

Cab Air-Conditioning Test Procedure—Heavy Trucks with and without Sleepers**RATIONALE**

Not Applicable.

1. SCOPE

This SAE recommended practice establishes a uniform test procedures for on highway trucks equipped with an air-conditioning system used to condition the air in the cabin and sleeper compartment of the vehicle. This specification will apply to heavy trucks with and without sleeper compartments.

1.1 Purpose

The purpose is to provide a standard test procedure for comparison and evaluation of heavy truck air-conditioning performance.

2. REFERENCES**2.1 Related Publications**

The following publications are provided for information purposes and are not a required part of this document.

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. (Body)

SAE J1163 Determining Seat Index Point

SAE J1559 Measurement of Solar Heating Effect

3. DEFINITIONS**3.1 Air Conditioning System**

Any system that lowers the cabin and/or sleeper air temperature by the means of a refrigerant.

3.2 Compressor

Pumps low pressure refrigerant vapor out of the evaporator by suction, raises the pressure, then pumps it under high pressure into the condenser.

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions. Copyright © 2011 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
http://www.sae.org

SAE WEB ADDRESS:

**SAE values your input. To provide feedback
on this Technical Report, please visit
http://www.sae.org/technical/standards/J2646_201105**

3.3 Condenser

Removes heat from the entering high pressure, high temperature de-superheated vapor refrigerant, changing it to a high pressure, high temperature subcooled liquid refrigerant.

3.4 Expansion Device

Valve, orifice tube, or other expansion device in the refrigerant circuit for the purpose of metering liquid from the condenser into the evaporator inducing a large pressure drop changing the refrigerant to a low temperature, low pressure liquid.

3.5 Evaporator

Removes unwanted heat from the air by the boiling of liquid refrigerant in the evaporator coil.

3.6 Cab Average Temperature

The average of the head, lap and floor temperatures (see Figure 1) measured in both the driver and passenger locations

3.7 Cab Sleeper Average Temperature

The average of all measured temperatures inside the sleeper (see Figure 2) responsible for ensuring even temperature distribution within the sleeper area.

3.8 Ambient Temperature

Air temperature measured external to the vehicle and internal to the Vehicle Environmental Chamber.

3.9 Refrigerant

Chemical used in a refrigeration system for the purpose of heat transfer.

4. TEST EQUIPMENT

4.1 Vehicle Environmental Chamber (VEC)

Environmental chamber large enough to contain the vehicle and test equipment. The chamber must have provisions to maintain ambient temperature, relative humidity, and solar intensity. Chamber capability should maintain the following levels of accuracy:

Temperature: ± 2 °C (± 4 °F)

Relative Humidity: $\pm 3\%$

Solar Load: ± 50 W/m²

4.2 Engine Speed

Engine tachometer with an accuracy of 2% of observed values.

4.3 Pyranometer

A device used to measure radiant energy from the solar load placed horizontal above the vehicle roof surface.

4.4 Temperature Measurement Devices

Devices used to measure temperature inside the VEC as well as inside and outside the vehicle to be used for calculating and comparison of cooling performance, i.e.,... thermocouples, RTD's, etc. Must have an accuracy of ± 1.5 °C (± 2.7 °F).

4.5 Air Velocity/Wind Speed

Anemometer to measure air velocity (with a measuring accuracy of 2% of observed values).

4.6 Data Acquisition System

System that will monitor and record all required test parameters and necessary measured conditions consistent with this specification at the required time interval.

4.7 Pressure Transducer

Device used to measure refrigerant pressure within the refrigeration system that are required within this specification for the purpose of calculating cooling performance.

4.8 Mass Flow Meter

Device used to measure the mass flow of refrigerant in the refrigeration system.

4.9 Refrigerant Charging and Recovery Station

Equipment used to charge the refrigeration system and recover the refrigerant from the refrigeration system.

4.10 Voltage/Current Shunt

Device used to measure voltage or current from the HVAC system electrical components.

5. AIR-CONDITIONING TEST VEHICLE PREPARATION

5.1 Instrumentation/Test Setup

5.1.1 Panel Louver Direction

Aim panel louvers towards the occupant, toward the shoulder level of the seats. Aim all other louvers straight ahead.

NOTE: All HVAC louvers are open and directed perpendicular to their mounting surface, however none of the louvers should be directed at any of the thermal probes unless location of the louver is located directly at a probe when adjusted perpendicular to their mounting surface.

5.1.2 Vehicle Exterior Ambient Temperature

The vehicle test chamber temperature should be measured by 4 exterior thermocouples. Two thermocouples are to be placed along the centerline of the vehicle, ½ way between the ground and the highest point of the vehicle (excluding bolt on items), 915 mm (3 ft) forward of the front of the vehicle and 915 mm (3 ft) away from the back of the vehicle. Left and right side vehicle ambient should be measured at a point 150 mm (6 inches) away from left side and right side of the vehicle. If a vehicle does not have mirrors, take measurement 450 mm (18 inches) outward from left and right side window.

5.1.3 Fresh Air Inlet Temperature

A minimum of one temperature measurement device should be installed in the fresh air inlet.

5.1.4 Recirc Air Inlet Temperature

A minimum of one temperature measurement device should be installed in the recirc air inlet.