

# MEMORANDUM



## Introduction

Thatched roofs in Denmark have been fireproofed for many years. Usually, the method used is one of the three specified in the Danish Institute of Fire and Security Technology's (DBI) Fire Safety Information no. 29, Fire Prevention in Thatched Roofs (BtI 29).

However, in recent years, it has been observed that a number of thatched roofs have degraded over a relatively short time span – typically five to ten years.

This has resulted in increasing scepticism about the methods used for fire protection. It is feared that fireproofed thatched roofs are no longer adequately ventilated, preventing them from drying, and it is presumed that this results in the fast degradation of the thatching material.

Preliminary tests performed by thatcher Erling Bach Petersen in Kolind, during which a variety of mineral wool insulation and panel materials were replaced with glass matting for fireproofing of thatched roofs, indicate that this is presumably possible. These preliminary tests demonstrated that the thatching material burns at a slower rate and with no flying particles.

Use of glass matting rather than the much more compact fire resistant methods described in BtI 29 presumably means that air flow through the thatching material will not be affected to any great degree at usual airflow rates.

## Object

Due to the fact that it would be preferable to use the much more open glass matting than currently recognised methods in order to ensure adequate ventilation of the thatching material, the aim of the conducted test is to show that the benefits of using glass matting for prevention of fire in thatched roofs are the same as for other types of fire protection.

## Description

Fire test no. 2 was performed on 20 March 2003 at Carlo F. Christensen, Kastbjergvej 15, 8585 Glesborg.

The building used for this test was the same as that used in the first test: a 4.5 x 5.0 m building with timber supporting structure and 13 mm plaster board cladding (as shown in the drawing in Appendix 1). After installation of rafters and battens, the roof was fireproofed in the following way:

Sepatec 9679/M300 glass matting (combination matting at 600 g per square metre) was fixed on top of the roof battens for fire protection. The glass matting was drawn tight to lie close to the underside of the thatching material after thatching.

Lengths of matting were laid longitudinally along the roof with an overlap (minimum 100 mm) jammed over a batten. Rockwool ablative coated batts with a thickness of 50 mm and a width of 600 mm were laid on top of the glass matting along the eaves and gables before thatching. Rockwool ablative coated batts with a thickness of 50 mm and a width of 750 mm were laid along the ridge of the roof, on both sides, on top of the glass matting.

The roof was then thatched using the so-called stick method whereby the thatching material is secured by jamming it between battens and 6 mm steel wire (to replace hazel sticks). It is held taut against the underlying batten using stainless steel wire and fixed to the batten with a screw. The method is shown on page 8 of BtI 29.

Thatching was carried out with well-seasoned, dry reeds, which were coarse and bent. The thatching was slightly more compact than that used in the first test. However, it was still looser than general thatch quality. Therefore, the roof used for this test was also a very combustible thatched roof in which a fire would develop very quickly.

Heather secured with chicken netting was used for the ridge.

## Test conditions

On the day of the test, the temperature was approximately 4°C and the wind speed was 4-5 m/s, mostly perpendicular to the side of the roof that was ignited. No rain.

## Method

The thatched roof was ignited with four tufts of straw which were inserted into the eaves, similar to external ignition such as arson or a rapid forest fire.

The crew from the Grenå fire service began extinguishing the fire in the roof after 38 minutes with the help of a few thatchers who cut away the thatching material so that it could be pulled to the ground.

During the fire, the following conditions were observed:

1. flying particles in the air
2. heat radiation in terms of necessary distance to the roof
3. burn through to the roof void
4. ignition in the roof void
5. water penetration during extinguishing operations

## Observations

After ignition in the eaves, the fire spread quickly to the entire roof surface adjacent to the ignited eaves. During the first few minutes, the fire was intense and the flames high. The fire then changed in nature to a smouldering fire, which continued until the extinguishing operation began.

Re. 1) No flying particles were observed in the air which could potentially start another fire.

Re. 2) It was possible during the entire course of the fire to stand approximately 2.5 metres from the burning roof without discomfort due to heat radiation.

Re. 3) At no stage was it observed that the fire burned through to the roof void.

Re. 4) Charring of a batten end was observed at one corner next to the eaves/gable.

Re. 5) During the extinguishing operation, no penetration of water through the glass matting was observed. Due to a change in the procedure for installing the glass matting at the eaves to extend the matting over the outer side of the wall, no water was observed running down the inner side of the wall as was the case in the first test.

## Supplementary observations

- After 15 minutes of fire, the glass matting was completely cold everywhere and unaffected by the fire.
- There was a lot of smoke in the roof void during the fire, confirming the open structure of the glass matting.
- After 35 minutes, a firefighter using breathing apparatus examined the underside of the burning roof surface and ascertained discovered that the temperatures were so high that it was only possible to hold a hand against the surface for a few seconds.

- The red-hot thatching material could be observed through the glass matting. It was subsequently ascertained that the battens in these locations had not been affected by the fire.

## **Conclusion**

Use of Sepatec 9679/M300 to prevent fire in thatch roofs meets the conditions laid down in BtI 29 with regard to reduction of external fire exposure and heat radiation.

Fireproofing with Sepatec 9679/M300 must be accompanied by extra insulation consisting of approximately 50 mm Rockwool ablative coated batts laid out in a 600 mm wide belt along the eaves and gables and 50 mm Rockwool ablative coated batts extending 750 mm down from the ridge of the roof with the thatch ridge laid on top of this extra insulation.

## **Final remarks**

Prevention of fire in thatched roofs according to the instructions in this memorandum and in the attached construction guidelines can be considered to rank equally with the methods described in Fire Safety Information no. 29, Fire Prevention in Thatched Roofs, and will be included as a new method on revision of this information.

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