Off-Road Tire and Rim Selection and Application – SAE J1315 DEC83

SAE Recommended Practice
Completely Revised December 1983

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SAE Recommended Practice

Report of the Off-Road Machinery Technical Committee, Subcommittee 2, approved May 1981, completely revised December 1983. Rationale statement available.

1. Purpose—The purpose of this recommended practice is to provide general guidelines for the selection and application of off-road tires and rims (SAE J751 APR80).

2. Scope—This recommended practice applies to the selection of tires and rims for load carrying ability as related to size, inflation pressure, and speed for machines in SAE J1116 Category 1, Construction. Included are off-road tires of categories E, L, G, and C only, together with rims commonly used to mount them (Ref. J751 APR80). Consideration of tire characteristics such as flotation, cut and bruise resistance, ride quality, wear, and tractive ability are not covered herein.

3. General—A large number of special sizes and types of tires for a variety of specialized applications have been developed and placed in service. The proliferation is extensive and growing, and suggests the need to place the existing industry-accepted application philosophy in an organized and public form.

Tires discussed in this recommended practice are included under a general designation entitled off-road. As such, they are, by conditions of their service, subject to a greater diversity of operating forces than are tires utilized for on-highway service. The type and magnitude of these forces are a function not only of tire construction, but also of machine performance and operating conditions.

The interaction of tire, machine, and operating conditions is critical and can be favorable or unfavorable to tire performance and life. The effect of such phenomena is not within the scope of general load tables alone (Ref. paragraph 5.1.1).

4. Definitions—The following definitions are pertinent to this document.

4.1 Operating Mass (Weight)—The total mass (weight) in kilograms (pounds) of the machine as specified and fully serviced, including a full fuel tank and an 80 kg (175 lb) operator.

4.2 Loaded Mass (Weight)—The sum of the operating mass (weight) and manufacturer's rated payload.

4.3 Highest Individual Wheel Load—The largest load on a single tire/rim when measured on level ground at stationary conditions. For specific machine types, the loading and load distribution shall be as follows:

4.3.1 For transport machines (that is, dumpers and tractor-scrapers), use loaded mass (weight) distribution at rated payload.

4.3.2 For wheel loaders:

4.3.2.1 For front axle tires, both the static (breakout) and travel (carry) conditions must be considered.

4.3.2.1.1 Breakout Condition—Rear tires carry no load and front tires carry a load equal to the sum of the machine operating mass (weight) and the breakout force (see SAE J732).

4.3.2.1.2 Carry Condition—All tires on the ground and bucket with rated payload at SAE carry position (see SAE J732).

4.3.2.2 For rear axle tires, use the operating mass (weight) with the empty bucket in the SAE carry position.

4.3.3 For wheel loaders with forks in place of buckets:

4.3.3.1 For front axle tires, use the loaded mass (weight).

4.3.3.2 For rear axle tires, use the operating mass (weight).

4.3.4 For wheel dozers, graders, and compactors, all of which carry no payload, use the machine operating mass (weight) distribution.

4.3.5 For all other machines not included under paragraph 4.3, the tire and/or rim manufacturers should be consulted.

5. Tire Selection and Application

5.1 Selection of tire size and carcass strength on each axle shall be based on the highest individual wheel load and the speed range capability of the machine which the tires will serve.

5.1.1 Maximum load per tire shall not be greater than that specified in the applicable tables of the Tire and Rim Association (T&RA) Yearbook, or that approved by the manufacturer of the specific tires to be placed in service.

5.1.2 When performance capability of the machine is such that the possibility of excessive heat generation in the tire exists, consideration should also be given to the average tire load and speed in the machine work cycle. Adjustments can be made in maximum load and speed so that the tire operating temperature is limited to an acceptable level by the following methods:

5.1.2.1 For transport machines (that is, dumpers and tractor-scrapers), reference should be made to SAE J1098, Ton Mile per Hour Application Practice, or to other specialized data available from individual tire manufacturers.

5.1.2.2 For work machines (that is, wheel loaders and wheel dozers), the tire manufacturer's recommendations should be sought.

6. Rim Selection

6.1 Selection of rim size, contour, and type or style designation shall be based on the tire design, the highest individual wheel load, the required tire inflation pressure, the speed range capability of the machine, and the method by which the rim is attached to the hub of the machine.

6.1.1 Rim size and contour shall be in accord with specific recommendations given by either:

6.1.1.1 The Tire and Rim Association (T&RA) Yearbook for those tires included in that standard.

6.1.1.2 The manufacturers of the specific tires and rims to be mounted and placed in service.

6.1.2 Rim type or style designation shall conform to the specific recommendations given by the manufacturer of the rims.

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