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Government of India
Ministry of Railways

SCHEDULE OF TECHNICAL REQUIREMENTS OF MACHINERY AND PLANT LUBRICANTS

USED IN WORKSHOPS OF INDIAN RAILWAYS

RESEARCH DESIGNS & STANDARDS ORGANISATION
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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 for Machinery & Plant Lubricants shall be restricted to the items given in Clause –7.

2.4 Approval of the firms will be given only when their products to minimum five specifications listed in Clause 7 are found satisfactory after inspection/testing.

2.5 The firm should submit the Brand Names of the applied products.

2.6 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- 5 Kg. ii) Heavy Duty Balance capacity- 300 Kg.	 1 No. 1 No.
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.)
1.	Viscometer bath with temp. controller @ of 40^0C & 100^0C	2 Nos.
2.	Viscometer tubes	6 Nos.
3.	Stop watch	2 Nos.
4.	Flash Point (COC)/PMCC	1 No./1No.
5.	Air oven (350±1^0C)	1 No.
6.	Air oven (105±1^0C)	1 No.
7.	Pour Point	1 No.
8.	Foaming characteristics	1 No.
9.	Muffle furnace (100^0C to 1200^0C)	1 No.
10.	Rust preventive characteristics	1 No.
11.	Copper strip corrosion	1 No.
12.	Acidity (organic + inorganic)	1 No.
13.	Demulsibility	1 No.
14.	Aniline point	1 No.
15.	Saponification value	1 No.
16.	Colour comparator	1 No.
17,	Dean and stark apparatus	1 No.
18.	Cast iron corrosion	1 No.
19.	Bactericides test	1 No.
20.	Resistance to oxidation test	1 No.
21.	Thermal stability	1 No.
22.	Emulsion characteristics	1 No.
23	Floc point	1 No.
24.	Water distillation plant	1 No.
25.	Chemical balance upto accuracy 4 decimal	1 No.
26.	Physical balance upto accuracy 3 decimal	1 No.
27.	Heating mental	2 Nos.
28	Condarson Carbon Residue	1 No.
29.	Desicators	2 Nos.
30.	Crucible	6 Nos.
31.	Heat resistance glass apparatus (beaker, flask, funnel, measuring cylinder, separating funnel, titration arrangement),	Adequate quantity

	chemical reagent, solvent and thermometers as per relevant specifications	
32.	4-Ball test equipment	1 No.
33.	Air release value equipment	1 No.
34.	Shear stability	1 No.
35.	Quench meter	1 No.
36.	Rotating bomb oxidation test	1 No.
37.	Petter W1 or CTRL -38 & sequence II D Engine test	1 No.
38.	MAK T-7 test	1 No.
39.	Stability and compatibility of finished lubricating test	1 No.
40.	Border line pumping temp. test	1 No.
41.	Apparent viscosity test equipment	1 No.
42.	Channel point apparatus	1 No.
43.	FZG-Niemann Test equipment (Type test)	1 No.
44.	Hydrolytic stability test (type test)	1 No.
45.	Filterability test (Type test)	1 No.

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 at their own cost on sample drawn and forwarded by RDSO officials.

2. Necessary other testing facility which is not cover above is required to be arranged 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' 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 (Give list of vendors):

5.4.1 Base Oils

i) I.O.C
ii) H.P.C

iii) B.P.C
iv) Madras Refineries
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.

5.4.3 Packing Materials

M/s Balmer Lawrie & Co.Ltd.

5.5 Master Blend Document for each product for which approval is sought. should indicate complete details of at least two alternative 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 specification IS Standards, ASTM and other are available with the firm in original.

5.7 Firm should have R&D facilities, if approved by Deptt. Of Science & Technology or other Govt. University copy of valid certificate should 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 in case there are more than two complaints from railways about quality of supplies the firm's name will be deleted from the list of approved suppliers.

5.10 Firm should give an undertaking that the R&D and Quality control staff should provide Technical services to railway as and when required.

5.11 Inspection and testing plan with characters to be tested and frequency should be indicated. Testing as per relevant IS/RDSO specification 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.

5.12 Quality Assurance Plan (QAP) for the product detailing various aspects like the QAP shall be available and submitted (in duplicate) along with vendor approval application form for approval by RDSO.

GUIDE LINES FOR QUALITY ASSURANCE PLAN FOR REGISTRATION

The QAP to be submitted by vendor in duplicate shall cover the following details

1.	Firm's Name
2.	Firm's address (i) Head Office (ii) Works/Factory (iii) PHONE/FAX
3.	Details of the applied items with brand name and specification
4	Organisation Chart showing Key personnel (Name, Designation, Qualification, Experience, responsibilities)
5.	Q.A. Organisation Chart (Name, Designation, Qualification, Experience, responsibilities)
6.	Quality Policy
7.	Valid ISO-9001-2000 Certificate for applied item
8.	Brief Description of manufacturing of applied items.
9.	Process Flow Chart /Description of Manufacturing Process It shall have various stages of manufacturing of Finished Product.
10.	Criteria for selection of vendor
11.	List of Sub vendor & items supplied by them
12.	Master recipe approval documents for M&P Lubricants manufacture
13.	Format of Inspection Plan of Raw Material, In process, Finished product, packing material

Format of Sr.9

S. No.	Item	Sample Size	Frequency	Parameters for Inspection	Specifica-tion	Acceptance Test Criteria/Value	Traceability

14.	Laid Down Procedure regarding identification of accepted/rejected material
15.	Laid down procedure regarding disposal of rejected Material at every stages from raw materials to Finished Product.
16.	Corrective & Preventive Action after rejection of material.
17.	Storage Plan for raw material & Finished Product
18.	Bond House for Storage of Finished Product
19.	Internal Test Certificate of the applied products.
20.	List of relevant IRS/IS/AWS/RDSO etc. available
21.	Laid Down Procedure for Handling customer complaint
22.	Details of additives/additive package with manufactured name and address for i) IS:10522 ii) IS:11656 iii) IS:8406 iv) IS:1012
23.	Detailed Policy of calibration of equipment/gauges & records of the same.

24.	In House Testing facilities available for calibration with the firm				
S. No.	Name of Master	Make	Range	Frequency of calibration	Traceability to National Standard
25.	Personnel Trained for In-House Calibration				
S. No.	Name	Qualification	Experience		
26.	Calibration Plan of the items identified for specified calibration in STR/Specification.				
S. No.	Measuring Equipments	Ref.Para of STR/Specn.	Range/ Accuracy	Frequency	In-House/ Out Source	Name of Agency
27.	Calibration Plan for other measuring equipment					
S. No.	Measuring Equipments		Range/ Accuracy	Frequncy	In-House/ Out Source	Name of Agency
28.	Process Capability Calculation					
29.	Signature of quality Control In-charge on each Page No. of QAP (X of Y)					

6.0 **UPGRADATION OF VENDORS FROM PART II TO PART I**

For up gradation of the vendor from Pt.II to Pt.I, the vendor must have Successfully manufactured and supplied minimum Quantity of products, for each of the approved brands as per list given below.

Minimum Quantity of Supply Required

S.No.	Specn.No.	Product & VG Grades	Quantity (KL)
1.	IS : 13656	Engine Oil EPL 2 20W/40	50
2.	IS : 13656	Engine Oil EDL 2 SAE-40	20
3.	IS : 1118	Gear Lubricant SAE 90,140	2.0
4.	IS : 8406	Gear Lubricant VG-68, 220	2.0
5.	IS : 10522	Hydraulic Oil VG-32, 46, 68, 150,	160
6.	IS : 11656	Antiwear Hydraulic Oil VG-32, 68	30
7.	IS : 493 Pt.II	Spindle Oil VG-10	1.0
8.	IS : 493 Pt.I	Machinery Oil VG-32, 46, 68, 100, 150, 22O, 320	470
9.	IS : 1589	Cylinder Oil VG-680 Type1	1.0
10.	IS : 1115	Oil Cutting Soluble	30
11.	IS : 3065	Neat Cutting Oil Type 2 Gr.III	8.0
12.	IS : 2664	Quenching Oil Mineral (Medium), Compound & Additive Type)	30
13.	IS : 1012	Turbine Oil VG-32, 46,NON ISO-VG	15
14.	IS : 4578	Refrigeration Machinery Oil VG-68	2.0
15.	RDSO Specn. M&C/Lub/101/01	Pneumatic Oil VG-100, 220	2.0
16.	RDSO Specn M&C/Lub/102/01	Tool Way Oil VG-32, 68, 220	2.0

And other terms and conditions as per Cl.4.24 of MCG -7.4.2201.

7. **List of M&P lubricants with respective specification**

7.1 **Internal Combustion Engine Crankcase Oils to IS: 13656 –2002** Type EPL- 2(API-SF) Automotive Petrol Engine Gr. 20W/40

7.2 **Internal Combustion Engine Crankcase Oils to IS: 13656-2002** Type EDL- 2(API-CD), with MAK T-7 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--2002** Type EDL-3

7.4 **Gear Lubricants, Multipurpose (Extreme Pressure gear oil) to IS: 1118-1992 / Reaffirmed – 2006** (API-GL-4) with 4-ball test only Grades SAE-90, SAE-140

7.5 **Gear Lubricants to IS: 8406-1993/Reaffirmed – 2006** (EP Type with Demulsibility , 4 Ball Test, and min. pass load of 12^{th} stage in FZG Niemann Test)
Gr. VG-68. VG-220

7.6 **Oil Hydraulic to IS:10522-1983/Reaffirmed-2004** (Antiwear)with Aniline Point 90^{o}C Min. in place of Seal Compatibility test and a min.pass limit of 9^{th} stage in FZG Niemann Test.
Gr. VG-32, VG-46, VG-68, VG-150

7.7 **Antiwear Hydraulic Oil Extra Heavy Duty to IS: 11656-1986/Reaffirmed- 2002**
Gr.VG-32, VG-68
(This also should have Aniline Point (^{0}C) 90 min. instead of Seal Compatibility Test) and NAS Value below 8.

7.8 **Oil for Refrigeration Machinery to IS: 4578-1997/ Reaffirmed – 2004**
Gr. VG-68

7.9 **Oil Cylinder, pure mineral to IS: 1589-1994/ Reaffirmed – 2006**
Gr.VG-680 Type-1

7.10 **Turbine Oil to IS: 1012-2002/ Reaffirmed – 2005** with a min. value of 400 mts. in Rotating Bomb Oxidation Test ASTM D-2272
Gr. VG-32, VG-46, Non-ISO-VG
Non ISO VG Viscosity of this grade is 76 CST ± 10% at 40^{0} C. All other properties shall be as per VG-68 grade.

7.11 **Oil Spindle to I.S:493 (Pt.II)-1981/Reaffirmed-2004**
VG-10

7.12 **General Purpose Machinery Oil to IS: 493(Pt.I)-1981/ Reaffirmed-2004**
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-2002,** with Bactericides Test

7.14 **Cutting Oil, Neat to IS: 3065-1985/Reaffirmed-2002,** Type-2-Gr.III

7.15 **Quenching Oil to IS: 2664-1980/Reaffirmed-2004** 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^{o}C Min.

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 – 2006,** Gr. VG-100, VG-220

7.17 **Machine Tool Way Oil to RDSO Specn. No. M&C/Lub/102/-2001/Reaffirmed – 2006** Gr. VG –32, VG –68, VG –220