

OTR

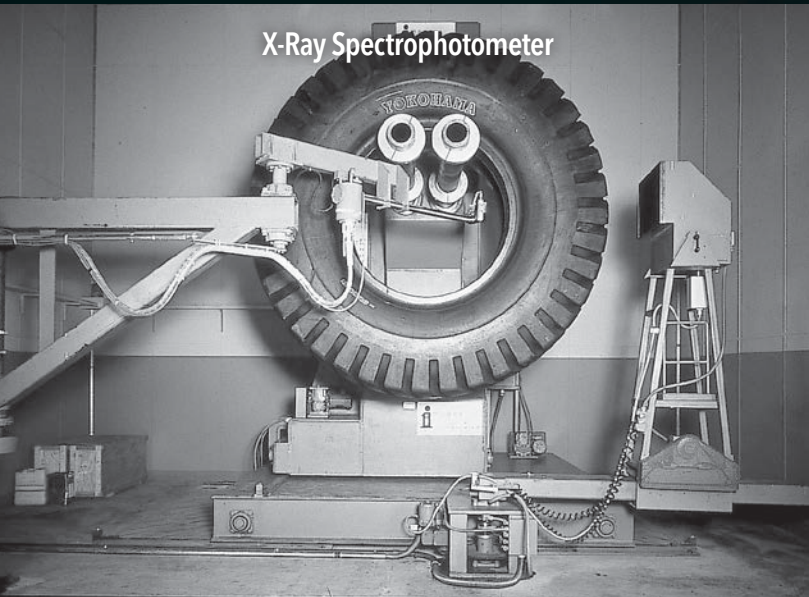
SALES
REFERENCE
GUIDE



 **YOKOHAMA**[®]

Off The Road Tires *OTR*

X-Ray Spectrophotometer



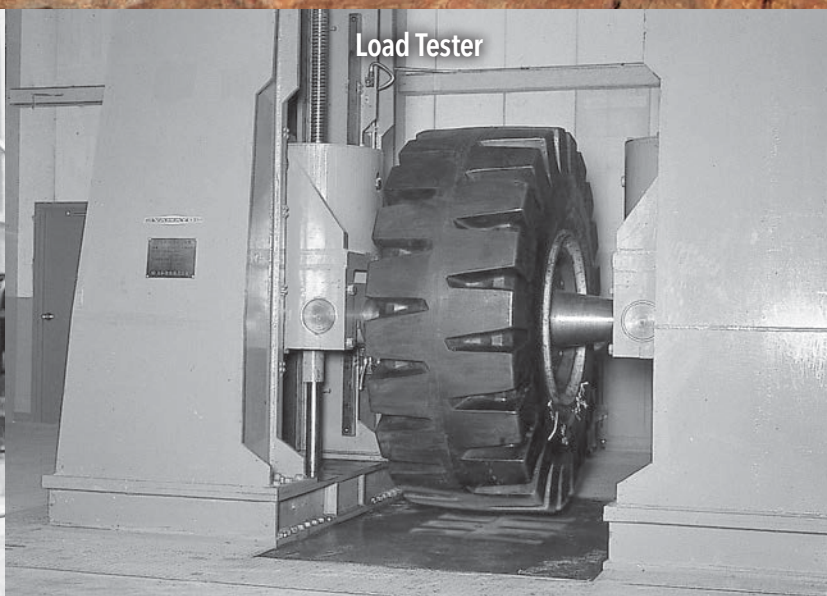
ONOMICHI Off-The-Road Tire Plant



YOKOHAMA has built its reputation on the attention given to the technological capabilities and advancements of every one of its tires. Its off-the-road tires are high-quality products manufactured at integrated production facilities with rigid quality control. In the pages that follow, we discuss the basic construction, selection, use, maintenance of, and various applications encountered with, the wide variety of **YOKOHAMA** off-the-road tires so that you can get the most in performance, longevity and fuel-efficiency out of whatever tire you may need.



Tire Drum Tester



Load Tester



TABLE OF CONTENTS

1 OUTLINE OF OFF-THE-ROAD TIRES

TRA Classification of OFF-THE-ROAD TIRES	1
Tread Pattern	1
Tread Thickness	2
Construction of OFF-THE-ROAD TIRES	2
Tire Marking (Radial)	3
Size Identification and Aspect Ratio	3
Tire Specification Code	4
Tires by Type of Vehicle	5
Load Index	7
Speed Symbol	8
Conversion Table: Star Mark to Ply Rating	8

2 YOKOHAMA OFF-THE-ROAD TIRES

Radial : Application	
Earthmover	9
Loader & Dozer	10
Grader	11
Mobile Crane	11
Industrial	11
Radial : Technical Data	
Earthmover	13
Loader & Dozer	17
Grader	19
Industrial	19
Crane	19
Appendix (Radial)	21
Bias : Application	
Earthmover	23
Loader & Dozer	24
Grader	27
Compactor	27
Industrial	28
Bias : Technical Data	
Earthmover	29
Loader & Dozer	37
Grader	41
Industrial	43
Wide Base Low-Seam Mining	45
Appendix (Bias)	47

3 TIRE MAINTENANCE

Inflation Pressure	49
Load	50
Speed	50
Proper Matching of Dual-Tires	51
Road Surface Maintenance	52
Tire Problems & Major Causes	52
Instructions for Operations	53
Tire Appearance Check-up	53
Measuring Tread Wear	54
Ton-Kilometer-Per-Hour (Ton-Mile-Per-Hour)	55
Load-and-Carry Operation of Front-End Loaders	57
Protecting Tires on Vehicle in Highway Drive-Away	58
Handling of Tires	61
Safety Precautions for Demounting	61
Safety Precautions for Mounting	62
Safety Precautions for Operation	63
Tire Storage	64
How to Reduce Tire Costs	64

4 RIMS, VALVES & O-RINGS

Tubes and Flaps	65
Rims	65
Valves	67
O-Rings	71
Combination Tables	73

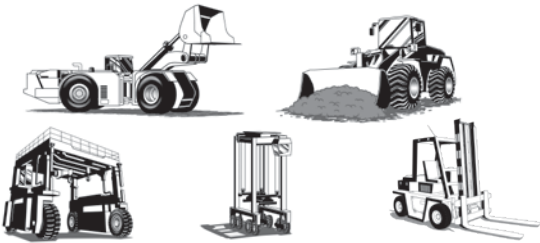
5 MISCELLANEOUS DATA

Earthmover Data	75
Conversion Tables	78
Approximate Weight of Materials	80
Notes	81



TRA Classification of OFF-THE-ROAD TIRES

YOKOHAMA OFF-THE-ROAD TIRES are classified as follows by the Tire and Rim Association (TRA).

Application	TRA Code	Tread Type	Vehicles
Earthmover	E-2 E-3 E-4 E-7	Traction Regular Rock Regular Rock Deep Flotation	
Grader	G-2 G-3	Traction Regular Rock Regular	
Loader & Dozer	L-2 L-3 L-4 L-5 L-4S L-5S	Traction Regular Rock Regular Rock Deep Rock Extra Deep Smooth Deep Smooth Extra Deep	
Compactor	C-1 C-2	Smooth Grooved	
Mobile Crane	-	-	
Industrial	IND-3 IND-4 IND-5	Traction Regular Deep Extra Deep	

Caution: Never replace a tire mounted on a vehicle with any tire designed for a different type of vehicle.

For example, you should never place an earthmover tire on a loader.

Tread Pattern

The tread pattern is designed to produce varying degrees of traction, cut resistance, flotation, wear and heat resistance. Selection of the proper OFF-THE-ROAD TIRES depends on the job and the conditions.

For example, different tread patterns are used to produce maximum traction or flotation on sand, mud and rock. There are five basic tread patterns: rock, traction, block, rib and smooth.



Rock Pattern



Traction Pattern



Block Pattern



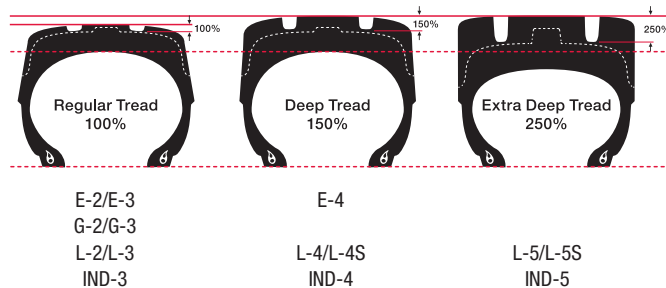
Rib Pattern



Smooth

Tread Thickness

According to the Tire and Rim Association (TRA), there are three general classifications for tread thickness for OFF-THE-ROAD TIRES: regular, deep and extra deep. Deep and extra deep are 1.5 (150%) and 2.5 (250%) times thicker than regular, respectively. The thicker treads have greater cut and wear resistance.

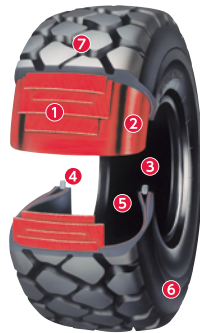


Although thicker treads give greater wear and cut resistance, they also generate and retain more heat. Accordingly, work conditions for thick tread tires should be thoroughly evaluated to prevent heat separation and other heat related damage. Deep and extra deep tread tires have almost the same overall diameter which is larger than regular tread tires. When replacing regular tread tires with deep or extra deep tread tires, the larger overall diameters of the thicker tread tires should be taken into consideration.

Construction

Structural Diagram of RADIAL TIRES

- ① Belt
- ② Carcass
- ③ Inner Liner
- ④ Bead Wire
- ⑤ Chafer
- ⑥ Sidewall
- ⑦ Tread



Structural Diagram of BIAS TIRES

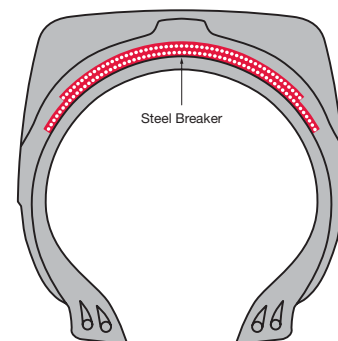
- ① Breaker
- ② Tread
- ③ Sidewall
- ④ Carcass
- ⑤ Bead
- ⑥ Inner



Steel Breakers (Bias Tires)

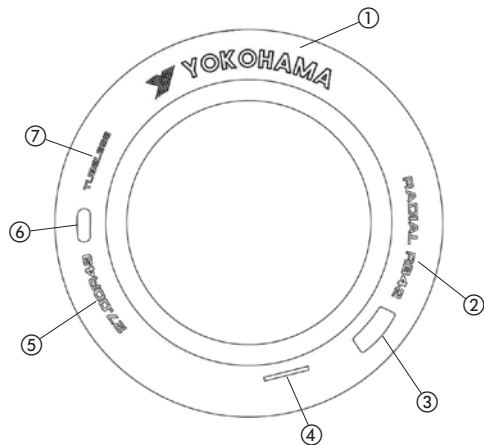
The steel breaker tire has steel cord breakers that give it very high cut resistance. It is especially useful where sharp rock is a problem, and is applicable to loader, dozer, dump truck and occasionally earthmover tires. However, the adhesiveness between the steel cord and rubber is more susceptible to heat damage than that of nylon cord and rubber. Accordingly, steel breaker tires should not be subjected to conditions where heat generation is great. Because of the difficulty involved in retreading steel breaker tires, they should not be used for jobs where more easily retreaded tires can be used.

Steel Breaker Diagram





Tire Marking (Radial)



- ① Brand Name
- ② Tread Pattern Name
- ③ Tire Specification Code
- ④ Serial Number
- ⑤ Tire Size
- ⑥ Star Mark / Load Index & Speed Symbol
- ⑦ Tubeless or Tube Type

Size Identification and Aspect Ratio

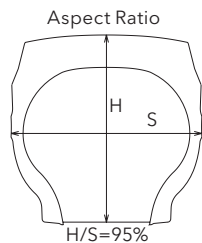
Narrow Base Tires

27.00 R 49 ☆☆ (Radial)

- Star Mark
- Rim Diameter (inches)
- Radial Construction
- Section Width (inches)

27.00-49 48PR (Bias)

- Ply Rating
- Rim Diameter (inches)
- Section Width (inches)



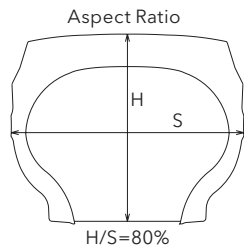
Wide Base Tires

29.5 R 25 ☆☆ (Radial)

- Star Mark
- Rim Diameter (inches)
- Radial Construction
- Section Width (inches)

29.5-25 34PR (Bias)

- Ply Rating
- Rim Diameter (inches)
- Section Width (inches)



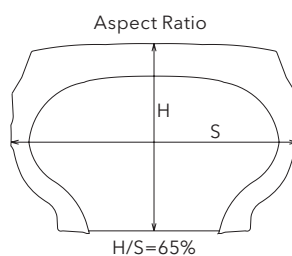
Ultra Wide Base Tires

750/65 R 25 ☆ (Radial)

- Star Mark
- Rim Diameter (inches)
- Radial Construction
- Aspect Ratio (65%)
- Section Width (mm)

45/65-45 58PR (Bias)

- Ply Rating
- Rim Diameter (inches)
- Aspect Ratio (65%)
- Section Width (inches)



Other Tires

445/95 R 25 174 F (Radial)

- Speed Symbol
- Load Index
- Rim Diameter (inches)
- Radial Construction
- Aspect Ratio (95%)
- Section Width (mm)

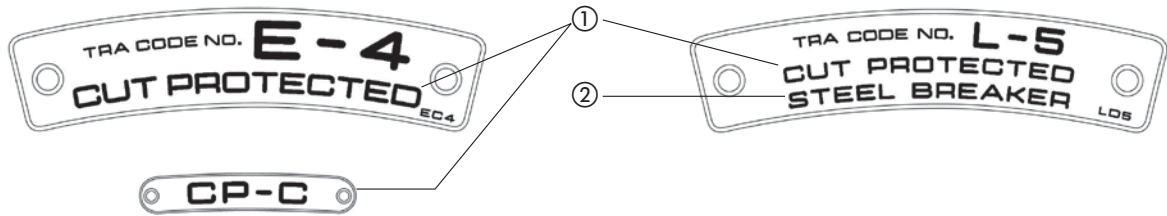
42x18-20 NHS 36PR (Bias)

- Ply Rating
- Suffix Designation
- Rim Diameter (inches)
- Section Width (inches)
- Overall Diameter (inches)

Widths of narrow and wide base tires of the same diameter are shown below:

Narrow Base Tires	Wide Base Tires
13.00	15.5
14.00	17.5
16.00	20.5
18.00	23.5
21.00	26.5
24.00	29.5
27.00	33.5
30.00	37.5

Tire Specification Code



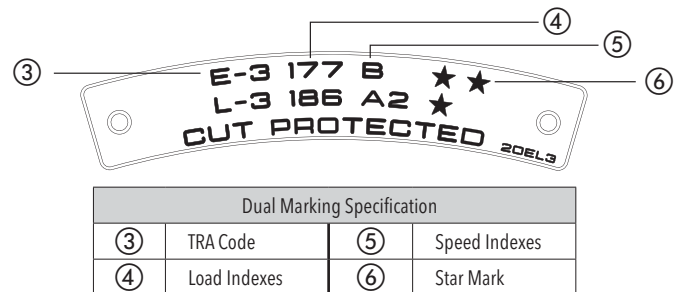
① Tire Specification Code

Code Type I	Specification
CUT PROTECTED	Cut Resistance Type
REGULAR	Regular (Standard) Type
HEAT RESISTANT	Heat Resistance Type

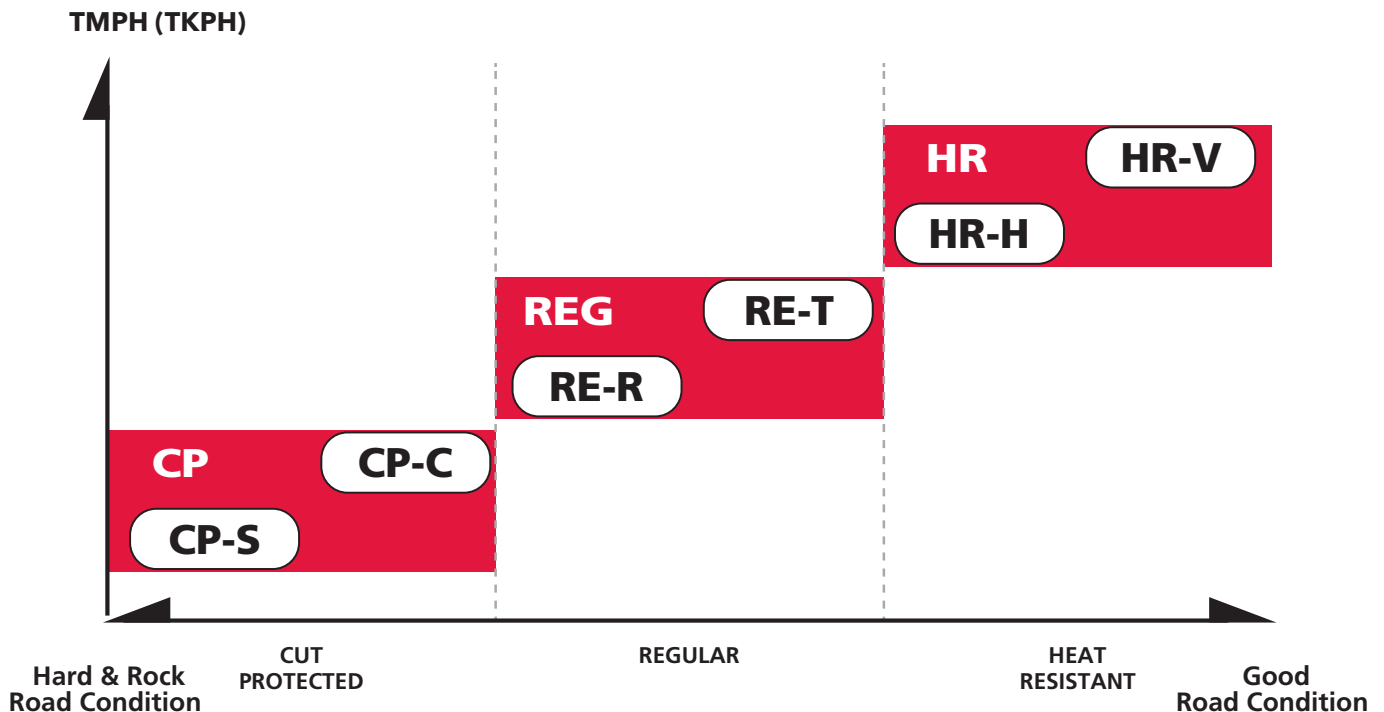
Code Type II	Specification
CP-S	Special Cut Resistance Type
CP-C	Cut Resistance Type
RE-R	Regular (Standard) Type
RE-T	Regular (Standard) Type With Heat Resistance
HR-H	Heat Resistance Type
HR-V	Special Heat Resistance Type

② Special Code

Code	Specification
FOR SDC RIM	Semi-Drop Center Rim Use Only
STEEL BREAKER	Steel Breaker For Bias Tires
WIDE STEEL BREAKER	Wide Steel Breaker For Bias Tires



Positioning Map of Tire Specification Code





Tires by Type of Vehicle

YOKOHAMA OFF-THE-ROAD TIRES are also classified by type of vehicle and application suitable for usage.

Dump Trucks



(TRA Codes E-1, E-2, E-3, E-4 and E-7)

Since dump trucks must travel under heavy load at high speeds over relatively long distances, tires for dump trucks must have high heat and wear resistance. High resistance to cuts is sometimes also necessary.

Scrapers



(TRA Code E-2, E-3, E-4 and E-7)

Scraper tires, of which the wide base type is most common, should have the same properties as those for dump trucks. Superior flotation and traction are also occasionally required.

Front-End Loaders



(TRA Codes L-2, L-3, L-4, L-5, L-4S and L-5S)

Since front-end loaders operate on rough ground, cut and wear resistance are vital and the tires must provide stability for the loader body. Flotation and traction properties may also be necessary, depending on the working conditions. In certain cases, such as the wet and rough conditions of underground mines, the L-4S and L-5S with smooth treads are used because of their high wear and cut resistant properties.

Tire Dozers



(TRA Codes L-2, L-3, L-4 and L-5)

Since a tire dozer is used not only for dozing and leveling, but sometimes for pushing a motor scraper, tires with better traction than loader tires are necessary. Other requirements vary widely depending on job conditions.

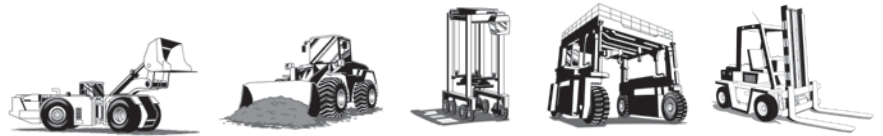
Motor Graders



(TRA Codes G-1, G-2 and G-3)

The motor grader, which is used for road leveling, clearing and snow removal, needs tires that provide high traction and directional stability. Other characteristics depend on job requirements.

Industrial Vehicles



(TRA Codes IND-3, IND-4 and IND-5)

Used for particular service such as port and yard service, industrial vehicles range from forklifts to pot carriers to oil drilling platforms. These tires require extreme casing durability and outstanding tire life to perform in their harsh environments.

Straddle Carriers



(TRA Codes IND-3)

Straddle carriers are special vehicles that are mainly used at seaport areas to carry ocean-going freight containers. These tires require extra heavy-duty performance, and wear and heat resistance, because straddle carriers operate continuously and turn frequently.

Rubber Tired Gantry Cranes (RTG)



(TRA Codes IND-3 and IND-4)

Rubber tired gantry cranes are special cranes mainly used to load and unload containers at seaport areas. These tires require abrasion resistance and durability.

Towing Tractors



(TRA Codes IND-3)

Towing tractors are used to move large aircraft. Thus, these tires mainly require extra traction.



Load Index

The Load Index is an international numerical code associated with the maximum load a tire can carry at the speed indicated by its Speed Symbol under service specified conditions.

L I	kg	lbs	L I	kg	lbs	L I	kg	lbs	L I	kg	lbs	L I	kg	lbs	L I	kg	lbs
40	140	310	90	600	1320	140	2500	5520	190	10600	23400	210	19000	41900	260	80000	176500
41	145	320	91	615	1360	141	2575	5680	191	10900	24000	211	19500	43000	261	82500	182000
42	150	330	92	630	1390	142	2650	5840	192	11200	24700	212	20000	44100	262	85000	187500
43	155	340	93	650	1430	143	2725	6000	193	11500	25400	213	20600	45400	263	87500	193000
44	160	355	94	670	1480	144	2800	6150	194	11800	26000	214	21200	46700	264	90000	198500
45	165	365	95	690	1520	145	2900	6400	195	12150	26800	215	21800	48100	265	92500	204000
46	170	375	96	710	1570	146	3000	6600	196	12500	27600	216	22400	49400	266	95000	209500
47	175	385	97	730	1610	147	3075	6800	197	12850	28300	217	23000	50700	267	97500	214950
48	180	395	98	750	1650	148	3150	6950	198	13200	29100	218	23600	52000	268	100000	220500
49	185	410	99	775	1710	149	3250	7150	199	13600	30000	219	24300	53600	269	103000	227500
50	190	420	100	800	1760	150	3350	7400	200	14000	30900	220	25000	55100	270	106000	233500
51	195	430	101	825	1820	151	3450	7600	201	14500	32000	221	25750	56800	271	109000	240500
52	200	440	102	850	1870	152	3550	7850	202	15000	33100	222	26500	58400	272	112000	247000
53	206	455	103	875	1930	153	3650	8050	203	15500	34200	223	27250	60000	273	115000	253500
54	212	465	104	900	1980	154	3750	8250	204	16000	35300	224	28000	61500	274	118000	260000
55	218	480	105	925	2040	155	3875	8550	205	16500	36400	225	29000	64000	275	121500	268000
56	224	495	106	950	2090	156	4000	8800	206	17000	37500	226	30000	66000	276	125000	276000
57	230	505	107	975	2150	157	4125	9100	207	17500	38600	227	30750	68000	277	128500	283000
58	236	520	108	1000	2200	158	4250	9350	208	18000	39700	228	31500	69500	278	132000	291000
59	243	535	109	1030	2270	159	4375	9650	209	18500	40800	229	32500	71500	279	136000	300000
60	250	550	110	1060	2340	160	4500	9900	210	19000	41900	230	33500	74000			
61	257	565	111	1090	2400	161	4625	10200	211	19500	43000	231	34500	76000			
62	265	585	112	1120	2470	162	4750	10500	212	20000	44100	232	35500	78500			
63	272	600	113	1150	2540	163	4875	10700	213	20600	45400	233	36500	80500			
64	280	615	114	1180	2600	164	5000	11000	214	21200	46700	234	37500	82500			
65	290	640	115	1215	2680	165	5150	11400	215	21800	48100	235	38750	85500			
66	300	660	116	1250	2760	166	5300	11700	216	22400	49400	236	40000	88000			
67	307	675	117	1285	2830	167	5450	12000	217	23000	50700	237	41250	91000			
68	315	695	118	1320	2910	168	5600	12300	218	23600	52000	238	42500	93500			
69	325	715	119	1360	3000	169	5800	12800	219	24300	53600	239	43750	96500			
70	335	740	120	1400	3080	170	6000	13200	220	25000	55100	240	45000	99000			
71	345	760	121	1450	3200	171	6150	13600	221	25750	56800	241	46250	102000			
72	355	785	122	1500	3300	172	6300	13900	222	26500	58400	242	47500	104500			
73	365	805	123	1550	3420	173	6500	14300	223	27250	60000	243	48750	107500			
74	375	825	124	1600	3520	174	6700	14800	224	28000	61500	244	50000	110000			
75	387	855	125	1650	3640	175	6900	15200	225	29000	64000	245	51500	113500			
76	400	880	126	1700	3740	176	7100	15700	226	30000	66000	246	53000	117000			
77	412	910	127	1750	3860	177	7300	16100	227	30750	68000	247	54500	120000			
78	425	935	128	1800	3960	178	7500	16500	228	31500	69500	248	56000	123500			
79	437	965	129	1850	4080	179	7750	17100	229	32500	71500	249	58000	128000			
80	450	990	130	1900	4180	180	8000	17600	230	33500	74000	250	60000	132500			
81	462	1020	131	1950	4300	181	8250	18200	231	34500	76000	251	61500	135500			
82	475	1050	132	2000	4400	182	8500	18700	232	35500	78500	252	63000	139000			
83	487	1070	133	2060	4540	183	8750	19300	233	36500	80500	253	65000	143500			
84	500	1100	134	2120	4680	184	9000	19800	234	37500	82500	254	67000	145500			
85	515	1140	135	2180	4800	185	9250	20400	235	38750	85500	255	69000	150000			
86	530	1170	136	2240	4940	186	9500	20900	236	40000	88000	256	71000	156500			
87	545	1200	137	2300	5080	187	9750	21500	237	41250	91000	257	73000	161000			
88	560	1230	138	2360	5200	188	10000	22000	238	42500	93500	258	75000	165500			
89	580	1280	139	2430	5360	189	10300	22700	239	43750	96500	259	77500	171000			

Speed Symbol

The Speed Symbol indicates the speed at which the tire can carry a load corresponding to its Load Index under service specified conditions.

Speed Symbol	Speed (mph)	Speed (km/h)
A1	2.5	5
A2	5	10
A3	10	15
A4	12.5	20
A5	15	25
A6	20	30
A7	22.5	35
A8	25	40

Speed Symbol	Speed (mph)	Speed (km/h)
B	30	50
C	35	60
D	40	65
E	43	70
F	50	80
G	55	90

Conversion Table: Star Mark to Ply Rating

Loader			Earthmover			Grader		
Tire Size	Star Mark*	Ply Rating	Tire Size	Star Mark*	Ply Rating	Tire Size	Star Mark*	Ply Rating
17.5R25	☆	UP TO 16 PR	17.5R25	☆☆	UP TO 22 PR	14.00R24	☆	UP TO 16 PR
20.5R25	☆	UP TO 20 PR	20.5R25	☆☆	UP TO 28 PR	17.5R25	☆	UP TO 20 PR
23.5R25	☆	UP TO 24 PR	23.5R25	☆☆	UP TO 32 PR	20.5R25	☆	UP TO 20 PR
26.5R25	☆	UP TO 26 PR	26.5R25	☆☆	UP TO 36 PR			
29.5R25	☆	UP TO 28 PR	29.5R25	☆☆	UP TO 40 PR			
			14.00R25	☆☆☆	UP TO 32 PR			
			16.00R25	☆☆	UP TO 32 PR			
18.00R25	☆☆	UP TO 36 PR	18.00R33	☆☆	UP TO 36 PR			
			24.00R35	☆☆	UP TO 48 PR			
			27.00R49	☆☆	UP TO 56 PR			
			33.00R51	☆☆	UP TO 66 PR			

*Star Mark: For Radial tires, the load capacity is indicated by the star mark.



RADIAL: APPLICATION

Earthmover

Tire Size	Star Mark	TRA Code / Pattern										
		E-3	E-3	E-3	E-4	E-4	E-4	E-4	E-4	E-4	E-4	E-4
		RT31	RB31	RL31	RT41	RL45	RB41	RB42	RB42A	RL42	RL47	RL47
												
		Type										
T/L	T/L	T/L	T/L	T/L	T/L	T/L	T/L	T/L	T/L	T/L	T/L	
14.00R25NHS	☆☆☆						●					
16.00R25	☆☆						●					
18.00R33	☆☆							●		●		
24.00R35	☆☆							●	●	●		
27.00R49	☆☆							●				
33.00R51	☆☆							●			** ●	
46/90R57	☆☆											** ●
17.5R25	☆☆			●								
20.5R25	☆☆	* ●	●	●								
23.5R25	☆☆	●	●	* ●	●							
26.5R25	☆☆	* ●	●		●	●						
29.5R25	☆☆		●		●	●						
750/65R25	☆☆	●										

* : E-3+, Tread Depth 125% level

** : Not available yet; YOKOHAMA will inform when available.

NHS: Not for highway service

T/L: Tubeless Type



Loader & Dozer

Tire Size	Star Mark	TRA Code / Pattern									
		L-3	L-3	L-3	L-4	L-4	L-5	L-5	L-5S	L-2	
		RT31	RB31	RL31	RT41	RL45	RL51	RL52	R69	** MYX S01	
											
		Type									
		T/L	T/L	T/L	T/L	T/L	T/L	T/L	T/L	T/L	T/L
18.00R25	☆☆								●		
17.5R25	☆		●							●	
20.5R25	☆	* ●	●	●							●
23.5R25	☆	●	●		●		●				
26.5R25	☆	* ●	●		●	●		●			
29.5R25	☆		●		●	●					

* : L-3+, Tread Depth 125% level

** : The tread design for both 17.5R25 and 20.5R25 are slightly different.

T/L: Tubeless Type





Grader

Tire Size	Star Mark	TRA Code / Pattern		
		G-2	G-2	
		RT21	* MYX S01	
				
		Type		
		T/L	T/L	
14.00R24TG	☆	●		
17.5R25	☆		●	
20.5R25	☆			●

* : The tread design for both 17.5R25 and 20.5R25 are slightly different.

Mobile Crane

Tire Size	Star Mark LI/SS	Pattern		
		RB01		RB03
				
		Type		
		T/T	T/L	T/T
14.00R24NHS	☆☆☆	●		●
385/95R25	170F		●	
445/95R25	174F		●	

Industrial

Tire Size	Star Mark	TRA Code / Pattern
		IND-4
		RR41
		
		Type
		T/L
16.00R25	☆☆☆	●

TG : Tractor-Grade tire. Not for highway service.
NHS : Not for highway service

T/T : Tube Type
T/L : Tubeless Type





RADIAL: TECHNICAL DATA

Earthmover

Tire Size	Pattern	Star Mark	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	1/32				
14.00R25	RB41	☆☆☆	04153	E-4	REG	119	82	-	○	1405	55.3	393	15.5	652	25.7	431	17.0	38.0	48	-	10.00-1.5
16.00R25	RB41	☆☆	04150	E-4	CP	124	85	-	○	1532	60.3	450	17.7	706	27.8	500	19.7	45.1	57	-	11.25-2.0
18.00R33	RB42	☆☆	04201	E-4	CP	168	115	-	○	1870	73.6	507	20.0	857	33.7	569	22.4	55.3	70	-	13.00-2.5
	RB42	☆☆	14210	E-4	HR	250	171	-	○												
	RL42	☆☆	42000	E-4	CP	168	115	-	○	1870	73.6	507	20.0	857	33.7	569	22.4	50.0	63		
	RL42	☆☆	42008	E-4	HR	250	171	-	○												
24.00R35	RB42	☆☆	04210	E-4	CPS	253	173	-	○	2173	85.4	656	25.8	978	38.5	745	29.3	63.5	80	-	17.00-3.5
	RB42	☆☆	04203	E-4	CP	277	190	-	○												
	RB42	☆☆	04206	E-4	REG	304	208	-	○												
	RB42	☆☆	04216	E-4	HR	422	289	-	○												
	RB42A	☆☆	04214	E-4	CPS	253	173	-	○	2180	85.8	666	26.2	980	38.6	748	29.4	63.5	80		
	RB42A	☆☆	04211	E-4	CP	277	190	-	○												
	RB42A	☆☆	04212	E-4	REG	304	208	-	○												
	RL42	☆☆	42006	E-4	CP	277	190	-	○												
RL42	☆☆	42007	E-4	HR	422	289	-	○	2163	85.2	647	25.5	978	38.5	749	29.5	58.7	74			
27.00R49	RB42	☆☆	04209	E-4	CPS	350	240	-	○	2683	105.6	735	28.9	1220	48.0	830	32.7	73.7	93	-	19.50-4.0
	RB42	☆☆	04204	E-4	CP	430	295	-	○												
	RB42	☆☆	04205	E-4	REG	535	367	-	○												
	RB42	☆☆	04213	E-4	HR	615	422	-	○												
33.00R51	RB42	☆☆	04215	E-4	CPS	480	329	-	○	3061	120.5	920	36.2	1380	54.3	1021	40.2	91.0	115	-	24.00-5.0
	RB42	☆☆	04207	E-4	CP	600	411	-	○												
	RB42	☆☆	04208	E-4	REG	680	466	-	○												
	RL47	☆☆	47006	E-4	CP	590	404	-	○	3055	120.3	920	36.2	1375	54.1	1045	41.1	88.0	111		
	RL47	☆☆	47005	E-4	REG	670	459	-	○												

TG: Tractor-Grade tire. Not for highway service.

NHS: Not for highway service.

PSI × 0.0703 = kg/cm² POUND × 0.4536 = kg PSI × 6.895 = kPa

Tire Size	Pattern	Application Max Speed km/h mph	Tire Load Limits at Various Cold Inflation Pressures															
14.00R25	RB41	Earthmover 50 30	SM															***
			kPa	450	475	500	525	550	575	600	625	650	675	700	725	750	775	800
			psi	65	69	73	76	80	83	87	91	94	98	102	105	109	112	116
			kg	4000	4125	4375	4500	4625	4750	5000	5150	5300	5450	5600	5800	5800	6000	6150
			lbs	8800	9100	9650	9900	10200	10500	11000	11400	11700	12000	12300	12800	12800	13200	13600
16.00R25	RB41	Earthmover 50 30	SM											**				
			kPa	450	475	500	525	550	575	600	625	650	675	700				
			psi	65	69	73	76	80	83	87	91	94	98	102				
			kg	5150	5450	5600	5800	6000	6300	6500	6700	6900	7100	7300				
			lbs	11400	12000	12300	12800	13200	13900	14300	14800	15200	15700	16100				
18.00R33	RB42 RL42	Earthmover 50 30	SM											**				
			kPa	450	475	500	525	550	575	600	625	650	675	700				
			psi	65	69	73	76	80	83	87	91	94	98	102				
			kg	7750	8000	8500	8750	9000	9250	9750	10000	10300	10600	10900				
			lbs	17100	17600	18700	19300	19800	20400	21500	22000	22700	23400	24000				
24.00R35	RB42 RB42A RL42	Earthmover 50 30	SM											**				
			kPa	450	475	500	525	550	575	600	625	650	675	700				
			psi	65	69	73	76	80	83	87	91	94	98	102				
			kg	13200	13600	14000	14500	15500	16000	16500	17000	17500	18000	18500				
			lbs	29100	30000	30900	32000	34200	35300	36400	37500	38600	39700	40800				
27.00R49	RB42	Earthmover 50 30	SM											**				
			kPa	450	475	500	525	550	575	600	625	650	675	700				
			psi	65	69	73	76	80	83	87	91	94	98	102				
			kg	19500	20000	20600	21800	22400	23000	23600	25000	25750	26500	27250				
			lbs	43000	44100	45400	48100	49400	50700	52000	55100	56800	58400	60000				
33.00R51	RB42 RL47	Earthmover 50 30	SM											**				
			kPa	450	475	500	525	550	575	600	625	650	675	700				
			psi	65	69	73	76	80	83	87	91	94	98	102				
			kg	27250	29000	30000	30750	32500	33500	34500	35500	36500	37500	38750				
			lbs	60000	64000	66000	68000	71500	74000	76000	78500	80500	82500	85500				

Type
Specification Code

T/T: Tube Type
REG: Regular
CPUG: Cut Protected for Underground

T/L: Tubeless Type
HR: Heat Resistant

CP: Cut Protected
CP-S: Cut Protected -S



RADIAL: TECHNICAL DATA

Earthmover

Tire Size	Pattern	Star Mark	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	1/32				
46/90R57	RL47	☆☆	47001	E-4	CP	-	-	-	○	-	-	-	-	-	-	-	-	97.0	122	-	29.00-6.0
	RL47	☆☆	47003	E-4	REG	-	-	-	○	-	-	-	-	-	-	-	-	97.0	122	-	29.00-6.0
17.5R25	RL31	☆☆	03160	E-3	CP	124	85	-	○	1342	52.8	445	17.5	622	24.5	486	19.1	31.9	40	-	14.00-1.5
20.5R25	RB31	☆☆	13110	E-3	CP	153	105	-	○	1476	58.1	530	20.9	676	26.6	586	23.1	33.8	43	-	17.00-2.0
	RT31+	☆☆	13120	E-3	CP	139	95	-	○	1490	58.7	535	21.1	676	26.6	586	23.1	40.7	51		
	RL31	☆☆	13130	E-3	CP	135	93	-	○	1496	58.9	536	21.1	686	27.0	571	22.5	35.1	44		
23.5R25	RB31	☆☆	13111	E-3	CP	168	115	-	○	1600	63.0	612	24.1	720	28.3	672	26.5	35.9	45	-	19.50-2.5
	RT31	☆☆	13121	E-3	CP	175	120	-	○	1600	63.0	612	24.1	720	28.3	672	26.5	35.8	45		
	RL31	☆☆	03172	E-3	CP	146	100	-	○	1601	63.0	626	24.6	720	28.3	665	26.2	40.7	51		
	RT41	☆☆	14151	E-4	CP	139	95	-	○	1614	63.5	606	23.9	728	28.7	674	26.5	54.0	68		
	RT41	☆☆	04128	E-4	CPUG	123	84	-	○	1614	63.5	606	23.9	728	28.7	674	26.5	54.0	68		
26.5R25	RB31	☆☆	13112	E-3	CP	182	125	-	○	1732	68.2	675	26.6	785	30.9	744	29.3	38.8	49	-	22.00-3.0
	RT31+	☆☆	13122	E-3	CP	182	125	-	○	1731	68.1	668	26.3	778	30.6	748	29.4	45.6	57		
	RT41	☆☆	14152	E-4	CP	160	110	-	○	1732	68.2	675	26.6	781	30.7	740	29.1	60.1	76		
	RT41	☆☆	04126	E-4	CPUG	143	98	-	○	1732	68.2	675	26.6	781	30.7	740	29.1	60.1	76		
	RL45	☆☆	14501	E-4	CP	160	110	-	○	1760	69.3	675	26.6	796	31.3	744	29.3	60.1	76		
29.5R25	RB31	☆☆	13113	E-3	CP	270	185	-	○	1850	72.8	760	29.9	831	32.7	842	33.1	48.0	60	-	25.00-3.5
	RT41	☆☆	14153	E-3	CP	204	140	-	○	1865	73.4	760	29.9	846	33.3	833	32.8	65.0	82		
	RT41	☆☆	04127	E-4	CPUG	182	125	-	○	1865	73.4	760	29.9	846	33.3	833	32.8	65.0	82		
	RL45	☆☆	14502	E-4	CP	204	140	-	○	1901	74.8	770	30.3	860	33.9	850	33.5	65.0	82		
750/65R25	RT31	☆☆	03169	E-3	CP	225	154	-	○	1620	63.8	743	29.3	730	28.7	817	32.2	43.7	55	-	24.00-3.0

TG: Tractor-Grade tire. Not for highway service.

NHS: Not for highway service.

PSI × 0.0703 = kg/cm² POUND × 0.4536 = kg PSI × 6.895 = kPa

Tire Size	Pattern	Application Max Speed km/h mph	Tire Load Limits at Various Cold Inflation Pressures															
46/90R57	RL47	Earthmover 50 30	SM											**				
			kPa	450	475	500	525	550	575	600	625	650	675	700				
			psi	65	69	73	76	80	83	87	91	94	98	102				
			kg	46250	47500	50000	51500	53000	54500	56000	58000	60000	61500	63000				
			lbs	102000	104500	110000	113500	117000	120000	123500	128000	132500	135500	139000				
17.5R25	RL31	Earthmover 50 30	SM											**				
			kPa	275	300	325	350	375	400	425	450	475	500	525				
			psi	40	44	47	51	54	58	62	65	69	73	76				
			kg	3350	3550	3750	4000	4250	4375	4625	4750	5000	5150	5450				
			lbs	7400	7850	8250	8800	9350	9650	10200	10500	11000	11400	12000				
20.5R25	RB31 RT31+ RL31	Earthmover 50 30	SM											**				
			kPa	275	300	325	350	375	400	425	450	475	500	525				
			psi	40	44	47	51	54	58	62	65	69	73	76				
			kg	4375	4750	5000	5300	5600	5800	6150	6500	6700	6900	7300				
			lbs	9650	10500	11000	11700	12300	12800	13600	14300	14800	15200	16100				
23.5R25	RB31 RT31+ RT41	Earthmover 50 30	SM											**				
			kPa	275	300	325	350	375	400	425	450	475	500	525				
			psi	40	44	47	51	54	58	62	65	69	73	76				
			kg	5600	6000	6500	6700	7100	7500	7750	8250	8500	9000	9250				
			lbs	12300	13200	14300	14800	15700	16500	17100	18200	18700	19800	20400				
26.5R25	RB31 RT31+ RT41 RL45	Earthmover 50 30	SM											**				
			kPa	275	300	325	350	375	400	425	450	475	500	525				
			psi	40	44	47	51	54	58	62	65	69	73	76				
			kg	7100	7500	8000	8500	9000	9500	9750	10300	10600	11200	11500				
			lbs	15700	16500	17600	18700	19800	20900	21500	22700	23400	24700	25400				
29.5R25	RB31 RT41 RL45	Earthmover 50 30	SM											**				
			kPa	275	300	325	350	375	400	425	450	475	500	525				
			psi	40	44	47	51	54	58	62	65	69	73	76				
			kg	8500	9250	9750	10300	10900	11500	11800	12500	12850	13600	14000				
			lbs	18700	20400	21500	22700	24000	25400	26000	27600	28300	30000	30900				
750/65R25	RT31	Earthmover 50 30	SM									**						
			kPa	275	300	325	350	375	400	425	450	475						
			psi	40	44	47	51	54	58	62	65	69						
			kg	6900	7300	7750	8250	8750	9250	9750	10300	10600						
			lbs	15200	16100	17100	18200	19300	20400	21500	22700	23400						

Type
Specification Code

T/T: Tube Type
REG: Regular
CPUG: Cut Protected for Underground

T/L: Tubeless Type
HR: Heat Resistant

CP: Cut Protected
CP-S: Cut Protected -S



RADIAL: TECHNICAL DATA

Loader & Dozer

Tire Size	Pattern	Star Mark	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	1/32				
18.00R25	R69	☆☆	46901	L-5S	CPUG	-	-	-	○	1673	65.9	500	19.7	760	29.9	571	22.5	85.0	107	-	13.00-2.5
17.5R25	RB31	☆	03150	L-3	CP	-	-	-	○	1348	53.1	442	17.4	607	23.9	500	19.7	31.0	39	-	14.00-1.5
	MYX S01	☆	00290	L-2	-	-	-	-	○	1334	52.5	445	17.5	600	23.6	510	20.1	27.2	34		
20.5R25	RB31	☆	13110	L-3	CP	-	-	-	○	1476	58.1	530	20.9	658	25.9	610	24.0	33.8	43	-	17.00-2.0
	RT31+	☆	13120	L-3	CP	-	-	-	○	1490	58.7	535	21.1	658	25.9	610	24.0	40.7	51		
	RL31	☆	13130	L-3	CP	-	-	-	○	1496	58.9	536	21.1	673	26.5	595	23.4	35.1	44		
	MYX S01	☆	00291	L-2	-	-	-	-	○	1494	58.8	534	21.0	655	25.8	610	24.0	30.1	38		
23.5R25	RB31	☆	13111	L-3	CP	-	-	-	○	1600	63.0	612	24.1	703	27.7	694	27.3	35.9	45	-	19.50-2.5
	RT31	☆	13121	L-3	CP	-	-	-	○	1600	63.0	612	24.1	703	27.7	694	27.3	35.8	45		
	RT41	☆	14151	L-4	CP	-	-	-	○	1614	63.5	606	23.9	708	27.9	691	27.2	54.0	68		
	RL51	☆	51501	L-5	CP	-	-	-	○	1658	65.3	621	24.4	740	29.1	694	27.3	78.3	9		
26.5R25	RB31	☆	13112	L-3	CP	-			○	1732	68.2	675	26.6	763	30.0	760	29.9	38.8	49	-	22.00-3.0
	RT31+	☆	13122	L-3	CP	-			○	1731	68.1	668	26.3	760	29.9	765	30.1	45.6	57		
	RT41	☆	14152	L-4	CP	-			○	1732	68.2	675	26.6	757	29.8	761	30.0	60.1	76		
	RL45	☆	14501	L-4	CP	-			○	1760	69.3	675	26.6	776	30.6	769	30.3	60.1	76		
	RL52	☆	52090	L-5	CP	-			○	1784	70.2	697	27.4	800	31.5	737	29.0	96.0	121		
29.5R25	RB31	☆	13113	L-3	CP	-	-	-	○	1850	72.8	760	29.9	806	31.7	866	34.1	48.0	60	-	25.00-3.5
	RT41	☆	14153	L-3	CP	-	-	-	○	1865	73.4	760	29.9	833	32.8	855	33.7	65.0	82		
	RL45	☆	14502	L-4	CP	-	-	-	○	1901	74.8	770	30.3	840	33.1	873	34.4	65.0	82		

TG: Tractor-Grade tire. Not for highway service.

NHS: Not for highway service.

PSI × 0.0703 = kg/cm² POUND × 0.4536 = kg PSI × 6.895 = kPa

Tire Size	Pattern	Application Max Speed km/h mph	Tire Load Limits at Various Cold Inflation Pressures															
18.00R25	R69	Loader 10 5	SM													**		
			kPa	525	550	575	600	625	650	675	700	725	750	775	800	825		
			psi	76	80	83	87	91	94	98	102	105	109	112	116	120		
			kg	11200	11800	12150	12500	12850	13200	13600	14000	14500	15000	15000	15500	16000		
			lbs	24700	26000	26800	27600	28300	29100	30000	30900	32000	33100	33100	34200	35300		
17.5R25	RB31 MYX S01	Loader 10 5	SM					*										
			kPa	400	425	450	475	500										
			psi	58	62	65	69	73										
			kg	6000	6150	6500	6700	7100										
			lbs	13200	13600	14300	14800	15700										
20.5R25	RB31 RT31+ RL31 MYX S01	Loader 10 5	SM					*										
			kPa	400	425	450	475	500										
			psi	58	62	65	69	73										
			kg	8000	8250	8750	9000	9500										
			lbs	17600	18200	19300	19800	20900										
23.5R25	RB31 RT31+ RT41 RL51	Loader 10 5	SM					*										
			kPa	400	425	450	475	500										
			psi	58	62	65	69	73										
			kg	10300	10600	11200	11500	12150										
			lbs	22700	23400	24700	25400	26800										
26.5R25	RB31 RT31+ RT41 RL45 RL52	Loader 10 5	SM					*										
			kPa	400	425	450	475	500										
			psi	58	62	65	69	73										
			kg	12850	13200	14000	14500	15000										
			lbs	28300	29100	30900	32000	33100										
29.5R25	RB31 RT41 RL45	Loader 10 5	SM					*										
			kPa	400	425	450	475	500										
			psi	58	62	65	69	73										
			kg	15500	16000	17000	17500	18000										
			lbs	34200	35300	37500	38600	39700										

Type
Specification Code

T/T: Tube Type
REG: Regular
CPUG: Cut Protected for Underground

T/L: Tubeless Type
HR: Heat Resistant

CP: Cut Protected
CP-S: Cut Protected -S



RADIAL: TECHNICAL DATA

Grader

Tire Size	Pattern	Star Mark	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	1/32				
14.00R24TG	RT21	☆	02101	G-2	REG	-	-	-	○	1346	53.0	356	14.0	621	24.4	433	17.0	24.6	31	-	8.00TG
17.5R25	MYX S01	☆	00290	G-2	-	-	-	-	○	1334	52.5	445	17.5	600	23.6	510	20.1	27.2	34	-	14.00-1.5
20.5R25	MYX S01	☆	00291	G-2	-	-	-	-	○	1494	58.8	534	21.0	655	25.8	610	24.0	30.1	38	-	17.00-2.0

Industrial

Tire Size	Pattern	Star Mark	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	inch	mm	1/32		
16.00R25	RR41	☆☆☆	04151	IND-4	-	-	-	-	○	1499	59.0	423	16.7	656	25.8	497	19.6	52.4	66	-	11.25-2.0

Crane

Tire Size	Pattern	Star Mark LI/SS	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	1/32				
14.00R24NHS	RB01	☆☆☆	00130	MC	-	-	-	○		1353	53.3	384	15.1	625	24.6	424	16.7	22.5	28	14.00R24/25	10.00W
	RB03	☆☆☆	00134	MC	-	-	-	○	-												
385/95R25 (DOT Crane)	RB01	170F	00350	MC	-	-	-	-	○	1353	53.3	384	15.1	629	24.8	420	16.5	22.5	28	-	10.00-1.5
445/95R25 (DOT Crane)	RB01	174F	00129	MC	-	-	-	-	○	1485	58.5	445	17.5	690	27.2	487	19.2	23.3	29	-	11.25-2.0

TG: Tractor-Grade tire. Not for highway service.
 NHS: Not for highway service.
 PSI × 0.0703 = kg/cm² POUND × 0.4536 = kg PSI × 6.895 = kPa

Tire Size	Pattern	Application Max Speed km/h mph	Tire Load Limits at Various Cold Inflation Pressures															
14.00R24TG	RT21	Grader 40 25	SM								*							
			kPa	200	225	250	275	300	325	350	375							
			psi	29	33	36	40	44	47	51	54							
			kg	2240	2430	2650	2800	3000	3250	3350	3650							
			lbs	4940	5360	5840	6150	6600	7150	7400	8050							
17.5R25	MYX S01	Grader 40 25	SM					*										
			kPa	200	225	250	275	300										
			psi	29	33	36	40	44										
			kg	2650	2900	3075	3350	3650										
			lbs	5840	6400	6800	7400	8050										
20.5R25	MYX S01	Grader 40 25	SM					*										
			kPa	200	225	250	275	300										
			psi	29	33	36	40	44										
			kg	3450	3875	4125	4375	4625										
			lbs	7600	8550	9100	9650	10200										

Tire Size	Pattern	IP	Tire Load Limits at Various Speeds For Smooth Floors and Runways Use							
		kPa	km/h	0 km/h	Creep	4	10	15	20	25
		PSI	mph	Static	Creep	2.5	5	10	12	15
16.00R25	RR41	1000	Kg	22300	19800	18000	16700	16100	15700	15500
		145	lbs	49200	43700	39700	36800	35500	34600	34200

Tire Size	Pattern	IP		Tire Load Limits at Various Speeds												
		kPa	km/h	Static	Creep	4	10	30	40	45	50	60	70	80	90	100
		PSI	mph	Static	Creep	2.5	5	20	25	28	30	35	43	50	55	62
14.00R24NHS	RB01	900	Kg.	16300	13200	11700	10100	-	6800	6500***	6200					
	RB03	130	lbs	35900	29100	25800	22300	-	15000	14300	13700					
385/95R25 (DOT Crane)	RB01	900	Kg.	15000	-	12600	10800	7500	6900	-	6700	6600	6300	6000(170F)	5600	5100
		130	lbs	33100	-	27800	23800	16500	15200	-	14800	14600	13900	13200	12300	11200
445/95R25 (DOT Crane)	RB01	900	Kg.	16800	-	14100	12100	8400	7700	-	7500	7400	7000	6700(174F)	6300	5700
		130	lbs	37000	-	31100	26700	18500	17000	-	16500	16300	15400	14800	13900	12600

Type
Specification Code

T/T: Tube Type
REG: Regular
CPUG: Cut Protected for Underground

T/L: Tubeless Type
HR: Heat Resistant

CP: Cut Protected
CP-S: Cut Protected -S



APPENDIX

(RADIAL)

Haulage Service (OFF-THE-ROAD for Dump Trucks & Scrapers)

30 MPH (50 KPH) Maximum Speed | Distance: Up to 2.5 miles (4 km) one way

Wide Base Radial Ply Tires

Conventional Radial Ply Tires

- NOTES**
- 1. Bold face figures denote maximum load for symbols shown.
 - 2. For 40 mph (65 km/h) maximum speed, the loads must be reduced 12% with no change in inflation pressure.
 - 3. When haul length exceeds 2.5 miles (4 km) one way, consult your Yokohama service representative.

Slow Speed Service (OFF-THE-ROAD for Loaders & Dozers)

5 MPH (10 KPH) Maximum speed | Distance: Up to 250 feet (76 m) one way

Wide Base Radial Ply Tires

- NOTES**
- 1. Bold face figures denote maximum load for symbols shown.
 - 2. On front tires for front-end loaders, it is permissible to increase inflation pressure up to 15 psi (100 kPa) above that shown in the table with no increase in load.
 - 3. For tire load limits at various speeds:

Max. Speed	% Load Change From 5 MPH Table
Stationary	+60%
Creep	+30%
2 1/2 mph (4 km/h)	+15%
5 mph (10 km/h)	No Change
10 mph (15 km/h)	-13%
15 mph (25 km/h)	-20%

- 4. Creep
This is movement of equipment at very slow speed (not over 200 feet (60 m) in 30 minutes). During creep motion, loads on the tires are very high and consideration must be given to the type of surface over which the equipment is traveling.

Tractor & Grader Service (OFF-THE-ROAD)

25 MPH (40 KPH) Maximum speed | Distance: Unlimited

Conventional Radial Ply Tires

- NOTES**
- 1. Bold face figures denote maximum load for symbols shown.
 - 2. For maintenance work on established highways, inflation pressures may be increased 50% if desired with no increase in loads.
 - 3. For slope and ditching service, inflation pressures should be increased 15 psi (100 kPa) with no increase in load rating. For extreme conditions, consult tire and rim manufacturers for additional recommended operating requirements.
 - 4. For tire load limits at various speeds with no increase in inflation pressure:

Max. Speed	% Change To Loads In Table
25 mph (40 km/h)	No Change
30 mph (50 km/h)	-9%
35 mph (60 km/h)	-18%
40 mph (65 km/h)	-27%

Highway Service (OFF-THE-ROAD for Mobile / Wheeled Cranes)

Size Conversion Table

Metric	Inch
385/95R24, 25	14.00R24, 25
445/95R25	16.00R25

NOTES: Bold face figures denote maximum load for symbols shown.

Industrial Service (OFF-THE-ROAD for Smooth Floors & Runways Use)

NOTES 1. Industrial Vehicle

Consists of usage on vehicles such as counterbalanced lift trucks, container handlers, straddle carriers, aircraft tow tractors, log stackers and rough terrain trucks.

2. Smooth Floors and Runways

These are defined as paved or protected operating surfaces which are free of undulations, obstructions or discontinuities.

3. Creep

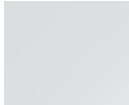
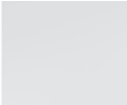
This is movement of equipment at very slow speed (not over 200 feet (60 m) in 30 minutes). During creep motion, loads on the tires are very high and consideration must be given to the type of surface over which the equipment is traveling.

Check maximum air pressure requirements of rims and wheels to ensure ability to accommodate correct air pressure of tire.



BIAS: APPLICATION

Earthmover

Tire Size	TRA Code / Pattern				
	E-3		E-3	E-4	E-4
	Y67		Y565	Y523	Y567
					
	Ply Rating & Type				
	T/T	T/L	T/L	T/L	T/L
10.00-20NHS	24 [♣]				
12.00-20NHS	24 ^S ,28 ^S				
14.00-20NHS	32				
14.00-24NHS	24,28				
16.00-24NHS		24			
14.00-25NHS		24			
16.00-25		24 [♣] ,28 [♣]		28	
18.00-25		32		32	
18.00-33				32	
21.00-35				36 [♣] ,40	
24.00-35				42 [♣]	
24.00-49				42,48	
27.00-49				48 [♣]	
33.00-51				50 ^S ,58	50 [♣] ,58
36.00-51			58,66	50	
40.00-57				68,76	68
26.5-25		26			
29.5-25		28			
26.5-29		26			
29.5-29		28			
33.25-29		26,32 [♣]			
29.5-35		34			
33.25-35		32,38			
37.25-35		30,36 [♣]			
37.5-39		52 [♣]			

♣: Both nylon breaker construction and steel breaker construction available
 S: Steel breaker construction only
 NHS : Not for highway service
 T/T : Tube Type T/L : Tubeless Type



Loader & Dozer

Tire Size	TRA Code / Pattern									
	L-2		L-2		L-3		L-3		L-3	
	Y103		Y548		Y67		Y526K		Y575	
										
	Ply Rating & Type									
	T/T		T/T	T/L	T/T	T/L	T/T		T/T	
13.00-24TG						16 ^S				
15.5-25	12				12	12				
17.5-25	12		12,16	12,16		12 ^Δ ,16			12 ^Δ ,16	
20.5-25	12,16					16			12 ^Δ ,20	
23.5-25	16					16 ^Δ	16 ^Δ			16 ^Δ ,20 ^Δ
26.5-25									20 ^Δ ,24	
29.5-25									28 ^Δ	
29.5-29						28				

Δ: Both nylon breaker construction and steel breaker construction available

S: Steel breaker construction only

TG: Tractor-Grade tire. Not for highway service. T/T: Tube Type T/L: Tubeless Type

NHS: Not for highway service





Loader & Dozer

Tire Size	TRA Code / Pattern					
	L-4	L-4	L-5	L-5	L-5/L-5S	L-5
	Y67E	Y545	Y524	**Y524	**Y524Z	Y525
						
	Ply Rating & Type					
	T/L	T/L	T/L	T/L	T/L	T/T
12.00-24NHS						20
17.5-25	12					
20.5-25				16,20		
23.5-25		20 [¶] ,24	16,20,24			
26.5-25		20,24		20,24		
29.5-25		28		28 [¶]		
29.5-29	28		28,34 [§]			
35/65-33		30 [§] ,42 [§]		24 [§] ,30 [§] ,42 [§]	42 [§]	
45/65-45		58 [§]		38 [§] ,50 [§] ,58 [§]	58 [§]	

** Y524 with side protector

¶: Both nylon breaker construction and steel breaker construction available

§: Steel breaker construction only

NHS : Not for highway service

T/T : Tube Type T/L : Tubeless Type

Loader & Dozer

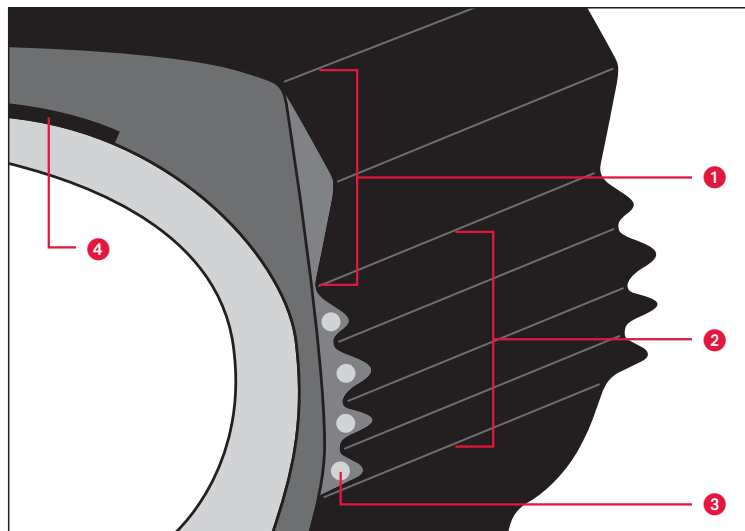
Tire Size	TRA Code / Pattern				
	L-5S		L-5S	L-4S	L-5S
	Y69		Y69K	Y69U	Y69U
					
	T/T	T/L	T/L	T/T	T/L
12.00-24NHS	16			16	
18.00-25		28	32		
17.5-25		16,20			20 ^S
20.5-25		16			
23.5-25		20			
26.5-25			32		32 ^S
29.5-29			34		

^S: Steel breaker construction only

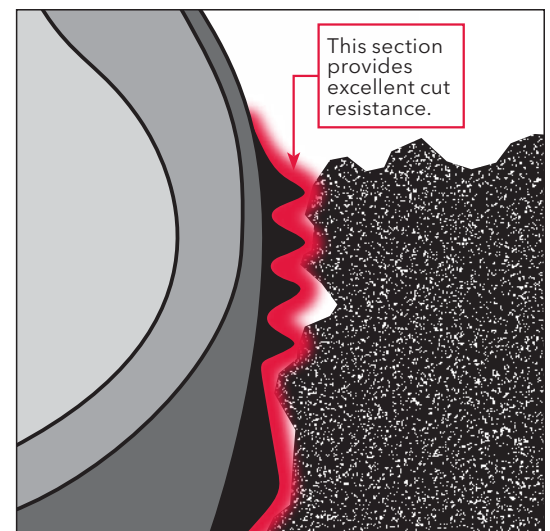
NHS : Not for highway service

T/T : Tube Type T/L : Tubeless Type

Special Construction of Y69U



- ① Buttress Shoulder Profile
- ② Special Reinforcement (Wavy Side +ZSC)
- ③ ZSC
- ④ Steel Breaker Construction





Grader

Tire Size	TRA Code / Pattern	
	G-2	G-3
	Y103	Y67
		
	Ply Rating & Type	
	T/L	T/L
13.00-24TG	12	12
14.00-24TG	12	16
16.00-24TG		16

TG: Tractor-Grade tire. Not for highway service. T/T : Tube Type T/L : Tubeless Type

Industrial

Tire Size								
	IND-3		IND-3S	IND-3	IND-4	IND-4S		IND-5S
	Y67		Y69PS	Y573	Y523	Y69		Y69
								
	T/T	T/L	T/L	T/L	T/L	T/T	T/L	T/L
12.00-20NHS	18							
12.00-24NHS	20,28							
14.00-24NHS		28				30		
16.00-25		36	32					
18.00-25		40			32,40		40	40
21.00-25		40					40	
18.00-33					40*		40	
21.00-35		40					42	
33.00-51					58			
36.00-51					58			
40.00-57					76			
17.5-25				36				
29.5-25		34						
29.5-29		40						
33.25-29		38						
33.25-35		44						

*: Both nylon breaker construction and steel breaker construction available.

NHS: Not for highway service. T/T: Tube Type T/L : Tubeless Type





BIAS: TECHNICAL DATA

Earthmover

Tire Size	Pattern	Ply Rating	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	1/32				
10.00-20NHS	Y67	24	16757	E-3	RER	-	-	○	-	1060	41.7	280	11.0	498	19.6	295	11.6	20.4	26	10.00-20	8.50V
12.00-20NHS	Y67	24	16759	E-3	CP	-	-	○	-	1135	44.7	322	12.7	516	20.3	347	13.7	25.5	32	12.00-20	8.50V
	Y67	28	16786	E-3	CP	-	-	○	-												
14.00-20NHS	Y67	32	16765	E-3	CP	-	-	○	-	1250	49.2	386	15.2	583	23.0	401	15.8	27.5	35	14.00-20	10.00WI
14.00-24NHS	Y67	24	06715	E-3	CPC	95	65	○	-	1345	53.0	380	15.0	624	24.6	408	16.1	27.7	35	14.00-24/25	10.00W
	Y67	28	06716	E-3	CPC	95	65	○	-												
16.00-24NHS	Y67	24	06722	E-3	CPC	139	95	-	○	1475	58.1	445	17.5	686	27.0	467	18.4	34.3	43	-	11.25-2.0
14.00-25	Y67	24	06708	E-3	RER	109	75	-	○	1345	53.0	380	15.0	624	24.6	408	16.1	27.7	35	-	10.00-1.5
16.00-25	Y67	24	06709	E-3	CPC	124	85	-	○	1475	58.1	445	17.5	686	27.0	467	18.4	34.3	43	-	11.25-2.0
	Y67	28	06710	E-3	CPC	124	85	-	○	-	-	-	-	-	-	-	-	-			
	Y523	28	02326	E-4	CPC	102	70	-	○	1540	60.6	443	17.4	724	28.5	467	18.4	59.3	75		

TG: Tractor-Grade tire. Not for highway service.
NHS: Not for highway service.

PSI × 0.0703 = kg/cm² POUND × 0.4536 = kg PSI × 6.895 = kPa

Tire Size	Pattern	Application Max Speed km/h mph	Tire Load Limits at Various Cold Inflation Pressures															
10.00-20NHS	Y67	Earthmover 50 30	PR															24
			kPa	425	450	475	500	525	550	575	600	625	650	675	700	725	750	775
			psi	62	65	69	73	76	80	83	87	91	94	98	102	105	109	112
			kg	2240	2360	2430	2500	2575	2650	2725	2800	2800	2900	3000	3000	3075	3150	3250
			lbs	4940	5200	5360	5520	5680	5840	6000	6150	6150	6400	6600	6600	6800	6950	7150
12.00-20NHS	Y67	Earthmover 50 30	PR										24					28
			kPa	425	450	475	500	525	550	575	600	625	650	675	700	725	750	775
			psi	62	65	69	73	76	80	83	87	91	94	98	102	105	109	112
			kg	2800	2900	3000	3075	3150	3250	3350	3450	3550	3650	3750	3750	3875	4000	4000
			lbs	6150	6400	6600	6800	6950	7150	7400	7600	7850	8050	8250	8250	8550	8800	8800
14.00-20NHS	Y67	Earthmover 50 30	PR															32
			kPa	425	450	475	500	525	550	575	600	625	650	675	700	725	750	
			psi	62	65	69	73	76	80	83	87	91	94	98	102	105	109	
			kg	3875	4000	4125	4250	4375	4500	4625	4750	4875	5000	5150	5150	5300	5450	
			lbs	8550	8800	9100	9350	9650	9900	10200	10500	10700	11000	11400	11400	11700	12000	
14.00-24NHS	Y67	Earthmover 50 30	PR							24			28					
			kPa	425	450	475	500	525	550	575	600	625	650					
			psi	62	65	69	73	76	80	83	87	91	94					
			kg	4375	4500	4625	4750	4875	5000	5150	5300	5450	5600					
			lbs	9650	9900	10200	10500	10700	11000	11400	11700	12000	12300					
16.00-24NHS	Y67	Grader 40 25	PR								24							
			kPa	300	325	350	375	400	425	450	475							
			psi	44	47	51	54	58	62	65	69							
			kg	4625	4875	5000	5300	5450	5600	5800	6000							
			lbs	10200	10700	11000	11700	12000	12300	12800	13200							
14.00-25	Y67	Earthmover 50 30	PR							24								
			kPa	425	450	475	500	525	550	575								
			psi	62	65	69	73	76	80	83								
			kg	4375	4500	4625	4750	4875	5000	5150								
			lbs	9650	9900	10200	10500	10700	11000	11400								
16.00-25	Y67 Y523	Earthmover 50 30	PR								24				28			
			kPa	300	325	350	375	400	425	450	475	500	525	550	575			
			psi	44	47	51	54	58	62	65	69	73	76	80	83			
			kg	4625	4875	5000	5300	5450	5600	5800	6000	6300	6500	6500	6700			
			lbs	10200	10700	11000	11700	12000	12300	12800	13200	13900	14300	14300	14800			

Type
Specification Code

T/T: Tube Type
CP: Cut Protected
CPS: Cut Protected -S
CPC: Cut Protected -C
CPUG: Cut Protected for Underground

T/L: Tubeless Type
REG: Regular
RER: Regular-R
RET: Regular-T

STL: Steel Breaker Construction
HR: Heat Resistant
HRH: Heat Resistant-H
HRV: Heat Resistant-V



BIAS: TECHNICAL DATA

Earthmover

Tire Size	Pattern	Ply Rating	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	1/32				
18.00-25	Y67	32	06732	E-3	CPC	160	110	-	○	1599	63.0	520	20.5	734	28.9	540	21.3	38.5	49	-	13.00-2.5
	Y523	32	52304	E-4	CPC	139	95	-	○	1652	65.0	517	20.4	772	30.4	541	21.3	61.3	77		
18.00-33	Y523	32	52315	E-4	CPC	153	105	-	○	1800	70.9	520	20.5	840	33.1	554	21.8	41.1	52	-	13.00-2.5
	Y523	32	52318	E-4	RER	125	102	-	○												
21.00-35	Y523	36	02302	E-4	CPC	190	130	-	○	2045	80.5	590	23.2	951	37.4	623	24.5	63.2	80	-	15.00-3.0
	Y523	36	02336	E-4	CPC/STL	133	91	-	○												
	Y523	40	52320	E-4	RER	219	150	-	○												
24.00-35	Y523	42	02320	E-4	CPC	226	155	-	○	2175	85.6	687	27.0	990	39.0	710	28.0	64.6	81	-	17.00-3.5
	Y523	42	52322	E-4	RER	263	180	-	○												
	Y523	42	52330	E-4	CPC/STL	158	109	-	○												
24.00-49	Y523	42	52339	E-4	CPC	277	190	-	○	2529	99.6	655	25.8	1184	46.6	697	27.4	64.6	81	-	17.00-3.5
27.00-49	Y523	48	52341	E-4	CPC	336	230	-	○	2659	105.5	748	29.4	1245	49.0	791	31.1	71.3	90	-	19.50-4.0
	Y523	48	52373	E-4	RER	387	265	-	○												
	Y523	48	02328	E-4	CPC/STL	235	161	-	○												
33.00-51	Y523	50	52329	E-4	CPC/STL	361	248	-	○	3039	119.6	927	36.5	1404	55.3	985	38.8	82.7	104	-	24.00-5.0
	Y523	58	02329	E-4	HRV	642	440	-	○												
	Y567	50	56754	E-4	CPC	516	354	-	○	3039	119.6	927	36.5	1404	55.3	985	38.8	82.7	104		
	Y567	50	56755	E-4	RER	613	420	-	○												
	Y567	58	56750	E-4	CPC	516	354	-	○												
	Y567	58	56752	E-4	RET	664	455	-	○												

TG: Tractor-Grade tire. Not for highway service.

NHS: Not for highway service.

PSI × 0.0703 = kg/cm² POUND × 0.4536 = kg PSI × 6.895 = kPa

Tire Size	Pattern	Application Max Speed km/h mph	Tire Load Limits at Various Cold Inflation Pressures														
			PR									28			32		
18.00-25	Y67 Y523	Earthmover 50 30	kPa	300	325	350	375	400	425	450	475	500	525	550	575		
			psi	44	47	51	54	58	62	65	69	73	76	80	83		
			kg	6000	6300	6500	6900	7100	7300	7500	7750	8000	8250	8500	8750		
			lbs	13200	13900	14300	15200	15700	16100	16500	17100	17600	18200	18700	19300		
			PR									28			32		
18.00-33	Y523	Earthmover 50 30	kPa	300	325	350	375	400	425	450	475	500	525	550	575		
			psi	44	47	51	54	58	62	65	69	73	76	80	83		
			kg	6900	7300	7500	8000	8250	8500	8750	9000	9250	9500	10000	10300		
			lbs	15200	16100	16500	17600	18200	18700	19300	19800	20400	20900	22000	22700		
			PR												36		40
21.00-35	Y523	Earthmover 50 30	kPa	300	325	350	375	400	425	450	475	500	525	550	575	600	625
			psi	44	47	51	54	58	62	65	69	73	76	80	83	87	91
			kg	9250	9500	10000	10300	10900	11200	11500	11800	12150	12500	12850	13200	13600	14000
			lbs	20400	20900	22000	22700	24000	24700	25400	26000	26800	27600	28300	29100	30000	30900
			PR												42		
24.00-35	Y523	Earthmover 50 30	kPa	300	325	350	375	400	425	450	475	500	525	550	575		
			psi	44	47	51	54	58	62	65	69	73	76	80	83		
			kg	11800	12150	12850	13200	14000	14500	15000	15500	15500	16000	16500	17000		
			lbs	26000	26800	28300	29100	30900	32000	33100	34200	34200	35300	36400	37500		
			PR												42		
24.00-49	Y523	Earthmover 50 30	kPa	300	325	350	375	400	425	450	475	500	525	550	575		
			psi	44	47	51	54	58	62	65	69	73	76	80	83		
			kg	14000	14500	15500	16000	16500	17000	17500	18500	19000	19500	20000	20600		
			lbs	30900	32000	34200	35300	36400	37500	38600	40800	41900	43000	44100	45400		
			PR												48		
27.00-49	Y523	Earthmover 50 30	kPa	300	325	350	375	400	425	450	475	500	525	550	575		
			psi	44	47	51	54	58	62	65	69	73	76	80	83		
			kg	17000	18000	19000	19500	20600	21200	21800	22400	23000	23600	24300	25000		
			lbs	37500	39700	41900	43000	45400	46700	48100	49400	50700	52000	53600	55100		
			PR									50			58		
33.00-51	Y523 Y567	Earthmover 50 30	kPa	300	325	350	375	400	425	450	475	500	525	550	575		
			psi	44	47	51	54	58	62	65	69	73	76	80	83		
			kg	24300	25750	27250	28000	29000	30000	31500	32500	33500	34500	35500	35500		
			lbs	53600	56800	60000	61500	64000	66000	69500	71500	74000	76000	78500	78500		
			PR														

Type
Specification Code

T/T: Tube Type
CP: Cut Protected
CPS: Cut Protected-S
CPC: Cut Protected-C
CPUG: Cut Protected for Underground

T/L: Tubeless Type
REG: Regular
RER: Regular-R
RET: Regular-T

STL: Steel Breaker Construction
HR: Heat Resistant
HRH: Heat Resistant-H
HRV: Heat Resistant-V



BIAS: TECHNICAL DATA

Earthmover

Tire Size	Pattern	Ply Rating	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	1/32				
36.00-51	Y523	50	52345	E-4	CPC	481	330	-	○	3198	125.9	1040	40.9	1476	58.1	1090	42.9	92.2	116	-	26.00-5.0
	Y565	58	03179	E-3	RET	730	500	-	○	3200	126.0	1045	41.1	1460	57.5	1100	43.3	51.8	65		
	Y565	66	03180	E-3	RET	730	500	-	○												
40.00-57	Y523	68	02307	E-4	RET	657	450	-	○	3551	139.8	1127	44.4	1624	63.9	1200	47.2	92.8	117	-	26.00-5.0
	Y523	76	02308	E-4	RET	657	450	-	○												
	Y567	68	56751	E-4	RER	717	491	-	○	3544	139.5	1127	44.4	1621	63.8	1200	47.2	92.8	117		
	Y567	68	56751	E-4	CPC	613	420	-	○												
26.5-25	Y67	26	06759	E-3	REG	153	105	-	○	1730	68.1	700	27.6	778	30.6	732	28.8	44.9	57	-	22.00-3.0
29.5-25	Y67	28	06762	E-3	REG	160	110	-	○	1876	73.9	776	30.6	822	32.4	826	32.5	49.6	62	-	25.00-3.5
26.5-29	Y67	26	06760	E-3	REG	182	125	-	○	1834	72.2	691	27.2	829	32.6	723	28.5	40.8	51	-	22.00-3.0
29.5-29	Y67	34	06764	E-3	CP	168	115	-	○	1947	76.7	768	30.2	876	34.5	806	31.7	49.6	62	-	25.00-3.5
33.25-29	Y67	26	16752	E-3	CP	212	145	-	○	2075	81.7	836	32.9	924	36.4	873	34.4	45.8	58	-	27.00-3.5
	Y67	32	16753	E-3	CP	212	145	-	○												
	Y67	32	16766	E-3	CP/STL	148	102	-	○												

TG: Tractor-Grade tire. Not for highway service.
NHS: Not for highway service.

PSI × 0.0703 = kg/cm² POUND × 0.4536 = kg PSI × 6.895 = kPa

Tire Size	Pattern	Application Max Speed km/h mph	Tire Load Limits at Various Cold Inflation Pressures															
			PR							50			58			66		
36.00-51	Y523 Y565	Earthmover 50 30	kPa	300	325	350	375	400	425	450	475	500	525	550	575	600		
			psi	44	47	51	54	58	62	65	69	73	76	80	83	87		
			kg	30000	31500	32500	34500	35500	36500	37500	38750	40000	41250	42500	43750	45000		
			lbs	66000	69500	71500	76000	78500	80500	82500	85500	88000	91000	93500	96500	99000		
			PR															
40.00-57	Y523 Y567	Earthmover 50 30	kPa	300	325	350	375	400	425	450	475	500	525	550	575	600	625	
			psi	44	47	51	54	58	62	65	69	73	76	80	83	87	91	
			kg	38750	40000	41250	43750	45000	46250	48750	50000	51500	53000	54500	56000	58000	58000	
			lbs	85500	88000	91000	96500	99000	102000	107500	110000	113500	117000	120000	123500	128000	128000	
			PR					26										
26.5-25	Y67	Earthmover 50 30	kPa	225	250	275	300	325										
			psi	33	36	40	44	47										
			kg	7750	8250	8750	9250	9500										
			lbs	17100	18200	19300	20400	20900										
			PR					28										
29.5-25	Y67	Earthmover 50 30	kPa	225	250	275	300	325										
			psi	33	36	40	44	47										
			kg	9250	10000	10600	10900	11500										
			lbs	20400	22000	23400	24000	25400										
			PR					26										
26.5-29	Y67	Earthmover 50 30	kPa	225	250	275	300	325										
			psi	33	36	40	44	47										
			kg	8250	8750	9250	9750	10300										
			lbs	18200	19300	20400	21500	22700										
			PR					26										
29.5-29	Y67	Earthmover 50 30	kPa	225	250	275	300	325	350	375	400							
			psi	33	36	40	44	47	51	54	58							
			kg	10000	10600	11200	11800	12150	12850	13200	14000							
			lbs	22000	23400	24700	26000	26800	28300	29100	30900							
			PR			26		32										
33.25-29	Y67	Earthmover 50 30	kPa	225	250	275	300	325										
			psi	33	36	40	44	47										
			kg	12150	12850	13600	14000	15000										
			lbs	26800	28300	30000	30900	33100										
			PR															

Type
Specification Code

T/T: Tube Type
CP: Cut Protected
CPS: Cut Protected-S
CPC: Cut Protected-C
CPUG: Cut Protected for Underground

T/L: Tubeless Type
REG: Regular
RER: Regular-R
RET: Regular-T

STL: Steel Breaker Construction
HR: Heat Resistant
HRH: Heat Resistant-H
HRV: Heat Resistant-V



BIAS: TECHNICAL DATA

Earthmover

Tire Size	Pattern	Ply Rating	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	1/32				
29.5-35	Y67	34	06766	E-3	REG	248	170	-	○	2120	83.5	776	30.6	965	38.0	819	32.2	39.5	50	-	25.00-3.5
33.25-35	Y67	32	16711	E-3	CP	226	155	-	○	2248	88.5	853	33.6	1003	39.5	898	35.4	47.1	59	-	27.00-3.5
	Y67	38	06770	E-3	REG	263	180		○												
37.25-35	Y67	30	16701	E-3	CP	277	190	-	○	2390	94.1	960	37.8	1060	41.7	1010	39.8	50.6	64	-	31.00-4.0
	Y67	30	16751	E-3	CPBP	277	190	-	○												
	Y67	36	16715	E-3	CP	277	190	-	○												
	Y67	36	16714	E-3	CP/STL	194	133	-	○												
37.5-39	Y67	52	16712	E-3	REG	385	264	-	○	2556	100.6	949	37.4	1137	44.8	1015	40.0	53.8	68	-	32.00-4.5
	Y67	52	16750	E-3	CP/STL	225	154														

TG: Tractor-Grade tire. Not for highway service.
 NHS: Not for highway service.
 PSI × 0.0703 = kg/cm² POUND × 0.4536 = kg PSI × 6.895 = kPa

Tire Size	Pattern	Application Max Speed km/h mph	Tire Load Limits at Various Cold Inflation Pressures															
29.5-35	Y67	Earthmover 50 30	PR								34							
			kPa	225	250	275	300	325	350	375	400							
			psi	33	36	40	44	47	51	54	58							
			kg	10900	11500	12150	12850	13600	14000	14500	15000							
			lbs	24000	25400	26800	28300	30000	30900	32000	33100							
33.25-35	Y67	Earthmover 50 30	PR					32			38							
			kPa	225	250	275	300	325	350	375	400							
			psi	33	36	40	44	47	51	54	58							
			kg	12850	14000	14500	15500	16000	17000	17500	18000							
			lbs	28300	30900	32000	34200	35300	37500	38600	39700							
37.25-35	Y67	Earthmover 50 30	PR			30		36										
			kPa	225	250	275	300	325										
			psi	33	36	40	44	47										
			kg	15500	16500	17500	18500	19500										
			lbs	34200	36400	38600	40800	43000										
37.5-39	Y67	Earthmover 50 30	PR									52						
			kPa	225	250	275	300	325	350	375	400	425	450	475				
			psi	33	36	40	44	47	51	54	58	62	65	69				
			kg	17000	18500	19500	20600	21200	22400	23000	24300	25000	25750	26500				
			lbs	37500	40800	43000	45400	46700	49400	50700	53600	55100	56800	58400				

**Type
Specification Code**

T/T: Tube Type
CP: Cut Protected
CPS: Cut Protected-S
CPC: Cut Protected-C
CPUG: Cut Protected for Underground

T/L: Tubeless Type
REG: Regular
RER: Regular-R
RET: Regular-T
CPBP: Cut Protected with Unique Belt Package

STL: Steel Breaker Construction
HR: Heat Resistant
HRH: Heat Resistant-H
HRV: Heat Resistant-V



BIAS: TECHNICAL DATA

Loader & Dozer

Tire Size	Pattern	Ply Rating	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	1/32				
12.00-24 NHS	Y525	20	52503	L-5	CPS	-	-	○	-	1280	50.4	330	13.0	596	23.5	360	14.2	58.2	74	11.00/12.00-24	8.50V
	Y69	16	06902	L-5S	CPS	-	-	○	-	1280	50.4	333	13.1	604	23.8	356	14.0	54.8	69		
	Y69U	16	06907	L-4S	CPS	-	-	○	-	1254	49.4	328	12.9	590	23.2	348	13.7	43.3	55		
13.00-24TG	Y67	16	06701	L-3	CPC	-	-	-	○	1288	50.7	366	14.4	582	22.9	401	15.8	27.9	35	-	8.00TG
14.00-24NHS	Y69ET	20	06954	L-5S	CPC	-	-	○		1365	53.7	380	15.0	654	25.7	393	15.5	63.1	79	14.00-24/25	10.00VA
18.00-25	Y69	28	06932	L-5S	CP	-	-	-	○	1651	65.0	533	21.0	751	29.6	571	22.5	83.4	104	-	13.00-2.5
	Y69K	32	06906	L-5S	CP	-	-	-	○	1700	66.9	520	20.5	785	30.9	555	21.9	84.1	106		
15.5-25	Y103	12	10350	L-2	CP	-	-	-	○	1286	50.6	390	15.4	575	22.6	433	17.0	25.5	32	-	12.00-1.3
17.5-25	Y103	12	10352	L-2	CP	-	-	-	○	1364	53.7	435	17.1	599	23.6	477	18.8	27.0	34	-	14.00-1.5
	Y67	12	06705	L-3	CP	-	-	-	○	1356	53.4	443	17.4	600	23.6	483	19.0	30.3	38		
	Y67	16	06706	L-3	CP	-	-	-	○	1340	52.8	435	17.1	595	23.4	473	18.6	30.2	38		
	Y575	12	57505	L-3	CP	-	-	-	○	1390	54.7	430	16.9	649	25.6	454	17.9	69.0	87		
	Y575	16	57506	L-3	CP	-	-	-	○	1400	55.1	452	17.8	658	25.9	473	18.6	69.0	87		
	Y69	16	06952	L-5S	CP	-	-	-	○												
	Y69	20	06955	L-5S	CP	-	-	-	○												
20.5-25	Y103	12	10361	L-2	CP	-	-	-	○	1480	58.3	540	21.3	647	25.5	583	23.0	31.5	40	-	17.00-2.0
	Y103	16	10362	L-2	CP	-	-	-	○	1498	59.0	528	20.8	651	25.6	578	22.8	33.4	42		
	Y67	16	06723	L-3	CP	-	-	-	○	1495	58.9	532	20.9	663	26.1	574	22.6	32.7	41		
	Y575	12	57501	L-3	CP	-	-	-	○	1558	61.3	539	21.2	721	28.4	575	22.6	80.3	101		
	Y575	20	57508	L-3	CP	-	-	-	○												
	Y524	16	52401	L-5	CP	-	-	-	○												
	Y524	20	52402	L-5	CP	-	-	-	○												
	Y69	16	06933	L-5S	CP	-	-	-	○	1545	60.8	540	21.3	714	28.1	564	22.2	81.0	102		

TG: Tractor-Grade tire. Not for highway service.
NHS: Not for highway service.

PSI × 0.0703 = kg/cm² POUND × 0.4536 = kg PSI × 6.895 = kPa

Tire Size	Pattern	Application Max Speed km/h mph	Tire Load Limits at Various Cold Inflation Pressures															
			PR				16						20					
12.00-24 NHS	Y525 Y69 Y69U	Loader 10 5	kPa	600	625	650	675	700	725	750	775	800	825					
			psi	87	91	94	98	102	105	109	112	116	120					
			kg	5600	5800	6000	6150	6300	6300	6500	6700	6700	6900					
			lbs	12300	12800	13200	13600	13900	13900	14300	14800	14800	15200					
			PR									16						
13.00-24TG	Y67	Loader 10 5	kPa	400	425	450	475	500	525	550	575	600						
			psi	58	62	65	69	73	76	80	83	87						
			kg	5150	5450	5600	5800	6000	6150	6300	6500	6500						
			lbs	11400	12000	12300	12800	13200	13600	13900	14300	14300						
			PR										16					
14.00-24NHS	Y69ET	Loader 10 5	kPa	400	425	450	475	500	525	550	575	600	625	650	675	700		
			psi	58	62	65	69	73	76	80	83	87	91	94	98	102		
			kg	6150	6300	6500	6700	6900	7100	7300	7500	7750	8000	8250	8250	8500		
			lbs	13600	13900	14300	14800	15200	15700	16100	16500	17100	17600	18200	18200	18700		
			PR													20		
18.00-25	Y69 Y69K	Loader 10 5	kPa	400	425	450	475	500	525	550	575	600	625	650	675	700	725	750
			psi	58	62	65	69	73	76	80	83	87	91	94	98	102	105	109
			kg	10300	10600	11200	11500	11800	12150	12500	12850	13200	13600	13600	14000	14500	14500	15000
			lbs	22700	23400	24700	25400	26000	26800	27600	28300	29100	30000	30000	30900	32000	32000	33100
			PR										12					
15.5-25	Y103	Loader 10 5	kPa	225	250	275	300	325	350	375	400							
			psi	33	36	40	44	47	51	54	58							
			kg	4000	4250	4500	4750	4875	5150	5300	5600							
			lbs	8800	9350	9900	10500	10700	11400	11700	12300							
			PR						12					16				20
17.5-25	Y103 Y67 Y575 Y524 Y69	Loader 10 5	kPa	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575
			psi	33	36	40	44	47	51	54	58	62	65	69	73	76	80	83
			kg	4750	5000	5300	5600	5800	6150	6300	6700	6900	7100	7300	7500	7750	8000	8250
			lbs	10500	11000	11700	12300	12800	13600	13900	14800	15200	15700	16100	16500	17100	17600	18200
			PR		12				16				20					
20.5-25	Y103 Y67 Y575 Y524 Y69	Loader 10 5	kPa	225	250	275	300	325	350	375	400	425	450					
			psi	33	36	40	44	47	51	54	58	62	65					
			kg	6300	6700	7100	7500	7750	8250	8500	8750	9250	9500					
			lbs	13900	14800	15700	16500	17100	18200	18700	19300	20400	20900					
			PR															

Type
Specification Code

T/T: Tube Type
CP: Cut Protected
CPS: Cut Protected-S
CPC: Cut Protected-C
CPUG: Cut Protected for Underground

T/L: Tubeless Type
REG: Regular
RER: Regular-R
RET: Regular-T

STL: Steel Breaker Construction
HR: Heat Resistant
HRH: Heat Resistant-H
HRV: Heat Resistant-V



BIAS: TECHNICAL DATA

Loader & Dozer

Tire Size	Pattern	Ply Rating	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	1/32				
23.5-25	Y103	16	10364	L-2	CP	-	-	-	○	1614	63.5	597	23.5	686	27.0	680	26.8	36.0	45	-	19.50-2.5
	Y67	16	06726	L-3	CP	-	-	-	○	1605	63.2	596	23.5	709	27.9	636	25.0	42.4	53		
	Y526	16	52632	L-3	CP	-	-	-	○	1601	63.0	626	24.6	711	28.0	662	26.1	40.5	51		
	Y575	16	57504	L-3	CP	-	-	-	○	1605	63.2	605	23.8	708	27.9	645	25.4	42.2	53		
	Y575	20	57507	L-3	CP	-	-	-	○												
	Y545	20	54503	L-4	CP	-	-	-	○												
	Y545	24	54502	L-4	CP	-	-	-	○	1680	66.1	630	24.8	760	29.9	660	26.0	56.0	71		
	Y524	16	52403	L-5	CP	-	-	-	○	1666	65.6	620	24.4	764	30.1	662	26.1	88.0	111		
	Y524	20	52404	L-5	CP	-	-	-	○												
Y69	20	06935	L-5S	CP	-	-	-	○	1645	64.8	600	23.6	749	29.5	635	25.0	93.2	117			
26.5-25	Y575	20	57509	L-3	CP	-	-	-	○	1740	68.5	690	27.2	770	30.3	733	28.9	42.8	54	-	22.00-3.0
	Y575	24	57512	L-3	CP	-	-	-	○												
	Y545	20	54505	L-4	CP	-	-	-	○	1786	70.3	704	27.7	800	31.5	764	30.1	68.4	86		
	Y545	24	54506	L-4	CP	-	-	-	○												
	Y524	20	52405	L-5	CP	-	-	-	○	1808	71.2	696	27.4	820	32.3	722	28.4	97.1	122		
	Y524	24	52406	L-5	CP	-	-	-	○												
	Y69K	32	06905	L-5S	CP	-	-	-	○	1790	70.5	695	27.4	825	32.5	723	28.5	90.6	114		
	Y69U	32	06918	L-5S	CPS	-	-	-	○	1803	71.0	717	28.2	837	33.0	739	29.1	90.8	114		
29.5-25	Y575	28	57514	L-3	CP	-	-	-	○	1855	73.0	765	30.1	813	32.0	830	32.7	49.1	62	-	25.00-3.5
	Y545	28	54501	L-4	CP	-	-	-	○	1900	74.8	785	30.9	847	33.3	842	33.1	73.1	92		
	Y524	28	52431	L-5	CP	-	-	-	○	1908	75.1	774	30.5	868	34.2	825	32.5	110.9	140		
29.5-29	Y67E	28	06774	L-3	CP	-	-	-	○	1947	76.7	768	30.2	849	33.4	840	33.1	49.6	62	-	25.00-3.5
	Y524	28	52409	L-5	CP	-	-	-	○	2040	80.3	771	30.4	914	36.0	831	32.7	106.3	134		
	Y69K	34	06965	L-5S	CP	-	-	-	○	2019	79.5	782	30.8	938	36.9	820	32.3	107.7	136		
35/65-33	Y545	30	54512	L-4	REG	-	-	-	○	2083	82.0	902	35.5	952	37.5	925	36.4	62.8	79	-	28.00-3.5
	Y545	42	54515	L-4	REG	-	-	-	○												
	Y524	24	52433	L-5	CP	-	-	-	○	2075	81.7	900	35.4	952	37.5	933	36.7	96.2	121		
	Y524	30	52444	L-5	CPBP	-	-	-	○												
	Y524	42	52436	L-5	CP	-	-	-	○												
	Y524Z	42	52443	L-5/L-5S	CP	-	-	-	○	2065	81.3	906	35.7	956	37.6	935	36.8	96.2	121		
45/65-45	Y545	58	54507	L-4	CP	-	-	-	○	2730	107.5	1150	45.3	1240	48.8	1205	47.4	70.3	89	-	36.00-4.5
	Y524	38	52427	L-5	CPBP	-	-	-	○	2740	107.9	1180	46.5	1260	49.6	1230	48.4	115.0	145		
	Y524	50	52420	L-5	CP	-	-	-	○												
	Y524	58	52442	L-5	CP	-	-	-	○												
	Y524Z	58	52440	L-5/L-5S	CP	-	-	-	○	2740	107.9	1180	46.5	1260	49.6	1230	48.4	115.0	145		

TG: Tractor-Grade tire. Not for highway service.
NHS: Not for highway service.

PSI × 0.0703 = kg/cm² POUND × 0.4536 = kg PSI × 6.895 = kPa

Tire Size	Pattern	Application Max Speed km/h mph	Tire Load Limits at Various Cold Inflation Pressures															
23.5-25	Y103 Y67 Y526 Y575 Y545 Y524 Y69	Loader 10 5	PR				16			20				24				
			kPa	225	250	275	300	325	350	375	400	425	450	475				
			psi	33	36	40	44	47	51	54	58	62	65	69				
			kg	8000	8500	9000	9500	10000	10600	10900	11200	11800	12150	12500				
			lbs	17600	18700	19800	20900	22000	23400	24000	24700	26000	26800	27600				
26.5-25	Y575 Y545 Y524 Y69K Y69U	Loader 10 5	PR						20		24						32	
			kPa	225	250	275	300	325	350	375	400	425	450	475	500	525	550	
			psi	33	36	40	44	47	51	54	58	62	65	69	73	76	80	
			kg	10000	10900	11500	12150	12500	13200	13600	14000	14500	15000	15500	16000	16500	17000	
			lbs	22000	24000	25400	26800	27600	29100	30000	30900	32000	33100	34200	35300	36400	37500	
29.5-25	Y575 Y545 Y524	Loader 10 5	PR									28						
			kPa	225	250	275	300	325	350	375	400	425						
			psi	33	36	40	44	47	51	54	58	62						
			kg	12150	12850	13600	14500	15000	16000	16500	17000	17500						
			lbs	26800	28300	30000	32000	33100	35300	36400	37500	38600						
29.5-29	Y67E Y524 Y69K	Loader 10 5	PR									28				34		
			kPa	225	250	275	300	325	350	375	400	425	450	475	500	525		
			psi	33	36	40	44	47	51	54	58	62	65	69	73	76		
			kg	12850	14000	14500	15500	16000	17000	17500	18000	19000	19500	20000	20600	21200		
			lbs	28300	30900	32000	34200	35300	37500	38600	39700	41900	43000	44100	45400	46700		
35/65-33	Y545 Y524 Y524Z	Loader 10 5	PR	24				30							42			
			kPa	350	375	400	425	450	475	500	525	550	575	600	625			
			psi	51	54	58	62	65	69	73	76	80	83	87	91			
			kg	19000	19500	20000	21200	21800	22400	23000	23600	24300	25000	25750	26500			
			lbs	41900	43000	44100	46700	48100	49400	50700	52000	53600	55100	56800	58400			
45/65-45	Y545 Y524 Y524Z	Loader 10 5	PR				38						50				58	
			kPa	350	375	400	425	450	475	500	525	550	575	600	625	650	675	
			psi	51	54	58	62	65	69	73	76	80	83	87	91	94	98	
			kg	34500	35500	37500	38750	40000	41250	42500	43750	45000	46250	47500	47500	48750	50000	
			lbs	76000	78500	82500	85500	88000	91000	93500	96500	99000	102000	104500	104500	107500	110000	

Type
Specification Code

T/T: Tube Type
CP: Cut Protected
CPS: Cut Protected-S
CPC: Cut Protected-C
CPUG: Cut Protected for Underground

T/L: Tubeless Type
REG: Regular
RER: Regular-R
RET: Regular-T
CPBP: Cut Protected with Unique Belt Package

STL: Steel Breaker Construction
HR: Heat Resistant
HRH: Heat Resistant-H
HRV: Heat Resistant-V



BIAS: TECHNICAL DATA

Grader

Tire Size	Pattern	Ply Rating	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	1/32				
13.00-24TG	Y103	12	10356	G-2	RER	-	-	-	○	1280	50.4	345	13.6	576	22.7	383	15.1	27.0	34	-	8.00TG
	Y67	12	06719	G-3	RER	-	-	-	○	1280	50.4	334	13.1	586	23.1	358	14.1	27.9	35		
14.00-24TG	Y103	12	10357	G-2	RER	-	-	-	○	1341	52.8	375	14.8	604	23.8	409	16.1	28.5	36	-	8.00TG
	Y67	16	06720	G-3	RER	-	-	-	○	1351	53.2	373	14.7	624	24.6	388	15.3	27.7	35		
16.00-24TG	Y67	16	06721	G-3	RER	-	-	-	○	1475	58.1	445	17.5	686	27.0	467	18.4	34.3	43	-	10.00VA

TG: Tractor-Grade tire. Not for highway service.
 NHS: Not for highway service.
 PSI × 0.0703 = kg/cm² POUND × 0.4536 = kg PSI × 6.895 = kPa

Tire Size	Pattern	Application Max Speed km/h mph	Tire Load Limits at Various Cold Inflation Pressures															
13.00-24TG	Y103 Y67	Grader 40 25	PR								12							
			kPa	125	150	175	200	225	250	275	300							
			psi	18	22	25	29	33	36	40	44							
			kg	1700	1900	2060	2240	2360	2500	2650	2725							
			lbs	3740	4180	4540	4940	5200	5520	5840	6000							
14.00-24TG	Y103 Y67	Grader 40 25	PR							12			16					
			kPa	125	150	175	200	225	250	275	300	325	350					
			psi	18	22	25	29	33	36	40	44	47	51					
			kg	2060	2300	2500	2650	2900	3075	3250	3450	3550	3650					
			lbs	4540	5080	5520	5840	6400	6800	7150	7600	7850	8050					
16.00-24TG	Y67	Grader 40 25	PR								16							
			kPa	125	150	175	200	225	250	275	300							
			psi	18	22	25	29	33	36	40	44							
			kg	2650	3000	3250	3550	3750	4000	4250	4500							
			lbs	5840	6600	7150	7850	8250	8800	9350	9900							

**Type
Specification Code**

T/T: Tube Type
CP: Cut Protected
CPS: Cut Protected-S
CPC: Cut Protected-C
CPUG: Cut Protected for Underground

T/L: Tubeless Type
REG: Regular
RER: Regular-R
RET: Regular-T

STL: Steel Breaker Construction
HR: Heat Resistant
HRH: Heat Resistant-H
HRV: Heat Resistant-V



BIAS: TECHNICAL DATA

Industrial

Tire Size	Pattern	Ply Rating	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	1/32				
12.00-20NHS	Y67	18	06711	IND-3	-	-	-	○	-	1143	45.0	322	12.7	516	20.3	347	13.7	25.5	32	12.00-20	8.50V
12.00-24NHS	Y67	20	16746	IND-3	-	-	-	○	-	1240	48.8	318	12.5	558	22.0	350	13.8	26.4	33	11.00/12.00-24	8.50V
	Y67	28	16787	IND-3	-	-	-	○	-	1240	48.8	318	12.5	558	22.0	350	13.8	26.4	33	11.00/12.00-24	8.50V
14.00-24NHS	Y69	30	06914	IND-4S	-	-	-	○	-	1365	53.7	385	15.2	653	25.7	407	16.0	49.7	58	14.00-24/25	10.00W
	Y67	28	16780	IND-3	-	-	-	-	○	1357	53.4	388	15.3	612	24.1	420	16.5	27.7	35	-	10.00VA
16.00-25	Y67	36	16747	IND-3	-	-	-	-	○	1490	58.7	448	17.6	668	26.3	488	19.2	34.3	43	-	11.25-2.0
	Y69PS	32	06919	IND-3S	-	-	-	-	○	1470	57.9	417	16.4	658	25.9	457	18.0	43.8	55	-	11.25-2.0
18.00-25	Y67	40	16719	IND-3	-	-	-	-	○	1620	63.8	514	20.2	722	28.4	551	21.7	38.5	49	-	13.00-2.5
	Y69	40	06915	IND-4S	-	-	-	-	○	1650	65.0	530	20.9	748	29.4	557	21.9	58.7	74	-	13.00-2.5
	Y69	40	06916	IND-5S	-	-	-	-	○	1645	64.8	530	20.9	745	29.3	563	22.2	83.3	105	-	13.00-2.5
	Y523	32	52304	IND-4	-	-	-	-	○	1652	65.0	517	20.4	772	30.4	541	21.3	61.3	77	-	13.00-2.5
	Y523	40	02343	IND-4	-	-	-	-	○	1652	65.0	517	20.4	772	30.4	541	21.3	61.3	77	-	13.00-2.5
21.00-25	Y67	40	16743	IND-3	-	-	-	-	○	1730	68.1	590	23.2	772	30.4	639	25.2	40.6	51	-	15.00-3.0
	Y69	40	06972	IND-4S	-	-	-	-	○	1779	70.0	601	23.7	798	31.4	640	25.2	56.2	71	-	15.00-3.0
18.00-33	Y69	40	06977	IND-4S	-	-	-	-	○	1868	73.5	514	20.2	843	33.2	565	22.2	58.7	74	-	13.00-2.5
	Y523	40	05326	IND-4	-	-	-	-	○	1850	72.8	518	20.4	869	34.2	542	21.3	56.2	71	-	13.00-2.5
	Y523-SB	40	02335	IND-4	-	-	-	-	○	1850	72.8	518	20.4	869	34.2	542	21.3	56.2	71	-	13.00-2.5
21.00-35	Y67	40	16781	IND-3	-	-	-	-	○	2004	78.9	580	22.8	935	36.8	622	24.5	42.0	53	-	15.00-3.0
	Y69	42	06917	IND-4S	-	-	-	-	○	2050	80.7	612	24.1	927	36.5	662	26.1	64.1	81	-	15.00-3.0
33.00-51	Y523	58	02355	IND-4	-	-	-	-	○	3056	120.3	934	36.8	1414	55.7	983	38.7	82.7	104	-	24.00-5.0
36.00-51	Y523	58	05230	IND-4	-	-	-	-	○	3198	125.9	1040	40.9	1379	54.3	1150	45.3	92.2	116	-	26.00-5.0
40.00-57	Y523	76	02338	IND-4	-	-	-	-	○	3584	141.1	1143	45.0	1567	61.7	1271	50.0	92.8	117	-	29.00-6.0

*Not fixed yet. Yokohama will inform when available.

TG: Tractor-Grade tire. Not for highway service.

NHS: Not for highway service.

PSI × 0.0703 = kg/cm² POUND × 0.4536 = kg PSI × 6.895 = kPa

Tire Size	Pattern	IP	Tire Load Limits at Various Speeds For Smooth Floors and Runways Use							
			kPa	km/h	Static	Creep	4	10	15	20
			PSI	mph	Static	Creep	2.5	5	10	12
12.00-20NHS	Y67	900	Kg	10450	9300	8400	7850	7550	7350	7250
		131	lbs	23050	20500	18500	17300	16650	16200	16000
12.00-24NHS	Y67	990	Kg	12400	11050	10000	9300	8950	8750	8650
		144	lbs	27350	24350	22050	20500	19750	19300	19050
	Y67	990	Kg	12400	11050	10000	9300	8950	8750	8650
		144	lbs	27350	24350	22050	20500	19750	19300	19050
14.00-24NHS	Y69	1000	Kg	17100	15200	13800	12850	12350	12050	11900
		145	lbs	37700	33500	30400	28350	27250	26550	26250
	Y67	1000	Kg	17100	15200	13800	12850	12350	12050	11900
		145	lbs	37700	33500	30400	28350	27250	26550	26250
16.00-25	Y67	1000	Kg	22500	20000	18150	16900	16250	15900	15650
		145	lbs	49600	44100	40000	37250	35800	35050	34500
	Y69PS	1000	Kg	22500	20000	18150	16900	16250	15900	15650
		145	lbs	49600	44100	40000	37250	35800	35050	34500
18.00-25	Y67	1000	Kg	28800	25600	23200	21600	20800	20300	20000
		145	lbs	63500	56450	51150	47600	45850	44750	44100
	Y69	1000	Kg	28800	25600	23200	21600	20800	20300	20000
		145	lbs	63500	56450	51150	47600	45850	44750	44100
	Y69	1000	Kg	28800	25600	23200	21600	20800	20300	20000
		145	lbs	63500	56450	51150	47600	45850	44750	44100
	Y523	900	Kg	27000	24000	21750	20250	19500	19050	18750
		131	lbs	59500	52900	47950	44650	43000	42000	41350
	Y523	1000	Kg	28800	25600	23200	21600	20800	20300	20000
		145	lbs	63500	56450	51150	47600	45850	44750	44100
21.00-25	Y67	990	Kg	37100	32950	29850	27800	26800	26150	25750
		144	lbs	81800	72650	65800	61300	59100	57650	56750
	Y69	990	Kg	37100	32950	29850	27800	26800	26150	25750
		144	lbs	81800	72650	65800	61300	59100	57650	56750
18.00-33	Y69	1000	Kg	33300	29600	26850	25000	24050	23500	23150
		145	lbs	73400	65250	59200	55100	53000	51800	51050
	Y523	1000	Kg	33300	29600	26850	25000	24050	23500	23150
		145	lbs	73400	65250	59200	55100	53000	51800	51050
	Y523-SB	1000	Kg	33300	29600	26850	25000	24050	23500	23150
		145	lbs	73400	65250	59200	55100	53000	51800	51050
21.00-35	Y67	990	Kg	43750	38900	35250	32800	31600	30850	30400
		144	lbs	96450	85750	77700	72300	69650	68000	67000
	Y69	990	Kg	43750	38900	35250	32800	31600	30850	30400
		144	lbs	96450	85750	77700	72300	69650	68000	67000
33.00-51	Y523	900	Kg	110700	98400	89200	83050	79950	78100	76900
		131	lbs	244050	216950	196650	183100	176250	172200	169550
36.00-51	Y523	810	Kg	127800	113600	102950	95850	92300	90150	88750
		117	lbs	281750	250450	226950	211300	203500	198750	195650
40.00-57	Y523	960	Kg	180000	160000	145000	135000	130000	127000	125000
		139	lbs	396850	352750	319650	297600	286600	280000	275550

Type
Specification Code

T/T: Tube Type
CP: Cut Protected
CPS: Cut Protected-S
CPC: Cut Protected-C
CPUG: Cut Protected for Underground

T/L: Tubeless Type
REG: Regular
RER: Regular-R
RET: Regular-T

STL: Steel Breaker Construction
HR: Heat Resistant
HRH: Heat Resistant-H
HRV: Heat Resistant-V



BIAS: TECHNICAL DATA

Industrial

Tire Size	Pattern	Ply Rating	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	1/32				
17.5-25	Y573	36	57301	IND-3	-	-	-	-	○	1362	53.6	442	17.4	613	24.1	456	18.0	14.0	18	-	14.00-1.5
29.5-25	Y67	34	16793	IND-3	-	-	-	-	○	1863	73.3	765		*	*	*	*	49.6	62	-	25.00-3.5
29.5-29	Y67	40	16796	IND-3	-	-	-	-	○	1970	77.6	780	30.7	860	33.9	820	32.3	49.6	62	-	25.00-3.5
33.25-29	Y67	38	16767	IND-3	-	-	-	-	○	2078	81.8	840	33.1	895	35.2	900	35.4	45.8	58	-	27.00-3.5
33.25-35	Y67	44	16749	IND-3	-	-	-	-	○	2278	89.7	854	33.6	990	39.0	923	36.3	47.1	59	-	27.00-3.5

Wide Base Low-Seam Mining

Tire Size	Pattern	Ply Rating	Part No.	TRA Code or Application	CMPD	TKPH	TMPH	Type		Inflated Dimensions				Static Loaded Radius		Static Loaded Width		Groove Depth		Tube Size	Rim Size Flange Height
										Overall Diameter		Overall Width									
								T/T	T/L	mm	inch	mm	inch	mm	inch	mm	1/32				
32x15-15NHS	Y67	28	26761	IND-3	CP	-	-	○	-	831	32.7	330	13.0	373	14.7	338	13.3	19.1	24	-	11.50
35x15-15NHS	Y67	32	26762	IND-3	CP	-	-	○	-	914	36.0	363	14.3	422	16.6	371	14.6	26.2	33	-	10.50
36x11-15NHS	Y67	24	26763	IND-3	CP	-	-	○	-	914	36.0	272	10.7	417	16.4	279	11.0	19.1	24	-	7.50
38x16-15NHS	Y67	36	26764	IND-3	CP	-	-	○	-	993	39.1	378	14.9	442	17.4	394	15.5	25.4	32	-	11.50
39x15-20NHS	Y20	36	02004	IND-3	CP	-	-	○	-	1006	39.6	340	13.4	*	*	*	*	23.0	29	-	11.00TG
42x13-20NHS	Y67	36	16782	IND-3	CP	-	-	○	-	1080	42.5	325	12.8	505	19.9	348	13.7	20.6	26	-	10.00WI
42x18-20NHS	Y67	36	16788	IND-3	CP	-	-	○	-	1110	43.7	429	16.9	521	20.5	460	18.1	21.4	27	-	15.00T
44x15-20NHS	Y67	36	16784	IND-3	CP	-	-	○	-	1153	45.4	348	13.7	523	20.6	371	14.6	24.6	31	-	10.00WI
44x18-20NHS	Y67	36	16763	IND-3	CP	-	-	○	-	1151	45.3	442	17.4	526	20.7	462	18.2	25.4	32	-	15.00T
50x20-20NHS	Y67	36	16769	IND-3	CP	-	-	○	-	1260	49.6	478	18.8	577	22.7	503	19.8	27.8	35	-	15.00T

*Not fixed yet. Yokohama will inform when available.

TG: Tractor-Grade tire. Not for highway service.

NHS: Not for highway service.

PSI × 0.0703 = kg/cm² POUND × 0.4536 = kg PSI × 6.895 = kPa

Tire Size	Pattern	IP	Tire Load Limits at Various Speeds For Smooth Floors and Runways Use							
			kPa	km/h	Static	Creep	4	10	15	20
			PSI	mph	Static	Creep	2.5	5	10	12
17.5-25	Y573	1000	Kg	18550	16500	14950	13900	13400	13100	12900
		145	lbs	40900	36400	32950	30650	29550	28900	28450
29.5-25	Y67	630	Kg	36000	32000	29000	27000	26000	25400	25000
		91	lbs	79350	70550	63950	59500	57300	56000	55100
29.5-29	Y67	750	Kg	42500	37750	34200	31850	30700	29950	29500
		109	lbs	93700	83200	75400	70200	67700	66050	65050
33.25-29	Y67	630	Kg	46350	41200	37350	34750	33500	32700	32200
		91	lbs	102200	90850	82350	76600	73850	72100	71000
33.25-35	Y67	720	Kg	54000	48000	43500	40500	39000	38100	37500
		104	lbs	119050	105800	95900	89300	86000	84000	82650

Tire Size	Pattern	IP	Tire Load Limits at Various Cold Inflation Pressures							
			PSI	125	130	135	140	145	150	170 Foam
			kPa	860	900	930	970	1000	1030	1170 Foam
32x15-15NHS	Y67	lbs.		9800	10000	10200	10500	10700	10900	11700
		kg.		4450	4540	4630	4760	4850	4940	5310
35x15-15NHS	Y67	lbs.		11100	11300	11600	11800	12100	12300	13200
		kg.		5030	5130	5260	5350	5490	5580	5990
36x11-15NHS	Y67	lbs.		8800	9000	9200	9400	9600	9800	10600
		kg.		3990	4080	4170	4260	4350	4450	4810
38x16-15NHS	Y67	lbs.		9900	10100	10300	10600	10800	11000	11800
		kg.		4490	4580	4670	4810	4900	4990	5350
39x15-20NHS	Y20	lbs.		12400	12700	13000	13300	13500	13800	14900
		kg.		5620	5760	5900	6030	6120	6260	6760
42x13-20NHS	Y67	lbs.		12300	12600	12900	13100	13400	13700	14700
		kg.		5580	5720	5850	5940	6080	6210	6670
42x18-20NHS	Y67	lbs.		16400	16800	17200	17500	17900	18300	19600
		kg.		7440	7620	7800	7940	8120	8300	8890
44x15-20NHS	Y67	lbs.		15100	15400	15800	16100	16500	16800	18100
		kg.		6850	6990	7170	7300	7480	7620	8210
44x18-20NHS	Y67	lbs.		16800	17200	17600	17900	18300	18700	20100
		kg.		7620	7800	7980	8120	8300	8480	9120
50x20-20NHS	Y67	lbs.		26400	27000	27700	28200	28800	29400	30000
		kg.		11980	12250	12560	12790	13060	13340	13610

Type
Specification Code

T/T: Tube Type
CP: Cut Protected
CPS: Cut Protected-S
CPC: Cut Protected-C
CPUG: Cut Protected for Underground

T/L: Tubeless Type
REG: Regular
RER: Regular-R
RET: Regular-T

STL: Steel Breaker Construction
HR: Heat Resistant
HRH: Heat Resistant-H
HRV: Heat Resistant-V



APPENDIX

(BIAS)

Haulage Service (OFF-THE-ROAD for Dump Trucks & Scrapers)

30 MPH (50 KPH) Maximum Speed | Distance: Up to 2.5 miles (4 km) one way

Narrow Base Bias Ply Tires

- NOTES**
- Figures in parentheses denote ply rating for which bold face loads and inflations are maximum.
 - For 40 mph (65 km/h) maximum speed, the loads must be reduced 15% with no change in inflation pressure.
 - When haul length exceeds 2.5 miles (4 km) one way, consult your YOKOHAMA service representative.

Wide Base Bias Ply Tires

- NOTES**
- Figure in parentheses denote ply rating for which bold face loads and inflations are maximum.
 - For 40 mph (65 km/h) maximum speed, the loads must be reduced 17% with no change in inflation pressure.
 - When haul length exceeds 2.5 miles (4 km) one way, consult your YOKOHAMA service representative.

Slow Speed Service (OFF-THE-ROAD for Loaders & Dozers)

5 MPH (10 KPH) Maximum Speed | Distance: Up to 250 feet (76 meters) one way

Narrow Base Bias Ply Tires

65 Series Bias Ply Tires

Wide Base Bias Ply Tires

- NOTES**
- Figures in parentheses denote ply rating for which bold face loads and inflations are maximum.
 - On front tires for front-end loaders, it is permissible to increase inflation pressure up to 15 psi that shown in the table with no increase in load.
 - For tire load limits at various speeds:

Max. Speed	% Load Change From 5 MPH Table
Stationary	+60%
Creep	+30%
2 1/2 mph (4 km/h)	+15%
5 mph (10 km/h)	No Change
10 mph (15 km/h)	-13%
15 mph (25 km/h)	-20%

ETC Bias Ply Tires(10-16.5, 13.5-20, 16.9-24, 18.4-24)

- NOTES**
- Figures in parentheses denote ply rating for which load and inflation pressure are maximum.
 - Consult your YOKOHAMA service representative for data concerning front-end loaders or shovels used in load and carry service.
 - It is permissible to increase inflation pressure up to 15 psi that shown in table with no increase of load.
 - For tire load limits at various speeds:

Max. Speed	% Load Change From 5 MPH Table
Stationary	+60%
Creep	+30%
2 1/2 mph (4 km/h)	+15%
5 mph (10 km/h)	No Change
10 mph (15 km/h)	-13%
15 mph (25 km/h)	-20%

Tractor and Grader Service (OFF-THE-ROAD for Motor Graders)

25 MPH (40 KPH) Maximum Speed | Distance: Unlimited

Narrow Base Bias Ply Tires**Wide Base Bias Ply Tires**

- NOTES**
- Figures in parentheses denote ply rating for which loads and inflation pressure are maximum.
 - For maintenance work on established highways, inflation pressure may be increased 50% if desired with no increase in load.
 - For tire load limits at various speeds with no increase in inflation pressure:

Max. Speed	% Load Change From Table
25 mph (40 km/h)	No Change
30 mph (50 km/h)	-9%
35 mph (60 km/h)	-18%
40 mph (65 km/h)	-27%

Industrial Service (OFF-THE-ROAD for Smooth Floors & Runways Use)

- NOTES**
- Industrial Vehicle**
Consists of usage on vehicles such as counterbalanced lift trucks, container handlers, straddle carriers, aircraft tow tractors, log stackers and rough terrain trucks.
 - Smooth Floors and Runways**
These are defined as paved or protected operating surfaces which are free of undulations, obstructions or discontinuities.
 - Creep**
This is movement of equipment at very slow speed (not over 200 feet (60 m) in 30 minutes). During creep motion, loads on the tires are very high and consideration must be given to the type of surface over which the equipment is traveling.

Check maximum air pressure requirements of rims and wheels to ensure ability to accommodate correct air pressure of tire.

For steer wheel loads on lift trucks, multiply the load by 0.8.



OFF-THE-ROAD TIRES are very expensive, therefore it is very important to use them under proper conditions. It cannot be overemphasized to have a good maintenance program for obtaining the best tire performance.

Inflation Pressure

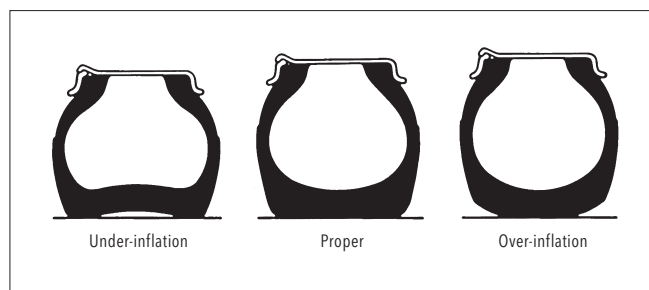
Proper inflation pressure is essential to get the best performance from tires. Optimum traction, flotation, and load endurance can only be obtained if the proper inflation pressure is maintained. Both over-inflation and under-inflation shorten tire life and can result in tire failures. Proper inflation pressure depends on the vehicle, ground conditions, load, speed, and other factors.

Under-inflation

- Excessive heat generation from increased deflection may cause separation.
- Excessive tire deflection causes cords to fatigue.
- Rapid wear due to excessive tread movement against road surface.
- Sidewalls are more susceptible to cutting and rupture.
- Radial cracks can form in the upper sidewall.
- Cracks in the inner liner can occur.

Over-inflation

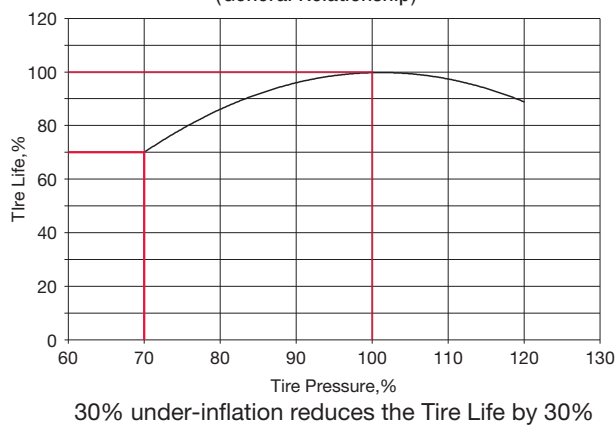
- Increased ground contact pressure at centerline results in rapid wear there.
- Reduced protection of cords against shocks may lead to impact breaks.
- Excessive pressure is exerted on the beads, increasing the potential for bead burst.
- Riding comfort deteriorates leading to driver fatigue.
- Tire slippage due to reduced traction causes wear issues.
- Tendency for the tire to be cut is increased.



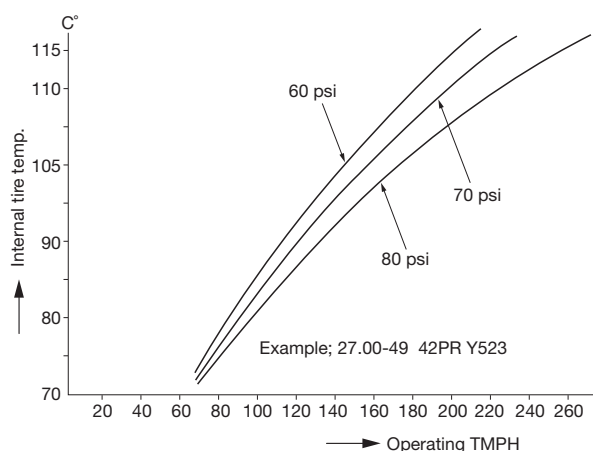
Caution:

- In the course of operation, the air pressure rises in correlation to the air temperature. The amount of increase varies depending on operation.
- This is extremely important in continuous operations. If heat generated results in an air pressure rise of 25% in bias tires, the cold inflation pressure should be checked.
- If heat generated results in an air pressure rise of 20% in radial tires, the cold inflation pressure should be checked.
- If cold inflation pressure is accurate, travel speed and/or load must be reduced.
- Otherwise, overheating may cause separations.
- Tires should not be bled to compensate for the increase in pressure.
- Valves should always be capped. This keeps mud and dust out of the valve core and protects the air seal.

Pressure and Tire Life
(General Relationship)

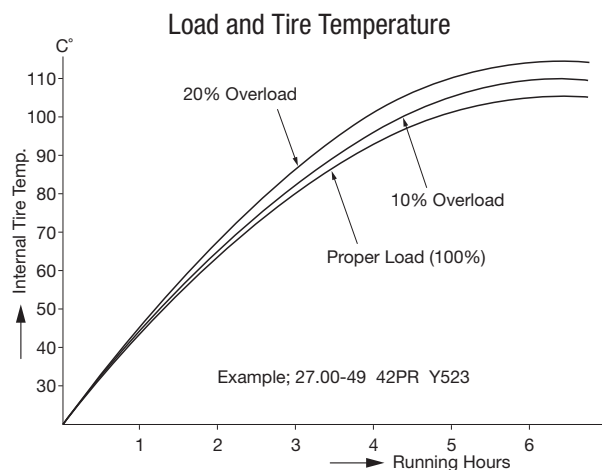
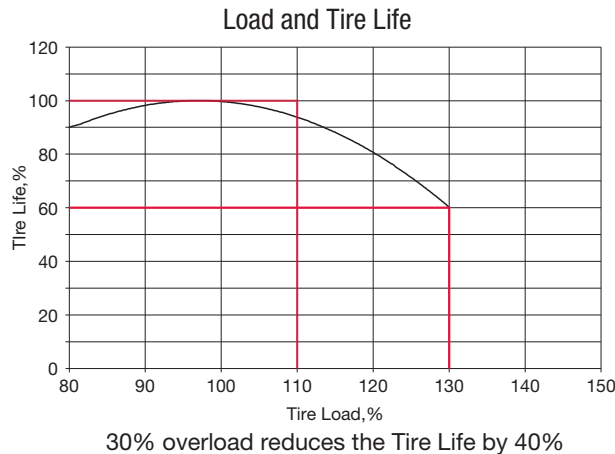


Inflation Pressure and Tire Temperature



Load

Overloading shortens tire life and increases the chance of early tire failure. For the best tire performance, the maximum recommended load should not be exceeded. If the load exceeds the specified capacity of the tire, a tire with a higher ply rating should be used.



Results of Overloading

- Excessive heat generation causes separation.
- Excessive tire deflection causes broken cords.
- Rapid wear due to excessive tread movement against road surface.
- Bead failure due to excessive bead movement.
- Risk of bursting due to increased cord tension.

Speed

Excessive traveling speeds produce abnormally high internal temperatures in tires. A vehicle has two speed limitations: the actual maximum speed that the vehicle can attain and the average operating speed that the vehicle can sustain. The average sustainable operating speed is limited by the tires' Ton-Mile-Per-Hour (TMPH) rating (as specified in this guide).

Speed and Load Relation (according to TRA)

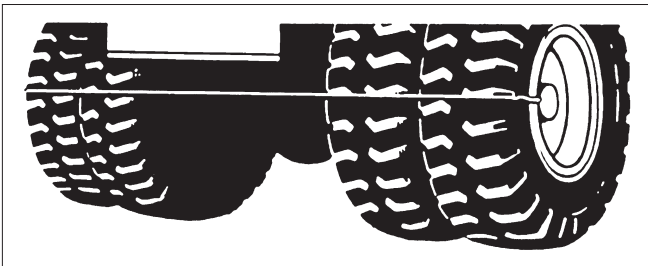
The load capacity of a tire is influenced by the maximum speed of the vehicle as follows:

Vehicle	Maximum Speed	Variation In Load Capacity	
		Bias Tire	Radial Tire
Loaders and Dozers	Stationary	160%	160%
	Creep	130%	130%
	2.5 mph (4 km/h)	115%	115%
	5 mph (10 km/h)	100%	100%
	10 mph (15 km/h)	87%	87%
	15 mph (25 km/h)	80%	80%

Vehicle	Maximum Speed	Variation In Load Capacity	
		Bias Tire	Radial Tire
Dump Trucks and Scrapers	30 mph (50 km/h)	100%	100%
	40 mph (65 km/h)	Narrow Base 85%	Narrow Base 88%
		Wide Base 83%	Wide Base 88%

Proper Matching of Dual-Tires

It is essential that dual-tires have the same overall diameter. Otherwise, the one with the larger diameter will carry most of the load and will be prone to damage and wear. If the difference in outer diameters is extremely large, the smaller tire slips and scrapes along the ground, causing the center of the tread to wear quickly. Naturally, the larger tire will be prone to excessive heat generation from overloading. The allowable difference in dual-tire pair diameters is shown in the table below.



In no case should a difference in diameters be corrected by adjusting inflation pressure.

Size	Bias Tolerance				Radial Tolerance			
	Diameter		Circumference		Diameter		Circumference	
	mm	in	mm	in	mm	in	mm	in
8.25*20NHS	8	0.3	25	1.0	6	0.2	19	0.7
9.00*20NHS	9	0.4	28	1.1	7	0.3	22	0.9
10.00*20NHS	10	0.4	31	1.2	7	0.3	22	0.9
11.00*20NHS	10	0.4	31	1.2	7	0.3	22	0.9
12.00*20NHS	11	0.4	35	1.4	8	0.3	25	1.0
12.00*24/25NHS	11	0.4	35	1.4	8	0.3	25	1.0
13.00*24/25NHS	12	0.5	38	1.5	9	0.4	28	1.1
14.00*20NHS	13	0.5	41	1.6	9	0.4	28	1.1
14.00*24/25NHS	13	0.5	41	1.6	9	0.4	28	1.1
16.00*25	15	0.6	47	1.9	11	0.4	35	1.4
18.00*25	17	0.7	53	2.1	12	0.5	38	1.5
18.00*33	17	0.7	53	2.1	12	0.5	38	1.5
21.00*25	20	0.8	63	2.5	14	0.6	44	1.7
21.00*35	20	0.8	63	2.5	14	0.6	44	1.7
24.00*35	22	0.9	69	2.7	15	0.6	47	1.9
24.00*49	22	0.9	69	2.7	15	0.6	47	1.9
27.00*49	25	1.0	79	3.1	18	0.7	57	2.2
33.00*51	30	1.2	94	3.7	21	0.8	66	2.6
36.00*51	33	1.3	104	4.1	23	0.9	72	2.8
40.00*57	36	1.4	113	4.4	26	1.0	82	3.2

NHS: Not for highway service.

Caution:

- Radial tires should never be matched with bias tires.
- It is recommended to match tires from the same manufacturer.

Diameter Measuring Methods

- Use a 1-inch x 2-inch wooden stud.
- Use a rubber cord across the dual tires.
- Use a steel tape to measure the circumference of each tire.

Road Surface Maintenance

The maintenance of road surfaces is one of the most important factors in determining the life of a tire. Bumps, check holes, rocks and so on can cut and wear tires. Even bursting can result. Of particular importance is the maintenance of loading and dumping areas because the chances of damage at these places are great. Road and ground conditions there have a large effect on the productivity of the vehicles.



Good Condition

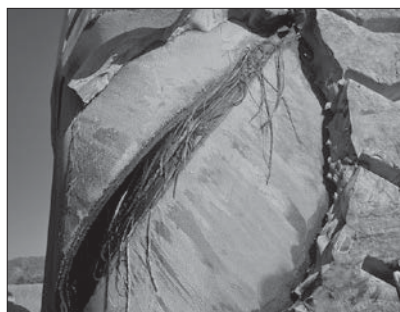


Poor Condition

Tire Problems and Major Causes

Any aberrations causing tire problems should be promptly repaired. The following is a list of tire problems and causes:

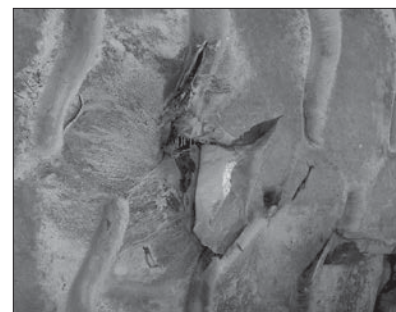
Tire Problems	Overload	High Speed Travel	Slippage	Over Inflation	Under Inflation	Excess Braking	Poor Road Condition	Poor Vehicle Maintenance	Poor Rim
1. Tread cuts and snags	○	○	○	○	○		○		
2. Uneven, rapid tread wear	○	○	○	○	○	○	○	○	
3. Cracked and broken tread	○		○	○		○	○	○	
4. Sidewall cuts and snags	○				○		○		
5. Tread separation	○	○		○	○			○	
6. Ply separation	○	○		○	○			○	
7. Bead failure	○		○	○	○	○		○	○
8. Inner liner failure	○	○			○				○
9. Impact breaks	○	○		○			○		



Impact Break



Tread Separation



Tread Cuts (Rock Penetration)



Instructions for Operations

Even if tires and roads are properly maintained, tire life can be seriously shortened by improper use. The following are musts for maximum efficiency.

General:

- Avoid abrupt starts and stops.
- Do not operate on road shoulders.
- Reduce speed on turns.
- Do not turn wheels while stationary.
- Do not spin tires.
- Maintain proper inflation pressure.
- Remove any objects, such as rocks which get stuck in the tread or between dual tires.
- Check tires, rims and valves regularly for any abnormalities.
- Repair any damaged tires immediately.
- Avoid rocks at loading and dumping areas.
- Avoid running over oil or grease spills.

Loader Operating:

- Keep loading areas clear of rocks and other obstacles.
- Avoid spilling load around the tires.
- Avoid over-loading.
- Load to the center of the dump truck's decks.

Motor Scraper Operating:

- Prevent tires from slipping when loading.
- Avoid cornering when the pusher is in operation.

Operating under Ambient Temperatures below -40°F:

- Consult Yokohama Tire Corporation.

Tire Appearance Check-up

In order to prevent tire troubles, it is helpful to make routine visual check-ups of the tire, rim, valve, inflation pressure, etc. Make inspections for the following and carry out any procedure recommended.

Tire Tread:

- Remove foreign matter from the tread.
- Repair any damage reaching the carcass.
- If separation exists, remove tire and examine if repair is necessary.
- If damage reached carcass, remove tire and repair.
- If cuts or chips reach carcass, repair.
- Cracks in tread groove may be source of air leakage; check inflation pressure.
- Uneven wear may be caused by improper inflation pressure. Rotate tires if necessary.
- Damage from contact with vehicle should be avoided. Alter body parts if possible. Repair any tire damage if necessary.
- Oil or grease on tire should be washed off.

Shoulder and Sidewall:

- Repair any cuts reaching the carcass.
- Identify cause of cracks e.g. from under-inflation, overloading, ozone or cut growth and repair if necessary.
- Wash off oil or grease spots.

Valve:

- Replace valve or valve parts if leakage exists from valve core, deflection of stem or extension.
- Ensure valve cap is in position.

Dual Tires:

- Remove any foreign object stuck between duals.
- Repair stone ejector if bent or out of position.

Inflation Pressure:

- Adjust if not proper.
- Detect location and repair if leakage exists.

Rim:

- Replace if deformation or cracks exist.

Measuring Tread Wear

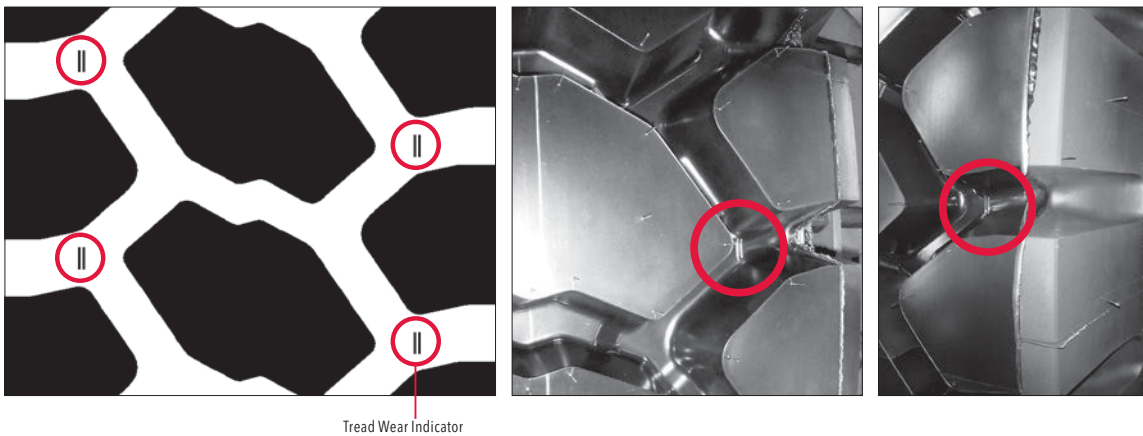
Tread wear can be determined by comparing the remaining groove depth with that of a new tire.

There are special marks indicating where the groove depth should be measured for most YOKOHAMA OFF-THE-ROAD TIRES. For rock or traction patterns, the indicators are located one-fourth of the tread width from the shoulders. Rib pattern tires don't have indicators. The tread depth of rib pattern tires should be measured at the locations specified below.

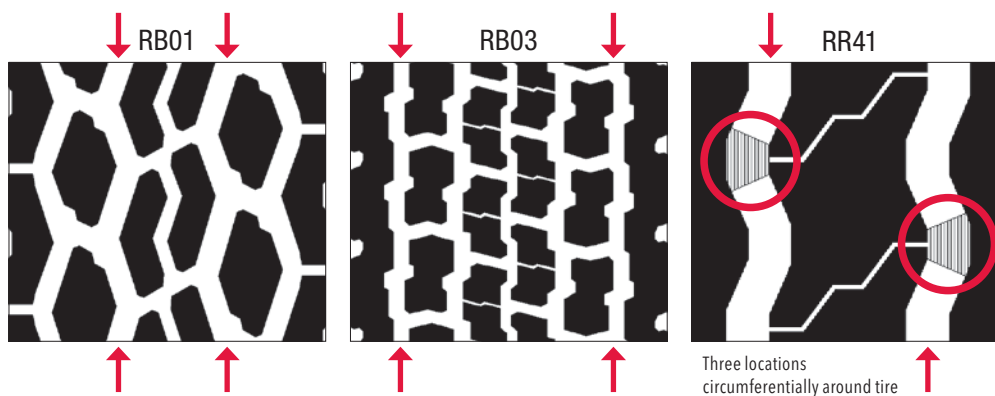
The average of the figures obtained by measuring the groove depths for both the inside and outside of the tire should be used. A depth gauge is used to measure the depth of the grooves as shown:

① Normal

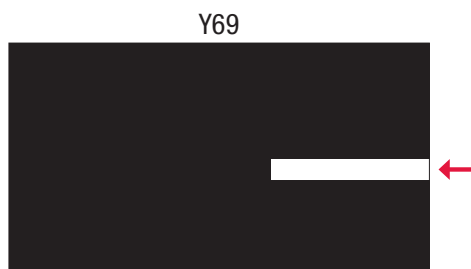
Example of tread wear indicators for typical OFF-THE-ROAD TIRES.



② Rib Pattern Tires



③ Tires with unique tread wear indicator locations



Ton-Mile-Per-Hour (TMPH)

Rating materials and adhesives used in tires are especially vulnerable to damage from high temperatures which limit the amount and type of usage for tires. This is especially true for OFF-THE-ROAD TIRES for dump trucks and scrapers where high internal temperatures are not uncommon, because rapid dissipation of heat is hindered by the thick tire construction. Various conditions also influence the limits of use for OFF-THE-ROAD TIRES. TMPH is the measure of usage that normally indicates the limits of use under average working conditions.

Operating TMPH

Operating TMPH is computed to compare actual use with the tire's TMPH rating. The operating TMPH is calculated in the following manner by observation and measurement of actual operation.

Operating TMPH = (average tire load in short tons) × (average speed in miles per hour)

Where,

Average tire load = $1/2$ [(load on tire when vehicle is empty) + (load on tire when vehicle is laden)]

Average speed = (round trip distance) × (number of trips per shift) ÷ (total hours of operation per shift*)

* Exclude for calculation between shifts

For actual computation and reference this data should be collected:

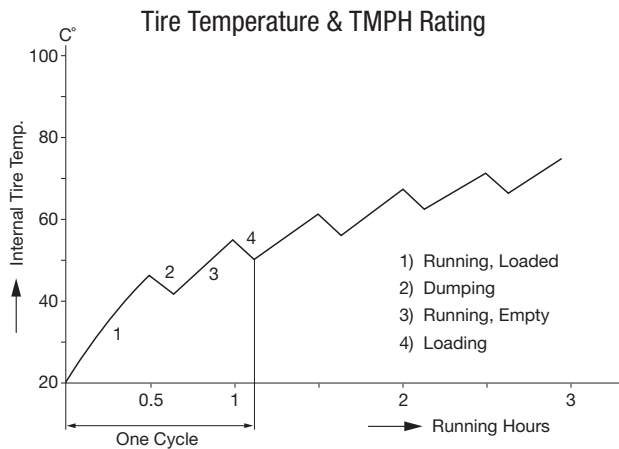
- Vehicle empty:
Load on front axle ÷ number of tires = ___tons/tire
Load on rear axle ÷ number of tires = ___tons/tire
- Vehicle loaded:
Load on front axle ÷ number of tires = ___tons/tire
Load on rear axle ÷ number of tires = ___tons/tire
- Payload = ___tons
- Round trip distance = ___miles
- Number of trips per day = ___times
- Number of shifts per day hours of each shift
Number of shifts ___times
Hours per shift ___hours
(including inspection ___hours, lunch ___hours and rest ___hours.)
- Actual maximum speed in operation ___miles/hour
- Ambient temperature High ___°F/Average ___°F

Use of TMPH Rating

With the formula described above, the operating TMPH required for a particular job can be computed and OFF-THE-ROAD TIRES which satisfy the requirement can be selected. Operating TMPH should always be less than the tire's TMPH rating. The real factor limiting tire usage is heat. TMPH measurements and ratings are only tools used to construct guidelines so that tires do not overheat. As previously stated, these guidelines are constructed assuming average operating conditions. Under some conditions it is possible for more heat to be generated than would normally be expected at a given operating TMPH level. This should be kept in mind when operating TMPH approaches the tire's TMPH rating to prevent heat damage.

Use of TKPH (Ton-Kilometers-Per-Hour)

Generally, TMPH is the common measure, but TKPH, the metric measure is also used. Care should be taken when converting from TMPH, since TMPH uses the short ton (2,000 lbs) and mileage (1 km = 0.621 miles) and TKPH uses the metric ton (2,204.6 lbs or 1.1023 short tons). To convert TKPH to TMPH, divide TKPH by 1.459.



Adjusting TMPH for Ambient Temperature

Materials, reinforcements and adhesives used in tires are vulnerable to damage from high temperatures which limit the amount and type of usage for tire. This is especially true for OFF-THE-ROAD TIRES for dump trucks and scrapers where high internal temperatures are common, because heat dissipation is hindered by the thick tire constructions. Various conditions also influence the limits of use for OFF-THE-ROAD TIRES. The "Operating TMPH" is the measure of work required from an OFF-THE-ROAD TIRE under specific conditions. The Operating TMPH should not exceed the tire's rated TMPH.

Operating TKPH is adjusted in the following manner by observation and measurement of actual operation.

Adjusted Operating TKPH = $K_t \times K_g \times \text{Operating TKPH}$

K_t : adjustment coefficient for temperature

K_g : adjustment coefficient for grade

K_t : adjustment coefficient for temperature

The TKPH tire ratings are based on an ambient temperature of 38°C (100°F). The Operating TKPH must be adjusted to compensate for a reduced or increased rate of heat dissipation to the ambient air.

For Bias Tires with maximum yearly temperature exceeding 100°F (38°C):

$$K_t = \frac{77}{77 + (38 - T_c)}$$

K_t = adjustment coefficient for temperature
 T_c = maximum yearly temperature in centigrade
 $T_c = (5 \div 9) \times (T_f - 32)$
 T_f = maximum yearly temperature in fahrenheit

For Bias Tires with maximum yearly temperature less than 100°F (38°C):

$$K_t = \frac{77}{77 + \frac{1}{2} \times (38 - T_c)}$$

For Radial Tires with maximum yearly temperature exceeding 100°F (38°C):

$$K_t = \frac{55}{55 + (38 - T_c)}$$

For Radial Tires with maximum yearly temperature less than 100°F (38°C):

$$K_t = \frac{55}{55 + \frac{1}{2} \times (38 - T_c)}$$

K_g : adjustment coefficient for grade

The grade of a haul road transfers load from one axel to the other of a typical haul truck. Use the chart on the following slide to determine K_g in the case of downhill loaded drive.

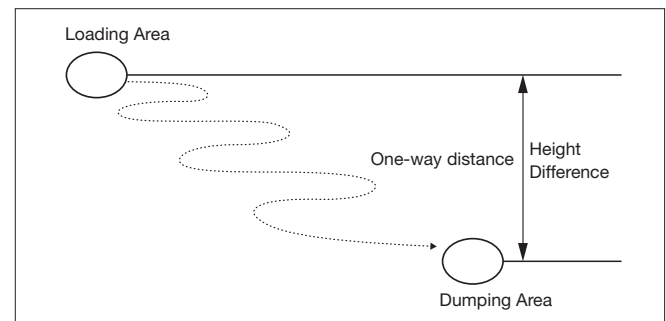
Mines should be designed so that the maximum grade does not exceed 10%.

Adjustment Coefficient for Grade

Grade	Front K_g	Rear K_g
-1%	1.01	1.00
-2%	1.02	0.99
-3%	1.02	0.98
-4%	1.03	0.98
-5%	1.04	0.97
-6%	1.05	0.97
-7%	1.06	0.96
-8%	1.06	0.96
-9%	1.07	0.95
-10%	1.08	0.95

-1%: Downhill 1%

How to Get Grade?



Grade = Height Difference* ÷ One-way distance

* Dumping Area Altitude – Loading Area Altitude

How to Get the Height Difference?

1. Hearing from customer
2. V-Box study
 - Consult Yokohama Tire Corporation.

TMPH of Steel Breaker Tires

A TMPH rating is not given for steel breaker tires. However, the TMPH capability can be estimated by multiplying the TMPH rating of a comparable tire of standard construction by 0.7.



Load & Carry Operation of Front-End Loaders

In loading and grading operations with loaders and dozers, tire heat does not pose a large problem because the average operating speed is very low compared with dump trucks and scrapers. However, for load-and-carry operations the average operating speed is higher and tire temperature may become an important factor. This is especially important for L-5 and L-5S tires which have a very thick tread. In this case, operation must be limited by the following charts. If the use of L-5 tires is too limiting, L-4 and L-3 tires are an alternative.

Load & Carry Guidelines for Bias Tires

TRA Code	Air Pressure for Front Tires	Maximum One Way Distance	Average Work day Speed		
			~29"	~33"	~45"
L-3	Standard A.P. +100kPa (+15psi)	2000ft. (610m)	7 mph (11km/h)	—	—
L-4		800ft. (244m)	6 mph (9km/h)	4 mph (7km/h)	3 mph (5km/h)
* L-5		250ft. (76m)	4 mph (7km/h)	3 mph (5km/h)	2 mph (3km/h)

* When tires designed for dig and load vehicles are used in load-and-carry operations, the haul distance must be limited to 250 ft (76 m) one way and maximum speed to 5 mph (10 kph).

Speed & Load Recommendations for Load & Carry Operations

Max. Speed	% Load Change From 5MPH Table
5 mph (10km/h)	No Change
10 mph (15km/h)	–13%
15 mph (25km/h)	–20%

Protecting Tires on Vehicle in Highway Drive-Away

Because of the special extra-heavy construction of OFF-THE-ROAD TIRES, special precautions must be observed to protect these expensive tires when the vehicle is driven on the highway for delivery, or moved by an operator to a new job site. If the precautions are not observed, excessive tire heat may develop and the tire may fail prematurely. Always consult the vehicle or tire manufacturer for specific information before starting out on a trip. Vehicles in transit should be accompanied by responsible personnel in a pilot car to enforce the following precautions and maintain a check on equipment. This is good insurance for a large investment. The following precautions apply to tires on all vehicles in transit, driven or towed. Check the following guidelines and consult Yokohama Tire Corporation.

Load & Pressure

- Empty vehicles before starting.
- Instructions for use of drive-away tables:
 - 1) Determine the load each tire will carry.
 - 2) Using the table, select the inflation pressure shown for the load determined. This is the pressure required for drive-away service.
 - 3) Ignore tire ply rating when determining drive-away load and pressure conditions.
- Check inflation pressure before starting out each day and adjust to pressure recommended for highway drive-away by vehicle manufacturer.
- Do not drive or tow vehicles using tires with 'dry ballast' in highway drive-away.
- Do not reduce inflation pressure by bleeding tires during highway drive-away. During highway drive-away pressure build-up in tires is normal.

Maximum Highway Speed

Regular Tread Tires (E-3)

Narrow Base: 30 mph (50 kph)

Wide Base: 20 mph (30 kph)

- Average operating speed
(Running Distance ÷ (Running Hours + Stop Hours))
should be under the speed obtained by the following equation:

$$\text{Speed} = \frac{\text{Tire TMPH}}{\text{Tire Load (s-ton)}} \times 0.8$$

0.8 is a safety coefficient.

- Where narrow base and wide base tires are mixed on a vehicle, use the guidelines specified for wide base tires.

Deep Tread (E-4) & Special Compound Tires

- Do not drive vehicles equipped with deep tread (E-4) and special compound tires over the highway unless the proposed trip is reviewed and approved by qualified YOKOHAMA personnel.

Extra Deep Tread Tires

- Do not under any circumstances move extra deep tread tires over the highway.

Operation Mode

YOKOHAMA recommends the following mode of operation:

- Stop for a 30-minute cooling period after each 2 hours of sustained operation.
- A one-hour minimum stop period should be observed after every four hours of operation.

Driving	Stop	Driving	Stop	Driving	Stop	...
2H	0.5H	2H	1.0H	2H	0.5H	

The following is an example for driving a vehicle on the highway for delivery:

- 1) Vehicle model: YOKO 155 (155 m-ton)
- 2) Tire size: 36.00-51 66PR E-3
- 3) Temperature: 50°F~100°F (10°C~38°C)
- 4) Tire load: Empty before starting, load on front tire 29.5 m-ton (32.5 s-ton)
- 5) Inflation pressure: 515 kPa (75 psi)
- 6) Maximum speed: 30 mph (50 kph)
- 7) Average speed:

	TRA Code	Tire Spec	Ton-Mileage		Average Speed	
			TMPh	TKPh	MPH	KPH
Y565	E-3	RE-T	500	730	12.31	19.80
		HR-V	600	875	14.77	23.73

8) Recommended Operation Mode:

2H Driving	0.5H Stop	2H Driving	1H Stop	2H Driving	0.5H Stop	2H Driving	1H Stop	...
Speed (V)		Speed (V)		Speed (V)		Speed (V)		

	TRA Code	Tire Spec	*Speed (V)	
			MPH	KPH
Y565	E-3	RE-T	16.92	27.22
		HR-V	20.31	32.63

$$\begin{aligned} * \text{Speed} &= \text{Average Speed} \times \frac{\text{Driving Hours} + \text{Stop Hours}}{\text{Driving Hours}} \\ &= \text{Average Speed} \times (5.5 \div 4) \end{aligned}$$

Protecting Tires on Vehicle in Highway Drive-Away

Load and Inflation Pressure Table for Transit (as recommended by the TRA)

Narrow Base Earthmover Tires in Drive-Away Service Only

30 MPH (50 KPH) Maximum Speed

Tire Size Designation	Tire Load Limits at Various Cold Inflation Pressures																
	Radial Ply																
	kPa	240	275	310	345	380	415	450	485	515	550	585	620	655	690	725	760
	psi	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110
	Diagonal Ply																
	kPa	170	205	240	275	310	345	380	415	450	485	515	550	585	620	655	690
	psi	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
16.00*25	kg	2440	2710	2970	3220	3450	3650	3880	4080	4260	4470	4630	4810	4990	5170	5350	5490
	lbs	5380	5980	6550	7100	7600	8050	8550	9000	9400	9850	10200	10600	11000	11400	11800	12100
18.00*25	kg	3150	3520	3860	4150	4450	4720	4990	5260	5530	5760	5990	6210	6440	6670	6890	7120
	lbs	6950	7750	8500	9150	9800	10400	11000	11600	12200	12700	13200	13700	14200	14700	15200	15700
21.00*25	kg	4060	4330	4940	5350	5720	6080	6440	6760	7120	7440	7710	8030	8300	8570	8890	9160
	lbs	8950	9550	10900	11800	12600	13400	14200	14900	15700	16400	17000	17700	18300	18900	19600	20200
24.00*25(**)	kg	5260	5850	6400	6890	7390	7890	8350	8750	9160	9570	9980	10390	10750	11110	11480	11790
	lbs	11600	12900	14100	15200	16300	17400	18400	19300	20200	21100	22000	22900	23700	24500	25300	26000
24.00*29	kg	5620	6260	6850	7390	7940	8440	8940	9390	9840	10250	10700	11110	11520	11880	12290	12660
	lbs	12400	13800	15100	16300	17500	18600	19700	20700	21700	22600	23600	24500	25400	26200	27100	27900
18.00*33	kg	3650	4080	4470	4810	5170	5490	5810	6120	6400	6670	6990	7210	7480	7760	7980	8260
	lbs	8050	9000	9850	10600	11400	12100	12800	13500	14100	14700	15400	15900	16500	17100	17600	18200
27.00*33(**)	kg	7350	8210	8980	9710	10390	11070	11700	12290	12880	13470	14020	14560	15060	15600	16100	16600
	lbs	16200	18100	19800	21400	22900	24400	25800	27100	28400	29700	30900	32100	33200	34400	35500	36600
30.00*33(**)	kg	9070	10070	11020	11930	12790	13610	14380	15100	15830	16560	17240	17870	18550	19140	19780	20370
	lbs	20000	22200	24300	26300	28200	30000	31700	33300	34900	36500	38000	39400	40900	42200	43600	44900
21.00*35	kg	4810	5350	5850	6350	6800	7210	7670	8030	8440	8800	9160	9530	9840	10210	10520	10840
	lbs	10600	11800	12900	14000	15000	15900	16900	17700	18600	19400	20200	21000	21700	22500	23200	23900
24.00*35	kg	6170	6850	7530	8120	8710	9250	9800	10300	10800	11250	11700	12160	12610	13060	13470	13880
	lbs	13600	15100	16600	17900	19200	20400	21600	22700	23800	24800	25800	26800	27800	28800	29700	30600
24.00*43(**)	kg	6890	7670	8390	9070	9710	10300	10890	11480	12020	12560	13060	13560	14060	14560	15010	15470
	lbs	15200	16900	18500	20000	21400	22700	24000	25300	26500	27700	28800	29900	31000	32100	33100	34100
18.00*49(**)	kg	4630	5170	5620	6080	6530	6940	7350	7710	8070	8440	8800	9160	9480	9800	10120	10430
	lbs	10200	11400	12400	13400	14400	15300	16200	17000	17800	18600	19400	20200	20900	21600	22300	23000
21.00*49(**)	kg	5850	6490	7120	7710	8260	8750	9250	9750	10210	10660	11110	11520	11930	12340	12750	13150
	lbs	12900	14300	15700	17000	18200	19300	20400	21500	22500	23500	24500	25400	26300	27200	28100	29000
24.00*49	kg	7390	8210	9030	9750	10430	11110	11750	12340	12930	13520	14060	14610	15150	15650	16150	16650
	lbs	16300	18100	19900	21500	23000	24500	25900	27200	28500	29800	31000	32200	33400	34500	35600	36700
27.00*49	kg	9070	10070	11020	11930	12790	13610	14380	15100	15830	16560	17240	17870	18550	19190	19780	20370
	lbs	20000	22200	24300	26300	28200	30000	31700	33300	34900	36500	38000	39400	40900	42300	43600	44900
30.00*51	kg	11200	12470	13650	14740	15830	16830	17780	18730	19600	20500	21320	22140	22950	23720	24490	25220
	lbs	24700	27500	30100	32500	34900	37100	39200	41300	43200	45200	47000	48800	50600	52300	54000	55600
33.00*51	kg	12970	14470	15830	17100	18330	19500	20590	21680	22730	23720	24720	25630	26580	27440	28350	29260
	lbs	28600	31900	34900	37700	40400	43000	45400	47800	50100	52300	54500	56500	58600	60500	62500	64500
36.00*51	kg	15830	17600	19280	20820	22320	23720	25080	26400	27670	28800	30160	31300	32430	33570	34470	35610
	lbs	34900	38800	42500	45900	49200	52300	55300	58200	61000	63500	66500	69000	71500	74000	76000	78500
40.00*57	kg	20190	22500	24590	26580	28580	30390	31980	33790	35380	36970	38330	39920	41280	42640	44230	45360
	lbs	44500	49600	54200	58600	63000	67000	70500	74500	78000	81500	84500	88000	91000	94000	97500	100000

* Tire size designation will include "R"(Radial Ply) or "-"(Diagonal or Bias Ply)

**Not available from Yokohama Tire Corporation.

NOTES: Figures are subjected to change without prior notice.

Wide Base Earthmover Tires in Drive-Away Service Only
30 MPH (50 MKH) Maximum Speed

Tire Size Designation	Tire Load Limits at Various Cold Inflation Pressures																
	Radial Ply																
	kPa	240	275	310	345	380	415	450	485	515	550	585	620	655	690	725	760
	psi	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110
	Diagonal Ply																
	kPa	170	205	240	275	310	345	380	415	450	485	515	550	585	620	655	690
	psi	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
15.5*25	kg	1700	1890	2060	2230	2390	2540	2690	2840	2970	3080	3220	3360	3470	3580	3700	3810
	lbs	3740	4160	4540	4920	5260	5600	5920	6250	6550	6800	7100	7400	7650	7900	8150	8400
17.5*25	kg	2020	2250	2470	2670	2860	3040	3220	3380	3540	3700	3860	3990	4150	4290	4420	4540
	lbs	4460	4960	5440	5880	6300	6700	7100	7450	7800	8150	8500	8800	9150	9450	9750	10000
20.5*25	kg	2700	3020	3290	3560	3810	4060	4290	4510	4720	4940	5130	5350	5530	5720	5900	6080
	lbs	5960	6650	7250	7850	8400	8950	9450	9950	10400	10900	11300	11800	12200	12600	13000	13400
23.5*25	kg	3450	3830	4200	4540	4850	5170	5490	5760	6030	6310	6580	6800	7080	7300	7530	7760
	lbs	7600	8450	9250	10000	10700	11400	12100	12700	13300	13900	14500	15000	15600	16100	16600	17100
26.5*25	kg	4330	4810	5260	5720	6120	6490	6890	7260	7580	7940	8260	8570	8890	9160	9480	9750
	lbs	9550	10600	11600	12600	13500	14300	15200	16000	16700	17500	18200	18900	19600	20200	20900	21500
29.5*25	kg	5220	5810	6350	6890	7390	7850	8300	8710	9160	9530	9930	10340	10700	11070	11430	11750
	lbs	11500	12800	14000	15200	16300	17300	18300	19200	20200	21000	21900	22800	23600	24400	25200	25900
26.5*29	kg	4630	5170	5620	6080	6530	6940	7350	7710	8120	8480	8800	9160	9480	9800	10120	10430
	lbs	10200	11400	12400	13400	14400	15300	16200	17000	17900	18700	19400	20200	20900	21600	22300	23000
29.5*29	kg	5580	6210	6760	7350	7850	8350	8850	9300	9750	10160	10570	10980	11390	11790	12160	12520
	lbs	12300	13700	14900	16200	17300	18400	19500	20500	21500	22400	23300	24200	25100	26000	26800	27600
33.25*29	kg	6850	7620	8350	9030	9660	10300	10890	11430	12020	12520	13060	13560	14020	14520	14970	15420
	lbs	15100	16800	18400	19900	21300	22700	24000	25200	26500	27600	28800	29900	30900	32000	33000	34000
33.5*33(**)	kg	7480	8350	9120	9840	10570	11250	11880	12470	13110	13650	14240	14790	15330	15830	16330	16830
	lbs	16500	18400	20100	21700	23300	24800	26200	27500	28900	30100	31400	32600	33800	34900	36000	37100
37.5*33(**)	kg	8980	10020	10980	11840	12700	13520	14290	15010	15740	16420	17100	17780	18420	19050	19640	20280
	lbs	19800	22100	24200	26100	28000	29800	31500	33100	34700	36200	37700	39200	40600	42000	43300	44700
29.5*35	kg	6080	6760	7390	7980	8530	9070	9620	10120	10610	11070	11520	11980	12380	12840	13250	13650
	lbs	13400	14900	16300	17600	18800	20000	21200	22300	23400	24400	25400	26400	27300	28300	29200	30100
33.25*35	kg	7440	8260	9070	9800	10480	11160	11790	12430	13020	13560	14150	14700	15200	15740	16240	16740
	lbs	16400	18200	20000	21600	23100	24600	26000	27400	28700	29900	31200	32400	33500	34700	35800	36900
37.25*35	kg	8980	9980	10930	11790	12660	13430	14200	14970	15650	16370	17060	17690	18330	18960	19550	20140
	lbs	19800	22000	24100	26000	27900	29600	31300	33000	34500	36100	37600	39000	40400	41800	43100	44400
33.5*39(**)	kg	8070	8980	9800	10610	11390	12110	12790	13470	14110	14740	15330	15920	16510	17060	17600	18140
	lbs	17800	19800	21600	23400	25100	26700	28200	29700	31100	32500	33800	35100	36400	37600	38800	40000
37.5*39	kg	9660	10750	11750	12700	13610	14520	15330	16150	16920	17650	18370	19100	19780	20460	21090	21730
	lbs	21300	23700	25900	28000	30000	32000	33800	35600	37300	38900	40500	42100	43600	45100	46500	47900
37.5*51(**)	kg	10930	12160	13290	14380	15420	16370	17330	18230	19100	19960	20770	21590	22360	23130	23860	24590
	lbs	24100	26800	29300	31700	34000	36100	38200	40200	42100	44000	45800	47600	49300	51000	52600	54200

* Tire size designation will include "R" (Radial Ply) or "-" (Diagonal or Bias Ply)

**Not available from Yokohama Tire Corporation.

NOTES: Figures are subjected to change without prior notice.

$$\text{PSI} \times 0.0703 = \text{kg/cm}^2 \quad \text{POUND} \times 0.4536 = \text{kg} \quad \text{PSI} \times 6.895 = \text{kPa}$$

Handling of Tires

Improper handling of tires can lead to damage, especially to the beads. Therefore, it is necessary to prevent excess pressure from being exerted on the beads.

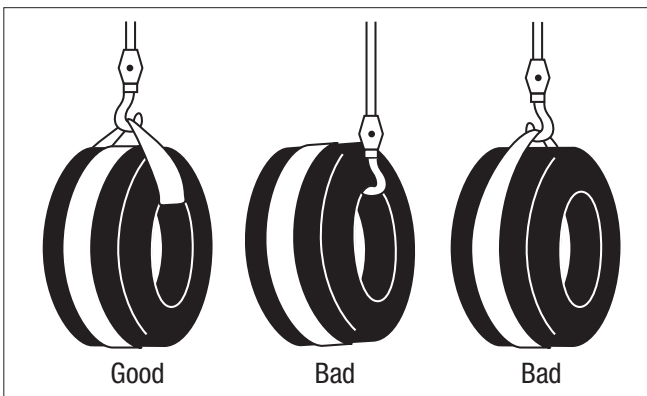
When using a forklift to lift a tire:

- Lay the tire vertically across the fork, or
- Use a round fork at least six-inches in diameter.
- Do not insert a flat type fork within the tire.



When lifting tires by crane:

- Use a wide nylon or rubber sling.
- Do not hook the tire beads.
- Do not use a rope sling.



Safety Precautions for Demounting

Safety Precautions

WARNING

Tire and rim servicing can be dangerous, and should be performed only by trained personnel using proper tools and procedures. Failure to comply with these procedures may result in faulty positioning of the tire and/or rim, and cause the assembly to burst with explosive force, sufficient to cause serious physical injury or death.

Demounting

1. Before Demounting

- Always exhaust all air from a single tire and from both tires of a dual assembly prior to removing any wheel components such as nuts and rim clamps.
- A broken rim part under pressure can blow apart and cause serious injury or death.
- Make sure to remove valve core to exhaust all air from the tire. Remove both cores from a dual assembly. (When you remove the wheel lugs, if the tire is still under pressure, the assembly may fly apart.)
- Check the valve stem by running a piece of wire through the stem to make sure it is not plugged. (Foreign material may clog the valve stem during deflation or ice may form as the air leaves the tire, clogging the valve stem.)

2. During Demounting

- Demounting tools apply pressure to rim flanges to unseat tire beads, and keep your fingers clear. Always stand to one side and hold the tool with one hand when you apply hydraulic pressure. (If the tool slips off, it can fly with enough force to cause serious injury or death.)
- Do not use tools in the vicinity of the flange butt weld.

3. After Demounting

- Clean rims and repaint to stop detrimental effects of corrosion and facilitate checking and tire mounting. Be very careful to clean all dirt and rust from the lock ring and gutter. This is important to secure the lock ring in its proper position. A filter on the air inflation equipment to remove the moisture from the air line helps prevent corrosion. The filter should be checked periodically to see that it is working properly. (Parts must be clean for a proper fit - particularly the gutter section which holds the lock ring in its proper position.)

Safety Precautions for Mounting

1. Before Mounting

- Check rim components for cracks. Replace all cracked, badly worn, damaged and severely rusted components with new parts of the same size and type. When a component is in doubt, replace it. (Parts that are cracked, damaged or excessively corroded are weakened. Bent or repaired parts may not engage properly.)
- Do not, under any circumstance, attempt to rework, weld, heat or braze any rim component that is cracked, broken or damaged. Replace with a new part that is not cracked, broken or damaged and which is of the same size and type. (Heating may weaken a part to extent that it is unable to withstand forces of inflation or operation.)
- Check type of rim and make sure all parts of such rim are being assembled properly. Follow instruction manual of rim or ask your distributor if you have any doubts. (Mismatched parts may appear to fit, but when the tire is inflated they may fly apart with explosive force.)
- Mixing parts of one type rim with those of another is potentially dangerous. Always check rim with manufacturer for approval.
- Remove rust, dirt and other foreign matter from the rim surface, particularly on the bead seats and O-ring slot.
- Clean the inside of the tire.
- Make sure tube and flap are correct and not damaged for tube type tires.
- Always prepare a new O-ring for tubeless tires.
- Do not reinflate a tire that has been run flat or has been run at 80% or less of its recommended operating pressure, or when there is obvious or suspected damage to the tire or wheel components. (Components may have been damaged or dislocated during the time the tire was run flat or seriously under-inflated.)

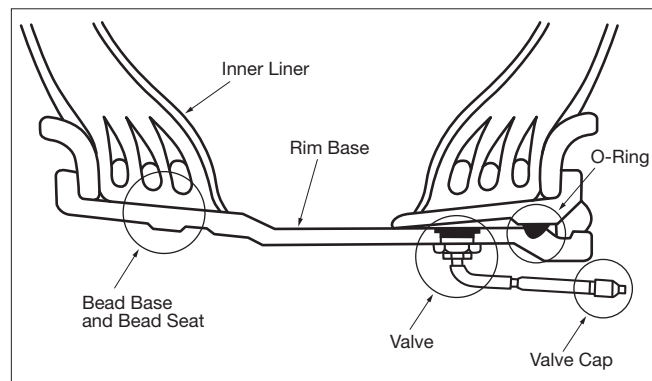
2. During Mounting and Inflation

- Do not try to seat rings or other components by hammering while tire is inflated or partially inflated.
- Double check to make sure all components are properly seated prior to inflation.

- Do not inflate tire before all components are properly in place. Place in safety cage or use a restraining device and inflate to approximately 0.35 kg/cm² (5 psi), recheck components for proper assembly. Observe that O-ring does not roll out of its groove. If assembly is not performed properly, deflate and correct. Never hammer on an inflated or partially inflated tire/rim assembly. If assembly is correct at approximately 0.35 kg/cm² (5 psi), continue to inflate fully to seat the tire beads.
- Never sit or stand in front of a tire and rim assembly that is being inflated. Always use a clip-on chuck with a sufficient length of hose to permit the person inflating the tire to stand clear of the potential trajectory of the wheel components, and use an in-line valve with gauge or a pressure regulator preset to a desired value when inflating a tire. When a tire is in a restraining device, do not lean any part of your body or equipment on or against the restraining device. (If parts are improperly installed they may fly apart with explosive force.)
- Never attempt to weld on an inflated tire/rim assembly or on a rim assembly with a deflated tire (heat from welding will cause a sudden, drastic increase in pressure, resulting in an explosion with the force of a bomb; deflated tires can catch fire inside the air chamber) broken or damaged. Replace with a new part that is not cracked, broken or damaged and which is of the same size and type. (Heating may weaken a part to extent that it is unable to withstand forces of inflation or operation.)

3. After Inflation

- Make sure no air leakage can be suspected, especially in tubeless tires.





Safety Precautions for Operation

Operation

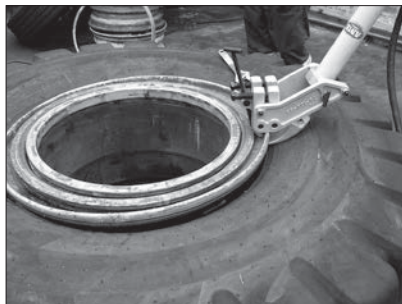
- Do not use under-inflated tires.
- Do not bleed or reduce air pressure to compensate for the increase in pressure resulting from operation.
- Do not use under-size rims. Use recommended rim for the tire.
- Do not overload or over-inflate tire/rim assemblies. Check for adequate rim strength if special operating conditions are required. (Excessive overload can cause damage to the tire and rim assembly.)
- Never run a vehicle on one tire of a dual assembly. (The carrying capacity of the single tire and rim is dangerously exceeded, and operating a vehicle in this manner can result in damage to the rim and tire or cause a tire fire.)
- Never use a tube in a tubeless tire/rim assembly where the rim is suspected of air leakage. (Loss of air pressure through fatigue cracks or other fractures in a tubeless rim warns you of a potential rim failure. This safety feature is lost when tubes are used with leaking rims. Continued use may cause the rim to burst with explosive force.)
- Always inspect rims and wheels for damage during tire checks. (Early detection of potential rim failure may prevent serious injury.)
- Never add or remove an attachment or otherwise modify a rim (Especially by heating, welding or brazing) unless the tire has been removed and approval has been received from the rim manufacturer. (Modification or heating of a rim or one of its parts may weaken it so that it cannot withstand forces created by inflation or operation.)
- Never mount bias tire and radial tire on the same axle. Follow vehicle manufacturer's recommendation.
- Never use tire under unintended service conditions for the tire. Please consult YOKOHAMA if vehicle operation requires specialized tire fitment.

Tools for Mounting and Demounting Tires

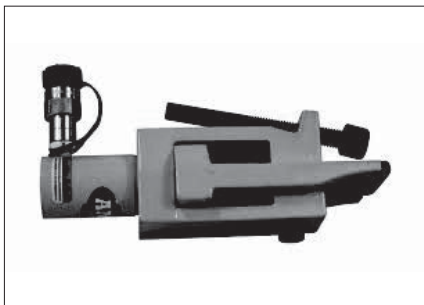
The following are all portable tools, and can be used both horizontally and vertically.



Hydraulic tire remover (tire push type) and bead wedges. Commonly used for 25 inch rims.



Hydraulic tire remover (tire push type) in operation.



Hydraulic tire remover (rim flange push type). Commonly used for 33 inch or larger rims.



Hydraulic tire remover (rim flange push type) in operation.



Tire handler

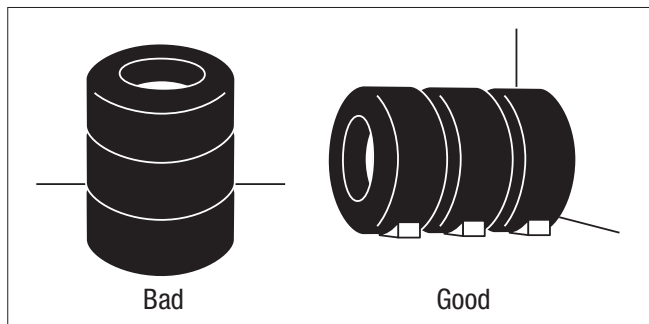
Tire Storage

In general, tires should be removed from the rim, cleaned, and stored in a cool, dry room. They should be stored in an upright position, not horizontally, so that the proper space between the beads will be maintained. Make sure that the tire is not deformed by any external pressure exerted on it.

Avoid the following when storing tires:

- Direct sunlight
- Ozone
- Oil and grease
- High temperatures and humidity

If tires must be stored outside, cover them with a tarpaulin for protection. If a vehicle is stored with tires mounted, rest the vehicle on blocks to relieve the load on the tires. Deflate the tires and cover them. Rotate the tires once a month to prevent permanent deformation, if the vehicle cannot be rested on blocks.



How to Reduce Tire Costs

Select the proper tire for the job:

- Tire size
- Ply rating
- Tire specification

Maintain a tire record:

- Keep a tire card for each tire
- Analyze scrap tires

Carry out good tire maintenance:

- Perform regular inflation pressure checks
- Regularly inspect tire appearance
- Ensure proper matching of dual tires
- Prevent oil saturation
- Prevent high temperature and humidity
- Prevent wavy condition
- Keep haul road, loading and dumping area clean
- Provide good drainage

Maintain good job conditions:

- Do not overload
- Avoid excessive speed
- Train operator

Tubes & Flaps

Tube type tires employ tubes to retain air under pressure within the carcass. The flap is a liner which is placed between the rim and tube to protect the tube from damage by the rim and beads. The size of the tube and flap are usually indicated by the size of tire for which they can be used, without regard for the ply rating. For example, a 23.5-25 size tube or flap can be used with a tire of 23.5 inch width and a diameter of 25 inches. Some tubes and flaps can be used for more than one size of tire. For example, a size 13.00-24 and 13.00-25.

Storage of Tubes and Flaps

Tubes and flaps should be cleaned and all of the air expelled before storage. They should always be stored in a dry, cool place. The tubes should be packed lightly when storing to prevent the metal valve stems from causing damage.

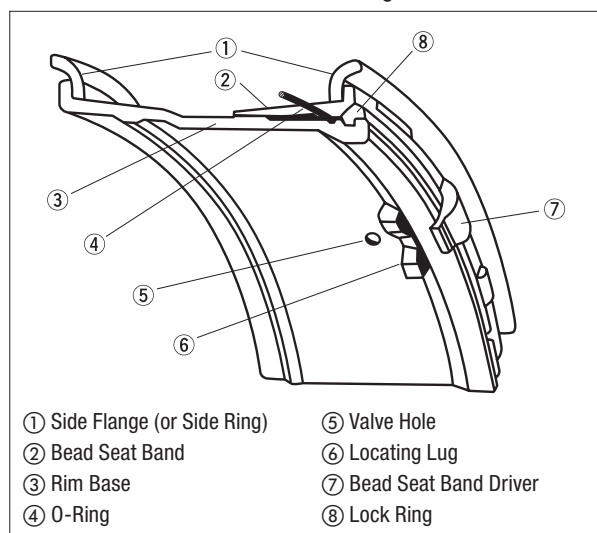
Valves for Tube Type Tires

The type of valve used for a tube type tire depends on the type of rim it is mounted to. Therefore, when purchasing tubes, proper attention should be given to the valve type.

Rims

Normally, a rim is composed of a rim base, two side flanges (or side rings), bead seat band and lock ring. On some smaller size rims, parts may be joined. For tubeless tires, an O-ring is also used.

Rim Construction Diagram



Rim Identification

Rims are normally identified by a three-part code consisting of rim width (inches), flange shape (alphabetical) and rim diameter (inches). A flat base rim example would be: 9.00 V x 24. This follows the nomenclature of tire size with the addition of the flange identification, in this case. The code for full tapered bead seat rims does not indicate the flange shape, but some indicate flange height in inches. An example would be 17.00 x 25 - 2.0, where 2.0 is the flange height in inches.

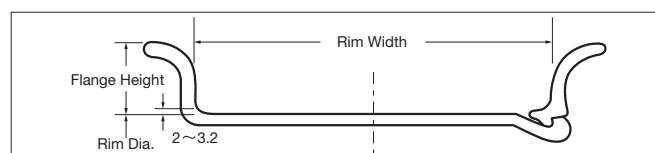
Type of Rims

Tires can function properly only when they are mounted on the right rim. There are four basic types of rims for off-the-road tires: flat base, full tapered bead seat, semi-drop center and drop center.

Flat Base Type Rims

There are two sub-classifications of interchangeable flat base type rims as shown below. A tire which fits on one kind of flat base rim will fit on all flat base rims of the same width and diameter. These rims are used for relatively small tube type off-the-road tires.

Flat Base Rim/5° Flat Base Rim

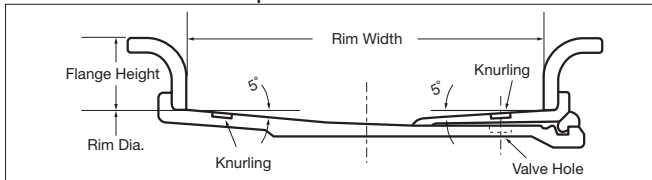


Rim Size		Tire Size	
Flat Base Rim	5° Flat Base Rim	Standard	Alternative
6.50T	6.5	8.25-20	9.00-20
7.00T	7.0	9.00-20	10.00-20
7.50V(VM)	7.5	10.00-20	11.00-20
8.00V	8.0	11.00-20	12.00-20.24
8.50V(VM)	8.5	12.00-20.24	13.00-24
9.00V	9.0	13.00-24	12.00-20.24, 14.00-20.24
10.00W(W)	—	14.00-20.24, R24	13.00-24

Full Tapered Bead Seat Rims

Most large-wheeled construction machinery employ full tapered bead seat rims. These rims have a 5° taper in the bead seat which strengthens the rim/bead binding. Additionally, a fine groove called "knurling" lines the bead surface to prevent further slippage. Flat base rims have a looser fit and some slippage may occur under quick acceleration if used on the same large-wheeled vehicle. Almost all rims with diameters over 25" are full tapered bead seat types. Wide base variations are also available.

Full Tapered Bead Seat Rim

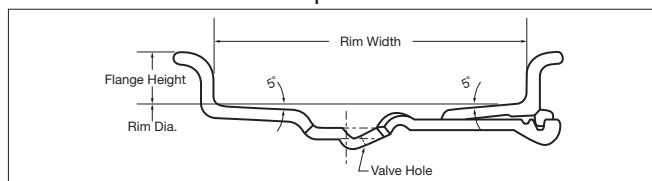


Narrow Base		Wide Base	
Rim Size	Tire Size	Rim Size	Tire Size
8.50	12.00-25, 13.00-25	12.00	15.5-25
10.00	14.00-25	14.00	17.5-25, 17.5R25
11.25	16.00-25, 16.00R25	17.00	20.5-25, 20.5R25
13.00	18.00-25, 33, 18.00R33	19.50	23.5-25, 23.5R25
15.00	21.00-25, 35	22.00	26.5-25, 26.5R25
17.00	24.00-25, 29, 35, 49	25.00	29.5-25, 29, 35, 29.5R25
19.50	27.00-49	27.00	33.25-35
22.00	27.00-33, 30.00-51	28.00	33.5-33, 39, 35/65-33
24.00	33.00-51	31.00	37.25-35
26.00	36.00-51	32.00	37.5-33, 39, 51, 40/65-39
29.00	40.00-57	36.00	45/65-45

Semi-Drop Center Rims (SDC)

This rim has a 5°-inclined bead seat and a depressed center. It is abbreviated as the "SDC" rim. Most SDC rims for OFF-THE-ROAD tires have diameters of 20" or 24". They are used on graders and loaders, and are identified by the marking on the tire sidewall: "For SDC RIM" or "For SDC RIMS".

Semi-Drop Center Rim

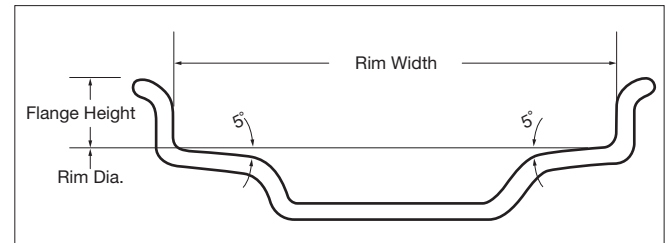


Rim Size	Tire Size	Rim Size	Tire Size
8.00TG	12.00-20, 24	11.00TG	14/70-20
	13.00-24	14.00TG	42x17-20
	14.00-24, 14.00R24	12.00SDC	15.5-25
10.00VA	13.00-24	14.00SDC	17.5-25, 17.5R25
	14.00-24, 14.00R24		
	16.00-24		

Drop Center Rims (DC)

The drop center rim also has a 5°-inclined bead seat, but with a deeply depressed center (dropped rim center) section for easier tire mounting. Most DC rims are used on small loaders.

Drop Center Rim



Rim Size	Tire Size	Rim Size	Tire Size
7JA	23x8.50-12	11LB	14.0/65-15
	27x8.50-15	W13	15.5/60-18
	27x9.50-15		15.5/70-18.20
8-1/2JA	10.0/70-12	W14L	17.5/65-20
W10L	12.5/65-18	W15L	16.9-24, 28, 30
10LB	12.5/70-16	W16L	18.4-24
		12.00DC*	15.5-25
		13.00DC*	15.5-25, 17.5-25, R25
		14.00DC*	17.5-25, R25

Caution with Wheel Use

Wheel defects such as cracks or corrosion can lead to air leakage, causing among other dangers, deteriorated traction and braking performance. Service life of the tire will degrade, also. More importantly, safe operation of the vehicle will be jeopardized.

- Do not use wheels with defects such as corrosion or cracks.
- Do not use rims for tubeless application that have been welded, have rust or have air leakage.
- Do not use wheels with cracks, breakage or rust erosion on the nut seat of the wheel.
- Do not use wheels if packing gutters are deformed by rust.
- Do not re-use O-rings.

Tube Valves

This valve has an opening to accommodate a standard valve core. This type of valve is mainly used for tires smaller than 14.00-24.

TRSP1000 Spud Air-Liquid Type

More air is required to fill larger tires. To decrease the filling time, a large bore valve can be utilized due to its increased internal diameter. This type of valve is used for wide base and narrow base tires with tread widths larger than 15.5 and 16.00, respectively. The large bore valve is also called a "jumbo valve", for which the third letter of its part number stands for.



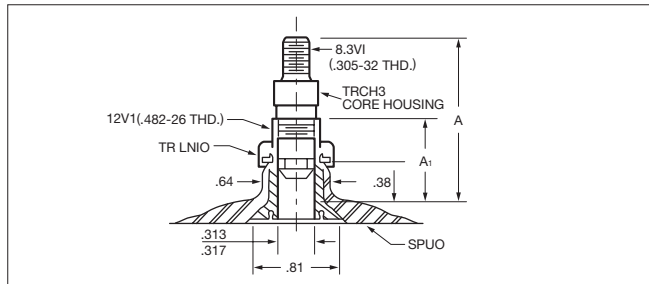
TRJ4000 Large Bore Tube Valve (Swivel Type)



(3) Air/Water Tube Valves

A liquid compound (normally a calcium chloride solution) can be injected into a tube with this valve. Two types are available, the TR218A and TR220A.

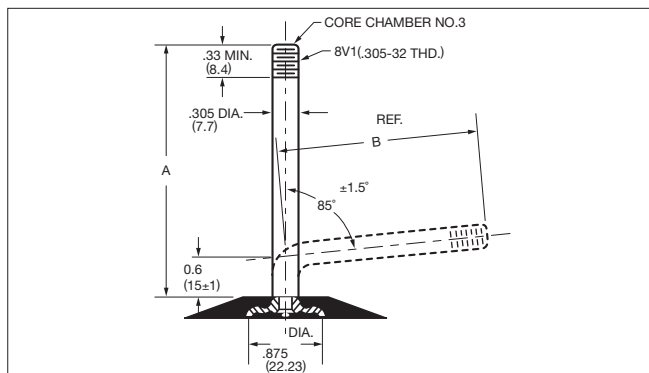
Air-Liquid Type



unit inch (mm)

Valve No.	A ₁	A
TR218A	0.81 (20.6)	1.63 (41.1)
TR220A	1.19 (30.2)	2.00 (50.7)

Convertible Tube Valve Air-Liquid Type



unit inch (mm)

Valve No.	A	B (Ref)
440	3.35 (85)	3.0 (75)
441	4.13 (105)	3.7 (95)
442	4.53 (115)	4.1 (105)
443	4.92 (125)	4.5 (115)
444	5.51 (140)	5.1 (130)
445	6.10 (155)	5.7 (145)

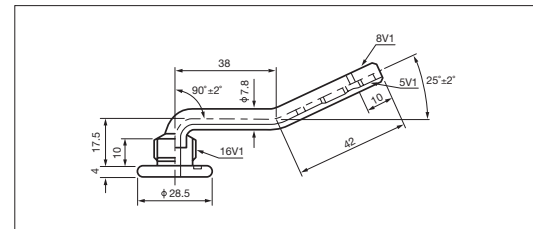
Valve Core: TRCa (short core only)

Rim Valves

(1) Standard Bore Rim Valves

This is the rim valve counterpart to the standard bore tube valve explained on the opposite page.

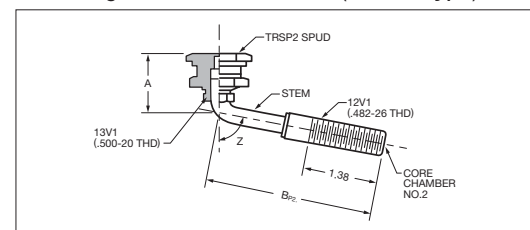
TR503A Dimension



(2) Large Bore Rim Valves

This is a rim valve with a large valve core, corresponding to the large bore tube valve. There are three types available.

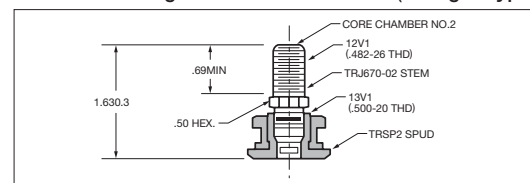
Large Bore Tubless Valve (Swivel Type)



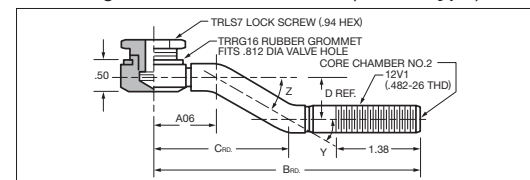
Valve No.	*TR Stem No.	A	B	Z°
TRJ650-03	J650-02	1.08	3.12	80

* Recommended torque at installation: 70-80 inch-pound

TRJ670-03 Large Bore Tubeless Valve (Straight Type)



Large Bore Tubeless Valve (Turret Type)



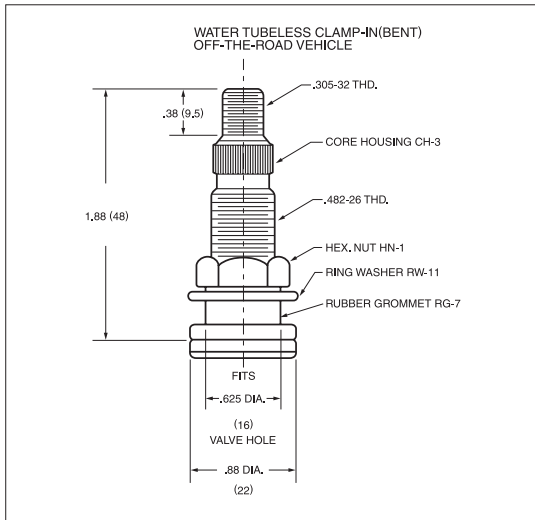
Valve No.	A	B	C	D	Y°	Z°
TRJ690	1.25	4.69	2.31	0.56	28	28

Rim Valves

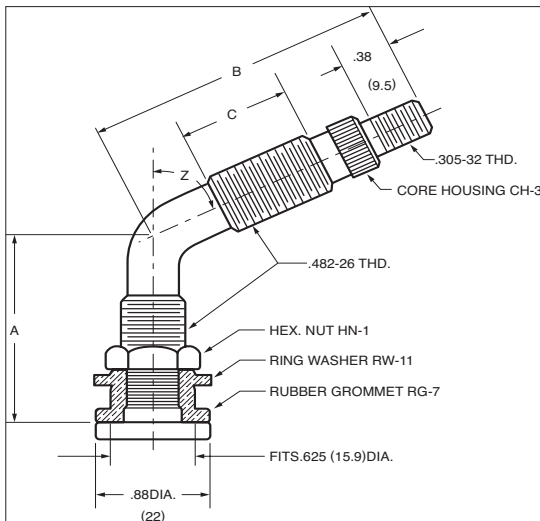
(3) Air/Water Rim Valves

This is a rim valve with a core housing, corresponding to its tube valve type explained previously. There are four types of these valves available: TR618A, TR621A, TR622A and TR623A.

TR618A Dimensions



TR621A, TR622A and TR623A Dimensions



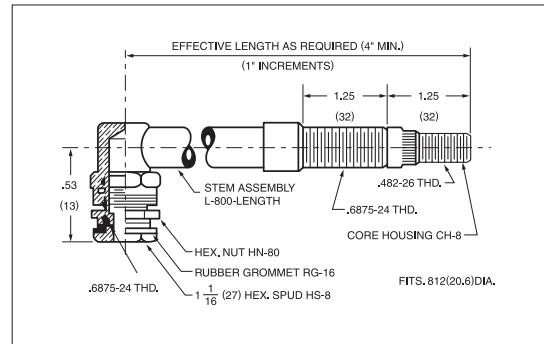
Valve No.	A	B	C	Z
TR621A	1.53 (39)	2.97 (75)	1.59 (40)	65°
TR622A	1.75 (44)	4.53 (115)	1.84 (47)	65°
TR623A	1.53 (39)	2.25 (57)	0.88 (22)	65°

unit inch (mm)

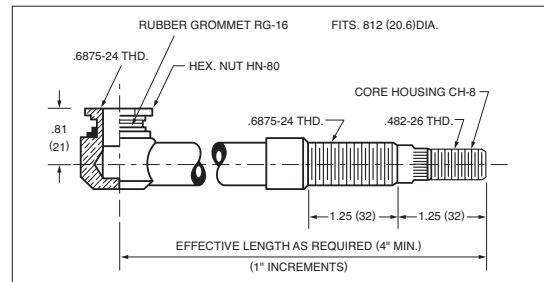
(4) Super Large Bore Rim Valves

Super large bore rim valves have an internal diameter 50% larger than large bore valves which makes air inflation easier and faster.

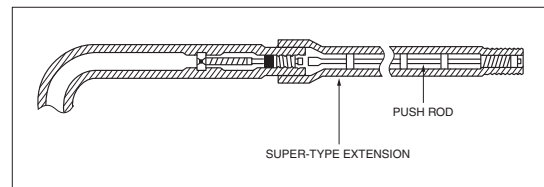
TRL850 Length (Swivel Type) Dimensions



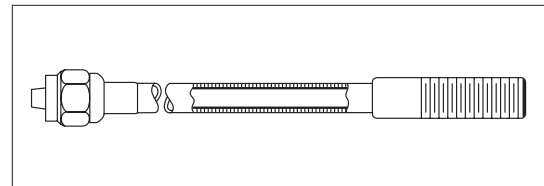
TRL890 Length (Turret Type) Dimensions



Extension



Semi-flexible Extension



Type	Number	Overall Length	Effective Length	Thread Length
SUPER TYPE EXTENSION	3605	55	38	25
	3607	75	58	36
	3610	100	83	36
	3612	120	103	36
	3613	133	116	36
	3616	165	148	36
	3620	200	183	36

unit : mm

(5) Caution with Tubeless Air Valves

Whenever the tubeless tire is demounted and changed, the tubeless air valve (rim valve) must be replaced with a new one, regardless of appearance.

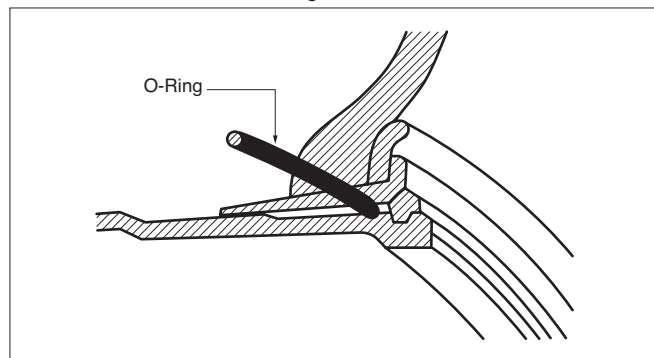
Valve Classification by Rim Type			
Type of Rim	Tire Width	Tube Type	Tubeless
FLAT BASE TYPE	14.00 and Under 16.00 and Over	Standard Bore Tube Valve Large Bore Tube Valve	Standard Bore Rim Valve Large Bore Rim Valve
FULL TAPERED	14.00 and Under 16.00 and Over 15.5 and Over	Standard Bore Tube Valve Large Bore Tube Valve Large Bore Tube Valve	Standard Bore Rim Valve Large Bore Rim Valve Large/Super Large Bore Rim Valve
SEMI-DROP CENTER	All Sizes	Standard Bore Tube Valve Air/Water Tube Valve	Air/Water Rim Valve
DROP CENTER	All Sizes	Air/Water Tube Valve	Air/Water Rim Valve

NOTES: Valves for inside dual-pair tire are equipped with a supplemental valve extension to facilitate air inflation. The extension is made of brass which is apt to nicks, scratches and dents. Care is required when (de)mounting, and storage should be in a clean, moisture free area.

O-Rings

Rims for tubeless OFF-THE-ROAD TIRES require the use of an O-ring. Also referred to as a "seal ring" or "gasket", the O-ring forms an air-tight seal between separate parts of the rim. It must be used properly. It is very important to note that even if rim diameters are the same, different size O-rings may be necessary depending on the type of rim used.

O-Ring Structure



O-Ring No.	Rim	Tire	Section Diameter		Inside Circumference	
			mm	inch	mm	inch
OR224TG	24" SDC	24" rim diameter	6.7	0.26	1768	69.61
OR225T	25" SDC	14.00-25 and under	6.7	0.26	1802	70.94
	25" TB	17.5-25 and under 20.5-25 (use 17.00×25-1.7 rim)				
OR325T	25" TB	16.00-25 and over 20.5-25 (use 17.00×25-2.0 rim) and over	9.8	0.39	1800	71.06
OR329T	29" TB	29" rim diameter	9.8	0.39	2127	83.74
OR333T	33" TB	33" rim diameter	9.8	0.39	2447	96.34
OR335T	35" TB	35" rim diameter	9.8	0.39	2560	100.79
OR339T	39" TB	39" rim diameter	9.8	0.39	2868	112.91
OR345T	45" TB	45" rim diameter	9.8	0.39	3311	130.35
OR349T	49" TB	49" rim diameter	9.8	0.39	3572	140.63
OR451T	51" TB	51" rim diameter	12.7	0.50	3666	144.33
OR457T	57" TB	57" rim diameter	12.7	0.50	4103	161.54

SDC: semi-drop center rim TB: tapered bead seat rim

O-Ring identification

OR 3 25 T

- Type of rim (Full tapered bead seat rim)
- Rim diameter (Bead diameter in inches)
- Cross section diameter O-ring (in eighths of an inch)
- Indicates that the ring is for OFF-THE-ROAD TIRES

Caution with O-Rings

- Do not use used or damaged O-rings.
- Clean rim and then lubricate with vegetable oil before mounting the O-ring.
- Take caution not to damage O-ring with tire lever. Avoid twisting.
- Keep spare O-rings on hand for emergencies. A 20% backup rate is recommended.



Combination Tables

OFF-THE-ROAD TIRES, Tube, Flap and O-Ring Combination Table

Tire Size	Tube Size	Valve Size		Flap Size	O-Ring Size
		Tube Valve	Rim Valve		
12.5/70-16	—	—	TR575,TR415	—	—
10-16.5	10-16.5	TR15	TR575	—	—
17.5/65-20	17.5/65-20	TR218A	TR618A	—	—
14/70-20	14/70-20	TR179A	—	14/70-20	—
13.5-20	13.5-20	TR78A	—	13.5-20	—
15.0-20	15.0-20	TJ179W	—	15.0-20	—
42×17-20	42×17-20	TR179A	—	42×17-20	—
16.9-24	16.9-24	TR218A	TR618A	—	—
18.4-24	18.4-24	TR218A	TR618A	—	—
750/65R25	—	—	TRJ650,TRJ670,TRJ690	—	OR325T
15.5-25	15.5-25	JSJ1175B,JSJ1175	TRJ650,TRJ670,TRJ690	15.5/17.5-25	OR225T
17.5R25	—	—	TRJ650,TRJ670,TRJ690	—	OR225T
17.5-25	17.5-25	JSJ1175B,JSJ1175	TRJ650,TRJ670,TRJ690	15.5/17.5-25	OR225T
20.5R25	—	—	TRJ650,TRJ670,TRJ690	—	OR325T/OR225T
20.5-25	20.5-25	JSJ1175B,JSJ1175	TRJ650,TRJ670,TRJ690	20.5-25	OR325T/OR225T
23.5R25	—	—	TRJ650,TRJ670,TRJ690	—	OR325T
23.5-25	23.5-25	JSJ1175B,JSJ1175	TRJ650,TRJ670,TRJ690	23.5-25	OR325T
26.5R25	—	—	TRJ650,TRJ670,TRJ690	—	OR325T
26.5-25	26.5-25	JSJ1175	TRJ650,TRJ670,TRJ690	26.5-25	OR325T
29.5R25	—	—	TRJ650,TRJ670,TRJ690	—	OR325T
29.5-25	—	—	TRJ650,TRJ670,TRJ690	—	OR325T
26.5-29	—	—	TRJ650,TRJ670,TRJ690	—	OR329T
29.5-29	—	—	TRJ650,TRJ670,TRJ690	—	OR329T
33.25-29	—	—	TRJ650,TRJ670,TRJ690	—	OR329T
35/65-33	—	—	TRJ650,TRJ670,TRJ690	—	OR333T
29.5-35	—	—	TRJ650,TRJ670,TRJ690	—	OR335T
33.25-35	—	—	TRJ650,TRJ670,TRJ690	—	OR335T
37.25-35	—	—	TRJ650,TRJ670,TRJ690	—	OR335T
37.5-39	—	—	TRJ650,TRJ670,TRJ690	—	OR339T
40/65-39	—	—	TRJ650,TRJ670,TRJ690	—	OR339T
45/65-45	—	—	TRJ650,TRJ670,TRJ690	—	OR345T
385/95R25	—	—	TRJ650	—	OR225T
445/95R25	—	—	TRJ650,TRJ670,TRJ690	—	OR325T

PSI × 0.0703 = kg/cm² POUND × 0.4536 = kg PSI × 6.895 = kPa

OFF-THE-ROAD TIRES, Tube, Flap and O-Ring Combination Table

Tire Size	Tube Size	Valve Size		Flap Size	O-Ring Size
		Tube Valve	Rim Valve		
9.00-20	9.00-20	TR175A,TR76A	—	8.25/9.00(R)20	—
10.00-20	11.1/10.00(R)20	TR78A,TR76A	—	10.00/11.1(R)20	—
11.00-20	11.00-20	TR78A,TR76A	—	11.00/12.00(R)20	—
12.00-20	12.00-20	TR78A,TR76A	—	11.00/12.00(R)20	—
14.00-20	14.00-20	TR179A,JS179	—	13/80,13.00/14.00/15.0(R)20	—
12.00-24	11.00/12.00(R)24	TR78A,TR77A	TR618A,TR503A	10.00/11.00/12.00-24	—
13.00-24	13.00-24/25	TR77A,JS179A	TR618A,TR503A	13.00/14.00-24/25	OR224TG
14.00R24	14.00(R)24/25	JS179	TR618A	13.00/14.00-24/25	OR224TG
14.00-24	14.00-24/25	TR77A,TR175A,TR179A	TR618A,TR503A	13.00/14.00-24/25	OR224TG
16.00-24	16.00-24/25	JSJ1175B,JSJ1175	TR618A,TR503A	16.00/18.00-24/25	OR224TG
14.00-25	14.00-24/25	TR77A,TR175A,TR179A	TR508,TR650	13.00/14.00-24/25	OR225T
16.00R25	—	—	TRJ650,TRJ670,TRJ690	—	OR325T
16.00-25	16.00-24/25	JSJ1175B,JSJ1175	TRJ650,TRJ670,TRJ690	16.00/18.00-24/25	OR325T
18.00R25	—	—	TRJ650,TRJ670,TRJ690	—	OR325T
18.00-25	18.00-24/25	JSJ1175B,JSJ1175C	TRJ650,TRJ670,TRJ690	16.00/18.00-24/25	OR325T
21.00-25	21.00-24/25	JSJ1175	TRJ650,TRJ670,TRJ690	21.00-24/25*15.5/17.5-25	OR325T
24.00-25	24.00-25	JSJ1175	TRJ650,TRJ670,TRJ690	20.5/24.00-25	OR325T
24.00-29	—	—	TRJ650,TRJ670,TRJ690	—	OR329T
18.00R33	—	—	TRJ650,TRJ670,TRJ690	—	OR333T
18.00-33	—	—	TRJ650,TRJ670,TRJ690	—	OR333T
21.00-35	—	—	TRJ650,TRJ670,TRJ690	—	OR335T
24.00R35	—	—	TRJ650,TRJ670,TRJ690	—	OR335T
24.00-35	—	—	TRJ650,TRJ670,TRJ690	—	OR335T
24.00-49	—	—	TRJ650,TRJ670,TRJ690	—	OR349T
27.00R49	—	—	TRJ650,TRJ670,TRJ690	—	OR349T
27.00-49	—	—	TRJ650,TRJ670,TRJ690	—	OR349T
30.00-51	—	—	TRJ650,TRJ670,TRJ690	—	OR451T
33.00R51	—	—	TRJ650,TRJ670,TRJ690	—	OR451T
33.00-51	—	—	TRJ650,TRJ670,TRJ690	—	OR451T
36.00-51	—	—	TRJ650,TRJ670,TRJ690	—	OR451T
40.00-57	—	—	TRL870,TRL850	—	OR457T
46/90R57	—	—	TRL870,TRL850	—	OR457T

The valve sizes for tubes and rims shown in tables (p.73-74) correspond with the conventional standards of TRA,JATMA, etc.

$$\text{PSI} \times 0.0703 = \text{kg/cm}^2 \quad \text{POUND} \times 0.4536 = \text{kg} \quad \text{PSI} \times 6.895 = \text{kPa}$$



Earthmover Data

Formulas & Rules

The following are useful formulas and rules of thumb:

- Production, hourly = Load (BCY)/Cycles × Cycles/hr
= Load (BM³)/Cycles × Cycles/hr
- Load factor (L.F.) = $\frac{\text{Bank cubic yards (BCY)}}{\text{Loose cubic yards (LCY)}}$
- Load factor (L.F.) = Bank cubic meters (BM³)
= Loose cubic meters (LM³)
- Load factor (L.F.) = $\frac{100\%}{100\% + \% \text{ of swell}}$
- Load (bank measure) = $\frac{\text{Loose cubic yards (LCY)} \times \text{L.F.}}{\text{Loose cubic meters (LM}^3\text{)} \times \text{L.F.}}$
- Shrinkage factor (S.F.) = $\frac{\text{Compacted cubic yards (CCY)}}{\text{Bank cubic yards (BCY)}}$
- Shrinkage factor (S.F.) = $\frac{\text{Compacted cubic meters (CM}^3\text{)}}{\text{Bank cubic meters (BM}^3\text{)}}$
- Density = Weight/Unit volume
- Load (bank measure) = $\frac{\text{Weight of Load}}{\text{Bank density}}$
- Rolling resistance factor = 40 lbs/ton + (30 lbs/ton/inch × inches)
= 20 kg/ton + (15 kg/ton/2.5 cm × cm)
- Rolling resistance = 2% of GVW* + 1.5% of GVW × inch of tire penetration
= 2% of GVW + 0.6% of GVW × cm of tire penetration
*GVW = Gross Vehicle Weight
- Grade resistance factor (GR factor) = 20 lbs/ton × % of grade
= 10 kg/ton × % of grade
- Grade resistance = GR factor (lbs/ton) × GVW (tons)
= GR factor (kg/ton) × GVW (tons)

- Grade resistance = 1% of GVW × % of grade
- Total resistance = Rolling resistance (lbs or kg) + Grade resistance (lbs or kg)
- Rolling Resistance (%) = 2% + 1.5% per inch of tire penetration
= 2% + 0.6% per cm of tire penetration
- Grade (%) = % of grade
- Effective grade (%) = PR (%) + GR (%)
- Usable pull (traction limitation) = Coefficient of traction × Weight on drivers
= Coefficient of traction × (Total weight × % on drivers)
- Pull required = Rolling resistance + Grade resistance
= Total resistance
- Total cycle time = Fixed time + Variable time
- Fixed time: Refer to respective machine production section.
- Variable time = Total haul time + Total return time
- Travel time = $\frac{\text{Distance (ft)}}{\text{Speed (ft/min)}}$
- Travel time = $\frac{\text{Distance (m)}}{\text{Speed (m/min)}}$
- Cycles per hour = $\frac{60 \text{ minutes}}{\text{Total cycle time (minutes)}}$
- Adjusted productivity = Hourly productivity × Efficiency factor
- No. of units requires = $\frac{\text{Hourly production required}}{\text{Unit hourly production}}$
- No. of scrapers a pusher will load = $\frac{\text{Scraper cycle time}}{\text{Unit hourly production}}$



Earthmover Data

Typical Rolling Resistance Factors

Road Surface	lbs/ton	(kg/ton)
A roadway of hard, smooth, stabilized surface without penetration under load, watered, maintained:	40	(20)
A firm, smooth rolling roadway with dirt or light surface flexing slightly under or undulating, maintained fairly regularly, watered:	65	(35)
Snow packed:	50	(25)
Snow loose:	90	(45)
A dirt roadway, rutted, flexing under load, little if any maintenance, no water, 1" (25 mm) or more tire penetration:	100	(50)
Rutted dirt roadway, soft under travel, no maintenance, no stabilization, 4" (100 mm) to 6" (150 mm) tire penetration:	150	(75)
Loose sand or gravel:	200	(100)
Soft, muddy, rutted roadway, no maintenance:	200 to 400	(100 to 200)

Various tire sizes and inflation pressures will greatly reduce or increase the above figures. The quantities given are sufficiently accurate for estimating purposes when specific information on performance of particular equipment on given soil conditions is not available. See other Earthmoving Data Section tables for additional information.

Approximate Coefficient of Traction Factors

Road Surface	Traction Factors	
	Rubber Tires	Tracks
Concrete	.90	.45
Dry clay loam	.55	.90
Wet clay loam	.45	.70
Rutted clay loam	.40	.70
Dry sand	.20	.30
Wet sand	.40	.50
Quarry pit	.65	.55
Loose gravel road	.36	.50
Packed snow	.20	.25
Ice	.12	.12*
Firm earth	.55	.90
Loose earth	.45	.60
Stockpiled coal	.45	.60

*Semi-skeleton shoes = .27

Material* Swell Percentage & Load Factors

Materials	Swell %	Load Factor (%)
Cinders	45	69
Clay, dry or wet	40	72
Clay and gravel dry or wet	40	72
Coal, anthracite or bituminous	35	74
Earth, loam and dry or wet	25	80
Gravel, dry	12	89
Gravel, wet	11	89
Gypsum	74	57
Hardpan	50	67
Limestone	67	60
Rock, well blasted	65	60
Sand, dry or wet	12	89
Sandstone	54	65
Shale and soft rock	65	60
Slag, bank	23	81
Slate	65	60
Trap rock	65	61

*Varies with moisture content, grain, size, degree of compactness, etc. Tests must be made to determine exact material characteristic.

Swell-Voids-Load Factor Table

Swell (%)	Voids (%)	Load Factor
5	4.8	.952
10	9.1	.909
15	13.0	.870
20	16.7	.833
25	20.0	.800
30	23.1	.769
35	25.9	.741
40	28.6	.714
45	31.0	.690
50	33.3	.667
55	35.5	.645
60	37.5	.625
65	39.4	.606
70	41.2	.588
75	42.9	.571
80	44.4	.556
85	45.9	.541
90	47.4	.526
95	48.7	.513
100	50.0	.500

Swell-Voids-Load Factor Table

Load Factor (%)	Voids (%)	Swell (%)
95	5	5.3
90	10	11.1
85	15	17.6
80	20	25.0
75	25	33.3
70	30	42.9
65	35	53.8
60	40	66.7
55	45	81.8
50	50	100.0

Conversion Tables

Metric to Standard (UK, US, etc.)

Multiply Metric Unit	by	to Obtain English Unit
Kilometer (km)	0.6214	Mile
Meter (m)	1.0936	Yard
Centimeter (cm)	0.0328	Foot
Millimeter (mm)	0.03937	Inch
Square Kilometer (km ²)	0.3861	Square Mile
Hectare (Ha)	2.471	Acre
Square meter (m ²)	10.76	Square foot
Square centimeter (cm ²)	0.1550	Square inch
Cubic meter (m ³)	1.308	Cubic yard
kilograms/cubic meter (kg/m ³)	1.686	Pounds/cubic yard
Liter (l or ltr.)	0.2642	Gallon (US)
Liter (l or ltr.)	61.02	Cubic inch
Imperial gallon	1.20	US gallon
Kilometer per hour (kph)	0.621	MPH
Cubic centimeter (cm ³)	0.0338	Fluid ounce
Metric tonne (t)	0.984	Long ton
Metric tonne (t)	1.102	Short ton
Kilogram (kg)	2.205	Pound, avdp.
Gram (g or gr.)	0.0353	Ounce, avdp.
Calorie, Kilo (C or Cal.)	3.968	BTU
Kilogram-meter (kgm)	7.233	Foot-pound
Meter-kilogram (m-kg)	7.233	Pound-foot
Metric horsepower (CV)	0.9863	HP
kg/square centimeter (kgs./cm ²)	14.225	Pounds/square inch
kilopascal (kPa)	0.14503	Pounds/square inch

1 km = 1,000 m 1 m = 100 cm 1 cm = 10 mm 1 km² = 100 Ha

1 Ha = 10,000 m² 1 m² = 10,000 cm² 1 cm² = 100 mm²

1 m³ = 1,000 liters 1 liters = 1,000 cm³

1 metric ton = 1,000 kg 1 quintal = 100 kg 1 kg = 1,000 g

1 Cal = 427 kgm = 0.0016 CVH = 0.00116 KWH

1 kg/cm² = 98.066 kPa Torque unit: 1 CV = 75 kgm/sec

1 kg/cm² = 0.97 atmoshp 1 bar = 100 kPa

Standard (UK, US, etc.) to Metric

Multiply English Unit	by	to Obtain Metric Unit
Mile, statute (M)	1.609	Kilometer
Foot (ft)	0.3048	Meter
	30.48	Centimeter
Inch (in., ")	0.025	Meter
Square mile (mile ²)	2.590	Square kilometer
Acre	0.4047	Hectare
Square foot (ft ²)	0.0929	Square meter
Square inch (in ²)	6.452	Square centimeter
Cubic yard (yd ³)	0.765	Cubic meter
Cubic foot (ft ³)	0.0283	Cubic meter
Pound/cubic yard (lbs/yd ³)	0.5933	Kilogram/cubic meter
US gallon (US gal)	3.785	Liter
US gallon	0.833	Imperial gallon
MPH	1.61	Kilometer per hour
TMPH	1.459	TKPH
Cubic inch (in ³)	0.016	Liter
Fluid ounce (fl oz)	29.57	Cubic centimeter
Long ton (lg ton)	1.016	Metric tonne
Short ton (sh ton)	0.907	Metric tonne
Pound (lb)	0.4536	Kilogram
Ounce (oz)	28.35	Gram
BTU	0.2520	Kilogram-calorie
Foot-pound (ft-lb)	0.1383	Kilogram-meter
Horse power (HP)	1.014	Metric horsepower
Pound/square inch (PSI)	0.0703	Kg/square centimeter
Pound/square inch (PSI)	6.895	Kilopascal

1 mile = 1,760 yds 1 yd = 3 ft 1 ft = 12 in 1 sq mile = 640 acres

1 acre = 43,560 sq ft 1 sq ft = 144 sq in 1 cu ft = 7.48 gal

1 gal = 231 cu in = 4 quarts liq 1 quart = 32 fl oz 1 fl oz = 1.80 cu in

1 sh ton = 2,000 lbs 1 lg ton = 2,240 lbs 1 lb = 16 oz, avdp.

1 BTU = 778 ft lb = 0.000393 HPH = 0.000293 KWH

1 HP = 550 ft lb/sec 1 atmoshp = 14.7 psi

Inches to Millimeters

in/32	mm	in/32	mm	in/32	mm	in/32	mm
1	0.8	21	16.7	41	32.5	105	83.3
2	1.6	22	17.5	42	33.3	110	87.3
3	2.4	23	18.3	43	34.1	115	91.3
4	3.2	24	19.1	44	34.9	120	95.3
5	4.0	25	19.8	45	35.7	125	99.2
6	4.8	26	20.6	46	36.5	130	103.2
7	5.6	27	21.4	47	37.3	135	107.2
8	6.4	28	22.2	48	38.1	140	111.1
9	7.1	29	23.0	49	38.9	145	115.1
10	8.0	30	23.8	50	39.7	150	119.1
11	8.7	31	24.6	55	43.7	155	123.0
12	9.5	32	25.4	60	47.6	160	127.0
13	10.3	33	26.2	65	51.6	165	131.0
14	11.1	34	27.0	70	55.6	170	134.9
15	11.9	35	27.8	75	59.5	175	138.9
16	12.7	36	28.6	80	63.5	180	142.9
17	13.5	37	29.4	85	67.5	185	146.9
18	14.3	38	30.2	90	71.4	190	150.8
19	15.1	39	31.0	95	75.4	195	154.8
20	15.9	40	31.8	100	79.4	200	158.8

Millimeters to Inches

mm	in/32	mm	in/32	mm	in/32	mm	in/32
1	1	21	27	41	52	105	132
2	3	22	28	42	53	110	139
3	4	23	29	43	54	115	145
4	5	24	30	44	55	120	151
5	6	25	32	45	57	125	158
6	8	26	33	46	58	130	164
7	9	27	34	47	59	135	170
8	10	28	35	48	61	140	176
9	11	29	37	49	62	145	183
10	13	30	38	50	63	150	189
11	14	31	39	55	69		
12	15	32	40	60	76		
13	16	33	42	65	82		
14	18	34	43	70	88		
15	19	35	44	75	95		
16	20	36	45	80	101		
17	21	37	47	85	107		
18	23	38	48	90	113		
19	24	39	49	95	120		
20	25	40	50	100	126		



Conversion Tables

Pounds to Kilograms

lbs	kg	lbs	kg	lbs	kg	lbs	kg
1	0.5	220	99.8	800	362.9	4200	1905.1
10	4.5	240	108.9	900	408.2	4400	1995.8
20	9.1	260	117.9	1000	453.6	4600	2086.6
30	13.6	280	127.0	1100	499.0	4800	2177.3
40	18.1	300	136.1	1300	589.7	5000	2268.0
50	22.7	320	145.2	1400	635.0	5200	2358.7
60	27.2	340	154.2	1500	680.4	5400	2449.4
70	31.8	360	163.3	1600	725.8	5600	2540.2
80	36.3	380	172.4	1700	771.1	5800	2630.9
90	40.8	400	181.4	1800	816.5	6000	2721.6
100	45.4	420	190.5	1900	861.8	7000	3175.2
110	49.9	440	199.6	2000	907.2	8000	3628.8
120	54.4	460	208.7	2200	997.9	9000	4082.4
130	59.0	480	217.7	2400	1088.6	10000	4536.0
140	63.5	500	226.8	2600	1179.4	11000	4989.6
150	68.0	520	235.9	2800	1270.1	12000	5443.2
160	72.6	540	244.9	3000	1360.8	13000	5896.8
170	77.1	560	254.0	3200	1451.5	14000	6350.4
180	81.6	580	263.1	3400	1542.2	15000	6804.0
190	86.2	600	272.2	3600	1633.0	16000	7257.6
200	90.7	700	317.5	3800	1723.7	17000	7711.2
				4000	1814.4	18000	8164.8
						19000	8618.4
						20000	9072.0

Kilograms to Pounds

kg	lbs	kg	lbs	kg	lbs	kg	lbs
1	2	110	243	450	992	2100	4630
5	11	120	265	500	1102	2200	4850
10	22	130	287	550	1213	2300	5071
15	33	140	309	600	1323	2400	5291
20	44	150	331	650	1433	2500	5512
25	55	160	353	700	1543	2600	5732
30	66	170	375	750	1654	2700	5952
35	77	180	397	800	1764	2800	6173
40	88	190	419	850	1874	2900	6393
45	99	200	441	900	1984	3000	6614
50	110	210	463	950	2094	3500	7716
55	121	220	485	1000	2205	4000	8818
60	132	230	507	1100	2425	4500	9921
65	143	240	529	1200	2646	5000	11023
70	154	250	551	1300	2866	5500	12125
75	165	260	573	1400	3086	6000	13228
80	176	270	595	1500	3307	6500	14330
85	187	280	617	1600	3527	7000	15432
90	198	290	639	1700	3748	7500	16535
95	209	300	661	1800	3968	8000	17637
100	221	350	772	1900	4189	8500	18739
		400	882	2000	4409	9000	19841
						9500	20944
						10000	22046

Miles Per Hour to Kilometers Per Hour

mph	kph	mph	kph	mph	kph	mph	kph
1	1.61	16	25.74	31	49.88	46	74.01
2	3.22	17	27.35	32	51.49	47	75.62
3	4.83	18	28.96	33	53.10	48	77.23
4	6.44	19	30.57	34	54.71	49	78.84
5	8.05	20	32.18	35	56.32	50	80.45
6	9.65	21	33.79	36	57.92		
7	11.26	22	35.40	37	59.53		
8	12.87	23	37.01	38	61.14		
9	14.48	24	38.62	39	62.75		
10	16.09	25	40.23	40	64.36		
11	17.70	26	41.83	41	65.97		
12	19.31	27	43.44	42	67.58		
13	20.92	28	45.05	43	69.19		
14	22.53	29	46.66	44	70.80		
15	24.14	30	48.27	45	72.41		

Kilometers Per Hour to Miles Per Hour

kph	mph	kph	mph	kph	mph	kph	mph
1	0.62	26	16.16	51	31.70	76	47.23
2	1.24	27	16.78	52	32.32	77	47.86
3	1.86	28	17.40	53	32.94	78	48.48
4	2.49	29	18.02	54	33.56	79	49.10
5	3.11	30	18.65	55	34.18	80	49.72
6	3.73	31	19.27	56	34.80	81	50.34
7	4.35	32	19.89	57	35.43	82	50.96
8	4.97	33	20.51	58	36.05	83	51.58
9	5.59	34	21.13	59	36.67	84	52.21
10	6.22	35	21.75	60	37.29	85	52.83
11	6.84	36	22.37	61	37.91	86	53.45
12	7.46	37	23.00	62	38.53	87	54.07
13	8.08	38	23.62	63	39.15	88	54.69
14	8.70	39	24.24	64	39.78	89	55.31
15	9.32	40	24.86	65	40.40	90	55.94
16	9.94	41	25.48	66	41.02	91	56.56
17	10.57	42	25.10	67	41.64	92	57.18
18	11.19	43	26.72	68	42.26	93	57.80
19	11.81	44	27.35	69	42.88	94	58.42
20	12.43	45	27.97	70	43.51	95	59.04
21	13.05	46	28.59	71	44.13	96	59.66
22	13.67	47	29.21	72	44.75	97	60.29
23	14.29	48	29.83	73	45.37	98	60.91
24	14.92	49	30.45	74	45.99	99	61.53
25	15.54	50	31.08	75	46.61	100	62.15

Grade in Degrees to Grade in Percent

Grade in Degrees	Grade in Percent	Grade in Degrees	Grade in Percent
1°	1.8%	11°	19.4%
2°	3.5%	12°	21.3%
3°	5.2%	13°	23.1%
4°	7.0%	14°	24.9%
5°	8.8%	15°	26.8%
6°	10.5%	16°	28.7%
7°	12.3%	17°	30.6%
8°	14.0%	18°	32.5%
9°	15.8%	19°	34.4%
10°	17.6%	20°	36.4%

Inflation Pressure (kg/cm² to lbs/in²)

kg/cm²	lbs/in²	kg/cm²	lbs/in²	kg/cm²	lbs/in²	kg/cm²	lbs/in²
0.1	1	2.6	37	5.1	72	7.6	108
0.2	3	2.7	38	5.2	74	7.7	109
0.3	4	2.8	40	5.3	75	7.8	111
0.4	6	2.9	41	5.4	77	7.9	112
0.5	7	3.0	43	5.5	78	8.0	114
0.6	9	3.1	44	5.6	80	8.1	115
0.7	10	3.2	45	5.7	81	8.2	116
0.8	11	3.3	47	5.8	82	8.3	118
0.9	13	3.4	48	5.9	84	8.4	119
1.0	14	3.5	50	6.0	85	8.5	121
1.1	16	3.6	51	6.1	87	8.6	122
1.2	17	3.7	53	6.2	88	8.7	124
1.3	18	3.8	54	6.3	89	8.8	125
1.4	20	3.9	55	6.4	91	8.9	126
1.5	21	4.0	57	6.5	92	9.0	128
1.6	23	4.1	58	6.6	94	9.1	129
1.7	24	4.2	60	6.7	95	9.2	131
1.8	26	4.3	61	6.8	97	9.3	132
1.9	27	4.4	62	6.9	98	9.4	133
2.0	28	4.5	64	7.0	99	9.5	135
2.1	30	4.6	65	7.1	101	9.6	136
2.2	31	4.7	67	7.2	102	9.7	138
2.3	33	4.8	68	7.3	104	9.8	139
2.4	34	4.9	70	7.4	105	9.9	141
2.5	36	5.0	71	7.5	107	10.0	142

Temperature (Centigrade to Fahrenheit)

°C	°F	°C	°F	°C	°F	°C	°F
-19	-2.2	+26	+78.8	+71	+159.8	+116	+240.8
-18	-0.4	27	80.6	72	161.6	117	242.6
-17	+1.4	28	82.4	73	163.4	118	244.4
-16	3.2	29	84.2	74	165.2	119	246.2
-15	5.0	30	86.0	75	167.0	120	248.0
-14	6.8	31	87.8	76	168.8	121	249.8
-13	8.6	32	89.6	77	170.6	122	251.6
-12	10.4	33	91.4	78	172.4	123	253.4
-11	12.2	34	93.2	79	174.2	124	255.2
-10	14.0	35	95.0	80	176.0	125	257.0
-9	15.8	36	96.8	81	177.8	126	258.8
-8	17.6	37	98.6	82	179.6	127	260.6
-7	19.4	38	100.4	83	181.4	128	262.4
-6	21.2	39	102.2	84	183.2	129	264.2
-5	23.0	40	104.0	85	185.0	130	266.0
-4	24.8	41	105.8	86	186.8	131	267.8
-3	26.6	42	107.6	87	188.6	132	269.6
-2	28.4	43	109.4	88	190.4	133	271.4
-1	30.2	44	111.2	89	192.2	134	273.2
0	32.0	45	113.0	90	194.0	135	275.0
+1	33.8	46	114.8	91	195.8	136	276.8
2	35.6	47	116.6	92	197.6	137	278.6
3	37.5	48	118.4	93	199.4	138	280.4
4	39.2	49	120.2	94	201.2	139	282.2
5	41.0	50	122.0	95	203.0	140	284.0
6	42.8	51	123.8	96	204.8	141	285.8
7	44.6	52	125.6	97	206.6	142	287.6
8	46.8	53	126.4	98	208.4	143	289.4
9	48.2	54	129.2	99	210.2	144	291.2
10	50.0	55	131.0	100	212.0	145	293.0
11	51.8	56	132.8	101	213.8	146	294.8
12	53.6	57	134.6	102	215.6	147	296.6
13	55.4	58	136.4	103	217.4	148	298.4
14	57.2	59	138.2	104	219.2	149	300.2
15	59.0	60	140.0	105	221.0	150	302.0
16	60.8	61	141.8	106	222.8		
17	62.6	62	143.6	107	224.6		
18	64.4	63	145.4	108	226.4		
19	66.2	64	147.2	109	228.2		
20	68.0	65	149.0	110	230.0		
21	69.8	66	150.8	111	231.8		
22	71.6	67	152.6	112	233.6		
23	73.4	68	154.4	113	235.4		
24	75.2	69	156.2	114	237.2		
25	77.0	70	158.0	115	239.0		

Approximate Weight of Materials*

Materials	Lbs per Loose Yd ³	Kg per Loose M ³	Lbs per Bank Yd ³	Kg per Bank M ³
Bauxite	2400	1425	3200	1900
Caliche	2500	1485	3700	2200
Cinders	1100	650	—	—
Dry Excavated Clay	2500	1485	3100	1840
Wet Excavated Clay	2900	1725	4500	2675
Natural Bed Clay	2800	1650	3400	2015
Dry Clay & Gravel	2000	1185	2800	1650
Wet Clay & Gravel	2800	1650	3100	1840

Materials	Lbs per Loose Yd ³	Kg per Loose M ³	Lbs per Bank Yd ³	Kg per Bank M ³
Anthracite Raw Coal	2000	1190		
Bituminous Raw Coal	1600	950		
Decomposed Rock				
75% R 25% E	3300	1955	4720	2800
50% R 50% E	2900	1725	3860	2290
25% R 75% E	2650	1580	3320	1970
Dry Earth	2600	1550	3000	1780
Wet Earth	2900	1725	3500	2075
Loam Earth	2100	1250	2700	1600
Granite	2800	1650	4600	2725

R: Rock, E: Earth

Materials	Lbs per Loose Yd ³	Kg per Loose M ³	Lbs per Bank Yd ³	Kg per Bank M ³
Pit Run Gravel	3200	1900	3700	2200
Dry Gravel	2500	1485	2800	1650
Dry 1/4" - 2" Gravel	2800	1650	3200	1900
Wet 1/4" - 2" Gravel	3400	2015	3800	2250
Sand & Gravel	2700	1600	3400	2015
Gypsum	2700	1600	3400	2015
Limestone	2600	1550	4400	2600
Dry Peat	700	415	1150	675
Moist Peat	1350	800	2250	1340
Wet Peat	1900	1125	3200	1900
Sandstone	2660	1550	4300	2550
Dry Sand	2400	1425	2700	1600
Damp Sand	2850	1680	3200	1900
Wet Sand	3100	1840	3500	2075

Materials	Lbs per Loose Yd ³	Kg per Loose M ³	Lbs per Bank Yd ³	Kg per Bank M ³
Dry Sand & Gravel	2900	1725	3400	2015
Wet Sand & Gravel	3400	2015	3800	2250
Slag	3000	1780	5000	2965
Dry Snow	220	130		
Wet Snow	860	515		
Crushed Stone	2700	1600		
Top Soil	1600	960	2300	1365
Trap Rock	2900	1725	4400	2600

*Varies with moisture content, grain, degree of compactness, etc.
Tests must be made to determine exact material characteristics.

Lined area for notes.

SAFETY PRECAUTIONS CONCERNING MOUNTING, DEMOUNTING AND OPERATION

WARNING

Tire and rim servicing can be dangerous, and should be performed only by trained personnel using proper tools and procedures. Failure to comply with these procedures may result in faulty positioning of the tire and/or rim, and cause the assembly to burst with explosive force, sufficient to cause serious physical injury or death.

DEMOUNTING

1. BEFORE DEMOUNTING

- Always exhaust all air from a single tire and from both tires of a dual assembly prior to removing any wheel components such as nuts and rim clamps.
- A broken rim part under pressure can blow apart and cause serious injury or death.
- Make sure to remove valve core to exhaust all air from the tire. Remove both cores from a dual assembly. (When you remove the wheel lugs, if the tire is still under pressure, the assembly may fly apart.)
- Check the valve stem by running a piece of wire through the stem to make sure it is not plugged. (Foreign material may clog the valve stem during deflation or ice may form as the air leaves the tire, clogging the valve stem.)

2. DURING DEMOUNTING

- Demounting tools apply pressure to rim flanges to unseat tire beads, and keep your fingers clear. Always stand to one side and hold the tool with one hand when you apply hydraulic pressure. (If the tool slips off, it can fly with enough force to cause serious injury or death.)
- Do not use tools in the vicinity of the flange butt weld.

3. AFTER DEMOUNTING

- Clean rims and repaint to stop detrimental effects of corrosion and facilitate checking and tire mounting. Be very careful to clean all dirt and rust from the lock ring and gutter. This is important to secure the lock ring in its proper position. A filter on the air inflation equipment to remove the moisture from the air line helps prevent corrosion. The filter should be checked periodically to see that it is working properly. (Parts must be clean for a proper fit - particularly the gutter section which holds the lock ring in its proper position.)

MOUNTING

1. BEFORE MOUNTING

- Check rim components for cracks. Replace all cracked, badly worn, damaged and severely rusted component with new parts of the same size and type. When a component is in doubt, replace it. (Parts that are cracked, damaged or excessively corroded are weakened. Bent or repaired parts may not engage properly.)
- Do not, under any circumstance, attempt to rework, weld, heat or braze any rim component that is cracked, broken or damaged. Replace with a new part that is not cracked, broken or damaged and which is of the same size and type. (Heating may weaken a part to extent that it is unable to withstand forces of inflation or operation.)
- Check type of rim and make sure all parts of such rim are being assembled properly. Follow instruction manual of rim or ask your distributor if you have any doubts. (Mismatched parts may appear to fit, but when the tire is inflated they may fly apart with explosive force.)
- Mixing parts of one type rim with those of another is potentially dangerous. Always check rim with manufacturer for approval.
- Remove rust, dirt and other foreign matter from the rim surface, particularly on the bead seats and O-ring slot.
- Clean the inside of the tire.
- Make sure tube and flap are correct and not damaged for tube type tires.
- Always prepare a new O-ring for tubeless tires.
- Do not reinflate a tire that has been run flat or has been run at 80% or less of its recommended operating pressure, or

when there is obvious or suspected damage to the tire or wheel components. (Components may have been damaged or dislocated during the time the tire was run flat or seriously under-inflated.)

2. DURING MOUNTING AND INFLATION

- Do not try to seat rings or other components by hammering while tire is inflated or partially inflated.
- Double check to make sure all components are properly seated prior to inflation.
- Do not inflate tire before all components are properly in place. Place in safety cage or use a restraining device and inflate to approximately 0.35 kg/cm² (5 psi), recheck components for proper assembly. Observe that O-ring does not roll out of its groove. If assembly is not performed properly, deflate and correct. Never hammer or an inflated on partially inflated tire/rim assembly. If assembly is correct at approximately 0.35 kg/cm² (5 psi), continue to inflate fully to seat the tire beads.
- Never sit or stand in front of a tire and rim assembly that is being inflated. Always use a clip-on chuck with a sufficient length of hose to permit the person inflating the tire to stand clear of the potential trajectory of the wheel components, and use an in-line valve with gauge or a pressure regulator preset to a desired value when inflating a tire. When a tire is in a restraining device, do not lean any part of your body or equipment on or against the restraining device. (If parts are improperly installed they may fly apart with explosive force.)
- Never attempt to weld on an inflated tire/rim assembly or on a rim assembly with a deflated tire. (Heat from welding will cause a sudden, drastic increase in pressure, resulting in an explosion with the force of a bomb. Deflated tires can catch fire inside the air chamber.)

3. AFTER INFLATION

- Make sure no air leakage can be suspected, especially in tubeless tires.

OPERATION

- Do not use under-inflated tires.
- Do not bleed or reduce air pressure to compensate for the increase in pressure resulting from operation.
- Do not use under-size rims. Use recommended rim for the tire.
- Do not overload or over-inflate tire/rim assemblies. Check for adequate rim strength if special operating conditions are required. (Excessive overload can cause damage to the tire and rim assembly.)
- Never run a vehicle on one tire of a dual assembly. (The carrying capacity of the single tire and rim is dangerously exceeded, and operating a vehicle in this manner can result in damage to the rim and tire or cause a tire fire.)
- Never use a tube in a tubeless tire/rim assembly where the rim is suspected of air leakage. (Loss of air pressure through fatigue cracks or other fractures in a tubeless rim warns you of a potential rim failure. This safety feature is lost when tubes are used with leaking rims. Continued use may cause the rim to burst with explosive force.)
- Always inspect rims and wheels for damage during tire checks. (Early detection of potential rim failure may prevent serious injury.)
- Never add or remove an attachment or otherwise modify a rim (Especially by heating, welding or brazing) unless the tire has been removed and approval has been received from the rim manufacturer. (Modification or heating of a rim or one of its parts may weaken it so that it cannot withstand forces created by inflation or operation.)
- Never mount bias tire and radial tire on the same axle. Follow vehicle manufacturer's recommendation.
- Never use tire under unintended service conditions for the tire. Please consult YOKOHAMA if vehicle operation requires specialized tire fitment.

Specifications subject to change without notice.