SAE International™ SURFACE VEHICLE STANDARD

SAE J709

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Superseding J709 MAY1977

Agricultural Tractor Tire Loadings, Torque Factors, and Inflation Pressures

1. ***Scope***—This SAE Standard establishes loadings, tangential pull values, and inflation pressure relationships for tire sizes and ply ratings currently used on agricultural tractors. Primary purpose of this recommendation is for use with SAE J708 MAY59.

   The performance of the tractor is materially affected by tire loadings, tire tangential pull values, and inflation pressure; therefore, it becomes desirable to publish this information.

1.1 **Rationale**—This standard is obsolete and/or out of date. We have not been able to populate a committee responsible for updating it, so we are cancelling it.

2. ***References***—There are no referenced publications specified herein.

3. ***Definitions***

3.1 **Maximum Load**—Maximum loads on individual tires are determined by considering the maximum axle load on each half of the axle and dividing by the number of tires on that half. The maximum load is to include:

   a. Net Weight—Defined as the actual weight of the vehicle with standard equipment, including the maximum capacity of engine fuel, oil, coolant, and operator 77.4 kg (175 lb).

   b. Accessory weight, optional equipment weight, and special order modifications.

      Accessory Weight—Means the combined weight of those installed production items not previously considered in net weight (such as air-conditioner, etc.).

      Optional Equipment Weight—Means the difference in net weight between the optional item and standard item replaced (such as engine, brakes, tires, etc.). This is to include the net weight of additional items offered by the manufacturer which are not replacements for standard items (such as cabs, sideboards, etc.).

   c. Tire Ballast—If used, must be included in determination of maximum load.

   d. Field Modifications—Means the net weight change due to vehicle alterations made by those other than the original manufacturer (such as modifications for additional capacity, reinforcements, etc.).

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3.2 **Tangential Pull—**The tangential pull value of a tire is the maximum horizontal pull considered to be acting at the tires loaded rolling radius contact point with the ground (or contact surface), and which the tire can continuously withstand excluding momentary and occasional peak loads.

4. General Principles

4.1 All agricultural tractor tire loads shown in Tables 1–6 are expressed in pounds. SI units will be added when total agreement on all conversion factors have been finalized.

4.2 All agricultural tractor tire inflation pressures shown in Tables 1–6 are expressed in pounds per square inch gage, at approximately the prevailing atmospheric temperature at time of test and do not include any inflation pressure buildup due to vehicle operation.

4.3 Tire inflation pressures shall be recorded with the valve at the bottom position.

4.4 The maximum individual tire loading shall not exceed the tire load versus inflation pressure for its respective ply rating shown in Tables 1–6 for the respective tire size.

4.5 Ply rating is used to identify a given tire with its maximum recommended load. It is an index of tire strength and does not necessarily represent the number of actual plies in the tire.

4.6 If the tire used is not recorded in Tables 1–6, its load and inflation should be in accordance with the latest standards or design guides of The Tire and Rim Association, Inc.

*5. Operating Conditions—*Refer to footnotes in appropriate tables.

6. Tire Selection

6.1 Selection of size and ply rating on each axle shall be based on the highest individual wheel load (as determined above), when vehicle is weighed statically.

Maximum load per tire shall not be greater than specified in applicable tables.

6.2 **For Sustained High Torque Service—**Drive wheel tires on agricultural tractors operating in the field must be selected to withstand the maximum pull of the tractor under normal operating service.

The maximum tangential pull capability of the tire is shown in the appropriate tables. These values are to be used for vehicle design including field modifications.

TABLE 1—AGRICULTURAL DRIVE WHEEL TRACTOR TIRES USED IN FIELD SERVICE—TIRES USED AS SINGLES

Basic Tire Load and Tangential Pull (Italic) Values for Tire Selection									
Tire Load Limits at Various Cold Inflation Pressures									
Tire Size Designation	12	14	16	18	20	22	24	26	
8.3–24	970	1060	1150	1230	1310	1380(4)			
	910	1000	1080	1160	1230	1300			
9.5–16	910	1000	1080	1160	1230(4)				
	780	860	930	1000	1060				
9.5–24	1210	1330	1430	1540	1630(4)				
	1110	1220	1320	1420	1500				
11.2–24	1470	1610	1740	1860(4)					
	1320	1450	1570	1670					
12.4–16	1350	1480	1590	1710	1820	1920	2020(6)	2120	2390@32(8)
	1120	1230	1320	1420	1510	1590	1680	1760	1980@32
12.4–24	1760	1920	2080(4)	2230	2370	2510	2640(6)		
	1570	1710	1850	1980	2110	2230	2350		
12.4–28	1880	2050	2220(4)						
	1710	1870	2020						
13.6–24		2270(4)							
		1970							
13.6–28	(1)2210	2420(4)							
	(1)1970	2150							
13.6–38		2810(4)	3030	3250	3460	3660(6)			
		2640	2850	3060	3250	3440			
14.9–24	(1)2470	2700	2920	3130	3330(6)	3520	3710	3880(8)	
	(1)2120	2320	2510	2690	2860	3030	3190	3340	
14.9–26		2790	3020	3240	3440(6)				
		2430	2630	2820	2990				
14.9-28		2890	3120	3340	3560(6)	3760	3960	4140(8)	
		2540	2750	2940	3130	3310	3480	3640	
14.9–30		2980	3220	3450	3670(6)				
		2650	2870	3070	3270				
15.5–38		3160	3410	3660	3890(6)	4110	4330	4540(8)	
		2970	3210	3440	3660	3860	4070	4270	
16.9–24	3000	(1)3280	3550	3800(6)	4040	4270	4500(8)	4710	4920@28(10)
	(1)2520	(1)2760	2980	3190	3390	3590	3780	3960	4130@28
16.9–26	(1)3100	(1)3390	3660	3920(6)					
	(1)2670	(1)2920	3150	3370					
16.9–28			3780	4050(6)	4310	4560	4800(8)		
			3290	3520	3750	3970	4180		
16.9–30			3900	4180(6)					
			3430	3680					
16.9–34			4150	4440(6)					
			3740	4000					
16.9–38			4390	4700(6)	5000	5290	5560(8)		
			3990	4280	4550	4810	5060		

TABLE 1—AGRICULTURAL DRIVE WHEEL TRACTOR TIRES USED IN FIELD SERVICE—TIRES USED AS SINGLES (CONTINUED)

Basic Tire Load and Tangential Pull (Italic) Values for Tire Selection									
Tire Load Limits at Various Cold Inflation Pressures									
Tire Size Designation	12	14	16	18	20	22	24	26	
18.4–16.1	(1)2370	(1)2600	2810(6)	3010	3200(8)				
	(1)1870	(1)2050	2220	2380	2530				
18.4–24			4240	4550	4840(8)				
			3520	3780	4020				
18.4–26	(1)3710	(1)4060	4380(6)	4700	5000(8)	5280	5560	5830(10)	6580@32(12)
	(1)3150	(1)3450	3720	4000	4250	4490	4730	4960	5590
18.4–28			4530(6)	4850	5160(8)	5460	5740	6020(10)	6790@32(12)
			3900	4170	4440	4700	4940	5180	5840@32
18.4–30			4670(6)	5010	5330(8)	5630	5920	6210(10)	
			4060	4360	4640	4900	5150	5400	
18.4–34			4960(6)	5320	5650(8)	5980	6290	6590(10)	
			4410	4730	5030	5320	5600	5870	
18.4–38			5250(6)	5630	5980(8)	6330	6660	6980(10)	
			4730	5070	5380	5700	5990	6280	
20.8–34			5560(6)	6440(8)					
			4840	5600					
20.8–38			6360	6820(8)	7250	7670(10)			
			5660	6070	6450	6830			
23.1–26	(1)5310	(1)5810	6280(8)	6730	7160(10)				
	(1)4350	(1)4760	5150	5520	5870				
23.1–30			6690(8)						
			5620						
23.1–34			7110(8)						
			6110						
24.5–32	(1)6450	(1)7060	7640	8180	8700(10)				
	(1)5420	(1)5930	6420	6870	7310				

NOTE 1—Figures in parentheses denote ply rating for which bold face loads and inflations are maximum.
NOTE 2—For shipping purposes, tire inflation pressures may be increased to 30 psi (consult tire manufacturer for minimum tire shipping pressure). This higher inflation pressure must be reduced to operating inflation before the tractor is removed from the carrier.
NOTE 3—For transport service and operations which do not require sustained high torque, the following load limits at various speeds apply with no change in inflation pressure:

1. Loads at these inflation pressures are for R-3 type when in agricultural service only.

Max. Speed	% Increase to Loads in Above Table
10 MPH	20%
15 MPH	10%
20 MPH	Same as Above Table

TABLE 2—LOW SECTION HEIGHT AGRICULTURAL DRIVE WHEEL TRACTOR TIRES USED IN FIELD SERVICE— TIRES USED AS SINGLES

Basic Tire Load and Maximum Tangential Pull (Italic) Values for Tire Selection

Tire Load Limits at Various Cold Inflation Pressures

Tire Size Designation	16	18	20	22	24	26	
17.5L-24	3390(6)	3630	3860	4080(8)			
	2920	3120	3320	3510			
19.5L-24	4050	4340	4620(8)	4880	5140	5390	5860@30(12)
	3400	3650	3880	4100	4320	4530	4920@30
28L-26		7800(10)	8290(12)				
		6400	6800				
30.5L-32		9120(10)					
		7660					

NOTE 1—Figures in parentheses denote ply rating for bold face loads and inflations are maximum.
NOTE 2—For shipping purposes, tire inflation pressures may be increased to 30 psi (consult tire manufacturer for minimum tire shipping pressure). This higher inflation pressure must be reduced to operating inflation before the tractor is removed from the carrier.
NOTE 3—For transport service and operations which do not require sustained high torque, the following load limits at various speeds apply with no change in inflation pressure:

Max. Speed	% Increase to Loads in Above Table
10 MPH	20%
15 MPH	10%
20 MPH	Same as Above Table

TABLE 3—TRACTOR DRIVE WHEEL TIRES USED AS DUALS

Basic TIre Load and Maximum Tangential Pull (Italic) Values for TIre Selection								
	Tire Load Limits at Various Cold Inflation Pressures							
Tire Size Designation	12	14	16	18	20	22	24	26
8.3–24	850	930	1010	1080	1150	1210(4)		
	800	870	950	1020	1080	1140		
12.4–28	1650	1800	1950(4)					
	1500	1640	1770					
13.6–28	1940	2130(4)						
	1730	1900						
13.6–38	2260	2470(4)	2670	2860	3040	3220(6)		
	2120	2320	2510	2690	2860	3030		
15.5–38	2540	2780	3000	3220	3420(6)	3620	3810	4000(8)
	2390	2610	2820	3030	3210	3400	3580	3760
16.9–34	3080	3370	3650	3910(6)				
	2770	3030	3290	3520				
16.9–38	3260	3570	3860	4140(6)	4400	4660	4890(8)	
	2970	3250	3510	3770	4000	4240	4450	
18.4–34	3690	4040	4360(6)	4680	4970(8)	5260	5540	5800(10)
	3280	3600	3880	4170	4420	4680	4930	5160
18.4–38	3910	4280	4620(6)	4950	5260(8)	5570	5860	6140(10)
	3520	3850	4160	4460	4730	5010	5270	5530
20.8–34	4470	4890(6)	5290	5670(8)				
	3890	4250	4600	4930				
20.8–38	4730	5180	5600	6000(8)	6380	6750(10)		
	4210	4610	4980	5340	5680	6010		
23.1–26	4670	5110	5530(8)	5920	6300(10)			
	3830	4190	4530	4850	5170			
23.1–30	4980	5450	5890(8)					
	4180	4580	4950					
23.1–34	5290	5780	6260(8)					
	4550	4970	5380					
24.5–32	5680	6210	6720	7200	7660(10)			
	4770	5220	5640	6050	6430			
Low Section Height								
28L-26	5410	5920	6410	6860(10)	7300(12)			
	4440	4860	5260	5630	5990			
30.5L-32	6780	7420	8030(10)					
	5700	6230	6750					

NOTE 1—Figures in parentheses denote ply rating for which bold face loads and inflations are maximum.
NOTE 2—12 psi is the absolute minimum inflation pressure for tires used as duals.
NOTE 3—For transport service and operations which do not require sustained high torque, the following load limits at various speeds apply with no change in inflation pressure:

Max. Speed	% Increase to Loads in Above Table
10 MPH	20%
15 MPH	10%
20 MPH	Same as Above Table

TABLE 4—DRIVE WHEEL TIRES USED ON TRACTORS WITH CYCLIC LOADING SERVICE (WHICH DO NOT REQUIRE SUSTAINED HIGH TORQUE) - TIRES USED AS SINGLES

Maximum Tire Load Ratings for Working Speeds Up to 5 mph

Tire Size Designation	Tire Load Limits at Various Cold Inflation Pressures											
	12	14	16	18	20	22	24	26	28	30	32	
13.6–28		3010	3260	3490(4)								
14.9-24		3370	3640	3900	4150	4390	4620(6)	4840	5050	5260	5460(8)	
14.9–26		3480	3760	4030	4290	4530	4770(6)					
14.9–28		3590	3890	4160	4430	4680	4930(6)	5160	5390	5610	5830(8)	
14.9–30		3710	4010	4300	4570	4830	5080(6)					
16.9–24			4420	4730	5030	5320(6)	5600	5870	6130(8)	6380	6630	7100@36(10)
16.9–26	(1)3860	[1]4220	4560	4890	5200	5500(6)						
16.9–28			4710	5050	5370	5680(6)	5970	6260	6540(8)			
16.9–30			4860	5210	5540	5860(6)						
16.9-34			5160	5530	5880	6220(6)						
18.4–24			5290	5660	6020	6370	6700	7020(8)				
18.4–26	[1]4620	[1]5050	5460	5850	6220(6)	6580	6920	7260	7580	7890	8190(10)	
18.4–28			5640	6040	6430(6)	6800	7150	7490	7830	8150	8460	9640@40(12)
18.4–30	[1]4920	[1]5380	5820	6240	6630(6)	7010	7380	7730(8)	8080	8410	8740(10)	
18.4–34			6180	6620	7040(6)	7450	7830	8210(8)	8570	8930	9270(10)	
23.1–26	[1]6610	[1]7230	7820	8380	8910(8)	9420	9920	10390(10)				
23.1–30			8340	8930	9500(8)							
23.1–34			8850	9480	10090(8)							
24.5–32				10190	10840	11460	12060(10)					
Low Section Height												
17.5L–24			4220	4520	4810(6)	5090	5350	5610	5860(8)			
19.5L-24			5050	5410	5750	6080	6400(8)	6710	7000	7290	7570	8370@38(12)
28L–26				9710	10330	10920(10)	11490	12040(12)				
30.5L–32				12170	12940(10)							

NOTE 1— 1. Figures in parentheses denote ply rating for which bold face loads and inflations are maximum.
NOTE 2— 2. For shipping purposes, tire inflation pressures may be increased to 30 psi. (Consult tire manufacturer for minimum tire shipping pressure.) This higher inflation pressure must be reduced to operating before the tractor is removed from the carrier.
NOTE 3— 3. Tire load limits at higher speeds with no change in inflation pressure:

1. Loads at these inflation pressures are for R-3 type when used in agricultural service only.

Max. Speed	% Increase to Loads in Above Table
10 MPH	20%
15 MPH	10%
20 MPH	Same as Above Table