



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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Nasos stansiyalari va GES
kafedrasi professori.

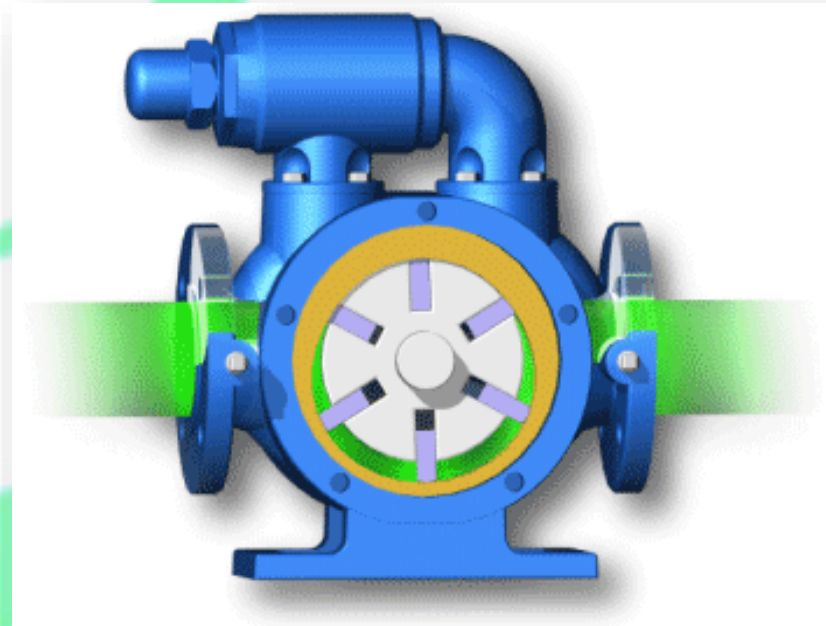


MA'RUZA REJASI:

- **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

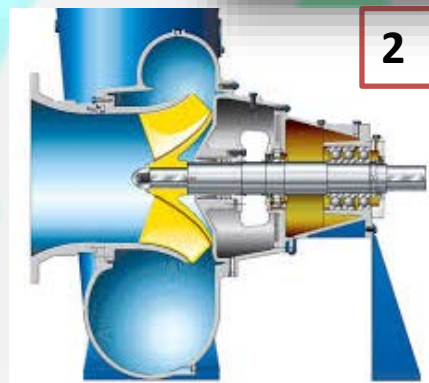
suv va havo ko'targichli

shnekli



1

1



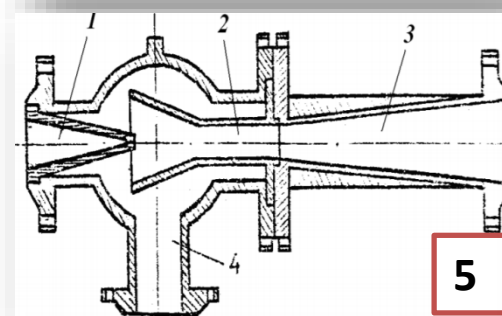
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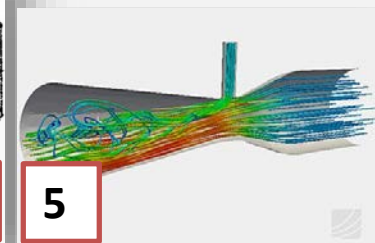
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4



5



5



6

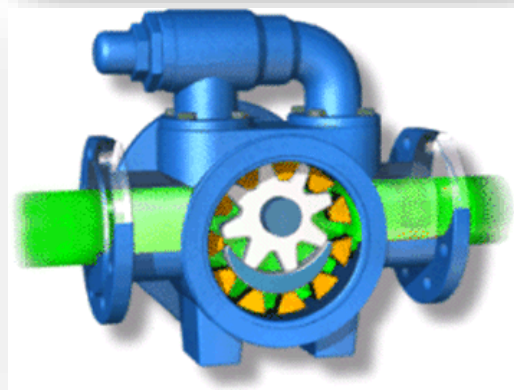


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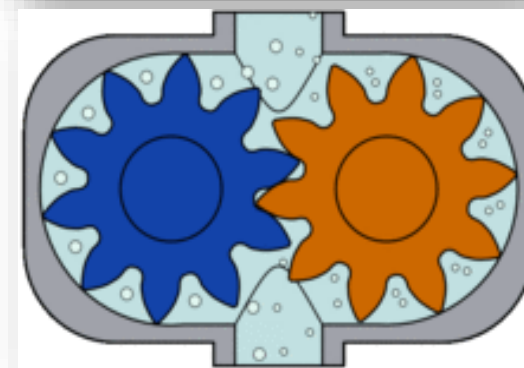
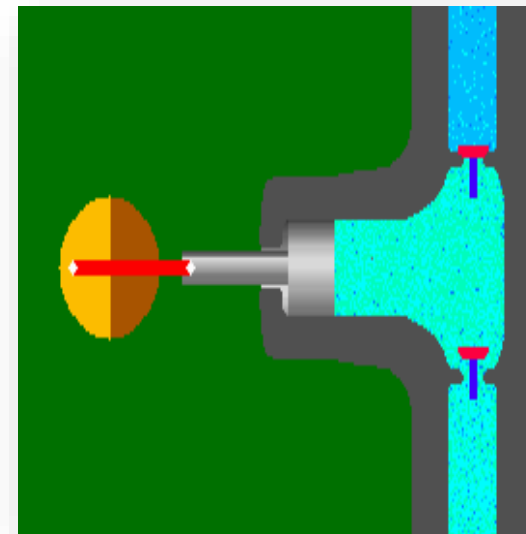
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Nasoslar tasnifi

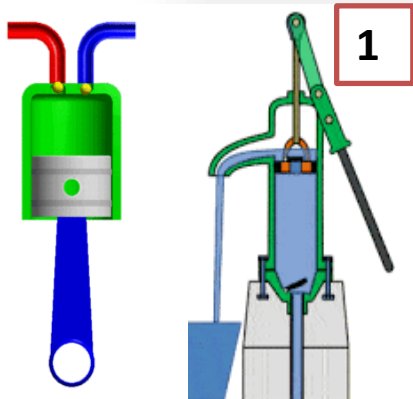


Hajmiy nasoslar

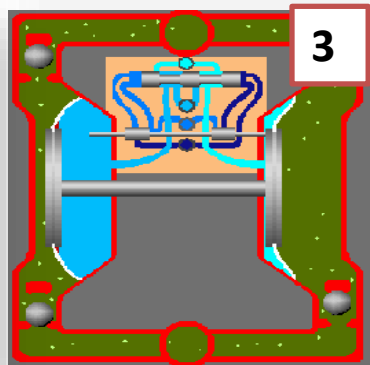
Suyuqlik, nasosning kirish va chiqish qismlariga navbati bilan ulanadigan ish kamasidagi hajmni davriy o'zgartirib turuvchi ish organining ta'sirida siljiydi.



Nasoslar tasnifi



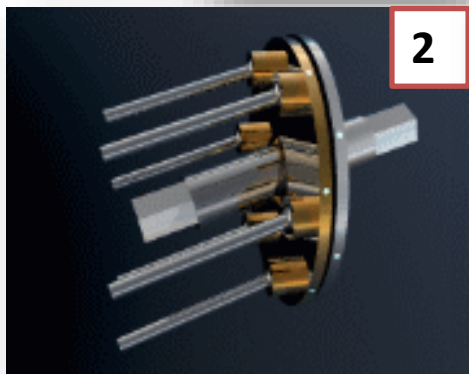
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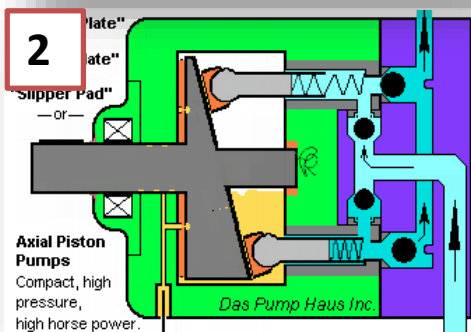
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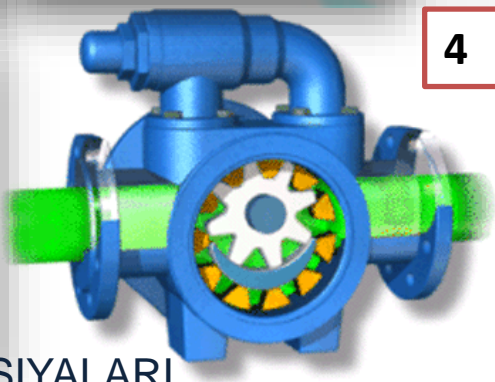
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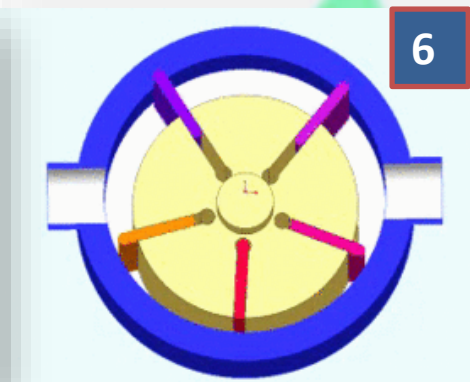
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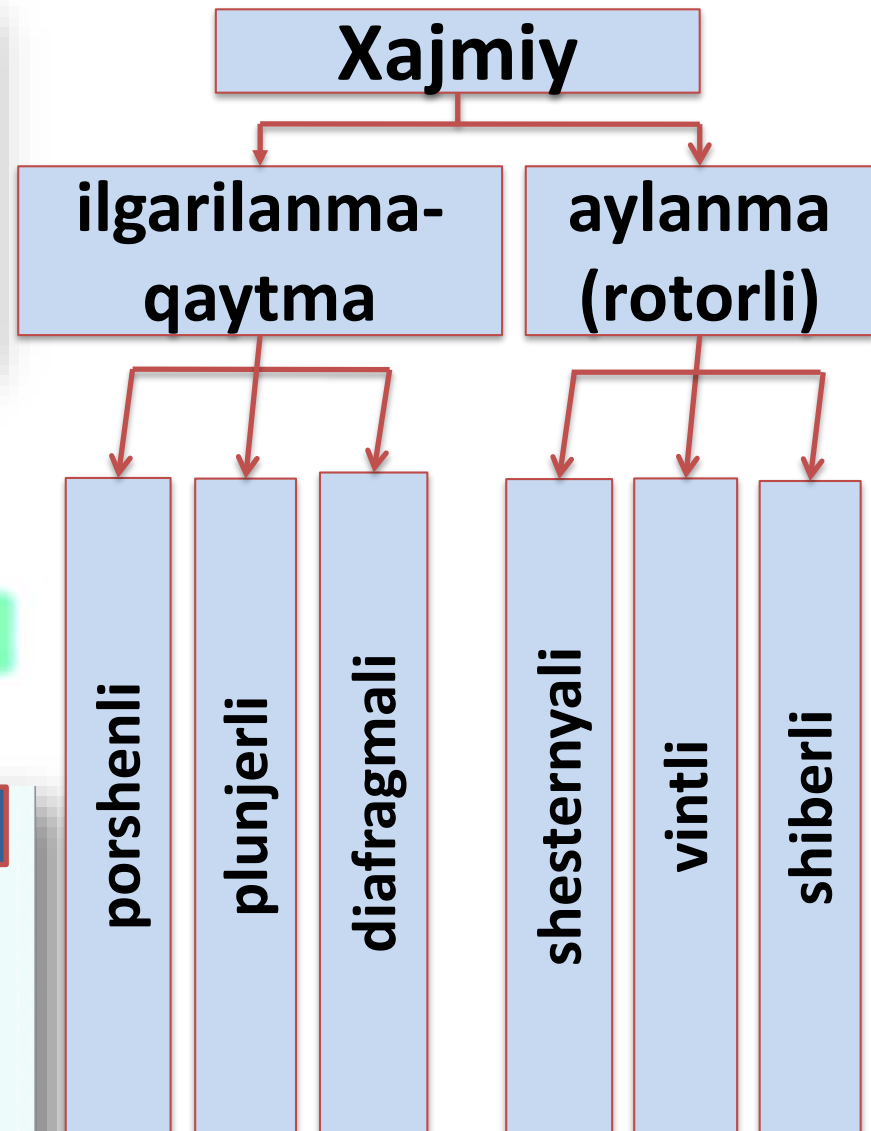
2



4



6



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 ³ /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

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

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

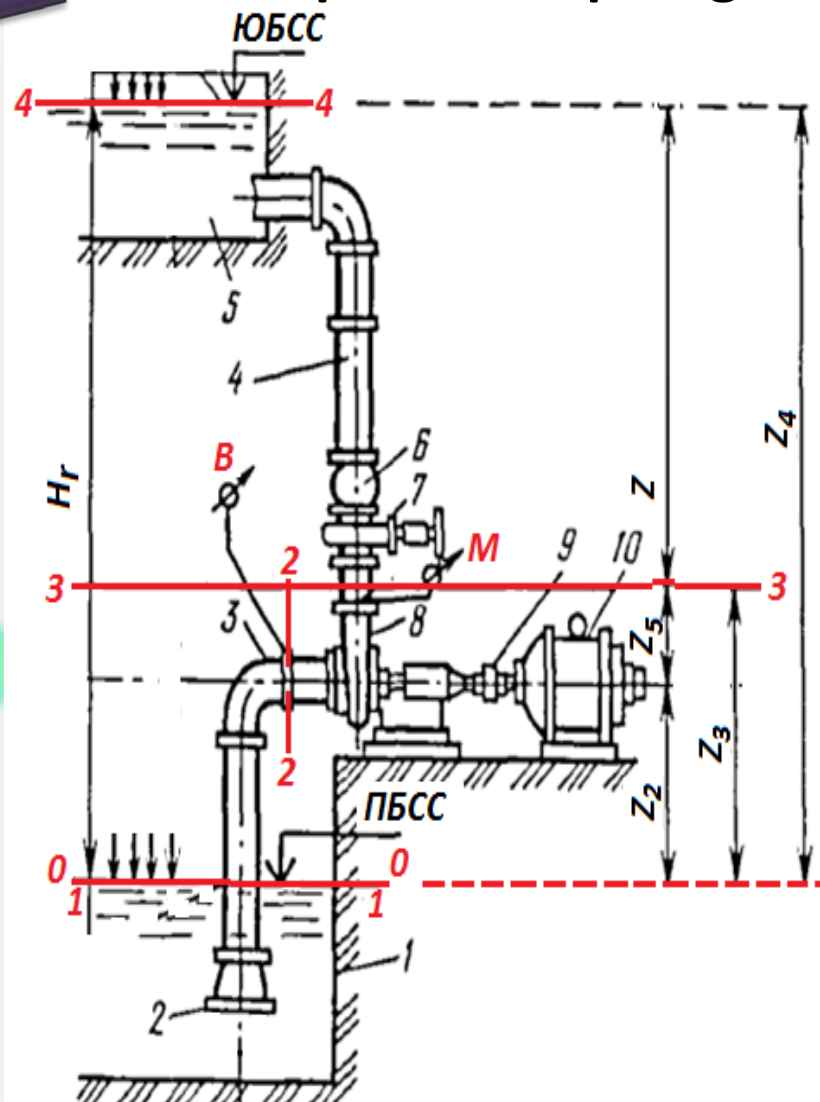
$$0 + \frac{p_{at}}{\gamma} + \frac{0}{2g} = z_2 + \frac{p_v}{\gamma} + \frac{\alpha_2 v_2^2}{2g} + \Delta h_s \quad (1)$$

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

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

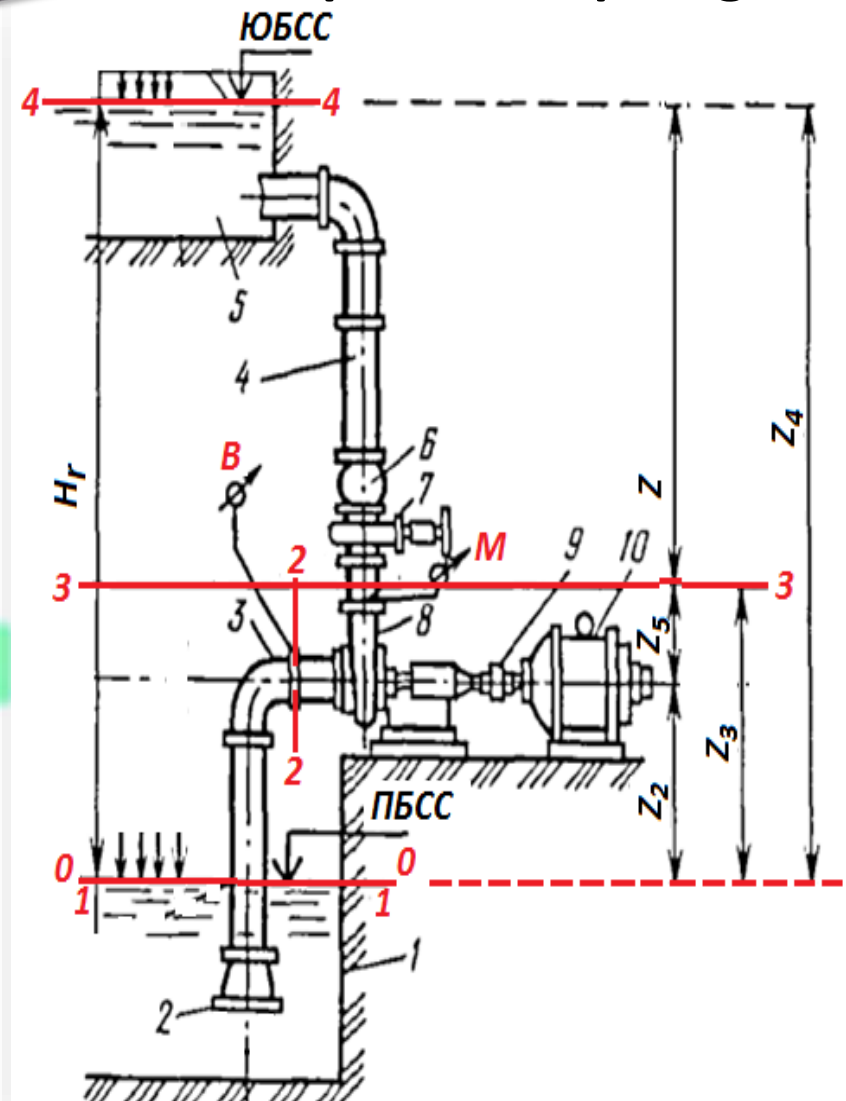
$$z_2 + z + \Delta h_s + \Delta h_n = \left(\frac{p_m}{\gamma} - \frac{p_v}{\gamma} \right) + \left(\frac{\alpha_3 v_3^2}{2g} - \frac{\alpha_2 v_2^2}{2g} \right) \quad (5)$$

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

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

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

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



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

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

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

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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