

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

CHAPTER 7

M-1001

Table 7.39 Fully loaded 110-ton tank car—center-plate load (kip) (page 4 of 5)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
145	100	0.137260%	130	125	7.168088%	120	40	0.000014%
145	95	0.060442%	130	120	9.983974%	115	110	2.068222%
145	90	0.021431%	130	115	4.976418%	115	105	1.167231%
145	85	0.006205%	130	110	2.283699%	115	100	0.322831%
145	80	0.001667%	130	105	0.979699%	115	95	0.131530%
145	75	0.000700%	130	100	0.326963%	115	90	0.073553%
145	70	0.000308%	130	95	0.112886%	115	85	0.040860%
145	65	0.000098%	130	90	0.032722%	115	80	0.012943%
145	60	0.000014%	130	85	0.011612%	115	75	0.002689%
145	55	0.000028%	130	80	0.003740%	115	70	0.000574%
145	50	0.000014%	130	75	0.001009%	115	65	0.000084%
145	45	0.000014%	130	70	0.000266%	115	60	0.000028%
145	40	0.000014%	130	65	0.000070%	115	55	0.000014%
145	35	0.000014%	130	60	0.000028%	110	105	0.844779%
145	30	0.000014%	130	50	0.000014%	110	100	0.722045%
140	135	0.751769%	130	45	0.000014%	110	95	0.316177%
140	130	1.151879%	130	30	0.000014%	110	90	0.186636%
140	125	1.625193%	130	25	0.000014%	110	85	0.079451%
140	120	1.892470%	125	120	7.850939%	110	80	0.018756%
140	115	1.526524%	125	115	6.775121%	110	75	0.002872%
140	110	1.068464%	125	110	2.482074%	110	70	0.000546%
140	105	0.551195%	125	105	0.898049%	110	65	0.000140%
140	100	0.252681%	125	100	0.293961%	110	60	0.000042%
140	95	0.084871%	125	95	0.091455%	110	55	0.000042%
140	90	0.025578%	125	90	0.029682%	110	50	0.000014%
140	85	0.007270%	125	85	0.011332%	105	100	1.237017%
140	80	0.002745%	125	80	0.003726%	105	95	0.923122%
140	75	0.001065%	125	75	0.001303%	105	90	0.281663%
140	70	0.000378%	125	70	0.000392%	105	85	0.074842%
140	65	0.000098%	125	65	0.000070%	105	80	0.012929%
140	60	0.000028%	125	60	0.000014%	105	75	0.002353%
140	35	0.000014%	125	55	0.000014%	105	70	0.000518%
140	20	0.000014%	125	50	0.000014%	105	65	0.000196%
135	130	2.784790%	125	45	0.000014%	105	60	0.000070%
135	125	5.731072%	125	30	0.000014%	105	55	0.000028%
135	120	4.683997%	120	115	5.085508%	105	50	0.000014%
135	115	3.247738%	120	110	3.123491%	105	45	0.000014%
135	110	1.893338%	120	105	0.884630%	105	35	0.000014%
135	105	0.840366%	120	100	0.260554%	100	95	1.025405%
135	100	0.333561%	120	95	0.097856%	100	90	0.412591%
135	95	0.104818%	120	90	0.037568%	100	85	0.054601%
135	90	0.031209%	120	85	0.014176%	100	80	0.008320%
135	85	0.009203%	120	80	0.005911%	100	75	0.001807%
135	80	0.003558%	120	75	0.002017%	100	70	0.000518%
135	75	0.001107%	120	70	0.000518%	100	65	0.000112%
135	70	0.000294%	120	65	0.000098%	100	60	0.000056%
135	65	0.000112%	120	60	0.000014%	100	55	0.000014%
135	60	0.000014%	120	55	0.000014%	100	50	0.000014%
135	55	0.000014%	120	50	0.000014%	100	45	0.000014%
135	45	0.000014%	120	45	0.000014%	95	90	0.246952%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.39 Fully loaded 110-ton tank car—center-plate load (kip) (page 5 of 5)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
95	85	0.080921%	90	65	0.000056%	75	70	0.003110%
95	80	0.012551%	90	60	0.000014%	75	65	0.000560%
95	75	0.002157%	90	50	0.000014%	75	60	0.000042%
95	70	0.000350%	85	80	0.030732%	75	55	0.000014%
95	65	0.000112%	85	75	0.013195%	70	65	0.000392%
95	60	0.000028%	85	70	0.001261%	70	60	0.000084%
95	55	0.000014%	85	65	0.000154%	70	55	0.000014%
95	50	0.000014%	85	55	0.000014%	65	60	0.000042%
95	40	0.000014%	80	75	0.011976%	65	55	0.000014%
90	85	0.086412%	80	70	0.004076%	60	55	0.000014%
90	80	0.031335%	80	65	0.000210%	60	50	0.000014%
90	75	0.004538%	80	60	0.000014%	50	45	0.000014%
90	70	0.000546%	80	55	0.000014%	50	40	0.000014%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

7.3.2.39 Longitudinal Coupler Load—Fully Loaded 110-ton Tank Car

Test Date	August 2006–April 2007
Test Mode	General Service—286,000 lb GRL
Max MPH	53
Average MPH	25.0
Recorded Mileage	11,840
Total Number of Cycles	40,800,629
Average Cycles/Mile	3446.0
Track Class	Various

Travel Speed Distribution		
Range (mph)		Percent at Level
0	10	19.4
10	20	16.6
20	30	21.0
30	40	30.1
40	50	12.6
50	60	0.3

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 1 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
390	-120	0.000002%	300	-240	0.000002%	280	200	0.000005%
380	-115	0.000002%	300	-250	0.000002%	280	190	0.000002%
380	-380	0.000002%	300	-270	0.000002%	280	170	0.000002%
370	-210	0.000002%	300	-300	0.000002%	280	140	0.000002%
360	-100	0.000002%	300	-325	0.000002%	280	-30	0.000002%
360	-310	0.000002%	295	285	0.000007%	280	-40	0.000002%
360	-360	0.000002%	295	280	0.000002%	280	-90	0.000002%
350	330	0.000002%	295	255	0.000002%	280	-115	0.000002%
350	-190	0.000002%	295	245	0.000002%	280	-120	0.000002%
350	-370	0.000002%	290	280	0.000012%	280	-140	0.000002%
340	100	0.000002%	290	275	0.000005%	280	-160	0.000002%
340	-140	0.000002%	290	270	0.000002%	280	-215	0.000002%
335	-330	0.000002%	290	265	0.000002%	280	-240	0.000002%
330	320	0.000002%	290	260	0.000002%	280	-290	0.000002%
330	315	0.000002%	290	250	0.000002%	280	-340	0.000002%
330	-140	0.000002%	290	240	0.000002%	280	-350	0.000002%
330	-180	0.000002%	290	230	0.000002%	280	-355	0.000002%
330	-210	0.000002%	290	220	0.000002%	280	-360	0.000002%
330	-235	0.000002%	290	210	0.000002%	275	265	0.000686%
330	-330	0.000002%	290	200	0.000002%	275	260	0.000078%
325	305	0.000002%	290	190	0.000002%	275	255	0.000027%
325	265	0.000002%	290	180	0.000002%	275	250	0.000007%
320	250	0.000002%	290	50	0.000002%	275	245	0.000005%
320	220	0.000002%	290	-130	0.000002%	275	240	0.000002%
320	180	0.000002%	290	-135	0.000002%	275	235	0.000002%
320	-100	0.000002%	290	-140	0.000002%	275	230	0.000002%
315	305	0.000002%	290	-210	0.000002%	275	185	0.000002%
315	300	0.000002%	290	-250	0.000002%	275	-225	0.000002%
310	280	0.000002%	290	-270	0.000002%	270	260	0.000944%
310	270	0.000002%	290	-360	0.000002%	270	255	0.000140%
310	250	0.000002%	285	275	0.000032%	270	250	0.000039%
310	205	0.000002%	285	270	0.000007%	270	245	0.000010%
310	-100	0.000002%	285	265	0.000005%	270	240	0.000007%
310	-110	0.000002%	285	260	0.000002%	270	235	0.000002%
310	-130	0.000002%	285	245	0.000002%	270	230	0.000005%
310	-140	0.000002%	285	240	0.000002%	270	220	0.000002%
310	-210	0.000002%	285	230	0.000002%	270	210	0.000005%
310	-580	0.000002%	285	225	0.000002%	270	205	0.000002%
305	105	0.000002%	285	215	0.000002%	270	200	0.000002%
300	290	0.000005%	285	180	0.000002%	270	190	0.000002%
300	280	0.000002%	280	270	0.000311%	270	180	0.000002%
300	260	0.000002%	280	265	0.000064%	270	170	0.000002%
300	220	0.000002%	280	260	0.000017%	270	80	0.000002%
300	200	0.000002%	280	255	0.000010%	270	40	0.000002%
300	190	0.000002%	280	250	0.000005%	270	-90	0.000002%
300	160	0.000002%	280	245	0.000002%	270	-110	0.000002%
300	150	0.000002%	280	235	0.000002%	270	-120	0.000002%
300	-90	0.000002%	280	230	0.000002%	270	-125	0.000002%
300	-105	0.000002%	280	220	0.000002%	270	-150	0.000002%
300	-225	0.000002%	280	210	0.000002%	270	-160	0.000002%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

CHAPTER 7

M-1001

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 2 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
270	-200	0.000002%	260	-180	0.000002%	250	-50	0.000002%
270	-210	0.000002%	260	-190	0.000002%	250	-60	0.000002%
270	-220	0.000002%	260	-200	0.000002%	250	-90	0.000002%
270	-230	0.000002%	260	-210	0.000002%	250	-120	0.000002%
270	-285	0.000002%	260	-220	0.000002%	250	-140	0.000002%
270	-290	0.000002%	260	-240	0.000002%	250	-150	0.000002%
270	-310	0.000002%	260	-250	0.000002%	250	-155	0.000002%
270	-320	0.000002%	260	-260	0.000002%	250	-160	0.000002%
270	-330	0.000002%	260	-270	0.000002%	250	-170	0.000002%
270	-370	0.000002%	260	-280	0.000002%	250	-180	0.000002%
265	255	0.001561%	260	-335	0.000002%	250	-190	0.000002%
265	250	0.000159%	260	-345	0.000002%	250	-200	0.000002%
265	245	0.000034%	260	-360	0.000002%	250	-230	0.000002%
265	240	0.000012%	255	245	0.002625%	250	-250	0.000002%
265	235	0.000007%	255	240	0.000211%	250	-260	0.000002%
265	230	0.000002%	255	235	0.000039%	250	-280	0.000002%
265	225	0.000002%	255	230	0.000007%	250	-300	0.000002%
265	220	0.000002%	255	225	0.000002%	250	-320	0.000002%
265	215	0.000002%	255	220	0.000002%	250	-325	0.000002%
265	210	0.000002%	255	215	0.000002%	250	-380	0.000002%
265	205	0.000002%	255	210	0.000002%	250	-390	0.000002%
265	-190	0.000002%	255	205	0.000002%	250	-410	0.000002%
260	250	0.001824%	255	200	0.000002%	245	235	0.001831%
260	245	0.000223%	255	190	0.000002%	245	230	0.000228%
260	240	0.000051%	255	125	0.000002%	245	225	0.000071%
260	235	0.000015%	255	120	0.000002%	245	220	0.000015%
260	230	0.000007%	255	-80	0.000002%	245	215	0.000005%
260	225	0.000002%	255	-155	0.000002%	245	210	0.000002%
260	220	0.000010%	255	-250	0.000002%	245	205	0.000002%
260	210	0.000015%	250	240	0.001794%	245	145	0.000002%
260	205	0.000002%	250	235	0.000179%	245	105	0.000002%
260	200	0.000010%	250	230	0.000762%	245	-60	0.000002%
260	190	0.000005%	250	225	0.000015%	245	-90	0.000002%
260	180	0.000005%	250	220	0.000081%	245	-95	0.000002%
260	170	0.000002%	250	215	0.000002%	245	-110	0.000002%
260	160	0.000002%	250	210	0.000029%	245	-130	0.000002%
260	140	0.000002%	250	200	0.000015%	245	-300	0.000002%
260	100	0.000002%	250	195	0.000002%	245	-310	0.000002%
260	90	0.000002%	250	190	0.000007%	245	-345	0.000002%
260	80	0.000002%	250	180	0.000005%	245	-375	0.000002%
260	35	0.000002%	250	170	0.000002%	240	230	0.004245%
260	10	0.000002%	250	160	0.000002%	240	225	0.000279%
260	-10	0.000002%	250	150	0.000002%	240	220	0.001679%
260	-30	0.000002%	250	140	0.000002%	240	215	0.000015%
260	-80	0.000002%	250	130	0.000002%	240	210	0.000162%
260	-110	0.000002%	250	120	0.000002%	240	205	0.000005%
260	-120	0.000002%	250	110	0.000002%	240	200	0.000025%
260	-125	0.000002%	250	95	0.000002%	240	195	0.000002%
260	-130	0.000002%	250	-10	0.000002%	240	190	0.000010%
260	-170	0.000002%	250	-20	0.000002%	240	180	0.000007%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 3 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
240	170	0.000002%	235	180	0.000002%	230	-185	0.000002%
240	165	0.000002%	235	10	0.000002%	230	-190	0.000002%
240	160	0.000002%	235	-65	0.000002%	230	-200	0.000002%
240	140	0.000002%	235	-95	0.000002%	230	-210	0.000002%
240	130	0.000002%	235	-105	0.000002%	230	-220	0.000002%
240	120	0.000002%	235	-120	0.000002%	230	-240	0.000002%
240	110	0.000002%	235	-145	0.000002%	230	-250	0.000002%
240	100	0.000002%	235	-160	0.000002%	230	-270	0.000002%
240	90	0.000002%	235	-210	0.000002%	230	-280	0.000002%
240	70	0.000002%	235	-330	0.000002%	230	-290	0.000002%
240	50	0.000002%	230	220	0.006674%	230	-300	0.000002%
240	40	0.000002%	230	215	0.000409%	230	-310	0.000002%
240	20	0.000002%	230	210	0.001529%	230	-330	0.000002%
240	0	0.000002%	230	205	0.000012%	230	-395	0.000002%
240	-10	0.000002%	230	200	0.000140%	225	215	0.004274%
240	-40	0.000002%	230	195	0.000002%	225	210	0.000493%
240	-50	0.000002%	230	190	0.000032%	225	205	0.000061%
240	-70	0.000002%	230	185	0.000002%	225	200	0.000012%
240	-90	0.000002%	230	180	0.000012%	225	195	0.000010%
240	-110	0.000002%	230	175	0.000002%	225	190	0.000002%
240	-120	0.000002%	230	170	0.000007%	225	185	0.000002%
240	-130	0.000002%	230	165	0.000002%	225	180	0.000002%
240	-140	0.000002%	230	160	0.000005%	225	175	0.000002%
240	-145	0.000002%	230	150	0.000007%	225	170	0.000002%
240	-150	0.000002%	230	145	0.000002%	225	150	0.000002%
240	-160	0.000002%	230	140	0.000002%	225	140	0.000002%
240	-170	0.000002%	230	130	0.000005%	225	130	0.000002%
240	-190	0.000002%	230	120	0.000005%	225	85	0.000002%
240	-200	0.000002%	230	110	0.000002%	225	-55	0.000002%
240	-210	0.000002%	230	100	0.000002%	225	-60	0.000002%
240	-220	0.000002%	230	90	0.000005%	225	-70	0.000002%
240	-230	0.000002%	230	80	0.000002%	225	-75	0.000002%
240	-250	0.000002%	230	70	0.000002%	225	-90	0.000002%
240	-260	0.000002%	230	30	0.000002%	225	-100	0.000002%
240	-270	0.000002%	230	20	0.000002%	225	-105	0.000002%
240	-280	0.000002%	230	5	0.000002%	225	-115	0.000002%
240	-300	0.000002%	230	0	0.000002%	225	-125	0.000002%
240	-310	0.000002%	230	-20	0.000002%	225	-130	0.000002%
240	-330	0.000002%	230	-60	0.000002%	225	-135	0.000002%
240	-350	0.000002%	230	-70	0.000002%	225	-195	0.000002%
240	-360	0.000002%	230	-75	0.000002%	225	-330	0.000002%
235	225	0.002797%	230	-100	0.000002%	220	210	0.006559%
235	220	0.000407%	230	-120	0.000002%	220	205	0.000316%
235	215	0.000086%	230	-125	0.000002%	220	200	0.002860%
235	210	0.000025%	230	-130	0.000002%	220	195	0.000020%
235	205	0.000010%	230	-140	0.000002%	220	190	0.000176%
235	200	0.000005%	230	-145	0.000002%	220	185	0.000002%
235	195	0.000002%	230	-150	0.000002%	220	180	0.000029%
235	190	0.000002%	230	-170	0.000005%	220	175	0.000002%
235	185	0.000002%	230	-180	0.000005%	220	170	0.000012%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 4 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
220	165	0.000002%	220	-490	0.000002%	210	90	0.000005%
220	160	0.000010%	215	205	0.002436%	210	80	0.000002%
220	155	0.000002%	215	200	0.000314%	210	75	0.000002%
220	150	0.000012%	215	195	0.000064%	210	70	0.000002%
220	145	0.000002%	215	190	0.000020%	210	60	0.000002%
220	140	0.000007%	215	185	0.000012%	210	55	0.000002%
220	130	0.000005%	215	180	0.000010%	210	50	0.000002%
220	120	0.000007%	215	175	0.000005%	210	40	0.000002%
220	110	0.000002%	215	170	0.000002%	210	30	0.000002%
220	100	0.000002%	215	165	0.000002%	210	20	0.000002%
220	95	0.000002%	215	160	0.000002%	210	15	0.000002%
220	80	0.000005%	215	150	0.000002%	210	10	0.000002%
220	70	0.000002%	215	140	0.000002%	210	0	0.000002%
220	65	0.000002%	215	135	0.000002%	210	-5	0.000002%
220	50	0.000002%	215	105	0.000002%	210	-15	0.000002%
220	40	0.000002%	215	85	0.000002%	210	-20	0.000002%
220	25	0.000002%	215	75	0.000002%	210	-30	0.000002%
220	20	0.000002%	215	15	0.000002%	210	-45	0.000002%
220	-10	0.000002%	215	-25	0.000002%	210	-50	0.000002%
220	-35	0.000002%	215	-75	0.000002%	210	-60	0.000002%
220	-50	0.000002%	215	-85	0.000002%	210	-65	0.000002%
220	-60	0.000002%	215	-90	0.000002%	210	-70	0.000002%
220	-65	0.000002%	215	-95	0.000002%	210	-80	0.000005%
220	-70	0.000002%	215	-105	0.000002%	210	-90	0.000002%
220	-80	0.000002%	215	-115	0.000002%	210	-100	0.000002%
220	-85	0.000002%	215	-120	0.000002%	210	-110	0.000002%
220	-90	0.000002%	215	-130	0.000002%	210	-115	0.000002%
220	-100	0.000005%	215	-135	0.000002%	210	-120	0.000002%
220	-105	0.000002%	215	-140	0.000002%	210	-125	0.000002%
220	-110	0.000005%	215	-165	0.000002%	210	-130	0.000002%
220	-120	0.000002%	215	-335	0.000002%	210	-140	0.000002%
220	-125	0.000002%	210	200	0.007618%	210	-150	0.000002%
220	-130	0.000002%	210	195	0.000333%	210	-155	0.000002%
220	-140	0.000005%	210	190	0.002353%	210	-160	0.000002%
220	-150	0.000005%	210	185	0.000051%	210	-170	0.000005%
220	-160	0.000002%	210	180	0.000120%	210	-180	0.000002%
220	-170	0.000002%	210	175	0.000010%	210	-190	0.000005%
220	-180	0.000002%	210	170	0.000037%	210	-200	0.000002%
220	-190	0.000002%	210	165	0.000002%	210	-210	0.000002%
220	-200	0.000002%	210	160	0.000020%	210	-220	0.000005%
220	-205	0.000002%	210	150	0.000022%	210	-230	0.000002%
220	-215	0.000002%	210	145	0.000002%	210	-240	0.000002%
220	-230	0.000002%	210	140	0.000015%	210	-250	0.000002%
220	-250	0.000002%	210	135	0.000002%	210	-260	0.000002%
220	-260	0.000002%	210	130	0.000015%	210	-270	0.000002%
220	-270	0.000002%	210	120	0.000007%	210	-280	0.000002%
220	-280	0.000002%	210	115	0.000002%	210	-285	0.000002%
220	-290	0.000002%	210	110	0.000007%	210	-300	0.000002%
220	-320	0.000002%	210	105	0.000002%	210	-310	0.000002%
220	-360	0.000002%	210	100	0.000007%	210	-320	0.000002%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 5 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
210	-325	0.000002%	200	160	0.000066%	200	-190	0.000002%
210	-330	0.000002%	200	155	0.000007%	200	-200	0.000002%
210	-340	0.000002%	200	150	0.000049%	200	-205	0.000002%
210	-350	0.000002%	200	145	0.000007%	200	-210	0.000002%
210	-360	0.000002%	200	140	0.000032%	200	-220	0.000002%
210	-470	0.000002%	200	135	0.000010%	200	-230	0.000002%
205	195	0.003152%	200	130	0.000022%	200	-235	0.000002%
205	190	0.000475%	200	125	0.000002%	200	-240	0.000002%
205	185	0.000123%	200	120	0.000017%	200	-250	0.000002%
205	180	0.000039%	200	115	0.000002%	200	-260	0.000005%
205	175	0.000027%	200	110	0.000007%	200	-270	0.000002%
205	170	0.000007%	200	105	0.000002%	200	-280	0.000002%
205	165	0.000010%	200	100	0.000010%	200	-285	0.000002%
205	160	0.000005%	200	95	0.000002%	200	-300	0.000002%
205	155	0.000002%	200	90	0.000010%	200	-310	0.000002%
205	150	0.000005%	200	80	0.000005%	200	-325	0.000002%
205	145	0.000002%	200	70	0.000005%	200	-370	0.000002%
205	140	0.000007%	200	60	0.000002%	200	-420	0.000002%
205	135	0.000007%	200	50	0.000002%	200	-845	0.000002%
205	130	0.000002%	200	45	0.000002%	195	185	0.004221%
205	125	0.000002%	200	40	0.000002%	195	180	0.000691%
205	115	0.000002%	200	30	0.000002%	195	175	0.000169%
205	100	0.000002%	200	20	0.000002%	195	170	0.000064%
205	95	0.000002%	200	15	0.000002%	195	165	0.000029%
205	75	0.000002%	200	10	0.000002%	195	160	0.000025%
205	45	0.000002%	200	0	0.000002%	195	155	0.000017%
205	40	0.000002%	200	-10	0.000002%	195	150	0.000007%
205	25	0.000002%	200	-15	0.000002%	195	145	0.000007%
205	20	0.000002%	200	-20	0.000002%	195	140	0.000007%
205	0	0.000002%	200	-30	0.000002%	195	135	0.000005%
205	-60	0.000002%	200	-40	0.000002%	195	130	0.000005%
205	-70	0.000002%	200	-45	0.000002%	195	125	0.000002%
205	-80	0.000002%	200	-50	0.000002%	195	120	0.000002%
205	-110	0.000002%	200	-55	0.000002%	195	115	0.000002%
205	-115	0.000002%	200	-60	0.000002%	195	110	0.000002%
205	-120	0.000002%	200	-70	0.000002%	195	105	0.000002%
205	-125	0.000002%	200	-80	0.000005%	195	95	0.000002%
205	-145	0.000002%	200	-90	0.000007%	195	90	0.000002%
205	-160	0.000002%	200	-95	0.000002%	195	80	0.000002%
205	-165	0.000002%	200	-100	0.000002%	195	75	0.000002%
205	-170	0.000002%	200	-110	0.000005%	195	70	0.000002%
205	-185	0.000002%	200	-120	0.000005%	195	65	0.000002%
205	-225	0.000002%	200	-130	0.000007%	195	50	0.000002%
205	-280	0.000002%	200	-140	0.000002%	195	35	0.000002%
200	190	0.006767%	200	-145	0.000002%	195	25	0.000002%
200	185	0.000564%	200	-150	0.000002%	195	20	0.000002%
200	180	0.001373%	200	-160	0.000005%	195	-20	0.000002%
200	175	0.000034%	200	-170	0.000002%	195	-45	0.000002%
200	170	0.000145%	200	-180	0.000002%	195	-60	0.000002%
200	165	0.000015%	200	-185	0.000002%	195	-65	0.000002%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 6 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
195	-75	0.000002%	190	-60	0.000002%	185	75	0.000002%
195	-90	0.000002%	190	-65	0.000002%	185	70	0.000002%
195	-100	0.000002%	190	-70	0.000002%	185	65	0.000002%
195	-105	0.000002%	190	-75	0.000002%	185	55	0.000002%
195	-110	0.000002%	190	-80	0.000002%	185	45	0.000002%
195	-115	0.000002%	190	-90	0.000002%	185	40	0.000002%
195	-125	0.000002%	190	-95	0.000002%	185	25	0.000002%
195	-145	0.000002%	190	-100	0.000005%	185	15	0.000002%
195	-160	0.000002%	190	-110	0.000002%	185	-25	0.000002%
195	-195	0.000002%	190	-115	0.000002%	185	-40	0.000002%
195	-215	0.000002%	190	-120	0.000005%	185	-55	0.000002%
195	-235	0.000002%	190	-125	0.000002%	185	-75	0.000002%
190	180	0.007826%	190	-130	0.000005%	185	-80	0.000002%
190	175	0.000833%	190	-135	0.000002%	185	-85	0.000002%
190	170	0.001605%	190	-140	0.000002%	185	-100	0.000002%
190	165	0.000076%	190	-150	0.000002%	185	-105	0.000002%
190	160	0.000184%	190	-160	0.000007%	185	-115	0.000002%
190	155	0.000025%	190	-170	0.000005%	185	-120	0.000002%
190	150	0.000083%	190	-180	0.000002%	185	-125	0.000002%
190	145	0.000012%	190	-190	0.000005%	185	-135	0.000002%
190	140	0.000037%	190	-200	0.000005%	185	-160	0.000002%
190	135	0.000005%	190	-210	0.000002%	185	-165	0.000002%
190	130	0.000032%	190	-220	0.000005%	185	-195	0.000002%
190	125	0.000005%	190	-230	0.000002%	185	-210	0.000002%
190	120	0.000025%	190	-240	0.000005%	185	-215	0.000002%
190	115	0.000002%	190	-250	0.000002%	185	-350	0.000002%
190	110	0.000017%	190	-260	0.000002%	180	170	0.010497%
190	105	0.000002%	190	-265	0.000002%	180	165	0.001331%
190	100	0.000022%	190	-270	0.000002%	180	160	0.002422%
190	90	0.000015%	190	-290	0.000002%	180	155	0.000164%
190	85	0.000002%	190	-300	0.000002%	180	150	0.000350%
190	80	0.000007%	190	-670	0.000002%	180	145	0.000032%
190	75	0.000002%	185	175	0.005931%	180	140	0.000123%
190	70	0.000007%	185	170	0.000966%	180	135	0.000015%
190	65	0.000002%	185	165	0.000284%	180	130	0.000074%
190	60	0.000007%	185	160	0.000100%	180	125	0.000010%
190	55	0.000002%	185	155	0.000044%	180	120	0.000049%
190	50	0.000002%	185	150	0.000027%	180	115	0.000005%
190	45	0.000002%	185	145	0.000027%	180	110	0.000047%
190	40	0.000005%	185	140	0.000015%	180	105	0.000002%
190	30	0.000002%	185	135	0.000005%	180	100	0.000044%
190	20	0.000002%	185	130	0.000005%	180	95	0.000002%
190	10	0.000002%	185	125	0.000007%	180	90	0.000025%
190	0	0.000002%	185	120	0.000007%	180	85	0.000002%
190	-10	0.000002%	185	115	0.000002%	180	80	0.000022%
190	-20	0.000005%	185	110	0.000002%	180	75	0.000002%
190	-30	0.000005%	185	105	0.000005%	180	70	0.000007%
190	-40	0.000002%	185	100	0.000002%	180	65	0.000002%
190	-50	0.000002%	185	95	0.000002%	180	60	0.000007%
190	-55	0.000002%	185	90	0.000002%	180	55	0.000002%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 7 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
180	50	0.000010%	175	145	0.000098%	170	150	0.006495%
180	45	0.000002%	175	140	0.000069%	170	145	0.000154%
180	40	0.000005%	175	135	0.000020%	170	140	0.000490%
180	35	0.000002%	175	130	0.000017%	170	135	0.000032%
180	30	0.000005%	175	125	0.000007%	170	130	0.000184%
180	25	0.000002%	175	120	0.000007%	170	125	0.000020%
180	20	0.000007%	175	115	0.000005%	170	120	0.000123%
180	15	0.000002%	175	110	0.000010%	170	115	0.000005%
180	10	0.000005%	175	105	0.000005%	170	110	0.000093%
180	5	0.000002%	175	100	0.000005%	170	105	0.000002%
180	0	0.000002%	175	95	0.000002%	170	100	0.000061%
180	-10	0.000002%	175	90	0.000002%	170	95	0.000005%
180	-20	0.000002%	175	85	0.000002%	170	90	0.000042%
180	-30	0.000005%	175	80	0.000002%	170	85	0.000002%
180	-40	0.000002%	175	75	0.000002%	170	80	0.000027%
180	-50	0.000002%	175	70	0.000002%	170	75	0.000002%
180	-65	0.000002%	175	65	0.000002%	170	70	0.000022%
180	-70	0.000005%	175	60	0.000002%	170	65	0.000002%
180	-80	0.000002%	175	50	0.000002%	170	60	0.000015%
180	-90	0.000005%	175	40	0.000002%	170	55	0.000002%
180	-95	0.000002%	175	30	0.000002%	170	50	0.000010%
180	-100	0.000007%	175	20	0.000002%	170	45	0.000002%
180	-105	0.000002%	175	10	0.000002%	170	40	0.000010%
180	-110	0.000005%	175	5	0.000002%	170	35	0.000002%
180	-120	0.000007%	175	-5	0.000002%	170	30	0.000010%
180	-125	0.000002%	175	-20	0.000002%	170	25	0.000002%
180	-130	0.000010%	175	-30	0.000002%	170	20	0.000010%
180	-140	0.000005%	175	-45	0.000002%	170	10	0.000007%
180	-150	0.000010%	175	-65	0.000002%	170	0	0.000005%
180	-155	0.000002%	175	-70	0.000002%	170	-5	0.000002%
180	-160	0.000005%	175	-80	0.000002%	170	-10	0.000002%
180	-170	0.000002%	175	-85	0.000002%	170	-15	0.000002%
180	-180	0.000002%	175	-90	0.000002%	170	-20	0.000002%
180	-190	0.000005%	175	-95	0.000002%	170	-30	0.000002%
180	-200	0.000002%	175	-100	0.000002%	170	-35	0.000002%
180	-210	0.000002%	175	-105	0.000002%	170	-40	0.000002%
180	-220	0.000002%	175	-110	0.000002%	170	-50	0.000005%
180	-230	0.000002%	175	-120	0.000002%	170	-55	0.000002%
180	-235	0.000002%	175	-130	0.000002%	170	-60	0.000005%
180	-240	0.000002%	175	-135	0.000002%	170	-65	0.000002%
180	-250	0.000002%	175	-145	0.000002%	170	-70	0.000005%
180	-260	0.000002%	175	-150	0.000002%	170	-75	0.000002%
180	-310	0.000002%	175	-180	0.000002%	170	-80	0.000007%
180	-325	0.000002%	175	-195	0.000002%	170	-85	0.000002%
180	-400	0.000002%	175	-220	0.000002%	170	-90	0.000007%
180	-425	0.000002%	175	-230	0.000002%	170	-95	0.000005%
175	165	0.009321%	175	-290	0.000002%	170	-100	0.000010%
175	160	0.002088%	175	-340	0.000002%	170	-110	0.000007%
175	155	0.001441%	170	160	0.020264%	170	-115	0.000002%
175	150	0.000762%	170	155	0.005877%	170	-120	0.000005%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 8 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
170	-125	0.000002%	165	-5	0.000002%	160	50	0.000017%
170	-130	0.000005%	165	-20	0.000002%	160	45	0.000005%
170	-140	0.000010%	165	-25	0.000002%	160	40	0.000010%
170	-150	0.000007%	165	-35	0.000002%	160	35	0.000002%
170	-160	0.000005%	165	-45	0.000002%	160	30	0.000007%
170	-170	0.000005%	165	-50	0.000002%	160	25	0.000002%
170	-180	0.000002%	165	-55	0.000002%	160	20	0.000012%
170	-190	0.000002%	165	-60	0.000002%	160	15	0.000002%
170	-200	0.000002%	165	-65	0.000002%	160	10	0.000010%
170	-210	0.000005%	165	-70	0.000002%	160	0	0.000010%
170	-220	0.000002%	165	-75	0.000002%	160	-10	0.000005%
170	-230	0.000002%	165	-80	0.000002%	160	-15	0.000002%
170	-250	0.000002%	165	-85	0.000002%	160	-20	0.000007%
170	-270	0.000002%	165	-90	0.000002%	160	-25	0.000002%
170	-285	0.000002%	165	-95	0.000002%	160	-30	0.000002%
170	-300	0.000002%	165	-105	0.000002%	160	-35	0.000002%
170	-320	0.000002%	165	-110	0.000002%	160	-40	0.000002%
170	-325	0.000002%	165	-115	0.000002%	160	-45	0.000002%
170	-330	0.000002%	165	-125	0.000002%	160	-50	0.000002%
170	-350	0.000002%	165	-130	0.000002%	160	-55	0.000002%
170	-460	0.000002%	165	-140	0.000002%	160	-60	0.000005%
170	-590	0.000002%	165	-145	0.000002%	160	-65	0.000002%
165	155	0.059889%	165	-155	0.000002%	160	-70	0.000005%
165	150	0.005247%	165	-160	0.000002%	160	-75	0.000002%
165	145	0.000483%	165	-170	0.000002%	160	-80	0.000005%
165	140	0.000181%	165	-185	0.000002%	160	-85	0.000002%
165	135	0.000066%	165	-220	0.000002%	160	-90	0.000010%
165	130	0.000039%	165	-245	0.000002%	160	-95	0.000002%
165	125	0.000017%	165	-325	0.000002%	160	-100	0.000010%
165	120	0.000017%	165	-385	0.000002%	160	-105	0.000002%
165	115	0.000012%	160	150	0.031875%	160	-110	0.000010%
165	110	0.000010%	160	145	0.002223%	160	-115	0.000002%
165	105	0.000005%	160	140	0.005581%	160	-120	0.000007%
165	100	0.000007%	160	135	0.000196%	160	-125	0.000002%
165	95	0.000005%	160	130	0.000792%	160	-130	0.000010%
165	90	0.000007%	160	125	0.000044%	160	-135	0.000002%
165	85	0.000002%	160	120	0.000277%	160	-140	0.000010%
165	80	0.000005%	160	115	0.000017%	160	-145	0.000002%
165	70	0.000002%	160	110	0.000174%	160	-150	0.000005%
165	65	0.000002%	160	105	0.000012%	160	-160	0.000005%
165	55	0.000002%	160	100	0.000110%	160	-170	0.000005%
165	50	0.000002%	160	95	0.000005%	160	-175	0.000002%
165	45	0.000002%	160	90	0.000086%	160	-180	0.000005%
165	35	0.000002%	160	85	0.000002%	160	-185	0.000002%
165	25	0.000002%	160	80	0.000051%	160	-190	0.000005%
165	20	0.000002%	160	75	0.000002%	160	-200	0.000002%
165	15	0.000002%	160	70	0.000027%	160	-220	0.000002%
165	10	0.000002%	160	65	0.000002%	160	-230	0.000002%
165	5	0.000002%	160	60	0.000025%	160	-235	0.000002%
165	0	0.000002%	160	55	0.000002%	160	-240	0.000002%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 9 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
160	-250	0.000002%	155	-75	0.000002%	150	-5	0.000002%
160	-290	0.000002%	155	-80	0.000002%	150	-10	0.000005%
160	-300	0.000002%	155	-85	0.000002%	150	-15	0.000002%
160	-310	0.000002%	155	-90	0.000002%	150	-20	0.000007%
160	-320	0.000002%	155	-95	0.000002%	150	-25	0.000002%
160	-340	0.000002%	155	-100	0.000002%	150	-30	0.000007%
160	-350	0.000002%	155	-105	0.000002%	150	-35	0.000002%
160	-360	0.000002%	155	-110	0.000002%	150	-40	0.000005%
160	-370	0.000002%	155	-115	0.000002%	150	-45	0.000002%
160	-380	0.000002%	155	-120	0.000002%	150	-50	0.000007%
160	-525	0.000002%	155	-125	0.000005%	150	-55	0.000005%
160	-660	0.000002%	155	-135	0.000002%	150	-60	0.000005%
160	-990	0.000002%	155	-140	0.000002%	150	-70	0.000010%
155	145	0.014350%	155	-150	0.000002%	150	-80	0.000010%
155	140	0.002475%	155	-155	0.000002%	150	-85	0.000002%
155	135	0.000649%	155	-170	0.000002%	150	-90	0.000012%
155	130	0.000221%	155	-180	0.000002%	150	-95	0.000002%
155	125	0.000086%	155	-185	0.000002%	150	-100	0.000015%
155	120	0.000042%	155	-200	0.000002%	150	-105	0.000002%
155	115	0.000032%	155	-320	0.000002%	150	-110	0.000010%
155	110	0.000022%	155	-400	0.000002%	150	-115	0.000002%
155	105	0.000012%	150	140	0.027674%	150	-120	0.000007%
155	100	0.000015%	150	135	0.003176%	150	-125	0.000002%
155	95	0.000005%	150	130	0.008225%	150	-130	0.000007%
155	90	0.000007%	150	125	0.000275%	150	-135	0.000002%
155	85	0.000007%	150	120	0.001208%	150	-140	0.000010%
155	80	0.000005%	150	115	0.000078%	150	-145	0.000002%
155	75	0.000002%	150	110	0.000377%	150	-150	0.000010%
155	70	0.000002%	150	105	0.000025%	150	-155	0.000002%
155	65	0.000002%	150	100	0.000230%	150	-160	0.000010%
155	60	0.000002%	150	95	0.000012%	150	-165	0.000002%
155	55	0.000005%	150	90	0.000213%	150	-170	0.000005%
155	50	0.000002%	150	85	0.000007%	150	-180	0.000005%
155	45	0.000005%	150	80	0.000123%	150	-190	0.000002%
155	40	0.000002%	150	75	0.000005%	150	-200	0.000002%
155	35	0.000002%	150	70	0.000066%	150	-210	0.000002%
155	25	0.000002%	150	65	0.000005%	150	-220	0.000002%
155	20	0.000002%	150	60	0.000047%	150	-230	0.000005%
155	15	0.000005%	150	55	0.000002%	150	-240	0.000002%
155	10	0.000005%	150	50	0.000027%	150	-260	0.000002%
155	5	0.000002%	150	45	0.000007%	150	-280	0.000002%
155	0	0.000002%	150	40	0.000025%	150	-290	0.000002%
155	-15	0.000002%	150	35	0.000002%	150	-370	0.000002%
155	-20	0.000002%	150	30	0.000017%	150	-390	0.000002%
155	-30	0.000002%	150	25	0.000002%	150	-420	0.000002%
155	-40	0.000002%	150	20	0.000017%	145	135	0.020333%
155	-55	0.000005%	150	15	0.000005%	145	130	0.003681%
155	-60	0.000002%	150	10	0.000017%	145	125	0.001255%
155	-65	0.000002%	150	5	0.000002%	145	120	0.000453%
155	-70	0.000002%	150	0	0.000005%	145	115	0.000245%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

CHAPTER 7

M-1001

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 10 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
145	110	0.000074%	145	-160	0.000002%	140	-90	0.000020%
145	105	0.000047%	145	-170	0.000002%	140	-95	0.000002%
145	100	0.000020%	145	-195	0.000002%	140	-100	0.000012%
145	95	0.000049%	145	-235	0.000002%	140	-105	0.000005%
145	90	0.000027%	145	-335	0.000002%	140	-110	0.000015%
145	85	0.000015%	145	-630	0.000002%	140	-115	0.000002%
145	80	0.000012%	140	130	0.037722%	140	-120	0.000010%
145	75	0.000010%	140	125	0.004872%	140	-125	0.000002%
145	70	0.000005%	140	120	0.012409%	140	-130	0.000017%
145	65	0.000010%	140	115	0.001297%	140	-135	0.000002%
145	60	0.000005%	140	110	0.001657%	140	-140	0.000012%
145	55	0.000005%	140	105	0.000088%	140	-145	0.000002%
145	50	0.000005%	140	100	0.000625%	140	-150	0.000012%
145	45	0.000002%	140	95	0.000292%	140	-155	0.000002%
145	40	0.000005%	140	90	0.000488%	140	-160	0.000005%
145	35	0.000002%	140	85	0.000022%	140	-170	0.000007%
145	30	0.000007%	140	80	0.000248%	140	-180	0.000002%
145	25	0.000002%	140	75	0.000012%	140	-190	0.000005%
145	20	0.000005%	140	70	0.000113%	140	-200	0.000002%
145	15	0.000005%	140	65	0.000007%	140	-210	0.000002%
145	10	0.000005%	140	60	0.000071%	140	-215	0.000002%
145	5	0.000002%	140	55	0.000005%	140	-220	0.000002%
145	-5	0.000002%	140	50	0.000047%	140	-230	0.000002%
145	-10	0.000002%	140	45	0.000005%	140	-240	0.000002%
145	-15	0.000002%	140	40	0.000029%	140	-255	0.000002%
145	-20	0.000002%	140	35	0.000002%	140	-270	0.000002%
145	-30	0.000002%	140	30	0.000029%	140	-275	0.000002%
145	-35	0.000002%	140	25	0.000002%	140	-280	0.000002%
145	-45	0.000002%	140	20	0.000027%	140	-290	0.000002%
145	-50	0.000002%	140	15	0.000007%	140	-310	0.000002%
145	-55	0.000002%	140	10	0.000022%	140	-320	0.000002%
145	-60	0.000002%	140	5	0.000002%	140	-330	0.000002%
145	-65	0.000002%	140	0	0.000015%	140	-350	0.000002%
145	-70	0.000002%	140	-5	0.000002%	140	-400	0.000002%
145	-75	0.000002%	140	-10	0.000012%	140	-410	0.000002%
145	-80	0.000005%	140	-15	0.000002%	140	-430	0.000002%
145	-85	0.000005%	140	-20	0.000005%	140	-495	0.000002%
145	-90	0.000002%	140	-25	0.000002%	135	125	0.046688%
145	-95	0.000002%	140	-30	0.000007%	135	120	0.011488%
145	-100	0.000005%	140	-35	0.000002%	135	115	0.002507%
145	-105	0.000005%	140	-40	0.000007%	135	110	0.001181%
145	-110	0.000005%	140	-45	0.000002%	135	105	0.000186%
145	-115	0.000002%	140	-50	0.000007%	135	100	0.000098%
145	-120	0.000005%	140	-55	0.000002%	135	95	0.000069%
145	-125	0.000002%	140	-60	0.000010%	135	90	0.000191%
145	-135	0.000002%	140	-65	0.000002%	135	85	0.000029%
145	-140	0.000002%	140	-70	0.000012%	135	80	0.000029%
145	-145	0.000002%	140	-75	0.000002%	135	75	0.000022%
145	-150	0.000002%	140	-80	0.000012%	135	70	0.000012%
145	-155	0.000002%	140	-85	0.000005%	135	65	0.000010%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 11 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
135	60	0.000012%	135	-365	0.000002%	130	-120	0.000010%
135	55	0.000010%	135	-385	0.000002%	130	-125	0.000002%
135	50	0.000010%	130	120	0.105653%	130	-130	0.000012%
135	45	0.000010%	130	115	0.010505%	130	-135	0.000002%
135	40	0.000005%	130	110	0.015019%	130	-140	0.000005%
135	35	0.000005%	130	105	0.000581%	130	-145	0.000002%
135	30	0.000007%	130	100	0.002468%	130	-150	0.000012%
135	25	0.000007%	130	95	0.000125%	130	-155	0.000002%
135	20	0.000007%	130	90	0.001520%	130	-160	0.000010%
135	15	0.000007%	130	85	0.000049%	130	-165	0.000002%
135	10	0.000005%	130	80	0.000618%	130	-170	0.000010%
135	5	0.000005%	130	75	0.000022%	130	-180	0.000007%
135	0	0.000005%	130	70	0.000297%	130	-185	0.000002%
135	-5	0.000002%	130	65	0.000022%	130	-190	0.000005%
135	-10	0.000002%	130	60	0.000150%	130	-195	0.000002%
135	-15	0.000002%	130	55	0.000010%	130	-200	0.000002%
135	-20	0.000002%	130	50	0.000083%	130	-210	0.000002%
135	-25	0.000002%	130	45	0.000010%	130	-220	0.000002%
135	-30	0.000002%	130	40	0.000059%	130	-230	0.000002%
135	-35	0.000002%	130	35	0.000012%	130	-240	0.000002%
135	-40	0.000002%	130	30	0.000037%	130	-250	0.000002%
135	-45	0.000002%	130	25	0.000007%	130	-300	0.000002%
135	-50	0.000005%	130	20	0.000037%	130	-340	0.000002%
135	-55	0.000002%	130	15	0.000010%	130	-370	0.000002%
135	-60	0.000002%	130	10	0.000037%	130	-1360	0.000002%
135	-65	0.000002%	130	5	0.000005%	125	115	0.093300%
135	-70	0.000005%	130	0	0.000027%	125	110	0.006993%
135	-75	0.000005%	130	-5	0.000005%	125	105	0.001922%
135	-80	0.000007%	130	-10	0.000022%	125	100	0.001078%
135	-85	0.000005%	130	-15	0.000002%	125	95	0.000301%
135	-90	0.000005%	130	-20	0.000012%	125	90	0.000154%
135	-95	0.000007%	130	-25	0.000002%	125	85	0.000282%
135	-100	0.000002%	130	-30	0.000010%	125	80	0.000064%
135	-105	0.000002%	130	-35	0.000005%	125	75	0.000047%
135	-110	0.000002%	130	-40	0.000012%	125	70	0.000034%
135	-115	0.000002%	130	-45	0.000002%	125	65	0.000025%
135	-120	0.000005%	130	-50	0.000010%	125	60	0.000017%
135	-125	0.000002%	130	-55	0.000005%	125	55	0.000015%
135	-130	0.000002%	130	-60	0.000012%	125	50	0.000015%
135	-135	0.000002%	130	-65	0.000005%	125	45	0.000015%
135	-140	0.000005%	130	-70	0.000015%	125	40	0.000005%
135	-145	0.000002%	130	-75	0.000007%	125	35	0.000010%
135	-155	0.000002%	130	-80	0.000015%	125	30	0.000007%
135	-160	0.000002%	130	-85	0.000002%	125	25	0.000007%
135	-205	0.000002%	130	-90	0.000020%	125	20	0.000007%
135	-210	0.000002%	130	-95	0.000005%	125	15	0.000012%
135	-255	0.000002%	130	-100	0.000017%	125	10	0.000010%
135	-260	0.000002%	130	-105	0.000002%	125	5	0.000002%
135	-295	0.000002%	130	-110	0.000015%	125	0	0.000005%
135	-335	0.000002%	130	-115	0.000002%	125	-5	0.000002%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 12 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
125	-10	0.000005%	120	60	0.000368%	120	-200	0.000005%
125	-15	0.000005%	120	55	0.000017%	120	-210	0.000002%
125	-20	0.000002%	120	50	0.000176%	120	-215	0.000002%
125	-25	0.000002%	120	45	0.000017%	120	-220	0.000005%
125	-30	0.000002%	120	40	0.000123%	120	-230	0.000002%
125	-35	0.000002%	120	35	0.000012%	120	-250	0.000002%
125	-40	0.000005%	120	30	0.000074%	120	-260	0.000002%
125	-45	0.000005%	120	25	0.000012%	120	-290	0.000002%
125	-50	0.000005%	120	20	0.000054%	115	105	0.052144%
125	-55	0.000002%	120	15	0.000010%	115	100	0.008010%
125	-60	0.000005%	120	10	0.000051%	115	95	0.002907%
125	-65	0.000007%	120	5	0.000005%	115	90	0.001064%
125	-70	0.000002%	120	0	0.000029%	115	85	0.000730%
125	-75	0.000005%	120	-5	0.000005%	115	80	0.000306%
125	-80	0.000002%	120	-10	0.000025%	115	75	0.000125%
125	-85	0.000002%	120	-15	0.000005%	115	70	0.000088%
125	-90	0.000007%	120	-20	0.000012%	115	65	0.000051%
125	-95	0.000005%	120	-25	0.000002%	115	60	0.000056%
125	-100	0.000002%	120	-30	0.000007%	115	55	0.000027%
125	-105	0.000005%	120	-35	0.000005%	115	50	0.000032%
125	-110	0.000002%	120	-40	0.000010%	115	45	0.000027%
125	-115	0.000007%	120	-45	0.000005%	115	40	0.000025%
125	-125	0.000002%	120	-50	0.000017%	115	35	0.000022%
125	-130	0.000002%	120	-55	0.000007%	115	30	0.000017%
125	-135	0.000002%	120	-60	0.000022%	115	25	0.000015%
125	-140	0.000002%	120	-65	0.000002%	115	20	0.000015%
125	-145	0.000002%	120	-70	0.000022%	115	15	0.000015%
125	-150	0.000002%	120	-75	0.000005%	115	10	0.000020%
125	-155	0.000002%	120	-80	0.000025%	115	5	0.000010%
125	-160	0.000002%	120	-85	0.000005%	115	0	0.000005%
125	-170	0.000002%	120	-90	0.000022%	115	-5	0.000005%
125	-190	0.000002%	120	-95	0.000005%	115	-10	0.000007%
125	-210	0.000002%	120	-100	0.000025%	115	-15	0.000010%
125	-245	0.000002%	120	-105	0.000005%	115	-20	0.000005%
125	-250	0.000002%	120	-110	0.000020%	115	-25	0.000007%
125	-275	0.000002%	120	-115	0.000002%	115	-35	0.000007%
125	-300	0.000002%	120	-120	0.000017%	115	-40	0.000005%
125	-340	0.000002%	120	-125	0.000002%	115	-45	0.000010%
125	-405	0.000002%	120	-130	0.000015%	115	-50	0.000005%
125	-955	0.000002%	120	-135	0.000005%	115	-55	0.000007%
120	110	0.066357%	120	-140	0.000015%	115	-60	0.000005%
120	105	0.007694%	120	-145	0.000002%	115	-65	0.000010%
120	100	0.023997%	120	-150	0.000012%	115	-70	0.000005%
120	95	0.000988%	120	-155	0.000002%	115	-75	0.000007%
120	90	0.005017%	120	-160	0.000007%	115	-80	0.000005%
120	85	0.000426%	120	-165	0.000002%	115	-85	0.000005%
120	80	0.001527%	120	-170	0.000002%	115	-90	0.000005%
120	75	0.000081%	120	-175	0.000002%	115	-95	0.000005%
120	70	0.000694%	120	-180	0.000005%	115	-100	0.000005%
120	65	0.000047%	120	-190	0.000005%	115	-105	0.000002%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 13 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
115	-110	0.000002%	110	-55	0.000010%	105	55	0.000103%
115	-115	0.000002%	110	-60	0.000025%	105	50	0.000145%
115	-120	0.000002%	110	-65	0.000007%	105	45	0.000049%
115	-125	0.000002%	110	-70	0.000027%	105	40	0.000076%
115	-130	0.000002%	110	-75	0.000005%	105	35	0.000042%
115	-135	0.000005%	110	-80	0.000032%	105	30	0.000027%
115	-140	0.000002%	110	-85	0.000002%	105	25	0.000022%
115	-145	0.000002%	110	-90	0.000022%	105	20	0.000022%
115	-150	0.000002%	110	-95	0.000005%	105	15	0.000020%
115	-160	0.000002%	110	-100	0.000025%	105	10	0.000025%
115	-165	0.000002%	110	-105	0.000005%	105	5	0.000012%
115	-175	0.000002%	110	-110	0.000027%	105	0	0.000010%
115	-190	0.000002%	110	-115	0.000002%	105	-5	0.000010%
115	-230	0.000002%	110	-120	0.000025%	105	-10	0.000012%
115	-240	0.000002%	110	-125	0.000005%	105	-15	0.000010%
115	-255	0.000002%	110	-130	0.000017%	105	-20	0.000007%
115	-300	0.000002%	110	-135	0.000005%	105	-25	0.000007%
115	-325	0.000002%	110	-140	0.000012%	105	-30	0.000005%
115	-355	0.000002%	110	-145	0.000002%	105	-35	0.000007%
110	100	0.091692%	110	-150	0.000007%	105	-40	0.000007%
110	95	0.008752%	110	-155	0.000002%	105	-45	0.000010%
110	90	0.039401%	110	-160	0.000010%	105	-50	0.000002%
110	85	0.001770%	110	-165	0.000002%	105	-55	0.000007%
110	80	0.006164%	110	-170	0.000007%	105	-60	0.000007%
110	75	0.000554%	110	-175	0.000002%	105	-65	0.000007%
110	70	0.002235%	110	-180	0.000005%	105	-70	0.000007%
110	65	0.000267%	110	-185	0.000002%	105	-75	0.000002%
110	60	0.002223%	110	-190	0.000007%	105	-80	0.000007%
110	55	0.000061%	110	-195	0.000002%	105	-85	0.000005%
110	50	0.000426%	110	-200	0.000005%	105	-90	0.000007%
110	45	0.000027%	110	-210	0.000002%	105	-95	0.000007%
110	40	0.000255%	110	-220	0.000002%	105	-100	0.000002%
110	35	0.000025%	110	-225	0.000002%	105	-105	0.000002%
110	30	0.000132%	110	-230	0.000005%	105	-110	0.000002%
110	25	0.000015%	110	-250	0.000002%	105	-115	0.000005%
110	20	0.000093%	110	-255	0.000002%	105	-120	0.000002%
110	15	0.000017%	110	-290	0.000002%	105	-125	0.000002%
110	10	0.000066%	110	-300	0.000002%	105	-130	0.000002%
110	5	0.000015%	110	-315	0.000002%	105	-135	0.000002%
110	0	0.000039%	110	-325	0.000002%	105	-140	0.000002%
110	-5	0.000010%	110	-340	0.000002%	105	-145	0.000002%
110	-10	0.000044%	110	-420	0.000002%	105	-150	0.000002%
110	-15	0.000012%	105	95	0.049499%	105	-155	0.000002%
110	-20	0.000022%	105	90	0.011174%	105	-160	0.000002%
110	-25	0.000010%	105	85	0.004794%	105	-175	0.000002%
110	-30	0.000020%	105	80	0.002098%	105	-180	0.000002%
110	-35	0.000005%	105	75	0.001059%	105	-185	0.000002%
110	-40	0.000022%	105	70	0.000409%	105	-210	0.000002%
110	-45	0.000005%	105	65	0.000850%	105	-230	0.000002%
110	-50	0.000025%	105	60	0.000338%	105	-255	0.000002%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 14 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
105	-315	0.000002%	100	-145	0.000002%	95	-70	0.000007%
105	-460	0.000002%	100	-150	0.000010%	95	-75	0.000005%
105	-610	0.000002%	100	-160	0.000010%	95	-80	0.000005%
100	90	0.143976%	100	-165	0.000002%	95	-85	0.000010%
100	85	0.013495%	100	-170	0.000005%	95	-90	0.000010%
100	80	0.053051%	100	-175	0.000002%	95	-95	0.000010%
100	75	0.002007%	100	-180	0.000002%	95	-100	0.000005%
100	70	0.008490%	100	-190	0.000002%	95	-105	0.000005%
100	65	0.000934%	100	-200	0.000002%	95	-110	0.000007%
100	60	0.003672%	100	-205	0.000002%	95	-115	0.000005%
100	55	0.000225%	100	-210	0.000002%	95	-120	0.000005%
100	50	0.001348%	100	-230	0.000002%	95	-125	0.000002%
100	45	0.000083%	100	-260	0.000002%	95	-130	0.000002%
100	40	0.004176%	100	-300	0.000002%	95	-135	0.000002%
100	35	0.000064%	100	-340	0.000002%	95	-140	0.000002%
100	30	0.000441%	100	-370	0.000002%	95	-150	0.000002%
100	25	0.000029%	100	-420	0.000002%	95	-155	0.000002%
100	20	0.000157%	100	-500	0.000002%	95	-160	0.000002%
100	15	0.000027%	100	-615	0.000002%	95	-165	0.000002%
100	10	0.000184%	95	85	0.080871%	95	-205	0.000002%
100	5	0.000015%	95	80	0.013750%	95	-215	0.000002%
100	0	0.000076%	95	75	0.006625%	95	-225	0.000002%
100	-5	0.000007%	95	70	0.005395%	95	-230	0.000002%
100	-10	0.000086%	95	65	0.001377%	95	-325	0.000002%
100	-15	0.000015%	95	60	0.000735%	95	-335	0.000002%
100	-20	0.000037%	95	55	0.000610%	95	-405	0.000002%
100	-25	0.000010%	95	50	0.001196%	90	80	0.156309%
100	-30	0.000027%	95	45	0.000230%	90	75	0.015184%
100	-35	0.000007%	95	40	0.000179%	90	70	0.065791%
100	-40	0.000029%	95	35	0.006162%	90	65	0.006738%
100	-45	0.000007%	95	30	0.003691%	90	60	0.016245%
100	-50	0.000027%	95	25	0.000037%	90	55	0.001233%
100	-55	0.000007%	95	20	0.000044%	90	50	0.005289%
100	-60	0.000032%	95	15	0.000029%	90	45	0.000676%
100	-65	0.000007%	95	10	0.000270%	90	40	0.031950%
100	-70	0.000032%	95	5	0.000020%	90	35	0.000125%
100	-75	0.000010%	95	0	0.000017%	90	30	0.008980%
100	-80	0.000054%	95	-5	0.000015%	90	25	0.000267%
100	-85	0.000007%	95	-10	0.000012%	90	20	0.000517%
100	-90	0.000037%	95	-15	0.000012%	90	15	0.000059%
100	-95	0.000005%	95	-20	0.000012%	90	10	0.002640%
100	-100	0.000034%	95	-25	0.000012%	90	5	0.000020%
100	-105	0.000005%	95	-30	0.000007%	90	0	0.000132%
100	-110	0.000034%	95	-35	0.000010%	90	-5	0.000027%
100	-115	0.000002%	95	-40	0.000007%	90	-10	0.000120%
100	-120	0.000022%	95	-45	0.000010%	90	-15	0.000017%
100	-125	0.000005%	95	-50	0.000010%	90	-20	0.000051%
100	-130	0.000012%	95	-55	0.000007%	90	-25	0.000010%
100	-135	0.000002%	95	-60	0.000012%	90	-30	0.000039%
100	-140	0.000015%	95	-65	0.000005%	90	-35	0.000010%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 15 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
90	-40	0.000039%	85	30	0.016473%	80	55	0.007603%
90	-45	0.000010%	85	25	0.019519%	80	50	0.017831%
90	-50	0.000037%	85	20	0.000081%	80	45	0.001647%
90	-55	0.000007%	85	15	0.000093%	80	40	0.007054%
90	-60	0.000047%	85	10	0.032188%	80	35	0.000880%
90	-65	0.000015%	85	5	0.000032%	80	30	0.003399%
90	-70	0.000056%	85	0	0.000027%	80	25	0.000132%
90	-75	0.000010%	85	-5	0.000042%	80	20	0.000966%
90	-80	0.000051%	85	-10	0.000015%	80	15	0.000326%
90	-85	0.000010%	85	-15	0.000017%	80	10	0.170017%
90	-90	0.000051%	85	-20	0.000017%	80	5	0.000042%
90	-95	0.000007%	85	-25	0.000012%	80	0	0.000201%
90	-100	0.000037%	85	-30	0.000015%	80	-5	0.000020%
90	-105	0.000005%	85	-35	0.000015%	80	-10	0.000152%
90	-110	0.000027%	85	-40	0.000010%	80	-15	0.000020%
90	-115	0.000005%	85	-45	0.000012%	80	-20	0.000064%
90	-120	0.000022%	85	-50	0.000010%	80	-25	0.000020%
90	-125	0.000002%	85	-55	0.000007%	80	-30	0.000061%
90	-130	0.000017%	85	-60	0.000012%	80	-35	0.000015%
90	-135	0.000002%	85	-65	0.000010%	80	-40	0.000061%
90	-140	0.000017%	85	-70	0.000007%	80	-45	0.000012%
90	-145	0.000002%	85	-75	0.000012%	80	-50	0.000051%
90	-150	0.000010%	85	-80	0.000007%	80	-55	0.000015%
90	-155	0.000002%	85	-85	0.000007%	80	-60	0.000061%
90	-160	0.000007%	85	-90	0.000007%	80	-65	0.000010%
90	-170	0.000005%	85	-95	0.000007%	80	-70	0.000061%
90	-180	0.000005%	85	-100	0.000005%	80	-75	0.000007%
90	-190	0.000005%	85	-105	0.000007%	80	-80	0.000108%
90	-200	0.000002%	85	-110	0.000002%	80	-85	0.000007%
90	-205	0.000002%	85	-115	0.000005%	80	-90	0.000076%
90	-210	0.000002%	85	-120	0.000002%	80	-95	0.000007%
90	-220	0.000002%	85	-125	0.000002%	80	-100	0.000039%
90	-230	0.000002%	85	-130	0.000002%	80	-105	0.000005%
90	-245	0.000002%	85	-135	0.000002%	80	-110	0.000034%
90	-250	0.000002%	85	-140	0.000002%	80	-115	0.000005%
90	-270	0.000002%	85	-145	0.000002%	80	-120	0.000020%
90	-300	0.000002%	85	-150	0.000002%	80	-125	0.000002%
90	-325	0.000002%	85	-155	0.000002%	80	-130	0.000017%
90	-360	0.000002%	85	-160	0.000002%	80	-135	0.000002%
90	-450	0.000002%	85	-165	0.000002%	80	-140	0.000012%
90	-550	0.000002%	85	-175	0.000002%	80	-150	0.000012%
85	75	0.072545%	85	-180	0.000002%	80	-155	0.000002%
85	70	0.017108%	85	-195	0.000002%	80	-160	0.000007%
85	65	0.008144%	85	-260	0.000002%	80	-165	0.000002%
85	60	0.005466%	85	-270	0.000002%	80	-170	0.000005%
85	55	0.003385%	85	-325	0.000002%	80	-175	0.000002%
85	50	0.002632%	85	-450	0.000002%	80	-180	0.000002%
85	45	0.001750%	80	70	0.241910%	80	-190	0.000002%
85	40	0.000279%	80	65	0.018549%	80	-195	0.000002%
85	35	0.300304%	80	60	0.178218%	80	-200	0.000002%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 16 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
80	-205	0.000002%	75	-135	0.000002%	70	-145	0.000002%
80	-210	0.000002%	75	-140	0.000002%	70	-150	0.000010%
80	-220	0.000002%	75	-145	0.000002%	70	-155	0.000002%
80	-230	0.000002%	75	-150	0.000002%	70	-160	0.000005%
80	-250	0.000002%	75	-175	0.000002%	70	-165	0.000002%
80	-290	0.000002%	75	-205	0.000002%	70	-170	0.000002%
80	-330	0.000002%	75	-290	0.000002%	70	-180	0.000002%
80	-350	0.000002%	75	-305	0.000002%	70	-190	0.000002%
80	-380	0.000002%	75	-325	0.000002%	70	-195	0.000002%
80	-390	0.000002%	70	60	0.401734%	70	-210	0.000002%
75	65	0.087599%	70	55	0.021590%	70	-220	0.000002%
75	60	0.019024%	70	50	0.161515%	70	-240	0.000002%
75	55	0.011159%	70	45	0.013090%	70	-245	0.000002%
75	50	0.006980%	70	40	0.026098%	70	-270	0.000002%
75	45	0.003096%	70	35	0.001049%	70	-340	0.000002%
75	40	0.000956%	70	30	0.009818%	70	-360	0.000002%
75	35	0.003836%	70	25	0.000392%	70	-385	0.000002%
75	30	0.001314%	70	20	0.027899%	70	-530	0.000002%
75	25	0.012858%	70	15	0.000196%	70	-545	0.000002%
75	20	0.012078%	70	10	0.032174%	65	55	0.110052%
75	15	0.046440%	70	5	0.000064%	65	50	0.024571%
75	10	0.000098%	70	0	0.000480%	65	45	0.011517%
75	5	0.000049%	70	-5	0.000507%	65	40	0.005056%
75	0	0.000039%	70	-10	0.000304%	65	35	0.005843%
75	-5	0.000034%	70	-15	0.000061%	65	30	0.001806%
75	-10	0.000037%	70	-20	0.000105%	65	25	0.004600%
75	-15	0.000032%	70	-25	0.000027%	65	20	0.025137%
75	-20	0.000020%	70	-30	0.000083%	65	15	0.014605%
75	-25	0.000027%	70	-35	0.000027%	65	10	0.021076%
75	-30	0.000017%	70	-40	0.000066%	65	5	0.000091%
75	-35	0.000020%	70	-45	0.000012%	65	0	0.000091%
75	-40	0.000012%	70	-50	0.000086%	65	-5	0.003716%
75	-45	0.000015%	70	-55	0.000017%	65	-10	0.000395%
75	-50	0.000015%	70	-60	0.000074%	65	-15	0.000689%
75	-55	0.000015%	70	-65	0.000010%	65	-20	0.000037%
75	-60	0.000012%	70	-70	0.000069%	65	-25	0.000032%
75	-65	0.000012%	70	-75	0.000010%	65	-30	0.000032%
75	-70	0.000012%	70	-80	0.000061%	65	-35	0.000029%
75	-75	0.000007%	70	-85	0.000010%	65	-40	0.000020%
75	-80	0.000012%	70	-90	0.000064%	65	-45	0.000022%
75	-85	0.000010%	70	-95	0.000007%	65	-50	0.000022%
75	-90	0.000007%	70	-100	0.000042%	65	-55	0.000007%
75	-95	0.000005%	70	-105	0.000005%	65	-60	0.000020%
75	-100	0.000005%	70	-110	0.000029%	65	-65	0.000012%
75	-105	0.000007%	70	-115	0.000005%	65	-70	0.000012%
75	-110	0.000005%	70	-120	0.000017%	65	-75	0.000007%
75	-115	0.000002%	70	-125	0.000002%	65	-80	0.000010%
75	-120	0.000002%	70	-130	0.000020%	65	-85	0.000005%
75	-125	0.000005%	70	-135	0.000005%	65	-90	0.000007%
75	-130	0.000002%	70	-140	0.000012%	65	-95	0.000007%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 17 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
65	-100	0.000005%	60	-130	0.000012%	55	-130	0.000002%
65	-105	0.000007%	60	-135	0.000002%	55	-135	0.000002%
65	-110	0.000007%	60	-140	0.000010%	55	-140	0.000002%
65	-115	0.000002%	60	-145	0.000002%	55	-145	0.000002%
65	-120	0.000005%	60	-150	0.000007%	55	-150	0.000002%
65	-125	0.000002%	60	-160	0.000005%	55	-155	0.000002%
65	-130	0.000002%	60	-165	0.000002%	55	-160	0.000002%
65	-140	0.000002%	60	-170	0.000002%	55	-165	0.000002%
65	-150	0.000002%	60	-175	0.000002%	55	-185	0.000002%
65	-155	0.000002%	60	-180	0.000002%	55	-220	0.000002%
65	-175	0.000002%	60	-190	0.000002%	55	-315	0.000002%
65	-230	0.000002%	60	-200	0.000002%	55	-350	0.000002%
65	-235	0.000002%	60	-220	0.000002%	55	-355	0.000002%
65	-280	0.000002%	60	-240	0.000002%	55	-415	0.000002%
60	50	0.351975%	60	-260	0.000002%	55	-445	0.000002%
60	45	0.035735%	60	-440	0.000002%	55	-450	0.000002%
60	40	0.163331%	55	45	0.273202%	50	40	0.524700%
60	35	0.005618%	55	40	0.034284%	50	35	0.043529%
60	30	0.031708%	55	35	0.017267%	50	30	0.242376%
60	25	0.001505%	55	30	0.011208%	50	25	0.013814%
60	20	0.006213%	55	25	0.008684%	50	20	0.037127%
60	15	0.061252%	55	20	0.004757%	50	15	0.001902%
60	10	0.042605%	55	15	0.044399%	50	10	0.006186%
60	5	0.042181%	55	10	0.101305%	50	5	0.008544%
60	0	0.001118%	55	5	0.033970%	50	0	0.006130%
60	-5	0.000091%	55	0	0.000186%	50	-5	0.000248%
60	-10	0.002461%	55	-5	0.000113%	50	-10	0.001223%
60	-15	0.000475%	55	-10	0.000091%	50	-15	0.000076%
60	-20	0.000179%	55	-15	0.000074%	50	-20	0.000333%
60	-25	0.000037%	55	-20	0.000051%	50	-25	0.000056%
60	-30	0.000147%	55	-25	0.000064%	50	-30	0.000194%
60	-35	0.000025%	55	-30	0.000042%	50	-35	0.000022%
60	-40	0.000115%	55	-35	0.000034%	50	-40	0.000186%
60	-45	0.000020%	55	-40	0.000020%	50	-45	0.000017%
60	-50	0.000100%	55	-45	0.000020%	50	-50	0.000127%
60	-55	0.000015%	55	-50	0.000015%	50	-55	0.000017%
60	-60	0.000152%	55	-55	0.000017%	50	-60	0.000174%
60	-65	0.000010%	55	-60	0.000010%	50	-65	0.000010%
60	-70	0.000076%	55	-65	0.000012%	50	-70	0.000076%
60	-75	0.000010%	55	-70	0.000010%	50	-75	0.000010%
60	-80	0.000071%	55	-75	0.000007%	50	-80	0.000061%
60	-85	0.000007%	55	-80	0.000007%	50	-85	0.000010%
60	-90	0.000130%	55	-85	0.000010%	50	-90	0.000042%
60	-95	0.000007%	55	-90	0.000010%	50	-95	0.000007%
60	-100	0.000042%	55	-95	0.000005%	50	-100	0.000029%
60	-105	0.000005%	55	-100	0.000007%	50	-105	0.000005%
60	-110	0.000020%	55	-105	0.000002%	50	-110	0.000022%
60	-115	0.000002%	55	-110	0.000007%	50	-115	0.000002%
60	-120	0.000017%	55	-120	0.000005%	50	-120	0.000015%
60	-125	0.000002%	55	-125	0.000002%	50	-125	0.000002%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 18 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
50	-130	0.000010%	45	-130	0.000002%	40	-205	0.000002%
50	-135	0.000002%	45	-140	0.000005%	40	-210	0.000002%
50	-140	0.000007%	45	-145	0.000002%	40	-215	0.000002%
50	-145	0.000002%	45	-150	0.000002%	40	-230	0.000002%
50	-150	0.000002%	45	-155	0.000002%	40	-250	0.000002%
50	-155	0.000002%	45	-245	0.000002%	40	-255	0.000002%
50	-160	0.000002%	45	-255	0.000002%	40	-260	0.000002%
50	-170	0.000002%	45	-270	0.000002%	40	-265	0.000002%
50	-175	0.000002%	45	-285	0.000002%	40	-280	0.000002%
50	-180	0.000002%	45	-370	0.000002%	40	-300	0.000002%
50	-200	0.000002%	45	-845	0.000002%	40	-380	0.000002%
50	-220	0.000002%	40	30	0.954581%	35	25	0.584979%
50	-240	0.000002%	40	25	0.074124%	35	20	0.084357%
50	-280	0.000002%	40	20	0.347931%	35	15	0.044622%
50	-290	0.000002%	40	15	0.011005%	35	10	0.025411%
50	-325	0.000002%	40	10	0.035122%	35	5	0.207431%
50	-800	0.000002%	40	5	0.079501%	35	0	0.001914%
45	35	0.255648%	40	0	0.006385%	35	-5	0.000694%
45	30	0.055997%	40	-5	0.000417%	35	-10	0.000581%
45	25	0.023517%	40	-10	0.002598%	35	-15	0.000176%
45	20	0.010659%	40	-15	0.000125%	35	-20	0.000127%
45	15	0.012470%	40	-20	0.000895%	35	-25	0.000115%
45	10	0.009716%	40	-25	0.000083%	35	-30	0.000066%
45	5	0.014338%	40	-30	0.000441%	35	-35	0.000027%
45	0	0.004436%	40	-35	0.000022%	35	-40	0.000020%
45	-5	0.002814%	40	-40	0.000272%	35	-45	0.000015%
45	-10	0.000245%	40	-45	0.000027%	35	-50	0.000010%
45	-15	0.000091%	40	-50	0.000196%	35	-55	0.000015%
45	-20	0.000076%	40	-55	0.000017%	35	-60	0.000012%
45	-25	0.000054%	40	-60	0.000125%	35	-65	0.000012%
45	-30	0.000047%	40	-65	0.000012%	35	-70	0.000010%
45	-35	0.000029%	40	-70	0.000083%	35	-75	0.000005%
45	-40	0.000022%	40	-75	0.000015%	35	-80	0.000005%
45	-45	0.000017%	40	-80	0.000054%	35	-85	0.000005%
45	-50	0.000015%	40	-85	0.000010%	35	-90	0.000007%
45	-55	0.000020%	40	-90	0.000034%	35	-95	0.000005%
45	-60	0.000007%	40	-95	0.000005%	35	-100	0.000005%
45	-65	0.000012%	40	-100	0.000032%	35	-105	0.000005%
45	-70	0.000012%	40	-105	0.000005%	35	-110	0.000005%
45	-75	0.000007%	40	-110	0.000025%	35	-115	0.000002%
45	-80	0.000007%	40	-115	0.000002%	35	-120	0.000002%
45	-85	0.000005%	40	-120	0.000012%	35	-125	0.000002%
45	-90	0.000010%	40	-125	0.000002%	35	-130	0.000002%
45	-95	0.000005%	40	-130	0.000007%	35	-135	0.000002%
45	-100	0.000002%	40	-140	0.000010%	35	-140	0.000002%
45	-105	0.000005%	40	-150	0.000007%	35	-145	0.000002%
45	-110	0.000002%	40	-160	0.000005%	35	-155	0.000002%
45	-115	0.000005%	40	-170	0.000005%	35	-160	0.000002%
45	-120	0.000002%	40	-180	0.000002%	35	-185	0.000002%
45	-125	0.000002%	40	-200	0.000002%	35	-210	0.000002%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 19 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
35	-275	0.000002%	30	-330	0.000002%	20	-5	0.012701%
35	-350	0.000002%	30	-335	0.000002%	20	-10	0.056830%
30	20	1.699626%	30	-340	0.000002%	20	-15	0.001358%
30	15	0.234734%	25	15	3.991473%	20	-20	0.004115%
30	10	0.665977%	25	10	0.335338%	20	-25	0.000400%
30	5	0.019024%	25	5	0.054546%	20	-30	0.002225%
30	0	0.045806%	25	0	0.014463%	20	-35	0.000076%
30	-5	0.001480%	25	-5	0.004497%	20	-40	0.000922%
30	-10	0.006473%	25	-10	0.001990%	20	-45	0.000059%
30	-15	0.000272%	25	-15	0.000510%	20	-50	0.000382%
30	-20	0.001895%	25	-20	0.000304%	20	-55	0.000069%
30	-25	0.000154%	25	-25	0.000252%	20	-60	0.000157%
30	-30	0.001245%	25	-30	0.000130%	20	-65	0.000022%
30	-35	0.000044%	25	-35	0.000047%	20	-70	0.000098%
30	-40	0.000615%	25	-40	0.000044%	20	-75	0.000015%
30	-45	0.000020%	25	-45	0.000027%	20	-80	0.000051%
30	-50	0.000243%	25	-50	0.000025%	20	-85	0.000010%
30	-55	0.000017%	25	-55	0.000025%	20	-90	0.000039%
30	-60	0.000127%	25	-60	0.000025%	20	-95	0.000015%
30	-65	0.000010%	25	-65	0.000015%	20	-100	0.000020%
30	-70	0.000064%	25	-70	0.000012%	20	-105	0.000005%
30	-75	0.000007%	25	-75	0.000022%	20	-110	0.000015%
30	-80	0.000054%	25	-80	0.000015%	20	-115	0.000002%
30	-85	0.000010%	25	-85	0.000010%	20	-120	0.000015%
30	-90	0.000032%	25	-90	0.000007%	20	-125	0.000002%
30	-95	0.000007%	25	-95	0.000007%	20	-130	0.000005%
30	-100	0.000022%	25	-100	0.000005%	20	-135	0.000002%
30	-105	0.000002%	25	-105	0.000002%	20	-140	0.000010%
30	-110	0.000015%	25	-115	0.000005%	20	-145	0.000002%
30	-115	0.000002%	25	-120	0.000002%	20	-150	0.000005%
30	-120	0.000010%	25	-125	0.000002%	20	-155	0.000002%
30	-125	0.000005%	25	-130	0.000002%	20	-160	0.000010%
30	-130	0.000012%	25	-135	0.000002%	20	-165	0.000002%
30	-135	0.000002%	25	-150	0.000002%	20	-170	0.000005%
30	-140	0.000010%	25	-155	0.000002%	20	-175	0.000002%
30	-145	0.000002%	25	-160	0.000002%	20	-180	0.000002%
30	-150	0.000005%	25	-165	0.000002%	20	-190	0.000005%
30	-155	0.000002%	25	-170	0.000002%	20	-200	0.000002%
30	-160	0.000005%	25	-190	0.000002%	20	-210	0.000002%
30	-170	0.000002%	25	-195	0.000002%	20	-215	0.000002%
30	-180	0.000002%	25	-200	0.000002%	20	-235	0.000002%
30	-190	0.000002%	25	-205	0.000002%	20	-250	0.000002%
30	-195	0.000002%	25	-240	0.000002%	20	-255	0.000002%
30	-200	0.000002%	25	-245	0.000002%	20	-260	0.000002%
30	-210	0.000002%	25	-290	0.000002%	20	-280	0.000002%
30	-220	0.000002%	25	-380	0.000002%	20	-315	0.000002%
30	-225	0.000002%	25	-465	0.000002%	20	-400	0.000002%
30	-230	0.000005%	20	10	5.891926%	15	5	3.650713%
30	-245	0.000002%	20	5	0.261435%	15	0	0.225153%
30	-260	0.000002%	20	0	1.094819%	15	-5	0.032669%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 20 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
15	-10	0.008821%	10	-55	0.000054%	5	-50	0.000127%
15	-15	0.002527%	10	-60	0.000309%	5	-55	0.000083%
15	-20	0.001127%	10	-65	0.000037%	5	-60	0.000056%
15	-25	0.000598%	10	-70	0.000336%	5	-65	0.000039%
15	-30	0.000238%	10	-75	0.000020%	5	-70	0.000034%
15	-35	0.000127%	10	-80	0.000093%	5	-75	0.000025%
15	-40	0.000113%	10	-85	0.000012%	5	-80	0.000022%
15	-45	0.000086%	10	-90	0.000091%	5	-85	0.000015%
15	-50	0.000105%	10	-95	0.000076%	5	-90	0.000010%
15	-55	0.000093%	10	-100	0.000037%	5	-95	0.000032%
15	-60	0.000044%	10	-105	0.000017%	5	-100	0.000010%
15	-65	0.000029%	10	-110	0.000032%	5	-105	0.000007%
15	-70	0.000032%	10	-115	0.000007%	5	-110	0.000007%
15	-75	0.000020%	10	-120	0.000017%	5	-115	0.000007%
15	-80	0.000012%	10	-125	0.000005%	5	-120	0.000005%
15	-85	0.000015%	10	-130	0.000017%	5	-125	0.000005%
15	-90	0.000010%	10	-135	0.000002%	5	-130	0.000002%
15	-95	0.000012%	10	-140	0.000015%	5	-135	0.000005%
15	-100	0.000012%	10	-145	0.000002%	5	-140	0.000002%
15	-105	0.000007%	10	-150	0.000005%	5	-145	0.000005%
15	-110	0.000017%	10	-155	0.000002%	5	-160	0.000002%
15	-115	0.000005%	10	-160	0.000005%	5	-165	0.000002%
15	-120	0.000002%	10	-165	0.000002%	5	-185	0.000002%
15	-125	0.000002%	10	-170	0.000002%	5	-205	0.000002%
15	-130	0.000002%	10	-175	0.000002%	5	-210	0.000002%
15	-135	0.000002%	10	-180	0.000005%	5	-325	0.000002%
15	-140	0.000002%	10	-190	0.000002%	5	-340	0.000002%
15	-145	0.000002%	10	-195	0.000002%	5	-370	0.000002%
15	-150	0.000002%	10	-200	0.000005%	0	-10	31.427491%
15	-155	0.000002%	10	-205	0.000002%	0	-15	0.122437%
15	-165	0.000002%	10	-210	0.000005%	0	-20	9.485310%
15	-170	0.000002%	10	-215	0.000002%	0	-25	0.023519%
15	-180	0.000002%	10	-220	0.000002%	0	-30	0.051404%
15	-200	0.000002%	10	-230	0.000002%	0	-35	0.000478%
15	-220	0.000002%	10	-240	0.000002%	0	-40	0.004703%
15	-235	0.000002%	10	-260	0.000002%	0	-45	0.000157%
15	-250	0.000002%	10	-270	0.000002%	0	-50	0.001733%
15	-325	0.000002%	10	-290	0.000002%	0	-55	0.000096%
15	-345	0.000002%	10	-300	0.000002%	0	-60	0.000723%
10	0	4.635411%	10	-305	0.000002%	0	-65	0.000074%
10	-5	0.182875%	10	-320	0.000002%	0	-70	0.000373%
10	-10	5.853927%	5	-5	3.608189%	0	-75	0.000034%
10	-15	0.005573%	5	-10	0.109614%	0	-80	0.000199%
10	-20	0.424594%	5	-15	0.012652%	0	-85	0.000022%
10	-25	0.001203%	5	-20	0.004671%	0	-90	0.000196%
10	-30	0.003039%	5	-25	0.002331%	0	-95	0.000010%
10	-35	0.000167%	5	-30	0.000951%	0	-100	0.000081%
10	-40	0.001319%	5	-35	0.000248%	0	-105	0.000010%
10	-45	0.000078%	5	-40	0.000179%	0	-110	0.000071%
10	-50	0.000735%	5	-45	0.000118%	0	-115	0.000005%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 21 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
0	-120	0.000037%	-5	-115	0.000007%	-10	-195	0.000002%
0	-125	0.000005%	-5	-120	0.000002%	-10	-205	0.000002%
0	-130	0.000020%	-5	-125	0.000002%	-10	-210	0.000002%
0	-140	0.000015%	-5	-130	0.000002%	-10	-220	0.000002%
0	-145	0.000002%	-5	-135	0.000002%	-10	-230	0.000002%
0	-150	0.000010%	-5	-140	0.000002%	-10	-240	0.000002%
0	-160	0.000010%	-5	-150	0.000002%	-10	-320	0.000002%
0	-170	0.000002%	-5	-165	0.000002%	-15	-25	0.425819%
0	-180	0.000005%	-5	-170	0.000002%	-15	-30	0.050075%
0	-185	0.000002%	-5	-175	0.000002%	-15	-35	0.006973%
0	-190	0.000002%	-5	-180	0.000002%	-15	-40	0.002669%
0	-195	0.000002%	-5	-185	0.000002%	-15	-45	0.000855%
0	-200	0.000002%	-5	-190	0.000002%	-15	-50	0.000554%
0	-210	0.000002%	-5	-220	0.000002%	-15	-55	0.000525%
0	-220	0.000002%	-5	-230	0.000002%	-15	-60	0.000189%
0	-230	0.000002%	-5	-250	0.000002%	-15	-65	0.000083%
0	-240	0.000002%	-5	-305	0.000002%	-15	-70	0.000064%
0	-245	0.000002%	-5	-450	0.000002%	-15	-75	0.000051%
0	-250	0.000002%	-10	-20	5.652143%	-15	-80	0.000039%
0	-255	0.000002%	-10	-25	0.043041%	-15	-85	0.000034%
0	-265	0.000002%	-10	-30	0.549653%	-15	-90	0.000020%
0	-270	0.000002%	-10	-35	0.002524%	-15	-95	0.000017%
0	-285	0.000002%	-10	-40	0.026811%	-15	-100	0.000007%
0	-290	0.000002%	-10	-45	0.001478%	-15	-105	0.000007%
0	-305	0.000002%	-10	-50	0.004002%	-15	-110	0.000005%
0	-315	0.000002%	-10	-55	0.000159%	-15	-115	0.000005%
0	-320	0.000002%	-10	-60	0.001228%	-15	-120	0.000002%
0	-325	0.000002%	-10	-65	0.000091%	-15	-125	0.000002%
0	-330	0.000002%	-10	-70	0.000556%	-15	-130	0.000002%
0	-400	0.000002%	-10	-75	0.000034%	-15	-135	0.000002%
-5	-15	1.198756%	-10	-80	0.000326%	-15	-140	0.000002%
-5	-20	0.049676%	-10	-85	0.000025%	-15	-145	0.000002%
-5	-25	0.032075%	-10	-90	0.000201%	-15	-150	0.000002%
-5	-30	0.007059%	-10	-95	0.000012%	-15	-165	0.000002%
-5	-35	0.002105%	-10	-100	0.000208%	-15	-175	0.000002%
-5	-40	0.001189%	-10	-105	0.000007%	-15	-180	0.000002%
-5	-45	0.000262%	-10	-110	0.000105%	-15	-185	0.000002%
-5	-50	0.000203%	-10	-115	0.000002%	-15	-220	0.000002%
-5	-55	0.000142%	-10	-120	0.000054%	-15	-320	0.000002%
-5	-60	0.000091%	-10	-125	0.000002%	-15	-325	0.000002%
-5	-65	0.000066%	-10	-130	0.000032%	-15	-410	0.000002%
-5	-70	0.000051%	-10	-135	0.000002%	-20	-30	1.702162%
-5	-75	0.000056%	-10	-140	0.000025%	-20	-35	0.062546%
-5	-80	0.000039%	-10	-150	0.000015%	-20	-40	0.337676%
-5	-85	0.000020%	-10	-155	0.000002%	-20	-45	0.002534%
-5	-90	0.000022%	-10	-160	0.000007%	-20	-50	0.020843%
-5	-95	0.000012%	-10	-165	0.000002%	-20	-55	0.000988%
-5	-100	0.000010%	-10	-170	0.000010%	-20	-60	0.003262%
-5	-105	0.000010%	-10	-180	0.000005%	-20	-65	0.000216%
-5	-110	0.000007%	-10	-190	0.000002%	-20	-70	0.000806%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 22 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-20	-75	0.000098%	-25	-120	0.000010%	-30	-200	0.000002%
-20	-80	0.000623%	-25	-125	0.000005%	-30	-205	0.000002%
-20	-85	0.000059%	-25	-130	0.000005%	-30	-210	0.000002%
-20	-90	0.000206%	-25	-135	0.000005%	-30	-215	0.000002%
-20	-95	0.000017%	-25	-140	0.000005%	-30	-220	0.000002%
-20	-100	0.000211%	-25	-145	0.000005%	-30	-225	0.000002%
-20	-105	0.000017%	-25	-150	0.000005%	-30	-240	0.000002%
-20	-110	0.000066%	-25	-155	0.000002%	-30	-260	0.000002%
-20	-115	0.000005%	-25	-165	0.000002%	-30	-315	0.000002%
-20	-120	0.000042%	-25	-170	0.000002%	-30	-330	0.000002%
-20	-125	0.000002%	-25	-175	0.000002%	-35	-45	0.259543%
-20	-130	0.000025%	-25	-180	0.000002%	-35	-50	0.016203%
-20	-135	0.000002%	-25	-200	0.000002%	-35	-55	0.004490%
-20	-140	0.000012%	-25	-220	0.000002%	-35	-60	0.002363%
-20	-145	0.000002%	-25	-290	0.000002%	-35	-65	0.000770%
-20	-150	0.000010%	-25	-320	0.000002%	-35	-70	0.000539%
-20	-155	0.000002%	-25	-325	0.000002%	-35	-75	0.000216%
-20	-160	0.000007%	-25	-385	0.000002%	-35	-80	0.000123%
-20	-170	0.000007%	-30	-40	1.394836%	-35	-85	0.000081%
-20	-180	0.000005%	-30	-45	0.019799%	-35	-90	0.000091%
-20	-190	0.000002%	-30	-50	0.262655%	-35	-95	0.000034%
-20	-200	0.000002%	-30	-55	0.002588%	-35	-100	0.000029%
-20	-210	0.000002%	-30	-60	0.010988%	-35	-105	0.000025%
-20	-215	0.000002%	-30	-65	0.000620%	-35	-110	0.000015%
-20	-220	0.000002%	-30	-70	0.001706%	-35	-115	0.000012%
-20	-230	0.000002%	-30	-75	0.000235%	-35	-120	0.000005%
-20	-240	0.000002%	-30	-80	0.001091%	-35	-125	0.000010%
-20	-250	0.000002%	-30	-85	0.000074%	-35	-130	0.000005%
-20	-265	0.000002%	-30	-90	0.000348%	-35	-135	0.000002%
-20	-275	0.000002%	-30	-95	0.000037%	-35	-140	0.000002%
-20	-290	0.000002%	-30	-100	0.000154%	-35	-145	0.000002%
-20	-320	0.000002%	-30	-105	0.000029%	-35	-150	0.000002%
-20	-335	0.000002%	-30	-110	0.000081%	-35	-155	0.000005%
-25	-35	1.160617%	-30	-115	0.000017%	-35	-160	0.000002%
-25	-40	0.036737%	-30	-120	0.000047%	-35	-175	0.000002%
-25	-45	0.005926%	-30	-125	0.000012%	-35	-180	0.000002%
-25	-50	0.001924%	-30	-130	0.000032%	-35	-185	0.000002%
-25	-55	0.000828%	-30	-135	0.000010%	-35	-200	0.000002%
-25	-60	0.000400%	-30	-140	0.000017%	-35	-205	0.000002%
-25	-65	0.000603%	-30	-145	0.000005%	-40	-50	0.563133%
-25	-70	0.000132%	-30	-150	0.000015%	-40	-55	0.014948%
-25	-75	0.000270%	-30	-155	0.000005%	-40	-60	0.290040%
-25	-80	0.000083%	-30	-160	0.000007%	-40	-65	0.001939%
-25	-85	0.000100%	-30	-165	0.000002%	-40	-70	0.008564%
-25	-90	0.000037%	-30	-170	0.000005%	-40	-75	0.000395%
-25	-95	0.000027%	-30	-175	0.000002%	-40	-80	0.001304%
-25	-100	0.000022%	-30	-180	0.000005%	-40	-85	0.000093%
-25	-105	0.000012%	-30	-185	0.000002%	-40	-90	0.000392%
-25	-110	0.000012%	-30	-190	0.000005%	-40	-95	0.000042%
-25	-115	0.000012%	-30	-195	0.000002%	-40	-100	0.000184%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 23 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-40	-105	0.000020%	-50	-75	0.001206%	-55	-235	0.000002%
-40	-110	0.000113%	-50	-80	0.006434%	-60	-70	0.303201%
-40	-115	0.000015%	-50	-85	0.000299%	-60	-75	0.007000%
-40	-120	0.000047%	-50	-90	0.000846%	-60	-80	0.084660%
-40	-125	0.000002%	-50	-95	0.000167%	-60	-85	0.000721%
-40	-130	0.000022%	-50	-100	0.000297%	-60	-90	0.004206%
-40	-135	0.000005%	-50	-105	0.000029%	-60	-95	0.000137%
-40	-140	0.000012%	-50	-110	0.000098%	-60	-100	0.000642%
-40	-145	0.000002%	-50	-115	0.000020%	-60	-105	0.000047%
-40	-150	0.000015%	-50	-120	0.000056%	-60	-110	0.000284%
-40	-155	0.000002%	-50	-125	0.000007%	-60	-115	0.000017%
-40	-160	0.000007%	-50	-130	0.000027%	-60	-120	0.000076%
-40	-170	0.000007%	-50	-135	0.000010%	-60	-125	0.000012%
-40	-180	0.000005%	-50	-140	0.000015%	-60	-130	0.000032%
-40	-185	0.000002%	-50	-145	0.000005%	-60	-135	0.000007%
-40	-190	0.000002%	-50	-150	0.000007%	-60	-140	0.000020%
-40	-195	0.000002%	-50	-155	0.000002%	-60	-145	0.000002%
-40	-200	0.000002%	-50	-160	0.000002%	-60	-150	0.000005%
-40	-220	0.000002%	-50	-165	0.000002%	-60	-155	0.000002%
-40	-280	0.000002%	-50	-170	0.000002%	-60	-160	0.000007%
-45	-55	0.149655%	-50	-175	0.000002%	-60	-165	0.000002%
-45	-60	0.011527%	-50	-180	0.000005%	-60	-170	0.000002%
-45	-65	0.003605%	-50	-190	0.000002%	-60	-175	0.000002%
-45	-70	0.001392%	-50	-200	0.000002%	-60	-195	0.000002%
-45	-75	0.000875%	-50	-210	0.000002%	-60	-210	0.000002%
-45	-80	0.000297%	-50	-215	0.000002%	-60	-230	0.000002%
-45	-85	0.000154%	-50	-240	0.000002%	-60	-245	0.000002%
-45	-90	0.000098%	-55	-65	0.099636%	-60	-260	0.000002%
-45	-95	0.000056%	-55	-70	0.009142%	-60	-270	0.000002%
-45	-100	0.000042%	-55	-75	0.002596%	-60	-320	0.000002%
-45	-105	0.000022%	-55	-80	0.001088%	-65	-75	0.041877%
-45	-110	0.000020%	-55	-85	0.000375%	-65	-80	0.005375%
-45	-115	0.000012%	-55	-90	0.000162%	-65	-85	0.001686%
-45	-120	0.000010%	-55	-95	0.000100%	-65	-90	0.000642%
-45	-125	0.000007%	-55	-100	0.000071%	-65	-95	0.000262%
-45	-130	0.000002%	-55	-105	0.000037%	-65	-100	0.000147%
-45	-135	0.000005%	-55	-110	0.000025%	-65	-105	0.000076%
-45	-140	0.000002%	-55	-115	0.000017%	-65	-110	0.000037%
-45	-145	0.000005%	-55	-120	0.000012%	-65	-115	0.000027%
-45	-150	0.000002%	-55	-125	0.000010%	-65	-120	0.000017%
-45	-155	0.000002%	-55	-130	0.000007%	-65	-125	0.000017%
-45	-160	0.000002%	-55	-135	0.000002%	-65	-130	0.000012%
-45	-165	0.000002%	-55	-140	0.000005%	-65	-135	0.000005%
-45	-170	0.000002%	-55	-145	0.000002%	-65	-140	0.000007%
-45	-180	0.000002%	-55	-155	0.000002%	-65	-145	0.000005%
-45	-190	0.000002%	-55	-165	0.000002%	-65	-150	0.000002%
-45	-220	0.000002%	-55	-175	0.000002%	-65	-155	0.000002%
-50	-60	0.570499%	-55	-180	0.000002%	-65	-160	0.000002%
-50	-65	0.010559%	-55	-190	0.000002%	-65	-165	0.000002%
-50	-70	0.229058%	-55	-200	0.000002%	-65	-170	0.000002%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 24 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-65	-185	0.000002%	-75	-190	0.000002%	-85	-170	0.000002%
-65	-195	0.000002%	-75	-195	0.000002%	-85	-175	0.000002%
-65	-200	0.000002%	-75	-205	0.000002%	-85	-180	0.000002%
-65	-215	0.000002%	-75	-210	0.000002%	-85	-220	0.000002%
-65	-235	0.000002%	-75	-235	0.000002%	-85	-230	0.000002%
-65	-240	0.000002%	-75	-415	0.000002%	-85	-255	0.000002%
-70	-80	0.162424%	-80	-90	0.073710%	-85	-260	0.000002%
-70	-85	0.004615%	-80	-95	0.002814%	-85	-295	0.000002%
-70	-90	0.038794%	-80	-100	0.022590%	-90	-100	0.056342%
-70	-95	0.000490%	-80	-105	0.000363%	-90	-105	0.002120%
-70	-100	0.002512%	-80	-110	0.002145%	-90	-110	0.026882%
-70	-105	0.000108%	-80	-115	0.000096%	-90	-115	0.000277%
-70	-110	0.000426%	-80	-120	0.000554%	-90	-120	0.001934%
-70	-115	0.000042%	-80	-125	0.000010%	-90	-125	0.000042%
-70	-120	0.000093%	-80	-130	0.000093%	-90	-130	0.000196%
-70	-125	0.000015%	-80	-135	0.000005%	-90	-135	0.000012%
-70	-130	0.000044%	-80	-140	0.000034%	-90	-140	0.000069%
-70	-135	0.000007%	-80	-145	0.000002%	-90	-145	0.000002%
-70	-140	0.000017%	-80	-150	0.000017%	-90	-150	0.000022%
-70	-145	0.000002%	-80	-155	0.000002%	-90	-155	0.000002%
-70	-150	0.000007%	-80	-160	0.000005%	-90	-160	0.000007%
-70	-155	0.000002%	-80	-170	0.000002%	-90	-165	0.000002%
-70	-160	0.000007%	-80	-175	0.000002%	-90	-170	0.000007%
-70	-170	0.000002%	-80	-180	0.000002%	-90	-175	0.000002%
-70	-180	0.000002%	-80	-190	0.000002%	-90	-180	0.000005%
-70	-195	0.000002%	-80	-200	0.000002%	-90	-185	0.000002%
-70	-220	0.000002%	-80	-205	0.000002%	-90	-190	0.000002%
-70	-230	0.000002%	-80	-210	0.000002%	-90	-200	0.000002%
-70	-240	0.000002%	-80	-220	0.000002%	-90	-210	0.000002%
-70	-260	0.000002%	-80	-240	0.000002%	-90	-220	0.000002%
-70	-330	0.000002%	-80	-255	0.000002%	-90	-235	0.000002%
-75	-85	0.033774%	-80	-280	0.000002%	-90	-275	0.000002%
-75	-90	0.003733%	-80	-300	0.000002%	-90	-550	0.000002%
-75	-95	0.001069%	-80	-340	0.000002%	-95	-105	0.010512%
-75	-100	0.000466%	-80	-385	0.000002%	-95	-110	0.001887%
-75	-105	0.000191%	-85	-95	0.024745%	-95	-115	0.000571%
-75	-110	0.000113%	-85	-100	0.002556%	-95	-120	0.000216%
-75	-115	0.000059%	-85	-105	0.000828%	-95	-125	0.000083%
-75	-120	0.000029%	-85	-110	0.000326%	-95	-130	0.000034%
-75	-125	0.000022%	-85	-115	0.000150%	-95	-135	0.000020%
-75	-130	0.000012%	-85	-120	0.000061%	-95	-140	0.000015%
-75	-135	0.000007%	-85	-125	0.000020%	-95	-145	0.000002%
-75	-140	0.000005%	-85	-130	0.000015%	-95	-150	0.000005%
-75	-145	0.000002%	-85	-135	0.000007%	-95	-155	0.000005%
-75	-150	0.000002%	-85	-140	0.000005%	-95	-160	0.000002%
-75	-155	0.000005%	-85	-145	0.000002%	-95	-170	0.000002%
-75	-160	0.000002%	-85	-150	0.000002%	-95	-180	0.000002%
-75	-165	0.000002%	-85	-155	0.000005%	-95	-185	0.000002%
-75	-170	0.000002%	-85	-160	0.000002%	-95	-190	0.000002%
-75	-175	0.000002%	-85	-165	0.000002%	-95	-195	0.000002%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 25 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-95	-200	0.000002%	-110	-150	0.000110%	-120	-205	0.000002%
-95	-215	0.000002%	-110	-155	0.000005%	-120	-210	0.000002%
-95	-290	0.000002%	-110	-160	0.000025%	-120	-220	0.000002%
-100	-110	0.064729%	-110	-170	0.000010%	-120	-235	0.000002%
-100	-115	0.001478%	-110	-175	0.000002%	-120	-240	0.000002%
-100	-120	0.020715%	-110	-180	0.000015%	-120	-250	0.000002%
-100	-125	0.000172%	-110	-190	0.000010%	-120	-260	0.000002%
-100	-130	0.001078%	-110	-195	0.000002%	-120	-290	0.000002%
-100	-135	0.000025%	-110	-200	0.000002%	-120	-350	0.000002%
-100	-140	0.000123%	-110	-205	0.000002%	-120	-590	0.000002%
-100	-145	0.000010%	-110	-210	0.000002%	-125	-135	0.002588%
-100	-150	0.000034%	-110	-230	0.000002%	-125	-140	0.000387%
-100	-155	0.000002%	-110	-240	0.000002%	-125	-145	0.000120%
-100	-160	0.000015%	-110	-250	0.000002%	-125	-150	0.000039%
-100	-165	0.000002%	-110	-270	0.000002%	-125	-155	0.000015%
-100	-170	0.000005%	-110	-360	0.000002%	-125	-160	0.000007%
-100	-175	0.000002%	-115	-125	0.004855%	-125	-165	0.000005%
-100	-180	0.000005%	-115	-130	0.000696%	-125	-170	0.000005%
-100	-190	0.000002%	-115	-135	0.000208%	-125	-175	0.000002%
-100	-195	0.000002%	-115	-140	0.000093%	-125	-180	0.000002%
-100	-200	0.000002%	-115	-145	0.000027%	-125	-200	0.000002%
-100	-210	0.000005%	-115	-150	0.000015%	-125	-205	0.000002%
-100	-215	0.000002%	-115	-155	0.000010%	-125	-215	0.000002%
-100	-295	0.000002%	-115	-160	0.000007%	-125	-220	0.000002%
-105	-115	0.013149%	-115	-165	0.000005%	-125	-260	0.000002%
-105	-120	0.001199%	-115	-170	0.000002%	-125	-315	0.000002%
-105	-125	0.000297%	-115	-175	0.000002%	-125	-330	0.000002%
-105	-130	0.000135%	-115	-185	0.000002%	-130	-140	0.032593%
-105	-135	0.000044%	-115	-190	0.000002%	-130	-145	0.000287%
-105	-140	0.000020%	-115	-195	0.000002%	-130	-150	0.008983%
-105	-145	0.000017%	-115	-200	0.000002%	-130	-155	0.000039%
-105	-150	0.000005%	-115	-210	0.000002%	-130	-160	0.000265%
-105	-155	0.000005%	-115	-230	0.000002%	-130	-165	0.000007%
-105	-160	0.000002%	-115	-235	0.000002%	-130	-170	0.000034%
-105	-165	0.000002%	-115	-560	0.000002%	-130	-175	0.000002%
-105	-175	0.000002%	-120	-130	0.037593%	-130	-180	0.000015%
-105	-180	0.000002%	-120	-135	0.000505%	-130	-185	0.000002%
-105	-190	0.000002%	-120	-140	0.027034%	-130	-190	0.000007%
-105	-195	0.000002%	-120	-145	0.000051%	-130	-195	0.000002%
-105	-200	0.000002%	-120	-150	0.000706%	-130	-200	0.000007%
-105	-205	0.000002%	-120	-155	0.000010%	-130	-205	0.000002%
-105	-210	0.000002%	-120	-160	0.000051%	-130	-210	0.000002%
-105	-255	0.000002%	-120	-165	0.000002%	-130	-220	0.000002%
-105	-280	0.000002%	-120	-170	0.000012%	-130	-235	0.000002%
-110	-120	0.033749%	-120	-175	0.000005%	-130	-240	0.000002%
-110	-125	0.000998%	-120	-180	0.000020%	-130	-260	0.000002%
-110	-130	0.017661%	-120	-185	0.000002%	-130	-270	0.000002%
-110	-135	0.000098%	-120	-190	0.000012%	-130	-275	0.000002%
-110	-140	0.001179%	-120	-195	0.000002%	-130	-300	0.000002%
-110	-145	0.000015%	-120	-200	0.000005%	-130	-330	0.000002%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

CHAPTER 7

M-1001

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 26 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-130	-350	0.000002%	-145	-215	0.000002%	-160	-350	0.000002%
-135	-145	0.008012%	-145	-220	0.000002%	-160	-480	0.000002%
-135	-150	0.000397%	-145	-230	0.000002%	-165	-175	0.000363%
-135	-155	0.000083%	-145	-235	0.000002%	-165	-180	0.000064%
-135	-160	0.000022%	-150	-160	0.004037%	-165	-185	0.000022%
-135	-165	0.000012%	-150	-165	0.000113%	-165	-190	0.000007%
-135	-170	0.000005%	-150	-170	0.003566%	-165	-195	0.000002%
-135	-175	0.000002%	-150	-175	0.000010%	-165	-200	0.000002%
-135	-185	0.000002%	-150	-180	0.000091%	-165	-205	0.000002%
-135	-190	0.000005%	-150	-185	0.000002%	-165	-210	0.000002%
-135	-195	0.000002%	-150	-190	0.000007%	-165	-215	0.000002%
-135	-205	0.000002%	-150	-195	0.000002%	-165	-220	0.000002%
-135	-210	0.000002%	-150	-200	0.000005%	-165	-225	0.000002%
-135	-215	0.000002%	-150	-205	0.000002%	-165	-250	0.000002%
-135	-225	0.000002%	-150	-210	0.000002%	-165	-265	0.000002%
-135	-270	0.000002%	-150	-230	0.000002%	-170	-180	0.001554%
-135	-530	0.000002%	-150	-245	0.000002%	-170	-185	0.000044%
-140	-150	0.011586%	-150	-250	0.000002%	-170	-190	0.000065%
-140	-155	0.000255%	-150	-310	0.000002%	-170	-195	0.000005%
-140	-160	0.002270%	-155	-165	0.000498%	-170	-200	0.000032%
-140	-165	0.000025%	-155	-170	0.000091%	-170	-205	0.000002%
-140	-170	0.000191%	-155	-175	0.000037%	-170	-210	0.000002%
-140	-175	0.000002%	-155	-180	0.000017%	-170	-220	0.000002%
-140	-180	0.000015%	-155	-185	0.000002%	-170	-225	0.000002%
-140	-185	0.000002%	-155	-190	0.000002%	-170	-230	0.000002%
-140	-190	0.000005%	-155	-195	0.000002%	-170	-235	0.000002%
-140	-195	0.000002%	-155	-200	0.000002%	-170	-240	0.000002%
-140	-200	0.000002%	-155	-220	0.000002%	-170	-250	0.000002%
-140	-210	0.000002%	-155	-240	0.000002%	-170	-260	0.000002%
-140	-215	0.000002%	-155	-250	0.000002%	-170	-270	0.000002%
-140	-220	0.000002%	-155	-265	0.000002%	-175	-185	0.000167%
-140	-225	0.000002%	-155	-285	0.000002%	-175	-190	0.000029%
-140	-230	0.000002%	-155	-295	0.000002%	-175	-195	0.000007%
-140	-245	0.000002%	-155	-305	0.000002%	-175	-200	0.000007%
-140	-250	0.000002%	-160	-170	0.005483%	-175	-205	0.000002%
-140	-255	0.000002%	-160	-175	0.000113%	-175	-210	0.000002%
-140	-275	0.000002%	-160	-180	0.001186%	-175	-215	0.000002%
-140	-280	0.000002%	-160	-185	0.000015%	-175	-220	0.000002%
-140	-315	0.000002%	-160	-190	0.000056%	-175	-225	0.000002%
-140	-350	0.000002%	-160	-195	0.000005%	-175	-230	0.000002%
-140	-360	0.000002%	-160	-200	0.000007%	-175	-235	0.000002%
-145	-155	0.002181%	-160	-205	0.000002%	-175	-245	0.000002%
-145	-160	0.000145%	-160	-210	0.000002%	-175	-250	0.000002%
-145	-165	0.000039%	-160	-215	0.000002%	-175	-260	0.000002%
-145	-170	0.000015%	-160	-220	0.000002%	-175	-265	0.000002%
-145	-175	0.000002%	-160	-230	0.000002%	-175	-295	0.000002%
-145	-180	0.000005%	-160	-240	0.000002%	-180	-190	0.000725%
-145	-185	0.000002%	-160	-250	0.000002%	-180	-195	0.000025%
-145	-190	0.000002%	-160	-275	0.000002%	-180	-200	0.000184%
-145	-200	0.000002%	-160	-325	0.000002%	-180	-205	0.000005%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 27 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-180	-210	0.000022%	-200	-240	0.000005%	-220	-315	0.000002%
-180	-215	0.000002%	-200	-245	0.000002%	-225	-235	0.000034%
-180	-220	0.000005%	-200	-250	0.000002%	-225	-240	0.000007%
-180	-225	0.000002%	-200	-275	0.000002%	-225	-245	0.000005%
-180	-235	0.000002%	-200	-310	0.000002%	-225	-250	0.000002%
-180	-240	0.000002%	-205	-215	0.000069%	-225	-260	0.000002%
-180	-245	0.000002%	-205	-220	0.000025%	-225	-275	0.000002%
-180	-260	0.000002%	-205	-225	0.000010%	-225	-285	0.000002%
-180	-270	0.000002%	-205	-230	0.000002%	-230	-240	0.000238%
-180	-280	0.000002%	-205	-235	0.000002%	-230	-245	0.000007%
-180	-290	0.000002%	-205	-245	0.000002%	-230	-250	0.000137%
-180	-500	0.000002%	-205	-265	0.000002%	-230	-255	0.000002%
-180	-550	0.000002%	-205	-280	0.000002%	-230	-260	0.000007%
-185	-195	0.000125%	-205	-295	0.000002%	-230	-265	0.000002%
-185	-200	0.000027%	-210	-220	0.000159%	-230	-270	0.000002%
-185	-205	0.000012%	-210	-225	0.000012%	-230	-285	0.000002%
-185	-210	0.000007%	-210	-230	0.000059%	-230	-290	0.000002%
-185	-215	0.000002%	-210	-240	0.000005%	-230	-300	0.000002%
-185	-220	0.000002%	-210	-245	0.000002%	-230	-305	0.000002%
-185	-225	0.000002%	-210	-255	0.000002%	-230	-310	0.000002%
-185	-235	0.000002%	-210	-280	0.000002%	-230	-315	0.000002%
-185	-290	0.000002%	-210	-285	0.000002%	-230	-370	0.000002%
-185	-300	0.000002%	-210	-290	0.000002%	-235	-245	0.000012%
-185	-485	0.000002%	-210	-300	0.000002%	-235	-250	0.000002%
-190	-200	0.000429%	-210	-320	0.000002%	-235	-260	0.000002%
-190	-205	0.000034%	-210	-360	0.000002%	-235	-275	0.000002%
-190	-210	0.000174%	-210	-390	0.000002%	-235	-365	0.000002%
-190	-215	0.000007%	-215	-225	0.000049%	-240	-250	0.000252%
-190	-220	0.000012%	-215	-230	0.000010%	-240	-255	0.000002%
-190	-225	0.000002%	-215	-235	0.000002%	-240	-260	0.000203%
-190	-230	0.000005%	-215	-240	0.000002%	-240	-265	0.000002%
-190	-250	0.000002%	-215	-245	0.000002%	-240	-270	0.000005%
-190	-305	0.000002%	-215	-250	0.000002%	-240	-280	0.000002%
-190	-310	0.000002%	-215	-270	0.000002%	-240	-320	0.000002%
-190	-370	0.000002%	-215	-280	0.000002%	-240	-330	0.000002%
-190	-520	0.000002%	-215	-285	0.000002%	-240	-350	0.000002%
-195	-205	0.000110%	-215	-305	0.000002%	-240	-510	0.000002%
-195	-210	0.000032%	-220	-230	0.000181%	-245	-255	0.000002%
-195	-215	0.000012%	-220	-235	0.000010%	-245	-270	0.000002%
-195	-220	0.000005%	-220	-240	0.000147%	-245	-305	0.000002%
-195	-225	0.000002%	-220	-245	0.000002%	-245	-315	0.000002%
-195	-230	0.000002%	-220	-250	0.000007%	-250	-260	0.000284%
-195	-330	0.000002%	-220	-255	0.000002%	-250	-270	0.000078%
-195	-350	0.000002%	-220	-260	0.000002%	-250	-275	0.000002%
-200	-210	0.000282%	-220	-270	0.000002%	-250	-280	0.000002%
-200	-215	0.000020%	-220	-285	0.000002%	-250	-285	0.000002%
-200	-220	0.000113%	-220	-290	0.000002%	-250	-310	0.000002%
-200	-225	0.000002%	-220	-295	0.000002%	-250	-315	0.000002%
-200	-230	0.000007%	-220	-300	0.000002%	-250	-380	0.000002%
-200	-235	0.000002%	-220	-310	0.000002%	-255	-265	0.000005%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

Table 7.40 Fully loaded 110-ton tank car—longitudinal coupler load (kip) (page 28 of 28)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-255	-270	0.000002%	-285	-325	0.000002%	-320	-340	0.000225%
-255	-285	0.000002%	-285	-430	0.000002%	-320	-350	0.000012%
-255	-315	0.000002%	-290	-300	0.000223%	-320	-360	0.000002%
-255	-510	0.000002%	-290	-310	0.000164%	-325	-335	0.000002%
-260	-270	0.000152%	-290	-320	0.000005%	-330	-340	0.000358%
-260	-280	0.000125%	-290	-340	0.000002%	-330	-350	0.000113%
-260	-290	0.000015%	-295	-325	0.000002%	-330	-360	0.000002%
-260	-310	0.000002%	-295	-330	0.000002%	-340	-350	0.000086%
-265	-285	0.000002%	-295	-335	0.000002%	-340	-360	0.000022%
-265	-300	0.000002%	-300	-310	0.000233%	-340	-365	0.000002%
-265	-305	0.000002%	-300	-320	0.000184%	-340	-440	0.000002%
-270	-280	0.000294%	-300	-330	0.000002%	-350	-360	0.000010%
-270	-285	0.000002%	-300	-340	0.000002%	-350	-370	0.000002%
-270	-290	0.000358%	-305	-335	0.000002%	-350	-385	0.000002%
-270	-300	0.000010%	-305	-340	0.000002%	-350	-410	0.000002%
-270	-310	0.000002%	-310	-320	0.000123%	-365	-425	0.000002%
-270	-365	0.000002%	-310	-325	0.000002%	-370	-385	0.000002%
-275	-290	0.000002%	-310	-330	0.000127%	-400	-600	0.000002%
-280	-290	0.000414%	-310	-340	0.000017%	-410	-430	0.000002%
-280	-300	0.000206%	-310	-350	0.000005%	-410	-455	0.000002%
-280	-310	0.000002%	-315	-325	0.000002%	-420	-500	0.000002%
-280	-320	0.000002%	-315	-330	0.000002%	-430	-440	0.000002%
-280	-335	0.000002%	-315	-335	0.000002%	-570	-600	0.000002%
-280	-355	0.000002%	-320	-330	0.000436%	-590	-610	0.000002%
-285	-300	0.000002%	-320	-335	0.000002%			

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

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AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

7.3.2.40 Coupler Vertical Load—Fully Loaded 110-ton Tank Car

Test Date	September 2006–December 2008
Test Mode	General Service—286,000 lb GRL
Max MPH	54
Average MPH	24.8
Recorded Mileage	11,840
Total Number of Cycles	129,983
Average Cycles/Mile	11.0
Track Class	Various

Travel Speed Distribution		
Range (mph)		Percent at Level
0	10	20.2
10	20	17.8
20	30	23.1
30	40	26.2
40	50	12.0
50	60	0.6

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.41 Fully loaded 110-ton tank car—coupler vertical load (kip) (page 1 of 2)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
65	-5	0.000769%	35	10	0.003847%	20	-20	0.040005%
65	-15	0.000769%	35	5	0.003077%	20	-25	0.014617%
65	-20	0.000769%	35	0	0.003077%	20	-30	0.006924%
60	-5	0.000769%	35	-5	0.000769%	20	-35	0.002308%
60	-10	0.000769%	35	-10	0.003077%	20	-40	0.000769%
55	45	0.000769%	35	-15	0.004616%	20	-45	0.000769%
55	-20	0.000769%	35	-20	0.006924%	20	-50	0.000769%
55	-30	0.000769%	35	-25	0.005385%	15	10	0.670088%
50	40	0.000769%	35	-30	0.003847%	15	5	1.676373%
50	0	0.000769%	35	-35	0.002308%	15	0	0.907811%
50	-5	0.000769%	35	-40	0.000769%	15	-5	0.548533%
50	-15	0.000769%	35	-45	0.000769%	15	-10	0.335428%
50	-20	0.000769%	35	-50	0.000769%	15	-15	0.166176%
50	-30	0.000769%	30	25	0.005385%	15	-20	0.047699%
50	-35	0.000769%	30	20	0.014617%	15	-25	0.019233%
50	-40	0.000769%	30	15	0.009232%	15	-30	0.003847%
50	-45	0.000769%	30	10	0.008463%	15	-35	0.003077%
45	40	0.000769%	30	5	0.006155%	15	-40	0.001539%
45	35	0.000769%	30	0	0.006924%	10	5	6.230815%
45	25	0.000769%	30	-5	0.006924%	10	0	12.020033%
45	15	0.000769%	30	-10	0.010771%	10	-5	3.110407%
45	10	0.000769%	30	-15	0.012309%	10	-10	0.709324%
45	0	0.000769%	30	-20	0.014617%	10	-15	0.173869%
45	-5	0.000769%	30	-25	0.010001%	10	-20	0.048468%
45	-15	0.001539%	30	-30	0.004616%	10	-25	0.014617%
45	-20	0.000769%	30	-35	0.001539%	10	-30	0.006155%
45	-25	0.000769%	30	-40	0.002308%	10	-35	0.002308%
45	-30	0.001539%	30	-45	0.000769%	10	-40	0.000769%
45	-40	0.000769%	30	-50	0.000769%	5	0	38.795843%
45	-45	0.000769%	25	20	0.038467%	5	-5	15.828224%
45	-50	0.000769%	25	15	0.057700%	5	-10	1.433264%
40	30	0.000769%	25	10	0.033851%	5	-15	0.228491%
40	25	0.000769%	25	5	0.032312%	5	-20	0.059239%
40	20	0.000769%	25	0	0.041544%	5	-25	0.013848%
40	15	0.001539%	25	-5	0.028465%	5	-30	0.004616%
40	10	0.001539%	25	-10	0.043852%	5	-35	0.000769%
40	5	0.000769%	25	-15	0.043083%	5	-45	0.000769%
40	0	0.001539%	25	-20	0.026157%	5	-50	0.000769%
40	-10	0.000769%	25	-25	0.016156%	0	-5	9.690498%
40	-15	0.000769%	25	-30	0.005385%	0	-10	2.398006%
40	-20	0.001539%	25	-35	0.001539%	0	-15	0.349276%
40	-25	0.002308%	25	-40	0.000769%	0	-20	0.064624%
40	-30	0.002308%	25	-45	0.000769%	0	-25	0.010771%
40	-35	0.000769%	20	15	0.151558%	0	-30	0.003077%
40	-40	0.000769%	20	10	0.214643%	0	-35	0.000769%
40	-50	0.000769%	20	5	0.166945%	-5	0	0.000769%
35	30	0.001539%	20	0	0.171561%	-5	-10	1.452498%
35	25	0.001539%	20	-5	0.109245%	-5	-15	0.601617%
35	20	0.003077%	20	-10	0.123093%	-5	-20	0.079241%
35	15	0.004616%	20	-15	0.090781%	-5	-25	0.014617%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

Table 7.41 Fully loaded 110-ton tank car—coupler vertical load (kip) (page 2 of 2)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-5	-30	0.006155%	-10	-30	0.006155%	-20	-25	0.006155%
-5	-35	0.002308%	-10	-35	0.001539%	-20	-30	0.001539%
-5	-40	0.001539%	-10	-40	0.000769%	-25	-30	0.001539%
-5	-45	0.000769%	-15	-20	0.073086%	-25	-35	0.000769%
-10	-15	0.296962%	-15	-25	0.020003%	-30	-35	0.000769%
-10	-20	0.150020%	-15	-30	0.004616%	-35	-45	0.000769%
-10	-25	0.022311%	-15	-35	0.000769%			

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

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AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

7.3.2.41 Car Body Twist Moment—Fully Loaded 110-ton Tank Car

Test Date	August 2006–April 2007
Test Mode	General Service—286,000 lb GRL
Max MPH	53
Average MPH	25.0
Recorded Mileage	10,807
Total Number of Cycles	1,452,763
Average Cycles/Mile	134.4
Track Class	Various

Travel Speed Distribution		
Range (mph)		Percent at Level
0	10	19.4
10	20	16.6
20	30	21.0
30	40	30.1
40	50	12.6
50	60	0.3

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.42 Fully loaded 110-ton tank car— car body twist moment (in.-kip) (page 1 of 2)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
2750	250	0.00014%	1750	500	0.03569%	750	0	2.36367%
2750	0	0.00007%	1750	250	0.04154%	750	-250	1.18836%
2750	-250	0.00007%	1750	0	0.05527%	750	-500	0.44290%
2750	-500	0.00007%	1750	-250	0.10060%	750	-750	0.09812%
2750	-1000	0.00028%	1750	-500	0.11325%	750	-1000	0.05903%
2750	-1250	0.00014%	1750	-750	0.01655%	750	-1250	0.05564%
2500	2000	0.00014%	1750	-1000	0.00069%	750	-1500	0.00339%
2500	1750	0.00021%	1750	-6000	0.00007%	750	-1750	0.00024%
2500	1500	0.00028%	1500	1250	0.06875%	750	-2250	0.00007%
2500	1250	0.00055%	1500	1000	0.10733%	750	-2500	0.00007%
2500	1000	0.00083%	1500	750	0.08785%	500	250	14.30653%
2500	750	0.00103%	1500	500	0.08227%	500	0	12.26957%
2500	500	0.00179%	1500	250	0.08381%	500	-250	4.99178%
2500	250	0.00344%	1500	0	0.09021%	500	-500	0.88829%
2500	0	0.00564%	1500	-250	0.11036%	500	-750	0.15792%
2500	-250	0.00145%	1500	-500	0.10835%	500	-1000	0.08603%
2500	-500	0.00234%	1500	-750	0.02213%	500	-1250	0.07062%
2500	-750	0.00268%	1500	-1000	0.00086%	500	-1500	0.01039%
2500	-1000	0.00165%	1500	-1250	0.00012%	500	-1750	0.00034%
2250	2000	0.00138%	1500	-1500	0.00041%	250	0	15.93014%
2250	1750	0.00392%	1500	-1750	0.00021%	250	-250	9.16887%
2250	1500	0.00379%	1500	-2000	0.00007%	250	-500	0.98438%
2250	1250	0.00461%	1500	-2250	0.00007%	250	-750	0.15646%
2250	1000	0.00585%	1250	1000	0.14922%	250	-1000	0.07160%
2250	750	0.00688%	1250	750	0.23686%	250	-1250	0.02581%
2250	500	0.01088%	1250	500	0.19788%	250	-1500	0.01205%
2250	250	0.01872%	1250	250	0.20669%	250	-1750	0.00021%
2250	0	0.04082%	1250	0	0.17234%	250	-2000	0.00007%
2250	-250	0.03194%	1250	-250	0.13741%	0	-250	8.06049%
2250	-500	0.01012%	1250	-500	0.05631%	0	-500	2.70106%
2250	-750	0.01122%	1250	-750	0.01473%	0	-750	0.19053%
2250	-1000	0.00220%	1250	-1000	0.00344%	0	-1000	0.05646%
2250	-1250	0.00007%	1250	-1250	0.00234%	0	-1250	0.01638%
2250	-1500	0.00007%	1250	-1500	0.00344%	0	-1500	0.00771%
2000	1750	0.01260%	1250	-1750	0.00062%	0	-1750	0.00055%
2000	1500	0.01229%	1000	750	0.33168%	0	-2000	0.00007%
2000	1250	0.02588%	1000	500	0.75076%	0	-2250	0.00007%
2000	1000	0.01645%	1000	250	0.55389%	-250	-500	3.35690%
2000	750	0.03662%	1000	0	0.49312%	-250	-750	0.73243%
2000	500	0.04364%	1000	-250	0.22326%	-250	-1000	0.10933%
2000	250	0.06532%	1000	-500	0.10724%	-250	-1250	0.02117%
2000	0	0.11544%	1000	-750	0.03810%	-250	-1500	0.00632%
2000	-250	0.08790%	1000	-1000	0.01578%	-250	-1750	0.00337%
2000	-500	0.03474%	1000	-1250	0.01217%	-250	-2000	0.00138%
2000	-750	0.00788%	1000	-1500	0.00681%	-250	-2250	0.00007%
2000	-1000	0.00034%	1000	-1750	0.00083%	-500	-750	2.07214%
1750	1500	0.01958%	1000	-2250	0.00007%	-500	-1000	0.94971%
1750	1250	0.03411%	1000	-2500	0.00014%	-500	-1250	0.10492%
1750	1000	0.03165%	750	500	2.22715%	-500	-1500	0.03425%
1750	750	0.03347%	750	250	5.24100%	-500	-1750	0.00733%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

Table 7.42 Fully loaded 110-ton tank car— car body twist moment (in.-kip) (page 2 of 2)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-500	-2000	0.00193%	-1000	-1750	0.00864%	-1750	-2000	0.00661%
-500	-2250	0.00007%	-1000	-2000	0.00083%	-1750	-2250	0.00262%
-750	-1000	1.93378%	-1250	-1500	0.10043%	-1750	-2500	0.00028%
-750	-1250	0.97671%	-1250	-1750	0.00207%	-2000	-2250	0.02017%
-750	-1500	0.21390%	-1250	-2000	0.00017%	-2000	-2500	0.01604%
-750	-1750	0.00558%	-1500	-1750	0.00043%	-2000	-2750	0.00379%
-750	-2000	0.00158%	-1500	-2000	0.00034%	-2250	-2500	0.19301%
-1000	-1250	1.17581%	-1500	-2250	0.00014%	-2250	-2750	0.07716%
-1000	-1500	0.15723%	-1500	-3250	0.00007%	-2500	-2750	0.26253%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

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AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

7.3.2.42 Individual Side-Bearing Load—Empty 110-ton Tank Car

Test Date	September 2006–December 2008
Test Mode	General Service—Empty
Max MPH	54
Average MPH	24.8
Recorded Mileage	9,738
Total Number of Cycles	321,336
Average Cycles/Mile	33.0
Track Class	Various

Travel Speed Distribution		
Range (mph)		Percent at Level
0	10	20.2
10	20	17.8
20	30	23.1
30	40	26.2
40	50	12.0
50	60	0.6

Table 7.43 Empty 110-ton tank car—individual side-bearing load (kip)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
70	0	0.000156%	35	0	0.001712%
65	50	0.000156%	30	25	0.126503%
60	0	0.000156%	30	20	0.123858%
50	0	0.000156%	30	15	0.033765%
45	40	0.000156%	30	10	0.009492%
45	35	0.000156%	30	5	0.005135%
45	5	0.000156%	30	0	0.006068%
45	0	0.000156%	25	20	0.833396%
40	35	0.001712%	25	15	0.685575%
40	30	0.000934%	25	10	0.123391%
40	25	0.000311%	25	5	0.038589%
40	20	0.000311%	25	0	0.021784%
40	15	0.000311%	20	15	2.826947%
40	10	0.000467%	20	10	2.837373%
40	5	0.000311%	20	5	0.612599%
40	0	0.000467%	20	0	0.111254%
35	30	0.014160%	15	10	14.818290%
35	25	0.011203%	15	5	14.216894%
35	20	0.007313%	15	0	0.867316%
35	15	0.002178%	10	5	42.940567%
35	10	0.000934%	10	0	9.530989%
35	5	0.001089%	5	0	9.185557%

**AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars**

M-1001

CHAPTER 7

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AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

7.3.2.43 Vertical Bolster Load—Empty 110-ton Tank Car

Test Date	September 2006–December 2008
Test Mode	General Service—Empty
Max MPH	54
Average MPH	24.8
Recorded Mileage	9,738
Total Number of Cycles	2,309,634
Average Cycles/Mile	237.2
Track Class	Various

Travel Speed Distribution		
Range (mph)		Percent at Level
0	10	20.2
10	20	17.8
20	30	23.1
30	40	26.2
40	50	12.0
50	60	0.6

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.44 Empty 110-ton tank car—vertical bolster load (kip)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
75	40	0.000043%	60	0	0.000043%	40	15	0.032040%
75	20	0.000043%	55	50	0.156129%	40	10	0.004676%
75	15	0.000043%	55	45	0.162017%	40	5	0.000909%
70	60	0.000043%	55	40	0.065681%	40	0	0.000173%
70	50	0.000043%	55	35	0.017232%	35	30	6.556753%
70	45	0.000130%	55	30	0.001862%	35	25	5.971509%
70	40	0.000043%	55	25	0.000606%	35	20	1.811369%
70	35	0.000043%	55	20	0.000173%	35	15	0.298229%
70	25	0.000043%	55	15	0.000216%	35	10	0.024593%
70	10	0.000043%	55	10	0.000173%	35	5	0.001299%
70	5	0.000043%	55	5	0.000216%	35	0	0.000216%
65	60	0.000260%	55	0	0.000043%	30	25	16.467198%
65	55	0.002122%	50	45	0.812943%	30	20	16.123247%
65	50	0.008833%	50	40	1.274271%	30	15	2.345610%
65	45	0.002598%	50	35	0.162190%	30	10	0.129155%
65	40	0.000346%	50	30	0.020393%	30	5	0.001645%
65	35	0.000130%	50	25	0.003117%	30	0	0.000173%
65	30	0.000087%	50	20	0.000996%	25	20	20.193416%
65	25	0.000043%	50	15	0.000563%	25	15	8.351670%
65	20	0.000043%	50	10	0.000433%	25	10	0.261210%
65	15	0.000043%	50	5	0.000390%	25	5	0.006624%
65	10	0.000043%	50	0	0.000087%	25	0	0.000563%
65	5	0.000087%	45	40	2.503773%	20	25	0.000043%
65	0	0.000043%	45	35	2.078208%	20	15	4.047568%
60	55	0.054468%	45	30	0.241510%	20	10	0.689590%
60	50	0.128419%	45	25	0.039270%	20	5	0.058104%
60	45	0.015370%	45	20	0.008616%	20	0	0.002338%
60	40	0.001775%	45	15	0.003377%	15	10	0.776703%
60	35	0.001429%	45	10	0.001429%	15	5	0.199166%
60	30	0.000260%	45	5	0.000606%	15	0	0.006971%
60	25	0.000087%	45	0	0.000216%	10	5	0.227049%
60	20	0.000130%	40	35	3.818094%	10	0	0.021908%
60	15	0.000087%	40	30	3.155565%	5	0	0.030005%
60	10	0.000130%	40	25	0.519173%			
60	5	0.000130%	40	20	0.091140%			

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

7.3.2.44 Center-Plate Load—Empty 110-ton Tank Car

Test Date	September 2006–December 2008
Test Mode	General Service—Empty
Max MPH	54
Average MPH	24.8
Recorded Mileage	9,738
Total Number of Cycles	3,663,968
Average Cycles/Mile	376.3
Track Class	Various

Travel Speed Distribution		
Range (mph)		Percent at Level
0	10	20.2
10	20	17.8
20	30	23.1
30	40	26.2
40	50	12.0
50	60	0.6

Table 7.45 Empty 110-ton tank car—center-plate load (kip)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
75	0	0.000027%	40	25	0.000218%	30	5	0.042822%
70	0	0.000027%	40	20	0.000464%	30	0	0.004176%
65	0	0.000027%	40	15	0.000600%	25	20	7.207623%
60	0	0.000027%	40	10	0.001474%	25	15	19.533195%
55	0	0.000027%	40	5	0.001092%	25	10	3.700005%
50	40	0.000027%	40	0	0.000655%	25	5	0.232835%
50	10	0.000027%	35	30	0.002729%	25	0	0.009634%
50	5	0.000055%	35	25	0.013674%	20	15	35.156775%
50	0	0.000082%	35	20	0.017686%	20	10	17.931025%
45	35	0.000027%	35	15	0.020251%	20	5	1.015238%
45	30	0.000082%	35	10	0.018914%	20	0	0.019241%
45	15	0.000027%	35	5	0.007069%	15	10	10.716797%
45	10	0.000055%	35	0	0.001501%	15	5	1.747231%
45	5	0.000164%	30	25	0.208981%	15	0	0.021316%
45	0	0.000246%	30	20	0.875008%	10	5	0.376477%
40	35	0.000464%	30	15	0.773478%	10	0	0.009143%
40	30	0.000328%	30	10	0.329452%	5	0	0.001501%

**AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars**

M-1001

CHAPTER 7

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AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

7.3.2.45 Longitudinal Coupler Load—Empty 110-ton Tank Car

Test Date	September 2006–December 2008
Test Mode	General Service—Empty
Max MPH	54
Average MPH	24.8
Recorded Mileage	10,769
Total Number of Cycles	11,552,968
Average Cycles/Mile	1072.8
Track Class	Various

Travel Speed Distribution		
Range (mph)		Percent at Level
0	10	20.2
10	20	17.8
20	30	23.1
30	40	26.2
40	50	12.0
50	60	0.6

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 1 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
370	355	0.000009%	310	-230	0.000009%	275	-215	0.000009%
370	-235	0.000009%	305	295	0.000346%	275	-375	0.000009%
365	355	0.000113%	305	290	0.000035%	270	260	0.001255%
365	350	0.000026%	305	285	0.000009%	270	255	0.000113%
360	350	0.000095%	305	-200	0.000009%	270	250	0.000043%
360	345	0.000009%	305	-230	0.000009%	270	245	0.000017%
360	340	0.000009%	300	290	0.000476%	270	220	0.000009%
355	345	0.000095%	300	285	0.000043%	270	215	0.000009%
355	340	0.000009%	300	280	0.000017%	270	210	0.000009%
355	335	0.000009%	300	265	0.000009%	270	185	0.000009%
355	-240	0.000009%	300	240	0.000009%	270	70	0.000009%
350	340	0.000208%	300	200	0.000009%	270	-125	0.000009%
350	335	0.000017%	300	-90	0.000009%	270	-180	0.000009%
350	-80	0.000009%	300	-190	0.000009%	270	-215	0.000009%
350	-180	0.000009%	295	285	0.000528%	265	255	0.001480%
345	335	0.000095%	295	280	0.000061%	265	250	0.000208%
345	330	0.000009%	295	275	0.000017%	265	245	0.000069%
345	325	0.000009%	295	270	0.000009%	265	240	0.000009%
340	330	0.000130%	295	265	0.000009%	265	220	0.000009%
340	325	0.000017%	290	280	0.000597%	265	160	0.000009%
335	325	0.000087%	290	275	0.000069%	265	-230	0.000009%
335	320	0.000009%	290	270	0.000017%	265	-235	0.000009%
330	320	0.000061%	290	265	0.000009%	260	250	0.002251%
330	315	0.000017%	290	250	0.000009%	260	245	0.000208%
330	310	0.000009%	290	235	0.000009%	260	240	0.000043%
330	-150	0.000009%	290	-80	0.000009%	260	235	0.000026%
330	-190	0.000009%	290	-120	0.000009%	260	230	0.000017%
325	315	0.000277%	290	-435	0.000009%	260	210	0.000009%
325	310	0.000026%	285	275	0.000900%	260	200	0.000009%
325	305	0.000009%	285	270	0.000095%	260	95	0.000009%
320	310	0.000164%	285	265	0.000026%	260	60	0.000009%
320	305	0.000035%	285	260	0.000017%	260	-60	0.000009%
320	295	0.000009%	285	225	0.000009%	260	-210	0.000009%
320	275	0.000009%	285	-285	0.000009%	260	-230	0.000009%
320	-150	0.000009%	280	270	0.000892%	260	-240	0.000009%
320	-195	0.000009%	280	265	0.000078%	260	-265	0.000009%
315	305	0.000364%	280	260	0.000035%	260	-270	0.000009%
315	300	0.000035%	280	255	0.000009%	255	245	0.001974%
315	295	0.000009%	280	220	0.000009%	255	240	0.000320%
315	290	0.000009%	280	160	0.000009%	255	235	0.000095%
315	285	0.000009%	280	-155	0.000009%	255	230	0.000026%
315	245	0.000009%	280	-185	0.000009%	255	225	0.000009%
310	300	0.000251%	275	265	0.001065%	255	220	0.000009%
310	295	0.000035%	275	260	0.000121%	255	210	0.000009%
310	290	0.000009%	275	255	0.000026%	255	-175	0.000009%
310	285	0.000009%	275	250	0.000009%	255	-225	0.000009%
310	240	0.000009%	275	245	0.000009%	250	240	0.003177%
310	180	0.000009%	275	230	0.000009%	250	235	0.000398%
310	-80	0.000009%	275	-125	0.000009%	250	230	0.000069%
310	-110	0.000009%	275	-210	0.000009%	250	225	0.000026%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 2 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
250	220	0.000009%	235	210	0.000035%	225	175	0.000009%
250	195	0.000009%	235	205	0.000017%	225	160	0.000009%
250	60	0.000009%	235	200	0.000017%	225	65	0.000009%
250	-55	0.000009%	235	195	0.000009%	225	-95	0.000009%
250	-100	0.000009%	235	190	0.000009%	225	-165	0.000009%
250	-120	0.000009%	235	185	0.000009%	225	-290	0.000009%
250	-130	0.000009%	235	90	0.000009%	225	-330	0.000009%
250	-160	0.000009%	235	40	0.000009%	220	210	0.005098%
250	-170	0.000009%	235	-95	0.000009%	220	205	0.000710%
250	-185	0.000009%	235	-160	0.000009%	220	200	0.000502%
250	-190	0.000009%	235	-175	0.000009%	220	195	0.000035%
250	-200	0.000009%	235	-180	0.000009%	220	190	0.000043%
250	-230	0.000009%	230	220	0.005626%	220	180	0.000009%
245	235	0.003497%	230	215	0.000684%	220	175	0.000009%
245	230	0.000441%	230	210	0.000182%	220	170	0.000009%
245	225	0.000078%	230	205	0.000035%	220	165	0.000009%
245	220	0.000026%	230	200	0.000035%	220	160	0.000017%
245	215	0.000009%	230	195	0.000009%	220	150	0.000009%
245	205	0.000009%	230	170	0.000009%	220	130	0.000009%
245	200	0.000009%	230	165	0.000009%	220	120	0.000009%
245	175	0.000009%	230	150	0.000009%	220	70	0.000009%
245	-100	0.000009%	230	130	0.000009%	220	60	0.000009%
245	-120	0.000009%	230	100	0.000009%	220	25	0.000009%
245	-210	0.000009%	230	90	0.000009%	220	15	0.000009%
240	230	0.003627%	230	65	0.000009%	220	-10	0.000009%
240	225	0.000398%	230	45	0.000009%	220	-85	0.000009%
240	220	0.000095%	230	30	0.000009%	220	-95	0.000009%
240	215	0.000026%	230	15	0.000009%	220	-100	0.000009%
240	210	0.000009%	230	-10	0.000009%	220	-105	0.000009%
240	205	0.000009%	230	-80	0.000009%	220	-110	0.000009%
240	200	0.000009%	230	-100	0.000009%	220	-120	0.000009%
240	195	0.000009%	230	-125	0.000009%	220	-130	0.000009%
240	185	0.000009%	230	-140	0.000009%	220	-135	0.000009%
240	180	0.000009%	230	-145	0.000009%	220	-140	0.000009%
240	175	0.000009%	230	-160	0.000009%	220	-150	0.000017%
240	170	0.000009%	230	-180	0.000009%	220	-160	0.000017%
240	70	0.000009%	230	-190	0.000009%	220	-170	0.000009%
240	-130	0.000009%	230	-215	0.000009%	220	-180	0.000009%
240	-140	0.000009%	230	-250	0.000009%	220	-190	0.000009%
240	-150	0.000009%	230	-290	0.000009%	220	-250	0.000009%
240	-160	0.000009%	230	-300	0.000009%	220	-260	0.000009%
240	-165	0.000009%	230	-365	0.000009%	220	-315	0.000009%
240	-180	0.000009%	225	215	0.004406%	220	-450	0.000009%
240	-200	0.000009%	225	210	0.000519%	215	205	0.005124%
240	-280	0.000009%	225	205	0.000130%	215	200	0.000753%
240	-300	0.000009%	225	200	0.000052%	215	195	0.000138%
240	-340	0.000009%	225	195	0.000017%	215	190	0.000052%
235	225	0.003869%	225	190	0.000009%	215	185	0.000009%
235	220	0.000632%	225	185	0.000009%	215	180	0.000017%
235	215	0.000147%	225	180	0.000009%	215	175	0.000009%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 3 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
215	170	0.000009%	210	-180	0.000017%	200	50	0.000009%
215	165	0.000017%	210	-190	0.000009%	200	40	0.000009%
215	160	0.000009%	210	-200	0.000009%	200	30	0.000009%
215	155	0.000009%	210	-210	0.000009%	200	10	0.000009%
215	135	0.000009%	210	-220	0.000009%	200	-10	0.000009%
215	105	0.000009%	210	-320	0.000009%	200	-20	0.000009%
215	80	0.000009%	205	195	0.005782%	200	-30	0.000009%
215	75	0.000009%	205	190	0.000943%	200	-60	0.000009%
215	70	0.000009%	205	185	0.000147%	200	-70	0.000009%
215	-135	0.000009%	205	180	0.000052%	200	-80	0.000009%
215	-140	0.000009%	205	175	0.000026%	200	-95	0.000009%
215	-185	0.000009%	205	165	0.000017%	200	-100	0.000009%
215	-275	0.000009%	205	160	0.000009%	200	-110	0.000026%
210	200	0.007115%	205	155	0.000009%	200	-115	0.000009%
210	195	0.000710%	205	140	0.000009%	200	-120	0.000017%
210	190	0.001056%	205	130	0.000009%	200	-130	0.000017%
210	185	0.000052%	205	110	0.000009%	200	-135	0.000009%
210	180	0.000069%	205	80	0.000009%	200	-140	0.000017%
210	175	0.000009%	205	60	0.000009%	200	-150	0.000017%
210	170	0.000017%	205	45	0.000009%	200	-160	0.000017%
210	165	0.000009%	205	35	0.000009%	200	-170	0.000009%
210	160	0.000017%	205	-50	0.000009%	200	-180	0.000009%
210	150	0.000009%	205	-70	0.000009%	200	-185	0.000009%
210	145	0.000009%	205	-80	0.000009%	200	-190	0.000009%
210	140	0.000009%	205	-110	0.000009%	200	-195	0.000009%
210	130	0.000009%	205	-135	0.000009%	200	-200	0.000009%
210	120	0.000009%	205	-145	0.000009%	200	-255	0.000009%
210	100	0.000009%	205	-150	0.000009%	200	-540	0.000009%
210	90	0.000009%	205	-165	0.000009%	200	-700	0.000009%
210	80	0.000009%	205	-220	0.000009%	200	-890	0.000009%
210	70	0.000009%	205	-300	0.000009%	195	185	0.007409%
210	60	0.000009%	205	-335	0.000009%	195	180	0.001246%
210	40	0.000009%	200	190	0.009175%	195	175	0.000303%
210	30	0.000009%	200	185	0.000900%	195	170	0.000078%
210	20	0.000009%	200	180	0.001411%	195	165	0.000052%
210	10	0.000009%	200	175	0.000087%	195	160	0.000017%
210	0	0.000009%	200	170	0.000121%	195	155	0.000017%
210	-10	0.000009%	200	165	0.000009%	195	150	0.000009%
210	-40	0.000009%	200	160	0.000035%	195	145	0.000009%
210	-60	0.000009%	200	155	0.000009%	195	140	0.000009%
210	-80	0.000009%	200	150	0.000017%	195	130	0.000009%
210	-90	0.000009%	200	140	0.000026%	195	125	0.000009%
210	-100	0.000009%	200	135	0.000009%	195	120	0.000009%
210	-125	0.000009%	200	130	0.000009%	195	115	0.000009%
210	-130	0.000009%	200	120	0.000009%	195	110	0.000009%
210	-140	0.000017%	200	115	0.000009%	195	105	0.000009%
210	-150	0.000009%	200	110	0.000009%	195	100	0.000009%
210	-160	0.000009%	200	70	0.000009%	195	65	0.000009%
210	-170	0.000009%	200	65	0.000009%	195	50	0.000009%
210	-175	0.000009%	200	60	0.000009%	195	-20	0.000009%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 4 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
195	-65	0.000009%	190	-65	0.000009%	185	-125	0.000009%
195	-80	0.000009%	190	-70	0.000009%	185	-130	0.000009%
195	-85	0.000009%	190	-90	0.000009%	185	-135	0.000009%
195	-95	0.000009%	190	-95	0.000009%	185	-140	0.000017%
195	-115	0.000009%	190	-105	0.000009%	185	-155	0.000009%
195	-125	0.000009%	190	-110	0.000017%	185	-160	0.000009%
195	-135	0.000009%	190	-115	0.000009%	185	-165	0.000009%
195	-140	0.000009%	190	-120	0.000017%	185	-170	0.000009%
195	-145	0.000009%	190	-125	0.000009%	185	-180	0.000009%
195	-150	0.000009%	190	-130	0.000017%	185	-215	0.000009%
195	-155	0.000009%	190	-135	0.000009%	180	170	0.017987%
195	-165	0.000009%	190	-140	0.000017%	180	165	0.002779%
195	-175	0.000009%	190	-145	0.000009%	180	160	0.003211%
195	-200	0.000009%	190	-150	0.000017%	180	155	0.000190%
195	-280	0.000009%	190	-160	0.000017%	180	150	0.000338%
195	-300	0.000009%	190	-170	0.000009%	180	145	0.000035%
195	-340	0.000009%	190	-180	0.000009%	180	140	0.000138%
190	180	0.013650%	190	-200	0.000009%	180	135	0.000026%
190	175	0.001541%	190	-220	0.000009%	180	130	0.000078%
190	170	0.001939%	190	-230	0.000009%	180	125	0.000009%
190	165	0.000104%	190	-270	0.000009%	180	120	0.000095%
190	160	0.000138%	190	-275	0.000009%	180	115	0.000017%
190	155	0.000017%	190	-330	0.000009%	180	110	0.000026%
190	150	0.000078%	190	-415	0.000009%	180	100	0.000035%
190	145	0.000009%	185	175	0.010248%	180	95	0.000009%
190	140	0.000061%	185	170	0.002129%	180	90	0.000026%
190	135	0.000009%	185	165	0.000528%	180	80	0.000017%
190	130	0.000043%	185	160	0.000130%	180	75	0.000009%
190	125	0.000009%	185	155	0.000043%	180	70	0.000026%
190	120	0.000026%	185	150	0.000009%	180	60	0.000017%
190	115	0.000009%	185	145	0.000017%	180	50	0.000017%
190	110	0.000009%	185	140	0.000017%	180	45	0.000009%
190	100	0.000009%	185	135	0.000009%	180	40	0.000017%
190	95	0.000009%	185	130	0.000009%	180	30	0.000009%
190	90	0.000009%	185	125	0.000009%	180	25	0.000009%
190	80	0.000009%	185	120	0.000009%	180	20	0.000009%
190	70	0.000026%	185	115	0.000009%	180	10	0.000009%
190	60	0.000009%	185	105	0.000009%	180	0	0.000009%
190	55	0.000009%	185	100	0.000009%	180	-10	0.000017%
190	50	0.000009%	185	90	0.000009%	180	-15	0.000009%
190	30	0.000009%	185	75	0.000009%	180	-20	0.000009%
190	20	0.000009%	185	65	0.000009%	180	-25	0.000009%
190	15	0.000009%	185	60	0.000009%	180	-40	0.000009%
190	10	0.000009%	185	50	0.000009%	180	-50	0.000009%
190	0	0.000017%	185	30	0.000009%	180	-60	0.000009%
190	-5	0.000009%	185	0	0.000009%	180	-70	0.000009%
190	-20	0.000009%	185	-5	0.000009%	180	-80	0.000017%
190	-40	0.000009%	185	-85	0.000009%	180	-85	0.000009%
190	-55	0.000009%	185	-110	0.000009%	180	-100	0.000017%
190	-60	0.000009%	185	-115	0.000009%	180	-105	0.000009%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 5 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
180	-110	0.000017%	175	-120	0.000009%	170	-85	0.000009%
180	-115	0.000017%	175	-130	0.000009%	170	-90	0.000017%
180	-120	0.000017%	175	-135	0.000009%	170	-95	0.000009%
180	-125	0.000009%	175	-140	0.000009%	170	-100	0.000017%
180	-130	0.000026%	175	-145	0.000009%	170	-105	0.000009%
180	-135	0.000009%	175	-160	0.000009%	170	-110	0.000026%
180	-140	0.000009%	175	-170	0.000009%	170	-115	0.000009%
180	-150	0.000017%	175	-180	0.000009%	170	-120	0.000035%
180	-160	0.000017%	175	-185	0.000009%	170	-130	0.000026%
180	-165	0.000009%	175	-190	0.000009%	170	-135	0.000009%
180	-170	0.000017%	175	-200	0.000009%	170	-140	0.000035%
180	-175	0.000009%	175	-205	0.000009%	170	-145	0.000009%
180	-180	0.000009%	175	-385	0.000009%	170	-150	0.000017%
180	-185	0.000009%	170	160	0.031178%	170	-160	0.000017%
180	-190	0.000009%	170	155	0.004743%	170	-170	0.000009%
180	-195	0.000009%	170	150	0.005592%	170	-180	0.000009%
180	-205	0.000009%	170	145	0.000364%	170	-200	0.000009%
180	-210	0.000009%	170	140	0.000597%	170	-220	0.000009%
180	-230	0.000009%	170	135	0.000035%	170	-240	0.000009%
180	-330	0.000009%	170	130	0.000268%	170	-245	0.000009%
180	-520	0.000009%	170	125	0.000009%	170	-250	0.000009%
175	165	0.017234%	170	120	0.000147%	170	-260	0.000009%
175	160	0.003791%	170	115	0.000017%	170	-310	0.000009%
175	155	0.000918%	170	110	0.000069%	170	-400	0.000009%
175	150	0.000286%	170	105	0.000009%	170	-430	0.000009%
175	145	0.000069%	170	100	0.000035%	165	155	0.026937%
175	140	0.000026%	170	95	0.000009%	165	150	0.005479%
175	135	0.000026%	170	90	0.000043%	165	145	0.001368%
175	130	0.000009%	170	85	0.000009%	165	140	0.000467%
175	125	0.000017%	170	80	0.000035%	165	135	0.000121%
175	120	0.000009%	170	70	0.000026%	165	130	0.000061%
175	115	0.000009%	170	60	0.000009%	165	125	0.000035%
175	110	0.000009%	170	50	0.000009%	165	120	0.000017%
175	105	0.000009%	170	45	0.000009%	165	115	0.000017%
175	95	0.000009%	170	40	0.000009%	165	110	0.000009%
175	90	0.000009%	170	35	0.000009%	165	105	0.000009%
175	85	0.000009%	170	30	0.000017%	165	100	0.000009%
175	75	0.000009%	170	20	0.000017%	165	95	0.000009%
175	50	0.000009%	170	10	0.000009%	165	90	0.000009%
175	35	0.000009%	170	5	0.000009%	165	85	0.000009%
175	20	0.000009%	170	0	0.000017%	165	80	0.000009%
175	10	0.000009%	170	-10	0.000017%	165	75	0.000009%
175	-5	0.000009%	170	-20	0.000009%	165	50	0.000009%
175	-25	0.000009%	170	-30	0.000009%	165	35	0.000009%
175	-45	0.000009%	170	-40	0.000009%	165	30	0.000009%
175	-80	0.000009%	170	-50	0.000009%	165	20	0.000009%
175	-90	0.000009%	170	-60	0.000009%	165	15	0.000009%
175	-95	0.000009%	170	-70	0.000009%	165	10	0.000009%
175	-110	0.000009%	170	-75	0.000009%	165	5	0.000009%
175	-115	0.000009%	170	-80	0.000009%	165	-5	0.000009%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 6 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
165	-10	0.000009%	160	25	0.000009%	155	85	0.000009%
165	-15	0.000009%	160	20	0.000017%	155	80	0.000009%
165	-30	0.000009%	160	10	0.000026%	155	75	0.000009%
165	-45	0.000009%	160	5	0.000009%	155	70	0.000009%
165	-80	0.000009%	160	0	0.000043%	155	65	0.000009%
165	-85	0.000009%	160	-5	0.000009%	155	60	0.000009%
165	-90	0.000009%	160	-10	0.000017%	155	55	0.000009%
165	-95	0.000017%	160	-20	0.000009%	155	50	0.000009%
165	-105	0.000009%	160	-30	0.000009%	155	45	0.000009%
165	-110	0.000009%	160	-35	0.000009%	155	40	0.000009%
165	-115	0.000009%	160	-40	0.000009%	155	35	0.000009%
165	-120	0.000009%	160	-50	0.000017%	155	30	0.000009%
165	-125	0.000009%	160	-55	0.000009%	155	25	0.000009%
165	-130	0.000009%	160	-60	0.000017%	155	20	0.000009%
165	-135	0.000009%	160	-65	0.000009%	155	15	0.000009%
165	-140	0.000009%	160	-70	0.000009%	155	5	0.000009%
165	-145	0.000009%	160	-75	0.000009%	155	0	0.000009%
165	-150	0.000009%	160	-80	0.000017%	155	-5	0.000009%
165	-160	0.000009%	160	-85	0.000009%	155	-10	0.000009%
165	-165	0.000009%	160	-90	0.000026%	155	-15	0.000009%
165	-190	0.000009%	160	-95	0.000009%	155	-25	0.000009%
165	-230	0.000009%	160	-100	0.000026%	155	-30	0.000009%
165	-285	0.000009%	160	-105	0.000017%	155	-35	0.000009%
165	-330	0.000009%	160	-110	0.000026%	155	-40	0.000009%
165	-450	0.000009%	160	-115	0.000009%	155	-45	0.000009%
160	150	0.046577%	160	-120	0.000026%	155	-60	0.000009%
160	145	0.006821%	160	-125	0.000009%	155	-65	0.000017%
160	140	0.008162%	160	-130	0.000043%	155	-75	0.000009%
160	135	0.000459%	160	-140	0.000017%	155	-80	0.000009%
160	130	0.001073%	160	-150	0.000017%	155	-85	0.000009%
160	125	0.000052%	160	-160	0.000017%	155	-90	0.000009%
160	120	0.000459%	160	-165	0.000009%	155	-95	0.000009%
160	115	0.000026%	160	-170	0.000017%	155	-100	0.000009%
160	110	0.000164%	160	-180	0.000009%	155	-110	0.000009%
160	105	0.000017%	160	-190	0.000009%	155	-115	0.000009%
160	100	0.000104%	160	-200	0.000009%	155	-120	0.000009%
160	95	0.000009%	160	-295	0.000009%	155	-130	0.000009%
160	90	0.000061%	160	-360	0.000009%	155	-135	0.000009%
160	85	0.000009%	155	145	0.036475%	155	-145	0.000009%
160	80	0.000061%	155	140	0.007392%	155	-150	0.000009%
160	75	0.000009%	155	135	0.002017%	155	-165	0.000009%
160	70	0.000052%	155	130	0.000571%	155	-175	0.000009%
160	65	0.000009%	155	125	0.000182%	155	-180	0.000009%
160	60	0.000035%	155	120	0.000043%	155	-285	0.000009%
160	55	0.000009%	155	115	0.000026%	155	-325	0.000009%
160	50	0.000026%	155	110	0.000017%	155	-345	0.000009%
160	45	0.000009%	155	105	0.000009%	155	-350	0.000009%
160	40	0.000017%	155	100	0.000026%	150	140	0.069324%
160	35	0.000009%	155	95	0.000009%	150	135	0.008699%
160	30	0.000026%	155	90	0.000009%	150	130	0.012932%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 7 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
150	125	0.000744%	150	-135	0.000009%	145	-40	0.000009%
150	120	0.002051%	150	-140	0.000035%	145	-45	0.000009%
150	115	0.000087%	150	-145	0.000009%	145	-50	0.000009%
150	110	0.000736%	150	-150	0.000017%	145	-55	0.000009%
150	105	0.000026%	150	-155	0.000009%	145	-60	0.000009%
150	100	0.000260%	150	-160	0.000017%	145	-65	0.000009%
150	95	0.000026%	150	-165	0.000009%	145	-70	0.000009%
150	90	0.000164%	150	-170	0.000009%	145	-75	0.000009%
150	85	0.000017%	150	-175	0.000009%	145	-80	0.000009%
150	80	0.000104%	150	-180	0.000009%	145	-85	0.000009%
150	75	0.000009%	150	-190	0.000009%	145	-90	0.000009%
150	70	0.000061%	150	-200	0.000009%	145	-95	0.000009%
150	65	0.000009%	150	-240	0.000009%	145	-100	0.000009%
150	60	0.000043%	150	-250	0.000009%	145	-110	0.000009%
150	55	0.000009%	150	-375	0.000009%	145	-120	0.000009%
150	50	0.000043%	150	-380	0.000009%	145	-130	0.000009%
150	45	0.000017%	150	-390	0.000009%	145	-135	0.000009%
150	40	0.000026%	145	135	0.047529%	145	-140	0.000009%
150	35	0.000009%	145	130	0.010023%	145	-145	0.000009%
150	30	0.000026%	145	125	0.002640%	145	-150	0.000009%
150	25	0.000009%	145	120	0.000770%	145	-155	0.000009%
150	20	0.000026%	145	115	0.000260%	145	-165	0.000009%
150	15	0.000009%	145	110	0.000130%	145	-170	0.000009%
150	10	0.000035%	145	105	0.000061%	145	-195	0.000009%
150	0	0.000043%	145	100	0.000035%	145	-200	0.000009%
150	-5	0.000009%	145	95	0.000035%	145	-205	0.000009%
150	-10	0.000026%	145	90	0.000026%	140	130	0.087337%
150	-15	0.000009%	145	85	0.000009%	140	125	0.011789%
150	-20	0.000017%	145	80	0.000017%	140	120	0.017857%
150	-25	0.000009%	145	75	0.000017%	140	115	0.001013%
150	-30	0.000017%	145	70	0.000017%	140	110	0.002882%
150	-35	0.000009%	145	65	0.000009%	140	105	0.000113%
150	-40	0.000009%	145	60	0.000009%	140	100	0.000866%
150	-45	0.000009%	145	55	0.000026%	140	95	0.000035%
150	-50	0.000009%	145	50	0.000017%	140	90	0.000493%
150	-60	0.000017%	145	45	0.000009%	140	85	0.000017%
150	-65	0.000009%	145	40	0.000017%	140	80	0.000251%
150	-70	0.000017%	145	35	0.000009%	140	75	0.000009%
150	-75	0.000009%	145	30	0.000009%	140	70	0.000147%
150	-80	0.000026%	145	25	0.000009%	140	65	0.000017%
150	-85	0.000009%	145	20	0.000009%	140	60	0.000104%
150	-90	0.000026%	145	15	0.000009%	140	55	0.000009%
150	-95	0.000009%	145	10	0.000009%	140	50	0.000104%
150	-100	0.000026%	145	5	0.000009%	140	45	0.000009%
150	-105	0.000009%	145	0	0.000009%	140	40	0.000061%
150	-110	0.000043%	145	-5	0.000009%	140	35	0.000009%
150	-115	0.000009%	145	-10	0.000009%	140	30	0.000052%
150	-120	0.000035%	145	-15	0.000009%	140	25	0.000009%
150	-125	0.000009%	145	-20	0.000009%	140	20	0.000035%
150	-130	0.000035%	145	-25	0.000009%	140	15	0.000009%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

CHAPTER 7

M-1001

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 8 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
140	10	0.000052%	135	95	0.000069%	135	-190	0.000009%
140	5	0.000017%	135	90	0.000061%	135	-345	0.000009%
140	0	0.000052%	135	85	0.000043%	130	120	0.117623%
140	-5	0.000009%	135	80	0.000035%	130	115	0.014706%
140	-10	0.000052%	135	75	0.000017%	130	110	0.022695%
140	-20	0.000026%	135	70	0.000009%	130	105	0.001420%
140	-25	0.000009%	135	65	0.000017%	130	100	0.003670%
140	-30	0.000017%	135	60	0.000017%	130	95	0.000164%
140	-35	0.000009%	135	55	0.000017%	130	90	0.001350%
140	-40	0.000017%	135	50	0.000017%	130	85	0.000078%
140	-45	0.000009%	135	45	0.000017%	130	80	0.000606%
140	-50	0.000017%	135	40	0.000017%	130	75	0.000043%
140	-55	0.000009%	135	35	0.000026%	130	70	0.000346%
140	-60	0.000017%	135	30	0.000009%	130	65	0.000035%
140	-65	0.000009%	135	25	0.000009%	130	60	0.000216%
140	-70	0.000017%	135	20	0.000009%	130	55	0.000017%
140	-75	0.000009%	135	15	0.000017%	130	50	0.000138%
140	-80	0.000035%	135	10	0.000017%	130	45	0.000017%
140	-90	0.000052%	135	5	0.000017%	130	40	0.000121%
140	-95	0.000017%	135	-5	0.000009%	130	35	0.000017%
140	-100	0.000035%	135	-10	0.000009%	130	30	0.000078%
140	-105	0.000017%	135	-15	0.000009%	130	25	0.000009%
140	-110	0.000052%	135	-20	0.000009%	130	20	0.000087%
140	-115	0.000017%	135	-30	0.000009%	130	15	0.000009%
140	-120	0.000043%	135	-35	0.000009%	130	10	0.000078%
140	-125	0.000009%	135	-40	0.000009%	130	5	0.000017%
140	-130	0.000052%	135	-50	0.000009%	130	0	0.000069%
140	-135	0.000009%	135	-55	0.000009%	130	-5	0.000009%
140	-140	0.000017%	135	-60	0.000009%	130	-10	0.000061%
140	-145	0.000009%	135	-65	0.000009%	130	-15	0.000009%
140	-150	0.000017%	135	-70	0.000009%	130	-20	0.000026%
140	-155	0.000009%	135	-75	0.000009%	130	-25	0.000009%
140	-160	0.000009%	135	-80	0.000009%	130	-30	0.000017%
140	-170	0.000017%	135	-85	0.000009%	130	-35	0.000009%
140	-190	0.000009%	135	-90	0.000009%	130	-40	0.000017%
140	-210	0.000009%	135	-95	0.000009%	130	-45	0.000009%
140	-220	0.000009%	135	-100	0.000026%	130	-50	0.000043%
140	-230	0.000009%	135	-105	0.000009%	130	-55	0.000009%
140	-240	0.000009%	135	-110	0.000009%	130	-60	0.000052%
140	-270	0.000009%	135	-115	0.000009%	130	-65	0.000009%
140	-300	0.000009%	135	-120	0.000009%	130	-70	0.000043%
140	-310	0.000009%	135	-125	0.000009%	130	-75	0.000009%
140	-350	0.000009%	135	-130	0.000009%	130	-80	0.000043%
140	-420	0.000009%	135	-135	0.000009%	130	-85	0.000009%
135	125	0.066087%	135	-140	0.000009%	130	-90	0.000043%
135	120	0.013555%	135	-145	0.000009%	130	-95	0.000017%
135	115	0.003713%	135	-150	0.000009%	130	-100	0.000052%
135	110	0.001091%	135	-160	0.000009%	130	-105	0.000017%
135	105	0.000320%	135	-165	0.000009%	130	-110	0.000043%
135	100	0.000138%	135	-185	0.000009%	130	-115	0.000017%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 9 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
130	-120	0.000043%	125	-20	0.000009%	120	35	0.000026%
130	-130	0.000043%	125	-25	0.000009%	120	30	0.000156%
130	-135	0.000009%	125	-30	0.000009%	120	25	0.000026%
130	-140	0.000043%	125	-35	0.000009%	120	20	0.000121%
130	-145	0.000009%	125	-40	0.000009%	120	15	0.000026%
130	-150	0.000017%	125	-45	0.000009%	120	10	0.000078%
130	-160	0.000017%	125	-50	0.000009%	120	5	0.000017%
130	-165	0.000009%	125	-55	0.000009%	120	0	0.000113%
130	-170	0.000009%	125	-60	0.000009%	120	-5	0.000009%
130	-180	0.000017%	125	-65	0.000017%	120	-10	0.000078%
130	-185	0.000009%	125	-70	0.000017%	120	-15	0.000009%
130	-200	0.000009%	125	-75	0.000009%	120	-20	0.000035%
130	-205	0.000009%	125	-80	0.000017%	120	-25	0.000017%
130	-210	0.000009%	125	-85	0.000009%	120	-30	0.000026%
130	-220	0.000009%	125	-90	0.000017%	120	-35	0.000009%
130	-230	0.000009%	125	-95	0.000017%	120	-40	0.000052%
130	-240	0.000009%	125	-100	0.000017%	120	-45	0.000009%
130	-255	0.000009%	125	-105	0.000009%	120	-50	0.000043%
130	-260	0.000009%	125	-110	0.000009%	120	-55	0.000017%
130	-265	0.000009%	125	-115	0.000009%	120	-60	0.000043%
130	-420	0.000009%	125	-120	0.000009%	120	-65	0.000017%
130	-430	0.000009%	125	-125	0.000009%	120	-70	0.000043%
130	-450	0.000009%	125	-130	0.000009%	120	-75	0.000017%
125	115	0.089856%	125	-135	0.000009%	120	-80	0.000052%
125	110	0.017225%	125	-140	0.000009%	120	-85	0.000009%
125	105	0.005237%	125	-145	0.000009%	120	-90	0.000061%
125	100	0.001619%	125	-150	0.000009%	120	-95	0.000009%
125	95	0.000545%	125	-155	0.000009%	120	-100	0.000069%
125	90	0.000251%	125	-160	0.000009%	120	-105	0.000009%
125	85	0.000113%	125	-165	0.000009%	120	-110	0.000069%
125	80	0.000087%	125	-170	0.000009%	120	-115	0.000017%
125	75	0.000069%	125	-200	0.000009%	120	-120	0.000069%
125	70	0.000043%	125	-210	0.000009%	120	-125	0.000009%
125	65	0.000035%	125	-215	0.000009%	120	-130	0.000035%
125	60	0.000043%	125	-230	0.000009%	120	-135	0.000009%
125	55	0.000026%	120	110	0.147711%	120	-140	0.000035%
125	50	0.000026%	120	105	0.021562%	120	-145	0.000009%
125	45	0.000026%	120	100	0.030044%	120	-150	0.000017%
125	40	0.000017%	120	95	0.001826%	120	-160	0.000017%
125	35	0.000017%	120	90	0.005185%	120	-165	0.000009%
125	30	0.000009%	120	85	0.000242%	120	-170	0.000017%
125	25	0.000009%	120	80	0.001723%	120	-175	0.000009%
125	20	0.000017%	120	75	0.000113%	120	-180	0.000009%
125	15	0.000017%	120	70	0.000822%	120	-190	0.000009%
125	10	0.000017%	120	65	0.000052%	120	-200	0.000009%
125	5	0.000017%	120	60	0.000415%	120	-205	0.000009%
125	0	0.000009%	120	55	0.000026%	120	-210	0.000009%
125	-5	0.000009%	120	50	0.000329%	120	-240	0.000009%
125	-10	0.000009%	120	45	0.000017%	120	-260	0.000009%
125	-15	0.000017%	120	40	0.000190%	120	-270	0.000009%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

CHAPTER 7

M-1001

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 10 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
120	-280	0.000009%	115	-125	0.000009%	110	-95	0.000017%
120	-345	0.000009%	115	-130	0.000009%	110	-100	0.000078%
120	-370	0.000009%	115	-135	0.000017%	110	-105	0.000017%
120	-390	0.000009%	115	-140	0.000009%	110	-110	0.000069%
115	105	0.118411%	115	-150	0.000009%	110	-115	0.000009%
115	100	0.022972%	115	-155	0.000009%	110	-120	0.000052%
115	95	0.007236%	115	-160	0.000009%	110	-125	0.000009%
115	90	0.002398%	115	-165	0.000009%	110	-130	0.000035%
115	85	0.000753%	115	-175	0.000009%	110	-135	0.000009%
115	80	0.000346%	115	-185	0.000009%	110	-140	0.000026%
115	75	0.000242%	115	-220	0.000009%	110	-145	0.000009%
115	70	0.000130%	110	100	0.181590%	110	-150	0.000009%
115	65	0.000182%	110	95	0.025950%	110	-155	0.000009%
115	60	0.000069%	110	90	0.040942%	110	-160	0.000017%
115	55	0.000061%	110	85	0.004588%	110	-170	0.000009%
115	50	0.000043%	110	80	0.006622%	110	-175	0.000009%
115	45	0.000035%	110	75	0.000424%	110	-180	0.000009%
115	40	0.000043%	110	70	0.002225%	110	-210	0.000009%
115	35	0.000035%	110	65	0.000156%	110	-220	0.000017%
115	30	0.000017%	110	60	0.000943%	110	-230	0.000009%
115	25	0.000017%	110	55	0.000182%	110	-310	0.000009%
115	20	0.000017%	110	50	0.000658%	110	-410	0.000009%
115	15	0.000052%	110	45	0.000061%	110	-430	0.000009%
115	10	0.000026%	110	40	0.000381%	105	95	0.150117%
115	5	0.000026%	110	35	0.000026%	105	90	0.031066%
115	0	0.000026%	110	30	0.000260%	105	85	0.010794%
115	-5	0.000017%	110	25	0.000035%	105	80	0.003203%
115	-10	0.000017%	110	20	0.000164%	105	75	0.001091%
115	-15	0.000017%	110	15	0.000043%	105	70	0.000987%
115	-20	0.000009%	110	10	0.000138%	105	65	0.000268%
115	-25	0.000009%	110	5	0.000035%	105	60	0.000138%
115	-30	0.000009%	110	0	0.000164%	105	55	0.000121%
115	-35	0.000009%	110	-5	0.000026%	105	50	0.000095%
115	-40	0.000009%	110	-10	0.000130%	105	45	0.000078%
115	-45	0.000009%	110	-15	0.000026%	105	40	0.000061%
115	-50	0.000026%	110	-20	0.000061%	105	35	0.000069%
115	-55	0.000009%	110	-25	0.000009%	105	30	0.000035%
115	-60	0.000009%	110	-30	0.000052%	105	25	0.000043%
115	-65	0.000026%	110	-35	0.000017%	105	20	0.000035%
115	-70	0.000009%	110	-40	0.000052%	105	15	0.000052%
115	-75	0.000017%	110	-45	0.000017%	105	10	0.000043%
115	-80	0.000017%	110	-50	0.000052%	105	5	0.000035%
115	-85	0.000017%	110	-55	0.000017%	105	0	0.000026%
115	-90	0.000009%	110	-60	0.000069%	105	-5	0.000043%
115	-95	0.000017%	110	-65	0.000026%	105	-10	0.000017%
115	-100	0.000017%	110	-70	0.000061%	105	-15	0.000035%
115	-105	0.000009%	110	-75	0.000009%	105	-20	0.000026%
115	-110	0.000026%	110	-80	0.000078%	105	-25	0.000017%
115	-115	0.000009%	110	-85	0.000026%	105	-30	0.000009%
115	-120	0.000009%	110	-90	0.000087%	105	-35	0.000026%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 11 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
105	-40	0.000017%	100	-15	0.000026%	95	10	0.000138%
105	-45	0.000017%	100	-20	0.000078%	95	5	0.000069%
105	-50	0.000009%	100	-25	0.000009%	95	0	0.000052%
105	-55	0.000026%	100	-30	0.000061%	95	-5	0.000061%
105	-60	0.000035%	100	-35	0.000017%	95	-10	0.000043%
105	-65	0.000026%	100	-40	0.000078%	95	-15	0.000035%
105	-70	0.000009%	100	-45	0.000026%	95	-20	0.000017%
105	-75	0.000026%	100	-50	0.000069%	95	-25	0.000017%
105	-80	0.000017%	100	-55	0.000017%	95	-30	0.000017%
105	-85	0.000017%	100	-60	0.000061%	95	-35	0.000035%
105	-90	0.000017%	100	-65	0.000026%	95	-40	0.000017%
105	-95	0.000017%	100	-70	0.000104%	95	-45	0.000017%
105	-100	0.000009%	100	-75	0.000026%	95	-50	0.000035%
105	-105	0.000017%	100	-80	0.000095%	95	-55	0.000035%
105	-110	0.000009%	100	-85	0.000009%	95	-60	0.000026%
105	-115	0.000017%	100	-90	0.000078%	95	-65	0.000026%
105	-120	0.000009%	100	-95	0.000017%	95	-70	0.000017%
105	-125	0.000017%	100	-100	0.000078%	95	-75	0.000026%
105	-130	0.000009%	100	-105	0.000017%	95	-80	0.000009%
105	-145	0.000009%	100	-110	0.000069%	95	-85	0.000026%
105	-150	0.000009%	100	-115	0.000017%	95	-90	0.000035%
105	-155	0.000009%	100	-120	0.000061%	95	-95	0.000026%
105	-160	0.000009%	100	-125	0.000009%	95	-100	0.000026%
105	-165	0.000009%	100	-130	0.000035%	95	-105	0.000026%
105	-170	0.000009%	100	-135	0.000009%	95	-110	0.000017%
105	-175	0.000009%	100	-140	0.000035%	95	-115	0.000009%
105	-185	0.000009%	100	-145	0.000009%	95	-120	0.000009%
105	-195	0.000009%	100	-150	0.000009%	95	-125	0.000017%
105	-275	0.000009%	100	-155	0.000009%	95	-130	0.000009%
100	90	0.243513%	100	-160	0.000017%	95	-135	0.000009%
100	85	0.033507%	100	-170	0.000017%	95	-140	0.000009%
100	80	0.051381%	100	-200	0.000009%	95	-145	0.000009%
100	75	0.003973%	100	-210	0.000009%	95	-155	0.000009%
100	70	0.008119%	100	-240	0.000009%	95	-175	0.000009%
100	65	0.000952%	100	-320	0.000009%	90	80	0.291847%
100	60	0.003064%	95	85	0.190038%	90	75	0.042439%
100	55	0.000208%	95	80	0.036882%	90	70	0.068095%
100	50	0.001402%	95	75	0.013217%	90	65	0.005419%
100	45	0.000121%	95	70	0.004847%	90	60	0.012222%
100	40	0.000822%	95	65	0.001714%	90	55	0.000900%
100	35	0.000078%	95	60	0.000684%	90	50	0.004060%
100	30	0.000580%	95	55	0.000415%	90	45	0.000415%
100	25	0.000052%	95	50	0.000251%	90	40	0.001956%
100	20	0.000346%	95	45	0.000173%	90	35	0.000130%
100	15	0.000061%	95	40	0.000130%	90	30	0.001056%
100	10	0.000260%	95	35	0.000104%	90	25	0.000130%
100	5	0.000061%	95	30	0.000087%	90	20	0.000718%
100	0	0.000260%	95	25	0.000087%	90	15	0.000121%
100	-5	0.000061%	95	20	0.000078%	90	10	0.000450%
100	-10	0.000173%	95	15	0.000078%	90	5	0.000095%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

CHAPTER 7

M-1001

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 12 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
90	0	0.000381%	85	5	0.000104%	80	-15	0.000035%
90	-5	0.000061%	85	0	0.000069%	80	-20	0.000121%
90	-10	0.000260%	85	-5	0.000087%	80	-25	0.000026%
90	-15	0.000017%	85	-10	0.000078%	80	-30	0.000138%
90	-20	0.000095%	85	-15	0.000026%	80	-35	0.000026%
90	-25	0.000026%	85	-20	0.000009%	80	-40	0.000147%
90	-30	0.000104%	85	-25	0.000026%	80	-45	0.000017%
90	-35	0.000026%	85	-30	0.000026%	80	-50	0.000130%
90	-40	0.000087%	85	-35	0.000026%	80	-55	0.000035%
90	-45	0.000035%	85	-40	0.000017%	80	-60	0.000147%
90	-50	0.000078%	85	-45	0.000035%	80	-65	0.000026%
90	-55	0.000017%	85	-50	0.000026%	80	-70	0.000164%
90	-60	0.000104%	85	-55	0.000035%	80	-75	0.000026%
90	-65	0.000017%	85	-60	0.000026%	80	-80	0.000138%
90	-70	0.000121%	85	-65	0.000035%	80	-85	0.000026%
90	-75	0.000017%	85	-70	0.000026%	80	-90	0.000138%
90	-80	0.000130%	85	-75	0.000035%	80	-95	0.000035%
90	-85	0.000026%	85	-80	0.000035%	80	-100	0.000095%
90	-90	0.000113%	85	-85	0.000017%	80	-105	0.000017%
90	-95	0.000009%	85	-90	0.000017%	80	-110	0.000087%
90	-100	0.000130%	85	-95	0.000026%	80	-115	0.000009%
90	-105	0.000017%	85	-100	0.000009%	80	-120	0.000078%
90	-110	0.000078%	85	-105	0.000009%	80	-125	0.000009%
90	-115	0.000017%	85	-110	0.000009%	80	-130	0.000026%
90	-120	0.000069%	85	-115	0.000009%	80	-135	0.000009%
90	-125	0.000009%	85	-120	0.000009%	80	-140	0.000035%
90	-130	0.000052%	85	-125	0.000009%	80	-150	0.000026%
90	-140	0.000026%	85	-130	0.000009%	80	-155	0.000009%
90	-150	0.000026%	85	-135	0.000009%	80	-160	0.000017%
90	-155	0.000009%	85	-140	0.000009%	80	-170	0.000009%
90	-160	0.000009%	85	-145	0.000009%	80	-180	0.000009%
90	-170	0.000009%	85	-165	0.000009%	80	-190	0.000009%
90	-180	0.000009%	85	-200	0.000009%	80	-200	0.000009%
90	-190	0.000009%	80	70	0.411176%	80	-210	0.000009%
90	-215	0.000009%	80	65	0.054930%	80	-230	0.000009%
90	-260	0.000009%	80	60	0.098096%	80	-280	0.000009%
85	75	0.236424%	80	55	0.007600%	80	-300	0.000009%
85	70	0.049857%	80	50	0.018281%	80	-310	0.000009%
85	65	0.017009%	80	45	0.001316%	80	-350	0.000009%
85	60	0.006570%	80	40	0.006198%	80	-400	0.000009%
85	55	0.002380%	80	35	0.000485%	75	65	0.277903%
85	50	0.001065%	80	30	0.002978%	75	60	0.059509%
85	45	0.000554%	80	25	0.000294%	75	55	0.021613%
85	40	0.000692%	80	20	0.001463%	75	50	0.008924%
85	35	0.000225%	80	15	0.000338%	75	45	0.003350%
85	30	0.000199%	80	10	0.000866%	75	40	0.001636%
85	25	0.000182%	80	5	0.000147%	75	35	0.001039%
85	20	0.000156%	80	0	0.000675%	75	30	0.000995%
85	15	0.000156%	80	-5	0.000104%	75	25	0.000485%
85	10	0.000164%	80	-10	0.000381%	75	20	0.000398%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 13 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
75	15	0.000294%	70	-10	0.000580%	65	-5	0.000164%
75	10	0.000294%	70	-15	0.000035%	65	-10	0.000104%
75	5	0.000173%	70	-20	0.000173%	65	-15	0.000061%
75	0	0.000087%	70	-25	0.000017%	65	-20	0.000052%
75	-5	0.000104%	70	-30	0.000164%	65	-25	0.000035%
75	-10	0.000199%	70	-35	0.000035%	65	-30	0.000026%
75	-15	0.000035%	70	-40	0.000182%	65	-35	0.000052%
75	-20	0.000035%	70	-45	0.000052%	65	-40	0.000026%
75	-25	0.000035%	70	-50	0.000260%	65	-45	0.000035%
75	-30	0.000017%	70	-55	0.000035%	65	-50	0.000026%
75	-35	0.000026%	70	-60	0.000173%	65	-55	0.000043%
75	-40	0.000026%	70	-65	0.000017%	65	-60	0.000026%
75	-45	0.000035%	70	-70	0.000182%	65	-65	0.000026%
75	-50	0.000026%	70	-75	0.000026%	65	-70	0.000026%
75	-55	0.000035%	70	-80	0.000138%	65	-75	0.000026%
75	-60	0.000026%	70	-85	0.000009%	65	-80	0.000026%
75	-65	0.000026%	70	-90	0.000138%	65	-85	0.000026%
75	-70	0.000026%	70	-95	0.000017%	65	-90	0.000017%
75	-75	0.000035%	70	-100	0.000121%	65	-95	0.000017%
75	-80	0.000026%	70	-105	0.000009%	65	-100	0.000009%
75	-85	0.000035%	70	-110	0.000069%	65	-105	0.000009%
75	-90	0.000026%	70	-115	0.000009%	65	-110	0.000009%
75	-95	0.000009%	70	-120	0.000061%	65	-115	0.000009%
75	-100	0.000026%	70	-130	0.000017%	65	-120	0.000009%
75	-105	0.000009%	70	-140	0.000017%	65	-125	0.000017%
75	-110	0.000009%	70	-145	0.000009%	65	-130	0.000009%
75	-115	0.000009%	70	-150	0.000009%	65	-135	0.000009%
75	-120	0.000017%	70	-155	0.000009%	65	-140	0.000009%
75	-130	0.000009%	70	-160	0.000017%	65	-145	0.000009%
75	-135	0.000009%	70	-165	0.000009%	65	-160	0.000009%
75	-140	0.000009%	70	-170	0.000017%	65	-180	0.000009%
75	-145	0.000009%	70	-175	0.000009%	65	-360	0.000009%
75	-155	0.000009%	70	-180	0.000009%	60	50	0.647634%
75	-160	0.000009%	70	-190	0.000009%	60	45	0.073886%
75	-170	0.000009%	70	-200	0.000009%	60	40	0.182568%
75	-255	0.000009%	70	-220	0.000009%	60	35	0.015122%
70	60	0.508389%	70	-240	0.000009%	60	30	0.031472%
70	55	0.062798%	70	-600	0.000009%	60	25	0.003246%
70	50	0.147174%	65	55	0.320714%	60	20	0.010110%
70	45	0.009746%	65	50	0.066052%	60	15	0.000978%
70	40	0.026045%	65	45	0.027508%	60	10	0.003609%
70	35	0.002467%	65	40	0.018290%	60	5	0.000563%
70	30	0.007799%	65	35	0.005964%	60	0	0.001948%
70	25	0.000848%	65	30	0.003341%	60	-5	0.000294%
70	20	0.003289%	65	25	0.001697%	60	-10	0.000961%
70	15	0.000398%	65	20	0.000952%	60	-15	0.000078%
70	10	0.001558%	65	15	0.000623%	60	-20	0.000225%
70	5	0.000234%	65	10	0.000476%	60	-25	0.000043%
70	0	0.001021%	65	5	0.000286%	60	-30	0.000268%
70	-5	0.000173%	65	0	0.000199%	60	-35	0.000061%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 14 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
60	-40	0.000260%	55	-40	0.000043%	50	-110	0.000052%
60	-45	0.000026%	55	-45	0.000043%	50	-115	0.000009%
60	-50	0.000216%	55	-50	0.000035%	50	-120	0.000043%
60	-55	0.000035%	55	-55	0.000035%	50	-125	0.000009%
60	-60	0.000173%	55	-60	0.000043%	50	-130	0.000026%
60	-65	0.000026%	55	-65	0.000035%	50	-135	0.000009%
60	-70	0.000216%	55	-70	0.000026%	50	-140	0.000026%
60	-75	0.000043%	55	-75	0.000009%	50	-145	0.000009%
60	-80	0.000121%	55	-80	0.000026%	50	-150	0.000017%
60	-85	0.000017%	55	-85	0.000026%	50	-160	0.000009%
60	-90	0.000087%	55	-95	0.000009%	50	-165	0.000009%
60	-95	0.000009%	55	-100	0.000017%	50	-170	0.000009%
60	-100	0.000095%	55	-105	0.000009%	50	-175	0.000009%
60	-105	0.000009%	55	-110	0.000009%	50	-180	0.000009%
60	-110	0.000061%	55	-115	0.000009%	50	-190	0.000009%
60	-115	0.000009%	55	-125	0.000009%	50	-210	0.000009%
60	-120	0.000061%	55	-140	0.000009%	50	-250	0.000009%
60	-125	0.000009%	55	-200	0.000009%	50	-290	0.000009%
60	-130	0.000043%	55	-205	0.000009%	50	-300	0.000009%
60	-135	0.000009%	55	-280	0.000009%	50	-380	0.000009%
60	-140	0.000035%	50	40	0.997181%	50	-600	0.000009%
60	-150	0.000009%	50	35	0.089605%	45	35	0.578328%
60	-155	0.000009%	50	30	0.219147%	45	30	0.097897%
60	-160	0.000009%	50	25	0.015572%	45	25	0.036285%
60	-170	0.000009%	50	20	0.034857%	45	20	0.014170%
60	-180	0.000009%	50	15	0.004120%	45	15	0.006128%
60	-200	0.000009%	50	10	0.010430%	45	10	0.003116%
60	-210	0.000009%	50	5	0.000848%	45	5	0.001420%
60	-225	0.000009%	50	0	0.004233%	45	0	0.000632%
60	-300	0.000009%	50	-5	0.000329%	45	-5	0.000459%
60	-310	0.000009%	50	-10	0.001549%	45	-10	0.000251%
60	-320	0.000009%	50	-15	0.000087%	45	-15	0.000113%
60	-590	0.000009%	50	-20	0.000589%	45	-20	0.000087%
55	45	0.449079%	50	-25	0.000078%	45	-25	0.000087%
55	40	0.083788%	50	-30	0.000286%	45	-30	0.000069%
55	35	0.035082%	50	-35	0.000061%	45	-35	0.000069%
55	30	0.022271%	50	-40	0.000260%	45	-40	0.000061%
55	25	0.006700%	50	-45	0.000035%	45	-45	0.000026%
55	20	0.003229%	50	-50	0.000234%	45	-50	0.000061%
55	15	0.001705%	50	-55	0.000052%	45	-55	0.000035%
55	10	0.000900%	50	-60	0.000225%	45	-60	0.000026%
55	5	0.000580%	50	-65	0.000035%	45	-65	0.000035%
55	0	0.000294%	50	-70	0.000121%	45	-70	0.000017%
55	-5	0.000225%	50	-75	0.000026%	45	-75	0.000026%
55	-10	0.000130%	50	-80	0.000113%	45	-80	0.000026%
55	-15	0.000061%	50	-85	0.000009%	45	-85	0.000035%
55	-20	0.000095%	50	-90	0.000095%	45	-90	0.000009%
55	-25	0.000052%	50	-95	0.000009%	45	-95	0.000009%
55	-30	0.000043%	50	-100	0.000061%	45	-100	0.000009%
55	-35	0.000043%	50	-105	0.000009%	45	-105	0.000009%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 15 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
45	-110	0.000009%	40	-330	0.000009%	30	-35	0.000078%
45	-120	0.000009%	35	25	0.742008%	30	-40	0.000450%
45	-125	0.000009%	35	20	0.122159%	30	-45	0.000052%
45	-130	0.000009%	35	15	0.049537%	30	-50	0.000225%
45	-155	0.000009%	35	10	0.017528%	30	-55	0.000035%
45	-165	0.000009%	35	5	0.005765%	30	-60	0.000260%
45	-205	0.000009%	35	0	0.002311%	30	-65	0.000035%
45	-210	0.000009%	35	-5	0.001143%	30	-70	0.000242%
40	30	1.192629%	35	-10	0.000450%	30	-75	0.000017%
40	25	0.094080%	35	-15	0.000147%	30	-80	0.000095%
40	20	0.272588%	35	-20	0.000130%	30	-85	0.000017%
40	15	0.016957%	35	-25	0.000095%	30	-90	0.000078%
40	10	0.042569%	35	-30	0.000130%	30	-95	0.000009%
40	5	0.003982%	35	-35	0.000130%	30	-100	0.000035%
40	0	0.011573%	35	-40	0.000052%	30	-105	0.000009%
40	-5	0.000589%	35	-45	0.000052%	30	-110	0.000026%
40	-10	0.002891%	35	-50	0.000043%	30	-115	0.000009%
40	-15	0.000138%	35	-55	0.000043%	30	-120	0.000035%
40	-20	0.000545%	35	-60	0.000017%	30	-125	0.000009%
40	-25	0.000087%	35	-65	0.000026%	30	-130	0.000017%
40	-30	0.000372%	35	-70	0.000017%	30	-135	0.000009%
40	-35	0.000078%	35	-75	0.000017%	30	-140	0.000035%
40	-40	0.000320%	35	-80	0.000017%	30	-150	0.000017%
40	-45	0.000043%	35	-85	0.000017%	30	-155	0.000009%
40	-50	0.000346%	35	-90	0.000009%	30	-165	0.000009%
40	-55	0.000035%	35	-95	0.000017%	30	-170	0.000009%
40	-60	0.000216%	35	-100	0.000009%	30	-180	0.000009%
40	-65	0.000035%	35	-105	0.000009%	30	-185	0.000009%
40	-70	0.000138%	35	-110	0.000009%	30	-190	0.000009%
40	-75	0.000035%	35	-115	0.000009%	30	-220	0.000009%
40	-80	0.000104%	35	-120	0.000009%	30	-290	0.000009%
40	-85	0.000009%	35	-125	0.000009%	30	-300	0.000009%
40	-90	0.000173%	35	-130	0.000009%	30	-315	0.000009%
40	-95	0.000009%	35	-155	0.000009%	30	-400	0.000009%
40	-100	0.000052%	35	-170	0.000009%	30	-530	0.000009%
40	-105	0.000009%	35	-175	0.000009%	25	15	2.121533%
40	-110	0.000043%	35	-185	0.000009%	25	10	0.212976%
40	-120	0.000052%	35	-205	0.000009%	25	5	0.057137%
40	-125	0.000009%	35	-230	0.000009%	25	0	0.014732%
40	-130	0.000035%	30	20	1.720917%	25	-5	0.003532%
40	-140	0.000017%	30	15	0.159976%	25	-10	0.001307%
40	-145	0.000009%	30	10	0.400295%	25	-15	0.000346%
40	-150	0.000017%	30	5	0.017554%	25	-20	0.000208%
40	-160	0.000009%	30	0	0.049329%	25	-25	0.000121%
40	-170	0.000009%	30	-5	0.001688%	25	-30	0.000164%
40	-180	0.000009%	30	-10	0.007046%	25	-35	0.000069%
40	-205	0.000009%	30	-15	0.000199%	25	-40	0.000043%
40	-210	0.000009%	30	-20	0.001281%	25	-45	0.000043%
40	-300	0.000009%	30	-25	0.000130%	25	-50	0.000035%
40	-310	0.000009%	30	-30	0.000537%	25	-55	0.000035%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 16 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
25	-60	0.000026%	20	-130	0.000009%	15	-180	0.000009%
25	-65	0.000043%	20	-140	0.000009%	15	-200	0.000009%
25	-70	0.000026%	20	-150	0.000009%	15	-220	0.000009%
25	-75	0.000026%	20	-160	0.000017%	15	-260	0.000009%
25	-80	0.000009%	20	-165	0.000009%	15	-270	0.000009%
25	-85	0.000017%	20	-170	0.000009%	15	-275	0.000009%
25	-90	0.000009%	20	-175	0.000009%	15	-280	0.000009%
25	-95	0.000026%	20	-180	0.000009%	10	0	10.341550%
25	-100	0.000009%	20	-190	0.000009%	10	-5	0.217329%
25	-105	0.000009%	20	-200	0.000009%	10	-10	1.406167%
25	-110	0.000009%	20	-220	0.000009%	10	-15	0.004198%
25	-115	0.000017%	20	-230	0.000009%	10	-20	0.014256%
25	-120	0.000009%	20	-250	0.000009%	10	-25	0.000762%
25	-125	0.000009%	20	-260	0.000009%	10	-30	0.006258%
25	-130	0.000009%	20	-310	0.000009%	10	-35	0.000286%
25	-135	0.000009%	20	-350	0.000009%	10	-40	0.002848%
25	-145	0.000009%	20	-380	0.000009%	10	-45	0.000164%
25	-150	0.000009%	15	5	6.518611%	10	-50	0.000476%
25	-170	0.000009%	15	0	0.351589%	10	-55	0.000095%
25	-180	0.000009%	15	-5	0.037480%	10	-60	0.000303%
25	-190	0.000009%	15	-10	0.010448%	10	-65	0.000087%
25	-280	0.000009%	15	-15	0.001359%	10	-70	0.000329%
25	-305	0.000009%	15	-20	0.000476%	10	-75	0.000061%
20	10	3.894540%	15	-25	0.000329%	10	-80	0.000156%
20	5	0.260660%	15	-30	0.000225%	10	-85	0.000026%
20	0	0.578492%	15	-35	0.000173%	10	-90	0.000113%
20	-5	0.010422%	15	-40	0.000095%	10	-95	0.000009%
20	-10	0.030010%	15	-45	0.000130%	10	-100	0.000095%
20	-15	0.000666%	15	-50	0.000138%	10	-105	0.000009%
20	-20	0.003332%	15	-55	0.000069%	10	-110	0.000052%
20	-25	0.000234%	15	-60	0.000052%	10	-115	0.000009%
20	-30	0.001117%	15	-65	0.000043%	10	-120	0.000043%
20	-35	0.000113%	15	-70	0.000035%	10	-125	0.000009%
20	-40	0.000511%	15	-75	0.000026%	10	-130	0.000026%
20	-45	0.000061%	15	-80	0.000035%	10	-135	0.000009%
20	-50	0.000277%	15	-85	0.000026%	10	-140	0.000017%
20	-55	0.000069%	15	-90	0.000035%	10	-150	0.000009%
20	-60	0.000164%	15	-95	0.000009%	10	-155	0.000009%
20	-65	0.000026%	15	-100	0.000017%	10	-160	0.000009%
20	-70	0.000130%	15	-105	0.000009%	10	-165	0.000009%
20	-75	0.000026%	15	-110	0.000009%	10	-170	0.000017%
20	-80	0.000121%	15	-115	0.000009%	10	-175	0.000009%
20	-85	0.000026%	15	-120	0.000009%	10	-180	0.000009%
20	-90	0.000087%	15	-130	0.000009%	10	-190	0.000009%
20	-95	0.000017%	15	-135	0.000009%	10	-200	0.000017%
20	-100	0.000078%	15	-140	0.000009%	10	-210	0.000009%
20	-105	0.000009%	15	-150	0.000009%	10	-220	0.000009%
20	-110	0.000043%	15	-160	0.000009%	10	-250	0.000009%
20	-115	0.000009%	15	-170	0.000009%	10	-270	0.000009%
20	-120	0.000026%	15	-175	0.000009%	10	-280	0.000009%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 17 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
10	-310	0.000009%	0	-90	0.000433%	-5	-90	0.000095%
10	-340	0.000009%	0	-95	0.000035%	-5	-95	0.000061%
5	-5	3.059733%	0	-100	0.000216%	-5	-100	0.000026%
5	-10	0.240847%	0	-105	0.000035%	-5	-105	0.000052%
5	-15	0.015996%	0	-110	0.000113%	-5	-110	0.000026%
5	-20	0.004544%	0	-115	0.000017%	-5	-115	0.000026%
5	-25	0.001948%	0	-120	0.000087%	-5	-120	0.000009%
5	-30	0.000909%	0	-125	0.000009%	-5	-125	0.000017%
5	-35	0.000537%	0	-130	0.000052%	-5	-130	0.000009%
5	-40	0.000424%	0	-135	0.000017%	-5	-135	0.000009%
5	-45	0.000286%	0	-140	0.000026%	-5	-140	0.000017%
5	-50	0.000242%	0	-145	0.000009%	-5	-145	0.000009%
5	-55	0.000182%	0	-150	0.000017%	-5	-150	0.000009%
5	-60	0.000138%	0	-155	0.000009%	-5	-155	0.000009%
5	-65	0.000130%	0	-160	0.000026%	-5	-160	0.000009%
5	-70	0.000078%	0	-165	0.000009%	-5	-165	0.000009%
5	-75	0.000087%	0	-170	0.000009%	-5	-170	0.000009%
5	-80	0.000035%	0	-180	0.000009%	-5	-175	0.000009%
5	-85	0.000043%	0	-190	0.000009%	-10	-20	6.685685%
5	-90	0.000009%	0	-200	0.000009%	-10	-25	0.063958%
5	-95	0.000026%	0	-205	0.000009%	-10	-30	0.673169%
5	-100	0.000026%	0	-210	0.000009%	-10	-35	0.006587%
5	-105	0.000026%	0	-220	0.000009%	-10	-40	0.034061%
5	-110	0.000017%	0	-230	0.000009%	-10	-45	0.001385%
5	-115	0.000017%	0	-235	0.000009%	-10	-50	0.004839%
5	-120	0.000009%	0	-240	0.000009%	-10	-55	0.000502%
5	-125	0.000017%	0	-250	0.000009%	-10	-60	0.002121%
5	-130	0.000009%	0	-260	0.000009%	-10	-65	0.000312%
5	-135	0.000009%	0	-265	0.000009%	-10	-70	0.001134%
5	-140	0.000009%	0	-275	0.000009%	-10	-75	0.000294%
5	-145	0.000009%	0	-315	0.000009%	-10	-80	0.000632%
5	-170	0.000009%	0	-330	0.000009%	-10	-85	0.000087%
5	-185	0.000009%	0	-360	0.000009%	-10	-90	0.000390%
5	-225	0.000009%	0	-380	0.000009%	-10	-95	0.000061%
0	-10	23.373232%	0	-420	0.000009%	-10	-100	0.000329%
0	-15	0.142950%	-5	-15	3.346387%	-10	-105	0.000043%
0	-20	4.460646%	-5	-20	0.084394%	-10	-110	0.000225%
0	-25	0.006639%	-5	-25	0.019302%	-10	-115	0.000026%
0	-30	0.023933%	-5	-30	0.010188%	-10	-120	0.000138%
0	-35	0.001350%	-5	-35	0.002735%	-10	-125	0.000017%
0	-40	0.008855%	-5	-40	0.001307%	-10	-130	0.000078%
0	-45	0.000493%	-5	-45	0.000710%	-10	-135	0.000017%
0	-50	0.002311%	-5	-50	0.000511%	-10	-140	0.000052%
0	-55	0.000190%	-5	-55	0.000398%	-10	-145	0.000009%
0	-60	0.001584%	-5	-60	0.000303%	-10	-150	0.000035%
0	-65	0.000138%	-5	-65	0.000208%	-10	-155	0.000009%
0	-70	0.000684%	-5	-70	0.000138%	-10	-160	0.000017%
0	-75	0.000113%	-5	-75	0.000138%	-10	-165	0.000009%
0	-80	0.000415%	-5	-80	0.000087%	-10	-170	0.000009%
0	-85	0.000069%	-5	-85	0.000078%	-10	-180	0.000009%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

CHAPTER 7

M-1001

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 18 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-10	-220	0.000009%	-20	-130	0.000035%	-30	-70	0.003532%
-10	-305	0.000009%	-20	-135	0.000009%	-30	-75	0.000320%
-15	-25	0.651270%	-20	-140	0.000026%	-30	-80	0.001619%
-15	-30	0.051857%	-20	-145	0.000009%	-30	-85	0.000104%
-15	-35	0.016403%	-20	-150	0.000017%	-30	-90	0.000892%
-15	-40	0.009357%	-20	-155	0.000009%	-30	-95	0.000052%
-15	-45	0.002856%	-20	-160	0.000017%	-30	-100	0.000329%
-15	-50	0.001350%	-20	-165	0.000009%	-30	-105	0.000035%
-15	-55	0.000753%	-20	-170	0.000017%	-30	-110	0.000190%
-15	-60	0.000441%	-20	-180	0.000009%	-30	-115	0.000017%
-15	-65	0.000277%	-20	-190	0.000009%	-30	-120	0.000087%
-15	-70	0.000234%	-20	-200	0.000009%	-30	-125	0.000009%
-15	-75	0.000138%	-20	-210	0.000009%	-30	-130	0.000061%
-15	-80	0.000087%	-20	-230	0.000009%	-30	-140	0.000026%
-15	-85	0.000069%	-20	-240	0.000009%	-30	-145	0.000009%
-15	-90	0.000052%	-25	-35	0.360583%	-30	-150	0.000026%
-15	-95	0.000043%	-25	-40	0.038146%	-30	-160	0.000017%
-15	-100	0.000043%	-25	-45	0.013702%	-30	-165	0.000009%
-15	-105	0.000026%	-25	-50	0.005678%	-30	-170	0.000009%
-15	-110	0.000017%	-25	-55	0.002536%	-30	-175	0.000009%
-15	-115	0.000017%	-25	-60	0.001264%	-30	-180	0.000017%
-15	-120	0.000017%	-25	-65	0.000615%	-30	-190	0.000017%
-15	-125	0.000009%	-25	-70	0.000346%	-30	-200	0.000009%
-15	-130	0.000009%	-25	-75	0.000225%	-30	-240	0.000009%
-15	-135	0.000009%	-25	-80	0.000242%	-30	-280	0.000009%
-15	-140	0.000017%	-25	-85	0.000095%	-30	-300	0.000009%
-15	-145	0.000009%	-25	-90	0.000078%	-35	-45	0.189380%
-15	-150	0.000009%	-25	-95	0.000052%	-35	-50	0.030287%
-15	-155	0.000017%	-25	-100	0.000043%	-35	-55	0.011131%
-15	-170	0.000009%	-25	-105	0.000035%	-35	-60	0.004665%
-20	-30	2.166803%	-25	-110	0.000026%	-35	-65	0.001939%
-20	-35	0.045123%	-25	-115	0.000017%	-35	-70	0.000961%
-20	-40	0.455718%	-25	-120	0.000009%	-35	-75	0.000744%
-20	-45	0.005981%	-25	-125	0.000009%	-35	-80	0.000268%
-20	-50	0.017338%	-25	-130	0.000009%	-35	-85	0.000147%
-20	-55	0.001350%	-25	-135	0.000009%	-35	-90	0.000121%
-20	-60	0.004060%	-25	-140	0.000009%	-35	-95	0.000052%
-20	-65	0.000424%	-25	-145	0.000009%	-35	-100	0.000052%
-20	-70	0.001411%	-25	-150	0.000009%	-35	-105	0.000052%
-20	-75	0.000190%	-25	-155	0.000009%	-35	-110	0.000035%
-20	-80	0.000753%	-25	-170	0.000009%	-35	-115	0.000026%
-20	-85	0.000087%	-25	-175	0.000009%	-35	-120	0.000026%
-20	-90	0.000415%	-25	-185	0.000009%	-35	-125	0.000035%
-20	-95	0.000061%	-25	-195	0.000009%	-35	-130	0.000009%
-20	-100	0.000372%	-30	-40	3.403654%	-35	-135	0.000017%
-20	-105	0.000017%	-30	-45	0.033186%	-35	-140	0.000009%
-20	-110	0.000173%	-30	-50	1.939424%	-35	-155	0.000009%
-20	-115	0.000017%	-30	-55	0.004916%	-35	-180	0.000009%
-20	-120	0.000095%	-30	-60	0.014386%	-35	-185	0.000009%
-20	-125	0.000017%	-30	-65	0.000987%	-40	-50	3.536078%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 19 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-40	-55	0.028815%	-45	-160	0.000009%	-55	-170	0.000009%
-40	-60	0.503386%	-45	-175	0.000009%	-55	-175	0.000009%
-40	-65	0.004285%	-50	-60	0.866202%	-60	-70	0.721979%
-40	-70	0.013667%	-50	-65	0.035653%	-60	-75	0.020012%
-40	-75	0.000978%	-50	-70	0.268321%	-60	-80	0.093889%
-40	-80	0.003151%	-50	-75	0.003532%	-60	-85	0.002718%
-40	-85	0.000242%	-50	-80	0.012603%	-60	-90	0.007825%
-40	-90	0.001047%	-50	-85	0.000580%	-60	-95	0.000450%
-40	-95	0.000104%	-50	-90	0.002476%	-60	-100	0.001835%
-40	-100	0.000788%	-50	-95	0.000182%	-60	-105	0.000121%
-40	-105	0.000035%	-50	-100	0.000840%	-60	-110	0.000415%
-40	-110	0.000286%	-50	-105	0.000052%	-60	-115	0.000043%
-40	-115	0.000009%	-50	-110	0.000268%	-60	-120	0.000199%
-40	-120	0.000113%	-50	-115	0.000026%	-60	-125	0.000017%
-40	-125	0.000009%	-50	-120	0.000156%	-60	-130	0.000113%
-40	-130	0.000078%	-50	-125	0.000017%	-60	-135	0.000009%
-40	-135	0.000017%	-50	-130	0.000078%	-60	-140	0.000061%
-40	-140	0.000061%	-50	-135	0.000017%	-60	-145	0.000009%
-40	-145	0.000009%	-50	-140	0.000043%	-60	-150	0.000017%
-40	-150	0.000017%	-50	-145	0.000009%	-60	-155	0.000009%
-40	-155	0.000009%	-50	-150	0.000026%	-60	-160	0.000026%
-40	-160	0.000026%	-50	-160	0.000017%	-60	-165	0.000009%
-40	-165	0.000009%	-50	-170	0.000009%	-60	-170	0.000017%
-40	-170	0.000009%	-50	-175	0.000009%	-60	-175	0.000009%
-40	-180	0.000017%	-50	-190	0.000009%	-60	-180	0.000009%
-40	-190	0.000009%	-50	-200	0.000009%	-60	-185	0.000009%
-40	-235	0.000009%	-50	-215	0.000009%	-60	-190	0.000009%
-40	-240	0.000009%	-50	-220	0.000009%	-65	-75	0.119623%
-40	-310	0.000009%	-50	-225	0.000009%	-65	-80	0.017147%
-40	-335	0.000009%	-50	-230	0.000009%	-65	-85	0.006241%
-45	-55	0.208371%	-50	-340	0.000009%	-65	-90	0.002571%
-45	-60	0.025448%	-55	-65	0.178690%	-65	-95	0.001004%
-45	-65	0.009643%	-55	-70	0.022107%	-65	-100	0.000459%
-45	-70	0.003964%	-55	-75	0.008102%	-65	-105	0.000190%
-45	-75	0.001584%	-55	-80	0.003142%	-65	-110	0.000121%
-45	-80	0.001307%	-55	-85	0.001143%	-65	-115	0.000052%
-45	-85	0.000346%	-55	-90	0.001368%	-65	-120	0.000052%
-45	-90	0.000190%	-55	-95	0.000225%	-65	-125	0.000017%
-45	-95	0.000104%	-55	-100	0.000164%	-65	-130	0.000026%
-45	-100	0.000104%	-55	-105	0.000069%	-65	-135	0.000017%
-45	-105	0.000052%	-55	-110	0.000043%	-65	-140	0.000017%
-45	-110	0.000035%	-55	-115	0.000026%	-65	-145	0.000009%
-45	-115	0.000026%	-55	-120	0.000043%	-65	-150	0.000009%
-45	-120	0.000017%	-55	-125	0.000009%	-65	-155	0.000009%
-45	-125	0.000009%	-55	-130	0.000026%	-65	-160	0.000009%
-45	-130	0.000009%	-55	-135	0.000009%	-65	-165	0.000009%
-45	-135	0.000009%	-55	-140	0.000009%	-65	-175	0.000009%
-45	-140	0.000009%	-55	-145	0.000009%	-65	-215	0.000009%
-45	-145	0.000009%	-55	-155	0.000009%	-65	-240	0.000009%
-45	-150	0.000009%	-55	-160	0.000009%	-70	-80	0.242769%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

CHAPTER 7

M-1001

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 20 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-70	-85	0.015078%	-80	-130	0.000190%	-90	-340	0.000009%
-70	-90	0.048291%	-80	-135	0.000035%	-95	-105	0.046949%
-70	-95	0.002207%	-80	-140	0.000087%	-95	-110	0.006925%
-70	-100	0.005038%	-80	-145	0.000017%	-95	-115	0.002251%
-70	-105	0.000710%	-80	-150	0.000035%	-95	-120	0.000779%
-70	-110	0.001108%	-80	-155	0.000009%	-95	-125	0.000286%
-70	-115	0.000069%	-80	-160	0.000026%	-95	-130	0.000113%
-70	-120	0.000346%	-80	-165	0.000009%	-95	-135	0.000061%
-70	-125	0.000026%	-80	-170	0.000017%	-95	-140	0.000043%
-70	-130	0.000121%	-80	-175	0.000009%	-95	-145	0.000017%
-70	-135	0.000017%	-80	-210	0.000009%	-95	-150	0.000009%
-70	-140	0.000173%	-80	-275	0.000009%	-95	-155	0.000009%
-70	-145	0.000009%	-85	-95	0.073349%	-95	-160	0.000009%
-70	-150	0.000052%	-85	-100	0.011149%	-95	-180	0.000009%
-70	-160	0.000017%	-85	-105	0.003488%	-95	-185	0.000009%
-70	-165	0.000009%	-85	-110	0.002389%	-95	-190	0.000009%
-70	-170	0.000009%	-85	-115	0.000519%	-95	-220	0.000009%
-70	-175	0.000009%	-85	-120	0.000138%	-95	-230	0.000009%
-70	-180	0.000009%	-85	-125	0.000087%	-95	-250	0.000009%
-70	-190	0.000009%	-85	-130	0.000043%	-95	-310	0.000009%
-70	-200	0.000009%	-85	-135	0.000026%	-100	-110	0.068000%
-70	-245	0.000009%	-85	-140	0.000017%	-100	-115	0.005895%
-70	-265	0.000009%	-85	-145	0.000017%	-100	-120	0.012897%
-75	-85	0.084913%	-85	-150	0.000009%	-100	-125	0.000710%
-75	-90	0.012611%	-85	-155	0.000009%	-100	-130	0.001324%
-75	-95	0.005219%	-85	-165	0.000009%	-100	-135	0.000078%
-75	-100	0.002337%	-85	-170	0.000009%	-100	-140	0.000303%
-75	-105	0.000666%	-85	-180	0.000009%	-100	-145	0.000035%
-75	-110	0.000303%	-85	-190	0.000009%	-100	-150	0.000095%
-75	-115	0.000130%	-85	-195	0.000009%	-100	-155	0.000009%
-75	-120	0.000061%	-85	-205	0.000009%	-100	-160	0.000026%
-75	-125	0.000035%	-85	-225	0.000009%	-100	-170	0.000017%
-75	-130	0.000017%	-85	-295	0.000009%	-100	-175	0.000009%
-75	-135	0.000017%	-90	-100	0.091301%	-100	-180	0.000017%
-75	-140	0.000017%	-90	-105	0.007929%	-100	-190	0.000009%
-75	-145	0.000009%	-90	-110	0.017441%	-100	-200	0.000009%
-75	-150	0.000009%	-90	-115	0.001004%	-100	-205	0.000009%
-75	-155	0.000017%	-90	-120	0.002199%	-100	-210	0.000009%
-75	-170	0.000009%	-90	-125	0.000156%	-105	-115	0.028599%
-75	-190	0.000009%	-90	-130	0.000485%	-105	-120	0.004709%
-75	-215	0.000009%	-90	-135	0.000026%	-105	-125	0.001532%
-75	-220	0.000009%	-90	-140	0.000147%	-105	-130	0.000615%
-80	-90	0.180404%	-90	-145	0.000026%	-105	-135	0.000225%
-80	-95	0.012629%	-90	-150	0.000061%	-105	-140	0.000087%
-80	-100	0.028858%	-90	-155	0.000009%	-105	-145	0.000035%
-80	-105	0.001575%	-90	-160	0.000026%	-105	-150	0.000026%
-80	-110	0.003670%	-90	-165	0.000009%	-105	-155	0.000009%
-80	-115	0.000225%	-90	-170	0.000017%	-105	-165	0.000017%
-80	-120	0.000666%	-90	-190	0.000009%	-105	-170	0.000009%
-80	-125	0.000026%	-90	-200	0.000009%	-110	-120	0.044067%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 21 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-110	-125	0.006656%	-125	-155	0.000078%	-140	-245	0.000009%
-110	-130	0.007314%	-125	-160	0.000043%	-140	-280	0.000009%
-110	-135	0.000441%	-125	-165	0.000035%	-140	-290	0.000009%
-110	-140	0.000727%	-125	-170	0.000017%	-140	-300	0.000009%
-110	-145	0.000087%	-125	-175	0.000009%	-140	-330	0.000009%
-110	-150	0.000182%	-125	-180	0.000009%	-140	-350	0.000009%
-110	-155	0.000026%	-125	-185	0.000009%	-145	-155	0.006128%
-110	-160	0.000043%	-130	-140	0.019242%	-145	-160	0.001480%
-110	-165	0.000009%	-130	-145	0.001948%	-145	-165	0.000433%
-110	-170	0.000026%	-130	-150	0.003099%	-145	-170	0.000121%
-110	-180	0.000009%	-130	-155	0.000208%	-145	-175	0.000052%
-110	-185	0.000009%	-130	-160	0.000355%	-145	-180	0.000017%
-110	-190	0.000009%	-130	-165	0.000026%	-145	-185	0.000009%
-110	-210	0.000009%	-130	-170	0.000078%	-145	-195	0.000009%
-110	-220	0.000009%	-130	-175	0.000009%	-145	-200	0.000009%
-110	-280	0.000009%	-130	-180	0.000043%	-145	-210	0.000009%
-110	-430	0.000009%	-130	-185	0.000009%	-145	-220	0.000009%
-115	-125	0.023985%	-130	-190	0.000009%	-150	-160	0.008180%
-115	-130	0.003220%	-130	-200	0.000009%	-150	-165	0.001021%
-115	-135	0.000952%	-130	-210	0.000009%	-150	-170	0.001151%
-115	-140	0.000346%	-130	-240	0.000009%	-150	-175	0.000078%
-115	-145	0.000156%	-130	-290	0.000009%	-150	-180	0.000104%
-115	-150	0.000069%	-135	-145	0.009054%	-150	-185	0.000009%
-115	-155	0.000052%	-135	-150	0.001697%	-150	-190	0.000017%
-115	-160	0.000009%	-135	-155	0.000606%	-150	-200	0.000009%
-115	-165	0.000017%	-135	-160	0.000190%	-150	-210	0.000009%
-115	-170	0.000009%	-135	-165	0.000078%	-150	-215	0.000009%
-115	-175	0.000009%	-135	-170	0.000035%	-150	-220	0.000017%
-115	-180	0.000009%	-135	-175	0.000017%	-150	-250	0.000009%
-115	-330	0.000009%	-135	-185	0.000009%	-150	-280	0.000009%
-120	-130	0.035117%	-135	-190	0.000009%	-150	-300	0.000009%
-120	-135	0.002458%	-135	-195	0.000009%	-150	-320	0.000009%
-120	-140	0.004501%	-135	-200	0.000009%	-150	-395	0.000009%
-120	-145	0.000260%	-135	-205	0.000009%	-155	-165	0.003817%
-120	-150	0.000467%	-135	-220	0.000009%	-155	-170	0.000718%
-120	-155	0.000052%	-135	-260	0.000009%	-155	-175	0.000164%
-120	-160	0.000121%	-135	-280	0.000009%	-155	-180	0.000069%
-120	-165	0.000009%	-140	-150	0.013815%	-155	-185	0.000026%
-120	-170	0.000026%	-140	-155	0.001385%	-155	-190	0.000009%
-120	-175	0.000009%	-140	-160	0.001748%	-155	-195	0.000009%
-120	-180	0.000009%	-140	-165	0.000164%	-155	-200	0.000009%
-120	-190	0.000017%	-140	-170	0.000164%	-155	-250	0.000009%
-120	-200	0.000009%	-140	-175	0.000026%	-155	-280	0.000009%
-120	-220	0.000009%	-140	-180	0.000061%	-160	-170	0.007704%
-120	-285	0.000009%	-140	-185	0.000009%	-160	-175	0.000502%
-120	-420	0.000009%	-140	-190	0.000009%	-160	-180	0.000571%
-125	-135	0.010473%	-140	-200	0.000009%	-160	-185	0.000052%
-125	-140	0.002545%	-140	-210	0.000009%	-160	-190	0.000052%
-125	-145	0.000692%	-140	-215	0.000009%	-160	-195	0.000017%
-125	-150	0.000260%	-140	-235	0.000009%	-160	-200	0.000017%

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 22 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-160	-205	0.000009%	-180	-210	0.000035%	-210	-245	0.000009%
-160	-210	0.000009%	-180	-220	0.000009%	-210	-250	0.000009%
-160	-215	0.000009%	-180	-230	0.000009%	-210	-260	0.000009%
-160	-220	0.000009%	-180	-240	0.000009%	-210	-280	0.000009%
-160	-230	0.000009%	-180	-260	0.000009%	-210	-310	0.000009%
-160	-240	0.000009%	-180	-270	0.000009%	-210	-315	0.000009%
-165	-175	0.002199%	-180	-320	0.000009%	-215	-225	0.000095%
-165	-180	0.000493%	-180	-410	0.000009%	-215	-230	0.000009%
-165	-185	0.000147%	-185	-195	0.001169%	-215	-235	0.000009%
-165	-190	0.000052%	-185	-200	0.000208%	-215	-240	0.000009%
-165	-195	0.000017%	-185	-205	0.000087%	-215	-250	0.000009%
-165	-200	0.000017%	-185	-210	0.000017%	-215	-255	0.000009%
-165	-205	0.000009%	-185	-215	0.000009%	-215	-270	0.000009%
-165	-210	0.000009%	-185	-220	0.000009%	-220	-230	0.000087%
-165	-225	0.000009%	-185	-280	0.000009%	-220	-235	0.000017%
-165	-320	0.000009%	-190	-200	0.001099%	-220	-240	0.000017%
-170	-180	0.002527%	-190	-205	0.000130%	-220	-245	0.000009%
-170	-185	0.000372%	-190	-210	0.000147%	-220	-250	0.000009%
-170	-190	0.000303%	-190	-215	0.000017%	-220	-270	0.000009%
-170	-195	0.000026%	-190	-220	0.000026%	-220	-275	0.000009%
-170	-200	0.000035%	-190	-230	0.000017%	-220	-310	0.000009%
-170	-205	0.000009%	-190	-240	0.000017%	-220	-440	0.000009%
-170	-210	0.000017%	-190	-250	0.000009%	-225	-235	0.000061%
-170	-215	0.000009%	-190	-260	0.000009%	-225	-240	0.000017%
-170	-220	0.000009%	-190	-275	0.000009%	-225	-245	0.000009%
-170	-225	0.000009%	-190	-290	0.000009%	-225	-250	0.000009%
-170	-230	0.000009%	-190	-320	0.000009%	-225	-275	0.000009%
-170	-240	0.000009%	-190	-330	0.000009%	-225	-375	0.000009%
-170	-250	0.000009%	-195	-205	0.000485%	-230	-240	0.000052%
-170	-290	0.000009%	-195	-210	0.000121%	-230	-245	0.000026%
-170	-330	0.000009%	-195	-215	0.000035%	-230	-250	0.000017%
-170	-340	0.000009%	-195	-220	0.000009%	-230	-255	0.000009%
-170	-350	0.000009%	-195	-235	0.000009%	-230	-260	0.000009%
-175	-185	0.001558%	-195	-240	0.000009%	-230	-265	0.000009%
-175	-190	0.000441%	-195	-250	0.000009%	-230	-270	0.000009%
-175	-195	0.000113%	-200	-210	0.000770%	-230	-290	0.000009%
-175	-200	0.000035%	-200	-215	0.000095%	-235	-245	0.000043%
-175	-205	0.000009%	-200	-220	0.000061%	-235	-250	0.000017%
-175	-210	0.000009%	-200	-225	0.000009%	-235	-255	0.000017%
-175	-215	0.000009%	-200	-230	0.000017%	-235	-260	0.000009%
-175	-220	0.000009%	-200	-260	0.000009%	-235	-280	0.000009%
-175	-225	0.000009%	-200	-300	0.000009%	-240	-250	0.000061%
-175	-245	0.000009%	-205	-215	0.000346%	-240	-255	0.000009%
-175	-255	0.000009%	-205	-220	0.000078%	-240	-260	0.000009%
-175	-260	0.000009%	-205	-225	0.000017%	-240	-275	0.000009%
-175	-345	0.000009%	-205	-230	0.000009%	-240	-300	0.000009%
-180	-190	0.002008%	-210	-220	0.000355%	-245	-255	0.000017%
-180	-195	0.000303%	-210	-225	0.000043%	-245	-260	0.000017%
-180	-200	0.000329%	-210	-230	0.000052%	-245	-265	0.000009%
-180	-205	0.000026%	-210	-240	0.000009%	-245	-270	0.000009%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.46 Empty 110-ton tank car—longitudinal coupler load (kip) (page 23 of 23)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-250	-260	0.000043%	-275	-305	0.000009%	-320	-370	0.000009%
-250	-265	0.000017%	-275	-310	0.000009%	-320	-420	0.000009%
-250	-270	0.000009%	-275	-320	0.000009%	-325	-335	0.000009%
-250	-275	0.000009%	-280	-290	0.000009%	-330	-340	0.000017%
-250	-280	0.000009%	-280	-300	0.000009%	-330	-355	0.000009%
-250	-290	0.000009%	-285	-295	0.000009%	-330	-370	0.000009%
-250	-430	0.000009%	-285	-300	0.000009%	-330	-500	0.000009%
-255	-265	0.000026%	-285	-360	0.000009%	-335	-350	0.000009%
-255	-270	0.000009%	-290	-300	0.000017%	-335	-385	0.000009%
-255	-285	0.000009%	-290	-305	0.000009%	-340	-355	0.000009%
-255	-295	0.000009%	-290	-360	0.000009%	-340	-360	0.000009%
-260	-270	0.000017%	-295	-305	0.000009%	-345	-355	0.000009%
-260	-275	0.000009%	-295	-310	0.000009%	-345	-360	0.000009%
-260	-280	0.000009%	-295	-315	0.000009%	-360	-370	0.000009%
-260	-285	0.000009%	-300	-310	0.000009%	-370	-380	0.000009%
-260	-320	0.000009%	-305	-315	0.000009%	-375	-385	0.000009%
-260	-510	0.000009%	-305	-330	0.000009%	-380	-410	0.000009%
-265	-275	0.000009%	-310	-320	0.000009%	-385	-400	0.000009%
-265	-295	0.000009%	-310	-330	0.000009%	-390	-400	0.000009%
-265	-300	0.000009%	-315	-335	0.000009%	-400	-410	0.000009%
-270	-280	0.000017%	-320	-330	0.000009%	-400	-420	0.000009%
-270	-285	0.000009%	-320	-335	0.000009%	-410	-420	0.000009%
-270	-320	0.000009%	-320	-340	0.000009%	-420	-440	0.000009%
-275	-285	0.000009%	-320	-350	0.000009%	-430	-470	0.000009%
-275	-290	0.000009%	-320	-360	0.000009%	-470	-500	0.000009%

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

7.3.2.46 Coupler Vertical Load—Empty 110-ton Tank Car

Test Date	September 2006–December 2008
Test Mode	General Service—Empty
Max MPH	54
Average MPH	24.8
Recorded Mileage	10,769
Total Number of Cycles	106,826
Average Cycles/Mile	9.9
Track Class	Various

Travel Speed Distribution		
Range (mph)		Percent at Level
0	10	20.2
10	20	17.8
20	30	23.1
30	40	26.2
40	50	12.0
50	60	0.6

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.47 Empty 110-ton tank car—coupler vertical load (kip)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
55	-10	0.000936%	25	-15	0.031827%	5	-10	1.144852%
45	35	0.000936%	25	-20	0.018722%	5	-15	0.219984%
45	-5	0.000936%	25	-25	0.007489%	5	-20	0.042125%
45	-25	0.000936%	25	-30	0.001872%	5	-25	0.014978%
45	-40	0.000936%	25	-35	0.001872%	5	-30	0.003744%
40	35	0.000936%	25	-40	0.000936%	5	-35	0.001872%
40	30	0.000936%	25	-45	0.000936%	5	-40	0.000936%
40	25	0.000936%	20	15	0.070208%	0	-5	9.388164%
40	-10	0.000936%	20	10	0.198454%	0	-10	2.241964%
40	-15	0.000936%	20	5	0.180668%	0	-15	0.295808%
40	-20	0.000936%	20	0	0.159137%	0	-20	0.058038%
40	-25	0.000936%	20	-5	0.130118%	0	-25	0.014042%
40	-35	0.000936%	20	-10	0.159137%	0	-30	0.005617%
40	-45	0.000936%	20	-15	0.073952%	0	-35	0.000936%
35	30	0.000936%	20	-20	0.023403%	0	-40	0.000936%
35	25	0.006553%	20	-25	0.005617%	-5	-10	0.907083%
35	20	0.000936%	20	-30	0.001872%	-5	-15	0.418437%
35	15	0.000936%	20	-35	0.001872%	-5	-20	0.068335%
35	0	0.000936%	20	-40	0.000936%	-5	-25	0.015914%
35	-5	0.002808%	20	-55	0.000936%	-5	-30	0.004681%
35	-10	0.002808%	15	10	0.745137%	-5	-35	0.000936%
35	-15	0.002808%	15	5	2.016363%	-5	-40	0.000936%
35	-20	0.001872%	15	0	1.034392%	-10	-15	0.263045%
35	-25	0.001872%	15	-5	0.610338%	-10	-20	0.109524%
35	-30	0.001872%	15	-10	0.253684%	-10	-25	0.015914%
35	-40	0.000936%	15	-15	0.129182%	-10	-30	0.006553%
30	25	0.008425%	15	-20	0.031827%	-10	-35	0.001872%
30	20	0.006553%	15	-25	0.009361%	-10	-40	0.000936%
30	15	0.001872%	15	-30	0.005617%	-15	-20	0.073952%
30	10	0.001872%	15	-35	0.002808%	-15	-25	0.064591%
30	5	0.003744%	15	-40	0.000936%	-15	-30	0.013105%
30	0	0.008425%	15	-45	0.000936%	-15	-35	0.001872%
30	-5	0.008425%	15	-50	0.000936%	-15	-40	0.001872%
30	-10	0.009361%	10	5	10.085560%	-20	-25	0.042125%
30	-15	0.010297%	10	0	12.955648%	-20	-30	0.040252%
30	-20	0.007489%	10	-5	2.807369%	-20	-35	0.008425%
30	-25	0.005617%	10	-10	0.497070%	-20	-40	0.001872%
30	-30	0.001872%	10	-15	0.132926%	-25	-30	0.028083%
30	-35	0.000936%	10	-20	0.043061%	-25	-35	0.014978%
30	-45	0.000936%	10	-25	0.016850%	-25	-40	0.001872%
25	20	0.018722%	10	-30	0.008425%	-30	-35	0.005617%
25	15	0.028083%	10	-35	0.001872%	-30	-40	0.002808%
25	10	0.026211%	10	-40	0.000936%	-30	-45	0.000936%
25	5	0.030891%	10	-45	0.000936%	-30	-50	0.000936%
25	0	0.049613%	10	-50	0.000936%	-35	-40	0.000936%
25	-5	0.029019%	5	0	38.699380%	-45	-50	0.000936%
25	-10	0.033700%	5	-5	12.953775%			

AAR Manual of Standards and Recommended Practices Design, Fabrication, and Construction of Freight Cars

7.3.2.47 Car Body Twist Moment—Empty 110-ton Tank Car

Test Date	September 2006–December 2008
Test Mode	General Service—Empty
Max MPH	54
Average MPH	24.8
Recorded Mileage	9,738
Total Number of Cycles	84,480
Average Cycles/Mile	8.7
Track Class	Various

Travel Speed Distribution		
Range (mph)		Percent at Level
0	10	20.2
10	20	17.8
20	30	23.1
30	40	26.2
40	50	12.0
50	60	0.6

Table 7.48 Empty 110-ton tank car—car body twist moment (in.-kip)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
2500	-250	0.00135%	500	0	13.49828%
1000	250	0.00338%	500	-250	1.80772%
1000	-250	0.00270%	500	-500	0.05574%
1000	-500	0.00270%	500	-750	0.00270%
1000	-750	0.00270%	250	0	76.51922%
750	500	0.03040%	250	-250	11.54665%
750	250	0.07939%	250	-500	0.05473%
750	0	0.04797%	0	-250	3.48842%
750	-250	0.02770%	0	-500	0.07196%
750	-500	0.01216%	-250	-500	0.01892%
750	-750	0.00946%	-500	750	0.00135%
500	250	6.87380%			

**AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars**

M-1001

CHAPTER 7

7.3.2.48 Standard Bolster Side-Bearing Load—Loaded Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	75
Average MPH	32.3
Recorded Mileage	24,245
Total Number of Cycles	741
Average Cycles/Mile	0.03
Track Class	Various

Table 7.49 Fully loaded ARC-5 Car—intermodal standard bolster side-bearing load (kip)

Maximum Load	Minimum Load	Percent Occurrence
35	10	0.134953
30	5	0.134953
25	10	0.404858
20	15	0.809717
20	10	2.159244
20	5	0.539811
20	0	0.404858
20	-5	0.134953
20	-10	0.404858
15	10	7.287449
15	5	2.294197
15	0	1.349528
15	-5	0.809717
15	-10	0.269906
15	-15	0.134953
10	5	12.280702
10	0	4.453441
10	-5	1.754386
10	-10	0.269906
10	-15	0.134953
5	0	31.713900
5	-5	8.502025
5	-10	1.079622
5	-15	0.134953
0	-5	20.107962
0	-10	1.349528
-5	-10	0.944669

**AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars**

7.3.2.49 Standard Bolster Vertical Load—Loaded Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	75
Average MPH	32.3
Recorded Mileage	23,110
Total Number of Cycles	3,316,377
Average Cycles/Mile	143.5
Track Class	Various

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.50 Fully loaded ARC-5 Car—intermodal standard bolster total vertical load (kip) (page 1 of 2)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
120	115	0.000060	85	75	0.000211
115	30	0.000030	85	70	0.000030
115	20	0.000030	85	65	0.000211
110	25	0.000030	85	60	0.001417
105	100	0.000060	85	55	0.001417
105	30	0.000060	85	50	0.001870
105	25	0.000090	85	45	0.002925
105	20	0.000030	85	40	0.002834
100	95	0.000151	85	35	0.001930
100	45	0.000060	85	30	0.001960
100	40	0.000060	85	25	0.000543
100	35	0.000121	85	20	0.000211
100	30	0.000030	85	15	0.000060
100	25	0.000060	80	75	0.004553
100	20	0.000030	80	70	0.001327
95	90	0.000211	80	65	0.003860
95	85	0.000060	80	60	0.008021
95	50	0.000121	80	55	0.008533
95	45	0.000151	80	50	0.007930
95	40	0.000211	80	45	0.009800
95	35	0.000302	80	40	0.006754
95	30	0.000211	80	35	0.006031
95	25	0.000030	80	30	0.002684
95	20	0.000090	80	25	0.000844
95	15	0.000030	80	20	0.000121
90	85	0.000543	80	15	0.000090
90	80	0.000121	80	5	0.000030
90	60	0.000121	75	70	0.030726
90	55	0.000241	75	65	0.050628
90	50	0.000482	75	60	0.076499
90	45	0.000633	75	55	0.045743
90	40	0.000995	75	50	0.038777
90	35	0.000784	75	45	0.029038
90	30	0.000482	75	40	0.022072
90	25	0.000422	75	35	0.015258
90	20	0.000181	75	30	0.004734
90	15	0.000060	75	25	0.000784
90	10	0.000030	75	20	0.000452
90	5	0.000030	75	15	0.000060
85	80	0.001568	70	65	0.852949

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

Table 7.50 Fully loaded ARC-5 Car—intermodal standard bolster total vertical load (kip) (page 2 of 2)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
70	60	0.629000	55	30	0.036938
70	55	0.243941	55	25	0.011488
70	50	0.138495	55	20	0.000784
70	45	0.097034	55	15	0.000121
70	40	0.070830	55	10	0.000030
70	35	0.026173	50	45	15.659317
70	30	0.005518	50	40	1.532365
70	25	0.001055	50	35	0.213727
70	20	0.000905	50	30	0.073755
70	15	0.000060	50	25	0.008533
65	60	4.921033	50	20	0.000633
65	55	1.795393	50	15	0.000181
65	50	0.737612	50	10	0.000121
65	45	0.405563	45	40	3.825228
65	40	0.180076	45	35	0.887866
65	35	0.039953	45	30	0.085093
65	30	0.006965	45	25	0.006001
65	25	0.002834	45	20	0.000874
65	20	0.001538	45	15	0.000482
65	15	0.000030	40	35	3.170719
65	10	0.000030	40	30	0.228442
60	55	14.116368	40	25	0.012122
60	50	5.948479	40	20	0.002352
60	45	1.760475	40	15	0.000422
60	40	0.374475	40	10	0.000030
60	35	0.051261	35	30	0.578161
60	30	0.014685	35	25	0.085666
60	25	0.008262	35	20	0.003528
60	20	0.001417	35	15	0.000030
60	15	0.000030	30	25	0.293905
60	10	0.000030	30	20	0.001236
55	50	31.958549	25	20	0.001236
55	45	7.681485	15	10	0.000030
55	40	0.725732	15	5	0.000030
55	35	0.080268	10	5	0.000060

**AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars**

M-1001

CHAPTER 7

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**AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars**

7.3.2.50 Standard Bolster Center-Plate Load—Loaded Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	75
Average MPH	32.3
Recorded Mileage	23,110
Total Number of Cycles	3,414,959
Average Cycles/Mile	147.8
Track Class	Various

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.51 Fully loaded ARC-5 Car—intermodal standard bolster center-plate load (kip)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
25	20	0.000146	70	20	0.000439	85	45	0.002430
30	25	0.000205	70	25	0.001845	85	50	0.000878
35	25	0.000029	70	30	0.005271	85	55	0.001113
35	30	0.002870	70	35	0.022724	85	60	0.001435
40	30	0.004451	70	40	0.076458	85	65	0.001991
40	35	0.414500	70	45	0.136693	85	70	0.006413
45	20	0.000029	70	50	0.171891	85	75	0.007526
45	25	0.000351	70	55	0.265040	85	80	0.009136
45	30	0.012094	70	60	0.644195	90	20	0.000176
45	35	0.203136	70	65	1.116880	90	25	0.000410
45	40	3.379689	75	5	0.000029	90	30	0.000703
50	10	0.000029	75	15	0.000029	90	35	0.000732
50	20	0.000029	75	20	0.000234	90	40	0.000996
50	25	0.001406	75	25	0.001230	90	45	0.000439
50	30	0.015051	75	30	0.004246	90	50	0.000146
50	35	0.118098	75	35	0.015256	90	55	0.000264
50	40	1.388040	75	40	0.029224	90	60	0.000234
50	45	13.522534	75	45	0.034466	90	65	0.000644
55	20	0.000117	75	50	0.036838	90	70	0.000527
55	25	0.002138	75	55	0.039210	90	75	0.000088
55	30	0.015374	75	60	0.094203	90	80	0.000381
55	35	0.097366	75	65	0.100675	90	85	0.007701
55	40	0.511661	75	70	0.163897	95	15	0.000029
55	45	6.598674	80	15	0.000029	95	20	0.000117
55	50	36.207287	80	20	0.000264	95	25	0.000088
60	20	0.000381	80	25	0.000674	95	30	0.000205
60	25	0.002489	80	30	0.003075	95	35	0.000234
60	30	0.016311	80	35	0.006969	95	40	0.000146
60	35	0.051187	80	40	0.009751	95	45	0.000029
60	40	0.299272	80	45	0.009780	95	60	0.000059
60	45	1.818587	80	50	0.006237	95	65	0.000088
60	50	7.914736	80	55	0.006911	95	70	0.000059
60	55	16.313812	80	60	0.010073	95	90	0.000146
65	20	0.000234	80	65	0.007467	100	20	0.000088
65	25	0.002870	80	70	0.036750	100	25	0.000088
65	30	0.008961	80	75	0.107615	100	30	0.000088
65	35	0.035140	85	5	0.000029	100	35	0.000029
65	40	0.164336	85	15	0.000088	100	90	0.000029
65	45	0.491163	85	20	0.000088	100	95	0.000029
65	50	0.980832	85	25	0.000732	105	20	0.000059
65	55	2.146058	85	30	0.001757	105	100	0.000059
65	60	4.037442	85	35	0.002694	110	20	0.000059
70	15	0.000029	85	40	0.002782	115	110	0.000029

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

7.3.2.51 Articulated Bolster Side-Bearing Load—Loaded Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	75
Average MPH	32.3
Recorded Mileage	20,138
Total Number of Cycles	1,212,111
Average Cycles/Mile	60.2
Track Class	Various

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.52 Fully loaded ARC-5 Car—articulated bolster side-bearing load (kip)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
60	-45	0.000083	25	-15	0.007425	5	-10	1.646714
55	50	0.000083	25	-20	0.008250	5	-15	0.593345
45	-35	0.000165	25	-25	0.004868	5	-20	0.261445
45	-40	0.000083	25	-30	0.001485	5	-25	0.117233
40	35	0.000083	25	-35	0.000743	5	-30	0.044633
40	20	0.000083	25	-40	0.000825	5	-35	0.010065
40	-15	0.000165	25	-45	0.000330	5	-40	0.001238
40	-20	0.000083	25	-50	0.000083	0	-5	32.201920
40	-25	0.000165	20	15	0.144294	0	-10	8.468862
40	-30	0.000413	20	10	0.315318	0	-15	1.741012
40	-35	0.000330	20	5	0.186947	0	-20	0.455156
35	30	0.000908	20	0	0.086296	0	-25	0.131919
35	25	0.000330	20	-5	0.029618	0	-30	0.030195
35	20	0.000083	20	-10	0.021945	0	-35	0.004125
35	15	0.000165	20	-15	0.024420	0	-40	0.000413
35	5	0.000743	20	-20	0.013530	-5	-10	18.983162
35	0	0.000165	20	-25	0.009075	-5	-15	4.267843
35	-5	0.000248	20	-30	0.006930	-5	-20	0.683106
35	-15	0.000083	20	-35	0.005363	-5	-25	0.125484
35	-20	0.000743	20	-40	0.001733	-5	-30	0.025740
35	-25	0.000495	20	-45	0.000743	-5	-35	0.003548
35	-30	0.001320	15	10	0.829957	-5	-40	0.000495
35	-35	0.000165	15	5	0.565707	-10	-15	4.404547
35	-45	0.000083	15	0	0.180842	-10	-20	0.640205
35	-50	0.000083	15	-5	0.077386	-10	-25	0.101723
30	25	0.006188	15	-10	0.060143	-10	-30	0.015923
30	20	0.002063	15	-15	0.040013	-10	-35	0.002805
30	15	0.000743	15	-20	0.032505	-10	-40	0.000413
30	10	0.001073	15	-25	0.037538	-15	-20	1.025401
30	5	0.002970	15	-30	0.020130	-15	-25	0.197589
30	0	0.002475	15	-35	0.009653	-15	-30	0.026400
30	-5	0.001320	15	-40	0.002228	-15	-35	0.004290
30	-10	0.001980	15	-45	0.000825	-15	-40	0.000578
30	-15	0.001568	10	5	1.705124	-15	-45	0.000083
30	-20	0.003465	10	0	0.579980	-20	-25	0.383133
30	-25	0.003300	10	-5	0.251297	-20	-30	0.058163
30	-30	0.001485	10	-10	0.149409	-20	-35	0.006765
30	-35	0.000578	10	-15	0.116656	-20	-40	0.000578
30	-40	0.000083	10	-20	0.109313	-20	-45	0.000083
25	20	0.030525	10	-25	0.081263	-25	-30	0.083078
25	15	0.010808	10	-30	0.039683	-25	-35	0.011220
25	10	0.020460	10	-35	0.012870	-25	-40	0.001238
25	5	0.021285	10	-40	0.003383	-30	-35	0.012788
25	0	0.015840	10	-45	0.000495	-30	-40	0.001485
25	-5	0.008993	5	0	12.051289	-35	-40	0.002228
25	-10	0.007095	5	-5	5.242012	-40	-45	0.000083

AAR Manual of Standards and Recommended Practices Design, Fabrication, and Construction of Freight Cars

7.3.2.52 Articulated Bolster Vertical Load—Loaded Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	75
Average MPH	32.3
Recorded Mileage	9,359
Total Number of Cycles	219,697
Average Cycles/Mile	23.5
Track Class	Various

Table 7.53 Fully loaded ARC-5 Car—articulated bolster total vertical load (kip)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
120	50	0.000455	80	60	2.019600
110	80	0.001366	80	50	0.885765
110	70	0.001821	80	40	0.186621
110	60	0.002731	80	30	0.011834
110	40	0.000455	80	20	0.000910
110	30	0.001821	80	10	0.000455
110	20	0.000455	70	60	44.695194
110	10	0.000455	70	50	4.687365
100	90	0.036869	70	40	0.363228
100	80	0.080566	70	30	0.028221
100	70	0.040055	70	20	0.003186
100	60	0.008193	60	50	24.956644
100	50	0.006828	60	40	1.001379
100	40	0.011379	60	30	0.065090
100	30	0.002731	60	20	0.005462
100	10	0.000455	60	10	0.000455
90	80	2.845282	50	40	6.110689
90	70	0.362772	50	30	0.133365
90	60	0.124262	50	20	0.026400
90	50	0.124717	40	30	2.258565
90	40	0.050069	40	20	0.009559
90	30	0.008648	30	20	0.002731
80	70	8.834895			

**AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars**

M-1001

CHAPTER 7

7.3.2.53 Articulated Bolster Center-Plate Load—Loaded Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	75
Average MPH	32.3
Recorded Mileage	6,342
Total Number of Cycles	189,607
Average Cycles/Mile	29.9
Track Class	Various

Table 7.54 Fully loaded ARC-5 Car—articulated bolster center-plate load (kip)

Maximum Load	Minimum Load	Percent Occurrence
110	30	0.000527
110	10	0.000527
100	50	0.001055
100	40	0.003692
100	30	0.003164
100	20	0.003692
90	80	0.002637
90	60	0.008439
90	50	0.049576
90	40	0.056960
90	30	0.027953
90	20	0.001582
80	70	0.418761
80	60	0.975175
80	50	0.710944
80	40	0.336485
80	30	0.076474
80	20	0.005274
70	60	24.587700
70	50	6.869999
70	40	1.235186
70	30	0.154530
70	20	0.005801
60	50	47.064190
60	40	4.175479
60	30	0.259484
60	20	0.005274
50	40	12.542786
50	30	0.219401
50	20	0.002110
40	30	0.190394
40	20	0.002637
30	20	0.002110

7.3.2.54 Articulated Connector Vertical Load—Loaded Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	75
Average MPH	32.3
Recorded Mileage	14,683
Total Number of Cycles	2,559,912
Average Cycles/Mile	174.3
Track Class	Various

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.55 Fully loaded ARC-5 Car—articulated connector vertical load (kip) (page 1 of 2)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-30	-35	0.000039	25	-15	0.000039	45	-5	0.008203
-25	-30	0.000039	25	-10	0.000508	45	0	0.035587
-20	-30	0.000078	25	-5	0.002149	45	5	0.122934
-20	-25	0.000117	25	0	0.034962	45	10	0.331261
-15	-30	0.000039	25	5	0.202312	45	15	0.693422
-15	-25	0.000039	25	10	0.593263	45	20	1.165665
-15	-20	0.000039	25	15	1.501575	45	25	1.481457
-10	-15	0.000547	25	20	4.815595	45	30	1.842251
-5	-15	0.000234	30	-15	0.000156	45	35	2.835918
-5	-10	0.001094	30	-10	0.000664	45	40	5.107949
0	-30	0.000039	30	-5	0.004375	50	-25	0.000078
0	-20	0.000039	30	0	0.038244	50	-20	0.000352
0	-15	0.000039	30	5	0.209656	50	-15	0.000547
0	-10	0.000703	30	10	0.608966	50	-10	0.001797
0	-5	0.004922	30	15	1.289146	50	-5	0.007422
5	-25	0.000039	30	20	3.228744	50	0	0.028790
5	-20	0.000039	30	25	8.603148	50	5	0.078089
5	-15	0.000078	35	-20	0.000039	50	10	0.155865
5	-10	0.000430	35	-15	0.000508	50	15	0.257274
5	-5	0.002461	35	-10	0.001328	50	20	0.328410
5	0	0.033165	35	-5	0.004805	50	25	0.387982
10	-30	0.000039	35	0	0.037111	50	30	0.505174
10	-15	0.000156	35	5	0.225555	50	35	0.865811
10	-10	0.000391	35	10	0.525565	50	40	1.634275
10	-5	0.002109	35	15	1.119335	50	45	3.355272
10	0	0.015391	35	20	2.706265	55	-35	0.000078
10	5	0.249501	35	25	5.161115	55	-30	0.000078
15	-30	0.000039	35	30	9.749788	55	-25	0.000039
15	-20	0.000078	40	-20	0.000117	55	-20	0.000469
15	-15	0.000078	40	-15	0.000586	55	-15	0.000469
15	-10	0.000273	40	-10	0.001289	55	-10	0.001563
15	-5	0.002070	40	-5	0.006211	55	-5	0.004688
15	0	0.014102	40	0	0.037736	55	0	0.015782
15	5	0.139809	40	5	0.143481	55	5	0.026251
15	10	0.983589	40	10	0.413374	55	10	0.041095
20	-20	0.000078	40	15	1.045778	55	15	0.051721
20	-15	0.000039	40	20	2.017022	55	20	0.063166
20	-10	0.000508	40	25	3.162960	55	25	0.089730
20	-5	0.001641	40	30	4.697661	55	30	0.182311
20	0	0.018126	40	35	7.897928	55	35	0.402709
20	5	0.165123	45	-25	0.000039	55	40	0.830107
20	10	0.635725	45	-20	0.000313	55	45	1.559936
20	15	2.348323	45	-15	0.000664	55	50	2.932796
25	-25	0.000078	45	-10	0.001875	60	-45	0.000039

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

Table 7.55 Fully loaded ARC-5 Car—articulated connector vertical load (kip) (page 2 of 2)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
60	-35	0.000078	70	-15	0.000117	80	5	0.000117
60	-30	0.000039	70	-10	0.000078	80	10	0.000234
60	-25	0.000078	70	-5	0.000195	80	15	0.000117
60	-20	0.000352	70	0	0.000234	80	20	0.000195
60	-15	0.000273	70	5	0.000352	80	25	0.000156
60	-10	0.000703	70	10	0.000469	80	30	0.000117
60	-5	0.002461	70	15	0.000859	80	35	0.000430
60	0	0.003985	70	20	0.005156	80	40	0.000742
60	5	0.005703	70	25	0.014883	80	45	0.001211
60	10	0.006250	70	30	0.027384	80	50	0.002109
60	15	0.010118	70	35	0.044728	80	55	0.001836
60	20	0.016602	70	40	0.047424	80	60	0.002539
60	25	0.061838	70	45	0.040470	80	65	0.004961
60	30	0.154458	70	50	0.043244	80	70	0.007657
60	35	0.317628	70	55	0.055744	80	75	0.008633
60	40	0.596974	70	60	0.113988	85	-30	0.000039
60	45	0.908508	70	65	0.202429	85	0	0.000039
60	50	1.261293	75	-30	0.000078	85	10	0.000039
60	55	1.647361	75	-25	0.000078	85	15	0.000039
65	-25	0.000039	75	-15	0.000039	85	20	0.000039
65	-20	0.000156	75	-5	0.000078	85	25	0.000039
65	-15	0.000273	75	0	0.000117	85	35	0.000117
65	-10	0.000625	75	5	0.000313	85	40	0.000273
65	-5	0.000742	75	10	0.000117	85	45	0.000234
65	0	0.000586	75	15	0.000430	85	50	0.000313
65	5	0.000742	75	20	0.000898	85	55	0.000508
65	10	0.001445	75	25	0.001719	85	60	0.000352
65	15	0.001953	75	30	0.003516	85	65	0.000391
65	20	0.013047	75	35	0.006367	85	70	0.000195
65	25	0.051994	75	40	0.005391	85	75	0.000547
65	30	0.100277	75	45	0.004180	85	80	0.001367
65	35	0.204499	75	50	0.005821	90	-5	0.000039
65	40	0.249305	75	55	0.009883	90	35	0.000078
65	45	0.293057	75	60	0.020001	90	40	0.000039
65	50	0.317511	75	65	0.030821	90	45	0.000039
65	55	0.369466	75	70	0.056525	90	50	0.000156
65	60	0.470446	80	-45	0.000039	90	55	0.000039
70	-35	0.000078	80	-20	0.000039	90	80	0.000078
70	-25	0.000078	80	-15	0.000117	90	85	0.000156
70	-20	0.000117	80	0	0.000039	100	-35	0.000039

**AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars**

M-1001

CHAPTER 7

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7.3.2.55 Articulated Connector Lateral Load—Loaded Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	75
Average MPH	32.3
Recorded Mileage	24,245
Total Number of Cycles	1,512,779
Average Cycles/Mile	62.4
Track Class	Various

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.56 Fully loaded ARC-5 Car—articulated connector lateral load (kip) (page 1 of 3)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
80	-100	0.000066	50	10	0.000060	40	10	0.000132
75	40	0.000066	50	-5	0.000066	40	5	0.000132
70	65	0.000066	50	-10	0.000066	40	0	0.000132
65	-10	0.000066	50	-15	0.000066	40	-5	0.000529
65	-25	0.000066	50	-20	0.000198	40	-10	0.000198
65	-65	0.000066	50	-25	0.000132	40	-15	0.000463
65	-90	0.000066	50	-35	0.000397	40	-20	0.000529
60	55	0.000264	50	-40	0.000198	40	-25	0.000397
60	50	0.000198	50	-50	0.000066	40	-30	0.000595
60	45	0.000066	50	-65	0.000066	40	-35	0.000595
60	25	0.000066	50	-70	0.000066	40	-40	0.000132
60	5	0.000066	50	-75	0.000198	40	-45	0.000198
60	-10	0.000066	50	-80	0.000132	40	-50	0.000264
60	-20	0.000198	50	-85	0.000132	40	-55	0.000198
60	-45	0.000066	50	-90	0.000066	40	-75	0.000066
60	-65	0.000066	45	40	0.003041	40	-80	0.000066
60	-85	0.000132	45	35	0.001454	35	30	0.013551
60	-90	0.000066	45	30	0.000925	35	25	0.003768
60	-95	0.000066	45	25	0.000198	35	20	0.001983
55	50	0.000859	45	20	0.000132	35	15	0.001058
55	45	0.000331	45	15	0.000198	35	10	0.001256
55	40	0.000132	45	10	0.000066	35	5	0.000727
55	35	0.000132	45	5	0.000132	35	0	0.000595
55	-5	0.000066	45	0	0.000066	35	-5	0.000463
55	-10	0.000066	45	-5	0.000198	35	-10	0.000331
55	-20	0.000066	45	-15	0.000529	35	-15	0.001124
55	-25	0.000066	45	-20	0.000595	35	-20	0.000925
55	-30	0.000066	45	-25	0.000198	35	-25	0.001454
55	-50	0.000066	45	-30	0.000529	35	-30	0.000595
55	-55	0.000066	45	-35	0.000331	35	-35	0.000529
55	-65	0.000066	45	-40	0.000198	35	-40	0.000331
55	-70	0.000066	45	-45	0.000066	35	-45	0.000264
55	-75	0.000132	45	-50	0.000066	35	-50	0.000198
55	-85	0.000132	45	-55	0.000066	35	-55	0.000066
55	-90	0.000066	45	-75	0.000066	35	-60	0.000066
50	45	0.002181	40	35	0.007007	35	-70	0.000066
50	40	0.000397	40	30	0.002380	30	25	0.028226
50	35	0.000463	40	25	0.001058	30	20	0.012956
50	30	0.000264	40	20	0.000264	30	15	0.007271
50	25	0.000066	40	15	0.000066	30	10	0.004098

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.56 Fully loaded ARC-5 Car—articulated connector lateral load (kip) (page 2 of 3)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
30	5	0.005553	20	-35	0.000397	0	-10	1.027976
30	0	0.003371	20	-40	0.000198	0	-15	0.104444
30	-5	0.003239	20	-45	0.000132	0	-20	0.011700
30	-10	0.002115	20	-60	0.000066	0	-25	0.003107
30	-15	0.003371	20	-75	0.000066	0	-30	0.001520
30	-20	0.002776	20	-80	0.000066	0	-35	0.000463
30	-25	0.001124	15	10	5.774076	0	-40	0.000198
30	-30	0.000992	15	5	2.619219	0	-45	0.000132
30	-35	0.000331	15	0	1.774152	0	-50	0.000132
30	-40	0.000595	15	-5	0.598633	-5	-10	1.433388
30	-45	0.000264	15	-10	0.117334	-5	-15	0.088645
30	-50	0.000066	15	-15	0.024062	-5	-20	0.015072
30	-60	0.000132	15	-20	0.008461	-5	-25	0.003900
25	20	0.110062	15	-25	0.001983	-5	-30	0.001388
25	15	0.117598	15	-30	0.000529	-5	-35	0.000397
25	10	0.069739	15	-35	0.000463	-5	-40	0.000132
25	5	0.048454	15	-50	0.000132	-10	-15	0.168366
25	0	0.012427	10	5	25.168383	-10	-20	0.021153
25	-5	0.010973	10	0	10.880506	-10	-25	0.005619
25	-10	0.012692	10	-5	2.081732	-10	-30	0.001520
25	-15	0.007866	10	-10	0.251193	-10	-35	0.000397
25	-20	0.003305	10	-15	0.042042	-10	-40	0.000066
25	-25	0.001388	10	-20	0.009254	-10	-45	0.000198
25	-30	0.000463	10	-25	0.002909	-10	-50	0.000066
25	-35	0.000529	10	-30	0.001058	-15	-20	0.046074
25	-40	0.000397	10	-35	0.000397	-15	-25	0.009651
25	-45	0.000132	10	-40	0.000198	-15	-30	0.003371
25	-50	0.000066	10	-45	0.000660	-15	-35	0.000793
25	-55	0.000066	10	-50	0.000198	-15	-40	0.000132
25	-60	0.000066	10	-60	0.000066	-15	-45	0.000066
20	15	2.731529	5	0	27.581556	-20	-25	0.021285
20	10	0.745449	5	-5	5.038872	-20	-30	0.004693
20	5	0.502916	5	-10	0.618663	-20	-35	0.001190
20	0	0.097304	5	-15	0.063922	-20	-40	0.000463
20	-5	0.083819	5	-20	0.013022	-20	-45	0.000595
20	-10	0.048652	5	-25	0.002975	-20	-50	0.000132
20	-15	0.014411	5	-30	0.002049	-20	-55	0.000066
20	-20	0.004759	5	-35	0.000397	-25	-30	0.009519
20	-25	0.001917	5	-40	0.000397	-25	-35	0.001653
20	-30	0.001256	0	-5	9.524325	-25	-40	0.001190

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.56 Fully loaded ARC-5 Car—articulated connector lateral load (kip) (page 3 of 3)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-25	-45	0.000264	-40	-50	0.000595	-55	-60	0.001719
-25	-50	0.000066	-40	-55	0.000198	-55	-65	0.000595
-25	-60	0.000066	-40	-60	0.000132	-55	-70	0.000529
-25	-75	0.000066	-40	-65	0.000066	-55	-75	0.000066
-30	-35	0.004561	-40	-70	0.000132	-55	-80	0.000066
-30	-40	0.001586	-40	-75	0.000066	-55	-85	0.000066
-30	-45	0.000529	-45	-50	0.002909	-60	-65	0.002049
-30	-50	0.000397	-45	-55	0.001388	-60	-70	0.000132
-30	-55	0.000198	-45	-60	0.000463	-60	-75	0.000132
-30	-60	0.000132	-45	-65	0.000132	-65	-70	0.000925
-30	-65	0.000066	-45	-70	0.000264	-65	-75	0.000132
-30	-75	0.000066	-45	-75	0.000066	-70	-75	0.000661
-35	-40	0.004297	-45	-80	0.000066	-75	-80	0.000463
-35	-45	0.001983	-50	-55	0.002909	-80	-85	0.000198
-35	-50	0.000331	-50	-60	0.000529	-80	-90	0.000066
-35	-55	0.000198	-50	-65	0.000264	-85	-90	0.000264
-35	-60	0.000264	-50	-70	0.000264	-85	-95	0.000132
-35	-70	0.000264	-50	-75	0.000132	-90	-95	0.000066
-35	-80	0.000066	-50	-80	0.000066	-95	-100	0.000066
-40	-45	0.002578	-50	-85	0.000066			

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

CHAPTER 7

M-1001

7.3.2.56 Articulated Connector Longitudinal Load—Loaded Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	75
Average MPH	32.3
Recorded Mileage	12,577
Total Number of Cycles	301,612
Average Cycles/Mile	24.0
Track Class	Various

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.57 Fully loaded ARC-5 Car—articulated connector longitudinal load (kip) (page 1 of 2)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
375	-150	0.000332	225	125	0.005968
350	300	0.000332	225	100	0.005305
325	300	0.000332	225	75	0.003316
325	-25	0.000332	225	50	0.004973
325	-175	0.000332	225	25	0.002984
300	275	0.000663	225	0	0.001326
300	250	0.000995	225	-25	0.000663
300	225	0.000663	225	-50	0.000332
300	200	0.000663	225	-100	0.000332
300	175	0.000332	225	-250	0.000332
300	150	0.000332	200	175	0.157156
300	125	0.000332	200	150	0.062332
300	75	0.000995	200	125	0.022214
300	50	0.000332	200	100	0.015914
275	250	0.005968	200	75	0.009947
275	225	0.007294	200	50	0.006963
275	200	0.002321	200	25	0.004310
275	175	0.001989	200	0	0.002652
275	150	0.001326	200	-25	0.001658
275	125	0.000663	200	-50	0.001326
275	100	0.000332	200	-75	0.000663
275	75	0.000332	200	-100	0.000995
275	50	0.000663	200	-125	0.000995
250	225	0.097476	200	-150	0.000332
250	200	0.010941	175	150	0.381948
250	175	0.005305	175	125	0.072610
250	150	0.004310	175	100	0.032161
250	125	0.003316	175	75	0.015251
250	100	0.001658	175	50	0.010610
250	75	0.001326	175	25	0.008620
250	50	0.001326	175	0	0.004310
250	25	0.000663	175	-25	0.003979
250	0	0.000995	175	-50	0.002984
250	-25	0.000663	175	-75	0.002321
250	-50	0.000332	175	-100	0.002984
250	-150	0.000663	175	-125	0.000995
250	-275	0.000332	175	-150	0.000332
225	200	0.094492	150	125	1.771813
225	175	0.018235	150	100	0.328899
225	150	0.015914	150	75	0.106097

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.57 Fully loaded ARC-5 Car—articulated connector longitudinal load (kip) (page 2 of 2)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
150	50	0.021882	75	-125	0.000332
150	25	0.012910	75	-150	0.000332
150	0	0.012267	50	25	9.278809
150	-25	0.008620	50	0	0.279830
150	-50	0.003979	50	-25	0.025198
150	-75	0.006299	50	-50	0.006631
150	-100	0.002321	50	-75	0.002652
150	-125	0.000332	50	-200	0.000332
150	-150	0.000332	25	0	2.168349
150	-175	0.000663	25	-25	0.072610
125	100	14.383380	25	-50	0.008620
125	75	1.459823	25	-75	0.003316
125	50	0.233744	25	-100	0.000663
125	25	0.038128	25	-125	0.000332
125	0	0.015583	25	-150	0.000332
125	-25	0.013262	0	-25	0.772516
125	-50	0.005968	0	-50	0.020225
125	-75	0.004642	0	-75	0.004310
125	-100	0.000663	0	-100	0.001989
125	-125	0.000332	0	-125	0.000995
125	-150	0.000995	-25	-50	0.055038
125	-200	0.000332	-25	-75	0.006963
100	75	39.454662	-25	-100	0.002321
100	50	2.948159	-25	-125	0.000995
100	25	0.125658	-50	-75	0.011604
100	0	0.215510	-50	-100	0.000995
100	-25	0.014257	-50	-125	0.000663
100	-50	0.007294	-50	-150	0.000663
100	-75	0.001989	-50	-175	0.000995
100	-100	0.000332	-75	-100	0.001989
100	-150	0.000995	-75	-125	0.000332
100	-220	0.000332	-100	-125	0.001326
75	50	24.482449	-100	-150	0.000332
75	25	0.548387	-125	-150	0.000663
75	0	0.065316	-125	-200	0.000332
75	-25	0.013262	-125	-250	0.000332
75	-50	0.005968	-150	-175	0.000332
75	-75	0.002984	-150	-200	0.000332
75	-100	0.000332	-175	-200	0.000332

**AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars**

M-1001

CHAPTER 7

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AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

7.3.2.57 Trailer-Hitch Vertical Load—Loaded Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	75
Average MPH	32.3
Recorded Mileage	20,082
Total Number of Cycles	6,045,382
Average Cycles/Mile	301.0
Track Class	Various

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.58 Fully loaded ARC-5 Car—trailer-hitch vertical load (kip) (page 1 of 3)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
0.0	-2.5	0.001605	22.5	15.0	0.435605	32.5	30.0	6.591792
2.5	-2.5	0.000314	22.5	17.5	1.804121	35.0	-2.5	0.000496
2.5	0.0	0.003308	22.5	20.0	8.169525	35.0	0.0	0.000265
5.0	-2.5	0.000215	25.0	-2.5	0.000529	35.0	2.5	0.000480
5.0	0.0	0.000811	25.0	0.0	0.000976	35.0	5.0	0.000976
5.0	2.5	0.007344	25.0	2.5	0.001803	35.0	7.5	0.002547
7.5	-2.5	0.000165	25.0	5.0	0.003011	35.0	10.0	0.004417
7.5	0.0	0.000232	25.0	7.5	0.009114	35.0	12.5	0.009164
7.5	2.5	0.001720	25.0	10.0	0.021405	35.0	15.0	0.024415
7.5	5.0	0.013299	25.0	12.5	0.057862	35.0	17.5	0.059517
10.0	-2.5	0.000132	25.0	15.0	0.191750	35.0	20.0	0.118669
10.0	0.0	0.000248	25.0	17.5	0.930562	35.0	22.5	0.249265
10.0	2.5	0.000662	25.0	20.0	3.938378	35.0	25.0	0.566399
10.0	5.0	0.002233	25.0	22.5	11.792953	35.0	27.5	1.237523
10.0	7.5	0.028882	27.5	-2.5	0.000430	35.0	30.0	1.538894
12.5	-2.5	0.000050	27.5	0.0	0.000562	35.0	32.5	2.602499
12.5	0.0	0.000083	27.5	2.5	0.000959	37.5	-2.5	0.000414
12.5	2.5	0.000248	27.5	5.0	0.002746	37.5	0.0	0.000215
12.5	5.0	0.000976	27.5	7.5	0.006451	37.5	2.5	0.000430
12.5	7.5	0.005707	27.5	10.0	0.016376	37.5	5.0	0.000992
12.5	10.0	0.051725	27.5	12.5	0.038261	37.5	7.5	0.001571
15.0	-2.5	0.000066	27.5	15.0	0.107801	37.5	10.0	0.002746
15.0	0.0	0.000033	27.5	17.5	0.423497	37.5	12.5	0.007675
15.0	2.5	0.000083	27.5	20.0	1.650979	37.5	15.0	0.016823
15.0	5.0	0.000629	27.5	22.5	4.933071	37.5	17.5	0.033629
15.0	7.5	0.003193	27.5	25.0	13.764706	37.5	20.0	0.056589
15.0	10.0	0.025408	30.0	-2.5	0.000447	37.5	22.5	0.099944
15.0	12.5	0.361383	30.0	0.0	0.000430	37.5	25.0	0.188292
17.5	-2.5	0.000017	30.0	2.5	0.000513	37.5	27.5	0.304944
17.5	0.0	0.000050	30.0	5.0	0.001687	37.5	30.0	0.362376
17.5	2.5	0.000033	30.0	7.5	0.005211	37.5	32.5	0.610664
17.5	5.0	0.000744	30.0	10.0	0.011149	37.5	35.0	1.471371
17.5	7.5	0.004301	30.0	12.5	0.023092	40.0	-2.5	0.000414
17.5	10.0	0.032603	30.0	15.0	0.064247	40.0	0.0	0.000165
17.5	12.5	0.286781	30.0	17.5	0.198333	40.0	2.5	0.000513
17.5	15.0	1.745961	30.0	20.0	0.633955	40.0	5.0	0.000695
20.0	-2.5	0.000132	30.0	22.5	1.943732	40.0	7.5	0.001059
20.0	0.0	0.000149	30.0	25.0	5.169119	40.0	10.0	0.002878
20.0	2.5	0.000711	30.0	27.5	11.370581	40.0	12.5	0.004962
20.0	5.0	0.002035	32.5	-2.5	0.000380	40.0	15.0	0.011381
20.0	7.5	0.006997	32.5	0.0	0.000265	40.0	17.5	0.017716
20.0	10.0	0.029295	32.5	2.5	0.000546	40.0	20.0	0.028121
20.0	12.5	0.184471	32.5	5.0	0.001555	40.0	22.5	0.041370
20.0	15.0	1.005528	32.5	7.5	0.003507	40.0	25.0	0.058177
20.0	17.5	4.124206	32.5	10.0	0.007162	40.0	27.5	0.063635
22.5	-2.5	0.000397	32.5	12.5	0.015169	40.0	30.0	0.066778
22.5	0.0	0.000513	32.5	15.0	0.038360	40.0	32.5	0.117263
22.5	2.5	0.001588	32.5	17.5	0.102343	40.0	35.0	0.342956
22.5	5.0	0.003176	32.5	20.0	0.263044	40.0	37.5	0.481210
22.5	7.5	0.008221	32.5	22.5	0.686144	42.5	-2.5	0.000496
22.5	10.0	0.027112	32.5	25.0	1.740899	42.5	0.0	0.000314
22.5	12.5	0.100606	32.5	27.5	3.571652	42.5	2.5	0.000331

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.58 Fully loaded ARC-5 Car—trailer-hitch vertical load (kip) (page 2 of 3)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
42.5	5.0	0.000711	55.0	-2.5	0.000496	62.5	2.5	0.000050
42.5	7.5	0.000893	55.0	0.0	0.000165	62.5	5.0	0.000033
42.5	10.0	0.001753	55.0	2.5	0.000132	62.5	7.5	0.000116
42.5	12.5	0.003325	55.0	5.0	0.000281	62.5	10.0	0.000083
47.5	22.5	0.002068	55.0	7.5	0.000248	62.5	12.5	0.000099
47.5	25.0	0.001671	55.0	10.0	0.000331	62.5	15.0	0.000033
47.5	27.5	0.001654	55.0	12.5	0.000414	62.5	17.5	0.000017
47.5	30.0	0.001720	55.0	15.0	0.000347	62.5	20.0	0.000050
47.5	32.5	0.001191	55.0	17.5	0.000215	62.5	22.5	0.000050
47.5	35.0	0.000281	55.0	20.0	0.000215	62.5	27.5	0.000033
47.5	37.5	0.000232	55.0	22.5	0.000232	62.5	55.0	0.000017
47.5	40.0	0.000314	55.0	25.0	0.000182	62.5	57.5	0.000033
47.5	42.5	0.000744	55.0	27.5	0.000198	62.5	60.0	0.000099
47.5	45.0	0.004615	55.0	30.0	0.000066	65.0	-2.5	0.000314
50.0	-2.5	0.000397	55.0	45.0	0.000017	65.0	0.0	0.000083
50.0	0.0	0.000165	55.0	47.5	0.000083	65.0	2.5	0.000050
50.0	2.5	0.000198	55.0	50.0	0.000017	65.0	5.0	0.000017
50.0	5.0	0.000298	55.0	52.5	0.000529	65.0	7.5	0.000050
50.0	7.5	0.000414	57.5	-2.5	0.000463	65.0	10.0	0.000033
50.0	10.0	0.000645	57.5	0.0	0.000165	65.0	12.5	0.000017
50.0	12.5	0.001009	57.5	2.5	0.000066	65.5	15.0	0.000017
50.0	15.0	0.001174	57.5	5.0	0.000149	65.0	17.5	0.000017
50.0	17.5	0.001621	57.5	7.5	0.000132	65.0	20.0	0.000033
50.0	20.0	0.000992	57.5	10.0	0.000165	65.0	22.5	0.000033
50.0	22.5	0.001059	57.5	12.5	0.000215	65.0	25.0	0.000017
50.0	25.0	0.000893	57.5	15.0	0.000182	65.0	57.5	0.000017
50.0	27.5	0.000645	57.5	17.5	0.000165	65.0	60.0	0.000017
50.0	30.0	0.000728	57.5	20.0	0.000149	65.0	62.5	0.000099
50.0	32.5	0.000132	57.5	22.5	0.000165	67.5	-2.5	0.000215
50.0	35.0	0.000033	57.5	25.0	0.000149	67.5	0.0	0.000017
50.0	37.5	0.000050	57.5	27.5	0.000066	67.5	2.5	0.000017
50.0	40.0	0.000050	57.5	52.5	0.000083	67.5	5.0	0.000033
50.0	42.5	0.000149	57.5	55.0	0.000248	67.5	7.5	0.000033
50.0	45.0	0.000364	60.0	-2.5	0.000496	67.5	10.0	0.000033
50.0	47.5	0.002316	60.0	0.0	0.000182	67.5	12.5	0.000033
52.5	-2.5	0.000662	60.0	2.5	0.000083	67.5	15.0	0.000050
52.5	0.0	0.000298	60.0	5.0	0.000066	67.5	17.5	0.000017
52.5	2.5	0.000215	60.0	7.5	0.000083	67.5	22.5	0.000050
52.5	5.0	0.000298	60.0	10.0	0.000033	67.5	62.5	0.000033
52.5	7.5	0.000331	60.0	12.5	0.000099	67.5	65.0	0.000033
52.5	10.0	0.000364	60.0	15.0	0.000132	70.0	-2.5	0.000132
52.5	12.5	0.000612	60.0	17.5	0.000149	70.0	0.0	0.000033
52.5	15.0	0.000711	60.0	20.0	0.000116	70.0	2.5	0.000017
52.5	17.5	0.000645	60.0	22.5	0.000066	70.0	7.5	0.000017
52.5	20.0	0.000314	60.0	25.0	0.000050	70.0	17.5	0.000033
52.5	22.5	0.000314	60.0	27.5	0.000033	70.0	20.0	0.000050
52.5	25.0	0.000612	60.0	30.0	0.000017	70.0	65.0	0.000050
52.5	27.5	0.000463	60.0	52.5	0.000017	70.0	67.5	0.000050
52.5	30.0	0.000132	60.0	55.0	0.000083	72.5	-2.5	0.000248
52.5	32.5	0.000050	60.0	57.5	0.000149	72.5	0.0	0.000033
52.5	47.5	0.000182	62.5	-2.5	0.000397	72.5	5.0	0.000017
52.5	50.0	0.000761	62.5	0.0	0.000050	72.5	7.5	0.000050

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.58 Fully loaded ARC-5 Car—trailer-hitch vertical load (kip) (page 3 of 3)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
72.5	10.0	0.000033	77.5	0.0	0.000017	85.0	0.0	0.000017
72.5	65.0	0.000017	77.5	2.5	0.000033	85.0	20.0	0.000017
72.5	67.5	0.000033	77.5	10.0	0.000017	85.0	80.0	0.000017
72.5	70.0	0.000050	77.5	12.5	0.000017	87.5	-2.5	0.000083
75.0	-2.5	0.000182	77.5	15.0	0.000017	87.5	20.0	0.000017
75.0	0.0	0.000033	77.5	17.5	0.000017	90.0	-2.5	0.000066
75.0	7.5	0.000017	77.5	65.0	0.000017	90.0	15.0	0.000017
75.0	10.0	0.000017	77.5	70.0	0.000017	90.0	87.5	0.000017
75.0	12.5	0.000017	77.5	75.0	0.000017	92.5	-2.5	0.000033
75.0	20.0	0.000033	80.0	-2.5	0.000198	92.5	87.5	0.000017
75.0	67.5	0.000017	82.5	-2.5	0.000149	95.0	-2.5	0.000066
75.0	70.0	0.000017	82.5	12.5	0.000033	97.5	-2.5	0.000496
75.0	72.5	0.000017	82.5	77.5	0.000017	97.5	5.0	0.000017
77.5	-2.5	0.000265	85.0	-2.5	0.000066	97.5	12.5	0.000017

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

7.3.2.58 Trailer-Hitch Lateral Load—Loaded Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	75
Average MPH	32.3
Recorded Mileage	22,113
Total Number of Cycles	4,928,341
Average Cycles/Mile	222.9
Track Class	Various

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.59 Fully loaded ARC-5 Car—trailer-hitch lateral load (kip)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
24	-20	0.000041	14	-18	0.001948	6	-2	0.247101
24	-22	0.000041	14	-20	0.000041	6	-4	0.386905
22	-16	0.000122	12	10	0.008137	6	-6	0.220236
22	-18	0.000568	12	8	0.000629	6	-8	0.071627
22	-20	0.000893	12	4	0.000020	6	-10	0.011180
22	-22	0.000101	12	2	0.000041	6	-12	0.001339
20	18	0.000142	12	0	0.000101	6	-14	0.000101
20	-12	0.000243	12	-2	0.000101	6	-16	0.000020
20	-14	0.001441	12	-4	0.001887	4	2	1.030367
20	-16	0.006635	12	-6	0.014062	4	0	2.685041
20	-18	0.008279	12	-8	0.047237	4	-2	3.969145
20	-20	0.002212	12	-10	0.078140	4	-4	1.562189
20	-22	0.000041	12	-12	0.069658	4	-6	0.292431
18	16	0.001725	12	-14	0.026865	4	-8	0.030883
18	14	0.000264	12	-16	0.004160	4	-10	0.001948
18	-6	0.000081	12	-18	0.000061	4	-12	0.000081
18	-8	0.000101	10	8	0.008055	2	0	34.074448
18	-10	0.000974	10	6	0.000690	2	-2	19.429865
18	-12	0.005681	10	4	0.000183	2	-4	3.121274
18	-14	0.019662	10	2	0.000122	2	-6	0.172269
18	-16	0.035245	10	0	0.000243	2	-8	0.005681
18	-18	0.017592	10	-2	0.000771	2	-10	0.000142
18	-20	0.001136	10	-4	0.011890	0	-2	28.546707
16	14	0.005681	10	-6	0.052837	0	-4	1.704042
16	12	0.000386	10	-8	0.086175	0	-6	0.040176
16	10	0.000041	10	-10	0.071951	0	-8	0.000873
16	-4	0.000020	10	-12	0.031836	-2	-4	0.798829
16	-6	0.000365	10	-14	0.007366	-2	-6	0.020453
16	-8	0.002536	10	-16	0.000710	-2	-8	0.000568
16	-10	0.011424	10	-18	0.000020	-2	-10	0.000020
16	-12	0.034839	8	6	0.011383	-4	-6	0.055313
16	-14	0.060994	8	4	0.002151	-4	-8	0.001907
16	-16	0.044599	8	2	0.001745	-4	-10	0.000061
16	-18	0.008684	8	0	0.000812	-6	-8	0.014325
16	-20	0.000162	8	-2	0.009821	-6	-10	0.000507
14	12	0.006189	8	-4	0.068502	-6	-12	0.000020
14	10	0.000507	8	-6	0.124728	-8	-10	0.008502
14	8	0.000020	8	-8	0.093865	-8	-12	0.000446
14	-4	0.000284	8	-10	0.038634	-10	-12	0.005499
14	-6	0.003754	8	-12	0.009151	-10	-14	0.000162
14	-8	0.015421	8	-14	0.001177	-12	-14	0.002273
14	-10	0.044315	8	-16	0.000101	-12	-16	0.000061
14	-12	0.073392	6	4	0.043706	-14	-16	0.000568
14	-14	0.060548	6	2	0.015888	-16	-18	0.000061
14	-16	0.018018	6	0	0.041353			

**AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars**

7.3.2.59 Trailer-Bogie Vertical Load—Loaded Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	75
Average MPH	32.3
Recorded Mileage	6,340
Total Number of Cycles	218,398
Average Cycles/Mile	34.4
Track Class	Various

Table 7.60 Fully loaded ARC-5 Car—trailer-bogie vertical load (kip)

Maximum Load	Minimum Load	Percent Occurrence
30	24	0.095239
36	18	0.000458
36	24	0.178573
36	30	0.953763
42	18	0.000458
42	24	0.002289
42	30	0.216119
42	36	59.737270
48	24	0.000458
48	30	0.774732
48	36	25.952620
48	42	6.705647
54	24	0.008242
54	30	0.669878
54	36	0.745886
54	42	0.027931
54	48	1.899285
60	18	0.000458
60	24	0.017399
60	30	0.094323
60	36	0.003663
60	42	0.014194
60	48	0.228482
60	54	1.644704
66	18	0.000916
66	24	0.007326
66	30	0.004579
66	42	0.000916
66	48	0.012821
72	0	0.000458
72	18	0.000458
72	24	0.000458

7.3.2.60 Trailer-Bogie Lateral Load—Loaded Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	75
Average MPH	32.3
Recorded Mileage	4,210
Total Number of Cycles	226,099
Average Cycles/Mile	53.7
Track Class	Various

Table 7.61 Fully loaded ARC-5 Car—trailer-bogie lateral load (kip)

Maximum Load	Minimum Load	Percent Occurrence
6	-6	0.001327
6	-8	0.003981
4	2	0.001327
4	0	0.002211
4	-2	0.015038
4	-4	0.072535
4	-6	0.085361
4	-8	0.012384
2	0	0.230430
2	-2	1.533841
2	-4	3.099969
2	-6	0.545336
2	-8	0.001769
0	-2	66.597816
0	-4	19.232283
0	-6	0.322867
0	-8	0.000442
-2	-4	8.162796
-2	-6	0.048651
-4	-6	0.029633

**AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars**

7.3.2.61 Standard Bolster Side-Bearing Load—Empty Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	65
Average MPH	34.4
Recorded Mileage	2,051
Total Number of Cycles	181
Average Cycles/Mile	0.09
Total Spectrum:	
Track Class	Various

Table 7.62 Empty ARC-5 Car—intermodal standard bolster side-bearing load (kip)

Maximum Load	Minimum Load	Percent Occurrence
10	5	9.944752
10	0	8.287292
10	-5	1.104972
10	-10	1.104972
5	0	54.143646
5	-5	7.182321
5	-10	0.552486
5	-40	1.104972
0	-5	13.812155
0	-15	1.657459
0	-30	1.104972

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

7.3.2.62 Standard Bolster Center-Plate Load—Empty Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	65
Average MPH	34.4
Recorded Mileage	4,548
Total Number of Cycles	973,599
Average Cycles/Mile	214.1
Track Class	Various

Table 7.63 Empty ARC-5 Car—intermodal standard bolster center-plate load (kip)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
10	5	0.002876	40	15	0.040879
15	0	0.000308	40	20	0.037079
15	5	0.041393	40	25	0.017975
15	10	4.838234	40	30	0.001438
20	0	0.001541	40	35	0.005444
20	5	0.107642	45	0	0.001335
20	10	2.896778	45	5	0.010271
20	15	34.843053	45	10	0.008114
25	0	0.003389	45	15	0.007190
25	5	0.089565	45	20	0.003287
25	10	0.702034	45	25	0.000514
25	15	8.970017	45	35	0.000205
25	20	32.670021	45	40	0.000924
30	0	0.005136	50	0	0.001952
30	5	0.041290	50	5	0.005957
30	10	0.310600	50	10	0.002362
30	15	1.281945	50	15	0.000719
30	20	4.383838	50	45	0.000205
30	25	7.208923	55	0	0.001541
35	0	0.003595	55	5	0.006265
35	5	0.022494	55	10	0.000308
35	10	0.106615	55	50	0.000205
35	15	0.227301	60	0	0.001335
35	20	0.434060	60	5	0.006265
35	25	0.423788	60	10	0.000308
35	30	0.170810	65	0	0.000411
40	0	0.004519	65	5	0.005752
40	5	0.014790	70	5	0.000924
40	10	0.032970	75	5	0.000308

**AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars**

7.3.2.63 Articulated Connector Vertical Load—Empty Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	65
Average MPH	34.4
Recorded Mileage	2,497
Total Number of Cycles	585,334
Average Cycles/Mile	234.4
Track Class	Various

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.64 Empty ARC-5 Car—intermodal articulated connector vertical load (kip) (page 1 of 2)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-20	-30	0.000171	20	-15	0.310934
-20	-25	0.000683	20	-10	0.591628
-15	-20	0.007346	20	-5	1.028985
-10	-25	0.000171	20	0	1.938551
-10	-20	0.004613	20	5	3.327160
-10	-15	0.060137	20	10	4.654095
-5	-20	0.004613	20	15	6.265312
-5	-15	0.036902	25	-35	0.000171
-5	-10	0.362357	25	-30	0.000171
0	-30	0.000171	25	-25	0.003759
0	-25	0.000171	25	-20	0.042027
0	-20	0.004442	25	-15	0.084396
0	-15	0.067995	25	-10	0.273861
0	-10	0.390546	25	-5	0.810648
0	-5	1.619759	25	0	1.825624
5	-25	0.000171	25	5	2.896637
5	-20	0.007859	25	10	3.696693
5	-15	0.138383	25	15	3.851818
5	-10	0.774771	25	20	4.050508
5	-5	2.190715	30	-35	0.000171
5	0	5.052671	30	-30	0.000171
10	-25	0.000854	30	-25	0.001708
10	-20	0.025626	30	-20	0.005979
10	-15	0.313155	30	-15	0.036219
10	-10	1.299942	30	-10	0.190660
10	-5	2.974370	30	-5	0.655011
10	0	4.930860	30	0	1.326080
10	5	7.391677	30	5	1.729098
15	-30	0.000171	30	10	1.998175
15	-25	0.000513	30	15	2.067367
15	-20	0.072096	30	20	1.735419
15	-15	0.484339	30	25	1.527162
15	-10	1.214349	35	-35	0.000342
15	-5	2.047378	35	-30	0.000171
15	0	3.029382	35	-25	0.000683
15	5	4.081772	35	-20	0.003075
15	10	6.149652	35	-15	0.035023
20	-30	0.000171	35	-10	0.146925
20	-25	0.007517	35	-5	0.473063
20	-20	0.112585	35	0	0.786559

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.64 Empty ARC-5 Car—intermodal articulated connector vertical load (kip) (page 2 of 2)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
35	5	0.871297	50	-20	0.001538
35	10	0.886161	50	-15	0.005296
35	15	0.749567	50	-10	0.035535
35	20	0.579840	50	-5	0.060307
35	25	0.431719	50	0	0.022893
35	30	0.397892	50	5	0.009567
40	-30	0.000513	50	10	0.004442
40	-25	0.000854	50	15	0.003929
40	-20	0.002392	50	20	0.001879
40	-15	0.028189	50	25	0.001367
40	-10	0.119932	50	30	0.000854
40	-5	0.348861	50	35	0.000171
40	0	0.439749	50	45	0.000854
40	5	0.350398	55	-20	0.000683
40	10	0.234054	55	-15	0.002733
40	15	0.176480	55	-10	0.014522
40	20	0.123861	55	-5	0.011617
40	25	0.099601	55	0	0.002733
40	30	0.064579	55	5	0.001025
40	35	0.070900	55	10	0.001196
45	-35	0.000171	55	15	0.000513
45	-20	0.002050	55	20	0.000171
45	-15	0.017426	60	-20	0.000342
45	-10	0.077563	60	-15	0.000854
45	-5	0.177164	60	-10	0.002221
45	0	0.141116	60	-5	0.002050
45	5	0.064920	60	0	0.000171
45	10	0.036219	60	5	0.000854
45	15	0.028702	60	15	0.000171
45	20	0.019134	65	-40	0.000171
45	25	0.013155	65	-35	0.000171
45	30	0.008713	65	-30	0.000171
45	35	0.003075	65	-15	0.000171
45	40	0.007517	65	-10	0.000513
50	-45	0.000171	65	-5	0.000513
50	-30	0.000342	65	0	0.000342

**AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars**

M-1001

CHAPTER 7

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AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

7.3.2.64 Articulated Connector Lateral Load—Empty Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	70
Average MPH	34.4
Recorded Mileage	2,916
Total Number of Cycles	448,239
Average Cycles/Mile	153.7
Track Class	Various

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.65 Empty ARC-5 Car—intermodal articulated connector lateral load (kip) (page 1 of 3)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
100	95	0.004462	90	70	0.000223	75	5	0.000223
100	90	0.001562	90	65	0.000669	75	0	0.000223
100	85	0.000669	90	60	0.000669	75	-20	0.000223
100	80	0.000892	90	55	0.000223	75	-25	0.000223
100	75	0.000446	90	15	0.000446	75	-35	0.000446
100	55	0.000223	90	-10	0.000223	75	-40	0.000223
100	50	0.000223	90	-15	0.000223	75	-45	0.000223
100	25	0.000223	90	-20	0.000223	70	65	0.010039
100	10	0.000223	90	-25	0.000223	70	60	0.002231
100	5	0.000223	90	-50	0.000223	70	55	0.001339
100	-10	0.000446	85	80	0.005577	70	50	0.000446
100	-15	0.000446	85	75	0.001562	70	45	0.000892
100	-20	0.001115	85	70	0.000669	70	40	0.000669
100	-25	0.000446	85	65	0.000446	70	35	0.000892
100	-30	0.000446	85	40	0.000223	70	30	0.000223
100	-35	0.000446	85	-5	0.000223	70	25	0.000446
100	-45	0.000223	85	-15	0.000223	70	20	0.000223
100	-50	0.000669	85	-35	0.000223	70	5	0.000223
100	-55	0.000446	85	-55	0.000223	70	-5	0.000223
100	-60	0.000892	85	-100	0.000223	70	-10	0.000669
100	-65	0.000223	80	75	0.005577	70	-15	0.000669
100	-70	0.000223	80	70	0.001115	70	-20	0.000223
95	90	0.004016	80	65	0.001339	70	-30	0.000669
95	85	0.001785	80	60	0.000223	70	-35	0.000223
95	80	0.000669	80	55	0.000669	70	-55	0.000223
95	75	0.000446	80	50	0.000446	65	60	0.013163
95	65	0.000223	80	40	0.000223	65	55	0.001339
95	55	0.000446	80	35	0.000446	65	50	0.000892
95	35	0.000223	80	10	0.000223	65	45	0.000892
95	10	0.000223	80	-10	0.000223	65	40	0.001115
95	0	0.000223	80	-15	0.000446	65	35	0.000669
95	-5	0.000223	80	-30	0.000223	65	30	0.000446
95	-20	0.000223	80	-35	0.000223	65	25	0.000446
95	-25	0.000223	75	70	0.009593	65	20	0.000446
95	-30	0.000223	75	65	0.002677	65	15	0.000446
95	-45	0.000223	75	60	0.000446	65	10	0.000223
95	-55	0.000223	75	55	0.000892	65	0	0.000223
90	85	0.004016	75	45	0.000223	65	-5	0.001115
90	80	0.000892	75	40	0.000223	65	-10	0.002008
90	75	0.000669	75	25	0.000223	65	-15	0.002454

AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

Table 7.65 Empty ARC-5 Car—intermodal articulated connector lateral load (kip) (page 2 of 3)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
65	-20	0.000669	55	-25	0.001115	40	-5	0.401348
65	-25	0.000669	55	-35	0.000223	40	-10	0.142781
65	-35	0.000223	50	45	0.082322	40	-15	0.021863
65	-50	0.000446	50	40	0.020302	40	-20	0.002008
65	-55	0.000223	50	35	0.011824	40	-25	0.001339
60	55	0.019186	50	30	0.010485	40	-50	0.000223
60	50	0.005131	50	25	0.008701	35	30	1.847452
60	45	0.003793	50	20	0.012270	35	25	0.602357
60	40	0.002454	50	15	0.014724	35	20	0.412949
60	35	0.001785	50	10	0.029895	35	15	0.524720
60	30	0.002677	50	5	0.064698	35	10	0.764324
60	25	0.001115	50	0	0.128726	35	5	0.896620
60	20	0.001562	50	-5	0.137650	35	0	0.904205
60	15	0.000223	50	-10	0.064698	35	-5	0.609273
60	10	0.000892	50	-15	0.017401	35	-10	0.203909
60	5	0.002231	50	-20	0.001339	35	-15	0.038819
60	0	0.002008	45	40	0.235812	35	-20	0.004239
60	-5	0.006024	45	35	0.061574	35	-25	0.000223
60	-10	0.009147	45	30	0.034803	35	-30	0.000223
60	-15	0.005577	45	25	0.031680	35	-40	0.000223
60	-20	0.000892	45	20	0.045511	35	-45	0.000223
60	-25	0.000669	45	15	0.066482	35	-50	0.000446
60	-30	0.000669	45	10	0.138542	30	25	3.535391
60	-35	0.000223	45	5	0.298278	30	20	1.202260
60	-50	0.000446	45	0	0.390417	30	15	0.955517
55	50	0.031903	45	-5	0.271061	30	10	1.175935
55	45	0.011378	45	-10	0.102178	30	5	1.481576
55	40	0.003793	45	-15	0.021194	30	0	1.316262
55	35	0.004239	45	-20	0.002677	30	-5	0.828353
55	30	0.003570	45	-25	0.000669	30	-10	0.238712
55	25	0.003570	45	-30	0.000446	30	-15	0.045065
55	20	0.002677	45	-70	0.000223	30	-20	0.002454
55	15	0.003346	40	35	0.773694	30	-25	0.000446
55	10	0.004462	40	30	0.230457	30	-30	0.000669
55	5	0.007585	40	25	0.127164	30	-45	0.000223
55	0	0.023648	40	20	0.153490	30	-50	0.000223
55	-5	0.040157	40	15	0.243843	30	-55	0.000223
55	-10	0.030341	40	10	0.425220	25	20	6.201379
55	-15	0.011601	40	5	0.644299	25	15	2.991261
55	-20	0.002677	40	0	0.675756	25	10	3.268569

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.65 Empty ARC-5 Car—intermodal articulated connector lateral load (kip) (page 3 of 3)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
25	5	2.859635	10	-5	0.633814	-10	-25	0.000892
25	0	1.706456	10	-10	0.235142	-10	-35	0.000446
25	-5	0.735322	10	-15	0.037480	-10	-40	0.000223
25	-10	0.208594	10	-20	0.001562	-15	-20	0.018294
25	-15	0.036588	10	-45	0.000223	-15	-25	0.002677
25	-20	0.004685	10	-100	0.000223	-15	-30	0.000223
25	-25	0.002454	5	0	3.480509	-15	-40	0.000446
25	-30	0.000446	5	-5	0.724837	-20	-25	0.005354
25	-35	0.000669	5	-10	0.166206	-20	-30	0.000223
25	-40	0.000223	5	-15	0.027887	-20	-35	0.000223
25	-45	0.000223	5	-20	0.002008	-20	-45	0.000223
20	15	12.259308	5	-25	0.000223	-25	-30	0.003123
20	10	6.784550	5	-35	0.000446	-25	-35	0.000892
20	5	3.687765	5	-45	0.000223	-25	-40	0.000223
20	0	1.556090	0	-5	1.111684	-25	-50	0.000223
20	-5	0.528513	0	-10	0.128503	-30	-35	0.002677
20	-10	0.162413	0	-15	0.019186	-30	-40	0.000892
20	-15	0.033241	0	-20	0.002008	-30	-45	0.000223
20	-20	0.008255	0	-25	0.000223	-35	-45	0.000669
20	-25	0.001785	0	-35	0.000223	-35	-40	0.003346
20	-40	0.000223	0	-50	0.000446	-40	-45	0.004016
15	10	12.207773	0	-55	0.000446	-40	-50	0.000223
15	5	3.679287	0	-70	0.000223	-40	-55	0.000223
15	0	1.300199	0	-85	0.000223	-45	-50	0.001339
15	-5	0.515127	-5	-10	0.237596	-45	-55	0.000223
15	-10	0.185615	-5	-15	0.016509	-50	-55	0.000669
15	-15	0.047742	-5	-20	0.003123	-55	-60	0.000223
15	-20	0.005577	-5	-25	0.000669	-65	-70	0.000223
15	-25	0.000892	-5	-30	0.000669	-80	-85	0.000223
10	5	6.418897	-10	-15	0.055328	-90	-95	0.000223
10	0	1.539580	-10	-20	0.007808			

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

7.3.2.65 Articulated Connector Longitudinal Load—Empty Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	65
Average MPH	34.4
Recorded Mileage	2,497
Total Number of Cycles	24,207
Average Cycles/Mile	9.7
Track Class	Various

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

Table 7.66 Empty ARC-5 Car—intermodal articulated connector longitudinal load (kip) (page 1 of 2)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
500	100	0.004131	425	-250	0.008262	325	-50	0.049572
500	50	0.008262	425	-350	0.004131	325	-75	0.008262
500	25	0.004131	425	-475	0.004131	325	-100	0.020655
500	0	0.008262	400	25	0.004131	325	-125	0.004131
500	-25	0.004131	400	0	0.004131	325	-150	0.008262
500	-50	0.004131	400	-25	0.008262	325	-175	0.004131
500	-75	0.008262	400	-75	0.008262	300	225	0.004131
500	-100	0.004131	400	-100	0.012393	300	200	0.004131
500	-125	0.004131	400	-125	0.004131	300	50	0.024786
500	-175	0.012393	400	-150	0.004131	300	25	0.033048
500	-200	0.004131	400	-175	0.004131	300	0	0.028917
500	-225	0.008262	400	-250	0.004131	300	-25	0.033048
500	-250	0.016524	375	100	0.004131	300	-50	0.028917
500	-275	0.012393	375	50	0.004131	300	-75	0.020655
500	-300	0.008262	375	25	0.008262	300	-100	0.004131
500	-325	0.004131	375	0	0.004131	300	-150	0.004131
500	-350	0.012393	375	-25	0.016524	300	-175	0.008262
500	-375	0.004131	375	-50	0.012393	300	-225	0.004131
500	-400	0.008262	375	-75	0.008262	275	225	0.004131
500	-425	0.020655	375	-100	0.004131	275	125	0.008262
500	-450	0.004131	375	-125	0.008262	275	100	0.033048
500	-500	0.037179	375	-200	0.004131	275	75	0.004131
475	25	0.004131	375	-275	0.004131	275	50	0.053703
475	-125	0.004131	375	-325	0.004131	275	25	0.099145
475	-150	0.004131	350	250	0.004131	275	0	0.057835
475	-200	0.004131	350	25	0.004131	275	-25	0.041310
475	-250	0.004131	350	0	0.020655	275	-50	0.012393
475	-275	0.004131	350	-25	0.028917	275	-75	0.008262
450	25	0.004131	350	-50	0.082620	275	-100	0.012393
450	0	0.004131	350	-75	0.008262	275	-250	0.004131
450	-75	0.004131	350	-100	0.012393	250	225	0.004131
450	-100	0.004131	350	-125	0.008262	250	175	0.020655
450	-125	0.004131	350	-175	0.004131	250	125	0.033048
450	-150	0.004131	350	-425	0.004131	250	110	0.078490
450	-175	0.008262	325	275	0.004131	250	75	1.041021
450	-250	0.004131	325	250	0.004131	250	50	11.666047
425	-50	0.004131	325	50	0.004131	250	25	0.190028
425	-125	0.008262	325	25	0.012393	250	0	0.057835
425	-150	0.008262	325	0	0.033048	250	-25	0.020655
425	-175	0.012393	325	-25	0.057835	250	-50	0.024786

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

Table 7.66 Empty ARC-5 Car—intermodal articulated connector longitudinal load (kip) (page 2 of 2)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
250	-75	0.008262	200	0	0.016524	125	50	0.033048
250	-100	0.004131	200	-25	0.020655	125	25	0.008262
250	-125	0.004131	200	-50	0.004131	125	0	0.004131
225	200	0.008262	175	150	14.293386	100	75	0.632049
225	175	0.020655	175	125	3.317222	100	50	0.020655
225	150	0.045441	175	100	1.615235	100	25	0.012393
225	125	0.128062	175	75	1.222787	100	0	0.004131
225	100	0.809683	175	50	0.483331	75	50	0.028917
225	75	17.903912	175	25	0.049572	75	25	0.012393
225	50	9.013922	175	0	0.004131	75	0	0.008262
225	25	0.115669	175	-25	0.004131	50	25	0.020655
225	0	0.053703	175	-175	0.004131	50	0	0.008262
225	-25	0.024786	150	125	13.851365	50	-75	0.004131
225	-50	0.004131	150	100	4.585451	50	-100	0.004131
225	-125	0.004131	150	75	1.367373	50	-200	0.004131
200	175	1.545008	150	50	0.107407	25	-25	0.004131
200	150	0.921221	150	25	0.012393	25	-50	0.004131
200	125	1.069938	150	0	0.012393	0	-25	0.008262
200	100	1.470649	150	-25	0.012393	0	-100	0.004131
200	75	0.983187	150	-75	0.004131	0	-150	0.004131
200	50	0.470938	125	100	8.452101			
200	25	0.190028	125	75	0.491593			

**AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars**

M-1001

CHAPTER 7

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AAR Manual of Standards and Recommended Practices

Design, Fabrication, and Construction of Freight Cars

CHAPTER 7

M-1001

7.3.2.66 Trailer-Hitch Vertical Load—Empty Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	70
Average MPH	34.4
Recorded Mileage	3,334
Total Number of Cycles	812,591
Average Cycles/Mile	243.7
Track Class	Various

Table 7.67 Empty ARC-5 Car—intermodal trailer-hitch vertical load (kip)

Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence	Maximum Load	Minimum Load	Percent Occurrence
-10.0	-12.5	0.000123	15.0	-5.0	0.000985	22.5	17.5	0.195917
-5.0	-7.5	0.000615	15.0	-2.5	0.007261	22.5	20.0	0.092913
-2.5	-5.0	0.040611	15.0	0.0	0.029904	25.0	-12.5	0.000123
0.0	-7.5	0.000369	15.0	2.5	0.103004	25.0	-2.5	0.000123
0.0	-5.0	0.092913	15.0	5.0	0.162320	25.0	0.0	0.000738
0.0	-2.5	1.629233	15.0	7.5	0.303597	25.0	2.5	0.000615
2.5	-7.5	0.001969	15.0	10.0	0.713274	25.0	5.0	0.000492
2.5	-5.0	0.080976	15.0	12.5	1.483895	25.0	7.5	0.001108
2.5	-2.5	0.965061	17.5	-5.0	0.000246	25.0	10.0	0.000369
2.5	0.0	6.817329	17.5	-2.5	0.002584	25.0	12.5	0.015383
5.0	-7.5	0.001108	17.5	0.0	0.010706	25.0	15.0	0.025228
5.0	-5.0	0.039872	17.5	2.5	0.027566	25.0	17.5	0.009845
5.0	-2.5	0.383588	17.5	5.0	0.027320	25.0	20.0	0.000738
5.0	0.0	2.393455	17.5	7.5	0.053656	25.0	22.5	0.001969
5.0	2.5	11.467024	17.5	10.0	0.100420	27.5	-2.5	0.000246
7.5	-7.5	0.001108	17.5	12.5	0.213268	27.5	0.0	0.000369
7.5	-5.0	0.014645	17.5	15.0	0.776159	27.5	2.5	0.000246
7.5	-2.5	0.131308	20.0	-7.5	0.000492	27.5	5.0	0.000123
7.5	0.0	0.754500	20.0	-5.0	0.000615	27.5	7.5	0.000123
7.5	2.5	5.125088	20.0	-2.5	0.001600	27.5	10.0	0.000861
7.5	5.0	26.291210	20.0	0.0	0.004430	27.5	12.5	0.005538
10.0	-7.5	0.000738	20.0	2.5	0.007876	27.5	15.0	0.003323
10.0	-5.0	0.003815	20.0	5.0	0.007138	27.5	17.5	0.000123
10.0	-2.5	0.049594	20.0	7.5	0.011937	27.5	22.5	0.000123
10.0	0.0	0.256587	20.0	10.0	0.015983	27.5	25.0	0.000246
10.0	2.5	1.640924	20.0	12.5	0.046395	30.0	-5.0	0.000123
10.0	5.0	7.318811	20.0	15.0	0.321810	30.0	-2.5	0.000123
10.0	7.5	18.680738	20.0	17.5	1.370554	30.0	0.0	0.000123
12.5	-7.5	0.000369	22.5	-5.0	0.000123	30.0	10.0	0.000985
12.5	-5.0	0.001477	22.5	-2.5	0.000615	30.0	12.5	0.000615
12.5	-2.5	0.015752	22.5	0.0	0.001108	30.0	15.0	0.000246
12.5	0.0	0.090698	22.5	2.5	0.002830	30.0	22.5	0.000123
12.5	2.5	0.405493	22.5	5.0	0.001969	30.0	27.5	0.000123
12.5	5.0	1.137596	22.5	7.5	0.002584	32.5	-7.5	0.000123
12.5	7.5	2.469385	22.5	10.0	0.001723	32.5	10.0	0.000492
12.5	10.0	5.356077	22.5	12.5	0.028797	32.5	12.5	0.000246
15.0	-7.5	0.000246	22.5	15.0	0.135123	32.5	30.0	0.000123

AAR Manual of Standards and Recommended Practices
Design, Fabrication, and Construction of Freight Cars

M-1001

CHAPTER 7

7.3.2.67 Trailer-Hitch Lateral Load—Empty Intermodal Car

Test Date	December 1986–February 1987
Test Mode	Intermodal Service
Max MPH	65
Average MPH	34.4
Recorded Mileage	3,334
Total Number of Cycles	370,957
Average Cycles/Mile	111.3
Track Class	Various

Table 7.68 Empty ARC-5 Car—intermodal trailer-hitch lateral load (kip)

Maximum Load	Minimum Load	Percent Occurrence
16	-6	0.000539
16	-16	0.000270
10	-6	0.000270
10	-8	0.000270
10	-10	0.000270
8	-2	0.000270
8	-4	0.009165
8	-6	0.023722
8	-8	0.004313
8	-10	0.000539
6	4	0.012131
6	2	0.000270
6	0	0.004313
6	-2	0.112142
6	-4	0.442100
6	-6	0.180883
6	-8	0.000809
4	2	0.159318
4	0	0.586321
4	-2	4.103710
4	-4	3.410368
4	-6	0.266069
4	-8	0.000539
2	0	16.545044
2	-2	24.118429
2	-4	5.478263
2	-6	0.080063
0	-2	42.635670
0	-4	1.594794
0	-6	0.002965
-2	-4	0.222667
-2	-6	0.000809
-4	-6	0.002696