



<b>SURFACE VEHICLE RECOMMENDED PRACTICE</b>	<b>J1612™</b>	<b>DEC2024</b>
	Issued	2010-10
	Reaffirmed	2024-12
Superseding J1612 OCT2010		
Cab Heating Systems Test Procedure and Performance Requirements— Trucks, and Multipurpose Vehicles		

## RATIONALE

SAE J1612 has been reaffirmed to comply with the SAE Five-Year Review policy.

### 1. SCOPE

This SAE Recommended Practice establishes uniform test procedures and performance requirements for engine coolant type heating systems of enclosed truck cabs. The intent is to provide a test that will ensure acceptable comfort for cab occupants. It is limited to a test that can be conducted on uniform test equipment in commercially available laboratory facilities.

There are two options for producing hot coolant in this document. Testing using these two approaches on the same vehicle will not necessarily provide identical results. Many vehicle models are offered with optional engines, and each engine has varying coolant temperatures and flow rates. If the test is being conducted to compare the performance of one heater design to another heater design, then the external coolant source approach (Test A) will yield the most comparable results. If the test is being conducted to validate the heater installation on a specific vehicle model with a specific engine, then using the engine to heat the coolant (Test B) will be more appropriate.

This document will be reviewed and revised as required with advancements in technology and changes in environmental laws.

### 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](http://www.sae.org).

SAE J1163 Determining Seat Index Point

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### 3. DEFINITIONS

#### 3.1 Coolant

Liquid used for heat transfer composed of 50% ethylene glycol/50% water or other liquids specified by vehicle manufacturer for use in the heat transfer system.

#### 3.2 Heating-Defrosting System

The system used to heat the cab interior and to clear the windshield including all ducting, fans, and heat exchanger equipment.

#### 3.3 Truck Cab

Front occupant space for a driver and one or two passengers.

#### 3.4 Sleeper Cab

Occupant space behind the Truck Cab intended to be used as living space either during travel or while the vehicle is parked.

#### 3.5 Crew Cab

Occupant space behind a Truck Cab intended to carry additional passengers and/or to be used as a warming area for personnel during extended stationary operation.

#### 3.6 Seat Index Point (SIP)

This point describes the theoretical hip pivot point of a seated human. Alternately referred to as the "H-Point", "Seat Reference Point" (SRP), and "Seating Reference Point" (SgRP).

#### 3.7 Average Cab Temperature

Average of all temperature probe values applicable to the test vehicle configuration

### 4. HEATING TEST

#### 4.1 Performance Criteria

The Heating and Defrosting System shall have sufficient capacity to raise the average cab temperature:

From: -18 °C (0 °F)

To: +20 °C (68 °F)

Within: 30 minutes.

The Heating and Defrosting System shall have sufficient air distribution to ensure that all temperature probes reach at least +15.6 °C (60 °F) within 30 minutes.

At the end of the test, the temperature at each occupant head shall not exceed the temperature at the feet.

The heater and the defroster may be used in any combination that provides optimum heating performance.

## 4.2 Test Equipment

### 4.2.1 Vehicle Environmental Chamber (VEC)

Environmental chamber sufficiently large to contain the basic vehicle with provision for circulating air. The chamber must be capable of maintaining the specified temperature conditions for the duration of the test.

### 4.2.2 Engine Speed

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

### 4.2.3 Time

Stopwatch or other timing device.

### 4.2.4 Temperature

Thermometers, thermocouples, or other temperature measuring devices with an accuracy of  $\pm 0.5\text{ }^{\circ}\text{C}$  ( $\pm 1\text{ }^{\circ}\text{F}$ ).

### 4.2.5 Air Velocity

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

## 4.3 Test Conditions

The engine in the test vehicle will be used to provide coolant flow to the heater and defroster system under test.

All engine, heater, and defroster units shall be standard production parts or equivalent, adjusted to the manufacturer's specified limits.

### 4.3.1 Coolant Source

**TEST A:** Independent coolant supply.

**TEST B:** Engine running at 1500 rpm  $\pm$  50 rpm in neutral gear or the high idle RPM set by the vehicle OEM, whichever is higher. An auxiliary means for preheating the engine is permissible to provide easier engine starting. Engine speed shall be maintained with no load (normal engine parasitic loads only) throughout the test.

### 4.3.2 Heater Defroster System Coolant Flow

**TEST A:** 11.4 kg/min  $\pm$  2.3 kg/min (25 lb/min  $\pm$  5 lb/min)

**TEST B:** With engine—That flow resulting from engine operation as prescribed in 4.3.1.

### 4.3.3 Heater Defroster System Coolant Temperatures

**TEST A:** To be maintained at  $65\text{ }^{\circ}\text{C} + 3\text{ }^{\circ}\text{C}/-0\text{ }^{\circ}\text{C}$  ( $150\text{ }^{\circ}\text{F} + 5\text{ }^{\circ}\text{F}/-0\text{ }^{\circ}\text{F}$ ) for the entire test period

**TEST B:** To be at  $65\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$  ( $150\text{ }^{\circ}\text{F} \pm 5\text{ }^{\circ}\text{F}$ ) at the start of the test, or the maximum temperature that the engine can produce at the test conditions if it cannot reach this value. Coolant temperature after the start of the test is to be a function of the engine temperature control characteristics at the test conditions.

### 4.3.4 VEC Temperature

Average Chamber Temperature:  $-18\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$  ( $0\text{ }^{\circ}\text{F} \pm 4\text{ }^{\circ}\text{F}$ ).

### 4.3.5 VEC Air Velocity

The maximum wind velocity shall not exceed 8 km/h (5 mph).

#### 4.3.6 Heating and Defrosting System Controls

Set Heater and Defroster controls to maximum temperature and maximum fan settings, or the best combination to provide optimum heating performance.

#### 4.3.7 Cab

Engine hood, doors, windows, and controllable fresh air vents shall be closed. Operation of the side windows is not permitted during the test. The bunk curtain shall be open throughout the test. Window coverings shall not be used.

NOTE: The intent is that the cab be in a condition that represents actual in-service use.

#### 4.3.8 Auxiliary Heater

If an auxiliary heater (or heaters) is part of the standard heater and defroster system, it may be operated.

### 5. TEST INSTRUMENTATION

#### 5.1 Coolant Temperature

The temperature of the engine coolant shall be measured as near to the inlet and outlets of the heater core as possible, but not farther than 152 mm (6 in) from the heater inlet and outlet tubes. For those systems using more than one heater, it shall be measured at the inlet of the heater unit getting the first coolant flow, and the outlet of the heater unit getting the last coolant flow.

#### 5.2 Air Temperature Probe Locations

Thermocouples for measuring cab interior temperatures will be used to determine heating system performance. Additional temperature measurements may be recorded at the discretion of the testing party to achieve further information related to the vehicle heating system. Recommended measurements include air temperature into the heater (fresh air and re-circulated air measured separately) and air temperature out of the main heater unit.

##### 5.2.1 Truck Cab

Locate temperature probes at the driver and passenger positions relative to each Seat Index Point (SIP) per Figure 1.

##### 5.2.2 Crew Cab

Locate temperature probes at the driver and passenger side crew seats relative to each Seat Index Point (SIP) per Figure 1.

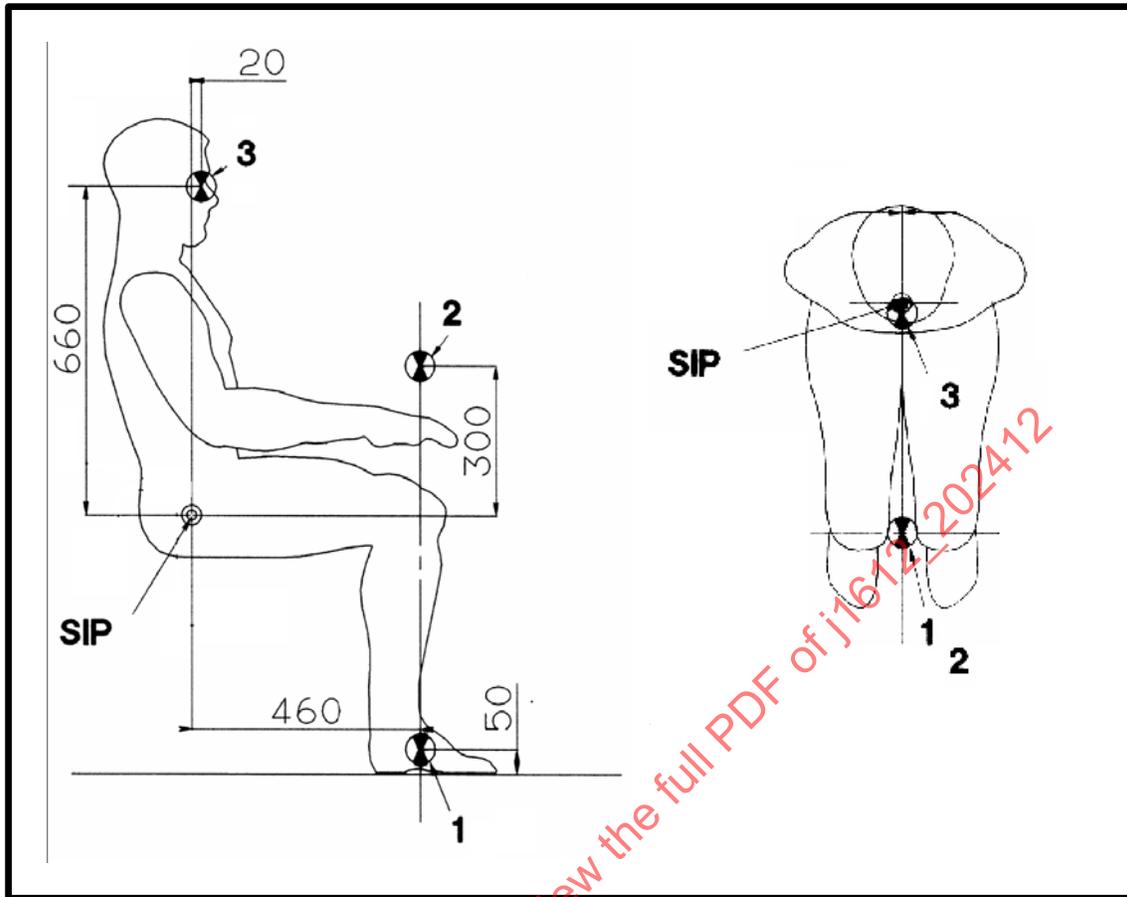


FIGURE 1 - TEMPERATURE PROBE LOCATIONS FOR SEATS

## 5.2.3 Sleeper Cab

Locate temperature probes in the Sleeper Cab per Figure 2 and Table 1.

TABLE 1 - TEMPERATURE PROBE LOCATIONS FOR SLEEPER BUNK

Probe ID	Description		Horizontal Location	Vertical Location
T1	Sleeper Bunk, Passenger Side	Top	600 mm from side wall and rear wall	600 mm below ceiling
T3		Middle	600 mm from side wall and rear wall	150 mm above mattress
T5		Floor	300 mm ahead of bunk, equally spaced between cab wall and T6	300 mm above floor
T2	Sleeper Bunk, Driver Side	Top	600 mm from side wall and rear wall	600 mm below ceiling
T4		Middle	600 mm from side wall and rear wall	150 mm above mattress
T6		Floor	300 mm ahead of bunk, equally spaced between cab wall and T5	300 mm above floor