INDIAN RAILWAYS

FUNCTIONAL REQUIRMENT SPECIFICATION

FOR

BOGIE MOUNTED BRAKES CYLINDER WITH BUILT IN DOUBLE ACTING SLACK ADJUSTER

FOR

ICF DESIGN BG MAIN LINE COACHES

Issued By:
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FUNCTIONAL REQUIREMENT SPECIFICATION FOR DOUBLE ACTING BOGIE MOUNTED BRAKE CYLINDER FOR ICF DESIGN BG MAINLINE COACHES

1 FOREWORD

1.1 At present ICF type main line conventional coaches have been provided with 203 mm single acting Bogie Mounted Brake Cylinder. Railways have reported that the piston stroke of 203 mm size BMBC on ICF coaches gets reduced up to 20 mm from the pre-set value of 32 mm in every trip. This necessitates readjustment of piston stroke in each trip by the maintenance staff. Sometimes, frequent brake binding on GS and SLR coaches is also reported. This problem is limited to GS & SLR coaches due to dense loading in these coaches, therefore, huge variation in tare and loaded weight is observed. The reason can be attributed to single acting slack adjuster used in BMBC which allows the piston rod to pay out in loaded condition this is not allowed to go back due to absents of pay in mechanism when the coach becomes empty. This is why need of Bogie Mounted Brakes Cylinder with built in double acting slack adjuster for BG main line coaches has been arises.

2 SCOPE

2.1 This Functional requirement specification covers the technical requirements related to manufacture, supply, performance and testing of Double acting Bogie Mounted Brake cylinder for ICF design BG Mainline coaches.

3 TECHNICAL REQUIREMRNT

3.1 The brake cylinder bore size shall have of 8” (203.2 mm).

3.2 The brake cylinder shall have an in-built double acting slack adjuster.

3.3 The brake cylinder shall maintain a constants gap between the wheel and brake shoes. Whenever there is change i.e. increase or decrease in the gap between the wheel and brake shoes is occurred, it shall be automatically adjusts by the brake cylinder.

3.4 The take-up stroke for brake cylinder shall be 32 + 10 mm.

3.5 Double acting Bogie Mounted Brake cylinder should generate a brake force of min 1106 kg at cross head at 3.8 kg/cm^2 pressure.

3.6 The minimum take-up capacity of the in-built slack adjuster shall be 305 mm.

3.7 Mounting dimensions of the brake cylinder shall be as per the RDSO’s drawing No. SK-81057 (latest alteration).

4.0 PERFORMANCE REQUIREMENTS

4.1 The double acting brake cylinder is to be so designed that it provides faultless operation under the Indian Railway environmental conditions for a period of at least 6 years from the date of commission.

4.2 The double acting brake cylinder should be designed in such a way that it has minimum wear and tear and maintenance possibility.

5 MATERIAL & WORKMANSHIP

5.1 The material of brake cylinder with in-built slack adjuster shall confirm to the latest revision of Collaborator / RDSO approved drawing.

5.2 All the components shall be manufactured/ procured to the material specification indicated against each component in the drawings.

5.3 The castings shall be sound, clean and sharp without defects or blemishes of any kind and conform to the requirement of the specification.

5.4 The rubber item shall be smooth, free from pin holes, blisters, porosities and other visual flaws.

5.5 The fabrication and welding of fabricated cylinder body shall conform to the requirements of Section-II of IS: 2825 (code for unfired pressure vessel).

5.6 Fabrication, welding of other items shall be carried out in accordance with the procedure laid down in RDSO pamphlet no. G-72 (Rev. I).

6 DIMENSIONS AND TOLERANCES

6.1 The dimensions and tolerances of brake cylinder shall be as indicated in the latest revision of drawings as indicated in the approved drawings.

6.2 All critical dimensions identified in the drawing shall be gauged. The manufacturers shall have the necessary gauge available with them.

7 TESTS

7.1 Type Test

7.1.1 The following test shall constitute type test and shall be carried out in accordance to Annexure - B at the time of Product approval:

a) Performance and Endurance Test

7.2 Routine Test

7.2.1 Leakage & Function Test for Brake Cylinder Complete

The leakage and function test of the brake cylinders should be conducted in accordance with Annexure-A.

7.2.2 Hydraulic Test

This test shall be conducted on cylinder body. The cylinder body shall be subjected to hydraulic pressure of 7 Kg/cm^2 for 5 minutes. There should be no leakage.

8 WARRANTY

8.1 The firm shall, at his cost, replace the double acting brake cylinder failing prematurely or proving unsatisfactory in service for reasons attributed to defective / faulty design, defective material or poor workmanship within a period of 30 months from the date of delivery or 24 months from the date of fitment, whichever is earlier. This warranty shall survive, notwithstanding the fact that the double acting brake cylinder may have been inspected, accepted and payment thereof made by the PURCHASER.

9 PAINTING

9.1 The exterior of the brake cylinder shall be painted with black enamel paint.

10 PACKING

10.1 The manufacturer shall ensure that all external ports of brake cylinders are suitably covered with protection caps to prevent ingress of foreign particles during handling and storage.

10.2 The manufacturer shall also ensure that brake cylinders in assembled condition are adequately packed before dispatch to prevent damage in handling and storage.

ANNEXURE - A

TESTING PROCEDURE OF BOGIE MOUNTED BRAKE CYLINDER WITH BUILT IN DOUBLE ACTING SLACK ADJUSTER

S. No.	Description of Tests	Specified Values
1	**Leakage Test (Room Temperature)**	
a	Check brake cylinder leakage at 0.8 Kg/cm^2 air pressure	Leakage should not exceed 0.1 Kg/cm^2 in 10 min.
b	Check brake cylinder leakage at 3.8 Kg/cm2 air pressure	Leakage should not exceed 0.1 Kg/cm2 in 10 min.
2	**Maximum Slack Adjustment Take-up**	
a	Apply 0.7 Kg/cm2 air pressure and allow the ram to extend out completely.	305 mm (Minimum)
3	**Constant Piston stroke Test at 0.8 kg/cm2 (Stopper plate at 100 mm from initial position)**	
a	**Forward slack adjuster take-up.** Increase the gap between the brake cylinder front end and the stopper plate.	After application and release of BC pressure, the gap between the brake cylinder front end and the stopper plate should remain constant.
b	**Backward slack adjuster take-up**. Decrease the gap between the brake cylinder front end and the stopper plate.	After application and release of BC pressure, the gap between the brake cylinder front end and the stopper plate should remain constant.
4	**Constant Piston stroke Test at 3.8 kg/cm2 (Stopper plate at 100 mm from initial position)**	
a	**Forward slack adjuster take-up.** Increase the gap between the brake cylinder front end and the stopper plate.	After application and release of BC pressure, the gap between the brake cylinder front end and the stopper plate should remain constant.
b	**Backward slack adjuster take-up**. Decrease the gap between the brake cylinder front end and the stopper plate.	After application and release of BC pressure, the gap between the brake cylinder front end and the stopper plate should remain constant.
5	**Constant Piston stroke Test at 0.8 kg/cm2 (Stopper plate at 225 mm from initial position)**	
A	**Forward slack adjuster take-up.** Increase the gap between the brake cylinder front end and the stopper plate.	After application and release of BC pressure, the gap between the brake cylinder front end and the stopper plate should remain constant.

B	**<u>Backward slack adjuster take-up</u>**. Decrease the gap between the brake cylinder front end and the stopper plate.	After application and release of BC pressure, the gap between the brake cylinder front end and the stopper plate should remain constant.
6	**Constant Piston stroke Test at 3.8 kg/cm2 (Stopper plate at 225 mm from initial position)**	
A	**<u>Forward slack adjuster take-up.</u>** Increase the gap between the brake cylinder front end and the stopper plate.	After application and release of BC pressure, the gap between the brake cylinder front end and the stopper plate should remain constant.
b	**<u>Backward slack adjuster take-up</u>**. Decrease the gap between the brake cylinder front end and the stopper plate.	After application and release of BC pressure, the gap between the brake cylinder front end and the stopper plate should remain constant.

ANNEXURE-B

TESTING PROCEDURE OF BOGIE MOUNTED BRAKE CYLINDER WITH BUILT IN DOUBLE ACTING SLACK ADJUSTER (TYPE TESTING – ONCE A YEAR)

Leakage Test for Brake Cylinder complete

Apply 0.7 Kg/Cm2 & 3.8 Kg/Cm2 air pressure and wait 5 minutes after application and observe that the leakage is not more than as given in table below.

Brake Cylinder Pressure	Temp *	Maximum leakage rate
0.7 Kg/Cm2	-10^{o} C	0.07 Kg/Cm2 in 10 minutes
	21^{o} C	0.03 Kg/Cm2 in10 minutes
	55^{o} C	0.03 Kg/Cm2 in10 minutes
3.8 Kg/Cm2	-10^{o} C	0.03 Kg/Cm2 in10 minutes
	21^{o} C	No. leakage in 10 minutes
	55^{o} C	No. leakage in 10 minutes

Cycle Test/ Endurance Test

After Leakage & Performance test for brake cylinder successfully completed, cycle the brake cylinder at a pressure of 6.2 Kg/Cm2 for 200,000 cycles at room temperature.

Efficiency at the completion of cycle test / endurance test must not decrease more than 2% when subjected to leakage & environmental test after the cycle test at room temperature.