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PIVOT STOVE & HEATING



THERMAL CLEARANCE TESTING OF THE CHARNWOOD ARC 7 FREE-STANDING APPLIANCE

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Revision Details

Revision	Date	Comments
0	6/11/2020	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 ARC 7 FREE-STANDING APPLIANCE

Report

The Charnwood ARC 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 870mm deep x 755mm 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 420mm in front of the appliance door and be placed centrally in the 755mm width. The Thermal resistivity of the floor protector is 0.026m².K/W for 6mm thick compressed board sheets.

The Charnwood ARC 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

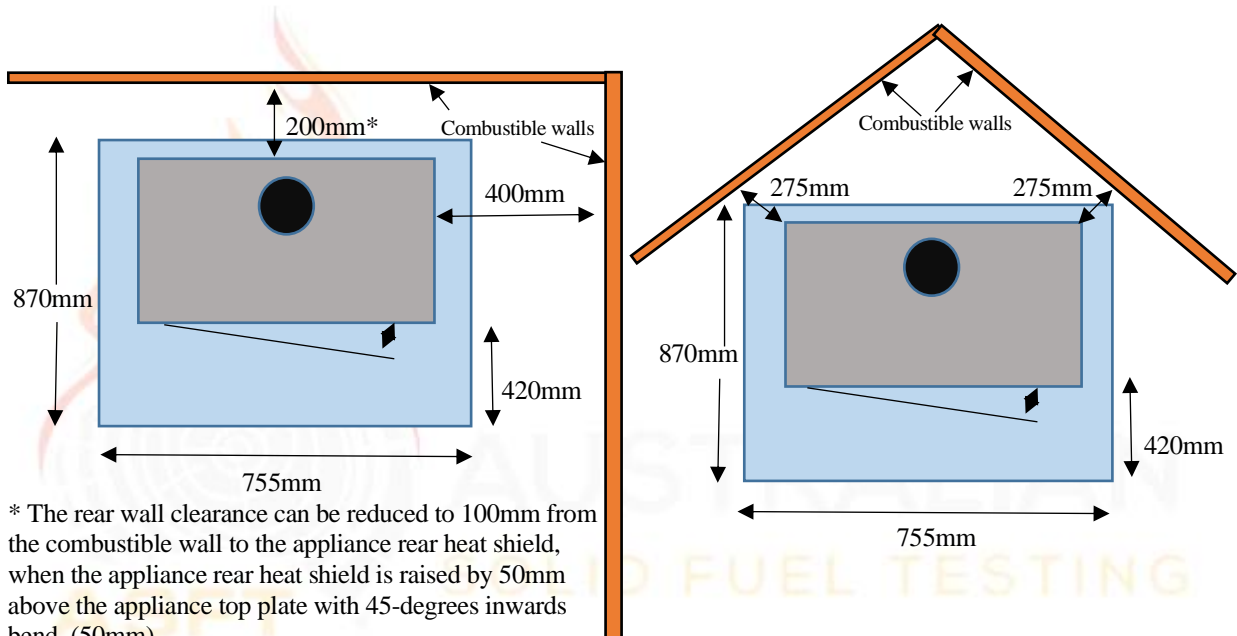


Figure 1 – Clearance Diagram

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 ARC 7 appliance and flue system took place on 4 and 5 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 – 601mm from corner, 1149mm above the floor
9	Floor – 150mm in front of centre	24	Rear wall – 585mm from corner, 979mm above the floor
10	Floor – Centre of flue	25	Rear wall – 587mm from corner, 657mm above the floor
11	Floor – 150mm behind centre	26	RHS wall, 693mm from corner, 664mm above the floor
12	Floor – 300mm behind centre	27	RHS wall, 254mm from corner, 1009mm above the floor
13	Floor – 450mm LHS of centre	28	RHS wall, 825mm from corner, 605mm above the floor
14	Floor – 300mm LHS of centre	29	Rear wall – 641mm from corner, 1110mm 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 – 743mm from corner, 792mm above the floor
20	Ceiling Ring – 25mm in front	26	RHS wall, 537mm from corner, 969mm above the floor
21	Ceiling Ring – Inner side	27	RHS wall, 669mm from corner, 707mm above the floor
22	Ceiling Ring – 25mm to side	28	RHS wall, 533mm from corner, 887mm above the floor
23	LHS wall – 604mm from corner, 1151mm above the floor	29	LHS wall, 563mm from corner, 1024mm above the floor
24	LHS wall – 583mm from corner, 975mm 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 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 4.0kg with an average refuelling rate of 0.9kg/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 and the fuel selection control pulled fully out.

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 3.5kg.

The highest temperature rises were achieved by leaving the main door resting against the door catch with the primary air fully open and the fuel selection control pulled fully out.

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	10.1 – 22.2	18.4 – 21.8
B	16.3 – 20.8	18.0 – 20.2

Maximum Surface Temperature Rise above Ambient - Position A

Position	Thermocouple Number	High Fire Test (°C)	Thermocouple Number	Flash Fire Test (°C)
Floor	4	58.6	6	53.1
Ceiling	20	33.4	20	34.6
Rear Wall	29	61.9	29	58.4
Side Wall	28	63.4	27	51.4

Maximum Surface Temperature Rise above Ambient - Position B

Position	Thermocouple Number	High Fire Test (°C)	Thermocouple Number	Flash Fire Test (°C)
Ceiling	20	36.0	20	35.6
RHS Wall	28	59.3	27	67.1
LHS Wall	29	54.6	29	59.5

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: ARC 7		Serial No: KZL1122
Manufacturer: Charnwood		
Overall Height: 826mm	Overall Depth: 450mm	Overall Width: 496mm
Top Plate Width: 496mm	Top Plate Depth: 419mm	Top Plate Thickness: 54mm
Usable Firebox Height: 250-350mm	Width: 358mm	Depth: 230mm
Usable Firebox Volume: 24.7 Litres		
Firebox Material Type/Seam Fully Welded: 5mm steel, seams fully welded		
Firebrick Type: Fully lined 30mm compressed vermiculite		
Main Door Opening Height: 444mm	Width: 356mm	
Door Height: 615mm	Width: 468mm	Depth: 13-82mm
Door glass Height: 400mm	Width: 340mm	
Primary Air Location: Below firebox		
Dimension of Primary Air: 6 ports @ 33mm×79mm, 4mm×64mm, 19mm×10mm, 5mm×4mm, 31mm×16mm, 31mm×16mm		
Area of Primary (mm ²): 2607 + 256 + 190 + 20 + 496 + 496 = 4065mm²		
Secondary/Tertiary Air Location: Rear of firebox, 27mm below baffle		
Dimension of Secondary/Tertiary Air: 8 rounded end slots @ 5mm by 26mm		
Area of Secondary/Tertiary Air (mm ²): 997.1mm²		
Baffle Plate size: 370mm × 215mm × 28mm vermiculite		
Flue Dimensions: 152mm		
Spigot Dimensions:	OD: 165mm	ID: 155mm
Spigot to Rear of Appliance: 85mm		
Rear Internal to External Heat Shield: 40mm		
Firebox to Side External Heat Shield: 30mm		
Heat Shield Material Type: 1.6mm sheet metal		
Water Heater Fitted: No		
Fan Location/Speeds: No fan fitted		
Catalytic Combustor fitted: No		
Grate: Yes, with ash pan		
NOTE: Accuracy of measurement is ±5% of the measured value		

7. CONCLUSION

The Charnwood ARC 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.



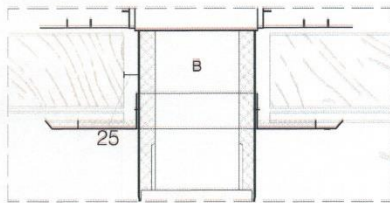
APPENDIX 1:

Room Seal Flue Kit

Installation Manual

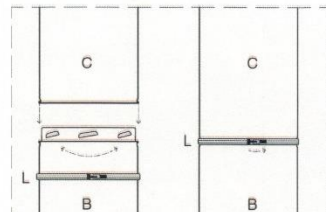
Reduced Clearance
 4m Flue Kit

Ceiling Ring



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

Flue Assembly

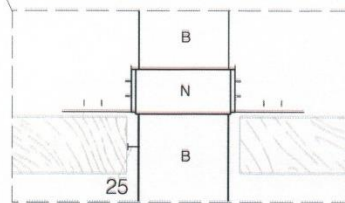


NOTE:
 To assemble flue, first lock into place, second secure locking band around joint

Reduced Clearance Flue Kit

Item	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

