The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE STANDARD

SAE J2115

REAF. JUN2000

Issued 1993-06
Reaffirmed 2000-06

Superseding J2115 JUN1993

Submitted for recognition as an American National Standard

Brake Performance and Wear Test Code Commercial Vehicle Inertia Dynamometer

1. ***Scope—***This SAE Standard provides test procedures for air, air/hydraulic, and hydraulic drum and disc brakes used on highway commercial vehicles over 4536 kg (10 000 lb) GVWR.

1.1 **Purpose—**The purpose of this code is to provide a procedure for evaluating performance and wear of a brake and drum or disc when tested on an inertia-type brake dynamometer.

2. ***References—***There are no referenced publications specified herein.

3. ***Test—***The procedures include the following:

a. Effectiveness tests at various conditions and speeds
b. Fade and recovery
c. Wear and effectiveness at various temperatures

4. ***Instrumentation, Equipment, and Test Conditions***

4.1 The dynamometer inertia should be equivalent to the maximum loading conditions to which the brakes are normally subjected. Rotation speeds should be established based on revolutions per kilometer (mile) for the tires normally used to carry such wheel loads. Dynamometer inertia is to be based on the maximum static radius and half the GAWR.

4.2 **Thermocouples—**Install thermocouples in drum or disc and in lining (optional) as shown in Figures 1 to 6.

4.3 **Warmup—**If required, make a series of 48 to 0 km/h (30 to 0 mph) stops at 3 mpsps (10 fpsps) to obtain the initial drum or disc temperature of 93 to 121 °C (200 to 250 °F).

4.4 **Cooling Speed—**Unless otherwise specified, cooling speed is at the speed of the next stop.

4.5 **Air Flow—**Unless otherwise specified, air at ambient temperature is directed uniformly and continuously over the brake drum or disc at a velocity of 670 m/min (2200 ft/min).

4.6 Ambient temperature is to be between 15 and 40 °C (59 and 104 °F).

TO PLACE A DOCUMENT ORDER; (724) 776-4970 FAX: (724) 776-0790
SAE WEB ADDRESS http://www.sae.org

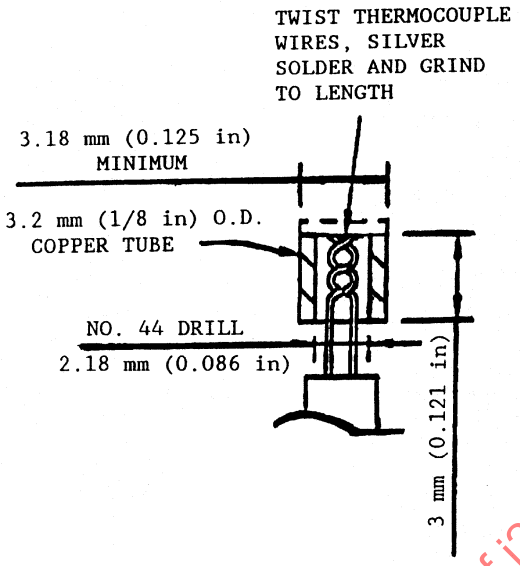

FIGURE 1—THERMOCOUPLE CONSTRUCTION

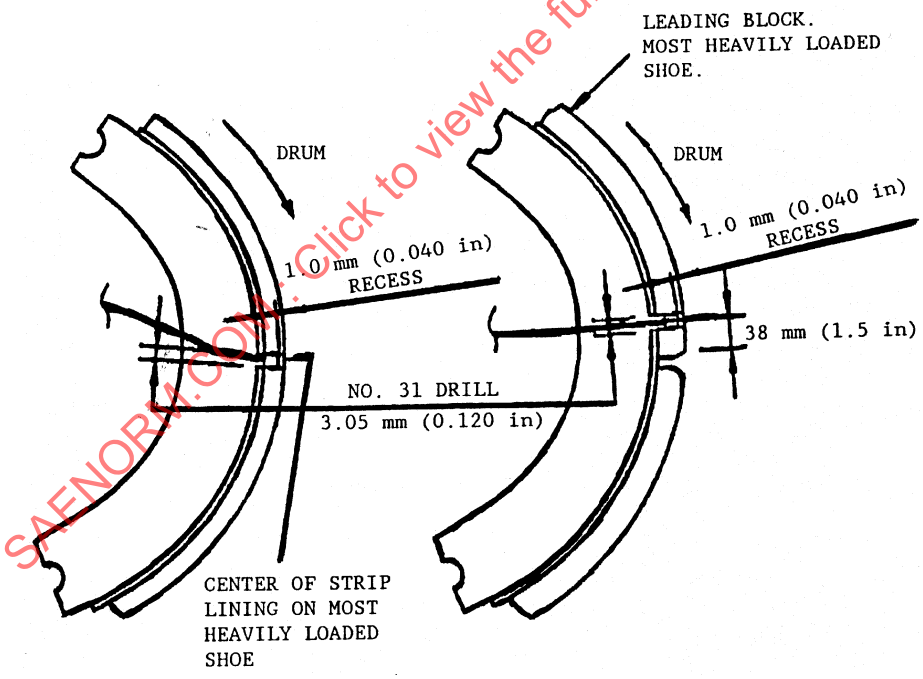

FIGURE 2—BRAKE SHOE THERMOCOUPLE INSTALLATION

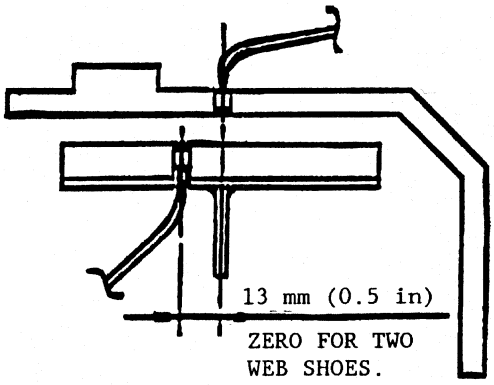

FIGURE 3—DRUM THERMOCOUPLE AND SINGLE WEB SHOE THERMOCOUPLE LOCATION

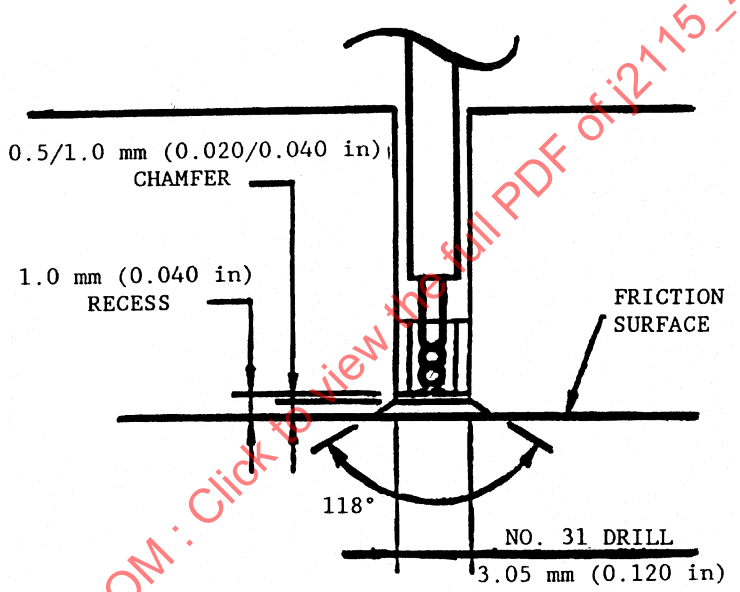

FIGURE 4—DRUM OR DISC THERMOCOUPLE INSTALLATION

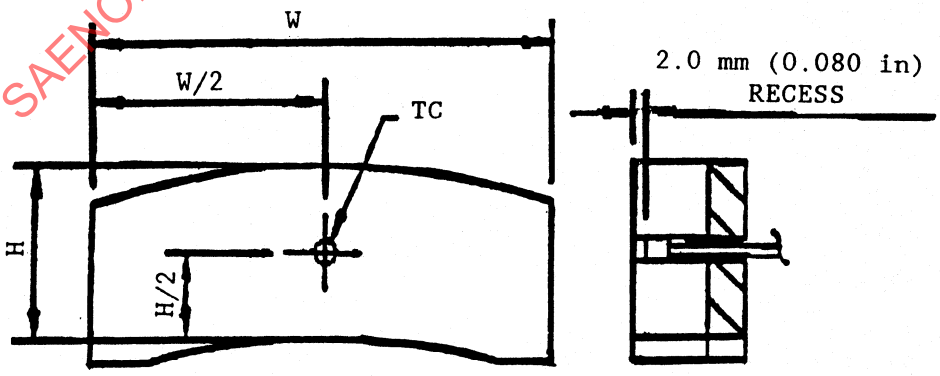

FIGURE 5—PAD THERMOCOUPLE LOCATION

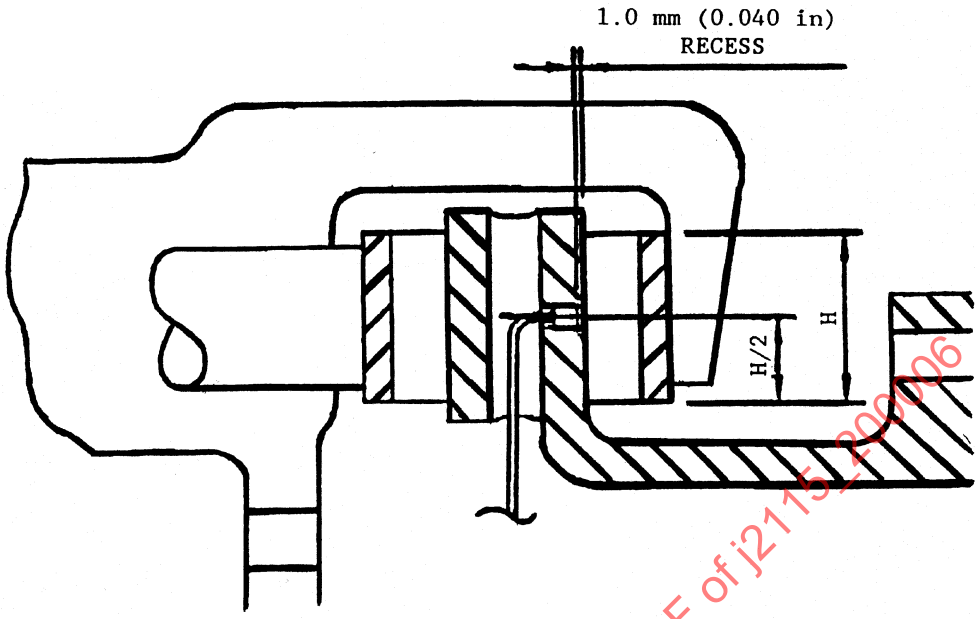

FIGURE 6—DISC

4.7 Chamber air pressure rise rate is to be 1.5 MPa/s ± 0.3 MPa/s (220 psi/s ± 45 psi/s).

4.8 Tests described herein are for air or air/hydraulic brakes. For hydraulic brakes, all effectiveness tests should be run from 1.40 to 12.4 MPa (200 to 1800 psi) at 1.4 MPa (200 psi) increment.

5. Performance Procedure

5.1 The lining should be attached and ground per manufacturer specifications. New drums or discs are recommended for each test. Surface finish is to be in accordance with manufacturer recommendations with careful attention to insure uniform surface finish from test to test. Measure swept surface hardness at 3 points, 120 degrees apart. Mount the brake and drum or disc assembly on the dynamometer, center, and record runout. Maximum runout is 0.254 mm (0.010 in) T.I.R. at open end of drum wear surface or 0.254 mm (0.010 in) at outer radius of disc wear surface. Measure lining and drum or disc as in 6.1.

5.2 **Preburnish Effectiveness—**Adjust brake to manufacturer's specifications. Warm brake to initial drum or disc temperature of 93 to 121 °C (200 to 250 °F). Make an 80 km/h (50 mph) stop at 69 kPa (10 psi). Cool brake at 48 km/h (30 mph). Make successive stops at 138, 276, 414, 552, and 690 kPa (20, 40, 60, 80, and 100 psi) with an initial drum or disc temperature of 93 to 121 °C (200 to 250 °F).

5.3 **Preburnish Static Torque—**With drum or disc temperature 24 to 52 °C (75 to 125 °F), measure static breakaway torque and actuator stroke in forward and reverse direction with calibrated actuator. Repeat three times. Measure static breakaway torque in forward and reverse directions at 276, 414, 552, and 690 kPa (40, 60, 80, and 100 psi).

5.4 **Burnish—**Make 200 stops from 64 km/h (40 mph) at 3.0 mpsps (10 fpsps) with an initial drum or disc temperature of 177 to 204 °C (350 to 400 °F). Make 200 additional stops at 260 to 288 °C (500 to 550 °F). Inspect lining and drum or disc and record percentage of lining area contact of each shoe and pad. Make sketch or photo of contact.

5.5 **Postburnish Static Torque—**Adjust brakes to manufacturer specifications. Repeat 5.3.

5.6 80 km/h (50 mph) First Effectiveness—Warm brake to initial drum or disc temperature of 93 to 121 °C (200 to 250 °F). Make an 80 km/h (50 mph) stop at 69 kPa (10 psi). Cool brake. Make successive stops at 103, 138, 276, 414, 552, and 690 kPa (15, 20, 40, 60, 80, and 100 psi) with an initial drum or disc temperature of 93 to 121 °C (200 to 250 °F).

5.7 32 km/h (20 mph) First Effectiveness—Repeat 5.6 except at 32 km/h (20 mph).

5.8 96 km/h (60 mph) First Effectiveness—Repeat 5.6 except at 96 km/h (60 mph).

5.9 Recovery Baseline—Make three 48 km/h (30 mph) stops at 3.6 mpsps (12 fpsps) from drum or disc temperature of 93 to 121 °C (200 to 250 °F).

5.10 Fade—Warm brake to initial drum or disc temperature of 93 to 121 °C (200 to 250 °F). Make 10 snubs from 80 to 24 km/h (50 to 15 mph) at 2.7 mpsps (9 fpsps) with 72 s intervals between start of each snub with pressure limited to 690 kPa (100 psi).

5.11 Hot Stop—One minute after end of last fade snub deceleration make a 32 km/h (20 mph) stop attempting to maintain 4.3 mpsps (14 fpsps) with pressure limited to 690 kPa (100 psi).

5.12 Recovery—Two minutes after end of hot stop decelerations, make 20 stops from 48 km/h (30 mph) at a deceleration rate of 3.6 mpsps (12 fpsps) at 1 min intervals between the start of each stop.

5.13 Reburnish—Make 50 stops from 64 km/h (40 mph) at 3.0 mpsps (10 fpsps) with an initial drum or disc temperature of 260 to 288 °C (500 to 550 °F).

5.14 80 km/h (50 mph) Second Effectiveness—Repeat 5.6.

5.15 32 km/h (20 mph) Second Effectiveness—Repeat 5.7.

5.16 96 km/h (60 mph) Second Effectiveness—Repeat 5.8.

6. Wear and Third Effectiveness Test

6.1 Preparation—(Use lining from previous test.) The brake shoe and lining assembly thickness shall be measured at established toe, center, and heel points on each side of each shoe. Weigh the shoe and lining assembly. Measure maximum and minimum diameter or thickness at the center of swept width of drum or disc. Location of previous measurements must be permanently marked so that future measurements will be taken at the same location.

Measure swept surface hardness at 3 points, 120 degrees apart. Mount the brake and drum assembly on the dynamometer, center, and record runout. Maximum runout is 0.254 mm (0.010 in) T.I.R. at open end of drum wear surface or 0.254 mm (0.010 in) at outer radius of disc wear surface.

Record line pressure at every 100th snub. Measure lining and drum or disc at conclusion of snub cycle. Record lining and drum or disc condition including comments regarding noise, chatter, grabbiness, heat checks, and scoring. Adjust brakes to manufacturer specifications.