

*International Water Mist Conference , Barcelona (Spain), November 14-15, 2012*

## **Complete Fire Protection With EI-Mist of a 540 m Tall Tower**

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### **Introduction**

The Russian Ministry of Communications has placed its trust in the excellence driven partnership of Eusebi's Group parent company, Eusebi Impianti S.r.l, which will be responsible for monitoring and dealing with the engineering of this complex project, and the Russian joint venture OOO Plamya E1, which will supervise the assembly operations, leveraging its ample expertise and widespread presence in the area.

The Eusebi Group was chosen from three potential players, who are widely regarded as the most important and technologically advanced in the fire protection field. The challenge lies not only on the design and technical sides, but also arises from the extremely tight deadline. Indeed, the Russian authorities seek the permanent and full protection of the tower by February next year.

The Eusebi Group, through its Russian joint venture, OOO Plamya E1, has won an order worth approximately US\$ 6 million for the design, supply and installation of a water mist system, EI Mist, to protect the Ostankino TV tower in Moscow. This 540-meter high construction, which in August 2000 suffered a terrible fire, is the tallest in Europe and among the five tallest buildings in the world.

The focus of this paper is to emphasize fire protection measures to avoid the most prevalent threat faced by all high rise buildings - FIRE. No building is immune from fire. Until the owners/trustees of these institutions develop plans for dealing with the fire threat, they place the building and its occupants, visitors, workers at risk. The complexity of these plans may vary from a simple evacuation plan, to a fire prevention program, to a more complex plan that includes passive and automatic fire protection systems.

Structural damage from an earthquake might be repaired. Damage from fire, however, is usually permanent and irreparable. Fire can travel (spread) through very small openings and concealed spaces to quickly reach upper parts of a high rise building, deprive occupants of a life supporting environment, and cause partial to total destruction of property.

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Local fire department could save workers/guests/visitors and their property from any fire that may occur, and believe insurance will cover the rest. Reality is very different, and our daily fire statistics bear this out .

All the hotels, offices complex, Companies Headquarters located in high rise buildings should have a reliable fire fighting system to allow visitors and guests to safely evacuate the premises.



The presentation gives a brief state of the art of the fire fighting protection for high rise buildings, focusing on the major problems (complexity, many pumping systems, high pressures with traditional sprinkler components) faced with traditional systems. A high pressure system can solve all these problems and lead to a reliable and cost effective fire protection system for rooms, corridors, stairs, escape routes and In particular fire-wall penetrations. The fire can spread quickly from the external and internal side of the building: externally trough the broken windows and internally trough stairwells, elevators shaft, ductwork opening provided for the utilities.

In such high buildings, once started, the fire will be quite impossible to control by Fire brigades: fire ladders are not able to reach floors higher then 25-30 meters; it's so necessary that an automatic fire protection systems have to be installed for internal protection.

Basing on actual standard and technology the logical choice was to provide a combined, water based, wet and dry system. The European standard EN 12845 deals

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with Design, Installation and maintenance of Sprinkler Systems: annex E deals with sprinkler systems in high rise buildings and recommend to:

- split the system in sub-system not controlling more than 45 meter of building height;
- take in consideration the high water pressures, needed to reach upper floors.

In order to have a sprinkler system properly balanced several pumping sets have to be provided, each one with different pressure head values. Many pressure regulators have to be installed in order to meet the pressure requirement at each level, each single nozzle.

This leads to a huge complexity of the sprinkler system, in terms of equipment, use and maintenance.

Several application have demonstrated that High Pressure water mist systems can be sprinkler equivalent in the protection of high rise buildings and have better performances, so this was chosen for the actual protection.

A single pump set with pressures as high as 150 bar supplies all the levels without pressure regulators, minimizing the amount of risers and the size of the piping. Further, components usually used with this system have been installed in all the levels of the building, being consistent with pressures as high as 150 bar and more.

Considering the low system complexity also other particular protections have been achieved: cable ducts and their openings are always a problem. The tower core is full of cables and suitable fire protection has been designed providing dry Ei-Mist systems.

In conclusion, a High pressure water mist system allowed several benefits with regards to standard sprinkler systems: The installed EI MIST HP, complies with Russians fire-prevention standards and NFPA 750, IMO 913, A800, and CEN 14972.

Further developments by the technical committees of NFPA 750 and CEN/TC 191 WG3 (EN 14972) would be recommended on High Rise Buildings protections.