

Beam Path Purge

BEAM PATH CONDITIONING FOR HIGH-POWER LASER SYSTEMS

One of the most important aspects of beam delivery for a high-power laser system is the beam purge. Beam purge can be defined as a low flow of clean, dry air or nitrogen that is introduced into the enclosed laser beam path. This flow of gas keeps a positive pressure inside the enclosed beam path to keep contaminants (particulate or vapors) out of the path of the laser beam.

A good beam purge is required to obtain consistent performance from any laser system, regardless of the power level; at power levels higher than 3,000 Watts, it is absolutely essential because problems created by poor-quality beam purge often are magnified at these power levels.

The external beam path is subject to contaminants such as dirt, grinding dust, and other large particulate that can distort the shape of the raw beam if introduced into the beam path. Less obvious contaminants such as paint and chemical fumes, oil mist, water vapor, and other sources of hydrocarbons also can cause distortion of the raw beam, creating disastrous results. This distortion is known as thermal blooming, or abnormal widening of the laser beam. The raw beam focus capability is changed as the focal point shifts in and out of the material, creating inconsistent and unacceptable cutting results.

To prevent this occurrence and keep the focal point constant, a proper beam purge must be used. This keeps a positive pressure of flowing gas within the beam delivery path and prevents shop contamination from entering.

At power levels higher than 3,000 Watts, it is recommended to pressurize the internal beam path with Nitrogen. Use gas pressure of 100 – 100mbar with a gas flow of 20L/min.

Laser users often mistakenly assume that a system can operate with beam purges turned down and still maintain peak performance. As an alternative for saving money, air can be used in place of nitrogen as the beam purge gas. However, the air must be clean, dry, and oil-free. It is not adequate to use standard air from a shop compressor to purge the beam path. Oil mist, water vapor, and hydrocarbons can be found in the cleanest shop air, even when a compressor with an air dryer is used.

The best solution is to obtain a secondary air dryer and locate it close to the laser machine. The air dryer should filter the air to 1 micron and regulate the dew point to 40 degrees Fahrenheit or lower. Using a dedicated air dryer and leaving the purge turned up at all times will help prevent countless hours of troubleshooting.

For additional information, contact a Haas Laser Technology sales representative (973) 598-1150 or visit our website www.haaslti.com



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