SAE International™

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J971

CAN-CELLED AUG2008

Issued 1966-09
Cancelled 2008-08

Superseding J971 APR2000

Brake Power Rating Test Code—Commercial Vehicle Inertia Dynamometer

1. ***Scope***—The code provides test procedures and methods of calculating a brake rating from the data obtained for brakes used in highway commercial vehicles over 4.5 T (10 000 lbs) GVWR air and hydraulic. Some general correlation may be expected between brake ratings established by this means and those obtained from vehicle tests such as outlined in SAE J880. The brake rating power, kW (hp) calculated by conduct of this code is an arbitrary index of performance of the brake and drum when tested by this procedure and may be appreciably different from the values obtained by other techniques.

1.1 **Purpose**—The purpose of this SAE Recommended Practice is to provide a method for determining a brake rating based on the energy absorption and dissipation capacity of the brake and drum when tested on an inertia-type brake dynamometer.

1.2 **Rationale**—SAE J971 is a dynamometer test to determine the brake horsepower rating. This rating is best determined via vehicle test as it is highly dependent upon the brake cooling characteristics that are not simulated on the dynamometer. Certain conditions specified currently in SAE J971, such as the percentage of lining to drum contact, may not allow the test to be run as specified. Testing per SAE J971 is not being done, having been replaced by testing to the procedures specified by FMVSS-121 and SAE J2115.

2. ***References***

2.1 **Applicable Publication**—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, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J880—Brake System Rating Test Code—Commercial Vehicles

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

3.1 The dynamometer inertia should be equivalent to the maximum loading conditions to which brakes tested 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 rolling radius and half the GAWR.

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

3.3 **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).

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

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

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

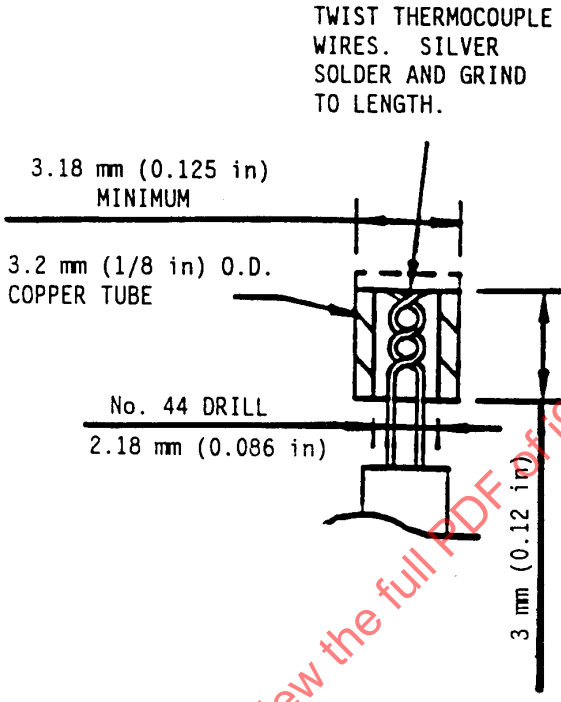

FIGURE 1—THERMOCOUPLE CONSTRUCTION

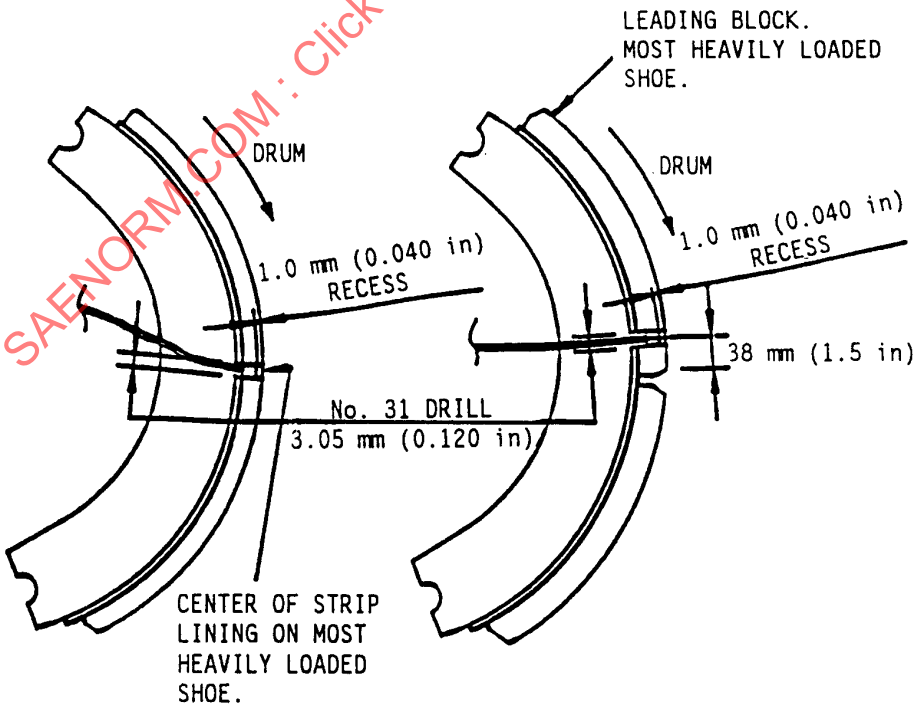

FIGURE 2—BRAKE SHOE THERMOCOUPLE INSTALLATION

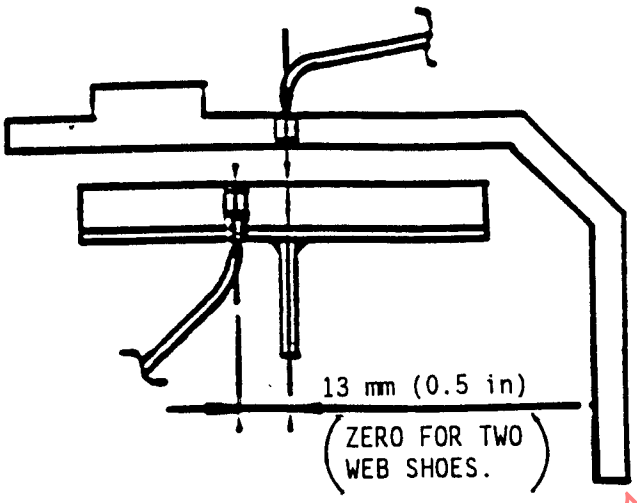

FIGURE 3—DRUM THERMOCOUPLE AND SINGLE WEB SHOE THERMOCOUPLE LOCATION

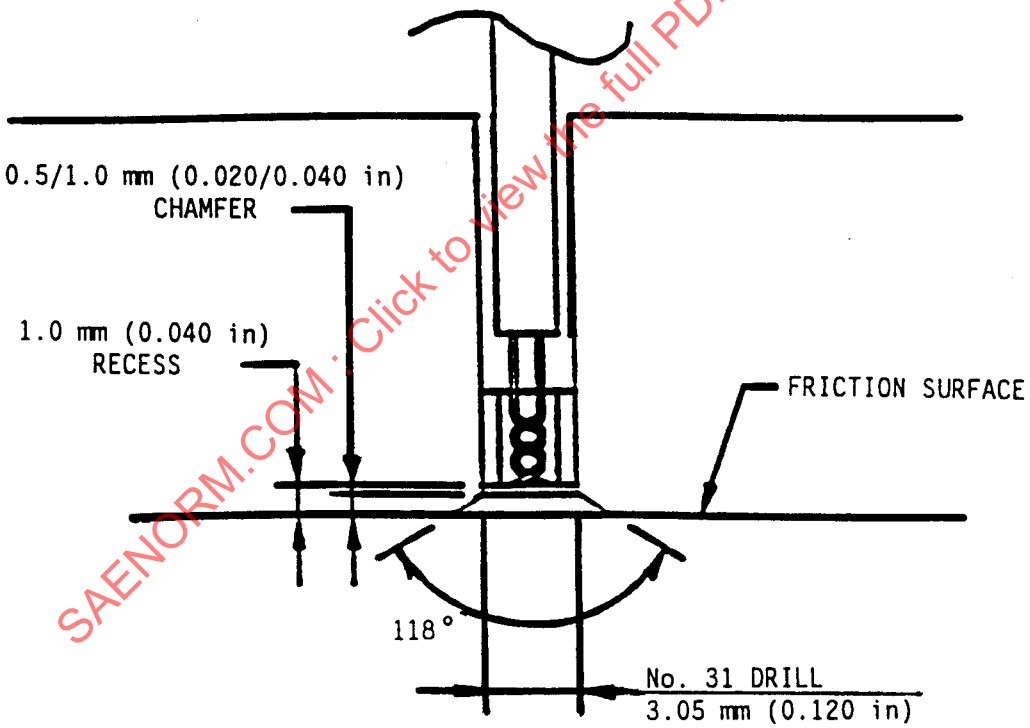

FIGURE 4—DRUM OR DISC THERMOCOUPLE INSTALLATION

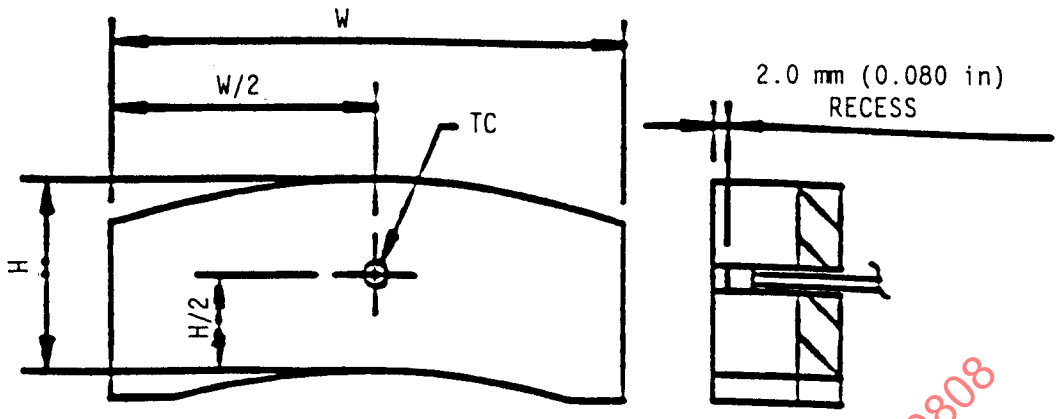

FIGURE 5—PAD THERMOCOUPLE LOCATION

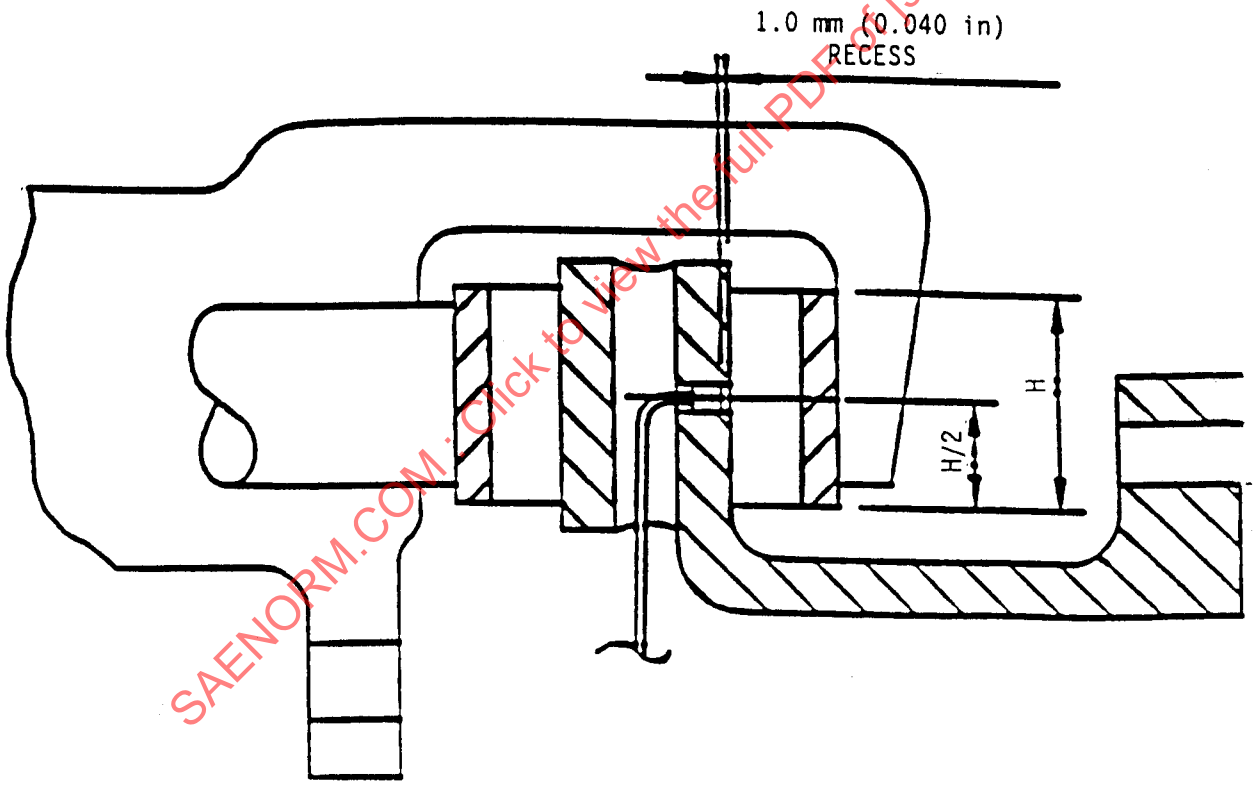

FIGURE 6—DISC THERMOCOUPLE LOCATION

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

3.7 Chamber air pressure rise rate is to be 1.50 MPa/s ± 0.3 MPa/s (220 psi/s ± 45 psi/s).

3.8 Tests described herein are for air brakes. For hydraulic brakes, all test pressure should be limited to 12.4 MPa (1800 psi) at 1.4 MPa (200 psi) increment.

4. Performance Procedure

4.1 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. 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.

4.2 **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. If 80% drum or disc contact is not obtained on each block segment of each shoe or pad, repeat the test with new lining until 80% is obtained. Make a sketch or photo of contact.

4.3 **80 km/h (50 mph) 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).

4.4 **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).

4.5 **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 the pressure limited to 690 kPa (100 psi).

4.6 **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).

4.7 **Recovery—**Two minutes after end of hot stop deceleration, 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. Power Rating Procedure

5.1 **General—**This procedure requires 3 to 5 rating test cycles to determine the maximum number of snubs the brake can make in 12 min without departing from specified deceleration and max pressure requirements. The first rating test is run using 12 snub cycle. If requirements are met increase by one or two snub cycle based on the performance margin of previous cycles. If it fails, reduce number of snubs by one. Once the maximum number of snubs has been established, a power rating can be calculated based on that test using the kinetic energy formula in 6.1.

Snubs should be made in accordance with the brake apply time shown in Table 1, thus continually compensating for fractions of seconds. Continue with the second and subsequent tests, each increasing in severity as required for proper brake rating.