



McCANNA/MARPAC Valves

Product Data Bulletin
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McCANNA Ball Valves for Hydrogen Peroxide Service

Hydrogen Peroxide

Hydrogen Peroxide, H_2O_2 , is a colorless heavy liquid. Also, commonly called Peroxide or Hydrogen Dioxide. It is miscible in all proportions with water and commercially furnished in concentrations of 27.5%, 30%, 35%, 50%, 70%, 90%, 98%. Concentrations above 52% are considered HIGH STRENGTH. It is fundamentally unstable, decomposing to oxygen, water and heat.

Hydrogen Peroxide is a strong oxidizer and is catalytically decomposed by many common materials such as heavy metals, ordinary dirt and enzymes. Also, if allowed to remain in contact with readily oxidizable organic materials it may cause spontaneous combustion. In high concentrations, if the material is catalytically decomposed, there is insufficient water present to carry away the heat of decomposition. Thus there is a danger of explosion if the solution is confined. Even in low concentrations the oxygen from decomposition will cause combustible materials to burst into flame.

Valve Materials of Construction

It is, therefore, apparent that judicious selection of materials and cleanliness must be observed in the handling of Hydrogen Peroxide.

To this end, materials are categorized in Class I and Class II for proper handling of various strengths of Hydrogen Peroxide. Class I materials are those that are acceptable for unlimited contact with hydrogen peroxide. Class II materials are those that may be used for short term contact prior to storage or use (one week at atmospheric temperature). McCannaSeal[®] and McCannaFlo[®] ball valve metal materials of construction fall into Class II. TFE seals and Kel-F lubricant are Class I materials.

Class II materials used in the construction of McCANNA ball valves are as follows:

- A. Aluminum castings: ASTM:B26 alloy 356 (UNS alloy A03560).
- B. Aluminum barstock: ASTM:B211 alloy 6061-T6.
- C. Stainless steel castings: ASTM:A351 grade CF8M (316), CF3M (316L), CF8 (304), CF3 (304L).
- D. Stainless steel barstock: ASTM:A276 type 316 (UNS alloy S31600). stems furnished in condition B, work hardened and condition A in larger valve sizes where stem diameter is larger than 1 $\frac{1}{4}$ ". Other parts can be in the annealed condition.
- E. Stainless steel spring: ASTM:A313 type 316 (UNS alloy S31600).

Valve Design

Ball valves by design have a ball in an enclosed volume between two seats. This volume presents a hazard from pressure build-up from the decomposition of Hydrogen Peroxide. Therefore, the valve must offer cavity relief of some method. In the McCannaSeal design, the valve may be furnished as a one-way flow valve by drilling a hole in the body between the body cavity and the inlet port. The tight seat direction is indicated by a special plate or arrow stamped on the body. For McCannaFlo designs the hole can be drilled through the ball port. While the foregoing is the preferred method of cavity relief, McCannaSeal valves can be furnished with self-relieving seats if the system design will not allow one-way valves. (Reference maintenance brochure MMAIM2007).

Preparation of Valve Materials

It is obvious from the characteristics of Hydrogen Peroxide that the system handling the material must be very clean. For HIGH STRENGTH H_2O_2 the system must be clean to prevent fire and explosion hazards. For low strength H_2O_2 the system must be clean just to keep the material from further decomposition. Cast materials must be free from blow holes, porosity, inclusions, etc. In addition, castings and parts made from bar stock must be free from processing contaminates. The parts that come in contact with the fluid must be specially treated prior to use to obtain the degree of cleanliness required.

McCANNA ball valves are prepared for hydrogen peroxide service as follows:

STAINLESS STEEL parts (body, ball, stem, seat rings, spring, bonnet, bonnet fasteners, adapters, seat retainers and seat retainer screws) are passivated. Simply, passivation of stainless steel consists of immersion in a 70% nitric acid solution for 4.5 hours.

Aluminum parts are passivated by immersion in a 35% nitric acid solution for 1.5 hours. Anodized aluminum parts (ball and stem) are not immersed in the nitric acid but are cleaned in a detergent solution.

TFE seats, stem seals, and gaskets are cleaned in a detergent solution.

After passivation and cleaning the parts are rinsed in deionized water, dried and handled with clean gloves. Only Kel-F grease is used during assembly, applied sparingly to stem seals and threaded parts. Testing is done using deionized water or clean, dry, oil-free air. The valve assembly is then sealed in a polyethylene bag. It is recommended that the user further condition the valve in his system by flushing with a weak Hydrogen Peroxide solution.

Uses of Hydrogen Peroxide

Hydrogen Peroxide is a strong oxidant which makes it suitable as a bleaching agent in textiles, wood pulp and hair bleach. As a good source of oxygen it has been used as a rocket fuel oxidizer and torpedo propellant. As it breaks down into gas it can be used in the production of foam rubber and other porous materials. It is used as an antiseptic, and for hydroxylation, viscosity control for starch and cellulose derivatives, etc.

Specifying Valves for Hydrogen Peroxide Service

All orders for ball valves to be used in Hydrogen Peroxide service must clearly state, Prepare for Hydrogen Peroxide Service, in order for the valves to receive the special preparation. Unidirectional valves will be furnished unless self-relieving seat design is specifically ordered.

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FLOWSERVE CORPORATION FLOW CONTROL DIVISION

1978 Foreman Drive
Cookeville, Tennessee 38501 USA
Phone: 931 432 4021
Facsimile: 931 432 3105
www.flowserve.com