SAE International

SURFACE VEHICLE STANDARD

SAE J49 JUL2012

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Superseding J49 APR1980

Specification Definitions - Hydraulic Backhoes

RATIONALE

This standard is being revised to update the figures to include roll-over protective structures and to update out-of-date references.

1. SCOPE

1.1 This standard applies to hydraulic backhoes which have no more than 190 degrees of rotational swing, and are mounted on wheel tractors and crawler tractors.

1.2 Purpose

The purpose of the standard is to establish a uniform method of providing dimensional and operational specifications for hydraulic backhoes.

Dimensional and operational specifications are determined without assembly or equipment changes such as buckets, dippersticks, etc. When specifications are affected by adjustable or extendable members, the position must be specified. 4.2.1 – 6.2 are further defined by Figures 1–8. Figures 1–8 are not intended to be descriptive of any existing machine and are used only to clarify the meaning of the standard.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: http://www.sae.org

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J31 Hydraulic Backhoe Lift Capacity

SAE J326 Nomenclature - Hydraulic Backhoes

SAE J695 Turning Ability and Off Tracking - Motor Vehicles

SAE J732 Specification Definitions - Loaders

2.1.2 ISO Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ISO 7451 Earth-moving machinery - Volumetric ratings for hoe-type and grab-type buckets of hydraulic excavators and backhoe loaders

ISO 7457 Earth-moving machinery - Determination of turning dimensions of wheeled machines

ISO 8812 Earth-moving machinery - Backhoe loaders - Definitions and commercial specifications

3. SPECIFICATIONS - GENERAL

3.1 MODEL DESIGNATION

Manufacturer's model number for the backhoe specified.

3.2 TYPE OF BACKHOE

3.2.1 Integral Backhoe

A backhoe which is an integral part of the prime mover.

3.2.2 Utility Backhoe

A backhoe which is not an integral part of the prime mover.

3.3 PRIME MOVER MODEL

For utility backhoes, state the manufacturer's model number on which the specifications are based.

3.4 LOADER

State whether the unit is equipped with a loader, and if so, give manufacturer's model number of the loader. Specify type and size of loader bucket.

3.5 TIRE OR TRACK

State the track shoe type and width in millimeters (inches) or the tire type size, ply and specified tire inflation pressure; where the front and rear tires are different, both must be specified.

3.6 TREAD OR TRACK GAGE

The transverse distance in millimeters (inches) between the centerlines of the tires or sprockets; where front and rear treads are different, both must be specified.

3.7 WHEELBASE

As specified in ISO 8812.

3.8 BUCKET

Specify type, weight (kg, lb), cutting width (mm, in) and volumetric rating (capacity) per ISO 7451.

3.9 COUNTERWEIGHT

Specify type and amount (kg, lb) of counterweight and/or ballast, if any.

3.10 EXTENDABLE DIPPERSTICK

If dipperstick is extendable, specify:

a. Type - Telescoping, additional member, sliding collar or other.

b. Method of Extension - Hydraulic or manual.

c. Extension - Minimum and maximum extension and number of intermediate positions available.

4. SPECIFICATIONS - DIMENSIONAL

4.1 General

All applicable measurements shall be made at bucket teeth, unless otherwise specified. Directional references in the specifications shall be in accordance with SAE J326. When the unit is equipped with an extendable dipperstick, indicate the position of the dipperstick used for this specification.

4.2 Transport

These dimensions shall be taken with all components in the transport position. Transport position is to be defined by the manufacturer.

4.2.1 Transport Height (A)

The vertical distance in mm (in) from the ground to the highest point on the backhoe machine, or prime mover.

4.2.2 Stabilizer Spread Transport (B)

The distance in mm (in) between the farthest points of the stabilizer assemblies.

4.2.3 Ground Clearance (C)

The minimum distance in mm (in) from the ground to lowest point on the backhoe or machine per ISO 8812.

4.2.4 Angle of Departure

As specified in ISO 8812.

4.2.5 Overall Length In Transport Position (D)

The horizontal distance in mm (in) with loader buckets, if so equipped, at carry position as specified in ISO 8812.

4.2.6 Overall Width (E)

The maximum outside width in mm (in) of the backhoe or machine.

4.2.7 Operating Mass

The total mass in kg (lb) of unit as specified, fully serviced, and including a full fuel tank and an 80 kg (175 lb) operator.

4.2.8 Mass Distribution (Wheeled Machined)

Front and rear wheel reactions of the unit as specified in 4.2.7.

4.2.9 Machine Clearance Diameter

As specified in ISO 7457.

4.3 Operational

These dimensions shall be obtained with main bearing surfaces of the stabilizers on the ground. On rubber-tired units, all the tires shall be tangent to the ground; and on track units, the track is to be on the ground and all rollers to contact the track.

4.3.1 Digging Depth, Maximum (F)

The vertical distance in mm (in) from the ground line to the tip of the bucket teeth.

4.3.2 Digging Depth, 610 mm (2 ft) Flat Bottom (G)

The vertical distance in mm (in) from the ground line to a flat bottom trench 610 mm (24 in) in length generated by the bucket teeth.

4.3.3 Digging Depth, 2440 mm (8 ft) Flat Bottom (H)

The vertical distance in mm (in) from the groundline to a flat bottom trench 2440 mm (96 in) in length generated by the bucket teeth.

4.3.4 Overall Operating Height, Fully Raised (J)

The vertical distance in mm (in) from the ground line to the highest point attainable.

4.3.5 Loading Height (K)

The maximum vertical distance in mm (in) from the ground to the lowest point of the bucket. Bucket is to be positioned so that a line passing through the hinge pin center and passing through the farthest forward point of the bucket cutting edge shall be 60 degree maximum with respect to the horizontal.

4.3.6 Loading Reach (L)

The horizontal distance in mm (in) from the intersection of swing pivot centerline and supporting surface to the bucket teeth with bucket positioned and located as in 4.3.5.

4.3.7 Reach from the Swing Pivot (M)

The maximum horizontal distance in mm (in) from the intersection of the swing pivot centerline and the supporting surface to the bucket teeth at the ground line.

4.3.8 Swing Pivot to Rear Wheels (N)

The perpendicular distance in mm (in) from the centerline of the swing pivot to the centerline of the rear wheels.

4.3.9 Bucket Rotation (P)

The degrees of uninterrupted rotation about the bucket hinge pin.

4.3.10 Swing Arc (Q)

The degrees of uninterrupted rotation about the swing pivot centerline.

4.3.11 Stabilizer Spread, Operating Position (R)

The distance in mm (in) between centers of stabilizer pads when positioned as stated.

4.3.12 Side Shift (S), (Side Shift Backhoes)

Specify in mm (in) the maximum operating distance which the swing pivot centerline can be offset from centerline of machine.

4.3.13 Wall Clearance (T), (Side Shift Backhoes)

The minimum distance in mm (in) from the centerline of swing pivot in the full side shift position to the extreme outer point of the backhoe or machine with the machine in the operating position (stabilizer may be repositioned).

4.3.14 Leveling Angle (U)

The maximum side slope in degrees that the backhoe can dig a vertical trench by adjusting the stabilizers.

5. SPECIFICATION - HYDRAULIC

The hydraulic specifications shall be determined with the oil temperature at 82 °C (180 °F). The viscosity of the oil used to rate the components shall be stated. If volumes are specified in gallons, state whether U. S. or Imperial.

5.1 System Relief Valve Setting

Measured as minimum Pascals (psi) at specified flow in L/min (gal/min).

5.2 Pump Capacity

Minimum delivery in L/min (gal/min) specified hydraulic fluid at rated engine rpm and relief valve pressure setting in Pascals (psi).

5.3 Hydraulic System Capacity

Measured in liters (gallons) of hydraulic oil required to fill reservoir and hydraulic system to working capacity.

6. SPECIFICATIONS - OPERATIONAL

The unit shall be equipped as previously specified when determining the following specifications:

6.1 Digging Force, Using Bucket Cylinder (V)

Maximum calculated force in Newtons (pounds) applied at the tip of bucket teeth tangent to the arc of bucket rotation about the bucket hinge pin.

6.2 Digging Force, Using Dipperstick Cylinder (W)

Maximum calculated force in Newtons (lb) applied at the tip of the bucket teeth tangent to the arc of the bucket rotation about the dipperstick hinge pin. Use the bucket position as determined by 6.1.

6.3 Lift Capacity, Using Boom Cylinder(s)

Specify per SAE J31.

6.4 Lift Capacity, Using Dipperstick Cylinder(s)

Specify per SAE J31.

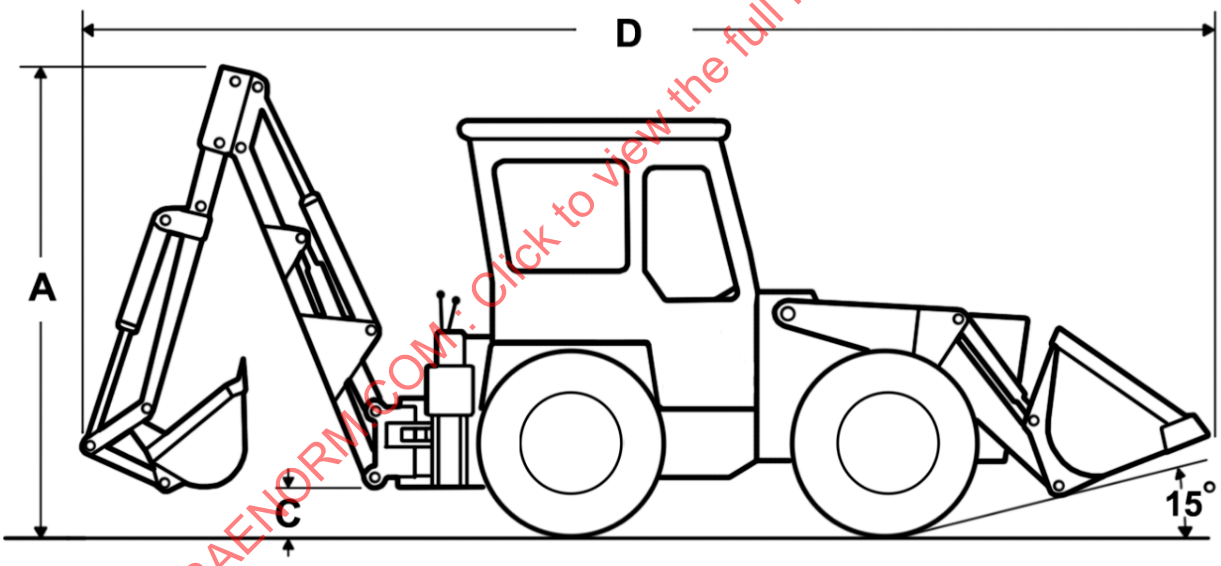

FIGURE 1 - TRANSPORT POSITION OF INTEGRAL BACKHOE WITH EXTENDABLE DIPPERSTICK

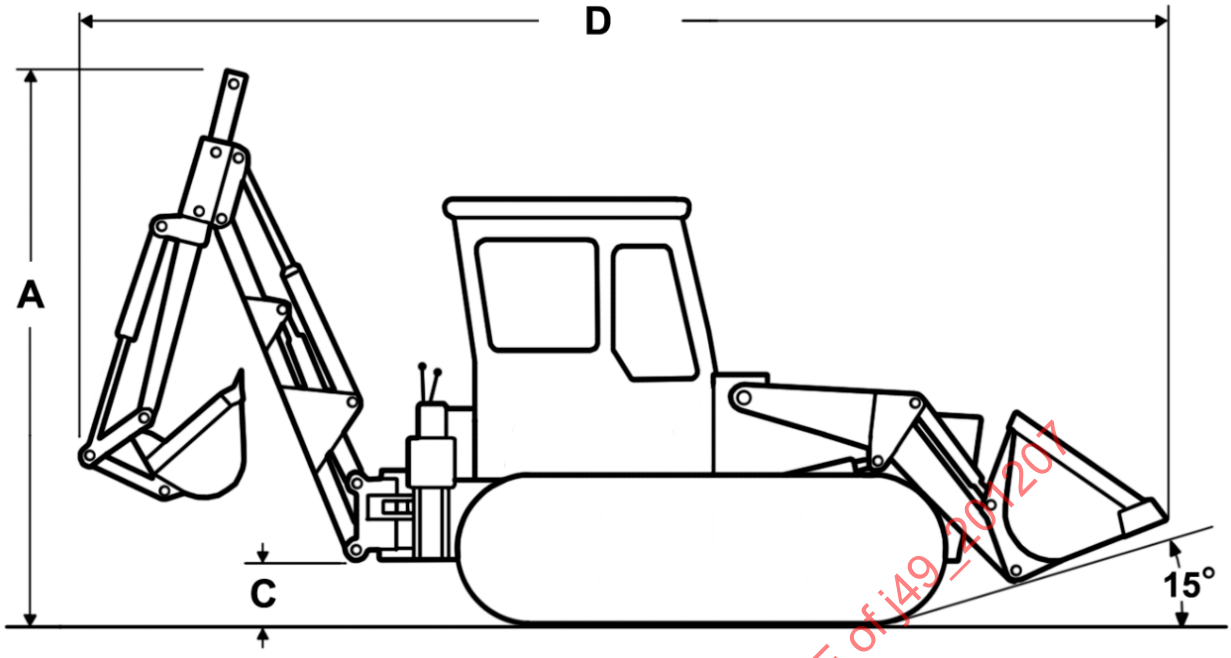

FIGURE 2 - TRANSPORT POSITION OF CRAWLER BACKHOE WITH EXTENDABLE DIPPERSTICK

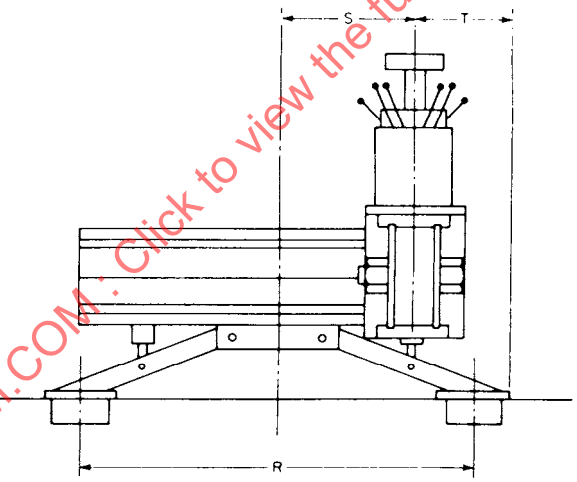

FIGURE 3 - OPERATIONAL POSITION OF UTILITY BACKHOE SIDE SHIFT

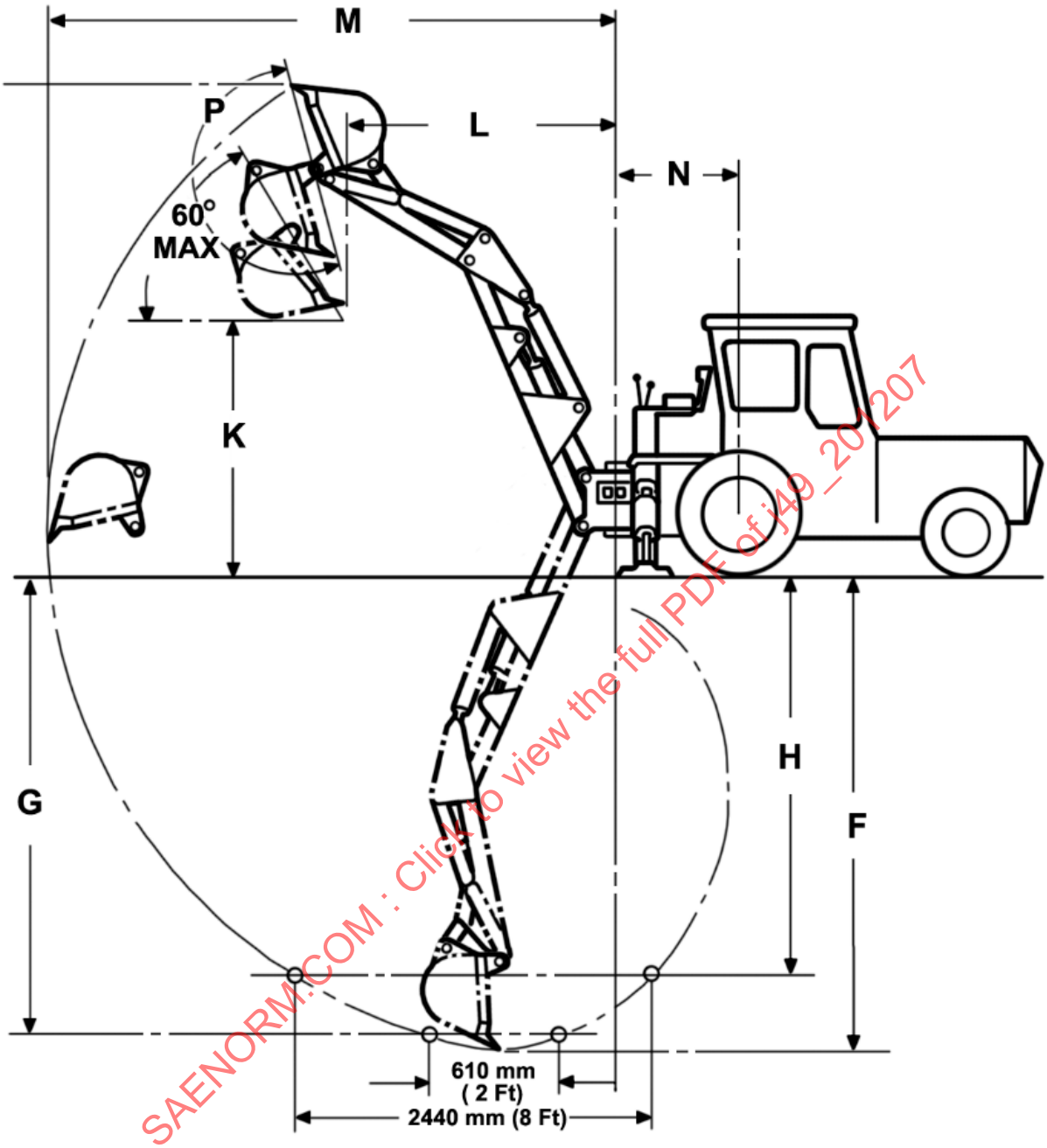

FIGURE 4 - OPERATIONAL POSITION OF UTILITY BACKHOE

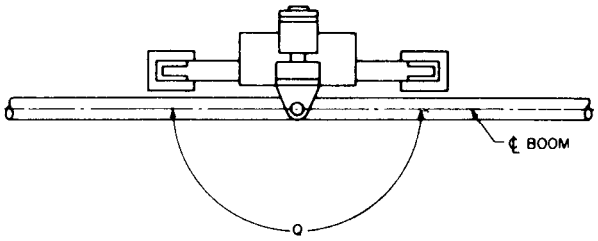

FIGURE 5 - SWING ARC