

American Eco Systems Elmosa Seawater Intake and Outfall Systems InvisiHead Intake Head and Outfall Diffuser Specifications 2018

THE NATURAL SEAWATER INTAKE SYSTEM
Self-operating, Self-maintaining, Gravity-flow Passive Seawater Intake System
No pumps. We let nature do the work

US EPA: Best Technology Available (BTA)

Do you have problems in your intake with:

- Zebra Mussels?
- Fish, Fish larvae, Sand, Trash and debris?
- Seagrass? or Potential for oil spills?

The 2013 InvisiHead is hurricane and 8-meter wave proof. It is streamlined and built to last in full operation for over 50 years

The **NEW InvisiHead**

Our Design Philosophy is based on:

- Pro action rather than Reaction
- Prevention rather than Curing
- Preservation & Exclusion rather than Eradication

Users: Electric Power Plants, Seawater Desalination Plants, Oil Refineries, Mining, Fish Farms, Aquaculture, District Cooling, Municipalities, and Others

We have the permanent and the natural solution

American Eco Systems Corporation
540 Centre St., Nutley, New Jersey 07110 US
t. +1 973 563 7270 f. +201 218 6854
e. elmosa@amecosys.com

Elmosa

www.amecosys.com/elmosa

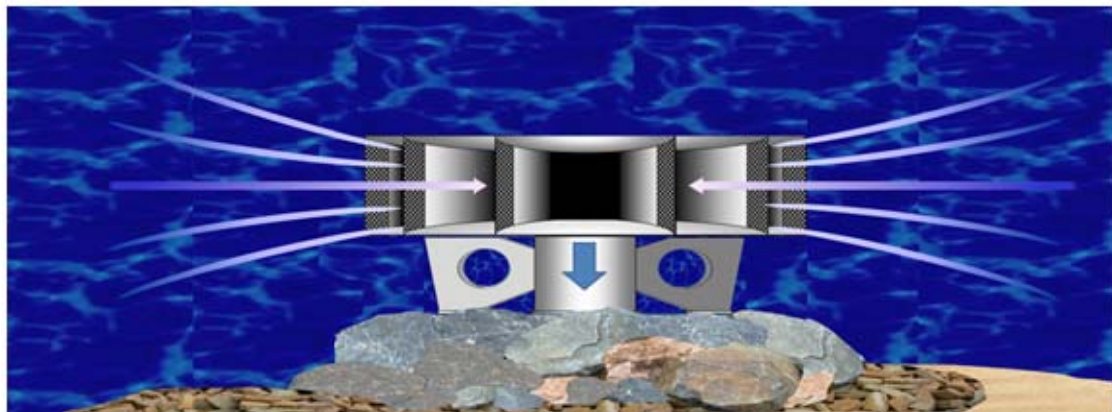
The InvisiHead Sea Outfall; flow attains local ambient conditions as soon as it is out

Wastewater, cooling water, brine, etc. **From User**

Paraboloidal InvisiHead diffuser

AES The Home of the InvisiHead

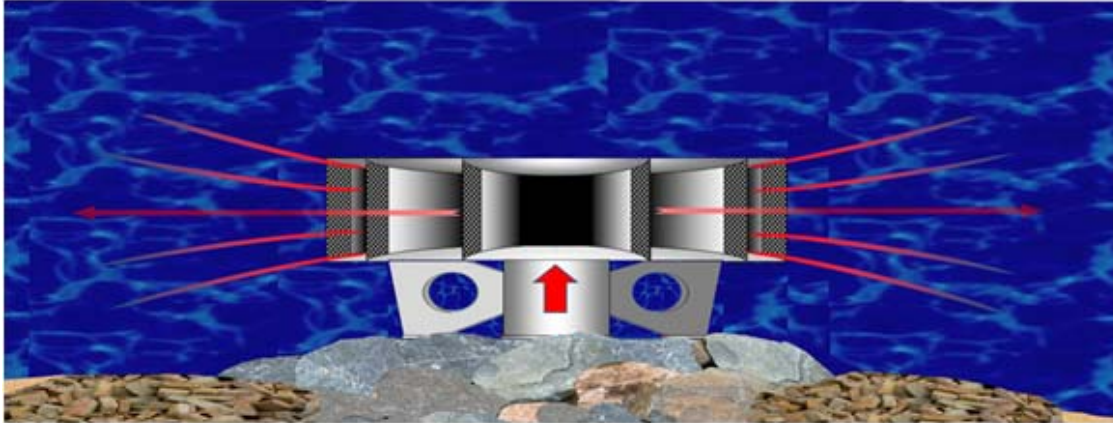
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Technical:

- Intake entrance and outfall exit velocity: 0.09 m/s max., intake head outlet velocity at the upstream InvisiHead/intake pipe inlet interface region: 0.11-0.12 m/s;
- Flow controlling mechanism: Potential flow;
- Intake flow pattern:

- Omni directional,
- Flaring or funneling in,
- Continuous parabolic round surround, up, sideways, and down,
- Phasing in,



- Marine currents take supremacy over the flow and maintains self-cleansing conditions;
- Integrated natural inelegance;
- Flow management and control;
- Outfall Flow pattern:
 - Omni directional,
 - Flaring or funneling out,
 - Continuous parabolic round surround solid diffusion,
 - Achieves the required dilution early in the near field mixing zone,
 - Effluent fades out and disappears in the ambient within the vicinity of the structure;
- Flow Domain:
 - 4-D-spatial and temporal,
 - Continuous exponential expansion;
- Flow streamline regime:
 - Curved upward – straight – curved downward
 - Symmetrical or asymmetrical around central disc as per the site requirements;
- Flow velocity regime:
 - Decelerating away from entrance or exist,
 - asymptotic to horizontal plane,
 - velocity approaches 0 m/s after a short span (5-10 m away);
- Flow velocity profile:
 - Almost flat with uniform velocity at the entry or exit line;
- Pressure distribution:
 - Uniform at the entry or exit line (no eddies) or head loss due to friction,
 - Head loss is negligibly small – 0.017 mm,
 - Pressure drop is less than 0.002 mb.

Physical:

- Exclusion zone envelopes 4-phase flow pattern:
 - Approach,
 - Stabilization,
 - Acceleration to depart,
 - Steady state;
- Dimensions vary with:
 - Flow capacity,
 - Height – to – diameter flow tuning ratios,
 - Dimensions of each flow phase,
 - Wave height,
 - Submarine currents,
 - Local site conditions such as stratifications and presence of layers of plankton.

Mechanical:

- Design approach:
 - proaction: The natural order manages the flow and removes suspension;
- Design philosophy:
 - exclude,
 - prevent,
 - preserve;
- Process:
 - Natural – no O&M;
- Flow type:
 - Passive;
- Flow area:
 - None restricted flow,
 - No mechanical screens:
 - moving or,
 - stationary;
- Operation:
 - Self-operating;
- Maintenance:
 - Self-maintaining:
 - No backwash,
 - No air purging,
 - No manual or mechanical interference,
 - No traveling or drum screens,
 - No mesh;
 - No controls,
 - No alarms;
 - No moving parts.
- Chemical dispensing:
 - Built-in anti biofouling (optional);
- Material:
 - Made of high grade stainless steel as per site, application, and customer requirements:
 - 316L or Duplex or Super Duplex for the intake,
 - 316L SS for cooling, Duplex or Super Duplex for brine diffuser;
- Assembly:
 - Factory assembled or assembles at site;

- Fabrication:
 - Mill finished,
 - Welding stains removed;
- Weight:
 - A function of size;
- Stability:
 - Robust heavy duty structure-
 - Outstands Cat5 hurricane force;
- Floor anchorage:
 - Through built-in support legs;
- Life span:
 - In full operation for over 50 years;
- Maintenance:
 - None;
- Operation:
 - None – ‘Plug N’ Play’ approach;
- InvisiHead/intake or outfall pipe connection:
 - InvisiHead flange is made to match the pipe flange or flange adopter.

Environmental:

- Compliance:
 - Meets and exceeds US EPA standards and requirements;
- Fish Mortality:
 - Zero;
- Biodiversity:
 - Promotes and stimulate biodiversity
 - **Natural diversion:** If the following comes into the InvisiHead it flows straight through and out of it from the opposite end and into the ambient seawater again because through current velocities are much higher than the velocity at the IH outlet:
 - Adult fish,
 - Juvenal fish,
 - Fish shoals,
 - Fish larvae,
 - Jelly fish,
 - Seaweed, and the rest of marine life,
 - Sediments, debris, and trash.
- Dilution:
 - As an outfall disperses, blends and dilutes effluents like:
 - RO brine,
 - Cooling water,
 - Aquaculture and fish farms effluents,
 - Municipal wastewater discharges,
 - Discharges fade away in the ambient early in the near-field mixing zone.