

Process gas requirements (Core, VWI, and OptiMix gas connect consoles)

You must supply the process gases and supply gas plumbing for your cutting system. See *Table 7* on page 46 for supply gas quality, pressure, and flow requirements.

CAUTION

Gas leaks or pressure and flow rates that are outside of recommended ranges can:

- Cause problems with system performance
- Result in bad cut quality
- Shorten the life of consumables

If the quality of the gas is bad, it can decrease:

- Cut quality
- Cut speed
- Cut thickness capabilities

See *Table 7* on page 46 for the recommended pressures and flow rates.

Table 7 – Gas quality, pressure, and flow requirements

Gas*	Quality	Pressure	Maximum flow rate
O ₂ (oxygen)	99.5% pure, clean, dry, oil-free**	7.5 bar ± 0.4 bar (110 psi ± 5 psi)	70.83 slpm 150 scfh
N ₂ (nitrogen)***	99.99% pure, clean, dry, oil-free	7.5 bar ± 0.4 bar (110 psi ± 5 psi)	180.83 slpm 380 scfh
Air**, [†]	Clean, dry, oil free consistent with 8573-1:2010 Class 1.4.2	7.5 bar ± 0.4 bar (110 psi ± 5 psi)	118 slpm 250 scfh
H ₂ (hydrogen)	99.995% pure	7.5 bar ± 0.4 bar (110 psi ± 5 psi)	50 slpm 105 scfh
Ar (argon)	99.99% pure; clean, dry, oil-free	7.5 bar ± 0.4 bar (110 psi ± 5 psi)	118 slpm 250 scfh
F5 (95% nitrogen, 5% hydrogen)	99.98% pure	7.5 bar ± 0.4 bar (110 psi ± 5 psi)	40 slpm 85 scfh

* Water can be used as a shield fluid for XPR300 plasma power supplies that have a VWI or OptiMix gas connect console. See *Shield water requirements (VWI and OptiMix)* on page 49 for the specifications and requirements for water that is used for shield purposes.

** Air compressors must provide air that meets the ISO air specification. **Important:** Any air compressors that provide air to the cutting system must extract oil prior to air delivery.

*** Nitrogen is required for all mild steel processes.

[†] Air is required for H₂ mix processes.

Code conformity

- All customer-supplied equipment must meet applicable national and local codes for supply gas and supply gas plumbing. Contact a licensed plumber for more information about the codes in your location.
- Any installation, modification, or repair of supply gas equipment or plumbing systems must be done by a licensed plumber.

Plumbing for supply gases

WARNING



If you use oxygen as the plasma gas for cutting, it can cause a potential fire hazard due to the oxygen-enriched atmosphere that collects. Hypertherm recommends that you install an exhaust ventilation system to remove the oxygen-enriched atmosphere that can collect when oxygen is used as the plasma gas for cutting. Flashback arrestors are required to stop the spread of fire to the supply gases (unless a flashback arrestor is not available for a specific gas or pressure). You must supply the flashback arrestors for your cutting system or you can get them from your cutting machine supplier.



Hydrogen is a flammable gas that presents an explosion hazard. Keep flames away from cylinders and hoses that contain hydrogen. Keep flames and sparks away from the torch when using hydrogen as a plasma gas. Consult your local safety, fire, and building code requirements for the storage and use of hydrogen. Hypertherm recommends that you install an exhaust ventilation system to remove the hydrogen-enriched atmosphere that can collect when hydrogen is used as the plasma gas for cutting. Flashback arrestors are required to stop the spread of fire to the supply gases (unless a flashback arrestor is not available for a specific gas or pressure). You must supply the flashback arrestors for your cutting system. You can get them from your cutting machine supplier.

You must install the supply gases and supply gas plumbing for your cutting system.

- You can use flexible hoses that are designed to carry the appropriate gas and are rated for the correct pressure. Other hoses can crack and leak.
- You can use rigid copper pipes.
- Do not use steel or aluminum.

-  Supply-gas hoses are available from Hypertherm. (See *Supply hoses* on page 342.)
-  All customer-supplied equipment must meet applicable national and local codes for supply gas and supply gas plumbing. Contact a licensed plumber for more information about the codes in your location.

Hypertherm recommends an internal diameter of 10 mm (0.375 inch) for supply-gas hoses that are 76 m (250 feet) or less. *Table 8* on page 48 describes the recommended sizes for gas fittings.

Table 8 – Recommended gas fitting sizes

Fitting type	Size
N ₂ / Ar	5/8 inch – 18 RH, internal (inert gas) "B"
Air	9/16 inch – 19, JIC, #6
F5 / H ₂	9/16 inch – 18, LH (fuel gas) "B"
O ₂	9/16 inch – RH (oxygen)

-  The location of regulators and the number of elbow fittings can have an effect on inlet pressure. If the inlet pressure for your cutting system is not within recommended specifications, contact your cutting machine supplier or regional Hypertherm Technical Service team.

CAUTION

Never use PTFE tape on any joint preparation.

All hoses, hose connections, and hose fittings used for supply gas plumbing must be designed for use with the appropriate gas and pressure rating. Other hoses, hose connections, or hose fittings can crack or leak.

Some air compressors use synthetic lubricants that contain esters. Esters will damage the polycarbonates in the air filter bowl.

Regulators for supply gases

CAUTION

Do not use low-quality gas regulators. They do not provide consistent supply gas pressure. Low-quality gas regulators can also cause problems with system performance and decrease cut quality.

Synthetic lubricants that contain esters (which are used in some air compressors) will damage polycarbonates used in the air filter bowl.

You must supply the gas regulator for your cutting system. Choose a high-quality gas regulator that has the following characteristics:

- A 2-stage gas regulator that maintains consistent gas pressure with high-pressure gas cylinders
- or
- A 1-stage gas regulator that maintains consistent gas supply pressure with liquid cryogenic or bulk gas storage.

For best results, position the gas regulator (or regulators) within 3 m (10 feet) of the gas connect console.

Shield water requirements (VWI and OptiMix)

Use of water as a shield fluid is optional. If you use water as a shield fluid, always use water that meets the specifications in *Table 9* and *Table 10*.

Table 9 – Quality, pressure, and flow requirements for shield water (use is optional)

Water type	Quality*	Minimum and maximum pressure	Maximum flow rate required
H ₂ O	<p>Deionized water is not recommended to use as shield water.</p> <p>Hypertherm recommends a water softener if the water has a high mineral content. (See <i>Table 10</i>.)</p> <p>Water with high levels of particulates must be filtered.</p>	<p>2.76 bar (40 psi) minimum</p> <p>7.92 bar (115 psi) maximum</p>	35 L/h (9.4 US gal/h)

* Water that does not meet minimum purity specifications can cause excessive deposits on the torch nozzle and shield. These deposits can alter the water flow and produce an unstable arc.

Table 10 – Purity measurement methods for shield water

Methods to measure water purity				
Water purity level	Conductivity µS/cm at 25°C (77°F)	Resistivity mΩ·cm at 25°C (77°F)	Dissolved solids or hardness (ppm of NaCl)	Grains per gallon (gpg of CaCO ₃)
Pure water <i>(For reference only. Do not use.)</i>	0.055	18.3	0	0
Maximum purity	0.5	2	0.206	0.010
Minimum purity	18	0.054	8.5	0.43
Maximum potable water <i>(For reference only. Do not use.)</i>	1000	0.001	495	25

Plumbing and hose requirements for optional shield water

You must supply the plumbing and hoses for the shield water.

- You can use flexible hoses that are designed to carry water.
- You can use rigid copper pipes.
- Do not use steel or aluminum pipes.

Install the plumbing and hoses consistent with all local and national codes. After installation, pressurize the entire system and test it for leaks.

To decrease the risk of leaks in the cutting system, make sure to tighten all connections to the recommended torque specifications in *Table 16* on page 108.



Hoses are available from Hypertherm. (See *Water (optional shield fluid) (blue)* on page 344 of the *Parts List*.)

Regulator requirement for optional shield water

Internal water pressure regulators are built into the VWI and OptiMix gas connect consoles. External water pressure regulators are only required with the water pressure is above 7.92 bar (115 psi).