SB-0265

Inlet Water Quality

Purpose

Water quality plays a crucial role in determining how well an ultrahigh-pressure waterjet system operates. Adhere to specifications for water quality to ensure optimum performance of ultrahigh-pressure pumps and components.

It is the customer's responsibility to maintain inlet water quality and temperature within the recommended parameters.

Scope

All intensifier and direct drive ultrahigh-pressure water pumps.

Requirements

Primary water

Use a municipal tap water supply source (or equivalent) for the primary water (Filtered Water In) to the pump. Process water, boiler condensate, or untreated water sources are generally not acceptable. Do not use water treated by the deionization (DI) process. Reverse osmosis (RO) process is acceptable under certain circumstances. Just like DI, RO can cause damage unless a proper bypass feature is put in place. Contact Flow Technical Services or a Project Manager for further information.

Plumbing

All plumbing connections between the pump and the primary water source or water softener should be made with appropriately-sized fittings and pipes (½ inch [15 mm] or larger).

Flow recommends pipes and fittings made with copper or Schedule 80 PVC. Use only quality hoses such as Push-Lok® or stainless steel. Do not use pipes and fittings made with iron or aluminum.

Water condition

The inlet water source must meet the minimum required levels for the following parameters.

Parameter	Min. Required Level	Good Level	Best Level
Alkalinity	50 ppm	25 ppm	10 ppm
Bacteria	< 100 colonies/100 ml	< 50 colonies/100 ml	< 25 colonies/100 ml
Chlorine	0.05 mg/l	0.05 mg/l	0.05 mg/l
Hardness (as $CaCO_3$)	≤ 17 ppm	15 ppm	1 ppm
Iron (Fe)	0.2 ppm	0.1 ppm	0.01 ppm
Manganese (Mn)	0.1 ppm	0.05 ppm	0.025 ppm
Magnesium (Mg)	0.5 ppm	0.1 ppm	0.1 ppm
pH	6.5-9.5	6.5-9.5	6.5-9.5
Silica (SiO_2)	15 ppm	10 ppm	1 ppm
Total Dissolved Solids (TDS)	200 mg/l	100 mg/l	5 mg/l*

* Water will begin to damage high-pressure components if levels are below this value.

Primary water treatments

Water softeners

A sodium ion exchange water softening system should be used to treat water hardness. The water softening system must have the capacity to handle 1.5 times the maximum flow rate of the pump. Both the exiting flow rate (in gallons [liters] per minute) and the flow rate of gallons (liters) per duty cycle should be considered.

Most water utilities change the source of the water supply seasonally, causing water hardness to change significantly. A softener should be selected that can handle the highest expected hardness levels.

A dual sodium ion exchange system is recommended to allow for regular regeneration of the system and to provide a continuous supply of treated water.

Water with unusually high iron levels requires additional water softening treatment from the local water treatment supplier.

Ultra-filtration

Water with silica levels above 15 ppm should be treated with an ultra-filtration system.

Suspended particulate filtration

The primary water supply must be filtered for suspended particulate matter. FLOW pumps include filters for this purpose. Replace filter cartridges as specified in the maintenance manual. Only FLOW filters with absolute ratings should be used.

A quality 1- or 2-stage 5 micron absolute pre-filter should be installed in the primary water source by the customer.

Primary water flow rates

Required primary water flow rates for pumps (with maximum orifice sizes) are listed in the most recent revision of the pump manual.

Cooling water

Cooling water for heat exchangers on intensifier pumps can be provided from a standard water source. This water does not need to be softened.

Cooling water flow rates

Required cooling water flow rates for pumps are listed in the most recent revision of the pump manual. Information about recommended chiller unit minimum BTU ratings can be obtained from Flow Technical Services or a Project Manager.

Inlet water temperature

If the temperature of the inlet water to the pump does not fall within the parameters as specified in the pump manual, a chiller may be required to achieve the expected pump maintenance cycles. The capacity of a chiller is determined by horsepower, application, and site-specific conditions. Contact Flow Technical Services for more information.

Required inlet water temperature ranges for pumps are listed in the most recent revision of the pump manual.