



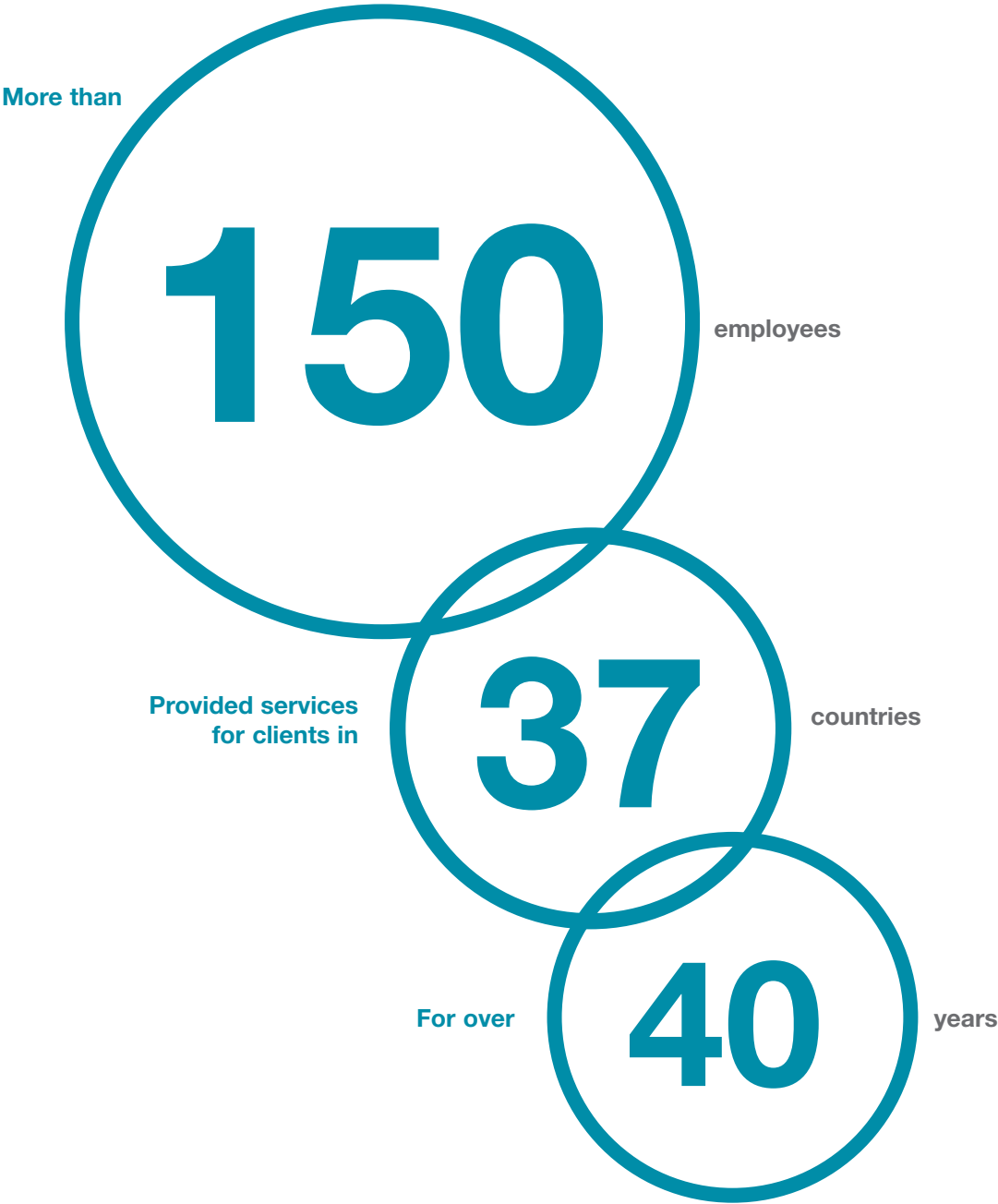
EXPRO

WELL FLOW MANAGEMENT™

Fluids



Expro offers a fully integrated package of **hydrocarbon reservoir** and **process fluid flow measurement, sampling** and **analysis services**.





What we offer

Expro Fluids is a global business that undertakes:

Sampling of hydrocarbon reservoir and process fluids at high pressures and temperatures to maintain the integrity of the sample. Collection of this type of sample is a key deliverable of well logging and Drill Stem Testing (DST) operations during the exploration and appraisal phase of reservoir exploitation.

Analysis of these fluids to measure their hydrocarbon compositions, their toxic components, and to describe their physical and chemical properties. This data is required to maximise production from the reservoir and to help design optimised processing facilities.

Specialist **Metering** of wet gas and gas condensates.

A complete understanding of fluid properties is key to the accurate evaluation of:

- Reservoir performance and reserves
- Flow assurance and well performance
- Type and value of the product
- Process requirements
- Development risk

The Expro Fluids business is focused on well test activity, and in particular:

- High cost/high data risk wells offshore and in deepwater
- Reservoirs containing complex fluids – gas/condensate, high mercury/sulphur
- Increasingly, fluid analysis is conducted close to the wellsite – a service that was introduced by Expro

Expro is the front runner in accreditation for the industry. Our commitment to quality is demonstrated by our onshore laboratories in Norway and UK having a significant number of analytical services accredited to the ISO 17025 standard - the highest level of certification for laboratories. A full schedule of accredited services can be made available on request or by visiting the respective websites of the accreditation bodies.

Our SmartLab® is the first offshore laboratory to be accredited under ISO 17025 worldwide. The accreditation is for compositional analysis of oil and gas to C36+, molecularly weight and density. We are working towards adding more analysis such as Hg and sulphur speciation, and Rn222.

Why are we doing it?

Through participation in a number of ISO standard committees, Expro is frequently challenged to achieve the same standards and accreditation requirements in offshore operations as onshore. Despite the many variables, including people and equipment, the team has now achieved accreditation to ISO 17025 for SmartLab® and is hoping to extend this to include Hg and sulphur speciation.

Additional accreditations include:

- **Expro Petrotech Achilles** – Joint Qualification System (www.achilles.com)
- **Petrotech Laboratories** – SmartLab Norwegian Accreditation (www.akkreditert.no)
- **Petrotech Laboratories** – Onshore Norwegian Accreditation (www.akkreditert.no)
- **Expro FAC** – United Kingdom Accreditation Service Testing Laboratory No. 4391
- **Expro ADS** – United Kingdom Accreditation Service Testing Laboratory No. 1880





Accredited to
ISO 17025

Expro Fluids

Our complete fluids sampling and analysis services are delivered globally via our key technical centres, with satellite facilities in North Africa, the Middle East and India.

Fluid Analysis Centre (FAC)

FAC (UK based) offers specialised, PVT analysis, sulphur speciation, compositional analysis, flow assurance measurement and interpretation services, dedicated to reservoir and process engineering requirements. Rigorous calibration and verification procedures are used and our highly accurate and reproducible measurements are traceable to national standards.

Analytical Data Services (ADS)

ADS (UK) provides detailed high-end chemical analysis, coupled with a flexible approach and customer focus, designed to meet tight deadlines and the specific requirements of our customers. In addition to our mature fully-accredited quality water characterisation service, the ADS teams are recognised as world leaders in providing sulphur speciation and mercury services both offshore and in-country.

Areas of expertise include: mercury services, sulphur speciation services, oilfield water characterisation, elemental analysis and additional analytical services, both onshore and offshore.

Expro Petrotech

Expro Petrotech (Norway) offers a fully integrated package of hydrocarbon reservoir and process fluid flow measurement, sampling and analysis services. These include: sampling tools with pressure compensation systems; keeping samples in monophasic condition from reservoir to surface; fully customisable onsite laboratories for drilling and logging operations and production well testing; tools to help with quick decision making during drilling; wireline formation testing, drill stem testing and isokinetic split stream sampling on wellheads and separators.

Sample Management Facility

Expro has large secure bonded and bonded areas (Continental Shelf Number UK0907/040/94) at both our Fluids sites in Aberdeen, UK. These were purposely built for the safe handling, maintenance and storage of hydrocarbon fluid samples and equipment, and are licensed by the local authority under the 'Petroleum (Consolidation) Act 1928'.

Expro's sample storage and management system monitors each sample's movement allowing access to the history of all samples.



Onsite well
fluid analysis
available in
8 hours

Metering

Expro is the market leader in optimisation of well test data from the testing of gas condensate wells and offers the full range of surface and subsurface testing equipment along with highly experienced personnel.

Representative formation fluid samples and accurate volumetric flow measurements for compositional and PVT analysis are crucial when testing gas condensate reservoirs. We offer the following services in response to this:

SmartVent™

SmartVent wet gas flow meters are utilised on applications both offshore and onshore, and are increasingly recognised as effective replacements for test separators and related infrastructure. Size, weight and cost savings are realised by installing SmartVent wet gas meters on each of the flowlines. These systems are a cost-effective alternative to test separators, giving continuous readings of each well's production rates and providing enhanced reservoir management and production optimisation.

MultiTrace™

The MultiTrace technique can be used onsite to calibrate or verify meter performance under actual conditions. In combination with SmartVent wet gas venturi meters that monitor the total liquid content of the gas stream, the MultiTrace technique is used to verify measured production rates and to establish the water/condensate split of the liquid phase. The overall accuracy and data confidence is greatly improved by this technique and Expro is one of the few companies that offer this service.

IsoSplit® wellhead sampling

Expro offers wellhead multi-phase sampling and metering for gas and volatile oil reservoirs, as well as online wellhead three-stage process simulations including PVT sampling. IsoSplit provides more accurate results than those obtained from a conventional test separator for gas condensate well testing. Sampling at the wellhead provides representative well fluid samples, as the fluid is typical of the reservoir conditions at dew point and has been least affected by phase changes.

IsoSplit® separator sampling

The techniques presently used in the oil and gas industry, for the recombination of surface samples to obtain representative well stream compositions, rely on correct measurement of oil and gas rates. However, the efficiency of the test separator deteriorates with high gas loads as a consequence of the carryover of dispersed liquid in the gas phase. This carryover is not normally accounted for in the gas/liquid ratio measured, resulting in gas/liquid ratio uncertainty.

Expro has developed the IsoSplit isokinetic sampling technique which:

- Enables accurate determination of liquid carryover
- Provides a representative well stream composition
- Is generally applicable over a wide range of gas/oil ratios (GOR)



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Sampling

In order to address challenges faced in reservoir engineering and PVT analysis techniques, the industry demands that downhole fluid samples are truly representative. Expro aims to fulfill this requirement with its complete range of sampling services.

Our single-phase bottom hole non-reactive samplers, carriers and surface sampling equipment are designed to ensure that representative reservoir fluid samples are obtained. Our PVT experts liaise with the sampling teams to ensure that optimum samples are obtained.

Single-phase sampling tools

Expro's pressure compensated sampler (PCS) is a single-phase bottom hole sampling tool with a pressure compensation system, to keep the sample in monophasic condition from the reservoir to the surface. The tool can be deployed by carrier or run on slickline, electric line or coiled tubing.

Sample transfer unit

Expro's pressure compensated sampling (PCS) bottom hole sample transfer unit enables preparation of sampling tools and sample transfer once they are recovered to surface. Transfer into either single or dual-phase positive displacement cylinders is achieved rapidly and without the requirement of sample recombination, thereby eliminating the chances of compromising the samples.

Tubing Conveyed Sampling (TCS)

The TCS is a tool for bottom hole sampling of petroleum reservoirs. It can host four single-phase samplers, wireless firing from surface, mechanical clock, electronic-timers and rupture discs. The tool can be operated in extreme HP/HT wells without compromising the safety of the sample and carrier sections can be added if additional samples are required.

Sample bottles

Our single-phase sample bottles are a unique system for monophasic PVT sample transportation, keeping the sample at reservoir pressure or above all the way to the laboratory. The bottles are designed for extreme conditions and allow analyses of chemical components such as H₂S, mercaptans and mercury.



Analysis

The successful development of hydrocarbon reservoirs requires accurate analysis of obtained reservoir fluid.

Expro offers routine data measurement and more complex processing issues that require an analytical solution, both onsite and offshore. These are delivered through the extensive technical support and experience of our personnel.

Pressure Volume Temperature (PVT) analysis

Wireline fluid samples collected during logging operations can offer early characterisation of the reservoir fluid and yield invaluable information to help plan the next stage of the testing or appraisal process. Expro has designed and constructed mobile laboratory systems to provide objective high quality data, which can be used as an independent verification of sample quality - whichever logging vendor is used.

- **SmartLab®**

Expro's mobile ISO 17025 accredited onsite laboratory, SmartLab provides onsite PVT sample validation and detailed compositional analysis for oil, water and gas. It is designed to determine the quality and contamination level of samples retrieved. The system can be tailored to measure as many parameters as possible, detailing hydrocarbons, water and trace elements. We offer our technical knowledge and experience onsite to assist the tool operator in securing the best possible fluid sample.

- **TurboPVT™**

Customers can obtain PVT well fluid analysis service results in as little as eight hours with our TurboPVT service. This is an onsite reservoir fluid analysis service which delivers speedy and accurate PVT data based on a combination of measurements and tuned Equation of State (EOS) predictions. This equipment is compact and especially cost-effective for operations in remote locations where logistics are challenging.

Mud doping and contamination studies

Sampling during drilling and wireline formation testing heavily depends on fluid contamination levels from drilling mud. Expro has developed special services to back calculate the contamination from drilling mud by the use of three individual techniques: oil based mud (OBM), synthetic oil based mud (SOBM) and water based mud (WBM).

Onsite analytical services

In addition to general gas analysis (CO₂, H₂S, sulphur, radon and mercury speciation) we have developed customised analytical services which include hydrocarbon analysis, GC C36+, micro GC and oil/gas/water analysis.

Sample transfer and validation

Expro offers comprehensive wellsite-to-laboratory management of all hydrocarbon, non-hydrocarbon, trace element and water samples. The service range aims to secure the highest quality data for facility design, efficiency, safety and environment. Services and products are provided through a global network of sampling operations and reservoir fluid analysis centres.

MultiScale™

Our market leading mineral scaling simulation software consists of one basic package and three add-ons - a general package for single point or multiple stream calculations, a module for systems with the addition of triazine scavengers, a second for MEG systems and a third for process simulation.

Onshore analysis

Expro offer PVT analysis onshore in our regional satellite laboratories where sample transfer may be an issue, local support is required or the location is remote. These laboratories can be set up and dismantled quickly due to their modular construction. All the satellite laboratories are supported by the resources of the Fluids Analysis Centre (FAC) in the UK. The FAC centre of technical excellence provides reliable PVT and compositional analyses. Over 30 skilled engineers, chemists and technicians are available to provide lab data, support, training and consultation. Typical services provided (over 300 studies per year) for oil, condensate, gas and water samples are: sample validation, C36+ composition, recombination, constant mass expansion, differential vapourisation, constant volume deletion, separator tests, fingerprinting, slim tube tests, swelling tests, re-vapourisation studies and EOR studies. More complicated and ad hoc tests are also available as required.

Applications

	Drilling open hole	Cased hole well test	Production
Metering		Multi-phase sampling Tracer (validation) MPF metering Clamp-on metering	Multi-phase sampling Tracer (validation) MPF metering Clamp-on metering
Sampling	Drilling - FASTRACK™ Reservoir characterisation instrument (RCI) Modular Formation Dynamic Tester (MDT) Reservoir Description Tool (RDT)	TCS – BHS carriers Bottom hole sampling Wellhead sampling IsoSplit®	PVT sampling Bottom hole sampling Wellhead sampling IsoSplit®
Analysis	SmartLab® Online PVT Contamination studies Mud doping Hg/sulphur speciation PVT analysis: onshore/offshore	PVT Hydrocarbon analysis Non-hydrocarbon analysis Water analysis H ₂ S-Hg-speciation Flow assurance	Flow assurance H ₂ S-Hg-speciation H ₂ O – CO ₂ Oil in water PVT analysis True boiling point (TBP) analysis Water analysis

Expro's mission is **well flow management**. We provide services and products that **measure, improve, control** and **process** flow from high-value oil and gas wells, from exploration and appraisal through to mature field production optimisation and enhancement.

With a specific focus on **offshore, deepwater** and other **technically challenging environments**, we provide a range of mission critical services across **three key areas**:

- Well Test & Appraisal Services
- Subsea, Completion & Intervention Services
- Production Services

Our vision is to be the **market leader** in well flow management, using the industry's best people, to deliver the highest standards of **safety, quality** and **personalised customer service**.

Expro's **40+ years** of experience and innovation empowers the company to offer **tailor-made solutions** for customers across the energy sector. With 4,500 employees in over 50 countries, Expro offers a **truly global service solution**.



For more information contact:

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Or visit www.exprogroup.com/contact