Insulation

Aviko, Lomm, The Netherlands

Fire Investigation



Kingspan®

Executive Summary

A fire occurred on 2nd July 2020 on the roof of an industrial building used by Aviko, a Dutch food company, at Spikweien in Lomm.

The roof comprised steel beams, steel sheet, a bituminous vapour barrier, 80 mm Kingspan Therma™ TR26 insulation*, manufactured at Kingspan Insulation's Winterswijk facility in The Netherlands, and a bituminous waterproofing membrane. On top of that, there were steel constructions to support ventilators and piping made from metal and polypropylene (PP), respectively.

The initial fire started below the roof, spread to the roof and then laterally across the roof surface.

Two parts of the roof were affected by the external fire, with burned waterproofing membrane surfaces measuring 44 m^2 and 7 m^2. The surface area of the burned insulation was significantly less than that of the waterproofing.

The investigation of the condition of the insulation showed the fire didn't propagate into the upper surface of the insulation other than under the influence of the burning bituminous waterproofing membrane and PP piping. Where insulation remained, it was visibly damaged up to 30 mm deep.

The bottom surface of the insulation was, in places, also visibly damaged up to 30 mm deep under the influence of the internal fire.

The investigation concluded that the main contributors to fire development were the PP piping and the bituminous waterproofing membrane. It is estimated that the insulation's contribution to the fire load was no more than 4%.

* Manufactured at Kingspan Insulation's Winterswijk facility in The Netherlands.

Jeroen Helders, Group Treasurer & Insurance Risk Manager at Cosun, concluded that the outcomes of the fire incident confirm the added value of using proper materials:

"Using the PIR insulation materials from Kingspan on the roof has proven to be highly effective in containing and preventing the spread of the fire in our production site in Lomm.

This, in turn, has resulted in significantly lower losses and reduced downtime. Such outcomes highlight the importance of our strategy in selecting the right materials for our production sites, in combination with other fire safety measures.

As such, I can state that it truly pays off to invest in high-quality insulation solutions."

The Kingspan Therma™ TR26 installed in the roof in this case study was manufactured at Kingspan's facility in Winterswijk in the Netherlands. Kingspan Therma™ TR26 manufactured and sold in other countries may perform differently, however, this case study may still be of interest.

Introduction

A fire occurred on the roof of an industrial building, used by Aviko at Spikweien in Lomm, the Netherlands. Kingspan Insulation commissioned Efectis to conduct an analysis of the incident and the performance of Kingspan's insulation materials on the roof of the building*. Efectis is an independent global consultancy specialising in the fire performance of products, systems or constructions, with 70 years of experience. For the purpose of this fire investigation, the NFPA 921's scientific method was used by Efectis as a guideline.

The building was constructed using a steel frame, with the roof itself made of steel beams, steel sheet, a bituminous vapor barrier, 80 mm Therma™ TR26 insulation** (*Figure 1*) and a bituminous waterproofing membrane. Therma™ TR26 has a reaction to fire classification E for the product and B-s2, d0 in end use situation according to EN 13501-1.



Figure 1: 80 mm Kingspan Therma™ TR26 insulation.

Additionally, steel constructions were present to support piping and ventilators (*Figure 2*). The piping was made of metal and polypropylene (PP). Some piping was insulated with mineral fibre insulation. Parts of the roof were covered with concrete tiles to support the installations and walking paths were made of rubber tiles.



Figure 2: Impression of the installations present on the roof prior to the fire (source: Aviko).

* A copy of the Efectis report is available upon request from the Kingspan Insulation Marketing Department (see rear cover).

**Manufactured at Kingspan Insulation's Winterswijk facility in The Netherlands.

The Fire

The Fire Department was alerted of the fire at the Aviko building at 4:01 am (*Figure 3*). According to the operator of the Aviko facility, the fire was reported inside a furnace. The Fire Department arrived at the scene at 4:15 am and four minutes later the crew commander reported a fire located in the chimney and on the roof.

At 5:16 am it was reported that the main body of the fire had been suppressed and at 5:36 am the fire was officially under control. The fire was limited to the furnace, the chimney and the roof, including the installations on the roof. The initial fire started below the roof, spread to the roof and then laterally across the roof surface.



Figure 3: Fire on the roof of the Aviko building (source: 1limburg.nl).

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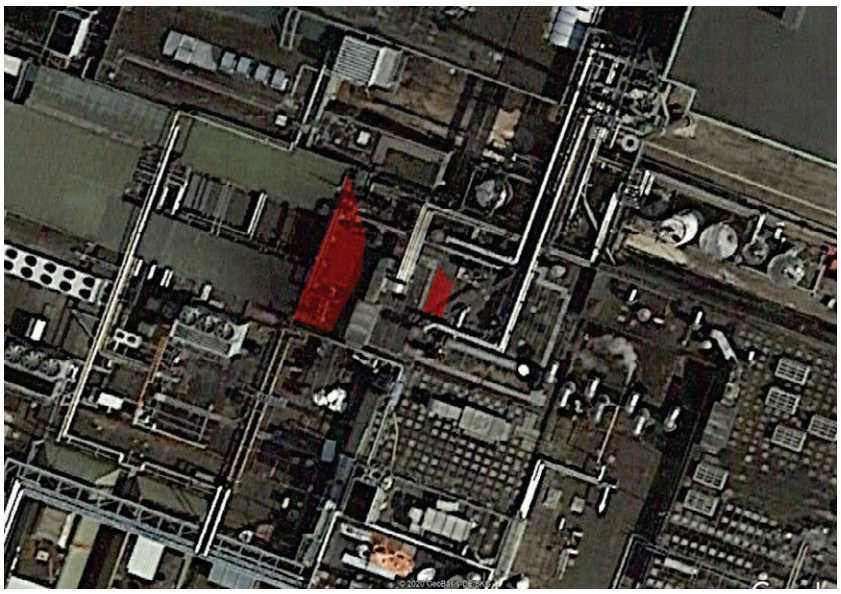


Figure 4: Burned surface on the roof of the Aviko building.



Figure 5: Part of the burned roof.



Figure 6: Overview of the damaged roof. Behind the ventilation unit a part of the roof is burned as well (source: Aviko).

Efectis conducted a site investigation of the roof on 13th July 2020. At the time of the investigation, the roof was in the process of being cleaned for repair, and parts of the insulation and waterproofing membrane had been removed.

Two parts of the roof were affected, with burned waterproofing membrane surfaces measuring 44 m^2 and 7 m^2 (see *Figures 4, 5* and 6). The surface area of the burned insulation was significantly less than that of the waterproofing. There was a ventilation unit on the roof between the two burned surfaces and the fire spread between them through PP pipework.

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On one part of the roof all insulation was gone but the reason for it is unclear – it could have potentially been consumed by the fire or removed by the fire department or in the cleaning process.

Where insulation remained, it was visibly damaged up to 30 mm deep from the top (*Figure 7*), or from the bottom (*Figure 8*) depending on the location of the fire (initially an internal fire, followed by an external fire).



Figure 7: Where the fire propagated over the roof, the insulation was heated from above and started expanding.



Figure 8: Where the fire was beneath the roof, the insulation was damaged bottom up.

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Based on the condition of the insulation at the fire site, it is possible to conclude that the fire didn't propagate into the insulation other than under the influence of the burning bituminous waterproofing membrane and PP piping.

It is estimated that the insulation contributed to the fire load no more than 4% (see *Figure 9*). The main contributors to the fire development were the PP piping and the bituminous roofing.

Product	Heat of combustion (MJ/kg)[1]	Amount of product involved (kg)	Fire load (MJ)
Polypropylene	45	720	32,400
Bituminous vapour barrier	27	97	2,619
PIR	26.2 (can vary between 22 and 30)	73	1,913
Bituminous roofing	27	510	13,770
Total fire load			50,702

[1] NEN 6060 2015, A1 2018.

Figure 9: Heat combustion of used products.

- **PP piping:** The quantity of PP piping has been estimated based on pictures from 2017. It is estimated there was 720 kg of PP involved in the fire (at 45 m in length, 0.3 m in dimeter, 20 mm thickness, based on weight of 0.91 kg/dm^3).
- **Insulation:** A surface of 51 m^2 was affected by the fire, but the burned surface of insulation was smaller than that of the roofing – 60% of the total burned surface has been used to estimate the fire load for insulation resulting in 73 kg (at 80 mm thickness, weight of 30 kg/m^3).
- **Bituminous roofing:** There was 510 kg of bituminous roofing involved, estimated from two layers comprising 8 mm thickness, with a weight of 10 kg/m^2.
- **Vapour barrier:** There was 97 kg of bituminous vapour barrier based on a thickness of 3 mm, weighted 3.8 kg/m^2 on an area of about 50% of the burned area.

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