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Fuel Lab Catalogue

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Contents

About Fuel Lab

Fuel Lab is a new and innovative portable Laboratory developed for fuel and oil analysis. It can be applied to industry and marine installations (vessels) that require the use and complete characterization of Fuel Oil, Heavy Fuel Oil (HFO), Gas Oil (GO) Marine Gas Oil (MGO), Marine Diesel Oil (MDO) or lubricating and hydraulic oils.

Figure 1 - Fuel Lab main container box. Weight with equipment: 39 kg. Weight with equipment and reagents*: 74kg

*Reagents will be delivered in a different container due to the shipping specifications. The weight presented refers to a 50 trials kit.

How can Fuel Lab help you?

Due to the constant and even more restrictive legislation that has been imposed (to shore and sea) focusing on emissions from the combustion process, it is more important than ever to get to know the characteristics of your product, understand the levels of each parameter and in that way take proper actions and avoid burdens.

Not only does fuel emissions affect the environment, which can result in penalties to its users but also if its characteristics are not maintained between certain values can represent a problem in terms of the equipment's performance. That is what fuel lab bring to you. It is a portable fuel lab that allows characterizing properties in a fast quantitative/qualitative way.

Which are the applications and how does it work?

The majority of the tests comprised in the kit follow international standards such as ISO or ASTM. It can be applied to analyse fuel samples (Fuel Oil, Diesel and other petroleum products) and oil samples (Hydraulic and Lubricating oils), having for each case its specific and typical trials. It has the advantage of allowing its users to perform the tests in the field due to its portability and autonomy.

The Laboratory comprises, technologically advanced equipment, laboratory materials, consumables (reagents, cleaning kit and security kit) and a user´s manual with complete information how each trial can be performed and its result evaluated.

Fuel Lab List

Fuel oil, diesel and others

- Apparent density @15ºC (ASTM D1298);
- Kinematic viscosity @40ºC and 100°C (ISO 3104 and ISO 8217);
- Nature of the water (fresh or salt water);
- Determination of water content by the petroleum column method;
- Determination of TAN or TBN value (ASTM D974);
- Flash point and fire point determination in open cup (ASTM D92);
- Asphaltenes content (Reference Spot Test);
- Determination of carbon aromatic index (CCAI) (ISO 8217);
- Determination of compatibility of fuel oil mixtures (ASTM D2781);
- Standard test method for corrosiveness to copper from petroleum products by copper strip test (ASTM D130-18);
- Qualitative analysis for active sulphur species by doctor test (ASTM D4952);
- Determination of total sediment content by hot filtration (ISO 10307 - part 1).

Hydraulic and lubricating oils

- Apparent density @15ºC and 50ºC (ASTM D1298);
- Kinematic viscosity @40ºC and 100ºC (ISO 3104 and ISO 8217);
- Viscosity index from kinematic viscosity at 40ºC and 100°C;
- Determination of water content by the petroleum column method;
- Determination of TAN or TBN value (ASTM D974);
- Insoluble content and degree of dispersion (Reference Spot Test);
- Flashpoint and fire point determination in open cup (ASTM D92);
- Standard test method for corrosiveness to copper from petroleum products by copper strip test (ASTM D130-18).

Fuel oil tests

Apparent density @15ºC (ASTM D1298)

Description: It consists of a quick and non-destructive method for determining the amount of matter that is present per unit of volume.

Advantage: This test enables the determination of the density of any fuel, in the following range of values: 0.85 to 1.05 g/cm^3.

Figure 2 - Apparent density test material.

Kinematic viscosity @40ºC and 100°C (ISO 3104 and ISO 8217)

Description: The viscosity corresponds to a physical property that characterizes the resistance of a given fluid to flow, as well as the shear deformation. It corresponds to the internal friction in fluids due to intermolecular interactions and this magnitude is generally a function of temperature. In addition to being a function of temperature, in particular, the kinematic viscosity is a function of the specific mass of the product.

Advantage: The present test makes it possible to determine the viscosity of the fuel by using a kinematic viscometer set at a specific temperature (40°C or 100ºC). The test is based on the international standard ISO 3104 and allows the determination of values in the range of 5-700 mm² / s (cSt) using the gauge used.

Figure 3 - Kinematic viscosity test material.

Nature of the water (fresh or salt water)

Description: A quick method of determining the nature of the water present in the fuel, in particular specifying whether.

Advantage: Neglect the presence of salts present in the water that lead later to phenomena like corrosion or degradation of materials.

Figure 4 - Nature of water content test material.

Determination of water content by the petroleum column method

Description: The water content of a fuel is determined in order to minimize the possibility of corrosion problems, especially in cases where the sulphur content is high, as well as to avoid influences on the calorific value of the fuel. Water increases the possibility of formation of emulsions which can cause problems in the nebulization of the product.

Advantage: A quick method for quantification of the water content in the sample (on a scale from 0 to 1 v/v%).

Figure 5 - Determination of water content test material.

Determination of TAN or TBN value (ASTM D974)

Description: Determination of acid or basic constituents in fuel samples. It is applicable for the determination of acids or bases whose dissociation constants in water are greater than 10^{-9}.

Advantage: A quick method of determining the level of acidity/basicity of the fuel.

Figure 6 - Determination of TAN or TBN test material.

Flash point and fire point determination in open cup (ASTM D92)

Description: The flash point corresponds to the lowest temperature at which a fuel releases enough steam to form a flammable mixture from an external source of heat. It is not sufficient for combustion to be maintained. In turn, the combustion point is the lowest temperature at which the steam of fuel will continue to burn for at least 5 seconds after ignition by an open flame.

Advantage: Determine the flash point and fire point of a fuel sample using the open cup method (according to international standard). It assesses the range of applicability (combustion) of the fuel and assesses its danger.

Figure 6 - Flash point and fire point determination in open cup test material.

Asphaltenes content (Reference Spot Test)

Description: Asphaltenes are heavy petroleum aromatic compounds with higher boiling points. They are formed by aromatic rings, having paraffin-like chains and high polarity. These compounds can cause serious problems during the production of fuel. These problems include the formation of organic deposits in reservoirs and runoff lines, changes in rock wettability and the formation and stabilization of emulsions.

Advantage: A quick method of quantifying the content of these compounds by comparison with standard charts.

Figure 7 - Asphaltenes content test material.

Determination of carbon aromatic index (CCAI) (ISO 8217)

Description: Estimation of CCAI value based on the knowledge of several fuel properties.

Advantage: It allows to avoid the use of fuels non-characteristic kinematic viscosities and apparent density. Provides information about the ignition delay of the fuel.

Determination of compatibility of fuel oil mixtures (ASTM D2781)

Description: Determination of the degree of compatibility of a mixture of a different fuel oil types.

Advantage: This is a good (expeditious and portable) way of measuring the compatibility of marine fuels, including waste and distillate fuel.

Figure 8 - Compatibility of fuel mixtures test material.

Standard test method for corrosiveness to copper from petroleum products by copper strip test (ASTM D130-18)

Description: Determine the degree of corrosiveness to copper of samples of petroleum products containing a steam pressure of not more than 124 kPa (18 psi) at 37.8 ° C.

Advantage: It allows for an accelerated ageing process to verify the presence in metal fuel damage equipment or materials by oxidation-reduction reaction.

Figure 7 - Determination of corrosion by the copper blade method test material.

Qualitative analysis for active sulphur species by doctor test (ASTM D4952)

Description: Qualitative method to determine the presence of sulphur compounds in fuel samples.

Advantage: Method for determination of sulphur species present in the samples.

Figure 8 - Qualitative analysis for active sulphur species by doctor test material.

Determination of total sediment content by hot filtration (ISO 10307 - part 1)

Description: Method for determination of total sediments in fuel samples having a maximum viscosity of 55 mm²/sat at 100ºC or for mixtures of distillates containing residues.

Advantage: It allows to determine accurately (gravimetric method after vacuum filtration), the content of insoluble organic material or inorganic material up to a range of 0,50 wt% for residual fuel or 0,40% for distillates.

Figure 9 - Determination of total sediments test material.

Oil tests

Apparent density @15ºC and 50ºC (ASTM D1298)

Figure 12 - Apparent density test material.

Description: It consists of an expedition and a quick method for determining the amount of matter that is present per unit of vol.

Advantage: This test enables the determination of the density of any oil type, in the following range of values: 0.85 to 1.05 g/cm³.

Kinematic viscosity @40ºC and 100ºC (ISO 3104 and ISO 8217)

Figure 103 - Kinematic viscosity test material.

Description: Viscosity corresponds to a physical property that characterizes the resistance of a given fluid to flow, as well as the shear deformation. It corresponds to the internal friction in the fluids due to intermolecular interactions and this magnitude is generally a function of temperature. In addition to being a function of temperature, in particular, the kinematic viscosity is a function of the specific mass of the product.

Advantage: The present test makes it possible to determine the viscosity of the oil by using a kinematic viscometer set at a specific temperature (40°C or 100ºC). The test is based on international standard ISO 3104 and allows the determination of values in the range of 5-700 mm²/s (cSt) using the gauge used.

Viscosity index from kinematic viscosity at 40ºC and 100°C

Description: The viscosity index is a widely used and accepted measure of the variation in kinematic viscosity due to changes in the temperature of a petroleum product between 40ºC and 100°C. A higher viscosity index indicates a smaller decrease in kinematic viscosity with increasing temperature of the lubricant. The viscosity index is used in practice as a single number indicating temperature dependence of kinematic viscosity.

Advantage: From experimental data, it is able to quickly understand the tribological behaviour of the oil.

Determination of water content by the petroleum column method

Description: The water content of oil is determined in order to minimize the possibility of corrosion problems, especially in cases where the sulphur content is high, as well as to avoid influences on the calorific value of the oil. Water increases the possibility of formation of emulsions which can cause problems in the nebulization of the product.

Advantage: A quick method that allows accurate quantification of the water content (on a scale from 0 to 1 v/v%).

Figure 14 - Determination of water content test material.

Determination of TAN or TBN value (ASTM D974)

Description: Determination of acid or basic constituents in oil samples. It is applicable for the determination of acids or bases whose dissociation constants in water are greater than 10^{-9}.

Advantage: A quick method of determining the level of acidity/basicity of the oil.

Figure 15 - Determination of TAN or TBN value test material.

Insoluble content and degree of dispersion (Reference Spot Test)

Description: Determination of the fraction of insoluble matter present in the sample of oil under study by comparison with reference letters.

Advantage: It allows for an expeditious determination of the level of contamination of insoluble present in the sample, as well as the degree of dispersion of the samples (e.g.: soot concentration). It allows evaluating the need to replace the product in order not to affect equipment and materials.

Figure 116 - Insoluble content and degree of dispersion test material.

Flashpoint and fire point determination in open cup (ASTM D92)

Description: The flash point corresponds to the lowest temperature at which a fuel releases enough steam to form a flammable mixture from an external source of heat. It is not sufficient for combustion to be maintained. In turn, the combustion point is the lowest temperature at which the steam on oil will continue to burn for at least 5 seconds after ignition by an open flame.

Advantage: Determine the flash point and fire point of a fuel sample using the open cup method (according to international standard). It assesses the range of applicability (combustion) of the oil and assesses its danger.

Figure 127 - Flashpoint and fire point test material.

Standard test method for corrosiveness to copper from petroleum products by copper strip test (ASTM D130-18)

Description: Determine the degree of corrosiveness to copper of samples of petroleum products (for example lubricating oils) containing a steam pressure of not more than 124 kPa (18 psi) at 37.8°C.

Advantage: It allows for an accelerated ageing process to verify the presence in metal fuels damage equipment or materials by oxidation-reduction reaction.

Figure 138 - Standard test method for corrosiveness to copper from petroleum products by copper strip test material.

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