TABLE 2—STOPPING PERFORMANCE

Category	Maximum stopping distance, m
I, III, IV	$S = \frac{V^2}{6.27} + \frac{V}{3}$ (Eq. 10)
Combinations of braked and unbraked machines I and III, I and IV.	$S = \frac{V^2}{3.52} + \frac{V}{3}$ (Eq. 11)
(V = initial velocity, m/s)	

8.1.3 FADE AND RECOVERY PERFORMANCE

8.1.3.1 Agricultural tractors equipped with service braking systems shall have capability to absorb braking energy through the designated service braking system equivalent to an energy input rate defined in 6. 3.1 over a distance of 1 km, maintaining fade stopping performance as defined by the applicable formula in Table 3:

TABLE 3—FADE STOPPING PERFORMANCE

Category	Maximum stopping distance, m
I, III, IV	$S = \frac{V^2}{4.38} + \frac{V}{3}$ (Eq. 12)
Combinations of braked and unbraked machines I and III, I and IV.	$S = \frac{V^2}{2.54} + \frac{V}{3}$ (Eq. 13)
(V = initial velocity, m/s)	

The machines shall have recovery stopping performance as defined by the applicable formulas in 8.1.2.

8.1.3.2 For machines with service braking systems which require both infinitely variable drive as primary retarding system and friction device to bring the vehicle to a complete stop, the friction device alone shall absorb braking energy at a rate defined in 6.3.1 over a distance of 0.1 km, with the service braking system maintaining fade and recovery stopping performance as defined in 8.1.3.1.

8.1.4 WETTED BRAKE RECOVERY PERFORMANCE—Agricultural tractors equipped with service braking systems that have friction surfaces subject to wetting shall have wetted brake recovery stopping performance as defined by the applicable formula in 8.1.2.

8.1.5 Agricultural tractors equipped with service braking systems and having capability of carrying increasingly heavy loads with corresponding restriction to decreased maximum speeds shall have braking capability at speeds below 25 km/h and corresponding maximum gross mass as specified by stopping distance formulas in 8.1.2.

8.1.6 Any machine with a service braking system which an operator might disconnect during normal operation shall have other braking capability, tested independently, as specified by secondary braking system in 8.3.

8.1.7 Agricultural tractors with service braking systems other than conventional friction type service brakes shall meet the performance specifications given in 8.1.1, 8.1.2, 8.1.3, 8.1.4, and 8.1.5. Service braking systems which require more than one braking device in combination to meet the definition of service braking system shall meet the performance specifications given in 8.1.1, 8.1.2, 8.1.3, 8.1.4, and 8.1.5.

8.2 Parking Brake System

8.2.1 Agricultural tractors equipped with parking brake systems shall have the capability of holding the agricultural machine, at manufacturer's maximum mass (weight) rating as defined in 3.7, stationary in both forward and reverse direction on a 20% grade or equivalent condition of loading.

8.2.2 The parking brake system, when applied, shall remain in the applied position in compliance with 8.2.1 despite any contraction of the brake parts, exhaustion of the source of energy, or leakage of any kind.

8.3 Secondary Braking System

8.3.1 Agricultural tractor equipped with secondary braking systems shall have stopping performance as defined by the applicable formula in Table 4:

TABLE 4—SECONDARY BRAKING SYSTEM STOPPING PERFORMANCE

Category	Maximum stopping distance, m
I, III, IV	$S = \frac{V^2}{3.52} + \frac{V}{3}$ (Eq. 14)
Combinations of braked and unbraked machines I and III, I and IV.	$S = \frac{V^2}{2.07} + \frac{V}{3}$ (Eq. 15)
(V = initial velocity, m/s)	

8.3.2 The secondary braking system for Category I shall be capable of being applied by a person seated in the operator's seat. The system shall be arranged so that it cannot be released from the operator's seat after any application unless immediate reapplication can be made from the seated position.

8.4 Braking systems for Categories III and IV, which actuate automatically in the event of accidental uncoupling from the towing machine, shall have stopping capabilities specified in 8.3.1 and holding capabilities specified in 8.2.1 for 15 min after the stop. These brakes shall be released only by a specific action of the operator.

8.5 Service and secondary braking system maximum permissible stopping distances are summarized in Table 5 for a test speed of 25 km/h.

TABLE 5—MAXIMUM PERMISSIBLE STOPPING DISTANCES FROM 25 km/h TEST SPEED FOR SERVICE AND SECONDARY BRAKING SYSTEMS

Categories and Combinations	Service Braking System Maximum Stopping Distances, m Stopping Performances and Recovery	Service Braking System Maximum Stopping Distances, m Fade	Secondary Braking System Maximum Stopping Distance, m
I, III, IV	10	13	16
Combinations of braked and unbraked I and III, I and IV.	16	21	26

NOTE: Stopping distances are distances traveled from the first movement of the brake controls to the point at which the machine comes to a stop.

(R) THREE-POINT HITCH, IMPLEMENT QUICK-ATTACHING COUPLER, AGRICULTURAL TRACTORS—SAE J909 JUN93 SAE Standard

Report of the Tractor Technical Committee, approved June 1966. Revised by the Agricultural Tractor Technical Committee April 1980, reaffirmed without change November 1984, and revised March 1991. Rationale statement available. Completely revised by the SAE Agricultural Tractor Technical Committee June 1993. Rationale statement available.

Foreword—This document is equivalent to ASAE S278.6, Attachment of Implements to Agricultural Wheel Tractors Equipped with Quick-Attaching Coupler.

See Rationale statement for ISO equivalency.

1. Scope

1.1 This SAE Standard sets forth the requirements for the attachment of three-point hitch implements or equipment to the rear of agricultural wheeled tractors equipped with quick-attaching couplers.

1.2 It is intended to establish those dimensions which are necessary to assure adequate clearance between components and to assure proper functioning of the tractor-implement combination when the implement is attached to the tractor by means of quick-attaching coupler.

1.3 Design of the latching mechanism and individual components of the coupler not restricted by this document are left to the discretion of the manufacturer.

2. References

2.1 Applicable Documents—The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

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

SAE J715—Three-Point Free Link Attachment of Implements to Agricultural Wheeled Tractors

SAE J1170—Power Take-Off for Agricultural Tractors

2.1.2 ASAE PUBLICATIONS—Available from ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.

ASAE S278.6—Attachment of Implements to Agricultural Wheeled Tractors Equipped With Quick-Attaching Coupler

3. Quick-Attaching Coupler for Tractors Equipped With a Three-Point Free-Link Hitch

3.1 In general, the dimensions associated with tractor and implement for use with the quick-attaching coupler are the same as those for the three-point hitch specified in SAE J715. This document sets forth those additional requirements that are necessary to provide for use with the coupler. It does not provide for interchangeability between tractors and couplers.

4. Quick-Attaching Coupler as Integral Part of Tractor Hitch

4.1 In some instances it may be desirable to provide linkage between the tractor and coupler of a configuration and attachment per the manufacturer's discretion where the coupler is not intended to be removed and the capability to attach implements directly to the tractor linkage shall not exist. This section sets forth the requirements for the coupler as an integral part of the tractor linkage for hitch categories, III, III-N, IV, and IV-N.

4.2 Integral Quick-Attaching Coupler—All dimensions related to the linkage between the tractor and quick-attaching coupler shall be at the discretion of the manufacturer.

4.2.1 Coupler lower socket tire clearance (Figure 1) with largest Code R-1 tire offered shall be 76.2 mm.

4.2.2 Lift range, power range, mast adjustment, leveling adjustment, tractor lift force capacity, and side sway provisions shall be in accordance with SAE J715.

4.2.3 Dimension C, Lower Socket Offset, and Dimension J, Upper Hook Offset, in Table 1 and Figure 2 shall be at the discretion of the manufacturer. All other dimensions shall be in accordance with Tables 1 and 2 and Figures 2 and 3, as set forth for quick-attaching coupler for tractors equipped with a three-point free-link hitch.

4.2.4 Horizontal distance from end of power take-off shaft to coupler lower socket with coupler positioned in conformance with dimension for drawbar hitch point per SAE J1170 shall be as follows:

a. 35 mm diameter PTO Shaft, 540 rpm = 508 mm/559 mm
b. 35 mm diameter PTO Shaft, 1000 rpm = 408 mm/559 mm
c. 45 mm diameter PTO Shaft, 1000 rpm = 610 mm/661 mm

5. Special Hitch Coupler Categories

5.1 It has been found from experience that certain large implements used with dual rear tires and narrow crop row spacings require a special category narrow hitch.

5.2 Special Category III-N Narrow Hitch Coupler—The dimensions of special Category III-N shall be as follows:

5.2.1 Dimensions A, S, T, U, V, and W in Table 1 shall be in accordance with Category II. All other dimensions shall be in accordance with Category III.

5.2.2 Dimensions B_1 and C_1 in Table 2 shall be in accordance with Category II. All other dimensions shall be in accordance with Category III.

5.3 Special Category IV-N Narrow Hitch Coupler—The dimensions of special Category IV-N shall be as follows:

5.3.1 Dimensions A, S, T, V, and W in Table 1 shall be:

A = 925 mm/930 mm
S = 858 mm
T = 1174 mm
V = 858 mm
W = 1174 mm

All other dimensions shall be in accordance with Category IV.

5.3.2 Dimension B_1 in Table 2 shall be 919 mm/922 mm. Dimension C_1 in Table 2 shall be in accordance with Category III. All other dimensions shall be in accordance with Category IV.

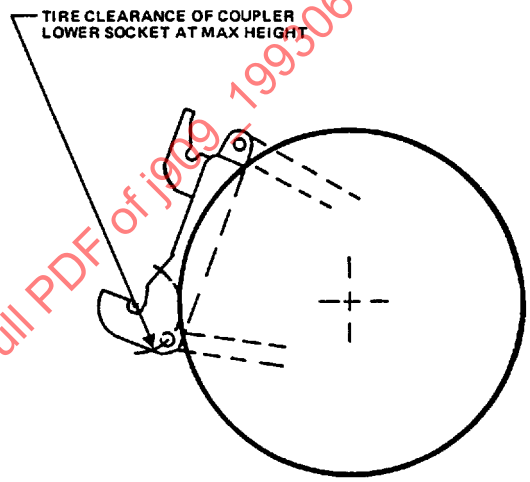

FIGURE 1—DIMENSIONS ASSOCIATED WITH TRACTOR

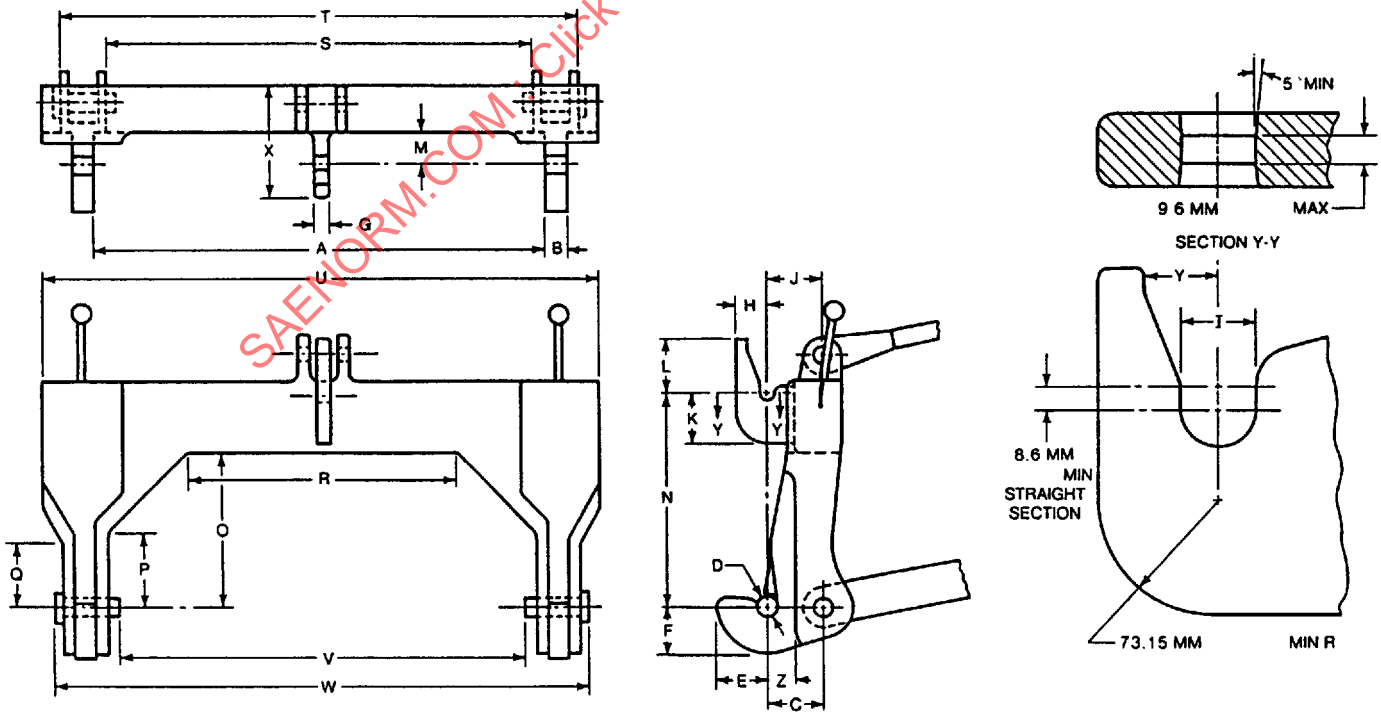

FIGURE 2—DIMENSIONS ASSOCIATED WITH QUICK-ATTACHING COUPLER
(Letter designations A, B, C, etc., correspond to dimensions in Table 1)