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**Specification Definitions - Front  
End Loader — SAE J732c**

**SAE STANDARD  
EDITORIAL CHANGE JUNE 1975**

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Report of Construction and Industrial Machinery  
Technical Committee approved June 1960 and last  
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### 1. PURPOSE AND SCOPE

The purpose of this SAE Standard is to provide a uniform method of rating front end loaders.

### 2. SPECIFICATIONS — GENERAL

This standard includes the definition of specifications peculiar to and most commonly used to describe this type of equipment. The specifications described must be qualified by stating the track shoe type and width or the tire type, size, ply, and specified inflation pressure; the model number or type of bucket disregarding teeth; and the type and amount of counterweight and/or ballast, if any, with which the machine is equipped. Paragraphs 3.1-3.16 are further defined by the illustrations. The illustrations are not intended to be descriptive of any existing machine and are used here only to clarify the meaning of the standard.

### 3. SPECIFICATIONS — DIMENSIONAL

Dimensional specifications are to be determined without assembly changes.

#### 3.1 OVERALL OPERATING HEIGHT (A)

FULLY RAISED The vertical distance in inches (millimeters) from the ground to the highest point attainable.

#### 3.2 HEIGHT TO HINGE PIN (B)

FULLY RAISED The vertical distance in inches (millimeters) from the ground to the centerline of the bucket hinge pin.

3.3 OVERALL HEIGHT (C) The vertical distance in inches (millimeters) from the ground to the highest point on the unit with the bucket on the ground

3.4 HEIGHT TO ANY OTHER POINT The vertical distance in inches (millimeters). (Must be defined and clearly shown).

3.5 OVERALL LENGTH (D) The horizontal distance in inches (millimeters) with the bucket on the ground and level.

3.6 DUMP ANGLE (E) The angle in degrees that the longest flat section of the inside bottom of the bucket will rotate below horizontal.

3.7 DUMP HEIGHT (F) The vertical distance in inches (millimeters) from

the ground to the lowest point of the cutting edge with the bucket hinge pin at maximum height and the bucket at a 45 deg dump angle. If the dump angle is less than 45 deg, specify the angles.

3.8 REACH (G) FULLY RAISED The horizontal distance in inches (millimeters) from the foremost point on the vehicle (including tires, tracks, or loader frames) to the cutting edge with the bucket hinge pin at maximum height and the bucket at a 45 deg dump angle. If the dump angle is less than 45 deg, specify the angle.

3.9 REACH (I) AT SPECIFIED HEIGHT (H) The horizontal distance in inches (millimeters) from the foremost point on the vehicle (including tires, tracks, or loader frame) to the bucket cutting edge at a 45 deg dump angle. Specify angles less than 45 deg.

3.10 ROLLBACK The angle in degrees that the bottom of the bucket cutting edge will rotate above horizontal.

3.11 MAXIMUM ROLLBACK (J) AT GROUND Maximum rollback without movement of the lift arm.

3.12 CARRY POSITION (K) The vertical distance from the ground to the centerline of the bucket hinge pin, with the angle of approach at 15 deg. (See SAE J 689.)

3.13 MAXIMUM ROLLBACK (L) AT CARRY POSITION The angle in degrees from the bucket cutting edge level position to the maximum rollback position.

3.14 MAXIMUM ROLLBACK (M) FULLY RAISED The angle in degrees from the bucket cutting edge level position to the maximum rollback position.

3.15 DIGGING DEPTH (N) The vertical distance in inches (millimeters) from the ground line to the bottom of the bucket cutting edge at the lowest position with the bucket cutting edge horizontal.

3.16 WHEELBASE (P) The horizontal distance in inches (millimeters) from the center of the front wheel or idler to the center of the rear wheel or sprocket.

3.17 OVERALL WIDTH The maximum

outside width in inches (millimeters) of the vehicle specified exclusive of bucket.

3.18 BUCKET WIDTH The maximum outside width in inches (millimeters) of the bucket specified.

3.19 GROUND CLEARANCE The minimum vertical distance in inches (millimeters) from the ground to the lowest point on the vehicle between the tires or tracks with the lift arm raised.

3.20 TREAD OR TRACK GAGE The transverse distance in inches (millimeters) between the centerlines of the tires or sprockets. If the front and rear are different, both must be specified.

3.21 MAXIMUM GRADING ANGLE - BUCKET The angle in degrees that the bucket cutting edge will rotate below the horizontal with the bucket cutting edge on the ground.

#### 4. SPECIFICATIONS - OPERATIONAL

The vehicle must have all relief valves at recommended setting and pump volume at rated engine rpm.

4.1 BUCKET CAPACITY As specified by SAE J742 (nominal heaped).

4.2 OPERATING WEIGHT The total weight in pounds (kilograms) of the vehicle as specified and fully serviced, including a full fuel tank and a 175 lb (79.38kg) operator.

4.3 TIPPING LOAD - SAE RATING The minimum weight in pounds (kilograms) at the center of gravity of the SAE rated load in the bucket which will rotate the machine to a point where, on the crawler units, the front track rollers are clear of the track and, on wheel loaders, the rear wheels are clear of the ground under the following conditions:

(a) Vehicle on a hard level surface and stationary.

(b) Maximum bucket rollback.

(c) Center of gravity of load at the maximum forward position in the raising cycle.

(d) Vehicle at operating weight and equipment as specified. Articulated steer loader shall be in full turn position (specify angle.)

4.4 TIPPING LOAD (at specified height) The minimum weight in pounds (kilograms) at the center of gravity of the SAE rated load in the bucket which will rotate the machine to a point where, on crawler units, the front track rollers are clear of the track and, on wheel loaders, the rear wheels are clear of the ground under the following conditions:

(a) Vehicle on hard level surface and stationary.

(b) Maximum bucket rollback.

(c) Center of gravity of load at the specified height position in the raising cycle.

(d) Vehicle at operating weight and Articulated steer loader shall be in full turn position (specify angle). equipment as specified.

4.5 LIFT CAPACITY TO MAXIMUM HEIGHT The maximum weight in pounds (kilograms) at the center of gravity of SAE rated load in the bucket that can be lifted from the ground to maximum height with the bucket positioned to retain maximum load, under the following conditions:

(a) Vehicle on a hard level surface and stationary but not anchored.

(b) Vehicle at operating weight and equipment as specified.

4.6 HYDRAULIC LIFTING CAPACITY (at specified height) The maximum weight in pounds (kilograms) at the center of gravity of SAE rated load in the bucket that can be lifted at a specified height with the bucket positioned to retain maximum load, under the following conditions:

(a) Vehicle on hard level surface and stationary with rear end tied down.

(b) Vehicle at operating weight and equipment as specified.

4.7 BREAKOUT FORCE Breakout force in pounds (kilograms) is the maximum sustained vertical upward force exerted 4 in. (101.6 mm) behind the tip of the bucket cutting edge and is achieved through the ability to lift and/or rollback the bucket about the specified pivot point under the following conditions:

(a) Tractor on a hard level surface with transmission in neutral.

(b) All brakes released.

(c) Unit at standard operating weight, rear of tractor not tied down.

(d) bottom of cutting edge parallel to and not more than 1 in. (25.4 mm) above or below the ground line.

(e) When bucket circuit is used, the pivot point must be specified as the bucket hinge pin, and the unit blocked under the bucket hinge pin pivot point in order to minimize linkage movement.

(f) When the lift circuit is used, the pivot point must be specified as the lift arm hinge pin. Wheel loaders shall have front axle blocked to eliminate change in position of pivot pins due to tire deflection.

(g) If both circuits are used simultaneously, the dominating pivot point listed in (e) or (f) must be specified.

(h) If the circuit used causes the rear of the vehicle to leave the ground, then the vertical force value required to raise the rear of the vehicle is the breakout force.

(i) For irregular shaped buckets, the tip of the bucket cutting edge referred to above shall mean the farthest forward point of the cutting edge.

4.8 RAISING TIME The time in seconds required to raise the bucket from the level position on the ground to full height with an SAE operating load. (See SAE J818.)

4.9 LOWERING TIME The time in seconds required to lower the empty bucket from the full height to a level position on the

ground.

4.10 DUMP TIME The time in seconds required to move the bucket from the load carrying position at maximum height to the full dump position while dumping an SAE operating load. (See SAE J818.)

4.11 LOADER CLEARANCE CIRCLE The smallest diameter measured in inches (millimeters) that the outermost point on the vehicle will describe when turning under the following conditions:

(a) On wheel vehicles, brakes cannot be used (skid steer vehicles are excluded).

(b) Loader bucket to be in the carry position as specified in paragraph 3.12.

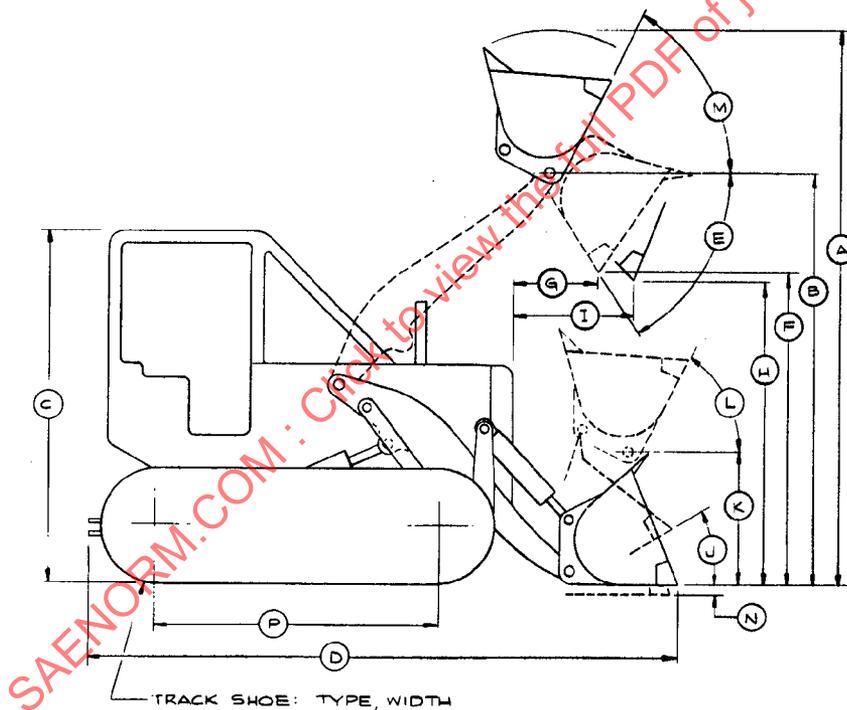


FIG. 1 - FRONT END LOADER - CRAWLER MOUNTED