

# CHEMICAL DETECTION AND IDENTIFICATION



**TNO** innovation  
for life

Chemical detectors and sensors are used to verify the presence of a (toxic) chemical agent or substance in the field. These detectors need to comply with specific operational and technical requirements. TNO can assist manufacturers, end-users, buyers and other stakeholders of detectors in defining their specific requirements and validate the performance of detector systems against the specifications. TNO support may consist of contract research and development as well as providing laboratory testing, testing facilities, technical advice and consultancy on detector procurement issues.

TNO provide support in developing and improving your solutions for identifying the toxic chemical agent at the scene. Customers range from governments to industries worldwide. The support we offer includes in-house laboratory testing, operational testing and evaluation of chemical detectors, including sensors and sensor arrays. In addition, TNO can provide consultancy during chemical detector development.

## LABORATORY AND OPERATIONAL TESTING

We can test your chemical detector using live Chemical Warfare Agents (CWAs), Toxic Industrial Chemicals (TICs), Toxic Industrial Materials (TIMs) and other relevant substances in either liquid, solid, gas or vapour phases. The compliance of the specific detector with pre-set requirements (e.g. NATO triptych) can be verified.

Parameters such as operational use, sensitivity, cross-sensitivity, response time, recovery time, interference rejection, false alarm rate, reliability and shelf-life can be determined. Several climatic parameters including temperature and humidity can be controlled during chemical exposure experiments with the detectors under evaluation.

## EVALUATION

We will evaluate which chemical detector best suits your requirements in your Testing, Evaluation and Consultancy procurement process. For this, we establish evaluation criteria (qualitative and/or quantitative) and perform theoretical and experimental evaluations. We will determine whether your chemical detector meets your predefined specifications in your development process.

## CONSULTANCY

In the whole development cycle of your chemical detector, we will provide hands-on advice, which can range from identifying the toxic chemical agent, selecting the best suited detection technology, to meeting user requirements on handling etc.



## TNO FACILITIES

- The High Tox laboratory of TNO in Rijswijk is the OPCW “designated laboratory” in The Netherlands. TNO is permitted to produce and handle limited quantities of CWAs for research purposes.

- The chemical detector or sensor is tested in a state-of-the-art test facility. A dynamic vapour generation system is used for production of vapours at a well-defined concentration of the toxic chemical compounds of interest. These compounds comprise all CWAs and a large selection of TICs. Relative humidity and temperature can be controlled within a wide range. Detectors can also be tested in the presence of interfering

components, such as gasoline vapour and exhaust fumes to exclude false positive or false negative alarms.

- The concentration and purity of the generated vapours of CWAs and a lot of the other chemical vapours can be verified and monitored using (semi) on-line analytical instrumentation, including gas-chromatography-mass spectrometry (GC-MS). Verified concentrations of chemicals can be generated down to near trace level, e.g. down to miosis level for nerve agents.

- A test chamber for testing detection equipment at elevated temperatures (up to 50 °C) is available (picture front page). Many commercially available CWA chemical gas detectors have been tested through a test and evaluation routine at TNO.

- Operating at room temperature a range of 0- 95% relative humidity (RH) of the air (non-condensing) can be used. Other operational temperatures can be used ranging from -25 – to +50 °C. At the extreme end of this range some limitations may apply in controlling the RH, due to natural operational restrictions and/or to avoid condensation effects.

## TNO EXPERTISE AND EXPERIENCE

The threat of chemical warfare agents has been the driver for developing technologies, instruments, and operational procedures for several decades. TNO has always been at the forefront of this development and has established a unique knowledge base of detectors and detection technologies during decades of research and development, test and evaluation, calibration, and quality control of all kinds of chemical detection systems for

liquids, vapours, gasses and aerosols.

Besides the Netherlands Ministry of Defence, placing large R&D programmes and contracts at TNO, other governments, industries and organisations have benefitted from TNO’s independent position as well. As such, we have assisted many customers from governments and industries worldwide in developing and improving their solutions for countering a chemical threat



## TNO

The 3300 TNO professionals put their knowledge and experience to work in creating smart solutions to complex issues. These innovations help to sustainably strengthen industrial competitiveness and social wellbeing. We are partnered by some 3000 companies and organisations, including SMEs, in the Netherlands and around the world. For more information: [www.tno.nl](http://www.tno.nl)

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