



# Critical Infrastructure Protection

● Threats and Threat Mitigation<sup>SM</sup>

# Choose Innovation – Choose Bruker

Bruker is recognised as the leading authority on the use of detection and identification technologies to mitigate the threat from the accidental or deliberate release of toxic gases, explosives and radioactive materials that could kill and injure civilians.

We offer the world's most comprehensive range of threat detection and identification solutions and can help you to assess how these can be best employed to protect people and property.

We develop, manufacture and supply technology worldwide for a range of customers and end users that need to protect people and property.

These include, but are not limited to governments, commercial enterprises and multi-national corporations who need to protect their employees and clients from the ever-increasing threat from terrorism.

Bruker is strongly committed to meeting its customers' needs by continuing to revolutionise the design, manufacture and distribution of detection tools based on our core technologies; by providing solutions that are regarded as the 'Gold Standard' by threat mitigation experts.

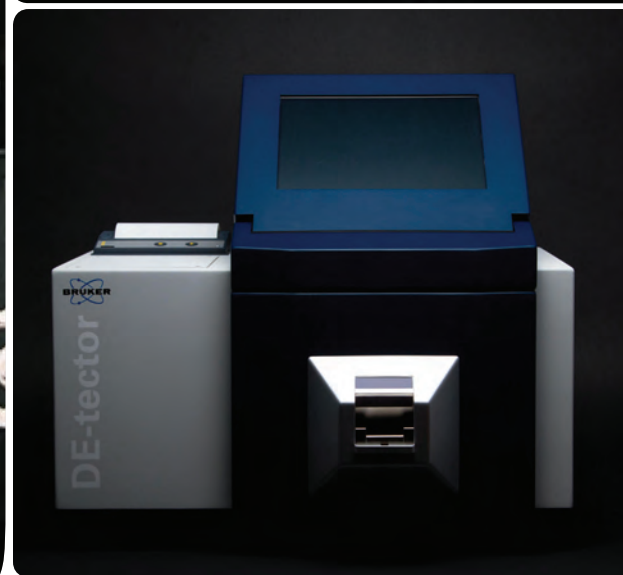


Bruker Detection products are carefully manufactured and configured in Germany, and are not subject to ITAR (International Traffic in Arms Regulations) controls".

# Understanding Your Needs

Our on-going efforts in research and development illustrate our long-term commitment to technological innovation on behalf of our customers. With more than 25 years of experience in meeting the sector's needs across a range of disciplines, Bruker has built an enviable rapport with both the military and civil defence communities, and with various specialist counter-terror teams, through understanding their specific requirements and providing an attentive and responsive service.

Our solution-oriented approach enables us to work closely with you to further establish your specific needs and determine the relevant solution package from our comprehensive range, or even collaborate with you on new developments. Through this commitment, Bruker provides a world class, market-leading range of technological solutions to meet your security and threat mitigation requirements.







# Exploiting Mass Transit Vulnerabilities

## **SARIN GAS ATTACK ON THE TOKYO SUBWAY: 1995**

To many observers the notorious Sarin Gas Attack on the Tokyo subway in 1995, perpetrated by the infamous Aum Shinrikyo sect (currently known as Aleph), was a wake-up call. The attack was carried out on the morning of 20<sup>th</sup> March 1995 when members of the sect released the chemical warfare agent 'sarin' in a coordinated attack on five trains in the Tokyo subway system.

Thirteen commuters were killed, fifty four were seriously injured and over 900 more people were affected by the release. Some unconfirmed estimates claim as many as 5,000 people were injured by the toxic gas.

## **DEADLY HYDROGEN CYANIDE GAS**

During the evening of May 5<sup>th</sup> 1995 a remote-controlled device was found in a toilet in the Kayabacho Tokyo subway station that would have been capable of releasing deadly hydrogen cyanide gas into the ventilation system had it not been discovered and made safe. Subsequently, several other undetonated devices were found at other locations in the Tokyo subway. The placement of these devices was attributed to the same sect that had perpetrated the sarin attacks.



"Terrorists will continue to pursue opportunities to inflict mass casualties."  
(US Government Document, September 2011;  
[https://www.fema.gov/txt/about/programs/oppa/evolving\\_terrorist\\_threat.txt](https://www.fema.gov/txt/about/programs/oppa/evolving_terrorist_threat.txt))





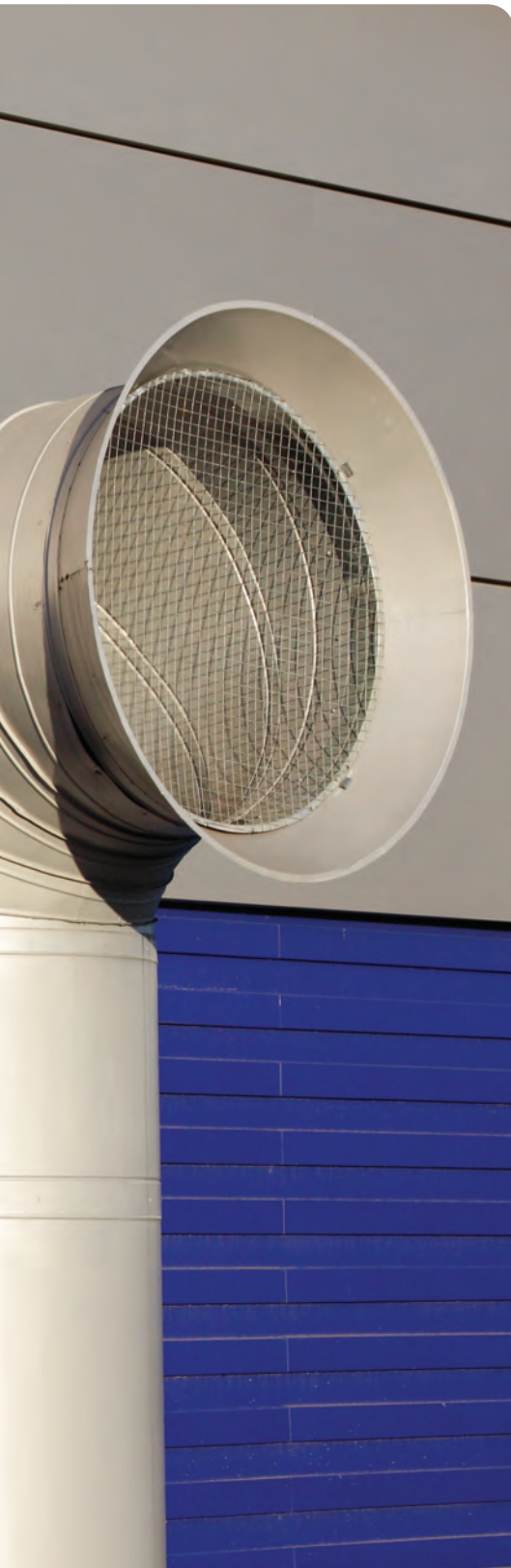
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# Building Vulnerabilities

Buildings with high occupancy rates, such as corporate offices, banks, government establishments and shopping malls are microcosms of the population. These both realise a soft target to the terrorist and are also vulnerable to accidental releases of toxic substances.

Recent events have increased interest in countering the vulnerability of buildings to CBRNE threats and the accidental release toxic chemicals. Of particular concern are the heating, ventilation and air conditioning systems (HVAC systems) of these facilities. Unprotected systems, especially those at street level, can be the point of ingress and distribution for airborne hazardous substances. Should toxins, in the form of gases, vapours or aerosols enter the building through this route, dissemination can take place quickly and significant casualties can be predicted. Depending on the nature of the release, and especially if a bio-warfare agent is used, the impact of that release might not be obvious until some days have elapsed. However, in the case of a release of a chemical weapon or a toxic industrial chemical, the impact would be immediate. As panic spreads, further loss of life could result directly from the resulting confusion; especially if evacuation protocols are not in place or are inadequate.

Other than the HVAC inlets, the visitor reception area and the mailroom are significant areas in a building in which the release of a toxic substance or a detonation of an explosive device would be the most likely to occur. The probability of a release in a lobby or reception lobby is higher when the building is access controlled, but the lobby is open to the public. The potential for the use of a radioactive material; either in the form of a prohibited isotope or even a dirty bomb, is also high in this location.











# Catastrophic Release of Toxic Chemicals

The potential to use a significant discharge of Toxic Industrial Chemical (TIC) as an attack vector instead of conventional Chemical Weapon Agents (CWA) is well understood by counter terrorism experts and Governments alike. Many chemicals used in the daily production of consumer products can cause significant harm if released into the atmosphere; either by accident or by malicious intent.

## CHLORINE GAS INCIDENT

In January 2005 in South Carolina, USA, a train carrying three chlorine tanks collided with a stationary train. One of the chlorine tanks, containing some 90 tonnes of liquid chlorine was breached, and released chlorine gas into the atmosphere.

According to an official report, the train engineer and eight other persons died because of chlorine gas inhalation. More than 500 people complaining of respiratory difficulties were taken to local hospitals; of these, over 70 were admitted for treatment.

## A CHLORINE GAS TERROR ATTACK

According to estimates, a terrorist attack on a chlorine road or rail tanker, where an explosive charge is used to rupture the pressure vessel, could release a toxic cloud of chlorine gas up to 20 kilometres wide. Even if this is an over-estimation, the impact of an inescapable cloud of a toxic gas is difficult to comprehend. Lives would be lost; human respiratory systems would be damaged irreversibly and in the release zone, all plant and all animal life would be seriously impaired.

If such an event takes place in an average city, estimates suggest a cloud of this size could kill or injure up to 100,000 people within 30 minutes. A release adjacent to an office building or a mass-transit railway would have an inestimable impact on life and health.





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# Nuclear Radiation Threats

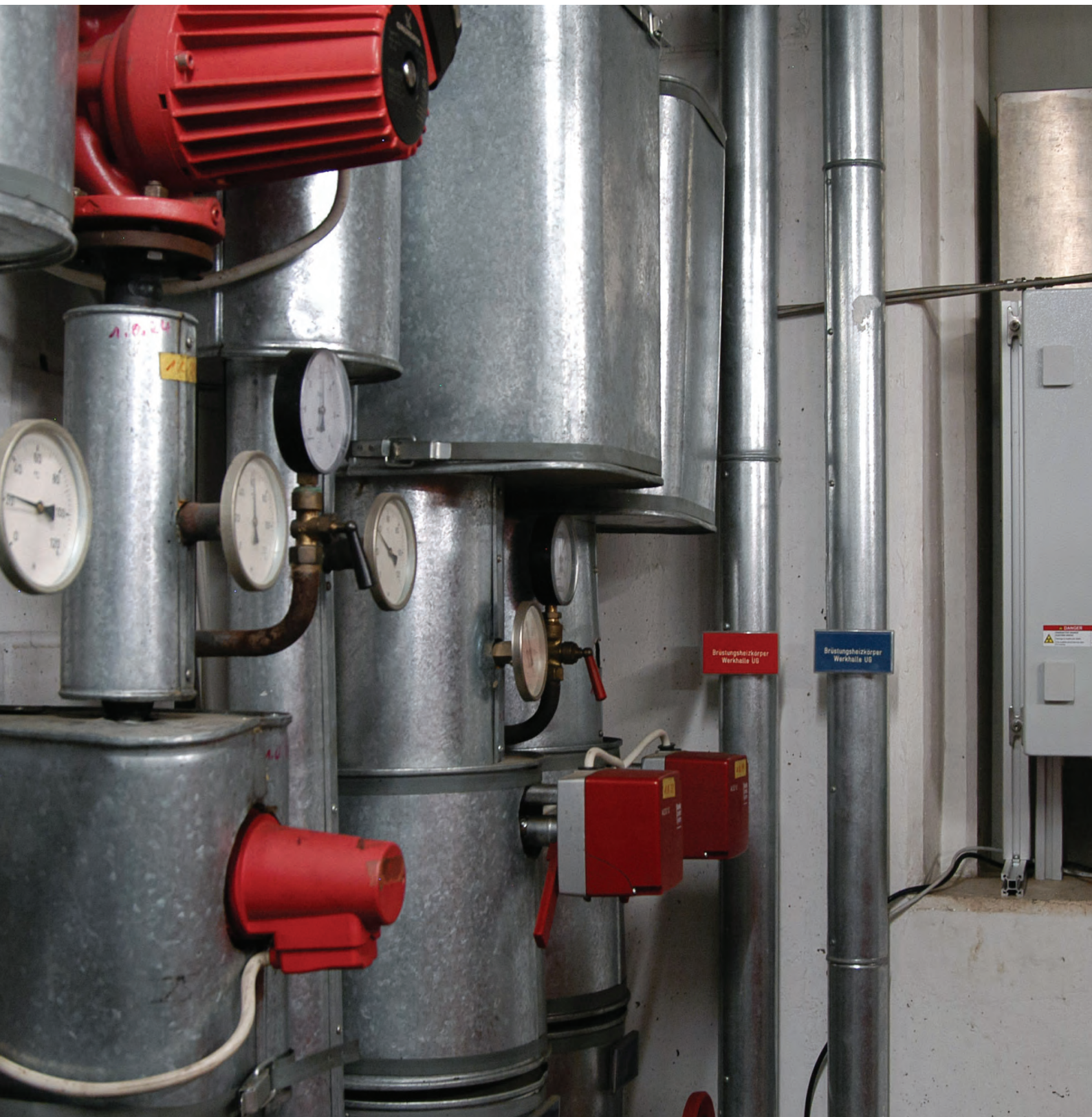
## DIRTY BOMB THREAT

The potential for terrorist groups to deploy a dirty bomb, a type of radiological dispersive device, (RDD), is still real. An RDD combines an explosive charge with radioactive material; when the explosive detonates, radioactive particles are distributed in the plume, and can be spread over a wide area. Critics note that the amount of radioactive particles distributed could be small, but that the impact of the discharge could render the immediate area unusable for some years. In Critical Infrastructures, such a discharge could render key areas around sites inaccessible.

One of the first reported attempts of radiological terror was carried out in November 1995. Allegedly, a group of Chechen separatists were involved and buried a caesium-137 source, wrapped in explosives, at the Izmaylovsky Park in Moscow. (See small inset image) A Chechen rebel leader alerted the media, following which the bomb was de-activated. At the time it was suggested that the incident amounted to nothing more than a mere publicity stunt but nevertheless the device was viable.











# Protecting Mass Transit Systems

With millions of people using mass transit systems daily, even small amounts of toxic materials can have a devastating effect on users - especially in underground railways. In addition, after any chemical attack, there would be massive disruption while remediation and clean up takes place.

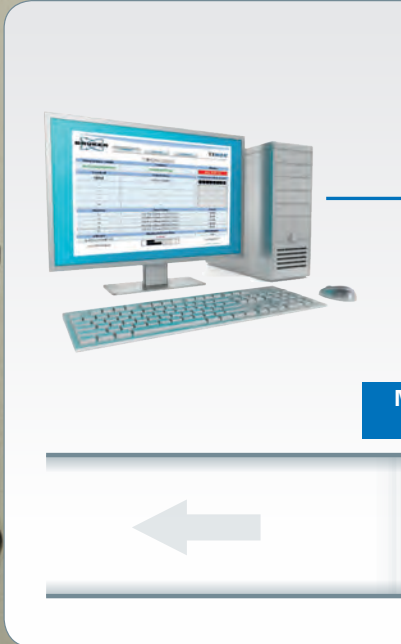
Early warning systems are indispensable, and Bruker has developed sensitive point detection and warning systems that will respond rapidly to traces of toxic chemicals in the air. Designated TIMON™ (Toxic Industrial MONitor), and an enhanced version, designated OrthoTIMON™, these devices are designed for covert installation in order not to attract unwanted attention.

TIMON and OrthoTIMON systems sample air at a selected point and send an alarm to a remote control room if a chemical weapon agent or a toxic industrial chemical is detected. Point detection systems also can be installed to the ventilation inlets of the station complex. In this way, any potential chemical release that uses the vector of the inlet air supply can be identified swiftly.

For wide area chemical threat detection, such as large platforms or stations, Bruker offers a passive scanning/detection system called RAPID™ (Remote Air Pollution Identification Device). This device, like the point detectors outlined above, is designed to detect gases and vapours that have been released either by accident or as part of an attack. The scanning system of RAPID can cover large swept volumes so that a single unit can identify threats emanating from multiple points in a large station concourse. RAPID integrates the chemical detection system with a video facility. In this way, the control room can target the RAPID system to monitor specific areas of the infrastructure such as the choke points of entrances and exits, or can steer the detector to areas where suspicious activity is identified.

For underground railways, RAPID can be directed down tunnels to detect emerging threats.







# Building Protection

Unprotected inlets to the heating, ventilation and air conditioning (HVAC) systems of major buildings such as offices, banks and Government establishments, are vulnerable to both accidental or deliberate releases of toxic substances. When toxic chemicals are involved, only small amounts of material are required. If the release is made close to the inlet of the HVAC, these toxic substances will be drawn into the building air supply and disseminate rapidly throughout the building causing trauma or death.

Other than ensuring the inlets are protected, by physical or mechanical means, detection systems should be installed to measure the air quality constantly, and alarm if a toxic material is discovered. If an alarm is triggered, the output of the detection device can be configured to take autonomous remedial action; including shutting down the airflow, isolating the specific intake or by diverting the incoming air to waste.

The schematic shown is a typical configuration of a chemical detection device mounted close to the primary air intake, usually downstream from the first particulate filter. The output of the instrument, showing a display of instrument status and detection state, is sent to control rooms over a standard Ethernet link; allowing the detector states to be monitored from multiple locations. Outputs from the detector can be used to control the incoming air flow; either diverting it or closing the effected inlet point.

In addition to a range of chemical detection systems, Bruker also offers Sentry™; a radiation identifier and DE-tector™ a trace explosives detector. Both products are especially suited to access control of buildings; helping you protect people and property.







# VIP Protection

Comprehensive VIP protection extends beyond visible threats such as violent encounters. Less visible, but potentially more life-threatening, is the deliberate or accidental release of chemicals or radioactive materials. Bruker offers a blend of significant technologies to warn against the dangers of such threats.

The Bruker RAPID™ (main picture) can be deployed to detect chemical releases over large distances, and is ideal for covertly monitoring streets and avenues through which VIP parades pass. With a range from just a few metres to several kilometres, this passive system is used routinely for both indoor and outdoor monitoring. Equipped with an integrated video camera the operator can use the video to target the sensor on the general parade or to focus on specific spots where suspicious activity is detected.

The Bruker Sentry™ is a radiation detection and identification device that is carried in an inconspicuous backpack and can be operated in a vehicle that is transporting the VIP. Using this new technology, it is possible to discriminate between radiation that is naturally occurring, or that used for medical purposes, and industrial and 'special nuclear' (fissionable) material.

The Bruker μRAID™ is a small, compact, battery operated personal chemical agent detector. The device detects all chemical weapons, riot control agents and a range of toxic industrial chemicals (including chlorine); all which can harm VIPs and their party.

At events such as conferences and speeches, additional chemical detection for the whole delegation can be afforded by the use of a Bruker point detector system that operates 24/7 such as TIMON™ and OrthoTIMON™. These devices can either be installed in the venue permanently, or built into temporary installations. Examples designed by Bruker, and mounted on transportable pedestals, can be located near to the dais to provide detection and alarm capability for the duration of the conference.









# Stadium Protection



On game days or match days, sports stadiums and sports arenas are a microcosm of society, and spectators arrive from all walks of life. VIPs are often in attendance and sports teams can include high value players 'worth millions'. Patrolling the vast areas of stadiums and arenas using conventional threat detection tools is recognised as a challenge, because this action could cause alarm all that are present. Under these circumstances, it is best that such technology is operated covertly; or in a way that does not infringe civil liberties.

The Bruker RAPID™ (main picture), is a passive scanning infrared detection system, that has the outward appearance of a standard video camera. With a detection range from a few metres to several kilometres and benefitting from an integrated scanner that operates over a full 360° arc, it is ideally suited to monitoring the large volumes of stadiums. The system detects and identifies almost 100 chemical gases or vapours; all at very low concentrations. RAPID integrates a colour video camera aligned with the detection head. Using this capability, the control room or security personnel can direct the RAPID to monitor threats from specific areas of the venue. These can include choke points such as entrances and exits or this capability can be used to allow the operator to direct the detection process to areas where suspicious activity is seen.

Checking large areas for radiation threats without disturbing the visitors is a task for the new Bruker Sentry™. Carried by an operator in an inconspicuous backpack; this system identifies radiation sources and characterises them in to three classifications; naturally occurring, used for medical purposes, and the most critical; fissionable material that should not be in a civilian situation. The Sentry can also be used as a checkpoint monitor, simply by positioning it near an entry or exit point. This checkpoint monitor concept can be applied equally to both foot or vehicular traffic.

For stadium and arena protection, Bruker also offers a wide range of threat detection technologies that can be used for confirmation of the detected threat. These would normally be held in a concealed section of the venue, and the equipment and the specialist response team, only deployed once a threat has been detected by the covert systems.





# Access Control: Explosives Detection

Explosives are acknowledged as the terrorist's first choice for a weapon of mass destruction. This is the reason that airports are equipped with explosives detection as part of their access control systems. These ensure passenger safety and protect the critical infrastructure of the airport, as well as the aircraft.

The new Bruker DE-tector™ (inset) is the bench-top version of a highly-sensitive detection system, developed by Bruker, that detects and identifies minute traces of explosives and drugs (narcotics) on people and their property. Trace explosives detection plays a key role in air passenger security screening as well as in general infrastructure protection, where it is often found in combination with baggage X-ray systems.

The benefits of DE-tector also extend to Access Security Control where it is used at the entrances of critical infrastructure installations to identify personnel that could have been in contact with explosives substances; including Home Made Explosives.

At visitor entrances to prisons and remand centres, DE-tector technology is used to identify people who are engaged in attempts to smuggle drugs to the inmates. In Customs facilities and warehouses, trace detection of drugs and explosives plays a significant role in the identification of contraband and counter-terror information can be obtained from explosives detection.

To expand further the utility of drugs and explosives trace detection, Bruker also offers a lightweight, portable, battery-operated detector which operates both as a "sniffer" system for hard-to-reach areas and offers conventional swab-based sampling for traditional measurements that are made on personal property.









# The Forgotten Dimension?

“Critical Infrastructure” is a term that refers to the basic backbone of a functioning society’s economy. Examples include facilities and services associated with power, oil, telecommunications, agriculture, water and sewerage, public health and transportation and many Government facilities.

To protect Critical Infrastructure properly, we need to consider the human aspect. This includes the people that work in these facilities and in many cases, the customers and users that rely on this infrastructure.

To help counter the threat from accidental or deliberate release of toxic chemicals (including chemical weapons) on Critical Infrastructure, Bruker focusses on protecting people and property. This approach covers a vast number of scenarios that can include employees in high occupancy buildings, through to operators and passengers in mass transit systems. Our capability to detect threats, and warn about them swiftly, also extends to people in airports, sports fans in stadiums, and encompasses VIPs and their delegations. All these micro-cosms of society deserve complete protection from man-made threats.

Detection technology is only part of the package. We work with our users to propose resources to assist in the creation of a threat assessment and then to define the concept of operation that meets their specific needs and their specific circumstances. In this way, our clients are able to enhance their present security plans to encompass defined external threats.

Bruker equipment is designed for use in adverse conditions where the ability to call on the supplier’s service engineer may be limited and therefore complex service requirements have been designed out of our products. In most cases, what little service is needed, can be completed by the operator or by the client’s own service personnel; high levels of technical expertise are normally not needed.

**Choose innovation; choose a partner recognised for integrity and capability; choose Bruker!**

# Global Resources – Local Focus



Bruker has support centres of technical expertise in every major area of the world providing sales, applications and engineering support for our complete product range. With more than 6,000 employees at 90 locations worldwide you can be confident that the support team fronts a uniquely integrated global resource. Research and development specialists, applications professionals and highly trained engineers in every field are dedicated to your investment in our equipment.

## Superior Detector Performance

For highly sensitive detection, identification and quantification of chemical, biological, explosive and radiation threats. Superior performance and high reliability comes as standard.

## Applications Support

Systems are configured to meet your needs and result from our detailed evaluation of your requirements.

## Standards & Compliance

All our systems are manufactured in ISO9001 compliant factories; so you can be assured of superior quality and performance.

## Software & Data Systems

Designed to industry standards on the Microsoft® platform, our software can be integrated with your security management software.

## Training

User Training and User-Level Maintenance is part of our standard Scope of Supply. Our goal is simple; to minimise your cost of ownership.

## Low Maintenance

All our systems are designed for extended maintenance periods and reduce the through-life-costs of your investment.



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