



Назначение:

Мультимедийная тренажерная программа предназначена для практической подготовки специалистов машинного отделения по эксплуатации судовых насосов в соответствии с требованиями Конвенции ПДНВ и национальными требованиями.

В МТП включены:

- Интерактивная мнемосхема оборудования.
- Описание насосов различных типов с фотографиями, схемами и анимационными роликами.
- 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».



Marine Pumps

CONSTRUCTION AND WORKING PRINCIPLES OF PLUNGER PUMP

Construction and working principles of positive displacement pumps

Plunger pump

Main parts of plunger pumps (Fig. 1) are plunger 1, cylinder 2 and valve casing with suction (inlet) valves 4 and discharge (outlet) valves 5. The plunger is driven by the crank mechanism and acts in reciprocating motion. The stroke outwards the cylinder is the suction stroke, and the stroke inwards the cylinder is the discharge stroke. During suction stroke the plunger creates vacuum in the cylinder space, the suction valve 4 opens and the liquid from suction pipe flows into the cylinder. The discharge valve remains closed. During discharge stroke the plunger produces positive pressure in the cylinder space, discharge valve opens and suction valve closes.

Fig. 1. Construction and working principles of plunger pump

1 - plunger, 2 - cylinder, 3 - valve box, 4 - suction valve, 5 - discharge valve, 6 - safety valve, 7 - discharge air vessel, 8 - plunger stuffing box

The liquid from the cylinder is pumped into the discharge pipe. The stuffing box 8 seals the plunger against the cylinder.

The suction and discharge valves are placed in valve box 3. They are self-acting i.e. they are opened and closed by liquid pressure.

Safety valve 6 opens when there is an excessive pressure rising during operation, which may cause the damage of pump or piping. In this case the liquid flows from the discharge to the suction channel.

7 6 5 4 3 2 1 8

Discharge

Suction

POSITIVE DISPLACEMENT PUMPS

Marine Pumps

CONSTRUCTION AND WORKING PRINCIPLES OF DOUBLE ACTION PISTON PUMP

Piston pump

The double action piston pump (Fig. 4) operates in similar way to plunger pump. Cylinder 2 has two working spaces (above and below piston). During reciprocating motion of the piston 1 each of them acts separately and is served by two belonging valves, suction valves 4 and discharge valves 7. Due to this if the suction is accomplished on one side of the piston the discharge is performed on the opposite side. The capacity of such a pump is two times bigger than in single action pump of the same number of working cycles per time, and the stream of the pumped liquid is more even. In addition, the discharge air vessel 8 levels out the fluctuation of pressure and capacity.

The driving mechanism is connected to the piston by means of a piston rod 5. The cross over of piston rod through cylinder cover is sealed with a stuffing box 6.

Valve box 3 is connected with both sides of the cylinder. The safety valve 9 protects parts of the pump and the system against excessive pressure increase of the pumped liquid.

Fig. 4. Construction and working principles of double action piston pump

1 - piston, 2 - cylinder, 3 - valve box, 4 - suction valve, 5 - piston rod, 6 - piston rod stuffing box, 7 - discharge valve, 8 - discharge air vessel, 9 - safety valve

9 8 4 7 3 2 6 5 1

Discharge

Suction

Fig. 3. Double action piston pump

POSITIVE DISPLACEMENT PUMPS



Marine Pumps

CONSTRUCTION AND WORKING PRINCIPLES OF JET PUMPS (EDUCTORS)

Construction and working principles of jet pumps (eductors)

Eductor (jet pump – Fig. 2) has a very simple construction and no moving parts when working. This is its basic advantage. The pump is motivated by a stream of motive medium supplied through connector 6 to nozzle 1. Air (gas), water or steam can be used as motive medium. It leaves nozzle with high speed, which results in arising of vacuum in suction chamber 2. Due to this the liquid suction from suction connector 4 occurs.

In chamber 2 both media mix and flow into diffuser 3. It has a widening shape, which causes conversion of mixture kinetic energy into the potential energy (pressure). Under suitable pressure the mixture of the pumped liquid and the motive medium is discharged into outlet pipe system through discharge connector 5.

Jet pump (eductors) can transfer gases, fluids and loose materials. The disadvantage of pump is mixing of motive medium with pumped medium. It limits the use of jet pump to systems allowing such a situation.

Jet pumps (eductors) used for production of vacuum or pumping from negative pressure spaces to atmospheric pressure are called ejectors. Jet pumps discharging into spaces of pressure higher than atmospheric are named injectors.




Fig. 1. Jet pump (eductor)

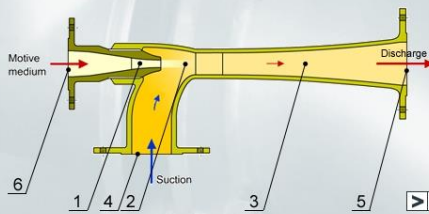


Fig. 2. Construction and working principles of jet pump (eductor)
(1 - nozzle, 2 - suction chamber, 3 - diffuser, 4 - suction connector, 5 - discharge connector, 6 - motive medium inlet)


JET PUMPS

Marine Pumps

QUESTION 1 OF 10

The swing pump has:

- ☐ A The reciprocating motion of working device.
- ☐ B The semirotary motion of working device.
- ☐ C The rotary motion of working device.



ASSESSMENT

