

FILTRATION EFFECT STUDY 0.5µm PRESENTED BY IPMD

ON DIESEL FUEL CONTAMINATION PARAMETERS

The purpose of the study is to characterize the effects generated by the 0.5µm filtration solution presented by IPMD in Cooperation with Micfil Ultra Fine Filter , on the main physical and microbiological contamination parameters of diesel fuels.

The European standard EN 590, describing the requirements and test methods for diesel fuel and on which the administrative specifications are based, defines limit values not to be exceeded for certain parameters such as water content and total contamination (sediment and suspended solids content).

However, EN 590 does not define a microbiological fuel quality limit or reference. However, the worldwide known phenomenon of microbiological proliferation in diesel fuels creates important problems related to the operation of facilities and the stability of fuel quality during storage.

It is within this framework that the microbiological diagnostics of fuels and the control of this parameter show a real interest.

1. Principle of the study:

Sufficient contaminated diesel fuel samples shall be taken for analysis before and after filtration at 0.5 µm. The values obtained are then compared.

The filtration is carried out on a laboratory unit, comparable to the equipment intended to operate the services on site. The filter cartridges have the same porosity characteristics as those used on site. Note that the equipment is not equipped with a water pre-separator, as are the on-site filtration units.

The parameters checked in the laboratory are as follows:

Paramètres	Norme	Spécification
Aspect visuel	Méthode visuelle	Clair et limpide, absence de matières en suspension
Teneur en eau	NF EN ISO 12937	Max 200 mg/kg
Contamination totale	NF EN 12662	Max 24 mg/kg
Teneur en micro-organismes totaux	ASTD D7687	Recommandé : Max 10 pgcATP/ml

2. Samples submitted for study:

Two samples of diesel fuel contaminated with water content, total contamination and total micro-organism content from two separate sites were studied.

Each representative sample of the batch to be treated was taken and stored in a 10 litre polyethylene drum. The analyses and filtration were carried out on receipt, between 4 and 48 hours after sampling.

Echantillon	Origine	Date de prélèvement	Date de réception laboratoire / filtration
Gazole – Site 1	Composite de 6 cubitainers et 1 citerne routière	02/05/2018	22/05/2018
Gazole – Site 2	2 citernes routières	22/05/2018	04/05/2018

3. Performing analyses :

3.1. Physico-chemical analyses :

Water content

The water content of the samples is carried out according to standard NF EN ISO 12937, by Karl Fischer coulometric. A test sample of approximately 2 ml of fuel is weighed to the nearest 0.1 mg and then injected into the Karl Fischer. The water content in mg/kg is measured.

Total contamination

Total contamination is carried out according to standard NF EN 12662, by gravimetry. The sample is heat treated at 40°C for 45 minutes. A test sample of about 300ml is weighed to the nearest 0.1g and then filtered on a glass microfiber membrane of porosity 0.7 µm previously tared. The membrane is then rinsed with heptane and dried in an oven at 110°C, before being cooled in a desiccator and weighed. The total contamination in mg/kg is then calculated.

3.2. Microbiological analyses :

Total microorganism content by ATP-metry

Microbiological analyses are performed according to the ASTM D7687 method, using the 2nd generation ATP-metry technique.

ATP (Adenosine Triphosphate) is a molecule present in ALL LIVING CELLS and which is at the heart of the metabolic activity of the cells of any living organism (ATP is the energy stored in living cells).

ATP-metry is an analytical technique that measures the concentration of intracellular Adenosine Tri Phosphate in a sample.

After isolating the living cells from the micro-organisms, the intracellular ATP is released from these cells and is then brought into contact with an enzyme (luciferase + luciferin). The reaction of ATP

with the enzyme generates a luminous flux that is detected by equipment called a luminometer. The intensity of this light signal is proportional to the concentration of ATP which itself is related to the quantity of microorganisms present in the sample (and therefore to its biological activity).

4. Results obtained :

Echantillons	Aspect visuel	Teneur en eau mg/kg	Contamination totale mg/kg	Teneur en micro- organismes totaux pgcATP/ml
Site 1 - avant filtration	Jaune, trouble, présence d'eau libre	2400	Echec de filtration	65.7
Site 1 - après filtration	Jaune, limpide, sans matière en suspension	120	14.5	< 1.65 (LQ)
Site 2 - avant filtration	Jaune, trouble, présence de matières en suspension	360	13.5	11.9
Site 2 - après filtration	Jaune, limpide, sans matière en suspension	110	< 5 (LQ)	< 1.65 (LQ)

5. Conclusion of the study and comments:

The results of this study, based on 2 diesel fuel samples, show that the 0.5µm filtration solution proposed by IPMD provides a significant benefit in reducing physio-chemical and microbiological contamination levels (bacteria, fungi and mould) in fuels. In both cases, parameters not complying with the European standard EN 590 were reduced to very satisfactory levels, in line with specifications.

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