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CLEANING OF POROUS METAL FILTER ELEMENTS

Cleaning of porous metal filter elements can be divided into two categories, IN-SITU cleaning and REMOVING elements for cleaning.

IN-SITU cleaning in liquid/solids systems can be accomplished by backwashing, and in gas/solids systems by blowing back. In either case, if the filtration processes are designed to operate within specific operating parameters, the systems will provide long on-stream life with effective solids recovery. The backwash or blowback methods are specific to each application and can offer many process options. In addition, IN-SITU chemical cleaning can be done using solvents or detergents, followed by rinses with a fluid compatible with the process; see the discussion of chemical cleaning that follows.

Cleaning filter elements after they are REMOVED from the filter can be done by several methods - chemical cleaning with compatible solvents, ultra-sonic cleaning of insoluble solids, and controlled temperature/atmosphere fluid bed cleaning. Multiple cleanings of MOTT porous metal elements is common. Some elements have been chemically cleaned and reused more than 60 times.

DO NOT mechanically clean porous metal elements. Wire brushing, scraping, sand or glass bead blasting can smear the pores and close off the porous media.

Chemical cleaning follows a logical sequence. First, determine what contaminants are present in the filter. Next, determine the chemical agents that will dissolve these contaminants (without dissolving or attacking the porous metal). The chemical agents compatible with 316L stainless steel porous media could be, but are not limited to: We recommend Citric & Oxalic Acid.

Water at any temperature; 15% nitric acid up to 150°F; 20% caustic up to 212°F; alcohols; acetic acid; acetone; ammonia; organic solvents; methylene chloride; industrial cleaners such as Oakite 31 or Sonicor #103 (to remove oil or grease); solvents; and detergents.

- For $CaCO_3$ & similar deposits oxalic & phosphonic acid are useful

Soak the elements in the chemical agent as required, flush with clean filtered water or other compatible fluid, blow out with clean air or steam. Two chemical agents may be required, such as 15% nitric acid to remove iron oxide and 20% caustic to remove aluminum particulate, with a water flush between soaks.

To remove inert or insoluble solids from porous metal elements, ultra-sonic cleaning is an effective process. The fluid medium usually contains a detergent for maximum efficiency of removal. It is recommended that ultra-sonic transducers provide at least 60 watts per gallon of fluid in the ultra-sonic bath. Cleaning may require from 10 to 60 minutes. Optimum results are obtained when the cleaning solution is flowed through the element in the reverse direction during ultra-sonic cleaning.

For elements used for gas/solids service, it is necessary to bake the elements in an oven at 300°F to 400°F after cleaning, to assure that all moisture is removed from the elements.

Controlled atmosphere fluid bed cleaning is a very specialized process. Manufacturers of fluid bed cleaning equipment should be contacted to discuss the specific cleaning requirements.

To evaluate the effectiveness of cleaning and the integrity of filter elements, it is necessary to air flow test, and leak and/or bubble point test the elements after cleaning. For post cleaning evaluation to be meaningful, new elements should be serialized and 'base lined', with air flow and bubble point data recorded, before they are put into service. This provides a basis for comparison and evaluation.

Air flow testing determines the differential pressure through the media at a given air flow, usually set at 2 SCFM/Ft^2. After cleaning, the differential pressure at the same air flow may be slightly higher than the 'base line' value; a 10-15% increase is generally accepted as 'clean'. A significantly higher differential pressure indicates ineffective cleaning. A second cleaning may be required. See AIR FLOW TESTING PROCEDURE on Page 3.

Bubble point testing or leak testing is the measure of integrity of a filter element or cartridge. Bubble testing is the determination of the actual bubble point or 'first bubble' of an element. Leak testing determines whether there are any 'leaks' in an element at a pressure below the minimum bubble point for the particular porous media being tested. Each Mott filter grade has a specific bubble point range which is used as the basis for bubble point or leak tests. See BUBBLE POINT TESTING on Page 4.

Another factor for evaluating filter cleaning is weight, 'before and after'. Record the weight of the new element, on a precision scale, and the weight of element after cleaning and drying to determine the effectiveness of cleaning. Higher weight indicates contaminants remain in the filter. Lower weight could indicate weight loss due to corrosion. The same weight indicates the filter is free of contaminants.

Suggested source for ultra-sonic cleaners and power supplies is: **Branson Ultrasonics Corporation**, Eagle Road, Danbury, CT 06813-1961, Phone: 203-796-0400 / Fax: 203-796-0450.

A suggested source for fluid bed cleaning equipment is: **Procedyne Corporation**, 11 Industrial Drive, New Brunswick, NJ 08901, Phone: 201-249-8347 / Fax: 201-249-7220.

There are companies that specialize in cleaning porous metal filter elements and cartridges, including the final testing capability required. Suggested sources for cleaning services are as follows:

Polymer Cleaning Technology, Inc., 422 Route 206, Unit 1101, Somerville, NJ 08876
Phone: 201-281-0055 / Fax: 201-874-3342.

FIL-CLEAN Corporation, #11 International Court, Greenville, SC 29607
Phone: 803-675-0017 / Fax: 803-675-0032.

Carolina Filters, Inc., P.O. Box 716, 109 E. Newberry Avenue, Sumter, SC 29151
Phone: 803-773-6842 / Fax: 803-775-6190