



GTS
SPECIALIST KNOWLEDGE IN GLASS

Total Solutions for the Glass Supply Chain

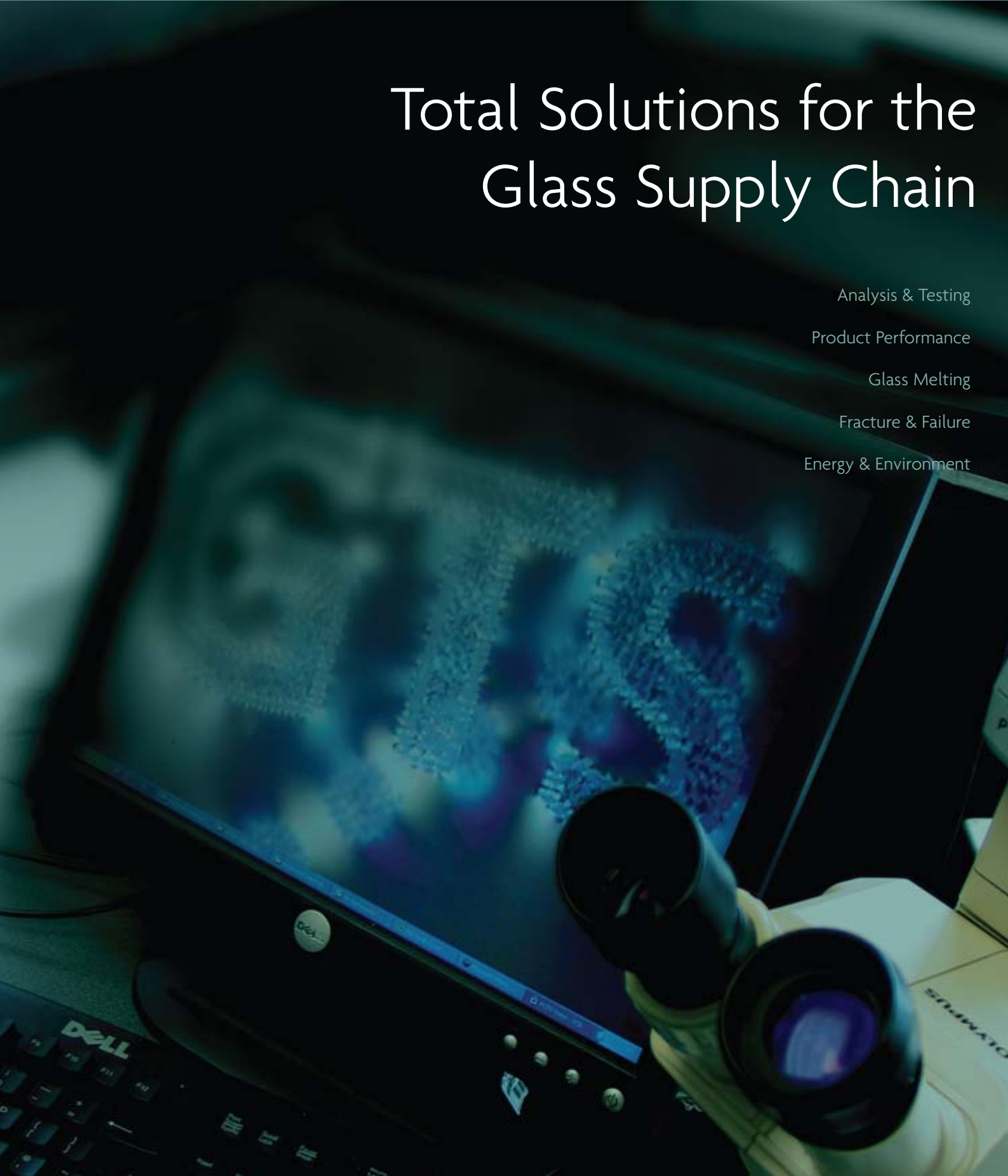
Analysis & Testing

Product Performance

Glass Melting

Fracture & Failure

Energy & Environment



GTS Services:

Analysis & Testing

Multi-disciplinary troubleshooting
Durability – Leachate – Migration Testing
Physical Testing
Impact Vertical Load – Physical Testing
Colour Analysis
Thermal Analysis
Wet Chemical Analysis
Bubble/Seed Analysis
Inclusions/Cord Analysis
XRF Analysis

Product Performance

Glass Distribution/Thickness Assessment
Thermal Shock Resistance Testing
Coating Adhesion Testing
Impact Resistance Testing
Stress/Annealing/Toughening Assessment
Internal Pressure Testing
Consultancy and Advice Service
Design Assessment
Elemental Migration Testing
Fitness for Purpose

Glass Melting

R & D new and novel glasses
Composition Modification
Composition Consultancy and Advice
Trial Melts / Raw Material Assessment
Refractory Corrosion
Stability Testing
Advance Glass Service
Special Glasses Service
Pilot Scale Trials
Glass Melting

Fracture & Failure

Fracture Investigations
Scientific Analysis
Architectural/Automotive Glass Failure
Fibre Optic/Medical Device Glass Failure
Scientific Equipment Glass Failure
Chemical Plant Glass Failure
Consumer Goods Glass Failure
Product Recalls
Food Container Failures
Insurance Claims/Trading Standards Service
Expert Witness Service

Energy & Environment

Stack Testing
Hot End Coating Emissions
Workplace Monitoring
Consultancy and Advice
Equipment Sales –
The System 700 Portable Gob Monitor

Welcome to GTS



Glass Technology Services Ltd (GTS) is a UK-based technical glass solutions provider active both in research and development and technical troubleshooting. All areas of glass and glass production are covered from fibre to flat, from container to scientific, from production to in-situ use and failure, working with a diverse customer base comprising, for instance, manufacturers, government funded agencies, retailers, suppliers, designers and consumers.



With a regular global clientele of over 500 companies, GTS is active in Europe, Asia and the Americas. Projects have included plant specification in Siberia, market impact studies in South America, investment audits in China and ecology ventures in India.

GTS carries out most of its testing under the auspices of UKAS 17025 which not only accredits test methods and equipment but those employed to carry out the tests. Equipment is regularly reviewed and replaced and currently includes SEMs, an XRF for extreme accuracy in chemical analysis and mass spectrometry for bubble gas analysis. Rapid turnaround is offered (under four hours is guaranteed for certain services) backed by quality systems and experienced professional staff.

Case Study

At Ferozabad in India, the Swiss Development Agency conducted an international project where GTS helped to specify, tutor and help the local glassmaking community. The brief was to help stop the practice of using small high-pollution furnaces - these had been causing pollution emissions which had visibly started to take their toll on the Taj Mahal.

GTS attends around 1000 technical problems a year covering, for instance, routine analysis to plant threatening failure. It has a team of environmental scientists and engineers which can deal with a range of issues including interpretation of legislation, analysis, diagnostics and emissions monitoring, with individuals in the team specialising in the fields of melting, batch chemistry, furnace operation, glass forming and production, quality and inspection.

GTS places much onus on the level of its staff competence: its environmental team has MCERTS accreditation; our Product Performance section can field a Law Society registered Expert Witness.

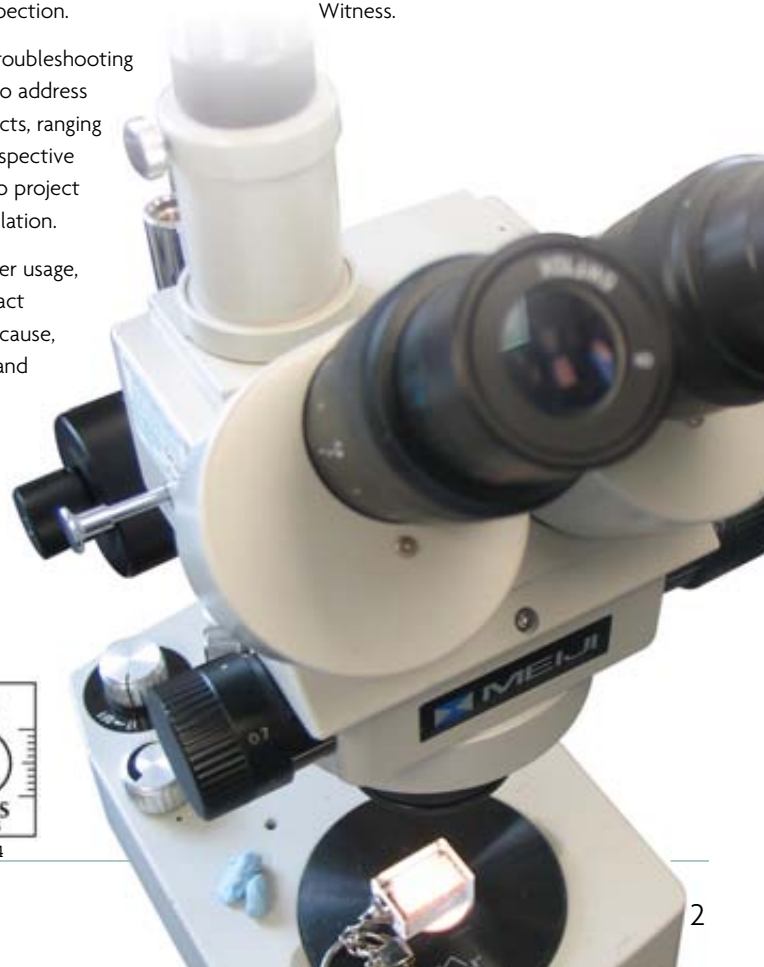
The solution was to teach the community a better practice of multi-pot construction to reduce the scale of the problem. The team was involved in the design, specification and construction of a larger single-site melting facility for communal use. This provided better emission control and reduced the pollution damage to one of the world's most treasured monuments. GTS also educated the local community in how to build such facilities for themselves.

A dedicated consultancy/troubleshooting team has been developed to address larger multi-discipline projects, ranging from full site audits for prospective buyers/investors through to project management of plant installation.

In the area of glass consumer usage, GTS is frequently asked to act independently to establish cause, acting as expert witnesses and providing courts with impartial advice as to how and why glass products have behaved in certain situations that may have led to failure, loss or injury.



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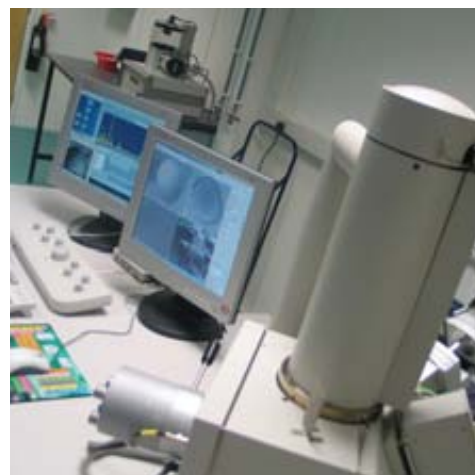
Strengthening the quality of service

The move by Glass Technology Services to the new premises at Chapeltown was used as an opportunity to strengthen the range and quality of services offered by GTS, for instance, by the acquisition of a new 'state of the art' scanning electron microscope (SEM), coupled with the latest generation analysis using Energy Dispersive Spectroscopy (EDS).

Scanning Electron Microscope (SEM)

The new SEM purchased by GTS is the very latest generation of high resolution imaging equipment with the capability of up to 1 million times magnification. It has the Oxford INCA 300 EDS detector attached, which allows quantitative chemical analysis of extremely small areas of an imaged sample. The advanced configuration also allows for many samples to be analysed without necessarily being carbon coated, although coating does afford better imaging for more detailed analysis. The equipment is fully digital and so enables both images and chemical analyses to be e-mailed directly to the customer. Results can be back with customers within a few hours of receipt.

At GTS the SEM is mainly used to identify inclusions and cord in glass, to look at problems with enamelling, identify unknown glasses, examine damage at fracture origins and survey glass corrosion problems.



Scanning Electron Microscope

Thermal Expansion Kit

The new Netzsch DIL-402PC dilatometer allows the accurate measurement of many important physical properties of glasses including thermal expansion coefficient, sintering temperatures and shrinkage steps, density change, glass transition temperature, dilatometric softening point and phase transitions.

This equipment can be used not only to measure the physical properties of glass but also those of ceramics, metals and polymers at temperatures of up to 1,000 Celsius. This can be vital for quality control, troubleshooting and product development.



The Residual Gas Analyser

Residual Gas Analyser

The portable quadrupole mass spectrometer/residual gas analyser (RGA) allows a semi-quantitative analysis of the gases found inside bubbles found in glass.

This analysis is generally carried out on a 24-hour turnaround, providing the customer with rapid information to enable any necessary operational changes to be made quickly and efficiently, minimising potential losses in production. This analysis can be done either in-house or on customers' sites.

UV-VIS Spectrophotometer

The use of this spectroscope is an effective way to identify trace contaminants, glass redox and unknown colouring species. Spectrophotometry can also be used to determine the colour co-ordinates of glass, including faint colours in clear glass.

Case Study

GTS and WRAP have recently completed a project looking into the possibilities of recycling waste generated in glass fibre production. Fibres were drawn from a range of mixtures of materials, incorporating waste and batch formulations, and simulating the fibre dimensions drawn in the factory. GTS was able to solve one of the problems of fibre glass recycling, by a complete remelting of the waste, reducing environmental concerns and allowing new compositions to be explored.



X-Ray Fluorescence

X-Ray Fluorescence (XRF)

X-Ray Fluorescence (XRF) allows for greater accuracy and lower limits of detection for chemical analysis of glasses. With dedicated programmes designed specifically for both container glass and flat glass, most manufacturing requirements are covered. Available analyses include raw materials, refractories, oxides analysis, trace lead and cadmium content programmes.

The service GTS provides keeps in mind customers' tight production schedules, with reports typically being issued within two to five days of sample receipt and in some cases, same/next day reporting.

Small Scale Glass Melting

The identification and use of new materials for production is an important part of any new product development and GTS can provide a series of small scale melting trials in order to give glassmakers the confidence to introduce new/alternative raw materials into their process. The trial process also determines and promotes the economic use of raw materials. Glass samples can also be provided to customer specification.

TCR Tecora Isostack Sampler

GTS, being a founder member of the Stack Testing Association (STA), has over 20 years' experience in the field of stack testing. The range and nature of such testing has greatly increased in complexity in recent years, together with the fact that the elevated temperatures found in glass manufacture present further difficulties and the latest IPPC regulation has widened the scope of testing to include those of heavy metals.

As a result, GTS has invested heavily in both equipment and staff training. The TCR Tecora Sampler is an electronic sampling system dedicated to stack emissions and ambient monitoring including heavy metals.

Our on-site personnel all have the required accreditation and are equipped with industry standard systems, all of which provides our customers with confidence in their results.

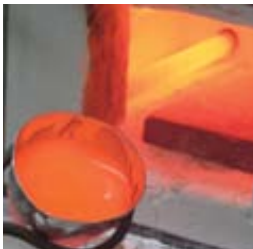


Tecora Isostack Sampler

Glass Technology Services is an independent laboratory providing a comprehensive range of services related to glass manufacture and use. All our services, some of which are detailed below, are backed by experienced, multi-disciplinary staff specialising in all aspects of glass technology.

Case Study

With rising prices and poor retention, selenium as a decolouriser has become a difficult and expensive option for glassmakers. GTS, working with a well known materials supplier, was able to establish the benefits of a new selenium precursor which greatly improves the retention in glass and so reducing both emissions to atmosphere and cost per effective unit consumed. This work has yielded very promising results which should help the container glass industry meet its ever more onerous legislative targets.



Bubble Analysis

The occurrence of bubble/blister in glass can lead to significant losses in production. The identification of gas components and relative pressures can be crucial in determining sources and eliminating the problem.

Chemical Analysis

GTS offers a range of wet chemical and instrumental techniques to meet the most demanding analytical requirements by suppliers, users and manipulators of glass.

Domestic Glassware Fitness for Purpose

Glassware intended for the home should be of a manufacturing quality and design to ensure the article is fit for the purpose intended, for instance satisfying freezer or oven safe criteria. GTS expertise and ISO 17025 accredited tests can ascertain whether a product is ready to be launched onto the retailers' shelves.

Environmental Testing and Consultancy

GTS operates a mobile stack and in-factory emissions monitoring service. The organisation and staff have achieved accreditation to UKAS and MCERTS standards and are able to provide the required compliance testing for LAAPC and IPPC processes.

Energy efficiency is a major driving force in all the industries. GTS employs specialist staff administering the glass industry's Climate Change Agreement and negotiating CO₂ allocations at site and sector level. Other services include lead and acid fume emissions, IPPC compliance monitoring and hot end coating emissions testing.

GTS also offers wider environmental consultancy services, including sector support for the EU Emissions Trading Scheme and a wide range of projects principally focussed in the areas of energy, waste management and recycling



Impact Tester



Shadow Graph

Providing a comprehensive range of services in Glass Technology

Case Study

GTS, entering the optoelectronic glass arena, has been instrumental in the development of a unique and highly specialist glass composition capable of acting as a host material for passive optoelectronic components. The glass allows the engineering of microscopic wave guides and beam-splitters enabling rapid optical transfer for mobile phones and wireless communications. Close control of ionic migration and diffusion were imperative for the work to achieve success in this field.



Evaluation of Product Quality/Services to the Retail Sector

Low quality glass can lead to problems ranging from poor in-service performance to serious personal injury; we assess annealing/residual stress, carry out dimensional checks against specification, defect assessment, strength testing and evaluation of design.

Fracture and Failure Analysis

Fracture analysis can be carried out to determine any true cause of breakage/failure and help identify remedial action. This service includes glass products in the building, vehicle, furniture, art, container and domestic glass sectors. An expert witness service is also available.

Fragment Identification

Glass fragments found in products are a serious issue at all stages of the supply chain. It is important to identify if the fragment has been introduced during glass manufacture, filling or after purchase. UKAS accredited compositional analysis and microscopic examination can help source the fragment. A rapid response service is also available.

Glass Coatings/Surface Analysis

The properties of glass surfaces can be different to the bulk properties. Factors can be critical to issues such as label adhesion, coatings, cap/glass interactions and durability for bottles and jars, glazing, technical and pharmaceutical glass.

Impact Resistance Testing

To ensure glass containers have an adequate impact resistance we test to standard manufacturing codes of practice using an industry standard AGR Pendulum Impact Tester.

Internal Pressure Testing

Carbonated beverage bottles need to be able to withstand the pressure produced by their contents, from filler to consumer without failure. This is tested using an industry standard AGR Ramp Pressure Tester.

Inclusion & Cord Analysis

Rapid analysis to identify inclusion and cord problems can minimise production losses. The service is designed to operate within tight production schedules; an express service can provide results within a few hours of sample receipt.

Trial Glass Melts/Raw Material Assessment

The identification and use of new materials in production is an important part of any process industry. GTS can provide melting trials to ensure customer confidence in new raw materials, improve melting and refine performance.

Thermal Shock Testing

The thermal shock endurance of an item, carried out to BSEN 1183, can be an important factor in the assessment of fitness for purpose. This is especially important for glass articles that experience heat or cold during their normal use/life, e.g candleholders, domestic ware, cafetieres, etc.

Vertical Load Testing

Glass containers are compression tested to BSEN ISO 8113:2004 using a 25kN Hounsfield Testing Machine. The equipment can also be used for bending and tensile testing



Vertical Load Tester

Workplace Monitoring

Companies can ensure that they are COSHH compliant, protecting employee health and safety. All monitoring work can be carried out to recognised NIOSH and OSHA methods. Alternatively, in-house methods can be developed.



GTS

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GTS
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