



HiQ for the Petrochemical Industry



The World Petrochemical Market



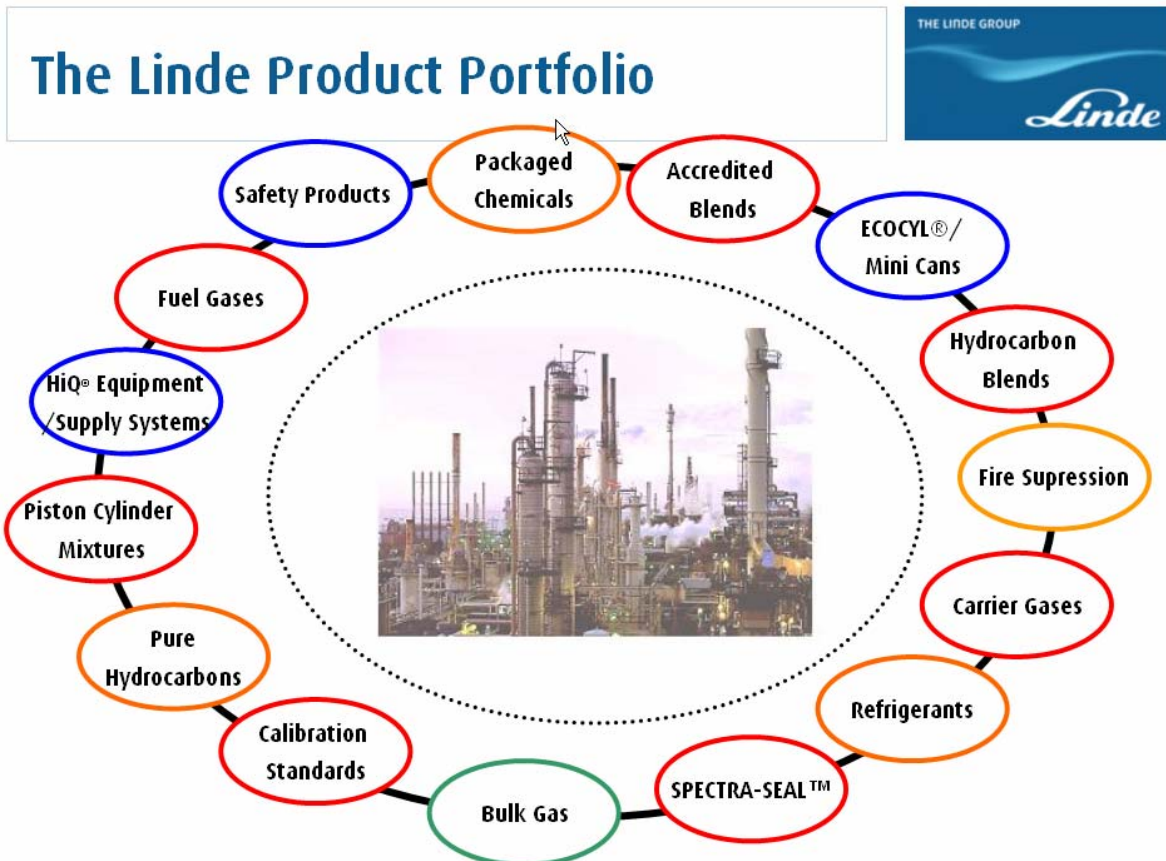
Current installed refinery capacity is predominant in areas where Linde is positioned as a strong supplier.

This includes areas such as Western Europe, S.E Asia and the Americas.

Linde is also currently established in areas of new investment, including Eastern Europe, China and South East Asia.

Petrochemical plants are quality and safety conscious, a philosophy that matches the Linde core values and company culture.

Linde offers a variety of products for use in all areas of a Petrochemical facility



Specialty Gases and Specialty Equipment have applications in many areas



Within a petrochemical refinery, we can distinguish five areas that have Specialty Gases Applications

- The Refinery Laboratory, which would include additional research and pilot plant potentials.
- Process Control Stations
- Health and Safety Departments
- Environmental Compliance and Emission Monitoring
- Combustion Control



Refinery Laboratory, Quality Control Laboratory, and Pilot Plant Requirements

Areas of Requirement:	Products	Products
Raw Material Qualification/Analysis	Hydrocarbon Blends Liquid or Vapour	<p>A refinery laboratory can feature many different types of gas chromatographs and other analytical instruments.</p> <p>Gas chromatographs use a variety of specialty gases, such as carrier gases, certified gas mixtures, or hydrocarbon blends for complex analytical work.</p>
Intermediate sample analysis from the various processing Units	Hydrocarbon Blends	
Finished product analysis and certification as per specified gas mixtures or customer specific gas mixture	Custom Gas Mixtures / Hydrocarbon Blends	
Wastewater treatment plants and Treated Effluent samples	Custom Gas Mixtures / Chemicals	
Plant bulk Chemicals analysis	Research Chemicals/Custom Gas	
Ambient Air Quality monitoring	Accredited Mixtures	
Research & Development	All types of Blends	
Investigation and failure analysis	All types of Blends	
And ULTRA PURE CARRIER GASES		

Process Control using In-Line, and On-Line/At-Line instrumentation

Areas of Requirement: Input Streams to Process (qualify material) Intermediate Product Streams (QC impurities and production) Quality Control of Final Product Streams (In-Spec material verification)	Products Hydrocarbon Blends Hydrocarbon Blends Custom Gas Mixtures / Hydrocarbon Blends	Products As with the refinery laboratory most applicable Process Control products are related to gas chromatography , such as carrier gases, hydrocarbon blends and custom gas mixtures.		
			And ULTRA PURE CARRIER GASES	




Health and Safety

Areas of Requirement: Confined Space for Combustibles Confined Space for Toxic Compounds Confined Space for Oxygen Deficiency Environmental Legislation requirements (measurement and reporting)	Instrument Portable and Fixed LEL Monitors Portable and Fixed Toxic Gas Detectors Portable Detectors Stack/CEM/Ambient Air sensors	Products Calibration Gas Mixtures and Zero Gases in Standard and Minican/ECOCYL® Calibration Gas Mixtures and Zero Gases in Standard and Minican/ECOCYL® Calibration Gas Mixtures and Zero Gases in Standard and Minican/ECOCYL® Accredited Gas Mixtures and Qualified Zero Gas	Products Calibration gas mixtures and zero gases are used for monitoring in various applications. These include: <ul style="list-style-type: none"> • combustibles (e. g. hydrocarbons) in confined spaces • measurement of toxics such as hydrogen sulphide, ammonia, carbon monoxide. • oxygen deficiency potential in confined spaces • perimeter monitoring for environment compliance and toxic gases

Environmental Monitoring


Refinery Process	Measure	Require	Products
Cracker	CO EMISSIONS	Low PPM CO/O ₂ /N ₂ Standards	
Claus Sulfur Recovery	SO ₂ EMISSIONS	Low PPM CO/SO ₂ /N ₂ Standards	<p>In each area, the products used will measure different types of emissions.</p> <p>Requirements include stable reactive mixtures, and all typically require accreditation.</p> <ul style="list-style-type: none"> The cracker unit monitors carbon monoxide emissions requiring various concentration levels. The sulphur recovery unit measures sulphur dioxide levels requiring various standards. The refinery fuel gas unit includes gas residue such as sulphur dioxide or hydrogen sulphide in combustion gas and feed streams.
	SO ₂ in Combustion Gas	Low PPM SO ₂ /N ₂ Standards	
Refinery Fuel Gas	H ₂ S in FEE STREAM	High PPM H ₂ S/N ₂ standards	

Stack Emission	Low CO/NO/NO ₂ /SO ₂
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Combustion Control

Areas of Requirement:	Instrument	Products	Products
Carbon Monoxide	Degree of Incomplete Combustion	PPM Level Carbon Monoxide/ Nitrogen or Air	
Oxygen Monitor	Excess Air from Combustion	% Oxygen/Air	<p>As in other target areas various calibration mixtures are used for monitoring.</p> <p>It is vital that you have an understanding of the types and levels of gas blends used in each unit.</p> <p>Measurements may include carbon monoxide, oxygen and potential hydrocarbon emissions.</p>
Combustible Monitor	Hydrocarbon emissions	PPM Methane or Propane/Air	

<ul style="list-style-type: none"> Efficient Fuel Use Complete Burn of Hydrocarbon Environmental Compliance 	
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HiQ®

HiQ® offers the best quality there is in the segment of Specialty Gases.

Our portfolio covers;

- High Purity Gases
- Calibration Mixture
- Process Mixtures
- Precision Gas Regulators
- Quality Engineered gas supply systems
- High quality service

HiQ® products meet every individual customer needs. Understanding your requirements is the first step in true supply partnerships.

High products are highly specialized and our team highly committed. Thus our customers profit from our knowledge.

HiQ® Product Portfolio:

- High purity gases
- Gas mixtures
- Precision gas regulators
- Quality engineered gas supply systems
- High quality service

! HiQ® Precision matters in everything we do.



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