



GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
भारत सरकार - रेल मंत्रालय

GUIDE ON HAULING CAPACITY & ATTACKING SPEED
OF DIESEL ELECTRIC FRIGHT LOCOMOTIVE ON
INDIAN RAILWAYS BG TRACK

भारतीय रेलवे की बड़ी लाईन हेतु डीजल इलेक्ट्रिक लोकोमोटिव की मालगाड़ी
को खींचने की छमता एवं आक्रमण गति संबंधी सुझाव

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Hauling capacity & attacking speed of diesel electric freight locomotives on Indian Railway BG track

1.0 Introduction

A large number of stalling cases on freight trains were reported by Zonal Railways. On analysis, it was found that cases of wheel slip and stalling have been taking place mostly while working with diesel electric locomotives on graded section with curves. Railways also reported that during monsoon period the stalling cases are 4 to 5 times higher.

Zonal Railways are regularly raising queries for the hauling capacity load chart for different diesel- electric locomotive at different gradients & curves on both dry rail as well as wet rail conditions for freight service.

The earlier issued freight locomotive load chart do not therefore truly represent the field conditions where a most of factors not accounted in the chart, like wet/ bad or adverse weather conditions, combination of grade with curve adding substantially to the rolling resistance that the locomotive has to overcome etc, are regularly present.

2.0 Objective

The main objective of this guide is to assist Railways take note of the revised load chart and fix the permissible trailing loads accordingly taking the local conditions into account and not go only by the existing fair weather load tables. This will enable realistic trailing loads to be fixed with the likelihood of stalling more or less eliminated, at least on account of motive power inadequacy.

On the other hand, the locomotive requirement for clearance of different gradients with curve as per actual conditions available in the fields can be worked out for multi diesel- electric locomotives for better guidance and smoother train operation.

It would be seen that the loco hauling capacity stands considerably reduced in wet condition as compared to the values used hither to. This will enable proper appreciation of stalling incidences and re-adjustment of load/number of locos if needed.

3.0 Causes of stalling / wheel slip

Wheel slip may be due to a number of reasons. Some of the causes are due to track and climatic conditions prevailing at the time, loading, topography of the section, locked axle, pinion slip etc.

4.0 Earlier Load chart study

RDSO has reviewed powering of the freight trains and the study shows the following:

Haulage charts presently issued by RDSO are based on the following conditions.

- Track maintained to standard conditions
- For fair weather conditions i.e. dry rail conditions
- Tangent track i.e. straight track without any curvature
- Adhesion values taken corresponding to standard track conditions

There is wide variation in adhesion measured on main line track and yard lines and on main line to main line depending on the condition of the rails. Similarly, adhesion values are considerably less for wet rails / bad weather and under un-sanded conditions.

The gradients are generally accompanied with steep curves and curves offer significant additional rolling resistance to the train. The gradients selected in the load chart are assumed to be compensated for curvature but often this is not followed.

Load charts now being followed by the Railways are the ones corresponding to dry rail conditions. It is likely that, these loads will permit attaining a trip reliability of 90%. That is out of 100 trains, 10 trains may have problems due to adverse operating conditions.

It is likely that on certain routes such levels of reliability may not be acceptable from traffic point of view. In that case, the load to be designated for these routes shall be kept lower as a conscious decision.

Under powering is leading to slogging of the locos – with load factors above the permissible limits – faster wear of loco wheels due to stalling and wheel slip and ultimately reliability and availability of the locos is affected.

5.0 Hauling capability of the locomotive

5.1 Load hauling capability and concept of Tractive Effort (T.E)

Primarily tractive effort of the locomotive determines the load hauling capacity. It is the combined adhesive force developed by the locomotive by the locomotive wheels on the rails. The tractive effort transforms into drawbar pull after accounting for the locomotive resistance, and pulls the trailing load.

Tractive effort varies with the speed. The starting tractive effort is determined by adhesion limit of the locomotive and decides the starting loads. Tractive effort at various speeds determines acceleration potential of the locomotive. Starting tractive effort in itself is a function of the locomotive weight and adhesion, higher the weight higher the T.E. and higher the adhesion, higher the T.E.

Though weight is constant for a particular locomotive, adhesion is dependent on number of factors and it is always the endeavor of the locomotive designer to achieve as high adhesion as possible to maximize the locomotive capability.

5.2 Factors affecting Load hauling capability

A locomotive employs the friction drive between the wheels and rails and maximum force which can be transmitted by this drive is dependent upon the load carried by the driving wheels and is simply referred to as adhesion. The full weight of the locomotive is usually employed for adhesion and increase in T.E of the loco without proportionate increase in weight necessitates that the values of adhesion, the ratio between tractive effort & weight be improved greatly.

Drive wheel and rail work as friction gear. In the stabilized state of torque transmission, the tractive effort in the starting condition is produced by adhesive friction between driven wheel and rail. As soon as rolling of the driven wheel starts, the adhesion friction changes to kinematic rolling friction.

Both adhesive and kinematic friction and there by tractive effort are dependent on many design and external variables. The factors which affect tractive effort can be broadly classified as under.

- Locomotive design
- No. of locos used for haulage i.e. single or multiple
- Track conditions and rail wheel contact
- Environmental conditions

5.2.1 Loco Design

- Axle load
- Load distribution and weight transfer
- Locomotive body and geometry
- Type of suspension
- Characteristics of transmission
- Electrical regulation and adhesion control

5.2.2 Haulage using single or multiple/triple locos

In case of double – headed locomotives / multi-operation of locomotives, tractive effort gets doubled. Hence, haulage capacity indicated in load charts will get doubled. Similarly, for triple headed locos, haulage charts will also get triple.

5.2.3 Track Conditions

- Gradient
- Track curvature

- Rail profile
- Vertical irregularities
- Angle of attack
- Slip stick effect
- Rail surface condition

5.2.3 Environmental & Weather conditions

- Dry track
- Wet track
- Oily track
- Sanding

6.0 Haulage Charts for locomotives

6.1 Standard Haulage Charts

The current load charts are very simple to use and clearly lay down the starting capability of a locomotive at level and on different gradients for tangent i.e. straight track.

It is however to be noted that, the load charts are valid for fair weather conditions and with track maintained to requisite standard only for tangent track.

6.2 Wet/bad or adverse weather conditions

As discussed earlier, the load hauling capability of a locomotive is dependent on adhesion between the rail & the wheel. Adhesion values vary significantly under different conditions of rail i.e. whether it is dry or wet and sanding carried out.

Based on several trials on Diesel-electric locomotives as well as Electric locomotives, RDSO had published a report no. TFC -77 in Jan.' 02. Based on the adhesion values for different locos under dry sanded and dry un-sanded conditions indicated in the report, it can be concluded that loss of adhesion shall be around 10% if sanding is not applied.

The adhesion values will be still worse for wet rail condition. The adhesion will be lower by around 15% - 20% on wet rail compared to dry rails. Similarly, adhesion on oily rail will be much lower compared to dry rail as much 40%.

It is, therefore, desirable that the load charts be redrawn taking adverse effect of wet rails into account.

6.3 Effect of curve

Similar to grade resistance on the gradients, the rolling stock encounters curve resistance on the curve. The curve resistance is significant and is of the order of 0.4 Kg per tonnes per degree of curvature and can significantly affect the loco starting capability as well as running. Graded sections are generally associated with curves. A loco which can start and haul 59 BOXN (CC+8+2t) i.e. 5400 t load on 1 in 200 gradient on straight section may not start with same load on 1 in 200 gradient with 4° curve. Hence, the element of curve resistance plays an important role in the stalling or running through with a load.

6.4 Effect of gradient

In addition, when negotiating a grade, certain other factors also play an important role, which determines whether the train be able to clear it or will get stalled.

- Trailing load
- Length of the gradient
- Attack/Approach speed of train

6.4.1 Trailing Load

Traditionally, the trailing load of 59 BOXN rakes has been taken as 5385 tonnes based on gross load of 91.28 tonnes for each BOXN wagon

But for BOXN rake, loading is permitted to a level of CC+8+2t tonnes. So for all purposes, the trailing load for BOXN rake should be taken as 5400 tonnes based on gross load of 91.6 t tonnes for each BOXN wagon.

Since, we are interested in eliminating cases of stalling on the run, it is, therefore, necessary that all load charts are drawn considering the standard 59 loaded BOXN wagons having capacity (CC+8+2t) i.e. 5400 tonnes which is the current limitation imposed by loop length.

6.4.2 Length of the Gradient & Attacking speed

Presently, the load charts only specify the maximum loads that a loco can start at different gradients, on tangent track and the loads that it can maintain continuously at specified balancing speed on different speed on different gradients. While the first part of the information is useful and essential, the latter part – regarding loads it can maintain at different balancing speeds on a gradient is not of great practical significance in regard to fixing up the trailing load. The weight of the trailing load is primarily determined by starting capability of the locomotive only, but when sectional capacity approaches saturation point balancing speed also assumes importance for generation of extra capacity.

Important point which is of practical value in the field is the information as to what is the **length of a particular gradient that a loco can clear with the given train load** already determined by its starting load capability consideration as per chart. This length will be dependent on two factors: firstly, the inherent loco design and its capability including its tractive effort Vs speed curve and secondly, the **attacking speed** i.e. the speed at which the locomotive attacks / approaches the start of the gradient.

The motive power requirement for clearance of different gradients as per actual conditions available in the field can be worked for different train speeds ensuring that the traction motor currents do not exceed the maximum permitted rating etc. of the locomotive and stalling are avoided. Therefore, this information has also been included in this report for better guidance and smoother train operations.

7.0 Load chart for freight services

To assist Railways to decide loads under adverse conditions also, it has now been decided to include **two sets of load charts for diesel-electric locomotives for freight services** i.e. one based on the dry rail condition (standard conditions) and the other for adverse conditions taking into consideration the wet rail adhesion with various curves. The details are as under:

Load chart for dry rail condition (standard conditions) with various curves is enclosed at **Annexure - I**.

Load chart for wet rail condition (bad weather condition) that may be encountered in actual field is enclosed at **Annexure - II**.

7.1 Assumptions:

The following assumptions have been considered while computing/ calculating haulage capacity of diesel electric locomotives for goods services:

- The load charts are applicable for dry rail conditions as well as wet rail conditions with curve varying from 1 degree to 5 degree with different gradients.
- The load charts are based on designed value of adhesion on dry rail conditions. The adhesion values in case of **wet rail condition** is likely to drop maximum by 20% as compared to dry un-sanded condition as per RDSO Report no. TFC - 77, January '2002.
- The Load chart has been calculated on the basis of 5% ageing factor & no acceleration reserve.
- No de-rating factor has been considered in computing haulage capacity.
- Specific starting resistance of loaded BOXN / BCN wagon has been taken as 4 kg/t on main line service

8.0 Charts for Attacking speed Vs length of maximum negotiable on graded section

To assist Railways for better guidance & smoother train operations, charts for attacking speed in both dry and wet rail conditions on ruling gradients of 1 in 100, 1 in 125 & 1 in 150 with 2° curves for multi-diesel electric locomotives for maximum loading of 59 BOXN (CC+8+2t) & 42 BCN (CC+8+2t) are enclosed at Annexure – III to Annexure – VI.

It will greatly assist in laying down operational guidelines like judicious imposition of speed restrictions, location of stop / warning signals, need for run through operation at the specific locations, provision of bankers etc.

9.0 Recommendations

Provision of adequate power as per the above solutions given in the present RDSO load chart & attacking speed on graded section may give additional benefits in the form of generation of extra path due to better / improved balancing speeds and clearance of critical block sections in lesser time. This may be advantageous for those sections, which are operating to near saturation level of line capacity. But when extra capacity is available to run extra trains, decision should be taken judiciously.

10. Note:

The values indicated in charts have been derived through theoretical computer simulation software and may be used as guidelines only. Although, every care has been taken while simulating / calculating data and analyzing it but it is difficult to arrive at actual results since practical conditions are always different from theoretical ones assumed. Any errors, omissions & suggestions for further improvement of this report will be thankfully acknowledged and included in the next revision.

WDM2 (2600 HP) DRY RAIL CONDITION

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM2 (2600)			Track condition : Dry Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4790	3625	2765	2080	1620
1/500	4935	4935	4935	3660	2605	2020	1625	1305	1030	835
1/400	4545	4545	4265	3150	2250	1755	1420	1145	910	740
1/200	3250	3250	2450	1830	1320	1040	850	695	555	450
1/150	2725	2695	1895	1415	1020	805	660	535	425	350
1/100	2050	1835	1285	960	690	540	440	355	280	225
1/50	1150	900	620	455	315	235	185	140	-	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM2 (2600)			Track condition : Dry Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h with 1° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5085	3780	2925	2275	1775	1375
1/500	4620	4620	4395	3240	2315	1800	1455	1175	950	755
1/400	4275	4275	3820	2830	2030	1585	1285	1045	845	675
1/200	3110	3110	2290	1710	1235	975	795	650	530	425
1/150	2625	2550	1795	1340	970	765	625	510	415	330
1/100	1990	1765	1240	925	660	520	420	340	275	215
1/50	1130	885	610	445	305	230	180	135	-	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM2 (2600)			Track condition : Dry Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h with 2° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	4120	3115	2445	1925	1520	1190
1/500	4340	4340	3925	2905	2080	1625	1320	1070	865	690
1/400	4035	4035	3455	2565	1845	1445	1175	955	775	620
1/200	2980	2980	2150	1605	1160	915	750	610	495	395
1/150	2530	2425	1705	1275	920	725	590	485	390	310
1/100	1935	1700	1190	890	635	500	405	325	260	205
1/50	1110	865	595	435	300	225	175	135	-	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM2 (2600)			Track condition : Dry Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h with 3° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	4930	3455	2640	2100	1670	1330	1045
1/500	4095	4095	3540	2630	1890	1480	1200	975	790	635
1/400	3820	3820	3155	2345	1690	1325	1080	880	715	570
1/200	2855	2855	2025	1515	1095	860	705	575	470	375
1/150	2440	2310	1625	1215	875	690	565	460	370	295
1/100	1880	1640	1150	855	610	480	390	315	250	195
1/50	1090	845	580	425	290	220	170	130	-	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM2 (2600)			Track condition : Dry Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h with 4° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5295	5295	5295	4205	2970	2290	1830	1465	1175	930
1/500	3870	3870	3225	2400	1725	1355	1105	890	730	585
1/400	3625	3625	2900	2160	1555	1225	1000	815	660	530
1/200	2745	2720	1910	1430	1030	815	665	545	440	350
1/150	2355	2205	1550	1555	835	655	535	435	355	280
1/100	1830	1585	1110	825	590	460	375	300	240	185
1/50	1070	830	570	415	285	215	165	125	-	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM2 (2600)			Track condition : Dry Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h with 5° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	4935	4935	4395	3660	2605	2020	1625	1305	1055	835
1/500	3675	3675	2960	2205	1590	1250	1020	830	675	540
1/400	3450	3450	2680	2000	1445	1135	930	755	615	495
1/200	2640	2575	1810	1355	975	770	630	515	415	330
1/150	2280	2105	1480	1105	795	625	510	415	335	265
1/100	1780	1530	1070	800	570	445	360	290	230	180
1/50	1050	815	560	405	275	205	160	-	-	-

WDM3A (3100 HP) DRY RAIL CONDITION

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3A (3100)			Track condition : Dry Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h on tangent track										
BOXX/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	4830	3565	2735	2080
1/500	4935	4935	4935	4710	3495	2730	2185	1700	1375	1090
1/400	4545	4545	4545	4055	3025	2380	1910	1500	1215	970
1/200	3250	3250	3250	2370	1790	1425	1160	920	750	605
1/150	2725	2725	2575	1840	1395	1115	910	720	590	470
1/100	2050	2050	1765	1260	950	760	620	485	395	315
1/50	1150	1040	870	610	455	355	280	215	165	125

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3A (3100)			Track condition : Dry Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h with 1° degree curve										
BOXX/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5085	3905	2940	2295	1770
1/500	4620	4620	4620	4175	3110	2445	1960	1535	1245	990
1/400	4275	4275	4275	3650	2730	2155	1740	1365	1110	885
1/200	3110	3110	3105	2220	1680	1340	1090	865	705	565
1/150	2625	2625	2440	1745	1325	1055	860	680	560	450
1/100	1990	1990	1695	1210	915	730	595	470	380	300
1/50	1130	1020	850	600	445	345	275	210	160	120

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3A (3100)				Track condition : Dry Rail				Weight of loco : 112.8 T		
Trailing load in tonnes at Km/h with 2° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4195	3270	2495	1970	1540
1/500	4340	4340	4340	3740	2800	2205	1780	1395	1135	905
1/400	4035	4035	4035	3310	2485	1965	1590	1255	1020	815
1/200	2980	2980	2915	2085	1580	1260	1025	810	665	535
1/150	2530	2530	2320	1660	1260	1005	820	650	530	425
1/100	1935	1935	1635	1170	880	705	570	450	365	290
1/50	1110	1000	835	585	435	340	270	200	160	115

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3A (3100)				Track condition : Dry Rail				Weight of loco : 112.8 T		
Trailing load in tonnes at Km/h with 3° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	4630	3565	2810	2165	1725	1355
1/500	4095	4095	4095	3390	2545	2010	1625	1280	1040	835
1/400	3820	3820	3820	3030	2280	1810	1465	1155	945	755
1/200	2855	2855	2750	1965	1490	1190	970	765	630	505
1/150	2440	2440	2210	1585	1200	955	780	615	505	405
1/100	1880	1880	1580	1125	850	675	550	430	350	280
1/50	1090	975	815	575	425	330	260	195	150	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3A (3100)			Track condition : Dry Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h with 4° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5295	5295	5295	5295	3985	3095	2460	1905	1530	1210
1/500	3870	3870	3870	3095	2330	1845	1495	1180	960	770
1/400	3625	3625	3625	2795	2105	1670	1355	1070	875	705
1/200	2745	2745	2600	1860	1410	1125	915	725	595	475
1/150	2355	2355	2110	1510	1145	915	745	590	480	385
1/100	1830	1815	1525	1090	820	655	530	415	340	265
1/50	1070	960	800	560	415	320	255	190	-	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3A (3100)			Track condition : Dry Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h with 5° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	4935	4935	4935	4710	3495	2730	2185	1700	1375	1090
1/500	3675	3675	3675	2850	2145	1705	1385	1090	890	715
1/400	3450	3450	3450	2590	1955	1555	1265	1000	815	655
1/200	2640	2640	2465	1765	1335	1065	870	690	565	450
1/150	2280	2280	2020	1445	1095	875	710	560	460	365
1/100	1780	1760	1475	1050	795	630	510	400	325	255
1/50	1050	940	785	550	405	315	250	185	-	-

WDG3A (3100 HP) DRY RAIL CONDITION

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG3A (3100)				Track condition : Dry Rail				Weight of loco : 123 T		
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	4610	3490	2660	2090
1/500	5400	5400	5400	4640	3425	2665	2075	1660	1325	1090
1/400	5400	5400	5400	3990	2960	2320	1815	1460	1170	965
1/200	4400	4400	3310	2325	1745	1385	1095	890	720	600
1/150	3690	3690	2565	1805	1355	1075	850	690	560	465
1/100	2785	2645	1750	1230	920	730	575	465	370	305
1/50	1570	1320	860	590	430	330	250	195	145	115

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG3A (3100)				Track condition : Dry Rail				Weight of loco : 123 T		
Trailing load in tonnes at Km/h with 1° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4980	3730	2880	2235	1785
1/500	5400	5400	5400	4110	3050	2385	1865	1500	1205	995
1/400	5400	5400	5150	3590	2675	2105	1650	1330	1075	890
1/200	4210	4210	3100	2180	1640	1300	1030	835	680	565
1/150	3555	3555	2435	1715	1290	1025	810	660	535	445
1/100	2705	2550	1690	1185	890	705	555	450	360	295
1/50	1545	1295	845	580	425	325	250	195	145	115

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG3A (3100)				Track condition : Dry Rail				Weight of loco : 123 T		
Trailing load in tonnes at Km/h with 2° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4105	3120	2445	1915	1545
1/500	5400	5400	5290	3685	2745	2155	1690	1365	1100	905
1/400	5400	5400	4665	3260	2435	1920	1510	1220	985	815
1/200	4030	4030	2910	2050	1540	1225	970	790	640	530
1/150	3425	3425	2315	1630	1225	975	770	625	505	420
1/100	2625	2455	1625	1140	855	675	535	430	345	285
1/50	1520	1265	825	565	415	320	240	185	140	110

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG3A (3100)				Track condition : Dry Rail				Weight of loco : 123 T		
Trailing load in tonnes at Km/h with 3° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	4540	3485	2680	2118	1675	1360
1/500	5400	5400	4775	3335	2490	1960	1545	1250	1005	835
1/400	5165	5165	4255	2985	2235	1765	1390	1125	910	755
1/200	3870	3870	2740	1930	1455	1155	915	745	600	500
1/150	3305	3305	2205	1550	1165	925	735	595	480	400
1/100	2555	2370	1570	1100	825	650	515	415	330	270
1/50	1490	1240	810	555	405	310	235	180	135	105

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG3A (3100)			Track condition : Dry Rail				Weight of loco : 123 T			
Trailing load in tonnes at Km/h with 4° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5330	3910	3025	2345	1865	1485	1215
1/500	5235	5235	4350	3050	2280	1800	1420	1150	930	770
1/400	4905	4905	3915	2745	2060	1630	1285	1045	845	700
1/200	3715	3715	2590	1825	1375	1090	865	705	570	475
1/150	3195	3170	2105	1480	1115	885	700	570	460	380
1/100	2485	2290	1515	1065	795	630	495	400	320	260
1/50	1465	1220	790	540	395	305	230	175	135	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG3A (3100)			Track condition : Dry Rail				Weight of loco : 123 T			
Trailing load in tonnes at Km/h with 5° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	4645	3430	2670	2080	1665	1330	1095
1/500	4965	4965	3995	2805	2100	1660	1310	1065	860	715
1/400	4665	4665	3625	2545	1910	1515	1195	970	785	655
1/200	3580	3580	2455	1730	1300	1035	820	665	540	450
1/150	3090	3030	2010	1415	1065	845	670	540	435	360
1/100	2420	2215	1465	1025	770	605	475	385	305	250
1/50	1445	1195	775	530	385	295	225	170	130	-

WDM3D (3300 HP) DRY RAIL CONDITION

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3D (3300)				Track condition : Dry Rail				Weight of loco : 117 T		
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5180	3970	3090	2365
1/500	5400	5400	5400	5100	3780	2960	2345	1905	1560	1245
1/400	5400	5400	5400	4390	3275	2580	2055	1675	1380	1105
1/200	4185	4185	3515	2570	1940	1550	1250	1030	860	695
1/150	3510	3510	2730	2000	1515	1210	975	810	675	545
1/100	2650	2650	1870	1370	1035	830	665	550	460	370
1/50	1495	1345	925	670	500	390	310	245	200	155

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3D (3300)				Track condition : Dry Rail				Weight of loco : 117 T		
Trailing load in tonnes at Km/h with 1° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	4170	3240	2535	2005
1/500	5400	5400	5400	4520	3365	2650	2100	1700	1380	1130
1/400	5400	5400	5400	3950	2955	2335	1860	1510	1230	1010
1/200	4000	4000	3290	2405	1820	1455	1170	960	790	650
1/150	3380	3380	2590	1895	1435	1150	925	760	625	520
1/100	2570	2570	1800	1320	995	800	640	525	430	355
1/50	1470	1320	910	655	485	385	300	240	190	150

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3D (3300)			Track condition : Dry Rail				Weight of loco : 117 T			
Trailing load in tonnes at Km/h with 2° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4540	3495	2755	2180	1745
1/500	5400	5400	5400	4055	3030	2395	1905	1545	1260	1035
1/400	5185	5185	4945	3590	2690	2135	1705	1390	1135	935
1/200	3835	3835	3090	2260	1710	1370	1100	905	745	615
1/150	3260	3260	2460	1805	1366	1095	880	725	595	490
1/100	2500	2500	1735	1270	960	770	615	505	415	340
1/50	1445	1290	890	640	475	375	295	235	185	145

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3D (3300)			Track condition : Dry Rail				Weight of loco : 117 T			
Trailing load in tonnes at Km/h with 3° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5000	3860	3005	2390	1910	1540
1/500	5260	5260	5065	3670	2755	2180	1740	1420	1155	950
1/400	4910	4910	4515	3285	2470	1965	1570	1280	1050	865
1/200	3680	3680	2915	2135	1615	1290	1040	855	700	580
1/150	3145	3260	2345	1720	1300	1045	840	690	565	470
1/100	2430	2410	1675	1225	925	740	595	485	400	325
1/50	1420	1265	870	630	465	365	285	230	180	140

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3D (3300)				Track condition : Dry Rail				Weight of loco : 117 T		
Trailing load in tonnes at Km/h with 4° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	4305	3350	2630	2105	1695	1375
1/500	4975	4975	4615	3355	2520	2005	1600	1305	1070	880
1/400	4660	4660	4155	3025	2280	1815	1455	1190	975	805
1/200	3535	3535	2755	2020	1530	1225	985	810	665	550
1/150	3040	3040	2240	1640	1245	995	800	670	540	445
1/100	2365	2330	1620	1185	895	715	575	470	385	315
1/50	1395	1240	855	615	455	355	280	220	175	135

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3D (3300)				Track condition : Dry Rail				Weight of loco : 117 T		
Trailing load in tonnes at Km/h with 5° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5100	3780	2690	2335	1885	1520	1240
1/500	4720	4720	4240	3090	2325	1850	1480	1210	990	820
1/400	4435	4435	3845	2805	2115	1690	1355	1110	910	750
1/200	3400	3400	2610	1915	1450	1160	935	770	630	520
1/150	2940	2940	2140	1570	1190	950	765	630	515	425
1/100	2300	2250	1565	1145	865	690	555	450	370	300
1/50	1370	1220	835	600	445	350	275	215	170	130

WDG4 (4000 HP) DRY RAIL CONDITION

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4000)			Track condition : Dry Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	4980	3930	3095
1/500	5400	5400	5400	5400	4830	3735	2995	2395	1990	1640
1/400	5400	5400	5400	5400	4185	3255	2625	2110	1760	1460
1/200	5400	5400	4495	3225	2490	1960	1605	1305	1105	925
1/150	4840	4840	3490	2515	1945	1535	1260	1030	870	730
1/100	3655	3545	2400	1725	1335	1055	865	705	600	500
1/50	2080	1790	1195	850	650	510	410	330	270	220

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4000)			Track condition : Dry Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 1° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5330	4110	3300	2640
1/500	5400	5400	5400	5400	4300	3340	2695	2165	1805	1490
1/400	5400	5400	5400	4950	3780	2950	2390	1925	1615	1340
1/200	5400	5400	4205	3020	2335	1840	1510	1230	1040	870
1/150	4660	4660	3310	2385	1845	1460	1200	980	830	695
1/100	3550	3435	2310	1665	1285	1015	835	680	575	485
1/50	2045	1760	1175	835	635	495	400	320	265	215

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4000)			Track condition : Dry Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 2° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	4470	3495	2840	2295
1/500	5400	5400	5400	5080	3875	3020	2445	1970	1650	1370
1/400	5400	5400	5400	4500	3445	2695	2190	1770	1485	1235
1/200	5280	5280	3950	2840	2195	1735	1420	1160	980	825
1/150	4490	4490	3150	2270	1755	1390	1140	930	790	665
1/100	3450	3310	2225	1605	1240	980	805	655	555	465
1/50	2010	1725	1150	815	625	485	390	310	260	210

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4000)			Track condition : Dry Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 3° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4860	3845	3035	2490	2030
1/500	5400	5400	5400	4605	3525	2755	2235	1805	1515	1260
1/400	5400	5400	5400	4120	3160	2480	2020	1635	1375	1150
1/200	5065	5065	3725	2680	2075	1640	1345	1095	930	780
1/150	4335	4335	3005	2165	1675	1325	1090	890	755	630
1/100	3360	3195	2150	1545	1195	945	775	630	535	445
1/50	1975	1690	1125	800	610	475	380	305	250	205

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4000)			Track condition : Dry Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 4° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4225	3370	2680	2210	1815
1/500	5400	5400	5400	4210	3230	2530	2060	1670	1405	1170
1/400	5400	5400	5305	3795	2920	2295	1870	1520	1280	1070
1/200	4870	*5240	3525	2535	1960	1550	1270	1040	880	740
1/150	4190	4260	2870	2065	1600	1265	1040	850	720	605
1/100	3270	3090	2080	1495	1155	915	750	610	515	430
1/50	1945	1660	1105	785	595	465	375	295	245	200

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4000)			Track condition : Dry Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 5° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	4830	3735	2995	2395	1990	1640
1/500	5400	5400	5400	3875	2975	2340	1905	1550	1305	1090
1/400	5400	5400	4910	3520	2710	2135	1745	1420	1195	1000
1/200	4690	4690	3340	2405	1860	1475	1210	985	835	700
1/150	4055	4055	2745	1975	1530	1210	995	810	690	575
1/100	3185	2990	2010	1445	1120	880	725	590	495	415
1/50	1910	1625	1085	770	585	455	365	290	240	195

WDG4(4500 HP) DRY RAIL

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4500)			Track condition : Dry Rail					Weight of loco : 126 T		
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	5400	4525	3580
1/500	5400	5400	5400	5400	5400	4260	3420	2755	2300	1905
1/400	5400	5400	5400	5400	4765	3720	3010	2435	2040	1700
1/200	5400	5400	5090	3665	2840	2250	1845	1515	1285	1085
1/150	4840	4840	3955	2860	2220	1765	1455	1195	1020	860
1/100	3655	3550	2725	1970	1535	1220	1005	825	705	595
1/50	2080	1790	1370	980	755	595	485	395	330	275

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4500)			Track condition : Dry Rail					Weight of loco : 126 T		
Trailing load in tonnes at Km/h with 1° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	4720	3805	3055
1/500	5400	5400	5400	5400	4895	3815	3090	2490	2085	1735
1/400	5400	5400	5400	5400	4305	3370	2740	2220	1870	1560
1/200	5400	5400	4765	3435	2665	2110	1735	1425	1210	1020
1/150	4660	4660	3755	2715	2110	1675	1385	1135	970	820
1/100	3550	3440	2625	1895	1475	1175	670	795	680	575
1/50	2045	1765	1340	960	740	580	475	385	325	265

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4500)			Track condition : Dry Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 2° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5115	4015	3275	2660
1/500	5400	5400	5400	5400	4410	3455	2805	2270	1910	1595
1/400	5400	5400	5400	5105	3920	3085	2515	2045	1725	1445
1/200	5280	5280	4475	3230	2505	1990	1640	1345	1145	965
1/150	4490	4490	3570	2585	2010	1595	1320	1085	925	780
1/100	3450	3315	2530	1830	1425	1130	935	765	655	550
1/50	2010	1730	1315	940	725	570	465	375	315	260

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4500)			Track condition : Dry Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 3° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	4400	3490	2875	2350
1/500	5400	5400	5400	5225	4010	3150	2565	2085	1760	1470
1/400	5400	5400	5400	4675	3600	2840	2320	1890	1600	1340
1/200	5065	5065	4220	3050	2365	1880	1550	1270	1085	915
1/150	4335	4335	3405	2465	1915	1525	1260	1035	880	745
1/100	3360	3200	2445	1765	1375	1090	900	740	630	535
1/50	1975	1695	1285	920	710	555	455	365	305	255

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4500)			Track condition : Dry Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 4° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4820	3860	3080	2555	2105
1/500	5400	5400	5400	4775	3675	2895	2365	1925	1625	1365
1/400	5400	5400	5400	4310	3330	2625	2150	1755	1490	1250
1/200	4870	4870	3995	2885	2240	1780	1470	1205	1030	870
1/150	4190	4190	3255	2355	1830	1455	1200	990	845	715
1/100	3270	3095	2360	1710	1330	1055	870	715	610	515
1/50	1945	1665	1260	905	695	545	445	360	300	250

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4500)			Track condition : Dry Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 5° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4260	3430	2755	2300	1905
1/500	5400	5400	5400	4400	3395	2675	2190	1790	1515	1270
1/400	5400	5400	5400	4000	3090	2445	2005	1640	1390	1170
1/200	4690	4690	3790	2740	2130	1690	1395	1145	980	825
1/150	4055	4055	3115	2255	1755	1395	1150	945	810	685
1/100	3185	2995	2285	1650	1285	1020	840	690	590	495
1/50	1910	1630	1240	885	680	535	435	350	295	240

WDG4D(4500 HP) DRY RAIL

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4D (4500)		Track condition : Dry Rail					Weight of loco : 130.2 T			
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	5400	4515	3570
1/500	5400	5400	5400	5400	5400	4255	3420	2750	2290	1895
1/400	5400	5400	5400	5400	4760	3715	3005	2430	2035	1690
1/200	5400	5400	5085	3660	2835	2245	1840	1510	1280	1080
1/150	4990	4990	3950	2855	2215	1760	1450	1190	1015	855
1/100	3775	3775	2720	1965	1530	1215	1000	820	700	590
1/50	2145	2090	1365	975	750	590	480	390	325	270

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4D (4500)		Track condition : Dry Rail					Weight of loco : 130.2 T			
Trailing load in tonnes at Km/h with 1° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	4710	3795	3045
1/500	5400	5400	5400	5400	4885	3810	3080	2485	2080	1730
1/400	5400	5400	5400	5400	4295	3365	2735	2215	1860	1555
1/200	5400	5400	4760	3430	2660	2105	1730	1415	1205	1015
1/150	4805	4805	3750	2710	2105	1670	1380	1130	965	815
1/100	3665	3665	2620	1895	1470	1170	965	790	675	570
1/50	2110	2050	1335	955	735	575	470	380	320	260

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4D (4500)		Track condition : Dry Rail					Weight of loco : 130.2 T			
Trailing load in tonnes at Km/h with 2° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5105	4005	3265	2650
1/500	5400	5400	5400	5400	4405	3445	2800	2265	1900	1585
1/400	5400	5400	5400	5100	3915	3075	2505	2035	1715	1435
1/200	5400	5400	4470	3225	2500	1985	1630	1340	1140	960
1/150	4635	4635	3565	2580	2005	1590	1310	1075	920	775
1/100	3560	3560	2525	1825	1420	1125	930	760	650	550
1/50	2075	2010	1310	935	720	565	460	370	310	255

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4D (4500)		Track condition : Dry Rail					Weight of loco : 130.2 T			
Trailing load in tonnes at Km/h with 3° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	4395	3480	2865	2345
1/500	5400	5400	5400	5220	4005	3145	2560	2080	1750	1465
1/400	5400	5400	5400	4670	3595	2830	2315	1885	1590	1335
1/200	5230	5230	4215	3045	2360	1875	1545	1265	1075	910
1/150	4475	4475	3400	2460	1910	1520	1250	1030	875	740
1/100	3465	3465	2440	1760	1370	1085	895	735	625	530
1/50	2040	1970	1285	915	705	550	450	360	305	250

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4D (4500)		Track condition : Dry Rail					Weight of loco : 130.2 T			
Trailing load in tonnes at Km/h with 4° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4815	3850	3075	2545	2095
1/500	5400	5400	5400	4770	3670	2890	2360	1920	1620	1360
1/400	5400	5400	5400	4305	3320	2620	2145	1750	1480	1245
1/200	5025	5025	3990	2880	2235	1775	1465	1200	1020	865
1/150	4325	4325	3250	2350	1825	1450	1195	985	840	710
1/100	3370	3370	2360	1705	1325	1050	865	710	605	510
1/50	2005	1935	1260	900	690	540	440	355	295	245

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4D (4500)		Track condition : Dry Rail					Weight of loco : 130.2 T			
Trailing load in tonnes at Km/h with 5° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4255	3425	2750	2290	1895
1/500	5400	5400	5400	4395	3385	2670	2185	1780	1505	1265
1/400	5400	5400	5400	3995	3085	2440	2000	1635	1385	1165
1/200	4835	4835	3785	2735	2125	1685	1390	1140	975	820
1/150	4180	4180	3110	2250	1750	1390	1145	940	805	680
1/100	3285	3285	2280	1645	1280	1015	835	685	585	490
1/50	1970	1895	1235	880	675	530	430	345	290	235

WDG5 (5500 HP) DRY RAIL

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG5 (5500)		Track condition : Dry Rail					Weight of loco : 133.8 T			
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	5400	5400	5190
1/500	5400	5400	5400	5400	5400	5400	4925	4020	3330	2780
1/400	5400	5400	5400	5400	5400	5360	4325	3555	2960	2485
1/200	5400	5400	5400	5300	4080	3260	2670	2230	1880	1605
1/150	5210	5210	5210	4145	3200	2570	2115	1770	1500	1285
1/100	3940	3940	3940	2870	2225	1790	1475	1240	1055	905
1/50	2240	2240	2005	1450	1120	896	735	615	520	440

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG5 (5500)		Track condition : Dry Rail					Weight of loco : 133.8 T			
Trailing load in tonnes at Km/h with 1° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	5400	5400	4435
1/500	5400	5400	5400	5400	5400	5400	4435	3640	3025	2540
1/400	5400	5400	5400	5400	5400	4865	3940	3250	2715	2290
1/200	5400	5400	5400	4970	3830	3065	2515	2100	1775	1515
1/150	5020	5020	5020	3935	3045	2445	2015	1685	1430	1225
1/100	3825	3825	3800	2765	2145	1725	1425	1195	1015	870
1/50	2205	2205	1965	1420	1095	875	720	600	505	430

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG5 (5500)		Track condition : Dry Rail					Weight of loco : 133.8 T			
Trailing load in tonnes at Km/h with 2° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	5400	4725	3865
1/500	5400	5400	5400	5400	5400	4980	4030	3320	2770	2335
1/400	5400	5400	5400	5400	5400	4455	3620	2995	2505	2120
1/200	5400	5400	5400	4675	3605	2890	2375	1985	1680	1435
1/150	4840	4840	4840	3750	2900	2330	1920	1610	1365	1170
1/100	3720	3720	3665	2670	2070	1665	1375	1155	980	840
1/50	2165	2165	1925	1395	1075	860	705	590	495	420

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG5 (5500)		Track condition : Dry Rail					Weight of loco : 133.8 T			
Trailing load in tonnes at Km/h with 3° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	5075	4150	3425
1/500	5400	5400	5400	5400	5400	4550	3695	3055	2555	2160
1/400	5400	5400	5400	5400	5165	4100	3340	2770	2325	1970
1/200	5400	5400	5400	4415	3410	2735	2245	1880	1595	1360
1/150	4670	4670	4670	3575	2770	2225	1835	1540	1305	1120
1/100	3620	3620	3540	2580	2000	1610	1325	1115	950	815
1/50	2130	2130	1890	1365	1055	840	690	575	485	410

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG5 (5500)			Track condition : Dry Rail					Weight of loco : 133.8 T		
Trailing load in tonnes at Km/h with 4° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	4490	3695	3070
1/500	5400	5400	5400	5400	5270	4185	3410	2825	2370	2005
1/400	5400	5400	5400	5400	4775	3800	3105	2580	2170	1845
1/200	5245	5245	5245	4180	3230	2590	2135	1785	1515	1295
1/150	4515	4515	4515	3420	2645	2130	1755	1470	1250	1070
1/100	3520	3520	3425	2495	1930	1555	1285	1080	915	785
1/50	2095	2095	1850	1340	1030	825	675	565	475	405

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG5 (5500)			Track condition : Dry Rail					Weight of loco : 133.8 T		
Trailing load in tonnes at Km/h with 5° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	4925	4020	3330	2780
1/500	5400	5400	5400	5400	4865	3875	3160	2625	2210	1875
1/400	5400	5400	5400	5400	4440	3540	2895	2410	2030	1730
1/200	5050	5050	5050	3790	3070	2465	2030	1700	1445	1235
1/150	4365	4365	4365	3275	2535	2040	1680	1410	1200	1030
1/100	3430	3430	3315	2415	1870	1505	1240	1045	885	760
1/50	2060	2060	1815	1315	1010	810	665	550	465	395

WDM2 (2600 HP) WET RAIL CONDITION

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM2 (2600)				Track condition : Wet Rail				Weight of loco : 112.8 T		
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4790	3625	2765	2080	1620
1/500	3920	3920	3920	3660	2605	2020	1625	1305	1030	835
1/400	3610	3610	3610	3150	2250	1755	1420	1145	910	740
1/200	2575	2575	2450	1830	1320	1040	850	695	555	450
1/150	2155	2155	1895	1415	1020	805	660	535	425	350
1/100	1615	1555	1285	960	690	540	440	355	280	225
1/50	895	755	620	455	315	235	185	140	-	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM2 (2600)				Track condition : Wet Rail				Weight of loco : 112.8 T		
Trailing load in tonnes at Km/h with 1° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5085	3780	2925	2275	1775	1375
1/500	3670	3670	3670	3240	2315	1800	1455	1175	950	755
1/400	3395	3395	3395	2830	2030	1585	1285	1045	845	675
1/200	2460	2460	2290	1710	1235	975	795	650	530	425
1/150	2075	2075	1795	1340	970	765	625	510	415	330
1/100	1570	1495	1240	925	660	520	420	340	275	215
1/50	880	740	610	445	305	230	180	135	-	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM2 (2600)			Track condition : Wet Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h with 2° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	4930	4930	4930	4930	4120	3115	2445	1925	1520	1190
1/500	3445	3445	3445	2905	2080	1625	1320	1070	865	690
1/400	3200	3200	3200	2565	1845	1445	1175	955	775	620
1/200	2355	2355	2150	1605	1160	915	750	610	495	395
1/150	1995	1995	1705	1275	920	725	590	485	390	310
1/100	1520	1440	1190	890	635	500	405	325	260	205
1/50	865	725	595	435	300	225	175	135	-	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM2 (2600)			Track condition : Wet Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h with 3° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	4540	4540	4540	4540	3455	2640	2100	1670	1330	1045
1/500	3250	3250	3250	2630	1890	1480	1200	975	790	635
1/400	3030	3030	3030	2345	1690	1325	1080	880	715	570
1/200	2260	2260	2025	1515	1095	860	705	575	470	375
1/150	1925	1925	1625	1215	875	690	565	460	370	295
1/100	1480	1390	1150	855	610	480	390	315	250	195
1/50	850	710	580	425	290	220	170	130	-	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM2 (2600)			Track condition : Wet Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h with 4° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	4210	4210	4210	4205	2970	2290	1830	1465	1175	930
1/500	3070	3070	3070	2400	1725	1355	1105	890	730	585
1/400	2875	2875	2875	2160	1555	1225	1000	815	660	530
1/200	2170	2170	1910	1430	1030	815	665	545	440	350
1/150	1860	1860	1550	1555	835	655	535	435	355	280
1/100	1440	1340	1110	825	590	460	375	300	240	185
1/50	835	695	570	415	285	215	165	125	-	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM2 (2600)			Track condition : Wet Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h with 5° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	3920	3920	3920	3660	2605	2020	1625	1305	1055	835
1/500	2910	2910	2910	2205	1590	1250	1020	830	675	540
1/400	2735	2735	2680	2000	1445	1135	930	755	615	495
1/200	2085	2085	1810	1355	975	770	630	515	415	330
1/150	1795	1785	1480	1105	795	625	510	415	335	265
1/100	1400	1295	1070	800	570	445	360	290	230	180
1/50	820	680	560	405	275	205	160	-	-	-

WDM3A (3100 HP) WET RAIL CONDITION

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3A (3100)				Track condition : Wet Rail				Weight of loco : 112.8 T		
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	4830	3565	2735	2080
1/500	3920	3920	3920	4710	3495	2730	2185	1700	1375	1090
1/400	3610	3610	3610	4055	3025	2380	1910	1500	1215	970
1/200	2575	2575	2575	2370	1790	1425	1160	920	750	605
1/150	2155	2155	2155	1840	1395	1115	910	720	590	470
1/100	1615	1615	1615	1260	950	760	620	485	395	315
1/50	895	895	870	610	455	355	280	215	165	125

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3A (3100)				Track condition : Wet Rail				Weight of loco : 112.8 T		
Trailing load in tonnes at Km/h with 1° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5085	3905	2940	2295	1770
1/500	3670	3670	3670	4175	3110	2445	1960	1535	1245	990
1/400	3395	3395	3395	3650	2730	2155	1740	1365	1110	885
1/200	2460	2460	2460	2220	1680	1340	1090	865	705	565
1/150	2075	2075	2075	1745	1325	1055	860	680	560	450
1/100	1570	1570	1570	1210	915	730	595	470	380	300
1/50	880	880	850	600	445	345	275	210	160	120

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3A (3100)			Track condition : Wet Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h with 2° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	4930	4930	4930	4930	4930	4195	3270	2495	1970	1540
1/500	3445	3445	3445	3445	2800	2205	1780	1395	1135	905
1/400	3200	3200	3200	3200	2485	1965	1590	1255	1020	815
1/200	2355	2355	2355	2085	1580	1260	1025	810	665	535
1/150	1995	1995	1995	1660	1260	1005	820	650	530	425
1/100	1520	1520	1520	1170	880	705	570	450	365	290
1/50	865	865	835	585	435	340	270	200	160	115

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3A (3100)			Track condition : Wet Rail				Weight of loco : 112.8 T			
Trailing load in tonnes at Km/h with 3° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	4540	4540	4540	4540	4540	3565	2810	2165	1725	1355
1/500	3250	3250	3250	3250	2545	2010	1625	1280	1040	835
1/400	3030	3030	3030	3030	2280	1810	1465	1155	945	755
1/200	2260	2260	2260	1965	1490	1190	970	765	630	505
1/150	1925	1925	1925	1585	1200	955	780	615	505	405
1/100	1480	1480	1480	1125	850	675	550	430	350	280
1/50	850	850	815	575	425	330	260	195	150	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3A (3100)				Track condition : Wet Rail				Weight of loco : 112.8 T		
Trailing load in tonnes at Km/h with 4° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	4210	4210	4210	4210	3985	3095	2460	1905	1530	1210
1/500	3070	3070	3070	3070	2330	1845	1495	1180	960	770
1/400	2875	2875	2875	2795	2105	1670	1355	1070	875	705
1/200	2170	2170	2170	1860	1410	1125	915	725	595	475
1/150	1860	1860	1860	1510	1145	915	745	590	480	385
1/100	1440	1440	1440	1090	820	655	530	415	340	265
1/50	835	835	800	560	415	320	255	190	-	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3A (3100)				Track condition : Wet Rail				Weight of loco : 112.8 T		
Trailing load in tonnes at Km/h with 5° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	3920	3920	3920	3920	3495	2730	2185	1700	1375	1090
1/500	2910	2910	2910	2850	2145	1705	1385	1090	890	715
1/400	2735	2735	2735	2590	1955	1555	1265	1000	815	655
1/200	2085	2085	2085	1765	1335	1065	870	690	565	450
1/150	1795	1795	1795	1445	1095	875	710	560	460	365
1/100	1400	1400	1400	1050	795	630	510	400	325	255
1/50	820	820	785	550	405	315	250	185	-	-

WDG3A (3100 HP) WET RAIL CONDITION

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG3A (3100)			Track condition : Wet Rail				Weight of loco : 123 T			
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	4610	3490	2660	2090
1/500	5400	5400	5400	4640	3425	2665	2075	1660	1325	1090
1/400	5175	5175	5175	3990	2960	2320	1815	1460	1170	965
1/200	3700	3700	3310	2325	1745	1385	1095	890	720	600
1/150	3105	3105	2565	1805	1355	1075	850	690	560	465
1/100	2335	2335	1750	1230	920	730	575	465	370	305
1/50	1310	1175	860	590	430	330	250	195	-	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG3A (3100)			Track condition : Wet Rail				Weight of loco : 123 T			
Trailing load in tonnes at Km/h with 1° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4980	3730	2880	2235	1783
1/500	5255	5255	5255	4110	3050	2385	1865	1500	1205	995
1/400	4865	4865	4865	3590	2675	2105	1650	1330	1075	890
1/200	3540	3540	3100	2180	1640	1300	1030	835	680	565
1/150	2985	2985	2435	1715	1290	1025	810	660	535	444
1/100	2270	2270	1690	1185	890	705	555	450	360	295
1/50	1290	1150	845	580	425	325	250	195	145	115

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG3A (3100)			Track condition : Wet Rail				Weight of loco : 123 T			
Trailing load in tonnes at Km/h with 2° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4105	3120	2445	1915	1545
1/500	4940	4940	4940	3685	2745	2155	1690	1365	1100	905
1/400	4595	4595	4595	3260	2435	1920	1510	1220	985	815
1/200	3390	3390	2910	2050	1540	1225	970	790	640	530
1/150	2880	2880	2315	1630	1225	975	770	625	505	420
1/100	2205	2200	1625	1140	855	675	535	430	345	285
1/50	1265	1130	825	565	415	320	240	185	140	110

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG3A (3100)			Track condition : Wet Rail				Weight of loco : 123 T			
Trailing load in tonnes at Km/h with 3° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	4540	3485	2680	2118	1675	1360
1/500	4660	4660	4600	3335	2490	1960	1545	1250	1005	835
1/400	4350	4350	4255	2985	2235	1765	1390	1125	910	755
1/200	3250	3250	2740	1930	1455	1155	915	745	600	500
1/150	2775	2775	2205	1550	1165	925	735	595	480	400
1/100	2140	2125	1570	1100	825	650	515	415	330	270
1/50	1245	1105	810	555	405	310	235	180	135	105

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG3A (3100)			Track condition : Wet Rail				Weight of loco : 123 T			
Trailing load in tonnes at Km/h with 4° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5330	3910	3025	2345	1865	1485	1215
1/500	4405	4405	4350	3050	2280	1800	1420	1150	930	770
1/400	4125	4125	3915	2745	2060	1630	1285	1045	845	700
1/200	3125	3125	2590	1825	1375	1090	865	705	570	475
1/150	2685	2685	2105	1480	1115	885	700	570	460	380
1/100	2085	2050	1515	1065	795	630	495	400	320	260
1/50	1220	1085	790	540	395	305	230	175	135	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG3A (3100)			Track condition : Wet Rail				Weight of loco : 123 T			
Trailing load in tonnes at Km/h with 5° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	4645	3430	2670	2080	1665	1330	1095
1/500	4180	4180	3995	2805	2100	1660	1310	1065	860	715
1/400	3925	3925	3625	2545	1910	1515	1195	970	785	655
1/200	3005	3005	2455	1730	1300	1035	820	665	540	450
1/150	2595	2595	2010	1415	1065	845	670	540	435	360
1/100	2030	1985	1465	1025	770	605	475	385	305	250
1/50	1200	1065	775	530	385	295	225	170	130	-

WDM3D (3300 HP) WET RAIL CONDITION

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3D (3300)				Track condition : Wet Rail				Weight of loco : 117 T		
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5180	3970	3090	2365
1/500	5050	5050	5050	5100	3780	2960	2345	1905	1560	1245
1/400	4650	4650	4650	4390	3275	2580	2055	1675	1380	1105
1/200	3325	3325	3325	2570	1940	1550	1250	1030	860	695
1/150	2785	2785	2730	2000	1515	1210	975	810	675	545
1/100	2095	2095	1870	1370	1035	830	665	550	460	370
1/50	1175	1050	925	670	500	390	310	245	200	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3D (3300)				Track condition : Wet Rail				Weight of loco : 117 T		
Trailing load in tonnes at Km/h with 1° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	4170	3240	2535	2005
1/500	4725	4725	4725	4520	3365	2650	2100	1700	1380	1130
1/400	4375	4375	4375	3950	2955	2335	1860	1510	1230	1010
1/200	3180	3180	3180	2405	1820	1455	1170	960	790	650
1/150	2680	2680	2590	1895	1435	1150	925	760	625	520
1/100	2035	2035	1800	1320	995	800	640	525	430	355
1/50	1155	1030	910	655	485	385	300	240	190	150

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3D (3300)			Track condition : Wet Rail				Weight of loco : 117 T			
Trailing load in tonnes at Km/h with 2° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4540	3495	2755	2180	1745
1/500	4440	4440	4440	4055	3030	2395	1905	1545	1260	1035
1/400	4130	4130	4130	3590	2690	2135	1705	1390	1135	935
1/200	3045	3045	3045	2260	1710	1370	1100	905	745	615
1/150	2585	2585	2460	1805	1366	1095	880	725	595	490
1/100	1975	1975	1735	1270	960	770	615	505	415	340
1/50	1135	1010	890	640	475	375	295	235	185	145

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3D (3300)			Track condition : Wet Rail				Weight of loco : 117 T			
Trailing load in tonnes at Km/h with 3° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5000	3860	3005	2390	1910	1540
1/500	4185	4185	4185	3670	2755	2180	1740	1420	1155	950
1/400	3910	3910	3910	3285	2470	1965	1570	1280	1050	865
1/200	2920	2920	2915	2135	1615	1290	1040	855	700	580
1/150	2495	2495	2345	1720	1300	1045	840	690	565	470
1/100	1920	1905	1675	1225	925	740	595	485	400	325
1/50	1115	990	870	630	465	365	285	230	180	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3D (3300)			Track condition : Wet Rail				Weight of loco : 117 T			
Trailing load in tonnes at Km/h with 4° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	4305	3350	2630	2105	1695	1375
1/500	3960	3960	3960	3355	2520	2005	1600	1305	1070	880
1/400	3710	3710	3710	3025	2280	1815	1455	1190	975	805
1/200	2805	2805	2755	2020	1530	1225	985	810	665	550
1/150	2410	2410	2240	1640	1245	995	800	670	540	445
1/100	1870	1840	1620	1185	895	715	575	470	385	315
1/50	1095	970	855	615	455	355	280	220	175	-

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDM3D (3300)			Track condition : Wet Rail				Weight of loco : 117 T			
Trailing load in tonnes at Km/h with 5° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5050	5050	5050	5100	3780	2690	2335	1885	1520	1240
1/500	3755	3755	3755	3090	2325	1850	1480	1210	990	820
1/400	3530	3530	3530	2805	2115	1690	1355	1110	910	750
1/200	2700	2700	2610	1915	1450	1160	935	770	630	520
1/150	2330	2330	2140	1570	1190	950	765	630	515	425
1/100	1820	1780	1565	1145	865	690	555	450	370	300
1/50	1075	950	835	600	445	350	275	215	170	-

WDG4 (4000 HP) WET RAIL CONDITION

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4000)			Track condition : Wet Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	4980	3930	3095
1/500	5400	5400	5400	5400	4830	3735	2995	2395	1990	1640
1/400	5400	5400	5400	5400	4185	3255	2625	2110	1760	1460
1/200	4580	4580	4495	3225	2490	1960	1605	1305	1105	925
1/150	3845	3845	3490	2515	1945	1535	1260	1030	870	730
1/100	2900	2820	2400	1725	1335	1055	865	705	600	500
1/50	1640	1410	1195	850	650	510	410	330	270	220

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4000)			Track condition : Wet Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 1° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5330	4110	3300	2640
1/500	5400	5400	5400	5400	4300	3340	2695	2165	1805	1490
1/400	5400	5400	5400	4950	3780	2950	2390	1925	1615	1340
1/200	4380	4380	4205	3020	2335	1840	1510	1230	1040	870
1/150	3700	3700	3310	2385	1845	1460	1200	980	830	695
1/100	2815	2715	2310	1665	1285	1015	835	680	575	485
1/50	1610	1380	1175	835	635	495	400	320	265	215

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4000)				Track condition : Wet Rail				Weight of loco : 126 T		
Trailing load in tonnes at Km/h with 2° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	4470	3495	2840	2295
1/500	5400	5400	5400	5080	3875	3020	2445	1970	1650	1370
1/400	5400	5400	5400	4500	3445	2695	2190	1770	1485	1235
1/200	4195	4195	3950	2840	2195	1735	1420	1160	980	825
1/150	3565	3565	3150	2270	1755	1390	1140	930	790	665
1/100	2735	2620	2225	1605	1240	980	805	655	555	465
1/50	1580	1355	1150	815	625	485	390	310	260	210

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4000)				Track condition : Wet Rail				Weight of loco : 126 T		
Trailing load in tonnes at Km/h with 3° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4860	3845	3035	2490	2030
1/500	5400	5400	5400	4605	3525	2755	2235	1805	1515	1260
1/400	5375	5375	5375	4120	3160	2480	2020	1635	1375	1150
1/200	4025	4025	3725	2680	2075	1640	1345	1095	930	780
1/150	3445	3445	3005	2165	1675	1325	1090	890	755	630
1/100	2660	2530	2150	1545	1195	945	775	630	535	445
1/50	1555	1325	1125	800	610	475	380	305	250	205

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4000)			Track condition : Wet Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 4° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4225	3370	2680	2210	1815
1/500	5400	5400	5400	4210	3230	2530	2060	1670	1405	1170
1/400	5105	5105	5105	3795	2920	2295	1870	1520	1280	1070
1/200	3870	3870	3525	2535	1960	1550	1270	1040	880	740
1/150	3325	3325	2870	2065	1600	1265	1040	850	720	605
1/100	2590	2445	2080	1495	1155	915	750	610	515	430
1/50	1530	1300	1105	785	595	465	375	295	245	200

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4000)			Track condition : Wet Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 5° degree curves										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	4830	3735	2995	2395	1990	1640
1/500	5170	5170	5170	3875	2975	2340	1905	1550	1305	1090
1/400	4855	4855	4855	3520	2710	2135	1745	1420	1195	1000
1/200	3725	3725	3340	2405	1860	1475	1210	985	835	700
1/150	3215	3215	2745	1975	1530	1210	995	810	690	575
1/100	2520	2365	2010	1445	1120	880	725	590	495	415
1/50	1505	1275	1085	770	585	455	365	290	240	195

WDG4(4500 HP) WET RAIL

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4500)			Track condition : Wet Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	5400	4525	3580
1/500	5400	5400	5400	5400	5400	4260	3420	2755	2300	1905
1/400	5400	5400	5400	5400	4765	3720	3010	2435	2040	1700
1/200	4580	4580	4580	3665	2840	2250	1845	1515	1285	1085
1/150	3845	3845	3845	2860	2220	1765	1455	1195	1020	860
1/100	2900	2900	2725	1970	1535	1220	1005	825	705	595
1/50	1640	1640	1370	980	755	595	485	395	330	275

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4500)			Track condition : Wet Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 1° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	4720	3805	3055
1/500	5400	5400	5400	5400	4895	3815	3090	2490	2085	1735
1/400	5400	5400	5400	5400	4305	3370	2740	2220	1870	1560
1/200	4380	4380	4380	3435	2665	2110	1735	1425	1210	1020
1/150	3700	3700	3700	2715	2110	1675	1385	1135	970	820
1/100	2815	2725	2625	1895	1475	1175	670	795	680	575
1/50	1610	1385	1340	960	740	580	475	385	325	265

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4500)			Track condition : Wet Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 2° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5115	4015	3275	2660
1/500	5400	5400	5400	5400	4410	3455	2805	2270	1910	1595
1/400	5400	5400	5400	5105	3920	3085	2515	2045	1725	1445
1/200	4195	4195	4195	3230	2505	1990	1640	1345	1145	965
1/150	3565	3565	3565	2585	2010	1595	1320	1085	925	780
1/100	2735	2625	2530	1830	1425	1130	935	765	655	550
1/50	1580	1355	1315	940	725	570	465	375	315	260

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4500)			Track condition : Wet Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 3° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	4400	3490	2875	2350
1/500	5400	5400	5400	5225	4010	3150	2565	2085	1760	1470
1/400	5400	5400	5400	4675	3600	2840	2320	1890	1600	1340
1/200	4025	4025	4220	3050	2365	1880	1550	1270	1085	915
1/150	3445	3445	3405	2465	1915	1525	1260	1035	880	745
1/100	2660	2660	2445	1765	1375	1090	900	740	630	535
1/50	1555	1555	1285	920	710	555	455	365	305	255

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4500)			Track condition : Wet Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 4° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4820	3860	3080	2555	2105
1/500	5400	5400	5400	4775	3675	2895	2365	1925	1625	1365
1/400	5105	5105	5105	4310	3330	2625	2150	1755	1490	1250
1/200	3870	3870	3870	2885	2240	1780	1470	1205	1030	870
1/150	3325	3325	3255	2355	1830	1455	1200	990	845	715
1/100	2590	2590	2360	1710	1330	1055	870	715	610	515
1/50	1530	1530	1260	905	695	545	445	360	300	250

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4 (4500)			Track condition : Wet Rail				Weight of loco : 126 T			
Trailing load in tonnes at Km/h with 5° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4260	3430	2755	2300	1905
1/500	5170	5170	5170	4400	3395	2675	2190	1790	1515	1270
1/400	4855	4855	4855	4000	3090	2445	2005	1640	1390	1170
1/200	3725	3725	3725	2740	2130	1690	1395	1145	980	825
1/150	3215	4085	3115	2255	1755	1395	1150	945	810	685
1/100	2520	2520	2285	1650	1285	1020	840	690	590	495
1/50	1505	1505	1240	885	680	535	435	350	295	240

WDG4D(4500 HP) WET RAIL CONDITION

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4D (4500)		Track condition : Wet Rail					Weight of loco : 130.2 T			
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	5400	4515	3570
1/500	5400	5400	5400	5400	5400	4255	3420	2750	2290	1895
1/400	5400	5400	5400	5400	4760	3715	3005	2430	2035	1690
1/200	4725	4725	4725	3660	2835	2245	1840	1510	1280	1080
1/150	3965	3965	3950	2855	2215	1760	1450	1190	1015	855
1/100	2990	2990	2720	1965	1530	1215	1000	820	700	590
1/50	1690	1960	1365	975	750	590	480	390	325	270

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4D (4500)		Track condition : Wet Rail					Weight of loco : 130.2 T			
Trailing load in tonnes at Km/h with 1° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	4710	3795	3045
1/500	5400	5400	5400	5400	4885	3810	3080	2485	2080	1730
1/400	5400	5400	5400	5400	4295	3365	2735	2215	1860	1555
1/200	4520	4520	4520	3430	2660	2105	1730	1415	1205	1015
1/150	3820	3820	3750	2710	2105	1670	1380	1130	965	815
1/100	2905	2905	2620	1895	1470	1170	965	790	675	570
1/50	1660	1660	1335	955	735	575	470	380	320	260

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4D (4500)		Track condition : Wet Rail					Weight of loco : 130.2 T			
Trailing load in tonnes at Km/h with 2° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5105	4005	3265	2650
1/500	5400	5400	5400	5400	4405	3445	2800	2265	1900	1585
1/400	5400	5400	5400	5100	3915	3075	2505	2035	1715	1435
1/200	4330	4330	4330	3225	2500	1985	1630	1340	1140	960
1/150	3680	3680	3565	2580	2005	1590	1310	1075	920	775
1/100	2825	2825	2525	1825	1420	1125	930	760	650	550
1/50	1630	1630	1310	935	720	565	460	370	310	255

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4D (4500)		Track condition : Wet Rail					Weight of loco : 130.2 T			
Trailing load in tonnes at Km/h with 3° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	4395	3480	2865	2345
1/500	5400	5400	5400	5220	4005	3145	2560	2080	1750	1465
1/400	5400	5400	5400	4670	3595	2830	2315	1885	1590	1335
1/200	4155	4155	4155	3045	2360	1875	1545	1265	1075	910
1/150	3550	3550	3400	2460	1910	1520	1250	1030	875	740
1/100	2745	2745	2440	1760	1370	1085	895	735	625	530
1/50	1605	1605	1285	915	705	550	450	360	305	250

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4D (4500)			Track condition : Wet Rail				Weight of loco : 130.2 T			
Trailing load in tonnes at Km/h with 4° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4815	3850	3075	2545	2095
1/500	5400	5400	5400	4770	3670	2890	2360	1920	1620	1360
1/400	5400	5400	5400	4305	3320	2620	2145	1750	1480	1245
1/200	3995	3995	3990	2880	2235	1775	1465	1200	1020	865
1/150	3430	3430	3250	2350	1825	1450	1195	985	840	710
1/100	2670	2675	2360	1705	1325	1050	865	710	605	510
1/50	1575	1575	1260	900	690	540	440	355	295	245

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG4D (4500)			Track condition : Wet Rail				Weight of loco : 130.2 T			
Trailing load in tonnes at Km/h with 5° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	4255	3425	2750	2290	1895
1/500	5400	5400	5400	4395	3385	2670	2185	1780	1505	1265
1/400	5400	5400	5400	3995	3085	2440	2000	1635	1385	1165
1/200	3845	3845	3785	2735	2125	1685	1390	1140	975	820
1/150	3320	3320	3110	2250	1750	1390	1145	940	805	680
1/100	2600	2600	2280	1645	1280	1015	835	685	585	490
1/50	1550	1550	1235	880	675	530	430	345	290	235

WDG5 (5500 HP) WET RAIL

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG5 (5500)		Track condition : Wet Rail					Weight of loco : 133.8 T			
Trailing load in tonnes at Km/h on tangent track										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	5400	5400	5190
1/500	5400	5400	5400	5400	5400	5400	4925	4020	3330	2780
1/400	5400	5400	5400	5400	5400	5360	4325	3555	2960	2485
1/200	4935	4935	4935	4935	4080	3260	2670	2230	1880	1605
1/150	4140	4140	4140	4140	3200	2570	2115	1770	1500	1285
1/100	3125	3125	3125	2870	2225	1790	1475	1240	1055	905
1/50	1765	1765	1765	1450	1120	896	735	615	520	440

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG5 (5500)		Track condition : Wet Rail					Weight of loco : 133.8 T			
Trailing load in tonnes at Km/h with 1° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	5400	5400	4435
1/500	5400	5400	5400	5400	5400	5400	4435	3640	3025	2540
1/400	5400	5400	5400	5400	5400	4865	3940	3250	2715	2290
1/200	4720	4720	4720	4720	3830	3065	2515	2100	1775	1515
1/150	3985	3985	3985	3935	3045	2445	2015	1685	1430	1225
1/100	3035	3035	3035	2765	2145	1725	1425	1195	1015	870
1/50	1735	1735	1735	1420	1095	875	720	600	505	430

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG5 (5500)		Track condition : Wet Rail					Weight of loco : 133.8 T			
Trailing load in tonnes at Km/h with 2° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	5400	4725	3865
1/500	5400	5400	5400	5400	5400	4980	4030	3320	2770	2335
1/400	5400	5400	5400	5400	5400	4455	3620	2995	2505	2120
1/200	4520	4520	4520	4520	3605	2890	2375	1985	1680	1435
1/150	3845	3845	3845	3750	2900	2330	1920	1610	1365	1170
1/100	2950	2950	2950	2670	2070	1665	1375	1155	980	840
1/50	1705	1705	1705	1395	1075	860	705	590	495	420

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG5 (5500)		Track condition : Wet Rail					Weight of loco : 133.8 T			
Trailing load in tonnes at Km/h with 3° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	5075	4150	3425
1/500	5400	5400	5400	5400	5400	4550	3695	3055	2555	2160
1/400	5400	5400	5400	5400	5165	4100	3340	2770	2325	1970
1/200	4340	4340	4340	4340	3410	2735	2245	1880	1595	1360
1/150	3710	3710	3710	3575	2770	2225	1835	1540	1305	1120
1/100	2865	2865	2865	2580	2000	1610	1325	1115	950	815
1/50	1675	1675	1675	1365	1055	840	690	575	485	410

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG5 (5500)		Track condition : Wet Rail					Weight of loco : 133.8 T			
Trailing load in tonnes at Km/h with 4° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	5400	4490	3695	3070
1/500	5400	5400	5400	5400	5270	4185	3410	2825	2370	2005
1/400	5400	5400	5400	5400	4775	3800	3105	2580	2170	1845
1/200	4170	4170	4170	4170	3230	2590	2135	1785	1515	1295
1/150	3585	3585	3585	3420	2645	2130	1755	1470	1250	1070
1/100	2790	2790	2790	2495	1930	1555	1285	1080	915	785
1/50	1650	1650	1650	1340	1030	825	675	565	475	405

HAULAGE CAPACITY (FRIEGHT)										
Loco: WDG5 (5500)		Track condition : Wet Rail					Weight of loco : 133.8 T			
Trailing load in tonnes at Km/h with 5° degree curve										
BOXN/BCN Wagons and other casnub bogie air brake stocks										
GRADE	START	20	30	40	50	60	70	80	90	100
LEVEL	5400	5400	5400	5400	5400	5400	4925	4020	3330	2780
1/500	5400	5400	5400	5400	4865	3875	3160	2625	2210	1875
1/400	5230	5400	5230	5230	4440	3540	2895	2410	2030	1730
1/200	4010	4010	4010	3790	3070	2465	2030	1700	1445	1235
1/150	3465	3465	3465	3275	2535	2040	1680	1410	1200	1030
1/100	2715	2715	2715	2415	1870	1505	1240	1045	885	760
1/50	1620	1620	1620	1315	1010	810	665	550	465	395

Attacking speed Vs length of maximum negotiable stretch with exit speed

Load: 59 BOXN (CC+8+2t) = (5400 t) & Rail condition: Dry Rail (Standard)

S. no.	Attacking Speed (Km/h)	2 WDM2		2 WDM3A		2 WDG3A		2 WDM3D		2 WDG4	
		Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)
(A) Gradient 1 in 100 & 2° curves											
1	30	Not negotiable	Loco stalled	Not negotiable	Loco stalled	4.50	20	4.70	20	No limitation	20
2	40					6.00		6.50			
3	50					>10.00		>10.00			
4	60					>10.00		>10.00			
5	70					>10.00		>10.00			
(B) Gradient 1 in 125 & 2° curves											
1	30	0.50	20	0.65	20	No limitation	>20	No limitation	>20	No limitation	20
2	40	0.75		0.90							
3	50	1.00		1.30							
4	60	2.10		2.70							
5	70	4.00		5.00							
(C) Gradient 1 in 150 & 2° curves											
1	30	3.50	20	>10.00	20	No limitation	>20	No limitation	>20	No limitation	20
2	40	6.50									
3	50	10.00									
4	60	>10.00									
5	70	>10.00									

Note.: If curves are more than 2°, the maximum stretch negotiable is slightly less than the above specified values.

Attacking speed Vs length of maximum negotiable stretch with exit speed

Load: 59 BOXN (CC+8+2t)= (5400 t) & Rail condition: Wet Rail / Rainy

S. no.	Attacking Speed (Km/h)	2 WDM2		2 WDM3A		2 WDG3A		2 WDM3D		2 WDG4	
		Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)
(A) Gradient 1 in 100 & 2° curves											
1	30	Not negotiable	Loco stalled	Not negotiable	Loco stalled	3.70	20	3.80	20	No limitation	20
2	40					5.00		5.20			
3	50					8.00		8.50			
4	60					>10.00		>10.00			
5	70					>10.00		>10.00			
(B) Gradient 1 in 125 & 2° curves											
1	30	Not negotiable	Loco stalled	Not negotiable	Loco stalled	5.00	20	6.00	20	No limitation	20
2	40					7.00		8.00			
3	50					0.65		>10.00			>10.00
4	60	1.50	20	2.25	20	>10.00	>10.00	>10.00	>10.00	>10.00	
5	70	2.50		3.80		>10.00	>10.00				
(C) Gradient 1 in 150 & 2° curves											
1	30	2.00	20	3.00	20	No limitation	>20	No limitation	>20	No limitation	20
2	40	4.00		5.00							
3	50	7.10		10.00							
4	60	10.00		>10.00							
5	70	>10.00		>10.00							

Note.: If curves are more than 2°, the maximum stretch negotiable is slightly less than the above specified values.

Attacking speed Vs length of maximum negotiable stretch with exit speed

Load: 42 BCN (CC+8+2t) = (3847t) & Rail condition: Dry Rail (Standard)

S. no.	Attacking Speed (Km/h)	2 WDM2		2 WDM3A		2 WDG3A		2 WDM3D		2 WDG4	
		Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)
(A) Gradient 1 in 100 & 2° curves											
1	30	1.00	20	1.75	20	4.50	20	4.80	20	No limitation	20
2	40	1.50		2.00		6.00		6.50			
3	50	2.00		3.00		8.00		8.50			
4	60	2.60		4.50		>10.00		>10.00			
5	70	3.50		6.00		>10.00		>10.00			
(B) Gradient 1 in 125 & 2° curves											
1	30	4.00	20	8.75	20	No limitation	>20	20	>20	No limitation	20
2	40	6.00		10.00		>20		>20			
3	50	10.00		>10.00		>20		>20			
4	60	>10.00		>10.00		>20		>20			
5	70	>10.00		>10.00		>20		>20			
(C) Gradient 1 in 150 & 2° curves											
1	30	No limitation	20	No limitation	20	No limitation	>20	20	>20	No limitation	20
2	40		>20		>20			>20			
3	50		>20		>20			>20			
4	60		>20		>20			>20			
5	70		>20		>20			>20			

Note.: If curves are more than 2°, the maximum stretch negotiable is slightly less than the above specified values.

Attacking speed Vs length of maximum negotiable stretch with exit speed

Load: 42 BCN (CC+8+2t)= (3847t) & Rail condition: Wet Rail / Rainy

S. no.	Attacking Speed (Km/h)	2 WDM2		2 WDM3A		2 WDG3A		2 WDM3D		2 WDG4	
		Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)	Max. Stretch negotiable (Km)	Exit Speed (Km/h)
(A) Gradient 1 in 100 & 2° curves											
1	30	0.75	20	1.50	20	4.00	20	4.40	20	No limitation	20
2	40	1.25		1.70		5.50		6.10			
3	50	1.80		2.60		7.50		8.00			
4	60	2.20		3.50		10.00		>10.00			
5	70	3.00		5.70		>10.00		>10.00			
(B) Gradient 1 in 125 & 2° curves											
1	30	3.50	20	8.00	20	No limitation	20	No limitation	20	No limitation	20
2	40	5.00		9.00		>20		>20			
3	50	8.00		10.00		>20		>20			
4	60	>10.00		>10.00		>20		>20			
5	70	>10.00		>10.00		>20		>20			
(C) Gradient 1 in 150 & 2° curves											
1	30	No limitation	20	No limitation	20	No limitation	20	No limitation	20	No limitation	20
2	40		>20		>20		>20		>20		
3	50		>20		>20		>20		>20		
4	60		>20		>20		>20		>20		
5	70		>20		>20		>20		>20		

Note.: If curves are more than 2°, the maximum stretch negotiable is slightly less than the above specified values.