

FIRE CONTAINMENT AND CONTROL SYSTEMS

III INTERNATIONAL CONFERENCE MODERN TRENDS OF FIRE PROTECTION IN ROLLING STOCK

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LET ME INTRODUCE MYSELF

I AM

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(Rolling Stock Engineering Centre)
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Rolling stock
- + Speaker for CER in the TSI LOC&PAS working party

CENTRE D'INGÉNIERIE DU MATÉRIEL WHO ARE WE ?

ROLLING STOCK ENGINEERING CENTRE

Part of the SNCF Rolling Stock Division, located at Le Mans

Over **70 years of experience** in railway rolling stock engineering

250 technicians & engineers with cutting-edge technical skills
covering 90 technological and scientific railway disciplines

CENTRE D'INGÉNIERIE DU MATÉRIEL WHO ARE WE ?

Comprehensive know-how

Specification, support to development, design and installation of railway rolling stock and its equipment,

Assistance to project management for all rolling stock

Know-how upgraded by analysis of operational feedback and technology watch

Clients : Operators - Manufacturers - Equipment suppliers - Rolling stock and wagon operators - Wagon owners - Organising Authorities - Institutional bodies - Infrastructure managers

WHAT WE DO ?

Technical responsibilities

- Project Management
- Safety and braking equipment
- Diesel engine
- Bogies and bearing equipment
- Propulsion and energy conversion
- Body structure and interior fittings
- Systems engineering and transverse functions



WHAT WE DO ?

Services

- Procurement and refurbishment of rolling stock
- Assessment and diagnostics
- Functional and technical standards drafting
- Safety equipment integration and qualification
- Verification of component compliance with standards & regulations
- Assistance and advice for rolling stock design and homologation

All engineering services available with

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FIRE SAFETY FOR RAIL VEHICLES - SUMMARY

Regulation (TSI LOC&PAS)

Standardisation (EN 45545 series)

Work to be done by CEN TC256 WG1 FPRS

TSI LOC&PAS N°1302/2014 (18 NOVEMBER 2014)

4.2.10.2.1. Materials used to construct the rolling stock unit shall comply with the requirements of the EN45545-2



4.2.10.4.4. Running capability according EN 50553



4.2.10.3. Measures to detect/control fire

4.2.10.3.4 Fire containment and control systems for passenger rolling stock

(1) This clause is applicable to units of category B passenger rolling stock.

(2) The unit shall be equipped with adequate measures to control the spread of heat and fire effluents through the train.

(3) The conformity with this requirement shall be deemed to be satisfied by the verification of conformity to the following requirements:

— The unit shall be equipped with full cross section partitions within passenger/staff areas of each vehicle, with a maximum separation of 30 meters which shall satisfy requirements for integrity for a minimum of 15 minutes (assuming the fire can start from either side of the partition), **or with other Fire Containment and Control Systems (FCCS).**

TSI LOC&PAS N°1302/2014 (18 NOVEMBER 2014)

- **The unit shall be equipped with fire barriers that shall satisfy requirements for integrity and heat insulation for a minimum of 15 minutes at the following locations (where relevant for the concerned unit):**
 - Between the drivers cab and the compartment to the rear of it (assuming the fire starts in the rear compartment).
 - Between combustion engine and adjacent passenger/staff areas (assuming the fire starts in the combustion engine).
 - Between compartments with electrical supply line and/or traction circuit equipment and passenger/staff area (assuming the fire starts in the electrical supply line and/or the traction circuit equipment).
 - The test shall be carried out in accordance with the requirements of the specification referenced in Appendix J-1, index 60.



TSI LOC&PAS N°1302/2014 (18 NOVEMBER 2014)

(4) If other FCCS are used instead of full cross section partitions within passenger/staff areas, the following requirements shall apply:

- They shall be installed in each vehicle of the unit, which is intended to carry passengers and/or staff,
- **They shall ensure that fire and smoke will not extend in dangerous concentrations over a length of more than 30 m within the passenger/staff areas inside the unit, for at least 15 minutes after the start of a fire.**

The assessment of this parameter is an open point.



Result RFS 045 from ERA

STANDARDISATION EN 45545

EN 45545: Railway applications — Fire protection on railway vehicles *published in March 2013*

in 7 parts

Part 1: General

Part 2: Requirements for fire behaviour of materials and components

Part 3: Fire resistance requirements for fire barriers

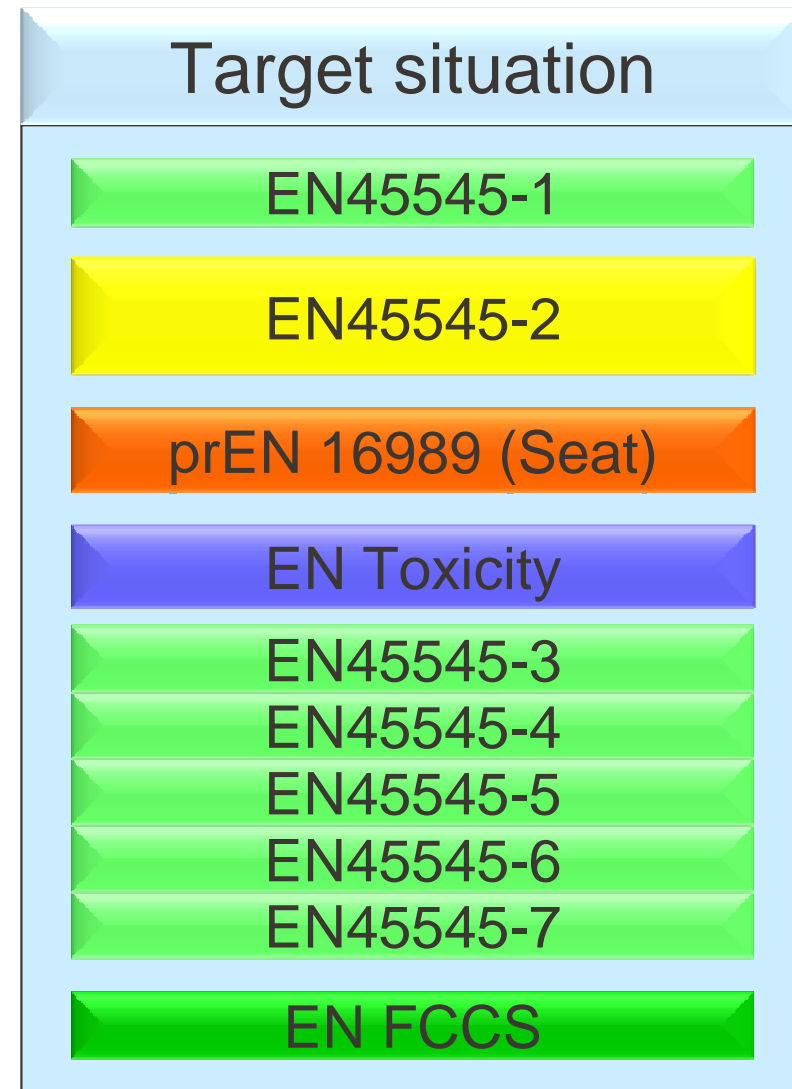
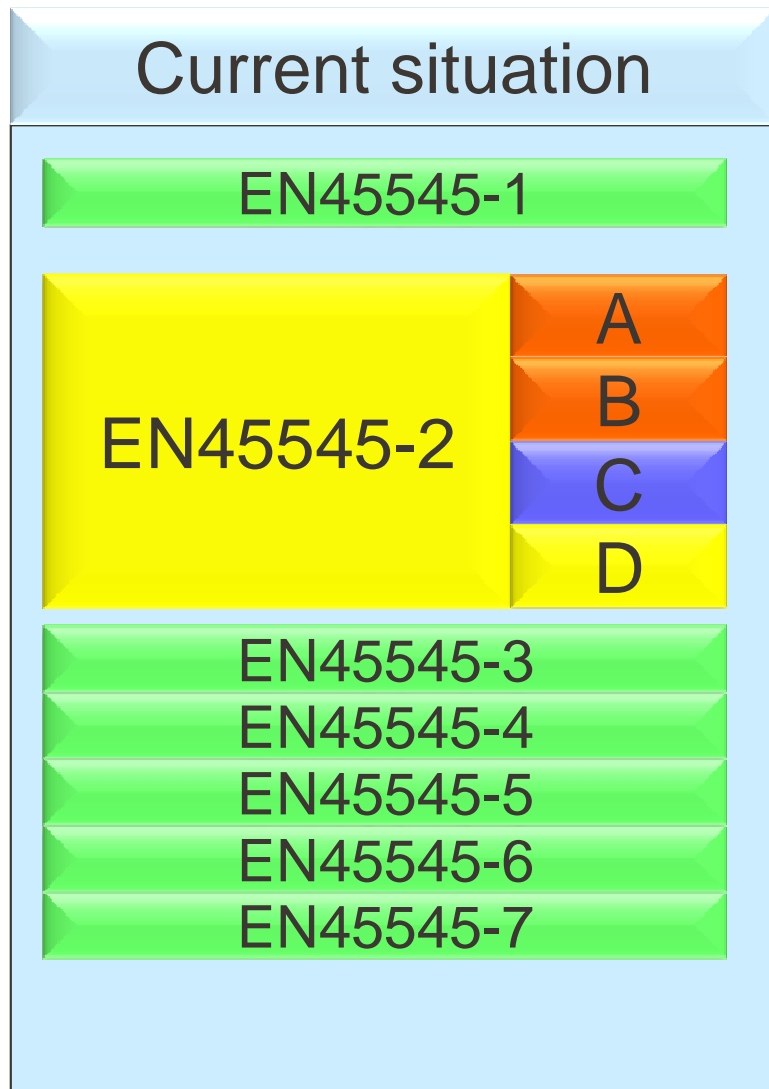
Part 4: Fire safety requirements for railway rolling stock design

Part 5: Fire safety requirements for electrical equipment including that of trolley buses, track guided buses and magnetic levitation vehicles

Part 6: Fire control and management systems

Part 7: Fire safety requirements for flammable liquid and flammable gas installations

WORKING PROGRAM OF CEN TC256 WG1



PREN16989 / EN 45545-2 ANNEXES A & B

prEN16983 Fire behaviour test on complete seats for railway vehicles

Based on Annexes A and B of EN45545-2:2013

Modification of the location of the burner (4 new holes, space between seat back)

HRR of the burner at 15 kW

Vandalization test machine well defined

Round robin tests in progress

In CEN enquiry in May 2016 ?

WI0740 / EN 45545-2 ANNEX C

prENToxicity (WI0740) Testing method for determination of combustion products from railway products

Based on Annex C of EN45545-2:2013

Refer to ISO 19021 (currently in DIS document)

Calculation of CIT, FED and FEC

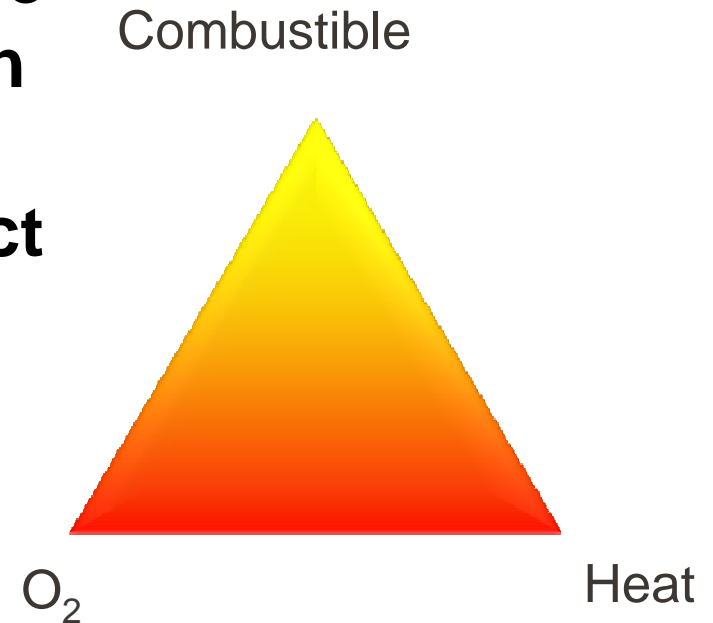
Ready for CEN enquiry

CEN enquiry in ??? (hope to be in September 2016)

WHAT IS FCCS?

An alternative system to physical fire barriers. It is an active system which restricts the passage of heat/flames and fire effluents sufficient to protect people near to it.

e.g. smoke exhaust system, water mist, aerosol ... may be potential systems for consideration as possible FCCS, choice to be made during TF FCCS.



CEN TC256 SG FCCS PROPOSAL

Title or the standard:

Railway application – Assessment of Fire Containment and Control Systems for railway vehicles

Scope of the standard:

This standard specifies the assessment of Fire Containment and Control Systems for railway vehicles which comply with EN45545-2 (material properties) and EN45545-4 (design rules).

This standard describes:

- Assessment of installation and capability of fire detection system
- Assessment of Interaction between fire detection system and FCCS
- Application and limitations of assessment process (mock-up or real scale test)

It considers the re-assessment of FCCS when vehicles which have already been assessed with FCCS are modified.

CONTENT OF THE STANDARD

Definitions of wording (FCCS, Fire Containment, Fire Control, Suppression system, fire (controlled), fire (uncontrolled) ...) (in addition of definitions in EN 45545-1, relevant Technical Specification for Interoperability (TSI) documents, EN ISO 13943 and ISO 8421-1)

Assessment of the fire detection system

What power and type of fire source for a test? what reaction time? Criteria to demonstrate that location of detectors is adequate? In a mock-up or in the real vehicle? (the power output of the fire source defined in the standard should be equivalent to the power output of ignition model 1 described in EN45545-1)

Assessment of the FCCS

What power and type of fire source for a test (heat, smoke) ? what working time in accordance with the running capability or with the “first evacuation”? In a mock-up or in the real vehicle? (the power output of the fire source defined in the standard should be equivalent to the power output of ignition model 5 described in EN45545-1 (reference type 2 fire described in EN50553))

CONTENT OF THE STANDARD

Application and limitations of assessment process (mock-up or real scale test)

(The demonstration of the efficiency of the FCCS by test shall be carried out in an environment representing all relevant aspects of the installed condition).

Definition of the boundary conditions to use mockup or real scale test (give a list of criteria)

Definition of layout of the test mockup in relation with the type of the vehicle and pass fail criteria of test

Definition of layout the real scale test and pass fail criteria of test

Integration type test

(emergency lighting, shut down HVAC, fire doors ...)

It considers the re-assessment of FCCS when vehicles which have already been assessed with FCCS are modified

Nature of modification which need a new assessment give a list of criteria)

It takes into account Reliability aspects

Definition criteria for Reliability aspects (The ability of systems to meet these requirements shall be verified by a system analysis e.g. EN50126, see also for example EN16334 clause 9.1)

THANK YOU