

# DRAFT UGANDA STANDARD

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



Reference number  
DUS 249-5: 2018

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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 Products*].

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 classification*:

- — *Part 1: General*
- — *Part 2: Specification for Spark Ignition (petrol) engines*
- — *Part 3: Specification for light and heavy duty 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 publication 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, JASO and ISO Oil sequences

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

## 1 Scope

This Draft Uganda standard specifies requirements and test methods for motorcycle engine oils for two-stroke cycle spark ignition gasoline engines that employ a crankcase scavenging system and are used in transportation and leisure applications

This Standard specifies the performance classification of two-stroke cycle gasoline engine oils based on the API classification, JASO and ISO classifications

## 2 Normative references

The following referenced documents referred to in the text in such a way that some or all of their content constitutes requirements 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.

US ISO 2719, *Determination of flash point -- Pensky-Martens closed cup method*

DUS ISO 3104, *Petroleum products -- Transparent and opaque liquids -- Determination of kinematic viscosity and calculation of dynamic viscosity*

DUS ISO 3987, *Petroleum products — Lubricating oils and additives — Determination of sulfated ash*

DUS ISO 13738-2011 *Lubricants, industrial oils and related products (class L) -- Family E (Internal combustion engine oils) -- Specifications for two-stroke-cycle gasoline engine oils (categories EGB, EGC and EGD)*

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

US 249-1, *Engine Oil- Performance Classification- Part 1- General*

## 3 Terms and definitions

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

### 3.1

#### **candidate oil**

Two-stroke cycle engine oil whose performance is subject to DUS 249-5:2018

### 3.2

#### Reference oil

Two-stroke cycle engine oil of known performance that is used for comparison to categorize the performance of the candidate oil.

## 4 Abbreviated terms

For the purposes of this standard, the following abbreviations in DUS 249- 1:2018 and the following apply:

### 4.1

#### JASO

Japanese Automobile Standards Organization.

## 5 Requirements

### 5.1 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.

#### 5.1.1 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.

#### 5.1.2 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.

#### 5.1.3 Physico-Chemical Requirements

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

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

### 5.2 General Performance requirements

Candidate two-stroke cycle engine oils shall be formulated such that their engine performance requirements be of one of the performance categories for engine oil specifications given in Table 1.

**Table 1 — Engine oil performance categories**

Specifications	Categories
API	TC
ISO	EGB, EGC, EGD
JASO	FB, FC, FD
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	

**5.2.1** Current obsolete categories are TA TB and TD under the API classification and FA under JASO classification

**5.2.2** Lubricants labelled or used in two- stroke cycle motorcycle gasoline engines must have a performance not lower than that defined by API TC, ISO EGB and JASO FB

### 5.3 Physical and chemical property requirements

In addition to prescribed performance requirements, candidate oil shall also satisfy the physical and chemical property requirements given in Table 2 and Table 3. These physical and chemical properties have been selected to minimize internal leakage in oil injection pumps and reduce the tendency toward pre-ignition due to ash-derived combustion chamber deposits.

**Table 2 — Physical and chemical property requirements for ISO category**

Requirement	Limit	Method
Kinematic viscosity at 100 °C, mm <sup>2</sup> /s	≥ 6.5	DUS ISO 3104
Sulfated ash mass %	≤ 0.18	DUS ISO 3987

**Table 3 — physic-chemical properties required for JASO and API category**

Item	Performance classification applied	Limit	Test method
Kinematic Viscosity, (min)	FB, FC/TC,FD	6.5	DUS ISO 3104
Flash point °C, (min)	FB, FC/TC,FD	70	US ISO 2719
Sulfated Ash mass %, (max)	FD	0.25	DUS ISO 3987
		0.18	

## 6 Packaging and Labelling

### 6.1 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, the containers shall be firmly secured with tamper- proof seal.

### 6.2 Labelling

The following information shall appear in legible and indelible marking on each container and each carton (if used):

- a) product name and application
- b) Category of engine oil the manufacturer's identification and/or distributor's name;
- c) SAE viscosity grade
- d) Relevant quality and certification marks
- e) batch identification
- f) net content (L)

g) Origin of the product/Made in.

h) Expiry date

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## Annex A (normative)

### Performance requirements in the laboratory test

#### A.1 ISO category

The ISO performance requirements of two-stroke engine oils shall be classified into three grades, as indicated in Table A.1, based on the six performance indices derived from four engine tests. The grades are EGB, EGC and EGD, from lower to higher performance. A standard reference oil, designated JATRE-1, shall be used in all test methods and its performance establishes the standard index of 100.

Regarding the classification of candidate oil, each performance index of the candidate oil shall meet the standard index given in Table A.1, candidate oil shall be classified according to the lowest category to which any one of the six candidate performance indices corresponds.

In the case of multiple engine tests being used to assess a candidate oils performance, a statistically based methodology should be used. For two tests, the mean of the candidate performance indices shall be equal to or exceed the standard index. For three or more tests, one test shall be discarded, and the mean of the remaining performance indices shall be equal to or exceed the standard index.

**Table A.1 — Performance requirements according to ISO category**

Performance parameter	Minimum performance requirement <sup>(a)</sup>			Test procedure
	EGB	EGC	EGD	
Lubricity	95	95	95	DUS ISO 13738-2011
Initial torque	98	98	98	
Detergency	85	95	–	
	–	–	125	
Piston skirt deposits	85	90	–	
	–	–	95	
Exhaust smoke	45	85	85	
Exhaust system Blocking	45	90	90	

<sup>(a)</sup> Each number represents an index, taking JATRE-1 as 100.

#### A.2 JASO category

The JASO performance level of 2 stroke oils is classified into three grades, FB, FC, and FD, according to the test result based on the mentioned test method in table A.2

The FC grade is defined for low smoke 2 cycle oils superior to FB with regard to exhaust smoke and exhaust system blocking. FD grade is defined as improved version of FC in terms of detergent performance at high temperature

NOTE FA grade was abolished in order to maintain consistence with ISO classification.

The evaluation items for the JASO test procedures and standard indices for each performance classification are shown in table A 2

**Table A.2 — Performance requirements according to JASO category**

Evaluation item			Standard index (min)			Test procedure
			FB	FC/TC <sup>(1)</sup>	FD	
Lubricity			95	95	95	DUS ISO 13738-2011
Initial Torque			98	98	98	
Detergency	Evaluation after 60, (min)	Fundamental part	85	95	-	
		Piston Skirt Part	-	-	-	
	Evaluation after 180, (min)	Fundamental part	-	-	125	
		Piston Skirt Part	-	-	95	
Exhaust Smoke			45	85	85	
Exhaust system Blocking			45	90	90	
<sup>(1)</sup> API category TC has equivalent Performance specifications to JASO category FC						

## ANNEX B (informative)

### Current and Obsolete engine oil Categories for 2 stroke cycle motorcycle gasoline engine applications

#### B.1 JASO Specifications

**Table B.1 — showing current JASO categories for two stroke cycle motorcycle Engine Oil**

Category	status	Service
FA	abolished	Original spec established regulating lubricity, detergency, initial torque, exhaust smoke and exhaust system blocking
FB	Current	Increased lubricity, detergency, exhaust smoke and exhaust system blocking requirements over FA.
FC	Current	Lubricity and initial torque requirements same as FB, however far higher detergency, exhaust smoke and exhaust system blocking requirements over FB.
FD	current	Same as FC with far higher detergency requirement.

#### B.2 ISO Specifications

The performance of two-stroke cycle motorcycle engine oils is classified into three grades, as indicated in Table B.2, based on the six performance indices derived from four engine tests from lower to higher performance

**Table B.2 — showing current and ISO categories for 2 stroke Spark Ignition application Engine Oil**

Category	status	service
ISO-L-EGB	Current	Same requirements as JASO FB + test for piston cleanliness
ISO-L-EGC	Current	Same requirements as JASO FC + test for piston cleanliness.
ISO-L-EGD	Current	Same requirements as JASO FD + test for piston cleanliness + detergent effect.

### B.3 API Specifications

For 2 stroke motorcycle gasoline engine oil, 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.3 — showing current and obsolete API categories for 2 stroke Spark Ignition application Engine Oil**

Spec	Status	Description
TA	Obsolete	Proposed classification for two-stroke engine oils required for extremely-small engines, typically less than 50 cc. Engine Tests for this classification were under preparation when the Coordinating European Council (CEC) withdrew support for this category.
TB	Obsolete	Proposed classification for two-stroke engine oils required for the engines of motor scooters and other highly-loaded small engines, typically between 50 and 200 cc. The test sponsor no longer requires this category, and the classification has been abandoned.
TC	Current	Designed for various high-performance engines, typically between 200 and 500 cc, such as those on motorcycles and snowmobiles, and chain saws with high fuel-oil ratios - but not outboards. Two-cycle engine oils designed for API Classification TC address ring-sticking, pre-ignition and cylinder scuffing problems.
TD	Obsolete	Designed for water-cooled outboard engines, this classification used the identical engine test to that in the National Marine Manufacturers association (NMMA) TC-W category. API TD has been superseded, and is no longer accepted by the NMMA, who now recommend oils meeting the requirements of TC-W3 for water-cooled outboard engines.

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## Annex C (informative)

### Supplementary information on the purpose and use of this International Standard

#### C.1 General

This Standard, specifies the performance classification of two-stroke cycle motorcycle gasoline engine oils, based on physical and chemical properties, and performance indices which are derived from six important performance parameters: lubricity, initial torque, detergency, piston skirt deposits, exhaust smoke and exhaust system blocking. This Standard is based upon the test procedures and specifications developed by the Japanese Automobile Standards Organization (JASO) of the Japanese Society of Automotive Engineers (JSAE).

JASO was joined in this effort by the American Society for Testing and Materials (ASTM) and the Coordinating European Council for the development of performance tests for fuels, lubricants and other fluids (CEC). The CEC L-079-A-99 test method was developed by CEC L-058 with the assistance of JASO. Subsequently, JASO expanded their performance classification system to include a new category, JASO FD. A similar test procedure to the CEC L-079-A-99 detergency test procedure was developed. Equivalency between data obtained using either of these two test procedures has been established and either test may be used to develop data for use in ISO-L-EGD or JASO FD. At the same time that JASO added the category FD, they also deleted the category FA. The ISO and JASO performance classification systems for two-stroke cycle engine oils are now harmonized.

## Bibliography

- [1] JASO M340, Two-stroke-cycle gasoline engine - engine oils - lubricity test
- [2] JASO M341 Two-stroke-cycle gasoline engine - Engine oils - Detergency test
- [3] JASO M342, Two-stroke cycle gasoline engine - Engine oils -Smoke test
- [4] JASO M343, Two-stroke-cycle gasoline engine - engine oils - Exhaust blocking system test
- [5] JIS K 2283, Crude Petroleum and Petroleum Products - Determination of Kinematic Viscosity and Calculation of Viscosity Index from Kinematic Viscosity

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