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THERMAL CLEARANCE TESTING OF THE VERMONT CASTINGS ENCORE FREE-STANDING APPLIANCE

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THERMAL CLEARANCE TESTING OF THE VERMONT CASTINGS ENCORE FREE-STANDING APPLIANCE

Report

The Vermont Castings Encore Free-Standing appliance installed with a Wildcat 6” default flue kit was tested in two positions in a manner conforming to joint Australian/New Zealand Standard 2918:2018, Appendix B.

A minimum 935mm deep x 940mm 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 940mm width. The Thermal resistivity of the floor protector is 0.026m².K/W for 6mm thick compressed board sheets.

The top of the appliance rear heat shield had 5 x 13mm diameter holes drilled evening across the top of the shield to allow for air flow through the rear heatshield.

The Vermont Castings Encore Free-Standing solid fuel appliance installed with a Wildcat 6” default 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

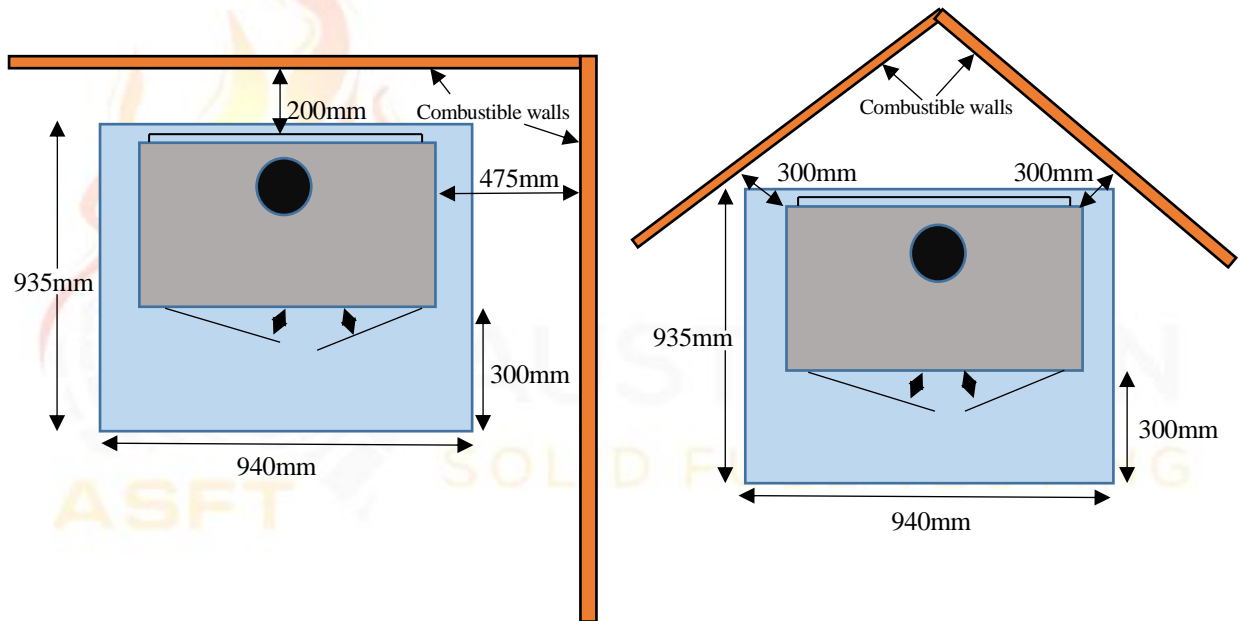


Figure 1 – Clearance Diagram

| | | | |
|---------------|-------------------|-----------------|---|
| Signed | | Approved | |
| Name | Garry W. Mooney | Name | Steve Marland |
| Title | Technical Officer | Title | Managing Director – Australian Solid Fuel Testing |
| Date | 29/04/2021 | Date | 29/04/2021 |

1. INTRODUCTION

Thermal Clearance testing of the Appliance and flue system took place on 23 April 2021 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 – mm from corner, mm above the floor |
| 9 | Floor – 150mm in front of centre | 24 | Rear wall – 614mm from corner, 904mm above the floor |
| 10 | Floor – Centre of flue | 25 | Rear wall – 741mm from corner, 576mm above the floor |
| 11 | Floor – 150mm behind centre | 26 | RHS wall, 469mm from corner, 487mm above the floor |
| 12 | Floor – 300mm behind centre | 27 | RHS wall, 481mm from corner, 886mm above the floor |
| 13 | Floor – 450mm LHS of centre | 28 | RHS wall, 528mm from corner, 461mm above the floor |
| 14 | Floor – 300mm LHS of centre | 29 | Rear wall – 713mm from corner, 722mm 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 – 227mm from corner, 472mm above the floor |
| 20 | Ceiling Ring – 25mm in front | 26 | RHS wall, 738mm from corner, 494mm above the floor |
| 21 | Ceiling Ring – Inner side | 27 | RHS wall, 817mm from corner, 918mm above the floor |
| 22 | Ceiling Ring – 25mm to side | 28 | RHS wall, 819mm from corner, 518mm above the floor |
| 23 | LHS wall – mm from corner, mm above the floor | 29 | LHS wall, 789mm from corner, 886mm above the floor |
| 24 | LHS wall – 614mm from corner, 904mm 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 12.5% moisture. Each firewood piece was 200mm x 100mm x 40mm.

4. FLUE SYSTEM

The flue system used during testing was a Wildcat 6" default Perforated flue kit was supplied by Wildcat Industries (Aust) P/L. 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 6.5kg with an average refuelling rate of 1.0kg/10 minutes.

During High Fire testing it was found that the highest surface temperatures occurred when the primary air control and the flue by-pass 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 5.4kg.

The highest temperature rises were achieved by leaving the main doors resting against the door catch with the primary air and the flue by-pass 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 | 15.0 – 20.8 | 19.2 – 21.9 |
| B | 18.6 – 21.0 | 19.4 – 21.2 |

Maximum Surface Temperature Rise above Ambient - Position A

| Position | Thermocouple Number | High Fire Test (°C) | Thermocouple Number | Flash Fire Test (°C) |
|-----------|---------------------|---------------------|---------------------|----------------------|
| Floor | 4 | 46.2 | 4 | 55.9 |
| Ceiling | 20 | 33.7 | 20 | 70.3 |
| Rear Wall | 29 | 61.1 | 29 | 83.0 |
| Side Wall | 26 | 60.7 | 26 | 81.9 |

Maximum Surface Temperature Rise above Ambient - Position B

| Position | Thermocouple Number | High Fire Test (°C) | Thermocouple Number | Flash Fire Test (°C) |
|----------|---------------------|---------------------|---------------------|----------------------|
| Ceiling | 20 | 55.4 | 22 | 56.0 |
| RHS Wall | 26 | 60.4 | 28 | 48.0 |
| LHS Wall | 24 | 54.3 | 29 | 56.7 |

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: Encore 2040 | | Serial No: HF2511673 | |
| Manufacturer: Vermont Casting | | | |
| Overall Height: 665mm | Overall Depth: 635mm | Overall Width: 695mm | |
| Top Plate Width: 687mm | Top Plate Depth: 350-395mm | Top Plate Thickness: 10mm | |
| Griddle Width: 435mm | Griddle Depth: 120-220mm | Griddle Thickness: 8mm | |
| Appliance Legs Height: 180mm | Depth: 18-48mm | Width: 18-48mm | |
| Usable Firebox Height: 290mm | Width: 530mm | Depth: 248mm | |
| Usable Firebox Volume: 38.12 Litres | | | |
| Firebox Material Type/Seam Fully Welded: Fully sealed 8mm case iron | | | |
| Firebrick Type: Ceramic, sides, and rear | | | |
| Main Door Opening Height: 280mm | Width: 540mm | | |
| Door Height: 245-360mm | Width: 325-327mm | Depth: 28mm | ×2 doors |
| Door glass Height: 180-225mm | Width: 203mm | ×2 doors | |
| Primary Air Location: Below firebox at rear | | | |
| Dimension of Primary Air: 1 slot 98×12mm + 2 slots 28×8-12mm | | | |
| Area of Primary (mm ²): 1,176+560 = 1,736mm² | | | |
| Secondary/Tertiary Air Location: Rear of firebox, 50mm above grate | | | |
| Dimension of Secondary/Tertiary Air: 2 holes @ 6mm + 6 holes @ 4.5mm | | | |
| Area of Secondary/Tertiary Air (mm ²): 56.56+95.44 = 152mm² | | | |
| Baffle Plate size: N/A | | | |
| Damper: 430×80×5mm | | | |
| Flue Dimensions: 152mm | | | |
| Spigot Dimensions: | OD: 166mm | ID: 156mm | |
| Spigot to Rear of Appliance: 20mm | | | |
| Rear Internal to External Heat Shield: 20-35mm | | | |
| Rear Heat Shield: 5 holes @ 13mm in top of appliance rear heat shield, bottom half | | | |
| Firebox to Side External Heat Shield: N/A | | | |
| Heat Shield Below Appliance: 492mm wide × 435mm deep with 25 – 60mm air gap | | | |
| Heat Shield Material Type: 1mm steel | | | |
| Water Heater Fitted: No | | | |
| Fan Location/Speeds: N/A | | | |
| Catalytic Combustor fitted: Yes, 315×60×25mm | | | |
| Grate: Yes | | | |
| NOTE: Accuracy of measurement is ±5% of the measured value | | | |

7. CONCLUSION

The Vermont Castings Encore Free-Standing appliance installed with a Wildcat 6” default 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:

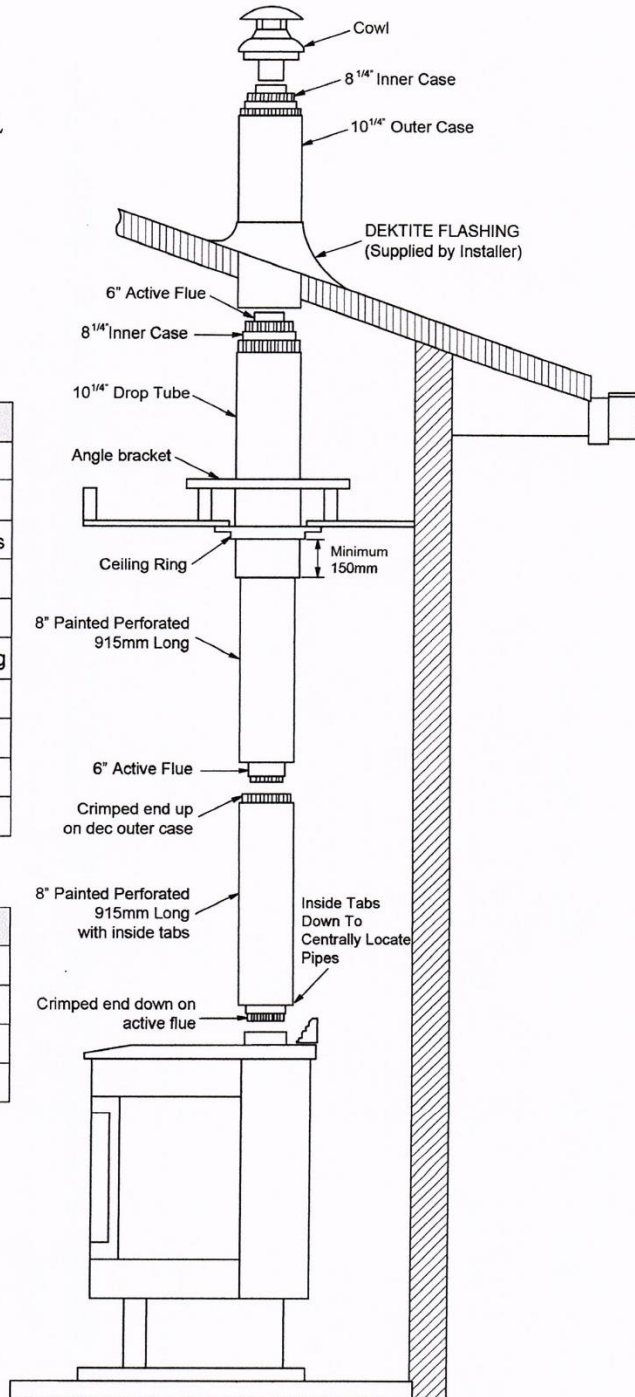


**Freestanding Universal/
 Default Kit Perforated
 6" - 8 1/4" - 10 1/4" System**

| 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 |

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

Default 10 25 Instruction page