

Fire Protection Solutions from one source



FOGTEC Rail System

Fire Protection Solutions for Rolling Stock

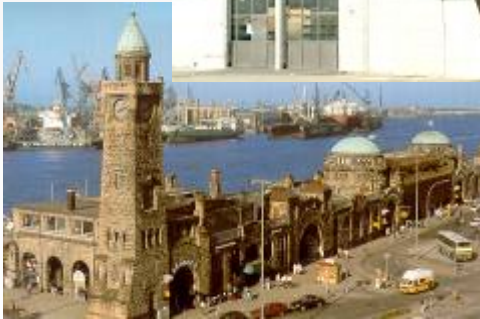
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- 4) The evaluation for using as compensation**

FOGTEC Brandschutz GmbH & Co. KG, Köln



FOGTEC Brandschutz GmbH & Co. KG, Köln



**Head office in Cologne, Germany
(with manufacturing hall)**

R&D, Rostock, Germany

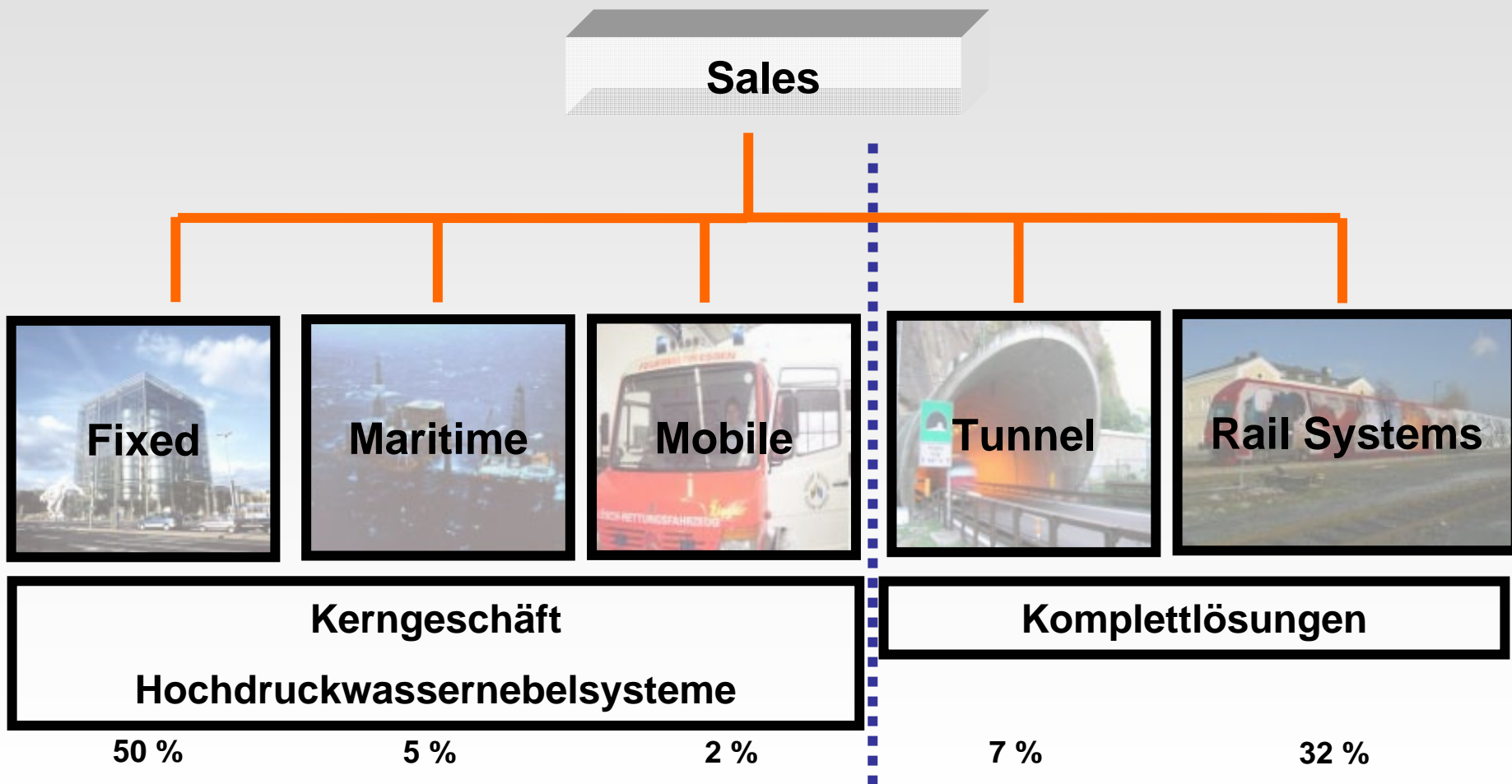
**Maritime Systems, Hamburg
Germany**

Office Asia, Mumbai, Indien

Office China, Shanghai, China

Office Spain, Madrid, Spain

Product areas / organisation of sales



Applications „Fixed Systems“



- Offices
- Archives
- Hotels
- IT – areas
- industrial applications
 - generators
 - engine test cells
 - gas turbines
 - CNC-machines
 - transformers
- cable channels
- deep fat fryers
- clean rooms
- flammable liquids

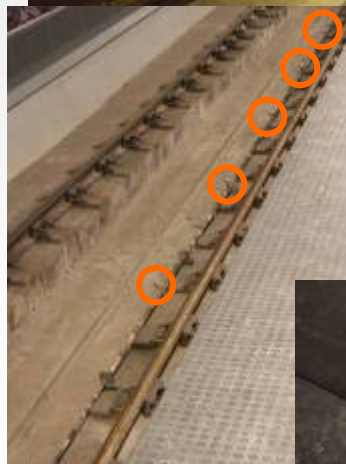


Applications „Mobile Systems and „Maritime Systems“



Railway Interior - 07.11.07

Applications “Metro and Tunnel Systems”



**Station protection,
e.g. Metro Budapest**



**Tunnel protection,
e.g. M30, Madrid**



FOGTEC Rail Systems



FOGTEC Rail Systems

Business Unit Rail Systems

- **Head Office Cologne, Germany**
 - In Spain exclusive rail systems representant: Hauptmann, Madrid
- **Specialised on development and marketing for fire protection solutions in rolling stock applications**
 - Fire detection technology
 - Fire fighting and fire extinguishing technology
 - Add on products
- **Development and manufacturing of complete modules**
- **Certificated regarding DIN 6700 for welding in rolling stock applications**
- **Rail Systems team: 18**
- **IRIS – certification process is started**



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What's new in fire protection for railway vehicles?

Until now:

Mostly the pressure of regulations brought fire protection systems on track. With additional costs and engineering efforts.

Now:

FOGTEC fire protection solutions are accepted for compensation!
(acceptance actual by EBA, BAV, BMVIT, CESIFER)

This could increase the safety, decrease complete project costs, give more possibilities for design aspects and help for the approval process.

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Compensation in rolling stock applications:

Actual and realised possibilities:

- Substitution of fire doors, reduced requirements on walls
- Reduction of the requirements on the durability on the bottom construction (e.g. for DMU's)
- Reduction of the requirements on construction materials
- Positive impact of the calculative evidence of strenght for the case, when the vehicle is full burning
- Impact on the planning of railway stations regarding the smoke volume to be conducted as well as the thermal loadings
- Positive impact on the evacuation concept

FOGTEC Rail Systems – references for compensation

Stadler Flirt



SBB – CH/ITA



SBB – CH/D



STA – A / ITA



NOH - Germany



SOB - CH



SBB - CH

FOGTEC Rail Systems – references for compensation



Stadler – Bayerische Zugspitzbahn – D



Siemens Desiro for ÖBB – A



Passenger coaches - D



Double deck trains – A



DMU – D

FOGTEC Rail Systems – references for compensation

MAGLEV



Railway Interior - 07.11.07

The Smarter Way of Fire Fighting

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Important for acceptance as compensation measurement:

- **100 % evaluation of systems functionality for**
 - **Fire detection**
 - **Components tested for railway application**
 - **System in railway vehicle tested regarding to „ARGE Directive – Fire Detection in Rolling Stock“**
 - **Fire Fighting system**
 - **Components tested for railway application**
 - **System evaluated in full scale fire tests regarding the test specifications of the responsible consultant and/or approval bodies**
- **Acceptable RAMS datas and/or redundant solutions**
- **Project processes regarding EN 50126**
- **For software based solutions SIL 1 regarding EN 5012X**

FOGTEC Rail Systems – evaluation of the Fire Fighting system

As an example for the Transrapid TR 09



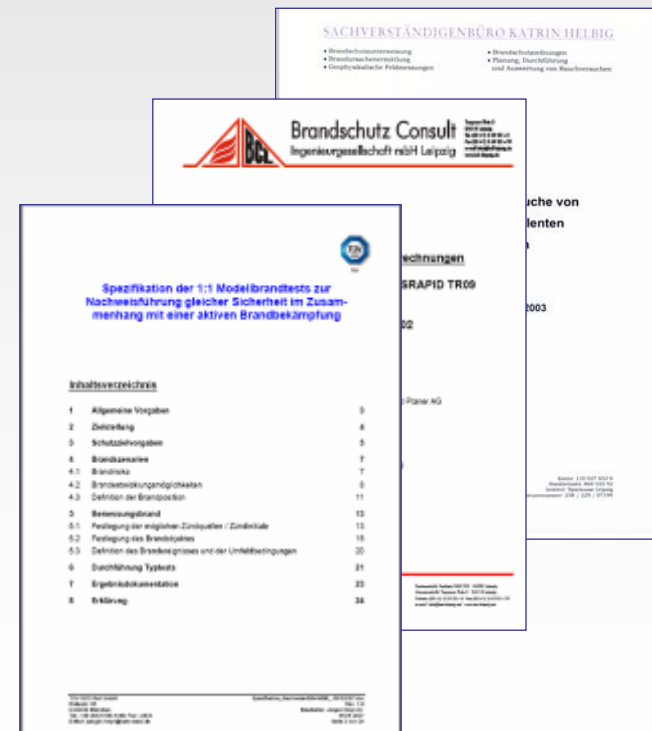
**MAGLEV Train
Transrapid TR 09
Munich Airport Link**

**ThyssenKrupp
Transrapid,
Kassel, Germany**

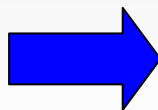
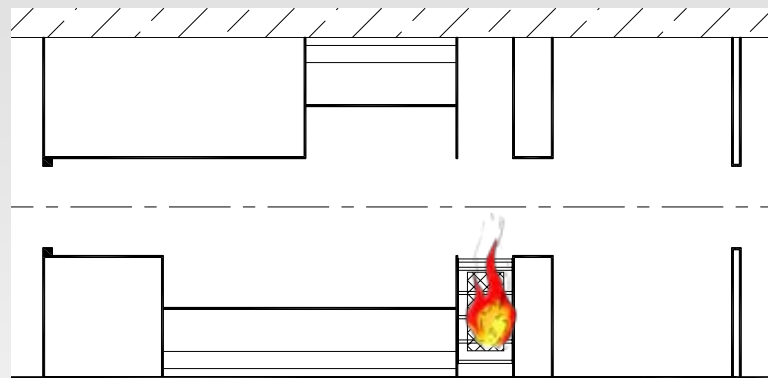
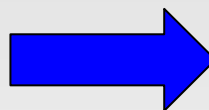
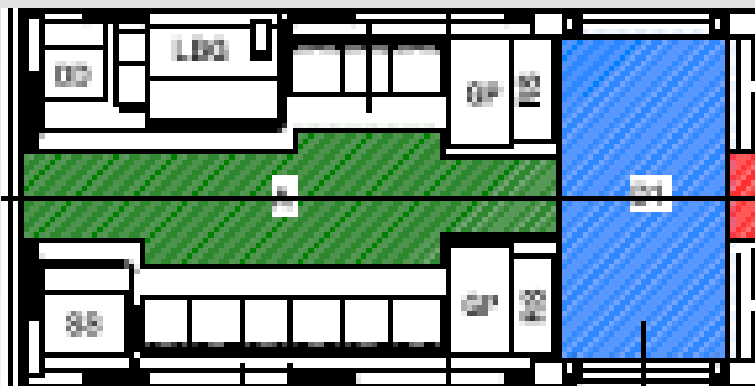
Aim of Evaluation of the System

To ensure safe atmosphere and area for people in the concerned area

Test Specification of TÜV Rail GmbH, based on the design fires specified by Brandschutz Consult Leipzig and the modell tests done by TÜV Rail GmbH, Brandschutz Consult Leipzig and Sachverständigenbüro Helbig with different fire loads.



Transfer of original Layout to Test-Mock up



Transfer of consultants requirements to real fire test

Fire load / Ignition source



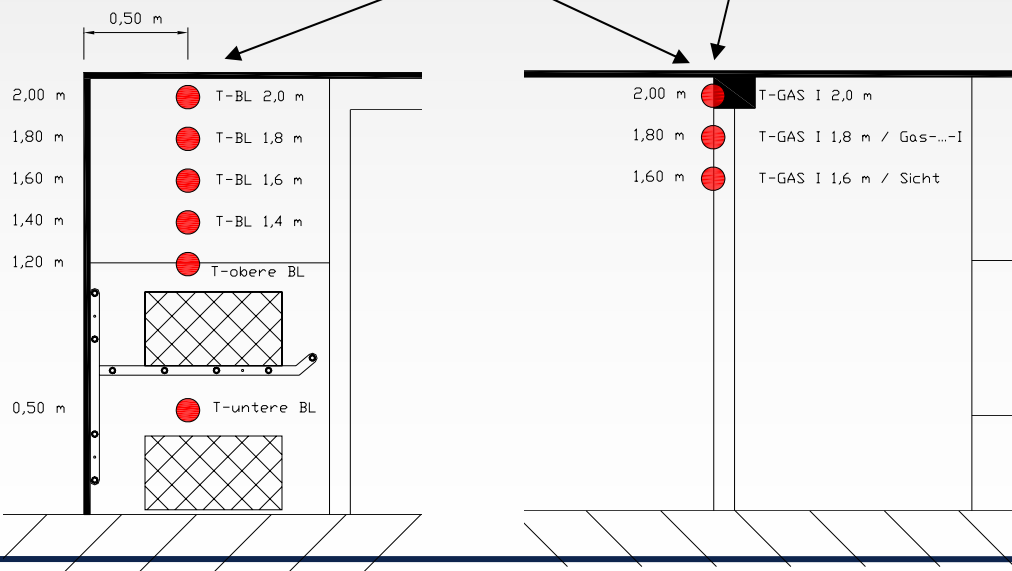
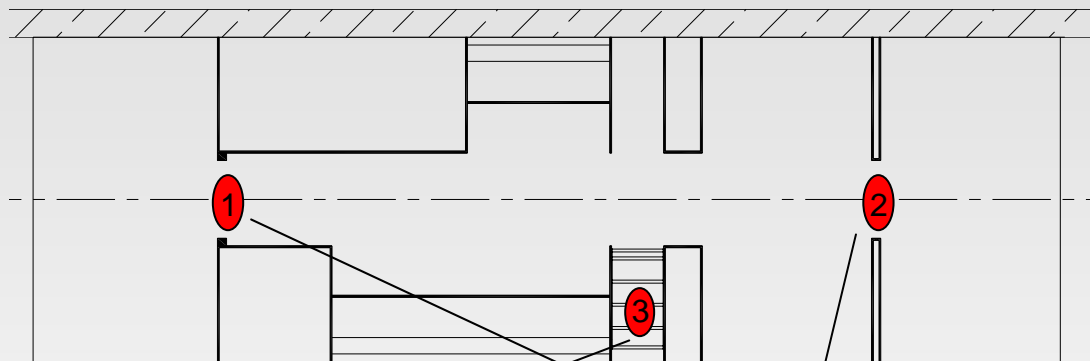
Plywood

Travel bags

UIC - Paper



Measurement Technology



Monitored Parameters

- Temperature
- Gases
- View

Criteria for Acceptance

Parameter	Target Value	Limit Value
Carbon monoxide	< 400 ppm	1400 ppm
Carbon Dioxide	< 0,8 Vol%	6 Vol%
Hydrocyanic acid	< 45 ppm	50 ppm
Oxygen	> 14 Vol%	12 Vol%
Gas temperature	< 60°C	65°C
Density of Smoke	> 0,2 m ⁻¹	0,3 m ⁻¹

Fire Test without Activation of the System

- Spread of fire from lower travel bag to upper travel back and to surrounding elements
- Temperature up to 950°C directly over the fire load and up to 450°C in the relevant areas for passenger protection
- high exposure from carbon monoxide and carbon dioxide
- extreme decrease of oxygen concentration

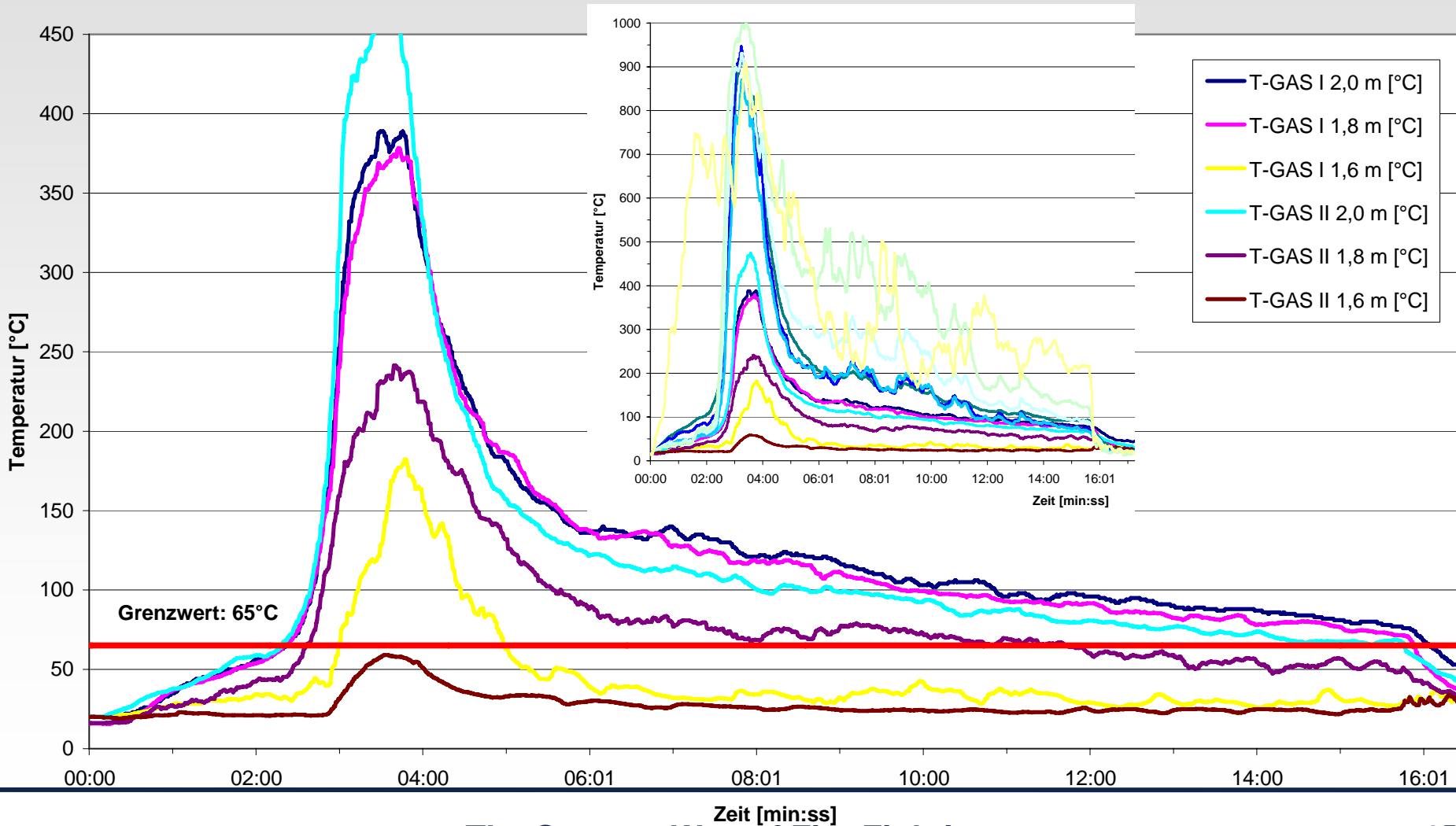
Consequences:

- persons abidance in the concerned area is not possible
- fire spread to the complete surrounding area, big damages

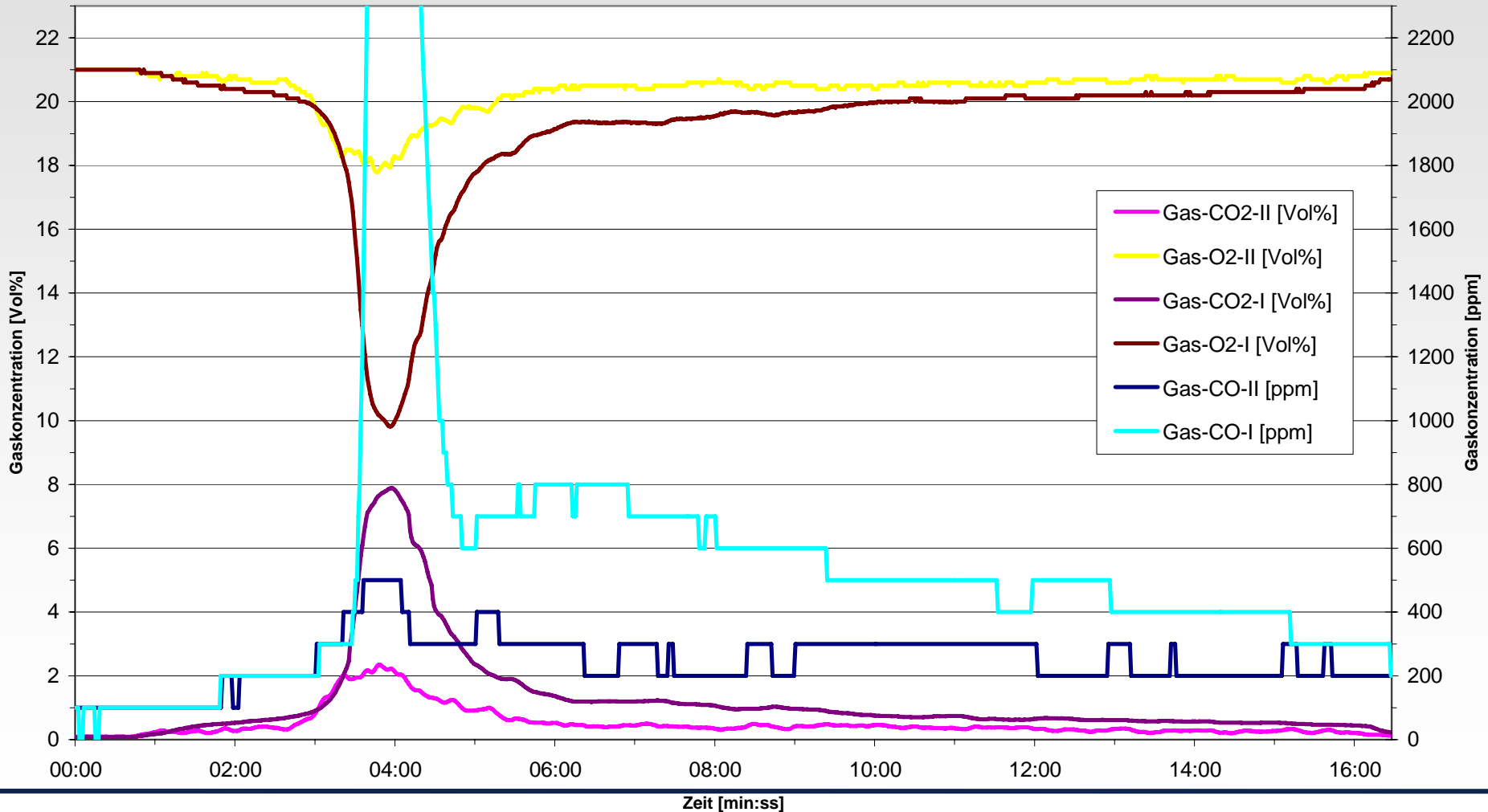
Fire Test without Activation of the System



jeweils 1 Reisetasche oben/unten, ohne Aktivierung der HDWN-Anlage



Abnahmeversuch 04 - Reisetaschen oben/unten, ohne HDWN-Anlage



Fire Test with Activation of the system

- Fire spread from lower travel bag to other elements is stopped, minimum damages on the upper travel bag and the surrounding area
- temperatures up to 250°C directly over the lower (ignited) travel bag and up to 55°C in the relevant areas for passenger protection
- no increase of carbon monoxide and carbon dioxide concentration
- no relevant changes in concentration of oxygen

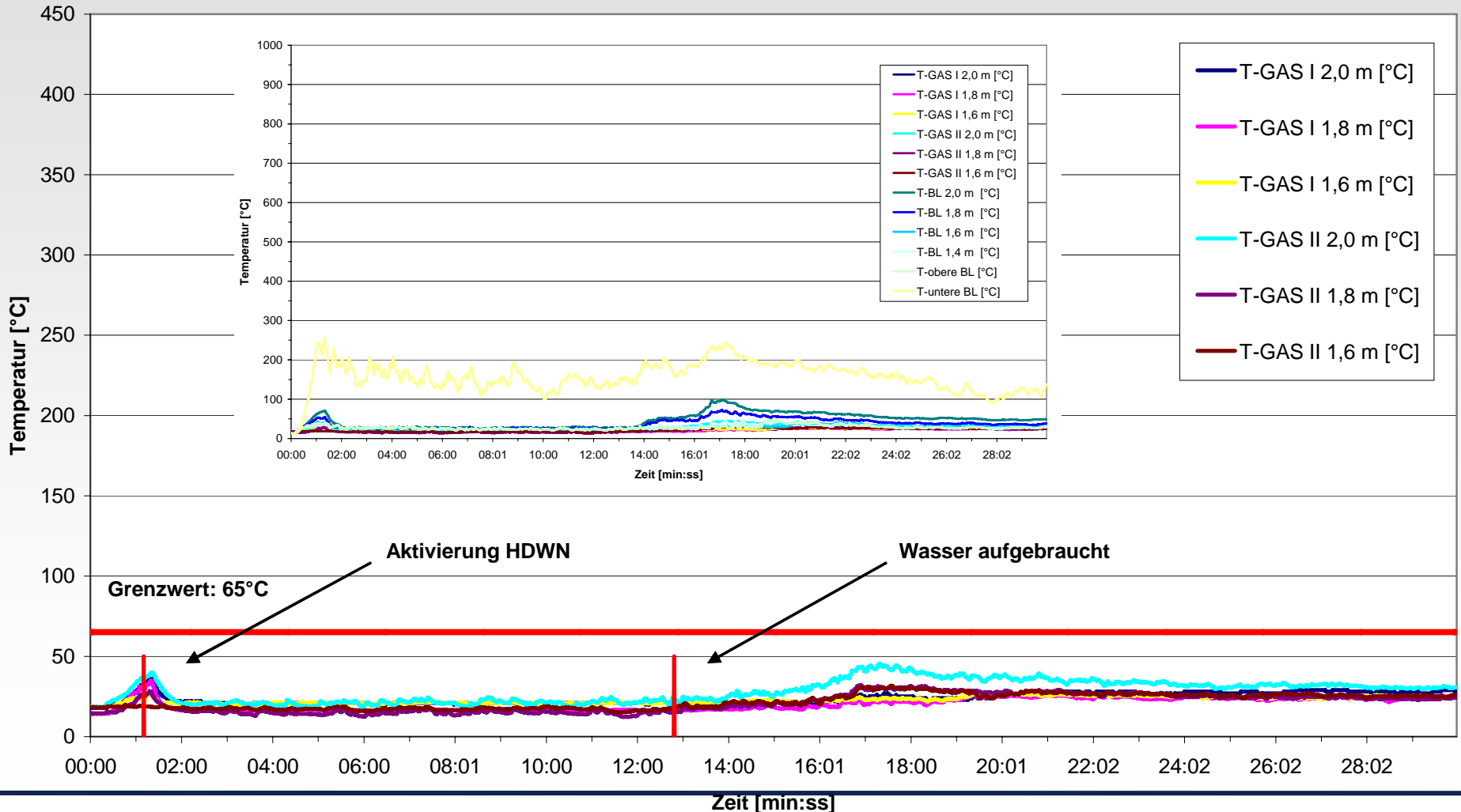
Consequences:

- persons' abidance in concerned area is possible
- fire spread can be reduced to a minimum, low damage

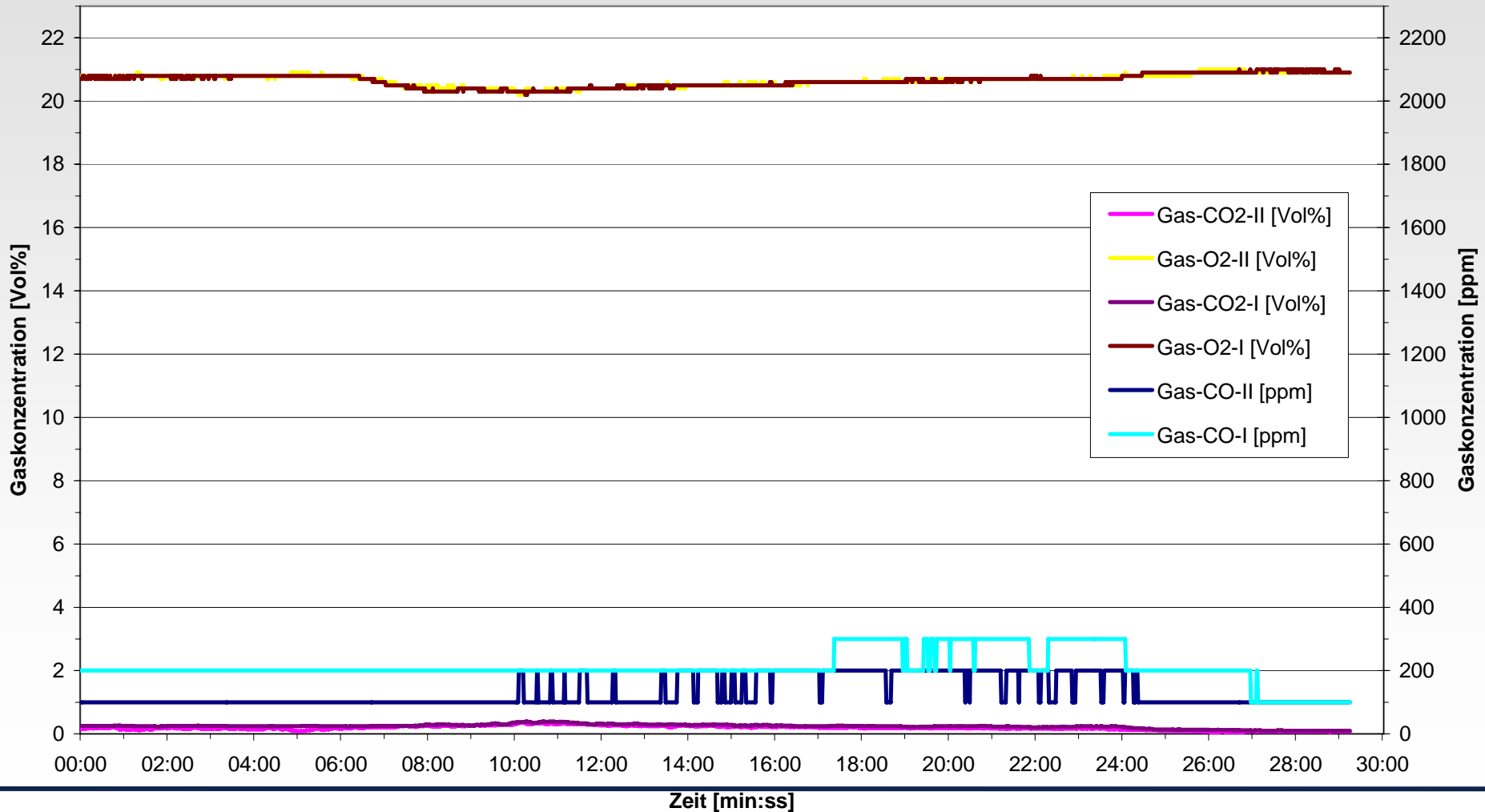
Fire Test with Activation of the system



jeweils 1 Reisetasche oben/unten, mit Aktivierung der HDWN-Anlage



Abnahmeversuch 02 - Reisetaschen oben/unten, mit HDWN-Anlage

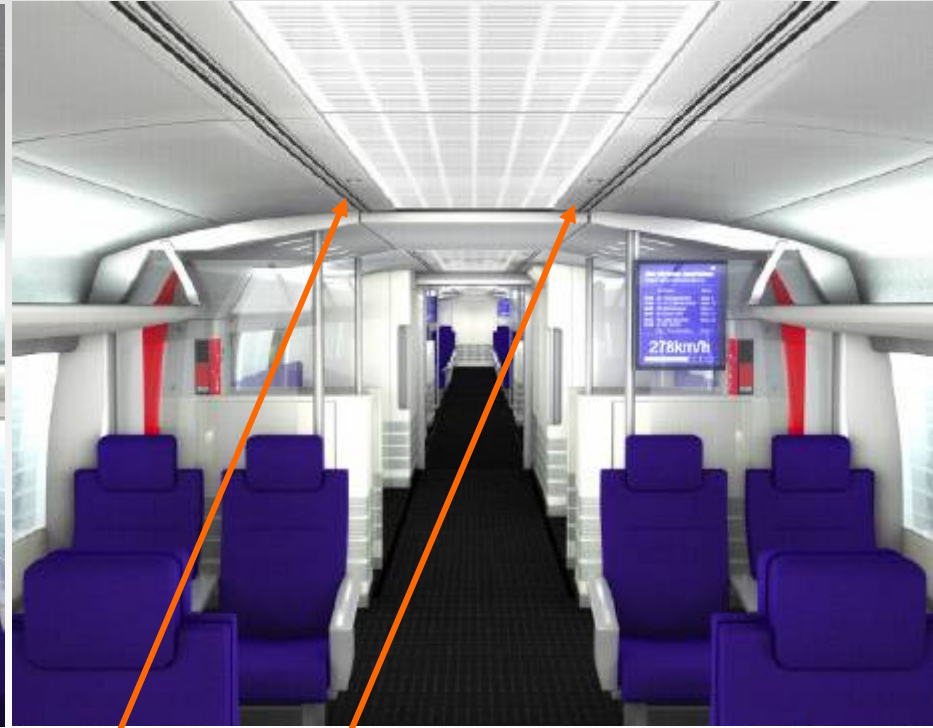
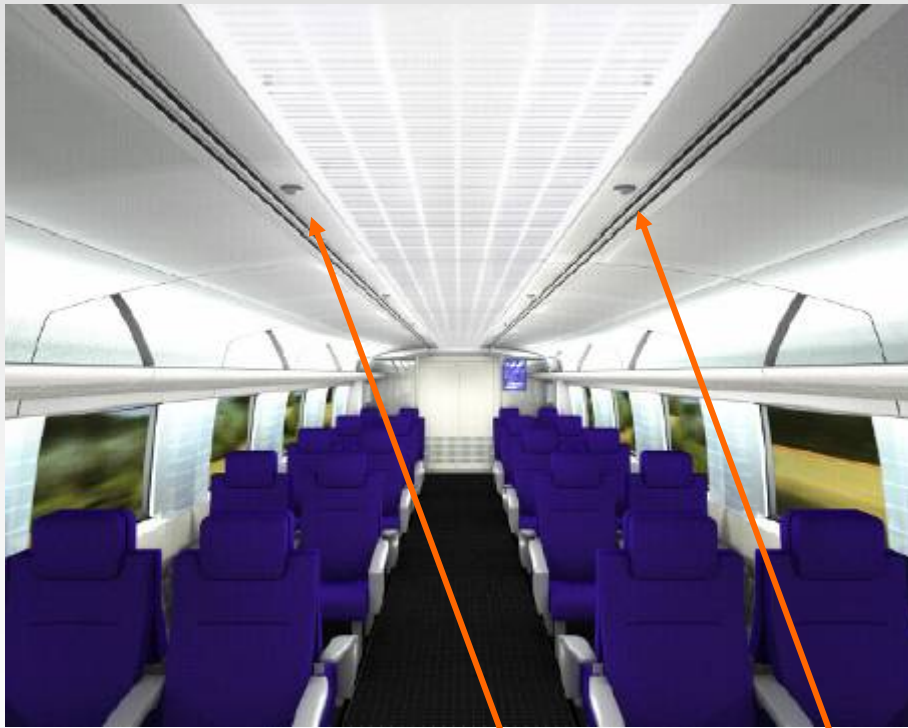


Results of the Fire Tests

- without the FOGTEC fire protection system high damages for vehicle and passengers in case of a fire
 - with the FOGTEC fire protection system an effective suppression of the fire spread to surrounding elements
 - caused by the survivable atmosphere in the concerned area damages to persons can be reduced to a minimum and an evacuation can be simplified
- System verification confirmed by the test reports of TÜV Rail



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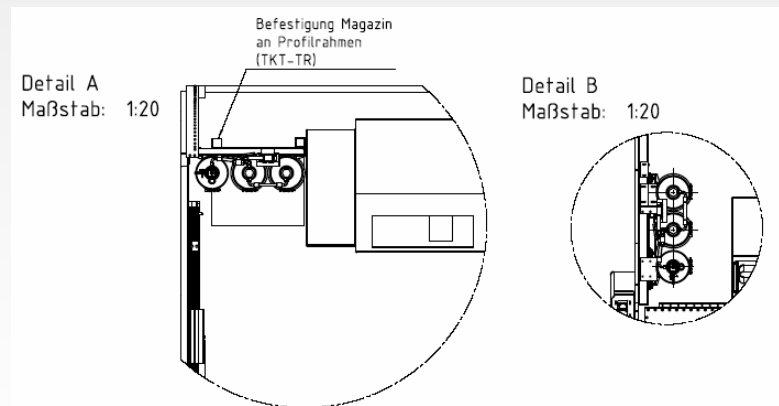
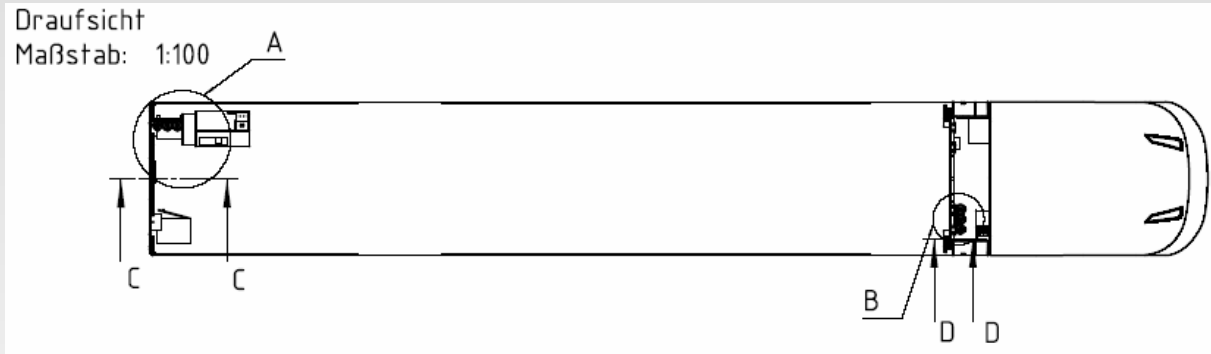
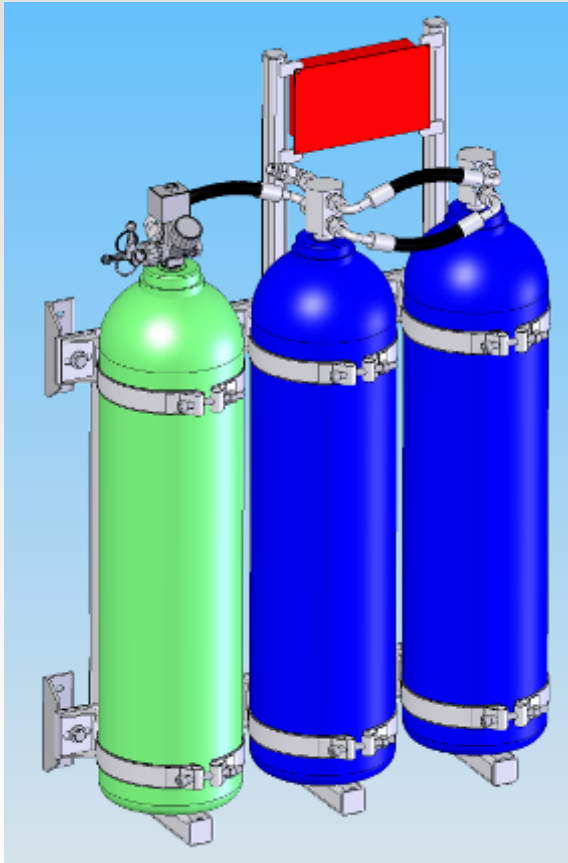


integrated FOGTEC – nozzles in the ceiling

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3 x 20 Liter cylinder system

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Pictures of the system



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Results from the new possibilities:

- Dispensing with fire protection doors and fire-resistant walls (rear wall of driver cabin, floor construction, separation of technical areas,...)
- Reducing requirements for materials
- Simplifying evacuation concepts
- Simplifying proof of operability during the flare phase

This brings along a number of additional positive effects:

- more freedom in design by removing design barriers in the vehicle and more freedom in the selection of materials
- positive effects on weight management are possible
- simplifying the approval procedure
- simplifying the evacuation planning and technical vehicle verification management
- may be considered as a reasonable solution against an overall economic background

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Thank you very much for your kind attention !

