

Confirming the Integrity of Anesthetic Gas Delivery and Vacuum Systems

A. Anesthetic Gas System

This procedure assumes familiarity with the gas delivery system in your facility.

1. Ensure that all outlets are shut-off.
2. Attach a pressure reducing valve(s) to each gas cylinder(s) in use and connect to the gas manifold. With the cylinders turned off, all pressure gauges should read “zero”.
3. Turn on one of the oxygen cylinders. The gauge on the pressure reducing valve will display the cylinder pressure. It should be close to 2000 psi if the cylinder is full.
4. Confirm that the inlet pressure gauge on the manifold is reading approximately 50 psi (45 to 55 psi).
5. Repeat this procedure for any other oxygen cylinders.
6. Use this same procedure for the Nitrous Oxide cylinder(s), if equipped. The cylinder pressure should be 750 psi, and the manifold pressure gauge should read approximately 50 psi (45 to 55 psi).
7. To check the integrity of the Oxygen (and Nitrous Oxide) delivery piping system:
 - a. Confirm that both the oxygen and nitrous oxide gauges on the manifold are reading approximately 50 psi.
 - b. Shut off both cylinders. The pressure reading on the manifold gauges should remain constant over a 15 minute period. (A significant drop within the 15 minutes indicates that the piping system may be leaking and further investigation is necessary).
8. To confirm there is no significant flow restriction in the piping system to the OR, or other outlet:
 - a. Turn on the Oxygen and Nitrous Oxide cylinders.
 - b. Observe the pressure gauges for these gases on the anesthetic machine. They should indicate the same pressure as the manifold gauges – approximately 50 psi (45 to 55 psi).
 - c. Turn on both gas flow controls on the anesthetic machine to maximum. The flow rates should go immediately to their maximum and there should be **NO APPRECIABLE DROP** in the pressure readings on any of the gauges on the anesthetic machine. A significant drop in pressure indicates a restriction in the delivery line (e.g. a crimped or plugged line) and further investigation is necessary.
9. The other outlets (recovery room, etc.) can be tested by ONE of the following:
 - a. Move and attach your anesthetic machine to each of the outlets and repeat the steps in #7;
or
 - b. Attach a breathing circuit or testing circuit with a pressure gauge to the outlet. The pressure should be 50 psi. When the flow meter is opened fully to its maximum delivery rate, there should be minimal pressure change;
or

- c. As a quick check, observe that the flow rate on the outlet is able to reach and sustain maximum flow. This option assumes that you have already checked the entire system.
10. Some gas delivery systems are equipped with a safety feature on the gas manifold. This safety feature automatically switches to another cylinder when the active cylinder is empty or drops below a critical pressure. To test this function, turn on one of the oxygen cylinders. Turn on the flow meter on the anesthetic machine. Turn on the second cylinder. Now shut off the first cylinder. Oxygen flow and the pressure in the system should remain normal. (Let it run for about two minutes to be sure.) Shut off the second cylinder and observe that the pressure falls within two minutes. Repeat this procedure for the Nitrous Oxide cylinders, if so equipped.
 11. If there are any concerns you should call a certified technician for servicing.

B. Vacuum System

You are responsible for following manufacturer instructions on required maintenance for vacuum units. A best practice is to develop a maintenance schedule and place it in your equipment maintenance file.

Several types of vacuum systems are available that operate trouble free for many years with only minimal “daily” maintenance. CSA guidelines regarding “suction” power are available to ensure the vacuum system can accommodate all outlets in the facility. The installer must follow these guidelines during the unit installation. Most systems used in Non-Hospital Surgical Facilities are duplex systems. They have two motors and compressor units which automatically switch one to the other on successive uses. Most systems also have manual switches on each functional unit.

Daily Vacuum Check

Each day that you use the vacuum system you should check it for proper functioning. The user can quickly do this by performing the following checks:

1. Turn on the outlet adjacent to the work station and observe that there is adequate negative pressure being generated (80 – 200 mmHg).
2. With the system unrestricted, confirm that the volume of flow is reasonable. Most experienced individuals can gauge this by the sound generated. See the biannual vacuum check for a more definitive procedure.

Biannual Vacuum Check

With the biannual Gas System Check, you should also inspect the vacuum system for fluid leaks and general condition.

1. Inspect the unit’s fluids and general condition. (Conduct the inspection and record results at the same time you are doing the biannual Gas System Check.)
2. If you have a duplex system, individually activate each unit.
3. Take about 7 oz or 200 ml of water in a container and time how long it takes to suction it up with the open end of the suction tubing. It should be less than 10 seconds.
4. If the system does not perform up to this expectation, you must contact a certified technician to inspect the system and correct the situation.