LES 7

O B S E R V A T O R Y
APPLIED SCIENCE AND TECHNOLOGY (AST)
Teacher's Guide A
Second Year of Secondary Cycle Two

NICE AND WARM!

STUDENT LOG

WORKING DOCUMENTS

EVALUATION DOCUMENTS

PROCEDURE AND EVALUATION: SSC1 – TECHNOLOGY

Observatory / Guide
11129-A

Name: _____ Group: _____ AST

The project

Sustainable Building Show Program

Competition
Champion builders

Visitors to the Sustainable Building Show will be able to observe professionals hard at work creating prototypes of the most energy-efficient house possible.

Each 12-person team will build the prototype of an energy-efficient house under the supervision of a foreperson of their choice. The prototype house will be built according to drawings provided by the organizers.

Day after day, visitors to the Sustainable Building Show will be able to observe teams competing for first prize. To qualify, the teams will have to submit their prototype to an energy efficiency test.

The goal of the event is to help visitors find efficient ways to insulate their homes and maximize energy efficiency. They will also have the opportunity to view the schematic drawings on display.

In this context, you will play the role of a member of a team participating in the competition.

The project (*continued*)

SPECIFICATIONS

General purpose of the energy-efficient house

- The prototype house must conserve heat well to maximize its energy efficiency.

Material constraints

- The prototype house must be built with the materials provided.
- Each part must respect the dimensioning and tolerances indicated in the detail drawings.
- The prototype must be built with the same number of parts as shown in the exploded-view and detail drawings.
- The prototype must contain thermal insulation.

Human constraints

- The prototype house must be built as quickly as possible.
- The prototype must demonstrate that the house is as well insulated as possible.

Aesthetic constraint

- The house must be attractive.

Safety constraint

- The parts must have no sharp edges.

Financial constraint

- Optimal use must be made of materials to avoid waste.

Environmental constraint

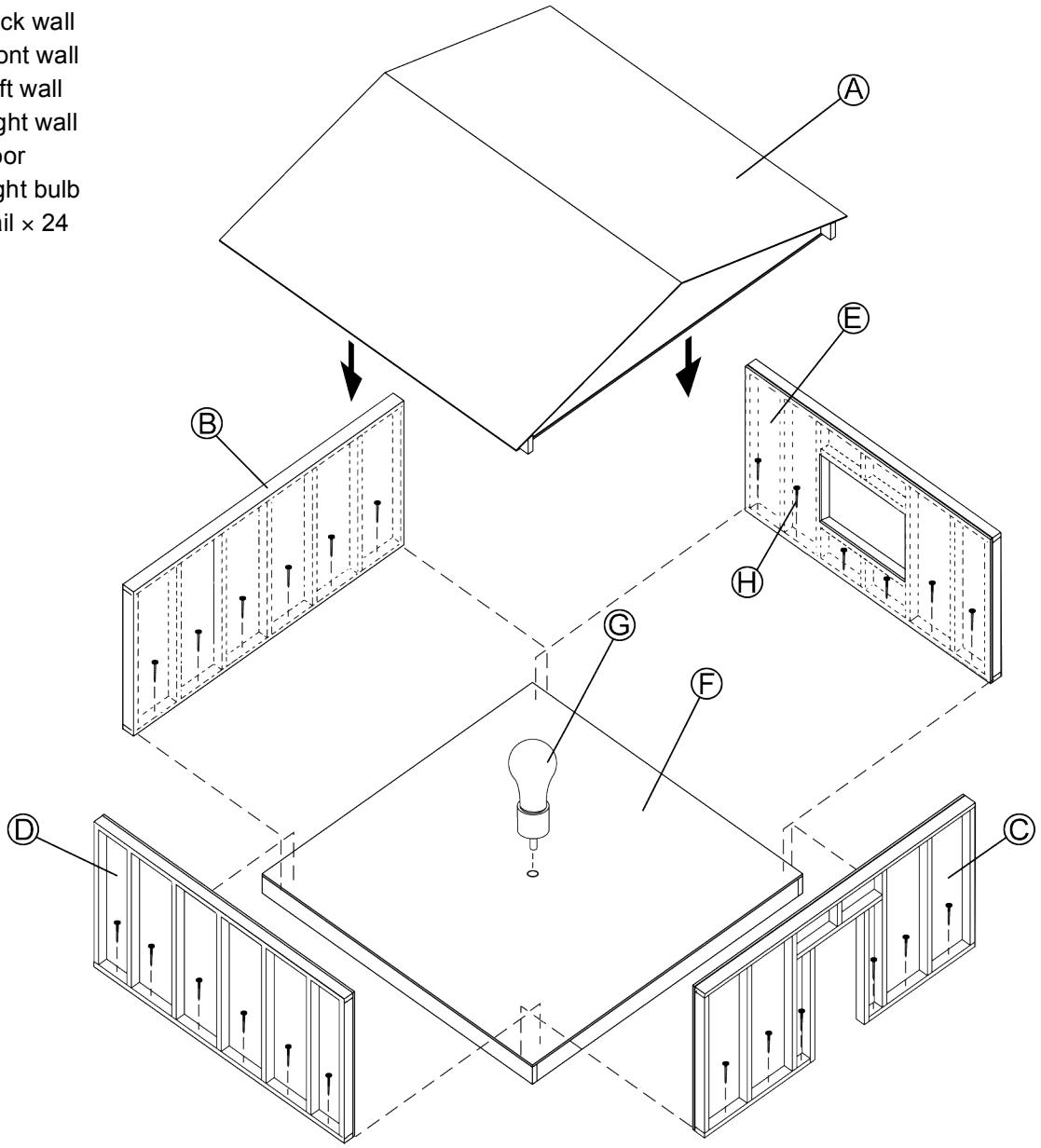
- The house design must ensure energy savings.

The project (*continued*)

Exploded view of the prototype of the energy-efficient house

SECTION NAMES

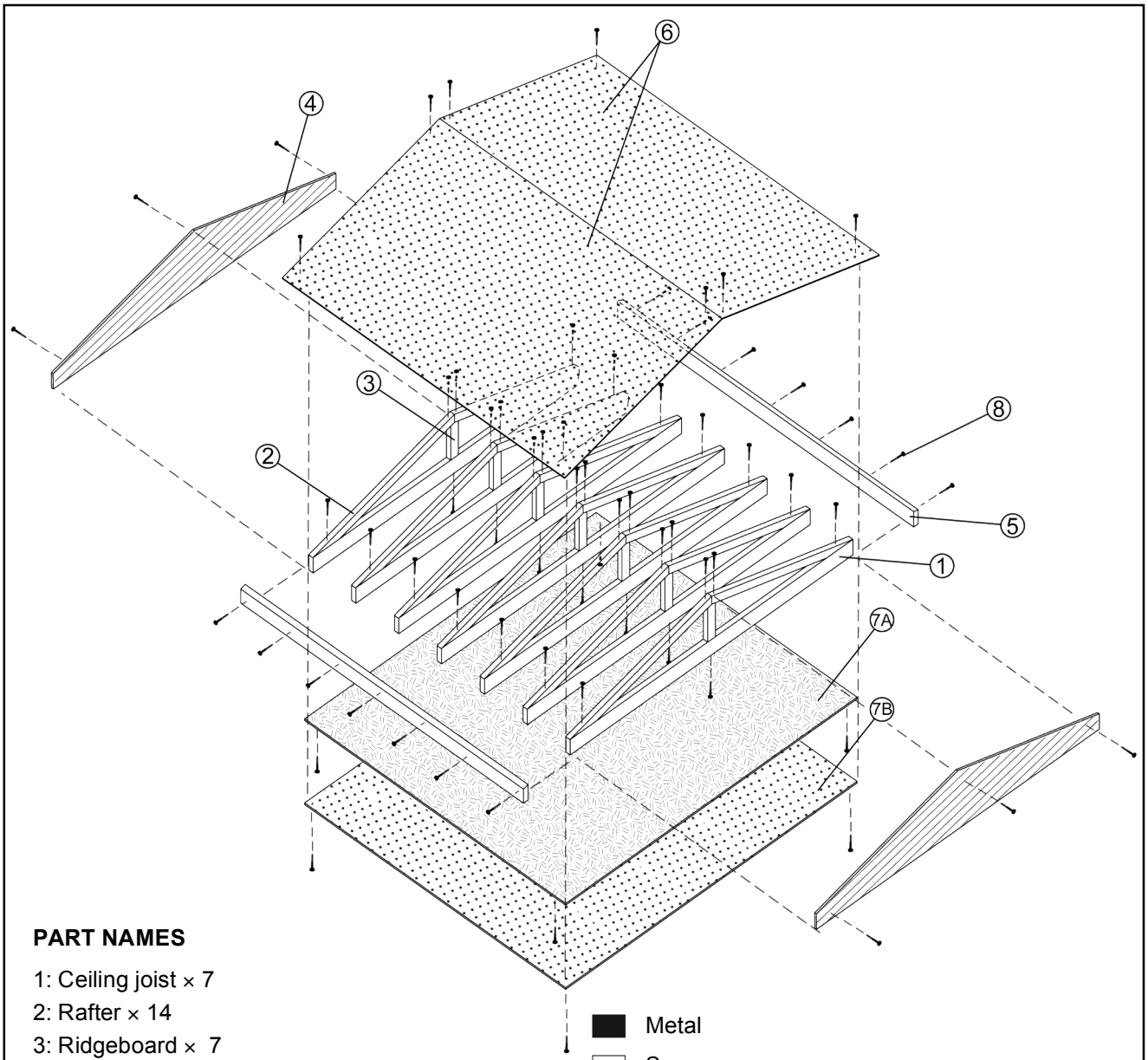
A: Roof
B: Back wall
C: Front wall
D: Left wall
E: Right wall
F: Floor
G: Light bulb
H: Nail × 24



TITLE: Exploded view Prototype of energy-efficient house	SCALE: 1:10

The project (*continued*)

Section A: roof



PART NAMES

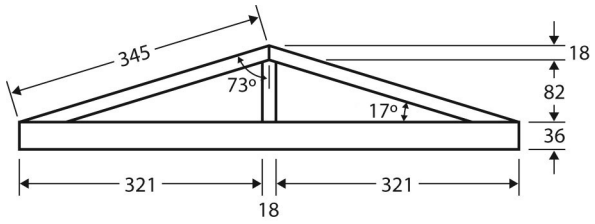
1: Ceiling joist × 7
2: Rafter × 14
3: Ridgeboard × 7
4: Roof truss × 2
5: Framing header × 2
6: Roofing × 2
7: Ceiling and vapour barrier
8: Nail × 72

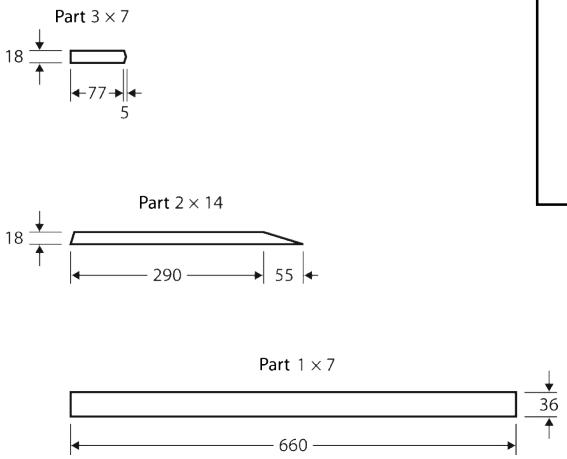
Metal
Spruce
Plywood
Corrugated plastic
Plastic sheet

NAME: Pair No. 1 TITLE: Exploded view of section A: roof	SCALE: 1:10

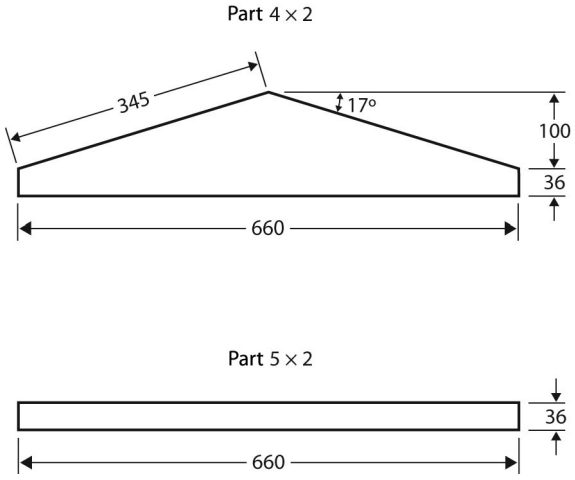
The project (*continued*)

Front view of the assembled roof truss





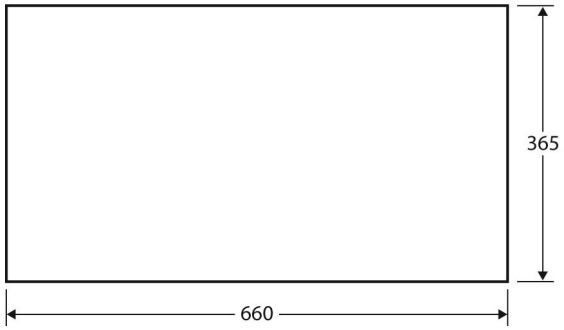
NAME: Pair No. 1 TITLE: Detail drawing, section A: roof, parts 1 to 3	SCALE: 1:10 ± 2 mm



NAME: Pair No. 1 TITLE: Detail drawing, section A: roof, parts 4 and 5	SCALE: 1:10 ± 2 mm

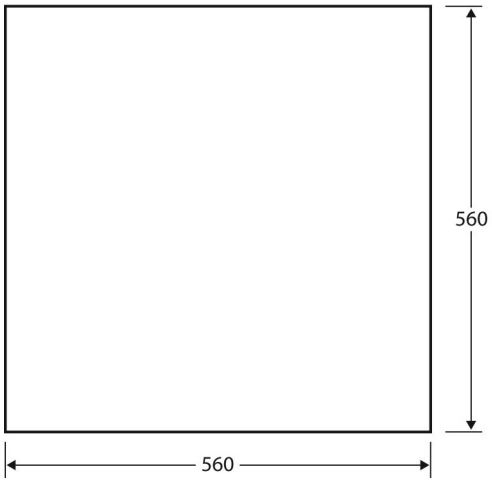
The project (*continued*)

Parts 6A and 6B



NAME: Pair No. 1 TITLE: Detail drawing, section A: roof, parts 6A and 6B	SCALE: 1:10 ± 2 mm

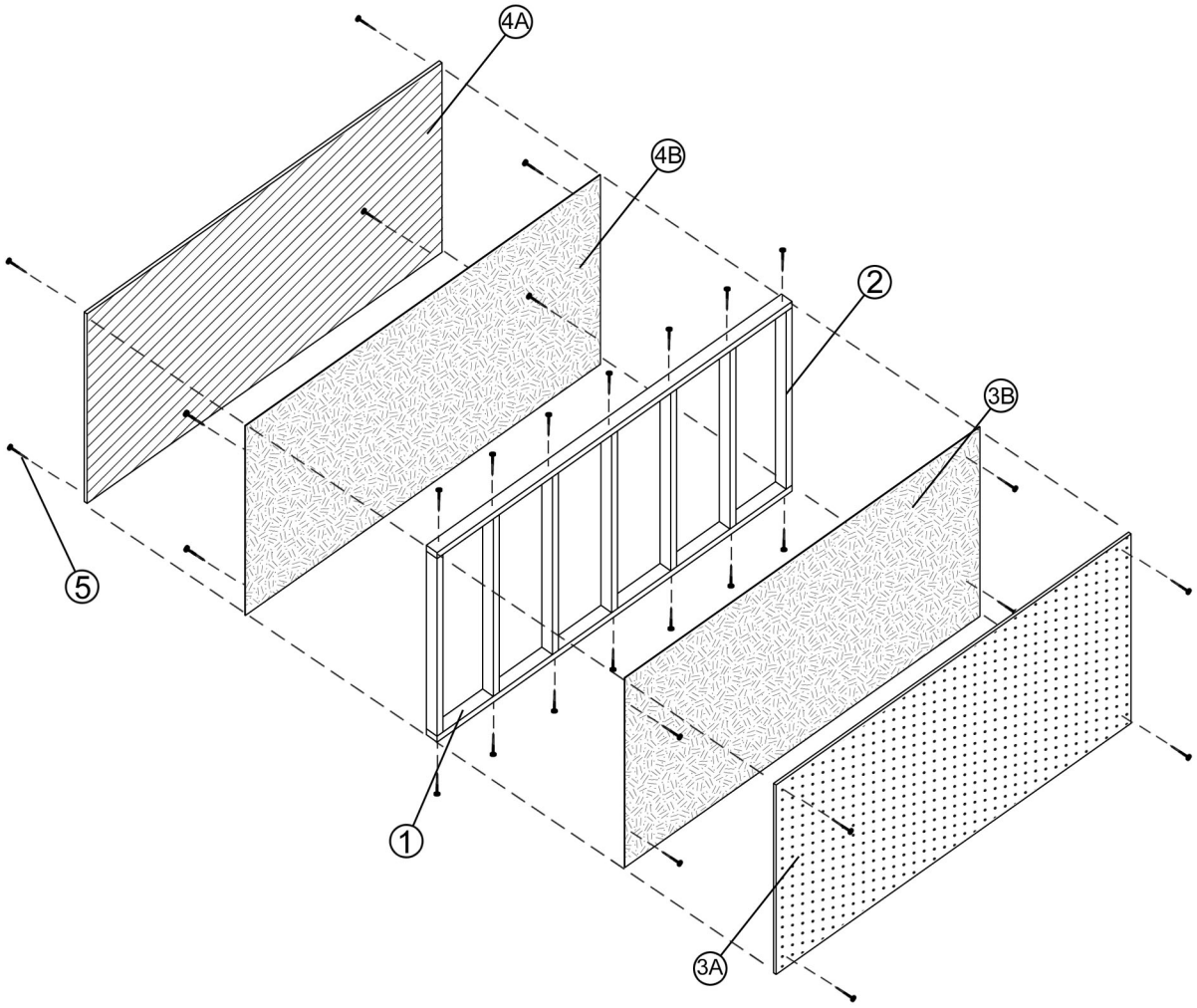
Parts 7A and 7B



NAME: Pair No. 1 TITLE: Detail drawing, section A: roof, parts 7A and 7B	SCALE: 1:10 ± 2 mm

The project (*continued*)

Section B: back wall



PART NAMES

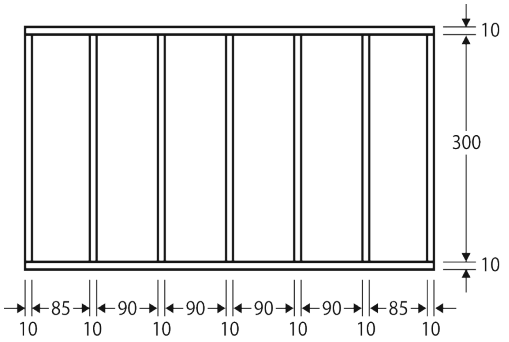
1:	Crosspiece × 2
2:	Stud × 7
3A and 3B:	Interior wall cladding and vapour barrier
4A and 4B:	Exterior wall cladding and air barrier
5:	Nail × 30

Metal
Spruce
Plywood
Corrugated plastic
Plastic sheet

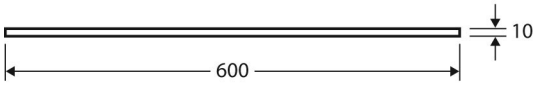
NAME: Pair No. 2 TITLE: Exploded view of section B: back wall	SCALE: 1:10

The project (*continued*)

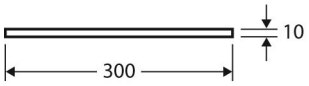
Front view of assembled back wall framing



Part 1 × 2



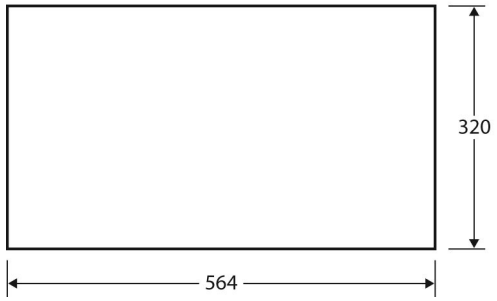
Part 2 × 7



NAME: Pair No. 2 TITLE: Detail drawing, section B: back wall, parts 1 and 2	SCALE: 1:10 ± 2 mm

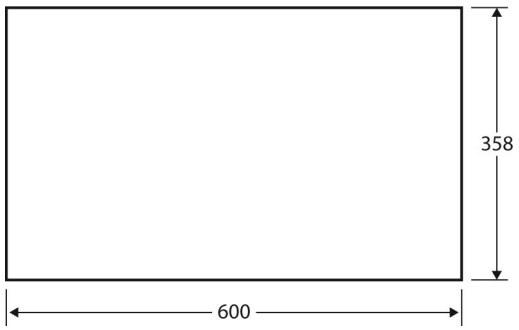
The project (*continued*)

Parts 3A and 3B



NAME: Pair No. 2 TITLE: Detail drawing, section B: back wall, parts 3A and 3B	SCALE: 1:10 ± 2 mm

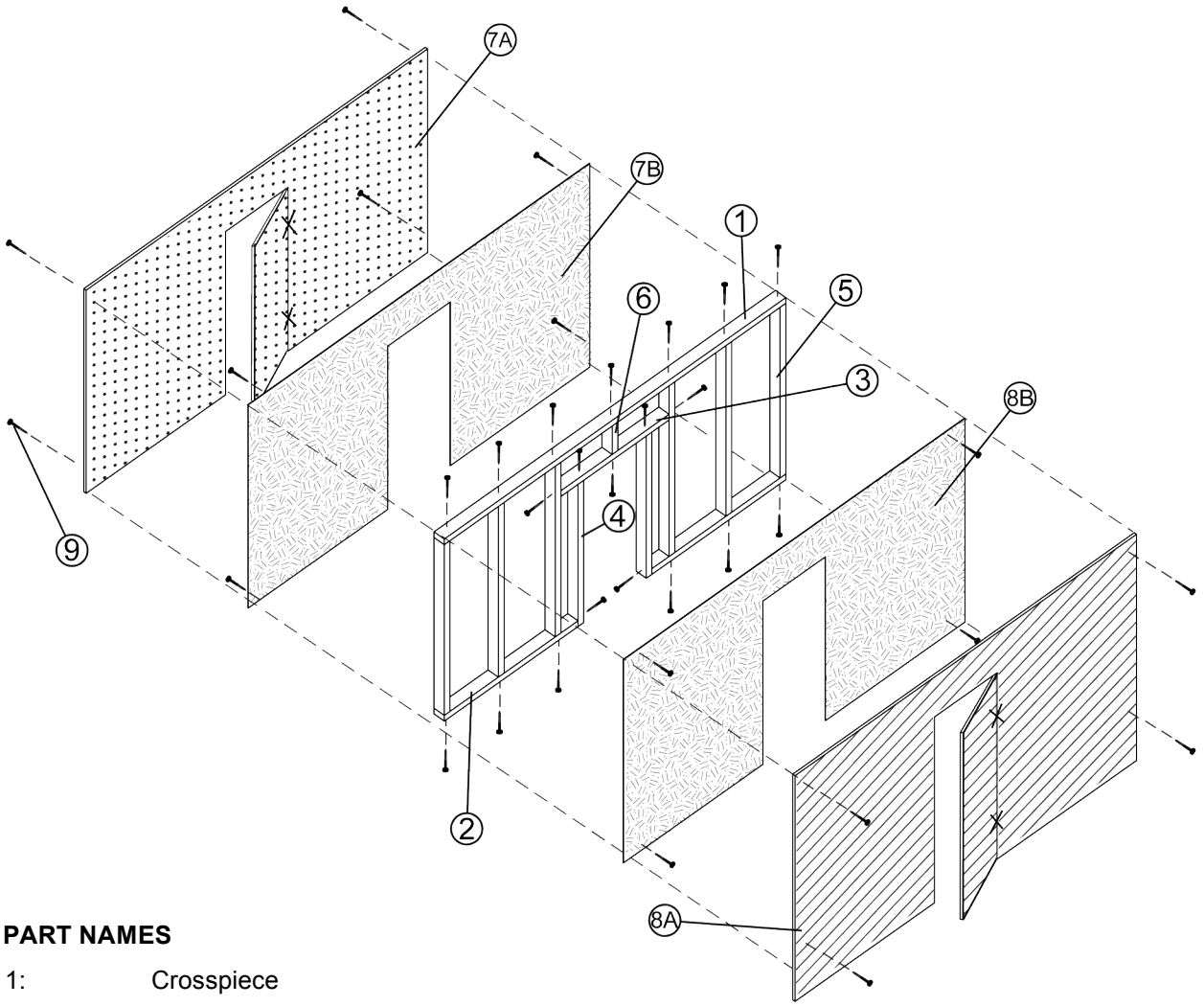
Parts 4A and 4B



NAME: Pair No. 2 TITLE: Detail drawing, section B: back wall, parts 4A and 4B	SCALE: 1:10 ± 2 mm

The project (*continued*)

Section C: front wall



PART NAMES

1:	Crosspiece
2:	Sill plate × 2
3:	Lintel
4:	Trimmer stud × 2
5:	Stud x 6
6:	Cripple stud
7A and 7B:	Interior wall cladding and vapour barrier
8A and 8B:	Exterior wall cladding and air barrier
9:	Nail × 32

Metal

Spruce

Plywood

Corrugated plastic

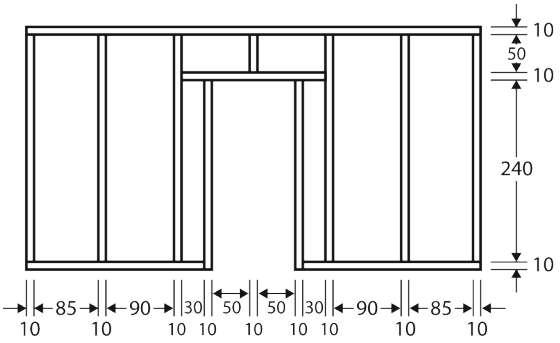
Plastic sheet

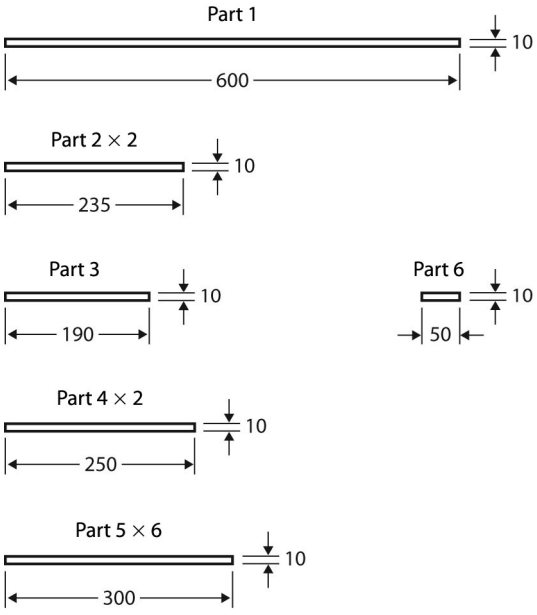
X Duct tape

NAME: Pair No. 3 TITLE: Exploded view of section C: front wall	SCALE: 1:10

The project (*continued*)

Front view of assembled front wall framing

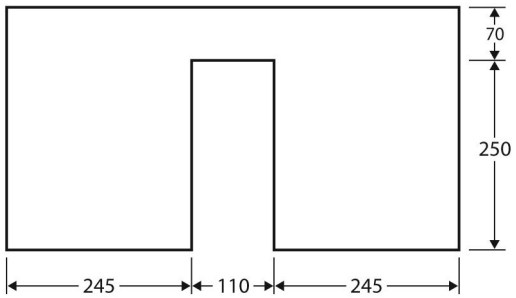




NAME: Pair No. 3 TITLE: Detail drawing, section C: front wall, parts 1 to 6	SCALE: 1:10 ± 2 mm

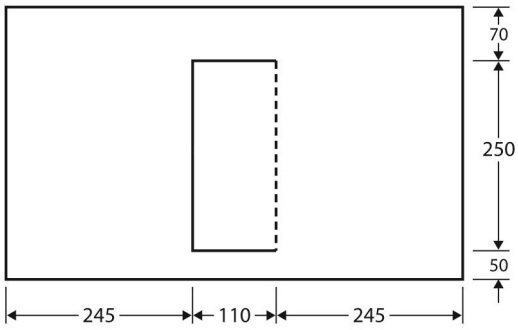
The project (*continued*)

Parts 7A and 7B



NAME: Pair No. 3 TITLE: Detail drawing, section C: front wall, parts 7A and 7B	SCALE: 1:10 ± 2 mm

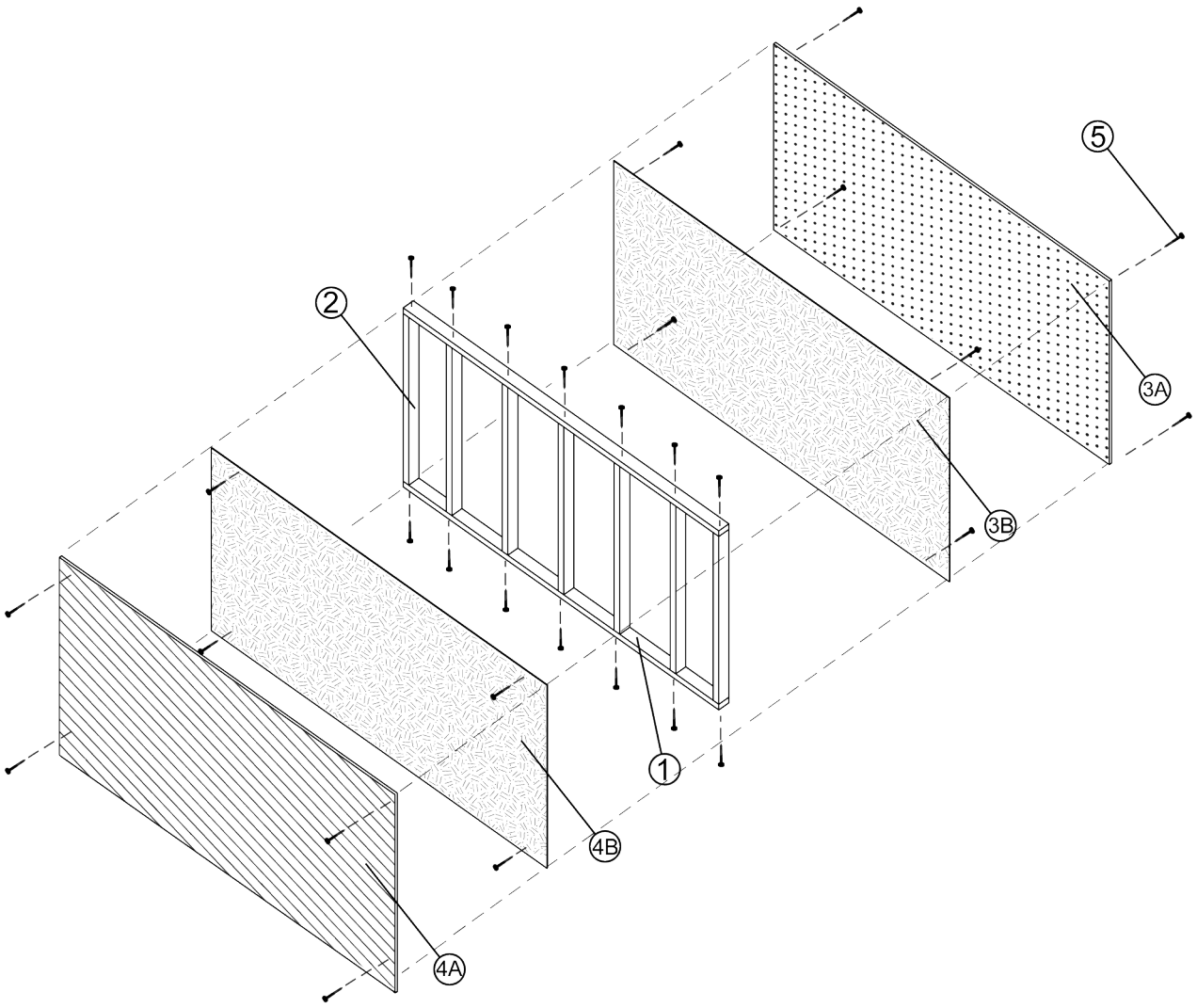
Parts 8A and 8B



NAME: Pair No. 3 TITLE: Detail drawing, section C: front wall, parts 8A and 8B	SCALE: 1:10 ± 2 mm

The project (*continued*)

Section D: left wall



PART NAMES

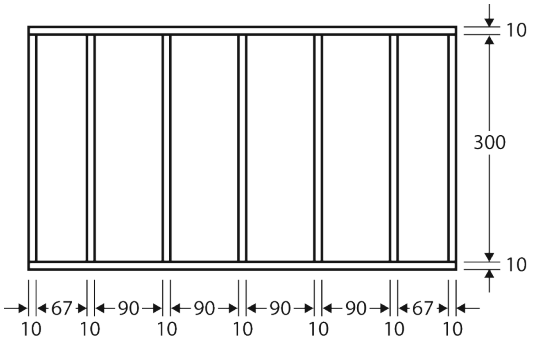
1:	Crosspiece × 2
2:	Stud × 7
3A and 3B:	Interior wall cladding and vapour barrier
4A and 4B:	Exterior wall cladding and air barrier
5:	Nail × 30

Metal
Spruce
Plywood
Corrugated plastic
Plastic sheet

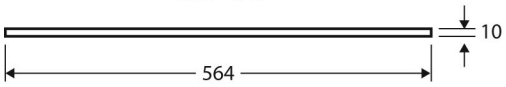
NAME: Pair No. 4 TITLE: Detail drawing, section D: left wall	SCALE: 1:10

The project (*continued*)

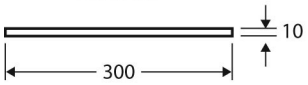
Front view of assembled left wall framing



Part 1 × 2



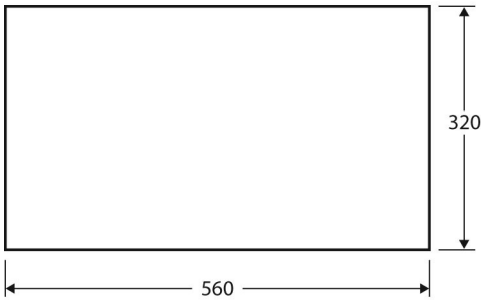
Part 2 × 7



NAME: Pair No. 4 TITRE: Detail drawing, section D: left wall, parts 1 and 2	SCALE: 1:10 ± 2 mm

The project (*continued*)

Parts 3A and 3B



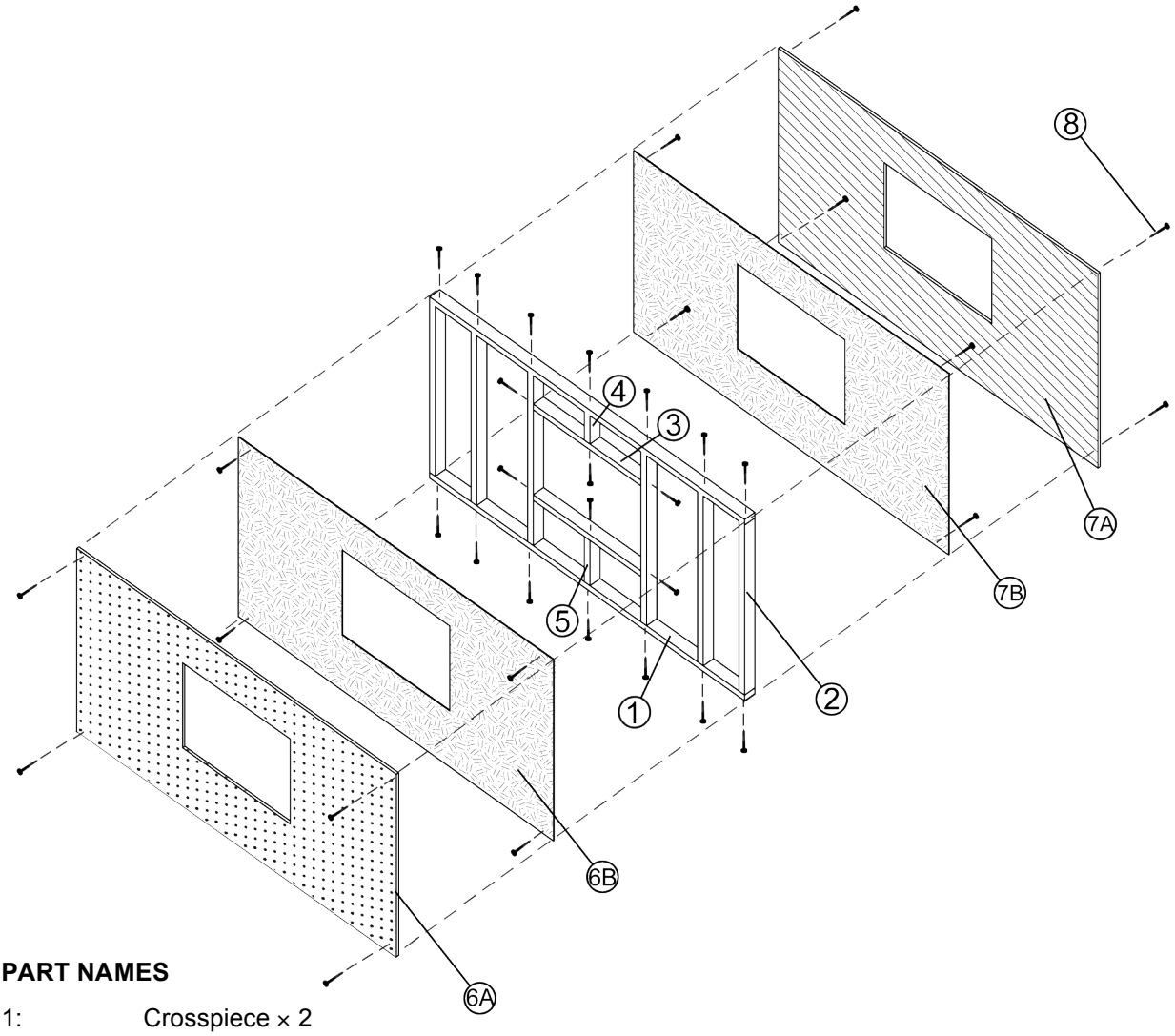
NAME: Pair No. 4 TITLE: Detail drawing, section D: left wall, parts 3A and 3B	SCALE: 1:10 ± 2 mm

Parts 4A and 4B

NAME: Pair No. 4 TITLE: Detail drawing, section D: left wall, parts 4A and 4B	SCALE: 1:10 ± 2 mm

The project (*continued*)

Section E: right wall



PART NAMES

1:	Crosspiece × 2
2:	Stud × 6
3:	Header × 2
4:	Upper cripple stud
5:	Lower cripple stud
6A and 6B:	Interior wall cladding and vapour barrier
7A and 7B:	Exterior wall cladding and air barrier
8:	Nail × 34

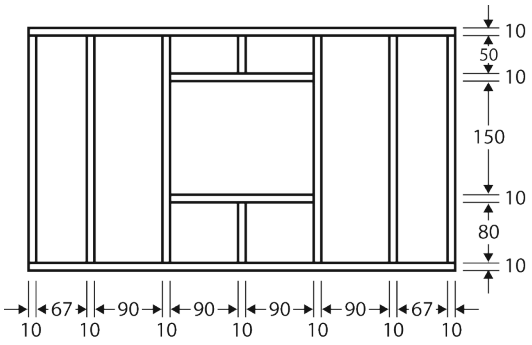
Metal
Spruce
Plywood
Corrugated plastic
Plastic sheet

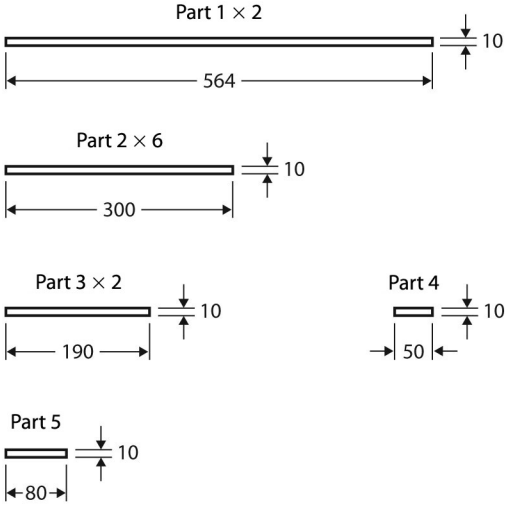
NAME: Pair No. 5
TITLE: Exploded view of section E: right wall

SCALE: 1:10

The project (*continued*)

Front view of assembled right wall framing



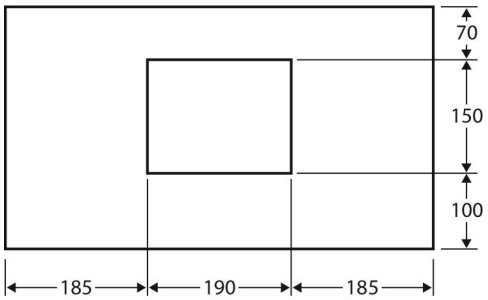


NAME: Pair No. 5
TITLE: Detail drawing, section E: right wall, parts 1 to 5

SCALE: 1:10 ± 2 mm

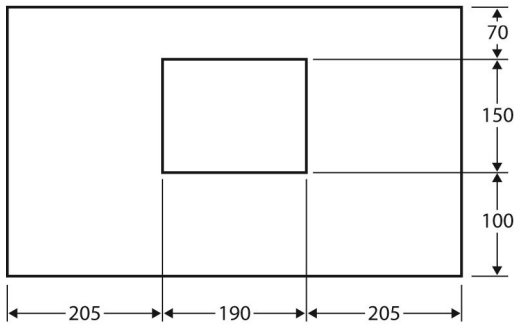
The project (*continued*)

Parts 6A and 6B



NAME: Pair No. 5 TITLE: Detail drawing, section E: right wall, parts 6A and 6B	SCALE: 1:10 ± 2 mm

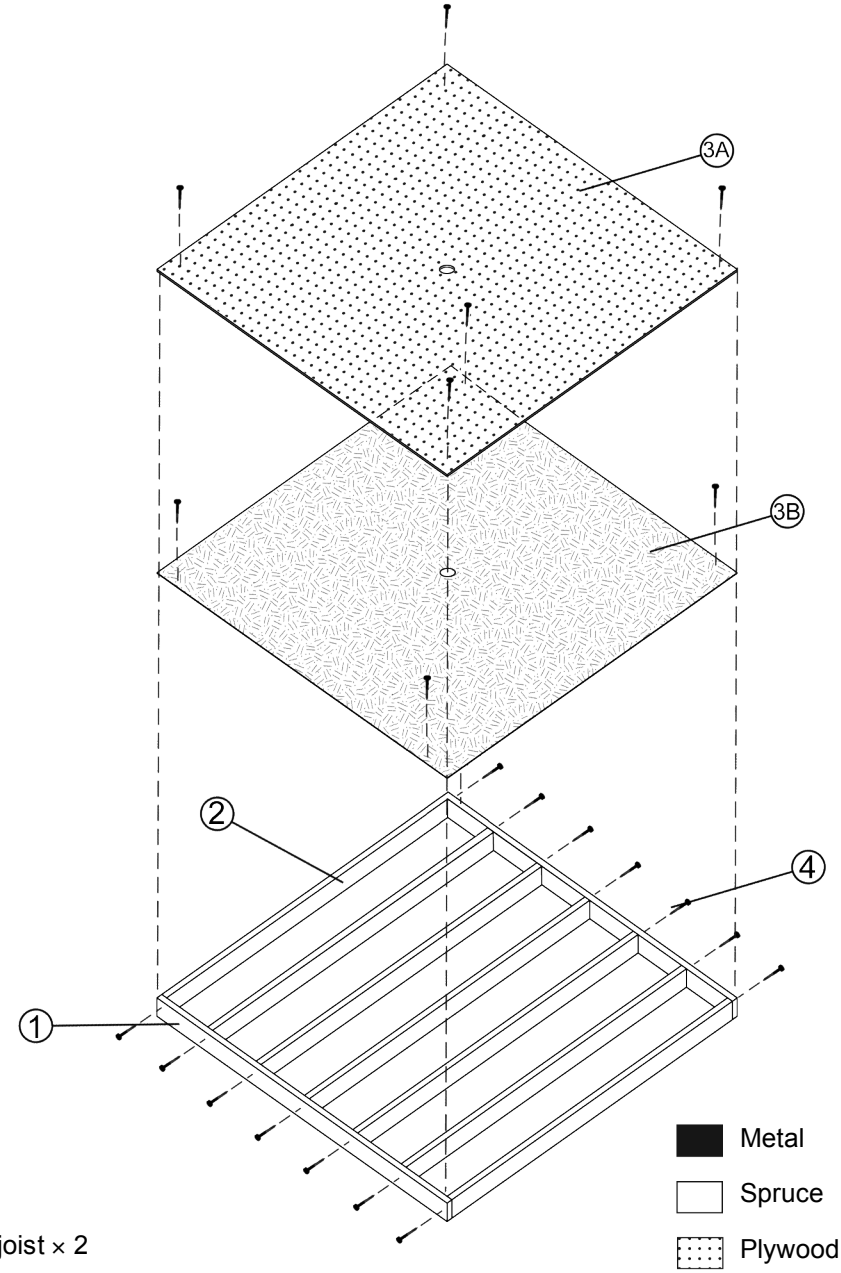
Parts 7A and 7B



NAME: Pair No. 5 TITLE: Detail drawing, section E: right wall, parts 7A and 7B	SCALE: 1:10 ± 2 mm

The project (*continued*)

Section F: floor



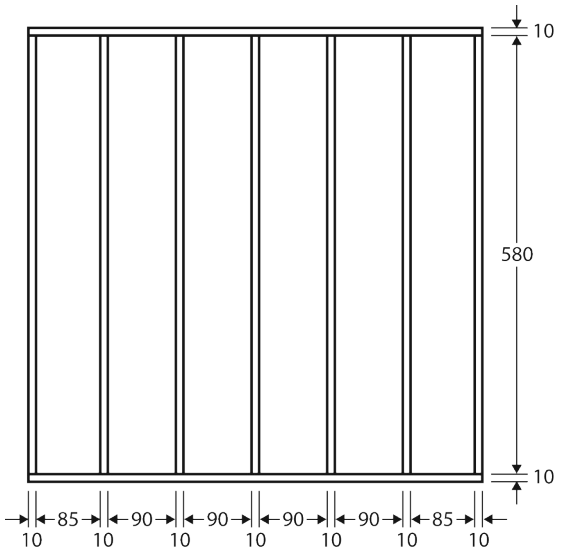
PART NAMES

1: End joist × 2
2: Floor joist × 7
3A and 3B: Floor and subfloor
4: Nail × 22

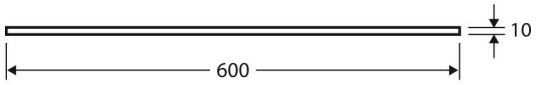
NAME: Pair No. 6 TITLE: Exploded view of section F: floor	SCALE: 1:10

The project (*continued*)

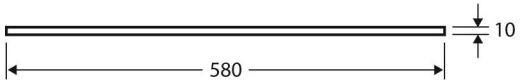
Top view of the assembled floor framing



Part 1 × 2



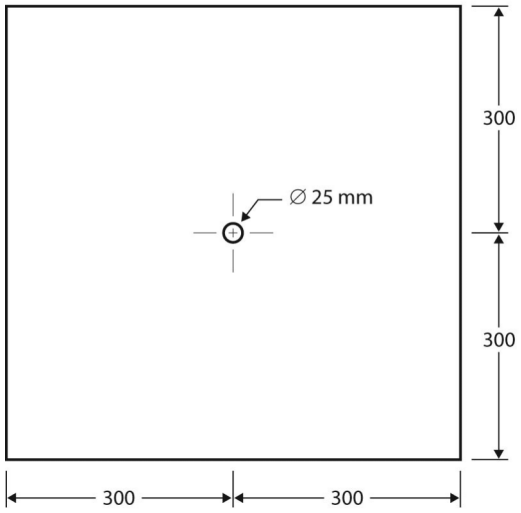
Part 2 × 7



NAME: Pair No. 6 TITLE: Detail drawing, section F: floor, parts 1 and 2	SCALE: 1:10 ± 2 mm

The project (*continued*)

Parts 3A and 3B



NAME: Pair No. 6 TITLE: Detail drawing, section F: floor, parts 3A and 3B	SCALE: 1:10 ± 2 mm

Creating the context

I ask myself questions

1. What is a general arrangement?

2. What is an exploded view?

3. What type of projection is normally used for an exploded view?

4. What is a detail drawing?

5. What is a dimension?

6. What are the main stages in the manufacturing process?

Creating the context (*continued*)

7. What is measuring?

8. What is machining?

9. Give a few examples of machining techniques.

10. What is drilling? What tools and machine tools would you use for drilling?

Creating the context (*continued*)

11. What is the difference between tapping and threading?

12. Name the tool used for tapping and give an example of the resulting object.

13. Name the tool used for threading and give an example of the resulting object.

14. How could you check the thickness of a part?

I must

15. Reformulate the goal of the project.

Creating the context (*continued*)

I think

16. Where do you think heat losses are likely to occur in the prototype? Indicate these places on a design plan for the prototype house. Refer to the drawings provided and remember to use symbols to show any movement of parts.

Reflection

	Yes	No
Do I fully understand the concepts related to the project?	☐	☐

Planning the project

I plan

1. Draw the technical diagram for the prototype of the energy-efficient house, using a multiview projection. You do not have to show the types of materials, the linking components, the guiding controls or the names of the parts indicated on the drawings provided.

Planning the project (*continued*)

Pair No: _____ ***Section:*** _____

2. How do you plan to insulate the prototype house?

_____

_____

_____

3. Make a list of the materials and equipment you will need to build your section. The foreperson of each team must also plan the materials and equipment for assembling and insulating the house.

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

4. What safey rules should you follow while building the prototype?

_____

_____

Ask your teacher to approve your plan of action before building your section.

Teacher's initials ☐

Reflection

	Yes	No
Have I considered other approaches to building the prototype energy-efficient house?	☐	☐

Completing the project

I build

1. Prepare the tables for recording the results of the energy efficiency test of your prototype house. Give each table a title.

2. Build your section, following the dimensioning and tolerances of the drawings provided. Make sure to record and justify any changes.

3. Assemble the prototype house, following the drawings provided.

Completing the project (*continued*)

4. Insulate the prototype. Plug all heat leaks. If you change your plan of action, indicate the changes on both the technical diagrams and the list of equipment and materials. Make sure you record all changes. Use the space below to provide any additional information, if necessary.

5. Did you work safely? Justify your answer with at least two examples of safety-conscious behaviour.

Reflection

	Yes	No
Did I record and justify each of the changes I made to my plan of action?	☐	☐

Testing the prototype

I evaluate my prototype

After you have recorded the results of the energy efficiency test of your prototype house, answer the following questions.

1. Does the prototype fulfill the general purpose of the prototype energy-efficient house? Explain your answer.

2. Did you meet all the requirements described in the specifications? If not, explain your answer.

3. Did you alter your plan of action? If so, explain your answer.

4. Did you have any trouble making the parts? Explain your answer.

Testing the prototype (*continued*)

5. Did you have any trouble assembling the prototype house? Explain your answer.

6. What are the advantages of your energy-efficient house?

7. What are the disadvantages of your energy-efficient house?

8. Suggest some improvements you could make to your prototype house.

My evaluation

Use the evaluation grid on the following page to evaluate yourself. Write A, B, C, D, or E in the "Me" column of the chart below.

SSC1—Seeks answers or solutions to scientific or technological problems				
Criteria*	**Observable indicators**	**Me**	**Teacher**	**Comments**
1	**Creating the context** Definition of the goal and completion of the design plan		☐ With help	
2	**Planning the project** Relevance of the elements of the plan of action: list of materials and technical diagram		☐ With help	
3	**Completing the project** Compliance with dimensioning, tolerances and safety rules		☐ With help	
4	**Testing the prototype** Analysis of the energy efficiency of the prototype house and suggested improvements		☐ With help	

*** Evaluation criteria**

1 Appropriate representation of the situation
2 Development of a suitable plan of action for the situation
3 Appropriate implementation of the plan of action
4 Development of relevant conclusions, explanations or solutions

Evaluation grid

Name: _____ Group: _____

SSC1 Seeks answers or solutions to scientific or technological problems

Criteria*	Observable indicators	A	B	C	D	E
1	**Creating the context** Definition of the goal and completion of the design plan	The goal is very clearly defined and relevant, AND the design plan is complete.	The goal is clearly defined and relevant, AND the design plan contains a few minor errors.	The goal is not very clearly defined or is irrelevant, OR the design plan contains many errors.	The goal is not very clearly defined or is irrelevant, AND the design plan contains major errors.	The work must be done again.
2	**Planning the project** Relevance of the elements of the plan of action: list of materials and technical diagram	The choice of materials is appropriate, AND the technical diagram is complete.	The choice of materials is appropriate, AND the technical diagram contains a few minor errors.	The choice of materials is partly appropriate, OR the technical diagram contains many errors.	The choice of materials is partly appropriate, AND the technical diagram contains many errors.	The work must be done again.
3	**Completing the project** Compliance with dimensioning, tolerances and safety rules	The parts comply with the dimensioning and tolerances of the detail drawings, AND the work was done safely.	A few aspects of the parts do not comply with the dimensioning and tolerances of the detail drawings, AND the work was done safely.	Many aspects of the parts do not comply with the dimensioning and tolerances of the detail drawings, AND the work was done safely.	The parts do not comply with the dimensioning and tolerances of the detail drawings, OR the work was not done safely.	The work must be done again.
4	**Testing the prototype** Analysis of the energy efficiency of the prototype house and suggested improvements	The house meets all the specifications, AND the suggested improvements are relevant.	The house meets most of the specifications, AND most of the suggested improvements are relevant.	The house meets most of the specifications, but the suggested improvements are not very relevant.	The house does not meet most of the specifications.	The work must be done again.

*** Evaluation criteria**

1 Appropriate representation of the situation
2 Development of a suitable plan of action for the situation
3 Appropriate implementation of the plan of action
4 Development of relevant conclusions, explanations or solutions