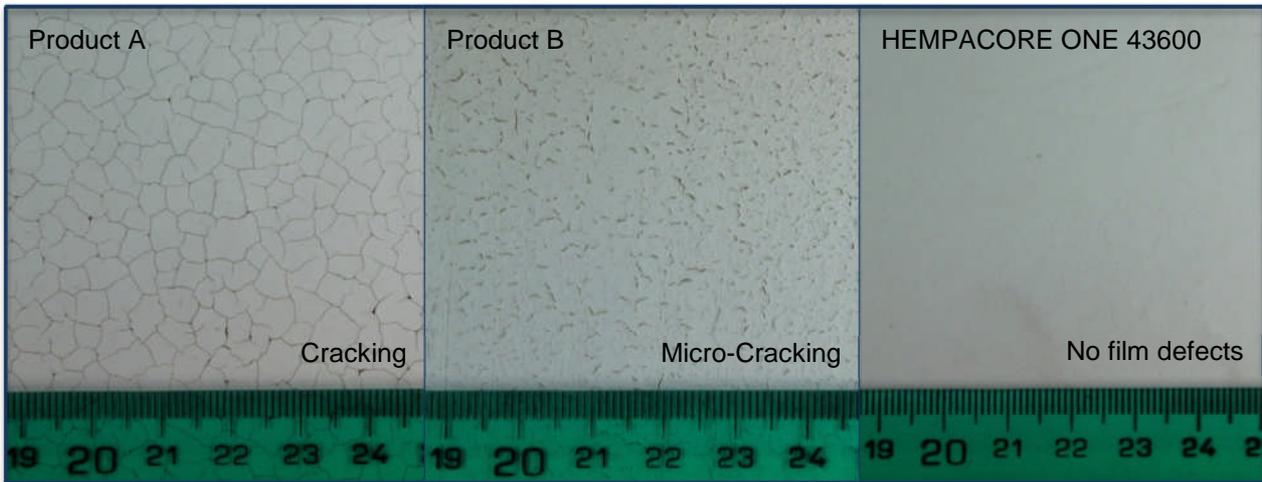




THE CORE ISSUE

HEMPEL

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Durability and reliability of intumescent coatings

Often little attention is given to the durability and reliability of intumescent coatings because the coatings are used in low corrosivity environments and/or protected by a topcoat. The durability and reliability of the coatings is, however, important as the products are expected to have a long lifetime and perform in case of fire so that lives are saved. Intumescent coatings are sometimes used without a topcoat or damage may occur to the topcoat over the lifetime of the coating system so it is important that the durability of the intumescent coating is taken into account.

Intumescent coatings that are not as durable as other intumescent coatings may require more frequent maintenance and have a shorter lifetime. Damages to the coating may also influence the fire performance of the coating.

Hempel has acknowledged the importance of durability for increased reliability of the intumescent system. Hempel's extensive experience within protective coatings and the use of high performance raw materials has resulted in excellent durability of HEMPACORE ONE 43600 and HEMPACORE ONE FD 43601 compared to other products on the market. In order to test and document the increased durability of the products, a series of tests has been conducted with HEMPACORE ONE 43600 and two commercially available intumescent coatings from international suppliers (products A and B).

The tests include accelerated exposure to UV and extreme temperature changes and have been conducted in accordance with the tests described in ETAG18-2 for X-conditions (Intumescent coating systems for outdoor use). Tests have been conducted on panels with non-topcoated intumescent with standard compatible primer as a preceding coat. X-condition tests, according to ETAG18-2 are designed to simulate resistance to outdoor exposure for intumescent coating systems (including topcoat).

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The weathering test is divided into two phases: UV and humidity exposure followed by exposure to extreme temperature changes in a climatic chamber.

Phase 1 consists of 112 cycles (equivalent to 28 days) of:

- 5 hours of dry UV exposure at 50°C (± 3°C) with relative air humidity of 10% (± 5%)
- 1 hour of water spray at 20°C (± 3°C)

Phase 2 consists of two cycles as described in the below table where the coating is exposed to extreme temperature and humidity changes:

| Day | Time | | | |
|---------|----------------------------|----------------------------|----------------------------|----------------------------|
| | 6 hours | 6 hours | 6 hours | 6 hours |
| 1. + 2. | 20°C ± 3°C; 95% ± 5% RH | 70°C ± 3°C; 20% ± 5% RH | 20°C ± 3°C; 95% ± 5% RH | 70°C ± 3°C; 20% ± 5% RH |
| 3. + 4. | 20°C ± 3°C; 95% ± 5% RH | 30°C ± 3°C; 40% ± 5% RH | 40°C ± 3°C; 95% ± 5% RH | 30°C ± 3°C; 40% ± 5% RH |
| 5. + 6. | -20°C ± 3°C; | 40°C ± 3°C; 95% ± 5% RH | -20°C ± 3°C; | 40°C ± 3°C; 95% ± 5% RH |

The results of the tests clearly show that HEMPACORE ONE 43600 performs better than the two other products (see pictures on page 1). After the first phase, degradation started for product A and B and after the second phase clear failures were seen. HEMPACORE ONE 43600 did not show any film defects during the tests.

| Product | Result after phase 1 | Result after phase 2 |
|---------------------|----------------------|-----------------------|
| HEMPACORE ONE 43600 | No degradation | No film defects |
| Product A | Pinholes | Pinholes and Cracking |
| Product B | Micro-cracking | Micro-Cracking |

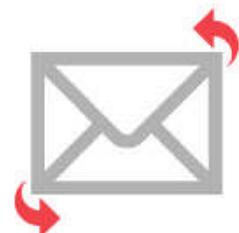
The results prove that there is a clear difference between commercially available intumescent coatings and show that it is important to consider the durability of the intumescent coating in order to secure the long term performance and reliability to the coating system. This study concludes that HEMPACORE ONE 43600 has superior durability performance compared to other commercially available intumescent products in case they are exposed to outdoor conditions. Hempel recommends applying a topcoat for outdoor conditions, as real life exposure and scenarios may be different to the conditions in the accelerated exposure tests, but the tests show that the risk if exposed is minimised.

More info

The Core Issue

The Core Issue is Hempel's series of technical articles that highlight some of the important issues of fire protection. For more information and technical articles about fire protection and intumescent coatings.

Visit: <http://www.hempel.com/fireprotection>



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