The Engineering Resource For Advancing Mobility®

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Cooperative Engineering Program

SAE J764 NOV85

Loading Ability Test Code—Scrapers

SAE Recommended Practice
Reaffirmed November 1985

Submitted for Recognition as
an American National Standard

RATIONALE:

This Recommended Practice was first approved in October 1961 and received its most recent editorial change in April 1980. The document could be reaffirmed with only a change to the equations contained in paragraph 4.11 which define the deviation from the average load in a 95% confidence interval.

The equations originally were printed in SAE handbooks as:

$$R\ (\%) = 310\ \frac{\sqrt{\Sigma(\Delta^2)}}{\Sigma L} \quad \text{for 5 weighings}$$

$$R\ (\%) = 238\ \frac{\sqrt{\Sigma(\Delta^2)}}{\Sigma L} \quad \text{for 10 weighings}$$

Where Σ = Symbol for summation
L = Weight of each individual load
L_{avg} = Average load of N weighings
$\Delta = L - L_{avg}$

Beginning in the 1965 Handbook, the equations were changed to:

$$R\ (\%) = 310\ \sqrt{\frac{\Sigma(\Delta^2)}{\Sigma L}} \quad \text{for 5 loads}$$

$$R\ (\%) = 238\ \sqrt{\frac{\Sigma(\Delta^2)}{\Sigma L}} \quad \text{for 10 loads}$$

Where Σ = Symbol for summation
L = Mass of each individual load
L_{avg} = Average of N weighings
$\Delta = L - L_{avg}$

with the denominator included within the radical sign. This printing error has apparently been continued for the past 21 years which would indicate that the document has not received wide spread usage.

The document is reaffirmed as a Recommended Practice with editorial correction of the equations.

RELATIONSHIP OF SAE STANDARD TO ISO STANDARD:

Not applicable.

REFERENCE SECTION:

SAE J1057a, Identification Terminology of Earthmoving Machines

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

APPLICATION:

The code applies to all independent or combination construction and industrial machines that are designed to scraper-load and transport material.

The loading procedure is limited to standing starts in order to reduce the number of variables that are difficult to control and measure. Because of the difficulties in controlling some of the other variables, meaningful numerical comparison of time and load from scraper to scraper requires that data be taken at the same time and place, and that units being compared be of approximately equal capacity.

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OFF-HIGHWAY MACHINERY PRACTICE

Submitted for recognition as an American National Standard

SAE J764

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Reaffirms J764 APR80

LOADING ABILITY TEST CODE--SCRAPERS

1. OBJECTIVE: The objective of the scraper loading ability test is to determine the amounts of specified material that can be loaded within specified times and to express the data as a load-growth curve. The amount loaded is reported in kilograms and may be converted to volume by means of unit mass.

   The test code sets forth a procedure for measuring the loading ability of a scraper. The loading ability of scrapers is influenced by a number of variables, such as: properties of the material to be loaded, technique employed in loading, and force available at the scraper cutting edge. This code makes every effort to recognize and minimize these variables in order to reduce the effects of the test results. Compliance to this code provides a satisfactory means of evaluating the loading ability of various scraper designs.

   The test is sufficiently general to cover any specified set of operating conditions. Any item listed as SPECIFIED is to be selected at the discretion of either the manufacturer, the testing agency, the customer, or a combination of these parties.

2. SCOPE: The code applies to all independent or combination construction and industrial machines that are designed to scraper-load and transport material. (See SAE J1116 and J1057a.)

   The loading procedure is limited to standing starts in order to reduce the number of variables that are difficult to control and measure. Because of the difficulties in controlling some of the other variables, meaningful numerical comparison of time and load from scraper to scraper requires that data be taken at the same time and place, and that the units being compared be of approximately equal capacity.

3. FACILITIES AND APPARATUS:

3.1 A test course with specified properties of material to be loaded. The course shall be relatively smooth with not over 3% average grade; the length and width will be determined by size of scraper and power available.

3.2 Time of run: ±0.01 min.

3.3 Mass: ±3% of max.

3.4 In-place, density and moisture: ±3%.

3.5 Tire pressure: ±3% of max.

3.6 Loading distance: ±0.5%.

4. PROCEDURE:

4.1 Prior to the start of loading test, the equipment shall be checked to insure that:

4.1.1 It is serviced and adjusted as specified.

4.1.2 Tire are inflated to the specified cold pressures and are not readjusted during test.

4.1.3 It develops the specified power. (This may be checked by application of the Reserve Tractive Ability Test or other suitable means.)

4.1.4 Cutting edges are of the specified type and condition.

4.2 Immediately prior to and during the loading test, determine the density, and, if specified, the moisture content of in-place material at a sufficient number of points to obtain significant data.

4.3 Well qualified and experienced operators should be used. Perform sufficient trial runs to familiarize personnel with test machines and procedure.

4.4 Prior to recording test data, the machines shall be operated until functional components are limbered up and lubricants reach reasonably stable temperatures.

4.5 Time intervals shall be established as follows: the first load shall be as large as practical; note the time required. Using this time as a base time, set up series of nominal loading times to provide sufficient data for the load growth curve.

4.6 At the start of each run, position the test equipment so as to produce parallel cuts. The scraper cutting edge shall be at cutting depth and assisting machines if used, in position to apply force.

4.7 The measured time begins with the start of the forward motion of the scraper and terminates with the end of motion. It shall not deviate from the nominal time more than ±5% of the base time.

4.8 At the end of each cut, release the apron before raising the bowl.

4.9 Record general information as required on the data summary sheet.

4.10 Data to be recorded for each run:

4.10.1 Loading time in minutes.

4.10.2 Gross scraper mass.

4.10.3 Loading distance.

4.11 Number of runs required and plotting of data; a minimum of five loads shall be checked for each nominal time. The R (%), defined as the deviation from the average load in percent of the average load in a 95% confidence interval, shall be determined for each series of loads from the following formulas:

$$R\ (\%) = 310\ \frac{\sqrt{\Sigma(\Delta^2)}}{\Sigma L} \quad \text{for 5 loads}$$

$$R\ (\%) = 238\ \frac{\sqrt{\Sigma(\Delta^2)}}{\Sigma L} \quad \text{for 10 loads}$$

Where Σ = Symbol for summation
L = Mass of each individual load
L_{avg} = Average of N weighings
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If R (%) calculation for five loads is greater than 5%, five additional loads shall be taken. If R (%) for ten loads is greater than 5%, the series is too erratic to be meaningful and should be discarded completely.

The average load in kilograms shall be plotted against the average of measured times for each nominal time.

4.12 It should be recognized that the significance of the data will depend greatly on the variation in the parameters. The following precautions, therefore, shall be observed to insure repeatability between test runs:

4.12.1 Each run should be on a plane surface.

4.12.2 Assisting machines, where used, should essentially apply the force along the longitudinal axis of the scraper.

4.12.3 Loads that are obviously erroneous (such as when a large rock obstructs loading, and so on) should be discarded immediately and not weighed.