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## **PACIFIC ENERGY FIREPLACE PRODUCTS**

### **THERMAL CLEARANCE TESTING OF THE NEO 1.6 INSERT AND ZERO CLEARANCE CASE SOLID FUEL APPLIANCE**

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by  
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# THERMAL CLEARANCE TESTING OF THE NEO 1.6 INSERT AND ZERO CLEARANCE CASE APPLIANCE

## Report

The appliance and flue system were installed into a Zero Clearance Test enclosure and tested in one position in a manner conforming to joint Australian/New Zealand Standard 2918:2001, Appendix B. A minimum 1075mm deep x 872mm wide x 18mm 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 500mm in front of the appliance. The Thermal resistivity of the floor protector is 0.19m<sup>2</sup>.K/W.

The Neo 1.6 insert appliance and Zero clearance case, when installed with a triple skin flue system, conforms to the requirements of joint AS/NZS 2918:2001, Appendix B, with respect to rear wall, side wall, internal wall noggins, mantle shelf, mantle uprights and floor surface temperatures, when tested in the position described in this report and using *Pinus radiata* firewood as the fuel type.

## TEST POSITIONS

The Neo 1.6 insert appliance and Zero clearance case was tested at the following clearances:

- 50mm from rear wall to rear edge of the appliance outer case
- 50mm from the side combustible wall to the side edge or corners of the appliance outer case
- 380mm from the side combustible wall in front of the appliance to the side of the appliance door
- 400mm from the top of the appliance outer case to the first internal wall noggin
- 250mm from side of appliance door to the Mantel upright.
- 405mm from the appliance brow to the mantle shelf, the mantle shelf shall not extend more than 250mm from the wall.
- 390mm from the appliance brow to the mantle key

The front wall of the zero clearance enclosure must be made of a non-combustible material for the first 300mm above the appliance out case.

Refer to Appendix 1 of this report for clearance diagrams.

**Investigation:** A. Wood

**Report:** S. Marland

**Checked by:** A. Reid

Signed: .....

A. Reid  
Technical Officer

Approved: .....

S. Marland  
Group Leader EGD

## **1. INTRODUCTION**

HRL Technology Pty Ltd was requested to assess the Neo 1.6 insert and zero clearance case solid fuel burning appliance, in conjunction with a Triple Skin flue system. Clearance testing was performed according to joint AS/NZS 2918:2001, Appendix B.

This report provides details of the safety clearance tests performed at the Solid Fuel Heater Testing and Research Laboratory of HRL Technology Pty Ltd. The testing was conducted from February 26 & 27, 2015, by Mr A Wood. The testing was commissioned by Pacific Energy Fireplace Products and the test results remain the property of this company.

The appliance was tested using *Pinus radiata* as firewood. No testing was undertaken with coal or briquettes.

## **2. DETAILS OF APPLIANCE**

The test results reported below apply only 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 construction or design of this model of the appliance or flue could invalidate this report.

Appendix 2 gives test appliance construction details.

## **3. INSTALLATION OF THE APPLIANCE**

The appliance/flue combination was installed in two test positions at clearances specified by the manufacturer after preliminary testing. Floor thermocouples were positioned according to joint AS/NZS 2918:2001, Appendix B.

### **3.1 Floor Protector**

A floor protector was installed beneath and in front of the appliance. The floor protector (cement fibre or similar) must be installed so that its leading edge is a minimum of 500mm in front of the appliance base. The floor protector must be a minimum of 872mm wide x 1075mm deep x 18mm thick. The floor protector consisted of 2 x 9mm thick Ballis board with a thermal resistance value of 0.19 m<sup>2</sup>kw.

### **3.2 Flue System**

The flue system used throughout testing was a triple skin flue from the top of the appliance which was manufactured by The Flue Factory. This flue system has not been tested to joint AS/NZS 2918:2001, Appendix F by HRL Technology Pty Ltd.

The flue height was 4.6 ± 0.3 m from the floor protector.

## 4. CLEARANCES

The Neo 1.6 insert appliance and Zero clearance case was tested at the following clearances:

- 50mm from rear wall to rear edge of the appliance outer case
- 50mm from the side combustible wall to the side edge or corners of the appliance outer case
- 380mm from the side combustible wall in front of the appliance to the side of the appliance door
- 400mm from the top of the appliance outer case to the first internal wall noggin
- 250mm from side of appliance door to the Mantel upright.
- 405mm from the appliance brow to the mantle shelf, the mantle shelf shall not extend more than 250mm from the wall.
- 390mm from the appliance brow to the mantle key

The front wall of the zero clearance enclosure must be made of a non-combustible material for the first 300mm above the appliance out case.

Refer to Appendix 1 of this report for clearance diagrams.

## 5. PROCEDURE

All clearance testing took place on February 26 and 27, 2015. The floor thermocouples were installed into positions as per joint AS/NZS 2918:2001, Appendix B. Other thermocouple positions were determined by monitoring surface temperatures during trial burn cycles. Hot sites were located with the aid of a Linear Laboratories C-600E infra-red pyrometer.

All 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 Tables 1 and 2.

### 5.1 High Fire Test

The appliance was fully fired in accordance with Section B9.1 of the joint Standard. 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 6.6kg with an average refuelling rate of 0.7kg/10 minutes.

During High Fire testing it was found that the highest surface temperatures caused through the operation of the appliance occurred when the primary air control 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 the joint Standard. The average fuel load for initiating the Flash Fire tests was 4.7kg. Highest temperature rises were achieved by fully opening the primary air control and leaving the main door ajar from the door catch

## 5.3 Fuel

The appliance was fired using a standard firewood fuel of *Pinus radiata* with an average moisture content of 11.8%. Each firewood piece was 300 mm x 100 mm x 40 mm.

## 6. RESULTS

### 6.1 Uncertainty of Measurement Statement

- (a) The uncertainty of distance measurement for determining clearance distances was not greater than  $\pm 2$  mm.
- (b) The uncertainty of temperature measurement during the entire test period was  $\pm 2^{\circ}\text{C}$  at the 95% confidence level.

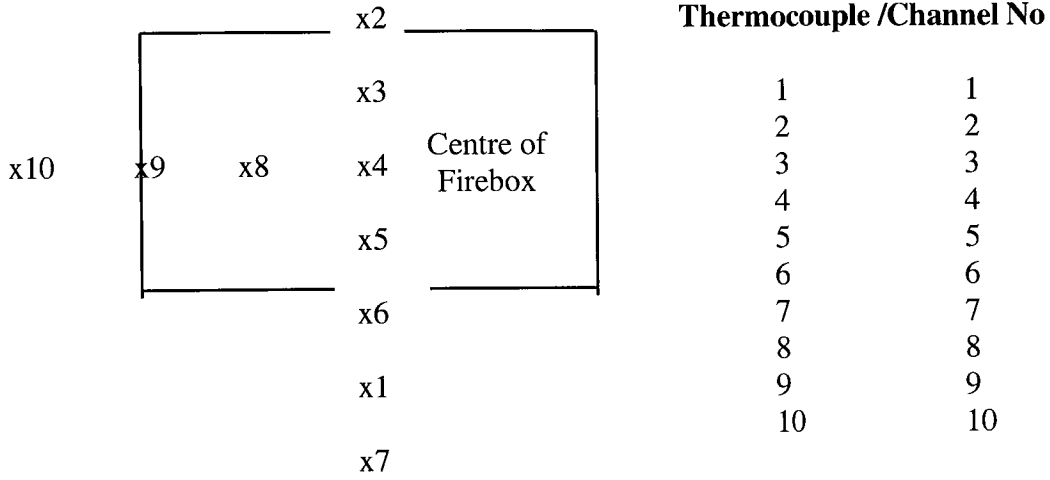
### 6.2 Test Enclosure Temperatures

Table 3 shows the ambient temperature range during testing. Tables 4 and 5 show the maximum temperature rise above ambient for each test surface.

## 7. CONCLUSION

The Neo 1.6 insert and Zero Clearance case solid fuel burning appliance, when installed with a triple skin flue system, conforms to the requirements of Australian/New Zealand Standard 2918:2001, with respect to floor, side wall, rear wall, internal noggins, mantle shelf and uprights surface temperatures, when tested in the test positions described earlier in this report in accordance with Appendix B of the joint Standard.

**Table 1: Position A**



**Thermocouple**

**Channel No**

|                                      |    |
|--------------------------------------|----|
| 11 LHS internal wall of enclosure    | 11 |
| 12 LHS internal wall of enclosure    | 12 |
| 13 Noggin on front wall of enclosure | 13 |
| 14 Internal front wall of enclosure  | 14 |
| 15 Mantle upright                    | 15 |
| 16 Mantle shelf                      | 16 |
| 17 Mantle key                        | 17 |
| 18 Rear wall of enclosure            | 18 |
| 19 Rear wall of enclosure            | 19 |
| 20 Ambient temperature               | 20 |

**Table 3: Ambient Temperature Range °C**

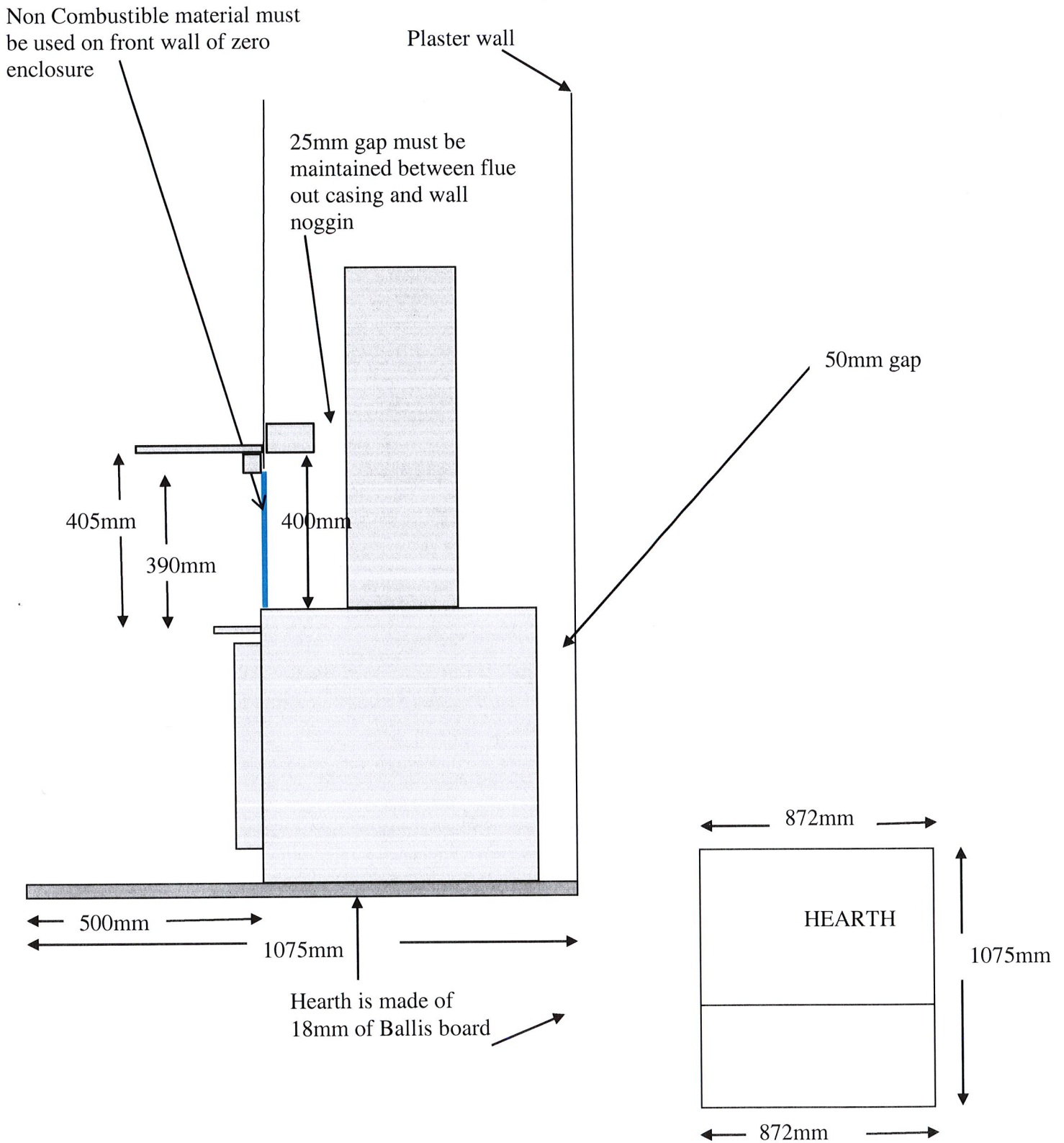
| <b>High Fire</b> | <b>Flash Fire</b> |
|------------------|-------------------|
| 27.6 – 28.1      | 28.1 – 29.5       |

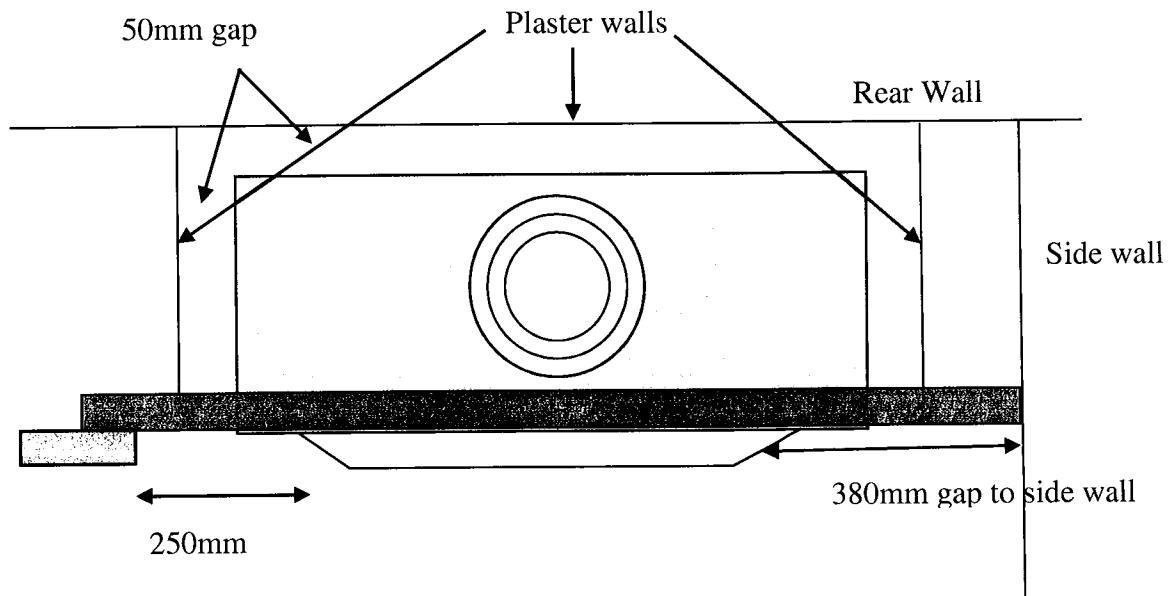
**Table 4: Maximum Temperature Rise - Position A**

| <b>Position</b>      | <b>Thermocouple Number</b> | <b>High Fire Test (°C)</b> | <b>Thermocouple Number</b> | <b>Flash Fire Test (°C)</b> |
|----------------------|----------------------------|----------------------------|----------------------------|-----------------------------|
| Floor                | 15                         | 62.4                       | 15                         | 76.6                        |
| Enclosure rear wall  | 19                         | 8.1                        | 19                         | 7.7                         |
| Enclosure side Wall  | 12                         | 17.3                       | 12                         | 16.2                        |
| Mantle shelf         | 16                         | 57.3                       | 16                         | 70.4                        |
| Mantle Upright       | 15a                        | 55.6                       | 15a                        | 67.9                        |
| Internal wall noggin | 13                         | 45.6                       | 13                         | 45.5                        |
| Enclosure front wall | 14                         | 19.5                       | 14                         | 17.4                        |



**APPENDIX 1:  
MINIMUM CLEARANCES FOR THE NEO 1.6 INSERT SOLID FUEL APPLIANCE**





## APPENDIX 2: SOLID FUEL BURNING APPLIANCE CONSTRUCTION DETAILS

|   |  |              |                   |
|---|--|--------------|-------------------|
| Appliance Model Name:   | <i>Neo 1.6 Insert</i>  |              |                   |
| Manufacturer:   | Pacific Energy Fireplace Products                                |              |                   |
| Serial Number:  | 40310763   |              |                   |
| Overall Zero Case Height:   | 642mm  |              |                   |
| Overall Zero Case Width (not including knobs):  | 978mm  |              |                   |
| Overall Zero Case Depth (not including handle):                                       | 575mm  |              |                   |
| Overall Insert Height:  | 545mm  |              |                   |
| Overall Insert Width (not including knobs):   | 835mm  |              |                   |
| Overall Insert Depth (not including handle):  | 574mm  |              |                   |
| Insert Width:   | 545mm  |              |                   |
| Insert Depth:   | 433mm  |              |                   |
| Insert Height:  | 517mm  |              |                   |
| Firebox Description:  | Height: 300mm  | Width: 465mm | Depth: 288mm      |
| Firebox Material Type/<br>Seam Fully Welded:  | 3.5mm steel, seams fully welded                                  |              |                   |
| Firebrick Size:   | Firebox is fully lined with bricks                               |              |                   |
| Main Door Opening:  | Height: 282mm  | Width: 434mm |                   |
| Door:   | Height: 373mm  | Width: 515mm | Depth: 38mm (max) |
| Door Glass:   | Height: 247mm  | Width: 390mm |                   |
| Primary Air Location:   | Under firebox  |              |                   |
| Dimension of Primary Air:   | 3 holes 1 @ 9.0mm dia + 1 @ 20mm dia + half circle @ 39mm        |              |                   |
| Area of Primary (mm <sup>2</sup> )  | 975mm <sup>2</sup>   |              |                   |
| Secondary/Tertiary Air Location:  | Incorporated into baffle plate                                   |              |                   |
| Dimension of Secondary/Tertiary Air:  | 24 holes @ 4mm dia + 18 holes @ 5.0mm dia + 12 holes @ 6.5mm dia |              |                   |
| Area of Secondary/Tertiary Air (mm <sup>2</sup> ):                                    | 361mm <sup>2</sup>   |              |                   |
| Flue Dimensions:  | 152mm OD   |              |                   |
| Spigot Dimensions:  | 160mm OD   | 153mm ID     |                   |
| Spigot to Rear of Appliance:  | 61mm   |              |                   |
| Rear Internal to External Heat Shield:  | 50mm   |              |                   |
| Side Internal to External Heat Shield:  | 55-100mm   |              |                   |
| Heat Shield Material Type:  | 1.5mm steel  |              |                   |
| Water Heater Fitted:  | NO   |              |                   |
| Fan Location/Speeds:  | Variable speed with thermostat control                           |              |                   |
| Catalytic Combustor:  | NO   |              |                   |
| Grate:  | No   |              |                   |
| Diagrams:   | Over the page  |              |                   |
| <b>Note the accuracy of measurements in Appendix 2 are ± 5% of the recorded value</b> |  |              |                   |
| Signed:   | <i>A. Reed</i> Date: <i>11/3/15</i>                              |              |                   |