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Wiener Linien Electric Bus

12 midibuses for the city centre

The first fully-electric, series-production bus in Europe

To date only prototype electric buses have been in service in Europe. Vienna is the first city to operate these trend-setting vehicles on a complete bus service route in the city centre as from autumn 2012.

This innovative concept and the drive technology of the 12 electric buses are from Siemens. These vehicles are the first series-production electric buses in Europe whose complete power requirement is supplied from the on-board battery system. The major advantages compared to diesel or gas-driven buses are their approx. 25% lower power requirements, minimum maintenance and completely emission-free operation.

Technical data

Total weight	12,000 kg
Tare weight	8,250 kg
Length / width / height	7,720 / 2,200 / 3,050 mm
Passenger capacity (seated / standing / wheelchair / driver)	40 + 1 13 / 26 / 1 / 1
Wheelbase	3,635 mm
Maximum speed	62 km/h
Operating autonomy	unlimited on the planned route
Batteries	lithium-ferrite
Battery capacity	96 kWh
Heating, ventilation, air conditioning	driver's and passenger areas fully electric
Motor	three-phase asynchronous 85 / 150 kW
Inverter	DC-AC IGBT mono inverter
Brakes	Regenerative braking system with self-ventilated disc-brakes
Charging time	10–15 mins/hour



The concept:

Emission-free electric bus

Using the latest battery technology it is for the first time possible to accumulate electricity so efficiently that it can be used on vehicles for public transport.

On this basis and in combination with the latest electrotechnology, Siemens has developed a bus concept, whose operating power is supplied solely from the on-board batteries. The heating and air-conditioning equipment is also battery-powered.

This all-electric concept has been implemented for the first time on a series-production scale in cooperation with the bus manufacturer Rampini. It involves 12 midibuses to go into service in Vienna's city centre as from autumn 2012. Highly manoeuvrable, low-noise, completely no-smell and emission-free and offering high passenger ride comfort, these electric buses set new standards in public transport in Vienna and in Europe.

The design:

Low-floor bus with kneeling system

The electric bus of the Wiener Linien is a low-floor vehicle with an average floor height of 350 mm, so that the bus can be boarded from street level at a height corresponding to one step. The kneeling system enables the entrance height in the front door area to be lowered to 250 mm, in the centre door area to 290 mm. The vehicle is boarded through two doors provided on the right side of the vehicle: one single-leaf swing door at the front and a two-leaf swing door in the centre of the bus. All doors are equipped with an anti-trap system which acts automatically when the doors close. When the vehicle is in motion a further safety system ensures that the doors cannot be opened.

The chassis is of modern design, comprising a self-supporting tube-frame structure which are electrically welded, sandblasted, painted and sealed. Highly corrosion-resistant materials are used for the exterior bodywork. The complete structure provides adequate protection in the event of a side collision.

The electric bus of the Wiener Linien features independent wheel suspension with air springs and shock absorbers at the front and a rigid axle with pneumatic springs and shock absorbers at the rear. This means high passenger ride comfort to meet the high expectations of passengers in Vienna.

The interior:

Numerous seats accessible without steps

The interior of the electric bus of the Wiener Linien meets the high standards of the whole Vienna bus fleet. The midibus offers space for 26 standees and 13 seats. Space for a wheelchair is also provided. During design, particular emphasis was placed on easy access to as many seats as possible without steps.

The stop-request buttons are arranged at the doors and also further inside the vehicle. A running blinking-light display in the roof area indicates the next stop.

A modern air-conditioning and heating system ensures fresh air in summer and warm air in the winter.

The lighting is provided in the ceiling. A sufficient number of lights are provided at suitable positions to ensure pleasant and safe illumination throughout the passenger area.



The driver's area:

Modern work place with optimum vision

The driver's area is of high-quality design to meet the requirements the responsible job of bus drivers involves. The ergonomically designed seat features self-adjusting air suspension and can easily be adjusted to the right position for the driver. The curved windscreen, a small window in the front right-hand corner of the bus and several interior and exterior mirrors ensure optimum vision. The non-mist exterior mirrors feature electric heating and can be adjusted both electrically and manually. A parabolic mirror is fitted in the driver's area to ensure a good view of the passenger area and another is fitted by the centre door.

The bus is of course equipped with all obligatory equipment such as powder fire extinguisher, first-aid box, breakdown triangle and wheel chock.

The drive technology:

Electric motor with energy recuperation

Siemens is responsible for the operation concept of the electric bus of the Wiener Linien. They also supply the modern drive technology. The core of the system is the water-cooled electric drive motor. Whereas conventional diesel engines have an efficiency of approx. 25%, this three-phase motor achieves approx. 90%.

The motor with a continuous rating of 85 kW is equipped with a Siemens IGBT inverter. A reduction gear unit from Rampini, which was specially developed for this bus, is used for the connection to the rear-axle differential.

The brake system:

Energy recuperation when braking

The brake system is controlled by two separate, independent circuits. All brakes are designed as self-ventilated disc brakes. Safety equipment such as anti-blocking system, anti-slip control, electronically-controlled braking, electronic stability control and "vehicle stop when door open" are integrated.

The brake system is moreover designed as a regenerative system – as soon as the driver lifts his foot off the accelerator, the first stage of energy recuperation is activated and the motor acts as a generator. When the brake pedal is actuated, recuperation is increased for the first third of pedal travel, the other two thirds serve to activate the pneumatic system.

The battery system:

Charging by current collector

The most efficient batteries at present are batteries with lithium-ferrite cells. The electric bus of the Wiener Linien is equipped with 9 batteries, of which 3 are located on the roof, 5 in the rear end and 1 under the bus in the place which is initially planned for diesel tank. The battery capacity installed on board is 96 kWh. An efficient battery-management system is provided to control the batteries and to monitor battery temperature and voltage.

Batteries are charged at the respective terminal stop of the bus route. Electrical power is drawn from the overhead line system of the Wiener Linien by means of current collectors and fed to the battery-charging unit.



A particular advantage with regard to energy efficiency is that the electric buses are supplied with recuperated energy – this means energy recuperated during the braking process from tramcars and metro cars.

The service concept:

Minimum in-house maintenance

Well-ried bus components are used on the electric bus of the Wiener Linien. Maintenance can thus easily be performed by Wiener Linien personnel. If required, Siemens services are available for the maintenance of electrical components.

During design, particular attention was paid to ensuring easy access to all relevant parts. Cleaning work can also be done in the usual manner.

All advantages

- First series-production electric bus in Europe
- Fully electric design, i.e. complete energy requirements are covered by the on-board batteries
- Latest battery technology
- Significantly lower operating costs compared to diesel or gas-driven buses
- Zero emission – no CO₂ emission
- Low-noise, no smell
- Power supply from excess energy from operating system of Wiener Linien
- Reduced maintenance costs
- High manoeuvrability for city-centre traffic
- Low-floor bus with additional kneeling function
- Comfortable interior with sufficient seating capacity, access to sufficient seats without a step

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