SURFACE VEHICLE RECOMMENDED PRACTICE

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Test Method for Measuring Power Consumption of Air Conditioning and Brake Compressors for Trucks and Buses

RATIONALE

This technical report is stabilized because it covers technology, products, or processes for which technical expertise no longer resides in the owning committee.

STABILIZED NOTICE

This document has been declared “STABILIZED” by SAE Truck and Bus Aerodynamics and Fuel Economy Committee and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

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1. Scope

Scope—The testing techniques outlined in this SAE Recommended Practice were developed as part of an overall program for testing and evaluating fuel consumption of heavy duty trucks and buses. The technique outlined in this document provides a general description of the type of equipment and facility which is necessary to determine the power consumption of these engine-driven components.

It is recommended that the specific operating conditions suggested throughout the test be carefully reviewed on the basis of actual data obtained on the specific vehicle operation.

If specific vehicle application is not known, see SAE J1343.

1.1 Purpose—The purpose of this document is to provide a recommended test procedure for establishing the power consumption of an air brake compressor or an air conditioning compressor. It is intended that this test procedure be used to determine compressor power consumption over a range of operating conditions, including both the loaded and unloaded modes. The resulting data is intended for use in the measure of probable vehicle fuel consumption under operating conditions.

2. Reference

2.1 Applicable Publication—The following publication forms a part of this specification to the extent specified herein. Unless otherwise specified, the latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1343—Information Relating to Duty Cycles and Average Power Requirements of Truck and Bus Engine Accessories, Section 3, Air Brake Compressors and Section 5, Air Conditioning Compressor

3. Test Equipment and Instrumentation

3.1 A test stand capable of driving the compressor over the recommended range of operating rpm.

3.2 A torque transducer calibrated over the full operating range of the compressor or other suitable means of determining torque.

3.3 A control source of cooling water, lubricating oil, cooling air, and/or refrigerant as required to meet the test conditions.

4. Test Procedure—Air Brake Compressors

4.1 Operating Conditions—The operating conditions are to be selected to simulate the duty cycle determined from vehicle in-service application.

4.2 Lubricating Oil

a. Temperature of Compressor Inlet—180 °F ± 5 °F (82 °C ± 2.8 °C)
b. Oil Viscosity—SAE 30
c. Oil Pressure—40 psig ± 10 psig (276 kPa ± 69 kPa)

4.3 Coolant (As Recommended by Manufacturer)

a. Flow—30 gpm ± 0.5 gpm
b. Temperature, Inlet—185 °F ± 10 °F (85 °C ± 5.6 °C)

4.4 Ambient Air Temperature

a. 85 °F ± 15 °F (29 °C ± 8.3 °C)

4.5 Air Inlet—Compressor to run with an open inlet without manifold connector or filter.

4.6 Air Flow (If Air Cooled)—Is 500 cfm ± 20 cfm (14.2 kl/m ± 0.556 kl/m) at 2700 ft/min ± 300 ft/min (49.4 km/h ± 5.49 km/h) measured at either corner of the cylinder head where the air impinges the head. The air flow shall impinge the compressed head from the top along the air compressor crankshaft center line and at a 45 degree ± 10 degree angle to the air compressor crankshaft center line.

4.7 Discharge Temperature—Must be stabilized for 5 min at each operating speed to be measured.

4.8 Operating Pressure and Inlet Condition—Power readings (or torque) are to be taken throughout the speed range (from 600 rpm to maximum rated speed) at each of the following four conditions shown in Table 1:

TABLE 1—

Condition	Inlet	Discharge
1	Open to atmosphere	100 psi (689 kPa)
2	Open to atmosphere	Unloaded
3	25 psi (172 kPa)	100 psi (689 kPa)
4	25 psi (172 kPa)	Unloaded

Discharge reservoir must have a minimum capacity of 1000 in^3 (16.4 L). Other operating pressures and inlet conditions can be selected based on the duty cycle determined from vehicle operation.

4.9 Test Procedure—To determine the power for the compressor being tested, the compressor must be run at the stabilized condition at each speed and operating mode. A torque transducer is installed at the input shaft to determine mean torque input requirements at each condition. Power will be calculated from the torque and speed measurements and should be corrected to a standard barometric pressure of 29.4 in Hg (100 kPa).