

# QI Services.

Complete solutions, ensuring safe and reliable delivery of medical gases to patients.



# What is QI?

**QI, pronounced “key”, describes a concept, whereby Linde Healthcare is developing and offering customized services and packages to healthcare facilities. The QI Service offerings include outsourcing solutions where Linde Healthcare can take full responsibility for on-site management of gases, devices and related activities.**

For a healthcare facility, managing all aspects around pharmaceutical and medical gases in a compliant way can be quite a challenge. This requires many high quality activities and operations to be carried out continuously and in a consistent way.

Linde Healthcare can be your partner in all aspects of ensuring safe and reliable delivery of medical gases to patients in hospitals and clinics, as well as taking full operational responsibility for on-site management of medical devices and a complete set of cryo services.

Linde Healthcare can offer outsourcing and support solutions to your organisation enabling you the peace of mind that you need. Our QI Services range covers full support of your facility’s responsibility in managing the gas piped distribution system, to the internal production of medical air, to analysis at point of use, staff training and beyond.

All these activities must be performed correctly and documented at all times to ensure patient safety.

Such requirements are recognised across International and National Standards for Medical Gas Pipeline Systems (MGPS). These include ISO7396 and National Standards, such as NFPA 99 and HTM-02, which have been adopted by many other countries.



# QI for security and quality.

QI Services will ensure you meet all your quality and operational objectives, whilst also complying with the MGPS standards.

Linde operates with the guiding principles of **Security** and **Quality**, and with our global gas supply infrastructure and professional network of support specialists, we always try to find the best customer solution alternative. Using QI Services gives you the assurance that “the right gas at the right quality” is always available when and where it is needed.

## Security

### 1. Adequacy

Ensures there is always an adequate supply of medical gas, wherever needed. This involves accurately assessing demand, ensuring a correctly designed pipeline system, and managing the correct level of inventory to ensure a reserve stock for medical gas and medical devices.

### 2. Continuity

Medical gas and medical devices must always be available when needed, and require management of dual supply sources, emergency reserves of bulk and cylinders, and an effective alarm system to give early warning if there is a failure.

## The portfolio of QI Services.

Our services can be offered on an individual basis or as part of a complete solution. Our preferred way of working together with you, is to identify your needs, and based on that we put together a customized solution of products and services.

QI Services offer everything you need to deliver medical gases safely and compliantly to patients. We can tailor solutions to your needs that support your existing operations and offer attractive financing alternatives for upgrades, new installations or rental schemes.

Linde Healthcare can be your outsourcing partner for all aspects of medical gas and medical device management. We will provide and monitor the quality of your gas products, carry out a risk audit, train staff, and even provide full on-site management and cryo services.

### 1. Equipment based solutions

Designing, sizing, installing, commissioning, maintaining and operating the supply units and medical devices including medical gas pipeline systems.

- Bulk supply plant for medical O<sub>2</sub>, medical N<sub>2</sub>O, N<sub>2</sub>
- QI Engineering
- QI Design
- QI MedOx93
- QI MedAir
- QI MedVac
- QI Device

Quality

3. Identity

The correct medical gas must be delivered to each terminal unit. This means detailed design and installation with formal commissioning and testing after any work on the system.

4. Conformity

Ensuring each medical gas is always in compliance with the pharmaceutical standard, requiring accurate tracking of all supplies and regular analysis of gases generated on-site. Also important is to ensure periodic checks at terminal units to ensure the quality of gas delivered to the patient is the same as delivered to the hospital.

Achieving these four goals requires a wide range of activities, from controlling supply of gases, to maintaining pipe work, to handling and moving cylinders and devices, to monitoring, analysis and of course, training of staff.

These activities are usually spread across several hospital departments; pharmacy, portorage, engineering, procurement, and nursing and therefore managing these activities and interactions in an efficient manner is very challenging.

Linde Healthcare has many years and world wide experience in managing all these activities. We are acknowledged experts in the field, indeed some of the standards now in use find their origins in Linde Group company procedures.

2. Maintaining operational standards

Providing management services to ensure medical gas operations are in compliance with required standards.

- QI Risk
- QI Infrastructure
- QI Training
- QI Maintenance
- QI Point Analysis

3. Monitoring and control

Services to ensure operation status is monitored and maintained correctly.

- QI Tracking
- QI Monitoring
- QI Secure Supply
- QI Point Analysis

4. On-site management

Customer tailored offering with combination of multiple QI Services or complete service solutions.

- QI Operations
- QI Facilities
- QI Cryo



# 1. Equipment based solutions.

A “Medical Gas Pipeline System” is an integrated system from supply source (bulk tank, cylinders or compressors) to the point of use. Linde Healthcare can design, supply and install all components of this system for a complete solution with point of use quality. The services provide continuous and reliable supply of medical gas, whenever needed. Managed equipment services for medical devices can be made available and financed in different ways as customized offers.

## Bulk supply plant

Linked with the QI Services portfolio, a full range of both single and dual tank supply systems is available for medical O<sub>2</sub>, medical N<sub>2</sub>O, synthetic air, N<sub>2</sub> or MedOx93. Ask your local Linde contact for details.

## QI Engineering

Provision of all aspects of the supply, installation, testing and commissioning of a bulk supply plant with tanks or a Medical Gas Pipeline System. Services include:

- On-site management of the medical gas supply chain and contractors.
- Testing and commissioning of MGPS and associated plant.
- Installation records as defined in ISO 7396 for the ‘Operational Management Document’.

## QI Design

Design of medical gas pipelines is a precise and skilled operation. Linde Healthcare are global experts and offer a wide range of services for all medical gases, including:

- Full design and drawings from an outline brief.
- Consultancy and advice on internal proposals and designs.
- Review and formal assessment of contractor submissions.

## QI MedAir / QI MedVac and QI MedOx93

Specification, design and installation of energy-efficient medical air, medical vacuum plants and medical oxygen supply in combination with medical oxygen 95 % on-site plants.

We have partnerships with world leading manufacturers of these systems and can offer a suitable package to suit your individual needs. For example, packaged /containerised systems to address the common problem of limited space. In addition, we can offer a specific on-site supply service: for a fixed volume-use fee, providing certified quality gas 24 /7, removing the worry over capital plant management.

## QI Device

Ensuring that the devices /components in your facility’s Medical Gas Pipeline System and other medical devices are up to date, maintained according to manufacturer’s recommendations and providing the best service possible.

Numerous packages are available, including renting or fixed-fee management services to ensure all devices are maintained for safe and secure on-demand gas delivery.



## 2. Maintaining operational standards.

All the major standards for Medical Gas Pipeline System (MGPS) highlight “operational management” as a key area to address, to ensure safety and security. Linde Healthcare can advise and provide support in all operational management areas.

### QI Risk

- In-depth inspection and assessment of your Medical Gas Pipeline Systems and processes.
- Performed by experienced and qualified audit engineers.
- Full report showing compliance to all relevant national and global standards.
- Detailed risk assessment with classification of every risk, each into an action programme.
- Advice and guidance on establishing an effective “Operational Policy”.

### QI Infrastructure

An essential requirement of MGPS standards is the maintenance of accurate drawings. This service ensures you have precise drawings of the current installation which meet compliance requirements for “as-fitted drawings”.

### QI Training

Appropriately trained staff is essential in ensuring both safety and code compliance. We offer a wide range of training programmes, covering safe handling and use of medical gases, which is obligatory for all personnel who handle medical gases. In addition, these courses

are available as web-based packages allowing maximum flexibility of learning whilst still allowing the management tracking required to ensure legal compliance.

We also offer high level Certified Training Courses in some countries, as required by International Standards as HTM-02 for both Authorised Person (AP) and Competent Person (CP).

### QI Maintenance

- According to International and National Standards, a defined programme must be followed to ensure a correct maintenance schedule for every piece of equipment in the MGPS.
- We have teams of highly skilled maintenance engineers available for both routine preventive maintenance and for emergency response.
- Management of maintenance records.
- Reducing the risk of being exposed to component or MGPS failure.

### QI Point Analysis

Full Pharmacopeia gas analysis services providing on-site sampling:

- At point of use (i.e. terminal units) to ensure the quality of gas delivered to patients from wall outlets.





# 3. Monitoring and control.

Effective management requires realtime and reliable information! Taking full advantage of the latest technology, Linde Healthcare offers a full range of remote monitoring packages to check on the system status at any time and be alerted to any alarms.

## QI Tracking

An individual full cylinder tracking and traceability service that facilitates and gives a support tool for quick recall:

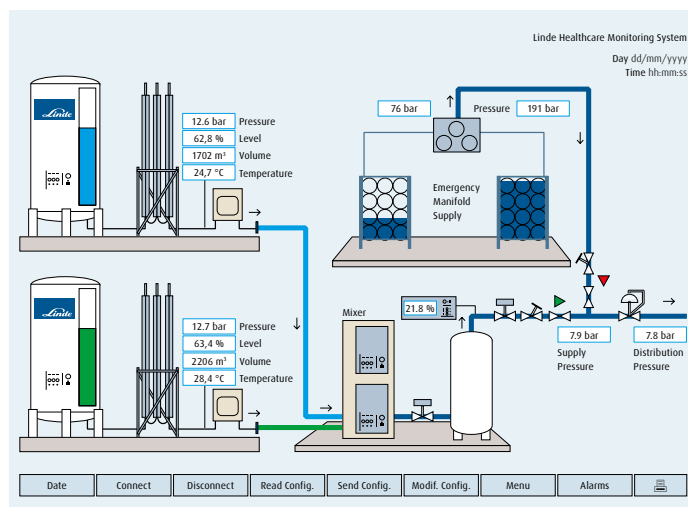
- Full pharmaceutical in-date checking and recall support, if needed.
- Cylinders are individually labelled, enabling tracking from cylinder delivery at facility, to user department, to return of empty cylinder.
- Current tracking status and historical records are available instantly on a web-based system that can be used for consumption analysis, cost split reports and cylinder storage optimization.

## QI Monitoring

Using the latest secure electronic transmissions to enable 24/7 monitoring and alarm notification of all on-site supply plants including Medair vacuum systems, MedOx93 plants and bulk supply systems. If an alarm or warning is raised, the appropriate response procedure is automatically engaged through active text, paging or email to the Linde or Hospital responsible person.

## QI Secure Supply

Continuous remote monitoring of stock levels in bulk tanks or gas pressure within the cylinder manifolds. Included in the service is the ability to initiate automatic re-ordering and scheduling procedures.



## QI Point Analysis

- Full Pharmacopeia gas analysis services providing on-site sampling:
- At on-site manufacturing plant for medical air or medical oxygen 93 %, to ensure GMP compliance.



## 4. On-site management.

The elements of the QI Service portfolio can be linked together creating your own solution. Instead of managing medical gases and your bio-preservation storage needs across several departments in a healthcare facility, with all the additional risks and inefficiencies, put your trust in a single dedicated operation run by experts. On-site management services from Linde Healthcare are the most effective and safe way to manage all your medical devices or medical gas operational needs throughout the hospital. Eventually what matters to us are your needs.

### QI Operations

Linde Healthcare technicians can be stationed on-site at the hospital to manage all aspects of the facilities' medical gas-related operations. The service can include taking the responsibility for managing stock, keeping of bulk and cylinders, internal transport of cylinders inside the institution and managing the cylinder tracking and traceability solution, manifold management, bulk system management, remote monitoring, maintenance, emergency response, gas sampling, permits to work, and staff training.

### QI Facilities

A total medical gas supply service for a fixed budget outlay. QI Facilities can incorporate gas supply to all on-site services, delivering supplies at all times directly to the point of use, and maintaining the total gas delivery system including MGPS all the way to patients in accordance with standards and regulations.

### QI Cryo

A full suite of services cover your complete hospital needs, whether you store your samples in one area or across multiple departments. We will work with you to upgrade your cryo storage facilities and ensure the greatest level of safety and sample security.

Linde will supply and deliver liquid nitrogen where needed in the hospital. Provide freezers and safety equipment. Design and installation of cryogenic gas lines or entire cryo-storage facilities. Provide monitoring systems with sample traceability, for new or pre-installed storage systems.

A complete description of the QI Cryo portfolio is also available. Please contact us for further information.





# Getting ahead through innovation.

Linde Healthcare is committed to working with healthcare providers and regulatory authorities in promoting continuous and safe use of medical products to improve patient care. We provide medical gas products, therapies, technical solutions and services to hospitals, clinics, nursing facilities, emergency management services and homecare providers around the world.

With our long experience and understanding of healthcare realities, you can depend on solutions that are delivered and serviced to the highest possible standards of quality, safety and efficacy.

**Linde – Living healthcare**

Contact us

For more detailed information please refer to the brochures for each QI Service.  
Please contact your local Linde Healthcare office or visit our QI Services global website [www.linde-healthcare-qiservices.com](http://www.linde-healthcare-qiservices.com)

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