

As technology demands precision and smaller tolerances, engineers are turning to Bird Precision for their fluid power orifice fitting needs. We offer a high-value solution in nozzle, restrictor and orifice applications, all designed with Bird Precision accuracy.

Conventional drilling methods inherently sacrifice quality and dependability due to drill wobble, run out and burr generations. Bird Precision wire-lapped orifices are burr-free, extremely round and sharp-edged with a standard hole tolerance of $+.0002/-0.0000$ inches.

Economically produced using mass production techniques, standard hole sizes range from $.00029$ through $.081$ inches in a synthetic sapphire or ruby material which is almost chemically inert and extremely wear resistant.

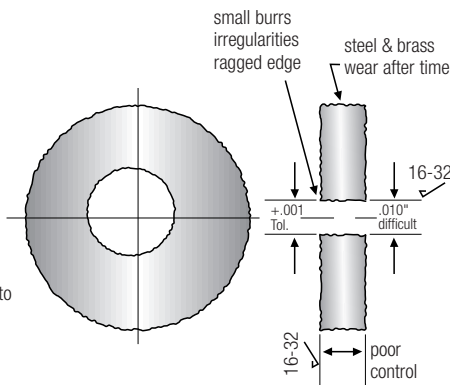
Bird Precision orifices are acclaimed for accuracy. They exhibit highly repeatable flows from $.5$ cc/min.

Fluid Power

A Comparison of Machining Methods

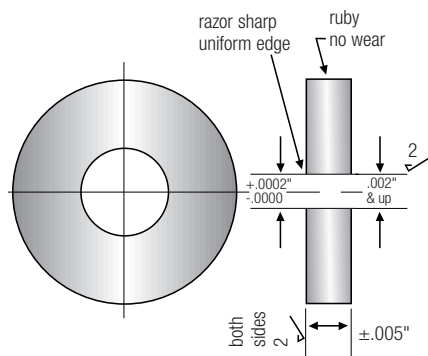
Drilled EDM or laser machining hole piercing methods cause:

- Ragged edges
- 16-32 micro inch finish
- Burrs
- Tool marks
- Out of round conditions
- Cd values vary
- Must be checked and matched to balance flow
- Small sizes difficult
- Tolerance control $.001$ " difficult



Bird Precision's method of wire lapping and flat surface lapping results in:

- Razor sharp edges
- 2 micro inch finish
- Roundness better than $.000050$ "
- Concentricity $.0003$ " or better
- Controlled bore length
- Cd very uniform
- 1,000's matched flows with sizes from $.0002$ " and up
- Tolerances $.0002$ " the norm
- Long life without wear



Many hydraulic engineers require balance flow in their systems. Therefore, in spool valves and servo valves where a shuttle oscillates back and forth between ports that contain an orifice, or in applications where two cylinders are required to lift in tandem with the same stroke, orifices with balance flow are critical.

Before the advent of precision sapphire and ruby orifices, hydraulic engineers were forced to calibrate orifices and segregate them into matched sets in order to achieve the balanced flow they needed.

Conventional methods of producing sharp edged orifices such as drilling and EDM are inherently flawed and do not produce orifices with a predictable coefficient of discharge. This is because of drill wobble, burrs, irregularities in the edge, out-of-roundness and imprecise tolerance of the hole.

To overcome these problems and produce orifices in production quantities that are closely matched in flow, Bird Precision utilizes a special wire lapping technique. This enables the variables such as surface finish, roundness, edge uniformity and orifice throat to be controlled to the nth degree. There is no chance of burrs, ragged edges, out-of-roundness or imprecise diameter tolerances that would change the orifice coefficient of discharge. At high pressures, even small variations effect the flow, causing wide swings and turbulence.

Bird Precision's wire lapping method enables the orifices to be manufactured in high quantities with reproducible precision. Additionally, the sapphire and ruby material has a very high wear resistance. The orifices do not quickly lose their sharp edge or tolerance under high pressure as do other metallic orifice materials.

APPLICATION EXAMPLE



In applications for cylinders and manifolds, Bird Precision orifice screws fill the demand for precision orifices that can be easily inserted.

Orifice screws are available in a variety of common threads, such as 1/16-27, 1/8-27, 1/4-18, 3-56, 10-32, 6-32, 12-24, 5/16-24 and 1/4-28.

Bird's full line of precision orifice are available screw mounted in sizes from .00029" through .081".

The threaded design of these hydraulic inserts makes it easy for the design engineer to interchange orifices in order to arrive at a specific flow. The incredible wear resistance of the ruby material ensures the engineer that once the required flow has been reached, the instrument will perform precisely over its lifespan.