

Avenio Tram – The Hague, Netherlands

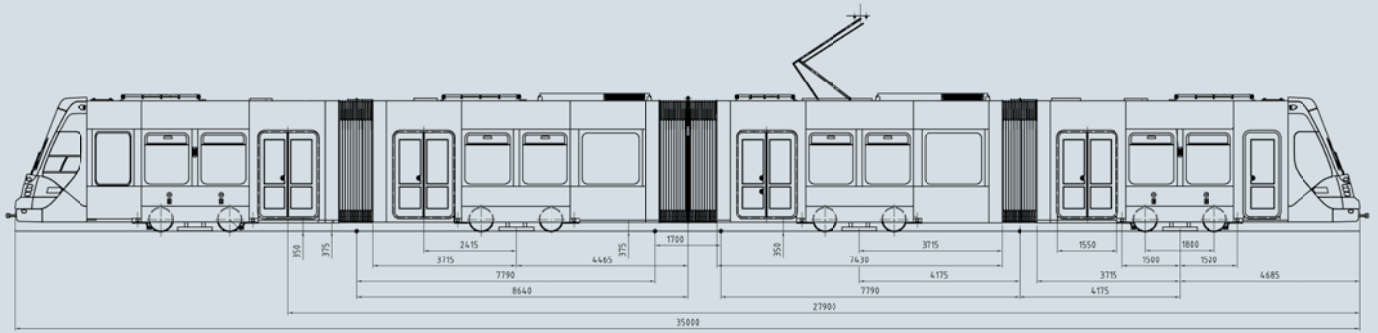
70 four-section, 100 % low-floor trams

HTM (Haagsche Tramweg-Maatschappij) has ordered 70 trams from Siemens for the network of the city of The Hague. They should replace part of the existing fleet of high-floor vehicles of the type GTL 8. The delivery of the 70 trains started from summer of 2014 till 2020. In the following years, HTM exercised contract options which bring the total fleet size to 70 Avenios, with a capacity of 232 passengers per vehicle.

The trams are retrofitted with the new collision warning system "siemens tram assistant" to avoid accidents. This will be the first tram fleet equipped with the innovative system.

Technical data	
Vehicle type	Avenio
Vehicle configuration	Four-section low-floor multiple unit for bi-directional operation
Axle arrangement	Bo'2'Bo'Bo'
Max. axle load	8.8 t

Line voltage	600 V/750 V DC
Track gauge	1,435 mm
Wheel diameter	600/520 mm (new/worn)
Vehicle length/width and height	35,000 mm/ 2,550 mm/ 3,650 mm, pantograph lowered
Entrance height	350 mm
Min. curve radius (horizontal)	25 m
Capacity (4 pers./m ²)	232, incl. 64 seats/ 6 tip-up seats
Max. speed	80 kmh
Max. gradient	8%
Max. starting acceleration	1.2 m/s ²
Mean service deceleration	1.2 m/s ²
Traction power rating (adhesion)	6 x 120 kW (75%)
Fire protection	EN 45545 Category 2-N



Side view

Project data	
Customer	Haagsche Tramweg-Maatschappij (HTM)
Location	Line network, The Hague, Netherlands
Delivery period	Summer 2014 to 2020
Scope of supply	70 four-section trams, spare parts, special tools, documentation, training
Testing	Static testing of all vehicles will be performed at the Vienna factory (Austria), dynamic tests in Wildenrath (Germany), and acceptance tests in The Hague.

General

The Avenio tram platform is based on the proven Combino Plus vehicles, which are already successfully in service in Lisbon and Budapest.

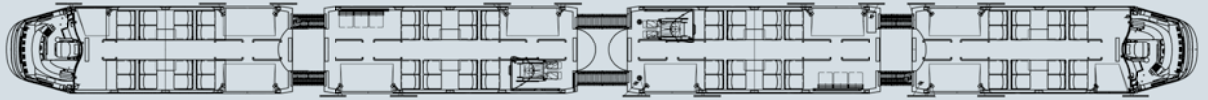
Each vehicle for The Hague consists of four modules, each supported on its own central bogie. Three of these bogies are powered. The modules are linked by articulated gangways to create a completely open and bright interior. Each vehicle end is equipped with a driver's cab for bi-directional operation.

Car body

The car body is a welded-steel construction with extensive use of weatherproof structural steel (Corten). The entire body shell is treated with a cathodic dip coating (KTL).

Interior design

The Avenio The Hague has an attractive, spacious interior design with two large multifunction areas (for wheelchairs/strollers) in the central modules. To ensure quick and convenient passenger flows, one single door and four double doors with a clearance width of 1.3 meters are arranged on each side over the length of the tram. Seats and handrails have been optimally designed according to ergonomic criteria. The air-conditioning units for the driver's cabs and the passenger area guarantee a comfortable, pleasant climate inside. Emergency intercommunication terminals are provided in each door zone to enable passengers to communicate directly with the driver.



Seating configuration

Traction equipment

The electrical equipment is concentrated in containers on the car roof. The traction system is made up of three modern pulse inverters using IGBT technology, six low-maintenance three-phase induction motors, and three 32-bit traction control units (Sibas®32). The vehicle control system is based on a bus transmission system that is backed by an additional hardwired control system for the essential train control functions, for redundancy and safety reasons.

Brake system

The Avenio has four separate and, independent brake systems:

- Electrodynamic brake in the powered bogies with braking to standstill
 - Hydraulic passive spring-loaded brake in the powered bogies
 - Hydraulic active disk brake in the non-powered bogies
 - Electromagnetic rail brake in all bogies
- Configuration and braking comply with EN 13452 and the directives in accordance with BOSTrab (German regulation on the construction and operation of trams).

Bogies

The three powered bogies with the two longitudinally installed drive units are characterized by a low center of gravity, minimum unsprung masses, and excellent running characteristics. The mechanical coupling of the wheels in the longitudinal direction results in a significantly improved operation compared with conventional 100 % low-floor bogies without wheel coupling. Two suspension stages in the bogie combined with the rubber-sprung wheel tires and vertical and horizontal dampers ensure an optimal dynamic operation.

Technical properties/special features

- Vehicle concept designed to meet highest aesthetic requirements for the environment in the operational area
- Spacious, bright interior design
- Perfect riding comfort and optimized wheel-track wear
- Optimal load distribution
- Powerful air-conditioning systems for the passenger compartment and the driver's cabs
- Roomy door areas and evenly arranged double doors
- Two large multifunction rooms for strollers and wheelchairs
- Large, easy-to-read train destination displays inside and outside
- Four electronic video cameras replace exterior mirrors



The ergonomic driver's cab provides a good overall view for safe operation.



The transparent layout between the driver's cab and passenger area offers passengers a unique riding experience.



Traction unit



Roomy door areas and evenly arranged double doors.



There is seating for up to 16 passengers in each bogie area.

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