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PIVOT STOVE & HEATING



THERMAL CLEARANCE TESTING OF THE CHARNWOOD ISLAND II FREE-STANDING APPLIANCE

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Revision Details

Revision	Date	Comments
0	16/11/2020	Preliminary report – awaiting payment and engineering drawings of appliance
1	16/12/2020	Issue of NATA endorsed test report

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THERMAL CLEARANCE TESTING OF THE CHARNWOOD ISLAND II FREE-STANDING APPLIANCE

Report

The Charnwood Island II Free-standing appliance installed with a Room Seal Flue Kit was tested in two positions in a manner conforming to joint Australian/New Zealand Standard 2918:2018, Appendix B.

A minimum 900mm deep x 875mm wide x 12mm thick floor protector (compressed board) should be used under and in front of the appliance base when installing the appliance (see joint AS/NZS 2918:2018 3.3.2). The floor protector should extend 470mm in front of the appliance door and be placed centrally in the 875mm width. The Thermal resistivity of the floor protector is 0.052m².K/W for 12mm thick compressed board sheets.

The Charnwood Island II Free-Standing solid fuel appliance installed with a Room Seal Flue Kit conforms to the requirements of the joint AS/NZS 2918:2018 Standard, Appendix B.

The appliance and flue system were tested at the following clearances:

Position A – Parallel position

Position B – Corner position

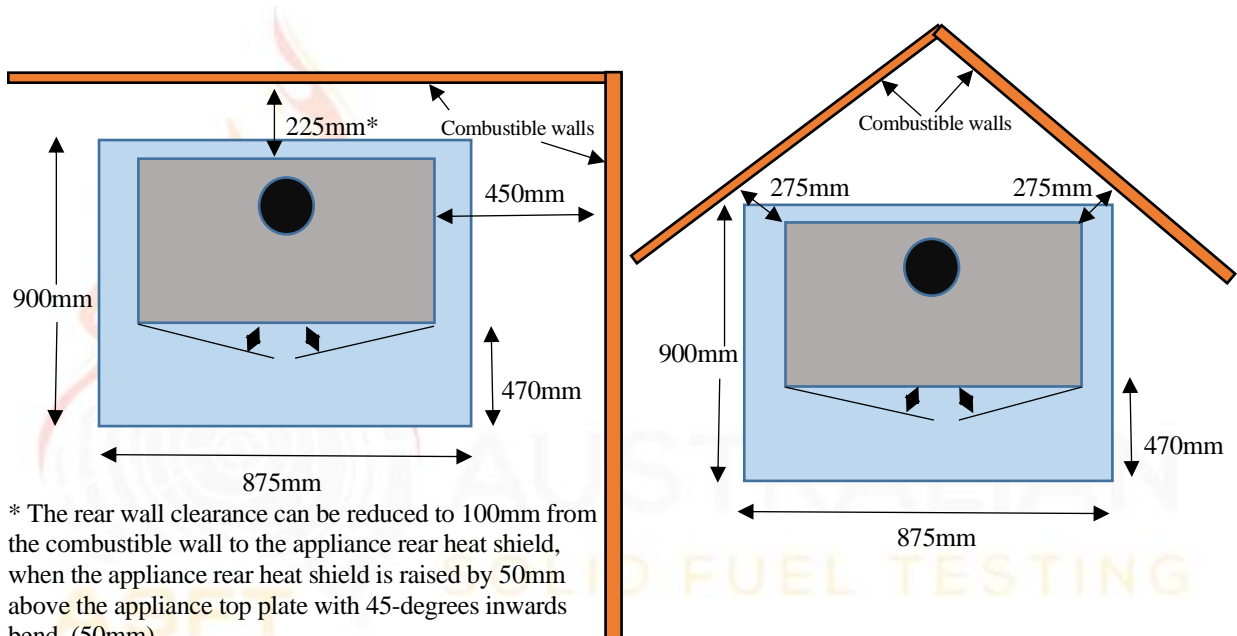


Figure 1 – Clearance Diagram

Signed		Approved	
Name	Garry W. Mooney	Name	Steve Marland
Title	Technical Officer	Title	Managing Director – Australian Solid Fuel Testing
Date	16/12/2020	Date	16/12/2020

1. INTRODUCTION

Thermal Clearance testing of the Charnwood Island II appliance and flue system took place on 11, 12 November 2020 at the Australian Solid Fuel Testing Laboratory located at 3 Garden Street, Morwell, Victoria. The testing was performed by Mr G.W. Mooney and Mr S. Marland.

2. PROCEDURE

Testing was conducted as per Appendix B of AS/NZS2918:2018, Hot sites were located with the aid of an infra-red thermometer. Thermocouple tips were stapled onto the test surfaces, with black tape over the first 100 mm to facilitate consistent and accurate recording of temperatures.

Thermocouple positions are shown in the table below:

Position A – Parallel Position

Thermocouple No.	Position	Thermocouple No.	Position
1	Floor - 1300mm in front of centre	16	Floor – 150mm RHS of centre
2	Floor – 1200mm in front of centre	17	Floor – 300mm RHS of centre
3	Floor - 1050mm in front of centre	18	Floor – 450mm RHS of centre
4	Floor – 900mm in front of centre	19	Ceiling Ring – Inner front
5	Floor – 750mm in front of centre	20	Ceiling Ring – 25mm in front
6	Floor – 600mm in front of centre	21	Ceiling Ring – Inner side
7	Floor – 450mm in front of centre	22	Ceiling Ring – 25mm to side
8	Floor – 300mm in front of centre	23	Rear wall – 730mm from corner, 936mm above the floor
9	Floor – 150mm in front of centre	24	Rear wall – 592mm from corner, 877mm above the floor
10	Floor – Centre of flue	25	Rear wall – 578mm from corner, 595mm above the floor
11	Floor – 150mm behind centre	26	RHS wall, 612mm from corner, 516mm above the floor
12	Floor – 300mm behind centre	27	RHS wall, 305mm from corner, 895mm above the floor
13	Floor – 450mm LHS of centre	28	RHS wall, 419mm from corner, 593mm above the floor
14	Floor – 300mm LHS of centre	29	Rear wall – 745mm from corner, 828mm above the floor
15	Floor – 150mm LHS of centre	30	Ambient temperature

Position B – Corner Position

Thermocouple No.	Position	Thermocouple No.	Position
19	Ceiling Ring – Inner front	25	LHS wall – 386m 578mm from corner, 595mm above the floor
20	Ceiling Ring – 25mm in front	26	RHS wall, 785mm from corner, 536mm above the floor
21	Ceiling Ring – Inner side	27	RHS wall, 517mm from corner, 908mm above the floor
22	Ceiling Ring – 25mm to side	28	RHS wall, 692mm from corner, 758mm above the floor
23	LHS wall – 835mm from corner, 621mm above the floor	29	LHS wall, 830mm from corner, 622mm above the floor
24	LHS wall – 599mm from corner, 879mm above the floor	30	Ambient temperature

TABLE 1

3. TEST FUEL

Testing was conducted with Pinus Radiata as the test fuel which had a moisture content of 11.7% moisture. Each firewood piece was 200mm x 100mm x 40mm.

4. FLUE SYSTEM

The flue system used during testing was a Room Seal Flue Kit supplied by Pivot Stoves & Heating. This flue system has been tested to joint AS/NZS 2918:2018, Appendix F. The flue height was 4.6 ± 0.1 m from the floor protector. Appendix 1 shows details of the flue system.

5. RESULTS

5.1 High Fire Test

The appliance was fired in accordance with Section B9.1 of AS/NZS2918;2018. The level of fuel was maintained between 50-75% of the full volume level of the fuel chamber during the High Fire test.

The average fuel load for initiating the High Fire tests was 4.3kg with an average refuelling rate of 0.8kg/10 minutes.

During High Fire testing it was found that the highest surface temperatures occurred when the primary air control of the appliance was fully open.

5.2 Flash Fire Test

Immediately after the High Fire test was completed, sufficient embers were removed to bring the fire bed to a level of 15-25% of the fuel chamber volume. The appliance was then fired in accordance with Section B9.2 of AS/NZS2918;2018.

The average fuel load for initiating the Flash Fire tests was 3.7kg.

The highest temperature rises were achieved by leaving the right hand side door open by 10mm with the primary air fully open.

5.3 Ambient and Test Surface Temperatures

The Tables below show the Ambient temperatures and test surfaces temperatures during testing of the appliance and flue combination:

Ambient Temperature Range °C

Position	High Fire	Flash Fire
A	14.8 – 28.4	25.4 – 28.0
B	24.9 – 28.9	21.8 – 26.5

Maximum Surface Temperature Rise above Ambient - Position A

Position	Thermocouple Number	High Fire Test (°C)	Thermocouple Number	Flash Fire Test (°C)
Floor	7	56.0	4	56.9
Ceiling	20	28.0	20	31.1
Rear Wall	29	51.0	29	65.7
Side Wall	26	62.3	26	59.6

Maximum Surface Temperature Rise above Ambient - Position B

Position	Thermocouple Number	High Fire Test (°C)	Thermocouple Number	Flash Fire Test (°C)
Ceiling	20	27.8	20	32.9
RHS Wall	29	58.5	26	55.5
LHS Wall	26	58.7	29	70.2

5.4 Uncertainty of Measurement Statement

5.5.1 The uncertainty of distance measurement for determining clearance distances was not greater than ± 3 mm.

5.5.2 The uncertainty of temperature measurement during the entire test period was a maximum of $\pm 2^\circ\text{C}$ at a 95% confidence level.

6. APPLIANCE CONSTRUCTION DETAILS

The test results reported directly relate to the appliance/flue system tested. The details of the appliance given in this section include features which may affect safety clearances. Any change in the design/construction of this appliance or flue may invalidate this report. Below are the constructions details of the appliance:

Appliance Model Name: Island II – BP		Serial No: BP001629
Manufacturer: Charnwood		
Overall Height: 730mm	Overall Depth: 430mm	Overall Width: 612mm
Top Plate Width: 612mm	Top Plate Depth: 390mm	Top Plate Thickness: 10mm
Appliance Legs Height: 105mm	Depth: 40-70mm	Width: 40-70mm
Usable Firebox Height: 180-280mm	Width: 510mm	Depth: 228-245mm
Usable Firebox Volume: 27.7 Litres		
Firebox Material Type/Seam Fully Welded: Fully welded, 5mm steel		
Firebrick Type: 30mm compressed vermiculite		
Main Door Opening Height: 340mm	Width: 473mm	
Left Side Door Height: 487mm	Width: 275mm	Depth: 20mm
Right Side Door Height: 487mm	Width: 265mm	Depth: 20mm
Door glass Height: 310mm	Width: 195mm	
Primary Air Location: Below firebox		
Dimension of Primary Air: 2 slots 35×25mm, 2 slots 14×25mm, 1 slot 40×20mm, 1 slot 40×8mm. 1st click: 2 slots 25×6.5mm + 1 slot 40×3mm (area: 445mm²)		
Area of Primary (mm ²): 1750+700+800+320 = 2,940mm²		
Primary Air fully out and Biomass Selector fully out: 2,235.3mm²		
Secondary/Tertiary Air Location: Rear of firebox 50mm below baffle		
Dimension of Secondary/Tertiary Air: 12 holes @ 7mm		
Area of Secondary/Tertiary Air (mm ²): 461.9mm²		
Baffle Plate size: 2 pieces @ 263×227×30mm compressed vermiculite. Secondary baffle: 240×240×5mm steel		
Flue Dimensions: 152mm		
Spigot Dimensions:	OD: 167mm	ID: 160mm
Spigot to Rear of Appliance: 90mm		
Rear Internal to External Heat Shield: 55mm		
Side Internal to External Heat Shield: N/A		
Heat Shield Material Type: 1.5mm steel		
Water Heater Fitted: No		
Fan Location/Speeds: N/A		
Catalytic Combustor fitted: No		
Grate: Yes		
Ash Pan: Yes		
NOTE: Accuracy of measurement is ±5% of the measured value		

7. CONCLUSION

The Charnwood Island II Free-standing appliance installed with a Room Seal Flue Kit, conforms to the requirements of Australian/New Zealand Standard 2918:2018, with respect to floor, ceiling, side wall and rear wall surface temperatures, when tested in the test positions shown in Figure 1 of this report in accordance with Appendix B of AS/NZS2918;2018.



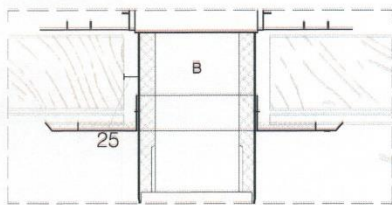
APPENDIX 1:

Room Seal Flue Kit

Installation Manual

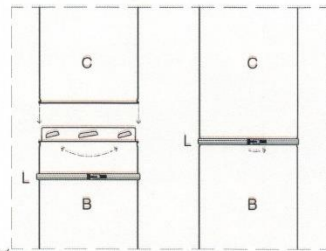
Reduced Clearance
 4m Flue Kit

Ceiling Ring



NOTE:
 There is a 25mm clearance between the flue and any timber at all times

Flue Assembly

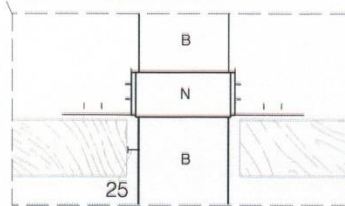


NOTE:
 To assemble flue, first lock into place, second secure locking band around joint

Reduced Clearance Flue Kit

Item	Description	QTY	Product Code
O	1000mm RSF, painted black (with Locking Band) Inside diameter: 150mm Outside diameter: 200mm	2	RFS-1000-black
B	1000mm starter length, end painted for drop box Inside diameter: 150mm Outside diameter: 200mm	1	RSF-1000 Starter
C	1000mm Room Sealed Flue (with Locking Band) Inside diameter: 150mm Outside diameter: 200mm	1	RSF-1000
E	Ceiling Ring	1	Choose correct ceiling ring pitch, see extra parts for options
F	8" Wind Cowl Stainless Steel Inside diameter: 150mm Outside diameter: 200mm	1	RFS-COWL
G	Room Sealed Flue Adapter Single to twin 150mm - 200mm	1	RSF-STARTER

Optional Support Brace



NOTE:
 The optional support brace (N) has the ability to adjust to any angle of adjacent roof beams
 There is a 25mm clearance between the flue and any timber at all times

