

System of Units (SI), as detailed in NIST Special Publication 811, which we incorporate by reference in §1066.1010. Except where specified, equations work with either system of units. Where the equations depend on the use of specific units, the regulation identifies the appropriate units.

(b) *Units conversion.* Use good engineering judgment to convert units between measurement systems as needed. For example, if you measure vehicle speed as kilometers per hour and we specify a precision requirement in terms of miles per hour, convert your measured kilometer per hour value to miles per hour before comparing it to our specification. The following conventions are used throughout this document and should be used to convert units as applicable:

(1)  $1 \text{ hp} = 33,000 \text{ ft} \cdot \text{ lbf}/\text{min} = 550 \text{ ft} \cdot \text{ lbf}/\text{s} = 0.7457 \text{ kW}$ .

(2)  $1 \text{ lbf} = 32.174 \text{ ft} \cdot \text{ lbf}/\text{m/s}^2 = 4.4482 \text{ N}$ .

(3)  $1 \text{ inch} = 25.4 \text{ mm}$ .

(4)  $1 \text{ mile} = 1609.344 \text{ m}$ .

(5) For ideal gases,  $1 \text{ } \mu\text{mol}/\text{mol} = 1 \text{ ppm}$ .

(6) For ideal gases,  $10 \text{ mmol}/\text{mol} = 1\%$ .

(c) *Temperature.* We generally designate temperatures in units of degrees Celsius ( $^{\circ}\text{C}$ ) unless a calculation requires an absolute temperature. In that case, we designate temperatures in units of Kelvin (K). For conversion purposes throughout this part,  $0^{\circ}\text{C}$  equals  $273.15 \text{ K}$ . Unless specified otherwise, always use absolute temperature values for multiplying or dividing by temperature.

(d) *Absolute pressure.* Measure absolute pressure directly or calculate it as the sum of atmospheric pressure plus a differential pressure that is referenced to atmospheric pressure. Always use absolute pressure values for multiplying or dividing by pressure.

(e) *Rounding.* The rounding provisions of 40 CFR 1065.20 apply for calculations in this part. This generally specifies that you round final values but not intermediate values. Use good engineering judgment to record the appropriate number of significant digits for all measurements.

(f) *Interpretation of ranges.* Interpret a range as a tolerance unless we explicitly identify it as an accuracy, repeat-

ability, linearity, or noise specification. See 40 CFR 1065.1001 for the definition of tolerance. In this part, we specify two types of ranges:

(1) Whenever we specify a range by a single value and corresponding limit values above and below that value (such as  $X \pm Y$ ), target the associated control point to that single value (X). Examples of this type of range include “ $\pm 10\%$  of maximum pressure”, or “ $(30 \pm 10) \text{ kPa}$ ”. In these examples, you would target the maximum pressure or  $30 \text{ kPa}$ , respectively.

(2) Whenever we specify a range by the interval between two values, you may target any associated control point to any value within that range. An example of this type of range is “ $(40 \text{ to } 50) \text{ kPa}$ ”.

(g) *Scaling of specifications with respect to an applicable standard.* Because this part 1066 applies to a wide range of vehicles and emission standards, some of the specifications in this part are scaled with respect to a vehicle’s applicable standard or weight. This ensures that the specification will be adequate to determine compliance, but not overly burdensome by requiring unnecessarily high-precision equipment. Many of these specifications are given with respect to a “flow-weighted mean” that is expected at the standard or during testing. Flow-weighted mean is the mean of a quantity after it is weighted proportional to a corresponding flow rate. For example, if a gas concentration is measured continuously from the raw exhaust of an engine, its flow-weighted mean concentration is the sum of the products of each recorded concentration times its respective exhaust flow rate, divided by the sum of the recorded flow rates. As another example, the bag concentration from a CVS system is the same as the flow-weighted mean concentration, because the CVS system itself flow-weights the bag concentration.

#### § 1066.25 Recordkeeping.

(a) The procedures in this part include various requirements to record data or other information. Refer to the standard-setting part and §1066.695 regarding specific recordkeeping requirements.

(b) You must promptly send us organized, written records in English if we ask for them. We may review them at any time.

(c) We may waive specific reporting or recordkeeping requirements we determine to be unnecessary for the purposes of this part and the standard-setting part. Note that while we will generally keep the records required by this part, we are not obligated to keep records we determine to be unnecessary for us to keep. For example, while we require you to keep records for invalid tests so we may verify that your invalidation was appropriate, it is not necessary for us to keep records for our own invalid tests.

**Subpart B—Equipment, Measurement Instruments, Fuel, and Analytical Gas Specifications**

**§ 1066.101 Overview.**

(a) This subpart addresses equipment related to emission testing, as well as test fuels and analytical gases.

(b) The provisions of 40 CFR part 1065 specify engine-based procedures for measuring emissions. Except as specified otherwise in this part, the provisions of 40 CFR part 1065 apply for testing required by this part as follows:

(1) The provisions of 40 CFR part 1065, subpart B, describe equipment specifications for exhaust dilution and sampling systems; these specifications apply for testing under this part as described in § 1066.110.

(2) The provisions of 40 CFR part 1065, subpart C, describe specifications for measurement instruments; these specifications apply for testing under this part as described in § 1066.120.

(3) The provisions of 40 CFR part 1065, subpart D, describe specifications for measurement instrument calibrations and verifications; these specifications apply for testing under this part as described in § 1066.130.

(4) The provisions of 40 CFR part 1065, subpart H, describe specifications for fuels, engine fluids, and analytical gases; these specifications apply for testing under this part as described in § 1066.145.

(5) The provisions of 40 CFR part 1065, subpart I, describe specifications for testing with oxygenated fuels; these

specifications apply for NMOG determination as described in § 1066.635.

(c) The provisions of this subpart are intended to specify systems that can very accurately and precisely measure emissions from motor vehicles such as light-duty vehicles. To the extent that this level of accuracy or precision is not necessary for testing highway motorcycles or nonroad vehicles, we may waive or modify the specifications and requirements of this part for testing these other vehicles, consistent with good engineering judgment. For example, it may be appropriate to allow the use of a hydrokinetic dynamometer that is not able to meet all the performance specifications described in this subpart.

**§ 1066.105 Ambient controls and vehicle cooling fans.**

(a) *Ambient conditions.* Dynamometer testing under this part generally requires that you maintain the test cell within a specified range of ambient temperature and humidity. Use good engineering judgment to maintain relatively uniform temperatures throughout the test cell before testing. You are generally not required to maintain uniform temperatures throughout the test cell while the vehicle is running due to the heat generated by the vehicle. Measured humidity values must represent the conditions to which the vehicle is exposed, which includes intake air; other than the intake air, humidity does not affect emissions, so humidity need not be uniform throughout the test cell.

(b) *General requirements for cooling fans.* Use good engineering judgment to select and configure fans to cool the test vehicle in a way that meets the specifications of paragraph (c) of this section and simulates in-use operation. If you demonstrate that the specified fan configuration is impractical for special vehicle designs, such as vehicles with rear-mounted engines, or it does not provide adequate cooling to properly represent in-use operation, you may ask us to approve increasing fan capacity or using additional fans.

(c) *Allowable cooling fans for vehicles at or below 14,000 pounds GVWR.* Cooling fan specifications for vehicles at or below 14,000 pounds GVWR depend on