ACCREDITATION STANDARDS

Patient Safety

MEDICAL GAS PIPELINE SYSTEM

The Canadian Standards Association (CSA) Medical gas pipeline systems – Part 1: Pipelines for medical gases, medical vacuum, medical support gases and anaesthetic gas scavenging systems (CAN/CSA Z7396.1-12) specifies the safety requirements for medical gas pipeline systems. It applies to all facilities providing health-care services, both public and private, regardless of type, size, location or range of services.

Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tr>
<td>as-built drawings</td>
<td>Documents used and maintained by the installer on which all components of a medical gas pipeline system are shown in the positions in which they are installed.</td>
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<tr>
<td>maintenance</td>
<td>Actions performed to preserve the as-built functionality of the medical gas pipeline system as required in the original manufacturer’s manual.</td>
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<tr>
<td>primary source</td>
<td>The portion of a supply system that is the first to be drawn on to supply the pipeline distribution system.</td>
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<tr>
<td>secondary source</td>
<td>The portion of the supply system that supplies the pipeline distribution system in the event of failure or exhaustion of the primary source of supply.</td>
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<tr>
<td>reserve source</td>
<td>The portion of the supply system that supplies the complete pipeline distribution system, or a portion of it, in the event of failure or exhaustion of both the primary and secondary sources of supply.</td>
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<td>terminal unit</td>
<td>An outlet assembly in a medical gas pipeline system at which the operator makes connections and disconnections.</td>
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<td>zone alarm</td>
<td>A system used to monitor the pressure of a medical gas or vacuum downstream of a zone valve.</td>
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<tr>
<td>zone valve</td>
<td>A shut-off valve in the pipeline distribution system that allows patient care personnel and first responders to isolate a zone within a health-care facility in the event of an emergency or for authorized maintenance within a zone.</td>
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Medical gases are safely and effectively managed

INDICATORS:

○ Written policy and procedures are in place for:
  • safe use, handling and storage
  • medical gas supply replenishment
  • changing of tanks
  • maintenance

○ The medical gas supply system capacity is documented and based upon usage estimates and frequency of gas supplier delivery

○ All medical gases are supplied from at least two sources, primary and secondary (reserve)
  • Portable cylinder supply systems consist of a primary supply of cylinders and a secondary supply of cylinders
  • Liquid supply systems consist of a primary liquid vessel source of supply and a secondary source that uses either a liquid vessel or high-pressure cylinders

○ Each medical gas supply cylinder are clearly labeled with the cylinder’s contents

○ Each medical gas supply cylinder are clearly marked as full, in use, or empty

○ Facilities that use a compressor to supply medical air have written procedures in place for response to a carbon monoxide (CO) alarm

Medical gas supply is safely stored and secured

INDICATORS:

○ All cylinders are protected from sparks, flames, excessive heat, physical damage, electrical contact or corrosion

○ All cylinders, either connected to the supply system or stored at the facility, are secured by a holder or device designed to secure a cylinder to prevent falling or rolling during storage, transportation and use

○ All cylinders are kept in the upright position where practicable

○ Cylinders not in use or empty are shut off and capped

○ Full and empty cylinders are kept separate

○ A post-valve wrench is readily available, as applicable

○ Medical gas supply is located in a locked room or enclosure accessible only to authorized personnel

○ Rooms or enclosures for supply systems are not used for any purpose other than for the placement and storage of medical gas cylinders
A “no smoking” sign is posted immediately outside each medical gas supply system room or enclosure

Rooms for cylinder supply systems are built of materials having a fire rating of at least one hour and meet building and fire code requirements

Personnel have unobstructed direct exit from supply system rooms via doors opening outward

Doors from the supply system room do not connect directly with storage locations for flammable materials

Electrical devices in rooms for supply systems are protected from damage by positioning at least 1.5 m (5 ft.) above the floor or by guarding

Ambient temperature in medical gas supply rooms is monitored to ensure that it does not exceed 40°C for any gas and is never below 15°C for nitrous oxide and carbon dioxide

**Medical gas system is safely operated and monitored**

**INDICATORS:**

- Orientation and training is provided to those who use the medical gas system to ensure safe, consistent and accurate operation
- Personnel are knowledgeable regarding the location of main and zone shut-off valves and procedures for shutting off the medical gas system
- Personnel are knowledgeable regarding the procedures for switching the supply cylinders, if needed
- Line pressure is observed and recorded at least once each surgical day
- Alarm panels are continuously monitored
- Alarm panels can be seen (unobstructed) and accessed
- Alarm panels clearly indicate the gas, zone and condition being monitored
- Zone valves are installed immediately outside each anaesthetizing location
- Zone valves are securely enclosed but allow for quick access in case of emergency

**The medical gas pipeline system is maintained in accordance with CAN/CSA Z7396.1-12**

**INDICATORS:**

- There is a preventive maintenance plan in place
- Documented preventive maintenance is performed by appropriately trained personnel in accordance with the CSA standards
- Maintenance is performed by appropriately trained personnel
- The source of supply is inspected and tested, at minimum, every six months
- The pressure relief valves are inspected, at minimum, every six months
The pressure relief valves are replaced, at minimum, every five years

The pressure setting of the line pressure regulator is alternated, at minimum, every six months (pipelines designed prior to 2009 may only have a single pressure regulator)

All alarms are self-tested, at minimum, monthly

Supply system alarms are inspected and tested for verification of labeling and signal operation, at minimum, every six months

Supply system alarms are inspected and tested for activation for all field devices and verification of set-point, at minimum, annually

Zone alarms are inspected and tested, at minimum, annually

Zone valves are tested for external leakage and control labels, at minimum, annually

Zone valves are tested for internal leakage, at minimum, annually

Terminal units are tested for function, wear and mechanical performance, at minimum, annually

Medical gas pipeline system records are appropriately maintained

INDICATORS:

- Preventive maintenance and repair records are retained for the life of the system
- As-built drawings of the medical gas pipeline system are retained by the facility

References


