RailServices
Customer Training

BETTER SERVICE THROUGH BETTER UNDERSTANDING
Railways are experiencing a period of massive growth. Transport capacity and the number of passengers are increasing, and trains have to remain in service longer than in the past. On the other hand, even tighter budgets have to be adhered to – without any compromises in quality.

For a rail operating company to remain competitive, safety and reliability are vitally important. Safety is something people take for granted, which is why Knorr-Bremse supports it over the entire life cycle of a vehicle. Reliability is a crucial factor in two ways: It keeps operational costs low and helps to make your services attractive for your customers.

For a train to be operated safely at all times, high-quality systems are a must. But they are not everything. Operators have to keep up with technological developments. Employees need to have in-depth and up-to-date knowledge of Knorr-Bremse systems. Necessary spare parts have to be available whenever they are needed. Rail vehicles have to be competently and reliably inspected and overhauled throughout their lifetime. To keep life-cycle costs low and improve performance, it is advisable to have the system modernized from time to time.

The best way to ensure all this is to rely on original parts and services from the original system manufacturer.
WELCOME TO RAILSERVICES CUSTOMER TRAINING BY KNORR-BREMSE

Knorr-Bremse RailServices is the service partner of choice for clients worldwide. The delivery of innovative but reliable solutions covering the entire lifecycle of rail vehicle systems is the linchpin of all our activities.

LEARNING FROM THE GLOBAL MARKET LEADER

As the market leader, Knorr-Bremse has established high product standards and is able to draw on extensive, specialized expertise. A knowledge of different products, manufacturers and operators is the key to offering a premium service delivery.

CHOOSE YOUR INDIVIDUAL TRAINING

This is where RailServices training courses kick in. Their modular structure means they can be adapted to the individual needs of our customers. Knowledge is not only imparted theoretically but combined with practical exercises on original vehicles. Experienced trainers and detailed documentation ensure the long-term success of the training.

INNOVATIVE LEARNING CONCEPT

The KB recipe for maximizing learning success is a balanced mixture of traditional training formats and modern forms of e-learning. In this way KB combines the effectiveness and flexibility of electronic learning methods with social aspects of face-to-face communication.

READY TO START?

Knorr-Bremse offers high quality standards in training, customer focus and flexibility. The following pages contain information about training content and procedures. Customers can choose a specific training course to enhance service quality and achieve cost and time savings.
OUR TRAINING VISION

“RAINING INTERNATIONAL SERVICE STANDARDS THROUGH A BETTER UNDERSTANDING OF PRODUCTS AND SYSTEMS.

INCREASING VEHICLE AVAILABILITY THROUGH EFFICIENT MAINTENANCE.”

CUSTOMER TRAINING PROGRAM

Each vehicle manufacturer or operator has his own individual profile - a profile that reflects his individual need for operational support, maintenance and servicing of braking and on-board systems.

RailServices Training by Knorr-Bremse offers the optimal customized training package for your requirements – regardless of whether your needs involve freight cars, locos, multiple units, high speed trains, metros, passenger cars or light rail vehicles. Experienced trainers and coaches coordinate the training content with you and deliver exactly what you need.
EXPERIENCE ON-SITE

Our RailServices training programs draw on over 100 years of engineering know-how in the railway industry.

Knorr-Bremse supplies theoretical knowledge as well as practical training perfectly customized to your requirements, either in our training centers or on-site.

OUR STANDARDS

■ High quality content and training style
■ Customer orientation
■ Flexibility

YOUR BENEFITS

LATEST KNOWLEDGE AT MANUFACTURER LEVEL

■ Localized training content in combination with international trainer experience

GREATER EFFICIENCY IN MAINTENANCE AND TROUBLESHOOTING

■ Same work – less time required
■ Reduction of downtimes
■ Shorter reaction times

FLEXIBLE COST STRUCTURE

■ No fixed expenses
■ Training on demand

KEEPING KB SERVICE STANDARDS

■ Lower costs during the life cycle of a braking system

FEWER UNEXPECTED FAILURES

■ Cost savings for line closures, towing and compensation services
KEY FACTS

TRAINING CONTENT

- Pneumatic and hydraulic braking systems
- IFE Door systems
- MERAK Heating, ventilation and air conditioning (HVAC)
- MICROELETTRICA SCIENTIFICA (MS) Contactors, disconnectors, resistors, switches

TRAINING COURSE

KNOWLEDGE TRANSFER

- Theoretical knowledge
  - Product understanding
  - System understanding
  - Diagnostics & troubleshooting
- Practical experience
  - Practical application of newly gained theoretical knowledge on the vehicle

ENSURING LEARNING SUCCESS

- Practical application of knowledge at the vehicle (e.g. diagnostics, troubleshooting)
- Exchange of best practice
- Exams (if required)

ENABLING SELF-STUDY

- Extensive training documentation enables participants to review and repeat the contents individually
- The training documentation serves as a reference book for refreshing the knowledge acquired as necessary
RAILSERVICES TRAINING ORGANISATION

TRAINER EDUCATION CONCEPT
In order to achieve maximum learning success for each participant, we set up a trainer education concept consisting of didactical & technical knowledge

- Selection of trainers:
  - Highly qualified trainers with many years of experience in commissioning and field service

- Trainer qualification concept:
  - Regular practical assignments to maintain high quality of the practical element of the training
  - Regular internal qualification measures to keep theoretical knowledge up-to-date
  - Didactical training to continuously improve the quality of knowledge transfer

INTERNATIONAL TRAINER NETWORK
Our on-site trainers cover local training requirements with their international experience and local expertise.

INFRASTRUCTURE & TRAINING MATERIAL
- Training centers (Academies) worldwide
- Detailed training documentation
- Animations & simulations for the demonstration of individual units or complete systems
- Visual aids (e.g. parts)
- E-learning solutions
## OUR TRAINING COURSES

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| System training (hydraulic braking system) | Maintenance training (hydraulic components) |

- **Technology training**
- **Functionality and light maintenance training**
- **Inspection, testing and diagnostics training**
- **Heavy maintenance and repair training**
TRAINING COURSES

EDUCATIONAL PATHWAYS BRAKES

### FREIGHT CAR BRAKE SPECIALIST

- **Level III (Experts)**
  - Slack adjuster repair training
  - Weighing valve repair training

- **Level II (Intermediates)**
  - Basic course: Inspection and maintenance training – freight car brakes

- **Level I (Beginners)**
  - Brake technology training – freight cars

### BRAKE DIAGNOSTIC SPECIALIST

- **Level III (Experts)**
  - ST03 A training

- **Level II (Intermediates)**
  - ESRA training
  - EP compact training

- **Level I (Beginners)**
  - Brake technology training

### RECOMMISSIONING SPECIALIST

- **Level III (Experts)**
  - Recommissioning training after overhaul (Locomotive/Multiple unit/Passenger car)
  - ST03 A training
  - ESRA training
  - EP compact training
  - EP 2002 training (and terminal software)

- **Level II (Intermediates)**
  - System and maintenance training (project or system specific)

- **Level I (Beginners)**
  - Brake technology training
TRAINING COURSE ID: **BPST01**  
**BRAKE TECHNOLOGY TRAINING**

**TARGET GROUP**  
Employees who are engaged in design, approval, operation, maintenance and repair of rail vehicles

**LEARNING TARGET**  
Participants will gain basic knowledge of the function of braking systems

**CONTENT**
- Introduction to the brake technology of rail vehicles and aspects of the operation of braking systems
- Physical basics
- Overview of braking systems for different vehicle types
- Presentation and explanation of various braking system configurations
- Familiarization with relevant braking system components

**PREREQUISITES**
- Completed vocational training in a metalworking or electrical profession or
- A degree in mechanical engineering, electrical engineering, or rail vehicle construction or
- Experience in rail vehicle construction or the railway industry

**RESULT**  
Certificate of attendance (final test available upon request)

**DURATION**  
2 days

**NUMBER OF PARTICIPANTS**  
12
TRAINING COURSE ID: **BPSFM01**

**BRAKING SYSTEM AND MAINTENANCE TRAINING**

**TARGET GROUP**
Employees who are engaged in the maintenance and repair of braking systems for rail vehicles

**LEARNING TARGET**
Participants will:
- understand the function of the braking system and the sub-components
- learn how to conduct maintenance-, setting-, measurement and testing activities according to the KB documentation
- learn how to detect and fix malfunctions

**CONTENT**
- Overview of and introduction to the relevant KB documentation
- Braking system design, function, servicing, troubleshooting and diagnostics in accordance with the KB documentation
- Performance of maintenance on the system in accordance with the KB documentation
- Logging in accordance with the KB or car builder documentation (if required)
- Introduction to spare part ordering from the KB spare parts catalogue

**PREREQUISITES**
- Completed vocational training in a metalworking or electrical profession and at least 6 months experience in rail vehicle maintenance or
- Previous participation in a RailServices brake technology training

**REQUIRED INFRASTRUCTURE & DOCUMENTATION**
- System-relevant documentation, special tools, materials and spare parts in accordance with the KB documentation
- Testing and measuring devices according to the KB documentation, sufficient supply of compressed air, power supply, lifting gear, and their availability for the duration of training
- Vehicle availability during training

**RESULT**
Certificate of attendance (final test available upon request)

**DURATION**
3 – 5 days (depending on the project or system)

**NUMBER OF PARTICIPANTS**
6
TRAINING COURSE ID: **BPSID01**

**RECOMMISSIONING TRAINING AFTER OVERHAUL – LOCOMOTIVE**

**TARGET GROUP**
Employees who are engaged in the maintenance and repair of braking systems for rail vehicles

**LEARNING TARGET**
Participants will learn how to:
- independently perform measurement and testing activities as part of the overhaul or main inspection
- support with the creation of a recommissioning report
- detect and fix malfunctions as well as correctly use the required test equipment

**CONTENT**
- Overview of and introduction to the relevant standards (e.g. VDV885, DIN27201–DIN27205)
- Expert knowledge of braking systems: air supply, brake control, mechanics, electronics, diagnostics
- Explanation of how to measure and test as well as recommendations how to use the measuring and testing technology
- Performance of the relevant tests on the basis of the operator’s protocol or commissioning protocol
- Notes and recommendations for creating a protocol for the recommissioning of the braking system after overhaul according to the local relevant regulations (e.g. DIN27201, VDV885) and manufacturer specifications

**PREREQUISITES**
- Completed vocational training in a metalworking or electrical profession and at least 6 months practical experience in rail vehicle servicing
- Prior participation in RailServices system and maintenance training or RailServices brake technology training

**REQUIRED INFRASTRUCTURE & DOCUMENTATION**
- System-relevant documentation and special tools in accordance with the KB device description
- Training room, pit or raised train, sufficient supply of compressed air, vehicle availability for at least 3 days

**RESULT**
Certificate of attendance (final test)

**DURATION**
5 days

**NUMBER OF PARTICIPANTS**
5
TRAINING COURSE ID: **BPSID02**

**RECOMMISSIONING TRAINING AFTER OVERHAUL – MULTIPLE UNIT**

**TARGET GROUP**
Employees who are engaged in the maintenance and repair of braking systems for rail vehicles

**LEARNING TARGET**
Participants will learn how to:
- independently perform measurement and testing activities as part of the overhaul or main inspection
- support with the creation of a recommissioning report
- detect and fix malfunctions as well as correctly use the required test equipment

**CONTENT**
- Overview of and introduction to the relevant standards (e.g. VDV885, DIN27201–DIN27205)
- Expert knowledge of braking systems: air supply, brake control, mechanics, electronics, diagnostics
- Explanation of how to measure and test as well as recommendations on how to use the measuring and testing technology
- Performance of the relevant tests on the basis of the operator’s protocol or commissioning protocol
- Notes and recommendations for creating a protocol for the recommissioning of the braking system after overhaul according to the local relevant regulations (e.g. DIN27201, VDV885) and manufacturer specifications

**PREREQUISITES**
- Completed vocational training in a metalworking or electrical profession and at least 6 months practical experience in rail vehicle servicing
- Prior participation in RailServices system and maintenance training or RailServices brake technology training

**REQUIRED INFRASTRUCTURE & DOCUMENTATION**
- System-relevant documentation and special tools in accordance with the KB device description
- Training room, pit or raised train, sufficient supply of compressed air, vehicle availability for at least 3 days

**RESULT**
Certificate of attendance (final test)

**DURATION**
4 days

**NUMBER OF PARTICIPANTS**
5
TRAINING COURSE ID: BPSID03

RECOMMISSIONING TRAINING AFTER OVERHAUL – PASSENGER CAR

TARGET GROUP
Employees who are engaged in the maintenance and repair of braking systems for rail vehicles

LEARNING TARGET
Participants will learn how to:
■ independently perform measurement and testing activities as part of the overhaul or main inspection
■ support with the creation of a recommissioning report
■ detect and fix malfunctions as well as correctly use the required test equipment

CONTENT
■ Overview of and introduction to the relevant standards (e.g. VDV885, DIN27201–DIN27205)
■ Expert knowledge of braking systems: air supply, brake control, mechanics, electronics, diagnostics
■ Explanation of how to measure and test as well as recommendations on how to use the measuring and testing technology
■ Performance of the relevant tests on the basis of the operator’s protocol or commissioning protocol
■ Notes and recommendations for creating a protocol for the recommissioning of the braking system after overhaul according to the local relevant regulations (e.g. DIN27201, VDV885) and manufacturer specifications

PREREQUISITES
■ Completed vocational training in a metalworking or electrical profession and at least 6 months practical experience in rail vehicle servicing
■ Prior participation in RailServices system and maintenance training or RailServices brake technology training

REQUIRED INFRASTRUCTURE & DOCUMENTATION
■ System-relevant documentation and special tools in accordance with the KB device description
■ Training room, pit or raised train, sufficient supply of compressed air, vehicle availability for at least 2 days

RESULT
Certificate of attendance (final test)

DURATION
4 days

NUMBER OF PARTICIPANTS
5
TRAINING COURSE ID: **BPPFM01**

**ESRA (ELECTRONIC SYSTEM FOR RAILWAY APPLICATION) TRAINING (PROJECT-RELATED)**

**TARGET GROUP**
Employees who are engaged in troubleshooting on braking systems in rail vehicles (equipped with ESRA, EPC controls), and who focus on electronics and master control

**LEARNING TARGET**
Participants will learn:
- the professional application of the error code lists for troubleshooting
- how to detect malfunctions of the braking system

**CONTENT**
- Introduction to the basic design of ESRA
- System architecture of the hardware
- Project-specific application of individual functions
- Basic hardware error and application error messages
- Integration into the master control and basic knowledge of Can-Bus

**PREREQUISITES**
- Completed vocational training in an electrical profession
- Previous participation in system and maintenance training for the particular system as well as ST03A training is recommended

**REQUIRED INFRASTRUCTURE & DOCUMENTATION**
- System-relevant documentation
- Training room (equipped with projector and white board)
- Vehicle provision for at least half a day

**RESULT**
Certificate of attendance (final test available upon request)

**DURATION**
1 - 2 days (depending on the braking system)

**NUMBER OF PARTICIPANTS**
6
TARGET GROUP  Employees who are engaged in troubleshooting on braking systems in rail vehicles equipped with EPC controls

LEARNING TARGET  Participants will learn how to:
- independently perform setting, measurement and testing in accordance with the KB documentation
- detect and fix malfunctions

CONTENT  ■ Overview of the relevant KB documentation
■ Introduction to the design, function, troubleshooting and diagnostics as per KB description
■ Correct use of the required test equipment
■ Performance of the relevant measuring, testing and setting of the device in accordance with the KB documentation
■ Logging according to the KB documentation (if required)

PREREQUISITES  ■ Completed vocational training in a metalworking or electrical profession
■ Previous participation in RailServices system and maintenance training for the particular system or RailServices brake technology training is recommended

REQUIRED INFRASTRUCTURE & DOCUMENTATION  ■ System-relevant documentation, special tools, materials and spare parts as per KB documentation
■ Training room (equipped with projector and white board)
■ Vehicle availability as agreed

RESULT  Certificate of attendance (final test available upon request)

DURATION  1 day

NUMBER OF PARTICIPANTS  6
## TRAINING COURSE ID: **BPPID01**
### ST03A TRAINING (PROJECT-RELATED)

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<td>Participants learn how to use the service terminal program in accordance with the project documentation in order to maintain the braking system</td>
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| **CONTENT** | ■ Overview of and introduction to the relevant KB documentation  
■ Ordering, licensing and installation of the ST03A software  
■ Software installation, event memory and history, requesting and saving BCU information, requests, examination of I/Os.  
■ Logging in compliance with KB documentation |
| **PREREQUISITES** | ■ Completed vocational training in a metalworking or electrical profession  
■ Previous participation in RailServices ESRA training or RailServices system and maintenance training is recommended |
| **REQUIRED INFRASTRUCTURE & DOCUMENTATION** | ■ KB documentation relating to device, operator/OEM licence  
■ Vehicle availability for the duration of training |
| **RESULT** | Certificate of attendance (final test available upon request) |
| **DURATION** | 1 day |
| **NUMBER OF PARTICIPANTS** | 6 |
TRAINING COURSE ID: BPPID02

EP2002 TRAINING (AND TERMINAL SOFTWARE)

TARGET GROUP
Employees who are required to have a basic understanding of the braking system fitted with EP2002

LEARNING TARGET
- Performance assessment and installation practices
- Detection of malfunctions of the braking system

CONTENT
- Introduction to the basic design of EP2002
- Introduction to the function and operation of EP2002
- System architecture of the hardware
- Project specific application
- Review of the brake specific communication system and system configuration
- Correct use of the diagnostic equipment (Brake Consultant) and interpretation of the results
- Failure logging procedure
- Obtain and upload software
- Commissioning tasks
- EP2002 documentation

PREREQUISITES
- Completed vocational training in a metalworking or electrical profession
- Previous participation in RailServices system and maintenance training for the particular system is recommended

REQUIRED INFRASTRUCTURE & DOCUMENTATION
- System-relevant documentation
- Training room (equipped with projector and white board)
- Vehicle availability for at least half a day

RESULT
Certificate of attendance (final test available upon request)

DURATION
2 - 3 days (depending on the braking system)

NUMBER OF PARTICIPANTS
6
### BRAKE TECHNOLOGY TRAINING – FREIGHT CARS

#### TARGET GROUP
Employees who are engaged in design, operation, maintenance and repair of freight cars or other rail vehicle types

#### LEARNING TARGET
Participants will gain basic knowledge of the function of freight car braking systems

#### CONTENT
- Introduction to the brake technology of rail vehicles and aspects regarding the operation of braking systems
- Overview of various braking system configurations
- Design of a braking system for freight cars
- Innovations in the brake technology of freight cars
- Familiarization with relevant (braking system) components

#### PREREQUISITES
- Completed vocational training in a metalworking or electrical profession (or equal qualification), and 3 months practical experience in rail vehicle maintenance

#### RESULT
Certificate of attendance (final test available upon request)

#### DURATION
2 days

#### NUMBER OF PARTICIPANTS
12
TRAINING COURSE ID: BFSID01

BASIC COURSE: INSPECTION AND MAINTENANCE TRAINING – FREIGHT CAR BRAKES (E.G. ACCORDING TO VPI GUIDELINES)

TARGET GROUP
Employees who are engaged in the maintenance and repair of freight cars with pneumatic braking systems

LEARNING TARGET
Participants will learn how to:
■ perform measurement and test activities in accordance with specific maintenance guidelines (e.g. VPI)
■ correctly use the required test equipment as well as detect and repair malfunctions

CONTENT
■ Overview and introduction to relevant standards (e.g. VPI 07, DIN27201–DIN27205)
■ Functionality and configuration of freight car braking systems, brake control, brake mechanism and diagnostics
■ Explanation of how to test and measure as well as recommendations for using measuring and testing technology
■ Final test of the vehicle and evaluation of the results according to the particular maintenance guidelines (e.g. VPI)

PREREQUISITES
■ Completed vocational training in a metalworking or electrical profession and at least 6 months practical experience in rail vehicle maintenance or
■ Previous participation in RailServices brake technology training – freight cars

REQUIRED INFRASTRUCTURE & DOCUMENTATION
■ System-relevant documentation (e.g. device description and installation drawing) and special tools in accordance with the KB documentation
■ Maintenance guideline for which training is required (e.g. VPI)
■ Necessary test equipment
■ Training room (equipped with projector and white board), sufficient supply of compressed air, vehicle availability for at least 2 days

RESULT
Certificate of attendance (final test available upon request)

DURATION
4 days

NUMBER OF PARTICIPANTS
6
TRAINING COURSE ID: **BFSID02**

**REFRESHMENT COURSE: INSPECTION AND MAINTENANCE TRAINING – FREIGHT CAR BRAKES (E.G. ACCORDING TO VPI GUIDELINES)**

**TARGET GROUP**
Employees who are engaged in the maintenance and repair of freight cars with pneumatic braking systems

**LEARNING TARGET**
Participants will:
- gain knowledge of the current topics related to brake technology for freight cars and associated regulations
- learn how to detect and fix malfunctions as well as correctly use the required test equipment

**CONTENT**
- Recap of functionality and configuration of freight car braking systems
- Relevant regulations, innovations in brake technology, analysis of disruptions on the basis of examples
- Presentation of latest developments in measurement and testing technology
- Final test of the vehicle and evaluation of the results according to the particular maintenance guidelines (e.g. VPI)

**PREREQUISITES**
Previous participation in RailServices inspection and maintenance training – Freight car brakes (basic course)

**REQUIRED INFRASTRUCTURE & DOCUMENTATION**
- System-relevant documentation (e.g. device description and installation drawing) and special tools in accordance with the KB documentation
- Maintenance guideline for which training is required (e.g. VPI)
- Necessary test equipment
- Training room (equipped with projector and white board), sufficient supply of compressed air, vehicle availability for at least 1 day

**RESULT**
Certificate of attendance (final test available upon request)

**DURATION**
2 days

**NUMBER OF PARTICIPANTS**
6
TRAINING COURSE ID: BFSID03
ADAPTATION COURSE: INSPECTION AND MAINTENANCE TRAINING – FREIGHT CAR BRAKES (E.G. ACCORDING TO VPI GUIDELINES)

TARGET GROUP
Employees who are engaged in the maintenance and repair of freight cars with pneumatic braking systems

LEARNING TARGET
Participants will learn:
■ how to independently perform measurement and test activities in accordance with particular maintenance guidelines
■ how to detect and repair malfunctions as well as correctly use the required test equipment

CONTENT
■ Recap of functionality and configuration of freight car braking systems
■ Key points, special procedures and differences between specific maintenance guidelines
■ Explanation of how to test and measure as well as recommendations for using measuring and testing technology
■ Final test of the vehicle and evaluation of the results in accordance with the particular maintenance guidelines (e.g. VPI)

PREREQUISITES
Previous participation in an inspection and maintenance training – freight car brakes (basic course)

REQUIRED INFRASTRUCTURE & DOCUMENTATION
■ System-relevant documentation (e.g. device description and installation drawing) and special tools in accordance with the KB documentation
■ Maintenance guideline for which training is required (e.g. VPI)
■ Necessary test equipment
■ Training room (equipped with projector and white board), sufficient supply of compressed air, vehicle availability for at least 1 day

RESULT
Certificate of attendance (final test available upon request)

DURATION
2 days

NUMBER OF PARTICIPANTS
6
TRAINING COURSE ID: BFPHR01

WEIGHING VALVE REPAIR TRAINING (WM/AML)

TARGET GROUP
Employees who are engaged in the maintenance and repair of pneumatic brake devices for rail vehicles

LEARNING TARGET
Participants will learn:
■ how to correctly overhaul in accordance with KB documentation
■ how to independently perform maintenance, setting, measurement and testing in accordance with the KB documentation
■ how to detect and fix malfunctions

CONTENT
■ Introduction and overview of the relevant KB documentation
■ Design, function, servicing, troubleshooting and diagnostics in accordance with KB documentation
■ Correct dismantling, cleaning and inspection according to KB documentation
■ Performance of the relevant tests in accordance with KB documentation
■ Logging according to the KB documentation (if required)
■ Introduction to spare part ordering in accordance with the KB spare parts catalogue

PREREQUISITES
■ Completed vocational training in a metalworking or electrical profession and at least 6 months practical experience in servicing rail vehicles or overhauling brake components
■ Previous participation in RailServices brake technology training is recommended

REQUIRED INFRASTRUCTURE & DOCUMENTATION
■ Device-related KB documentation, test object, special tools, materials and spare parts as per KB documentation
■ Against payment the required spare parts can be provided by KB (please allow for delivery time)
■ Testing and measuring equipment according to KB-documentation, assembling and disassembling tools, lifting gear, and their availability for the duration of training

RESULT
Certificate of attendance (final test available upon request)

DURATION
1 day

NUMBER OF PARTICIPANTS
6
**TRAINING COURSE ID:** **BFPHRO2**  
**SLACK ADJUSTER REPAIR TRAINING (TYPE DRV)**

<table>
<thead>
<tr>
<th><strong>TARGET GROUP</strong></th>
<th>Employees engaged in the maintenance and repair of slack adjusters</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LEARNING TARGET</strong></td>
<td>Participants will learn:</td>
</tr>
<tr>
<td></td>
<td>■ how to correctly overhaul in accordance with KB documentation</td>
</tr>
<tr>
<td></td>
<td>■ how to independently perform maintenance, setting, measurement and testing in accordance with KB documentation</td>
</tr>
<tr>
<td></td>
<td>■ how to detect and fix malfunctions</td>
</tr>
<tr>
<td><strong>CONTENT</strong></td>
<td>■ Introduction and overview of the relevant KB documentation</td>
</tr>
<tr>
<td></td>
<td>■ Design, function, servicing, troubleshooting and diagnostics in accordance with KB documentation</td>
</tr>
<tr>
<td></td>
<td>■ Correct dismantling, cleaning and inspection according to KB documentation</td>
</tr>
<tr>
<td></td>
<td>■ Performance of the relevant tests in accordance with KB documentation</td>
</tr>
<tr>
<td></td>
<td>■ Logging according to KB documentation (if required)</td>
</tr>
<tr>
<td></td>
<td>■ Introduction to spare part ordering in accordance with the KB spare parts catalogue</td>
</tr>
<tr>
<td><strong>PREREQUISITES</strong></td>
<td>■ Completed vocational training in a metalworking or electrical profession and at least 6 months practical experience in servicing rail vehicles or overhauling brake components</td>
</tr>
<tr>
<td></td>
<td>■ Previous participation in RailServices brake technology training is recommended</td>
</tr>
<tr>
<td><strong>REQUIRED INFRASTRUCTURE &amp; DOCUMENTATION</strong></td>
<td>■ Device-related KB documentation, test object, special tools, materials and spare parts as per KB documentation</td>
</tr>
<tr>
<td></td>
<td>■ Against payment the required spare parts can be provided by KB (please allow for delivery time)</td>
</tr>
<tr>
<td></td>
<td>■ Testing and measuring equipment according to KB documentation, assembling and disassembling tools, lifting gear, and their availability for the duration of training</td>
</tr>
<tr>
<td><strong>RESULT</strong></td>
<td>Certificate of attendance (final test available upon request)</td>
</tr>
<tr>
<td><strong>DURATION</strong></td>
<td>1 day</td>
</tr>
<tr>
<td><strong>NUMBER OF PARTICIPANTS</strong></td>
<td>6</td>
</tr>
</tbody>
</table>
**TRAINING COURSE ID:** BFPFM01  
**COMPACT FREIGHT CAR BRAKE CALIPER (CFCB) TRAINING**

### TARGET GROUP
Employees who are engaged in the maintenance and repair of pneumatic brake devices for rail vehicles

### LEARNING TARGET
Participants will learn:
- how to independently perform maintenance, setting, measurement and testing in accordance with the KB documentation
- how to detect and fix malfunctions

### CONTENT
- Overview of and introduction to the relevant KB documentation
- Design, function, servicing, troubleshooting and diagnostics in accordance with KB documentation
- Correct dismounting, cleaning, inspection according to KB documentation
- Performance of the relevant tests according to KB documentation
- Logging according to KB documentation (if required)
- Introduction to spare part ordering in accordance with the KB spare parts catalogue

### PREREQUISITES
- Completed vocational training in a metalworking or electrical profession and at least 6 months experience in servicing rail vehicles
- Previous participation in RailServices brake technology training is recommended

### REQUIRED INFRASTRUCTURE & DOCUMENTATION
- Device-related KB documentation, test object, special tools, materials and spare parts as per KB documentation
- Against payment the required spare parts can be provided by KB (please allow for delivery time)
- Basic workshop equipment, testing and measuring equipment according to KB documentation, lifting gear, and their availability for the duration of training
- Vehicle availability during training

### RESULT
Certificate of attendance (final test available upon request)

### DURATION
1 day

### NUMBER OF PARTICIPANTS
6
FUNCTION AND MAINTENANCE TRAINING FOR SELECTED PRODUCTS

**TARGET GROUP**
Employees who are engaged in the maintenance and repair of brake devices for rail vehicles

**LEARNING TARGET**
Participants will learn how to:
- independently perform maintenance, setting, measurement and testing in accordance with the KB documentation
- detect and fix malfunctions

**CONTENT**
- Overview of and introduction to the relevant KB documentation
- Design, function, service, diagnostics and troubleshooting according to the KB documentation
- Performance of the relevant tests according to the KB documentation
- Logging in accordance with the KB documentation (if required)
- Introduction to spare part ordering according to the KB spare parts catalogue

**PREREQUISITES**
- Completed vocational training in a metalworking or electrical profession and at least 6 months experience in servicing rail vehicles
- Previous participation in RailServices brake technology training is recommended

**REQUIRED INFRASTRUCTURE & DOCUMENTATION**
- Device-related KB documentation, test object, special tools, materials and spare parts as per KB documentation
- Against payment the required spare parts can be provided by KB (please allow for delivery time)
- Basic workshop equipment, testing and measuring equipment in accordance with the KB documentation, lifting gear, and their availability for the duration of training as well as documentation
- Vehicle availability during training

**RESULT**
Certificate of attendance (final test available upon request)

**DURATION**
Depending on the product

**NUMBER OF PARTICIPANTS**
6
TRAINING COURSE ID: BPSFM02

MAINTENANCE TRAINING – HYDRAULIC COMPONENTS

TARGET GROUP
Employees who are engaged in the maintenance, servicing and repair of hydraulic braking systems on rail vehicles

LEARNING TARGET
Participants will learn how to:
■ independently perform maintenance on hydraulic brake components in accordance with the KB documentation
■ test the braking system with or without using BCU and HCM (Caution: on a vehicle that is ready for service)
■ oil specification (cleanliness classes) and maintenance intervals based on customer experience and KB documentation

CONTENT
■ Overview and introduction of the relevant KB documentation
■ Introduction to maintenance of the braking system using the hydraulic service tools, exchange hydraulic components and maintenance parts (theoretical/practical)
■ Braking system design, function and maintenance in accordance with the KB documentation
■ Performance of the relevant testing of the device on the basis of the KB documentation and the maintenance interval

PREREQUISITES
■ Completed vocational training in a metalworking or electrical profession and at least 6 months experience in rail vehicle maintenance or
■ Previous participation in RailServices brake technology training

REQUIRED INFRASTRUCTURE & DOCUMENTATION
■ System-relevant documentation, special tools, materials and spare parts in accordance with the KB documentation
■ Required workshop infrastructure (depending on product being taught): Sufficient power supplies 230V (DC) 380V (3-phase AC)
■ Oil, spare parts, flushing unit, filling / bleeding unit and the AGH03 trigger unit incl. the control cables (project-specific), general tools
■ Training room inclusive projector
■ Vehicle availability during training (if possible on a pit)

RESULT
Certificate of attendance

DURATION
1 – 2 days (depending on the project or system)

NUMBER OF PARTICIPANTS
6
TRAINING COURSE ID: BPSFM03

SYSTEM TRAINING – HYDRAULIC BRAKING SYSTEM

TARGET GROUP
Employees who are engaged in the maintenance, servicing and repair of hydraulic braking systems on rail vehicles, or supporting departments

LEARNING TARGET
Participants will:
■ understand how the device functions and its applications in the system
■ learn how to work correctly on the braking system and its constituent hydraulic, mechanical and electronic brake components
■ learn how to conduct setting, measurement and testing activities according to the KB documentation
■ detect malfunctions on the braking system

CONTENT
■ Overview of the relevant KB documentation
■ Braking system design, function, servicing, troubleshooting and diagnostics in accordance with the KB documentation
■ Maintaining system log records in accordance with the KB-documentation (if required)

PREREQUISITES
■ Completed vocational training in a metalworking or electrical profession and at least 12 months experience in rail vehicle maintenance or an engineering department or
■ Previous participation in RailServices brake technology training or maintenance training

REQUIRED INFRASTRUCTURE & DOCUMENTATION
■ System-relevant documentation, special tools, materials and spare parts in accordance with the KB documentation
■ Required workshop infrastructure (depending on product being taught):
  Sufficient power supplies 230V (DC) 380V (3-phase AC)
■ Training room incl. projector
■ Vehicle availability during training (if possible on a pit)

RESULT
Certificate of attendance

DURATION
2 – 3 days (depending on the project or system)

NUMBER OF PARTICIPANTS
6
### HVAC Training Courses

**Training Structure and Educational Pathway HVAC**

<table>
<thead>
<tr>
<th>Level</th>
<th>Training Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level III</td>
<td>HVAC heavy maintenance training</td>
</tr>
<tr>
<td>(Experts)</td>
<td></td>
</tr>
<tr>
<td>Level II</td>
<td>HVAC system and maintenance training (project or system specific)</td>
</tr>
<tr>
<td>(Intermediates)</td>
<td></td>
</tr>
<tr>
<td>Level I</td>
<td>HVAC technology training</td>
</tr>
<tr>
<td>(Beginners)</td>
<td></td>
</tr>
</tbody>
</table>

#### Train Types
- **Locomotives**
- **Multiple units, high speed trains, metros**
- **Passenger cars**
- **Light rail vehicles**

**Legend:**
- Technology training
- Functionality and light maintenance training
- Inspection, testing and diagnostics training
- Heavy maintenance and repair training
**TRAINING COURSE ID:** HPST01  
**HVAC TECHNOLOGY TRAINING**

<table>
<thead>
<tr>
<th><strong>TARGET GROUP</strong></th>
<th>Employees who are engaged in mounting, commissioning, operation, maintenance and repair of HVAC units on trains</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LEARNING TARGET</strong></td>
<td>Participants will gain basic knowledge of the function of heating, ventilation, and air-conditioning systems</td>
</tr>
</tbody>
</table>
| **CONTENT** | ■ Introduction to the HVAC technology of rail vehicles and aspects of the operation of HVAC units  
■ Physical basis of cooling  
■ Various hardware architectures  
■ Familiarization with the relevant components |
| **PREREQUISITES** | Completed vocational training in a metalworking or electrical profession (or equal qualification) |
| **RESULT** | Certificate of attendance (final test available upon request) |
| **DURATION** | 2 days |
| **NUMBER OF PARTICIPANTS** | 8-10 |
### Training Course ID: HPSFM01

#### HVAC System and Maintenance Training

<table>
<thead>
<tr>
<th><strong>Target Group</strong></th>
<th>Employees who are engaged in mounting, commissioning, operation, maintenance and repair of HVAC units on trains</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning Target</strong></td>
<td>Participants will gain knowledge of the function, review and repair of specific HVAC systems</td>
</tr>
</tbody>
</table>
| **Content** | ■ General system overview  
■ Description of the main system components  
■ General description of HVAC mode of operation  
■ Description of HVAC electrical elements  
■ Fault diagnosis and use of the maintenance program  
■ Performance of preventive maintenance |
| **Prerequisites** | ■ Completed vocational training in a metalworking or electrical profession (or equal qualification) as well as basic knowledge of air-conditioning and practical experience as mechanical/electrical staff in the workshop or  
■ Previous participation in RailServices HVAC technology training |
| **Result** | Certificate of attendance (final test available upon request) |
| **Duration** | 3 days |
| **Number of Participants** | 8-10 |
TRAINING COURSE ID: HPSHR01
HVAC HEAVY MAINTENANCE TRAINING

TARGET GROUP
Employees who are engaged in mounting, commissioning, operation, maintenance and repair of HVAC units on trains

LEARNING TARGET
Participants will learn:
■ how to correctly conduct heavy maintenance in accordance with MERAK documentation
■ how to independently perform maintenance, setting, measurement and testing in accordance with the MERAK documentation
■ how to detect and fix malfunctions

CONTENT
■ Overview and introduction to the relevant MERAK documentation
■ Identification, function, service, troubleshooting and diagnostics according to the MERAK documentation
■ Correct dismantling, cleaning and inspection according to the MERAK documentation
■ Refrigerant handling and charging
■ Performance of the relevant tests in accordance with the MERAK documentation
■ Introduction to spare part ordering in accordance with the MERAK spare parts catalogue

PREREQUISITES
■ Completed vocational training in a metalworking or electrical profession (or equivalent qualification), basic knowledge of air-conditioning and brazing as well as practical experience as mechanical/electrical staff in the workshop or
■ Previous participation in RailServices HVAC system and maintenance training

RESULT
Certificate of attendance (final test available upon request)

DURATION
5 days

NUMBER OF PARTICIPANTS
6-8
# TRAINING COURSES

## TRAINING STRUCTURE AND EDUCATIONAL PATHWAY DOORS

| Level III (Experts) and Level II (Intermediates) | System and maintenance training for IFE entrance systems |
| Level I (Beginners) | DOOR technology training (project or system specific) |

| Locomotives | Multiple units, high speed trains, metros | Passenger cars | Light rail vehicles |

- Technology training
- Functionality and light maintenance training
- Inspection, testing and diagnostics training
- Heavy maintenance and repair training
TRAINING COURSE ID: **DPST01**

**DOOR TECHNOLOGY TRAINING**

**TARGET GROUP**  
Employees who perform inspection and maintenance activities on IFE entrance systems

**LEARNING TARGET**  
Participants will:
- gain basic knowledge of the function of IFE entrance systems
- learn how to independently perform inspection and basic maintenance activities in accordance with the IFE documentation
- learn how to recognize failure

**CONTENT**  
- Overview of and introduction to the relevant IFE documentation
- Practical training: design, function, maintenance, troubleshooting and diagnostics in accordance with the IFE documentation
- Safety check in accordance with the IFE documentation (if required)

**PREREQUISITES**  
- Completed vocational training in a metalworking or electrical profession (or equal qualification)
- Experience in rail vehicle maintenance is recommended

**REQUIRED INFRASTRUCTURE & DOCUMENTATION**  
- System-based IFE documentation, special tools, operational equipment and spare parts in accordance with IFE documentation
- Workshop infrastructure (depending on training content): Test equipment in accordance with IFE documentation, electrical power supply, lifting equipment
- Train/coach availability during the whole training session

**RESULT**  
Certificate of attendance (final test available upon request)

**DURATION**  
1 - 2 days (depending on the system)

**NUMBER OF PARTICIPANTS**  
6
TRAINING COURSE ID: **DPSID01**

**SYSTEM AND MAINTENANCE TRAINING FOR IFE ENTRANCE SYSTEMS**

**TARGET GROUP**
Employees who perform maintenance and repair activities on IFE entrance systems

**LEARNING TARGET**
Participants will:
- understand the functions of entrance systems
- learn how to independently perform maintenance, adjustment and control activities in accordance with the IFE documentation
- learn how to recognize and solve malfunctions (troubleshooting)

**CONTENT**
- Overview and introduction of the relevant documentation
- Practical training: units, function, maintenance, diagnostics and troubleshooting in accordance with the IFE documentation
- Performance of the relevant maintenance activities on the system in accordance with the IFE documentation
- Installation and safety checks in accordance with the IFE documentation (if specified)
- Ordering of spare parts according to the IFE spare parts catalogue
- IFE Service Software (Diag Studio, Update,…)

**PREREQUISITES**
- Degree in mechanical or electrical engineering (or equal qualification)
- Minimum of 6 months experience in rail vehicle maintenance is recommended
- Previous participation in RailServices DOOR technology training is recommended

**REQUIRED INFRASTRUCTURE & DOCUMENTATION**
- System-based IFE documentation, special tools, operational equipment and spare parts in accordance with the IFE documentation
- Workshop infrastructure (depending on the training content): Test equipment in accordance with the IFE documentation, electrical power supply, lifting equipment
- Train/coach availability during the whole training session

**RESULT**
Certificate of attendance (final test available upon request)

**DURATION**
2 - 5 days (depending on the system)

**NUMBER OF PARTICIPANTS**
6
TRAINING COURSES

TRAINING STRUCTURE MS ELECTRICAL PRODUCTS

<table>
<thead>
<tr>
<th>Level III (Experts)</th>
<th>Heavy maintenance training for high-speed circuit-breakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level II (Intermediates)</td>
<td>Heavy maintenance training for contactors Heavy maintenance training for resistors</td>
</tr>
<tr>
<td>Level I (Beginners)</td>
<td>Light maintenance training for high-speed circuit-breakers Preventive maintenance for high-speed circuit-breakers Light maintenance training for contactors Light maintenance training for resistors</td>
</tr>
</tbody>
</table>

| Locomotives | Multiple units, high speed trains, metros | Light rail vehicles | Passenger cars |

EDUCATIONAL PATHWAYS MS ELECTRICAL PRODUCTS

<table>
<thead>
<tr>
<th>HIGH-SPEED CIRCUIT-BREAKER SPECIALIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level III (Experts)</td>
</tr>
<tr>
<td>Level I (Beginners)</td>
</tr>
</tbody>
</table>

- **Technology training**
- **Functionality and light maintenance training**
- **Inspection, testing and diagnostics training**
- **Heavy maintenance and repair training**
TRAINING COURSE ID: **CPPFM01**

LIGHT MAINTENANCE TRAINING FOR RESISTORS

<table>
<thead>
<tr>
<th>TARGET GROUP</th>
<th>Employees who are engaged in the maintenance and repair of rail vehicles (locos, multiple units, high speed trains, metros, light rail vehicles, trolley busses and sub stations)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEARNING TARGET</td>
<td>Participants will gain basic knowledge of how to maintain Microelettrica resistors</td>
</tr>
</tbody>
</table>
| CONTENT | ■ Introduction to the components and their application  
■ General overview of the resistors product range  
■ Dielectric test  
■ Detection of failure causes  
■ Engine phase test (only for forced ventilated types) |
| PREREQUISITES | Basic electrical competence and manual skills |
| RESULT | Certificate of attendance |
| DURATION | 0.5 days |
| NUMBER OF PARTICIPANTS | 4 |
## TRAINING COURSE ID: CPPFM02

### LIGHT MAINTENANCE TRAINING FOR CONTACTORS

**TARGET GROUP**

Employees who are engaged in the maintenance and repair of rail vehicles (locos, multiple units, high speed trains, metros, light rail vehicles, trolley busses and sub stations)

**LEARNING TARGET**

Participants will gain basic knowledge of how to maintain Microelettrica contactors

**CONTENT**

- Introduction to the components and their application
- General overview of the range of contactors
- Disassembling and replacement of fixed and mobile contacts, arc chute, arc contacts, auxiliaries, arc runner (demonstration by MS expert personnel)
- Familiarization with the components
- Practical exercises

**PREREQUISITES**

Basic electric competence and manual skills

**RESULT**

Certificate of attendance

**DURATION**

0.5 days

**NUMBER OF PARTICIPANTS**

4
### Training Course ID: CPPFM03

**Preventive Maintenance Training for High-Speed Circuit-Breakers**

**Target Group**
Employees who are engaged in the maintenance and repair of rail vehicles (locos, multiple units, high speed trains, metros, light rail vehicles, trolley busses and sub stations)

**Learning Target**
Participants will gain basic knowledge of preventive maintenance for high-speed circuit-breakers

**Content**
- Introduction to the components and their application
- General overview of the range of HSCBs
- Ceramics and contact cleaning
- Detection of failure causes
- Check for oil leakage and for electric circuit

**Prerequisites**
Basic electric competences and manual skills

**Result**
Certificate of attendance

**Duration**
1 day

**Number of Participants**
4
TRAINING COURSE ID: CPPFM04
LIGHT MAINTENANCE TRAINING FOR HIGH-SPEED CIRCUIT-BREAKERS

TARGET GROUP  Employees who are engaged in the maintenance and repair of rail vehicles (locos, multiple units, high speed trains, metros, light rail vehicles, trolley busses and sub stations)

LEARNING TARGET  Participants will gain knowledge of light maintenance for high-speed circuit-breakers

CONTENT  ■ Replacement of main spare parts: contacts, electric board, shock absorber (demonstration by MS expert personnel)
          ■ Adjustments and tests

PREREQUISITES  Previous participation in RailServices preventive maintenance training for high-speed circuit-breakers

RESULT  Certificate of attendance

DURATION  1 day

NUMBER OF PARTICIPANTS  4
TRAINING COURSE ID: CPPHR01
HEAVY MAINTENANCE TRAINING FOR RESISTORS

TARGET GROUP
Employees who are engaged in the maintenance and repair of rail vehicles (locos, multiple units, high speed trains, metros, light rail vehicles, trolley busses and sub stations)

LEARNING TARGET
Participants will gain intermediate knowledge of how to maintain Microelectrica resistors

CONTENT
- Replacement of ceramic spacers
- Dielectric test
- Detection of failure causes and troubleshooting

PREREQUISITES
- Basic electrical competences and manual skills or
- Previous participation in RailServices light maintenance training for resistors

RESULT
Certificate of attendance

DURATION
1 day

NUMBER OF PARTICIPANTS
4
TRAINING COURSE ID: CPPHR02
HEAVY MAINTENANCE TRAINING FOR CONTACTORS

TARGET GROUP
Employees who are engaged in the maintenance and repair of rail vehicles (locos, multiple units, high speed trains, metros, light rail vehicles, trolley busses and sub stations)

LEARNING TARGET
Participants will gain knowledge of how to fully maintain Microelettrica contactors

CONTENT
- Disassembling and replacement of mobile pole, fixed pole and coil (demonstration by MS expert personnel)
- Settings and adjustments
- Dielectric test
- Practical exercises

PREREQUISITES
- Basic electrical competence and manual skills or
- Previous participation in RailServices light maintenance training for contactors

RESULT
Certificate of attendance

DURATION
1 day

NUMBER OF PARTICIPANTS
4
**TRAINING COURSE ID:** CPPHR03  
**HEAVY MAINTENANCE TRAINING FOR HIGH-SPEED CIRCUIT-BREAKERS**

<table>
<thead>
<tr>
<th><strong>TARGET GROUP</strong></th>
<th>Employees who are engaged in the maintenance and repair of rail vehicles (locos, multiple units, high speed trains, metros, light rail vehicles, trolley busses and sub stations)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LEARNING TARGET</strong></td>
<td>Participants will gain knowledge of heavy maintenance and testing for high-speed circuit-breakers</td>
</tr>
</tbody>
</table>
| **CONTENT** | ■ Detection of failure causes and troubleshooting  
■ Arc chute repair  
■ Settings and adjustments  
■ Dielectric test |
| **PREREQUISITES** | Previous participation in RailServices light maintenance training for high-speed-circuit-breakers |
| **RESULT** | Certificate of attendance |
| **DURATION** | 2 days |
| **NUMBER OF PARTICIPANTS** | 4 |
TRAINING COURSE ID: MARB01
SAFETY ON TRACK TRAINING

TARGET GROUP
This training is required by Swedish law for any person entering the track area. (Recommended for any other country)

LEARNING TARGET
Participants will learn and understand basic safety principles in order to move safely within the track area

Swedish legislation: This training is legally required for any person who enters the track area in Sweden. But the training solely focuses on safety and will not authorize the participants to work within the track area

CONTENT
■ Introduction to the relevant safety standards and regulations which are valid for the railway environment
■ Recognize the hazards within the track area
■ How alcohol, drugs and fatigue affect perception
■ General knowledge about electrical safety
■ Risk assessment within the track area
■ How to behave in the event of an accident and other incidents within the track area

PREREQUISITES
–

RESULT
Certificate of attendance

DURATION
■ Theoretical training and assessment conducted by a web based e-learning solution (approximately 2 hours)
■ Practical on-site training and final test (approximately 2 hours)

NUMBER OF PARTICIPANTS
6

Please note: The training content and training structure is aligned with Swedish legislation and rules, but can be adapted to the specific requirements in any other country.