Reaction to Fire test report

26 June 2025

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CLIENT INFORMATION

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TEST INFORMATION

Specification	Description
Test date	2025-06-11
Test number	IT-25-06-00057
Place of test	Cape Town
Product name	Ecofoil Double Sided Insulation
Sample description	Radiant Barrier
Standard	SANS 53501-1

REPORT COMPILATION

Author	C Kuhn B.(Chem)Eng(SU)
Assistant	PJ Gräbe (Pr Tech Mech Eng 200870007)

TEST REPORT SUMMARY

Specification	Description
TEST CONFIRMATION	
Client	DAMAX PLASTICS AND PACKAGING
Product name	Ecofoil Double Sided Insulation
Sample description	Radiant Barrier
Test number	IT-25-06-00057
Test facility	Ignis Fire Testing Laboratory Cape Town
Code applied	Class E
Class approved	Class E
Tests availiable	SANS 1743, SANS 53823, SANS 11925-2, SANS 11820
Density	60 *gsm*
Thickness	< 1 *mm*
CRITERIA	
Standard	SANS 53501-1
Materials	60 gsm polyprop laminated to a layer of metalised BOPP on both sides with 25 micrometer LD lamination
Tests performed	SANS 11925
Classification	E - s3,d0
Single Flame Ignitability	Fs $\leq$ 150 *mm* within 20 *s*
AUTHORISATION	
Date Authorised	2025-06-26
Authorised By	DJ Streicher (Pr Eng 880107) MSc.(Civ)Eng (UCT)
Author	C Kuhn B.(Chem)Eng(SU)
Assistants	PJ Gräbe (Pr Tech Mech Eng 200870007)
Report Authenticity Period	5 years

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1 Introduction

The client (DAMAX PLASTICS AND PACKAGING) approached Ignis testing to determine the SANS 53501-1 reaction to fire classification of the material. The material tested Ecofoil Double Sided Insulation with Radiant Barrier used for insulation purposes. The tests to evaluate the performance of the product are the Single Flame Ignitability (SANS 11925). These tests cover the range of classification based on criteria set out by SANS 53501-1.

2 Material data sheet

Description	Result/Value
Thickness	< 1 *mm*
Density	60 *gsm*
Facing	LD lamination
Glue	None
Binder/Adhesive	Yes
Fire retardant	Yes

3 Test description

For all tests, refer to Appendix A to see the required criteria for each classification of the SANS 53501-1 code.

3.1 SANS 11925-2 Single Flame Ignitability

Ignitability of products subjected to direct impingement of flame.

This test method was developed to define and investigate the reaction to fire performance of materials. The ignitability of products is determined by directing a small-flame impingement using a vertically oriented test specimen. This test measures the flame spread up the vertical surface of the test specimen after the application of a small 20 mm flame to the middle edge of the test surface for 30 seconds. Flaming droplets generated from the specimen are evaluated based on whether the droplets result in the ignition of a filter paper placed below the specimen. Furthermore, the duration of the self-sufficient flame is also measured which also influences the outcome of the test.

4 Test procedures

The test procedures for the relevant reaction-to-fire tests are listed and described below.

4.1 SANS 11925-2 Single Flame Ignitability

- Prepare a specimen of 250 mm +-2 long by 90 mm +-2 wide.
- Test the flame reaction and time to calibrate with no specimen.
- Adjust the flame height to 20 mm in a controlled environment with no samples present.
- Switch off the flame after adjustments.
- Fix the specimen within the holding bracket inside the test container.
- Bring the burner close enough to the sample to ensure contact is made with the bottom centre edge.
- Position a piece of filter paper in an aluminium tray directly below the specimen.
- Light the burner and start the timer simultaneously.
- Observe the forming of any flaming droplets and whether they result in the ignition of the filter paper in the tray below the sample.
- After 30 seconds, extinguish the flame and observe whether the specimen continues to flame.
- Measure the flame spread after waiting for all flames to self-extinguish.

5 Images

Figure 1: SANS 11925-2 Ignitability test sample after a completed test, flame spread not having exceeded 150 mm.No Flame spread exceeding 150 mm within 20 seconds, filter paper ignited from burning droplets.

6 Results and Discussions

6.1 SANS 11925-2 Single Flame Ignitability

Six samples were tested in the ignitability setup (SANS 11925-2). Four of the samples had a flame spread of less than 150 *mm* within 60 seconds. See Table 1 below.

Table 1: Single Flame Ignitability results of each sample tested

Sample	Fs	Burning droplets	Ignition of filter paper
1	< 150 *mm*	No	No
2	< 150 *mm*	No	No
3	< 150 *mm*	No	No
4	> 150 *mm*	No	No
5	> 150 *mm*	No	No
6	< 150 *mm*	No	No

7 Additional Information

7.1 All the tests were performed according to the set standards for testing elements with measurements captured as prescribed by the listed standards.

7.2 All the thermocouples were calibrated at ambient temperature before the start of the test. All the thermocouples were within plus/minus two degrees and referenced to the calibrated test device within plus/minus 2 degrees Celsius.

7.3 All the gas analysers were calibrated and zeroed at ambient conditions before the start of the test.

7.4 Three oxygen analysers are used to minimize the error between readings.

7.5 All weights are accurate to ± 0.02 grams margin of error.

7.6 Only carbon dioxide, carbon monoxide and oxygen were analysed, and no other gasses were measured.

7.7 Gas analysers were calibrated to 18% O_2, 1000 ppm CO and 2000 ppm CO_2 reference gasses.

7.8 The bomb calorimeter was calibrated with the prescribed Benzoic acid tablets, with three calibration runs before testing where the results were in a 1% error margin region.

8 Conclusion

The product satisfies the criteria for Class E combustibility classification. Due to the product being classified as Class E, thus a classification of E - s3,d0 can be given according to SANS 53501-1.

Declaration

I, Dirk Johannes Streicher ID 590115 5011 087, hereby declare that I am registered with ECSA as a Professional Engineer (880107) and that I have acquainted myself with the content of the relevant codes, performed and witnessed the above test, applied my knowledge and mind to the process and that the results are accurate and true. I also declare that I have no knowledge in my capacity as a competent Professional Engineer that there is any other legal requirement w.r.t. approval of the compliance of the submitted test sample to the relevant codes.

Signed at Ignis Fire Testing Laboratory Cape Town on 26 June 2025.

(Pr Eng 880107) MSc.(Civ)Eng (UCT)

Indemnity

Ignis Testing's test report serves to confirm the testing of the client's sample furnished at the date of testing. Ignis Testing takes no responsibility for any information furnished therein which may cause any damage or harm whatsoever. It remains the responsibility of the client and the end-user to confirm that the sample tested is the same quality and design supplied to the end-user and to their own reasonable satisfaction. By making use of the content contained in the testing report, be it an indivisible reliance, the client and or recipient of the report hereby irrevocably indemnify and hold harmless Ignis Testing, its directors, representatives and employees, against all and any actions, suits, proceedings, claims, demands, costs and expenses of whatsoever nature and howsoever incurred which may be taken or made against them or be incurred or become payable by them arising out of the report. Ignis Testing's rights shall always remain strictly reserved to substitute any information contained in its testing report should Ignis Testing reasonably become aware of any changes to or of the client's product and/or sample after testing. The client must conduct a further resistance test, at its own cost, should the design and quality of the product differ from the sample submitted for testing. The report is solely to be used by the recipient addressed therein and may not be amended and/or reproduced without the prior written consent of Ignis Testing, for which consent may be withheld for any reason whatsoever.

A SANS 53501 Classification Criteria

Table 2: Classification criteria set out by SANS 53501-1

Class	Equipment	Test methods	Classification criteria	Additional classification
A1	Non-Combustibility	SANS 11820[a] (EN 1182)	$\Delta T \leq 30°C$; $\Delta m \leq 50\%$ and $tr \leq 5\ s$	None
A1	Bomb Calorimeter	SANS 1743 (EN 1716)	PCS $\leq 2.0\ MJ/kg$ [a] and PCS $\leq 2.0\ MJ/kg$ [b c] and PCS $\leq 1.4\ MJ/m^2$ [d] and PCS $\leq 2.0\ MJ/kg$ [e]	None
A2	Non-Combustibility	SANS 11820[a] (EN 1182)	$\Delta T \leq 30°C$; $\Delta m \leq 50\%$ and $tr \leq 5\ s$	None
A2	Bomb Calorimeter	SANS 1743 (EN 1716)	PCS $\leq 3.0\ MJ/kg$ [a] and PCS $\leq 4.0\ MJ/kg$ [b c] and PCS $\leq 4.0\ MJ/m^2$ [d] and PCS $\leq 3.0\ MJ/kg$ [e]	None
A2	Single Burning Item	SANS 53823 (EN 13823)	FIGRA $\leq 120\ W/s$; LFS edge of specimen; $THR_{600\ s} \leq 7.5\ MJ$	Smoke production [f] and flaming droplets/particles [g]
B	Single Burning Item	SANS 53823 (EN 13823)	FIGRA $\leq 120\ W/s$; LFS edge of specimen; $THR_{600\ s} \leq 7.5\ MJ$	Smoke production [f] and flaming droplets/particles [g]
B	Single Flame Ignitability	SANS 11925-2 Exposure = 30s	Fs $\leq 150\ mm$ within $60\ s$	Smoke production [f] and flaming droplets/particles [g]
C	Single Burning Item	SANS 53823 (EN 13823)	FIGRA $\leq 250\ W/s$; LFS edge of specimen; $THR_{600\ s} \leq 15\ MJ$	Smoke production [f] and flaming droplets/particles [g]
C	Single Flame Ignitability	SANS 11925-2 Exposure = 30s	Fs $\leq 150\ mm$ within $60\ s$	Smoke production [f] and flaming droplets/particles [g]
D	Single Burning Item	SANS 53823 (EN 13823)	FIGRA $\leq$ \$750˜W/s\$	Smoke production [f] and flaming droplets/particles [g]
D	Single Flame Ignitability	SANS 11925-2 Exposure = 30s	Fs $\leq 150\ mm$ within $60\ s$	Smoke production [f] and flaming droplets/particles [g]
E	Single Flame Ignitability	SANS 11925-2 Exposure = 30s	Fs $\leq 150\ mm$ within $20\ s$	Flaming droplets/particles [g]
F	No performance determined	None	None	None

[a] For homogeneous products and substantial components of non-homogenous products.

[b] For any external non-substantial components of non-homogenous products

[c] Alternatively, any external non-substantial component having PCS $\leq 2.0\ MJ/m^2$, provided that the product satisfies the following criteria of SANS 53823: FIGRA $\leq 20\ W/s$, LFS M edge of the specimen and $THR_{600\ s} \leq 4.0\ MJ$ and s1, d0.

[d] For any internal non-substantial component of non-homogenous products.

[e] For the product as a whole.

[f] s1 = SMOGRA $\leq 30\ m^2/s^2$ and $TSP_{600\ s} \leq 50\ m^2$; s2 = SMOGRA $\leq 180\ m^2/s^2$ and $TSP_{600\ s} \leq 200\ m^2$; s3 = not s1 or s2.

[g] d0 = No flaming droplets/particles in SANS 53823 within 600 s; d1 = No flaming droplets/particles persisting longer than 10 s in SANS 53823 within 600 s; d2 = not d0 or d1.

B Explanatory terms

Table 3: Explanatory terms

Symbol	Definition
ΔT	Temperature rise (°C)
Δm	Mass loss (%)
FIGRA	Fire Growth Rate
Fs	Flame spread (mm)
LFS	Lateral Flame Spread (mm)
Tr	Duration of sustained flaming (s)
SMOGRA	Smoke Growth Rate (m^2/s^2)
TSP	Total Smoke Production
THR	Total Heat Release (MJ)
PCS	Gross calorific potential (MJ/kg or MJ/m^2)
PCI	Net calorific potential (MJ/kg or MJ/m^2)

Amendments

Table 4: Amendments

Date	Amendment	Signatory and Name
2025-06-26	Original	C Kuhn

Ecofoil Radiant Barrier Test Sheet

ALFIN BUSINESS SERVICES (PTY) LTD
2015/009953/07

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Sunward Park
Boksburg
1470

Cell: 071 676 3461
Office: 011 8961442

13.09.2023

1. Test Procedure:
The tests were conducted on a calibrated LaserComp Fox 314 guarded hotplate apparatus in accordance with SANS 1381-4:2013.
The samples were tested “as new” (not coated with grey paint to simulate accumulation of dust).
The samples were tested with a 40 mm air gap above the sample (“hot” side), and a 60mm air gap below the sample (“cold” side).
The tests were conducted at 36 C (hot plate) and 10 C (cold plate) with a downward heat flow.

2. Test Results:

Sample Description	Thermal Conductivity (W/m.K)	System R-Value (m^2.K/W)
1 Sided Foil	0.09009	1.11
2 Sided Foil	0.06536	1.53

The reported R-value is the “system” R-Value, inclusive of the air gaps, and is only valid if installed as tested.

Foil insulation is often referred to as reflective insulation or radiant barriers. They are manufactured from highly reflective foil. They reflect radiant heat instead of absorbing it. Usually installed in residential homes or commercial and industrial buildings. Additionally, they can be used instead of the usual plastic underlay for waterproofing.

Their primary use is to reduce solar heat in summer from penetrating your roof. While keeping your interior cooling costs down. Radiant barriers don’t reduce heat conduction as thermal bulk insulation products do.

HOW DOES FOIL INSULATION WORK?

Foil insulation or radiant barriers work by reflecting the heat source off the reflective foil. There are 3 different ways in which heat travels from a warm area into a cool area.

conducted
convection
radiation heat

When the sun hits your roof, it's the radiant energy that makes the roof hot. This heat travels by conduction into the roof, radiating solar heat into the cooler areas of your roof.
Using a radiant barrier for protection reduces the heat transfer from under the roof tiles and into your roof area where heat builds up fast.

WHICH CLIMATES DO RADIANT BARRIERS WORK BEST IN?

Reflective insulation is best used in warmer climates rather than cool ones. They are used to reflect heat so you won't gain many benefits in cold regions. Bulk thermal ceiling insulation like fibreglass is the preferred insulation for cold climates. You will save between 5% – 10% on cooling costs when used in hot and sunny climates.

TYPES OF RADIANT FOIL INSULATION

There are many different types of reflective foil insulation available for purchase. Radiant foil barriers consist of a highly reflective foil. This is laminated to one or both sides of material such as craft paper, oriented strand board or fibre-reinforced products to increase strength. Products like Ecofoil or Insumax Bubble are very effective radiant barriers.

COMBINING REFLECTIVE FOIL WITH BULK INSULATION

To get the best of both worlds, you can combine radiant barriers with bulk thermal insulation like think pink aerolite (fibreglass) or Insumax Bulk Ceiling Insulation (polyester) to achieve a higher R-value. The combined product is called factorylite if you go the fibreglass route or isofoil if you got the polyester route. In these combinations, the reflective insulation acts as the bulk thermal insulations facing material.

INSTALLING RADIANT BARRIERS

Get a qualified company that has experience installing radiant barriers. The effectiveness of the foil insulation depends on how the product is installed. It's much easier to install reflective insulation in a new home or building where you roll the foil over the beams from the outside and overlap it where it joins.
Doing a retrofit installation in an existing house is much more difficult because the roof is already on. You will have to cut the material to size and fit it between each beam separately which can be quiet time-consuming.

DOES DUST EFFECT REFLECTIVE FOIL INSULATION BARRIERS?

Dust plays a big role in the reflectiveness of the material. After a couple of years the radiant barrier will get dusty and lose some of its ability to reflect effectively. The radiant barrier needs to be installed foil face down to prevent as much dust accumulation on the reflective surface as possible.

This is the type of insulation that most people are familiar with. The insulation material itself is usually fiberglass, mineral wool (also called rock wool) or synthetic fibre (polyester). Each product has a material R-value for a given thickness, density and temperature. These products come in two forms, either in rolls, called blankets, which must be cut to fit the length of space or in precut lengths, called batts. In a horizontal space like a roof space, blankets or batts are simply laid between the timber joists.