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Specification Title:	Technical specification of Modified Hand Brake Assembly for Diesel and Electric Locomotives		

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भारत सरकार
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**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS**

**Technical specification of Modified Hand Brake Assembly for
Diesel and Electric Locomotives**

विशिष्ट संख्या चा.श. 0.01.00.35, संशोधन. 0.0

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अनुसंधान अभिकल्प एवं मानक संगठन
लखनऊ — 226 011

**RESEARCH DESIGNS & STANDARDS ORGANISATION
MANAK NAGAR, LUCKNOW-226011.**

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LIST OF AMENDMENTS

S. No.	Amendment Date	Version	Details
1.	---	---	---

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1. INTRODUCTION

Conventional type loco hand brake is very hard to operate by operating crew, due to big size of the handle and complicated system of operation. Because of inadequate attention, complexity of design and wear & tear, the brake often does not release easily on releasing. Moreover, the space requirement is more due to long handle and remains out of order most of the time as difficult to maintain.

2. OBJECTIVES AND SCOPE OF THE SPECIFICATION

The specification covers description of equipment, general requirements, functional and technical requirements, testing, maintenance, and environmental requirements for the Modified Hand Brake Assembly for Diesel and Electric Locomotives on Indian Railways.

3. TERMINOLOGY / ABBREVIATIONS

Abbreviations	Full form/Description
IEC	International Electro Technical Commission
ISO	International Standards Organisation
RDSO	Research Designs & Standards Organization
MPG	Motive Power Guidelines

4. DEFINITIONS

4.1 Throughout this specification and in any other specification here to annexed, the terms:

4.1.1 “Purchaser” means the President of the Republic of India;

4.1.2 “Tenderer” means Firm’s/companies participating in the tender;

4.1.3 “Contractor” means any person, firm or company with whom the order for the supply of the stores to be placed;

4.1.4 “Sub-contractor” means any person, firm or company from whom the contractor may obtain any material or fittings to be used in the supply of or manufacture of stores;

4.1.5 “Supplier” means a party that supplies goods or services. A supplier may be distinguished from a contractor or subcontractor, who commonly adds specialized input to deliverables. Also called vendor;

4.1.6 “Manufacturer” means entity that makes a goods through a process involving raw materials, components, or assemblies, usually on a large scale with different operations divided among different workers.

4.1.7 “Inspecting Officer” means the person(s), firms(s) or department(s) and his deputies, nominated by the purchaser to inspect the stores on his behalf;

4.1.8 “Engineers” means the Research Designs & Standards Organisation, Ministry of Railways, Manak Nagar, Lucknow – 226011.

4.2 In case of tenderer needs any clarification in respect of any clause of this specification or regarding the drawings the tenderer shall obtain it from Motive Power Directorate, RDSO for clarification.

5. BRIEF DESCRIPTION OF THE EQUIPMENT/COMPONENTS

- 5.1 The hand part of modified hand brake assembly shall be smooth operating worm & worm wheels being supported with two ball bearings.
- 5.2 The handle of application shall be with steering type wheel.
- 5.3 The whole assembly has been accumulated into the nose compartment on ALCo and Electric Loco, keeping the wheel projection only and outside of the Driver Cab near Compressor Compartment & top side of the 2nd Wheel on HHP Locomotive.
- 5.4 Simple worm & worm wheel designed as self-locked.

6. GENERAL REQUIREMENTS

- 6.1 Very easy to operate as there is a circular steering, having two ball bearings at both end. For application, the wheel is to be rotated just in clockwise direction only.
- 6.2 Brake can be released simply by rotating the steering anti-clockwise with worm & worm wheel drive.
- 6.3 This Paul-ratchet has been avoided here. The steering and worm & worm wheel mechanism can do application, release and locking at same time.
- 6.4 Less attention is required as sub-component has been eliminated.

7. SYSTEM REQUIREMENTS/SYSTEM COMPOSITIONS

- 7.1 Modified Hand Brake Assembly to drawing no. SKDP-3947 for ALCo Loco and SKDP-4089, Alt-01 for HHP Loco.
- 7.2 Modified Hand Brake Assembly to drawing no. SKEL-4993, 4998, Alt-01, 4999, 5000, 5001 & 5002 for Electric Locomotive.

8. FUNCTIONAL REQUIREMENTS

- 8.1 The modified Hand Brake Assembly shall confirm to drawing as per Para 7.
- 8.2 Arrangement shall be such that clockwise movement of the handle results brake application and anticlockwise movement resulted in release of hand brake.
- 8.3 There shall be provision of locking arrangement the handle to lock brake application/ release as required.
- 8.4 The link chain of modified Hand Brake Assembly shall be maintained as follows:

S. No.	Type of Loco	No. of Links
1.	ALCo Loco	85
2.	HHP Loco	191
3.	HHP Loco with dual cab	251
4.	For Electric Loco	130

- 8.5 The modified Hand Brake Assembly should be working smoothly in clockwise and anticlockwise direction with minimum 2.2 ton force available in connecting chain.

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8.6 Chain shall be round steel short link chains (Electric Butt Welded) grade L (3) Part-I non-calibrated load chain for lifting purposes as per IS-2429 or Equivalent Indian Standards.

9. TECHNICAL REQUIREMENTS

9.1 The system shall be of simple design, light in weight, robust in construction. The design shall be compact for ease of interfacing with brake rigging.

9.2 Mounting arrangement of Modified Hand Brake Assembly shall be secured against severe vibrations.

9.3 Design shall not degrade the safety of existing system.

9.4 Manufacturers shall guarantee availability of spares throughout the life of the equipment. List of recommended spares shall be submitted by the manufacturer.

10. SAFETY REQUIREMENTS

10.1 Handle and locking arrangement should be as per IS 2062(latest) or Equivalent Indian Standards.

10.2 Chain should be as per IS 2429 (latest) or Equivalent Indian Standards and Modified hand brake assembly should be working smoothly in clock wise and anticlockwise direction with minimum 2.2 ton force available in connecting chain.

10.3 Chain cover should be as per IS 210 (latest) or Equivalent Indian Standards.

10.4 Worm should be as per IS 1875 (latest) or Equivalent Indian Standards.

11. ENVIRONMENTAL/CLIMATIC REQUIREMENTS

The equipment shall be capable of working satisfactorily under the service conditions indicated below:

11.1 Altitude: - Mean sea level to an altitude of 1200 meters.

11.2 Relative Humidity: - Up to 100 %

11.3 Temperature (Ambient air):-

a) Maximum temperature

Stabled Locomotive under sun: 70 deg. C

On board Working loco under sun: 55 deg. C

b) Minimum temperature: - 5 deg. C

c) Average temperature: 47 deg. C

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- 11.4 Ambient conditions: - The equipment shall be capable of operating efficiently in spite of dust, dirt, mist, torrential rain, heavy sand or snow storms, presence of oil vapors and radiant heat, coastal area etc. to which rolling stock is normally exposed in service
- 11.5 Vibrations and shocks: - The equipment shall be designed to withstand vibrations and shocks normally encountered in rail traction without damaging the equipment. Shock & Vibration test shall be done as per IEC 61373 (category 1, Class-B) or Equivalent Indian Standards.
- 11.6 Modified hand brake assembly shall have minimum protection code of IP 54.
- 11.7 The part of the Modified hand brake assembly, if exposed to solar radiation during normal usage, shall remain unaffected by it.

12. DETAILS OF STANDARDS FOLLOWED AND VALIDATION

- IS: 2500 Part 1 or Equivalent Indian Standards for sampling plan.
- IEC 60529 or Equivalent Indian Standards, Degrees of protection provided by enclosures (IP Code).
- IEC 61373 or Equivalent Indian Standards, Electrical railway equipment – Rolling stock – Shock and vibration requirements
- Details of IS for material of Modified hand brake assembly are as under:

S. No.	Description	IS or Equivalent Indian Standards.
1.	CHAIN COVER	210 or Equivalent Indian Standards.
2.	COTTER PIN	549 or Equivalent Indian Standards.
3.	PINION	1030 or Equivalent Indian Standards.
4.	COVER PLATE	1079 or Equivalent Indian Standards.
5.	HEX. HD SCREW 1/4" UNCx1"LG., HEX.HD SCREW 1/4" UNCx1/2" LG & SPRING WASHER, HEX. NUT 3/8" UNC, HEX. HD SCREW 3/8"UNCx1"LG., HEX. NUT 5/16" UNC, CSK SCREW 5/16" UNCx3/4" LG, HEX. HD SCREW 5/16" UNCx1" LG., HEX. HD SCREW 5/16" UNCx 3" LG. and CASTLE	1364 or Equivalent Indian Standards.

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	NUT M16	
6.	PIN and WORM R.H.SINGLE START	1875 or Equivalent Indian Standards.
7.	PLAIN WASHER	2016 or Equivalent Indian Standards.
8.	REST PATI, BRG. BLOCK COVER, BEARNING POST, HANDLE AND LOCKING ARRGT and HOUSING COMPLETE	2062 or Equivalent Indian Standards.
9.	CHAIN LINK	2429 or Equivalent Indian Standards.
10.	SPRING WASHER 5/8"	3063 or Equivalent Indian Standards.

13. MAINTENANCE AND DIAGNOSTIC AID

- 13.1 Supplier shall arrange to supply along with the equipment, maintenance manuals of the equipment, one with each 5(or less) Modified hand brake assembly units. Manual shall contain information pertaining to detailed dimensional drawings indicating mounting arrangement layout, sub-assemblies, principle of operation, maintenance schedules, trouble shooting, details of special tools if required, parts catalogue and testing procedure of the equipment. Updated position of modifications shall also be incorporated.
- 13.2 Adequate number of color wall charts showing pictorial view of components along with part nos. will be given. The copies of Maintenance Manual and wall charts are meant for wider circulation for Railways and fresh copies shall be furnished as stipulated even if there are no changes in the manual and wall charts furnished against earlier contract.
- 13.3 Training of purchaser's personnel for operation and maintenance shall be given by the contractor free-of-charge. Demonstration of the working of the device on locomotive shall be given by the contractor free-of-charge.

14. DOCUMENTS REQUIRED FROM SUPPLIER

Following details shall be furnished by the supplier along with the offer:

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1. Drawing, Functional description, System design concept, Salient features etc. of the offered equipment.
2. Overall dimensions, mounting arrangement and weight.
3. Mechanical drawings of complete equipment as well as Major subassemblies with details of dimensions which are required to be taken out for maintenance. Details of mounting accessories shall also be provided.
4. Details of protection provided and their effectiveness/ proposed.
5. Test protocol with procedure of testing.
6. The details of type test and routine tests as required.
7. The results of tests required to be given are mentioned in paras 17.1.1 of this specification. A certificate from accredited testing laboratory covering testing of Modified hand brake assembly in accordance with IEC- 61373 or Equivalent Indian Standards for which in-house testing facility is not available.
8. List of special tools, jigs and fixtures needed for assembly, testing, commissioning, maintenance and repair schedule and manual.
9. Clause by clause compliance of this specification.
10. QAP (Quality Assurance Procedure)

15. ACCESSORIES

The equipment provider shall provide the details of accessories and their functions. Final selection of accessories shall be made by the purchaser.

16. GUARANTEE/WARRANTY

- 16.1 The supplier shall be responsible for any failure or damage to equipment provided in the locomotive due to defective design, materials, and workmanship up to a period of 24 months after commissioning on the locomotive or 36 months from the date of supply, whichever is earlier. The supplier shall replace within reasonable time, such defective equipment during the warranty period at his cost. The period of warranty shall be extendable in case of recurring problems attributable to defective design, material or manufacturing. The supplier's liability in this respect of any complaints, defects and /or claim shall be limited to the furnishing and installation of replacement parts free of any charge.
- 16.2 The supplier shall be responsible for carrying out all the modifications at his cost on any part of the equipment during the period of warranty required for satisfactory operation of the equipment as per technical specification. For any technical decision the final authority from the purchaser's side is RDSO.

17. TESTS & VERIFICATION

17.1 Test standards

- 17.1.1 Modified hand brake assembly will be tested mechanically to prove its reliability as per details given below:

Group 'A' tests

S.N	Nature of Test	Details
1	Visual & Dimension checks	As per RDSO Drawing & Annexure-I
2.	Performance Test	As per Annexure I
3.	Material tests	As per Annexure I
Group 'B' tests		
5.	Vibration & shock tests (with enclosure)	As per IEC 61373 or Equivalent Indian Standards
6.	Endurance test	The tests shall be acceptable if the equipment performs satisfactorily throughout the tests and also after the tests.

17.1.2 Any other test specified in the approved QAP as well as desired by purchaser.

17.2 Sampling plan

17.2.1 Samples are to be selected randomly from the lot. Sample size should be as given in Table below. If rejection number in a given sample is less than or equal to the acceptable limits, lot will be accepted. If rejection number is more than acceptable limits, second sample of same size as of first sample will be drawn from the lot. If combined rejection number is less than or equal to double the acceptable limits given in the table below, lot will be accepted otherwise the lot will be rejected.

Lot size	Visual Check		Physical check		Shock and Endurance test		Performance test	
	Sample size	Acceptable limit of rejection.	Sample size	Acceptable limit of rejection	Sample size	Acceptable limit of rejection.	Sample size	Acceptable limit of rejection.
0-25	100%	0	3	0	1	0	5	0
26-50	100%	0	5	0	1	0	8	0
51-75	100%	0	8	0	2	0	10	0
76-100	100%	0	10	0	2	0	13	0

18. TYPES OF TESTS

18.1 Type test & field trial

18.1.1 Type test:

Type test shall be carried out on 1 unit of equipment (one loco set) as per design and drawings specified in this specification before provisional approval from RDSO. If RDSO feels necessary to conduct type test on some more units, the samples will be picked up at random for further validations of design and drawings. This option shall be exercised by RDSO based on the performance of the unit till design is validated. Once design is validated the final approval shall be given by the RDSO. Following shall comprise type tests:

- Group 'A' & Group 'B' test mentioned in Para 17.1.1 above

b) Any other test considered necessary by RDSO in consultation with supplier/manufacturer.

The equipment shall successfully pass all the type tests for proving conformity with this specification. If the equipment fails in any of the type tests, the purchaser or his nominee at his discretion may call for another equipment of the same type and subject it to all tests or to the test(s) in which failure occurred. No failure shall be permitted in the repeat test(s).

18.1.2 Field trial:

After successful prototype development and testing, development order will be placed. A Modified Hand Brake Assembly shall be subjected to field trial. Quantity of field trial and field trial period shall be as per RDSO document no-MP-M-8.1-1 (Latest Version). Field performance feedback format is as under:

S. No.	Shed/Rly.	Loco No.	Date of fitment	Date of failure, any	Reason of failure	Remarks

The acceptance criteria of field trial shall be the satisfactory field performance of equipment.

18.2 Routine test

Following shall comprise the routine tests and shall be conducted by the manufacturer on each equipment and the test results will be submitted to the inspection authority before acceptance tests.

- Visual & dimensions checks,
- Performance test.
- Any other test specified in the approved QAP or desired by manufacturer.

18.3 The manufacturer shall submit Makers test certificate for outsourced item, as applicable.

18.4 Installation and Acceptance test

The supplier shall supply the complete layout drawing for the modified hand brake assembly (Assembly and components) indicating the overall dimensions and get them approved from RDSO before supply to IR. The acceptance test (Regular inspection) of the equipment shall be carried out by the purchaser or his nominee. The supplier shall provide, without extra charges, for material, equipment, tools and any other assistance, which the purchaser or his nominee may consider necessary for any test and examination. The supplier shall make available manufacturing drawings and material specifications of the components to the inspecting authority at the time of inspection.

Supplier will offer Modified Hand Brake Assembly for inspection after complete checking by them. The test results of every Modified Hand Brake Assembly will be submitted to the inspecting authority. Inspecting authority shall carry out all tests necessary to prove that the equipment fulfills the Functional/Technical

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requirements, covered in this specification. However, Group 'A' tests mentioned in Para 17.1.1 above shall be mandatory.

19. PAINTING, LABELING AND MARKING

19.1 The equipment shall be appropriately painted for aesthetics and protection. The parts, mounting points etc. shall be clearly marked in a manner that these are easily readable and remain legible over the lifetime of the equipment. ID plate having name of Component, Make, Sl. No, Date of Manufacture, Ratings shall be provided.

20. PACKAGING AND DELIVERY/SHIPMENT IF DIFFERENT FROM IRS

Each Modified Hand Brake Assembly shall be wrapped individually in a plane polythene sheet and packed in a Gunny Bag / Wooden box. Such boxes shall be packed in a carton or box, with adequate cushioning material to minimize movement of the material and to ensure that the Modified Hand Brake Assembly is capable of withstanding normal transit risks without damage.

The Modified Hand Brake Assembly shall be transported in packing, which ensures that their metrological characteristics are maintained.

21. IPR DISCLAIMER PIN POINTING RESPONSIBILITY FOR VIOLATION IF ANY ON SUPPLIER

Indian Railway shall not be responsible for infringement of patent rights arising due to similarity in design, manufacturing process, components used in design, development and manufacturing of Modified Hand Brake Assembly and any other factor, which may cause such dispute. The responsibility to settle any issue lies with the manufacturer.

22. INFORMATION TO BE SUPPLIED BY SUPPLIER

The supplier shall furnish following information:

22.1 List and details of customers where Modified Hand Brake Assembly have been supplied/offered.

22.2 Foreign collaboration, if any, for manufacturing of Modified Hand Brake Assembly for locomotive application.

22.3 Details of marketing/manufacturing arrangements, if any, with other firms in India and/or outside India. The contractor shall also indicate the indigenous and the detailed program for indigenous manufacture giving lists of specific items and their prices.

22.4 Details of infrastructure, manufacturing and testing facilities available.

23. Quality Assurance Program (QAP):

23.1 Supplier shall submit their internal quality assurance program in accordance with RDSO ISO procedures.

23.2 Supplier shall, on demand by RDSO/ Purchaser/ Inspecting authority nominated by RDSO/ Purchaser, make the records of checks carried out during internal quality assurance available for scrutiny.

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24. PREFERENCE TO MAKE IN INDIA:

The Government of India policy on “make in India” shall apply.

25. VENDOR CHANGES IN APPROVED STATUS:

All the provisions contained RDSO’s ISO procedures laid down in Document No. QO-D-8.1-11, dated 01.07.2020 (Titled “Vendor- changes in approved status”) and subsequent version/amendment thereof, shall be binding and applicable on the successful vendor/vendors in the contract floated by Railways to maintain of products supplied to Railways.

26. DATE OF ENFORCEMENT

The date of enforcement of the specification is with immediate effect i.e. 01.09.2021.

Annexure-I

Check Sheet for Modified hand brake assembly for ALCO, HHP and Electric Locos

Item	Modified hand brake assembly
Specn. No.	Nil
Drg. No.	SKDP-3947 for ALCo locomotives, SKDP-4089 Alt-01 for HHP locomotives and SKEL- 4993 Alt.0 for Electric Locomotives

1. Firm's Name :
2. Date (period) of Inspection :
3. P.O. Details :-
 - a) PO no. and date :
 - b) Order placing authority :
 - c) Specification no. (As mention in P.O) :
 - d) Drawing no. (As mention in P.O) :
 - e) Quantity on order :
 - f) Quantity offered for inspection on date :
 - g) Consignee :
 - h) Delivery period :

4. **Sampling Plan/Lot Size:-** As per Table given below (As per IS-2500 Part-I)

Lot Size	For Tests	
	Sample Size	Number of rejection acceptable
Up to 25	3	0
25-50	5	0
50-75	8	0
75-100	10	0
More than 100	10% of the lot	0

Table-1

5. **Types of Tests:**

A. Material Test: All internal parts specified i.e. IS standard in RDSO drawing no. SKDP-3947 for ALCo locomotives, SKDP-4089 Alt-01 for HHP locomotives and SKEL- 4993 Alt- 0 for Electric Locomotives should be complied.

B. Visual Check (Ref. Table-1 for sampling plan):

Sr.No	Specified	Standards	Observed	Remarks
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.				
a)	Month & Year of Manufacturer	Yes		
b)	Name of Manufacturer	Yes		
c)	Surface Finish	No any cut mark or debarring in any place.		

C. Dimension check (Ref; Table-1 for sampling plan):

- (i) Overall dimension check as per SKDP-3947 for ALCo locomotives, SKDP-4089 Alt-01 for HHP locomotives and SKEL- 4993 Alt-0 for Electric Locomotives.
- (ii) Dimension check for internal parts as per manufacturer drawings.

D. Performance Test (Ref; Table-1 for sampling plan): Modified hand brake assembly should be working smoothly in clock wise and anticlockwise direction in a test bench with minimum 2.2 ton force available in connecting chain.