TNO CLIMATIC-ALTITUDE CHAMBER



The TNO climatic-altitude chamber serves a wide variety of climatic testing needs. The ambient temperature can be controlled between -45 °C and +55 °C and air pressure can be reduced up to a level found at an altitude of 4,000 meters. The chamber's dynamometers enable transient testing of both light and heavy-duty engines and vehicles. It is an excellent tool to measure performance and tailpipe emissions of military vehicles in extreme but controlled conditions. Nowadays, military operations are carried out in very diverse operational scenarios, with diverse and demanding climatic conditions. Vehicles must be able to operate in arctic conditions as well as desert or tropical conditions. Recent area's of operations have also included locations with high altitudes. In short: the demands on military vehicles are high. The NATO Standard Agreement 2895 defines and prescribes 14 climatic conditions ranging from Extreme Hot Dry to Extreme Cold. Within TNO's Climatic Altitude Chamber vehicles can be put to the test to establish if the proposed solutions will actually work in the relevant climatic conditions.

Many military vehicles use engines from their 'brothers' in the civil automotive industry. Within this industry the emission standards are dominant drivers of powertrain development. The latest chapters, US 2010 and Euro VI, have a great impact on vehicle design, development and calibration. Whereas earlier legislation concentrated on emissions of a new engine at standard ambient conditions, future legislation will increasingly focus on actual emissions (ISC, IUC, OCE) of a vehicle throughout its operational lifetime. Extensive testing under different loads and widely varying ambient conditions is common practice to ensure in-service robustness. Summer and winter trials are necessary but costly undertakings. The number and duration of these trials can be significantly reduced by using a climaticaltitude chamber.



Recent Climatic Testing of the BVS10NLD of the Royal Netherlands Army



The TNO climatic-altitude chamber is part of the Powertrain Test Centre in Helmond, the Netherlands.

MORE THAN POWERTRAIN DEVELOPMENT

The climatic-altitude chamber is a very versatile tool. Even though its focus is on powertrain related needs, other areas, such as the comfort levels in the cabin or crew spaces, can also be tested. The performance of heating, ventilation and air conditioning systems, for example, can be validated by exposing the vehicle to extreme ambient temperatures.

TAILOR-MADE PROGRAM

Many different testing needs can be combined and integrated into one very compact and effective test program. TNO offers the capabilities of their testing facilities on a project basis. Your input will serve as the basis for TNO to develop a testing program to meet your objectives.

The climatic chamber has been operational from December 2009. Several military vehicles have been tested, both for industrial as governmental clients, as well as dozens of civil vehicles.

CAPABILITIES

- Temperature range: -45 °C to +55 °C
- Altitude range: 0 to 4000 m
- Wind speed: 120 km/h
- Door opening: 4 x 5 m
- Interior length: 23 m
- GVW: max 30 tons.
- Dynamometer power, torque: 550 kW, 7000 Nm
- Emissions: 02, C0, C02, THC, N0, N02, N20, NH3
- FTIR analyser
- Particulate partial flow sampler
- Full flow CVS at standard ambient conditions
- Two direct emission lines at all ambient conditions
- Transient dynamometers

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TNO is an independent innovation organisation. TNO connects people and knowledge to create innovations that sustainably boost the competitive strength of industry and the welfare of society.

TNO focuses its efforts on seven themes including Defence, Safety and Security: TNO works on a safe and secure society by creating innovations for people working in defence organisations, the police, emergency services and industry.

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