Selecting a Regulator

Pressure regulators allow users to safely withdraw gas from a cylinder by controlling the pressure. If a regulator is needed then overpressure protection is needed, unless the downstream components can withstand the full cylinder pressure.

Regulators *regulate pressure not flow*

Note: Single or double stage regulators are available. The number of gages doesn’t indicate whether or not it is a double or single stage regulator.

Selection and use of the wrong regulator can lead to serious or fatal accidents.
Selection Variables

When selecting a regulator contact your gas supplier and provide them with the following information:

1. The application;
2. The maximum possible inlet pressure;
3. Desired delivery pressure;
4. Whether or not the regulator will be used for a high purity system (see note at bottom of slide);
5. If a constant delivery pressure is needed (if so use a two stage regulator);
6. Desired accuracy; and
7. Flow requirements.

Regulators must have a max working pressure rating equal to or exceeding the maximum pressure in the gas cylinder or system to which it is connected. If it doesn’t then don’t use it!
Regulators come with connections that are compatible only with particular cylinder valves. These standardized connections help prevent the wrong regulator from being attached to a cylinder. The Compressed Gas Association (CGA) has established the U.S. standard for cylinder connections. Changing these connections could lead to serious injury or death.

UHP DISS connections are also available. These have been developed by the CGA and industry community and are used for ultra high purity gas applications (e.g. semiconductor settings).
Inspect Prior to Use

Inspecting regulators prior to use can help identify those that should not be used because they may leak and/or fail.

Make sure regulators being used for oxidizing gases (such as oxygen) are free from contamination prior to being installed. The presence of oils or other contamination could result in a fire.

A gradual rise in pressure from the high to low pressure side of a two stage regulator is known as creep and can be an indication of damage.
1. Parts that are not original regulator components;
2. If the threads have been damaged but aren’t visible now;
3. If this component is compatible with the original regulator;
4. If the Teflon tape was used to tighten an otherwise loose connection; and
5. If the part was tightened enough or over tightened.

Damage to the CGA connection like this can lead to leakage or component failure.

Teflon tape on a CGA connection may cause the connection to leak and not seal. Don’t use Teflon tape on a CGA connection!
Gas from a high-pressure system can travel back through a regulator if a check valve is not used. Flow should never be reversed through a regulator. This could damage the regulator resulting in premature regulator failure. Use a check valve if the regulator is connected to a high pressure system.

Note: Airgas analytical regulators are now available with a standard CGA check valve.
Building & Servicing Regulators

Don’t build or service your own regulators! Doing so endangers you and others. Reasons why individuals should not service or build their own regulator(s):

1. A new regulator has fittings and components that are tightened to meet specifications and satisfy testing requirements. Self serviced and pieced together regulator components may be over or under tightened.
2. The service history of old regulators is unknown.
3. They often contain parts that exceed the 5-year service requirement (CGA E-15-2011).
4. Components that are used may not be compatible with one another or the service application.
5. Components may have become obsolete, and may present a hazard if used.
The most common type of regulator failure occurs when the regulator outlet pressure is left dialed in when the inlet is charged with a high pressure supply.

Other types of regulator failures can be caused by improper use and overpressurization.

Some failures can allow the upstream pressure to travel through the regulator into downstream piping, valves, equipment etc.

Use overpressure protection, such as pressure relief valves, to protect downstream piping, valves, equipment, etc. from being over-pressurized.
Before Opening A Cylinder Valve

Before connecting a regulator to a cylinder valve make sure all connections are clean.

Before opening a cylinder valve always make sure:

1. The regulator delivery pressure adjustment knob is turned fully counterclockwise, to reduce the delivery pressure to zero; and

2. The regulator flow control valve is closed

Do not force the threads when connecting a regulator.

Note: if a regulator fitting does not fit the cylinder valve then the regulator is designed to be used with a different gas, or the connection is damaged. Contact your gas supplier if you encounter this problem.
Opening a Cylinder Valve

1. Place both hands on the cylinder valve and open it slowly, allowing the pressure to rise gradually in the regulator.

2. Open the cylinder valve fully once the high pressure gauge indicates full cylinder pressure.

3. The regulator adjustment knob can now be turned to adjust the delivery pressure to the desired setting.
1. Turn the regulator pressure adjustment knob fully counterclockwise, to reduce the delivery pressure to zero.

2. Close the cylinder valve.

3. Close the regulator flow control valve.

4. If you are going to remove the regulator make sure you bleed the lines first.

To preserve the life of a regulator, and help ensure the cylinder pressure does not bypass the diaphragm and overpressure any equipment downstream it is important to close the cylinder valve properly after each use.
Additional Safety Measures

1. Keep regulators clean.
2. Always pressurize a regulator slowly, while standing with the cylinder valve between you and the regulator if possible – a gauge could blow.
3. Never lubricate a regulator or use pipe dopes. This includes inlet fittings which are intended to be installed dry. Lubricants and pipe dopes could react with the gas or provide a source of contamination.
4. Always depressurize a regulator before closing the adjusting knob and removing the regulator from the cylinder.
5. Always remove regulators before moving a compressed gas cylinder.

Never use connection adaptors to mount a regulator that isn’t intended for the gas(es) being used.
Once lines and valves have been installed check all connection points for leaks using an inert gas and a soap bubble solution (e.g. Snoop), or some other equally effective & safe means.
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