



TRANSNET ENGINEERING

SPECIFICATION FOR DIESEL LOCOMOTIVE ENGINE LUBRICATING OIL

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DOCUMENT INFORMATION

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Project:	Engine Oil
Author:	DC Kleynhans
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DOCUMENT REVISIONS

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SCOPE

This specification describes the performance requirements for the Transnet Diesel Locomotive Engine Crankcase Lubricating Oil. The quality and performance of the oil shall be as classified by the Locomotive OEMs: WABTEC and PROGRESS RAIL. This requirement is for the Generation 7 lubricant as defined by the LMOA.

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1. Scope

This specification describes the performance requirements of fully formulated, zinc free and chlorine free, heavy duty, high dispersant, SAE 20W/40 multigrade diesel engine crankcase lubricating oils, with a nominal Total Base Number of 10,5. In addition, the qualities and performance of these oils shall be such that they can be classified by the Lubricants Committee of the Locomotive Maintenance Officers Association (LMOA) as a Generation 7 lubricant.

2. Application

This oil is intended for use in both two-stroke and four stroke diesel engines as listed in clause 7.5 of this specification.

3. Abbreviations

ASTM:	American Society for Testing and Materials
LMOA:	Locomotive Maintenance Officers Association
OEM:	Original Equipment Manufacturer
SAE:	Society of Automotive Engineers
GE:	General Electric, Lately Wabtec
GM EMD:	General Motors Electromotive Division, Lately Progress Rail
TBN:	Total base number
VI:	Viscosity index

4. Definitions

4.1. Approved oils:

Oils that have successfully undergone all the laboratory and bench tests specified by both locomotive engine manufacturers, GE and GM EMD, and have completed full-scale field evaluations as required by the locomotive manufacturers.

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4.2. Branded Oils:

Oils whose names have been registered as a Trademark. Branded oils meeting OEM requirements will be considered Transnet's preferred oils.

4.3. Preferred oils:

Branded oils that have been fully approved and listed by General Electric or by the General Motors Electromotive Division and the Locomotive Maintenance Officers Association (LMOA) as a "Generation 7" lubricant.

4.4. Qualified oils:

Oils which have successfully undergone laboratory and bench tests, and which are regarded by the locomotive manufacturers as qualified for full scale field trials. These oils by virtue of their formulation may be given "tentative" approvals by the locomotive engine manufacturers prior to full-scale field trials.

4.5. Tentative approval:

Locomotive manufacturers may award tentative approval to qualified oils based on formulations using both approved oil additive packages and base oils.

5. Normative references:

The following documents contain provisions that, through reference in the text, constitute requirements of this specification. The editions indicated were valid at the time of publication. All standards and specifications are subject to revision, and parties agreeing to this specification are encouraged to investigate the possibility of applying the most recent additions of the documents listed below.

- ASTM D664* *Standard Test Method for Total base number of Petroleum Products by Potentiometric Titration.*

- ASTM D2270* *Standard Practice for Calculating Viscosity Index from Kinematic Viscosity at 40- and 100-Degrees C.*

- ASTM D2896* *Standard Test Method for Base number of Petroleum Products by Potentiometric Perchloric Acid Titration.*

SABS ISO 9000:2000 Quality management systems – Fundamentals and vocabulary.

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6. General Requirements

6.1. Oils that will be Accepted

Oils defined under clauses 4.1, 4.2 and 4.3 are the oils addressed by this specification and are required. Oils meeting the requirements as defined in clauses 4.4 and 4.5 will not be acceptable. (See clause 7.2.) No other oils will be considered.

6.2. Technical data sheets:

The lubricant supplier shall submit complete technical data sheets for all lubricants tendered, including the results of all tests required to comply with LMOA, GM EMD and GE requirements. In addition, physical parameters detailed in Annexure No. 1 shall be submitted for each oil offered.

6.3. Lubricant formulations:

The supplier shall furnish data showing the composition of the candidate lubricant, regarding both the specific base stocks (crude source and refinery, etc.) and additive treatment (concentration, generic chemical description of each component, manufacturer).

All lubricants, under contract or purchase order, manufactured to this specification, shall be identical in every respect to the product approved.

No changes in the formulation (including both base oil source and additive package and concentration) or manufacturing process are allowed without the prior written approval of Transnet. Lack of such notification constitutes grounds for rejection and removal from the approved list of suppliers.

6.4. OEM Certificates:

The lubricant supplier shall submit a letter or certificate of compliance or approval from both GE and GM EMD, indicating conformance to their requirements, for each lubricating oil tendered. The results of OEM bench and engine testing should be made available to Transnet on request.

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6.5. Laboratory test certificates:

The lubricant supplier shall submit test results from a laboratory acceptable to Transnet, confirming that the product submitted for approval meets all of the stated requirements. Test limits shown are absolute; test precision was considered when setting them.

6.6. Material Safety Data Sheets:

The supplier shall submit a Material Safety Data Sheet (MSDS) for each lubricant tendered.

6.7. Chemical properties:

Lubricants shall not contain water, acid, particulates, or other substances that may be detrimental to the proper function and performance of the engines for which they are intended.

6.8. Lubricant Compatibility:

Mixtures of the lubricant approved, and the lubricant currently used shall pass all the requirements of this specification. The incoming supplier shall certify that, when his lubricant is mixed with a lubricant already in use, there shall be no incompatibility or loss in operating performance. Transnet reserves the right to request proof of compatibility, e.g. laboratory tests, etc.

6.9. Quality:

The supplier shall be certified to ISO 9000:2000 or an equivalent quality management system acceptable to Transnet. Suppliers shall perform regular quality control checks at each location where the material is manufactured. Each batch of oil blended shall be tested and results recorded on batch control certificates worded along the lines of Annexure No 2. Such quality control data shall be made available to Transnet upon request.

Because of the need for this oil to be zinc and chlorine free, and to prevent contamination with other lubricants, manufacturing or blending should preferably take place only in dedicated tanks. Failing this, stringent measures should be taken to clean blending tanks and piping between batches. The responsibility for this should be placed under the control of a competent person with defined responsibilities.

Transnet may check incoming shipments for compliance to this specification. The supplier is responsible for meeting this specification without dependence upon Transnet’s inspection. Non-compliance to physical and chemical requirements constitutes grounds for rejection of any shipment.

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If physical or chemical analyses determine that the delivered lubricant is not in compliance with the requirements, the supplier may be held liable for any losses due to equipment or lubricant damage.

6.10. Packaging and marking:

Each container, where lubricant is not supplied in bulk, shall be clearly identified on the top and side. The identification shall contain the Transnet specification number at least 50 mm high on 20 litre or larger containers.

6.11. Total Base Number

The Total Base Number of the Oil shall be equivalent to 10.5 mg potassium hydroxide per gram of oil (mg KOH/g) when determined by ASTM D2896 methods. In addition, the oil supplier shall also report the TBN value as determined by ASTM D664 test methods.

6.12. Viscosity Index:

The viscosity index of the lubricant shall be determined by ASTM D2270.

6.13. Tendering Requirements

Tenderers shall acknowledge, provide complete information, or indicate compliance with respect to each clause of this specification and Annexure 1 shall be completed in full. Tenderers not complying with this requirement shall be disqualified.

7. General Information

7.1. Transnet Lubricant Approvals:

Lubricants meeting all the technical requirements of this specification shall be acceptable by Transnet for use in the locomotives listed. The successful supplier shall keep Transnet informed of the latest development and improvements on oil as the LMOA progress to new generation oils.

7.2. Testing of Product by Transnet.

The implementation of field service trials by Transnet is a considerable expense, and it is regretted that no field trials can be undertaken on qualified or non-approved oils at this stage.

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7.3. Lubricant Properties

Property	Units	Test Method	Limit
SAE Viscosity Grade			20W40
Viscosity at 40°C	cSt	ASTM D445	Report
Viscosity at 100°C	cSt	ASTM D445	Report
Viscosity Index		ASTM D2270	Report
Total Base Number	mg KOH/g	ASTM D2896	10.5 minimum
Total Base Number	mg KOH/g	ASTM D664	Report
TBN retention.	mg KOH/g		Report

7.4. OEM EVALUATION TESTS

Type of test	Test Description
Bench	EMD Silver Corrosion and Oxidation Test. GE Oxidation Test.
Engine	Bronze Friction Test. 25-h EMD 2-567. 750-h GE 7FDL.

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7.5. Transnet Locomotives

CLASS-SERIES	MANUFACTURER AND MANUFACTURER'S MODEL	ENGINE MAKE	ENGINE MODEL
34-000	General Electric U26C	General Electric	7FDL-12D & D5
34-400	General Electric U26C	General Electric	7FDL-12D6
34-500	General Electric U26C	General Electric	7FDL-12D6
34-900	General Electric U26C	General Electric	7FDL-12B2
35-000	General Electric U15C	General Electric	7FDL-8E1
35-400	General Electric U15C	General Electric	7FDL-8E7
36-000	General Electric SG10	General Electric	7FDL-8
34-200	General Motors GT-26MC	General Motors	16-645E3
34-600	General Motors GT-26MC	General Motors	16-645E3
34-800	General Motors GT-26MC	General Motors	16-645E3
35-200	General Motors GT-18MC	General Motors	8-645E3
35-600	General Motors GT 18MC	General Motors	8-645E3
36-200	General Motors SW 1002	General Motors	8-645E3 (Roots Blower)
37-000	General Motors GT-26MC	General Motors	16-645E3B
39-200	General Motors GT-26MCU-3	General Motors	16-645E3B
43-000	Wabtec C30-ACi	Wabtec	7FDL-12N1
44-000	Wabtec ES40ACi	Wabtec	GEVO V12

8. Documentation

8.1 All documentation shall be in English.

8.2 All documentation must be provided as softcopies. Hardcopies must be provided where required.

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9. ANNEXURES

ANNEXURE NO. 1

PRODUCT QUALIFICATION CERTIFICATE – Page 1

NAME: Lubrication Oil, Engine, Diesel Locomotive, Multigrade, Grade 150 (SAE 20W/40)

Name of Manufacturer: _____

Brand Name of Product Offered: _____ Tender No. _____

SECTION A: FORMULATION DETAILS

BASE OIL BLEND

PROPERTY	UNITS	MINIMUM	MAXIMUM	TYPICAL	TEST METHOD	
					ASTM	IP
Viscosity @ 40 °C	mm ² /s				D445	IP71
Viscosity @ 100 °C	mm ² /s				D445	IP71
Viscosity Index	-				D2270	IP226

Brand, origin or supplier of base oil: _____

ADDITIVE PACKAGES

Brand of detergent-inhibitor additive package used: _____

Brand of viscosity index improver package used: _____

Has this oil gained approval of qualification from the locomotive manufacturers when formulated with alternative base stock, and if so, with which brand or origin of base oil? _____

State name of railroad where this oil formulation has been in regular use:

_____ for _____ months.

_____ for _____ months.

State manufacturers of locomotives in above railroad fleets and the approximate number of locomotives of each type:

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ANNEXURE NO. 1

PRODUCT QUALIFICATION CERTIFICATE – Page 2

SECTION B: FORMULATED OIL BLENDING CONTROL LIMITS

PROPERTY	UNITS	MINIMUM	MAXIMUM	TYPICAL	TEST METHOD	
					ASTM	IP
Rel. Density @ 20°C	-				#	
Viscosity @ 40°C	mm ² /s				D445	71
Viscosity @ 100°C	mm ² /s				D445	71
Viscosity Index (VI)	-				D2270	226
Pour Point	°C				D97	15
Flash Point	°C				D92	36
Sulphated Ash	% m/m				D874	163
Total Base No. *	mg KOH/g				D664	177
Total Base No. *	mg KOH/g				D2896	276
Total Acid No.	mg KOH/g				D974	139
Calcium Content	% m/m				#	

* Report by both methods

State method used.

TRACE ELEMENT CONTENT

PROPERTY	UNITS	MINIMUM	MAXIMUM	TYPICAL	TEST METHOD
					(e.g. atomic absorption (AA); inductively coupled plasma (ICP); X-ray fluorescence (XRF), etc.) Specify method used
Iron	µg/g				
Copper	µg/g				
Lead	µg/g				
Aluminium	µg/g				
Chromium	µg/g				
Silicon	µg/g				
Tin	µg/g				
Silver	µg/g				
Sodium	µg/g				
Zinc	µg/g				
Molybdenum	µg/g				
Chlorine	µg/g				

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ANNEXURE NO. 1

PRODUCT QUALIFICATION CERTIFICATE – Page 3

SECTION C: RECOMMENDED CONDEMNING LIMITS FOR USED OIL

FOR GENERAL ELECTRIC LOCOMOTIVES

PROPERTY	UNITS	MINIMUM	MAXIMUM	TYPICAL	TEST METHOD	
					ASTM	IP
Viscosity @ 40°C	mm ² /s				D445	71
Viscosity @ 100°C	mm ² /s				D445	71
Total Base No.	mg KOH/g				D664	177
Total Base No.	mg KOH/g				D2896	276
Pentane Insolubles	% m/m				LMOA Standard Insolubles Test Method	
Water Content	% m/m				#	

FOR EMD GENERAL MOTORS LOCOMOTIVES

PROPERTY	UNITS	MINIMUM	MAXIMUM	TYPICAL	TEST METHOD	
					ASTM	IP
Fuel Dilution	% m/m				#	
Viscosity @ 40°C	mm ² /s				D445	71
Viscosity @ 100°C	mm ² /s				D445	71
Flash Point	°C				D92	36
Total Base No.	mg KOH/g				D664	177
Total Base No.	mg KOH/g				D2896	276
Pentane Insolubles	% m/m				LMOA Standard insolubles Test Method	
Water Content	% m/m				#	

State method used

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ANNEXURE NO. 1

PRODUCT QUALIFICATION CERTIFICATE – Page 4

SECTION D: QUALIFICATION

(Complete either D.1 or D.2 deleting the inapplicable clause)

D.1

It is hereby certified that the engine oil is fully approved by listed locomotive manufacturers and in support hereof, copies of the following documentary evidence are attached:

Locomotive Manufacturer	Reference and date of letter, publication, bulletin, source of supply, maintenance instruction attached
General Electric	
General Motors	

D.1.2

It is hereby certified that the engine oil is regarded by the listed locomotive manufacturers as a Qualified Oil (see clause 4.4) and in support hereof, copies of the following documentary evidence are attached:

Locomotive Manufacturer	Reference and date of letter, publication, bulletin, source of supply, maintenance instruction attached
General Electric	
General Motors	

D.2

It is hereby certified that this engine oil is a re-brand / is identically (delete wording not relevant) formulated to the brand _____, which is fully approved by the locomotive manufacturers, and in support of this approval, copies of the following documentary evidence are attached, together with a sworn affidavit that the product is a re-brand / is identically formulated (delete wording not relevant) to the approved brand:

Locomotive Manufacturer	Reference and date of letter, publication, bulletin, source of supply, maintenance instruction attached
General Electric	
General Motors	

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D.2.1

It is further certified that the brand _____ which is approved by the locomotive manufacturers is blended from _____ base stocks of viscosity ____ mm²/s @ 100 °C and viscosity index _____ formulated with detergent/inhibitor additive package with _____ VI concentrate.

D.3

It is hereby guaranteed that the full expected volume of oil can be supplied for the entire duration of the contract. (Yes/No)

D.4

Briefly state what procedures you will follow to ensure continuity of supply, with reference to securing sufficient supplies of additive concentrates and suitable base stocks.

SECTION E: GUARANTEE OF COMPATIBILITY

It is hereby certified and guaranteed that the oil offered will be fully compatible in actual operational service with the multigrade diesel locomotive crankcase oils currently used by TRANSNET, both as regards actual physical admixture of the two oils, as well as with regard to ensuring freedom from excessive fuel dilution, excessive oil consumption and any other problems resulting from “residue clean-up” or other factors of changeover.

SIGNED THIS DAY _____ AT _____ BY _____

(full name in black letters) IN MY CAPACITY AS _____

(official designation) FOR THE COMPANY _____

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ANNEXURE NO. 2

BATCH CONTROL CERTIFICATE

Lubricating Oil, Engine, Diesel Locomotive, Multigrade, Grade 150 (20W/40)

Supplier: _____ Contract No: _____

Certificate No: _____ Date: _____

Batch Size: _____ litres

PROPERTY	UNITS	MANUFACTURING LIMITS		RESULT FOUND ON THIS BATCH	TEST FREQUENCY
		MIN	MAX		
Rel. Density @ 20°C	-				Every Batch
Viscosity @ 40°C	mm ² /s				Every Batch
Viscosity @ 100°C	mm ² /s				Every Batch
Viscosity Index	-				Every Batch
Pour Point	°C				Every 10 th Batch
Flash Point	°C				Every 3 rd Batch
Sulphated Ash	%m/m				Every 15 th Batch
Total Base No.(D664)	MgKOH/g				Every Batch *
Total Base No.(D2896)	MgKOH/g				Every Batch *
Calcium Content	%m/m				Every Batch

* Report both methods

TRACE ELEMENT CONTENT

PROPERTY	UNITS	MANUFACTURING LIMITS		RESULT FOUND ON THIS BATCH	TEST FREQUENCY
		MIN	MAX		
Iron	µg/g				Every 2nd Batch
Copper	µg/g				Every 2nd Batch
Lead	µg/g				Every 2nd Batch
Aluminium	µg/g				Every 2nd Batch
Chromium	µg/g				Every 2nd Batch
Silicon	µg/g				Every 2nd Batch
Tin	µg/g				Every 2nd Batch
Silver	µg/g				Every 2nd Batch
Sodium	µg/g				Every 2nd Batch
Zinc	µg/g				Every Batch
Molybdenum	µg/g				Every 2nd Batch

Signed: _____ Designation: _____

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DOCUMENT AUTHORITIES

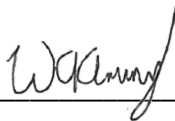
COMPILED BY
Dan Kleynhans
Senior Engineer
PSD Locomotives

Date 23 September 2025

Signature 

APPROVED BY
Walter Klingenberg
Principal Engineer
PSD Locomotives

Date 25 September 2025

Signature 

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