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(This report is not endorsed*)**

Test Report#:	**0284**
Issue Date:	**Monday, July 23, 2012**
Subject:	
Sample description:	**Solid Fuel Burning Insert Fire**
Make/Model:	**Undisclosed**
Client reference:	
Attention:	**Mr. Glenn Fretwell**
Company:	**SmartBurn Australia**
Address:	**Unit 2, 63 Walters Drive, Osborne Park 6017, Western Australia**
Phone:	**0061 8 9202 0700**

Standard Specification and Scope:
AS/NZS 2918:2001 Appendix B Thermal testing of installation clearances; Appendix B sets out the method for determining the maximum temperature rise above ambient temperature of heat sensitive materials as specified installation clearances from a solid fuel burning appliance.

Instructions:
The client requested that an undisclosed* solid fuel burning heater previously tested by Spectrum Laboratories be retested with the addition of two SmartBurn units before the heater was to be removed from the clearance rig to ensure the same conditions were observed, the solid fuel heater was to be tested as per the manufacturer's instructions.**
The purpose of the testing was to establish if the use of a SmartBurn product increased the required clearance distances during both High and Flash fire conditions.

*** The solid fuel heater was to remain anonymous at the request of its owner. The heater was solely for use in gathering this supporting information.**

****Two SmartBurn units were specified for use by Glenn Fretwell of SmartBurn Australia due to the size of the firebox to ensure that the maximum recommended additive quantity was used on test.**

No changes were made to the heater or test method other than the inclusion of the SmartBurn additive.

Summary:
The repeated testing revealed only minor variations in the recorded temperatures; these were of only a few degrees while the original clearance distances remained unchanged.
These changes are likely attributed to the operator loading of the firebox along with variation in the moisture content and atmospheric influence.
It is therefore the opinion of Spectrum Laboratories that based on the evidence gathered within this report that the SmartBurn formulae has no real world impact on the clearance distances and may be used without any special considerations apart from any specified by SmartBurn Australia.

This opinion is based on the results of only one sample test, it is not expected to vary if tested on other fireboxes as the extreme high temperatures appear to reduce or eliminate any effect of the additive.

***** The iANZ endorsement was removed from this report as the test methodology was altered by the inclusion of the SmartBurn Additive and the undisclosed heater manufacturers' details and design drawings. Other that these points the results should still be considered to be accurate and representative of what happened during test.**

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Checked By	**Tested by**
Philip Sparrow	**Poyang Chen**
Compliance Engineer	**Compliance Engineer**

1. Manufactures details and Description

a) Heater external dimensions, construction, surface finish and materials used:

The Heater had the following overall external dimensions;

Height 701 mm	**measured to the highest point of the cabinet, excluding spigot.**
Width 1017 mm	**measured at the widest points of the cabinet**
Depth 428 mm	**measured from the rear cabinet to the door**

The heater was not fitted with a pedestal base

The heater was constructed of welded panel steel.

CVB firebricks were included as part of the heaters construction.

The heater was enclosed inside a clearance cabinet made of sheet metals

The heater was installed into an enclosure, specified by the client.

b) Firebox internal dimensions, constructions:

The rectangular fire box dimensions had the following internal dimensions;

Height	**268 mm**	**As measured between metal floor ribs and the bottom of the front secondary air tube.**
Width	**878 mm**	**As measured between the interior metal side walls.**
Depth	**337 mm**	**As measured between the rear metal interior wall and the front of the door aperture.**

c) Air inlets:

The 'air wash' (referred to locally as the primary controlled air) was controlled with an air slide located at top left of the fire. The air wash inlet consisted of four rectangular apertures measuring 7 mm x 185 mm located on the top of the firebox.

The secondary air was introduced into the firebox through the three air tubes; each air tubes were located just under the baffle, 65mm separation distance at axial centre between two adjacent tubes.

All three secondary tubes had a row or holes facing forward and down, 45° from horizontal. The first tube had thirty-five 2.5 mm diameter holes, second air tube had twenty-nine 3.5 mm diameter holes and the rear tube had twenty-three 4.8 mm diameter holes.

There were three rectangular air opening located under the firebox floor, these air inlets were blocked off during the test.

d) Flue gas outlet:

The flue gas outlet spigot was positioned centrally when viewed from the front of the firebox and the spigot's axial centre was 142 mm from the rear wall of the firebox. The flue spigot had an inside diameter of 155 mm.

e) Removable grilles and cook tops:

The heater did not have any removable grille or cook tops.

f) Fuel loading doors:

The door consisted of a one piece steel frame with a rectangular glass window. Overall dimensions of the door were:

Height 412 mm
Width: 909 mm

The lowest edge of the glass was located 197 mm above the lower edge of the metal cabinet.

The viewing glass measured 397 mm high and 909 mm wide.

g) Refractory materials and gaskets:

The firebox was fitted with a total of ten CVB fire bricks covering the side, rear walls and ceiling.

Two side wall fire bricks measured	**255 mm x 285 mm x 25 mm .**
One rear wall centre fire bricks measured	**255 mm x 305 mm x 25 mm.**
Two rear wall (L/R) fire bricks measured	**255 mm x 300 mm x 25 mm.**
One ceiling centre fire bricks measured	**220 mm x 295 mm x 25 mm.**
Two ceiling (L/R) fire bricks measured	**220 mm x 285 mm x 25 mm.**
Two additional ceiling bricks measured	**47 mm x 95 mm x 40 mm.**

There were three fabricated metal gasket covering the floor, each measured 60 mm H x 276 mm W x 310 mm D

The door frame was fitted with a fire resistant rope to seal the gap between the door and the firebox.

h) Flue System:

The heater was tested with a double skinned flue system. The 150 mm flue was made of unpainted stainless steel. The 200 mm inner liner and 250 mm outer casing were made of unpainted stainless steel.

Both outer liners rested 70 mm above the top panel of the fire's outer cabinet, the flue was inserted into the flue spigot on the heater.

i) Flue Shield:

The fire was not fitted with a flue shield.

j) Water heating device:

The heater was not fitted with a water heating device.

k) Air circulation Fan:

This heater was not fitted with an air circulation fan.

l) Catalytic combustor:

This heater was not fitted with a catalytic combustor.

m) Bypass damper:

The heater was not fitted with bypass damper.

2. Safe Clearance Test Information

Unit:	**Undisclosed**
Date:	**25/06/2012**
Tester:	**P. Chen**
Checker:	**P. Sparrow**
Barometer reading:	**1014 MPa**

High fire test fuel pieces:	**21**
High fire total weight:	**27.6 kg**
Flash fire test fuel pieces:	**6**
Flash fire total weight:	**7.446 kg**
Test Fuel length:	**505 mm**
Moisture content range:	**10 - 20%**

Largest axis of combustion chamber 841 mm Left to Right.

The high fire was re-fuelled at approximately 15 minute intervals with 2 pieces of test fuel, the fire primary air slide set to fully open during High fire and assisted by a partially open door on flash fire to ensure the highest temperatures were recorded.

3. Test results and Clearance

Make and Model of fire: **Undisclosed**

Reference Standard: **AS/NZS 2918:2001 Appendix B**

Project Reference No: **#0284**

Ambient temperature range during test: **19.0 to 24.1 °C**

Maximum allowable temperature rises (as per AS/NZS 2918:2001)
To comply with the temperature limits of this standard the temperature rise above ambient temperature of monitored surfaces shall not exceed 65°C for the high fire test and 85°C for the flash fire test. The maximum allowable temperature rise for thermocouples within the test structure is 70°C during the high and flash fire procedures.

Floor Protector:

Floor Protector		
	Material	Thickness(mm)
Base Layer	*Nil*	*Nil*

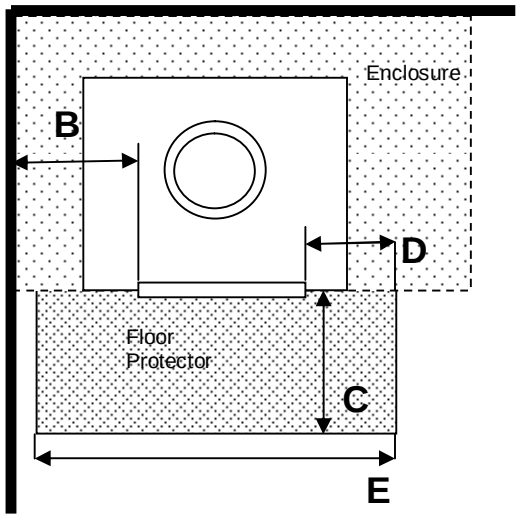
AS/NZS 2918 standard section 3.3.2 places minimum requirements for the floor protector.

For a fireplace insert appliance, the floor protector shall extend not less than 300 mm beyond the front of the fuel-loading and 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 200 mm from each side of any ash-removal or fuel-loading openings unless the floor protector forms an abutment with a wall or heat shield at a lesser distance.

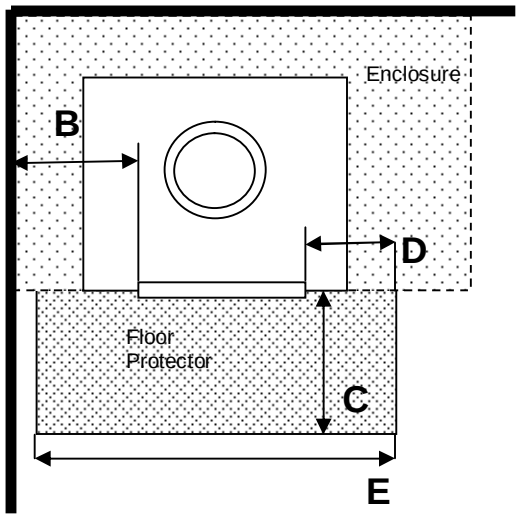
Minimum Access Clearance:
AS/NZS 2918 standard section 3.2.1 places minimum requirements for the access clearance.

To provide the user with access to the appliance, the clearance between any part of the appliance which only hand access, occasional user access, or maintenance access is necessary and any adjacent fixed surface or object shall be not less than 100 mm.

Test Results for high/Flash fire WITHOUT SmartBurn Additive:

Parallel Position Clearance Distance	Position	Clearance (mm)	Max temp rise	
			High	Flash
	**A**	N/A	Rear Wall	
			2.11	1.95
	B	320	Side Wall	
			56.48	49.74
	C	300	Floor	
			43.68	32.96
	D	200	Ceiling	
			34.25	32.12
	E	1309	Internal Cavity	
			33.3	36.1
	Mantel	Nil	Mantel	
			Nil	Nil

Test Results for high/Flash fire WITH SmartBurn Additive:

Parallel Position Clearance Distance	Position	Clearance (mm)	Max temp rise	
			High	Flash
	**A**	N/A	Rear Wall	
			8.3	1.67
	B	320	Side Wall	
			56.40	50.06
	C	300	Floor	
			44.62	30.82
	D	200	Ceiling	
			36.42	40.19*
	E	1309	Internal Cavity	
			34.4	35.0
	Mantel	Nil	Mantel	
			Nil	Nil

Note that this is the greatest deviation between the two results, the flash fire is the most unpredictable aspect of the test and the deviation was still only approximately 8^{o}C.

Technical Notes:

1. **The clearance measurement B were taken from the distance between walls and closest door edge of the appliance, C and D were measured from the edge of the floor protector to the door opening.**

2. **Fire as tested per installation had 375 mm clearance from the lower edge of the fire metal cabinet to the ground floor.**

3. **The fire was enclosed in a cavity built with 75mm thick hebel brick, there were 65mm air gap from both side of metal cabinet to the hebel brick, 500mm air gap from the top of the metal cabinet to the hebel, and 155mm from the rear of the fire cabinet to the hebel.**

   There were two circular air inlet with 100mm diameter located at the rear of the bottom hebel brick. Both air inlets were covered with metal mesh with 5mm holes.

   There was a 295mm x 400mm opening surrounding the flue system located at the top of the cavity. The opening was covered with metal mesh with 5mm holes.

4. **The fire as tested had 1310 mm clearance from the top of the cabinet to the ceiling.**

5. **There were no flammable material for the surface finish (ie:Gib) within 600mm above the front surface of the fire.**

6. **Two air inlets with 120mm diameter located at the lower cavity under the fire; two air outlets with 120mm diameter located at the upper cavity above the fire. All air inlets/outlets were covered with metal mesh with 5mm holes.**

Photo 1: Appliance as tested.

Withheld at the request of the firebox manufacturer.

Photo 2: Flash fire test fuel load.

Photo 3: Air inlet brackets and mesh.

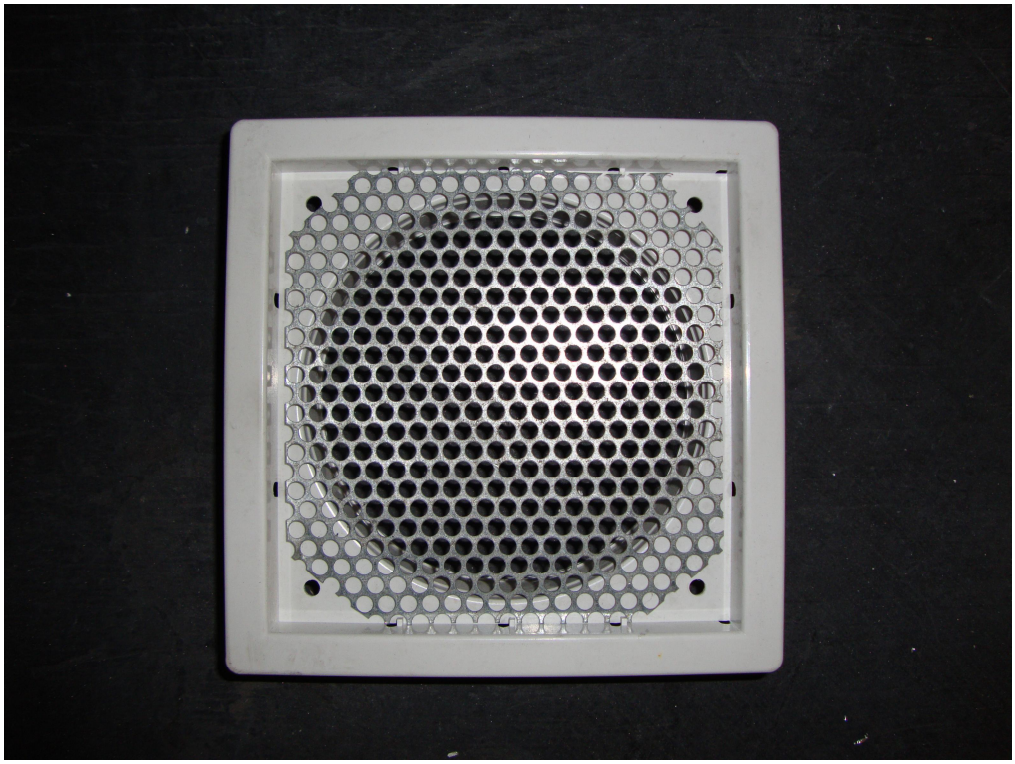


Photo 4: Air inlet for the clue system.

Manufacturer's drawings of flue shield as supplied

Withheld at the request of the firebox manufacturer.

Manufacturer's drawings of appliance as supplied:

Withheld at the request of the firebox manufacturer.

Copy of the operation and Installation manual:

Withheld at the request of the firebox manufacturer.

Measurement of Uncertainty:

The recorded measurement uncertainties apply to all measurements within this test report unless otherwise specified.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor *k* = 2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with IANZ requirements.

Measureand (X)	Calibrated Range	Measurement Uncertainty
Temperature	X ≤ 50 °C	± 2 °C
	50 °C < X ≤ 150 °C	± 3 °C*
Mass	X ≤ 210 g	± 0.1%
	210 g < X ≤ 300 g	± 0.010 kg
	0.3 kg < X ≤ 60 kg	± 0.012 kg
Length	X ≤ 200 mm	± 0.06 mm
	200 mm < X ≤ 1000 mm	± 3 mm
*Error is linear, ± 5 °C denotes maximum uncertainty with respect to 990 °C reading.		

End of Report.