

Liquid ballasting

Occasionally the machine needs extra weight to increase tractive power but also to lower the centre of gravity for improved stability. Primary, wheel or chassis mounted weights should be used, but on occasions when this is impossible, the tires can be liquid filled.

Liquid filling alters tire characteristics:

- tires get more rigid and less flexible
- rolling resistance increases
- increased risk of damage to tires, rims and axles
- considerably increased forces during road operations

Liquid recommendations

In areas without any risk of freezing:

- tubed tires - water only
- tubeless tires - water + anti corrosion fluid, usually ethylene glycol

In areas with a risk of freezing:

- tubed tires - water + calcium-chloride (CaCl_2) or ethylene glycol or methylated spirit
- tubeless tires - water + ethylene glycol

These solutions lower the freezing point and do not damage the tire, while the calcium chloride also increases the ballasting.

Liquid precautions

- Use pumps with rust resistant pressure gauges.
- Ensure the operator uses protective glasses, overalls, boots and rubber gloves.
- Prepare the solution by pouring the calcium chloride into the water and stirring the mix to help it dissolve.

Never pour the water into the calcium chloride: it is dangerous. Always mix calcium chloride in to water.

- Clean all the metal parts of the vehicle carefully when the filling or drainage operations are complete, as they may have come into contact with the anti-freeze, which is corrosive.
- Check tire pressure frequently as the quantity of air remaining in the tire is low.

Liquid volume

Maximum permitted filling volume is 75% of the total tire volume. For forestry machines, operating in heavy terrain, max. 50% filling volume.

Liquid ballasting (Radial)

Size	Rim	Volume of solution (gal) (at Valve Level= 75%)	Solution (up to -20°c)			Solution (up to -40°c)		
			Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)	Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)
IF 650/60R34	DW23B	120	240	108	1142	492	91	1252
IF 710/60R34	DW25B	152	304	137	1444	620	115	1583
IF 900/60R42	DW30B	308	615	277	2928	1259	234	3213
IF 650/65R34	DW23B	135	269	122	1283	551	103	1409
IF 600/70R30	DW21B	113	225	101	1072	461	86	1175
IF 650/65R38	DW23B	145	289	130	1376	591	110	1508
IF 710/60R38	DW25B	160	320	144	1524	655	122	1671
IF 710/70R42	DW25B	215	430	193	2042	878	163	2238
IF 710/75R42	DW25B	239	478	215	2271	977	181	2492
IF 750/75R46	DW25B	291	582	262	2767	1188	221	3034
IF 900/65R46	DW30B	370	741	333	3519	1513	281	3859
VF 380/90R46	DW13A	75	150	68	714	306	57	783
IF 800/65R32 CFO	DW27B	218	437	196	2073	891	166	2273
IF 800/70R32 CFO	DW27B	245	490	220	2328	1001	186	2553
IF 800/70R38 CFO	DW27B	273	547	246	2600	1118	208	2851

Size	Rim	Volume of solution (gal) (at Valve Level= 75%)	Solution (up to -20°c)			Solution (up to -40°c)		
			Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)	Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)
710/60R30	DW23B	137	273	123	1303	560	104	1429
900/60R32	DW30B	265	531	239	2525	1085	202	2769
650/60R34	DW20B	117	234	105	1114	478	89	1222
710/60R34	DW23B	150	298	134	1420	611	114	1559
900/60R38	DW28B	286	571	257	2717	1169	217	2981
900/60R42	DW28B	306	613	276	2913	1252	233	3195

Size	Rim	Volume of solution (gal) (at Valve Level= 75%)	Solution (up to -20°c)			Solution (up to -40°c)		
			Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)	Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)
440/65R24	DW14L	40	90	36	386	163	30	417
480/65R24	DW15L	49	112	45	478	203	38	516
540/65R24	DW16L	65	148	59	633	267	50	681
540/65R26	DW16L	71	143	67	690	291	54	750
440/65R28	DW14L	45	101	40	432	183	34	467
480/65R28	DW15L	54	123	49	527	223	41	569
540/65R28	DW16L	73	163	66	703	298	55	759
600/65R28	DW18L	96	216	86	928	392	73	999
540/65R30	DW16L	76	172	69	739	313	58	796
800/65R32	DW27B	223	445	200	2117	911	169	2322
540/65R34	DW16L	84	190	75	811	342	64	873
600/65R34	DW20B	111	221	100	1054	452	84	1155
540/65R38	DW16L	90	203	81	875	370	69	944
600/65R38	DW18L	118	265	106	1140	481	90	1228
650/65R38	DW20B	143	322	129	1385	584	109	1493
600/65R42	DW18L	127	287	114	1230	520	97	1327
650/65R42	DW20B	154	346	138	1488	628	117	1603

Size	Rim	Volume of solution (gal) (at Valve Level= 75%)	Solution (up to -20°c)			Solution (up to -40°c)		
			Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)	Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)
260/70R16	W8	9	20	8	84	35	7	90
280/70R16	W9	11	24	10	104	44	8	112
280/70R18	W9	12	26	11	115	49	9	121
300/70R20	W9	15	33	13	141	60	11	152
320/70R20	W10	18	42	17	179	75	14	194
360/70R20	W11	25	55	22	238	101	19	256
380/70R20	W12	30	66	27	289	121	23	311
320/70R24	W10	22	51	20	216	93	17	234
360/70R24	W11	26	60	24	256	108	20	276
380/70R24	W12	34	77	31	333	141	26	359
420/70R24	W13	44	97	39	426	179	33	459
480/70R24	W15L	56	128	51	545	229	43	587
480/70R26	W15L	61	157	55	602	249	46	637
320/70R28	W10	25	55	22	243	101	19	260
360/70R28	W11	32	73	29	311	132	25	337
380/70R28	W12	38	84	34	368	157	29	397
420/70R28	W13	49	110	44	474	201	37	509
480/70R28	W15L	59	132	54	576	243	45	620
600/70R28	DW18L	105	209	94	997	428	80	1094
420/70R30	W13	52	117	46	503	212	39	540
480/70R30	W15L	68	152	61	653	276	52	706
520/70R30	W16L	85	190	76	818	346	64	882
600/70R30	DW18L	110	218	99	1043	450	83	1147
480/70R34	W15L	75	170	68	730	309	57	785
520/70R34	W16L	92	209	83	895	379	70	966
600/70R34	DW18L	120	240	108	1142	490	91	1250
480/70R38	W15L	82	185	74	794	335	62	856
520/70R38	W16L	100	227	90	972	410	76	1047
580/70R38	W18L	132	295	118	1274	538	100	1374
710/70R38	DW23B	201	452	181	1945	820	153	2095
800/70R38	DW25B	270	540	243	2567	1103	205	2814
580/70R42	W18L	137	309	123	1327	560	104	1431
620/70R42	DW20B	156	351	140	1506	637	118	1623
710/70R42	DW23B	211	423	190	2011	864	161	2205

Size	Rim	Volume of solution (gal) (at Valve Level= 75%)	Solution (up to -20°c)			Solution (up to -40°c)		
			Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)	Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)
620/75R26	DW20B	127	254	114	1206	518	96	1323
650/75R32	DW20B	157	315	142	1497	644	120	1643
710/75R32	DW23B	201	401	181	1912	822	153	2099
650/75R38	DW23B	184	368	166	1753	754	140	1923
710/75R42	DW23B	243	487	219	2355	994	185	2558

Size	Rim	Volume of solution (gal) (at Valve Level= 75%)	Solution (up to -20°C)			Solution (up to -40°C)		
			Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)	Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)
280/85R20	W10	17	40	16	170	71	13	183
320/85R20	W11	24	55	22	236	99	18	254
280/85R24	W10	20	44	18	192	82	15	207
320/85R24	W11	27	62	25	267	112	21	287
340/85R24	W12	32	73	29	311	130	24	335
380/85R24	W13	42	95	38	410	172	32	441
420/85R24	W15L	56	126	50	540	227	42	582
280/85R28	W10	22	51	20	216	90	17	234
320/85R28	W11	31	68	28	298	126	24	322
340/85R28	W12	36	82	32	346	148	27	375
380/85R28	W13	47	106	42	456	192	36	492
420/85R28	W15L	62	139	56	598	254	47	644
380/85R30	W13	50	112	45	481	203	38	516
420/85R30	W15L	64	143	57	617	260	48	664
460/85R30	W16L	79	179	71	765	324	60	825
380/85R34	W13	54	108	49	525	221	41	569
420/85R34	W15L	70	159	63	677	287	53	730
460/85R34	W16L	86	194	78	838	353	66	902
320/85R38	W11	40	79	36	388	163	31	423
340/85R38	W12	45	101	41	441	185	35	474
380/80R38	W12	52	104	46	492	212	39	540
380/85R38	W13	59	135	53	573	243	45	617
400/75R38	W14	54	108	49	514	221	41	562
420/85R38	W15L	76	172	68	736	311	58	794
460/85R38	W16L	94	212	84	906	384	71	977
520/85R38	W18L	128	289	115	1237	523	97	1332
650/85R38	DW23B	220	439	198	2090	897	167	2291
520/85R42	W18L	138	311	124	1338	564	105	1442
480/80R42	W16B	103	205	92	994	421	78	1080
480/80R46	W16B	110	221	99	1065	450	83	1155
520/85R46	DW18L	146	293	134	613	258	48	662
480/80R50	DW15B	119	238	107	1153	487	91	1327

Size	Rim	Volume of solution (gal) (at Valve Level= 75%)	Solution (up to -20°C)			Solution (up to -40°C)		
			Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)	Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)
230/95R32	W7	18	42	16	176	75	14	190
270/95R32	W8	25	57	23	247	104	19	265
230/95R36	W7	20	46	18	196	84	16	212
270/95R38	W10	31	62	28	295	128	24	324
210/95R44	W7	20	44	18	192	82	15	207
230/95R44	W7	24	55	22	234	99	18	251
270/95R44	W8	33	75	30	320	135	25	344
300/95R46	W10	46	104	42	448	190	35	483
230/95R48	W7	24	55	22	232	99	18	251
270/95R48	W9	37	84	33	357	152	28	386
380/90R50	W12	77	154	69	743	313	58	853
300/95R52	W10	52	104	47	496	214	40	545
380/90R54	W12	82	163	74	794	335	63	911

Size	Rim	Volume of solution (gal) (at Valve Level= 75%)	Solution (up to -20°C)			Solution (up to -40°C)		
			Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)	Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)
500/60R22.5	AG16.00	54	108	48	518	218	41	564
560/60R22.5	AG16.00	65	148	59	633	267	50	681
580/65R22.5	AG16.00	80	179	72	770	324	60	829
600/50R22.5	AG20.00	63	128	58	613	258	48	662
600/55R26.5	AG20.00	85	170	76	818	346	64	889
680/55R26.5	AG20.00	102	229	92	986	417	77	1061
710/50R26.5	AG24.00	100	201	90	955	412	76	1050
750/60R30.5	AG24.00	178	357	161	1727	730	136	1876
650/65R30.5	AG20.00	141	282	127	1363	576	107	1482
850/50R30.5	AG28.00	185	370	167	1795	759	141	1951

Size	Rim	Volume of solution (gal) (at Valve Level= 75%)	Solution (up to -20°C)			Solution (up to -40°C)		
			Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)	Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)
12.4R36	W11	34	66	30	320	139	26	353
13.6R36	W12	46	93	42	441	190	35	485
7.50R20	5.50F	10	20	9	95	42	8	106
8.3R24	W7	10	20	9	95	40	8	104
9.5R20	W8	13	24	11	119	51	10	130
9.5R24	W8	15	29	13	137	57	11	148

Size	Rim	Volume of solution (gal) (at Valve Level= 75%)	Solution (up to -20°C)			Solution (up to -40°C)		
			Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)	Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)
340/80R18	11	24	46	21	225	97	18	247
400/70R18	13	30	60	27	284	121	23	311
400/70R20	13	32	64	29	306	130	25	335
400/70R24	DW13	37	73	33	348	150	28	381
440/80R24	DW14L	45	88	40	423	181	34	463
460/70R24	DW15L	52	101	46	487	209	39	536
500/70R24	DW16L	64	126	57	604	260	48	664
480/80R26	DW15L	74	148	67	703	302	56	770
440/80R28	DW15L	63	126	57	598	256	48	655

Liquid ballasting (Cross-ply construction)

Size	Rim	Volume of solution (gal) (at Valve Level= 75%)	Solution (up to -20°c)			Solution (up to -40°c)		
			Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)	Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)
Twin Tractor								
400/55-17.5	AG11.75	22	44	20	218	93	17	234
600/55-26.5	AG20.00	83	168	75	805	340	63	869
500/60-26.5	AG16.00	58	117	52	562	238	44	606
600/55-30.5	AG20.00	91	183	82	882	373	69	950
600/60-30.5	AG20.00	100	201	90	972	410	76	1047
750/45-30.5	AG24.00	108	216	97	1050	443	82	1131
800/55-30.5	AG28.00	195	392	176	1892	800	148	2040
900/60-32	DW27B	262	525	235	2531	1069	199	2730
710/65-38	DW24B	184	368	165	1777	752	139	1916
850/50-38	DW28B	234	467	211	2265	957	178	2439
850/60-38	DW28B	277	556	250	2686	1136	211	2895
850/55-42	DW28B	252	505	227	2443	1032	192	2633
Twin Implement								
280/60-15.5	AG8.00	12	24	11	115	49	9	123
400/45-15.5	AG13.00	15	29	13	141	60	11	154
400/60-15.5	AG13.00	24	49	22	229	99	18	251
420/55-17	13.00	25	49	22	232	99	18	254
400/55-17.5	AG11.75	22	44	20	218	93	17	234
400/55-22.5	AG11.75	29	57	26	282	119	22	304
500/45-22.5	AG16.00	37	75	33	357	152	28	386
500/60-22.5	AG16.00	59	119	54	576	243	45	620
560/45-22.5	AG16.00	48	95	43	461	194	36	496
560/60-22.5	AG16.00	71	143	64	690	291	54	745
600/50-22.5	AG20.00	70	141	63	677	287	53	730
710/40-22.5	AG24.00	81	161	73	781	329	61	840
400/60-26.5	AG13.00	42	84	38	410	172	32	441
500/60-26.5	AG16.00	70	141	63	677	287	53	730
710/45-26.5	AG24.00	98	196	88	946	399	74	1021
800/40-26.5	AG28.00	120	240	108	1164	492	91	1255
600/60-30.5	AG20.00	100	201	90	972	410	76	1047
650/65-30.5	AG20.00	136	271	123	1294	558	104	1422
710/50-30.5	AG24.00	122	243	109	1177	496	92	1268
750/60-30.5	AG24.00	185	370	167	1762	756	141	1932
800/45-30.5	AG28.00	143	287	128	1358	584	108	1488
850/50-30.5	AG28.00	204	408	184	1940	833	155	2128
Twin AMPT								
620/50B22.5	AG20.00	70	141	63	677	287	53	730
650/45B22.5	AG20.00	65	130	58	626	265	49	675
710/40B22.5	AG24.00	81	161	73	781	329	61	840
620/55B26.5	AG20.00	85	170	76	818	346	64	882
650/55B30.5	AG20.00	100	201	90	972	410	76	1047
750/50B30.5	AG24.00	122	243	109	1177	496	92	1268
850/45B30.5	AG28.00	166	331	149	1574	677	126	1727
Twin Garden Tractor								
350/60-17.5	AG11.75	18	35	16	172	73	14	187
400/55-17.5	AG11.75	22	44	20	218	93	17	234
400/55-22.5	AG11.75	29	57	26	282	119	22	304
500/45-22.5	AG16.00	37	75	33	357	152	28	386
500/60-22.5	AG16.00	59	119	54	576	243	45	620

Size	Rim	Volume of solution (gal) (at Valve Level= 75%)	Solution (up to -20°C)			Solution (up to -40°C)		
			Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)	Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)
Twin Garden Tractor								
560/45-22.5	AG16.00	48	95	43	461	194	36	496
560/60-22.5	AG16.00	71	143	64	690	291	54	745
23.1-26	DW20B	131	262	118	1266	536	99	1365
600/60-30.5	AG20.00	100	201	90	972	410	76	1047
Agroforest								
320/85-24	W11	28	55	25	262	112	21	289
380/85-24	W12	41	82	37	388	168	16	302
380/85-28	W12	45	88	40	426	183	34	467
420/85-28	W15L	59	119	53	564	243	45	622
420/85-30	W15L	62	123	56	589	254	47	646
460/85-30	W16L	82	163	74	778	335	62	853
420/85-34	W15L	70	139	63	664	287	53	730
460/85-34	W16L	88	176	80	840	362	67	922
420/85-38	W15L	73	146	65	690	295	55	756
460/85-38	W16L	91	181	82	864	373	69	950
520/85-38	DW16L	124	247	112	1180	507	94	1294

Liquid ballasting (Forestry)

Size	Rim	Volume of solution (gal) (at Valve Level= 75%)	Solution (up to -20°C)			Solution (up to -40°C)		
			Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)	Quantity CaCl. (lb)	Volume of Water (gal)	Total Mass (lb)
Twin Forestry (*)								
400/60-15.5	AG13.00	19	37	21	211	77	18	223
500/45-22.5	AG16.00	25/37	51/75	22/33	240/357	101/152	19/28	260/386
500/60-22.5	AG16.00	40/59	79/119	36/53	384/576	161/243	30/45	415/620
600/50-22.5	AG20.00	62	123	55	585	251	47	641
650/45-22.5	AG20.00	64	129	58	613	43	49	672
710/40-22.5	AG24.00	53/80	106/161	48/72	516/778	218/329	40/61	558/838
710/40-24.5	AG24.00	75	151	68	716	308	57	786
600/55-26.5	AG20.00	82	165	74	782	336	63	858
710/45-26.5	AG24.00	65/98	130/196	58/88	626/946	265/399	49/74	675/1021
750/50-26.5	AG24.00	85/125	170/251	76/113	818/1215	346/514	64/95	882/1310
600/60-30.5	AG20.00	67/100	135/201	61/90	653/972	276/410	51/76	703/1047
710/50-30.5	AG24.00	83/124	165/249	75/112	809/1208	342/512	64/95	873/1301
750/45-30.5	AG24.00	79/119	159/238	71/107	767/1151	324/487	60/90	827/1241
600/65-34	DW20B	80/120	161/240	72/108	778/1164	329/492	61/91	838/1255
710/55-34	DW24B	100/149	198/300	90/134	964/1444	408/611	76/113	1039/1557
750/65-34	DW24B	129/193	258/386	116/174	1246/1870	527/789	98/147	1343/2015

(*): Max 50% filling volume for tire operating in heavy terrain