

§ 162.050-27

46 CFR Ch. I (10-1-10 Edition)

(i) Each monitor must have a means to determine whether it is accurately calibrated.

[44 FR 53359, Sept. 13, 1979, as amended by CGD 76-088c, 48 FR 45727, Oct. 6, 1983; USCG-2004-18939, 74 FR 3389, Jan. 16, 2009]

§ 162.050-27 Oil content meter: Approval tests.

This section contains requirements that apply to performing each test.

(a) *Test conditions.* (1) The tests and each step in the tests must be carried out in the order described in this section. Each test must be performed without time delay between steps in the test. No maintenance, including replacement of parts, may be performed on the meter during or between the tests described in this section.

(2) A test rig of the type described in § 162.050-19 must be used when performing each test.

(3) Each mixture used during the tests must be prepared by combining oil supplied from the oil injection pipe of the test rig and water supplied from the mixture tank of the test rig. However, if the flow of oil through the oil injection pipe becomes intermittent, oil and water may be combined in the mixture tank to form the mixture.

(4) A mixture may be circulated through a meter only once during testing.

(5) Unless otherwise provided in a specific test, the water used in each test must be clean, fresh water.

(6) The oil used in each test, except Test No. 2 in paragraph (c) of this section, must be Arabian light crude oil.

(7) Each test must be performed at an ambient temperature of between 10 °C and 30 °C.

(8) Unless otherwise provided in a specific test, each test must be performed at the maximum mixture pressure, the maximum flow rate, and the power supply ratings at which the meter is designed to operate.

(9) The particulate contaminant described in Test No. 5 in paragraph (f) of this section, if not attapulgit, must be of a type that does not lose more than 3 percent of its weight after ignition and must be insoluble in a 500 ppm mixture.

(10) In each test the meter must be operated in accordance with the proce-

dures described in its instructions manual.

(11) Unless otherwise provided in a specific test, the centrifugal pump shown in Figure 162.050-19 in § 162.050-19 must be operated at 1,000 revolutions per minute or more in each test.

(12) Whenever the oil content of a mixture is recorded, a sample of the mixture must also be taken. The oil content of the sample must be measured using the method described in § 162.050-39.

(13) A one-liter sample of each oil to be used in testing must be taken and provided for use in the sample analysis required by § 162.050-39.

(b) *Test No. 1 Calibration and Zero Test.* The meter is calibrated and zeroed to manufacturer's instructions. It is then fed with water for 15 minutes and then with mixtures in the following concentrations: 15 ppm, 50 ppm, 100 ppm, and each additional concentration, in increments of 50 ppm up to the highest oil concentration that can be read on the meter. Each mixture is fed to the meter in the order listed in Table 162.050-27(c) for 15 minutes. Water is fed to the meter for a 15-minute period between each mixture. At the end of each 15-minute period, an oil content reading is obtained and recorded, and a calibration curve must be created.

(c) *Test No. 2 Response to Different Oil Types Test.* (1) If the meter is designed for use with crude oils, it is fed with a mixture of water and the first oil listed in Table 162.050-27(c) at the following concentrations: 15 ppm, 100 ppm, and a concentration that is 90 percent of the highest oil concentration in water that can be read on the meter. Each concentration is fed to the meter in the order listed until a steady reading occurs and is recorded. After each steady reading is recorded, the meter is fed with water for 15 minutes. At the end of each 15-minute period of feeding the meter with water, an oil content reading is again obtained and recorded, and a calibration curve must be created.

(2) The steps described in paragraph (c)(1) of this section are repeated using each of the other oils listed in Table 162.050-27(c). A calibration curve must be created for each oil tested.

TABLE 162.050-27(c)—OIL TYPE AND CHARACTERISTICS

Oil type	Characteristics
Sahara blend crude oil	Density—low. Viscosity—low. Pour point—very low. Producing country—Algeria. General description—mixed base.
Arabian light crude oil	Density—medium. Viscosity—medium. Pour point—low. Producing country—Saudi Arabia. General description—mixed base.
Nigerian medium crude oil	Density—high. Viscosity—medium. Pour point—low. Producing country—Nigeria. General description—naphthenic base.
Bachaquero 17 crude oil	Density—very high. Viscosity—very high. Pour point—low. Producing country—Venezuela. General description—asphaltic base.
Minas crude oil	Density—medium. Viscosity—high. Pour point—very high. Producing country—Indonesia. General description—paraffinic base.
Residual fuel oil	Bunker C or No. 6 Fuel Oil.

(3) If any oil listed in Table 162.050-27(c) is unavailable, an oil with similar properties may be substituted in testing.

(4) If the meter will be used with refined oil products, the steps described in paragraph (c)(1) of this section are performed using each of the following:

- (i) Leaded regular grade automotive gasoline;
- (ii) Unleaded automotive gasoline;
- (iii) Kerosene; and
- (iv) Light diesel or No. 2 fuel oil.

(5) If the meter will be used with category C and D oil-like noxious liquid substances to meet the requirements of 33 CFR 151.41(b), the tests described in paragraphs (c) and (d) of this section are to be performed using the substances for which approval is sought.

(d) *Test No. 3 Response Time Test.* (1) The meter is fed with water, zeroed, and then fed with a 100 ppm mixture. The time at which the meter first detects oil in the mixture, the times of reading 63 ppm and 90 ppm, and the time of reaching the highest steady reading of oil content are recorded. The oil content of the mixture at the highest steady reading is also recorded.

(2) The metering pump is turned off and the time at which the highest reading starts to decrease, the times of

reading 37 ppm and 10 ppm, and the time of returning to the lowest steady oil content reading are recorded. The oil content of the mixture at the lowest steady reading is also recorded.

(3) The time interval between first detecting oil in the mixture and reading 63 ppm, and the time interval between the first decrease in the highest reading and reading 37 ppm, are averaged and recorded as the response time for the meter.

(e) *Test No. 4 Oil Fouling and Calibration Shift Test.* (1) The meter is fed with water, zeroed, and then fed with a mixture containing 10 percent oil for one minute. The following must be recorded:

- (i) Time at which the meter first detects oil;
- (ii) Time of reading 15 ppm;
- (iii) Time of reading 100 ppm;
- (iv) Time of exceeding the highest oil concentration that can be read on the meter;
- (v) Time of returning to the highest oil concentration that can be read on the meter;
- (vi) Time of returning to a reading of 100 ppm;
- (vii) Time of returning to a reading of 15 ppm; and

(viii) Time of returning to the lowest steady oil content reading.

(2) The oil content of the mixture at the lowest steady reading described in paragraph (e)(1)(viii) of this section is recorded.

(3) The meter is fed with water, zeroed, and then fed with oil for 1 minute after which the flow of water is resumed. The times described in paragraph (e)(1) of this section are recorded.

(4) If it is necessary to clean the meter after each oil-fouling test for it to return to a zero reading, this fact and the time required to clean and recalibrate the meter must be noted and recorded in the test report.

(5) The meter is fed with a 100 ppm mixture until a steady oil content reading is obtained and recorded.

(f) *Test No. 5 Contaminant Test.* (1) The meter is fed with a 15 ppm mixture until a steady oil content reading is obtained and recorded.

(2) The meter is fed with a 15 ppm oil mixture of contaminated water consisting of not less than 270 ppm by weight of the clay mineral attapulgite, or similar contaminant that is stable in both fresh and salt water and 30 ppm by weight of iron oxides. The test contaminant should have a particle size distribution with about 30 percent of 10 microns or less and a maximum particle size of 100 microns. The oil content reading, when steady, is recorded.

(3) Each of the two contaminants will be mixed sequentially in the following manner: the mixing of attapulgite shall be for a period of not less than 15 minutes so that a homogeneous suspension is formed; then, iron oxides will be added for an additional period of not less than 10 minutes. The mixing process should maintain the contaminants in suspension throughout the test period.

(4) The test in paragraph (f)(2) of this section is repeated for 100 and 300 ppm oil mixtures in contaminated water.

(g) *Test No. 6 Air Entrainment Test.* (1) The meter is fed with a 15 ppm mixture until a steady oil content reading is obtained and recorded.

(2) Air is injected into the meter test rig before the sample pump or, in the absence of such pump, immediately before any conditioning unit used to pre-

pare the mixture for measurement. Injection must be by needle having an orifice dimension not exceeding 0.5 mm in diameter arranged in line with the sample flow. The quantity of air injected must be 1 percent of the designated flow rate of the sample pump or conditioning unit at the point of injection.

(3) Air must be delivered to the system by direct injection or pump via a suitable measuring device designed to permit a constant controllable flow rate within ± 10 percent of the required rate of injection for an uninterrupted effective test period of not less than 15 minutes.

(4) The oil content reading, when steady, is recorded.

(h) *Test No. 7 Oil Particle Size—Centrifugal Pump Test.* (1) The meter is fed with a 100 ppm mixture until a steady oil content reading is obtained and recorded.

(2) The meter is fed with a 100 ppm mixture that has first passed through the centrifugal pump of the test rig. The pump is run at one-fourth of its design speed. The oil content reading, when steady, is recorded.

(3) The steps described in paragraph (h)(2) of this section are repeated with the pump running at one-half of its design speed and then repeated at its design speed.

(i) *Test No. 8 Temperature Test.* (1) The steps described in paragraph (h)(1) of this section are repeated.

(2) The temperature of the mixture is adjusted to 10 °C and the flow continued until a steady oil content reading is obtained and recorded.

(3) The steps described in paragraph (i)(2) of this section are repeated with the temperature of the mixture at 65 °C or the highest mixture temperature at which the meter is designed to operate, whichever is lower.

(j) *Test No. 9 Sample Pressure or Flow Test.* (1) The steps described in paragraph (h)(1) of this section are repeated.

(2) If the meter has a positive displacement mixture pump, the mixture pressure is lowered to one-half of the meter's maximum design pressure. If the meter has a centrifugal mixture

pump, or is not equipped with a mixture pump, the mixture flow rate is reduced to one-half of the meter's design flow rate. The reduced flow rate or mixture pressure is maintained until a steady oil content reading is obtained and recorded.

(3) If the meter has a positive displacement mixture pump, the mixture pressure is increased to twice the meter's design pressure. If the meter has a centrifugal mixture pump or does not have a mixture pump, the mixture flow rate is increased to twice the meter's maximum design flow rate. The increased flow rate or mixture pressure is maintained until a steady oil content reading is obtained and recorded.

(k) *Test No. 10 Shutoff Test.* (1) The steps described in paragraph (h)(1) of this section are repeated.

(2) The water and metering pumps on the test rig are stopped for 8 hours after which the steps described in paragraph (h)(1) of this section are repeated.

(1) *Test No. 11 Supply Voltage Variation Test.* (1) The supply voltage to the meter is increased to 110 percent of its design supply voltage. The meter is then fed a 100 ppm mixture for one hour. At the end of the 1-hour period, an oil content reading is obtained and recorded.

(2) The steps described in paragraph (1)(1) of this section are repeated with the supply voltage to the meter lowered to 90 percent of its design supply voltage.

(3) Upon completing the steps described in paragraph (1)(2) of this section, the supply voltage to the meter is returned to the design rating.

(4) The steps described in paragraphs (1)(1) through (1)(3) of this section are repeated varying each power supply to the meter in the manner prescribed in those steps for supply voltage.

(m) *Test No. 12 Calibration and Zero Drift Test.* (1) The meter is calibrated and zeroed.

(2) The steps described in paragraph (h)(1) of this section are repeated.

(3) A 100 ppm mixture is fed to the meter for 8 hours. At the end of the 8-hour period, an oil content reading is obtained and recorded.

(4) The meter is fed with water until a steady oil content reading is obtained and recorded.

(n) *Test No. 13 Shutdown and Restart Test.* (1) All power to the meter is shut-off for one week. After 1 week the meter is restarted, zeroed, and calibrated.

(2) The meter is fed with a 100 ppm mixture for 1 hour. An oil content reading is then obtained and recorded.

(3) The meter is fed with water for 1 hour. An oil content reading is then obtained and recorded.

(4) The steps described in paragraphs (n)(2) and (n)(3) of this section are repeated three additional times. During the last hour in which the meter is fed with a 100 ppm mixture, the meter is inclined at an angle of 22.5° with the plane of its normal operating position.

[USCG-2004-18939, 74 FR 3389, Jan. 16, 2009]

§ 162.050-33 Bilge alarm: Design specification.

(a) This section contains requirements that apply to bilge alarms.

(b) Each bilge alarm must be designed to meet the requirements for an oil content meter in § 162.050-25(b) through (f) and 162.050-25(i), and the requirements in this section.

(c) Each bilge alarm must have a device that produces a warning signal, and a signal that can be used to actuate stop valves in a vessel's fixed piping system, when—

(1) the oil content of the mixture being measured by the bilge alarm exceeds 15 ppm \pm 5 ppm, and

(2) malfunction, breakdown, or other failure of the bilge alarm occurs.

(d) Each bilge alarm must have a ppm display. Emulsions and/or the type of oil must not affect the ppm display. Calibrating the bilge alarm must not be necessary once installed on board the vessel, however, onboard testing in accordance with the manufacturer's operating instructions is permitted for the purposes of checking instrument drift and repeatability of the instrument reading, as well as the ability to re-zero the instrument. The accuracy of the readings must at all times remain within the limits described in paragraph (c)(1) of this section.

(e) Each bilge alarm must be designed so that it displays each change