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रेल मंत्रालय

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

Haulage Capacity of Electric Locomotives

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Introduction

1. Different types of Electric Locomotives are in operation in Indian Railways for passenger and goods services. Operating conditions like gradient, curvature etc varies from one place to other on Indian Railways. Zonal Railways have a system of incorporating load table in their time – table for various class of locomotives. However, Zonal Railways have requested in the past for issue of load table for dry and wet condition of Rail so that they can also calculate and legislate haulage capacity of locomotives for various section in their Railways. In this respect Technical Circular No. 0128 has been issued by RDSO vide letter No. EL/3.1.39/1 dated 02/09/2014.
2. In the previous Technical Circulars, haulage capacity were issued for tangent and 2.5 degree of curvature with dry as well as wet condition. Zonal Railways further requested for issue of haulage capacity for different degree of curves in dry/wet weather condition. Therefore in this booklet, haulage capacity of WAG5A, WAG5H, WAG7, WAG9, WAG9H, WAM4, WAP4, WAP5 & WAP7 type of locomotives have been re-calculated in dry/wet weather condition with different degree of curves 1^0 to 5^0 . While calculating the haulage capacity in wet condition, 20% less adhesion as per Report no. TFC-77 Jan.2002 has been taken into account and starting TE has been reduced accordingly.
3. The various formula/assumption adopted for calculation for load table are given as under :
 - i) Starting specific resistance of loco has been taken as 6 kg/t.
 - ii) Loco Resistance (R_L) in kg/t is given by
$$R_L = 0.647 + 13.17/W + 0.00933V + 0.057/WN \cdot V^2$$
Where N is number of axles.
W is axle load of the locomotive in tonnes.
V is speed in kmph.
 - iii) Starting specific resistance of BOXN (loaded) wagon has been taken as 4 kg/t.
 - iv) Specific rolling resistance in kg/t as applicable to loaded BOXN wagons is given by
$$R_T = 0.6438797 + 0.01047218V + 0.00007323V^2$$
 - v) Starting resistance of ICF (loaded) all coil coaches has been taken as 4 kg/t.
 - vi) Specific rolling resistance in kg/t as applicable to loaded ICF all coil coaches (BG) is given by $R_T = 0.6854599 + 0.0211244V + 0.000082V^2$
 - vii) The load chart for freight trains is based upon maximum load of 59 BOXN (CC+8+2T)+1BV = 5400 tonnes.
 - viii) The load chart for passenger trains is based upon maximum load of 30 ICF (SG) coaches (30 X 55t) = 1650t.
 - ix) To consider the effect of curvature; compensated Grade has been taken into account as under:
$$1000 / G + 0.4 * S = 1000 / X ; \text{ (where } G \text{ is grade, } S \text{ is Degree of curvature, } X \text{ is compensated grade)}$$
4. Permissible loads should be worked out based on actual load trials by Zonal Railways.

Index

S no.	Type of Locomotive	Page no.	
		From	To
1.	WAG5A	3	9
2.	WAG5H	10	16
3.	WAG7	17	23
4.	WAG9	24	30
5.	WAG9H	31	37
6.	WAM4	38	44
7.	WAP4	45	51
8.	WAP5	52	58
9.	WAP7	59	65



Tap Changer Electric Locomotive-WAG5A

Table no. G5T / 1

Haulage Capacity for WAG5(TAO) Locomotive (3 step weak field)
GR - 15 : 62 (4.13) TM - TAO 659 Loco Wt. - 118.8 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition on tangent track					
SPEED (kmph)	TE in Tonne		BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	33.6	START	Up to 5400	Up to 5400	3586	3006	2261	1268
10	20.6	10			3442	2641	1785	866
20	20.6	20			3363	2593	1761	859
30	20.6	30			3278	2541	1735	851
40	20.6	40			3187	2484	1707	843
50	20.4	50			3060	2398	1658	824
60	17.0	60		4617	2442	1920	1330	655
70	13.8	70		3491	1881	1484	1027	498
80	10.6	80	5123	2467	1349	1064	733	343
90	8.3	90	3479	1755	970	764	522	231
100	6.5	100	2337	1225	680	533	357	143
105	5.6	105	1842	979	541	421	276	99

Table no. G5T / 2

Haulage Capacity for WAG5(TAO) Locomotive (3 step weak field)
GR - 15 : 62 (4.13) TM - TAO 659 Loco Wt. - 118.8 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 1^o Curve					
SPEED (kmph)	TE in Tonne		BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	33.6	START	Up to 5400	Up to 5093	3428	2893	2195	1245
10	20.6	10			3210	2500	1716	847
20	20.6	20			3141	2457	1695	841
30	20.6	30			3066	2409	1670	833
40	20.6	40			2985	2357	1643	825
50	20.4	50			2871	2278	1597	806
60	17.0	60		4136	2294	1825	1281	641
70	13.8	70		3141	1769	1411	989	487
80	10.6	80	4230	2229	1269	1012	705	335
90	8.3	90	2920	1591	913	726	501	225
100	6.5	100	1988	1113	639	505	342	138
105	5.6	105	1576	890	508	398	264	95

Table no. G5T / 3

Haulage Capacity for WAG5(TAO) Locomotive (3 step weak field)
GR - 15 : 62 (4.13) TM - TAO 659 Loco Wt. - 118.8 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 2^o Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	33.6	START	Up to 5400	Up to 4786	3283	2788	2132	1223
10	20.6	10			3007	2373	1653	829
20	20.6	20			2946	2333	1632	823
30	20.6	30			2879	2290	1610	816
40	20.6	40			2807	2242	1584	808
50	20.4	50		4747	2704	2169	1540	789
60	17.0	60		3743	2162	1739	1236	627
70	13.8	70	5201	2854	1669	1344	954	476
80	10.6	80	3597	2031	1197	963	679	327
90	8.3	90	2512	1454	861	691	482	219
100	6.5	100	1726	1018	602	480	328	134
105	5.6	105	1373	814	477	377	252	92

Table no. G5T / 4

Haulage Capacity for WAG5(TAO) Locomotive (3 step weak field)
GR - 15 : 62 (4.13) TM - TAO 659 Loco Wt. - 118.8 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 3^o Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	33.6	START	Up to 5400	Up to 4513	3149	2690	2073	1202
10	20.6	10			2827	2257	1593	812
20	20.6	20			2772	2221	1574	806
30	20.6	30			2713	2181	1553	799
40	20.6	40			2649	2138	1529	791
50	20.4	50		4319	2554	2070	1487	773
60	17.0	60		3416	2044	1660	1193	614
70	13.8	70	4476	2612	1578	1283	921	466
80	10.6	80	3124	1863	1132	919	655	319
90	8.3	90	2200	1336	814	658	464	213
100	6.5	100	1522	937	568	456	315	129
105	5.6	105	1214	749	450	358	242	88

Table no. G5T / 5

Haulage Capacity for WAG5(TAO) Locomotive (3 step weak field)
 GR - 15 : 62 (4.13) TM - TAO 659 Loco Wt. - 118.8 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 4⁰ Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	33.6	START	Up to 5400	Up to 4269	3026	2598	2017	1181
10	20.6	10			2667	2151	1538	795
20	20.6	20			2618	2118	1520	789
30	20.6	30			2564	2082	1500	782
40	20.6	40		4156	2506	2042	1477	775
50	20.4	50		3960	2419	1979	1438	758
60	17.0	60	5222	3141	1937	1587	1153	601
70	13.8	70	3924	2407	1497	1227	889	456
80	10.6	80	2759	1720	1074	878	632	311
90	8.3	90	1954	1235	771	629	447	207
100	6.5	100	1359	867	538	435	302	125
105	5.6	105	1085	692	425	340	231	85

Table no. G5T / 6

Haulage Capacity for WAG5(TAO) Locomotive (3 step weak field)
 GR - 15 : 62 (4.13) TM - TAO 659 Loco Wt. - 118.8 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 5⁰ Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	33.6	START	Up to 5400	Up to 4049	2911	2512	1963	1161
10	20.6	10			2523	2055	1486	779
20	20.6	20			2479	2024	1469	773
30	20.6	30		3955	2430	1991	1450	767
40	20.6	40		3826	2377	1954	1429	759
50	20.4	50		3655	2297	1895	1391	743
60	17.0	60	4617	2905	1841	1520	1115	589
70	13.8	70	3491	2231	1422	1175	860	446
80	10.6	80	2467	1596	1020	841	610	304
90	8.3	90	1755	1147	732	601	431	202
100	6.5	100	1225	805	510	415	290	121
105	5.6	105	979	642	402	324	222	81

Table no. G5T / 7

Haulage Capacity for WAG5(TAO) Locomotive (3 step weak field)
GR - 15 : 62 (4.13) TM - TAO 659 Loco Wt. - 118.8 T

Tractive Effort Values in Tonnes at Various Speeds		Trailing load in tonnes at km/h with Wet Condition on tangent track					
SPEED (kmph)		BOXN Air brake stock					
		Grade					
SPEED (kmph)	TE in Tonne	Level	1/500	1/200	1/150	1/100	1/50
0	26.9	START	Up to 5400	Up to 4320	Up to 2839	Up to 2376	Up to 988
10	20.6	10					1781 866
20	20.6	20					1761 859
30	20.6	30					1735 851
40	20.6	40					1707 843
50	20.4	50					1658 824
60	17.0	60			2442	1920	1330 655
70	13.8	70		3491	1881	1484	1027 498
80	10.6	80	5123	2467	1349	1064	733 343
90	8.3	90	3479	1755	970	764	522 231
100	6.5	100	2337	1225	680	533	357 143
105	5.6	105	1842	979	541	421	276 99

Table no. G5T / 8

Haulage Capacity for WAG5(TAO) Locomotive (3 step weak field)
GR - 15 : 62 (4.13) TM - TAO 659 Loco Wt. - 118.8 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 1⁰ Curve						
			BOXN Air brake stock						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	26.9	START	Up to 5400	Up to 4043	Up to 2713	Up to 2286	1728	970	
10	20.6	10					1716	847	
20	20.6	20					1695	841	
30	20.6	30					1670	833	
40	20.6	40					1643	825	
50	20.4	50			2278		1597	806	
60	17.0	60			2294		1825	1281	641
70	13.8	70			3141		1769	1411	989
80	10.6	80	4230	2229	1269	1012	705	335	
90	8.3	90	2920	1591	913	726	501	225	
100	6.5	100	1988	1113	639	505	342	138	
105	5.6	105	1576	890	508	398	264	95	

Table no. G5T / 9

Haulage Capacity for WAG5(TAO) Locomotive (3 step weak field)
GR - 15 : 62 (4.13) TM - TAO 659 Loco Wt. - 118.8 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 2^o Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	26.9	START	Up to 5400	Up to 3797	Up to 2597	Up to 2202	1678	952
10	20.6	10					1653	829
20	20.6	20					1632	823
30	20.6	30					1610	816
40	20.6	40					1584	808
50	20.4	50				2169	1540	789
60	17.0	60	3743	2162	1739	1236	627	
70	13.8	70	5201	2854	1669	1344	954	476
80	10.6	80	3597	2031	1197	963	679	327
90	8.3	90	2512	1454	861	691	482	219
100	6.5	100	1726	1018	602	480	328	134
105	5.6	105	1373	814	477	377	252	92

Table no. G5T / 10

Haulage Capacity for WAG5(TAO) Locomotive (3 step weak field)
GR - 15 : 62 (4.13) TM - TAO 659 Loco Wt. - 118.8 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 3^o Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	26.9	START	Up to 5004	Up to 3580	Up to 2491	Up to 2123	1631	935
10	20.6	10					1593	812
20	20.6	20					1574	806
30	20.6	30					1553	799
40	20.6	40					1529	791
50	20.4	50			2070	1487	773	
60	17.0	60		3416	2044	1660	1193	614
70	13.8	70	4476	2612	1578	1283	921	466
80	10.6	80	3124	1863	1132	919	655	319
90	8.3	90	2200	1336	814	658	464	213
100	6.5	100	1522	937	568	456	315	129
105	5.6	105	1214	749	450	358	242	88

Table no. G5T / 11

Haulage Capacity for WAG5(TAO) Locomotive (3 step weak field)
GR - 15 : 62 (4.13) TM - TAO 659 Loco Wt. - 118.8 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 4⁰ Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	26.9	START	Up to 4638	Up to 3385	Up to 2392	Up to 2050	1586	918
10	20.6	10					1538	795
20	20.6	20					1520	789
30	20.6	30					1500	782
40	20.6	40			2042	1477	775	
50	20.4	50			1979	1438	758	
60	17.0	60		3141	1937	1587	1153	601
70	13.8	70	3924	2407	1497	1227	889	456
80	10.6	80	2759	1720	1074	878	632	311
90	8.3	90	1954	1235	771	629	447	207
100	6.5	100	1359	867	538	435	302	125
105	5.6	105	1085	692	425	340	231	85

Table no. G5T / 12

Haulage Capacity for WAG5(TAO) Locomotive (3 step weak field)
GR - 15 : 62 (4.13) TM - TAO 659 Loco Wt. - 118.8 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 5⁰ Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	26.9	START	Up to 4320	Up to 3209	Up to 2301	Up to 1982	1543	902
10	20.6	10					1486	779
20	20.6	20					1469	773
30	20.6	30					1450	767
40	20.6	40				1954	1429	759
50	20.4	50				2297	1895	1391
60	17.0	60		2905	1841	1520	1115	589
70	13.8	70	3491	2231	1422	1175	860	446
80	10.6	80	2467	1596	1020	841	610	304
90	8.3	90	1755	1147	732	601	431	202
100	6.5	100	1225	805	510	415	290	121
105	5.6	105	979	642	402	324	222	81



Tap Changer Electric Locomotive-WAG5H

Table no. G5H / 1

Haulage Capacity for WAG5H Locomotive (3 step weak field)
GR - 18 : 64 (3.55) TM - HS15250A Loco Wt. - 126 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition on tangent track						
			BOXN Air brake stock						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	37.8	START	Up to 5400		4048	3396	2558	1441	
10	21.0	10			3511	2695	1822	885	
20	21.0	20			3430	2646	1798	878	
30	21.0	30			3343	2592	1771	870	
40	21.0	40			3250	2534	1742	861	
50	19.7	50			2947	2309	1595	790	
60	16.5	60			4471	2362	1857	1285	631
70	14.1	70			3565	1923	1517	1051	511
80	10.7	80	5161	2486	1360	1073	739	347	

Table no. G5H / 2

Haulage Capacity for WAG5H Locomotive (3 step weak field)
GR - 18 : 64 (3.55) TM - HS15250A Loco Wt. - 126 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 1^o Curve						
SPEED (kmph)	TE in Tonne		BOXN Air brake stock						
			Grade						
			Level	1/500	1/200	1/150	1/100	1/50	
0	37.8	START	Up to 5400		3870	3269	2484	1415	
10	21.0	10			3275	2551	1752	866	
20	21.0	20			3204	2506	1730	859	
30	21.0	30			3127	2458	1705	852	
40	21.0	40			3045	2405	1677	843	
50	19.7	50			5075	2765	2193	1536	773
60	16.5	60			4004	2219	1765	1238	617
70	14.1	70			3209	1808	1442	1012	499
80	10.7	80	4262	2246	1279	1020	711	338	

Table no. G5H / 3

Haulage Capacity for WAG5H Locomotive (3 step weak field)
GR - 18 : 64 (3.55) TM - HS15250A Loco Wt. - 126 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 2⁰ Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	37.8	START	Up to 5400	Up to 5397	3707	3150	2413	1391
10	21.0	10			3067	2420	1687	847
20	21.0	20			3005	2380	1666	841
30	21.0	30		5337	2937	2336	1643	834
40	21.0	40		5115	2864	2288	1617	825
50	19.7	50		4574	2603	2088	1481	757
60	16.5	60	5311	3623	2091	1681	1194	604
70	14.1	70		2915	1705	1374	976	488
80	10.7	80		3624	2047	1207	971	685

Table no. G5H / 4

Haulage Capacity for WAG5H Locomotive (3 step weak field)
GR - 18 : 64 (3.55) TM - HS15250A Loco Wt. - 126 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 3⁰ Curve					
SPEED (kmph)	TE in Tonne		BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	37.8	START	Up to 5400	Up to 5090	3557	3040	2346	1367
10	21.0	10			2884	2303	1626	830
20	21.0	20		4997	2828	2266	1607	824
30	21.0	30		4820	2767	2225	1585	816
40	21.0	40		4637	2702	2181	1561	808
50	19.7	50		4161	2459	1992	1430	742
60	16.5	60		3307	1977	1604	1152	591
70	14.1	70	4571	2669	1613	1312	942	478
80	10.7	80	3148	1878	1142	927	661	322

Table no. G5H / 5

Haulage Capacity for WAG5H Locomotive (3 step weak field)
GR - 18 : 64 (3.55) TM - HS15250A Loco Wt. - 126 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 4⁰ Curve					
SPEED (kmph)	TE in Tonne		BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	37.8	START	Up to 5400	4816	3418	2937	2283	1343
10	21.0	10		4679	2720	2195	1570	813
20	21.0	20		4540	2670	2161	1551	807
30	21.0	30		4392	2616	2124	1531	800
40	21.0	40		4238	2557	2084	1508	792
50	19.7	50		3815	2329	1904	1382	726
60	16.5	60	5057	3040	1873	1534	1114	579
70	14.1	70	4008	2459	1530	1255	910	467
80	10.7	80	2780	1734	1082	886	638	315

Table no. G5H / 6

Haulage Capacity for WAG5H Locomotive (3 step weak field)
GR - 18 : 64 (3.55) TM - HS15250A Loco Wt. - 126 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 5⁰ Curve					
SPEED (kmph)	TE in Tonne		BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	37.8	START	Up to 5400	4569	3289	2840	2223	1321
10	21.0	10		4275	2574	2097	1517	796
20	21.0	20		4158	2529	2066	1499	790
30	21.0	30		4033	2479	2031	1480	784
40	21.0	40		3901	2425	1994	1459	776
50	19.7	50		3521	2212	1823	1337	712
60	16.5	60	4471	2811	1780	1469	1077	567
70	14.1	70	3565	2279	1454	1202	880	458
80	10.7	80	2486	1609	1028	848	616	307

Table no. G5H / 7

Haulage Capacity for WAG5H Locomotive (3 step weak field)
GR - 18 : 64 (3.55) TM - HS15250A Loco Wt. - 126 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition on tangent track					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	30.2	START	Up to 5400	Up to 4873	Up to 3208	Up to 2689	2018	1126
10	21.0	10				1822	885	
20	21.0	20				2646	1798	878
30	21.0	30				2592	1771	870
40	21.0	40				2534	1742	861
50	19.7	50		2947	2309	1595	790	
60	16.5	60		4471	2362	1857	1285	631
70	14.1	70		3565	1923	1517	1051	511
80	10.7	80	5161	2486	1360	1073	739	347

Table no. G5H / 8

Haulage Capacity for WAG5H Locomotive (3 step weak field)
GR - 18 : 64 (3.55) TM - HS15250A Loco Wt. - 126 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 1^o Curve						
			BOXN Air brake stock						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	30.2	START	Up to 5400	Up to 4561	Up to 3066	2586	1959	1106	
10	21.0	10				2551	1752	866	
20	21.0	20				2506	1730	859	
30	21.0	30				2458	1705	852	
40	21.0	40			3045	2405	1677	843	
50	19.7	50			2765	2193	1536	773	
60	16.5	60			4004	2219	1765	1238	617
70	14.1	70			3209	1808	1442	1012	499
80	10.7	80	4262	2246	1279	1020	711	338	

Table no. G5H / 9

Haulage Capacity for WAG5H Locomotive (3 step weak field)
GR - 18 : 64 (3.55) TM - HS15250A Loco Wt. - 126 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 2^o Curve						
			BOXN Air brake stock						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	30.2	START	Up to 5400	Up to 4285	Up to 2936	2491	1902	1086	
10	21.0	10				2420	1687	847	
20	21.0	20				2380	1666	841	
30	21.0	30				2336	1643	834	
40	21.0	40			2864	2288	1617	825	
50	19.7	50			2603	2088	1481	757	
60	16.5	60			3623	2091	1681	1194	604
70	14.1	70			5311	2915	1705	1374	976
80	10.7	80	3624	2047	1207	971	685	330	

Table no. G5H / 10

Haulage Capacity for WAG5H Locomotive (3 step weak field)
GR - 18 : 64 (3.55) TM - HS15250A Loco Wt. - 126 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 3⁰ Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	30.2	START	Up to 5400	Up to 4040	Up to 2816	2403	1849	1067
10	21.0	10				2303	1626	830
20	21.0	20				2266	1607	824
30	21.0	30			2767	2225	1585	816
40	21.0	40			2702	2181	1561	808
50	19.7	50		2459	1992	1430	742	
60	16.5	60		3307	1977	1604	1152	591
70	14.1	70		4571	2669	1613	1312	942
80	10.7	80	3148	1878	1142	927	661	322

Table no. G5H / 11

Haulage Capacity for WAG5H Locomotive (3 step weak field)
GR - 18 : 64 (3.55) TM - HS15250A Loco Wt. - 126 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 4⁰ Curve						
SPEED (kmph)	TE in Tonne		BOXN Air brake stock						
			Grade						
			Level	1/500	1/200	1/150	1/100	1/50	
0	30.2	START	Up to 5400	Up to 3821	Up to 2705	2321	1799	1048	
10	21.0	10				2195	1570	813	
20	21.0	20				2670	2161	1551	807
30	21.0	30				2616	2124	1531	800
40	21.0	40				2557	2084	1508	792
50	19.7	50			3815	2329	1904	1382	726
60	16.5	60	5057	3040	1873	1534	1114	579	
70	14.1	70	4008	2459	1530	1255	910	467	
80	10.7	80	2780	1734	1082	886	638	315	

Table no. G5H / 12

Haulage Capacity for WAG5H Locomotive (3 step weak field)
GR - 18 : 64 (3.55) TM - HS15250A Loco Wt. - 126 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 5⁰ Curve					
SPEED (kmph)	TE in Tonne		BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	30.2	START	Up to 4873	Up to 3624	2602	2243	1751	1030
10	21.0	10			2574	2097	1517	796
20	21.0	20			2529	2066	1499	790
30	21.0	30			2479	2031	1480	784
40	21.0	40			2425	1994	1459	776
50	19.7	50		3521	2212	1823	1337	712
60	16.5	60	4471	2811	1780	1469	1077	567
70	14.1	70	3565	2279	1454	1202	880	458
80	10.7	80	2486	1609	1028	848	616	307



Tap Changer Electric Locomotive-WAG7

Table no. G7 / 1

Haulage Capacity for WAG7 Locomotive (3 step weak field)
GR - 16 : 65 (4.06) TM - HS15250A Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition on tangent track						
			BOXN Air brake stock						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	44.0	START	Up to 5400	Up to 5400	Up to 4739	3978	3002	1700	
10	30.8	10				2733	1357		
20	30.8	20				3942	2698	1347	
30	30.8	30				3865	2660	1336	
40	30.8	40				3781	2618	1324	
50	27.0	50			4098	3219	2239	1133	
60	22.6	60			3298	2601	1815	915	
70	15.8	70			4025	2177	1720	1197	590
80	11.6	80			2706	1485	1173	812	386
90	8.6	90	3614	1826	1011	797	546	244	
100	6.4	100	2293	1201	666	521	348	138	

Table no. G7 / 2

Haulage Capacity for WAG7 Locomotive (3 step weak field)
GR - 16 : 65 (4.06) TM - HS15250A Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 1^o Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	44.0	START	Up to 5400	Up to 5400	Up to 4532	3831	2915	1670
10	30.8	10				3804	2630	1329
20	30.8	20				3739	2598	1320
30	30.8	30				3669	2563	1309
40	30.8	40				3593	2524	1297
50	27.0	50			3848	3062	2158	1110
60	22.6	60			3100	2476	1750	896
70	15.8	70			3624	2048	1637	1154
80	11.6	80	4632	2446	1397	1116	782	377
90	8.6	90	3034	1655	952	758	524	238
100	6.4	100	1951	1091	625	494	334	134

Table no. G7 / 3

Haulage Capacity for WAG7 Locomotive (3 step weak field)
GR - 16 : 65 (4.06) TM - HS15250A Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 2^o Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	44.0	START	Up to 5400	Up to 4342	3693	2833	1641	
10	30.8	10			3613	2535	1302	
20	30.8	20			3554	2505	1293	
30	30.8	30			3490	2472	1283	
40	30.8	40		4268	3422	2435	1271	
50	27.0	50		3626	2917	2083	1087	
60	22.6	60		5033	2925	2360	1689	878
70	15.8	70		3293	1933	1561	1113	565
80	11.6	80	3940	2229	1319	1064	753	368
90	8.6	90	2610	1513	898	721	504	231
100	6.4	100	1693	998	589	469	320	129

Table no. G7 / 4

Haulage Capacity for WAG7 Locomotive (3 step weak field)
GR - 16 : 65 (4.06) TM - HS15250A Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 3^o Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	44.0	START	Up to 5400	Up to 5400	Up to 4167	3564	2756	1613
10	30.8	10				3439	2446	1276
20	30.8	20				3386	2418	1267
30	30.8	30			4124	3328	2387	1258
40	30.8	40			4030	3265	2353	1247
50	27.0	50			3427	2785	2013	1066
60	22.6	60			4598	2767	2255	1632
70	15.8	70	5155	3016	1830	1491	1075	553
80	11.6	80	3424	2047	1248	1015	727	360
90	8.6	90	2287	1391	849	688	486	225
100	6.4	100	1493	918	556	446	307	125

Table no. G7 / 5

Haulage Capacity for WAG7 Locomotive (3 step weak field)
GR - 16 : 65 (4.06) TM - HS15250A Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 4⁰ Curve						
SPEED (kmph)	TE in Tonne		BOXN Air brake stock						
			Grade						
			Level	1/500	1/200	1/150	1/100	1/50	
0	44.0	START	Up to 5400	Up to 5400	Up to 4005	3444	2682	1586	
10	30.8	10				3281	2363	1251	
20	30.8	20				3980	3233	2337	1243
30	30.8	30				3901	3179	2307	1233
40	30.8	40				3817	3121	2275	1222
50	27.0	50			5292	3249	2664	1947	1045
60	22.6	60			4230	2625	2158	1579	843
70	15.8	70	4522	2781	1736	1426	1039	541	
80	11.6	80	3025	1890	1184	971	702	352	
90	8.6	90	2032	1286	805	657	468	220	
100	6.4	100	1332	849	526	425	294	121	

Table no. G7 / 6

Haulage Capacity for WAG7 Locomotive (3 step weak field)
GR - 16 : 65 (4.06) TM - HS15250A Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds	
SPEED (kmph)	TE in Tonne
0	44.0
10	30.8
20	30.8
30	30.8
40	30.8
50	27.0
60	22.6
70	15.8
80	11.6
90	8.6
100	6.4

SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 5⁰ Curve						
	BOXN Air brake stock						
	Grade						
	Level	1/500	1/200	1/150	1/100	1/50	
START	Up to 5400	Up to 5346	3855	3331	2612	1560	
10			3837	3137	2285	1227	
20			3772	3092	2260	1219	
30			3701	3043	2233	1210	
40			3624	2990	2202	1199	
50		4887	3087	2553	1885	1025	
60		3915	2496	2068	1529	827	
70	4025	2579	1651	1367	1005	530	
80	2706	1755	1126	929	678	344	
90	1826	1195	764	628	451	214	
100	1201	788	498	405	283	117	

Table no. G7 / 7

Haulage Capacity for WAG7 Locomotive (3 step weak field)
GR - 16 : 65 (4.06) TM - HS15250A Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition on tangent track					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	35.2	START	Up to 5400	Up to 5400	Up to 3761	Up to 3153	Up to 2374	Up to 1333
10	30.8	10						
20	30.8	20						
30	30.8	30						
40	30.8	40					1324	
50	27.0	50					1133	
60	22.6	60		3298	2601	1815	915	
70	15.8	70		4025	2177	1720	1197	590
80	11.6	80		2706	1485	1173	812	386
90	8.6	90	3614	1826	1011	797	546	244
100	6.4	100	2293	1201	666	521	348	138

Table no. G7 / 8

Haulage Capacity for WAG7 Locomotive (3 step weak field)
GR - 16 : 65 (4.06) TM - HS15250A Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 1^o Curve					
SPEED (kmph) TE in Tonne			BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	35.2	START	Up to 5400	Up to 5339	Up to 3596	Up to 3035	Up to 2304	Up to 1310
10	30.8	10						
20	30.8	20						
30	30.8	30					1309	
40	30.8	40			1297			
50	27.0	50			2158	1110		
60	22.6	60		3100	2476	1750	896	
70	15.8	70		3624	2048	1637	1154	577
80	11.6	80	4632	2446	1397	1116	782	377
90	8.6	90	3034	1655	952	758	524	238
100	6.4	100	1951	1091	625	494	334	134

Table no. G7 / 9

Haulage Capacity for WAG7 Locomotive (3 step weak field)
GR - 16 : 65 (4.06) TM - HS15250A Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 2^o Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	35.2	START	Up to 5400	Up to 5017	Up to 3444	Up to 2925	Up to 2239	Up to 1286
10	30.8	10						1283
20	30.8	20						
30	30.8	30			3444	2925	2239	1283
40	30.8	40						1271
50	27.0	50			2925	2360	1689	1087
60	22.6	60						878
70	15.8	70	3293	1933	1561	1113	565	
80	11.6	80	3940	2229	1319	1064	753	368
90	8.6	90	2610	1513	898	721	504	231
100	6.4	100	1693	998	589	469	320	129

Table no. G7 / 10

Haulage Capacity for WAG7 Locomotive (3 step weak field)
GR - 16 : 65 (4.06) TM - HS15250A Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 3⁰ Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	35.2	START	Up to 5400	Up to 4732	Up to 3304	Up to 2822	Up to 2177	Up to 1264
10	30.8	10						
20	30.8	20						
30	30.8	30			3304	2822	2177	1258
40	30.8	40						1247
50	27.0	50			2785	2013	1632	1066
60	22.6	60						4598
70	15.8	70	5155	3016	1830	1491	1075	553
80	11.6	80	3424	2047	1248	1015	727	360
90	8.6	90	2287	1391	849	688	486	225
100	6.4	100	1493	918	556	446	307	125

Table no. G7 / 11

Haulage Capacity for WAG7 Locomotive (3 step weak field)
GR - 16 : 65 (4.06) TM - HS15250A Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 4^o Curve										
SPEED (kmph)	TE in Tonne		BOXN Air brake stock										
			Grade										
			Level	1/500	1/200	1/150	1/100	1/50					
0	35.2	START	Up to 5400	Up to 4476	Up to 3175	Up to 2726	Up to 2118	Up to 1242					
10	30.8	10						1233					
20	30.8	20											
30	30.8	30				2664	1947	1222					
40	30.8	40						1045					
50	27.0	50				4230	2625	2158	1579	843			
60	22.6	60	4522	2781	1736	1426	1039	541					
70	15.8	70						3025	1890	1184	971	702	352
80	11.6	80						2032	1286	805	657	468	220
90	8.6	90						1332	849	526	425	294	121
100	6.4	100											

Table no. G7 / 12

Haulage Capacity for WAG7 Locomotive (3 step weak field)
GR - 16 : 65 (4.06) TM - HS15250A Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 5⁰ Curve					
SPEED (kmph) TE in Tonne			BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	35.2	START	Up to 5400	Up to 4246	Up to 3055	Up to 2636	Up to 2062	Up to 1221
10	30.8	10						1219
20	30.8	20						
30	30.8	30				2553	1885	1210
40	30.8	40						1199
50	27.0	50				2068	1529	1025
60	22.6	60	3915	2496	2068	1529	827	
70	15.8	70	4025	2579	1651	1367	1005	530
80	11.6	80	2706	1755	1126	929	678	344
90	8.6	90	1826	1195	764	628	451	214
100	6.4	100	1201	788	498	405	283	117



Three Phase Electric Locomotive-WAG9

Table no. G9 / 1

Haulage Capacity for WAG9 Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition on tangent track						
			BOXN Air brake stock						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	46.9	START	Up to 5400	Up to 5400	Up to 5060	4249	3209	1821	
10	33.1	10				4249	2949	1469	
20	33.1	20				4249	2912	1459	
30	33.1	30				4167	2871	1447	
40	33.1	40				4078	2827	1434	
50	33.1	50				3984	2779	1420	
60	27.5	60			4050	3201	2241	1143	
70	23.7	70			3357	2666	1875	956	
80	20.7	80			5018	2799	2233	1577	802
90	18.3	90			4157	2369	1898	1346	684
100	16.6	100			3507	2040	1643	1170	593

Table no. G9 / 2

Haulage Capacity for WAG9 Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 1^o Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	46.9	START	Up to 5400	Up to 5400	Up to 4839	4092	3116	1789
10	33.1	10				4092	2839	1439
20	33.1	20				4032	2805	1429
30	33.1	30				3957	2767	1418
40	33.1	40				3876	2725	1405
50	33.1	50		4756	3790	2680	1391	
60	27.5	60		3809	3047	2162	1120	
70	23.7	70		3162	2540	1809	936	
80	20.7	80		4546	2640	2129	1521	786
90	18.3	90		3783	2237	1812	1299	669
100	16.6	100		3206	1930	1569	1129	581

Table no. G9 / 3

Haulage Capacity for WAG9 Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		Trailing load in tonnes at km/h with Dry Condition 2^o Curve					
		BOXN Air brake stock					
		Grade					
SPEED (kmph)	TE in Tonne	Level	1/500	1/200	1/150	1/100	1/50
0	46.9	START	Up to 5400	Up to 4637	3945	3029	1758
10	33.1	10			3896	2737	1410
20	33.1	20			3833	2705	1400
30	33.1	30			3765	2669	1390
40	33.1	40		4602	3691	2630	1377
50	33.1	50		4483	3612	2588	1364
60	27.5	60		3595	2906	2088	1098
70	23.7	70		5046	2988	2424	1747
80	20.7	80		4152	2498	2034	1470
90	18.3	90		3469	2119	1731	1255
100	16.6	100	4859	2951	1830	1501	1091
							568

Table no. G9 / 4

Haulage Capacity for WAG9 Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		Trailing load in tonnes at km/h with Dry Condition 3^o Curve					
		BOXN Air brake stock					
		Grade					
SPEED (kmph)	TE in Tonne	Level	1/500	1/200	1/150	1/100	1/50
0	46.9	START	Up to 5400	Up to 4450	3808	2946	1728
10	33.1	10			3709	2641	1382
20	33.1	20			3652	2611	1373
30	33.1	30			4447	3590	2577
40	33.1	40		4346	3522	2541	1351
50	33.1	50		4239	3450	2501	1338
60	27.5	60		3403	2778	2019	1077
70	23.7	70		4627	2831	2318	1689
80	20.7	80		3820	2369	1946	1421
90	18.3	90	5170	3202	2012	1658	1214
100	16.6	100	4309	2733	1739	1437	1056
							557

Table no. G9 / 5

Haulage Capacity for WAG9 Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 4^o Curve					
SPEED (kmph)	TE in Tonne		BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	46.9	START	Up to 5400	Up to 5400	Up to 4277	3679	2867	1699
10	33.1	10				3539	2552	1355
20	33.1	20				3487	2523	1346
30	33.1	30			4207	3430	2492	1336
40	33.1	40			4116	3368	2457	1325
50	33.1	50			4020	3302	2420	1312
60	27.5	60		5188	3229	2659	1953	1056
70	23.7	70		4271	2689	2221	1635	882
80	20.7	80		3536	2252	1865	1376	739
90	18.3	90	4610	2972	1914	1589	1175	629
100	16.6	100	3868	2543	1657	1379	1022	545

Table no. G9 / 6

Haulage Capacity for WAG9 Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds	
SPEED (kmph)	TE in Tonne
0	46.9
10	33.1
20	33.1
30	33.1
40	33.1
50	33.1
60	27.5
70	23.7
80	20.7
90	18.3
100	16.6

SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 5⁰ Curve					
	BOXN Air brake stock					
	Grade					
	Level	1/500	1/200	1/150	1/100	1/50
START	Up to 5400	Up to 5400	Up to 4117	3559	2792	1671
10				3384	2468	1329
20			4068	3336	2441	1321
30			3991	3283	2412	1311
40			3909	3226	2379	1300
50			3821	3165	2344	1288
60		4804	3072	2550	1892	1036
70			3964	2561	2131	1584
80	5018	3290	2146	1790	1333	725
90	4157	2772	1826	1526	1139	617
100	3507	2377	1581	1325	990	534

Table no. G9 / 7

Haulage Capacity for WAG9 Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition on tangent track					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	37.5	START	Up to 5400	Up to 5400	Up to 4018	Up to 3370	Up to 2539	Up to 1430
10	33.1	10						
20	33.1	20						
30	33.1	30						
40	33.1	40						
50	33.1	50						1420
60	27.5	60				3201	2241	1143
70	23.7	70			3357	2666	1875	956
80	20.7	80		5018	2799	2233	1577	802
90	18.3	90		4157	2369	1898	1346	684
100	16.6	100		3507	2040	1643	1170	593

Table no. G9 / 8

Haulage Capacity for WAG9 Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 1^o Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	37.5	START	Up to 5400	Up to 5400	Up to 3841	Up to 3244	Up to 2465	Up to 1404
10	33.1	10						
20	33.1	20						
30	33.1	30						
40	33.1	40						
50	33.1	50						1391
60	27.5	60			3809	3047	2162	1120
70	23.7	70			3162	2540	1809	936
80	20.7	80		4546	2640	2129	1521	786
90	18.3	90		3783	2237	1812	1299	669
100	16.6	100		3206	1930	1569	1129	581

Table no. G9 / 9

Haulage Capacity for WAG9 Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 2^o Curve						
			BOXN Air brake stock						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	37.5	START	Up to 5400	Up to 5357	Up to 3680	Up to 3127	Up to 2395	Up to 1380	
10	33.1	10							
20	33.1	20							
30	33.1	30							
40	33.1	40						1377	
50	33.1	50						1364	
60	27.5	60			3595	2906	2088	1098	
70	23.7	70			5046	2988	2424	1747	917
80	20.7	80			4152	2498	2034	1470	770
90	18.3	90			3469	2119	1731	1255	655
100	16.6	100	4859	2951	1830	1501	1091	568	

Table no. G9 / 10

Haulage Capacity for WAG9 Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 3^o Curve						
SPEED (kmph)	TE in Tonne		BOXN Air brake stock						
			Grade						
			Level	1/500	1/200	1/150	1/100	1/50	
0	37.5	START	Up to 5400	Up to 5053	Up to 3531	Up to 3017	Up to 2329	Up to 1356	
10	33.1	10							
20	33.1	20							
30	33.1	30							
40	33.1	40						1351	
50	33.1	50						1338	
60	27.5	60			3403	2778	2019	1077	
70	23.7	70			4627	2831	2318	1689	899
80	20.7	80			3820	2369	1946	1421	754
90	18.3	90		5170	3202	2012	1658	1214	642
100	16.6	100	4309	2733	1739	1437	1056	557	

Table no. G9 / 11

Haulage Capacity for WAG9 Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		Trailing load in tonnes at km/h with Wet Condition					
		4⁰ Curve					
		BOXN Air brake stock					
		Grade					
SPEED (kmph)	TE in Tonne	Level	1/500	1/200	1/150	1/100	1/50
0	37.5	START	Up to 5400	Up to 4780	Up to 3393	Up to 2915	Up to 2266
10	33.1	10					
20	33.1	20					
30	33.1	30					
40	33.1	40					
50	33.1	50					
60	27.5	60			3229	2659	1953
70	23.7	70		4271	2689	2221	1635
80	20.7	80		3536	2252	1865	1376
90	18.3	90	4610	2972	1914	1589	1175
100	16.6	100	3868	2543	1657	1379	1022

Table no. G9 / 12

Haulage Capacity for WAG9 Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 123 T

Tractive Effort Values in Tonnes at Various Speeds		Trailing load in tonnes at km/h with Wet Condition					
		5⁰ Curve					
		BOXN Air brake stock					
		Grade					
SPEED (kmph)	TE in Tonne	Level	1/500	1/200	1/150	1/100	1/50
0	37.5	START	Up to 5400	Up to 4535	Up to 3265	Up to 2819	Up to 2206
10	33.1	10					
20	33.1	20					
30	33.1	30					
40	33.1	40					
50	33.1	50					
60	27.5	60			3072	2550	1892
70	23.7	70		3964	2561	2131	1584
80	20.7	80	5018	3290	2146	1790	1333
90	18.3	90	4157	2772	1826	1526	1139
100	16.6	100	3507	2377	1581	1325	990



Three Phase Electric Locomotive-WAG9H

Table no. G9H / 1

Haulage Capacity for WAG9H Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 132 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition on tangent track					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	50.97	START	Up to 5400	Up to 5400	Up to 5400	4620	3490	1981
10	33.13	10				4318	2940	1460
20	33.13	20				4242	2903	1450
30	33.13	30			5348	4159	2863	1438
40	33.13	40			5205	4069	2818	1425
50	33.13	50			5055	3975	2770	1411
60	27.52	60			4041	3192	2233	1135
70	23.75	70			3349	2657	1866	947
80	20.69	80		5011	2791	2225	1568	793
90	18.34	90		4149	2360	1890	1337	675
100	16.60	100		3500	2032	1635	1161	584

Table no. G9H / 2

Haulage Capacity for WAG9H Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 132 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 1⁰ Curve					
SPEED (kmph) TE in Tonne			BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	50.97	START	Up to 5400	Up to 5400	5262	4450	3389	1946
10	33.13	10			5236	4092	2830	1430
20	33.13	20			5126	4023	2796	1420
30	33.13	30			5007	3948	2758	1409
40	33.13	40			4880	3867	2716	1396
50	33.13	50			4747	3781	2671	1382
60	27.52	60			3801	3039	2153	1111
70	23.75	70			3154	2532	1800	927
80	20.69	80		4538	2632	2121	1513	777
90	18.34	90		3775	2229	1803	1290	661
100	16.60	100		3199	1922	1561	1121	572

Table no. G9H / 3

Haulage Capacity for WAG9H Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 132 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 2⁰ Curve					
SPEED (kmph)	TE in Tonne		BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	50.97	START	Up to 5400	Up to 5400	5042	4290	3294	1913
10	33.13	10			4909	3887	2728	1401
20	33.13	20			4811	3824	2696	1392
30	33.13	30			4706	3756	2660	1381
40	33.13	40			4593	3682	2621	1368
50	33.13	50			4474	3604	2579	1355
60	27.52	60			3586	2898	2079	1089
70	23.75	70		5037	2979	2416	1738	908
80	20.69	80		4145	2489	2025	1461	761
90	18.34	90		3462	2111	1723	1247	647
100	16.60	100	4852	2944	1822	1492	1083	560

Table no. G9H / 4

Haulage Capacity for WAG9H Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 132 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 3⁰ Curve					
SPEED (kmph) TE in Tonne			BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	50.97	START	Up to 5400	Up to 5400	4839	4141	3204	1880
10	33.13	10			4619	3700	2632	1373
20	33.13	20			4532	3643	2602	1364
30	33.13	30			4438	3581	2569	1353
40	33.13	40			4337	3513	2532	1342
50	33.13	50			4230	3441	2492	1329
60	27.52	60			3394	2769	2010	1068
70	23.75	70		4619	2823	2310	1681	890
80	20.69	80		3812	2361	1937	1413	746
90	18.34	90	5163	3194	2003	1649	1205	633
100	16.60	100	4302	2725	1731	1429	1047	548

Table no. G9H / 5

Haulage Capacity for WAG9H Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 132 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 4⁰ Curve					
SPEED (kmph)	TE in Tonne		BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	50.97	START	Up to 5400	Up to 5400	4652	4002	3118	1849
10	33.13	10			4360	3530	2543	1346
20	33.13	20			4283	3478	2514	1337
30	33.13	30			4198	3421	2483	1327
40	33.13	40			4107	3359	2449	1316
50	33.13	50			4011	3293	2411	1303
60	27.52	60		5179	3221	2651	1945	1047
70	23.75	70		4262	2681	2212	1626	873
80	20.69	80		3528	2244	1856	1367	731
90	18.34	90	4603	2964	1906	1581	1167	621
100	16.60	100	3861	2535	1648	1371	1014	537

Table no. G9H / 6

Haulage Capacity for WAG9H Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 132 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 5^o Curve					
SPEED (kmph) TE in Tonne			BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	50.97	START	Up to 5400	Up to 5400	4478	3871	3037	1818
10	33.13	10			4129	3375	2459	1320
20	33.13	20			4059	3327	2432	1312
30	33.13	30			3982	3274	2403	1302
40	33.13	40			3900	3217	2370	1291
50	33.13	50			3812	3156	2335	1279
60	27.52	60		4795	3064	2541	1883	1027
70	23.75	70		3956	2552	2122	1575	856
80	20.69	80	5011	3282	2138	1781	1324	716
90	18.34	90	4149	2764	1817	1518	1130	608
100	16.60	100	3500	2369	1573	1317	982	526

Table no. G9H / 7

Haulage Capacity for WAG9H Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 132 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition on tangent track					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	40.78	START	Up to 5400	Up to 5400	Up to 4369	Up to 3665	Up to 2762	1556
10	33.13	10						1460
20	33.13	20						1450
30	33.13	30						1438
40	33.13	40						1425
50	33.13	50						1411
60	27.52	60			4041	3192	2233	1135
70	23.75	70			3349	2657	1866	947
80	20.69	80		5011	2791	2225	1568	793
90	18.34	90		4149	2360	1890	1337	675
100	16.60	100		3500	2032	1635	1161	584

Table no. G9H / 8

Haulage Capacity for WAG9H Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 132 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 1^o Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	40.78	START	Up to 5400	Up to 4178	Up to 3529	Up to 2681	1528	
10	33.13	10					1430	
20	33.13	20					1420	
30	33.13	30					1409	
40	33.13	40					1396	
50	33.13	50					1382	
60	27.52	60		3801	3039	2153	1111	
70	23.75	70		3154	2532	1800	927	
80	20.69	80		4538	2632	2121	1513	777
90	18.34	90		3775	2229	1803	1290	661
100	16.60	100		3199	1922	1561	1121	572

Table no. G9H / 9

Haulage Capacity for WAG9H Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 132 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 2^o Curve					
SPEED (kmph)	TE in Tonne		BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	40.78	START	Up to 5400	Up to 5400	Up to 4002	Up to 3401	Up to 2605	1502
10	33.13	10						1401
20	33.13	20						1392
30	33.13	30						1381
40	33.13	40						1368
50	33.13	50					2579	1355
60	27.52	60			3586	2898	2079	1089
70	23.75	70		5037	2979	2416	1738	908
80	20.69	80		4145	2489	2025	1461	761
90	18.34	90		3462	2111	1723	1247	647
100	16.60	100	4852	2944	1822	1492	1083	560

Table no. G9H / 10

Haulage Capacity for WAG9H Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 132 T

Tractive Effort Values in Tonnes at Various Speeds	
SPEED (kmph)	TE in Tonne
0	40.78
10	33.13
20	33.13
30	33.13
40	33.13
50	33.13
60	27.52
70	23.75
80	20.69
90	18.34
100	16.60

SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 3^o Curve						
	BOXN Air brake stock						
	Grade						
	Level	1/500	1/200	1/150	1/100	1/50	
START	Up to 5400	Up to 5400	Up to 3840	Up to 3282	Up to 2533	1476	
10						1373	
20						1364	
30						1353	
40					2532	1342	
50					2492	1329	
60			3394	2769	2010	1068	
70		4619	2823	2310	1681	890	
80		3812	2361	1937	1413	746	
90	5163	3194	2003	1649	1205	633	
100	4302	2725	1731	1429	1047	548	

Table no. G9H / 11

Haulage Capacity for WAG9H Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 132 T

Tractive Effort Values in Tonnes at Various Speeds		Trailing load in tonnes at km/h with Wet Condition 4^o Curve					
		BOXN Air brake stock					
		Grade					
SPEED (kmph)	TE in Tonne	Level	1/500	1/200	1/150	1/100	1/50
0	40.78	START	Up to 5400	Up to 5199	Up to 3690	Up to 2465	1451
10	33.13	10					1346
20	33.13	20					1337
30	33.13	30					1327
40	33.13	40				2449	1316
50	33.13	50				2411	1303
60	27.52	60		5179	3221	2651	1945
70	23.75	70		4262	2681	2212	1626
80	20.69	80		3528	2244	1856	1367
90	18.34	90	4603	2964	1906	1581	1167
100	16.60	100	3861	2535	1648	1371	1014

Table no. G9H / 12

Haulage Capacity for WAG9H Three Phase Locomotive
GR - 15 : 77 (5.133), TM - 6FRA 6068, Loco Wt. - 132 T

Tractive Effort Values in Tonnes at Various Speeds		Trailing load in tonnes at km/h with Wet Condition 5^o Curve					
		BOXN Air brake stock					
		Grade					
SPEED (kmph)	TE in Tonne	Level	1/500	1/200	1/150	1/100	1/50
0	40.78	START	Up to 5400	Up to 4932	Up to 3551	Up to 2400	1426
10	33.13	10					1320
20	33.13	20					1312
30	33.13	30					1302
40	33.13	40				2370	1291
50	33.13	50				2335	1279
60	27.52	60		4795	3064	2541	1883
70	23.75	70		3956	2552	2122	1575
80	20.69	80	5011	3282	2138	1781	1324
90	18.34	90	4149	2764	1817	1518	1130
100	16.60	100	3500	2369	1573	1317	982



Tap Changer Electric Locomotive-WAM4

Table no. M4 / 1

Haulage Capacity for WAM4 Locomotive
GR-15:62(4.13), TM-TAO659, Loco Wt.-112.8T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition on tangent track						
			BOXN Air brake stock						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	33.8	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1650	1278	
10	17.6	10					1486	716	
20	17.6	20					1452	707	
30	17.6	30					1416	697	
40	17.6	40					1379	686	
50	17.6	50					1341	674	
60	16.5	60			1212	612			
70	14.0	70			1372	976	489		
80	12.5	80			1428	1158	827	412	
90	11.2	90			1197	975	699	345	
100	9.2	100			1446	900	734	524	250
110	7.8	110			1099	692	564	401	182

Table no. M4 / 2

Haulage Capacity for WAM4 Locomotive
GR-15:62(4.13), TM-TAO659, Loco Wt.-112.8T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 1^o Curve							
			BOXN Air brake stock							
			Grade							
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50		
0	33.8	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1650	1255		
10	17.6	10					1429	700		
20	17.6	20					1397	691		
30	17.6	30					1364	682		
40	17.6	40					1329	671		
50	17.6	50					1294	660		
60	16.5	60				1633	1170	599		
70	14.0	70				1610	1310	942	478	
80	12.5	80				1354	1107	799	403	
90	11.2	90				1136	932	675	337	
100	9.2	100				1342	855	702	506	244
110	7.8	110			1543	1022	657	539	386	177

Table no. M4 / 3

Haulage Capacity for WAM4 Locomotive
GR-15:62(4.13), TM-TAO659, Loco Wt.-112.8T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 2^o Curve						
			BOXN Air brake stock						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	33.8	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1650	1232	
10	17.6	10					1376	685	
20	17.6	20					1346	677	
30	17.6	30					1315	667	
40	17.6	40					1283	657	
50	17.6	50					1249	646	
60	16.5	60				1561	1131	587	
70	14.0	70				1527	1253	910	468
80	12.5	80				1286	1059	772	394
90	11.2	90				1080	893	652	330
100	9.2	100				1251	813	672	488
110	7.8	110	1404	955	625	516	372	173	

Table no. M4 / 4

Haulage Capacity for WAM4 Locomotive
GR-15:62(4.13), TM-TAO659, Loco Wt.-112.8T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 3^o Curve						
			BOXN Air brake stock						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	33.8	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1650	1211	
10	17.6	10					1326	671	
20	17.6	20					1299	662	
30	17.6	30					1270	653	
40	17.6	40					1239	643	
50	17.6	50					1208	633	
60	16.5	60			1494	1093	575		
70	14.0	70			1452	1200	880	458	
80	12.5	80			1224	1015	746	386	
90	11.2	90			1565	1029	856	631	322
100	9.2	100			1170	775	645	472	232
110	7.8	110	1287	895	596	495	359	168	

Table no. M4 / 5

Haulage Capacity for WAM4 Locomotive
GR-15:62(4.13), TM-TAO659, Loco Wt.-112.8T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 4^o Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	33.8	START	Up to 1650	Up to 1650	Up to 1650	1650	1190	
10	17.6	10				1280	657	
20	17.6	20				1254	648	
30	17.6	30				1227	640	
40	17.6	40			1642	1198	630	
50	17.6	50			1590	1168	620	
60	16.5	60			1433	1058	563	
70	14.0	70			1383	1151	852	448
80	12.5	80			1167	975	722	377
90	11.2	90			1467	982	822	610
100	9.2	100	1566	1098	740	619	456	227
110	7.8	110	1186	842	569	475	347	163

Table no. M4 / 6

Haulage Capacity for WAM4 Locomotive
GR-15:62(4.13), TM-TAO659, Loco Wt.-112.8T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 5^o Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	33.8	START	Up to 1650	Up to 1650	Up to 1650	1650	1170	
10	17.6	10				1236	643	
20	17.6	20				1212	635	
30	17.6	30			1620	1186	627	
40	17.6	40			1573	1159	617	
50	17.6	50			1525	1131	607	
60	16.5	60			1646	1376	1025	552
70	14.0	70			1320	1106	825	439
80	12.5	80			1115	937	700	369
90	11.2	90			1379	939	791	591
100	9.2	100	1446	1034	707	595	441	221
110	7.8	110	1099	793	543	456	335	159

Table no. M4 / 7

Haulage Capacity for WAM4 Locomotive
GR-15:62(4.13), TM-TAO659, Loco Wt.-112.8T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition on tangent track						
			BOXN Air brake stock						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	27.0	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1650	996	
10	17.6	10					1486	716	
20	17.6	20					1452	707	
30	17.6	30					1416	697	
40	17.6	40					1379	686	
50	17.6	50					1341	674	
60	16.5	60			1212	612			
70	14.0	70			1372	976	489		
80	12.5	80			1428	1158	827	412	
90	11.2	90			1197	975	699	345	
100	9.2	100			1446	900	734	524	250
110	7.8	110			1099	692	564	401	182

Table no. M4 / 8

Haulage Capacity for WAM4 Locomotive
GR-15:62(4.13), TM-TAO659, Loco Wt.-112.8T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 1^o Curve							
			BOXN Air brake stock							
			Grade							
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50		
0	27.0	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1650	978		
10	17.6	10					1429	700		
20	17.6	20					1397	691		
30	17.6	30					1364	682		
40	17.6	40					1329	671		
50	17.6	50					1294	660		
60	16.5	60				1633	1170	599		
70	14.0	70				1610	1310	942	478	
80	12.5	80				1354	1107	799	403	
90	11.2	90				1136	932	675	337	
100	9.2	100				1342	855	702	506	244
110	7.8	110			1543	1022	657	539	386	177

Table no. M4 / 9

Haulage Capacity for WAM4 Locomotive
GR-15:62(4.13), TM-TAO659, Loco Wt.-112.8T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 2^o Curve					
			BOXN Air brake stock					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	27.0	START	Up to 1650	Up to 1650	Up to 1650	1650	960	
10	17.6	10				1376	685	
20	17.6	20				1346	677	
30	17.6	30				1315	667	
40	17.6	40				1283	657	
50	17.6	50				1249	646	
60	16.5	60			1561	1131	587	
70	14.0	70			1527	1253	910	468
80	12.5	80			1286	1059	772	394
90	11.2	90			1080	893	652	330
100	9.2	100			1251	813	672	488
110	7.8	110	1404	955	625	516	372	173

Table no. M4 / 10

Haulage Capacity for WAM4 Locomotive
GR-15:62(4.13), TM-TAO659, Loco Wt.-112.8T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 3^o Curve						
			BOXN Air brake stock						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	27.0	START	Up to 1650	Up to 1650	Up to 1650	1644	943		
10	17.6	10				1326	671		
20	17.6	20				1299	662		
30	17.6	30				1270	653		
40	17.6	40				1239	643		
50	17.6	50				1208	633		
60	16.5	60			1494	1093	575		
70	14.0	70			1452	1200	880	458	
80	12.5	80			1224	1015	746	386	
90	11.2	90			1565	1029	856	631	322
100	9.2	100			1170	775	645	472	232
110	7.8	110	1287	895	596	495	359	168	

Table no. M4 / 11

Haulage Capacity for WAM4 Locomotive
GR-15:62(4.13), TM-TAO659, Loco Wt.-112.8T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 4⁰ Curve					
SPEED (kmph)	TE in Tonne		BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	27.0	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1598	926
10	17.6	10					1280	657
20	17.6	20					1254	648
30	17.6	30					1227	640
40	17.6	40			1383	1642	1198	630
50	17.6	50				1590	1168	620
60	16.5	60				1433	1058	563
70	14.0	70			1167	975	852	448
80	12.5	80			1467	982	822	610
90	11.2	90						
100	9.2	100	1566	1098	740	619	456	227
110	7.8	110	1186	842	569	475	347	163

Table no. M4 / 12

Haulage Capacity for WAM4 Locomotive
GR-15:62(4.13), TM-TAO659, Loco Wt.-112.8T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 5⁰ Curve					
SPEED (kmph)	TE in Tonne		BOXN Air brake stock					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	27.0	START	Up to 1650	Up to 1650	Up to 1650	1555	910	
10	17.6	10				1236	643	
20	17.6	20				1212	635	
30	17.6	30			1620	1186	627	
40	17.6	40			1573	1159	617	
50	17.6	50			1525	1131	607	
60	16.5	60			1646	1376	1025	552
70	14.0	70			1320	1106	825	439
80	12.5	80			1115	937	700	369
90	11.2	90			1379	939	791	591
100	9.2	100	1446	1034	707	595	441	221
110	7.8	110	1099	793	543	456	335	159



Tap Changer Electric Locomotive-WAP4

Table no. P4 / 1

Haulage Capacity for WAP4 Locomotive (4 step weak field)
GR - 23 : 58 (2.52) TM - HS15250A Loco Wt. - 114 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition on tangent track					
			Passenger (ICF Coach) Air brake					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	30.8	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1650	1160
10	18.8	10					1604	782
20	18.8	20					1568	772
30	18.8	30					1529	761
40	18.8	40					1490	749
50	18.8	50					1449	737
60	18.8	60					1407	724
70	18.8	70					1365	710
80	17.2	80					1198	625
90	15.4	90				1405	1023	534
100	13.8	100			1439	1187	869	453
110	12.6	110			1230	1020	750	390
120	11.4	120		1573	1035	862	636	329
130	9.0	130	1609	1103	731	609	446	220
140	7.5	140	1158	807	538	446	324	150

Table no. P4 / 2

Haulage Capacity for WAP4 Locomotive (4 step weak field)
GR - 23 : 58 (2.52) TM - HS15250A Loco Wt. - 114 T

Tractive Effort Values in Tonnes at Various Speeds	
SPEED (kmph)	TE in Tonne
0	30.8
10	18.8
20	18.8
30	18.8
40	18.8
50	18.8
60	18.8
70	18.8
80	17.2
90	15.4
100	13.8
110	12.6
120	11.4
130	9.0
140	7.5

SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition on 1^o Curve						
	Passenger (ICF Coach) Air brake						
	Grade						
	Level	1/500	1/200	1/150	1/100	1/50	
START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1650	1139	
10					1543	765	
20					1509	756	
30					1474	745	
40					1437	734	
50					1398	722	
60					1359	709	
70					1319	695	
80				1585	1159	613	
90			1627	1346	989	523	
100			1370	1138	841	443	
110			1173	979	726	382	
120		1474	988	828	616	322	
130	1477	1036	698	584	431	215	
140	1068	759	513	428	313	146	

Table no. P4 / 3

Haulage Capacity for WAP4 Locomotive (4 step weak field)
GR - 23 : 58 (2.52) TM - HS15250A Loco Wt. - 114 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition on 2⁰ Curve					
SPEED (kmph)	TE in Tonne		Passenger (ICF Coach) Air brake					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	30.8	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1650	1119
10	18.8	10					1487	749
20	18.8	20					1455	740
30	18.8	30					1422	730
40	18.8	40					1387	719
50	18.8	50					1351	707
60	18.8	60			1314	695		
70	18.8	70			1277	681		
80	17.2	80			1519	1122	600	
90	15.4	90			1550	1291	958	512
100	13.8	100			1307	1093	814	434
110	12.6	110			1120	941	703	374
120	11.4	120		1386	945	796	597	315
130	9.0	130	1363	975	668	562	417	210
140	7.5	140	990	716	490	411	302	142

Table no. P4 / 4

Haulage Capacity for WAP4 Locomotive (4 step weak field)
GR - 23 : 58 (2.52) TM - HS15250A Loco Wt. - 114 T

Tractive Effort Values in Tonnes at Various Speeds	
SPEED (kmph)	TE in Tonne
0	30.8
10	18.8
20	18.8
30	18.8
40	18.8
50	18.8
60	18.8
70	18.8
80	17.2
90	15.4
100	13.8
110	12.6
120	11.4
130	9.0
140	7.5

SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition on 3⁰ Curve						
	Passenger (ICF Coach) Air brake						
	Grade						
	Level	1/500	1/200	1/150	1/100	1/50	
START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1650	1099	
10					1434	734	
20					1404	725	
30					1373	715	
40					1340	704	
50			1306	693			
60			1272	681			
70			1236	668			
80			1458	1087	589		
90			1480	1241	928	502	
100			1249	1051	789	425	
110		1566	1072	905	682	366	
120		1307	905	766	578	308	
130	1265	921	639	540	404	205	
140	921	676	469	395	292	138	

Table no. P4 / 5

Haulage Capacity for WAP4 Locomotive (4 step weak field)
GR - 23 : 58 (2.52) TM - HS15250A Loco Wt. - 114 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition on 4⁰ Curve						
SPEED (kmph)	TE in Tonne		Passenger (ICF Coach) Air brake						
			Grade						
			Level	1/500	1/200	1/150	1/100	1/50	
0	30.8	START	Up to 1650	Up to 1650	Up to 1650	1650	1080		
10	18.8	10				1384	718		
20	18.8	20				1356	710		
30	18.8	30				1327	700		
40	18.8	40				1296	690		
50	18.8	50				1264	679		
60	18.8	60				1232	667		
70	18.8	70				1602	1198	655	
80	17.2	80				1402	1054	577	
90	15.4	90			1415	1194	900	492	
100	13.8	100			1196	1012	765	417	
110	12.6	110			1477	1027	872	661	358
120	11.4	120			1236	868	739	561	301
130	9.0	130	1179	872	613	520	392	200	
140	7.5	140	861	641	450	380	282	135	

Table no. P4 / 6

Haulage Capacity for WAP4 Locomotive (4 step weak field)
GR - 23 : 58 (2.52) TM - HS15250A Loco Wt. - 114 T

Tractive Effort Values in Tonnes at Various Speeds	
SPEED (kmph)	TE in Tonne
0	30.8
10	18.8
20	18.8
30	18.8
40	18.8
50	18.8
60	18.8
70	18.8
80	17.2
90	15.4
100	13.8
110	12.6
120	11.4
130	9.0
140	7.5

SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition on 5⁰ Curve						
	Passenger (ICF Coach) Air brake						
	Grade						
	Level	1/500	1/200	1/150	1/100	1/50	
START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1650	1062	
10					1338	704	
20					1312	696	
30					1284	686	
40					1255	676	
50				1645	1225	666	
60				1593	1194	654	
70				1541	1162	643	
80			1596	1350	1022	566	
90			1355	1150	874	482	
100		1643	1146	975	743	408	
110		1398	986	841	642	351	
120	1573	1172	833	713	545	295	
130	1103	827	588	501	379	195	
140	807	608	431	366	273	131	

Table no. P4 / 7

Haulage Capacity for WAP4 Locomotive (4 step weak field)
GR - 23 : 58 (2.52) TM - HS15250A Loco Wt. - 114 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition on tangent track					
			Passenger (ICF Coach) Air brake					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	24.6	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1630	903
10	18.8	10					1604	782
20	18.8	20					1567	772
30	18.8	30					1529	761
40	18.8	40					1490	749
50	18.8	50					1449	737
60	18.8	60					1407	724
70	18.8	70					1365	710
80	17.2	80					1198	625
90	15.4	90				1405	1023	534
100	13.8	100			1439	1187	869	453
110	12.6	110			1230	1020	750	390
120	11.4	120		1573	1035	862	636	329
130	9.0	130	1609	1103	731	609	446	220
140	7.5	140	1158	807	538	446	324	150

Table no. P4 / 8

Haulage Capacity for WAP4 Locomotive (4 step weak field)
GR - 23 : 58 (2.52) TM - HS15250A Loco Wt. - 114 T

Tractive Effort Values in Tonnes at Various Speeds	
SPEED (kmph)	TE in Tonne
0	24.6
10	18.8
20	18.8
30	18.8
40	18.8
50	18.8
60	18.8
70	18.8
80	17.2
90	15.4
100	13.8
110	12.6
120	11.4
130	9.0
140	7.5

SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition on 1^o Curve						
	Passenger (ICF Coach) Air brake						
	Grade						
	Level	1/500	1/200	1/150	1/100	1/50	
START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1581	886	
10					1543	765	
20					1509	756	
30					1474	745	
40					1437	734	
50					1398	722	
60					1359	709	
70					1319	695	
80				1585	1159	613	
90			1627	1346	989	523	
100			1370	1138	841	443	
110			1173	979	726	382	
120		1474	988	828	616	322	
130	1477	1036	698	584	431	215	
140	1068	759	513	428	313	146	

Table no. P4 / 9

Haulage Capacity for WAP4 Locomotive (4 step weak field)
GR - 23 : 58 (2.52) TM - HS15250A Loco Wt. - 114 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition on 2⁰ Curve					
			Passenger (ICF Coach) Air brake					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	24.6	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1535	870
10	18.8	10					1487	749
20	18.8	20					1455	740
30	18.8	30					1422	730
40	18.8	40					1387	719
50	18.8	50					1351	707
60	18.8	60					1314	695
70	18.8	70					1277	681
80	17.2	80			1519	1122	600	
90	15.4	90			1550	1291	958	512
100	13.8	100			1307	1093	814	434
110	12.6	110			1120	941	703	374
120	11.4	120			1386	945	796	597
130	9.0	130	1363	976	668	562	417	210
140	7.5	140	990	716	490	411	302	142

Table no. P4 / 10

Haulage Capacity for WAP4 Locomotive (4 step weak field)
GR - 23 : 58 (2.52) TM - HS15250A Loco Wt. - 114 T

Tractive Effort Values in Tonnes at Various Speeds	
SPEED (kmph)	TE in Tonne
0	24.6
10	18.8
20	18.8
30	18.8
40	18.8
50	18.8
60	18.8
70	18.8
80	17.2
90	15.4
100	13.8
110	12.6
120	11.4
130	9.0
140	7.5

SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition on 3⁰ Curve						
	Passenger (ICF Coach) Air brake						
	Grade						
	Level	1/500	1/200	1/150	1/100	1/50	
START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1492	855	
10					1434	734	
20					1404	725	
30					1373	715	
40					1340	704	
50					1306	693	
60					1272	681	
70					1236	668	
80			1458	1087	588		
90			1480	1241	928	502	
100			1249	1051	789	425	
110			1566	1072	905	682	366
120			1307	905	766	578	308
130	1265	921	639	540	404	205	
140	921	676	469	395	292	138	

Table no. P4 / 11

Haulage Capacity for WAP4 Locomotive (4 step weak field)
GR - 23 : 58 (2.52) TM - HS15250A Loco Wt. - 114 T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition on 4⁰ Curve						
SPEED (kmph)	TE in Tonne		Passenger (ICF Coach) Air brake						
			Grade						
			Level	1/500	1/200	1/150	1/100	1/50	
0	24.6	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1451	840	
10	18.8	10					1384	718	
20	18.8	20					1356	710	
30	18.8	30					1327	700	
40	18.8	40					1296	690	
50	18.8	50					1264	679	
60	18.8	60					1232	667	
70	18.8	70			1602	1198	655		
80	17.2	80			1402	1054	577		
90	15.4	90			1415	1194	900	492	
100	13.8	100			1196	1012	765	417	
110	12.6	110			1477	1027	872	661	358
120	11.4	120			1236	868	739	561	301
130	9.0	130	1179	872	613	520	392	200	
140	7.5	140	861	641	450	380	282	135	

Table no. P4 / 12

Haulage Capacity for WAP4 Locomotive (4 step weak field)
GR - 23 : 58 (2.52) TM - HS15250A Loco Wt. - 114 T

Tractive Effort Values in Tonnes at Various Speeds	
SPEED (kmph)	TE in Tonne
0	24.6
10	18.8
20	18.8
30	18.8
40	18.8
50	18.8
60	18.8
70	18.8
80	17.2
90	15.4
100	13.8
110	12.6
120	11.4
130	9.0
140	7.5

SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition on 5⁰ Curve						
	Passenger (ICF Coach) Air brake						
	Grade						
	Level	1/500	1/200	1/150	1/100	1/50	
START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1412	825	
10					1338	704	
20					1312	696	
30					1284	686	
40					1255	676	
50			1645	1225	666		
60			1593	1194	654		
70			1541	1162	643		
80			1596	1350	1022	566	
90			1355	1150	874	482	
100		1643	1146	975	743	408	
110		1398	985	841	642	351	
120	1573	1172	833	713	545	295	
130	1103	827	588	501	380	195	
140	807	608	431	366	273	131	



Three Phase Electric Locomotive-WAP5

Table no. P5 / 1

Haulage Capacity for WAP5 Three Phase Locomotive
GR - 17:67 (3.941), TM - 6FXA7059, Loco Wt. - 78T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition on tangent track						
SPEED (kmph) TE in Tonne			Passenger (ICF Coach) Air brake						
			Grade						
			Level	1/500	1/200	1/150	1/100	1/50	
0	26.3	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1011		
10	22.4	10					993		
20	22.4	20					980		
30	22.4	30					967		
40	22.4	40					953		
50	22.4	50					938		
60	21.2	60					867		
70	18.8	70					745		
80	18.3	80				1320	710		
90	16.3	90				1528	1125	607	
100	14.5	100			1552	1288	954	517	
110	13.4	110			1350	1126	840	457	
120	12.2	120			1149	964	723	395	
130	11.1	130			1439	975	822	620	339
140	10.6	140			1259	867	735	557	306
150	9.6	150	1430	1038	725	617	469	256	
160	9.1	160	1208	893	632	540	412	225	

Table no. P5 / 2

Haulage Capacity for WAP5 Three Phase Locomotive
GR - 17:67 (3.941), TM - 6FXA7059, Loco Wt. - 78T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 1⁰ Curve								
			Passenger (ICF Coach) Air brake								
			Grade								
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50			
0	26.3	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650		993			
10	22.4	10									972
20	22.4	20									961
30	22.4	30									948
40	22.4	40									934
50	22.4	50									920
60	21.2	60									850
70	18.8	70									731
80	18.3	80							1278	696	
90	16.3	90						1467	1090	596	
100	14.5	100					1480	1237	924	507	
110	13.4	110					1289	1083	814	449	
120	12.2	120				1618	1099	928	701	387	
130	11.1	130				1355	934	792	602	332	
140	10.6	140			1637	1189	832	709	541	300	
150	9.6	150			1331	983	696	595	456	251	
160	9.1	160	1129	847	607	521	400	220			

Table no. P5 / 3

Haulage Capacity for WAP5 Three Phase Locomotive
GR - 17:67 (3.941), TM - 6FXA7059, Loco Wt. - 78T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 2^o Curve								
			Passenger (ICF Coach) Air brake								
			Grade								
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50			
0	26.3	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650		976			
10	22.4	10									953
20	22.4	20									942
30	22.4	30									929
40	22.4	40									916
50	22.4	50									902
60	21.2	60							1534	834	
70	18.8	70							1311	717	
80	18.3	80							1239	683	
90	16.3	90						1409	1056	585	
100	14.5	100					1414	1190	897	497	
110	13.4	110					1233	1043	790	440	
120	12.2	120				1524	1053	894	681	380	
130	11.1	130				1280	896	764	584	326	
140	10.6	140	1524	1126	799	684	526	294			
150	9.6	150	1244	933	669	575	443	246			
160	9.1	160	1060	806	584	503	389	216			

Table no. P5 / 4

Haulage Capacity for WAP5 Three Phase Locomotive
GR - 17:67 (3.941), TM - 6FXA7059, Loco Wt. - 78T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition						
SPEED (kmph)	TE in Tonne		3^o Curve						
			Passenger (ICF Coach) Air brake						
			Grade						
			Level	1/500	1/200	1/150	1/100	1/50	
0	26.3	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1642	959	
10	22.4	10						934	
20	22.4	20						924	
30	22.4	30						912	
40	22.4	40						899	
50	22.4	50				1618	885		
60	21.2	60				1486	819		
70	18.8	70				1271	703		
80	18.3	80				1597	1201	671	
90	16.3	90				1608	1356	1025	574
100	14.5	100				1353	1145	870	488
110	13.4	110				1182	1005	767	432
120	12.2	120				1439	1010	862	661
130	11.1	130	1641	1212	861	737	568	320	
140	10.6	140	1424	1069	768	661	511	288	
150	9.6	150	1168	888	644	555	431	241	
160	9.1	160	998	768	563	487	378	212	

Table no. P5 / 5

Haulage Capacity for WAP5 Three Phase Locomotive
GR - 17:67 (3.941), TM - 6FXA7059, Loco Wt. - 78T

13

Tractive Effort Values in Tonnes at Various Speeds	
SPEED (kmph)	TE in Tonne
0	26.3
10	22.4
20	22.4
30	22.4
40	22.4
50	22.4
60	21.2
70	18.8
80	18.3
90	16.3
100	14.5
110	13.4
120	12.2
130	11.1
140	10.6
150	9.6
160	9.1

SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition 4⁰ Curve						
	Passenger (ICF Coach) Air brake						
	Grade						
	Level	1/500	1/200	1/150	1/100	1/50	
START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1598	943	
10						916	
20						906	
30						894	
40						882	
50					869		
60				1568	804		
70				1440	746		
80			1636	1233	690		
90			1640	1537	1166	658	
100			1391	1306	995	563	
110		1175	1104	845	479		
120		1613	1030	970	746	424	
130	1364	883	833	643	366		
140	1534	1151	755	712	552	313	
150	1337	1017	676	639	497	283	
160	1099	846	568	537	419	237	
170	943	734	498	471	368	207	

Table no. P5 / 6

Haulage Capacity for WAP5 Three Phase Locomotive
GR - 17:67 (3.941), TM - 6FXA7059, Loco Wt. - 78T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition						
SPEED (kmph)	TE in Tonne		5⁰ Curve						
			Passenger (ICF Coach) Air brake						
			Grade						
			Level	1/500	1/200	1/150	1/100	1/50	
0	26.3	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1556	928	
10	22.4	10						899	
20	22.4	20						889	
30	22.4	30						878	
40	22.4	40						866	
50	22.4	50					1521	853	
60	21.2	60				1398	789		
70	18.8	70				1575	1197	678	
80	18.3	80				1482	1133	646	
90	16.3	90			1477	1259	967	553	
100	14.5	100			1245	1066	822	470	
110	13.4	110			1528	1090	936	725	416
120	12.2	120			1295	934	805	625	359
130	11.1	130	1439	1095	797	689	537	308	
140	10.6	140	1259	970	713	618	484	278	
150	9.6	150	1038	808	599	520	408	232	
160	9.1	160	893	702	524	456	358	203	

Table no. P5 / 7

Haulage Capacity for WAP5 Three Phase Locomotive
GR - 17:67 (3.941), TM - 6FXA7059, Loco Wt. - 78T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition on tangent track						
SPEED (kmph)	TE in Tonne		Passenger (ICF Coach) Air brake						
			Grade						
			Level	1/500	1/200	1/150	1/100	1/50	
0	21.0	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1414	Up to 792	
10	21.0	10							
20	21.0	20							
30	21.0	30							
40	21.0	40							
50	21.0	50							
60	21.0	60							
70	18.8	70			1400	745			
80	18.3	80			1320	710			
90	16.3	90			1528	1125	607		
100	14.5	100			1552	1288	954	517	
110	13.4	110			1350	1126	840	457	
120	12.2	120			1149	964	723	395	
130	11.1	130			1439	975	822	620	339
140	10.6	140			1259	867	735	557	306
150	9.6	150	1430	1038	725	617	469	256	
160	9.1	160	1208	893	632	540	412	225	

Table no. P5 / 8

Haulage Capacity for WAP5 Three Phase Locomotive
GR - 17:67 (3.941), TM - 6FXA7059, Loco Wt. - 78T

Tractive Effort Values in Tonnes at Various Speeds	
SPEED (kmph)	TE in Tonne
0	21.0
10	21.0
20	21.0
30	21.0
40	21.0
50	21.0
60	21.0
70	18.8
80	18.3
90	16.3
100	14.5
110	13.4
120	12.2
130	11.1
140	10.6
150	9.6
160	9.1

SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 1^o Curve						
	Passenger (ICF Coach) Air brake						
	Grade						
	Level	1/500	1/200	1/150	1/100	1/50	
START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1372	Up to 778	
10							
20							
30							
40							
50							
60							
70				1354	731		
80				1278	696		
90				1467	1090	596	
100			1480	1237	924	507	
110			1289	1083	814	449	
120		1618	1099	928	701	387	
130		1355	934	792	602	332	
140	1637	1189	832	709	541	300	
150	1331	983	696	595	456	251	
160	1129	847	607	521	400	220	

Table no. P5 / 9

Haulage Capacity for WAP5 Three Phase Locomotive
GR - 17:67 (3.941), TM - 6FXA7059, Loco Wt. - 78T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition					
SPEED (kmph)	TE in Tonne		2^o Curve					
			Passenger (ICF Coach) Air brake					
			Grade					
			Level	1/500	1/200	1/150	1/100	1/50
0	21.0	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1333	Up to 764
10	21.0	10						
20	21.0	20						
30	21.0	30						
40	21.0	40						
50	21.0	50						
60	21.0	60						
70	18.8	70					1311	717
80	18.3	80					1239	683
90	16.3	90				1409	1056	585
100	14.5	100			1414	1190	897	497
110	13.4	110			1233	1043	790	440
120	12.2	120		1524	1053	894	681	380
130	11.1	130		1280	896	764	584	326
140	10.6	140	1524	1126	799	684	526	294
150	9.6	150	1244	933	669	575	443	246
160	9.1	160	1060	806	584	503	389	216

Table no. P5 / 10

Haulage Capacity for WAP5 Three Phase Locomotive
GR - 17:67 (3.941), TM - 6FXA7059, Loco Wt. - 78T

Tractive Effort Values in Tonnes at Various Speeds	
SPEED (kmph)	TE in Tonne
0	21.0
10	21.0
20	21.0
30	21.0
40	21.0
50	21.0
60	21.0
70	18.8
80	18.3
90	16.3
100	14.5
110	13.4
120	12.2
130	11.1
140	10.6
150	9.6
160	9.1

SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition					
	3^o Curve					
	Passenger (ICF Coach) Air brake					
	Grade					
	Level	1/500	1/200	1/150	1/100	1/50
START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1296	Up to 751
10						
20						
30						
40						
50						
60						
70				1271	703	
80			1597	1201	671	
90			1608	1356	1025	574
100			1353	1145	870	488
110			1182	1005	767	432
120		1439	1010	862	661	373
130	1641	1212	861	737	568	320
140	1424	1069	768	661	511	288
150	1168	888	644	555	431	241
160	998	768	563	487	378	212

Table no. P5 / 11

Haulage Capacity for WAP5 Three Phase Locomotive
GR - 17:67 (3.941), TM - 6FXA7059, Loco Wt. - 78T

13

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition						
SPEED (kmph)	TE in Tonne		4^o Curve						
			Passenger (ICF Coach) Air brake						
			Grade						
			Level	1/500	1/200	1/150	1/100	1/50	
0	21.0	START	Up to 1650	Up to 1650	Up to 1650	Up to 1624	Up to 1261	Up to 738	
10	21.0	10							
20	21.0	20							
30	21.0	30							
40	21.0	40							
50	21.0	50							
60	21.0	60							
70	18.8	70					1233	690	
80	18.3	80			1640	1537	1166	658	
90	16.3	90			1391	1306	995	563	
100	14.5	100			1175	1104	845	479	
110	13.4	110			1613	1030	970	746	424
120	12.2	120			1364	883	833	643	366
130	11.1	130	1534	1151	755	712	552	313	
140	10.6	140	1337	1017	676	639	497	283	
150	9.6	150	1099	846	568	537	419	237	
160	9.1	160	943	734	498	471	368	207	

Table no. P5 / 12

Haulage Capacity for WAP5 Three Phase Locomotive
GR - 17:67 (3.941), TM - 6FXA7059, Loco Wt. - 78T

Tractive Effort Values in Tonnes at Various Speeds	
SPEED (kmph)	TE in Tonne
0	21.0
10	21.0
20	21.0
30	21.0
40	21.0
50	21.0
60	21.0
70	18.8
80	18.3
90	16.3
100	14.5
110	13.4
120	12.2
130	11.1
140	10.6
150	9.6
160	9.1

SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition						
	5⁰ Curve						
	Passenger (ICF Coach) Air brake						
	Grade						
	Level	1/500	1/200	1/150	1/100	1/50	
START	Up to 1650	Up to 1650	Up to 1650	Up to 1571	Up to 1227	Up to 725	
10							
20							
30							
40							
50							
60							
70					1197	678	
80				1482	1133	646	
90			1477	1259	967	553	
100			1245	1066	822	470	
110			1528	1090	936	725	416
120			1295	934	805	625	359
130	1439	1095	797	689	537	308	
140	1259	970	713	618	484	278	
150	1038	808	599	520	408	232	
160	893	702	524	456	358	203	



Three Phase Electric Locomotive-WAP7

Table no. P7 / 1

Haulage Capacity for WAP7 Three Phase Locomotive
GR - 20 : 72 (3.6), TM - 6FRA 6068, Loco Wt. - 123T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition on tangent track						
			Passenger (ICF Coach) Air brake						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	32.9	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1237		
10	23.2	10					985		
20	23.2	20					973		
30	23.2	30					960		
40	23.2	40					945		
50	23.2	50					930		
60	23.2	60					914		
70	23.2	70					898		
80	20.6	80				1457	767		
90	18.3	90				1237	652		
100	16.5	100			1444	1060	559		
110	15.0	110			1491	1239	915	482	
120	13.8	120			1280	1068	793	417	
130	12.7	130			1641	1102	924	689	362
140	11.8	140			1395	951	800	599	313

Table no. P7 / 2

Haulage Capacity for WAP7 Three Phase Locomotive
GR - 20 : 72 (3.6), TM - 6FRA 6068, Loco Wt. - 123T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition							
			1^o Curve							
			Passenger (ICF Coach) Air brake							
			Grade							
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50		
0	32.9	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1215		
10	23.2	10						964		
20	23.2	20						953		
30	23.2	30						940		
40	23.2	40						926		
50	23.2	50						911		
60	23.2	60						896		
70	23.2	70						880		
80	20.6	80							1410	752
90	18.3	90					1624	1197	639	
100	16.5	100					1385	1027	548	
110	15.0	110				1423	1190	886	473	
120	13.8	120				1222	1027	768	409	
130	12.7	130				1543	1054	889	667	354
140	11.8	140				1316	910	771	580	306

Table no. P7 / 3

Haulage Capacity for WAP7 Three Phase Locomotive
GR - 20 : 72 (3.6), TM - 6FRA 6068, Loco Wt. - 123T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition						
			2^o Curve						
			Passenger (ICF Coach) Air brake						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	32.9	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1193	
10	23.2	10						944	
20	23.2	20						933	
30	23.2	30						921	
40	23.2	40						907	
50	23.2	50						893	
60	23.2	60					1646	878	
70	23.2	70					1600	863	
80	20.6	80					1365	737	
90	18.3	90				1559	1160	626	
100	16.5	100			1588	1331	995	537	
110	15.0	110			1360	1144	859	463	
120	13.8	120			1170	988	744	400	
130	12.7	130			1456	1010	856	647	346
140	11.8	140			1244	873	742	563	299

Table no. P7 / 4

Haulage Capacity for WAP7 Three Phase Locomotive
GR - 20 : 72 (3.6), TM - 6FRA 6068, Loco Wt. - 123T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition					
			3^o Curve					
			Passenger (ICF Coach) Air brake					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	32.9	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1172
10	23.2	10						925
20	23.2	20						914
30	23.2	30						902
40	23.2	40						889
50	23.2	50					1635	876
60	23.2	60					1593	861
70	23.2	70					1550	846
80	20.6	80					1323	723
90	18.3	90				1498	1124	614
100	16.5	100			1518	1280	965	526
110	15.0	110			1301	1101	833	454
120	13.8	120		1612	1121	952	722	392
130	12.7	130		1377	969	825	628	339
140	11.8	140		1179	838	716	546	293

Table no. P7 / 5

Haulage Capacity for WAP7 Three Phase Locomotive
GR - 20 : 72 (3.6), TM - 6FRA 6068, Loco Wt. - 123T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition						
			4⁰ Curve						
			Passenger (ICF Coach) Air brake						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	32.9	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1152	
10	23.2	10						906	
20	23.2	20						896	
30	23.2	30						884	
40	23.2	40				1622	872		
50	23.2	50				1583	859		
60	23.2	60				1543	845		
70	23.2	70				1503	830		
80	20.6	80				1283	709		
90	18.3	90				1442	1091	602	
100	16.5	100			1454	1233	936	516	
110	15.0	110			1248	1061	808	445	
120	13.8	120			1525	1076	918	701	384
130	12.7	130			1306	930	796	609	332
140	11.8	140	1484	1121	806	691	530	287	

Table no. P7 / 6

Haulage Capacity for WAP7 Three Phase Locomotive
GR - 20 : 72 (3.6), TM - 6FRA 6068, Loco Wt. - 123T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Dry Condition					
			5^o Curve					
			Passenger (ICF Coach) Air brake					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	32.9	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1650	1132
10	23.2	10					1650	888
20	23.2	20					1640	878
30	23.2	30					1606	867
40	23.2	40					1571	855
50	23.2	50					1534	842
60	23.2	60					1497	829
70	23.2	70					1458	815
80	20.6	80				1639	1245	696
90	18.3	90			1635	1390	1059	591
100	16.5	100			1395	1189	909	506
110	15.0	110			1198	1024	785	436
120	13.8	120		1447	1034	886	681	376
130	12.7	130	1641	1241	895	769	592	325
140	11.8	140	1395	1067	775	668	515	281

Table no. P7 / 7

Haulage Capacity for WAP7 Three Phase Locomotive
GR - 20 : 72 (3.6), TM - 6FRA 6068, Loco Wt. - 123T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition on tangent track							
			Passenger (ICF Coach) Air brake							
			Grade							
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50		
0	26.3	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 963		
10	23.2	10						960		
20	23.2	20							945	
30	23.2	30								930
40	23.2	40								
50	23.2	50					898			
60	23.2	60					1457	767		
70	23.2	70								
80	20.6	80				1237	652			
90	18.3	90				1444	1060	559		
100	16.5	100				1491	1239	915	482	
110	15.0	110			1280	1068	793	417		
120	13.8	120			1641	1102	924	689	362	
130	12.7	130		1395	951	800	599	313		
140	11.8	140								

Table no. P7 / 8

Haulage Capacity for WAP7 Three Phase Locomotive
GR - 20 : 72 (3.6), TM - 6FRA 6068, Loco Wt. - 123T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 1^o Curve					
			Passenger (ICF Coach) Air brake					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	26.3	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 945
10	23.2	10						940
20	23.2	20						
30	23.2	30						
40	23.2	40						
50	23.2	50				926		
60	23.2	60				911		
70	23.2	70				896		
80	20.6	80				880		
90	18.3	90			1410	752		
100	16.5	100			1624	1197	639	
110	15.0	110			1385	1027	548	
120	13.8	120			1423	1190	886	473
130	12.7	130			1222	1027	768	409
140	11.8	140			1543	1054	889	667
			1316	910	771	580	306	

Table no. P7 / 9

Haulage Capacity for WAP7 Three Phase Locomotive
GR - 20 : 72 (3.6), TM - 6FRA 6068, Loco Wt. - 123T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition						
			2^o Curve						
			Passenger (ICF Coach) Air brake						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	26.3	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1638	Up to 928	
10	23.2	10						921	
20	23.2	20							
30	23.2	30							
40	23.2	40					907		
50	23.2	50					893		
60	23.2	60					878		
70	23.2	70					1600	863	
80	20.6	80			1365	737			
90	18.3	90			1559	1160	626		
100	16.5	100			1588	1331	995	537	
110	15.0	110			1360	1144	859	463	
120	13.8	120			1170	988	744	400	
130	12.7	130			1456	1010	856	647	346
140	11.8	140			1244	873	742	563	299

Table no. P7 / 10

Haulage Capacity for WAP7 Three Phase Locomotive
GR - 20 : 72 (3.6), TM - 6FRA 6068, Loco Wt. - 123T

Tractive Effort Values in Tonnes at Various Speeds	
SPEED (kmph)	TE in Tonne
0	26.3
10	23.2
20	23.2
30	23.2
40	23.2
50	23.2
60	23.2
70	23.2
80	20.6
90	18.3
100	16.5
110	15.0
120	13.8
130	12.7
140	11.8

SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition 3^o Curve						
	Passenger (ICF Coach) Air brake						
	Grade						
	Level	1/500	1/200	1/150	1/100	1/50	
START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1592	Up to 911	
10						902	
20							
30							
40							
50					876		
60					861		
70					1550	846	
80			1323	723			
90			1498	1124	614		
100			1518	1280	965	526	
110			1301	1101	833	454	
120			1612	1121	952	722	392
130			1377	969	825	628	339
140			1179	838	716	546	293

Table no. P7 / 11

Haulage Capacity for WAP7 Three Phase Locomotive
GR - 20 : 72 (3.6), TM - 6FRA 6068, Loco Wt. - 123T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition						
			4^o Curve						
			Passenger (ICF Coach) Air brake						
			Grade						
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50	
0	26.3	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1548	Up to 895	
10	23.2	10						884	
20	23.2	20							
30	23.2	30							
40	23.2	40							
50	23.2	50							
60	23.2	60				1543	845		
70	23.2	70				1503	830		
80	20.6	80				1283	709		
90	18.3	90				1442	1091	602	
100	16.5	100			1454	1233	936	516	
110	15.0	110			1248	1061	808	445	
120	13.8	120			1525	1076	918	701	384
130	12.7	130			1306	930	796	609	332
140	11.8	140	1484	1121	806	691	530	287	

Table no. P7 / 12

Haulage Capacity for WAP7 Three Phase Locomotive
GR - 20 : 72 (3.6), TM - 6FRA 6068, Loco Wt. - 123T

Tractive Effort Values in Tonnes at Various Speeds		SPEED (kmph)	Trailing load in tonnes at km/h with Wet Condition					
			5^o Curve					
			Passenger (ICF Coach) Air brake					
			Grade					
SPEED (kmph)	TE in Tonne		Level	1/500	1/200	1/150	1/100	1/50
0	26.3	START	Up to 1650	Up to 1650	Up to 1650	Up to 1650	Up to 1506	Up to
10	23.2	10						879
20	23.2	20						878
30	23.2	30						867
40	23.2	40						855
50	23.2	50					842	
60	23.2	60			1497	829		
70	23.2	70			1458	815		
80	20.6	80			1639	1245	696	
90	18.3	90			1635	1390	1059	591
100	16.5	100			1395	1189	909	506
110	15.0	110			1198	1024	785	436
120	13.8	120			1447	1034	886	681
130	12.7	130	1641	1241	895	769	592	325
140	11.8	140	1395	1067	775	668	515	281