

भारत सरकार
रेल मंत्रालय

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

उच्च क्षमता एवं दीर्घ आयु वाले
लोकोमोटिव साइड बफर की तकनीकी
अपेक्षाओं की अनुसूची
(इलास्टोमर स्प्रिंग टाईप)

**TECHNICAL SPECIFICATION & SCHEDULE OF TECHNICAL
REQUIREMENTS
FOR
HIGH CAPACITY AND LONG LIFE LOCOMOTIVE SIDE BUFFER
(ELASTOMER SPRING TYPE)**

विशिष्ट सं. चा.श.— 0.41.00.03 (संशोधन 03)

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SPECIFICATION NO. MP- 0.41.00.03 (Rev. 03)

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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 under frame 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 latest Alteration of RDSO assembly drawing no. SK.DL-4561, SK.DL-4725 and SK.DL-4748 consisting of parts as per Annexure-1

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, SK.DL -4748 & SK.DL -4725 and part drawings mentioned in **Annexure- 1**.

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 this document, the provisions of various clauses of the respective material specification shall also apply.

3.0 CHEMICAL COMPOSITION:

- 3.1 Chemical composition of the casted items (e.g. Buffer plunger, buffer casing and buffer base) shall be checked from test lug/test coupon integrally attached from the casted items to material specification mentioned in Annexure-1. For each heat, two test lugs/coupons shall be integrally cast. For other items like buffer plunger plug, buffer spindle, washer, check sleeve etc. sample for chemical composition can be made from these components itself. 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 in respect to items as specified under (see **Annexure-1**) to ensure that the castings are properly normalised to avoid retention of cast dendritic structure. The samples should be taken from test lugs/coupons attached to actual castings produced and not from separately cast test bars.
- SKDL-4561: for item 1,2,3 & 6
 - SKDL-4725: for item 1,2 & 11
 - SKDL-4748: for item 1,2 & 3.

- 4.2 Grain size observed shall be ASTM 5 or finer.

5.0 MECHANICAL TESTS (For Item 1 & 2 only of Annexure 1)

Minimum two numbers of integrally cast test coupons/test bars, marked with Heat no. & Sl. No. of the integral component should be casted. Test samples for Chemical test (Para 3.0), Metallographic Examination (Para 4.0), Tensile, Impact and Bend test shall be obtained from these test coupons/test bars. Coupons cast with buffer plunger/casing should be integral part of the same and shall be removed only in the presence of inspecting authority and tests conducted in front of inspecting authority.

5.1 Tensile Test

The tensile test shall be carried out after heat treatment for each heat in accordance with IS: 1608. 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 after heat treatment for each heat in accordance with IS: 1757. The test shall be carried out on three impact specimen from the same heat 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 after heat treatment for each heat in accordance with IS: 1599. 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 of Annexure 1)**6.1 Radiography Test**

Two percent (2%) of the castings subject to minimum two per batch of each-of the buffer plunger and casing shall be radiographically tested at the time of inspection on the locations marked on respective drawings, throughout the circumference, in accordance with IS:2595 with acceptance standard ASTM E 446 or its BIS equivalent 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.

Firm shall also carry out two percent (2%) radiography test of the castings of the buffer plunger and casing as per locations marked and acceptance criteria mentioned above.

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: 3658 and IS: 11732 respectively. Acceptance limit for liquid dye-penetrant test shall be up to severity level SR-2.

Inspector at the time of inspection shall conduct the Liquid dye-penetrant test as per sample size.

6.3 Hammering test (Except drawing no. SKDL-4748 Alt Latest)

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

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. Apart from this, one casting of buffer casing and one casting of buffer plunger per 300 buffer assemblies shall also be subjected to destructive test to ensure that it is free from porosity, shrinkage, slag inclusion, and other defects. This test (sectioning and DPT) will be done in the presence of Inspecting Authority and destructive test report to be communicated to RDSO. Record of testing report will be maintained properly by manufacturers. 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.

Thickness of sectioned surface should be as per drawing of buffer plunger & buffer casing.

Castings will be sectioned as per Sketch in **Annexure-3**.

8.0 Functional Tests

- i) Two numbers or two percent of buffer Assemblies (whichever is more) shall be subjected to minimum buffer stroke as mentioned in latest Alteration of RDSO assembly drawing no. SK.DL-4561, SK.DL-4725 and SK.DL-4748.
- ii) Buffer plunger should not rotate in assembled condition.

9.0 MARKINGS

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.

10.0 INSPECTION AND RETEST

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

Conformity of all the tests specified in clause 4.0 to 9.0.

- i. Dimensional checks as per relevant drawings mentioned in clause no.1.0.
- ii. Dimensions to be checked in assembled as well as in dismantled condition of buffer components and recorded as per test plan format provided in **Annexure-2**.
- 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 9.0.

Test plan incorporating the above test requirements is attached at **Annexure-2**.

- 10.2 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 10.1, the batch shall be considered unacceptable.
- 10.3 The records of all the tests done by the firm shall be maintained and made available to the inspector, if required.

11.0 TESTING AND INSPECTION FACILITIES

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.

12.0 WELD REPAIR

Minor repair/rectification of the casting defects by welding is permitted only on written agreement with the purchaser. Case of such nature shall be individually referred to the purchaser and prior approval shall be obtained in this regard. Based on purchaser's approval, minor repair/rectification of the casting defects by welding shall be carried out as per Para 15 of IS: 1030, but weld repair/rectification is strictly prohibited on critical areas as machine-finished casting, Radiography test area and DPT location area marked on drawings. Details of repair done shall be recorded and furnished to inspecting official at the time of offering the material for acceptance / inspection. After welding, castings will be properly heat treated. Records shall be maintained by the manufactures for the same and shown to inspecting authority.

13.0 REJECTION

- 13.1 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.
- 13.2 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.

14.0 PROTECTION AND PACKING

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 (color shade No.176 Phirozi to IS: 5 –1993) for latest Alteration of RDSO assembly drawing No SK.DL-4561, Carmine red color for SK.DL-4748 and SK.DL-4725) 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.

15.0 PROTOTYPE INSPECTION AND FIELD TRIAL:

Prototype inspection of offered sample of loco side buffer assembly will be done as per the test plan given at **Annexure- 2**

After successful prototype development and testing, field performance of the side buffer assembly shall be monitored for quantity and period as applicable. Field performance feedback will be obtained from zonal railways/ loco sheds in the format as under:

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

The acceptance criteria of field trial shall be the satisfactory field performance/ No failure of equipment.

16.0 PREFERENCE TO MAKE IN INDIA

The Govt. of India policy on 'Make in India' shall apply.

17.0 VENDOR CHANGES IN APPROVED STATUS

All the provisions contained in RDSO's ISO procedures laid down in document no. QO-D-8.1-11(Titled "Vendor - changes in approved status) and subsequent

versions/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.

18.0 DATE OF ENFORCEMENT

For all the firms, the time frame for implementation of revised requirement/ facilities in the STR shall be with effect from 22.08.2024

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 organization.

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, calipers (normal and digital both), gauges, etc. for measurements and checking dimensions. For checking temperature in furnace, immersion pyrometer to be used. For measuring pouring temperature, optical/laser beam/infrared pyrometer should be used.
- ii) Standard radiographs and relevant ASTM or equivalent BIS specification as mentioned in clause No. 6.1 of section A.
- iii) Facility to test the functionality of buffer assembly as per clause 8.0 (Section-A) of this document.

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 (SKDL-4565) shall be manufactured and tested as per spec.no.0.41.00.04 latest and spring pad assembly, long life (SKDL-4726 Alt latest) shall be manufactured and tested as per spec. no. MP-0.41.00.07 latest. Both types of springs 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 at least 8 years for future references/investigations. The manufacturer shall present these records as and when asked by the purchaser/inspecting official or RDSO, Lucknow. Spectrometer should have the capability to save the chemical analysis report with actual date and time stamp of the test conducted, apart from other details, in the computer/system and it should be without tampering. All the chemical analysis/ladle analysis should bear the date and time of test done and reports should be saved in the system.
 - 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 dispatch 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.

Annexure-1**SK.DL-4561**

S.N.	Name of Parts	Drg.No.	Material Specification
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	Buffer Spindle	SK.DL-4564 (ITEM 2)	IS: 1875 Steel Class 4
5	Washer	SK.DL-4564 (ITEM 3)	IS: 2062 Gr. E 250 C
6	Buffing Washer	SK.DL-4564 (ITEM 4)	IS: 1030 Gr.280-520W
7	Buffer Plunger Plug	SK.DL-4564 (ITEM 5)	IS: 1875 Steel Class 2
8	Shim	SK.DL-4564 (ITEM 6)	IS: 2062 Gr. E 250 BR
9	Check Sleeve	L/BD-655/M	IS:3885 (Pt.I)
10	Rubber Buffer Spring	SK.DL-4565	I.S.2062 Gr. E 250 A & Spec.No.MP-0.41.00.04 latest
11	16 Dia Rivet snap head X 50mm long		IS : 1148

SK.DL-4725

S.N.	Name of Parts	Drg.No.	Material Specification
1	Buffer Plunger	W/BD-359	IS:1030 Gr.280-520W
2	Buffer Casing	W/BD-392	IS:1030 Gr.200-400W
3	Buffer Spindle	W/BD-353	IS:1875 & R 10 Steel Class 4
4	Plug	W/BD-374	IS: 1875 Steel Class 2 or IS 2062-Fe 410WA
5	Cotter Split	W/KY-21	Steel IS:2630
6	Hex Nut m 39 (Galvanized)		IS:1363
7	Rubber Buffer Element	SK.DL-4565	IS:2062 Gr. E 250 A & STR Spec.No.MP-0.41.00.04 latest
8	Side Buffer Recoil Spring	W/BD-2252	IS:5192 & R 10, Rubber type B Gr 4
9	Recoil Parting Plate	W/BD-2253	IS:14329 Malleable Cast Iron Gr BM 350 or
10	Recoil Spring Washer	W/BD-350	IS: 2062 Gr. E 250 A
11	Buffing Washer	Item 4 of SK.DL-4564	IS: 1030 Gr.280-520W
12	Washer	Item 3 of SK.DL-4564	IS: 2062 Gr. E 250 C

SK.DL-4748

S.N	Name of Parts	Drg.No.	Material Specification
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	Check Sleeve for Plunger	L/BD-655/M	IS 3885, (Pt. I)
5	Buffer polymer Spring Assembly	SK.DL-4726	SK.DL-4726 & spec no. MP-0.41.00.07 latest
6	16 Dia Rivet snap head X 50mm long		IS : 2269

Annexure-2**Test Plan for High capacity & long life locomotive side buffers (SK.DL-4561, SK.DL-4748 & SK.DL-4725)****CHEMICAL COMPOSITION:** (Ref: Para 3.0 of Section- A)**(SKDL- 4748)**

CHEMICAL ANALYSIS													
HEAT NO.	ITEM	C% 0.25 max	Mn% 1.20 max	Si% 0.60 max	S% 0.035 max	P% 0.040 max	Cr% 0.35 max	Ni% 0.40 max	Mo% 0.15 max	Cu % 0.40 max	V% 0.05 max	HEAT TREATMENT BATCH NO	HARDNESS (BHN)
	Buffer Plunger												
	Buffer Casing,												
	Buffer Base												
	Check Sleeve	0.50-0.60	0.80-1.00	1.50-2.00	0.050	0.050							235-241 BHN

DIMENSIONAL CHECK SHEET**LONG LIFE LOCO SIDE BUFFER (BG) ASSEMBLY (30 KJ) TO IRS DRG. NO. SK.DL-4748**

Sample Size (Ref: Para 10.1 of Section-A): Two Nos or 2 % of the lot whichever is more.

01. Buffer Plunger SK.DL-4562 Material Specification IS-1030 GR. 280-520 W							
DRG. DIMENSIONS				OBSERVED DIMENSION			
I.D. 174mm - 0.8/-0.3							
O.D. 203mm - 0.8/-1.3							
I.D. 194mm + 0.0/-0.4							
FLANGE THICKNESS 19mm -0.4/-0.8							
LENGTH FROM COLLAR 432mm +0.25 / -0.00							
THICKNESS FROM COLLAR TO FLANGE 60mm 0.0 /-0.25							
FLANGE DIA 457 ± 2							
OVER ALL LENGTH 492mm ± 2							
SLOT 25mm +0.4/+0.8							
SLOT 19mm -0.4/-0.8							
SLOT-13.00							

02. Buffer Casing SK.DL-4563 Material Specification : IS-1030 GR. 280 – 250 W							
DRG. DIMENSIONS	OBSERVED DIMENSION						
I.D. 203mm + 0.51 /- 0.00							
I.D. 216mm + 0.51 /- 0.00							
LENGTH – 186mm + 0.25 /- 0.0							
LENGTH – 184mm + 0.25/- 0.0							
DIA 244mm ± 2							
DIA 238mm ± 2							
OVER ALL LENGTH 370mm ± 2							
COLLAR 25mm ± 2							
SQUARE 274 x 274mm ± 2							
CRS 210mm ± 0.2							
4 HOLE DIA 17mm ± 0.2							
4 HOLE DIA 29mm ± 0.2							
FLANGE THICKNESS 16±1 mm							

03. Buffer Base SK.DL – 4564 ITEM – 1 Material Specification – IS – 1030 Gr.280-520W							
DRG. DIMENSIONS	OBSERVED DIMENSION						
THICKNESS 16mm ± 1							
SQUARE 274 x 274mm ± 2							
CRS 210mm ± 0.2							
BOSS DIA 98mm ± 1							
BOSS INNER DIA 44mm ±0.5							
HOLE DIA 17mm ±0.2							
HOLE DIA 29mm ±0.2							
BOSS HEIGHT 15.00 mm							

04. Check Sleeve L/BD-655/M ITEM – 4 Material Specification : Spring Steel – IS-3885 Pt.I							
DRG. DIMENSIONS	OBSERVED DIMENSION						
I.D. 203mm ± 0.8							
I.D. 194mm -0.0/+0.4							
O.D. 216mm – 0.8 /-1.0							
HEIGHT 57mm ±1							
GROVE 25mm 0.0/- 0.4							
GROVE 19mm +0.4 / -0.0							
Gap in position 3mm							

05. LOCO SIDE BUFFER ASSEMBLY DRG. NO. SKDL – 4748							
DRG. DIMENSIONS				OBSERVED DIMENSION			
TOTAL HEIGHT 635 +2/- 1.5							
STROKE 105 +0.0 / -5.0 mm							
16 dia rivet, snap head x 50mm long							

CHEMICAL COMPOSITION: (Ref: Para 3.0 of Section- A)
(SKDL- 4561)

HEAT NO.	ITEM	CHEMICAL ANALYSIS										HEAT TREATMENT BATCH NO	HARDNESS (BHN)
		C% 0.25 max	Mn% 1.20 max	Si% 0.60 max	S% 0.035 max	P% 0.040 max	Cr% 0.35 max	Ni% 0.40 max	Mo% 0.15 max	Cu % 0.40 max	V% 0.05 max		
	Buffer Plunger												
	Buffer Casing												
	Buffer Base												
	Buffing Washer												
	Buffer Plunger Plug	0.15-0.25	0.60-0.90	0.15-0.35	0.050	0.050							120 Min.
	Buffer Spindle	0.40-0.50	0.60-0.90	0.15-0.35	0.050	0.050							175 Min.
	Washer	0.20	1.5	0.40	0.040	0.040							
	Shim	0.22	1.5	0.40	0.045	0.045							
	Check Sleeve	0.50-0.60	0.80-1.00	1.50-2.00	0.050	0.050							235-241 BHN

DIMENSIONAL CHECK SHEET
HIGH CAPACITY LOCO SIDE BUFFER (BG) ASSEMBLY (15 KJ) TO IRS DRG. NO. SK.DL-4561

(For inspection of High capacity side buffer assembly (SK.DL-4561) following items (from SN. 06 to SN.12) to be inspected in addition to items 1 to 4 above, as items (S.N. 1 to 4, buffer plunger, buffer casing, buffer base & check sleeve) are same in both side buffers SK.DL- 4748 & SK.DL-4561)

06. BUFFER SPINDLE SK.DL – 4564 ITEM – 2 Material Specification : IS – 1875								
DRG. DIMENSIONS	OBSERVED DIMENSION							
TOTAL LENGTH 480 [*] mm ± 0.5								
DIA 40mm ± 0.8								
DIA 30mm ± 0.8								
TAPER LENGTH 60mm ± 1								
DIA 60mm ± 0.3								
SLOT LENGTH 22mm +0.5/- 0.0 [*]								
SLOT DEPTH 11 [*] mm ± 0.2								
[*] To be verified on separate spindle of same lot, not in assembled condition.								

07. WASHER SK.DL – 4564 , ITEM– 3 Material Specification : IS – 2062								
DRG. DIMENSIONS	OBSERVED DIMENSION							
OUTER DIA 168mm +1.0/- 0.0								
INNER DIA 89mm +1.0/- 0.0								
THICKNESS 20mm ± 0.2								
THICKNESS 12mm ± 0.2								
THICKNESS 8mm ± 0.2								

08. BUFFING WASHER SK.DL– 4564 ITEM– 4 Material Specification : IS – 1030								
DRG. DIMENSIONS	OBSERVED DIMENSION							
OUTER DIA 170mm +1.0/- 0.0								
INNER DIA 100mm +0.2/- 0.5								
INNER DIA 44mm +.00/- 1.0								
THICKNESS 25mm								
THICKNESS 15mm								
TOTAL THICKNESS 135mm +1.0/- 0.0								
DEPTH 15 ± 0.3								
RIB THICKNESS 13								

09. BUFFER PLUNGER PLUG SK.DL – 4564 ITEM – 5 Material Specification : IS – 1875

DRG. DIMENSIONS	OBSERVED DIMENSION							
DIA 75mm \pm 0.5								
DIA 54 +1.0/- 0.0								
WIDTH OF KEY 21+0.0/-0.5								
HEIGHT 11mm \pm 0.2								
THICKNESS 19								

10. SHIM SK.DL-4564 ITEM– 6 Material Specification : IS – 2062

DRG. DIMENSIONS	OBSERVED DIMENSION							
OUTER DIA 168.0 +0.0/- 01.0								
INNER DIA 42.0mm +0.5/-0.2								
THICKNESS 3.0mm \pm 0.2								

11. RUBBER BUFFER SPRING SK.DL– 4565 (To be checked for SK.DL- 4561 & SK.DL-4725)

DRG. DIMENSIONS	OBSERVED DIMENSION							
OUTER DIA 168								
INNER DIA 42+1.0/-0								
THICKNESS 112 \pm 1			DM ITEM					
PLATE THICKNESS 5								
GAP BETWEEN PLATES 16.5								

12. LOCO SIDE BUFFER ASSEMBLY DRG. NO. SKDL – 4561

DRG. DIMENSIONS	OBSERVED DIMENSION							
TOTAL HEIGHT 635 +2/- 1.5								
STROKE 110 +0.0 / -5.0 mm								
16 dia rivet, snap head x 50mm long								

DIMENSIONAL CHECK SHEET
HIGH CAPACITY LOCO SIDE BUFFER (BG) ASSEMBLY (15 KJ) TO IRS DRG. NO. SK.DL-4725

01. Buffer Plunger W/BD-359 Material Specification IS-1030 GR. 280-520 W							
DRG. DIMENSIONS	OBSERVED DIMENSION						
I.D. 184mm +1/-0							
O.D. 202mm +0/-0.5							
Length 350mm \pm 1.2							
LENGTH 452mm \pm 2							
FLANGE DIA 460mm +2.0/-0							
WALL THICKNESS 9mm + 0.0/-0.75							
FLANGE THICKNESS 19mm \pm 2							

02. Buffer Casing W/BD-392 Material Specification : IS-1030 GR. 200 – 400 W							
DRG. DIMENSIONS	OBSERVED DIMENSION						
I.D. 203 mm + 0.50 /- 0.00							
O.D. 241 mm \pm 3mm							
LENGTH OF BASE 445 +0/-3							
WIDTH OF BASE 229 \pm 4.5							
CENTRE HOLE DIA 45 mm \pm 0.8							
FLANGE THICKNESS 19 mm +2.0/-0.0							
LENGTH 406.00mm \pm 2.0							
COLLAR 25mm \pm 2.0							

03. BUFFER SPINDLE W/BD-353 Material Specification : IS – 1875 CL4							
DRG. DIMENSIONS	OBSERVED DIMENSION						
DIA 40mm +0.8/-0							
THREADING M39x3							
THREAD LENGTH 102mm \pm 1.2							
SLOT LENGTH 22X10 mm							
SLOT DEPTH 11* mm							
* To be verified on separate spindle of same lot, not in assembled condition.							

04. BUFFER PLUNGER PLUG W/BD-374 ,Material Specification : IS – 1875 CL-2

DRG. DIMENSIONS	OBSERVED DIMENSION						
WIDTH OF KEY 21mm +0.0/-0.5							
HEIGHT 11mm +0.0/-0.5							
THICKNESS 19mm +0.0/-1.0							
05. RECOIL SPRING PARTING PLATE W/BD-2253 : IS:14329 Gr. BM 350 or IS – 2062 E 250 A							
OD 110 ± 0.8mm							
ID 42 ± 0.8MM							
THICKNESS 3.15mm +0.37/-0.16							

06. RECOIL SPRING WASHER W/BD-350 : IS – 2062 Gr. E 250 A

DRG. DIMENSIONS	OBSERVED DIMENSION						
OD 110mm ± 0.8							
OD 42mm ± 0.8							
THICKNESS 12 +0.9/-0.6							

07. RECOIL SPRING W/BD-2252

DRG. DIMENSIONS	OBSERVED DIMENSION						
OD 102mm ± 0.8							
OD 42mm ± 0.8							
THICKNESS 22mm ± 1.0							

08. BUFFING WASHER SK.DL – 4564 ITEM– 4, Material Specification : IS – 1030**280-520W**

DRG. DIMENSIONS	OBSERVED DIMENSION						
OUTER DIA 170mm +1.0/- 0.0							
INNER DIA 100mm +0.2/- 0.5							
INNER DIA 44m +.00/- 1.0							
THICKNESS 25mm							
THICKNESS 15mm							
TOTAL THICKNESS 135mm +1.0/- 0.0							
DIA 79							
DEPTH 15 ± 0.3							
RIB THICKNESS 13+1/-0.5							

09. WASHER SK.DL- 4564 ITEM- 3 Material Specification : IS – 2062							
DRG. DIMENSIONS	OBSERVED DIMENSION						
OUTER DIA 168mm +1.0/- 0.0							
INNER DIA 89mm +1.0/- 0.0							
THICKNESS 20mm \pm 0.2							
THICKNESS 12mm \pm 0.2							
THICKNESS 8mm \pm 0.2							

10. LOCO SIDE BUFFER ASSEMBLY DRG. NO. SKDL – 4725							
DRG. DIMENSIONS	OBSERVED DIMENSION						
TOTAL HEIGHT 635 +2/- 1.5							
STROKE 110 +0.0 / -5.0 mm							

CHEMICAL COMPOSITION: (Ref: Para 3.0 of Section- A)
(SKDL- 4725)

HEAT NO.	ITEM	CHEMICAL ANALYSIS										HEAT TREATMENT BATCH NO	HARDNESS (BHN)
		C% 0.25 max	Mn% 1.20 max	Si% 0.60 max	S% 0.035 max	P% 0.040 max	Cr% 0.35 max	Ni% 0.40 max	Mo% 0.15 max	Cu % 0.40 max	V% 0.05 max		
	Buffer Plunger												120 Min.
	Buffer Casing,		Mn% 1.00 max										
	Buffering Washer												
	Buffer Plunger Plug	0.15-0.25	0.60-0.90	0.15-0.35	0.050	0.050							120 Min.
	Buffer Spindle	0.40-0.50	0.60-0.90	0.15-0.35	0.050	0.050							175 Min.
	Washer	0.20	1.5	0.40	0.040	0.040							
	Recoil spring washer	0.23	1.5	0.40	0.050	0.050							

METALLOGRAPHIC EXAMINATION (Ref: Para 4.0 of Section- A)

S.N.	Clause no. of spec	Heat No.	Sl.no. of Casting	Test	Test Method	Pass/ Fail criteria	Remarks / Observed Value
1.	4.1			Metallographic examination	Microscope	No cast dendritic Structure.	
2.	4.2			Grain Size		ASTM 5 or finer.	

MECHANICAL TESTS

(For Buffer plunger and buffer casing only)

S.N.	Clause no. of spec	Heat No.	Sl.no. of Casting	Test		Test Method	Specified Value	Remarks / Observed Value
1.	5.1			Tensile Test	Minimum tensile strength	IS: 1608	520 Mpa	
					yield stress		280 Mpa	
					elongation		18 % Min	
					reduction in area		25 % Min	
2.	5.2			Impact Test		IS: 1757	> 22J	
3.	5.3			Bend Test		IS: 1599	Test pieces shall be capable of being bent cold without fracture to an angle of 60°	

NON-DESTRUCTIVE TESTS

(For Buffer plunger and buffer casing only)

S.N.	Ref. para of spec.	Heat No.	Sl.no. of Casting	Test	Test Method	Pass/ Fail criteria	Remarks / Observed Value
1.	6.1			Radiography Test	IS:2595	ASTM E 446 or its BIS equivalent	
2.	6.2			Liquid Dye-Penetrant Test	IS:3658	IS:11732	
3.	6.3			Hammering test (Except drawing no. SKDL-4748)	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.		
4.	7.0 & 10.1			Visual	1. 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. 2. Freedom of non-machined cast surface from any visible defects e.g. cracks, scabs, sand fusion etc. 3. Parting line fins, risers, notches and sprues shall be ground smooth.		

DESTRUCTIVE TEST

Ref. para of spec.			Test Method	Pass/ Fail criteria	Remarks
7.0			Two percent of castings subject to minimum two per batch 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. Apart from this, one casting of buffer casing and one casting of buffer plunger per 300 buffer assemblies shall also be subjected to destructive test. Castings will be sectioned as per Sketch in Annexure-3	Free from porosity, shrinkage, slag inclusion and other defects. 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. Thickness of sectioned surface should be as per drawings of buffer plunger & buffer casing	

MARKING

Ref. para of spec.	Test Method	Pass/ Fail criteria	Remarks (OK/ Not OK)
9.0	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.	

PAINTING

Ref. para of spec.	Test Method	Pass/ Fail criteria	Remarks (OK/ Not OK)
14.0	See Para 14.0 of Section- A	Painted surface should be free from common paint defects like flaking, peeling, blistering and chalking etc.	

FUNCTIONAL TEST

Ref. para of spec.	Test Method	Pass/ Fail criteria	Remarks (OK/ Not OK)
8.0	See Para 8.0 of Section- A	<ol style="list-style-type: none"> 1. Buffer assembly should regain its original length i.e. 635 ± 1.5 mm 2. Buffer assembly and its components must not show any crack/ permanent deformation. 	

Annexure-3

SKECH FOR DESTRUCTIVE TEST SECTIONING OF BUFFER PLUNGER & BUFFER CASING


