(1) Ambient temperature of (20 to 30) °C.
(2) Atmospheric pressure of (80.000 to 103.325) kPa and within ± 5 kPa of the value recorded at the time of the last engine map.
(3) Dilution air conditions as specified in § 1065.140, except in cases where you preheat your CVS before a cold start test.
(c) You may test engines at any intake-air humidity, and we may test engines at any intake-air humidity.
(d) Verify that auxiliary-work inputs and outputs are configured as they were during engine mapping, as described in § 1065.510(a).
(e) You may perform a final calibration of the speed, torque, and proportional-flow control systems, which may include performing practice duty cycles.
(f) You may perform the following recommended procedure to precondition sampling systems:
(1) Start the engine and use good engineering judgment to bring it to one of the following:
(i) 100% torque at any speed above its peak-torque speed.
(ii) 100% operator demand.
(2) Operate any dilution systems at their expected flow rates. Prevent aqueous condensation in the dilution systems.
(3) Operate any PM sampling systems at their expected flow rates.
(4) Sample PM for at least 10 min using any sample media. You may change sample media during preconditioning. You may discard preconditioning samples without weighing them.
(5) You may purge any gaseous sampling systems during preconditioning.
(6) You may conduct calibrations or verifications on any idle equipment or analyzers during preconditioning.
(7) Proceed with the test sequence described in § 1065.530(a)(1).
(g) Verify the amount of nonmethane contamination in the exhaust and background HC sampling systems within eight hours of starting each duty-cycle sequence for laboratory tests. You may verify the contamination of a background HC sampling system by reading the last bag fill and purge using zero gas. For any NMHC measurement system that involves separately measuring methane and subtracting it from a THC measurement, verify the amount of THC contamination using only the THC analyzer response. There is no need to operate any separate methane analyzer for this verification, however you may measure and correct for THC contamination in the CH_4 sample train for the cases where NMHC is determined by subtracting CH_4 from THC, using an NMC as configured in § 1065.365(d), (e), and (f); and the calculations in § 1065.660(b)(2). Perform this verification as follows:
(1) Select the HC analyzer range for measuring the flow-weighted mean concentration expected at the HC standard.
(2) Zero the HC analyzer at the analyzer zero or sample port. Note that FID zero and span balance gases may be any combination of purified air or purified nitrogen that meets the specifications of § 1065.750. We recommend FID analyzer zero and span gases that contain approximately the flow-weighted mean concentration of O_2 expected during testing.
(3) Span the HC analyzer using span gas introduced at the analyzer span or sample port. Span on a carbon number basis of one (C_1). For example, if you use a C_3H_8 span gas of concentration 200 µmol/mol, span the FID to respond with a value of 600 µmol/mol.
(4) Overflow zero gas at the HC probe or into a fitting between the HC probe and its transfer line.
(5) Measure the THC concentration in the sampling and background systems as follows:
(i) For continuous sampling, record the mean THC concentration as overflow zero air flows.
(ii) For batch sampling, fill the sample medium (*e.g.*, filter) and record its mean THC concentration.
(iii) For the background system, record the mean THC concentration of the last fill and purge.
(6) Record this value as the initial THC concentration, $x_{THC[THC-FID]init}$, and use it to correct measured values as described in § 1065.660.
(7) If any of the $x_{THC[THC-FID]init}$ values exceed the greatest of the following values, determine the source of the contamination and take corrective action, such as purging the system during an additional preconditioning cycle or replacing contaminated portions:
(i) 2% of the flow-weighted mean wet, net concentration expected at the HC (THC or NMHC) standard.
(ii) 2% of the flow-weighted mean wet, net concentration of HC (THC or NMHC) measured during testing.
(iii) 2 µmol/mol.
(8) If corrective action does not resolve the deficiency, you may request to use the contaminated system as an alternate procedure under § 1065.10.

§ 1065.525 Engine starting, restarting, and shutdown.

(a) Start the engine using one of the following methods:
(1) Start the engine as recommended in the owners manual using a production starter motor and adequately charged battery or a suitable power supply.
(2) Use the dynamometer to start the engine. To do this, motor the engine within ±25% of its typical in-use cranking speed. Stop cranking within 1 second of starting the engine.

(b) If the engine does not start after 15 seconds of cranking, stop cranking and determine why the engine failed to start, unless the owners manual or the service-repair manual describes the longer cranking time as normal.

(c) Respond to engine stalling with the following steps:

(1) If the engine stalls during warm-up before emission sampling begins, restart the engine and continue warm-up.

(2) If the engine stalls during preconditioning before emission sampling begins, restart the engine and restart the preconditioning sequence.

(3) If the engine stalls at any time after emission sampling begins for a transient test or ramped-modal cycle test, the test is void.

(4) If the engine stalls at any time after emission sampling begins for a discrete mode in a discrete-mode duty cycle test, void the test or perform the following steps to continue the test:

(i) Restart the engine.

(ii) Use good engineering judgment to restart the test sequence using the appropriate steps in §1065.530(b)

(iii) Precondition the engine at the previous discrete mode for a similar amount of time compared with how long it was initially run.

(iv) Advance to the mode at which the engine stalled and continue with the duty cycle as specified in the standard-setting part.

(v) Complete the remainder of the test according to the requirements in this subpart.

(d) Shut down the engine according to the manufacturer's specifications.

EFFECTIVE DATE NOTE: At 73 FR 37320, June 30, 2008, §1065.525 was revised, effective July 7, 2008. For the convenience of the user, the revised text is set forth as follows:

§1065.525 Engine starting, restarting, shutdown, and optional repeating of void discrete modes.

(a) Start the engine using one of the following methods:

(1) Start the engine as recommended in the owners manual using a production starter motor or air-start system and either an adequately charged battery, a suitable power supply, or a suitable compressed air source.

(2) Use the dynamometer to start the engine. To do this, motor the engine within ±25% of its typical in-use cranking speed. Stop cranking within 1 second of starting the engine.

(b) If the engine does not start after 15 seconds of cranking, stop cranking and determine why the engine failed to start, unless the owners manual or the service-repair manual describes the longer cranking time as normal.

(c) Respond to engine stalling with the following steps:

(1) If the engine stalls during warm-up before emission sampling begins, restart the engine and continue warm-up.

(2) If the engine stalls during preconditioning before emission sampling begins, restart the engine and restart the preconditioning sequence.

(3) If the engine stalls at any time after emission sampling begins for a transient test or ramped-modal cycle test, the test is void.

(4) Except as described in paragraph (d) of this section, void the test if the engine stalls at any time after emission sampling begins.

(d) If emission sampling is interrupted during one of the modes of a discrete-mode test, you may void the results only for that individual mode and perform the following steps to continue the test:

(1) If the engine has stalled, restart the engine.

(2) Use good engineering judgment to restart the test sequence using the appropriate steps in §1065.530(b).

(3) Precondition the engine by operating at the previous mode for approximately the same amount of time it operated at that mode for the last emission measurement.

(4) Advance to the mode at which the engine stalled and continue with the duty cycle as specified in the standard-setting part.

(5) Complete the remainder of the test according to the requirements in this subpart.

(e) Shut down the engine according to the manufacturer's specifications.

§1065.530 Emission test sequence.

(a) Time the start of testing as follows:

(1) Perform one of the following if you precondition sampling systems as described in §1065.520(f):

(i) For cold-start duty cycles, shut down the engine. Unless the standard-setting part specifies that you may only perform a natural engine cooldown, you may perform a forced engine cooldown. Use good engineering judgment to set up systems to send cooling air across the engine, to send cool oil through the engine lubrication system, to remove heat from coolant through the engine cooling system, and to remove heat from an exhaust aftertreatment system. In the case of a forced aftertreatment cooldown, good engineering judgment would indicate