

ISO 16332:2018 (E)

Diesel engines — Fuel filters — Method for evaluating fuel/water separation efficiency

Contents

	Foreword
	Introduction
1	Scope
2	Normative references
3	Terms and definitions
4	Symbols
5	Test equipment
5.1	Test fluids
5.1.1	Test fuels
5.1.2	Test water
5.2	Laboratory equipment
5.2.1	General
5.2.2	Sampling bottles and glassware
5.2.3	Water detection system
5.2.3.1	Karl Fischer (KF) titrator
5.2.3.2	Centrifuge
5.2.4	Equipment for determination of IFT
5.3	Test stand
5.3.1	General
5.3.2	Fuel/water separator test circuit
5.3.2.1	Fuel sump (1)
5.3.2.2	Water sump (6)
5.3.2.3	Heat exchanger (3)
5.3.2.4	Test pump (2)
5.3.2.5	Water injection pump (7)
5.3.2.6	Fuel flow meter (5a)
5.3.2.7	Water flow meter (5b)
5.3.2.8	Injection device (8)
5.3.2.9	Water emulsifying device (9)
5.3.2.10	Operating pressure gauge (10)
5.3.2.11	Differential pressure gauges (11)
5.3.2.12	Upstream sampling point (12)
5.3.2.13	Temperature indicator (13)
5.3.2.14	Water drainage system (15)
5.3.2.15	Back pressure gauge (16)
5.3.2.16	Back pressure control valve (17) (optional equipment)
5.3.2.17	Downstream sampling point (18)
5.3.2.18	Clean-up system (19)
5.3.2.19	Droplet size distribution measurement device (20)
5.3.2.20	Bypass line (21)
5.3.2.21	Inline water concentration measurement device (22) (Optional equipment)
5.3.2.22	General requirements on the hydraulic piping system
6	Test conditions
6.1	Volume of test fuel VT
6.2	Test fuel temperature T
6.3	Test flow rate QT

- 6.4 Upstream undissolved water concentration $c_{U,up}$
- 6.4.1 General
- 6.4.2 Water injection flow rate Q_W
- 6.5 Back pressure
- 6.6 Sampling
- 6.7 Droplet size distribution DSD
- 6.8 Test duration t_{test}
- 7 Accuracy of measuring instruments and test conditions
- 8 Validation procedures
 - 8.1 General
 - 8.2 Water detection system
 - 8.2.1 Inline water concentration measurement device (optional)
 - 8.2.2 Karl Fischer titration system
 - 8.3 Emulsifying device
 - 8.4 Filter test circuit and water injection system
 - 8.4.1 General
 - 8.4.2 Validation preparation
 - 8.4.3 Preconditioning cycle
 - 8.4.4 Validation cycle
- 9 Simplified laboratory test
 - 9.1 Test procedure
 - 9.1.1 General
 - 9.1.2 Pre-test preparation
 - 9.1.3 Preconditioning cycle
 - 9.1.4 Efficiency measurement
 - 9.2 Calculation of water separation efficiency and reporting of test results
- 10 Test report
- Annex A (normative) Fuel treatment to obtain test fuel F2
- Annex B (normative) Water emulsifying device
 - B.1 Calibrated orifice design details
 - B.2 Calibrated orifices concept
 - B.3 DSD generated by orifices
 - B.4 Water emulsifying device calibration procedure
- Annex C (normative) Conditions and parameters for the determination of the interfacial tension according to ISO 9101, drop volume method
- Annex D (normative) Validation of the sampling procedure for Karl Fischer titration and centrifuge
 - D.1 Karl Fischer titration (manual sampling)
 - D.1.1 Primary sampling procedure
 - D.1.2 Secondary sampling procedure
 - D.1.3 Secondary sampling procedure validation
 - D.2 Karl Fischer titration (automated sampling)
 - D.3 Centrifuge
- Annex E (normative) Determination of the concentration c_S of dissolved water in saturated fuel
- Annex F (informative) Typical fuel/water separator test report
- Annex G (informative) Report round robin
- Annex H (informative) Effect of KF-titration on the precision of water separation efficiency measurements