

Gradeability Test Code

—SAE J950

SAE Recommended Practice
Editorial change June 1977

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1979 EDITION OF THE SAE
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GRADEABILITY TEST CODE—SAE J950

SAE Recommended Practice

Report of Construction and Industrial Machinery Technical Committee approved May 1966. Editorial change June 1977.

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: $\pm 2^{\circ}\text{C}$.

Barometric pressure: ± 0.3 kPa.

Rotational speed: $\pm 2\%$ of max.

Length: $\pm 0.5\%$ of max.

Tire pressure: $\pm 3\%$ of max.

Track adjustment: ± 5 mm.

Oil pressure: ± 10 kPa.

Grade: ± 0.5 deg.

Speed: $\pm 2\%$ of max.

Mass: $\pm 3\%$ 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 vehicle 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. _____		Payload _____		Trailer Eq _____	
TOTAL MASS _____		Prime Mover _____		Trailer Eq _____		ENGINE POWER _____		Mfg by _____	
CONVERTER Mfg by _____		Model _____		Serial No. _____		TRANSMISSION Mfg by _____		Model _____	
NO. SPEED RANGES AND TOTAL MECHANICAL REDUCTION IN EACH RANGE _____		Serial No. _____							
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

The ϕ symbol is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. If the symbol is next to the report title, it indicates a complete revision of the report.