

STEERING GEAR SERVICE NEWS
(KAWASAKI ELECTRO-HYDRAULIC STEERING GEAR)

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SUBJECT : Maintenance of solenoid valve for unloading device

A report is heard that steering failed temporarily because the spool of the solenoid valve for unloading device rusted and stuck when one of the two pumps was used for a long time in the mechanical control type steering gear. This is a phenomenon in which the spool sticks at the position of power ON and is not reset even when the power is OFF,. then the pump discharge oil in the operating side flows into the pump in the stop side to turn the stopped pump reversely and configure a bypass circuit, finally causing the steering to fail.

The spool of the solenoid valve for unloading device seems to have stuck because corrosion (rusting) occurred in the area between the push rod and the cover when such a solenoid valve was excited for many hours while being affected heavily under the influence by the environment in the steering gear room (including oceanic atmosphere, dust containing chlorine, ambient temperature).

In consideration of this example of failure, though very rare, you are requested to pay proper attention to the following points in order to prevent steering failure:

1. In order to shorten the long-lasting excitation of the solenoid valve, reduce the operating pump (No.1&2) switchover interval as far as possible, and increase the frequency of the spool switchover operation.
2. Even before this ship leaves the port, make sure that the spool switchover works normally in the solenoid valve.
3. Check the solenoid valve every 6 months (See the check procedure).

If any abnormality is found in the solenoid valve, it is recommended to replace it with a complete solenoid valve.

Please note that similar switchover failure could occur when any foreign matter or deteriorated product in the operating oil is entrapped. It is recommended therefore to control the contamination of operating oil (sampling), and change such an operating oil in case NAS Class 11 is exceeded.

If the above-mentioned steering failure occurs in the solenoid valve, such a steering failure can be prevented by using two pumps at the same time. Please advise this to the crew of this ship in proper ways.

Complementary: As for the electric control type steering gear, no report of the steering failure by the solenoid valve has been heard, because of the difference in the circuit configuration. It is recommended however to carry out maintenance as described above. Also please note that the solenoid valve of this type is not used in the valve control type steering gear.

Type indications: Mechanical control type : FM/RM **_*** type,
Electric control type : FE/RE **_*** type,
Valve control type : RV **_*** type

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Procedures for Confirmation and Check of Solenoid valve for Unloading device

1. Preparation

- 1) Make it sure that the ship is safety condition such as at anchoring or at dock before starting work.
- 2) Use the specified bolts and keep the specified tightening torque when you install the part
- 3) Take care to prevent the entry of dirt and dust, and handle the parts not to damage them.

2. Tools

- 1) Hexagonal wrench(M5)
- 2) Vernier calipers

3. Procedures for Confirmation of Operation (See attached drawing)

- 1) Remove the cover(1) which is right side of the solenoid valve.
- 2) Confirm the “L” length of the push-rod is abt.6mm while the solenoid(2) is de-energized (Sol. OFF).
- 3) Confirm the “L” length of the push-rod is abt.9mm while the solenoid(2) is energized (Sol. ON) by means of starting the electric motor.
- 4) Confirm the push-rod is moved to correct position smoothly with repeating Sol. ON and Sol. OFF a few times.

4. Procedures for Check of Push-rod (See attached drawing)

- 1) Make it sure that the power of the hydraulic power unit is turned off and that the electric motor has completely stopped before starting work.
You must also confirm the system pressure has dropped to zero.
- 2) Remove the solenoid(2) which is left side of the solenoid valve.
- 3) Check the push-rod for such as any rust.
- 4) If it rusts. re-assemble it temporary after removing the rust by a nylon brush and applying the push-rod with working oil. Then replace it promptly.

5. Procedures for re-assembly

- 1) Apply the push-rod with working oil.
- 2) Install the solenoid(2) and cover(1) in the original position by specified tightening torque($2.8 \text{ N} \cdot \text{m} \pm 0.2$).

Solenoid valve for Unloading device