
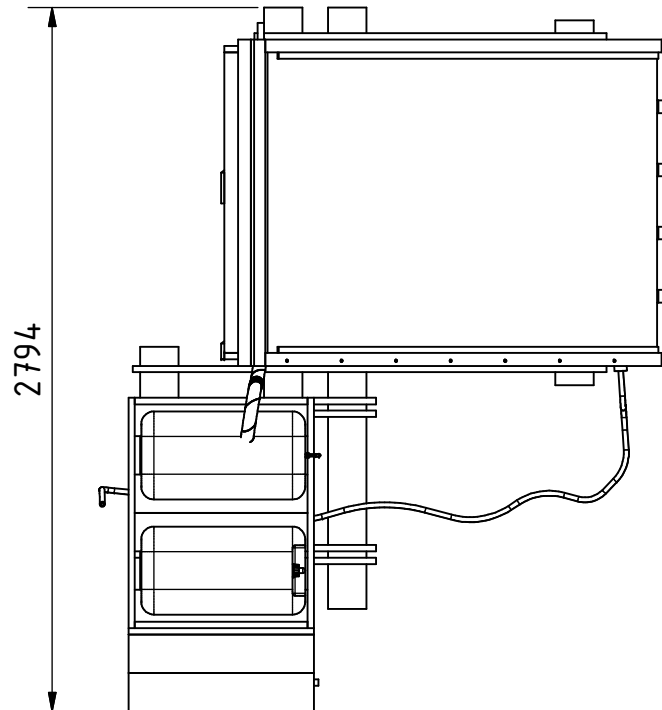
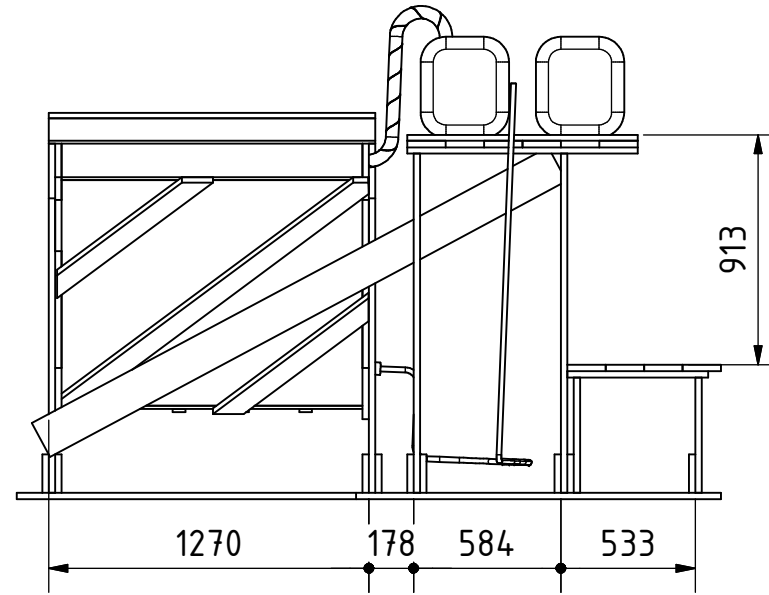
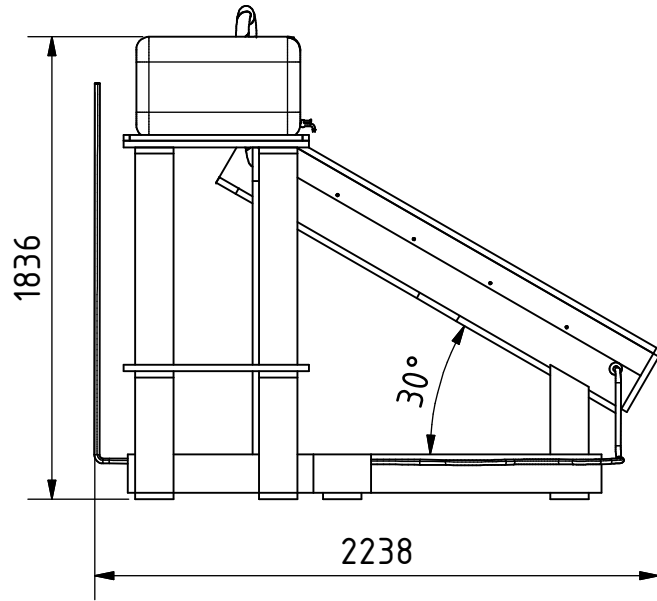

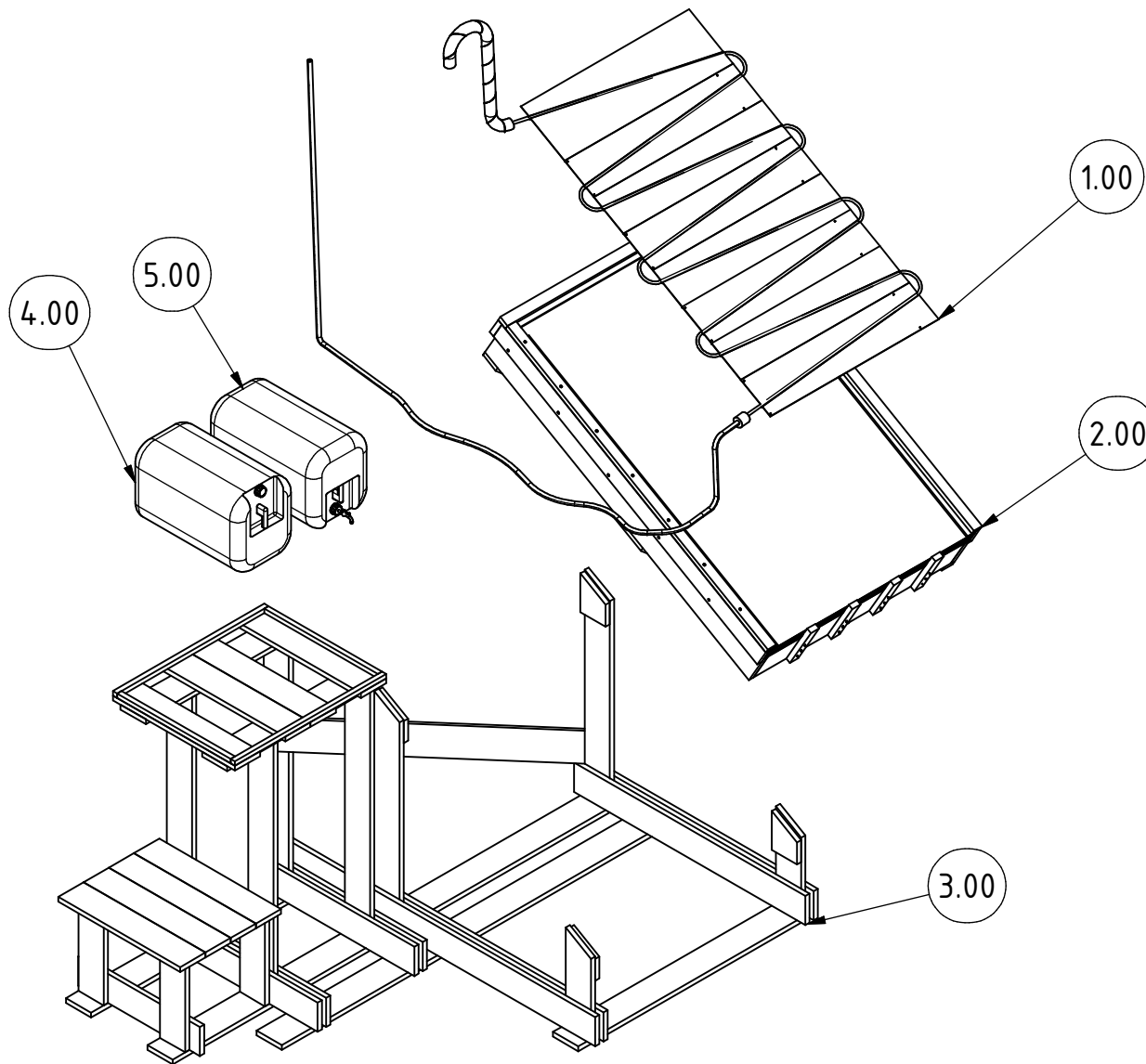



PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME 3D Views		SPECIFICATIONS			CODE A1
DEVELOPED BY IOG - Engineers Without Borders		REDESIGNED BY 	FILE NAME 0_Anlage.iam		QUANTITY 1
			LICENSE CC-BY-SA 4.0	DOC. TYPE Assembly	SCALE 2 : 35
					SHEET 1 / 24




PROJECT Solar water heater for disinfection	CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME 3D Views	SPECIFICATIONS			CODE A1
DEVELOPED BY IOG - Engineers Without Borders	REDESIGNED BY 	FILE NAME 0_Anlage.iam	QUANTITY 1	
		LICENSE CC-BY-SA 4.0	DOC. TYPE Assembly	SCALE 1 : 30
				SHEET 2 / 24



PROJECT Solar water heater for disinfection		CREATED BY A. Morillo		APPROVED BY D. Jaeger		DATE 22-05-2023		VERSION 0.01			
PART NAME Exploded 3D views		SPECIFICATIONS							CODE A2		
DEVELOPED BY IOG - Engineers Without Borders		REDESIGNED BY 		FILE NAME 0_Anlage.ipn				QUANTITY 1			
				LICENSE CC-BY-SA 4.0		DOC. TYPE Assembly		SCALE 1 : 30		SHEET 3 / 24	



## PARTS LIST

POS	QTY	PART NAME	FINE MANE	PART TYPE	SPECIFICATIONS	SHEET
A1	1	3D Views	0_Anlage.iam			1
A1	1	3D Views				2
A2	1	Exploded 3D views	0_Anlage.ipn			3
B1		Parts list				4
B2		Parts list				5
B3		Parts list				6
C1		Technical notes				7
C2		Technical notes				8
C3		Technical notes				9
1.00	1	Absorber	4.0_Absorber.ipn			10
1.00	1	Absorber				11
1.01	1	Pipe	3.ipt	Production	Pipe, OD 1/2", thickness 1mm, Flexible copper	12
1.02		Technical notes	2.3.ipt			13
1.03	4	Metal sheet2	2.2.ipt	Production	Metal sheet, thickness 0.6-1mm, aluminium/copper, 925x230mm	14
1.04	1	Metal sheet3	2.1.ipt	Production	Metal sheet, thickness 0.6-1mm, aluminium/copper, 980x335mm	15
1.05	1	Hose	7.4.ipt	Buy	Flexible drinking water hose, ID 1/2", L 3-4m	
1.06	1	Riser insulation	6.8.ipt	Buy	Insulation layer, thicknesss 50mm, glass wool or hemp mat, 850x350mm	
1.07	1	Technical notes	6.9.ipt	Buy	Insulation layer, thicknesss 50mm, glass wool or hemp mat, 350x90mm	
2.00	1	Absorber & Wooden box	6.0_Halter.ipn		Joined with 2" and 3" nails and 2" wood screw (pre-drilled)	16
2.00	1	Absorber & Wooden box				17
2.01	1	Glass pane1	6.5.ipt	Buy	Glass, thickness 5mm, 1830x1220mm	
2.02	2	Glass pane2	6.5b.ipt	Buy	Glass, thickness 5mm, 1220x460mm	
2.03	1	Bottom insulation	6.6.ipt	Buy	Insulation layer, thicknesss 10mm, glass wool or hemp mat, 3480x1190mm	
2.04	2	Wooden box board1	Part58.ipt	Production	Timber 178*25*1842mm, hard wood	
2.05	2	Wooden box board2	1.2.ipt	Production	Timber 178*25*1194mm, hard wood	

PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Parts list		SPECIFICATIONS			CODE B1
DEVELOPED BY IOG - Engineers Without Borders		REDESIGNED BY 	FILE NAME OHO e.V.		QUANTITY
		LICENSE CC-BY-SA 4.0	DOC. TYPE Parts list	SCALE	SHEET 4 /24


## PARTS LIST

POS	QTY	PART NAME	FINE MANE	PART TYPE	SPECIFICATIONS	SHEET
2.06	4	Wooden box board3	Part66.ipt	Production	Timber 51*25*254mm, hard wood	
2.07	1	Glass cover board1	6.2.ipt	Production	Timber 51*25*1295mm, hard wood	
2.08	2	Glass cover board2	6.19-2.ipt	Production	Timber 51*25*1816mm, hard wood	
2.09	6	Glass damping strip1	6.11-Side.ipt	Buy	Insulation layer, thicknesss 10mm, glass wool or hemp mat, 51*1740mm	
2.10	5	Glass damping strip2	6.11-Top.ipt	Buy	Insulation layer, thicknesss 10mm, glass wool or hemp mat, 51*1245mm	
2.11	2	Glass cover board3	6.4.ipt	Production	Timber 102*25*1842mm, hard wood	
2.12	1	Glass cover board4	6.3.ipt	Production	Timber 102*25*1295mm, hard wood	
2.13	2	Damping frame board1	6.18.ipt	Production	Timber 25*25*1740mm, hard wood	
2.14	2	Damping frame board2	6.1.ipt	Production	Timber 51*25*1245mm, hard wood	
2.15	2	Glass damping strip3	6.10-Top.ipt	Buy	Insulation layer, thicknesss 10mm, glass wool or hemp mat, 25*1195mm	
2.16	2	Glass damping strip4	6.10-Side.ipt	Buy	Insulation layer, thicknesss 10mm, glass wool or hemp mat, 25*1842mm	
2.17	2	Damping frame board3	6.7-Top.ipt	Production	Timber 51*25*1144mm, hard wood	
2.18	2	Damping frame board4	6.7-Side.ipt	Production	Timber 51*25*1791mm, hard wood	
2.19	1	Wooden box board4	1.3-1.ipt	Production	Timber 102*25*1107mm, hard wood	18
2.20	2	Wooden box board5	1.4.ipt	Production		19
3.00	1	Rack	Structure.ipn		Joined with 2" nails	20
3.00	1	Rack				21
3.01	1	Rack board1	5.4.ipt	Production	Timber 152*25*2794mm, hard wood	
3.02	1	Rack board2	5.7.ipt	Production	Timber 152*25*2388mm, hard wood	
3.03	2	Rack board3	5.3-1.ipt	Production	Timber 152*25*1448mm, hard wood	
3.04	1	Rack board4	5.2.ipt	Production	Timber 152*25*1880mm, hard wood	
3.05	2	Rack board5	5.10.ipt	Production	Timber 152*25*1168mm, hard wood	22
3.06	2	Rack board6	5.9.ipt	Production	Timber 152*25*508mm, hard wood	23
3.07	4	Rack board7	5.8-4.ipt	Production	Timber 152*25*203mm, hard wood	24
3.08	1	Rack board8	5.17.ipt	Production	Timber 152*25*2322mm, hard wood	
3.09	4	Rack board9	5.5-4.ipt	Production	Timber 152*25*965mm, hard wood	
3.10	4	Rack board10	5.11-1.ipt	Production	Timber 152*25*1346mm, hard wood	

PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Parts list		SPECIFICATIONS			CODE B2
DEVELOPED BY IOG - Engineers Without Borders		REDESIGNED BY 	FILE NAME		QUANTITY
			LICENSE CC-BY-SA 4.0	DOC. TYPE Parts list	SCALE 5 /24

**PARTS LIST**

POS	QTY	PART NAME	FINE MANE	PART TYPE	SPECIFICATIONS	SHEET
3.11	2	Rack board11	5.14-2.ipt	Production	Timber 152*25*914mm, hard wood	
3.12	9	Rack board12	5.6-6.ipt	Production	Timber 152*25*737mm, hard wood	
3.13	2	Rack rail1	5.15-1.ipt	Production	Timber 24*25*914mm, hard wood	
3.14	2	Rack rail2	5.16-2.ipt	Production	Timber 24*25*686mm, hard wood	
3.15	4	Rack board13	5.12-3.ipt	Production	Timber 152*25*457mm, hard wood	
3.16	2	Rack board14	5.13-2.ipt	Production	Timber 152*25*559mm, hard wood	
4.00	1	Output container	7.2.ipt	Buy	Plastic vessel, capacity 60L, square section, with lid	
5.00	1	Input container	7.1.ipt	Buy	Plastic vessel, capacity 60L, square section, with lid, include a 1/2" valve embedded on the lid	

PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Parts list		SPECIFICATIONS			CODE B3
DEVELOPED BY IOG - Engineers Without Borders	REDESIGNED BY 	FILE NAME		QUANTITY	
		LICENSE CC-BY-SA 4.0	DOC. TYPE Parts list	SCALE	SHEET 6 /24

OHO e.V.

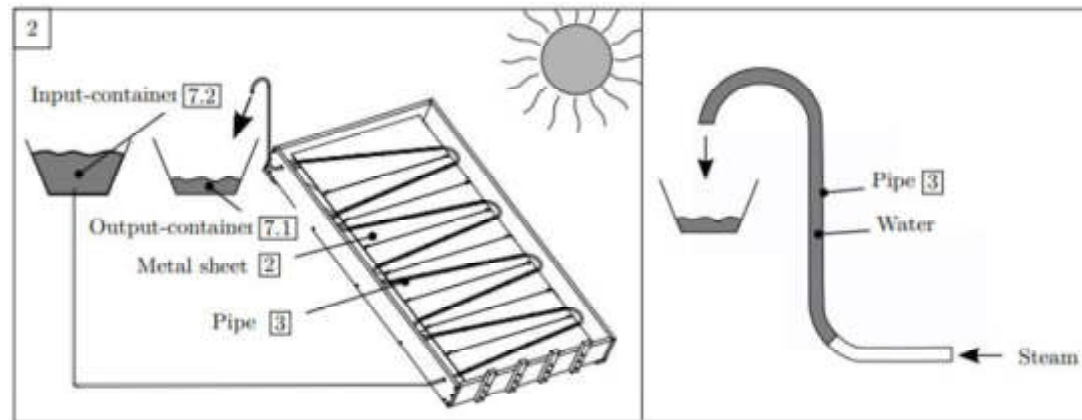
TECHNICAL NOTES

NOTES

How the system works


CONTENT

- The water flows from the input-container 7.2 into the pipe 3 . The sun heats up the metal sheets 2 and the water in the pipe. When the water is hot enough, it starts boiling and pathogens are killed. To isolate the front-side, two glass panes are placed on top of the pipe (this is not shown in the picture).
- When water boils, steam is produced. The steam needs much more room than the liquid water. Thus, the steam pushes some of the heated water out of the pipe into the output-container. Afterwards the boiled water flows out of the outlet and is collected in the output-container 7.1
- After enough water has flown out of the system cold, untreated water from inside of the input-container can pour in and the process restarts.



Considerations

- The pipe has to stick tight on the metal sheets.
- Glass panes on top of the absorber:
  - There must be two glass panes.
  - Do not replace glass with foil or acrylic glass!
- Wooden box has to be well insulated.
  - No water and only a bit of air should get inside

PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Technical notes		SPECIFICATIONS			CODE C1
DEVELOPED BY IOG - Engineers Without Borders		REDESIGNED BY 	FILE NAME OHO e.v.		QUANTITY
		LICENSE CC-BY-SA 4.0	DOC. TYPE Technical notes	SCALE	SHEET 7 /24

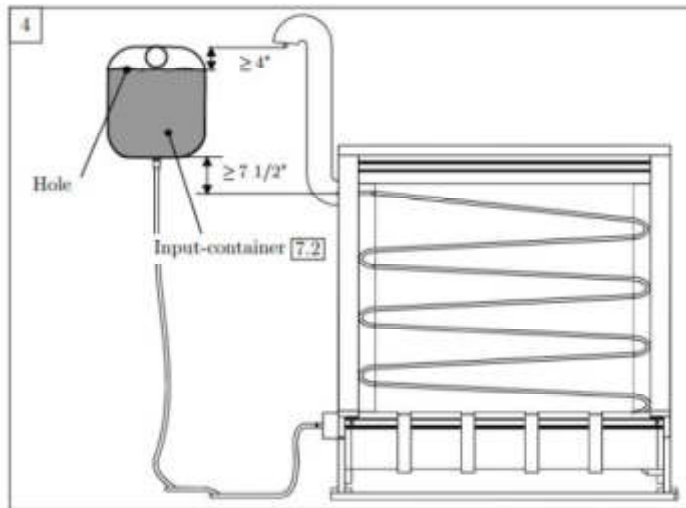
TECHNICAL NOTES

NOTES

Installation heights


CONTENT

- The input-container 7.2 has to be on the correct height (see picture below)
- At least 4" between water-level (input-container) and the outlet
  - < 4" : Untreated water will leave the system. Make sure to drill a hole into the input-container at that height!
  - Much more than 4" : The system will produce less water.
- The difference in height of the bottom of the input-container and the point where the pipe leaves the wooden box has to be 7 1/2". This difference also may not be changed, otherwise the system will not work well either. Please note that the water-level in the input-container 7.2 will fall while the system is running. In order to keep this variation low, the input-container should have a large floor area.



Insulation

- Insulation material which is resistant up to at least 140°C. For example glass wool or hemp mat.
- Each part can be made out of several smaller parts.
- Strips in contact with glass are attached to these in order to absorb shocks and to prevent it from breaking. The material needs to be very soft. If it is soft enough, you can use the insulation material

PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Technical notes		SPECIFICATIONS			CODE C2
DEVELOPED BY IOG - Engineers Without Borders	REDESIGNED BY 	FILE NAME OHO e.V.		LICENSE CC-BY-SA 4.0	QUANTITY SHEET 8 /24
			DOC. TYPE Technical notes	SCALE	



TECHNICAL NOTES

NOTES


Metal Sheet Bending Tool

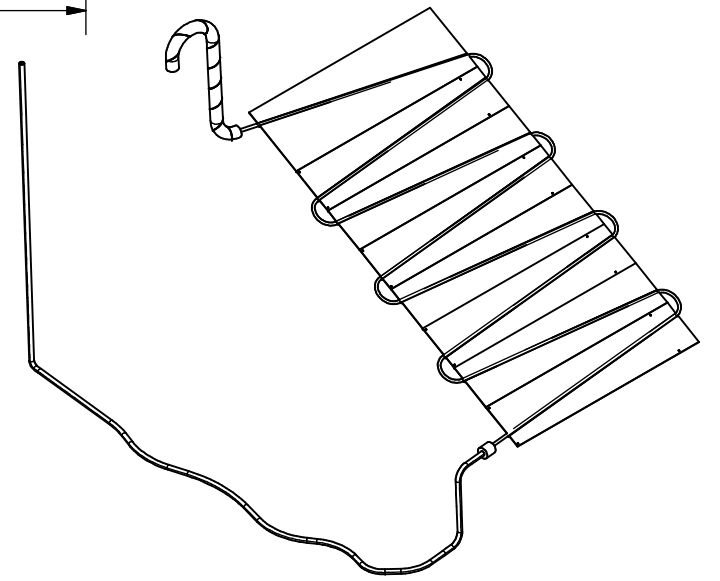
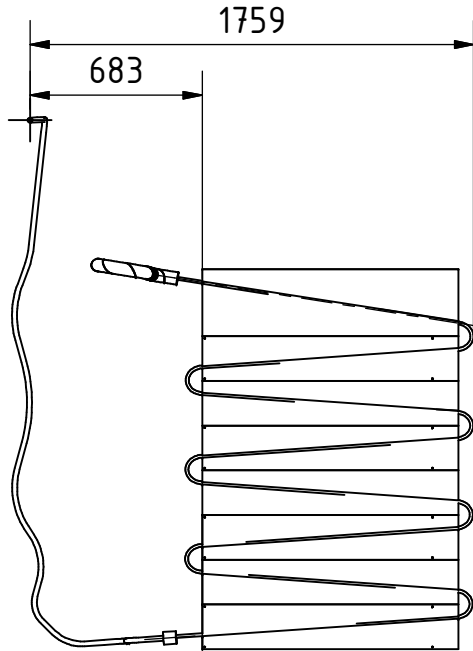
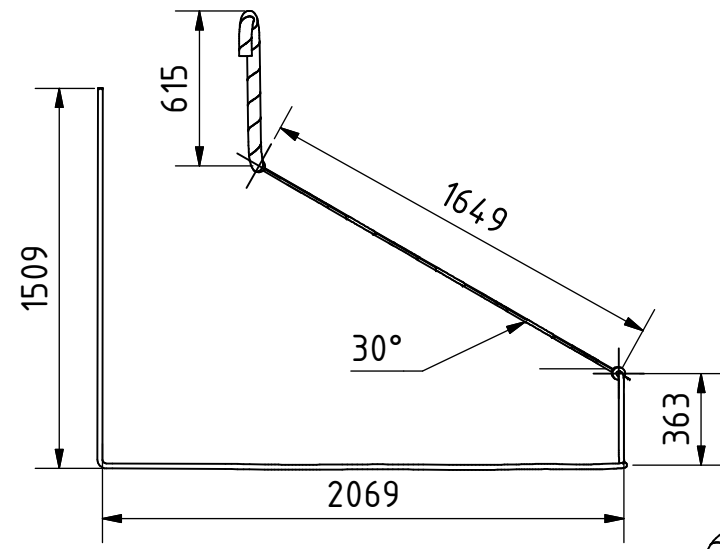
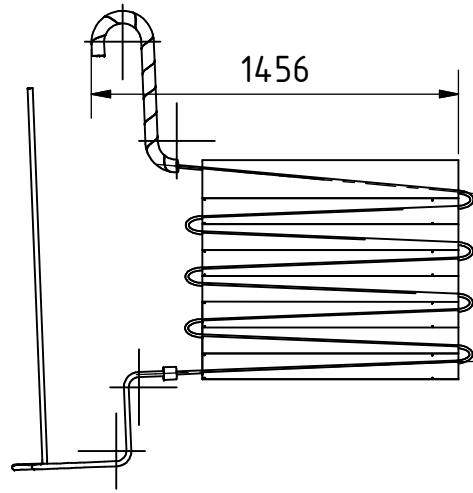
CONTENT


Instructions can be found in the documentation on building a Metal Sheet Bending Tool and a Pipe-Bending Tool. In case you do not have the tools for metal bending.

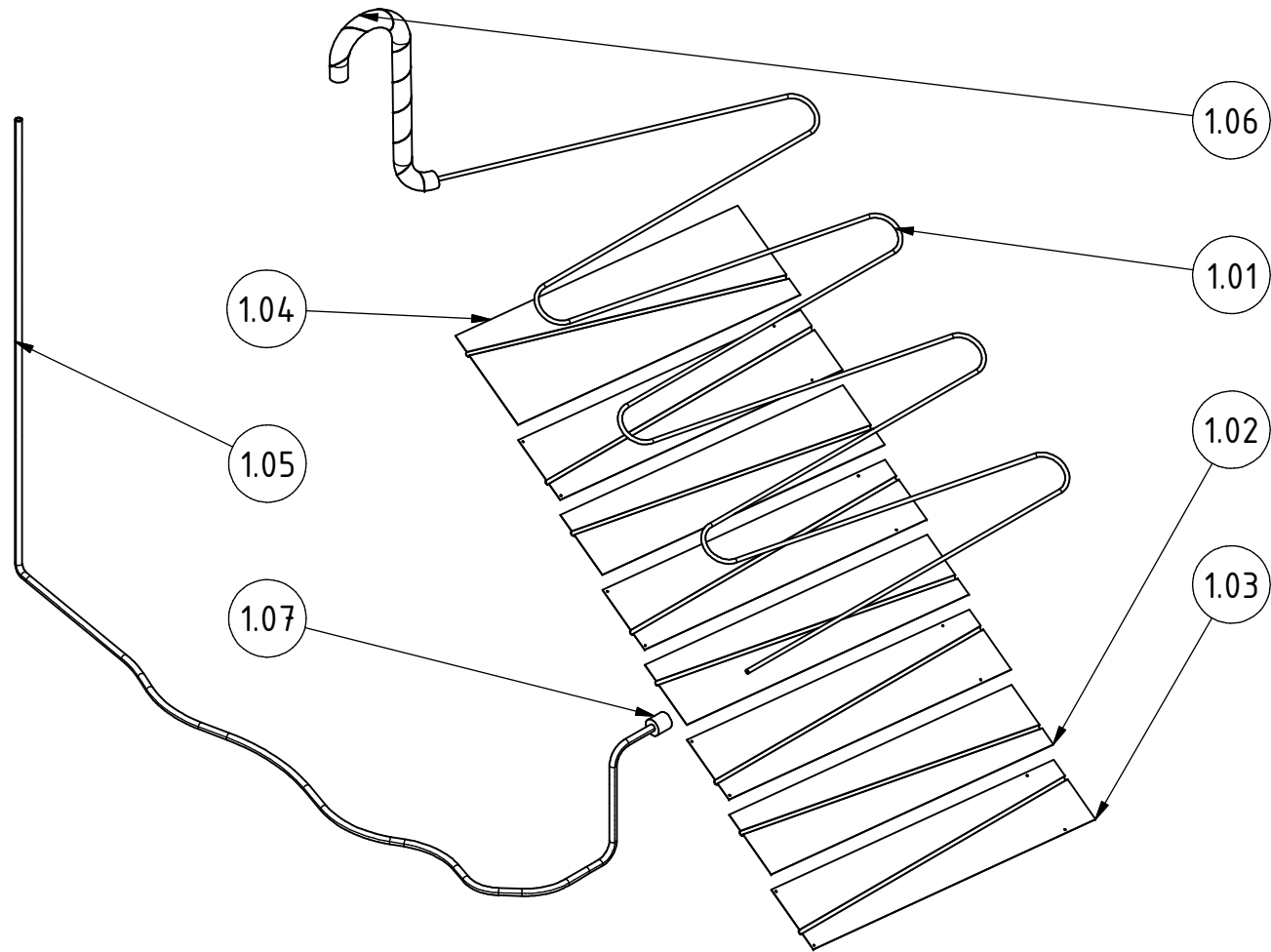
Insulation


- You will need at least two people and an area of at least 53.82 ft<sup>2</sup>.
- The rack has to stand on even ground. If you do not have even ground, use bricks or wood to level the rack.
- The rack is designed for two 60 liter containers with the dimensions 65 cm x 35 cm x 40 cm. If you use other containers, you might need to change the design.
- All boards and rails are made of wood. You do not have to smooth or sand it.
- After every step, check that the angles and distances of the boards have not changed.
- You will only need nails. Screws are not necessary. The nails have to be three times as long as the thickness of the material to be nailed down

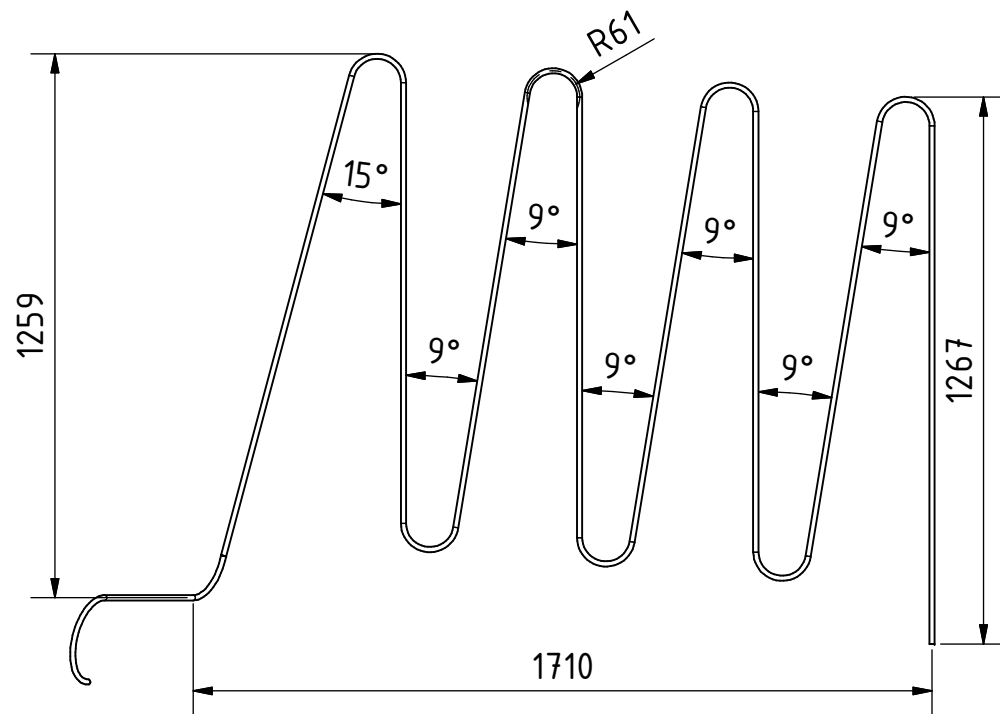
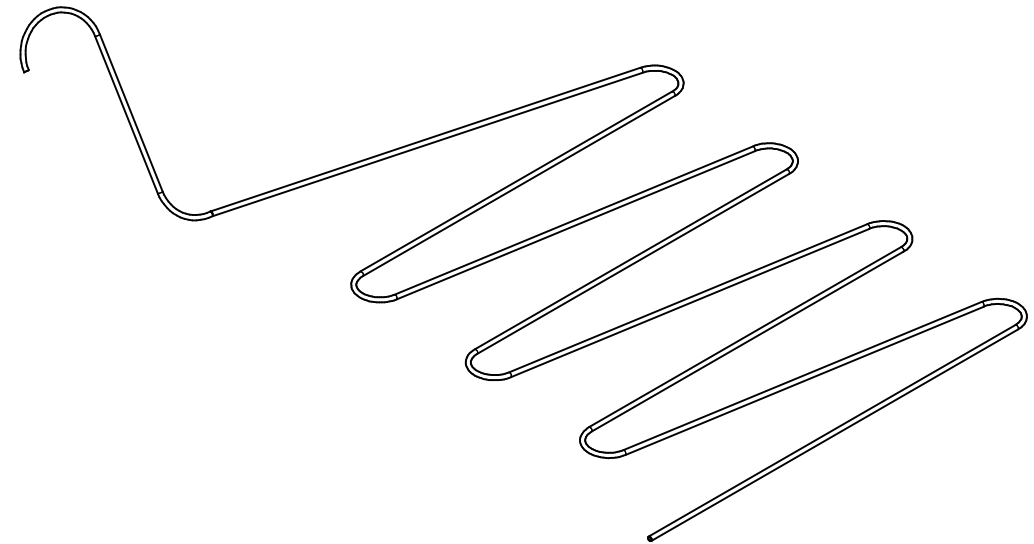
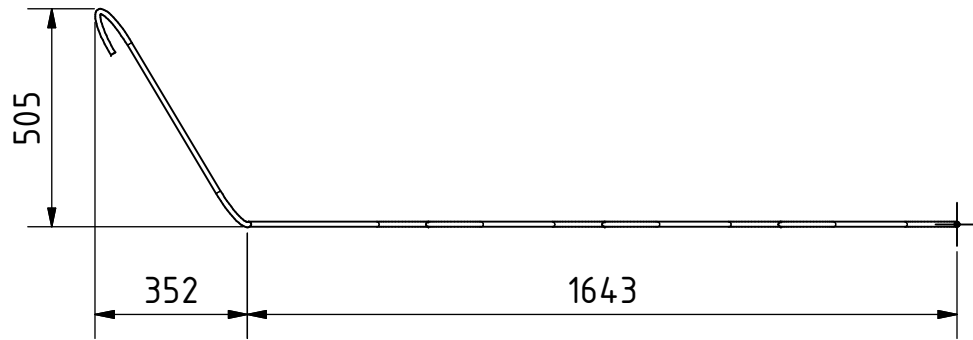
PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Technical notes		SPECIFICATIONS			CODE C3
DEVELOPED BY IOG - Engineers Without Borders		REDESIGNED BY 	FILE NAME OHO e.V.		QUANTITY
		LICENSE CC-BY-SA 4.0	DOC. TYPE Technical notes	SCALE	SHEET 9 /24




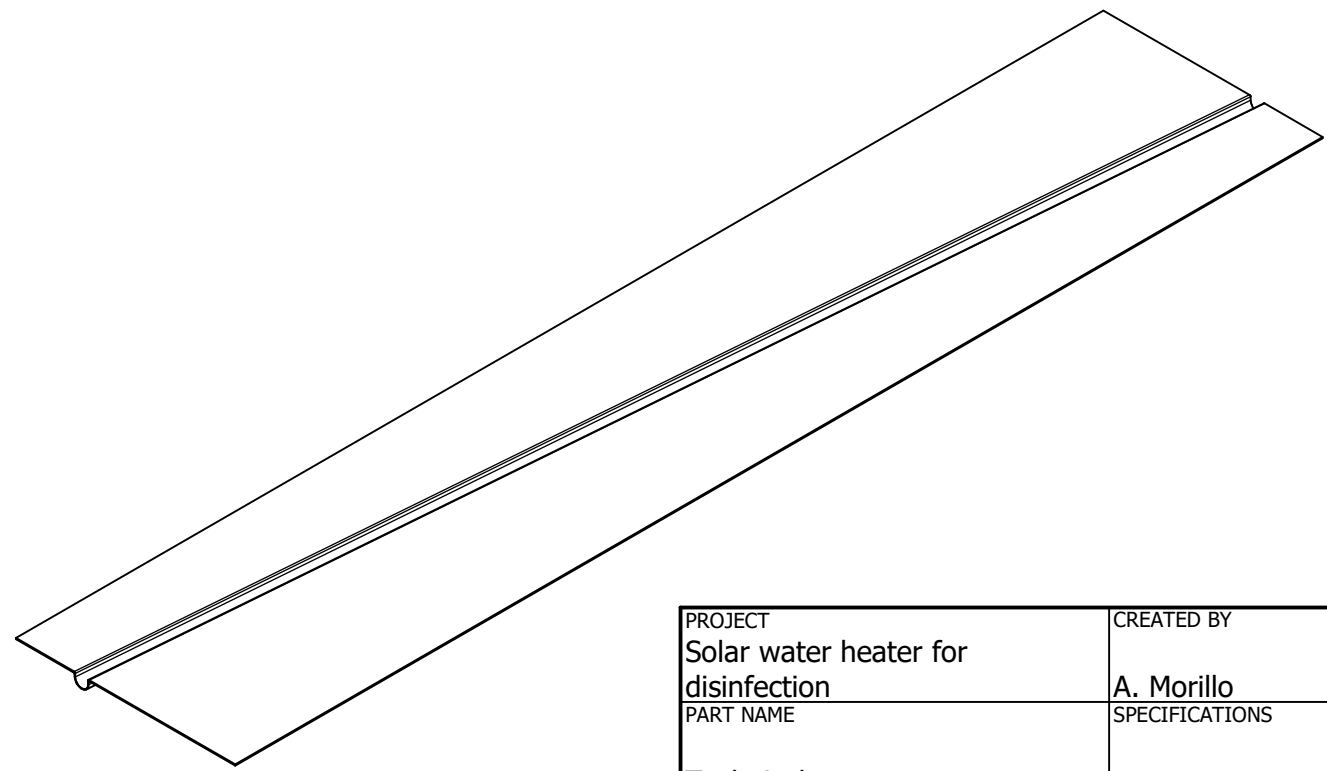
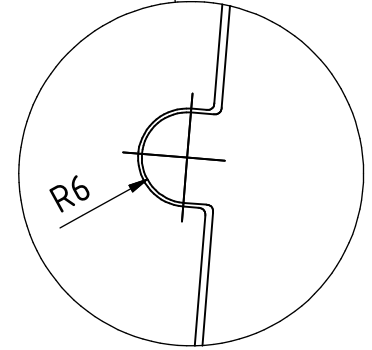
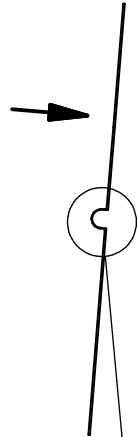
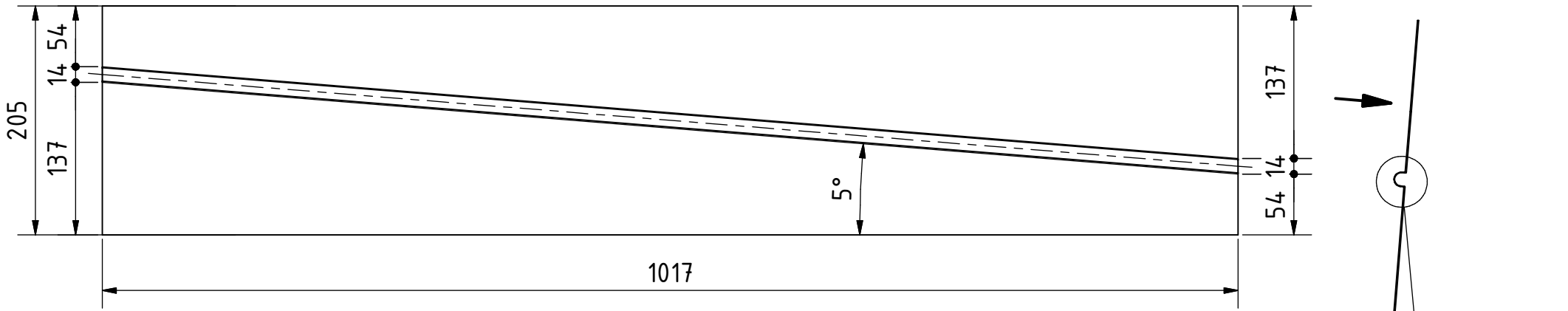
PROJECT Solar water heater for disinfection		CREATED BY A. Morillo		APPROVED BY D. Jaeger		DATE 22-05-2023		VERSION 0.01		
PART NAME Absorber		SPECIFICATIONS							CODE 1.00	
DEVELOPED BY IOG - Engineers Without Borders		REDESIGNED BY 		FILE NAME 4.0_Absorber.iam				QUANTITY 1		
				OHO e.V. LICENSE CC-BY-SA 4.0		DOC. TYPE Assembly		SCALE 1 : 30		SHEET 10 /24




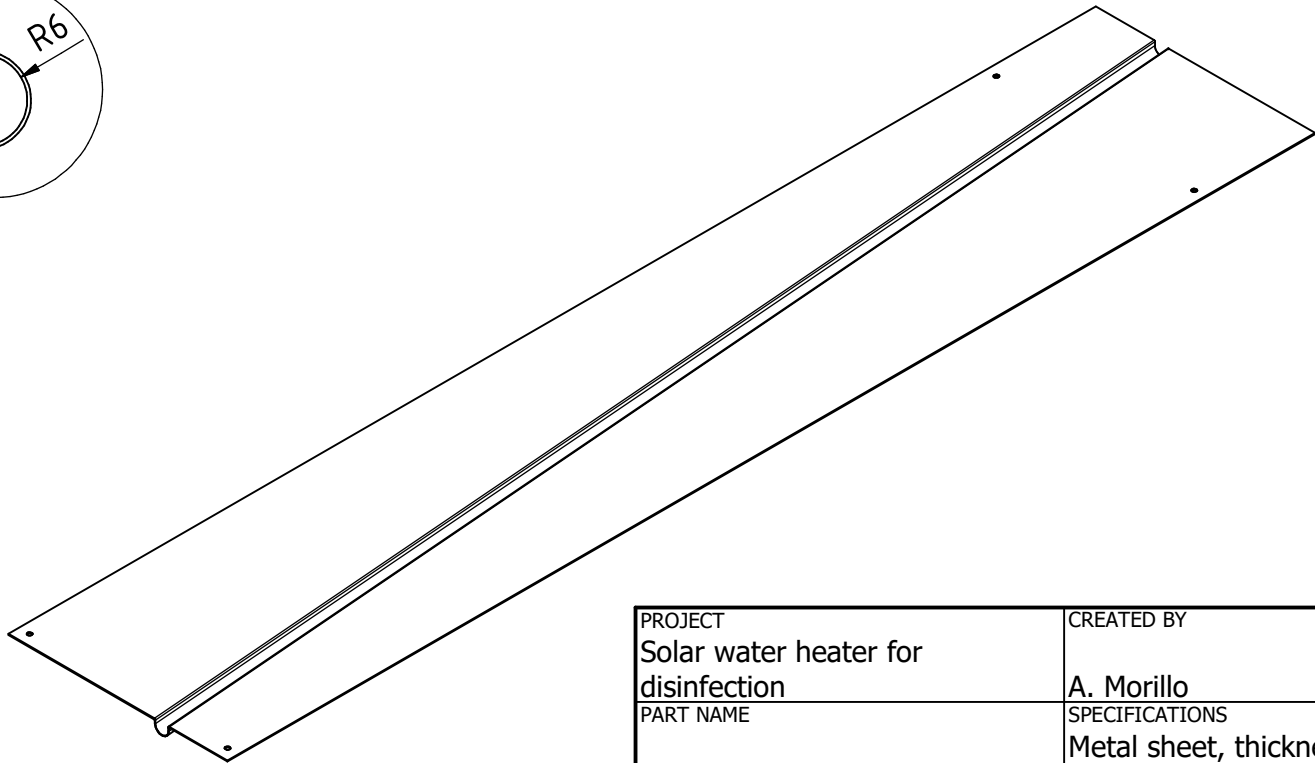
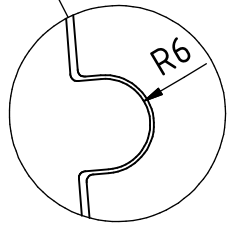
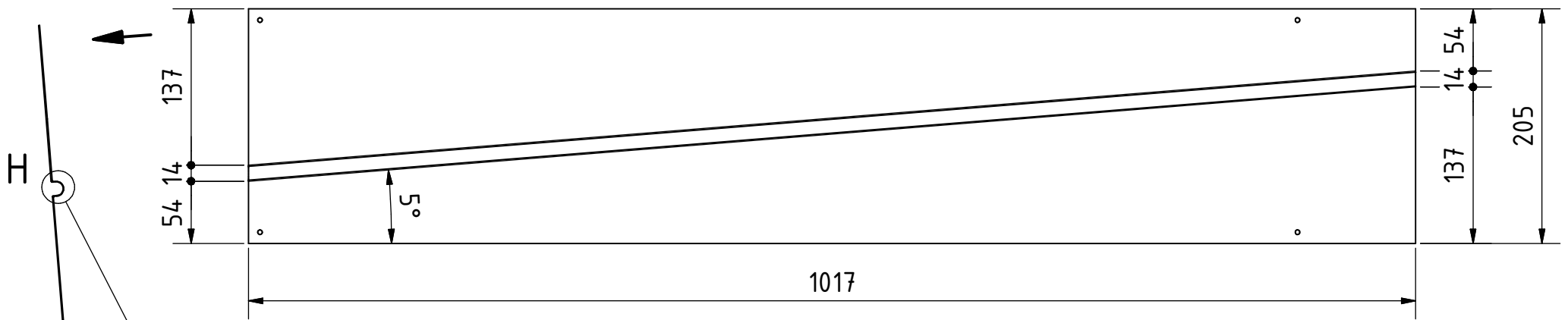
PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Absorber		SPECIFICATIONS			CODE 1.00
DEVELOPED BY		REDESIGNED BY	FILE NAME 4.0_Absorber.ipn		QUANTITY 1
IOG - Engineers Without Borders			OHO e.V.	LICENSE CC-BY-SA 4.0	DOC. TYPE Assembly
			SCALE 1 : 20	SHEET 11 / 24	




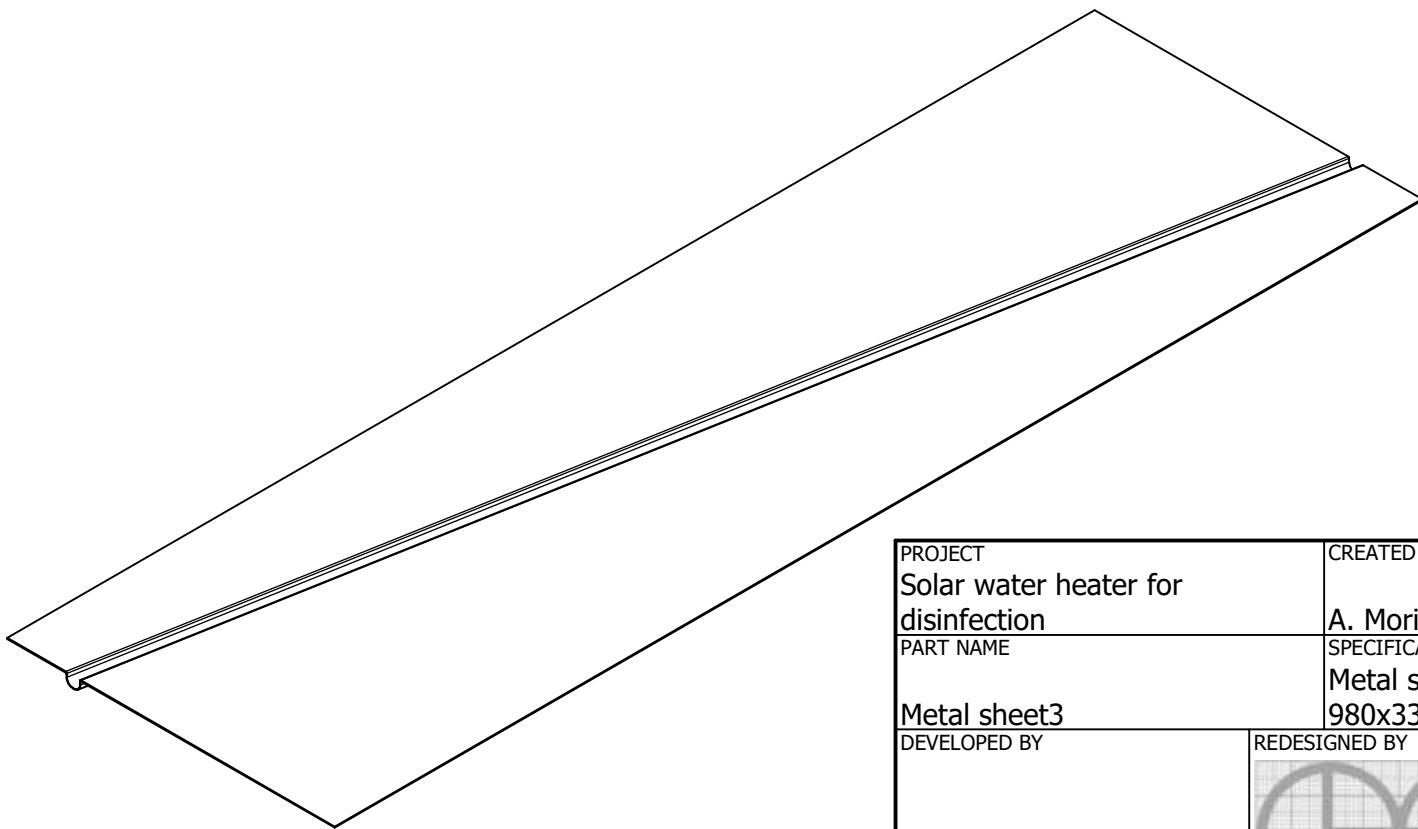
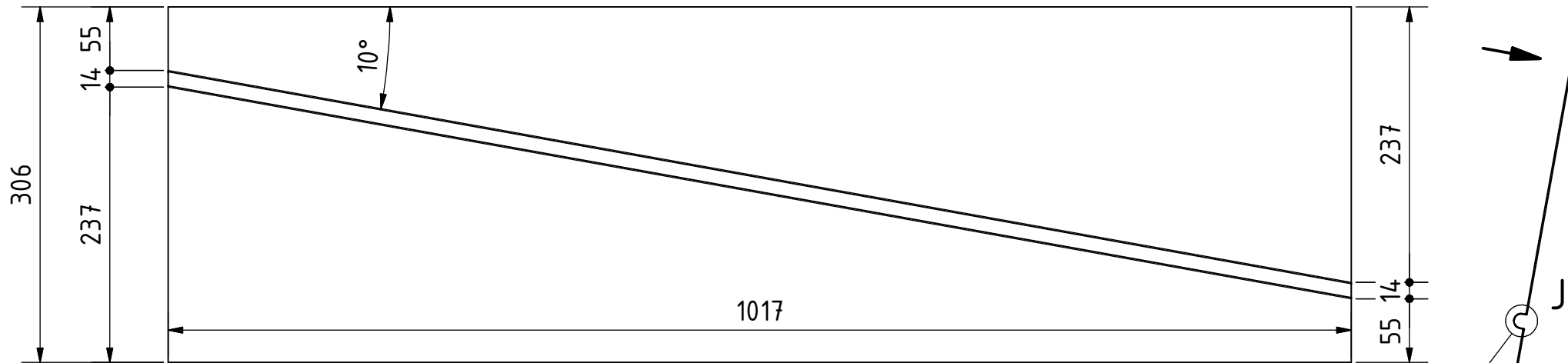
PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Pipe		SPECIFICATIONS Pipe, OD 1/2", thickness 1mm, Flexible copper			CODE 1.01
DEVELOPED BY IOG - Engineers Without Borders	REDESIGNED BY 	FILE NAME 3.ipt		QUANTITY 1	
		LICENSE CC-BY-SA 4.0	DOC. TYPE Part	SCALE 2 : 35	SHEET 12 / 24




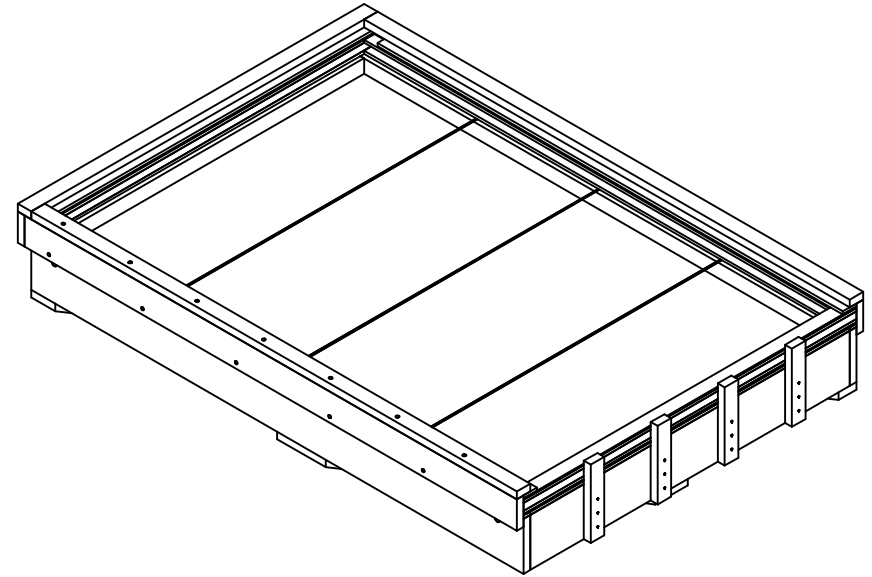
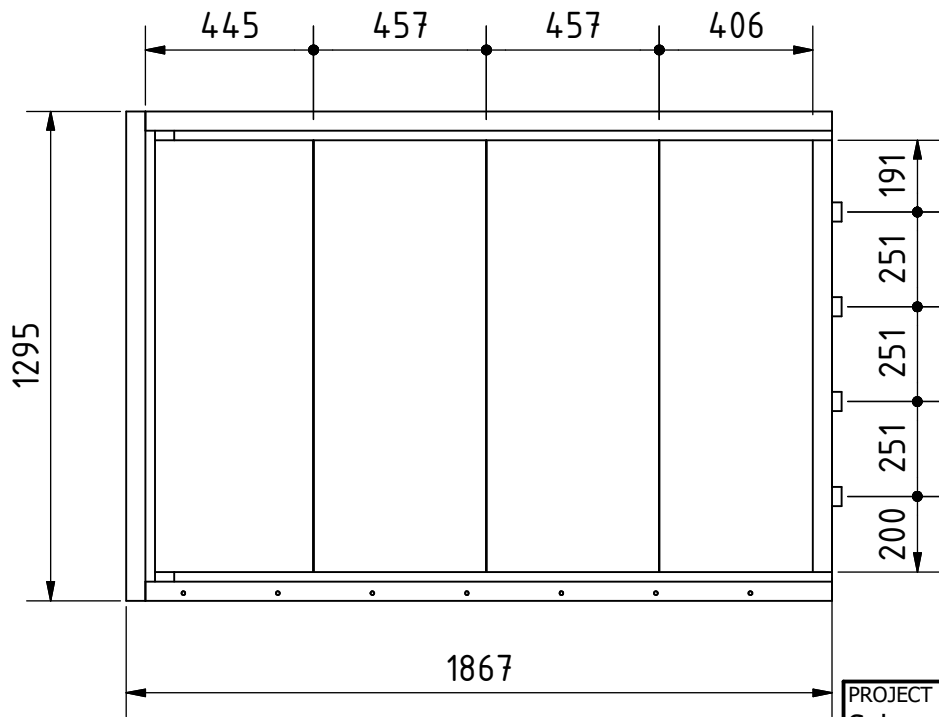
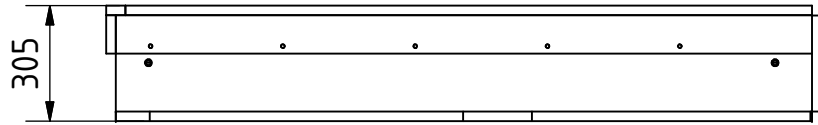
PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Technical notes		SPECIFICATIONS			CODE 1.02
DEVELOPED BY		REDESIGNED BY	FILE NAME 2.3.ipt		QUANTITY
IOG - Engineers Without Borders			OHO e.V.	LICENSE CC-BY-SA 4.0	DOC. TYPE Technical notes
			SCALE	SHEET 13 /24	




PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Metal sheet2		SPECIFICATIONS Metal sheet, thickness 0.6-1mm, aluminium/copper, 925x230mm			CODE 1.03
DEVELOPED BY	REDESIGNED BY	FILE NAME 2.2.ipt		QUANTITY 4	
IOG - Engineers Without Borders		LICENSE	DOC. TYPE	SCALE	SHEET
		CC-BY-SA 4.0	Part	1 : 5	14 /24



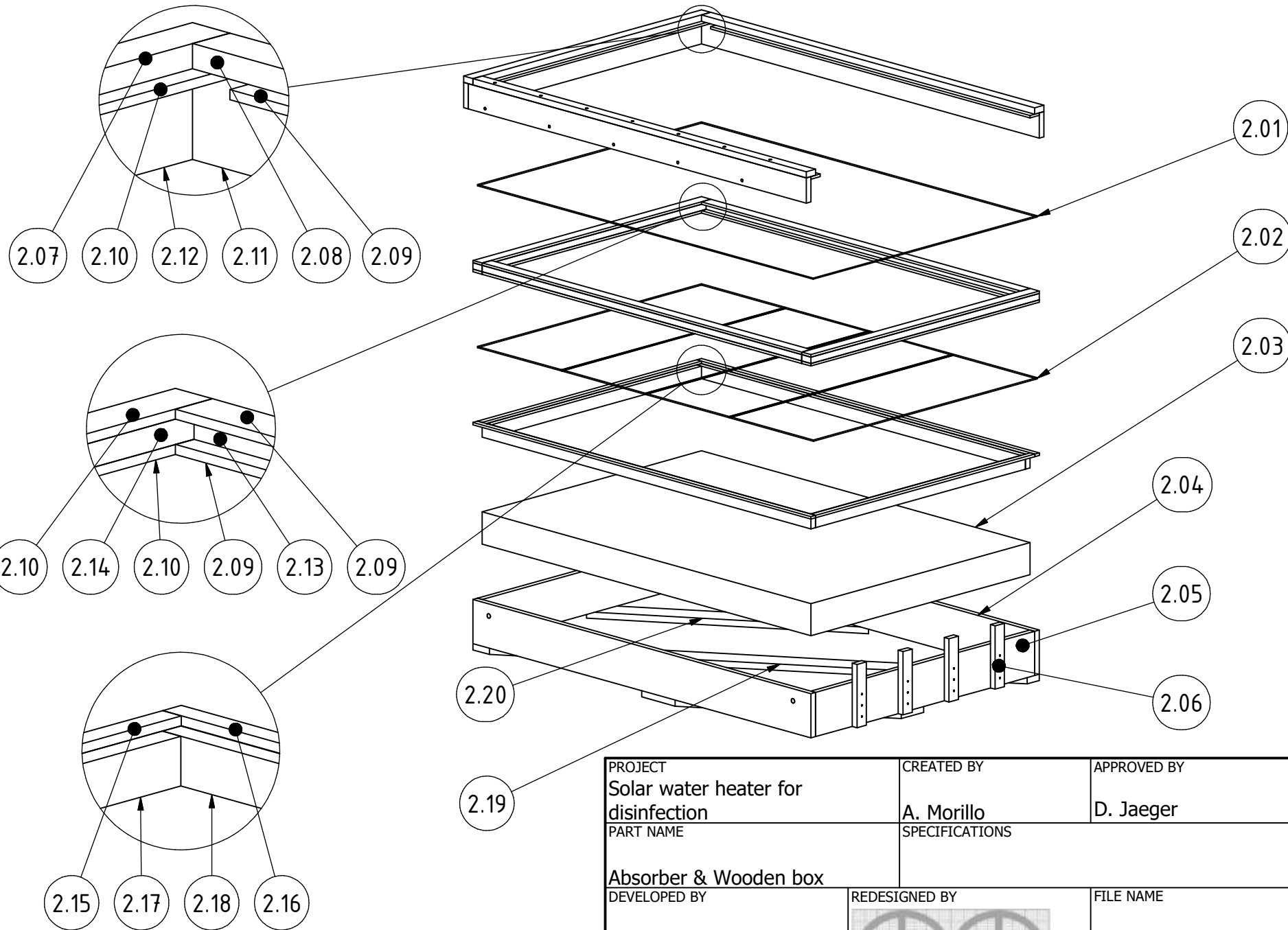
PROJECT	CREATED BY	APPROVED BY	DATE	VERSION	
Solar water heater for disinfection	A. Morillo	D. Jaeger	22-05-2023	0.01	
PART NAME	SPECIFICATIONS			CODE	
Metal sheet3	Metal sheet, thickness 0.6-1mm, aluminium/copper, 980x335mm			1.04	
DEVELOPED BY	REDESIGNED BY	FILE NAME		QUANTITY	
IOG - Engineers Without Borders		2.1.ipt		1	
		LICENSE	DOC. TYPE	SCALE	SHEET
		CC-BY-SA 4.0	Part	1 : 5	15 /24




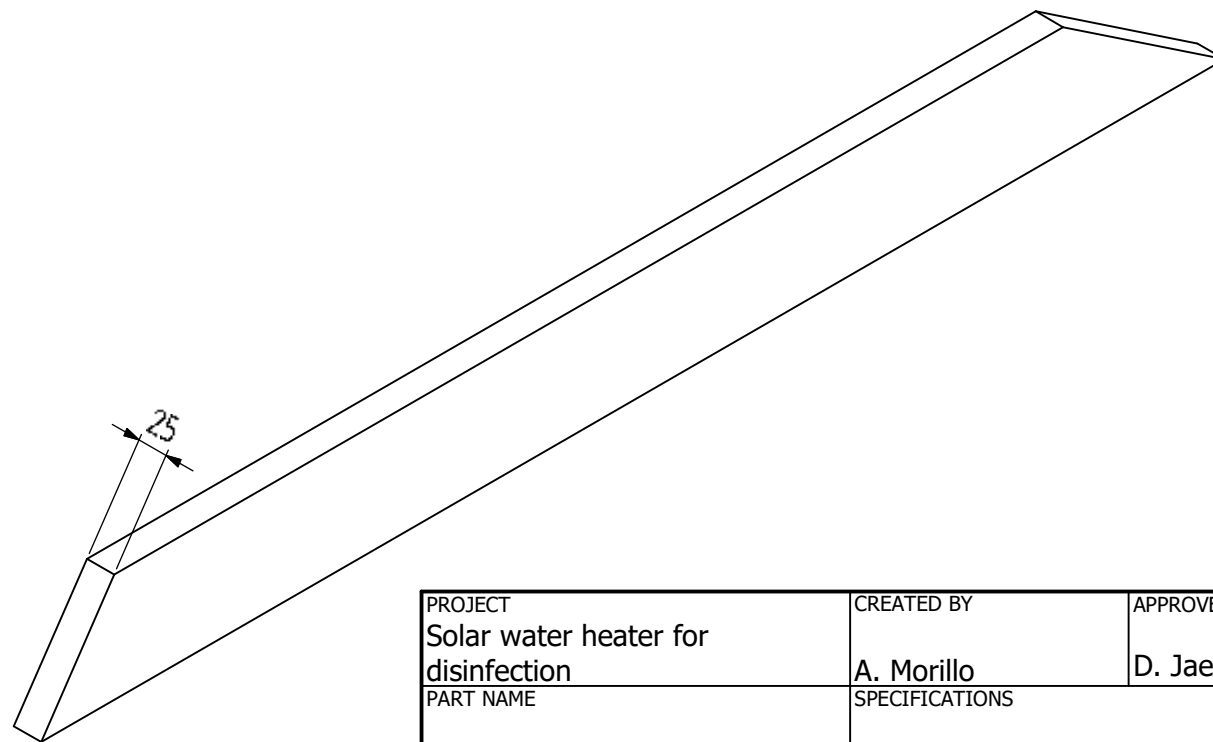
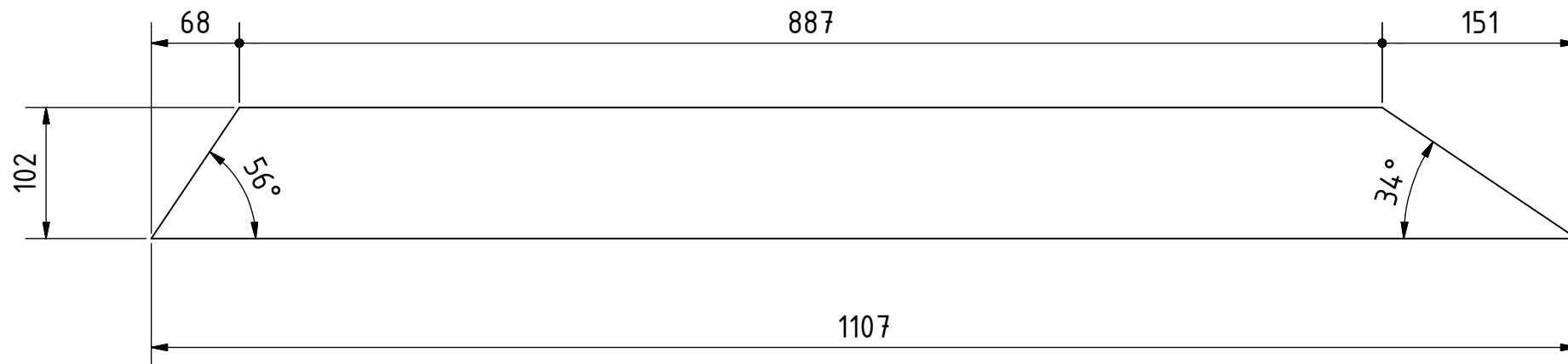
Joined with 2" and 3" nails and 2" wood screw (pre-drilled)


PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Absorber & Wooden box		SPECIFICATIONS			CODE 2.00
DEVELOPED BY IOG - Engineers Without Borders		REDESIGNED BY	FILE NAME 6.0_Halter.iam		QUANTITY 1
			LICENSE CC-BY-SA 4.0	DOC. TYPE Assembly	SCALE SHEET 16 / 24

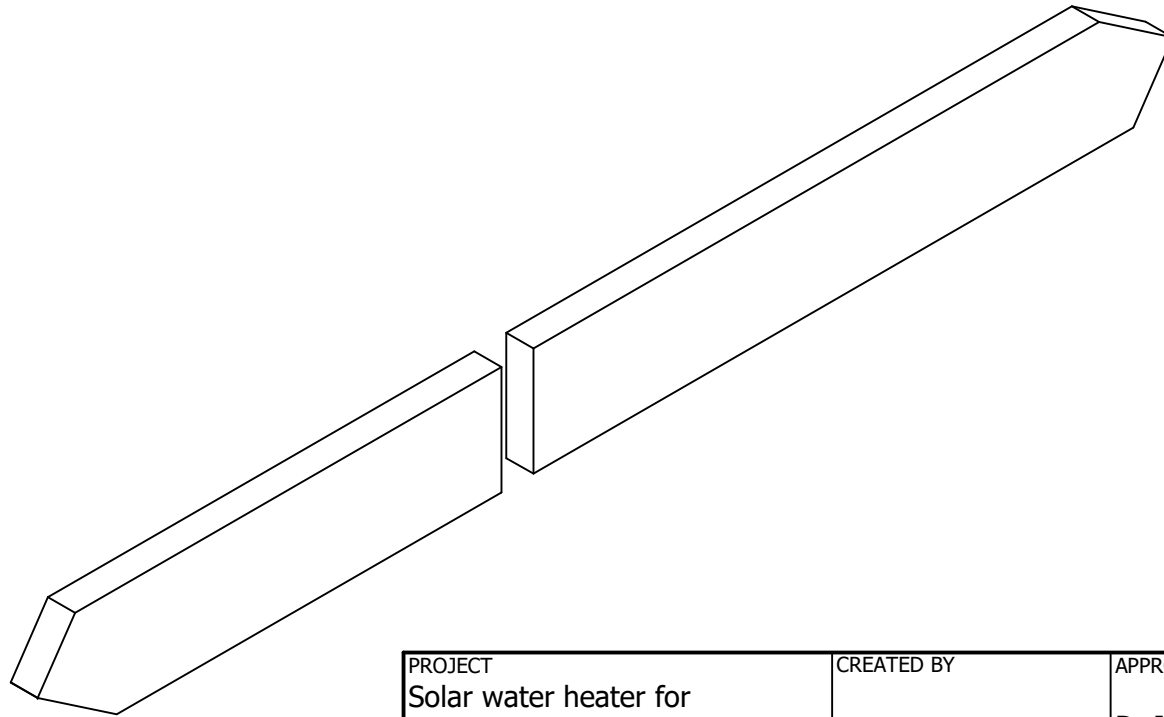
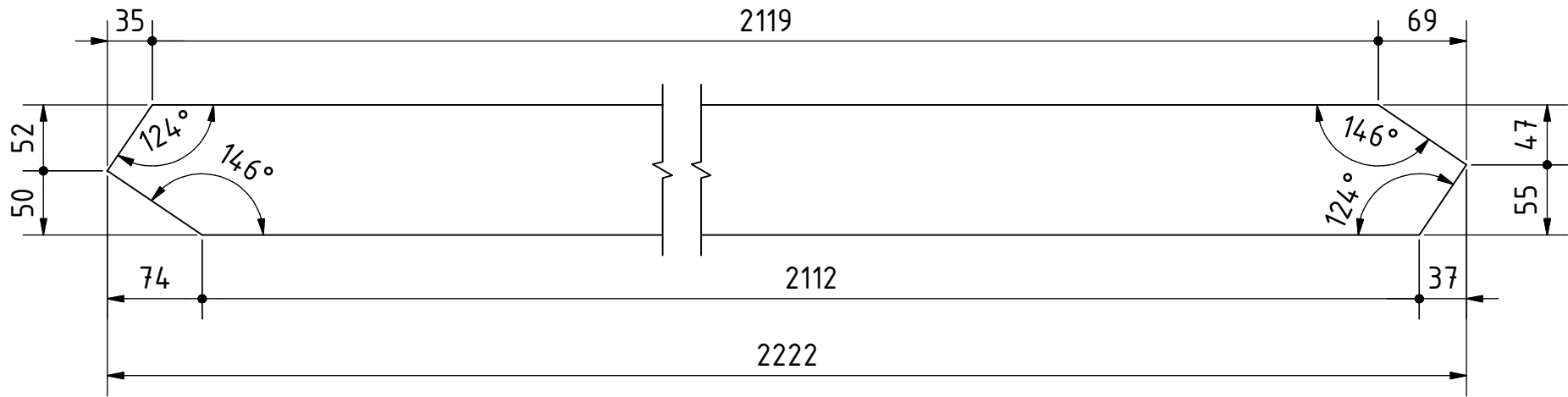





PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Absorber & Wooden box		SPECIFICATIONS			CODE 2.00
DEVELOPED BY		REDESIGNED BY	FILE NAME 6.0_Halter.ipn		QUANTITY 1
IOG - Engineers Without Borders			OHO e.V.		SHEET
			LICENSE CC-BY-SA 4.0	DOC. TYPE Assembly	SCALE 1 : 20

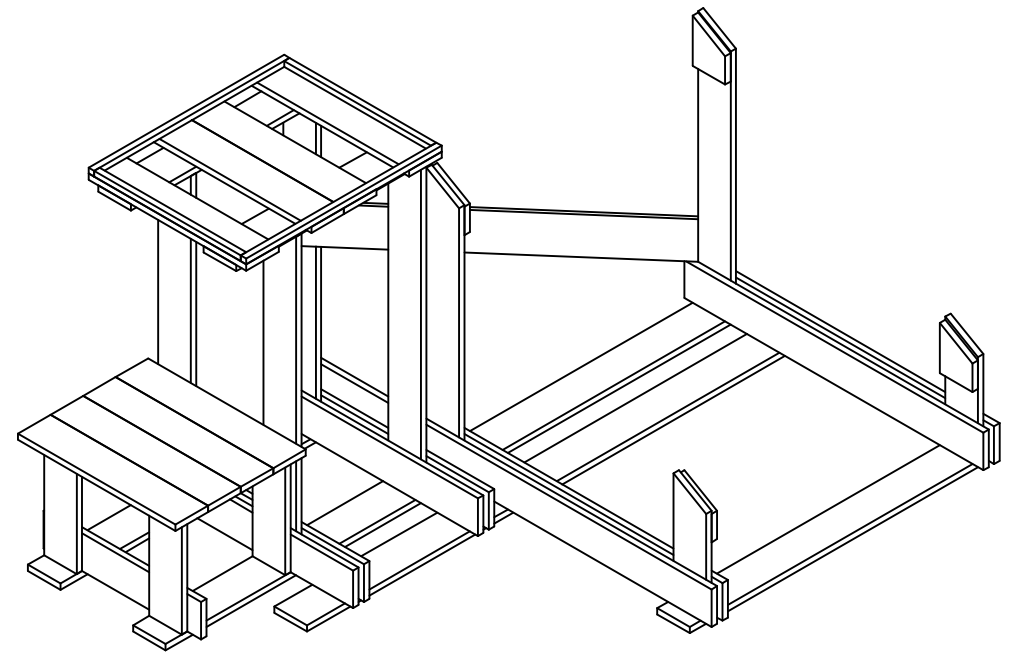
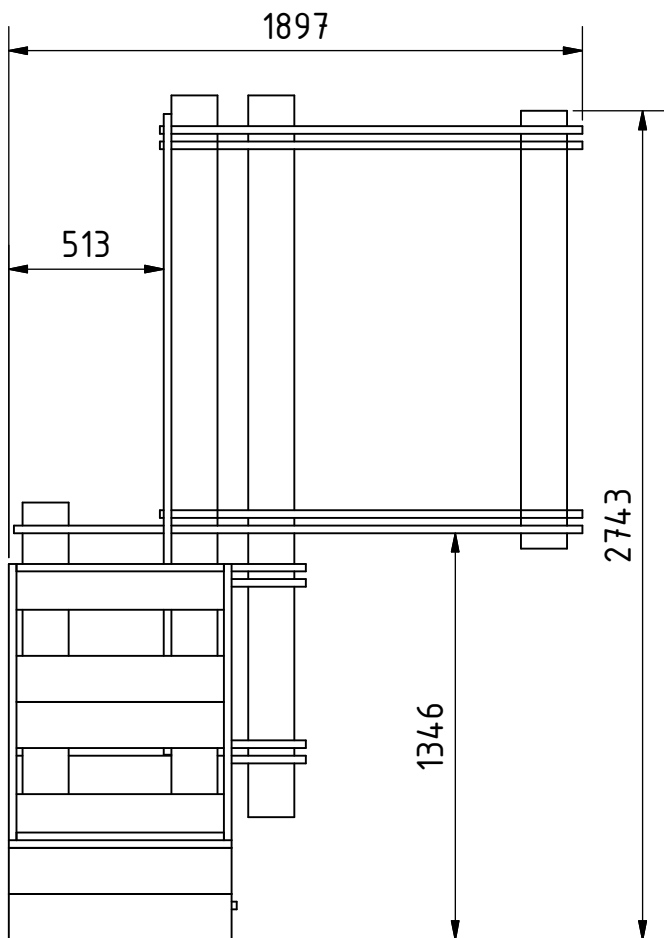
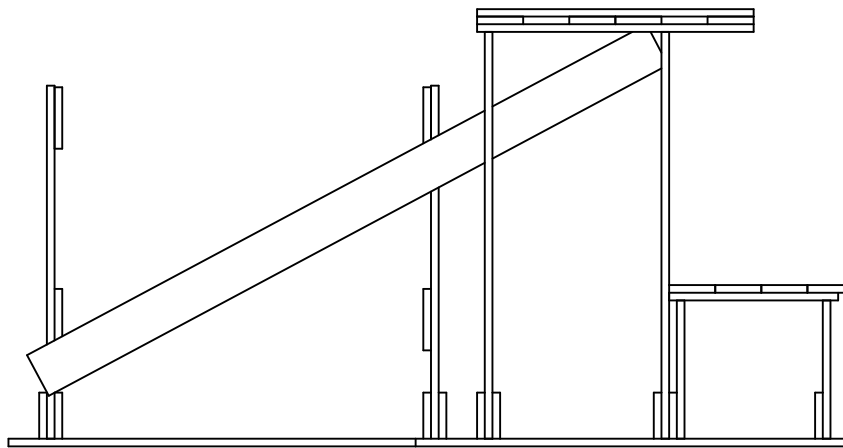
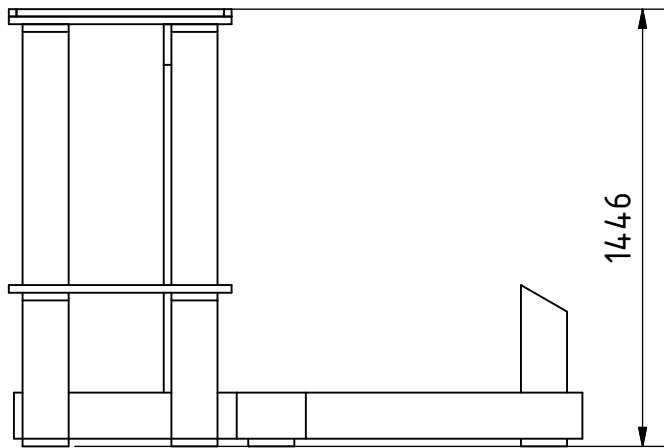



PROJECT Solar water heater for disinfection	CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Wooden box board4	SPECIFICATIONS Timber 102*25*1107mm, hard wood			CODE 2.19
DEVELOPED BY	REDESIGNED BY	FILE NAME 1.3-1.ipt		QUANTITY 1
IOG - Engineers Without Borders		LICENSE	DOC. TYPE	SHEET
		CC-BY-SA 4.0	Part	18 /24
		OHO e.V.	SCALE 1 : 5	

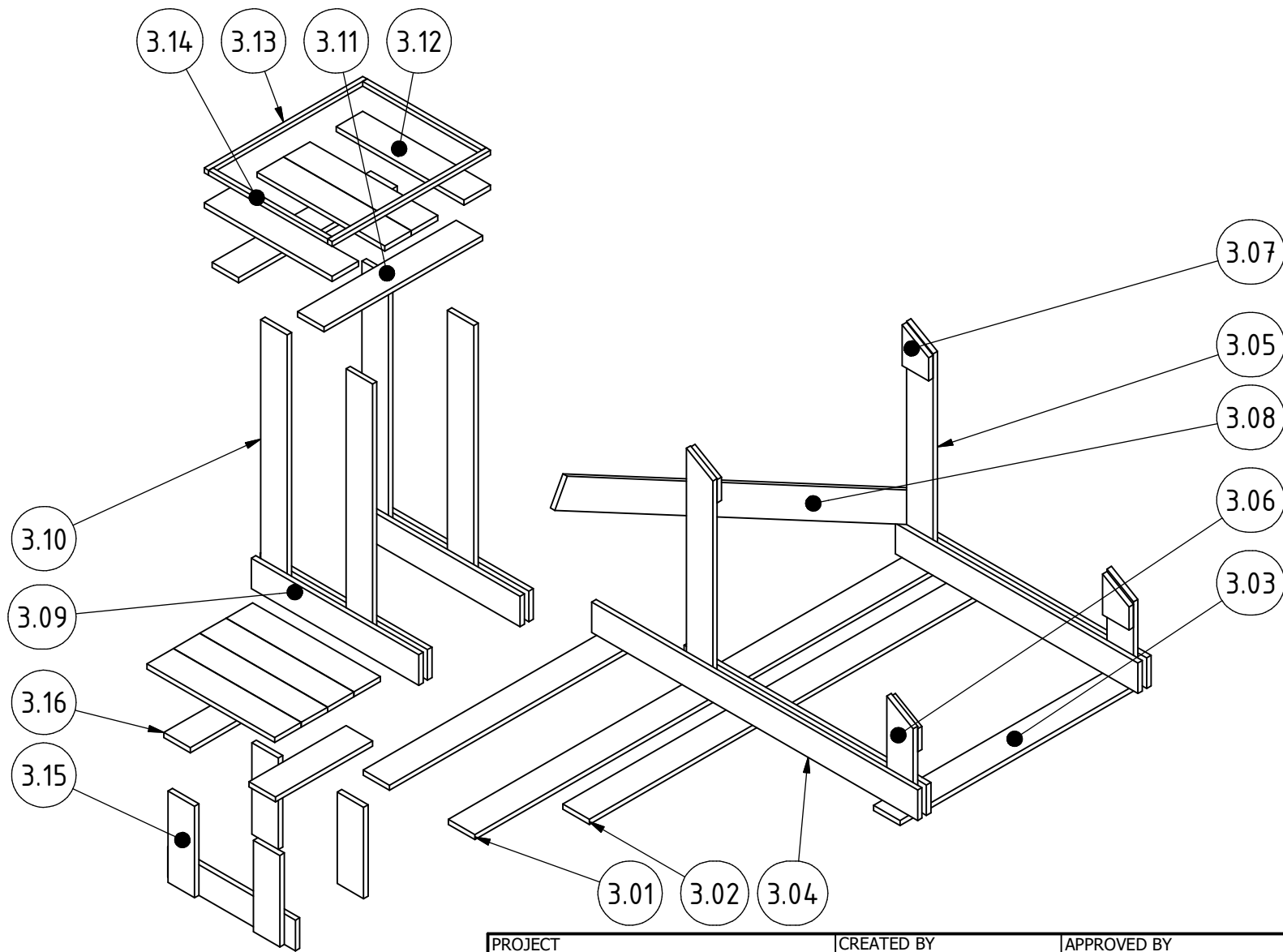


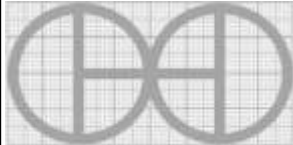
PROJECT Solar water heater for disinfection	CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Wooden box board5	SPECIFICATIONS			CODE 2.20
DEVELOPED BY	REDESIGNED BY	FILE NAME 1.4.ipt		QUANTITY 2
IOG - Engineers Without Borders		LICENSE	DOC. TYPE	SHEET
		CC-BY-SA 4.0	Part	19 /24
		OHO e.V.	SCALE 1 : 5	

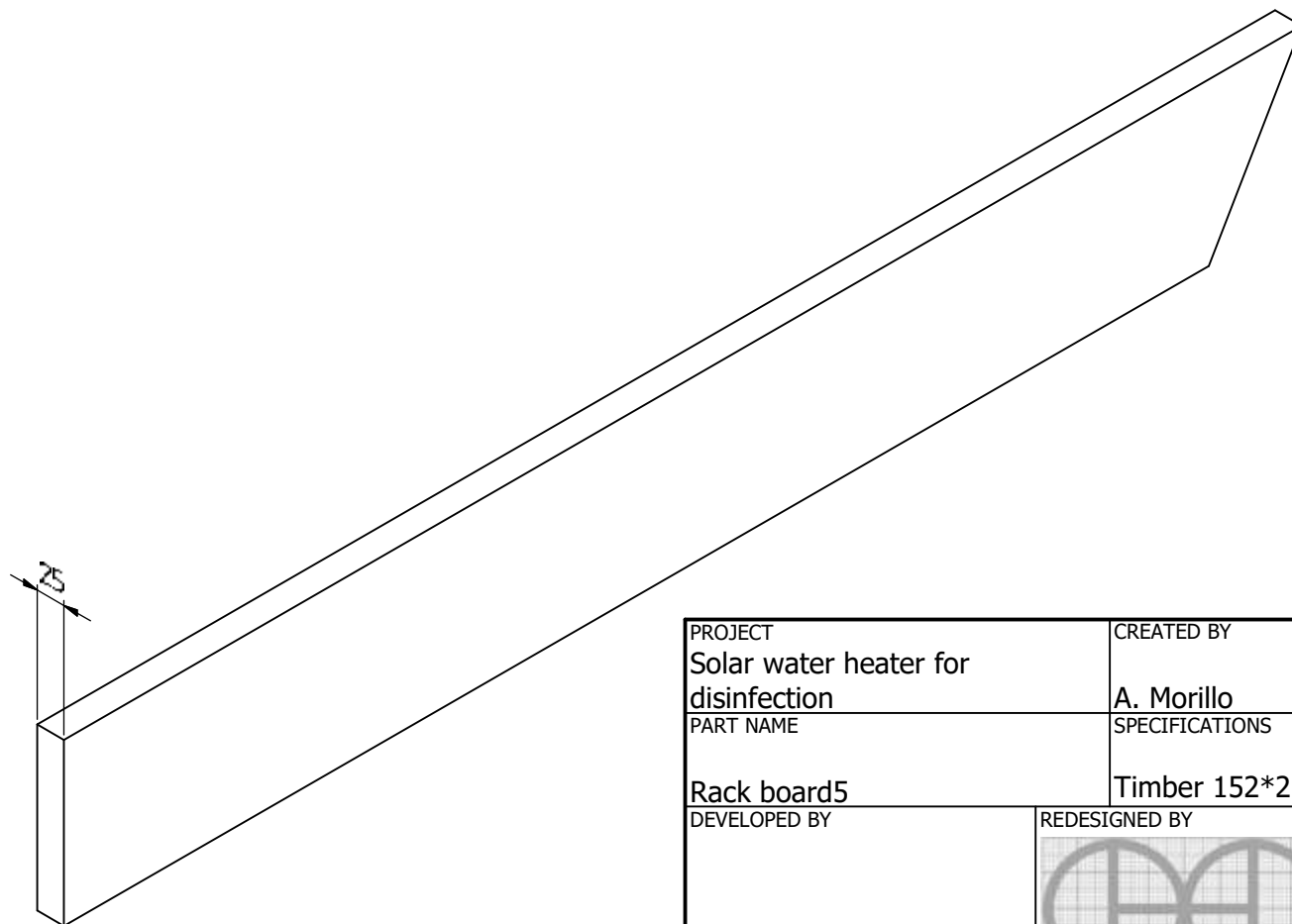
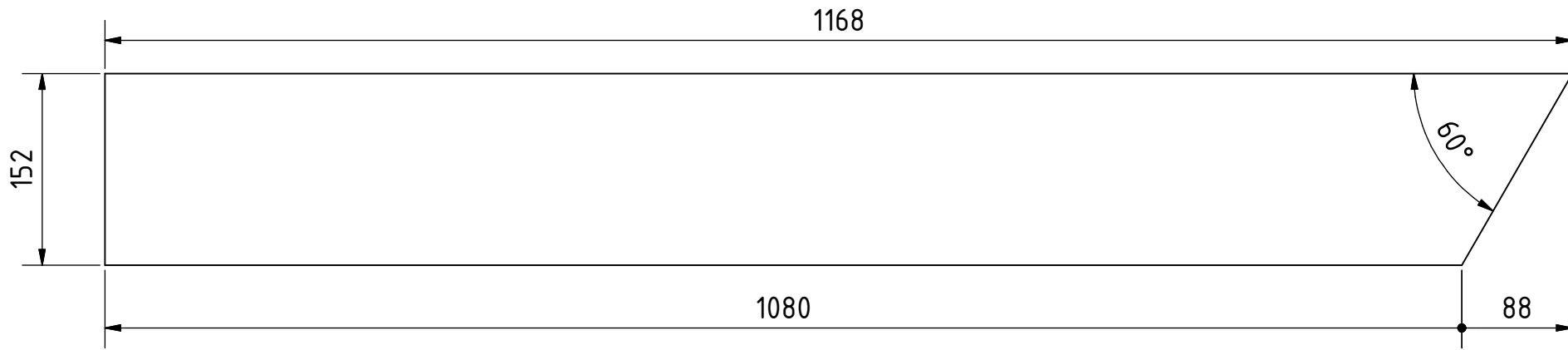
Joined with 2" nails




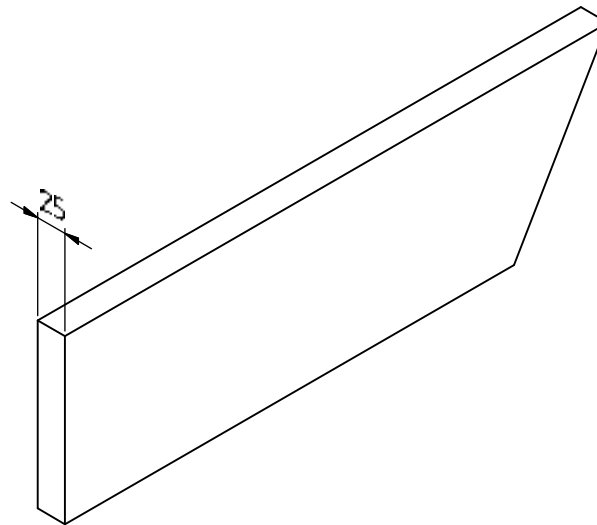
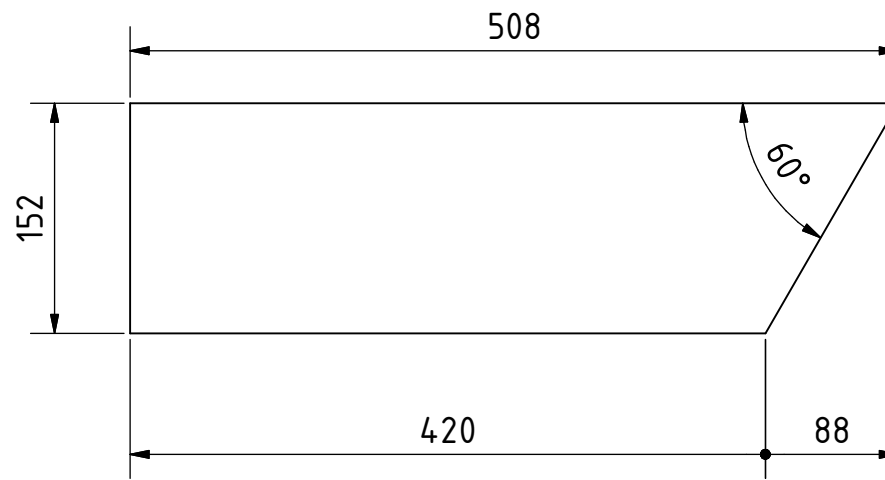
PROJECT Solar water heater for disinfection	CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Rack	SPECIFICATIONS			CODE 3.00
DEVELOPED BY	REDESIGNED BY	FILE NAME Structure.iam		QUANTITY 1
IOG - Engineers Without Borders		LICENSE CC-BY-SA 4.0	DOC. TYPE Assembly	SHEET 20 /24
		OHO e.V.		




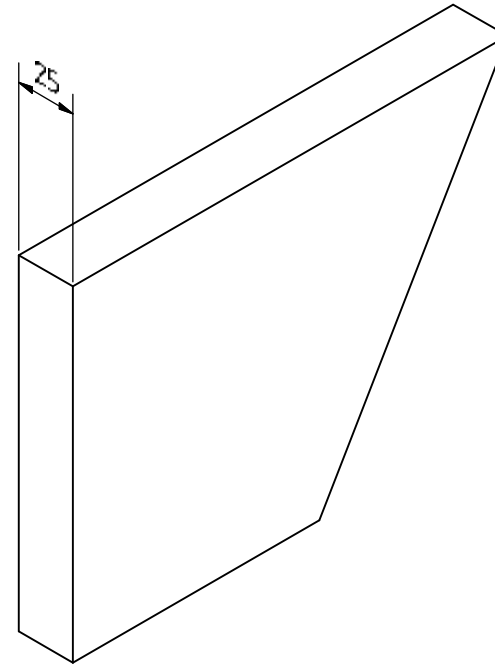
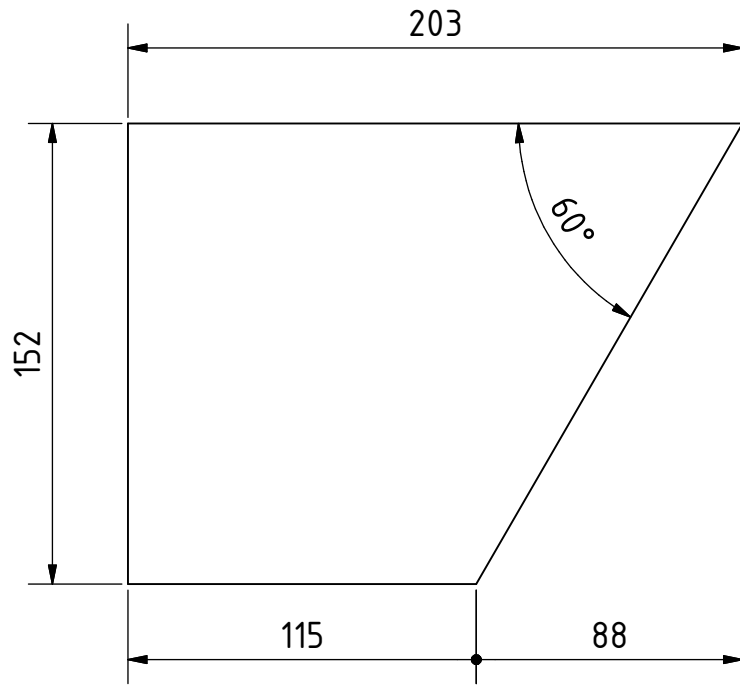
PROJECT Solar water heater for disinfection		CREATED BY A. Morillo		APPROVED BY D. Jaeger		DATE 22-05-2023		VERSION 0.01	
PART NAME Rack		SPECIFICATIONS							CODE 3.00
DEVELOPED BY		REDESIGNED BY		FILE NAME Structure.ipn				QUANTITY 1	
IOG - Engineers Without Borders				OHO e.V.		LICENSE CC-BY-SA 4.0	DOC. TYPE Assembly	SCALE 1 : 25	SHEET 21 / 24




PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Rack board5		SPECIFICATIONS Timber 152*25*1168mm, hard wood			CODE 3.05
DEVELOPED BY IOG - Engineers Without Borders		REDESIGNED BY 	FILE NAME OHO e.v.: 5.10.ipt		QUANTITY 2
			LICENSE CC-BY-SA 4.0	DOC. TYPE Part	SCALE 1 : 5
					SHEET 22 /24



PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Rack board6		SPECIFICATIONS Timber 152*25*508mm, hard wood			CODE 3.06
DEVELOPED BY IOG - Engineers Without Borders		REDESIGNED BY 	FILE NAME 5.9.ipt		QUANTITY 2
			LICENSE CC-BY-SA 4.0	DOC. TYPE Part	SCALE 1 : 5
					SHEET 23 /24



PROJECT Solar water heater for disinfection		CREATED BY A. Morillo	APPROVED BY D. Jaeger	DATE 22-05-2023	VERSION 0.01
PART NAME Rack board7		SPECIFICATIONS Timber 152*25*203mm, hard wood			CODE 3.07
DEVELOPED BY IOG - Engineers Without Borders	REDESIGNED BY 	FILE NAME 5.8-4.ipt		QUANTITY 4	
		LICENSE CC-BY-SA 4.0	DOC. TYPE Part	SCALE 2 : 5	SHEET 24 /24