

Gradeability Test Code – SAE J950 APR80

SAE Recommended Practice
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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 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