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 climate control  
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**filtration**  
 fluid & gas handling  
 hydraulics  
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 process control  
 sealing & shielding



Enhanced measurement  
 range 0 and 20ppm



# Cat Fines Test Kit

Parker Kittiwake announces the  
 easy-to-use Cat Fines Test Kit



# Easy-to-use test kit detects catalytic fines to prevent irreparable damage to fuel pumps, injectors, piston rings and liners



## Key benefits

- Low cost
- Simple to use
- Onboard usage
- No installation required
- Compact, lightweight and portable

This product is covered by the following patents:

- US 9759706
- GB 2547960
- WO 2017042558

## The test kit

The Parker Kittiwake Cat Fines Test Kit is an innovative breakthrough in the early detection of catalytic (cat) fines. In just 15 minutes, the simple onboard test identifies the presence of abrasive silicon and aluminium cat fines, which can cause irreversible damage to a vessel's fuel system if they become embedded into engine components.

The test is a simple to use chemical bottle test which determines the level of cat fines present in a representative sample of fuel oil, allowing the operator to identify the ingress of abrasive and potentially damaging components in the fuel oil before it enters the system.

The quality of fuel brought on board is increasingly difficult to predict. Until now, the detection of cat fines in fuel oil was only possible by obtaining a fuel sample, which is then sent for laboratory analysis. The Cat Fines Test Kit provides accurate results onboard and in a matter of minutes, providing ship owners with an detailed picture of the level of corrosive elements present almost instantly, potentially preventing critical damage before it occurs.

As a means of self-preservation, vessels collect representative fuel samples during bunkering and then send them off for laboratory analysis. However, the test results often only become available once a ship has set sail and is far out to sea, by which time significant engine damage may already be in progress. Current industry practice is to use high-end instruments that are more suited for laboratory use rather than on board the vessel.

The Cat Fines Test Kit identifies excessive levels of cat fines onboard and in real time, allowing the operator to take preventative action and call for further laboratory testing to confirm that the fuel is suitable before it is used. It has been designed to flag up HFO samples that may be contaminated with dangerous levels of cat fines before the fuel has even been pumped aboard and is simple to perform, cost effective, and can be completed within a few minutes.

The Cat Fines Test Kit is capable of identifying those fuel samples that have a cat fine concentration of  $> 60$  ppm (Al + Si), and which therefore exceed the limit recommended by ISO 8217:2012. It has been specifically designed to provide the crew with a clear sail or don't sail indication with regards to fuel quality.

## Cat fines

Cat fines cause damage to fuel injection equipment. The fines are particles of spent aluminium and silicon catalyst that arise from the catalytic cracking process in the refinery, and vary both in size and hardness. If not reduced by suitable treatment, the abrasive nature of these fines will damage the engine, particularly fuel pumps, injectors, piston rings and liners, leading to unexpected damage, costly repairs, and unplanned downtime.

Much of the heavy fuel oil (HFO) burnt in the cylinders of large 2-stroke marine diesel engines is contaminated with cat fines. These particles, which find their way into the fuel at the oil refinery, can cause catastrophic abrasive damage to engine cylinder liners during the combustion process.

This problem has been inadvertently exacerbated by recent changes to emissions regulations, which can require the use of alternative fuels, leading to the increased uptake of cat-fine prone, low-sulphur fuel oils.

Cat fines can accumulate in the fuel during storage, and become concentrated before fuel oil separators and consequently before entering the engine. The rate of settling is determined by Stokes' Law, which takes account of the particle size, difference in density of the catalyst fine and the fuel, and the viscosity of the fuel. It is vital to ensure that measurements taken on the level of cat fines in fuel is current and not retrospective.

Various values are quoted for the density of cat fines, but in reality they may be likened to honeycombed structures. This is further hindered by the outer shell of water by virtue of the close proximity of the density of water to that of the fuel.

The extent of the removal also depends on the height of the tank (fixed) and the size of the particles (variable). As far as the centrifuge is concerned, the critical factor is the relationship between the actual viscosity of the fuel and that for which the centrifuge was sized. If there is a difference in viscosity, the residence time of the fuel in the centrifuge will be greater than the designated value; hence directionally the centrifuge should be able to remove fines of a smaller size.

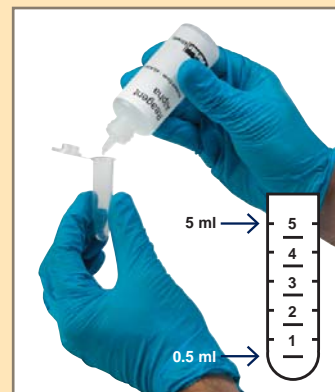
With the introduction of modern centrifuges without gravity discs the recommendation is now to operate all available in parallel, which enables the flow through each to be reduced to the minimum practical level. The fuel is afforded the longest residence time in the centrifuges and the highest separation efficiency can be achieved. Combined output should be equal to the consumption. The temptation of using a higher rate - so the daily service tank overflows back to the settling tank and is re-circulated should be avoided.

NOTE: The ISO 8217:2012 limit for acceptable levels of Cat Fines in HFO is 60 ppm.

Cat Fines Test Kit	FG-K30566-KW
Contents	Centrifuge and Power Supply Reagent Alpha Sample Preparations (25) Pipettes (25) Syringes (25) Centrifuge Tubes (50) Safety Goggles and Gloves
Power Supply	AC/DC Switching Adaptor 110/240VAC, 50/60Hz, 1.4A
Size	Carry Case 350 x 560 x 220mm Centrifuge 190 x 240 x 140mm
Test Time	5 minutes typical - sample preparation 15 minutes centrifuge cycle
Weight	7.80kg
Correlation	Go / No-Go – 50ppm Reference
Cat Fines Reagent Kit	FG-K30579-KW
Contents	Reagent Alpha Sample Preparations (25) Pipettes (25) Syringes (25) Centrifuge Tubes (50)

## Method

1. Fill a test tube to the 5 ml graduation line with water and close the cap fully.
2. Fill a second test tube to the first (0.5 ml) graduation line with Reagent Alpha.
3. Place the tubes in opposite positions on the centrifuge holder.



4. Completely fill a syringe with HFO by drawing the plunger back to the stop very slowly.
5. Unscrew the cap from a new Cat Fines Test Fluid Bottle and add all of the HFO from the syringe.



6. Replace the cap and shake the bottle vigorously for 3 minutes.
7. Remove the cap from the bottle and use a pipette to extract some of the mixture.



8. Remove the test tube containing 0.5 ml of Reagent Alpha from the centrifuge.
9. Gently lower the pipette into the test tube until it lies just above the Reagent Alpha.

10. Very slowly add the mixture until the 5 ml line is reached (refill the pipette as required).
11. Close the cap on the test tube and return it to its position opposite the water-filled tube.
12. Ensure centrifuge lid is firmly shut. Spin the tubes for 15 minutes. (push timer down to start).
13. Use picture below to decide whether the HFO has significant (> 20 ppm) cat fine contamination.





# Now part of the Parker family, genuine Kittiwake products are only available from Parker Kittiwake.

## Cylinder Monitoring

### Ferrous Wear Meter

The Ferrous Wear Meter (FWM) quantifies metallic wear in an oil samples taken from cylinder scrapedown oil. The FWM offers a simple, easy to use instrument that offers Parker Kittiwakes quality, accuracy and reliability.

This unit is ideal for testing and analysing used cylinder scrapedown oil samples on - board. for metallic wear, indicating high cylinder liner wear. The FWM is constructed using a sophisticated magnetometer adapted for field applications. A 5 ml test tube filed with the sample is placed directly in the hole in the instrument and its metallic content, in PPM, is displayed on the screen in less than 2 seconds. Use in collaboration with the Cold Corrosion Test Kit (below) to obtain total iron measurements from your ships cylinder oil. **Part Number - FG-K30258-KW**



### Cold Corrosion Test Kit

The oil used to lubricate the cylinders of large 2-stroke marine diesel engines has to contend with high temperatures and acidic products formed during the combustion of sulphur-rich bunker oils.

Paker Kittiwakes Cold Corrosion Test Kit is a quick, simple to use chemical test that provides an accurate measure of the parts per million (PPM) value of  $Fe^{2+}$  and  $Fe^{3+}$  compounds in used scrape down oil. Rather than simply giving a figure for the total iron (including metallic compounds), which other tests provide, knowing the specific PPM of corroded iron allows informed decisions to be made in adjustments to feed rates and the Base Number (BN) of the oil used. **Part Number - FG-K19763-KW**

### DIGI Water & BN Test Kit

At the heart of Parker Kittiwakes on-board oil test solution range is the DIGI Test Cell, providing simple, accurate results for Water in Oil and Base Number.

Parker Kittiwakes oil test kit range provides a complete set of economically priced equipment with a level of accuracy suited to routine analysis. With an easy to read digital display providing instructions and results, a five year (5000 tests) battery life and built in memory for recording previous test results, the Parker Kittiwake DIGI Cell has become a favoured test method worldwide for on-board testing. Test cells are available for either Water in Oil or Base Number (BN). Alternatively, a DIGI Combined Test Cell is available that performs both test measurements in a single cell.

**Part Number: FG-K1-008-KW**



The world's first real-time alarm system for engine liner wear. Parker Kittiwakes LinerSCAN marks a new era in asset protection, providing early warning against critical engine damage.

Parker Kittiwakes LinerSCAN is designed to remove the uncertainty of cylinder liner damage resulting from low fuel quality, slow steaming, low sulphur levels, lower oil feed rates and cylinder oil formulation changes. Trials have shown that LinerSCAN highlights the first signs of damage earlier than other systems and enables safe reduction of lubricant feed rate. LinerSCAN is a fully automated system and will help save money by optimising the lubricant feed rate, reducing your maintenance loads and by helping you prevent unnecessary engine damage.

**Part Number - FG-K17400-KW**

### LinerSCAN

