

## MODERN ROLLING STOCK

To meet the demands of increasing passenger traffic, reduce travel times, improve consumer properties, and reduce ticket prices, FPC purchases carriages with advanced technical features and improved interior design. All new rolling stock is equipped with environmentally friendly toilet facilities (bio-toilets) and air conditioning units.

### DOUBLE-DECKER CARRIAGES

The Company's inventory fleet comprises 442 double-decker carriages.

The fundamental advantage of a double-decker carriage is its increased passenger capacity allowing to carry more passengers on busy routes, especially to southern resorts.

Double-decker carriages are as comfortable and equipped as modern conventional carriages, and even surpass them in many other respects. Depending on the class, double-decker carriages have double-berth or four-berth compartments. Air conditioning and heating units in each carriage help constantly maintain a comfortable microclimate.

Environmentally friendly toilet facilities with three cabins allow passengers to use toilets at stops and in resort areas. Slackless couplings and pressure-proof gangways helped

reduce noise and vibration in carriages and increase the safety of passengers when moving from carriage to carriage.

The demands of disabled persons have also been considered: one of the carriages in each train (administrative carriage) is equipped with special lifts for boarding wheelchair users from low platforms and has a special compartment and toilet.

A double-decker carriage with seats was designed in Russia using the latest technology, equipment, and materials, as well as advanced passenger carriage building expertise and know-how of TVZ. One of the key features of the new rolling stock is the change of the side wall shape and curved glass windows used for the first time in the history of Russian carriage building.

The carriage is equipped with new modern rigid slackless couplings and gangways which ensure the safe and convenient move from carriage



to carriage, protection of passengers and staff in gangways from noise, precipitation, dust, sudden temperature and pressure drops. For visually impaired passengers, all signage in carriages is duplicated in Braille.

Double-decker carriages with seats are operated on the Moscow–Voronezh route.

### RIC CARRIAGES

From 2012 to 2015, the Company purchased 200 RIC carriages to replace rolling stock on international routes.

The RIC sleeping carriage, model 61-4476 (WLABmz), is intended for international passenger services in the UIC countries (1,435 mm gauge), the European part of the Russian Federation, the CIS, and Baltic countries (1,520 mm gauge).

The carriage complies with mandatory standards of the Russian Federation and the European Community in terms of conception, as well as exterior and interior design.

Operation between railway networks with different track gauges is carried out by replacing bogies at gauge-changers using existing infrastructure facilities.

The maximum operating speed is 200 km/h on 1,435 mm gauge tracks and 160 km/h on 1,520 mm gauge tracks.

The Company obtained permits for operating new RIC carriages in 16 European countries.



## TALGO TRAINS

The Company has purchased 140 Talgo carriages since 2015. Seven trains with 20 carriages per train are currently in operation. The maximum speed of the trains in service is 200 km/h.

Due to their original design and technology solutions, passenger carriages by Patentes Talgo S.L. have several specific technical features, which significantly increase the average speed of the rolling stock on the existing track infrastructure, including:

- natural (passive) tilting system
- no wheelsets – trucks with independently rotating wheels
- radial positioning of trucks in curves
- variable-gauge system
- independent power supply
- articulated flexible connection (coupling).

The natural tilting system allows increasing the speed of the train on curved tracks while reducing the negative impact of unbalanced lateral force on passenger comfort.

The system for radial positioning of trucks in curves allows increasing the service life of running gear while reducing rail wear.

The use of air suspension in conjunction with the natural tilting system and the system for radial positioning of trucks in curves provides soft riding and, thereby, significantly improves the passenger comfort.

To continuously diagnose the most safety-critical systems, the train is equipped with an automatic monitoring system allowing to monitor the brake system parameters (including antiskid device), and the operation of the climate system, electrical equipment, safety systems, fire alarm, fire extinguishing system, etc.

Currently, Talgo trains run on the Moscow–Nizhny Novgorod and Moscow–Berlin routes.

The Moscow–Berlin train does not need bogie exchange to operate on the European track gauge, which allows reducing travel time significantly.



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## CARRIAGE-2019

Following the approved technical specifications, TVZ has developed the carriage model range provided for by the Carriage-2019 project. Starting from 2019, delivery of model 61-4516 (third-class open sleeping), model 61-4517 (second-class sleeping) and model 61-4529 (administrative compartment) carriages have been carried out under a long-term contract. The carriage design has incorporated the most advanced features popular with passengers.

Specific features of the new model range carriages:

- Use of semi-automated passenger service technologies with a single service compartment for two carriages
- No redundant vestibules, which allows creating additional areas for extra passenger comfort during travels (shower, multifunctional service area with vending machines, purifier for distribution of drinking water, and other equipment).

This design means that new carriages are included in a train set as twin units: one carriage with a service compartment + one carriage with no service compartment. A second-class sleeping carriage sits 36 passengers, while a third-class open sleeping carriage has berths for 54 people.

The design features of the new model range carriages also include:

- the use of pressure-proof gangways
- full LED lighting
- power sockets (220 V) and USB ports at each berth
- sensor taps, hand driers and baby changing tables in toilets
- convertible tables and individual safes for each passenger in compartment carriages
- automated sliding interior doors
- refreshed interior design.

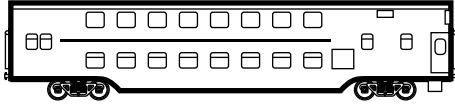
The staff carriage features a compartment to accommodate two wheelchair users along with their travelling companions, a specially designed toilet with shower and boarding lifts in the redundant vestibule. The disabled passenger compartment is equipped with a passenger information display with a text-to-voice service activated by a button.

In 2019, a total of 103 carriages were delivered for trains No. 99/100 (Moscow–Vladivostok) and No. 71/72 (Moscow–Belgorod).



## New carriage types<sup>1</sup>

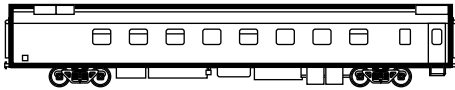
### Double-decker compartment carriage with berths. Model 61-4465



**64** **160**  
passengers km/h

- Environmentally friendly toilet facility
- Air conditioner
- Water cooler
- Audio and video system

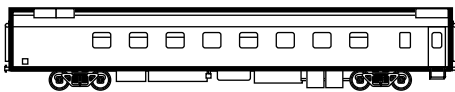
### RIC type sleeping carriage for use on international routes. Model 61-4476



**32** **160-200**  
passengers km/h

- Environmentally friendly toilet facility, including a shower
- Climate control (heating, ventilation, and cooling)
- Water supply system
- Reading lights
- Power sockets to charge mobile phones or laptops
- Public address system with a volume control

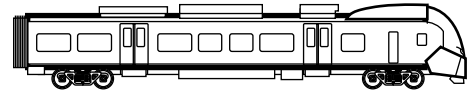
### Compartment carriage for train sets. Model 61-4462



**36 (18)** **160**  
passengers km/h

- Environmentally friendly toilet facility
- Air conditioner
- Water cooler
- Audio and video system

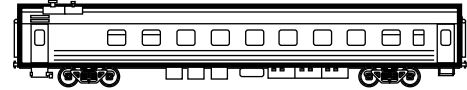
### Lastochka higher-speed electric train (Desiro RUS)



**443** **160**  
passengers km/h

- Environmentally friendly toilet facility
- Air conditioner (an individual unit in each cab and passenger compartment)
- Retractable steps for easy boarding from and alighting to low platforms (200 mm)
- Passive safety system for passengers
- Floor-mounted racks for large hand luggage

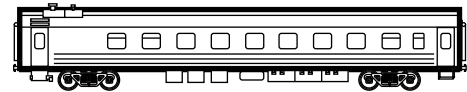
### Passenger carriage with seats. Model 61-4458



**60** **160**  
passengers km/h

- Environmentally friendly toilet facility
- Air conditioner
- Water cooler
- Audio and video system
- Attendant call buttons

### Open sleeping carriage. Model 61-4447

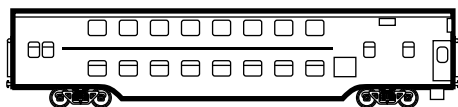


**54** **160**  
passengers km/h

- Environmentally friendly toilet facility
- Air conditioner
- Fire-extinguishing system connected to the on-board water supply system

<sup>1</sup> Average carriage life: at least 40 years.

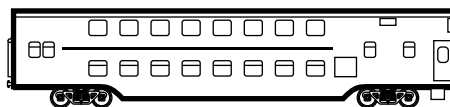
**Double-decker compartment carriage with seats.  
Model 61-4465**



**64** passengers **160** km/h

- Environmentally friendly toilet facility
- Air conditioner
- Water cooler
- Audio and video system

**Double-decker carriage with berths.  
Model 61-4492**



**160** km/h **60** berths per first-class carriage **104** berths per second-class carriage

- Environmentally friendly toilet facility
- Air conditioning and purification system
- Passenger information display
- Audio and video system
- Fire alarm system
- Train security and communication monitoring and control system

**Strizh higher-speed train (Talgo)**



**443** passengers **160** km/h

- Environmentally friendly toilet facility (motorised carriages)
- Air conditioner (an individual unit in each cab and passenger compartment)
- Retractable steps for easy boarding from and alighting to low platforms (200 mm)
- Passive safety system for passengers
- Floor-mounted racks for large hand luggage

**7** TRAINS

BY PATENTES TALGO S.L.

**20** CARRIAGES

PER TRAIN, INCLUDING:

- 1** buffet carriage
- 1** dining carriage
- 2** railway service carriages with a diesel generator



**For use on international routes**

**3** train sets with 1,520/1,435 mm variable-gauge wheelsets **216** passenger seats

- 2 first-class carriages with seats
- 9 first- and second-class sleeping carriages
- 2 VIP sleeping carriages with a toilet and a shower in each compartment
- 3 first-class sleeping carriages, each with a compartment for special needs passengers

Commissioned in 2016

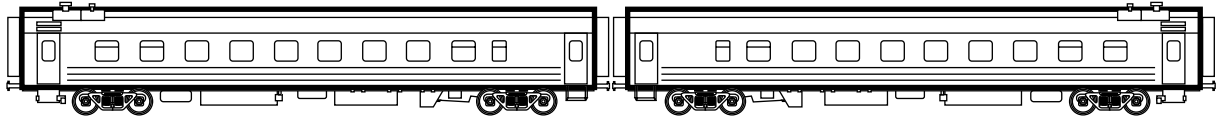
**For use on domestic routes**

**4** train sets with fixed-gauge wheelsets **414** passenger seats

- 11 first- and second-class carriages with seats
- 5 VIP sleeping carriages with a toilet and a shower in each compartment

Commissioned in June 2015 (Moscow-Nizhny Novgorod route)

## Carriage-2019



- **Twin units:** transition to semi-automated passenger service technologies with a single attendant team per two carriages; smart use of the carriage space, divided into service areas and shower cubicles
- **Single-vestibule body:** reduced labour intensity of carriage equipment maintenance
- **LED lighting:** reduced energy consumption and operating expenses
- **Autonomous operation of bio-toilets:** continued operability of toilet modules, translating into improved equipment reliability

## UPGRADING THE ROLLING STOCK IN 2020–2025

FPC is continuously working to improve passenger carriage design with a particular focus on the comfort and functionality of a passenger seat.

One of the focus areas is improving the tested types of open sleeping carriages.

In 2019, by order of FPC, the concept was developed of a modular open sleeping carriage, scheduled for production by JSC TVZ in 2020. The carriage features the traditional layout of passenger berths; however, the design and ergonomics will change dramatically. The primary purpose of these changes is to improve personal comfort and provide passengers with the opportunity to tailor the space to their individual needs.

This version of the modular carriage concept offers a combination of the passenger berth arrangement typical of the traditional open sleeping carriage model and “compartments” that are partitioned off with modular closet sections. In this way, the concept has kept traditional-layout berths convenient for large groups travelling together or senior passengers but also offers new berths for improved privacy achieved by using individual partitioning sections that can also be used to hold hand luggage and outerwear.

Given the planned transition to larger carriages (size T, used for electric trains), the implementation of this concept will enable adding one more passenger compartment to a carriage, increasing the length of berths and fitting a shower into a dedicated cubicle.

A life-size model of a carriage featuring this modular interior was presented at the 13th International Forum “Transport of Russia”, with the model to be showcased during 2020 at railway stations in major Russian cities to test the concept with customers. A final go/no-go decision on the concept will be taken based on a passenger survey to be organised by JSC Federal Passenger Company.