



# SURFACE VEHICLE STANDARD

**J880™****JAN2023**

Issued 1980-02  
Revised 2011-10  
Reaffirmed 2023-01

Superseding J880 OCT2011

## Brake System Rating Test Code - Commercial Vehicles

### RATIONALE

All of the revisions, updates, and corrections to this SAE Standard, although many, are clearly editorial in nature, and do not generate any substantive changes to the methodology and procedures of this SAE Standard. Figure 2, which may exhibit a somewhat different appearance, is identical to the previous Figure 2, except for the revisions and corrections required to address the various errors and omissions. The different appearance is due exclusively to the fact that the Figure had to be recreated from scratch, instead of just modifying the existing figure.

SAE J880 has been reaffirmed to comply with the SAE Five-Year Review policy.

#### 1. SCOPE

This code is intended for commercial vehicles over 4500 kg (10 000 lb) with brake systems having typical service pressure ranges 0 to 14.1 mPa (0 to 2050 psi) hydraulic or 0 to 830 kPa (0 to 130 psi) air and is not directly applicable to vehicles with other systems. Air over hydraulic systems are to be tested as air systems.

##### 1.1 The code provides test procedures and instructions for:

- a. Instrumentation and equipment
- b. Vehicle preparation
- c. Determining brake system energy absorption capacity
- d. Calculation of brake rating

##### 1.2 Purpose

The purpose of this code is to provide a method for determining a brake system rating for new commercial highway vehicles, based on the energy absorption and dissipation capacity of the brake system as established by a repeated test procedure. For performance requirements, refer to SAE J257.

1.2.1 The code includes provision for those single unit, combination, and special vehicles which cannot be loaded to the manufacturer's gross vehicle weight rating, or cannot be accelerated in the time interval required, or cannot attain the specified 80.5 km/h (50 mph) speed.

1.2.2 Methods for measuring energy absorption capacity, other than described herein, may be equally valid.

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Documents

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

|           |                                                                                 |
|-----------|---------------------------------------------------------------------------------|
| SAE J257  | Brake Rating Horsepower Requirements—Commercial Vehicles                        |
| SAE J843  | Brake System Road Test Code—Passenger Car and Light-Duty Truck                  |
| SAE J971  | Brake Power Rating Test Code—Commercial Vehicle Inertia Dynamometer             |
| SAE J1505 | Brake Force Distribution Test Procedure—Trucks and Buses                        |
| SAE J2115 | Air Brake Performance and Wear Test Code Commercial Vehicle Inertia Dynamometer |

## 3. INSTRUMENTATION AND EQUIPMENT

Each vehicle to be checked must be equipped with:

- 3.1 A device for measuring deceleration that is accurate to the nearest 0.3 G's (0.3 mpsps or 1.0 fpsps).
- 3.2 A fifth wheel speed indicator or calibrated speedometer or tachometer.
- 3.3 A device for measuring the stopping distance of the vehicle to an accuracy within 1 ft from initial movement of the brake pedal until the vehicle has come to rest.
- 3.4 A calibrated line pressure gage.
- 3.5 A stop watch or timing device.
- 3.6 A means of monitoring the lining temperature to within 5 °C (10 °F) at each brake position either simultaneously or sequentially with a temperature range of 0 to 540 °C (0 to 1000 °F). Brake thermocouple installation is to conform to SAE J2115.
- 3.7 Provision for reservoir pressure control to limit service line pressure to maximum permitted.
- 3.8 Shutoff valve to permit cutoff of front and/or rear brakes if brake balance (Section 6) or individual axle brake rating (see 8.3) tests are to be run.

## 4. VEHICLE INFORMATION AND DATA

- 4.1 Vehicle Information Sheet (Figure 1) to be filled in prior to starting test.
- 4.2 Brake Rating Test Data Sheet (Figure 2) for use during the tests. It should be noted that the maximum individual brake temperatures are not to be used as criteria for brake rating. The measurement of brake temperatures as an index of brake condition during the test is necessary to provide test control and aid in analyzing test results.

## VEHICLE INFORMATION SHEET

Test No. \_\_\_\_\_ Required Watts (BRHP) \_\_\_\_\_ Test Watts (BRHP) \_\_\_\_\_

Test Facility and Location \_\_\_\_\_

Vehicle Make and Model \_\_\_\_\_

Estimated Center of Gravity of Body and Test Load Above Ground \_\_\_\_\_

Weight Distribution: Front Axle \_\_\_\_\_ Rear Axle(s) \_\_\_\_\_ Total \_\_\_\_\_

Trailer Axle(s)  
Gross Total \_\_\_\_\_

Special Conditions Which Might Affect Brake Performance \_\_\_\_\_

Are Backing Plates or Dustshields Installed? Front \_\_\_\_\_ Rear \_\_\_\_\_ Trailer \_\_\_\_\_

Tire Size: Front \_\_\_\_\_ Measured Static Rolling Radius: Front \_\_\_\_\_  
Rear \_\_\_\_\_ Rear \_\_\_\_\_  
Trailer \_\_\_\_\_ Trailer \_\_\_\_\_Type of Wheels: Front \_\_\_\_\_ Rear \_\_\_\_\_ Trailer \_\_\_\_\_  
(Cast Steel Spoke, Steel Disc, Alum., Disc, etc.)Type of Rim: Front \_\_\_\_\_ Rear \_\_\_\_\_ Trailer \_\_\_\_\_  
(Flat Base, Drop Center, etc.)

| Brake Drum:  | Weight | Type  | Make  | Part No. |
|--------------|--------|-------|-------|----------|
| Front        | _____  | _____ | _____ | _____    |
| Rear-Forward | _____  | _____ | _____ | _____    |
| Rear-Rear    | _____  | _____ | _____ | _____    |
| Trailer      | _____  | _____ | _____ | _____    |

| Brakes:      | Size  | Make  | Type  | Lining | Assy. No. |
|--------------|-------|-------|-------|--------|-----------|
| Front        | _____ | _____ | _____ | _____  | _____     |
| Rear-Forward | _____ | _____ | _____ | _____  | _____     |
| Rear-Rear    | _____ | _____ | _____ | _____  | _____     |
| Trailer      | _____ | _____ | _____ | _____  | _____     |

Actuation Details: (Fill Out per Headings for Either Hydraulic or Air Brakes)

| If Hydraulic: | Vacuum Booster<br>or Air Chamber<br>Type and Size | Pedal Ratio<br>and Usable<br>Travel | Master Cylinder<br>Dia and Stroke | Wheel Cylinder<br>Dia(s) |
|---------------|---------------------------------------------------|-------------------------------------|-----------------------------------|--------------------------|
|               | _____                                             | _____                               | _____                             | _____                    |

| If Air: | Air Chamber<br>Type and Size | Slack Adj.<br>Length or<br>Wedge Angle | Cam Radius | Cam Rotation<br>(With or Opp.<br>Drum) |
|---------|------------------------------|----------------------------------------|------------|----------------------------------------|
|         | _____                        | _____                                  | _____      | _____                                  |

|              |       |       |       |       |
|--------------|-------|-------|-------|-------|
| Front        | _____ | _____ | _____ | _____ |
| Rear-Forward | _____ | _____ | _____ | _____ |
| Rear-Rear    | _____ | _____ | _____ | _____ |
| Trailer      | _____ | _____ | _____ | _____ |

| Adjustment: | Front | Rear-Forward | Rear-Rear | Trailer |
|-------------|-------|--------------|-----------|---------|
| (Automatic) | _____ | _____        | _____     | _____   |
| (Manual)    | _____ | _____        | _____     | _____   |

| Actuator Stroke<br>at 80 psi<br>(552 kPa)<br>(L/R) | Front | Rear-Forward | Rear-Rear | Trailer |
|----------------------------------------------------|-------|--------------|-----------|---------|
|                                                    | _____ | _____        | _____     | _____   |

FIGURE 1 - VEHICLE INFORMATION SHEET

## BRAKE RATING TEST DATA SHEET

Test No. \_\_\_\_\_ Data Sheet No. \_\_\_\_\_ of \_\_\_\_\_ Date \_\_\_\_\_  
 No. of \_\_\_\_\_ Brake Rating \_\_\_\_\_ Passed \_\_\_\_\_ Did Not Pass \_\_\_\_\_  
 Snubs \_\_\_\_\_ Power/kW (brhp) \_\_\_\_\_

NOTE: Starting Temperature (Hottest Brake) Must be 66-93 °C (150-200 °F) for Conditioning, Cold Stop(s), Drift Time, Rating Test, and Cooled Stop

Drift Time, s: (1) \_\_\_\_\_ (2) \_\_\_\_\_ (3) \_\_\_\_\_  
 Cold Stop(s) \_\_\_\_\_ Start Temp. \_\_\_\_\_ Max. Line Pressure \_\_\_\_\_ Max. Decel. \_\_\_\_\_ Stop Dist. \_\_\_\_\_ Wheels \_\_\_\_\_ Pedal or Actuator Stroke, m (in) \_\_\_\_\_  
 32.2 °C (°F) MPa (hydraulic) m/s<sup>2</sup> m (ft) Locked or Cycled L/F R/F LR-F RR-F LR-R RR-R  
 km/h \_\_\_\_\_ KPa (pneumatic) ft/s<sup>2</sup> \_\_\_\_\_  
 20mph \_\_\_\_\_  
 First \_\_\_\_\_  
 Second \_\_\_\_\_  
 Third \_\_\_\_\_

Rating Test Initial Speed, km/h (mph) \_\_\_\_\_ Final Speed, km/h (mph) \_\_\_\_\_ Cycle Time, s \_\_\_\_\_  
 Deceleration, m/s<sup>2</sup> (ft/s<sup>2</sup>) Initial \_\_\_\_\_ Minimum Limit \_\_\_\_\_

| Snub | Brake Apply Time | Press. MPa (hydraulic) KPa (pneumatic) | Decel. m/s <sup>2</sup> (ft/s <sup>2</sup> ) | Temperature, °C (°F) |  |  |  |  |  | Snub | Brake Apply Time | Press. MPa (hydraulic) KPa (pneumatic) | Decel. m/s <sup>2</sup> (ft/s <sup>2</sup> ) | Temperature, °C (°F) |  |  |  |  |  |
|------|------------------|----------------------------------------|----------------------------------------------|----------------------|--|--|--|--|--|------|------------------|----------------------------------------|----------------------------------------------|----------------------|--|--|--|--|--|
|      |                  |                                        |                                              |                      |  |  |  |  |  |      |                  |                                        |                                              |                      |  |  |  |  |  |
| 1    |                  |                                        |                                              |                      |  |  |  |  |  | 16   |                  |                                        |                                              |                      |  |  |  |  |  |
| 2    |                  |                                        |                                              |                      |  |  |  |  |  | 17   |                  |                                        |                                              |                      |  |  |  |  |  |
| 3    |                  |                                        |                                              |                      |  |  |  |  |  | 18   |                  |                                        |                                              |                      |  |  |  |  |  |
| 4    |                  |                                        |                                              |                      |  |  |  |  |  | 19   |                  |                                        |                                              |                      |  |  |  |  |  |
| 5    |                  |                                        |                                              |                      |  |  |  |  |  | 20   |                  |                                        |                                              |                      |  |  |  |  |  |
| 6    |                  |                                        |                                              |                      |  |  |  |  |  | 21   |                  |                                        |                                              |                      |  |  |  |  |  |
| 7    |                  |                                        |                                              |                      |  |  |  |  |  | 22   |                  |                                        |                                              |                      |  |  |  |  |  |
| 8    |                  |                                        |                                              |                      |  |  |  |  |  | 23   |                  |                                        |                                              |                      |  |  |  |  |  |
| 9    |                  |                                        |                                              |                      |  |  |  |  |  | 24   |                  |                                        |                                              |                      |  |  |  |  |  |
| 10   |                  |                                        |                                              |                      |  |  |  |  |  | 25   |                  |                                        |                                              |                      |  |  |  |  |  |
| 11   |                  |                                        |                                              |                      |  |  |  |  |  | 26   |                  |                                        |                                              |                      |  |  |  |  |  |
| 12   |                  |                                        |                                              |                      |  |  |  |  |  | 27   |                  |                                        |                                              |                      |  |  |  |  |  |
| 13   |                  |                                        |                                              |                      |  |  |  |  |  | 28   |                  |                                        |                                              |                      |  |  |  |  |  |
| 14   |                  |                                        |                                              |                      |  |  |  |  |  | 29   |                  |                                        |                                              |                      |  |  |  |  |  |
| 15   |                  |                                        |                                              |                      |  |  |  |  |  | 30   |                  |                                        |                                              |                      |  |  |  |  |  |

Hot Stop(s) \_\_\_\_\_ Start Temp. \_\_\_\_\_ Max. Line Pressure \_\_\_\_\_ Max. Decel. \_\_\_\_\_ Stop Dist. \_\_\_\_\_ Wheel \_\_\_\_\_ Pedal or Actuator Stroke, m (in) \_\_\_\_\_  
 32.2 °C (°F) MPa (hydraulic) m/s<sup>2</sup> m (ft) Locked or Cycled L/F R/F LR-F RR-F LR-R RR-R  
 km/h \_\_\_\_\_ KPa (pneumatic) ft/s<sup>2</sup> \_\_\_\_\_  
 20 mph \_\_\_\_\_

Stability: Cold Stop \_\_\_\_\_ Rating Test \_\_\_\_\_ Hot Stop \_\_\_\_\_ Cooled Stop \_\_\_\_\_

Satisfactory (S) or Unsatisfactory (U)

Remarks (All deviations from the standard or special procedures, including burnish, must be noted.)

Test Summary

(S)

(U)

Cold Stop

Rating Test

Hot Stop

Stability

Final Inspect.

Time \_\_\_\_\_ m Ambient Temp. \_\_\_\_\_ °C (°F) Road Condition \_\_\_\_\_

Location \_\_\_\_\_

Driver \_\_\_\_\_ Data Recorder \_\_\_\_\_

FIGURE 2 - BRAKE RATING TEST DATA SHEET