

ŠKODA GROUP RAIL

Škoda Group is one of the leading European companies in the field of transport engineering, with a history spanning more than 165 years. Škoda focuses on the development and production of vehicles for railway and urban public transport. Its products include primarily electric suburban train units, battery-powered trains, low-floor trams, metro trainsets, trolleybuses, electric buses, hydrogen buses, electric motors, components, passenger coaches, digital solutions, and complete drive systems for environmentally friendly public transport.

Thanks to its ecosystem of production plants, service centers, and engineering offices, the outstanding work of thousand of project engineers, and designers, and billions invested annually in its own research and development, Škoda Group boasts a portfolio of modern vehicles that meet the latest European standards. Škoda places great emphasis on the use of cutting-edge technologies for modern urban and rail transport vehicles. Škoda is also developing railway vehicles and buses with alternative propulsion systems.

Škoda Group's transport solutions are used in the Czech Republic, Slovakia, Germany, Finland, Poland, Lithuania, Latvia, Estonia, Italy, the Balkans, Australia, the USA, and many other countries around the world.

Škoda Group currently employs 10,000 people. In addition to its production sites and technology centers in the Czech Republic, Finland, and Turkey, Škoda Group also has branches in Germany, Italy, Austria, Belgium, Hungary, Poland, and Ukraine.

Škoda Group provides comprehensive transport solutions for urban, intercity, and mainline rail transport, and it continues to work to ensure that travel is comfortable, fast, sustainable, and safe. Thanks to a wide range of boarding height options, low-floor and barrier-free access is ensured in all areas where its vehicles operate.

Škoda Group is part of PPF Group, which invests in a wide range of sectors – from financial services and telecommunications to biotechnology, real estate, and engineering. PPF Group operates in Europe, Asia, Africa, and North America.

ŠKODA GROUP

**ETCS** 6 → 7 **ETCS** RAIL

# **ETCS** (EUROPEAN TRAIN CONTROL SYSTEM)

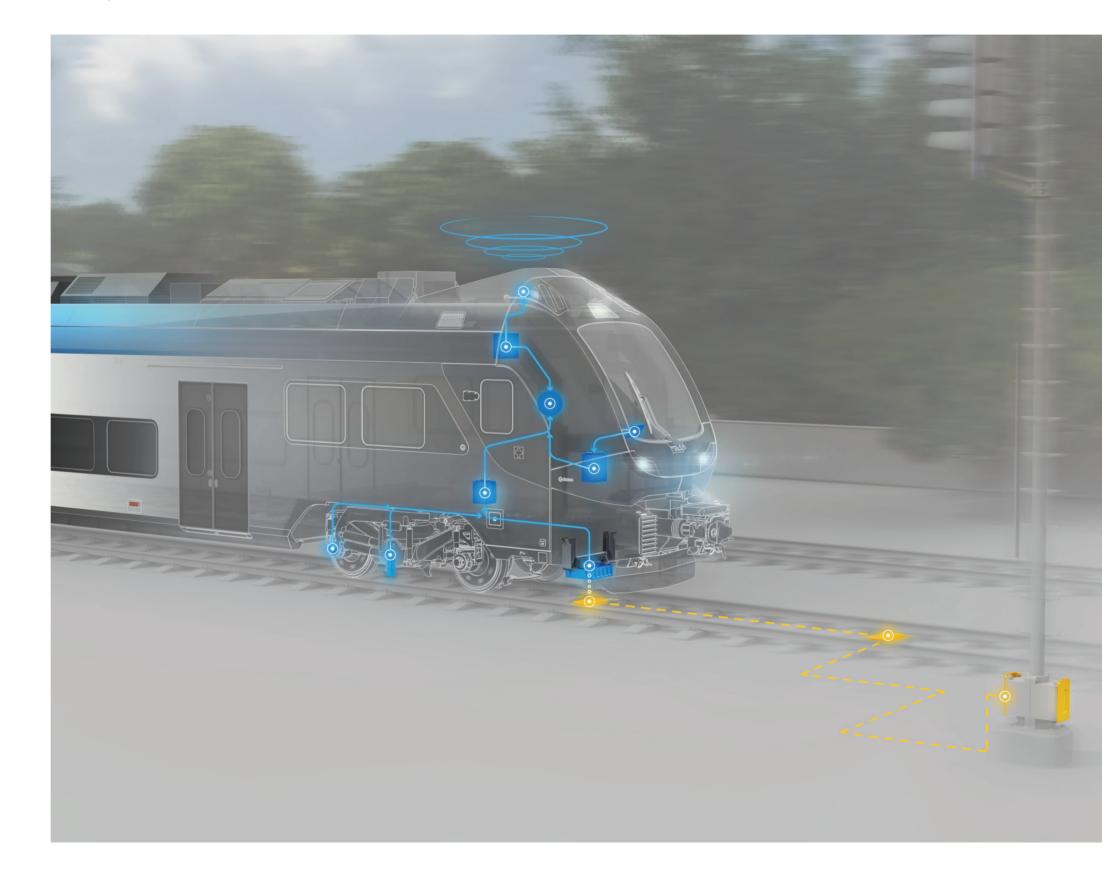
The term ETCS refers to a safety and interoperability standard for railway vehicles within the European Union. It is a unified system aimed at standardizing safety levels and accelerating cross-border transport.

Modern Škoda railway vehicles are now routinely equipped with the unified European train control system ETCS (European Train Control System). This system is designed to replace the variety of national safety technologies with a single common standard, enabling interoperability across European rail networks. The main benefit of ETCS is a significant increase in the safety of rail transport in Europe.

Škoda Group plays a key role in the implementation of exclusive ETCS operation in the Czech Republic. The total number of vehicles being equipped or already equipped with the ETCS system exceeds 400 units. For new generations of electric units, we are developing solutions that comply with the latest technical standards and legislative requirements, with a focus on the future.

We integrate ETCS not only into newly manufactured vehicles but also into existing ones through so-called retrofitting. This additional installation is being carried out on a wide range of vehicles for various operators, from express locomotives to special working machines. Škoda Group manages the entire process - from engineering through installation to the approval procedure.

Thanks to the acquisition of The Signalling Company, Škoda Group is ready to offer customers its own comprehensive ETCS system solution.



ŠKODA GROUP BATTERY MULTIPLE UNITS 10 → 11

BEMU – The battery electric multiple unit is the train transport solution of the future. Thanks to the combination of traction battery and overhead catenary power supply, it can also operate on lines with non-electrified sections up to 80 km long. This also reduces the number of changes for passengers, making transport more convenient and time-efficient. The unit's batteries are continuously recharged from the overhead catenary system during the journey on electrified sections, via regenerative braking, and directly from the electricity grid in the depot.

The design of the unit is based on the proven concept of regional EMUs. All electrical equipment, including traction batteries, is located on the roof of the BEMU. This makes it possible to keep a low-floor between the bogies.

# **TECHNOLOGY**

BEMU is low-floor, providing barrier-free access. If necessary, the floor height can be adapted to the ustomer's requirements. The open multifunctional space near the door provides storage space for luggage, bicycles and prams. A higher level of passenger comfort is contributed by Wi-Fi connection and 230 V electrical sockets to easily chargé mobile phones, laptops or tablets.

The train is controlled from a comfortable and safe driver's cab using a modern control system. Up to three coupled units can be controlled by a single driver thanks

to a train control system which uses WTB communication. The BEMU is equipped with automatic train control, including automatic speed control systems.

The wireless transmission of diagnostic data is used for online monitoring of inservice vehicles. The BEMU has an external and internal camera system.

SKODA GROUP BATTERY MULTIPLE UNITS 12 → 13

# BATTERY ELECTRIC MULTIPLE UNITS

The BEMUs meets the latest legislative TSI requirements, including fire safety requirements according to EN 45545-2. The cabinet and interior structure consist of modern non-flammable materials. The cars also have a built-in automated system for monitoring and detecting smoke and fire. Each car has a central door closing and door locking system.

rack gauge	1,435 mm
ar Width	2,820 mm
ar Height	4,260 mm
eight of Entrance above TOR	580 mm
nstalled Power	4 × 340 kW
1aximum speed	160 km/h in trolley mode 120 km/h in battery mode
ower supply	3 kV DC / 25 kV 50 Hz
attery range	up 80 km

**BATTERY MULTIPLE UNITS** 14 → 15 **BATTERY ELECTRIC MULTIPLE UNITS** 

ŠKODA GROUP RAIL

# **CZECH REPUBLIC**

# **BEMU** MORAVIAN-SILESIAN REGION

The design of the BEMU is based on the EMU single-deck units. The BEMU is composed of two cars. The first 4 units operate in the Moravian-Silesian Region has been in operation since December 2024. Another 15 units are expected to enter service in 2026/2027.

All these 19 trains will run in the Moravian-Silesian region, which is a pioneer of this technology in the Czech Republic. The cars have a classic bogie arrangement - each car is supported by two separate bogies. The propulsion system allows the use of traction bogies under the front and middle cars. Consequently, the overall vehicle performance depends on the customer's requirements and the operational purpose of the unit. The singledeck BEMU is designed for a track gauge of 1,435 mm, and we also have a solution ready for 1,520 mm.

In the first three months, the four battery units in the Moravian-Silesian Region attracted 15% more passengers. According to estimates, they will save at least 200,000 liters of diesel annually and reduce CO<sub>2</sub> emissions by 500 tons.







ŠKODA GROUP ELECTRIC MULTIPLE UNITS 18 → 19

Electric multiple units made by Škoda Group are among the most reliable on the market. All vehicles excel thanks to their lightweight integral construction made of aluminium profiles and modern and reliable drives. Thanks to electrical energy recovery during electrodynamic braking, energy is also utilised to the optimal extent. This significantly contributes to minimizing the unit's operating costs.

Double-deck units and push-pull trainsets are rolling in the Czech Republic, Slovakia, Finland, Lithuania, Ukraine and Germany.

Modern single-deck RegioPanter and InterPanter can be seen on lines in the Czech Republic, Slovakia, Latvia and Estonia, whose design is adapted for wide gauge tracks.

# **ECOLOGY**

The entire production cycle of the electric vehicles and their operation and disposal are environmentally friendly. We rely on the EN ISO 14001 standard. Significant operating cost savings are achieved thanks

to low maintenance costs and reduced energy consumption. Additionally, more than 95% of the components and elements of the units are recyclable.

# **SERVICE**

For Škoda Group, customer care does not end when it delivers the vehicles. It provides regular, high-quality service to both single-deck and double-deck units. The daily availability of the entire fleet of these modern units is a matter of course.

Škoda Group is experienced in servicing vehicles from a number of countries around the world, for example, the Czech Republic, Slovakia, Lithuania and Ukraine.

ŠKODA GROUP ELECTRIC MULTIPLE UNITS 20 ightarrow 21

# **TECHNOLOGY**

All electric multiple units are low-floor, providing barrier-free access. If necessary, the floor height can be adapted to the customer's requirements. The open multifunctional space near the door provides storage space for luggage, bicycles and prams. The cars have a Wi-Fi connection and are equipped with 230 V electrical sockets to easily charge mobile phones, laptops or tablets.

The train is controlled from a comfortable and safe driver's cab using a modern control system. Up to three coupled units can be controlled from a single station thanks to a superior train control system which uses WTB communication. The units are equipped with automatic train control, including automatic speed control systems.

The wireless transmission of diagnostic data is used for online monitoring of inservice vehicles. The electric units have an external and internal camera system.

The electric units meet the latest legislative TSI and GOST requirements, including fire safety requirements according to EN 45545-2. The cabinet and interior structure consist of modern non-flammable materials. The cars also have a built-in automated system for monitoring and detecting smoke and fire. Each car has a central door closing and door locking system (while rolling).

# TAILOR-MADE TECHNOLOGICAL SOLUTIONS

Škoda Group offers a wide range of variability and modularity for its products. Thanks to this, it is possible to adapt them to the customer's specific wishes. At the same time, each introduces developments which are taken into account in other projects.

Electric multiple units are designed for electrified lines with different power supply systems; they can be supplied with different cabinet widths, entry heights or interior layouts. The default configuration of the electric multiple units is three-car version, but the trains can naturally be adapted according to the customer's needs. Quick coupling of several units into one functional unit is enabled by automatic end coupling.

Push-pull trainsets can be pulled by various electric or diesel locomotives, including the most modern electric locomotive Emil Zátopek.

The train capacity depends on the customer's requests, and the specific implementation may vary – it depends on seat spacing, the number of first class seats, the number of bicycle stands or the required boarding area size.

Each train has enough space for transporting wheelchairs and has been adapted for transporting people with reduced mobility or orientation, including barrier-free toilets. Other arrangements depend on the customer's requirements. The interior space may be entirely open, without doors or partitions, or divided to individual passenger compartments.

ŠKODA GROUP ELECTRIC MULTIPLE UNITS 22 → 23 RAIL

# SINGLE-DECK ELECTRIC MULTIPLE UNITS

Single-deck units consist of two to seven cars. At the ends of each unit are head cars, and between these are passenger cars.

The cars have a classic bogie arrangement – each car is supported by two separate bogies. The propulsion system allows the use of traction bogies below the head and passenger cars. Consequently, the overall vehicle performance depends on the customer's requirements and the operational purpose of the unit. The single-deck electric multiple units are designed for gauges of 1,435 mm and 1,520 mm. The different widths of the vehicle body also depends on the gauge.

Thanks to a wide range of door entry heights, low-floor cars and barrier-free entry are provided. Each car can have either one or two pairs of doors.

rack gauge	1,435 / 1,520 mm
ontact voltage	3 kV DC, 3 kV DC + 25 kV / 50 Hz, 25 kV / 50 Hz, 15 kV / 16.7 Hz
op speed	160 km/h
aximum acceleration	up to 1.1 m/s²
ehicle width	2,820 / 3,400 mm
ehicle / box height	4,260 mm
oarding height	580-760 mm above TR
parding door width	1,300-1,500 mm
nit power	Number of traction motors × 340 kW

ŠKODA GROUP ELECTRIC MULTIPLE UNITS 24 → 25 SINGLE-DECK ELECTRIC MULTIPLE UNITS

RAIL ELECTRIC MOLTIPLE UNITS

# REGIOPANTER / INTERPANTER

The RegioPanter electric multiple unit is designed primarily for regional tracks, where passengers will appreciate the comfortable and cosy seats, air conditioning and Wi-Fi connection. Škoda has delivered several dozens of these modern vehicles for Czech Railways. The wide entrance door and the fully passable interior without inner doors provide fast and smooth movement of passengers.

There is also plenty of space inside the units for people with reduced mobility, and many bicycle stands. Of course, the entrance is barrier-free. Each unit has sliding stairs adaptable to different platform heights.

RegioPanter units are single-system units for 3 kV DC, or dual-system for 3 kV DC and 25 kV 50 Hz. They are designed for a track gauge of 1,435 mm, and the cars are equipped with a drive bogie containing two asynchronous motors and one standard bogie.

Two- or three-car RegioPanters are operating in several regions in the Czech Republic. At the customer's request, the two-car single-deck electric units can provide 147 seats with a total capacity

of 317 passengers. The three-car single-deck electric units accommodate 241 seats with a total capacity of 497 passengers.

InterPanter units are designed for interregional and long distance transport. The interior of the InterPanter electric units is adapted for comfortable travel over longer distances.

The InterPanter has spatially and acoustically separated passenger compartments, a first class section, compartments for mothers with children, and large-capacity shelves for oversized luggage.

In the Czech Republic, the units are operated in their three- and five-car versions. At the customer's request, the three-car InterPanter can provide 200 seats, and the five-car version can house 350 seats. Of course, there is also plenty of space for people with reduced mobility or for bicycles.

The InterPanter units are two-system trains designed for voltages of 3 kV DC and 25 kV 50 Hz and a 1,435 mm track gauge.







ŠKODA GROUP ELECTRIC MULTIPLE UNITS

26 → 27

SINGLE-DECK ELECTRIC MULTIPLE UNITS

REGIOPANTER

**ESTONIA** 

The train for railway operator Eesti
Liinirongid (Elron) is built on the
RegioPanter platform (trains in the Czech
Republic and Slovakia), which was also
used in the design of trains to neighbouring
Latvia. This is what the model for Estonia
could be compared with the most, but even
so the trains are different, according to
customer specifications. Estonian trains
have first class, some trains have a catering
compartment etc.

In addition to the wider track gauge, the trains are designed as dual-system trains for 3 kV and 25 kV 50 Hz power systems, so that they can serve both newly electrified railway sections and sections with older catenary lines. In addition, Estonia is located in a colder climate than is typical in other parts of Europe. Trains must therefore be able to withstand more challenging temperature conditions, especially in winter.



ŠKODA GROUP ELECTRIC MULTIPLE UNITS 28 → 29
SINGLE-DECK ELECTRIC MULTIPLE UNITS
RAIL

# **REGIOPANTER PID**

**CZECH REPUBLIC** 

The RegioPanter PID is distinctive mainly because of its unique grey-red colouring, which it acquired as part of its integration into the Prague Integrated Transport PID fleet. These trains bring reliability and comfort to regional transport in and around the capital city of the Czech Republic.

Each of these trainsets is made up of two front cars, with one middle between. The capacity of the trainset is 498 passengers. The design of the trains also provides for alternative modes of transport, so each is equipped with space for 15 bicycles or six buggies. Mobility-impaired passengers will appreciate the low-floor design of the train, the special space for two wheelchairs and the spacious toilet.

The equipment includes 230 V sockets for charging laptops, phones or tablets, also a stable wi-fi connection as well as ergonomic seats for a comfortable ride. A fully air-conditioned interior is of course standard.





ŠKODA GROUP ELECTRIC MULTIPLE UNITS

SINGLE-DECK ELECTRIC MULTIPLE UNITS

RAIL

SINGLE-DECK ELECTRIC MULTIPLE UNITS

# **REGIOPANTER**

The new electrical multiple units made by Škoda are designed for suburban transport on tracks with a gauge of 1,520 mm and power supply voltage of 3 kV DC, with the option of future conversion to 25 kV 50 Hz. The vehicles are able to withstand climatic conditions of -40 °C to +40 °C. These vehicles can transport at least 400 seated and 450 standing passengers. The maximum speed of these vehicles is 160 km/h.

Škoda Group supplies thirty-two units for the Latvian State Railways (Pasažieru Vilciens). Škoda will also cover the maintenance, supply of spare parts and personnel training.





LATVIA

ŠKODA GROUP ELECTRIC MULTIPLE UNITS

RAIL

SINGLE-DECK ELECTRIC MULTIPLE UNITS

SINGLE-DECK ELECTRIC MULTIPLE UNITS

# **REGIOPANTER**

The new electric multiple units for a Slovak customer have been supplied to run on regional and electrified lines in Slovakia and for speeds of 160 km/h and a voltage of 3 kV DC and 25 kV 50 Hz. They are supplied in two versions: The first is a three-car variant with a length of 80 m and a capacity of 247 seats. The second is a four-car variant with a length of 106 m and capacity of 343 seats. Each car in the train has a classic dual-bogie arrangement, and each unit always has three drive bogies. Thanks to this, the sets have excellent driving characteristics on all electrified tracks in Slovakia, providing reliable adherence to the timetable, even in difficult winter conditions.

Wide boarding doors together with a fully passable modern interior space with no interior doors enable the fast and smooth movement of passengers. Boarding the vehicle is possible directly from standard platforms with a height of 550 mm, without the need for stairs. For other platforms, boarding is provided with the aid of sliding stairs. Passengers will especially appreciate the comfortable seating, electrical outlets, air-conditioning and stylish LED interior lighting. The trains also come with a clear information system with monitors, high-performance Wi-Fi, plenty of space for transporting wheelchairs, prams and bicycles, and easy and barrier-free boarding for all passengers.







**ELECTRIC MULTIPLE UNITS** 34 → 35 SINGLE-DECK ELECTRIC MULTIPLE UNITS

ŠKODA GROUP RAIL

# **REGIOPANTER**

The electric units for Bulgaria represent a significant step forward in improving the level of regional rail transport there. This project will bring Bulgarian passengers a new, higher standard of regional travel.

The units for Bulgaria are based on the successful RegioPanter platform and include all its advantages. A total of 25 barrier-free electric units will replace outdated rolling stock, each offering more than 300 seats, air-conditioned cars, and smooth, quiet operation.

These units will reach a maximum speed of 160 km/h and are designed for operation on lines electrified with 25 kV AC 50 Hz. Passengers will benefit from ergonomic seating, air-conditioned interiors, and onboard Wi-Fi. Passenger safety is ensured by advanced exterior and interior camera systems. The trains will also feature a partially low-floor design to ensure full accessibility for all passengers. For quick, safe, and convenient boarding, the trains have low-floor entry and 1,500 mm-wide doors. The units also include multifunctional areas for wheelchair users, strollers, and bicycles.

# **BULGARIA**



ŠKODA GROUP ELECTRIC MULTIPLE UNITS 36 → 37 SINGLE-DECK ELECTRIC MULTIPLE UNITS

RAIL

and capacity.

# **REGIOPANTER - REGIOJET**

The partnership between Škoda Group and RegioJet, the largest private railway operator in Central Europe, brings a project of 23 new electric units. The delivery will include two types of trains – 15 two-car trains and 8 three-car trains. The units for RegioJet will be tailored to the operator's specific needs and will bring renowned comfort to the Ústí nad Labem Region by the end of 2026. This ambitious project aims to run 3.3 million kilometers annually over 15 years,

The new low-floor units, designed for suburban and regional routes, will be capable of speeds up to 160 km/h. The two-car units will be 53 meters long with 142 seats, while the three-car units will be 80 meters long and offer 228 seats. A first-class compartment will also be included.

significantly increasing both service quality

Passenger comfort is a priority in the equipment of the units. They will feature fully air-conditioned interiors, Wi-Fi, 230 V electrical outlets, USB sockets, barrier-free entrances and interiors, ergonomic seating, and spacious storage areas for bicycles and strollers. Each train will be equipped with a spacious toilet for passengers with reduced mobility, and the three-car unit will also include a standard toilet. Advanced safety features and the latest technologies, including ETCS, ensure compliance with the latest industry standards.

# CZECH REPUBLIC



ŠKODA GROUP ELECTRIC MULTIPLE UNITS 38 → 39 RAIL

# DOUBLE-DECK ELECTRIC MULTIPLE UNITS

Double-deck electric multiple units can consist of two or up to six cars.

These vehicles have a classic bogie concept with two separate bogies under each vehicle body. The two-floor electric units are designed for gauges of 1,435 mm and 1,520 mm. The different widths of the vehicle body also depend on the gauge.

The vehicles meet the G2 gauge with DE2 extension in the upper part according to EN 15273-2, or the GOST 9238 profile. The units consist of low-floor cars, providing barrier-free access to the lower floor. There are two pairs of doors in each car, enabling the quick and smooth movement of passengers.

Track gauge	1,435 / 1,520 mm
Contact voltage	3 kV DC, 3 kV DC + 25 kV / 50 Hz, 25 kV / 50 Hz
Maximum speed	up to 160 km/h
Maximum acceleration	up to 1 m/s²
Vehicle width	2,820 / 3,370 mm
Vehicle / box height	4,635 mm
Boarding height	550–960 mm above TR
Boarding door width	1,300-1,500 mm

ŠKODA GROUP ELECTRIC MULTIPLE UNITS 40 → 41

RAIL

# **CITYELEFANT**

# CZECH REPUBLIC, SLOVAKIA, UKRAINE, LITHUANIA

The double-deck units were supplied by Škoda to the Czech Republic, Slovakia, Lithuania and Ukraine. The design and main dimensions of all cars are similar.

Designed for suburban transport in the Czech Republic, CityElefant double-decked units are made for a 1,435 mm gauge. The cars are equipped with a wide entrance door and a lifting platform to provide barrier-free access to the lower floor. The open space at the entry door provides enough storage space for luggage, bicycles and prams.

The interiors of the cars are fully air-conditioned, airy and easy to pass.
The variable seating arrangement makes travelling comfortable and convenient, with plenty of space for people with reduced mobility. At the customer's request, the CityElefant three-car units accommodate 310 seats and have a total capacity of 640 passengers. The combination of four asynchronous traction motors with an output of 500 kW and electrodynamic braking provide the option to recover energy and significantly reduce energy consumption for operating the trains.

Units for Lithuania and Ukraine are designed for a wide gauge of 1,520 mm and a maximum speed of 160 km/h.

The double-deck unit for Lithuania is designed for suburban drives in a two and three-car design. The three-car train provides 304 seats and a total capacity of 640 passengers.

The double-deck electric unit for Ukraine is a two-system unit designed for interregional transport purposes. The vehicles are specially adapted to demanding climatic conditions. The units for Ukraine consist of six cars, providing a total of 636 seats.

The double-deck unit for Slovakia is a twosystem unit, compatible with the European ETCS signalling system. The two-floor unit is designed for a gauge of 1,435 mm and suburban transport to Slovak cities. The three-car version has 307 seats and a total capacity of 640 passengers.





# DOUBLE-DECK PUSH-PULL TRAINSETS AND CARS

The push-pull trainsets are non-traction cars pulled or pushed by a locomotive. The trains are designed for gauges of 1,435 mm and 1,520 mm. The boarding height range allows operating platforms with heights of 350 to 760 mm from the top of the rail.

The first generation of cars is designed for a maximum speed of 160 km/h and was derived from the proven CityElefant units. The second generation of push-pull trains has been completely redeveloped in a version for long-distance transport with a maximum speed of up to 200 km/h.

Double-deck cars are made in Finland. These include passenger, driving, restaurant or sleeping cars. All types of cars are designed to be pressure-tight and have excellent thermal insulation, which dedicates them for the demanding Nordic conditions of temperatures down to -40 °C. The inter-car transitions are also pressure-tight, allowing safe and comfortable movement between cars. All cars have a strong aluminium construction designed in accordance with applicable safety standards so that the deformation zones in the event of an accident absorb the impact energy and the passenger compartment remains protected from the collision effects.

Track gauge	1,435 / 1,520 / 1,524 mm
Contact voltage	3 kV DC 15 kV / 16.7 Hz 25 kV / 50 Hz
Maximum design speed	up to 200 km/h
Vehicle width	2,800 / 2,820 / 3,200 / 3,370 mm
Vehicle / box height	4,630 / 4,635 mm
Boarding height	550-960 mm above TR
Boarding door width	800-1,340 mm

ŠKODA GROUP DOUBLE-DECK PUSH-PULL TRAINSETS 44 → 45
RAIL AND CARS

DOUBLE-DECK PUSH-PULL TRAINSETS

# **PUSH-PULL**

The push-pull trainsets delivered to Czech Railways are modern vehicles designed for regional transport in the Moravian-Silesian Region. The basic version is a three-car trainset consisting of a driving car, passenger car and an end car. This trainset has a total capacity of 356 seats, with 10 seats in first class.

The maximum speed of this trainset is 160 km/h; it is partly a low-floor, providing barrier-free boarding from platforms with a height of 550 mm. The entire microprocessor control system allows the trainset to be checked from the driver's cab or from the locomotive by just one driver without anybody else having to be present. In the standard version, the trainset is equipped with an information system, Wi-Fi and a new ETCS system.

These trainsets are fully air-conditioned with comfortable seats. The spacious multifunctional areas can transport up to thirty bicycles, prams and bulky luggage. It also includes ski holders. The train trainset has five toilets, one of which is intended for wheelchair users. The trainset is also adapted for the transport of passengers with reduced visual and space orientation, and it also provides room for up to four wheelchair users with accompaniment.





**CZECH REPUBLIC** 

ŠKODA GROUP DOUBLE-DECK PUSH-PULL TRAINSETS 46 → 47
RAIL AND CARS

DOUBLE-DECK PUSH-PULL TRAINSETS

# **PUSH-PULL**

The push-pull trainsets for Germany are designed for the Deutsche Bahn's operation on the Nuremberg-Ingolstadt-Munich line. Each train consists of a control car, four passenger cars, an end car and an Emil Zátopek locomotive made by Škoda.

The trainset is designed for a maximum speed of 200 km/h and is operated at a maximum speed of 190 km/h. The cars have a special pressure-tight box, which provides comfortable and undisturbed travel, even in tunnels or passing vehicles travelling at speeds of up to 300 km/h.

Škoda Group is the first supplier in Germany to provide a vehicle with barrier-free access from the platform at a height of 760 mm.

The push-pull trainset meets the strictest German and European standards.

The interior of the car is divided into first and second class, and there is also a children's section.

At the customer's request, this trainset provides 676 seats. Each train also offers 37 places for bicycles, several seats for people with reduced mobility and two space for wheelchair passengers, with the addition of places for people accompanying people with disabilities.







ŠKODA GROUP DOUBLE-DECK PUSH-PULL TRAINSETS 48 → 49

RAIL AND CARS

DOUBLE-DECK PUSH-PULL TRAINSETS

# **PUSH-PULL**

The push-pull trainset for Slovakia consists of a double-deck control car and double-deck passenger cars. The trainset is designed for a maximum speed of 160 km/h and a gauge of 1,435 mm.

The body of the vehicle, which is made of large aluminium parts, significantly reduces the weight of the train and extends its service life.

Internal camera systems with real-time recording and transmission to the driver's station and exterior anti-graffiti painting help increase passenger safety while reducing the effects of vandalism. Wide, low-floor entrance doors for fast, comfortable and safe boarding and alighting of passengers, including people with reduced mobility and passengers with luggage and prams, further increase operational efficiency.

At the customer's request, this trainset provides 362 seats with a total capacity of 714 passengers.







ŠKODA GROUP 50 → 51 DOUBLE-DECK CARS RAIL

DOUBLE-DECK PUSH-PULL TRAINSETS AND CARS

# PASSENGER CARS AND DRIVING CARS

Currently, several hundred of these passenger cars are transporting people on all major track lines. Thanks to their comfort and reliability, the double-deck Škoda passenger cars have become very popular with passengers. The cars have a spacious and bright interior with a wide range of services on both floors. The lower floor allows easy boarding to the car at the level of the platform, even for passengers with reduced mobility.

The Škoda Group portfolio contains three main types of passenger cars. The basic Ed model is equipped with seats for passengers on both floors and in a compartment. The Eds model is specially designed for families and passengers with reduced mobility and is divided into two areas. On the lower floor, the arrangement is adapted for disabled passengers, while there is a playground on the upper floor

and compartments providing peace for passengers with children. The third model, the Edfs, is equipped with space for both passengers with reduced mobility and families with children, and the car also has a section for a conductor and a dining car with a cooling device.

The control cars are arranged in sets in a push-pull system, i.e. with a control car at one end and a locomotive at the other. This system allows the conductor to control the train from both ends without having to change the locomotive. Upon reaching the final stop, the driver only moves from the locomotive cab to the driver's cab, and the train heads in the opposite direction. These cars offer passengers an equally pleasant and safe environment for travelling as the double-deck passenger cars.







ŠKODA GROUP 52 → 53 DOUBLE-DECK CARS RAIL

DOUBLE-DECK PUSH-PULL TRAINSETS AND CARS

# **SLEEPING AND RESTAURANT CARS**

Sleeping cars provide a comfortable and quiet environment to relax during a long distance or overnight trip.

The Finnish railways are currently operating 40 double-deck sleeping cars. Each compartment has two beds. On the lower floor, it is also possible to connect some compartments to form a spacious family compartment. The top floor compartments are also equipped with a private bathroom. The cars are air-conditioned, and you can regulate the temperature in the individual compartments.

The latest cars made by Škoda are restaurant cars. These cars complement the company's portfolio, providing full-scale service for passengers in double-decked cars. The passenger compartments on the upper floor can also be used as a conference room for up to 41 people. The restaurant section on the lower floor of the car houses a kitchen, a sales counter and a dining room.

A café is located at the end of a car in the pass-through floor. It is an open space area for passengers where they can meet, and it can also be used for cultural programmes. At the opposite end of the car is a kiosk, which also provides service for the upper floor.



## **FINLAND**



ŠKODA GROUP 54 → 55 DOUBLE-DECK CARS RAIL

DOUBLE-DECK PUSH-PULL TRAINSETS AND CARS

# ITALIAN NIGHT COACHES

This project reflects the growing popularity of night train travel in Europe. The new coaches for the Italian railways will offer an extraordinary travel experience with greater comfort, privacy and a tranquillity resembling a conventional hotel room. The trains are thus ready to meet the demanding requirements of passengers.

The Superior coaches are equipped with comfortable spacious bedrooms, six of which are with single beds and two with double beds. Each has its own toilet and shower. Thanks to the air-conditioning solution, the temperature in each unit can be individually adjusted. The facilities also include modern information and audio/video infotainment systems. A coach also includes a staff room with kitchen equipped with electrical appliances. The Comfort Class offers seven compartments in each coach, each equipped with four beds and its own washbasin. In addition, the facilities also include a larger space for people with reduced mobility and their companions. One toilets and transport lifts are also available for such people to facilitate their entry and exit. The air conditioning can also be individually adjusted in each compartment.

The Easy coaches offer a spacious passenger lounge with a 2+1 seating arrangement. For maximum comfort, individual sections have dividing walls, armrests and oversized headrests, and each seat has its own individual lighting. The wide central aisle allows for comfortable use of the interior space when the train is moving, while the vestibule area features luggage racks and storage spaces. There is one toilet on each side of the coach.









SKODA GROUP LOCOMOTIVES 58 → 59

The production of locomotives at Škoda is based on a long tradition. The first electric locomotive, named 1ELo, was manufactured as early as 1927. Since then, more than five and a half thousand electric locomotives have been produced. The locomotives have been and are designed for various gauges, power supply systems and speeds.

The state-of-the-art Emil Zátopek platform locomotives are designed for smooth operation on railway corridors in all neighbouring countries of the Czech Republic and Hungary. Thanks to the modular arrangement of the electrical components, the locomotive can be used for different power supply systems – 25 kV/50 Hz or 15 kV/16.7 Hz with alternating voltage, or even with a direct voltage of 3 kV.

The Emil Zátopek platform locomotives are also ready for use via the unified European security and control system ECTS/ERMTS, and they also provide economical electro-dynamic recovery during braking. Thanks to their versatility, Emil Zátopek locomotives are interoperable throughout Europe.

# TECHNICAL DEVELOPMENT

Škoda Group's knowledge is based on its long-term experience in the field of producing locomotives, modern technical facilities, quality human resources, and proven components from renowned suppliers that provide high quality.

The design and development of these locomotives is, of course, adapted to the customer's requirements, which determines the final form and design of the locomotive.

# INNOVATION

The most powerful domestic locomotive, named Emil Zátopek, meets all demanding technological parameters and the latest European TSI safety regulations. At the customer's request, the locomotive can, for example, be equipped with an external camera system or front information boards.

The aerodynamic shape of the front of the vehicle's structure minimises aerodynamic noise and frontal resistance values, even at high speeds.

The locomotive cabins are pressure-tight, and they naturally include a heating system, ventilation and air-conditioning.

The control system contains a subsystem of operational, fault and service diagnostics. Locomotive operation data are sent in real time using the Datarail or MIP system to a central server for further evaluation. Of course, another diagnostic system can be used according to customer requirements.

ŠKODA GROUP LOCOMOTIVES 60 → 61

# SECURITY AND RELIABILITY

The cab design corresponds to scenarios according to EN 15227. In order to increase the internal safety for the operating staff, a system is deployed that ensures accessibility to the individual electrical parts only after they are safely grounded.

Component reliability is always verified by stress testing and is based on a concept proven in operation. Individual traction drive chain components are optimally loaded to achieve the highest possible efficiency rate and minimise energy consumption depending on the current operating load.

# PERFORMANCE AND EFFICIENCY

The four-axle drive makes the Emil Zátopek platform locomotive one of the most powerful locomotives of its kind in the world. Other benefits are high efficiency in terms of total operating costs, based on low vehicle life cycle costs. Additionally, electricity consumption costs are forwarded to the operator.

The layout of the driver's workstation can, of course, be adapted according to customer requirements. For example, it can be supplemented with a washing corner, a thermal box, a movable step, storage space and more.

# **FULL SERVICE**

The locomotive service life is at least 35 years. Škoda Group provides its products with warranty services, but the world trend is heading towards comprehensive care and maintenance, i.e. full service. Given its continuous improvement, Škoda is able to provide this type of maintenance for all its locomotives across Europe.

# **ECOLOGY**

Significant operating cost savings are achieved through low maintenance costs and reduced energy consumption. Additionally, more than 95% of the components and elements in the unit are recyclable.

Furthermore, the entire locomotive production cycle until operation and up to its disposal is environmentally friendly. We rely on the EN ISO 14001 standard.

SKODA GROUP LOCOMOTIVES 62 → 63

# POWERFUL LOCOMOTIVE

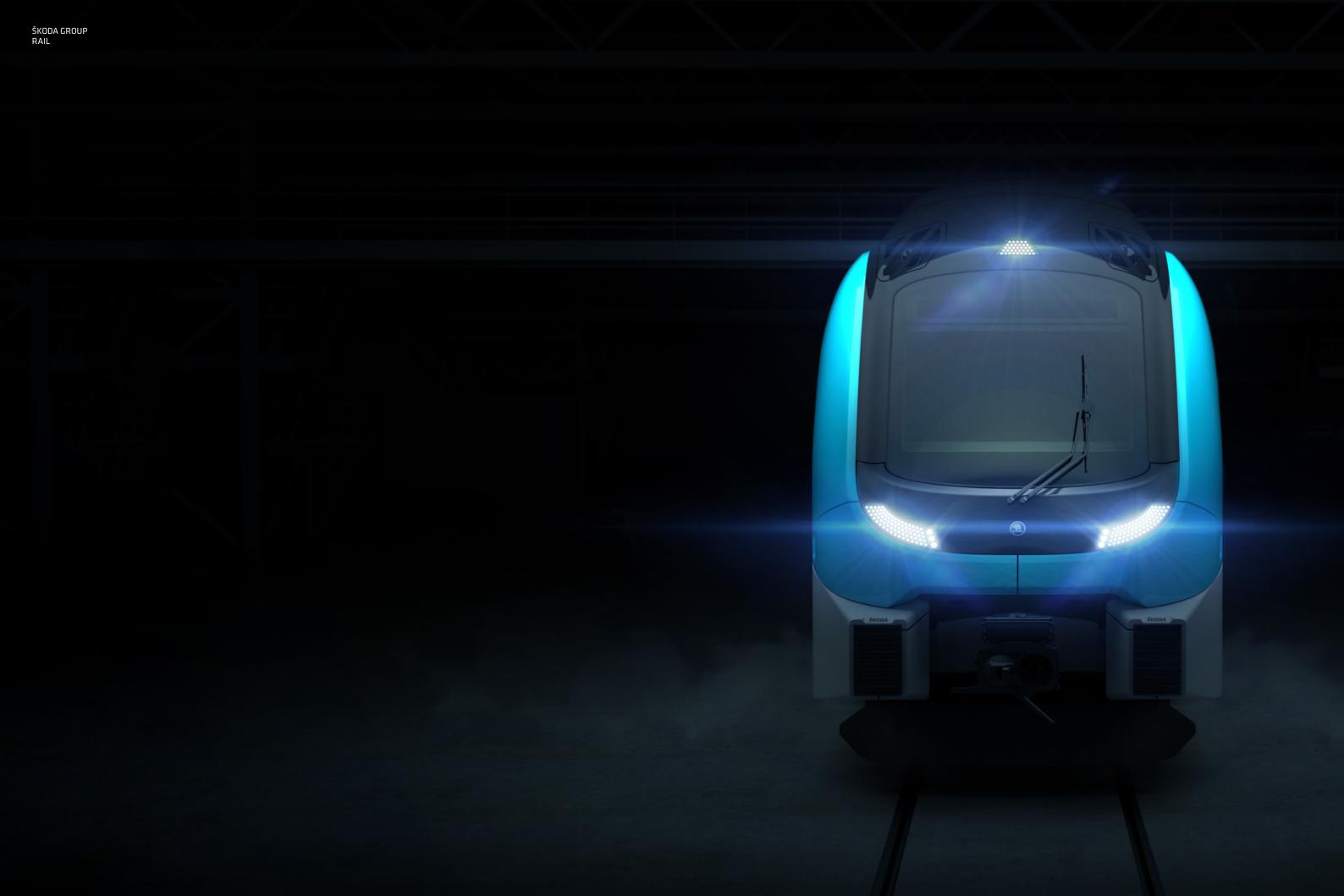
Wheelset arrangement	Bo'Bo'		
Continuous performance	6,400 kW		
Gauge	1,435 mm		
Wheel diameter	1,250 / 1,170 mm		
Starting traction force	275 kN		
Permanent traction	220 kN		
Weight	88 t		
Power supply systems	109E	109E2	109E3
	3 kV DC	3 kV DC	15 kV / 16.7 Hz
	25 kV / 50 Hz	25 kV / 50 Hz	
	15 kV / 16.7 Hz	15 kV / 16.7 Hz	
Maximum speed	200 km/h	160 km/h	200 km/h



IKODA GROUP LOCOMOTIVES 66 → 67

# UNIVERSAL LOCOMOTIVE

Wheelset arrangement	Bo'Bo'
Continuous performance	5,000-6,400 kW
Gauge	1,435-1,520 mm
Wheel diameter	1,250 / 1,170 mm
Starting traction force	300-350 kN
Permanent traction	250-310 kN
Weight	85-100 t
Maximum speed	160 km/h
Power supply systems	1.5 kV DC
	3 kV DC
	15 kV / 16.7 Hz
	25 kV / 50 Hz





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