

Document No:	Technical Pamphlet No. G-106	Version No: Nil	Date Issued: Feb-2014
Document Title: Operation and Maintenance Manual for Bogie Covered Double Decker Wagon Type “BCACBM”			

# GOVERNMENT OF INDIA MINISTRY OF RAILWAYS



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## OPERATION AND MAINTENANCE MANUAL FOR BOGIE COVERED DOUBLE DECKER WAGON TYPE “BCACBM”

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## **PREFACE**

This manual contains instructions for the maintenance and operation of Bogie Covered Double Decker Wagon Type “BCACBM”. The Broad Gauge Bogie Covered Autocar carrier wagon to diagram drawing No.-WD-11013-S-01 has been developed by RDSO for transportation of automobile cars. A rake of these wagons consists of 3 units; each unit consists of 9 wagons- 2 nos. wagon ‘A’ & 7 nos. wagon ‘B’. Both ‘A’ and ‘B’ wagons have twin decks to accommodate cars. The upper decks of both wagons are movable to accommodate different heights of cars by diamond screw jack arrangement fitted in the wagon. Wagon-‘A’ is fitted with CBC couplers on both ends with the coupler at one end at a designed height from rail level as 1105mm, the other end incorporates CBC at a lower height of 861mm. Wagon-‘B’ is fitted with CBC couplers on both ends at a designed height from rail level as 861mm. Each unit shall be moved as one entity and the movement of individual wagon (i.e. Wagon-‘A’ and Wagon-‘B’) shall not be done. The design incorporates LCCF-20 (C) bogie with speed potential of 100 kmph and single pipe graduated release air brake system. This wagon is fit to run up to a maximum permissible speed of 100 kmph in empty and 95 kmph in loaded condition.

The movement of the wagon on the Indian Railway network shall be governed by the RDSO Final Speed Certificate No.MW/BCACBM dated 27.02.2013 and its amendments issued from time to time.

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## 1. SCOPE:

This maintenance manual is for Broad Gauge Bogie Covered Autocar carrier wagon type “BCACBM” to diagram drawing No.-WD-11013-S-01 designed by RDSO for transportation of automobile cars and does not apply to any Automobile Car Carrier Wagon owned by Railways or private parties.

## 2. LEADING PARTICULARS:

PARTICULARS			Wagon-A	Wagon-B
2.1.	Length over headstocks		22626 mm	22626 mm
2.2.	Length over coupler faces		23555 mm	23555 mm
2.3.	Bogie Centre		14345 mm	14345 mm
2.4.	Width over sole bars		2896 mm	2896 mm
2.5.	Inside width between side stanchion faces		2746 mm	2746 mm
2.6.	Overall width of roof		2900 mm	2900 mm
2.7.	Overall height from R.L.		4305 mm	4305 mm
2.8.	Height of CBC from R.L.		X-End 1105 mm Y-End 861 mm	Both Ends 861 mm
2.9.	Height of Lower deck floor from R.L.		X-End 1182 mm Y-End 938 mm	Both Ends 938 mm
2.10.	Height of movable upper deck floor from R.L. (in Step of 50mm)		X-End 1306-2006 mm Y-End 1550-2100 mm	Both Ends 1550-2100 mm
2.11.	Estimated Tare		35.860 T	35.720 T
2.12.	Pay Load		15 T	15 T
2.13.	Gross Load		50.860 T	50.720 T
2.14.	Number of wagons per rake		06	21
2.15.	Maximum number of cars per rake		318	
2.16.	Axle Load		12.715 T	12.680 T
2.17.	Operating Speed (Maximum)	Empty	100 kmph	100 kmph
		Loaded	95 kmph	95 kmph
2.18.	Material of construction for wagon body		IS:2062 E250A with Cu, IS:1079 Gr-'O', IS:4923-97, IS:513 Gr-'O'	
2.19.	Couplers		High tensile non- Transition CBC to RDSO STR No. 48-BD-08	
2.20.	Draft Gears		High Capacity Draft Gear to RDSO STR No. 49-BD-08	
2.21.	Bogie		LCCF Bogie to specification no. CONTR-LCCF20 (C)-96 <ul style="list-style-type: none"> <li>Wheel Base 2000 mm</li> <li>Wheel Dia on Tread (new) 840 mm</li> <li>Wheel Dia on Tread (worn) 780 mm</li> <li>Axle load capacity 22T</li> </ul>	
2.22.	Brake system		Single pipe graduated release air brake system. <ul style="list-style-type: none"> <li>Air Brake Equipment to RDSO STR No. 02-ABR-2002</li> <li>Air Brake Pipe and Pipe Joints to RDSO STR No. 04-ABR-2002</li> </ul>	

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### 3. Overhaul, Inspection and testing (Maintenance Schedule):

In order to keep the wagon in good fettle, following schedule of maintenance are recommended:-

- a) Trip examination
- b) Routine overhauling (ROH)
- c) Periodic overhauling (POH)

The periodicity and the kilometrage of the various schedules shall be in accordance with the instructions issued by the Railway Board from time to time.

#### 3.1. Trip examination:

**3.1.1.** The trip examination for the BCACBM wagon at the originating and terminating stations shall be done at nominated “Base Depot”. Since these wagons are generally to be run in unit train service, being a special commodity rolling stock, involving wagon to wagon transfer of commodity during loading/unloading shall make efforts to maintain the integrity of the rake.

**3.1.2.** The Incoming rake, after unloading of automobile cars at loading and unloading terminals, is required to be placed on maintenance lines for inspection and attention. The details of tentative examination and attention required thereon in general are listed below:

- i) All underframe fittings including brake gear, draw & buffing gear and running gear should be examined and made in sound condition with all fittings intact.
- ii) Wheels must be tapped to detect loose/cracked wheel.
- iii) The wheel profile should be checked to ensure that rejectable defects have not been allowed. Tyre Defect Gauge may also be used for this purpose.
- iv) The Air Brake system of the rake should be checked as follows:
  - a) Connect compressor line on stationary air compressor to one end of rake through a Rake Test Rig as per RDSO instruction G-97.
  - b) Charge the Brake Pressure of rake to 5 kg/cm<sup>2</sup>.
  - c) Check and attend to the parts of Air Brake System components like Distributor Valve, Slack Adjuster (SAB), Brake Cylinder, Centrifugal Dirt Collector, Cut-off Angle Cocks, Auxiliary Reservoir, Hose Coupling etc as per manufacturer's manual/As per RDSO instruction G-97. Release condensates wherever collected in the Air Brake System.
  - d) Check the "A" Dimension of Slack Adjuster and set to dim. 70 +2, -0 mm. Adjust the pins in the pull rod holes if required. Due corrections and repairs to be made for ensuring 100% Brake Power.
  - e) Record reading as per proforma specified at page 15 of this manual.
  - f) The piston stroke should be 100±10 mm in empty and loaded condition.
- v) The general conditions of underframe, bogies, side bearer assembly etc. should be examined and repairs attended to.
- vi) Check all safety fittings, safety brackets etc and defects if any attended to.
- vii) Inspect hand brake system for proper functioning.
- viii) One bogie complete in all respect may be kept as spare to save time and power.
- ix) Inspection of all springs (side bearer and suspension).
- x) Visual inspection of Elastomeric pads for any defect.

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- xi) Examine the wagon underframe and superstructure visually to identify distress, if any wagons found with distress makes that are unattendable in the yard should be marked sick and attended to in sickline.
- xii) All end doors and flap doors to be properly and effectively secured in closed position.
- xiii) All screw jacks for operating the middle deck adjustment should be in disengaged position. Greasing of the jack spindle shall be carried out if required for ease of movement of middle deck.
- xiv) All middle decks of the wagon to be properly and effectively secured in locked position.
- xv) All the originating trains should be examined by train examining staff before despatch to ensure that the wagons are in a fit condition and do not have any rejectable defects. The rejectable defects are those defects covered by IRCA Manual such as defective/broken parts of running gear, draw and buffing gear, Elastomeric pads, springs, side bearer arrangement, air brake system, wheel and axle assembly, automatic locks etc. It is to be noted that a certificate has to be given to the yardmaster by the TXR to this effect without which the trains cannot be despatched
- xvi) The level of Air pressure on the Engine and the brake van along with the percentage of effective brake power must be recorded on the brake power certificate and countersigned by the driver and the guard. Preferably 100% brake power should be ensured at the primary maintenance station. One Car may be allowed to have a dummy (ineffective) brake cylinder on en-route/return trip.
- xvii) Before loading and unloading, the wagons shall be visually examined by the representative of automobile car company to be ensured that the requirements of deck heights for safe loading and unloading of automobile cars.

### **3.2. Routine overhauling (ROH):**

**3.2.1.** A first routine overhaul should be given to all wagons as a unit of 9 wagons (Wagon A-2, Wagon B-7) at the nominated depot.

**3.2.2.** Disconnect 9 wagon units into separate individual wagon. Each wagon requires to undergo ROH individually. The important points generally to look into is given below for ready reference. Other details of RDSO standard ROH procedure should also be followed.

- (1) Remove bogie brake rigging attachments to underframe, brake gears & flexible pipes connections.
- (2) Remove center pivot split pin, lock pin & shackle lock etc.
- (3) Lift the body through lifting pads.
- (4) Run out the bogie.
- (5) Place the structure complete on trestles.
- (6) Visually inspect the structure of the wagon if found any defects like welding cracks, sidewall stanchion deformations, corroded side panel, roof profile deformation, locking of upper decks, locking of end doors, locking of flap doors, door hinge, missing of door hinge pins etc which shall be rectified and dimensions will be maintained as per RDSO drawings listed with this manual.

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- (7) Visually inspect the structure of the upper deck, maintain the camber along width, if lost, check clearances of all deck guide rollers with roller guide pressing and maintain per drawing no WD-11013-S-05. Checks the workings of all screw jack arrangement provided in the wagon and make sure the proper functioning of lifting arrangements for middle deck. Also check locking arrangement of deck with side stanchions and make sure for proper functioning of locking arrangement.
- (8) 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 new wheel tread profile.
- (9) Strip the bogie. After proper cleaning, examine the bogie side frames, bolster and other castings for cracks, wear surface etc.
- (10) All the side bearer liners of the slide block and side bearer seat should be replaced.
- (11) Checks bolster springs & side bearer springs for defective/broken springs. Replace the defective one such that variation in the height of springs in the same group not to exceed 2mm
- (12) Examine centre pivot, centre pivot pin, centre pivot liner, side bearer liner & side bearer springs.
- (13) Strip brake gear fittings and examine for wear & damage and serviceability bogie brake gear levers. Replace worn-out bushes & pins, brake blocks and repair worn out brake heads.
- (14) The attention and repair of bogie and its components should be done as per chapter "CAST STEEL BOGIE TYPE LCCF 20 (C)-96" of 'Maintenance Manual of Bogie Container Flat wagon type BLCA/BLCB' (latest revision) issued by RITES.
- (15) Thoroughly inspect axle boxes externally for any sign of defects such as grease leaking out, visible sign of damage or seized bearing. Rotate axle box by hand to see that it revolves freely and smoothly Defective wheel sets on this account should be sent to POH shop for repair. Check adapter & replace if found any defect.
- (16) Examine underframe brake gear levers; replace worn-out bushes & pins.
- (17) Examine slack adjuster (SAB) and replace or attend to the defects as per RDSO instruction G-92. After fitment set the SAB "A" dimension 70 +2, -0mm.
- (18) Examine all draft & Buffing gear, CBC, uncoupling gear etc. Attend to defective or worn-out parts as per RDSO instructions G-76. Examine Draft Gear and replace the defective one. Dimension 25mm clearance of the wedge block on the Yoke should be maintained.
- (19) Check-up Hand Brake arrangement for repair. Replace the missing or damaged parts. Lubricate the gears.
- (20) Lower the under frame on bogies and provide pivot pin shackle, pin with split pin. Check the C.P assembled height which should be in the range of 71mm to 73mm.
- (21) Dimension 66±3mm between underframe bolster bottom plate to bogie side frame top should be maintained.
- (22) Test air brake as per RDSO instruction G-97.

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- (23) Check the distance from Side Frame top liner to Side Bearer Seat 131 +0, - 0.5mm at all four Side Bearer points under tare condition of the Flat Wagon. Keep the distance within tolerance by altering Shims provided at the top side bearer locations.
- (24) Paint the bogie, stencil station code & date of ROH.
- (25) Touch up paint & lettering if required as per RDSO drawing no. WD-11013-S-26.
- (26) Special instruction: The CBC height should not be more than 861mm on both end of Wagon-B, 1105mm on X-end of wagon-A and 861mm on other end of Wagon-A. No packing be given over axle box adapter for CBC height adjustment.
- (27) All items of Air brake equipment to be ROH as per instructions laid by RDSO instruction G-97.

### **3.3.Periodic overhauling (POH):**

- 3.3.1.** All items of ROH attention shall be attended to in POH.
- 3.3.2.** The general procedure laid down for POH of BOXN and other wagons are applicable to these wagons. As these wagons are as module/unit of 9 wagons containing 2 Wagon ‘A’ and 7 Wagon ‘B’, the BCACBM wagons may be sent to nominated wagon repair shops for POH in a complete module/units so that the shops can turn out the wagons as modules/units for service.
- 3.3.3.** The unit will be disconnected and maintenance and repairs as individual wagon carried out as per routine POH method.
- 3.3.4.** The important aspects, which require particular attention, are given below:

#### **3.3.4.1. Bogie Shop:**

- (1) The procedure for attending the repairs of bogie frames, bolster and liners are maintained as per chapter "BOGIE Type LCCF 20 (C)" of Maintenance Manual of Bogie Container Flat wagon latest revision.
- (2) Dismantle the bogies, replace the pins and bushes in brake gear, check the side frames and bolster etc. for any defect. Attend or replace as necessary.
- (3) All the side bearer liners of the slide block and side bearer seat should be replaced.
- (4) Check the springs and replace the defective ones. All the springs are required to be tested as per load test chart.
- (5) Check the side bearer parts, centre pivot and its liners. All liners including centre pivot liner need replacement.
- (6) All brake gear components should be dismantled, cleaned and necessary repairs are to be carried out. All pins and bushes require renewal.
- (7) Attend to wheel sets for new tread profile. All Roller Bearings need thorough attention.
- (8) Assemble the bogies and check for leading dimension and tolerances.



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- (9) Side Bearer Springs may be replaced if the heights under load testing of individual springs are not within specified limits.

#### **3.3.4.2. Complete structure and Assembly Shop:**

- (1) Place the Complete structure on trestles.
- (2) Underframes should be wire brushed, or shot blasted & cleaned and checked for any member being defective due to welding defects, etc. and defects are attended to before primer coat paint.
- (3) All stiffeners, strengthening pieces, side stanchions, end doors and flap doors etc. checked for defect and repair to be carried out.
- (4) Visually inspect the structure of the wagon if found any defects like cracks in underframe, welding cracks in any structural members, sidewall stanchion deformations, corroded side panel, roof profile deformation, locking of upper decks, locking of end doors, locking of flap doors, door hinge, missing of door hinge pins etc. shall be rectified and dimensions will be maintained as per RDSO drawings listed with this manual.
- (5) Visually inspect the structure of the upper deck, maintained the camber if lost, clearances of deck guide rollers with roller guide pressing as per drawing no WD-11013-S-05. Checks the working of all screw jack arrangement provided in the wagon and make sure the proper functioning of lifting arrangements for middle deck. Also check locking arrangement of deck with side stanchions and make sure for proper functioning of locking arrangement.
- (6) Check all deck guide rollers if found worn out replace them as per Item no.-7 and 8 of RDSO drawing no WD-11013-S-05.
- (7) Visually inspect the stanchions and measure the distance between sides stanchion at two locations i.e. bottom and top of all stanchions of the wagon and maintain straightness of side stanchions for proper movement of upper deck.

#### **3.3.4.3. Air Brake equipment:**

- (1) Air Brake equipment are attended to by replacing all rubber items & defective parts, as per instructions laid by RDSO instruction G-97.
- (2) Clean the strainers & drain the water and dirt etc. in dirt collectors, Auxiliary Reservoir, etc. Attend to air brake as per instructions laid by RDSO instruction G-97.
- (3) Remove SAB, dismantle and change the worn-out parts, grease the items inside and attend to as per RDSO instructions G-92 to the extent applicable.

#### **3.3.4.4. CBC and Draft Gears:**

- (1) Dismantle & attend to worn-out parts by replacing/attending to the defects in components draft gear, coupler body, yoke, yoke pin, wear liner on coupler body and striker casting, uncoupling gear etc. as per RDSO instructions G-80.
- (2) Examine all draft & Buffing gear, CBC, uncoupling gear etc. Attend to defective or worn-out parts as per RDSO instructions G-76.

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- (3) The CBC height should not be more than 861mm on both end of Wagon-B, 1105mm on X-end of wagon-A and 861mm on other end of Wagon-A. No packing be given over axle box adapter.

#### **3.3.4.5. Paint Shop:**

Painting & marking of station code, POH date, Base Depot, return date etc. shall be followed as per RDSO marking diagram drawing No.WD-11013-S-26 with latest alteration for both wagons. After painting and marking sufficient drying time should be allowed between each coat.

#### **4. Material Handling Equipment/Facilities Required For ROH Depot:**

1. Material Handling Equipment Facilities Required are given as below:
  - i) Overhead cranes 15 t capacity : 2 Nos.
  - ii) Power Operated lifting Jacks 25 t capacity : 5 Nos.
  - iii) Fork Lifts 5 t capacities : 3 Nos.
  - iv) Hydraulic Jacks 25 t capacity : 4 Nos
2. Other facilities like SAB repair shop, Air Brake repair and Overhaul shop, CBC, Machine shop, Stores etc need be provided. The repair in shop/ROH depot of these items will be as is the practice for other air brake bogie stocks.

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## 5. Operation:

### 5.1. Opening and closing of end swing doors and end flap doors:

**5.1.1. At the time of loading/originating stations-** At the time of loading at originating stations, first of all end swing doors shall be opened and hooked on side wall as per provision given in sidewalls, thereafter all lower deck end flap doors shall be opened. After adjustment of required deck height for loading as per requirement, all upper deck end flap doors shall be opened. After successful loading of automobile cars, first all End Flap doors shall be closed, thereafter End Doors shall be closed and locked properly.

**5.1.2. At the time of unloading terminating stations-** At the time of unloading at terminating stations, first of all end swing doors shall be open and hooked on side wall as per provision given in sidewall then all upper deck's and lower deck's end flap doors shall be open. After unloading of automobile cars from all upper deck close the End Flap doors of upper decks, adjust the required deck height for unloading from lower deck at all X-end of Wagon-A as per requirement. After successfully unloading of automobile cars, first of all End Flap doors of lower and upper deck shall be closed and after all End Doors shall be closed and secured properly.

### 5.2. Movement of middle decks:

**5.2.1. Upper deck height adjustment:** At the time of loading/unloading at originating/terminating stations, after opening of swing and lower flap doors, before adjustment of required deck height, unlock the upper deck after engaging the screw jack with upper deck. Now required upper deck height can be obtained by means of screw jack arrangement provided within the wagon with the help of ratchet wrench or any battery operated torque wrench.

**5.2.2. Deck locking and unlocking:** At the time of loading/unloading at originating/terminating stations, after adjustment of required deck height all upper decks should be locked properly by locking arrangement provided in upper decks.

**5.2.3. Safety precautions:** Following safety precautions shall be taken during the movement of upper deck height adjustment:

- i) Before adjustment of required deck height and unlocking of upper deck, it must be ensured that screw jacks are engaged with upper deck to prevent accident.
- ii) After engagement of screw jacks, unlocking of upper deck with side stanchions should be ensured before starting movement of upper deck through the screw jacks.

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- iii) After adjustment of desired deck height all decks must be locked and ensured before loading of automobile cars.
- iv) Disengage screw jacks with upper deck.
- v) Care may be taken during the opening and closing of end flap doors. It must be ensured that the end flap doors are properly in locked position at the time of movement of upper deck operation to prevent accident.

**5.3. Check list before ready for loading of automobile cars:** Following check list shall be followed by user before loading/unloading of cars:

- i) End swing and flap doors of all wagons in the rake must be opened.
- ii) All upper decks must be in locked position after adjustment of desirable height of deck through the rake.
- iii) Readiness of ramp at required height to be ensured for lower as well as upper deck.
- iv) For Loading and unloading availability of straight track may be ensured for better result.

#### **5.4. Loading and Unloading**

**5.4.1. Placement of ramp:** Place the ramp as per desirable height provided by wagon owners/automobile car transporter Company.

**5.4.2. Sequence of loading and Unloading automobiles:** Following sequence of loading and unloading shall be followed by wagon owners/automobile car transporter Company:

- i) At the time of loading first of all, after placement of ramp to lower deck, loading of cars in all lower decks will be carried out after placement of ramp with upper deck, loading of cars in all upper decks will be carried out.
- ii) At the time of unloading first of all, after placement of ramp to upper deck, unloading of cars in all upper decks will be carried out. Then after placement of ramp with lower deck, unloading of cars in all lower decks will be carried out.

**5.4.3. Movement of Vehicles:** For movement of vehicles para no.5.4.2 shall be followed and also ensured that movement of vehicles takes place from end to end of the complete rake.

**5.5. Lashing/securing:** All automobile car wheels must be secure with lashing arrangement provided by wagon owner/automobile Transporters Company with floor of the wagon.

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## 6. Marshalling:

These wagons are specialised for transportation of automobiles cars only. This special wagon, both in empty and loaded condition should always be run as a special train. The wagon shall be moved only in a special train formation both in empty and loaded condition hauled by a single loco only, under approved special instructions to framed by the Chief operations Manager of the concerned Railways, RDSO speed certificate, CRS sanctions and various instructions/orders/circulars issued by the Railway Board from time to time.

## 7. List of construction drawings:

### 7.1.Structures:

DRAWING NO.	DESCRIPTIONS
WD-11013-S-00	INDEX.
WD-11013-S-01	DIAGRAM.
WD-11013-S-02	GENERAL ARRANGEMENT (WAGON-A&B).
WD-11013-S-03	LOWER DECK FRAME ARRANGEMENT.(WAGON-A)
WD-11013-S-04	LOWER DECK FRAME ARRANGEMENT.(WAGON-B)
WD-11013-S-05	UPPER DECK ARRANGEMENT & DETAILS (WAGON-A&B)
WD-11013-S-06	LOWER DECK FRAME DETAILS (SHEET-I) (WAGON-A&B)
WD-11013-S-07	LOWER DECK FRAME DETAILS (SHEET-II) (WAGON-A&B)
WD-11013-S-08	LOWER DECK FRAME DETAILS (SHEET-III) (WAGON-A&B)
WD-11013-S-09	FLOOR PLATE ARRGT. & DETAILS OF LOWER DECK (WAGON-A&B)
WD-11013-S-10	BODY SIDE ARRANGEMENT & DETAILS (WAGON-A)
WD-11013-S-11	BODY SIDE ARRANGEMENT & DETAILS (WAGON-B)
WD-11013-S-12	END FLAP ARRANGEMENT & DETAILS (WAGON-A&B)
WD-11013-S-13	ROOF ARRANGEMENT & DETAILS (WAGON-A&B)
WD-11013-S-14	LIFTING ARRANGEMENT & DETAILS OF UPPER DECK (WAGON-A&B)
WD-11013-S-15	END SWING DOOR ARRANGEMENT (WAGON-A&B)
WD-11013-S-16	END SWING DOOR DETAILS (WAGON-A&B)
WD-11013-S-17	BRAKE GEAR ARRANGEMENT (WAGON-A&B)
WD-11013-S-18	BRAKE GEAR DETAILS
WD-11013-S-19	FITMENT OF AIR BRAKE EQUIPMENT AND PIPE LAYOUT (WAGON-A)
WD-11013-S-20	FITMENT OF AIR BRAKE EQUIPMENT AND PIPE LAYOUT (WAGON-B)
WD-11013-S-21	DETAILS OF PIPES FOR FITMENT OF AIR BRAKE EQUIPMENT
WD-11013-S-22	DETAILS OF FITMENT OF AIR BRAKE EQUIPMENT
WD-11013-S-23	BRAKE DIAGRAM
WD-11013-S-24	UNCOUPLING GEAR ARRANGEMENT & DETAILS
WD-11013-S-25	CENTRE PIVOT & SIDE BEARER ARRANGEMENT (WAGON-A&B)
WD-11013-S-26	MARKING DIAGRAM
WD-97025-S-35	ARRANGEMENT OF HIGH TENSILE CENTRE BUFFER COUPLER (NON-TRANSITION)

Document No:	Technical Pamphlet No. G-106	Version No: Nil	Date Issued: Feb-2014
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## 7.2. Bogie:

DRAWING NO.	DESCRIPTIONS
CONTR-9404-S/1	INDEX
CONTR-9404-S/2	BOGIE GENERAL ARRANGEMENT
CONTR-9404-S/3	CAST STEEL SIDEFAME
CONTR-9404-S/4	BOGIE DETAILS
CONTR-9404-S/5	CAST STEEL BOLSTER
CONTR-9404-S/6	WEDGE
CONTR-9404-S/7	SPRING DETAILS
CONTR-9404-S/9	BOGIE BRAKE GEAR ARRANGEMENT
CONTR-9404-S/10	BOGIE BRAKE GEAR DETAILS
CONTR-9404-S/11	L-TYPE COMPOSITION BRAKE BLOCK
CONTR-9404-S/12	WHEEL AND AXLE ASSEMBLY
CONTR-9404-S/13	WHEEL
CONTR-9404-S/14	LEADING DIMENSIONS & TOLERANCES
CONTR-9404-S/15	SPRING LOADED SIDE BEARER ASSEMBLY & DETAILS
CONTR-9404-S/16	MARKING SCHEME FOR CAST STEEL SIDEFAMES AND BOLSTER
CONTR-9404-S/17	BRAKE BEAM

## 8. List of components used in BCACBM wagon, not generally used in other wagons:

- 8.1. Belt Lashing/Car securement system-** These shall be provided by wagon owners/AFTO.
- 8.2. Ratchet wrench/Battery operated slow speed wrenches–** This shall be provided by wagon manufacturer/owners/AFTO.
- 8.3. Rollers for middle deck movement-** As per item no.-7 and 8 of RDSO drawing no WD-11013-S-05.
- 8.4. Screw jack Assembly-** As per item no.-7 of RDSO drawing no WD-11013-S-14.

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## 9. Proforma for SWTR:

### PROFORMA FOR SINGLE WAGON TEST FOR BCACBM WAGON

Wagon No. .... Bogie Make..... DV.NO & MAKE.....

S.No.	Check	Specified Value	Observed Value
1.	Pressure in BP	$5 \pm 0.1 \text{ kg/cm}^2$	
2.	Pressure in AR	$5 \pm 0.1 \text{ kg/cm}^2$	
3.	Leakage from the system in one minute.	$0.1 \text{ kg/cm}^2$ (max.)	
4.	Full service application:		
4.1	Brake cylinder filling time (Pressure rise from 0 to $3.6 \text{ kg/cm}^2$ )	18 to 30 sec	
4.2	Maximum brake cylinder pressure)	$3.8 \pm 0.1 \text{ kg/cm}^2$	
4.3	Reduction in BP pressure required for full service application	$1.3 \text{ to } 1.6 \text{ kg/cm}^2$	
5.	Release after full service application:		
5.1	Draining time (Brake cylinder pressure to fall from $3.8 \pm 0.1 \text{ kg/cm}^2$ to $0.4 \text{ kg/cm}^2$ )	45 to 60 sec	
6.	Sensitivity of brakes. Isolate brake pipe from main line. Check the response of brakes when brake pipe pressure is reduced at the most equal to $0.6 \text{ kg/cm}^2$ in 6 seconds.	Brake should apply within 6 sec	
7.	Insensitivity of brakes. Isolate brake pipe from main line. Check the response of brakes when brake pipe pressure is reduced at least equal to $0.3 \text{ kg/cm}^2$ in 60 seconds	Brake should not apply.	
8.	Emergency application:		
8.1	Brake cylinder filling time (Pressure rise from 0 to $3.6 \text{ kg/cm}^2$ )	18 to 30 sec	
8.2	Maximum brake cylinder pressure)	$3.8 \pm 0.1 \text{ kg/cm}^2$	
9.	Piston stroke	$100 \pm 10 \text{ mm}$	
10.	Leakage from brake cylinder after emergency application	$0.1 \text{ Kg/cm}^2$ (max.) within 5 minute	
11.	Automatic exhausting of brake cylinder and control chamber.		
11.1	Apply emergency brake (i.e. BP= $0 \text{ kg/cm}^2$ ) check the brake cylinder pressure after giving a brief pull to release book.	Brake Cylinder and Control Reservoir should exhaust automatically.	
12.	AR Charging Time (pressure rise from 0 to $5 \text{ kg/cm}^2$ )	$175 \pm 30 \text{ Sec.}$ for C3W D.V $60 \text{ to } 120 \text{ Sec.}$ for KEO D.V	
13.	CR Charging Time (pressure rise from 0 to $4.8 \text{ kg/cm}^2$ )	$165 \pm 20 \text{ Sec.}$ for C3W D.V $160 \text{ to } 210 \text{ Sec.}$ for KEO D.V	

S.No. 12 to 13 to be checked at the time of prototype wagon only.

Date:

Signature and name of  
Testing Authority

