SAE International

SURFACE VEHICLE STANDARD

SAE J1940 OCT2012

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(R) Small Engine Power and Torque Rating Procedure

RATIONALE

SAE J1940 provides a single method for determining and reporting the power and torque ratings of small engines. Using this procedure to provide small engine rating information is useful for comparing the power and torque ratings of various engines. This procedure depends on two primary SAE test procedures to measure engine power and torque; SAE J1349 (Net) and SAE J1995 (Gross) Engine Power Test Codes, which correct the measured test data to standardized test conditions. Using these well known engine test procedures helps ensure consistent and comparable test results and engine ratings.

The small off-road utility engine industry, unlike automotive, motorcycle, and marine industries, does not have complete control of the end configuration of the engines in many engine applications. It is typical for the equipment manufacturer to install their own intake systems, exhaust systems, and other engine accessories in many applications. These systems need to conform to certain minimum performance requirements to meet emissions regulations. Therefore the engine manufacturer does not have direct control of the engine power and torque in the final application. A gross power rating is useful for these types of engines because variables such as intake and exhaust system configurations are eliminated from the test procedure.

Some small engine manufacturers produce a variety of configurations of a single engine model, with many combinations of unique components for multiple customers, which makes it difficult and cost prohibitive to monitor the net power of all potential production configurations. A gross power rating is useful for these types of engines because variables such as intake and exhaust system configurations are eliminated from the test procedure.

Some small engine manufacturers produce engine models with standardized exhaust and intake systems. A net power rating is useful for these types of engines because variables such as intake and exhaust system configurations are included in the test procedure.

The flexibility to use either Net or Gross test procedures and engine ratings, as specified in this procedure, is necessary in order to provide customers with consistent and comparable engine ratings. Because of the wide variety of standardized and customized engine configurations that are typical of the small engine industry, the flexibility to use either Net or Gross test procedures and ratings continues to be relevant and continues to be acceptable going forward.

The flexibility to rate engines at speeds other than the unique speed settings required for specific engine applications is also necessary in order to provide customers with consistent and comparable engine ratings. Because of the wide variety of customized engine applications with unique speed requirements, the flexibility to rate engines at speeds other than the unique speed settings for each application continues to be relevant and acceptable going forward. It would be difficult and cost prohibitive for engine manufacturers to identify and rate each unique engine application speed setting. The flexibility to select appropriate engine rating speeds for small engines is acceptable when using Net or Gross test procedures and ratings.

This procedure will continue to use statistical methods as part of the methodology to better define the declared power and torque ratings for small engines. Variations in the power and torque of small engines have been reduced over the last

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decade through improved engine design and improved manufacturing technologies that were implemented to reduce exhaust and evaporative emissions. Therefore, the requirement for the statistical mean values for power and torque of tested production engines has been changed from a minimum of 85% to 95% of the declared rated power or torque.

FOREWORD

This standard provides a statistically based procedure to determine small engine power and torque ratings, using well known SAE Net and Gross Engine Power Test Codes, and provides for standardized reporting of engine rating information. This standard also acknowledges the wide variety of unique engine applications and typical production variations common for engines within this classification.

It is recommended that this revision of the J1940 standard be applied to small engine power and torque ratings within one year of publication by SAE.

1. SCOPE

This SAE Standard is applicable to small spark ignition and compression ignition engines, having a maximum of 1.0 L swept volume displacement, powering off-road applications such as lawn and garden, construction, general utility equipment, and off-highway recreational vehicles. It is not intended to cover engines powering on-road vehicles, motorcycles, or boats.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J1349 Engine Power Test Code - Spark Ignition and Compression Ignition – As Installed Net Power Rating

SAE J1995 Engine Power Test Code - Spark Ignition and Compression Ignition - Gross Power Rating

3. TEST CODES

3.1 Engines shall be tested in accordance with the applicable parts of SAE J1349 or SAE J1995.

4. ENGINE RATING DETERMINATION

4.1 Production engines shall be randomly selected using statistical sampling methodology, run-in according to the engine manufacturer's recommendations, and tested using the appropriate SAE Engine Power Test Code.

4.2 The statistical mean values of power and/or torque shall be determined with a 95% confidence level.

4.3 The statistical mean values of production engines shall be at least 95% of the declared power and/or torque rating at rated engine speeds. There are no requirements or restrictions for the upper limit of the mean values.

4.4 The declared power and/or torque ratings shall be expressed as a whole numbers or as 0.1 or 0.01 increments. The increment selected shall be at the preference and agreement of the engine supplier and customer, however all values must still meet all the requirements of this standard. Converted units and rounded values such as hp (kW) also must meet all the requirements of this standard.

4.5 The declared power and/or torque ratings may also be presented at multiple rating speeds, and/or presented as a curve on a graph.