

HOGE E FIRE PROTECTION





TUNNEL FIRE PROTECTION

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To increase safety
To reduce fire-related damage
To reduce fire-related unavailability
To protect people and investments from fire
To allow compensation measures on infrastructure

See e.g.: NFPA130 Annex G ARGE Guidelines Italian Minister's Decree 28 "Safety in Railway Tunnels" and UNI 11565



NFPA130 Annex G: the new revision of 2014 introduces the advantages of using on-board suppression systems

Annex G On-board Fire Suppression System G.1 On-board fire suppression systems (e.g., mist systems), while relatively new in the passenger rail and fixed guideway industry have been successfully used on a number of passenger rail and diesel powered light rail systems outside of the United States. The applications for this type of system can range from protection of diesel engine compartments to the interior of passenger rail vehicles. The use of a fire suppression system may save lives in the incident vehicle during a fire condition; minimize damage to the train, tunnel and the station which it has entered; reduce or eliminate potential use of station sprinklers; reduce or eliminate the need for downstands; significantly reduce the impact of designing for fire emergencies on station architecture; reduce tunnel ventilation capacities by approximately 40 percent; reduce the number and/or diameter of emergency ventilation fans at each end of each station and within the tunnels, thus reducing structure sizes: decrease shaft airflow cross section areas by approximately 40 percent; and decrease tunnel ventilation shaft portal areas that correspond to the required fans sizes/ velocities. When considering the addition of a fire suppression system, several design challenges should be met by the rail vehicle manufacturer. These challenges include the type of extinguishing medium used, which all must be approved by the AHJ the size and number of medium canisters and where on the vehicle to place them for easy access for maintenance;

The NFPA130 Annex G is the first standard to introduce the advantages of using on-board fire suppression systems for rolling stock!



NFPA130 Annex G

Extract from the Annex G:

"Fire Suppression Systems […] have been successfully used on a number of rail systems outside of the US"

"The use of a fire suppression system may save lives in the incident vehicle during a fire condition"

"minimize the damage to the train, tunnel and station" "significantly reduce the impact of designing for fire emergencies"

And many design improvements on underground infrastructure design...please refer to the "Smart Concepts" to presentation



The ARGE Guidelines

Technical guidelines developed from the middle of years 2000 by a working group, led and under the supervision of TÜV Süd and TÜV Nord, of German speaking-area companies active in firefighting in rolling stock.

Widely applied all over the world and considered the "state of art" of the technical requirements and guidelines for design and validation.

3 parts:

- Fire detection in railway vehicles
- Firefighting in railway vehicles
- System functionality of fire protection systems for railway vehicles



The Italian case – DM "Safety in Railway Tunnels" and UNI 11565

A long and sad history of terrorism influenced nationwide public opinion and safety/security autorities:

- Summer of '69 train bombings
- Reggio Calabria riots and train bombings in '70-72
- Bologna Station bombing in 1980

Some particularly targeted trains in tunnels with , inside the 18.5km-long *Grande Galleria dell'Appennino*, with high death toll and nationwide shock:

- Train *Italicus*, 3 August 1974
- Train Rapido 904, 23 December 1984



The Italian case – DM "Safety in Railway Tunnels" and UNI 11565

In beginning of years 2000, with the planning and opening of the new high speed lines (in particular the new Florence-Bologna HS line, 78km 73.5 of them in tunnels), the need of improved safety did rise strongly.

The DM "Safety in Railway Tunnels" was released, introducing many requirements for safety and security:

- Escape routes in tunnels
- Quick reaction of rescue forces
- Access protection (surveillance etc.)
- Introduction of the mandatory requirement of fixed firefighting systems in all rolling stock running in tunnels longer then 1km



The Italian case – DM "Safety in Railway Tunnels" and UNI 11565

For the technical application, the standard UNI11565 was put into force:

UNI 11565 - RAILWAY VEHICLES - DESIGN, INSTALLATION, VALIDATION AND MAINTENANCE OF FIRE DETECTION AND EXTINGUISHING SYSTEMS TO BE USED IN RAIL VEHICLES

Conceptually very similar to the ARGE Guidelines



Fire Protection systems for Rolling Stock applications



FOGTEC projects in Israel

Refurbishments

Alstom PP Generator Wagons Bombardier DD Generator Wagons (with fire tests)

New trains

Bombardier DD (new generations) Vossloh EURO locomotives









Contents

- Technologies
 - For passenger areas
 - For technical areas



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Passenger areas

Smoke detection technology

- → Smoke is the first effect of a fire.
- → In an enclosed area as a passenger wagon, detecting fire by temperature means detecting it too late.
- → By point detectors or by smoke aspiration systems

Temperature detection: can be used in combination in "extreme" conditions





Passenger areas

Firefighting by high pressure water mist

Video 1





Video 2



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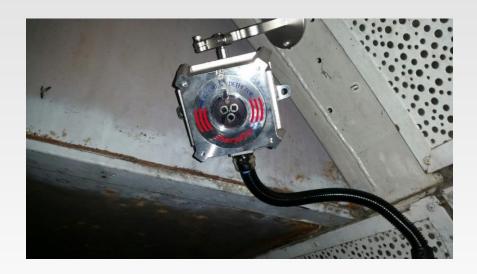


- Linear Heat Detector LHD
- Temperature detection
- Maintenance free component
- Robust in harsh environmental conditions





- Infra-red mini triple IR (IR3)
 Flame Detector
- Very quick flame detection
- Special version with metal housing for harsh environments
- Tested at Israel stat rail's fire test





Firefighting by high pressure water mist



Video 4



Aerosol systems



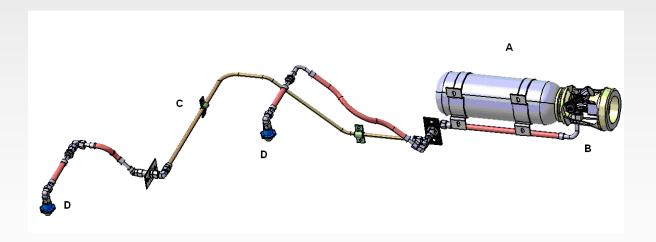


Video



Nitrogen systems

"total flooding concept" applicable only to enclosed electrical cabinets





Thank you very much for your kind attention!

