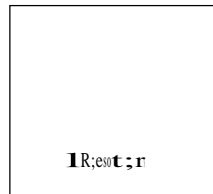


STR No. – M&C/STR/Lub/01/2011/Rev-II



**Government of India
Ministry of Railways**

**SCHEDULE OF TECHNICAL REQUIREMENTS OF MACHINERY AND PLANT
LUBRICANTS USED IN WORKSHOPS OF INDIAN RAILWAYS**

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**Schedule of Technical Requirements of Machinery & Plant Lubricants for
Workshops of Indian Railways**

1. Scope:

- 1.1 The schedule of technical requirements covers the norms for manufacturing facilities and quality control requirements of Machinery & Plant Lubricants for Workshops of Indian Railways.

2. Requirements:

Vendor seeking approval shall comply all the below mentioned requirements.

- 2.1 The firm should have manufacturing, quality control, testing, storage and Bond room facilities in the same campus of the factory. Firm should have covered area with adequate space for storage of raw materials, finished product and packing material. It should be free from dust, dampness, humidity and exposure to sunlight. There should be one bond room with locking arrangement for storage of finished product for purchase inspection.
- 2.2 Earmarked covered area for storage of rejected material should available. The firm's premises should be neat, clean and hygienic.
- 2.3 Application for approval of Machinery & Plant Lubricants shall be restricted to the items of specifications listed in Clause-7.
- 2.4 Approval of the firms may be given for any number of items applied as given in the clause 7 of the STR, if found satisfactory after inspection/testing as per apex documents.
- 2.5 The firm should submit the Brand Names of the applied products.
- 2.6 The firm should have pollution control and fire protection certificate from authorized agency.
- 2.7 The firm should have minimum annual turnover of one (01) crore.

3.0 Manufacturing Facilities

The firm should have following manufacturing facilities

S. No.	Item	Qty. (min.)
1.	Blending tank fitted with jacketed cooler, stirring, heating arrangement with proper temperature measuring device Min. Size 2 MT	1 No.
2.	Pilot plant for manufacturing sample/master batch preparation (Min. Size 20 litres)	1 No.
3.	Storage tank of adequate capacity	4 no.
4.	Automatic barrel filling machine	1 No.
5.	Filtering Machine	1 No.
6.	Barrel sealing Machine	1 No.
7.	Air Compressor	1 No.
8.	Transfer Pump	5 Nos.
9.	Trolley	1 No.
10.	Stock lifter	1 No.

11.	Weighing Balance i) Electronic Weighing Balance Capacity- 5Kg. ii) Heavy Duty Balance capacity- 300Kg.	1No. 1No.
12.	Diesel Generator Set of adequate capacity	1 No.

3.1 The details of manufacturing and quality control facilities shall be submitted as per Annexure to STR format.

4.0 Quality Control Facilities:

The firm should have proper air-conditioned laboratory for testing of raw materials in process, and finished products with following test facilities in house as per relevant specification of the applied products.

S. No.	Test Equipment	Qty. (Min.)	Item Nos. of clause no. 7 for which equipment required
1.	Viscometer bath with temp. controller @ of 40 ⁰ C	1 No.	7.1 to 7.17
2.	Viscometer bath with temp. controller @ of 100 ⁰ C	1 No.	7.1 to 7.7, 7.9 to 7.10 & 7.15
3.	Viscometer tubes	6 Nos.	7.1 to 7.17
4.	Stop watch	2 Nos.	7.1 to 7.17
5.	Flash Point (COC) Apparatus	1 No.	7.1 to 7.13 & 7.15 to 7.17
6.	Flash Point (PMCC) Apparatus	1No.	7.14
7.	Air oven (350±1 ⁰ C)	1 No.	7.1 to 7.17
8.	Air oven (105±1 ⁰ C)	1 No.	7.1 to 7.17
9.	Pour Point Apparatus	1 No.	7.1 to 7.3, 7.5 to 7.12, 7.15 to 7.17
10.	Foaming characteristics Apparatus	1 No.	7.1 to 7.7 & 7.10
11.	Muffle furnace (100 ⁰ C to 1200 ⁰ C)	1 No.	7.1 to 7.17
12.	Rust preventive characteristics Apparatus	1 No.	7.5 to 7.7, 10 & 12
13.	Copper strip corrosion Test Apparatus	1 No.	7.4 to 7.17
14.	Acidity (organic + inorganic) Apparatus	1 No.	7.1 to 7.3, 7.5 to 7.12 & 7.14 to 7.17
15.	Demulsibility Apparatus	1 No.	7.5
16.	Aniline point Apparatus	1 No.	7.6 to 7.7
17.	Saponification value Apparatus	1 No.	7.9, 7.11 to 7.12 & 7.14 to 7.17
18.	ASTM Colour Apparatus	1 No.	7.8, 7.11 to 7.12 & 7.16 to 7.17
19.	Dean and stark Apparatus	1 No.	7.8 & 7.13
20.	Cast iron corrosion test facility	1 No.	7.13
21.	Bactericides test Apparatus	1 No.	7.13
22.	Resistance to oxidation test Apparatus	1 No.	7.15
23.	Thermal stability Apparatus	1 No.	7.13 & 7.14
24.	Water distillation plant	1 No.	7.1 to 7.17
25.	Chemical balance upto accuracy 4 decimal	1 No.	7.1 to 7.17

26.	Physical balance up to accuracy 3 decimal	1 No.	7.1 to 7.17
27.	Heating mantle	2 Nos.	7.1 to 7.17
28.	Conderson Carbon Residue Apparatus	1 No.	7.9
29.	Desiccators (2 Nos.), Crucible (6 Nos.) Heat resistance glass apparatus (beaker, flask, funnel, measuring cylinder, separating funnel, titration arrangement), chemical reagent, solvent, hydrometers and thermometers as per relevant specifications	Adequate quantity	7.1 to 7.17
30.	4-Ball test equipment	1 No.	7.4,7.5. 7.16 & 7.17
31.	Air release value equipment	1 No.	7.5 to 7.7 & 7.10
32.	Shear stability	1 No.	7.1 to 7.3
33.	G.M. Magnetic Quenchometer	1 No.	7.15
34.	Rotating bomb oxidation test Apparatus	1 No.	7.10
35.	Stability and compatibility of finished lubricating oil	1 No.	7.1 to 7.17
36.	Apparent viscosity test equipment	1 No.	7.1 to 7.3
37.	Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES)(ASTM D 4951)(for Determination of Additive Elements in Lubricating Oils like Calcium, Barium, Magnesium, zinc, phosphorus, sodium, Sulphur)	1No.	7.1 to 7.3
38.	Standard Test Method for Detection of Nitrogen in Petroleum and Petroleum Products as per IS:13656 -2019 or latest	1No.	7.1 to 7.3
39.	Cold Cranking Simulator(CCS) for Low temp cranking viscosity @ -15 °C, Cp, max	1No.	7.1 to 7.3
40.	Cannon Mini-rotatory Viscometer (CMRV) for Low temperature Pumping Viscosity @ - 20°C ,Cp, max.	1No.	7.1 to 7.3
41.	High temp. and High shear(HTHS) viscometer for high shear rate viscosity, Cp @150°C ,min.	1No.	7.1 to 7.3
42.	Apparatus for Evaporation Loss @ 250°C by Noak's Method, %wt, max	1No.	7.1 to 7.3
TYPE TEST FACILITIES			
43.	Sequence-III G Engine test	1No.	7.1 to 7.3
44.	MACK T-8Etest	1No.	7.2
45.	MACK T-8E & T-11	1No.	7.3
46.	FZG-Niemann Test equipment	1No.	7.5 & 7.6
47.	Hydrolytic stability test equipment	1No.	7.7
48.	Filterability test equipment	1No.	7.7
49.	NAS Value test Apparatus	1 No.	7.7
50.	Oxidation test (1000 hours) Apparatus	1 No.	7.6 & 7.7
51.	Pump wear test (250 hours) Apparatus	1 No.	7.6 & 7.7

Note: 1. The type test facilities where not available with the firm, the firm shall agree to get those tests conducted at Indian Institute of Petroleum, Dehradun/NABL accredited laboratories/ NABL accredited Government laboratories at their own cost on sample drawn and forwarded by RDSO officials.

2. Necessary other testing facility which is not covered above is required to be tested by firm from NABL accredited laboratories to meet the relevant specification.

5.0 Quality Control Requirements:

- 5.1** There should be a system to ensure the traceability of products from raw material to finished product stage.
- 5.2** Ensure that the system of '*first in first out (FIFO)*' is followed for raw material and intermediate stage products.
- 5.3** There should be qualified technical personnel having adequate experience in the relevant field to look after the production, quality check and testing activities of Machinery & Plant Lubricants. He should be able to take corrective step in case of difficulties in maintaining quality. He should also take step to comply with QAP. The R&D/ Quality Control staff shall be able to provide technical services to the Railway Workshop as and when required.

5.4. Procurement of Raw materials and packing materials only from the following approved sources (Given list of vendors):

5.4.1 Base Oils

- i) IOCL
- ii) HPCL
- iii) BPCL
- iv) Chennai Petroleum Corporation Limited
- v) Firms having their own refineries.

5.4.2 Additives

- i) M/s Lubrizol India Ltd.
- ii) M/s Indian Additives Ltd.
- iii) M/s Bayer India Ltd.
- iv) M/s Afton Chemical India Pvt Ltd.

5.4.3 Packing Materials

- (i) M/s Balmer Lawrie &Co. Ltd

5.5 Master Blend Document for each product for which approval is sought should

- indicate complete details of one master blends of each product along with percentage composition of different raw materials used and details of additives package with name of manufacturers and brand name & bound to use the same additive and additive package for regular supplies.
- 5.6 Ensure that all the relevant latest specifications of IS Standards, ASTM and others are available with the firm in original.
 - 5.7 Firm should have R&D facilities where approved by Department of Science & Technology or other Government University copy of valid certificate should be available otherwise the firm should tie up with Govt. R&D Laboratory.
 - 5.8 Firm should give an undertaking in respect of formula used for preparation of samples for approval shall not be changed during supplies.
 - 5.9 Firm should give an undertaking that the R&D and Quality control staff should provide Technical services to Railway as and when required.
 - 5.10 Inspection and testing plan with characters to be tested and frequency should be indicated. Testing as per relevant IS/RDSO specifications of M&P Lubricants (enclose all necessary ISO document/formats). The firm should disclose the internal acceptance limits of various test to meet the relevant specification and process capability of the product manufacturing to maintain consistent quality of the products.
 - 5.11 Guidelines for preparing Quality Assurance Plan (QAP) during registration should be as per QM-RF-8.1.3 for the product detailing various aspects. The prepared QAP should be submitted in duplicate at the time of registration for approval by RDSO.
 - 5.12 Firm should submit latest ISO: 9001 certificate for the applied item(s), latest electricity bills and factory license.
 - 5.13 The firm should mention clearly laid down procedure for identification of accepted or rejected material and also for disposal of rejected material at every stage from raw material to finished products.
 - 5.14 Firm should take corrective and preventive action after rejection of material.
 - 5.15 Firm should submit internal test certificate of the applied item(s).

6.0 **UPGRADATION OF VENDORS FROM THE LIST OF DEVELOPMENTAL ORDER TO THE LIST OF APPROVED VENDOR**

For upgradation of the vendor from the list of developmental order to the list of Approved vendors, the vendor must have successfully manufactured and supplied minimum Quantity of products, for each of the approved brands as per list given below.

S.No.	Specification No.	Product & VG Grades	Quantity (KL)
1.	IS : 13656	Engine Oil EPL-7(API-SN)20W/40	50
2.	IS : 13656	Engine Oil EDL-8(API-CI4)SAE-40	20
3.	IS : 13656	Engine Oil EDL-9(API-CI4PLUS) SAE-40	20
4.	IS : 1118	Gear Lubricant SAE 90,140	2.0
5.	IS : 8406	Gear Lubricant VG-68, 220	2.0
6.	IS : 10522	Hydraulic Oil VG-32, 46, 68, 150,	160
7.	IS : 11656	Antiwear Hydraulic Oil VG-32, 68	30
8.	IS : 493 Pt.II	Spindle Oil VG-10	1.0
9.	IS : 493 Pt.I	Machinery Oil VG-32, 46, 68, 100, 150, 220, 320	470
10.	IS : 1589	Cylinder Oil VG-680 Type1	1.0
11.	IS : 1115	Oil Cutting Soluble	30
12.	IS : 3065	Neat Cutting Oil Type 2 Gr.III	8.0
13.	IS : 2664	Quenching Oil Mineral (Medium), Compound & Additive Type)	30
14.	IS : 1012	Turbine Oil VG-32, 46,NON ISO-VG	15
15.	IS : 4578	Refrigeration Machinery Oil VG-68	2.0
16.	RDSO Specn. M&C/Lub/101/01	Pneumatic Oil VG-100, 220	2.0
17.	RDSO Specn M&C/Lub/102/01	Tool Way Oil VG-32, 68, 220	2.0

7.0 List of M&P Lubricants with respective specification:

- 7.1 **Internal Combustion Engine Crankcase Oils to IS:13656-2019**,Type EPL-7(API-SN) Automotive Petrol Engine Gr.20W/40
- 7.2 **Internal Combustion Engine Crankcase Oils to IS:13656-2019**,Type EDL-8 (API-CI4), with MAK T-10/12 test, Diesel Engines Gr.SAE-40
- 7.3 **Internal Combustion Engine Crankcase Oils for Diesel Engines of Rajadhani/ Shatabdi Power Cars-PL No.80.01.0246 to IS:13656-2019**,TypeEDL-9 (API-CI4 PLUS)
- 7.4 Gear Lubricants, Multipurpose (Extreme Pressure gear oil) to IS: 1118-2019(API-GL-4) with 4-ball test only Grades SAE-90 &SAE-140
- 7.5 **Gear Lubricants to IS: 8406-1993/Reaffirmed – 2016**(EP Type with Demulsibility, 4 Ball Test, and min. pass load of 12th stage in FZG Niemann Test) Gr. VG-68. VG-220
- 7.6 **Oil Hydraulic to IS:10522-1983/Reaffirmed-2019**(Antiwear)with Aniline Point 90°C Min. in place of Seal Compatibility test and a min.pass limit of 9thstage in FZG Niemann Test. Gr. VG-32, VG-46, VG-68, VG-150
- 7.7 O
- 7.8 **Oil for Refrigeration Machinery to IS: 4578-1997/ Reaffirmed –2019**, Gr. VG-68
- 7.9 **Oil Cylinder, pure mineral to IS: 1589-1994/ Reaffirmed –2016**, Gr.VG-680 Type-1
- 7.10 **Turbine Oil to IS: 1012-2002/ Reaffirmed – 2018**with a min. value of 400 mts. in Rotating Bomb Oxidation Test ASTM D-2272Gr. VG-32, VG-46, Non-ISO-VG, Non ISO VG Viscosity of this grade is 76 CST ± 10% at 40^o C. All other properties shall be as per VG-68 grade.
- 7.11 **Oil Spindle to I.S:493 (Pt.II)-2019**, VG-10
- 7.12 **General Purpose Machinery Oil to IS: 493(Pt.I)-2019**,Gr. VG-32, VG-46, VG-68, VG-100, VG-150, VG-220, VG-320, (All the grades should have Rust preventive characteristics as per P: 96 Method A of IS: 1448)
- 7.13 **Cutting Oil, Soluble to IS: 1115-1986/Reaffirmed-2018**, with Bactericides Test
- 7.14 **Cutting Oil, Neat to IS: 3065-1985/Reaffirmed-2018**,Type-2-Gr.III
- 7.15 **Quenching Oil to IS: 2664-1980/Reaffirmed-2019** for Quenching Operation of Metals
 - (i) **Mineral Type** (Medium) (for normal quenching operation) with G.M. Magnetic Quenchometer Value of 28 Secs. Max., Viscosity Index 95 min., and Flash Point COC, 200°CMin.
 - (ii) **Compound Type** (for accelerated quenching operation) with G.M.Magnetic Quenchometer Value of 25 Secs. Max
 - (iii) **Additive Type** (for accelerated quenching of H.S. Tools etc.) with G.M. Magnetic Quenchometer Value of 21 Secs. Max
- 7.16 **Pneumatic Tool Oil to RDSO Specn. No. M&C/Lub/101/-2001/Reaffirmed– 2020**, Gr. VG-100,VG-220
- 7.17 **Machine Tool Way Oil to RDSO Specn. No. M&C/Lub/102/-2001/Reaffirmed –2020** Gr. VG –32, VG –68, VG –220