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PIVOT STOVE & HEATING



THERMAL CLEARANCE TESTING OF THE CHARNWOOD AIRE 3 FREE-STANDING APPLIANCE

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Revision Details

Revision	Date	Comments
0	19/11/2020	Preliminary report – awaiting payment and engineering drawings of appliance
1	15/12/2020	Issue of NATA endorsed test report

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THERMAL CLEARANCE TESTING OF THE CHARNWOOD AIRE 3 FREE-STANDING APPLIANCE

Report

The Charnwood Aire 3 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 645mm deep x 675mm wide x 6mm 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 300mm in front of the appliance door and be placed centrally in the 675mm width. The Thermal resistivity of the floor protector is 0.026m².K/W for 6mm thick compressed board sheets.

The Charnwood Aire 3 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

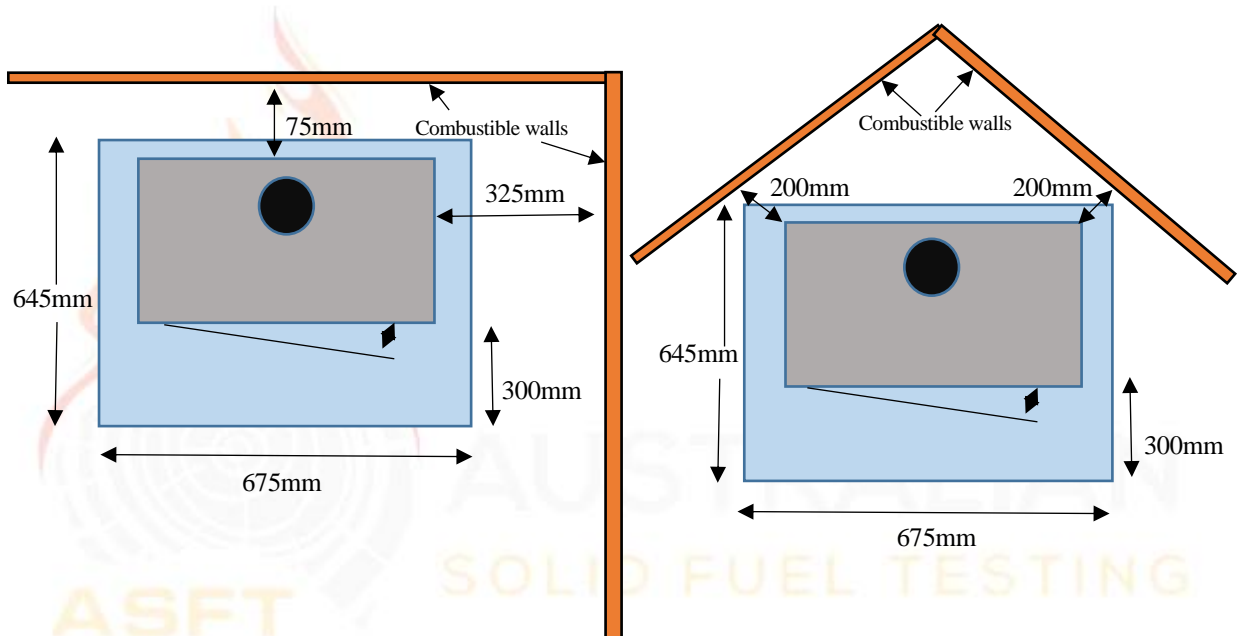


Figure 1 – Clearance Diagram

Signed		Approved	
Name	Garry W. Mooney	Name	Steve Marland
Title	Technical Officer	Title	Managing Director – Australian Solid Fuel Testing
Date	15/12/2020	Date	15/12/2020

1. INTRODUCTION

Thermal Clearance testing of the Charnwood Aire 3 appliance and flue system took place on 18 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 – 541mm from corner, 892mm above the floor
9	Floor – 150mm in front of centre	24	Rear wall – 540mm from corner, 746mm above the floor
10	Floor – Centre of flue	25	Rear wall – 318mm from corner, 481mm above the floor
11	Floor – 150mm behind centre	26	Wood storage area, 190mm from rear, 50mm from firebox, 165mm from the side
12	Floor – 300mm behind centre	27	RHS wall, 197mm from corner, 776mm above the floor
13	Floor – 450mm LHS of centre	28	RHS wall, 231mm from corner, 476mm above the floor
14	Floor – 300mm LHS of centre	29	Rear wall – 430mm from corner, 671mm 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 – 431mm from corner, 480mm above the floor
20	Ceiling Ring – 25mm in front	26	RHS wall, 553mm from corner, 549mm above the floor
21	Ceiling Ring – Inner side	27	RHS wall, 420mm from corner, 789mm above the floor
22	Ceiling Ring – 25mm to side	28	RHS wall, 526mm from corner, 503mm above the floor
23	LHS wall – 348mm from corner, 743mm above the floor	29	LHS wall, 539mm from corner, 538mm above the floor
24	LHS wall – 509mm from corner, 377mm 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 105mm x 100mm x 40mm.

4. FLUE SYSTEM

The flue system used during testing was a Room Seal Flue Kit with the Flue casing resting on the appliance top plate. Flue kit was supplied by Pivot Stoves & Heating Co. 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 1.2kg with an average refuelling rate of 0.3kg/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 1.1kg.

The highest temperature rises were achieved by leaving the main door resting against the door catch 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	10.0 – 20.0	17.4 – 19.4
B	18.4 – 24.6	22.9 – 26.1

Maximum Surface Temperature Rise above Ambient - Position A

Position	Thermocouple Number	High Fire Test (°C)	Thermocouple Number	Flash Fire Test (°C)
Floor	7	49.7	7	48.8
Ceiling	20	23.8	20	25.5
Wood storage area	26	37.1	26	36.8
Rear Wall	29	56.4	29	49.9
Side Wall	28	60.4	28	66.0

Maximum Surface Temperature Rise above Ambient - Position B

Position	Thermocouple Number	High Fire Test (°C)	Thermocouple Number	Flash Fire Test (°C)
Ceiling	20	23.3	20	22.4
RHS Wall	26	61.7	26	68.9
LHS Wall	29	49.3	29	43.4

5.4 Uncertainty of Measurement Statement

- 5.5.1 The uncertainty of distance measurement for determining clearance distances was not greater than $\pm 3\text{mm}$.
- 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: Aire 3	Serial No: AA00500	
Manufacturer: Charnwood		
Overall Height: 665mm	Overall Depth: 345mm	Overall Width: 375mm
Top Plate Width: 375mm	Top Plate Depth: 315mm	Top Plate Thickness: 10mm
Log Storage Area Height: 110mm	Depth: 260-270mm	Width: 340mm
Usable Firebox Height: 200-230mm	Width: 273mm	Depth: 140mm
Usable Firebox Volume: 8.6 Litres		
Firebox Material Type/Seam Fully Welded: Fully welded 5mm steel		
Firebrick Type: 30mm compressed vermiculite		
Main Door Opening Height: 288mm	Width: 274mm	
Door Height: 367mm	Width: 340mm	Depth: 30-42mm
Door glass Height: 215-235mm	Width: 258mm	
Primary Air Location: Below firebox		
Dimension of Primary Air: Fully open, 2 slots 25×17mm + 2 slots 7×13mm Open to 1st click, 2 slots 10×17mm + 2 slots 10×10mm Fully closed, 5×17mm + 2 trapezoids 5mm top, 10mm bottom, 4mm high		
Area of Primary (mm ²): Fully open, 850 + 182 = 1032mm² 1st click, 340 + 200 = 540mm² Fully closed, 170 + 60 = 230mm²		
Secondary/Tertiary Air Location: Rear of firebox, 30-60mm below baffle		
Dimension of Secondary/Tertiary Air: 30 holes @ 3mm		
Area of Secondary/Tertiary Air (mm ²): 212.1mm²		
Baffle Plate size: 290×144×30mm compressed vermiculite		
Flue Dimensions: 152mm		
Spigot Dimensions:	OD: 142mm	ID: 135mm
Spigot to Rear of Appliance: 60mm		
Rear Internal to External Heat Shield: 37mm		
Firebox to Side External Heat Shield: N/A		
Heat Shield Material Type: 1.4mm steel		
Water Heater Fitted: N/A		
Fan Location/Speeds: No		
Catalytic Combustor fitted: No		
Grate: No		
Ash pan: Yes		
NOTE: Accuracy of measurement is ±5% of the measured value		

7. CONCLUSION

The Charnwood Aire 3 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.



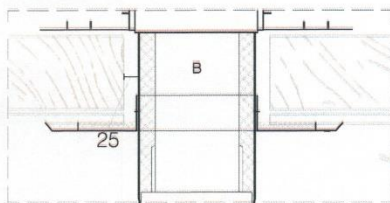
APPENDIX 1:

Room Seal Flue Kit

Installation Manual

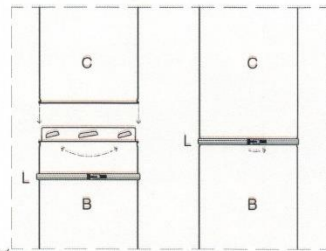
Reduced Clearance
 4m Flue Kit

Ceiling Ring



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

Flue Assembly

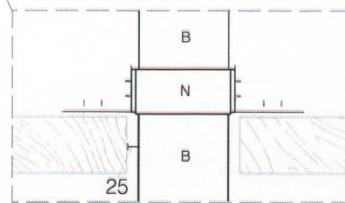


NOTE:
 To assemble flue, first lock into place, second secure locking band around joint

Reduced Clearance Flue Kit

Item	Item	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

