



## High Altitude Chamber (GHK) – up to 3,800 m above sea level

### Service description

- High-altitude climatic chamber with roller test bench for vehicle dynamics tests under different environmental conditions (altitude, temperature, humidity)
- Vehicle preconditioning
- Performance of exhaust emission analyses, e.g. according to WLTC Driving Cycle
- Determination of emissions at the tailpipe and upstream of the catalytic converter to optimise exhaust emission treatment

### Areas of application

- Proof of functionality of complete vehicles and motorcycles
- Tuning of engine control devices
- Proof of functionality within the scope of the exhaust emission standard
- Securing the homologation of vehicles

### Added value for our customers

- Emission and application measurements without additional changeover times
- Variations of environmental parameters height, humidity and temperature in combination with application measurements possible
- Conditioning cells enable parallel campaigns on multiple vehicles

### Technical Data

- **Temperature range:** –30 °C to +50 °C
- **Cooling capacity:** max. 180 kW
- **Relative humidity:** up to 95 %
- **Ambient pressure:**  
approx. 960 hPa to 630 hPa  
(approx. 560 m to 3,800 m)
- **Air stream fan:**
  - Rear wheel drive vehicle:  
max. 34,000 m<sup>3</sup>/h, max. 130 km/h
  - Front wheel drive vehicle:  
max. 26,000 m<sup>3</sup>/h, max. 100 km/h
  - Suitable for hybrid vehicles due to integrated extinguishing device
- **CVS emission sampler:** 2 sampling lines (diluted emissions in bag and modal emissions at tailpipe, or undiluted emissions at separate sampling point)
- **Dynamometer:** Roller dynamometer (single axle roller) with  $P_{max} = 210$  kW, tractive force = 6 kN,  $v_{max} = 200$  km/h, vehicle weight simulation of up to 8,000 lbs, max. axle load up to 2,000 kg
- **Chamber dimensions (LxWxH):**  
8.50 m x 4.50 m x 4.30 m



## Conditioning Units and Preheating Hall

### Service description

- Preconditioning of vehicles for testing in the high altitude chamber, in particular for exhaust emission analyses
- Preparation of the vehicles (mounting of roller wheels, application of measuring technology or change of catalytic converters)

### Areas of application

- Preparation of vehicles for testing in the high altitude chamber

### Added value for our customers

- Efficient preparation of vehicles for testing
- Rapid reaction if repairs are required
- Short distances to the high altitude chamber

### Technical Data

#### Conditioning units

- Temperature range:  $-25^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$
- Independent temperature control in both units
- Chamber dimensions (LxWxH):  
5.70 m x 2.70 m x 2.35 m

#### Preheating hall

- Vehicle mover for placing the vehicles into the test chamber
- Fully equipped workshop with lifting platform



## Temperature Chamber (TK)

### Service description

- Drive-in temperature chamber for functional tests at high and low temperatures
- Combined environmental conditions (temperature, snow or ice)

### Areas of application

- Proof of functionality of components and systems
- Cold start tests
- Fatigue strength tests
- Test standards: DIN EN 60068-2, MIL-STD 810, RTCA/DO-160, various manufacturer standards

### Added value for our customers

- Large temperature chamber for testing a complete system at extremely low temperatures including all the interactions of the individual components

### Technical Data

- Temperature range:  $-70^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- Temperature gradient: max. 1 K/min
- Cooling capacity: max. 70 kW
- Floor loading: max. 5 kN/m<sup>2</sup>
- Cable feedthrough ( $\varnothing$ ): 100 mm (3x)
- Power supply:  
230 V or 400 V (16 A, 32 A, 63 A and 125 A CEE);  
mobile, programmable AC power supply  
(6,000 VA/15 to 1,200 Hz)
- Compressed air supply: max. 25 bar
- Chamber dimensions (LxWxH):  
5.50 m x 4.50 m x 4.00 m  
– Door (WxH): 4.50 m x 4.00 m



## Climatic Chamber (KK)

### Service description

- Drive-in climatic chamber for functional or tightness tests with combined environmental conditions, e.g. temperature, humidity, rain, snow, ice or sun
- Tests under special environmental conditions, e.g. temperature, humidity and argon
- H<sub>2</sub>-compatible for hydrogen-powered vehicles

### Areas of application

- Climate tests on components and systems
- Blowing-rain and IP protection class testing
- Test standards: DIN EN 60068-2, MIL-STD 810, RTCA/DO-160, various manufacturer standards

### Added value for our customers

- Realistic and varied tests under different combined environmental conditions in a large space

### Technical Data

- **Temperature range:** -40 °C to +120 °C
- **Temperature gradient:** max. 1 K/min
- **Cooling capacity:** max. 120 kW
- **Relative humidity:**  
10% to 95% relative humidity (at a temperature of +10 °C to +80 °C)
- **Cable feedthrough (Ø):** 150 mm (2x)
- **Power supply:** 230 V or 400 V (16 A, 32 A, 63 A and 125 A CEE) mobile, programmable AC power supply (6,000 VA/15 to 1,200 Hz)
- **Compressed air supply:** max. 25 bar
- **Water supply:**  
Well water (inlet and outlet)
- **Emission volume flow:** max. 1,500 m<sup>3</sup>/h
- **Chamber dimensions (LxWxH):**  
9.00 m x 4.50 m x 4.30 m  
– Door (WxH): 4.00 m x 3.90 m



## Vehicle Chamber I

### Service description

- Temperature chamber with roller test bench for functional tests at high and low temperatures
- Temperature shock tests even for large test specimens, e.g. control cabinets
- TISAX certification

### Areas of application

- Proof of functionality of components and systems
- Tuning of control devices
- Cold start test on vehicles
- Test standards: EN 60068-2-14 Na, various manufacturer standards

### Added value for our customers

- Cost-effective test chamber with high cooling capacity

### Technical Data

- **Temperature range:** -70 °C to +80 °C
- **Cooling capacity:** max. 190 kW
- **Dynamometer:**  
Roller test bench with one roller (single axle roller)  $P_{\max} = 40 \text{ kW}$ ,  $v_{\max} = 120 \text{ km/h}$
- **Chamber dimensions (LxWxH):**  
7.00 m x 3.50 m x 2.60 m



## Vehicle Chamber II

### Service description

- Temperature chamber with roller test bench for functional tests at high and low temperatures
- Suitable for hybrid vehicles due to mobile extinguishing device
- Temperature shock tests even for large test specimens, e.g. control cabinets
- TISAX certification

### Areas of application

- Proof of functionality of components and systems
- Tuning of control devices
- Cold start test on vehicles
- Driving dynamics measurements
- Test standards: EN 60068-2-14 Na, various manufacturer standards

### Added value for our customers

- Cost-effective test chamber with roller test bench

### Technical Data

- **Temperature range:**  $-40^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$
- **Cooling capacity:** max. 110 kW
- **Dynamometer:**  
Roller test bench with one roller (single axle roller)  $P_{\text{max}} = 53 \text{ kW}$ ,  $v_{\text{max}} = 120 \text{ km/h}$  driver guidance system (default driving curve)
- **H<sub>2</sub>-compatible, explosion-proof for hydrogen-powered vehicles, for example**
- **Chamber dimensions (LxWxH):**  
8.00 m x 5.00 m x 2.50 m
- **Air stream fan:**  
 $26,000 \text{ m}^3/\text{h}$ ,  $v_{\text{max}} = 100 \text{ km/h}$



## Climate Combination Chamber

### Service description

- Walk-in climatic chamber for functional or ageing tests at various temperatures and controlled humidity

### Areas of application

- Proof of functionality of components and systems
- Ageing through temperature / climate cycles
- Test standards: DIN EN 60068-2, MIL-STD 810, RTCA / DO-160, various manufacturer standards

### Added value for our customers

- All possible climate conditions in one facility
- Powerful climatic chamber for tests with high temperature gradients or high relative humidity

### Technical Data

- Temperature range:  $-70^{\circ}\text{C}$  to  $+120^{\circ}\text{C}$
- Temperature gradient: max. 5 K/min
- Cooling capacity: max. 70 kW
- Relative humidity: up to 95 %
- Cable feedthrough ( $\varnothing$ ): 125 mm (3x)
- Power supply: 230 V or 400 V (16 A, 32 A, 63 A and 125 A CEE) mobile, programmable AC power supply (6,000 VA / 15 to 1,200 Hz)
- Air pressure: max. 25 bar
- Water supply:  
Well water (inlet and outlet)
- Chamber dimensions (LxWxH):  
4.00 m x 2.20 m x 2.70 m



## Temperature Shock Units

### Service description

- Facilities for simulating the thermal load on a component through shock temperature changes in a two-chamber process (air/air)

### Areas of application

- Ageing of electric motors and power electronics
- Verification of the resistance of components to faults caused by temperature changes, e.g. cracking in soldered, glued and welded joints
- Test standards: LV124, DIN EN 60068-2-14 Na, MIL-STD 810

### Added value for our customers

- Accelerated validation of development stages

### Technical Data

- Temperature range:  $-70^{\circ}\text{C}$  to  $+220^{\circ}\text{C}$
- Change time:  $<10$  sec
- Cable feedthrough ( $\emptyset$ ): 35 mm and 125 mm
- Chamber dimensions unit 1 (LxWxH): 640 mm x 460 mm x 400 mm
- Chamber dimensions unit 2 (LxWxH): 680 mm x 850 mm x 610 mm
- Test item weight: max. 35 kg to 100 kg





## Temperature and Climate Cabinets

### Service description

- Climate cabinets with volumes of up to 1,500 litres for the qualification of electric, electronic and mechatronic components and systems
- Operation of the test items using equipment directly at the test cabinet (control cabinet, notebook, power supply units, etc.)

### Areas of application

- Rapid temperature change tests
- Temperature and humidity tests
- Low and high temperature tests
- Icing tests
- Ageing tests
- Test standards: LV124, DIN EN 60068-2, MIL-STD 810, RTCA / DO-160, various manufacturer standards

### Added value for our customers

- Extensive climatic and mechanical testing options in one test laboratory
- Function monitoring during the tests

### Technical Data

- Temperature range:  $-70^{\circ}\text{C}$  to  $+180^{\circ}\text{C}$
- Temperature gradient: up to  $15\text{K}/\text{min}$
- Relative humidity: 10 % to 98 %
- Cable feedthrough ( $\varnothing$ ): 125 mm
- Test item weight: max. 100 kg to 250 kg
- Dimensions of the 7 climate cabinets:
  - Length: 450 mm to 1,600 mm
  - Width: 580 mm to 1,100 mm
  - Height: 750 mm to 950 mm



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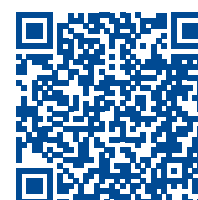
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