Our services

Rail vehicles

- **Testing of thermal passenger comfort** in accordance with relevant standards EN 13129, EN 14750, EN 14813 and UIC 553 as well as all related tests, e.g. identification of thermal bridges and leaks, comfort measurements, flow analysis based on PIV measurements etc.
- **Functional tests on critical components** using specially developed standardised test procedures, e.g. windscreen wiper tests under simulated operating conditions or load tests on diesel engines under extreme climatic conditions
- **Customer specific tests** such as comfort and functional tests under rapidly changing climatic conditions, e.g. when passing through tunnels
- **Measurement of energy consumption** in defined test cycles, calculation of annual energy consumption for energy efficiency analysis and optimisation

Road vehicles

- **Analysis of thermal comfort** inside the vehicle
- **Functional tests on subsystems** such as windscreen wipers in snow and rain, cold engine starting tests etc.
- **Tailored tests for solving individual customer problems**, e.g. snow accumulation in engine compartment under operating condition, self and foreign soiling of driver's cab due to water spray
- **Tests of refrigeration units in accordance with the ATP agreement** on the carriage of perishable foodstuffs

Aviation

- **Cold starting tests** on aircraft engines
- **Air conditioning** of cockpit and cabin
- **Testing of components** under extreme temperatures and solar radiation
- **Icing tests** and **flow analyses** of aircraft engines and wings

Technical systems

- **Functional tests under extreme weather conditions and wind loads**
  - construction – e.g. facade and roof components
  - transport – e.g. signalling systems, transmitters, track switches, wind barriers, lifts
  - energy – e.g. wind turbines, transformers

Vienna Climatic Wind Tunnel

Climatic Wind Tunnel

Shareholders

26.0% AIT Austrian Institute of Technology

29.6% ALSTOM Transport Austria

14.8% ALSTOM Transport s.A.

14.8% SIEMENS

14.8% Hitachi Rail STS

Rail Tec Arsenal is an internationally active independent research and testing institute for rail and road vehicles, new transport systems and technical facilities that are exposed to extreme climatic conditions.

As an internationally recognised expert in climatic testing, Rail Tec Arsenal operates two state-of-the-art Climatic Wind Tunnels designed to optimise thermal comfort in public transport vehicles and to investigate and improve the availability and safety of systems in sensitive industrial areas.

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RAIL TEC ARSENAL

Quality in any weather

RAIL TEC ARSENAL

Any weather on earth

The **Vienna Climatic Wind Tunnel** operated by **Rail Tec Arsenal** provides the opportunity to investigate the **impact of weather** on vehicles and components under **realistic operating conditions**. **Any weather conditions** can be produced at the push of a button – from intense solar radiation to snow, rain and ice. The combination with wind, load and drive cycle simulations allows the implementation of realistic test scenarios.

The facility has been specially designed for **climatic tests on rail vehicles**, but also ensures **optimal testing conditions for road vehicles** in general and busses and trucks in particular.

In its capacity as an **accredited testing facility**, Rail Tec Arsenal is authorised to carry out all climate-related conformity tests in accordance with **international standards** and also offers professional support in the **quality assurance** of new vehicles and the **development** of air-conditioning components. The focus is both on the optimisation of thermal comfort and the improvement of general reliability, safety and energy efficiency.

State-of-the-art measurement technology, **high quality infrastructure** and individual support by our **experienced staff** all combine to provide optimal working conditions for our clients.

Your benefit

• more safety
through **tested functionality** of critical components

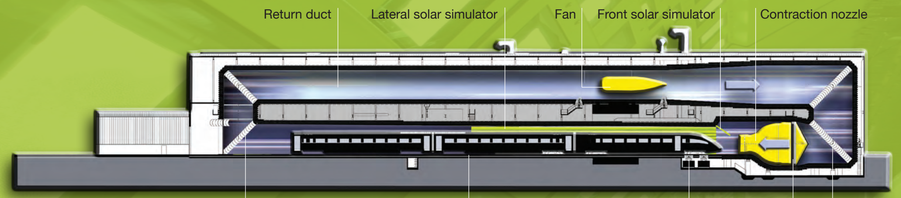
• more reliability
through **certification for any weather**

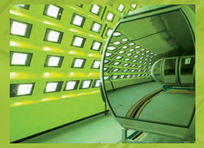
• more comfort
through **optimised heating, ventilation and air-conditioning systems**

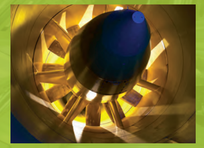
• more energy efficiency
through **measurement and optimisation of energy consumption** under realistic operating conditions

Vienna Climatic Wind Tunnel

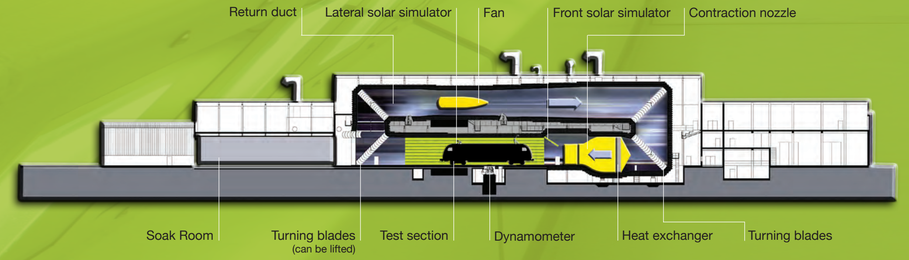
Large **Climatic Wind Tunnel** (LWT)







Small **Climatic Wind Tunnel** (SWT)



Climatic Wind Tunnels

Technical Data

	SWT	LWT
Maximum temperature range	-45°C to +60°C	
Maximum wind speed restrictions at low temperatures e.g. at -20°C	120 km/h 120 km/h	300 km/h 200 km/h
Maximum temperature gradient in the temperature range -20°C to +60°C	10 K/h	
Relative humidity at temperatures > +10°C	10% to 98%	
Solar intensity of lateral solar simulator at fixed 30° angle of incidence operating temperature > -10°C	200 W/m² to 1,000 W/m²	
Solar intensity of front solar simulator maximum wind speed: at incidence angles < 45° up to 120 km/h at incidence angles ≥ 45° up to 50 km/h operating temperature > -10°C	200 W/m² to 1,000 W/m²	
Rain, snow and icing systems	stationary ceiling mounted rain and icing system spray rig covering entire tunnel cross section mobile (snow) nozzles	
Braking and load simulation	dynamometer with one driven axle	roller rig with one driven and one nondriven axle
Maximum power	250 kW drive power 300 kW brake power	850 kW drive and brake power 1.5 MW overload for 90 s
Maximum speed	160 km/h	280 km/h
Load simulation	4,000 to 20,000 kg	up to 20,000 kg
Maximum axle load	14,000 kg	20,000 kg
Roller diameter	1,591.5 mm	1,000 mm
Roller surface	tungsten carbide coated	-
Roller spacing	1,000 mm	-
Roller width	1,000 mm	track profile
Distance between axles, adjustable	-	1,100 mm to 3,000 mm
Gauge of track	-	1,435 mm
Passenger simulation	latent and sensible load continuously adjustable in accordance with standard requirements	

	SWT	LWT
Test section length	33.8 m	100.0 m
Distance between nozzle and start of test section (also begin of lateral solar simulator)	3.5 m	
Distance between nozzle and dynamometer / roller rig	16.0 m	7.5 m
Test section width height cross sectional area	4.9 m to 5.1m 5.9 m to 6.0 m 27.2 m² to 28.7 m²	4.9 m to 5.6 m 5.9 m to 6.2 m 27.2 m² to 32.2 m²
Dimensions of lateral solar simulator length / height	30.0 m / 4.3 m	47.5 m / 4.3 m
Access clearance width / height / area	4.23 m / 5.95 m / 25.17 m²	
Contraction nozzle dimensions width / height / area	3.5 m / 4.6 m / 16.1 m²	
Contraction ratio of nozzle	3.98	5.72

Soak Room

Dimensions length / width / height	30 m / 8 m / 6 m
Temperature range	+5°C to +60°C
Relative humidity at temperatures > +10°C	10% to 98%

Soak Room for pre-tests and alternating climate tests in combination with the SWT.

	Small preparation hall	Large preparation hall
Dimensions length / width / height	60 m / 11 m / 7.5 m	100 m / 11 m / 8.5 m
5 t ground controlled gantry crane	-	along entire hall length

Preparation halls for setup and adjustment work.

Auxiliary and test voltages

200 – 1,000 V DC	2 x 175 kW 350 A max
1,000 – 3,600 V DC	350 kW 235 A max
3 x 200 – 1,000 V 40 – 60 Hz	350 kVA 500 A max
200 – 1,200 V 16 ⅔ Hz	350 kVA 350 A max
500 – 1,800 V 40 – 60 Hz	350 kVA 350 A max
3 x 400 V 50 Hz	350 kVA 500 A max
20 – 200 V DC	200 A max