



Назначение:

Мультимедийная тренажерная программа предназначена для практической подготовки специалистов машинного отделения по эксплуатации электрогидравлического поворотного-лопастного рулевого устройства в соответствии с требованиями Конвенции ПДНВ и национальными требованиями.

В МТП включены:

- Интерактивная мнемосхема устройства.
- Интерактивный имитатор панели управления с навигационного мостика, на центральном посту управления машинного отделения и локальном посту.
- Описание установки с фотографиями и схемами.
- Задания для проверки знаний.

Целевая аудитория

Машинная команда –
Управления

Машинная команда –
Эксплуатации

Машинная команда -
Вспомогательный

Тип судна

Все типы



Нормативная база

Конвенция ПДНВ:

- Правила III/1, III/2, III/3, III/4, III/5.

Кодекс ПДНВ:

- Раздел A-III/1, Таблица A-III/1 «Спецификация минимального стандарта компетентности для вахтенных механиков судов с обслуживаемым или периодически необслуживаемым машинным отделением», сфера компетентности «Эксплуатация главных установок и вспомогательных механизмов и связанных с ними систем управления».
- Раздел A-III/2, Таблица A-III/2 «Спецификация минимального стандарта компетентности для старших механиков и вторых механиков с главной двигательной установкой мощностью 3 000 кВт или более», сфера компетентности «Эксплуатация, наблюдение, оценка работы и поддержание безопасности двигательной установки и вспомогательных механизмов».
- Раздел A-III/4, Таблица A-III/4 «Спецификация минимального стандарта компетентности для лиц рядового состава машинной вахты», сфера компетентности «Выполнение обычных обязанностей по вахте в машинном отделении, которые поручаются лицам рядового состава».
- Раздел A-III/5, Таблица A-III/5 «Спецификация минимального стандарта компетентности для лиц рядового состава в качестве квалифицированного моториста на судах с обслуживаемым или периодически необслуживаемым машинным отделением», сфера компетентности «Содействие наблюдению и управлению несением машинной вахты».



Rotary Vane Steering Gear

1. INTRODUCTION

1.1 GENERAL DESCRIPTION

The steering gear is composed of one hydraulic rotary vane actuator mounted directly on the rudder stock, served by two pump units delivering the necessary oil pressure for operating the rudder.

These two pump units may be operated jointly or separately. Each pump unit will provide oil with sufficient pressure to develop the specified rudder torque.

In normal operation at sea, only one pump unit is in operation while the other is acting as a stand-by unit. During manoeuvre of the vessel, when the shortest possible steering time is required, it is possible to run both pump units simultaneously and in such case the rudder rate will be doubled.

The pump units are equipped with solenoid valves, which are normally operated by means of signals from the bridge steering controls.

The pump is submerged in the oil tank. The tank is divided into three chambers, one for each pump unit and one for the integrated storage tank, with one low level alarm-switch in each of the pump unit chambers.



Rotary Vane Steering Gear

2. MAIN ELEMENTS DESCRIPTION

2.1 THE ACTUATOR

The actuator consists of three main components: a cylindrical housing with stoppers, a rotor and a bolted-on cover.

The rotor, turning in a bearing at top and at the bottom, is equipped with vanes upon which the oil pressure is acting and thereby developing the turning torque. The turning movement is limited by stoppers fixed to the housing.

The stoppers also act as mechanical rudder stop in hard-over position.

The axial bearing thrusting of the actuator is of sufficient capacity to carry the full weight of rudder, rudderstock and rotor, eliminating the need for a separate rudder carrier bearing.

In addition to the stoppers, the actuator is equipped with electrical limit switches stopping the turning movement at the predetermined angle.

The sealing system consists of synthetic oil resistant material resting in seal grooves, preventing effectively internal leakages, and gland seals preventing external leakage.

The bearings of the actuator are lubricated by means of the system oil.

The actuator consists of following main components:

- 1 Housing
- 2 Cover
- 3 Rotor
- 4 Stoppers
- 5 Vanes
- 6 Safety relief valve

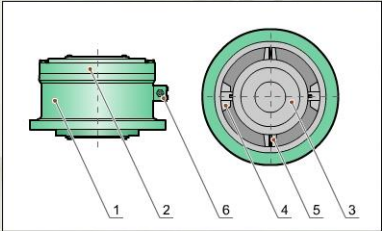


Fig.1.



Rotary Vane Steering Gear

4. STEERING GEAR OPERATING MODE

The steering gear may operate in one of the following steering modes:

1. **Follow-up control (FU).**
2. **Non-follow-up control (NFU).**
3. **Local control.**

Follow-up control

Setting adequate set rudder deflection value is performed by means of steering wheel (**follow-up control FU**). This mode of controlling is performed in the program by clicking the appropriate side of steering wheel in the FU part of the control column. One mouse clicking corresponds to approx. 1 of rudder deflection angle. To keep the desired course of the ship it is necessary to hold the left mouse button continuously. Releasing this button causes return of set value into zero position. Rudder deflection set angle is visible on the rudder setting position indicator.

Non-follow-up control

This kind of control can be performed from:

- Main Control Column,
- Wing Control Panel,
- Override Control Panel.

Clicking on the adequate control joystick selects non-follow-up control.

Override control joystick is often equipped with priority so that other steering modes are disconnected when the steering is operated. If the priority steering is used an audible alarm will be activated, the alarm can be reset with the BUZZER push button. To regain normal steering, push the OVERRIDE RESET push button.

Rotary Vane Steering Gear

6. STARTING PROCEDURE

To put the steering gear into service the following duties should be performed:

- **at the diagram:**
 1. Check the oil level in Pump Unit 1 and Pump Unit 2 tanks.
 2. Open valves to rotary vane actuator from Pump Unit 1 and Pump Unit 2.
- **at the Local Control Room Panel:**
 1. Set Pump 1 Control Switch to position - Remote.
 2. Set Pump 2 Control Switch to position - Remote.
- **at the bridge control panel:**
 1. Start pump 1 by PUMP RUN 1 - push button.
 2. Set Steering Mode Switch to adequate Steering Mode.

From time to time, during steering gear exploitation a loss of oil may occur. Oil reservoirs are refilled by manually operated refilling pump. Clicking the left mouse button at the active field above the pump carries out this operation. All suitable valves should be opened earlier (depending on the fact which tank is to be refilled).

Fig. 1. Steering gear - installation diagram

1. Screw pump; 2. Oil reservoir; 3. Safety relief valve; 4. Return line oil filter; 5. Control valve; 6. Solenoid - pilot valve; 7. Lock valve; 8. Steering gear actuator; 9. Safety valves; 10. Rudder position indicator; 11. Follow-up controller; 12. Rudder setting position indicator; 13. Non-follow-up controller; 14. Refilling pump; 15. Oil storage reservoir

