

Intertek

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Center for Evaluation of Clean Energy Technology

Test Specification – Engine Cylinder Compression Testing

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(CECET)**

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Revision History Log

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1 Objective

The objective of this Test Specification is to provide methods for testing the compression ratios of cylinders in an internal combustion engine (ICE) for vehicles participating in vehicle testing, including the Advanced Vehicle Testing and Evaluation (AVTE) program or in other advanced vehicle testing activities. This Test Specification outlines the methods for experimental conduct and data analysis. The actual steps for the test conducted are listed and described in the associated Center for Evaluation of Clean Energy Technology. (CECET) internal Work Instruction document.

2 Test Conduct

Documentation resulting from usage of this Test Specification shall be consistent, easy to understand, easy to read, and readily reproducible. All documentation required to complete testing shall be completed, approved, and ready for issue prior to commencing the testing it addresses. The following will abide by company policy:

- Review and approval of test results
- Storage and retention of records during and following testing activities
- Recording of any deviation from the outlined procedures and the reason for the deviation

3 Initial Conditions & Prerequisites

Prior to conduct of any portion of the testing, the following initial conditions and prerequisites shall be met. Satisfactory completion of these items should be verified.

3.1 Personnel

Personnel conducting testing under this Test Specification, i.e., the Test or Project Engineer(s), shall be familiar with the requirements of this Test Specification, shall be trained in accordance with company policy, and shall be certified by a Mandated Reviewer prior to commencing any testing activities. This requirement includes training in all aspects of the test equipment.

3.2 Manufacturer Information

3.2.1 This test is based on the manufacturer's specifications for internal combustion testing. Hence, the following information should be obtained from the manufacturer:

3.2.1.1 Instructions on the disassembly and reassembly of pertinent components required to complete the compression test, if available

3.2.1.2 Minimum compression ratio of a cylinder

3.2.1.3 Maximum compression ratio variation between cylinders

3.3 Instrumentation

3.3.1 All instrumentation used during testing shall be calibrated. The calibration shall be performed and documented in accordance with company policy.

3.3.2 All instrumentation shall have the accuracies and resolutions noted. Unless specific exceptions have been made by a Mandated Reviewer, the following identifies the minimum instrumentation specification that shall be installed and employed during the testing:

3.3.2.1 Cylinder pressure gauge: accuracy requirement is ± 5 psi (± 34.4 kPa) for pressure transducers with a capacity to test up to 200 psi (1379 kPa)

4 Test Activity Requirements

This section addresses testing required to meet the stated purpose and objective of this Test Specification.

4.1 Collected Test Data

The following data shall be collected during testing:

4.1.1 Cylinder compression ratio versus time (dimensionless)

4.2 Test Requirements

4.2.1 The vehicle dashboard does not indicate any engine overheating

4.2.2 SLI battery voltage is within the normal range (12.7 - 14.7 V)

5 Reported Test Results

From the data collected during this testing, an average of the maximum compression values obtained during the specified number of tests for each cylinder can be calculated. The average for each cylinder can be compared against tests from an earlier test date and also against the other cylinder averages to provide the minimum and maximum variation amongst the cylinders.

6 Glossary

AVTE: Advanced Vehicle Testing and Evaluation

CECET: Center for Evaluation of Clean Energy Technology

Compression Ratio: Ratio of swept volume to clearance volume at top dead center of a piston in an engine's cylinder.

Effective Date: After a document has been reviewed and approved, the first date the procedure can be utilized in an official capacity.

Initial Conditions: Conditions that must exist prior to an event occurring.

ICE: Internal combustion engine

Mandated Reviewer: The individual(s) responsible for the implementation of the AVTE program and of other advanced vehicle testing activities.

Prerequisites: Requirements that shall be met or resolved prior to an event occurring.

Shall: This word is used to indicate an item which requires adherence without deviation. 'Shall' is used to identify the binding requirements in a statement. This is a go or no-go criterion.

Should: This word is used to identify an item which requires adherence if at all possible. 'Should' statements identify preferred conditions.

SLI: Starting, lighting, and ignition

Test or Project Engineer: The individual(s) assigned responsibility for the conduct of any given test.

7 References

None