



मोटर वाहन अनुप्रयोग (डीजल और गैसोलीन) के लिए
आंतरिक दहन इंजन क्रैंककेस तेल -विशिष्ट IS 13656 :
2019 के अनुसार

PRODUCT MANUAL FOR
Internal combustion engine crankcase oils for
automotive application (Diesel and Gasoline)
According to IS 13656 : 2019

भारतीय मानक ब्यूरो)अनुरूपता मूल्यांकन (विनियम की स्कीम-I के तहत यह उत्पाद मानुयल प्रमाणीकरणके प्रचलन में रीति और पारदर्शिता के सुसंगत सुनिश्चित करने के लिए सभी क्षेत्रीय/शाखा कार्यालयों एवं लाइसेन्स धारियों द्वारा संदर्भ सामग्री के रूप में उपयोग किया जाएगा। बीआईएस लाइसेन्स/प्रमाण पत्र प्राप्त करने के इच्छुक भावी आवेदकों द्वारा भी इस दस्तावेज़ का उपयोग किया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

1.	उत्पाद Product	:	IS 13656: 2019
	शीर्षक Title	:	Internal combustion engine crankcase oils for automotive application (Diesel And Gasoline)
	संशोधन संख्या No. of amendments	:	01
2.	नमूनाकरण दिशा निर्देश Sampling Guidelines		
a)	कच्चा माल Raw material	:	Composition of engine oil to be declared by manufacturer
b)	समूहिकरण दिशा निर्देश Grouping Guidelines	:	Please refer Annex -A
c)	नमूने का परिमाण Sample Size	:	1 Litre
3.	परीक्षण उपकरणों की सूची List of Test Equipment	:	Please refer Annex -B

4.	निरीक्षण व परीक्षण स्कीम Scheme of Inspection and Testing	:	Please refer Annex -C
5.	एक दिन में संभावित परीक्षण Possible tests in a day	:	All tests except Low Temperature Pumping Viscosity and Stability of Finished Lubricating Oils
6.	Scope of the Licence :		
	IS 13656 : 2019 के अनुसार मानक मुहर का उपयोग करने के लिए लाइसेन्स निम्नलिखित कार्यक्षेत्रके लिए प्रदान किया जाता है Licence is granted to use Standard Mark as per IS 13656 : 2019 with the following scope:		
	Name of the product	Internal combustion engine crankcase oils for automotive application (Diesel And Gasoline)	
	Type	Diesel engine oils and/or Petrol engine oils.	
	Performance Level Category	Diesel engine oils - EDL2, EDL3,.....etc (applicable IS category in Table under clause 3.1.1), and/or Petrol engine oils.- EPL2, EPL3,.....etc (applicable IS category in Table under clause Table 3.1.2)	
	SAE viscosity grade	Mono viscosity grades -0W, 5W,.....etc (as per SAE viscosity grades given in Table-1), and/or Multigrades as combination of monogrades such as SAE 10W-30, SAE 15W-40, etc	

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ANNEX A

Guidelines for processing applications for grant of licence and change in scope of licence

For the purpose of Grant of Licence or change in scope of licence, the following shall be ensured:

- A. For compliance to Engine Performance Test Requirements as per CI 3.4, manufacturer shall submit existing engine test database for the performance category claimed, clearly showing conformity to the applicable requirements under table 2 to table 12 of the Indian Standard. Relevant documents like API/ACEA/ OEM specification providing available provisions for Base Oil Interchange (BOI), Viscosity Grade Read-Across (VGRA), Viscosity Modifier Interchange (VMI), minor additive component substitution and evidence of compliance to the same shall also be provided by the Engine oil manufacturer. Compliance to the above shall be verified by BIS.
- B. The Engine oil shall comply with the requirements given under CI 3.3 and CI 4, when tested inhouse/independent lab, and this shall be ensured subsequent to the establishment of compliance to 'A' above

Each combination of Type, Performance Level Category (as applicable) and SAE viscosity grade shall be tested to cover in the scope of licence.

However, while considering grant of licence/inclusion of additional variety, it shall be ensured that the applicant/licensee has got the complete manufacturing and testing facilities for variety intended to be covered.

During operation of the licence, BO shall ensure that all the varieties covered in the licence are tested in rotation.

ANNEXURE B
TO PRODUCT MANUAL FOR
Internal combustion engine crankcase oils for automotive application (Diesel And Gasoline)
According to IS 13656 2019

Major test equipment required to test as per requirements of Indian Standard.

Sr No.	Tests used in with Clause Reference	Test Equipment
1.	Appearance (CI 4.2.1)	Colourless glass test tube of 25mm internal diameter
2.	Stability of Finished Lubricating Oils (CI 4.2.3)	Standard Reference Oils, Test Jar, Thermometers, Cork –, Jacket, Disk, Gasket, Bath (with arrangement of cooling as per the pour point)
3.	Kinematic viscosity CI 6.2, Table 14 [IS 1448:Part : 25/Sec 1/ASTM D445/ASTM D7042] Viscosity index (CI 4.2.2 (a) and (b) and Table 13; CI 6.2, Table 14 [IS 1448:Part 56]	<u>IS 1448:part 25: Sec 1/ASTM D445</u> Viscometers, Viscometer Holders, Temperature-Controlled Bath, Temperature Measuring Devices, Timing Device, Ultrasonic Bath, Unheated – (optional), Chromic Acid, Sample Solvent, Drying Solvent, Certified Viscosity Reference Standards, <u>ASTM D7042</u> Stabinger Viscometer, syringes, Flow through or Pressure adaptor, Hot Filling Adapter, Auto sampler, screen, magnet, Ultrasonic Bath- Unheated (optional), Sample Solvent (volatile petroleum spirit or naptha), toluene or Xylene (for residual fuels), Drying solvent (Highly conc. Ethanol - 96%or higher), Dry Air or Nitrogen, Certified Viscosity and Density Reference Standard
4.	Density CI 6.2, Table 13 [IS 1448:Part 16/ ASTM D7042]	<u>IS 1448:Part 16</u> Hydrometer cylinder, Hydrometer, Constant temperature bath, Thermometer, Glass or plastics stirring rod <u>ASTM D7042</u> Stabinger Viscometer, syringes, Flow through or Pressure adaptor, Hot Filling Adapter, Auto sampler, screen, magnet, Ultrasonic Bath- Unheated (optional), Sample Solvent (volatile petroleum spirit or naptha), toluene or Xylene (for residual fuels), Drying solvent (Highly conc. Ethanol - 96%or higher), Dry Air or Nitrogen, Certified Viscosity and Density Reference Standard
5.	Evaporative Loss (CI 4.2.2 (a) and (b) and Table 13 [IS 1448:Part 136]	Evaporation Crucible with Lid, Electrical Heating Block, Wood's Alloy, Thermometers, Measuring Thermometer, Relay switch, series resistance, wulff bottle, Fork Piece with Stop-cock, Water Jet Vacuum or Oil Pump, U Tube Pressure Gauge, Rubber Tubing, Buffer Bottle, T-Piece with Tube and Tube Clip, benzene
6.	Foaming tendency/Stability CI 4.2.2 (a) and (b) and Table 13; CI 6.2, Table 14 [IS 1448:Part : 67, ASTM D 6082]	<u>1448:Part : 67</u> Foaming Test Apparatus, Test Baths , Air Supply, Flowmeter, Volume-measuring Device, Timer, Temperature Sensor Heptane,Toluene (IS 537), Acetone (IS 170), Propan-2-ol, Detergent (non-ionic, soluble in water), n-butylphthalate (for flow meter, if required). Test equipments as per ASTM D 6082
7.	(Low shear-Rate) Kinematic viscosity 100° C ; High-Shear Rate Kinematic viscosity 150° C, [IS 1448:Part: 25/Sec 1/ ASTM D 4683 / CEC	<u>IS 1448:part 25: Sec 1</u> Viscometers, Viscometer Holders, Temperature-Controlled Bath, Temperature Measuring Devices, Timing Device, Ultrasonic Bath, Unheated – (optional), Chromic Acid, Sample Solvent, Drying Solvent, Certified Viscosity Reference Standards Test Equipments as per ASTM D 4683 / CEC L-36-A-90 (D 4711)

	L-36-A-90 (D 4711) / D 5481]	/ D 5481
8.	Pour Point (CI 4.2.2 (a) and (b) and Table 13; CI 6.2, Table 14 [IS 1448:Part 10: Sec 2]	Test jar, Temperature measuring device, Cork, Jacket, Disc, Gasket, Cooling baths, Timing device, water bath, Air conditioner,
9.	Total Base no. ; CI 6.2, Table 14[IS 1448:Part : 86]	Potentiometric Titrimeter, Glass Electrode, Reference Electrode, stirrer, burette, titration beaker, titration stand, acetic acid, acetic anhydride, chlorobenzene, perchloric acid, potassium hydrogen phthalate, sodium perchlorate electrolyte, titration solvent, Sodium carbonate, sodium acetate solution
10.	Low temp Cranking viscosity CI 3.3.1, 3.3.2, 4.2.2 (a) (i) and 4.2.2 (b) (i), Table 1; CI 6.2, Table 14 [ASTM D 5293]	Cold Cranking Simulator (manual/ automated), Ultrasonic Bath, Unheated – (optional), Calibration Oils
11.	Total Acid no. CI 6.2, Table 14, [IS 1448:Part : 1/Sec 1]	p-Naphtholbenzein indicator solution, nitrogen, phenolphthalein indicator solution, anhydrous iso-propanol, toluene, titration solvent, alcoholic potassium hydroxide, barium hydroxide as per IS 1448 (Part 176) : 2020
12.	Low Temp. Pumping Viscosity Clauses 3.3.1, 3.3.2, 4.2.2 (a) (i) and 4.2.2 (b) (i) Table 1; CI 6.2, Table 14, [ASTM D 4684]	Mini rotary viscometer, Weights, Temperature Control System, Temperature Measuring Device, dry Gas, locking pin, Low Cloud point Newtonian Calibration oil, Methanol, Oil Solvent (Commercial heptanes or similar solvent), Acetone
13.	Flash Point (CI 4.2.2 (a) and (b) and Table 13; CI 6.2, Table 14 [IS 1448:Part 69/Part 21]	IS 1448:Part 69 Cleaning solvent, Verification liquids, Steel wool, Cleveland open cup apparatus, Shield, Temperature measuring device, Barometer IS 1448:Part 21 Cleaning solvent, Verification liquids, Flash point apparatus, Temperature measuring device, Barometer, Heating bath or oven
14.	Sulphur CI 6.2, Table 14, [ASTM D 2622/D 4951 /D 5185/D7751/ D6443]	ASTM D 4951 Inductively-Coupled Plasma Atomic Emission Spectrometer, Analytical Balance, Peristaltic Pump, (Recommended), Solvent Dispenser, (Optional), Specimen Solution Container, Vortexer, (Optional), Ultrasonic Homogenizer (Optional), Internal Standard, Organometallic Standards, Dilution Solvent, Working Standards, Check Standard Test Equipments as per ASTM D 2622/D 5185/D7751/ D6443
15.	Sulphated ash CI 6.2, Table 14, [IS1448:Part : 4/Sec 2]	Dish, Electric Muffle Furnace, Analytical Balance, Desiccator/Cooling Container (without Desiccant), Filter Paper, Low-Ash Mineral Oil, Sulphuric Acid (relative density 1.84), Iso-propyl Alcohol, Toluene
16.	Calcium CI 6.2, Table 14 [ASTM D4951/D 5185/D7751/D6443]	ASTM D 4951 Inductively-Coupled Plasma Atomic Emission Spectrometer, Analytical Balance, Peristaltic Pump, (Recommended), Solvent Dispenser, (Optional), Specimen Solution Container, Vortexer, (Optional), Ultrasonic Homogenizer (Optional), Internal Standard, Organometallic Standards, Dilution Solvent, Working Standards, Check Standard Test equipment as per ASTM D 5185/D7751/D6443
17.	Barium CI 6.2, Table 14,	ASTM D 4951

	ASTM D4951/D 5185/D7751/D6443	Inductively-Coupled Plasma Atomic Emission Spectrometer, Analytical Balance, Peristaltic Pump, (Recommended), Solvent Dispenser, (Optional), Specimen Solution Container, Vortexer, (Optional), Ultrasonic Homogenizer (Optional), Internal Standard, Organometallic Standards, Dilution Solvent, Working Standards, Check Standard Test equipment as per ASTM D 5185/D7751/D6443
18.	Magnesium CI 6.2, Table 14 ASTM D4951/D 5185/D7751/D6443	ASTM D 4951 Inductively-Coupled Plasma Atomic Emission Spectrometer, Analytical Balance, Peristaltic Pump, (Recommended), Solvent Dispenser, (Optional), Specimen Solution Container, Vortexer, (Optional), Ultrasonic Homogenizer (Optional), Internal Standard, Organometallic Standards, Dilution Solvent, Working Standards, Check Standard Test equipment as per ASTM D 5185/D7751/D6443
19.	Zinc CI 6.2, Table 14 ASTM D4951/D 5185/D7751/D6443	ASTM D 4951 Inductively-Coupled Plasma Atomic Emission Spectrometer, Analytical Balance, Peristaltic Pump, (Recommended), Solvent Dispenser, (Optional), Specimen Solution Container, Vortexer, (Optional), Ultrasonic Homogenizer (Optional), Internal Standard, Organometallic Standards, Dilution Solvent, Working Standards, Check Standard
20.	Phosphorus CI 6.2, Table 14, [ASTM D4951/IS 1448 [P : 54]	ASTM D 4951 Inductively-Coupled Plasma Atomic Emission Spectrometer, Analytical Balance, Peristaltic Pump, (Recommended), Solvent Dispenser, (Optional), Specimen Solution Container, Vortexer, (Optional), Ultrasonic Homogenizer (Optional), Internal Standard, Organometallic Standards, Dilution Solvent, Working Standards, Check Standard
21.	Nitrogen CI 6.2, Table 14, [ASTM D 5762/D 4629/D5291]	ASTM D4629 Furnace, Combustion tube, drier tube, Chemiluminescent Detector. Totalizer, Micro-litre Syringe, Strip Chart Recorder (Optional), Sample Inlet System, Quartz Insert Tube (Optional), Vacuum System (Optional), Analytical Balance (Optional), Magnesium Perchlorate Mg(ClO ₄) (if permeation drier is not used), Inert Gas (argon or helium, ultra-high purity grade), Oxygen, Solvents for diluting and matrix matching (such as, toluene, isooctane, xylene, acetone, cetane), Nitrogen Stock Solution, Calibration standards, Cupric Oxide wire, Quartz wool (optional), pyridine, carbazole Test equipment as per ASTM D 5762/D5291]
22.	Sodium CI 6.2, Table 14, [ASTM D D4951]	ASTM D 4951 Inductively-Coupled Plasma Atomic Emission Spectrometer, Analytical Balance, Peristaltic Pump, (Recommended), Solvent Dispenser, (Optional), Specimen Solution Container, Vortexer, (Optional), Ultrasonic Homogenizer (Optional), Internal Standard, Organometallic Standards, Dilution Solvent, Working Standards, Check Standard

The above list is meant only for guidance and may not be treated as exhaustive.

ANNEX C
TO PRODUCT MANUAL FOR
Internal combustion engine crankcase oils for automotive application (Diesel and
Gasoline), According to IS 13656: 2019
SCHEME OF INSPECTION AND TESTING

1. LABORATORY - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1. The manufacturer shall prepare and implement a calibration plan for the test equipment.

2. TEST RECORDS - The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. PACKING AND MARKING - The Standard mark as given in the Schedule of the licence shall be marked on each container provided always that the material to which this mark is thus applied conforms to every requirement of the specification.

3.1. Labelling and marking shall be done as per the provision of the IS 13656: 2019. In addition, the following details shall be mentioned on each pack legibly and indelibly:

- a) BIS Licence No. CM/L
- b) BIS website details i.e. -“For details of BIS certification please visit www.bis.gov.in.”

4. CONTROL UNIT – For the purpose of this scheme Internal combustion engine crankcase oils for automotive application of the same type, same performance level category and the same SAE viscosity grade packed in a day manufactured from same batch of raw materials (additives, base oil, PPD, antifoam reagent) shall constitute a control unit.

5. LEVELS OF CONTROL - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

5.1. All the production which conforms to the Indian Standard and covered by the licence should be marked with the Standard Mark

6. REJECTIONS – Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016.

TABLE 1 LEVELS OF CONTROL
(Clause 5 of SIT)

(1)				(2)	(3)		
TEST DETAILS				Test Equipment R: required S: Sub Contracting	LEVELS OF CONTROL		
Cl.	Requirement	Test Methods			No. of samples	Frequency	Remarks
		Clause	Reference				
4.2	Low Temperature Cranking Viscosity	Table-1	ASTM D 5293	R	One	Each control unit	
4.2	Low Temperature Pumping Viscosity	Table-1	ASTM D 4684	R	One	Once a week	
4.2	Low-Shear-Rate Kinematic Viscosity at 100°C	Table-1	IS 1448 [P : 25/Sec 1]/ ASTM D 4683 / CEC L-36-A-90 (D 4711) / D 5481	R	One	Each control unit	
4.2	High-Shear-Rate Kinematic Viscosity at 150°C & 10 ⁶ S ⁻¹	Table-1	IS 1448 [P : 25/Sec 1]/ ASTM D 4683 / CEC L-36-A-90 (D 4711) / D 5481	R	One	Each control unit	
4.2	Appearance	Table-13	IS 13656	R	Firm to have adequate in-process controls to check compliance of this parameter as per requirements given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity		
4.2	Viscosity Index	Table-13	IS 1448-56	R	One	Each control unit	
4.2	Pour Point °C	Table-13	IS 1448-10-2	S	One	Once a month	
4.2	Flash Point COC °C	Table-13	IS 1448-69/21	R	One	Each control unit	

4.2	Evaporation Loss, %	Table-13	IS 1448-136	R	One	Each control unit	
4.2	Foaming tendency/stability ml/ml @ 24°C @ 93.5°C @ 24°C after the test at 93.5°C	Table-13	IS 1448-67 ASTM D 6082 (for high temp foaming tendency)	R	One	Each control unit	
	Density @ 15°C	Table-14	ASTM D 7042/IS 1448-16	R	One	Each control unit	
	Kinematic Viscosity at 40°C	Table-14	ASTM D 445/D 7042 /IS 1448-25-1	R	One	Each control unit	
	Total Base Number	Table-14	IS 1448-86	R	One	Each control unit	
	Total Acid Number	Table-14	IS 1448 (Part 176)	R	One	Each control unit	
	Sulphur	Table-14	ASTM D 2622/D 4951 /D 5185/D7751/ D6443	S	One	Once in three months or on each consignment of raw material, whichever is earlier	
	Sulphated Ash	Table-14	IS 1448-4-2				
	Calcium	Table-14	ASTM D 4951/D 5185/D 7751/D 6443				
	Barium	Table-14	ASTM D 4951/D 5185/D 7751/D 6443				
	Magnesium	Table-14	ASTM D 4951/D 5185/D 7751/D 6443				
	Zinc	Table-14	ASTM D 4951/D 5185/D 7751/D 6443				

	Phosphorus	Table-14	ASTM D 4951/ IS 1448-54				
	Nitrogen	Table-14	ASTM D 5762/D 4629/D5291				
	Sodium	Table-14	ASTM D 4951				
4.3	Stability of Finished Lubricating Oils	Annex-B	IS 13656	R	One	Once a week	
3.4	Engine Performance Tests	Table-2 to Table- 12	IS 13656	Compliance to these requirements to be ensured as per Annex A			

Note-1: Whether test equipment is required or sub-contracting is permitted in column 2 shall be decided by the Bureau and shall be mandatory. Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-2:- Levels of control given in column 3 are only recommendatory in nature. The manufacturer may define the control unit/batch/lot and submit his own levels of control in column 3 with proper justification for approval by BO Head.