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**GOVERNMENT OF INDIA  
MINISTRY OF RAILWAYS**

उच्च क्षमता वाले  
लोकोमोटिव साइड बफ़र की तकनीकी  
अपेक्षाओं की अनुसूची  
(रबर स्प्रिंग टाइप)

**SCHEDULE OF TECHNICAL REQUIREMENTS  
FOR  
HIGH CAPACITY LOCOMOTIVE SIDE BUFFER  
(RUBBER SPRING TYPE)**

Supersedes specification No. MP-0.41.00.03 (Rev. 0.00)  
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## **SCHEDULE OF TECHNICAL REQUIREMENTS FOR LOCOMOTIVE SIDE BUFFER ASSEMBLY**

(RUBBER SPRING TYPE)

### **SCOPE**

The BG diesel and electric locomotives presently deployed on Indian Railways are equipped with Side Buffers at the head stock ends to protect the passengers and locomotive underframe and equipments from sudden shocks. Two side buffer assemblies at each end (Total four) are provided on each locomotive. This document lays down the technical requirements for the procurement and supply of side buffer, which is considered one of the safety items for train operation. The arrangement of side buffer assembly shall conform to Drawing no.SK.DL-4561 consisting of parts as under.

**TABLE-1**

| <b>S.No.</b> | <b>Name Of Parts</b>               | <b>Drg.No.</b>      | <b>Material Specification</b>  |
|--------------|------------------------------------|---------------------|--|
| 1.           | Buffer Plunger                     | SK.DL-4562          | IS:1030 Gr.280-520W  |
| 2.           | Buffer Casing                      | SK.DL-4563          | IS:1030 Gr.280-520W  |
| 3.           | Buffer Base                        | SK.DL-4564(ITEM 1)  | IS: 1030 Gr.280-520W   |
| 4.           | Spindle                            | SK.DL-4564(ITEM 2)  | IS: 1875 steel Class 4   |
| 5.           | Washer                             | SK.DL-4564(ITEM 3)  | IS: 2062 Gr.Fe410WC  |
| 6.           | Buffing Washer                     | SK.DL-4564(ITEM 4)  | IS: 1030 Gr.280-520W   |
| 7.           | Plug                               | SK.DL-4564 (ITEM 5) | IS: 1875 Steel Class2  |
| 8.           | Shim                               | SK.DL-4564(ITEM 6)  | IS: 2062 Gr.Fe410WB  |
| 9.           | Check Sleeve                       | L/BD-655/M          | IS:3885(Pt.I)  |
| 10.          | Rubber Buffer Spring               | SK.DL-4565          | I.S.2062 Gr.Fe410WA &<br>STR Spec.No.MP-0.41.00.04<br>(Rev.01) AUGUST 2005 |
| 11.          | 16 Dia Rivet snap head X 50mm long |                     | IS : 1148  |

**Note- Latest alteration of all drawings and specifications shall be referred.**

This document is divided in section-A and section-B. The former covers the technical requirements, method of sampling, testing and re-testing, marking etc. and the later covers mainly schedule of infrastructure requirements for manufacturing, testing, quality control and inspection for side buffer assembly used on BG locomotives.

## **SECTION-A**

### **1.0 TECHNICAL REQUIREMENTS**

- 1.1 General Arrangement of the Buffer Assembly shall be to Latest Alteration of RDSO assembly drawing No.SK.DL-4561 and part drawings mentioned in Table1.

### **2.0 MATERIAL**

- 2.1 The material of all components of side buffer assembly shall be strictly in accordance with the specification stipulated in the respective component drawings.
- 2.2 In addition to tests and quality requirements mentioned in the STR, the provisions of various clauses of the respective material specification shall also apply.

### **3.0 CHEMICAL COMPOSITION:**

- 3.1 Chemical composition shall be checked on the finished products manufactured to material specification mentioned in Table-1. The variation of the chemical analysis of the product with respect to the ladle analysis shall conform to respective clauses mentioned in the material specification. Residual elements shall be permitted to the extent mentioned in relevant specification.

### **4.0 METALLOGRAPHIC EXAMINATION**

- 4.1 Metallographic examination shall be carried out for each heat treatment batch in respect to item no 1, 2, 3, & 6 to ensure that the castings are properly normalised to avoid retention of cast dendritic structure.
- 4.2 Grain size observed shall be ASTM 5 or finer.

### **5.0 MECHANICAL TESTS (For Item 1 & 2 only)**

#### **5.1 Tensile Test**

The tensile test shall be carried out in accordance with IS:1608 for each heat treatment batch. The minimum tensile strength, yield stress, elongation and reduction in area shall be 520 Mpa, 280 Mpa, 18 % and 25% min. respectively.

#### **5.2 Impact Test**

The impact test shall be carried out in accordance with IS:1757 for each heat treatment batch. The test shall be carried out on three samples from the same batch and average values obtained shall be higher than the minimum specified value of 22J. However, the individual values obtained shall not be less than 70% of the specified value.

#### **5.3 Bend Test**

The bend test shall be carried out in accordance with IS: 1599 for each heat treatment batch. Test pieces shall be capable of being bent cold without fracture to an angle of 60°. Test pieces shall be of suitable length convenient for bending on the machine, and shall have a rectangular section of 25 x 20 mm. The edge of a rectangular test piece shall be rounded to a radius of not more than 1.5mm and the test shall be done by bending the test piece over the thinner section.

## **6.0 NON-DESTRUCTIVE TESTS (For Item 1& 2 only)**

### **6.1 Radiography Test**

Two percent of the castings subject to minimum two per batch of each of the buffer plunger and casing shall be radiographically tested on the locations marked on respective drawings, throughout the circumference, in accordance with IS:2595 with acceptance standard ASTM E 446 conforming to level 2 in respect of shrinkage and level 3 in respect of porosity, sand and slag inclusions. Hot tears and cracks shall not be permitted.

### **6.2 Liquid Dye-Penetrant Test**

The firm shall carry out 100 percent liquid dye-penetrant test on locations marked in the respective drawings of buffer plunger and casing. The method and acceptance standard for liquid dye-penetrant test shall be in accordance with IS: 9565 and IS:11732 respectively.

### **6.3 Hammering test**

Each buffer plunger shall be subjected to five blows of 5 Kg. Hammer on welded portion of plug spindle to ascertain quality of welding. After hammering magnetic particle examination and liquid dye penetrant test shall be carried out on the welded area of plunger head so as to confirm that no cracks have developed by hammering.

## **7.0 DESTRUCTIVE TEST**

7.1 Two percent of castings of buffer casing and plunger subject to minimum two per batch shall be subjected to destructive test in case of new development, change in casting process or any change in the design to ensure that it is free from porosity, shrinkage, slag inclusion and other defects. Minimum two longitudinal and one transverse section of the castings shall be made at the locations decided by the inspecting officer. Liquid dye-penetrant test shall be carried out on the sectioned surfaces. Porosity up to a level of 2% of cross sectional area may be considered acceptable provided size of each blowhole is limited to 2mm both in diameter and length. Bunching of blowholes more than three numbers located less than 10mm apart shall be considered rejectable.

## **8.0 MARKINGS**

8.1 Marking on the buffer assembly / components shall be stamped / cast thereon as specified in the respective drawings. The buffer components with illegible markings shall be identified and must be rejected from the lot by manufacturer. If any of the components are found having illegible marking at the time of fitment in Railway workshops / sheds premises, those shall be replaced by the manufacturer free of cost. The cost of transportation shall also be borne by the manufacturer.

## **9.0 INSPECTION AND RETEST**

9.1 For passing the batch, the inspector shall randomly select two percent of the assemblies subject to minimum two per batch, for carrying out following:

- i) Conformity of all the tests specified in clause 4.0 to 8.0,
- ii) Dimensional checks as per relevant drawings mentioned in clause No.1.0,

- iii) Freedom of non-machined cast surface from any visible defects e.g., cracks, scabs, sand, fusion, etc.  
(Parting line fins, risers, notches and sprues shall be ground smooth.)
  - iv) The general surface finish of the cast surfaces shall be satisfactory and free from harmful imperfections with proper marking as per clause 8.0
- 9.2 In the event selected sample fails, double the number of samples drawn earlier shall be randomly picked up for passing the batch. If any of the samples fails to meet the requirement mentioned in clause 9.1, the batch shall be considered unacceptable.
- 9.3 The records of all the tests done by the firm shall be maintained and made available to the inspector, if required.

## **10.0 TESTING AND INSPECTION FACILITIES**

- 10.1 The manufacturer shall provide labour, appliances, material and other details at his own expenses, prepare and furnish test pieces required for testing as may be carried out at his premises in accordance with schedule. Failing to provide facilities at his own works for carrying out the prescribed tests, the manufacturer shall bear the cost of conducting the tests elsewhere.

## **11.0 WELD REPAIR**

- 11.1 Minor repair of the casting shall be carried out as per Para 15 of IS: 1030, but no rectification is allowed on machine-finished casting. Details of repair done shall be recorded and furnished to inspecting official at the time of offering the material for acceptance / inspection.

## **12.0 REJECTION**

- 12.1 The buffer assemblies and/or its components found defective due to improper workmanship or not complying with the provisions of this schedule shall be rejected.
- 12.2 The manufacturer should ensure that the rejected materials are not re-offered for inspection/testing. The procedure for disposal of the rejected materials shall be clearly mentioned in the QAP of the manufacturer and details produced to the inspecting official on demand.

## **13.0 PROTECTION AND PACKING**

- 13.1 After the completion of inspection, all parts of the buffers except machined surfaces, shall be applied red oxide – zinc chrome priming to IS: 2074. Thereafter when it gets dry, two coats of synthetic enamel paint to IS:8662-1993 (colour shade No.176 Phirozi to IS: 5 –1993) shall be applied. Exposed machined surfaces shall be protected with two coats of white lead and the exposed cylindrical portion of the plungers shall be cased in wood, secured with bands of hoop-iron.

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## **SECTION-B**

### **INFRASTRUCTURAL REQUIREMENT**

**1.0** All manufacturing firms seeking approval/registration for supply of Locomotive Side Buffer assembly must be RDSO approved Class 'A' foundry as per IS: 12117 and shall submit certificate to this effect along with application on standard proforma to be obtained from RDSO. The firm shall also be ISO-9000 certified organisation.

**2.0** Apart from infrastructure facilities of class-A foundry, as stipulated in IS:12117, the manufacturer shall have the facilities as under:

#### **3.0 MOBILE HANDLING AND CHARGING/DISCHARGING FACILITIES**

Suitable mobile handling facilities, e.g. transferring castings from moulding to heat treatment and then to machine shops, etc. Suitable facilities, e.g., manipulators for charging /discharging the casting in and out of heat treatment furnaces.

#### **4.0 FACILITIES FOR WELDING /MACHINING/ASSEMBLY/RIVETTING**

**4.1** Vertical boring, turning lathe, milling machines, etc. of adequate capacity for boring buffer casing of 220mm dia., turning 210mm dia. Plunger, facing plunger & casing ends and machining other components of buffer assembly.

**4.2** Universal drilling machines for drilling 30mm dia rivet holes on buffer base plate and casing.

**4.3** Jigs and fixtures for proper assembly of buffer.

**4.4** Facilities for hot riveting.

**4.5** Surface table of suitable size.

#### **5.0 FACILITIES FOR PRODUCT TESTING**

**5.1** Apart from testing facilities mentioned in IS: 12117 for Class-A foundry, certain other facilities shall also be available with the firm as indicated below:

i) Suitable micrometers, callipers, gauges, etc. for measurements and checking dimensions.

ii) Standard radiographs and relevant ASTM specification as mentioned in clause No. 6.1 of section A.

## **QUALITY CONTROL REQUIREMENTS**

- 1.0** The internal quality assurance programme (QAP) submitted by the firm prior to manufacturing must cover the following:
- a)** The foundry shall have established control at various stages of manufacture such as raw material composition, charge composition, sand preparation, moulding, melting, heat treatment and product testing & inspection. The internal quality assurance plan at all the stages shall be prepared incorporating the acceptance criteria. The same shall be made available to the inspecting official whenever required.
  - b)** Manufacturer will not be permitted to sublet any of the operations for producing steel castings. RDSO approval will be required for any change in manufacturing process, place and material of buffer assembly and its components.
  - c)** Gauging scheme to ensure dimensional accuracy of the components. System to ensure that the gauges are recalibrated from time to time and are accurate.
  - d)** System to ensure use of correct raw material.
  - e)** There shall be a proper system to ensure quality of all the components procured from other manufacturers. Proper tests / inspection procedure in conformity with the requirement of the specifications for such components shall be developed and maintained. Rubber Buffer Springs shall be manufactured and tested as per spec.no.0.41.00.04 (Rev.0.00) December 2003 and shall be procured from the sources approved by RDSO/MP only. Buffer spindle, plug & check sleeve shall be tested as per requirements of relevant specifications stipulated in the respective drawings.
  - f)** There should be a proper system for disposal of defective components identified during various stages of manufacture and implementation of QAP, so that such components are not mixed up with the lot being offered for inspection.
  - g)** Heat-wise identification of the casting shall be ensured.
  - h)** The manufacturer shall keep the records of internal Quality Assurance Programme properly for future references/investigations. The manufacturer shall present these records as and when asked by the purchaser/inspecting official or RDSO, Lucknow.
  - i)** It should be possible from the QAP records to identify the manufacturing details/tests of components with serial number marked on the components from QAP records. There must be relation between serial number marked on the components with heat number, batch number, date of manufacture and various test results.
  - j)** The accuracy of gauges shall be checked by inspecting authority before the commencement of inspection.



## **REGULATORY REQUIREMENTS**

- 1.0** The Inspecting Authority shall have free access at all times, while performing the work on the purchase contract, to all parts of the manufacturer's works, which concerns the manufacture of the ordered material. The inspector shall comply with all applicable safety rules and local regulations. The manufacturer shall accord the inspector, free of charges, all reasonable facilities and necessary assistance to satisfy the inspector that the material is being furnished in accordance with this specification. Test and inspection shall be made prior to despatch at the place of manufacture to ensure that provisions of this specification are being met. Any additional tests must be negotiated prior to placement of order. All inspections shall be conducted while not interfering with manufacturing operations.
- 1.1** All components of the buffer assembly shall be interchangeable.
- 1.2** Any deviation from specified tests shall be worked out with prior concurrence of the purchaser.
- 1.3** In case the offer does not correspond to this specification in any respect, a DEVIATION STATEMENT shall be submitted by the tenderer. This statement shall give the deviations clause wise with technical reasons for the same. The manufacturer shall not make any change in the drawings. In case the tenderer does not require any deviation from the drawings and this specification, a no DEVIATION certificate shall be submitted.
- 1.4** The buffer manufacturer shall supply all the spare parts required for the maintenance of buffers supplied by them for use on Indian Railways against specific requirements of Railways, failing which their approval shall liable to be cancelled.