

TENDER SPECIFICATION

NO:- CLW/MS/3/003

ALT.	1	2	3	4	5
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ENCLOSURES:

1. ANNEXURE - 'A'

2. DRG. NO. 1209-01.111-005 alt. 3 } ⑤
 1209-01.111-006 alt. 2 } ⑦
 1209-01.111-007 alt. 2 }

TOTAL NO. OF SHEETS. - ~~8~~ 9 + ALT. SHEET-1 ①

ALT.	1	2	3	4	5
SHEETS	3	1&9	7	2&3	ALL

TECHNICAL SPECIFICATION FOR AXLE BOX COMPLETE WITH

ROLLER BEARINGS FOR USE ON WAP-7 AND ⑤
WAG/2 ELECTRIC LOCOMOTIVES

ISSUED BY:
 DY. CHIEF ELECTRICAL ENGINEER/CON/TU
 D&D CENTRE
 C.L.W./CHITTARANJAN

REPD. BY	CHKD. BY	REVIEWED BY	APPROVED BY	WAG-9 (CO-CO) WAP-7 SPECIFICATION FOR AXLE BOX COMPLETE WITH ROLLER BEARINGS		D&D CENTRE	
				⑤		CHITTARANJAN LOCOMOTIVE WORKS. CHITTARANJAN-713331	
CDM	SUPDT.	29.1.97 SME/D&D	DY. CEE/CON/TU	ALT. NO	1	2	3
					4	5	

NO. CLW/MS/3/003 Date: 27.01.97

**TECHNICAL SPECIFICATION FOR AXLE BOX COMPLETE WITH ROLLER BEARINGS FOR
USE ON WAG -9 AND WAP-7 ELECTRIC LOCOMOTIVES** (5)

1. SCOPE :

This specification covers the manufacture, supply, delivery and inspection of axle box and axle roller bearings for use on WAG-9 & WAP-7 elec. locomotives. The supplier has to comply with the dimensions and instructions specified on the relevant drawings. (5)

2. SCOPE OF SUPPLY :

Qty. one set shall comprise quantity per loco as indicated in Annexure 'A' of this specification.

3. SPECIFICATIONS AND STANDARDS :

The following specifications and standards shall be the part of this specification.

3.1 IS: 1865 Gr. S6500/7 ⁽⁴⁾ Material to be used for SGI casting.

3.2 IS: 3823 Pt. 2 Methods of evaluating static load rating of rolling bearings.

3.3 IS: 3824 Pt. 2 Methods of evaluating Dynamic load ratings of rolling bearings.

3.4 IS: 4397 Cold rolled carbon steel strips for ball and roller bearing cages.

3.5 IS: 5935 Radial internal clearances in unloaded radial rolling bearings.

3.6 IS: 5669 General plan of boundary dimensions for radial rolling bearings.

3.7 IS: 5692 Tolerance for radial rolling bearings.

3.8 IS: 6453 Technical supply condition for rolling bearings.

3.9 IS: 3073 Assessment of surface roughness.

3.10 IS: 1500-1983 Method for Brinell hardness test

3.11 IS: 7754-1975 Micro structure test for SGI casting.

4. CLIMATIC & ENVIRONMENTAL CONDITION :

4.1 Maximum atmospheric temperatures :

- a) Under Sun 70°C
b) In shade 50°C

PREPD. BY	CHKD. BY	REVIEWED BY	APPROVED BY	WAG-9 (CO-CO), WAP-7 Specification for axle box Complete WITH Roller Bearings.	D&D CENTRE CHITTARANJAN LOCOMOTIVE WORKS CHITARANJAN - 713321 Date: 24.06.97 NO. CLW/MS/3/003
CDM	SUPDT.	JME/D&D	D. CEE/CON	(5)	ALT. NO. ① ② ③ ④ ⑤

- 4.2 Humidity : 100% saturation during rainy season.
- 4.3 Reference site conditions
 - a) Ambient temp: 0°C Min., 47°C Max.
 - b) The contractor will indicate the expected temprature rise under reference site condition.
 - c) Humidity : 60%
 - d) Altitude : 160 m above mean sea level.
- 4.4 Rain fall :
Very heavy in certain areas.
- 4.5 Atmosphere during hot weather :
Extremely dusty and desert terrain in certain areas.
- 4.6 Coastal area :
Bearings will be designed to work in coastal areas in humid and salt laden atmosphere.
- 4.7 Vibration :

The axlebox, bearing, sub-system and their mounting arrangement will be designed to withstand vibrations and shocks encountered in service as specified in corresponding IEC publications unless otherwise prescribed.

5. GENERAL :

5.1 The material for axle box housing shall comply with speen No. IS: 1865 Gr. SG500/7. Alternative material according to AS 1831, BS 2789 or BS 1005 may be considered with prior approval of purchaser. ① ④

5.2 The bearing units shall be dimensionally suitable for mounting on the axle to Dr9.No.1209-01.011.002. Grease lubricated cylindrical roller bearing units shall be used. The bearing shall include an effective seal to keep grease inside the bearing and to provide it from any ingress of contamination. A labyrinth type seal shall be used.

5.3 The roller bearings shall generally conform to the technical supply conditions for roller bearings as per IS:6453. Rollers and bearing races shall be manufactured from high quality bearing material. The material used for manufacture the rollers and races shall be furnished to purchaser along with the offer and got approved by him. Material used for other components such as end cap, cover, abutment ring etc. shall conform to the relevant drawings.

6. APPROVAL OF DRAWINGS :

The manufacturer shall prepare and submit 2 sets of complete working drawings in metric units giving assembly and component details of

PREP. BY	CHKD. BY	REVIEWED BY	APPROVED BY	WAG-9 (CO-CO) WAG-7	D&D CENTRE CHITTARANJAN LOCOMOTIVE WORKS CHITTARANJAN - 713331 Date - 27-04-97 NO. CLW/MS/3/0663
<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	Specification for axle box complete with roller bearings. ⑤	A.T. NO. ① ② ③ ④ ⑤
CDM	SUPD.T.	S.M.E D&D	DY. CEE/CUN/TU		

roller bearing and axle box, for approval of the purchaser before manufacture.

- 6.1 All drawings shall be fully dimensioned. The requisite tolerances shall be shown on each dimension of the detailed drawings and the condemning sizes of wearing parts shall also be shown against the relevant dimensions.
- 6.2 Material specification for each component shall be indicated on the relevant drawing. If these are other than IS or IRS, then duplicate copies of such specifications in english shall be supplied to the purchaser.
- 6.3 Full calculations in support of the design capacity (Load rating) and life expectancy of the roller bearings shall be offered for approval of the purchaser.

7. TECHNICAL REQUIREMENTS :

- 7.1 The axle box housing and other components shall conform to the size and shape as shown on the relevant drawings.
- 7.2 The castings shall be cleaned by shot or sand blast before machining and painting. Any alternative cleaning method of castings, shall have prior approval of the purchaser. Sharp corners shall be broken and burrs removed before painting. The painting shall be done in accordance with the paint specification. The finish colour shall be RAL 7009 Greenoay. The machining surfaces shall be protected with a rust resistant coating which can be easily removed prior to installation of the axle box.
- 7.3 The mechanical properties of each batch of castings shall be established by the manufacturer. The microstructure examination and the hardness may be sufficient provided that the manufacturer can demonstrate that his manufacturing control can ensure compliance with this specification. At least one batch of castings shall be provided with the results of 0.2% proof stress test.
- 7.4 Test bars suitable for microstructural examination and tensile property test shall be cast at the end of every purchaser with at least four test bars suitable for the mechanical tests and three test bars for the microstructural examination from each batch of castings.
 ↙ treatment batch. The manufacturer shall provide the bearing unit if asked by the purchaser in loose condition, shall be supplied prelubricated and ready to mount unless otherwise mutually agreed upon by the purchaser and the manufacturer.
- 7.5 The end cap design shall be used to support the thrust loads of the bearing. Following technical data shall be for the design
- 7.6
- | | |
|-----------------------------------|-------------------|
| a) Axle static load | 22.5 ton per axle |
| b) Unspring mass | 3.9 ton per axle |
| c) Wheel set mass (without motor) | 2750 kg. |
| d) Wheel diameter | 1092 mm (New) |

PREP. BY	CHKD. BY	REVIEWED BY	APPROVED BY	WAG-9 (CO-CO) WAGON	DAD CENTRE
<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	Specification for axle box complete with roller bearings	CHITTARANJAN LOCOMOTIVE WORKS CHITTARANJAN - 713321 NO. CLW/MS/5/803
CDM	SUPD.	ME/D&D	DY. CEE/CON/V		ALT. NO. ① ② ③ ④ ⑤

- e) Maximum service speed 100 km/hour
- f) Maximum test speed 110 km/hour
- g) Type of suspension Coil springs
- h) Track broad gauge (1676 mm)
- i) Bearing Inner diameter 150 mm
- j) Bearing outer diameter 250 mm
- k) Bearing width 180 mm

7.7 The components of the bearings and other parts of the axle box shall normally be fully interchangeable.

8. LIFE EXPECTANCY :

- 8.1 The bearings shall be designed for a minimum life expectancy of 2.2 million kilometers service. Life expectancy is defined as that life at which no more than 10% of the bearings may have been replaced solely due to fatigue of metal. This life expectancy definition is not to be construed as a basis for circumventing responsibility for short service life or any premature bearing failure related to materials and workmanship.
- 8.2 Life expectancy calculations and additional supporting data showing service experience shall be provided. The calculated life of the bearing shall be stated. The dynamic capacity of the bearing shall be nominated.
- 8.3 Lubrication seals (including the wear rings, if used) shall be designed for a minimum life of 2.2 million kilometers. During this period the lubricant retention properties shall be maintained to the extent that sufficient lubricant is retained in the bearing for proper lubrication of the bearing when it is lubricated in accordance with an approved maintenance schedule. The maintenance schedule prepared by manufacturer shall have prior approval of the purchaser.

9. DOCUMENTS TO BE SUPPLIED :

- Minimum ten copies of the maintenance manual shall be supplied incorporating the following informations:-
- a) Description of the bearings as well as radial and axial clearances.
- b) Mounting of the bearings indicating quantity of lubricant per box.
- c) Maintenance checks in service such as grease topping, bearing examination, seal change and grease change etc. between major examination.
- d) Procedure for bearing extraction, examination and assembly, special tools, if any for this purpose.
- e) Initial and condemning limits for components.
- f) Types/brands of suitable grease/lubricants.

REFD. BY	CHKD. BY	REVISED BY	APPROVED BY
<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
CDM1	SUBDT.	E'D&D	TY. EST. CON'N
WAG-9 (CO-CO) ^{WAG-9}		D&S CENTRE	
Specification for axle box complete with roller bearings		CHITTAPANIAN LOCOMOTIVE WORKS	
		CHITTARANJAN - 713331	
		Date - 27/01/97	
		NO. LW/MS/3/003	
		ALT. NO. ML	① ② ③ ④ ⑤

10. MARKING :

Each bearing shall have clear readable marking on one of its side face. The marking shall be as follows;

- a) Manufacturer's name/Trade mark
- b) Complete designation of the bearing, defining type, dimensions, radial internal clearance etc.
- c) Year and month of manufacture with batch number.

11. PROTECTION AGAINST CORROSION :

The type of protection against corrosion shall be decided by the manufacturer depending on the packing material used under proper storage conditions. The anticorrosive treatment shall be effective for atleast twenty four months in order to ensure a satisfactory functioning of the rolling bearing.

12. INSPECTION AND ACCEPTANCE :

- 12.1 The inspecting authority of the purchaser shall have free access to the works of the manufacturer at all times during manufacture. He shall be free to inspect the manufacture at any stage, to reject any material which do not conform to the terms of this specification.
- 12.2 Castings @ 5% from each batch shall be selected for inspection. If the sample is rejected, 10% castings shall be inspected. Any visual crack, discontinuities, sand inclusions, shrinks or porosity in castings is not acceptable. However, scattered holes in non critical area of the castings that measure no more than 3 mm in depth and have solid bottom can be considered for acceptance.
- 12.3 Wall thickness at number of locations, bore for its size, taper, ovality and surface finish shall be meticulously checked.
- 12.4 Mechined housing and all other loose components such as end cap, cover, abutment ring etc. shall be checked for dimensions which should conform to the dimensions of relevant drawings.
- 12.5 Each bearing shall be checked for dimensions, appearance and finishings. The running surface shall be free from tool marks chatter waves, grinding scratches, pits, rust, discolourisation and other surface imperfections.
- 12.6 Bearings @ 2% from the lot shall be selected for checking of its bore diameter, width, radii run out, hardness and magnetic particle testings duly approved by the purchaser.
- 12.7 Any deviation other than the specified values on the relevant drawings shall not be accepted. The rings and rollers should not show any sign of cracks or harmful defects.
- 12.8 After inspection, the inspector shall affix his stamp/seal on each assembled box as a token of the material passed by him.

PREP BY	CHKD. BY	REVIEWED BY	APPROVED BY	WAG-9 (CO-CO) WAP-7	D & F CENTRE CHITTARANJAN LOCOMOTIVE WORKS Date: 27.02.97 N ^o . LW/MS/3/003
<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	Specification for axle box complete WITH roller bearings ⑤	ALT. NO. ① ② ③ ④ ⑤
CPM	SUPP.	SMF/D&C	DY. CEE/CON/T		

13. GNARANTEE :

The manufacturer/supplier shall have guarantee for the bearings and their satisfactory performance for the period of five years from putting into service or six years from the installation which ever is earlier. All aspects of workmanship and material will be covered by this guarantee.

14. PACKING AND DELIVERY :

14.1 The bearings, when supplied in loose condition, if asked by the purchaser, shall be prepared and PACK in such a manner as will properly protect them from damage or deterioration during transit and storage prior to installation. The storage period of at least 24 months shall be considered.

14.2 The protective packing shall be suitable for transport and storage under tropical conditions of high temperature, high humidity, ~~heavy~~ heavy rain fall and fungus-conductive and environments. dusty

15. REFERENCE :

15.1 The axle boxes used by M/s. ABB transportation for WAG-9 class (Co'Co) electric locomotives is supplied by

M/s. SKF AUSTRALIA PTY LTD.,
P.O. BOX 93,
FORTITUDE VALLEY QLD

15.2 Type :

- a) ABB Drg.No. IB011-00176, 00178, 00182, 00183, 00184 & 00507.
- b) Cylindrical roller bearing - CRU 150 to SKF REF BC2-0067A.

③ 16. HARD-WARES COVERED IN THIS SPECIFICATION SHALL BE ANY OF FOLLOWING MAKE:

- a) UN-BRAKO (PRECISION FASTENERS)
- b) G.K.W.
- c) LAXMI PRECISION
- d) SUNDARAM FASTENERS (TVS)

PREP. BY <i>[Signature]</i>	CHKD. BY 3Y	REVIEWED BY <i>[Signature]</i> 29.1.97	APPROVED BY <i>[Signature]</i>	WAG-9 (CO-CO) WAGON Specification for axle box complete with roller bearings ⑤	D&D CENTRE CHITTARANJAN LOCOMOTIVE WORKS CHITTARANJAN - 713331 <i>Scale 27.01.97</i> NO. CLW/MS/3/603
CDM	SUPDT.	4E /U8D	DY. GEN/CON/TU	ALT. NO. <u>14</u> ① ② ③ ④ ⑤	

ANNEXURE - A TO SPECIFICATION NO. CLW/MS/3/003

I) ITEM - A (Axle box complete with roller bearings):

Sl.No.	Description	Drq.No.	Qty per set (Loco)
01.	Axle box complete with earth contact.	1209-01.111-005	4
02.	Axle box complete with Hasler Transmitter.	1209-01.111-006	1
03.	Axle box complete with blank cover.	1209-01.111-007	7

II) ITEM - B (Axle box complete without roller bearings):

Sl.No.	Description	Drq.No.	Qty per set (Loco)
01.	All components of axle box complete with earth contact except item No.7 & 8 to 17.	1209-01.111-005	As indicated ref.Nos.1 to 6 in the Drq.
02.	All components of axle box complete with Hasler transmitter except item No.7 & 8 to 16.	1209-01.111-006	As indicated ref.Nos.1 to 6 in the Drq.
03.	All components of axle box complete with blank cover except item No.7 & 8 to 17.	1209-01.111-007	As indicated ref.Nos.1 to 6 in the Drq.

III) ITEM - C (Cylindrical roller Unit):

Sl.No.	Description	Type	Qty per set (Loco)
01.	Cylindrical roller Unit	SKF-CRU 150 or, Similar.	12

NOTE FOR THE TENDERERS

Tenderers are free to submit their offers for any one, or all three of above items A,B,C. However tenderers quoting for Item-A must indicate break-up price for Item-B and C.

① THIS SHEET IS SUPERSEDED BY SHEET 9.

PREP'D BY	CHK'D BY	REVIEWED BY	APPROVED BY	WAG-9 (CO-CO)	D & D CENTRE
				SPECIFICATION FOR:	CHITTARANJAN LOCOMOTIVE
				AXLE BOX AND	WORKS, CHITTARANJAN (W.B)
				AXLE ROLLER	
				BEARINGS	
C.D.M	SUPD/SME/D&D		DY. CEE/CON/TU		NO: CLW/MS/3/003
					DATE: 27.01.97

(5)

ANNEXURE 'A' TO SPECIFICATION NO. CLW/MS/3/003, ALI. 5.

Sl. No.	Description	Drq. No.	Qty per set (Loco)
01.	All components of Axle box complete with Earth contact except item No. 16.	1209-01.111-005 alt. ③,	As indicated in the drg. 4 nos.
02.	All components of Axle box complete with Hasler transmitter except item no. 13.	1209-01.111-006 alt. ②,	As indicated in the drg. 1 no.
03.	All components of Axle box complete with blank cover.	1209-01.111-007 alt. ②,	As indicated in the drg. 7 nos.
04.	CYLINDRICAL ROLLER UNIT, CRU-150 OF SKF OR SIMILAR	1209-01.311-061 alt. ①	12 Nos.

PREPD. BY <i>[Signature]</i> 16.4.98	CHKD BY <i>[Signature]</i>	REVIEWED BY <i>[Signature]</i> 16.4.98	APPROVED BY <i>[Signature]</i> 17.4.98	SPECIFICATION FOR AXLE BOX COMPLETE WITH ROLLER BEARINGS. (5)	CENTRE for D & D CHITTARANJAN LOCOMOTIVE WORKS CHITTARANJAN-713331
CDM	SUPD.T.	AME/D&D	DY. CME/D&D		
				ALT NO.	① ② ③ ④ ⑤

DETAILS OF ALTERATIONS

ALT.	DATE	DESCRIPTION	SIGNATURE	REMARKS
①	16-4-98	HEADING ON SHEET 1 TO 7 WAS TECHNICAL SPECIFICATION FOR AXLE BOX AND AXLE ROLLER BEARINGS. MATL. SPECN. IS: 1030 GR. 1 WAS IS: 1865 GR. SG 500/7 AGAINST CLAUSE 3.1 OF SHEET 2 AND CLAUSE 5.1 OF SHEET 3. SHEET 8 SUPERSEDED BY SHEET 9. SHEET 9 AND ALTERATION SHEET 1 ADDED.	<i>[Signature]</i> 16.4.98	
②	25-7-01	ALT. No. FOR DRGS. ADDED ON SHEET No.1 AND SHEET No.9.	<i>[Signature]</i> 25.7.01	DRGS. ALTERED LATER ON.
③	1-02-02	PARA 16 FOR HARDWARES ADDED IN SHEET-7	<i>[Signature]</i> 01.02.02	THE NAME OF HARDWARE SUPPLIERS ADDED TO ACHIEVE THE PROPER QUALITY.
④	29-01-03	MATL. SPECIFICATION IS: 1865 GR. SG 500/7 WAS IS: 1030 GR. 1 AGAINST CLAUSE 3.1 OF SHEET 2 AND CLAUSE 5.1 OF SHEET 3.	<i>[Signature]</i> 29/01/03	DECIDED BY THE COMPETENT AUTHORITY TO SWITCHOVER TO SG CI CASTING IN LINE WITH ORIGINAL MATERIAL SPECIFIED BY ADTRANZ.
⑤	29-1-08	ON TOP SHEET ALT. NO. ③, ② AGAINST DRG. NOS. WERE ②, ①, ① RESPECTIVELY. THE WORD "WITH" WAS WITHOUT IN THE TITLE COLUMN. FOR USED LOCOS WAP-7 ADDED. <u>ON SHEET NO. 2</u> THE WORD "WITH" WAS WITHOUT. USED FOR LOCOS WAP-7 ADDED. <u>ON ALL THE SHEETS</u> TITLE BLOCK ALTERED ACCORDINGLY.	<i>[Signature]</i> 30/1/8	FOR PROCUREMENT OF AXLE BOX BRG. (UNSEALED) AND AXLE BOX HOUSING FROM SAME UNIT. AS PER GM/CLW'S NOTE No. SEC. 1/6 DT. 30-11-07 AND RDSO'S ADVICE LETTER No. EL/3-2-108 (3 PHASE) DT. 9-2-07.

PREP. BY	CHKD. BY	REVD. BY	APPROVED BY	WAG/9(coc), WAP-7
<i>[Signature]</i> 16.4.98	<i>[Signature]</i> 17.4.98	<i>[Signature]</i> 16.4.98	<i>[Signature]</i> 17.4.98	SPECIFICATION FOR AXLE BOX COMPLETE WITH ROLLER BEARINGS.
CDM	SUPDT.	AME/D&D	DY.CME/D&D	⑤
D & D CENTRE CHITTARANJAN LOCOMOTIVE WORKS, CHITTARANJAN.				No. CLW/MS/3/003
ALT. No.				① ② ③ ④ ⑤