AUSTRALIAN SOLID FUEL TESTING

3 Garden Street, Morwell Vic 3840
ABN: 46 610 154 768

PREPARED FOR

Pivot Stove & Heating

THERMAL CLEARANCE TESTING OF THE ESSE 700-SE FREE-STANDING APPLIANCE

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By:
Steve Marland

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Pivot Stove & Heating
306 South Gippsland Hwy
Dandenong South Vic 3175

Mr Greg Parker-Hill

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0	21/09/2016	Initial Issue
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THERMAL CLEARANCE TESTING OF THE ESSE 700-SE FREE-STANDING SOLID FUEL APPLIANCE

Report

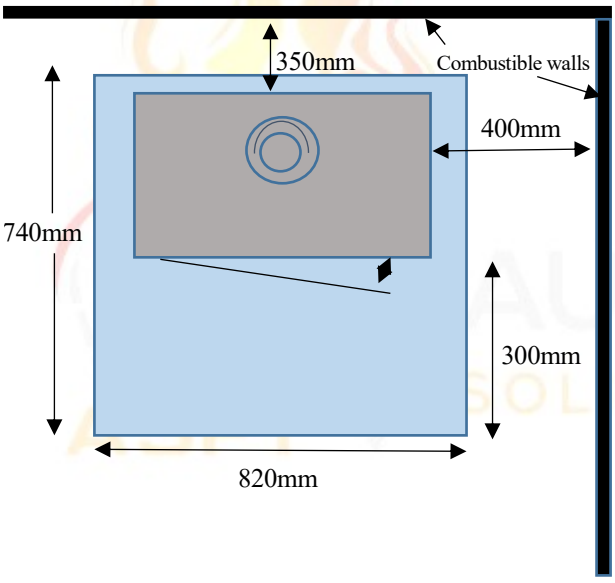
The ESSE 700-SE Free-standing appliance and Wildcat default flue kit was tested in two positions in a manner conforming to joint Australian/New Zealand Standard 2918:2001, Appendix B.

A minimum 740mm deep x 820mm wide x 9mm thick floor protector (Bellis Board) should be used under and in front of the appliance base when installing the appliance (see joint AS/NZS 2918:2001 3.3.2). The floor protector should extend 300mm in front of the appliance fuel loading door and be placed centrally in the 820mm width. The Thermal conductivity of the floor protector is 0.1m².K/W for 9mm thick sheets.

The ESSE 700-SE Free-Standing solid fuel appliance installed with a Wildcat default flue kit conforms to the requirements of the joint AS/NZS 2918:2001 Standard, Appendix B.

The appliance and flue were tested at the following clearances;

Position A – Parallel position



Position B – Corner position

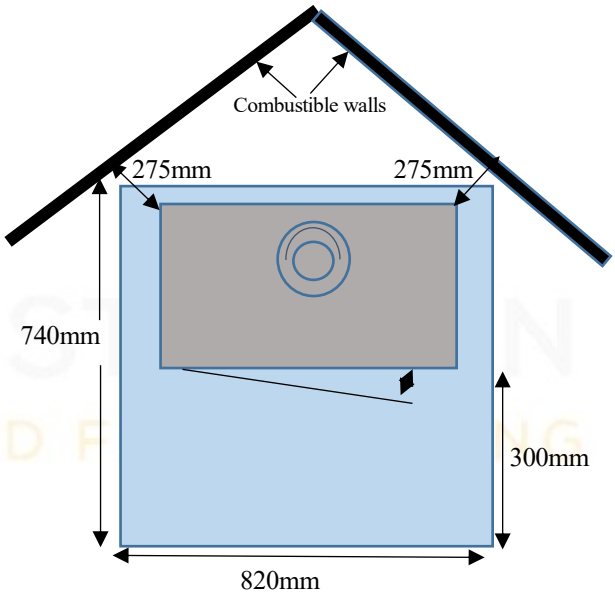


Figure 1 – Clearance Diagram

Signed	
Name	Steve Marland
Title	*Managing Director – Australian Solid Fuel Testing*
Date	27 June 2017

1. INTRODUCTION

Thermal Clearance testing of the ESSE 700-SE appliance and flue system took place on September 15, 2016 at the Australian Solid Fuel Testing Laboratory located at 3 Garden Street, Morwell, Victoria. The testing was performed by Mr S. Marland.

2. PROCEDURE

Testing was conducted as per Appendix B of AS/NZS2918;2001, Hot sites were located with the aid of a 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 – 684mm from corner, 821mm above the floor
9	Floor – 150mm in front of centre	24	Rear wall – 678mm from corner, 1111mm above the floor
10	Floor – Centre of flue	25	Rear wall – 655mm from corner, 666mm above the floor
11	Floor – 150mm behind centre	26	RHS wall, 517mm from corner, 795mm above the floor
12	Floor – 300mm behind centre	27	RHS wall, 460mm from corner, 604mm above the floor
13	Floor – 450mm LHS of centre	28	RHS wall, 260mm from corner, 612mm above the floor
14	Floor – 300mm LHS of centre	29	Control box/ Spare
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 – 652mm from corner, 661mm above the floor
20	Ceiling Ring – 25mm in front	26	RHS wall, 509mm from corner, 800mm above the floor
21	Ceiling Ring – Inner side	27	RHS wall, 458mm from corner, 607mm above the floor
22	Ceiling Ring – 25mm to side	28	RHS wall, 770mm from corner, 508mm above the floor
23	LHS wall – 678mm from corner, 824mm above the floor	29	Control box/ Spare
24	LHS wall – 677mm from corner, 1107mm 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 11.1% moisture. Each firewood piece was 300mm x 100mm x 40mm.

4. FLUE SYSTEM

The flue system used during testing was a Wildcat Default Flue kit which was manufactured by Wildcat Industries Pty Ltd. This flue system has not been tested to joint AS/NZS 2918:2001, Appendix F. The flue height was 4.6 ± 0.1m 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;2001. 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 5.9kg 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.

The appliance fan was switched on to its maximum setting during testing and the temperatures were recorded.

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;2001. The average fuel load for initiating the Flash Fire tests was 4.2kg. The highest temperature rises were achieved by leaving the main door 30mm open from the door catch and the primary air fully open.

5.4 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℃

Position	High Fire	Flash Fire
A	15.2 – 20.1	17.7 – 21.1
B	17.6 – 20.0	16.2 – 19.5

Maximum Surface Temperature Rise above Ambient - Position A

Position	Thermocouple Number	High Fire Test (°C)	Thermocouple Number	Flash Fire Test (°C)
Floor	6	57.2	6	54.3
Ceiling	19	7.3	19	9.2
Rear Wall	23	62.5	23	60.0
Side Wall	27	63.2	27	65.6

Maximum Surface Temperature Rise above Ambient - Position B

Position	Thermocouple Number	High Fire Test (°C)	Thermocouple Number	Flash Fire Test (°C)
Ceiling	19	5.9	19	7.9
RHS Wall	28	63.3	28	74.1
LHS Wall	25	51.7	25	70.3

5.5 Uncertainty of Measurement Statement

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

5.5.2 The uncertainty of temperature measurement during the entire test period was a maximum of ± 2°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: **ESSE 700-SE**	Serial No: **1509 792**	
Manufacturer: **ESSE**		
Overall Height: **680mm**	Overall Depth: **440mm**	Overall Width: **560mm**
Top Plate Width:**543mm**	Top Plate Depth: **372mm**	Top Plate Thickness: 24**mm**
Appliance Legs Height: **145mm**	Width: **73mm**	Depth: **73mm**
Usable Firebox Height: **310-330mm**	Width: **446mm inside bricks**	Depth: **290mm bricks to ashlip edge**
Firebox Material Type/Seam Fully Welded: **5mm steel, seams fully welded**		
Firebrick Type: **compressed vermiculite, rear wall and sides fully lined**		
Main Door Opening Height: **434mm**		Width: **421mm**
Door Height:**484mm**	Width: **465mm**	Depth: **21mm**
Door glass Height: **322mm**	Width: **387mm**	
Primary Air Location: **Above door and in bottom of door**		
Dimension of Primary Air: **10 holes @ 10mm dia + 8 oval slots at 20mm x 10mm**		
Area of Primary (mm^2): **786 + 1429 = 2215mm²**		
Secondary/Tertiary Air Location: **Air tube at rear of box, 25mm below baffle**		
Dimension of Secondary/Tertiary Air: **19 holes @ 5.0mm dia**		
Area of Secondary/Tertiary Air (mm^2): **373.1mm²**		
Baffle Plate size: **475mm x 270mm x 5mm**		
Flue Dimensions: **152mm**		
Spigot Dimensions:	OD: **174mm**	ID: **151mm**
Spigot to Rear of Appliance: **40mm**		
Rear Internal to External Heat Shield: **27mm**		
Firebox to Side External Heat Shield: **None**		
Heat Shield Material Type: **1.0mm**		
Water Heater Fitted: **NO**		
Fan Location/Speeds: **No**		
Catalytic Combustor fitted: **NO**		
Grate: **Yes, only open when operated by leever, closed during normal operation**		
NOTE: Accuracy of measurement is ±5% of the measured value		

7. CONCLUSION

The ESSE 700-SE Free-Standing solid fuel appliance installed with a Wildcat default flue kit conforms to the requirements of Australian/New Zealand Standard 2918:2001, with respect to floor, ceiling, side wall and rear wall surface temperatures, when tested in the two test positions shown in Figure 1 of this report in accordance with Appendix B of AS/NZS2918;2001.

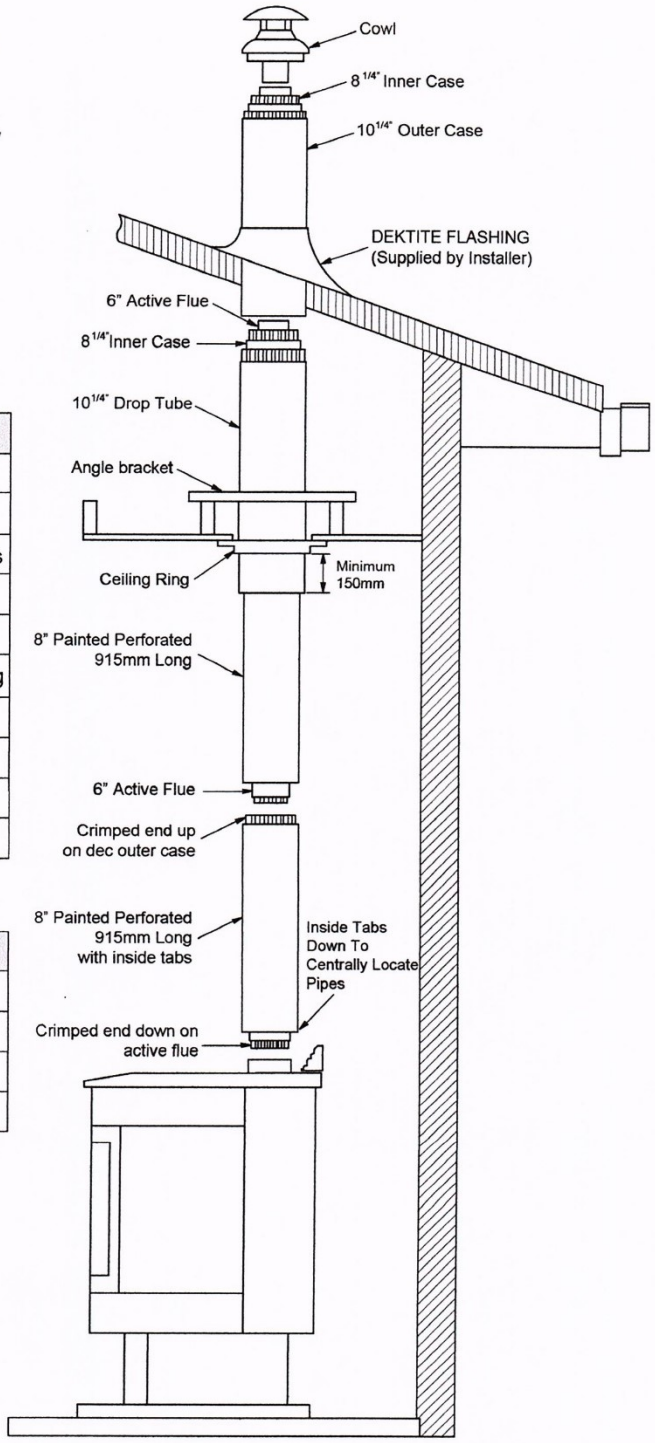
APPENDIX 1:

Wildcat INDUSTRIES (Aust) P/L

Freestanding Universal/ Default Kit Perforated 6" - 8 1/4" - 10 1/4" System

QTY	DESCRIPTION
4	6" Stainless Steel Inner Flue 915mm Long
1	8" Painted Perforated 915mm Long
1	8" Painted Perforated 915mm Long with inside tabs
2	8 1/4" Galvanized Inner Flue Casing 915mm Long
1	10 1/4" Half Painted Drop Tube
1	10 1/4" Galvanized Outer Flue Casing 915mm Long
1	Cowl
1	Ceiling Ring
2	50 x 50 Angles 915mm Long
1	Installation Guide

CARTON SPECIFICATIONS	
Height	460mm
Width	460mm
Length	1150mm
Weight	32kg



WILDCAT INDUSTRIES
35 Marconi Drive, Dandenong South VIC 3175
PH: 03 9794 9956
ABN 84 112 862 718
www.wildcatindustries.com.au

MUST ONLY BE INSTALLED BY AN AUTHORISED PERSON IN COMPLIANCE WITH AS 2918

Default 10 25 Instruction page