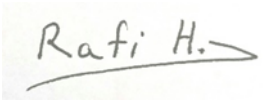
Israel Electric Corp. Ltd. Generation & Energy Group Generation, Engineering and Maintenance Division Chief Chemist Department	
Specification No. 1000	**Technical Specification for Chemicals and similar materials**
Version: 03	
First Version: 20/08/2010	
Valid since: 05/11/2025	
Page 1 of 10	**Category: Turbine Oils**
Cancels and replaces Specification No. 1000 version 02	

IEC Specification

MINERAL TURBINE OILS ISO VG 32/46 FOR STEAM, GAS TURBINES AND COMBINED CYCLE TURBINES

	Name	Date	Signature
Updated by	Nasim Abu Shkara	05/11/2025	
Checked by	Dr. Rafi Halaui	05/11/2025	
Approved by	Perry Shoshany	05/11/2025	

1. **Purchaser:** Israeli Electric Corporation (IEC)

2. **Scope**:

This specification covers zinc-free and ashless turbine oils for use in Israel Electric Corporation (*Israel Electric*) steam turbines, heavy-duty gas turbines and combined cycle systems applications under most severe operating conditions.

3. **IEC Catalog No.**

Catalog No.	Description
4571717	Mineral turbine oil ISO VG 32 , TYPE: **MOBIL DTE 832** Package : 190-210L Barrel
5249721	Mineral turbine oil ISO VG 46 , TYPE: **MOBIL DTE 846** Package : 190-210L Barrel
5018623	Mineral turbine oil ISO VG 32 , TYPE: **RENOLIN ETERNA 32** Package : 190-210L Barrel
5018621	Mineral turbine oil ISO VG 46 , TYPE: **RENOLIN ETERNA 46** Package : 190-210L Barrel
5250180	Mineral turbine oil ISO VG 32 , TYPE: **AGIP OTE GT 32** Package : 190-210L Barrel
5250181	Mineral turbine oil ISO VG 46 , TYPE: **AGIP OTE GT 46** Package : 190-210L Barrel
5367775	Mineral turbine oil ISO VG 32 , TYPE: **TURBO OIL T 32** Package : 190-210L Barrel
5019114	Mineral turbine oil ISO VG 46 , TYPE: **TURBINOL X-EP 46** Package : 190-210L Barrel
5238582	Mineral turbine oil ISO VG 32 , TYPE: **MOL TURBINE 32K** Package : 190-210L Barrel

4. **Physical and Chemical Requirements**

The proposed product shall comply with the physical and chemical properties mentioned in table 1 and table 2 (see Appendix No. 1).

5. **RESPONSIBILITY OF OIL VENDOR**

It is generally recognized that turbine lubricating fluid should be a petroleumderivative free fromwater, sediment, inorganic acids, or any material which, in the service specified, would be injurious to the oil or the

equipment.There should be no tendency toward permanent emulsification or rapid oxidationwith the formation of sludge.

The responsibility of supplying the proper oil for the lubricating system to meet this instruction rests with the oil vendor and the turbine operator. The oil vendor is expected to make recommendations to the turbine

It is the responsibility of the oil vendor to ensure that the supplied product is not contaminated during shipment.

The delivery transport system shall be adequately clean with no residual matter or fluid which could mix with and contaminate or degrade the lubricant. Special care and attention shall be given to this matter.

The oil vendor shall provide information to the end customer regarding provisions taken to avoid contamination

during shipment.

6. Packaging and Marking

6.1 The product shall be supplied according to the package sizes mentioned in paragraph 3.

6.2 The product shall be delivered in new and original manufacturer's package.

6.3 Packages shall comply with packaging and labeling requirements of Israeli Standard No. 2302.

6.4 The package shall be made of appropriate materials and shall be in excellent conditions. Details on the containers shall be provided by the bidder on presenting the proposal for IEC's approval.

6.5 The label on the package shall include the following details:

- Product Name
- Manufacturer’s Name
- Part Number
- Material description and concentration
- Net volume (L) of package
- Distinctive lot or production batch number
- Date of manufacture
- Date of expiration
- Safety Marking

6.6 Marking shall be accomplished by stenciling or other similar process and shall be waterproof.

6.7 The label on the package shall include only the material supplied with the package.

7. Quality Assurance

7.1 The manufacturer shall have a certificate attesting compliance with the requirements of the international standard ISO 9001 valid for the scope of supply required in IEC specification.

7.2 The quality of the product is under the responsibility of the supplier.

8. Tender Documentation

The Supplier / Manufacturer shall submit with its offer to the tender the following documents in their latest version:

8.1 The bidder shall provide a certificate attesting compliance of the Manufacturer with the requirements of the international standard ISO 9001 valid for the scope of supply required in IEC specification. The date of validity of the certificate and the edition of ISO 9001 standard shall be valid on the last date set for submission of proposals in the tender.

8.2 Manufacturer's Technical specification (TDS), containing at least, the data required in IEC Specification.

8.3 Manufacturer's Declaration – Tables 1 and 2 (Appendix No. 1) filled and signed by the bidder or the quality assurance manager of the manufacturer.

8.4 Manufacturer's Declaration concerning product Conformity to OEM'S specifications, signed by Quality Assurance Manager of the Manufacturer (Appendix No. 2)

8.5 Manufacturer's Safety Data Sheet (SDS)

8.6 Manufacturer’s Part Number (P/N)

8.7 Photograph of the label on the product package that complies with the requirements of paragraph 5

8.8 Analysis from independent certified ISO 17025 laboratory for tests in this field, containing at least the data required in IEC specification (Table no.2) .

9. Delivery Documentation

Each delivery shall be accompanied by the following documents, in their latest version:

9.1 Manufacturer's Certificate of analysis (COA) of the proposed product from certified laboratory* for tests in this field, containing at least, the data required in IEC Specification.

9.2 Manufacturer's Safety Data Sheet (SDS) for the proposed product

Remark *

Certified Laboratory is a laboratory with quality management system which complies with ISO 9001 requirements relevant for laboratory tests and/or laboratory services.

10. References

Israeli Standard 2302 part 1 – Dangerous substances and preparations : Classification, packaging, labeling and marking

Israeli Standard 2302 part 2 – Dangerous Substances and preparations - Transportation : Classification, packaging, labeling and marking.

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

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

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

ASTM D664 - Standard Test Method for Acid Number of Petroleum Products by Potentiometric Titration

ASTM D665 - *Standard Test Method for Rust-Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water*

ASTM D892 - Standard Test Method for Foaming Characteristics of Lubricating Oils

ASTM D 943 - *Standard Test Method for Oxidation Characteristics of Inhibited Mineral Oils*

ASTM D1298 - *Standard Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method*

ASTM D1500 - *Standard Test Method for ASTM Color of Petroleum Products (ASTM Color Scale)*

ASTM D1401 - Standard Test Method for Water Separability of Petroleum Oils and Synthetic Fluids

ASTM D2270 - *Standard Practice for Calculating Viscosity Index from Kinematic Viscosity at 40 °C and 100 °C*

ASTM D2272 - Standard Test Method for Oxidation Stability of Steam Turbine Oils by Rotating Pressure Vessel

ASTM D3427 - Standard Test Method for Air Release Properties of Hydrocarbon Based Oils

ASTM D4057 - Standard Practice for Manual Sampling of Petroleum and Petroleum Products

ASTM D4304 - Standard Specification for Mineral and Synthetic Lubricating Oil Used in Steam or Gas Turbines

ASTM D6304 - Standard Test Method for Determination of Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fischer Titration

ASTM D7155 - Standard Practice for Evaluating Compatibility of Mixtures of Turbine Lubricating Oils

ISO 2049 - Petroleum products - Determination of colour (ASTM scale)

ISO 2160 - Petroleum products — Corrosiveness to copper — Copper strip test

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

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

ISO 3675 - *Crude petroleum and liquid petroleum products — Laboratory determination of density — Hydrometer method*

ISO 3733 - Petroleum products and bituminous materials — Determination of water — Distillation method

ISO 4406 - Hydraulic fluid power — Fluids — Method for coding the level of contamination by solid particles

ISO 6247 - Hydraulic fluid power — Fluids — Method for coding the level of contamination by solid particles

ISO 6614 - Petroleum products — Determination of water separability of petroleum oils and synthetic fluids

ISO 7120 - *Petroleum products and lubricants — Petroleum oils and other fluids — Determination of rust-preventing characteristics in the presence of water*

DIN 51381 - *Testing of lubricating oils, governor oils and hydraulic fluids; determination of air release properties*

DIN 51558-1 -*Testing of Mineral Oils; Determination of the Neutralization Number, Colour-indicator titration*

OEM SPECIFICATIONS

Siemens - TLV 9013 05 - *Turbine Oil Specification (Turbine oils with higher thermal stability)*

Alstom HTGD 90117 - *Lubricating and Control Oil for Turbines*

GE GEK 32568- *Lubricating Oil Recommendations for Gas Turbines with Bearing Ambients Above 500 ºF (260 ºC)*

GE GEK 46506 - *Turbine Lube Oil (Recommended Properties & Maintenance Practices)*

GE GEK 101941 - *Lubricating Oil Recommendations with Antiwear Additives for Gas Turbines with Bearing Ambients Above 500 ºF (260 ºC)*

GE GEK 107395 - *Lubricating Oil Recommendations Single Shaft STAG Units with Bearing Ambients Above 500 ºF (260 ºC)*

GE GEK 121608 - Lubricating Oil RecommendationsCombined Cycle Steam Turbines, and Gas Turbines with Bearing Ambient Temperature Above 500°F (260°C)

Appendix No. 1: Declaration of the manufacturer

Table No. 1: Declaration Concerning Technical Requirements of Delivery

Requirement	Yes/No
Package: 190-210L new hermetically sealed metal Barrel	
Supply date of the oil shall be up to 4 months from the date of manufacture.	

Table No. 2: Physical and Chemical requirements of proposed product

Property	ISO VG 32	ISO VG 46	Test Method ASTM	Test Method ISO/DIN	Manufacturer Data
	limit		-	-	
Gravity (0API)	29-39	29-39	D-287		
Pour Point	-120C	-120C	D-97		
Kinematic viscosity at 40 ºC, cSt	28.8-35.2	41.4-50.6	D 445	ISO 3104	
Carbon Residu Ramsbottom	0.10% (max.) (or equivalent)	0.10% (max.) (or equivalent)	D-524 (or equivalent)		
Evaporation Loss, (wt%)	6% max (1490C)	6% max (1490C)	D-972		
AIGH (0C)	357 (min)	357 (min)	E659		
Volatility/Oil Thickening				Din 51356	Report on D445&D4530
Thermal Stability				CM Thermal test A	Report % change viscosity & total precip.
Coking Value – 320 F oil sump temp.: 400 F panel temp., continuous splash.				Panel Coker Test (FTM 791a-3462)	Report Coking Value
Viscosity index, min	98	98	D 2270	ISO 2909	
Density at 15 ºC, kg/m^3, max	900	900	D 1298	ISO 3675	
Flash point, ºC, min	210	210	D 92	ISO 2592	
Water content, ppm, max	200	200	D 6304	ISO 3733	
ASTM Colour, rating, max	2	2	D 1500	ISO 2049	
Visual examination at 20 ºC	clear and bright		-	-	
Acid number (AN), mg KOH/g, max	0.2	0.2	D 974^A	DIN 51558-1	
Demulsibility, separation time, minutes, max	20	20	D 1401	ISO 6614	

Air release, 50 ºC, minutes, max	4	4	D 3427	DIN 51 381	
Foaming at 25 ºC, tendency/stability, ml, max Sequence I Sequence II Sequence III	50/0 50/0 50/0	50/0 50/0 50/0	D 892	ISO 6247	
Corrosion protection against steel	pass	pass	D 665B	ISO 7120	
Copper corrosion, 3h/100 ºC, classification	1b max	1b max	D 130	ISO 2160	
RPVOT, minutes, min -after nitrogen treatment, %, min	1000 85	1000 85	D 2272 D 2272^{B}	-	
Oxidation stability: hours to neut. number 2.0 mg KOH/g, min	7,000	7,000	D 943	-	
Cleanliness at the delivery stage, max	19/17/14	19/17/14	-	ISO 4406	

Name of Manufacturer: _____
Signature of the Bidder or Quality Assurance Manager of the Manufacturer:_____
Date:_____

Appendix No. 2: Declaration of the manufacturer

Title: Declaration of product Conformity to OEM'S specifications (Original Equipment Manufacturer)

I hereby declare that the proposed product _____ meets with the requirement of the following OEM specifications :

- Siemens - TLV 9013 05
- Alstom HTGD 90117
- GE GEK 32568
- GE GEK 46506
- GE GEK 101941
- GE GEK 107395
- GE GEK GEK121608

Name of the manufacturer : _____

Signature of Quality Assurance Manager of the Manufacturer: _____

Date: _____