

§ 94.101

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EMISSION STANDARDS AND RELATED REQUIREMENTS.”

[64 FR 73331, Dec. 29, 1999, as amended at 67 FR 68343, Nov. 8, 2002; 68 FR 9784, Feb. 28, 2003; 68 FR 54960, Sept. 19, 2003; 69 FR 9215, Feb. 27, 2004]

Subpart B—Test Procedures

§ 94.101 Applicability.

Provisions of this subpart apply for testing performed by the Administrator or a manufacturer.

§ 94.102 General provisions.

(a) The test procedures specified in this part are intended to produce emission measurements that are equivalent to emission measurements that would result from emission tests performed during in-use operation using the same engine configuration installed in a vessel.

(b) Test procedures otherwise allowed by the provisions of this subpart shall not be used where such procedures are not consistent with good engineering practice and the regulatory goal specified in paragraph (a) of this section.

(c) Alternate test procedures may be used if shown to yield equivalent results, and if approved in advance by the Administrator.

§ 94.103 Test procedures for Category 1 marine engines.

(a) Gaseous and particulate emissions shall be measured using the test procedures specified in 40 CFR part 89, except as otherwise specified in this subpart.

(b) The Administrator may specify changes to the provisions of paragraph (a) of this section that are necessary to comply with the general provisions of § 94.102.

§ 94.104 Test procedures for Category 2 marine engines.

(a) Gaseous and particulate emissions shall be measured using the test procedures specified in 40 CFR part 92, except as otherwise specified in this subpart.

(b)(1) The requirements of 40 CFR part 92 related to charge air temperatures, engine speed and load, and engine air inlet restriction pressures do not apply for marine engines.

(2) For marine engine testing, charge air temperatures, engine speed and load, and engine air inlet restriction pressures shall be representative of typical in-use marine engine conditions.

(c) Conduct testing at ambient temperatures from 13 °C to 30 °C.

(d) The Administrator may specify changes to the provisions of paragraph (a) of this section that are necessary to comply with the general provisions of § 94.102.

[64 FR 73331, Dec. 29, 1999, as amended at 67 FR 68343, Nov. 8, 2002]

§ 94.105 Duty cycles.

(a) *Overview.* For the purpose of determining compliance with the emission standards of § 94.8, except for those in § 94.8(e), engines shall be tested using the appropriate duty cycles described in this section.

(b) *General cycle.* Propulsion engines that are used with (or intended to be used with) fixed-pitch propellers, and any other engines for which the other duty cycles of this section do not apply, shall be tested using the duty cycle described in the following Table B-1:

TABLE B-1—GENERAL MARINE DUTY CYCLE

Mode No.	Engine speed ¹ (percent of maximum test speed)	Percent of maximum test power ²	Minimum time in mode (minutes)	Weighting factors
1	100	100	5.0	0.20
2	91	75	5.0	0.50
3	80	50	5.0	0.15
4	63	25	5.0	0.15

¹ Engine speed: ±2 percent of point.

² Power: ±2 percent of engine maximum value.

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(c) *Variable-pitch and electrically coupled propellers.* (1) Constant-speed propulsion engines that are used with (or intended to be used with) variable-pitch propellers or with electrically coupled propellers shall be tested using the duty cycle described in the following Table B-2:

TABLE B-2—DUTY CYCLE FOR CONSTANT-SPEED PROPULSION ENGINES

Mode No.	Engine speed ¹ (percent of maximum test speed)	Percent of maximum test power ²	Minimum time in mode (minutes)	Weighting factors
1	100	100	5.0	0.20
2	100	75	5.0	0.50
3	100	50	5.0	0.15
4	100	25	5.0	0.15

¹ Engine speed: ±2 percent of point.
² Power: ±2 percent of engine maximum value.

(2) For the purpose of determining compliance with the emission standards of §94.8, variable-speed propulsion engines that are used with (or intended to be used with) variable-pitch propellers or with electrically coupled propellers shall be tested using the duty cycle described in Table B-3, which follows:

TABLE B-3—DUTY CYCLE FOR VARIABLE SPEED PROPULSION ENGINES USED ON NON-PROPELLER LAW VESSELS AND FOR VARIABLE SPEED AUXILIARY ENGINES

Test segment	Mode No.	Engine speed ¹	Percent of maximum test torque ²	Minimum time in mode (minutes)	Weighting factors
1	1	Maximum Test Speed	100	5.0	0.15
1	2	Maximum Test Speed	75	5.0	0.15
1	3	Maximum Test Speed	50	5.0	0.15
1	4	Maximum Test Speed	10	5.0	0.10
2	5	Intermediate	100	5.0	0.10
2	6	Intermediate	75	5.0	0.10
2	7	Intermediate	50	5.0	0.10
2	8	Idle	0	5.0	0.15

¹ Engine speed (non-idle): ±2 percent of point. Engine speed (idle): Within manufacturer's specifications. Idle speed is specified by the manufacturer.
² Torque (non-idle): ±2 percent of engine maximum value. Torque (idle): minimum fueling rate Load less than 5 percent of peak torque.

(d) *Auxiliary.* For the purpose of determining compliance with the emission standards of §94.8: (1) Constant speed auxiliary engines shall be tested using the duty cycle described in Table B-4, which follows:

TABLE B-4—DUTY CYCLE FOR CONSTANT-SPEED AUXILIARY ENGINES

Mode No.	Engine speed ¹	Percent of maximum test torque ²	Minimum time in mode (minutes)	Weighting factors
1	Maximum Test Speed	100	5.0	0.05
2	Maximum Test Speed	75	5.0	0.25
3	Maximum Test Speed	50	5.0	0.30
4	Maximum Test Speed	25	5.0	0.30
5	Maximum Test Speed	10	5.0	0.10

¹ Engine speed: ±2 percent of point.
² Torque: ±2 percent of engine maximum value.

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(2) Variable speed auxiliary engines shall be tested using the duty cycle described in Table B-3 in paragraph (c)(2) of this section.

(e) *Recreational.* For the purpose of determining compliance with the emis-

sion standards of § 94.8, recreational engines shall be tested using the duty cycle described in Table B-5, which follows:

TABLE B-5—RECREATIONAL MARINE DUTY CYCLE

Mode No.	Engine speed ⁽¹⁾ (percent of maximum test speed)	Percent of maximum test power ⁽²⁾	Minimum time in mode (minutes)	Weighting factors
1	100	100	5.0	0.08
2	91	75	5.0	0.13
3	80	50	5.0	0.17
4	63	25	5.0	0.32
5	idle	0	5.0	0.30

¹ Engine speed: ±2 percent of point.
² Power: ±2 percent of engine maximum value.

[64 FR 73331, Dec. 29, 1999, as amended at 67 FR 68343, Nov. 8, 2002]

§ 94.106 Supplemental test procedures for Category 1 and Category 2 marine engines.

This section describes the test procedures for supplemental testing conducted to determine compliance with the exhaust emission requirements of § 94.8(e)(1). In general, the supplemental test procedures are the same as those otherwise specified by this subpart, except that they cover any speeds, loads, ambient conditions, and operating parameters that may be experienced in use. The test procedures specified by other sections in this subpart also apply to these tests, except as specified in this section.

(a) Notwithstanding other provisions of this subpart, testing conducted to determine compliance with the exhaust emission requirements of § 94.8(e) may be conducted:

(1) At any speed and load (or any combination of speeds and loads that is nominally steady-state) within the applicable Not To Exceed Zone specified in paragraph (b) of this section;

(2)(i) Without correction, at any intake air temperature between 13°C and 35°C (or between 13°C and 30°C for engines not drawing intake air directly from a space that could be heated by the engine);

(ii) Without correction at any ambient water temperature (or equivalent) between 5°C and 27°C;

(iii) Without correction at any ambient humidity between 7.1 and 10.7 grams of moisture per kilogram of dry air; and

(3) With a continuous sampling period not less than 30 seconds in duration.

(b) The specified Not to Exceed Zones for marine engines are defined as follows. These Not to Exceed Zones apply, unless a modified zone is established under paragraph (c) of this section.

(1) For commercial Category 1 engines certified using the duty cycle specified in § 94.105(b), the Not to Exceed zones are defined as follows:

(i) The Not to Exceed zone is the region between the curves $power = 1.15 \times SPD^2$ and $power = 0.85 \times SPD^4$, excluding all operation below 25% of maximum power at rated speed and excluding all operation below 63% of maximum test speed.

(ii) This zone is divided into two subzones, one above and one below 45% of maximum power at rated speed.

(iii) SPD in paragraph (b)(1)(i) of this section refers to percent of maximum test speed.

(iv) See Figure B-1 for an illustration of this Not to Exceed zone which follows: