

KES

Specification of Transmission Oil

KES B-M037

(EST.) 1988 - 01 - 10

Contents

1. Scope of Application
2. Kind
3. Quality
4. Sampling Method
5. Testing Method
6. Inspection
7. Submission of Inspection Results
8. Alteration of Content and Maker



1. Scope of Application

This standard specifies the transmission oils (Hereinafter referred to as "oil") used at factory and market for lubrication and wear proofing of automobile gears, and also specifies its testing methods.

2. Kind

The kind of the oil shall be classified as shown in Table 1 according to the gears used, period of use and the accuracy of the gears applied.

3. Quality

The oil shall carry proper quality as the lubricant for various gears of automobiles and also shall not contain water nor a precipitate as a mineral oil mixed with an additioner, and shall satisfy the requirements of the Table 2 to 9 when tested according to item 5.

4. Sampling Method

The sampling method for test shall conform to KS M 2001 (Method of sampling crude oils and petroleum products).

5. Testing Method

5.1 Color

Shall conform to KS M 2106 [Testing method for color of petroleum products (ASTM scale)].

5.2 Specific Weight

Shall conform to KS M 2002 (Testing method for specific gravity of crude petroleum oil and its products).

5.3 Flash Point

Shall conform to KS M 2010 (Testing method for flash point of crude oil and petroleum products)

5.4 Pour Point

Shall conform to KS M 2016 (Testing method for pour point and cloud point of crude oil and petroleum products)

Table 1. Kind of oil

General name	Application gear	SAE grade	Material symbol
EP gear oil	Helical gear Bevel gear Worm gear	75W	O-HE01
		80	O-HE02
		90	O-HE03
		140	O-HE04
		80W - 90	O-HE11
		85W - 140	O-HE12
Long life EP gear oil	Helical gear Bevel gear Worm gear	80	O-HL02
		90	O-HL03
		140	O-HL04
		80W - 90	O-HL11
		85W - 140	O-HL12
Hypoid gear oil	Hypoid gear	80	O-HP02
		90	O-HP03
		140	O-HP04
Long life Hypoid gear oil	Hypoid gear	75W	O-HG01
		80	O-HG02
		90	O-HG03
		140	O-HG04
		75W - 80	O-HG13
		80W - 90	O-HG11
		85W - 140	O-HG12
		80W - 90	O-HR11
Rack and pinion Gear oil	Rack gear Pinion gear	85W - 140	O-HR12

5.5 Viscosity

Shall conform to KS M 2014 (Testing methods for kinematic viscosity and calculating method for viscosity index of crude oil and petroleum products).

5.6 Low Temperature Viscosity

Shall conform to ASTM D 2893 (Low temperature viscosity or automotive fluid lubricants measurer by brookfield viscometer).

5.7 Neutralization Number

Shall conform to KS M 2024 (Testing methods for neutralization number of petroleum products by color-indicator titration) or KS M 2004 (Testing methods for neutralization number of petroleum products).

5.8 Copper Corrosion

Shall conform to KS M 2018 (Testing methods for copper corrosion of petroleum products)

5.9 Foaming Characteristics

Shall conform to KS M 2025 (Testing method for foaming characteristics of petroleum products).

5.10 Aniline Point

Shall conform to KS M 2053 (Testing method for aniline point and mixed aniline point of petroleum products).

5.11 Rust-preventing Characteristics

Shall conform to KS M 2009 (Testing method for rust-preventing characteristics of lubricating oil).

5.12 Analysis of Phosphour

Shall conform to ASTM D 1091

However, the maker's test method, only if approved by the material research part of KIA, may be applied.

5.13 Analysis of Zn

Shall conform to the maker's test method. However, in advance, this test method shall be approved by the material research part of KIA.

5.14 Analysis of Cl

Shall conform to ASTM D 1317 or ASTM D 808 (Method for analysis of chlorine).

5.15 Analysis of S

Shall conform to KS M 2027 (Testing methods for sulfur in crude oil and petroleum products). However, the test method others than this, if necessary, shall conform to 5.12.

5.16 Mixed Characteristics

Two different kind of oils shall be mixed to 1:1 in volume rate and then retained for 3 hours at $120 \pm 1^\circ\text{C}$, and further the state of seperating or precipating shall be checked and recorded. In this time, the name of the different oil shall be written beside the results.

5.17 Friction Coefficient

This shall be measured by the SAE Type II pendulum or a friction coefficient tester equivalent to this. In this time, the type of tester used shall be written.

5.18 Oil Seal Characteristics

Shall conform to the testing methods for anti-rubber characteristics specified in KS M 2141 (Non-petroleum base motor vehicle brake fluids). However, the material of the rubber shall be determined according to the agreements between the parties concerned and shall be written in the test reporter. Also, as for the test condition, the temperature and the time shall be $100 \pm 2^\circ\text{C}$ and 200 hours respectively.

5.19 Oxidation Stability Characteristics

Shall conform to KS M 2008 (Testing method for oxidation stability of turbine oil). However, as for the test condition, the air flow rate the test time and the test temperature shall be $9 \pm 0.5 \text{ l/hr}$, 100 hr and $140 \pm 10^\circ\text{C}$, respectively.

5.20 Insoluble n-pentane

Shall conform to KS M 2221 (Testing methods for insolubles in used lubricating oils).

5.21 Extreme Pressure Characteristics

Shall conform to KS M 2026 (Testing for load carrying capacity of petroleum products)

5.22 Falex Load

Shall conform to ASTM D 3233 (Measurement of extreme pressure properties of fluid lubricants).

5.23 Timken Load

Shall conform to ASTM D 2782 (Measurement of extreme pressure properties of lubricants fluid).

5.24 Friction Flux Point

Shall conform to NDS XXK 2740 (Testing methods for oil film strength).

5.25 Shear Stability Characteristics

Shall conform to ASTM D 2603 (Test for sonic shear stability of polymer containing oil).

5.26 Falex Wear Quantity

Shall conform to ASTM D 2670 (Measurement wear properties of fluid lubricants).

Table 2. EP gear oil single grade

No.	Material symbol		O-HE01	O-HE02	O-HE03	O-HE04	Testing method
	SAE						
	Item		75W	80	90	140	
1	Color ASTM		Report				5.1
2	Specific weight 15/4°C		Report				5.2
3	Flash point °C		180 or more		190 or more	200 or more	5.3
4	Pour point °C		-30 or less	-20 or less	-12.5 or less	-5 or less	5.4
5	Viscosity cst	40°C	Report				5.5
		100°C	4.1 or more	9.5 - 11.5	17 - 20	27 - 30	
6	Viscosity index		100 or more	90 or more	85 or more		5.5
7	Low temperature viscosity 15000 cp °C		-40 or less	-26 or less	—		5.6
8	Neutralization number mg KOH/gr		Report				5.7
9	Copper corrosion 100°C 24Hr		2 or less				5.8
10	Foaming characteristics ml	SEQ I	50 or less - 0				5.9
		SEQ II	50 or less - 0				
		SEQ III	50 or less - 0				
11	Aniline point °C		100 or more				5.10

Table 2 (Continued)

No.	Material symbol		O-HE01	O-HE02	O-HE03	O-HE04	Testing method	
	SAE		75W	80	90	140		
	Item							
12	Rust-preventing characteristics	Distilled water	No rust				5.11	
		Artificial sea water	No rust					
13	Metallic element	P	Report				5.12	
		Zn	Report				5.13	
		Cl	Report				5.14	
		S	Report				5.15	
14	Mixed characteristics		No precipating, no seperating				5.16	
15	Friction coefficient	0°C	Report				5.17	
		25°C	Report					
		50°C	Report					
		100°C	Report					
16	Oil seal characteristics 100 ± 2°C 200 Hr	Nitril rubber	Change in hardness Hs	±10				5.18
			Change in volume %	-5 - 10				
			Physical appearance	No defects such as precipating of carbon black and others				
		Acryl rubber	Change in hardness Hs	±10				
			Change in volume %	-5 - 10				
			Physical appearance	No defects such as precipating of carbon black and others				
		Silicon rubber	Change in hardness Hs	±10				
			Change in volume %	-5 - 10				
			Physical appearance	No defects such as procipitating of carbon black and others				

Table 2 (Continued)

No.	Material symbol		O-HE01	O-HE02	O-HE03	O-HE04	Testing method
	SAE		75W	80	90	140	
Item							
17	Oxidation stability 140±1°C 100Hr Air 9±0.5 l /Hr	Viscosity index	40°C	1.2 or less			5.19
			100°C	1.2 or less			
		Change in neutralization number mgKOH/g		1.0 or less			
		Insoluble n-pentane wt%		1.0 or less			
		Load-resistance characteristics	4-aall kg/cm ²	3.0 or more	3.5 or more		
			Falex kg	Report			
		Friction flux point kg/cm ²		4.0 or more	4.5 or more		
		Copper corrosion		3 or less			
		Cotalyst corrosion		No change and no change in color			
18	4 ball	Limit accepted load kg/cm ²		4.0 or more	3.5 or more		5.21
		Limit burned load kg/cm ²		4.5 or more	4.0 or more		
19	Falex fail load kg		Report			5.22	
20	Timken load kg		Report			5.23	
21	Wear amount	4-ball mm		0.5 or less			5.21
		Falex teeth number		Report			5.26
22	Friction flux point kg/cm ²		5.0 or more	5.5 or more		5.24	
23	Shear stability characteristics	Change in viscosity % 40°C		20 or less			5.25
		Change in viscosity % 100°C		20 or less			
		Viscosity index		Report			