भारत सरकार–रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ– 226011
e-mail: dsetm@rdso.railnet.gov.in
Telephone : 0522-2465716

Government of India - Ministry of Railways
Research, Designs & Standards Organization, LUCKNOW – 226011
Fax: 91-0522-2465716

No. EL/3.2.182 Date: As signed

To Principal Chief Electrical Engineers:

1.	Central Railway, Mumbai CST-400001	मध्य रेलवे, मुम्बई ,सीएसटी–400001
2.	East Central Railway, Hazipur-844101	पूर्व मध्य रेलवे, हाजीपुर–844101
3.	East Coast Railway, Chandra Shekharpur, Bhubaneshwar-751017	पूर्व तटीय रेलवे, चन्द्रशेखरपुर, भुबनेश्वर–751 017
4.	Eastern Railway, Fairlie Place, Kolkata -700 001.	पूर्व रेलवे, फेयर्ली प्लेस, कोलकाता–700 001
5.	North Central Railway, Block-A, Subedarganj, Allahabad- 211 033	उत्तर मध्य रेलवे, ब्लाक– ए, सुबेदारगंज इलाहाबाद – 211 033
6.	Northern Railway, Baroda House, New Delhi-110001	उत्तर रेलवे, बड़ोदा हाउस, नयी दिल्ली – 110001
7.	North Western Railway, Jaipur- 302 006	उत्तर पश्चिम रेलवे जयपुर– 302006
8.	North Eastern Railway, Gorakhpur-273001	उत्तर पूर्व रेलवे गोरखपुर– 273001
9.	North East Frontier Railway, Maligaon, Guwahati-781011	उत्तर पूर्व फ्रेन्टीयर रेलवे मालीगॉव गुवाहाटी–781011
10.	South Central Railway, Secunderabad -500371	दक्षिण मध्य रेलवे, रेल निलायम, सिकंदराबाद–500 371
11.	South East Central Railway, Bilaspur - 495004	दक्षिण पूर्व मध्य रेलवे, बिलासपुर – 495 004
12.	South Eastern Railway, Garden reach, Kolkata-700043	दक्षिण पूर्व रेलवे, गार्डेनरीच, कोलकाता–700 043
13.	Southern Railway, Park Town, Chennai - 600003	दक्षिण रेलवे, पार्क टाउन, चेन्नई–600003
14.	South Western Railway, Hubli- 580020	दक्षिण पश्चिम रेलवे हुबली–580020
15.	West Central Railway, Jabalpur-482001	पश्चिम मध्य रेलवे, जबलपुर – 482001
16.	Western Railway, Churchgate, Mumbai-400 020	पश्चिम रेलवे, चर्चगेट, मुम्बई– 400 020
17.	Chittaranjan Locomotive Works, Chittaranjan-713331(WB)	चित्तरंजन रेल इंजन कारखाना, चित्तरंजन – 713331
18.	Banaras Locomotive Works, Varanasi -221 004	बनारस रेल इंजन कारखाना, वाराणसी–221004
19.	Patiala Locomotive Works, Patiala (Punjab)-147003	पटियाला रेल इंजन कारख़ाना, पटियाला (पंजाब)–147003

Sub.: Issue of Modification Sheet No. RDSO/2012/EL/MS/0415 (Rev. -1) for Modified Interference between TM assembly components of TM Type 6FRA6068.

Ref: RDSO's letter No. EL/3.2.182 dated 11.12.2024

1. To avoid confusion/ambiguity among user, RDSO has circulated draft Modification sheet RDSO/2012/EL/MS/0415 (Rev.-1) dated 11.12.2024 to ensure adequate interference between TM assembly components of traction motor type 6FRA6068 for comments.

2. Earlier, there are various amendments (Amendment-1, 2, 3 and Amendment No.-3 (rev. 1) of Modification Sheet No. RDSO/2012/EL/MS/0415 (Rev.0) issued by RDSO on dated 03/10/2012, 24/12/2013, 18/05/2017, 19/06/2019 and 02/07/2019) respectively.
3. During the VC held on dated 30.10.2024 for addressing reliability issues chaired by MTRS Railway Board, it was emphasized that all amendments of MS-415 (Rev. 0) to be clubbed together to avoid confusion/ambiguity among the users.
4. A Modification sheet RDSO/2012/EL/MS/0415 (Rev.-1) dated 12.03.2025 is being issued and enclosed here with for necessary information and necessary action please.

SANJAY KUMAR TIWARI

Digitally signed by SANJAY KUMAR TIWARI
Date: 2025.03.12 12:13:32 +05'30'

(Sanjay Kumar Tiwari)
Executive Director/LS

Copy to:

(i)	M/s Bharat Heavy Electrical limited, Piplani, Bhopal- 462 022.
(ii)	CG Power and Industrial Solutions Ltd, Plot No. 29, 30, 31& 32, New Industrial Area No.1 AKVN, District Raisen Industrial Area, Mandideep, Madhya Pradesh 462046.
(iii)	M/s Saini Electrical Engineering Pvt Ltd, E-7, MIDC, Ambernath, Mumbai-421506.
(iv)	M/s Medha Servo Drives Pvt Ltd, 2-3-2/A, behind mint compound, Cherrapalli, Hyderabad-500051
(v)	M/s CRRC Pioneer Electric India Private Limited, Plot Number 177-178, Sector 4, HSIIDC Growth Center Bawal, District, Rewari-123501, Haryana,
(vi)	Govik Industries Private Limited, 720, Tulsiani Chambers, Road 212, Free Press Journal Marg, Nariman Point, Mumbai, Maharashtra 400021
(vii)	M/s Siemens Limited, Birla Aurora, Level 21,Plot No. 1080,Dr. Annie Besant Road, Worli,Mumbai - 400030
(viii)	M/s Bharat Bijlee Limited, 2 MIDC Thane-Belapur Road,Airoli, Navi Mumbai 400 708

भारत सरकार–रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ– 226011
e-mail: dsetm@rdso.railnet.gov.in
Telephone : 0522-2465716

Government of India - Ministry of Railways
Research, Designs & Standards Organization, LUCKNOW – 226011
Fax: 91-0522-2465716

No. EL/3.2.182 **Dated: As signed**

Modification Sheet No. RDSO/2012/EL/MS/0415 (Rev. '1')

Title:-

Modified interference between TM assembly components, in order to ensure adequate interference between assembly components of traction motor Type 6FRA6068.

Purpose:-

Purpose of issuing Rev '1' of Modification Sheet no. 0415 is to clubbed various instructions issued by MS-415 (Rev. 0) followed by Amendment-1,2,3 & 3 (Rev-1) issued on dated 03/10/2012 ,24/12/2013,18/05/2017, 19/06/2019 and 02/07/2019 respectively to avoid confusion/ambiguity among user.

This Modification Sheet No. **RDSO/2012/EL/MS/0415 Rev. '1'** supersedes the earlier issued Modification sheet no. RDSO/2012/EL/MS/0415 (Rev. `0') and its subsequent Amendment No.-1, 2, 3 and Amendment No.-3 (Rev. 1) issued on dated 03.10.2012, 24.12.2013, 18/05/2017, 19.06.2019 and 02.07.2019 respectively.

1.0 Object:

To obtain adequate interference between associated TM assembly components of traction motor Type 6FRA 6068 by correcting dimension and machining tolerances of vital assembly components in order to have proper fitment of these components to prevent failures of traction motor.

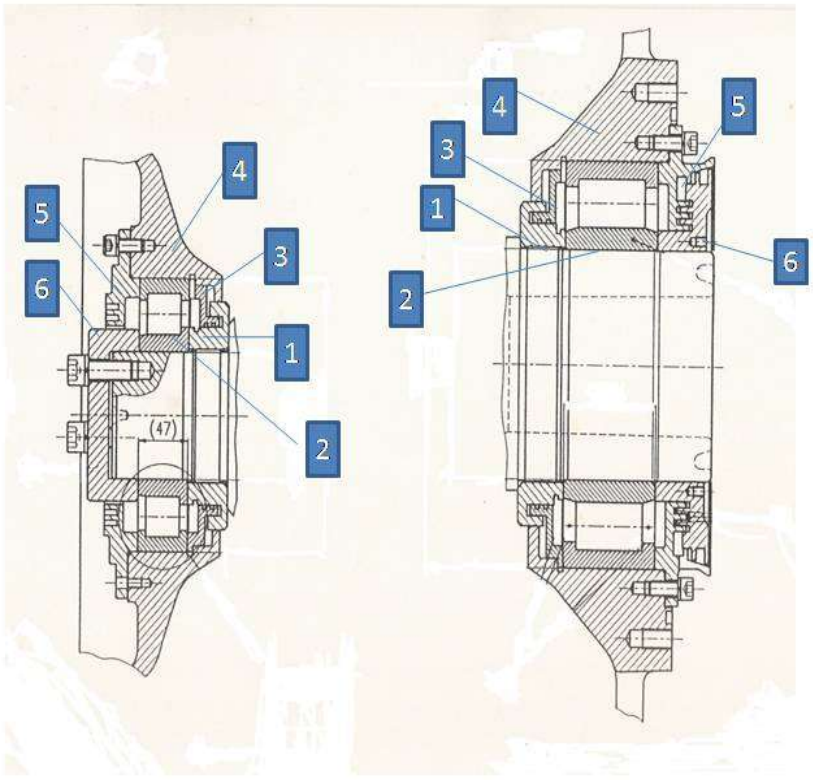
2.0 Existing arrangements:

The failures on traction motors bearings and its assembly components have taken place on traction motor type 6FRA6068 mainly on account of the following defects.

i. Looseness of Inner bearing labyrinth (stopper) (NDE) inside NDE End frame (bearing bracket)
ii. Looseness of NDE bearing inside NDE End frame (bearing bracket)
iii. Looseness of Inner bearing labyrinth (stopper) (DE) inside DE End frame (bearing bracket)
iv. Looseness of DE bearing inside DE End frame (bearing bracket)

RDSO carried out the in depth analysis of these problems. A detailed study on concentricity & parallelism of stators, appropriate fits and tolerances for end/bearing components of TM type 6FRA6068 has been carried out. Manufacturers of bearings, traction motors complete and vital components were also involved in this study. A

sketch of the traction motor with bearing arrangement has been given below for better appreciation:



SN	Part name (DE)
1	Inner Labyrinth on the shaft
2	Bearing
3	Inner Labyrinth in End Frame
4	End Frame
5	Outer Labyrinth
6	Outer bearing cap

SN	Part name (NDE)
1	Inner Labyrinth on the shaft
2	Bearing
3	Inner Labyrinth in End Frame
4	End Frame
5	Outer bearing Cap
6	Clamp plate

Fig.1 : Bearing Assembly

Dimensions and tolerances given as per BT's TOT Documents/CLW's Drawings have been studied in detail. The combination of the dimensions for four extreme possibilities have been calculated. Following **Table A** give the type of fits available in two mating components in extreme conditions:

Table A : Existing Dimensions (DE side)

Table A1:Shaft Diameter (1TWD.096.009 Alt 0) and Inner Labyrinth DE (4TWD.096.043 Alt.4)

ID of Inner Labyrinth		Shaft Diameter		Interference / Clearance; all negative values are interferences and positive are clearances			
A =Min.	B =Max.	C = Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
184.000	184.046	184.050	184.079	-0.050	-0.079	-0.004	-0.033

Table A2:Shaft Diameter (1TWD.096.009 Alt 0) and Inner Racer of Bearings DE (NU2236 SKF & FAG make) : <u>NO CHANGE is required</u>

ID of Inner Racer		Shaft Diameter		Interference / Clearance; all negative values are interferences and positive are clearances			
A =Min.	B =Max.	C = Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D

179.975	180.000	180.043	180.068	-0.068	-0.093	-0.043	-0.068

Table A3:DE Inner Labyrinth DE(4TWD.096.028 Alt.3) and End Frame DE (1TWD.096.005 Alt.6)

Inner Diameter of End Frame for Inner Labyrinth		Outer Diameter of Inner Labyrinth		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B =Max.	C = Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
305.000	305.052	305.004	305.036	-0.004	-0.036	0.048	0.016

Table A4: Outer Racer of DE Bearing (NU2236,SKF & FAG make) and End Frame DE (1TWD.096.005 Alt.6)

ID of Bearing Housing in End Frame		OD of Outer Race		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B =Max.	C = Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
319.943	320.000	319.960	320.000	-0.017	-0.057	0.040	0.000

Table A5: Shaft Diameter (1TWD.096.009 Alt 0) and Outer Labyrinth DE (4TWD.096.029 Alt. 5): <u>NO CHANGE is required</u>

ID of Outer Labyrinth		Shaft Diameter		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B =Max.	C = Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
179.748	179.783	179.843	179.868	-0.095	-0.120	-0.060	-0.085

Table A6: Shaft Diameter (1TWD.096.009 Alt 0) and Inner Labyrinth NDE (4TWD.096.042 Alt.4)

ID of Inner Labyrinth		Shaft Diameter		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B =Max.	C = Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
105.000	105.035	105.037	105.059	-0.037	-0.059	-0.002	-0.024

Table A7: Shaft Diameter (1TWD.096.009 Alt 0) and Inner Racer of Bearings NDE NJ320 SKF make) : <u>NO CHANGE is required</u>

ID of Inner Racer		Shaft Diameter		Interference / Clearance; all negative values are interferences and positive are clearances			
A =Min.	B =Max.	C = Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
99.985	100.000	100.023	100.045	-0.038	-0.060	-0.023	-0.045

Table A8: Shaft Diameter (1TWD.096.009 Alt 0) and Inner Racer of Bearings (NJ320 FAG make : <u>NO CHANGE is required</u>

ID of Inner Racer		Shaft Diameter		Interference / Clearance; all negative values are interferences and positive are clearances			
A =Min.	B =Max.	C = Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
99.980	100.000	100.023	100.045	-0.043	-0.065	-0.023	-0.045

Table A9: Inner Labyrinth NDE(4TWD.096.031 Alt. 3) and End Frame NDE (0TWD.096.003 Alt.8)

Inner Diameter of End Frame for Inner Labyrinth		Outer Diameter of Inner Labyrinth		Interference / Clearance; all negative values are interferences and positive are clearances			
A =Min.	B =Max.	C = Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
205.000	205.046	205.004	205.033	-0.004	-0.033	0.042	0.013

Table A10: Outer Racer of NDE Bearing (NJ320, SKF make) and End Frame NDE (0TWD.096.003 Alt.8)

ID of Bearing Housing in End Frame		OD of Outer Racer		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B =Max.	C = Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
214.949	214.978	214.980	215.000	-0.031	-0.051	-0.002	-0.022

Table A11: Outer Racer of NDE Bearing (NJ320 FAG make) and End Frame NDE(0TWD.096.003 Alt.8)

ID of Bearing Housing in End Frame		OD of Outer Racer		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B =Max.	C = Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
214.949	214.978	214.970	215.000	-0.021	-0.051	0.008	-0.022

Table A12: Shaft Diameter (1TWD.096.009 Alt 0) and Clamp Plate NDE (2TWD.096.033 Alt. 5)

ID of Clamp Plate		Shaft Diameter		Interference / Clearance; all negative values are interferences and positive are clearances			
A =Min.	B =Max.	C = Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
100.000	100.035	100.023	100.045	-0.023	-0.045	0.012	-0.010

From the above table, it can be inferred that existing dimensions of components both on DE and NDE sides are such that:-

1. Over the range of machining tolerances, outer racer of bearings and bearing brackets have got fits from clearance to interference, i.e. at certain combinations of dimensions within specified tolerances; there is possibility of rotation of bearing in the end frames due to the clearance.
2. Similarly, because of existing tolerances of inner bearing labyrinth and its seating in end frame allow clearance to interference fits.
3. Inner racers of bearings and shaft also have only interference fits.
4. Similarly, other sets of components, which should be interference fits, there manufacturing tolerances allow clearances.

But in IR applications , at CLW and in sheds , where there is no measurement of interferences of mating surfaces during assembly , if no positive interference to the tune of 10 micron is given , there is possibilities of excessive higher clearances, as explained in the table A with certain combinations of existing dimensions. If this is the case the possibility for the rotation of the outer racer in its housing is remote. However, in the circumstances where clearances areas high as 40 micron as given in Table A, because of vibration in the traction motors, the outer racer may start creeping or doing

a stick-slip rotation. This will cause severe overheating resulting in total evaporation of lubricant and eventual bearing failure.
Same is true for all other mating components.

The inner racers of bearings are usually fitted with an interference fit on their shafts. The extent of this may vary with size, speed, load, vibration, operating temperature etc. It is necessary to ensure that the inner racer does not slip and rotate on the shaft, or even creep around because this may soon develop into rotation. If such rotation occurs sliding friction will generate heat and inner racer temperature will rise, causing it to expand. Slipping may increase and bearing clearance will get reduced. Lubrication of active surfaces will be affected; surface flaws will develop and get worse. This all will lead to bearing failure.

Study reveals that the standards machining tolerances as per fits and dimensions has led to such situation, where we have got interference to clearance fits over the complete range of machining tolerances of two mating components. In traction motor applications, where the dimensions are customized, in order to provide necessary fits, tolerance bands are also required to be customized.

3.0 **Modified arrangement:**

3.1 Maximum interferences have been left untouched as these have been derived by the designer based on various factors. Manufacturing tolerances of bearings can't be revised as these are as per ISO. Customized bearings can be manufactured with added cost. Dimensions of armature shafts are also left untouched in order to avoid machining. Only minimum interferences have been ensured as 10 micron.

3.2 Dimensions of bearings and shaft have also been left untouched.

3.3 Minimum 10 micron of interference fit at room temperature is ideal between end frames and outer racers, considering the possibility of rise in temperature during operation, which will relax the interference. Higher interference at room temperature will get relaxed at operating temperature, which will relax the interference and so the radial clearances of the bearings will remain within specified limits.

3.4 Better interference fits between labyrinths and end frames can be achieved as there is no restrictions imposed on account of bearing operating clearance, as discussed above.

3.5 While keeping the dimensions of bearings and shaft unchanged and leaving maximum interference untouched, a major constraint on achieving interference within ideal limits is accuracy of CNC machines. Closer tolerances can be achieved on more accurate and precision machine tools, of course at higher cost. A tradeoff has been done to revise dimensions of labyrinths and end frames.

3.6 After six months intense deliberations and debates with manufacturers of bearings, mechanical components and OEM of traction motors, followed by extensive literature survey and trying various combinations of dimensions, following modified changes were recommended in **table-B** below:-

Table B : for DE side modified assembly components

Table B1: Shaft Diameter (1TWD.096.009 Alt 1) and Inner Labyrinth DE (4TWD.096.043 Alt.7)

ID of Inner Labyrinth		Shaft Diameter		Interference / Clearance; all negative values are interferences and positive are clearance			
A =Min.	B =Max.	C =Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
184.000	184.040	184.050	184.079	-0.050	-0.079	-0.010	-0.039

Table B2: Shaft Diameter (1TWD.096.009 Alt 1) and Inner Racer of Bearings DE (NU2236, SKF , FAG & NEI make

ID of Inner Racer		Shaft Diameter		Interference / Clearance; all negative values are interferences and positive are clearance			
A =Min.	B =Max.	C =Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
179.975	180.00	180.043	180.068	-0.068	-0.093	-0.043	-0.068

Note:-

Ensure actual pinion is inserted in the shaft before mounting of inner racer (DE). Measure the bore diameter of inner racer (DE) and bearing seat diameter and ensure there shall be interference between 50 -65 micron. This can be done by selecting right match of inner racer for a given shaft. Record these measurements.

Table B3: Inner Labyrinth DE (4TWD.096.028 Alt.6) and End Frame DE (1TWD.096.005 Alt.11)

Inner Dia. of End Frame for Inner Labyrinth		Outer Diameter of Inner Labyrinth		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B =Max.	C = Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
305.025	305.050	305.060	305.080	-0.035	-0.055	-0.010	-0.030

Table B4: Outer Racer of DE Bearing (NU2236, SKF, FAG, NEI make) and End Frame DE (1TWD.096.005 Alt.11)

ID of Bearing Housing in End Frame		OD of Outer Racer		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B =Max.	C =Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
319.950	319.990	319.960	320.000	-0.010	-0.050	0.030	-0.010

Note:-

a. Manufacturers shall machine the bore of bearing housing of End Frame for a dimension near 319.970 mm to achieve interference over the complete range of tolerances of OD of outer racer.
b. During fitment, Railway to ensure positive interference between outer racer of DE bearing and End Frame DE.
c. Clearance should not be there between outer racer of DE bearing and End Frame DE. Sheds/PUs/TM manufacturers to ensure during fitment.
d. Measure the outer diameter of the outer racer of the bearing (DE). Measure the bore diameter of bearing end frame (DE). Interference in the range of 10 -25 micron shall be ensured. This can be achieved by ensuring appropriate combination of bearing and bearing end frame. Record the measurements**.**

Table B5: Shaft Diameter (1TWD.096.009 Alt 1) and Outer Labyrinth DE (4TWD.096.029 Alt. 8)

ID of Outer Labyrinth		Shaft Diameter		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B =Max.	C =Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
179.748	179.783	179.843	179.868	-0.095	-0.120	-0.060	-0.085

Matching of Components:-

1) Measure the outer diameter of the outer racer of the bearing (DE). Measure the bore diameter

of bearing end frame (DE). Interference in the range of 10 -25 micron shall be ensured. This can be achieved by ensuring appropriate combination of bearing and bearing end frame. Record the measurements. Record these measurements.

2) Ensure actual pinion is inserted in the shaft before mounting of inner racer (DE). Measure the bore diameter of inner racer (DE) and bearing seat diameter and ensure there shall be interference between 50-65 micron. This can be done by selecting right match of inner racer for a given shaft. Record these measurements.

Table B6: Shaft Diameter (1TWD.096.009 Alt 1) and Inner Labyrinth NDE (4TWD.096.042 Alt.7)

ID of Inner Labyrinth		Shaft Diameter		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B = Max.	C =Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
105.000	105.025	105.037	105.059	-0.037	-0.059	-0.012	-0.034

Table B7: Shaft Diameter (1TWD.096.009 Alt 1) and Inner Racer of Bearings NDE NJ320, SKF make)

ID of Inner Racer		Shaft Diameter		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B =Max.	C =Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
99.985	100.000	100.023	100.045	-0.038	-0.060	-0.023	-0.045

Table B8: Shaft Diameter (1TWD.096.009 Alt 1) and Inner Racer of Bearings (NJ320, FAG & NEI make)

ID of Inner Racer		Shaft Diameter		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B =Max.	C =Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
99.980	100.000	100.023	100.045	-0.043	-0.065	-0.023	-0.045

Note:- (B7&B8)

Measure the bore diameter of inner racer (NDE) and bearing seat diameter and ensure there shall be interference between 35-60 micron. This can be done by selecting right match of inner racer for a given shaft. Record these measurements.

Table B9: Inner Labyrinth NDE(4TWD.096.031 Alt. 6) and End Frame NDE (0TWD.096.003 Alt.13)

Inner Diameter of End Frame for Inner Labyrinth		Outer Diameter of Inner Labyrinth		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B =Max.	C =Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
205.010	205.040	205.050	205.070	-0.040	-0.060	-0.010	-0.030

Table B10: Outer Race of NDE Bearing (NJ320, SKF make) and End Frame NDE (0TWD.096.003 Alt.13)

ID of Bearing Housing in End Frame		OD of Outer Racer		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B =Max.	C =Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
214.948	214.970	214.980	215.000	-0.032	-0.052	-0.010	-0.030

Table B11: Outer Race of NDE Bearing (NJ320, FAG & NEI make) and End Frame NDE (0TWD.096.003 Alt.13)

ID of Bearing Housing in End Frame		OD of Outer Race		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B =Max.	C =Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
214.948	214.970	214.970	215.000	-0.022	-0.052	0.00	-0.030

Note:-

a. Manufacturers shall machine the bore of bearing housing of End Frame for a dimension near 214.960 mm to achieve interference over the complete range of tolerance of OD of outer racer.
b. During fitment, Railway to ensure positive interference between outer racer of NDE bearing and End Frame NDE.
c. Clearance should not be there between outer racer of NDE bearing and End Frame NDE. Sheds/PUs/TM manufacturers to ensure during fitment.
d. Measure the outer diameter of the outer racer of the bearing (NDE). Measure the bore diameter of bearing end frame (NDE). Interference in the range of 10 -25 micron shall be ensured. This can be achieved by ensuring appropriate combination of bearing and bearing end frame. Record these measurement.

Table B12: Shaft Diameter (1TWD.096.009 Alt 1) and Clamp Plate NDE (2TWD.096.033 Alt. 9)

ID of Clamp Plate		Shaft Diameter		Interference / Clearance; all negative values are interferences and positive are clearances.			
A =Min.	B =Max.	C =Min.	D= Max.	E=A-C	F=A-D	G=B-C	H=B-D
100.000	100.013	100.023	100.045	-0.023	-0.045	-0.010	-0.032

Matching of Components:

1. Measure the outer diameter of the outer racer of the bearing (NDE). Measure the bore diameter of bearing end frame (NDE). Interference in the range of 10 -25 micron shall be ensured. This can be achieved by ensuring appropriate combination of bearing and bearing end frame. Record these measurement.
2. Measure the bore diameter of inner racer (NDE) and bearing seat diameter and ensure there shall be interference between 35-60 micron. This can be done by selecting right match of inner racer for a given shaft. Record these measurements.

4.0 Application to class of locomotives:
All three phase locomotive equipped with Traction Motors type 6FRA6068.

5.0 Periodicity of implementation:
During the assembly of new Traction motors / Overhauling /Repair

6.0 Agency of Implementation:
Traction Motor Manufacturers, PUs, POH Workshops & Electric Loco sheds.

7.0 Reference RDSO Modification sheet no. RDSO/2012/EL/MS/0415 (Rev. `0') and its subsequent Amendment No.-1, 2, 3 and Amendment No.-3 (Rev. 1) issued on dated 03.10.2012, 24.12.2013, 18/05/2017, 19.06.2019 and 02.07.2019 respectively.

8.0 Distribution:
As per standards mailing list.

SANJAY KUMAR TIWARI

(Sanjay Kumar Tiwari)
for Director General/Electrical

Digitally signed by SANJAY KUMAR TIWARI
Date: 2025.03.12 12:07:17 +05'30'