

**Environmental Protection Agency**

**Pt. 1039, App. III**

RMC mode	Time in mode (seconds)	Engine speed <sup>1,3</sup>	Torque (percent) <sup>2,3</sup>
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.

<sup>1</sup> Speed terms are defined in 40 CFR part 1065.  
<sup>2</sup> The percent torque is relative to the maximum torque at the commanded engine speed.  
<sup>3</sup> 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 <sup>1</sup>	Torque (percent) <sup>2</sup>	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

<sup>1</sup> Speed terms are defined in 40 CFR part 1065.  
<sup>2</sup> 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 <sup>1,3</sup>	Torque (percent) <sup>2,3</sup>
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.

<sup>1</sup> Speed terms are defined in 40 CFR part 1065.  
<sup>2</sup> The percent torque is relative to the maximum torque at the commanded engine speed.  
<sup>3</sup> 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.

**APPENDIX III TO PART 1039—STEADY-STATE DUTY CYCLES FOR VARIABLE-SPEED ENGINES WITH MAXIMUM POWER BELOW 19 kW**

(a) The following duty cycle applies for discrete-mode testing of variable-speed engines with maximum power below 19 kW:

G2 mode number	Engine speed <sup>1</sup>	Observed torque (percent) <sup>2</sup>	Weighting factors
1 .....	Maximum test speed .....	100	0.09

G2 mode number	Engine speed <sup>1</sup>	Observed torque (percent) <sup>2</sup>	Weighting factors
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	Idle	0	0.05

<sup>1</sup> Speed terms are defined in 40 CFR part 1065.

<sup>2</sup> The percent torque is relative to the maximum torque at the commanded test speed.

(b) The following duty cycle applies for ramped-modal testing of variable-speed engines with maximum power below 19 kW:

RMC mode	Time in mode (seconds)	Engine speed <sup>1,3</sup>	Torque (percent) <sup>2,3</sup>
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.

<sup>1</sup> Speed terms are defined in 40 CFR part 1065.

<sup>2</sup> The percent torque is relative to the maximum torque at the commanded engine speed.

<sup>3</sup> 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.

EFFECTIVE DATE NOTE: At 73 FR 37243, June 30, 2008, Appendix III to Part 1039 was removed, effective July 7, 2008.

APPENDIX IV TO PART 1039—STEADY-STATE DUTY CYCLES FOR VARIABLE-SPEED ENGINES WITH MAXIMUM POWER AT OR ABOVE 19 kW]

(a) The following duty cycle applies for discrete-mode testing of variable-speed engines with maximum power at or above 19 kW:

C1 mode number	Engine speed <sup>1</sup>	Observed torque (percent) <sup>2</sup>	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	Idle	0	0.15

<sup>1</sup> Speed terms are defined in 40 CFR part 1065.

<sup>2</sup> The percent torque is relative to the maximum torque at the commanded test speed.

(b) The following duty cycle applies for ramped-modal testing of variable-speed engines with maximum power at or above 19 kW:

RMC Mode	Time in mode (seconds)	Engine speed <sup>1,3</sup>	Torque (percent) <sup>2,3</sup>
1a Steady-state	126	Warm Idle	0.
1b Transition	20	Linear Transition <sup>2</sup>	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.