

Most [Ultra High Pressure Intensifier Pumps](#) operate at a maximum pressure of 60,000 PSI (pounds per square inch), sending a highly pressurized water stream to a cutting head. The total volume of water, or the "flow rate", the pump can deliver to the cutting head(s) is determined by the [intensifier pump's horsepower \(hp\)](#) rating. Higher flow rates deliver larger volumes of water, enabling a single pump to operate multiple cutting heads. Conversely, lower pump horsepower delivers lower flow rates.

Jet Edge's OmniJet's Orifice inside diameter ("I.D.") concentrates the water stream, and in combination with a Nozzle, delivers the cutting pressure to the cutting surface. The orifice must be selected relative to the pump pressure being utilized and the flow rate being delivered in order to achieve the cutting effectiveness of the system. An orifice that is correctly sized and seated will deliver a tight cohesive stream that might look like a piece of fishing line. Choosing an orifice with too large an I.D. creates an over cycle condition for the pump as too much water is leaving the cylinder compared to the water volume coming in. This makes the piston cycle too fast, and the PLC shuts down before there is seal damage. While technically there is no smallest orifice that can be used, it is unusual to see one smaller than 0.007" and that is used when cutting with water only.

Below, we outline how to Select your Jet Edge OmniJet Water-only Orifice.

Selecting your Jet Edge OmniJet Waterjet Orifice

1. Choose your Performance Standard

Orifices incorporate a hardened jewel material that is used to direct the water stream. Typical materials are Sapphire, Ruby, Diamond, and Synthetic materials. Sapphire is the most common in the industry, however, diamond is increasingly popular due to its reliability, longer life, and lower operating costs in per hour usage over its lifetime. Ruby and Sapphire orifices are more prone to chipping, leading to diminished cut quality and shorter nozzle life – however they are both cheaper than diamond and synthetics. Consider your application and performance requirement and choose your Orifice type first:



OmniJet Waterjet Sapphire Orifices

Our Sapphire Orifices are lab grown using the highest quality materials and finished using a propriety polishing process to ensure consistent quality, high performance and long life in waterjet applications. Jet Edge Sapphire Orifices have a larger radius on the I.D. bore to reduce the risk of damage to the lead-in edge during cutting. They have a shorter coherent stream but are an excellent choice for users where the water quality is less than ideal.



OmniJet Waterjet tetraCORE Orifices

Our tetraCORE Orifices are precision engineered under tightly controlled conditions. tetraCORE approaches the hardness and wear resistance of Diamond, while offering prices compared to Sapphire. They are manufactured with a smaller radius on the I.D. bore when compared to our Sapphire Orifices to produce a long and smooth coherent stream for cutting. tetraCORE Orifices provide 10-15 times more expected life than Sapphire.



OmniJet Waterjet Diamond Orifices

Our Diamond orifices are the “go-to” standard for waterjet cutting with a 600-hour guarantee against a defect failure when used with our Short Stop Hp Filter. Each of our Diamond Orifices are cut in a way to ensure strength through the elimination of stress points and oriented to utilize its strongest and most resistant surface. Diamond Orifices provide the highest combination of quality, cut speeds and life expectancy at over 2000 hours when cleaned as needed and used with our Short Stop Hp Filter.



OmniJet Waterjet High-Performance Orifices

Our High-Performance Orifices are lab grown using the highest quality materials and finished using a propriety polishing process to ensure consistent quality, high performance, and long life in waterjet applications. They produce the longest, smoothest, coherent stream for and are 100% tested. When compared to a standard orifice, the solid core stream produced is nearly 3 times longer. It is best suited for cutting thicker materials (e.g., foam, rubber, etc.) or for cutting products where wetting/staining of the cut edge is of concern such as wood grain for the automotive industry.

2. Consult Orifice I.D. Sizing Table

Orifice I.D.'s are selected relative to the the water flow, referred to as “flow rate”, and the operating pressure of the UHP pump. Ccombined with the appropriate nozzle, a smaller I.D. provides greater precision for intricate shapes and a higher cut finish quality on thinner materials. A larger I.D. allows for greater water and abrasive flow and provides for a faster cut. Accordingly, sizing the maximum I.D. for the flow rate and cutting pressure is recommended. When utilizing a higher horsepower pump that delivers water to multiple cutting heads, each orifice/nozzle combination must be considered.

3. Add a Short Stop Filter Assembly

The Jet Edge Short Stop Filter is an in-line filter that prevents line-borne contaminants from reaching your HP On/Off Valve Needle and Seat as well as your waterjet orifice. The filter is designed to simply and effectively capture debris larger than .0055 that leads to damage of the needle and seat and orifice resulting in premature failure and higher maintenance costs. When the Short Stop Filter is used with the Permalign II Diamond Orifices, you are covered by a 600hr Orifice Guarantee.



Abbreviated Orifice I.D. Sizing Table

Orifice I.D.'s are selected relative to the operating pressure (psi) the pump is cutting at, the [water flow rate of the UHP pump](#), and the number of orifices being supplied by the pump.

To determine the maximum orifice size in the Sizing Table:

- Choose the Operating Pressure (psi) column the pump will be set to for a cut
- Scroll down the Operating Pressure (psi) column until you arrive at the Pump Flow Rate you are utilizing
- The maximum orifice diameter associated with the selected combination is listed in the left column.

Note: The flow rates provided in the table below are for one orifice. When a multiple-orifice setup is used, the required flow rate must be multiplied by that number of orifices. For example, a motion system using four 0.010 orifices at 55K psi requires a flow rate of four times 0.49, or 1.96 U.S. GPM. A higher horsepower pump delivering the higher flow rates will be required. Choosing an orifice with too large an I.D. creates an over cycle condition for the pump as too much water is leaving the cylinder compared to the water volume coming in.

Operating Pressure (psi) & Flow Rates (gpm)

Orifice I.D. (Inches)	Operating Pressure (psi) x 1,000									Pump Flow Rates (gpm)
	20	25	30	35	40	45	50	55	60	
0.010	0.30	0.33	0.36	0.39	0.42	0.44	0.47	0.49	0.51	
0.011	0.36	0.40	0.44	0.47	0.51	0.54	0.57	0.59	0.62	
0.012	0.43	0.48	0.52	0.56	0.60	0.64	0.67	0.71	0.74	
0.013	0.50	0.56	0.61	0.66	0.71	0.75	0.79	0.83	0.86	
0.014	0.58	0.65	0.71	0.77	0.82	0.87	0.92	0.96	1.00	
0.015*	0.66	0.74	0.81	0.88	0.94	1.00	1.05	1.10	1.15	
0.016	0.76	0.85	0.93	1.00	1.07	1.13	1.20	1.25	1.31	
0.017	0.85	0.95	1.05	1.13	1.21	1.28	1.35	1.41	1.48	
0.018	0.96	1.07	1.17	1.27	1.35	1.43	1.51	1.59	1.66	
0.019	1.07	1.19	1.31	1.41	1.51	1.60	1.69	1.77	1.85	
0.020**	1.18	1.32	1.45	1.56	1.67	1.77	1.87	1.96	2.05	
0.021	1.30	1.46	1.59	1.72	1.84	1.95	2.06	2.16	2.25	
0.022	1.43	1.60	1.75	1.89	2.02	2.14	2.26	2.37	2.47	
0.023	1.56	1.75	1.91	2.07	2.21	2.34	2.47	2.59	2.70	
0.024	1.70	1.90	2.08	2.25	2.40	2.55	2.69	2.82	2.95	
0.025***	1.85	2.06	2.26	2.44	2.61	2.77	2.92	3.06	3.20	
0.026	2.00	2.23	2.44	2.64	2.82	2.99	3.16	3.31	3.46	

Jet Edge Intensifier Pump	Sample Operating Pressure (psi)	Maximum Flow Rate (gpm)	Maximum Orifice I.D.
HERO50	55,000 psi	1.1 gpm (4.1 lpm)	*0.015 in (0.38 mm)
HERO100	55,000 psi	2.0 gpm (7.6 lpm)	**0.020 in (0.51 mm)
HERO150	55,000 psi	3.2 gpm (12.1 lpm)	***0.025 in (0.64 mm)

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OmniJet Waterjet Sapphire Standard Orifice Assemblies

Part Number	Jewel Insert and I.D. (7/16" - 20 Thread)
36874003	OmniJet Sapphire Standard Orifice Assembly, .003" I.D.
36874004	OmniJet Sapphire Standard Orifice Assembly, .004" I.D.
36874005	OmniJet Sapphire Standard Orifice Assembly, .005" I.D.
36874006	OmniJet Sapphire Standard Orifice Assembly, .006" I.D.
36874007	OmniJet Sapphire Standard Orifice Assembly, .007" I.D.
36874008	OmniJet Sapphire Standard Orifice Assembly, .008" I.D.
36874009	OmniJet Sapphire Standard Orifice Assembly, .009" I.D.
36874010	OmniJet Sapphire Standard Orifice Assembly, .010" I.D.
36874011	OmniJet Sapphire Standard Orifice Assembly, .011" I.D.
36874012	OmniJet Sapphire Standard Orifice Assembly, .012" I.D.
36874013	OmniJet Sapphire Standard Orifice Assembly, .013" I.D.
36874014	OmniJet Sapphire Standard Orifice Assembly, .014" I.D.
36874015	OmniJet Sapphire Standard Orifice Assembly, .015" I.D.
36874016	OmniJet Sapphire Standard Orifice Assembly, .016" I.D.
36874018	OmniJet Sapphire Standard Orifice Assembly, .018" I.D.
36874020	OmniJet Sapphire Standard Orifice Assembly, .020" I.D.
37111021	OmniJet Sapphire Standard Orifice Assembly, .021" I.D.
37111022	OmniJet Sapphire Standard Orifice Assembly, .022" I.D.
37111023	OmniJet Sapphire Standard Orifice Assembly, .023" I.D.
37111024	OmniJet Sapphire Standard Orifice Assembly, .024" I.D.
37111027	OmniJet Sapphire Standard Orifice Assembly, .027" I.D.
37111030	OmniJet Sapphire Standard Orifice Assembly, .030" I.D.
37111032	OmniJet Sapphire Standard Orifice Assembly, .032" I.D.
37111034	OmniJet Sapphire Standard Orifice Assembly, .034" I.D.
37111036	OmniJet Sapphire Standard Orifice Assembly, .036" I.D.
37111038	OmniJet Sapphire Standard Orifice Assembly, .038" I.D.
37111040	OmniJet Sapphire Standard Orifice Assembly, .042" I.D.
37111042	OmniJet Sapphire Standard Orifice Assembly, .042" I.D.

OmniJet Waterjet tetraCORE Orifice Assemblies

Part Number	Jewel Insert and I.D. (7/16" - 20 Thread)
109918005	OmniJet tetraCORE Orifice Assembly, .005" I.D.
109918006	OmniJet tetraCORE Orifice Assembly, .006" I.D.
109918007	OmniJet tetraCORE Orifice Assembly, .007" I.D.
109918008	OmniJet tetraCORE Orifice Assembly, .008" I.D.
109918009	OmniJet tetraCORE Orifice Assembly, .009" I.D.
109918010	OmniJet tetraCORE Orifice Assembly, .010" I.D.
109918011	OmniJet tetraCORE Orifice Assembly, .011" I.D.
109918012	OmniJet tetraCORE Orifice Assembly, .012" I.D.
109918013	OmniJet tetraCORE Orifice Assembly, .013" I.D.
109918014	OmniJet tetraCORE Orifice Assembly, .014" I.D.
109918015	OmniJet tetraCORE Orifice Assembly, .015" I.D.

OmniJet Waterjet Diamond Orifice Assemblies

Part Number	Jewel Insert and I.D. (7/16" - 20 Thread)
37205004	OmniJet Diamond Orifice Assembly, .004" I.D.
37205005	OmniJet Diamond Orifice Assembly, .005" I.D.
37205006	OmniJet Diamond Orifice Assembly, .006" I.D.
37205007	OmniJet Diamond Orifice Assembly, .007" I.D.
37205008	OmniJet Diamond Orifice Assembly, .008" I.D.
37205009	OmniJet Diamond Orifice Assembly, .009" I.D.
37205010	OmniJet Diamond Orifice Assembly, .010" I.D.
37205011	OmniJet Diamond Orifice Assembly, .011" I.D.
37205012	OmniJet Diamond Orifice Assembly, .012" I.D.
37205013	OmniJet Diamond Orifice Assembly, .013" I.D.
37205014	OmniJet Diamond Orifice Assembly, .014" I.D.
37205015	OmniJet Diamond Orifice Assembly, .015" I.D.

OmniJet Waterjet Sapphire Hi Performance Orifice Assemblies

Part Number	Jewel Insert and I.D. (7/16" - 20 Thread)
100546004	OmniJet Sapphire Hi Performance Orifice Assembly, .004" I.D.
100546005	OmniJet Sapphire Hi Performance Orifice Assembly, .005" I.D.
100546006	OmniJet Sapphire Hi Performance Orifice Assembly, .006" I.D.
100546007	OmniJet Sapphire Hi Performance Orifice Assembly, .007" I.D.
100546008	OmniJet Sapphire Hi Performance Orifice Assembly, .008" I.D.
100546009	OmniJet Sapphire Hi Performance Orifice Assembly, .009" I.D.
100546010	OmniJet Sapphire Hi Performance Orifice Assembly, .010" I.D.
100546011	OmniJet Sapphire Hi Performance Orifice Assembly, .011" I.D.
100546012	OmniJet Sapphire Hi Performance Orifice Assembly, .012" I.D.
100546013	OmniJet Sapphire Hi Performance Orifice Assembly, .013" I.D.
100546014	OmniJet Sapphire Hi Performance Orifice Assembly, .014" I.D.
100546015	OmniJet Sapphire Hi Performance Orifice Assembly, .015" I.D.
100546016	OmniJet Sapphire Hi Performance Orifice Assembly, .016" I.D.
100546018	OmniJet Sapphire Hi Performance Orifice Assembly, .018" I.D.
100546020	OmniJet Sapphire Hi Performance Orifice Assembly, .020" I.D.
100546024	OmniJet Sapphire Hi Performance Orifice Assembly, .024" I.D.
100546027	OmniJet Sapphire Hi Performance Orifice Assembly, .027" I.D.
100546030	OmniJet Sapphire Hi Performance Orifice Assembly, .030" I.D.
100546038	OmniJet Sapphire Hi Performance Orifice Assembly, .038" I.D.
100546040	OmniJet Sapphire Hi Performance Orifice Assembly, .040" I.D.

In-line Filter Installation and Maintenance (see illustration)

In most cases, the filter assembly is installed just prior to the HP On/Off Valve, replacing the Standard Adapter P/N 26218. The Short Stop Filter is inserted into the Short Stop Adapter and then nested with the Short Stop Body. The Short Stop Filter should be checked, cleaned, or replaced every 400hrs depending upon water quality.

Part Number	Description
104707	Short Stop Filter Assembly, 3/8"M X 1/4"F, 60K PSI
110976	Short Stop Filter Assembly, 3/8"M X 1/4"F, 100K PSI
104709	Short Stop Filter

