



TOSHKENT IRRIGATSIYA VA QISHLOQ  
XO'JALIGINI MEXANIZATSIYALASH  
MUHANDISLARI INSTITUTI



**FAN:**

**GES va NASOS STANSIYALARINI  
LOYHALASH ASOSLARI**

MAVZU

**02**

**NASOSLAR TASNIFI VA ENERGETIK  
KO'RSATKICHLARI**



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# MA'RUZA REJASI:

- **Nasoslar tasnifi**
- **Nasoslarning qo'llanish sohalari**
- **Nasoslarning asosiy energetik ko'rsatkichlari**

# Nasoslar

Nasoslar mexanik yoki boshqa turdagi energiyani suyuqlikning gidravlik energiyasiga aylantirib beruvchi gidravlik mashinalar hisoblanadi.



# Nasoslar tasnifi

Harakat turi bo'yicha



```
graph TD; A[Harakat turi bo'yicha] --> B["dinamik  
nasoslar"]; A --> C["hajmiy  
nasoslar"];
```

dinamik  
nasoslar

hajmiy  
nasoslar

# Nasoslar tasnifi



## Dinamik nasoslar

Suyuqlik, nasosning kirish hamda chiqish qismlari bilan doimiy bog'langan ish kamerasidagi ish organining ta'sirida siljiydi.



# Nasoslar tasnifi

**Dinamik**

**parrakli**

**ishqalanishli**

**markazdan qochma**

**diagonal**

**o'qiy**

**uyurmali**

**oqimchali**

**suv va havo ko'targichli**

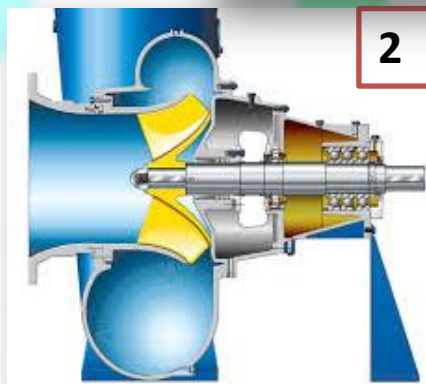
**shnekli**



1

1

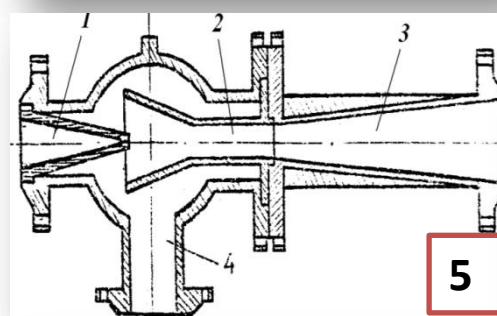
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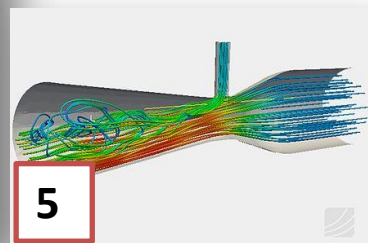
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4



5



5



6



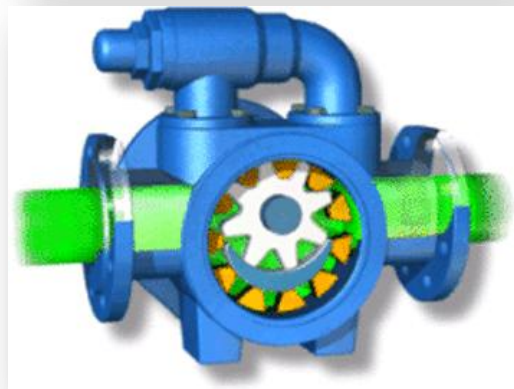
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7

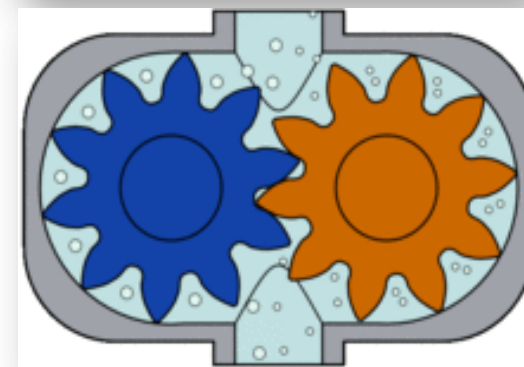
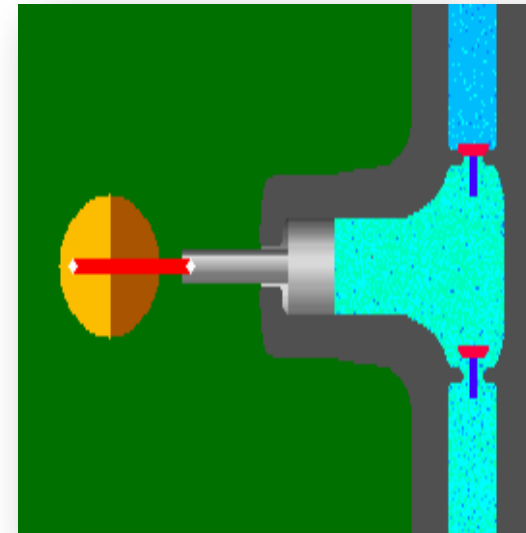
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# Nasoslar tasnifi

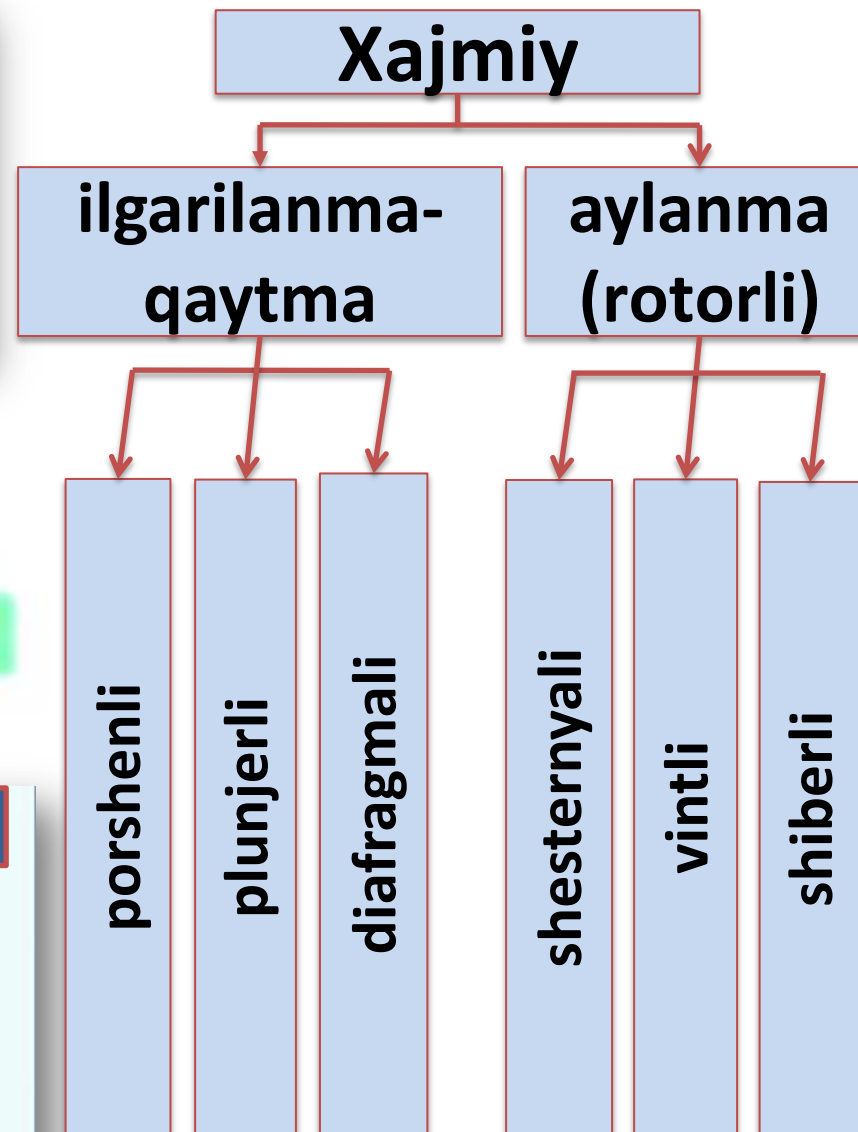
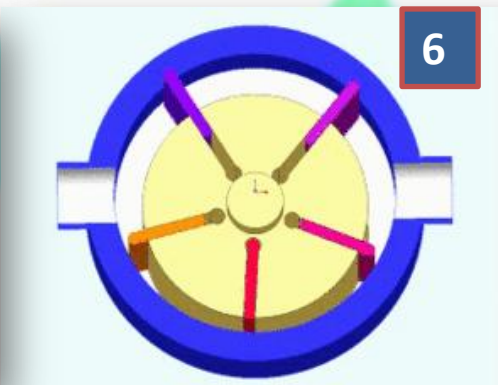
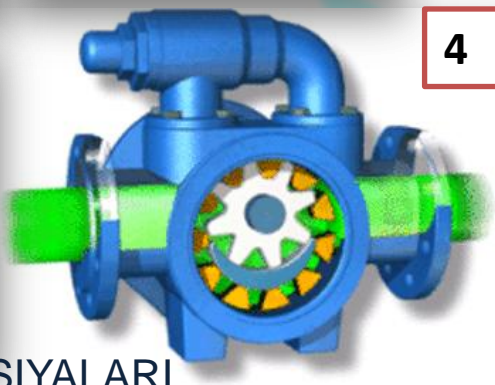
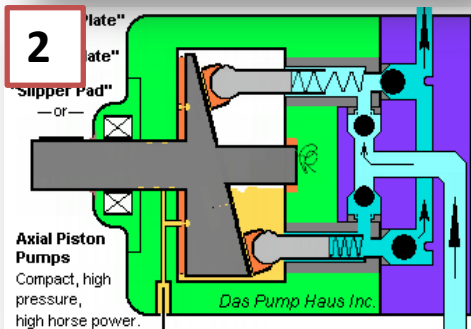
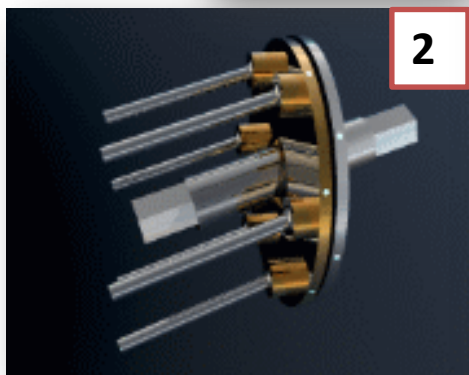
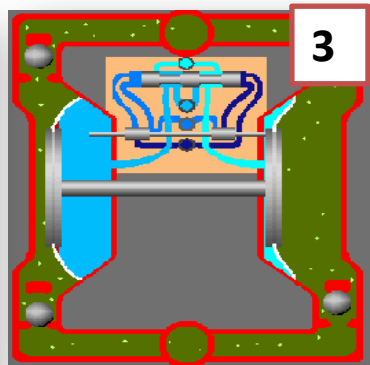
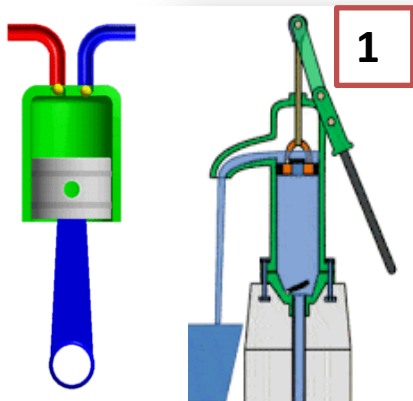


## Hajmiy nasoslar

Suyuqlik, nasosning kirish va chiqish qismlariga navbati bilan ulanadigan ish kamerasidagi hajmni davriy o'zgartirib turuvchi ish organining ta'sirida siljiydi.



# Nasoslar tasnifi





# Nasoslar tasnifi

Nasosning yiriklik ko'rsatkichlari	Foydali quvvati, kvv
mikro	$N_f < 0,4$
mini	$0,4 \div 4$
kichik	$4 \div 100$
o'rta	$100 \div 400$
yirik	$N_f > 400$

# Nasoslar tasnifi

Nasosning yiriklik ko'rsatkichlari	Suv sarfi, m <sup>3</sup> /s
kichik	$Q \leq 1,0$
o'rta	1,0 ÷ 10
katta	10 ÷ 100

# Nasoslar tasnifi

Nasosning yiriklik ko'rsatkichlari	Napori, m
kichik	$H \leq 20$
o'rta	$20 \div 60$
yuqori	$H > 60$

# Nasoslarning qo'llanilish soxalari

Ichimlik suvi bilan  
ta'minlash

Sanoat korxonalarini

Kemalar

Neft'-gaz

Qog'oz ishlab chiqarish

Sug'orish

Kanalizatsiya

IES

Zax qochirish

Ximiya

Oziq-ovqat

# Nasoslarning asosiy energetik ko'rsatkichlari

Ko'rsatkichlar:

Nasos stansiyasi ish rejimi diapazonini o'zgarib turishini, uning jihozlari va konstruktiv xususiyatlarini aniqlovchi ko'rsatkichlar

**NAPOR**

**SARF**

**QUVVAT**

**FIK**

# Nasoslarning asosiy energetik ko'rsatkichlari

Napor,  $H$ , m

Nasosning kirish va chiqish oralig'ida  
suyuqlik solishtirma energiyasining  
o'zgarishidir

# Nasoslarning asosiy energetik ko'rsatkichlari

Napor, H, m

nasos naporini aniqlashga doir

1-1 va 2-2 kesimlar

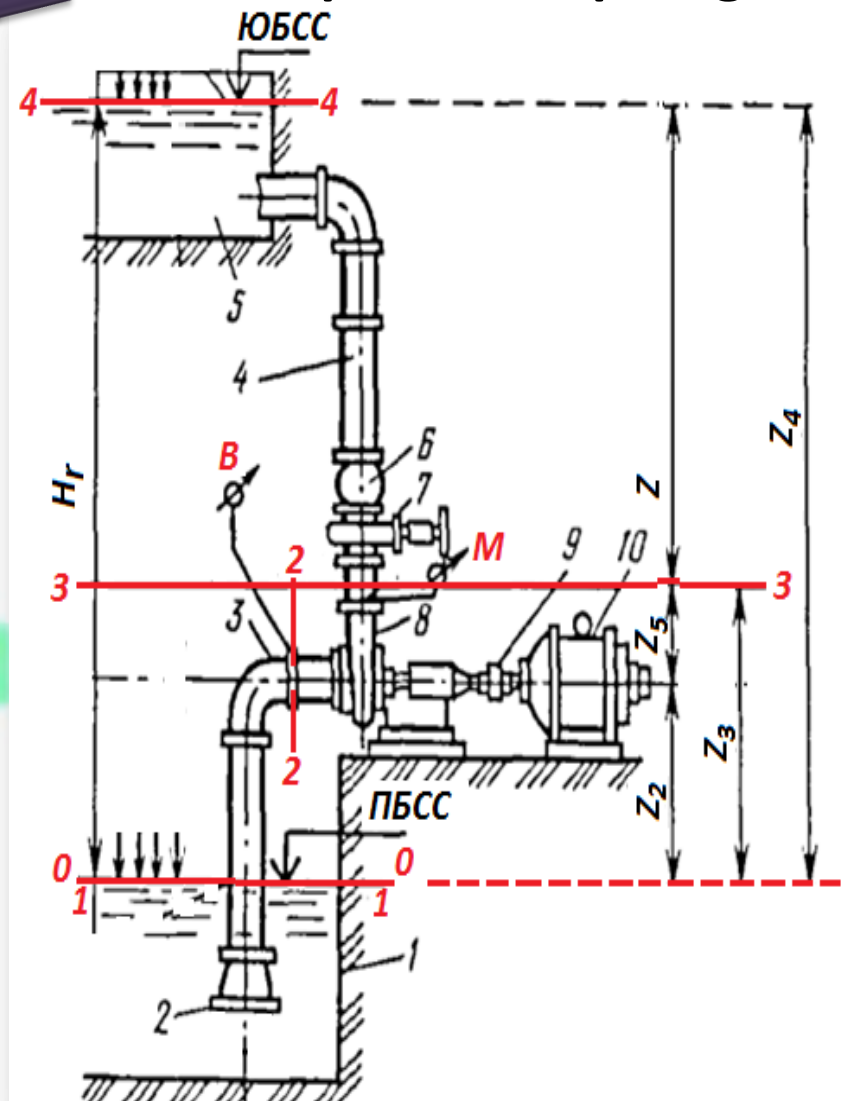
$$0 + \frac{p_{at}}{\gamma} + \frac{0}{2g} = z_2 + \frac{p_v}{\gamma} + \frac{\alpha_2 v_2^2}{2g} + \Delta h_s \quad (1)$$

3-3 va 4-4 kesimlar

$$z_3 + \frac{p_m}{\gamma} + \frac{\alpha_3 v_3^2}{2g} = z_3 + z + \frac{p_{at}}{\gamma} + \frac{0}{2g} + \Delta h_n \quad (2)$$

(1) va (2) tenglamalardan

$$z_2 + \frac{p_v}{\gamma} + \frac{\alpha_2 v_2^2}{2g} + \Delta h_s = -z + \frac{p_m}{\gamma} + \frac{\alpha_3 v_3^2}{2g} - \Delta h_n \quad (3)$$



# Nasoslarning asosiy energetik ko'rsatkichlari

Napor, H, m

nasos naporini aniqlashga doir

$$z_2 + z + \frac{p_v}{\gamma} + \frac{\alpha_2 v_2^2}{2g} + \Delta h_s + \Delta h_n = \frac{p_m}{\gamma} + \frac{\alpha_3 v_3^2}{2g} \quad (4)$$

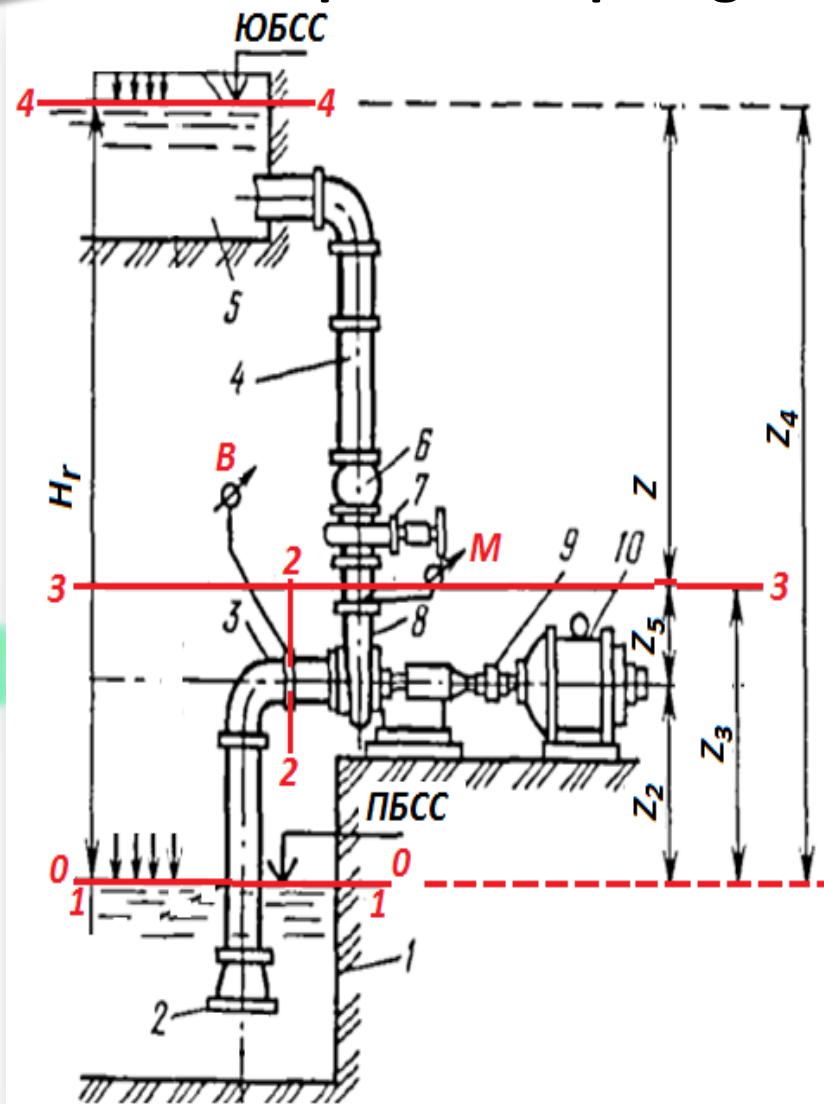
$$z_2 + z + \Delta h_s + \Delta h_n = \left( \frac{p_m}{\gamma} - \frac{p_v}{\gamma} \right) + \left( \frac{\alpha_3 v_3^2}{2g} - \frac{\alpha_2 v_2^2}{2g} \right) \quad (5)$$

$$H - z_5 = \left( \frac{p_m}{\gamma} - \frac{p_v}{\gamma} \right) + \left( \frac{\alpha_3 v_3^2}{2g} - \frac{\alpha_2 v_2^2}{2g} \right); \quad (6)$$

$$z_5 = z_4 - (z + z_2) \quad (7)$$

$$H - (z_2 + z_5 + z) = h_f \quad (8)$$

$$z_5 + z_2 + z = H_g \quad \text{yoki} \quad H = H_g + h_f \quad (9)$$





# Nasoslarning asosiy energetik ko'rsatkichlari

Napor,  $H$ , m

$$H = H_g + h_f$$

Shunday qilib, monometrik yoki to'la napor – geometrik napor va quvurlardagi qarshiliklarda yo'qotilgan naporlar yig'indisiga teng

$$H_g = \nabla YUBSS - \nabla PBSS$$

# Nasoslarning asosiy energetik ko'rsatkichlari

Suyuqlik sarfi,  
 $Q, l/s$

Birlik vaqt ichida ko'ndalang kesim yuzadan o'tayotgan suyuqlik hajmiga teng

$$Q = \omega \cdot v$$

$$Q = \mu \omega \sqrt{2gH}$$

$l/s, m^3/s, m^3/soat$

# Nasoslarning asosiy energetik ko'rsatkichlari

Quvvat, N, vt

Nasos 1 sek.da ma'lum balandlikka ko'tarilgan  $m$  massali suyuqlikni chiqarsa, unda nasosning foydali ishi

$$a = m g H$$

# Nasoslarning asosiy energetik ko'rsatkichlari

## Quvvat, N, vt

Agar  $m = \rho Qt$  bo'lsa,  
nasosning foydali quvvati:

$$N_f = \rho g QH = \gamma QH$$

## O'lchov birlik

1 ot kuchi = 75 kg m/s,

$$N_f = \gamma QH / 75 = 1000QH / 75 = 13,33QH \text{ o.k.}$$

1 kvv = 102 kg m/s,

$$N_f = \gamma QH / 102 = 1000QH / 102 = 9,81QH \text{ kvv}$$

Nasosni harakatga keltirish uchun dvigatel' sarf qilgan energiyaga nasosning valdagi quvvati yoki nasosning iste'mol quvvati deyiladi

$$N_{ist} = \frac{\rho g QH}{\eta} : 1000 = \frac{9,81QH}{\eta} \text{ [kvv]}$$

$$N_{ist} = \frac{N_f}{\eta} = \frac{\rho g QH}{\eta} \text{ [vt]}$$

# Nasoslarning asosiy energetik ko'rsatkichlari

FIK

$$\eta = \frac{N_f}{N_{ist}} 100\%$$

## Adabiyotlar:

1. M.Mamajonov, D.Bazarov **Nasos stansiyalaridan foydalanish va diagnostikasi**, Darslik, Toshkent, 2019. – 348 bet.
2. T.Tursunov, D.Bazarov, M.Berdiyev **Gidroenergetik inshootlar**. TIQXMMI, 2019 y. 224 b.
3. M.Mamajonov. **Nasoslar va nasos stansiyalari**. Darslik, Toshkent, 2012. – 373 bet.
4. Mamajonov m. **Nasoslar va nasos stansiyalari**. Darslik, Toshkent, 2012. – 352 bet.
5. M.Mamajonov, B.Uralov, A.Hakimov, T.Majidov, E.Kan. **Nasoslar va nasos stansiyalari**. O'quv qo'llanma, Toshkent, TIMI, 2010.- 242 b.
6. <https://ru.wikipedia.org/wiki/%D0%9D%D0%B0%D1%81%D0%BE%D1%81>
7. <https://moodle.tiame.uz/course/view.php?id=705>



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