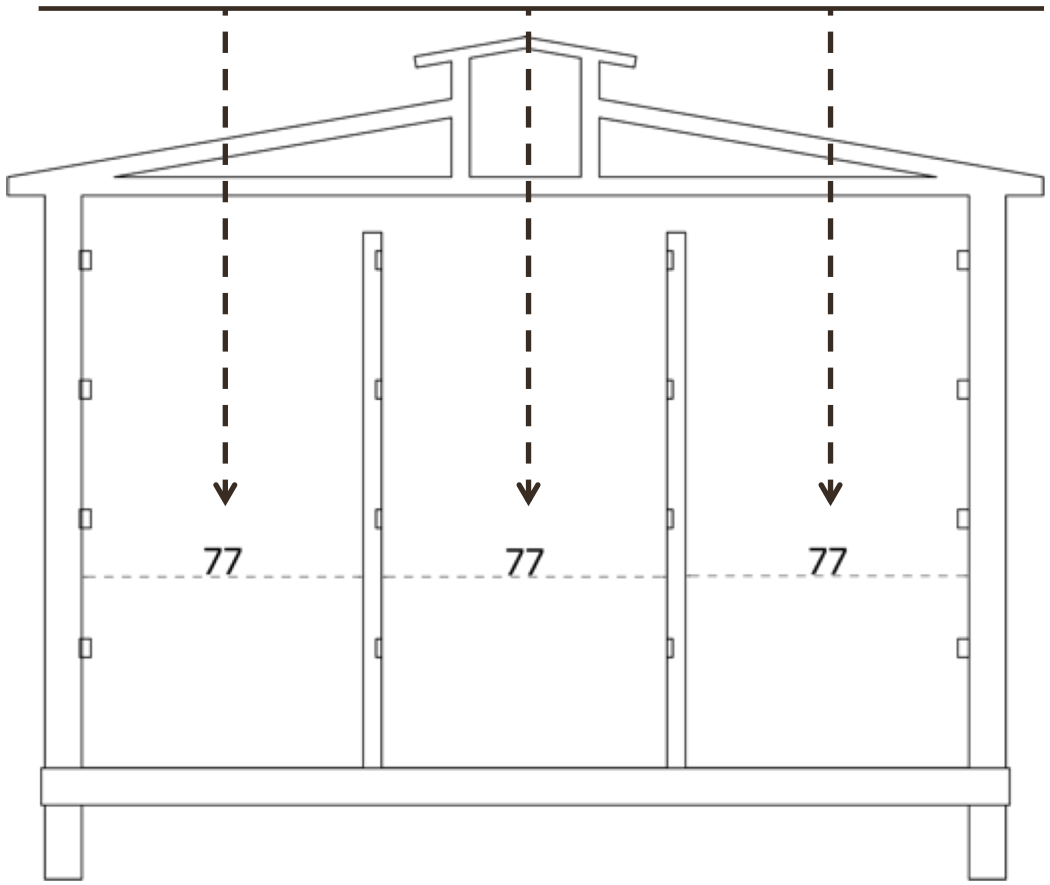
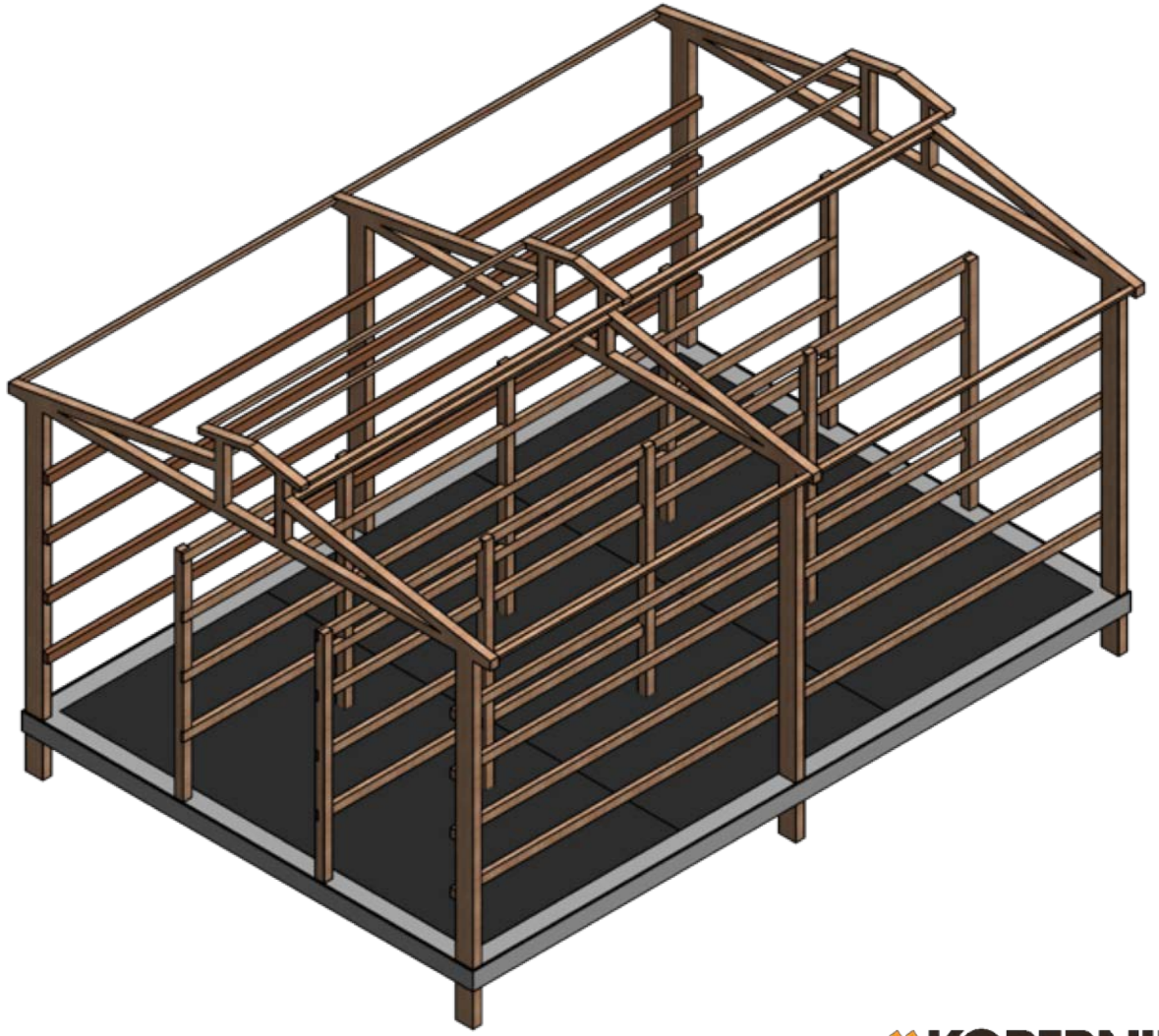


Illustration of rack arrangement



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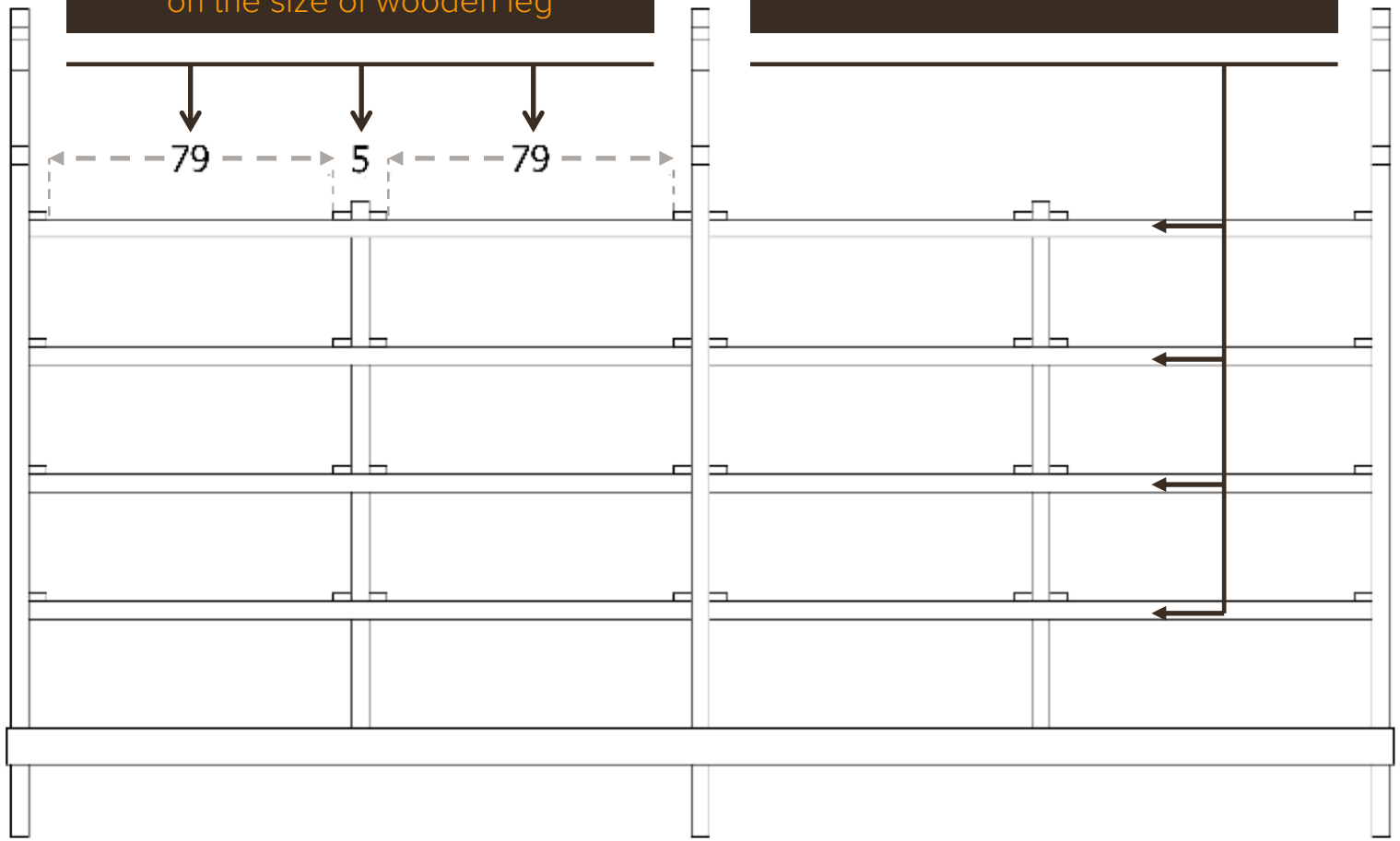
STEP 13: INSTALLATION OF RAILS AS WOOD BINDER FOR RACK AND SUPPORT FOR TRAY

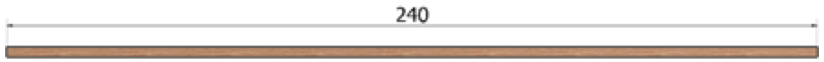
Spacing of rail installation

Rail installation with 79 cm space and additional 5 cm in the middle based on the size of wooden leg

Rails are fastened by four levels



List of materials



2 cm x 5 cm wood with a length of 240 cm

No	Material	Qty.
1	Ironwood 2 cm x 5 cm – 240 cm	10 units
2	Nail 3 cm	128 units

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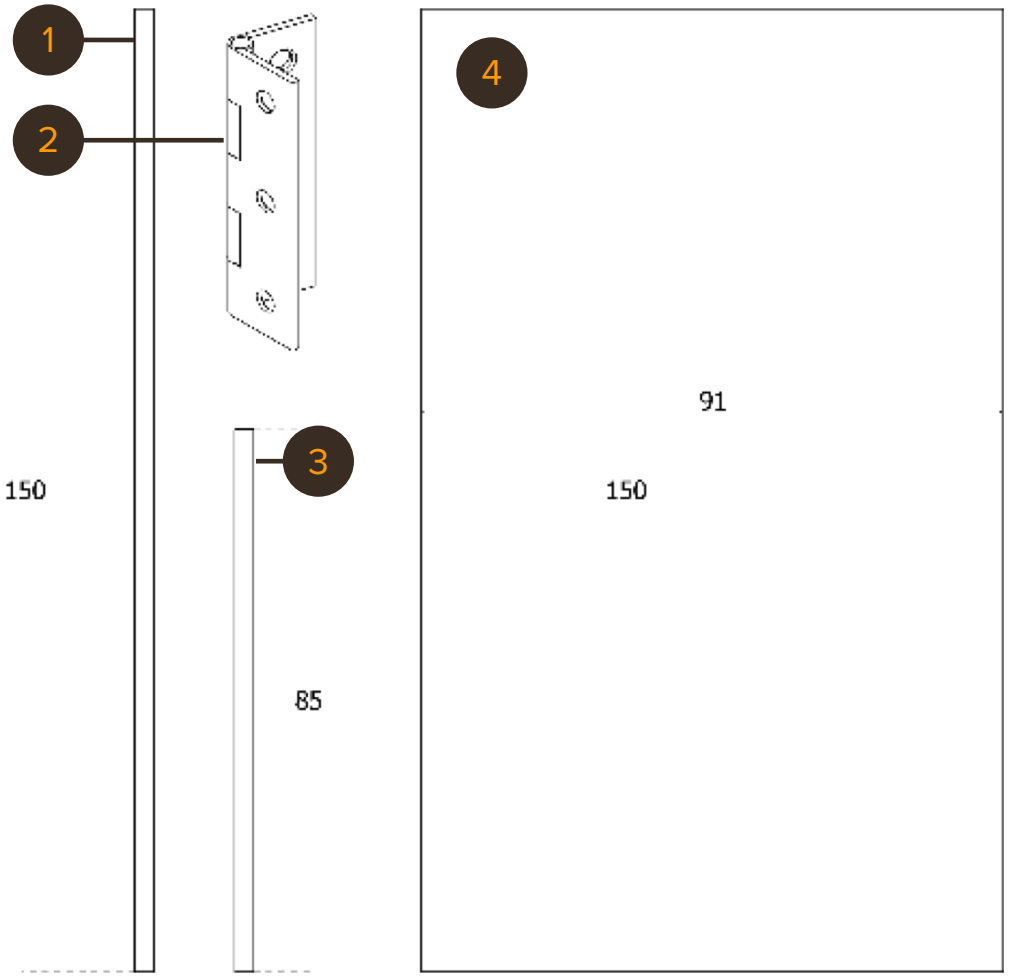
STEP 14: DOOR FRAME ASSEMBLY

Detailed size of door frame (cm)

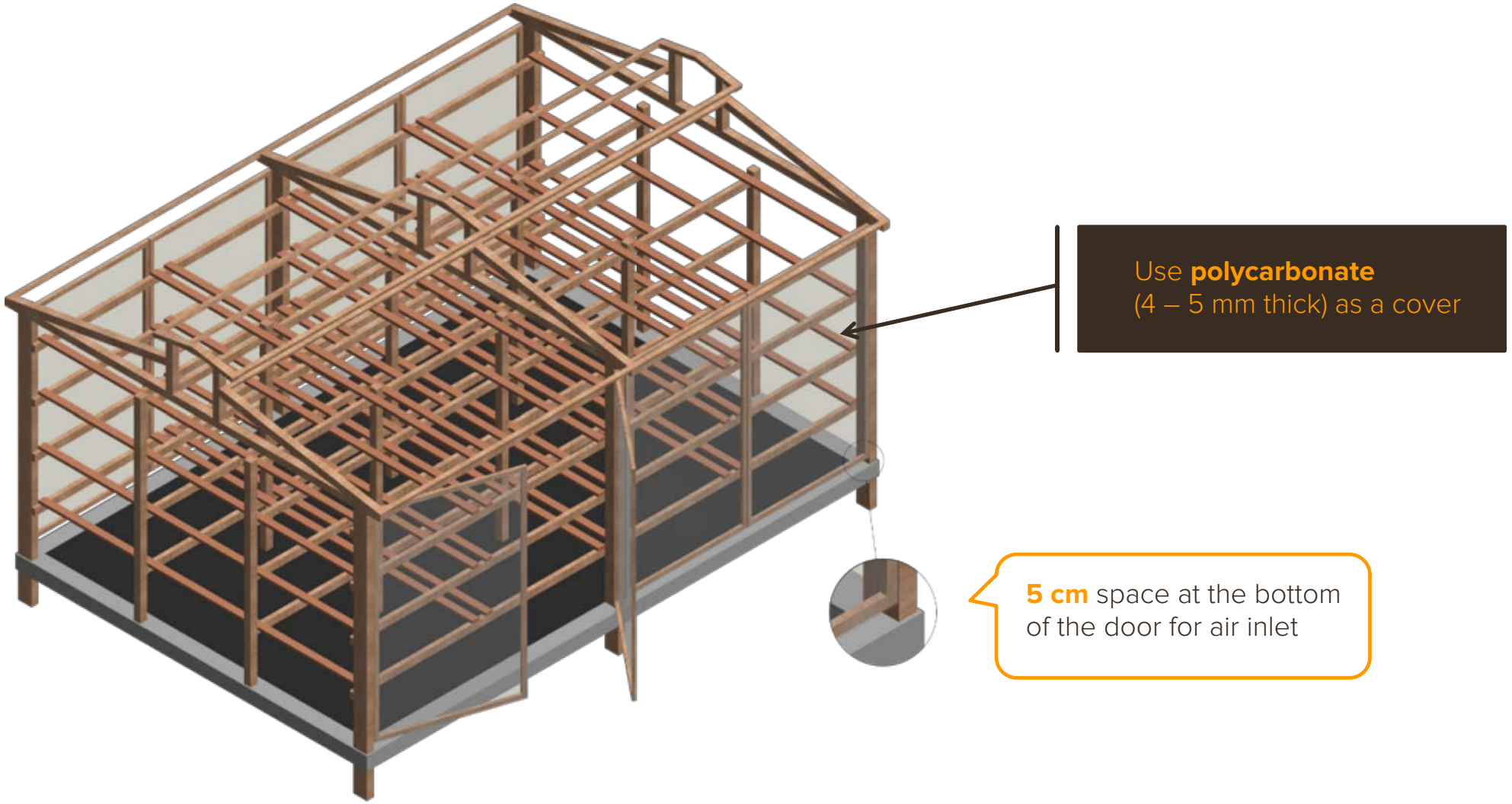


List of materials for installing door frames

No	Material	Qty.
1	Kaso wood 2 cm x 3 cm – 150 cm	16 units
2	Door hinges	8 pairs
3	Kaso wood 2 cm x 3 cm – 85 cm	16 units
4	Polycarbonate - 91 cm x 150 cm	8 sheets

STEP 15: DOOR INSTALLATION AT THE LATERALS OF THE DRYER

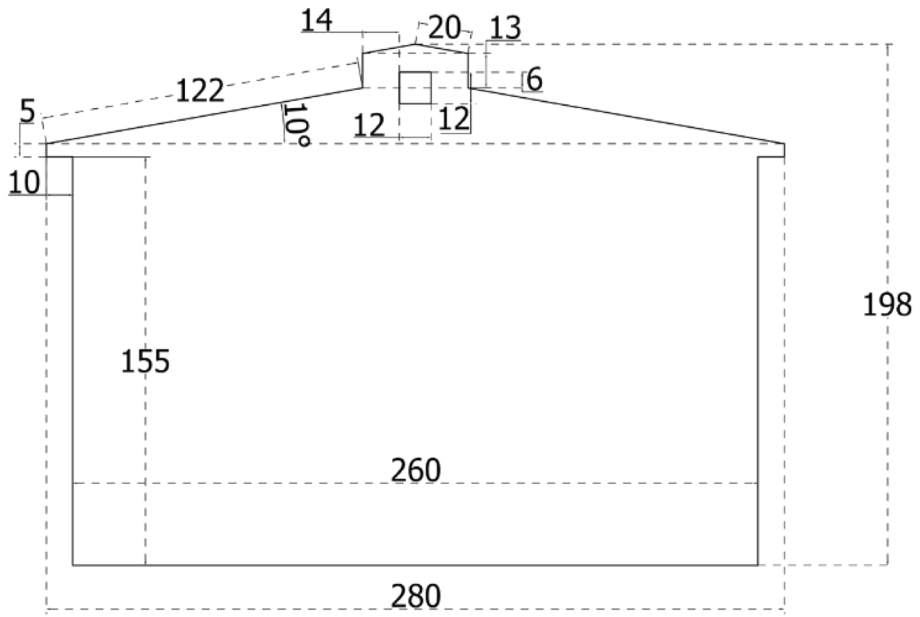
Illustration of door installation



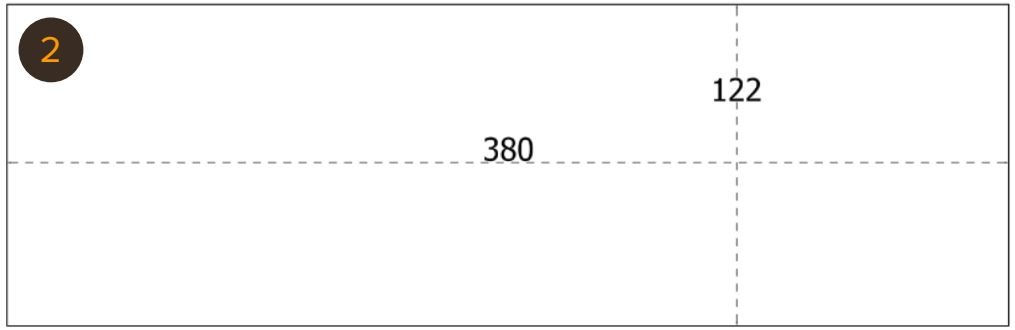
STEP 16: POLYCARBONATE AS WALL AND ROOF OF THE SOLAR DRYER

Polycarbonate cutting size (cm)

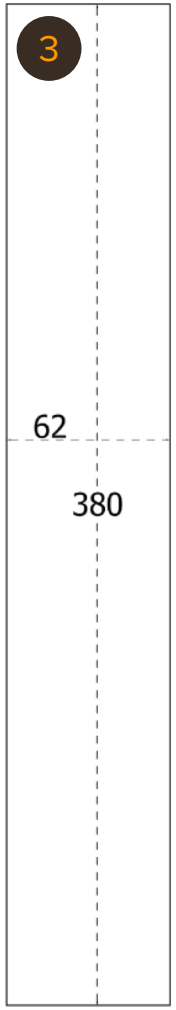
1



2



3



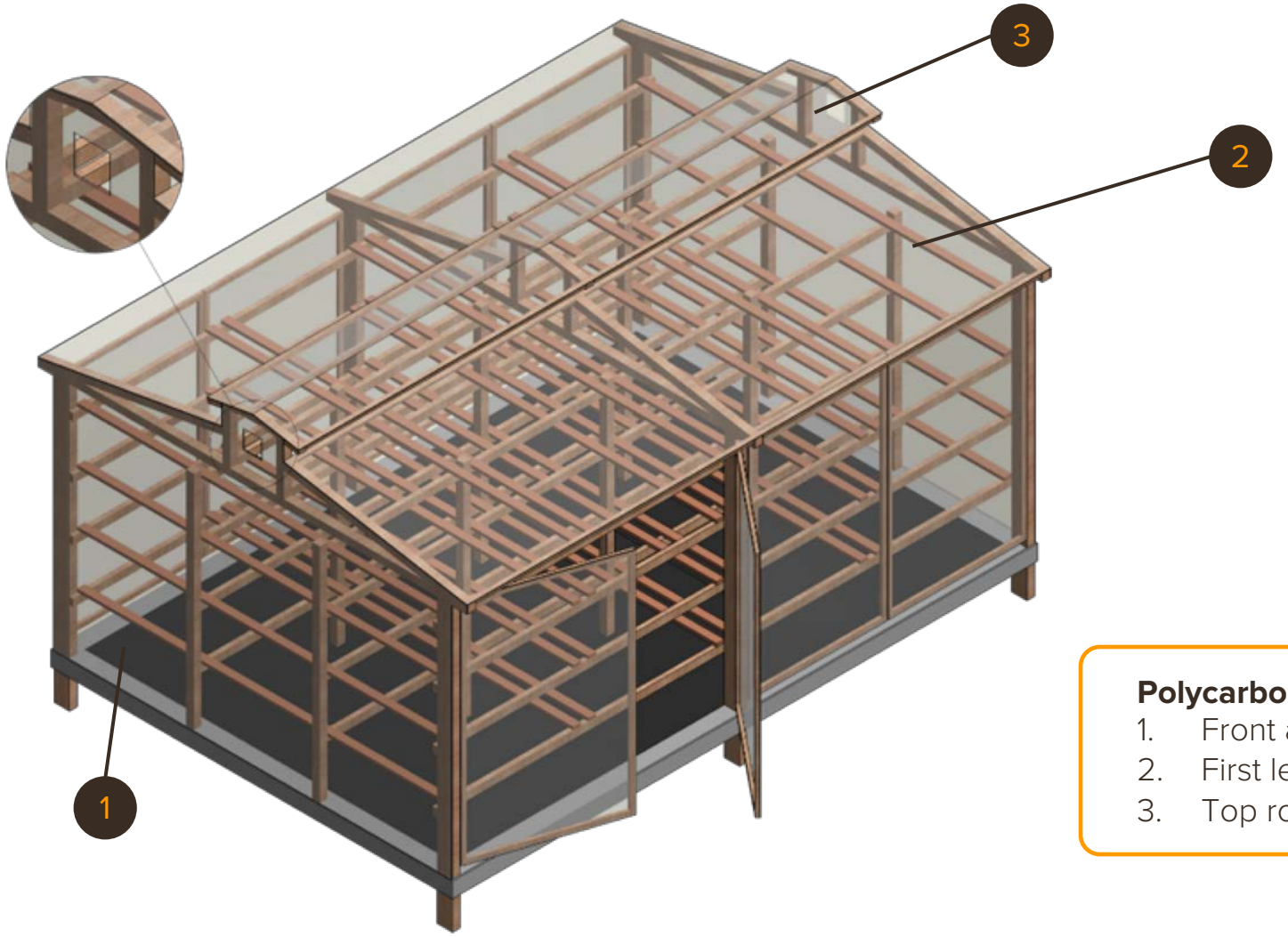
List of materials

No	Material	Qty.
1	**Polycarbonate (4-5mm thick) – 198 cm x 280 cm**	**2 sheets**
2	**Polycarbonate (4-5mm thick) – 122 cm x 380 cm**	**2 sheets**
3	**Polycarbonate (4-5mm thick) – 62 cm x 380 cm**	**2 sheets**
4	Roofing nail	2 kg
5	Silicone sealant	2 units

STEP 17: POLYCARBONATE SHEETS ARE FASTENED TO THE MAIN FRAME AND WOODEN ROOF SUPPORT WITH TACK AND SILICONE GLUE

Illustration of installed polycarbonate

12 cm x 12 cm
hole for exhaust fan



Polycarbonate

1. Front and back walls
2. First level roof section
3. Top roof

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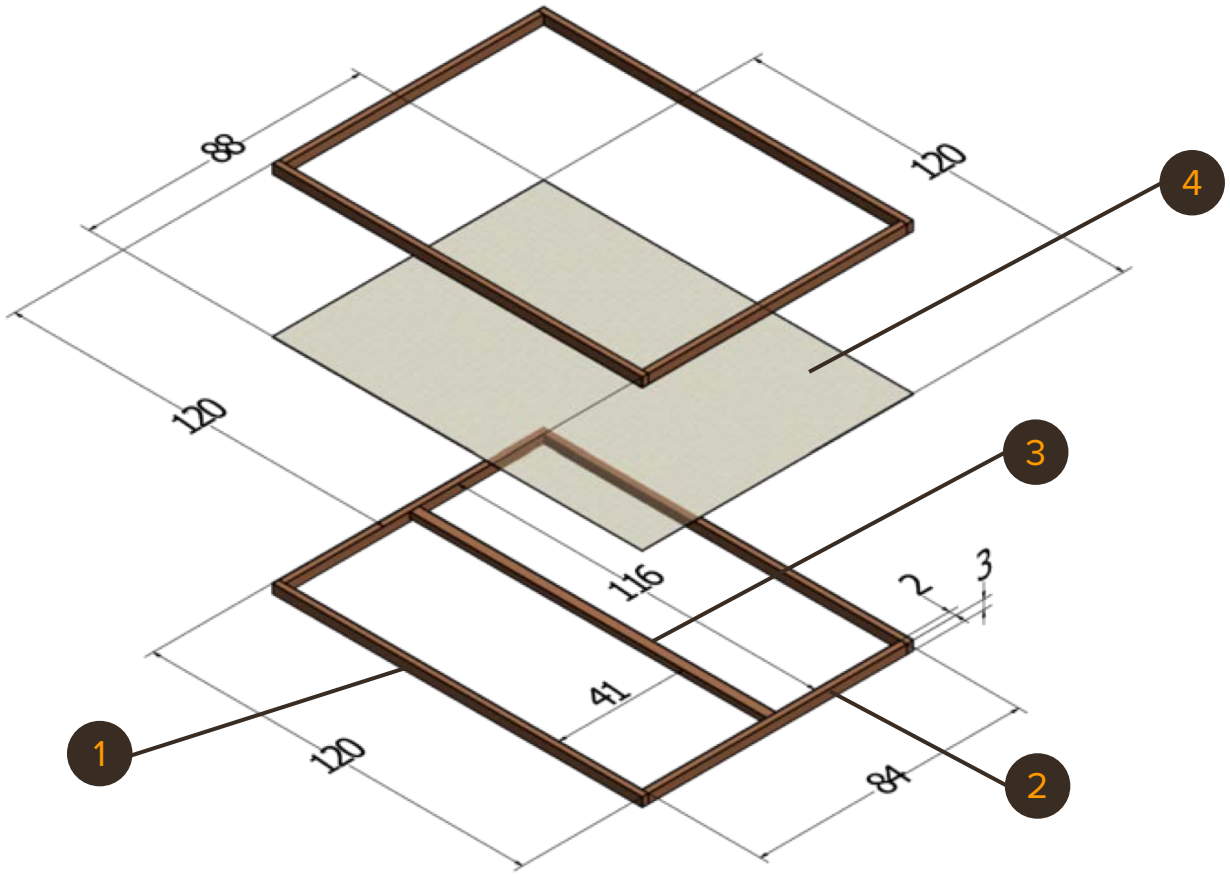
STEP 18: TRAY ASSEMBLY

Size of tray (cm)



List of materials

No	Material	Qty.
1	**Kaso wood 2 cm x 3 cm – 120 cm**	**128 units**
2	**Kaso wood 2 cm x 3 cm – 84 cm**	**128 units**
3	**Kaso wood 2 cm x 3 cm – 116 cm**	**32 units**
4	**Net**	**1 roll**
5	Nail (3 cm)	2 kg
6	Nail (5 cm)	1 kg

STEP 19: TRAY (32 UNITS)

Tray

The assembly is done separately between the upper and lower frame. After fastening the net to the lower frame, the upper frame is joined to the lower frame

Net is fastened to the lower frame by using 3 cm nails that are curved at a distance of **10 cm**

STEP 20: EQUIPMENT TO MOUNT THE EXHAUST FAN WHICH CAN BE FOUND AT ELECTRONICS OR COMPUTER STORE

List of materials for fan installation

No	Material	Qty.
1	Exhaust fan 12 cm x 12 cm – 1.6 A	2 units
2	Cable tie 20 cm x 2 cm	8 units

STEP 21: INSTALL TWO FAN UNITS ON THE FRONT AND BACK THE SOLAR DRYER

Illustration of installed fan

Create four **holes at the end of the fan** using a small drill

Secure the fan with polycarbonate using cable ties

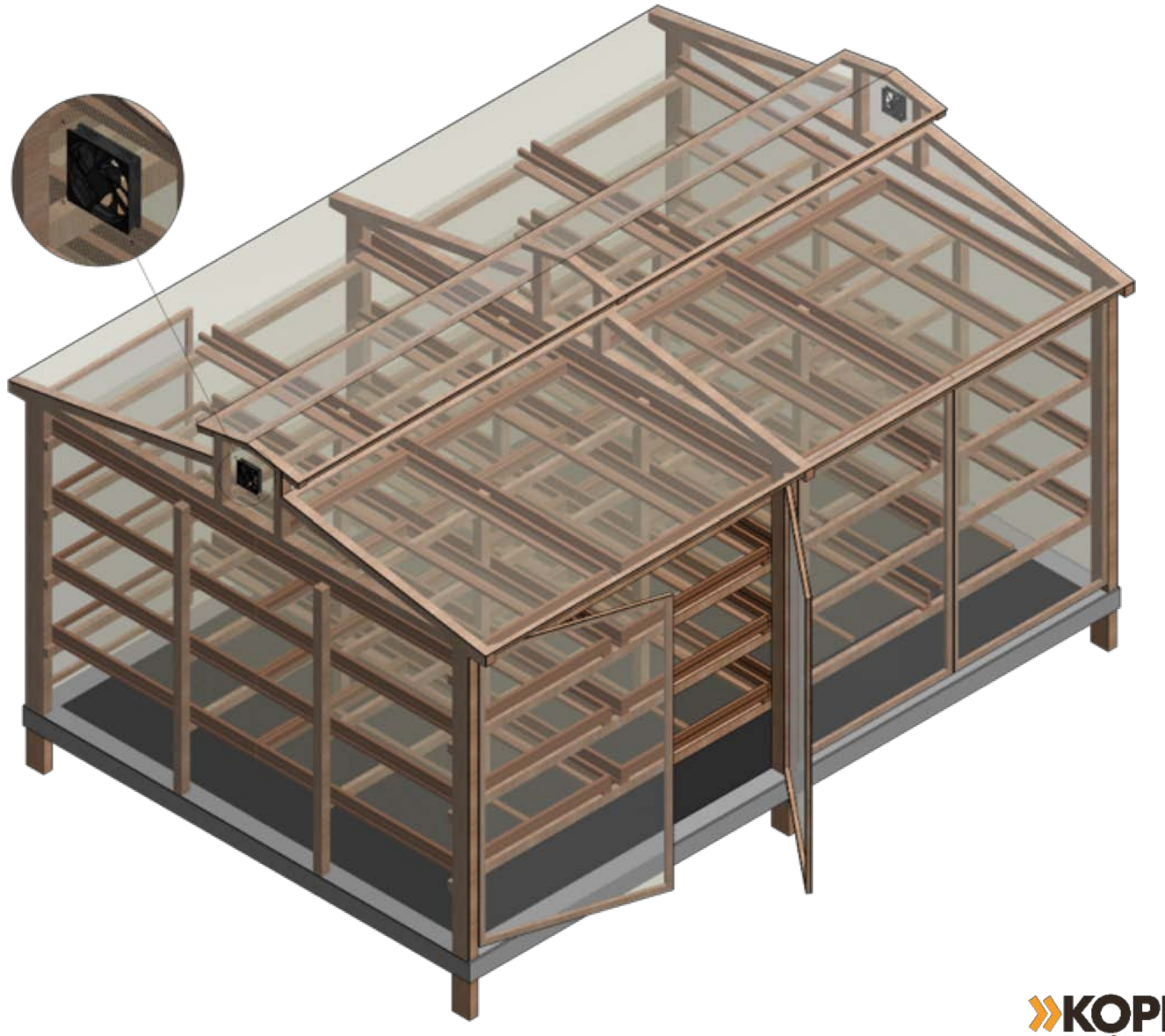


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ILLUSTRATION OF THE COMPLETED SOLAR DRYER