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Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

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/TC 068, Petroleum and petroleum products.

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

Lubricating grease — Specification

1 Scope

This Draft East African Standard specifies performance requirements of four classes of lubricating grease, namely industrial non-extreme pressure, industrial high-performance extreme pressure, automotive non-extreme pressure, and automotive and multi-purpose extreme pressure, each in four consistency grades, and all of which can contain suspended solid lubricants.

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 93, Standard test methods for flash point by Pensky-Martens closed cup tester

ASTM D 95, Standard test method for water in petroleum products and bituminous materials by distillation

ASTM D 217, Standard test methods for cone penetration of lubricating grease

ASTM D 445, Standard test method for kinematic viscosity of transparent and opaque liquids (and calculation of dynamic viscosity)

ASTM D 566, Standard test method for dropping point of lubricating grease

ASTM D 942, Standard test method for oxidation stability of lubricating greases by the oxygen pressure vessel method

ASTM D 1263, Standard test method for leakage tendencies of automotive wheel bearing greases

ASTM D 1264, Standard test method for determining the water washout characteristics of lubricating greases

ASTM D 1742, Standard test method for oil separation from lubricating grease during storage

ASTM D 1743, Standard test method for determining corrosion preventive properties of lubricating greases

ASTM D 1831, Standard test method for roll stability of lubricating grease

ASTM D 2265, Standard test method for dropping point of lubricating grease over wide temperature range

ASTM D 2266, Standard test method for wear preventitive characteristics of lubricating grease (four-ball method)

ASTM D 2509, Standard test method for measurement of load-carrying capacity of lubricating grease (Timken method)

ASTM D 2596, Standard test method for measurement of extreme-pressure properties of lubricating grease (four-ball method)

ASTM D 4048, Standard test method for detection of copper corrosion from lubricating grease

ASTM D 4049, Standard test method for determining the resistance of lubricating grease to water spray

ASTM D 4057, Standard Practice for manual sampling of petroleum and petroleum products

ASTM D 4289, Standard test method for elastomer compatibility of lubricating greases and fluids

ASTM D 4290, Standard test method for determining the leakage tendencies of automotive wheel bearing grease under accelerated conditions

IP 34, Determination of flash point - Pensky-Martens closed cup method

IP 50, Determination of cone penetration of lubricating grease

IP 71, Petroleum products – Transparent and opaque liquids – Determination of kinematic viscosity and calculation of dynamic viscosity

IP 132, Petroleum products – Lubricating grease – Determination of dropping point

IP 220, Petroleum products and lubricants – Determination of rust-prevention characteristics of lubricating greases

IP 396, Determination of dropping point of lubricating grease – Automatic apparatus method

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

additive

compound added to lubricating grease to improve either the performance of the grease, or its storage stability (or both)

3.2

lubricating grease

semi-solid to solid product consisting of a stabilized mixture of liquid lubricant with soaps or other thickeners, that may contain other additives imparting special properties.

4 Requirements

4.1 General requirements

- 4.1.1 Lubricating grease shall;
 - a) consist of base oil, a thickening agent and acceptable additives with the ability to resist changes in structure and consistency during service; and
 - b) be homogeneous, free from lumps, abrasive matter and any other impurities that might have a deleterious effect on its performance.

4.2 Base oil

The base oil used in the manufacture of the Lubricating grease shall comply with the relevant requirements in table 1 and table 2 with regard to the class (see clause 1) and the consistency grade of the grease.

4.3 Grease

Lubricating grease shall comply with the relevant requirements in table 1 and table 2, appropriate to the consistency grade of the grease as specified by the purchaser.

4.4 Specific requirements

Lubricating grease shall comply with the requirements given in Table 1 and Table 2 when tested in accordance with the test methods specified therein

S/NO.	Property	Requirement										
			Industrial nor	n-EP ^a		Industrial h	igh perfor EP ^a	mance	method			
				Consi	stency g	ade						
a)	Grease	0	1	2	3	1	2	3				
i)	Penetration	355 to	310 to	265 to	220 to	310 to	265 to	220 to	ASTM D			
	mm	385	340	295	250	340	295	250	217			
				Ŷ					IP 50			
ii)	Drop point, °C,	90	90	90	90	180	180 or	180 or	ASTM D			
	min.					or	260b	260 ^b	566			
						260 ^b			2265			
									or IP 132			
									IP 396			
iii)	Water washout	10	10	10	10	-	-	-	ASTM D			
	mass), max.	N							1204			
iv)	Water washout					15	15	15	ASTM D			
	mass), max.								1204			
v)	Water spray-off	-	-	-	-	20	20	20	ASTM D			
	mass), max.								4049			
vi)	Oil separation,	10	10	8	5	6	6	6	ASTM D			
	max.								1742			
vii)	Rust prevention	Pass	Pass	Pass	Pass	-	-	-	ASTM D 1743			
viii)	Rust EMKOR ^c , SKF ^c	-	-	-	-	Pass	Pass	Pass	IP 220			
ix)	4 ball wear,	-	-	-	-	0.90	0.90	0.90	ASTM D			
	mm, max.								2200			

Table 1 — Specific requirements for industrial greases and their base oils

x)	4 ball EP load wear index, kgf, min.	-	-	-	-	30	30	30	ASTM D 2596	
xi)	4 ball EP weld point, kgf, min.	-	-	-	-	200	200	200	ASTM D 2596	
xii)	Timken ok load, kg, min.	-	-	-	-	25	25	25	ASTM D 2509	
xiii)	Worked stability, change in penetration between 60and 20 000 double strokes, %, max.	10	10	10	10	-	-	on on	ASTM D 217	
xiv)	Worked stability, change in penetration between 60 and 100 000 double strokes, %, max.	-	-	-	-	10	10	10	ASTM D 217	
xv)	Bearing leakage at 160 °C, g, max.	-	-	-	< <u>C</u>	10	10	10	ASTM D 4290	
xvi)	Copper corrosion at 100 °C	1	1		1	1	1	1	ASTM D 4048	
xvii)	Oxidation stability after 100 h, kPa, max.	70	70	70	70	50	50	50	ASTM D 942	
xviii)	Water content, % (by mass), max.	2.0	2.0	2.0	2.0	0.5	0.5	0.5	ASTM D 95	
xix)	Roll stability, % change, max.	20	20	20	20	10	10	10	ASTM D 1831	
xx)	Elastomer compatible volume change		-	-	-	-5 to +30	-5 to +30	-5 to +30	ASTM D 4289	
xxi)	Elastomer compatible hardness change	-	-	-	-	-15 to +2	-15 to +2	-15 to +2	ASTM D 4289	
xxii)	Soap type	Report				Report				
xxiii)	Type of suspended solid lubricant	Report				Report				
xxiv	Suspended solid lubricant addition, % (by mass)	Report				Report	Report			
b)	Base oil	1								
i)	Kinematic	22 to 460	22 to	22 to	22 to	68 to	68 to	68 to	ASTM D	

	viscosity at 40		460	460	460	1000	1000	1000	445			
	C, mm-/s								or IP 71			
ii)	Flash point, °C, min.	180	180	180	180	200	200	200	ASTM D 93 or IP 34			
^a EP	^a EP extreme pressure.											
^b It is recommended that the drop point should be agreed on by the purchaser and the supplier and the following is												
offered as a guideline:												
For operating temperatures up to 120 °C : drop point of 180 °C min. For operating temperatures up to 150 °C drop point of 260 °C min.												

^c Rust tests approved by EMKOR and SKF bearing companies

S/NO.	Property				Requir	ement				Test
			Automotive	non-EP ^a		Automo	tive and	multi-pu ª	rpose	method
			Γ	С	onsister	ncy grade			[
a)	Grease	0	1	2	3	0	2	21/2	3	
i)	Penetration	355 to	310 to	265	220	355 to	265 to	250 to	220 to	ASTM D
	mm	385	340	295	250	385	295	280	250	217 IP 50
ii)	Drop point, °C, min.	90	90	90	90	180	180	180	180	ASTM D 566
			0							ASTM D 2265
										or IP 132
										IP 396
iii)	Water washout at 38 °C, % (by mass), max.	10	10	10	10	-	-	-	-	ASTM D 1264
iv)	Water washout at 79 °C, % (by mass), max.	-	-	-	-	15	15	15	15	ASTM D 1264
S S	Water spray- off at 38 °C, % (by mass), max.	-	-	-	-	20	20	20	20	ASTM D 4049
vi)	Oil separation, % (by mass), max.	10	10	8	5	10	8	6	5	ASTM D 1742
vii)	Rust prevention	Pass	Pass	Pass	Pass	-	-	-	-	ASTM D 1743
viii)	Rust EMKOR⁰,	-	-	-	-	Pass	Pass	Pass	Pass	IP 220

Table 2 — Specific requirements for automotive and multi-purpose greases and their base oils

	SKF⁰									
ix)	4 ball wear, scar diameter, mm, max.	-	-	-	-	0.90	0.90	0.90	0.90	ASTM D 2266
x)	4 ball EP load wear index, kgf, min.	-	-	-	-	30	30	30	30	ASTM D 2596
xi)	4 ball EP weld point, kgf, min.	-	-	-	-	200	200	200	200	ASTM D 2596
xii)	Timken ok load, kg, min.	-	-	-	-	18	18	18	18	ASTM D 2509
xiii)	Worked stability, change in penetration between 60and 20 000 double strokes, %, max.	10	10	10	10	d'		PL.	-	ASTM D 217
xiv)	Worked stability, change in penetration between 60 and 100 000 double strokes, %, max.	-	-	J	5	10	10	10	10	ASTM D 217
xv)	Bearing leakage at 105 °C, g, max.	7	54	7	7	-	-	-	-	ASTM D 1263
xvi)	Bearing leakage at 160 °C, g, max.		-	-	-	10	10	10	10	ASTM D 4290
xvii)	Copper corrosion at 100 °C	1	1	1	1	1	1	1	1	ASTM D 4048
xviii)	Oxidation stability after 100 h, kPa, max.	70	70	70	70	50	50	50	50	ASTM D 942
xix)	Water content, % (by mass), max.	2.0	2.0	2.0	2.0	0.5	0.5	0.5	0.5	ASTM D 95
xx)	Roll stability, % change, max.	20	20	20	20	10	10	10	10	ASTM D 1831
xxi)	Elastomer compatible volume	-	-	-	-	-5 to +30	-5 to +30	-5 to +30	-5 to +30	ASTM D 4289

	change												
xxii)	Elastomer compatible hardness change	-	-	-	-	-15 to +2	-15 to +2	-15 to +2	-15 to +2	ASTM D 4289			
xxiii)	Soap type	Report				Report							
	Type of suspended solid lubricant	Report				Report				1			
	Suspended solid lubricant addition, % (by mass)	Report				Report			h.	~ /			
b)	Base oil												
i)	Kinematic 22 to 22 to 22 to 22 to 22 to 68 to 68 to 68 to 68 to 40 viscosity at 40 EC, mm²/s 460 460 460 460 1000												
ii)	Flash point, °C, min.	180	180	180	180	200	200	200	200	ASTM D 93 or IP 34			
^a EP: extrem	EP: extreme pressure.												
^b aRust tests	aRust tests approved by EMKOR and SKF bearing companies.												

6 Packaging

6.1 The lubricating grease 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

7 Labelling

7.1 The containers shall be legibly and indelibly labelled with the following information:

- a) name of the product as "lubricating grease";
- b) description of product for example "Industrial non-EP lubricating grease, Industrial high performance EP lubricating grease, Automotive non-EP lubricating grease or Automotive and multi-purpose EP lubricating grease";

c) name and physical address of the manufacturer, registered trade mark or distributor's;

d) type of thickener used;

- e) batch identification number;
- f) net content;
- g) date of manufacture;
- h) shelf life;
- i) country of origin; and

consistency grade of the product. j)

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

8 Sampling

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Annex A

(informative)

Compatibility and application

A.1 Compatibility and application

A.1.1 Compatibility

A.1.1.1 The mutual compatibility of greases depends on the thickeners and the additives present and shall usually be determined in experiments. Incompatibility manifests itself in structural changes, particularly after short, moderate heating of the mixture, which affects the working penetration, oil separation, dropping points, etc.

A.1.1.2 Changes in properties caused by a change in the formulation cannot be predicted exactly, even when the same soaps or oils are used.

A.1.1.3 Greases that contain the same soap type are usually compatible with each other.

A.1.1.4 Table A.1 contains compatibility guidelines for the different types of grease and can be used as a guideline when recommending greases to end users.

NOTE Not all types of grease are compatible, for grease compatibility, contact supplier".

A.1.2 Application

Table A.2 contains application guidelines for the different types of grease and can be used as a guideline when recommending greases to end users.

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1	2	3	4	5	6	7	8	9	10	11	12	13	14
Properties	Aluminium complex	Barium	Calcium	Calcium 12H ^a	Calcium complex	Clay	Lithium	Lithium 12H ^a	Lithium complex	Polyurea	Sodium	Calcium sulfonate	Lithium calcium mixture
Aluminium complex	С	I	I	С	I	I	I	I	С	I	I	I	Ι
Barium	I	С	I	С	I	I	I	I	I	I	I	I	Ι
Calcium	I	I	С	С	I	В	С	В	С	I	В	С	В
Calcium complex	I	I	I	В	С	I	I	I	В	С	I	С	I
Clay	I	I	С	С	I	С	I	I	I	I	I	I	Ι
Lithium	I	I	С	С	I	I	С	С	С	I	I	В	С
Lithium 12H ^a	I	I	В	С	I	I	С	С	С	I	I	В	С
Lithium complex	С	I	С	С	В	I	С	С	С	I	I	С	В
Polyurea	I	I	I	I	С	I	I	I	I	С	I	В	Ι
Sodium	I	Ι	I	I	Ι	I	I	I	Ι	Ι	С	I	Ι
Lithium calcium mixture	Ι	Ι	В	В	Ι	I	С	С	В	Ι	Ι	В	С
Calcium sulfonate	I	I	С	С	С	I	В	В	С	В	I	С	В
а													
12H: 12-hydroxyst	earate.												
NOTE In the table	,												
C indicates com	patibility												
I indicates inco	mpatibility												
B indicates bord	lerline compati	bility.											

Table A.1 — Compatibility guidelines for lubricating greases by thickener type

1	2	3	4	5	6	7	8	9	10	11	12	13
Properties	Aluminium	Sodium	Calcium – conventional	Calcium – anhydrous	Lithium	Aluminium complex	Calcium complex	Lithium complex	Polyurea	Calcium sulfonate	Organo clay	Lithium calcium mixture
Dropping point, EF	230	325-350	205-220	275-290	350-400	500+	500+	500+	470	500+	500+	350-400
Dropping point, EC	110	163-177	96-104	135-143	177-204	260+	260+	260+	243	260+	260+	177-204
Maximum usable temperature, EF	175	250	200	230	275	350	350	350	350	350	350	275
Maximum usable temperature, EC	79	121	93	110	135	177	177	177	177	177	177	135
Water resistance	Good to excellent	Poor to fair	Good to excellent	Excellent	Good	Good to excellent	Fair to excellent	Good to excellent	Good to excellent	Good to excellent	Fair to excellent	Good to excellent
Work stability	Poor	Fair	Fair togood	Good to excellent	Good to excellent	Good to excellent	Fair to good	Good to excellent	Poor to good	Good to excellent	Fair to good	Good to excellent
Oxidation stability	Excellent	Poor to good	Poor to excellent	Fair to excellent	Fair to excellent	Fair to excellent	Poor to good	Fair to excellent	Good to excellent	Good	Good	Fair to excellent
Protection against rust	Good to excellent	Good to excellent	Poor toexcellent	Poor to excellent	Poor to excellent	Good to excellent	Fair to excellent	Fair to excellent	Fair to excellent	Good to excellent	Poor to excellent	Fair to excellent
Pumpability (in centralized systems)	Poor	Poor to fair	Good to excellent	Fair to excellent	Fair to excellent	Fair to good	Poor to fair	Good to excellent	Good to excellent	Good	Good	Fair to excellent
Oil separation	Good	Fair to good	Poor to good	Good	Good to excellent	Good to excellent	Good to excellent	Good to excellent	Good to excellent	Good to excellent	Good to excellent	Good to excellent
Appearance	Smooth and clear	Smooth to fibrous	Smooth and buttery	Smooth and buttery	Smooth and buttery	Smooth andbuttery	Smooth andbuttery	Smooth andbuttery	Smooth andbuttery	Smooth and buttery	Smooth and buttery	Smooth andbuttery
Other properties	EP ^a grades available	Adhesive and cohesive	EP ^a grades available	EP ^a grades available	EP ^a grades available, reversible	EP ^a grades available, reversible	EP ^a and anti-wear inherent	EP ^a grades available	EP ^a grades available	EP ^a and anti-wear inherent	EPªgrades available	EP ^a grades available
Principal uses	Thread lubricants	Rolling contact bearings	General uses foreconomy	Military multiservice ^ь	Multi- service ^b automotive and	Multi- service ^b and industrial	Multiservice ^b automotive and industrial	Multiservice ^b automotive and industrial	Multiservice ^b automotive and industrial	Multiservice ^b automotive and industrial	High temp. (frequent relube)	Multi- service ^b automotive &industrial

Table 4 — Grease application guide by thickener type

						industrial							
а	^a EP: extreme pressure.												
b	Multiservice includes rolling contact bearings, plain bearings, and others.												

Annex B

(normative)

Quality verification of lubricating grease

B.1 Quality verification

B.1.1 When a purchaser requires ongoing verification of the quality of lubricating grease, it is suggested that, instead of concentrating solely on evaluation of the final product, he also direct his attention to the manufacturer's quality system. In this connection it should be noted that SANS 9001 covers the provisions of an integrated quality system.

B.1.2 If the lubricating grease does not bear the certification mark and no information about the implementation of quality control or testing during manufacture is available to help in assessing the quality of a consignment, and a purchaser wishes to establish, by inspection and testing of samples of the final product, whether a consignment of lubricating grease complies with this standard, the sampling procedure given in ASTM D 4057 can be used.

NOTE The sampling procedure applies to fully manufactured products only.

B.2 Sampling and compliance with this standard

B.2.1 Sampling

B.2.1.1 General

The sampling procedure given in B.2.1.2 shall be used in determining whether a lot complies with the relevant requirements of this standard. The samples so drawn shall be deemed to represent the lot.

B.2.1.2 Samples for inspection and testing

After checking for compliance with the relevant requirements of 7.1 and 7.2, the relevant sampling procedure given in ASTM D 4057 shall be used to determine whether a lot complies with this standard, and the samples so taken shall be deemed to represent the lot for the respective properties.

B.2.2 Compliance with this standard

Deem the lot to comply with the relevant requirements of this standard if, on inspection of the containers and on testing of the sample taken in accordance with B.2.1.2, no defective is found.

Bibliography

TZS 798: 12021, Lubricating Grease - Specification

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