

§ 1065.120

installed in use. Use working fluids that are of the same type and thermodynamic state as normal in-use operation.

(b) *Laboratory work inputs.* You may supply any laboratory inputs of work to the engine. For example, you may supply electrical work to the engine to operate a fuel system, and as another example you may supply compressor work to the engine to actuate pneumatic valves. We may ask you to show by engineering analysis your accounting of laboratory work inputs to meet the criterion in paragraph (a) of this section.

(c) *Engine accessories.* You must either install or account for the work of engine accessories required to fuel, lubricate, or heat the engine, circulate coolant to the engine, or to operate aftertreatment devices. Operate the engine with these accessories installed or accounted for during all testing operations, including mapping. If these accessories are not powered by the engine during a test, account for the work required to perform these functions from the total work used in brake-specific emission calculations. For air-cooled engines only, subtract externally powered fan work from total work. We may ask you to show by engineering analysis your accounting of engine accessories to meet the criterion in paragraph (a) of this section.

(d) *Engine starter.* You may install a production-type starter.

(e) *Operator demand for shaft work.* Command the operator demand and the dynamometer(s) to follow the prescribed duty cycle with set points for engine speed and torque at 5 Hz (or more frequently) for transient testing or 1 Hz (or more frequently) for steady-state testing. Use a mechanical or electronic input to control operator demand such that the engine is able to meet the validation criteria in §1065.514 over each applicable duty cycle. Record feedback values for engine speed and torque at 5 Hz or more frequently for evaluating performance relative to the cycle validation criteria. Using good engineering judgment, you may improve control of operator demand by altering on-engine speed and torque controls. However, if these changes result in unrepresentative testing, you

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must notify us and recommend other test procedures under §1065.10(c)(1).

§ 1065.120 Fuel properties and fuel temperature and pressure.

(a) Use fuels as specified in subpart H of this part.

(b) If the engine manufacturer specifies fuel temperature and pressure tolerances and the location where they are to be measured, then measure the fuel temperature and pressure at the specified location to show that you are within these tolerances throughout testing.

(c) If the engine manufacturer does not specify fuel temperature and pressure tolerances, use good engineering judgment to set and control fuel temperature and pressure in a way that represents typical in-use fuel temperatures and pressures.

§ 1065.122 Engine cooling and lubrication.

(a) *Engine cooling.* Cool the engine during testing so its intake-air, oil, coolant, block, and head temperatures are within their expected ranges for normal operation. You may use laboratory auxiliary coolers and fans.

(1) If you use laboratory auxiliary fans you must account for work input to the fan(s) according to §1065.110.

(2) See §1065.125 for more information related to intake-air cooling.

(3) See §1065.127 for more information related to exhaust gas recirculation cooling.

(4) Measure temperatures at the manufacturer-specified locations. If the manufacturer does not specify temperature measurement locations, then use good engineering judgment to monitor intake-air, oil, coolant, block, and head temperatures to ensure that they are in their expected ranges for normal operation.

(b) *Forced cooldown.* You may install a forced cooldown system for an engine and an exhaust aftertreatment device according to §1065.530(a)(1).

(c) *Lubricating oil.* Use lubricating oils specified in §1065.740.

(d) *Coolant.* For liquid-cooled engines, use coolant as specified in §1065.745.