ACOUSTIC EMISSION TESTING

STATE-OF-THE-ART NON-DESTRUCTIVE TESTING
Acoustic emission testing made simple

Acoustic emission testing (AT or AET) is a non-destructive testing method which is recognised by industry and research facilities and which is used in assessing the condition of materials, components or entire structures.

When materials are under stress, the stress is relieved within the material and presents as acoustic emissions. The acoustic waves that are produced spread freely and evenly in all directions. The physical properties of waves mean that every signal can be explicitly attributed to a source.

Local concentrations of acoustic emission signals occur where there are faults in the material. These faults can be triggered by cracking, delamination, corrosion, material inclusions, as well as turbulent flows in leaks, friction at crack edges, dislocation movement, erosion or other effects.

How AT works

Acoustic emission testing takes advantage of the properties of acoustic emission sources. Acoustic emission events in materials are recorded from outside using sensors.

Similar to the seismic locating of earthquakes, the structural localisation of acoustic sources is based on the measurement of the transit-time differences between the acoustic source and the different AT sensors. The sensitivity of the entire measuring chain ensures that an incipient material failure can be detected at an early stage.

Based on defined criteria, special acoustic emission software analyses and interprets the acoustic emission events in the unit being monitored. The findings provide precise information about the condition of the structure in real time and are able to determine the exact location of the defect.

Materials suitable for acoustic emission testing

A number of different materials, such as concrete, glass, stone, wood, ceramic, metal, brittle polymeric materials and composites can undergo acoustic emission testing.
THE BENEFITS OF ACOUSTIC EMISSION TESTING

Used successfully in Austria since 1981, today AT is an indispensable periodic testing method for assessing the condition of pressure vessels, pipes, tanks and storage facilities. AT allows an integral test result to be obtained across the entire structure under test and identifies the onset of material failure at an early stage.

Fundamental advantage of AT is its ability to check pressure vessels and storage tanks etc. for corrosion and leaks during the production process or during short production downtimes. The component under test is tested from outside under operating conditions and in real time. Essentially this means that the operating medium does not need to be transferred and put into interim storage, the vessel does not need to be opened and cleaned, and waste does not need to be disposed of.

The benefits of acoustic emission testing at a glance

- Components can be tested from outside (no need to empty and open sensitive components with the associated risks)
- Integral monitoring of the entire vessel
- Can be performed with operating medium in installation conditions (no additional stress (static/corrosive))
- Safety-related monitoring during pressure testing of sensitive components or where there is high-risk potential (gas pressure tests)
- Early identification of incipient damage mechanisms
- Significant reduction in testing times/ increase in plant availability
- Replaces internal inspections
- Continuous monitoring possible, even remotely

The tests we have performed so far show that acoustic emission testing is not just the present state of the art, it is primarily a simple and uncomplicated testing method that provides our customers with peace of mind and considerable time-savings.”

Head of Non-Destructive Testing, Dominik Salg
YOUR BENEFITS: TEST RESULTS IN A FEW EASY STEPS

01 Activate
02 Attach sensors
03 Perform computerised test

SPECIAL INDUSTRIAL PLANTS

Industrial plants often have specific features that need to be considered when selecting testing equipment. We adapt our equipment to suit your plant.

- Unusual geometric shapes
- Special material properties
- Increased safety requirements due to hazardous materials (medium)
- Demanding environmental conditions
- Deployment in explosion protection zones
- Test object in a difficult or inaccessible position (underground pipelines, high-level tanks)
- Large volumes

We guarantee that we will meet all requirements and comply with the statutory provisions of the German Industrial Safety Regulation (BetrSichV), the AP directives of the German Society for Non-Destructive Testing (DGZfP), and the Technical Regulations on Industrial Health and Safety (TRBS).
We attach our acoustic emission sensors to the test unit from outside. Weak spots are then localised in the same way that earthquakes are located. We can see every fault in the material on screen. The measurement results provide us with precise statements about the condition of the test object.”

*Technical Project Manager, Steffen Adelmann*
OTHER NDT SERVICES TANK INSPECTIONS AS PER §16 OF THE GERMAN INDUSTRIAL SAFETY REGULATION.

We have many years of experience in the field of periodic testing and always recommend the method best suited to our customers’ needs.

– Developing test concepts for plants that require monitoring (scheduling, cost planning, resource planning, classifying pressure equipment)
– Developing test instructions for periodic testing of pipelines and vessel

SERVICE & INSTALLATION

Bilfinger Noell’s work is based on the high quality and safety standards of the international power plant and chemical plant construction industries. The particular care and expertise we bring to handling sensitive building structures and components also come into play in acoustic emission testing. Bilfinger Noell is able to use certified personnel to perform non-destructive testing.

<table>
<thead>
<tr>
<th>VT Visual testing</th>
<th>PT Penetration testing</th>
<th>MT Magnetic particle testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>UT Ultrasonic testing</td>
<td>LT-leak testing</td>
<td>Special testing procedures Paschen test</td>
</tr>
</tbody>
</table>

AT Acoustic Emission Testing
BILFINGER NOELL GMBH
OTHERS PROMISE THE FUTURE,
WE’RE WORKING ON IT NOW!

The Würzburg company Noell has been involved in the German process industry since 1824. The company, which has its head office in the Franconian wine country, was originally known as the “rail car factory” of the “Noell brothers”.

Today Bilfinger Noell GmbH is a member of the Bilfinger group of companies with Engineering & Technologies, Maintenance, and Modifications & Operations divisions. The company, with its own Nuclear Technologies, Magnet Technologies and Service & Assembly business units, has a successful worldwide operation as an international provider of industrial services.

For many operators of nuclear facilities and conventional power plants, the name Bilfinger Noell stands for reliability and excellent quality. These traits can be seen in our efficient approach and environmentally friendly processes, from development, through production, right through to service.

What’s more, the in-house production of superconductive magnetic coils and special machinery has made Bilfinger Noell a renowned research and development partner in magnet technologies and nuclear energy, for example. Our services are provided through framework contracts and service contracts, as well as through contract staffing. We support our customers at all times and can step in as troubleshooters whenever we’re needed.

WE ARE BILFINGER

Bilfinger is a leading international provider of industrial services. The Group increases plant efficiency, ensures a high level of availability and reduces maintenance costs. The portfolio covers the entire value chain, from consulting, engineering, production, installation, maintenance, plant expansion and their general overhaul, right through to environmental technologies and digital applications.

The company provides its services across two lines of business: Engineering & Technologies, and Maintenance, Modifications & Operations. Bilfinger is particularly active in Continental Europe, Northwestern Europe, North America and the Middle East. Our customers from the process industry come from the chemical & petrochemical, energy & utilities, oil & gas, pharmaceuticals & biopharmaceuticals, metallurgy and cement sectors. With around 37,000 employees, Bilfinger stands for the highest standards in safety and quality and has an annual turnover of about € 4 billion.