

## New PMAFIX™ Pro connectors for ICE trains

ABB`s latest-generation cable protection for the most demanding requirements offering long service life

### PMA

This latest generation of fittings is the result of decades of experience with highly diverse applications.

One of the Germany`s best-known trains, the Intercity Express, or ICE , transports over 80 million people safely to their destinations. A familiar sight, but only few passengers are familiar with the technical components that make up these trains, or how precisely these components interact with each other. Essential for ensuring that train operations are conducted safely are Eurobalises. Eurobalises are part of the train control system which identifies any risks that might affect and hinder train operations. These serve as passive locating systems – “electronic milestones”. The trains use sensors to calculate their position between two balises. Train control systems slow down trains which fail to keep to a specified speed if there is the potential for an incident. They are therefore a key element in helping ensure travel safety.



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Each year, ICE trains transport over

**80 million people**  
safely to their destinations

Intercity Express trains (ICE) are Deutsche Bahn`s fastest trains. For over 30 years, they have been safely conveying passengers to the Netherlands, Switzerland, Belgium, Austria and France. They transport passengers to 149 ICE stations in Germany and are serviced and repaired at special ICE workshops. Maintenance and operational

— The Eurobalises installed in the tracks transmit data from the track to the train. For example, permanent-way data, such as locally permitted speeds, gradients and signal information.

**Every year, the Intercity Express (ICE) long-distance high-speed passenger trains operated by Deutsche Bahn (DB) bring 80 million people together throughout Germany and Europe. Many elements need to be closely coordinated if these journeys are to be carried out safely. So that passengers can continue to rely on the service, sophisticated solutions and products, such as the PMAFIX Pro connector system for cable protection systems, are needed.**



— The primary maintenance site for ICE 1 and ICE 4 trains is in Hamburg, where the workforce numbers 1,300. Servicing can be carried out at three different levels.

testing is carried out continuously after every period in service. Similarly, the routes along which the ICE trains run must be maintained and checked for potential hazards.

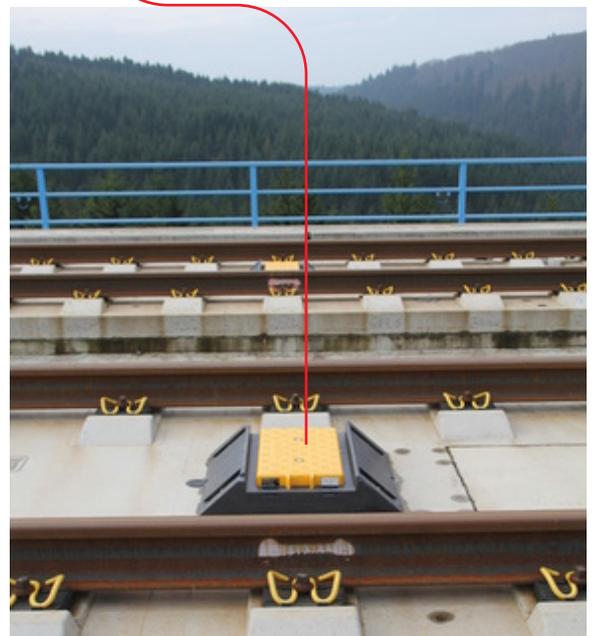
## Eurobalises help make trains and routes safe for operational service.

Eurobalises in the centre of the track are an important component for ensuring that data is transmitted from the track to the train. Based on the transponder principle, the balise transmits what are in effect telegrams to the antennae on the train where they are analysed and processed. The data is used in the speed monitoring equipment in Deutsche Bahn's tilting trains, in the Berlin S-Bahn's train control systems, for European Train Control System (ETCS) pilot projects, for transitioning (i.e. switching over train control systems) and for national train control within Germany using Eurobalise technology. The Eurobalise components installed in the track and the balise antennae on the train itself, both employed for the purpose of transmitting data, are collectively known as "Eurobalise technology".

At the European level, the Eurobalise is standardized by the European Rail Agency (ERA). It is a safety-related element of the ETCS and uniform with the European Railway Traffic Management System (ERTMS). Migration to ETCS is currently under way throughout Europe. The aim is to replace the variety of train control systems used in Europe and to

introduce a uniform, interoperable European standard - Harmonizing systems and processes will enhance the operational reliability of cross-border

## Eurobalises act as early warning





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Intercity Express (ICE) trains have been transporting passengers for over 30 years.

rail traffic and permit end-to-end cross-border movements free of technical barriers.

Alstom, the market leader in ETCS technology has been commissioned by Deutsche Bahn to equip the ICE 1 fleet with ETCS. In order to meet the customer's application requirements, ABB's PMA™ cable protection experts have also been brought in. The Eurobalise cable will now be assembled using PMAFix Pro technology. Testing conducted in the PMA laboratory in Switzerland demonstrated the XVCSG conduit was viable. As an experienced cable protection partner, the ABB PMA team was able to assist in assembling the cable and making it waterproof according to IP68/69 by using PMAFIX Pro fittings.

#### The advantages of PMAFIX Pro

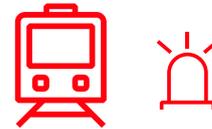
Using PMAFIX Pro ensures that the plug connections can be re-used and easily repaired. PMAFIX Pro fittings consists of an outer body and an inner sealing element. The sealing element assumes both the sealing and the locking function at the same time. It also helps ensure that all protection classes up to IP68 and IP69K are met, even under conditions of permanent dynamic stress. The PMAFIX Pro conduit fittings are manufactured using multi-component injection casting technology. The advantages are:

- simple push-fit assembly of the conduit
- the material is self-extinguishing
- halogen-free
- REACH and RoHS compliant
- offers operational safety due to visual and acoustic control features.

PMAFIX™ Pro screw connections are made of specially modified polyamide 6; they are halogen-free and REACH and RoHS compliant, as well as being UV- and weather-resistant.

The new Eurobalise cable is now assembled using

## PMAFIX™ Pro connectors





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This latest generation of fittings combines the special features of PMAFIX™ cable protection with the knowledge gained from years of experience in a wide range of applications.

#### ABB and Alstom

As a reliable supplier to DB AG, the ABB PMA cable protection team – working on behalf of Alstom – has been able to make a significant contribution to cable protection solutions by employing the latest PMA™ cable protection technology on the ECTS project for the ICE 1 fleet.

#### Why ABB?

We can support you throughout the entire life cycle of your equipment, enhancing the economic efficiency and the performance of your rail vehicle fleet while helping to lower life-cycle operating costs. Based on the knowledge we have gained during our decades supporting the rail sector, we pay close attention to the safety and reliability requirements of rail systems.

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