

the steam. These substances may corrode, erode, or form deposits on the steam parts, reducing efficiency and power, and causing valve seats to leak. It is imperative that feed water treatment and boiler operation be carefully controlled to insure a supply of clean steam at all times.

LUBRICATING OIL

The importance of using the highest grade turbine oil for the lubrication of turbines cannot be too strongly emphasized. Although the first cost of the best grade of oil may be considerably greater than that of an inferior grade, the additional cost is more than compensated for by longer service, less danger of damage to bearing surfaces, and elimination of serious shut-downs due to improper lubrication.

Turbine oils are produced by so many manufacturers and under so many different trade names and brands, that Elliott Company finds it impossible to thoroughly investigate all of them and to maintain a complete list of those suitable for turbine use. For this reason, Elliott Company does not recommend any specific brand of oils for use with Elliott turbines. Purchasers of turbines and turbine driven units are urged to consult with the representatives of reliable refineries regarding their lubricating oil requirements, and to insist that the oil purchased shall be suitable for the service intended, bearing in mind the general considerations stated below, which will serve to identify the types of oil required for the different classes of Elliott turbine equipment.

Basic requirements of a good TURBINE OIL are as follows:

1—Properly refined, highly filtered pure mineral oil, free from acid, alkali, water, sediment, soap, resins or any substance which in service will prove injurious to the oil or to turbine and accessory parts coming in contact with the oil.

2—Best possible ability to separate rapidly from water and least tendency to emulsify or foam when agitated with air or water.

3—Least tendency to break down or form sludge when agitated at normal operating temperatures and mixed with air or water. (See tabulation for normal temperatures.)

4—Reasonably high Flash and Fire Points, bearing in mind the probable operating temperatures and unavoidable proximity to high temperature steam surfaces.

5—Viscosity and Viscosity Index, (relationship between viscosity and temperature changes) commensurate with the service intended. (See tabulation for recommended viscosity.)

	Pressure Circulation	Ring Oiled
Viscosity (Saybolt Universal Seconds) at 100 degrees F	140-170	280-325
Viscosity (Saybolt Universal Seconds) at 210 degrees F	42-44	49-55

	Pressure Circulation	Ring Oiled
Minimum Operating Oil Tank Temperature, degrees F	130	130
Minimum Oil Temperature before starting, degrees F	50	60
Normal Bearing Temperature, degrees F	140-170	150-190

RING OILED SYSTEM is a system in which oil rings only are depended upon to carry oil to the bearings from the oil reservoir. Standard water cooling is used in this system. Non-water-cooled bearings are not recommended, but if specifically permitted by conditions of an individual application, a carefully selected oil, containing a minimum of tallow or carbon and sludge-forming ingredients should be used.

PRESSURE CIRCULATION SYSTEM is a system in which an oil pump forces oil through cooler, strainer, etc., to bearings, governor, and other parts, returning the warm oil by gravity to an oil reservoir. Oil rings are included only for starting and idling operation.

CARE OF OIL—All oil should be maintained in first class condition by the elimination of moisture, dirt and other impurities. For pressure circulation system, filter or purify the oil frequently or employ the continuous by-pass system of removing impurities.

Refer to the lubrication manufacturer for recommendations as to employing rust inhibitors when the initial charge of new oil is placed in the system or for proportions of new oil to be added when replenishing the old.

STARTING AND STOPPING

(Refer to Figs. 1, 4, & 5)

Prepare the turbine for the initial start-up as follows:

1—Disconnect coupling between turbine and driven machine.

2—Blow out all steam piping, disconnecting at turbine inlet flange if necessary.

3—Remove bearing case cap (536) and pedestal cap (521) carefully, to prevent distorting oil rings (624) which are held in place by upper half bearing liners (523). Remove upper half bearing liners and roll out lower half liners by rolling away from the locating lugs so as not to damage them. Inspect and clean bearing liners.

4—Carefully clean both bearing oil reservoirs and journals. Roll lower half bearing liners into place. Locating lugs on liners must be correctly positioned in locating grooves in the bearing case.

5—Fill reservoirs to overflow height with the proper grade of turbine oil. (see section on Lubricating Oil). See that lower halves of bearing liners are flooded with oil and that the ball thrust bearing (623) is likewise flooded with oil.

6—Replace upper half bearing liners around shaft journals and under the oil rings. Upper half bearing liners should be lined up with lower half bearing liners, which are already in