

A Siemens Inspiro metro train is shown from a front-quarter perspective, parked on a track. The train is white with a red and yellow stripe along the side. The background shows a grassy field and trees under a clear blue sky.

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Warsaw Metro Line 2

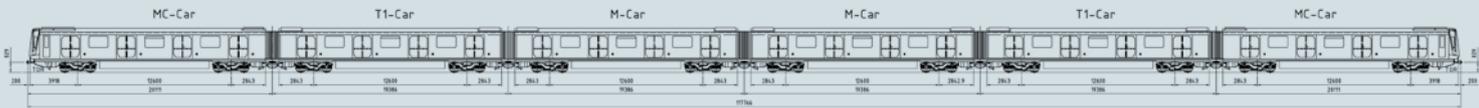
35 six-car Inspiro metro trains

In February 2011, Siemens was awarded the contract to supply 35 new six-car metro trains for Metro Warsaw. About 15 of these trains are to be used on the existing Line 1 and 20 on the Line 2, which is under construction. The vehicles are part of the new Inspiro platform. Six trains of the new Inspiro platform were completely produced in Siemens' Vienna plant. The final assembly of the remaining vehicles was carried out in Nowy Sącz, Poland by the consortium partner NEWAG SA. All 35 trains will be delivered to Metro Warsaw in 2014.

Dynamic commissioning of the first train including type testing took place at the Siemens test center in Wegberg-Wildenrath and subsequently on site in Warsaw. The Inspiro design was developed by BMW Group subsidiary Designworks USA.

Technical Data

Train configuration	Mc-T-M-M-T-Mc
Wheel arrangement	Bo'Bo'+2'2'+Bo'Bo'+Bo'Bo'+2'2'+Bo'Bo'
Carbody material	Aluminum
Track gauge	1,435 mm
Length over couplers	approx. 117,800 mm
Width of car	2,740 mm (across door leaves)
Floor height above top of rail	1,130 mm
Wheel diameter new / worn	850 / 770 mm
Tare weight / total weight	approx. 163,000 kg / approx. 265,000 kg (7 pers./m ²)
Max. axle load	12.6 t
Number of seats	234
Train capacity 7 pers./m ²	1,502
Passenger doors per car	8
Min. curve radius service line / depot	300 m / 60 m
Max. gradient	4.5 %
Max. speed	90 km/h
Max. starting acceleration	1.2 m/s ²
Mean deceleration service brake	1.3 m/s ²
Power supply	750 V DC / Third rail



General Information

Each train comprises six aluminum made cars in a Mc-T-M-M-T-Mc configuration.

The trains are capable of carrying up to 1,502 passengers each (at 7 persons/m²), with seating for up to 234 and standing room for up to 1,194. The train is designed for tunnel operation and based on the modular Inspiro platform from Siemens which enables trains to be optimally adjusted to specific customer requirements. The end cars are each equipped with a driver's cab to permit bidirectional use. The cars are connected with semi-permanent couplers. Fast separation in the middle of the train is possible by means of a semiautomatic coupler. The half trains can move separately for shunting purposes. Both end cars have automatic couplers. With these couplers it is possible to tow the existing vehicles on the line 1.

The electrical connections within the train are designed as pluggable jumper cables. Pneumatic functions are transmitted via hoses and by the air pipe connection of the coupler halves. The wide and open gangways between the cars (vertical clearance 1,950 mm, clear width approx. 1,500 mm) enable unrestricted passage through the train.

Two-thirds of the axles of the train are electrically driven. The 750 V DC line voltage is supplied via current collectors from the third rail. The trains are equipped with an ATC system that permits operation both on the new Line 2 and on the existing Line 1.

Noise and Vibration

The internal noise level is 75 dB(A) in the passenger compartment and 67 dB(A) in the cab, both measured at 80 km/h. The measuring method is according to ISO 3095 for external noise and ISO 3381 for internal noise.

Carbody

The metro train is designed as a lightweight construction with modular design components. All materials are chosen with the consideration to minimize the environmental impact and to enhance the recyclability. The carbody is designed as a lightweight aluminum-profile construction consisting of a welded assembly of large-sized extrusions.

The exterior carbody surfaces are painted. With the color scheme being implemented by application of suitable films.



Bogies

The bogie SF 1000, developed for advanced metro vehicles, has been further optimized and is suitable for operating speeds up to 90 km/h and for axle loads of approx. 13 tons. The bogies mainly consist of high strength, low-alloy steel. Each axle of the bogie is equipped with one brake disk and one compact brake caliper unit. Every bogie is equipped with one spring brake actuator which serves as the parking brake. Secondary suspension is provided by an air spring, and a metal rubber spring is used for primary suspension. One current collector is mounted on each side of the motor bogies. The traction motors are transversally installed and suspended on the bogie frame.

Passenger Information- and Video Surveillance Systems

The Passenger Information Display & Announcement System provides both visual and audio information inside and outside the train. It comprises, among other elements, the destination indicators at the end and side faces of the cars as well as the loudspeakers. Six displays are also installed in each passenger compartment for passenger information. Provisions are made for installation of six additional advertising displays. A video surveillance system (CCTV) is installed in the passenger compartment. An external camera is provided at the end cars (looking in the direction of travel).

Recycling Performance

A program for recycling and disposal has been drawn up, achieving a total recycling rate of more than 95 % for the metro train. The dismantling procedures for the metro components are described in the maintenance and repair manual.

Highlights

- Forced air-cooled compact IGBT traction inverter
- 66 % traction
- Electrodynamic braking to standstill
- No motor speed sensors
- Redundant power supply through two auxiliary converters per train
- Data communication via Ethernet and WLAN

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The information in this document contains general descriptions of the technical options available, which do not always have to be present in individual cases. The required features should therefore be specified in each individual case at the time of closing the contract.