



FBK TURBINE EX32

Long-life Turbine Oil

Due to factors such as longer periods between regular inspections of power generation equipment and the appearance of large-capacity steam turbines, recent years have seen a demand for increasingly high-quality lubricating oil for main generators. **FBK TURBINE EX32** is a long-life turbine oil that not only takes full advantage of the thermal resistance that is a property of amine-type turbine oils, but that also enables used-oil control (forced replenishment) equivalent to that of previous steam turbine oils by radically suppressing the production of sludge caused by degeneration of antioxidants.

● Development concept

Turbine oil used in previous steam turbines contains phenol antioxidant to prevent deterioration due to oxidation. Because, due to the properties of this turbine oil, almost no sludge is produced by consumption of the phenol antioxidant during usage, it is possible to realize extended life of the oil being used by regularly removing some of the used oil and carrying out forced replenishment with new oil. However, in cases, for example, where stringent usage temperature conditions apply, the rate of depletion of the antioxidant increases with the inevitable result that the need for replenishment becomes more frequent. For this reason, gas turbines, for example, where usage temperature conditions are more stringent than is the case with steam turbines, require thermal-resistant turbine oil with outstanding oxidative stability performance under high-temperature conditions and this is why gas-turbine-dedicated oil with amine-type antioxidant is widely used. While one of the general properties of this gas-turbine oil is its extremely long-life compared to phenol-type turbine oils, when the level of the amine-type

antioxidant in the oil being used is depleted to a certain extent, the risk of production of sludge from deteriorated antioxidant arises. For this reason, the regular addition of new oil to replenish the depleted antioxidant promotes the production of sludge by the deteriorated antioxidant and, as a result, although not the best approach, in many cases oil is used until its life expires, at which point the entire oil supply is replaced. The purpose of development of **FBK TURBINE EX32** was to enable a level of used-oil control equivalent to that of existing steam turbine oils at the same time as taking advantage of the thermal-resistance property of amine-type antioxidants that have proven themselves in gas-turbine-dedicated oils.

● Features of developed oil

1. Excellent thermal stability

FBK TURBINE EX32 uses an amine-type antioxidant with outstanding thermal-resistance property. Generally, while amine-type antioxidants provide excellent thermal-resistance property, compared to previous phenol-type

antioxidants, they are known for their tendency to produce sludge due to deterioration, whereas **FBK TURBINE EX32** uses a specially selected amine-type antioxidant one of the properties of which is its resistance to sludge production.

2. Outstanding oxidative stability

Unlike many lubricating oils, turbine oils are used over period of ten years or longer during which time oil is partially replaced (forced replenishment) during shutdown maintenance. On the other hand, as it deteriorates, turbine oil produced sludge that adversely affects machine operation.

FBK TURBINE EX32 uses a highly-refined hydrogenolytic base oil with a specially-selected amine-type antioxidant added to realize superb oxidative stability property capable of withstanding long-term usage even under stringent conditions.

3. Superb rust-preventive property

FBK TURBINE EX32 is furnished with a powerful rust-preventive agent that provides superb rust-preventive performance, preventing the appearance of rust in the system even with long-term continuous usage.

4. Outstanding antifoaming property

Lubricating oil or hydraulic operation oil foams under conditions such as intense mixing of oil with air, the suction of air into parts of piping that are not airtight, sudden separation and release of the air or other gases that have dissolved in oil. For this reason, although careful investigation of causes of foaming and the implementation of countermeasures is a first priority, performance that ensures the rapid elimination of foam that is produced by the oil itself is a requirement.

FBK TURBINE EX32 contains an antifoaming agent that reinforces the required performance to demonstrate superb practical performance.

5. Good anti-emulsification and water separation properties

Because mixture with water often causes lubricating oils or hydraulic operation oils to emulsify, sometimes causing unstable operation, oil needs to be resistant to emulsification and to readily separate from mixed water.

The outstanding water separation performance of **FBK TURBINE EX32** eliminates any problems that may occur due to emulsification caused by mixture with water.

6. Good viscosity-temperature characteristics and low-temperature characteristics

Because of its resistance to changes in viscosity caused by temperature and low pour point, **FBK TURBINE EX32** demonstrates truly excellent performance even as a hydraulic operation oil.

● Application

Large-capacity, high-temperature steam turbines

● Packaging

200L drum

● Typical properties of FBK TURBINE

EX32

Density	(15°C)	g/cm ³	0.843
Color	ASTM		L0.5
Kinematic viscosity	(40°C)	mm ² /s	32.0
	(100°C)	mm ² /s	5.9
Viscosity index			130
Flash point	(COC)	°C	230
Acid value		mgKOH/g	0.11
Pour point		°C	-17.5
Copper corrosion	(100°C, 3h)		1
Rust-preventive property	(Artificial seawater, 24h)		No rust
RPVOT	(150°C)*Note 1	min	1,850
TOST	(95°C)*Note 2	h	8,000 or more

Hazardous material classification under the Fire Service Law:
Category 4 4th class petroleum, Hazardous substances class III

Note 1: Rotating Pressure Vessel oxidation stability test method

Note 2: Turbine oil oxidation stability test

* The values of typical properties are subject to change based on revisions of the product without notification. (December 2008)



Handling Precautions

▼ Please handle this product with care in accordance with the following precautions.

Caution Handling Precautions	<ul style="list-style-type: none"> ● <u>If the oil comes into contact with the eyes, it may cause irritation.</u> Always wear <u>protective glasses.</u> ● <u>Contact with the skin may cause inflammation.</u> Always wear <u>protective gloves.</u> ● <u>Avoid swallowing the oil (If swallowed, it can cause diarrhea and vomiting).</u> ● <u>Keep out of reach of children</u> ● <u>Refer to the applicable "Material Safety Data Sheet" (MSDS) prior to use. Please obtain the "Material Safety Data Sheet" from the store or shop where the product is purchased.</u>
	<ul style="list-style-type: none"> ● <u>If the oil comes into contact with the eyes, rinse the eyes thoroughly with fresh water and seek medical attention.</u> ● <u>If the oil comes into contact with the skin, wash the affected area thoroughly with soap and water.</u> ● <u>If oil is swallowed, do not induce vomiting. Seek immediate medical attention.</u>
Disposal of Waste Oil and Container	<ul style="list-style-type: none"> ● <u>Do not pressurize the empty drum. It may explode when pressurized.</u> ● <u>Do not weld, heat, drill or cut the container. The residue may ignite causing an explosion.</u> ● <u>Disposal methods are regulated by laws and ordinances. Disposal must be carried out properly in accordance with laws and ordinances. If you have further questions concerning disposal,</u>
Storage Methods	<p>After using, always seal the container securely to prevent dust and water from entering the oil. Store in a dark place and avoid exposure to direct sunlight.</p>