Johnson Screens

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Z-Alloy Intake Screens compared to Zebra Mussel resistant coatings

In the early 1990's, Johnson Screens introduced Z-Alloy for intake screens that inhibit the attachment of zebra mussels to passive intake screens, which was a growing crisis in the Great Lakes.

A beta site began at the J.H. Campbell Power Plant in 1993, where Johnson Screens proved the effectiveness of Z-Alloy design.

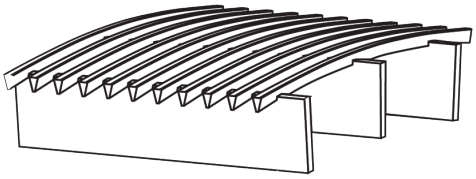
Zebra Mussel infestation has spread throughout the US and the rest of the world, Johnson Screens has installed hundreds of Z-Alloy passive intake screens worldwide, allowing for municipalities, power plants and industry requiring raw water from lakes and rivers, to have access to an uninterrupted water source.

Some other intake manufactures offer screens that claim to deter Zebra Mussel attachment by using coatings, a much less expensive alternative.

Coating Issues

Johnson Screens was approached at a trade show by an intake screen user that was drawing water from Lake Champlain in Vermont and having issues with their screen.

The man stated after about three years of using their coated intake screen, they were having to periodically remove the screen (pictured on the left) for manual cleaning because much of the coating had worn off and Zebra Mussels were blocking off the screen.



A wedgewire screen is an extremely difficult item to coat properly.

Example
T-24 Screen with #69 wire - Non coated vs. Coated

Specified Slot Width	Open Area	Rated flow at 0.5 fps	Coated Screen Real Open Area	De-rated flow to stay under 0.5 fps
0.125" (3.2 mm)	63.78%	3400 gpm	60.56%	3200 gpm (5.9% less flow)
0.079" (2 mm)	52.67%	2800 gpm	47.01%	2500 gpm (10.7% less flow)
0.039" (1 mm)	35.45%	1900 gpm	24.47%	1300 gpm (31.6% less flow)

Note – If the wire size is reduced to accommodate the coating thickness and maintain the needed open area - then the issue is the actual strength of the screen itself.

Note – The above is all assuming the coating is applied in an exact even way, which is not what it would be. Blinding across the tight slot widths would also be a concern.

A single coating of an intake screen is, at a minimum in the, 0.008 in. thick range. Now a slot that was manufactured to +/- 0.002 in tolerance, is now reduced by a minimum of 0.016 in. due to the coating.

Slot velocity and headloss data are traditionally calculated based on the non-coated screen and can be affected by coatings, as shown by the data in the example.

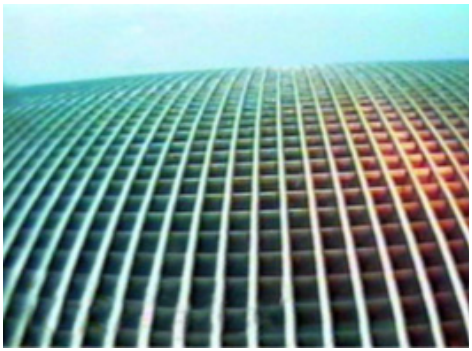
WE Power – (24) T-96HCE (2.2 BGD)

Handling

Handling and mishandling with coated screens, now becomes critical at the job site to ensure that the screens are not damaged in any way before or during the installation. This is not an issue with a solid material.

NSF-61 Certification

When Johnson Screens introduced Z-Alloy to the market, it was tested it and approved using NSF-61 Certification criteria. Recently Johnson Screens has submitted all intake screen products, including Z-Alloy, to NSF and received NSF-61 Certification for use in Drinking Water Applications.



Z-Alloy Screen after six years of service

Coatings Summary

The use of coatings on an intake screen as a long term solution to repel zebra mussels has not been proven over time.

A number of manufactures coatings contain a solid solution of copper and nickel containing at least 65 percent copper. This coating can wear down over time, be gouged off during transportation or installation and could be damaged over the life of the screen. Johnson Screens' intakes are constructed from a solid copper nickel wire, and as long as it is kept clean, will provide years of Zebra Mussel protection.

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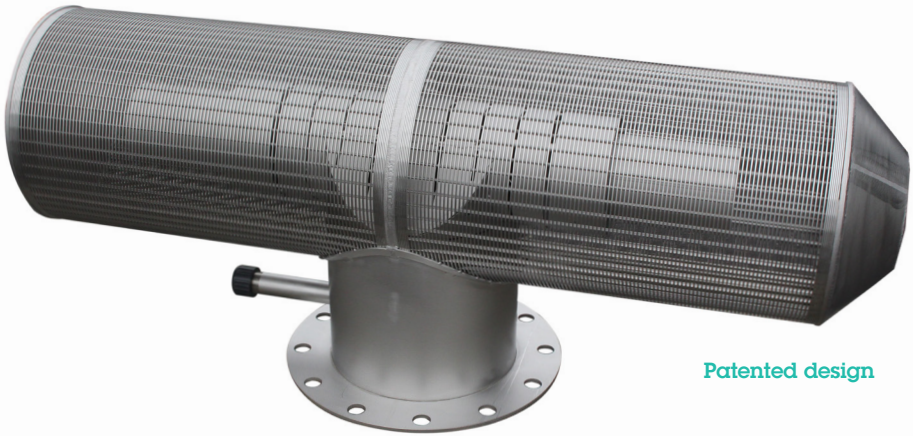
Johnson Screens Exclusive Max-Flow Intake System

Johnson Screens' next generation Passive Intake Screen, the Max-Flow™ design, increases flow capacity of the previous designs by up to 40% more.

The patent-pending design offers significant capital savings in any intake project by using smaller number of intake screens.

Additionally, a smaller Hydroburst System and significant less costs for the piping and civil work on a project will further increase project savings.

Max-Flow passive intake screens are available in all common Johnson Screens intake materials, including 304, 316, super duplex, and z-alloy.



Patented design

New features include:

- 1.4 times more capacity than the previous design
- Newly redesigned internal modifier
- An efficient means to withdraw water by evenly distributing flow and reducing the velocity to a 0.5 feet per second or less
- Non-plugging design is easy to maintain using Johnson Screens patented Hydroburst screen cleaning system
- 316b compliant intake screens

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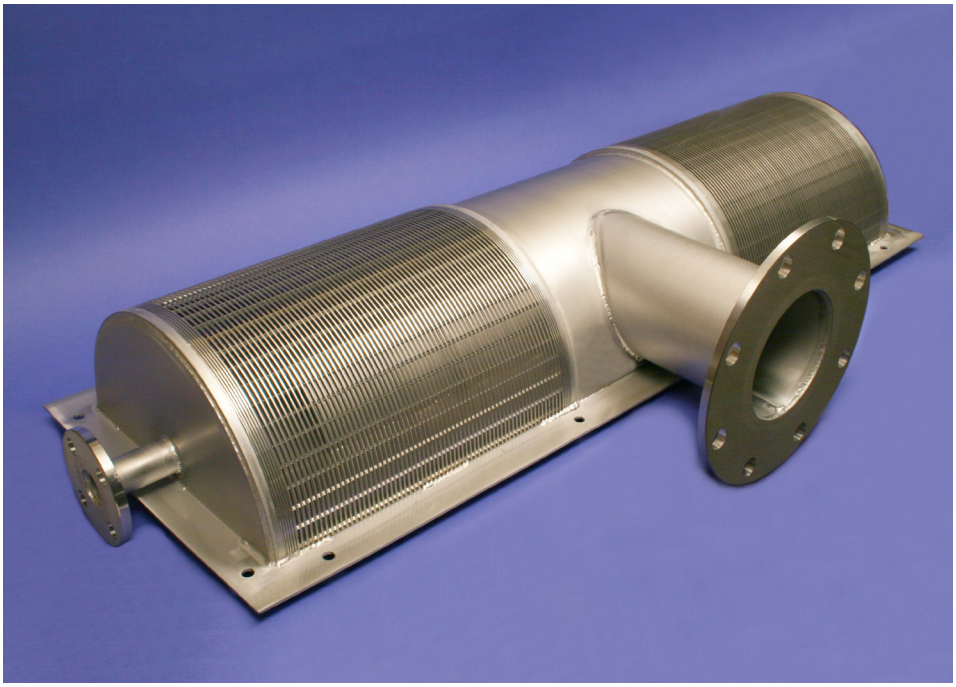
Passive Half Intake Screens –
Proven technology for shallow water resources



Based on the design of Johnson Screens' passive intake screen systems, the patent half screen intake system provides uninterrupted, environmentally safe water withdrawal from lakes, rivers and oceans. The half screen intake system allows for the screen to be used in half the operational depth of water of the traditional passive intake screen system.

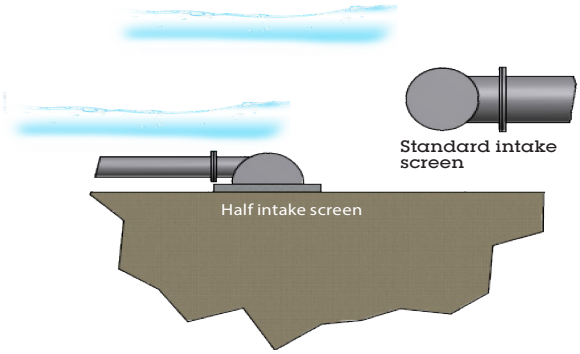
Design features include:

- Low profile – half the water depth needed
- Hydroburst cleaning system option
- Passive intake screen – no maintenance
- Vee-Wire construction

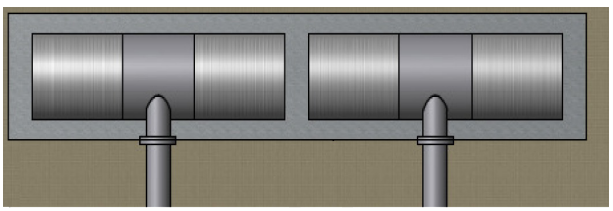
As water demands expand for cities and towns, water resources that previously were harder to withdraw from due to their shallow depth have now become a more viable option.

The general rule-of-thumb for proper intake screen depth has been to allow a half diameter of operational depth clearance from top and bottom, to prevent silt from being sucked up from the bottom and creating a vortex on the top of the water.

- Sits on a concrete pad and eliminates half the depth needed for the same flow.
- Functions identically to the standard Johnson Screens passive intake screen system.
- Uses the same control of flow distribution, with the patented multiple flow modifier design and Hydroburst system to keep the screen surface clean of debris.
- Standard sizes range from 1/2T - 12HC to 1/2T - 96HC intake screens, and are typically applied in pairs.



The half screen intake system is able to operate at half the water depth of traditional intake screen systems



The half screen intake sits on a concrete pad and eliminates half the depth needed for the same flow

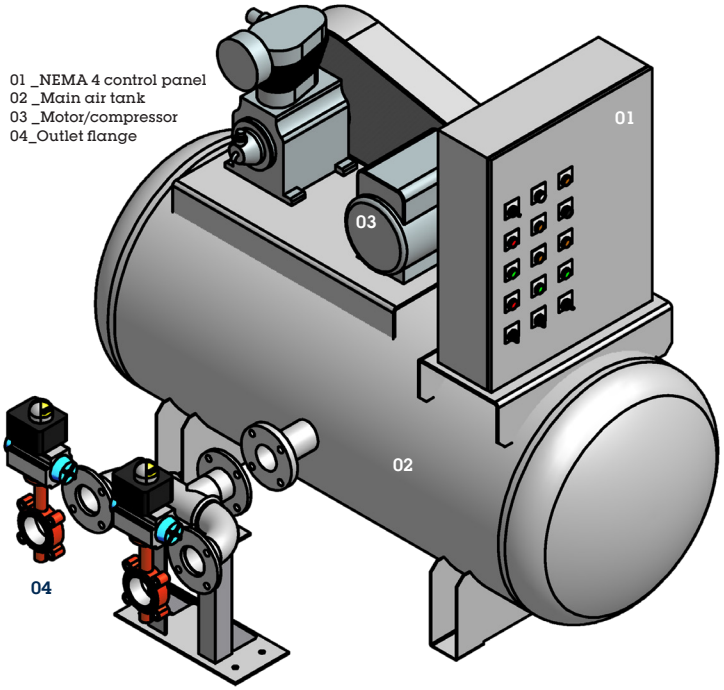
Typical Hydroburst air backwash cleaning system

Hydroburst Maximizes Intake System Efficiency

When debris in the water is high, the Hydroburst system provides fast and effective cleaning of the screen cylinders.

- Air volume is precisely matched to the intake screen cylinder size for maximum delivery.
- Measured air bursts force debris away and scour the screen surface for highly effective cleaning. A specially designed manifold distributes air inside the screen cylinder for optimal performance.

Varieties of controls are available, including manual, automatic activation on headloss, and timed activation.

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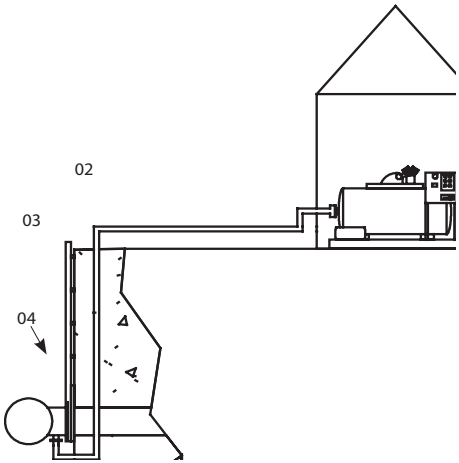

01_Hydroburst system cleaning
02_The Hydroburst is designed for a specific distance and depth of screen
03_Optional intake screen rail
04_ABW connection can also be on top of the screen