Development of Freight Stock

Criteria for Wagon Design

- Increase in pay/tare ratio

- Reduction in the tare wt. of freight stock
- Increase in the speed potential of the freight stock
- Increase in the reliability of the wagon component.

  - It will increase by upgrading of specification of component and reduce the maintenance cost by increasing ROH from 18 to 24 months.

Types of Wagon

- **Open type** – BOXN,BOXNHS,BOXNHA,BOXNCR,BOST,BOSTHS,BOXNLW,BOXNHL,BOXNAL,BOY-25,BOXN-25,BOBSN-25
- **Closed type** – BCN,BCNA,BCNAHS, BCNHL.
- **Hopper type** – BOBR,BOBRN,BOBYN, BOBRNAL, BOBRN-25
- **Flat type** – BRN,BFNS,BFKI,BOXKH,BLC etc.
- **Tank type** – BTPN,BTPGLN, etc.
- **Brake Van** – BVZC, BVZI

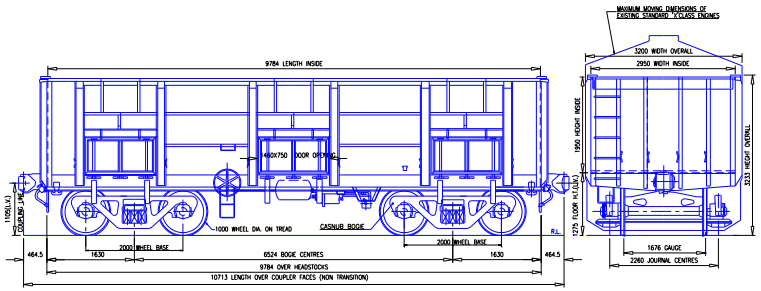
Open Wagons

Open wagon

- BOXN Wagon –
- Estimated tare – 22.47 t
  Axle load – 20.32 t
  Pay load - 58.81 t
  Gross load – 81.28 t
  Length - 10713 mm
  Width - 3200 mm
  Height - 3225 mm

BOXN

WAGON DIRECTORATE R.D.S.O.	BOGIE OPEN WAGON	OPERATIONAL CODE 'BOXN'
GAUGE-B.G.	DIAGRAM	TYPE OF WAGON CODE 10



SPECIAL FEATURES

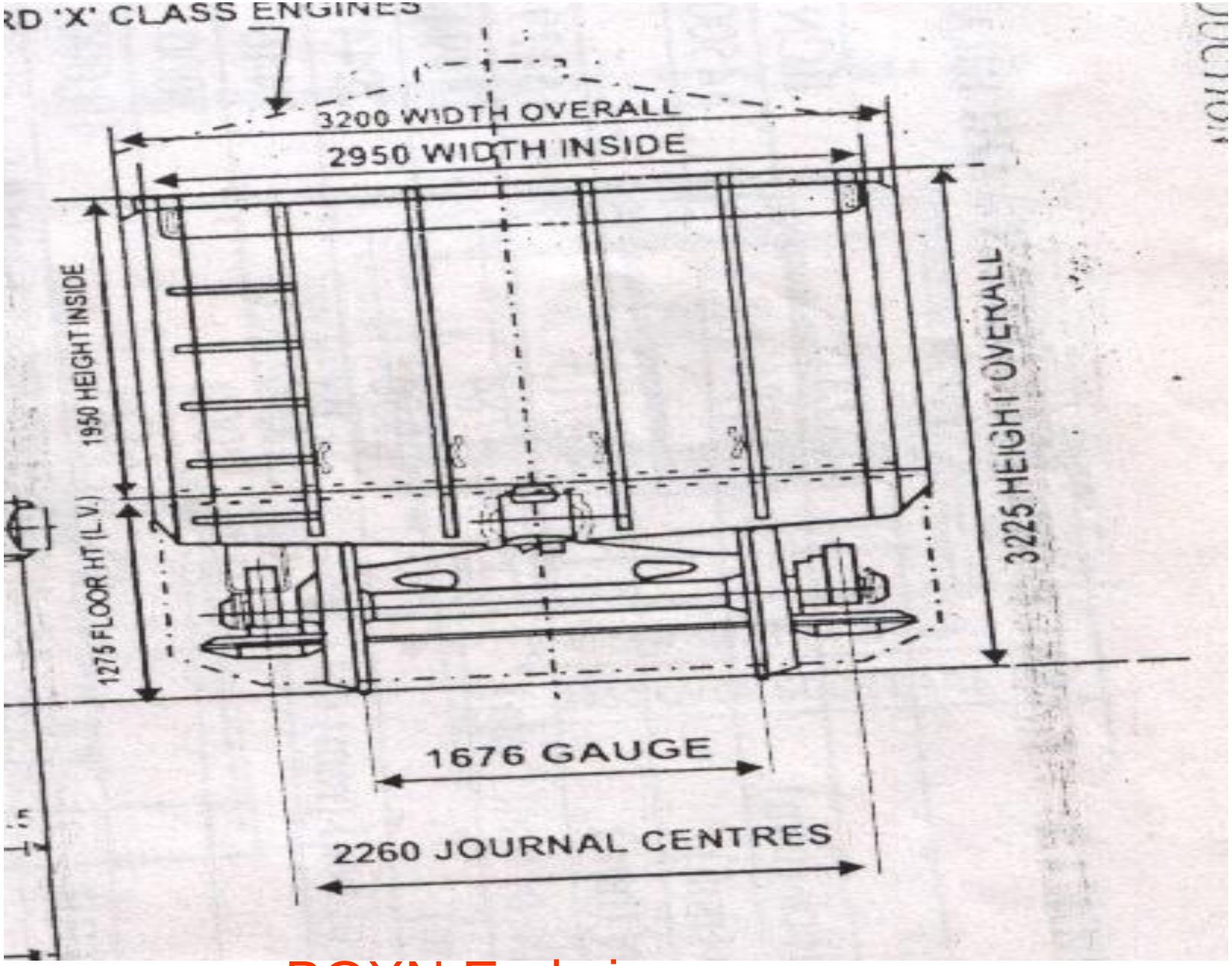
Suitable for tippling.

Wt. OF ASSEMBLY SUB-COMPONENT

Wt. of U'frame & floor plates	5.07 t.
Wt. of body	4.92 t.
Wt. of air brake fittings & piping and brake gear on U'frame	0.6 t.
C.B.C. complete including uncoupling gear	1.32 t.
Bogie brake gear complete	0.5 t.

SPEED CERTIFICATE NO:-
MW/BOXN Dt. 12.01.1989

REFERENCE:-
DRAWING NO:- WD-80007/S-2



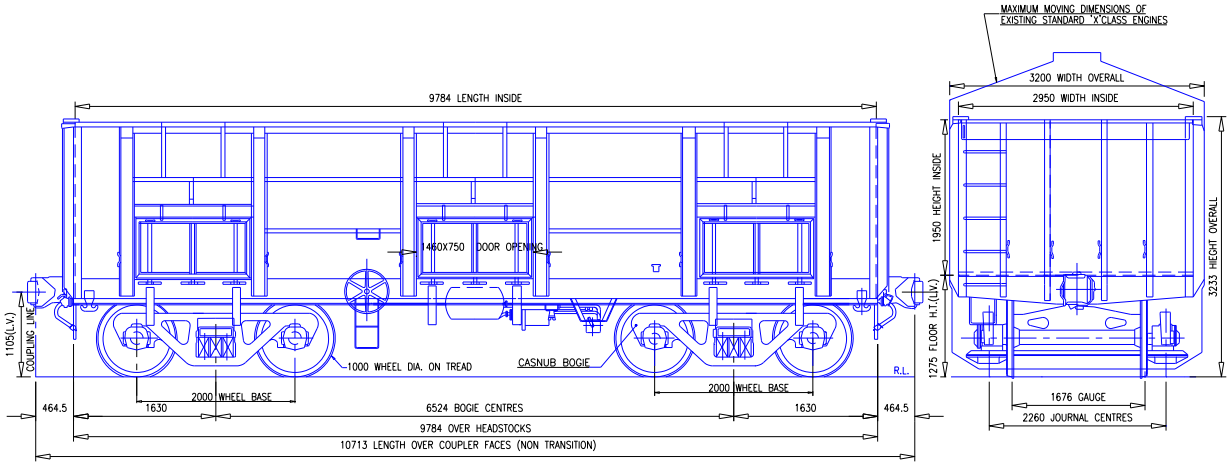
BOXN End view

BOXNHS

- Estimated tare – 23.1 t - more
- Length - 10713 mm - same
  Width - 3200 mm - same
  Height - 3233 mm - lower than BOXNHA and higher than BOXN.
- Volumetric cap. – 56.29 m^3

BOXNHS

WAGON DIRECTORATE R.D.S.O.	BOGIE OPEN WAGON	OPERATIONAL CODE 'BOXNHS'
GAUGE–B.G.	DIAGRAM	TYPE OF WAGON CODE 12



SPECIAL FEATURES

Suitable for tippling.

Wt. OF ASSEMBLY SUB–COMPONENT

Wt. of U'frame & floor plates	5.07 t.
Wt. of body	4.92 t.
Wt. of air brake fittings & piping and brake gear on U'frame	0.6 t.
C.B.C. complete including uncoupling gear	1.32 t.
Bogie brake gear complete	0.5 t.

SPEED CERTIFICATE NO:–

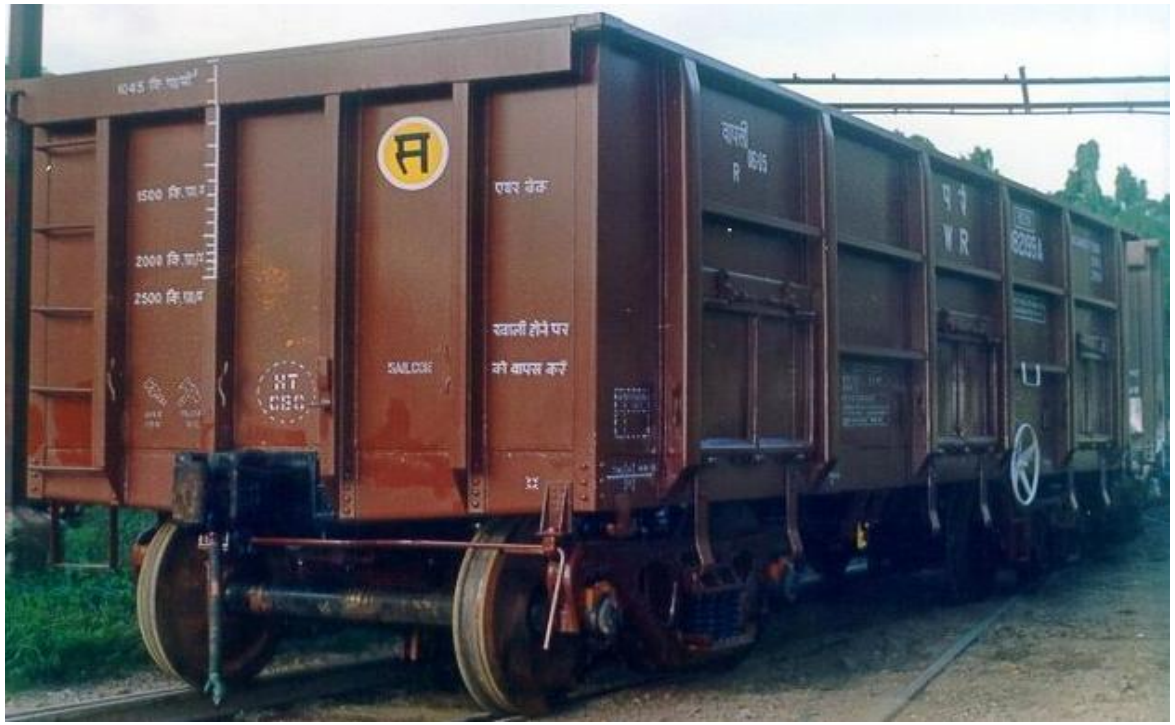
MW/CSNB/HSB Dt. 15.07.2002

REFERENCE:–

DRAWING NO:– WD–80007/S–2

BOGIE OPEN WAGON TYPE BOXNHS

- Pay to tare ratio – 2.5 (v/s 2.25 of BOXC)
- TLD of 7.59 t/m (v/s 5.925 t/m of BOXC)
- Nos. of wagons/rake – 58 (v/s 45 of BOXC)
- Compressed air based Brake system (v/s vacuum brake system of BOXC)
- Increase in revenue of Rs. 3.63 Crores per rake per year (of 20.32 t BOXN) over BOXC

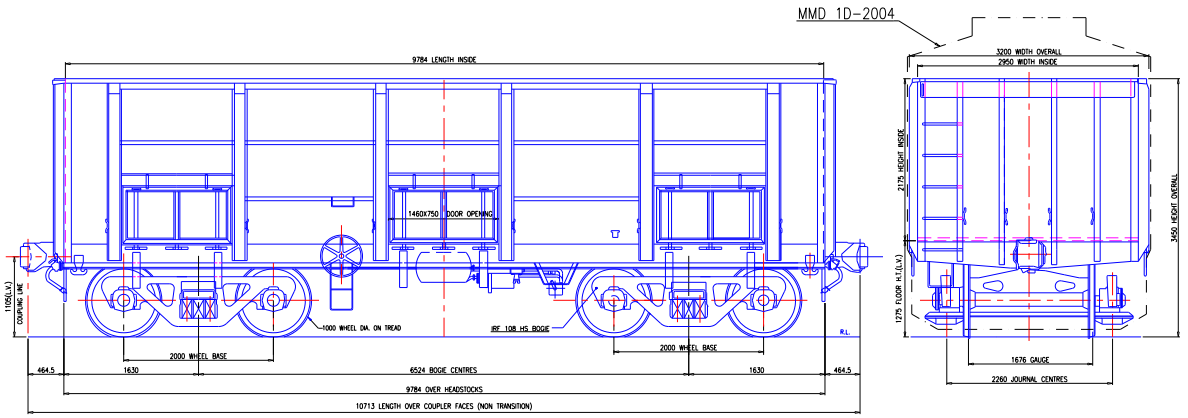


BOXNHA

- Estimated Tare - 23.17 t
- Gross load - 88.40 t
- Pay load - 65.23 t
- **Use of IRSM -41** - Floor plate - 6 mm
  - Side stanchion – 8 mm
  -Body side sheet – 5mm
  -End sheet – 5 mm
  - Door sheet – 5 mm
- Length& width – same as Boxn
  - Height - 3450 mm – **225 mm higher than BOXN**

BOXNHA

WAGON DIRECTORATE R.D.S.O.	BOGIE OPEN WAGON 88.40 TONNES	OPERATIONAL CODE 'BOXNHA'
GAUGE–B.G.	D I A G R A M	TYPE OF WAGON CODE 11



SPECIAL FEATURES

Suitable for tippling.

Wt. OF ASSEMBLY SUB–COMPONENT

Wt. of U'frame & floor plates	5.16 t.
Wt. of body	5.27 t.
Wt. of air brake fittings & piping and brake gear on U'frame	1.10 t.
C.B.C. complete including uncoupling gear	1.32 t.
Bogie brake gear complete	0.5 t.

SPEED CERTIFICATE NO:–

MW/CS/BOXNHA Dt. 14.05.2001

REFERENCE:–

DRAWING NO:– WD–98015–S–02

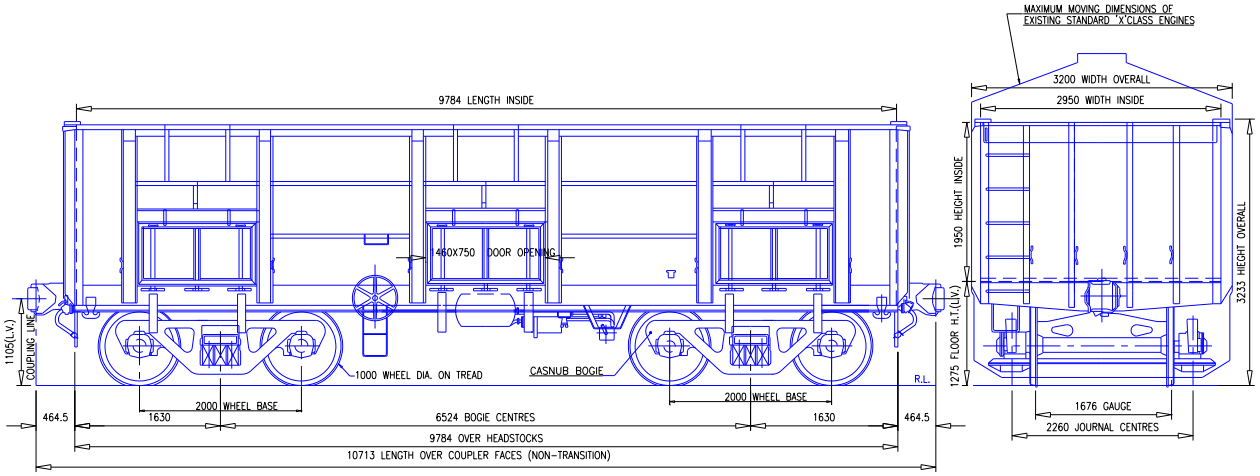
BOXN CR

- BOXNCR is similar to BOXN except the following –

- **The wagon body** is manufactured from steel to IRSM M-44 instead of steel to IS 2062 or IRSM -41.
- **Crib angles side** is mfd. From IRSM-44 steel instead of IS 2062.
- **Sole bar** is mfd from IRSM-41 instead of IS 2062 steel.
- Other features like overall dimensions, CBC, brake gear, brake system are same as BOXN.

BOXNCR

WAGON DIRECTORATE R.D.S.O.	BOGIE OPEN WAGON	OPERATIONAL CODE 'BOXNCR'
GAUGE–B.G.	D I A G R A M	TYPE OF WAGON CODE 13



SPECIAL FEATURES

Suitable for tippling.

Wt. OF ASSEMBLY SUB-COMPONENT

Wt. of U'frame & floor plates	5.07 t.
Wt. of body	4.92 t.
Wt. of air brake fittings & piping and brake gear on U'frame	0.6 t.
C.B.C. complete including uncoupling gear	1.32 t.
Bogie brake gear complete	0.5 t.

SPEED CERTIFICATE NO:–
MW/BOXN Dt. 12.01.1989

REFERENCE:–
DRAWING NO:– WD–80007/S–2

BOXNCR

- IRSM-44 shall be cut by shearing or plasma cutting m/c and for welding, **consumables** to be used as follows –

S. No.	Material combination	Welding consumables to be used		
		MMAW electrodes (as per IRS:M28-02)	MIG/MAG welding filler wires (as per IRS:M46-03)	SAW welding filler wire (as per IRS:M39-01)
1.	IS-2062*/5986/1079 to IS-2062/5986/1079	A2	I	I
2.	IS-2062*/5986/1079 to IS-1030	A2	I	I
3.	IS-1030 to IS-1030	A3	I	II
4.	IS-2062*/5986/1079 to IRSM-41 (Corten Steel)/ IS-8500 Gr. 570 B/ SAILMA-350HY	A2	I	I

Contd.

	Material combination	Welding consumables to be used		
		MMAW electrodes (as per IRS:M28-02)	MIG/MAG welding filler wires (as per IRS:M46-03)	SAW welding filler wire (as per IRS:M39-01)
5.	IRS:M41 to IRSM-41/ IS 8500 Gr. 570 B	D	IV	V
6.	IS-2062*/5986/1079 to IRS:M44 (Stainless Steel)	A3	I	-
7.	IRS:M44 to IRSM-44	M2	VI	-
8.	IRS:M44 to IRSM-41	D	IV	V
9.	IS-1030 to IS-3885	A3 (with special welding procedure i.e. maintain of pre and post heating and inter pass temperature)	I	-
10.	IS-2062*/5986/1079 to IS-3885	A3 (with special welding procedure i.e. maintain of pre and post heating and inter pass temperature)	I	-
11.	Mn- Steel liner to IS-1030	M5	-	
12.	SAILMA-350 HY to IS-8500 Gr. 570 B/ SAILMA-350 HY	A3	I	II
13.	IS-8500 Gr. 570 B to IS-8500 Gr. 570 B	C1	III	IV
14.	IS-2062** Copper bearing with IS-2062** copper bearing	D	IV	V

Contd.

	Material combination	Welding consumables to be used		
		MMAW electrodes (as per IRS:M28-02)	MIG/MAG welding filler wires (as per IRS:M46-03)	SAW welding filler wire (as per IRS:M39-01)
15.	IS-2062** Copper bearing to HCRS	D	IV	V
16.	HCRS to HCRS	D	IV	V
17.	HCRS to IRS:M41	D	IV	V
18.	IS-2062** Copper bearing with plain IS-2062*	A2	I	I
19.	HCRS to IS-2062*	A3	I	-
20.	HCRS to IS-5986	A3	I	-
21.	IS-2062 Gr. Fe 410 A with IS-2062 Gr. Fe. 410 A	A1	I	I
22.	IS-2062 Gr. Fe 410 B with IS-2062 Gr. Fe. 410 B	A2	I	I

* **Grade Fe 410 WA & Grade Fe 410 WB**

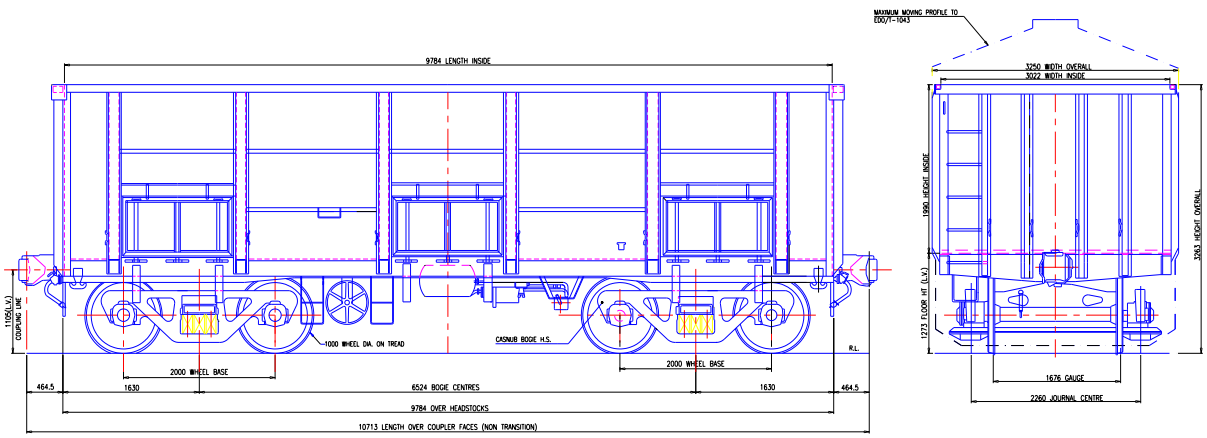
** **Grade Fe 410 Cu-WA & Grade Fe 410 Cu-WB**

BOXNLW
Light Wt. BOXN wagon

- It has been designed with the purpose of reducing tare wt. as also to achieve higher put within the constraints of existing axle loads and TLD.
- Tare – 20.6 t against 22.47 t
- Tare is reduced by using CRF section in place of fabricated members.

BOXNLW

WAGON DIRECTORATE R.D.S.O.	BOGIE OPEN WAGON	OPERATIONAL CODE 'BOXN(LW)'
GAUGE-B.G.	DIAGRAM	TYPE OF WAGON CODE 14



SPECIAL FEATURES

Wt. OF ASSEMBLY SUB-COMPONENT

Wt. of U'frame & floor plates	3.45 t.
Wt. of body	4.10 t.
Wt. of air brake fittings & piping and brake gear on U'frame	0.70 t.
C.B.C. complete including uncoupling gear	1.32 t.

SPEED CERTIFICATE NO:-
MW/CS/BOXNHA Dt. 14.05.2001

REFERENCE:-
DRAWING NO:- WD-88088-S-02

BOXNLW

- Drg. No. – WD – 88088-S-02
- Length over coupler faces – 10713 mm
- Width overall – 3250 mm
- Width inside – 3022 mm
- Height overall - 3263 mm
- 06 doors are provided.

Benefits of BOXNLW

- Reduction in tare wt. – 1.8 t
- Increasing in pay load – 1.8 t
- Increase in pay to tare ratio – 2.94 compared to 2.61
- Lower maintenance cost
- Structural members – CRF
- Plates & Sheets – Stainless steel so as to minimize corrosion
- 250 NOs. order by Rly. Board

BOXNLW

- Pay load – 60.87 t, less than HL
- Tare – 20.6 t
- Gross wt. – 81.28 t, less than HL
- Axle load – 20.32 t, less than HL
- Pay/tare – 2.94, less than HL
- TLD – 7.59 t/m less than HL
- Nos. of wagon in 620 m – 58
- Vol. cap – 58.84 m^3

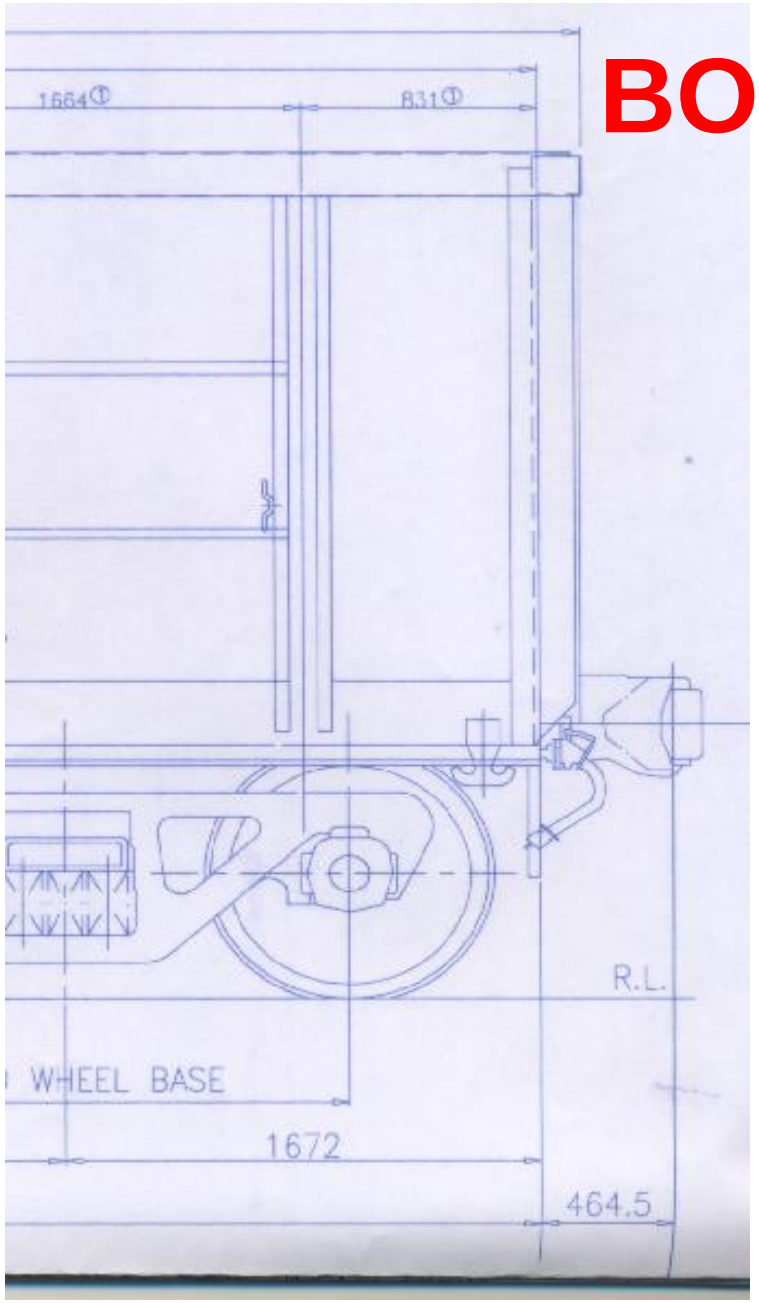
BOXNHL

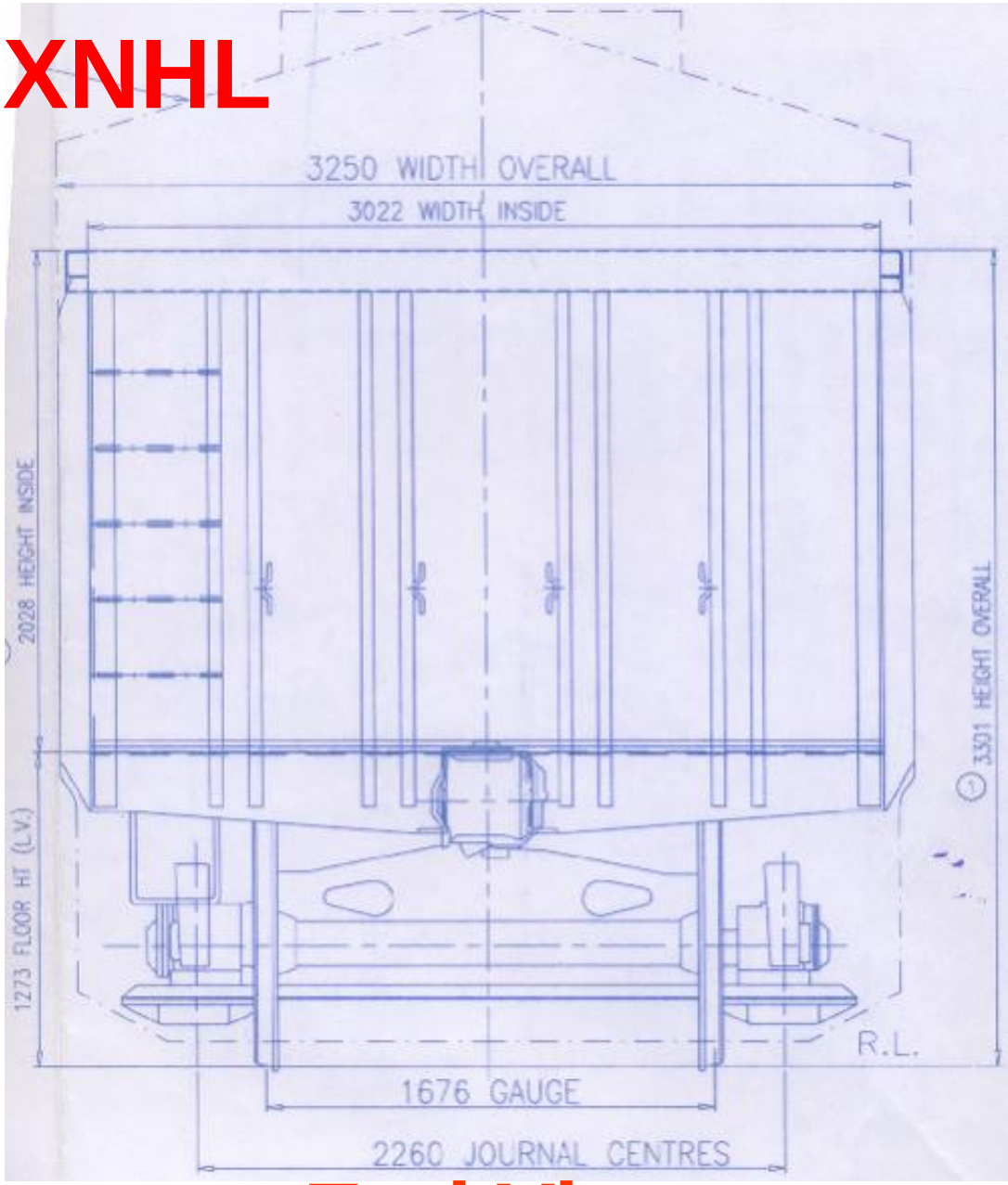
- Estimated tare–20.6 t- less than BOXNHS
  Axle load – 22.9 t - more
  Pay load - 71.0 t - more
  Gross load – 91.6 t - more
  Length - 10963 mm - greater
  Width - 3250 mm - greater
  Height - 3301 mm – greater
  volumetric cap. – 61.05 m^3 – more
  Floor ht.– 1273 - 2 mm less than BOXNHS

BOXNHL
CARRYING CA
TARE
AREA
22120896516
E Co B
FITTED WITH SINGLE PIPE GRADUATED
RELEASE AIR BRAKE
BOXN HL

BOXNHL

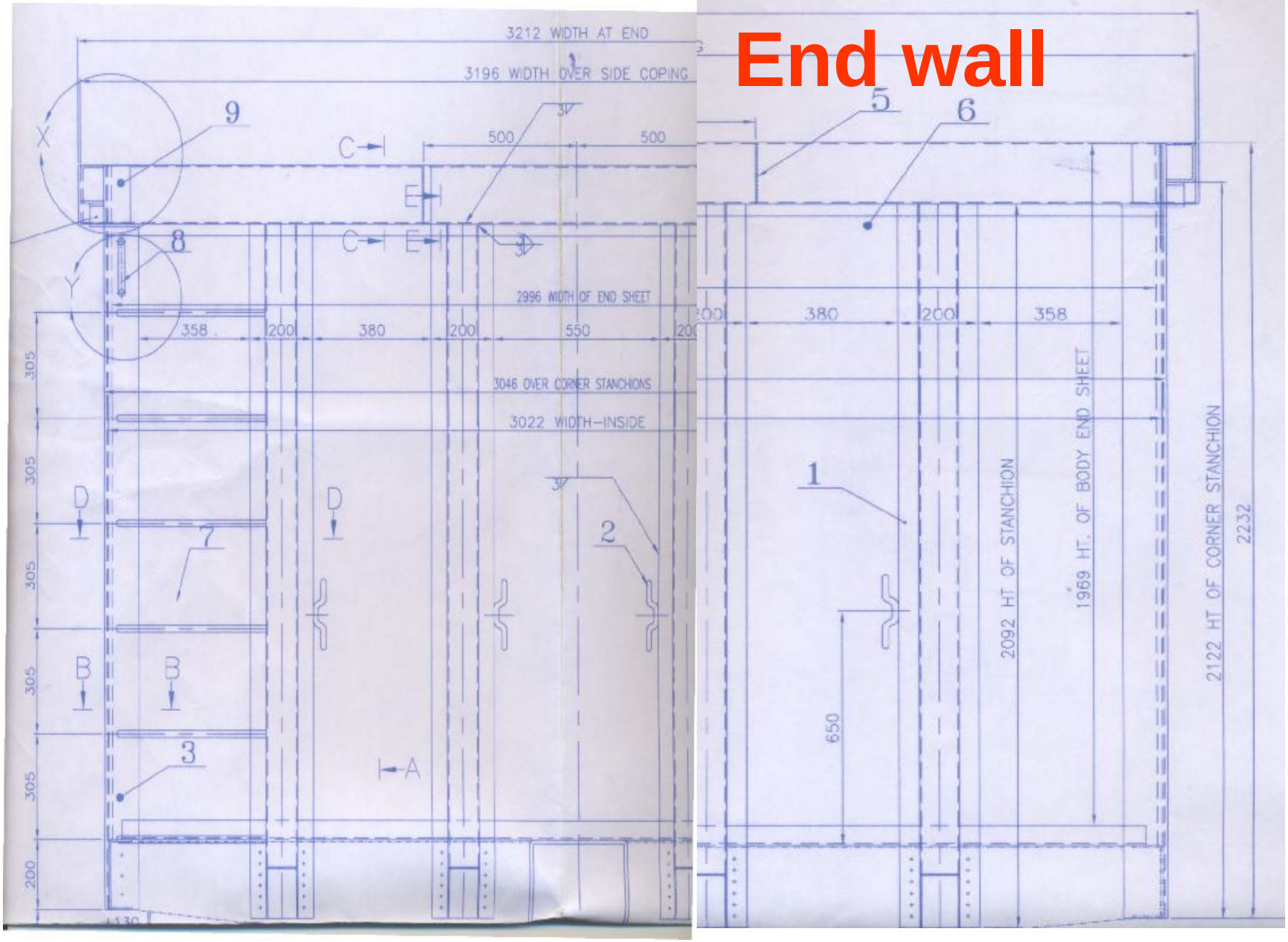
BOXNHL





End View

End wall


3212 WIDTH AT END
3196 WIDTH OVER SIDE COPING
9
X
C
E
500
500
8
Y
2996 WIDTH OF END SHEET
358
200
380
200
550
3046 OVER CORNER STANCHIONS
3022 WIDTH-INSIDE
305
305
305
305
305
200
D
D
7
2
B
B
3
A
5
6
1
380
200
358
2092 HT OF STANCHION
1969 HT. OF BODY END SHEET
2122 HT OF CORNER STANCHION
2232
650

HUCK BOLTING

AVDEL

22.9 T AXLE LOAD OPEN WAGON TYPE BOXNHL

- **Pay to tare ratio of 3.45 (v/s 2.5 of existing BOXN)**
- **TLD of 8.35 t/m (v/s 7.59 t/m of existing BOXN)**
- **Nos. of wagons/rake – 58**
- **Increase in revenue of Rs. 1.2 Crores per rake per year over BOXN (CC+6+2 t)**

COMPARISION BETWEEN BOXNHS & BOXNHL WAGON

DIMENSIONS

Sl.	Description	BOXNHS	BOXNHL	Difference
1	Length over Buffer/Coupler	10,713	10,963	+250
2	Length over Head stock	9,784	10,034	+250
3	Overall height from RL	3,233	3,301	+68
4	Floor height from RL	1,275	1,273	-2
5	Buffer height	1105	1105	-
6	In side height	1,950	2,028	+78
7	Width inside	2,950	3,022	+72
8	Width over all	3,200	3,250	+50
9	Floor Area	28.87 m^2	30.32 m^2	+1.45 m^2
10	Volumetric capacity	56.29 m^3	61.05 m^3	+4.76 m^3
11	Wheel base	2,000	2,000	same
12	Wheel diameter	1,000	1,000	same
13	Bogie centre distance	6,524	6,690	+166

COMPARISION BETWEEN BOXNHS & BOXNHL WAGON

	BRAKE			
1	Type of Brake	Air, 355mm Dia. cylinder	Air, 300mm Dia. cylinder	-55ϕ
2	Air brake Pipe 32 Bore ,, 20 Bore	IS: 1239 Pt.1 Heavy ,,	IS: 1239 Pt.1 Heavy SS to ASTM-A312 (ERW)	same Changed
3	Reservoir	100 Liters capacity	75 Liters capacity	-25 lts.
4	Type of SAB	IRSA-600	IRSA-750	Changed

	LOAD & COUPLER			
1	Axle load	22.82 t	22.9 t	+0.08
2	Pay load	68.08 t	71.0 t	+2.92 t
3	Tare weight	23.2 t	20.6 t	-2.6 t
4	Gross weight	91.28 t	91.6 t	+0.32t
5	No. of Wagon/train in 636 m	58	58	same
6	Pay load/train 58 wagons	3,949 t	4,118 t	+169 t
7	Gross load/train	5,294 t	5,313 t	+19 t
8	Track loading density (Gross)	8.52 t/m	8.35t/m	-0.17t/m
9	Type of Coupler	CBC-Non Transition 48-BD-2002	CBC-Non Transition WD-66-BD-06	Components are same, but imported

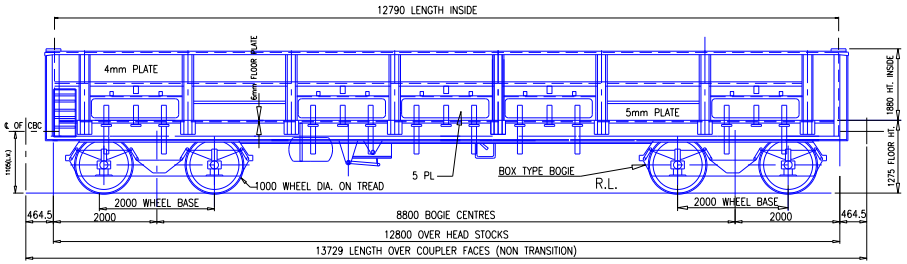
BOST

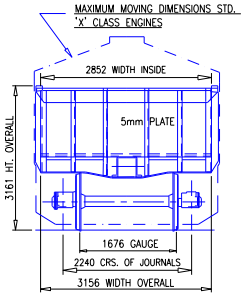
Open Air brake type Wagon for steel loading

- **Purpose to introduce** –
- Sizable proportion of steel plant products are being loaded in BOX wagon.
- The population of BOX wagon is declining because of condemnation
- Rly. Bd. Advise to RDSO to design for steel loading

BOXC

WAGON DIRECTORATE R.D.S.O.	STANDARD BOGIE OPEN WAGON 81.28 TONNES	OPERATIONAL CODE 'BOXC'
GAUGE-B.G.	D I A G R A M	TYPE OF WAGON CODE — —





CLEAR DOOR OPENING – 1460X750

SPECIAL FEATURES

1. SPECIALLY FOR THE TRANSPORT OF COAL
2. B5 DOORSS ASIDE (BOTTOM HINGED)
3. SUITABLE FOR TIPPLING
4. FITTING WITH SLACK ADJUSTER & EMPTY LOAD BOX.

Wt. OF ASSEMBLY SUB-COMPONENT

Wt. of U'frame & floor plates & Wt. of body	10.70 t.
Wt. of vacuun brake fittings & piping and brake gear on U'frame.....	1.30 t.
C.B.C. complete including uncoupling gear	1.32 t.

SPEED CERTIFICATE NO:-

MW/SPD/BG Dt. 16.02.1968

REFERENCE:-

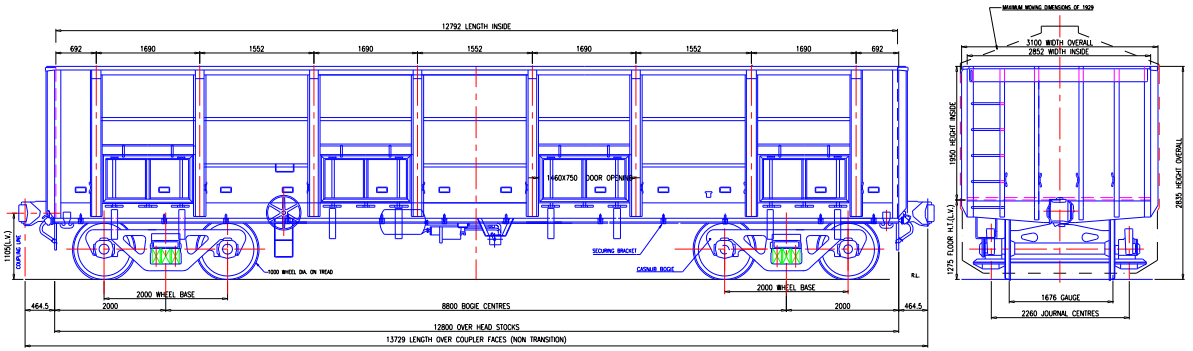
DRAWING NO:- SK.101-62601

BOST

- Length is same as BOX wagon
- Fitted with Casnub bogie air brake
- Lower side walls as compared to BOX wagon
- Speed – 100 Kmph
- Underframe has been straightened to sustain to point loading of steel consignment
- Pay load – same as BOX wagon
- GOC Workshop has been made.

BOST

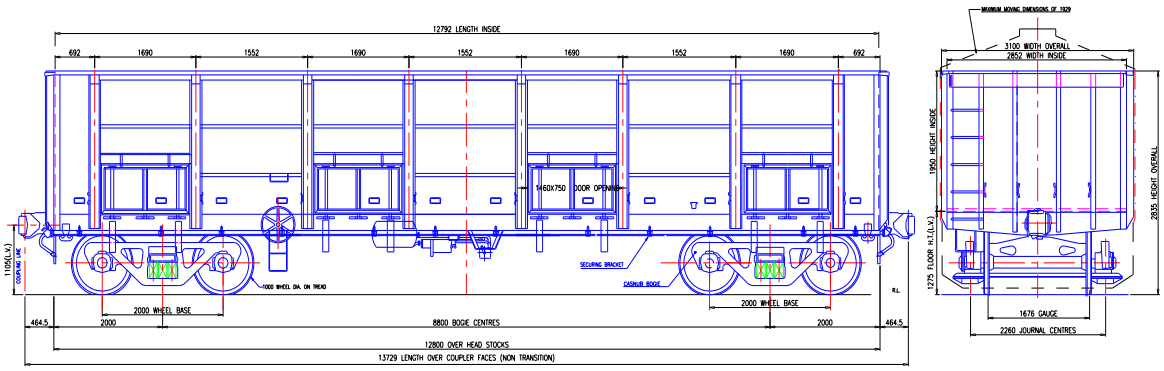
WAGON DIRECTORATE R.D.S.O.	BOGIE OPEN WAGON	OPERATIONAL CODE 'BOST'
GAUGE-B.G.	DIAGRAM	TYPE OF WAGON CODE 19



SPECIAL FEATURES	Wt. OF ASSEMBLY SUB-COMPONENT
	Wt. of U'frame & iron work with body..... 10.932 t. Wt. of floor plate ..... 1.717 t. Wt. of air brake fittings & piping and brake gear on U'frame..... C.B.C. complete including uncoupling gear ..... 1.32 t. Bogie brake gear complete ..... 0.5 t.
SPEED CERTIFICATE NO:- MW/BOST Dt. 12.11.2003	REFERENCE:- DRAWING NO:- WD-00012-S-01

BOSTHS

WAGON DIRECTORATE R.D.S.O.	BOGIE OPEN WAGON	OPERATIONAL CODE 'BOSTHS'
GAUGE–B.G.	DIAGRAM	TYPE OF WAGON CODE --



SPECIAL FEATURES

Wt. OF ASSEMBLY SUB–COMPONENT

Wt. of U'frame & iron work with body	10.932 t.
Wt. of floor plate	1.717 t.
Wt. of air brake fittings & piping and brake gear on U'frame	
C.B.C. complete including uncoupling gear	1.32 t.
Bogie brake gear complete	0.5 t.

SPEED CERTIFICATE NO:–
MW/BOST Dt. 31.05.2004

REFERENCE:–
DRAWING NO:– WD–00012–S–01

Benefits of BOST

- Suitable for consignment from steel plants which can not be loaded in BOXN due to shorter length
- Equal in length to BOX and equipped with air brake
- Speed – 100 kmph
- Casnub bogie

BOST

- Axle Load (in tonnes) : 20.32
- TLD (in tonne/meter) : 5.92
- Payload (in tonnes) : 55.78
- Tare Weight (in tonnes) : 25.5
- Gross Load (in tonnes) : 81.28
- Pay to Tare Ratio : 2.18
- Length (over head stock) : 12800

BOST

- Width (overall) : 3100
- Height (from rail level) : 2835
- Cubic Capacity(in cum) : 65.84
- Bogie type : Casnub 22 HS
- Wheel diameter (in mm) : 1000 mm
- Speed Potential (in Kmph)E/L : 80/75
- **Purpose : For transportation of Steel Plates, Sheets, Coal etc.**

BOXNAL

- All body and steel under frame designed for carrying bulk commodity like coal and iron ore without door.

- Except under frame all body structure, end sheets, side sheets and floor plates – Aluminium alloys.

BOXNAL

- **Use of Al alloys in BOXN wagon –**
- **Advantages –**

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

BOXNAL

- **Disadvantages** –

1. Very expensive
2. It is prone to pilpherage

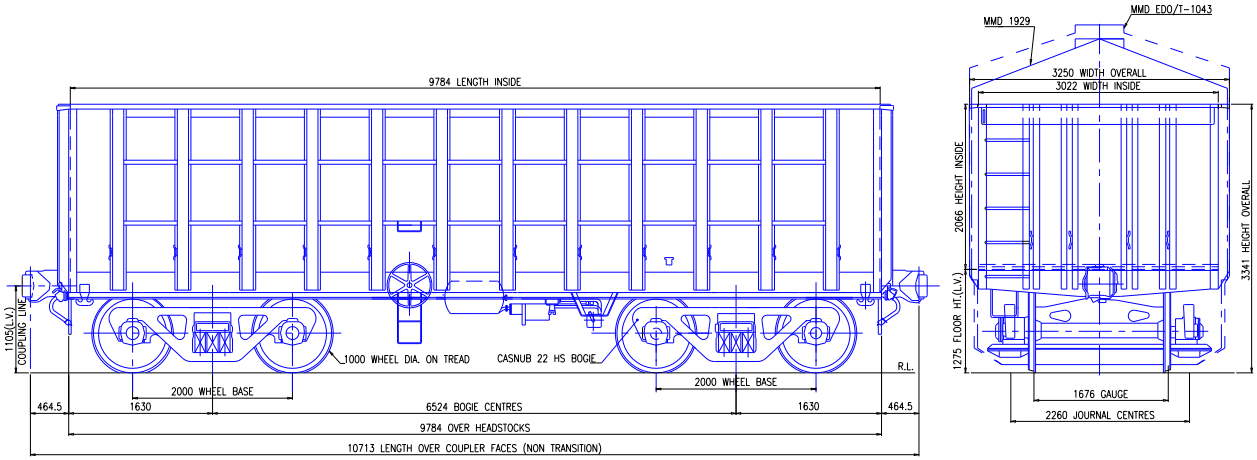
Benefits of BOXNAL

- **Use of AL alloys in BOXN will result in**
- 4.21 t reduction in tare wt.
- 4.21 t increase in pay load

- Pay to tare ratio 3.45 compared to 2.61 of existing BOXN wagon

BOXNAL

WAGON DIRECTORATE R.D.S.O.	BOGIE OPEN WAGON	OPERATIONAL CODE 'BOXNAL'
GAUGE–B.G.	DIAGRAM	TYPE OF WAGON CODE 20



SPECIAL FEATURES

1. SINGLE GRADUATED RELEASE AIR BRAKE SYSTEM
2. HIGH TENSILE (NON TRANSITION TYPE) CENTRE BUFFER COUPLER.
3. CASNUB 22HS BOGIES.
4. THE WAGON SUPER STRUCTURE IS MADE OF ALUMINIUM ALLOY EXTRUSIONS AND PLATES.

Wt. OF ASSEMBLY SUB–COMPONENT

Wt. of U'frame & floor plates.....	2.96 t.
Wt. of body	2.48 t.
Wt. of air brake fittings & piping and brake gear on U'frame...	0.70 t.
C.B.C. complete including uncoupling gear	1.32 t.

SPEED CERTIFICATE NO:–

MWBOXNAL Dt. 00.05.2001

REFERENCE:–

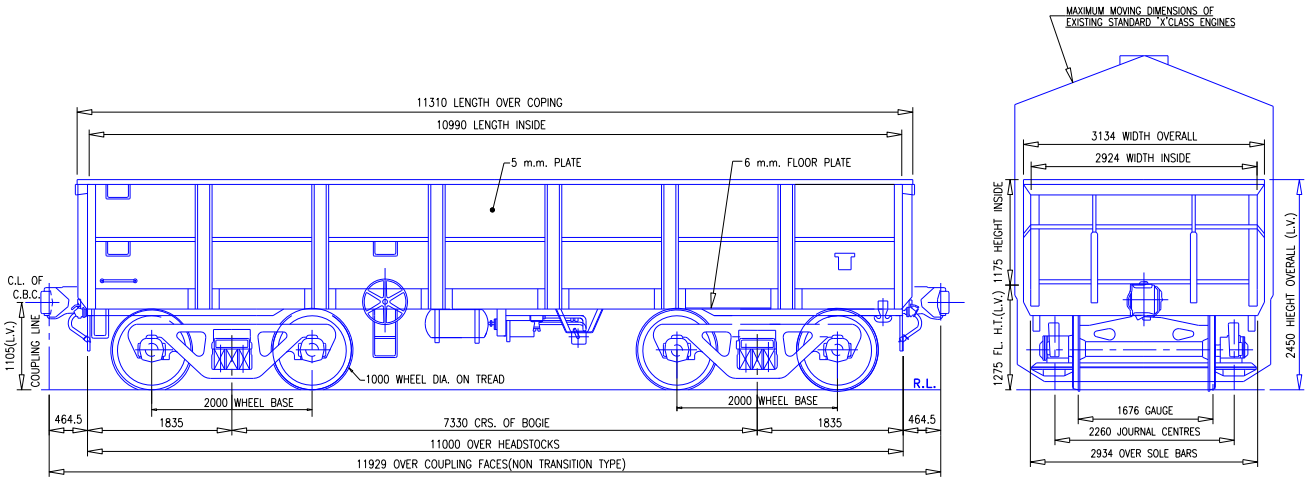
DRAWING NO:– WD–02021–S–02

BOY
Drg No. SK-73511

- **Specific features –**
- Specially for transport of iron ores
- Fitted with air brake
- Fitted with SAB, Empty load device
- Suitable for tippling
- Fitted with cast steel friction snubbed bogies.
- 52 wagons per rake

BOY

WAGON DIRECTORATE R.D.S.O.	STANDARD GONDOLA WAGON 91.4 TONNES	OPERATIONAL CODE 'BOY'
GAUGE-B.G.	D I A G R A M	TYPE OF WAGON CODE 18



SPECIAL FEATURES

1. Specially for transport of iron ore.
2. Fitted with air brakes.
3. Fitted with slack adjuster & empty load box.
4. Suitable for tippling.
5. Fitted with cast steel friction snubbed bogies.

Wt. OF ASSEMBLY SUB-COMPONENT

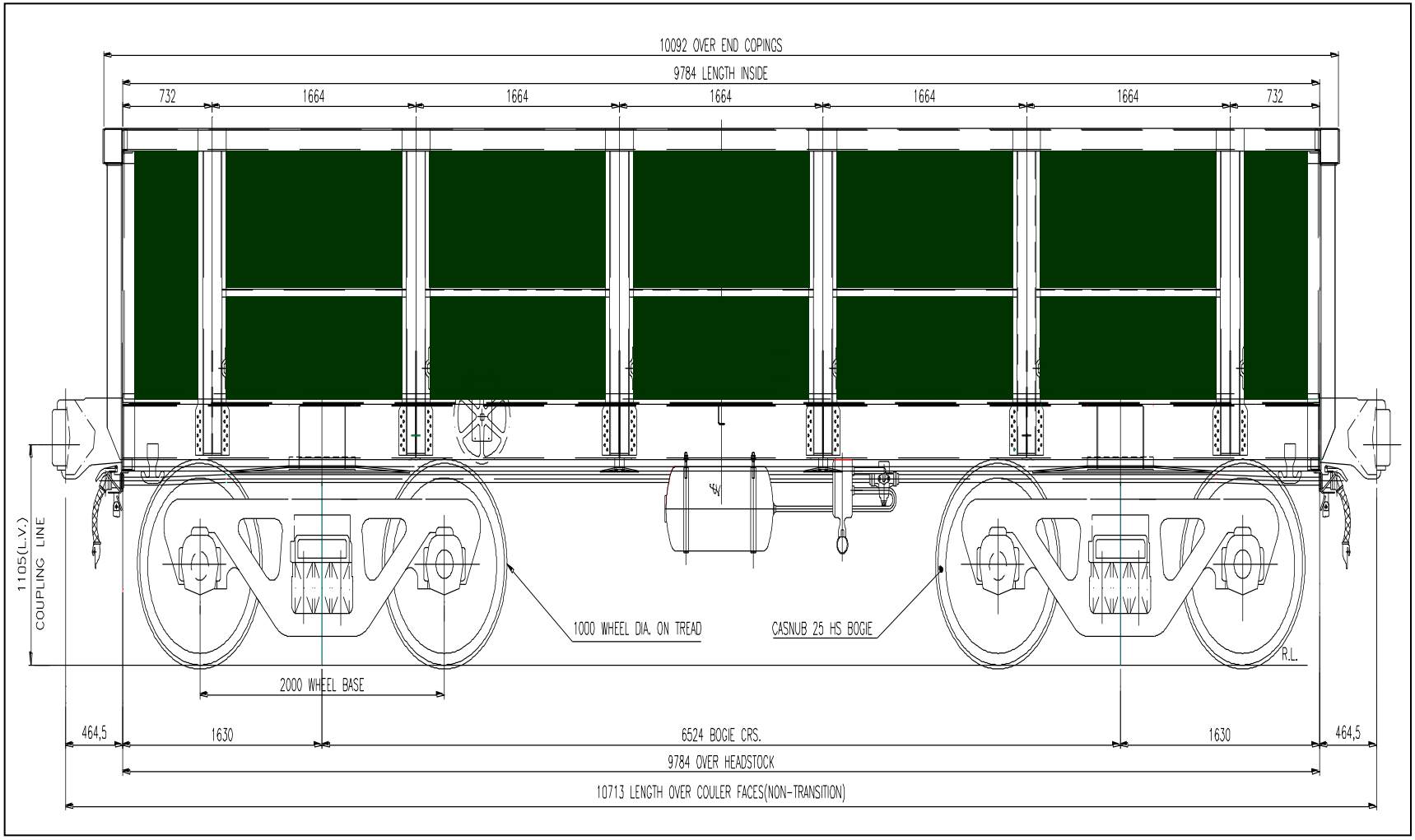
Wt. of U'frame & floor plates	4.99 t.
Wt. of body	2.40 t.
Wt. of air brake fittings & piping and brake gear on U'frame	0.6 t.
C.B.C. complete including uncoupling gear	1.32 t.
Bogie brake gear complete	0.672 t.

SPEED CERTIFICATE NO:-
MW/PLNG/BOY Dt. 19.07.1984

REFERENCE:-
DRAWING NO:-SK-73511

BOY -25

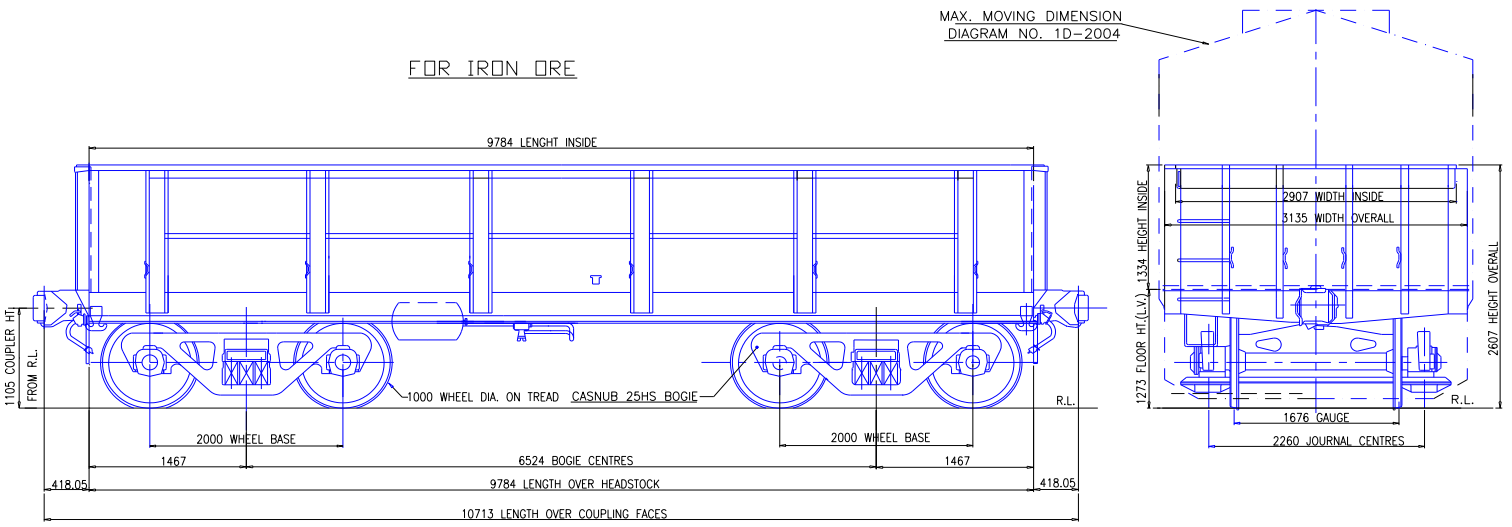
- This is open low sided gandola wagon was designed at 25 t axle load.
- **Stainless steel & CRF section**
- Carrying minerals & Ores.
- The specifications and material schedule have been sent to Railway Board in November, 2006 for floating tender
- Pay to tare ratio of 3.76 (v/s 3.42 of existing BOY).
- Track loading density of 9.33 t/m (v/s 7.67 t/m of existing BOY)


10092 OVER END COPINGS
9784 LENGTH INSIDE
732
1664
1664
1664
1664
1664
732
1105(L.V.)
COUPLING LINE
1000 WHEEL DIA. ON TREAD
CASNUB 25 HS BOGIE
R.L.
2000 WHEEL BASE
464,5
1630
6524 BOGIE CRS.
1630
464,5
9784 OVER HEADSTOCK
10713 LENGTH OVER COULER FACES(NON-TRANSITION)

BOY -25

BOY-25

WAGON DIRECTORATE R.D.S.O.	BOGIE OPEN WAGON	OPERATIONAL CODE 'BOY25'
GAUGE–B.G.	DIAGRAM	TYPE OF WAGON CODE ----



SPECIAL FEATURES

Wt. OF ASSEMBLY SUB–COMPONENT

Wt. of U'frame & floor plates.....
Wt. of body .....
Wt. of air brake fittings & piping and brake gear on U'frame... 0.6 t.
C.B.C. complete including uncoupling gear ..... 1.32 t.
Bogie brake gear complete ..... 0.5 t.

SPEED CERTIFICATE NO:–

REFERENCE:–

DRAWING NO:– WD–06071–S–02

25 T AXLE LOAD IRON ORE WAGON TYPE BOY-25

- Pay to tare ratio – 3.76 (v/s 3.42 of existing BOY)
- TLD of 9.33 t/m (v/s 7.67 t/m of existing BOY)
- Nos. of wagons/rake – 58 (v/s 52 of existing BOY)
- Bogie mounted brake system
- HT CBC with bottom shelf and high capacity draft gear
- Increase in revenue of Rs. 4.76 Crores per rake per year over BOY

Comparison bet.BOY/BOY-25

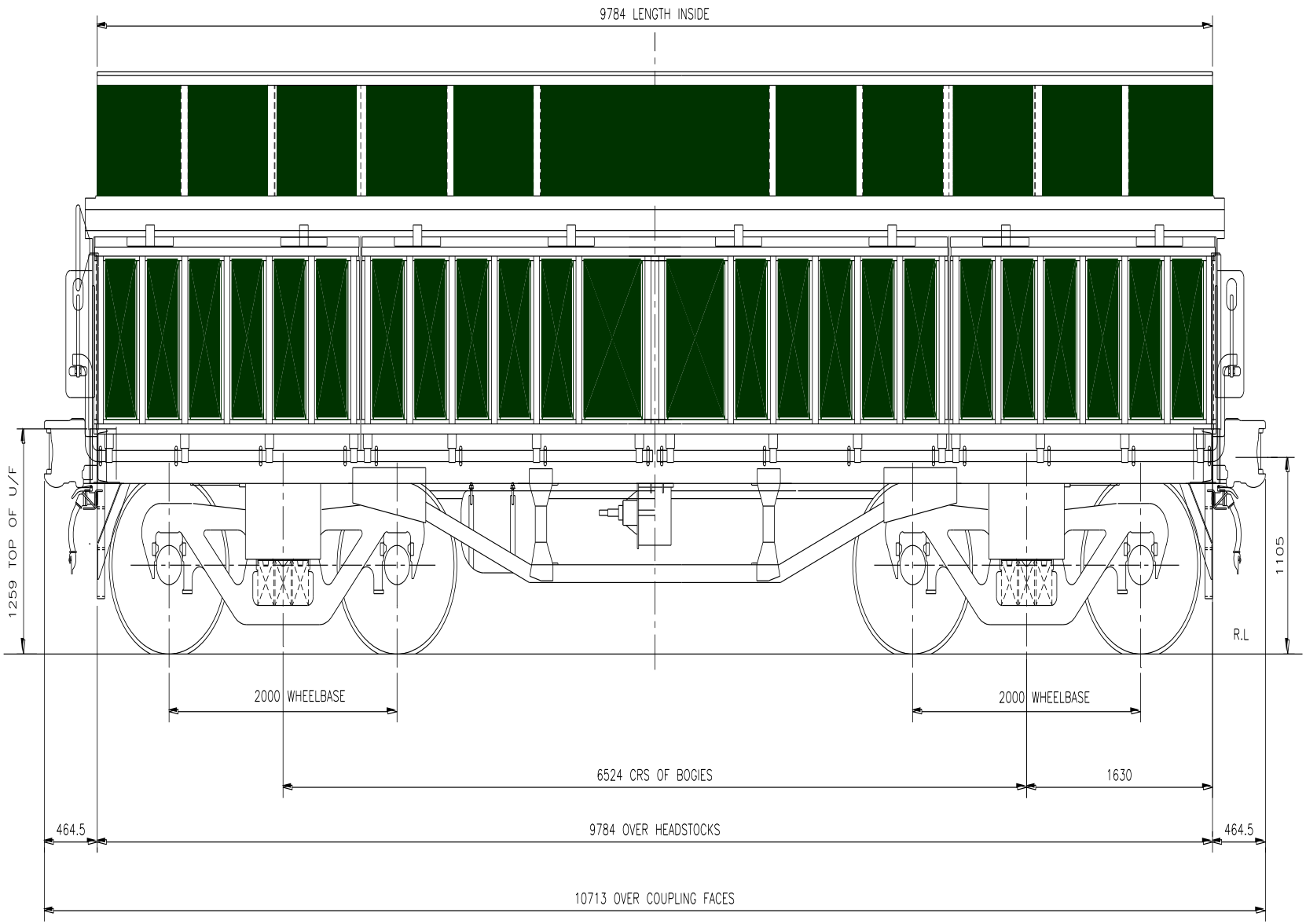
Description	BOY	BOY-25
Length over coupler faces	11929	10713
Width overall	3134	3135
Height overall	2450	2607
Bogie	20.3 t NLB	25t CASNUB

25 T AXLE LOAD COAL WAGON TYPE BOXN-25

- Pay to tare ratio – 3.6 (v/s 2.5 of existing BOXN)
- TLD of 9.33 t/m (v/s 7.59 t/m of existing BOXN)
- Nos. of wagons/rake – 58
- Increase in revenue of Rs. 2.5 Crores per rake per year over BOXN (CC+8+2t)

25 T AXLE LOAD BOGIE HOPPER WAGON TYPE BOBSN-25

- **Pay to tare ratio – 3.0 (v/s 2.01 of existing BOBSN)**
- **TLD of 9.33 t/m (v/s 7.9 t/m of existing BOBSN)**
- **Nos. of wagons/rake – 58 (v/s 53 of existing BOBSN)**
- **Increase in revenue of Rs. 4.85 Crores per rake per year over BOBSN**


9784 LENGTH INSIDE
1259 TOP OF U/F
1105
R.L
2000 WHEELBASE
2000 WHEELBASE
6524 CRS OF BOGIES
1630
464.5
9784 OVER HEADSTOCKS
464.5
10713 OVER COUPLING FACES

BOBSN-25

Covered Wagons

BCN wagon Elevation

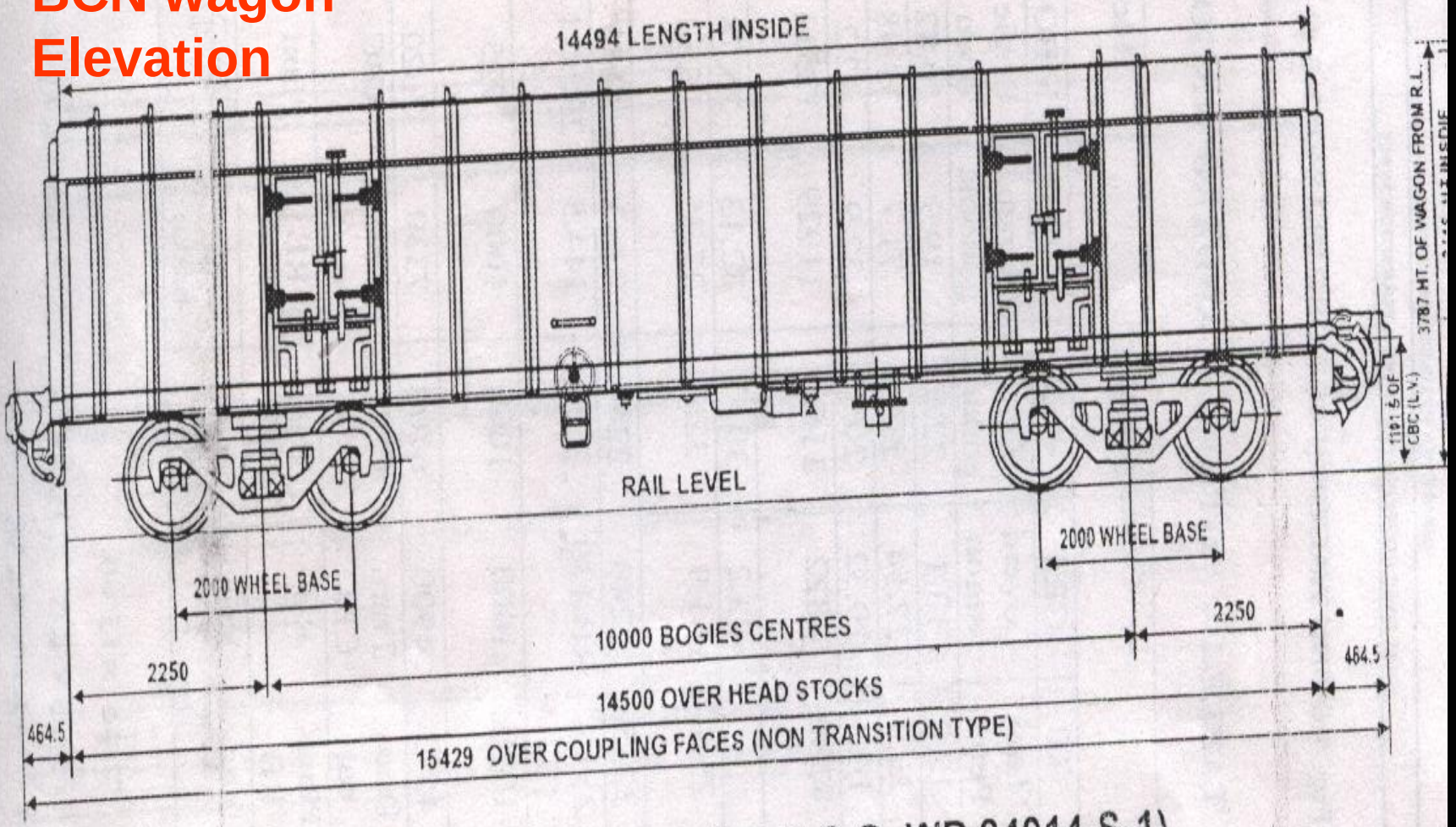
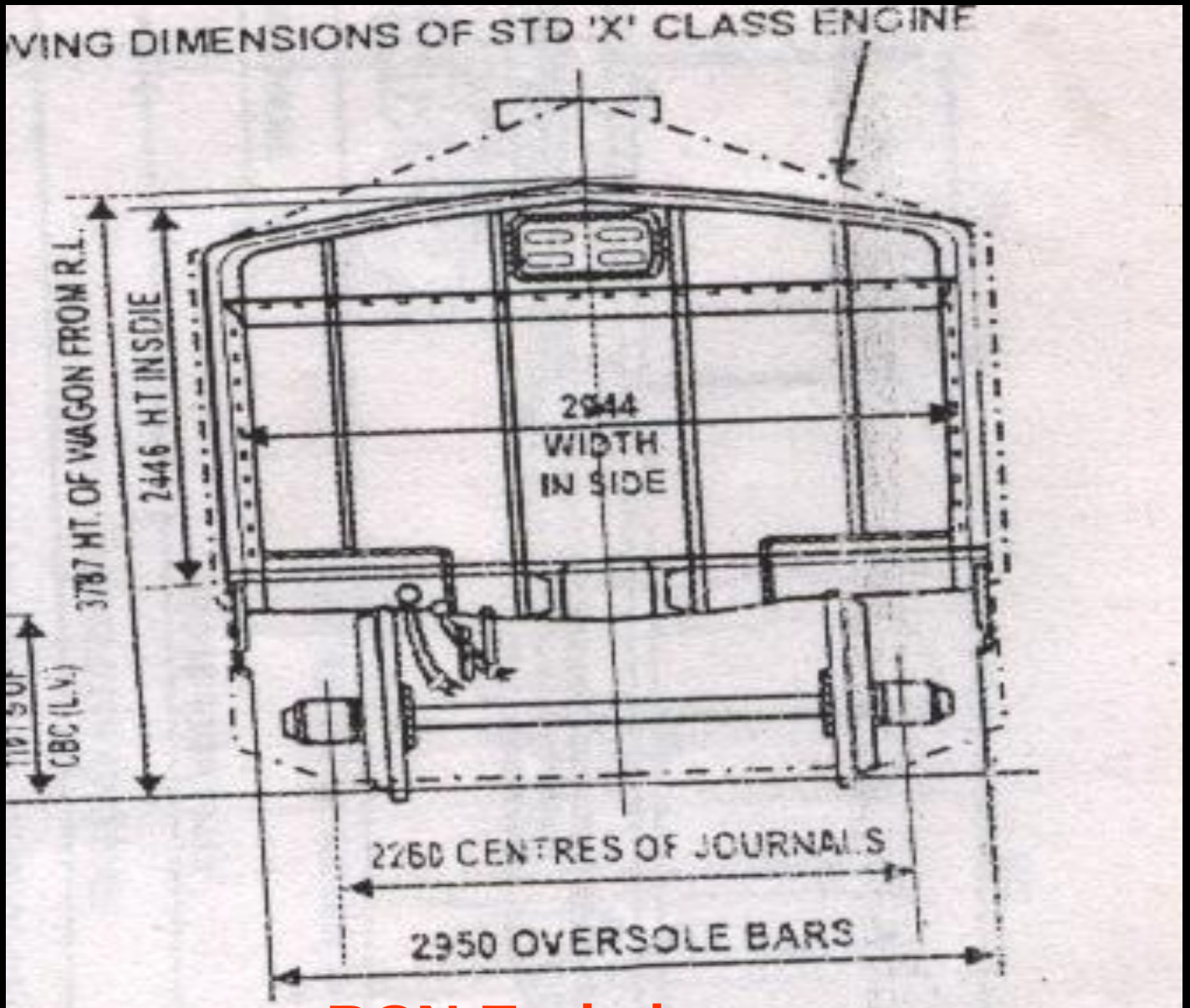


Fig. 1.4 BCN WAGON (Ref. R.D.S.O. WD 84014-S-1)


VING DIMENSIONS OF STD 'X' CLASS ENGINE
3787 HT. OF WAGON FROM R.L.
2446 HT INSIDE
2344
WIDTH
IN SIDE
(BC (L.V.)
2260 CENTRES OF JOURNALS
2950 OVERSOLE BARS

BCN End view

BOGIE COVERED WAGON TYPE BCNAHS

- Pay to tare ratio of 2.31 (v/s 1.85 of BCX)
- TLD of 5.625 t/m (v/s 5.15 t/m of BCX)
- Nos. of wagons/rake – 44
- Increase in revenue of Rs. 1.41 Crores per rake (of 20.32 t BCNAHS) per year over BOXC

Description	BCN	BCNA/HS
Length over coupler	15429	14450
Length over h/stock	14500	13521
Height	3787	4017
Width over sole bar	2950	2950
Tare	27.20	24.55
G. Weight	81.28	81.28
Axle load	20.32	20.32
Pay load	54.08	56.73
Bogie	22NLB	NLB/HS

BCNHL

- Designed in 2006
- 22.9 t axle load
- CRF section
- Stainless steel made structures

एन पी
58

331009
60011

बीसीएनएचएल
331009
60172
R

वहन
क्षमता
टेयर
क्षेत्रफल
70·8टन
21·10टन
33·6मी²

एयर ब्रेक

व्यपसे
R
03-15

22.9 T A/L COVERED WAGON TYPE BCNHL

- **Pay to tare ratio of 3.40 (v/s 2.30 of existing BCNA)**

- **TLD of 8.35 t/m (v/s 5.625 t/m of existing BCNA)**
- **Wagon length reduced to 10.963 m from existing 14.45m for BCNA wagon**

BCNHL

- **Nos. of wagons/rake – 58 (v/s 44 of existing BCNA)**
- **Increase in revenue earning of Rs. 5 Crores per rake per year over BCNA (CC+8+2 t, Cement)**

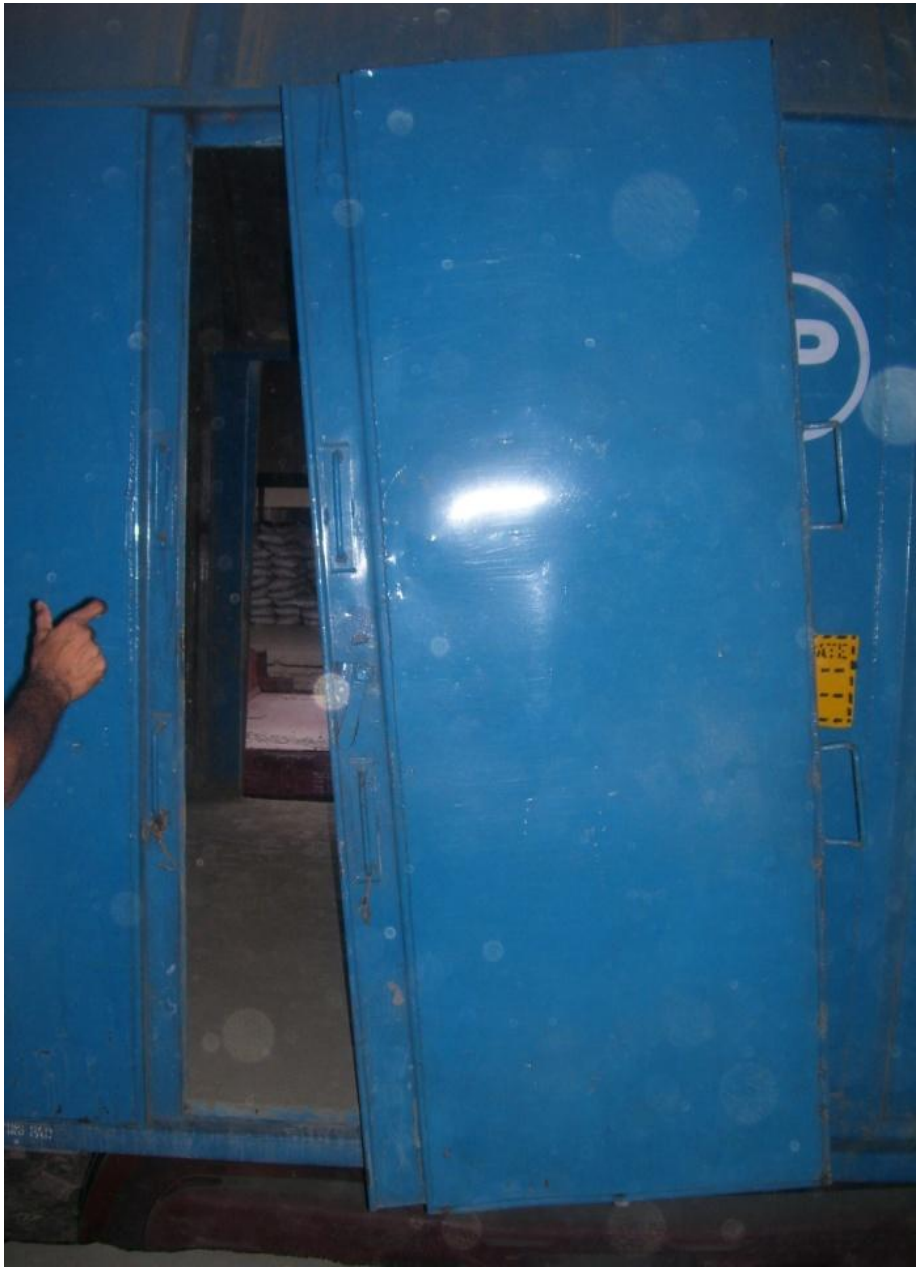
Design failure of Door locking arrangement

Breakage of door hinges

Doors drooping

Doors bent due to hitting of fixed structures

BCNHL
331009
60547
C-C
TARE
AREA
70·8t
21·00t
33·6m²



Modified Door for BCNHL Wagon

Facilities required for fabrication/maintenance of Stainless Steel Wagons

Guidelines by CAMTECH/GWL

S
Hopper Wagons

Hopper Wagons

- **BOBR** – A long pull rod is used for connecting two bogies.
- **BOBRN** – A SAB is used for this purpose.
- **BOBYN** – Side buffers
  - CBC transition type
  - DOM – 04 hand wheels are provided for operating side doors and bottom doors.

BOTTOM DISCHARGE COAL HOPPER WAGON TYPE BOBRN

- Pay to tare ratio – 2.2 (v/s 2.126 of BOBR)
- TLD of 7.67 t/m (v/s 7 t/m of BOBR)
- Nos. of wagons/rake – 58 (v/s 53 of BOBR)
- Increase in revenue earning of Rs. 1.3 Crores per rake per year over BOBR

BOBYN

BOBYN

Description	BOBR	BOBRN	BOBYN/HS
Length over couplers	11600	10600	11647/12000 over buf
Height	3735	3735	3050
Width	3500	3500	3189
Tare	26.0	25.6	27.04
Pay load	55.28	55.68	54.24
G. Wt.	81.28	81.28	81.28
Axle load	20.32	20.32	20.32
No. of wagons	51	55	50

BOBRNAL

- Carrying bulk commodities like iron ores & coal
- Bottom discharge wagon for fast unloading of commodities
- Aluminium is used in structures and remains parts – same

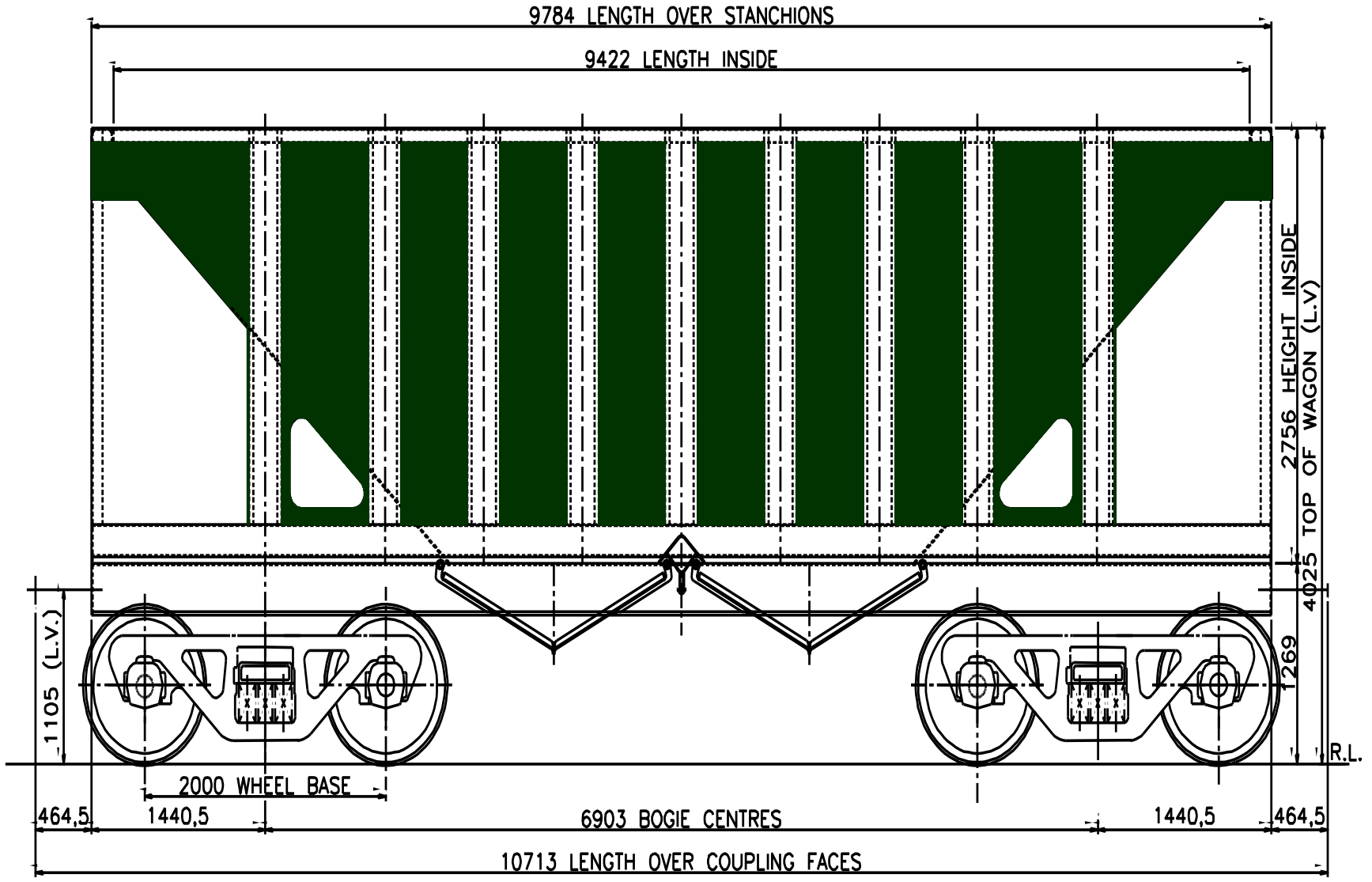
BOBRN AL

- 3.2 t reduction in tare wt.
- 3.2 t increase in pay load
- Pay to tare ratio 2.63 against 2.17% of existing BOBRN wagon

25 T AXLE LOAD BOTTOM DISCHARGE COAL HOPPER WAGON TYPE BOBRN-25

- **Pay to tare ratio – 3.26 (v/s 2.2 of existing BOBRN)**
- **TLD of 9.33 t/m (v/s 7.67 t/m of existing BOBRN)**
- **Based on Garib Rath MMD**
- **Nos. of wagons/rake – 58**

- **Increase in revenue earning of Rs. 3.23 Crores per rake per year over BOBRN(CC+6+2t)**


9784 LENGTH OVER STANCHIONS
9422 LENGTH INSIDE
2756 HEIGHT INSIDE
4025 TOP OF WAGON (L.V)
1105 (L.V.)
1269
R.L.
2000 WHEEL BASE
464,5
1440,5
6903 BOGIE CENTRES
1440,5
464,5
10713 LENGTH OVER COUPLING FACES

BOBRN-25

Tank Wagons

BTPN

- Length – 12420 mm over coupler faces
- Height of barrel from rail level – 4154 mm
- Barrel length – 11458 mm
- Barrel – 2850 mm inside dia.
- Bogie – NLB
- Volumetric cap. Of barrel - 70.40 m^3
- Tare – 27 t
- CC – 54.28 t
- Gross wt. – 81.28 t
- Axle load – 20.31 t
- Cc/rake – 2551.16 t
- Axle load – 20.32 t

BOGIE TANK WAGON TYPE BTPN

- **Pay to tare ratio – 2.0 (v/s 1.74 of TPR)**
- **TLD of 6.54 t/m (v/s 3.921 of TPR)**
- **Nos. of wagons/rake – 47**
- **Volumetric capacity – 70.4 m3**
- **Increase in revenue earning of Rs. 4.8 Crores per rake per year over TPR**

- **BTPGL** – Bogie liquefied petroleum gas tank wagon.

  - tare – 45.7 t
  - CC – 35.5 t
  - Gross – 81.28 t
  - Vacuum brake system
  - Length over h/stock – 18000 mm
  - Length over coupler faces – 19282 mm

BTPGLN - Bogie liquefied petroleum gas tank wagon. Tare – 41.60 t, CC – 37.6 t, Gross – 79.20t, Air brake, Length is same as BTPGL.

BTPGLN

BTFLN

- It is a frameless bogie tank wagon, was developed and validated for strength during the year.
- Existing BTPN has pay load /tare wt. ratio – 2.0 A need to improve payload with the existing axle load .
- No center sill
- Tractive & buffing forces are taken up by the barrel itself, thus optimizing the use of wagon mass which is subjected to bi-axial stress.

BTFLN

Design of BTFLN Wagon

Comparison bet BTFLN & BTPN

Description	BTPN	BTFLN
Length over H/stock	11491	11491
Axle load	20.32	20.32
Tare wt	**27**	**23.53**
Pay load	**54.28**	**57.75**
Pay/Tare	**2.0**	**2.45**
Vol. Cap.	70.40	76
Pay load/rake	2605	2772

Flat Wagons

Flat wagons

- **BFNS** – Bogie flat steel wagon type
- - for transportation of HR coil
  - Tare weight – 23.6 t
  - Pay load - 57.7 t
  - adjustable stoppers have been provided for placement of coil in the groove and preventing longitudinal shifting of coils.
  - Length and width equal to BRN to facilitate loading flat products as being done on BRN.
  - fit to run at 100 kmph.

BFNS

- **Length** – 14645 mm over couplers
- **Height** – 2776 mm over stanchions bkt
  - 2650 mm over side wall
- **Width** - 3045 mm over stanchions bkt
- **BRN** – Bogie Rail wagon type
- Purpose: For transportation of Rails, Steel Coils, Plates etc.

Description	BRN	BRNA
Length	14645	14645
Width over sole bars	2845	2845
Height	2544	2409
Tare	24.393	23.543
CC	56.887	57.737
G. Wt	81.28	81.28
Axle load	20.32	20.32

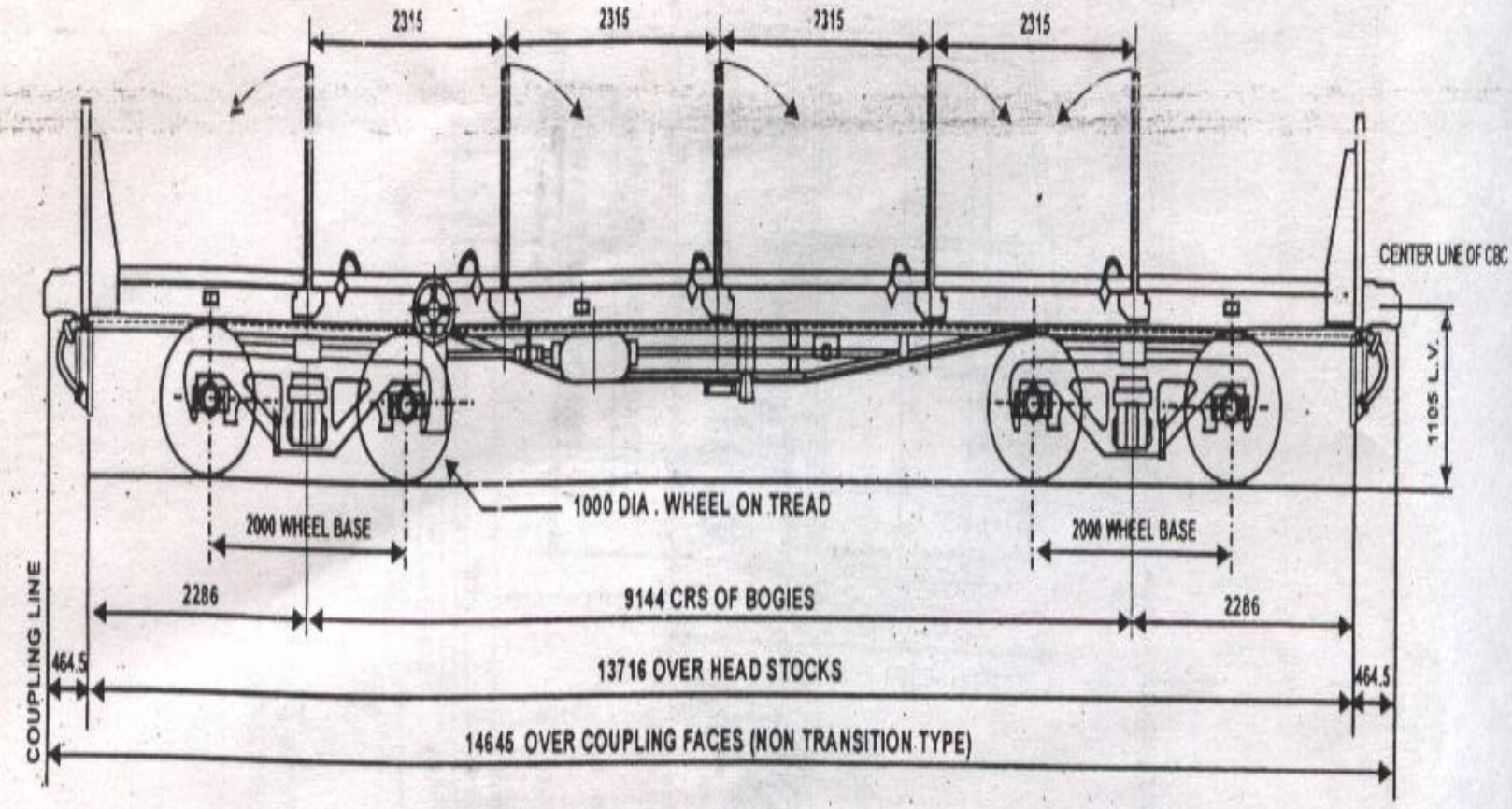


Fig. 1.5 BRN WAGON (Ref. RDSO WD 84013-S-1)

BRN Wagon

BFKN Wagon

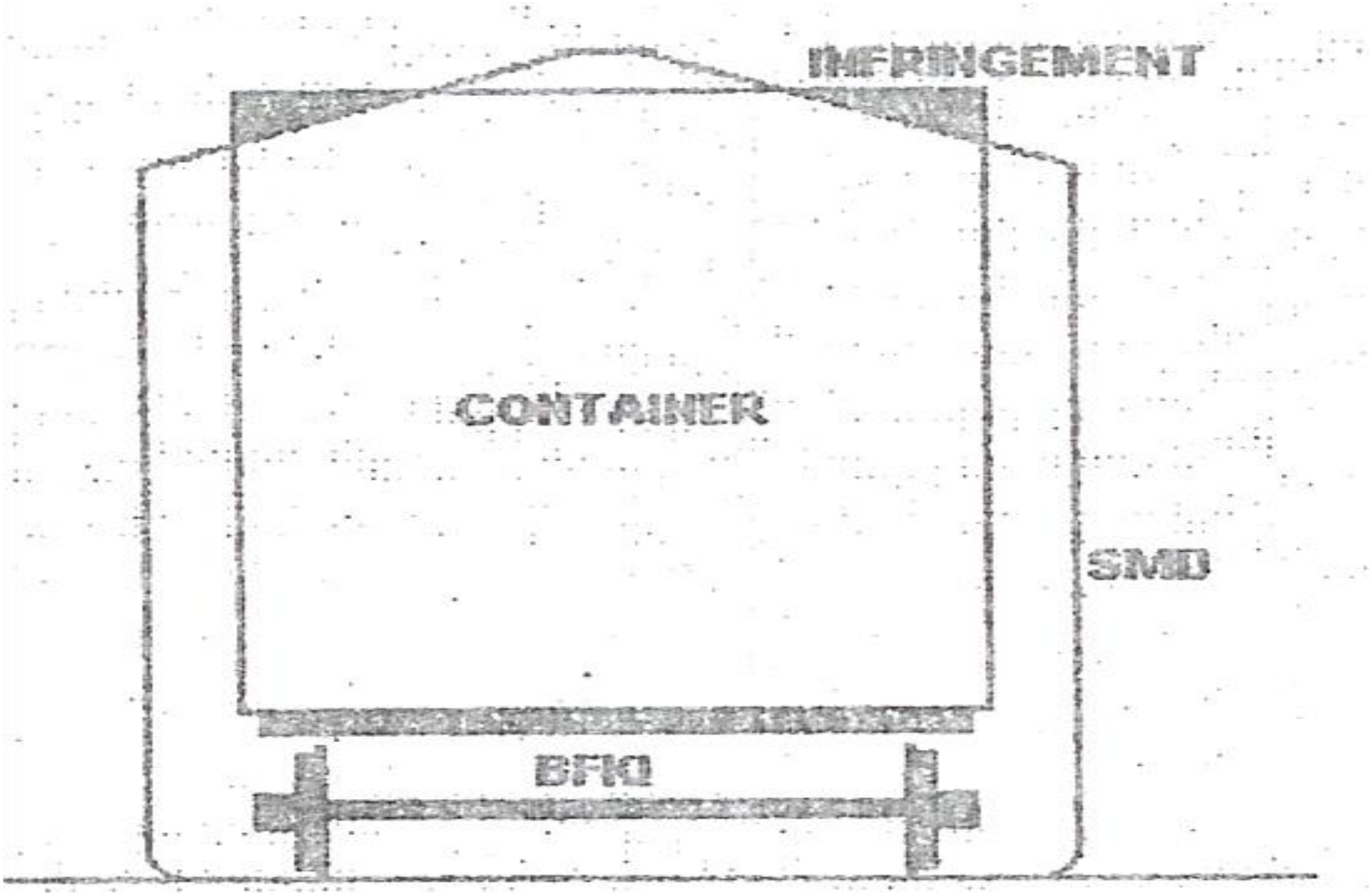
- Air brake CASNUB bogie container flat wagons owned by container corporation Ltd.
- Converted from BFKI.
- Tare wt. – 20.5 t
- Pay load – 61 t
- Speed – 75 kmph

BLC Wagon

- **Meaning of BLC** – Bogie Low platform container flat wagons.
- Low platform container flat wagon, light weight, all welded skelton design underframe for an optimum tare to payload ratio.
- Wheel dia – 840 mm, condemn. – 780 mm.
- CBC on raised end of A car and slackless draw bar on inner end of A car and on all B cars
- Tare wt (A) - 19.1 t, B – 18.01 t
- Pay load – 61 t.
- Speed – 100 kmph

Necessity for introducing BLC

- If the ISO containers are loaded on the BFKI wagons, the overall dimensions exceeds the **Standard moving dimensions of X-class engine** by 254 mm at the top side height, in such a case the load is to be moved as ODC with speed restrictions. This will in turn decreases the speedy movement of containers.



BFKI wagon

- If the same containers are loaded on the specially made well wagons, the load can very well be moved as Non-ODC, but at either ends of the wagon 1.5 metres of length are necessary to accommodate the CBC couplers. Consequently the length of the wagon is increased by 3 metres (3000 mm). This will inturn reduces the number of wagons on a loop line from 42 for the existing BFKI wagons to 38 resulting in loss of earning capacity.

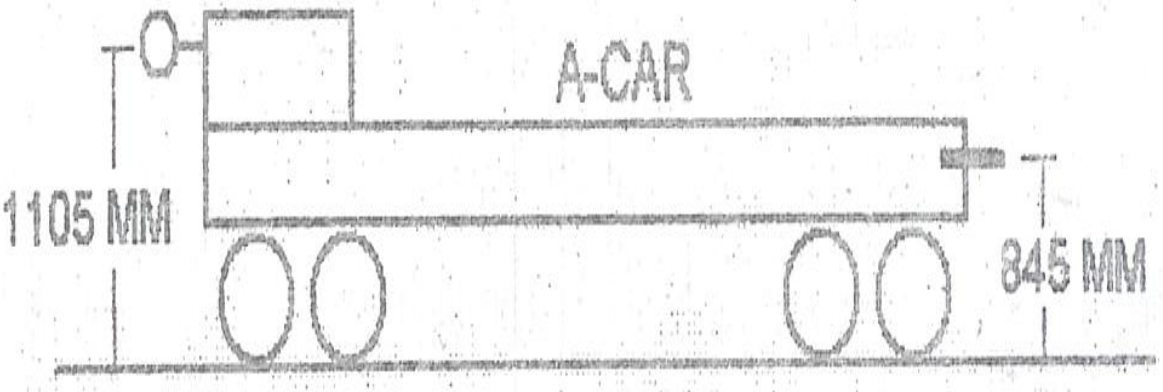
Well Wagon

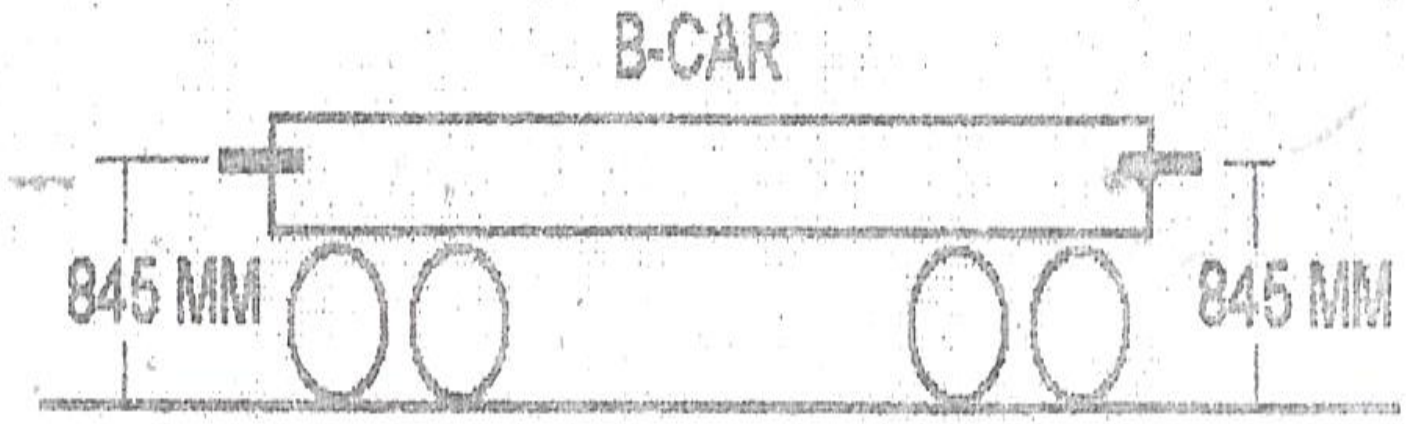
- So to over come the above two shortcomings, the BLC wagons are developed with a intention to move the ISO containers as non-ODC load with high speed as well as with more number of wagons for a given length of formation.

BLC Wagons

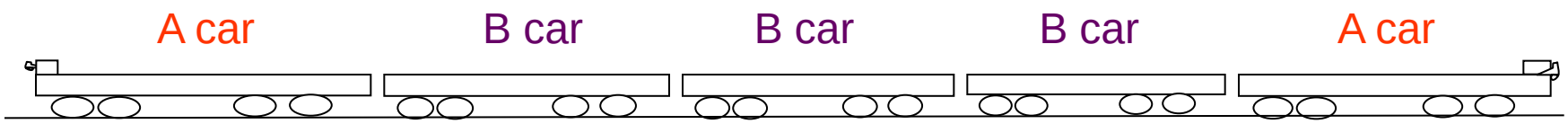
- **1. Special features of BLC wagons.**
- A. These wagons are designed to carry ISO containers with a height of 2896 mm as non-ODC load.
- B. These wagons are manufactured in multiple unites. Each multiple units consist of two A-CARS.

  C. The buffer height of outer end of A-CAR is 1105mm and it the inner end is 845mm.


A-CAR
1105 MM
845 MM

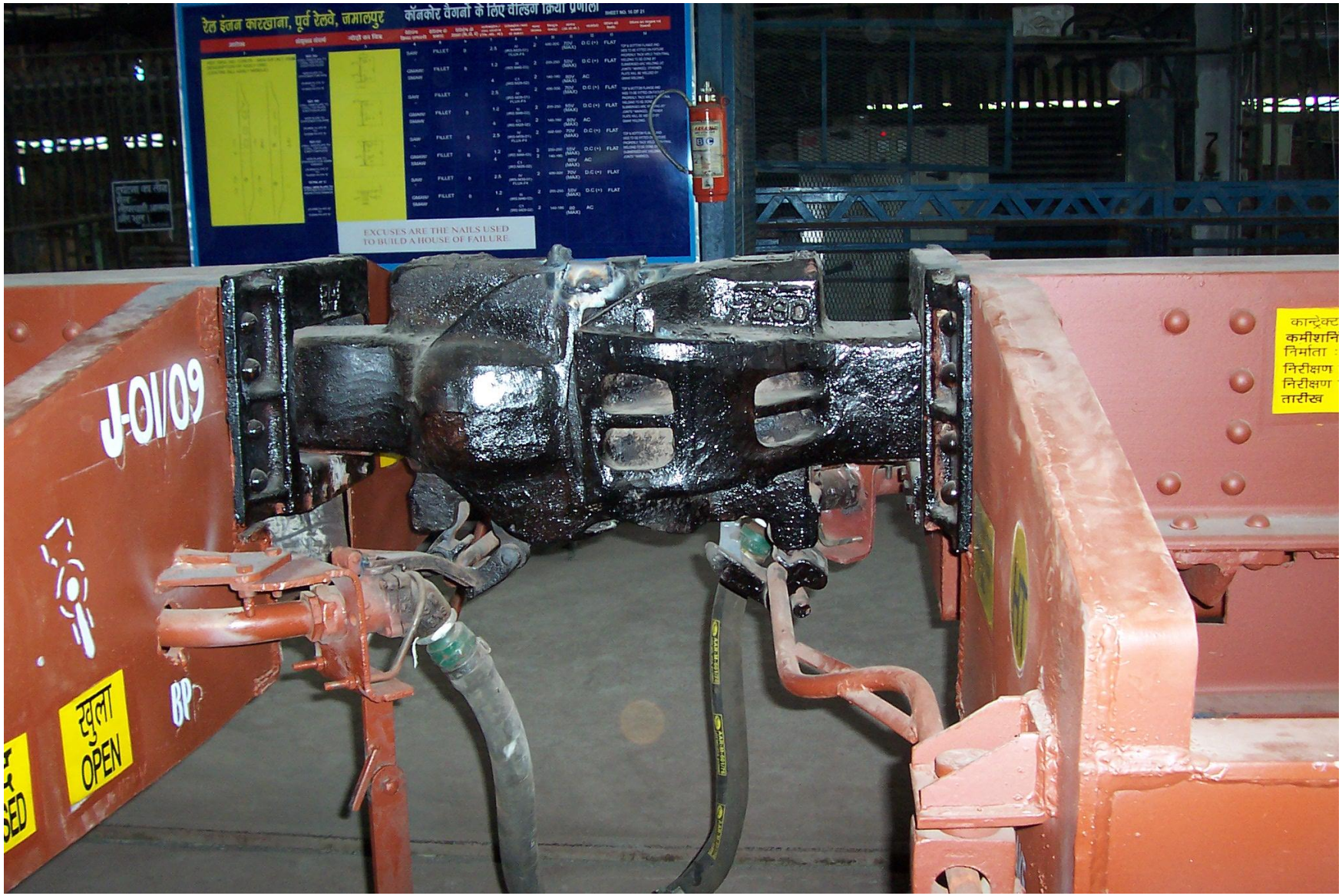

B-CAR
845 MM
845 MM

One Unit BLC Wagons

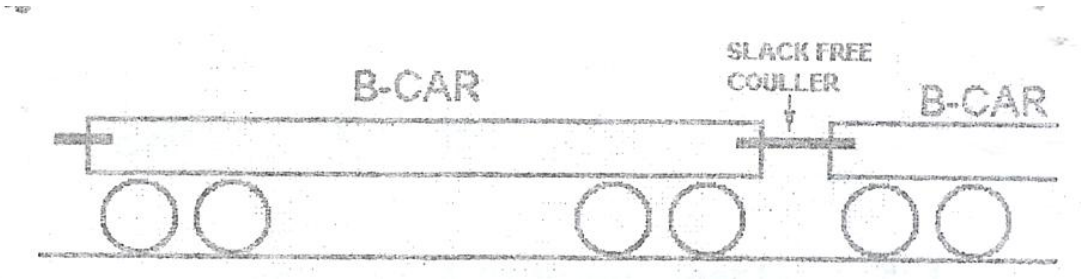


- D. Both the ends of B-CARS are having a buffer height of 845 mm .
- E. The outer end of A-CAR is provided with AAR CBC coupler and it the inner end is provided with slackness Couplers.

CBC fitting

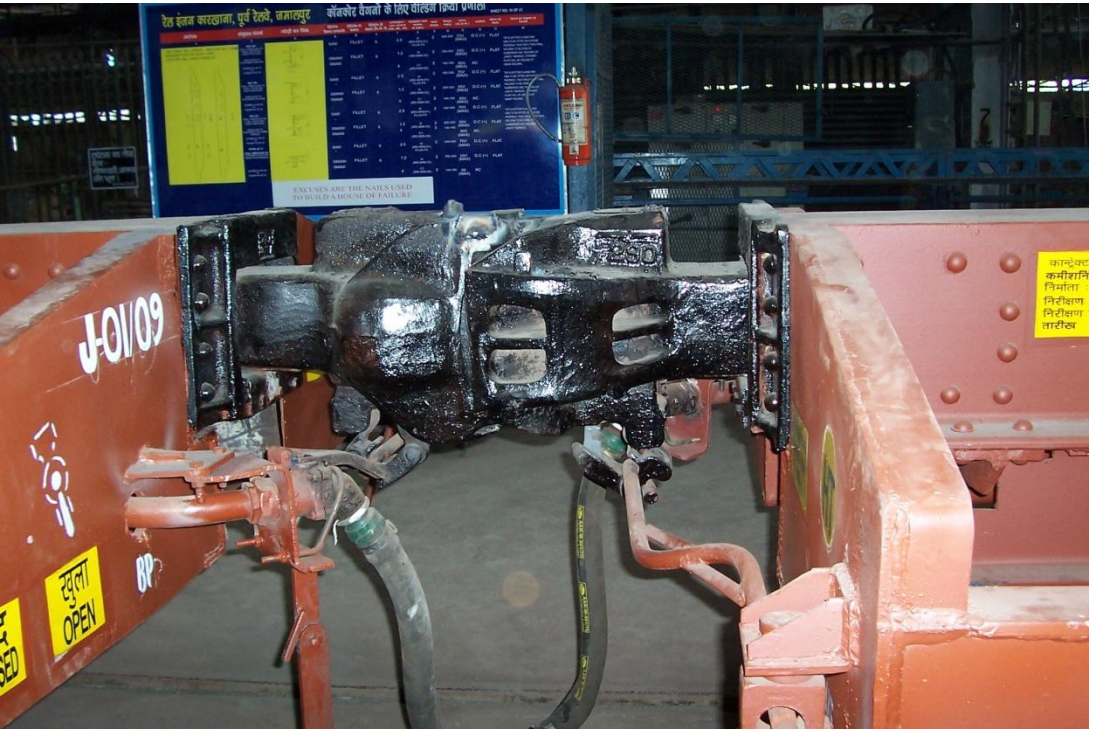

रेल इंजन कारखाना, पूर्व रेलवे, जमालपुर
EXCUSES ARE THE NAILS USED
TO BUILD A HOUSE OF FAILURE
J-01/09
BP
खुला
OPEN

- F. Both the ends of B-CARS are provided with slack less coupler.



G. The overall slack in slackness couplers between the two wagons is only $1^{1/2}$”,when compared to a slack of $7^{1/2}$” in the standard AAR CBCS between the two wagons.

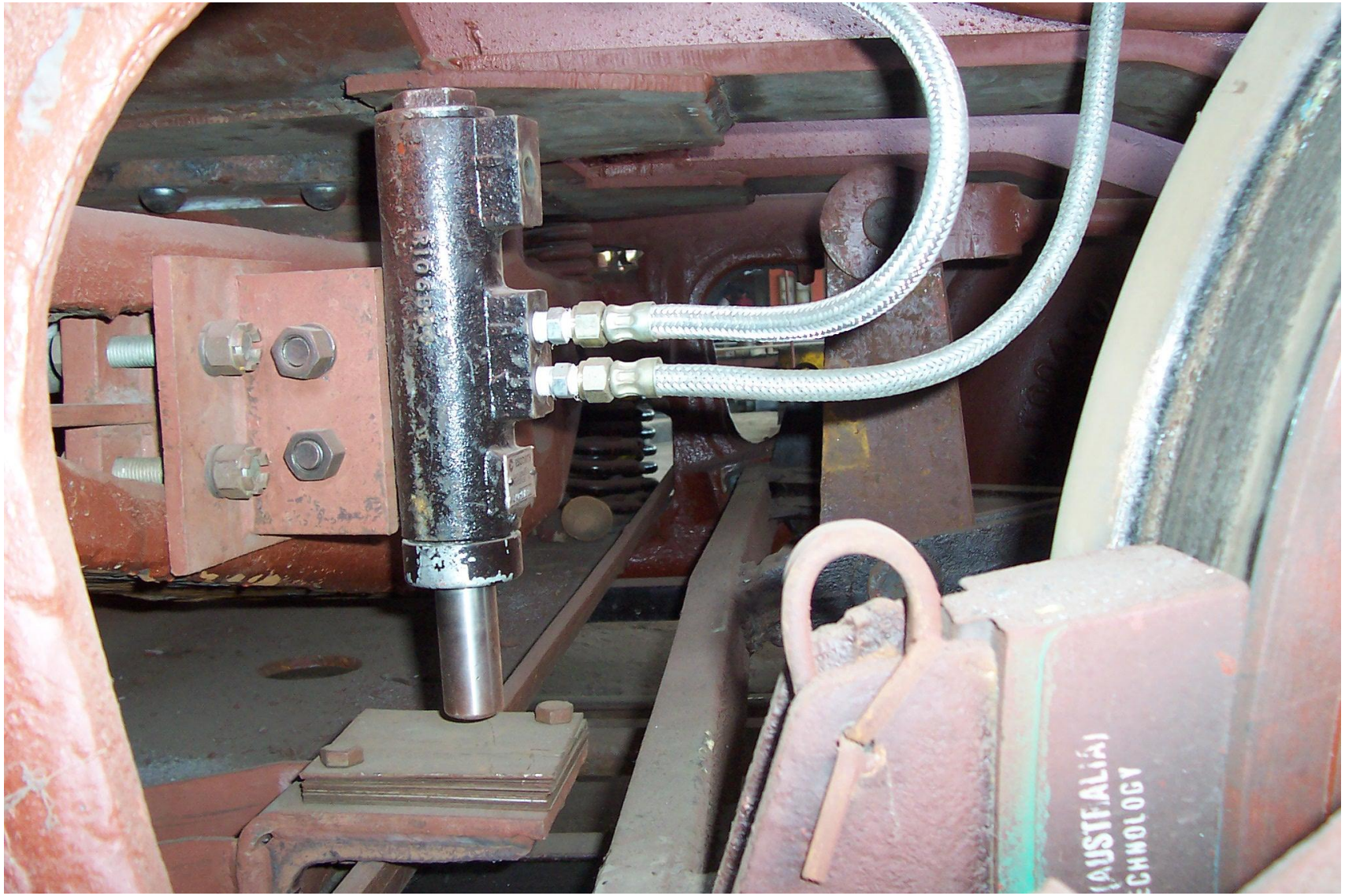
Slack less draw bar fitting



CBC fitting

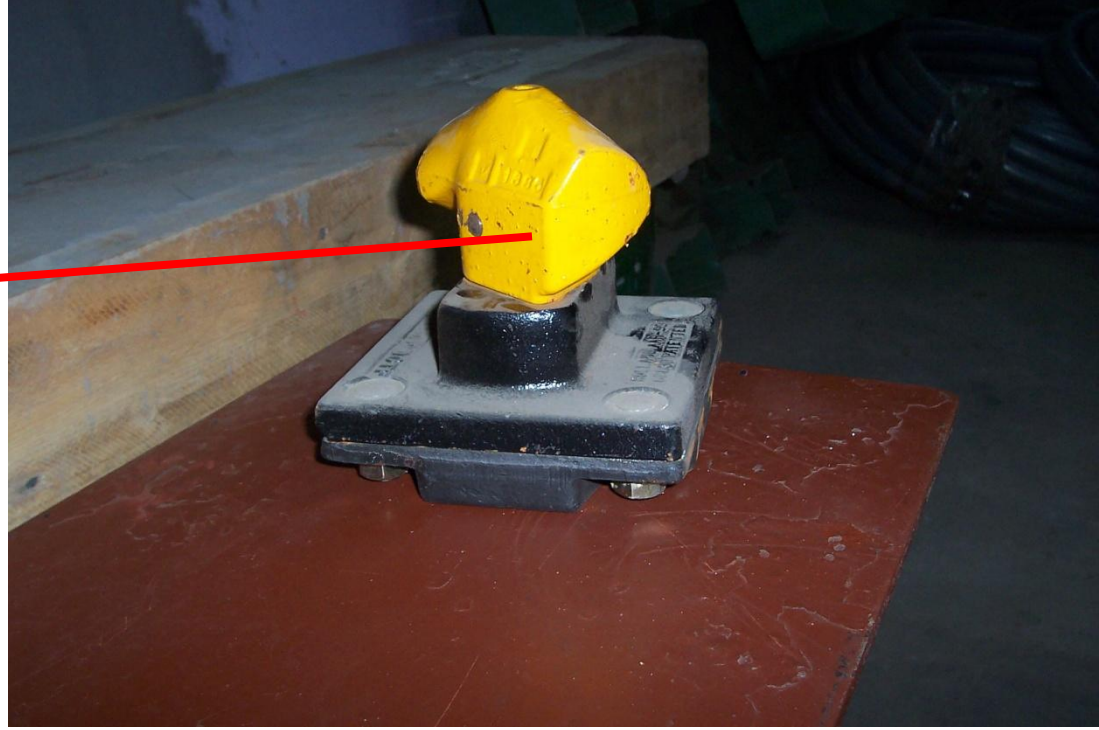
- The maximum permissible wheel diameter for both the wagons is 840mm. the Condemning diameter is 780mm.
- These wagons are provided with two stage load sensing device which admits a maximum pressure of 2.2kp/sq.cm when the gross load is less than 40 tons and 3.8kg/sq.cm when the gross load exceeds 40 tons automatically.
- The maximum permissible speed is 100KMPH.

Load Sensing Device



- These wagons provided with automatic twisting locks. These locks are designed to lock the containers with the wagons with a force of 600 kgs. It unlocks the container from the wagon with a force of 1000 kgs.
- The floor height of these wagons from the rail level is decreased to 1009 mm from the standard of 1269mm.
- A formation can be formed with 9 multiple units with 45 wagons. The length of each unit is 69 metres approximately.

Automatic Twist locks



- These wagons are provided with new hybrid design of bogie frame and bolster. In order to bring down the plat form height.
- **Note** (1) – Use of L type composition brake blocks are used in order to achieve an emergency braking distance within 1200 m.
- **Note (2)** – One container wagon – sick, the unit of 5 wagons to be disconnected.

Basic characteristics and dimensions

Sl No.	Description	A car	B car
1	Track gauge	1676	1676
2	Estimated tare wt.	19.10 t	18 t
3	Pay load	61 t	61 t
4	Gross wt.	80.10 t	79 t

Sl No.	Description	A car	B car
5	Length over H/stock	13625	12212
6	Width over sole bar at c/line	2100	2100
7	Distance between bogie centers	9675	8812
8	Floor height	1009	1009
9	Ht. of CBC from rail level	1105	-
10	Ht. of draw bar from rail level	845	845
11	Wheel base	2000	2000
12	Dia. Of wheel	840/780	840/780

Cast steel Bogie type LCCF 20(C)

- BLC wagons are mounted on two nos. of cast steel bogies **similar to** CASNUB bogies.
- **Salient features** -

Gauge - 1676 mm
Axle load – 20.32 t
Wheel dia. – 840(new)/780 mm (worn)
Wheel base – 2000 mm
Type of roller bearing – CTRB
Distance bet. Journal centers- 2260 mm
Distance bet. Side bearers – 1750 mm
Side bearers – Spring loaded side bearers

- **Center pivot** – Flat type
- **Bolster spring group** – Helical springs, inner spring lower than outer spring.
- **Damping**– friction spring arrgt. With spring
  - manganese steel wedge
  - friction liners on bolster & side frame.
- **Anti rotation features** – Anti rotation lugs are provided on bolster and simultaneous anti rotation stopper at side frame.
- **LSD** fitted on bolster and spring plank
- **Brake beam** – Unit type fabricated brake beam

LCCF 20 (C)

Centre pivot
rivetted to bolster

Integral flat type
centre pivot

Comparison of 22 NLB &container bogie type LCCF 20(C)

Description	22 NLB	LCCF20 (C)
C/pivot ht. from rail	932 mm	715 mm
Max ht. of side frame from rail	851	786
Bottom of side frame	165	149
Ht. of side bearer top	921	772
Wheel dia	1000/925	840/780
Side frame design	Cast steel design for narrow jaw adapter	Cast steel design for wide jaw adapter
Bolster design	Separate c/pivot	Integral c/pivot
Side bearer	CC pad	Coil spring

Description	22 NLB	LCCF20 (C)
Load bearing coil spring	12 outer,8 inner spring	14 outer,12 inner spring
Snubber springs	4,material IS:3195Gr.60 Si7	4, IS3195 Gr 50 CrMoV4
Brake shoe	Conventional	Non metallic
Adapter	Narrow jaw	Wide jaw
Elastomeric pads	similar	Similar
Side frame key	similar	Similar
Spring plank	similar	Similar

Ready for dispatch

Brake Van

BVZC

- Discomfort to Guard
- Chances to derailment due to sudden lifting of wheels as it is lighter than BOXN wagon specially in case of high speed.

BVZI

- Designed to improve riding quality of the brake van
- To increase speed potential to 100 kmph
- To provide increased comfort level for the guard during running goods train
- Two ICF bogie are used
- Oscillation trial is satisfactory up to 110 kmph
- Manufacturing at ASR workshop

BVZI

BVZI

- Improved Amenities on Brake Vans –
- Provision of additional window.
- Provision of cushioned fixed seat with arms.
- Provision of table with sun mica top for writing.
- Provision of storage space in cabin for guard's equipment.
- Provision of additional railings and fencings for safety during exchange of signals.

BVZI

- Provision of door locking arrangement from inside and outside.
- Provision of extended roof on both sides with steel sheet.
- Provision of modified footsteps with rounded corners.

BVZI

- Provision of side window glass of transparent acrylic sheet with wire mesh.
- Painting outside with silver paint and inside with white enamel paint.
- Painting of railings with reflective red colour to make them visible during the night.
- Further, provision of light and fan in 50 brake vans has also been approved by Railway Board on trial basis.

New Design of Wagons

MODIFIED CONTAINER FLAT BI-LEVEL AUTOCAR WAGON 'BCACM'

Features:

- Existing container flat wagons (A type & B type) modified by provision of a suitable Bi–level structure for transportation of autocars
- Can carry upto 270 auotcars
- Autocars like WagonR having higher height can not be transported.

Current Status: Design completed. Two rakes converted at Jagadhari Workshop. Inaugural run flagged off on 24/12/2008.

New Design of Wagons

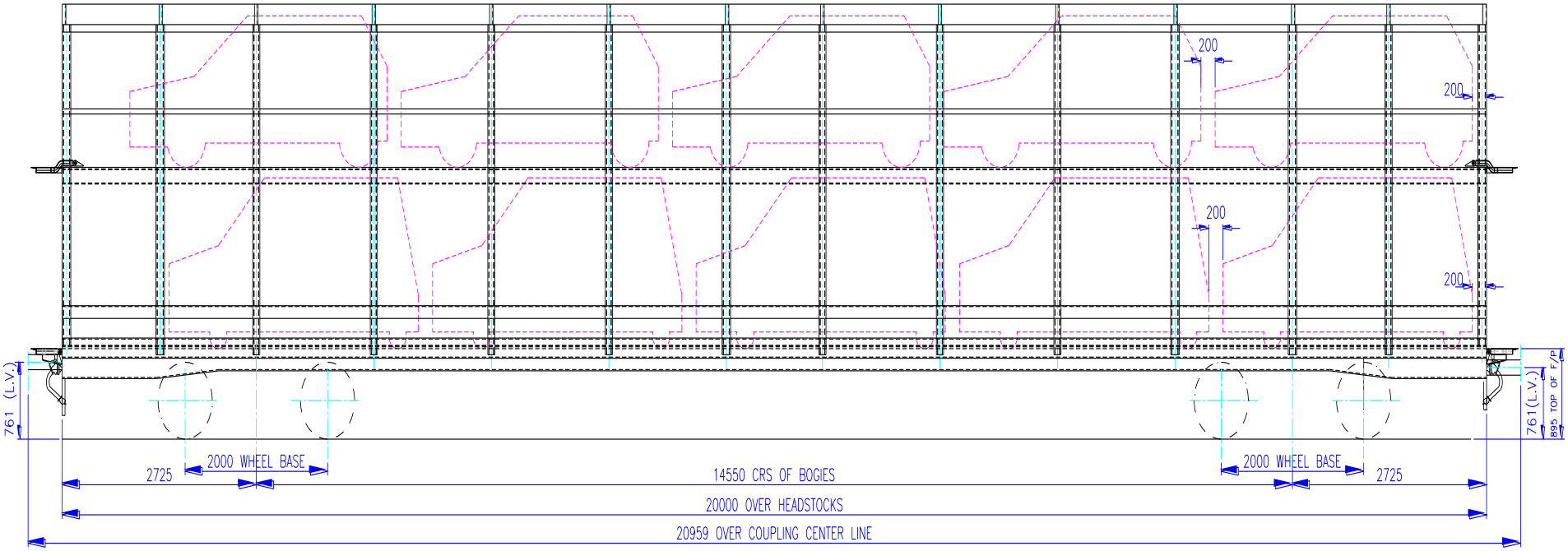
New Design Bi-Level Autocar Wagon (BCACB)

Features

- Dedicated wagon for transportation of autocars
- Can carry upto 294 autocars.
- New bogie design with lower wheel dia (760-700 mm)
- Lower axle load (10 t) & TLD (2 t/m)
- Provision of hydraulic cushioning devices

Status: Procurement of ten rakes included in RSP08-09. Design Submitted to Railway Board in February'08.

Diagram of Bi-level Autocar Wagon Type ‘BCACB’



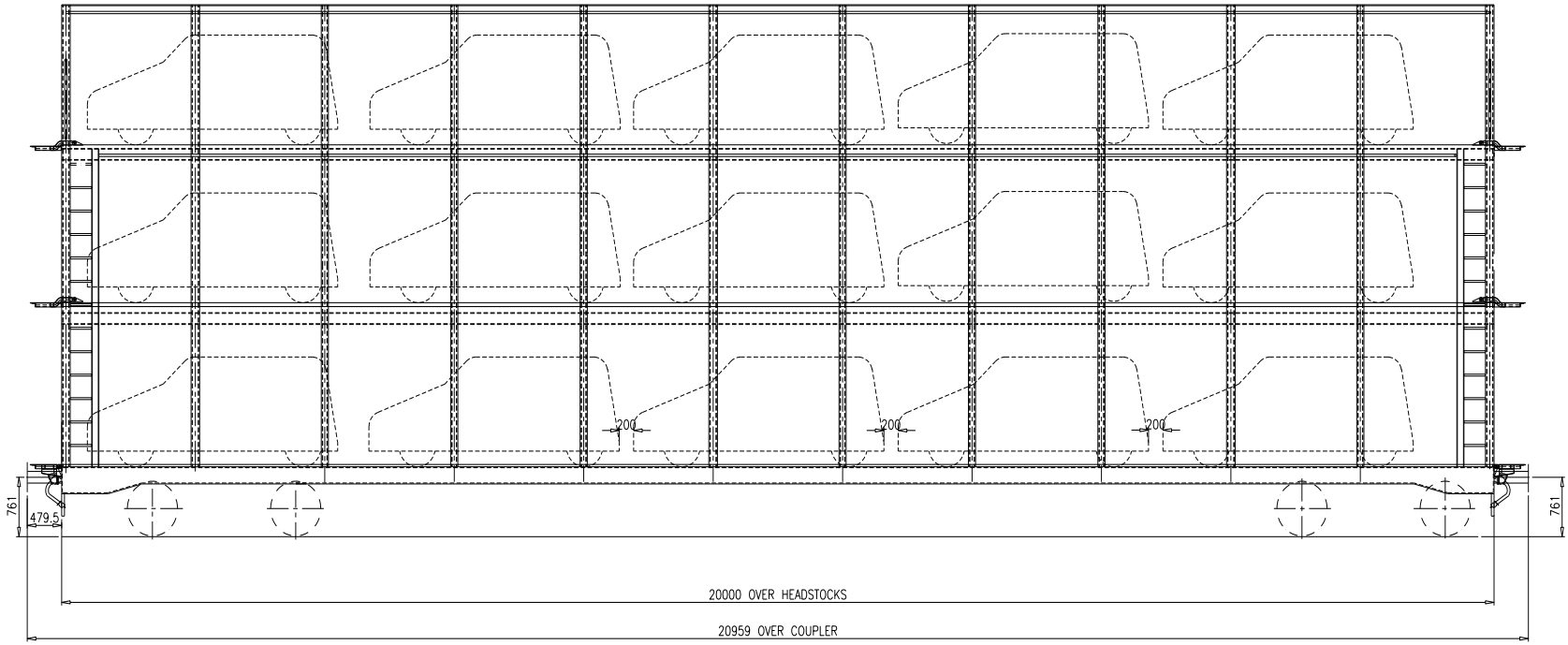
NEW DESIGN TRI-LEVEL AUTOCAR WAGON

Features:-

- Can carry upto 444 autocars
- Can run only on Double stack ISO container routes (i.e. presently Jaipur- Pipavav)
- Can accommodate various types of cars in three decks

Status: Conceptual design under-way

Diagram of Tri-level Autocar Wagon Type ‘BCACT’



Thank You