The Loss Prevention Consultancy Ltd

Expert Advisory Report on Proposed Changes to BS 5306-8 in respect of the use of portable fire extinguishers in areas where there may be live electrical apparatus.

Instructed by Walker Morris LLP representing Safelincs Limited

Report No 21/1051 **18 May 2021**

1. Introduction

This report has been prepared by Stewart Kidd who has worked in fire safety in the UK and overseas since 1974. In that time, he has been responsible for the implementation of fire safety programmes in very large health facilities, power generation plants, water production and treatment plants and petrochemical plants and very large construction sites. He has extensive experience of teaching fire safety at all levels from induction courses for new staff through to training fire brigade fire safety officers. His courses have included the use of portable fire extinguishers and training for both volunteer and whole-time fire fighters and Certificate/Diploma courses for the FPA and British Institute of Facilities Management and the Institution of Fire Engineers.

Since 1989 he has had significant involvement in the promotion of the protection of historic and heritage buildings and has provided consultancy and fire risk assessment services to all the UK's major heritage organisations. This includes production of the only Approved Code of Practice for fire safety management in heritage buildings which forms part of Scottish Building Standards. It is his work in this area which prompted his interest in the potential value of watermist as a firefighting agent.

During his career he has been responsible for specifying the purchase and installation of portable fire extinguishers for multi-site operations and managed large in-house fire maintenance departments. In Hong Kong he held personal accreditation as a Class III Fire Services Contractor which involved taking and passing an examination. In Libya he developed a specialised AFFF extinguisher (when none was available on the local market) to deal with a problem of brake fires on asphalt tankers. He also developed a prototype of a wheeled AFFF foam unit using obsolete US Air Force chemical foam engines which was successfully used in tank truck loading ramps. In Hong Kong he replaced a very large stock on non-compliant portables with units which complied with BS 5423. Later as the General manager of the HK branch of a major UK fire company he oversaw the only Halon 1301 and 1211 refilling plants in the territory.

Following seven years as the Director of the UK's national fire safety organisation, Stewart has worked as an independent consultant and undertaken several important assignments as an expert witness including advising on cases involving the adequacy and effectiveness of fire safety measures and equipment and relating to the interpretation of standards and codes of practice.

2. My Instructions

I am instructed on behalf of Safelincs Limited to prepare an expert advisory report on matters related to proposed changes in the British Standard document relating to the selection and positioning of portable fire extinguishers. More specifically I am asked:

1. Does it pose any safety risk for a user to discharge water-based extinguishers, which were successfully di-electrically tested in line with BS EN3-7, on live electrical equipment of up to 1000 Volt AC if a safety distance of 1m is adhered to? If it does, please assess

whether you consider such a safety risk to be of a level to mean that the Standard should be amended in line with the Draft Standard so as not to permit (or to discourage) the use of these products in these circumstances.

2. If the answer to 1 above is that it does not pose any safety risk (or does not pose an unacceptable safety risk), please confirm whether this applies to:

a. Foams

b. Water

c. De-ionised water

provided they have each been successfully di-electrically tested in line with BS EN3-7?

3. Do fuses, protecting the electrical system of a property, get triggered if there is a direct stream of water from the electrical equipment to the floor? Does this prevent any risk to the user?

4. Do you consider the BS EN3-7 di-electric test to be safe practice and fit for purpose?

5. Do you consider the current BS 5306-8 Standard to set out safe advice in relation to water based extinguishing liquid which has been tested in line with BS EN3-7 and its use?

6. If the answer to 5 above is "no", please confirm what additional advice you consider could be added to the Standard to provide sufficient safety advice?

7. Do you have any experience or knowledge of any safety related incidents caused by the use of water based extinguishing liquid which has been tested in line with BS EN3-7 on live fires involving electrical equipment since 2000 (when we understand the first iteration of the Standard was issued)?

8. Do you consider the use of water based extinguishing liquid which has been tested in line with BS EN3-7 on live equipment to be less safe than any of the other extinguishers the use of which is recommended in the Draft Standard (e.g., Class F extinguishers)?

9. Are you able to identify any other types of fire extinguishers which require a user to take specific steps or actions to prevent other risks from occurring prior to or during the discharge of the extinguisher? If so, please provide details of those other extinguishers, the steps that a user is required to take and the other risks that those steps are designed to eliminate or mitigate to a tolerable level

3. Documents and sources on which I have relied in providing my opinion

(The serial number of the publications is used in references where this is not obvious).

1. BS:0 *A standard for standards* – Principles of standardisation (2016)

2. BS 0-1 *Rules for the structure and drafting of UK standards* (2017)

3. BS 0-3 *British Standards standardization policies* Part 1 *Fire safety*

4. BS 5306: *Fire extinguishing installations and equipment on premises* Part 0 *Guide for selection, use and application of fixed firefighting systems and other types of fire equipment* (2020)

5. BS 5306: *Fire extinguishing installations and equipment on premises Part 8: Selection and positioning of portable fire extinguishers – Code of practice* (2012)

6. BS 7671 *Requirements for Electrical Installations*: (2018)

7. BSi Committee Document: FSH-2-20_0038-203038 Draft for Public Comment: BS 5306-8 dated 31 July 2020.

8. COWI A*S, Manual Fire Extinguishing Equipment for Protection of Heritage*, Oslo, 2006

9. HSE, Personal Communication to Stewart Kidd, *Fatal accidents resulting from injury by electrocution where firefighting equipment had been in use*, 15 September 2017

9A.HSE, Spreadsheet listing all fatal electrocutions in the UK from 1996-2018
10. Kidd, S, Guide for Practitioners No 7: *Fire Safety Management in Traditional Buildings*, Historic Scotland, Edinburgh (2010)
11. Kidd S, Portable Protection – Time for a Rethink in Fire Risk management October 2018
12. Kidd S, 'Overlooked asset' in *Fire Risk Management*, November 2017
13. Jackson L and Williams C, *An Independent Guide to Watermist Systems*, BRE (2006)
14. Xiangchun Li, and others, *Effect of Water on the Chain Reaction Characteristics of Gas Explosion*, ACS Omega, 2021[1]

4. The Background to the Issues

The use of portable fire extinguishing devices in the UK is largely controlled by a British Standard publication, BS 5306: *Fire extinguishing installations and equipment on premises* Part 8: *Selection and positioning of portable fire extinguishers – Code of practice*. The standard presently in use is the 2012 iteration. It is normal practice for British Standards to be reviewed every five years (BS 0-1: 5.6.2). In the 2012 iteration, Clause 9 covers "Fires involving electricity". More specifically, Clause 9.2 requires that:

Water-based extinguishers that do not pass the dielectric test specified in BS EN3-7 are marked DO NOT USE ON LIVE ELECTRICAL EQUIPMENT.

The clause goes on to say that despite the exhortation in capitals, it is acceptable to install such extinguishers in premises where "electric lighting fittings and power sockets outlets are present". This is clearly an abrogation of responsibility by the drafters of the standard who then append an Informative Note (i.e., not Normative) No 2:

Water-based extinguishers can be marked as being suitable for use on live electrical equipment up to 1 000 V a.c. at a distance of 1m in accordance with BS EN3-7.

It is perhaps worth noting that a significant majority of premises in the UK into which portable extinguishers are likely to be installed will only utilise electricity at a maximum of 415 V AC.

For unknown reasons, the Note 2 continues:

The British Standards Technical Committee FSH/2[2] have stated that the national practice is not marking the extinguisher if it passes the test (…) but marking a warning if the extinguisher failed the test or was not submitted.

I have always considered that this Note is remarkably unhelpful to the extent of being perverse as it restricted the practical use of tested water-based extinguishers in circumstances where they would be very useful.

The 2020 draft revision of BS 5306-8 has inserted a new Clause 5.4 Conductivity:

[1] https://doi.org/10.1021/acsomega.1c00153

[2] ie. the BSi committee responsible for BS 5306-8 and other standards

Only electrically non-conductive extinguishing media, such as powder, carbon dioxide or other clean agent[3], should be specified for use on electrical equipment. Responsible persons and potential users should be made aware that electrical equipment needs to be switched off before any extinguisher is discharged onto it.

Further into the draft a total change in the guidance given in respect of fires in electrical equipment can be found in Clause 7.7 which is considerably more restrictive than the 2012 iteration and which has removed any reference to the testing of extinguishers in respect of electrical conductivity. There is a very bald restriction on types of extinguisher which may be used repeating the advice given in Clause 5.4. This is followed by a boxed Note headed (in bold)

Warning: Before any extinguisher is discharge onto electrical equipment, it is expected that the equipment will be isolated or switched off.

The Note continues:

The fire can result in a failure of cut-off protection and therefore the use of conductive extinguishing media could result in electrocution.

This section causes me some concern and I comment in detail later on this report.

5. The Status of Standards

The British Standards Institution, a body established under Royal Charter, is the UK member of CEN, the European standards organisation. It is a firm rule that CEN members are obliged to publish any standards produced by CEN and at the same time to withdraw any conflicting or comparable national standards.

Virtually all British Standards, including BS 5306-8 contain a statement in bold:

***Compliance with a British Standard cannot confer immunity from legal obligations*.**

Despite this, the legal status of standards is unclear as they are invariably called up in litigation where their content covers aspects of the matter referred to the courts. BS 0 says generally there is no obligation to comply with these (4.1.4 of BS 0) – unless this is a specific legal requirement (as, for example, in the case of BS 7671 *Requirements for Electrical Installations*). Thus, a manufacturer can choose to ignore a British Standard and substitute with his own requirements. This is the case in respect of automatic fire sprinkler systems where a number of companies choose not to comply with BS EN 12845 and use an US standard, NFPA 13 or an insurance standard, FM Global Data Sheets instead.

Perhaps more importantly, the BSI website makes it clear that:

[3] Defined as: electrically non-conducting, volatile or gaseous, fire extinguishing medium that does not leave a residue upon evaporation

'British Standards are voluntary in that there is no obligation to apply them or comply with them, except in those few cases where their application is directly demanded by regulatory instruments. They are tools devised for the convenience of those who wish to use them.'

BS 0 then goes on to state that care should be taken in development of standards to avoid being restrictive:

'Particularly for the purpose of preventing anticompetitive effects or impeding innovation, whenever possible, provisions are expressed in terms of performance rather than design or descriptive characteristics.'

Associated with BS 0 are BSi's *Rules for the structure and drafting of standards*, in this it sets out objectives which include a requirement in Clause 4 which requires that documents 'should provide a framework for future technical development'.

It is my opinion that FSH/2 has failed in this case to take into account developments in the past 10-15 years in respect of the development of portable extinguishers using watermist (see 6, below) which offer a number of distinct benefits.

6. Watermist as a Fire Fighting Medium

While water under pressure to generate a mist was employed by the US Navy in the 1930's as an alternative to foam (and steam) in firefighting, it was not until the 1980's that this technique was adopted for maritime fire protection having advantages over traditional automatic sprinkler protection in the impact of large volumes of water on ship stability.

In the last ten years, water mist has been the subject of extensive research and development, resulting in systems that have been optimised and proven for many applications[4]. Currently, water mist systems are an emerging technology for life safety building applications, including residential buildings (Reference 13). At the same time, the effectiveness of watermist for local applications has encouraged manufacturers to offer portable extinguishers which generate very small water droplets which are more effective in fighting fires than straight jets or solid streams of water. Watermist is more effective as not only does it cool the fire, but it also excludes oxygen in a smothering effect. There is also evidence that the mist droplets will interfere with the fire's chemistry and chain reaction (Reference 14). This attribute makes it possible for a (water-based) watermist extinguisher to be used on Class A (normal combustibles, Class B (Flammable liquids) and Class F (Cooking fats and oils) fires (Reference 11).

Watermist is also not a good conductor of electricity and when the water discharged is de-ionized it is effectively non-conductive. A watermist extinguisher therefore, which passes the BS EN3-7 conductivity test, is safe to use on live electrical equipment.

[4] Including systems used for 'live line washing' of electrical overhead line conductors at 400kV.

Given these properties, watermist extinguishers are, in my opinion, the nearest thing available to a universal extinguisher – and certainly the only such portable extinguisher since the withdrawal of the Halon 12ll (Bromotrifluromethane) extinguisher (following the UK's implementation of the Montreal Protocol). While BCF was safe to use against all types of fires (other than some Class D fires), it was never claimed to be the best agent against, for example, Class A fires (Reference 11) However, the important benefits (References 11, 12) of a universal extinguisher are obvious:

- Staff training needs are greatly simplified if there is only one type of portable extinguisher
- The avoidance of the need for multiple types of extinguisher can offer cost savings
- Maintenance is simplified – and probably cheaper
- There is no danger of the wrong unit being used in a fire[5]

It is my belief that a watermist extinguisher using de-ionised water is the nearest thing to a truly 'universal use' portable extinguisher.

7. Questions Put to Me and My Responses

1. Does it pose any safety risk for a user to discharge water-based extinguishers, which were successfully di-electrically tested in line with BS EN 3-7, on live electrical equipment of up to 1000 Volt AC if a safety distance of 1m is adhered to?

No, in my opinion and based on the research I have undertaken there is no real-world evidence of this activity creating a material risk to persons using the extinguisher.

1.1 If it does, please assess whether you consider such a safety risk to be of a level to mean that the Standard should be amended in line with the Draft Standard so as not to permit (or to discourage) the use of these products in these circumstances.

Based on my experience and the research I have undertaken I believe that the proposed amendment to the Draft Standard is unnecessary and unfounded given that there is no evidence of any persons coming to harm in the circumstances described.

2. If the answer to 1 above is that it does not pose any safety risk (or does not pose an unacceptable safety risk), please confirm whether this applies to:

[5] I have for many years been concerned at the high probability of errors (and said so in a number of articles (Reference 11 for example) and in conference papers) in the selection of portable extinguishers by staff and this informs my view that where there is a possibility of utilisation of multi-purpose extinguishers, these should be marketed actively. This even if, for example, the 'A' rating of a watermist portable extinguisher is less than that of a water extinguisher, the fact that the watermist unit can be safely used against most types of fires has to be seen to be a distinct advantage in respect of staff training, positioning of extinguishers and servicing and maintenance.
Some employers are seeking to instruct staff not to use fire extinguishers. One of the reasons for this , in my opinion, is the potential liability should staff be injured while fighting a fire or the practice where two different extinguishers are being specified in multiple locations in a building because of the theoretical risk of using an extinguisher containing water in the vicinity of electrical equipment

a. Foams

Yes, while conductivity of any foam water solution may be greater than that of the de-ionised water, if the di-electric test was successfully passed there can be little risk of injury to users.

b. Water

Potable water ('tap' water) contains sufficient ions to make it more conductive that distilled or de-ionised water so there may be a potential hazard to the user of an extinguisher containing potable water but if the unit has passed the di-electric test this can be discounted as negligible.

c. *De-ionised water provided they have each been successfully di-electrically tested in line with BS EN 3-7?*

If the extinguisher has passed the BS EN-3-7 di-electric test, then there would be no material risk to the user of such an extinguisher.

3. Do fuses, protecting the electrical system of a property, get triggered if there is a direct stream of water from the electrical equipment to the floor? Does this prevent any risk to the user?

It is more probable that the electrical ring main or circuitry in the property will be protected by miniature circuit breakers (MCBs) rather than fuses. High amperage fuses (typically 80 -100 amps) will be found protecting the supply to the property, but these are unlikely to blow as the individual circuits from the distribution board or consumer unit are each protected by an MCB which will operate first. The MCB will automatically rapidly disconnect any circuit which is overloaded or suffering a short circuit thus isolating the appliance or equipment from supply. Loads as low as twice the rated current are usually sufficient to trip the MCB – usually in less than 3.5 milli-seconds (Reference 6).

In addition, most UK buildings are now protected with an additional safety device, the Residual Current Device (RCD) which detects any leakage of current to earth. If this is detected, the RCD very quickly operates isolating all or part of the Distribution Board or Consumer Unit.

A direct stream of water to the floor in my understanding and experience may not trigger an MCB but would almost certainly probably trigger an RCD to operate thus eliminating any risk to the user.

4. Do you consider the BS EN3-7 di-electric test to be safe practice and fit for purpose?

4.1. Yes. It is my opinion that the test is realistic, credible, safe and entirely appropriate as a way of determining whether an extinguisher which is discharged (either deliberately or inadvertently) in the vicinity of high voltage is safe to use. The fact that the test voltage is 35kV suggests a considerable safety margin in locations where the highest voltage likely to be encountered is 220 V or 415 V. Additionally, when the extinguisher is charged with low conductivity de-ionised water, any concerns about injury being suffered by a user must be of a very small order indeed.

4.2 Clause 9.2 sets out the required performance of an extinguisher to meet the declared need for suitability to be used on live electrical equipment. The test is essential to prove that at no time during the test discharge does the current between the handle and an earth exceed 0.5mA

4.3 Annex C of BS EN 3-7 sets out the testing method which involves the discharge of water from an extinguisher against a vertically hung metal plate which is connected to a transformer with an output of 35 kV AC. The extinguisher to be tested is placed 1m away from the energised plate and an ammeter[6] is connected to measure any current between the handle of the extinguisher and an earth and between the nozzle and an earth. (Where there is no complete metallic path between the discharged water, a path for current shall be created for the test).

Comment

Given that BS EN 3-7 is a CEN standard, the UK was required to publish it and withdraw any national standard which covers the same areas. BS 5423 was therefore withdrawn in January 1997. Given that FSH/2 would have been invited to draft a National Foreword and National Annex for BS EN 3-7, it's not clear to me why this committee has drafted wording in BS 5306-8 which effectively negates the value of testing extinguishers to BS EN 3-7. The wording in the existing Clause 9 of BS 5306-8 is antithetical to the wording and intent of BS EN 3-7. If the committee had wished to reinforce or augment the requirements of BS EN 3-7 this should have been done via a National Annex. I've not seen any evidence that there are problems in the use of EN 3-7 in other European countries nor have I heard of any issues[7] resulting from the use of tested extinguishers in the presence of live electrical equipment. It would appear that only the UK has adopted this position and without any objective basis for such a position.

5. Do you consider the current BS 5306-8 Standard to set out safe advice in relation to water based extinguishing liquid which has been tested in line with BS EN 3-7 and its use?

No. The advice given is confusing and ambivalent and out of date as it does not take account of the value of water when applied as a mist nor where the design of the extinguisher renders it safe to use in the presence of energised electrical equipment.

6. If the answer to 5 above is "no", please confirm what additional advice you consider could be added to the Standard to provide sufficient safety advice?

The Clause should be amended to include wording which makes it clear that, in some circumstances, certain types of portable fire extinguisher with a BS EN 3-7 di-electric test approval can be used on live electrical appliances. The advice to disconnect or isolate appliances should remain as this is valuable but it is not always possible to do this – especially in the case of kitchen fires. Suggested wording for a new Clause should include the following information:

[6] The term 'ammeter' is used in Para C2 of BS EN 3-7, this is identical to an 'amp meter'

[7] I have worked in Austria, Belgium, Bulgaria, Czechia, Denmark, Germany, Greece, Holland, Poland, Portugal, Romania, Spain and Slovenia.

a. Portable fire extinguishers using water mist have been available in the UK for a number of years, but do not appear to have been widely promoted. Apart from their widespread effectiveness against Class A, B and F fires, they have a major advantage in that they have a high level of di-electric safety.

b. All the manufacturers of portable water mist fire extinguishers on the market in the UK state that their products are safe for use on 1000 V AC., and all have also passed the prescribed BS EN-3 test at 35 kV.

c. Examination of the effectiveness of water mist units in standard tests suggests that they provide full ABC fire coverage, albeit with the A rating lower than the equivalent size of water extinguisher. This means that these extinguishers are effectively multi-purpose extinguishers. Implicitly this will reduce the training burden on employers and the risk that the wrong type of extinguisher might be used.

If this argument is accepted by FSH/2 then they must consider whether the foam and water extinguishers which have also been satisfactorily tested to the di-electric requirement in BS EN 3-7 should be labelled differently for effectiveness and safety.

7. Do you have any experience or knowledge of any safety related incidents caused by the use of water based extinguishing liquid which has been tested in line with BS EN 3-7 on live fires involving electrical equipment since 2000 (when we understand the first iteration of the Standard was issued)?

No, despite extensive research involving the Fire Protection Association, the National Fire Chief's Council, the Fire Industry Association and the Health and Safety Executive (HSE). In September 2017, the HSE confirmed to me that there are no records of any persons being electrocuted while using any kind of fire equipment. (Reference 9 and 9A).

8. Do you consider the use of water based extinguishing liquid which has been tested in line with BS EN 3-7 on live equipment to be less safe than any of the other extinguishers the use of which is recommended in the Draft Standard (e.g., Class F extinguishers)?

Prior to the introduction of the Class F units (which principally use a strong alkaline solution), most kitchens where fat and oil fires were a hazard were provided with foam extinguishers. While effective in fire suppression, these units often significantly disturbed the surface of the hot oil causing it to splash; burn injuries were not uncommonly suffered by users and those near-by. The Class F (often known as wet chemical) extinguisher applies its contents more precisely and gently using a rigid 'wand' rather than a hose and nozzle. However, the resultant saponification of the oil and fats caused by the application of the alkaline solution generates the need for significant clean-up. Such activity is, however less than such which will follow the discharge of a dry powder extinguisher.

With regard to electrical safety, I do not believe there are any serious difference in the levels of safety or otherwise between those extinguishers containing water which have passed the BS EN 3-7 di-electric test and Class F portables in respect of electrical

conductivity where the Class F extinguishers have also passed the prescribed BS EN-3-7 35kV di-electric test.

I note that in the proposed 2020 draft amendment to BS 5306-8 there is no proscription or advice on the use of Class F extinguishers in respect of the possibility of their being used on live electrical equipment other than the general observations in Clause 5.4.

Noting further the wording in the new Clause 7.7.1 of the draft (which effectively prohibits the location of any extinguisher containing water on electrical equipment), I am confused by the implicit specification of Class F extinguishers (which do contain water) in proximity to kitchen equipment which in many cases will be electrically powered. The confusion is exacerbated by the second sentence of Clause 7.7.1:

Specific dedicated extinguishers should be provided for mains intake distribution and cooking appliances which are involved in the greatest number of fires.

The 'dedicated extinguishers' for 'cooking appliances' must surely be Class F portables, but how can it be right to permit these to be used when other portables containing water cannot be used in the same area?

I would add that I have witnessed tests with watermist systems on kitchen ranges which have proved every bit as effective as fire suppression systems using wet chemicals – with the added benefit that the operation of the watermist system results in considerably less clean-up and down-time while the suppressant media is replaced.

9. Are you able to identify any other types of fire extinguishers which require a user to take specific steps or actions to prevent other risks from occurring prior to or during the discharge of the extinguisher? If so, please provide details of those other extinguishers, the steps that a user is required to take and the other risks that those steps are designed to eliminate to mitigate to a tolerable level.

There are a number of potential hazards implicit in the use of portable fire extinguishers and for this reason, despite legislation requiring the presence of equipment in the workplace and the training of staff in their use[8], some employers are known to have instructed their staff not to use extinguishers (Reference 10).

It has been reported that injuries have occurred during training in the use of extinguishers, most notably those containing carbon dioxide gas due to the propensity for frosting on the metal parts of the extinguisher which can cause low temperature burns. Such extinguishers also generate significant noise when operated and this can take the untrained user by surprise causing the unit to be dropped. The gas is, of course, an asphyxiant and should not be used in confined spaces where it could accumulate or linger. The discharge of the gas can also cause reduced visibility.

[8] In England & Wales: Article 13 (1) and (3) of the Regulatory Reform (Fire Safety) Order 2005

The use of dry chemical (powder) extinguishers may also prove hazardous in that while the powders employed are not in themselves toxic, they are very unpleasant to inhale and can cause short-term health issues in anyone present in a confined space. Further, more serious longer-term issues have been reported in individuals who are prone to pulmonary problems.

Accordingly, in order to minimise any negative impact, as a minimum, where carbon dioxide extinguishers are to be installed, staff must be fully trained not only in their use but warned to ensure that they do not touch the metal parts of the cylinder body, alerted to the noise that will be encountered and the impact on visibility. Staff also need to be aware that the units should not be used in a confined space and that the area of discharge should be fully ventilated.

Similarly, where dry chemical extinguishers are likely to be used, staff should be alerted to possible reduced visibility and to avoid inhaling the powder. Where this does take place, they should be instructed to seek medical help if any ill-effects are experienced.

8. Specific Applications for Watermist Extinguishers in Heritage Applications

Research undertaken in Europe[9] and the US has indicated that the safest type of firefighting medium to be used in heritage and historic buildings is water (References 8,10) The European project running from 2002-2007 was part of major research funded by the EU/European Science Foundation and this particular project was undertaken by Historic Scotland and the Norwegian Riksantikvaren through a well-known Norwegian consultancy company, Cowi AS. Water was shown to be the firefighting agent of choice in respect of all collections' items and historic fabric.

Several UK heritage buildings[10] are now protected by automatic watermist fire suppression systems (Reference 10) and in Europe, watermist hose reels[11] are widely used. Portable watermist trolleys are also used, for example, in the Schönbrunn Palace, Vienna.

Following litigation when the malicious discharge of a dry powder extinguisher in a church resulted in clean-up costs of more than £240,000[12], all the UK's heritage organisations issued guidance advising heritage buildings to remove such extinguishers from their buildings. The reason why the extinguisher supplier had provided dry powder extinguishers was said to have been their standard practice in or near electrical distribution boards. Should guidance from British Standards suggest that in future, such circumstances could be countered by the use of extinguishers tested to BS EN 3-7, this would be hugely welcomed by heritage occupancies especially given the research into the optimum type of extinguishing media.

[9] *Manual Fire Extinguishing Equipment for Protection of Heritage*, Cowi AS
[10] E,g.: National Library of Wales, Old Royal Palace, Stirling and the National Portrait Gallery
[11] https://fogtec-international.com/files/wall_cabinets.pdf
[12] Chubb Fire Ltd v Vicar of Spalding [2010] EWCA Civ 981, [2010] 2 CLC 277. 50 (Case reversed on appeal),

9. Conclusions

The conclusion that any impartial fire expert must draw is that there have been attempts over many years to constrain technical developments in the wider availability and use of portable extinguishers which are tested to BS EN3-7. This has constrained the extinguisher market and provided a disincentive for those who might be considering moving away from the default position that, where an electrical fire safety risk exists, the only solution is to provide multiple extinguisher units.

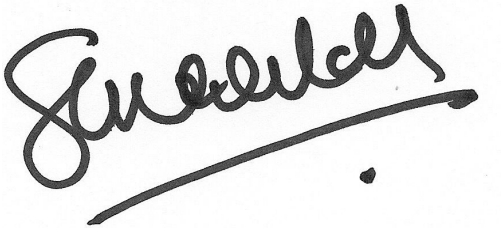
The risks of accidental electrocution while using a water-based extinguisher remains theoretical and unproven given that no authenticated data exists to demonstrate that injuries have resulted from such use. It may be also that developments in the past 25 years in the provision of highly responsive MCBs and the wider use of RCDs also reduces the likelihood of electrocution.

It certainly appears to the outsider that FSH/2 has decided to selectively disregard portions of EN-3 for no reason that has been publicly stated. As someone with more than 30 years of working in the British Standards system, it's clear to me that if a UK mirror committee has concerns about the contents of an EN standard, the appropriate response is to try to counter this at CEN TC/WG level. If those concerns are not reflected in the final EN draft, then the UK committee has the option of expressing their views in a National Annex and modifying the EN text in a National Annex by augmenting it.

The proposed 2020 revision to BS 5306-8 further constrains the use of BS EN 3-7 tested portable extinguishers beyond the already restrictive position in the 2012 draft of the standard

Statement of Truth

I confirm that I have made clear which facts and matters referred to in this report are within my own knowledge and which are not. Those that are within my own knowledge I confirm to be true. The opinions I have expressed represent my true and complete professional opinions on the matters to which they refer.



Stewart Kidd, 18 May 2021

Annex 1 Biography of the Technical Expert

Alexander Stewart Kidd MA, MSc, FIFireE, FIFSM, FSyI, CPP, FSA Scotland
Chartered Security Professional

EXPERIENCE

November 1998 – Present: Director, Loss Prevention Consultancy Ltd

April 2000 – December 2015: Secretary General/Director, British Automatic Fire Sprinkler Association

July 1997 - December 1998: Group Security and Loss Prevention Controller, Asprey Group plc

February 1989 - June 1997: Director, The Fire Protection Association/Head of External Affairs, Loss Prevention Council (also from April 1996 - June 1997): Director-General, Arson Prevention Bureau

September 1987 - January 1989: County Civil Protection Officer, Cambridgeshire County Council

September 1982 - August 1987: Security Advisor and Manager Risk Control Department, Ministry of Works, Power and Water, State of Bahrain

1981-1982: Director and General Manager, AFA Minerva (Thorn EMI) Hong Kong Ltd.

1978 -1981: Loss Prevention Engineer, China Light & Power Co Ltd., Hong Kong

1977 -1978: Fire, Safety and Security Advisor, Libyan Institute of Petroleum, Tripoli, Libya

1975 - 1977: Assistant Director of Safety and Security, King Faisal Specialist Hospital & Research Centre, Riyadh Saudi Arabia

1974 - 1975: District Security Officer, Ealing Health District (also responsible for fire safety)

1971 - 1975: Commissioned Service, Infantry, Corps of Royal Military Police (V)

1966 - 1968: Service as Inspector with Hong Kong Police Force also 1978 -1982 service as an Inspector with Royal HK Auxiliary Police Force.

EDUCATIONAL & PROFESSIONAL

1956 - 1961	Blairmore School
1961 - 1965	St Bees School
1965 - 1966	Aberdeen College of Commerce
1969 - 1973	University of Aberdeen, MA
1977	Institute of Industrial Security, Member (By examination)
1977	Institute of Fire Prevention Officers, Member
1977	Institution of Fire Engineers, Preliminary Certificate (By examination)
1979	Institution of Fire Engineers, Member (By examination)
1979	Institute of Fire Prevention Officers, Fellow
1980	Institute of Industrial Security, Fellow (By dissertation)
1984	Certified Protection Professional (US) (By examination)
1986	Institute of Risk Management, Fellow
1994 - 1996	University of Leicester, MSc
1995	Institution of Fire Engineers, Fellow
1999	Institute of Fire Safety Managers, Fellow
2000	The Security Institute, Fellow
2003	Fellow, Society of Antiquaries, Scotland
2006	Life Vice President, Institute of Fire Safety Managers
2011	Life Vice President, Security Institute
2011	Chartered Security Professional

OTHER RELEVANT INFORMATION

Chairman, HK Branch, International Professional Security Association 1979-81
Lecturer, Security Studies, HK Polytechnic 1979-82
Licensed by HK Fire Services Department as Class I, II and III Fire Service Contractor
Prepared several HK Fire Services Department Fire Service Circulars
Member, NFPA Committee on Non-Nuclear Power Generation (NFPA 850/1) 1980 - 88
Vice Chairman, Middle East Chapter, American Society for Industrial Security 1985-87
President, Industrial Fire Protection Association 1989 - 97
Freeman, City of London 1991
Vice Chairman, Confederation of Fire Protection Associations - Europe 1992 - 97
Chairman CFPA Europe Hotel Fire Safety Working Party 1992-4
Special Expert Member, NFPA Committee on Cultural Resources (NFPA 914/920) 1991-2015
Vice Chairman, Federation of British Fire Organisations 1992-97
Special Expert Member, NFPA Committee on Security (NFPA 730, 731) 2002 -
Governor, Institute of Risk Management, 1993 – 99
Expert Witness, Bailey Enquiry into Fire Safety in the Royal Palaces (1993)
Security Adviser, Pool Reinsurance Ltd 1990-94
Insurance Industry Rep., Inspectorate of the Security Industry, 1993-97
Member, UK Government Fire Safety Deregulation Initiative WG 1993-4
Vice Chairman, Security Industry Lead Body (1993 - 95)
President, Institute of Fire Safety Management, 1997 - 2005; Life Vice President 2006 -
Member, Advisory Board, Cranfield Security Centre, RMCS Cranfield University, 1998 - 2001
Secretary and then Vice Chairman. The Security Institute, 1999 – 2007
Director, The Security Institute, 2000 - 2007
Member, Home Office/ODPM Fire Safety Advisory Board/Cost of Fire Working Group 2000 - 2004
Member, Fire Safety Advisory Board/Fire Statistics Sub Committee, 2000-2007
Director, Fire Industry Confederation, 2000-2007
Member, ODPM Consultation Review Group on Fire Safety Order 2003 - 4
UK Delegate and Chairman of WG2 to EC COST C17 Programme - Protection of Heritage 2002 - 2007
Lead Trainer in Fire Safety Management and Business Continuity Management for British Institute of Facilities Management 1998 – 2019
Secretary General and Director. British Automatic Fire Sprinkler Association 2000 - 2016
Convener, Sprinkler Coordination Group 2008 - 2015
Council member, Federation of British Fire Organisations 2005 - 2012
Council member, Fire Industry Coordination Group 2008 – 2010
Council member, Fire Safety Federation 2012 -2017
Council Member, Business Sprinkler Alliance 2010-2019
Vice Chairman, Fire Services National Museum Trust 2015 -

BSi COMMITTEES/LOSS PREVENTION COUNCIL/ABI WORKING PARTIES

Fires on Construction Sites (Secretary)
Gas Turbine Fire Protection (Chairman)
Empty Premises (Chairman)
Protection of Heritage Buildings (Chairman)
Electrical Safety (Chairman)
London Groundwater
Fire Safety in the Food Industry (Chairman)
Halon Replacements
Terrorism and Security
Keyholding and Alarm Response
Water Supplies and Sprinkler Systems
Adviser on security and business continuity to Pool Re Ltd for terrorism cover

British Standards Committee Memberships

F: Fire
FSH/018: Fixed firefighting systems
GW/3: Security services
FSH/018/2: Sprinkler systems
FSH/018/02/01 Revision of BS 9251
FSH/018/0-/03 Revision of BS 5306-0
FSH/018/5: Watermist systems
FSH/09: Fire terminology
FSH/24/0/06: Application of fire safety engineering principles to the design of buildings: fire protection systems
FSH/018/05/06 Task group for EN 14972 series
Also contributed text to BS 7913: Conservation of Historic Buildings, BS 5454: Archives

MAJOR PUBLICATIONS

A Dictionary of Industrial Security, London, 1987: Routledge and Kegan Paul
Fire Safety in Hotels: Recommendations for Europe, (Editor) London, 1993: FPA
Heritage Under Fire, (Editor) London, 1995: Fire Protection Association.
An Introduction to Physical Security, (Editor) London, 1996: The Loss Prevention Council
Arson and its Causes: MSc dissertation, University of Leicester 1996
European Hotel Fire Safety: An Analysis of the Implementation and Impact of the 1986 EC Recommendations 666 on Fire Safety in Existing Hotels, IFTO, London, 2000
TAN 22 Fire Risk Management in Heritage Buildings, Edinburgh, 2001: Historic Scotland
TAN 28 Fire Safety Management in Historic Buildings, 2005, Historic Scotland
Security Report 2006, (Editor) 2006, Workplace Law Publishing
Monitoring and Managing Generators, Aon Insurance London 2007
Monitoring and Managing Transformers, Aon Insurance, London 2007
The Protection of Thermal Turbogenerators, Gensip, London, 2009
Guide for Practitioners No 7: Fire Safety Management in Traditional Buildings, 2010, Historic Scotland. (Note this is an Approved Code of Practice under Scottish Building Standards)
Practice Note*: Construction Site Fire Safety Management,* 2016, Association for Project Safety