Introduction

In the past, Promat MANDOLITE® 550 cementitious fire protection spray was frequently applied for protection of steel bulkheads and loadbearing structures against hydrocarbon fires. The production of Promat MANDOLITE® 550 has been discontinued. For repair and maintenance works of existing applications of Promat MANDOLITE® 550, Promat recommends to use Promat FENDOLITE® MII. Promat FENDOLITE® MII has been applied since the 1980's and has also been tested for its ability to protect steel structures and bulkheads against hydrocarbon fires. As explained in this document, it is generally conservative to replace Promat MANDOLITE® 550 by the same thickness of Promat FENDOLITE® MII.

Comparison for bulkheads

Required thickness

In order to evaluate the required thickness of Promat FENDOLITE® MII in a situation where it is applied as a replacement or repair of Promat MANDOLITE® 550 on steel bulkheads, a comparison is made using the following data:

- Promat MANDOLITE® 550: FIRTO reports TE 4652, TE 4653; Yarsley report 74671/2
- Promat FENDOLITE® MII: Fire Insurers Laboratory of Korea report 1993-1619

The mentioned test reports concern steel bulkheads of 5mm thick, exposed to hydrocarbon fire curves, protected with 32, 43 and 45.5mm of Promat MANDOLITE® 550 and 37 and 47 mm of Promat FENDOLITE® MII.

Evaluation

The tests on Promat FENDOLITE® MII have been terminated after 120 minutes, before relevant failure criteria (temperature increase of 140°C average, 180°C max) had been reached. Nevertheless, looking at the available test results within 120 minutes, Promat FENDOLITE® MII performs significantly better than Promat MANDOLITE® 550, looking at both local maximum temperatures and average temperatures. This is illustrated in figure 1.

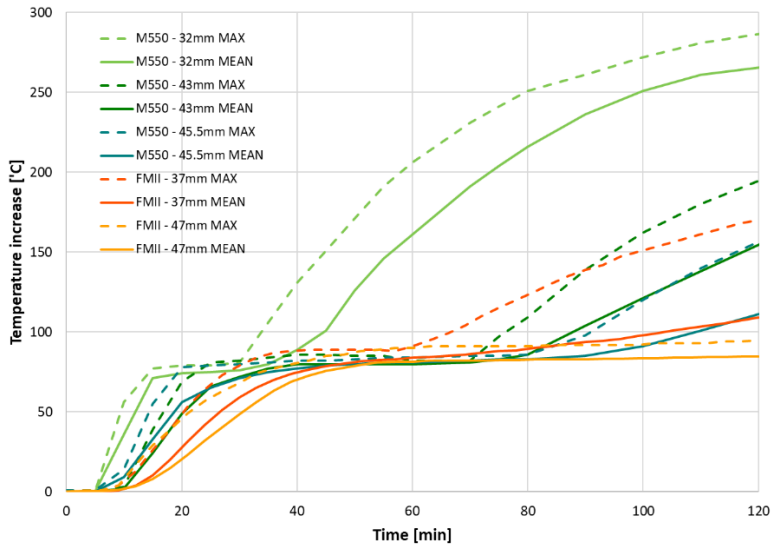


Figure 1: mean and maximum rise of bulkhead temperatures in five fire tests

Comparison for steel structures

Required thickness

In order to evaluate the required thickness of Promat FENDOLITE® MII in a situation where it is applied as a replacement or repair of Promat MANDOLITE® 550 on steel structures, a comparison is made using the following data:

- Promat MANDOLITE® 550: Lloyd's Register Certificate of Fire Approval SAS F100365 (expiry date 7 March 2013)
- Promat FENDOLITE® MII: BRE assessment CC 82654 Rev.7 (expiry date 21 August 2020)

Both reports contain design tables for the same application (protection of steel elements against hydrocarbon fire, with cementitious spray including mesh and pins) and are based on tests in accordance with BS standards. For this reason, they are the best basis that is available to compare the fire protection performance of both materials. Nevertheless, the scope in terms of section factors and critical steel temperature is not fully the same in both reports. The comparison is done for the range where both reports overlap in scope:

- Section factors 30 – 310 m^{-1}
- Critical steel temperatures of 300 – 400 °C.
- Fire protection thickness 12 – 60 mm.

Evaluation

A detailed comparison shows that the required thicknesses are generally very similar. In the most favourable situation, the required thickness for Promat FENDOLITE® MII is 5 mm less than for Promat MANDOLITE® 550. In the most unfavourable situation, 2 mm extra thickness would be needed. In the majority of situations, the required thickness for both materials does not differ more than 1 mm and on average there is a minor advantage for Promat FENDOLITE® MII. The comparison is limited to fire resistances of 60, 90 and 120 minutes. Below and above this range, in some cases larger differences occur.

Conclusion

Given the evaluation above, that Promat FENDOLITE® MII generally performs equal or better than Promat MANDOLITE® 550, both on bulkheads and on steel structures, it is concluded that it is generally safe to replace or repair Promat MANDOLITE® 550 with Promat FENDOLITE® MII of the same thickness.

The information given in this Application Procedure is based on practical experience, independent and other tests and represents, in Promat's opinion, the best technical advice available. Since the products are applied under circumstances beyond our control, Promat can accept no direct or consequential liability, whether in contract or in tort, for the interpretation of such recommendations and reserves the right to modify the recommendations as necessary. Should it be unclear as to the meaning of any of the instructions given above, or if further information is required, please consult Promat.