Course description

Traction Engineering Training
B3 Traction Standards
B3a Gen. Overview, B3b Mechanical Standards, B3c Fire Behavior, B3d Electrical and Software Standards

Course goal
The goal of this course is to:
- Know the most important international standard applied for the development of traction and auxiliary converter in railway applications

Learning objectives
Upon completion of this course the participants will be able to:
- Understand the implication of the standards on the design
- Find the needed standard in the databases
- Find on his own detailed information in the standards and apply it to the design

Participant profile
This training is targeted to engineers with master university degree or equivalent. The first general overview (B3a) is especially designed for new engineers in the global ABB traction organization with no experience in the field working in several functions (sales, engineering, development, supply management, head of production, service). The specific sessions B3b, B3c, B3d are reserved for specialists in the sector.

Prerequisites
The participant should have basic electro technical and traction converter knowledge from general education and/or experience or from participation to Training Module “B1 Electrical Basics” and “B2 Converter Basics”.

Topics
- Shock and Vibrations and stability of mechanical construction
- Welding requirements
- Fire behavior
- Input Voltages for traction systems
- Environmental conditions
- Insulation coordination
- Requirements for electrical components
- EMC (Electro Magnetic Compatibility)
- RAMS (Reliability, Availability, Maintainability, Safety)
- Control software safety and development processes

Course type and methods
This is an instructor led course with theoretical presentations. After each sub module the participants will be required to pass a test to receive the certification.

Language
German and English (on request).

Duration
The duration is:
- B3a Gen. Overview 2h
- B3b Mechanical Standards 3h
- B3c Fire Behavior 3h
- B3d El. and Sw Standards 4h
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### Course outline

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### Standard List:

#### Mechanical:

- **EN 12663** Railway applications. Structural requirements of railway vehicle bodies
- **IEC 61373** Railway applications - Rolling stock equipment - Shock and vibration tests
- **DIN 25201** Design guide for railway vehicles and their components - Bolted joints
- **DIN EN 15085-1** Railway applications - Welding of railway vehicles and components – Part 1: General
- **DIN EN 15085-2** Railway applications - Welding of railway vehicles and components – Part 2: Quality requirements and certification of welding manufacturer
- **DIN EN 15085-3** Railway applications - Welding of railway vehicles and components – Part 3: Design requirements
- **DIN EN 15085-4** Railway applications - Welding of railway vehicles and components – Part 4: Production requirements
- **DIN EN 15085-5** Railway applications - Welding of railway vehicles and components – Part 4: Inspection, testing
- **IEC 60529** Degree of protection provided by enclosures (IP Code)
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**Fire behavior:**

- **NF F-16-101**  
  Rolling stock - Fire behaviour - Materials selection (French Standard)
- **NF F-16-102**  
  Rolling stock - Fire behaviour - Materials selection – application for electrical system (French Standard)
- **EN 45545-1**  
  Railway applications - Fire protection on railway vehicles - Part 1: General
- **EN 45545-2**  
  Railway applications - Fire protection on railway vehicles - Part 2: Requirements for fire behaviour of materials and components
- **DIN 5510-1**  
  Preventive Rail protection in railway vehicles; Level of protection, fire preventive measures and certifications
- **DIN 5510-2**  
  Preventive Rail protection in railway vehicles; Part 2: Fire behaviour and fire side effects of materials and parts – Classification, requirements and test methods
- **EN 50264-1**  
  Railway rolling stock power and control cables having special fire performance - Part 1: General requirements
- **EN 50264-2**  
  Railway rolling stock power and control cables having special fire performance - Standard wall - Part 2: Single core cables
- **EN 50264-3**  
  Railway rolling stock cables having special fire performance - Standard wall - Part 3: Multicore cables

**Electrical and control software:**

- **EN 50163/IEC 60850**  
  Railway applications. Supply voltages of traction systems
- **UIC 550**  
  Power supply installations for passenger stocks
- **EN 50124-1**  
  Railway applications - Insulation coordination – Part 1: Basic Requirements – Equipment and Creepage Distances
- **EN 50124-2**  
  Railway applications - Insulation coordination – Part 2: Over Voltages and related Protections
- **EN 50121-1/IEC 61000-1**  
  Electro Magnetic Compatibility - Part 1: General
- **EN 50121-2/ IEC 61000-2**  
  Electro Magnetic Compatibility - Part 2: Emission of the whole Railway System to the Outside World
- **EN 50121-3-1/ IEC 61000-3-1**  
  Electro Magnetic Compatibility - Part 3-1: Rolling Stock — Train and complete Vehicle
- **EN 50121-3-2/ IEC 61000-3-2**  
  Electro Magnetic Compatibility - Part 3-2: Rolling Stock – Apparatus
- **EN 50126**  
  Railway applications – The specification and demonstration of reliability, availability, maintainability and safety (RAMS)
- **EN 50155**  
  Railway Applications - Electronic Equipment used on Rolling Stock
- **EN 50128**  
  Railway applications – Communications, signalling and processing systems – Software for railway control and protection systems

**ABB legal company name**

**Business area**

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