

NBL

NBL® - R137 Fire Proofing Paint

Reactive Intumescent Coating

Technical data sheet & Application guidelines



General

DETERMINE THE FIRE RESISTANCE PERIOD

The fire resistance requirement for a building is defined in terms of fire resistance period and stated in terms of minutes (45, 60, 75, 90, 120, etc. up to 180 minutes). This information is usually given in local building regulations and it depends on the height, occupants and type of the building. In practice it means that the building frame has to maintain its load bearing capacity during the fire until everybody has left the burning building.

Intumescent coating, often referred to as intumescent paint, is one of the easiest and most efficient ways to protect load bearing elements of buildings against fire. Intumescent coating delays the collapse of the structure through insulating the structural elements (columns, beams, floors and roofs) that support the building, thus helping achieve fire resistance levels specified in terms of time. Therefore it fulfills with the highest priority of passive fire protection, preventing the collapse of the building, allowing the time for safe evacuation of people from it, and making it safer for the emergency services.

How intumescent paints work?

Intumescent is a reactive coating which swells as a result of heat exposure, thus increasing in volume and decreasing in density. Specifically, an intumescent paint is a coating that reacts to heat by swelling in a controlled manner to many times its original thickness, producing a carbonaceous char formed by a large number of small bubbles that act as an insulating layer to protect the substrate.

The scope of intumescent products is the prevention of the structural collapse of the building, which can occur if load bearing steel elements reach a critical state. For steel, this is linked to the critical temperature, defined as the temperature at which the load bearing capacity becomes equal to the effect of the applied loads (so the steel element is very close to the collapse).

Critical temperature of steel can vary from 350 °C to 750 °C, depending mainly on the loading scheme, but in most of the cases between 500 °C and 620 °C.

NBL®-R137

NBL®-R137 is a waterborne intumescent coating consisting of resins and fillers and is designed for the fire protection of structural steelwork. In a fire, a chemical reaction takes place, causing the material to expand and form an insulating layer, which prevents the temperature of the steel from rising to a critical level.

For normal interior application, NBL®-R137 can be used without any additional, decorative top coat. For exterior, semi exposed or high ambient humidity applications, the addition of a topcoat is necessary.

NBL®-R137 can be specifically used in areas where the application of solvent-based products is perceived to be an environmental hazard. Examples of such areas are: hospitals, schools, public buildings, commercial malls, etc. NBL®-R137 can be applied with brush and roller or airless paint equipment for speed and quality of finish.

NBL®-R137 is supplied ready for use and should not be diluted (only in specific case: maximum dilution with 5 % water). It should be stirred thoroughly with a mixer prior to application by airless spray, brush or roller. It can be applied directly to the contour of primed I and H-sections of beams/columns and hollow sections to provide the necessary fire resistance levels.

General description

NBL®-R137 is a water-based, white, thin film intumescent coating for the protection of structural steelwork

Usage / Fields of application

NBL®-R137 can provide up to 180 minutes fire resistance

- inside of buildings
- exterior, semi exposed or high ambient humidity application (additional top-coat applied)

System advantages / customer benefits

- For up to 180 minute fire resistance
- Easy to apply (in factory or on site)
- Aesthetic surface (thin, seamless with improved finish)
- Can be repainted
- Compatible with a wide range of primers and top coats

Finish

NBL®-R137 can be applied to a smooth matt finish (white colour). A compatible top coat can be applied if a decorative or protective finish is further required

Application process

NBL®-R137 may only be applied by trained professionals. Not for use in components that are constantly in highly humid areas or are exposed to aggressive gases. Surface must be free from grease, oil, rust, dirt or any other contaminant that may inhibit the bonding of NBL®-R137 to the primer. Stir well before use. Apply NBL®-R137 with a roller, brush or airless spray.

NBL®-R137 may be applied up to a maximum wet film thickness (WFT) of 1000 µm in a single spray, or WFT 250 µm when applied using a brush or roller.

Labeling

The product labeling complies with the current legal regulations

Packaging

- 25 kg plastic drums
 - 900 kg per pallet
- Subject to change

Storage requirements

Store in cool and dry warehouse conditions. Shelf-life at least 18 months in original unopened containers

Warranty

NBL products are manufactured to rigid standards of quality. Any product which has been applied in accordance with NBL written instructions or recommended by NBL, but which is proved to be defective, will be replaced free of charge



Technical data and properties

Colour	white
Consistency	liquid
Density	1200 kg/m ³ ± 50 kg/m ³
Solid content	73% ± 2 %
Expansion ratio	~ 1 : 15
Viscosity	~30 Pas at 20 °C
Consumption	~1750 g/m ² [1 mm DFT*]
Drying time between layers (for the same product)	~700 µm WFT** after 1.5 hours (25 °C, 50 % RH)
Working temperature	+10 °C up to +35 °C
Storage temperature	+5 °C up to +45 °C
VOC-content	≤ 10 g/l
Dilution	water - max. 5 %

* Dry film thickness

** Wet film thickness

All physical and mechanical values are averages based on standard production and tested according to internal procedures. The typical values are given for guidance only and the figures depend on the test methods used.

NBL reserves the right to alter product specifications without prior notice, in line with company policy of continuous development and improvement.

Substrate preparation

Prior to the application of NBL® - 137 for internal or external structural steelwork, it is essential to apply an anti-corrosive primer. Steelwork must be prepared to SA 2.5 or EN ISO 8501-1, before being coated with a compatible primer approved by NBL, and applied in full compliance with the manufacturer's recommendations.

Surface should be blast cleaned no more than four hours prior to the application of the primer and must be free from grease, oil, rust, dirt or any other contaminant that may inhibit the bonding of the NBL® - 137 to the primer. All steel must be physically clean, dry and free from mud, concrete slurry, grease, zinc salts and other forms of contamination. Oil & grease should be cleaned with specific solvent.

The following types (family) of primers are recommended and generally compatible with NBL® - 137:

- Acrylic
- Oil Alkyd primer
- Two component epoxy
- Epoxy zinc rich

The primer thickness should be measured and recorded, prior to the application of NBL® - 137, in order to accurately check the thickness of the latter during and after application. A DFT (dry film thickness) reading must be taken as soon as the coating is fully cured, within a minimum 7 days. An electronic electromagnetic dry film thickness gauge may be used.

Site Requirements

NBL® - R137 can be both applied at construction site or in steel structure manufacturing factory. Prior to application of NBL® - 137, the applicator should ensure that adequate services are available for the application process and site conditions are within the given parameters during application and drying of the material:

- Ambient air temperature between 10 and 35 °C
- Humidity should not exceed 80 %
- The surface must be dry and without any condensation on the steel
- Air movement is the most significant factor affecting the drying of water-borne paints. Good air flow and ventilation are always recommended to ensure there are no areas around the structure without ventilation. A ventilated air speed of 2 m/s will improve drying characteristics, especially in high humidity environments.



Application Processing

Mechanically mix for about 1-2 minutes to ensure that the product is mixed to a uniform consistency and to fully incorporate all of the ingredients into a homogenous mixture. Slow speed mixers or mechanical mixers are highly recommended to ensure no aeration or air bubbles are formed during the mixing process. Manual mixing is not recommended.

Maximum thickness per coat at 25°C and 50 % relative humidity:

- Spray: up to 700 µm DFT (~ 1000 µm WFT)
- Brush/ roller: up to 250 µm DFT in one coat (~ 380 µm WFT)
- Consumption: from 0,90 kg/m² to 1,75 kg/m², dependent upon fire resistance classes (30, 45, 60, 75, 90, 120, etc. up to 180 minutes)

Maximum thickness is also dependent upon steel section shape, degree of cosmetic finish required and skill of the applicator. Prior to over-coating ensure the previous coat is dry. As a guideline, applicators may allow around 10 % and 30 % wastage for brush/ roller and spray application respectively. This is, again, dependent upon application conditions, the steel section size and the skill of the applicator.

Drying times are dependent on temperature, air movement and relative humidity. At 25°C and 50% R.H.: 1 hour on surface for 400 µm wet film thickness (one coat by brush/roller); 2/3 days completely dry.

Thickness checks during application and measurement of dry film thickness

During the application of NBL® - 137 measure the wet film thickness (WFT) frequently with a wet film thickness gauge. To determine dry film thickness based (DFT) on the wet film thickness (WFT), for a rapid calculation, multiply the wet film thickness by 0.7

After sufficient drying time a survey of the dry film thickness should be carried out using a suitable coating thickness gauge. An electromagnetic induction instrument with a statistical function to store readings and give an average is most useful. Where dry film readings include a primer and/or topcoat an allowance must be made for these coatings and subtracted from the total reading.



Protective and/or decorative top coats

NBL® - 137 for normal interior application can be used without any additional decorative top layer. Adding a topcoat is necessary for exterior semi exposed or high ambient humidity applications. NBL® - 137 is a water-based environmental friendly product, but it can be sensitive to high humidity or chemical aggression when exposed to external or extreme conditions.

If necessary, a topcoat must be applied to the surface of the intumescent coating either as a protection against environment degradation or for decorative purposes. The topcoat should be specified, based upon the intended lifetime of the system and the environmental conditions.

All the following chemically compatible families can be used for environmental protection of NBL® - 137: Alkyd, Acrylic, Polyurethane and Epoxy.

Prior to the application of the topcoat, the applicator must ensure that the specified dry film thickness of NBL®-137 has been achieved. The surface of the intumescent coating must be clean, dry and free from contamination before over coating with the topcoat.





Fire testing methods

Historically, each country has developed its own fire tests in support of its national building regulations. Fire resistance tests tell us how an element of construction or fire protection system will prevent a fully developed fire from causing structural collapse of the element, or prevent the fire from passing from the room of origin into an adjacent room, corridor or other space.

Fire resistance is not a property of an individual material but is the measure of the performance of a complete system or construction when exposed to standard heating conditions. The failure criteria of elements of building construction when tested in accordance with BS 476: Parts 20-24 or in accordance with the EN 13381 are as follows:

- **Loadbearing Capacity (R)** the ability of the construction element to withstand specified mechanical actions whilst being exposed to fire, at one or more sides, during a determined period of time, without loss of structural stability. The criteria applied to determine the loss of stability, vary according to the type of load bearing element. For axially loaded elements, such as columns, walls, we consider a rate of deformation (rate of contraction) & a limit state for the actual deformation (contraction).
- **Integrity (E)** the ability of the construction element with a separating function to withstand exposure to fire on one side without fire propagation to the unexposed side as a consequence of flaming or the passage of hot gases.
- **Thermal Insulation (I)** the ability of the construction element to withstand exposure to fire on one side without fire propagation to the unexposed side as a consequence of heat transfer. Thermal insulation limits the heat transfer as a result of which neither the unexposed side nor adjacent materials will ignite

During the test, it is determined how long the building element preserves the tested performance when exposed to fire. Each performance has a number of criteria which determine when a building element loses that performance. Based on the test, the building element is assigned one of the following fire resistance classes: resistance to fire during 30, 45, 60, 90, 120, 180, 240 minutes.



Test by cone calorimeter as refer to ASTM E1354:2017

The common international testing standards:

- Building Construction Components and Materials; Reaction to fire (cone calorimeter) ASTM E 1354:2017
- Building Materials and Structures; Load bearing elements – Fire resistance ASTM E119-18c
- Building Materials and Structures; Load bearing elements – Fire resistance BS 476 Part 21:1987
- Applied Reactive Protection Products; Fire resistance BS EN 13381-8:2013
- Building Materials and Structures; Load bearing elements – Fire resistance ISO 834-4/5:2000

Are NBL's products subject to third party testing and accreditation?

NBL endorses the use of any third party accreditation authorities and believes that the credibility given by authorities like these gives the whole marketplace confidence in the products. NBL products can be tested at accredited laboratories to a variety of standards, including ASTM E119, BS 476: Part 21, AS 1530: Part 4, BS EN 13381-8, ISO 834-4:2000 or any national building codes required by local authority.

In Vietnam, NBL products meet the National Fire and Life Safety code as refer to test results No.4366 KD/PCCC-P9, No.2596 KD/PCCC-P9, No.2299 KD/PCCC-P9, No.1502 KD/PCCC-P9 issued by Police Bureau of Fire Prevention, Fighting and Rescue – Ministry of Public Security.



NBL allows any Third Party Site-based Inspections, assigned by our customer, to monitor the application of NBL products, during the manufacture and the construction phase up to and prior to the final Authority Having Jurisdiction (AHJ) in accordance with the various prescribed Building Codes and Standards.



NBL continue to push the development of fire protection systems further, constantly searching for improvement for the construction industry as a whole through representation at trade associations and technical committees.



NBL

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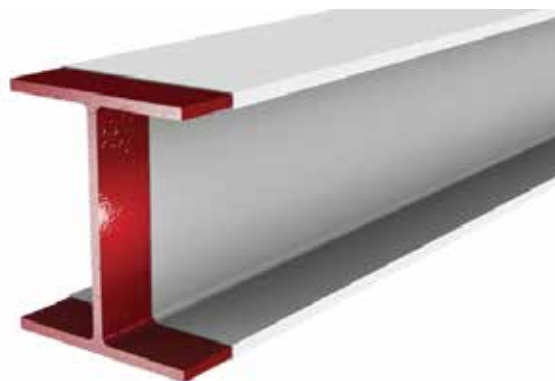
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The guidelines and recommendations are based on our best knowledge and experience. Nothing in these guidelines shall create or be deemed to create any obligation on the part of NBL. It remains the responsibility of the user to check the product and its use meets local legislation and regulatory requirements. Specific application and/or installation details mentioned in classification documents, assessments and other approvals as well as in NBL technical data sheets must be followed.