



NORMAN FILTER COMPANY

STAINLESS STEEL ELEMENT CLEANING INSTRUCTIONS

Purpose

The purpose of this document is to provide general cleaning instructions for all welded Stainless Steel Elements with various filtration media types.

Filter Media Types:

Wire Mesh – Fine micron wire mesh media in which the warp and weft wires pass alternately over two and under two wires (twill) and in which the warp wires are heavier in diameter than the weft wires (dutch). Wire mesh is a surface type filtration media.

Random Metal Fiber (RMF) – Filtration media in which metal fibers are randomly pressed and sintered to form a porous material that can be used in different shapes, pleated or not, without affecting the filtration characteristics. RMF is a depth type filtration media.

Porous Sintered – Filtration media in which metal powders are pressed and sintered to form a porous material used for depth filtration. Porous sintered material is a depth type filtration media.

Cleaning Materials:

- a. Filtered De-ionized (DI) Water
- b. Octagon Oxygen Cleaning Compound (OCC or NOC)
- c. Isopropyl Alcohol (IPA) per ASTM D770-05
- d. Acetone per ASTM D329-07e1
- e. Dawn® liquid detergent or generic equivalent
- f. Powder Free Exam Gloves – Purple Nitrile gloves or equivalent used during final cleaning

Cleaning Process:

Wire Mesh-

1. *Pre-Wash*: Parts are to be hand washed using Dawn® liquid detergent or equivalent. Oils and grease to be removed using acetone or IPA (Isopropyl Alcohol)
2. *First Rinse*: Parts are to be rinsed using filtered non-DI Water to remove any detergent or solvent residue. DI water rinses are acceptable but not mandatory in this step
3. *Ultra-sonic Wash*: Parts are to be immersed in degassed heated (105° - 140° F) wash solution for no less than 30 minutes. Use OCC (Octagon) for random metal fiber elements.
4. *Second Rinse*: Parts to be rinsed using DI Water to remove any cleaning fluid

5. *Pre Drying* (if necessary): To expedite drying of DI Water, dip PIECE in a de-wetting agent of IPA (Isopropyl Alcohol).
6. *Drying Techniques*:
 - i. N₂ (99.9% pure filtered Nitrogen) Drying (when necessary): Parts shall be dried using an N₂ blow dryer to remove any DI water or de-wetting rinse residue.
 - ii. Conventional Oven Drying: Parts shall be dried using an oven (212° - 230°F) to remove any DI water. Intake to conventional oven should be filtered to a level greater than the media it is cleaning.
 - iii. Vacuum Oven Drying

RMF and Porous Sintered material:

Step 1: Determine what contaminants are present in the Filter

Step 2: Determine the chemical agents that will dissolve these contaminants (without dissolving or attacking the porous metal)

Chemical agents compatible with 316/316L stainless steel porous media include, but are not limited to:

- Water at any temperature
- Alcohols
- Acetone
- Ammonia
- Organic solvents
- Methylene chloride
- Industrial cleaners such as Oakite 31 or Sonikor #103 (to remove grease)
- Solvents and detergents

*** Note: NFC stainless steel elements are welded assemblies and the use of acids for cleaning may deteriorate welds if not properly applied and rinsed.**

Step 3: 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.

Additional methods of cleaning porous metal media:

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

The cleaning techniques for Random Metal Fiber (RMF) media elements uses the same method as the porous sintered media. Due to the fact that both media types are for depth filtration, whereas wire mesh media is for surface filtration.

Other Cleaning Techniques:

These cleaning techniques are used by the Mott Corporation for cleaning their porous sintered media and are generally accepted as being effective.

1. Blowback and backwash flushing – cleaning is the simplest cleaning method and is the routine method recommended for our process filters. For backwash to work, we are relying on the reverse flow of liquid to pick up and transport particles out of the media structure. The liquids are usually filtrate or some other process compatible fluid. This method depends on the particles being loosely held on or within the pore structure. For deeply imbedded particles, multiple blowbacks will be necessary. When gas is used as the pressure source over the liquid, much turbulence is created as a gas/liquid mixture is forced through the media which disturbs particles and helps remove them from the structure.
2. Soak and flush – typically refers to the introduction of a detergent solution, allowing it to soak long enough for the detergent action to loosen particles then flushing them out of the media. This can be done in process filters or with small parts in a laboratory.
3. Circulation flows – This method requires a cleaning system to pump and circulate a cleaning solution through the media until it is clean. Normally the circulation is in the reverse direction from which the media was fouled. Solids removed must be filtered out before the solution is returned to the media. This process is useful when materials must be dissolved out.
4. Ultrasonic baths – Special equipment is necessary to use ultrasonic sound waves to excite particles and move them out of the media. Small parts are easily cleaned in laboratory models while element bundles require large tank set ups with high power inputs. Used in conjunction with the proper detergent solution, ultrasonic cleaning is the most effective procedure for deeply imbedded particles.
5. Furnace cleaning – is a simple method of burning or volatilizing organic or biological compounds. Polymer materials are removed most effectively this way. It is best used for materials which leave no ash residue, otherwise this residue must be removed by additional cleaning methods.
6. Hydroblasting – is a technique which usually precludes other cleaning methods if the foulant is grossly adhered to the media surface. Cross-flow tubes have been cleaned this way. The high pressure water blast removes materials by high-energy impaction. It does not penetrate very deeply into the media structure, but in most cases the fouling may be only at the media surface. It is also a common practice in plants, typically being used to clean heat exchanger tubes. This method has been used successfully by one commercial cleaning firm to remove catalyst plugging on the inside of our filter elements.

Information from Mott Corporation: http://www.mottcorp.com/resource/pdf/cleaning_methods.pdf