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DESIGN of A WATER MIST SYSTEMS with 14972 series

The point of view of a Fire Engineer developing fire protection specifications

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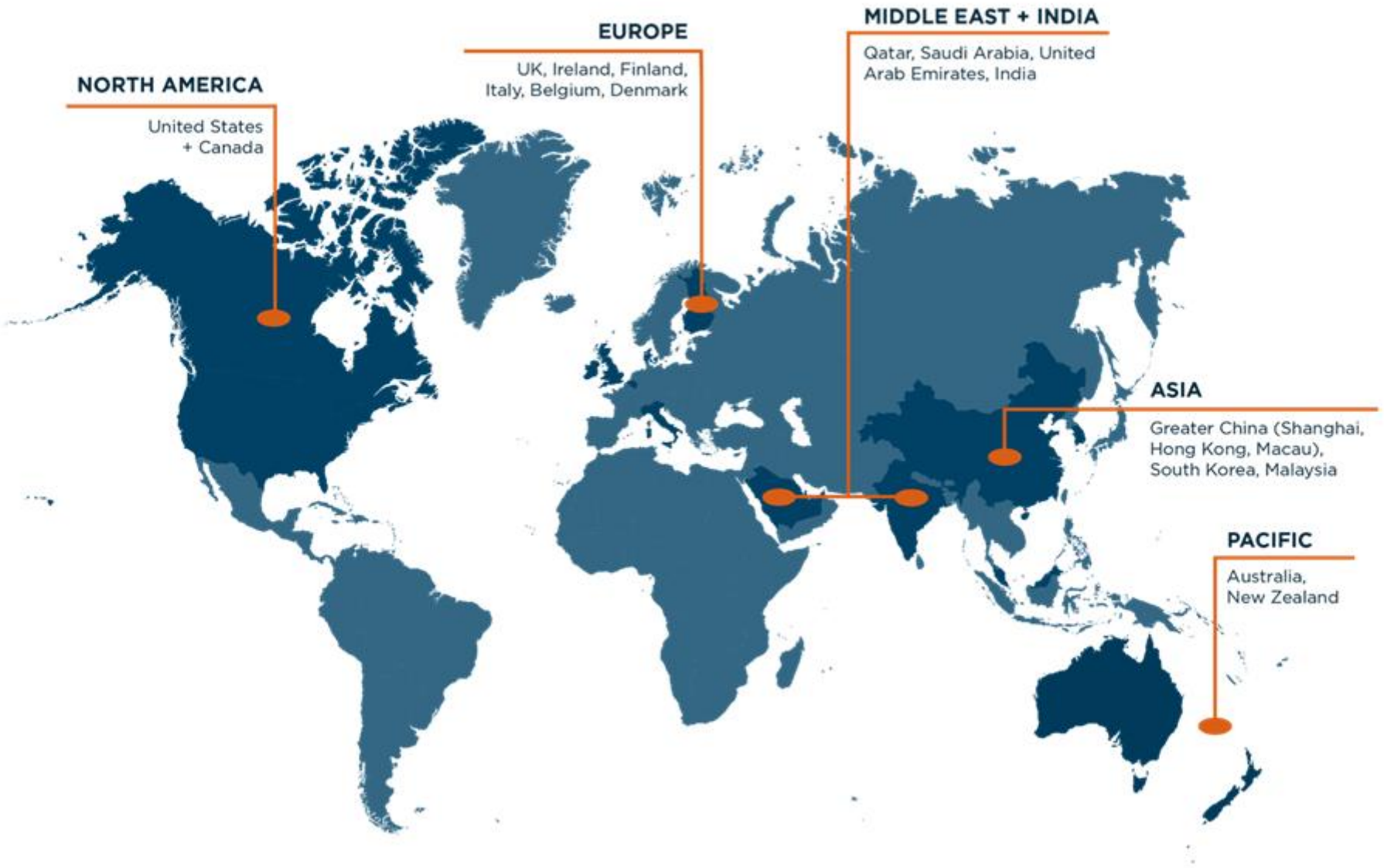


Agenda

- Foreword – the point of view of the Design Engineer
- The Water Mist Standardization in Europe
- The EN 14972 series project
- The Design process for a water misty fire protection system
- The Fire Test Protocols published
- A guide to use the Protocol Tests
- IWMA as a source of updated information
- Conclusions

The point of view of the design engineer 1/2

The Fire Protection Engineer selects the most suitable protection for a given application and provides specification for the procurement process.

- The correct process for the protection against fire of a given building/application should start from the analysis of the fire hazard by a fire protection engineer
- According to such an analysis the Fire Protection Engineer selects the most appropriate fire protection system to be provided, taking into consideration not only the construction features of the systems but also the “loss expectancies”
- This last point is of utmost importance, it is expected that the Fire Protection Engineer takes into consideration the consequences of the intervention of the protection systems, as well as the management of the system and its operation.

The point of view of the design engineer 2/2

The Fire Protection Engineer selects the most suitable protection for a given application and provides specification for the procurement process.

- Then it is expected a complete specification of the fire protection system to be provided to be prepared by the engineer, to be used for the procurement process that will imply, in all cases, a bidding process involving two or more potential suppliers.
- The preparation of the specification is therefore a substantial part of the job of the Fire Protection Engineer who needs, for preparing it, the basic design data to dimension the system.
- In the normal engineering job this is made by consulting the applicable technical standards where it should be possible to find the basic information for the preliminary design of the required system.

The European Standardization on Water Mist Systems 1/6

The need for a standard on water mist system was realized by the TC 191 – the European Fire Fighting System Committee.

- In the early ‘90s a “task group” of TC191-WG5 – the sprinkler system working group was started and the works to develop a European water mist standard were started.
- The work was “intensive” with 10 to 20 delegates attending most of the meetings but the “speed” was not adequate for the development of the industry
- At the end, in 2008, a first document was published – the TS 14972, TS meaning Technical Specification, a sort of tentative standard to be confirmed in a few years.
- In the same time the main European countries developed national standards on water mist systems, including BSI in UK, DIN/VdS in Germany, Apsad/CNPP in France… and in US the NFPA 750 was at its third edition!

The European Standardization for Water Mist 2/6

The Technical Specification issued in 2010 as CEN/TS 14972

MOST OF THE DESIGN SPECIFICATIONS ARE TO BE TAKEN FROM THE DIOM - Design; Installation, Opeartion and Maintenance

The European Standardization for Water Mist 3/6

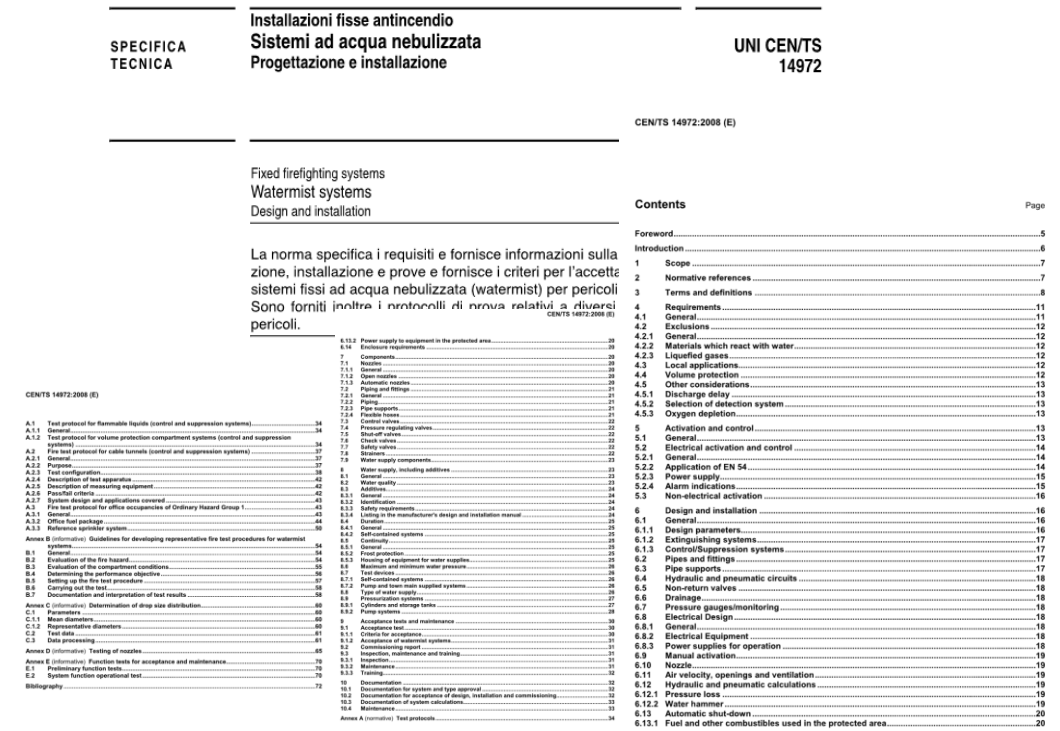
It is immediately clear the inadequacy of the document

The concept of a water mist system is not clear in the original document, being still referred to the Halon replacement with detection and discharge!

The protocols included in the standard are quite limited and not coordinated with the international standardization that remains prevalent

There is no indication about the certification rules for compliance with the standard

Only nozzles are considered among the components.



SPECIFICA TECNICA

Installazioni fisse antincendio
Sistemi ad acqua nebulizzata
Progettazione e installazione

UNI CEN/TS 14972

CEN/TS 14972:2008 (E)

Fixed firefighting systems
Watermist systems
Design and installation

La norma specifica i requisiti e fornisce informazioni sulla zione, installazione e prove e fornisce i criteri per l'accetta sistemi fissi ad acqua nebulizzata (watermist) per pericoli Sono forniti inoltre i protocolli di prova relativi a diversi pericoli.

CEN/TS 14972:2008 (E)

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IT WAS THEN SOON PROPOSED TO DEVELOP A MORE COMPREHENSIVE TRUE EN STANDARD, COVERING ALL ASPECTS OF THE WATER MIST SYSTEMS AND COORDINATED WITH THE REST OF THE WORLD

The European Standardization for Water Mist 4/6

The European Standard EN 14972 – parts 1 to 17 e the EN 17450 parts 1 to 5

THE PROJECT EN 14972 AND 17450

PART 1 IS: Design, Installation, Inspection and Maintenance

Parts 2 to 17 are the Fire Test Protocols already accepted; Parts 18 to 22 being developed as soon as consolidated on the market.

EN 17450 series are the standards (5 for the time being) covering construction and testing of main components.

IT REMAINS THE REFERENCE TO THE DIOM

Design, Installation, Operation & Maintenance Manual issued by the Manufacturer

The European Standardization for Water Mist 5/6

The series of protocols published as EN 14972 – parts 2 to 17

The most relevant innovation of the EN 14972 series is the pubblication as EN standard of the 14972-1 and of the fire test protocols that are officially recognized and EN Standards

They were selected according to a decision taken since the beginning of the works; they include only protocols already existing and used by one or more manufacturers that make them available on the market.

They are NOT harmonized standards and then they do not follow the process of CE Marking by Notified Bodies.

EN 14972, *Fixed firefighting systems — Water mist systems*, consists of the following parts:

- *Part 1: Design, installation, inspection and maintenance;*
- *Part 2: Test protocol for shopping areas for automatic nozzle systems;*
- *Part 3: Test protocol for office, school class rooms and hotel for automatic nozzle systems;*
- *Part 4: Test protocol for non-storage occupancies for automatic nozzle systems;*
- *Part 5: Test protocol for car garages for automatic nozzle systems;*
- *Part 6: Test protocol for false floors and false ceilings for automatic nozzle systems;*
- *Part 7: Test protocol for commercial low hazard occupancies for automatic nozzle systems;*
- *Part 8: Test protocol for machinery in enclosures exceeding 260 m^3 for open nozzle systems;*
- *Part 9: Test protocol for machinery in enclosures not exceeding 260 m^3 for open nozzle systems;*
- *Part 10: Test protocol for atrium protection with sidewall nozzles for open nozzle systems;*
- *Part 11: Test protocol for cable tunnels for open nozzle systems;*
- *Part 12: Test protocol for commercial deep fat cooking fryers for open nozzle systems;*
- *Part 13: Test protocol for wet benches and other similar processing equipment for open nozzle systems;*
- *Part 14: Test protocol for combustion turbines in enclosures exceeding 260 m^3 for open nozzle systems;*
- *Part 15: Test protocol for combustion turbines in enclosures not exceeding 260 m^3 for open nozzle systems;*
- *Part 16: Test protocol for industrial oil cookers for open nozzle systems.*
- *Part 17: Test protocol for residential occupancies for automatic nozzle systems.*

The European Standardization for Water Mist 6/6

What is included in the new project 14972 and 17450

Togheter with the standard on the **Design, Installation, Maintenance,** now completed with the **Inspection,** that is part of the EN 14972-1

There is also the EN 17450 series, from 1 to 5, here detailed, that covers the construction characteristics of the main components of the system, and the test to be passed to be considered **COMPLIANT** with the European standardization

EN 17450, *Fixed firefighting systems — Water mist systems*, consists of the following parts:

— Part 1: *Product characteristics and test methods for strainer and filter components*

— Part 2: *Product characteristics and test methods for nozzles*

— Part 3: *Product characteristics and test methods for check valves*[1]

— Part 4: *Product characteristics and test methods for control deluge valves and actuators*

— Part 5: *Product characteristics and test methods for pressure switches*[1]

Also the above mentioned Component Standards are NOT harmonized standards and then they do not follow the process of CE Marking by Notified Bodies.

IS THE NEW STANDARD A REAL DESIGN TOOL?

To which extent the new standard meets the Fire Protection Engineer's needs for the design of a water mist system "suitable for the application"?

Let's have a look to the simple diagram here shown.

It gives an idea of the design process that the Fire Protection Engineer follows when selecting and specifying a fire protection system for a given application

The reference to the applicable standard is always involved together with the fire hazard classification and configuration.

The general process includes some steps:

Fire Risk Analysis (Fire Hazard identification)

Fire Hazard Classification (OH, EH, Storage, etc…)

Fire Hazard lay-out and configuration (size, height, etc…)

In general, at this point, the fire protection specification can be deducted from the applicable standards.

USING EN 14972 standard series

The specification process for a water mist system according to EN 14972

The process continues in two different ways

Conventional Standard, e.g.: EN 12845, EN 15004, ecc..

Answer to the question: is the fire hazard under consideration covered by a fire test protocol

si

no

COMPLETE DEFINITON OF THE SYSTEM USING THE APPLICABLE STANDARDIZATION.

Other

EN 14972, *Fixed firefighting systems — Water mist systems*, consists of the following parts:

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- *Part 5: Test protocol for car garages for automatic nozzle systems;*
- *Part 6: Test protocol for false floors and false ceilings for automatic nozzle systems;*
- *Part 7: Test protocol for commercial low hazard occupancies for automatic nozzle systems;*
- *Part 8: Test protocol for machinery in enclosures exceeding 260 m³ for open nozzle systems;*
- *Part 9: Test protocol for machinery in enclosures not exceeding 260 m³ for open nozzle systems;*
- *Part 10: Test protocol for atrium protection with sidewall nozzles for open nozzle systems;*
- *Part 11: Test protocol for cable tunnels for open nozzle systems;*
- *Part 12: Test protocol for commercial deep fat cooking fryers for open nozzle systems;*
- *Part 13: Test protocol for wet benches and other similar processing equipment for open nozzle systems;*
- *Part 14: Test protocol for combustion turbines in enclosures exceeding 260 m³ for open nozzle systems;*
- *Part 15: Test protocol for combustion turbines in enclosures not exceeding 260 m³ for open nozzle systems;*
- *Part 16: Test protocol for industrial oil cookers for open nozzle systems.*
- *Part 17: Test protocol for residential occupancies for automatic nozzle systems.*

HOW TO USE THE EN 14972

How can we use the mentioned protocols and what do they represent

The series of protocols, those already published shown here and the 5 more under preparation, are not easy to use if the Fire Engineer is not an expert in water mist technology.

But we need to include the “normal” Fire Engineer in the number of engineers that can specify a water mist fire protection.

This condition is well known within the working group and thefore the following decision was taken “to bridge the gap”

IT WAS THEN DECIDED, WITHIN WG10 TO PREPARE THE AMENDMENT 1 TO 14972-1 INCLUDING THE ADDITIONAL INFO REQUIRED

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— *Part 16: Test protocol for industrial oil cookers for open nozzle systems.*

— *Part 17: Test protocol for residential occupancies for automatic nozzle systems.*

THE AMENDMENT 1 TO EN 14972-1 - to help the Fire Engineers

What is include in the Amendment 1

The index of the Annexes is given here;
The annexes has been published as EN 14972-1:2020+A1:2025 and includes:

- Some “errata corrige” to the main text
- Information on the “operating areas” for automatic nozzle systems
- A more “engineered” description of the hazards covered by each of the protocols included in the currente version of the standard

IN EACH OF THE ANNEXES FROM C TO R «ADDITIONAL INFORMATION» ON EACH OF THE PUBLISHED PROTOCOL IS GIVEN.

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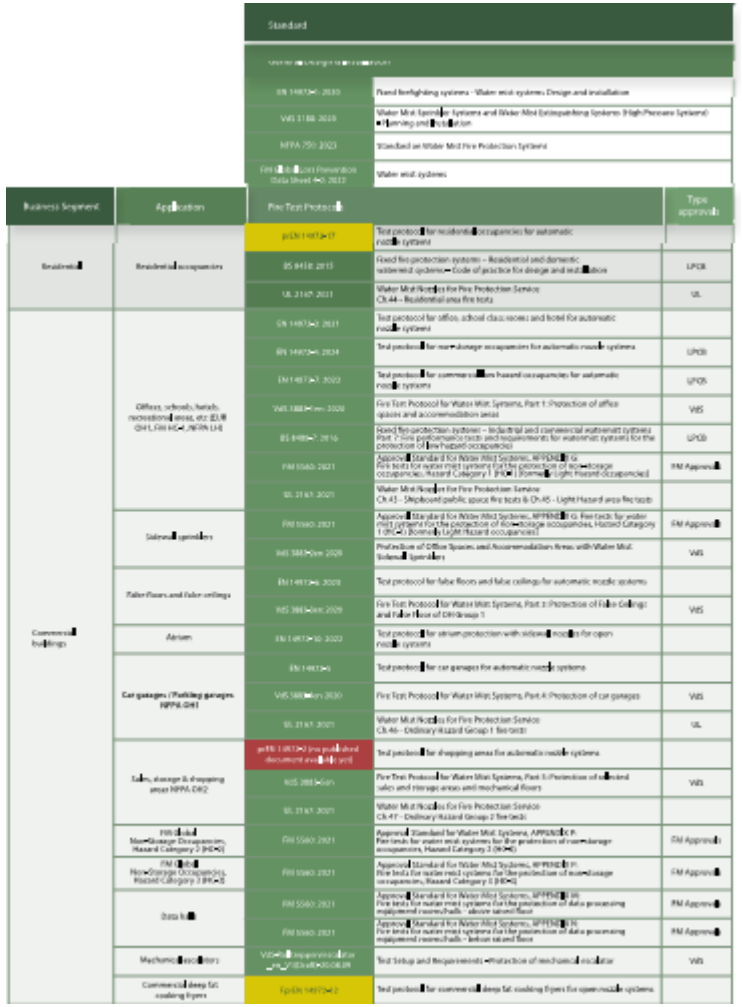
ASSISTANCE TO THE FIRE PROTECTION ENGINEERS

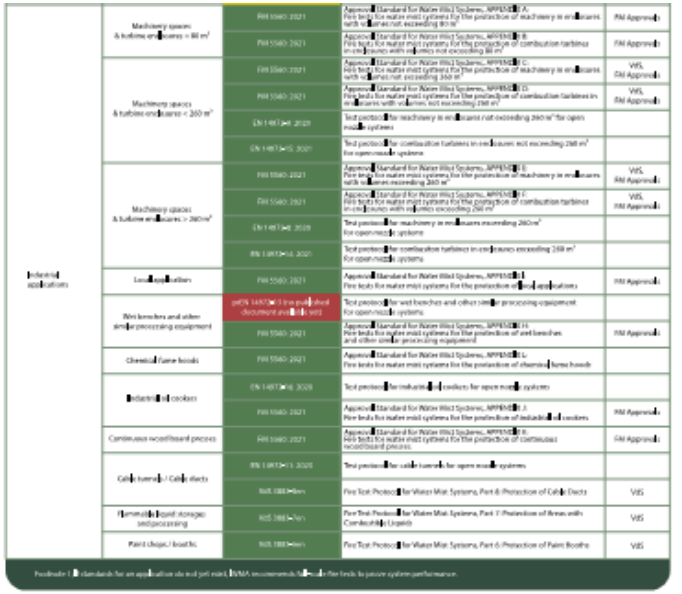
The EN 14972-1 + A1 help to answer the key question: Is the Protocol 14972-XX representing the fire hazard under consideration?

As mentioned already, the key matter for the Fire Engineer in specifying a water mist fire protection is the identification of the Fire Test pritocol representing that hazard

When this is accomplished, the specification of the water mist system will simply become: a system certified to have passed the protocol XX shall be provided.

The Matrix from IWMA is now being expanded with Amend.nt 1





THE MATRIX FROM IWMA HAS BEEN PUBLISHED AND REGULARLY UPDATED

CURRENT STATUS AND DEVELOPMENTS

Where are we now and which are the expected future developments

The EN 14972 series is now “REAL” and it represents the most comprehensive standard on water mist system available in the world

With the coming further protocols (see here) they will include almost all the available protocols for testing water mist systems

They are existing protocols “Endorsed by CEN”

With the Annex 1 most of the “doubts and questions” have been covered

There are of course some open points to address for a practical use of the standard…

Other protocols to be published:

Part 18: Local Application involving flammable liquids

Part 19: Areas with combustible liquids

Part 20: areas classified HC2 ed HC3 as per FM approval standard 5560

Part 21: Data Processing Areas

Part 22: Electronically activated nozzles for domestic use.

THE STANDARD EN-14972 SERIES CURRENTLY REPRESENTS THE MOST COMPREHENSIVE STANDARD ON WATER MIST SYSTEM AVAILABLE WORLDWIDE

OPEN ISSUES FOR THE PRACTICAL APPLICATION

For the current use of the EN 14972 and 17450 series some open issues still exist, mainly to be solved at National Level. They include:

- **The recognition of the authority/organization that can approve the system tested according to one of the fire test protocols published as EN 14972-2 to 17 by one recognized laboratory**
- **The recognition of the authority/organization that can approve the components, based on the report of the tests carried out in accordance with one of the EN 17450 test procedures**
- **The qualification of the water mist installer that can correctly complete the design and installation of the water mist system according to EN 14972-1 standard.**

The first two point are “vital” for the industry: a common framework is now available to avoid the need to run different fire test for the recognition in different countries. The third is more a national issue and is being developed in various countries.

CONCLUSION

It was a long long task, but it is finished (almost). It will help the diffusion of one of the most promising fire protection technology of the recent years

The availability of recognized fire test protocols is a key issue for the use of a water mist fire protection system

They are now, and will be more and more, available as EN standards receiving the recognition of the International community

The current status of the standardization should now be a real help for the Fire Protection Engineers

IT WILL CERTAINLY GIVE A STRONG IMPULSE TO THE DIFFUSION OF THE TECHNOLOGY.

JENSEN HUGHES

Thank You

Questions?