

Environmental Protection Agency

Pt. 1039, App. II

(6) In 40 CFR part 1068, subpart C, we identify several reporting and record-keeping items for making demonstrations and getting approval related to various exemptions.

(7) In 40 CFR part 1068, subpart D, we identify several reporting and record-keeping items for making demonstrations and getting approval related to importing engines.

(8) In 40 CFR 1068.450 and 1068.455 we specify certain records related to testing production-line engines in a selective enforcement audit.

(9) In 40 CFR 1068.501 we specify certain records related to investigating and reporting emission-related defects.

(10) In 40 CFR 1068.525 and 1068.530 we specify certain records related to recalling nonconforming engines.

[72 FR 53134, Sept. 18, 2007]

APPENDIX I TO PART 1039 [RESERVED]

APPENDIX II TO PART 1039—STEADY-STATE DUTY CYCLES

(a) The following duty cycles apply for constant-speed engines:

(1) The following duty cycle applies for discrete-mode testing:

D2 mode number	Engine speed	Torque (percent) ¹	Weighting factors
1	Engine governed	100	0.05
2	Engine governed	75	0.25
3	Engine governed	50	0.30
4	Engine governed	25	0.30
5	Engine governed	10	0.10

¹ The percent torque is relative to maximum test torque.

(2) The following duty cycle applies for ramped-modal testing:

RMC mode	Time in mode (seconds)	Engine speed	Torque (percent) ^{1, 2}
1a Steady-state	53	Engine governed	100.
1b Transition	20	Engine governed	Linear transition.
2a Steady-state	101	Engine governed	10.
2b Transition	20	Engine governed	Linear transition.
3a Steady-state	277	Engine governed	75.
3b Transition	20	Engine governed	Linear transition.
4a Steady-state	339	Engine governed	25.
4b Transition	20	Engine governed	Linear transition.
5 Steady-state	350	Engine governed	50.

¹ The percent torque is relative to maximum test torque.

² Advance from one mode to the next within a 20-second transition phase. During the transition phase, command a linear progression from the torque setting of the current mode to the torque setting of the next mode.

(b) The following duty cycles apply for variable-speed engines with maximum engine power below 19 kW:

(1) The following duty cycle applies for discrete-mode testing:

G2 mode number	Engine speed ¹	Torque (percent) ²	Weighting factors
1	Maximum test speed	100	0.09
2	Maximum test speed	75	0.20
3	Maximum test speed	50	0.29
4	Maximum test speed	25	0.30
5	Maximum test speed	10	0.07
6	Warm idle	0	0.05

¹ Speed terms are defined in 40 CFR part 1065.

² The percent torque is relative to the maximum torque at the commanded test speed.

(2) The following duty cycle applies for ramped-modal testing:

RMC mode	Time in mode (seconds)	Engine speed ^{1, 3}	Torque (percent) ^{2, 3}
1a Steady-state	41	Warm idle	0.
1b Transition	20	Linear transition	Linear transition.
2a Steady-state	135	Maximum test speed	100.
2b Transition	20	Maximum test speed	Linear transition.
3a Steady-state	112	Maximum test speed	10.
3b Transition	20	Maximum test speed	Linear transition.
4a Steady-state	337	Maximum test speed	75.
4b Transition	20	Maximum test speed	Linear transition.
5a Steady-state	518	Maximum test speed	25.
5b Transition	20	Maximum test speed	Linear transition.
6a Steady-state	494	Maximum test speed	50.
6b Transition	20	Linear transition	Linear transition.
7 Steady-state	43	Warm idle	0.

¹ Speed terms are defined in 40 CFR part 1065.

² The percent torque is relative to the maximum torque at the commanded engine speed.

³ Advance from one mode to the next within a 20-second transition phase. During the transition phase, command a linear progression from the torque setting of the current mode to the torque setting of the next mode, and simultaneously command a similar linear progression for engine speed if there is a change in speed setting.

(c) The following duty cycles apply for variable-speed engines with maximum engine power at or above 19 kW: (1) The following duty cycle applies for discrete-mode testing:

C1 mode number	Engine speed ¹	Torque (percent) ²	Weighting factors
1	Maximum test speed	100	0.15
2	Maximum test speed	75	0.15
3	Maximum test speed	50	0.15
4	Maximum test speed	10	0.10
5	Intermediate test speed	100	0.10
6	Intermediate test speed	75	0.10
7	Intermediate test speed	50	0.10
8	Warm idle	0	0.15

¹ Speed terms are defined in 40 CFR part 1065.

² The percent torque is relative to the maximum torque at the commanded test speed.

(2) The following duty cycle applies for ramped-modal testing:

RMC mode	Time in mode (seconds)	Engine speed ^{1, 3}	Torque (percent) ^{2, 3}
1a Steady-state	126	Warm Idle	0.
1b Transition	20	Linear Transition	Linear Transition.
2a Steady-state	159	Intermediate Speed	100.
2b Transition	20	Intermediate Speed	Linear Transition.
3a Steady-state	160	Intermediate Speed	50.
3b Transition	20	Intermediate Speed	Linear Transition.
4a Steady-state	162	Intermediate Speed	75.
4b Transition	20	Linear Transition	Linear Transition.
5a Steady-state	246	Maximum Test Speed	100.
5b Transition	20	Maximum Test Speed	Linear Transition.
6a Steady-state	164	Maximum Test Speed	10.
6b Transition	20	Maximum Test Speed	Linear Transition.
7a Steady-state	248	Maximum Test Speed	75.
7b Transition	20	Maximum Test Speed	Linear Transition.
8a Steady-state	247	Maximum Test Speed	50.
8b Transition	20	Linear Transition	Linear Transition.
9 Steady-state	128	Warm Idle	0.

¹ Speed terms are defined in 40 CFR part 1065.

² The percent torque is relative to the maximum torque at the commanded engine speed.

³ Advance from one mode to the next within a 20-second transition phase. During the transition phase, command a linear progression from the torque setting of the current mode to the torque setting of the next mode, and simultaneously command a similar linear progression for engine speed if there is a change in speed setting.

Environmental Protection Agency

Pt. 1039, App. VI

[69 FR 39213, June 29, 2004, as amended at 73 FR 37241, June 30, 2008]

APPENDIX V TO PART 1039 [RESERVED]

APPENDIX VI TO PART 1039—NONROAD
COMPRESSION-IGNITION COMPOSITE
TRANSIENT CYCLE

Time(s)	Normalized speed (percent)	Normalized torque (percent) ¹
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	1	3
25	1	3
26	1	3
27	1	3
28	1	3
29	1	3
30	1	6
31	1	6
32	2	1
33	4	13
34	7	18
35	9	21
36	17	20
37	33	42
38	57	46
39	44	33
40	31	0
41	22	27
42	33	43
43	80	49
44	105	47
45	98	70
46	104	36
47	104	65
48	96	71
49	101	62
50	102	51
51	102	50
52	102	46
53	102	41
54	102	31
55	89	2
56	82	0
57	47	1
58	23	1
59	1	3
60	1	8
61	1	3
62	1	5

Time(s)	Normalized speed (percent)	Normalized torque (percent) ¹
63	1	6
64	1	4
65	1	4
66	0	6
67	1	4
68	9	21
69	25	56
70	64	26
71	60	31
72	63	20
73	62	24
74	64	8
75	58	44
76	65	10
77	65	12
78	68	23
79	69	30
80	71	30
81	74	15
82	71	23
83	73	20
84	73	21
85	73	19
86	70	33
87	70	34
88	65	47
89	66	47
90	64	53
91	65	45
92	66	38
93	67	49
94	69	39
95	69	39
96	66	42
97	71	29
98	75	29
99	72	23
100	74	22
101	75	24
102	73	30
103	74	24
104	77	6
105	76	12
106	74	39
107	72	30
108	75	22
109	78	64
110	102	34
111	103	28
112	103	28
113	103	19
114	103	32
115	104	25
116	103	38
117	103	39
118	103	34
119	102	44
120	103	38
121	102	43
122	103	34
123	102	41
124	103	44
125	103	37
126	103	27
127	104	13
128	104	30
129	104	19
130	103	28
131	104	40
132	104	32
133	101	63
134	102	54