

## ISOCHEM PUMPS FOR HYDROGEN PEROXIDE APPLICATIONS

Hydrogen Peroxide (H<sub>2</sub>O<sub>2</sub>) has found some new uses in major areas of both the municipal and industrial markets, mainly by replacing chlorine as an environmentally friendly alternative in both markets. Unlike chlorine, which has potentially harmful side effects, Hydrogen Peroxide breaks down into water and oxygen.

Currently, the major areas for Hydrogen Peroxide use are in the pulp and paper industry and in the water treatment sector of the municipal market. Significant growth is expected in both markets, as the major producers of Hydrogen Peroxide continue to expand their production capabilities.

In the pulp and paper industry, Hydrogen Peroxide has been proven as a viable oxidizing agent to replace chlorine in the bleaching of wood pulp, and the deinking and bleaching of recycled paper. In the municipal market, Hydrogen Peroxide is also displacing chlorine for testing malodorous wastewater and for taste and odor control of potable water. Many varied applications for Hydrogen Peroxide are slowly emerging. These applications range from the replacement of nitric acid in various industrial processes to the use of high purity Hydrogen Peroxide to clean semiconductors and circuit boards in the electronics industry.

**Due to a combination of factors including its strong oxidation potential and relatively low viscosity, some precautions must be taken when selecting a transfer pump for any concentration of Hydrogen Peroxide.** High strength solutions of Hydrogen Peroxide (52% by weight or above) readily decompose and generate extreme heat when supplied with a sufficient source of organic material (including human skin, ordinary clothing, oils and carbon pump components).

Several factors make an Isochem the pump of choice for the most Hydrogen Peroxide applications. The sealless design eliminates the risk of leakage and the resultant oxidation and heat generation. The low flow requirements in most applications (whether in H<sub>2</sub>O<sub>2</sub> production or point of use metering) match Isochem hydraulics, the non-lubricating nature of H<sub>2</sub>O<sub>2</sub> is easily addressed by use of plastic gears, bearings, and wear plates and our substantial experience in pumping Hydrogen Peroxide allows us to readily address other important aspects of the application.



Material selection for Hydrogen Peroxide transfer pumps has been simplified due to its carbon incompatibility and product integrity issue. Decomposition into water and oxygen is accelerated by a wide variety of catalysts, especially in lower concentrations of Hydrogen Peroxide. Nickel, which is a major constituent of Hastelloy C, happens to be one of these catalysts. Therefore, Hastelloy C construction is generally not recommended for Hydrogen Peroxide applications because it will enhance this

undersized reaction. (This is based on customer preference). In a gear pump, two plastic gears, Teflon vs. Teflon is the best choice for gear materials at low pressures. At differential pressures above 50 psig, 316 SS or Alloy 20 vs. Teflon should be used. (Alloy 20 has lower content of Nickel than Hastelloy C). Teflon wear plates and bearings provide excellent service in Hydrogen Peroxide applications.

There are several other options that are required for applications involving Hydrogen Peroxide and Isochem pumps. On a gear pump, bearing flush ports are required to provide additional lubrication to the bearings, and also to flush the bearing area when the pump is taken out service (Option A). On either pump, venting options are recommended to allow the inevitable production of free oxygen gas to be vented (Option V for a gear pump, Option AX for a centrifugal). For either pump, a welded driven magnet is recommended to prevent Hydrogen Peroxide from reaching the carbon containing magnets (Option W on a gear pump, MW on a centrifugal). As you know, the containment can of centrifugal pump is Hastelloy C as standard\*\*. A 316 Stainless steel containment can is available as an alternate (this is also based on customer preference). Specify a 316 SS containment can on the order. (Note that you will have 40% greater heat generation). The containment can for the gear pumps (with a base pump material selection of 316 SS) is 316 SS. The last requirement for Hydrogen Peroxide applications is that the pump be pickled and passivated via a procedure where Nitric Acid is passed through the pump to remove oxidants from the wetted surfaces of the pump. (Pulsafeeder offers this procedure, or the distributor or customer may choose to provide their own means of pickling and passivating). Note: Pulsafeeder's standard offering for pickle and passivation is to pickle and passivate before building the pump.

There is great potential for business as application of Hydrogen Peroxide continues to grow around the world. If you have questions about Hydrogen Peroxide service, or any other service, please contact your application Engineer.

Basic Model selection is as follows;

Isochem Gearchem – GMC(2-8)-A(K or U)A(or D)T-TTF(or O)-AVW (P&P)

Isochem Gearchem – GMH(6-8)-A(K or U)AT-TTO-AVW (P&P)

Isochem Gearchem – GM12-A(K or U)ATTTRAVW (P&P)

Isochem Gearchem – GM16UATTTRAVW (P&P)

Isochem Centrifugal – CMC1 or CMH?-BSNE(or F, L or M)D(or E, K or L)N(or Y)AXMW

\*\* Note: As of 1999, a 316 Stainless steel containment can became standard on the Isochem Gearchem gear pumps. Use Option M for a Hastelloy C containment can.