

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
RESEARCH DESIGNS AND STANDARDS ORGANISATION
Manak Nagar, Lucknow-11
Dated:- 15th Oct., 1982.

No.EL/2.2.48/JTMU

SPECIAL MAINTENANCE INSTRUCTIONS

No.RDSO/ELRS/SMI/99

1. TITLE
Fits and limits on auxiliary motor bearing and modifications to associated components for NPV, MCP, MVSI & MVSL motors fitted on A.C. electric locomotives.

2. OBJECT:

2.1 A large number of Auxiliary motors failures have been reported by Railways on account of bearing. Besides quality of bearing, it is essential to adopt proper fits and limits to obtain good performance of bearings.

This SMI suggests, considering the various factors involved in traction applications, fits and limits to be adopted on auxiliary motors and modifications to other associated components.

3.0 Instructions :

The general principle adopted in the bearing scheme for auxiliary machines, having ball bearing at both ends, are as follows:

i. Driving end bearing shall be locating bearing with M6 interference fits between outer race and housing bore. The interference fits between inner race and shaft shall be as K5. (Table 2&3 of Annexure 1).

ii. Non driving end bearing shall be floating bearing with J6 clearance between outer race and housing bore and interference fits between inner race and shaft shall be as K5.

iii. Outer races of both drive and non drive end bearings, shall be gripped from sides, by bearing housing covers, to prevent creepage of outer races in the housing bores.

3.1 WORK TO BE DONE:

i. Provide fits and limits as per table on the bearing housings & shafts, for building up housing/shaft refer RDSO SMI No.RDSO/ELRS/SMI/94.

ii. Machine the bearing housing covers and assemble as per procedure enclosed at annexure-2.

Contd.2

4.0 Periodicity:

During IOH or whenever a burnt/failed motor comes to shop/shed for heavy repairs.

5.0 Application of class of locomotive:

All WAM4/WCM1/WAP1/WAG4 class of locomotives.

6.0 Agency of Implementation:-

All electric locosheds and repair shops of Railways.

7.0 Distribution:

As per enclosed list.

Note: This supersedes SMIno.RD30/EL-RS/MI/16 issued vide RD30 letter no.EL/2.2.48 dt. 3rd May, 1978 for the MPV, MCP and MVSL and MVSL motors.

DG/

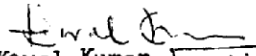

(Kewal Kumar)
For Director General/Elect.

Table-1. DETAILS OF BEARING

Annexure-I

Type of Aux.	MPV	MCP	MVSL	MVSI
Motors Make	HBB	BBL	HBB	HBB
Type	2200M	50d14-46	1 J180	3K112
Particulars	6441	TRU180 LGY11 2m.	OK 1122	mi
BEARING TYPE	6312	6309	6310	6310
D.E.				
Outer Dia.	130	100	110	110
mm				
Inner Dia.	60	45	50	50
mm				
BEARING TYPE	6312	6307	6310	6310
IDE				
Outer Dia	130	80	110	110
mm				
Inner Dia.	60	35	50	50
mm				

NOTE: 1. DEPENDING ON BEARING DIMETERS ADOPT THE FOLLOWING TOLERANCES ON SHAFT/HOUSING FOR DRIVING/NON DRIVING END BEARINGS.

2. ADOPT C3 CLEARANCES FOR BEARINGS, (1MICRON=0.001mm)

TABLE-2. TOLERANCES (K₉) ON SHAFT AND INNER RACE AND RADIAL INTERNAL CLEARANCE (C3).

NOMINAL SHAFT DIA.	DRIVE END/NON DRIVE END	RADIAL INTERNAL CLEARANCE	C3 TYPE (GREATER THAN NORMAL)
mm	K ₉	MINIMUM MICRONS	MAXIMUM MICRONS
30	+11	-10	
35	+13	-12	13
40	+13	-12	15
45	+13	-12	18
50	+13	-12	18
55	+13	-15	18
60	+13	-15	23

TABLE -3 TOLERANCE ON BEARING OUTER RACE AND HOUSING BORE.

NOMINAL DRIVE END (M6)	NON DRIVE END (J-6)
HOUSING DIA	HOUSING DIA
mm	mm
Tolerance Microns.	Tolerance Microns.
72	-24
80	-24
90	-28
100	-28
110	-33
130	-33

ANNEXURE-2.

METHOD TO BE ADOPTED FOR OBTAINING REQUIRED FITS.

The following procedure shall be adopted for obtaining required fits:-

- (i) If the bearing housing has become oval, machine the housing to the extent ovality occurred. Grind the surface to smooth finish.
- (ii) Machine and grind the shaft at bearing seatings to the extent shaft has worn-out. Any shaft having more than 0.15 mm wear should be repeated.
- (iii) Measure the bearing housing diameter, shaft diameter and the bearing outer and inner diameter, chrome plate the bearing housing and shaft to achieve the required interference fits as per table under para work to be done. For chrome plating please refer to MI No. 94.

PROCEDURE FOR FITMENT OF THE BEARINGS IN THE HOUSING.

- (i) As shown in fig. of RD30 SKEL No. 3524 measure dimension X, Y₁, Y₂, and B. of bearing housings.
- (ii) $3 \times Y_1 + Y_2$ should be greater than X by 0.125 mm.
- (iii) If step No. 2 is not satisfied, remachine dimension Y₁ and Y₂ equally to achieve the required result.
- (iv) After the bearing covers have been suitably machined following steps should be adopted for assembly of the bearing for both ends.
 1. Press the ball bearing 1 in to the end covers 2 as shown in fig 1(a) and fit the inner bearing cap 3 with its flange against the outer roller race bearing face.
 2. Fit suitable distance pieces over the stud 4 and tighten the nuts evenly, a half turn a time, in sequence 1, 3, 2, 4 until the face of the inner bearing cap (3) is flush with the inside face of the end cover the object of using distance pieces is to pull the bearing outer race into the position relative to the bearing caps.
 3. Remove the nuts and distance pieces, fit the outer bearing cap 5 and tighten the nuts finger tight.
 4. Using feel gauges, check the gap between the faces of the outer bearing cap 5 and the end cover 2.
 5. Compare the gap measurement obtained with the table and determine the number of shims, each ~~13mm~~ ^{15mm} thick, required to give the correct end nip of $.05 \pm .015$ mm on the outer race of the bearing.
 6. Reverse the nuts 4 and bearing cap 5, fit the appropriate number of shims required, refit the end cap and tighten the securing nuts.

Jain.

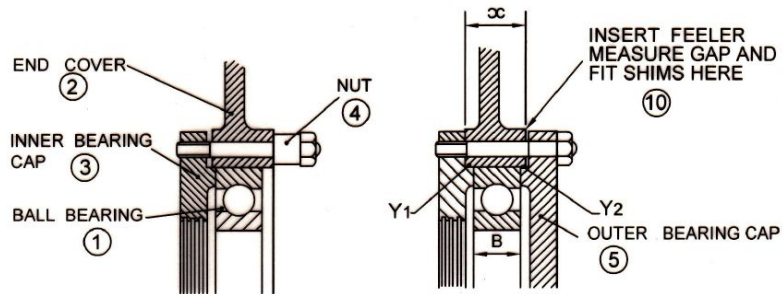


FIG 1 (a)

$$B + Y_1 + Y_2 = X + 0.125$$

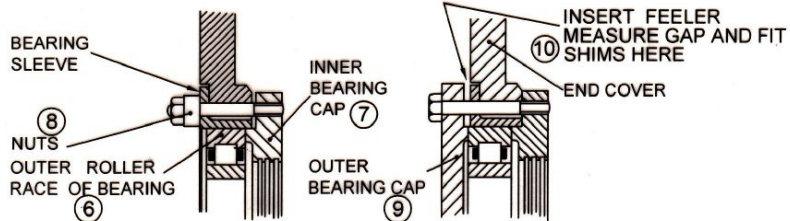


FIG 1 (b)

TABLE

GAP (mm)	NO OF SHIMS 0-13 THICK. REQD.
0.05 TO 0.15	0
0.15 TO 0.3	1
0.3 TO 0.45	2
0.45 TO 0.6	3
0.60 MAX.	4

CHECKED WITH ORIGINAL
AND FOUND CORRECT

SSE *[Signature]* DIR *[Signature]*

REF:

SCALE :- N.T.S.

APPROVED :

PROCEDURE FOR ASSEMBLING BALL AND ROLLER BEARINGS.

R.D.S.O., ELEC. DTE.

SKEL:- 3524

DT	17/4/82
D	
T	
C	