

**Machine Slope Operation Test Code**

**Foreword**—This document has been replaced by J/ISO 10266.

1. **Scope**—This SAE Standard applies to off-road self-propelled construction, forestry and industrial machines as listed in categories 1, 2, and 4 of SAE J1116.

1.1 **Purpose**—This Standard provides a field procedure to determine the ability of a machine to operate statically and dynamically on sloping surfaces.

Depending upon the objective of the test, any item listed as specified is to be selected at the discretion of either the manufacturer, the test agency, the owner, or a combination of these parties.

2. **References**

2.1 **Applicable Publication**—The following publication forms a part of the specification to the extent specified herein. Unless otherwise indicated the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1116—Categories of Off-Road Self-Propelled Work Machines

3. **Facilities**—The static test course shall consist of facilities to permit placing the machine on a specified sloping surface. (Components of machine may be at a different angle than the specified slope because of the suspension system.) The dynamic test course may be used.

The dynamic test course shall be uniform in grade and sufficiently long and wide to permit ready maneuverability on either axis of orientation. The course as specified should be maintained in good condition consistent with the objective of the test. Use of seat belts and ROPS is advised on critical slopes and maneuvers.

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4. **Apparatus**—Means to measure and accuracy:

Time:  $\pm 0.05$  minute  
Temperature:  $\pm 2$  °C  
Barometric pressure:  $\pm 0.3$  kPa  
Rotational speed:  $\pm 2\%$  of max  
Distance:  $\pm 0.5\%$  of max  
Tire pressure:  $\pm 3\%$  of max  
Track adjustment:  $\pm 5$  mm  
Oil pressure:  $\pm 10$  kPa  
Grade:  $\pm 1\%$  of max  
Mass:  $\pm 3\%$  of max

5. **Procedure**—Prior to test operation a complete check of the machine should be made to assure specified mass, mass distribution, lubrication, coolant, and fuel. All adjustments, including governor, brakes, clutches, tire pressure, or track adjustment, should be set as recommended by the manufacturer.

If the machine has not previously been used it should be limbered-up, as recommended by the manufacturer. Any malfunction or maladjustment that may develop during limbering-up should be corrected before proceeding further.

Prior to recording test data the machine shall be operated until reasonably stable temperatures have been attained in all lubricants and functional components.

6. **Static Test**—Tilt the machine at the specified slope with the longitudinal axis oriented with the forward end up grade. The machine should be secured in position by application of brakes or use of wheel chocks. Idle the engine and auxiliary equipment if specified, for the duration of the test. Record the following at 5 min intervals:

Engine rpm  
Coolant temperature (cylinder head temperature on air cooled engines)  
Abnormal noise  
Oil pressure and temperature  
Observed "hot spots"  
Observed oil and coolant leaks  
Special observations as required for auxiliary equipment

The test shall continue until coolant and oil temperatures have stabilized.

The test shall be considered terminated at the time any specified critical temperature is reached, noise is indicative of component failure, engine stalls, oil pressure becomes erratic or drops below the minimum recommended by the manufacturer or the specified time interval elapses.

Repeat the test successively with longitudinal axis of the machine oriented on the slope as follows:

- a. With the forward end of the machine downgrade.
- b. With the forward end of the machine at 90 deg to the right of the inclination of the slope.
- c. With the forward end of the machine 90 deg to the left of the inclination of the slope.

7. **Dynamic Test**—With the front of the machine upgrade, it shall be maneuvered alternately forward and reverse continuously for the duration of the test. Speed shall be kept uniform and controlled within the range of the slowest gear selection for both forward and reverse movement. Record the following at 5 min intervals:

- Coolant temperatures (cylinder head temperature on air cooled engines)
- Abnormal noise
- Oil pressure and temperature with corresponding engine rpm
- Observed "hot spots"
- Observed oil or coolant leaks
- Special observations as required for auxiliary equipment
- Number of cycles

The test shall continue until coolant and oil temperatures have stabilized.

The test shall be considered terminated at the time any specified critical temperature is reached, noise is indicative of component failure, engine stalls, oil pressure becomes erratic or drops below the minimum recommended by the manufacturer or the specified time interval elapses.

Repeat the test exactly in the remaining three directions.

8. **Computations and Records**—Records will be summarized in accordance with Figure 1, Machine Slope Operation Data Summary Sheet.

DATE \_\_\_\_\_

TESTING AGENCY \_\_\_\_\_ LOCATION \_\_\_\_\_

MACHINE Make \_\_\_\_\_ Model \_\_\_\_\_ Type \_\_\_\_\_ Ser No \_\_\_\_\_

ATTACHMENTS \_\_\_\_\_

WEIGHT Prime Mover \_\_\_\_\_ Trid Eq \_\_\_\_\_ Payload \_\_\_\_\_ Total \_\_\_\_\_

ENGINE Make \_\_\_\_\_ Power \_\_\_\_\_ Model \_\_\_\_\_ Ser No \_\_\_\_\_

(rpm) High Idle \_\_\_\_\_ Low Idle \_\_\_\_\_ Full Load \_\_\_\_\_

Coolant Capacity (L) \_\_\_\_\_ Crankcase Oil Capacity (L) \_\_\_\_\_

TRANSMISSION Make \_\_\_\_\_ Model \_\_\_\_\_ Ser No \_\_\_\_\_

CONVERTER Make \_\_\_\_\_ Model \_\_\_\_\_ Ser No \_\_\_\_\_

OPERATING GEAR \_\_\_\_\_ TOTAL GEAR REDUCTION \_\_\_\_\_

TEST COURSE DESCRIPTION AND LOCATION \_\_\_\_\_

ALTITUDE \_\_\_\_\_ HUMIDITY \_\_\_\_\_

AMBIENT TEMP \_\_\_\_\_ BAROMETRIC PRESSURE \_\_\_\_\_

TIRES: Position \_\_\_\_\_ Size \_\_\_\_\_ Ply Rating \_\_\_\_\_ Type \_\_\_\_\_ Pressure \_\_\_\_\_ Condition \_\_\_\_\_

TRACK: Width \_\_\_\_\_ Type \_\_\_\_\_ Condition \_\_\_\_\_ Adjustment \_\_\_\_\_

| Test No.                   |      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|----------------------------|------|---|---|---|---|---|---|---|---|---|----|
| Direction                  |      |   |   |   |   |   |   |   |   |   |    |
| Grade or Slope             | %    |   |   |   |   |   |   |   |   |   |    |
| Test Distance (half cycle) | m    |   |   |   |   |   |   |   |   |   |    |
| Test Time                  | min  |   |   |   |   |   |   |   |   |   |    |
| Engine Speed               | rpm  |   |   |   |   |   |   |   |   |   |    |
| Oil Pressure (max/min)     | kPa  |   |   |   |   |   |   |   |   |   |    |
| Oil Temperature            | C    |   |   |   |   |   |   |   |   |   |    |
| Coolant Temp (max/min)     | C    |   |   |   |   |   |   |   |   |   |    |
| Machine Speed              | km/h |   |   |   |   |   |   |   |   |   |    |
| Cycles                     |      |   |   |   |   |   |   |   |   |   |    |

REMARKS \_\_\_\_\_

OBSERVERS \_\_\_\_\_

FIGURE 1—MACHINE SLOPE OPERATION DATA SUMMARY

PREPARED BY THE SAE MACHINE TECHNICAL COMMITTEE