

TGD 15

Code of practice for the
installation and inspection of
sprayed non-reactive coatings
for the fire protection of
structural steelwork



FIRE AND YOUR LEGAL LIABILITY

Fire kills around 300 people and damage claims exceed £1 billion every year in the UK. That's why we must all play our part.

Why is this of relevance to me?

If you are involved in the provision of fire protection, at any level, then you share liability for its usefulness and its operation when it's needed in a fire, and that liability will still be there in the event of a court case.

I place the order; it is not my responsibility to install the works

If it is your responsibility to specify the materials and/or appoint the installation contractor it is also your responsibility to ensure that they can prove competency for the fire protection materials used, or the works to be carried out. It's no longer simply a duty of care or voluntary – it's a legal obligation under sections 5.3 and 5.4 of the Regulatory Reform (Fire Safety) Order 2005. Similar provisions also exist in equivalent legislation in Scotland and Ireland.

If you knowingly ignore advice that leads to a failure in the fire performance of any element of installed fire protection within a building, then you are likely to be found to be just as culpable as the deficient installer.

You also share liability for the provision of information required under Building Regulation 38 (formerly 16B) that tells the user of the building about the fire prevention measures provided in the building. The user needs this to make an effective risk assessment under the Regulatory Reform (Fire Safety) Order 2005 and national equivalents in Scotland and Ireland.

I'm only installing what I'm contracted to do

If you are installing fire protection, then as with those specifying the materials and/or the contractor, you also have a legal obligation to ensure that the materials you install are adequate under Sections 5.3 and 5.4 of the Regulatory Reform (Fire Safety) Order 2005 and national equivalents in Scotland and Ireland.

What is expected of me?

In the event of fire, and deaths, a court will want to know how every fire protection system was designed and specified; the basis for selection of the installer; whether adequate time was provided for its installation; and whether there was adequate liaison between the different parties to ensure it was installed correctly. No ifs, no buts – it's all contained in the Construction, Design and Management Regulations 2015.

The CDM 2015 Regulations, enforced by Health and Safety Executive, concentrate on managing the risk, and the health and safety of all those who design, specify and build, those that use the building, those who maintain it and those that demolish it – cradle to grave.

Be aware – the time to consider the above is before the event, not after it!



The Association for Specialist Fire Protection (ASFP)

The Association was formed in 1976, and currently represents UK manufacturers and contractors of specialist passive fire protection products, with associate members representing regulatory, certification, testing and consulting bodies. It seeks to increase awareness and understanding of the nature of fire and the various forms, functions and benefits provided by passive fire protection. It is willing to make available its specialist knowledge on all aspects of fire protection and can assist specifiers and main contractors in identifying products suitable for specific requirements, both in the UK and related overseas markets. The Association encourages experimental work related to passive fire protection and promotes consideration and discussion of all issues affecting the fire-stopping in buildings

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AMENDMENT SHEET: ASFP Code of practice for sprayed non-reactive coatings

DATE	SECTION	AMENDMENT SUMMARY	SOURCE
April 2021	2	Replace definition of European Technical Assessment Guidelines (ETAGs) with European Assessment Documents (EADs) to bring into line with current practice	TO
	3.2.1	Remove specific year from any quoted standard.	
	6.3	Amended to bring into line with ASTM E605	
	C.2	Amended Picture re E605	

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Code of practice for the installation & inspection of sprayed non-reactive coatings for the fire protection of structural steelwork

1. INTRODUCTION

This Code of Practice has been compiled to enable the specifier and installers of fire protection systems using sprayed non-reactive coatings to ensure that these systems are specified and installed in a manner that assures their effectiveness and provides confidence that they will perform as required in the event of fire and continue to do so for a reasonable period during the life time of the building. That is, the product is fit for purpose and will provide all the intended functions in fire.

The importance of fire safety is emphasised under the Regulatory Reform (Fire Safety) Order 2005⁽²⁾ in which the ‘responsible person’ (who may be the owner, designer or architect, specifier or contractor) is responsible for ensuring that the structure is fully compliant with all known, current legislation appertaining to the fire protection of the building

Readers are also reminded of the statutory duties arising from Building Regulation 38 of Approved Document B⁽¹⁰⁾. The Construction Design & Management 2007 regulations urge a prudent approach to the selections of fire protection product & on site installers. Regulation 38 requires that those making risk assessments, as required by Regulatory Reform Fire Safety Order 2005, are provided with all relevant detail of the fire protection as selected and installed. This can only be done if effective records are made in the selection, purchasing and installation stages of providing fire protection measures. More than one responsible person can exist.

There are several mechanisms, namely passive or reactive fire protection, by which steel structures can be insulated from the heat generated in a fire, in order to prevent or delay collapse of the building. Typical passive systems include fire resistant sprayed non-reactive coating systems. The on-site installation of these products is discussed in this publication. Complementary publications are available from Association for Specialist Fire Protection at www.asfp.org.uk/publications as TGD 11⁽⁴⁰⁾ and TGD 14⁽⁴²⁾ for the on-site installation of reactive coatings and fire protection board systems.

The ASFP ‘Yellow Book’ publication⁽³²⁾ entitled ‘ Fire protection for structural steel in buildings’ provides detailed technical information on the fire performance and requirements of steel in fire as well as the thickness of a wide range of fire tested fire protection products to provide the required levels of fire resistance. The latest version is available as a free download from www.asfp.org.uk/publications

All fire protection systems must be installed in a manner which will provide full compliance with the manufacturer’s fire tested system.

Passive fire protection systems such as sprayed non-reactive coatings are installed during the construction phase on or around the elements to be protected and provide localised protection by stability and thermal insulation. Although they do not fulfil any structural function, non-reactive coatings can be considered to be part of the fabric of the building.

1.1 Scope

This code of practice describes the specification and installation of sprayed non-reactive coatings for the fire protection of structural steelwork in the form of beams, columns, with solid, hollow, cellular or circular sections as defined in Eurocode EN1993-1-2 or historically in BS 5950 “The structural use of steelwork in buildings”⁽²¹⁾ and other steel structural members e.g. angles, tees etc. The code applies to products manufactured by members of ASFP as well as products manufactured or sold within the EU

In its section on ‘Use of Guidance – Materials and Workmanship’, Approved Document B advocates the adoption of independent 3rd party certification schemes for manufacture and installation of fire protection, as follows:

‘Independent schemes of certification and accreditation of installers can provide confidence that the required level of performance for a system, product, component or structure can be achieved.’

This guidance document considers the process of fire protection using sprayed non-reactive coatings, but its prime objective is to establish procedures for the effective application and control of these coatings at site.

In conjunction with the appropriate product manufacturer’s instructions these procedures will serve as a guide to determine that the required level of fire protection is provided for the structure, and collectively will offer evidence to satisfy the ‘responsible person’ that the installation has been correctly carried out.

1.2 Types of sprayed non-reactive coatings

The type of appropriate sprayed fire protection coating will depend on the expected fire exposure conditions. The text in this publication relates to a fire exposure corresponding to a cellulosic fire curve rather than hydrocarbon fire exposure or fire exposure in tunnels or blast conditions.

1.2.1 Sprayed ‘cementitious’ coatings

The word ‘cementitious’ is a general term used by industry for both gypsum and cement-based slurry coating systems.

Cementitious non-reactive coatings are available in medium and high-density systems so that products can be selected for different exposure conditions and different fire resistance periods. Some ‘cementitious’ coatings are designed to withstand fully external conditions. Gypsum based and cement-based coatings can be in the density range of 260kgs/m³ up to 750kgs/m³.

Sprayed products include use of cement or gypsum /filler blend which can be applied directly to un-primed or primed steel. They exhibit good general weather resistance once they have set.

Whilst primarily used as fire protection to structural steelwork these products are also used to afford fire, thermal or acoustic improvement of other building elements such as for the upgrading of concrete floors or the structural frame.

These products are delivered to site as a dry blend which is then mixed with water on site and pumped to the workface as wet slurry. Once at the spray nozzle they are sprayed using a combination of line pressure and air introduced at the nozzle.

1.2.2 Sprayed mineral wool coatings

These products are a blend of cements, fillers and mineral wool.

They are delivered to site as dry product in bags and blown using an air stream to the nozzle and then mixed with water as they leave the system. They are sometimes referred to as 'dry spray materials'.

Mineral wool based non-reactive coatings are generally available as low to medium density systems with a typical density range of 145kgs/m³ up to 270/m³.

2. DEFINITIONS

For the purpose of this document, the following definitions apply:

Barrier coat:

Part of the substrate preparation for application of a sprayed non-reactive coating, where a barrier coating is applied to isolate a bare or primed substrate from the sprayed coating. The purpose of the barrier coat is to prevent adverse interaction between an incompatible substrate or primer and the sprayed non-reactive coating. Barrier coats are frequently used in refurbishment projects.

Bonding agent:

System/material used to promote bonding of sprayed coating to substrate

Cellular beam:

A steel beam with one or more openings of one or more types of shapes such as circular, rectangular, hexagonal, connected circular openings etc

Coating manufacturer:

The manufacturer of the fire protection system supplied to the 'Applicator'.

Contract administrator:

The person responsible for co-ordinating the various requirements of the contract to ensure that all documentation is completed and in order. The contract administrator may be a nominee of the client or specifier, but more usually would be appointed by the contractor.

Designer:

The architect or engineer responsible for designing the structure and/or its protection from fire. The designer will generally define the fire protection standards for the building, but not the detailed fire protection specification.

Euroclass:

One of a number of product classifications for fire contained in EN 13501^(25,26) Parts 1 -5. Part 1 is concerned with classifications for reaction to fire, whereas Part 2 is primarily concerned with classifications for resistance to fire, excluding ventilation systems.

European Assessment Document:

A European Assessment Document contains the voluntary product standard rules by which European Technical Assessments (ETAs) are produced, in order to satisfy the European Construction Product Regulation. EADs replace the previous European Technical Approval Guidelines ETAGs. At the time of writing, the current EAD for Spray applied Passive Fire Protection is EAD350140-00-1106⁽²⁹⁾. This standard may ultimately be used as a basis for voluntary UKCA marking in the UK.

Fire assessment:

An opinion by an expert of the likely fire performance (fire resistance period) of an element of a building or element of structure if it were to be tested using a standard fire test.

Fire engineer (Fire safety engineer):

A qualified, competent, and experienced engineer, responsible for the fire safety strategy & details of the fire safety engineering design.

Fire safety engineering:

The application of scientific and engineering principles, rules (e.g. Structural Codes etc), and expert judgement, based on an understanding of the phenomena and effects of fire and of the reaction and behaviour of people to fire, to protect people, property and the environment from the destructive effects of fire. See BS 7974⁴⁸.

Fire resistance period:

The length of time, expressed in minutes, for which the steel member or other components is required to withstand exposure to standardised fire testing methods, such as BS 476 Part 20⁽²¹⁾, 21 or 22, without the load capacity falling below the fire limit state factored load or loss of integrity and/or insulation.

Installer:

The company responsible for application of the sprayed coating works.

Lattice beam:

An open beam built from members joined and braced by intersecting diagonal members.

Limiting design (steel) temperature:

The maximum temperature of the critical element of a steel member prior to failure under fire conditions as defined in BS 449-2:1996 Structural steel in buildings⁽¹⁵⁾ and as discussed in BS 5950-8:1990⁽²¹⁾

It is the temperature determined by calculation at which failure of the structural steel element is expected against a given load level at a particular location in the building.

Mechanical Reinforcement:

The method specified by the manufacturer to provide additional retention to the spray applied coating

Method statement:

A Method Statement is a document detailing how a particular work item will be carried out. It should include details of the possible dangers/risks associated with the work, the methods of control to be established, and how the work will be managed.

Passive fire protection products:

Products which do not change their physical form on heating, and which provide fire protection by means of their physical and/or thermal properties.

Primer:

A coating, usually anti-corrosive, applied to the substrate prior to application of any spray applied coating. The primer is the only part of the specification that would normally be applied in shop.

Quality and inspection plan:

The document setting out the specific quality practices, standards, and sequence of activities relevant to the contract. This document may be used as an aid to efficient management of the contract, as a 'sign-off' document verifying formal inspection and acceptance of the work, or both.

Reaction to fire:

The degree to which a product will contribute, by its own decomposition, to a fire under specified conditions. Products, other than floorings, are classified as A1, A2, B, C, D, E or F (with class A1 being the highest performance and F being the lowest) in accordance with BS EN 13501-1. Class F is assigned when a product fails to attain class E. Untested products cannot be classified in accordance with BS EN 13501-1. There may be some products lawfully on the market using the classification system set out in previous National Classifications based on testing to BS476. Where this is the case, Table B1 in Approved Document B can be used for the purposes of identifying reaction to fire performance.

Responsible person:

Responsible person is defined in several ways: -

[a] In relation to a workplace, the employer, if the workplace is to any extent under his control.

[b] In relation to any premises not falling within [a]

[i] The person who has control of the premises (as occupier or otherwise) in connection with the carrying on by him of a trade, business, or other undertaking (for profit or not), or

[ii] The owner, where the person in control of the premises does not have control in connection with the carrying on by that person of a trade, business, or other undertaking

Sealer coat or topcoat: combustible

An additional coating which may be applied over a fire protection system to prevent degradation of the system, or to provide a seal against the release of dust. Sealer/topcoats are common applications onto some sprayed non-reactive coatings.

Section factor (A/V or H_p/A)

The rate of increase in temperature of a steel cross-section is determined by the ratio of the heated surface (A) to the volume (V) (also known as H_p/A) has units of m^{-1}) Sections with low section factors heat up more slowly.

Specification:

The specification is the detailed fire protection requirement as defined for all elements of the structure. It may allow the use of an approved product or nominate a preferred supplier for the fire protection system, in accordance with instructions from the client.

Specifier:

The person or company who issues the specification for fire protection.

Spray applied non-reactive coating:

A spray applied to the substrate to provide passive fire protection/thermal insulation/acoustic insulation to the substrate

Steel UB or UKB

Universal beam of steel as manufactured to BS 4 Part 1 2005⁽¹⁴⁾

Steel UC or UKC

Universal column of steel as manufactured to BS 4 Part 1 2005⁽¹⁴⁾

3. GUIDANCE FOR THE USE OF SPRAYED NON-REACTIVE COATINGS

This list is for guidance purposes and it may not be exhaustive. The installer may wish to include other factors. The manufacturer should be contacted whenever detailed guidance and information is required.

3.1 Management of application at site

3.1.1 Choice of specialist installer

Approved Document B Volume 2 states.

‘In accordance with regulation 7, building work must be carried out in a workmanlike manner using adequate and proper materials’.

Further, it continues.

‘Independent schemes of certification and accreditation of installers can provide confidence that the required level of performance for a system, product, component or structure can be achieved’.

Requirements for such a independent third party certification scheme include verifying skills, training, ability to choose suitable products, certificated operatives and supervisors, planned and random inspection, issue of certificates of conformity on completion, an audit trail, etc. There are a number of suitable UKAS approved schemes available.

Competence in application requires an understanding of the importance of such factors as surface preparation, data sheet limitations for conditions during applications, mechanical reinforcement requirements etc.

Confirmation of installer competence in the procedures for installation of fire protection and the control of quality can be provided through third party contractor certification, and all ASFP installer / contractor / applicator members must now hold third party certification. Requirements for such a scheme include verified skills training, ability to choose suitable products, certificated operatives and supervisors, random inspection, issue of certificates of conformity on completion, an audit trail and a UKAS accredited approval body. There are several such schemes available. However, inclusion in the scheme does not necessarily mean the contractor has skills in each discipline

At the level of the operative, Informal evidence of competence in application can be provided in the form of completion of training courses run by individual manufacturers, but as these courses are unregulated the quality of the ‘applicator approval’ may vary.

Many client authorities and specifiers require installers to provide more formal evidence of staff competence, through completion of recognized applicator training courses.

As well as competence in application, specialist installers should be able to demonstrate a commitment to the health and safety of their staff working on site, as well as an appreciation of their Health and Safety and Environmental obligations under the law. Many clients and specifiers require membership of the Contractor Health and Safety Assessment Scheme as an essential element of their installer selection criteria.

Use of such independent assessment schemes provides clients and specifiers with confidence regarding the competence of potential contractors, helps to fulfil their own duty of care

responsibilities under the CDM regulations and gives the 'responsible person' confidence of compliance with the Regulatory Reform Order.

3.1.2 Design Review

Prior to commencement of coating at site, a design review should be carried out to confirm that no alterations to the design have been made that might affect the drawings and hence the coating thickness requirements for the structural members.

- **Primed steel**
 - It is at this stage that the issue of primer compatibility must be addressed.
- If steel work is primed off site or on site, a documented record of primer type that has been applied must be available.
- **Specification of thickness of sprayed non-reactive coating.**
 - The correct sprayed coating thickness must be determined for each section, in order to produce a list of section sizes with their associated coating thicknesses for the entire project. Rationalised coating thickness may be considered.
 - The detailed breakdown of coating thicknesses will normally be the responsibility of the fire protection installer who will usually prepare the detail in conjunction with the coating manufacturer, and in accordance with 3rd party Certification requirements. The ASFP 'Yellow Book' provides data and product thickness tables for most applications.
 - Most of the necessary information can be obtained from the manufacturers' product assessments, or direct from the manufacturer.

The following information must be provided as part of the contract documentation:

- Fire resistance period required.
- Steelwork section sizes to be protected and the extent of the protection.
- Design limiting temperature.
- Nature of any partial protection provided by concrete floors, fire resistant walls, etc.

Any discrepancies should be highlighted to the Contract Administrator for clarification.

3.1.3 Regulatory issues

Fire safety of life in new buildings and major alterations is regulated throughout the UK by building regulations, which are enforced by the local building control authority.

The Building Regulations 2019⁽¹⁾ apply in England and Wales and are expressed in broad functional requirements namely B1 Means of Escape, B2 Internal fire spread (linings), B3 Internal fire spread (structure) B4 External Fire Spread and B5 Access to the Fire Brigade.

Clause 1 of Internal fire spread Requirement B3 of the Building Regulations 2010⁽¹⁾ states that 'the building shall be designed and constructed so that, in the event of fire, its stability will be maintained for a reasonable period' and Clause 4 states, "the building shall be designed and constructed so that the spread of unseen fire and smoke within concealed spaces in its structure is inhibited"

Approved Document B, volumes 1 and 2⁽¹⁰⁾ provide non-mandatory guidance that is deemed to comply with the functional requirements of the Building Regulations. Appendix B provides the specific provisions of test for fire resistance of elements of structure and the minimum periods of fire resistance required.

Alternative approaches are permitted, such as an intermediate approach using BS 9999⁽²⁴⁾ or via fire safety engineering approaches to BS 7974 provided that the designer can demonstrate that legislative requirements have been satisfied.

The Building Scotland Regulations 2004 apply in Scotland and are supported by Technical handbook (Fire) 2019⁽¹¹⁾.

The Building Regulations (Northern Ireland) 2000 supported by guidance document DFP Technical Booklet E-Fire safety 2012⁽¹²⁾ apply in Northern Ireland.

Other fire legislation may also apply for certain buildings e.g. health premises, schools, underground railways etc and these may require a different level of fire protection from those required in the Building Regulations.

3.1.4 Statutory duties

The major regulatory requirements are the Regulatory Reform (Fire Safety) Order 2005⁽²⁾ and the CDM Regulations 2015⁽³⁾.

The importance of fire safety is emphasised in recent legislation by means of the RRO and equivalent legislation in other parts of the UK. This legislation applies to occupied buildings and states that there must be a 'responsible person' (see definitions) who is responsible for reducing the risk of fire and its spread, ensuring that fire protection in the premises is maintained and repaired and carrying out a fire risk analysis of the building

A legal duty and liability arises under Regulation 38 of the Building Regulations (England and Wales) to provide details of all fire precautions to the client so that the Responsible Person can carry out the required statutory duties. Regulation 38 of the Building Regulations requires that fire safety information shall be given to the 'responsible person' - as defined in RRO 2005⁽²⁾ - at the completion of the project or when the building is first occupied

The use of non-reactive coatings for fire protection will assist the building to comply with both the RRO⁽²⁾ and the CDM Regulations⁽³⁾ because these systems are of low maintenance and have been shown to be durable.

3.1.5 Health and safety issues

The Construction, Design and Management Regulations 2015⁽³⁾ are the responsibility of the Main Contractor and apply to the building process and includes the construction, alterations and maintenance of buildings and requires that dangerous products should be replaced as far as reasonable with those which do not present or which have a lower hazard. It would be prudent to ensure that measures to ensure regulatory compliance are built into every contract at the specification stage.

Although implementation of the CDM Regulations⁽³⁾ is the responsibility of the main contractor, the specifier/installer should try to remove or reduce the effect of hazardous products by specifying safer alternatives.

The specifier/installer should ensure that the products are not harmful during application or to the building occupants during the lifetime of the building. They should therefore not degrade with time and give off toxic fumes or other materials. If work has to be carried out whilst it is occupied, harmful products should not be liberated into the atmosphere during application

Health, Safety and Environmental precautions on site are delegated to the everyone involved with the contract, but the installer should also require that any products used on site are used in full compliance with the recommendations of manufacturers' health and safety data sheets, and that the safety of all personnel in the vicinity of the application is protected.

The installer must ensure that all relevant Health and Safety data sheets, application instructions and method statements are available to the application operative(s) and client & that they are fully understood.

3.1.6 Compliance with Environmental Regulations

During and throughout the application process, full compliance with all relevant environmental legislation must be demonstrated. As a minimum, this includes:

Observance of all precautions and conditions for use of the fire protection system, as defined in the manufacturer's Product Safety Data Sheets and manufacturers' safe working recommendations.

Compliance with relevant Site Storage Regulations, including COSHH Regulations⁽⁵⁾ where applicable.

3.1.7 Waste disposal

Compliance where relevant with Waste Disposal Regulations, in particular the Hazardous Waste (England and Wales) Regulations 2005⁽⁶⁾, Waste Duty of Care Regulations 1991⁽⁹⁾ and, the Site Waste Management Plan Regulations 2008⁽⁸⁾

3.1.8 Quality Control and Quality Assurance provisions

The main quality control provisions for site application of sprayed coating systems are set out in section 4 and 5 of this document.

In order to determine the most appropriate product specification, the specifier must consider a range of factors including:

- Likely fire scenario
- Service conditions
- Regulatory requirements
- Technical requirements and standards
- Conditions and potential constraints of site application
- Health, Safety and Environmental considerations

Specifications for spray applied fire protection systems are structured in a similar way to any other coating specification, but as well as the standard clauses that would apply to the use of coatings, the specifier must also identify the requirements for fire resistance of the coating system, to meet the standards required by Building Regulations and/or stipulated by the building designer.

They also provide an opportunity for the specifier to stipulate procedural and contractual requirements of the work, for example quality assurance standards required to satisfy the 'responsible person' under the Regulatory Reform Order.

This section identifies the main factors to be considered when preparing a specification for a site-applied sprayed system.

3.2 Factors affecting 'in service' performance

The following factors can affect the in-service performance of the system, and must therefore be considered early in the design process:

3.2.1 In-service environment.

The nature of the environment to which the Passive fire protection system will be exposed may affect their durability or their performance in a fire situation and must therefore have a major influence on the properties required of them. Environment may have a significant bearing on the choice of sprayed material

For Passive fire protection systems, EAD350140-00-1106 defines a number of environments in terms of product durability. The advice of the steel and coating system manufacturer should be obtained.

3.2.2 Design life and life to first maintenance

In most cases, correctly applied systems used internally in buildings should not require maintenance over the design life of the building, other than where mechanical damage has occurred.

Some coatings are designed to be installed in high humidity or fully exposed external applications.

The suitability of a particular sprayed coating for the expected exposure and humidity should always be confirmed with the manufacturer. Some sprayed systems may only be suitable for internal applications.

Routine inspection for maintenance purposes is always recommended.

3.2.3 Ease of inspection and maintenance

The specifier, installer and responsible person /building user should plan routine inspection and planned maintenance of the fire protection systems.

4. APPLICATION OF SPRAYED NON-REACTIVE COATINGS AT SITE.

EAD 350140-00-1106⁽²⁹⁾ includes tests for durability in different environments. All products should be 'fit for purpose'. For more information on the EAD text see www.eota.be

The main contractor must first ensure that the steelwork is properly installed and is suitable for installation of the specified fire protection systems. The main contractor should provide the limiting temperature information for the steelwork and define the scope of protection required.

Sprayed fire protection coatings require application by specialist installers who know and understand not only the practicalities of coating application, but also the importance of attention to detail in the installation process.

This requirement is reflected in the statement from Approved Document B: Fire Safety⁽¹⁰⁾, viz:-

‘Independent schemes of certification and accreditation of installers can provide confidence that the required level of performance for a system, product, component or structure can be achieved.’

The application of all coatings should be carried out fully in accordance with manufacturers’ technical data sheets and the applicator’s method statement.

4.1 Use of un-primed steel sections

Spray applied fire protective systems have excellent adhesion to bare steel. All loose scale, rust and dust must be removed prior to the application of the sprayed coating. Mechanical methods such as a wire brush are usually deemed acceptable. The recommendations of the material manufacturer should be followed in all cases.

Oil and grease contaminants should be removed by the use of suitable emulsifying degreasers, suitable clean organic solvents or steam cleaning before the commencement of the application

It is recommended that all steel is treated with the appropriate corrosion protection for exterior use. However, it is for the building designer to decide whether the risk of corrosion in the interior environment warrants the use of a priming system.

4.2 Use of primed steel sections

Primed surfaces should be in a sound condition and fully cured. The primer should have been applied in accordance with the primer manufacturer’s instructions to the appropriate thickness.

Whilst the condition of the primer to the steelwork is not the responsibility of the installer of sprayed fire protection system they have a duty of care to notify the main contractor of any concerns there may be regarding the condition of the primer before the application of the sprayed system.

The compatibility of the primer with the intended sprayed coating is essential and must be confirmed with the coating manufacturer.

The installer should request the recommended procedure from the coating manufacturer for applying the sprayed coating over the particular primer.

4.3 Compatibility of sprayed non-reactive coating with unidentified existing paint layers

In these circumstances the adhesion of the existing paint coatings may be in doubt and the compatibility between layers of the system may be uncertain. The only safe options are:

- 1) The complete removal of these coatings and the application of a primer/primer system compatible with the sprayed coating.
- 2) The complete removal of the coatings and the application of the sprayed coating onto the un-primed steel. Seek further advice from the sprayed coating manufacturer.

4.4 Preparation of galvanized steelwork before coating.

Galvanizing is normally prepared for coating by the use of a mordant solution (T-wash) to etch the surface.

The installer should request the recommended procedure from the coating manufacturer

4.5 Composite beams and floors

A composite beam and floor assembly is one where the beams and floor are connected, generally by means of shear studs and are deemed to work together in the case of a fire.

A series of fire resistance tests have been undertaken by the Steel Construction Institute, to examine the effects of leaving unfilled the void formed by a trapezoidal deck and its supporting beam in composite construction.

General guidance is given in the ASFP 'Yellow Book'⁽³²⁾.

4.6 Steel beams with web openings (cellular beams)

The coating manufacturer will need to know the physical dimensions of the steel beam and limiting temperature of each section in order to advise the installer of the required sprayed coating thickness.

General guidance is given in the ASFP 'Yellow Book'⁽³²⁾.

4.7 Mechanical retention and mesh reinforcement

Expanded metal or ribbed metal lath are generally used to form hollow encasements around structural steel members. It may also be used to provide a suitable background over unacceptable substrates.

The fixing criteria for such products should follow the sprayed coating manufacturer's system instructions, noting that the recommendations may vary for different types of non-reactive coatings.

Methods of mechanical retention of mesh, mesh categories and mesh fixing systems are discussed in Section 7 of BS 8202-1:1995.

In certain situations it may be required to provide additional reinforcement for the sprayed coating, such as in the case of deep webbed solid beams; or to minimise effects of expected vibration; because steel shape and size is beyond scope of manufacturer's data for dimensional limits; or at joints of adjacent substrates. Other examples may also apply.

Always follow the manufacturer's instructions. A manufacturer may have specific test data to reflect the suitability of their product in one or more of these circumstances

4.8 Fire protection of other substrates

4.8.1 Aluminium

The fire protection of aluminium demands different fire protection requirements and criteria compared to the fire protection of steelwork, such as limiting failure temperatures.

Aluminium and Aluminium alloy surfaces are alkali sensitive and require special treatment. It is recommended that a suitable etch primer be used.

The manufacturer should provide written confirmation of all measures required to the system installer prior to the application of the sprayed coating

4.8.2 Concrete

Most regular concrete substrates are suitable as a background for spray applied fire protective materials. The concrete surface must be free from all release agents, contaminants and impurities.

Special concretes with very high or very low suction properties or unusual thermal movement characteristics may require special treatment. Consult the manufacturer in such cases.

4.8.3 Gypsum Plaster and Plasterboards

As some fire protective materials contain Portland cement these should not be applied to gypsum plaster or plasterboard backgrounds.

Where the sprayed product being considered is based on gypsum rather than a Portland cement then the manufacturer should provide the required specification.

4.8.4 Wood

Given the high shrinkage and moisture movement characteristics of timber it is not considered desirable to apply sprayed fire protective materials direct to these surfaces for the purposes of fire resistance.

Where situations arise which call for sprayed fire protective materials to come into contact with wood then the wood should be pre-treated with a suitable sealer, as instructed by the coating manufacturer.

4.9 Preparation for Application

4.9.1 Storage of Material

Bagged materials must be kept dry, undercover, stored off the ground, and away from wet or damp surfaces or areas of very high humidity. It is vitally important that manufacturer's instructions are followed. If they are not followed then the installation company will be liable for all that follows. The installer should make and maintain full records such as deliveries, usage, product stock identification marks, etc to justify the installation being made.

The manufacturer's recommendations should always be followed in all instances

4.9.2 Weather Protection during application

Generally,

- the applied material must be protected from extremes of weather (freezing or warm drying winds, radiant heat or running water) during application and initial curing.
- the sprayed coating should not be applied unless the substrate and air temperatures are at least 2°C and rising or if the substrate or air temperatures are less than 4°C and falling.
- maximum air and substrate temperature of 45°C.
- Surface temperature should be at least 2°C above dew point temperature.

In all cases, published manufacturer's instructions should be followed.

4.9.3 Drying

Provision should be made for adequate ventilation during and after application until the non-reactive coatings are dry.

Accelerated curing should be avoided in hot climates. Wetting may be required through the curing period according to the manufacturer's instructions.

4.9.4 Masking

Where appropriate, it may be prudent and necessary to mask off surrounding areas to protect from overspray.

4.9.5 Equipment

Equipment suitable for the application of sprayed fire protective materials is widely available throughout the world. It is important, however, that any plant used should conform to the required technical specification indicated by the sprayed coating manufacturer.

4.10 Monitoring of environmental conditions.

Minimum and maximum air and steel temperatures may be stipulated for some products, and attempts to continue application outside those limits may well have detrimental effects on both integrity of the coating (especially the materials ability to bond to the substrate) as well as on long term performance.

It is the installer's responsibility to monitor/record these conditions in accordance with the specification.

4.11 General application notes

It is generally impractical to apply a single coat of less than 8 mm using a wet system, or in the case of mineral wool the minimum practical thickness would be 10mm.

Coating thicknesses should be continuously checked to ensure that the correct thickness is applied

The time between coats will be subject to the environmental conditions at the time of application, and manufacturer's instructions.

4.12 Standards of cosmetic finish

Where a decorative standard of finish is considered appropriate a sample area of application should be carried out on site so that the standard of workmanship and finish can be predetermined and accepted by all interested parties.

5 QUALITY CONTROL ON SITE

This section sets out the factors that need to be considered to ensure that the site application delivers the quality of work defined in the specification and satisfies all legal requirements.

5.1 Verification of fire performance

5.1.1 Reaction to fire properties of the sprayed non-reactive coating system

Typical requirements would be taken from one or more of the following requirements:-

- Classification in accordance to BS EN 13501-1:2018¹⁵
- Historical National Classifications such as Non combustible to BS 476 Pt 4¹² or BS 476 Pt 11¹³ or Class 0 as defined in previous issues of guidance documents for UK and Ireland.
- BS 476 Pt 6 – Fire propagation¹⁴
- Surface Spread of Flame to BS 476 Pt 7¹⁶

These fire properties apply to the product and not to the system. Non-reactive coatings should meet one or more of these properties. European fire tests for Reaction to Fire show that most non-reactive coatings have low smoke emission. This is not currently a requirement of UK building regulations, but the specifier may decide that for safety reasons and possible future requirements that low smoke emission is important. Similarly, a Class 0 or non-combustible product based on Historical National classifications may have been specified.

5.1.2 Fire resistance of the sprayed non-reactive coating system

Systems should have been tested to BS EN 13381-4, or to BS 476 – 21 1987¹⁷, the equivalent European fire test BS EN 1365:1999 and 2000 (parts 3 and 4)¹⁸ or other international test standard, which could be shown to be suitable. All fire tests must be carried out by a UKAS approved laboratory and assessments be given in accordance with published ASFP practice – see ASFP ‘Yellow Book’ entitled ‘Fire protection for structural steel in buildings: 4th Edition’. Products manufactured by ASFP members will be part of an independent recognised 3rd party certification scheme. This will help demonstrate that the product used is fit for purpose, and meets the requirements laid down in the ‘Materials’ section of Advisory Document regulation 7.

Fire resistance periods required are usually 30, 60, 90 120 or 240 minutes for the appropriate thickness of sprayed coating protection. Approvals relate to a range of limiting temperatures of 300°C-750°C over the range of steel section types covered in a certificate.

Different thicknesses of non-reactive coatings are usually required for the specified fire resistance periods.

Different non-reactive coatings of the same thickness should not be expected to provide the same fire resistance period for a given application. The characteristics of different systems directly affect the performance in fire

Fire resistance tests are based on specific systems consisting of one or more components. It is essential that the installer follows the instructions specified by the manufacturer.

5.1.3 Fire resistance requirements

The minimum fire resistance requirements for life safety are listed in the documents supporting the relevant building regulations e.g. Approved Document B – Appendix A and will depend on the type of building, its use and its height.

The specifier or the installer will then be able to decide what thicknesses of sprayed protection are required. The protection thickness is obtained by calculating the A/V (Hp/A) factors and then checking manufacturers' literature for the thickness required. Most manufacturers and the ASFP Yellow Book²⁰ give tables of A/V section factors for steel sections and each manufacturer will provide details of the thicknesses of the sprayed protection to give the required fire resistance for a specific section. The thicknesses will vary for one, two, three-sided protection etc or for columns and beams etc

5.1.4 Fire safety engineering

If there has been a fire safety engineering design to Structural Eurocodes²¹, BS 7974 or BS 9999²² for the building then fire resistance levels may differ than those recommended in Approved Document B⁽¹⁰⁾ and sprayed coating system thicknesses will thus differ. The deemed to satisfy guidance in

Approved Document B⁽¹⁰⁾ may not be suitable for large and complex buildings and a fire safety engineering design may be required.

5.1.6 Life safety or property protection

The Building Regulations of the UK are intended to protect life of persons in and around a building. They are intended to ensure that people can escape safely in the event of a fire and to provide safety for the fire and rescue personnel who may need to enter the building. Fire resistance periods are sometimes lower than those specified for insurance requirements, which are designed to protect property. Insurers have their own requirements for fire resistance periods, as detailed in Approved Document B: Fire safety (Volume 2) Incorporating insurers' requirements for property protection³².

5.2 Quality control considerations & equipment

Quality control measures at site should be adequate to confirm that the standards of surface preparation and application stipulated in the specification, and in manufacturers' technical data sheets, are being met.

They should also be realistic and cause minimal disruption to the overall fixing process (unless defective work is identified and corrective action becomes necessary).

Essential quality control criteria are defined below and require the following calibrated and certificated measurement equipment to be available on site, where appropriate to do so:

- Ambient temperature thermometer
- Minimum – maximum thermometer
- Steel temperature gauge, preferably electronic
- Calibrated equipment to determine relative humidity and dew point, preferably electronic.
- Tape measure to check steel section sizes, if necessary
- Needle point thickness gauges
- Calibrated scales for use with density testing

5.3. Product quality assurance

The manufacturer of the sprayed non-reactive coating should be capable of providing evidence of product quality and fitness for purpose and should be registered to ISO 9000³¹ Quality Management System via a recognised agency.

ASFP listed products will also have been assessed to independent third party certification schemes which assess the performance or quality of the product and fire protection systems. Third party product certification bodies provide quality audits specifically on fire protection and consistency in the manufacture, testing and batch approval process, where relevant.

UKAS accredited third party product certification is now a requirement for listing of products in the ASFP Yellow Book⁽⁵⁾, as well as being favoured by Building Regulations AD-B and contributing significantly to compliance with the Regulatory Reform Order.

5.4 System assessment & verification of fire performance

The above procedures are designed to determine that products are manufactured consistently to the approved formulation and tested to recognised standards, giving confidence about the quality of certificated products. Following laboratory testing, it is necessary for products to be assessed in order to determine the appropriate thicknesses for a range of steel section sizes and orientations.

The validity of assessments can be checked by reference to the procedures set out in the guidelines document in Annex C, or more specifically by reference to loading tables given in the ASFP 'Yellow Book'⁽⁵⁾. For standard sections, the checking of assessed data is therefore relatively straightforward and is covered by third party certification as described above. The quality of bespoke fire engineering assessments may also be determined through advice on the necessary qualifications, experience and competence of those who carry out the assessments – see Passive Fire Protection Federation guidance documents at www.pfpf.org.uk

At the present time, third party certification and/or listing in the ASFP Yellow Book⁽⁵⁾ are effective ways of demonstrating product quality and fitness for purpose.

Testing to BS EN 13381-4⁽³³⁾ and UKCA-marking is also acceptable for verifying product performance. Not only can this provide confidence about the fire performance of the system, but it will also provide independent information about product compatibility and durability in different environments.

5.5 Coating thickness plan

Most construction projects are complex and involve a range of structural steel section sizes and configurations. Depending on dimensions and exposure conditions, each steel section may require a different thickness of coating to provide the specified level of protection. Some sections and configurations may also have been independently assessed, to determine the most efficient coating thickness.

The coating schedule for such a structure may therefore be relatively complex and one of the main tasks for the site sub-contractor will be ensuring that each steel section receives the correct thickness of fire protection.

In order to assist the sub-contractor to deliver the correct quality of work, and to provide an easy reference for subsequent quality control checks, the following documents should be made available at the commencement of the work:

A copy of the plans and drawings of the structure

A list of the sprayed coating thicknesses required for each steel section size.

The coating installer will use this information to prepare a coating thickness plan that best suits his schedule and work methods, but must retain the documentation for quality control purposes, either by his own QA inspector and to assist any third party inspection.

Different fire protection systems may be used on large contracts or preferred for different steel sections. Guidance on junctions between different fire protection systems is provided in ASFP publication TGD 08.

6. QUALITY PLAN, INSPECTION CRITERIA AND METHODOLOGY

6.1 Quality plan

Competent installers and applicators will already have in-house systems in place to control site work and to demonstrate compliance with specification requirements. The following mechanism is therefore offered as a possible refinement of such systems, but is not a mandatory or prescriptive requirement.

For most sizeable projects involving several tiers of contractual responsibility, it is good practice for the contractor to prepare a quality plan which documents the sequence of activities required to deliver the specified quality of finish.

This plan also identifies any inspection stages in the process, and will normally be submitted to the Contract Administrator at the commencement of the work for his comment and approval, and also to advise the Contract Administrator of any key inspection stages or quality 'hold points' in the process.

'Hold points' are points in the installation programme where opportunities are offered to the client or third party inspector to confirm acceptance of the standards being achieved, before work is allowed to proceed to the next stage. The frequency of inspections should be agreed between specifier, installer, third party inspectors etc.

The quality plan can be produced in the form of a simple table and may serve a number of functions, as follows:

It summarises the quality requirements contained in the specification and in coating suppliers' data sheets

It can be structured to include reference to the standards or methods of test to be used, and criteria for work acceptance

It can be used to record conformance with specification at each stage of the process

It can be structured to include sign-off by client, third party agency etc at key points (hold points) in the process. However, periodic inspection by the client or third party inspector does not absolve the contractor of the ultimate responsibility for the quality of the finished work.

The quality plan could be used as both a checklist for inspection, and a summary verification document to demonstrate compliance with the specification.

A typical layout for a quality plan / checklist is provided in Annex A.

6.2 Site inspection criteria

Typically, the inspection criteria for a large construction project would include the following:

1. Surface preparation:

Primer compatibility confirmation

Dust or other contamination – visual

Identification of any areas requiring mechanical retention

2. Application:

Air temperature, substrate temperature, relative humidity and dew point (throughout the application process) – as specified or as manufacturer's data sheet.

Batch numbers of all products used.

Dates and times of application and compliance with recommended over-coating times from manufacturer's data sheets

Applied thickness checks

3. Coating thickness checks and records:

- i. On completion of installation of sprayed coating
- ii. Following planned maintenance after repair

Visual appearance – as specified or in accordance with the agreed standard.

6.3 Coating Thickness

6.3.1 Measuring gauges

The method of thickness determination shall use a gauge of the needle point type. The thickness measured should allow for the general contours of the surface finish.

6.3.2 Thickness measurement

Coating Thickness Surveys should be carried out in accordance with section 6.3.3. On steel sections, the spray coating on the flange should not be permitted to taper off toward the flange edge. Where there appears to be such tapering, the thickness should be checked across the flange and over the flange edges at the recommended intervals. It is considered advisable to record measured thicknesses.

6.3.3 Coating Thickness Surveys

Readings should be taken in agreement with the steelwork plan to provide evidence that minimum thicknesses have been applied.

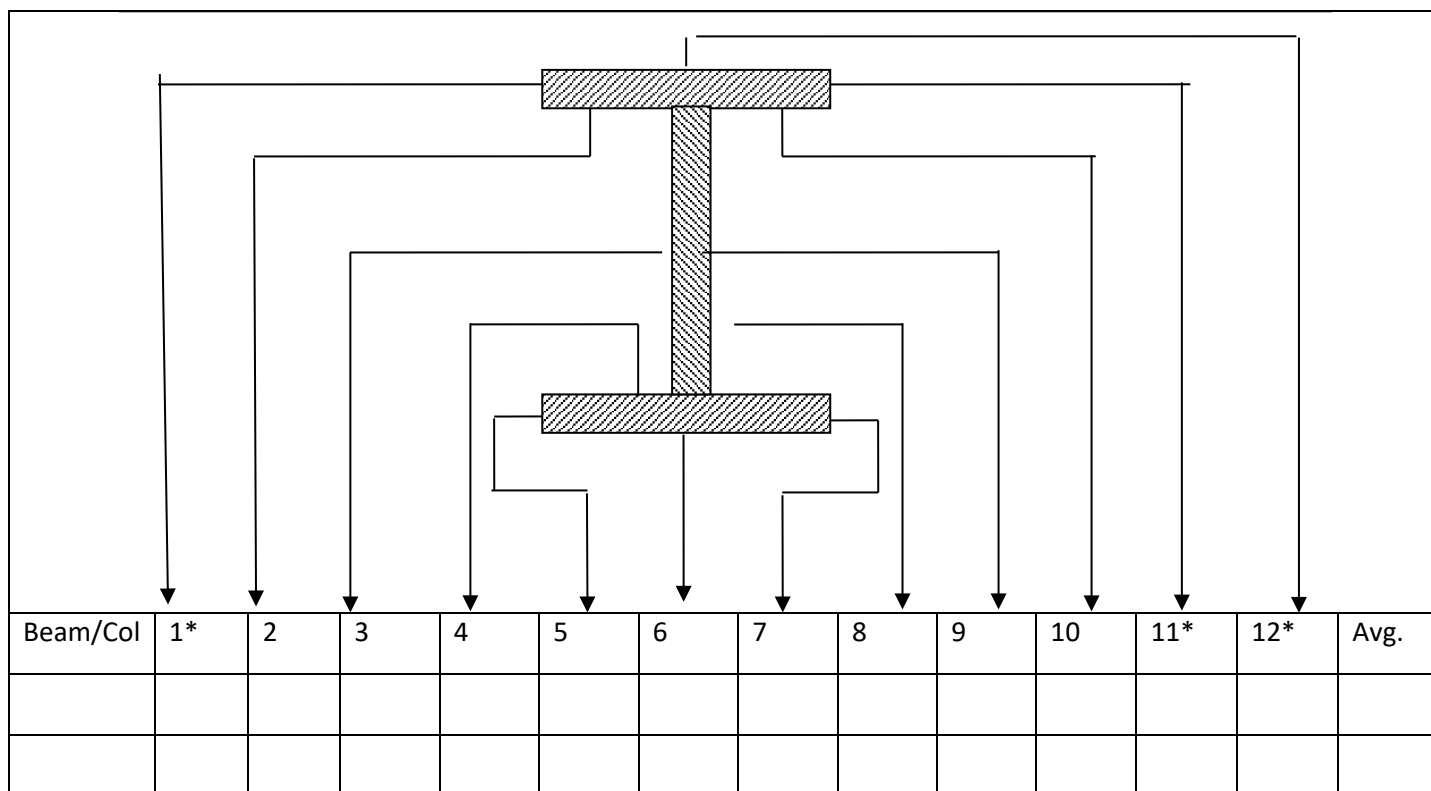
Third party verification of thicknesses should be called for in the specification.

Whether carried out by an independent third party at completion of application or by the contractor on an ongoing basis, the guidelines given in ASTM E605 section 8.1 for setting out the frequency of measurements would be recommended:

Generally, the frequency of thickness measurements, per bay, or per 900sqm (whichever provides the greater number of measurements), should be:-

- one measured column, 2 sets of 12 readings, 300mm apart.
- One measured beam, 2 sets of 9 readings, 300mm apart.
- For wall / ceiling slab applications, 4 readings in a 300mm square.

The figure overleaf shows typical measurement positions for I section beams and columns, with two rings of measurements taken at a random location, 300mm apart.



6.3.4 Acceptance criteria

Conditions of Acceptance for reduced thickness: (in accordance with ASTM E605 Section 8.1.6)

- The overall Average of the area must not be below the specified thickness.
- No individual reading should be either 6mm or 25% below the specified thickness.

If an item fails on checking, that item should be repaired and rechecked. Another item of the same type, within the same bay / 900 sqm should also be checked (eg if a column has failed, that column should be repaired and rechecked, and in addition another column should be checked).

6.3.5 Wet spray density measurements

Measurements of wet spray density should always be carried out in accordance with the instructions of the manufacturer of the sprayed coating system

6.4 Site remedial work

6.4.1 Thickness corrections

During the application process and after completion of the work, repairs may be necessary to ensure that the standard of fire protection, surface integrity and finish is in accordance with the manufacturer's instructions.

If the thickness of the sprayed coating, does not comply with the nominal coating thickness stated in the schedule of thickness, nor does it fall within the under thickness guidelines set out in ASTM E605⁽⁵⁰⁾ work shall be undertaken to bring the affected area up to the required thickness. This should

be done before the applied material is substantially dry, or by subsequent wetting, and taking into account the minimum coating thickness to be applied at any one time.

6.4.2 Repair procedure

The repair procedure for spray applied coatings should be obtained from the system manufacturer.

In cases where the coating has detached due to mechanical damage, or suffered localised degradation due to water ingress, the normal repair procedure would involve mechanical removal of the damaged or denatured coating to a firm (unaffected) edge, followed by reinstatement of the system to the original, specified thickness. If the underlying steel substrate has become corroded, this should be re-prepared in accordance with the manufacturer's instructions prior to re-application of the coating.

The cause of the damage or degradation, such as water damage, should obviously be addressed prior to carrying out the repairs, to avoid any repetition.

If incorrect installation is found after the application of the system has been completed, it may be necessary to replace the entire system or seek the manufacturer's advice regarding the best method of bringing the system up to the required level of performance.

NOTE: ASFP Installers are required to be part of an independent 3rd Party Certification scheme so that such risks are avoided.

6.4.3 Refurbishment or upgrading fire protection

The ASFP recommends that the refurbishment or upgrading of fire protection systems shall always be carried out in accordance with the advice of the system manufacturer.

Further information is provided in ASFP Technical Guidance Note TGD 10⁽¹⁰⁾ Code of practice for the refurbishment & up grading of fire protection of structural steelwork

6.4.4 Junctions between different fire protection systems

Where unprotected areas of steelwork meet fire protected elements in a structure, it is normally considered good practice to overlap the fire protection onto the adjoining 500mm of 'unprotected' structural steel to limit heat transfer into the protected substrate.

Further guidance on junctions between different types of fire protection on a structure is given in ASFP Technical Guidance Note 008⁽¹¹⁾

6.4.5 Planned maintenance

Periodic inspections should be carried out as part of the normal maintenance plan for the building and any damaged sprayed coating should be repaired or replaced in accordance with the manufacturer's instructions.

6.5 Dispute procedure

A dispute as to the achieved thickness of a sprayed coating may arise for a variety of reasons, including:-

- Misinterpretation of specification.
- Incorrect matching of thickness to section size.
- Faulty or inappropriate measurement equipment.
- Incorrect calibration of measurement equipment.
- Misinterpretation of the guidance given on measurement.

Where the parties are unable to agree, the following procedures are recommended:-

The basis of the dispute is set out in written format.

Where appropriate the coating manufacturer's advice is sought.

Where appropriate, measurement instruments are re-checked for accuracy/calibration.

The extent of the disputed area(s) is clearly defined by increasing the frequency of readings in the vicinity of exceptionally high or low readings.

Where correction of the application is required, the procedures set out in 6.4.2 are followed.

7.0 RECORDS AND REPORTS

Detailed and accurate records are an essential contract requirement. Information should be kept available until handover to the client is completed and statutory duties under Regulation 16B are completed - see requirements summarised in Approved Document B Appendix G.

Where appropriate, site records should contain the following information:

- Verification of Product and Specification
- Basic Contract Information
- Contract documents for installation of the fire protection product.
- Quality Control Records

7.1 Independent verification of site application

In the section on 'Use of Guidance – Materials and Workmanship', Approved Document B advocates the adoption of independent certification schemes specifically in the installation of fire protection, as follows:

'Independent schemes of certification and accreditation of installers can provide confidence that the required level of performance for a system, product, component or structure can be achieved.'

The ASFP insists that contractor / applicator members must have third party certification to cover their activities which aids compliance with the Regulatory Reform (Fire Safety) Order 2005⁽⁶⁾.

Installers who subscribe to such schemes would be expected to maintain detailed records of the work and to carry out their own coating thickness surveys to ensure that the completed job complies with the specification, and inspection/approving bodies should then be able to accept their data and/or Certificates of Conformity as a basis for signing off the work.

Building owners and designers should be aware of the benefits of using reputable, independently certificated applicators and fire protection systems.

7.2 Contract document checklist

Compliance with this process and contract checklist will provide confidence that the sprayed fire protection system has been correctly installed and that the relevant statutory requirements have been diligently and responsibly complied with.

PROCESS REQUIREMENT	DOCUMENTARY EVIDENCE
Design requirements & Suitability of Product and Specification	3rd Party Certificated product (+ Yellow Book listing), assessed to agreed guidelines, to meet the fire performance required. Coating thickness table and/or Product Calculator output. Supplier confirmation of fitness-for-purpose for service environment and life to first maintenance
Correct and Complete Contract Documentation	Complete / accurate contract details Complete / accurate specification, including primer coat, mechanical retention and any topcoat requirements etc.
Quality of Site Application	3rd Party Certificated installer Method statement(s) and quality and inspection plan. Design review to confirm continued accuracy of coating thickness schedule. Batch records and C of C's for all products. Confirmed system compatibility Concession records Daily environmental records Daily slump/density test records Contractor Safety Policy, project risk assessments & safe working plans Compliance with site storage & waste disposal regulations. Compliance the Contractor Health and Safety Assessment Scheme.

Verification of sprayed coating, thickness and compliance	Installer's coating thickness survey results. Completed quality and inspection plan Corrective action records (if required) 3rd Party coating thickness report (if applicable). Project finalisation and signing off.
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ANNEX A SITE QUALITY AND INSPECTION PLAN / CHECKLIST

The Inspection Plan / Checklist is not prescriptive, but may be used as a template either for:

A verification document to confirm that every stage of the process has been completed satisfactorily in accordance with the specification. If used in this way, it could be submitted along with the full documentation package as a summary of the evidence (of compliance) contained in the package, or

A simple checklist to assist the Installer, Specifier, 3rd Party Inspector or Responsible Person to monitor or audit the process.

PROJECT (X)

Site Quality and Inspection Plan / Checklist			
1	Contractor	A	Approval Required
2	Sub-contractor	D	Document Required
3	Customer	H	Hold Point (advance written notice required)
4	Customer Agency	W	Witness Point (advance written notice required)
		V	Verification (may be observation or document review)
		R	Review
	PROJECT		ISSUE DATE

REF NO.	ACTIVITY	PROCEDURE	ACCEPTANCE CRITERIA	1	2	3	4	REMARKS
	JOB OR PART IDENTIFICATION							
1	DESIGN CRITERIA	Document check	Validation of requirements					
2	PRODUCT CERTIFICATION	Document check	Independent report or 3 rd party certification					
3	FIRE ASSESSMENT VALIDATION	Document and qualification check	3 rd party certification + PFPF guidelines					
4	DOCUMENT AVAILABILITY							

REF NO.	ACTIVITY	PROCEDURE	ACCEPTANCE CRITERIA	1	2	3	4	REMARKS
	JOB OR PART IDENTIFICATION							
	Product Data Sheets	Document check	Available and complete					
	Method Statements							
	Design Drawings							
	Other Contract Documents							
5	SURFACE PREPARATION							
	Check Contractor daily records for completeness and spec conformance, and physically check 'SUBSTRATE' items below:	Document check	Complete and conforming with spec.					
	Part identification	Document check	Correct references					
	Primer condition/Raw steel	Physical check						Any concerns to raised with main contractor regarding condition of any primed steel
	Key coat application, if required	Record material batch numbers	Manufacturers recommendation					
	Mechanical retention	Physical check	Manufacturers recommendation					Re-entrant angle
	Ambient environmental conditions – air and surface temperature, humidity, dew point.	Document check	Specification / data sheets					

REF NO.	ACTIVITY	PROCEDURE	ACCEPTANCE CRITERIA	1	2	3	4	REMARKS
	JOB OR PART IDENTIFICATION							
6	SPRAYED COATING APPLICATION :							
	Pre-application checks – Check Contractor daily records for completeness and spec conformance.	Document check	Complete and conforming with spec.					
	Pre-application checks – Ambient conditions							
	Air temperature		>4°C or as spec					Note also coating manufacturers' recommendations.
	Steel temperature		4 – 35°C; >3°C above dew point					
	Dew point							
	Coating Application							
	Check product name, any batch numbers and that these match details on Contractor records	Visual container and document check						
	Check key coat (if specified)	Visual	Specification					
	Mechanical retention	Visual	Specification					
	Visual appearance	Visual	No defects					
7	Coating APPLICATION – sprayed coating							
	Water to material ratio	Water meter if possible	As per manufacturers recommendation					

REF NO.	ACTIVITY	PROCEDURE	ACCEPTANCE CRITERIA	1	2	3	4	REMARKS
	JOB OR PART IDENTIFICATION							
	Material density – ex mixer		As per manufacturers recommendation					
	Material density – ex spray head		As per manufacturers information					
	Coating thickness	As this document	As per specification (See appendix X for guidance record sample)					
	Visual appearance	Visual	No defects					Remedial application where required
8	Coating APPLICATION – Topcoat (if applicable)							
	Pre-application checks – Check Contractor daily records for completeness and spec conformance.	Document check	Complete and conforming with spec.					
	Pre-application checks – Ambient conditions							
	Air temperature		>5°C or as spec					Note also coating manufacturers' recommendations
	Relative Humidity		<85% or as spec.					
	Dew point							
	Check product name, colour, batch numbers, coat number and that	Visual container and document check						

REF NO.	ACTIVITY	PROCEDURE	ACCEPTANCE CRITERIA	1	2	3	4	REMARKS
	JOB OR PART IDENTIFICATION							
	these match details on Contractor records							
	Check drying / over coating time of last coat	Document check	Specification					
	Visual appearance	Visual	No defects					Remedial application where required
	FINAL INSPECTION - HOLD POINT 4							
9	FINAL DOCUMENT CHECK	Document check	Full data pack, including independent certification if required in the contract, and approval of site remedial work, if any.					

ANNEX B CONTRACT VALIDATION CHECKLIST

Process Stage	Key Criteria	Requirement / Evidence
1. Design requirements	Is the basis for fire resistance rating defined?	AD-B or BS 9999 ⁽²⁾ or insurance design code. The limiting temperature should be stated for all steel sections
	What is the basis for load ratio / limiting temperature?	Appropriate default temperature or project specific design information
2. Product Testing and Assessment	Is the product fully tested and approved for fire resistance?	BS 476 Pt21 or BS EN13381-4 test data (independently verified)
	Has the fire protection system been fully and independently assessed across a defined A/V range?	UKCA-mark
	Does the design involve cellular beams and is there sufficient information available to calculate the required thickness of coating	Third party certificated manufacturer plus Yellow Book listing.
		Testing in accordance with ASFP test protocol.
3. Contract specification	Will the product satisfy all design requirements for the project?	Manufacturers written confirmation
	Are any fire engineered assessments included and are these correct?	Independent fire-engineer's assessment to ASFP Advisory Note 17 and in accordance with PFPF guide on conducting Technical Assessments.
	Has a coating thickness breakdown for each section been produced?	Section v. Coating thickness in mm table or printout from manufacturer or installer
	Are all coats compatible?	Manufacturer's written approval
4. Installation Contractor competence	Is the installer competent in his understanding, application and quality control of non-reactive coatings?	Contractor audit, or Third party certification and Yellow Book listing. ISO 9000:2000 registered.
	Are the installer's site supervisors and operatives competent in all aspects of product application?	Training verified through third party certification and manufacturer's certification.
	Does the installer have a complete understanding of the particular project, and a working plan to deliver contract requirements in full?	Contract schedule, method statement(s) and quality and inspection plan.

Process Stage	Key Criteria	Requirement / Evidence
	Is independent inspection of the installer's work (including coating thickness surveys etc) necessary to validate the installation of fire protection?	Not if third party certificated, unless required by insurance.
	Are site Health & Safety measures properly covered?	Contractor Safety Policy, project risk assessments and safe working plans Should include compliance with site storage and waste disposal regulations. Compliance with / membership of the Contractor Health and Safety Assessment Scheme. Product Safety Data Sheets.
5. Audit trail & Contract Documentation (required at start-up)	Evidence that all above requirements are met.	Existence and quality of documents and supporting evidence.
	Correct allocation of coating thickness to each element of the structure.	Coating thickness schedule and drawings (relating coating thickness to each individual structural element)
	Evidence of safe, serviceable and accurate equipment.	Servicing records or calibration certificates as appropriate.
	Other contract specific requirements.	Supporting documents Product Technical Data Sheets etc.
6. Completed project documentation.	Start-up documentation	Copies of all relevant documentation from the above.
	QA records – surface preparation, product details, environmental conditions, application, density/thickness checks etc.	Completed Quality and Inspection plan (or equivalent) plus supporting detailed records from site.
	Problems, faults requiring rectification during the course of the contract, corrective actions and concessions.	Documented evidence of any problems and actions taken, including all correspondence, justification, supporting evidence, manufacturer recommendations etc and authorisation of action.
	System validation.	Independent survey report (if any)

Process Stage	Key Criteria	Requirement / Evidence
	conclusion	Project finalisation and signed off

ANNEX C – QUALITY CONTROL SAMPLE FORMS/PROCEDURES

C.1 Density Measurement

During normal spraying operation, take a daily sample of material from both the mixer and spray nozzle working in the normal mode. The samples should be taken in a standard container of known volume (without the use of agitation to increase packing rate).

Using the edge of a trowel or a tensioned wire, level the top of the sample by cutting back immediately after spraying or sampling from the mixer. *Do not compress the sample.*

Weigh the samples within ten minutes and record the bag numbers, the time the samples were taken and from the weight and volume, calculate the wet densities and record these values.

DENSITY CHECKS ON SITE

CONTRACT Nr.	CONTRACT NAME		DATE
	LOCATION		
DATE			
TIME			
BAGS/MIX			
WATER/MIX			
MIXER DENSITY			
SPRAY DENSITY			
Work Area			
Report Form Number	Revision		

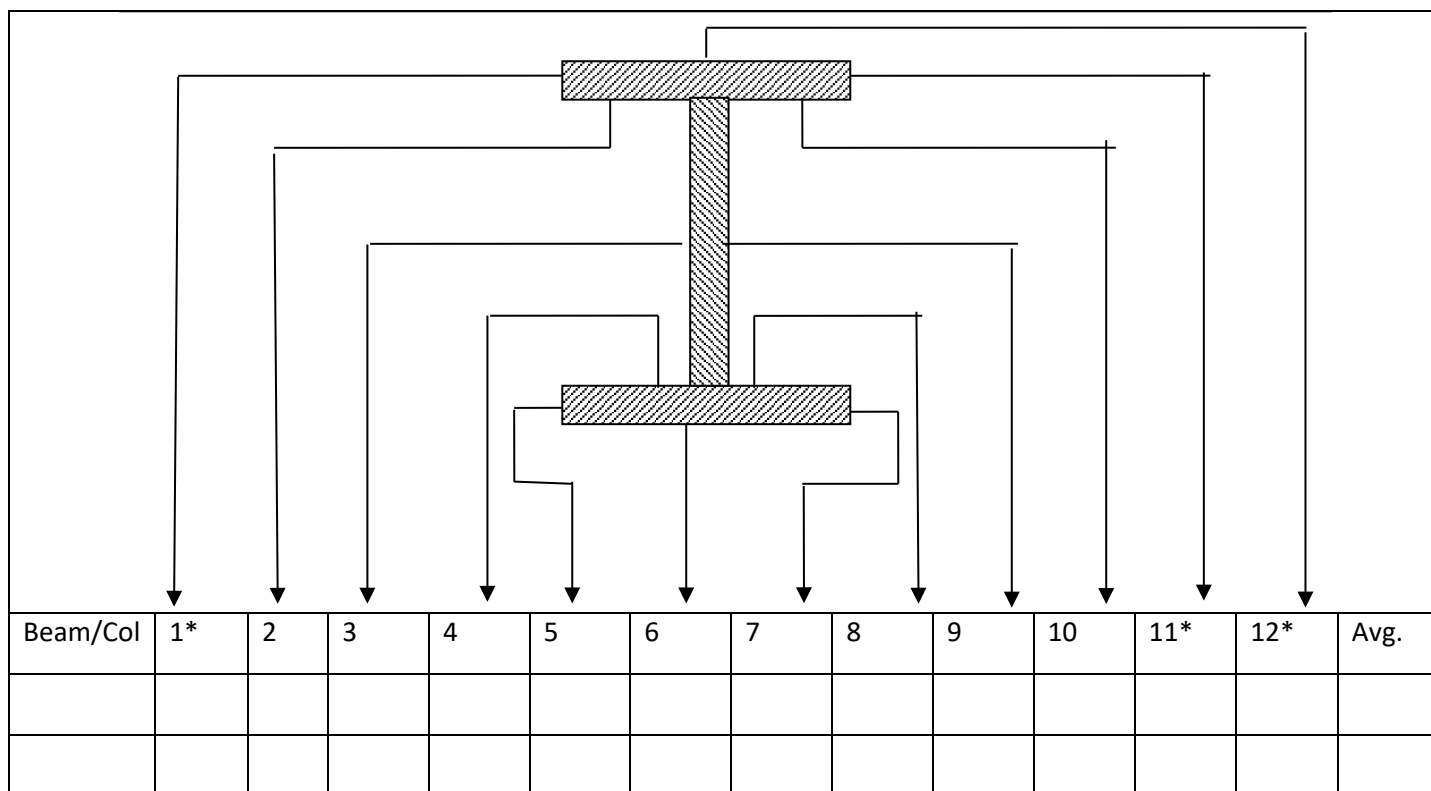
NOTE: In the case of spray applied mineral wool it is recommended that an area of the surface to be sprayed is marked out and a record be kept of the amount of material used to coat it to a known thickness. In this way the approximate density can be calculated.

C.2 Thickness Control

The procedure is provided in Section 6.3.3

SAMPLE THICKNESS CHECK FORM

CONTRACT Nr.
CONTRACT NAME:
LOCATION:
OPERATOR
SUPERVISOR



Measure at least one beam and or column per bay / 900sqm.

Two rings of measurements 300mm apart per section

The acceptance criteria for reduced thickness:-

- A) Average must not be lower than specified thickness
- B) No reading 6mm or 25% below the specified thickness.

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The ASFP serves and represents the needs of its members and the wider passive fire protection industry, by raising standards and competence through training, testing, certification and quality of installation and maintenance. It aims to advance knowledge and guidance on all aspects of 'built-in' fire protection; provide technical support and impartial advice; lead regulatory and behavioural change as an independent authority; and improve competence and quality through training.

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