

## Turbine Oils (Lubricating, Control and Governor Oils)

TLV 9013 04/01

Page 1 of 5

### 1. Scope of this specification

This specification (TPS) is valid for procuring turbine oils used as lubricating, control and governor oils for Siemens steam and gas turbosets with and without gearbox.

### 2. Type of turbine oil

According to this TPS turbine oil is a mineral oil or a synthetic oil containing additives to increase corrosion protection and ageing stability. Turbine oils used for gear lubrication may additionally contain additives to increase the load capacity and to decrease wear.

### 3. Chemical composition

Turbine oil normally is a paraffin based mineral oil subsistent on a mixture of saturated hydrocarbons; a defined composition cannot be given on account of the quantity of different components. Criterion of selection for use as turbine oil is the physical condition.

The admixed additives may not cause any negative effects on the materials of the oil system. They may not contain metal-organic components (e.g. organic Zinc components).

The use of synthetic oil based on poly- $\alpha$ -olefines is admitted for steam turbines, however not for gas turbines.

### 4. Requirements

#### 4.1 General requirements

##### 4.1.1 Viscosity range

##### 4.1.1.1 Steam- and gas turbosets

Turbine oils of viscosity classes ISO VG 32 and ISO VG 46 are used.

##### 4.1.1.2 Industrial turbosets

In industrial turbosets only turbine oils of viscosity class ISO VG 46 are used.

Power Generation Group KWU

Siemens AG

 prepared:  
TWCC Sand *sa*

 checked:  
16.3.92 *fluritz*

 released:  
20.3.92 *Smull*

In case of doubt, the latest issue of the German text shall be applicable

Copying of this document, and giving it to others and the use or communication of the contents thereof, are forbidden without express authority. Offenders are liable to the payment of damages. All rights are reserved in the event of the grant of a patent or the registration of utility model or design.

## 4.1.2 Thermal stability

The turbine oil must be capable of withstanding temperatures in turboset components (e.g. bearings, couplings, gear boxes) of max. 120°C and oil tank temperatures of max. 80°C without physical or chemical degradation of the oil character.

## 4.1.3 Compatibility

The turbine oil must be miscible with traces (max. 4% by volume) of turbine oils of another kind but same base (mineral or synthetic). There should be no deterioration of the turbine oil in the presence of such trace quantities.

## 4.1.4 Physiological consideration

The turbine oil must not represent a safety or health hazard to the persons working with it providing that normal good industrial hygiene practices are followed.

4.2 Requirements of conditions on delivery

	Value	Unit	Test DIN	ASTM
Kinematic viscosity at 40°C ISO VG 32	min. 28.8 max. 35.2	mm <sup>2</sup> /s mm <sup>2</sup> /s	53018	D 445
ISO VG 46	min. 41.4 max. 50.6	mm <sup>2</sup> /s mm <sup>2</sup> /s		
Air release at 50°C	max. 4	min	51381	D 3427
Neutralization number a) turbosets without gearbox b) turbosets with gearbox	max. 0.20 max. 0.30	mg KOH/g mg KOH/g	51558	D 974
Water content	max. 0.01	% by weight	51777	D 1744
Foaming at 25°C Foaming tendency Foamstability (0 cm <sup>3</sup> )	max. 400 max. 450	cm <sup>3</sup> s	-	D 892

	Value	Unit	Test DIN	ASTM
Water release	max. 300	s	51589	-
Density at 15°C	max. 0.900	g/cm <sup>3</sup>	51757	D 1298
Flash point ISO VG 32 ISO VG 46	min. 160 min. 185	°C °C	DIN ISO 2592	D 92
Pourpoint equal or lower than	-6	°C	DIN ISO 3016	D 97
Particle distribution	min. 17/14	Code	DIN ISO 4406	-
Colour	max. 2	-	DIN ISO 2049	D 1500
Demulsification	max. 20	min	51599	D 1401
Corrosion effects on copper	max. 2-100A3	-	51759	D 130
Corrosion protection against steel	max. 0-B	-	51585	D 665
Ageing behaviour Increase of neu- tralization number after 2.500h	max. 2.0	mgKOH/g	51587	D 943

#### 4.3 Additional requirements to turbine oils used in gearbo- xes

FZG - Test A/8, 3/90 according to DIN 51 354 resp. ASTM D 1947:

Failure load stage	min. 8
specific weight change	max. 0.27mg/kWh
Change of tooth flanks at	
load stage 1 - 5	polishing effects
load stage 6	scratches
load stage 7	scorings, max $R_t$ : 5 -10 $\mu\text{m}$ $R_a$ : 0.7-1.0 $\mu\text{m}$

5. Pattern test and approval

To gain approval for a turbine oil the following procedure is provided:

- a) This TPS is placed at the manufacturer's or supplier's disposal.
- b) An initial sample (10 kg) should be delivered to Siemens AG Power Generation KWU TWCC. The container must show a clearly indicated product name, also the name of the manufacturer or supplier. The manufacturer or supplier must have already established the conformity of his product to the specification given under point 4.2 and, if occasion arises, point 4.3. He must supply a copy of his test report with the sample and at the same time certify that the conditions given under point 4.1 are met. A safety data sheet must be attached.
- c) The initial sample will be tested by Siemens AG Power Generation KWU TWCC according to this TPS. The test results certified by the supplier may vary from those obtained by Siemens AG Power Generation KWU TWCC only by the reproducibility of the relevant test procedure (see DIN 50 848, part 1).

Providing that the specification is met, the turbine oil will be approved for use as a lubricating, control and governor oil. The product will be published in the list of approved turbine oils.

- d) The approval does not release the supplier from his responsibility for the quality of the product. Siemens AG Power Generation KWU TWCC must be informed without fail in case of any alteration in the product or manufacturing process. In this case a new approval will become necessary.

6. Delivery

In due time prior to delivery the supplier has to inform Siemens AG Power Generation KWU TWCC or the purchaser by letter of the test results of the batches proposed for delivery.

The turbine oil must be delivered in cleaned containers. They must show a clearly indicated product name and batch number.

Before filling the system a 2 litre sample is to be taken and sent to Siemens AG Power Generation KWU TWCC or the purchaser for analysis. In the case of several batches the supplier will blend a 2 litre sample from those batches.

---

The proportions of the blend should reflect the final mixture that will result from filling the various batches into the turbine oil system.

For turbosets with gearbox the sample quantity is 5 litres.

7. Filling

Filling of the system shall be made by the supplier at his own risk and expense.

Filling is to be made through a filter unit having a maximum mesh of 40 $\mu$ m. Filling must be finished within max. 24 hours.

8. Special agreements

Special agreements concerning variations from the requirements of this TPS need authorization by Siemens AG Power Generation KWU TWCC. They must be fixed by letter.