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Engine Oil— Performance Classification — Part 2: API Specification for Spark Ignition (petrol) engines

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Foreword

Uganda National Bureau of Standards (UNBS) is a parastatal under the Ministry of Trade, Industry and Cooperatives established under Cap 327, of the Laws of Uganda, as amended. UNBS is mandated to co-ordinate the elaboration of standards and is

(a) a member of International Organisation for Standardisation (ISO) and

(b) a contact point for the WHO/FAO Codex Alimentarius Commission on Food Standards, and

(c) the National Enquiry Point on TBT Agreement of the World Trade Organisation (WTO).

The work of preparing Uganda Standards is carried out through Technical Committees. A Technical Committee is established to deliberate on standards in a given field or area and consists of key stakeholders including government, academia, consumer groups, private sector and other interested parties.

Draft Uganda Standards adopted by the Technical Committee are widely circulated to stakeholders and the general public for comments. The committee reviews the comments before recommending the draft standards for approval and declaration as Uganda Standards by the National Standards Council.

The committee responsible for this document is Technical Committee UNBS/TC 16, *[Petroleum Products and facilities]*, Subcommittee SC 1, *[Petroleum and Petrochemicals]*.

This second edition cancels and replaces the first edition (US 249-2000), which has been technically revised.

US 249 consists of the following parts, under the general title *Engine oil — Performance specification*:

- *— Part 1: General*
- *— Part 2: API Specification for spark Ignition (petrol) Engines*
- *— Part 3: API Specification for Compression Ignition (diesel) Engines*
- *— Part 4: Specification for internal combustion engine oils used in four stroke-cycle motorcycle gasoline engines and associated drive trains*
- *— Part 5: Specification for internal combustion engine oils used in two stroke-cycle motorcycle gasoline engines and associated drive trains*

Introduction

Due to the technological advances that have occurred since the publishment of US 249:2000/ EAS 159, it has become necessary to keep abreast with such changes, hence the revision of this standard.

It has become necessary to sub-divide this standard into five parts.

DUS 249-1:2017, Engine Oil — Performance Classifications — Part 1: General

DUS 249-2:2017, Engine Oils — Performance Classifications — Part 2: API Specification for Spark Ignition (petrol) Engines

DUS 249-3: 2017, Engine Oil — Performance Classification — Part 3: API Specification for light and heavy duty compression Ignition (diesel) engines

DUS 249- 4: 2017, Engine Oil — Performance Classification — Part 4: Specification for internal combustion engine oils used in four-stroke cycle motorcycle gasoline engines and associated drive trains

DUS 249-5: 2017 Engine Oils — Performance Classification — Part 5: Specification for Internal Combustion engine oils used in two-stroke cycle motorcycle gasoline engines and associated drive trains

This standard outlines the performance classifications as applicable to API Oil sequences

Note: Current engine oil categories that may be deemed obsolete by API during the course of the application of this standard shall be considered obsolete as well.

Engine Oil — Performance Classification — Part 2: API Specification for Spark Ignition (petrol) engines

1 Scope

This Draft Uganda Standard specifies performance requirements, sampling and test methods for spark ignition engine oil of passenger cars, light duty trucks, vans and related equipment meeting or exceeding API service category SJ.

It does not cover engine oil for compression ignition engines, aviation equipment, outboard motors, lawn mowers, railroad locomotives or ocean going vessels.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

DUS 2040 *Standard test method for flash and fire points by Cleveland open cup tester*.

US 1730:2017 *Standard test method for pour point of petroleum products*

US 1732:2017, Standard practice for manual sampling of petroleum and petroleum products

US 1733:2017, Standard practice for automatic sampling of petroleum and petroleum products

US ISO 3104:1994 *Standard test method for kinematic viscosity of transparent and opaque liquids (the calculation of dynamic viscosity*

DUS 2041 *Standard test method for foaming characteristics of lubricating oils*

DUS 2042 *Standard practice for calculating viscosity index from kinematic viscosity at 40 and 100 °C*.

DUS 2043 *Standard Test Method for Measuring Viscosity of New and Used Engine Oils at High Shear Rate and High Temperature by Tapered Bearing Simulator Viscometer at 150 °C*

DUS 2044 *Standard test method for determination of yield stress and apparent viscosity of engine oils at low temperature.*

US 2045 *Standard test method for determination of additive elements in lubricating oils by inductively coupled plasma atomic emission spectrometry*.

DUS 2046 Standard test method for evaporation loss of lubricating oils by the Noack method.

DUS 2047 *Standard test method for high temperature foaming characteristics of lubricating oils*.

DUS 2048 *Standard test method for determination of high temperature deposits by thermos oxidation engine oil simulation test.*

DUS 2049 *Standard Test Method for Estimation of Engine Oil Volatility by Capillary Gas Chromatography*

DUS 2050 *Standard Test Method for Evaluation of Rust Preventive Characteristics of Automotive Engine Oils*

DUS 2051 *Standard Test Method for Evaluation of Automotive Engine Oils for Inhibition of Deposit Formation in a Spark-Ignition Internal Combustion Engine Fuelled with Gasoline and Operated Under Low-Temperature, Light-Duty Conditions*

DUS 2052 *Standard test method for measuring the effect on filterability of engine oils after treatment with various amounts of water and a long (6-h) heating time*.

DUS 2052 *Standard Test Method for Measuring the Effect on Filterability of Engine Oils After Treatment with Water and Dry Ice and a Short (30 min) Heating Time*

DUS 2056 Standard Test Method for Apparent Viscosity of Engine Oils and Base Stocks Between –10 °C and –35 °C Using Cold-Cranking Simulator

DUS 2057 Standard Test Method for Low Temperature, Low Shear Rate, Viscosity/Temperature Dependence of Lubricating Oils Using a Temperature-Scanning Technique

DUS 2053 *Standard test method for the determination of homogeneity and miscibility in automotive engine oils.*

DUS 2054 *Standard Test Method for Determination of Moderately High Temperature Piston Deposits by Thermo-Oxidation Engine Oil Simulation Test-TEOST MHT*

DUS 2058 Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry

DUS 2055 *Standard Test Method for Evaluation of Automotive Engine Oils in the Sequence IIIG, Spark-Ignition Engine*

DUS 2059 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

DUS 2060 Standard Test Method for Rubber Property—Effect of Liquids

DUS 2061 Standard Test Method for Rubber Property—Durometer Hardness

DUS 2062 Standard Test Method for Evaluation of the Ability of Engine Oil to Emulsify Water and Simulated Ed85 Fuel

DUS 2063 Standard Test Method for Measuring the Effect on Filterability of Engine Oils After Treatment with Water and Dry Ice and a Short (30 min) Heating Time

DUS 2064 Standard Test Method for Multielement Determination of Used and Unused Lubricating Oils and Base Oils by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES)

DUS 2065 Standard Test Method for Bench Oxidation of Engine Oils by ROBO Apparatus

DUS 2066 Standard Practice for Utilization of Test Data to Determine Conformance with Specifications

DUS 249-1:2018 *Engine Oil- Performance Classification- Part 1- General*

3 Terms and definitions

For the purposes of this standard, the terms and definitions given in DUS 249-1:2018 and the following apply.

3.1
energy conserving category
the group of engine oils that have demonstrated fuel economy benefits and are intended primarily for use in automotive gasoline engine applications, such as passenger cars, light- duty trucks and vans.

3.2
Resource conserving category
the group of engine oils that have demonstrated fuel economy benefits, emission system and turbo charger protection and compatibility with ethanol containing fuel up to E85 and are intended primarily for use in spark ignition engines such as passenger cars, light- duty trucks and vans.

3.3
tamper proof seal
a seal designed such that malicious disassembly and reassembly using commonly available tools will be detected upon visual inspection

4 Abbreviated terms

4.1
EELQMS
European Engine Lubricants Quality Management System.

4.2
EOLCS
Engine Oil Licensing and Certification System

5 Classification

Engine lubricating oils shall be classified according to viscosity grade and performance

5.1 Classification according to viscosity

The viscosity of the lubricating oil shall be classified as either single grade or multi-grade basing on the SAE viscosity grades, as per designations indicated in SAE J300_201501

5.2 Classification according to performance

Engine lubricating oil shall be classified according to performance based on API performance classification

6 Requirements

6.1 General requirements

The engine oil shall consist of acceptable petroleum products, or of acceptable synthetically prepared products, or of a combination of these two types of products, compounded in all cases, with such functional additives, for example, detergents, dispersants, oxidation inhibitors and corrosion inhibitors as are necessary to enable it to comply with the other requirements of this standard.

6.1.1 Stability

When tested in accordance with DUS 2053, the engine oil shall remain clear and homogeneous, and shall show no evidence of separation of components and no evidence of colour change.

6.1.2 Compatibility

When tested in accordance with DUS 2053, the engine oil shall be compatible with other oils of the same viscosity grade that comply with the requirements of this standard.

6.1.3 Licenses

6.1.3.1 All products licensed under API shall be listed in API EOLCS licensee directory (www.api.org) and shall bear appropriate labelling as described in 7.2 in addition to the API Engine oil quality marks

6.1.3.2 The Uganda National Bureau of Standard shall be notified of any changes in the formulation of engine oil and an API warranty certificate shall be produced as evidence before a new spec can be taken for reference purposes

6.2 Physico-Chemical Requirements

6.2.1 The oil shall be free from suspended matter, grit, water or any other foreign matter and impurities.

6.2.2 The oil shall comply with the physico-chemical requirements as in table 1 and other bench-test requirements as specified in this standard

Table 1 — Requirements for Physico-Chemical (other than viscosity)

No.	Characteristics	Requirement for Grade												
		SAE 0W	SAE 5W	SAE 10W	SAE 15W	SAE 20W	SAE 25W	SAE 20	SAE 30	SAE 40	SAE 50	SAE 60	Multi-Grade	Method of Test
1	Appearance	When examined in transmitted light in a colourless test tube of 25mm internal diameter, oil shall be clear, bright and free from turbidity and sediments.												
2	Viscosity index, (Min)	100	100	100	95	95	95	95	95	90	90	90	_	DUS 2042
3	Pour point, ^{0}C, (Ma)x	-33	-33	-27	-24	-21	-15	-9	-6	-6	-6	6	_	US 1730:2017
4	Flash point COC ^{0}C, (Min)	160	160	190	190	200	200	200	215	215	220	220	200 or 185	DUS 2040
5	Evaporative loss, %, (Max)	2+-0	20	20	25	25	15	15	10	10	10	10	22 or 20	DUS 2046

NOTE 1 For defence requirements pour point for SAE 40 shall be -18^{0}C, Max and for SAE 50 shall be -9^{0}C

NOTE 2 Flash point for multi grade is valid only for 0W-20, 5W-20, 5W-30, 10W-30 and for other multi grades it is not required

NOTE 3 Evaporation loss for SAE 0W-20, 5W-20, 5W-20, 5W-30, 10W-30 is 22 and for SAE 15W-40 it is 20

6.3 Viscosity Grades

6.3.1 The oils shall conform to one of the SAE mono-viscosity grades as in Table 2 or SAE multi-grades, which are combinations of W-Grades and other mono-grades, as for example: SAE 10 W and SAE 30 for the SAE 10W-30 grade. Viscosity limits for each of the mono-grades are also given in Table 2.

6.3.2 In case of multi-grades, the prescribed viscosity limits for both the constituent components of the multi-grade, shall be met.

Table 2 — Engine oil viscosity classification

SAE Viscosity grade	Low –temperature (^{o}C) Cranking Viscosity , mPa.s, (Max)[a]	Low temperature (^{o}C) Pumping Viscosity , mPa.s with no yield stress (Max)[b]	Low-Shear-Rate Kinematic Viscosity (mm^2/s) at 100 ^{O}C[c]		High-shear-Rate Viscosity mPa.s at 150 ^{o}C and 10^6 S[d]
			Min	Max	
0 W	6200 at -35	60 000 at -40	3.8	-	-
5 W	6600 at -30	60 000 at -35	3.8	-	-
10 W	7000 at -25	60 000 at -30	4.1	-	-
15 W	7000 at -20	60 000 at -25	5.6	-	-
20 W	9500 at -15	60 000 at -20	5.6	-	-
25 W	13000 at -10	60 000 at -15	9.3	-	-
8	-	-	4	<6.1	1.7
12	-	-	5.0	<7.1	2.0
16	-	-	6.1	<8.2	2.3
20	-	-	6.9	< 9.3	2.6
30	-	-	9.3	< 12.5	2.9
40	-	-	12.5	< 16.3	2.9 (0W-40, 5W-40 and 10W-40 grades)
40	-	-	12.5	< 16.3	3.7(15W-40,20W-40, 25W-40,40 grades)
50	-	-	16.3	< 21.9	3.7
60	-	-	21.9	< 26.1	3.7

[a] test method to be used is DUS 2056

[b] test method to be used is DUS 2044

[C] test method to be used is US ISO 3104:1994

[d] test method to be used is DUS 2043

6.4 Performance Categories

Candidate engine oils shall be formulated such that their engine oil specifications be of a quality level least equivalent to one of the performance categories for engine oil sequence given in Table 3.

Table 3 — Engine oil performance categories

Sequence	Performance Categories
API	SJ SL, SM, SN

NOTE: The consumer shall refer to the owner's or operator's manual for recommended category of engine oil to be used in a specific engine

6.4.1 Lubricants labelled or used as spark ignition engine oils under the API sequence shall have a performance not lower than that defined by API SJ

6.4.2 API categories, SL SM, SN which exceed the performance requirements of SJ, also meet the requirements of this standard.

6.5 Test requirements

All engine oil licensed under the API sequence in addition to meeting the requirements stipulated in clause 6 above, shall comply with laboratory tests requirements as specified in Annex A

7 Packaging and Labelling

7.1 Packaging

The condition of the drums or smaller containers and the bulk tankers into which the engine oil is filled shall have no detrimental effect on the quality of the engine oil during normal transportation and storage. Only containers of the same size filled with oil of the same batch identification shall be packed together in a carton. Prior to use, containers shall be firmly secured with a tamper-proof seal.

7.2 Labelling

Each container and each carton (if present) shall be legibly and indelibly marked with the following information in English language.

1. product name for single performance engine oil 'Petrol Engine Oil'
2. name and address of the manufacturer and registered trade mark if any and/or distributor's name;
3. category of oils according to API
4. API engine oil quality mark
5. SAE viscosity grade;
6. net content.
7. origin of the product/Made in.
8. date of production and the batch number

8 Sampling

The relevant sampling procedure given in US 1733:2017 or in DUS 1732:2017 shall be used to provide samples for testing

Annex A
(normative)

Laboratory/bench test requirements

A.1 API service category SN

Table A.1 — Laboratory/bench test requirements for API SN service category

Requirements	Test Method	Properties	Units	Limits
1.LABORATORY/BENCH TESTS				
Viscosity Grades	SAE J300	All those that apply, typically SAE 0W-20, 0W-30, 5W-20, 5W-30 and 10W-30	Manufacturer sets targets within SAE J300 specification	
Foam Tests	DUS 2041, Option A	Sequence I, tendency/stability[11], [12], (max)	ml	10/0
		Sequence II, tendency/stability [11], [12], (max)	ml	50/0
		Sequence III, tendency/stability[11], [12], (max)	ml	10/0
	DUS 2047, Option A	Sequence IV, tendency/stability) [11], (max)	ml	100/0
EOFT	DUS 2052	Filterability, (max)	% flow reduction	50
EOWTT	DUS 2063	Filterability with 0.6% Water, (max)	% flow reduction	50
		Filterability with 1.0% Water, (max)	% flow reduction	50
		Filterability with 2.0%, (max)	% flow reduction	50
		Water Filterability with 3.0% Water, (max)	% flow reduction	50
Aged Oil Low-Temperature Pumpability	DUS 2044	MRV TP-1 Apparent Viscosity and Yield Stress	cP and Pa	<60,000 cP with no yield stress [16] [17]
TEOST 33C	DUS 2048	High temperature deposits, (max)	total deposit weight, mg	30 [1], [2], [15]
TEOST MHT [9]	DUS 2054	High temperature deposits, (max0	deposit weight, mg	35 [3]
Emulsion retention	DUS 2062	Oil mixed with 10% Water and 10% E85	0˚C and 25˚C @ 24 hours	No water separation [2], [15]

Homogeneity & Miscibility	DUS 2053	Oil Compatibility	None	Pass [13]
Gelation Index [5]	DUS 2054	Scanning Brookfield Viscosity, Yield Stress, , (max)	Calculated	12 [2], [14]
Volatility	DUS 2046	Evaporation Loss (Noack), (max)	% off @ 250˚C	15 [8]
	DUS 2049	Simulated distillation (GCD), (max)	% off @ 371˚C	10
Ball Rust Test [5]	DUS 2050	Rust rating, (min)	Average Gray Value	100
Elastomer compatibility				
Polyacrylate Rubber ACM-1 (SAE J2643)	DUS 2060	Volume	% change	-5,9
	DUS 2061	Hardness	pts	-10,10
	DUS 2059	Tensile strength	% change	-40,40
Hydrogenated Nitrile HNBR-1 (SAE J2643)	DUS 2060	Volume	% change	-5,10
	DUS 2061	Hardness	pts	-10,5
	DUS 2059	Tensile strength	% change	-20,15
Silicone Rubber VMQ-1 (SAE J2643)	DUS 2060	Volume	% change	-5,40
	DUS 2061	Hardness	Pts	-30,10
	DUS 2059	Tensile strength	% change	-50,5
Fluorocarbon Rubber FKM-1 (SAE J2643)	DUS 2060	Volume	% change	-2,3
	DUS 2061	Hardness	pts	-6,6
	DUS 2059	Tensile strength	% change	-65,10
Ethylene Acrylic Rubber AEM-1 (SAE J2643)	DUS 2060	Volume	% change	-5,30
	DUS 2061	Hardness	pts	-20,10
	DUS 2059	Tensile strength	% change	-30,30
Phosphorus [9]	DUS 2045	Phosphorus content, (min)	%	0.06 [10]
Phosphorus [9]	DUS 2045	Phosphorus content, , (max)	%	0.08 [4], [10]
Sulfur [9]	DUS 2045	Sulfur content of SAE 0W and 5W multi grades, , (max)	%	0.5 [4], [10]
Sulfur [9]	DUS 2058	Sulfur content of SAE 10W multi grades, (max),max	%	0.6 [4], [10]

NOTE 1 If CCS viscosity measured is less than or equal to the maximum CCS viscosity specified for the original viscosity grade, run DUS 2044 at the low-temperature pumping viscosity temperature specified in SAE J300 for the original viscosity grade.

NOTE 2 If CCS viscosity measured is higher than the maximum CCS viscosity specified for the original viscosity grade in SAE J300, run DUS 2044 at 5°C higher temperature.

(1)Not required for SAE 0W-20.

(2)Not required for SN Non-ILSAC GF-5 viscosity grades

(3)45 max for SN Non-ILSAC GF-5 viscosity grades.

(4)No maximum for SN Non-ILSAC GF-5 viscosity grades.

(8)Calculated conversions specified in DUS 2046 are allowed.

(9)For all viscosity grades: If API CH-4, CI-4 and/or CJ-4 categories precede the “S” category and there is no API Certification Mark, the “S” category limits for phosphorus, sulfur, and the TEOST MHT do not apply. However, the CJ-4 limits for phosphorus and sulfur do apply for CJ-4 oils.

(10)This is a non-critical specification as described in DUS 2066.

(11)After 1-minute settling period for all ILSAC viscosity grades and all SN-RC oils.

(12)After 10-minute settling period for non-ILSAC GF-5 viscosity grades which are not SN-RC.

(13)Shall remain homogeneous and, when mixed with ASTM reference oils, shall remain miscible.

(14)To be evaluated from –5˚C to temperature at which 40,000 cP is attained or –40˚C, or 2 Celsius degrees below the appropriate MRV TP-1 temperature (defined by SAE J300), whichever occurs first.

(15)Not Required for SN ILSAC GF-5 viscosity grades which do not also contain the API Certification Mark or are not SN-RC.

(16)The aged oil is an end-of-test sample generated either in the Sequence IIIGA test (DUS 2055) or the ROBO test (DUS 2065).

(17)The temperature at which the DUS 2044 (MRV TP-1) test is conducted is determined by first measuring the low-temperature cranking viscosity (CCS) of the aged oil sample at the temperature corresponding to the original viscosity grade in SAE J300.

A.2 API service category SM

Table A.2 — Laboratory/bench test requirements for API SM category

1. LABORATORY/BENCH TESTS				
1.1 Viscosity Grades	SAE J300	All those that apply, typically SAE 0W-20, 0W-30, 5W-20, 5W-30 and 10W-30.		Manufacturer sets targets within SAE J300 specification
1.2 Foam Test	DUS 2041 (Option A)	Sequence I, tendency/stability [1]	ml initial Foam/ml after settling	10/0 max
		Sequence II, tendency/stability [1]		50/0 max
		Sequence III, tendency/stability [1]		10/0 max
	DUS 2047	Sequence IV, tendency/stability [2]		100/0 max
1.3 Phosphorus	DUS 2045	Phosphorus content	%	0.06 min
				0.08 max [3]
1.4 EOFT	DUS 2052	0.6% Water - with dry ice - % reduction in flow	% reduction	50 max
1.5 EOWTT	DUS 2063	with 0.6% Water	% reduction	50 max
		with 1.0% Water	% reduction	50 max
		with 2.0% Water	% reduction	50 max
		with 3.0% Water	% reduction	50 max
1.6 TEOST (MHT4)	DUS 2054	Total Deposits	mg	35 max [4]
1.7 Homogeneity & Miscibility	DUS 2053	Oil Compatibilty		pass [5]
1.8 Gelation Index [6]	DUS 2054	Scanning Brookfield Viscosity, Yield Stress	Calculated	12 max [7]
1.9 Volatility	DUS 2046	Volatility (Noack)	% off @ 250˚C	15 max
	DUS 2049	Volatility (GCD)	% off @ 371˚C	10 max
1.10 Ball Rust Test [6]	DUS 2050	Rust rating	Avg Gray Value	100 min
1.11 Sulfur	DUS 2045 or	Sulfur content of SAE 0W and 5W multigrades	%	0.5 max [3]
	DUS 2058	Sulfur content of SAE 10W multigrades	%	0.7 max [3]
1.12 Aged Oil Low-Temperature Pumpability [3]	DUS 2044	MRV TP-1 Apparent Viscosity and Yield Stress	cP and Pa	<60,000 cP with no yield stress [8] [9]

(1) Stability after 10-minute settling period.

(2) Stability after 1-minute settling period.

(3) Not required for non-ILSAC GF-4 viscosity grades.

(4) 45 max for non-ILSAC GF-4 viscosity grades.

(5) Shall remain homogeneous and, when mixed with ASTM reference oils, shall remain miscible.

(6) If API CI-4 and/or CJ-4 categories precede the"S" category and there is no API Certification Mark, the Sequence VG (DUS 2051), Ball Rust (DUS 2050), and Gelation Index (DUS 2057) tests are not required.

(7) To be evaluated from –5˚C to temperature at which 40,000 cP is attained or –40˚C, or 2 Celsius degrees below the appropriate MRV TP-1 temperature (defined by SAE J300), whichever occurs first.

(8) The aged oil is an end-of-test sample generated in the Sequence IIIGA test (DUS 2055).

(9) The DUS 2044 (MRV TP-1) test is conducted at the original SAE J300 viscosity grade temperature if the measured CCS viscosity is less than or equal to the original viscosity grade maximum; and at 5°C higher temperature otherwise.

A.3 API service category SJ AND SL

Table A.3 — Laboratory/bench test requirements for API SJ and SL category

Requirements	Test	Properties	Units	Limits	
				SJ	SL
1 Laboratory/bench Tests					
Viscosity Grades		All those that apply, typically SAE 0W-20, 0W-30, 5W-30 and 10W-30.		Manufacturer sets targets within SAE J300 specification	
Foam Test	DUS 2041	Sequence I, (max)	ml initial Foam / ml after settling	10/0	10/0
		Sequence II, (max)		50/0	50/0
		Sequence III , (max)		10/0	10/0
		Sequence IV, (max)		200/50	100/0
Phosphorus	DUS 2045 or DUS 2064	Phosphorus Content, (max)	%	0.10	0.10 (1)

EOFT	DUS 2052	0.6% Water - with dry ice - % reduction in flow, (max)	%	50	50
EOWTT	DUS 2063	0.6% Water - without dry ice - % rate of change , (max)	%	Report	50
		1.0% Water - without dry ice - % rate of change , (max)	%	Report	50
		2.0% Water - without dry ice - % rate of change (max)	%	Report	50
		3.0% Water - without dry ice - % rate of change (max)	%	Report	50
TEOST	DUS 2048	Total Deposits, (max)	mg	60	NR
TEOST (MHT4)	DUS 2054	Total Deposits, (max)	mg	NR	45
Homogeneity and Miscibility	DUS 2053	Oil Compatibility	-	pass	pass
Scanning Brookfield	DUS 2057	Gelation Index	-	12	12
Volatility	DUS 2046	Volatility (Noack), % off, (max)	%	22	15
	DUS 2049	Volatility (GCD), % off, (max)	%	17	10
BRT (ball rust test)	DUS 2050	Rust rating, (min)	Gray value	100	100
NOTE There is also a 0.08 min P requirement, unless a successful Sequence VG test has been run					

Annex B
(informative)

Current and Obsolete Categories of Spark Ignition Application Engine Oils

B.1 API Categories

Current and previous API service categories are listed below. For automotive gasoline engine, the latest API service category includes performance properties of each earlier category and can be used to service older engines where earlier category oils are recommended.

Table B.1 — Current and obsolete API categories for Spark Ignition application Engine Oil.

Category	Status	Service
SN	Current	Introduced in October 2010 for 2011 and older vehicles, designed to provide improved high temperature deposit protection for pistons, more stringent sludge control, and seal compatibility. API SN with Resource Conserving matches ILSAC GF-5 by combining API SN performance with improved fuel economy, turbocharger protection, emission control system compatibility, and protection of engines operating on ethanol-containing fuels up to E85.
SM	Current	For 2010 and older automotive engines.
SL	Current	For 2004 and older automotive engines.
SJ	Current	For 2001 and older automotive engines.
SH	Obsolete	For 1994-1997 and older requirements for automotive engines
SG	Obsolete	Introduced 1989 has much more active dispersant to combat black sludge
SF	Obsolete	CAUTION: Not suitable for use in gasoline-powered automotive engines built after 1988
SE	Obsolete	CAUTION: Not suitable for use in gasoline-powered automotive engines built after 1979.
SD	Obsolete	CAUTION: Not suitable for use in gasoline-powered automotive engines built after 1971. Use in more modern engines may cause unsatisfactory performance or equipment harm.
SC	Obsolete	CAUTION: Not suitable for use in gasoline-powered automotive engines built after 1967. Use in more modern engines may cause unsatisfactory performance or equipment harm.
SB	Obsolete	CAUTION: Not suitable for use in gasoline-powered automotive engines built after 1951. Use in more modern engines may cause unsatisfactory performance or equipment harm.
SA	Obsolete	CAUTION: Contains no additives. Not suitable for use in gasoline-powered automotive engines built after 1930. Use in more modern engines may cause unsatisfactory performance or equipment harm.
Note: categories indicated as obsolete do not meet requirements for this standard or any other related Uganda standard on Engine Oil		

Bibliography

[1] ACEA European Oil Sequences 2012. Service fill oils for Gasoline engines, light duty diesel engines, engines with after treatment devices and heavy duty engine oils

[2] ASTM D4485 Standard Specification for Performance of Active API Service Category Engine Oils

[3] API 1509, Engine oil licensing and certification system

[4] SAE J300, Engine oil viscosity classification

[5] SANS 1516:2005 High performance engine lubricating oil for petrol engines (for API service category SJ)

[6] US 249:2000/ EAS 159, Specification for engine oil

[7] DUS 249-3 Engine Oil- Performance Classification- Part 3- Specification for Compression Ignition Engines

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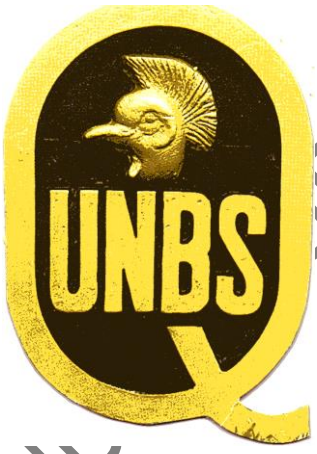

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