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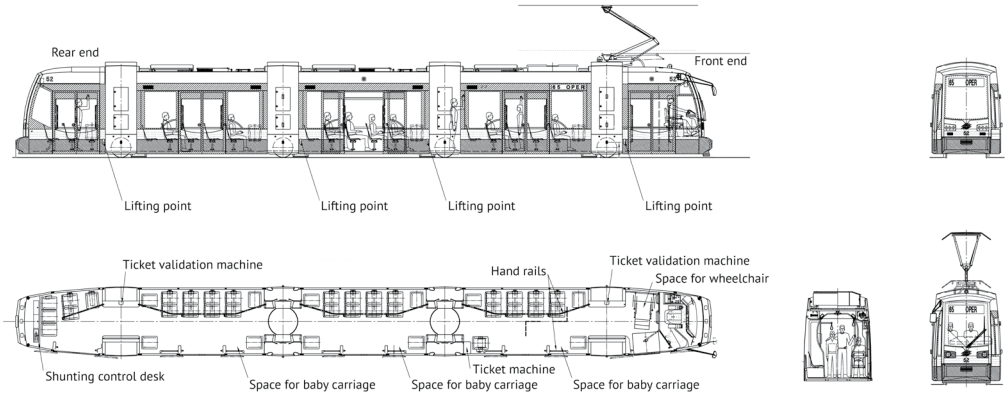
Tram System – ULF Vienna, Austria

150 ultra low floor trams

Wiener Linien ordered an additional 150 ULF tramcars (80 short trams and 70 long trams) in spring 2004. Siemens will deliver these tramcars between December 2006 and 2015.

Both the customer Wiener Linien and its passengers have been very satisfied with the previous series of 150 tramcars. Many improvements have been made to make the vehicle even more attractive.

Technical Data		
Vehicle	Tramcar for unidirectional operation	
	Short tram	**Long tram**
Motorization	75 %	67 %
Wheel arrangement	1'+A'+A'+A'	1'+A'+A'+A'+A'+1'
Track gauge	1,435 mm	1,435 mm
Vehicle length	24,210 mm	35,470 mm
Vehicle width	2,400 mm	2,400 mm
Height of vehicle above t.o.r	3,615 mm	3,615 mm
Maximum axle load	< 12 t	< 12 t
Capacity (4 pers./m²)	136	207
Maximum speed	70 km/h	70 km/h
Starting acceleration	1.3 m/s²	1.3 m/s²
Max. service brake deceleration	1.8 m/s²	1.8 m/s²
Power supply	600 V DC	600 V DC
Traction rating	6 x 52 kW	8 x 52 kW
Wheel diameter max / min	690 mm / 610 mm	690 mm / 610 mm
Low-floor percentage	100 %	100 %
Entrance level	197 mm	197 mm



Project data	
Customer	Wiener Linien GmbH & Co KG
Contract	2nd series
Delivery period	December 2006 – 2015
Number of trams	150 trams (80 short / 70 long trams)
Scope of supply	Complete rolling stock
Test	Extensive testing on the customer's route network and in a climatic test chamber

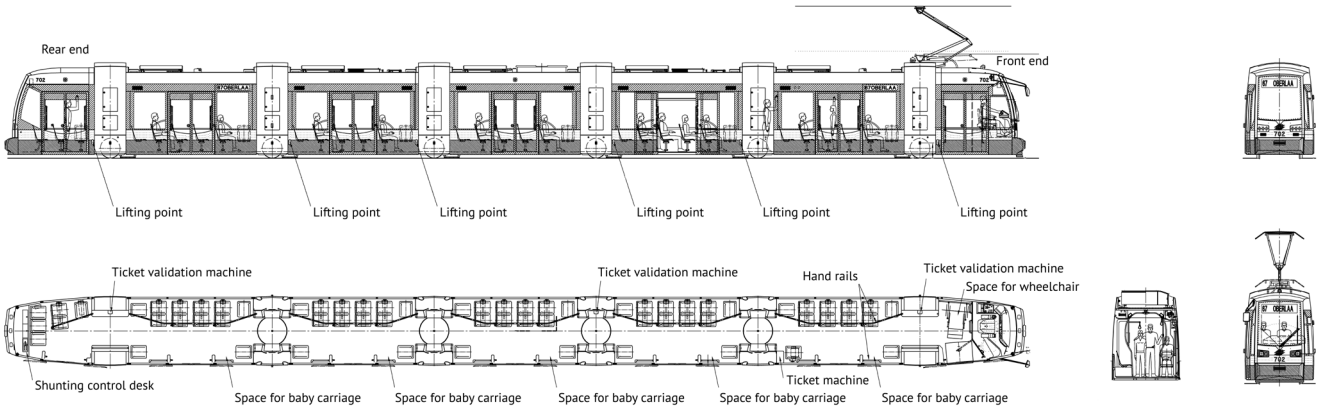
General vehicle design
This new-generation vehicle was designed for the existing infrastructure at Wiener Linien and to meet increasingly challenging passenger demands: such as air conditioning and level passageways through the passenger compartment, passenger information systems, and facilities for persons with impaired mobility.

Two types of vehicle are being built: a short tram (24,210 mm) and a long tram (35,470 mm) that can carry 136 and 207 persons at 4 pers/m², respectively. Newly designed plastic seats have been installed to improve hygiene and for fire protection reasons.

The ergonomically designed driver's cab is very spacious and air-conditioned. The master controller is integrated into the driver's seat, enabling the driver to operate the tram with maximum comfort.

An easily accessible wheelchair space is provided behind the driver's cab. A manually operated folding ramp is available for bridging any differences in height between vehicle and platform. Passengers with baby carriages benefit from the very low entrance height and end-to-end low floor.

Another special feature of the new vehicle is the smoke and heat detection system. All information from the detectors is transmitted in realtime to the driver. The use of flame-resistant and incombustible materials completes the vehicle safety concept.



Carbody
The carbody essentially comprises a series of vehicle modules and portal running gear with driven and non-driven single wheels, which are radially controlled in curves. Each portal running gear supports one vehicle module and is coupled to the next module. The two front and end modules are connected. Thus, the front and end portals are hinge mounted in the body. The ULF modules are equipped with two suspension systems in line with standard practice for rolling stock.

The primary suspension consists of bonded-rubber laminated springs. Longitudinal and lateral guidance is provided by the column-guide principle used in bogies. The wheels are of the resilient type with rubber inserts. The portal posts are connected to each other by means of cross-bars running under the wheel housings to reliably prevent any changes in gauge dimensions due to portal deformation.

An offset secondary suspension system consisting of helical springs and hydraulic cylinders connected in series supports the vehicle module bodies in the portals. The driver can raise the hydraulic cylinders to a preset height above top of rail to achieve the required ground clearance. Despite varying passenger loads, the height above top of rail is maintained at a constant level by an additional control unit. It also enables the trams to continue running on the tracks even in the event of heavy snowfall in winter.

Traction system
Traction and braking are effected by spring-mounted drive and brake units, which are integrated and suspended laterally in the portal. Both units combine the air-cooled 52 kW asynchronous traction motor and flange-mounted gear unit with brake disc and brake caliper. In the short tram with three intermediate vehicle modules, the two center portals and the end portal are driven; in the long tram with five intermediate, the four center portals are driven. A special control system ensures that the portal makes a sinusoidal movement similar to that of a conventional wheel-and-axle set.

Driver's desk

Entering the vehicle

Passenger compartment

Series vehicles ULF

Electrical equipment
The vehicle is designed for maximum redundancy. The drive units are fed by two air-cooled traction inverters based on IGBT technology. The braking resistors are self-ventilated. The two auxiliary converter units and the two 24 V battery packs are installed in a roof-mounted container.

The tram is controlled by a Sibas® 32 control unit which is linked to the electrical components via the redundant MVB bus system and Sibas-KLIP stations. Vital functions are also hardwired as a fallback level.

Passenger compartment furnishings
One air conditioner is mounted on the roof of each vehicle module for the passenger compartment. The compartment is heated with hot air supplied via air outlets in the floor and is ventilated and cooled with air via outlets in the ceiling. Thus, a pleasant environment is maintained inside the compartment regardless of the climatic conditions outside.

The passenger compartments are equipped with loudspeakers and interior displays at the ends of each module to provide passengers with information. Handholds and handrails are color-coded to help visually impaired passengers. Separate areas are provided next to the doors in the passenger modules for stowing baby carriages, bicycles etc.

Technical features

- A 24- or 35-meter low-floor tramcar offering end-to-end interior access, one floor level, and the lowest step height in the world. A range of vehicle lengths are available depending on the capacity requirements of the transit operator.
- A folding ramp at the first doors behind the cab and color coding the interior for easier boarding by passengers with impaired mobility.
- Maximum safety for passengers with comprehensive fire protection measures throughout the entire tram.
- Pleasant interior conditions for passengers even in adverse weather conditions.
- High vehicle availability thanks to redundant design of the traction equipment and auxiliary systems.

Siemens AG
Infrastructure & Cities Sector
Rail Systems Division
Nonnendammallee 101
13629 Berlin, Germany

contact.mobility@siemens.com

www.siemens.com

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