भारत सरकार GOVERNMENT OF INDIA
रेल मंत्रालय MINISTRY OF RAILWAYS
रेलवे बोर्ड RAILWAY BOARD

No.2012/M(N)/951/32. (E:3325703) **Dated: 08.02.2024**

Principal Chief Mechanical Engineer
All Zonal Railways

Sub: En-route detachment of Brake Van

Ref: (i) ER letter no. MC/226/EF/A-II dt. 15.01.2024 (copy enclosed)
(ii) RDSO letter no. MW/BVZI dt. 01.02.2024 (copy enclosed)

Vide letter under reference (i), Eastern Railway has submitted the detailed case report of the detachment of BVZI 8638120017 due to failure of center pivot. The main causes for failure was found to be misalignment between bottom & top structure and lack of tack welding on Center pivot nut bolts. Cases of failures of center pivot in BVZI wagons have been reported by other Zonal Railways also.

RDSO has examined the issue of failures of center pivot in BVZI wagons over Indian Railways and issued guidelines for open line and workshop maintenance staff for minimising the failures.

It is requested that strict compliance of RDSO guidelines should be ensured in Examination yards/ROH Depots/Workshops.

DA: As above

08.02.24.

(Happy Walia)
EDME (Freight)
Railway Board
Email: edmef@rb.railnet.gov.in

Eastern Railway

Mechanical Department
17 Netaji Subhash Road,
Kolkata - 700001

No. MC/226/EF/A-II

Dated: 15.01.2024

EDME/Frt,
Railway Board,
New Delhi.

Sub: En-route detachment of Brake VAn no. BVZI - 86381200017 at BWN Up Yard, RL-5 at HWH Division from train no. UP EC 32975 BCN/Ld/BXR on 13.01.2024.

Ref: i) Sr. DME/ER/HWH's letter no.MC/Asset Failure dated 14.01.2024 (**enclosed**).

ii) NH ROH depot's Attention Report dated 09.12.2023 (**enclosed**).

iii) Annexure consisting Photographs (**enclosed**).

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In connection with detachment of BVZI from train No. UP EC 32975 BCN/Ld/BXR on 13.01.2024 at BWN - Up Yard of HWH Division, detail case report, ROH attention details and photographs are enclosed herewith.

Two weeks safety drive has been launched to ensure availability of CP nut bolt with tack welding and proper fitment of top and bottom center pivot over Eastern Railway.

This is for your kind information please.

Encl: As above.

15.01.24

(Manish Kumar Gupta)
CME/Planning
Mobile No. 9002020404

EASTERN RAILWAY

L. No.: MC/Asset Failure

Date : 14/01/2024

CRSE Freight
Eastern Railway,

Sub: - Special report regarding detachment of BK Van No. BVZI 86381200017 UP Yard/BWN.

History: On 13.01.24 train no- UP EC/ 32975 consists of 42 BCN (Ld)+ MT, Ex. MMS, arrived BWN UP yard RL-5. ACNL/BWN issued a memo to TXR/BWN to attend KRIL BVZI 8638120017 for **nut missing in hand brake**. TXR/BWN jointly check the load with Train Manager and found that in center pivot, 01 nos. nut and bolts deficient and other 03 nos. nuts and bolts found loose and welding missing. Loose nuts and bolts were tightened up but the repairing of center pivot housing was not possible in yard, so detachment memo issued at 04.30 hrs.

Observation: The brake van checked at BWN Sickline on date 14.01.24 and following observation were found

1. One No center pivot nut bolt at DLI end trolley found missing.
2. Found gap between centre pivot bottom and top structure in DLI end trolley.
3. Found misalignment between bottom and top structure due to which Nut –Bolt cannot be inserted in DLI end trolley.
4. Found no tack welding between the bottom and top structure of CP and no tac welding in CP nut & bolt in DLI end trolley.
5. Locking plate of pivot nut in also missing.
6. B clearance only 04 mm.

BPC Particular: BPC No-50000518407
Issued from – TPGY Yard/TPJ/SR
Date of issue- 02.01.24
Type of BPC- Premium
Total Load -42 BCN (Ld)+ MT
Last loading point – MMS
Last GDR done on 10.01.24 at MMS
Destination: GAYA

Wagon particular
Wagon No. BVZI- 86381200017
POH- LLHW -22.07.22
IOH- 09.12.23 NH/SDAH
R. dt – 08/24

Crew particular
LP – Bimalesh Kumar / UDL
GTM – R. Agarwal / UDL

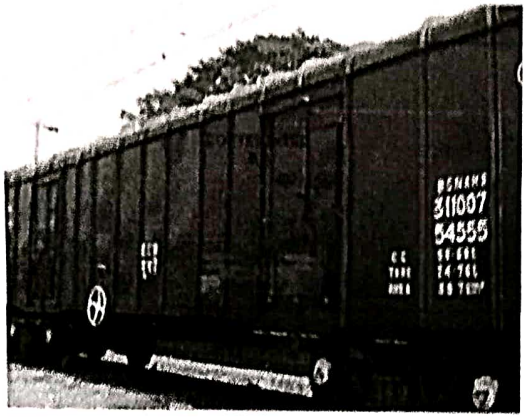
Responsibility

1. IOH of wagon was done on dt. 09.12.23 at NH depot. It is mandatory to check the center pivot nut bolt and welding but within a month it is found that welding is missing so ROH depot is primarily responsible for this.
2. The brake van lastly examined at TPGY/SR as PREMIUM. Being a safety item centre pivot must be checked intensively but maintenance staff has not given proper attention. Hence TPGY/SR is also responsible for this incident.

The above is for kind information and necessary action please.

14/1/24
Sr DME(Co)/HWH

NAIHATI ROH DEPOT
SDAH DIVISION, EASTERN RAILWAY



DATE OF ROH - 09/12/2023

RAILWAY - KRIL

TYPE - BVZI

WAGON NO. - 86381200017

POH DATE -LLHM-22/07/2022

RETURN DATE - 08/24

PREVIOUS ROH DATE (IF ANY)

11	Nominal Clearances of Bogie									
S. N	The nominal crearances & tolerances of the bogie assembly (LCCF20(C), 22W, WM, NLB, HS) are given below:-									
	Description	Parameters	Observations							
1	Lateral clearance between side frame & bolster	22W(M), NLB, NL, NLM-18±3 mm. 22HS-25 (±3)mm								
2	Lateral clearance between side frame & axle box/adapter	22W(M)-25 (+3/-0)mm, 22NLB, NLM, NL & HS-16 (+6/-1.5)mm.								
3	Longitudinal clearance between side frames & axle box/adapter	22W(Retro)-2(+7/-0)mm, 22W(M)-10 (+7/-0)mm , 22NLB, NLM, NL & HS-9 (+2/-3) mm.								
4	Longitudinal clearance between side frame & bolsterer	22W(M), NLB, NL, NLM & 22 HS- 6±0 mm.								
5	Clearance between anti rotation lug & bolster	22W(M), NLB, NL, NLM, 22 HS-4 (+3/-0) mm.								

Ref. IRCA PART III, Clause 2.16.4 & ref. fig. 3 & 4 of RDSO Tcchnical Pamphlet G-95.

Signature of SSE/JE

BODY REPAIR

1. ***Underframe:-***

Condition of Member	Head Stock	Stinger	Cross Bar	Solebar	Scrp & Paint of Sole Bar In Door way Position	Body Bolster	Striker Casting	ATL/RA LOCK or Body Stanchion
Check	OK	OK	OK	OK	-	OK	OK	OK
Repair	OK	OK	OK	OK	-	OK	OK	OK

2. ***Body, Floor & Roof Repair:-***

Body		Floor		Roof			Others
No of Patch	Size (cm.)	No of Patch	Size (cm.)	No of Patch	Size (cm.)	Checking for water tight	
OK	-	3	1-60/50, 2-40/30		OK	CHECKED, FOUND OK	BOTH END LV BOARD DEFT & FITTED, 1 REFLECTIVE TAPE FITTED

3. ***Door Repair:-***

Door Hinge (F/S)	Swing Door/ Flap Door	Long Cotter	Short Cotter	Door Hasp	Door Staple	Door Eye	Weather Pocket	DRS	Gravity Cotter/ Leaf	Door Locking Bolt	Others
2 NOS WELD	OK	-	-	-	-	-	-	-	-	OK	OK

STAFF- MANISH, DIPANJAN, PAPUN
WELD GAS- BANTI (PVT)

09/12/23
Signature of SSE/JE

TESTING PROFORMA

DV:- Incoming /Outgoing	EK E 15031766	BP HOSE:- Outgoing	X-INDORUB 05/2022D. Y-INDORUB 05/2022A.
BC:- Incoming /Outgoing	NOT FOUND	FP HOSE:-Outgoing	X-LRW 03A 2019.Y-LRW 03A 2019.
Condition of Cut off Angle Cock+APD: Examined (Y/N)		YES	
Draining of AR & CR: Done (Y/N)		YES	
Checking of AR/CPB/BC brackets: Done (Y/N)		YES	
All Metal Pipe Joints (Soap tested): Checked for Leakage and Repaired: Done (Y/N)			

Must Change Items	Dirt Collector Filter	Dirt Collector Sealing Ring	Rubber Gasket	MU Washer	AR Drain Plug Leather Washer	BC Drain Plug Leather Washer
	DONE	DONE	DONE	DONE	DONE	-

RESULT

SN	CHECKED & SPECIFIED	Pre Test	Final Test	Remarks
1	***Charging*** :- (a)Pressure in BP :- 5±0.1 Kg./cm²	05 Kg./cm²	05 Kg./cm²	
	(b) Pressure in F.P (If Twin pipe):- 6±0.1 Kg./cm²	06 Kg./cm²	06 Kg./cm²	
2	***Leakage Test:-*** Leakage from the system after charging:- (0.1 Kg./cm² in one minute)	NIL	NIL	
3	***Full service application-*** (pressure rise from 0 to 3.6 Kg./cm²)			
	(a) Empty-(18 to 30 Sec). (BLC/BMBS 2.2 ± 0.25 kg/cm² & Other-3.6±0.1 kg/cm²)	26 SEC	24 SEC	
	(b) Loaded-18 to 30 Sec.(3.8±0.1 kg/cm²)	26 SEC	24 SEC	
4	***Brake Release Test:-*** Brake cylinder pressure to fall from 3.8 kg./cm² to 0.4 kg./cm²) in 45 to 60 sec.	49 SEC	48 SEC	
5	***Sensitivity Test:-*** Brake should apply within 6 sec. (BP Pressure is reduced at the most equal to 0.6 Kg./cm² in 6 sec)	02 SEC	02 SEC	
6	***Insensitivity Test:-*** Brake should not apply. (BP pressure is reduced at the most equal to 0.3 Kg./cm² in 60 sec)	OK	OK	
7	***Emergency application Test:-*** (a) Brake cylinder filling time:-(Pressure rise from 0 to 3.6 kg./cm²).			
	(i) Empty- BLC/BMBS (2.2 + 0.25 kg/cm²),(Other-3.8±0.1 kg/cm²) 18 to 30 sec	26 SEC	24 SEC	
	ii) Loaded-3.8±0.1 kg/cm²	26 SEC	24 SEC	
	(b) Maximum BC Pressure-(i) Empty.BLC/BMBS (2.2 + 0,25 kg/cm²),(Other-3.8±0.1 kg/cm²)	3.8 Kg./cm²	3.8 Kg./cm²	
	(ii) Loaded.3.8±0.1 kg/cm²	-	-	
8	***BC Leakage Test:-*** 0.1 Kg./cm² within 5 minutes. (Leakage from BC after emergency application	NIL	NIL	
9	**Piston stroke:-**(i) Empty-85±10 mm (BCN/BFKN/BRN/BFNS), 95±10 mm (BLC), 54±10 mm (BMBS).	30/34 MM	34/32 MM	
	(ii) Load-130±10 mm (BCN/BFKN/BRN/BFNS), 120±10 mm (BLC), 70±10 mm(BMBS)	-	-	
10	APM arm movement from fully retracted Position to bogie side frame top (BCN-92±1 mm, BOXNHL- 96±1 mm, BOST-99±1mm)	-	-	
11	Unrestricted movement of lever arm of APM Device (Empty).BC Pressure 2.2 + 0.25 kg/cm2	-	-	
12	Restrict the movement of lever arm of APM Device by more than 25 mm (by putting a block of 25 mm thickness) from its initial position (Load). BC Pressure 3.8 + 0.1 kg/cm2	-	-	
13	***"A" Dimension***	-	-	
14	***Gap between LSD plunger & stopper***	-	-	

STAFF-DEBASHIS BISWAS.

09.02.24

Signature & Name of Testing SSE/JE.

MAINTENANCE OF CTRB, WHEEL & ITS ASSEMBLIES

Trolley No	Axle Details			Wheel Details				CTRB Mfg/OH Dt/G.Seal			
	Position	Axle Cons No	Ust By/On	Turned/ Unturned	Dia (mm)	Gauge (mm)	Profile (mm)	CUP No		CTRB Mfg/OH Dt/G.Seal	
T-363	R1/L1	10238	08.03.22	T	854	1600	-	-	-	-	-
	R2/L2	87728R	08.03.22	T	857	1601.2	-	-	-	-	-
T-364	R3/L3	82711	08.03.22	T	845.5	1601	-	-	-	-	-
	R4/L4	806702	08.03.22	T	849	1600	-	-	-	-	-

Height Adjuster:-	12 (MM)		37 (mm)		None	

Signature of SSE/JE/Wheel

Condition of Adapters, EM Pad, S/B Top Plate PU Cover & PU Pad

Position	Adapter		EM Pad		S/B Top PLATE			PU Cover			PU Pad/Rubber Pad		
	S/N	S/N	S/N	S/N									
R1/L1					R1/L1			R1/L1			R1/L1		
R2/L2													
R3/L3					R2/L2			R2/L2			R2/L2		
R4/L4													

Condition of TOP Casting:-	X End	OK	Y End	OK
Condition of U Shackle/GIP COTTER & CP Rubber Washer:-	X End	FITTED	Y End	FITTED
SFK Used (Serviceable/New):-	X End		Y End	

Lubricated by Graphite Flake	X End	DONE	Side Bearer height (m.m)	X End	R1		L1	
	Y End	DONE		Y End	R2		L2	

BATCH:-A- AMIT,KUNDUD, SUPRIYO, SHUBHAM.
WELDER-ABHINOY.

RANJIT KUMAR MONDAL
Signature of SSE/JE/Lifting

BRAKE GEAR FITTINGS

1.	*Condition of Hand Brake Mechanism*							*Brake Gear Pin & Bush*						
Hand Wheel	Spindle	Bevel Gear	Screw with Nut	Connecting Link	Hand Brake Pull Rod	H/Bk. Equalizing Lever	H/Brake Cable	Pin No 3	Pin No 7	Pin No 8	Pin No 9	Pin No 14	Pin No 15	Power pin
OK	OK	-	OK	OK	OK	OK	-	-	-	-	-	-	-	-

2.	*Load Empty Mechanism*					
Sign Plate	-	Connecting Link	-	LSD	-	
E/L Device	-	ELB Short	-	PRV	-	
E/L Handle	-	ELB Long	-	DCV	-	
BK. Shaft Long	-	EL 60 Valve	-	Flexi Hose	-	
Tooth Segment	-	APM Reservoir	-	I/Cock	-	
Bell Crank	OK	Sensor Arm	-	LSD Bkt	-	

3.	*Brake Rigging Component*													
SAB	Pull Rod (Long)	Pull Rod (ShOrt)	Control Rod	B/E Pull Rod	Tie Rod (Load)	Tie Rod (Empty)	Horizontal Lever	Hand Lever Safety Bkt	Pull Rod Safety Bkt	Lubrication of BC	Lubrication of Lever & pin	Hand Brake Operation	Others	
-	-	-	-	-	-	-	-	-	-	-	YES			

STAFF-DEBASHIS.

09.02.24
Signature of SSE/JE/BK. Gear

MAINTENANCE OF CENTER BUFFER COUPLER DURING ROH (AS PER G-76)

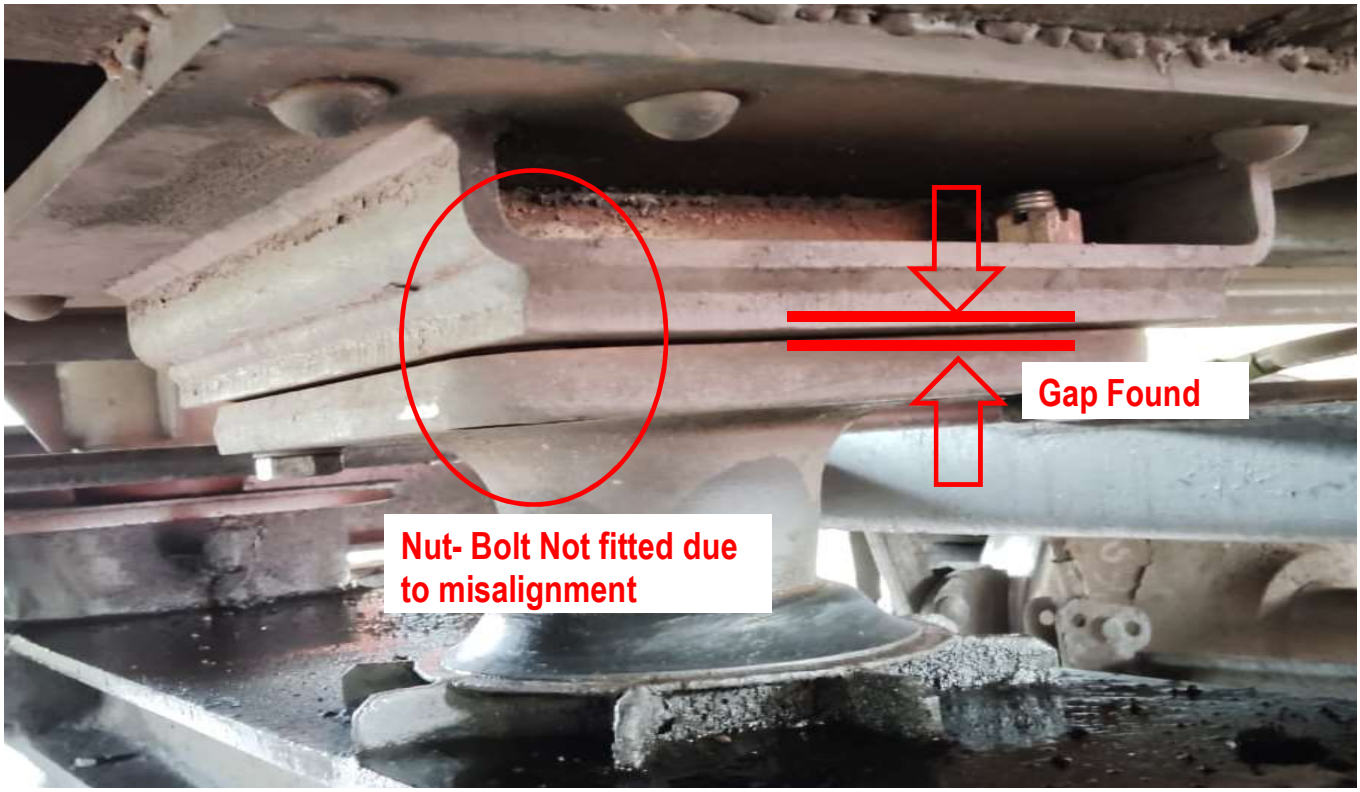
Sl No	Checking Parameters:-	Specified Limits	X End	Y End	Remarks
1	Anti-Creep Protection:- (Check With Pay Bars & Screw Driver)	(i) Lock not raised (Acceptable)	OK	OK	
		(ii) Lock raised	NOT APPLICABLE	NOT APPLICABLE	
2	CBC ContourCondition:-	(i) Cheking With Gauge No 1	NOT PASSED	NOT PASSED	
		(ii) Cheking With Gauge No 2	NOT APPLICABLE	NOT APPLICABLE	
3	Knuckle Stretch & Nose Wear:-	(i) Cheking With Gauge No 4.	NOT TOUCHED	NOT TOUCHED	
			NOT PASSED	NOT PASSED	
4	Shank Wear Plate:-	Thickness should not be less than 5 mm	OK	OK	
5	Striker Casting Wear Plate:-	Must Change Item	CH	CH	
6	Slack in Draft Gear Assembly:-	Max. 25 mm	20 MM	19 MM	
7	Coupler Operating Mechanism:-	(i) Bearing Piece	OK	OK	
		(ii) Operating Handle	OK	OK	
		(iii) Operating Handle Safety Bracket	OK	OK	
		(iv) Toggle	OK	OK	
		(v) Lock	OK	OK	
		(vi) Connector	OK	OK	
		(vii) Hook	OK	OK	
8	Knuckle:	Check for any Crack (DPT)	OK	OK	
9	CBC Body:-	Check for any Crack (DPT)	OK	OK	
10	Draft Pad:-	Check for Breakage/Damaged/ Perished	OK	OK	
11	Yoke:-	Check for Breakage/ Hole Elongated	OK	OK	
12	Knuckle Pin with APD:-	Checking for Worn/Breakage	OK	OK	
13	Thrower:-	Checking for Defective/Missing	OK	OK	
14	Miscellaneous Work of Draw Gear:-	(i) Foot Step	OK	OK	
		(ii) Anchor Plate Support	OK	OK	
		(iv) Yoke Pin Support	OK	OK	
		(v) Yoke Support	OK	OK	
15	CBC Height	(1090 -1105 mm)	1096 MM	1098 MM	
16	Back Stopper:-	Check for Breakage/Rivet Cut	OK	OK	
17	Srriker Casting:-	Check for any Crack/Rivet Loose/Breakage	OK	OK	
18	Front Follower:-	Check for any Breakage	OK	OK	

STAFF-BINOD,NISHIT,GOURI,BARMAN,DULAL,PAVAN, GOUTAM.

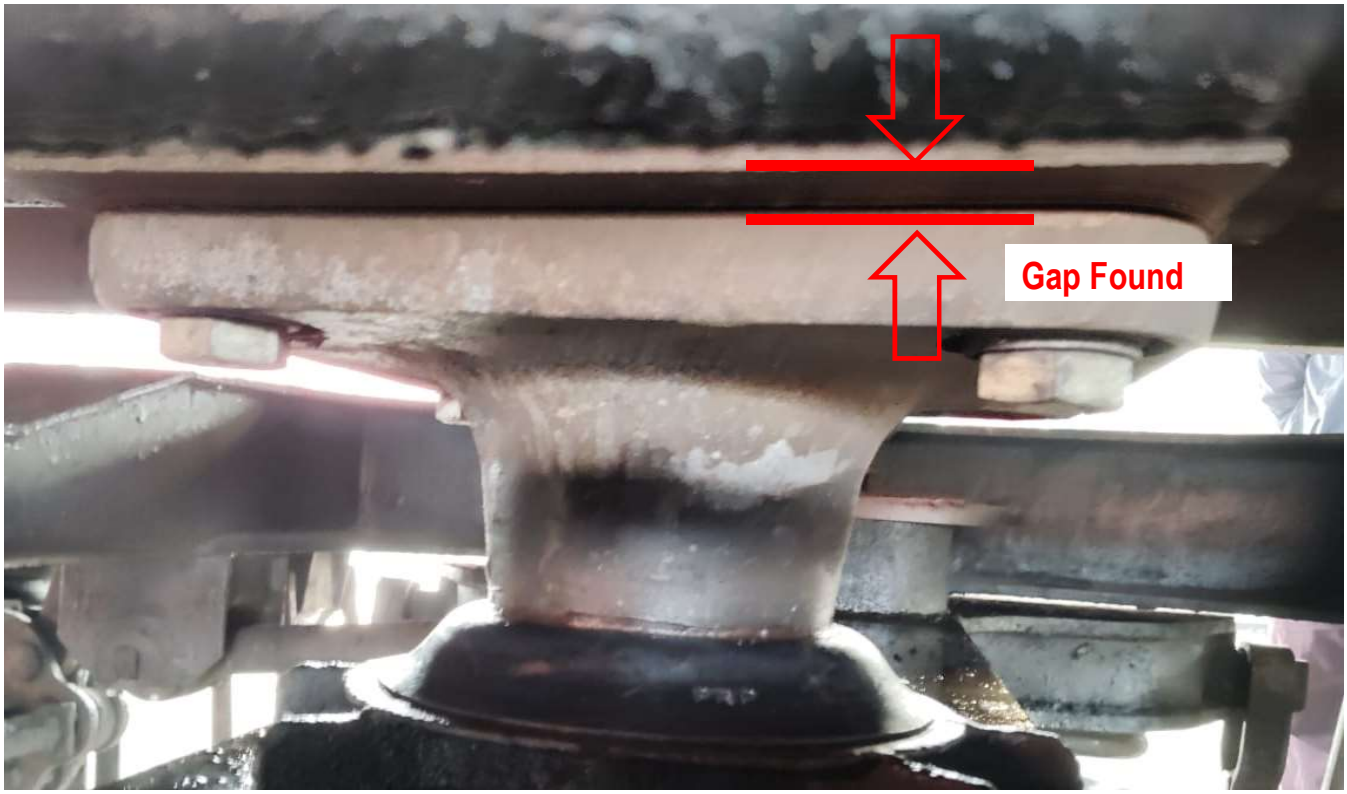
Signature of SSE/JE
S.chowdhury
09.12.23

Annexure

Center Pivot Failure Zone of BVZI at BWN dated 13.01.24



Right Side View



Left Side View

अअमासं RDSO
रेल अग्रदूत Transforming Railways
www.rdso.indianrailways.gov.in
फैक्स / Fax : 91-0522-2452494
टेलीफोन / Tele: 0522- 2462638

सत्यमेव जयते

भारत सरकार –रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ – 226011
Government of India - Ministry of Railways
Research Designs & Standards Organisation
Lucknow – 226011

MW/BVZI February 01, 2024

Principal Chief Mechanical Engineer
All Zonal Railways

विषय: Failure of Center Pivot pin of BVZI wagon.

1. BVZI type Guards Brake Van operating over Indian Railways are fitted with ICF-bogie with same Center Pivot pin as per ICF drawing no T-0-6-602.
2. Recently, few Zonal Railways have reported failure of Center Pivot pin of BVZI wagons during service. Accordingly following action has been taken by RDSO.
   a. Failure cases reported by Zonal Railways during last 12 months and available details are summarized and attached as Annexure-1.
   b. In the case of centre pivot pin breakage of wagon no. NWR-86110980012 on EC railway, failed pin was sent for metallurgical testing and report of M&C Dte. RDSO is attached as Annexure-2.
   c. Further in two subsequent cases over E C Railway, officials of wagon design dte were deputed to inspect wagon no. SER-86071102096 & ER-86021002551 in which breakage reported on 13.01.2024 and 15.01.2024 respectively. Investigation report of deputed official is attached at Annexure-3.
   d. Shunting practice being followed for brake van and other wagons in DDU yard of E C Railway was also studied.
3. Based on above analysis following observations are made in the failure of centre pivot pin of BVZI wagons:
   a. In 12 Reported cases by Zonal Railways (Annexure-1), 09 Cases i.e. 75% are attributed to rough shunting by reporting Railways.
   b. From the attached M&C report (Annexure-2) it is evident that no shortcoming w.r.t. material composition was noticed and failure is attributed to sudden impact load.
   c. Similarly from the Annexure-3, it can be seen that in wagon no. NWR-86110980012, hand brake of concerned bogie was found in applied condition and as regard to wagon no. NWR-86110980012 it is noted that bent in footboard and pin is noticed clearly indicating sudden impact load.
   d. It was also observed that wagons in DDU yard are still being subjected to hump/loose shunting and similar practice may be prevailing over other Zonal Railways as well.
4. From above observations it is clearly evident that failure of BVZI centre pivot pin are happening due to sudden impact force coming during shunting, hand brake jam etc. and no design deficiency has been noticed in these wagons.
5. It is pertinent to mention here that IR has already switched over to BVCM type brake vans wef 01.01.2017 and BVZIs are not being produced any more.
6. However for the safe and efficient operation of existing fleet of approx. 3700 BVZIs, Zonal Railway may pls ensure following in operation and maintenance of these wagons:

a. Avoid loose shunting of Brake vans which causes direct impact on Center pivot pin.

b. Besides through visual examination, dye penetrant testing of centre pivot pins shall be done during IOH and POH of BVZIs. Replacement of defective centre pivot pin shall be ensured accordingly.

c. Proper greasing of centre pivot pin and inside contact surface of silent block shall be ensured in IOH and POH. Graphite grease or equivalent shall be used. Replace the center pivot silent block if found worn, damaged or rubber has perished as per maintenance manual BG coaches ICF design chapter-3 clause 316d (v).

d. Proper tightening of CP top bolts with recommended HT bolts (grade 8.8 and above) to be ensured during IOH/POH. Recommended torque value of 66kgf-m shall be ensured through a calibrated torque wrench.

e. Complete Brake rigging shall be checked and maintained as per chapter-7 of Maintenance manual for wagons Rev-2.0 Dec:2022 during yard/ sick line / IOH and POH attention.

f. It should be strictly ensured that hand brake is properly released before movement of Brake van

This is for your kind information and necessary action please.

DA: As above.

Digitally Signed by Sanjay Kumar
Date: 01-02-2024 17:08:43
Reason: Approved

(संजय कुमार)
निदेशक / माल डिब्बा– ।।।
कृत महानिदेशक / माल डिब्बा / अ.आ.मा.स0.
ई–मेल:-dirwagonwd3@gmail.com

Copy to:

EDME (Frt.), Railway Board, Rail Bhawan, New Delhi for information.

Annexure-I

BVZI wagon Center Pivot Pin broken reported cases

S.No.	Details of BVZI wagon	Date & Place of pin Failure	Probable cause of failure reported	Remarks
1.	Wagon No. ECR-86101386717 POHed-PRTW-04.10.23 Return-11/24 (One Pin Broken)	28.01.23 BSP div.SECR	-	.
2.	Wagon No. NWR-86110980012 POHed-KTTW-31.01.23 Return-02/25 (One Pin Broken)	18.11.23 DDU Yard	sudden impact	Inspected at WCC/DDU some accidental mark on foot board found causes fresh bend. Effected trolley found hand brake in application mode. It appears that due to heavy impact and brake binding center pivot pin broken.
3.	Wagon No. SWR-86150907710 POHed-JUDW-27.02.23 Return-04/25 (One Pin Broken)	27.11.23 Chunar/NCR	Rough shunting	.
4.	Wagon No. ER-86020901060 (One Pin Broken)	22.11.23 BRWD/Dhanbad /ER	Loosening of Bolts	CMT report shows loosening of bolts and deep rough machining mark on sectional change portion of C. Pivot pin.
5.	Wagon No. SWR-86150703343 POHed-JUDW-01.03.21 Return-04/23 (both C.P pin broken)	05.03.23 HRR/KJG/MYS	Sudden impact	Both the Centre Pivot pin broken shows hit mark on failed C. Pivot pin. Failed in brittle manner due to sudden impact during service.
6.	Wagon No. ECoR-86121114758 POHed-KTTW-19.05.20 IOH-FL:11.10.21(JP/NWR) Return-06/22 (One Rear Pin Broken)	19.04.22 PKL/BYO/SWR	Rough Shunting	Sr.DME Co-ord reported that one C.Pivot pin broken due to rough shunting.
7.	Wagon No. EcoR-86121446071 (One Rear Pin Broken)	19.11.23 NFR/New Bongaigaon	Sudden impact	C. Pivot pin broken due to sudden impact and surface found crystalline in nature.
8.	Wagon No. ER-86020800639 POHed-JUDWW-10.04.223 IOH-Nil Return-05/25 (One Rear Pin Broken)	08.11.23 DHN Div.	Rough Shunting	-
9.	Wagon No. SER-86071102096 POHed-KGPW-11.11.22 IOH-Nil Return-11/24	12.1.24 DDU Div Section-SEB-GHD at NBG	Rough Shunting	Inspection carried out by RDSO, The pin shear off due to sudden impact load.
10.	Wagon No. ER-86021002551 POHed-ADLW-26.7.22 IOH-BSL-20.9.23 Return-9/24	13.01.24 DHN Div/ BRWD	Rough Shunting	Inspection carried out by RDSO, The pin shear off due to sudden impact load. No other abnormality found which causes for CP pin failure.
11.	Wagon No. NE-86041110205 POHed-JUDW-31.3.22 IOH-Nil Return-4/24	25.11.23 BRGW/NKJ WCR/Jabalpur	Rough Shunting	-
12.	Wagon No. ECR-86100964848 POHed-rws-16.2.22 IOH-BSL-28.7.23 Return-3/24	13.11.23 NKJ WCR/Jabalpur	-	-

भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ - 226 011
EPBX (0522) 2451200
Fax (0522) 2458500

Government of India-Ministry of Railways
Research Designs & Standards Organisation
Lucknow - 226 011
DID (0522) 2450115
DID (0522) 2465310

सं: धा०र०/ऍम०आई०टी०/आई०एंडटी०/3 दिनांक:25.01.2024

धातुकर्मीय अन्वेषण रिपोर्ट संख्या : 153/2023

1. RDSO personnel involve in metallurgical investigation:-

Prasenjit Prajapati (M.S/Research)	Roop Singh Jatav (ARO/M&C)	R. C. Rahate (Dy. Dir./M&C)	Rajesh Srivastava (Dir./M&C)	S.K. Srivastava (Dir./M&C)
Tested & draft report framed by	Draft report prepared by	Draft report reviewed by	Draft Report approved by	Report approved by
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Sub: Metallurgical Investigation of fractured Center Pivot Pin of BVZI type Brake Van.

Ref: Director/WD-III's note no. MW/BVZI, dt. 07.12.2023.

Reference above, two broken pieces of failed Center Pivot Pin counter to each other were received from Wagon Directorate for metallurgical investigation. The details are as under:

2. Sample Particulars (as furnished)

Component/System identity (Coach / Loco/Wagon etc.)	Wagon
Date of failure	18.112023
Place/Railway	DDU/ECR
Location in system if part of assembly	Center Pivot
Drawing no./Specification No.	IS: 1875 CL-4
Sketch of failed component after joining Fracture pieces, Please attach	Not Attached
Function of component in brief	To bear buffer and draft load
Manufacturer	SARITA
Date of manufacture	Not mentioned
Date of fitment	2009
Attach Report of prelim investigation	Not attached
Expected service life	Condition based (25 years)

3. M&C Lab. Identification No.

Sl. No.	M&C Lab. No.	Component	Paint Marking
1.	153/2023/1	Centre Pivot Pin	NWR 86110980012
2	153/2023/2		——

4. Visual Examination

Visual examination revealed that Centre Pivot Top Pin had broken transversely from the transition zone (zone at which diameter change) into two pieces **(fig.1&2)**. The two pieces are counter to each other. The fracture had taken place in fatigue manner initiating from shear lips **(fig.4).** Fatigue had progressed up to about 10mm depth in transverse direction and remaining fracture face is crystalline in nature. **(fig.3)**. As per referred letter, the CP Top Pin in service of BVZI wagon no. is given NWR – 8110980012 whereas NWR 86110980012 is mentioned on sample **(Fig. 3(a)).**

Fig.1 Photograph of broken Center Pivot Pin after joining the received broken pieces.

Fig.2 Close view of failed Center Pivot Pin shown in fig.1 above.

Fig. 3(a) showing the fraction face (fatigue zone) of sample no. 153/23/1.

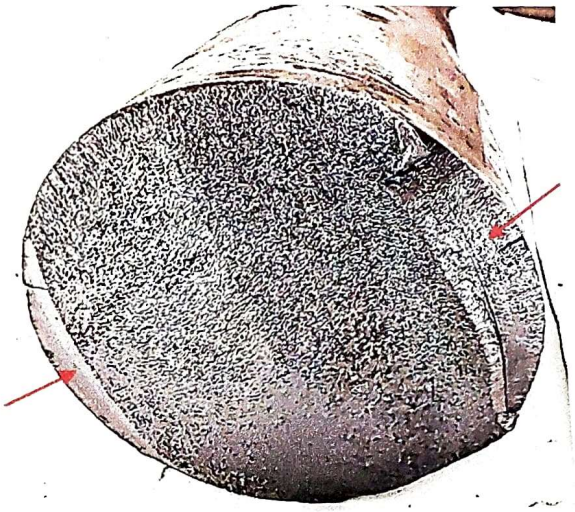

Fig. 3(b) showing fracture face (fatigue zone) of sample no. 153/23/2.

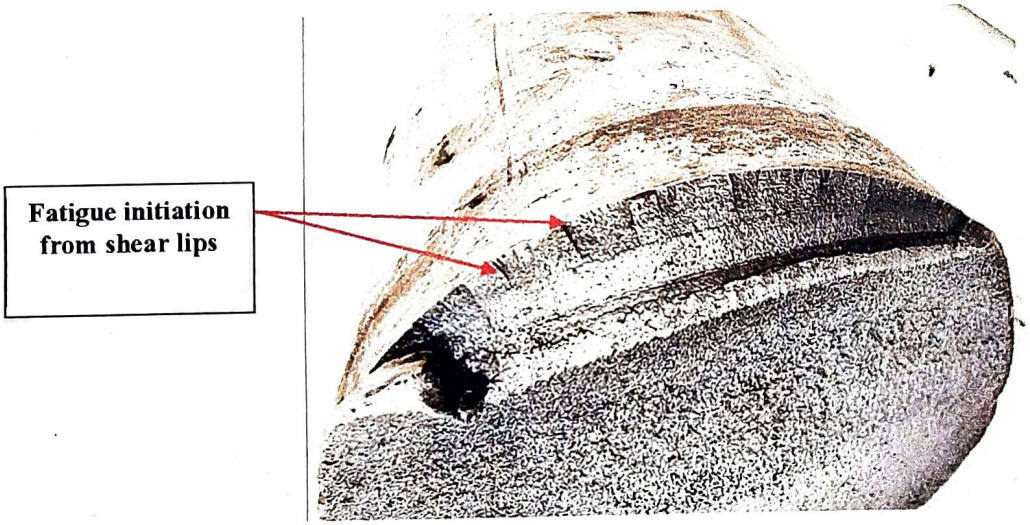

Fig.4 Photograph of fracture face showing shear lips and subsequent fatigue initiation from the shear lips in sample no. 153/23/2.

5. Chemical Analysis

Sample No.	%C	%Mn	%Si	%P	%S
153/2023	0.42	0.747	0.187	0.042	0.016
Specified as per IS: 1875, CL-4	0.40-0.50	0.60-0.90	0.15-0.35	0.04 max.	0.04 max.
Permissible deviation in check analysis as per IS:1875, Cl-4	±0.03	±0.04	±0.03	+0.005	+0.005

6. Hardness Test

Sample No.	Hardness (BHN)
153/2023	173, 177, 178
Specified as per IS: 1875, CL-4	175 min.

7. Tensile Test

Sample No.	UTS, MPa	YS, MPa	%El (GL=5.65√S)
153/2023	649.68	382.17	22.0
Specified as per IS: 1875, CL-4	620.0 min.	320.0 min.	15.0 min.

8. Micro-examination

Sample No.	Condition	Observation
153/2023	Adjacent to fracture face	Revealed normalised Ferrite Pearlite structure **(fig.5)**
Specified as per IS: 1875, CL-4		Normalized structure

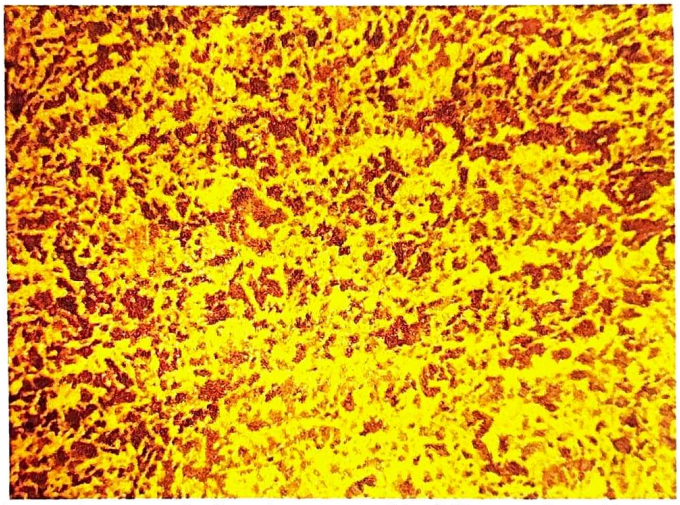

Fig.5 Photomicrograph showing normalised Ferrite-Pearlite structure.

9. Discussion

Chemical composition of CP Top Pin conforms to the relevant specification.

Mechanical properties i.e. tensile strength, yield strength % elongation and hardness also conform to the relevant specification n.

Micro-examination revealed normalised Ferrite-Pearlite structure which is satisfactory.

It is evident from above that metallurgical properties of failed CP Top Pin conform to the relevant specification. Visual examination revealed that CP Top Pin had failed transversely from the transition zone. The fracture had taken place in fatigue manner initiating from shear lips. No abnormality is observed adjacent to the fracture face.
The failure of CP Top Pin might have taken place due to other than metallurgical aspects.

10. Conclusion

Metallurgical properties of CP Top Pin conform to the relevant specification. The failure of CP Top Pin in fatigue mode may be attributable to other than metallurgical aspects.

सुधीर कुमार 25/01/2024

(सुधीर कुमार श्रीवास्तव)
अपर कार्यकारी निदेशक /धातु एवं रसायन

ED/WD Dte.

ANNEXURE-3

Tour Report

Date of visit: 17.01.2024 to 18.01.2024
Place of visit: Nabenagar Road/MGS division and Barwadih ROH depot / DHN division of ECR.
Purpose of tour: Inspection regarding center pivot pin broken of BVZI Brake Van.

Under signed visited Nabenagar Road/MGS division and Barwadih ROH depot / DHN division of East Central Railway for center pivot pin broken case reported in BVZI Brake Van.

A. The condition of BVZI Brake Van stable at Nabenagar Road/MGS division station yard is as under.

1. Brake Van No. : SER 86071102096 BVZI
2. Manufacturer and year: Jessop & Company Limited Jessop - 2011
3. Last POH: KGPW- 11.11.2022
4. Last IOH : Not done
5. Return date:11/2024
6. Condition : a. Centre pivot pin broken (shear off on non-hand brake bogie side)
   b. Side bearer welding failure.
   c. Nonstandard pin found in hand brake lever
   d. Hand brake pull rod secured by iron wire.
   e. There are no symptoms found of brake binding.
   f. The wagon was at station line and no facility was available to lift, as such CP pin and side bearers cannot be examined.

B. The condition of BVZI Brake Van at Barwadih ROH depot /DHN division is as under.

1. Brake Van No. : ER 86021002551 BVZI
2. Manufacturer and year: Jessop & Company Limited Jessop - 2010
3. Last POH: ADLW - 26.7.2022
4. Last IOH: BSL 20.9.2023.
5. Return Date: 09-2024
6. Condition : centre pivot pin broken (shear off on hand brake bogie side)
7. Auxiliary reservoir not fitted as per BVZI drawing. Bigger size AR fitted like ICF coach.
8. There are no symptoms found of brake binding.
9. The broken center pivot pin was dry not greased/lubricated.
10. Both the side bearers checked thoroughly, silent block, bronze piece including base plate also checked but nothing unusual found.

After inspection of both Brake vans, the actual cause of failure of center pivot pin not found. However, after talking the different C&W staff, it has been learned that long haul as well as regular rakes are run in this area, due to sudden impact in shunting may be causes the centre pivot pin to break.

J. Ahmad
SSE/D/WD-III

Naresh Chandra
SSE/M/WD-II

Enclose- Annexure I Photographs of BVZI brake vans

JDSW-WD-III

Annexure I

A.

Brake Van No. : SER 86071102096 BVZI	
	
Brake Van stable at Nabenagar Road station yard /MGS division	
	
Centre Pivot Pin Broken	Hand brake fork fitted with wrong size pin
	
. Centre Pivot Pin Broken	

B.

Brake Van No. : ER 86021002551 BVZI	
	
Brake Van at Barwadih ROH depot /DHN Division	
	
Broken Centre Pivot Pin	Broken Centre Pivot Pin
	
	
Bigger Size Auxiliary Reservoir	Side Bearer Bronze Piece With Bottom Plate