



## SPECTRA-SEAL<sup>®</sup> calibration gas mixtures. Consistency you can trust.



SPECTRA-SEAL<sup>®</sup> calibration gas mixtures provide flat-line stability and extended shelf life.

**Background** The demand for stable, accurate measurement is the cornerstone of today's fast-paced analytical world. Calibration standards of low-level reactive mixtures, typically those with levels below 5 ppm, can prove to be unstable over time. This can result in incorrect measurements, lost productivity and, with emission monitoring, potential legislative fines. To overcome these issues, the original SPECTRA-SEAL<sup>®</sup> cylinder process for low-level reactive gases was introduced in 1973. The result was the first cylinder capable of guaranteed stability of low-level reactive mixtures for multi-year periods.

**Description** In order to keep pace with technological advances and increasingly stringent legislative requirements, today's SPECTRA-SEAL<sup>®</sup> calibration gas mixtures use state-of-the-art packaging technology with various proprietary cylinder treatment processes that exceed the increasingly demanding requirements for consistency and stability in a wide variety of calibration standards down to part-per-billion levels. SPECTRA-SEAL<sup>®</sup> ensures the concentration accuracy and stability of highly reactive calibration gas mixture standards for the full length of their 5-year certification period.

**Process** Amongst a range of techniques, Linde uses a proprietary process to render the aluminium surface of the SPECTRA-SEAL<sup>®</sup> cylinder chemically inert. Additional processes convert this passivation layer into a smooth, tightly adherent surface, with negligible adsorptive properties. As a result of these procedures, Linde can guarantee that SPECTRA-SEAL<sup>®</sup> calibration gas mixtures will remain stable, with a consistent analytical response for 5 years from their manufacturing date. You can be confident of your results first time, every time.

**Product range** SPECTRA-SEAL<sup>®</sup> offers long-term stability for binary calibration gas mixtures requiring low-level carbon monoxide, carbonyl sulphide, methyl mercaptan, hydrogen sulphide, nitric oxide, nitrogen dioxide, sulphur dioxide or moisture. Each mixture can be produced and certified according to ISO standards with full traceability, when required. Standard certification is offered at  $\pm 5\%$  analytical accuracy. A limited range of products are offered with  $\pm 1\%$  certification, where local Primary Reference Mixtures are held (for analytical comparison) – currently limited to NO mixtures at levels down to 100 ppb and for NO<sub>2</sub> and SO<sub>2</sub> mixtures at 450 ppb.

- Benefits**
- Long-term shelf life reduces cylinder change-out requirements
  - Flat-line stability ensures consistent results for each sample
  - Lightweight aluminium cylinders make transport easier
  - Shrink-wrap valve protection reduces potential valve contamination
  - Availability of low-ppb-level components reduces potential need for gas dilution

**SPECTRA-SEAL® standard products**

Component	Level	Typical balance gas
Carbon monoxide	> 100 ppb – < 1 %	Air, nitrogen
Carbonyl sulphide	> 100 ppb – < 1 %	Air, nitrogen
Hydrogen sulphide	> 100 ppb – < 1 %	Air, nitrogen
Methyl mercaptan	> 100 ppb – < 1 %	Air, nitrogen
Moisture (H <sub>2</sub> O)	> 1000 ppb – 500 ppm	Nitrogen
Nitric oxide	> 50 ppb – < 1 %	Nitrogen
Nitrogen dioxide	> 50 ppb – < 1 %	Air, nitrogen
Sulphur dioxide	> 200 ppb – < 1 %	Air, nitrogen

**Options** Other balance gases such as helium, argon and methane are available, subject to purity requirements. Higher concentration values are also available on request. Please contact Linde for more information.



REDLINE® C 200/2 two-stage cylinder regulator



REDLINE® S 201 series gas supply panel

**Equipment** With low-level reactive mixtures, the introduction of moisture or oxygen can compromise your supply system. Linde uses its wealth of experience in the design and installation of reactive gas supply systems to ensure that the quality of your gas standard is not compromised. To upgrade an existing gas supply installation for use with SPECTRA-SEAL® calibration gas mixtures, we recommend replacing your current gas controls with a REDLINE® S 201 series gas supply panel with internal gas purge to ensure the integrity of the gas stream. For direct cylinder connection, we recommend our REDLINE® two-stage cylinder regulator C 200/2.

**HiQ® specialty gases – more than a label**

The specialty gas products you use in your daily operations should of course meet your specific requirements. But they should also be available in a form and frequency that matches your needs. That’s why you need a supply partner who truly listens and understands your company’s business concerns. HiQ® specialty gases and equipment are the global benchmark for quality and convenience in the specialty gases business today. With our product range and flexibility, HiQ® specialty gases meet the precise and varied requirements of all our customers.

**The SPECTRA-SEAL® promise**

SPECTRA-SEAL® calibration gas mixtures will remain stable, with a consistent analytical response for 5 years from manufacturing date. You can be confident of your results first time, every time.

For technical enquiries please call: +44 (0) 800 02 0800  
 For ordering, contact your local Linde supplier.  
 Visit our website at <http://hiq.linde-gas.com>



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