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GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

डब्ल्यू०डी०एम०_२ सी लोकोमोटिव का रेखाचित्र पुस्तिका

DIAGRAM BOOK OF WDM_{2c} LOCOMOTIVE

रिपोर्ट सं० एम०पी०.मिस्ले०.१०२, सेप्टेम्बर, २०००
Report No. MP-MISC - 102, September, 2000

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S.No. 1933

WDM2C CLASS CO-CO DIESEL ELECTRIC LOCOMOTIVE

BRIEF DESCRIPTION OF THE LOCOMOTIVE

Underframe of WDM2C locomotive is fabricated using rolled sections and plates with top plate for mounting major equipment. The frame section consists of a central box section as the main load-bearing member with side extensions at either end to the full width of the locomotive for carrying underframe equipment. The box section comprises of two-side longitudinal ISMB 400 I-beams with 14 mm top and bottom plates and a 22 mm plate between I-beam and the bottom plate. Side extensions are provided by 5 mm plates bent in the form of an angle with 6 mm top chequered plate. The central box section of the frame, which carries main power equipment is further strengthened by providing two additional central ISMB 350 beams over the requisite length. The bogie suspension of WDM2C is similar to that of WDM2.

The locomotive is equipped with two 3-axle bogies of the trimount type fully equalised. In addition to the swivel bearing about which bogie swings, there are two pads, one on each side; the three thus form a 3 point support to carry the load on each bogie. The lateral spacing of pads, affords stability on a curve and their frictional resistance prevents noising at high speeds. The suspension is on four groups of springs, two outer and two inner helical coils each, the inner coils working in conjunction with friction snubbers. The axle boxes are of roller bearing type. Some of WDM2C locos are provided with high speed bogies. On high speed bogies conical rubber thrust pads are provided in the end axle boxes.

The locomotive is powered with DLW make 251B uprated fuel efficient 16 cylinder Diesel engine capable of producing 3100 HP at 1050 rpm under standard conditions with Napier NA 295 IR or ABB-VTC-304-VG15 model turbo supercharger and a longer after cooler for better after cooling of the engine inlet air commensurate with the increased air flow. Some of the WDM2c locos rebuilt at DCW are provided with GE 7s 1716 turbo super charger.

The locomotive is equipped with AC-DC transmission consisting of a directly coupled self ventilated BHEL make TA10102 CW model traction alternator with BHEL make panel mounted rectifier type ALR 5400A, driving 6 axle hung nose suspended BHEL TM4906AZ model traction motors geared for maximum speed of 120 km/h.

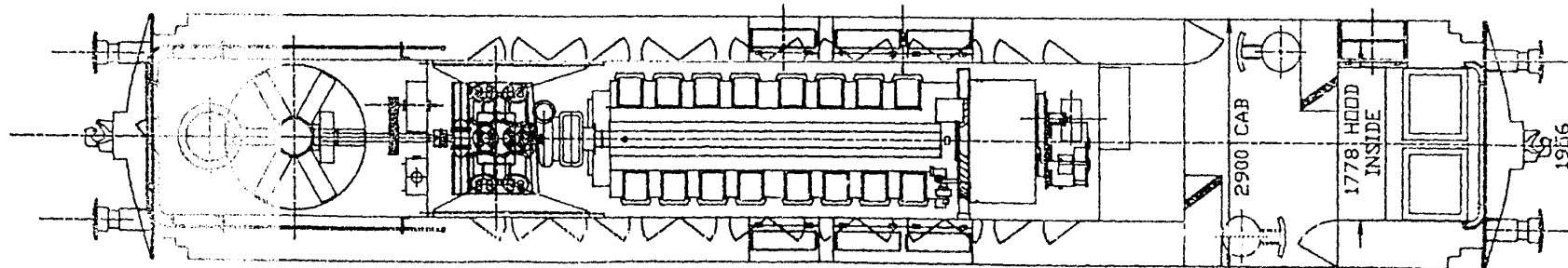
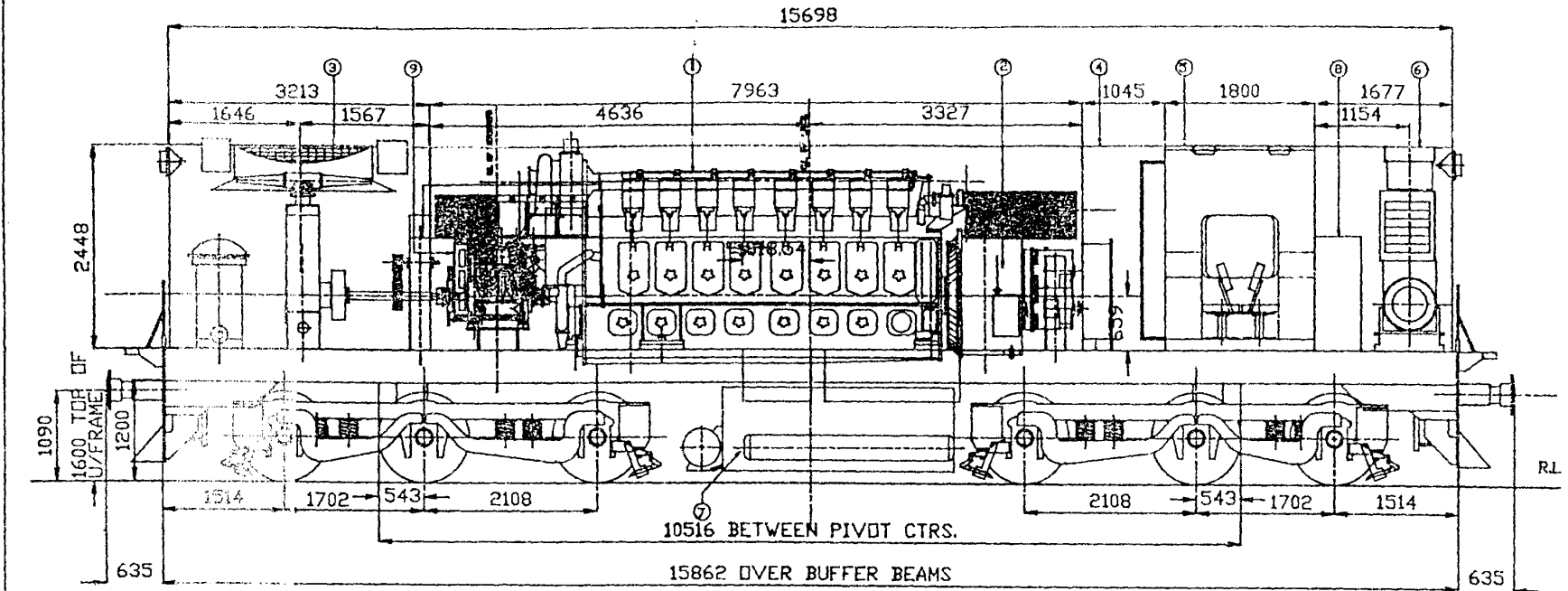
The locomotive is equipped with IRAB-1 Brake system. Hand brake operated by a lever from driver's cab is provided for use on stabled locomotive and for holding a light locomotive on grade in emergency.

The locomotive is suitable for multiple operation.

Other electrical and mechanical systems are similar to WDM2. Locomotive is provided with dynamic brake, rating and characteristic is similar to the one provided in WDM2 locomotive.

The prototype WDM2C mixed service Locomotive was turned out from DLW on September 1994.

DCW/PTA started converting WDM2 locomotives into WDM2c during rebuilding. Existing cab and control stands on WDM2 are not disturbed. Alternator TA 10102CW and rectifier type ALR 5400A are provided in place of traction generator. TM 4907 type motors with roller type bearing are provided in place of TM4906. Also online centrifuge and dual brake system are provided.



CLASS	TYPE	GAUGE	SERVICE
WDM2C	CO-CO	1676mm	MIXED

9	EXPRESSOR	1
8	PANEL MOUNTED BRAKES	1
7	FUEL TANK	1
6	SHORT HOOD	1
5	CAB	1
4	CONTACTOR COMPARTMENT	1
3	RADIATOR ARRGY.	1
2	TRACTION ALTERNATOR	1
1	ENGINE-DLV/ALCO 251(G/UPGRADED)	1
	DESCRIPTION	NCL
DRG No. 39.01.01		
GENERAL ARRANGEMENT		

PROCUREMENT PARTICULARS FOR WDM₂C LOCOMOTIVE

Contract number	Date	Builder	Year put on line	I. R. loco Numbers	Remarks
91/RSF/466/3	6/12/91	DLW	1994-95	14001-14017 = 17	Out of combined order of 223 locos
91/RSF/466/3	6/12/91	DLW	1995-96	14018-14024 = 7	----DO -----
92/RSF/466/2	19/5/92	DLW	1995-96	14025-14054 = 30	Out of combined order of 70 locos
93/RSF/466/2	2/5/93	DLW	1995-96	14055-14057 = 3	Out of combined order of 88 locos

6/12/91

MAIN PARTICULARS OF WDM2_c LOCOMOTIVE

GENERAL		Cooling system	
Weight of loco in Working order (t)	112.8	Water pump type	Centrifugal
Adhesive weight in Working order (t)	112.8	Water Pump capacity	2457 l/m at 1050rpm
Maximum axle load (t)	18.8	No. of radiator fans	One
Wheel dia (new) Driving mm.	1092	Fan drive	Eddy current clutch
Tractive effort (Kg.), Maximum	30450	Fan power	90 HP at 1050 engine rpm
	Continuous	28050	Water tank capacity
Speed (Km/h)	Maximum	120	Supercharger
	Continuous	22.8	
Transmission	Electric	Governor	Woodward/EDC
ENGINE		Weight of engine (dry) Kg	19026
Make and type	DLW 251B (Uprated)	TRANSMISSION (ELECTRICAL)	
No./Loco	One		
Lube oil sump capacity	1270 Litre	Alternator	
Horse power		Make and type	BHEL TA 10102 CW
Standard UIC condition	3100HP	Number per locomotive	One
Site (47°C – 600m)	3007Hp	Maximum speed	1050rpm
Cylinder formation	45 Degree V type	Max. Voltage	1100 V
Number of cylinder	16	Max. current	4400 A
		Continuous Rating :	
Bore and stroke in mm	228.6 X 266.7	Low voltage	3700A, 525V
Compression ratio	12.5 : 1	High voltage	1760A, 1100V
RPM		Unit weight with accessories	6400 Kg approximately
Rated	1050	Traction motor	
Idle	400	Make and type	BHEL TM 4906 AZ/4907 BZ
Mean piston speed m/sec.	9.33	Number per locomotive	Six
B.M.E.P (Kg/cm ²)	15.041	Continuous current	1000 A
		Continuous voltage	325 V
Injection system		1 Hr. rating current	1060 A
Type	Jerk direct	Maximum speed	2275 rpm
Type of pump and injector	APFICO AKK	Gear ratio	18 : 65
		Suspension	Axle hung, nose suspension
		Unit weight(with pinion, gear & gear case)	3690 Kg

AUXILIARIES				
Auxiliary generator			Sand	
Make and type	BHEL AG 3101AY AG 3101 AY-1	BHEL AG 2702 AZ	Number of boxes / Locomotive	4
HP absorbed	17 HP	17 HP	Total capacity	0.16m ³
Rating	75V, 160A at 950 rpm	75 V, 160A at 950 rpm	COMPRESSOR	
Unit weight	435 Kg	365 Kg	Make	KPC/ELGI
Exciter			Type	KCW523/623/LG3CDB
Make and type	BHEL AG 3101AY	BHEL AG 2702 AZ	HP absorbed	50/52/60KW at 1000 rpm
HP absorbed	30 HP	30 HP	Weight	850Kg
Rating	80V, 250A at 950 rpm	90V, 220A at 950 rpm	Compressor capacity	
Unit weight	435 Kg	365 Kg	Free air delivery At 10 Kg/cm² At Idling (400 RPM) At 1000 RPM	2266 l/m (KCW523/623/LG3CDB) 5000 l/m (KCW523) 5665 l/m (KCW623/LG3CDB)
BATERIES			TM BLOWER (FRONT)	
Make and type	EXIDE (Lead Acid 4HMFG 31KP)		Type	Centrifugal (DIDW)
Number of cells	32		Number per locomotive	One
Voltage	64		HP absorbed	40 HP
Capacity	450AH (10Hr)		Weight	80kg (without motor)
Head light	250 W, 32V		TM BLOWER (REAR)	
BRAKES				
Locomotive	Air, hand & dynamic.		Type	Centrifugal (SWSI)
Train	Air		Number per locomotive	One
System	Panel mounted IRAB-I		HP absorbed	34 HP
CONTROL SUPPLIES			Weight	105kg (without motor)
Fuel tank (detachable)				
Number per locomotive	One			
Total capacity	5000 liters			

**PERFORMANCE OF 3100 HP WDM2C BG DE LOCOMOTIVE
2750 HP INPUT TO TRACTION**

1 - TA 10102 CW TRACTION ALTERNATOR

6 - TM 4906 AZ TRACTION MOTOR

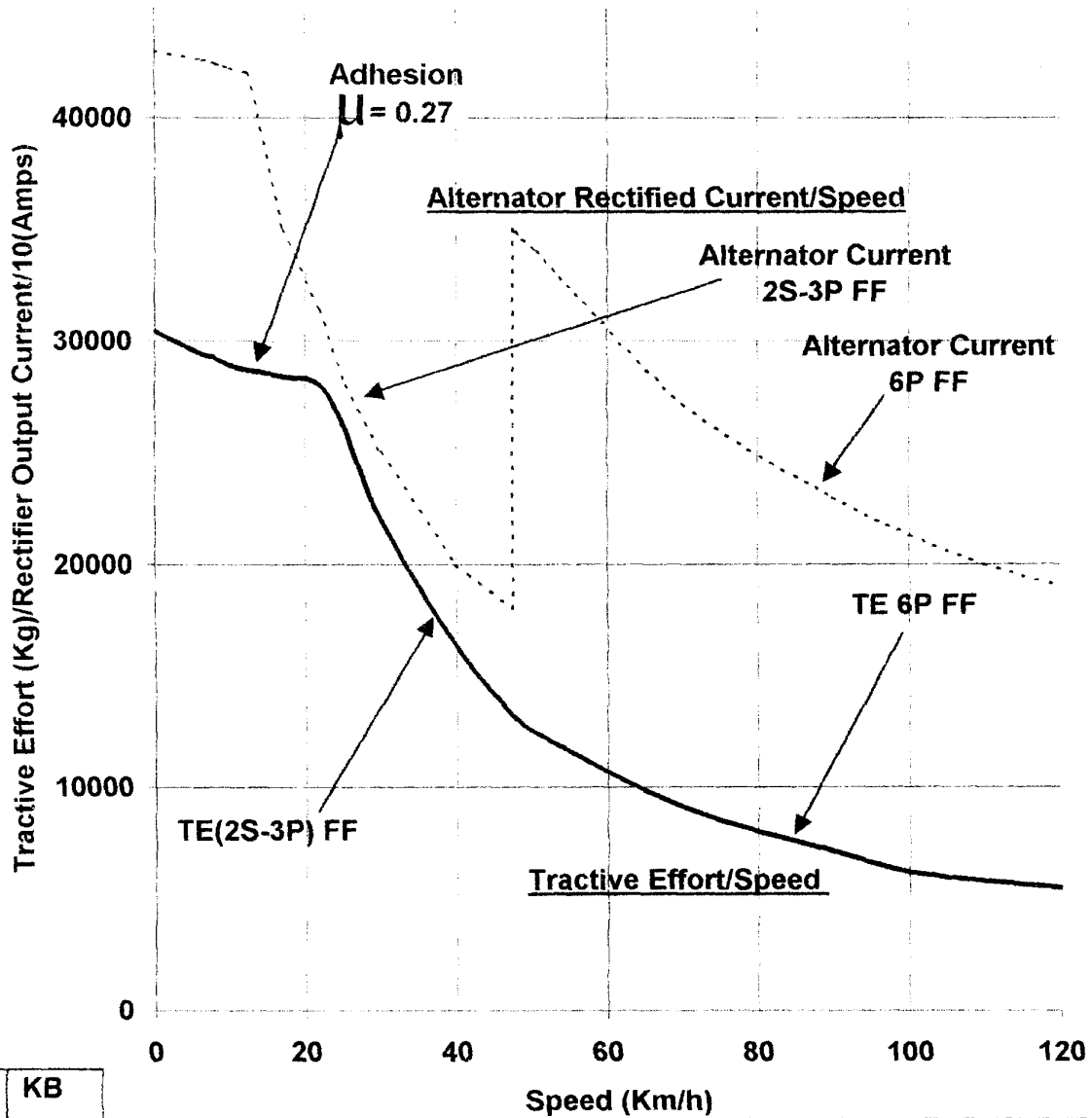
Wheel Dia.(Half Worn) - 1055 mm, Gear Ratio - 18:65

Motor Combination - 2S-3P FF & 6P FF

Starting TE - 30450 Kg., Max. Speed - 120 Km/h

Cont. loco. speed - 22.8 Km/h, Cont. loco. TE - 28050 Kg.

Transition : Forward - 47.5 Km/h, Backward - 45 Km/h



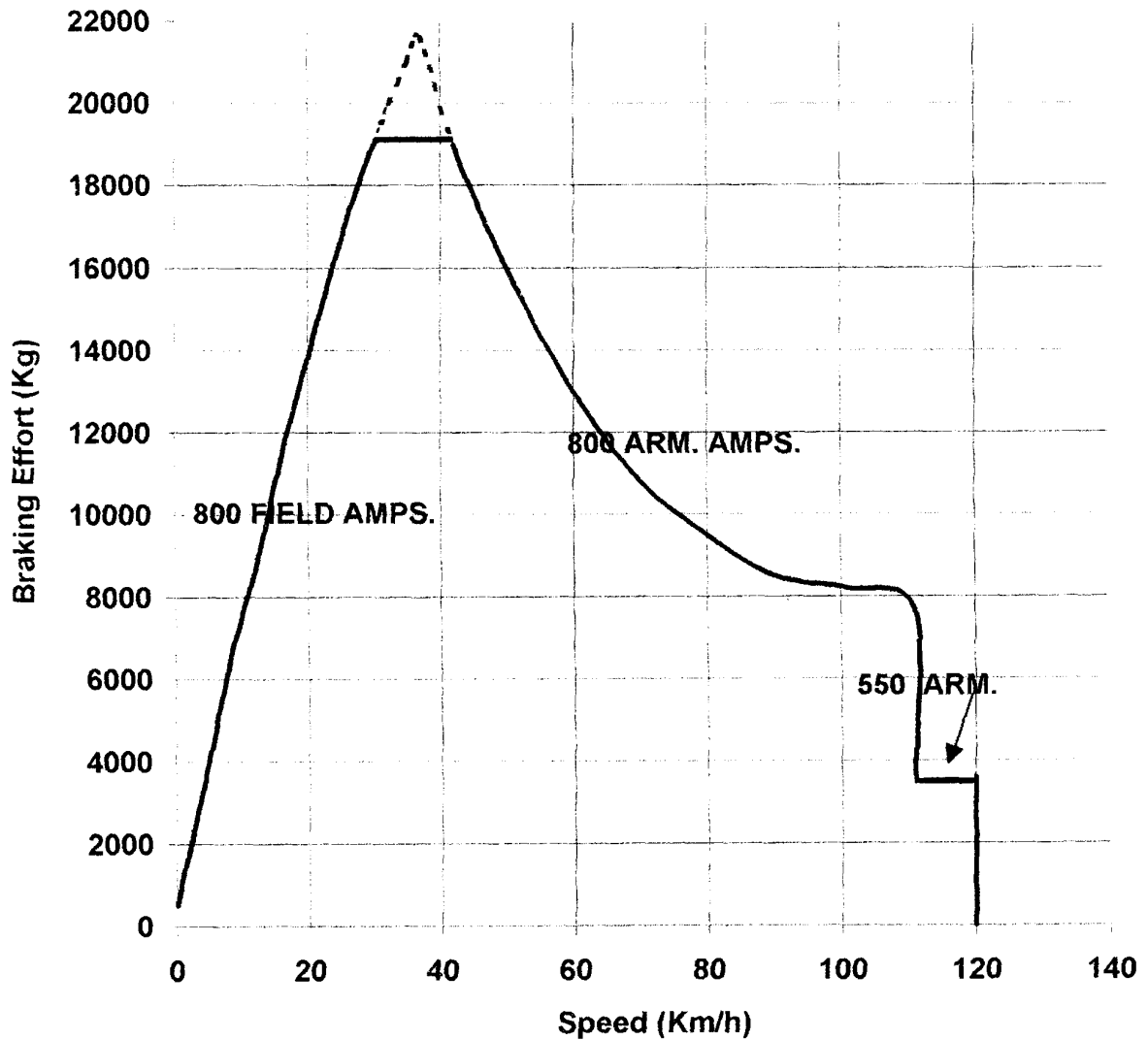
D	KB
C	HG
APPD.	
JD/EM	

RDSO (MP)	Ref :
	GDP - 1034

DYNAMIC BRAKING CHARACTERISTIC OF BG DE LOCOMOTIVE TYPE WDM2C & WDM2

TRACTION ALTERNATOR : TA 10102 CW(One)
TRACTION MOTOR : TM 4906 AZ(Six)
 Wheel Dia. :- 1092 mm (New)
 Gear Ratio :- 18:65
 Motor RPM :- 17.5 x Speed in Km/h

Resistance per motor :-
 Load :- 0.500 Ohms.,
 Arm + CPS :- .0190ohms(WDM2c)
 :- 0.022 Ohms(WDM2)
Total :- 0.5190 Ohms.(WDM2c)
 :- 0.522 Ohms.(WDM2)



D	KB
C	HG
APPD. JD/EM	ALT - 1 1. WDM2c added in the main heading 2. Resistance for WDM2c added

Ref : BHEL CURVE No.TNE/SK/367	
RDSO (MP)	GDP - 1067

HAULAGE CAPACITY (Passenger)											
LOCOMOTIVE:-WDM_{2c}				GAUGE: B.G.				WT OF LOCOMOTIVE: 112.8t			
Trailing load in tonnes at km/h on tangent track, ICF stock (With 0.005 m/sec ² acceleration reserve)											
GRADE	SPEED										
	20 Km/h	30 Km/h	40 Km/h	50 Km/h	60 Km/h	70 Km/h	80 Km/h	90 Km/h	100 Km/h	110 Km/h	120 Km/h
LEVEL						2005	1560	1200	910	715	
500	Above 1900t					1585	1225	980	775	595	475
400					1805	1435	1115	895	705	545	435
200				1510	1190	955	750	610	485	375	295
150			1625	1215	960	775	605	495	390	300	240
100	1955	1625	1150	860	680	550	430	345	275	205	-
50	1000	830	580	430	330	265	200	-	-	-	-

NOTE :

- This chart has been issued superseding chart no DE/T - 397.
- The values of trailing tonnage given in the chart are the maximum permissible values. The values are applicable for straight track only. In a curved section actual permissible load will be less than the values specified above. The actual permissible loads should be fixed based on load trial.
- The trailing loads fixed by load trial should be conformed by load factor trial also and the loads recommended should be such that the load factor does not exceed 60%.

D	A. Brahmane
C	V. P. Bajaj
APPD.	S. MANI
DATE	27.10.98

RDSO	DE/T-397A
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HAULAGE CAPACITY (Freight)												
LOCO:-WDM _{2C}			GAUGE: B.G.				WT OF LOCO: 112.8t					
Trailing load in tonnes at km/h on tangent track, BOXN/BOX stock												
GRADE	SPEED											
	20 Km/h	30 Km/h	40 Km/h	50 Km/h	60 Km/h	70 Km/h	80 Km/h	90 Km/h	100 Km/h	STARTING		
BOXN												
LEVEL	Above 4700t					4830	3565	2735	2080	>4700		
500			4710	3495	2730	2185	1700	1375	1090	>4700		
400			4055	3025	2380	1910	1500	1215	970	4545		
200	3985	3320	2370	1790	1425	1160	920	750	605	3195		
150	3075	2575	1840	1395	1115	910	720	590	470	2690		
100	2100	1765	1260	950	760	620	485	395	315	2020		
50	1040	870	610	455	355	280	215	165	125	1130		
BOX												
LEVEL	Above 3660t						3385	2650	2050	>3660		
500						3325	2620	2110	1660	1080	>3660	
400			3855			2895	2290	1855	1465	1195	960	>3660
200	3840	3210	2300	1745	1395	1140	905	745	600	2955		
150	2990	2505	1800	1365	1090	895	710	585	470	2510		
100	2060	1730	1240	940	750	610	485	395	315	1920		
50	1030	860	605	450	350	280	215	165	125	1110		
NOTE :												
<ul style="list-style-type: none"> ➤ This chart has been issued superseding chart no DE/T - 389 and DE/T - 390. ➤ Both starting and hauling tonnage have to be considered for fixing the permissible trailing load ➤ The value of trailing tonnage given in the chart are the maximum permissible values. The values are applicable for straight track only. In a curved section actual permissible load will be less than the values specified above . The actual permissible loads should be fixed based on load trial. ➤ The trailing loads fixed by load trial should be conformed by load factor trial also and the loads recommended should be such that the load factor does not exceed 60%. 												
D	A. Brahmane							RDSO (MP)	DE/T-397B			
C	V. P. Bajaj											
APPD.	S. MANI											
DATE	16.02.99											