

CONTAINER WAGONS-

BLC TRAIN OPERATION AND MAINTENANCE PRACTICE

Duration: 6 Hrs.

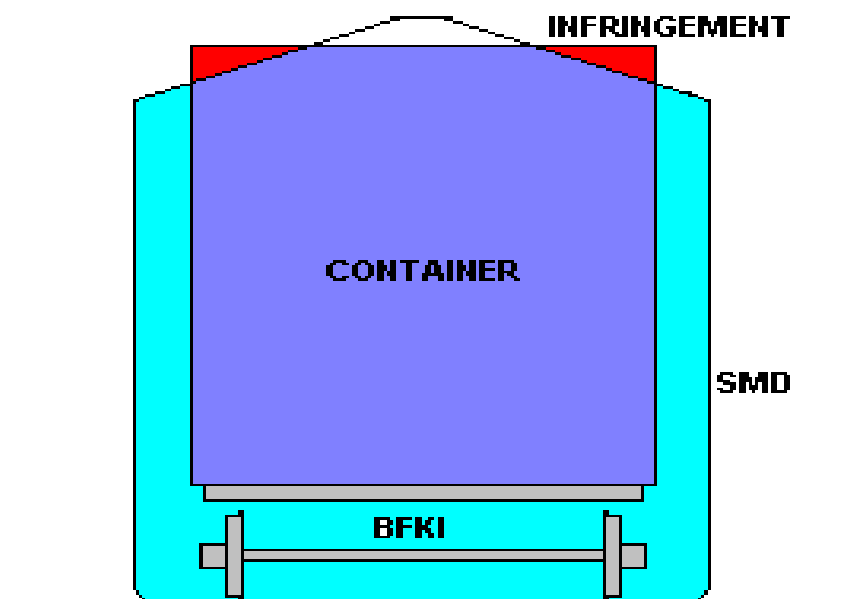
BLC wagon means - Bogie Low platform flat wagons for carrying ISO containers.

Different sizes of available containers:

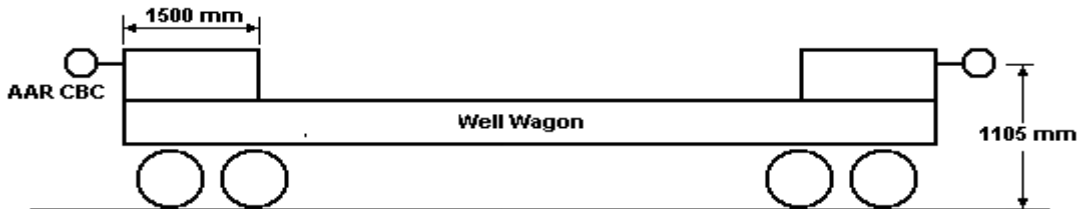
Description	Length	Breadth	Height
ISO Containers for inland movement	20 feet	2438 mm	2593 mm (8'-6")
ISO containers for international movements	20 feet	2438 mm	2896 mm(9'-6")
ISO containers for international movements	40 feet	2438 mm	2896 mm

Necessity for introducing BLC wagons:

1. 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 vertically and 533 mm horizontally. In such a case the load is to be moved as ODC and is not permitted to run at speeds more than 75 kmph. This will in turn decreases the speedy movement of containers.



- 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 in turn reduces the number of wagons on a loop line from 42 for the existing BFKI wagons to 38 resulting in loss of earning capacity.



So to overcome the above two short comings, 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.

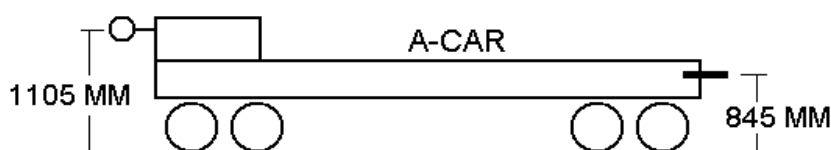
These wagons are manufactured in multiple units with low floor height at the centre to accommodate the ISO containers and raised at ends to facilitate coupling of these unit with the Loco and brake van. The wagon which is having raised at one end is called A-Car and the wagon which is not having raised end is called B-Car. Each multiple unit consists of two A-Cars at the ends and three B-Cars in the middle.

Special features of BLC wagons:

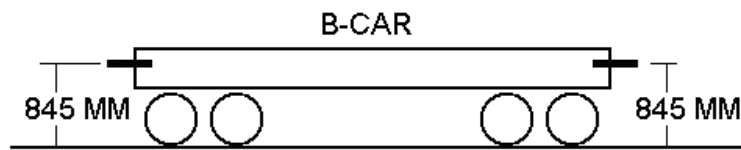
- These wagons are designed to carry ISO containers with a height of 2896 mm as Non-ODC load.
- These wagons are manufactured in multiple units. Each multiple units consist of two A-CARS and three B-CARS.



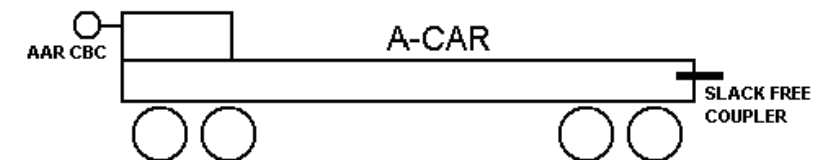
- The buffer height of outer end of A-CAR is 1105mm and at the inner end is 845mm.



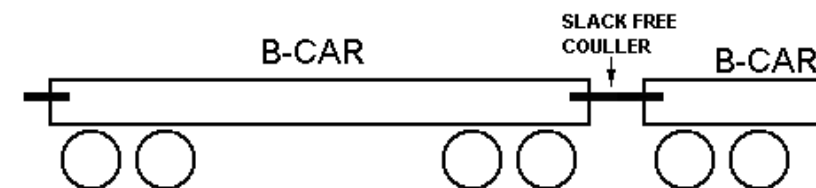
4. Both the ends of B-CARS are having a buffer height of 845mm.



5. The outer end of A-CAR is provided with AAR CBC coupler and at the inner end is provided with Slackless Couplers.



6. Both the ends of B-CARS are provided with Slackless couplers.



7. The overall slack in Slackless couplers between the two wagons is only 1 ½", When compared to a slack of 7 ½" in the standard AAR CBCs between the two wagons.
8. The maximum permissible wheel diameter for both the wagons is 840 mm. The condemning diameter is 780 mm.
9. These wagons are provided with two-stage load sensing device, which admits a maximum pressure of 2.2 kg/sq.cm when the gross load is less than 40 tons, and 3.8 kg/sq.cm when the gross load exceeds 40 tons automatically.
10. These wagons are provided with Cast Steel Casnub Bogie (CONTR-LCCF-20(C)) latest rev. The spring loaded side bearers are used on these bogies. The spring loaded side bearers are designed to take 90% of load in tare condition.
11. 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.



12. The floor height of these wagons from the rail level is decreased to 1009 mm from the standard of 1269mm.
13. The maximum permissible speed is 100 KMPH.
14. A formation can be formed with 9 multiple units with 45 wagons. The length of each unit is 69 meters approximately.
15. These wagons are provided with new hybrid design of bogie frame and bolster in order to bring down the plat form height.

Important Dimensions of BLC Wagons:

1. Floor height from Rail level : 1009 mm
2. Slack less drawbar height : 845 mm
3. Wheel Diameter : 840 mm (new)
: 780 mm (cond.)
4. Axle Load : 20.32 T
5. Tare weight - 'A' car - : 19.10 T
 'B' car - : 18 T
6. Carrying capacity : 61 T
7. Length of 'A' car : 13625 mm
8. Length of 'B' car : 12212 mm
9. Length of one unit : 69 metre (One unit = 2BLCA+3BLCB)
10. Length of one rake : 619 metre
11. Piston Stroke : 95 ± 10 mm in empty
: 120 ± 10 mm in loaded
12. 'A' dimension : 70 to 72 mm
13. BC pressure : 2.2 kg/cm² in empty
: 3.8 kg/cm² in loaded
14. Maximum Speed : 100 KMPH



Bolster Spring Free Height & Arrangement

Type of Spring	New	Cond.	Springs in one nest
Outer	260mm	245 mm	7 nos.
Inner	243 mm	228 mm	6 nos.
Snubber	288 mm	273 mm	2 nos.

Comparative Features of BLC-BFKI:

S.NO	FEATURES	BLC	BFKI
01	Wagon Unit	Consist of 5 wagons (2 Nos. A-CAR +3 Nos. B-CAR)	Single Wagon
02	Platform Height from RL	1009mm	1269 Wagon
03	Length of Wagon over Head Stock	A-CAR 13625 mm B-CAR 12212mm	13716mm
04	Tare	A-CAR 19.1t B-CAR 18.1t	20.5t
05	Pay Load	61 t	48 t
06	Wheel diameter	840mm	1000mm
07	Type of bearing	Tapered two row Cartridge bearing	Tapered two row cartridge bearing
08	Permissible Speed	100kmph	75kmph
09	Coupling	CBC & Slack less Draw bar	CBC
10	Twist Lock	Automatic	Manual
11	Empty/Load Device	Two stage automatic pneumatically operated	Manually leverage
12	Side Bearer Arrangement	Spring loaded side bearer arrangement	Rubber bonded
13	Suspension	Two stage suspension	Single suspension
14	Rake carrying capacity/Rake Length	45 Wagons	42 Wagons
15	Brake System	Air Brake	Vacuum Brake
16	Brake Cylinder Pressure	3.8 Kg/CM Sq. in loaded 2.2 Kg/CM Sq. in empty	-----

Important Parts of BLC Wagons:

(A) Automatic Load Sensing Device:

Low platform container flat is fitted with two stage automatic load sensing device in each of the bogie. Initial pressure of 2.2 kg/ cm² is set under the condition. Clearance between operating value and buffer is adjusted such that it operates when gross weight crosses 40 tonnes. At this changeover weight pressure in the brake cylinder raises to 3.8 kg/cm².



(B) Automatic Twist Lock:

In order to minimize the manual operation automatic twist locks of M/s Holland and co. USA is fitted on low platform container flat for securing the containers. (Unique feature of this lock is its locking and unlocking is automatic). Radii of spindle head are so designed that while lowering the container, lock automatically operates the moment of force of 600 kg is exerted by the container. For fitting the container from the container flat a force of 1000 kg is required for the lock to operate.

**(C) Slack Less/Free Couplers:****Different parts of Slack free couplers:**

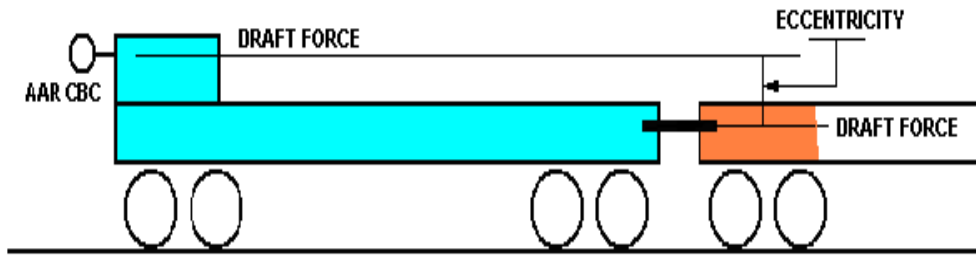
The Slack free draw bar system consist of,

- | | |
|-------------------------------|-----------------------|
| a). Key stone Mini draft gear | b). Straight draw bar |
| c). Standard AAR yoke | d). Striker casting. |

Necessity for providing the Slack Free/Less Couplers:

We know that the buffer height of A-Car at raised end is 1105 mm and for the B-Car is 845 mm. Due to the difference in buffer heights between the raised end of A-Car and the B-Car, the draft force transmission not lies on the same line. Because of the eccentricity in the draft line between these wagons, there is a possibility for off loading of wheel whenever the tractive force/buffing force is applied suddenly.

This sudden load is mainly caused by the excessive slack available in the standard AAR couplers. The shock loads acting on couplers can be prevented by reducing the slack between the two couplers.

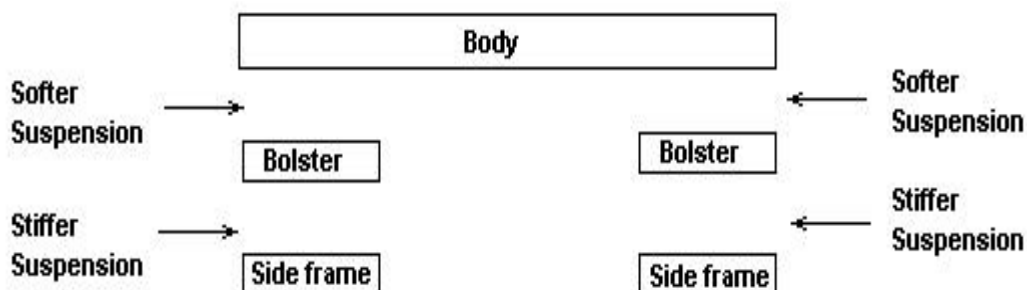
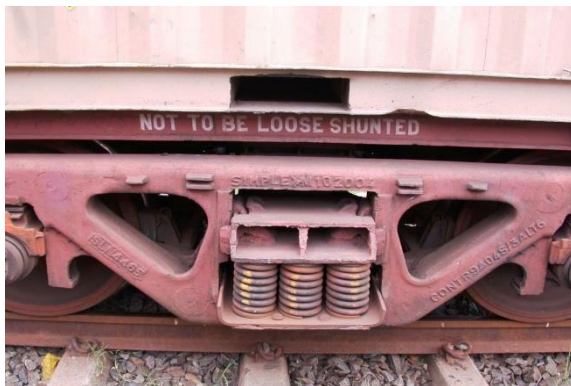


So to overcome the above shortcoming, the Slack less/free couplers are introduced for the BLC wagons at one of A-Car and at both ends of B-Cars.

Purpose of two stage vertical suspension:

These wagons are provided with two stage vertical suspension. These suspensions are necessary for providing softer suspension under tare and stiffer suspension under loaded condition.

The two stage vertical suspension is necessary to provide higher static deflection in empty condition, so that the spring off-loading in the empty condition lies within limits. Vertical suspension in loaded condition is stiffer on account of the constraint in the space between the bolster and the bogie frame



The softer suspension is provided between the body and bolster and the stiffer suspension is provided between the bolster and bogie frame.

Load Distribution:

The weight distribution between centre pivot and side bearers is optimized to avoid hunting. 90% of the body weight under tare condition is borne by the side bearers which are of spring loaded design to ensure that no hunting takes place. The spring loaded side bearer arrangement has the distinct advantage of retaining the load distribution between centre pivot and side bearers irrespective of any manufacturing inaccuracies in the body and bogie bolster as well as the condition of the wheel (New or Worn). 10% of body weight under tare condition & full pay load will be borne by Centre Pivot.

MAINTENANCE PATTERN OF BLC WAGON:-

Special conditions for examination of container trains (Close Circuit)

1. BLC wagon is maintenance free or requires very less maintenance. It is subjected to maintain for in CLOSED CIRCUIT RAKES.
2. The BLC rakes shall be based for maintenance at the nominated CC base depot.
3. The examinations of BLC rakes shall be done in empty condition, i.e. without containers on the wagons.
4. The BPC is valid for 6000km OR 30days for 'A' Class & 7500km OR 35 days for 'A' SPL Class yard whichever is earlier.
5. In case kilometers are not logged on BPC, the validity of BPC shall be for 20 days only from date of its issue (including the date of issue). The rake shall be returned back to its base depot within validity of the BPC.
6. If the rake stabled in the train examination yard for more than 24 hrs or more the rake is subjected safe to run examination and same BPC is revalidated for remaining period of the BPC.
7. If one unit i.e. five wagons of the CC rake is detached/attached this is not INVALID.
8. Rake with invalid BPC shall normally not be permitted to run in service. Further loading shall not be permitted in rakes with invalid BPC.
9. If the km /days of the BPC is completed before reaching the base depot, the validity of the BPC is extended for 7 days for one time unloading only. If it is in loaded condition after unloading the rake is sent in empty condition to base depot.
10. If km of run is not logged on BPC by crew, the BPC valid for 15 days from the date of issue of BPC.
11. All the rakes examined on CC pattern shall be subjected to safe to run examination by TXR (at TXR point) or by Guard & Loco pilot (at other points after every loading / unloading).

PROBLEM FACED DURING MAINTANENCE AND OPERATION OF BLC RAKE:-

1. Due to low platform container, it is trouble to repair and testing of brake power properly and consuming more time.
2. Provision of LSD, the plunger accumulating dust / cement and due to such problem, it is necessary to pay more attention for avoiding mall functioning of LSD.
3. Some container depot are not having C&W staff so loading /Unloading .The revalidation is necessary for locking of container is not done due to this locking of container is not so easy reroute.
4. Due to floating bolster on run while functioning of LSD .The plunger of VTA valve is not inserting directly into its housing and bending effects occurs on plunger, resulting damage to the VTA valve.

Safety of Container wagon:

Locks of all the container wagons should be checked during intensive examination and 100% availability of operating lock should be ensured before giving BPC.

Sufficient number of unit exchange spares should be made available to the maintenance units so those wagons are not detained for want of locks.

Commissioning of new BLC Rakes:

All new rakes of BLC wagons shall be commissioned by their respective CC base depot. The depot under taking commissioning of new BLC rakes will send detailed wagon-wise commissioning depot of such rakes to all concerned including Northern Railway, for centralize planning for ROH/ POH of all BLC wagons. During movement of new rakes from the manufacturer's placed to CC based depot, rake can be loaded one time in the direction of CC base depot.

Examination of Container Rakes in Loaded condition:

It is not feasible to examine BLC wagons with containers loaded on wagons as under frame safety items cannot be attended because of lower wheel diameter and floor height. In order to carry out examination of rakes in loaded conditions (container on wagon) on non pit lines, following inputs are required:

- Replacement of under frame mounted brake system with bogie mounted brake system for which a suitable design should be developed by RDSO.
- Mechanized defect detection systems like acoustic bearing detectors and online bogie monitoring systems etc. to be installed within 50 kilometers from base so that list of defects becomes available to TXR.

CTO may provide input as above or construct examination pit in their ICD or examination of rakes.

ROH OF BLC WAGON

A routine overhaul should be given to all wagons as a unit of 5 wagons (car A-2, car B-3) at nominated depot at intervals of 18 months. (Newly built 24 months)

Disconnect 5 car units in to separate individual cars. Each car required to undergo ROH individually. The important points generally to look into are given below for ready reference. Other details of ROH procedures as per RDSO instructions for ROH on wagons should also be looked into.

1. Remove bogie brake rigging attachments to under frames, break gears & flexible pipes connected to VTA.
2. Remove centre pivot split pin, lock pin and shackle lock etc.
3. Lift the body through lifting pads. Run out the bogie.

4. Clearance of 16 mm between load sensing device sensing tip to stopper are required to be maintained within tolerance of ± 1 mm.
5. Place the under frame on trestles.
6. After removing the side frame key and lifting the bogie remove wheel sets from the bogie. Machine the wheel tread of all the wheels to worn wheel trade profiles.
7. Strip the bogie. After proper cleaning, examine the bogie side frames, bolster and other castings for cracks etc.
8. All the side bearers' liners of the spigot and hole should be replaced. The procedure for attending the repairs of bogie frames, bolster and liners should be as per instructions.
9. Check bolsters springs and side bearer's springs for defective/broken springs. Replace the defective one such that variation in the free height of springs in the same group not to exceed 2mm.
10. Examine center pivot, center pivot pin, center pivot liner.
11. Strip brake gear fittings and examine for wear and damage and serviceability of bogie brake gear levers, replace worn out bushes and pins.
12. Examine the load sensing device on bogie with air brake in respect of item 5.
13. Replace all the worn out brake blocks and repair worn out brake heads.
14. Check the roller bearings for grease leakages and check adapter and replace if found any defect.
15. Reset the load sensing valve on bogie and tack weld the fasteners after setting with the necessary gap (16mm) between tip and stopper as mentioned.
16. Examine under frame brake gear levers; replace worn out bushes and pins.
17. Examine slack adjuster (SAB) and replace or attend to the defects as per RDSO instructions G-92. After fitment set the SAB "A" dimensions 72 with +0 and - 2 mm.
18. Check up hand brake arrangement for repair. Replace the missing or damage parts. Lubricate the gears.
19. Lower the under frame on bogies and provide pivot pin shackle, pin with split pin and connect brake gear pin. Dimensions 60 with +0 and -0.5 mm between center pivot top to side bearer top liner should be maintained.
20. Test air brakes as per G-97 RDSO instructions.
21. Check automatic locks. Replace the defective locks. Check welding failures. Check automatic locks for any damage to lock head and for rotation of head. Change the lock head and rubber spring of locks.
22. Check the distance from side frame top liner to side bearer seat 131 with +0 and -0.5 mm at all four side bearer points under tare conditions of the flat wagons. Keep the distance within tolerance by altering shims provided at the top side bearer locations.

23. Ensure all APD (anti pilferage devices) measures are incorporated after assembly.
24. Paint the bogie, stencil station code and date of ROH.
25. Touch up pain and lettering.
26. Special instructions: The draw bar height and CBC height should not be more than 845 mm and 1105 mm respectively. No packing is given over axle box adapter.

The following items must be attended to during ROH of BLC rakes:

1. Ultrasonic testing of axles.
2. Wheel treads profiling.
3. Side bearer liner renewal for spigot and base.
4. Wide jaw adapter renewal/replacement.
5. Side frame repair/ building up at location of adapter.
6. Brake beam (truss bar) pocket liner replacement/ rotation.

LOADING OF CONTAINER ON BLC WAGON & TROUBLESHOOTING:

Container when loaded/unloaded by KALMAR (Special Crane.) pressure on twist lock is not perfectly vertical at JNPT/NSICT. As a result following problems arises:

1. Cases of trolley shifting and sometimes body/trolley and wheels are dismantled.
2. Center pivot pins get bend and ring damaged.
3. EM pads are damaged and broken.
4. Adaptor gets canted.
5. Side bearer springs shifted/ broken.
6. Twist lock head damaged.
7. Due to rough loading excess pressure comes to wheel set bearing and oil film between roller and race may cut which causes grease oozing resulting hot axle.

Remedy: To reduce this problem now at JNPT/NSICT loading is done by EOT.

Examination pattern & Rake formation

1. Generally CC Rakes are formed with 45 wagons (9 units) & 1 Brake Van.
2. CC/Free circuit BPC issued for 6000km/30days in 'A' class Yard.
3. CC/Free circuit BPC issued for 7500km/35days in Special 'A' class Yard.
4. Special attention is to be given during examination on Composite b/block, brake power 100%, EM Pad, T/Lock etc.
5. After every loading/unloading revalidation of BPC is compulsory and then special attention is to be given that loading of container is perfectly set on ATL.
6. Examination must be at base depot.-TKD/GMC/AQ/SBI/DER.
7. 100 man hrs. Is required for examination.
8. Piston stroke of BC is maintained 95±10 mm in empty & 120±10mm in loaded condition.
9. Periodicity of POH – 6 years & ROH for newly built – 24 months, Subsequent ROH – 18 months.

Advantages

1. Due to reduction in CBC coupler chances of train parting almost nil.
2. During acceleration and de-acceleration, impact on loaded consignment is reduced resulted lesser damage of body & trolley.
3. Reduction in maintenance cost.
4. Theft cases are completely eliminated.
5. Transportation time is reduced due to quick loading & unloading of consignments.
6. Carrying capacity is increased as reduction of tare weight.
7. Hence earning of Railways is increased.

Limitations

1. Whenever anyone wagon is marked sick, unit of five wagons has to be detached.
2. Re railing at the time of derailment due to 5 wagons coupled.

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