Gradeability Test Code – SAE J950 APR80

SAE Recommended Practice
Editorial Change April 1980

THIS IS A PREPRINT WHICH IS SUBJECT TO REVISIONS AND CORRECTIONS. THE FINAL VERSION WILL APPEAR IN THE 1983 EDITION OF THE SAE HANDBOOK.

PREPRINT

Report of the Construction and Industrial Machinery Technical Committee, approved May 1966, editorial change April 1980.

Purpose—The purpose of this code is to provide a field procedure to determine the ability of a machine to ascend a grade under specified conditions, such as surface material and condition, percent grade, load, speed, and gear. Any item listed as specified is to be selected at the discretion of either the manufacturer, the test agency, the customer, or a combination of these parties.

Scope—This code applies to all self-propelled construction and industrial machines and their combinations with mounted and/or trailed equipment.

Facilities and Apparatus

Facilities—The test course shall be straight and uniform in grade (as specified). It shall be sufficiently long and wide to permit safe operation. The course should be maintained in good condition consistent with the objective of the test.

Apparatus and Accuracy:

Time: ±0.01 minute.
Temperature: ±2°C.
Barometric pressure: ±0.3 kPa.
Rotational speed: ±2% of max.
Length: ±0.5% of max.
Tire pressure: ±3% of max.
Track adjustment: ±5 mm.
Oil pressure: ±10 kPa.
Grade: ±0.5 deg.
Speed: ±2% of max.
Mass: ±3% of max.

Procedure—Prior to test operations 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 truck adjustment should be set as specified.

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 start of test, the machine shall be inspected to assure that:

1. It is serviced as specified.
2. It delivers specified power. This may be checked by application of the reserve tractive effort test or other suitable means.
3. All items directly related to the combustion system are as specified and operating properly, such as: carburetor or fuel injection system; ignition system; air cleaner; fuel pump; fuel lines; filters, tank, etc.
4. Test apparatus is installed and checked for functioning.

The machine shall start to ascend the grade at the speed and gear specified. Transition grades are permissible. Ascend the test grade at full governed throttle in the gear to be tested.

Maximum stabilized machine speed up the grade shall be maintained for at least 10 s. Record this speed.

Repeat the test until the machine speed variations between the highest two of three consecutive runs are within 3%. Report the average of these two values.

Extra safety precautions should be taken on critical grades.

Records will be summarized in accordance with Fig. 1, Gradeability Data Summary Sheet.

GRADEABILITY DATA SHEET

TESTED BY _____ LOCATION _____ DATE _____
MACHINE Mfg by _____ Model _____ Serial No. _____
TOTAL MASS _____ Payload _____ Prime Mover _____ Trailed Eq _____
ENGINE POWER _____ Mfg by _____ Model _____ Serial No. _____
CONVERTER Mfg by _____ Model _____ Serial No. _____
TRANSMISSION Mfg by _____ Model _____ Serial No. _____
NO. SPEED RANGES AND TOTAL MECHANICAL REDUCTION IN EACH RANGE _____
COURSE LOCATION AND DESCRIPTION _____
ALTITUDE _____ AMBIENT TEMP _____
BAROMETRIC PRESSURE _____ HUMIDITY _____

TIRES

Position	Size	Ply Rating	Type	Pressure	Condition

TRACK

Side	Shoe Type	Shoe Width	Adjustment	Condition

TEST NO.	1	2	3	4	5	6	7	8
SPEED RANGE								
GRADE								
COURSE LENGTH								
RUN TIME								
STABILIZED SPEED								

OBSERVERS _____

REMARKS _____

FIG. 1—GRADEABILITY DATA SUMMARY SHEET