

CRYOSPEED[®]

Cryogenic Solutions for
Science and Research



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In our view no two scientific or research organisations are the same. Each has its own unique challenges and solutions and CRYOSPEED from BOC fully reflects this. It is a precise, innovative service that we have developed with specific customers in mind.

In fact, CRYOSPEED has more than forty years' experience supplying cryogenic products and services, ensuring our understanding of the subtle differences required across different sectors is unequalled.

We know what drives science and research and have developed specific services to match your needs. In this brochure you'll find a full introduction to the CRYOSPEED service, designed for customers with specific cryogenic needs.

CRYOSPEED

Complete cryogenic solutions for science and research

With CRYOSPEED, BOC has been designing and developing cryogenic gases, equipment and solutions for use in science and research establishments over the past forty years.

We're experts in the safe supply and efficient use of leading cryogenic solutions. What we know, we share with customers every day across many different sectors. Whatever the size of your department, research establishment or scientific business, CRYOSPEED has a safe, reliable and leading cryogenic supply solution for you.

Perhaps you've outgrown cylinder supply or you require liquid for its cryogenic properties, you can be confident that CRYOSPEED will work with you to develop a solution tailored to your needs.

When you turn to CRYOSPEED for your cryogenic gas needs, you choose a partner known for reliability, flexibility and expert customer service. CRYOSPEED customers have the piece of mind that comes from knowing supply is secure and help is always at hand

This brochure brings together the comprehensive cryogenic gas, equipment and service elements you would expect from the market leading supplier to science and research.



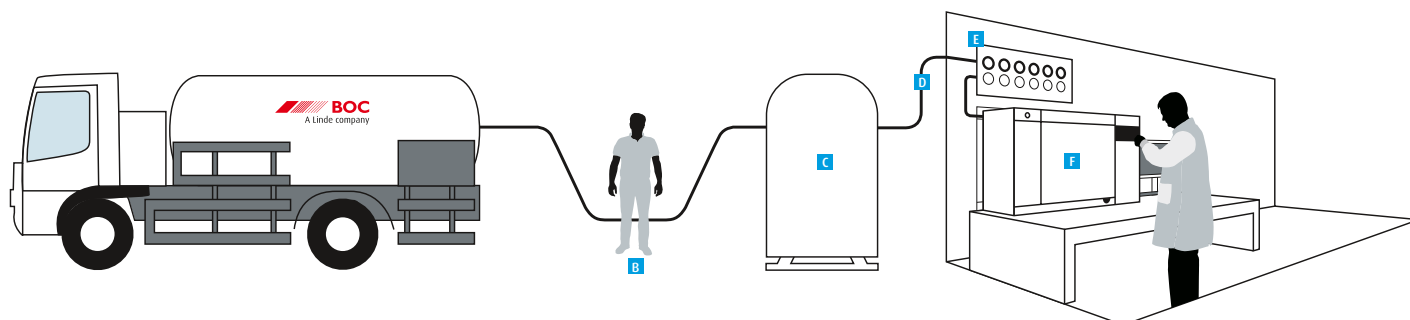
Cryogenic gas supply & storage

Whether you require gas in large or small volumes, CRYOSPEED can meet your needs by providing a hands free delivery of liquid argon, carbon dioxide, nitrogen and oxygen.

Our cryogenic liquids are stored in vacuum insulated vessels which are filled on site by the CRYOSPEED Sales and Service Operators (CSSO). To complement the supply of gas, CRYOSPEED offers a wide range of vessels and equipment to support their safe handling, use and storage.

CRYOSPEED offers a comprehensive range of storage vessels, tailored to your requirements that include:

- Advice on the most suitable storage solution – factoring in capacity, flow rate and pressure requirements
- The most comprehensive choice of storage flasks, dewars and vessels that range from 0.6 litre open flasks through to ultra-high pressure 2,000 litre pressurised vessels
- Safe design, supply, installation and commissioning of vessels including emergency shutdown procedure and safety precautions. All this information is provided during the handover and is also contained within the handover documentation
- Ongoing maintenance support either as part of the rental agreement or through the Cryocare service and other maintenance packages for privately owned equipment
- Advice on safe handling, correct selection and use of required personal protective equipment



A Cryospeed vehicle, **B** Cryospeed operator, **C** Cryogenic storage vessel, **D** Gas being piped into lab, **E** Gas panel, **F** Gas chromatograph

Deliveries that suit you

Delivered by the largest mini-bulk fleet in the UK and Ireland, CRYOSPEED can be found in more places, more often than any other supplier. Our operators will deliver your product without assistance and have the experience and flexibility to provide true security of supply.

Scheduled deliveries

Most CRYOSPEED customers rely on the simplicity and security of our scheduled delivery service. Our operators are experts in understanding customer usage patterns and adapting to changing requirements, so they'll look at your demand and schedule regular deliveries to ensure security of supply.

So there's no need for you to place orders and if you expect changes in demand, let us know and we'll adapt to your needs. If anything unexpected happens outside of the normal delivery schedule, your CRYOSPEED operator is only a call away.

Unscheduled delivery

If you have variable demands which make scheduled delivery impractical, that's not a problem. Just give us 48-hours' notice of your requirement and we'll fit you into our schedules.

Emergency deliveries

Sometimes, unforeseen circumstances can catch us all out. We'll make every effort to get your supply to you in good time and because we have the largest fleet and widest coverage, CRYOSPEED takes some beating in keeping our customers' running at short notice.

Service

As a BOC customer, you'll have a dedicated CRYOSPEED operator who'll not only deliver your product when you need it, but will be a regular point of contact. You'll even get their mobile phone number.

Highly trained, they provide a truly personal service – practical answers to your product, technical and safety questions, guidance on best practice and advice when developing a service and supply package that works best for you. Through a wealth of experience they can offer advice on the most suitable storage options for you – together with a choice of maintenance packages to ensure you meet current legislation.

The CRYOSPEED Sales and Service Operators are with you every step of the way in helping you to manage your cryogenic equipment and safety requirements:

- Safely delivering your product when and where you need it
- Providing advice on product and equipment safe handling, use and storage
- Performing detailed pre-delivery vessel inspections
- Carrying out planned preventative maintenance and repairs on vessels rented from BOC to give you peace of mind
- Offering and in many cases fulfilling BOC Cryocare maintenance packages for owners of cryogenic vessels and pipe work systems
- Providing advice on our cryogenic equipment range, including suitable personal protective equipment
- Giving practical and workable answers to all your commercial, technical and safety questions

Account management

Working along side the CRYOSPEED Sales and Service Operators, you'll find the unrivalled support of BOC's wider infrastructure. BOC has a large team of account managers who'll discuss all your gas process and application requirements – as well as answer a wide range of commercial, service and supply queries.

Cryogenic preservation solutions

Research costs continue to increase. So, too, does the value of intellectual property and scientific breakthroughs in a highly competitive marketplace. As a result, the integrity of tissue samples and other items stored at very low temperature has never been more important.

Safe, secure cryogenic storage of these samples is a key factor in reducing risk and driving growth in today's scientific and research environment. CRYOSPEED offers a wide range of cryogenic storage options to meet these needs and include both on-site and off-site solutions. All are designed to exceed the highest safety and quality standards letting you focus on your area of expertise.

On-site liquid refrigerators

BOC offer a range of liquid refrigerators suitable for storing a number of samples where immersion into liquid nitrogen is permitted.

Materials to be stored are placed in canisters which are suspended from the top of the unit. These are then immersed in the liquid nitrogen and the liquid nitrogen vapour.

The liquid nitrogen used in the refrigerators is supplied from a separate cryogenic storage vessel that's filled by BOC CRYOSPEED on a regular basis. These vessels are available for rent from CRYOSPEED, helping to ensure all maintenance and legal responsibilities are carried out.

Alternatively should your research necessitate the purchase of this equipment then we can both supply them to you and also maintain them under a maintenance contract. To find out more about the BOC Cryocare package for privately owned vessels please turn to page 09.



On-site Drystore refrigerators

DryStore refrigerators offer exceptional sample security and enhanced operator safety as the storage area is completely free of liquid nitrogen. Instead, the nitrogen is housed in a jacket surrounding the chamber. This means that temperatures down to -190°C can be achieved while easy access is maintained.

You don't need to be an engineer to operate the state-of-the-art control systems. Sample status can be checked at a glance. Liquid nitrogen levels are topped-up automatically. Early warning alarms are clear and obvious.

Furthermore, you can check your DryStore remotely and record the status of your samples minute-by-minute on any PC, giving a complete history of chamber conditions.

We understand how precious samples can be. So BOC offer an emergency engineering response, annual refrigerator servicing and DryCare, a full service package.

Monitoring and Control

Protecting the quality of your samples is paramount, so DryStore has been designed to provide the peace of mind that comes from visible sample security.

DryStore continually monitors its liquid nitrogen levels and tops up automatically when required. DryStore can also be configured to fill at a certain time each day in order to fit in with existing distribution systems. Manual filling is possible through simple stop/start switches.

In many applications, a full record of a sample's history is vital in order to assure its viability, so a complete audit trail should always be available. When this level of rigour is required, DryStore is the perfect solution.



Off-site Cryogenic storage

Many scientific and research organisations wish to maintain their focus on what they do best and outsource their storage needs to a specialist in the field. The BOC Cryobank provides just this resource – ultra-low temperature storage from the UK's leading experts in cryogenics.

Mitigating risk is a key consideration for scientific and research establishments who wish to partner with a supplier whom they can entrust the safe and physically secure storage of valuable and fragile assets. Having piece of mind is key.

BOC has established a national cryogenic storage facility for tissue samples and other items that need to be kept at ultra-low temperatures. The storage facility offers a high degree of flexibility in the provision of sample storage; science and research organisations can choose between taking space within existing freezers or chose to re-locate whole freezers to the unit or rent entire new dedicated units for their exclusive use.

Movement around the Cryobank facility is governed by strict ID authentication and access controls. The innovative cryogenic storage also makes for unprecedented sample security and operator safety.

The Cryobank facility provides research laboratories with a new standard of secure, cryogenic storage for tissue samples and other assets. It enables researchers to

confidently outsource their requirement for very low temperature storage and mitigate the commercial risk associated with maintaining samples in perfect conditions. Customers are assured of consistently optimal conditions all the time they need storage.

From bulk tanks of liquid nitrogen for large cryopreservation facilities, to smaller cryogenic vessels connected to a single refrigerator, BOC has the right supply for you. Security of supply, expert service and trouble-free installation: this is why customers turn to BOC to supply liquid nitrogen systems for cryopreservation solutions.



Remote monitoring through CRYOSPEED telemetry

Having a continuous gas supply is usually a pre-requisite and ensures your research can go on un-interrupted. CRYOSPEED can provide you with a state-of-the-art telemetry system that allows real time remote monitoring of liquid levels. The system is compatible with most existing CRYOSPEED supply vessels and is straightforward to install.

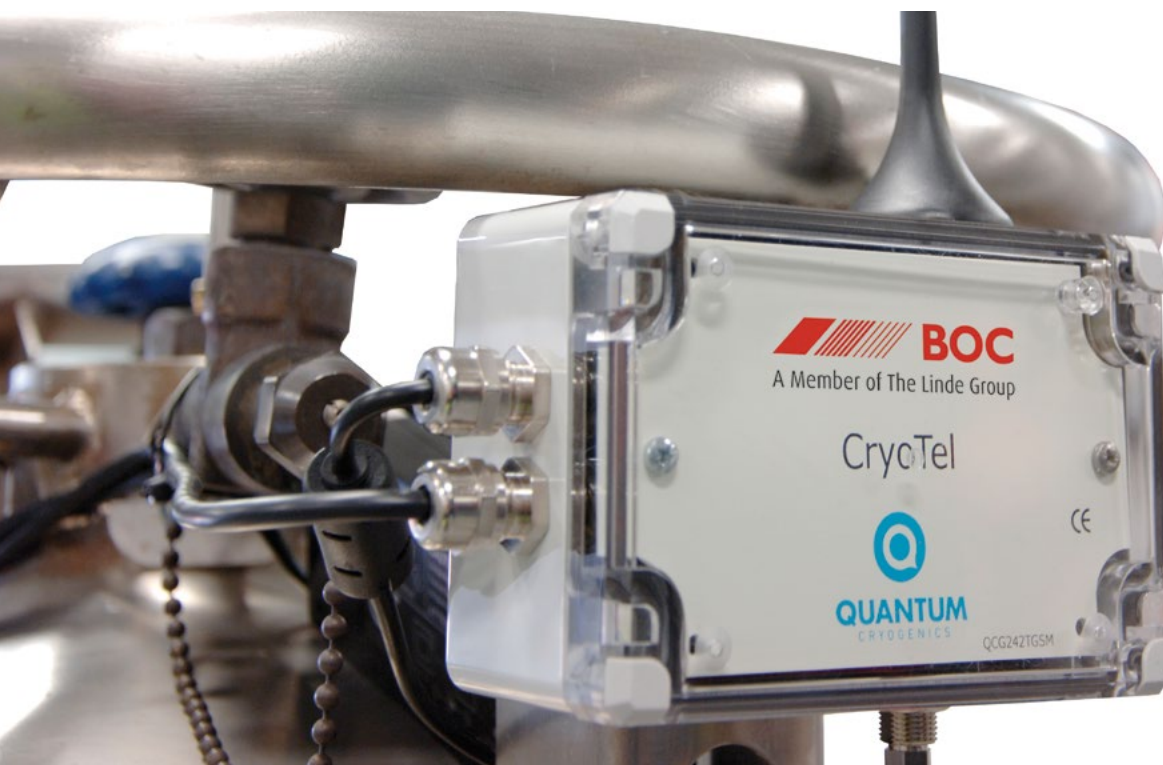
As a BOC customer, you benefit from a dedicated CRYOSPEED operator who'll not only deliver your product when you need it, but will be a regular point of contact. The telemetry system can be configured to your requirements and by choosing the low level alarm the CRYOSPEED operator will be notified when your vessel content has reached a pre-agreed level to trigger a delivery. This ensures unrivalled security of supply.

The telemetry unit can be connected to the vessel contents gauge to allow the user to remotely access up to date information on demand, or to receive an update at a pre-defined time, or simply to be sent alarm messages when they occur. The system also interfaces with an internet logging facility, CryoTel, for ongoing recording of data. Logging can be set up to record as frequently as desired. Data can be downloaded for easy manipulation.

A system designed for you

The system can be configured to meet user specific requirements. All you need to do is simply decide on whether you require the CryoTel internet logging facility and select the power source – battery, mains or solar – and we'll take care of the rest.

Once the system has been selected it will be installed and charged through a monthly fee. There is also a one-off installation charge depending on the power source required.



Cryogenic maintenance solutions

At CRYOSPEED safety is our top priority. We understand that complying with safety legislation is a necessity, but it can be time consuming and complicated, requiring detailed understanding of engineering, gases and regulations.

We know exactly what is required to conform to safety legislation such as Pressure Systems Safety Regulations 2000 (PSSR) and have developed services to assist you in achieving the required full compliance.

Currently any owner or user of a gas system which is pressurised above 0.5 bar (g) must be able to demonstrate the following:

- The system is working within safe operating limits
- A Written Scheme of Examination (WSE) is in place
- The system is regularly maintained and inspected by a competent body

It is a legal requirement to conform to PSSR. Failure to do so means your system is at risk of being shut down until compliance has been achieved.

If you rent a pressurised cryogenic vessel from CRYOSPEED then you can relax. All the maintenance required under PSSR is included in the rental agreement with BOC at no additional cost – ensuring the vessel is always in safe working condition. Furthermore, your CRYOSPEED Sales and Service Operator will carry out the required Planned Preventative Maintenance inspections in line with the Written Scheme of Examination for the vessels you rent – including the fitting of any replacement parts.

If you own your own cryogenic vessel, you must ensure that Pressure Systems Safety Regulations 2000 are conformed to and managed by a competent person.

BOC can undertake this for you through two tailored maintenance packages, BOC Cryocare and BOC OnStream.

BOC Cryocare

BOC Cryocare is a maintenance solution specially developed by CRYOSPEED for owners of small-to-medium vessels. It is managed by your dedicated CRYOSPEED Sales and Service Operator and will ensure your vessel is compliant with current legislation.

The Cryocare package includes:

- The pre-delivery inspection that is made every time the vessel is filled or an annual Planned Preventative Maintenance inspection where CRYOSPEED do not regularly fill it. This includes checking vessel safety devices and labelling, recording and repairing any defects to ensure the vessel is in safe and good working order and compliant with current legislation
- Your dedicated CRYOSPEED Sales and Service Operator will carry out planned preventative maintenance in line with the Written Scheme of Examination for the specific vessel(s). This includes replacing the vessel pressure relief valves and carrying out the essential checks included in the annual inspection, again recording and repairing any defects.

Once an inspection audit is completed and remedial work carried out, you'll receive all the necessary documentation and certificates for your records, giving you the peace of mind that your legal requirements have been met.

BOC OnStream

BOC OnStream is a service specifically designed for owners of fixed pressure systems – ranging from simple systems with a single regulator and short distribution pipe work to longer, more complicated systems with many control and outlet points.

Even if your equipment is currently in poor condition, we can assist you in upgrading your system to improve safety whilst delivering PSSR compliance, allowing you to concentrate on your scientific research.

BOC OnStream will help you achieve full compliance.

To find out more please contact Customer Engineering Services on 0800 222 888.

Cryogenic equipment



Only custom-made cryogenic equipment should ever be used to handle cryogenic products. CRYOSPEED has selected a range of vessels, equipment and safety products that perform to extremely high standards of both quality and safety and meet or exceed all legislative requirements.

Dewars and vessels

CRYOSPEED offers a wide range of dewars and storage vessels for rent or sale. Dewars are available in a range of sizes that offer strength and durability within a lightweight high-efficiency package.

Vessels come in a range of sizes, pressures and flow rates to meet the varying needs of different scientific and research establishments.

Available for nitrogen, oxygen, argon and carbon dioxide these vessels are designed to ensure a continuous supply of either liquid or gas whilst minimising product evaporation. The location where the vessels are to be located require little in the way of preparation and can be situated within a suitable storage area or alternatively near to the point of use.

Safety products

Handling and working with cryogenic liquids is hazardous. Personal safety in scientific and research establishments is paramount and CRYOSPEED is proud to offer a comprehensive range of personal protective equipment and associated safety products that comply with industry safety legislation, including European Safety Standards.

CRYOSPEED can provide information on the right equipment and talk through the safety requirements that need to be met. We offer a range of supporting services to ensure your cryogenic needs are met.

BOC offers a comprehensive range of PPE and workplace safety products, all of which comply with industry safety legislation.

The range includes:

- Head protection – safety helmets & bump caps
- Eye and face protection – safety goggles & face shields
- Hearing protection – ear plugs, ear muffs & communication headsets
- Respiratory protection – face masks & air respirators
- Hand protection – general handling gloves & cut resistant gloves
- Skincare – skin protection and skin cleansing
- Clothing – lab coats and disposable clothing
- Footwear – safety boots and specialist hazard footwear
- Workplace safety – first aid & signage

To view the full range or to order please go to boconline.co.uk/shop

BOC safety products are also available through Science Warehouse at www.sci-ware.com

Gas detection and monitoring



If gases are used in confined spaces, monitoring equipment should be installed as a matter of course. BOC can supply and install a range of battery and mains powered oxygen and carbon dioxide monitors, alarms and emergency response equipment ensuring the area where gases are used is constantly monitored.

Oxygen monitors

Oxygen monitors help to ensure the working environment is safe. They monitor the oxygen levels in the environment; too little oxygen (oxygen deficiency) there is a danger of asphyxiation or too much oxygen (oxygen enrichment), there is a danger of severe fires. If a level becomes dangerous, the monitors will emit audible and visual alarms to alert personnel. Oxygen monitors from CRYOSPEED are available that measure oxygen deficiency, oxygen enrichment or both.

Carbon dioxide monitors

Carbon dioxide is toxic at low levels. If excessive levels of carbon dioxide can occur, use carbon dioxide monitoring equipment, not oxygen deficiency equipment, to ensure that the working environment is safe.

One 2 One monitors

This system combines simple, reliable operation with ease of installation, providing a low cost solution for workplace monitoring. Each set contains a sensor unit, remote repeater alarm unit and interconnecting cable. They are available for monitoring oxygen or carbon dioxide.

The One 2 One oxygen monitor and repeater unit continuously monitors the concentration of the oxygen in the air surrounding its sensor. In the event oxygen levels fall beyond pre-set levels visual and audible alarms, both at the base monitor for personnel already in the room and at the entrance to the room will be activated.

The One 2 One unit is ideal for simple, single room set-ups. Alternatively fixed systems are available for complex scientific and research working environments.

Cryogenic safety

There are a number of potential hazards when using gases that are liquefied by cooling them to low temperatures, some of which are highlighted here along with preventative measures that should be taken.

All people who work with low temperature liquefied gases or systems using such gases should be given adequate training on the risks of asphyxiation, fire hazards, cold burns, frostbite and hypothermia.

BOC offers a range of cryogenic safety training courses, please see page x for further details. For further information on cryogenic safety please refer to the BOC document "Care with Cryogenics".

Cold burns and frostbite

Because of the low temperature of liquefied atmospheric gases, the liquid, cold vapour or gas can produce damage to the skin similar to heat burns. Unprotected parts of the skin coming into contact with un-insulated items of cold equipment may also become stuck to them and the flesh may be torn on removal.

Cold vapours or gases from liquefied atmospheric gases may cause frostbite, given prolonged or severe exposure of unprotected parts. A symptom that usually gives warning of freezing is local pain, however sometimes no pain is felt or it is short lived. Frozen tissues are painless and appear waxy, with a pale yellowish colour. Thawing of the frozen tissue can cause intense pain. Shock may also occur.

Treatment of cold burns

The immediate treatment is to loosen any clothing that may restrict blood circulation and seek hospital attention for all but the most superficial injuries. Do not try to remove clothing that is frozen to skin.

Do not apply direct heat to the affected parts, but if possible place in lukewarm water. Clean plastic kitchen film or sterile dry dressings should be used to protect damaged tissues from infection or further injury, but they should not be allowed to restrict the blood circulation. Alcohol and cigarettes should not be given.

Where exposed skin is stuck to cold surfaces such as un-insulated cryogenic pipe work, isolate the source of the cold liquid and thaw with copious amounts of tepid water until the skin is released.

Over pressurisation

When vaporised into gas, all of these liquefied gases increase many hundreds of times in volume. This results in a large pressure increase if the volume change is restricted. The normal in-leak of heat through the insulated walls of the storage vessels and pipe work into the cryogenic liquid raises its temperature and hence, with time, the pressure rises due to the generation of gas.

Cryogenic systems must therefore be designed with adequate pressure relief on storage vessels and anywhere where liquid may be trapped, such as pipework between valves. If liquid is vented into the atmosphere, it vaporises with a consequential large expansion in volume which can be very noisy. Therefore, venting should be controlled and adequate precautions taken to protect personnel. The cloud of cold gas vented into atmosphere can also present a risk.



Cryogenic safety training

Whether gas usage is a large or seemingly small part of your scientific or research activities, knowledge about the properties and potential risks of different gases can lead to increased levels of safety.

BOC offers a comprehensive range of safety training services tailored to those working in scientific and research environments. These include open courses held off-site where delegates from different establishments can attend, courses undertaken onsite at customers' premises and where a more flexible method of learning is required e-Learning is available.

Courses include

- Cryogenic gases safety awareness workshop
- Liquid nitrogen decanting practical
- Using liquid nitrogen safely on-line module

Who should complete cryogenic safety training?

- Anyone using, handling or storing cryogenic liquids
- Laboratory and other managers with operational responsibilities for safety
- Managers, supervisors and staff from all functions who are responsible for the safe use of cryogenic liquids within their department
- Risk managers and anyone responsible for health and safety

What you will learn

This will depend on the course undertaken however there are some common learnings:

- Correctly identify cryogenic vessels
- Recognise how cryogenic vessels operate
- Be aware of the hazards posed by cryogenic liquids
- Identify key safety features on cryogenic vessels
- Be aware of and control the hazards when decanting cryogenic liquids
- Be aware of the need to move vessels with care
- Recognise the need for ventilation and monitors
- Wear appropriate Personal Protective Equipment when using cryogenic liquids
- Manage the safe storage of cryogenic liquids
- Introduce safe working practices into their workplace

For instructor led courses, all delegates will receive a certificate of attendance and comprehensive workshop literature for continued reference. This includes relevant standard operating procedures if a practical workshop has been attended

All users of cryogenic gases should be fully aware of their safe use and the BOC workshops are a great way to learn how to assess and manage risks.

In addition, as a BOC customer, your CRYOSPEED operator is on hand to answer day-to-day questions regarding the storage and handling of cryogenic gases. Each operator is highly trained and ready to give practical advice to help ensure those working in scientific and research establishments are using cryogenic products safely and efficiently.

To find out more about cryogenic safety training from BOC visit www.bocsafetytraining.com, call us on 01270 758 898 or email boc-safetytraining@gas-safe-interactive.com

BOC – turning ideas into solutions

BOC is a member of The Linde Group, the leading global gases and engineering company. BOC is the UK's largest provider of industrial, specialist and medical gases, as well as related products and services. As a leader in the application of technology, we are constantly looking for new ways to provide our customers with high quality products and innovative solutions.

At BOC we help our customers to create added value, clearly discernible competitive advantage and hence greater profitability. To achieve this we have a comprehensive range of products, services and technical support, which can be customised to meet the individual requirements of our clients.

To keep ahead of the competition in today's market, you need a partner for whom quality, service, process and productivity optimisation are an integral part of customer support. We are there for you and with you, helping to build your success.

BOC's reputation has been forged through partnerships – with customers, with relevant regulatory authorities and with key suppliers. In this way, we deliver comprehensive and consistent benefits to you.

BOC – world-leading knowledge and resources adapted to local requirements.

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