Filtration Group®
Industrial

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Filter elements for hydraulic and lubricating fluids
e-protect

electrostatically conductive

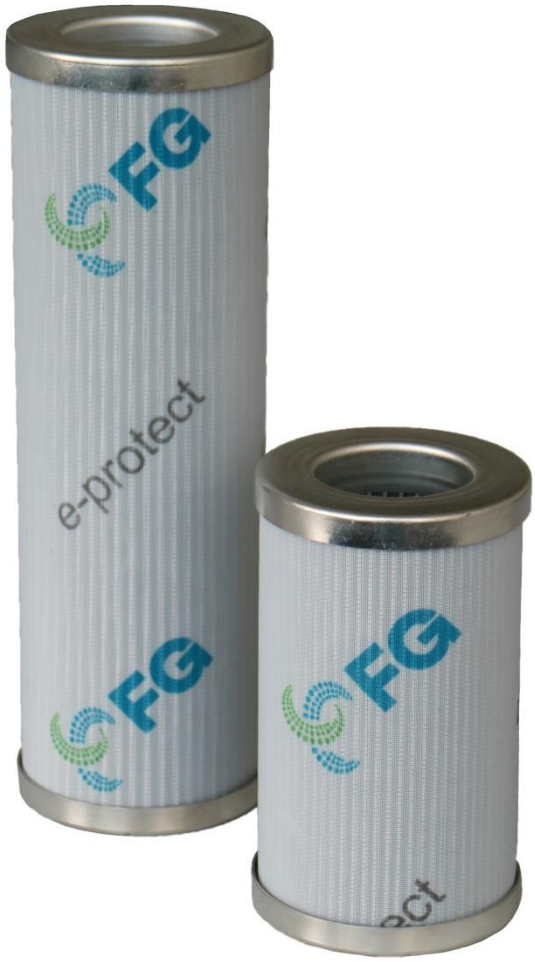
1. Features

High-performance filter elements for low conductive hydraulic and lubricating oils

The FGC e-protect filter element made by Filtration Group, has been designed for use with low conductive hydraulic and lubricating oils (e.g. turbine lubricating oil in power plant technology) . The filter element is distinguished by reliable conductivity, which has been registered for patent approval, as well as an element design that is optimised to suit electrostatic properties. The special element design prevents damage in the filter layers caused by electrostatic discharge.

The long-term advantages of using FGC e-protect filter elements:

- No disruptive discharge or damage in the filter material caused by electrostatic discharge
- Reliable filtration during the entire service life of the element
- Guaranteed equipment availability
- Prevention of follow-up costs
- Increase of oil service life
- Prevention of varnish build-up on the element caused by electrostatic effects
- No additional maintenance requirements needed because of direct compatibility with conventional filter elements
- Reliable filtration in electrostatically critical applications
- High dirt-holding capacity, defined filtration rate and efficient differential pressure properties
- Worldwide distribution



2. Description

Charge separation in fluid systems is a well-known phenomenon in high-performance filters (filter fineness < 10 µm).
Charge separation occurs during perfusion of the filter's fine pores due to the viscous friction between the oil molecules and the surface of the fibre. Electron transfer takes place as a result of the close contact between the friction partners.
The intensity and direction of the electron transfer depends on the material properties of the friction partners (triboelectric series). Depending on the electric properties of the filter material and of the oil, there is a subsequent charge equalisation or charge accumulation (after charge separation).
With the fluids that have dominated the market so far, the charge separation is equalised again depending on the so-called relaxation time so that there are no noticeable effects in the fluid components including the filter elements or in the fluids (TRBS 2153).

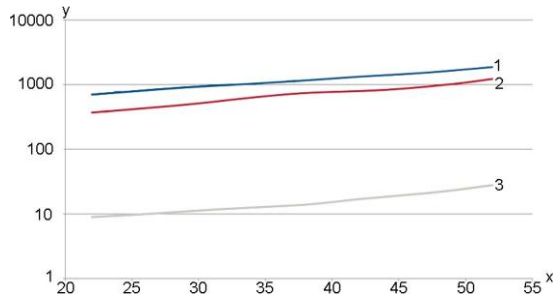
A significant increase of electrostatic charge within the fluid systems can have many causes:

- Low retention time due to increasingly compact systems with low oil volumes
- Increasing filtration requirements, even in lubrication applications
- Increased application of environmentally-friendly zinc and ash-free oils

3. Practical consequences

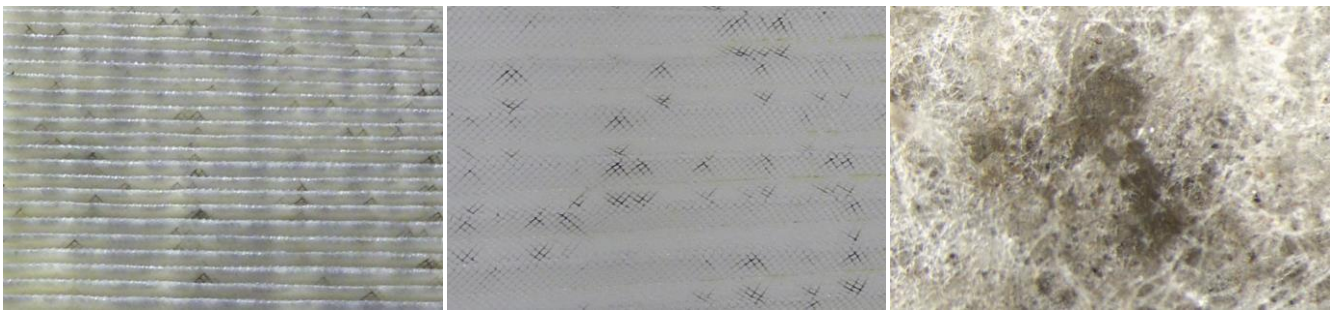
If these requirements are satisfied, electrostatic charges can occur in the filter element and in the fluid, which are equalised through local discharge with a higher energy. Indicators of intense discharge processes range from audible crackling to detectable damage in the filter layers and components. Effects on oil ageing and the appearance of "varnish" plus the malfunction of electronic components cannot be excluded. However, these depend on additional limiting conditions in the respective system. Filters that prevent electrostatic discharge must be used when high viscosity lubricating oils are utilised with fine filters as well as in the field of power plant technology.

To prevent electrostatic charges, the conductivity of the fluid should be at least 500 pS/m.
With the new zinc and ash-free hydraulic oils however, there are fluids on the market that are far below the minimum conductivity mentioned above, which can lead to increased electrostatic charges.



x = Oil temperature °C
y = Conductivity pS/m

1 = High-alloy hydraulic oil, contains Zn
2 = Synthetic ester (HEES)
3 = Low-alloy hydraulic oil, Zn-free



Filter materials with discharge traces when using zinc and ash-free oil.

4. Prevention of damaging discharge

We generally recommend the application of FGC e-protect filter elements or hydraulic and lubricating oils with conductivity < 500 pS/m (e.g. zinc and ash-free oils) or when electrostatic effects occur in the system (e.g. discharge sounds).

Designation examples:	
Pi 3105 PS 10	Standard design
Pi 3105 PS 10 EP	e-protect design

The FGC e-protect design is available as an additional feature with PS, SM-x and MB elements. The e-protect design is marked with the addition "EP" in the element description.

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