

PARIS
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INTERNATIONAL
RAILWAY SAFETY COUNCIL

fire safety

▶ in railway stations in Germany

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(safety authorisation and supervision of infrastructure managers, approval of structural works)



fire safety in railway stations in Germany

- ▶ overview about stations
- ▶ general requirements for stations
- ▶ fire safety requirements in railway stations
- ▶ concept of fire strategy for stations
- ▶ analysis of passenger flows
- ▶ temporary conditions
- ▶ approval procedures by EBA
- ▶ conclusion

overview about stations

A station is defined as a structural work as part of railway infrastructure.

This includes:

- ▶ station building and platforms with their entrance and retirement,
- ▶ super structural parts and
- ▶ roofing as well as integral part of technical facilities.

The main German infrastructure manager (IM) DB Station & Service AG operates circa 5.400 stations.

These are differed in:

- ▶ aboveground and underground station with building and
- ▶ hold point with or without building.

general requirements railway stations (I)

Stations have to fulfill the requirements for public safety and order as well as that requirements, which are given from railway operation.

These requirements are fulfilled according railway safety if:

- ▶ emergence and expansion of fire and smoke obscuration is prevented
- ▶ in case of a fire or accident other kind the rescue of humans or animals is possible
- ▶ effective fire-fighting operations are possible

general requirements railway stations (II)

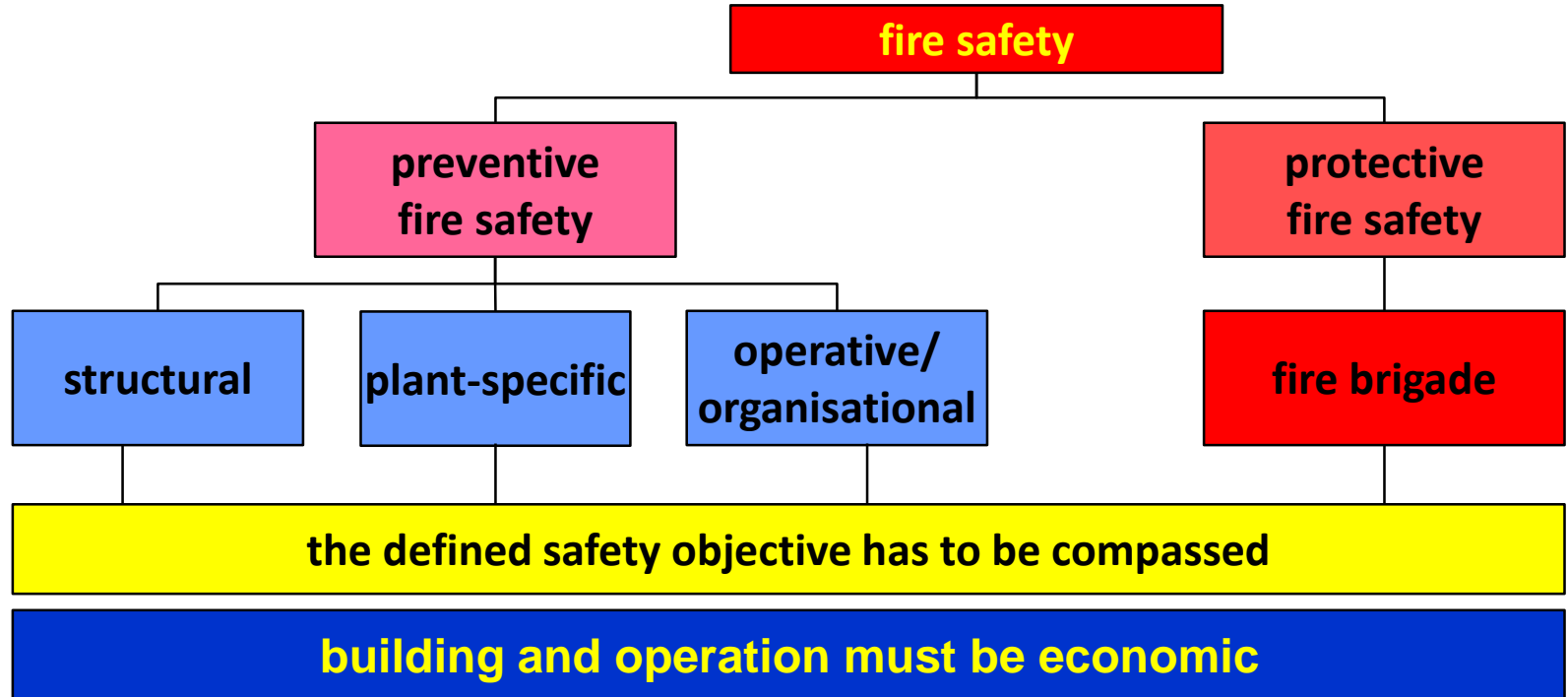
regulations and technical rules

- international** ▶ Directive 2008/57/EC → transfer to national law: “Transeuropäische-Eisenbahn-Interoperabilitätsverordnung”, TSI (INF, PRM, SRT)
- national** ▶ “Eisenbahn-Bau- und Betriebsordnung”, “Musterbauordnung”
- EBA** ▶ Guideline for fire safety requirements from EBA
- DB AG** ▶ Technical Building Regulations (for example Guidance 124-fire safety, Guidance 813)

Musterbauordnung (MBO): defines the national fire safety requirements for buildings in general and specific buildings. Those are adapted on railway stations.

fire safety requirements in railway stations

the fire safety requirements are differed in:



fire safety requirements in railway stations

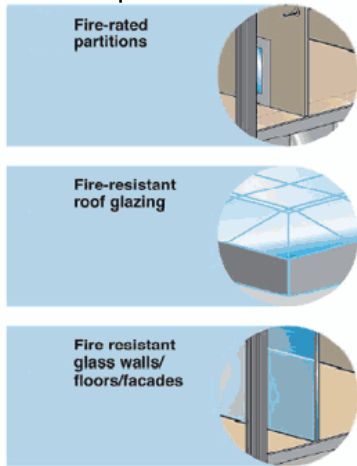
fire safety:

structural

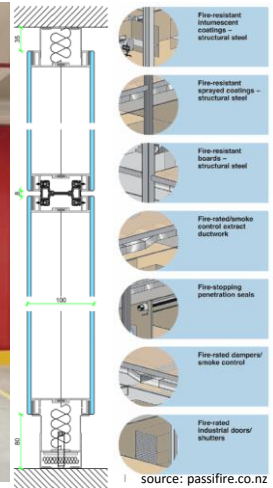
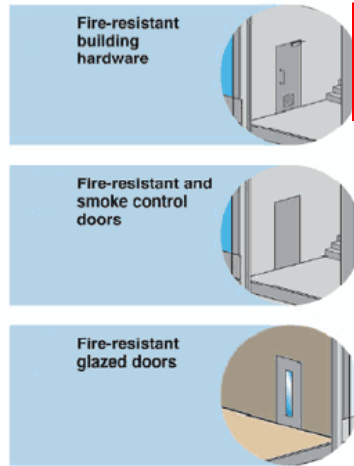
plant-specific

operative/
organisational

fire brigade



source: passfire.co.nz



fire safety requirements in railway stations

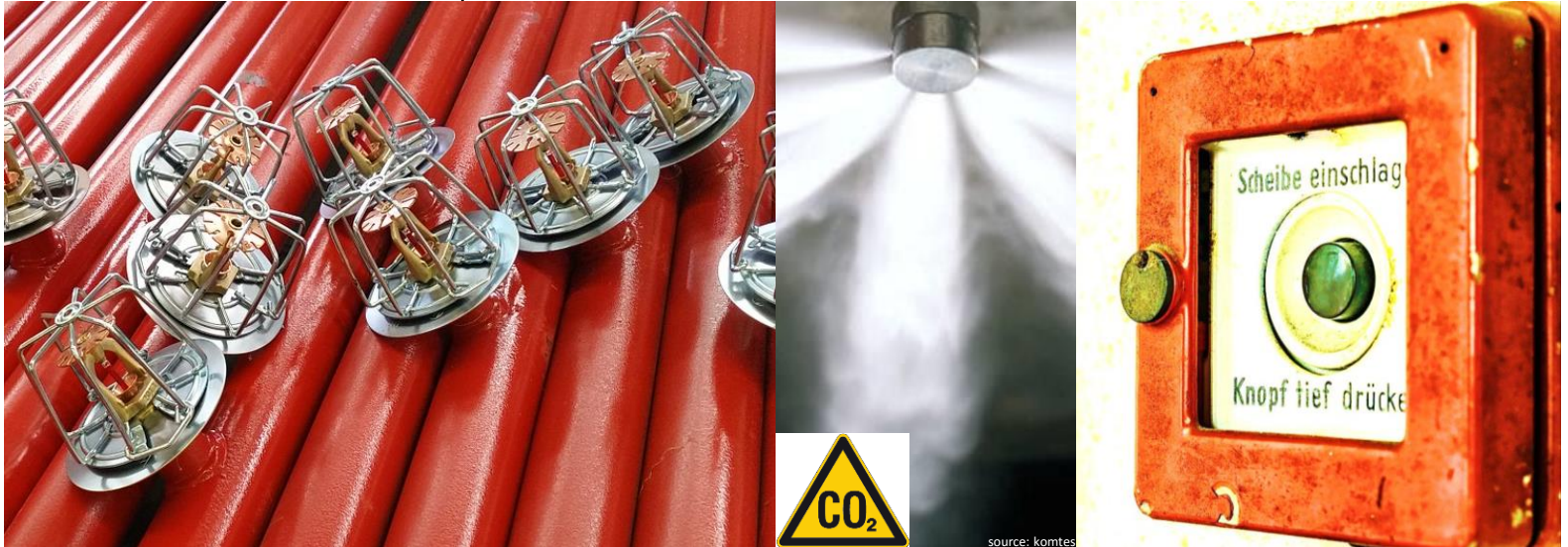
fire safety:

structural

plant-specific

operative/
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fire brigade



source: komtes

fire safety requirements in railway stations

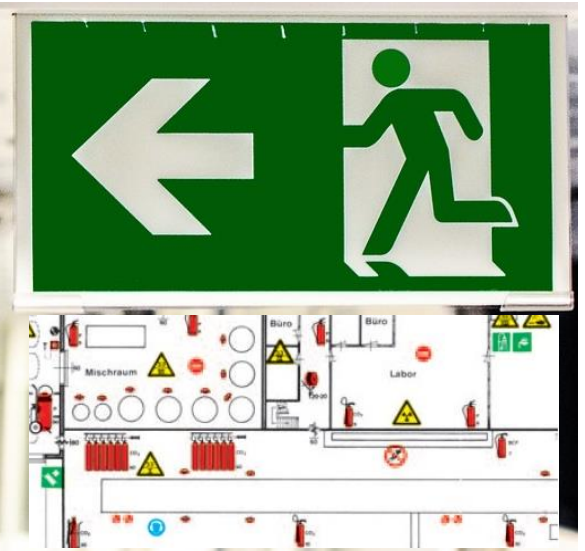
fire safety:

structural

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fire safety requirements in railway stations

fire safety:

structural

plant-specific

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fire brigade



concept of fire strategy for stations

The concept of fire strategy is a substantial document of verification by infrastructure manager and in focus in presentation.

This includes all fire safety verifications to achieve the safety objective.

The **key aspects** of verifications are:

- ▶ structural fire safety;
- ▶ safe self-rescue and third-party rescue;
- ▶ accepted engineering methods for fire → design fire for urban railway and mixed passenger train traffic (DB);
- ▶ fire technical assessment → EBA-accepted inspection engineers (4-eye-principal)
→ adapted requirement from MBO.

analysis of passenger flows (I)

Analyses of passenger flows are an important part in the concept of fire strategy which will be proofed as calculated verification.

The following **general requirements** are valid:

- ▶ verification of safe usability of escape ways for a defined time period;
- ▶ verification of safety for persons in case of influence from fire aspects (heat and waste gas);
- ▶ verification of structural works and of brick partition from partition of escape way for time period of self-rescue and third-party rescue;
- ▶ restriction of fire action for a unity of use as well as;
- ▶ warranty of adequate visibility conditions trough conduction of smoke.

analysis of passenger flows (II)

Passenger flow models:

Two main groups for models of passenger flows are to be differed:

- ▶ Hydraulic models (current model) inclusive network modal and
- ▶ Individual models (microscopic model)

calculation methods:

- ▶ calculation Predtetschenski / Milinski
- ▶ calculation NFPA
- ▶ calculation with:
 - ▶ EXODUS / PedGo / ASERI

each building area has to apply to the following principle:

the evacuation period $t_{\text{evacuation}}$ has to be less than the available evacuation period $t_{\text{available}}$

$$t_{\text{evacuation}} < t_{\text{available}}$$

analysis of passenger flows (example I)

Video 1

Source:
BPK-Engineers

analysis of passenger flows (example II)

VIDEO 2

Source:
BPK-Engineers

temporary conditions

Station “Berlin Gesundbrunnen” – temporary construction level



temporary conditions

Station “Berlin Gesundbrunnen” – temporary passenger routing is also relevant

DB BAHN

Zugang zu den Bahnsteigen access to the platforms

15.01. (Mi) – 20.01.2014 (Mo)

- Wegen Bauarbeiten ist der **Zugang zu den Bahnsteigen nur von dieser Seite** aus möglich
- Fahrgäste zur S-Bahn** gehen bitte zunächst auf die Fern- und Regionalbahnsteige und von dort aus durch den Tunnel im Untergeschoß zu den S-Bahnsteigen
- Alternativ besteht die Möglichkeit, über den Bahnsteig der U-Bahn-Linie U8 zu gehen

S Bahn Berlin

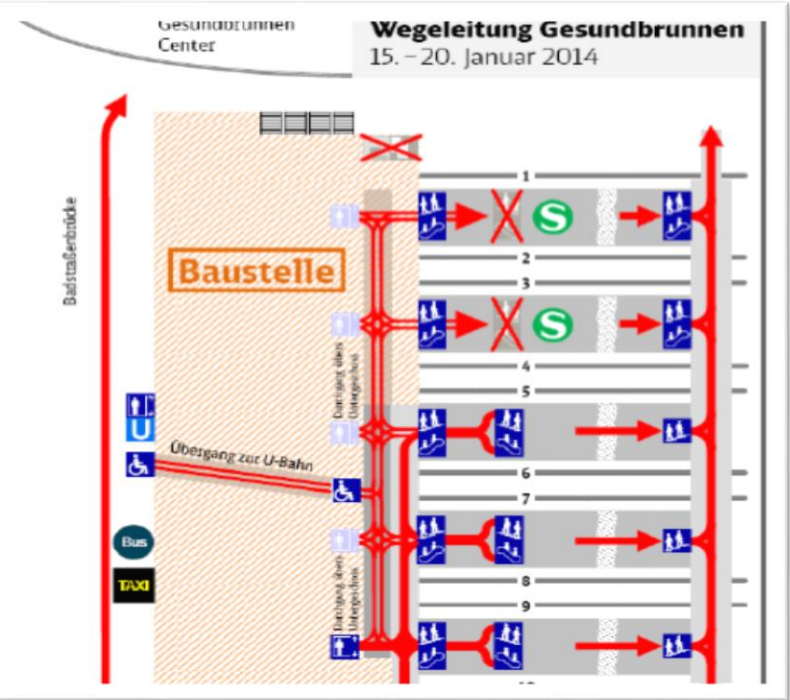


DB BAHN

Zugang zu den Bahnsteigen access to the platforms

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- wegen Bauarbeiten ist der **Zugang zu den Bahnsteigen**



analysis of passenger flows

temporary construction levels may require temporary passenger routings

helpful options:

- ▶ stopping restrictions
- ▶ one-way guiding
- ▶ controlled running directions / separation
- ▶ mobile barriers
- ▶ personnel for supporting
- ▶ announcement via speakers with special information about the situation



approval procedures by EBA

Essential basis of approval procedures for stations:

- ▶ Infrastructure managers need a safety authorisation according Directive 2004/49/EG on basis of Regulation 1169/2010
- ▶ after implementing a safety management system (SMS) which is supervised by safety authority according Regulation 1077/2012

Within the authorisation for putting into service for new, upgraded and renewed infrastructure according Directive 2008/57/EC is the compliance of national technical rules with the inspected concept of the fire strategy an important part of verification.

conclusion

An integral concept of fire strategy for stations which has to reproduce the requirements for use and verifications to compass the defined safety objective comprehensive.

- ▶ It is the **base** of verification **to construct** and **operate** safe during the overall time of use of station.
- ▶ The **self-rescue** is an **essential** part of verification.
- ▶ **Analyses of passenger flows** are a **usable tool** for the verification of final state and also for building construction in process.

Thank you very much for your attention!