

7<sup>th</sup> April 2022

## **Fire Protection of Concrete Filled Hollow Structural Steel.**

Tremco CPG UK Ltd develop, certify and market intumescent coatings for the protection of structural steel against fire. Part of our responsibility is the continuous development and improvement of the market through products, testing and approvals.

Tremco CPG UK Ltd are active contributing members of the ASFP, BCF and CEPE intumescent technical committees, enhancing customer protection through closing gaps in the testing and approval process.

Filling of Closed Profile, or Structural Hollow, Sections with concrete is a known practice in structural design of buildings. Both circular and square/rectangular profiles can be treated this way. Filling Hollow Sections with concrete offers several advantages over unfilled hollow sections such as cost versus strength optimisation, durability and aesthetics, increased fire resistance and much more. This method has been used in the construction industry for decades.

On occasion, it is necessary to fire protect these types of sections in order to meet construction code fire resistance requirements that filling with concrete alone will not meet.

Reactive coatings that are commercially available must be firetested and assessed to the appropriate test standard that is relevant to the local construction code. Fire testing of reactive coatings normally encompasses the fire-testing of various sizes of structural steel sections at a number of different thicknesses of protection followed by a statistical analysis producing interpolations within defined parameters. In Europe, these fire tests and assessments for plain structural steel is currently carried out in accordance with EN13381-8:2013.

There was no standard for testing and assessing concrete filled hollow sections when the above standard was being drafted, and it was only added after the process was completed.

Prior to having established such testing parameters, how to calculate the amount of intumescent coating for concrete filled hollows was unspecified. This can lead to interpretation and inconsistency in the market and the potential for an uneven competitive landscape. Several academic papers exist using a limited number of products, and have been used as the basis for guidance. However suitability of the one size fits all approach is unproven, especially with the market advancing with multiple technologies.

The market position has changed with the publication of EN 13381-6:2012 – “*Applied protection to concrete filled hollow steel columns*”. This standard has been specifically introduced to allow the testing, and assessment of results in a consistent manner across all commercially available passive fire protection materials, including reactive coatings, competing in the fire protection of structural steel market.

Further, testing and assessment to EN13381-6:2012 is the only way to achieve classification of structural fire resistance (R) in accordance with EN13501-2.

As EN 13381-6:2012 is an active standard, it is the recommendation of the CEPE Intumescent Coatings Technical Committee that this should be the sole method of testing and assessment used for concrete filled hollow steel columns. The use of other mathematical models should be avoided. This is confirmed in the ICTC0083 Guidance Note dated February 2020.

For any further information, please contact your Nullifire representative.

**Disclaimer.**

***Tremco CPG UK Limited products are manufactured to rigid standards of quality. Any product which has been applied (a) in accordance with Tremco CPG UK Limited written instructions and (b) in any application recommended by Tremco CPG UK Limited, but which is proved to be defective, will be replaced free of charge.***

***The information in this document is intended for guidance only, and is based upon practical experience and laboratory tests which Tremco CPG UK Limited believe are reliable. It is the responsibility of the Buyer to determine the suitability of the product for its own particular use. Tremco CPG UK has no control over the quality or condition of substrate, or the many factors that can affect the use and application of the product, and as such Tremco CPG UK accept no liability for any loss, injury or damages resulting from such use. Variations in application conditions, procedures and steelwork environments can cause unsatisfactory results, always refer to the application instructions or Nullifire Technical Services before use for guidance. Tremco CPG UK Limited reserves the right to alter product specifications without prior notice, in line with Company policy of continuous development and improvement***

***The English language version of this document prevails over any other translated version***

18 February 2020



## **CEPE Guidance on Passive Fire Protection of Concrete Filled Hollow Sections using Reactive (Intumescent) Coatings**

This Guidance note is prepared by CEPE, the sole pan-European industry association for coatings, printing inks and artists' colours manufacturers. Amongst the many specialist sectors that CEPE represents is an active group of manufacturers of reactive (or intumescent) coatings providing fire protection of building structural members.

For several years now, through its Intumescent Coatings Technical Committee (ICTC), CEPE has been active in leading and supporting developments within Europe aimed at improving the reputation of, and adding confidence to, intumescent fire protection products amongst regulators, specifiers, main contractors and specialist sub-contractors. The list of members of CEPE's ICTC appears in Annex 1 at the end of this document.

### **Introduction**

Filling Closed Profile or Structural Hollow Sections, with concrete is a known practice in structural design of buildings. Both Circular and square/rectangular profiles can be treated this way. Filling Hollow Sections with concrete offers several advantages over unfilled hollow sections such as cost versus strength optimisation, durability and aesthetics, increased fire resistance and much more. This method has been used in the construction industry for decades.

On occasion, it is necessary to fire protect these types of sections in order to meet construction code fire resistance requirements that filling with concrete alone will not meet.

Reactive coatings that are commercially available must be firetested and assessed to the appropriate test standard that is relevant to the local construction code. Fire testing of reactive coatings normally encompasses the fire-testing of various sizes of structural steel sections at a number of different thicknesses of protection followed by a statistical analysis producing interpolations within defined parameters. In Europe these fire tests and assessments for plain structural steel is currently carried out in accordance with EN13381-8:2013.

However, there was no standard for testing and assessing concrete filled hollow sections has not been included in this until recently.

Prior to having established such testing parameters, how to calculate the amount of intumescent coating for concrete filled hollows was unspecified. This can lead to interpretation and inconsistency in the market and the potential for an uneven competitive landscape. Several academic papers exist, and have been used as the

basis for guidance. However suitability of the one fits all approach is unproven, especially with the market advancing with multiple technologies.



## **Guidance**

The market position has changed with the publication of EN 13381-6:2012 – “*Applied protection to concrete filled hollow steel columns*”. This standard has been specifically introduced to allow the testing, and assessment of results to be done in a consistent manner across all commercially available passive fire protection materials including reactive coatings competing in the fire protection of structural steel market.

Further, testing and assessment to EN13381-6:2012 is the only way to achieve classification of structural fire resistance (R) in accordance with EN13501-2.

As EN 13381-6:2012 is an active standard, it is the recommendation of the CEPE ICTC group that this should be the sole method of testing and assessment used for concrete filled hollow steel columns. The use of other mathematical models should be avoided.

## **Annex 1 – Membership of the CEPE ICTC**

CEPE Intumescent Coatings Technical Committee (Chair = Anja Peter, Rudolf Hensel GmbH)

AkzoNobel  
Amonn Fire srl  
CIN / Barnices Valentine, S.A.U.  
Element Warringtonfire  
Hempel A/S  
Jotun A/S  
PPG  
Rudolf Hensel GmbH  
Sherwin Williams  
Sika Deutschland GmbH  
Tremco Illbruck  
UL International UK