


**Test 1
Non Cyclonic Testing
of
0.42mm BMT
KlipLok Classic 700 (Lysaght)
Roof Sheeting
with
75mm Spacer and 100mm
Insulation**

**PREPARED FOR
Carey Roofing Products Pty Ltd**

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1. Introduction

EngTest was approached by Mr. Dean Stubbs of JakMax Pty Ltd on behalf of Carey Roofing to undertake a series of cyclonic and non-cyclonic tests (including serviceability and strength limit states) on Carey Roofing products in accordance with the National Construction Code (NCC) and AS4040 as appropriate. This report relates to non-cyclonic test of Carey Roofing product in accordance with AS4040. All materials (panels, purlins, spacers and screws) were provided by Carey Roofing. Test pressures were provided by Rachael Zeuner (consultant of the project). Fixing of the panels was carried out by EngTest in accordance with the drawings and instructions provided by Rachael Zeuner, which are included in Appendix A. Testing was undertaken on 12th June 2013 by EngTest under the supervision of Mr. Brendan Scott, Dr Fereydoon Pooya Nejad, and Dr Togay Ozbakkaloglu from the School of Civil, Environmental and Mining Engineering.

2. Description of Test Procedures and Equipment

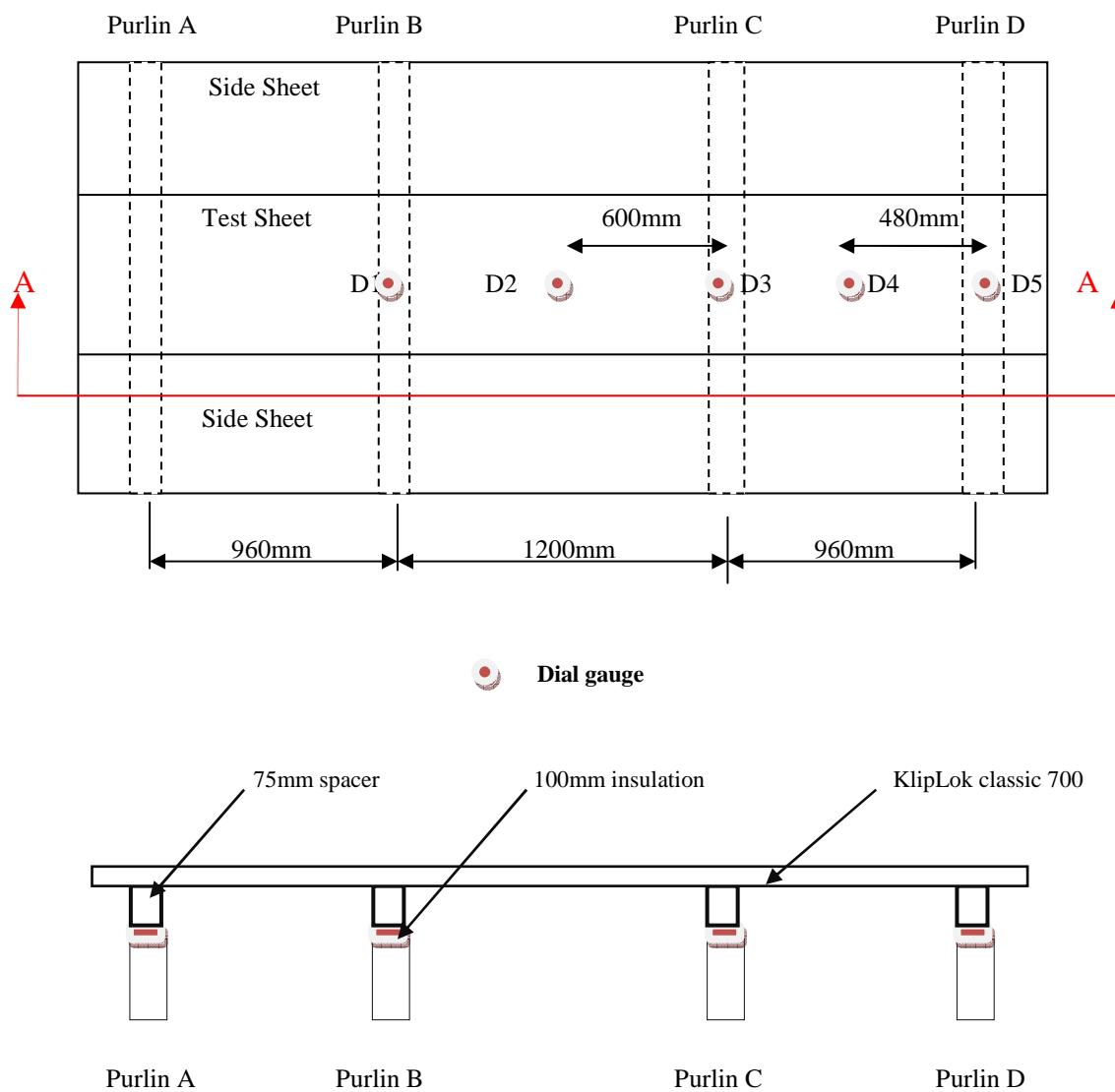
The test rig conforms to the requirements of AS4040.0–1992 and consists of two fixed vertical sides and a moveable base between the sides. The base is supported on hydraulic jacks and can be moved vertically. The panel supports are fastened to the sides of the test rig and the panels under test are fastened to the supports. Loads are applied to the panels through the airbags placed between the panels and the base of the test rig. The movement of the base is controlled electronically via pressure transducers placed inside the airbags to generate the required test pressures.

3. Test Details

Figures 1 to 3 show the test setup and installation arrangement of the panels on the test rig prior to testing. The side sheets and purlin connections to the loading frame were considered to be the part of the test rig, and hence were not under test. The setup of the air bag rig and the set up of the test specimens were undertaken by EngTest. Table 1 provides a summary of the test details and configurations.

Both serviceability limit state and strength limit state testing were undertaken in accordance with AS 4040.2-1992, *Methods of Testing Sheet Roof and Wall Cladding – Method 2: Resistance to Wind Pressures for Non-Cyclone Regions*. Each incremental load that was applied to the panels was maintained for a period of one minute in accordance with the

strength limit state test requirements of AS4040.2-1992. The test results are presented in Section 4.



Section A-A

Figure 1. Test setup.



Figure 2. Installation of the sheet to spacers.



Figure 3. Installed sheet prior to serviceability testing.

Table 1. Test materials and span arrangement.

Spacer height (mm)	Insulation thickness (mm)	Purlin type	Cladding	Clips	Cladding span (mm)	Cover plate thickness (mm)	Fasteners	
							Spacer to Purlin	Clips to Spacer
75	100	C1501.2	KlipLok Classic 700 (Lysaght) 0.42mm BMT	KlipLok Classic 700 (Lysaght)	960/1200/960	1.6	12_14×35 Buildex Metal Tekes	5_4.14×25 Bremick

4. Test results

4.1 Serviceability limit state

For serviceability limit state testing, deflections were measured for each load increment using dial gauges placed at the locations requested by Rachael Zeuner as shown in Figures 1 and 3. The target pressure for serviceability was also provided by Rachael Zeuner. Table 2 shows summary of dial gauges readings during serviceability limit state testing for each load increment, and Table 3 shows the deflections measured at the dial gages locations during the testing for each load increment. The results of the serviceability load test are presented in Figure 4.

Table 2. Summary of dial gauges readings in serviceability limit state testing.

Airbag pressure (kPa)	D1 (mm)	D2 (mm)	D3 (mm)	D4 (mm)	D5 (mm)	Comments
0.0	5.79	0.96	1.13	1.96	45.00	Immediately before application of the pressure
1.44	11.00	9.10	9.60	8.90	47.01	When the pressure has been applied for 1 minute
0.0	6.89	2.60	3.13	3.46	45.79	5 minutes after completion of removal of the pressure
2.30	14.80	13.10	12.05	11.60	49.50	When the pressure has been applied for 1 minute
0.0	7.32	3.14	4.63	3.91	46.11	5 minutes after completion of removal of the pressure
2.88	15.80	15.30	14.10	13.05	0.35	When the pressure has been applied for 1 minute
0.0	7.66	3.50	4.92	4.15	46.25	5 minutes after completion of removal of the pressure

Table 3. Deflection at the dial gages locations.

Airbag pressure (kPa)	Deflection				
	D1 (mm)	D2 (mm)	D3 (mm)	D4 (mm)	D5 (mm)
0.0	0.00	0.00	0.00	0.00	0.00
1.44	5.21	8.14	8.47	6.94	2.01
0.0	1.10	1.64	2.00	1.50	0.79
2.30	9.01	12.14	10.92	9.64	4.50
0.0	1.53	2.18	3.50	1.95	1.11
2.88	10.01	14.34	12.97	11.09	5.35
0.0	1.87	2.54	3.79	2.19	1.25

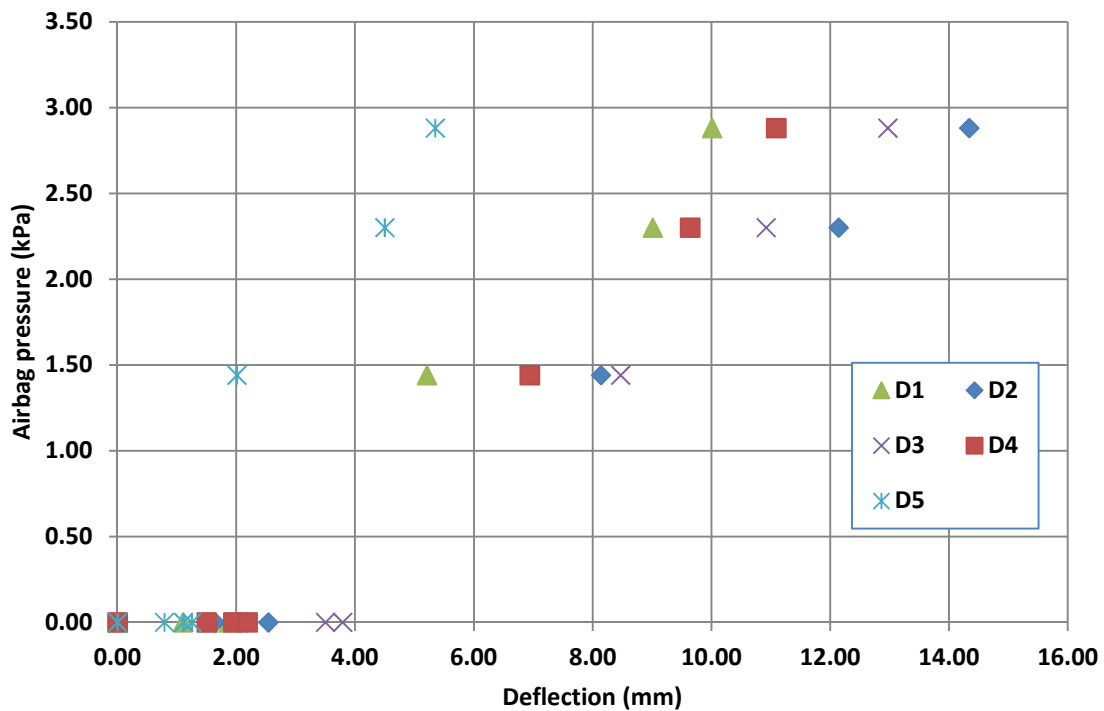


Figure 4. Summary of serviceability test results.

4.2 Strength limit state

After the removal of the dial gauges the sheeting was loaded incrementally from 2.88kPa to failure and increments of 0.5kPa. At each loading interval the pressures were maintained for a period of one minute as highlighted in Table 4. Based on the observations reported in Table the airbag pressure at failure was 7.89kPa and, in accordance with AS4040.2, the panels passed the strength limit state for a maximum pressure of 7.68kPa.

Table 4. Summary of strength limit state testing.

Airbag Pressure (kPa)	Comments
2.88	Pressure was maintained for a period of one minute. Increasing deflection.
3.38-7.68	Pressure was maintained for a period of one minute. Increasing deflection (Figure 5).
7.89	Panel failed . Centre sheet pulled out from the clips. Separation of centre test panel from side panels at overlaps (Figures 6-7). Failure occurred at 7.89kPa .



Figure 5. Deflection of the sheet at airbag pressure of 7.68kPa.



Figure 6. Sheeting at failure.



Figure 7. Separation of centre test panel from side panels at overlaps at failure.

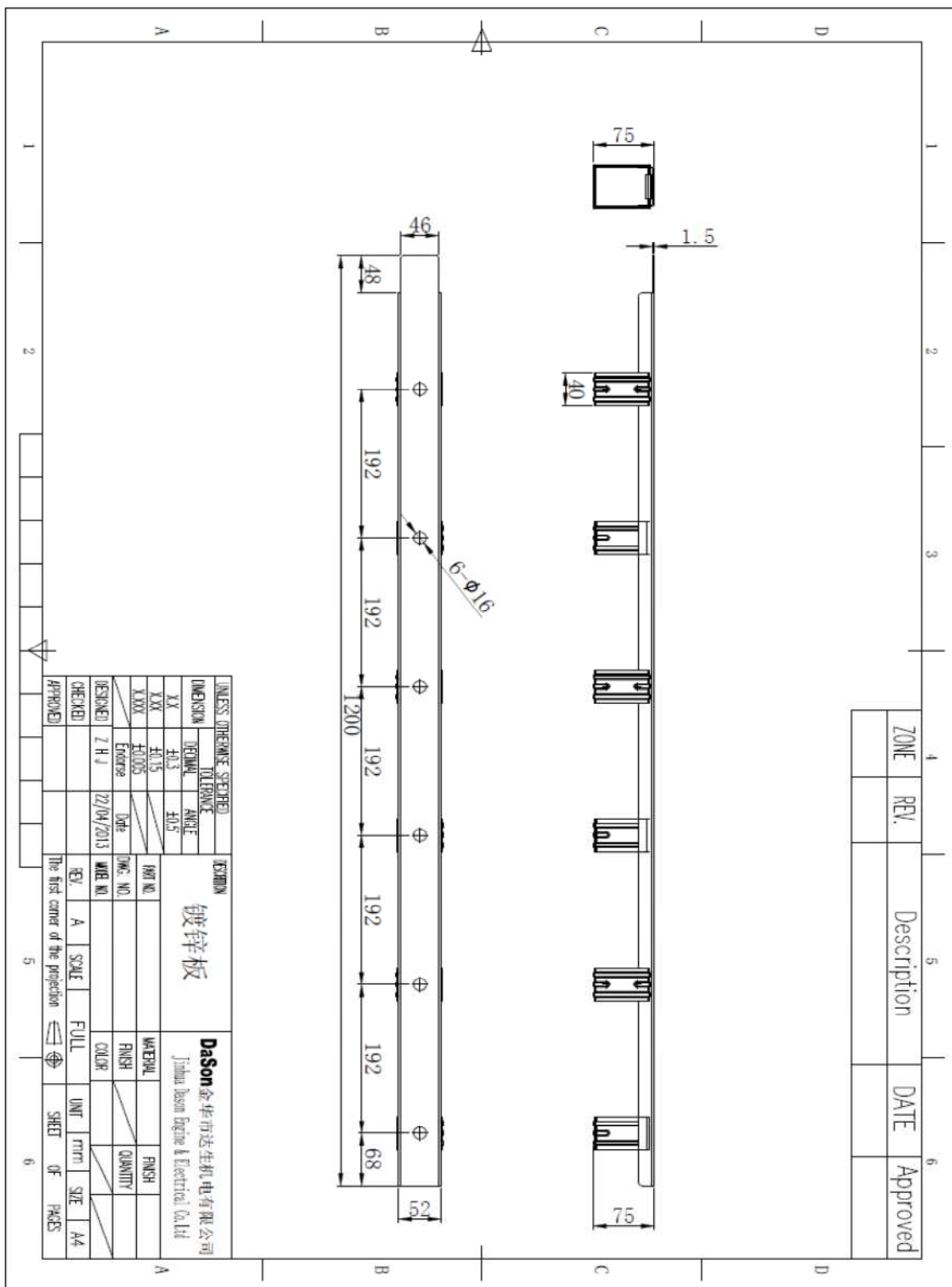
5. References

National Construction Code (NCC) Series 2012; Volume 1, Section B Structures, Specification B1.2 Design of Buildings in Cyclonic Areas; Australian Building Codes Board.

AS 4040.0-1992, Methods of testing sheet roof and wall cladding – Part 0: Introduction, list of methods and general requirements. Standards Australia, Homebush, NSW, Australia.

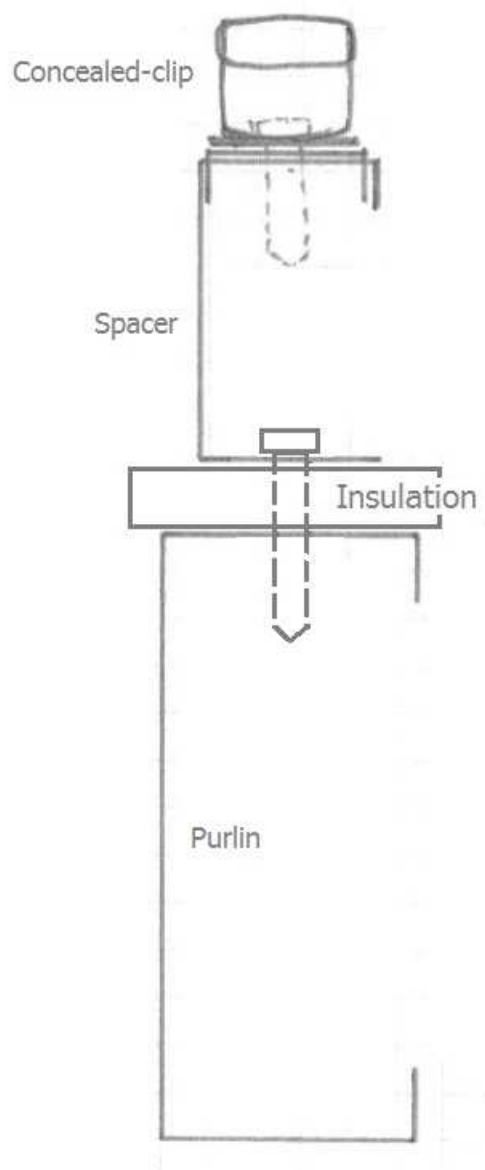
AS 4040.2-1992, Methods of testing sheet roof and wall cladding – Method 2: Resistance to wind pressures for non-cyclone regions. Standards Australia, Homebush, NSW, Australia.

APPENDIX A: Carey Roofing Fixing Details





Spacer Installation Diagram



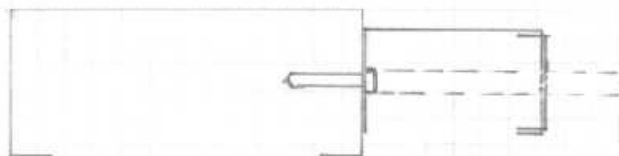
Rachael Zeuner Consulting Engineer

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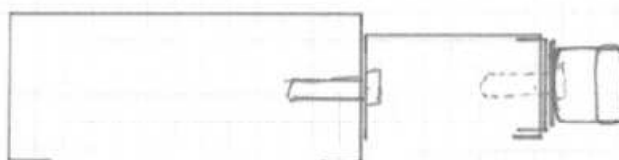
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- Using a socket drive (S116 socket)
- Place screw into a S116 socket drive.
- Put the socket drive through the hole on the top plate of the spacer to fix the legs of the spacer onto the steel purlin supports.



① Step 1

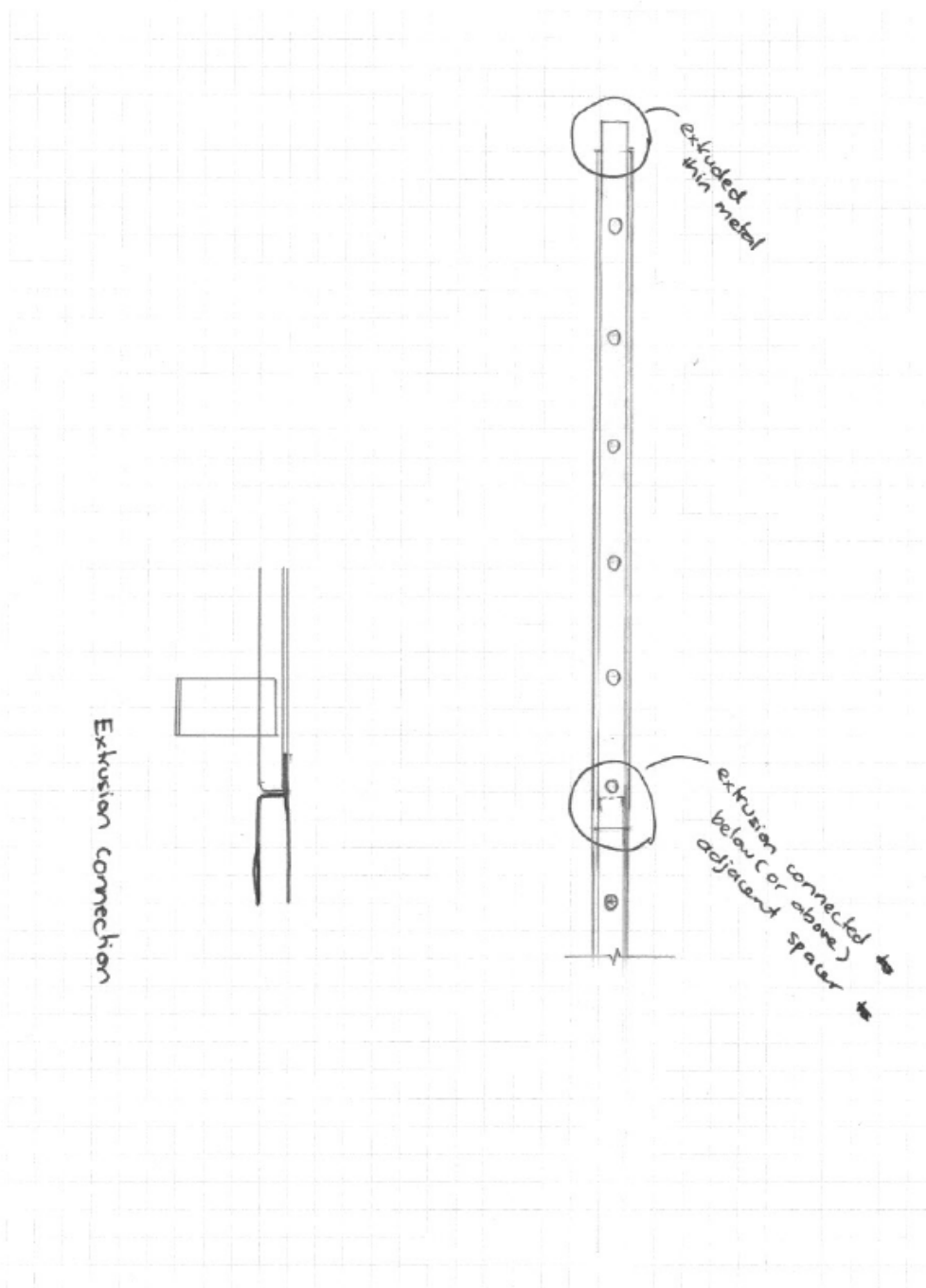


② Step 2

- Fix concealed clip to spacer



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