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International Paints Appraises the Fire Resistance of Protected Steel Rods Subject to Tensile Loading

In August 2014 International Paint Ltd's Fire Protection division undertook a full scale fire test of a 6m slender steel rod under tensile loading with an applied intumescent coating. A bespoke tensile loading rig for use in a large floor furnace was designed by International Paints' in-house Structural Engineers to permit this first ever test of its kind.

The fundamental aim of the investigation was to ascertain the need for a specific test of a rod in tension for fire protection product validation. Forthcoming international and European fire test standards are expected to benefit from the findings.

Specifically, the test was designed to demonstrate that the strain developed within the fire protection material had no detrimental effect on its insulating performance. Furthermore, a series of unloaded sections were included to assess the influence of a number of factors relating to intumescent coating performance on rods, including curvature, section factor, etc.

It was concluded that the imposition of a tensile load on a steel rod has negligible influence on the performance of a fire protection material in comparison to an unloaded rod and that therefore a tension test is therefore not required of industry. Despite localised deformation resulting in high strains the intumescent coating did not lose its cohesion prior to ultimate failure of the rod itself, which occurred as predicted in-line with structural calculations.

A report has been prepared for the benefit of the fire resistance and structural engineering communities. A copy of the document and all raw data will be made available to those who request it.

Selected images of test setup (left) and the snapped rod following the fire test (right)



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