

CDI 3000 Series

SONIC NOZZLE FLOW REFERENCES

- **Accurate flow reference**
- **Verify compressor output**
- **Benchmark flowmeter in place**



CDI 3000-series sonic nozzles provide a convenient way to test and benchmark the performance of CDI flowmeters in place

HOW A SONIC NOZZLE WORKS

The entrance portion of the nozzle is shaped so that a gas entering the nozzle achieves a uniform velocity when it reaches the throat of the nozzle. If there is a sufficient pressure drop between the entrance of the nozzle and the throat, the gas will accelerate to the speed of sound. The flow through the nozzle is then dependent only on the pressure and temperature of the gas entering the nozzle; the downstream pressure has no effect as long as it is low enough to permit the speed of sound to be reached. The discharge portion is tapered, to permit the gas to regain much of the pressure it lost on entering the nozzle. This allows the pressure at the throat of the nozzle to be considerably lower than the pressure at the discharge, and extends the range of conditions over which the nozzle can be used.

PIPING AND USING THE NOZZLE

Pipe air to the nozzle with pipe having an inside diameter at least four times as great as the throat diameter of the nozzle. Install a good-quality pressure gauge and a thermometer sensing the temperature of the air approaching the nozzle. If there could be severe distortion in the flow approaching the nozzle, provide a length of pipe equal to ten times its diameter to allow the flow to settle. On the discharge end of the nozzle, install a muffler with sufficient capacity to ensure a minimal pressure drop.

The flow of a particular gas through a nozzle with a particular area varies in direct proportion to the absolute pressure and in inverse proportion to the square root of the absolute temperature.

SPECIFICATIONS

Accuracy:

0.5 percent plus errors due to temperature and pressure measurement

Wetted materials:

Brass