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Subpart JJJJ: Determining Engine HP

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Overview

- Purpose: Provide an overview of the considerations related to measuring engine horsepower (HP) for purposes of demonstrating compliance with the New Source Performance Standards for Stationary Spark Ignition Internal Combustion Engines (40 CFR part 60 subpart JJJJ)
- Outline:
  - Background
  - Brake Power
  - Information from Engine Manufacturers on Measuring Engine HP in Field

Background

- Subpart JJJJ gives some engines the option to meet NOx, CO, and VOC standards in units of either g/HP-hr or ppm (Table 1)

- Testing requirements in § 60.4244 provide equation for converting concentration (ppmv) to g/HP-hr
  - Equation includes “brake work of the engine, in HP-hr”

- Concentration standards added in response to public comments on proposed rule:
  - Comment: Commenters believe that the NSPS should include concentration-based alternative standards, at least for units that do not have mandated certification. Commenters stated that HP determinations for mechanical drive units can be very complex and induce significant error, and therefore the rule should include concentration-based alternative standards.
  - Response: EPA agrees that it would be appropriate to include concentration-based alternatives in the final rule for owners and operators who have to conduct performance testing to demonstrate compliance with the rule. Allowing a concentration-based alternative provides flexibility for owners and operators and may be for many facilities an easier and less costly alternative.

Brake Power

- Part 1054 definition for brake power:
  - *Brake power* means the usable power output of the engine, not including power required to fuel, lubricate, or heat the engine, circulate coolant to the engine, or to operate aftertreatment devices.

- My understanding (NOT official agency guidance) is that the terms “HP” and “BHP” are generally used interchangeably in the stationary engine regulations (subparts IIII, JJJJ, ZZZZ)

Information from Engine Manufacturers on Measuring Engine HP in Field

- Engine manufacturers indicated there is no simple and direct method to measure the HP of an engine installed in the field; many variables affect HP, including:
  - Quality and energy content of the fuel
  - Varying loads on the engine
  - Environment in which the engine is operating
  - Energy transfer efficiency to the driven equipment (generator, pump, compressor, etc.)
- Engine manufacturers indicated that engines powering an electrical generator can estimate HP by measuring generator output and adjusting to account for generator efficiency and parasitic loads on the engine
  - Virtually all gensets have control panel that provides a direct reading of output power, or alternatively, volts, amps, or power factors from which you can calculate the output power
  - Operator would obtain output of generator (kW) from the control panel and adjust by the efficiency of the generator and the parasitic load
    - Generator efficiency and parasitic load can be obtained from engine manufacturer