

ANSI/ASAE S296.5 W/Corr. 1 DEC2003 (R2013)

General Terminology for Traction of Agricultural Traction and Transport Devices and Vehicles



**American Society of
Agricultural and Biological Engineers**

**S
T
A
N
D
A
R
D**

ASABE is a professional and technical organization, of members worldwide, who are dedicated to advancement of engineering applicable to agricultural, food, and biological systems. ASABE Standards are consensus documents developed and adopted by the American Society of Agricultural and Biological Engineers to meet standardization needs within the scope of the Society; principally agricultural field equipment, farmstead equipment, structures, soil and water resource management, turf and landscape equipment, forest engineering, food and process engineering, electric power applications, plant and animal environment, and waste management.

NOTE: ASABE Standards, Engineering Practices, and Data are informational and advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. The ASABE assumes no responsibility for results attributable to the application of ASABE Standards, Engineering Practices, and Data. Conformity does not ensure compliance with applicable ordinances, laws and regulations. Prospective users are responsible for protecting themselves against liability for infringement of patents.

ASABE Standards, Engineering Practices, and Data initially approved prior to the society name change in July of 2005 are designated as "ASAE", regardless of the revision approval date. Newly developed Standards, Engineering Practices and Data approved after July of 2005 are designated as "ASABE".

Standards designated as "ANSI" are American National Standards as are all ISO adoptions published by ASABE. Adoption as an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by ASABE.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

CAUTION NOTICE: ASABE and ANSI standards may be revised or withdrawn at any time. Additionally, procedures of ASABE require that action be taken periodically to reaffirm, revise, or withdraw each standard.

Copyright American Society of Agricultural and Biological Engineers. All rights reserved.

ASABE, 2950 Niles Road, St. Joseph, MI 49085-9659, USA, phone 269-429-0300, fax 269-429-3852, hq@asabe.org

ANSI/ASAE S296.5 W/Corr. 1 DEC2003 (R2013)

Revision approved December 2003; reaffirmed January 2014 as an American National Standard

General Terminology for Traction of Agricultural Traction and Transport Devices and Vehicles

Proposed by the ASAE Tractive and Transport Efficiency Committee; approved by the ASAE Power and Machinery Division Technical Committee; adopted by ASAE as a Recommendation June 1966; revised February 1970; reconfirmed December 1975; revised and reclassified as a Standard December 1976; reconfirmed December 1981; revised April 1987; reconfirmed December 1991; revised June 1995; approved as an American National Standard December 1995; reaffirmed by ASAE for one year January 2001; reaffirmed by ANSI January 2001; reaffirmed by ASAE December 2001, revised December 2003, approved by ANSI December 2003; reaffirmed by ASABE and ANSI February 2009; reaffirmed by ASABE December 2013; reaffirmed by ANSI January 2014; Corrigendum 1 published January 2014.

Keywords: Terminology, Tire, Traction, Transport

1 Purpose and Scope

1.1 This terminology is to assist in the standardized reporting of information on traction and transport devices and vehicles. When it is not possible for data to be reported using this terminology, it is recommended that new terms be clearly defined. Unless otherwise indicated, all definitions refer to individual traction or transport devices or vehicles operating on a horizontal surface.

2 Normative References

ASAE EP285.7 JAN01, Use of SI (Metric) Units

OECD Code 1, Standard Code for the Official Testing of Agricultural and Forestry Tractor Performance

3 Basic Terminology Common to all Traction and Transport Devices and Vehicles¹

3.1 ballast: Mass that can be added or removed for the purpose of changing total load or load distribution.

3.2 contact area: The area of engagement of the traction and transport surfaces, projected onto a horizontal plane at the nominal ground surface.

3.3 flotation: The ability to resist sinkage into or deformation of a surface being traversed.

3.4 ground pressure: The actual pressure exerted vertically on the soil surface by the traction and transport devices of a vehicle.

¹ All units should be consistent with ASAE EP285.7. Use of SI (Metric) Units.

3.5 ground pressure, nominal: The static load of a vehicle divided by the sum of the contact areas of the traction and transport devices in contact with the ground surface.

3.6 sinkage: Deformation of the supporting surface normal to the direction of travel of a traction or transport device. Equal to the sum of the static sinkage and slip sinkage.

3.7 traction device: A powered device for propelling a vehicle using reaction forces from the supporting surface; may be a wheel, tire, or track.

3.8 transport device: A non-powered device (zero input or output torque) that supports a vehicle on a surface during travel over that surface.

3.9 vehicle: A traction or transport machine incorporating combinations of traction and/or transport devices.

4 Terminology for Traction and Transport Devices

4.1 load, dynamic [W_d]: The total force normal to the undisturbed supporting surface on which the traction or transport device is operating. (The force is the sum of the static load and any additional forces such as load transfer — see Figure 1).

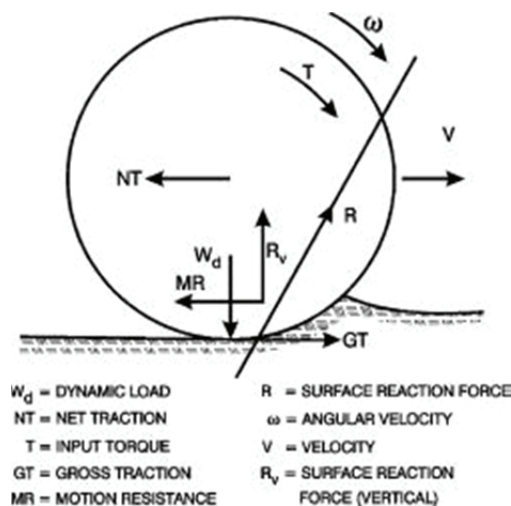


Figure 1 – Basic velocities and forces on a wheel, including resultant soil reaction force

4.2 load, static [W_s]: The total force normal to the supporting surface on which the traction or transport device is standing with zero input torque.

4.3 motion resistance of traction device [$MR = GT - NT$]: The difference between gross traction and net traction; accounts for all energy losses of a traction device not attributed to travel reduction (see Figure 1). *Motion resistance* is the preferred term; also called *rolling resistance*.

4.4 motion resistance of transport device: The force required in the direction of travel to overcome resistance from the supporting surface and internal resistance of the device. *Motion resistance* is the preferred term; also called *towing force*.

4.5 motion resistance ratio [ρ (or MRR) = MR/W_d]: The ratio of motion resistance to dynamic load. *Motion resistance ratio* is the preferred term; also called *coefficient of rolling resistance* or *coefficient of motion resistance*.

4.6 power, input [$T \cdot \omega$]: The product of input torque and angular velocity of the driving axle of a traction device.