



SIEMENS

Ingenuity for life

ICE 4 (BR 412)

high-speed trains

In May 2011, the German national railway company is concluding a framework agreement with Siemens Mobility for up to 300 trainsets. In the initial phase, 130 ICE 4-type trains have been ordered, and beginning in 2017 they will replace the Intercity and Eurocity fleets put into operation between 1971 and 1991. At a later time, it is planned to replace ICE 1 and ICE 2 vehicles. The ICE 4 will then be responsible for roughly 70 percent of Deutsche Bahn's interurban transport revenue.

The ICE 4 sets new standards in intercity traffic. Together with its partner Bombardier, Siemens has developed a

unique concept, that means it can be individually adapted to the requirements of various transport tasks.

The Powercar concept

The ICE 4's drive concept is based on the so called Powercar concept. To achieve a high degree of modularity and therefore flexibility, the components of the traction system – basically transformer, traction converter, cooler, and four traction motors – are implemented in autonomous, powered identical cars (Powercars) and integrated beneath the cars. All trainset configurations – from five to fourteen cars – are possible within certain framework conditions.

This means that the train can be optimally adapted to specific transport tasks in terms of acceleration, speed, and passenger capacity.

Electronic vehicle control system

The architecture of the vehicle control system is consistent with the flexible car concept, made possible by the future Ethernet Train Bus industry standard that allows for a flexible car setup. Individual cars will be provided with control units as needed to ensure maximum autonomy. The advanced, industry standard PROFINET is used in each car.

Technical data		
	7-car trainset	12-car trainset
Maximum speed	230 km/h	250 km/h
Train length	200 m	346 m
Voltage system	15 kV / 16.67 Hz 25 kV / 50 Hz 1.5 kV / DC; 3.0 kV / DC	15 kV / 16.67 Hz
Number of Powercars	3	6
Traction output	4.95 MW	9.9 MW
Brakes	Air brake with extra regenerative brake, track brake as electro-magnetic track brake	
Number of axles	28 (12 driven)	48 (24 driven)
Number of bogies	14 (6 driven)	24 (12 driven)
Axle load	< 18 t	
TSI class	2	1
Gauge	1,435 mm	
Car body	Steel, 28 m	
Pantograph	AC	
Service entry	12 / 2020	12 / 2017
Number of seats (total / first-class / restaurant)	456 / 77 / 17	830 / 205 / 23

SIBAS PN

SIBAS PN is Siemens' innovative railway automation system. The system is based on SIMATIC components used in industrial automation systems and their integrated engineering environment. The communication network comprises two hierarchical levels: ETB (Ethernet Train Bus) and PROFINET vehicle bus. Both communication systems are based on Fast Ethernet (100 Mbit/s, Switched Ethernet) with optional redundancy.

Trailing bogie

The ICE 4 uses a more highly developed variant of the Bombardier FLEXX Eco® trailing bogie. It has been optimized for high-speed transport. This bogie is especially track-friendly and helps reduce energy consumption through its construction and skirt option. The trailing bogie is characterized by its low unsprung mass and its very low weight. Thanks to its lightweight characteristics it reduces the ICE 4's total weight by 5%.

Power bogie

The ICE 4's power bogie is a further development of the tried-and-tested SF 500 family. This robust bogie meets high demands for bearing loads and traction forces and has already been successfully in use in high-speed transport and double-decker trains.

Ecofriendly operation

Despite its high seating capacity, the ICE 4 is relatively lightweight, with a superior weight-to-seat ratio. The ICE 4's modularity supports train configurations that require as few components as possible. Carefully selected innovations – like the combined use of lightweight trailing bogies with inside bearings and weight-optimized power bogies, and the further refinement of the aerodynamic design – help reduce weight and energy consumption. The ICE 4 needs more than 20% less energy than its predecessors.



Interior

The ICE 4 is a true world champion when it comes to usable floor space. In only seven cars, it can comfortably accommodate more than 450 seats in a 200 meter long train. The individual steelbodied cars have been lengthened to 28 meters, thereby reducing the number of intercar gangways, components, and bogies while increasing car capacity. Electronics cabinets have been largely eliminated from the interior, and the functional areas have been combined spatially. In addition, new seats are being used with innovative ergonomics and seat kinematics.

Configuring the ICE 4's large usable floor space is easy and straightforward, thanks to the emptytube principle. The entire passenger area has a modular layout, so all the furnishings can be varied at will. As a result, last-minute changes to accommodate new requirements can be quickly and easily implemented.

To ensure maximum flexibility, all passenger areas are equipped for easy reconfiguration. They're specifically designed for railway applications, are stain-resistant, easy to clean, and conform to fire, health, and environmental standards.

Innovative seats provide an especially high degree of interior flexibility. They are mounted on C-rails along which they can be moved: and all the passenger conveniences, including reservation indicators and electrical outlets, are integrated in the seats themselves. First-class seats are also equipped with reading lamps.

Lighting concept

The large panoramic windows (1,924 mm x 780 mm) ensure a well-lit interior and a bright, friendly atmosphere. At the same time, the innovative lighting in the passenger area provides bright, uniform illumination even when the luggage racks are full. The latest LED technology means that different colors can be selected to reflect different lighting scenarios, thereby adjusting the color and brightness of the lighting according to the time of day.

Accessibility

To make travel more enjoyable for those with limited mobility, the ICE 4's multifunction car provides an area for wheelchairs that is located in direct proximity to a wheelchair lift and roomy universal restroom that conform to TSI PRM standards. The floor is also equipped with a touch-sensitive guidance system to help blind or visually impaired passengers.

Intelligent passenger information

The passenger information system keeps passengers constantly informed – both visually and audibly – of the itinerary and the available services. In different regions, texts and speech can be output in different languages, e.g. German, English, and French. The ICE 4 is equipped for GSM mobile phone and mobile Internet access.





Published by
Siemens AG 2016

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Article No. MOML-T10022-00-7600
Printed in Germany
Dispo 21704
TH 166-160812 DA 09161.0

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