



P.O. Box 687, NELSON,
NEW ZEALAND

PHONE (03) 547 7347
FAX (03) 547 2909
EMAIL: info@appliedresearch.co.nz
WEB: www.appliedresearch.co.nz

**Safety Testing of the Quadra-Fire 4300 Millennium ACC Wood Burning Heater to
AS/NZS 2918:2001**

**Customer: The Fireplace
12 Tawari St.
Mt. Eden
AUCKLAND**

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December 2007

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December 12th, 2007

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12 Tawari St.
Mt. Eden
AUCKLAND

P1394

Attention: David Bell

**Safety Testing of the Quadra-Fire 4300 Millennium ACC Wood Burning Heater to AS/NZS
2918:2001**

A sample of the Quadra-Fire 4300 Millennium ACC wood-burning heater supplied by The Fireplace was tested for compliance to the joint New Zealand/Australian Standard 2918:2001. Tests were carried out in accordance with Appendix B of the standard. The unit was tested without a water heater fitted. The tests were carried out in our Beatty St. laboratory in December of 2007 by Rob Kay.

Accreditation

Laboratory Registration Number 395

This laboratory is accredited by International Accreditation New Zealand (IANZ). The tests reported herein have been performed in accordance with the terms of our accreditation. This accreditation does not extend to any opinions or any interpretations of test results contained in this report.



IANZ has a Mutual Recognition Arrangement (MRA) with the National Association of Testing Authorities (NATA), Australia, such that both organizations recognize accreditations by IANZ and NATA as being equivalent. Users of test reports are recommended to accept test reports in the name of either accrediting body.

1.0 Test Procedures

Tests were carried out using equipment and procedures specified in Appendix B of the joint New Zealand/Australian Standard 2918:2001.

In summary, the heater was installed in a test rig consisting of a back wall, a side wall, a ceiling and a floor. The distances between the heater and the walls were adjusted to ensure compliance with the requirements of the standard. The heater was tested in the 'normal' orientation, that is with the sides of the heater parallel to the walls of the test enclosure, and also in a 'corner' configuration, that is with the sides of the heater at 45° to the walls of the test enclosure. The heater was tested with a flue shield for both configurations, and wood fuel was used throughout.

Thermocouples embedded in the surface of the floor, ceiling and walls were used to locate the hottest points on these surfaces.

The standard requires that the heater be tested under high fire and flash fire conditions. During high fire operation the burner is operated with all controls set to give maximum heat output and is constantly refuelled to maintain the fuel chamber between 50 and 75% full. The heater doors are

kept fully closed except during fuel additions.

The flash fire test involves burning a single load of wood (the amount is that which occupies approximately 53% of the firebox volume). The doors may be left open or partially open if this leads to higher measured temperatures. Any other controls are also set to maximise the temperatures of surfaces adjacent to the heater. Some embers are removed prior to burning the flash fire load.

2.0 Details of the Heater and Installation

The heater as tested is described in our report 07/1717.

A 150mm flue was used for testing the heater, exiting through a Sheetmetal Fabricated Products 345mm square and 1.2mm thick reflective ceiling plate offset from the ceiling surface by 12mm.

The Quadrafire was tested with a flue shield. The flue shield was manufactured by Pioneer Manufacturing Limited, and was a 1200mm high double skin shield. The shield exterior skin was 5 sided, the inner was curved and had a reflective surface. The widest part of the shield was 200mm wide and it was 80mm deep. The bottom of the shield was approximately 50mm above the top plate of the heater, leaving a gap of about 10mm above the rear heat shield of the heater. The heat shield was spaced about 30mm off the flue.

The heater was tested without a wetback fitted.

Design information supplied by the manufacturer is given in Appendix 1 of report 07/1717.

3.0 Test Results

The ambient air temperature (see Appendix 1, location 31) for all tests was not less 25.3°C and not greater than 29.9°C. Refer to Appendix 1 for details of reported thermocouple locations. The following are the test uncertainties:

Uncertainty in the temperature measurements	1°C
Uncertainty in the location of the thermocouples	3mm
Uncertainty in the fuel addition weights	2g
Uncertainty in fuel moisture content	1%

3.1 High Fire Condition

The heater was operated with the door closed. Lengths of untreated rough-sawn 100mm x 50mm *Pinus radiata* were added at approximately ten-minute intervals to the firebox so that the fuel chamber was maintained at between 50 and 75% full. The wood fuel moisture content was between 10 and 20% on a wet weight basis.

Maximum temperature rises on surfaces of the test rig were obtained with the air control set to maximum.

The heater was fuelled at regular intervals until it was apparent that the maximum temperature rises above ambient had been obtained on the surface of the test rig. These are reported below.

Floor temperatures under the heater were measured along two lines crossing beneath the centre of the heater and beneath the feet of the heater, where it made contact with the floor. The exposed floor temperatures were measured at distances from -100mm to 650mm in front of the heater.

Average Fuel Usage at Maximum Output: 80.5g/minute (4.83kg/hour)

Normal Orientation with Flue Shield Fitted

Location	Peak Rise (°C) Above Ambient	Channel	Date
Side wall	58.8	24	05.12.07
Rear wall	36.2	19	05.12.07
Ceiling	44.7	14	05.12.07

Corner Configuration with Flue Shield Fitted

Location	Peak Rise (°C) Above Ambient	Channel	Date
Wall	58.5	16 & 25	05.12.07
Ceiling	41.9	12	05.12.07

Hearth/Floor Test

Location	Peak Rise (°C) Above Ambient	Channel	Date
Under Heater	34.6	1	05.12.07
Exposed Floor	59.0	9	05.12.07

3.2 Flash Fire Condition

The quantity of wood to be burned in the flash fire test is determined in two steps. The cold appliance is loaded with wood fuel until it is approximately 75% full (the test pieces are located so that they do not form a solid block). This required 12 pieces of test fuel. The flash fire test uses 70% (9 pieces totalling 8.072kg) of this amount.

Maximum air temperatures were obtained under flash fire conditions when the firebox door was open approximately 8mm and the air control set to maximum.

The heater was maintained under high fire conditions prior to the flash fire test.

After sufficient embers had been removed from the firebox to bring the fire bed volume to a level between 15 and 25% full by volume, the flash fire load was placed at random on the fire.

Temperatures given below are the maximum temperature rise above ambient obtained on surfaces of the test rig during flash fire operation.

Normal Orientation with Flue Shield Fitted

Location	Peak Rise (°C) Above Ambient	Channel	Date
Side wall	82.1	23	05.12.07
Rear wall	53.5	17	05.12.07
Ceiling	63.8	13	05.12.07

Corner Configuration with Flue Shield Fitted

Location	Peak Rise (°C) Above Ambient	Channel	Date
Wall	84.7	25	05.12.07
Ceiling	63.8	13	05.12.07

Hearth/Floor Test

Location	Peak Rise (°C) Above Ambient	Channel	Date
Under Heater	37.3	5	05.12.07
Exposed Floor	68.1	9	05.12.07

3.3 Minimum Wall ClearancesNormal Orientation

Where the sides of the heater are parallel to the walls of the test rig.

The side and rear walls were at the following distances (in mm) from the heater:

Clearances Measured From:	Side	Rear
With flue shield fitted	400	200

Corner Orientation

Where the sides of the heater are at 45 degrees to the walls of the test rig.

The side and rear walls were at the following distances (in mm) from the heater corners of the heater top plate:

Clearances Measured From:	Corner
With flue shield fitted	250

We note that AS/NZS2918 places additional constraints on clearances with regard to access (section 3.2.1) and also for materials of abnormally high heat sensitivity (section 3.2.2).

3.4 Hearth Requirements

The heater was tested on the exposed floor and complied with the requirements of the standard where no temperatures on the floor exceeded the specified limits. We note however that AS/NZS2918 places minimum requirements on floor protector construction where the floor area on which the heater is to be installed includes heat sensitive materials under or within 500mm of the appliance (see Section 3.3 of the standard).

4.0 Compliance

Section B10 of the joint Australian/New Zealand Standard 2918:2001 states that to comply with the temperature limits of the Standard, the temperature rise above ambient temperature of monitored surfaces shall not exceed 65°C during the high fire test and 85°C during the flash fire test.

On the basis of the results given above the unit tested complies with the requirements of the joint Australian/New Zealand Standard 2918:2001 for heat sensitive surfaces on the walls, ceiling and floor when installation and clearances are as specified in this report.

We note according to Section 3.3 of the Standard that if the appliance is installed on or within 500mm of heat sensitive materials in the floor then a floor protector will be required. This floor protector shall extend under the appliance and not less than 300mm beyond the front of the fuel loading or ash removal openings. The width of the floor protector shall be not less than the width of the appliance, and shall extend not less than 200mm from each side of the fuel loading or ash removal openings unless it forms an abutment with a wall or heat shield at a lesser distance.

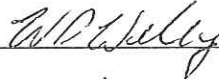
This report relates only to the items tested. Any subsequent alteration of the equipment as tested may invalidate the compliance test results.

This report:

Prepared by: R. Kay



Approved by: W.S. Webley



Release Date:

14-12-07

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Appendix 1: Thermocouple Temperature Measuring Locations

<u>Channel</u>	<u>Date</u>	<u>Location Details</u>
1(normal)	05.12.07	F1; under front of heater
5(corner)	05.12.07	F5; under rear of heater
9(corner)	05.12.07	Exposed floor in front of heater, 350mm forward of door glass
12(corner)	05.12.07	Ceiling plate, 15mm inside of front edge
13(normal & corner)	05.12.07	Ceiling plate, 15mm inside of side edge
14(normal)	05.12.07	Ceiling plate, 15mm inside of rear edge
16(corner)	05.12.07	R5; on flue centre line, 1110mm above the floor
17(normal)	05.12.07	R6; on flue centre line, 910mm above the floor
19(normal)	05.12.07	Remote, 150mm from centreline, 860mm above floor
23(normal)	05.12.07	H; 500mm from corner and 1210mm above floor
24(normal)	05.12.07	N; 500mm from corner and 1010mm above floor
25(corner)	05.12.07	O; 700mm from corner and 1010mm above floor
31(normal & corner)	05.12.07	Ambient temperature at 1210 above floor on outside of the sidewall at the front.

Ambient Temperature

Date
05.12.07

Temperature Range Over Duration of Test
25.3°C minimum, 29.9°C maximum