

Edge Filtration

The “One Micron” Filter

By Polytech-Filtration

Overview

This type of filter element utilizes stacks of paper discs tightly compressed on a tubular core to form a continuous cylindrical surface where contaminants are filtered at the edge of the cylinder.

Advantages

- Ability to capture very fine particles down to 1 micron.
- Backflushing can be particularly effective providing extended service life before element replacement, reducing costs associated with disposable filter media.

Disadvantages

- Suitable only for oils without waxes or paraffins.
- Water based coolants or tramp water in oil based coolant will blind off the filter elements requiring replacement.
- Requires pressure vessel and filter pump and has the problems associated with backflushing type filter in general including the possibility of packing the filter vessel with porous swarf.
- Backflushed solids may be difficult to filter out for removal from system.
- High cost to purchase.
- High cost to replace filter elements when they no longer backflush effectively.

How It Works

This type of filter element utilizes stacks of paper discs tightly compressed on a tubular core to form a continuous cylindrical surface. Solid contaminants are deposited on the surface as liquid flows through the narrow passages between the paper discs. Particles down to one micron are deposited on the face of the paper stack. The stack can be effectively backwashed quite a number of times before the element needs to be replaced. The effectiveness of backflushing stacked paper discs is improved over other types of backflushing filters because the high flow resistance between the paper discs limits the back flow through any one area once the solids have been dislodged, promoting more uniform cleaning of the surface.

Stacked paper edge filters are generally suited only to oil filtration as the paper fibers swell and blind off when they absorb water. The introduction of tramp water to the machining oil from parts washing or

chilling below the dew point of ambient plant air must be avoided. In addition, the choices of suitable oil are limited because long chain paraffins, such as chlorinated extreme pressure additives in honing oils, are big enough to be captured by the element, permanently blinding off flow through the element, necessitating replacement. The filter manufacturer's recommendations of permissible oil this for type of equipment should be strictly followed.

The operating limitations and equipment complexities associated with backflushing type filters in general apply to backflushing paper disc edge filtration as well. These include:

- Machining operations must stop during backflushing.
- Systems equipped to provide continuous flow during backflushing requires both additional clean and dirty tank capacity, with the dirty tanks subject to significant settling of solids. The additional purchase and replacement cost of oil must be considered.
- The closed pressure vessel may have difficulty expelling solid contaminants, particularly contaminants that create a tightly packed porous cake such as steel or cast iron grinding swarf requiring shutdown and disassembly of the pressure vessel. The addition of first stage magnetic separators may reduce the frequency of packing the vessel but cannot eliminate this risk.
- The need to filter the backflushed solids for removal from the filter system. Typically a bag filter is used with liquid straining through by gravity. This limits the effective particle retention of the bag resulting in a significant percentage of contaminants being recycled within the filter system.

One of the most successful applications for filter of this type is filtering carbide solids from grinding oil. Overall, the high capital cost and complexity of this type of system is difficult to justify when compared to simple stacked disc cartridge type depth filters or vacuum filters utilizing high performance bulk roll filter media.