LUBRICATION

GENERAL:

The information contained in this instruction sheet presents the Westinghouse Company's recommendations as to lubricants suitable for the operation of the apparatus referred to below.

QUALITY

The oil shall be a refined mineral oil of highest quality and uniformity. It shall contain no grit, inorganic acid, alkali, water, soap, asphaltum, pitch, resinous substances, or any other substance which will interfere with the lubricating properties of the oil, or that will be detrimental to the oil or to the metals with which the oil will come in contact in service.

The oil shall be capable of preventing the formation of rust on steel parts bathed with oil, should small quantities of water enter the oil during service. (See E. below).

A - FOR CIRCULATION SYSTEMS:

Specifications

Apparatus	Direct Connected Turbine Units	High Speed Geared Turbine Units	Large Geared Units Marine Propulsion Units
Flash Point, Deg.F.	330 Min.	350 Min.	350 Min.
Saybolt Viscosity Seconds at 100 F.	140 to 250	250 to 350	350 to 550 (See Note #2)
Seconds at 210 F.	40 to 50	50 to 60	52 to 66 (See Note #2)
Carbon Residue	0.10% Max.	1.0% Max.	1.0% Max.
Steam Emulsion No.	90 Max.	90 Max.	120 Max.
Neutralization No.	0.05 Max.	0.05 Max.	0.05 Max.
Sulphur Content	....	....	0.50 Max.

Note #1: The values shown are based on tests made in accordance with the latest approved A.S.T.M. methods.

Note #2: There is a present trend on the part of various interests in marine propulsion geared units to specify viscosity at 130 F. as 171 to 189, with a Dean & Davis Viscosity Index of 50 minimum. Such oils are very satisfactory for this service.

Note #3: The recommended values in the above table apply, of course, to new oil only.

B - FOR RING OILED BEARINGS:

For moderate bearing temperatures up to approximately 180 deg. F. the viscosity should be between 400 and 500 seconds Saybolt at 100 Deg. F.

For higher bearing temperatures, above 180 deg. F. the viscosity should be between 600 and 800 seconds Saybolt at 100 deg. F.

If trouble is experienced due to loss of oil from this type of bearing, consult the turbine manufacturer or the oil refiner.

On units which utilize ring oil lubrication for starting periods only, and have circulation system for normal operation, use the oil recommended in Section A, above.

C - FOR "FAST'S" COUPLINGS:

The coupling manufacturer's recommendations are as follows:

Lubricate the couplings by pouring or squirting into the Oil Collector Rings on the ends of the Casing the specified amount of good fluid lubricant, no lighter than heavy engine oil (S.A.E. 70, or 125-150 seconds Saybolt Viscosity at 210 F) or heavier than heavy gear oil (1000 seconds Saybolt viscosity at 210 F.) Oil poured or squirted into this collector ring will drain into the casing when at rest or will be thrown into the casing by centrifugal force when running. DO NOT USE GREASE. Oil will run out when the coupling is at rest if more than the necessary amount is put in.

D - FOR SLIDING PEDESTALS

Use a good roller bearing grease of the following characteristics:

The grease must be a homogeneous mixture of highly refined cylinder stock in combination with pure soda soap. There shall be no addition of graphite, mica, talc, asbestos or other fillers, abrasive or non-abrasive, and there shall not be present any asphaltic compounds of a tarry or resinous nature. The grease shall be so processed as to have a smooth fibrous characteristic. It shall conform to the following requirements.

Soap Content (Soda), per cent	11-16
Worked Penetration at 77 F. (ASTM D-17)	290-310
Melting Point, deg. F., Min.	300
Moisture, percent, Max.	0.5
Free Acid (as oleic)	none
Free Alkali, percent, Max.	0.3
Viscosity of mineral oil, seconds at 210 F., Min.	150

E - CORROSION IN LUBRICATION SYSTEMS:

In the normal operation of steam turbines, and particularly during starting and stopping periods of non-condensing (back pressure) turbines water may find its way into the oil system and be entrained in the oil. There are oils that will permit of fair amount of water being present without rusting of iron or steel parts. On the other hand, a number of well refined turbine oils will not tolerate the presence of water even in amounts as low as 0.02 percent without serious rusting of iron and steel parts.

Accumulation of rust and other corrosion products may render governors inoperative or clog oil strainers or filters, with consequent loss of oil to bearings and other parts. Serious pitting will result from

rusting of pinion and gear teeth. Rusting must be prevented in order to assure proper operation of the apparatus.

It is the practice of the Westinghouse Company to operate the turbine during the shop testing period with suitable lubricants having immunizing characteristics, thus attempting to build up a temporary film on all surfaces coming in contact with the oil, to minimize the possibility of rusting during the early operating life of the unit.

It is recommended that new oils be examined to determine their ability to prevent rusting in the presence of water. There is no standard test at the present time, although an A.S.T.M. committee is studying the matter. However, most refiners have developed test methods designed to cover this feature, and are sufficiently familiar with the matter to give reliable recommendations.

Where a new unit is installed in a station in which older units are already operating, and the new unit is to be serviced with well-seasoned oil from the existing system, rusting is unlikely to occur. Such oil should, of course, be carefully examined for its suitability in all other respects.

Where a new unit is installed in a station in which older units are already operating, but where the new unit will receive oil from a new separate system, some lubrication engineers are recommending that well-seasoned oil from the older system be transferred to the new system to operate the new unit, and the newly purchased oil be used in the older unit or units. This practice will no doubt avoid rusting. The older oil should be carefully examined for its suitability in all other respects.

Where the above practices cannot be used, some lubrication engineers are recommending that new units be initially operated on seasoned run-in oil that they will furnish for a period, and later replace with new oil. This practice is sound, and should avoid troubles from rusting.

In order to prevent rusting when starting new units, some lubrication engineers will recommend the addition of inhibiting agents to new oil, or the use of oils prepared with inhibiting agents already worked into them at the refinery. These practices are known to be effective if properly carried out by those skilled in such matters. Other lubrication engineers may at times recommend that 10 to 15% of well-seasoned oil, of the same type, be added to new oil, in order to prevent rusting. Although this is known to be effective, if properly carried out, nevertheless the addition of such old oil may accelerate the deterioration of the new oil, and it is felt this procedure should be resorted to only in emergencies.

In adding new oil to an existing system of well-seasoned oil, the above precautions will probably not be necessary.

In installing and starting new units, every care is and should be taken to prevent or remove rust, scale and such foreign matter from piping, reservoirs, etc. Should rusting be found, proper examination should be made to clearly determine whether the condition is due to the oil, or to the other suggested cause.

Printed in U.S.A. (9-40)