SAE International™ SURFACE VEHICLE STANDARD

SAE J283 REAF. APR2009

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Superseding J283 NOV1999

Test Procedure for Measuring Hydraulic Lift Capacity on Agricultural Tractors Equipped with Three-point Hitch

1. ***Scope***—The lift capacity can be determined by Section 4 and/or Section 5. When the results are recorded, the test method shall be identified.

1.1 Purpose—The purpose of this SAE Standard is to establish test procedures for measuring and recording lift capacity referred to in SAE J715 (Reference International Standard ISO 789/II).

2. References

2.1 Applicable Publications—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.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J708 DEC84—Agricultural Tractor Test Code
SAE J711 MAR91—Tire Selection Tables for Agricultural Tractors of Future Design
SAE J715 JUN93—Three-Point Free-Link Hitch Attachment of Implements to Agricultural Wheeled Tractors
SAE 2708 APR93—Agricultural Tractor Test Code (OECD)

2.1.2 ISO PUBLICATION—Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ISO 789/88/II—Agricultural tractors—Test procedures Part 2: Hydraulic power and lifting capacity

2.2 Related Publication—The following publication is provided for information purposes only and is not a required part of this document.

2.2.1 ASAE PUBLICATION—Available from ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.

ASAE S349.2—Test Procedure for Measuring Hydraulic Lift Force Capacity On Agricultural Tractors Equipped With Three-Point Hitch

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3. General

3.1 The accuracy of the measurements shall be as follows:

3.1.1 TIME—±2%

3.1.2 TEMPERATURE—±2 °C

3.1.3 PRESSURE—±2%

3.1.4 MASS (WEIGHTS)—±1/2%

3.1.5 DISTANCE—±3 mm

3.2 Check and adjust hydraulic system pressure, if required, to be within manufacturer's specification. The hydraulic oil temperature shall be maintained (±10 °C) at the value measured in the tractor during a 2 h maximum power PTO test. A hydraulic system oil temperature determined from maximum power drawbar operation shall be used when a PTO test cannot be conducted. These tests, if conducted, shall be in accordance with SAE J708.

3.3 Lift time, if required, shall be recorded as the average of three consecutive lift sequences.

3.4 Measurements and test data shall be recorded as shown in Figure 1.

3.5 This same procedure shall be used to determine the hydraulic lift capacity of tractors equipped with a quick-attaching coupler.

4. Static Lift Force Test

4.1 With the lower links horizontal, set the mast to 457 mm for Category I, to 483 mm for Category II, to 559 mm for Category III, and to 686 mm for Category IV. With the lower links horizontal, adjust the upper link such that the mast is vertical (see Figure 2).

4.2 A test frame shall be used which provides the mast height for each category in accordance with 4.1 and such that the lower hitch point spread is proper for the category being tested. (Category I, 681.0 to 684.3 mm; Category II, 822.5 to 825.5 mm; Category III, 963.7 to 966.7 mm; Category IV, 1165 to 1168 mm.) The lift force application point shall be 610 mm to the rear of the lower hitch point with the lower links horizontal. The construction angle (the angle between the mast and the test frame load arm) shall be 90 degrees (see Figure 2). The center of gravity shall be at a point 610 mm to the rear of the hitch points, on a line at right angles to the mast and passing through the middle of the line joining the lower hitch points.

4.3 Tractors with pneumatic tires shall be rigidly supported at the height from ground level equivalent to the loaded radius of the largest R-1 rear tires and the corresponding largest front tires (see SAE J711). The tire sizes and loaded radii used shall be listed as part of the test data, Figure 1. Tractors equipped with rubber tracks shall be rigidly supported at the height from ground equivalent to that height as measured statically on a hard flat surface with no hitch load. If the tractor tested cannot be conveniently supported at this radius, it is permissible to mathematically adjust the readings to the specified largest front and rear loaded radii or measured dimension.

4.4 The tractor should be operated at rated engine speed.

4.5 The hydraulic lift system's oil temperature shall be determined and maintained as specified in 3.2.

1. Tractor Description and Test Conditions:

1.1 Make and Model: _____

1.2 Maximum Drawbar Power SAE J708: _____ kW

1.3 Loaded Radii per Paragraph 4.3: Rear _____ mm, Front _____ mm

1.4 Category of Three-Point Hitch: _____

1.5 Three-Point Hitch Hydraulic System Pressure Setting: _____ kPa

1.6 Three-Point Hitch Hydraulic System Oil Temperature: _____ °C

1.7 Rated Engine Speed: _____ r/min

1.8 Quick-Attaching Coupler Used? Yes _____ No _____

2. Static Lift Force:

2.1 Tractor Static Hydraulic Lift Force (Paragraph 4.9): _____

2.2 Lift Force per Unit of Drawbar Power (Line 2.1 ÷ Line 1.2): _____ N/kW

2.3 Force and Height Measurement (Paragraph 4.8):

Position of Hitch	Vertical Lift** Force, N	Vertical Distance of Lower Hitch Point Above Ground, mm
Lowest	_____ N	203 mm
1/5 Point	_____ N	___ mm
2/5 Point	_____ N	___ mm
3/5 Point	_____ N	___ mm
4/5 Point	_____ N	___ mm
Highest	_____ N	___ mm

**Reported values are 90% of measured.

3. Dynamic Lift Capacity:

	Lift Link at Minimum Length Setting			Lift Link at Maximum Length Setting		
3.1 Mass Lifted:	_____ kg	_____ kg	_____ kg	_____ kg	_____ kg	_____ kg
3.2 Lift Time						
3.2.1 Reference	10 sec	6 sec	3 sec	10 sec	6 sec	3 sec
3.2.2 Actual	___ sec	___ sec	___ sec	___ sec	___ sec	___ sec
3.3 Height of Lower Hitch Point (Paragraph 5.5):						
3.3.1 Lowest Position	_____ mm			_____ mm		
3.3.2 Highest Position	_____ mm			_____ mm		

3.4 Linkage Settings Used: (Sketch if Required for Clarity of Hole Positions)

3.4.1 Upper Link Point Hole Position:

3.4.2 Lift Link Hole Position:

3.4.3 Lower Link Point Hole Position:

3.4.4 Lift Link Length Settings: Minimum _____ mm, Maximum _____ mm

3.4.5 Upper Link Length: _____

FIGURE 1—TEST DATA

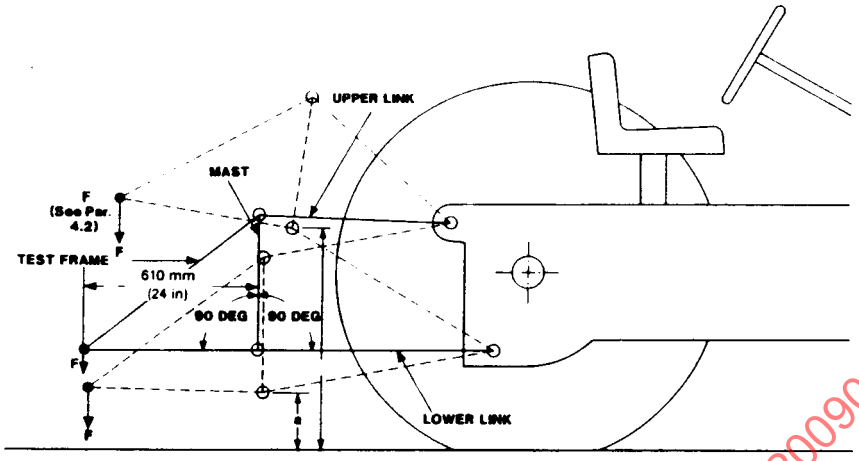

FIGURE 2—TEST FRAME

4.6 The tests shall be conducted so that lift force is measured throughout the total lift range as specified in SAE J715. Since the minimum power range is less than the total lift range, links may be adjusted once during the tests to obtain lift force throughout the total lift range. If the links are readjusted to meet the specified lift range, this information shall be recorded.

4.7 Tractors equipped with more than one upper link attaching point on the tractor should have the upper link attached to the category position recommended by the manufacturer for heavy draft implements such as mounted plows, etc.

4.8 Measure the vertical force, at static conditions, available from the 610 mm (24 in) point on the test frame and include the weight of the test frame. This vertical lift force shall be measured at not less than 6 points, equally spaced, including the maximum and the minimum points, throughout the total lift range. The pressure recorded during the test must exceed the minimum relief valve pressure setting. The value of force measured shall be mathematically corrected to correspond to a hydraulic pressure equivalent to 90% of the minimum relief valve setting.

4.9 The smallest corrected value determined in 4.8 shall be the tractor static hydraulic lift force.

5. Dynamic Lift Capacity Test

5.1 A test frame and tractor shall be used as described in 4.2 and 4.7.

5.2 The tractor shall be rigidly supported from ground level as described in 4.3.

5.3 A mass shall be mounted on the frame so that its center of gravity and the frame center of gravity are positioned as described in 4.2. The value determined in 4.8 can be used as a starting point.

5.4 The hydraulic lift system's oil temperature and pressure shall be determined and maintained as specified in 3.2.

5.5 The dynamic lift test shall be conducted so that the mass is lifted throughout the total lift range as specified in SAE J715. Since the minimum power range in SAE J715 is less than the total lift range, links may be adjusted once during the tests to assure the mass is capable of being lifted throughout the total lift range. If the links are readjusted to meet the specified lift range, this information shall be recorded in Figure 1.