

## SPECTRA VOC STANDARDS

### U.S. EPA PAMS

**Description** SPECTRA VOC standards are part of the HiQ® specialty gases program from Linde and are manufactured using exacting gravimetric techniques with all gravimetric measurements directly traceable to NIST (National Institute of Standards and Technology).

The United States Environmental Protection Agency's ozone precursor monitoring program known as PAMS, Photochemical Assessment Monitoring System, utilizes Linde standards for program quality assurance.

Under the 1990 Clean Air Act Amendments, EPA has required more extensive monitoring of ozone and its precursors in areas with persistently high ozone levels (mostly large metropolitan areas). In these areas, the States have established ambient air monitoring sites which collect and report detailed data for volatile organic compounds, nitrogen oxides, ozone and meteorological parameters. Analyses of these data help the EPA and the States to better understand the underlying causes of ozone pollution, to devise effective remedies and measure environmental improvement.

The standard that SPECTRA supplies is manufactured using exacting micro-gravimetric techniques with all measurements directly traceable to NIST (National Institute of Standards and Technology).

Linde offers the PAMS standard at the EPA specified concentrations expressed as ppb C (parts per billion expressed as carbon) and also at 100 ppb v/v and 1 ppm v/v. The PAMS calibration standard is supplied in a size 2A cylinder or a size 6A cylinder with guaranteed stability of 12 months.

To enhance your QA/QC procedures, Linde stocks at least two (2) individual batches of each VOC raw material. This allows you to order two (2) independent US EPA PAMS Calibration Standards from Linde.

**HiQ® Specialty Gases** The HiQ® specialty gases program from Linde supplies high purity gases, gas mixtures, precision engineered equipment and gas distribution systems, and services and support, to a wide range of industries employing specialty gases applications. In addition to the line of SPECTRA high purity gases the HiQ® program includes the REDLINE® and BASELINE® trademarked equipment product ranges and the SPECTRA-SEAL®, ECOCYL® and VERISEQ® specialty gas ranges.

HiQ® products represent Linde's commitment to the highest available quality and global consistency across gases, equipment and services.

Number following the compounds is the concentration in ppb C (parts per billion expressed as carbon) as specified by the U.S. EPA.

→ Acetylene 40 [74-86-2]	→ Ethyl Benzene 25 [100-41-4]
→ Benzene 30 [71-43-2]	→ Ethylene 20 [74-85-1]
→ n-Butane 40 [106-97-8]	→ o-Ethyltoluene 30 [611-14-3]
→ 1-Butene 30 [106-98-9]	→ m-Ethyltoluene 25 [620-14-4]
→ cis-2-Butene 35 [590-18-1]	→ p-Ethyltoluene 40 [622-96-8]
→ trans-2-Butene 25 [624-64-6]	→ n-Heptane 25 [142-82-5]
→ Cyclohexane 40 [110-82-7]	→ n-Hexane 30 [110-54-3]
→ Cyclopentane 20 [287-92-3]	→ 1-Hexene 60 [592-41-6]
→ n-Decane 30 [124-18-5]	→ Isobutane 25 [75-28-5]
→ m-Diethylbenzene 40 [141-93-5]	→ Isopentane 40 [78-78-4]
→ p-Diethylbenzene 25 [105-05-5]	→ Isoprene 40 [78-79-5]
→ 2,2-Dimethylbutane 40 [75-83-2]	→ Isopropylbenzene 40 [98-82-8]
→ 2,3-Dimethylbutane 50 [79-29-8]	→ n-Octane 30 [111-65-9]
→ 2,3-Dimethylpentane 50 [565-59-3]	→ n-Pentane 25 [109-66-0]
→ 2,4-Dimethylpentane 40 [108-08-7]	→ 1-Pentene 25 [109-67-1]
→ n-Dodecane 40 [112-40-3]	→ Methylcyclohexane 30 [108-87-2]
→ Ethane 25 [74-84-0]	→ Methylcyclopentane 25 [96-37-7]

**Compound [CAS#]**  
*(continued)*

- 2-Methylheptane 25 [592-27-8]
- 3-Methylheptane 25 [589-81-1]
- 2-Methylhexane 25 [591-76-4]
- 3-Methylhexane 25 [589-34-4]
- 2-Methylpentane 20 [107-83-5]
- 3-Methylpentane 40 [96-14-0]
- n-Nonane 25 [111-84-2]
- cis-2-Pentene 35 [627-20-3]
- trans-2-Pentene 25 [646-04-8]
- Propane 40 [74-98-6]
- n-Propylbenzene 30 [103-65-1]
- Propylene 25 [115-07-1]
- Styrene 40 [100-42-5]
- Toluene 40 [108-88-3]
- 1,2,3-Trimethylbenzene 25 [526-73-8]
- 1,2,4-Trimethylbenzene 40 [95-63-6]
- 1,3,5-Trimethylbenzene 25 [108-67-8]
- 2,2,4-Trimethylpentane 30 [540-84-1]
- 2,3,4-Trimethylpentane 25 [565-75-3]
- n-Undecane 30 [1120-21-4]
- o-Xylene 25 [95-47-6]
- m/p-Xylene (combined) 40 [108-38-3 / 106-42-3]

**Specifications**

Blend Tolerance	100 ppb to 1 ppm +/- 10%
	>1 ppm to 10 ppm +/- 5%
Analytical Accuracy	100 ppb to 1 ppm +/- 5%
	>1 ppm to 10 ppm +/- 2%
Stability	12 months

**Regulator Recommendation**

Various independent and Agency laboratories have indicated that to ensure repeatability with low level calibration gases it is best to utilize the same regulator for initial assay and for daily usage, thus minimizing the sources for potential variances and possible cross contamination. If a regulator is purchased along with the PAMS standard, Linde will perform the initial assay and certification analysis utilizing the regulator and cylinder as a matched set.

Linde's model 7621 regulator is ideal for use with the PAMS standard. Please see the equipment section for information on this and other gas handling equipment.

**Standard Available Cylinders**

Cylinder Size	Volume	Pressure	CGA
2A	4000 liters	2000 psig	350
6A	104 liters	1800 psig	180

All SPECTRA VOC Calibration Standards are guaranteed for a minimum of 12 months.

Please contact Linde for information on other concentrations, tolerances, and cylinder sizes.

**Linde Electronics and Specialty Gases**

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