

**Specification No. 07-ABR-92**

**UPDATED UPTO JULY, 1995**

**INDIAN RAILWAYS**

**SPECIFICATION  
FOR IRSA-600, IRSA-600J AND IRSA-450 BRAKE SLACK  
ADJUSTER FOR FREIGHT STOCK AND COACHING STOCK OF  
INDIAN RAILWAYS**

**ISSUED BY**

**RESEARCH DESIGNS & STANDARDS ORGANISATION**

**MINISTRY OF RAILWAYS**

**LUCKNOW - 226011**

JUNE, 92

PRICE: Rs. 3,700/-

**Amendment No. 5 of September, 2016 to Specification No. 07-ABR-92 for IRSA-600, IRSA-600J and IRSA-450 Brake Slack Adjuster for Freight Stock and Coaching Stock of Indian Railways.**

Add the following paragraph after clause 1 “**Scope**”

“All the provisions contained in RDSO’s ISO procedures laid down in Document No. QO-D-7.1-11 dated 19/07/2016 (Titled “Vendor-Changes in approved status”) and subsequent version/ amendments thereof, shall be binding and applicable on the successful vendor/ vendors in the contracts floated by Railways to maintain quality of products supplied to Railways”.

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**Amendment No. 4 of July, 2000 of Specification No. 07-ABR-92 for IRSA-600/IRSA-600J and IRSA-450 Slack Adjuster**

Add new para 9.2 and renumber existing para 9.2, 9.3 and 9.4 as 9.3, 9.4 and 9.5 respectively.

The list of items indicating the components to be manufactured in house by the supplier and components which can be manufactured by sublet vendors is enclosed as Annexure-VI. The original equipment manufacturer shall procure the below mentioned item with RDSO Inspection from the vendors approved by RDSO:

1.	Rubber gasket	Drg. No. WD-82064-S-09-RC Item 1
2.	Take up spring	Drg. No. WD-82064-S-04-RC Item 1,2,3 and 4
3.	Pay our spring	
4.	Clutch spring	
5.	Barrel spring	
6.	Bearing 45 TA (complete)	IS: 2513 and 5932
7.	Bearing 45 TA (without shaft washer)	IS: 2513 and 5932

**ANNEXURE-VI****LIST APPLICABLE FOR MANUFACTURER**

<b>S N</b>	<b>Description</b>	<b>Drg. No.</b>	<b>To be manufactured in house</b>	<b>May be manufactured by sublet vendor</b>
1	Sealing ring	WD-82064-S-08-RC(Item -5)		✓
2	Rubber gasket	WD-82064-S-09-RC(Item -1)		✓
3	Seal ring	WD-82064-S-08-RC(Item -6)		✓
4	Circlip 45 X 1.75 N	WD-82064-S-08-RC(Item -8)		✓
5	Dog pin	WD-82064-S-05-RC(Item -3)	✓	
6	Circlip 85 X 4 H	WD-82064-S-09-RC(Item -4)		✓
7	Pay out spring	WD-82064-S-04-RC(Item -2)		✓
8	Spring dowel sleeve 6 X 10	WD-82064-S-10-RC(Item -4)		✓
9	Barrel spring IRSA 600/450	WD-82064-S-04-RC(Item -4) SK-85065		✓
10	Spring dowel sleeve 5 X 24	WD-82064-S-10-RC(Item -3)		✓
11	Circlip 40 X 2.5 H	WD-82064-S-08-RC(Item -3)		✓
12	Take up spring	WD-82064-S-04-RC(Item -1)		✓
13	Clutch spring	WD-82064-S-04-RC(Item -3)		✓
14	Circlip 4.5 X 2.5 H	WD-82064-S-08-RC(Item -9)		✓
15	Multi tooth lock washer B 31/B 28 IRSA 600/600J	WD-82064-S-08-RC(Item -7) /WD-90002-S-02-RC(Item-6)		✓
16	Bearing 45 TA II (complete)	IS-2513 & 5932		✓
17	Bearing 45 TA II	IS-2513 & 5932		✓
18	Leader nut casting	WD-82064-S-07-RC(Item -1)	✓	
19	Clutch sleeve	WD-82064-S-03-RC(Item -4)	✓	
20	Leader nut	WD-82064-S-02-RC(Item -1)	✓	
21	Adjusting nut	WD-82064-S-02-RC(Item -2)	✓	
22	Actuating sleeve	WD-82064-S-06-RC(Item -1)	✓	
23	Barrel head	WD-82064-S-03-RC(Item -2)	✓	
24	Control rod head IRSA 600/600J	WD-82064-S-05-RC(Item -2)/ WD-90002-S-02-RC(Item -3)	✓	

25	Adjuster ear IRSA 600/600J	WD-82064-S-10-RC(Item -1)/ WD-90002-S-02-RC(Item -1)	✓	
26	Control rod IRSA 600/600J/450	WD-82064-S-10-RC(Item -2)/ WD-90002-S-02-RC(Item -2)/ SK.85069	✓	
27	Dust busing	WD-82064-S-09-RC(Item -2)	✓	
28	Spindle sleeve IRSA 600/600J/450	WD-82064-S-09-RC(Item - 6)/SK-85067	✓	
29	Spring sleeve	WD-82064-S-09-RC(Item -3)	✓	
30	Transaction sleeve	WD-82064-S-03-RC(Item -3)	✓	
31	Guide bushing	WD-82064-S-05-RC(Item -4)	✓	
32	Guide pin	WD-82064-S-03-RC(Item -1)	✓	
33	Wire ring	WD-82064-S-07-RC(Item -3)	✓	
34	Friction washer	WD-82064-S-07-RC(Item -2)	✓	
35	Adjuster tube socket	WD-82064-S-06-RC(Item -2)	✓	
36	Clutch ring	WD-82064-S-06-RC(Item -3)	✓	
37	Barrel IRSA 600/450	WD-82064-S-02-RC(Item -3) SK-85063	✓	
38	Adjuster spindle IRSA 600/450	WD-82064-S-02-RC(Item -4)/ SK-85064	✓	
39	Safety collar	WD-82064-S-10-RC(Item -5)	✓	
40	Lock washer	WD-82064-S-08-RC(Item -1)	✓	
41	Ear bushing IRSA 600/600J/450	WD-82064-S-10-RC(Item -6)/ WD-90002-S-02-RC(Item -4)/ SK.85068	✓	
42	Leader nut flange	WD-82064-S-05-RC(Item -1)/ SK-85064	✓	
43	Lock screw	WD-82064-S-09-RC(Item -5)		✓
44	Tab washer	WD-82064-S-08-RC(Item -4)		✓
45	Adjuster tube IRSA 600/450	WD-82064-S-05-RC(Item -5) SK-85066	✓	
46	Lock nut	WD-82064-S-08-RC(Item -2)		✓
47	Name plate	WD-82064-S-07-RC(Item -4)		✓
48	Rivet	WD-82064-S-07-RC(Item -5)		✓
49	Nut IRSA 600J	WD-90002-S-02-RC(Item -5)		✓

50	Punched washer M-20 IRSA 600J	IS:2016		✓
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**Amendment No. 3 of August, 1998 of Specification No. 07-ABR-92 for**  
**IRSA-600 / IRSA-600J and IRSA-450 Slack Adjuster**  
**For Freight stock and coaches of Indian Railways**

Delete existing paras 13.1 and 13.2 and substitute the following :

13.1 The following methods should be used for packing the complete slack adjuster :

13.1.1 Slack adjuster (without spindle and control rod assembly) should be kept in a polythene sheet tube of thickness of 0.16 mm (minimum) and sealed to arrest ingress of water and dust.

13.1.2 Adjuster spindle assembly and control rod assembly should be kept separately in a polythene sheet tube of thickness of 0.16 mm (minimum) after protecting the threaded portion by means of card board tubes and sealed to arrest ingress of water and dust.

13.1.3 For local dispatch, slack adjuster, adjuster spindle assembly and control rod assembly packed as per para 13.1.1 & 13.1.2 above may be dispatched further covering all items with polythene sheet.

13.1.4 For outside dispatch, 3 slack adjuster assemblies indicated in para 13.1.1 should be strapped with wire rope/ jute to avoid further movement. The assembly should be kept in a wooden box and then firmly wrapped with steel tape.

Adjuster spindle assembly and control rod assembly after protection as mentioned in para 13.1.2 should be tied with wire rope/ jute rope 10 nos. at a time and then to be kept in a wooden box. The wooden box to be firmly secured with steel tape.

13.2 The following methods should be used for packing the spares of slack adjuster:

13.2.1 Small individual spares should be kept in a polythene packet of thickness of 0.16 mm (minimum) after taking due protection against corrosion and rust and sealed to arrest ingress of water and dust. The spares after such packing should be kept in a wooden box in groups and secured with steel tape.

3.2.2 The bigger spares should be packed as below:

13.2.2.1 Control rod, adjuster spindle, barrel head etc. should be packed as mentioned at para 13.1.2 and then tied with wire rope or jute rope as indicated in para 13.1.4 and kept in wooden box and secured with steel tape.

13.2.2.2 Other big spares shall be individually packed with polythene sheet packet of 0.16 mm sheet thickness and sealed. Required quantity shall be kept in a wooden box and secured with steel tape.

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**AMENDMENT NO. 2 OF MAY, 96 OF SPECIFICATION NO. 07-ABR-92 FOR**

**IRSA-600/IRSA-600 J AND IRSA -450 SLACK ADJUSTER**

1. Add new para 6.3.5 after para 6.3.4

6.3.5 Suitable test machine for conducting endurance test as per Annexure-IV.

2. Add para 1.4.5 in Annexure-I after para 1.4.4

1.4.5 Endurance test

One slack adjuster shall be subjected to endurance test as per procedure given in Annexure-IV.

3. Replace the existing para-2 of Annexure-I by the following:

“2. After completion of tests detailed in para 1.4.3, 1.4.4 and 1.4.5 of Annexure-I, both the samples shall be tested for pay-in and pay-out as per para 1.4.1 again to ensure that there is no adverse effect on the slack adjuster and that it performs satisfactorily.”

4. Replace the existing para-1 of Annexure-II by the following:

“1. Purchase inspection shall be carried out as follows:

The inspecting official will carry out the Audit checks of the manufacturing procedure and manufacturer's Quality Assurance Programme to ensure that the slack adjusters offered for inspection have been manufactured strictly as per the laid down Quality Assurance Programme. The inspecting official will ensure that the slack adjusters offered has been manufactured by the manufacturing process and at the manufacturing place from where the slack adjuster components were manufactured and tested successfully in endurance test as per procedure given in Annexure-IV. After ensuring these requirements of Quality Assurance Programme and endurance tests, the purchase inspection shall be carried out as follows:”

5. Replace the existing para-3 of Annexure-II by the following:

One slack adjuster per two thousand assemblies or once in six months shall be subjected to vibration test, tension test as per procedure given at para 1.4.3 and 1.4.4 respectively of Annexure-I and endurance test as per procedure given at Annexure-IV.

**PROCEDURE FOR ENDURANCE TEST OF SLACK ADJUSTERS**

**TEST SET-UP**

- 1.1 The slack adjuster shall be secured on the test machine in a similar manner to the method of installation on the brake rigging on a wagon.
- 1.2 Timers which will shut off the test machine if a slack adjuster mal-function occurs which will alter the pressure rate, load rate, applied load, release load, index, hold load or index cut off will be set one second if needed above the minimum required for a normally operating slack adjuster.
- 1.3 Timers which will shut off the test machine if the pay-in or pay-out time are altered will be set 2 minutes above that required for normal operation of slack adjuster.
- 1.4 The load application and control system of test machine should be hydraulic and load application piston velocity should be 60 cm/min.
- 1.5 The indexing increment should be 2 mm and hold time should be one and half second.

**2. TEST PROCEDURE :**

- 2.1 The 3650 kg tensile load will be applied and released ten (10) time after which the 2 mm adjustment will be made by the test machine and corresponding adjustment made by a normal functioning slack adjuster. This cyclic action will be repeated for 100,000 load release applications or to failure as the case may be. For the duration of the test, the slack adjuster is caused to shorten (pay-in) and extend (pay-out) in the 2 mm increments for each ten (10) applications of load over a range of approximately 550 mm for IRSA-600 and 400 mm of IRSA-450.
- 2.2 After completion of 100,000 cycles and the slack adjuster passing the test, it will be disassembled to determine the interior condition. Examination will be done in the presence of RDSO inspecting officials.

**Amendment No. 1 of August, 92 of STR No. 07-ABR-92 for**  
**IRSA-600/IRSA-600 J and IRSA -450 Slack Adjuster**

1. Delete existing para 9.4 and substitute the following :

“Slack Adjuster and its components shall be free from injurious defects that may impair their strength. The suppliers shall also ensure that all components are greased with SERVOGEM-RR3 or BALMEROL MULTI GREASE LL3. The approximate requirement of lubricant for IRSA-450 is 1 kg and for IRSA-600 & IRSA-600J is 1.5 kg”.

2. Replace existing Annexure-III-B by revised Annexure-III-B attached.

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**ANNEXURE-III-B**  
**(Amendment No. 1)**

**Trial Scheme for monitoring performance of IRSA-450**  
**Slack Adjusters fitted on coaching stock**

**Object : To determine the performance of IRSA-450 Slack Adjusters fitted on coaching stock.**

**Instructions:**

1. Trial slack adjusters shall be fitted on coaching stock running on specified rake and performance monitored along with Slack Adjusters manufactured by M/s. Stone India Ltd. On each coach one Slack Adjuster shall be from those under trial and other slack adjuster shall be of M/s. Stone India Ltd. which is presently under use. Coaches fitted with trial slack adjuster shall have the following marking stenciled in 25 mm letters in white on both end wall panels :

“FITTED WITH IR SLACK ADJUSTER  
MAKE .....ON TRIAL”

2. Coach numbers, slack adjuster numbers, manufacturer’s name, date of fitment of both slack adjusters shall be noted by the PU/Workshop who fit these Slack Adjuster on trial and circulate to Zonal RIys. The concerned depot and Rly. workshop shall note the particulars of coach and slack adjusters where the coach is inspected / POHed.
3. Performance of “both slack adjusters” shall be monitored for a period of one POHs (18 months) on following lines:
  - 3.1 **Open line :**
    - 3.1.1 During the primary and secondary maintenance, the TXRs shall ascertain the correct functioning of both slack adjusters in the following manner:
      - a) The piston stroke and dimension ‘A’ should be checked and should be as specified for air-brake/vacuum brake coaches.
      - b) Rotate the slack adjuster 2 or 3 times in clockwise direction facing the control rod. Clearance between brake block and wheel tread will increase (pull rod comes out of the slack adjuster).
      - c) Apply brake. Initially higher piston stroke will be observed at first application. If the piston stroke is normal after 2 or 3 application, the ‘Pay-in’ is satisfactory.

- d) Rotate the slack adjuster 2 or 3 times in anti-clockwise direction facing the control rod. Clearance between brake block and wheel tread will decrease (pull rod goes inside the slack adjuster).
- e) Apply brake. Initially short piston stroke will be observed at first application. If the piston stroke is normal after 2 or 3 application, the 'Pay-out' is satisfactory.
- f) If the slack adjuster is found defective during the examination, it shall be removed from the coach and shall be sent to base workshop for detailed examination and testing on the rig. A detailed report shall be sent to manufacturer and RDSO. The slack adjuster once removed due to defective performance will be considered off from the trial and no further trials will be carried out on the same.

## 3.2 Workshops

- 3.2.1 During POH, the slack adjusters under trial shall be removed from the coach and mounted on the performance test rig (as indicated in Annexure-IV) and tested.
- 3.2.2 Attach the adjuster ear to the free end of the cylinder lever of the test rig.
- 3.2.3 Screw the test rig spindle into the slack adjuster until the entire length of the thread is covered by protection tube and attach the free end of the spindle to the test rig. After fixing the slack adjuster in the test rig 'pay-in' and 'pay-out' test should be carried out in the following manner :

### **Pay-in Test :**

- a) Let down the control rod, so that the fork of the rod clasps the adjuster tube of the slack adjuster.
- b) Apply and release the brake a few times letting the slack adjuster pay-in until the correct piston stroke is obtained (until the indicator is within  $\pm 5$  mm tolerance field of the scale)

**NOTE:** The slack adjuster pays-in up to max. 100 mm per braking.

### **Pay-out Test :**

- a) Turn up the control rod and make two brake applications letting the slack adjuster pay-out.

**NOTE:** The slack adjuster pays-out up to max. 30 mm per braking.

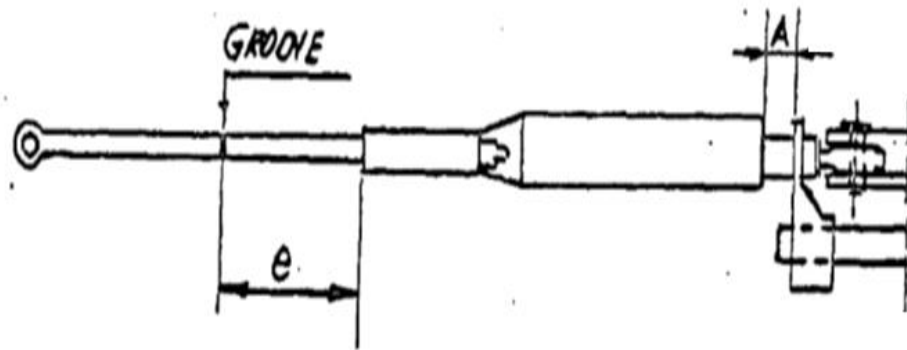
The above 'pay-in' and 'pay-out' tests should be repeated twice. If the performance of slack adjuster is found satisfactory, the adjuster shall be fitted on the same coach from which it was removed.

- 3.2.4 In case the slack adjuster does not pass the above tests, a detailed note is to be sent to the manufacturer with a copy endorsed to RDSO and the coach number and that slack adjuster shall have to be deleted from the further trials.
- 3.2.5 The workshops shall submit performance report of all the slack adjusters on trial as per the proforma enclosed as Annexure to RDSO.

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**PROFORMA FOR WORKSHOP**

Sl. No	Whether received from open line/removed from coach	Coach particulars		Slack Adjuster		Month & Year of manufacture of slack adjuster	Date of fitment of S.A	Date of check	Desired piston stroke		Dimensions				Nature of defect	Remarks
		No.	Type	No.	Make SIL SCL GREY GESC				Vac. Brake 125±15 mm	Air Brake 65-100 mm	Air Braked Coaches		Vac. Braked coaches			
											A	e	A	e		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17



+2

+4

'A' – Dimension between control rod head and slack adjuster barrel which should be 20 -0 mm for vacume braked coaches and 22 -0 mm for air braked coaches.

'e' – Distance between the groove on adjuster spindle and the end of spindle sleeve as shown above.

**Note:** This proforma is to be submitted by workshop after testing slack adjuster during POH.

**Specification for IRSA-600, IRSA-600J and IRSA-450****Brake Slack Adjuster for freight and coaching stock of Indian Railways****0. Foreword**

- 0.1 This specification was originally issued as specification No. 07-ABR-88 (Rev.).
- 0.2 This schedule is intended to cover the technical requirement /provision relating to material, construction and tests and does not include all necessary provision of the contracts.
- 0.3 This schedule draws reference to some of the relevant IS specification. Latest versions of these specifications shall be taken as reference.
- 0.4 For the purpose of deciding whether a particular requirements of this schedule is complied with, the final value observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS: 2-1960. The number of significant placed retained in the rounded off value should be the same as that of the specified value in this schedule.
- 0.5 In this revision the material and dimension of some of the component such as circlips, spring dowel sleeve, friction washer etc. has been revised/ updated.

**1. Scope**

This specification covers performance, developmental and purchase requirements for IRSA-600 and IRSA-600J Brake Slack Adjuster for freight stock and IRSA-450 for coaching stock designed for automatic controlling of brake block clearance and brake cylinder piston travel.

**2. General requirements**

- 2.1 Shall operate in harmony with power and hand brakes.
- 2.2 Shall be able to operate without maintenance for a minimum period of six years.

**3. Performance requirements**

- 3.1 Shall be capable of adjusting the brake block clearance quickly either way, i.e. when it is large or small as compared to the pre-determined value.



- 3.2 Shall have a total pay-in and pay-out capacity of 600mm for freight stock and 450mm for coaching stock.
- 3.3 Loss of brake force for Slack Adjuster type IRSA-600, IRSA-600J and IRSA-450 shall be more than 310kgs.
- 3.4 Shall not falsely pay-out slack due to heavy brake rigging resistance. Also, normal train shocks shall not cause false pay-in or pay-out of slack adjuster.

#### **4. Design and material**

- 4.1 The supplier shall be responsible for maintaining quality and workmanship so that the Slack Adjuster supplied shall meet all requirements mentioned against para 3 above and shall be in line with the latest RDSO Drg. No. WD-82064-S-01-RC and 90002-S-01-RC for freight stock and SK-85062 for coaching stock.
- 4.2 The dimensions and material composition of the various components of the Slack Adjuster shall conform to the latest RDSO drawings as mentioned in Annexures VA, VB and VC unless otherwise specified.

#### **5. Manufacturing facilities**

- 5.1 Supplier shall have adequate facilities for manufacture of Slack Adjuster conforming to RDSO drawings mentioned above.
- 5.2 Following facilities, however, shall be essential :
  - 5.2.1 A special purpose multi start thread milling machine /thread rolling machine for generating threads on Adjuster Spindle and a special purpose tapping machine for generating threads on Adjuster nut and Leader nut.
  - 5.2.2 Other machines such as Centre Lathe, Turret Lathe, Milling machine, Grinding machine, Drilling machine etc. for machining of components like Adjuster nut, Leader nut, Traction Sleeve, Clutch ring, Adjuster tube socket, Leader nut casing etc. shall be of reputed makes and of adequate capacity.
  - 5.2.3 Self-regulating furnaces for the heat treatment of components i.e. Leader nut flange, Guide bushing, Clutch ring, Adjuster tube socket, Ear Bushing and Dog pin.
- 5.3 Following facilities shall be optional but manufacturer shall have their own arrangement with the firms having facilities with proper quality control.

5.3.1 Facilities for surface treatment like phosphating, zinc plating etc., of the various components of Slack Adjuster.

## **6. Testing facilities**

6.1 Supplier shall have adequate facilities for checking of slack adjuster components according to the dimensional tolerances and surface finish shown on the RDSO drawings and also facilities for testing of complete Slack Adjuster assembly.

6.2 Following facilities, however, shall be essential :

6.2.1 Performance Test Rig for testing of pay-in and pay-out capacity of complete Slack Adjuster assembly.

6.2.2 Rig for testing loss of force in the Slack Adjuster.

6.2.3 Suitable ring, plug and thread gauge for checking the threaded components viz. Adjuster spindle, Adjuster nut and Leader nut.

6.2.4 Suitable gauges for checking the dimensions of the components.

6.2.5 Suitable testing machine for checking calibration of springs.

6.2.6 Suitable testing machines for conducting tests on Circlip and Spring dowel sleeves.

6.2.7 Suitable testing machines for conducting hardness tests.

6.3 Following facilities shall be optional:

6.3.1 Vibration Test Rig for subjecting the Slack Adjuster to 5 million cycles at a frequency range of 30-60 cycles/sec.

6.3.2 Tension Test Rig for subjecting the Slack Adjuster to a tensile load of 10 tonnes.

6.3.3 Suitable shadowgraph machine with sufficient magnification (30 times minimum) for detailed checking of threaded profile of Adjuster Spindle, Adjuster nut and Leader nut.

6.3.4 Physical and chemical properties of the components.

**Note:** In case the above facilities are not available with the manufactures, they shall have their own arrangement for conducting test from reputed institution or test houses and test reports submitted to inspecting officials.

## **7. Quality Assurance Programme (QAP)**

The Supplier shall submit to RDSO in house Quality Assurance Programme (QAP) which will be followed by them to ensure that the Slack Adjuster supplied shall meet all the requirements and shall maintain quality and workmanship. Following points shall be covered in QAP :

- 7.1 Inspection Procedure of raw material and the tests carried out.
- 7.2 Inspection procedure for the items manufactured in-house.
- 7.3 Procedure of selecting sublet venders for springs, semi-finished & finished items.
- 7.4 Inspection procedure for bought out hardware items.
- 7.5 Inspection procedure for springs.
- 7.6 Inspection procedure for semi-finished items procured from sub-vendors.
- 7.7 Inspection procedure for finished items procured from sub-vendors.
- 7.8 Inspection procedure at the assembly stage.
- 7.9 Agency and frequency of test for which facilities are not available with them and are optional.

## **8. Testing of Slack Adjuster for development order**

When RDSO is satisfied that manufacturing / testing facility and other technical staff back-up etc. necessary for successful and regular manufacture and supply of Slack Adjusters are available with the suppliers, two samples each of Slack Adjuster type IRSA-600/IRSA-600J and IRSA-450 as the case may be obtained from the supplier for testing in RDSO in terms of paras 1.4.1 and 1.4.2 of Annexure-I. If RDSO is satisfied with the test results of both these samples, arrangements would be made to place a developmental order for IRSA-600/IRSA-600J for freight stock and IRSA-450 Slack Adjusters for coaching stock on the firm.

**9. Manufacture :**

- 9.1 Manufacture of Slack Adjuster shall commence only after the supplier has been duly approved by RDSO and specific permission granted for the same.
- 9.2 Supplier shall ensure that all components not manufactured by him are procured from sublet vendors having adequate facilities. For such items, manufacturers shall have a well-defined procedure for the selection of sublet vendors and method of quality checks.
- 9.3 Supplier shall take care to see that finished components of Slack Adjuster conform strictly to the dimensional tolerances and the standard of surface finish identified on the RDSO drawing so that complete interchangeability could be achieved.
- 9.4 Slack Adjuster and its components shall be free from injurious defects that may impair their strength. Supplier shall also ensure that all components are greased with lithium base MP-2 grease or equivalent. The approximate requirement of lubricant for IRSA-450 is 1 kg and for IRSA-600 & IRSA-600J is 1.2 kg.

**10. Inspection :****10.1 General :**

- 10.1.1 Complete Slack Adjuster assembly shall be inspected and accepted by the inspecting authority of RDSO.
- 10.1.2 The Inspecting Authority shall have access to all manufacturing and testing facilities available with the supplier. Supplier shall be obliged to table any information to the Inspecting Authority as and when called for.
- 10.1.3 Inspecting Authority may deviate from the agreed procedure if and when found necessary to re-assure that the material is being furnished in accordance with the specification. In this regard, supplier shall not be entitled to object on any ground what so ever on the nature and procedure of testing that may be followed by the Inspecting Authority.

**10.2 Developmental Inspection :**

- 10.2.1 Developmental inspection shall be carried out by RDSO at the supplier's premises. Procedure for developmental inspection shall be as listed in Annexure-I. When the development inspection including field trials is

found satisfactory and meeting with all requirements, then the concerned firm shall be considered for regular production of Slack Adjuster.

### **10.3 Purchase Inspection :**

**10.3.1** Purchase Inspection procedure as listed in Annexure II shall be applicable for the firms who have been cleared for regular production of IRSA Slack Adjusters. This shall be carried out by the Inspecting Authority of RDSO at the supplier's premises for which necessary testing facilities shall be made available by the supplier at his own cost.

### **11. Service Trial :**

11.1 Service performance of the IRSA-600 / IRSA-600J Slack Adjuster for freight stock shall be monitored for 18 months and one POH cycle (18 months) for coaching stock. Service Trials with IRSA-450 Slack Adjuster under trial would be conducted on 100 coaches. These 100 coaches would have one Slack Adjuster of Stone India make and the second one which is under trial for the purpose of comparison.

11.2 Coaches fitted with these trial Slack Adjusters shall have the following marking stenciled in 25 mm letters in white on the end wall of the coaches.

“FITTED WITH IR SLACK ADJUSTER MAKE ..... ON TRIAL”

Similar marking shall be made on the centre panels on both sides of the wagon.

11.3 The trial performance of IR Slack Adjusters shall be monitored by the Railways and information furnished to RDSO, Lucknow as per the proforma. The detailed instructions are given in Annexure-IIIA for freight stock and Annexure-IIIB for coaching stock.

### **12. Marking and Painting :**

12.1 Supplier shall ensure that his initials are marked on the various components at location as shown in the relevant drawings. Complete Slack Adjuster assembly shall also carry the suppliers' name and address plate as shown in the RDSO Assembly drawing.

12.2 Complete Slack Adjuster shall be painted as per requirements mentioned in the RDSO Assembly Drawing to prevent corrosion.

**13. Packing :**

- 13.1 The assembled Slack Adjuster shall be fully shortened and packed in suitable wooden crates along with their control rods.
- 13.2 The supplier shall ensure that the Slack Adjuster assemblies are packed tight in the crates to prevent any damage during transport and handling.

**14. Guarantee :**

Supplier shall guarantee to replace at his own expense any part of Slack Adjuster which fails or proves unsatisfactory in service due to defective material or workmanship within 36 months from the date of supply or 24 months after putting into service whichever is earlier.

**15. Deviation :**

No deviation from this specification shall be normally permitted. However, in case any deviation is unavoidable the supplier shall furnish details of such deviation clause wise with technical reasons for the same so that they could be considered.

## **Procedure for developmental Inspection**

1. The inspection official shall make out audit check in the premises of manufacturer to find out that the firm has followed their quality assurance programme in manufacturing samples for developmental inspection. Two numbers out of lot of 20 Slack Adjusters offered for inspection shall be selected for developmental inspection in the first instance. These two samples shall be checked as per procedure given below.
  - 1.1 These two samples shall be dis-assembled and all components checked for dimensional accuracy, surface finish, general workmanship and marking with respect to RDSO detailed drawings.
  - 1.2 Components i.e. Rubber gasket, Barrel, Barrel head, Traction sleeve, Adjuster tube, Adjuster tube socket, Clutch ring, Actuating sleeve, Spring sleeve, Leader nut casing, Spindle sleeve, Dust bushing, Safety collar, Control rod head, Adjuster ear, Adjuster spindle, Guide pin, Ear bushing, Control rod, Guide bush, Leader nut flange & Dog pin shall be checked with relevant gauges wherever necessary. The thread profile of adjuster spindle, adjuster nut and leader nut shall be checked on the shadowgraph against enlarged master profile.
  - 1.3 Springs, circlips and spring dowel sleeves shall be tested as per procedure given in relevant IS specification given in the drgs. Clutch ring, Leader nut flange, Guide bushing & Dog pin to be tested for hardness.
  - 1.4 After welding of 'Eye' on the Adjuster Spindle, these samples shall be reassembled, checked for dimensional accuracy with respect to RDSO assembly drawing and subjected to the following tests:-
    - 1.4.1 **Pay-in and pay-out for complete range**

This test shall be performed on the performance Test Rig (see Annexure-IV). Pay-in and pay-out capacity shall be tested for the complete range i.e. 600 mm for freight stock slack adjuster and 450 mm for coaching stock slack adjuster as per procedure given below:-

      - 1.4.1.1 The Slack Adjuster sample shall be fitted on the Test Rig and extended to its maximum length. Brakes shall be applied a few times so that brake cylinder piston stroke is stabilised.

1.4.1.2 Brake Block clearance shall be increased. Brake shall be applied a few times till brake cylinder piston stroke is again stabilised. Permissible variation on piston stroke shall not exceed  $\pm 3$  mm. Similar procedure shall be repeated at two other locations to cover the entire range of Slack Adjuster pay-in.

1.4.1.3 After sample is fully contracted and brake cylinder piston stroke stabilised, brake block clearance shall be reduced to zero. Brake shall be applied a few times till brake cylinder piston stroke is again stabilised. Permissible variation on piston stroke shall not exceed  $\pm 3$  mm. Similar procedure shall be repeated at two other locations to cover entire range of Slack Adjuster pay-out. After testing on the test rig, the Slack Adjuster shall be removed and the Adjuster Spindle shall be rotated back to the desired length.

#### 1.4.2 **Loss of force :**

This test shall be done on the rig for checking loss of force. The loss of force as recorded on the rig at a barrel movement of 40 mm for freight and 25 mm for coaching stock with respect to adjuster tube shall not be more than 310kgs.

#### 1.4.3 **Vibration :**

This test shall be done with vibration Test Rig to determine that internal parts will not be seriously affected or worn sufficiently to prevent satisfactory operation when Slack Adjuster is subjected to 5 million cycles of vibration at a frequency rate as bellow:

Frequency (Hz)	Cycles (millions)
30	1
40	1
50	1
60	2
	5 million

#### 1.4.4 **Tension :**

This test shall be done on the Tension Test Rig to see the yield point of the weakest member of Slack Adjuster shall not exceed when subjected to a tensile load of 10 tonnes.

2. After completion of tests detailed in paras 1.4.3 and 1.4.4 of Annexure-I on both the samples, test as per para 1.4.1 shall be repeated to ensure that there is no adverse effect on the Slack Adjuster and that it performs satisfactorily.



3. If both the samples selected out of lot of 20 are found satisfactory in all respects, then the remaining slack adjusters to be purchased through developmental order shall be inspected in terms of procedure for purchase inspection as given in Annexure-II. If both the samples fail in any of the tests, then performance of the firm shall be considered unsatisfactory and developmental order placed on the firm shall be cancelled. If one of the two slack adjusters passes then two more slack adjusters shall be selected from the same lot and both should pass the tests mentioned in Annexure-I, otherwise developmental order shall stand cancelled.

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## **Procedure for Purchase Inspection**

1. Purchase inspection shall be carried out as follows :
  - 1.1 Two slack adjusters per 200 assemblies shall be checked as per procedure given bellow. For smaller lots also two nos. shall be selected.
  - 1.2 The slack adjuster samples shall be first checked for dimensional accuracy with respect to RDSO assembly drawing.
  - 1.3 The slack adjusters shall then be dis-assembled and all components shall be checked for general workmanship. Components i.e. Rubber gasket, Barrel, Barrel head, Traction sleeve, Adjuster tube socket, Clutch ring, Actuating sleeve, Spring sleeve, Leader nut casing, Spindle sleeve, Dust bushing, Safety collar, Control rod head, Adjuster ear, Adjuster spindle, Guide pin, Ear bushing, Control rod, Guide bush, Leader nut flange & Dog pin shall be checked for dimensional accuracy with relevant gauges wherever necessary. Adjuster spindle, adjuster nut and leader nut shall be checked by actual application of nuts on spindle held vertically. The nuts shall move smoothly with uniform speed without any jarring.
  - 1.4 Springs, circlips and spring dowel sleeves shall be tested as per procedure given in relevant IS specifications given in the drgs.
  - 1.5 Clutch ring, Leader nut flange, Guide bushing & Dog pin shall be tested for hardness.
  - 1.6 All components shall be checked for surface finish and marking with respect to RDSO detailed drawings wherever specified.
  - 1.7 The slack adjusters shall then be assembled back and their performance tested as per para 1.4.1 of Annexure-I. After testing on the test rig, the slack adjusters shall be removed and the adjuster spindles shall be rotated back to the desired length.
  - 1.8 If both the slack adjusters pass all these tests, further tests shall be carried as per para 2 of Annexure-II, if any one of the samples fail, the lot shall be rejected.

2% of the slack adjusters subjected to minimum of two assemblies shall be checked for pay-in and pay-out characteristics and loss of brake force in terms of paras 1.4.1 and 1.4.2 of Annexure-I. If all the samples pass, the lot shall be considered to have passed these tests. If any one or more samples fail, the lot shall stand rejected.

One Slack Adjuster per two thousand assemblies or once in six months shall be subjected to vibration test and tension test as per procedure given at paras 1.4.3 and 1.4.4 respectively of Annexure-I.

Inspection official shall carry out audit check to find out that firm has followed generally their QAP in manufacture of slack adjusters offered for inspection.

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**Trial Scheme for monitoring performance of IRSA-600 /  
IRSA-600J Slack Adjusters supplied by various  
manufacturers**

**Object : To determine the performance of IRSA-600 / IRSA-600J Slack Adjusters fitted on wagon stock.**

1. Trial slack adjuster shall be fitted on BOXN wagons running in closed circuit and performance monitored along with Slack Adjusters manufactured by M/s. Stone India Ltd. Wagons fitted with trial Slack Adjuster shall have the following marking stenciled in 25 mm letters in white on the centre panels on both sides of the wagon :

“FITTED WITH IR SLACK ADJUSTER MAKE ..... ON TRIAL”

2. Wagon numbers, slack adjusters, manufacturers' name, date of fitment of slack adjuster shall be noted by the concerned depot where the wagon is subjected to ROH.
3. Performance of slack adjuster shall be monitored for a periods of 18 months on the following lines :
  - 3.1 During the train examination, the TXRs shall ascertain the correct functioning of the slack adjuster in the following manner :-
    - a) The piston stroke and dimension 'A' should be checked and should be as specified.
    - b) Rotate the slack adjuster 2 or 3 times in clockwise direction facing the control rod. Clearance between brake block and wheel tread will increase (pull rod comes out of the slack adjuster).
    - c) Apply brake. Notice higher piston stroke at first application. If the piston stroke is normal after 2 or 3 application, the 'Pay-in' is satisfactory.
    - d) Rotate the slack adjuster 2 or 3 times in anti-clockwise direction facing the control rod. Clearance between brake block and wheel tread will decrease (pull rod goes inside the slack adjuster).
    - e) Apply brake. Notice short piston stroke at first application. If the piston stroke is normal after 2 or 3 application, the 'Pay-out' is satisfactory.

- f) If the slack adjuster is found defective during the examination, the wagon shall be marked sick.

3.2 Wagon marked sick due to defective slack adjuster as indicated above shall be attended at sick line/ ROH depot on the following lines :

3.2.1 The slack adjuster shall be removed from the wagon and mounted on the performance test rig (as indicated in Annexure IV)

3.2.2 Attach the adjuster ear to the free end of the cylinder lever of the test rig.

3.2.3 Screw the test rig spindle into the slack adjuster until the entire length of the thread is covered by protection tube and attach the free end of the spindle to the test rig. After fixing the slack adjuster in the test rig 'pay-in' and 'pay-out' test should be carried out in the following manner :

**Pay-in Test :**

- a) Let down the control rod, so that the fork of the rod clasps the adjuster tube of the slack adjuster.
- b) Apply and release the brake a few times letting the slack adjuster pay-in until the correct piston stroke is obtained (until the indicator is within  $\pm 5$  mm tolerance field of the scale)

**NOTE:** The slack adjuster pays-in up to max. 100 mm per braking.

**Pay-out Test :**

- a) Turn up the control rod and make two brake applications letting the slack adjuster pay-out.

**NOTE:** The slack adjuster pays-out up to max. 30 mm per braking.

The above 'pay-in' and 'pay-out' tests should be repeated twice. If the performance of slack adjuster is found satisfactory, the original adjuster spindle should be fitted back in the slack adjuster. The slack adjuster shall be fitted on the same wagon from which it was removed and performance checked as per para 3.1.

- 3.2.4 In case the slack adjuster does not pass the above test, a detailed note has to be sent to the manufacturer with a copy endorsed to RDSO and the wagon number and that slack adjuster shall have to be deleted from further trials.
- 3.2.5 The Depot shall give performance report of the slack adjusters on trial quarterly as per proforma enclosed.
- 3.2.6 Extent of wear on critical components shall be checked by RDSO on trial slack adjusters.

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**Trial Scheme for monitoring performance of IRSA-450  
Slack Adjusters fitted on coaching stock**

**Object :** To determine the performance of IRSA-450 Slack Adjusters fitted on coaching stock.

**Instructions:**

1. Trial slack adjuster shall be fitted on coaching stock running on specified rake and performance monitored along with Slack Adjusters manufactured by M/s. Stone India Ltd. On each coach one Slack Adjuster shall be from those under trial and other slack adjuster shall be of M/s. Stone India Ltd. which is presently under use. Coaches fitted with trial slack adjuster shall have the following marking stenciled in 25 mm letters in white on both end wall panels :

“FITTED WITH IR SLACK ADJUSTER MAKE ..... ON TRIAL”

2. Coach numbers, slack adjuster numbers, manufacturers' name, date of fitment of both slack adjusters shall be noted by the concerned depot and Rly. Workshop where the coach is subjected to POH.
3. Performance of both slack adjusters shall be monitored for a period of one POHs (18 months) on following lines :

**3.1 Workshops**

- 3.1.1 During POH, the slack adjusters under trial shall be removed from the coach and mounted on the performance test rig (as indicated in Annexure-IV) and tested.
- 3.1.2 Attach the adjuster ear to the free end of the cylinder lever of the test rig.
- 3.1.3 Screw the test rig spindle into the slack adjuster until the entire length of the thread is covered by protection tube and attach the free end of the spindle to the test rig. After fixing the slack adjuster in the test rig 'pay-in' and 'pay-out' test should be carried out in the following manner :

**Pay-in Test :**

- a) Let down the control rod, so that the fork of the rod clasps the adjuster tube of the slack adjuster.
- b) Apply and release the brake a few times letting the slack adjuster pay-in until the correct piston stroke is obtained (until the indicator is within  $\pm 5$  mm tolerance field of the scale)

**NOTE:** The slack adjuster pays-in up to max. 100 mm per braking.

**Pay-out Test :**

- a) Turn up the control rod and make two brake applications letting the slack adjuster pay-out.

**NOTE:** The slack adjuster pays-out up to max. 30 mm per braking.

The above 'pay-in' and 'pay-out' tests should be repeated twice. If the performance of slack adjuster is found satisfactory, the original adjuster spindle should be fitted back in the slack adjuster. The slack adjuster shall be fitted on the same coach from which it was removed and performance checked as per para 3.2.

- 3.1.4 In case the slack adjuster does not pass the above test, a detailed note has to be sent to the manufacturer with a copy endorsed to RDSO and the coach number and that slack adjuster shall have to be deleted from the further trials.

- 3.1.5 The workshops shall give performance report of all the slack adjusters on trial as per the proforma enclosed as Annexure.

**3.2 Open line :**

- 3.2.1 During the primary and secondary maintenance, the TXRs shall ascertain the correct functioning of both slack adjuster in the following manner :

- a) The piston stroke and dimension 'A' should be checked and should be as specified for air-brake/vacuum brake coaches.
- b) Rotate the slack adjuster 2 or 3 times in clockwise direction facing the control rod. Clearance between brake block and wheel tread will increase (pull rod comes out of the slack adjuster).
- c) Apply brake. Notice higher piston stroke at first application. If the piston stroke is normal after 2 or 3 application, the 'Pay-in' is satisfactory.

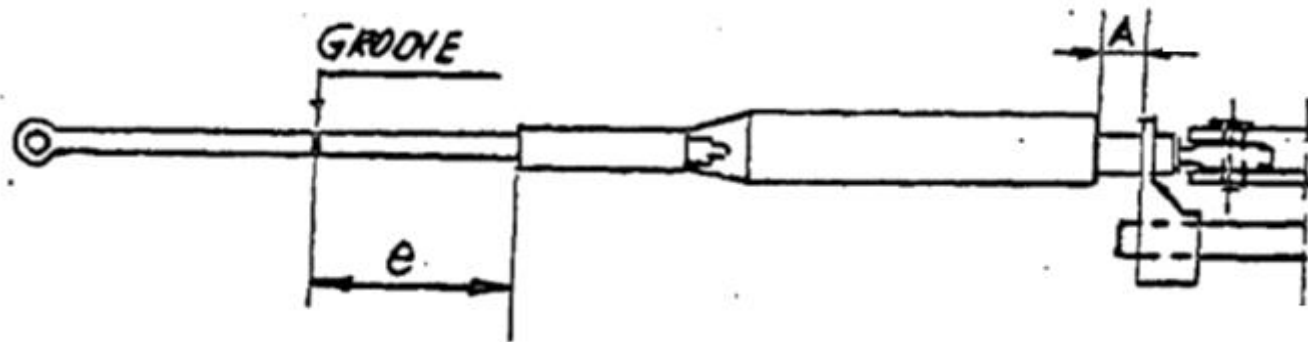


- d) Rotate the slack adjuster 2 or 3 times in anti-clockwise direction facing the control rod. Clearance between brake block and wheel tread will decrease (pull rod goes inside the slack adjuster).
- e) Apply brake. Notice short piston stroke at first application. If the piston stroke is normal after 2 or 3 application, the 'Pay-out' is satisfactory.
- d) If the slack adjuster is found defective during the examination, it shall be removed from the coach and shall be sent to base workshop for testing on the rig. A detailed report shall be sent to manufacturer / RDSO. The slack adjuster once removed due to defective performance will be considered off from the trial and no further trials will be carried out on the same.

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**PROFORMA FOR WORKSHOP**

Sl. No	Whether received from open line/removed from coach	Coach particulars		Slack Adjuster		Month & Year of manufacture of slack adjuster	Date of fitment of S.A	Date of check	Desired piston stroke		Dimensions				Nature of defect	Remarks
		No.	Type	No.	Make				Vac. Brake 125±15 mm	Air Brake 65-100 mm	Air Braked Coaches		Vac. Braked coaches			
											A	e	A	e		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

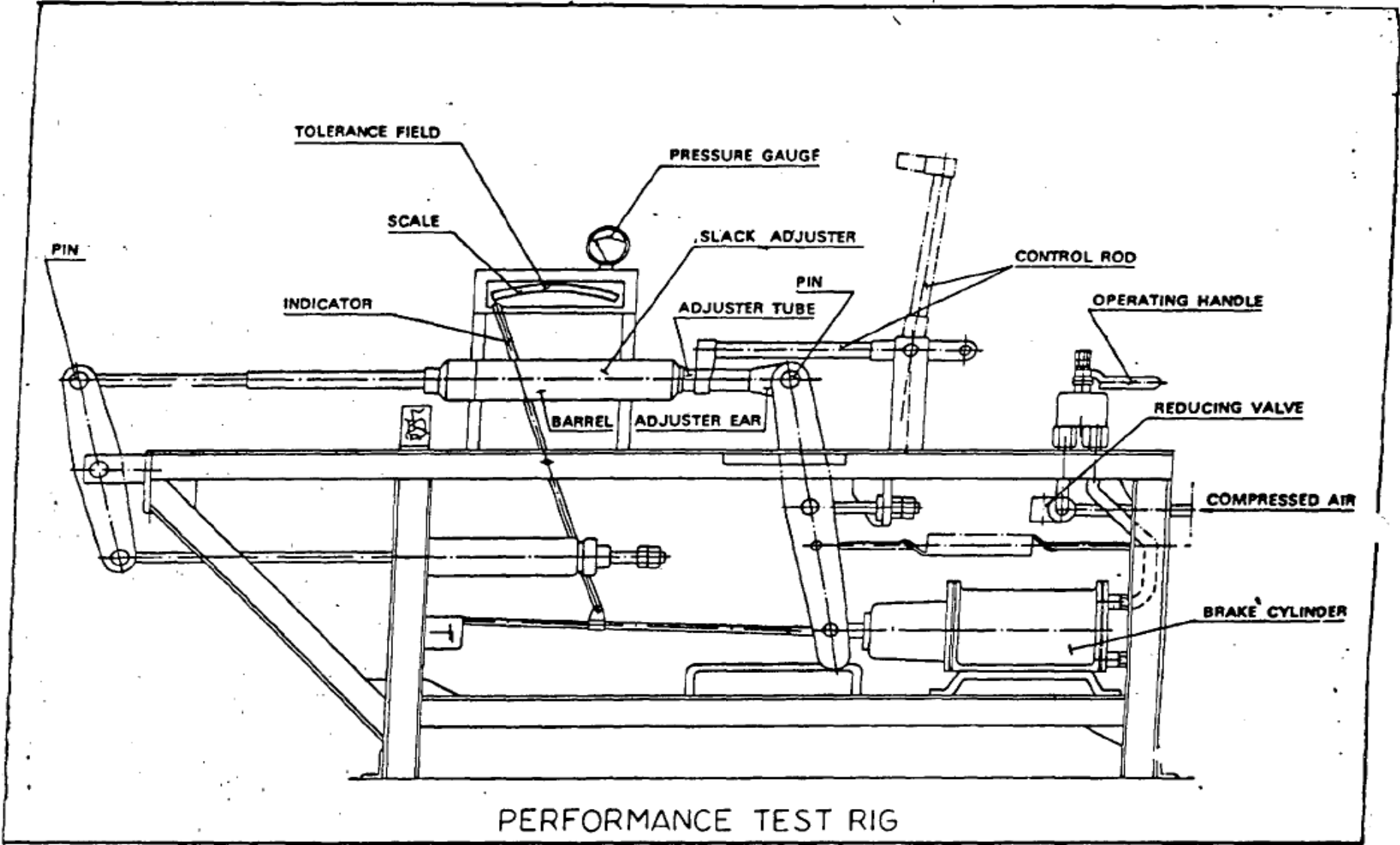


+2

+4

'A' – Dimension between control rod head and slack adjuster barrel which should be 20 -0 mm for vacume braked coaches and 22 -0 mm for air braked coaches.

'e' – Distance between the groove on adjuster spindle and the end of spindle sleeve as shown above.



**ANNEXURE-V-A****LIST OF DRAWINGS FOR IRSA-600 SLACK ADJUSTER**

<b>S. N.</b>	<b>Drawing No.</b>	<b>Description</b>	<b>Alt.</b>
1.	WD-82064-S-01-RC	General Arrangement	8
2.	WD-82064-S-02-RC	Slack Adjuster details sheet-1	6
3.	WD-82064-S-03-RC	Slack Adjuster details sheet-2	6
4.	WD-82064-S-04-RC	Slack Adjuster details sheet-3	5
5.	WD-82064-S-05-RC	Slack Adjuster details sheet-4	6
6.	WD-82064-S-06-RC	Slack Adjuster details sheet-5	4
7.	WD-82064-S-07-RC	Slack Adjuster details sheet-6	6
8.	WD-82064-S-08-RC	Slack Adjuster details sheet-7	8
9.	WD-82064-S-09-RC	Slack Adjuster details sheet-8	5
10.	WD-82064-S-10-RC	Slack Adjuster details sheet-9	9
11.	WD-82064-S-11-RC	Enlarged profile of threads	2

**ANNEXURE-V-B****LIST OF DRAWINGS FOR IRSA- 450 SLACK ADJUSTER**

<b>S. N.</b>	<b>Drawing No.</b>	<b>Description</b>	<b>Item</b>	<b>Alt.</b>
1.	SK.85062	General Arrangement	-	4
2.	SK.85063	Barrel for Slack Adjuster	-	1
3.	SK.85064	Adjuster spindle for Slack Adjuster	-	2
4.	SK.85065	Barrel spring	-	1
5.	SK.85066	Adjuster tube	-	1
6.	SK.85067	Spindle sleeves	-	1
7.	SK.85068	Ear bushing	-	1
8.	SK.85069	Control rod	-	3
9.	WD-82064-S-02-RC	Slack Adjuster details sheet-1	1 & 2	6
10.	WD-82064-S-03-RC	Slack Adjuster details sheet-2	1 to 4	6
11.	WD-82064-S-04-RC	Slack Adjuster details sheet-3	1 to 3	5
12.	WD-82064-S-05-RC	Slack Adjuster details sheet-4	1 to 4	6
13.	WD-82064-S-06-RC	Slack Adjuster details sheet-5	1 to 3	4
14.	WD-82064-S-07-RC	Slack Adjuster details sheet-6	1 to 5	6
15.	WD-82064-S-08-RC	Slack Adjuster details sheet-7	1 to 9	8
16.	WD-82064-S-09-RC	Slack Adjuster details sheet-8	1 to 5	5
17.	WD-82064-S-10-RC	Slack Adjuster details sheet-9	1,3,4 & 5	9
18.	WD-82064-S-11-RC	Enlarged profile of threads	-	2

**ANNEXURE-V-C****LIST OF DRAWINGS FOR IRSA- 600J SLACK ADJUSTER**

<b>S. N.</b>	<b>Drawing No.</b>	<b>Description</b>	<b>Item</b>	<b>Alt.</b>
1.	WD-90002-S-01-RC	General Arrangement	-	2
2.	WD-90002-S-02-RC	Slack Adjuster details	All items	1
3.	WD-82064-S-02-RC	Slack Adjuster details sheet-1	All items	6
4.	WD-82064-S-03-RC	Slack Adjuster details sheet-2	All items	6
5.	WD-82064-S-04-RC	Slack Adjuster details sheet-3	All items	5
6.	WD-82064-S-05-RC	Slack Adjuster details sheet-4	1,3,4 & 5	6
7.	WD-82064-S-06-RC	Slack Adjuster details sheet-5	All items	4
8.	WD-82064-S-07-RC	Slack Adjuster details sheet-6	All items	6
9.	WD-82064-S-08-RC	Slack Adjuster details sheet-7	All items	8
10.	WD-82064-S-09-RC	Slack Adjuster details sheet-8	All items	5
11.	WD-82064-S-10-RC	Slack Adjuster details sheet-9	3,4 & 5	9
12.	WD-82064-S-11-RC	Enlarged profile of threads	-	2