



WORKING DRAFT EAST AFRICAN STANDARD

Automotive manual transmission gear oils Extreme Pressure (EP) —
Specification

EAST AFRICAN COMMUNITY

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Foreword

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The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the Principles and procedures for development of East African Standards.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC068, Petroleum and Petroleum Products.

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Automotive manual transmission gear oils Extreme Pressure (EP) — Specification

1 Scope

This Draft East African Standard specifies requirements, methods of sampling and test for automotive manual transmission (extreme pressure) gear oils. The standard only covers declares a minimum performance level of GL4.

2 Normative references

The following documents are 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.

ASTM D 92, *Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester*

ASTM D97, *Standard Test Method for Pour Point of Petroleum Products*

ASTM D445, *Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)*

ASTM D 1298, *Standard Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method*

ASTM D 4052, *Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter*

ASTM D 2270, *Practical for calculating viscosity index from kinematic viscosity at 40 °C and 100 °C*

ASTM D4057, *Standard Practice for Manual Sampling of Petroleum and Petroleum Products*

ASTM D4177, *Standard Practice for Automatic Sampling of Petroleum and Petroleum Products*

SAE J306, *Grade transmission and axle classification*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 additives

material added to the lubricant for the purpose of imparting new properties or enhancing existing properties

3.2 base oil

base stock or a blend of two or more base stocks used to produce finished lubricants, usually in combination with additives

3.3 extreme pressure (EP) lubricant
 extreme pressure gear lubricant made from base oil and extreme pressure additives specifically introduced to reduce the effects of metal to metal contact in the operation of high load gears and bearings by forming a protective film during friction conditions

3.5 gear oils
 lubricants made specifically for transmissions, transfer cases, and differentials in automobiles

3.6 automotive manual transmission
 type of transmission in which the gears are changed manually including manual gearboxes, axles, hypoid gears, differentials, transfer boxes.

4 Requirements

4.1 General requirements

4.1.1 Automotive manual transmission (EP) gear oils shall:

- a) be formulated using base oils and extreme pressure additives that may be added to improve its properties as necessary to meet the requirements of the standard.
- b) be clear, homogenous, free from water, suspended matter and sediment.
- c) be classified based on SAE viscosity grades and performance designation of API.
- d) consist of homogeneous petroleum or synthetically prepared product or combination thereof, with additives necessary to meet the requirements.
- e) be free from water, suspended matter, dust, sediment or any other extraneous impurities.

4.1.2 The base oil used in formulating automotive manual transmission (EP) gear oils shall comply with EAS 1103.

4.2 Specific requirements

4.2.1 Automotive manual transmission (EP) gear oils shall be classified according to the SAE viscosity grades as specified in Table 1.

4.2.2 The automotive manual transmission (EP) gear oils may be sold in any of the SAE viscosity monograde or multigrade with a range of kinematic viscosity at 100 °C specified in table 1.

Table 1 — SAE J306 grade transmission and axle classification

SAE Viscosity Grades	Maximum Temperature for Viscosity of 150,000 cP (°C)	Kinematic Viscosity at 100 °C(cSt)	
		Minimum	Maximum
70W	-55	3.8	—
75W	-40	3.8	—
80W	-26	8.5	—
85W	-12	11.0	—
65		3.8	5.0
80	—	7.0	<11.0
85	—	11.0	<13.5
90	—	13.5	<18.5
110	—	18.5	<24.0
140	—	24.0	<32.5
190	—	32.5	<41.0
250	—	41.0	—
NOTE — W stands for winter.			

4.2.3 The automotive manual transmission (EP) gear oils shall comply with the physical and chemical requirements prescribed in table 2 when tested according to the method prescribed therein.

Table 2 — Physical and chemical requirements for automotive manual transmission (EP) gear oils

S/NO.	Characteristic		Requirement						Test method
	SAE Grade		75W -90	90	80W - 90	85W - 90	140	85W-140	
i)	Viscosity index min.		140	96	101	99	93	97	ASTM D 2270
ii)	Pour point °C max.		-48	-9	-27	-15	-6	-12	ASTM D 97
iii)	Specific gravity at 15 °C, max.		0.91	0.91	0.91	0.91	0.91	0.91	ASTM D 1481 ASTM D 1298 ASTM D 4052
iv)	Timken OK load	GL4	23	23	23	23	23	23	ASTM D 2509 ASTM D 2782
v)	kgf, min.	GL5	45	45	45	45	45	45	
vi)	Total acid No., KOH, mg/g, max.		0.5	0.5	0.5	0.5	0.5	0.5	ASTM D 974
vii)	Flash Point (CoC) °C, min.		205	224	216	232	238	244	ASTMD 92
a									

5.7 All automotive manual transmission (EP) gear oils brands marketed shall have to be enlisted in the API directory or licenses or proved that the formulation used conforms to the claimed API classification or any other institution through a certification from reputable additive manufacturers.

6 Packaging

6.1 The automotive manual transmission (EP) gear oils shall be packaged in suitable containers that will safeguard their quality during transportation and storage.

6.2 Only containers of the same size filled with the product from the same batch shall be packaged together.

6.3 Packaging shall be done only by authorized entities.

7 Labelling

7.1 The following information shall be clearly labelled on the container, or on a label affixed to the container:

- a) name and physical address of the manufacturer or supplier
- b) name of the product as “Automotive manual transmission gear oil”;
- c) performance level (API gl4, gl5...);
- d) viscosity grade of the product (whether monograde or multigrade);
- e) batch number/identification;
- f) net content;
- g) date of manufacture; and
- h) country of origin.

7.2 For bulk transportation, the above information shall be provided in the documentation accompanying the product.

8 Sampling

Sampling shall be done according to ASTM D4057 or ASTM D4177.

Annex A (informative)

API axle and manual transmission lubricant classification

A.1 General

The API, in a joint effort with the SAE and ASTM, has assigned performance designations to differentiate the various load-carrying capabilities of automotive transmission and axle lubricants.

The API axle and manual transmission lubricant classification system includes seven classes of service, of which two are current.

A.2 API GL specification

A.2.1 API GL5 (current) extreme pressure (EP)

Designates the type of service characteristic of gears, particularly hypoids in automotive axles operated under high-speed and/or low-speed, high-torque conditions. Lubricants qualified under U.S military specification MIL-L-2105D (formerly ML-L-2105C) satisfy the requirements of the API GL5 designation.

A.2.2 API MT-1 (current)

Designates lubricants intended for non-synchronized manual transmissions used in buses and heavy-duty trucks. Lubricants meeting API MT-1 provide protection against the combination of thermal degradation, component wear and oil seal deterioration which is not provided by lubricants meeting only the requirements of API GL4 and GL 5.

A.2.3 API GL-6 (in active) – Mild (EP)

Designates the type of service characteristic of gears designated with a very high pinion offset. Such designs typically require (gear) score protection in excess of that provided by API GL 5 gear oils. A shift to more modest pinion offsets, coupled with the obsolescence of original API GL 6 test equipment and procedure, has greatly diminished the commercial need for API GL 6 gear lubricant.

A.2.4 API GL 4 (current) – Lower level of EP

A.2.4.1 Designates the type of service characteristic of spiral-bevel and hypoid gears in automotive axles operated under moderate speeds and loads. These oils may be used in selected manual transmission and transaxle applications (user should consult axle/transmission manufacturer specific lubricant recommendations).

A.2.4.2 While this service designation is still used commercially to describe lubricants, some test equipment used for performance verification is no longer available.

A.2.5 API GL-3 (obsolete)

A.2.5.1 Designates the type of service characteristic of manual transmissions and spiral-bevel axles operating under mild to moderate to severe conditions of speed and load. The service conditions require a lubricant having load-carrying capacities greater than those that will satisfy API GL1 service, but below the requirements of lubricants satisfying API GL4 service.

A.2.5.2 Gear lubricants designated for API GL 3 are not intended for hypoid gear applications.

A.2.6 API GL-2 (obsolete)

A.2.6.1 Designates the type of service characteristic or automotive type worm-gear axles operating under such conditions of load, temperature and sliding velocities that lubricants satisfy for API GL1 will not suffice.

A.2.6.2 Products suited for this type of service contain antiwear or very mild extreme-pressure agents which provide protection for worm gears.

A.2.7 API GL1 (obsolete)

A.2.7.1 Designates the type of service characteristics of manual transmissions operating under such mild condition of low unit pressures and minimum sliding velocities, that untreated oil may be used satisfactorily. Oxidation and rust inhibitors, defoamers, and pour depressants may be used to improve the characteristics of lubricants intended for this service. Frictional modifiers and extreme pressure additives shall not be utilized.

A.2.7.2 Due to speeds and loads involved, untreated oil without oxidation and rust inhibitor additives is generally not a satisfactory lubricant for many passenger car manual transmissions. For some truck and tractor manual transmissions, untreated oils may be used successfully. In all cases, the transmission manufacturers' specific lubricant recommendations should be followed

Bibliography

TZS 675: 12018, Multipurpose automotive gear lubricants (EP) – Specification

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