

DESCRIPTION

In order to determine whether or not abrasive particles such as aluminium and silicon are significantly present in fuels before use, fuel samples need to be taken and sent to a laboratory for analysis. While fuel testing laboratories claim a quick turnaround in reporting of the analysis results, delays with sample dispatch and/or courier could extend the reporting time. The DREWCAT Fines Tester (PCN 1AB5967) is an onboard test kit that offers ship operators an alternate means to determine whether aluminium and silicon are significantly present or greater than total 20 mg/kg (ppm) in fuel.

The DREWCAT Fines Tester contains all the necessary equipment to determine the presence of aluminium and silicon using basic wet chemistry. The procedure is simple and involves three main steps: dilution, extraction, and measurement.

The fuel sample is first diluted with a solvent to decrease overall sample viscosity and density. Next, a portion of the mixture is extracted and prepared with reagent to create an emulsion. Finally, the emulsion is centrifuged for 15 minutes to allow any aluminium and silicon particles present to be separated from the emulsion and appear as solid particles at the bottom of the centrifuge tube for measurement.

A simple reference chart allow engineers on board to visually compare their results and ascertain the extent of aluminium and silicon presence from 20 ppm, 50 ppm, 100 ppm, and 200 ppm. The DREWCAT Fines Tester includes a benchtop centrifuge, manual, safety goggles, and sufficient reagent and labware for 25 test determinations. Additional reagent and labware is available by ordering the DREWCAT Fines Reagent Pack (PCN 1AB5968).

BACKGROUND

As global and regional environmental regulations continue to increase the demand for low sulfur fuel oils, refiners have also needed to increase their production of lighter fractions or streams. These lighter and more valuable refinery streams are made by breaking down long-chain hydrocarbons into shorter chains using advanced refinery units. One type used by modern refineries utilizes a fluidized catalytic cracker (FCC). The FCC unit works by breaking down large hydrocarbons using synthetic catalyst that is produced from alumina and silica.

Specialized synthetic catalysts, such as those used in FCC units, are expensive. To minimize loss of catalyst, FCC units are usually equipped with cyclones within the reactor that collect larger sized catalysts for reuse. Smaller sized



PCN 1AB5967

catalysts are recovered downstream via large filtration or other solid-liquid separation processes. Recovered catalyst particles are subsequently regenerated for reintroduction in the FCC reactor.

As spent catalysts decrease in diameter, they become less effective in the FCC unit and also become finer in size, and as a result, catalyst (cat) fines become more difficult to recover. Hence, cat fines are passed on with the heavy cycle oil refinery stream.

Wherever possible, bunker blenders and suppliers use available heavy cycle oil (slurry) in producing compliant marine fuel blends. While all marine fuels may contain a small amount of slurry oil, the chances for its presence and the presence of aluminium and silicon is likely to be higher in residual fuel grades including residual-type compliant fuels. The inclusion of slurry oil into residual fuel is possible because ISO 8217:2017 allows up to a maximum 60 mg/kg combined value for aluminum plus silicon.

APPLICATION

Cat fines are known to be very hard particles that can cause major damage because of their size and abrasive nature. As such, marine engine manufacturers have indicated that their engines are able to tolerate cat fines of no more than 15 mg/kg at the fuel inlet of a large-bore main engine.

Typically, cat fine particles are adequately reduced with conventional onboard treatment (i.e., settling, centrifuging, etc.). Cat fines that fail to be removed with conventional onboard treatment will enter the engine and may harm engine internals over time. In certain cases, catastrophic damage to engine cylinder liners and piston rings can quickly



Contact your Drew Marine representative for more information

occur during combustion of fuel that remains laden with a significant amount of cat fines. Moreover, cat fine particles that are larger than the clearances of moving parts in fuel injection equipment or greater than cylinder liner lubricating oil film thickness will have a higher likelihood of causing wear damage than smaller cat fine particles.

To detect whether aluminium and silicon are significantly present or greater than total 20 ppm in fuel, use the DREWCAT Fines Tester to screen fuel samples taken from new bunker deliveries, before and after centrifuge, and engine inlet. Should any of the fuel samples screened have unusual or significantly high levels cat fines, fuel samples should be sent immediately to a laboratory to confirm onboard measurement results.

Laboratory analysis results normally include aluminium and silicon determination. The combined sum of aluminium and silicon is typically compared against a maximum limit allowable by the specified grade of residual fuel.

The ISO 8217:2017 maximum limits for the various residual fuel grades are as follows:

Test Parameter	RMA10	RMB30 RMD80	RME180	RMG180 RMG/ RMK
Al + Si [mg/kg]	25	45	50	60

Note: 1 mg/kg = 1 ppm

SPECIFICATION

Centrifuge	
Speed	9,200 RPM (Fast setting)
Power Requirements	100-240V, 1.0A, 50/60Hz
Timer	1 to 15 minutes
Dimensions	240 x 187 x 139 mm (9.5 x 7.4 x 5.5 in)
Weight	1.6 kg (3 lb 6 oz)
Certifications	CE Marking

CLEANUP AND HANDLING

The use of harsh chemicals for cleaning test kit instruments and accessories is not advisable. Use only approved cleaning agents (e.g., DREW XP Test Kit Cleaner – PCN 1AB2738) to clean test kit components, and wipe clean using a dry rag. Dispose of the used rag as used oil.

ORDER INFORMATION

Description	PCN
Reorders	
DREWCAT Fines Tester	1AB5967
Spares and Replacements	
DREWCAT Fines Reagent Pack	1AB5968



Drew Marine®

100 South Jefferson Road
Whippany, NJ 07981 USA
1-973-526-5700
Drew-Marine.com