

Product Information Bulletin

MiniBrom™ Electrolytic Bromine Units, the “Green” Biocide

General

MiniBrom units produce electrolytic bromine for use as a cooling water biocide by electrochemical oxidation of a diluted, aqueous scale inhibited solution of sodium bromide and chloride via use of a patentedⁱ electrolytic cell made of impregnated graphite and a low voltage direct current power supply. The electrolytic bromine solution is produced at a level of 0.8%, measured as total bromine, which classifies it as an OSHA non-hazardous oxidizer. After addition to the cooling tower, the electrolytic bromine degrades to non-hazardous bromide ion, eliminating discharge of toxic, hazardous biocide chemicals in the cooling tower blowdown.

MiniBrom units are supplied as a component package consisting of a controller/power supply, electrolytic cell, and feed pump. Optional skidded mounting as a complete ready to operate assembly mounted on a dilution tank is also available. Biocide dose control is generally via an outside timed source turning the unit on and off, such as a typical cooling tower controller with a biocide timer function, or via an optional unit timer. Automatic polarity reversal provides for self cleaning of the electrodes. Units are capable of dose feed against a maximum back pressure of 50 psi.



Blended salt mixture, PCT 3023, or concentrate aqueous salt solution, PCT 3024, utilized to make the diluted feed solution have primary USEPA biocide registration as biocide precursors. Both products are also classified by DOT and OSHA as “non-hazardous”. Typically, any potable water source can be used as dilution water.

Sizing

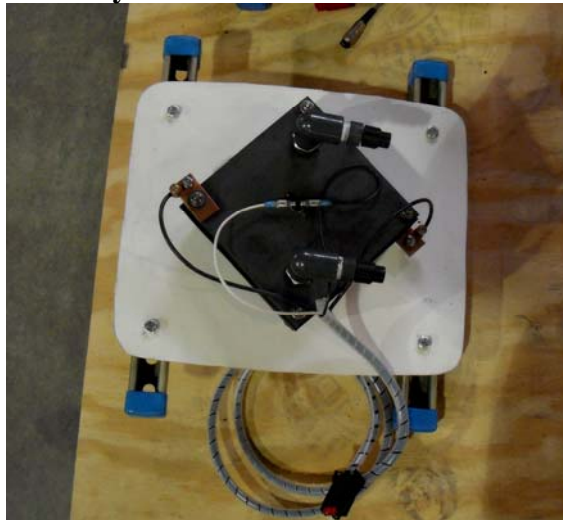
MiniBrom units should be sized to produce a residual total bromine level of 0.5 to 1.0 mg/l in the cooling water following a maximum of twelve (12) hours unit operation. For design purposes, a total bromine demand of 3 mg/l is assumed for typical cooling water.

Precursors

For difficult to service locations, PCT 3023, a blended dry salt mixture is recommended. This economical, concentrated precursor is mixed at 15 lbs of product to 50 gallons of dilution water, note that a mixer is highly recommended on the dilution tank. PCT 3024, a concentrate aqueous salt solution, is more convenient and a mixer is generally not needed. This precursor is mixed at 1 gallon of product to 15 gallons of dilution water.

MiniBrom power (bromine) output is controlled by adjustment of the feed solution conductivity, target 35,000 mmhos, via addition of more PCT 3023, or 3024, to the mix.

Electrolytic Cell



The electrolytic cell is constructed of two, MB 2.5, or three, MB 5, one inch thick impregnated ultra high density graphite plates with 0.25 inch spacing between plates to form the cell with overall dimensions of 7.5" x 7.5" x 2.25" for the MB-2.5, and 7.5" x 7.5" x 3.5" for the MB-5. The MB 2.5 is commonly termed a monopolar cell, while the MB 5 is a bipolar unit passing the electric current through two cells in series. Plates are "diamond" mounted with the bottom corner receiving diluted feed solution and the output bromine solution removed from the opposing upper top corner. The entire electrolytic cell is housed in a ventilated plastic; options are FRP or steel, box.

Control/Power Supply

The controller/power supply is an amperage limited solid state linear unit designed to provide direct current at the rated output amperage, 6 volts for the MB 2.5, 12 volts for the MB 5, maximum output, input power of 110 vac, and constructed to NEC requirements using UL approved components. The MB 2.5 power supply cabinet is completely sealed using exterior heat sinks for cooling while the MB 5 is fan cooled, both units are equipped with amp meter, automatic polarity reversing switch and timer, on-off power switch with indicator, high cell temperature shutdown, and fuses on both low and high voltage circuits.



MiniBrom Unit Specifications

Model	Output as Br lb/hr	Amp Output	Power use kw-hr	3024 use lb/hr	3023 use lb/hr	diluted solution use gal/hr	number of cell plates
MB 2.5	0.10	25	0.15	1.0	0.43	2.3	2
MB 5	0.21	30	0.36	2.0	0.86	4.5	3

- MiniBrom** options:
- rack mounted on dilution tank
 - mixer mounted on dilution drum, 110 vac, 1/20 hp
 - dose control timer
 - automatic makedown systems
 - unit mounted on double containment chemical feed station

Unit dimensions: power supply – 13" X 15" H X 6.25" D
 electrolytic cell – 12" X 12" X 7" D

Dilution Tank

Dilution tanks for all units can be made from 55 gallon capacity DOT approved polyethylene drums, double wall chemical containment drums, or double containment chemical feed stations. As an option, the **MiniBrom** unit can be mounted directly on top of the dilution tank with a stainless steel mounting rack. The transfer pump is mounted directly on top of the tank along with the optional mixer provided for use of dry salt precursor.

Transfer Pump

MiniBrom units are currently supplied with appropriate chemical pumps and 16 feet of 0.375 chemical grade PE tubing to route the produced bromine solution to the feed point.

Hydrogen Venting

Hydrogen gas is produced as a byproduct of electrolytic bromine production. To safely dispose of this byproduct, **MiniBrom** discharge lines should be piped to either cooling tower sumps or into a line returning to the cooling tower. Day tanks, if used, must be vented to the exterior of any building.



Optional steel cell housing **MiniBrom** Model MB 5 installed in major hospital power house, yellow plastic dilution tank to the right.

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ⁱ US patent #7,927,470