Geolabs Limited

GEOLABS LIMITED - QUALITY ASSURANCE

Geolabs Limited was formed in 1995 and has testing facilities and resources to undertake an extensive range of soils and rock testing including classification; earthworks, total stress, consolidation, shearbox, permeability, effective stress and advanced testing, as well as research oriented and bespoke testing to meet customer-specific project requirements.

We ensure that the highest level of quality is achieved and maintained in our operations through the application of a robust Quality Management system and quality assurance procedures across all laboratory activities.

The Geolabs Limited Quality Management system and associated documentation is reviewed and audited at least annually by the United Kingdom Accreditation Service (UKAS), which is the sole national accreditation body recognised by the UK government to assess organisations that provide certification, testing inspection and calibration services against published international standards for technical competence.

UKAS assess our compliance with relevant National Standards, test and project-specific specifications in accordance with the requirements of International Standard BS EN ISO/IEC 17025: 2017 - General requirements for the competence of testing and calibration laboratories.

This recently revised standard is the international reference for testing and calibration laboratories wishing to give confidence to their customers in their capability to deliver reliable results, and enables laboratories accredited to this standard to demonstrate their technical competence both nationally and around the world. Closely aligned to the requirements of BS EN ISO 9001:2015, UKAS accreditation to BS EN ISO 17025: 2017 also confirms a commitment to impartiality, protection of customer confidentiality, staff training and development and continuous improvement throughout the organisation.

Customers using a UKAS BS EN ISO 17025:2017 accredited laboratory can be assured that the accredited services that the laboratory provides will be recognised internationally, as BS EN ISO/IEC 17025:2017 was developed through the liaison of 18 internationally renowned organisations such as the International Laboratory Accreditation Cooperation (ILAC). This international recognition further reduces the need for multiple assessments and third-party audit by customers seeking to guarantee the quality of their required laboratory services.

Geolabs Limited actively organises and participates in a Proficiency and Interlaboratory Comparison Testing Scheme (PICTS), which provides geotechnical laboratories with the opportunity to monitor and assess their performance and validity of their test results through comparison with other laboratories in accordance with the requirements of clause 7.7.2 of BS EN ISO/IEC 17025:2017.
Geotechnical Soils & Rocks Testing Facilities

Geolabs Limited is one of the largest independent geotechnical soils, rocks and associated materials testing laboratories in the United Kingdom with in-house facilities that can perform a wide range of test procedures to British Standards and other National and International Standards.

We perform geotechnical tests for a variety of building, civil engineering and construction projects. Examples include exploration and testing for mineral resources, all types of testing relating to the development of energy resources (offshore and land-based), tunnelling and pipeline projects and major construction projects requiring advanced testing etc. We regularly undertake testing commissions from clients and projects from all over the world as well as providing essential technical support when required.

Staff

Our staff have a combined geotechnical laboratory testing experience in excess of 300 years. They have set-up and run laboratories on sites in the UK and overseas, on marine vessels, and have worked in difficult conditions in order to meet tight deadlines to clients’ requirements.

Our staff serve on numerous National and International Standards committees, working groups and technical panels, often in the capacity of Chairmen or Working Group Coordinators. They have also lectured and given technical papers throughout the world.

‘Routine’ Testing

Our extensive equipment resources enable us to perform a wide range of testing of a routine nature (all BS1377 tests including classification, durability, compactions, CBR’s, MCV’s and total stress shear strength). We also perform the Fall Cone and other tests to other specifications and National Standards.

Rock Testing

Our facilities allow us to perform: Unconfined Compressive Strength tests (which can include Young’s Modulus and Poisson’s Ratio determinations with load/unload cycles); Triaxial Compression Tests on rock cores; Swelling Strain and Swelling Index; Point Load; Slake Durability; Shore Schiéroscope; Shearbox tests (on specimens up to 150mm diameter); Ultrasonic wave velocity; 10% Fines; and Aggregate Crushing Value, Mohs’ Hardness values etc.

Two temperature-controlled laboratories with a total capacity of in excess of 300 data logged channels allow a wide range of compressibility, strength and permeability tests to be performed. These include:

Consolidation Testing

We have thirty data logged one-dimensional consolidation stations capable of performing tests on samples from 38mm to 150mm diameter. We also have six 76mm, one 100mm and six 250mm diameter hydraulic consolidation (Rowe) cells; these cells can also be used for Permeability tests. In addition, we have Floating Ring and three Continuous Rate of Strain Consolidation apparatuses.

Permeability Tests

We have the capacity to perform in excess of fifty triaxial permeability tests simultaneously, to BS1377 and Environment Agency Procedures. We have the resources to perform constant head permeability tests in 76mm and 112mm diameter cells, Falling Head permeability tests and Highways Agency permeability tests for graded aggregates. We also have six dedicated triaxial permeability cells allowing permeability tests to be performed on contaminated material with contaminated fluids as the permeant. We also have apparatus to perform permeability tests on one-dimensional consolidation tests at each stage of incremental loading.
Direct Shear and Ringshear

We have ten 60mm x 60mm shearbox apparatus (two capable of also performing 100mm x 100mm specimens and one capable of testing at higher normal stresses); two 300mm x 300mm shearboxes (one capable of also performing 150mm x 150mm specimens and both capable of performing soil v Geofabric, Geomembrane, Geotextiles, Geosynthetic etc. tests to BS and ASTM Standards); three Ringshear apparatus (for performing both BS1377 and custom interface tests); one Hoek shearbox apparatus (for rock testing). These extensive resources enable us to provide many combinations of direct shear testing.

Effective Stress Tests

We have facilities to run concurrently up to sixty effective stress triaxial tests on 38mm to 150mm diameter samples. These can have isotropic or anisotropic consolidation and drained or undrained loading conditions. We have thirty seven compression machines from 1 tonne to 10 tonne capacity dedicated to effective stress testing. Twelve high pressure cells and high pressure maintainers allow tests to be undertaken with effective pressures in excess of 1000kPa and confining pressures of up to 3500kPa.

Advanced Triaxial

Our Advanced testing facility comprises eight stress path stations each with their own dedicated stepless, computer controlled compression frames. We routinely test both 70mm and 100mm diameter specimens, but other sizes can be accommodated. Each cell is capable of being equipped with three pairs of bender elements to determine shearwave velocities (and hence assess shear modulus, G\text{max}) in up to three directions and local axial and radial strain measurements in compression and extension. We can automatically control cell and back pressures up to pressures of 2MPa with volume changes to a resolution of 1mm³. Three of the stress path cells can perform tests to greater than 10% axial strain on 100mm diameter specimens. This laboratory is temperature controlled to within ±1°C with tests controlled and monitored 24 hours per day. In addition to these cells we also have 38mm, 50mm and 100mm Bishop & Wesley cells. We can also test 66mm diameter specimens in Direct Simple Shear (DSS), in both static and dynamic modes, with dedicated high speed closed-loop computer control.

Direct Simple Shear

Our state-of-the-art Direct Simple Shear (DSS) apparatus uses its dedicated high-speed closed-loop computer control to enable both static and dynamic (cyclic) measurements to be made. We use low friction PTFE coated precision ground stainless steel rings to confine the 66mm diameter specimen.

Quality

Geolabs Limited is accredited in accordance with ISO/IEC 17025:2005 General Requirements for the competence of testing and calibration laboratories. We are annually audited by third-party accreditation expert auditors to ensure that we comply with the ISO/IEC 17025:2005 Standard as well as complying with the National Testing Standards and/or Documented Technical Procedures that we hold accreditation for.

Our accreditation demonstrates that we are technically competent and have the necessary technical expertise and experience to perform our large scope of accredited tests.

Our accreditation and annual surveillance and monitoring is certificated by the United Kingdom Accreditation Service (UKAS) which is the recognised national body in the United Kingdom responsible for assessing the competence of organisations in the fields of calibration, testing, inspection and certification of systems, products or services. We have been a UKAS Accredited laboratory since 1999 and have held accreditation for effective stress testing since 2000.
The Facility

- A temperature controlled laboratory and dedicated stores facility (maintained to better than ± 1°C).
- Customised, state-of-the-art test equipment and instrumentation for full test control and data acquisition, 24 hours a day to test completion.
- Multidisciplinary staff experienced in all aspects of soil and rock testing.
- Rapid processing of raw test data using in-house customised software to generate reports in printed, PDF and electronic formats.

The Analysis

- Determination of shearwave velocities for the determination of Gmax using bender elements in multiple orientations.
- Local, axial and radial strain measurement.
- Determination of Young's modulus, Poisson's ratio, shear and bulk modulus.
- Total and Effective Stress Path testing with base and mid-plane pore water pressure measurement.
- Static and dynamic shearing in either extension / compression or along pre-determined stress paths.
- Measurement of volumetric strain to 1 mm³.
- Independent computer control of vertical and horizontal total and effective stresses for maintained and ramped stress applications during anisotropic stages.
- Sample specific method statements written in-house to model construction and client parameter requirements.

The Benefits

- Independent testing facility exclusively devoted to commercial and research geotechnical laboratory testing.
- An all-round service of the highest standard backed by a fully documented quality management system.
- Research level testing and results presentation, both of which can be tailored to your requirements.
- A fully integrated, independent, soils testing facility capable of performing a wide range of testing from routine, effective stress, earthworks, consolidations, shearboxes, advanced, stabilized, remediation testing etc.
In addition to our vast scope of routine soil and rock testing, Geolabs also offers an impressive range of advanced soil testing capabilities. These make Geolabs a one-stop solution for all your geotechnical testing needs, irrespective of the size or complexity of your project.

We are always willing to discuss how we can adapt and customise our methods to suit your particular needs.

**Advanced Triaxial Testing**

- Stress path control
- Anisotropic capability
- Small strain stiffness
- Shear Modulus (G)
- Stiffness decay curve
- $K_0$
- Custom modelling
- Slow cyclic behaviour

8 advanced triaxial cells with computer controlled stress path capability allow the fitting of Piezo Bender Elements for measuring shear wave velocities in 3 orientations for deriving $G_{max}$. Local Strain using submersible LVDTs enables axial and radial strains to be measured to assess parameters such as small strain stiffness decay curves and Poisson’s Ratio. Mid-Height Flushable Probes ensure accurate pore pressure determination.

**Resonant Column**

Shear Modulus (G) and Damping (D)

- Very small strains (typically $10^{-9}$ to $10^{-2}$ %)
- Defines the early stiffness decay curve

The Resonant Column test provides shear moduli over a range of very small strains which can link with local strain data from advanced triaxial tests to give a broad picture of the material’s stiffness characteristics. Induced vibrations can be either torsional or flexural.

**CRS Consolidation**

- Pre-consolidation pressure based on continuous curve
- Continuous $e$ vs $\log(p')$
- Continuous $c_v$
- Continuous $m_v$
- Continuous $k$ (calculated)

3 Closed-loop controlled Constant Rate of Strain (CRS) oedometers measure permeability and allow consolidation parameters and permeability to be calculated seamlessly over the whole stress range tested.

**Cyclic Direct Simple Shear**

Our Direct Simple Shear (DSS) apparatus can perform both static and cyclic tests with sinusoidal or custom loading profile. Tests can be carried out controlling either the shear load or the shear strain. Platens are available with pins or ridges to best prevent slippage.
The Facility

- Independent testing company exclusively devoted to commercial, research and client-specific geotechnical laboratory testing, whose multidisciplinary staff are experienced in all aspects of soil and rock testing.
- Dedicated facility for hydraulic (Rowe) cell consolidation and permeability testing.
- UKAS accredited laboratory with staff having significant knowledge and experience of many national and international standards and Eurocode requirements.
- Rapid processing of test data using in-house developed software to provide clients with reports in printed, PDF and electronic formats.

The Analysis

- Capability to determine consolidation and permeability parameters of specimens of 75, 100 and 250 mm diameter.
- Comprehensive variety of drainage paths include: one-way and two-way vertical, and outwards and inwards horizontal (radially outwards to the periphery, and radially inwards from the periphery to a central sand drain).
- Specimens can be consolidated with equal strain (as with an oedometer), or with free strain (where specimen height can change variably across its top surface under uniform vertical stress, so accommodating any non-uniform compressibility).
- Height change, volume change and base pore pressure are monitored and logged throughout the test allowing flexibility when analysing the test data.
- An unlimited number of test stages can be performed, including loading and unloading loops, up to a maximum confining pressure of 3500 kPa.

The Benefits

- The wide range of drainage and loading conditions compared to traditional oedometer apparatus allows for closer modelling of in-situ conditions making the derived parameters much more applicable (such as measuring the horizontal permeability of laminated materials).
- Capability to test larger, more representative specimens which are particularly suitable for material incorporating coarser particles, and variable materials such as peats.
- The test methods and report presentation can be tailored to clients' specific requirements.
- In-house project management systems ensure an efficient process through to reporting within agreed timescales.

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The Facility

- A temperature controlled laboratory (maintained to better than ± 2°C) using the latest electronic data acquisition for 24 hours-a-day, 365 days-a-year testing.
- Multidisciplinary staff experienced in all aspects of soil and rock testing.
- Rapid processing of raw test data using our own in-house developed software to generate reports in printed, PDF and AGS formats.

The Analysis

- Anisotropically and isotropically consolidated undrained triaxial compression testing, single or multistage.
- Anisotropically and isotropically consolidated drained triaxial compression testing, single or multistage.
- Capable of testing a wide range of sample sizes (from 38 mm to 150 mm) and sample types (U100's, Shelby, MOSTAP, piston, Delft, windowless etc.) as well as lathing down from intact block samples.
- Facilities for high pressure testing using cell pressures in excess of 1700 KPa.

The Benefits

- Independent testing facility exclusively devoted to commercial and research geotechnical laboratory testing.
- An all-round service of the highest standard backed by a fully documented quality management system.
- High quality testing and results presentation, both of which can be tailored to your requirements.
- UKAS Accredited for both consolidated drained and undrained tests, in single stage and multistage test types, as well as a wide range of other specialist and routine tests.
The Facility

- A temperature controlled laboratory (maintained to better than ± 1°C) using the latest electronic data acquisition for 24 hours-a-day, 365 days-a-year testing.
- Multidisciplinary staff experienced in all aspects of soil and rock testing.
- Rapid processing of raw test data using our own in-house developed software to generate reports in printed, PDF and AGS formats.

The Analysis

- Oedometer Consolidation and swelling tests on samples from 50 mm to 100 mm diameter.
- Isotropic Consolidation in a triaxial cell on samples from 38 mm to 150 mm diameter as well as the conventional 100 mm diameter. This can be augmented with direct measurement of permeability at each effective pressure.
- Hydraulic (Rowe Cell) Consolidation on samples from 76 mm to 250 mm to allow either vertical drainage or horizontal drainage (either radially inwards or outwards), and also free or fixed vertical strain. As with the Isotropic Consolidation, this test can have permeability stages added to it.

The Benefits

- Independent testing facility exclusively devoted to commercial and research geotechnical laboratory testing.
- An all-round service of the highest standard backed by a fully documented quality management system.
- High quality testing and results presentation, both of which can be tailored to your requirements.
- We are UKAS Accredited for the Oedometer Consolidation and follow fully documented procedures for the other test methods.
The Facility

- A temperature controlled laboratory (maintained to better than ± 2°C) using the latest electronic data acquisition for 24 hours-a-day, 365 days-a-year testing.
- Multidisciplinary staff experienced in all aspects of soil and rock testing.
- Rapid processing of raw test data using our own in-house developed software to generate reports in printed, PDF and AGS formats.

The Analysis

- Constant Head Permeability in a Permeameter for non-cohesive material up to 10 mm particle size.
- Horizontal Permeameter (DoT: HA41/90). Used for drainage layer material up to 37½ mm particle size.
- Hydraulic (Rowe) Cell - from 76 mm to 250 mm sizes. Permeability can be measured in either vertical or horizontal directions - excellent for laminated soils.
- Contaminated Materials. A dedicated section can measure contaminated materials and flow liquids other than water (such as sea water, leachates or other permeants).
- Falling Head Permeability.

The Benefits

- Independent testing facility exclusively devoted to commercial and research geotechnical laboratory testing.
- An all-round service of the highest standard backed by a fully documented quality management system.
- High quality testing and results presentation, both of which can be tailored to your requirements.
- We are UKAS Accredited for the Triaxial Permeability and follow fully documented procedures for the other test methods.
The Facility

- A laboratory offering a wide range of rock and aggregate testing to National, International and ISRM Suggested Methods and Standards, providing a comprehensive, independent testing and consulting service.
- Multidisciplinary staff experienced in all aspects of soil and rock testing.
- Capability to re-core lump or core samples to give 38 to 100mm diameter specimens.
- Maximum compressive load capacity of 2000 kN (equivalent to 254 MPa UCS at 100mm diameter; 1763 MPa UCS at 38mm diameter).

The Analysis

- Uniaxial (Unconfined) Compressive Strength (UCS).
- Young’s Modulus and Poisson’s Ratio by bonded strain gauges, linear displacement transducers or Hall-Effect transducers.
- Direct Shear Strength using strain controlled shearbox with custom inserts and also by Hoek direct shear apparatus.
- Index (Classification) tests (density, porosities, moisture content, water absorption, particle density etc).
- Durability, Hardness, Tensile, Deformability, Swelling Strain, Ultrasonic P and S waves and Abrasiveness tests performed.
- Point Load Test (PLT) on rock cores and lumps.
- 10% Fines and Aggregate Crushing Value (ACV).

The Benefits

- In-house project management systems ensure a flexible approach to progressing testing promptly through the laboratory to deliver reported results within agreed timescales.
- A wide range of in-house soils and rocks testing equipment and expertise ensures that projects requiring a number of testing disciplines can be performed at one source.
- Independent testing facility exclusively devoted to commercial and research geotechnical laboratory testing.
- An all-round service of the highest standard backed by a fully documented quality management system.
- High quality testing and results presentation, both of which can be tailored to your requirements.

visit our website for prices and useful information: www.geolabs.co.uk
Independent Soil and Rock Geotechnical Laboratory Testing

- Unconfined Compressive Strength (UCS)
- Young’s Modulus, \( E \), and Poisson’s Ratio, \( \nu \)
- Stress-controlled or strain-controlled loading for compression tests
- Hoek Triaxial up to 70 MPa confining pressure
- Hoek Triaxial can have \( E \) and \( \nu \) determinations
- Sophisticated preparation techniques to allow testing at any orientation in relation to foliation/drilling angle
- Rock Shear Box (Direct Shear)
- Indirect Tensile Strength by Brazilian Disc method

- Rock permeability
- Rock swelling pressure
- Swelling Strain Index
- Cherchar Abrasivity
- Slake Durability Index
- Point Load Test (PLT)
- Thermal Conductivity
- Specific Heat Capacity
- Electrical Resistivity/Conductivity

- Petrography - analysis of rocks in thin section
- Thin section preparation
- Petrographic optical microscopy analyses
- Grain shape, sphericity and angularity determination
- Schmidt Hammer
- Shore Scleroscope
The Facility

- A laboratory resource conducive to high quality, high quantity, testing for each of the main disciplines within our Routine Section (comprising Classification, Earthworks, Total Stress Triaxial testing etc).
- Multidisciplinary staff experienced in all aspects of soil and rock testing.
- Rapid processing of raw test data using our own in-house developed software to generate reports in printed, PDF and AGS formats.

The Analysis

- Particle Size Distribution by wet and dry sieve and sedimentation by pipette or hydrometer.
- Atterberg Limits including Shrinkage and Liquidity Index
- Filter Paper Suction on intact and remoulded specimens.
- Earthworks testing, including: MCV, CCV, CBR and Compaction testing (2.5kg, 4.5kg and Vibro).
- Undrained Shear Strength by Quick Undrained Triaxial. Capable of testing a wide range of sample sizes (from 38 mm to 150 mm) and sample types (U100's, Shelby, MOSTAP, piston, Delft, windowless etc.)
- Particle Density by pyknometer or gas jar methods.
- Wet and Dry Densities by direct measurement and immersion techniques (including SMC determination).

The Benefits

- Independent testing facility exclusively devoted to commercial and research geotechnical laboratory testing.
- An all-round service of the highest standard backed by a fully documented quality management system.
- High quality testing and results presentation, both of which can be tailored to your requirements.
- We are UKAS Accredited for a wide range of geotechnical testing, including: Moisture Content, Atterberg Limits, Wet & Dry Sieves, Sedimentation by Pipette, Compaction related testing, CBR and Particle Densities etc.
The Facility

- A temperature controlled laboratory (maintained to better than ±2°C) using the latest electronic data acquisition for 24 hours-a-day, 365 days-a-year testing.
- Multidisciplinary staff experienced in all aspects of soil and rock testing.
- Rapid processing of raw test data using our own in-house developed software to generate reports in printed, PDF and AGS formats.

The Analysis

- Direct shear strength determination (peak and residual) using 60 mm, 100 mm and 300 mm square shearboxes for specimens with up to 20 mm largest particle size.
- Samples can be prepared from many sources (including remoulded bulk samples, U100's, core cutters, piston tubes and intact block samples).
- Ringshear apparatus for residual shear strength determination of fine grained material, both to BS1377 and the ICP Design Methods (particularly suitable for pile design).
- Geotextile/soil interface angle of friction testing.

The Benefits

- Independent testing facility exclusively devoted to commercial and research geotechnical laboratory testing.
- An all-round service of the highest standard backed by a fully documented quality management system.
- High quality testing and results presentation, both of which can be tailored to your requirements.
- We are UKAS Accredited for testing to BS1377 Part 7 for the small and large shearboxes and the ringshear apparatus, as well as a wide range of other specialist and routine tests.

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The Facility

- Thermal conductivity of soils and soft rocks by thermal needle probe procedure in accordance with ASTM D 5334-08.
- Thermal resistivity in accordance with IEEE 442-03 heat transfer theory.
- Specific heat and thermal diffusivity properties.
- Environmentally controlled testing area maintained to better than ± 2°C.

The Analysis

- Thermal conductivity and resistivity determinations for buried pipe and cable applications.
- Resistivity measurement of fluidised thermal backfill.
- Geothermal properties of grout and bentonite for ground source heating and cooling specifications.
- Thermal conductivity of compacted bentonite for radioactive and hazardous waste repository design.
- Measurement of material heat requirement (volumetric specific heat capacity) and rate of temperature change (thermal diffusivity).
- Moisture content and conductivity or resistivity relationship as thermal dryout curves.

The Benefits

- Independent testing facility devoted to commercial and research geotechnical testing.
- An all-round service of the highest standard backed by a fully documented quality management system
- A fully integrated soil and rock mechanics facility capable of performing a wide range of disciplines from routine testing through to state of the art advance testing.