



**TITLE** : Report on the evaluation of the fire properties of the **RIGIFOAM** product **LAMBDABOARD WM/MN (100 mm)** as under-roof insulation material using the **SANS 10177 – Part 11** test protocol in terms of **SANS 428**

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**DATE** : 29 October 2014

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## TABLE OF CONTENTS

LIST OF FIGURES AND TABLES .....	1
1. INTRODUCTION .....	2
2. SAMPLE DESCRIPTION .....	2
3. TEST PROCEDURES .....	3
3.1 <b>SANS 10177 – PART 11 (CLASSIFICATION)</b> .....	3
4. TEST RESULTS .....	5
4.1 <b>SANS 10177 – PART 11 (CLASSIFICATION)</b> .....	5
5. DISCUSSION OF RESULTS .....	12
6. CONCLUSIONS .....	13
ANNEXURE "A" .....	14

## LIST OF FIGURES AND TABLES

Figure 3.1.1: <b>SANS 10177 – Part 11</b> test facility with specimen frames .....	4
Figure 3.1.2: Typical roof test installation in the <b>SANS 10177 – Part 11</b> facility .....	4
Table 4.1.1: Observations made during the <b>SANS 10177-11</b> test .....	5
Figure 4.1.1: Temperatures recorded on front panel during test .....	6
Figure 4.1.2: Temperatures recorded on rear panel during test .....	7
Figure 4.1.3: Test installation before ignition of the fire source .....	8
Figure 4.1.4: Note the wrinkling of the facing material above the fire source .....	8
Figure 4.1.5: Note delamination of facing material above fire source .....	9
Figure 4.1.6: Note discolouration starting above fire source area .....	9
Figure 4.1.7: Note sporadic ignition above fire source area .....	10
Figure 4.1.8: Sporadic ignition and widening discolouration area above fire source area .....	10
Figure 4.1.9: Fire starting to collapse .....	11
Figure 4.1.10: Test installation subsequent to completion of the test .....	11

## 1. INTRODUCTION

The purpose of the investigation was to evaluate the fire propagation properties of the **RIGIFOAM** product **LAMDABOARD WM/MN (100 mm)**, an insulation material used as over purlin thermal insulation in roof envelopes and was done in terms of **SANS 428** using the **SANS 10177 – Part 11** test protocol.

## 2. SAMPLE DESCRIPTION

The **LAMDABOARD WM/MN (100 mm)** has the following characteristics:

### Product Details:

<i>Trade Name:</i>	LAMDABOARD
<i>Code:</i>	LAMDABOARD WM/MN
<i>Manufactured by:</i>	RIGIFOAM
<i>Manufacture date:</i>	6 October 2014
<i>Batch number:</i>	1262

### Physical Properties:

<i>Mass:</i>	$\pm 4\ 000\ \text{g/m}^2$
<i>Thickness:</i>	100 mm
<i>Width:</i>	1 220 mm
<i>Length:</i>	6 000 mm

### Product Composition:

<i>Core:</i>	Polyisocyanurate (PIR)
<i>Facing (upper):</i>	Natural mineral fibre (perforated)
<i>Facing (lower):</i>	White mineral fibre

### Intended usage:

*Over-purlin insulation material used in industrial and commercial buildings.*

### Generic Identification:

*PIR boards (No identification marks)*

Product information as supplied by **RIGIFOAM** can be found in **Annexure "A"**.

### **3. TEST PROCEDURES**

#### **3.1 SANS 10177 – PART 11 (CLASSIFICATION)**

The large-scale fire propagation properties of the system were evaluated by performing a test in the **FIRELAB** large-scale roof insulation test facility. A schematic diagram of the test facility with the specimen frames are shown in Figure 3.1.1.

The ignition source for the under-roof evaluation was constructed from 60 kg dry 38 mm x 38 mm SA Pine sticks stacked in an open-crib configuration to form a 1 000 mm x 750 mm x 480 mm high crib. The pack was ignited with commercial firelighters at each corner, in order to simulate a fire with slow heat build-up. The maximum heat output of the fire source (approximately 2.5 MW based on previous research) occurred after approximately 12 minutes.

The fire source was located at one end of the facility, approximately 1.5 m from the front end, 1.5 m from the side and 1.5 m from the centre line of the specimen frame. The position of the crib is indicated on Figure 3.1.1. No mass loss measurements were taken during the evaluations.

This test was performed simulating an under-roof installation without a sprinkler system. This evaluation investigated the fire propagation properties of the insulating material when used as an over-purlin application with the purlins positioned across the width of the test facility. A schematic side view of a typical roof test installation is shown in Figure 3.1.2.

The insulation material was installed over-purlin with 40 mm by 40 mm lightweight galvanized steel angles forming composite T-sections on the longitudinal joints.

For this evaluation the specimen frames were aligned in such a way that the roof slope was equal to 3 degrees. The distance between the top of the fire source and the roof directly above it was 2.7 metres.

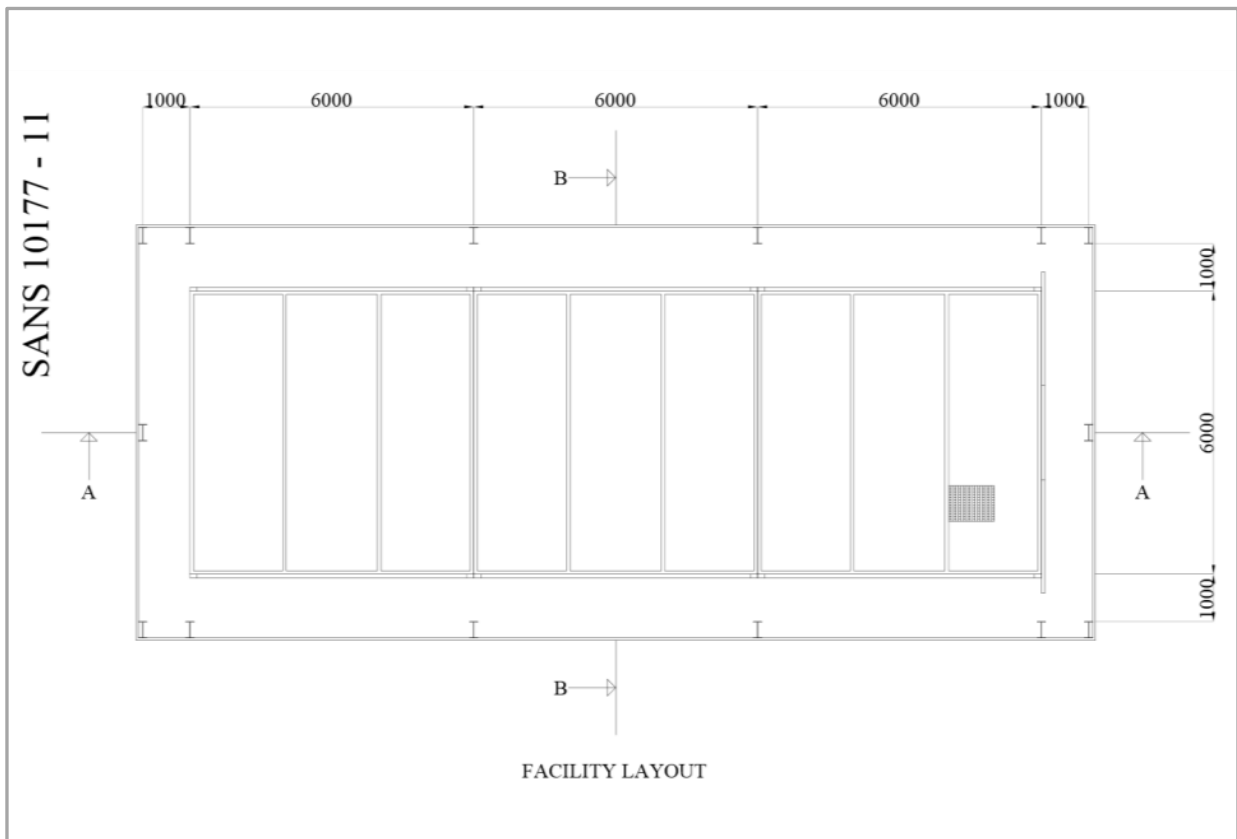


Figure 3.1.1: **SANS 10177 – Part 11** test facility with specimen frames

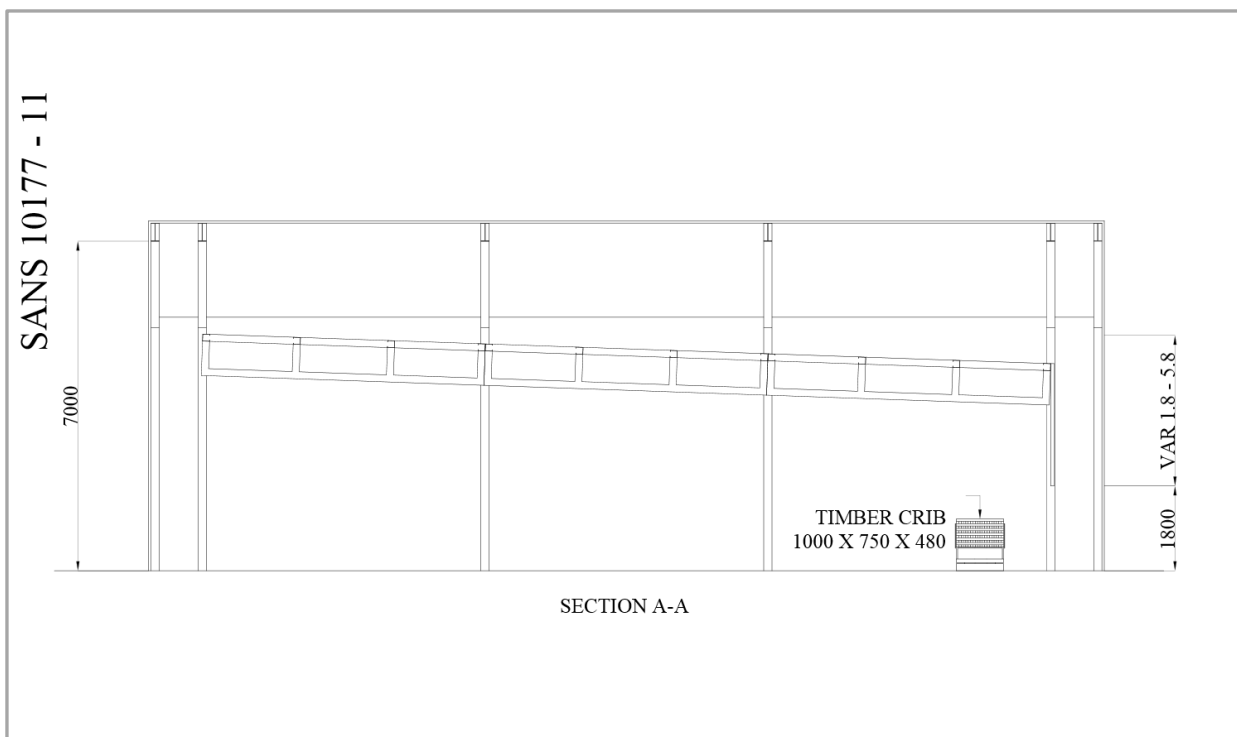


Figure 3.1.2: Typical roof test installation in the **SANS 10177 – Part 11** facility

## 4. TEST RESULTS

### 4.1 SANS 10177 – PART 11 (CLASSIFICATION)

The temperatures recorded on the front and rear specimen panels during this test are displayed graphically in Figures 4.1.1 and 4.1.2 respectively.

The installation before the ignition of the fire source is shown in Figure 4.1.3.

LAMDABOARD WM/MN (100 mm) – 4 000 g/m <sup>2</sup>	
OBSERVATIONS DURING THE SANS 10177 – PART 11 TEST	
TIME	OBSERVATION
00:00	Test Started
04:40	Flames start reaching insulation material
05:30	Flames touching surface of insulation material
05:50	Wrinkling of surface started
06:10	Delamination started
07:15	Full flame impingement on surface and discolouration started
09:00	Sporadic ignition
09:10	Flaming out
14:00	Fire source starts collapsing
23:30	Fire source nearly consumed
25:00	End of test
<u>Note(s):</u>	Insulation material showed only sporadic ignition above fire source area.

Table 4.1.1: Observations made during the SANS 10177-11 test

The test installation after the conclusion of the test is shown in Figure 4.1.10.

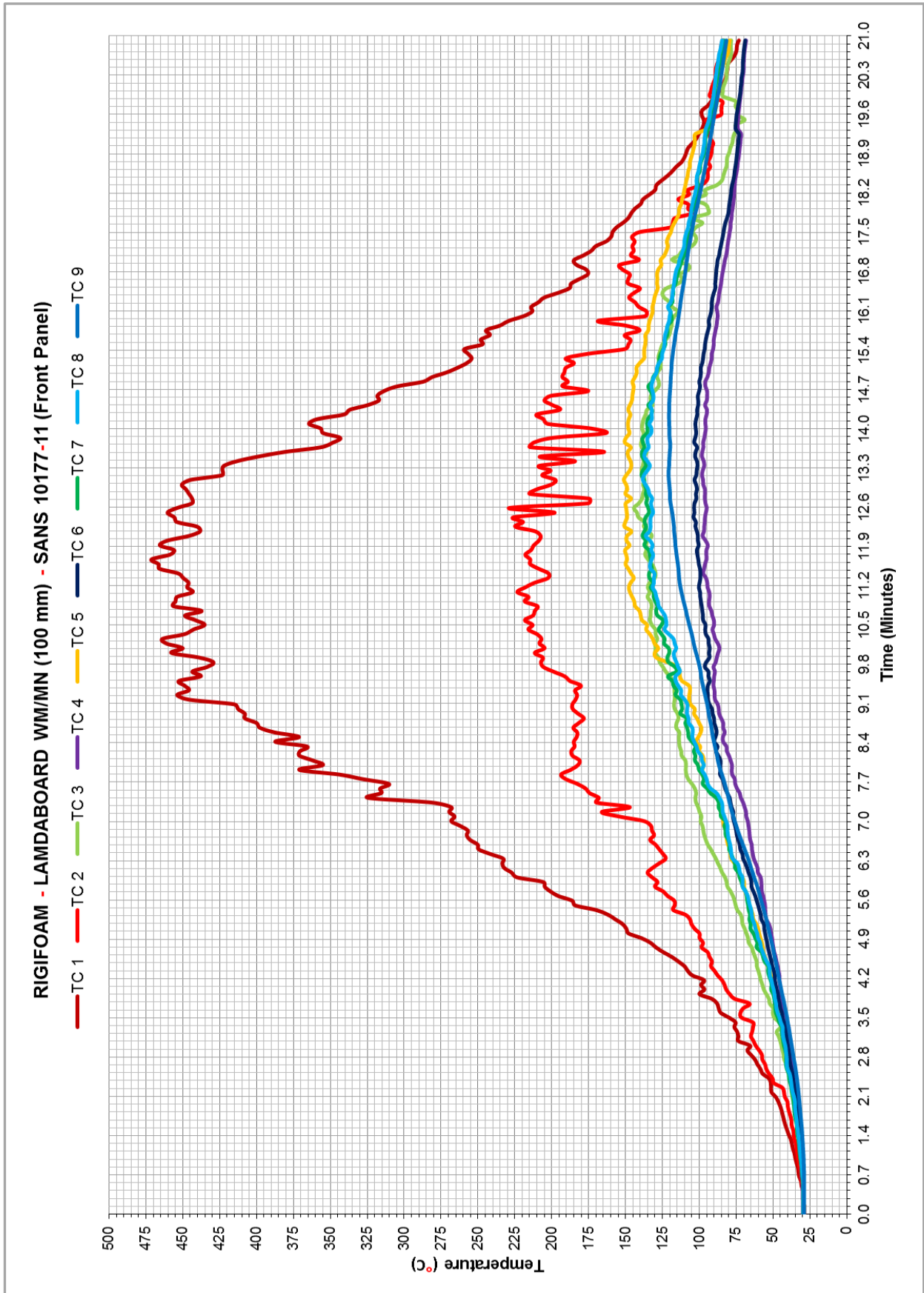


Figure 4.1.1: Temperatures recorded on front panel during test

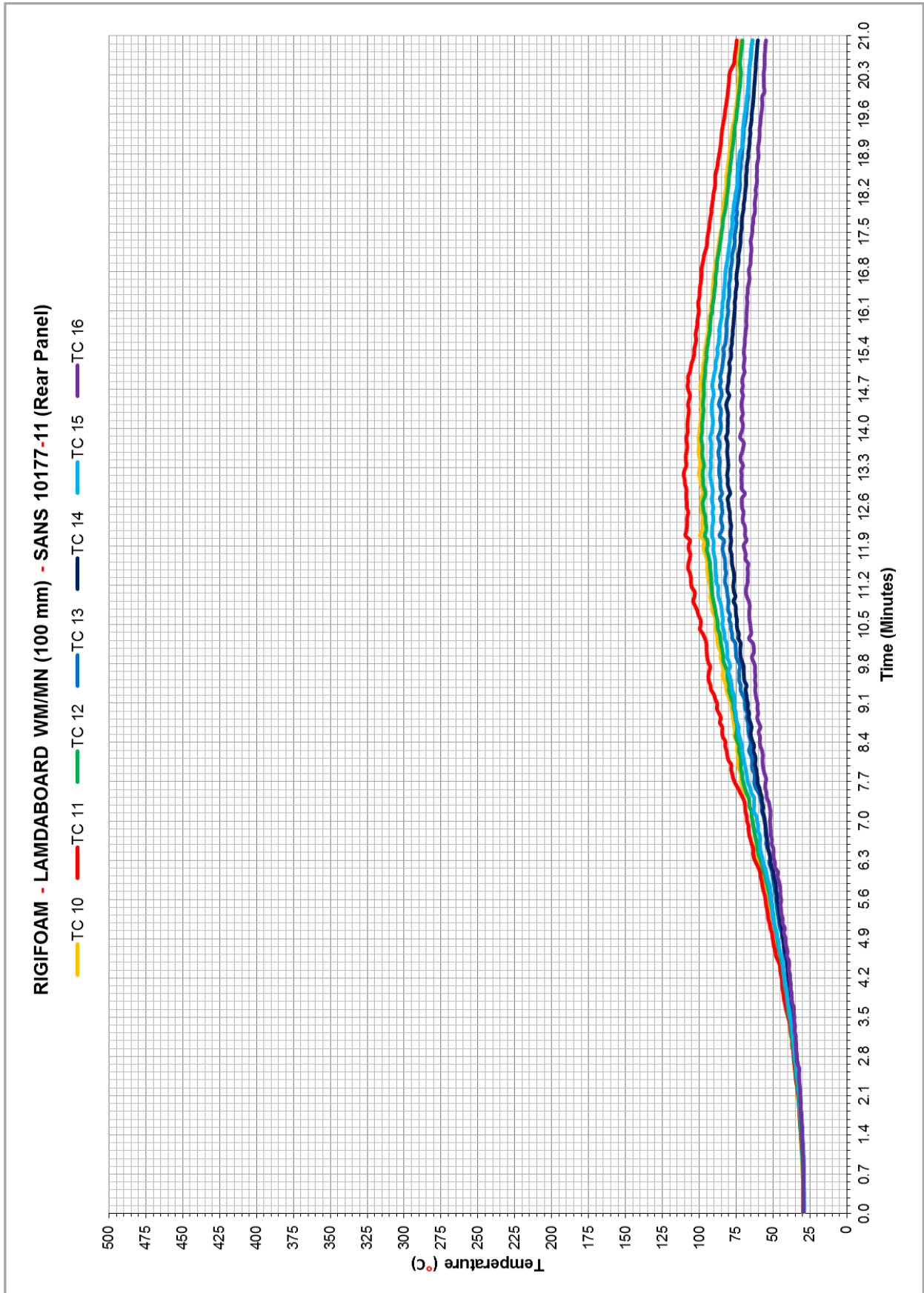


Figure 4.1.2: Temperatures recorded on rear panel during test





Figure 4.1.3: Test installation before ignition of the fire source



Figure 4.1.4: Note the wrinkling of the facing material above the fire source.



Figure 4.1.5: Note delamination of facing material above fire source.



Figure 4.1.6: Note discoloration starting above fire source area



Figure 4.1.7: Note sporadic ignition above fire source area



Figure 4.1.8: Sporadic ignition and widening discolouration area above fire source area



Figure 4.1.9: Fire starting to collapse



Figure 4.1.10: Test installation subsequent to completion of the test

## **5. DISCUSSION OF RESULTS**

No **SANS 10177- 5 and 10** tests were conducted on the material as the client opted to perform a full scale test in the large-scale **SANS 10177-11** facility. However based on material knowledge of previous tests on PIC material the material would be classified as **Combustible (B)**.

No flame spread other than sporadic ignition above the fire source area was observed during the entire test period. The facing material wrinkled during the early stages of the test which resulted in delamination and discolouration of the facing material.

The results of this large-scale evaluation without sprinklers confirmed that **RIGIFOAM 100 mm LAMBABOARD** does not propagate fire when installed as an under-roof insulating system.

The outcome of the **SANS 10177-11** test confirmed that the material tested have a classification of **B/ B1/ 2/ H (USP)** when used as an over purlin insulation material.

## 6. CONCLUSIONS


The material was tested as a requirement in terms of **SANS 428**.

The fire safety properties of **100 mm LAMBABOARD** insulation material as supplied by **RIGIFOAM** for evaluation is as follows:

- 🔥 The material assessment in lieu of a **SANS 10177-5** test, is classified as combustible is **Class B**.
- 🔥 The provisional classification awarded in lieu of a **SANS 10177-10** test, is **Class B/ B1/ 2**
- 🔥 The confirmation of the classification awarded to the material based on the fire performance as tested, using the **SANS 10177-11**, is **Class B/ B1/ 2/ H (USP)**
- 🔥 The classification awarded to the material tested, based on the **SANS 428** protocol, is **Class B/ B1/ 2/ H (USP) – See Note below**

- Note:**
- » *The use of the material tested will not affect or impact on the operation of any sprinkler system.*
  - » *The product was tested with a non-combustible facing on both sides. Should any facing be adhered to or used with the **LAMBABOARD** product the test results and classification of this report will no longer be valid.*

The above results does not relate to fire resistance. In instances where fire resistance is a requirement, this property needs to be determined in terms of **SANS 10177-2**.

<b>- SANS 10177 – PART 5, 10 and 11 –</b> <b>- Product Information -</b>		 <b>FIRELAB</b>
<b>Product Trade Name:</b>	LAMBDABOARD	
<b>Product Manufacturer:</b>	RIGIFOAM	
<b>Product Code No.:</b>	LAMBDABOARD WM/MN	
<b>Proposed Usage:</b>	OVER PURLIN	
<b>Generic Identification:</b>	PIR	
<b>Manufacturing Date:</b>	06/10/2014	
<b>Batch No.:</b>	1262	
<b>Actual Mass (g/m<sup>2</sup>):</b>	4000	
<b>Thickness (mm):</b>	100	
<b>Width (mm):</b>	1220	
<b>Length (mm):</b>	6000	
<b>Product Composition</b>	<i>Layer Description / Composition (Including bonding layers):</i>	<i>Mass (g/m<sup>2</sup>)</i>
<i>Layer 1:</i>	Lambdaboard	4000
<i>Layer 2:</i>		
<i>Layer 3:</i>		
<i>Layer 4:</i>		
<i>Layer 5:</i>		
<i>Layer 6:</i>		
<i>Layer 7:</i>		
<b>Wire Spacing (mm):</b>		
<b>Joint Overlap (mm):</b>		
<b>Installation Details:</b>	OVER PURLIN	