Four great reasons for a central gas supply

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Successfully and safely repeating a test or analysis procedure depends on good process flow and organization. Yet when it comes to supplying high purity gases for critical processes, too many simply place their high purity cylinder near the work area, strap or chain it to the wall, run some tubing found in the top desk drawer and call it good enough. They sometimes justify the decision as a matter of convenience or cost savings, but it is largely a lack of awareness about alternatives.

European companies shifted to using a central gas supply (CGS) for high purity gases decades ago, and they have proven that a CGS offers four key benefits: safety, economics, workflow efficiency and purity assurance. A CGS locates the main source of gas outside of the primary work area (or at least isolates or confines it). The main source of gas may be a single cylinder, cylinder bundle, bulk tank or cryogenic system. A manifold system controls flow at the gas source, where it is then piped to the point of use and controlled by an individual pressure or pressure/flow control regulator.

By recommending the correct CGS system, gas suppliers can position themselves as a cost-savings partner with customers in many industries including:

- Gas chromatography and electron capture detection (ECD) applications
- Atomic adsorption spectrometry
- Exhaust gas measurement for environmental controls
- Chemical process technology
- Laser cutting and related technology
- Pharmaceutical industry
- Petrochemical industry
- Food sector
- Semiconductor technology

1. Safety

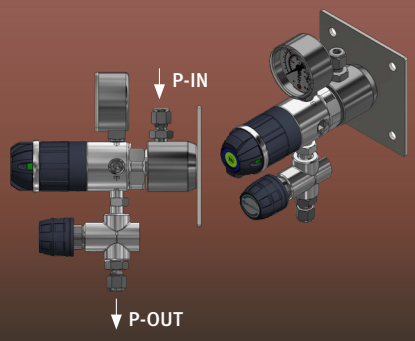
The importance of creating a safer workplace is reason enough to switch to a CGS. If the gas is corrosive, flammable or otherwise hazardous (i.e. high pressure), locating the supply a safe distance in a controlled area from the point of use reduces the potential for harm. In the event of an emergency, the lab can be equipped with solenoid shut-off valves placed downstream of the manifolds, and a valve control box can enable selective shutdown. Large-scale installations can be monitored by a gas management system that conveys/controls data from scales, solenoid valves and other devices. Although building and fire codes address many safety issues, these codes are often overlooked for existing facilities.

CGSs also eliminate the temptation for untrained staff to swap out cylinders. If there is no cylinder present, it can't accidentally fall and create a "compressed gas rocket" or hazards associated with removing and reinstalling high pressure regulators.

2. Economics and Efficiencies

Installing a CGS has upfront costs (which might be less than anticipated) but delivers a proven long-term payback. If interrupted gas flow or contamination from a cylinder change results in downtime, invalid test results or scrapping finished goods, the payback may be immediate. Cylinder bundles and bulk tanks lower cylinder rental costs and transportation charges, reduce the volume of residual gas being returned to the gas supplier and free up additional lab space.

CGSs also make lab personnel and other specialists more efficient by



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piping gas directly to the point of use. A continuous source of gas is literally right at hand, so their work can proceed efficiently. Because each process stream has its own point-of-use regulator to allow for individual pressure/flow control, fluctuations will not occur.

A variety of displays can communicate gas status to personnel, including something as detailed as digital display for volume of gas remaining to an alert that one cylinder is running low and is ready for manual, semi-automatic or fully-automatic switchover at the manifold.

3. Purity

Cylinder changes inherently contaminate the regulator with air, which requires purging the entire gas line to restore purity, wasting time and money. If impurities result in re-establishing new baseline values, using individual gas cylinders wastes even more time and money.

By choosing the correct manifold for a CGS, labs can maintain purity during a change-over between two cylinders or bundles. Many are familiar with manifold changeover systems that provide uninterrupted gas supply. However, the majority of these manifolds are not equipped with a purge circuit. Many also take false comfort in check valves that are install in CGA connections. Manifolds that integrate a purge circuit allow the impurities to be completely removed and all but guarantee contamination removal. A manifold with a purge circuit is shown below. The addition of correctly ported high purity valves allows for process isolation and subsequent purging of new cylinder connection. The purge circuit can also be used as a vent to reduce any remaining pressure in the cylinder connection. By closing the process isolation valve and opening and closing the purge valve several times purges the air from the system quickly and with minimal wasted gas while completely isolating analytical or process equipment from contamination.

4. Engineered Systems

Installing a CGS requires coordination between the gas supply, customer, equipment supplier and in the case of a new facility the architects/designers/planners of the lab. Make sure the designer accounts for local building code requirements related to compressed gases and their safe handling, required separation distances, gas (leak) detection, abatement, fire protection, excess flow and emergency shut off valve requirements.

More than 50% of equipment specified for the delivery of high purity or specialty gases is incorrect, resulting in poor system performance and a lot of finger pointing. Specification of the correct pipe material, diameter and joining method are all critical. Working with the manifold and regulator supplier during CGS design can also help ensure the correct equipment and piping specification.

1. Purge Valve 2. Process Isolation

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Lastly, chose regulators/manifolds and valves for performance and durability. For example, Hastelloy® and/or Elgiloy® diaphragms will last longer than stainless steel in corrosive gas applications. Lighter gases such as helium and hydrogen can cause harmonic 'flutter' and premature wear of the diaphragm, in which case look for a diaphragm with a dampening system.

Installing a CGS requires attention to detail. To help gas suppliers, designers and lab managers begin the process, CGE offers a free Planner Handbook for the installation of high purity gas systems up to purity 6.0.

It can be obtained by sending a request to the author via email: nick.wojnicz@esab.com gw

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