

How Often Do Gas Cylinders Need to Be Replaced?

Gas cylinders are made by many different manufacturers, are available in a variety of sizes, can be disposable or refillable and filled with a low, high or pressurized concentration. Generally speaking, the shelf life of calibration gas, (also known as span gas), is dependent on three factors:

1. Gas Type
2. Gas Concentration, and
3. Gas Cylinder Quality and Size

1. Gas Type

Calibration gases can be divided into two types: reactive and non-reactive.

“Reactive” is a broadly used term for chemicals that have some instability under certain conditions and may react with certain materials, moisture, oxygen or other chemicals. Reactive gas mixtures include gases such as ammonia (NH_3), chlorine (Cl_2), hydrogen sulfide (H_2S), sulfur dioxide (SO_2), hydrogen chloride (HCl), hydrogen cyanide (HCN), etc.

Reactive gas mixtures are normally filled in aluminum cylinders with stainless steel valves that have been treated to minimize reactivity with the reactive gas. These mixtures have a shorter shelf life, typically 6 months to one year, because the concentration of the reactive gas is likely to dissipate over time.

“Non-reactive” is a broadly used terms for chemicals that are stable under most conditions and are not affected by moisture, oxygen or other chemical interactions. Non-reactive gas mixtures include alkane or alkene hydrocarbons (methane (CH_4), propane (C_3H_8), hexane (C_6H_{14}), isobutylene (C_4H_8), etc.), nitrogen (N_2), hydrogen (H_2), carbon monoxide (CO), carbon dioxide (CO_2), etc. Non-reactive gas mixtures are normally filled in steel cylinders and typically have a shelf life of about 3 years.

2. Gas Concentration of Reactive Gases

In some cases, a higher concentration of a reactive gas can have a longer shelf life than a lower concentration. In low concentrations, a few reactions can have a much larger effect on the overall composition of the mixture than the same reactions in a highly concentrated mixture.

3. Gas Cylinder Quality and Size

A well-made gas cylinder will have, on a microscopic level, the smoothest interior walls as possible. If the walls are rough, it allows the gas to come in contact with a larger surface area which increases the likelihood of a reaction with contaminants or the cylinder material itself. The quality of the internal walls and the material of the valves are both factors that affect the shelf life of reactive gases. In addition to the quality of the materials, larger, high pressure cylinders allow for longer shelf life because the ratio of the internal wall surface to gas volume is substantially less and thus there is less potential for a reaction.

Regardless of the type of gas mixture, cylinders that do not bear a legible written, stamped or stenciled identification of the contents should not be used. It is also important to note the expiry date and not to use the gas past that date. If an inappropriate amount of calibration gas is used or if expired gas is used during

calibration or bump testing, the result could be improper calibration and may result in a potentially dangerous situation.

For suggestions on gas detection systems, indoor air quality monitors and calibration, please contact EnviroMed Detection Services.

References

Calibration Gas Shelf Life: What You Need to Know

Posted By Paul Fry Oct 7, 2013

<http://www.cacgas.com.au/blog/bid/340051/Calibration-Gas-Shelf-Life-What-You-Need-to-Know>

Calibration Gas Shelf Life

Gas Dynamics, LLC

http://gasdynamics.com/index.php?pr=Calibration_Gas_Shelf-Life

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