Modern Trends of Fire Protection in Rolling Stock 2014

Recent fire safety regulations and ongoing processes in Europe regarding active fire protection systems in rolling stock
IFAB Overview

- Consulting
  - Infrastructure Systems
  - „Classic“ Fire Protection
  - RAM-S & LCC
  - Simulations

- Fire and Smoke Testing
  - Laboratory
  - Smoke tests
  - Full scale and 1:1 testing
  - Measurements and methods

- Training/Seminars
  - Operators
  - Manufacturers
  - Supplier
  - Consultants
IFAB Infrastructure Systems

- Rail and road tunnels
- Rolling Stock
- Stations, Metros etc.

- Concepts
- Planning
- Approval processes
- Standards/Regulations
General overview of recent fire safety regulations / organisations related to rolling stock
Regulation pyramid

- TSI HS RST
- TSI CR LOC&PAS
- TSI SRT
- EN 45545
- EN 50553
- ARGE-Guidelines

EC-Directive
EC-Regulation
National (law)
Non statutory regulations

Number of documents
Complexity of Changeability
Detail
EC-Directive / EC-Regulation on top \(\rightarrow\) law.
EC-Directive must be transferred into national law by member states.
TSIs serve the implementation of the EC-Directive regarding Interoperability, but define mainly functional objectives.
TSIs are European legislative documents, superseding national legislation on the topics they address.
TSIs set out requirements to subsystems and interoperability constituents. These requirements are valid in all Member States of the EU.
TSIs define the interfaces between the different subsystems to ensure their compatibility.
TSIs apply to new subsystems and conditionally to the upgrade and renewal of existing subsystems, but does not apply to existing subsystems.
TSI refer to appropriate EN standards for related topics/contents.
Standard Committee

National level example Germany
Regional level example Europe
International

Secretariat:
DIN-FSF
Rüdiger Wendt

Secretariat:
AFNOR – BNF
Bernard Lerouge

Source: DIN FSF

Current situation
European/National Standards

BS 6853
UIC 564-2 u. a.
VNPB 03
ZT 6
PN 93/K-02506
PN 88/K-02500
DIN 5510
NF F 16-101 to -103
UNI CEI 11170-1 to 3 (FS 306574 and FS 304142) (Decreto Ministeriale)
RENFE DT-PCI/5A
The series of European standards "Railway applications — Fire protection on railway vehicles" consists of:

- Part 1: General
- Part 2: Requirements for fire behaviour of materials and components
- Part 3: Fire resistance requirements for fire barriers
- Part 4: Fire safety requirements for railway rolling stock design
- Part 5: Fire safety requirements for electrical equipment including that of trolley buses, track guided buses and magnetic leviation vehicles
- Part 6: Fire control and management systems
- Part 7: Fire safety requirements for flammable liquid and flammable gas installations

EN 45545

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Ongoing processes / Changes in future
Changes

- TSI HS RST
- TSI SRT → Running Capability: EN 50553
- EN 45545 → EN 50553
- DIN 5510 → DOW March 2016
- ARGE-Guidelines → Revision / FCCS
## Changes EN 45545

### Current situation

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### Target situation

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Source: CEN
EN FCCS impact on active fire protection systems in rolling stock
FIRE BARRIERS (according to recent TSI LOC&PAS)
Category B fire safety rolling stock shall comply with both of the following requirements:
“Fire spreading prevention measures (FSPM) shall ensure that fire and smoke will not extend in
dangerous concentrations over a length of more than 28 m within the passenger/staff areas inside a
unit, for at least 15 minutes after the start of a fire. The equipment to satisfy this requirement shall be
installed in each vehicle and shall provide at least the same level of safety to persons on board as full
cross section partitions, with integrity of 15 minutes. If full cross section partitions are used, the
assessment method shall be in accordance with the requirements of EN 1363-1:1999 partition test and
assuming the fire can start from either side of the partition. If the FSPM in the unit do not include full
cross section partitions within the passenger/staff areas, the safety level on board shall be
demonstrated by comparative analysis between full cross section partition and the FSPM chosen. If
this demonstration is done with the help of computational fluid dynamics (CFD) simulations, these
simulations shall be validated by 1:1 tests conducted on a model representing the circumstances
applicable to the unit which is subject to TSI assessment. In the determination of the safety level, the
reliability and availability of the FSPM, as well as the accuracy of the demonstration method, shall be
taken into account.”
The aim is to close the open point regarding FCCS in the TSIs

Scope of Standard:
This standard has to define the functional requirements for Water mist systems that can be used as Fire Spreading Protection Measures instead of full cross section partitions:
- Technical requirements in order to extinguish or contain fire and smoke emission
- Functional characteristics linked to essential requirements (e.g. safety)
- If the watermist system is activated automatically by means of a fire/smoke detector, the specific characteristics of such detection systems shall be specified (thermal inertia, etc)

This standard has to define an assessment method with pass/fail criteria. This assessment method shall be based on a real test with a suitable fire model (ignition model 5 according to EN 45545, additional details to be defined in the Standard) and it shall be possible to test the system regardless the train it will be fitted on. If the system is activated automatically, the assessment method shall cover the fire/smoke detection system coupled with the watermist system.
The TSI LOC&PAS may refer in the future to relevant part of the standard in order to close the open point on assessment, making them of mandatory application.

Source: RfS ERA
EN FCCS is another step into the holistic approach regarding fire safety in rolling stock!

The holistic approach becomes more and more important → NFPA130:2014 already underlines this in Annex G.
Holistic Approach

Today's accepted safety measures (prescriptive)

- Increase of safety level → Increase of costs
- Same safety level → Reduction of costs
- Clever solutions

Costs of safety system vs. Safety level

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Thank you very much for your kind attention!

E-Mail: klinger@ifab-fire.com

www.ifab-fire.com