



DRAFT EAST AFRICAN STANDARD

Metal cutting oil — Specification

EAST AFRICAN COMMUNITY

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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*.

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Metal cutting oil — Specification

1 Scope

This Draft East African Standard specifies requirements, sampling and test methods for neat cutting oils (straight oils) and soluble cutting oil concentrates (water-miscible fluids).

2 Normative references

The following referenced documents are indispensable for the application 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 D1662, *Standard Test Method for Active Sulfur in Cutting Oils*

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

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

ASTM D92, *Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester*

ISO 2592, *Petroleum and related products — Determination of flash and fire points — Cleveland open cup method*

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

ASTM D4052, *Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter*

ASTM D664, *Standard Test Method for Acid Number (Neutralization Number) of Petroleum Products by Potentiometric Titration*

ASTM D482, *Standard Test Method for Ash from Petroleum Products*

ASTM D95, *Standard Test Method for Water in Petroleum Products and Bituminous Materials by Distillation*

ISO 2160, *Petroleum products — Determination of Total Contamination by the Laboratory Turbidimetric Method*

IP 154, *Determination of Flocc Point of Petroleum Products*

ASTM D130, *Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test*

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>

— IEC Electropedia: available at <https://www.electropedia.org/>

3.1 neat cutting oils (straight)
high performance non-water-miscible lubricating oils used directly, without dilution, to provide lubrication and cooling for metal surfaces during cutting operations

3.2 soluble cutting oil/ water-miscible
concentrated oil product that requires dilution with water to create an aqueous emulsion (a cloudy, milk-like liquid) to provide lubrication and cooling for metal surfaces during cutting operations

4 categories of metal cutting oils

4.1 Neat cutting oils (straight)

The oil shall be of the following types and grades:

- 4.1.1 Type 1 - without added sulphur (Grade I, II and III).
- 4.1.2 Type 2 - non-staining, sulphurized (Grade I, II, III and IV).
- 4.1.3 Type 3 - staining, sulphured (Grade I, II and III).

4.2 Soluble cutting oil/ water-miscible

5 Requirement.

5.1 General requirements

- 5.1.1 The oil shall be a homogenous blend of fatty or mineral oils or both with or without additives.
- 5.1.2 The oil shall be clear and free from any ingredients injurious to persons handling it.
- 5.1.3 The oil should be free from any pungent or unpleasant odour.
- 5.1.4 The oil shall remain uniform in proper storage and shall not be separated by gravity into light and heavy oil components outside the viscosity limit.

5.2 Specific requirements

Metal cutting oil and fluid shall conform to the specific requirements given in Table 1 and Table 2. when tested in accordance with the methods prescribed therein.

Table 1 — Requirements and testing methods for neat cutting oils (straight)

S/N o.	Property	Requirement										Test Method
		Type 1			Type 2				Type 3			
		Grade I	Grade II	Grade III	Grade I	Grade II	Grade III	Grade IV	Grade I	Grade I	Grade I	
	Ash, percent by mass, max	0.01	0.01	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05	ASTM D874
	Acidity, organic [mg of potassium hydroxide (KOH) per g of oil], Max	3	5	7	7	7	7	7	7	7	7	ASTM D 974/ ASTM D 664
	Acidity inorganic [mg of potassium hydroxide (KOH) per g of oil]	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Test method
	copper strip corrosion for 3h at 100°C, max	1B	1B	1B	2B	2B	2B	2B	Staining			ISO 2160/ASTM D 130
	Flash point, closed (Pensky Martens), in 10°C, min	85	160	160	100	130	160	160	160	160	160	ASTM D93/ISO
	Kinematic viscosity at 40 °C, cSt,	3 - 9	15 -30	15 - 30	9 - 14	15 - 25	30 - 45	45 - 65	15 -25	26-40	40 -60	ASTM D445
	Thermal stability test	pass			pass				pass			ASTM D6743 / GB/T 23800
	Saponifiable matter, percentage by mass, min	-	9	16	5	9	9	9	5	10	18	ASTM D94/ISO 6293:1983
	Reactive sulphur at 100 °C, percentage by mass	-			0.05, max				0.5, min			ASTM D1662

Table 2 — Requirements and testing methods for soluble cutting oils

S/No.	Property	Requirement	Test Method
i.	Ash, percent by mass, max.	3.5	ASTM D874
ii.	Density	report	Test method
iii.	Water, percent by mass, max.	10	ASTM D6304 ISO 6296 ISO 20764
iv.	Emulsion test, 5 :1 and 20 :1 ratio in water of 400 ppm hardness (as CaCO ₃ ,)	0 .1 ml oil and 0.2 ml cream	IS 1448 (Part 98) ASTM D3707
v.	Frothing test, 5:1 and 20:1 ratio in 200 ppm hardness (as CaCO ₃ ,)	No froth after 15 minutes	IS 1448 (Part 99)
vi.	Cast iron corrosion test, 20:1 ratio emulsion with 400 ppm hard water (as CaCO ₃), max.	0/1 - 1	IP 125
vii.	copper corrosion, max	1b	ISO 2160 ASTM D 130
viii.	Kinematic viscosity at 40 °C, cSt,	report	ASTM D445
ix.	Thermal stability test	pass	ASTM D6743 GB/T 23800
x.	Flash point (COC), min.	150	ASTM D92
xi.	Volatile matter at 100°C for 16 h, percent by mass, max.	20	ASTM D6304
xii.	PH (5 % solution)	8.5 – 9.8	ISO 7129

6 Packaging and labelling

6.1 Packaging

The condition of the containers shall not be detrimental to the quality of the metal cutting oil during transportation and storage. The containers shall be acceptably sealed or leakproof, corrosion resistant, heat resistant, clean, and free from materials soluble in the product.

6.2 Labelling

Each container and bulk package shall bear (in prominent legible and indelible marking) the following information:

- a) manufacturer's name and physical address;
- b) trademark (if any);
- c) name of product as "metal cutting oil";
- d) type and grade for neat cutting oil;
- e) instructions for storage, use, and disposal;
- f) batch identification;

- g) dates of manufacture and expiry;
- h) net contents in metric units;
- i) safety precautions as applicable; and
- j) country of origin.

7 Sampling

Sampling shall be done in accordance with ISO 3170

PUBLIC REVIEW DRAFT

Bibliography

- [1] IS 3065:1985 specification for cutting oil, neat
- [2] IS 1115, Specification for general purpose cutting oil, soluble

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