

## AHJ Considerations for Approving the Plumis Automist Smartscan System

### Light Hazard Commercial Applications

#### INTRODUCTION

This document is intended to be an impartial evaluation of the code-compliance of the Plumis Automist Smartscan System as an alternative to prescriptively compliant NFPA 13 and NFPA 750 systems. As this is an evaluation of the applicable codes and standards, this document does not generally provide technical specifications of the Automist Smartscan System; the technical documentation referenced in this document is to be provided in conjunction with this document. The pathway to compliance for new technologies requires careful analysis of the applicable codes and standards, information for which is provided throughout this document. The ultimate *approval* of any alternative approach not specifically prescribed by model codes lies with the *Authority Having Jurisdiction* (AHJ). This document is intended to provide the code references necessary, when evaluated with attached supplemental technical documentation, for the AHJ to make an informed decision regarding approval of the system.

#### NON-REQUIRED SYSTEMS

Where automatic sprinkler systems are not required by §903 of the *International Fire Code*, the installation of the Automist Smartscan System is considered to be “non-required”. Non-required systems are permitted to be installed in accordance with §901.4.2:

**901.4.2 Nonrequired fire protection systems.** A fire protection system or portion thereof not required by this code or the *International Building Code* shall be allowed to be furnished for partial or complete protection provided that such system meets the applicable requirements of this code and the *International Building Code*.

The plumbing and electrical requirements for both required and non-required systems remain the same.

#### PLUMBING

The Automist Smartscan System can be connected to the building potable water supply. Installation of the plumbing system up to the point of connection is the responsibility of the building owner and a qualified plumbing contractor. Though the system is not, by definition, an *Automatic Fire Sprinkler System*, the *International Plumbing Code* does not prescribe specific requirements for a *Water Mist Fire Protection System*. As the Automist Smartscan System is intended to be equivalent to an *Automatic Fire Sprinkler System*, however, the intent of the code and the level of protection of the potable water supply may be assumed to be equivalent.

**608.17.4 Connections to automatic fire sprinkler systems and standpipe systems.** The potable water supply to automatic fire sprinkler and standpipe systems shall be protected against backflow by a double check backflow prevention assembly, a double check fire protection backflow prevention assembly or a reduced pressure principle fire protection backflow prevention assembly.

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## Exceptions:

1. Where systems are installed as a portion of the water distribution system in accordance with the requirements of this code and are not provided with a fire department connection, isolation of the water supply system shall not be required.
2. Isolation of the water distribution system is not required for deluge, preaction or dry pipe systems.

As the system does not contain any water until activated, it is similar to a dry or preaction system. All piping between the potable water supply and the point of connection the system shall be of materials permitted by and installed in accordance with the *International Plumbing Code*. The system is also not included with a fire department connection. Isolation of the water distribution system is therefore *not* required under the IPC for the installation of the Automist Smartscan System. The system is, however, equipped with a single check valve.

If an installation is to be provided with a valve on the connection to the water supply, it must be provided with supervision complying with NFPA 750 §8.8.1.8.1. The typical approved method is that prescribed by §8.8.1.8.1 (3), Valves locked in the correct position. All valves utilized must comply with IPC §605.7.

## ELECTRICAL

The Automist Smartscan System utilizes a 20A 230V branch circuit connected to a dedicated breaker. Installation of the branch circuit, including proper sizing of conductors and all other applicable requirements of the National Electrical Code, is the responsibility of the homeowner and a qualified electrical contractor.

The system is hardwired to the provided branch circuit. Connections occur within a box of suitable size for the conductor count in accordance with NFPA 70 §314.16.

At the time of installation, circuit identification is provided at the panel, and a breaker lock is installed to prevent accidental power loss to the system.

## REQUIRED SYSTEMS

Where *automatic sprinkler systems* are required by §903.2 of the *International Building Code*, *Automatic Fire-Extinguishing systems* may be permitted to be installed as an alternative where *approved* by the code official, in accordance with §903.1.1. *Automatic Water Mist Systems* are permitted where used in applications that are consistent with applicable listing or *approvals*, pursuant to §904.11. As the Automist Smartsan System is currently pursuing UL testing and listing, the key takeaway from §904.11 is *applicable approvals*.

The IBC §202 defines *Approved* as:

**APPROVED** – Acceptable to the *building official*.

The question then becomes how to determine what is acceptable, within the bounds of the applicable codes.

The IFC recognizes that technologies change and does not seek to prohibit the use of alternative means and methods not specifically prescribed by the code.

### **§104.9 Alternative materials, design and methods of construction and equipment.**

The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be approved where the *fire code official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

This specifies certain criteria for alternative materials, design and methods to meet, which can be broken down into the categories of *Intent* and *Equivalency*.

## INTENT

The Automist Smartsan System is an *Automatic Water Mist System* intended to be used as an alternative to automatic sprinkler systems in accordance with §903.1.1. The systems it is intended to be an alternative to are regulated by NFPA 13, so the intent should meet the intent of that standard.

Looking at the Intent of NFPA 13, the following is defined:

### **NFPA 13**

**1.2.1** The purpose of this standard shall be to provide a reasonable degree of protection for life and property from fire through standardization of design, installation, and testing requirements for sprinkler systems, including private fire service mains, based on sound engineering principles, test data, and field experience.

The key takeaways from the intent are:

- Provide a reasonable degree of protection for life and property from fire

While the Automist Smartscan System meets the intent laid out in NFPA 13, §1.1.2 states: *“This standard shall not provide requirements for the design or installation of water mist fire protection systems, which are not considered fire sprinkler systems and are addressed by NFPA 750.”* **This is not stating that water mist systems are an unacceptable technology to meet the intent of NFPA 13**; rather that they are outside of the scope of NFPA 13 and are considered a different system altogether, one which is regulated by NFPA 750.

Per IBC §904.11.1.1, “Automatic Water Mist Systems shall be designed and installed in accordance with NFPA 750 and the manufacturer’s instructions.” The Intent of NFPA 750 then, is defined:

### **NFPA 750**

**1.2.1** The purpose of this standard is to provide protection for life and property from fire through the standardization of design, installation, maintenance, and testing requirements for water-based fire suppression systems that use a specific spray (mist) that absorbs heat, displaces oxygen, or blocks radiant heat to control, suppress, or extinguish fires as required by the application.

The key takeaways from the intent are:

- Provide protection for life and property from fire
- Control, suppress, or extinguish fires as required by the application

The Plumis Automist Smartscan System is claimed to fully meet the intent(s) of a conventional NFPA 13 Automatic Sprinkler System *and* a Water Mist Fire Protection System (NFPA 750).

### **EQUIVALENCY**

Where *automatic sprinkler systems* are required by §903 of the IFC, alternatives may be permitted per §903.1.1:

**903.1.1 Alternative protection.** *Alternative automatic fire-extinguishing systems* complying with Section 904 shall be permitted instead of automatic sprinkler protection where recognized by the applicable standard and *approved* by the *fire code official*.

Looking back to IFC §104.9, the alternative materials, designs or methods must be “...not less than the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.” Additionally, NFPA 750 states in §1.5:

**1.5 Equivalency.** Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

The methods of determining and proving equivalency are also provided in the codes. The IFC §104.9.2 grants the *building official* the authority to require tests as evidence to substantiate claims:

### **104.9.2 Tests.**

Where there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the *fire code official* shall have the authority to require tests as evidence of compliance to be made at no expense to the jurisdiction. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the *fire code official* shall approve the testing procedures. Tests shall be performed by an *approved agency*. Reports of such tests shall be retained by the *fire code official* for the period required for retention of public records.

As the Automist Smartscan System is a relatively new system that was primarily developed in the UK, there are currently no recognized U.S. test standards for this specific system. However, §104.9.2 grants the *building official* the authority to approve testing procedures, and have tests performed by an *approved agency*. The IFC §202 defines *approved* and *approved agency* as:

**APPROVED** – Acceptable to the *fire code official*.

**APPROVED AGENCY** – An established and recognized agency that is regularly engaged in conducting tests, furnishing inspection services or furnishing product certification, and has been *approved* by the fire code official.

NFPA 750 contains similar language:

**1.5.1** Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

**1.5.2** The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

**1.6.1** Nothing in this standard shall be intended to restrict new technologies or alternate arrangements, provided the level of safety prescribed by this standard is not lowered.

The IFC also specifies requirements for supporting technical documentation:

**104.9.1 Research Reports.** Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from *approved* sources.

Using these definitions and the aforementioned provisions of IFC §104.9.2 and NFPA 750, the conclusion is that alternative systems may be acceptable if the *fire code official* finds the credibility and reputation of the testing agency, as well as the procedures and results of

their tests, to be acceptable. The Automist Smartscan System has been Independently tested by Exova Warringtonfire and demonstrated to meet the fire performance standards of BS 8458:2015 and BS 9252:2011. Exova Warringtonfire is ISO/IEC 17065:2012 Accredited. The documentation from the Exova Warringtonfire tests (provided separately from this document) may therefore meet the requirements for approval as satisfactory documentation of testing and performance.

## PERFORMANCE-BASED COMPLIANCE

In *The SFPE Code Official's Guide to Performance-Based Design Review*, the introduction states: "Performance-based design is an engineering approach to fire protection design based on established fire safety objectives and functional statements, analysis of fire scenarios, and assessment of designs based on those objectives and functional statements. Performance-based design differs from traditional prescriptive design in that specific methods for achieving compliance with the design intent are established by the design team, subject to the code official's concurrence, and a fire/life safety solution is developed that is tailored to the specific building, fire, and occupant characteristics contained within the building being assessed."

Essentially, prescriptive codes are, in simplest form, a "one-size-fits-all" approach with a wide range of allowable approaches. Under the guidance of highly qualified professional engineers, however, a performance-based design looks at each individual building to custom tailor design objectives and approaches for that specific occupancy and its unique hazards.

NFPA 750 recognizes the vast potential for variations in the design of *Automatic Water Mist Systems*, and as such is essentially written as a performance-based design standard. Performance objectives and suitable occupancies can be found in the standard. The Automist Smartscan System is the type of system that fits within the intent of performance-based design. It is designed for individual occupancies based on the layout, hazards, and design objectives – all to meet the intent of NFPA 750, NFPA 13, and the *International Fire Code*. A sample proposal and fire testing documentation is attached to this document – an example of a portion of the documentation necessary for review and approval of any performance-based design. An analysis of review and approval of performance-based design is a separate document altogether, and *The SFPE Code Official's Guide to Performance-Based Design Review* is the leading resource for this.

## SYSTEMS ACCEPTANCE

As with any fire protection system, acceptance testing must be conducted and often witnessed by the AHJ. Where conventional prescriptive systems have defined acceptance testing procedures, NFPA 750 recognizes the wide variation in designs and places the requirement to provide acceptance testing procedures on the manufacturer.

**14.1.2** A complete step-by-step description of the proposed acceptance test procedure, identifying all devices, controls, and functions to be tested and how the test will be conducted shall be approved prior to scheduling of acceptance testing.

The attached document “Automist Smartscan Hydra Design, Installation, Operation and Maintenance (DIOM) Manual” details what it refers to as the “Commissioning Procedure”, which is a functional check of all aspects of the system, and is in line with the intent of acceptance testing. The AHJ must approve this procedure prior to scheduling any acceptance testing.

## **SYSTEM INSPECTION, TESTING AND MAINTENANCE**

As with any fire protection system, regular Inspection, Testing and Maintenance (ITM) is essential to ensuring proper functionality of that system. Again, recognizing variations in design, NFPA 750 places the requirement to provide ITM instructions on the manufacturer.

**§15.1.1** Water mist systems, other than those installed in one- and two-family dwellings shall be inspected, tested, and maintained in accordance with NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*.

The ITM procedures for the Automist Smartscan System are included in the attached DIOM manual and meet the applicable requirements of NFPA 25, Chapter 12.

## **CONCLUSION**

This document was designed to provide the most current code references to assist the Authority Having Jurisdiction in making an informed decision regarding approval of the Plumis Automist Smartscan System. As this system falls outside of current prescriptive compliance, an alternative, performance-based approach must be utilized if it is to be approved. As such, certain local amendments to adopted codes may need to be considered in addition to this baseline document. Documentation will need to be provided with each permit and plan submission to prove the system is suitable as an equivalent alternative to residential automatic fire sprinkler systems. The whole process is designed to provide the AHJ with all necessary materials to make an informed decision in approving alternative and innovative approaches to meeting the intent of the codes.

## REFERENCED STANDARDS AND PUBLICATIONS

**2018** International Fire Code

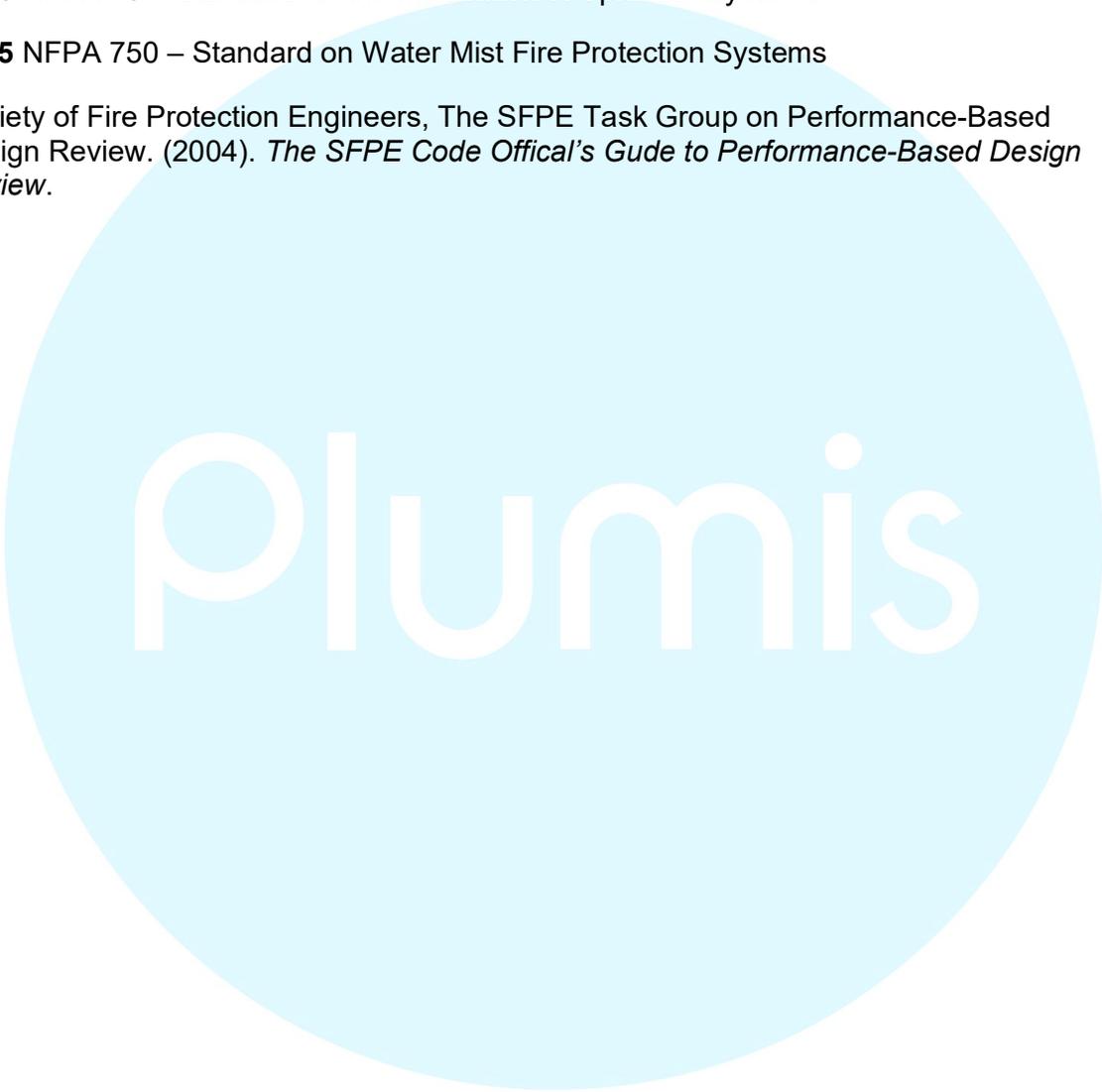
**2018** International Plumbing Code

**2017** NFPA 70 – National Electrical Code

**2016** NFPA 13 – Standard for the Installation of Sprinkler Systems

**2015** NFPA 750 – Standard on Water Mist Fire Protection Systems

Society of Fire Protection Engineers, The SFPE Task Group on Performance-Based Design Review. (2004). *The SFPE Code Official's Guide to Performance-Based Design Review*.



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## REFERENCED TECHNICAL DOCUMENTATION

1. Exova Warringtonfire BS 8458:2015 Testing Report
2. LABC Validation Testing Report
3. Automist Smartsan Hydra Design, Installation, Operation and Maintenance (DIOM) Manual
4. Sample Performance-Based Design Proposal



Plumis