Light Rail Regulations and System Engineering in accordance to BOSTrab

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Dipl. Ing. (FH) Michael Rüffer
Operations Manager & Manager Rail Division Verkehrsgesellschaft Frankfurt (VGF), Germany
Contents of this Presentation

It will

- be explained on which legal and organisational basis the rules and regulations for extensive realisation of a light rail system in Germany were created and how they have been and are being developed continuously in accordance with the present state of the art.

- give a short impression of the needs of approval / acceptance start of service for a new LRV-line

- try to give you a short summary
Subsystems of a Light Rail System

A light rail system mainly consists of the following components and subsystems:

- Rail vehicles
- Tracks
- Power supply systems
- Tunnels
- Lighting installations
- Telecommunication systems
- Train protection/signalling systems
- Contact lines
- Stops/stations
- Escalators and lifts
- Workshops for vehicles and infrastructure
Subsystems of a Light Rail System
DC powered tramways, light rail systems, subways and railways in Germany

(most of them are BOStrab-Systems)
BOStrab-Systems in Germany
Legal framework and entities for public transport in Germany

Laws
(passed by parliament)

Regulations
(passed by ministry authorized by law)

Operators
(approved by Safety Regulatory Authority)

Safety Regulatory Authority (SRA)
(installed by laws)

“Constitution” of the Federal Republic of Germany

“General Railway Law”

“Passenger Transport Act”

Federal Ministry of Transport

“EBO”
for railways

“BOStrab”
for urban rail
(trams, metros, light rail)

“BOKraft”
for buses, taxis

Public transport companies

Responsibility of federation

Responsibility of each of the 16 independent states

EBA
“federal agency for railways”

LfB
“representative of Country for railway supervision”

TAB
“technical supervisory bodies”

LfB
“representative of Country for railway supervision”

 operators
(federal railways)

non-federal Railways

Operators
(approved by Safety Regulatory Authority)
Regulations on the Construction and Operation of Urban Rail (tramways, light rail systems, subways) (BOStrab)

Legislature as regulation by Federal Ministry of Transport following authorization by public transport law

Contents

First Part  General
Second Part  Operating Management
Third Part  Operating Staff
Fourth Part  Operational Installations
Fifth Part  Vehicles
Sixth Part  Operation
Seventh Part  Procedural Formalities
Eighth Part  Non-compliances, Conclusion and Transitional Arrangements
BOStrab Recommendations
Basic Principles / Section 2

(1) Installations and vehicles must be so built that they meet safety requirements and good order. These requirements are deemed to be met when the installations and vehicles conform to this Regulation, to the requirements of the Technical Supervision Authority and the planning/licensing authorities, and to generally recognised codes of practice.
Responsibilities and procedures determined by BOStrab (1)

The **CEO of the transport authority** (Unternehmer)

- has to fulfill personally and in his organisation the basic principles of BOStrab (see slide before)

- has independent of his own personally responsibility to appoint a operations manager (Betriebsleiter) for the monitoring of the safe and orderly operation of the system as a whole
Responsibilities and procedures determined by BOSTrab (2)

The operations manager (Betriebsleiter)

- is personally responsible for the safe and orderly operation of the system as a whole (This includes the safety approval process for installations)
- has to be appointed by the public Transport Authority and confirmed by the Technical Supervisory Body after examination
- has to define transport authority-specific regulations (Dienstanweisungen, “DA”) to ensure a safe and orderly operation
Responsibilities and procedures determined by BOStrab (3)

The **Technical Supervisory Body** (Technische Aufsichtsbehörde, “TAB”)

- supervises that the BOStrab regulations are observed (including tests, signify agreements, acceptance and approval of installed systems)
- devines if necessary transport-authority-specific regulations
Responsibilities and procedures determined by BOStrab (4)

- Building work of installations shall not start until the Technical Supervisory Body has examined the construction documents and given its agreement to the Transport Authority (Section 60 of BOStrab).

- New or modified installations and trains shall not be put into operation before they have been approved by the Technical Supervisory Body (Section 62 of BOStrab).
Directives of the German Federal Regulations on Construction and Operation of Tramways (BOStrab)
BOStrab, Technical Rules, Standards, VDV Recommendations

- Principles
- Fundamental Requirements
- Spezified Requirements

VDV Recommendations
- Requirements from the operators point of view

Norms, Standards
- Definitions
- Solutions
- Tests
# BOStrab Basic Principles / Regulations of the Technical Supervision Authority

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<td># GVT</td>
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<td>Grundsätzliche Vereinbarungen für Statik und Konstruktion von Tunnelbauwerken</td>
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<tr>
<td>Teil 1 – Herstellung in offener BAUWEISE</td>
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<td>Ausgabe März 2006</td>
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<td>3. Auflage</td>
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<td>VGF/SPOT Frankfurt am Main</td>
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*Note: The table contains technical specifications and information related to the construction and engineering of tunnels and underground structures.*
BOStrab Basic Principles / Regulations of the Operations Manager
VDV Recommendations

VDV recommendations are not binding on the VDV member companies or third parties, but they are widely accepted as »the state of the art«. This is mainly because the transport companies’ expertise and practical experience find their way directly into the subject selection and contents of the recommendations through interdisciplinary work in the VDV committees or the participation of third parties.
VDV’s organisation and duties

The association e.g. advises its member companies, ensures the exchange of information between members and prepares standardised principles on technical, operational, legal and economic matters to reach the best possible organisation of the operation.

Moreover, the VDV represents the interests of its member companies towards the parliaments, authorities, industry and other institutions. The regional concerns of the member companies are attended to by nine regional groups.
The Federal Republic of Germany consists of 16 states

The 9 regional VDV groups
Associated VDV-Member Companies from Foreign Countries

**Niederlande**
- Continental Rail Services B. V., Rotterdam
- HTM Personenvervoer NV, Den Haag

**Dänemark**
- The Metro Company, Kopenhagen

**Norwegen**
- Bybanen AS, Bergen

**Tschechische Republik**
- Dopravni podnik hlavniho mesta Prahy

**Polen**
- Miejskie Zaklady Autobusowe Sp.zo.o; Warszawa

**Österreich**
- Holding Graz Kommunale Dienstleistungen GmbH
- Innsbrucker Verkehrsbetriebe und Stubaital GmbH
- Linz Linien GmbH
- Niederösterreichische Verkehrsorganisation Gesellschaft mbH
- Salzburg AG für Energie, Verkehr und Telekommunikation
- Salzburger VerkehrsVerbund GesmbH
- Stadtwerke Klagenfurt AG
- Steirische Verkehrsverbund GmbH
- Verkehrsverbund Ost-Region
- Wiener Linien GmbH & Co. KG

**Schweiz**
- Basler Verkehrs-Betriebe
- Bernmobil
- Verkehrsbetriebe Zürich
- Zürcher Verkehrsverbund

**Italien**
- SAD – Nahverkehr AG

**Luxemburg**
- Service des Transports en Commun de la Ville de Lux.
- CBRail S.á.r.L

**Finland**
- Helsingin kaupungin liikennelaitos (HKL), Helsinki

**Uganda**
- Pioneer Easy Bus Kampala in Uganda
**VDV’s organisation and duties**

Five general committees, 16 expert committees and numerous working groups with about 500 experts work on solving special problems of the association and its members.

In this connection the committees prepare regulations (VDV Recommendations) and numerous other publications, which are also presented in the Internet (www.vdv.de) under »publications«.
General committees and expert committees

General Committees
- Strategy
- Legal Matters and Economy

Expert Committees
- Rail Construction
- Operation of Mass Transit Systems
- Depots and Workshops
- Railway Vehicles
- Railway Operation
- Railways of Public Ports
- Electrical Power Installations
- Information Processing
- Marketing and Communication
- Personnel Management
- Price Formation and Sale
- Technical Questions concerning Buses
- Mass Transit Rolling Stock
- Telematics and Information Systems
- Industrial Railways
- Freight Traffic
- Orderer Market
- Customer Service, Information and Dialogue
- Non-Technical Railway Infrastructure Matters
Example of the co-action of BOStrab, technical rules of BOStrab and VDV Recommendations

§ 15 The Line of Route
§ 17 Permanent Way


Switch Handbook for Switch Installations from Rails without Grooves

Typification of Switches with Grooved Rails
Example of the co-action of BOStrab, technical rules of BOStrab and VDV Recommendations

§ 36 Brakes

Safety Requirements for the Electrical Equipment of Light Rail Vehicles and Metro Vehicles - Part 2: Safety Integrity Requirements at Vehicle related electrical/electronic/programmable electronic Protection Functions
Example of the co-action of BOStrab, technical rules of BOStrab and VDV Recommendations

§ 16 (9)
§ 31 (5)
§ 43 (5) Sent. 3
§ 53 (2)
§ 56 (3)

Requirements for Facilities Ensuring the Passengers’ Safety at Stations with Driverless Operation

Date: January 15, 1997

Preliminary Regulations on Driverless Operation in accordance with the German Federal Regulations on the Construction and Operation of Light Rail Transit Systems (BOStrab)

(BOStrab Regulations on Driverless Operation)
Example: Building, Homologation and start of service of the new Lines U8/U9 in Frankfurt / Main (VGF)

LRV-net Frankfurt
Example: Building, Homologation and start of service of the new Lines U8/U9 in Frankfurt / Main (VGF)

LRV vehicle U5-type car
Example: Building, Homologation and start of service of the new Lines U8/U9 in Frankfurt / Main (VGF)

LRV operation on street-level or in tunnel
Example: Building, homologation and start of service of the new Lines U8/U9 in Frankfurt / Main (VGF)

Approval procedure according to the German Law on Passenger Transport (PBeFg) and BOSTrab until the start of service

- Application for approval of building, operation and line layout acc. to PBeFg §§ 9, 12
- Official approval of the project or minor modification acc. to PBeFg § 28
- Letter of approval from the technical supervisory authority (TAB) for the building of installations acc. to BOSTrab § 60 (if not already part of the official approval, also for partial installations, if relevant) on the basis of technical data
- Supervision of construction works by TAB acc. to BOSTrab § 61
- Acceptance by TAB acc. to BOSTrab § 62
- Approval for start of service acc. to PBeFg § 37
Example: Building, Homologation and start of service of the new Lines U8/U9 in Frankfurt / Main (VGF)

Approval / acceptance procedure
- track / switches
- plattforms
Example: Building, homologation and start of service of the new Lines U8/U9 in Frankfurt / Main (VGF)

An acceptance acc. to BOStrab § 62 comprises

- observance of the order of action acc. to PBefG and BOStrab
- technical /operational issues
  - Observance of specifications / guidelines / regulations
  - Basic subjects like statics of structures or contact line systems
  - Operating concept (including incidents and requirements for train service and control room)
  - Layout of the line
  - Track system / cross-section design / turnaround systems
  - Station design (passages, evacuation, etc.)
  - Fire protection / rescue concepts
  - Traction power supply
  - Control and rail automation technology
  - Service rooms
  - Interface to vehicle systems
Summary: Main facts of German’s BOS trab-regulations

The use of BOS trab regulations

- provides transport authorities and technical supervising bodies a complete framework for the whole LRV- / Metro-System
- guarantees because of the focus on safety requirements and good order (e.g. „operations manager“) a high standard of service
- allows due to the practical definition flexible system specific solutions for each LRV- / Metro-System
- allows the user to benefit from the knowledge of the whole „BOS trab-familiy“ in VDV, which is not reduced to German transport authorities (as shown before)