



TURBINE OIL SPECIFICATIONS

Introduction

This specification describes the requirements for turbine oils used for lube and lifting oil of gas turbine-generators.

Only turbine oil approved by the gas turbine manufacturer shall be used.

References documents

DIN 51 562-1, DIN 51 381, DIN 51 558-1, DIN 51 777-1, ISO 6247, DIN 51 589-1, DIN 51 599, DIN 51 757, DIN ISO 2592, ISO 3016, ISO 5884, ISO 4406, DIN ISO 2049, DIN EN ISO 2160, DIN 51 585, DIN 51 587, DIN 51 354, ASTM D 445, ASTM D 3427, ASTM D 974, ASTM D 1744, ASTM D 892, ASTM D 1401, ASTM D 1298, ASTM D 92, ASTM D 97, ASTM D 1500, ASTM A 130, ASTM D 665, ASTM D 943, ASTM D 5182

Type of Turbine Oil

For the purpose of this specification, turbine oil is defined as a mineral oil or synthetic oil with additives which enhance corrosion protection and oxidation stability.

As a rule, turbine oil is a paraffin-base mineral oil comprising a mixture of saturated hydrocarbons. Because of the numerous chemical constituents involved, it is not possible to state a defined composition. The physical properties of the oil are the selection criteria for choosing a turbine oil.

The additives must not have any adverse effect on the materials used in the oil system. The additives must not contain any organometallic compound (e.g. organic zinc compounds).



- **Gas Turbine AE64.3A:**
Use oil type ISO VG 32 with FZG - Test ≥ 8 , due to the Gear Box
- **Gas Turbine AE94.3A & AE94.2:**
Use oil type ISO VG 46

Requirements (for “new” oil) – see also table 1

- ❑ **Thermal stability:**
The turbine oil must be capable of withstanding temperatures in turbo set components (e.g. bearings, coupling, gearboxes) of max 120°C and oil tank temperatures of max. 80°C without physical or chemical degradation of the oil properties.
- ❑ **Compatibility:**
The fluid must be capable of mixing with residue (max 4% vol) of another similarly based product (mineral or synthetic) with no negative impact on the properties of the oil.
- ❑ **Physiological properties:**
By nature, turbine oil must be non-hazardous to the health of the person working with it, if the necessary hygienic precautions are taken.



Table 1: Requirements for new oil

Properties	Unit	Value	DIN-ISO / ASTM Test method
Kinematic viscosity at 40 °C			
ISO VG 32	mm ² /s	28.8 - 35.2	51 562-1 / D 445
ISO VG 46	mm ² /s	41.4 - 50.6	
Air release capability at 50°C	min	≤ 4	51 381 / D 3427
Neutralization number			
A oil without EP/AW- additives	mg KOH/g	≤ 0.20	51 558-1 / D 974
B oil with EP/AW additives	mg KOH/g	≤ 0.30	
Water content	mg/kg	≤ 100	51 777-1 / D 1744
Foam properties at 25 °C			
Tendency (volume)	ml	≤ 400	ISO 6247 / D 892
Stability (dissipation time)	s	≤ 450	
Water separability	s	≤ 300	51 589-1
Demulsibility	min	40/40/0 (≤ 20)	51 599 / D 1401
Density at 15 °C	Kg/m ³	≤ 900	51 757 / D 1298
Flash point			
ISO VG 32	°C	> 160	2592 / D 92
ISO VG 46	°C	> 185	
Pour point	°C	≤ -6	ISO 3016 / D 97
Colour	-	≤ 2	2049/D 1500
Corrosive effect on copper	-	≤ 2 -100 A 3	2160 /D 130
Corrosion protection for steel	-	0 -8 (DIN) pass (ASTM)	515 85 / D 665
Ageing characteristics: increase of neutralization number after 2500 h	mg KOH/g h	≤ 2.0 ≥ 2500	51 587 / D 943

Properties	Unit	Value	DIN-ISO / ASTM Test method
Cleanliness level *	-	≤ 17/14	Test: ISO 5884 Result : ISO 4406

* Since the cleanliness level depends on the design of the system, the lube oil inside the lube oil reservoir must be ≤ 17/15/12 (see "Filling"). Each Supplier must be compliant (near) with the value wrote in this table.

Additional requirements on turbine oils for use in gearboxes (AE64.3A only)

Properties	Unit	Value	DIN-ISO / ASTM Test method
FZG- Test A/8,3/90			
Failure load stage	-	≥ 8	51 254 / D 5182

Note

A periodic check of the oil conditions helps to value the correct functioning of the system and to consider an possible early action. **Recommended intervals for oil checks: Every three months.**



Filling:

- ❑ Filling of the system shall be done by the supplier at his own risk and expense.
- ❑ Filling must be done through a filter unit having a maximum mesh size of **6/7** micron. The Cleanliness to reach must be **≤ 17/15/12 (see page 3)**
- ❑ Filling must be finished within max 24 hours. Additional services must be agreed between purchaser and supplier.
- ❑ Before filling of the reservoir, 2 litres sample is to be taken (in case of more batches will mixer 1 litre sample from those batches) and sent to Ansaldo. In case there is the gear box the sample quantity must be 3 liters.

Supply:

The supplier, before the each delivery, will communicate to Ansaldo (or the client) the test's results of each batch of oil utilized for the supply. For each batch the test results of the following parameters have to be submitted:

- ✓ Viscosity
- ✓ Air release
- ✓ Neutralization number
- ✓ Water content
- ✓ Foaming
- ✓ Water separability
- ✓ Demulsibility

The oil supply will be made in clean drums, each drum must be show univocal identification of the product and of the batch number.

IMPORTANT:

The approval does not release the supplier from his responsibility for the quality of the product.
ANSALDO ENERGIA must be informed without fail in case of any alteration in the product or manufacturing process. In this case a new approval will be necessary.



APPROVED TURBINE OILS

Attention:

- ❑ The selection should be made under consideration of the viscosity class determined for the Gas Turbine.
- ❑ Gas Turbine with Gearbox need special turbine oils suitable for gearbox lubrication.

Location	Supplier	Product Name	ISO VG class	Possible use with Gear Box
ITALY	Eni	eni OTE GT 32	32	X
		eni OTE GT 46	46	X
USA	ExxonMobil	Mobil DTE 932 GT (only for GAS Turbines)	32	X
	ExxonMobil	Mobil DTE 746	46	
	ExxonMobil	Mobil DTE 832	32	X
	ExxonMobil	Mobil DTE 846	46	X
	ExxonMobil	Mobil SHC 824 (very high pour point)	32	X
	ExxonMobil	Mobil SHC 825 (very high pour point)	46	
NETHERLANDS	shell	Turbo S4 GX32	32	X
	shell	Turbo S4 GX46	46	X
	shell	Turbo Oil T 46	46	
FRANCE	Total	Preslia 32	32	X
	Total	Preslia 46	46	X
	Total	Preslia GT 32	32	X
	Total	Preslia GT 46	46	X

The reproduction, transmission or use of this document or its content is not permitted without express written authority. Offenders will be liable for damages. All rights, including rights created by patent grant or registration of a utility model or design, are reserved.



The reproduction, transmission or use of this document or its content is not permitted without express written authority. Offenders will be liable for damages. All rights, including rights created by patent grant or registration of a utility model or design, are reserved.

Location	Supplier	Product Name	ISO VG class	Possible use with Gear Box
ESPANA	Cepsa	HD Turbinas * 32	32	X
	Cepsa	HD Turbinas * 46	46	X
	Cepsa	Turbinas EP (32)	32	X
	Cepsa	Turbinas EP (46)	46	X
USA	Chevron/Caltex/Texaco	GST 2300 32	32	X
	Chevron/Caltex/Texaco	GST 2300 46	46	X
	Chevron/Caltex/Texaco	GST OIL 46	46	
	Chevron/Caltex/Texaco	GST EP 32	32	X
	Chevron/Caltex/Texaco	GST EP 46	46	X
INDIA	Indian Oil Corp. (IOC)	Servoprime 32XL	32	X
	Indian Oil Corp. (IOC)	Servoprime 46 XL	46	X
	Indian Oil Corp. (IOC)	Servoprime 32G	32	X
	Indian Oil Corp. (IOC)	Servoprime 46G	46	X
KUWAIT	Kuwait Petroleum	Q8 van Gogh 46	46	
	Kuwait Petroleum	Q8 van Gogh EP 32	32	X
	Kuwait Petroleum	Q8 van Gogh EP 46	46	X
	Kuwait Petroleum	Q8 Volta 46	46	
	Kuwait Petroleum	Q8 Volta EP 32	32	X
	Kuwait Petroleum	Q8 Volta EP 46	46	X
RUSSIA	Lukoil	LUKOIL Tornado M 32	32	X
	Lukoil	LUKOIL Tornado M 46	46	X
	Lukoil	Tornado T 32	32	X
	Lukoil	Tornado T 46	46	X



The reproduction, transmission or use of this document or its content is not permitted without express written authority. Offenders will be liable for damages. All rights, including rights created by patent grant or registration of a utility model or design, are reserved.

Location	Supplier	Product Name	ISO VG class	Possible use with Gear Box
CANADA	Petro-Canada Lubricants	Turboflo XL 46	46	
	Petro-Canada Lubricants	Turboflo EP 32	32	X
	Petro-Canada Lubricants	Turboflo EP 46	46	X
	Petro-Canada Lubricants	Turboflo LV 46	46	
USA	Phillips 66.	Diamond Class™ AW Turbine Oil 32	32	X
	Phillips 66.	Ultra Clean Turbine Oil 46	46	
CHINA	Sinopec Corp.	L-TSE/LF32	32	X
	Sinopec Corp.	L-TSE/LF46	46	X
	Sinopec Corp.	L-TSA/LF46	46	