JPO ON PREVENTION OF BRAKE BINDING IN PASSENGER & GOODS TRAINS

1.0 Brake Binding:

Brake Binding is a serious technical issue that significantly impacts the reliability, safety and punctuality of train operations in rolling stock. Recently, the cases of brake binding have been raises significantly, including instances where multiple wagons in a single rake were affected. This sudden rise in brake binding incidents is a matter of concern and requires the urgent need for systematic monitoring and preventive measures over KRCL.

Loco Pilots often experience brake binding symptoms through abnormal increases in tractive effort, fluctuations in the load meter or ammeter or sudden deceleration. If such symptoms are not addressed in time, they can escalate into severe consequences such as brake/running gear overheating, smoke or fire. Therefore, in the event of any such suspicion, it is imperative to stop the train immediately, conduct a proper examination and resolve the issue at the earliest on spot.

In this context, **skilful driving** and **continuous counselling** play a crucial role. Loco Pilots (LP/ALP) and Train Managers (TMRs) must develop the habit of performing regular visual inspections (looking back) of the train formation especially at curves or other vantage points so that abnormalities like smoke, sparks or dragging wheels can be detected at an early stage.

The purpose of this guideline (Safety Circular) is to provide accurate information regarding the causes of brake binding, its early signs and the immediate corrective actions to be taken while train on run & during Intensive Examination to Running & C&W staff. This will assist in analysing the root causes of brake binding and help prevent recurrence of such incidents, thereby ensuring the safe, smooth and reliable operation of trains over KRCL.

2.0 Definition: -

Brake Binding is the localised application of brakes, either partially or fully, impeding the free rotation of wheels, even when the driver's brake valve (A-9) is in the **Released** position.

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3.0 Objectives: -

To prevent the adverse consequences of brake binding as follows:

a) Detention to train causing loss of punctuality of trains leading to discomfort to the passengers of Coaching Trains.
b) Flat places on tyre of wheel leading to bearing failure, weld failure/ rail fracture.
c) As a preventive measure detachment of coach/ wagon en-route causing inconvenient to passenger to complete their journey.
d) Stock ineffective percentage will be increased, leading to a rise in maintenance costs and reduced operational reliability.
e) More Tractive force needed to locomotive leading to High Power / Fuel Consumption.
f) Excessive tractive force resulting in to Train Parting
g) Overall, these issues contribute to a **negative image of the Railways**.

4.0 Causes of Brake Binding: -

1) Improper manual release.
2) Malfunctioning of Distributor Valve (DV).
3) Choked dirt collector, restricting proper air flow.
4) Improper Manual adjustment of brake gear
5) Jammed rigging or excessive friction in brake rigging components such as horizontal levers, pins, and brake beams.
6) Hand Brakes fully or partially applied, especially after the load is stabled and fresh driver takes over the charge.
7) Brake pipe pressure difference issues due to loco change/reversal.
8) Insufficient time for brakes release after brake application while on run.
9) Non-functional of locomotive air dryer, leading to moisture ingress in brake pipe lines and air brake components.
10) Defective/Leaky loco A-9 valve.
11) Improper settings of Empty -Load devices change over handles in wagons.
12) Defective APM or leakage.
13) Non implementation of various CAI/Modifications in LHB coaching stock.
14) Non adherence to check sheet issued by RDSO for maintenance of Air Brake system of LHB coaches by coaching depots in trip and monthly schedule. (Ref No- MC/LHB Brake dated 19.01.20217 & MC/LHB/Brake dated 11.10.2023)
15) Non comply with the guidelines associated with WSP system in LHB coaches.

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5.0 Precautions: -

1.	Ensure sufficient Brake pipe pressure in Locomotive and in Brake Van/SLR.
2.	Ensure proper manual release of QRV of DV. a) Enroute- By GDR. b) C &W Point- TXR staff
3.	Ensure relevant position of Empty Load device lever.
4.	Whenever Loco changed, ensure manual releasing of DV in coaches/wagons.
5.	Ensure sufficient brake release time. a) Twin Pipe- 90 sec. b) Single Pipe -180 sec.
6.	Ensure working of Air dryer and auto drain valve in locomotive, in case of malfunctioning, drain the moisture from MR/AR frequently.
7.	Keep constant watch on Air Flow Indicator.
8.	Defective/Leaky Loco A-9 valve to be attended.
9.	Ensure hand brakes are in released position.
10.	Ensure free movement of train during starting/Brake Feel test/Brake Power test.
11.	Increase the use of Dynamic brakes/Rheostatic brakes.
12.	Ensure, proper overhauled DV fitted in rolling stock.
13.	Ensure proper adjustment of Brake gear and sufficient gap between wheel & brake block.
14.	Do not leave the train with Jammed rigging or observance of excessive friction in brake rigging components such as horizontal levers, pins, and brake beams
15.	Ensure proper working of APM.
16.	Ensure, Implementation of various CAI/Modifications in LHB coaching stock.
17.	Ensure, Air Brake Testing is carried out as per check sheet issued by RDSO during maintenance of LHB coaches during trip and monthly schedule. (Ref No-MC/LHB Brake dated 19.01.20217 & MC/LHB/Brake dated 11.10.2023)
18.	WSP should in healthy condition in all aspects.

6.0 Circumstances of Attention of Brake Binding: -

1) Unusual sound from brake rigging or wheel area. (Reported by station staff/Gateman).
2) Smoke emission or visible sparks from braking gears (clearly noticeable in night by station staff/Gateman).
3) Fluctuating or low brake pipe (BP) pressure.
4) High tractive effort requirement or fluctuations in load meter/ammeter readings during train movement.
5) High temperature on wheel.
6) Skidding marks on wheel tread.

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7.0 Duties of Operating Staff/Gateman

1. Station staff must remain vigilant while trains are passing, observing for any unusual signs such as sparks, skidding, air leakage, hanging parts, etc. Any such observations should be immediately communicated to the Train Crew or TMR or SM for further necessary action.
2. Gatemen must stay alert while trains are passing and watch for any abnormal conditions like sparks, skidding, air leakage, or hanging parts. On noticing any such issues, they should immediately inform the Train Crew, TMR and Station Master for further necessary action.

8.0 Duties of LP & TMR

1.	Ensure sufficient Brake pipe pressure in Locomotive and in Brake Van/SLR.
2.	Ensure proper manual release of QRV of DV.
3.	Ensure relevant position of Empty Load device.
4.	Whenever Loco changed, ensure manual releasing of DV in coaches/wagons.
5.	Ensure working of Air dryer and auto drain valve in locomotive, in case of malfunctioning, drain the moisture from MR/AR frequently.
6.	Keep constant watch on Air Flow Indicator.
7.	Defective/Leaky Loco A-9 valve to be attended.
8.	Ensure hand brakes are in released position.
9.	Ensure free movement of train during starting/Brake Feel test/Brake Power test.
10.	Increase the use of Dynamic brakes/Rheostatic brakes.
11.	Clearing stable load, follow the GDR check procedure.
12.	Look back to the load frequently at all possible locations and exchange all right signal.
13.	Take immediate steps to stop the train and attend the unusual reported by Station staff/Gateman.

9.0 Duties of TXR staff @C&W points

1. Mechanical TXR staff should inspect the affected coach/wagon and attend the brake binding as per the procedure prescribed by RDSO.
2. Maintain the brake power as per the category of BPC.
3. In LHB coaches, TXR staff should crush the brake pads of the affected brake calipers if brakes are not released. If situation arises, brake system of not more than one coach should be isolated and maintain minimum 95 % Brake power in ICF/LHB coaching stock.

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4. Information should be given to PRC, C&W Control and on duty SM immediately with expected duration of delay.

10. Instructions for Train crew on brake binding in Freight stock.

The most important issue is the brake binding in freight stock. In case of brake binding in a wagon enroute, the loco pilots and Train Managers have to take remedial action for releasing and isolating the brakes for affected wagon before working the train further. Though the train crew is trained, they are not in a position to do the proper job due to lack of practical experience. The crews are therefore required to refresh their knowledge. The following guidelines for their benefit are given as under.

10.1 Conventional

The train crew shall be vigilant to detect brake binding, smoke emission, unusual sound etc. If they find any metal deposition, skidding marks, wheel disc unusually hot, brake blocks jammed, they should treat this as the case of brake binding.
1. They shall release the distributor valve by pulling the release handle manually and see that the brake blocks are released fully & ensure **there should be a sufficient gap between the wheel tread and the brake blocks.**
2. After ensuring that the brake blocks are free, distributor valve isolating handle shall be put **in horizontal position**. Pull the QRV of DV again & ensure brakes are released.
3. In case brake blocks are still having the grip on the wheel tread, further action is needed for releasing the brake cylinder pressure. **There is a drain plug provided at the rear side of brake cylinder, a 12 mm size double end spanner or adjustable spanner is required for unscrewing the plug.** The plug should be unscrewed by 2 or 3 threads carefully, so as to vent out the brake cylinder pressure to ensure that the piston has moved inside the cylinder thus releasing the brakes making the brake blocks free.
4. In case the brakes are still not released, the hand brakes should be checked, if it is in applied condition, releasing should be done by rotating the hand brake wheel in the **direction of 'Off'** position to ensure that the brake blocks are not gripping on wheel tread.
5. Ensure that the empty load box handle is in proper position depending upon the empty / load condition of the wagon
6. In case the brakes are still not released, **SAB Barrel** should be rotated in anti-clock wise direction by sitting the direction of SAB Pull rod . In the process length of SAB pull rod will increase and make sure that brake blocks are in loose condition.

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7. In case brake blocks are still gripping on the wheel tread, the control rod pin and end pull rod pin should be removed and gap created by applying little force manually between brake block and the wheel tread.

10.2 BMBS

a) **For releasing brake binding**

b) Operate Quick release valve of DV & Ensure piston stroke indicator inside position.
c) If not released, operate isolating cock of both brake cylinders & Ensure venting of pressure from cock.
d) If not released, release air pressure by opening flexible pipe flange studs.
e) If not released, Push rod pin of secondary brake beam

a) **For Isolating the Wagon**

1. For wagon isolation either isolate from DV or from BC isolating cock.
2. If not released, Drain AR tank & Close AR isolating cock.

11.0 Instructions for Train crew on brake binding in Coaching stock.

11.1 ICF Coach

1) Pull the quick release lever of DV.
2) Isolate FP and BP branch pipe and drain AR.
3) Isolate DV by lifting isolating handle and again pull the release lever of DV. Check the brakes get released by shaking the brake blocks
4) If brakes get released, close the isolation cocks of both brake cylinders and work the train.
5) In case of crimped / bent flexible pipe, straighten the flexible pipe to allow BC pressure to release. If brakes are released, close the isolation cocks of both brake cylinders and work the train.
6) If brake blocks are gripping a particular pair of wheels, then close the isolation cock of the brake cylinder, pull the latch of the brake cylinder and rotate the resetting plate in clockwise direction to release the brakes. Ensure that brakes are released by shaking them.
7) If brakes are released, close the isolation cocks of both brake cylinders and work the train.
8) In case of problem in pulling the latch, remove the brake cylinder piston rod pin and work the train. Pull the QRV of DV again & ensure brakes are released.

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11.2 LHB Coach

Procedure to Release and isolate Brake Binding of LHB Coach with FIAT trolley at enroute stations

1) In case of brake binding, the brake indicator of the affected bogie will show red colour.
2) Pull the Quick release lever of DV.
3) Rotate the Bogie isolation knob to horizontal position in anticlockwise direction to release and isolate the brake cylinders of the affected bogie.
4) If brakes are released, brake indicator of the affected bogie will change colour from red to green, ensure it. Check that the brakes are released by shaking the brake calipers. If brakes are released, work the train.
5) Loosen the hexagonal nut of the brake cylinder by 27 no. or 46 no. spanner. Check that the brakes are released by shaking the calipers and work the train.
6) @C&W Point, TXR staff should crush the brake pads of the affected brake calipers if brakes are not released and prepare report as per RDSO format. Maintain the Brake Power as per the guidelines for enroute trains. If situation arises, brake system of not more than one coach should be isolated and maintain minimum 95 % Brake power. **(Ref:-RDSO letter No MC/LHB/Brake date 05.12.2013)**

12.0 Cause-Wise Remedial Measures

S. No.	Cause	Remedial Measure
1	**Wrong adjustment of brake rigging**	✓ During maintenance, ensure brake rigging is adjusted as per the corresponding **wheel diameter.**
2	**Handbrake wheel in "ON" condition**	✓ Ensure during examination and **before departure** that the handbrake wheel is in the **fully OFF** condition.
3	**Mixing of brake blocks**	✓ Avoid mixing different types of brake blocks (e.g., **Cast Iron**, **L-type**, **K-type** composites) in the **same wheelset/bogie/coach**. Different friction coefficients (0.12, 0.17, 0.25) lead to uneven brake reaction forces.
4	**Incorrect position of Empty/Loaded box handle before unloading at goods shed**	✓ Ensure the **Empty/Loaded box handle** is set in the **Loaded position** before unloading.
5	**Coach/Wagon/Train not released during brake power testing (workshop/sick line/yard/power change/CRO)**	✓ Ensure proper **brake release** of the coach/wagon/train during brake power testing at the **workshop, sick line, yard**, and during **power change, CRO**, or pressure bypass en-route.

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6	**Malfunctioning of SAB due to defective unit Paying-out function not working properly**	✓ **Replace** the defective **(SAB)** unit during maintenance. Ensure the paying-out function of SAB operates smoothly; check for jamming or mechanical failure and rectify.
7	**Dropping of BP pressure beyond the prescribed limit (i.e., more than 0.2 Kg/cm²)**	✓ **Identify and attend to the specific source of leakage as listed below:**
7a.	**Leakage from palm end air hose**	✓ Reset MU washer / replace perished MU washer.
7b.	**Leakage from air hose**	✓ Replace torn air hose.
7c.	**Leakage from flange joint**	✓ Arrest leakage using Teflon tape or by tightening the flange.
7d.	**Dirt collector broken due to foreign material impact**	✓ Bypass BP pressure and operate train under single pipe system if feasible.
7e.	**Leakage from LSD (Load Sensing Device)**	✓ Attend and seal LSD leakage properly.
7f.	**Leakage from Passenger Emergency Alarm Signal system**	✓ Reset the system using the reset key / isolate the system if necessary.
7g.	**Leakage from levelling valve of air spring**	✓ Isolate the bogie air spring levelling valve and allow the train to run at a restricted speed of 60 kmph.
7h.	**Leakage from A9 valve**	✓ Attend the issue by loco staff, especially when load pulling is impacted due to BP–CR pressure difference.
7i.	**Leakage from cut-off angle cock**	✓ Set the ball valve properly / replace the defective angle cock. ✓ **Note: -** Such Problem generally takes place from rear most cut of angle cock of train. To attend first of all, close the pressure supply from engine end of coach by closing the cut off angle cock and then put the cut off angle cock in closed position. Finally, again open the other end cut off angle cock.
8.	**Blockage of BP pressure** due to dirt collector causing DV malfunction	✓ Clean the dirt collector at **regular intervals** as per schedule.
9.	**BP and CR pressure imbalance** during locomotive change en route	✓ Ensure **manual releasing** of the **entire rake** before coupling the outgoing locomotive.

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10.	After **full-service application**, insufficient **brake release time** given by loco pilot	✓ Ensure **counselling of the loco pilot** to provide adequate release time (90 sec for twin pipe / 180 sec for single pipe systems).
11.	**Defective Distributor Valve (DV)**	✓ Replace the defective DV with a tested and functional one.
12.	Any other **component of air brake system** not functioning properly	✓ Inspect, attend, and **replace faulty components** to restore full functionality of the air brake system.

13.0 Special Instructions to Train Crew (LP & TMR):-

1) Train crew should give proper statement while reporting the brake binding cases as early as possible.
2) This statement is helpful to analyse the actual cause of brake binding at TXR point.
3) Whenever, train is getting delayed in block section for more than 10 minutes, it should be informed to controller/SM through PFT or other suitable means for cause of detention and probable time of delay.
4) Train crew should release brakes whenever DV isolating cock is operated by them.
5) Statement should include the following important details to analyse the actual cause of brake binding at TXR point.

Date of Incident
Crew name
Employee No
HQ & Region
Contact No
Train Details with BPC No
Coach/Wagon particulars
Region/Section/KM/Chainage No
Caution order before incident
Signal Aspect Red- Yellow/Double Yellow / Green
Train detention time
Defect Observed
Action Taken
Evidence (Photo by TMR)
Loaded/Empty in case of Wagon
Position of Empty Load Device
Condition of Brake block
Track condition i.e curvature and any speed restriction on curve.

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Air Pressure Values in Locomotive at the time of Incident.

Air pressure	Loco	Brake van/LV
MR in Kg/cm2		----------
BP in Kg/cm2		
FP in Kg/cm2		

Loco parameters

1. Air flow indicator
2. No. of Traction motors working
3. No. of Compressor working.
4. No of sanders working
5. Availability of sand in sanders
6. Air dryer working or not?
7. Previous such incident recorded in Loco log book in other Railway.
8. Any other observations

14.0 Role of Section Controller

Controller should inform the cause of detention for PRC/C&W control as early as possible for further necessary action within time.

15.0 Role of PCOR/PRC: -

a) PRC should arrange to examine the affected coach/wagon at next TXR point & locomotives by Loco Inspector. The events should be closely monitored and advice the concern accordingly.

b) PRC should collect all necessary statements from Train crew including all relevant details with kilometre where such incidents occurred.

c) If the affected coach/wagon belongs to a foreign railway, a PC message should be sent to the concerned zonal railway and obtain the Action Taken/Analysis Report positively.

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