zerospark

THE ANTI-STATIC FILTERS

MPFILTRI®

RISK AND DAMAGE REDUCED TO ZERO

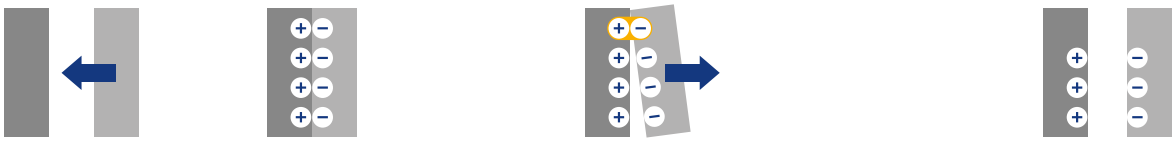
zerospark

zerospark is a specialist solution designed to solve the problem of electrostatic discharge inside hydraulic filters. Caused by the electrical charge build-up due to the passage of oil through the filters, this can result in damage to filter elements, oils and circuit components. It can even cause fire hazards in environments where flammable materials are present.

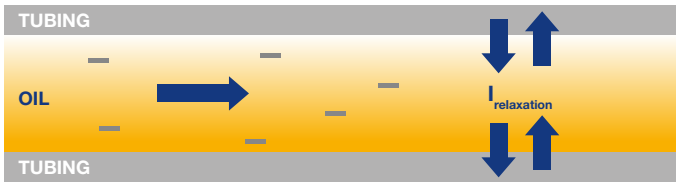
FROM CHARGE BUILD-UP TO DISSIPATION

THE TRIBOELECTRIC EFFECT

The body with the most electronegativity strips electrons from the other, generating a build-up of a net negative charge on itself. The other body is charged by the same amount but with the opposite sign, giving rise to very high potential differences. These, if not dissipated, can give rise to electrostatic discharges.



1. Contact
2. Distance ≤ 10 mm
3. Partial charge balancing
4. Electrostatic charged bodies



CHARGE RELAXATION (I)

Here are several methods to dissipate charge. One is charge relaxation, in which the pipes and specific other parts of equipment are made conductive. The charge build up then flows away along defined path ways in the equipment.

STANDARD FILTER ELEMENTS

Electrical charge build-up occurs in the dielectrics of the system: filter materials, oil and insulating pipes.

CELLULOSE FILTERS

On cellulose elements, triboelectric phenomena causes significant damage to the filter material.

GLASS FIBRE FILTERS

In the case of glass fibre elements, there is considerable damage to the bead and the adhesive that joins it to the rest of the filter, because the charges accumulated by the element are discharged onto the shank of the metal filter head. These burns can also extend into the interior of the material, compromising its mechanical strength.

WIRE MESH

Damage can also occur to the wire mesh, an element in the media that holds the different layers together.

DISSIPATIVE FILTER ELEMENTS

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To solve the problem of charge build-up in filters, MP Filtri has developed an innovative solution. By replacing certain insulating components with conductive zerospark versions, the charges on the media are free to move towards the head and are thus dissipated to the ground.

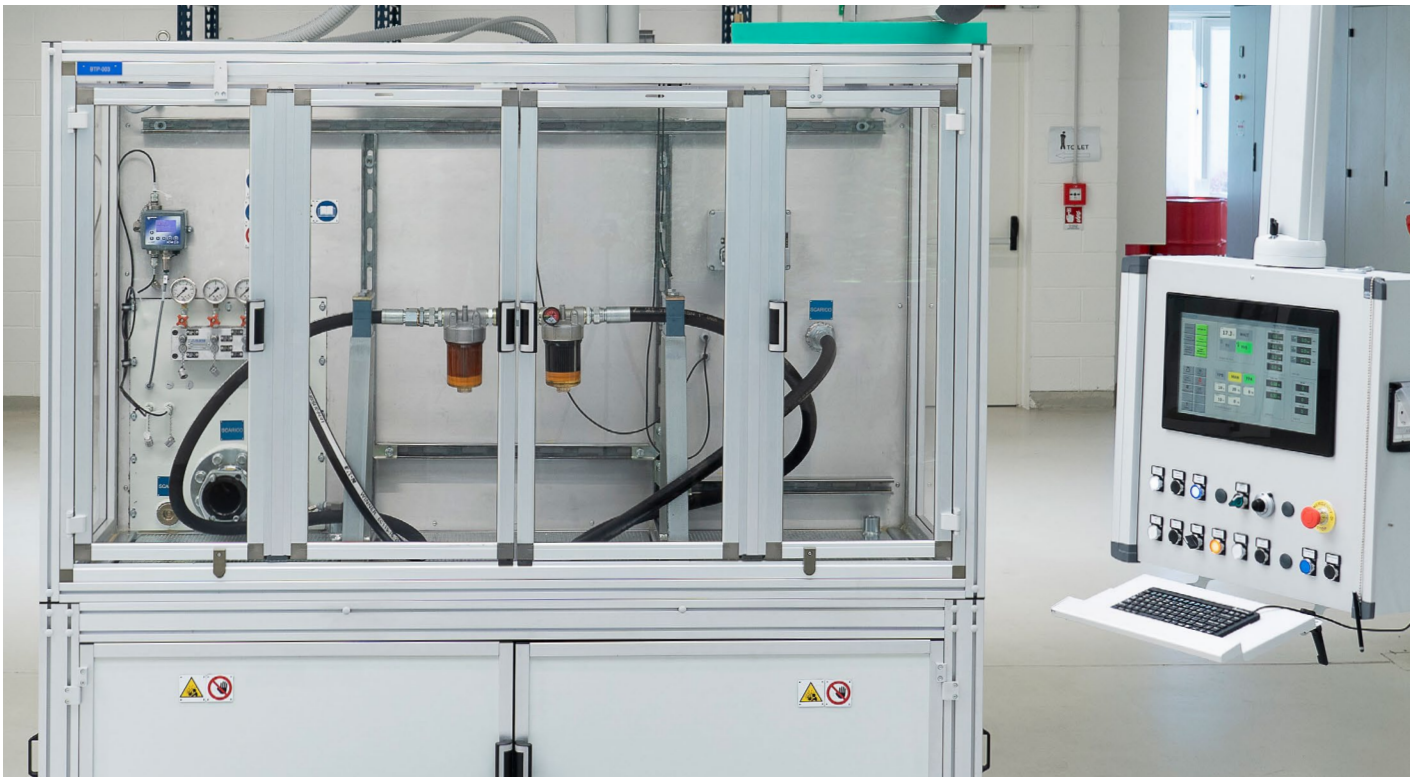
BENEFITS

- elimination of triboelectric effect
- dissipation of accumulated charges
- improved performance over time
- increased safety
- resistance to cyclic flow
- weight and cost optimisation

For further information or to request a quotation, please contact the Sales Department.

RESULTS

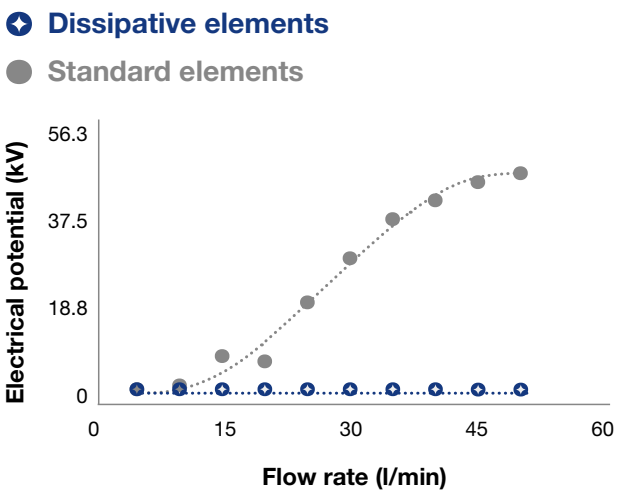
In order to carry out tests to measure the surface charges of the filters, MP Filtri has designed and built a test bench in collaboration with the University of Bologna's Electrical Energy Department.



The specific hydraulic system and the instruments used are capable of measuring and recording the electrical potential generated when a filter is crossed by a flow of oil, measured in kV.

This new specific bench allowed tests to be carried out under different flow and temperature conditions for both in-line filters (e.g: FMM) and return filters (e.g: MPFX) up to 250 l/min. It is also possible to change the type of oil, verifying the potential characteristics of the filters under different operating conditions.

Under standard working conditions, the potential goes from tens of kV to zero, clearly showing the effectiveness of our dissipative filters.



The following table summarises some examples of test results at the same flow rate and temperature for elements of the same size but made of different materials.

Filter element	Electrical potential (kV)	Current (µA)
Standard glass microfibre	11	-6.0
Dissipative glass microfibre	0	-9.0
Standard cellulose	6	-1.3
Dissipative cellulose	0	-2.1
Other glass microfibre	9-15	-7.0
Other glass microfibre	3-8	-16.0

When using a synthetic oil instead of mineral oil, the values and sign of the two electrical quantities may vary.

	Mineral oil	Synthetic oil
Filter element	**Electrical potential (kV)**	
Standard glass microfibre	+11	+30
Dissipative glass microfibre	0	~0.0
Standard cellulose	+6	-43
Dissipative cellulose	0	~0.0

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