

# NICE AND WARM!

## STUDENT LOG

### WORKING DOCUMENTS

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**PROCEDURE AND EVALUATION: SSC1 – TECHNOLOGY**

# 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.

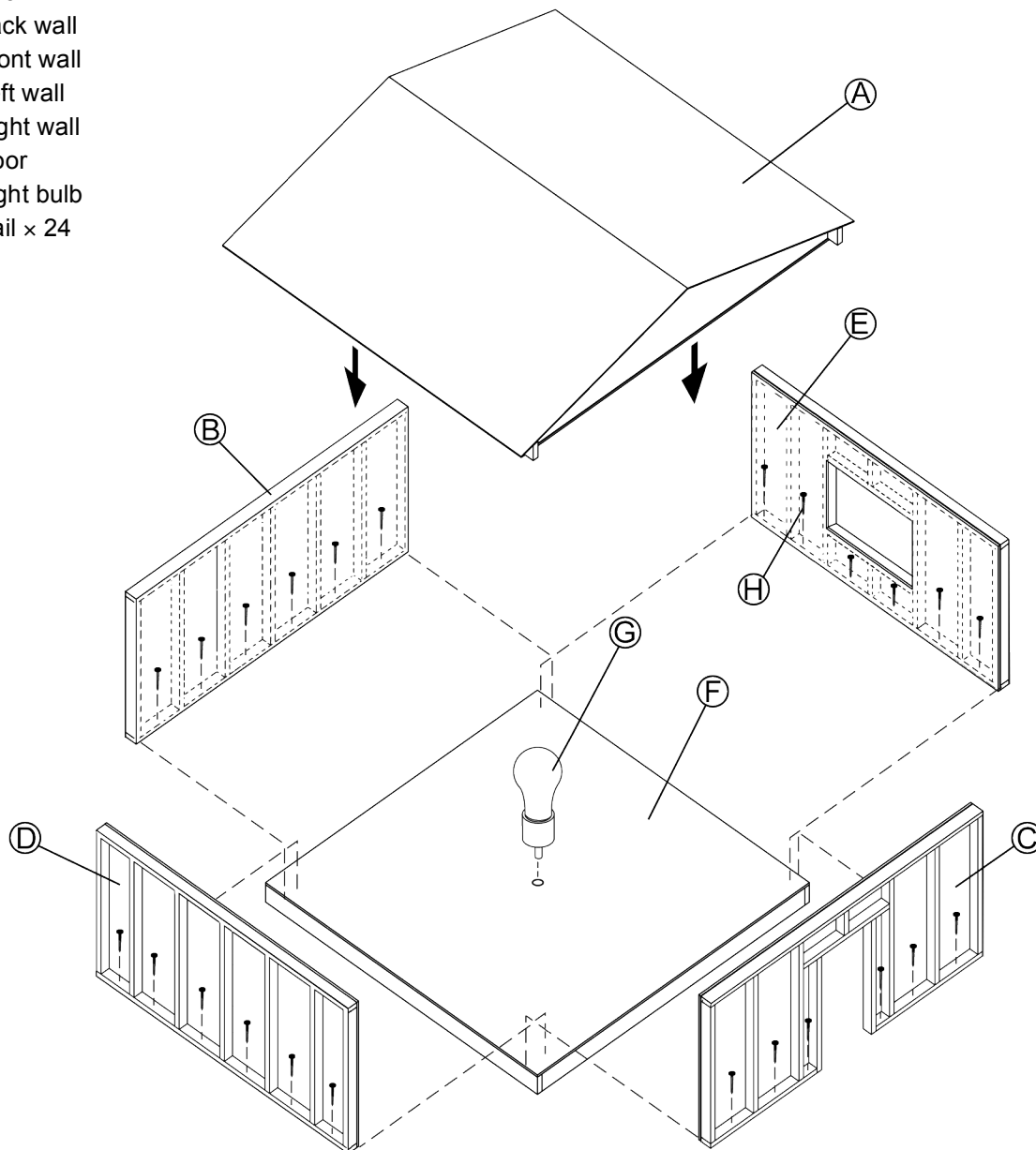


# The project *(continued)*

## 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

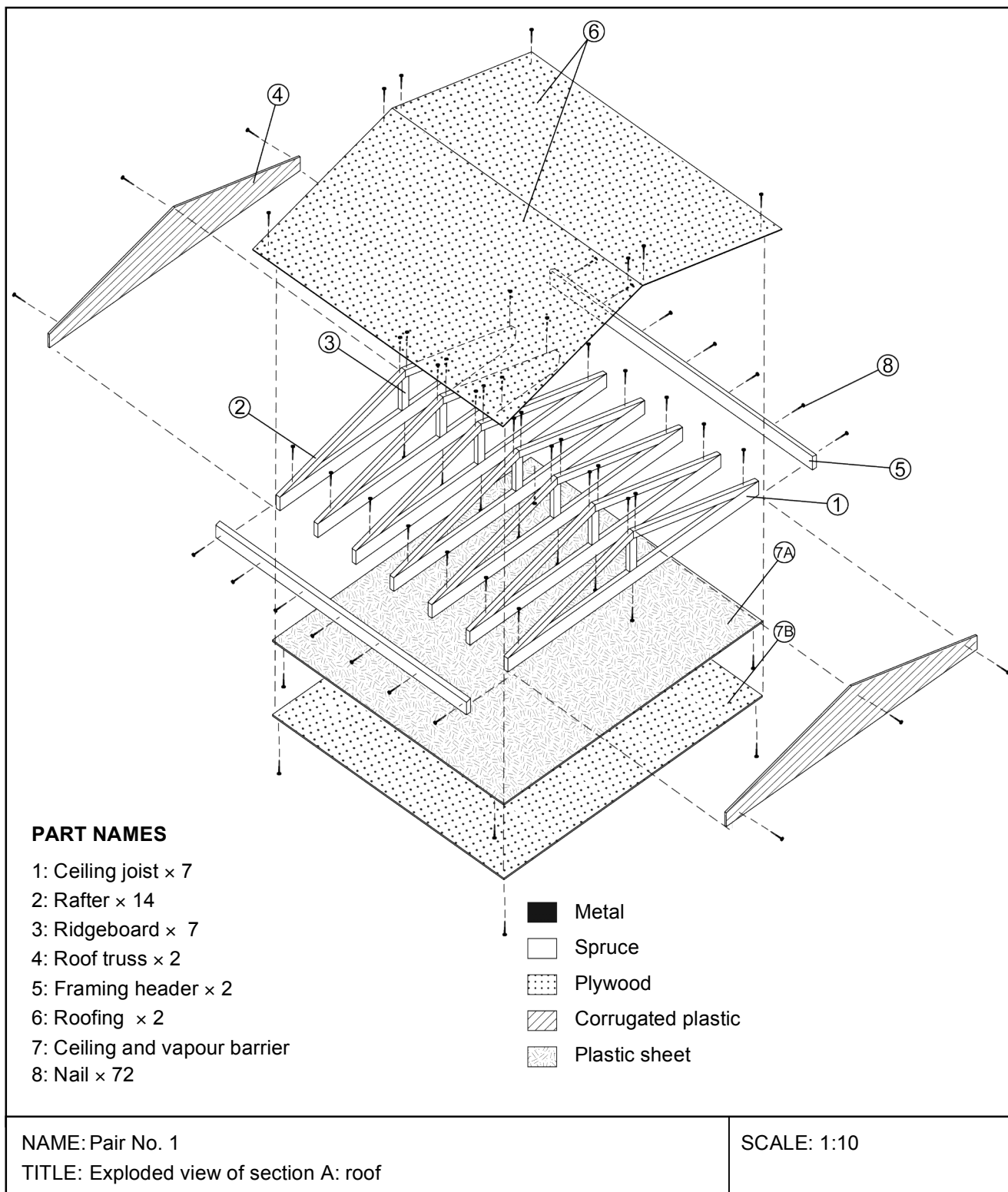


TITLE: Exploded view  
Prototype of energy-efficient house

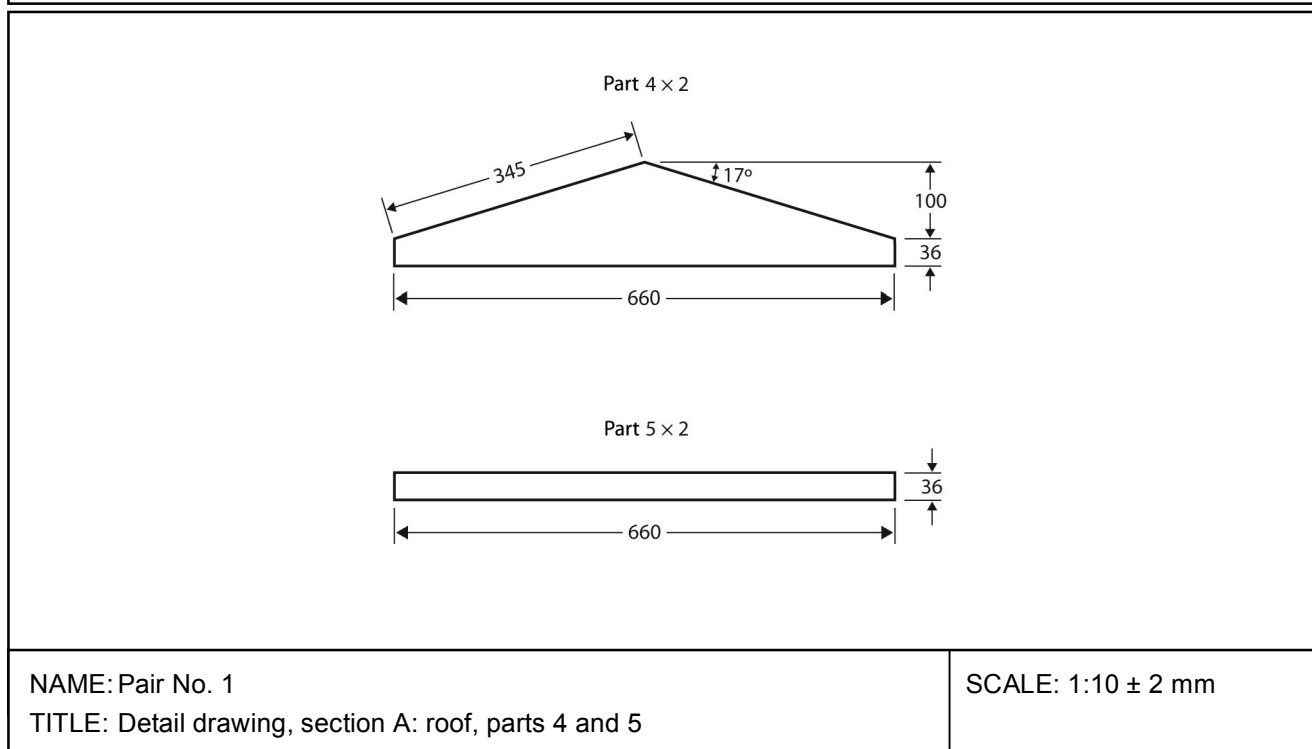
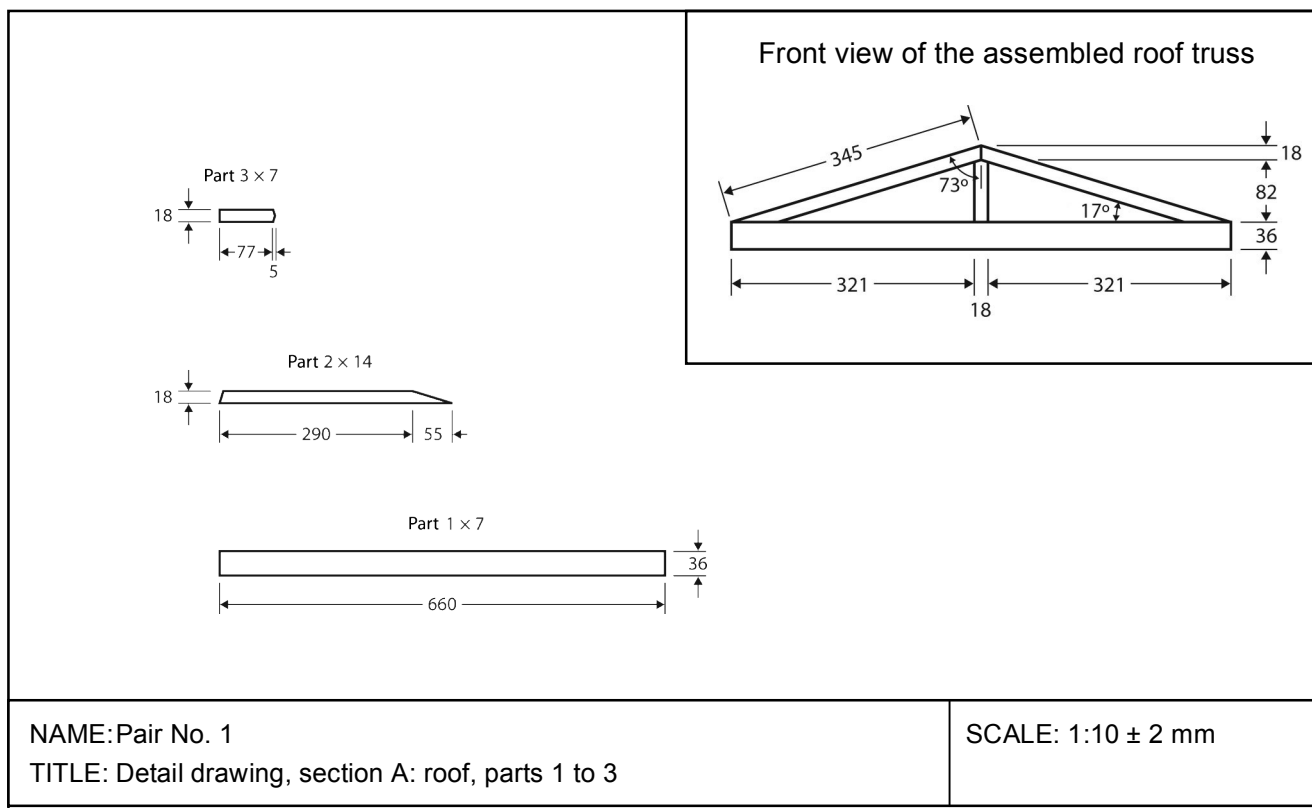
SCALE: 1:10

# The project *(continued)*

## Section A: roof



# The project *(continued)*

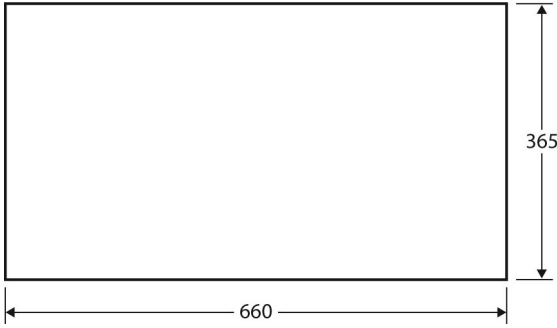


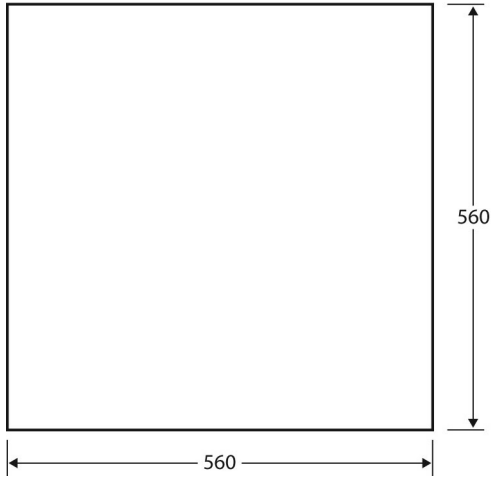
Name: \_\_\_\_\_

Group: \_\_\_\_\_

**EST**

## The project *(continued)*

|                                                                                                           |                           |
|-----------------------------------------------------------------------------------------------------------|---------------------------|
| <p>Parts 6A and 6B</p>  |                           |
| <p>NAME: Pair No. 1</p> <p>TITLE: Detail drawing, section A: roof, parts 6A and 6B</p>                    | <p>SCALE: 1:10 ± 2 mm</p> |

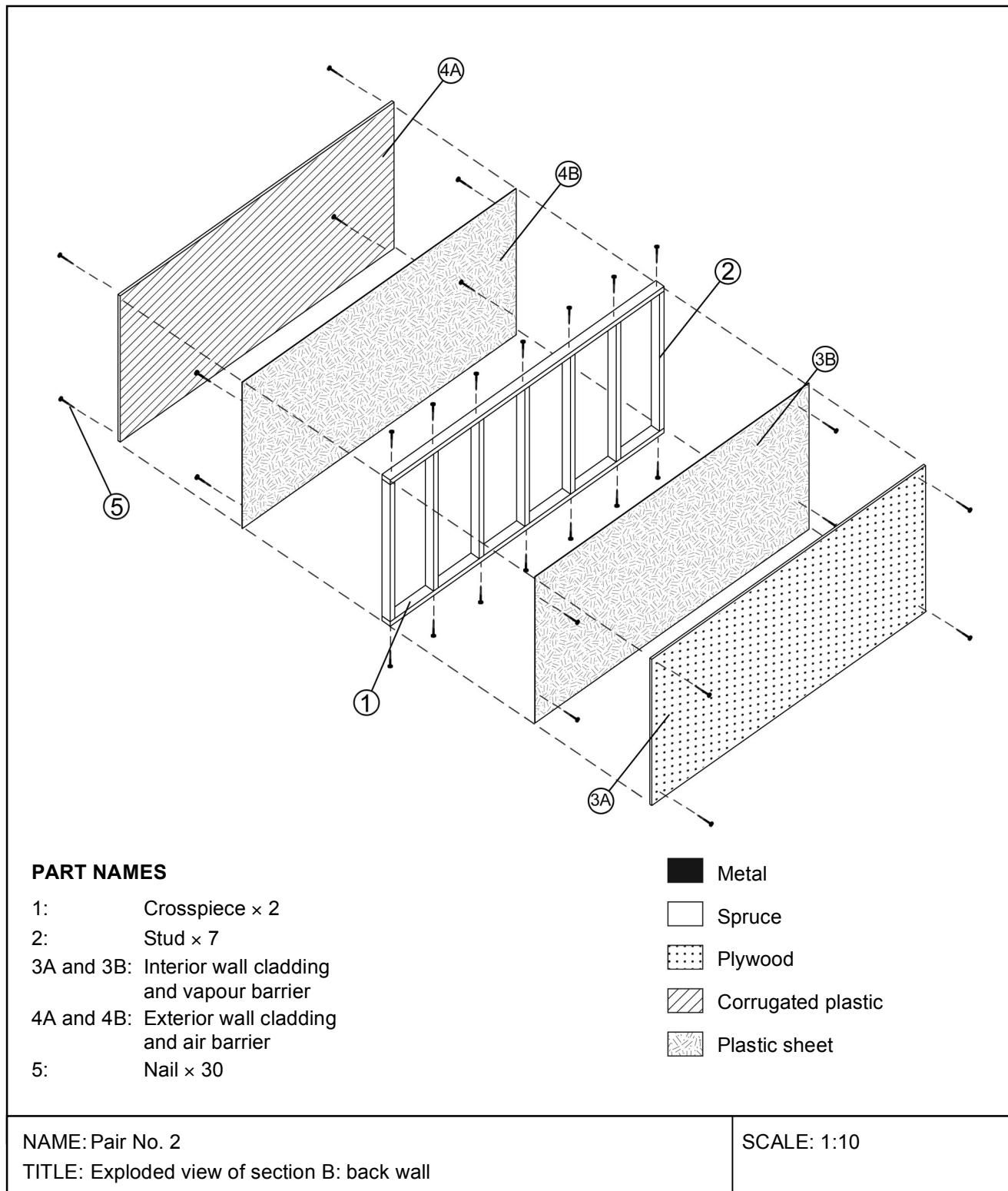
|                                                                                                             |                           |
|-------------------------------------------------------------------------------------------------------------|---------------------------|
| <p>Parts 7A and 7B</p>  |                           |
| <p>NAME: Pair No. 1</p> <p>TITLE: Detail drawing, section A: roof, parts 7A and 7B</p>                      | <p>SCALE: 1:10 ± 2 mm</p> |

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# The project *(continued)*

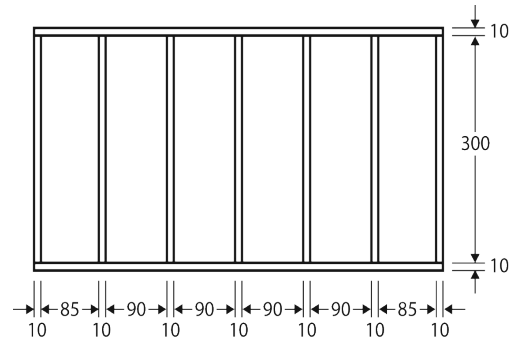
## Section B: back wall



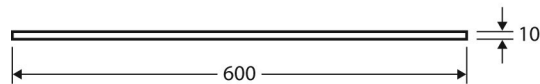


## The project *(continued)*

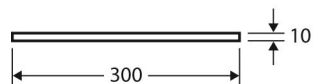
Front view of assembled  
back wall framing



Part 1  $\times$  2



Part 2  $\times$  7



NAME: Pair No. 2

TITLE: Detail drawing, section B: back wall, parts 1 and 2

SCALE: 1:10  $\pm$  2 mm

Name: \_\_\_\_\_

Group: \_\_\_\_\_

**EST**

## The project *(continued)*

Parts 3A and 3B

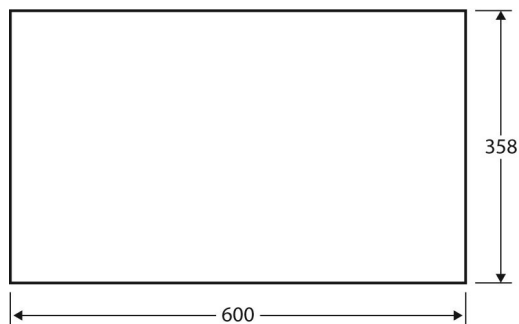


NAME: Pair No. 2

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 × 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

**Legend:**

■ Metal

□ Spruce

▤ Plywood

▨ Corrugated plastic

▩ Plastic sheet

X Duct tape

NAME: Pair No. 3

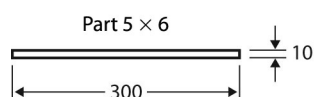
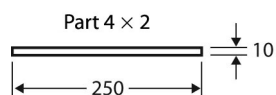
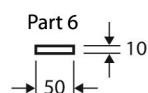
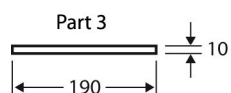
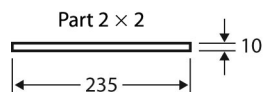
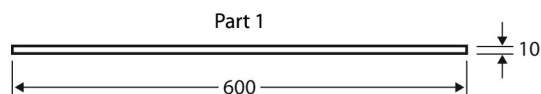
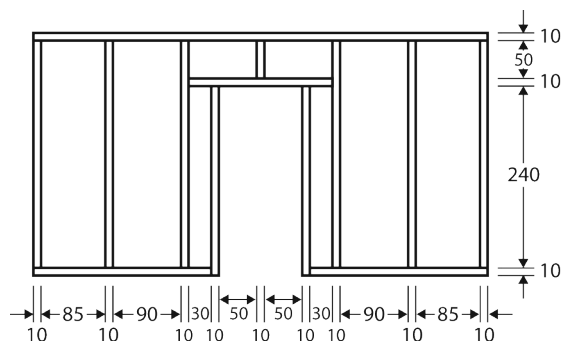
TITLE: Exploded view of section C: front wall

SCALE: 1:10

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# The project *(continued)*

Front view of assembled  
front wall framing

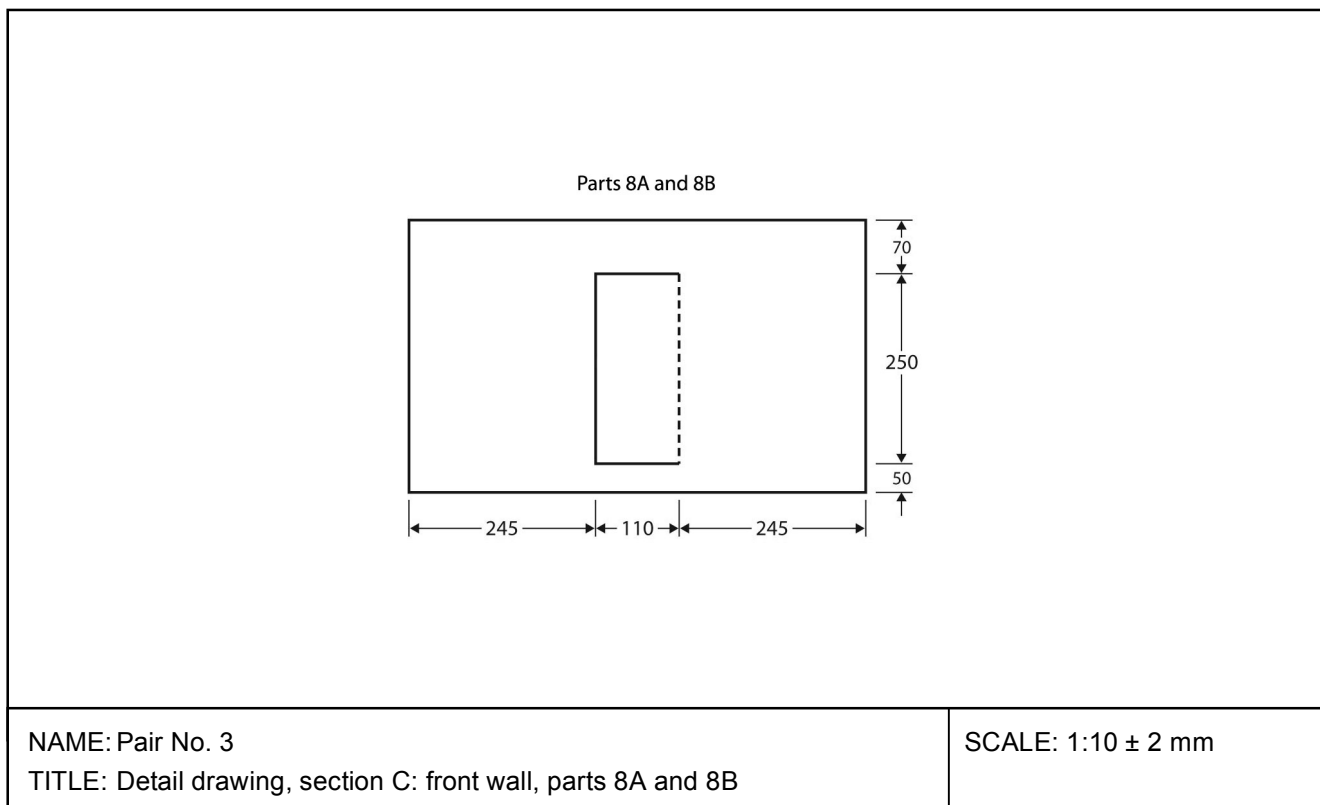
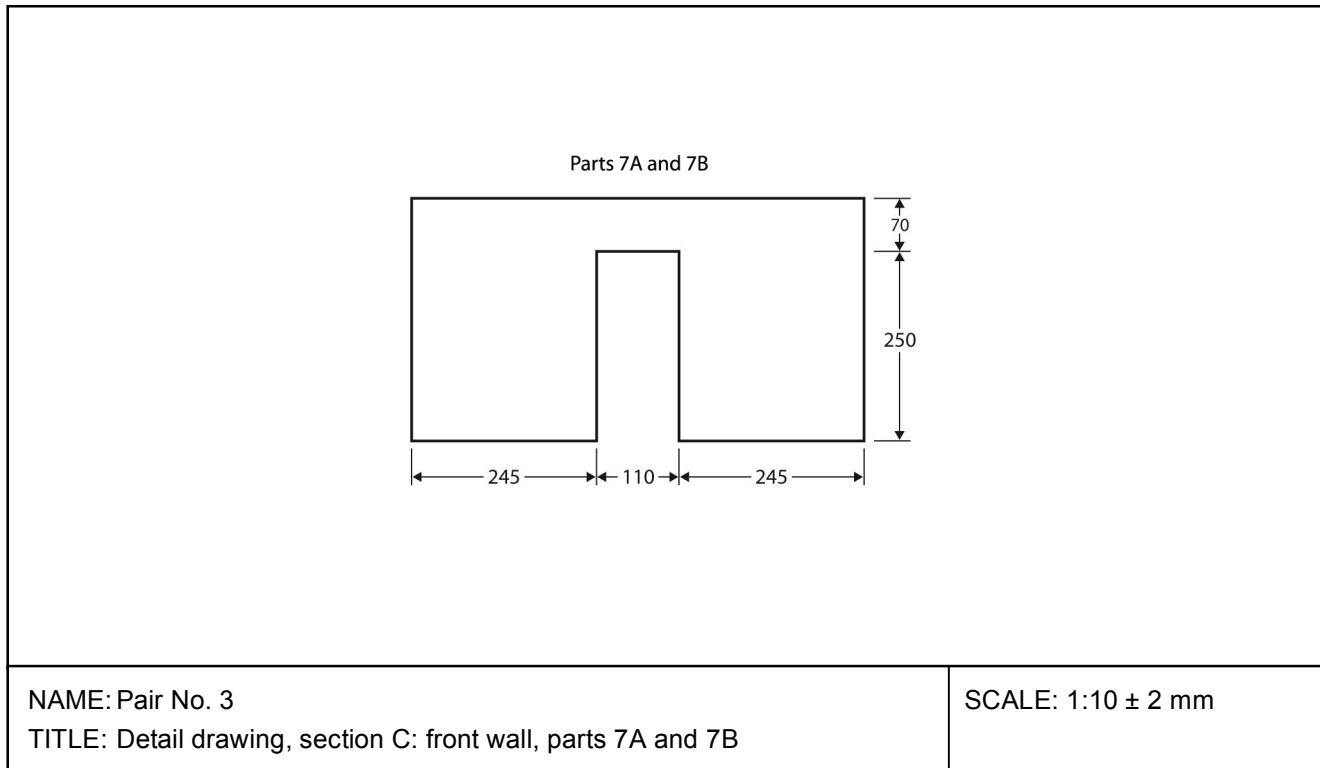


NAME: Pair No. 3

TITLE: Detail drawing, section C: front wall, parts 1 to 6

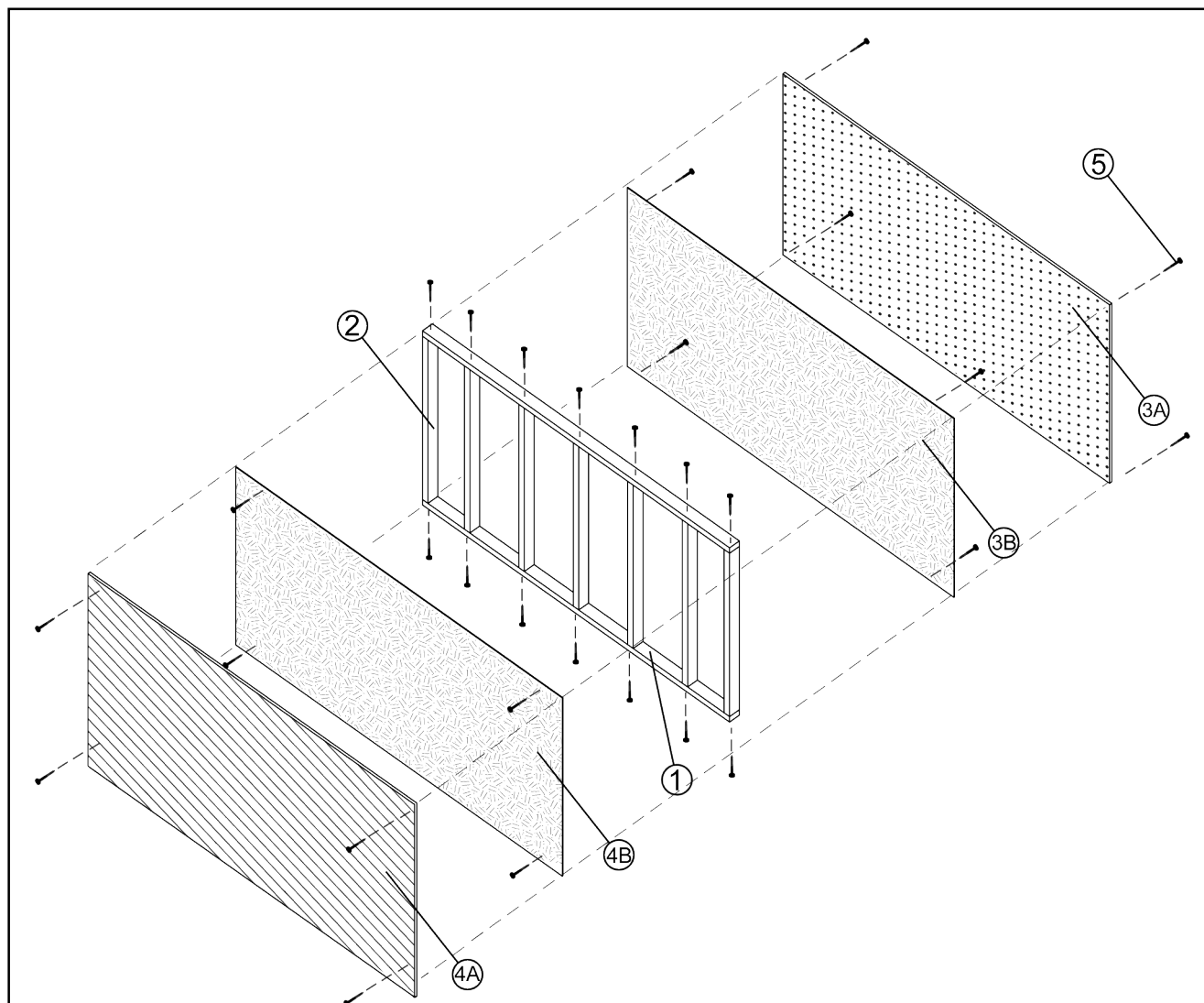
SCALE: 1:10  $\pm$  2 mm

## The project *(continued)*



# 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

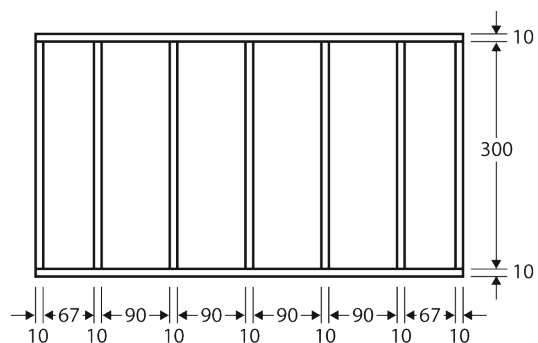
NAME: Pair No. 4

TITLE: Detail drawing, section D: left wall

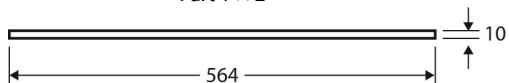
SCALE: 1:10

## The project *(continued)*

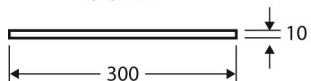
Front view of assembled  
left wall framing



Part 1  $\times$  2



Part 2  $\times$  7



NAME: Pair No. 4

TITRE: Detail drawing, section D: left wall, parts 1 and 2

SCALE: 1:10  $\pm$  2 mm

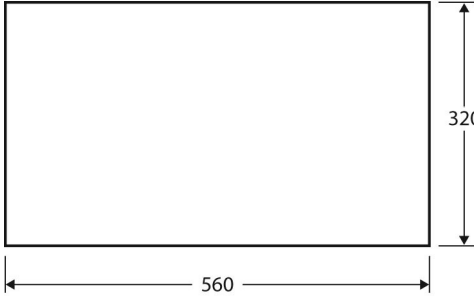


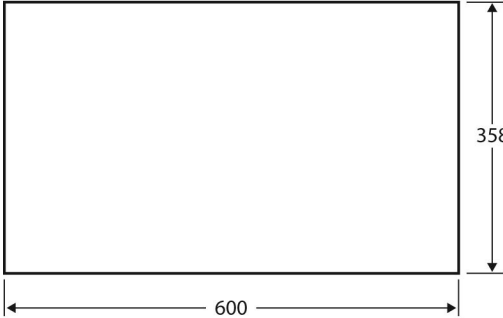
Name: \_\_\_\_\_

Group: \_\_\_\_\_

**EST**

## The project *(continued)*

|                                                                                                           |                           |
|-----------------------------------------------------------------------------------------------------------|---------------------------|
| <p>Parts 3A and 3B</p>  |                           |
| <p>NAME: Pair No. 4</p> <p>TITLE: Detail drawing, section D: left wall, parts 3A and 3B</p>               | <p>SCALE: 1:10 ± 2 mm</p> |

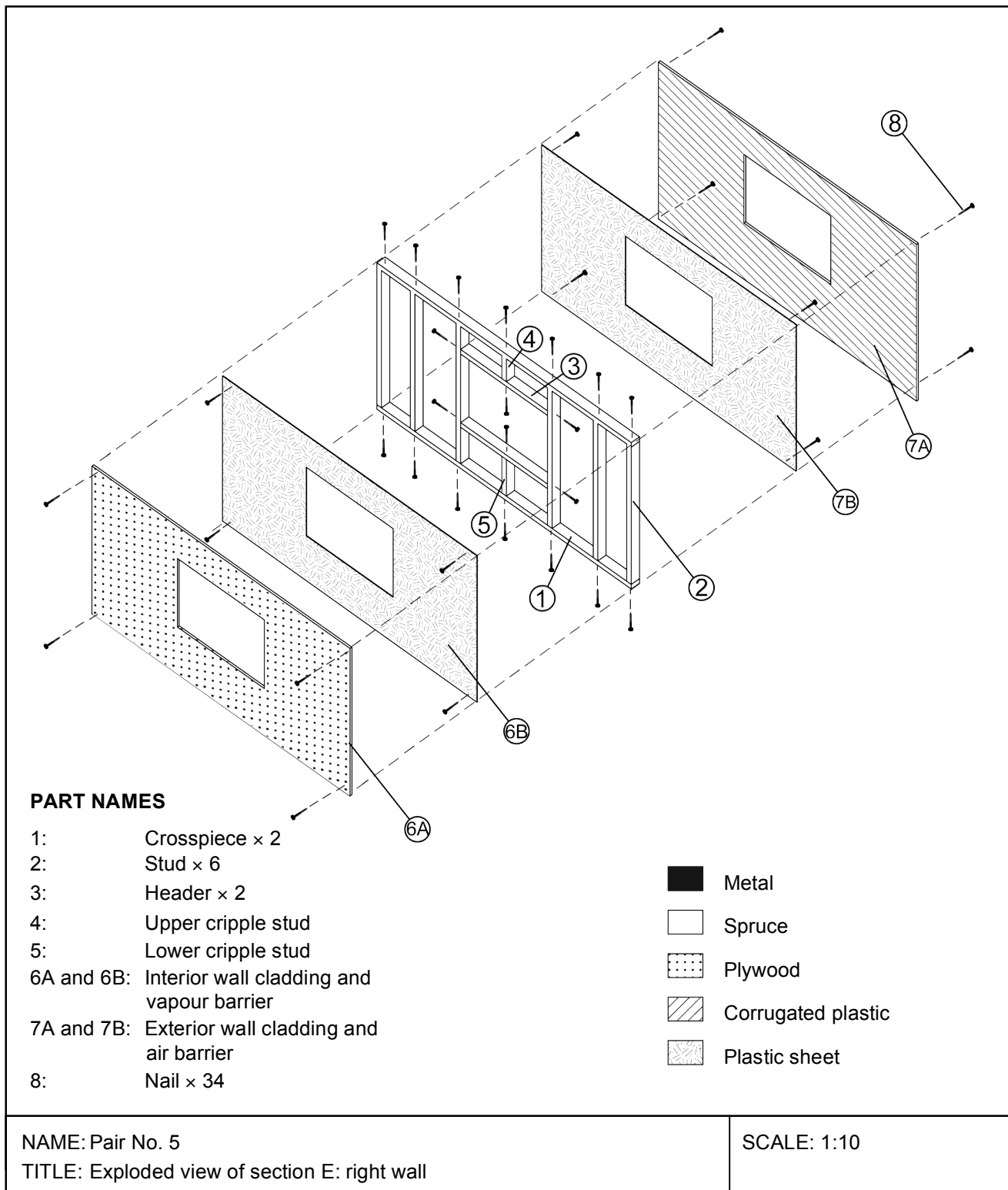
|                                                                                                             |                           |
|-------------------------------------------------------------------------------------------------------------|---------------------------|
| <p>Parts 4A and 4B</p>  |                           |
| <p>NAME: Pair No. 4</p> <p>TITLE: Detail drawing, section D: left wall, parts 4A and 4B</p>                 | <p>SCALE: 1:10 ± 2 mm</p> |





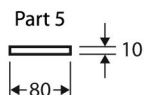
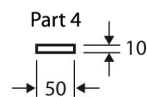
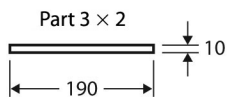
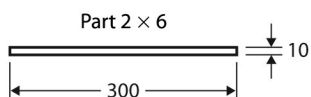
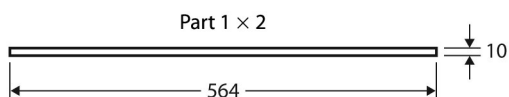
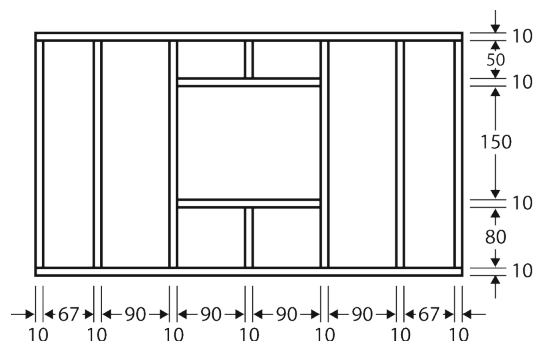
# The project *(continued)*

## Section E: right wall



# 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  $\pm$  2 mm

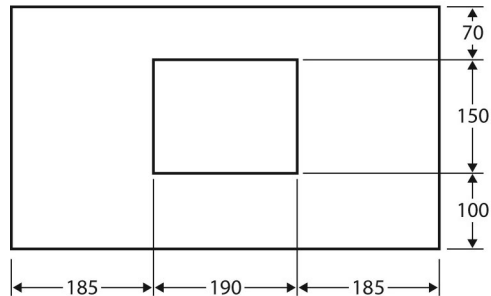
Name: \_\_\_\_\_

Group: \_\_\_\_\_

**EST**

## The project *(continued)*

Parts 6A and 6B

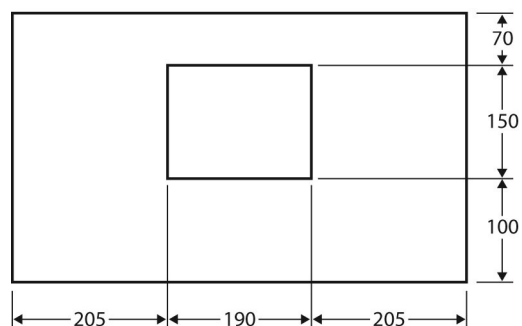


NAME: Pair No. 5

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

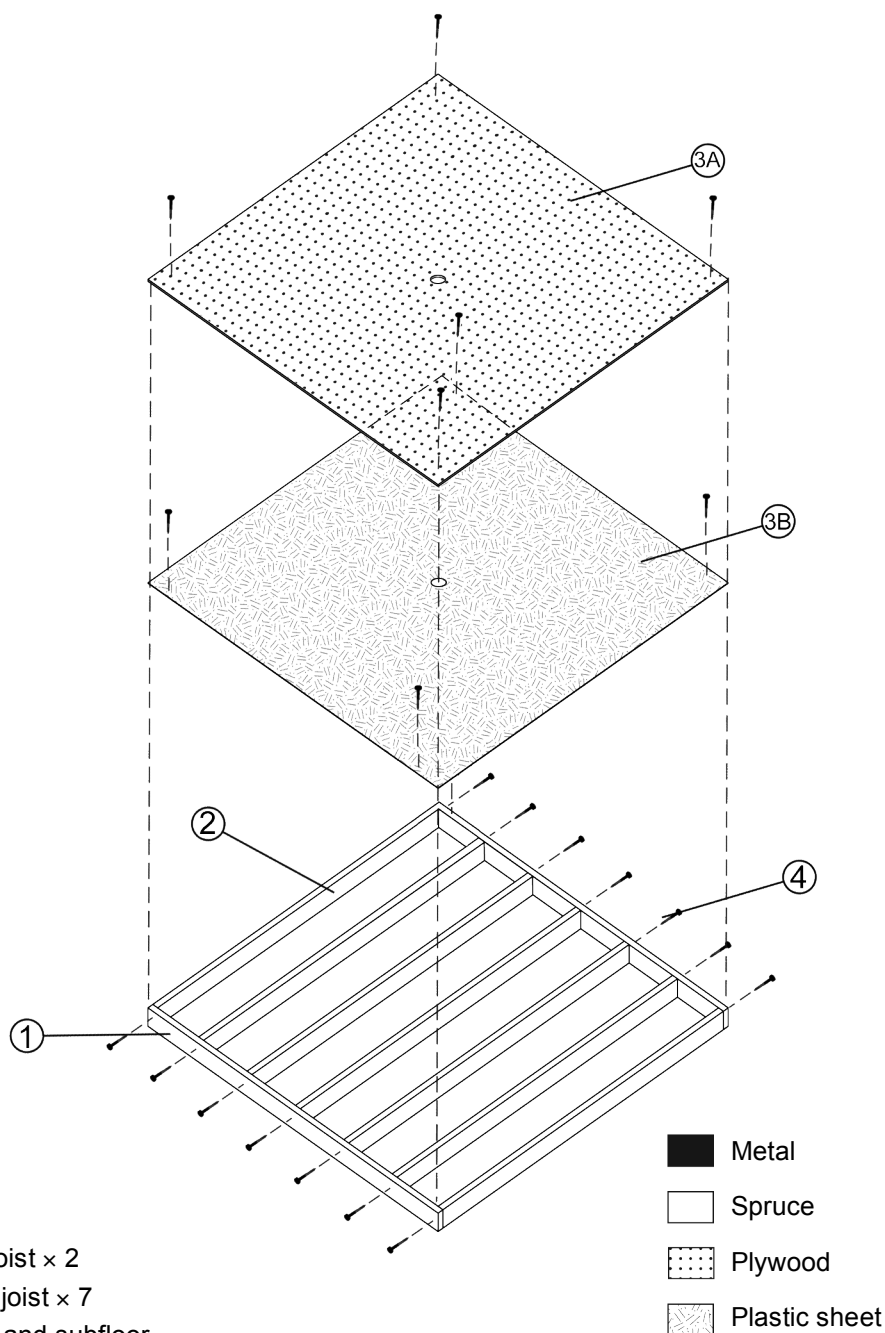
SCALE: 1:10 ± 2 mm

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# The project *(continued)*

## Section F: floor



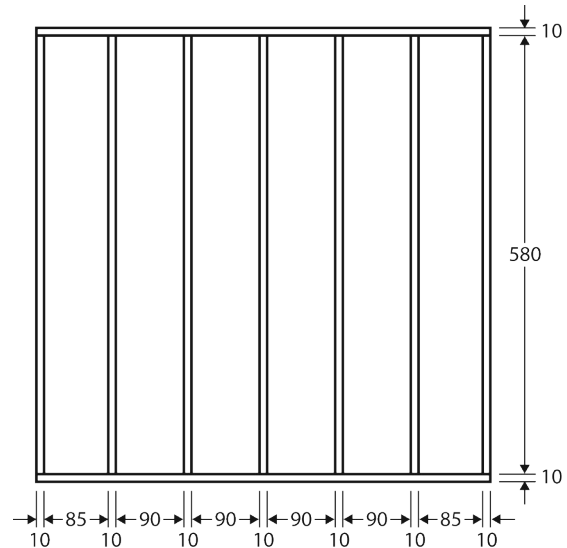
NAME: Pair No. 6

TITLE: Exploded view of section F: floor

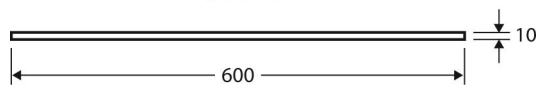
SCALE: 1:10

## The project *(continued)*

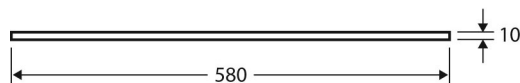
Top view of the assembled  
floor framing



Part 1  $\times$  2



Part 2  $\times$  7



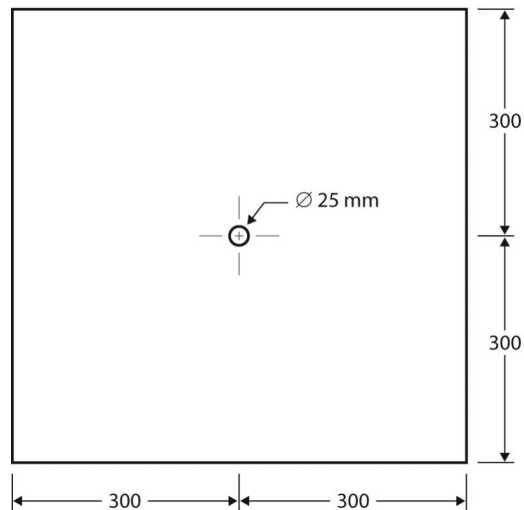
NAME: Pair No. 6

TITLE: Detail drawing, section F: floor, parts 1 and 2

SCALE: 1:10  $\pm$  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?

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2. What is an exploded view?

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

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4. What is a detail drawing?

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**EST** 5. What is a dimensional tolerance?

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

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## Creating the context *(continued)*

**EST** b) What is the difference between a tool and a machine tool?

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7. a) What is measuring?

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**EST** b) What is the difference between measuring and laying out?

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8. What is machining?

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9. Give a few examples of machining techniques.

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

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## Creating the context *(continued)*

11. What is the difference between tapping and threading?

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

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

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

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### I must

15. Reformulate the goal of the project.

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Name: \_\_\_\_\_

Group: \_\_\_\_\_

**EST**

## 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.

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### Reflection

Yes

No

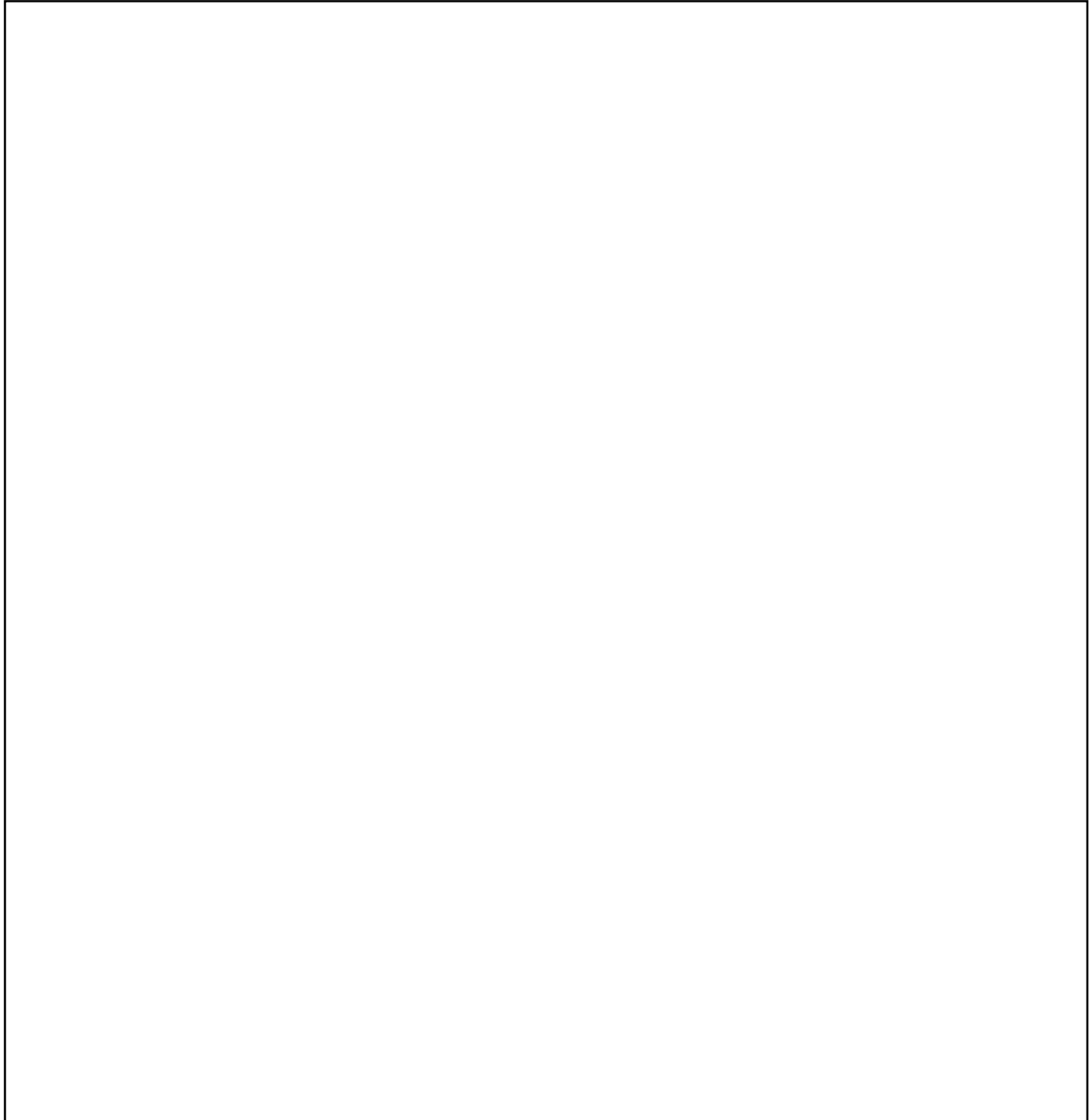
Do I fully understand the concepts related to the project?

☐☐

# 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)*

**Tandem No:**                      **Section:**

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

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- 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.**

[illegible]

- 4. What safety rules should you follow while building the prototype?**

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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?

7

7

# 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.

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

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### 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.

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

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

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

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## Testing the prototype *(continued)*

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

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

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

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

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# 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.

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

## \* 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

Name: \_\_\_\_\_

Group: \_\_\_\_\_

**EST**

# Evaluation grid

## SSC1 Seeks answers or solutions to scientific or technological problems

| Criteria* | Observable indicators                                                                                                   | A                                                                                                           | B                                                                                                                                   | C                                                                                                                                  | D                                                                                                                     | E                            |
|-----------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------|
| 1         | <b>Creating the context</b><br>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         | <b>Planning the project</b><br>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         | <b>Completing the project</b><br>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         | <b>Testing the prototype</b><br>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