
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)

Lubrifiants, huiles industrielles et produits connexes (classe L) — Famille E (Huiles pour moteurs à combustion interne) — Spécifications applicables aux huiles pour moteurs deux-temps à essence (catégories EGB, EGC et EGD)



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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 13738 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*, Subcommittee SC 4, *Classifications and specifications*.

Annex A of this International Standard is for information only.

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WARNING — The handling and use of products specified in this International Standard may be hazardous, if suitable precautions are not observed. This International Standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this International Standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1 Scope

This International Standard specifies the requirements of lubricating oils, hereinafter referred to as "two-stroke oil", to be used in two-stroke-cycle spark-ignition gasoline engines which employ a crankcase-scavenging system and are used in transportation, leisure and utility applications such as motorcycles, snowmobiles and chainsaws.

Annex A (clause A.4) covers two-stroke outboard motor applications.

The performance requirements of two-stroke oils classified in all of the categories covered by ISO 6743-15 which defines the classification of internal combustion engine oils, EGB, EGC and EGD, are embraced in this International Standard.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 6743-15:2000, *Lubricants, industrial oils and related products (class L) — Classification — Part 15: Family E (Internal combustion engine oils)*.

ISO 3987:1994, *Petroleum products — Lubricating oils and additives — Determination of sulfated ash*.

ISO 3104:1994, *Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity*.

JASO M340-92, *Lubricity test procedure for evaluating two-stroke gasoline engine oils*.

JASO M341-92, *Detergency test procedure for evaluating two-stroke gasoline engine oils*.

JASO M342-92, *Smoke test procedure for evaluating two-stroke gasoline engine oils*.

JASO M343-92, *Exhaust system blocking test procedure for evaluating two-stroke gasoline engine oils*.

CEC L-079-T-97, *Two stroke gasoline engine detergency test (Honda AF 27 motor scooter engine)*.

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

3.1

lubricity

qualitative term describing the ability of a lubricant to minimize friction between, and damage to, metal surfaces in relative motion under load

3.2

initial torque index

relative average output torque of the reference oil and the candidate oil at 200 °C in the lubricity test

3.3

detergency

property of an engine oil to prevent and/or remove deposits from the surfaces of an engine resulting in a degree of cleanliness of the interior engine parts with respect to deposits, such as varnish and carbon, originating from the engine oil or the fuel

3.4

exhaust smoke

visible emissions which consist of solid particulates and aerosol droplets from unburned or partially burned engine oil and/or fuel and which are emitted from an exhaust pipe

3.5

exhaust-system blocking

accumulation of deposits, usually from unburned portions of the engine oil and/or fuel, in an exhaust system consisting of cylinder exhaust port, exhaust pipe and muffler

3.6

reference oil

prepared two-stroke oil, of known performance, which is used for comparison to categorize the performance of a candidate oil

3.7

candidate oil

two-stroke oil whose performance is subject to evaluation in the test method

3.8

lubricity index

initial torque index

detergency index

exhaust smoke index

piston-skirt deposit index

exhaust-system blocking index

relative performance indices which are determined by comparing the weighted test results of the candidate oil with the weighted test results of the reference oil and normalizing the weighted test results of the reference oil to 100

NOTE In all cases, these are performance indices, which may require, in some test methods, calculating the inverse ratio of candidate and reference-weighted test results.

3.9

standard index

index which specifies the minimum performance level required for a candidate oil to be classified in the category defined by the standard index

3.10**cold sticking of piston rings**

condition in which the ring is free in its groove while the engine is running but stuck when the piston is cold, normally indicated by the absence of varnish or other deposits on the outer face of the ring and no signs of blowby on the piston skirt

NOTE There will be no associated power loss.

3.11**hot sticking of piston rings**

condition in which the ring is stuck in its groove while the engine is running, normally indicated by varnish or other deposits on the outer face of the ring, by signs of blowby on the piston skirt, or both

NOTE There may be associated power loss.

4 Two-stroke oil requirements**4.1 Requirements for physical and chemical properties**

In addition to prescribed performance requirements, a candidate oil shall also satisfy the physical and chemical property requirements given in Table 1. These physical and chemical properties have been selected to minimize internal leakage in oil injection pumps and reduce the tendency toward preignition due to ash-derived combustion chamber deposits.

Table 1 — Requirements for physical and chemical properties for ISO two-stroke oil standards

Requirement	Limit	Test method
Kinematic viscosity at 100 °C, mm ² /s	$\geq 6,5$	ISO 3104
Sulfated ash, % (m/m)	$\leq 0,18$	ISO 3987

4.2 Performance requirements

The performance of two-stroke oils is classified into three grades, as indicated in Table 2, 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, is used in all test methods and its performance establishes the standard index of 100.

Table 2 — Performance requirements according to category

Performance parameter	Minimum performance requirements ^a			Test procedure
	EGB	EGC	EGD	
Lubricity	95	95	95	JASO M340-92
Initial torque	98	98	98	JASO M340-92
Detergency	85	95	—	JASO M341-92
	—	—	125	CEC L-079-T-97
Piston-skirt deposits	85	90	—	JASO M341-92
	—	—	95	CEC L-079-T-97
Exhaust smoke	45	85	85	JASO M342-92
Exhaust-system blocking	45	90	90	JASO M343-92
^a Each number represents an index, taking JATRE-1 oil as 100.				

Regarding the classification of a candidate oil, each performance index of the candidate oil shall be at least equal to the standard index given in Table 2. A candidate oil shall be classified according to the lowest category to which any one of the six candidate performance indices corresponds.

NOTE An example of the assignment of a category to a candidate oil is given in annex A.

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

Annex A

(informative)

Supplemental information on purpose and use of this International Standard

A.1 Introduction

This International Standard, elaborated in 1996, specifies the performance classification of two-stroke-cycle 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 International 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 lubricants and engine fuels (CEC). The CEC L-079-T97 test method was developed by CEC L-058 with the assistance of JASO. Lubricants complying with this International Standard may be applied to crankcase-scavenged two-stroke-cycle spark-ignition gasoline engines used in transportation, leisure and utility applications such as motorcycles, snowmobiles and chainsaws.

Clause A.4 covers two-stroke outboard motor applications.

A.2 Purpose

The aim of this International Standard is to correctly classify two-stroke oils according to their performance level. The intent is to enable engine manufacturers to better communicate the lubricant needs of their engines to consumers and thus assist the consumer in selecting the proper lubricant from the many available in the marketplace. By doing so, it is hoped that the service life of two-stroke-cycle engines may be extended, thereby increasing consumer satisfaction.

A.3 Examples of assignment of performance classifications to two different two-stroke oils

Candidate oils A and B are shown in Table A.1. Candidate oil A is assigned the classification EGC, while candidate oil B is classified EGB. Note that although candidate oil B meets the lubricity, initial torque, detergency, piston-skirt deposits and exhaust-system blocking requirements of EGC, it fails to meet the exhaust-smoke requirement of EGC and, therefore, shall be classified no higher than EGB.