

Emcee Electronics, Inc.
Filterability Analyzer
Model 1143

Operation Manual



EMCEE ELECTRONICS, INC.

520 Cypress Ave.

Venice, FL 34285

(941) 485-1515

FAX 941-488-4648

WEBSITE: emcee-electronics.com

EMAIL: emcee-electronics@worldnet.att.net

The information contained in the accompanying document is proprietary and confidential, and may not be copied in any manner without prior written consent of Emcee Electronics, Inc. The document and the material therein may not be used for any purpose other than that intended by Emcee Electronics, Inc.

COPYRIGHT 2003 EMCEE ELECTRONICS, INC.

REVISION DATE: DECEMBER 16, 2003

Model 1143 Filterability Analyzer

Table of Contents

- 1.0 Scope
- 2.0 Significance
- 3.0 Definitions
- 4.0 Summary of Method
- 5.0 Apparatus
- 6.0 Preparation of Sample
- 7.0 Preparation of Apparatus
- 8.0 Calibration
- 9.0 Test Procedure
- 10.0 Report
- 11.0 Photographs

Service & Warranty Policy

The information contained in the accompanying document is proprietary and confidential and may not be copied in any manner whatsoever without prior written consent of Emcee Electronics, Inc. The document and the material therein may not be used for any purpose other than that intended by Emcee Electronics, Inc.

COPYRIGHT 2003 EMCEE ELECTRONICS, INC.

REVISION DATE: DECEMBER 16, 2003

Page 2

Model 1143 Filterability Analyzer

1.0 Scope

The Emcee Electronics Model 1143 Filterability Analyzer is a self contained instrument to detect the presence of particulate and/or precipitate in hydrocarbon fuels.

The instrument used in accordance with ASTM D-6426 determines the filterability of Distillate Fuel Oils.

Other fuels are currently being evaluated for application of this instrument.

2.0 Significance

Hydrocarbon fuel cleanliness can degrade due to various reasons. These reasons include pick-up of solid contaminants during shipping and storage, incompatibility of commingled fuels, and interaction of fuel with filter media.

The 1143 can detect the presence of contaminants which will clog filter media and create excessive back-pressure through the filter.

3.0 Definitions

Sample Volume is measured in Milliliters (mL).

Filter Inlet Pressure is measured in either pounds per square inch (PSIG) (Max=15) or kilopascals (kPa) (Max = 104).

A measurement of the Quality is calculated from the final pressure and volume readings. This calculation is presented as the Filterability Quality Factor (F-QF).

F-QF can vary between 0 (Very Poor) to 100 (Very Good).

The information contained in the accompanying document is proprietary and confidential and may not be copied in any manner whatsoever without prior written consent of Emcee Electronics, Inc. The document and the material therein may not be used for any purpose other than that intended by Emcee Electronics, Inc.

COPYRIGHT 2003 EMCEE ELECTRONICS, INC.

REVISION DATE: DECEMBER 16, 2003

Page 3

Model 1143 Filterability Analyzer

4.0 Summary of Method

The 1143 includes a funnel shaped teflon reservoir, an electronically controlled peristaltic pump, a disposable filter element, and a collection flask.

A Sample of Fuel (approximately 500 mL) is placed in the teflon reservoir. When the test is started a maximum of 300 mL of this sample is then pumped through a standard porosity filter element at 20 mL/min via the peristaltic pump.

The inlet pressure of the filter is continuously monitored and the test is concluded if the pressure exceeds 15 PSIG (104 kPa).

At the conclusion of the test the 1143 displays the final test variables.

1. Volume (0-300 mL)
2. Pressure (0-15 PSIG 0-104 kPa)
3. Quality Factor (0-100 F-QF)

The Filterability Quality Factor reduces the two variables (Volume & Pressure) to a single number between 0 & 100.

The (F-QF) is automatically calculated and displayed using the following formula.

The final pressure = $P_{(F)}$.
The maximum allowable pressure = $P_{(Max)}$
(15 PSIG or 104 kPa).
The final volume = $V_{(F)}$.

A. If $P_{(F)} < P_{(Max)}$

$$QF = (((P_{(Max)} - P_{(F)}) / P_{(Max)}) * 50) + 50$$

B. If $P_{(F)} = P_{(Max)}$

$$QF = V_{(F)} / 6$$

The information contained in the accompanying document is proprietary and confidential and may not be copied in any manner whatsoever without prior written consent of Emcee Electronics, Inc. The document and the material therein may not be used for any purpose other than that intended by Emcee Electronics, Inc.

COPYRIGHT 2003 EMCEE ELECTRONICS, INC.

REVISION DATE: DECEMBER 16, 2003

Page 4

Model 1143 Filterability Analyzer

5.0 Apparatus

The Instrument is set up as shown in Figure #1. The unit is powered from either the included AC Power pack or a 12V DC Source.

The tubing is routed from the funnel reservoir through the peristaltic pump rollers and to the filter element. A tee is located between the pump outlet and the filter element for attaching tubing to the pressure transducer.

Membrane switches located on the front panel control the following.

1. Power ON / OFF
2. Reset (Stops current test and clears data)
3. Purge (Runs pump for 2 min, 40 mL)
4. Test (Starts test sequence)
5. Mode A / B Mode A is the Default
(Mode B is for future use)
6. Flow Adjust Decrease / Increase
(Makes minor flow rate adjustments)

LCD Displays indicate the Pressure, Volume and Quality Factor

6.0 Preparation of Sample

The 500 mL sample must be representative of the lot being tested. Obtain the sample in accordance with ASTM D-4057 or D-4177 and report how and where the sample was taken. If any undissolved water is visually apparent (as determined by D-4176 or D-4860) the sample should be discarded and replaced.

7.0 Preparation of Apparatus

7.1 Open the case and assemble the components as shown in Figure #1, Figure #2, and Figure #3.

The information contained in the accompanying document is proprietary and confidential and may not be copied in any manner whatsoever without prior written consent of Emcee Electronics, Inc. The document and the material therein may not be used for any purpose other than that intended by Emcee Electronics, Inc.

COPYRIGHT 2003 EMCEE ELECTRONICS, INC.

REVISION DATE: DECEMBER 16, 2003

Page 5

Model 1143 Filterability Analyzer

7.2 Attach the power pack to the connector on the top of the 1143 case. (12V DC Input)

7.3 Plug the power pack into an appropriate AC electrical power source.

7.4 Momentarily press the 'ON' switch. The following conditions should then exist.

7.4.1 The Power light should be on.

7.4.2 The Mode A light should be on. (Mode B selection is for future use)

7.4.3 The Flow Adjust center light should be on.

7.4.4 Either the PSIG or the kPa light should be on. (The pressure can be displayed in either PSIG or kPa using internal jumper options)

7.4.5 The pressure display should read 00.0 (PSIG) or 000 (kPa)

7.4.6 The mL display should read 000.

7.4.7 The Quality Factor display should be blank.

7.5 The 18" tubing should be attached from the funnel shaped reservoir to the plastic in-line splice fitting. The splice fitting prevents the tubing from being pulled into the pump and also allows easy replacement of the portion of tubing depressed by the pump rollers.

7.6 A 12" tubing is attached from the in-line splice fitting to the plastic tee fitting. This 12" tubing (between the in-line splice and the tee) will be routed through the peristaltic pump slot.

7.7 A 12" tubing is attached from the plastic tee fitting to the pressure transducer relaxation chamber located in the left panel.

The information contained in the accompanying document is proprietary and confidential and may not be copied in any manner whatsoever without prior written consent of Emcee Electronics, Inc. The document and the material therein may not be used for any purpose other than that intended by Emcee Electronics, Inc.

COPYRIGHT 2003 EMCEE ELECTRONICS, INC.

REVISION DATE: DECEMBER 16, 2003

Page 6

Model 1143 Filterability Analyzer

7.8 The other 12" tubing is attached from the remaining plastic tee fitting to the barb end of the plastic Luer-Lok fitting. (The tapered end of the Luer-Lok fitting will be used to attach the disposable filter element (F-Cell))

7.9 Release the pump locking lever by moving the handle to the right

7.10 Lift the upper pump sliding block and insert the section of tubing between the in-line fitting and the tee fitting into the slot. The in-line fitting should be on the left side of the pump (Inlet). The in-line fitting should be placed just below the pump with the tubing in the slot on the left side of the pump.

7.11 Take hold of the tubing on each side of the pump and slide it back and forth over the rollers to eliminate any kinks. Release the tubing with the in-line fitting contacting the pump slot on the left side. The inline fitting will not go through the slot which prevents the tubing from drawing into the pump.

7.12 While applying slight pressure to the tubing at the pump outlet side (tubing tee fitting) close the pump locking handle by moving it to the left.

7.13 Insert the luer-lok fitting into the collection flask.
DO NOT ATTACH FILTER ELEMENT AT THIS TIME. The filter element (F-Cell) will be attached after calibration and purge operations.

8.0 Calibration

8.1 Calibration should be done when the tubing is replaced or when the tubing has been left in the instrument for some time. If several tests are done on similar fuels in a short period of time the calibration can be omitted between test.

The information contained in the accompanying document is proprietary and confidential and may not be copied in any manner whatsoever without prior written consent of Emcee Electronics, Inc. The document and the material therein may not be used for any purpose other than that intended by Emcee Electronics, Inc.

COPYRIGHT 2003 EMCEE ELECTRONICS, INC.

REVISION DATE: DECEMBER 16, 2003

Page 7

Model 1143 Filterability Analyzer

8.2 Pour 300 to 500 mL of the sample to be tested into the teflon reservoir. If a limited sample exist a similar viscosity fluid can be used for calibration purposes.

8.3 Momentarily press the Purge switch. The pump should then run for 2 minutes and should expel the air in all but the transducer tubing.

8.4 When the Purge is complete pour out the sample from the collection flask and reinsert the luer-lok fitting.

8.5 Momentarily press the Test switch. The pump will run for 15 minutes and automatically shut off when 300 mL is displayed.

8.6 Measure the volume of the collected sample by pouring it into a graduate. The sample should be between 285 and 315 mL.

8.6.1 If the volume is less than 285, Momentarily press the Increase switch located in the flow adjust box. The flow adjust indicator light should light to the right of the previous position. This will provide approximately 5 mL additional flow in the 15 minute cycle. Momentarily press the Increase again if additional correction is needed.

8.6.2 If the volume is more than 315, momentarily press the Decrease switch located in the flow adjust box. The flow adjust indicator light should light to the left of the previous position. This will provide approximately 5 mL less flow in the 15-minute cycle. Momentarily press the Decrease again if additional correction is needed.

8.7 Repeat calibration (Section 8.0) to insure the correction provides 285 to 315 mL in 15 minutes.

The information contained in the accompanying document is proprietary and confidential and may not be copied in any manner whatsoever without prior written consent of Emcee Electronics, Inc. The document and the material therein may not be used for any purpose other than that intended by Emcee Electronics, Inc.

COPYRIGHT 2003 EMCEE ELECTRONICS, INC.

REVISION DATE: DECEMBER 16, 2003

Page 8

Model 1143 Filterability Analyzer

9.0 Test Procedure

9.1 Measure the temperature of the fuel in the transfer container and if necessary, adjust to 15 to 25°C.

9.2 Shake the transfer container vigorously for approximately 2 minutes, and then allow it to stand on a vibration-free surface for approximately 5 minutes.

9.3 Rinse the fuel reservoir container with some of the product to be tested.

9.4 Release the pump locking lever by moving the handle to the right. This will reduce any tubing stretch from previous running. If the tubing section under the pump rollers has been used for more than 5 test it is best to replace that 12 in section.

9.5 Take hold of the tubing on each side of the pump and slide it back and forth over the rollers to eliminate any kinks. Release the tubing with the in-line fitting contacting the pump slot on the left side. The inline fitting will not go through the slot which prevents the tubing from drawing into the pump.

9.6 While applying slight pressure to the tubing at the pump outlet side (tubing tee fitting) close the pump locking handle by moving it to the left.

9.7 Place 450 ± 5 mL of the sample into the funnel shaped fuel reservoir. Check that the temperature is still within the range from 15 to 25°C. Record the actual temperature. If any undissolved water is visually apparent in the fuel at this time, as determined by ASTM D-4176 or D-4860, or both, the test shall be abandoned and the presence of water shall be reported.

9.8 Place the end of the tygon tubing with the plastic luer-lok fitting into the collection flask

9.9 Momentarily press the Purge switch. Approximately 40 mL will be drawn from the fuel reservoir through the tygon tubing and discharged into the collection flask, thus purging the air

The information contained in the accompanying document is proprietary and confidential and may not be copied in any manner whatsoever without prior written consent of Emcee Electronics, Inc. The document and the material therein may not be used for any purpose other than that intended by Emcee Electronics, Inc.

COPYRIGHT 2003 EMCEE ELECTRONICS, INC.

REVISION DATE: DECEMBER 16, 2003

Page 9

Model 1143 Filterability Analyzer

and any residual fuel from the system. The fuel flow will automatically cease at the end of the purge cycle (2 min).

9.10 After the purge cycle, insert the plastic luer-lok fitting attached to the tygon tubing into a pre-calibrated filter element (F-Cell) and place the filter into the mouth of the collection flask.

9.11 Momentarily press the Test switch. The peristaltic pump activates, drawing the fuel from the fuel reservoir, extruding it through the filter into the collection flask.

9.12 During the filtration period, the pressure is constantly displayed along with the amount of sample processed. The test will automatically stop when one of the following occurs:

9.12.1 The entire sample (300 mL) is discharged prior to reaching 15 PSIG (104 kPa).

9.12.2 The maximum allowable pressure has been reached (15 PSIG or 104 kPa).

9.13 When either limit (Pressure or Volume) is reached the following items will occur;

9.13.1 The pump will shut down

9.13.2 The pressure and volume displays will lock on the final results.

9.13.3 The maximum PSIG or mL light will come on indicating which limit was reached.

9.13.4 The filterability quality factor will be calculated and displayed.

9.14 Release the pump locking lever by moving the handle to the right. This will reduce tubing stretch and permanent set due to clamping.

The information contained in the accompanying document is proprietary and confidential and may not be copied in any manner whatsoever without prior written consent of Emcee Electronics, Inc. The document and the material therein may not be used for any purpose other than that intended by Emcee Electronics, Inc.

COPYRIGHT 2003 EMCEE ELECTRONICS, INC.

REVISION DATE: DECEMBER 16, 2003

Page 10

Model 1143 Filterability Analyzer

10.0 Report

10.1 Report the following information:

10.1.1 The source and how the sample was obtained.

10.1.2 The sample temperature recorded in 9.1 and, if applicable, Undissolved water present, Filtration not performed.

10.1.3 The final pressure ($P_{(F)}$).

10.1.4 The final volume ($V_{(F)}$).

10.1.5 The filterability quality factor (F-QF).

The information contained in the accompanying document is proprietary and confidential and may not be copied in any manner whatsoever without prior written consent of Emcee Electronics, Inc. The document and the material therein may not be used for any purpose other than that intended by Emcee Electronics, Inc.

COPYRIGHT 2003 EMCEE ELECTRONICS, INC.

REVISION DATE: DECEMBER 16, 2003

Page 11

Model 1143 Filterability Analyzer

11.0 Photographs



Figure #1



Figure #2

The information contained in the accompanying document is proprietary and confidential and may not be copied in any manner whatsoever without prior written consent of Emcee Electronics, Inc. The document and the material therein may not be used for any purpose other than that intended by Emcee Electronics, Inc.

COPYRIGHT 2003 EMCEE ELECTRONICS, INC.

REVISION DATE: DECEMBER 16, 2003

Page 12

Model 1143 Filterability Analyzer

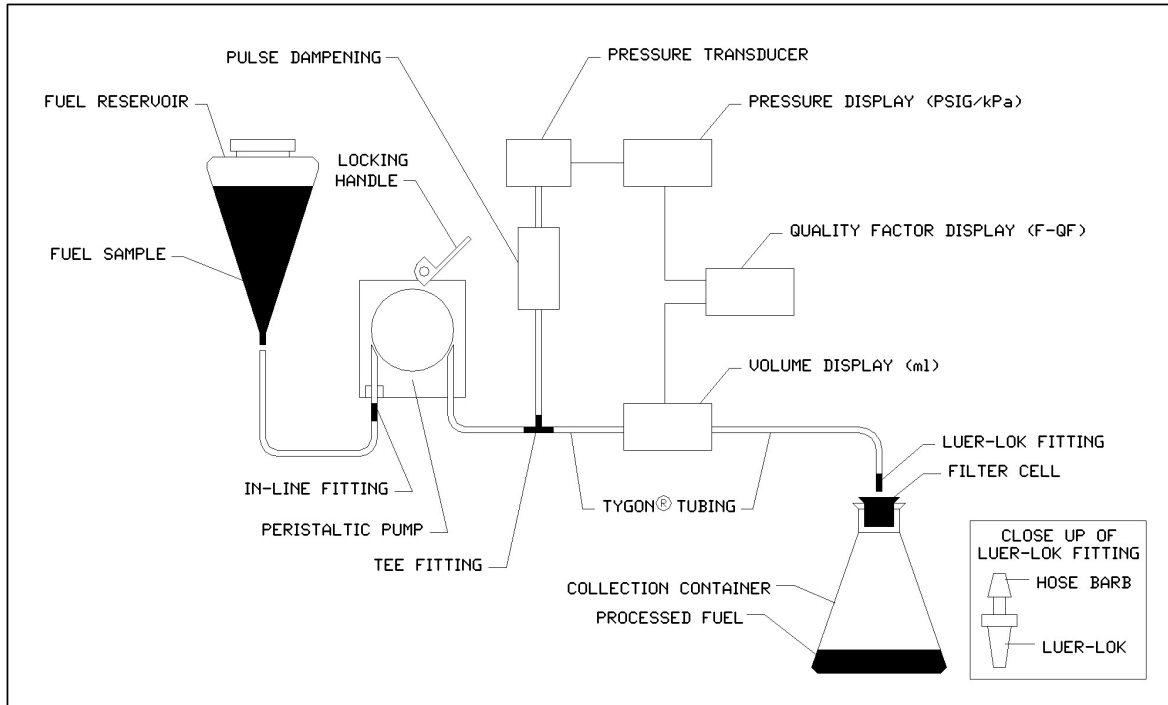


Figure #3

The information contained in the accompanying document is proprietary and confidential and may not be copied in any manner whatsoever without prior written consent of Emcee Electronics, Inc. The document and the material therein may not be used for any purpose other than that intended by Emcee Electronics, Inc.

COPYRIGHT 2003 EMCEE ELECTRONICS, INC.

REVISION DATE: DECEMBER 16, 2003

Page 13