REVISION OF SPECIFICATION / STR

Item Name: Grease for Cartridge Taper Roller Bearings of freight stock
Specification No. WD-24-Misc-2003(Rev.1)

1. RDSO is reviewing the specification/STR to cater to the latest technological developments in the field, modify clauses not relevant in the present context and making them more enabling with focus on functional requirements.

2. It is requested that your comments / suggestions with regard to improvements /modifications in specification / STR of the above mentioned item may be submitted in the following format along with the justification for the changes required.

Part A: Basic Information

SN	Particulars	Information
1.	Name	
2.	Designation	
3.	Professional Qualification	
4.	Organization / Firm's Name	
5.	Address for Correspondence	
6.	Contact No.	
7.	Email ID	
8.	Whether firm is registered with RDSO for the subject item. If yes, details like date of registration, current status etc If no, firm's experience in manufacturing of subject item or similar item	
8.	Whether any technical document/Report/Study to support suggested changes is available / enclosed for better appreciation	

Part B: Comments / suggestions on the specification

SN	Clause No. of RDSO STR/ Spec	Clause, as it exists in RDSO STR/ Spec	Clause , as it should read after incorporation of comments /suggestions in the RDSO Spec / STR	Justification for changes

Comments may be sent to following address within one month from the date of publication on rdso.indianrailways.gov.in

Director/Wagon
Research Designs and Standards Organization
Manak Nagar, Lucknow – 226011

Email: dswcdrdso@rdso.railnet.gov.in

SPECIFICATION N0. WD-24-MISC-2003 (Rev.1)
(Supercedes WD-24-MISC-2003)

INDIAN RAILWAY'S
SCHEDULE OF TECHNICAL REQUIREMENTS
NO.WD-24-MISC-2003 (Rev.1)

(Amendment No. 1 of October 2016)

FOR

GREASE FOR CARTRIDGE TAPER ROLLER BEARINGS OF FREIGHT STOCK.

ISSUED BY:-

RESEARCH DESIGNS & STANDARDS ORGANISATION
MINISTRY OF RAILWAYS
MANAK NAGAR, LUCKNOW-226011

November, 2006

PRICE Rs: 1600/-

Amendment No. 1 of October 2016 to Schedule of Technical Requirements No. WD-24-MISC-2003(Rev.1) for Grease for Cartridge Taper Roller Bearings of freight stock.

Add following clause as clause 16 (after clause 15):

16. Vendor-Changes in approved status

All the provisions contained in RDSO's ISO procedures laid down in Document No. QO-D-7.1-11 dated 19.07.2016 (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.

CONTENTS

APPENDIX

SPECIFICATION FOR GREASE OF CARTRIDGE TAPER ROLLER BEARINGS FOR FREIGHT STOCK APPLICATION.

1. SCOPE

1.1 This specification covers the requirements of grease for lubricating Cartridge Taper Roller Bearings for freight stock, which requires no lubrication in the field.

1.2 The grease shall be formulated for a minimum life of 8 lac km.

2. Eligibility Criteria

2.1 Any grease proposed for use on Cartridge Taper roller bearings of Freight stock ***shall be***

AAR approved in accordance with M-942-2004 of AAR MSRP Section H (the tenderer will have to produce the current valid certificate of approval of the brand of grease offered)

Or

Approved by RDSO, in accordance with this specification (Applications for approval shall be handled in accordance with Appendix-A)

3. PROPERTIES AND TESTS

3.1 THICKENERS, OILS AND INHIBITORS

The grease shall be a smooth well manufactured product by thickening refined virgin mineral petroleum oil or synthetic fluid of uniform quality, composed of high quality metallic soaps or non-soap substances having suitable anti oxidant and rust inhibitors and such other additives as are necessary for desired performance.

3.2 FILLERS AND OTHER FOREIGN MATTER

The grease shall be free from corrosive and abrasive matter. The use of viscosity index improver, bentonites or other clay material, filler shall be prohibited.

3.3 CONSISTENCY

The finished grease shall be homogenous and free from lumps.

4. MINERAL OIL

Grease shall be manufactured from petroleum virgin base oil only and re-refined/regenerated oil shall not be used.

Petroleum oil shall conform to the following properties:

	Items	Requirements	Analysis Method
3.1	Flash Point (Cleavel and Open cup)	171° C Min. (Desirable above 200°C)	ASTM- D-92 IS:1448 P:69
3.2	Viscosity Index	90 (Min.)	IS:1448:P-56/ ASTM-D-22-70
3.3	Base oil viscosity @ 100° *C*	14 cst *(Min).*	ASTM D-445

5. OXIDATION INHIBITOR

The inhibitor shall be of such material that the grease will satisfactorily lubricate journal roller bearings operating under no lubrication in the field conditions without evidence of undesirable oxidation or deterioration.

6. RUST INHIBITORS

The rust inhibitors shall be such materials as to prevent rusting of the bearings in service due to moisture, which may accumulate in the bearings from condensation.

7. GREASE

The finished product shall conform to the following requirements on sample taken from well mixed contents of container:

S.No.	Items.	Requirements	Methods /Analysis
7.1	Corrosion resistance (Emcor Rating)	*0.0*	ASTM-D-6138 / IP–220(distilled water)
7.2	Consistency (Penetration at 25° C/77 ° F worked)	± 15 points of vendor's registered/submitted value and within 265-385	ASTM-D-217/ IS:1448:P-60
7.3	Drop Point ° C	170 (Min.)	*IS:1448:P-52/* ASTM - D-2265
7.4	Moisture, Percent, max	0.1	ASTM-D-128 (35 g sample)
7.5	Oxidation Stability		
	Pressure Drop (Kgf/cm²) at100°C in 100 hrs.max.	0.7 (Desirable 0.5)	ASTM-D-942

S.No.	Items.	Requirements	Methods /Analysis
	Pressure Drop (Kgf/cm²) at 100°C in 500 hrs.max.	1.76 (Desirable 1.00)	ASTM-D-942
7.6	Structure Stability		
7.6.1	Elevated Temperature Roll Stability at 82± 1° C- Penetration after test, worked at 25° C	290-340	Appendix-B
7.6.2	Maximum change in consistency at 25° C, worked after 100,000 double strokes in standard grease worker	±15 points of established structural stability value but within the range of clause 7.2	ASTM D-217
7.7	V2F Test (144 hrs):		As per Appendix-F
	(a) Leakage Max..	*150 gms*	
	(b) Penetration worked at 25° C.	*270-340*	
	(c) Participation	*Uniform*	
7.8	760 hrs Rig Test:		As per Appendix-E
	(a) Leakage max.	*300 gms*	
	(b) Penetration after test worked at 25° C	±25 points of established value as per clause 7.2	
	(c) Distribution	*Uniform*	
7.9	Seal compatibility		As per Appendix-B of AAR-M-942-2004
	△ Swell volume	±10% ·	
	△ Hardness	±5 points	
	△ Seal bond strength	Pass	
7.10	Vibration test		As per Appendix – A of AAR -M-942-2004
	△ Consistency	±15 % max	
	State of migration	Pass	
	Distribution – % Grease in seals	48.0 min.	
	Distribution – % Grease in cones	23.0 min	
	Seal compatibility	Pass	
	Wt. % grease loss	±15 % max	
7.11	Low Temperature Torque	Record results	ASTM D-4693
7.12	Field service test	Pass	Generally as per Appendix – D of AAR -M-942-2004

7.13 Grease shall be of Lithium or Lithium Calcium complex base only unless specifically approved by RDSO. The quality assurance plan should not at any stage be changed including soap base without informing and approval by RDSO.

8 SIMULATED SERVICE TEST

8.1 In order to receive approval for use on Indian Railway, grease which otherwise conforms to this specification shall satisfactorily lubricate the roller bearing during an eight week simulated service test at RDSO (See 7.8 above).

8.2 During the eight week accelerated test the grease must maintain stable consistency in the bearing assemblies with not less than 270 units or not more than 340 units at 25° C.

9 COMPATIBILITY TEST

In addition to the requirements of Paragraph 8.1 and 8.2 the test grease shall satisfactorily lubricate and maintain a stable consistency in the bearing assemblies within the penetration ranges shown in Paragraph 8.2 for the grade of grease being tested when mixed 50% test grease with the remaining 50% composed of equal proportions of all other types of approved greases by RDSO for Cartridge Taper Roller Bearing application and of the same consistency range, during an eight week accelerated service test.

10 CHANGES IN PRODUCT

Grease to be supplied under this specification shall be essentially identical with the product submitted for approval tests. The test results of the approved sample of the manufacturer shall be included in the approved Quality Assurance Plan. Evidence of unauthorised changes in composition or methods of manufacture will be sufficient cause for withdrawal of RDSO approval. After RDSO approval, the manufacturer desiring any change at any stage in the product or Approved Quality Assurance Plan, RDSO must be informed about it with justification for each change. These changes will be incorporated only when approved by RDSO.

11 PACKING

The grease shall be packed in leak proof containers, new, sound, non-returnable 1.25 mm thickness steel drums of 180/182 Kgs. capacity. The steel used shall conform to IS: 13997-1994 "Gr. A". The sheets & blanks of drums should be phosphated to Cl. B of IS:3618-1966. The interior of drum shall be totally clean and free from rust before grease filling.

12 MARKING

Each drum shall be marked legibly with the following particulars in addition to the marking laid down in IS: 13997-94:

i) Brand Name of the grease
ii) Specification Number

iii) Order Number
iv) Manufacturer's name
v) Amount of Grease contained
vi) Batch Number
vii) Date of manufacture
viii) Place of manufacture

13 INSPECTION & QUALITY CONTROL TEST FOR BATCH INSPECTION

13.1 The Inspector representing the purchaser shall have free entry, at all times while the work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford to inspector, free of charge, all reasonable facilities and necessary assistance to satisfy him that the material is being furnished in accordance with this specification. Tests and inspection shall be generally performed at the place of manufacture prior to despatch.

13.2 The purchaser may carry out tests to cover the acceptance or rejection of the material in his own laboratory or elsewhere.

13.3 In all cases of supplies of stores meant for Indian Rlys or "Bearing-manufacturer" of Indian Railways, Quality Control Test on each batch of grease to be carried out shall be governed by Appendix-D.

14 QUALITY CONTROL

Quality Control Test shall be carried out at least once a year by RDSO as per the details given in Appendix-C.

15 KEEPING PROPERTIES

The keeping quality of the material shall be such that when stored in original sealed containers under normal conditions, it shall retain the properties given in the specification for not less than 18 months from the date of manufacture. The manufacturer shall have to deliver the materials to the consignee within two months from the date of manufacture.

INSTRUCTIONS REGARDING CERTIFICATION/APPROVAL OF CARTRIDGE TAPER ROLLER BEARING GREASE FOR WAGONS.

The following instructions will govern in the matter of approval of different types of grease for use on Wagon stock on Indian Railways:

1. A manufacturer desiring approval of this grease shall make written application to the Director General (Wagon), RDSO, Lucknow. This application shall be accompanied by a complete laboratory analysis of the grease duly checked according to specification requirement by the applicant (manufacturer). The applicant (manufacturer) shall have to possess full R&D laboratory for new generation development of grease besides regular Quality Control Laboratory.

2. The analysis shall cover the requirements of Paragraphs 4 and 7 of this specification.

3. If the review of the laboratory analysis is satisfactory, the grease will be tested by RDSO in accordance with the requirements of this specification. R.D.S.O. will furnish the applicant information concerning the sample size required (20 Kgs.). The manufacturer will be required to pay the testing charges, which will be intimated by RDSO. The prototype grease shall be manufactured in presence of RDSO official of Wagon Dte. and M&C Dte. Sample to be drawn from that particular batch and sealed by RDSO official. The drawn and sealed sample to be sent to M&C Directorate of RDSO for detailed tests at firm's cost and responsibility.

4. The manufacturer will be furnished a copy of the results by R.D.S.O. after completion of testing.

5. R.D.S.O. will review the test results. If the results are found satisfactory, Field trial of the grease will be done to assess its service performance. The scheme of Field trial will be issued separately by RDSO.

6. On successful completion of Field Trial, the grease will be approved for regular use in CTRBs.

7. Once qualified for use, neither the chemical composition nor the properties of the grease may be changed without specific approval of R.D.S.O.

8. Suppliers of approved greases shall provide a test certificate of their test results to R.D.S.O. for every batch for the following tests:
   - i) Consistency (Penetration)
   - ii) Drop Point
   - iii) Structural stability- Elevated Temperature Roll Stability
   - iv) Structural stability- Maximum change in consistency at 25° C, worked after 100,000 double strokes

STRUCTURE STABILITY- ELEVATED TEMPERATURE ROLL STABILITY TEST

1. SCOPE

This test method covers a determination of the changes in the consistency of lubricating greases when worked in the roll stability tester for an extended time period at an elevated temperature.

This test method is based upon ASTM-D-1831, except that each grease sample is run for 96 hours in a roll stability test machine equipped to operate at a thermostatically controlled temperature of 82±1° C.

2. APPLICABLE DOCUMENTS

2.1 ASTM STANDARDS

D-217 Test for Cone Penetration of Lubricating Grease.

D-1403 Test Method for Cone Penetration of Lubricating Grease Using One-Quarter and One-Half Scale Cone Equipment.

3. SUMMARY OF METHOD

A small sample (50g) of lubricating grease is worked for 96 hours at a temperature of 82± 1°C in the roll stability tester, equipped with a suitable cover, heater, thermostatic temperature control, and temperature indicator. Worked (60 stroke) penetrations are taken on the grease at 25±0.5°C before and after rolling.

4. APPARATUS

4.1 Roller stability tester, as shown in Fig.1 of ASTM-D- 1831, except equipped with a suitable cover, electric heater, thermostatic temperature control) and temperature indicator. Speed of operation to be 165 +15 rpm.

4.2 One half scale cone and shaft with worker as described in ASTM-D-1403.

5. PROCEDURE

5.1 Work a sample of the test grease for 60 strokes and determine the one-half scale worked penetration at 25±0.5°C in accordance with ASTM-D-1403.

5.2 Place 50 gms. of the unworked grease sample in the test cylinder. Distribute the grease uniformly on the inside wall of the cylinder with a spatula. Place a weighted roll in the cylinder and tighten the cap.

5.3 Mount the cylinder in position, start the machine, and set the temperature control for 82º ±1 C. During the test, the temperature indicator should be periodically checked and the temperature control adjusted accordingly, if necessary.

5.4 At the end of the 96 hour roller period remove the test cylinder from the machine and allow to cool to room temperature for 24 hrs. After cooling, transfer a sufficient quantity of grease to the One Half Scale worker and adjust it to a temperature of 25+0.5º C if necessary. Work the sample of test grease for 60 strokes and determine the quarter-scale worked penetration, in accordance with ASTM D-1403.

5.5 Convert the One Half Scale penetration value into full- scale equivalent value, using the conversion formula in ASTM D-1403. Record the full-scale equivalent worked penetration value after rolling.

6. INTERPRETATION OF RESULTS

The final full-scale equivalent penetration values shall fall within the limits of Paragraph 7.6 of this specification.

QUALITY CONTROL

1 The tests and checks given in Clause 2.0 below will be carried out at least once a year at M&C lab of RDSO on journal roller bearing grease brands approved by RDSO. Any other test as given in Clause 7.4 and 7.8 can also be conducted at the discretion of the purchaser.

1.1 20 Kg. sample of each approved brand of greases has to be supplied free of cost to RDSO/Lucknow by the grease manufacturer drawn by inspection authority for complete performance evaluation. The grease sample intended for testing should originate from an industrially manufactured product and not from a laboratory/pilot scale manufactured one. The drawl of such sample may also be performed by RDSO under Quality Assurance Plan of RDSO from supply of Stores to Railways.

2. Tests

2.1 Purpose of Tests: Audit test of RDSO approved journal roller bearing grease.

2.2 Outline of Tests: (See Specification Paragraphs 7.1, 7.2, 7.3, 7.4, 7.5, 7.6 & 7.7).

3. Failure to pass this audit test of samples drawn during inspection or Quality Audit Check from supply shall be the cause for review and withdrawal of production qualification.

APPENDIX-D

QUALITY CONTROL TEST FOR BATCH INSPECTION

1. The test to be performed by the inspecting authority on each manufacturing batch of grease for inspection and clearance shall be as under:-

	Test	Specification Paragraph
a)	Consistency (Penetration)	7.2
b)	Drop point	7.3
c)	Structure stability- Elevated Temperature Roll Stability at 82± 1° C- Penetration after test, worked at 25° C	7.6.1
d)	Structure stability- Maximum change in consistency at 25° C, worked after 100,000 double strokes in standard grease worker	7.6.2

2. The above test can be performed by the inspecting authority either at manufacturer's premises or at RDSO at the discretion of the inspecting authority. Alternatively, results of National Test House can also be considered, at the discretion of the Inspecting Authority.

3. Experience has shown that the grease quality differs from one manufactured batch to another manufactured batch. Therefore, one batch shall comprise of the grease manufactured in one go at a time e.g. if 100 drums are offered for inspection from two manufacturing batches, then the tests detailed in Clause 1.0 above shall be performed on both the manufactured batches.

4. Sampling- Inspecting Authority shall draw samples from each batch as per IS:1447(part-3).Test 'a' & 'b' of clause 1.0 shall be done on each sample and test 'c' & 'd' of clause 1.0 shall be done on composite sample for each batch. Sampling instrument and scale of sampling is given in Appendix-G.

APPENDIX-E

EIGHT WEEK SIMULATED SERVICE TEST FOR QUALIFYING CARTRIDGE TAPER ROLLER BEARING GREASE

1 This procedure for qualifying Cartridge bearing grease is based upon information developed by RDSO on roller bearing grease testing machines, which contain cylindrical roller bearing axle box on one end & spherical roller bearing axle box on other end of the axle. This information has been compared and correlated with data developed from greases run in field service.

2 Preparation of Bearings

The axle boxes shall be disassembled, cleaned in a suitable solvent and all parts of axle boxes and bearings shall be inspected. Where defective or worn parts are observed, they shall be replaced. Lubricate the bearing with 3.2 Kg. of grease. The grease shall be distributed among the various rolling elements and other components of the bearing.

3 Application of the Bearing

Mount each bearing on axle. Apply the end cap, locking plate and axle cap screws. Tight the axle end cap screws. Bend the tabs of the locking plates. Apply axle box cover and tighten it by axle box bolts.

4 Running Procedure

The bearings shall run at a speed of 105 Kmph for approximately eight weeks. This schedule shall be from 9 a.m. on Monday to 5 p.m. on Friday for seven consecutive weeks. On the eighth week, run the bearings from 9 a.m. on Monday morning until 5 p.m. on Tuesday. The accumulated kilometrage during this running period is 79,800 Kms. This kilometrage may vary slightly, depending upon holiday schedules.

Place a pan beneath the front and rear seals of each bearing to catch grease, which may purge from the bearings. Weigh the grease, which may accumulate weekly. If sufficient grease is available, make a quarter-scale penetration measurement (ASTM Method D-1403).

Also, describe the condition of the lubricant, which is purged from each bearing, i.e. grease, oil, separated, homogeneous etc.

5 Final Inspection

At the conclusion of the eight-week running period, remove each bearing and carefully inspect the grease in each bearing and record observations. Disassemble the bearing and remove grease from each bearing for laboratory analysis.

5.1 Bearing temperature shall be continuously recorded during the test. This information, plus data on the quantity of leakage, condition of the leakage, condition of the grease at final inspection, the laboratory analysis of the grease removed from each bearing, shall constitute the basis for determining the performance and acceptability of CTRB grease.

V2 F GREASE RIG TEST

1. Equipment:

The SKF vibrating grease testing V2F rig consists of a railway axle box fitted with a set of two spherical roller bearings. The axle box is mounted on a simple frame, which in turn is mounted on a shock absorber on a support. The vibrations are induced on the test rig by striking the axle box once per second with a hammer allowed to fall on to the top of the box using an eccentric body driven by one H.P. motor. Height of fall of the hammer is so adjusted that a vibration acceleration of 12-15 g is achieved. The axle is rotated by a three H.P. motor at a speed of 500 rpm, corresponding to a speed of 100 Kmph. Temperature shall be continuously recorded for the entire period of test.

2. Preparation of bearing:

The bearing shall be removed from the axle box and cleaned in a suitable solvent. Lubricate the bearing with 1.3 Kg of grease under test. The grease shall be distributed among the various rolling elements and other components of the bearings.

3. Running Procedure:

The bearing shall be run at a speed of 500 rpm for 72 hrs. The speed is changed to 1000 rpm for further 72 hrs. The grease after test (after 144 hrs.) is collected from the bearing. A representative sample of grease is subjected to consistency test at 25°C after 60 Double Strokes.

4. Reporting of results:

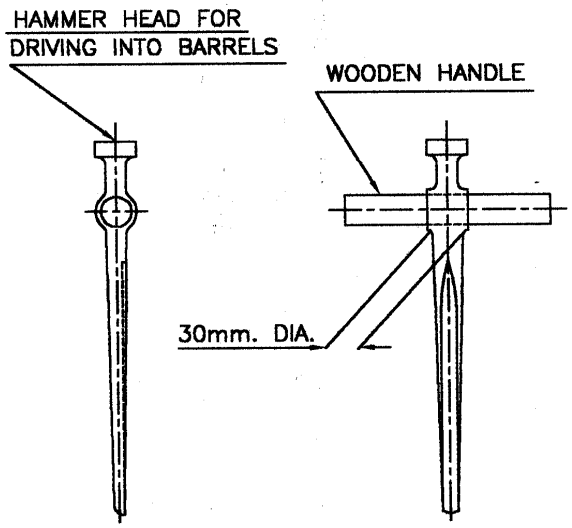
The consistency of the grease after test shall be recorded which shall be in the range of 270-340 unit. The condition of the grease after test shall be checked for

i) Appearance
ii) Homogeneity
iii) Oil separation
iv) Leakage (to be recorded).
v) The condition of rollers and other bearing parts shall be checked for
vi) Corrosion
vii) Oiliness
viii) Participation
ix) Distribution.

APPENDIX-G

APPENDIX– G

APPARATUS FOR SAMPLING:



SAMPLING SCOOP

SCALE OF SAMPLING AS PER BIS: 1447 (PART 3)

NO. OF PACKAGES IN A LOT (I)	NO. OF PACKAGES TO BE SAMPLED (II)
1 TO 3	ALL
4 TO 64	4
65 TO 125	5
126 TO 216	6
217 TO 343	7
344 TO 512	8
513 TO 729	9
730 TO 1000	10
AND SO ON	–

R.K.GAUR / SS