सत्यमेव जयते

(भारत सरकार)

GOVERNMENT OF INDIA

Procedure of Rake Testing For Freight Stock

IRCAMTECH/GWL/M/Rake Testing /Frt./1.0
August 2015

अआमा गं RDS
रेल अग्रदूत Transforming Railways

An ISO 9001-2008 Certified Organisation
उत्कृष्ट अनुरक्षण प्रौद्योगिकी केंद्र
EXCELLENCE IN MAINTENANCE

Indian Railways
Centre for Advanced Maintenance Technology

Maharajpur, Gwalior – 474005 (MP)
Ph: 0751 -2470803 & Fax: 0751 -2470841

Procedure of Rake Testing for Freight Stock

Rake Test :

A schematic layout of rake test rig (RTR) is shown in Fig (A). A rake of wagon stock can be tested with this Test Rig. This Rig may also be used for testing the train in yards before attaching the engine.

The Rake Test Rig unit consists of air supply system and mobile test rig. The details are provided in Annexure-I The mobile test rig is having a cubical structure and is mounted on wheels. It can be taken to the yards and sick lines. The procedure is as follows:

A. Carry out Visual Examination of rake.

B. Prepare Test Rig for Rake Test.

C. Conduct Leakage, Service Application and Release Test.

Visual inspection is a check of air brake sub-assembly for any damage on the brake pipe, hose coupling etc and then rectifying it. The steps are :-

i) Inspect loose suspension brackets and anti-pilferage devices of all air brake sub-assemblies.

ii) Visually inspect for any defect/damage in the brake pipe, hose pipe, coupling etc.

iii) Rectify or replace the problematic part/sub-assembly.

Rake Test can be performed by using a portable device called 'Test Rig' or by Locomotive. The Test Rig provides all facilities like locomotive to conduct the test. The source of compressed air supply to the Test Rig is through a compressor installed in the wagon depot for Brake Pipe and Feed Pipe of the test rig. The Air Dryer should also be provided just before connecting brake pipe and feed pipe for air supply system and Mobile test Rig.

Attach the rake test rig to the rake through the couplings. Carry out following tests as per the procedure given in G-97 Annexure-XI {MP guide No.11 (Rev.01) amendment No.01 of Jan-2010} for checking capability of locomotives for Charging/Releasing of train brakes, checking of leakage in the train, checking leakage in feed pipe, brake cylinder operative percentage, and procedure to be followed at way side.

Note: In case rake test rig is not available, testing shall be done by locomotive.

Following examination must be carried out before rake testing

- Hand Brakes of all wagons are fully released.
- Operating handle of empty load box is in correct position i.e. 'Empty' position when wagon is empty or lightly loaded and in 'Loaded' position when wagon is loaded beyond the specified value.
- Hose couplings of brake pipe & feed pipe on consequent wagons are coupled to one another to form a continuous air passage from the locomotive to the rear end of train.
- All the angle cocks except those at the rear end of the train are kept OPEN.
- Hose coupling at the rear end of the train is placed on hose coupling support.
- Isolating cocks of Distributor Valve on all wagons are in OPEN position.

1. Checking of Continuity and Leakage in Rake:

A. Attach the Diesel/Electric locomotive/Test Rig to the rake fitted with twin pipe air brake system and couple brake pipes and feed pipes. Ensure correct coupling with brake and feed pipe in a manner that there is no leakage of air from coupled joints.
B. The coupling should be done with angle cocks in closed position.
C. Open the angle cocks of loco after coupling feed pipe and brake pipe.
D. Open the angle cock of the brake pipes and the feed pipes on all the wagons and check for continuity and leakage of brake pipe and feed pipe by reducing and rebuilding brake pipe and feed pipe pressure operating by A9 brake valve & angle cock fitted in feed pipe on locomotive (on wagon side) respectively. The verification should invariably to be carried out through the pressure gauges (BP& FP) provided in Guard's Brake Van.

Brake Pipe pressure in train (kg/cm²)

S. N.	Length of the train	RTR/Locomotive	Brake Van
I	UP TO **56** BOXN WAGONS	5.0	4.8
2	BEYOND **56** BOXN WAGONS	5.0	4.7

Feed Pipe pressure in train (kg/cm²)

S.N.	Length of the train	RTR/Locomotive	Brake Van
I	UP TO **56** BOXN WAGONS	6.0	5.8
2	BEYOND **56** BOXN WAGONS	6.0	5.7

NOTE: If the pressure is not within specified limit as given above then check for leakage in rake and correct it.

Leakage Rate Test:

E. After the stabilizing pressure as given in above table, move the driver's automatic brake valve handle (A-9) towards application position to reduce brake pipe pressure from 5.0 kg/cm² to 4.0 kg/cm².
F. After the brake pipe pressure has been stabilized –
    i) Close the brake pipe isolating cock provided between additional C2W Relay valve and brake pipe of the locomotive or isolating cock of Test Rig for checking BP leakage.
    ii) Close the isolating cock provided between feed valve and feed pipe of the locomotive or isolating cock of FP for checking FP leakage.
G. Wait for 60 sec for temperature and gauge settlement then note the drop in pressure in brake pipe & feed pipe pressure gauge in locomotive for 05 minutes.
H. The drop in brake pipe & feed pipe pressure gauge shall not be more than **0.25 kg/cm²/min.** If the leakage rate is more than the value indicated in (H), check for excessive leakage on individual wagon as indicated below –

1. A hissing sound would be audible at points where leakage is heavy.
2. Once the hissing sound is heard from a particular area, pin-point the location of leakage by applying soap water solution.
3. Use permitted material viz. Teflon tape for arresting the leakage.

I. In case leakage is heavy and cannot be arrested, the wagon may have to be isolated/detached.

J. In case where leakage can be arrested temporarily by tap and the nature of leakage is such that it requires attention at primary depot, clear marking on the wagon should be done to draw attention of primary depot for adequate attention.

K. In case the leakage is from the distributor valve and cannot be arrested, isolation of the wagon can be carried out by closing the distributor valve isolating cock. In such condition, clear marking should be provided on the wagon to indicate this defect to primary depot. Do not close brake pipe angle cocks under any circumstances, either for isolation of wagons or for any purpose whatsoever, except for carrying out shunting operation after which the angle cocks should again be opened to ensure continuity of brake pipe.

2. Service application and Release Test:

A. Move the driver's automatic brake valve handle (A-9) towards service brake application position and drop the value of brake pipe pressure (BP) between **1.3 to 1.6 kg/cm^2.**

B. Brakes of all wagons should apply after brake application and brake blocks on wagons should firmly grip on the wheel tread.

C. Check the piston strokes of all wagons. All Piston strokes should be within the specified limits for different types of wagons. The piston strokes are given below in table.

SN	Type of wagon	Piston Stroke	
		Empty	Loaded
01	BOXN, BCN/BCNA, BRN, BTPGLN	85 mm +/- 10	130 mm +/- 10
02	BOXNHL, BCNHL	85 mm +/- 10	120 mm +/- 10
03	BTPN	85 mm +/- 10	130 mm +/- 10
04	BOY	90 mm +/- 10	135 mm +/- 10
05	BVZC	70 mm +/- 10	
06	BOBRN	100 mm+/-10	110 mm+/- 10
07	BOBYN	100 mm+/-10	110 mm+/- 10
08	BLC	95 mm +/- 10	120 mm +/- 10
09	BVZI	32 mm	
10	BOSTHS, BTPN.BOBSN	85 mm +/- 10	130 mm +/- 10
11	ALL TYPES OF WAGON BMBS (KNORR BREMSE DESIGN)	$\pm$ 54 mm	-

If the piston stroke is incorrect then, record "A" Dimension, it should be $70 \pm^{2}_{0}$ mm in empty and loaded condition.

D. Check all brake cylinders. Wagons with in-operative brake cylinders should be marked unfit and detached.

E. After the release of brake, the piston of brake cylinder should be fully inside and brake blocks are free from the wheels.

F. Guard's emergency brake valve: Ensure that Guard Emergency brake valve is working properly by operating it.

G. BPC (Brake Power Certificate): Ensure that Loco Pilot, Guard and TXR have checked the details given in the certificate and signed for its compliance.

3. Brake cylinder operative %: (Ref: Operating Manual for IR Sep.-2008)

1. The trains originating from primary depot should have a brake cylinder operating percentage of 100% in case of CC rake. For premium rakes, minimum originating brake power percentage is 95% and for end to end rake is 90%.
2. Train examination staff should check the operative percentage by observing gripping of brake blocks on wheels.

4. Procedure to be followed at Way-Side Station:

1. If the leakage rate is found more than the value indicated in 1(H), locate the source and arrest the leakage as per the procedure given in 1(I).

2. In case the leakage can be arrested temporarily by tape and the nature of leakage is such that it requires attention at primary depot, clear marking on the wagon should be done to draw the attention of primary depot for adequate attention.

3. In case the leakage is from distributor valve, follow the procedure given in 1(L).

4. In case the leakage is heavy and can not be arrested and wagon has to be detached, contact the control and obtain further advice.

NOTE:1. It is clarified that the maximum originating brake power for air braked goods trains running on end to end pattern of examination shall be **90%** except wherever local restrictions have specified higher levels of brake power to meet specific requirements. Exception shall only be made after prior personal approval of Chief Rolling Stock Engineer (Frt) has been obtained.

NOTE:2. Whenever a rake is stabled, it must be secured properly as per rules given in G&SR of Zonal Railways.

***

PROFORMA FOR RAKE TEST

Type of rake :

Type of Wagons :

Type of DVs :

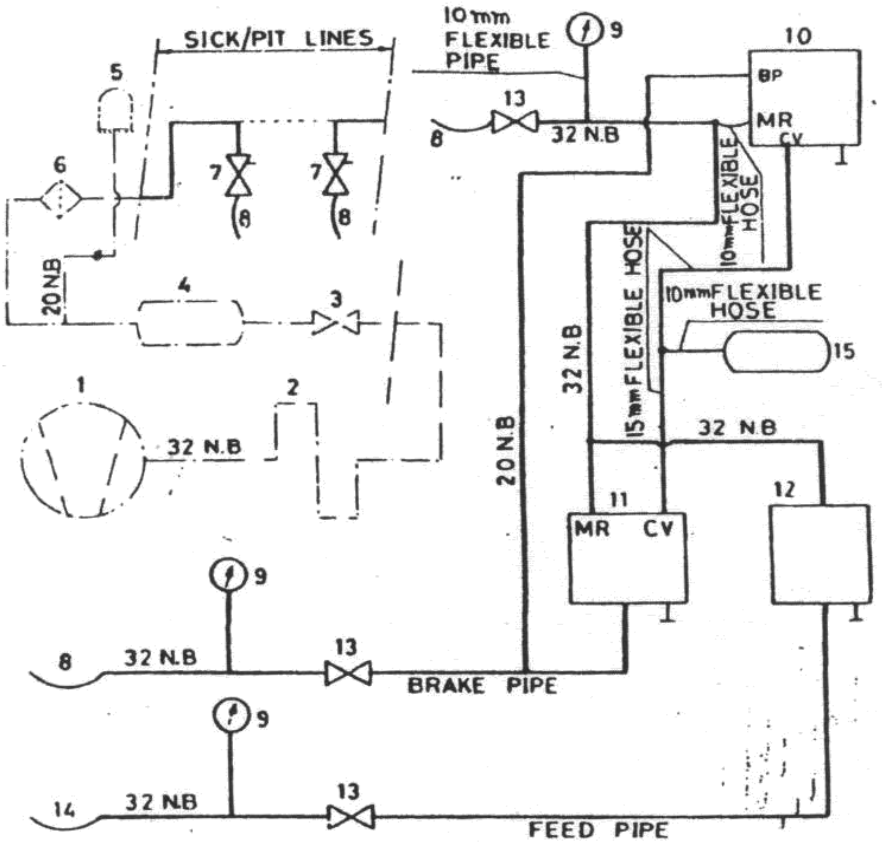
BP pressure :

FP pressure :

S.N.	Check	Specified	Actual
1.	**Pressure at last Wagon**		
	a) Brake pipe	Up to 56 wagons 4.8 Kg/cm² (min.) Beyond 56 wagons 4.7 Kg/cm² (min.)	
	b) Feed pipe	Up to 56 wagons 5.8 Kg/cm² (min.) Beyond 56 wagons 5.7 Kg/cm² (min.)	
2.	**Leakage Rate**		
	a) Brake pipe	Less than 0.25 Kg/cm²/min.	
	b) Feed pipe	Less than 0.25 Kg/cm²/min.	
3.	**Service Application and Release Test**		
	a) Brake application when B.P. pressure reduced between 1.3 to 1.6 Kg/cm²	Brakes should apply	
	b) Observe Piston stroke of brake cylinder	Piston in applied position and brake blocks are matting the wheels	
	c) Record the piston stroke	Piston stroke should be within specified limit.	
	d) Releasing of the brake when B.P. Pressure charge upto 5 Kg/cm²	Piston should be fully inside the brake cylinder.	
4.	Brake cylinder operating %	Trains originating from primary depot should have a brake cylinder operating percentage as prescribed at Clause No.03	

FIG-A

RAKE TEST RIG (RTR)
FOR TWIN PIPE AIR BRAKE SYSTEM



Note :—The equipments shown after the pit line are the parts of mobile test stand.

Item	Description	No. off	Item	Description	No. off
1.	Compressor 2000L/min. pressure 8-10 kg/cm²	1	8.	Brake hose coupling BP	2
2.	After cooler	1	9.	Single pressure gauge 6"	3
3.	Check valve	1	10.	Driver's Brake valve	1
4.	Main reservoir 300L.	1	11.	Relay valve DU-22	1
5.	Safety valve	1	12.	Feed valve F-2	1
6.	Filter	1	13.	Isolating cock	3
7	Angle cock	2	14.	Brake hose coupling FP	1
			15.	Equalising reservoir 9L	1

ANNEXURE- I

AIR SUPPLY SYSTEM

- This consists of a compressor (1), after cooler (2), check valve (3) main reservoir (4), safety valve (5) and filter (6). All these items are to be installed in a room in a yard.
- The compressor generates pneumatic pressure of 10 kg./cm2 and compressed air is stored in main air reservoir MR(4). The safety valve (5) opens out if the pressure exceeds 10 Kg./cm2. The oil and dirt will be separated out in the filter (6). The check valve(3) prevents back flow of air while compressor is off.
- The compressed air line is connected to the pipe line in the sick line/yard. Angle cock and hose coupling (BP) are provided at various points depending upon the train formation and check points in sick line.

MOBILE TEST RIG

- The rig consists of brake hose coupling BP (8) and isolating cock (13) at the inlet of the mobile test rig. The air connection can be tapped from one of the points of sickline. The mobile test rig is provided with driver's brake valve (10) and an equalizing reservoir (15).
- Brake pipe in the rake is charged while driver's brake valve (10) is kept in released and running position. The driver's brake valve inlet is connected to MR. It regulates the pressure to 5 kg./cm^2 through the relay valve (11). Isolating cock (13) is provided to isolate BP from driver's brake valve (10).
- The relay valve has been provided in the system for augmenting the feeding capacity of driver's brake valve. The hose coupling of BP is connected to the brake pipe coupling of the rake.
- The MR line is connected to the feed valve (12) and regulatory pressure of 6 kg/cm^2 is obtained from the outlet. Feed pipe in the rake will be charged through feed valve (12), isolating cock (13) and brake hose coupling FP (14).

TOOLS AND EQUIPMENTS:

[1] Rake Test Rig/Locomotive.

[2] Open End spanner 18x19"

[3] Spanner 10 mm & 12 mm