



# Hydraulic Steering

## Instructions for Filling Wagner 700 Series Manual Hydraulic Steering Systems

### Hydraulic Oil

Oil in hydraulic steering systems performs the dual function of lubrication and transmission of power. It constitutes a vital factor in a hydraulic system, and careful selection should be made with the assistance of a reputable supplier. Any good quality hydraulic oil of the proper viscosity is acceptable for use in the steering system, Wagner does however recommend the following ISO (SAE) Viscosity Grade 10 hydraulic oils in its steering systems:

#### Recommended Hydraulic Oils

Chevron .....	AW 10
Exxon .....	Nuto H10
Esso .....	Nuto H10
Gulf .....	Harmony AW10
Shell .....	Telus 10

**Do Not use brake fluid or automatic transmission fluid with Wagner hydraulic steering systems.**

Optimum operating temperature of the hydraulic oil is to be between 120<sub>i</sub>F (49<sub>i</sub>C) and 130<sub>i</sub>F (54<sub>i</sub>C). The maximum operating temperature of the hydraulic oil is 140<sub>i</sub>F (60<sub>i</sub>C). If operational conditions cause the oil temperature to exceed 140<sub>i</sub>F (60<sub>i</sub>C) adequate cooling of the return line oil must be provided.

### Cleanliness in Hydraulic Systems

All hydraulic systems must be thoroughly cleaned prior to filling the system with oil.

### Filling the System

This procedure for filling the system is dependent upon the development of a vacuum in the steering lines. It is therefore imperative that all fittings are tight and leak free.

Begin the process by filling the pump housing of the lowest steering station. The oil may be added to the helm pump, by removing a pipe plug at the front or back fill/vent port of the helm pump. Secure the plug and go to the next highest station. The process is repeated until the highest steering station is reached.

The helm pump is provided with a fill kit that contains a dipstick, dipstick tube, clear fill tubing and fill tubing adaptor. At the highest station fill the pump as before, and then install the dipstick tube in place of the plug. The fill tubing adaptor is then screwed firmly into the dipstick tube. Insert the fill tubing firmly into the fill tube adaptor and place the free end into a container of hydraulic oil. The container of oil should be as high or higher than the helm pump.

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## **Filling the System continued**

The oil level in the container must be maintained to keep the end of the fill tubing immersed in oil at all times. As the filling procedure continues, air will be expelled through the fill tubing and makeup oil will be drawn into the system.

### **Important**

Failure to maintain the proper oil level in the container will allow air to enter the system and adversely affect the filling procedure.

When the helm pump is mounted at a forward facing steering station, turning the helm **CLOCKWISE** (starboard helm) will push oil out of the starboard port of the helm pump.

At the steering cylinder determine which end of the cylinder and its associated bleed fitting will be pressurized when the helm pump is turned clockwise. Loosen the bleed fitting two turns, and attach a short length of hose to the fitting. Place the loose end of the hose into a container to catch the air/oil mixture that will be expelled. The other bleed fitting or bypass valve (if fitted) must be kept closed.

At the top steering station turn the wheel **CLOCKWISE** slowly at about one revolution per second. A mixture of air and oil will be expelled from the bleed fitting on the cylinder. After most of the air is expelled from the starboard line, the system will begin to feel firm and consistent. Close the bleed fitting tightly and open the opposite bleed screw 2 turns. Turn the steering wheel **COUNTER CLOCKWISE** until most of the air is expelled from the port line. Close the bleed fitting.

On vessels with multiple steering stations it is advantageous to have two people available to bleed the system. Turn the top station to port and the next lowest station to starboard at the same slow speed. This will have the effect of pumping oil in a loop, out of the top helm, down the port line into the second station helm pump, out of the second helm pump up the starboard line back to the upper helm pump. The air will be brought to the top station where it is vented out of the system and makeup oil is added to the system via the fill tubing. Observe the air being expelled from the system via the fill tubing. When air is no longer being expelled from the system move to the next lowest station and repeat the procedure as required. The steering system should now be usable. Remove the fill tube and fill tube adaptor and insert the dipstick.

The top helm pump must be vented to atmosphere at all times. The helm pump may be vented via the dipstick assembly, or a vented header tank if fitted. Alternately a small hole may be drilled in the plastic plug supplied with the helm pump to provide the vent to atmosphere.

The air remaining in the system will percolate out of the oil over time. It is imperative that the oil level in the top station be maintained to completely cover the internal workings of the helm pump. The oil level will just show on the dipstick. This will help prevent air from being introduced back into the system. The system may burp small quantities of air and oil mixture out the dipstick tube when systems are first commissioned. This is normal and not a cause for concern. A small towel wrapped around the dipstick to absorb the discharge is recommended. This will normally subside after a couple of weeks.

**CAUTION:** Inspect all mechanical connections regularly. Vibration and corrosion can cause nuts and bolts and other fasteners to fail if not properly installed or maintained. Loss of steering could result if the steering system is not maintained.



Wagner Engineering Ltd.  
135 Riverside Dr.  
North Vancouver, BC  
Canada V7H 1T6

Tel. (604) 988-1111  
Fax (604) 986-0334  
e-mail  
sales@wagnerengineering.ca