

NOT JUST FULL OF HOT AIR: MANAGING PIPED MEDICAL GAS SYSTEMS



Environment of Care News

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The network of pipes that snake their way across or behind hospital walls and ceilings is easy to overlook. But some of these pipes distribute medical gases from tanks and other sources throughout your facility—whether it's gas used for direct patient care or to support medical equipment. These should command serious attention to protect patients and prevent fires, leaks, air contamination, and other threats.

If your Joint Commission–accredited organization has piped medical gas systems, taking steps to safeguard your components and prepare staff is a priority.

GASSING UP ON THE FACTS

The National Fire Protection Association's (NFPA) NFPA 99: Health Care Facilities Code, 2012 Edition¹ defines medical gases used for medical care/treatment as medical air, oxygen, nitrous oxide, carbon dioxide, and helium.² With the exception of medical air, these can present significant hazards to patients, staff, and visitors, including improper venting, violent reactions when gases interact with other incompatible gases or materials, fire safety risks, and displacement of gases in a confined space thereby reducing the amount of breathable air.²

In addition, medical gas systems impact almost every patient in a hospital, particularly those who are most critical, says Mike Chihoski, MS, CHFM, CHSP, SASHE, AMDP, consultant for Joint Commission Resources.

"In the operating room, the proper functioning of an organization's medical gas system could be a life-or-death situation, as the medical gas system not only provides oxygen to patients but also powers equipment used in surgery and removes waste through the medical vacuum system," Chihoski says.

To help organizations properly manage piped medical gas and vacuum systems, The Joint Commission created *Environment of Care (EC) Standard EC.02.05.09*, which requires hospitals that have installed these systems to inspect, test, and maintain them. (See "Standards Connection" for the complete standard, below.)

DIFFICULTIES AND COMPLICATIONS

John Maurer, SASHE, CHFM, CHSP, engineer with The Joint Commission's Department of Engineering, says EC.02.05.09 isn't currently among the top 10 most cited standards by Joint Commission surveyors, "But that doesn't mean it should be taken for granted or ignored, as a significantly compromised medical gas and vacuum system could put accreditation status at risk," he says. "Actually, EP [element of performance] number 3 is cited more frequently than you'd think because accessibility can become a major issue due to limited space and equipment where shutoff valves are located."

For example, unlike other EC and LS standards that are based on different codes that instruct organizations on how to provide maintenance to a fire or utility system, The Joint Commission requires the organization to establish and schedule its own intervals for the inspection, testing, and maintenance of critical medical gas components. It is important to note that NFPA 99-2012 also requires a maintenance program to be defined for these systems, including inventories, procedures, and schedules.

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“We do not state what those frequencies need to be, so it’s completely up to the organization,” says Maurer, who recommends referring to Annex B within NFPA 991 for guidance on setting inspection, testing, and maintenance activity.

“Also, consider that a typical 200-bed hospital will have more than 1,000 connections, valves, alarms, and other components that make up the medical gas system, thus making it likely that at any given time something could go wrong with one or more of these components,” says Chihoski. Because the medical gas system is pervasive throughout the organization, “It requires not only proper maintenance from the facilities or clinical engineering staff but also an understanding from all staff of key requirements such as not blocking zone valves,” Chihoski adds.

Organizations also need to address issues related to third-party vendors that organizations often rely on to provide testing, inspection, and maintenance services. “The timeliness of reports from third-party vendors often causes problems. It’s important that your organization establish an agreement with the vendor on when you will receive a final report and how you will handle deficiencies that are identified during the inspection,” says Chihoski. If that vendor identifies a problem with a critical component of the medical gas system, for example, your hospital cannot wait 30 days to find out about it when a report is issued.

ACTION STEPS TO INCREASE SAFETY

Don’t take chances when it comes to piped medical gas systems. Follow these tips to abide by Joint Commission standards and reduce related risks:

- Inspect, test, and maintain your piped medical gas system at regular intervals defined by your facility, and document these efforts. Annually test master panels, which report the functionality of the branched systems.³
- Whenever a piped medical gas system is opened—whether for new construction, renovation, or repair—test the system for correct gas, purity, and pressure.⁴
- Individuals working on gas systems must have clear and unobstructed access to the medical gas shutoff valves so they can cut off the gas supply quickly in the event of a fire.⁴ Placing shutoff valves behind a door or other building feature is prohibited.⁴
- Be sure any persons working on the piped medical gas system are qualified, as an accidental breach and subsequent repair could lead to contaminated gases or cross-connections.⁴
- Determine who has the authority to shut off medical gases during an emergency. Many hospitals select the unit charge nurse for this responsibility because this person knows which patients are affected by medical gas and can implement clinical interventions as the gases are turned off; avoid choosing maintenance staff or respiratory therapy staff for this responsibility.⁴
- Make sure piped medical gas/vacuum system area shutoff and main supply valves are easy to access. “Nothing can be parked in front of these valves,” Maurer says. “While there is no distance requirement as far as the zone of accessibility, many organizations follow the rule of allowing three feet of open space around each valve.”
- Place current, accurate labels on every shutoff location in order to identify the gases present and the areas served. State this information in ranges whenever possible (for example, “Rooms 1–10” if 10 rooms are supplied with piped nonflammable medical gases from a wall-mounted shutoff and no other rooms are included in the sequence), and label all gas piping with contents⁴; in the area between the lay-in ceiling and the roof or floor deck above, every 20 feet of piping must be labeled with its contents.⁴

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- Placing medical gas shutoff valves in the same room as the area served is prohibited, including within an operating room.⁴ Isolating and shutting off the gas source during a fire has to be completed from a safe location—not in the same room as the fire.⁴
- Develop a detailed management plan for your medical gas system that clearly indicates roles and responsibilities of those involved with installing and maintaining the medical gas system.
- Create an inventory of all components of the medical gas system to ensure that all components are inspected and tested as required in your management plan.
- Review third-party vendor agreements to ensure you have addressed timeliness of reports and response actions for deficiencies identified during inspection and testing activities.
- Ensure that staff training clarifies staff responsibilities regarding medical gas systems. “Staff should know who is authorized to shut off medical gas in the event of a fire and that medical gas zone valves need to be maintained clear at all times to allow for emergency shutoff,” says Chihoski. “This is especially true in suites such as ORs or EDs, where equipment is sometimes allowed to be stored in corridors where these valves are located.”
- Work with construction to ensure that systems are tested properly after installation, and zone valves are labeled when placed into use.

SAFETY MATTERS

Maurer adds that it’s important to remain vigilant and proactive when it comes to overseeing piped medical gas systems and to consult with other experts, too. “I encourage hospitals to talk and share compliance tips with other organizations and professionals, such as engineering societies and social media chat rooms,” he says.

Maurer says it’s essential to brush up on other relevant Joint Commission standards that intersect with this issue, including the following:

- Life Safety (LS) Standard LS.02.01.20: The hospital maintains the integrity of the means of egress, EP 13, which requires removal of clutter and other obstructions in corridors, which can impede accessibility to medical gas valves.
- EC.02.05.01: The hospital manages risks associated with its utility systems—particularly EPs 9-13, which address contingency planning needed for disruptions, malfunctions, and emergencies, and EP 2, which requires maintaining a written inventory of all operating components of utility systems or of selected operating components of utility systems critical to patient care.

References

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Editor’s Note: John Maurer, SASHE CHFM, CHSP, is an Engineer in The Joint Commission’s Department of Engineering. Although he is a member of the NFPA 99 Technical Committee on Piping Systems, the views and opinions expressed in this article do not represent the official position of NFPA or any of its Technical Committees.