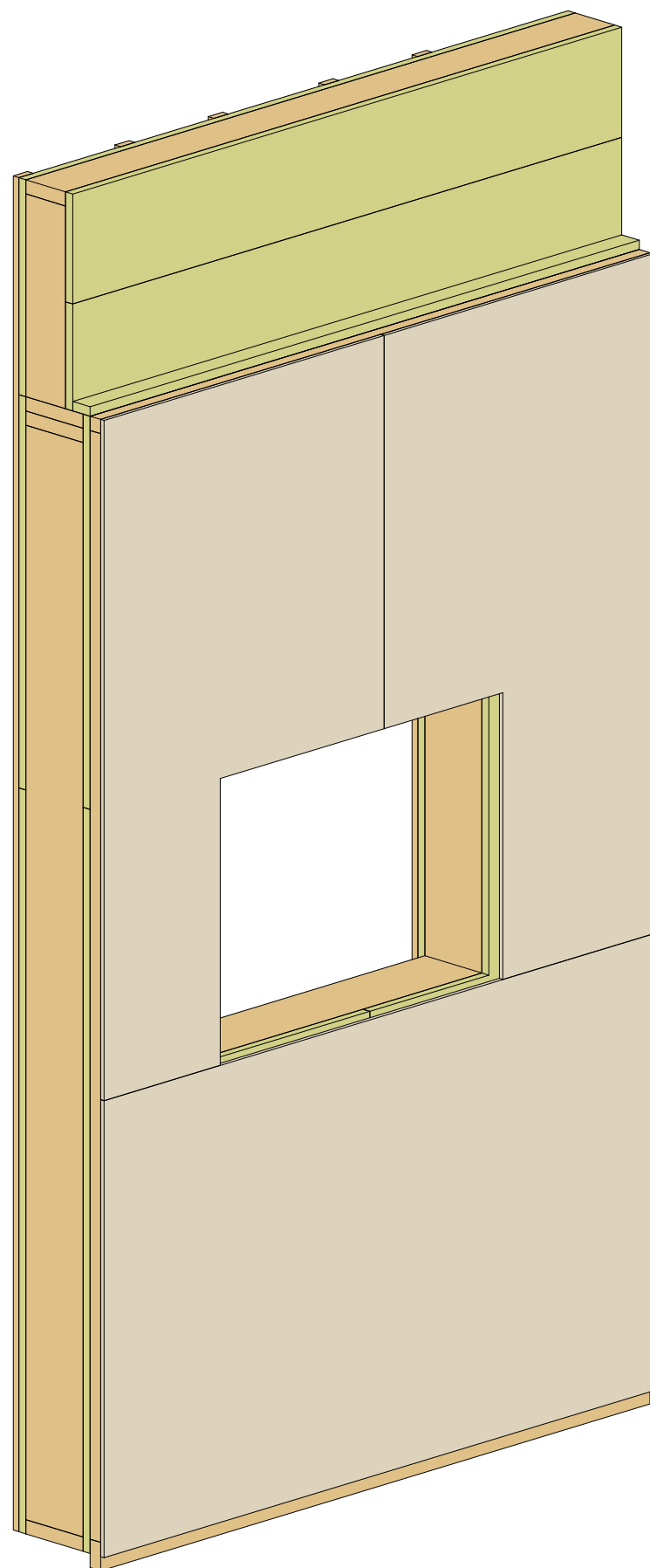
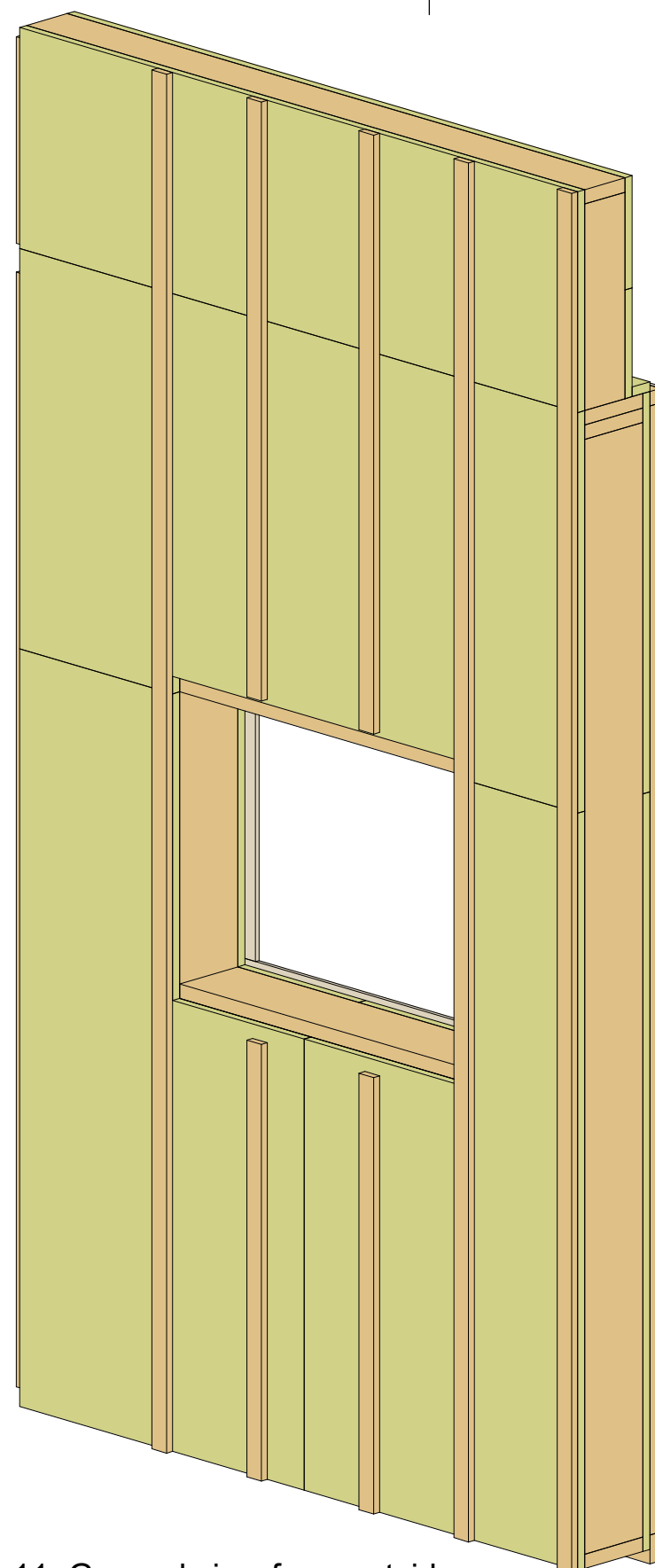
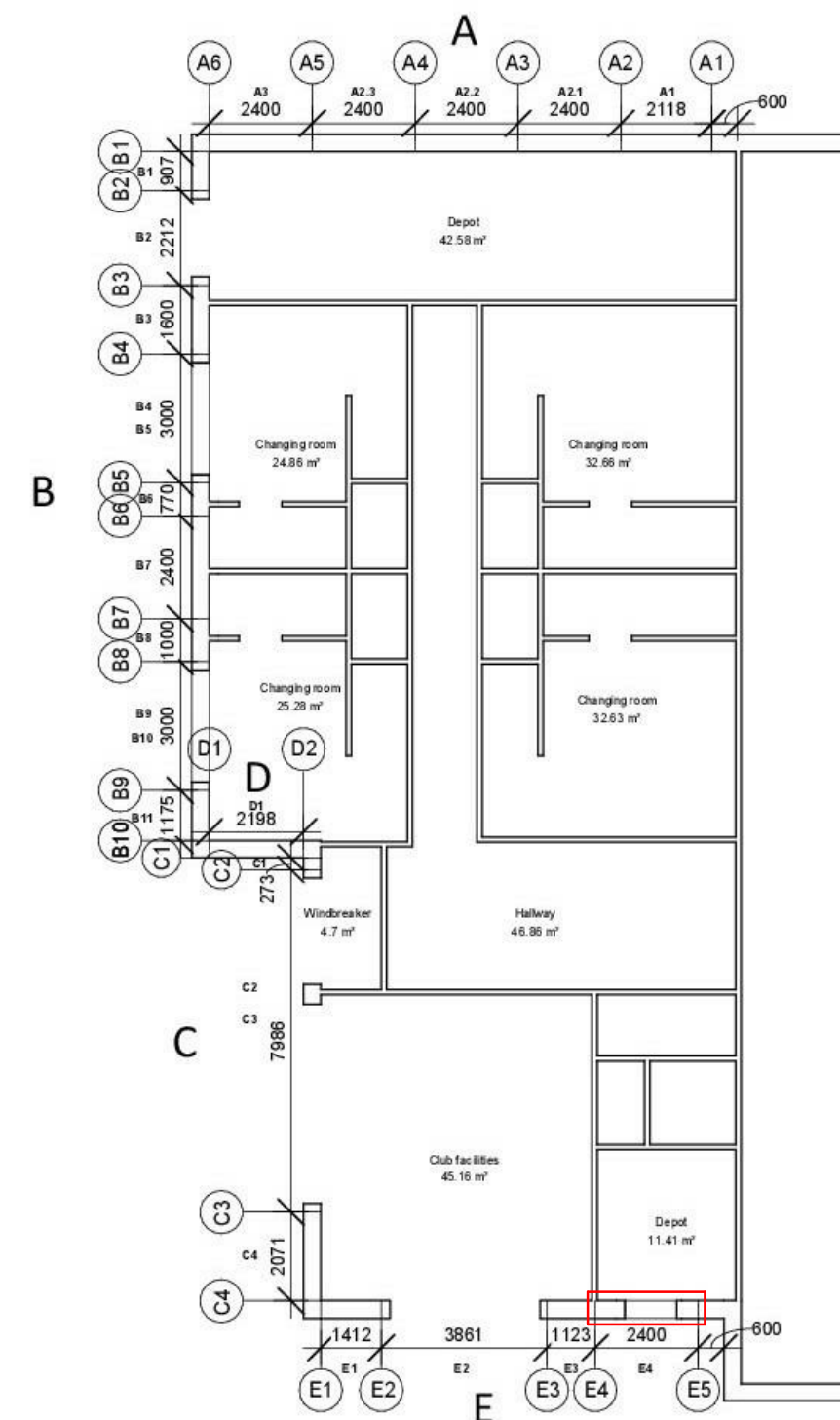




3D - 11. General view from inside

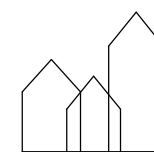


3D - 11. General view from outside



02.1 Element plan

1 : 200



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PROJECT: Production of wooden element E4/E5

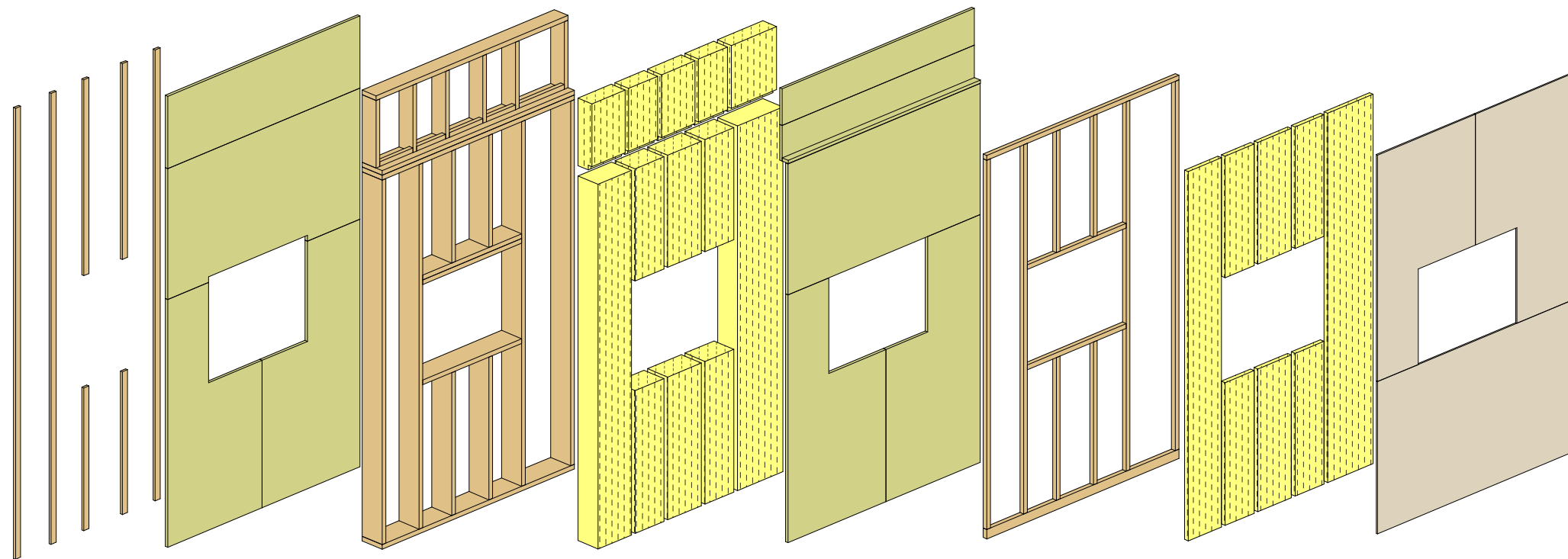
DATE: 01/05/19

SUBJECT: General

SCALE:

DRAWN BY: Carina Pronsaia (group 5)

CLASS: AH31-A18



3D - 10. Overview

GENERAL

Project: Grejs Kulturcenter, Vestermarksvej 13A, 7100 Vejle
Total amount of elements: 50
Element number: E4/E5 (No.25)
Width: 2355 mm
Height: 4350 mm
Thickness: 402 mm

TOLERANCES

For element: height: +/- 6mm
width: +/- 8/22,5 mm
diagonal: +/- 5 mm
For studs: height: +/- 2 mm (< 200 mm);
+/- 1,5% (> 200 mm)

MOISTURE

Moisture class 1 (near depot/storage room).

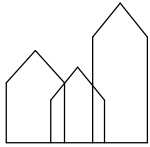
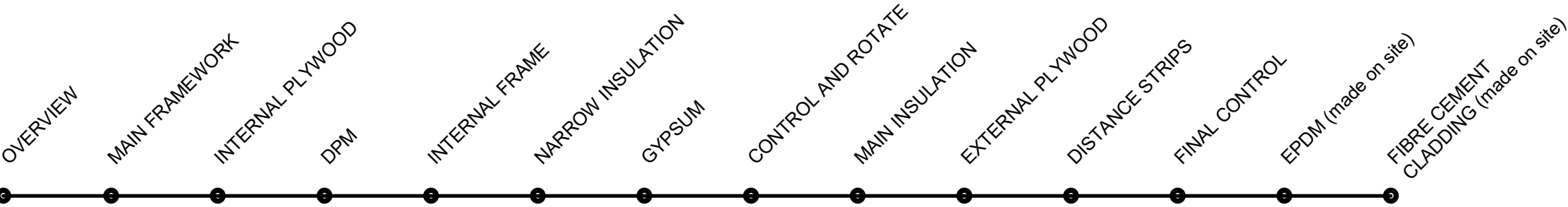
FIRE REQUIREMENTS

Fire resistance REI60 or BD wall 60.

ENERGY REQUIREMENTS

Required U = 0,15 W/m²K
Actual U = 0,15 W/m²K

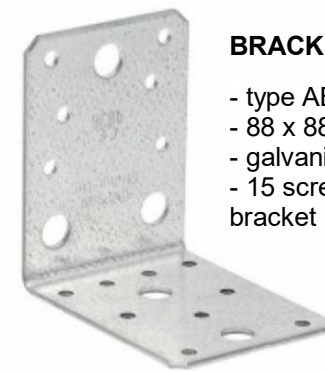
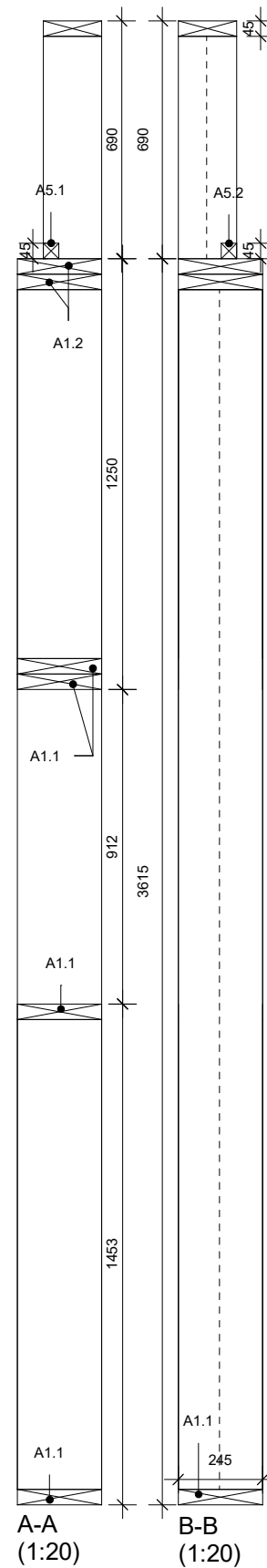
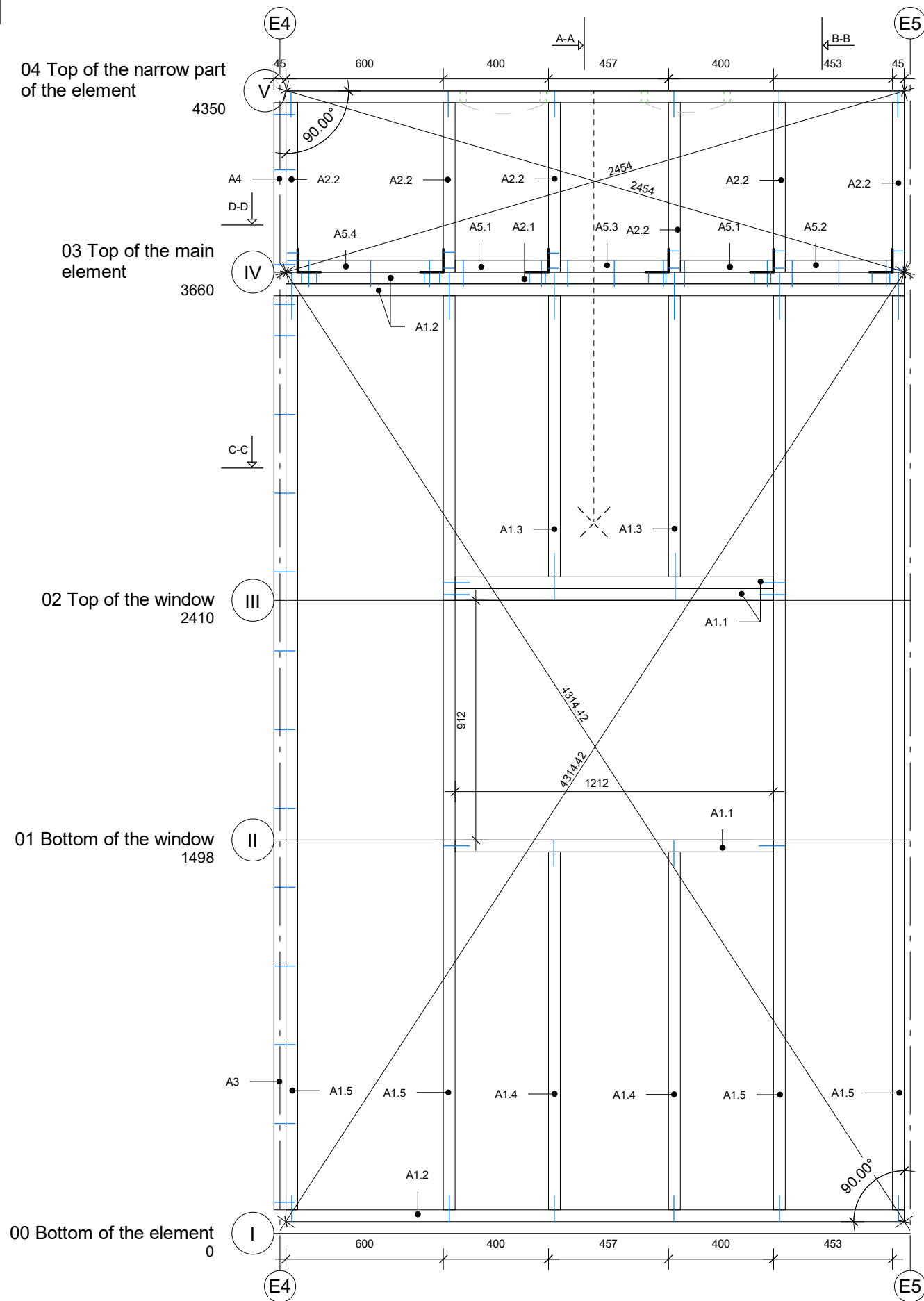
SEQUENCE



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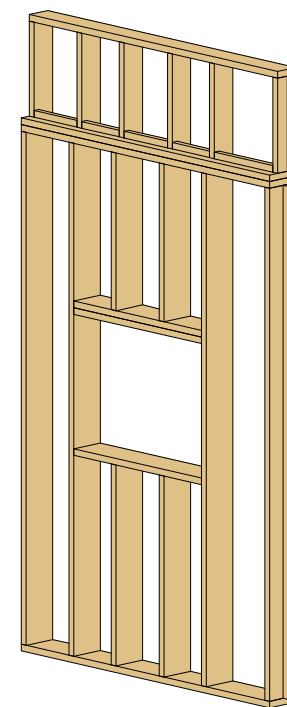
PROJECT: Production of wooden element E4/E5	DATE: 01/05/19	002
SUBJECT: Overview	SCALE:	
DRAWN BY: Carina Pronscaia (group 5)	CLASS: AH31-A18	

**BRACKETS**

- type AB90
- 88 x 88 x 65 mm
- galvanized
- 15 screws per bracket

ROPE

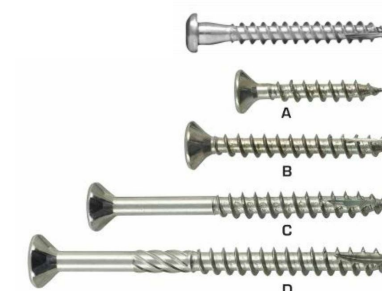
- 3-strand nylon rope
- 10 mm diameter with 2080 kp minimum breaking load
- from both sides is fixed through 2 holes in upper stud with distance to point of gravity = 150 mm
- point of gravity
- x = 1,173 m
- y = 2,052 m
- z = 0,189 m

**TIMBER**

- construction soft wood
- quality C24, bending strength = 24 MPa
- grade T2
- service moisture class 2

SCREWS

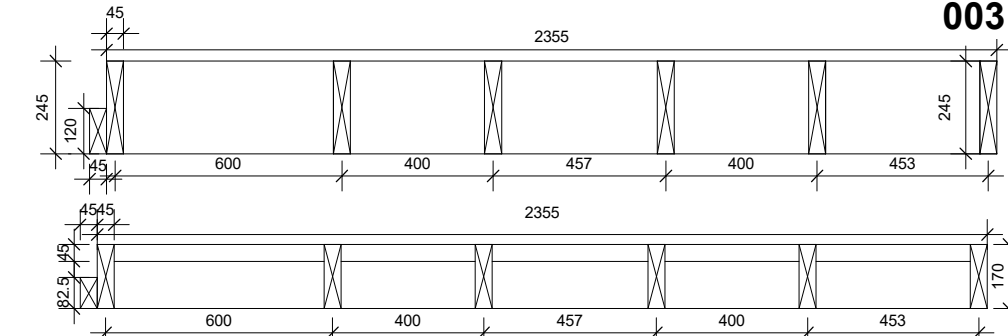
- SPUN® + HIGH-SPEED
- electro-galvanized
- fixed each 200 mm



Type	Length	Quantity
TX20 6x100/54	100 mm	80
TX20 5x80/45	80 mm	32
TX30 6x180/60	180 mm	18
CSA5,0X50 bracket screw	50 mm	90

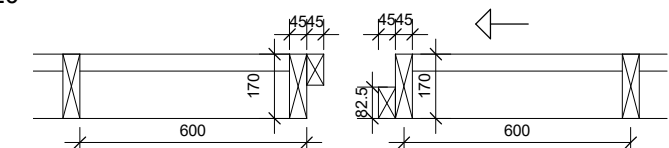
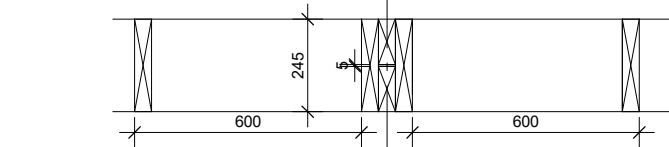
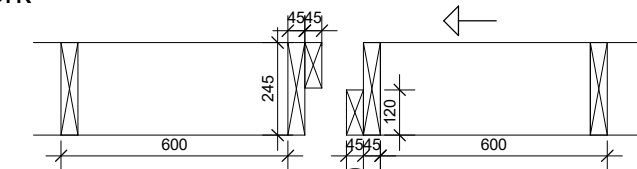
Top view - 01. Framework

1 : 20



Connection - 01. Framework

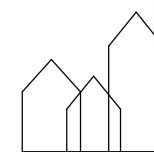
1 : 20



Connection, narrow - 01. Framework

1 : 20

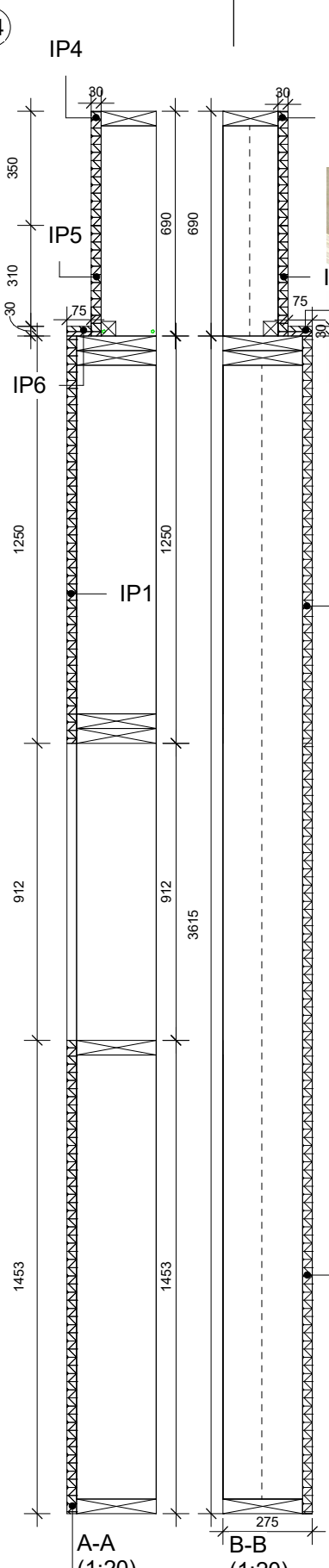
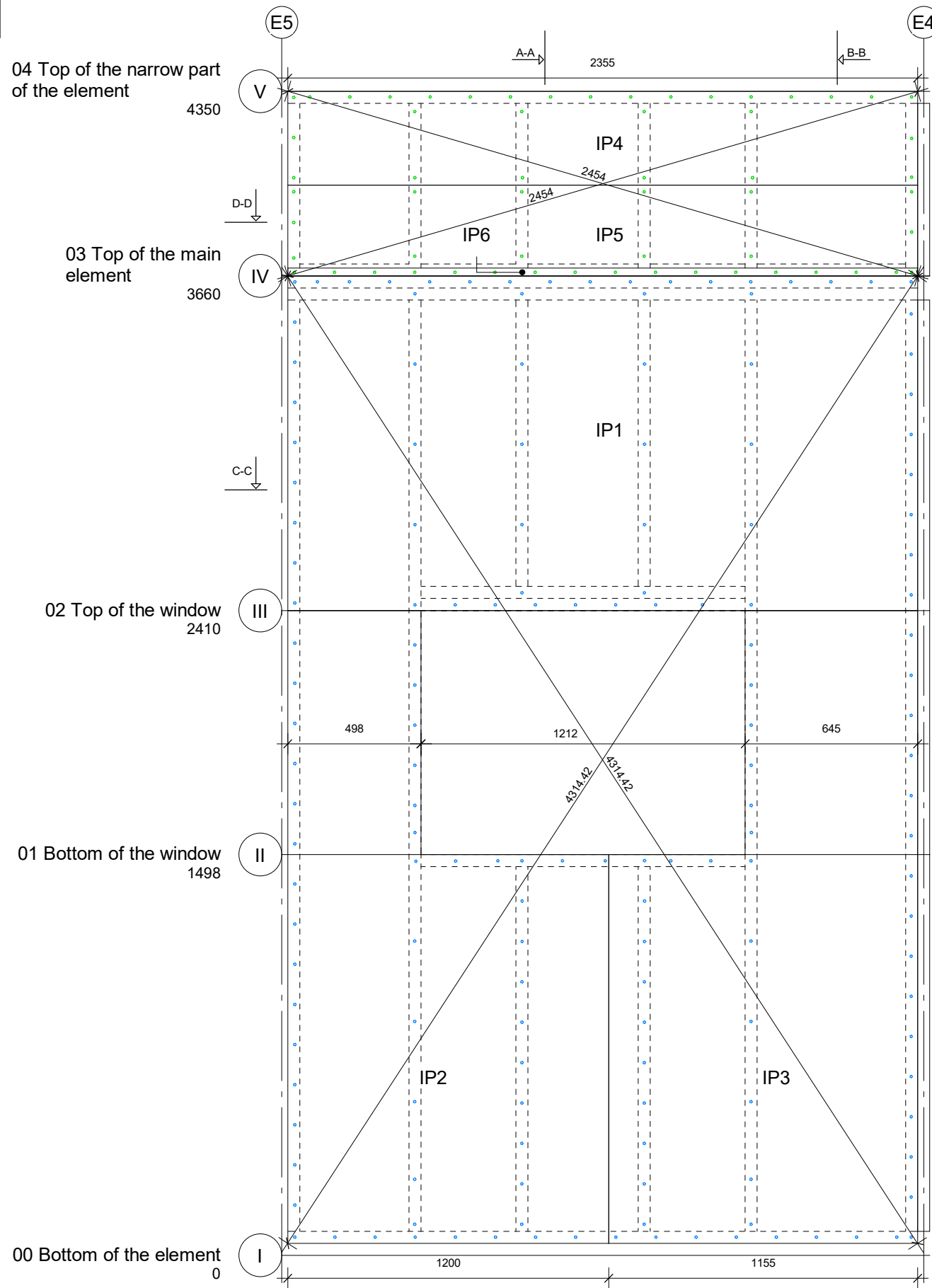
Identification	Type	Length	Quantity
A1.1	245x45	1212 mm	3
A1.2	245x45	2355 mm	3
A1.3	245x45	1070 mm	2
A1.4	245x45	1363 mm	2
A1.5	245x45	3480 mm	4
A2.1	170x45	2355 mm	1
A2.2	170x45	645 mm	6
A3	120x45	3480 mm	1
A4	82,5x45	645 mm	1
A5.1	45x45	355 mm	2
A5.2	45x45	408 mm	1
A5.3	45x45	412 mm	1
A5.4	45x45	555 mm	1
Total amount:			28



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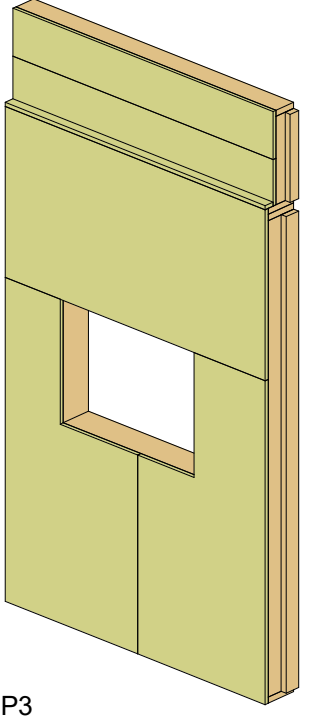
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PROJECT: Production of wooden element E4/E5	DATE: 01/05/19	003
SUBJECT: Main framework	SCALE: 1 : 20	
DRAWN BY: Carina Pronsaia (group 5)	CLASS: AH31-A18	



MATERIAL

- WISA spruce thin plywood
- face veneer grades: II and III
- glueing: phenolic resin cross-bonded weather resistant
- size tolerances (length, width): +/- 1 mm per 1 meter
- squareness tolerance: +/- 1 mm per 1 meter
- number of plies: 15
- weight: 14,5 kg/m²



SCREWS

1. SPUN® + HIGH-SPEED
 - d = 6 mm, l = 60 mm
 - spacing on edges ≤ 150 mm
 - spacing on studs ≤ 300 mm
2. SPUN® + HIGH-SPEED, CLIMATE® - G3
 - d = 6 mm, l = 60 mm
 - spacing on edges ≤ 150 mm
 - spacing on studs ≤ 300 mm

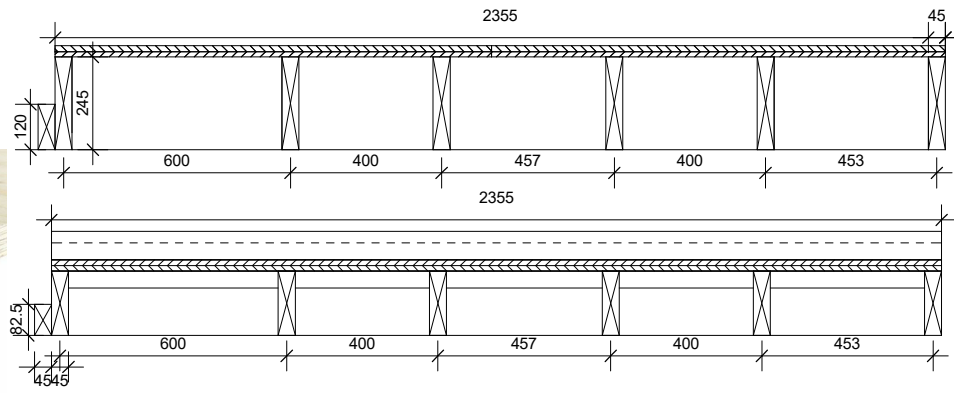


Identification	SPUN 6 x 60 mm	SPUN, CLIMATE 6 x 60 mm
IP1	60	
IP2	49	
IP3	48	
IP4		29
IP5		30
IP6		17
Total amount:	157	76

Identification	Width x length	Thickness	Quantity	Area [m ²]
IP1	1250x2355 mm	30 mm	1	2,944
IP2	1200x2365 mm	30 mm	1	2,838
IP3	1155x2365 mm	30 mm	1	2,731
IP4	350x2355 mm	30 mm	1	0,824
IP5	340x2355 mm	30 mm	1	0,800
IP6	75x2355 mm	30 mm	1	0,177
Total amount:			6	10,313

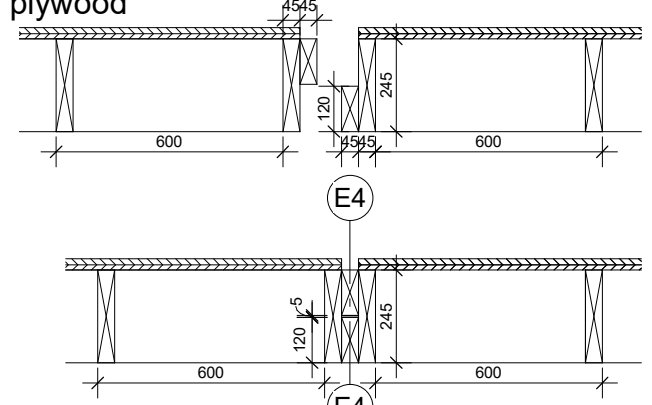
Top view - 02. Internal plywood

1 : 20



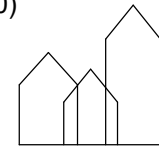
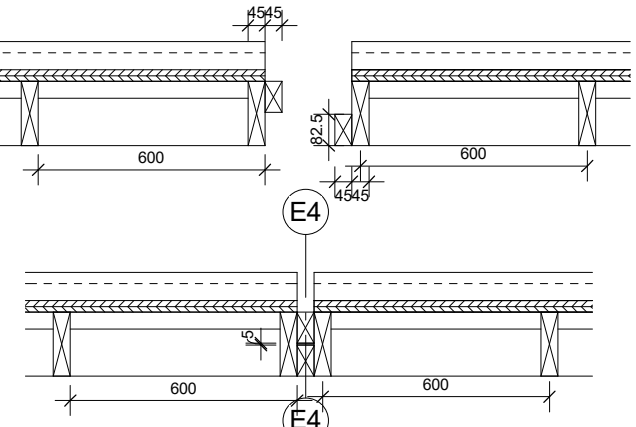
Connection - 02. Internal plywood

1 : 20



Connection, narrow - 02. Internal plywood

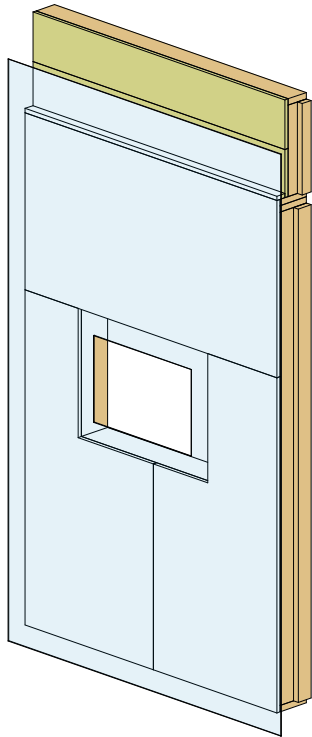
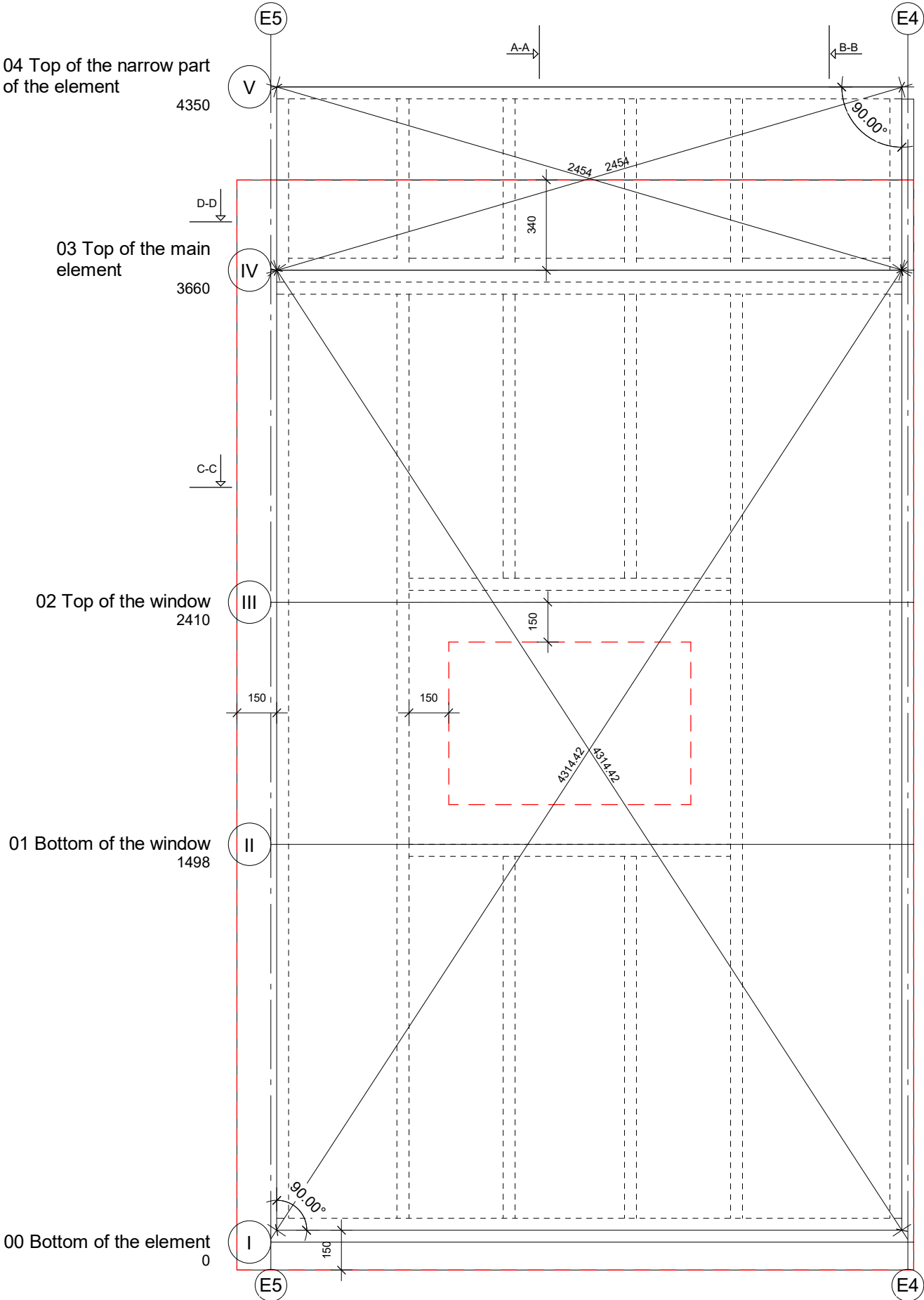
1 : 20



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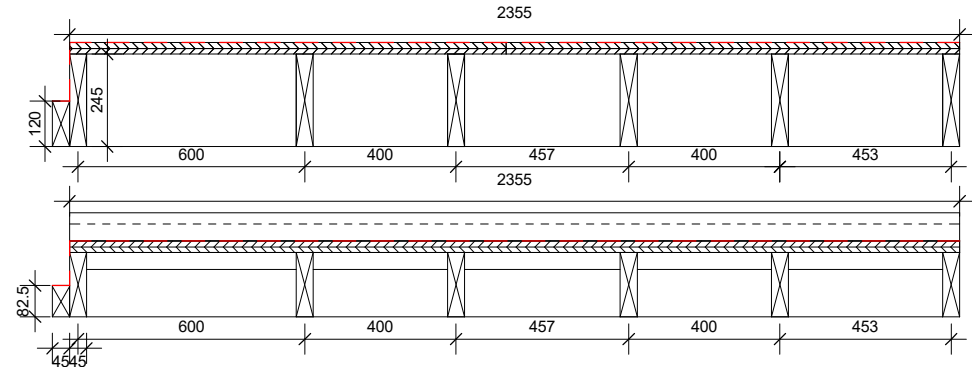
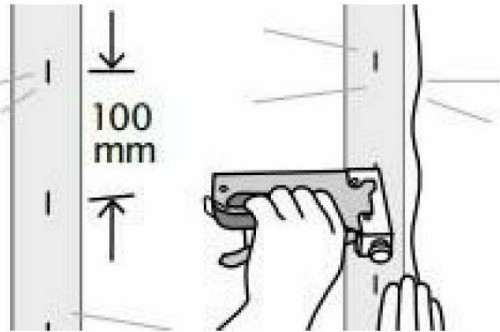
VIA Built Environment & Engineering
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PROJECT: Production of wooden element E4/E5	DATE: 12/09/18	004
SUBJECT: Internal plywood	SCALE: 1 : 20	
DRAWN BY: Carina Pronsaia (group 5)	CLASS: AH31-A18	

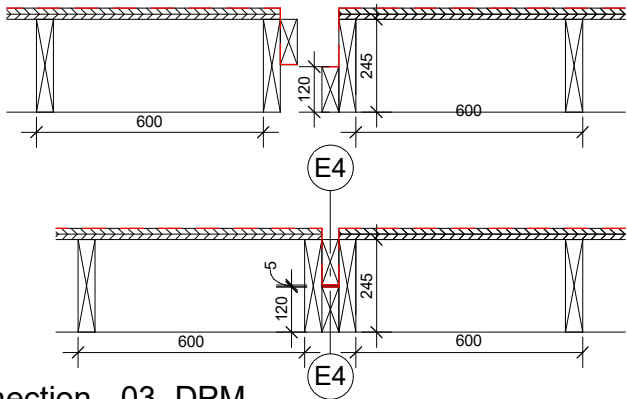


MATERIALS

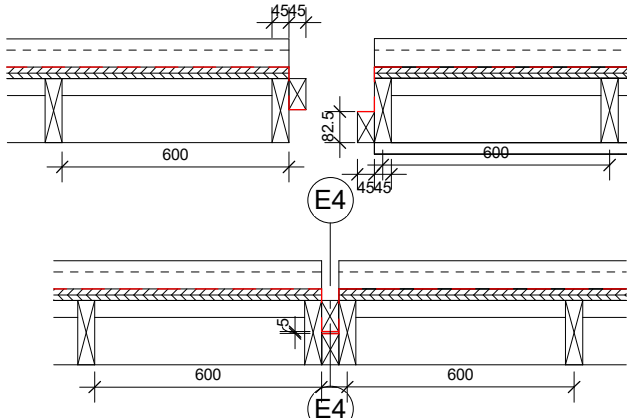
- DAFA ProFoil made of CE-labeled polyethylene
- length: 50 m
 - width: 2 m
 - thickness: 0,2 mm
 - overlap: min. 150 mm on the edges (horizontal and vertical) in order to ensure tight connection further in the execution phase
 - Z-value: 798 GPa s m2/kg
 - fixing: TJEP PG-50 staples
 - dimensions: 12 x 12,4 x 1,3 mm
 - spacing: 100 mm
 - DAFA tape is used over the staples and where two DPMS are connected



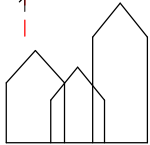
Top view - 03. DPM
1 : 20



Connection - 03. DPM
1 : 20



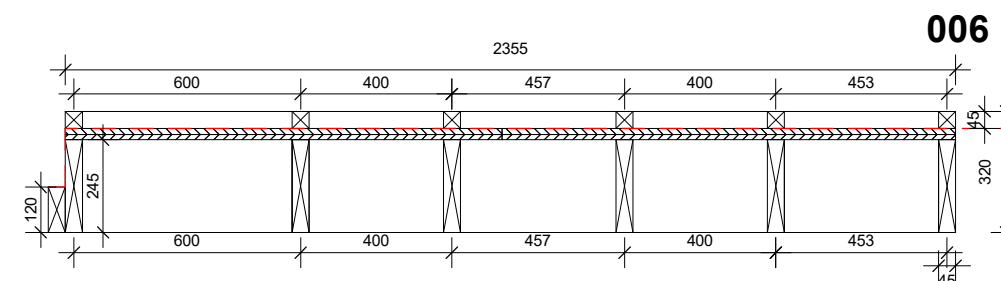
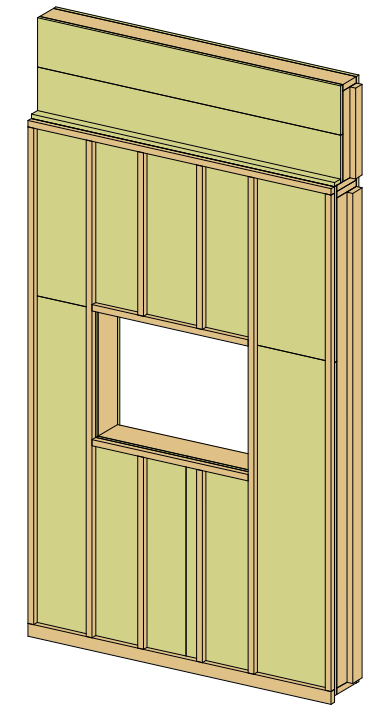
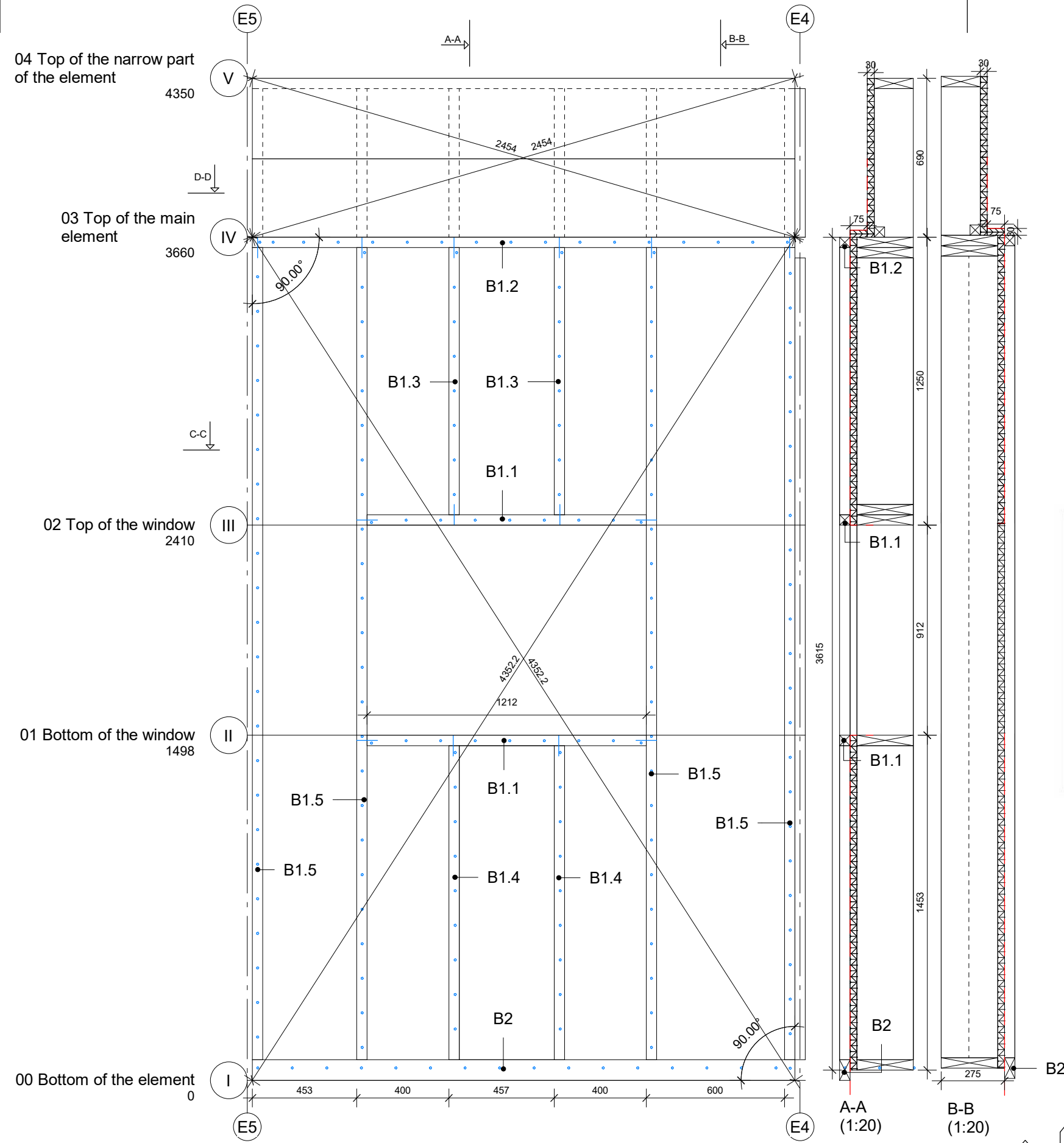
Connection, narrow - 03. DPM
1 : 20



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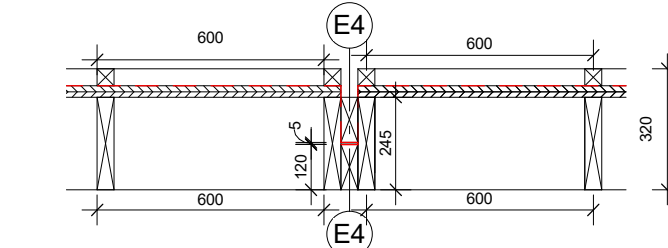
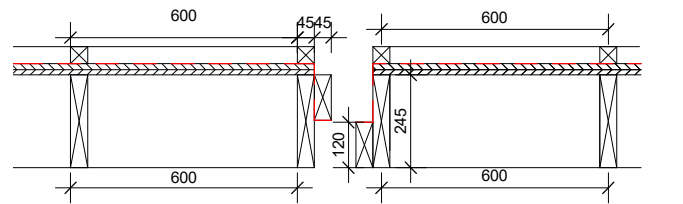
PROJECT: Production of wooden element E4/E5	DATE: 01/06/19	005
SUBJECT: DPM	SCALE: 1 : 20	
DRAWN BY: Carina Pronscaia (group 5)	CLASS: AH31-A18	



Top view - 04. Internal frame
1 : 20

TIMBER

- construction soft wood
- quality C24, bending strength = 24 MPa
- grade T2
- service moisture class 2



Connection - 04. Internal frame
1 : 20

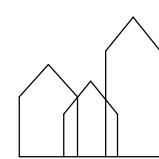
Identification	SPUN TX30, 6 x 90 mm/54
B1.1	26
B1.2	23
B1.3	16
B1.4	18
B1.5	92
B2	17
Total amount:	192

SCREWS

- SPUN® + HIGH-SPEED
- electro-galvanized
- fixed each 150 mm



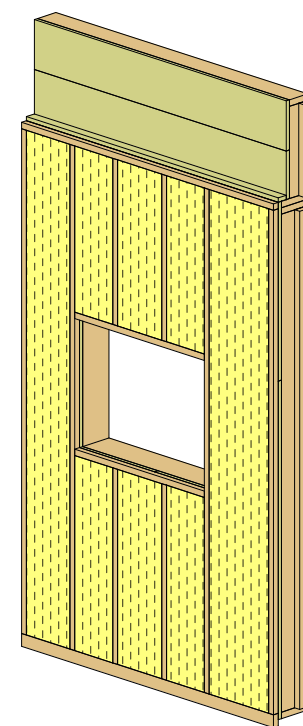
Identification	Type	Length	Quantity
B1.1	45x45 mm	1212 mm	2
B1.2	45x45 mm	2355 mm	1
B1.3	45x45 mm	1160 mm	2
B1.4	45x45 mm	1363 mm	2
B1.5	45x45 mm	3525 mm	4
B2	90x45 mm	2355 mm	1
Total amount:			12



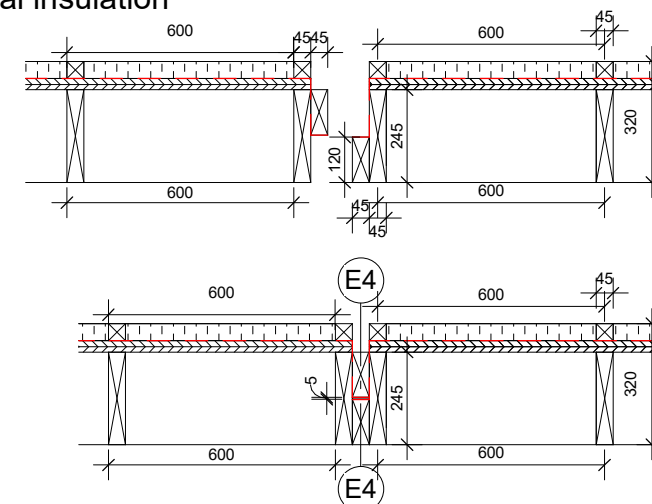
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PROJECT: Production of wooden element E4/E5	DATE: 01/06/19	006
SUBJECT: Internal frame	SCALE: 1 : 20	
DRAWN BY: Carina Pronscaia (group 5)	CLASS: AH31-A18	



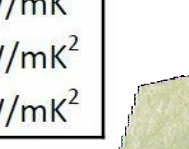
1 : 20



1 : 20

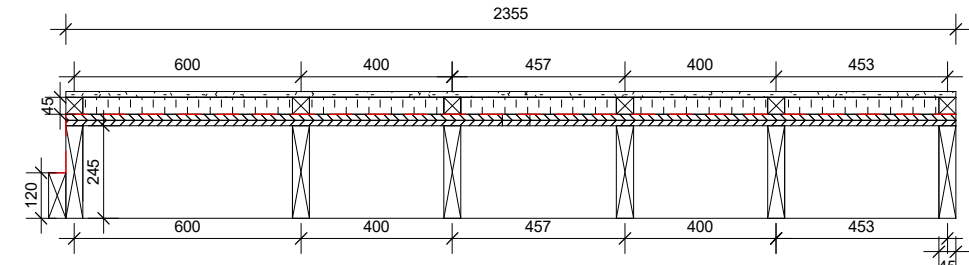
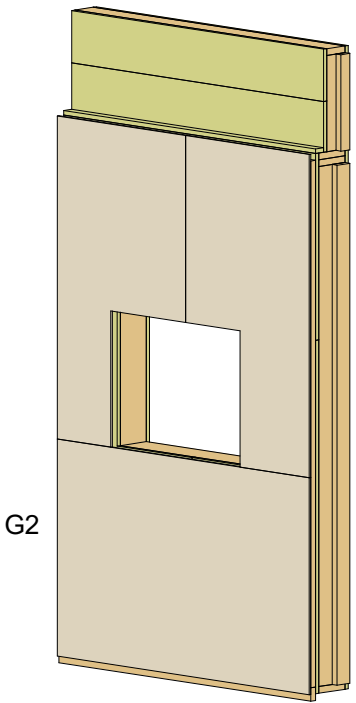
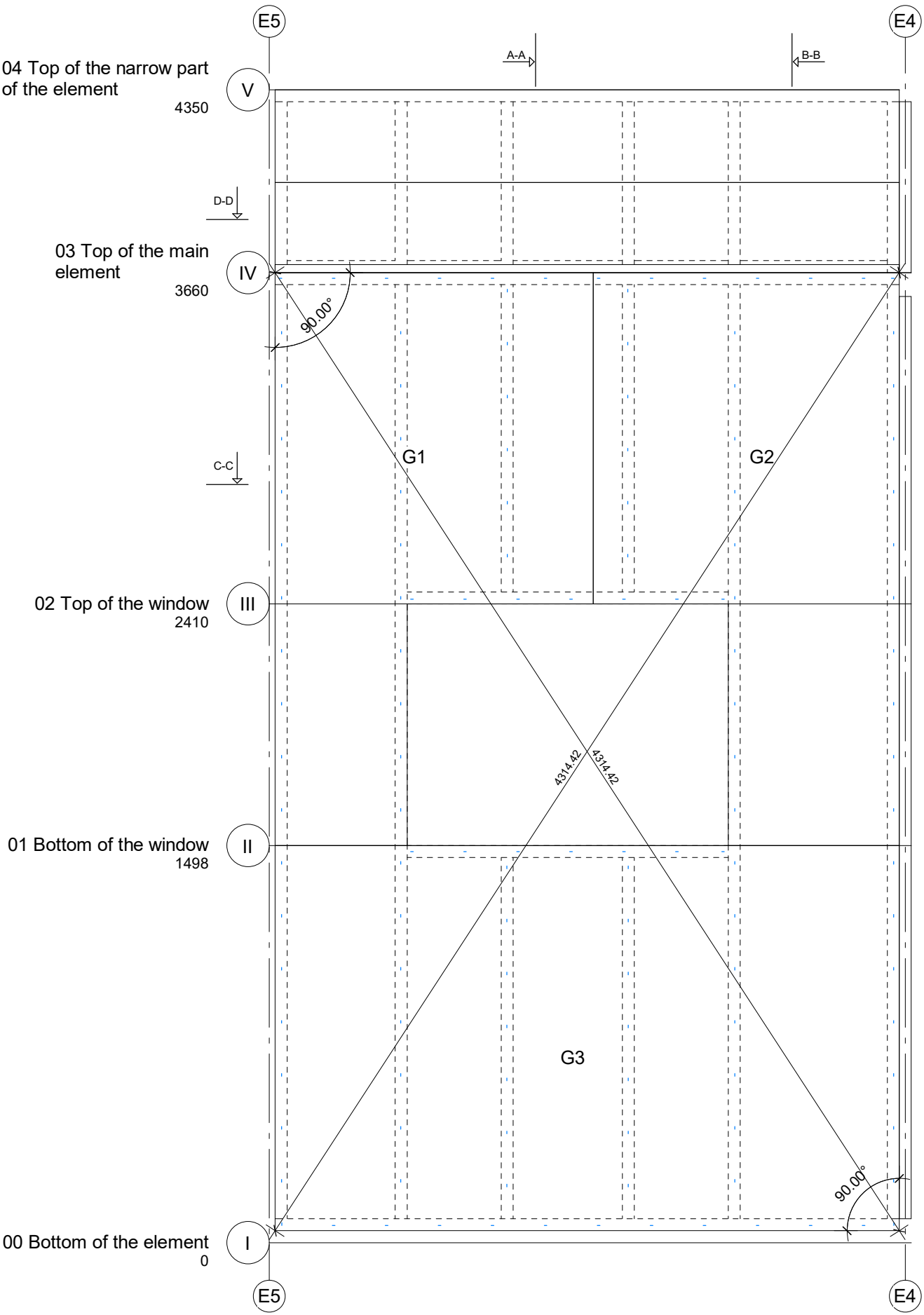
Part*	Material	Dimensions	λ (lambda)
1	mineral wool	45x408x3525 mm	0,34 W/mK ²
2	mineral wool	45x355x1160 mm	0,34 W/mK ²
3	mineral wool	45x412x1160 mm	0,34 W/mK ²
4	mineral wool	45x355x1160 mm	0,34 W/mK ²
5	mineral wool	45x555x3525 mm	0,34 W/mK ²
6	mineral wool	45x355x1363 mm	0,34 W/mK ²
7	mineral wool	45x412x1363 mm	0,34 W/mK ²
8	mineral wool	45x355x1363 mm	0,34 W/mK ²

4 W/mK
4 W/mK²
4 W/mK²
4 W/mK²

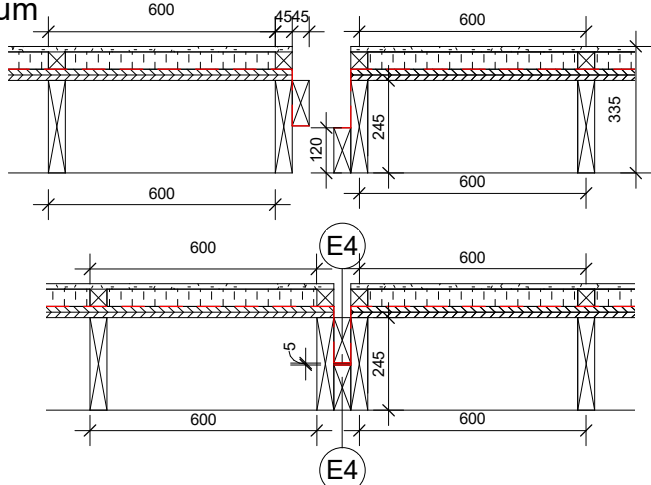


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PROJECT: Production of wooden element E4/E5	DATE: 01/05/19	007
SUBJECT: Narrow insulation	SCALE: 1 : 20	
DRAWN BY: Carina Pronsaia (group 5)	CLASS: AH31-A18	



Top view - 06. Gypsum
1 : 20



Connection - 06. Gypsum
1 : 20

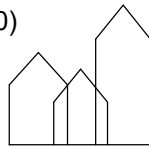
- MATERIAL**
- Fermacell gypsum-based dry boards with a paper fibre matrix
 - size tolerances (length, width): + 0 / - 2 mm
 - diagonal difference: ≤ 2 mm
 - thickness tolerance: +/- 0,2 mm
 - λ = 0,32 W/mK
 - weight: 18 kg/m²
 - cutting to size only with carbide-tipped tools or board knife

Identification	Width x length	Thickness	Quantity	Area [m ²]
G1	2162x1200 mm	15 mm	1	2,594
G2	2162x1155 mm	15 mm	1	2,497
G3	1200x2355 mm	15 mm	1	2,826
Total amount:			3	7,917

Identification	TJEP PZ-16
G1	36
G2	36
G3	62
Total amount:	134



- STAPLES**
- galvanized and resinated staples TJEP PZ-16
 - length: 45 mm
 - width: 10,8 mm
 - thickness: 1,38 - 1,52 mm
 - spacing: ≤ 200 mm



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PROJECT: Production of wooden element E4/E5	DATE: 01/05/19	008
SUBJECT: Gypsum	SCALE: 1 : 20	
DRAWN BY: Carina Pronscaia (group 5)	CLASS: AH31-A18	

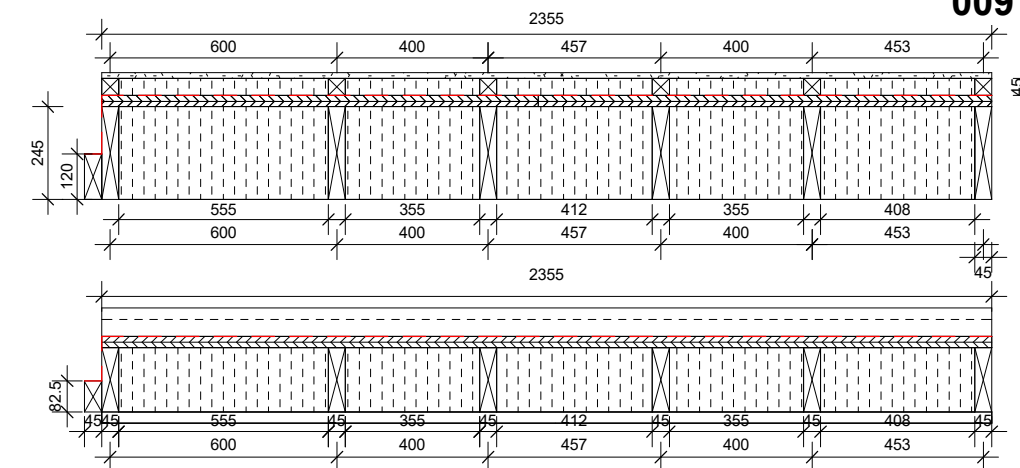
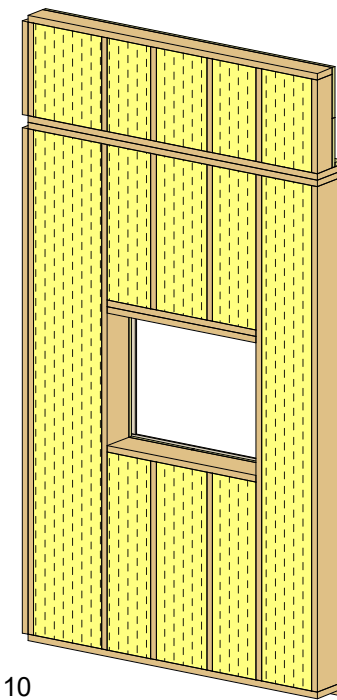
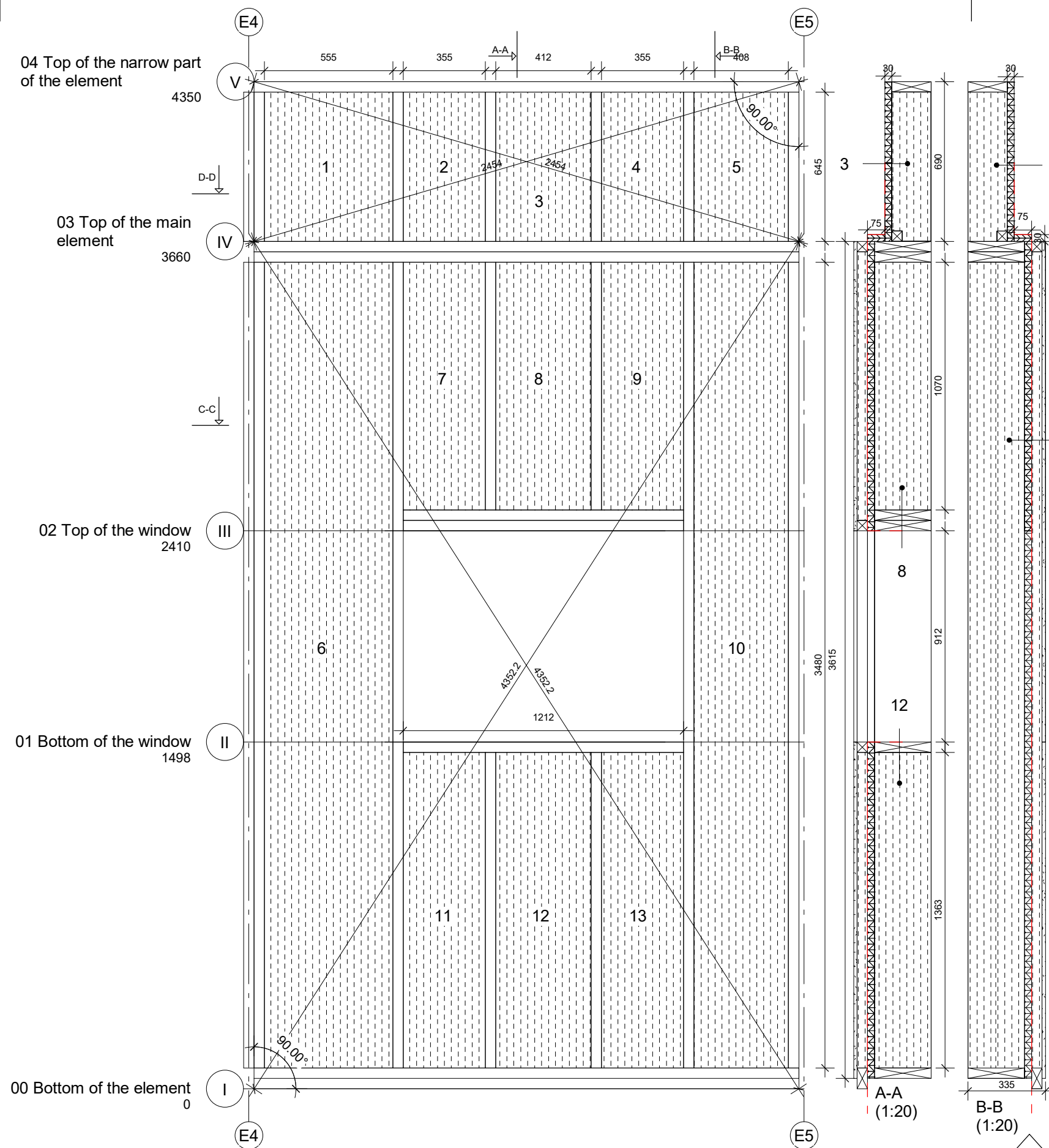
FIRST PROCESS CONTROL				
Project: Production of wooden element for Grejs Kulturcenter	Drawing No.:	Element: E4/E5	Date: 15/12/2018	Page: 01
	Supervisor:	Team:		

1. Element geometry	Prescribed	Ascertained	OK	Remedy	Daily control
1a. Total height (+/- 6 mm)	4350 mm	✓			
1b. Total width (8/22,5 mm)	2355 mm	✓			
1c. Diagonal (main part) (+/- 6 mm)	4314 mm	✓			
1d. Diagonal (narrow part) (+/- 6 mm)	2454 mm	✓			

2. Window opening	Prescribed	Ascertained	OK	Remedy	Daily control
2a. Height (+/- 2 mm)	912 mm	✓			
2b. Width (+/- 2 mm)	1212 mm	✓			
2c. Diagonal (+/- 3 mm)	1517 mm	✓			

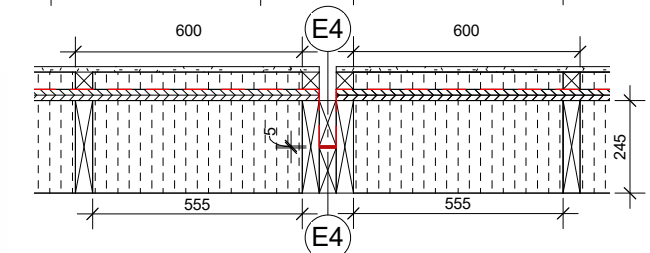
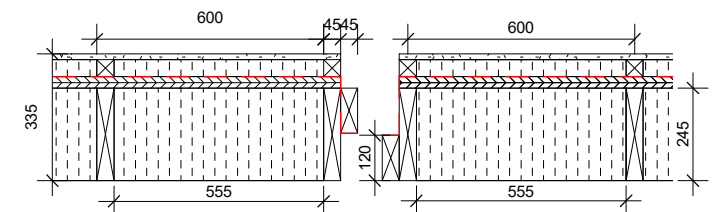
3. Quality of material	Prescribed	Ascertained	OK	Remedy	Daily control
3a. Load-bearing wooden framework C24	245x45 mm	✓			
3b. Load-bearing wooden framework C24	170x45 mm	✓			
3c. Internal plywood (+/- 1 mm/1000 mm)	30 mm spruce	✓			
3d. Damp proof membrane	0,2 mm polyethylene	✓			
3e. Non-loadbearing wooden framework C24	45x45 mm	✓			
3f. Mineral wool ($\lambda=0,034$ W/mK)	45 mm	✓			
3g. Gypsum board (+/- 2 mm)	15 mm firbe board	✓			

4. Quality of assembly	OK	Remedy	Daily control
4a. Load-bearing framework: SPUN High-speed 5x80, 6x100, 6x180; 5x50 bracket screws; Simpson strong-tie brackets			
4b. Internal plywood: 6x60 SPUN High-speed and 6x60 SPUN High-speed + climate			
4c. Damp proof membrane: TJEP PG-50 12 x 12,4 x 1,3 mm staples			
4d. Non-loadbearing wooden framework 6x60 SPUN High-speed			
4e. Mineral wool: correct placement of batts			
4f. Fibre gypsum boards: TJEP PZ-16 45 x 10,8 x 1,52 mm staples			
4g. Lifting rope: 10 mm Randers Reb 3-Strand nylon fibre rope			



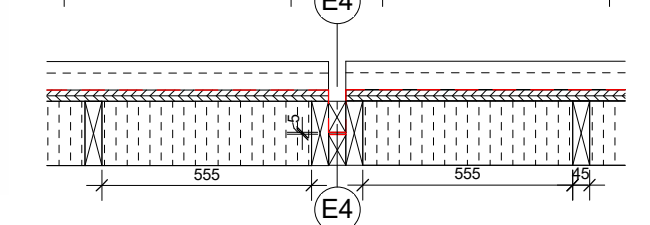
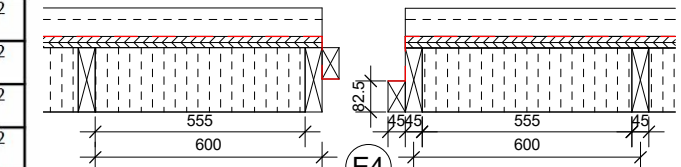
Top view - 07. Main insulation

1 : 20



Connection - 07. Main insulation

1 : 20



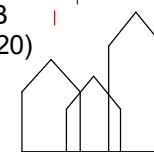
Connection, narrow - 04. Main insulation

1 : 20

Part*	Material	Dimensions	λ (lambda)
1	mineral wool	245x555x645 mm	0,34 W/mK
2	mineral wool	245x355x645 mm	0,34 W/mK
3	mineral wool	245x412x645 mm	0,34 W/mK
4	mineral wool	245x355x645 mm	0,34 W/mK
5	mineral wool	245x408x645 mm	0,34 W/mK
6	mineral wool	245x555x3480 mm	0,34 W/mK
7	mineral wool	245x355x1070 mm	0,34 W/mK
8	mineral wool	245x412x1070 mm	0,34 W/mK
9	mineral wool	245x355x1070 mm	0,34 W/mK
10	mineral wool	245x408x1070 mm	0,34 W/mK
11	mineral wool	245x355x1363 mm	0,34 W/mK
12	mineral wool	245x412x1363 mm	0,34 W/mK
13	mineral wool	245x355x1363 mm	0,34 W/mK

*exact division of mineral wool batts is shown on cutting lists

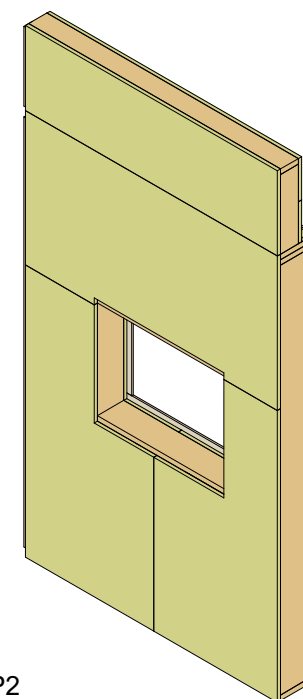
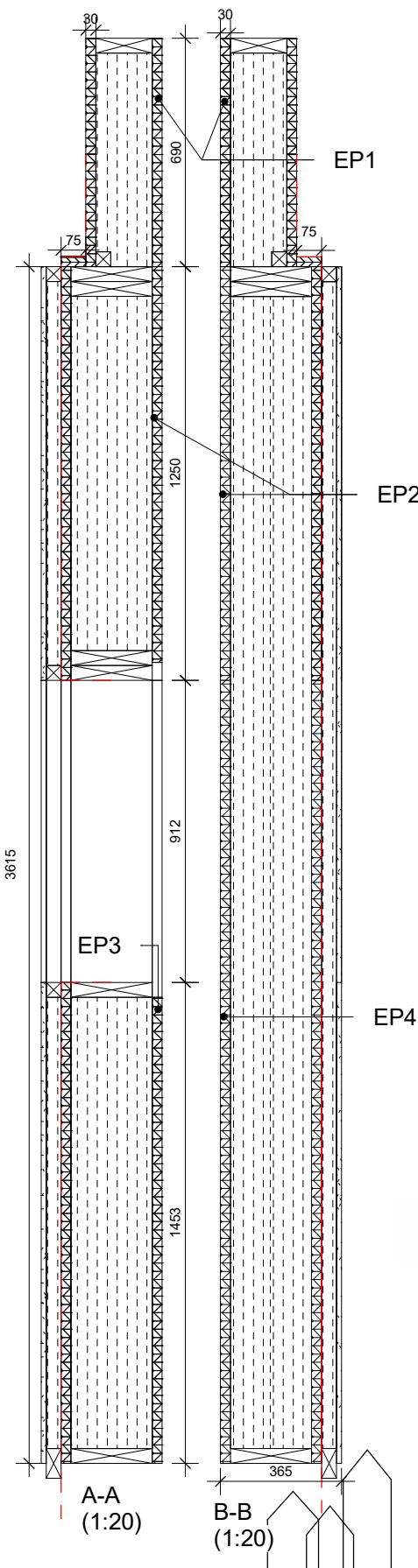
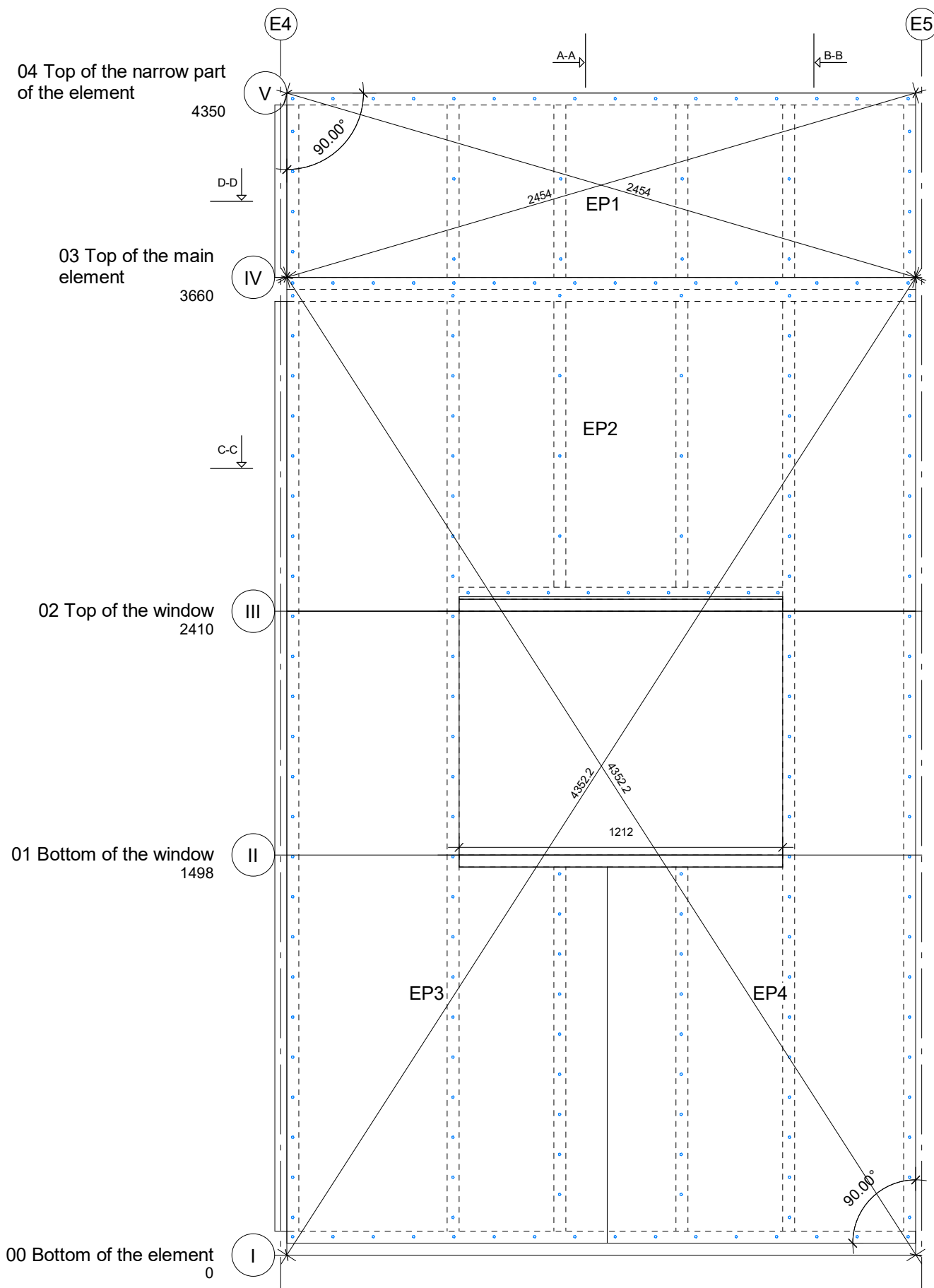
SAP nr.	DB nr.	Tykkelse (mm)	Bredde (mm)	Længde (mm)	Antal pk. pr. palle	Mængde m²
236719	1899021	245	565	965	15	16,36



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PROJECT: Production of wooden element E4/E5	DATE: 01/05/19	009
SUBJECT: Main insulation	SCALE: 1 : 20	
DRAWN BY: Carina Pronascaia (group 5)	CLASS: AH31-A18	



MATERIAL

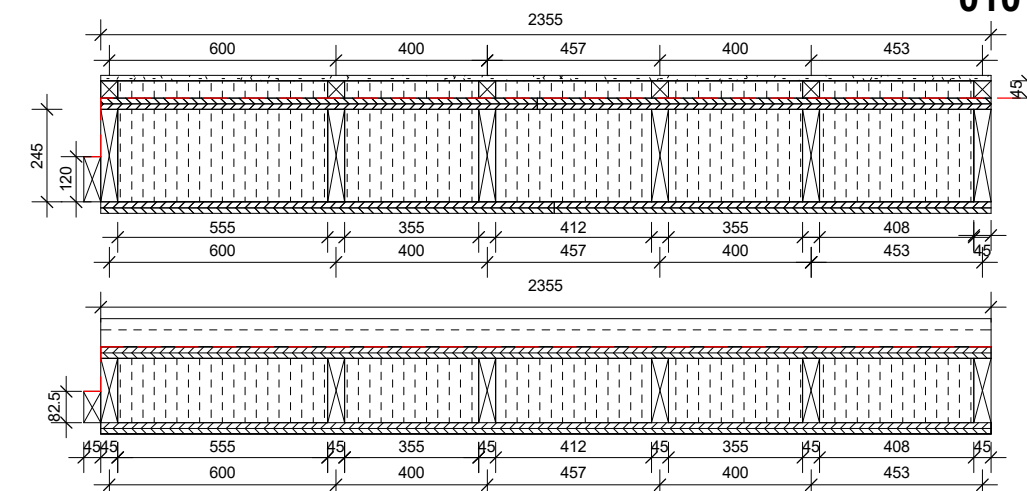
- WISA birch special thin plywood
- face veneer grades: II and III
- glueing: phenolic resin cross-bonded weather resistant
- size tolerances (length, width): $\pm 1 \text{ mm}/1000 \text{ mm}$
- squareness tolerance: $\pm 1 \text{ mm}/1000 \text{ mm}$
- number of plies: 21
- weight: 20.4 kg/m^2

SCREWS

SPUN® + HIGH-SPEED, CLIMATE® - G3
- electro-galvanised with slot TX30
- d = 6 mm, l = 60 mm
- spacing on edges: ≤ 150 mm
- spacing on studs: ≤ 300 mm

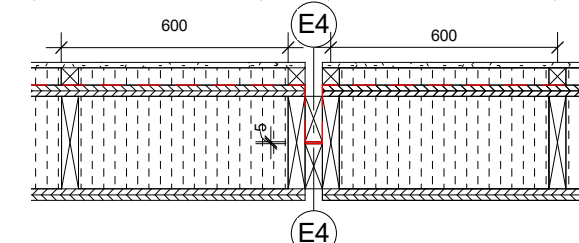
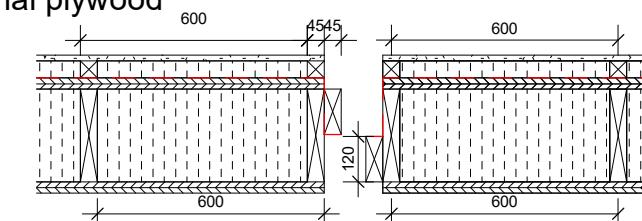


Identification	Width x length	Thickness	Quantity	Area [m ²]	SPUN®+HIGH-SPEED, CLIMATE®
EP1	690x2355 mm	30 mm	1	1,625	32
EP2	1250x2355 mm	30 mm	1	2,943	49
EP3	1200x2365 mm	30 mm	1	2,838	49
EP4	1150x2365 mm	30 mm	1	2,731	49
Total amount:			4	10,137	179



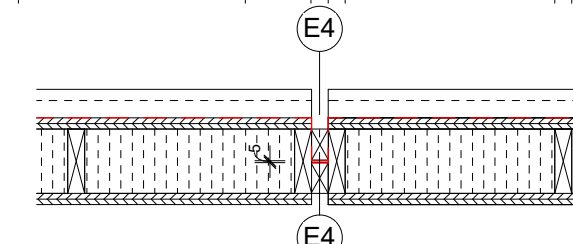
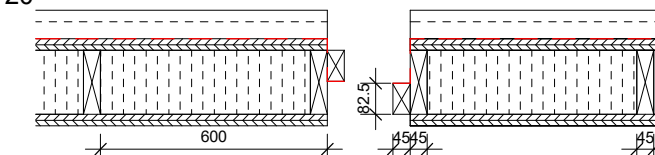
Top view - 08. External plywood

1 : 20



Connection - 08. External plywood

er 1 : 20



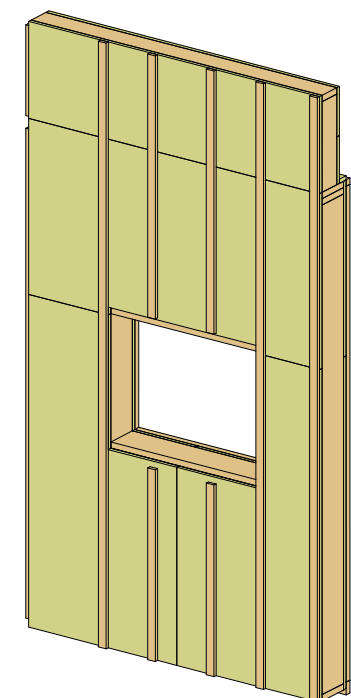
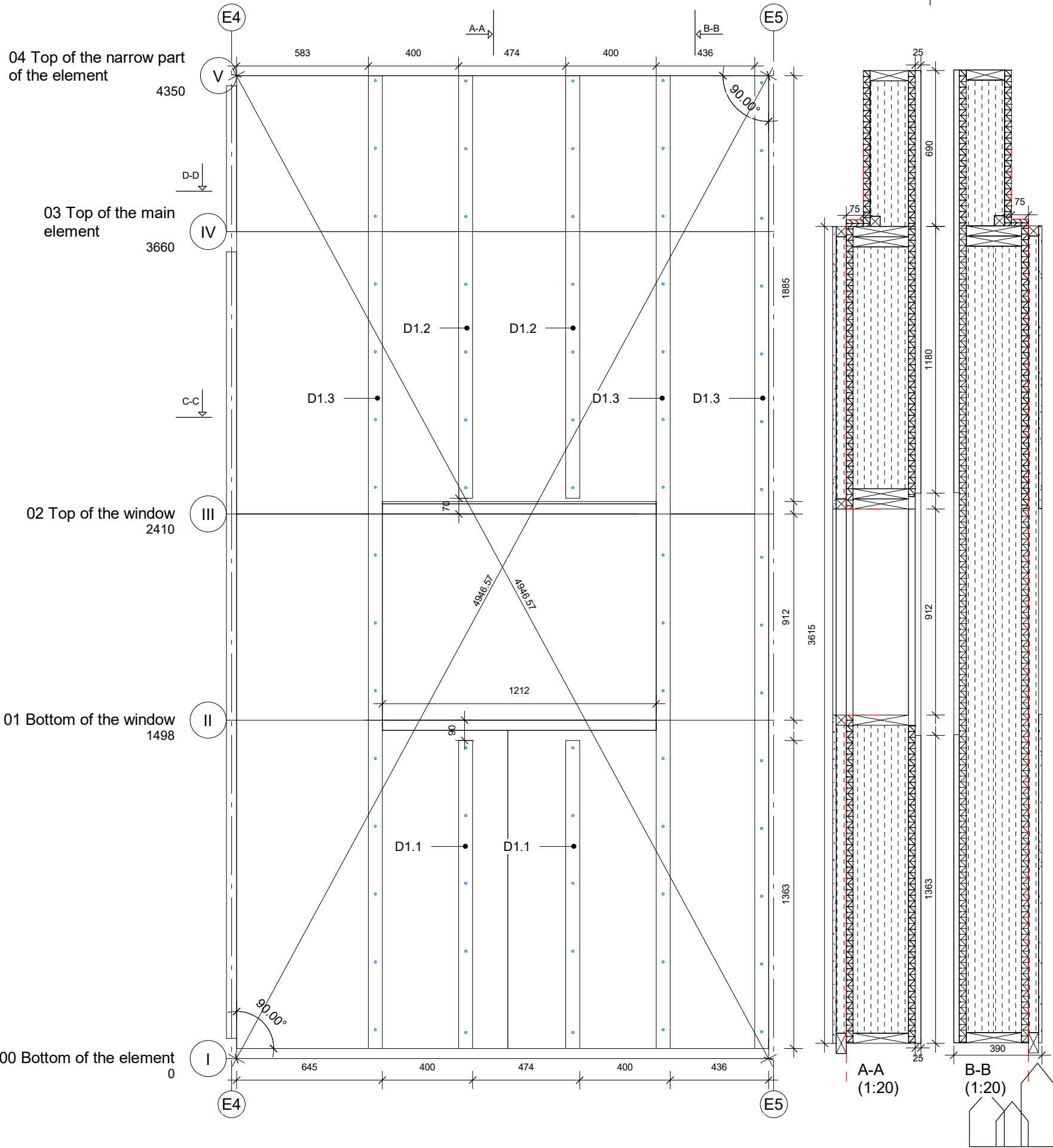
Connection, narrow - 05. External plywood

1 : 20

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PROJECT: Production of wooden element E4/E5	DATE: 01/05/19	010
SUBJECT: External plywood	SCALE: 1 : 20	
DRAWN BY: Carina Pronsaia (group 5)	CLASS: AH31-A18	



TIMBER

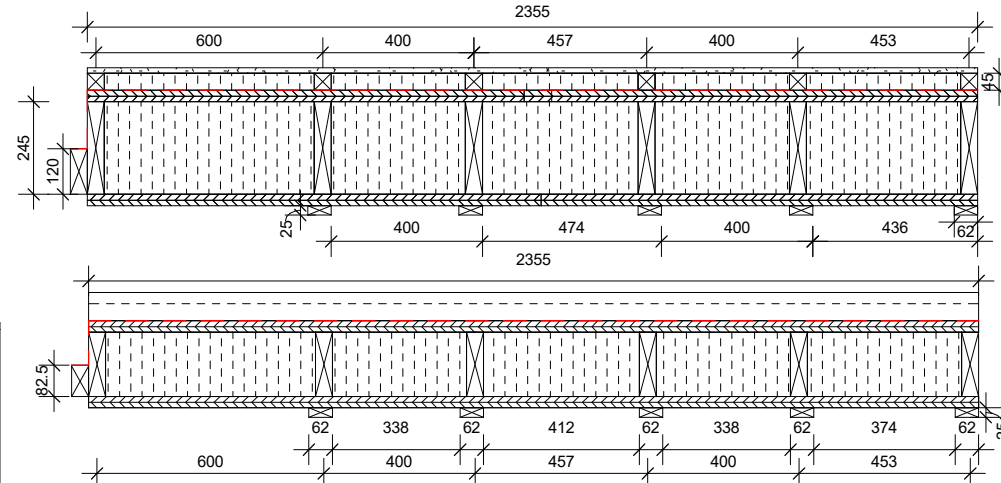
- construction soft wood
- quality C24, bending strength = 24 MPa
- grade T2
- service moisture class 2

SCREWS

- SPUN® + HIGH-SPEED, CLIMATE® - G3
- electro-galvanised with slot TX30
- d = 6 mm, l = 60 mm
- spacing ≤ 300 mm

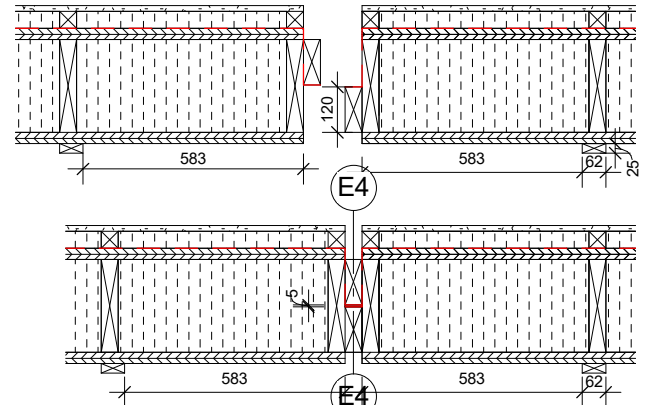


Identification	SPUN, CLIMATE 6 x 60 mm
D1.1	10
D1.2	14
D1.3	45
Total amount	69



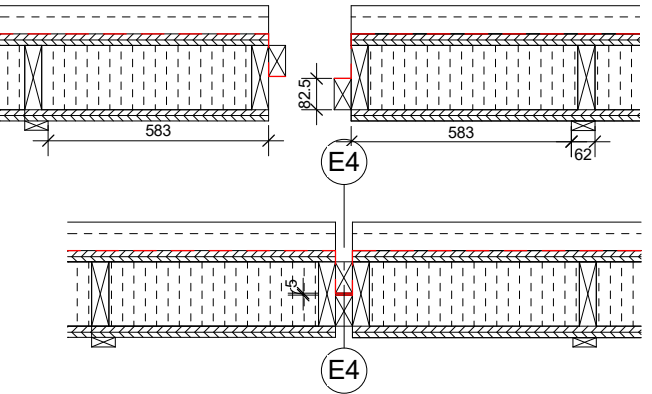
Top view - 09. Distance strips

1 : 20



Connection - 09. Distance strips

1 : 20



Connection, narrow - 06. Distance strips

1 : 20

Identification	Type	Length	Quantity
D1.1	25x63 mm	1363 mm	2
D1.2	25x63 mm	2355 mm	2
D1.3	25x63 mm	4305 mm	3
Total amount			7

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PROJECT: Production of wooden element E4/E5	DATE: 01/05/19	011
SUBJECT: Distance strips	SCALE: 1 : 20	
DRAWN BY: Carina Pronsaia (group 5)	CLASS: AH31-A18	

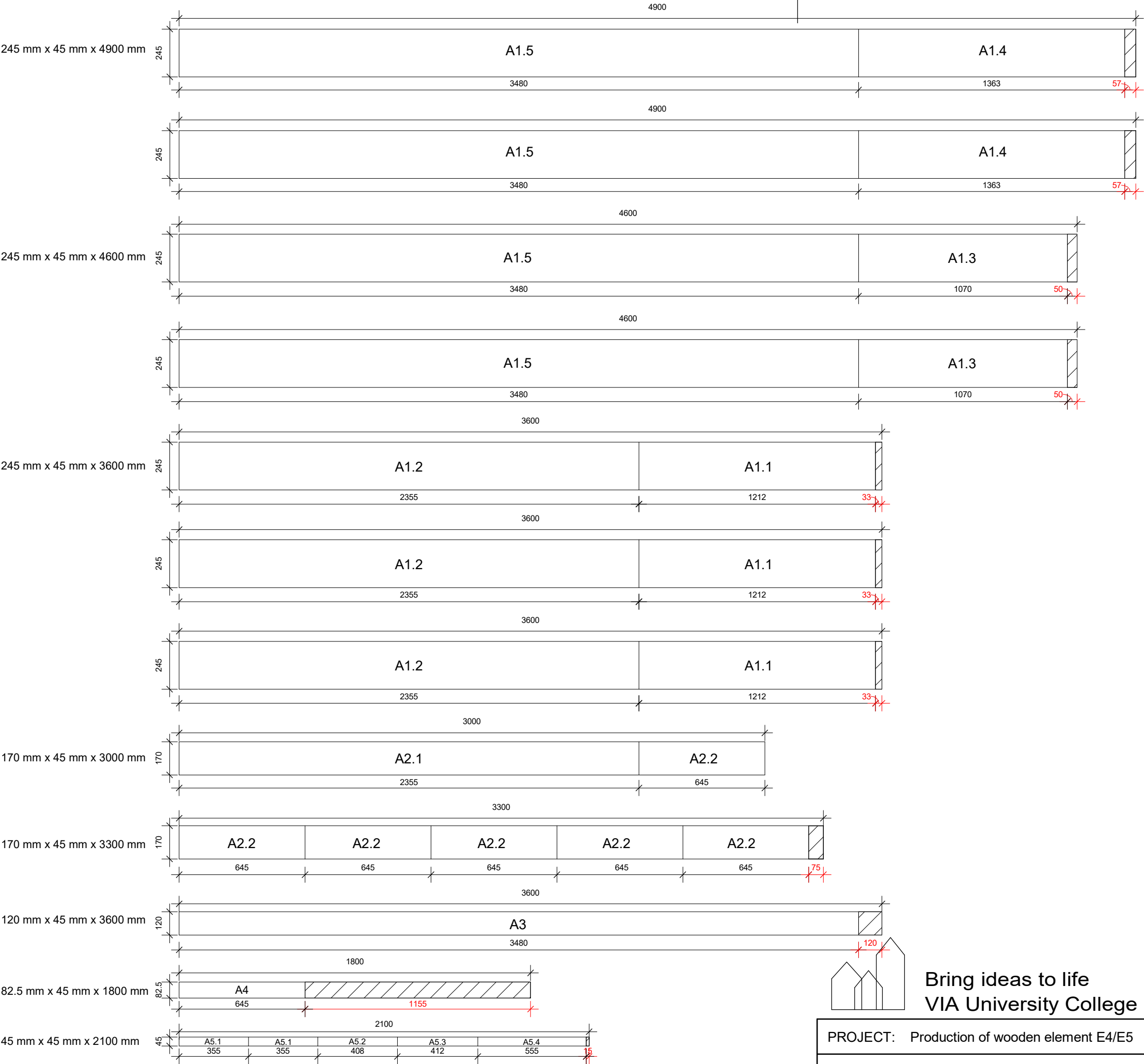
SECOND PROCESS CONTROL				
Project: Production of wooden element for Grejs Kulturcenter	Drawing No.:	Element: E4/E5	Date: 15/12/2018	Page: 02
	Supervisor:	Team:		

1. Element geometry	Prescribed	Ascertained	OK	Remedy	Daily control
1a. Total height (+/- 6 mm)	4350 mm	✓			
1b. Total width (8/22,5 mm)	2355 mm	✓			
1c. Diagonal (main part) (+/- 6 mm)	4314 mm	✓			
1d. Diagonal (narrow part) (+/- 6 mm)	2454 mm	✓			

2. Window opening	Prescribed	Ascertained	OK	Remedy	Daily control
2a. Height (+/- 2 mm)	912 mm	✓			
2b. Width (+/- 2 mm)	1212 mm	✓			
2c. Diagonal (+/- 3 mm)	1517 mm	✓			

3. Quality of material	Prescribed	Ascertained	OK	Remedy	Daily control
3a. Mineral wool ($\lambda=0,034$ W/mK)	245 mm	✓			
3b. External plywood (+/- 1 mm/1000 mm)	30 mm birch	✓			
3c. Distance strips C24	25x65 mm	✓			

4. Quality of assembly	OK	Remedy	Daily control
4a. Mineral wool: correct placement of batts			
4b. Internal plywood: 6x60 SPUN High-speed and 6x60 SPUN High-speed + climate			
4c. Distance strips: 6 x 60 mm SPUN High-speed + climate G3			

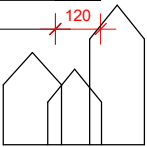


245 mm x 45 mm
Total amount ordered: 2 x 4900 mm + 2 x 4600 mm
+ 3 x 3600 mm = 29800 mm
Total amount used: 29487 mm
Total waste material: 313 mm
Waste ratio: 1.05%

170 mm x 45 mm
Total amount ordered: 3000 mm + 3300 mm = 6300 mm
Total amount used: 6225 mm
Total waste material: 75 mm
Waste ratio: 1.19%

120 mm x 45 mm
Total amount ordered: 3600 mm
Total amount used: 3480
Total waste material: 120 mm
Waste ratio: 3.33%

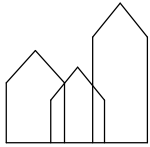
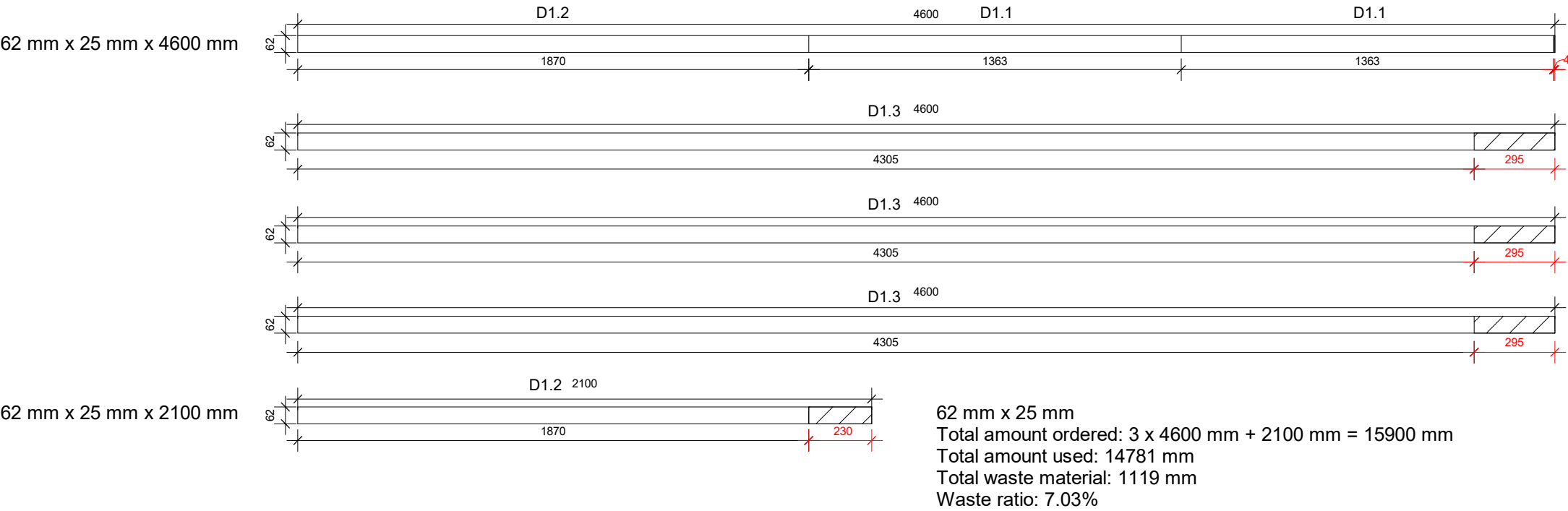
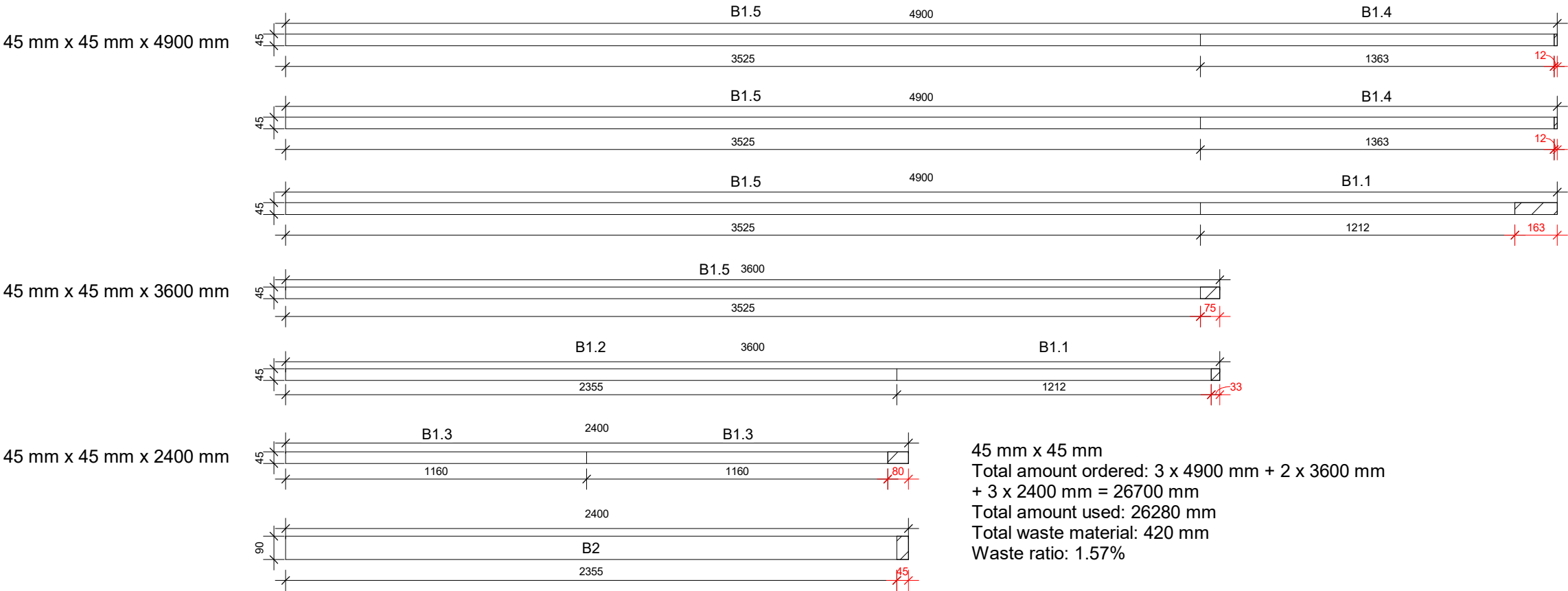
82,5 mm x 45 mm
Total amount ordered: 1800 mm
Total amount used: 645 mm
Total waste material: 1155 mm
Waste ratio: 64.16%, will be used in elements E3/E4
45 mm x 45 mm
Total amount ordered: 2100 mm
Total amount used: 2085
Total waste material: 15 mm
Waste ratio: 0.71%



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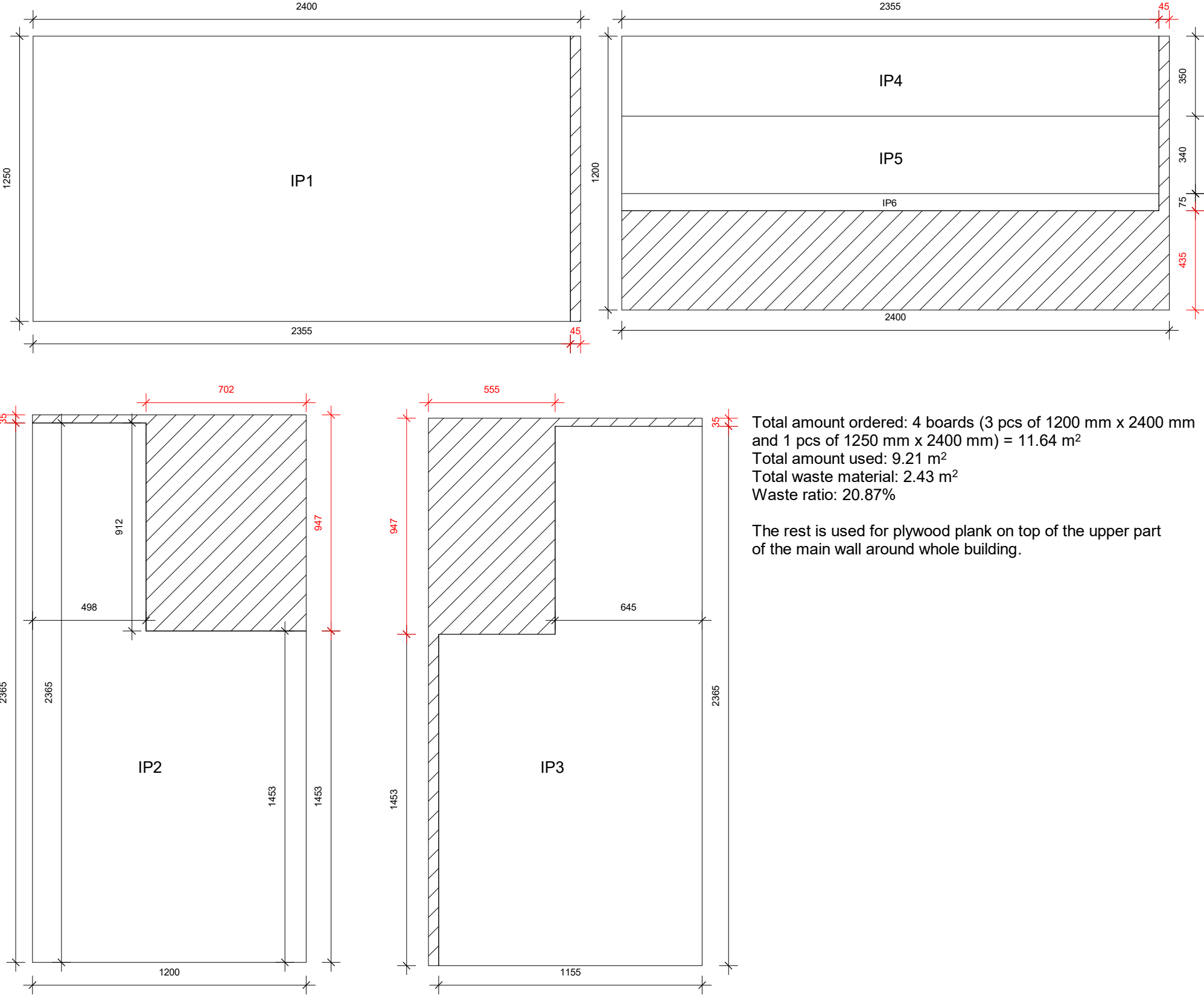
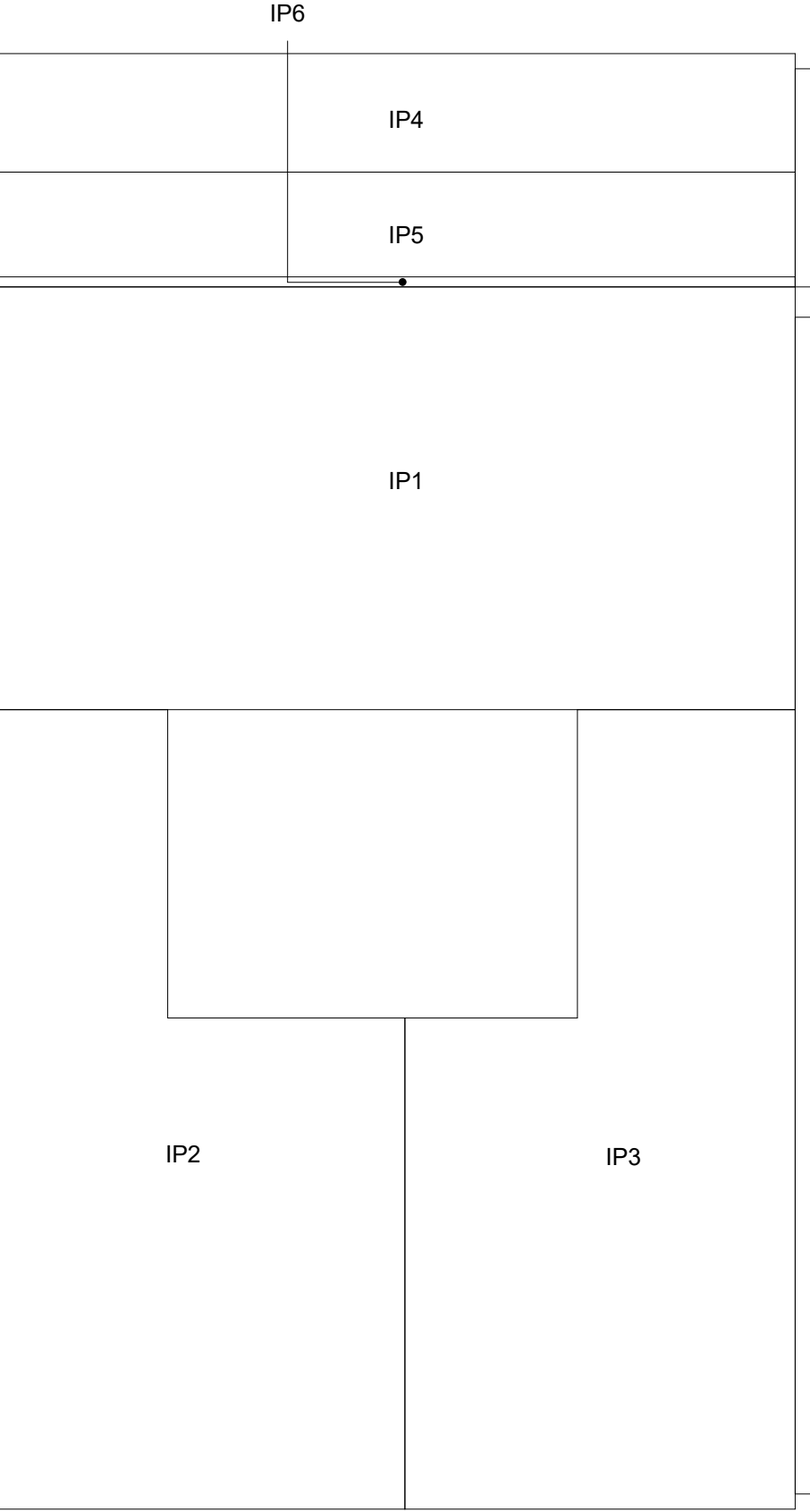
PROJECT: Production of wooden element E4/E5	DATE: 01/05/19	012
SUBJECT: Cutting list - timber	SCALE: 1 : 20	
DRAWN BY: Carina Pronscaia (group 5)	CLASS: AH31-A18	



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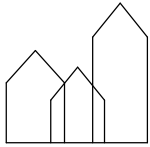
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PROJECT: Production of wooden element E4/E5	DATE: 01/05/19	013
SUBJECT: Cutting list - timber 2	SCALE: 1 : 20	
DRAWN BY: Carina Pronscaia (group 5)	CLASS: AH31-A18	



Total amount ordered: 4 boards (3 pcs of 1200 mm x 2400 mm and 1 pcs of 1250 mm x 2400 mm) = 11.64 m²
Total amount used: 9.21 m²
Total waste material: 2.43 m²
Waste ratio: 20.87%

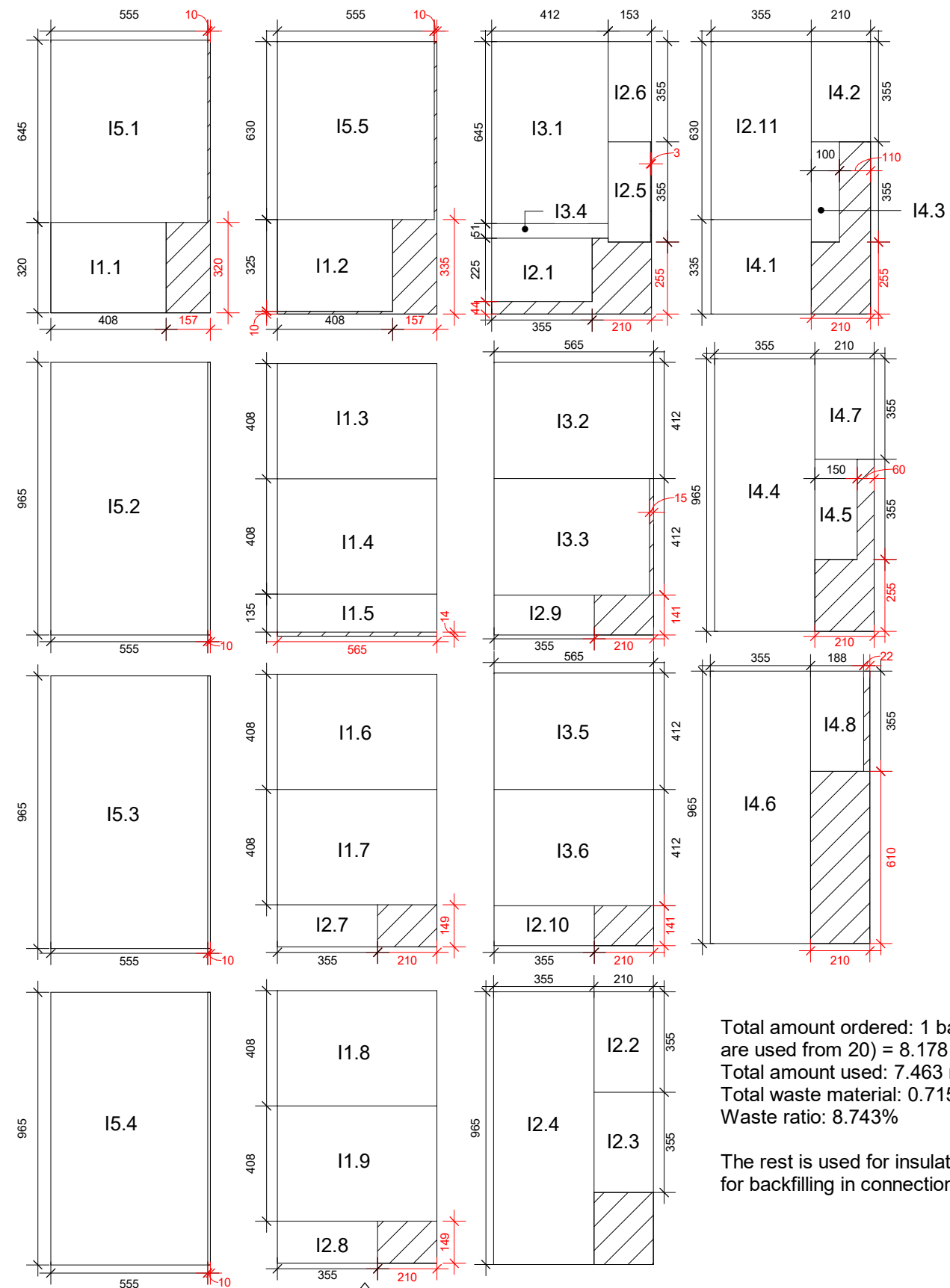
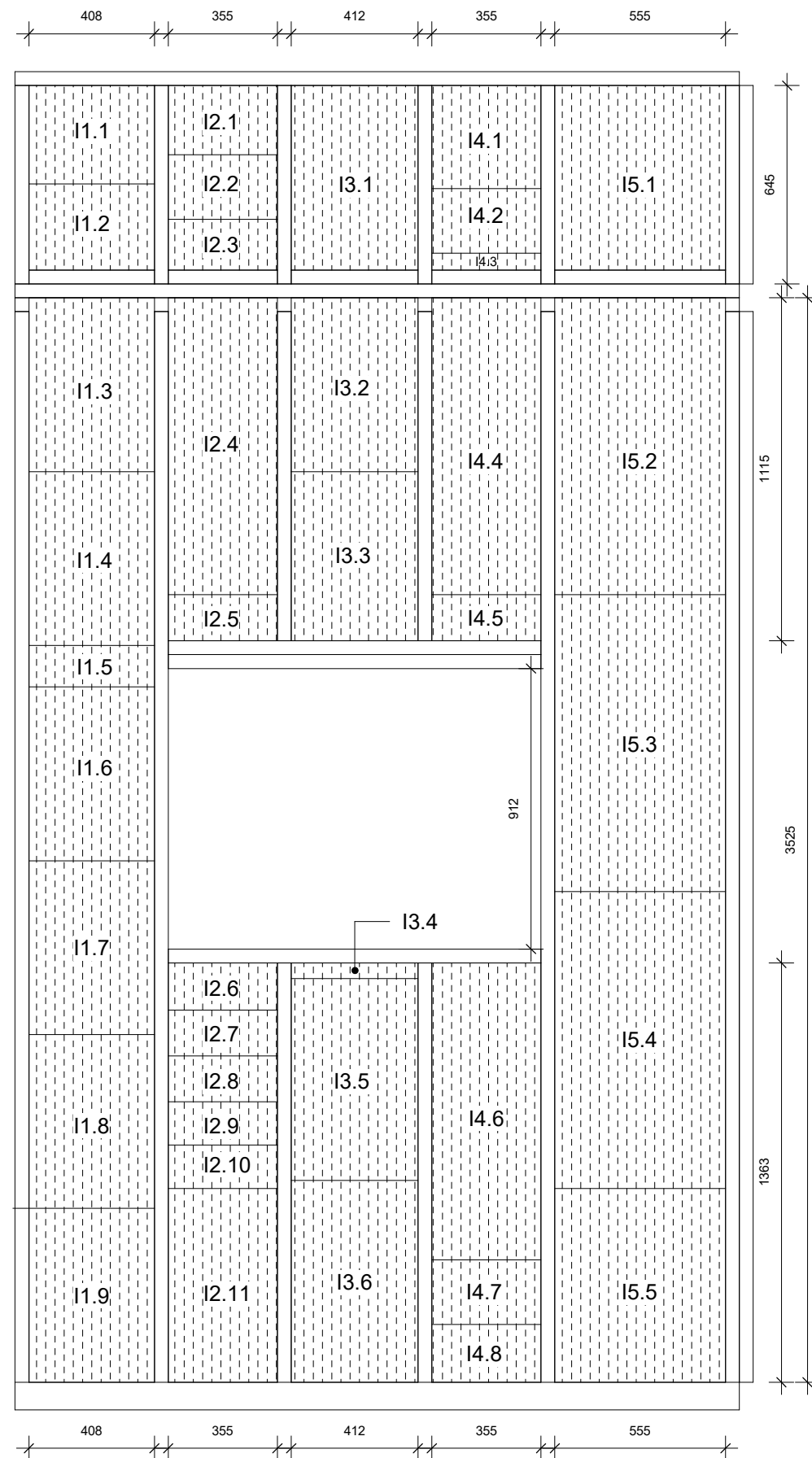
The rest is used for plywood plank on top of the upper part of the main wall around whole building.



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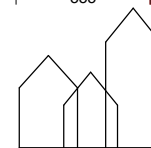
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PROJECT: Production of wooden element E4/E5	DATE: 01/05/19	014
SUBJECT: Cutting list - internal plywood	SCALE: 1 : 20	
DRAWN BY: Carina Pronsaia (group 5)	CLASS: AH31-A18	



Total amount ordered: 1 bag (15 batts (965x565 mm) are used from 20) = 8.178 m²
Total amount used: 7.463 m²
Total waste material: 0.715 m²
Waste ratio: 8.743%

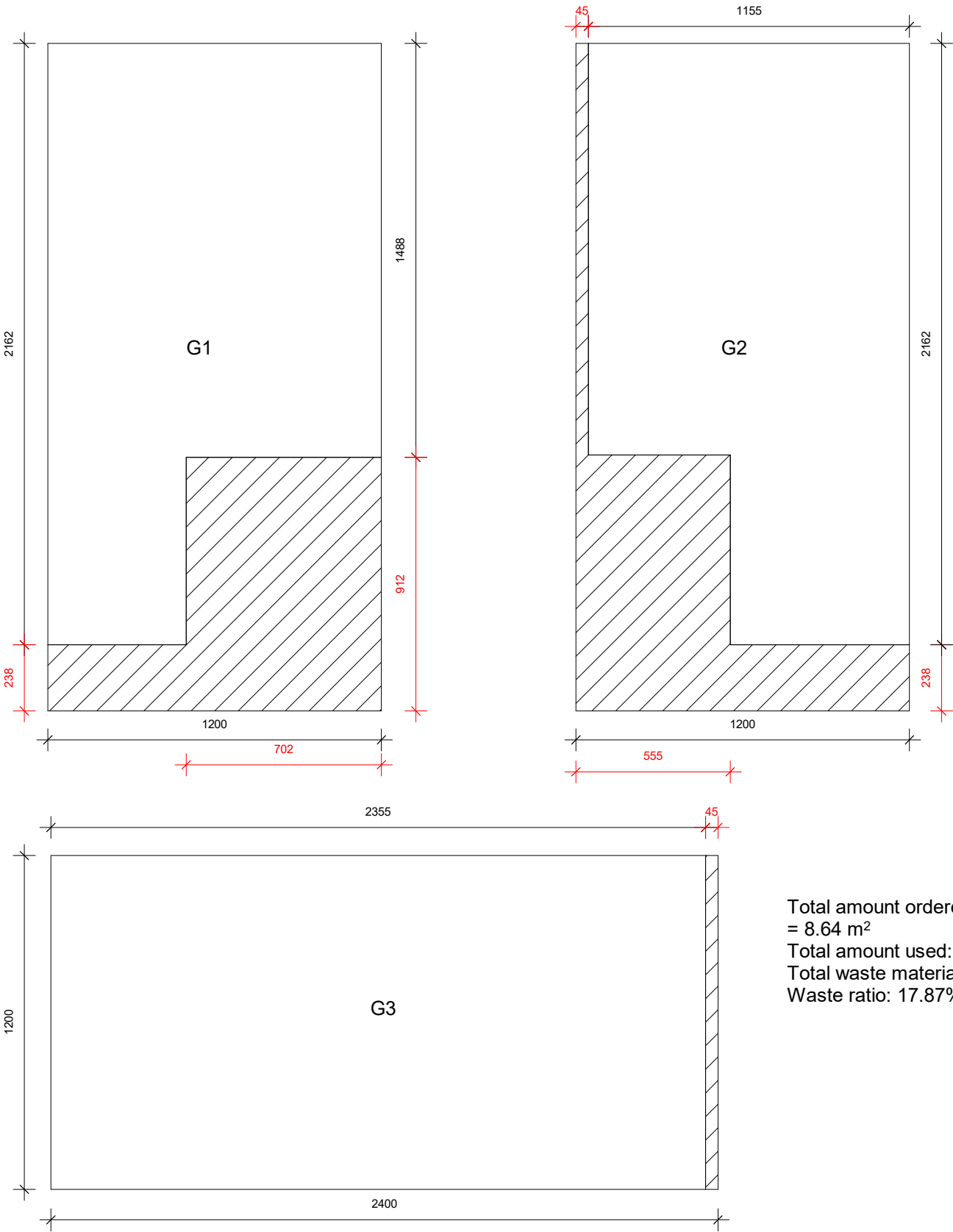
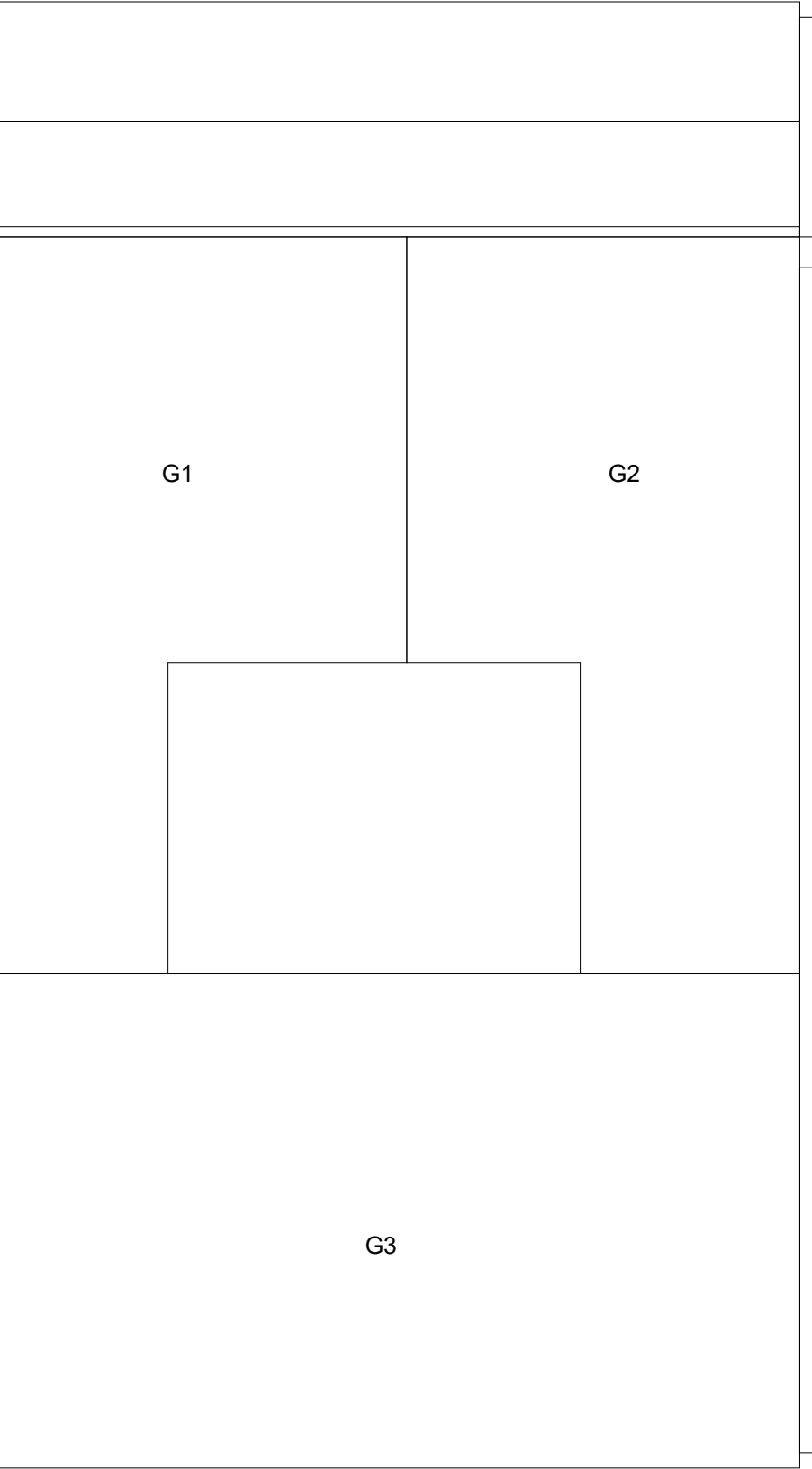
The rest is used for insulation in other elements and for backfilling in connections between some of the elemens.



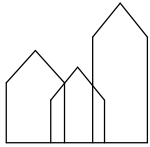
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PROJECT: Production of wooden element E4/E5	DATE: 01/05/19	015
SUBJECT: Cutting list - internal insulation	SCALE: 1 : 20	
DRAWN BY: Carina Pronscaia (group 5)	CLASS: AH31-A18	



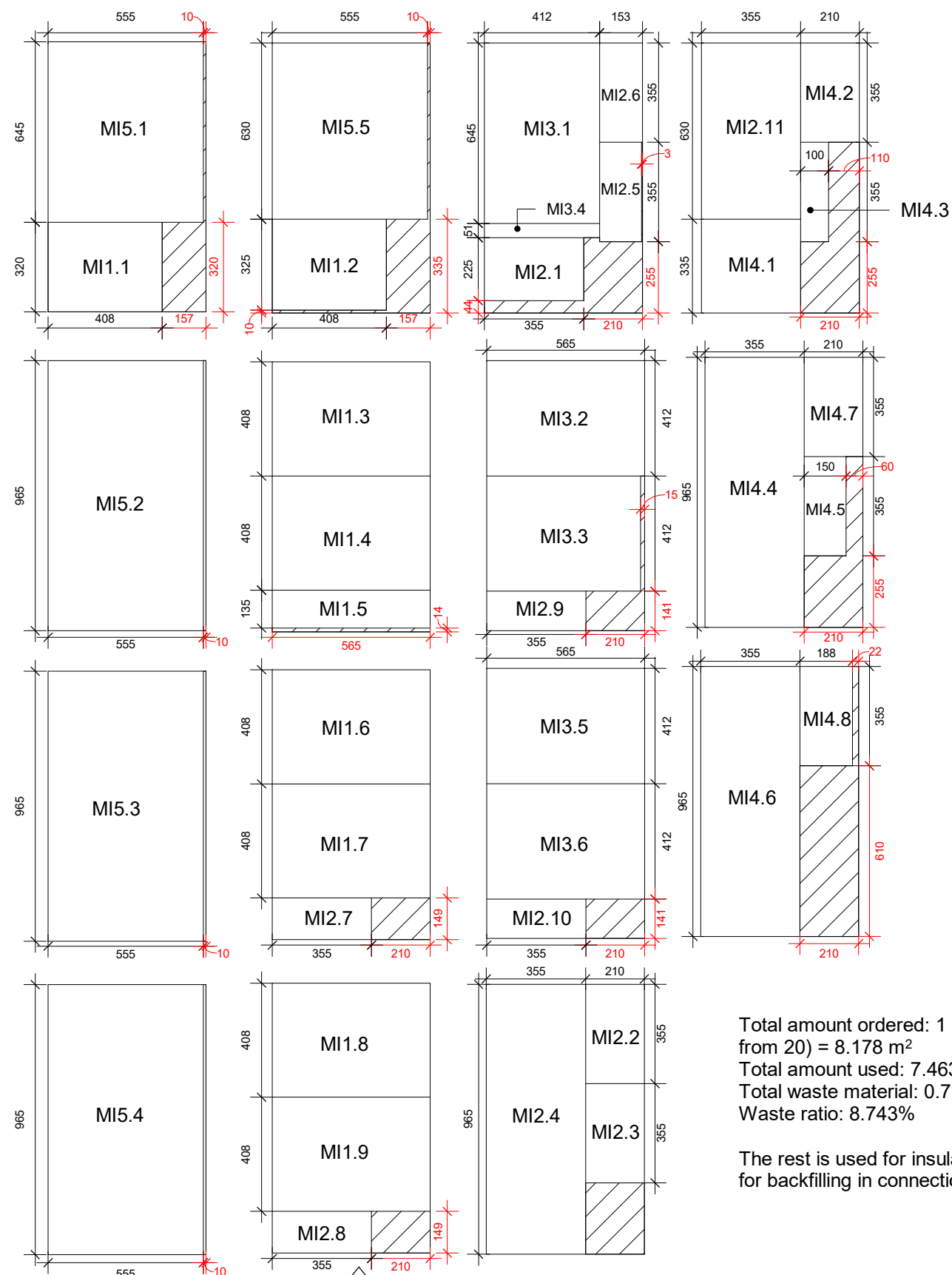
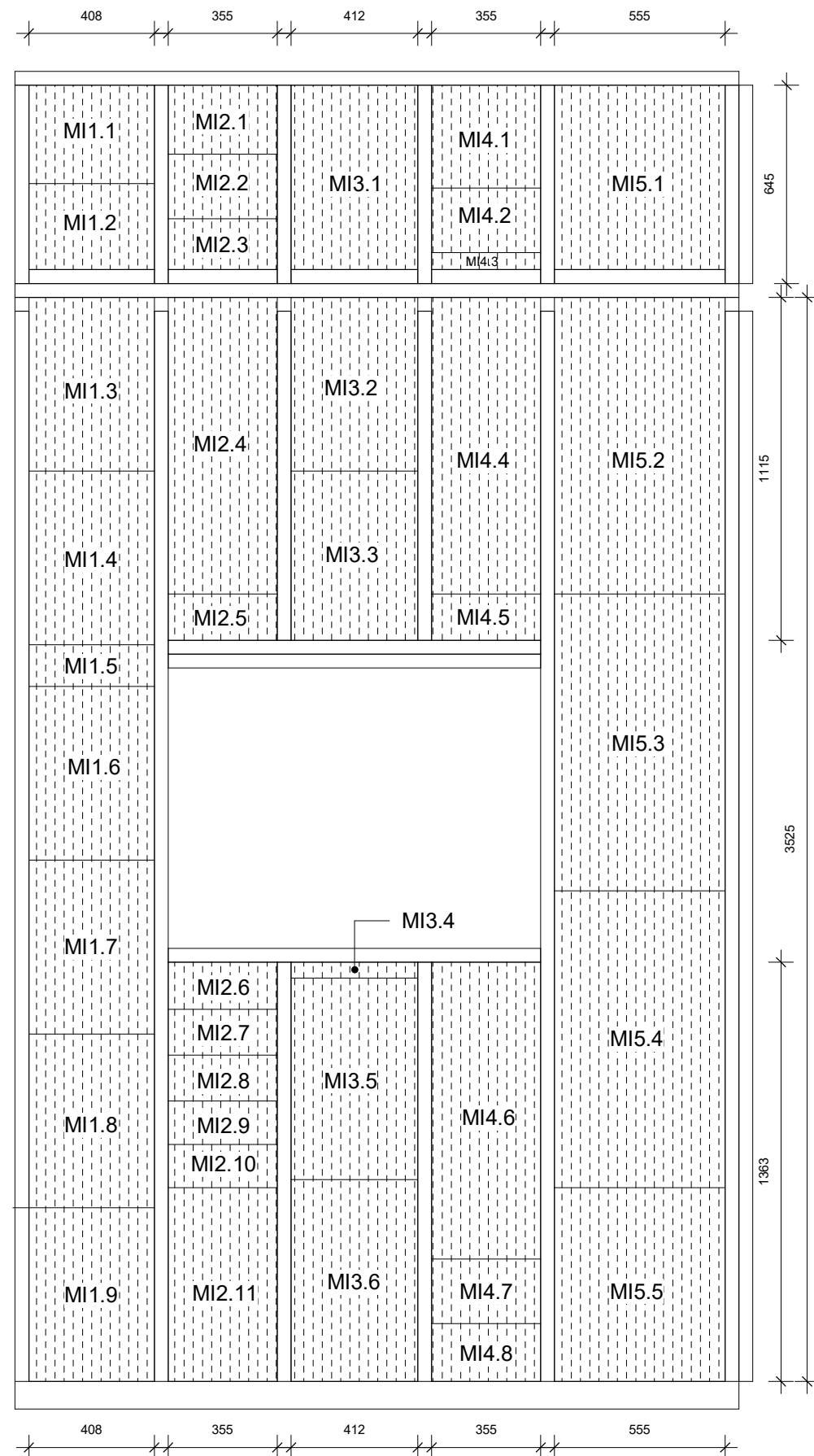
Total amount ordered: 3 boards (1200 mm x 2400 mm)
= 8.64 m²
Total amount used: 7.096 m²
Total waste material: 1.544 m²
Waste ratio: 17.87%



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PROJECT: Production of wooden element E4/E5	DATE: 01/05/19	016
SUBJECT: Cutting list - gypsum	SCALE: 1 : 20	
DRAWN BY: Carina Pronsaia (group 5)	CLASS: AH31-A18	



Total amount ordered: 1 bag (15 batts (965x565 mm) are used from 20) = 8.178 m²
Total amount used: 7.463 m²
Total waste material: 0.715 m²
Waste ratio: 8.743%

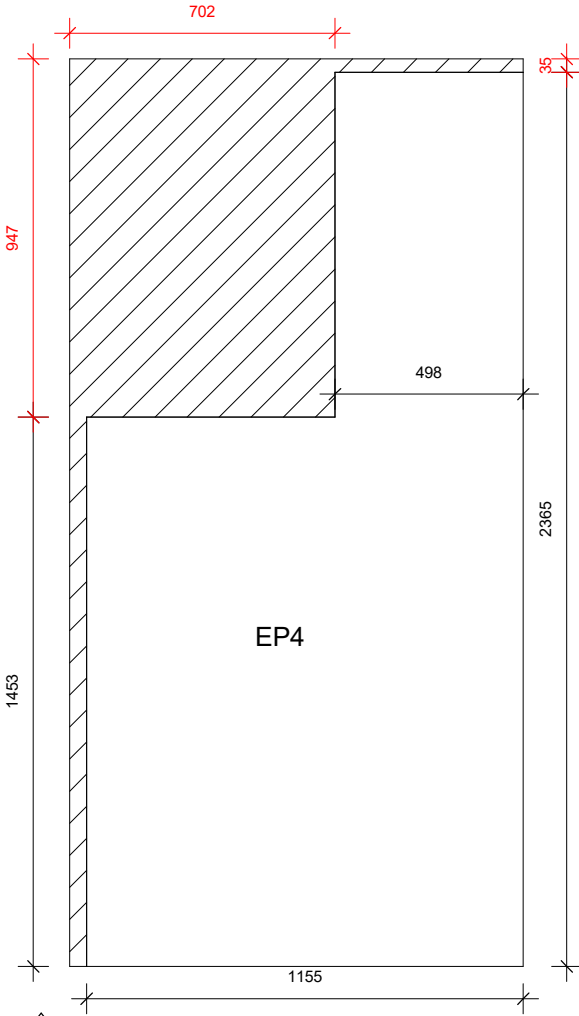
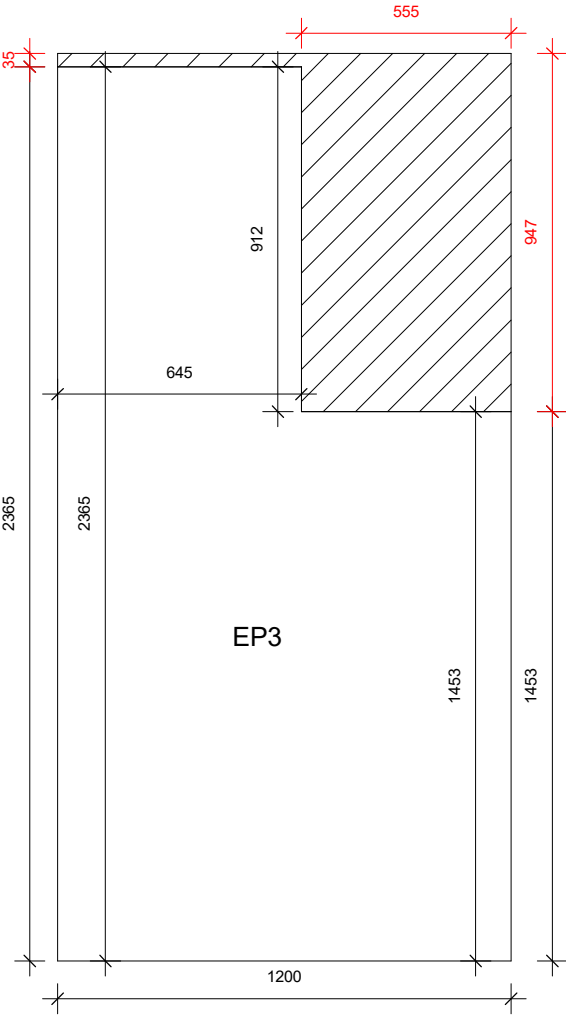
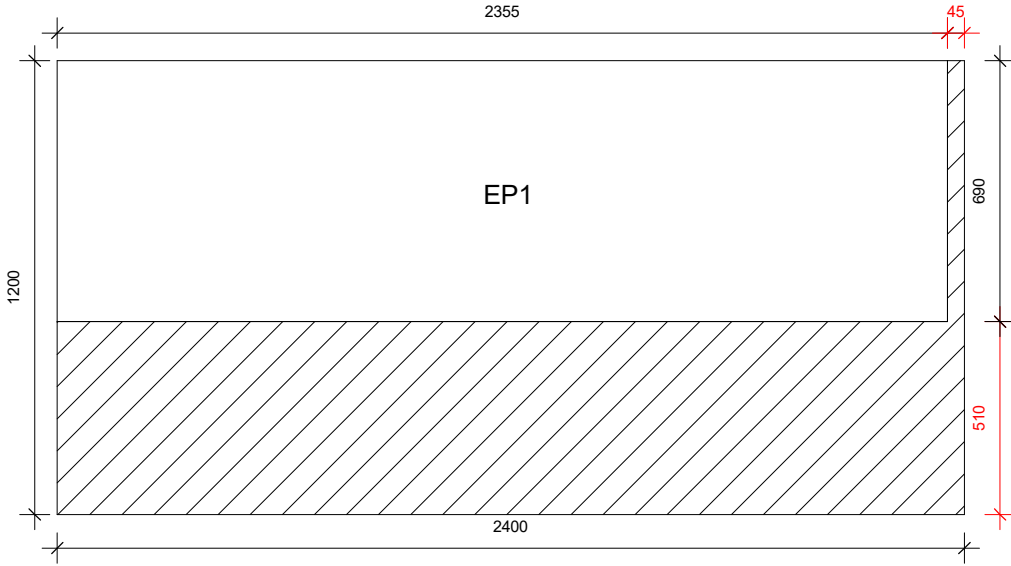
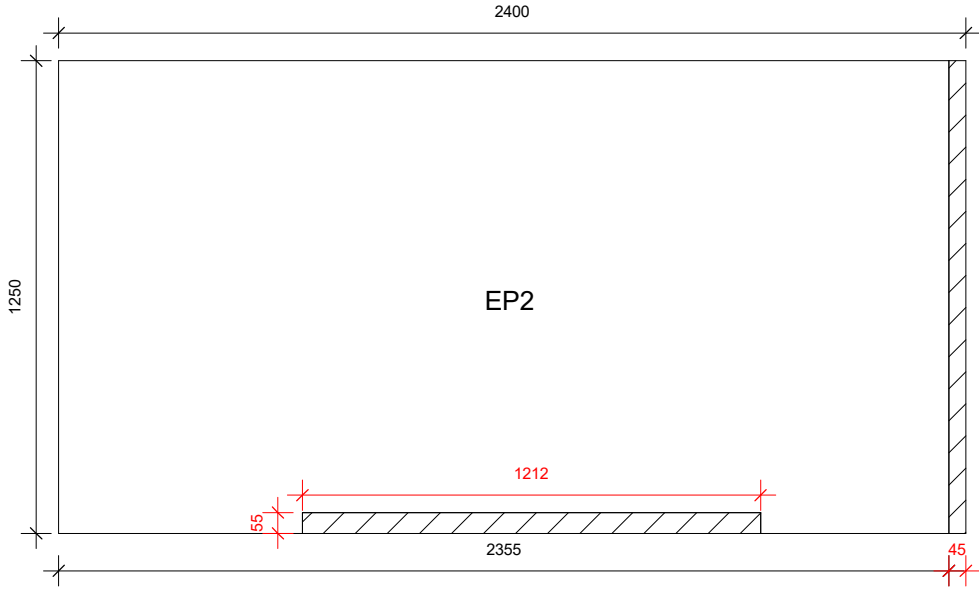
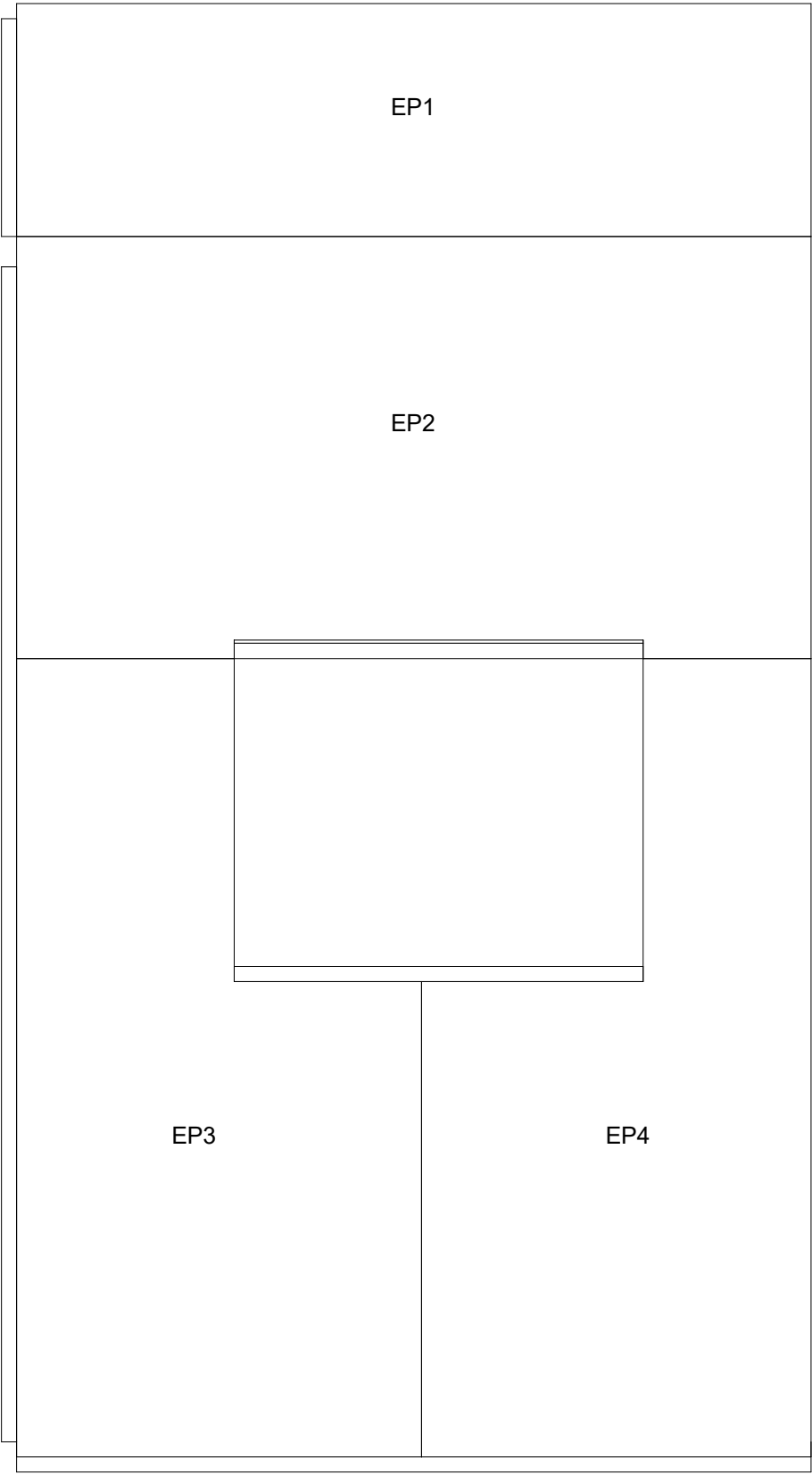
The rest is used for insulation in other elements and for backfilling in connections between some of the elements.



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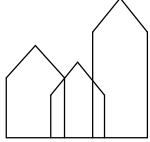
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PROJECT: Production of wooden element E4/E5	DATE: 01/05/19	017
SUBJECT: Cutting list - main insulation	SCALE: 1 : 20	
DRAWN BY: Carina Pronscaia (group 5)	CLASS: AH31-A18	



Total amount ordered: 4 boards (3 pcs of 1200 mm x 2400 mm and 1 pcs of 1250 mm x 2400 mm) = 11.64 m²
Total amount used: 8.966 m²
Total waste material: 2.674 m²
Waste ratio: 22.97%

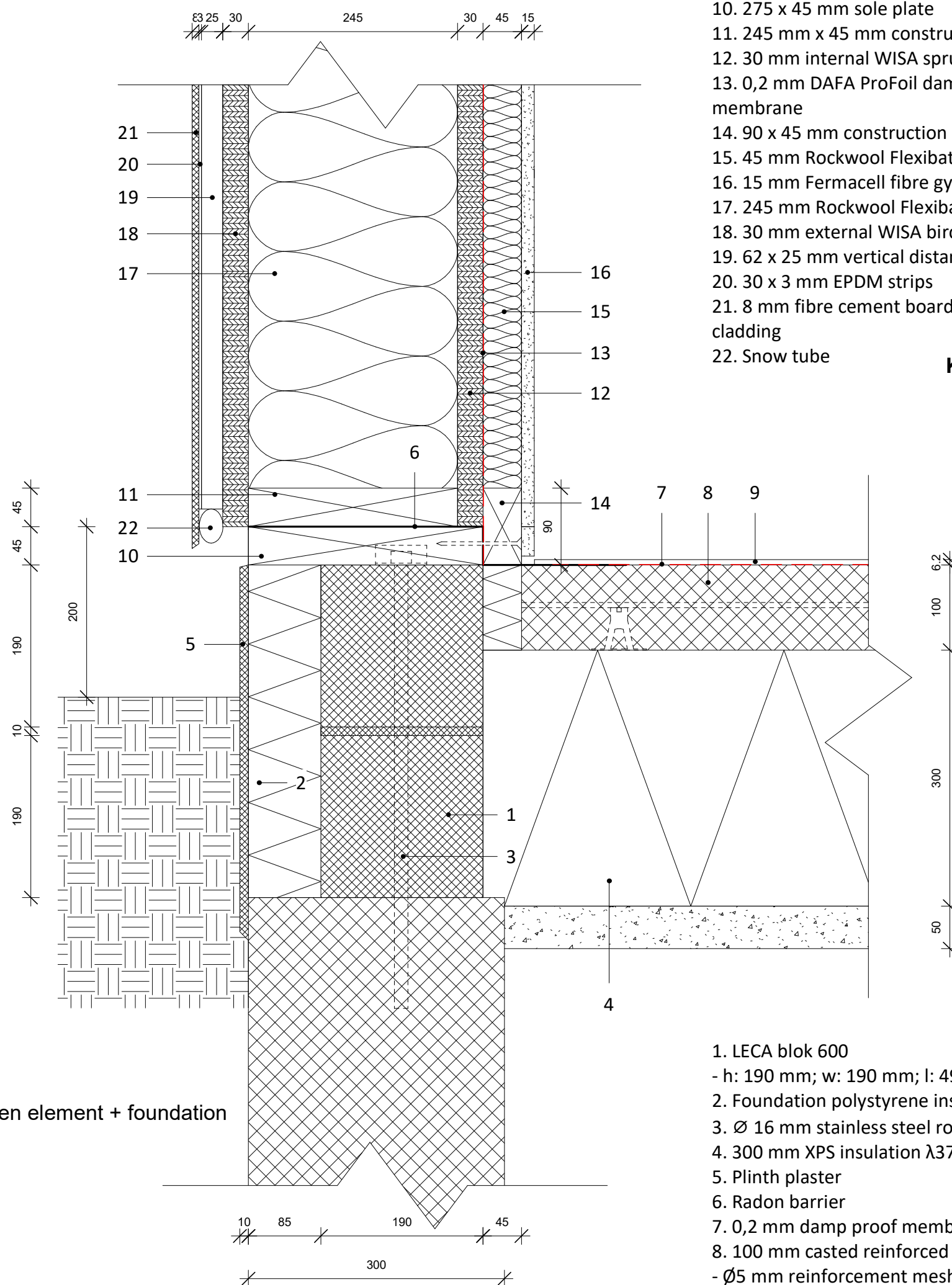
The rest can be used in element E3/E4.



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PROJECT: Production of wooden element E4/E5	DATE: 01/05/19	018
SUBJECT: Cutting list - external plywood	SCALE: 1 : 20	
DRAWN BY: Carina Pronsaia (group 5)	CLASS: AH31-A18	



K01_TXX_H5_E0_N01

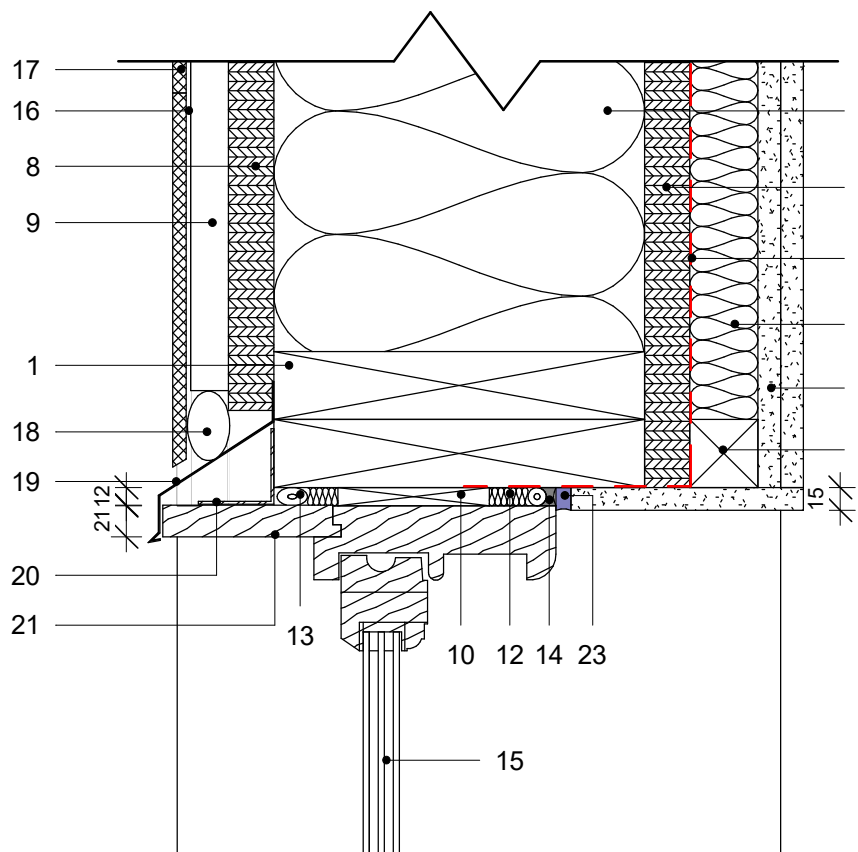
Wooden element + foundation
1 : 5



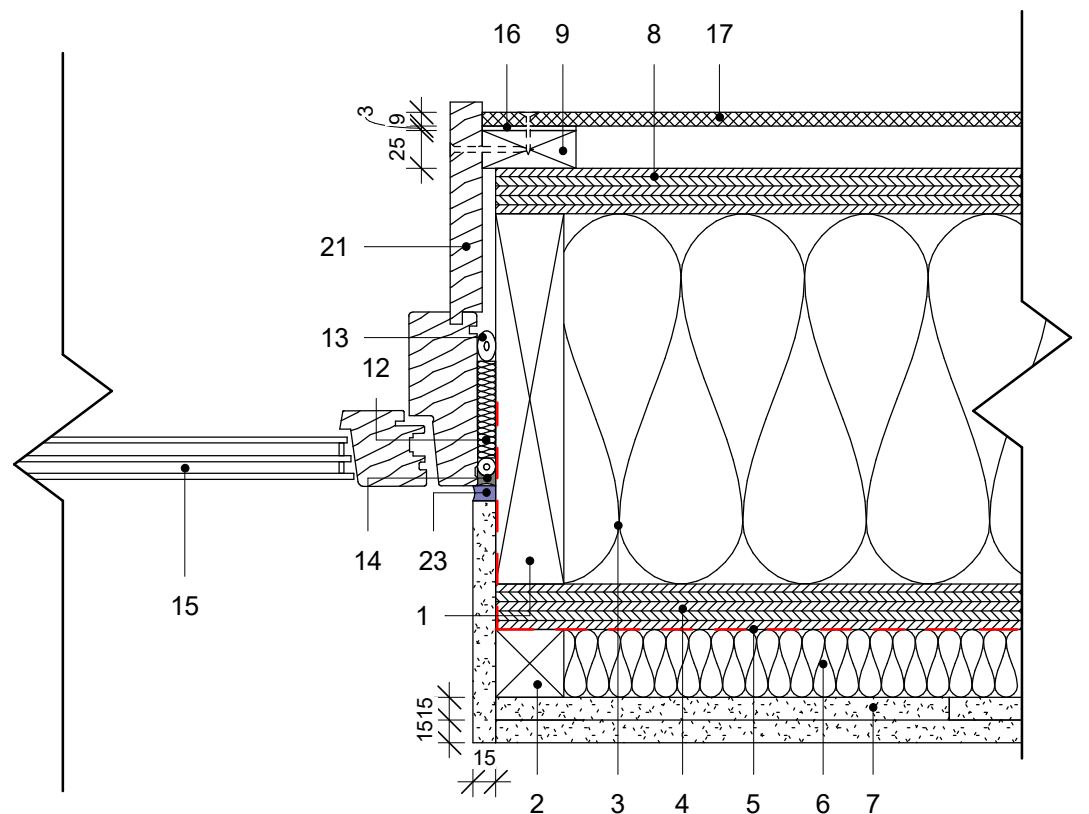
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Campus INDAST BY

PROJECT: Grejs Kulturcenter	DATE: 12/14/18	K01_TXX_H5_E0_N01
SUBJECT: Wooden element + foundation	SCALE: 1 : 5	
DRAWN BY: Agata Ostrowska (Group 5)	CLASS: AH31-A18	

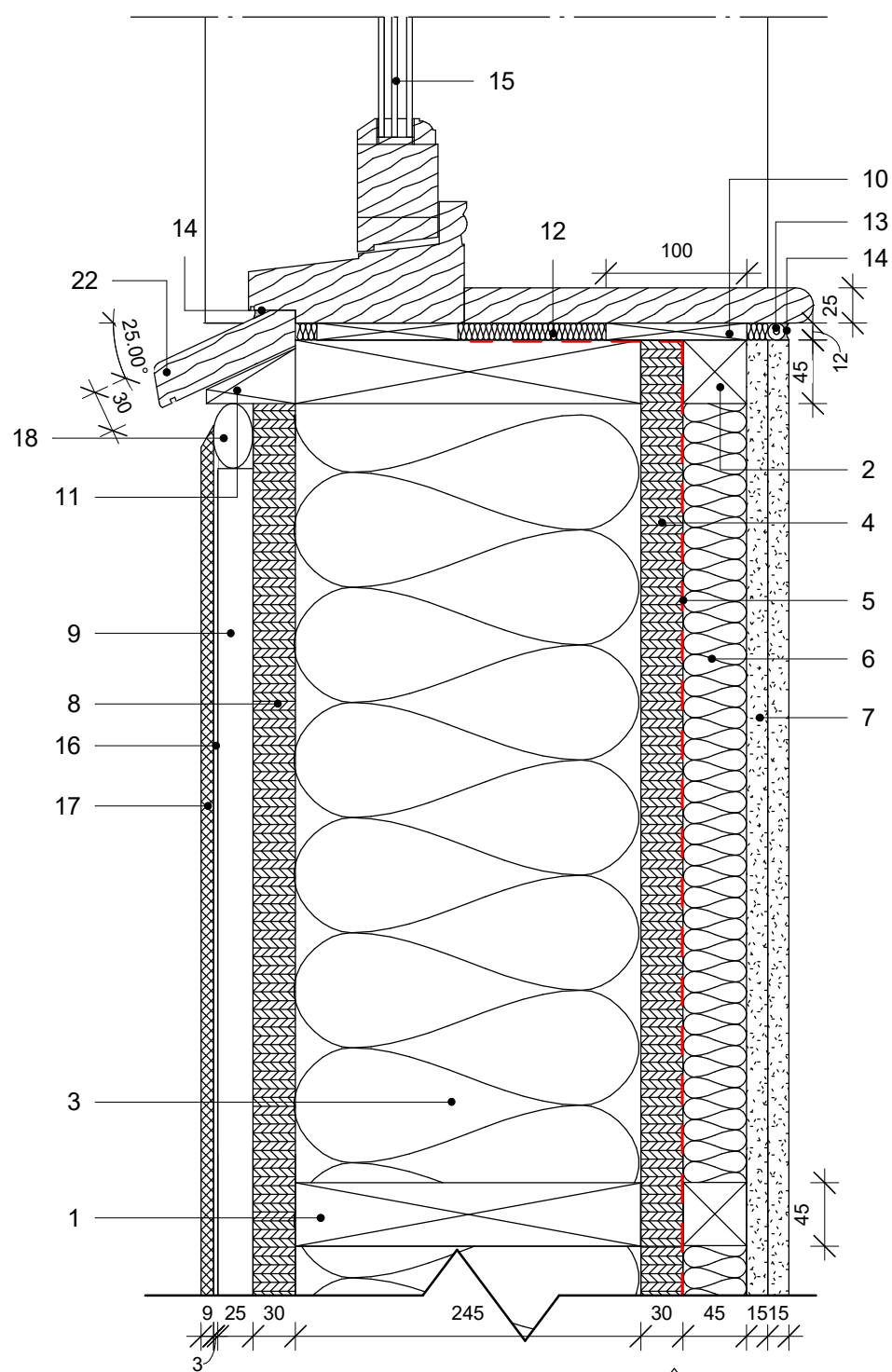


Top view
1 : 5



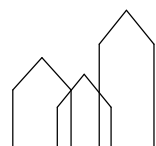
02 Groundfloor, side of window
1 : 5

K01_TXX_H7_EX_N02



Bottom view
1 : 5

1. 245 x 45 mm construction timber stud
2. 45 x 45 mm construction timber stud
3. 245 mm Rockwool Flexibatts $\lambda 34$
4. 30 mm internal WISA spruce plywood
5. 0,2 mm DAFA ProFoil damp proof membrane
6. 45 mm Rockwool Flexibatts $\lambda 34$
7. 15 mm Fermacell fibre gypsum board
8. 30 mm external WISA birch special plywood
9. 25 x 125 mm vertical distance strips
10. 12 x 100 mm timber piece for window and indoor sill support
11. 63 mm timber piece as support for outdoor sill
12. Caulking with mineral wool
13. Polyethylene sealant backer rod
14. Weather-proof silicone sealant
15. Tripple glazed window in wooden frame
16. 30 x 3 mm EPDM strips
17. 8 mm fibre cement boards as rainscreen cladding
18. Snow tube
19. Metal flashing
20. 50 x 50 x 35 x 2 mm Simpson Strong-Tie bracket fixed with 8 CSA5 $\varnothing 5$ mm bracket screws
21. 21 mm wooden casing
22. Treated wooden outdoor sill with 30 mm overhang
23. Acrylic sealant



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PROJECT: Kulturcenter	DATE: 12/07/18	K01_TXX_H7_EX_N02
SUBJECT: Detail - window	SCALE: 1 : 5	
DRAWN BY: Carina Pronsaia (group 5)	CLASS: AH31-A18	

CALCULATION OF POINT OF GRAVITY

MATERIAL	PART	WIDTH (x)	THICKNESS (z)	HEIGHT (y)	PROPORTION [distance]	VOLUME m ³	DENSITY [kN/m ³]	WEIGHT [kN]
EPDM	A1	1,000	0,003	1,000	-	0,003	14,30	0,043
Distance strips	A1	0,062	0,025	1,000	0,600	0,003	4,50	0,012
Birch special plywood	A1	1,000	0,030	1,000	-	0,030	6,50	0,195
External framework	A1	0,090	0,245	1,000	0,600	0,037	4,50	0,165
Batt insulation	A1	0,550	0,245	1,000	0,550	0,245	0,30	0,074
Spruce plywood	A1	1,000	0,030	1,000	-	0,030	6,50	0,195
Internal framework	A1	0,045	0,045	1,000	0,600	0,003	4,50	0,015
Batt insulation	A1	0,550	0,245	1,000	0,550	0,245	0,30	0,074
Fibre gypsum boards	A1	1,000	0,015	1,000	-	0,015	11,50	0,173
							Σ (weight):	0,945

DISTANCE TO CENTER [m]		
d (x)	d (z)	d (y)
0,345	0,197	1,830

w x d (x,z,y)		
w x d (x)	w x d (z)	w x d (y)
0,326	0,186	1,729

w x d (x,z,y)		
w x d (x)	w x d (z)	w x d (y)
0,823	0,469	4,365

MATERIAL	PART	WIDTH (x)	THICKNESS (z)	HEIGHT (y)	PROPORTION [distance]	VOLUME m ³	DENSITY [kN/m ³]	WEIGHT [kN]
EPDM	A2	1,000	0,003	1,000	-	0,003	14,30	0,043
Distance strips	A2	0,062	0,025	1,000	0,437	0,004	4,50	0,016
Birch special plywood	A2	1,000	0,030	1,000	-	0,030	6,50	0,195
External framework	A2	0,045	0,245	1,000	0,429	0,026	4,50	0,116
Batt insulation	A2	0,384	0,245	1,000	0,384	0,245	0,30	0,074
Spruce plywood	A2	1,000	0,030	1,000	-	0,030	6,50	0,195
Internal framework	A2	0,045	0,045	1,000	0,429	0,005	4,50	0,021
Batt insulation	A2	0,384	0,245	1,000	0,384	0,245	0,30	0,074
Fibre gypsum boards	A2	1,000	0,015	1,000	-	0,015	11,50	0,173
							Σ (weight):	0,906

DISTANCE TO CENTER [m]		
d (x)	d (z)	d (y)
1,296	0,197	0,749

w x d (x,z,y)		
w x d (x)	w x d (z)	w x d (y)
1,174	0,178	0,678

w x d (x,z,y)		
w x d (x)	w x d (z)	w x d (y)
2,130	0,323	1,231

MATERIAL	PART	WIDTH (x)	THICKNESS (z)	HEIGHT (y)	PROPORTION [distance]	VOLUME m ³	DENSITY [kN/m ³]	WEIGHT [kN]
EPDM	A3	1,000	0,003	1,000	-	0,003	14,30	0,043
Distance strips	A3	0,062	0,025	1,000	0,437	0,004	4,50	0,016
Birch special plywood	A3	1,000	0,030	1,000	-	0,030	6,50	0,195
External framework	A3	0,045	0,245	1,000	0,429	0,026	4,50	0,116
Batt insulation	A3	0,384	0,245	1,000	0,384	0,245	0,30	0,074
Spruce plywood	A3	1,000	0,030	1,000	-	0,030	6,50	0,195
Internal framework	A3	0,045	0,045	1,000	0,429	0,005	4,50	0,021
Batt insulation	A3	0,384	0,245	1,000	0,384	0,245	0,30	0,074
Fibre gypsum boards	A3	1,000	0,015	1,000	-	0,015	11,50	0,173
							Σ (weight):	0,906

DISTANCE TO CENTER [m]		
d (x)	d (z)	d (y)
1,296	0,197	3,035

w x d (x,z,y)		
w x d (x)	w x d (z)	w x d (y)
1,174	0,178	2,748

w x d (x,z,y)		
w x d (x)	w x d (z)	w x d (y)
1,778	0,270	4,164

MATERIAL	PART	WIDTH (x)	THICKNESS (z)	HEIGHT (y)	PROPORTION [distance]	VOLUME m ³	DENSITY [kN/m ³]	WEIGHT [kN]
EPDM	A4	1,000	0,003	1,000	-	0,003	14,30	0,043
Distance strips	A4	0,062	0,025	1,000	0,436	0,004	4,50	0,016
Birch special plywood	A4	1,000	0,030	1,000	-	0,030	6,50	0,195
External framework	A4	0,045	0,245	1,000	0,453	0,024	4,50	0,110
Batt insulation	A4	0,408	0,245	1,000	0,408	0,245	0,30	0,074
Spruce plywood	A4	1,000	0,030	1,000	-	0,030	6,50	0,195
Internal framework	A4	0,045	0,045	1,000	0,453	0,004	4,50	0,020
Batt insulation	A4	0,408	0,245	1,000	0,408	0,245	0,30	0,074
Fibre gypsum boards	A4	1,000	0,015	1,000	-	0,015	11,50	0,173
							Σ (weight):	0,898

DISTANCE TO CENTER [m]		
d (x)	d (z)	d (y)
2,151	0,197	1,830

w x d (x,z,y)		
w x d (x)	w x d (z)	w x d (y)
1,932	0,177	1,643

w x d (x,z,y)		
w x d (x)	w x d (z)	w x d (y)
3,521	0,323	2,996

MATERIAL	PART	WIDTH (x)	THICKNESS (z)	HEIGHT (y)	PROPORTION [distance]	VOLUME m ³	DENSITY [kN/m ³]	WEIGHT [kN]
EPDM	A5	1,000	0,003	1,000	-	0,003	14,30	0,043
Distance strips	A5	0,062	0,025	1,000	0,437	0,004	4,50	0,016
Birch special plywood	A5	1,000	0,030	1,000	-	0,030	6,50	0,195
External framework	A5	0,045	0,170	1,000	0,500	0,015	4,50	0,069
Batt insulation	A5	0,450	0,170	1,000	0,450	0,170	0,30	0,051
Spruce plywood	A5	1,000	0,030	1,000	-	0,030	6,50	0,195
Σ (weight):								0,569

DISTANCE TO CENTER [m]		
d (x)	d (z)	d (y)
1,178	0,129	4,005

w x d (x,z,y)		
w x d (x)	w x d (z)	w x d (y)
0,670	0,073	2,278

w x d (x,z,y)		
w x d (x)	w x d (z)	w x d (y)
1,017	0,111	3,460

Area A1 [m ²]	2,525
Area A2 [m ²]	1,815
Area A3 [m ²]	1,515
Area A4 [m ²]	1,823
Area A5 [m ²]	1,519
weight A1 [kN]	2,385
weight A2 [kN]	1,644
weight A3 [kN]	1,372
weight A4 [kN]	1,637
weight A5 [kN]	0,864

total weight	7,902
Σ w x d (x)	9,270
Σ w x d (z)	1,495
Σ w x d (y)	16,215

x	P _g = (Σd x w) / Σw	
	P _g =	1,173
z	P _g = (Σd x w) / Σw	
	P _g =	0,189
y	P _g = (Σd x w) / Σw	
	P _g =	2,052

U-VALUE: WOODEN ELEMENT E4/E5

LAYER	d [m]	λ [W/mK]	$R = d / \lambda$ [m ² K/W]	Reference
R _{si}			0,130	DS418 p. 23
Gypsum	0,03	0,32	0,094	Fermacell
Internal frame + insulation	0,045	0,049	0,918	DS418 + Rockwool
Internal plywood	0,03	0,165	0,182	DS418 p. 84
Framework	0,245	0,049	5,000	DS418 + Rockwool
External plywood	0,03	0,165	0,182	DS418 p. 84
R _{se}			0,040	DS418 p. 23
			$\Sigma R = 6,546$	

$1/U' = 6,546$
$U' = U = 0,1528$
$= 0,15$

λ INTERNAL FRAME	
total area [m ²]:	7,408
area of studs [m ²]:	1,327
% of wood:	17,913
% of insulation:	82,087
$\lambda = 0,049$	

λ EXTERNAL FRAME	
total area [m ²]:	7,408
area of studs [m ²]:	1,327
% of wood:	17,913
% of insulation:	82,087
$\lambda = 0,049$	

1. Moisture Analysis - steady-state diffusion analysis

1.1. Introduction

This rapport is divided into 1) Input data, 2) Output overview 3) Output details and 4) Nomenclature

Input data consists of two parts; 1) the material data for a building envelope and its surface resistances and 2) exterior conditions as monthly mean for interior and exterior temperatures and relative humidities and a moisture class (1-5) according to DS/EN ISO 13788. If not given, the moisture class will be shown as 0.

Output overview consists of data for the relative humidity on the internal surface for each of the 12 months. In order to minimise the risk of mould growth this value has to be less than 80% according to DS/EN ISO 13788 and less than 75% according to SBI-216, the guideline for the Danish Building Regulations.

The start month is calculated according to DS/EN ISO 13788 as the first month with accumulated water and this can be seen as the presented order of data in tables. If all 12 months are without dewpoints or every of the 12 months have dewpoints then January is selected as the start month

If the calculation reveals any dew point then accumulated water on the given month and a total counting from the start month will be given. Further, up to four charts showing the accumulated water for individual dew points will be visible.

Output details consists of charts for relative humidity, temperature, vapour pressure as a function of accumulated thickness and vapour pressure as a function of accumulated vapour resistance. The latter is specially interesting because the vapour pressure curve will be a straight line if no dew points. Values are also presented in tables (please see nomenclature for descriptions and units for the individual data columns).

Note that layers with relatively high thermal resistances is subdivided into equally sized layers according to the guideline in DS/EN ISO 13788. Showing all subdivided layers will only be relevant if there is a dew point between two of these layers and thus, the presented data may differ in amount of layers in the individual months.

Nomenclature presents descriptions and units for table and chart data.

2. Input data

2.1. Building Envelope

Material layer	s	λ	R	d	Z
Internal surface			0.25		
Fibre gypsum board	15	0.32	0.046875	0.001875	8
Non-loadbearing insulation	45	0.034	1.324	0.125	0.36
DPM	0.2	1	2E-4	5.333E-7	375
Internal spruce plywood	30	0.12	0.25	0.002	15
Loadbearing insulation	245	0.034	7.206	0.125	1.96
External birch special plywood	30	0.12	0.25	0.002	15
External surface			0.04		

s = Thickness (mm)

λ = Thermal conductivity (W / (m · °C))

R = Thermal resistance (m²·°C / W)

d = Permability (kg / (m·s·GPa))

Z = Vapour resistance (GPa·m²·s / kg)

2.2. External conditions

Month	t_e	φ_e	t_i	φ_i	Moisture
January	-0.4	91.0	20.0	35.7	1
February	-0.5	90.0	20.0	35.3	1
March	1.8	86.0	20.0	37.2	1
April	5.5	77.0	20.0	39.0	1
May	10.7	73.0	20.0	46.1	1
June	14.0	75.0	20.0	55.1	1
July	15.1	76.0	20.0	58.9	1
August	15.1	76.0	20.0	58.9	1
September	12.0	82.0	20.0	54.3	1
October	8.5	86.0	20.0	48.1	1
November	4.2	89.0	20.0	41.4	1
December	1.2	91.0	20.0	73.7	1

t_e = External temperature (°C)

φ_u = External relative humidity (%)

t_i = Internal temperature (°C)

ϕ_i = Internal relative humidity (%)

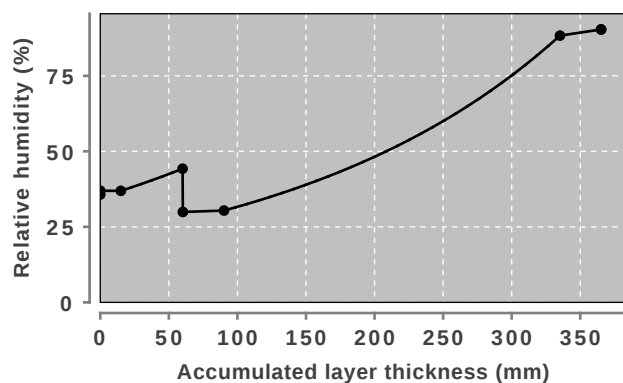
3. Output overview

	φ_{is}
January	37
February	36
March	38
April	40
May	47
June	56
July	59
August	59
September	55
October	49
November	43
December	76

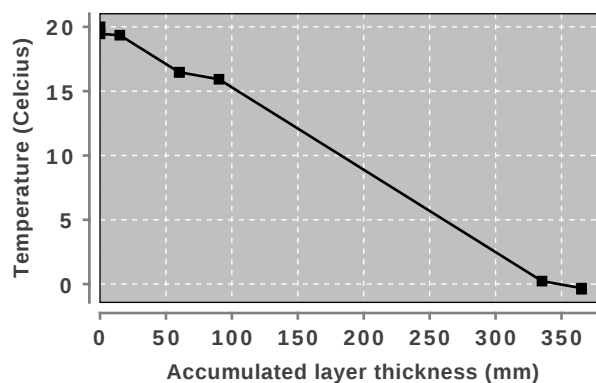
4. Output details

4.1. January

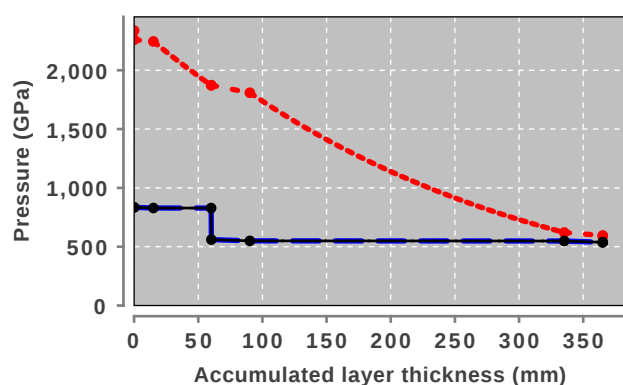
Relative humidity



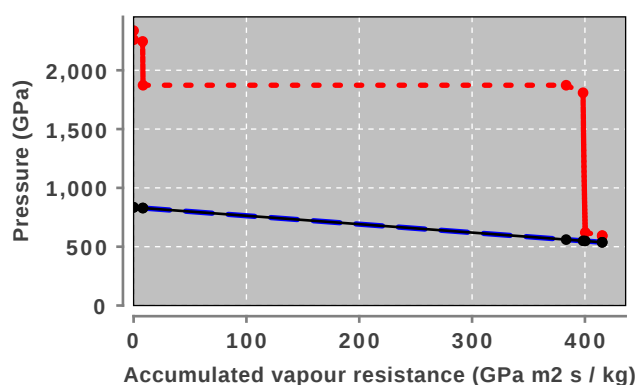
Temperature



Vapour Pressure



Vapour Pressure

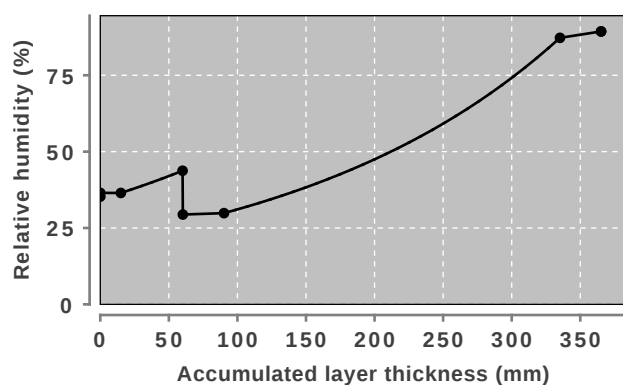


(full line: Vapour pressure P , - - - dashed line: Simulated vapour pressure P_0 , dotted line: Satuation vapour pressure P_{sat})

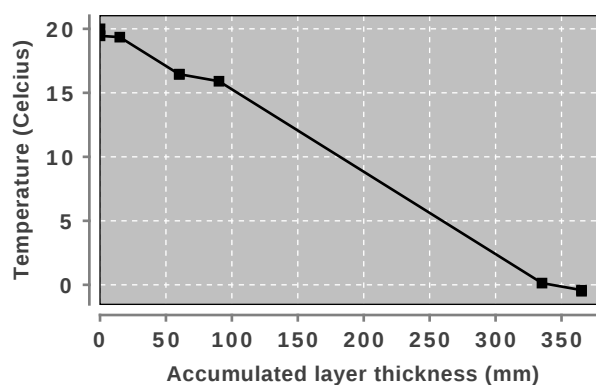
Interface	Σs	ΣZ	t	P_0	P	P_{sat}	ϕ	Δc	c
Internal	0	0.0	20.0	835	835	2337	36	0	0
Internal surface	0	0.0	19.5	835	835	2259	37	0	0
Fibre gypsum b... / Non-loadbearin...	15	8.0	19.4	829	829	2245	37	0	0
Non-loadbearing insulation / DPM	60	8.36	16.5	829	829	1873	44	0	0
DPM / Internal spruce plywood	60	383.3 6	16.5	560	560	1873	30	0	0
Internal spruc... / Loadbearing in...	90	398.3 6	15.9	550	550	1809	30	0	0
Loadbearing in... / External birch...	335	400.3 2	0.2	548	548	621	88	0	0
External surface	365	415.3 2	-0.3	538	538	595	90	0	0
External	365	415.3 2	-0.4	538	538	591	91	0	0

4.2. February

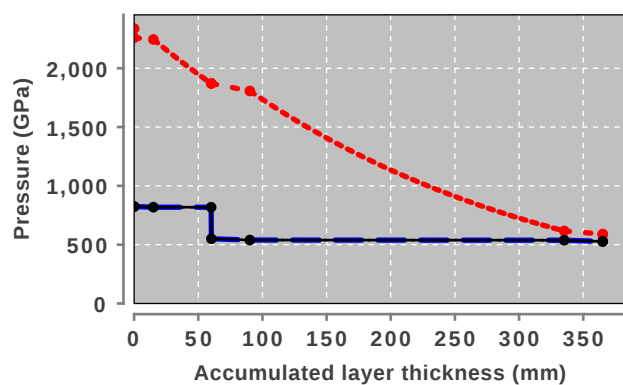
Relative humidity



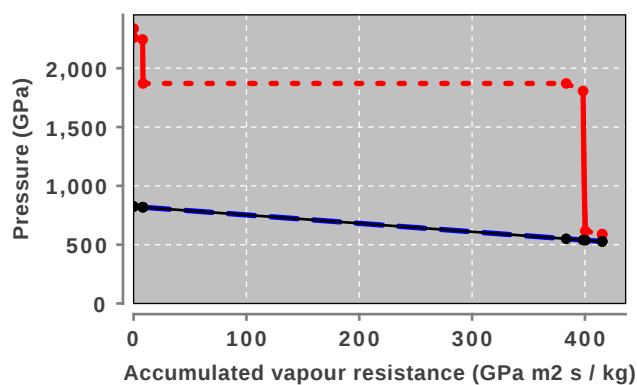
Temperature



Vapour Pressure



Vapour Pressure

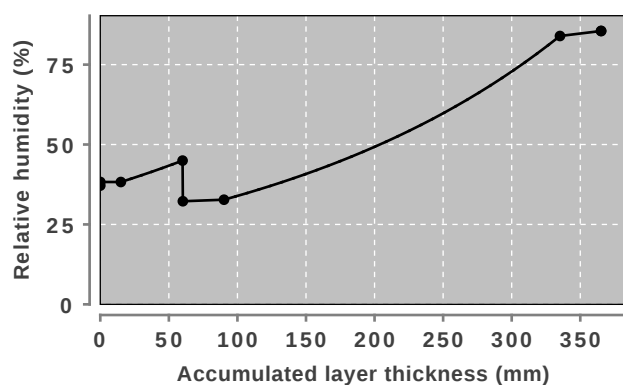


(full line: Vapour pressure P , - - - dashed line: Simulated vapour pressure P_0 , dotted line: Saturation vapour pressure P_{sat})

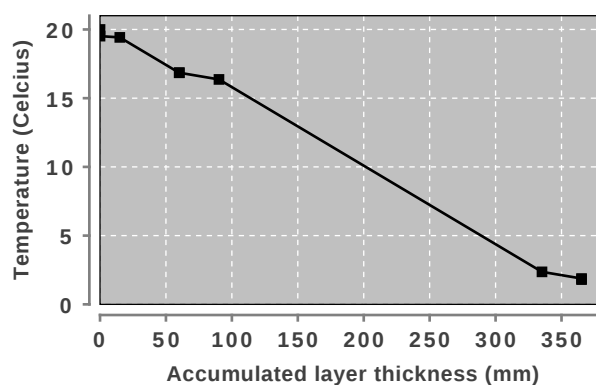
Interface	Σs	ΣZ	t	P_0	P	P_{sat}	ϕ	Δc	c
Internal	0	0.0	20.0	824	824	2337	35	0	0
Internal surface	0	0.0	19.5	824	824	2259	36	0	0
Fibre gypsum b... / Non-loadbearin...	15	8.0	19.4	819	819	2245	36	0	0
Non-loadbearing insulation / DPM	60	8.36	16.5	818	818	1871	44	0	0
DPM / Internal spruce plywood	60	383.3 6	16.5	550	550	1871	29	0	0
Internal spruc... / Loadbearing in...	90	398.3 6	15.9	539	539	1806	30	0	0
Loadbearing in... / External birch...	335	400.3 2	0.1	538	538	617	87	0	0
External surface	365	415.3 2	-0.4	527	527	590	89	0	0
External	365	415.3 2	-0.5	527	527	586	90	0	0

4.3. March

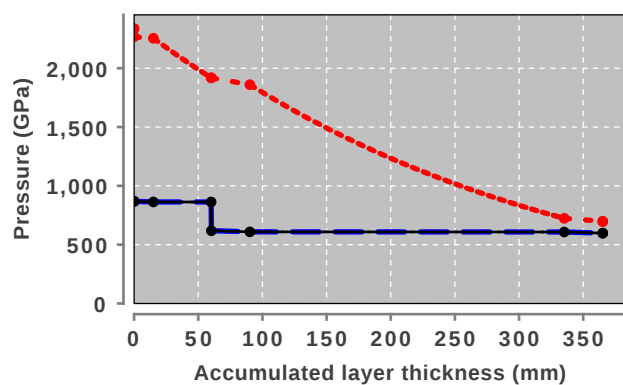
Relative humidity



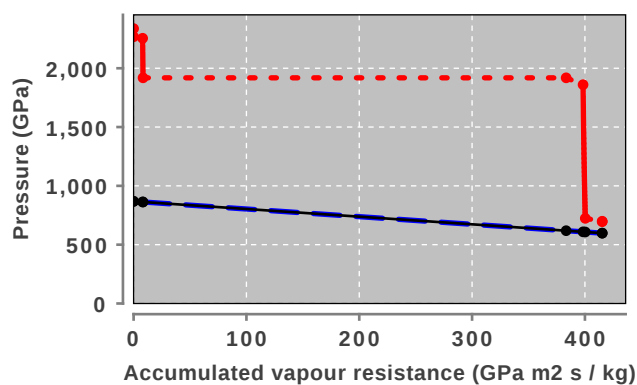
Temperature



Vapour Pressure



Vapour Pressure

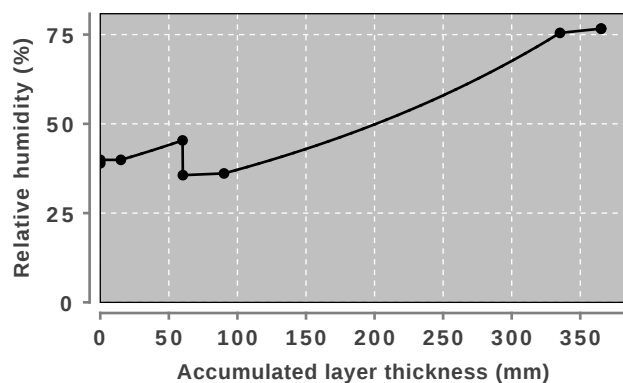


(full line: Vapour pressure P , - - - dashed line: Simulated vapour pressure P_0 , dotted line: Saturation vapour pressure P_{sat})

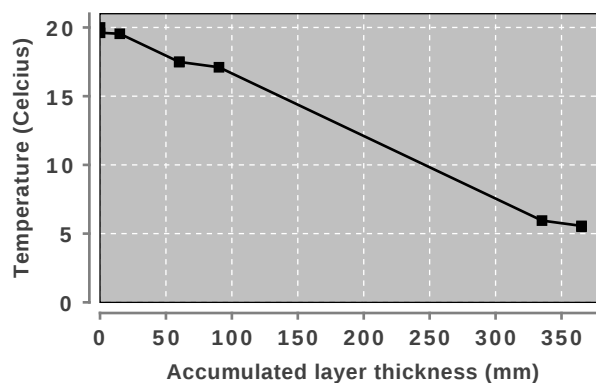
Interface	Σs	ΣZ	t	P_0	P	P_{sat}	ϕ	Δc	c
Internal	0	0.0	20.0	868	868	2337	37	0	0
Internal surface	0	0.0	19.5	868	868	2268	38	0	0
Fibre gypsum b... / Non-loadbearin...	15	8.0	19.4	863	863	2255	38	0	0
Non-loadbearing insulation / DPM	60	8.36	16.9	863	863	1918	45	0	0
DPM / Internal spruce plywood	60	383.3 6	16.9	619	619	1918	32	0	0
Internal spruc... / Loadbearing in...	90	398.3 6	16.4	609	609	1860	33	0	0
Loadbearing in... / External birch...	335	400.3 2	2.4	608	608	724	84	0	0
External surface	365	415.3 2	1.9	598	598	699	86	0	0
External	365	415.3 2	1.8	598	598	695	86	0	0

4.4. April

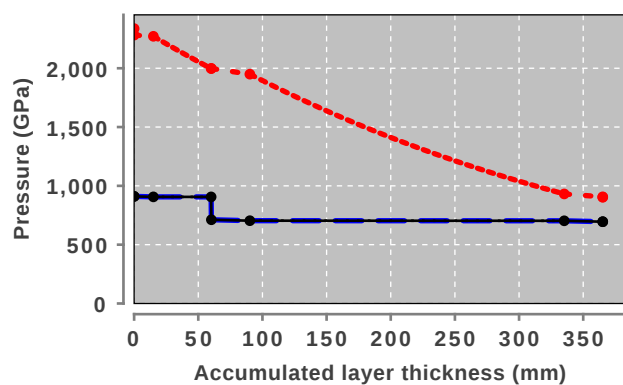
Relative humidity



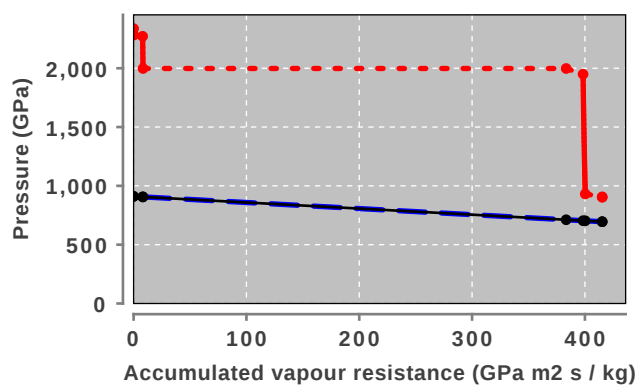
Temperature



Vapour Pressure



Vapour Pressure

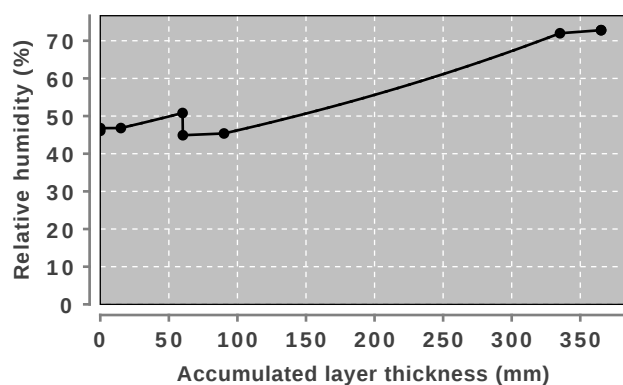


(full line: Vapour pressure P , - - - dashed line: Simulated vapour pressure P_0 , dotted line: Saturation vapour pressure P_{sat})

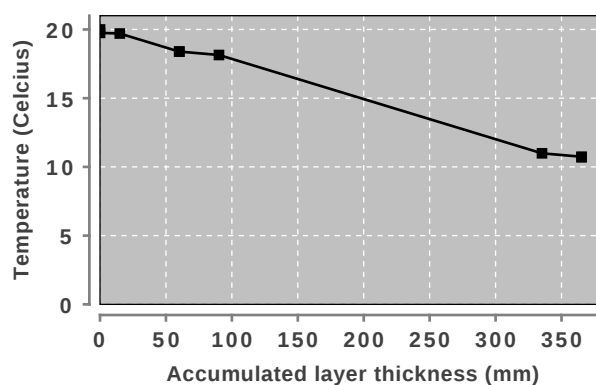
Interface	Σs	ΣZ	t	P_0	P	P_{sat}	ϕ	Δc	c
Internal	0	0.0	20.0	910	910	2337	39	0	0
Internal surface	0	0.0	19.6	910	910	2282	40	0	0
Fibre gypsum b... / Non-loadbearin...	15	8.0	19.5	906	906	2271	40	0	0
Non-loadbearing insulation / DPM	60	8.36	17.5	906	906	1998	45	0	0
DPM / Internal spruce plywood	60	383.3 6	17.5	712	712	1998	36	0	0
Internal spruc... / Loadbearing in...	90	398.3 6	17.1	704	704	1949	36	0	0
Loadbearing in... / External birch...	335	400.3 2	5.9	703	703	931	75	0	0
External surface	365	415.3 2	5.6	695	695	907	77	0	0
External	365	415.3 2	5.5	695	695	903	77	0	0

4.5. May

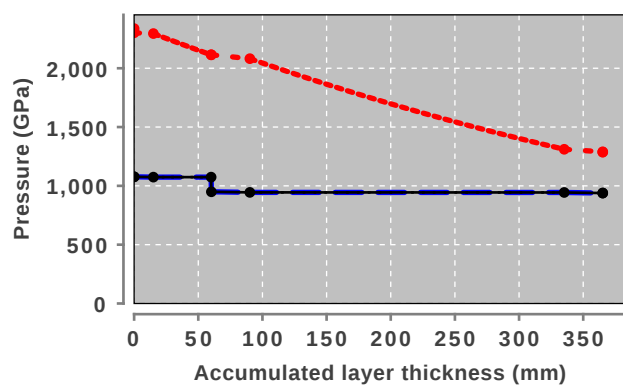
Relative humidity



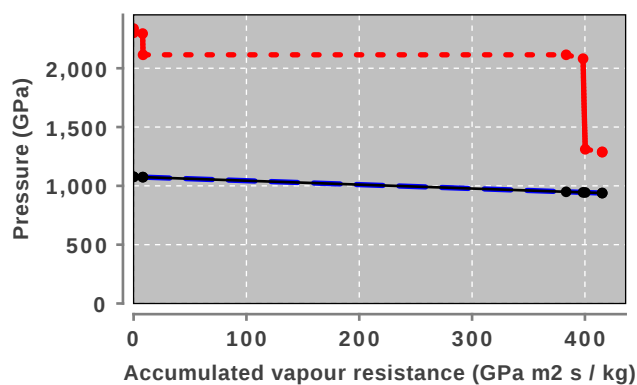
Temperature



Vapour Pressure



Vapour Pressure

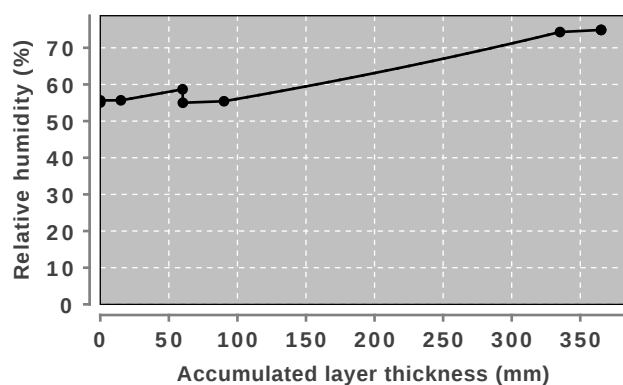


(full line: Vapour pressure P , - - - dashed line: Simulated vapour pressure P_0 , dotted line: Saturation vapour pressure P_{sat})

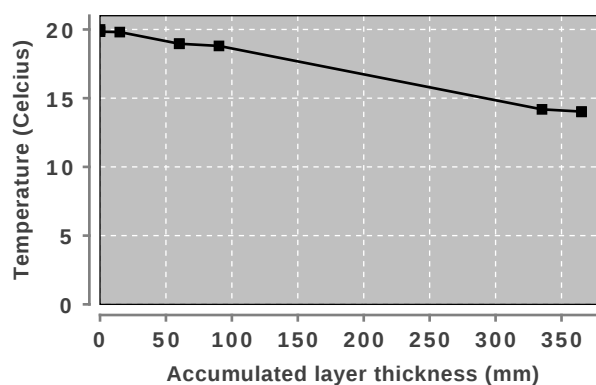
Interface	Σs	ΣZ	t	P_0	P	P_{sat}	ϕ	Δc	c
Internal	0	0.0	20.0	1077	1077	2337	46	0	0
Internal surface	0	0.0	19.8	1077	1077	2301	47	0	0
Fibre gypsum b... / Non-loadbearin...	15	8.0	19.7	1074	1074	2295	47	0	0
Non-loadbearing insulation / DPM	60	8.36	18.4	1074	1074	2114	51	0	0
DPM / Internal spruce plywood	60	383.36	18.4	949	949	2114	45	0	0
Internal spruc... / Loadbearing in...	90	398.36	18.1	944	944	2081	45	0	0
Loadbearing in... / External birch...	335	400.32	11.0	944	944	1311	72	0	0
External surface	365	415.32	10.7	939	939	1289	73	0	0
External	365	415.32	10.7	939	939	1286	73	0	0

4.6. June

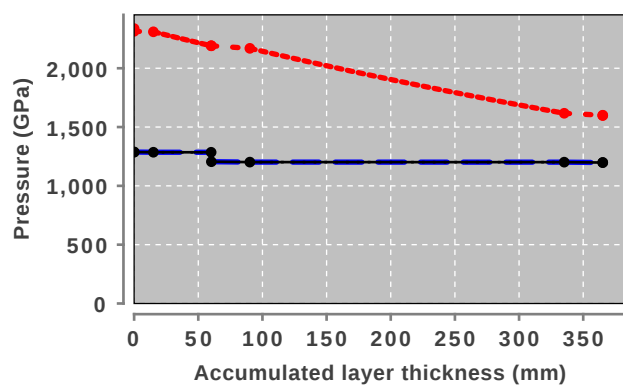
Relative humidity



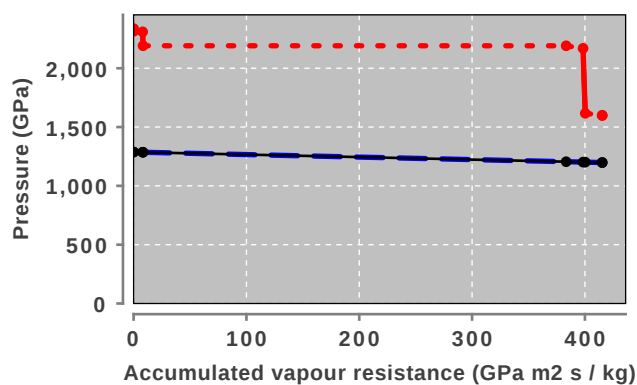
Temperature



Vapour Pressure



Vapour Pressure

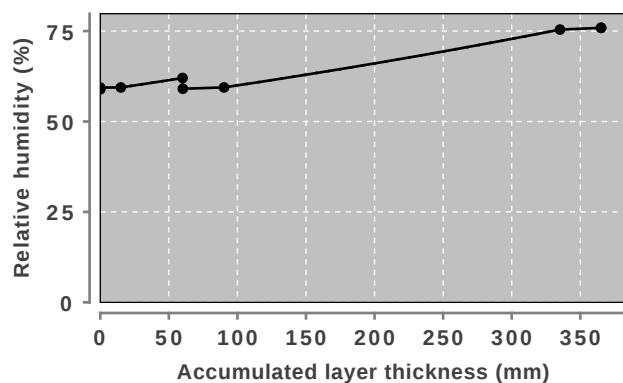


(full line: Vapour pressure P , - - - dashed line: Simulated vapour pressure P_0 , dotted line: Saturation vapour pressure P_{sat})

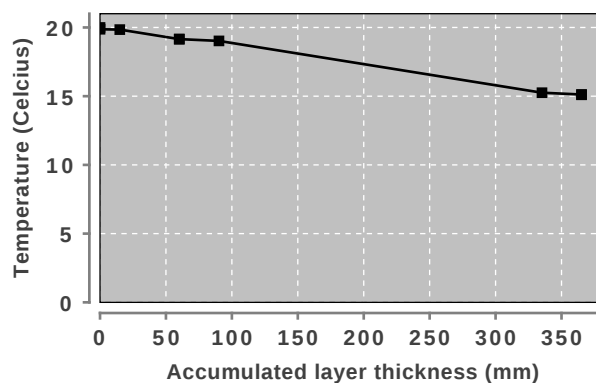
Interface	Σs	ΣZ	t	P_0	P	P_{sat}	ϕ	Δc	c
Internal	0	0.0	20.0	1287	1287	2337	55	0	0
Internal surface	0	0.0	19.8	1287	1287	2314	56	0	0
Fibre gypsum b... / Non-loadbearin...	15	8.0	19.8	1286	1286	2310	56	0	0
Non-loadbearing insulation / DPM	60	8.36	19.0	1286	1286	2191	59	0	0
DPM / Internal spruce plywood	60	383.36	19.0	1205	1205	2191	55	0	0
Internal spruc... / Loadbearing in...	90	398.36	18.8	1202	1202	2169	55	0	0
Loadbearing in... / External birch...	335	400.32	14.2	1202	1202	1617	74	0	0
External surface	365	415.32	14.0	1198	1198	1600	75	0	0
External	365	415.32	14.0	1198	1198	1598	75	0	0

4.7. July

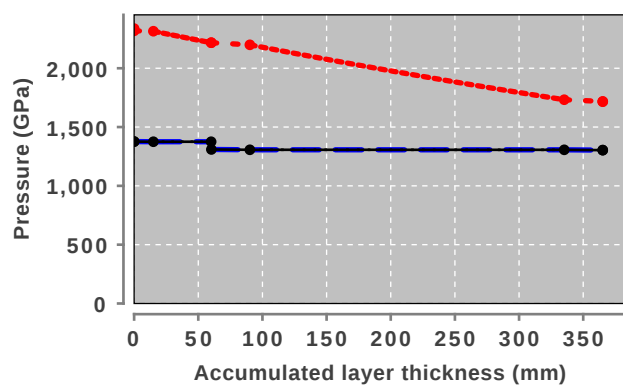
Relative humidity



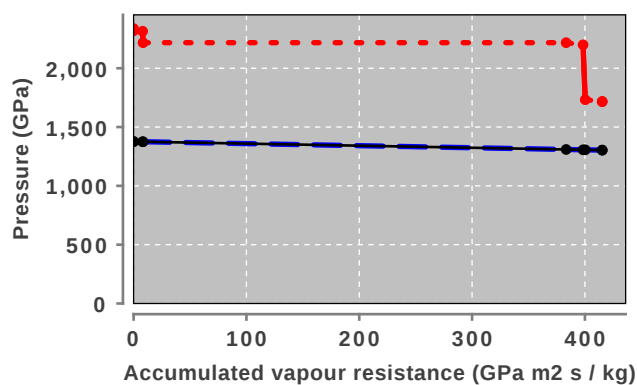
Temperature



Vapour Pressure



Vapour Pressure

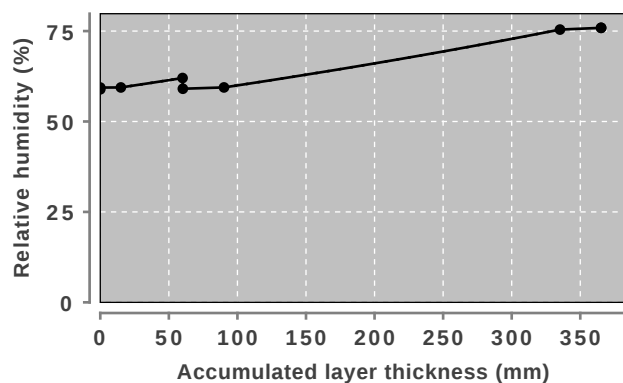


(full line: Vapour pressure P, - - - dashed line: Simulated vapour pressure P_0 , dotted line: Saturation vapour pressure P_{sat})

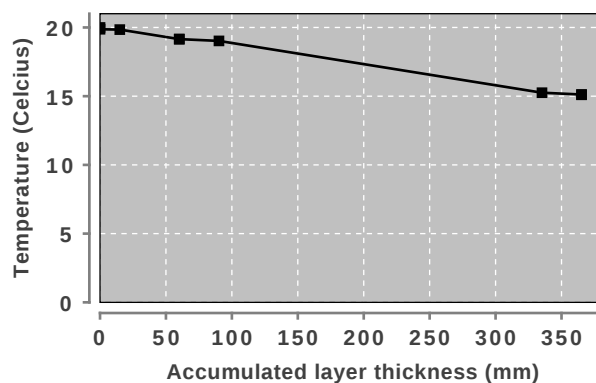
Interface	Σs	ΣZ	t	P_0	P	P_{sat}	ϕ	Δc	c
Internal	0	0.0	20.0	1376	1376	2337	59	0	0
Internal surface	0	0.0	19.9	1376	1376	2318	59	0	0
Fibre gypsum b... / Non-loadbearin...	15	8.0	19.8	1375	1375	2315	59	0	0
Non-loadbearing insulation / DPM	60	8.36	19.2	1375	1375	2217	62	0	0
DPM / Internal spruce plywood	60	383.36	19.2	1309	1309	2217	59	0	0
Internal spruc... / Loadbearing in...	90	398.36	19.0	1307	1307	2199	59	0	0
Loadbearing in... / External birch...	335	400.32	15.3	1306	1306	1732	75	0	0
External surface	365	415.32	15.1	1304	1304	1718	76	0	0
External	365	415.32	15.1	1304	1304	1715	76	0	0

4.8. August

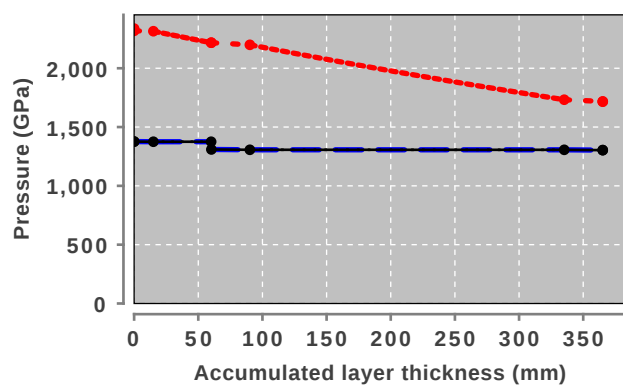
Relative humidity



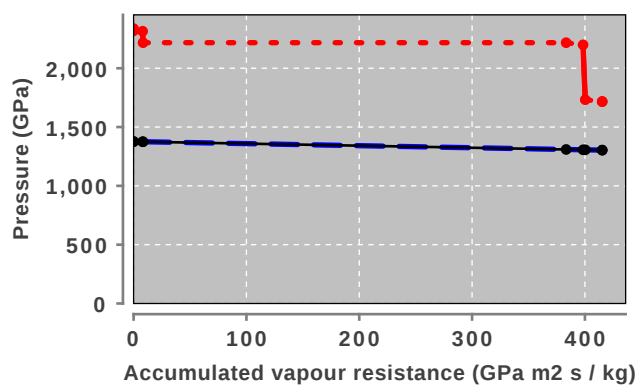
Temperature



Vapour Pressure



Vapour Pressure

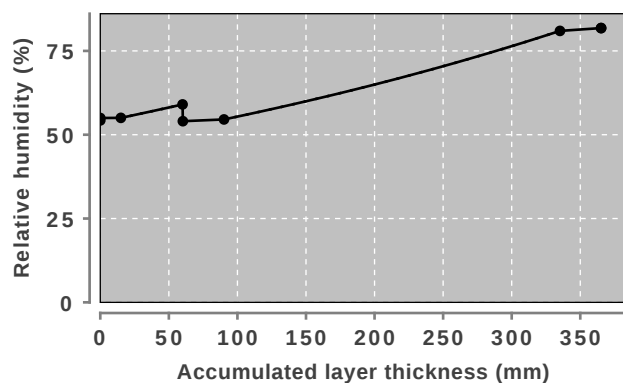


(full line: Vapour pressure P, - - - dashed line: Simulated vapour pressure P_0 , dotted line: Saturation vapour pressure P_{sat})

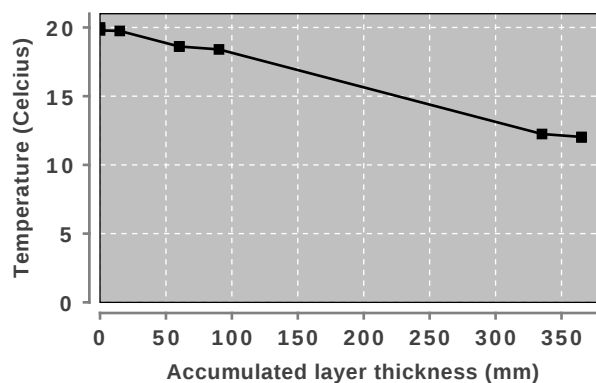
Interface	Σs	ΣZ	t	P_0	P	P_{sat}	ϕ	Δc	c
Internal	0	0.0	20.0	1376	1376	2337	59	0	0
Internal surface	0	0.0	19.9	1376	1376	2318	59	0	0
Fibre gypsum b... / Non-loadbearin...	15	8.0	19.8	1375	1375	2315	59	0	0
Non-loadbearing insulation / DPM	60	8.36	19.2	1375	1375	2217	62	0	0
DPM / Internal spruce plywood	60	383.36	19.2	1309	1309	2217	59	0	0
Internal spruc... / Loadbearing in...	90	398.36	19.0	1307	1307	2199	59	0	0
Loadbearing in... / External birch...	335	400.32	15.3	1306	1306	1732	75	0	0
External surface	365	415.32	15.1	1304	1304	1718	76	0	0
External	365	415.32	15.1	1304	1304	1715	76	0	0

4.9. September

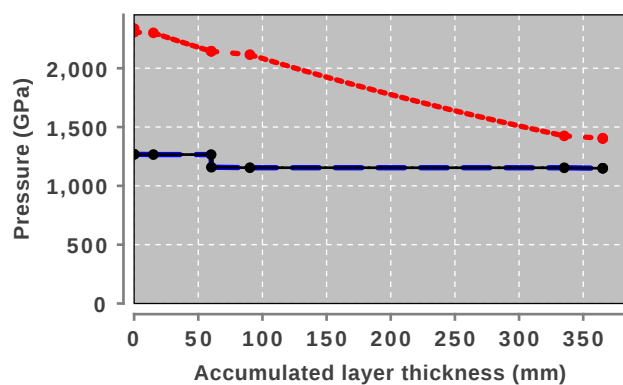
Relative humidity



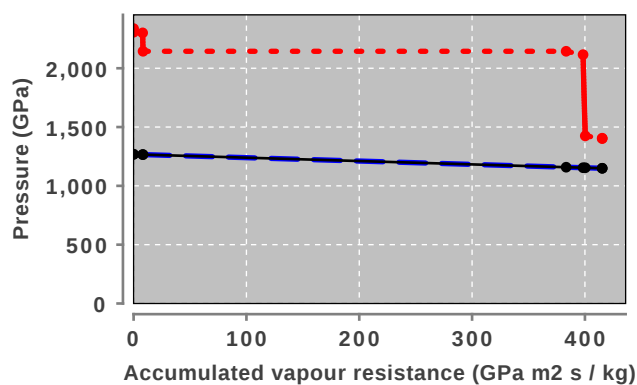
Temperature



Vapour Pressure



Vapour Pressure

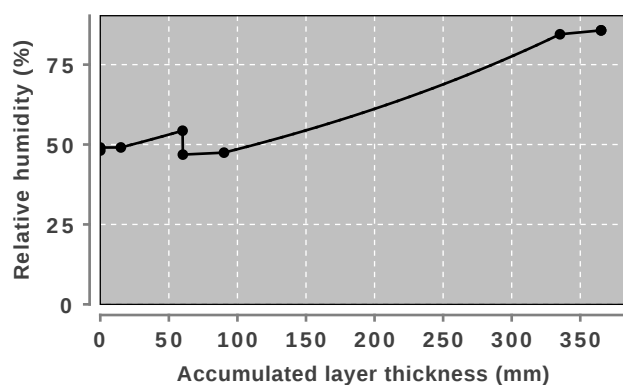


(full line: Vapour pressure P , - - - dashed line: Simulated vapour pressure P_0 , dotted line: Saturation vapour pressure P_{sat})

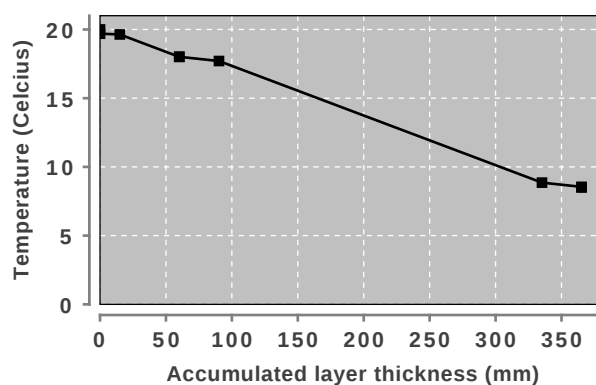
Interface	Σs	ΣZ	t	P_0	P	P_{sat}	ϕ	Δc	c
Internal	0	0.0	20.0	1268	1268	2337	54	0	0
Internal surface	0	0.0	19.8	1268	1268	2306	55	0	0
Fibre gypsum b... / Non-loadbearin...	15	8.0	19.7	1266	1266	2301	55	0	0
Non-loadbearing insulation / DPM	60	8.36	18.6	1266	1266	2144	59	0	0
DPM / Internal spruce plywood	60	383.3 6	18.6	1159	1159	2144	54	0	0
Internal spruc... / Loadbearing in...	90	398.3 6	18.4	1154	1154	2116	55	0	0
Loadbearing in... / External birch...	335	400.3 2	12.2	1154	1154	1425	81	0	0
External surface	365	415.3 2	12.0	1149	1149	1405	82	0	0
External	365	415.3 2	12.0	1149	1149	1402	82	0	0

4.10. October

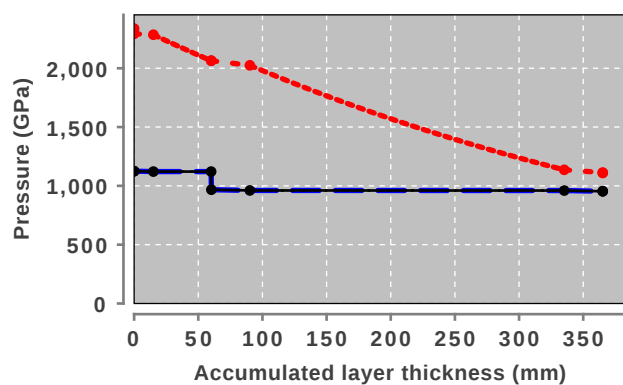
Relative humidity



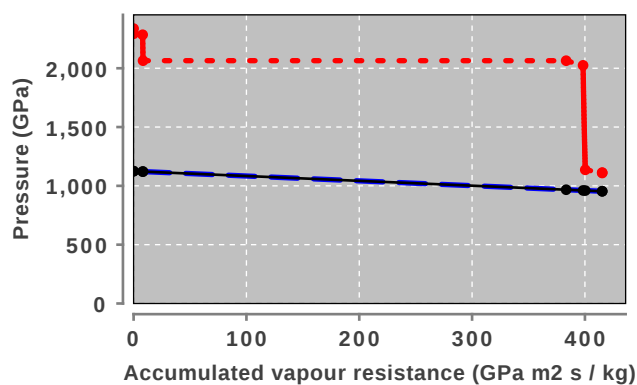
Temperature



Vapour Pressure



Vapour Pressure

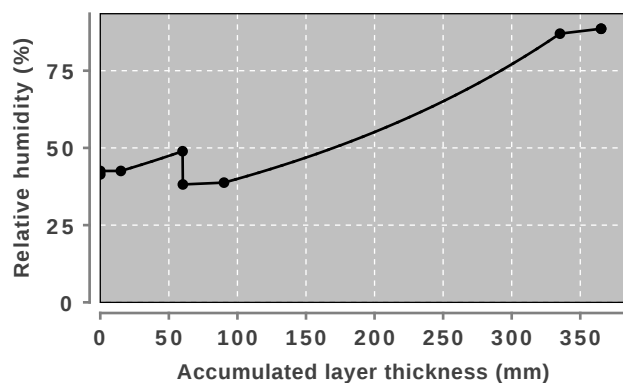


(full line: Vapour pressure P, - - - dashed line: Simulated vapour pressure P_0 , dotted line: Saturation vapour pressure P_{sat})

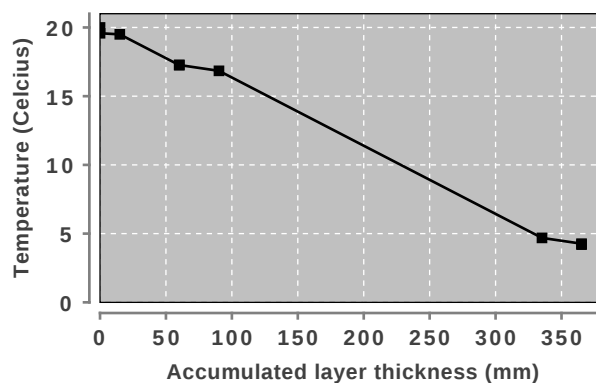
Interface	Σs	ΣZ	t	P_0	P	P_{sat}	ϕ	Δc	c
Internal	0	0.0	20.0	1125	1125	2337	48	0	0
Internal surface	0	0.0	19.7	1125	1125	2293	49	0	0
Fibre gypsum b... / Non-loadbearin...	15	8.0	19.6	1121	1121	2285	49	0	0
Non-loadbearing insulation / DPM	60	8.36	18.0	1121	1121	2064	54	0	0
DPM / Internal spruce plywood	60	383.3 6	18.0	967	967	2064	47	0	0
Internal spruc... / Loadbearing in...	90	398.3 6	17.7	961	961	2025	47	0	0
Loadbearing in... / External birch...	335	400.3 2	8.9	960	960	1136	84	0	0
External surface	365	415.3 2	8.5	954	954	1113	86	0	0
External	365	415.3 2	8.5	954	954	1109	86	0	0

4.11. November

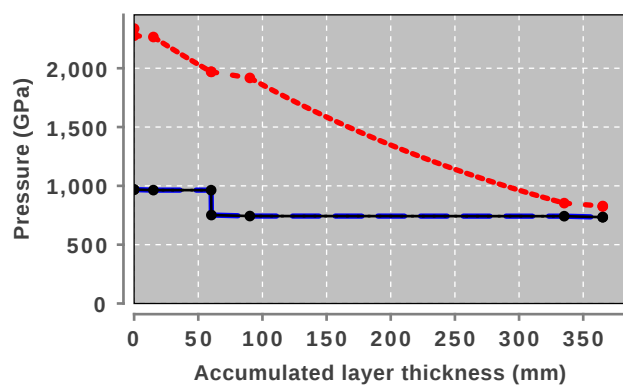
Relative humidity



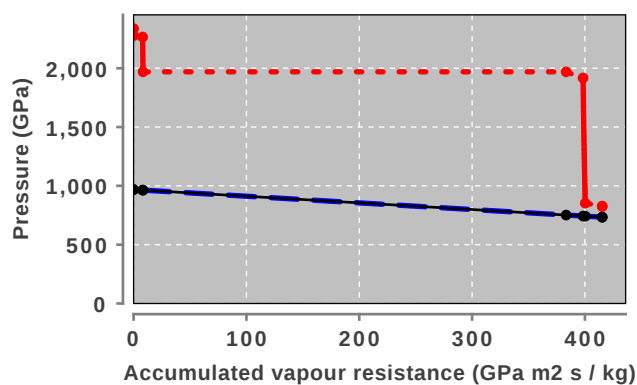
Temperature



Vapour Pressure



Vapour Pressure

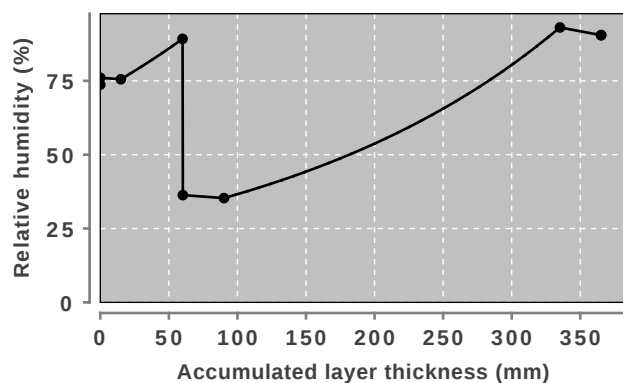


(full line: Vapour pressure P , - - - dashed line: Simulated vapour pressure P_0 , dotted line: Saturation vapour pressure P_{sat})

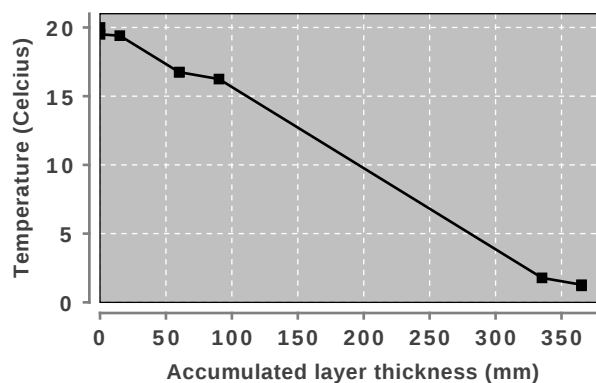
Interface	Σs	ΣZ	t	P_0	P	P_{sat}	ϕ	Δc	c
Internal	0	0.0	20.0	968	968	2337	41	0	0
Internal surface	0	0.0	19.6	968	968	2277	43	0	0
Fibre gypsum b... / Non-loadbearin...	15	8.0	19.5	964	964	2265	43	0	0
Non-loadbearing insulation / DPM	60	8.36	17.3	964	964	1970	49	0	0
DPM / Internal spruce plywood	60	383.3 6	17.3	752	752	1970	38	0	0
Internal spruc... / Loadbearing in...	90	398.3 6	16.8	743	743	1918	39	0	0
Loadbearing in... / External birch...	335	400.3 2	4.7	742	742	853	87	0	0
External surface	365	415.3 2	4.3	734	734	828	89	0	0
External	365	415.3 2	4.2	734	734	824	89	0	0

4.12. December

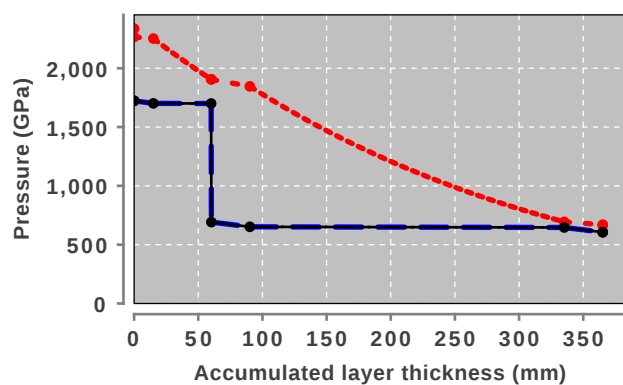
Relative humidity



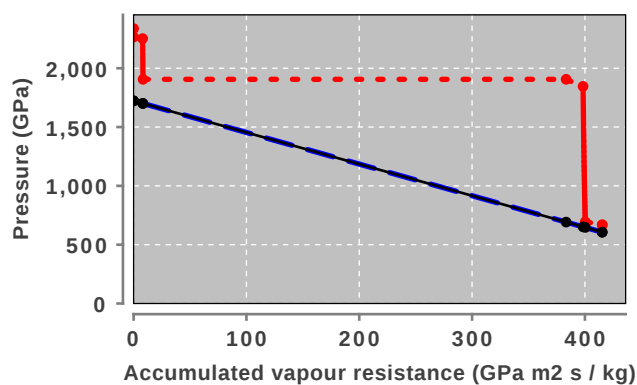
Temperature



Vapour Pressure



Vapour Pressure



(full line: Vapour pressure P , - - - dashed line: Simulated vapour pressure P_0 , dotted line: Saturation vapour pressure P_{sat})

Interface	Σs	ΣZ	t	P_0	P	P_{sat}	ϕ	Δc	c
Internal	0	0.0	20.0	1723	1723	2337	74	0	0
Internal surface	0	0.0	19.5	1723	1723	2265	76	0	0
Fibre gypsum b... / Non-loadbearin...	15	8.0	19.4	1701	1701	2252	76	0	0
Non-loadbearing insulation / DPM	60	8.36	16.7	1700	1700	1906	89	0	0
DPM / Internal spruce plywood	60	383.3 6	16.7	692	692	1906	36	0	0
Internal spruc... / Loadbearing in...	90	398.3 6	16.2	652	652	1846	35	0	0
Loadbearing in... / External birch...	335	400.3 2	1.8	646	646	694	93	0	0
External surface	365	415.3 2	1.3	606	606	670	90	0	0
External	365	415.3 2	1.2	606	606	666	91	0	0

5. Nomenclature

5.1. Building Envelope

s = Thickness (mm)
 λ = Thermal conductivity ($W / (m \cdot ^\circ C)$)
 R = Thermal resistance ($m^2 \cdot ^\circ C / W$)
 d = Permability ($kg / (m \cdot s \cdot GPa)$)
 Z = Vapour resistance ($GPa \cdot m^2 \cdot s / kg$)

5.2. External conditions

t_e = External temperature ($^\circ C$)
 ϕ_u = External relative humidity (%)
 t_i = Internal temperature ($^\circ C$)
 ϕ_i = Internal relative humidity (%)

5.3. Output details

Σs = Accumulated layer thickness (mm)
 ΣZ = Accumulated vapour resistance ($GPa \cdot m^2 \cdot s / kg$)
 t = Temperature ($^\circ C$)
 P_0 = Simulated vapour pressure (GPa), different from P if $P_0 > P_{sat}$ in at least one interface
 P = Vapour pressure (GPa)
 P_{sat} = Saturation vapour pressure (GPa)
 ϕ = Relative humidity (%)
 Δc = Water content per month (g/m^2)
 c = Accumulated water content since January (g/m^2)