

FIJI FAME in Jet Instrument



Def Stan 91-91 & ASTM D1655 Jet Fuels

IP 583; ASTM D7797 - Determination of the FAME content of aviation turbine fuel (AVTUR) with FTIR, Rapid Screening Method

Key Features

- Analysis time 20 minutes
- Certified range 10–150 mg/kg
- Laboratory and field instrument
- Fully automatic
- Suitable for untrained operators
- No cleaning solvents required
- No pre-sample preparation required
- 50 ml sample volume
- Patent Approved



What are the concerns over contamination?

- In many cases Diesel and JET use shared multi-product pipelines which can lead to fuel contamination
- FAME is surface active and attracted to the inner wall of pipelines which causes fuel contamination
- JET can release FAME from tankers and pipelines which creates cross contamination
- Whenever fuel is moved or stored there is the potential for fuel contamination

Industry concern over fuel contamination has prompted the need for improved testing, and reliable operating procedures are necessary to prevent airports suffering any disruption from handling contaminated fuel.

FIJI Technology

The patented FIJI - Fame In Jet Instrument was developed to offer the industry a rapid and easy check on Parts Per Million (ppm or mg/kg) levels of FAME in Aviation fuel using test method IP 583 and ASTM D7797. These methods are now been included in ASTM D1655 Standard Specification for Aviation Turbine Fuels and Defence Standard 91-91.

FIJI uniquely utilises state of the art FTIR (Fourier Transform Infra-Red Spectroscopy) technology and a patented sample preparation system which allows FAME detection accuracy down to the 10mg/kg level.

FIJI can be used as a field or lab based screening tool to give a quick indication of possible FAME contamination that may then necessitate further investigations. The instrument can be used to prevent expensive testing and avoid costly delays of fuel release.

What types of FAME can FIJI detect?

A key advantage over current analytical FAME in Jet methods is FIJI's ability to detect all types of FAME in the range C8 to C22 including;

- Coconut
- Mustard
- Palm
- Rapeseed
- Sunflower oil
- Soya
- Jatropha



Principles of FIJI operation

The FIJI instrument is robust, extremely simple to use and is fully automatic so no specialist operator training is involved. Tests require less than 50ml of sample and typically take under 20 minutes. Results are presented in mg/kg units together with an optional traffic light system for flagging FAME contamination levels of the fuel. By comparison current analytical tests can take many hours, require complex equipment and demand high skill levels.



FIJI Cartridge

Using a unique sample preparation module the sample is pumped at a controlled flow rate through a proprietary disposable cartridge. The sample components are spectrally analysed by the FTIR and a result is displayed in mg/kg and a graphical spectrum is also shown.

The system is self-cleaning so no solvents are required. After each test the cartridge is simply and easily replaced and the instrument is immediately ready for the next sample.

Operator Sequence



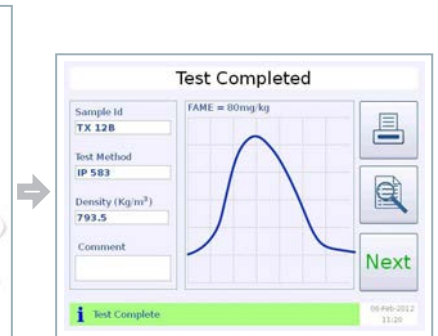
Place Cartridge



Load Sample



Press GO



Test Complete

Specification for FIJI (SA5000-2)

Measurement range:	Certified range 10-150 mg/kg FAME in AVTUR
Principle of measurement:	Flow Analysis by FTIR Spectroscopy
Operating Temperature Range:	5 – 35°C maximum (80% RH)
Test duration:	20 minutes
Sample size:	50ml
System:	Embedded computer
User Interface:	Colour Touch Screen with Interactive Menus
Connectivity:	USB 'A' (2 ports)
Voltage:	100 to 250V 50/60Hz
Power:	50W max
Size (HxWxD)/Weight:	55 x 38 x 42 cm / 27kg

What is the advantage of this technology?

The SetaAnalytics FIJI Analyser is a world class engineered instrument, offering trace level FAME measurement capability with a high degree of measurement precision. This was recognised in the EI programme with the best test method reproducibility at levels which are typically expected in a distribution system. It is also accepted that it is the only instrument with the capability of screening for all FAME types, including low carbon esters such as coconut.

FIJI is truly the first line of defence to check for FAME in jet fuel contamination when testing Jet A and Jet A-1 made to the specifications of ASTM D1655 or Def Stan 91-91.

Current Status of Jet Fuel Specifications

ASTM D1655 Standard Specification for Aviation Turbine Fuels and Defence Standard 91-91 are widely adopted to describe aviation turbine fuel requirements from refinery to aircraft. Both specifications have been updated to allow the new 50mg/kg FAME limit and now include the FIJI Rapid Screening Test Methods IP 583 and ASTM D7797.

Changes to ASTM D1655

- Table 3 – Incidental Materials has been updated and the level of FAME permitted in JET fuel has been increased from 5 mg/kg to 50mg/kg.
- An emergency release of 100 mg/kg is permitted when authorized by the airframe and engine manufacturers.
- Table 3 includes FIJI Rapid Screening methods, IP 593 / ASTM D7797, as accepted test methods for the new 50mg/kg level.
- The levels may increase to 100 mg/kg after two years, once the industry has been able to evaluate the field performance of fuels with higher FAME levels.

Changes to Defence Standard 91-91 – Issue 7, Amendment 3

- Table 1 – Incidental Materials will include a maximum of 50 mg/kg with an emergency release of 100 mg/kg
- Table 2 includes FIJI Rapid Screening methods, IP 593 / ASTM D7797, as accepted test methods for the new 50mg/kg level.
- From 2nd May 2015 FAME measurement will become a mandatory part of recertification which is conducted at the upstream supply terminals and prior to movement to airport.
- FAME tests are now mandated in DefStan 91-91

Test Method Precision

Concentration mg/kg	IP 583 FTIR	IP 585 GC-MS	IP 590 HPLC-ELSD	IP 599 GC Hcut
	Reproducibility (R)	Reproducibility (R)	Reproducibility (R)	Reproducibility (R)
30	3.9	8.5	6.9	2.9
*50	4.4	13.7	10.9	4.8
100	5.5	26.6	21.0	9.3
140	6.3	36.9	29.3	13.0
140	6.6	39.5	31.3	13.9

Where R = reproducibility as calculated by the Energy Institute from round robin data.

* Comparison of precision at selected FAME concentrations with proposed specification level of 50mg/kg.