

The ICE 4 power car concept

The multiple-unit concept of the ICE 4 was designed to offer the greatest possible flexibility. On the basis of five car types, 24 trainset configurations are possible to meet the varying needs for passenger capacity, top speed and route profiles. The ICE 4 can also be equipped with country-specific pantographs for service in different countries.

One prerequisite for a virtually freely configurable train was the development of a power car that combines all traction components in one car. In the power car, the key traction components are located below the floor: transformer, traction power converter with two pulse inverters and alternating current on-board power supply, traction cooling unit, parts of the high-voltage equipment, and the two type SF 500 ICE 4 dual-axle power bogies, each with two self-ventilated traction motors.

The ICE 4 trainsets will be composed of five car types: in addition to the power cars, there is also a powered service car with conductor compartment and pantograph as well as trailer cars with pantographs. The pantographs are for service in Germany and Austria and are equipped with narrower bows for Switzerland. Multiple-system power cars are planned for service in other countries. In addition, the trainsets have trailer cars without pantographs, a restaurant car and two end cars with driver cabs and rooms.

The basic ICE 4 configurations are seven-car and twelve-car trainsets, whereby two seven-car units can be joined for double-traction service. The seven-car train is 200 meters long, driven by three power cars and is designed for a top speed of 230 kilometers per hour. The twelve-car train, with a length of 346 meters, will be driven by six power cars and reach a top speed of 250 kilometers per hour with a different gear ratio.

A maximum of 50 percent of the axles will be powered in this train concept in order to ensure that the air brakes of the non-powered cars provide the necessary deceleration in an emergency braking. Depending on the profile of the rail route, fewer power cars and more trailer cars can also be used. Two pantographs (or two additional pantographs for Switzerland) are planned for each trainset. ICE 4 configurations from five up to 14 cars are possible.

The car bodies are 28 meters long, three meters longer than those of the Velaro D (Deutsche Bahn Series 407). As a result, they offer more usable space for higher seating capacity, shorten the car connections and, with the seven-car configuration, provide more room than an eight-car trainset. The lengthened car design made possible the concept of the power car and created space for the installation of the high-voltage and traction equipment.

The SF 500 ICE 4 traction bogies of the power cars are compact and 136 millimeters shorter than the bogies of the Velaro D, despite an additional 100 millimeters between the axles. This is also thanks to the self-ventilated, air-cooled traction motors: They need less installation space since they operate without external ventilators. Moreover, the integrated air cooling is also maintenance-free. Each wheel set in a power car has available a continuous output of ca. 400 kilowatts.

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