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**PREPARED FOR**

# **PIVOT STOVE & HEATING**



## **THERMAL CLEARANCE TESTING OF THE CHARNWOOD AIRE 7 FREE-STANDING APPLIANCE**

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## Revision Details

Revision	Date	Comments
0	23/10/2020	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 7 FREE-STANDING APPLIANCE

### Report

The Charnwood Aire 7 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 915mm deep x 820mm wide x 24mm 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 490mm in front of the appliance door and be placed centrally in the 820mm width. The Thermal resistivity of the floor protector is 0.1m<sup>2</sup>.K/W for 24mm thick compressed board sheets.

The Charnwood Aire 7 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

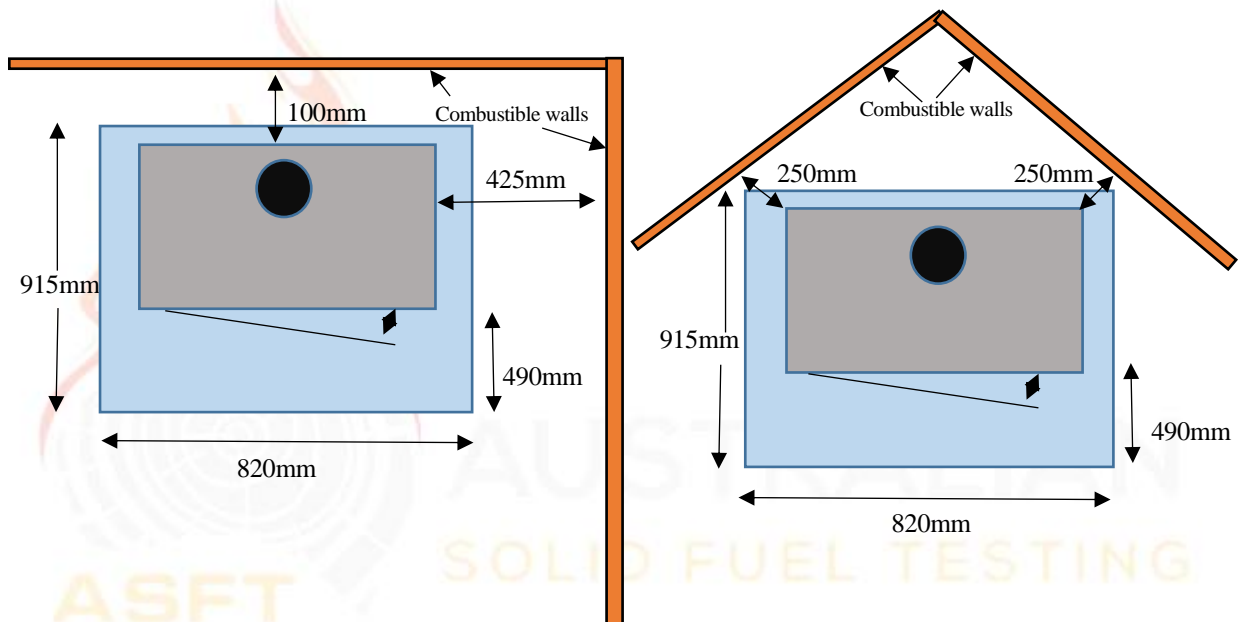




Figure 1 – Clearance Diagram

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

## 1. INTRODUCTION

Thermal Clearance testing of the Charnwood Aire 7 appliance and flue system took place on 20 and 21 October 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
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 – 616mm from corner, 1060mm above the floor
9	Floor – 150mm in front of centre	24	Rear wall – 574mm from corner, 755mm above the floor
10	Floor – Centre of flue	25	Rear wall – 400mm from corner, 415mm above the floor
11	Floor – 150mm behind centre	26	RHS wall, 719mm from corner, 437mm above the floor
12	Floor – 300mm behind centre	27	RHS wall, 360mm from corner, 603mm above the floor
13	Floor – 450mm LHS of centre	28	RHS wall, 382mm from corner, 459mm above the floor
14	Floor – 300mm LHS of centre	29	Rear wall – 637mm from corner, 821mm above the floor
15	Floor – 150mm LHS of centre	30	Ambient temperature
2	Floor – 1200mm in front of centre	17	Floor – 300mm RHS of centre

### Position B – Corner Position

Thermocouple No.	Position	Thermocouple No.	Position
19	Ceiling Ring – Inner front	25	LHS wall – 520mm from corner, 466mm above the floor
20	Ceiling Ring – 25mm in front	26	RHS wall, 736mm from corner, 438mm above the floor
21	Ceiling Ring – Inner side	27	RHS wall, 538mm from corner, 727mm above the floor
22	Ceiling Ring – 25mm to side	28	RHS wall, 706mm from corner, 516mm above the floor
23	LHS wall – 595mm from corner, 730mm above the floor	29	LHS wall, 690mm from corner, 429mm above the floor
24	LHS wall – 738mm from corner, 498mm 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 13.1% 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 was supplied by Pivot Stove & Heating. This flue system has been tested to joint AS/NZS 2918:2018, Appendix F. The flue height was  $4.6 \pm 0.1$ 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 4.8kg with an average refuelling rate of 0.6kg/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 3.6kg.

The highest temperature rises were achieved by leaving the main door open by 20mm 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	10.2 – 17.6	15.0 – 18.6
B	14.7 – 21.9	17.9 – 21.2

#### *Maximum Surface Temperature Rise above Ambient - Position A*

Position	Thermocouple Number	High Fire Test (°C)	Thermocouple Number	Flash Fire Test (°C)
Floor	7	62.9	7	66.9
Ceiling	20	21.7	20	24.8
Rear Wall	29	56.6	29	72.3
Side Wall	26	62.6	28	82.0

#### *Maximum Surface Temperature Rise above Ambient - Position B*

Position	Thermocouple Number	High Fire Test (°C)	Thermocouple Number	Flash Fire Test (°C)
Ceiling	20	24.1	20	27.1
RHS Wall	28	58.2	28	77.6
LHS Wall	29	54.9	29	48.5

### 5.4 Uncertainty of Measurement Statement

5.5.1 The uncertainty of distance measurement for determining clearance distances was not greater than  $\pm 3$ 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: <b>Aire 7</b>		Serial No: <b>ACL001018</b>
Manufacturer: <b>Charnwood</b>		
Overall Height: <b>656mm</b>	Overall Depth: <b>425mm</b>	Overall Width: <b>525mm</b>
Top Plate Width: <b>525mm</b>	Top Plate Depth: <b>375-395mm</b>	Top Plate Thickness: <b>10mm</b>
Usable Firebox Height: <b>270-318mm</b>	Width: <b>370-425mm</b>	Depth: <b>235mm</b>
Usable Firebox Volume: <b>28.72 Litres</b>		
Firebox Material Type/Seam Fully Welded: <b>Fully welded 5mm steel</b>		
Firebrick Type: <b>30mm compressed vermiculite</b>		
Main Door Opening Height: <b>383</b>	Width: <b>417mm</b>	
Door Height: <b>468</b>	Width: <b>495mm</b>	Depth: <b>25-52mm</b>
Door glass Height: <b>295-330</b>	Width: <b>415mm</b>	
Primary Air Location: <b>Below firebox</b>		
Dimension of Primary Air: <b>See below</b>		
Area of Primary (mm <sup>2</sup> ): <b>855mm<sup>2</sup></b>		
Secondary/Tertiary Air Location: <b>Rear of firebox 190mm below baffle</b>		
Dimension of Secondary/Tertiary Air: <b>6 holes @ 4.5mm + 8 slots @ 25×5mm with rounded ends</b>		
Area of Secondary/Tertiary Air (mm <sup>2</sup> ): <b>94.44+957.1 = 1051.54mm<sup>2</sup></b>		
Baffle Plate size: <b>455×205×30mm compressed vermiculite, Secondary Baffle: 310×180×5mm steel</b>		
Flue Dimensions: <b>152mm</b>		
Spigot Dimensions:	OD: <b>166mm</b>	ID: <b>160mm</b>
Spigot to Rear of Appliance: <b>90mm</b>		
Rear Internal to External Heat Shield: <b>65mm</b>		
Firebox to Side External Heat Shield: <b>N/A</b>		
Heat Shield Material Type: <b>1.5mm steel</b>		
Water Heater Fitted: <b>No</b>		
Fan Location/Speeds: <b>No</b>		
Catalytic Combustor fitted: <b>No</b>		
Grate: <b>No</b>		
<b>NOTE: Accuracy of measurement is ±5% of the measured value</b>		

## **7. CONCLUSION**

The Charnwood Aire 7 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.





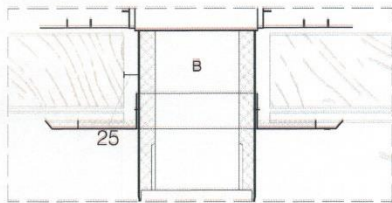
## APPENDIX 1:

### Room Seal Flue Kit

Installation Manual

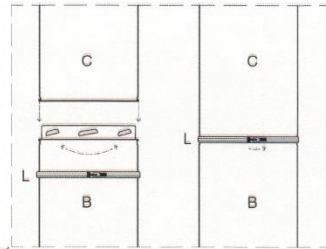
Reduced Clearance  
 4m Flue Kit

#### Ceiling Ring



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

#### Flue Assembly

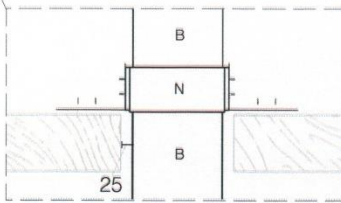


NOTE:  
 To assemble flue, first lock into place, second secure locking band around joint

#### 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\*

