STAINLESS STEEL WAGONS, ALUMINIUM WAGONS, HIGHER AXLE LOAD WAGONS

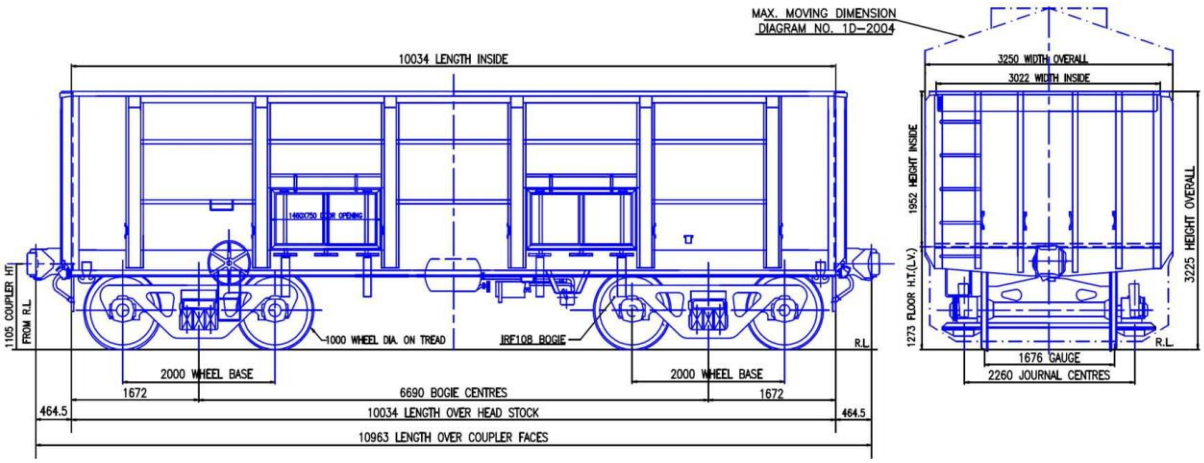
STAINLESS STEEL WAGONS:

RDSO has introduced SS in the newly designed BOXNHL, BOXNLW,BOXNR & BCNHL wagons. In constructional design, BOXNHL, BOXNR and BOXNLW wagon are similar to BOXN wagon and BCNHL wagon is similar to BCNA wagon.

BOXNHL WAGON:

This bogie open wagon was designed in year 2005, 250 mm longer, 76 mm higher and 50 mm wider than BOXN and BOXNHS wagon at 22.9 t axle load. The wagon is manufactured by using stainless steel and cold rolled sections. Air-braked, CBC couplers, roller bearings.

DESIGN FEATURES:



S.No	PARTICULARS	Parameter
1	Length over head stock (mm)	10034
2	Length over couplers (mm)	10963
3	Length inside (mm)	10034
4	Width inside/Width Overall (mm)	3022/3250
5	Height inside/Height (max.) from RL.	2028/3301
6	Bogie centers (mm)	6690
7	Journal length × dia. (mm)	144x278
8	Journal centers (mm)	2260
9	Wheel dia. on tread (New/Worn) (mm)	1000/906
10	Height of C.B.C. from R.L. (mm)	1105
11	C.G. from R.L. (empty) (m)	-
12	C.G. from R.L. (loaded) (m)	-
13	Floor area (Sq.M)	30.32
14	Cubic Capacity (Cu.M)	61.05
15	Maximum axle load (tonne)	22.9
16	Tare Weight (tonne)	20.6
17	Pay load (tonne)	71.0
18	Gross load (Pay+Tare) (tonne)	91.6
19	Ratio gross load/Tare	4.45
20	Ratio (Pay load to tare)	3.45
21	Track Loading density (tonnes/meter)	8.35
22	No. of wagons per train	58
23	Brake System	Air Brake
24	Coupler	C.B.C.
25	Bearing	CTRB
26	Maximum Speed (Loaded)/ Empty	75 kmph / 100 kmph

- Center sill - IS 8500 & IRSM – 44, HRF, CRF
- Sole bar - IRSM – 44- CRF pressed
- Pillar - 8 mm- IRSM-44 pressed
- Door way stiffener - 4 mm- IRSM-44 pressed
- Top coping - 7 mm, same, pressed
- Side wall plate, Floor plate,
- End wall sheet, Door - 4 mm, same
- Middle coping, End stanchion, Stringers - 4 mm, same, pressed

The bogie of this wagon is associated with Casnub 22 HS with flat centre pivot, 'K' type composite brake beam. Spring O-14, I-14 and S-4. Stainless steel (IRSM-44) and CRF sections used in body and under frame to reduce the tare weight (20.6 t) has improved quality coupler and draft gears. Lock bolts used for joining, instead of rivets. PU painting provided initially Red Oxide colour specified, later on changed to Phiroziblue. In Red Oxide colour wagons 'SS' written on side in a circle in Phiroziblue colour for identification.

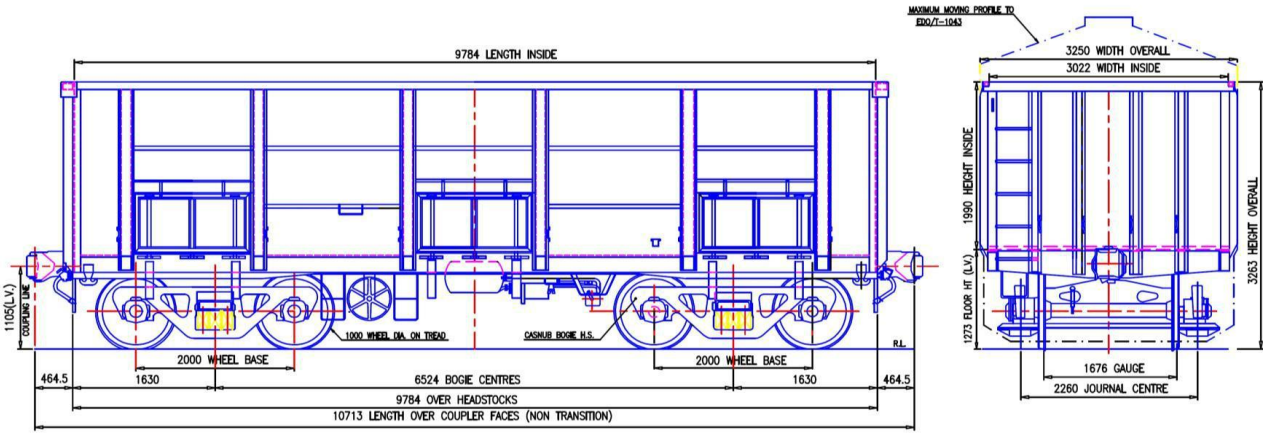
BOXN CR WAGON:

The wagon is a variant of BOXN wagon with its body in IRS M-44 steel. It's under frame is however made of mild steel. This has been done to provide better corrosion resistance to wagon body. All parameters of this wagon are same as that of BOXN wagon.

BOXN-LW WAGON:

To meet the requirement of higher pay to tare ratio, this bogie open wagon was designed in 1988. Cold Rolled Formed (CRF) sections and stainless steel/ carton steel are used in design to reduce the tare weight of the wagon.

DESIGN FEATURES:



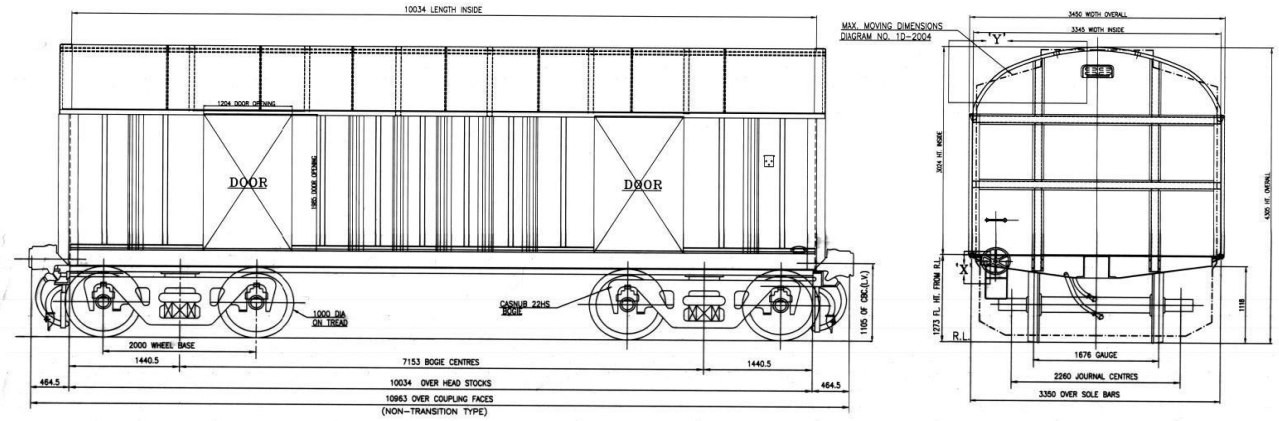
S.No	PARTICULARS	Parameter
1	Length over head stock (mm)	9784
2	Length over couplers (mm)	10713
3	Length inside (mm)	9784
4	Width inside/Width Overall (mm)	3022/3250
5	Height inside/Height (max.) from RL.	2066/3341
7	Journal length × dia. (mm)	144x278
8	Journal centers (mm)	2260
9	Wheel dia. on tread (New/Worn) (mm)	1000/906
10	Height of C.B.C. from R.L. (mm)	1105
11	C.G. from R.L. (empty) (m)	-
12	C.G. from R.L. (loaded) (m)	-
13	Floor area (Sq.M)	29.57
14	Cubic Capacity (Cu.M)	61.09
15	Maximum axle load (tonne)	20.32
16	Tare Weight (tonne)	18.26
17	Pay load (tonne)	63.02
18	Gross load (Pay+Tare) (tonne)	81.28
19	Ratio gross load/Tare	4.45

20	Ratio (Pay load to tare)	3.45
21	Track Loading density (tonnes/meter)	7.59
22	No. of wagons per train	58
23	Brake System	Air Brake
24	Coupler	C.B.C.
25	Bearing	CTRB
26	Maximum Speed (Loaded)/ Empty	100 kmph / 100 kmph

BCNHL WAGON:

This bogie covered wagon was designed in year 2006 for bagged commodities. Length reduced, width and height increased than BCNA. Number of wagons per rake increased to 58. The wagon is manufactured by using stainless steel and cold rolled sections. Air-braked, CBC couplers, roller bearings. The bogie of this wagon is associated with Casnub 22 HS with flat centre pivot, 'K' type composite brake beam. Spring O-14, I-14 and S-4. Stainless steel (IRSM-44) and CRF sections used in body and under frame to reduce the tare weight has improved quality coupler and draft gears. Lock bolts used for joining, instead of rivets. PU painting provided initially Red Oxide colour specified, later on changed to Phiroziblue. In Red Oxide colour wagons 'SS' written on side in a circle in Phiroziblue colour for identification.

DESIGN FEATURES:



S.No.	PARTICULARS	Parameter
1	Length over Hd. Stock	10034 mm
2	Length over buffer/couplers	10963 mm
3	Length inside	10034 mm
4	Width inside/overall	3345/3450 mm
5	Height inside/from rail	3024/4305mm
6	Bogie centres	7153 mm
7	Journal centres	2260mm
8	Wheel dia. On tread	1000mm
9	Nominal max. axle load	22.9 t.
10	Tare	20.8t.
11	Pay load	70.8t.
12	Ratio pay load /tare	3.4
13	Gross load	91.6 t.
14	No. of wagons per rake	58
15	Throughput per rake	4106 t.
16	Loading density	8.35 t./m
17	Cubic capacity	92.54 m^3
18	Speed (empty/ loaded)	100 Kmph
19	Type of coupler	CBC
20	Type of bearing	CTRB

ALUMINIUM WAGONS:

Some Recently with the rising price of steel, IR has been looking into using steel substitutes, and plans have also been drawn up for the production of aluminium-body wagons . It is thought that about 750 aluminium wagons will be built in 2005-2006. The tare weight is expected to be reduced by about 4.2 tonnes. Aluminium wagons besides being of a lower cost and having a lower tare weight, also have the advantage of suffering less corrosion in many circumstances. A typical rake with aluminium wagons instead of steel ones would carry almost 240 t more goods.

In order to further reduce the pay to tare ratio of wagon, steps have been taken to use aluminium alloys in design of wagons. In first phase, the two-bulk commodity transportation wagons, i.e. open wagon BOXN and hopper wagon BOBRN have been selected. In these two wagons, aluminium alloys have been used in the design of body keeping the underframe of steel in the first phase. The design of these two wagons with aluminium body has been completed as under.

BOXN-AL Wagon:

Aluminium body BOXN-AL wagon has been designed by RDSO for carrying bulk commodity like coal and iron ore without door. The wagon is to be handled on tippler for unloading. Except underframe, all body structural, end sheets, side sheets and floor plates are of aluminium alloys.

BOXNAL wagons are BOXN wagons with an aluminium body on top of a steel underframe. These wagons are naturally lighter and allow a higher payload to be carried for the same axle load.

The use of aluminum alloys in design of BOXN-AL will result in:

- 4.21 t reduction in tare weight
- 4.21 t increase in pay load
- 7.16% improvement in throughput
- Pay to tare ratio 3.45 compared to 2.61 of existing BOXN wagon.

Use of Aluminium in BOXN wagon:

Advantages:

1. Lightness
2. Corrosion resistance
3. External appearance
4. Eliminate painting
5. Easy to work with

Disadvantages:

1. Very expensive
2. It is prone to pilpherage
3. Lower fatigue strength

Design features of BOXN-AL wagon:

S. No	PARTICULARS	Parameter
1	Type of bogie	CASNUB 22HS
2	Length over head stock (mm)	9784
3	Length over couplers (mm)	10713
4	Length inside (mm)	9784
5	Width inside(mm)	3022
6	Width overall (mm)	3250
7	Height inside from R.L. (mm)	2066
8	Wheel base (mm)	2000
9	Bogie centers (mm)	6524
10	Journal Centres (mm)	2260
11	Journal diameter size (mm)	144.54 CTRB
12	Wheel Diameter on Tread (mm)	1000
13	Nominal maximum Axle Load (Tonnes)	20.32

4.14 t	Tare Weight (Tonnes)	18.26
15	Pay Load (Tonnes)	63.02
16	Gross Load (Tonnes)	81.28
17	Ratio Pay Load/Tare (Tonnes)	3.45
18	Track Loading Density (Tonne/Metre)	7.59
19	Floor Area (Sq. M)	29.33
20	Cubic Capacity (Litres)	61.09

BOBR-AL Wagon:

Aluminium body hopper wagon with steel underframe type BOBR-AL has also been designed for carrying bulk commodities like coal and iron ore. This is a bottom discharge wagon for fast unloading of commodities. The use of aluminium alloys in design of BOBR-AL will result in:

- 3.2 t reduction in tare weight
- 3.2 t increase in pay load
- 5.75% improvement in throughput
- Pay to tare ratio 2.63 compared to 2.17 of existing BOBRN wagon.

The aluminium alloy used is 'RDE-40', and has 4% zinc, 2% magnesium, 0.35% manganese, and 0.15% zirconium.

HIGHER AXLE LOAD WAGONS:

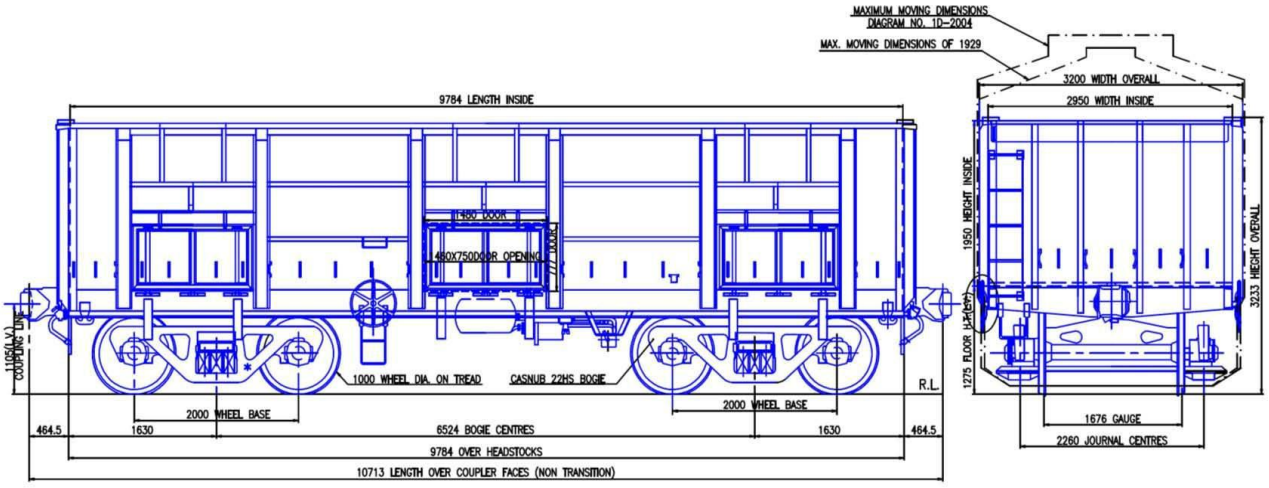
BOXNEL, BOBRNEL, BOYEL and BOBSNM1 are the higher axle load wagons. These wagons are fitted with **CASNUB- 22NLC** bogie.

Some important extra features of **CASNUB- 22NLC** bogies are:-

- Axle Load - 25 Tonne
- Outer spring - 14 (more dia)
- Inner spring - 14 (more dia)
- Snubber spring - 4 (more dia)
- Minimum wheel dia - 955 mm
- Min. axle wheel seat dia - 210 mm
- Bolster cross-section - more
- Wide jaw
- Centre Pivot - Flat type
- Distance between liners - more

BOXNEL WAGON:

This wagon has been designed in 2006 for transportation of iron ores, coal etc. BOXNEL wagons fitted with Casnub-22NLC bogies with a maximum axle load 25 t., non-transition center buffer couplers and single-pipe graduated release air brake system.



DESIGN FEATURES OF 'BOXNEL' WAGON:

S.No	PARTICULARS	Parameter
1	Length over head stock (mm)	9784
2	Length over couplers (mm)	10713
3	Length inside (mm)	9784
4	Width inside/Width Overall (mm)	2950/3200
5	Height inside/Height(max.) from RL.	1950/3233
6	Bogie centers (mm)	6524
7	Journal length × dia. (mm)	144x278
8	Journal centers (mm)	2260
9	Wheel dia. on tread (New) (mm)	1000
10	Height of C.B.C. from R.L. (mm)	1105
11	C.G. from R.L. (empty) (m)	1.016
12	C.G. from R.L. (loaded) (m)	1.737
13	Floor area (Sq.M)	28.87

14	Cubic Capacity (Cu.M)	56.29
15	Maximum axle load (tonne)	25
16	Tare Weight (tonne)	23.1
17	Pay load (tonne)	76.9
18	Gross load (Pay+Tare) (tonne)	100
19	Ratio gross load/Tare	4.33
20	Ratio (Pay load to tare)	3.33
21	Track Loading density (tonnes/meter)	9.33
22	No. of wagons per train	58
23	Brake System	Air Brake
24	Coupler	C.B.C.
25	Bearing	CTRB
26	Maximum Speed (Loaded)/ Empty	45+5 kmph / 60+5 kmph

BOBRNEL WAGON:

This wagon is a variant of BOBRN designed in year 2008. BOBRNEL wagons fitted with Casnub-22NLC bogies with a maximum axle load 25 t., non-transition center buffer couplers and single-pipe graduated release air brake system. Differentiated from BOBRN by an Olive Green band.

DESIGN FEATURES OF BOBRNEL WAGON:

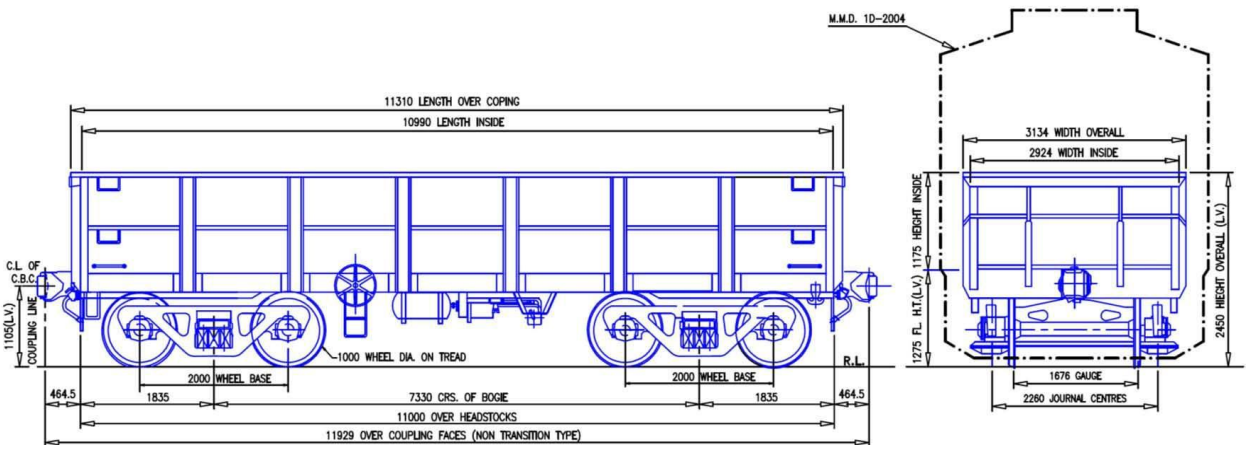
S.No.	PARTICULARS	Parameter
1	Length over Hd. Stock	9671mm
2	Length over buffer/couplers	10600 mm
3	Length inside	9327 mm
4	Width inside/overall	3340/3500 mm
5	Height inside/from rail	2466/3735 mm
6	Bogie centres	6790 mm

7	Journal centres	2260 mm
8	Wheel dia. On tread	1000 mm
9	Nominal max. axle load	25.00 t.
10	Tare	25.61 t.
11	Pay load	74.39 t.
12	Ratio pay load /tare	2.9
13	Gross load	100.00 t.
14	No. of wagons per rake	58
15	Throughput per rake	4314.62 t.
16	Loading density	9.43 t/m.
17	Cubic capacity	(Marking has been done for loading of Iron Ore upto 1725 mm Height from top.
18	Speed (empty/ loaded)	60+5/45+5 (Provisional) Kmph
19	Type of coupler	--
20	Type of bearing	--

BOYEL WAGON:

This wagon has been designed for transportation of iron ores, coal etc. This is a low-sided bogie open wagon-a BOY variant for 'enhanced loading'. BOYEL wagons fitted with Casnub-22NLC bogies with a maximum axle load 25 t., nontransition center buffer couplers and single-pipe graduated release air brake system.

DESIGN FEATURES OF 'BOYEL' WAGON:



S.No	PARTICULARS	Parameter
1	Length over head stock (mm)	11000
2	Length over couplers (mm)	11929
3	Length inside (mm)	10990
4	Width inside/Width Overall (mm)	2924/3134
5	Height inside/Height(max.) from RL.	1175/2450
6	Bogie centers (mm)	7330
7	Journal length × dia. (mm)	144x278
8	Journal centers (mm)	2260
9	Wheel dia. on tread New (mm)	1000
10	Height of C.B.C. from R.L. (mm)	1105
11	C.G. from R.L. (empty) (m)	0.972
12	C.G. from R.L. (loaded) (m)	1.613
13	Floor area (Sq.M)	32.13
14	Cubic Capacity (Cu.M)	37.8
15	Maximum axle load (tonne)	25
16	Tare Weight (tonne)	20.7
17	Pay load (tonne)	79.3
18	Gross load (Pay+Tare) (tonne)	100
19	Ratio gross load/Tare	4.83
20	Ratio (Pay load to tare)	3.83
21	Track Loading density (tonnes/meter)	8.38
22	No. of wagons per train	52
23	Brake System	Air Brake
24	Coupler	C.B.C.
25	Bearing	CTRB
26	Maximum Speed (Loaded)/ Empty	45+5 kmph / 60+5 kmph

BOBSNM1 WAGON:

Open hopper car with bottom/side discharge, variant of BOBS with different suspension and allowing a higher axle load of 25t. Used for ballast and ore transport. Several BOBS wagons were converted to BOBS-NM1 in 2006-2007.

DESIGN FEATURES OF BOBSNM1 WAGON:

S.No.	PARTICULARS	Parameter
1	Length over Hd. Stock	10668mm
2	Length over buffer/couplers	11597 mm
3	Length inside	9296mm
4	Width inside/overall	2743/3020 mm
5	Height inside/from rail	2042/3301mm
6	Bogie centres	7112 mm
7	Journal centres	2260 mm
8	Wheel dia. On tread	1000 mm
9	Nominal max. axle load	25.00t.
10	Tare	30.0 t.
11	Pay load	70.0 t.
12	Ratio pay load /tare	2.33
13	Gross load	100.00 t.
14	No. of wagons per rake	-
15	Throughput per rake	--
16	Loading density	8.62 t/m.
17	Cubic capacity	34.0m3
18	Speed (empty/ loaded)	55+5/45+5 Kmph
19	Type of coupler	CBC
20	Type of bearing	CTRB

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