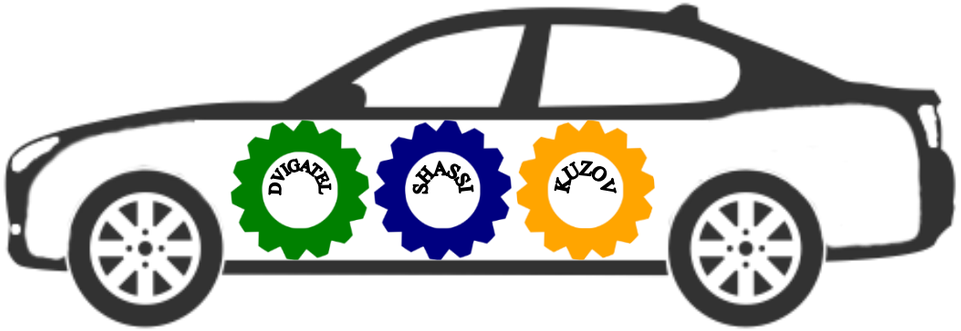
VEHICLES CONSTRUCTION

AVTOMOBILLAR KONSTRUKSIYASI



4th Topic: Valve control mechanism

(4-Mavzu: Gaz taqsimlash mexanizmi)

Part 2

Associate Professor: Yusupov Sarvarbek

4-Mavzu: Gaz taqsimlash mexanizmi

(4th Topic: Valve control mechanism)

O‘quv rejasi:

4.1. GTMning vazifasi va turlari.

4.2. GTM turlarining konstruksiyasi va ularning ishlash prinsipi.

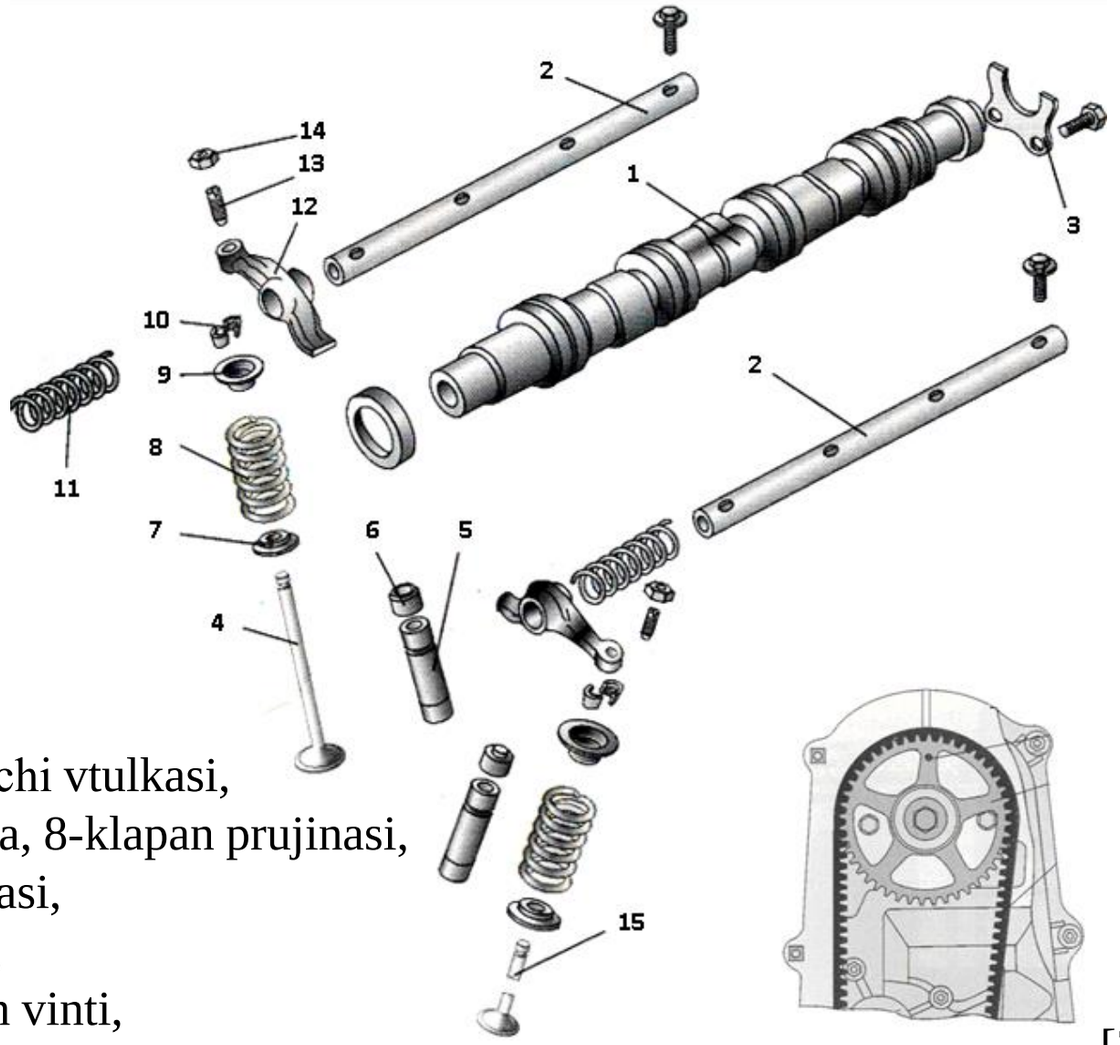
4.3. GTM valining konstruksiyasi va uning yuritma turlari.

4.4. GTM detallarining konstruksiyasi va ishlash prinsipi.

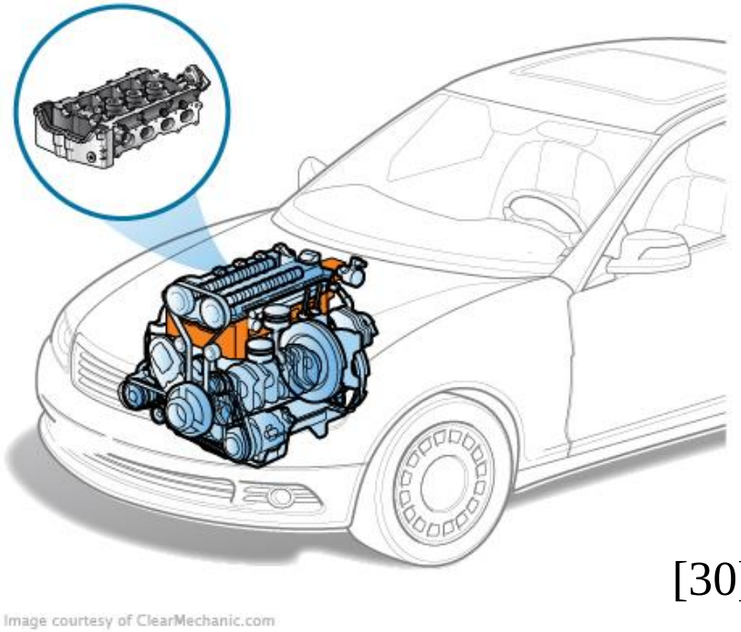
4.5. Gidrokompensator konstruksiyasi.

4.6. GTM fazasi va diagrammasi.

4.4. GTM detallarining konstruksiyasi va ishlash prinsipi.

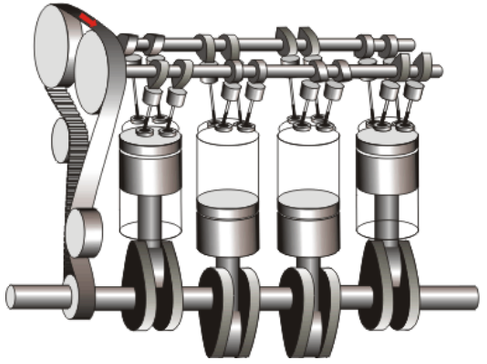


1-gaz taqsimlash vali,
2-koromislo o‘qi,
3-stoprlovchi plastina,
4-kiritish klapani,
5-klapanning yo‘naltiruvchi vtulkasi,
6-klapan salnigi, 7-shayba, 8-klapan prujinasi,
9- klapan prujinasi tarelkasi,
10-suxariklar, 11-prujina,
12-koromislo, 13-rostlash vinti,
14-kontrgayka.



[30]

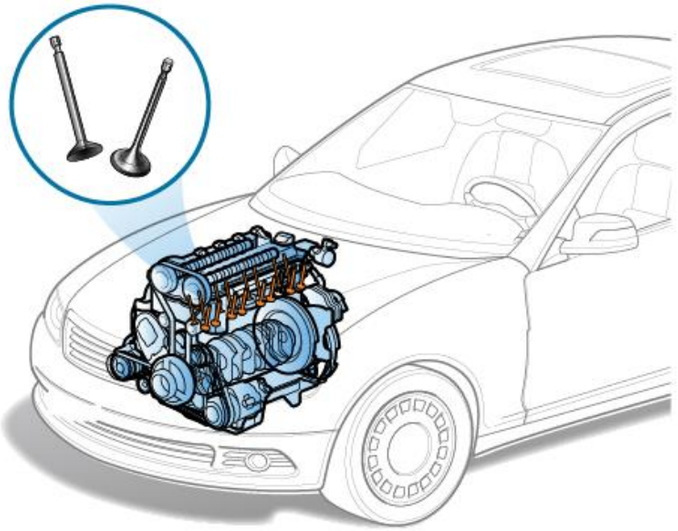
[31]



[32]

Klapanlar

Klapanlar silindrlar bloki kallagidagi kiritish yoki chiqarish kanallarini yopish va ochish uchun xizmat qiladi.



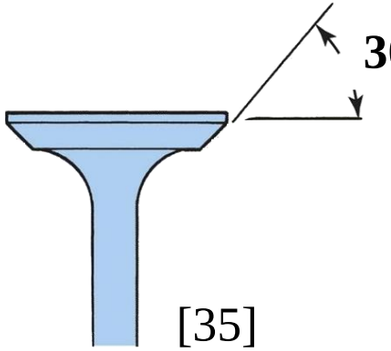
Vazifalariga ko‘ra:

- **Kiritish;**
- **Chiqarish.**

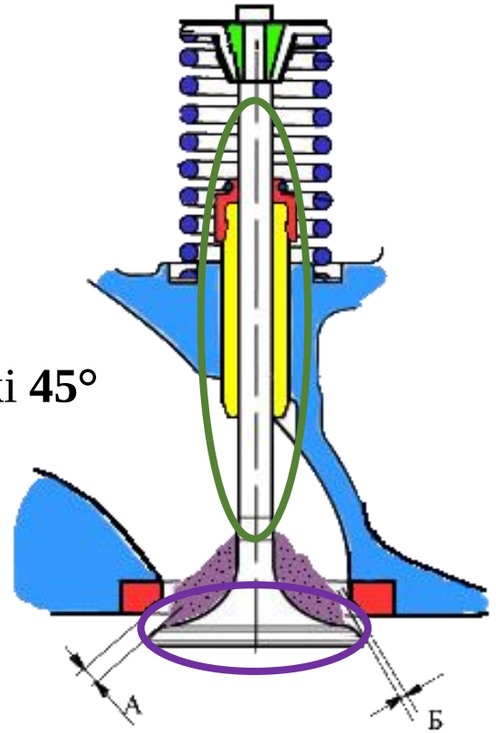
} **ish faskasi**

Klapan:

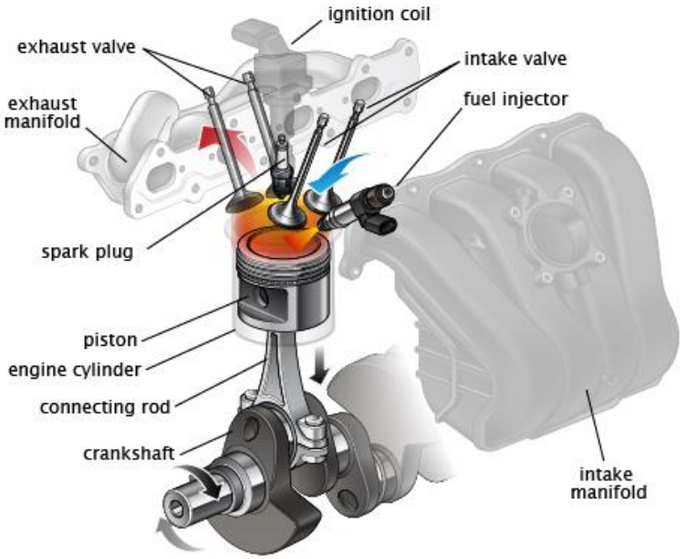
- ✓ **Kallak;**
- ✓ **Sterjen.**



[35]

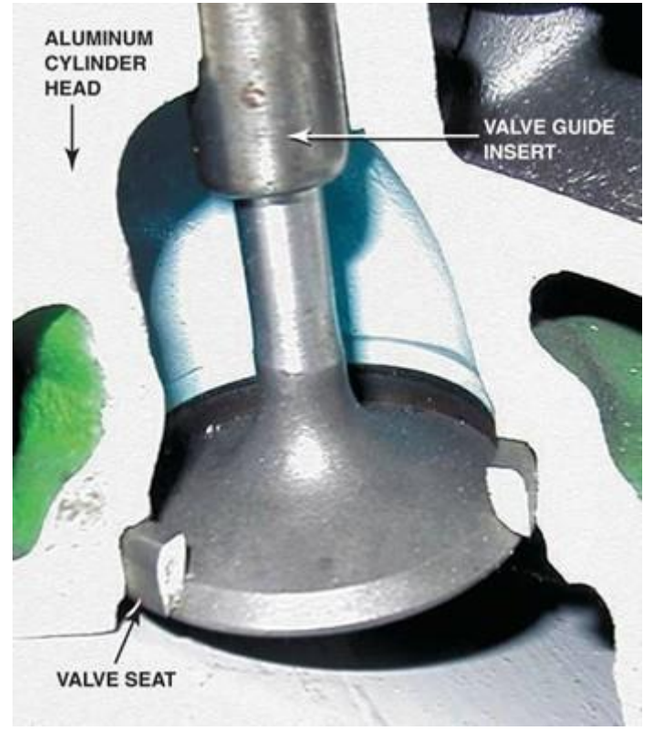


[34]



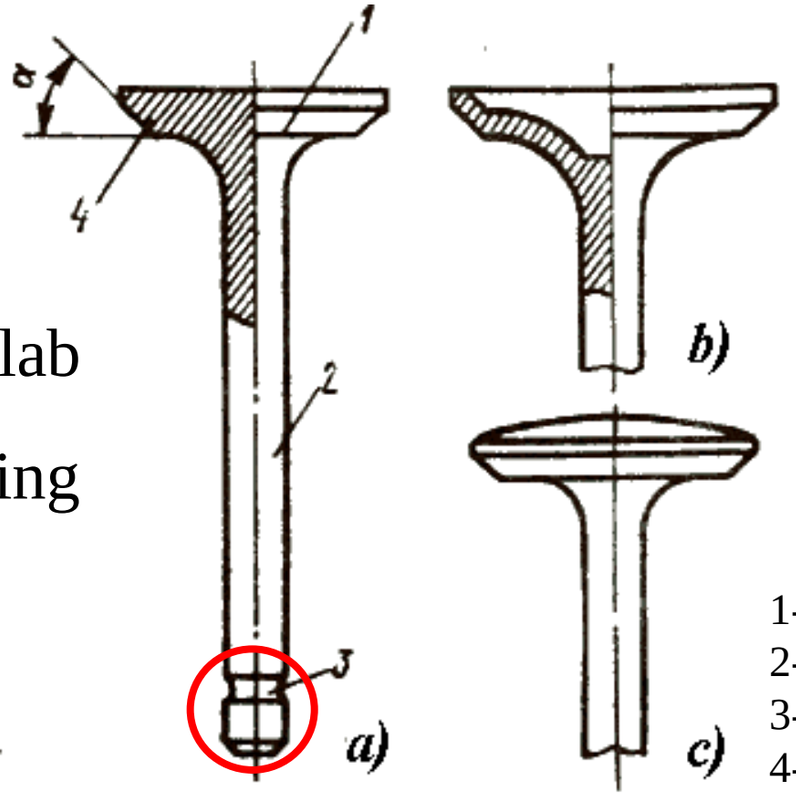
[33]

Klapanni kallak qismi konussimon faskali bo‘lib, u silindrlar blokining kallagida yoki silindrlar blokida ishlangan klapan o‘rindig‘iga jips o‘rnashishi uchun moslashtirilgan.



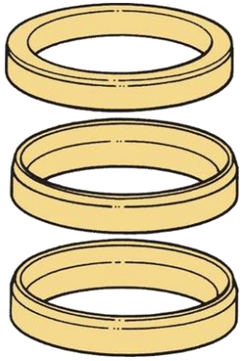
[36]

Klapan prujinalarini ushlab turish uchun klapan sterjenining uchida **ariqcha** qilinadi.



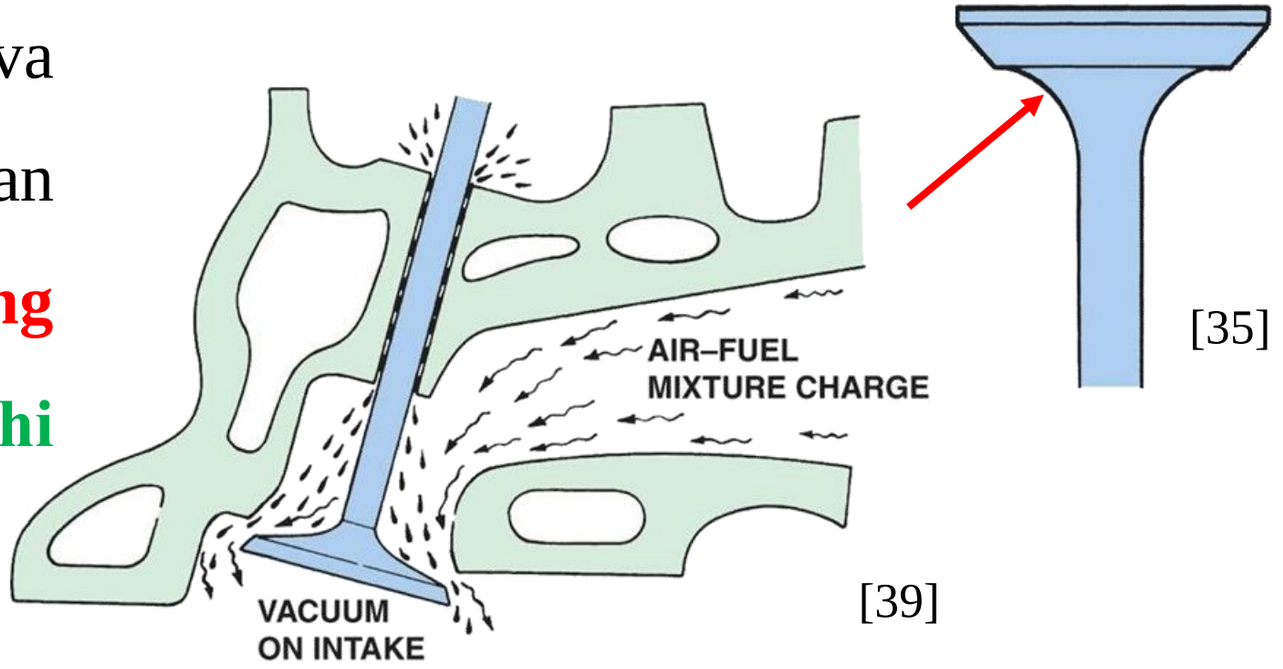
a - tarelkasimon, b - lolasimon, c - qavariq. [38]

1-klapan kallagi;
2-klapan o‘zagi;
3-halqasimon ariqcha;
4-konussimon faska.


[37]

Klapandan sterjenga o‘tish joyi radiusli bo‘ladi.

Shunda klapanning mustahkamligi va issiqlik o‘tkazuvchanligi oshadi, bundan tashqari, yangi **yonuvchi aralashmaning** klapan atrofidan **silindrga silliq o‘tishi yaxshilanadi.**



[35]

[39]

[40]

Kiritish

Chiqarish

Silindrni yonuvchi aralashma bilan yaxshiroq to‘ldirish maqsadida

Kiritish > **Chiqarish**

Chiqarish klapanlari og‘ir ish sharoitlarida ishlaydi.

Chunki yuqori haroratga ega ishlatilgan gazlarni silindrdan tashqariga chiqaradi.

Chiqarish

[41]

benzinli dvigatellarda **800-850°C** gacha,

dizellarda esa **500-600°C** gacha qiziydi.

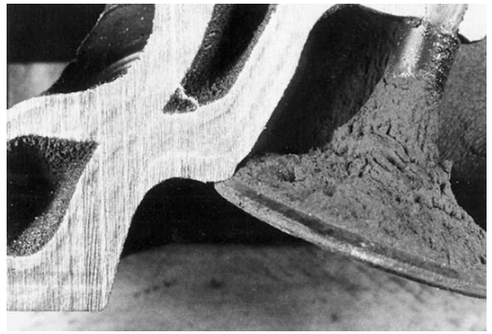
Kiritish

[40]

yengil sharoitda ishlaydi,

nisbatan ikki marta kam qiziydi.

[42]



faskasining kuyishiga

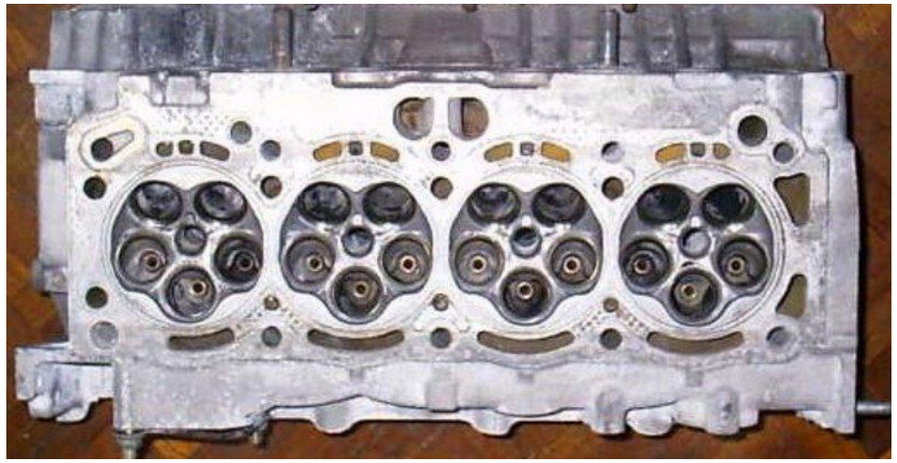
qiyshayishi

qurum

[43]

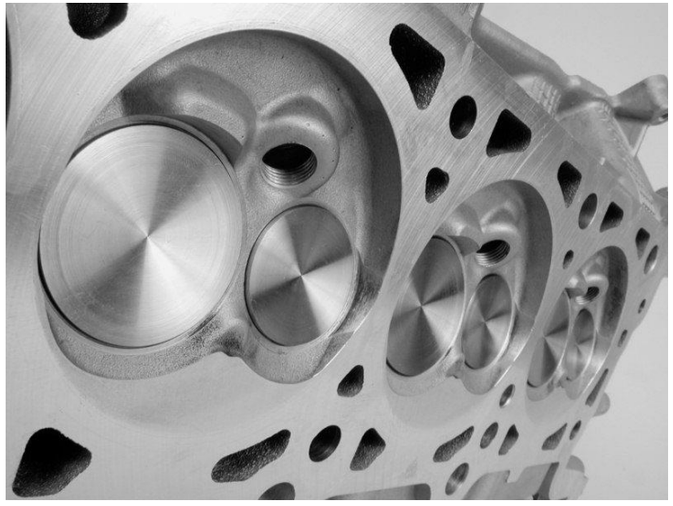
Klapanlarni silindrlar bosh kallagida joylashishi:

[45]



[47]

[46]

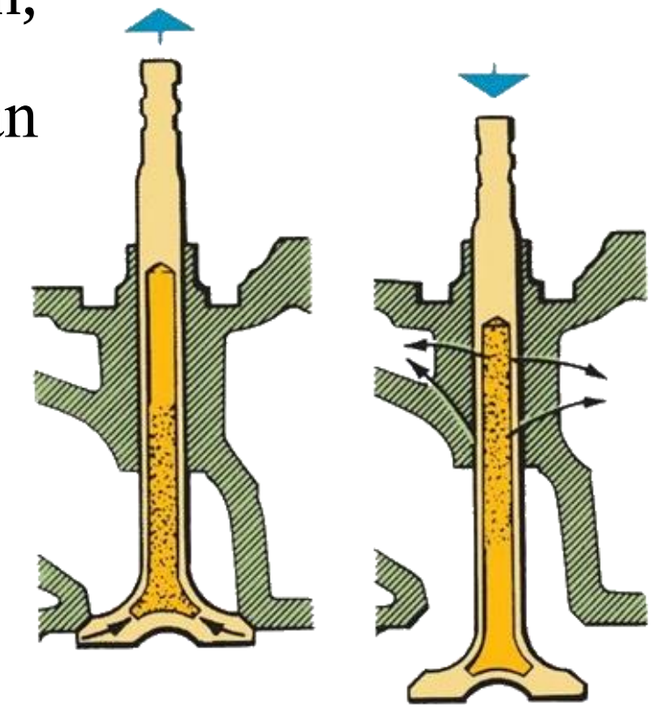


[44]

Kiritish klapanlari yeyilishga chidamli xromli po‘latdan, **chiqarish** klapanlari esa issiqbardosh silxrom po‘latdan tayyorlanadi.

Sterjeni esa xromli po‘latdan ishlanib, so‘ngra ular o‘zaro payvandlanadi.

Ayrim chiqarish klapanlari ish faskasining sirtiga xromli nikel qotishmasi eritilib quyiladi.



[48]

Klapan sterjenining ichi kovak qilib ishlanib, bolshlig‘ining **1/2** yoki **2/3** qismiga issiqlikni yaxshi tarqatish imkonini beradigan natriy quyiladi.

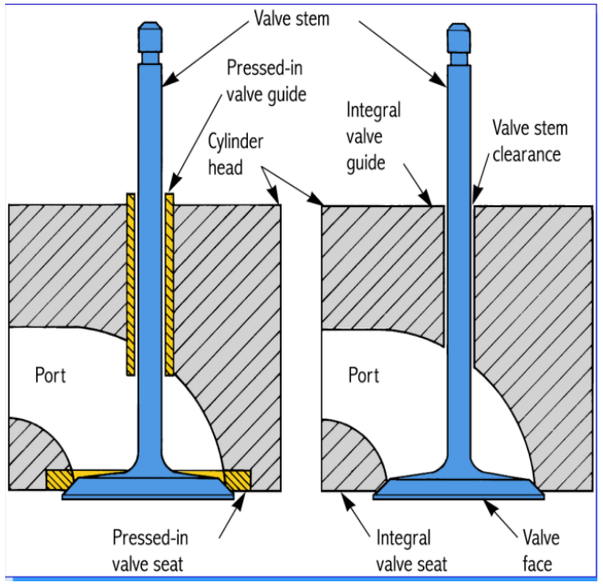
Klapanning yo‘naltiruvchi vtulkalari

Klapan yo‘naltiruvchi vtulka ichida harakatlanadi.

U klapanning o‘rindiqqa aniq o‘tirishini ta’minlaydi.

U kirgizma qilib cho‘yandan yoki metallokeramik qotishmadan tayyorlanadi.

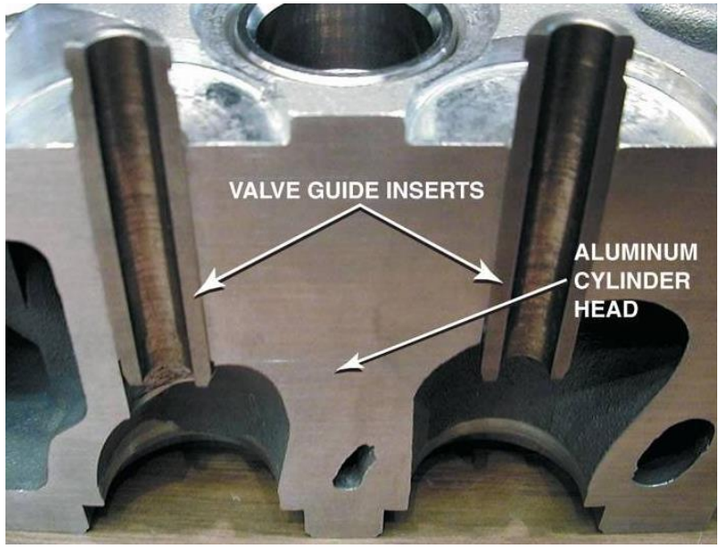
[51]



[50]

Presslab o‘rnatiladigan vtulka

Integralli vtulka

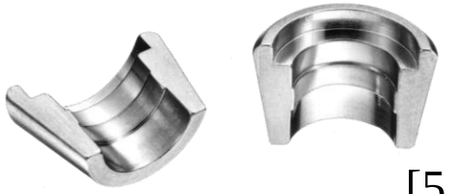


[49]

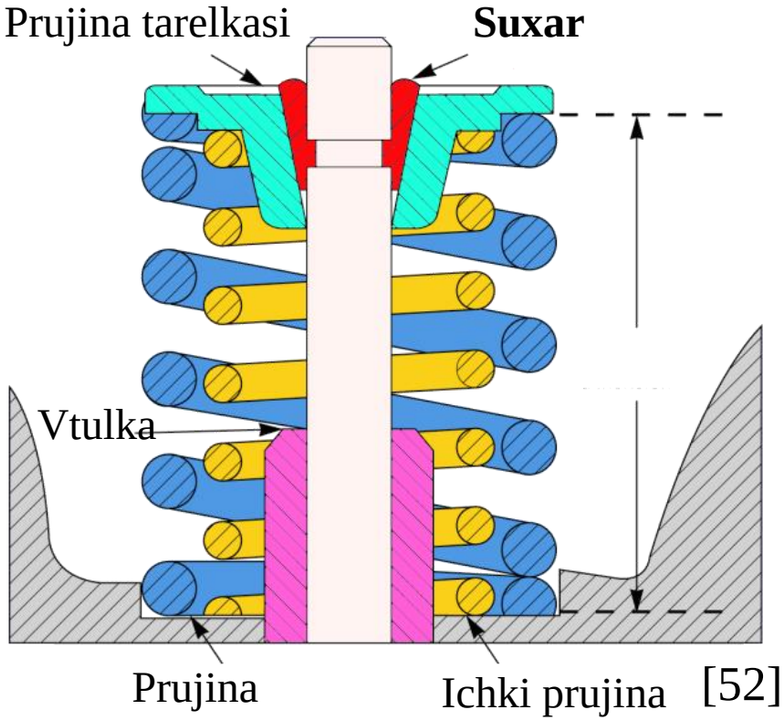
Klapan suxarlari va salnigi

Klapanning suxarlari yarim oysimon shaklida bo‘lib, klapan sterjeni uchudagi halqasimon ariqchaga o‘rnashadi.

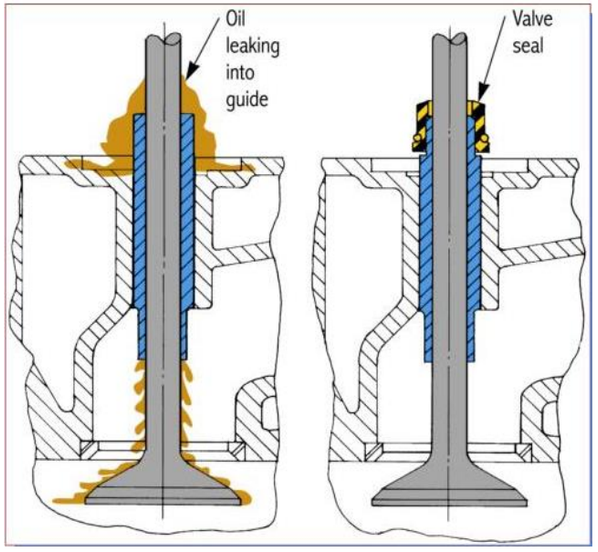
Uning vazifasi klapan prujinani detallarini mahkam tutib turishga xizmat qiladi.



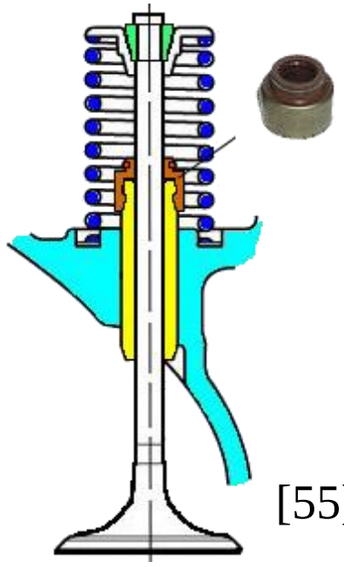
[53]



[52]



[54]



[55]

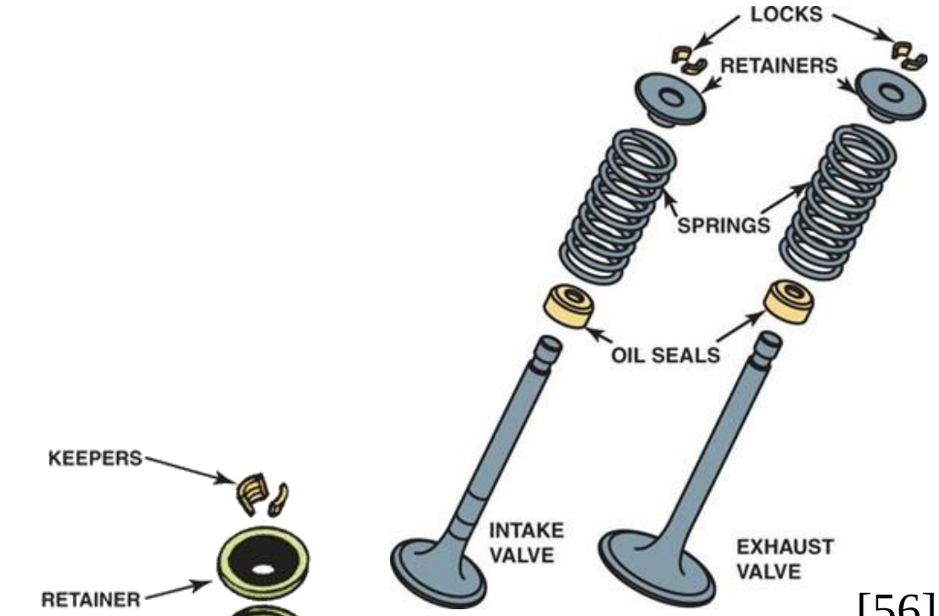
Klapan salnigi silidrlar bosh kallagidagi moyni klapan sterjeni bo‘ylab yonish kamerasiga oqib o‘tishini oldini oladi.

Klapan prujinalari

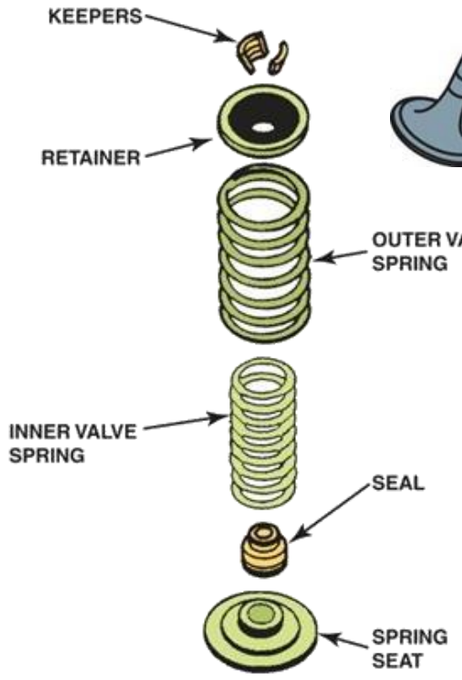
Klapanni o‘rindiqqa **zich o‘tirishini ta’minlaydi** va uni **yopiq holatda ushlab turish uchun xizmat qiladi.**

Klapanlar berkligida ularni **o‘rindiqqa jips siqib**, yopiq holda ushlab turadi va keyinchalik **tashqi kuchlar ta’sirida klapanlarni ochish uchun xizmat qiladi.**

Prujinalar **legirlangan po‘latdan** tayyorlangan bo‘lib, diametri **3 - 5 mm** li simdan yasaladi.



[56]



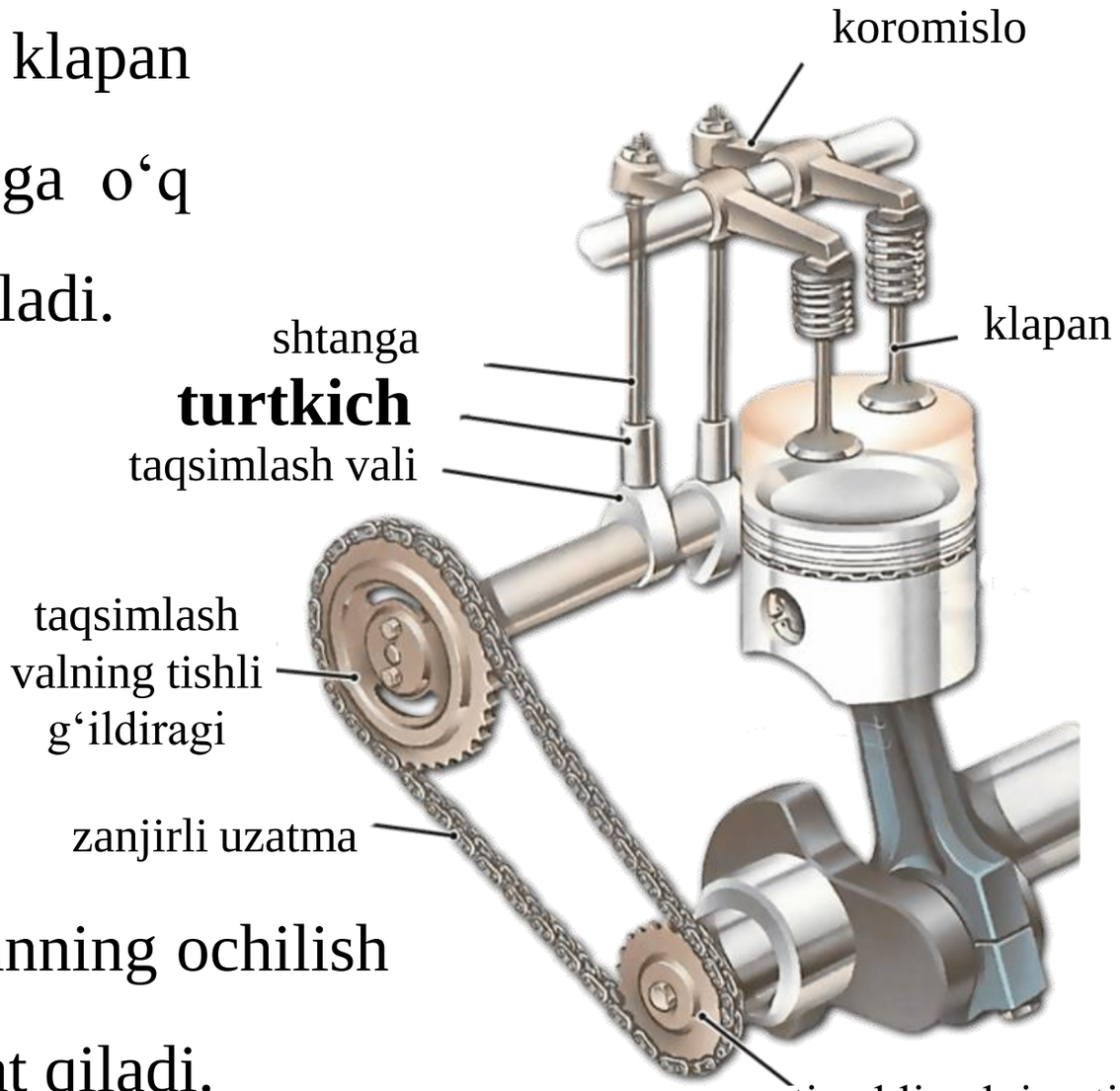
[57]

Turtkich

Taqsimlash vali mushtchasidan klapan sterjeniga yoki shtanga (koromislo)ga o‘q bo‘ylab kuch uzatish uchun xizmat qiladi.

[58]

[59]



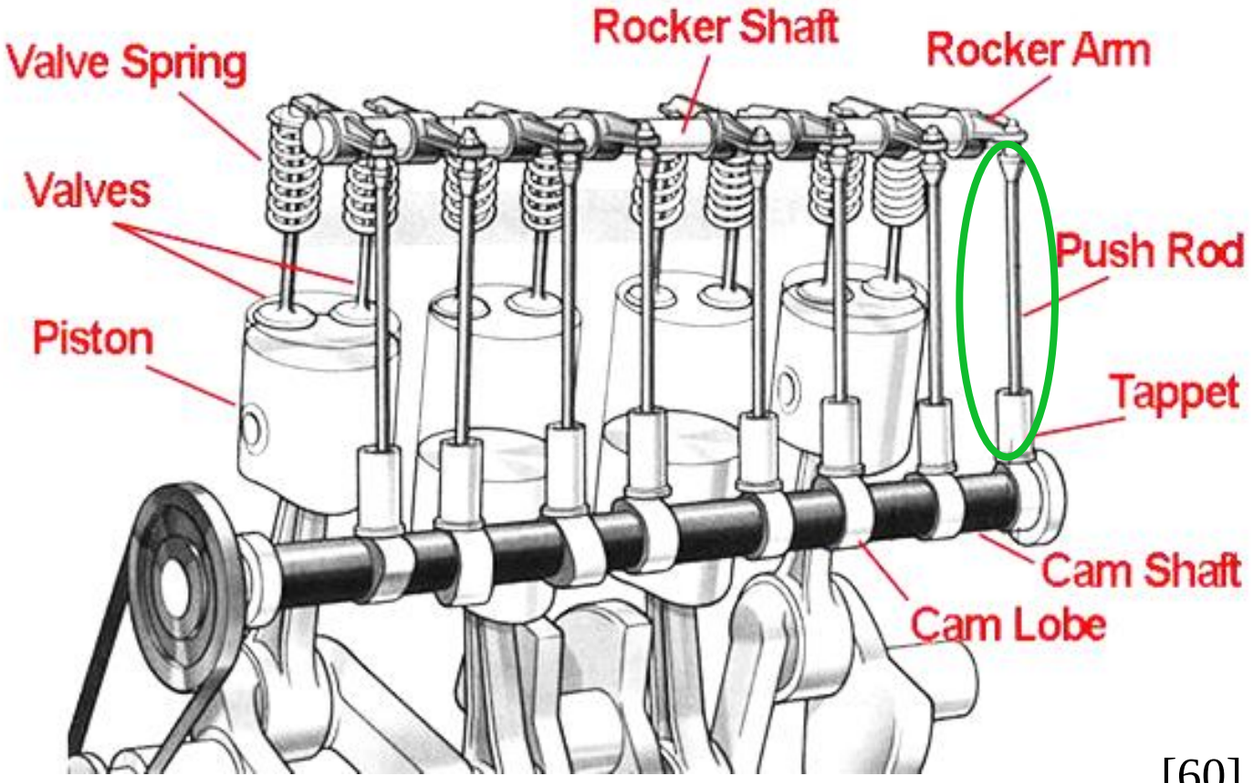
[18]

Turtkich harakat yo‘nalishini klapanning ochilish yo‘nalishiga o‘zgartirish uchun xizmat qiladi.

Shtangalar

Klapanlar yuqorida joylashganda harakatni turtkichdan koromislo orqali klapanga uzatib beradi.

Shtangalar o‘zaksimon po‘latdan tayyorlanib, yuqori qismiga toblangan po‘latdan konussimon tutkich kirgizilgan.



[60]

Koromislo

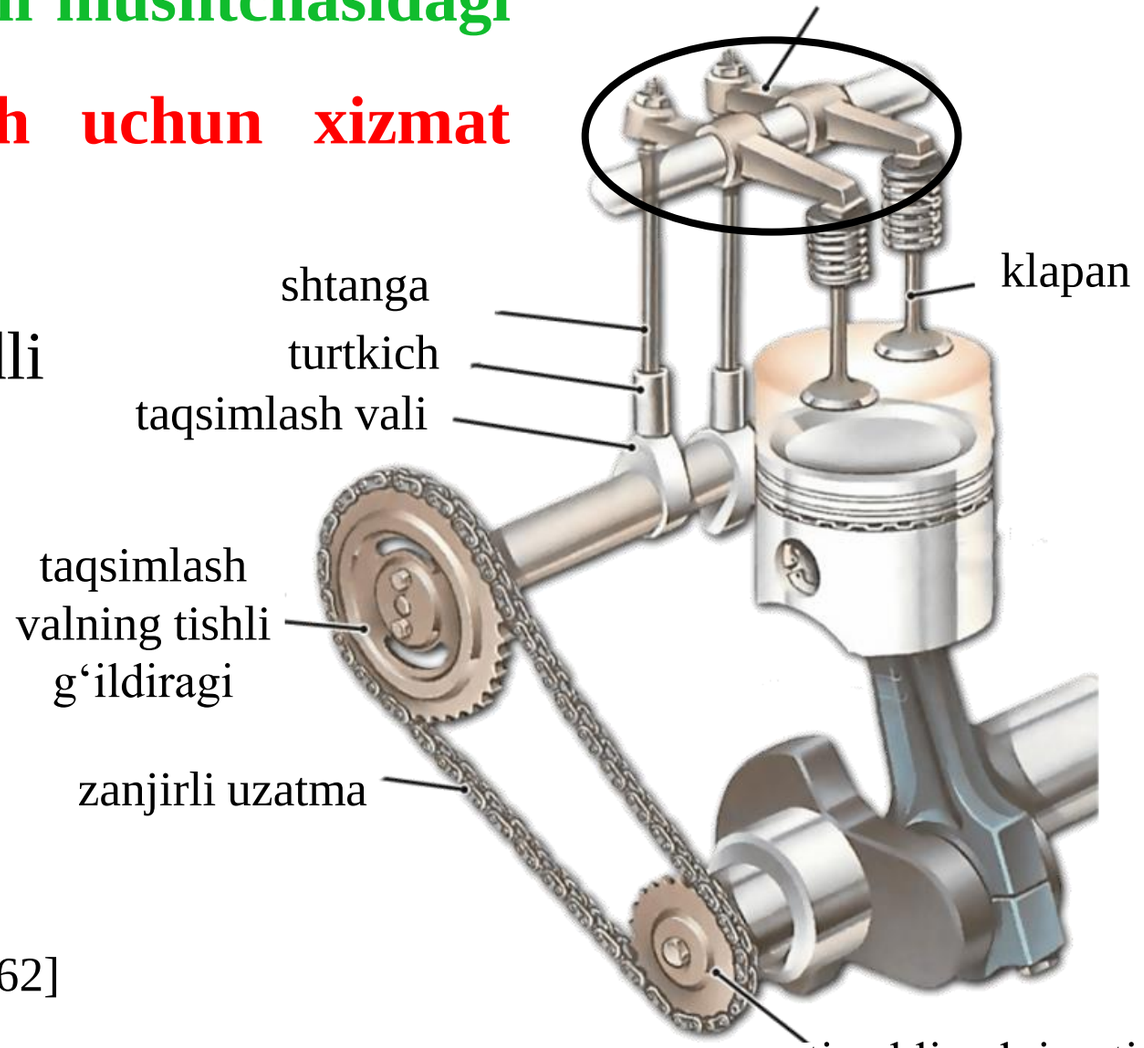
Shtangadagi yoki **taqsimlash vali mushtchasidagi** harakatni **klapan o‘zagiga uzatish uchun xizmat qiladi.**

U ikki yelkali bo‘lib, uglerodli po‘latdan shtampovkalanadi.

[61]

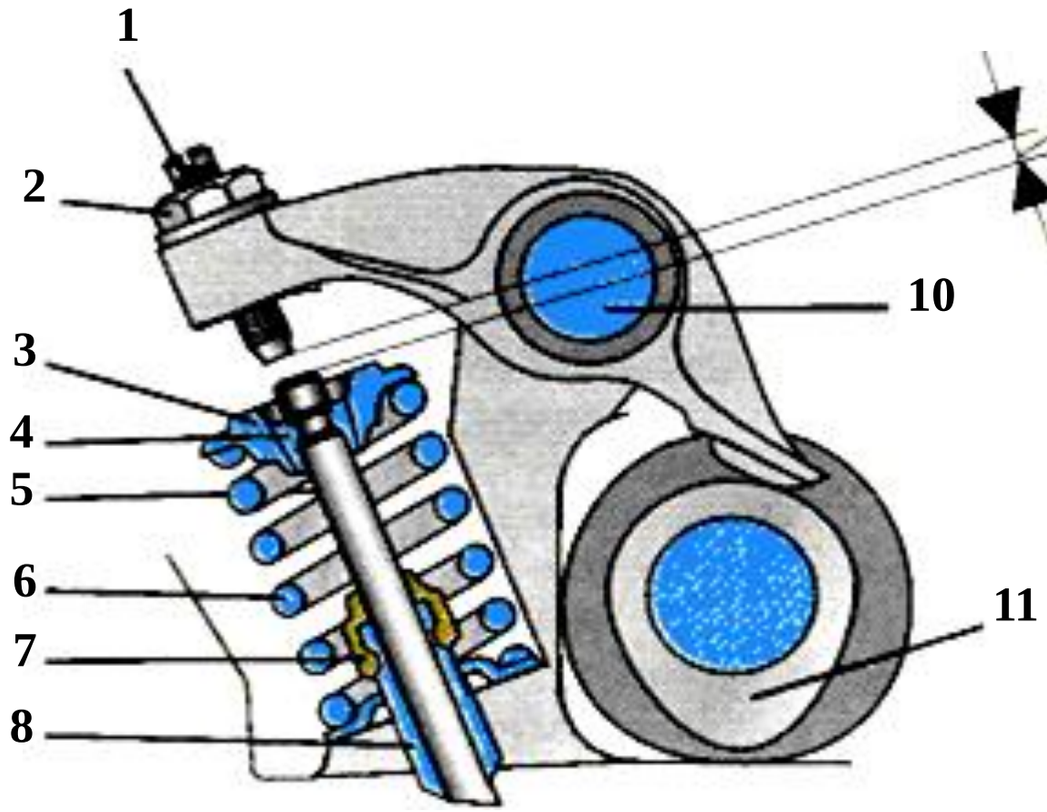
[62]

koromislo



[18]

Issiqlik tirqishi

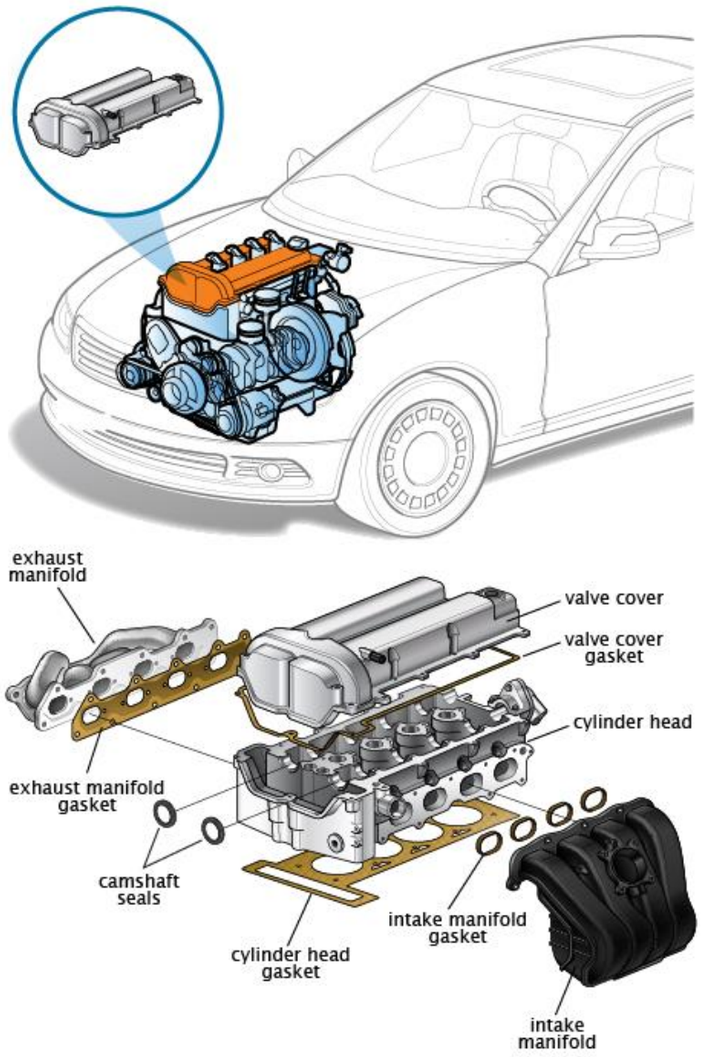


A=0,15…0,30 mm

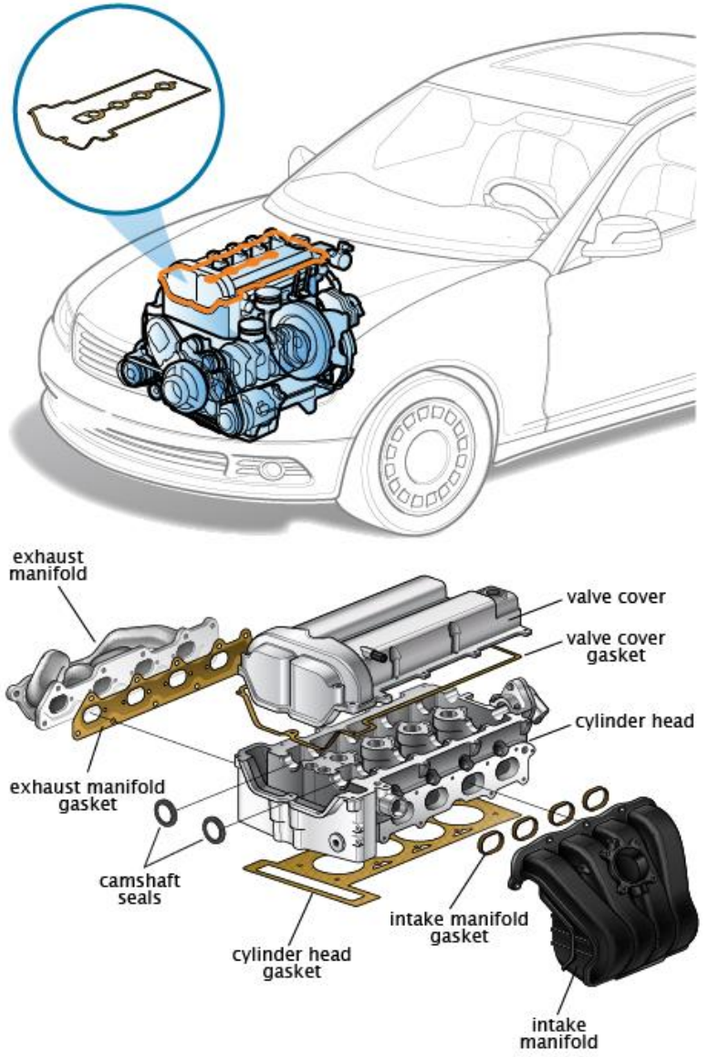
[61]

1-rostlash vinti, 2-kontrgayka, 3-klapan prujinasining tarelkasi, 4-suxariklar, 5-klapan sterjeni, 6-prujina, 7-klapan salnigi, 8-klapanning yo`naltiruvchi vtulkasi, 9-issiqlik tirqishi, 10-koromislo o‘qi, 11-taqsimlash valining mushtchasi.

Silindrlar bloki kallagining qopqog‘i



[63]



[64]

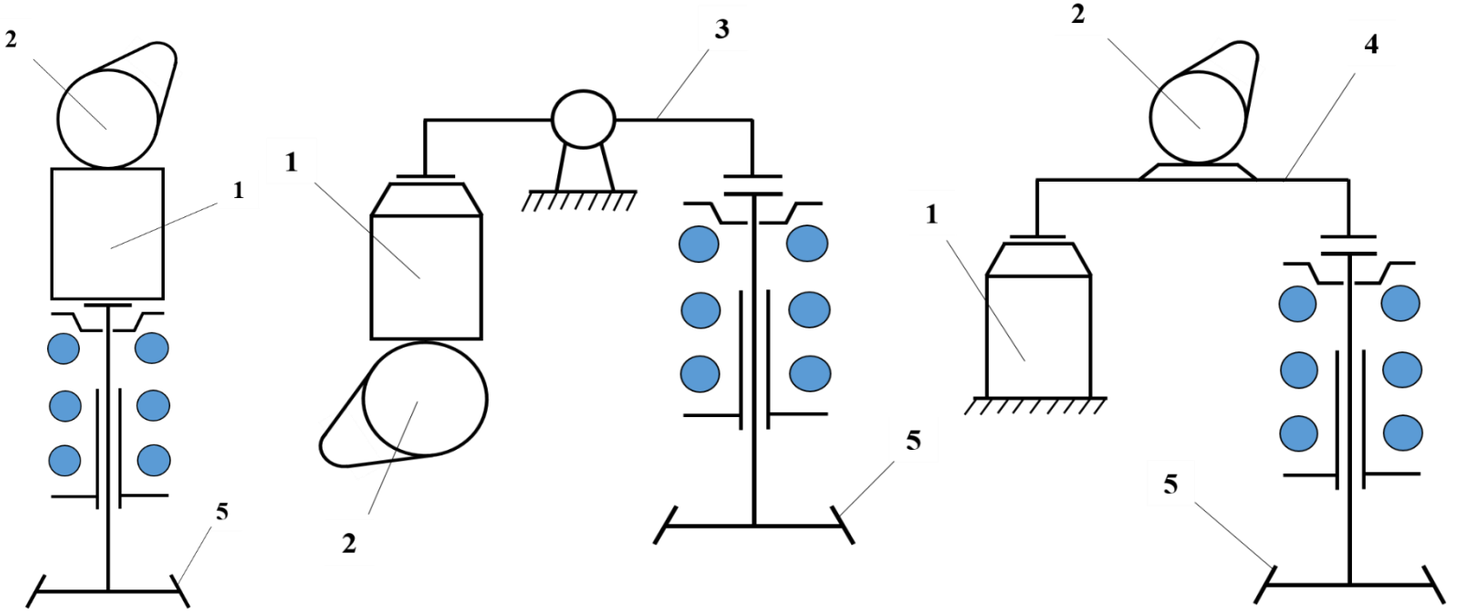
4.5. Gidrokompensator konstruksiyasi.

Gidrokompensatorni yuritmada joylashtirish usullari mumkin.

Klapanlar tirqishsiz o‘rnatiladi;

Shovqinsiz ishlashini ta`minlaydi;

Texnik qarovda tirqishni rostlash bilan bog‘liq bo‘lgan ishlar qisqaradi.



a) b) c) [65]

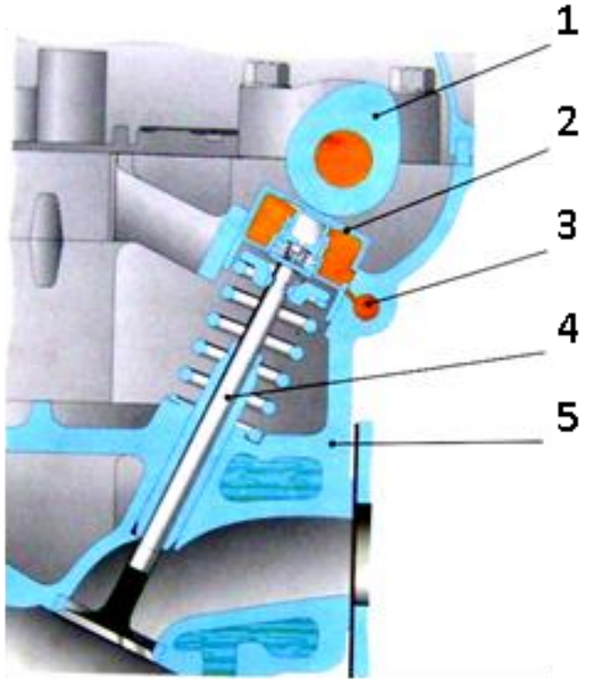
a-gidrokompensator taqsimlash vali mushtchasi bilan klapan oralig‘ida joylashgan;

b-gidrokompensator taqsimlash vali mushtchasi bilan koromislo oralig‘ida joylashgan;

c-gidrokompensator silindrlar bloki kallagi bilan klapan richagi oralig‘ida joylashgan;

1-gidrokompensator; 2-taqsimlash vali: 3-koromislo; 4-klapan richagi; 5-klapan.

Gidrokompensator turtkich ichida joylashtirilgan bo‘lib, u dvigatelning moylash tizimi bilan bog‘langan.

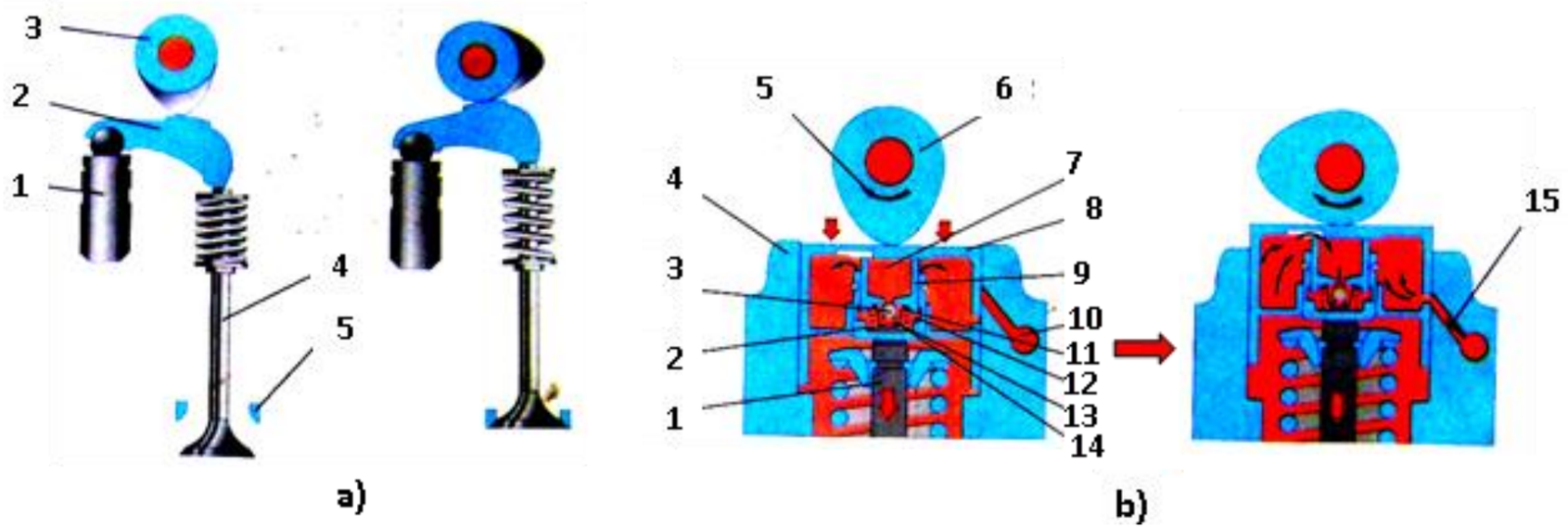


[65]

DOHC (Nexia-II) dvigatelida gidrokompensatorlarning joylashish sxemasi:

1-taqsimlash valining mushtchasi; 2-gidrokompensator; 3-moy kanali;

4-klapan, 5-dvigatel kallagi.



[65]

a-SOHC (Nexia) dvigatelida;

1-gidrokompensator (turtkich),

2-pishangcha, 3-kulachok, 4-klapan,

5-klapan egari.

b-DOHC (Nexia-II) dvigatelida;

1-klapan, 2-teskari klapan prujinasi, 3-teskari klapan,

4-dvigatel kallagi, 5-val aylanishi yo‘nalishi, 6-kulachok,

7-bo‘shliq, 8- gidrokompensator (turtkich), 9-plunjer,

10-dvigatel kallagidagi moy kanali, 11-plunjer, 12-gilza,

13-teskari klapan stakani, 14-bo‘shliq, 15-moy oqimi.

Taqsimlash vali aktuatori

Vazifasi:

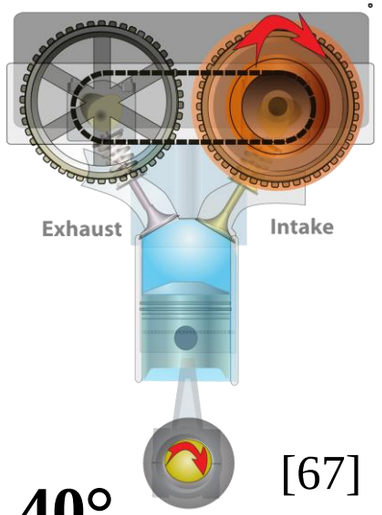
Kiritish va chiqarish klapanlarini dvigatel yuklamasidan kelib chiqib, avtomatik sozlaydi.

Boshqaruvi:

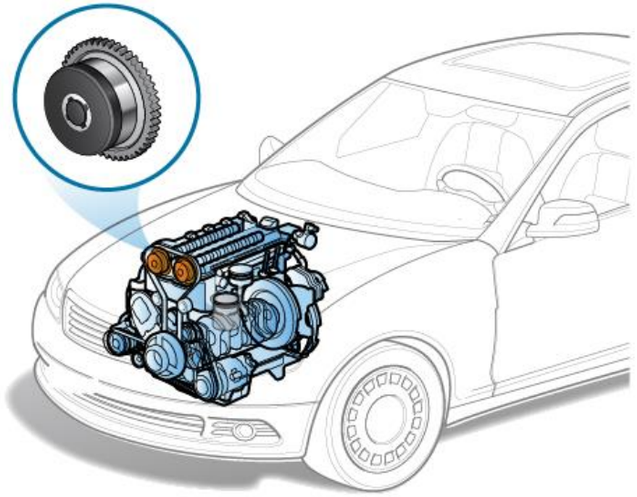
- **Mexanik;**
- **Gidravlik;**
- **Elektrik.**

NOx emissiyasini 24% ga kamaytirishi ko‘rsatilgan.

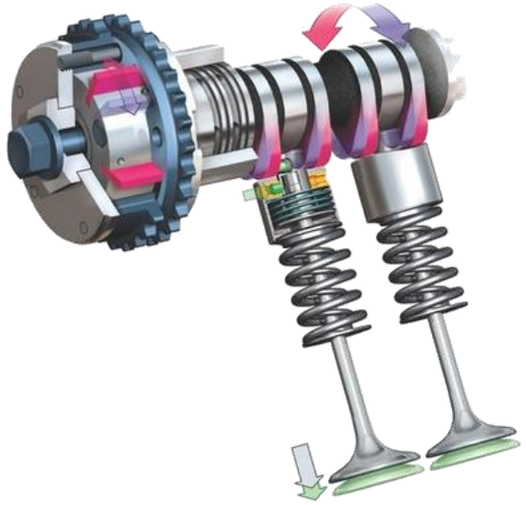
Variable Valve Timing



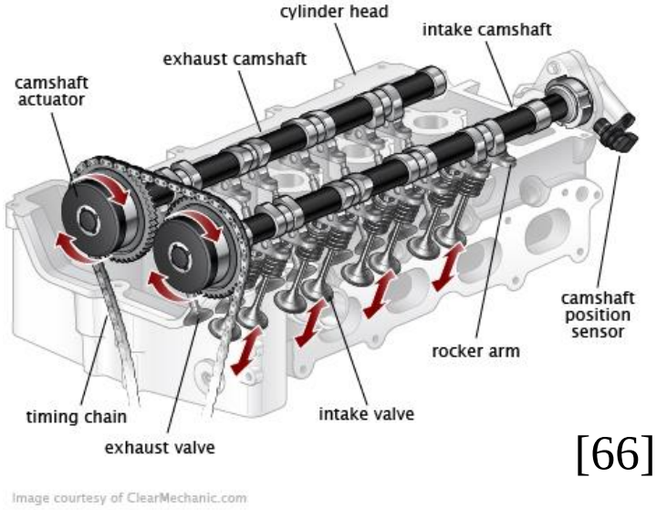
[67]



24° - 40°

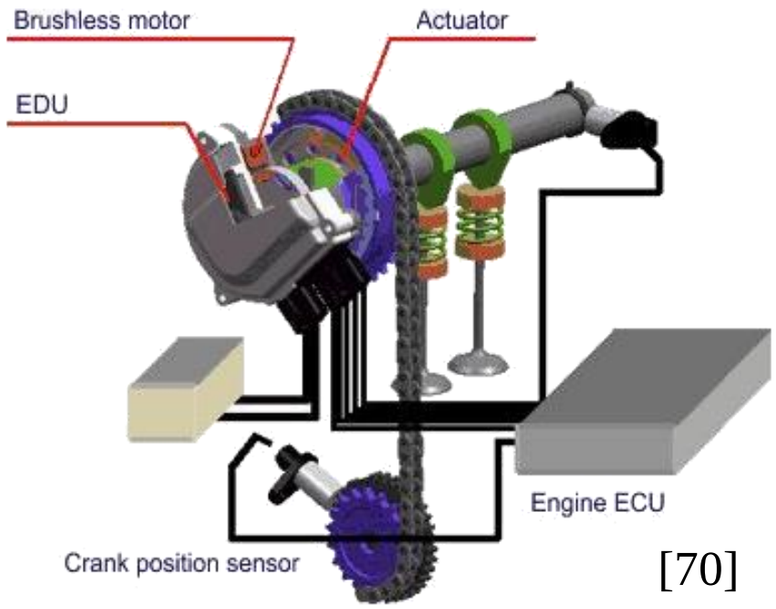


[68]

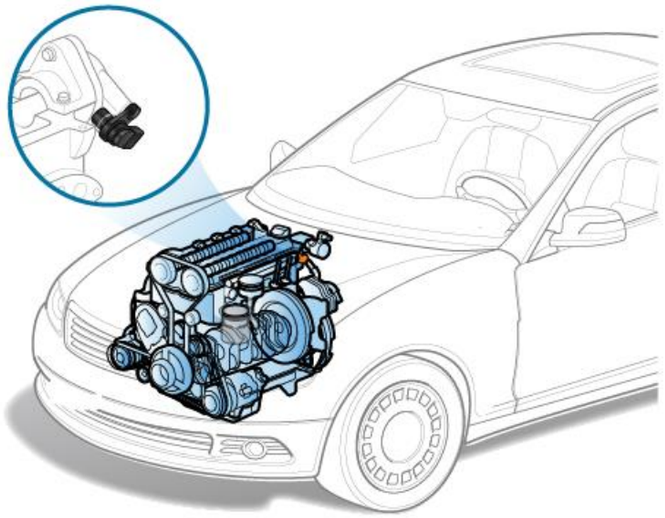


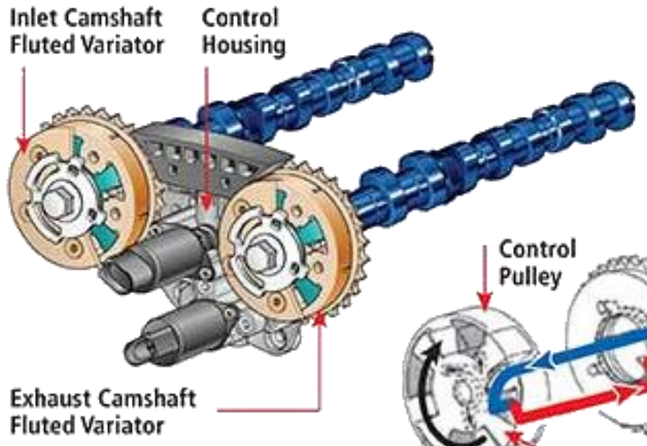
[66]

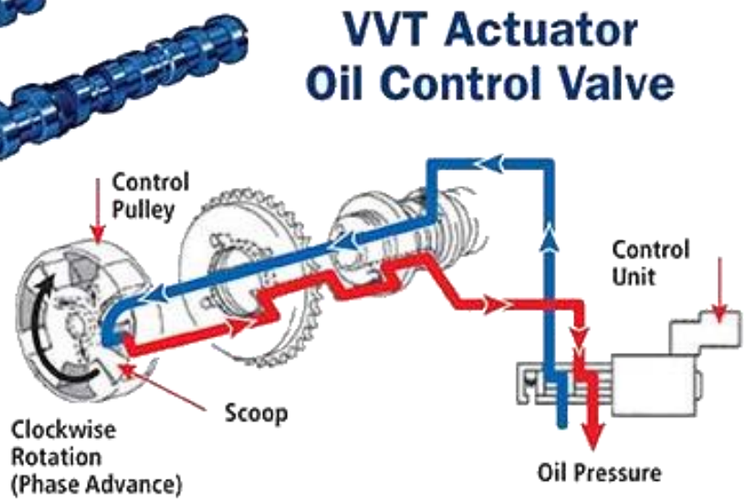
Aktuatorning ishlashi



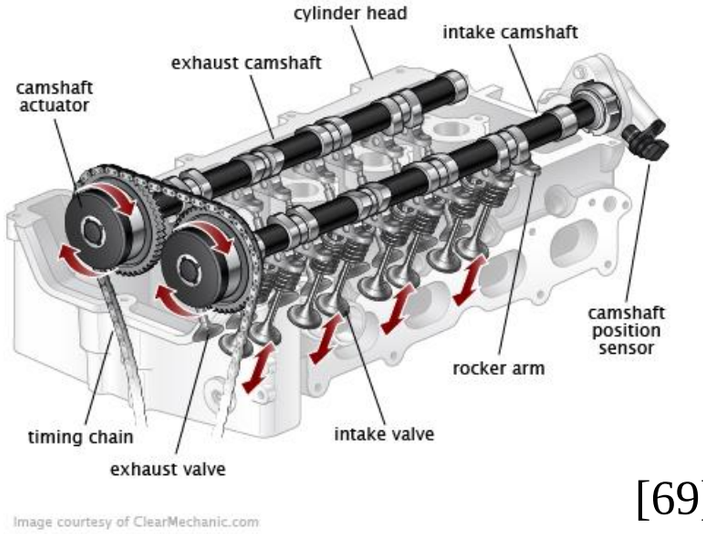
[70]





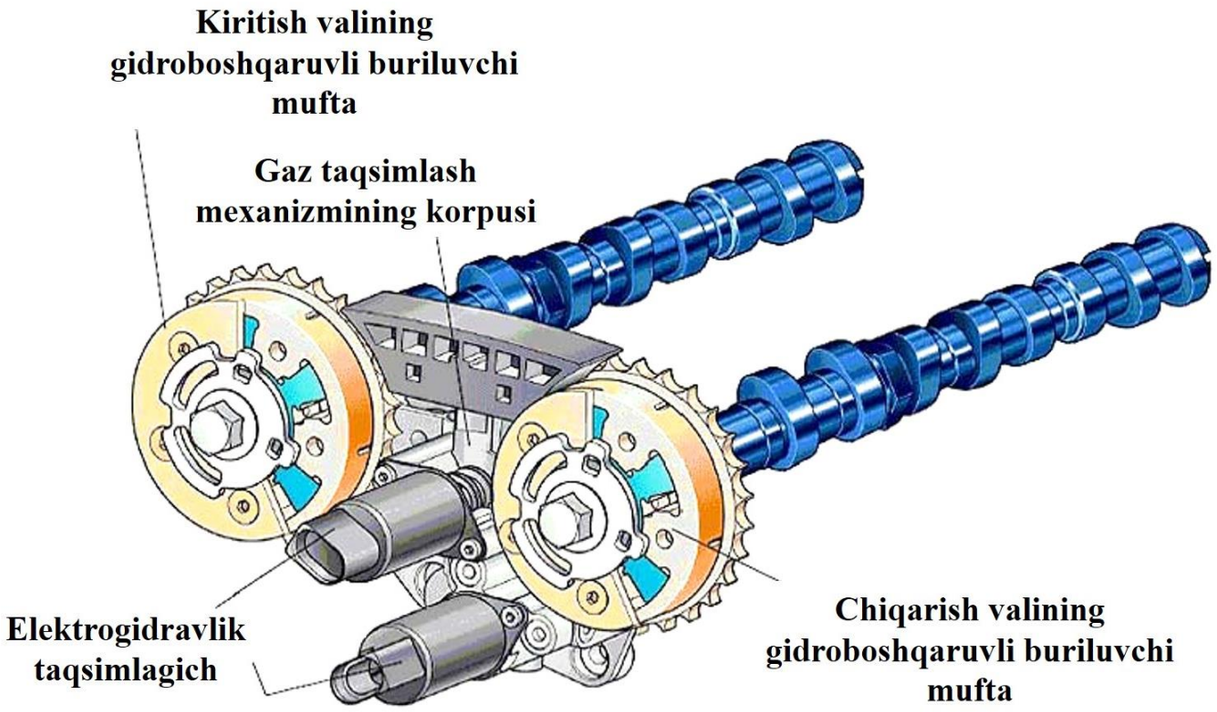


[71]

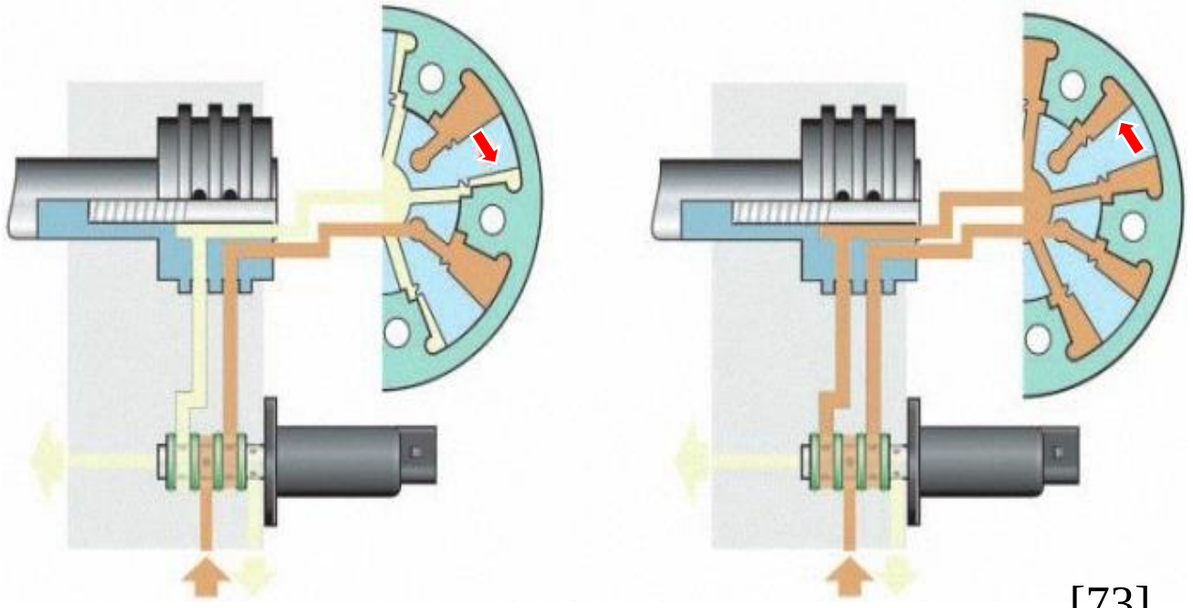


[69]

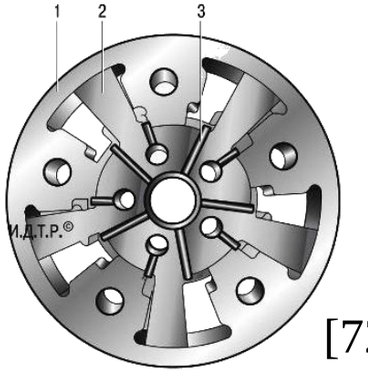
Gaz taqsimlash faza o‘zgartiruvchisining mexanizmi



[71]



[73]



[72]

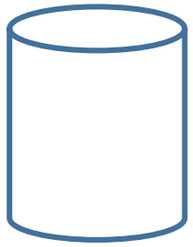
1-faza o‘zgartiruvchining korpusi;
2-rotor; 3-moy kanali.

4.6. GTM fazasi va diagrammasi.

To‘rt taktli dvigatel Klapanlar Porshen Ch.N

har bir takt 180° Ochilishi / Yopilishi

Quvvat ↑



Yonuvchi aralashma / Havo Ko‘p to‘lishi

Ishlatilgan gazlar Tozalanishi

Lekin kiritish va chiqarish jarayonlari juda kichik vaqt ichida o‘tadi.

Bu vaqt dvigatelning tezligiga bog‘liq bo‘lib, tirsakli valning aylanishlar chastotasi **6000 min $^{-1}$** bo‘lganda **0,0025 s** ni tashkil etadi.

! **klapanlar darhol ochilmaydi**, natijada silindr **kiritish taktida** yoqilg‘i aralashmasi yoki havo bilan **yetarli darajada to‘lmaydi**, **chiqarish taktida** esa ishlatilgan **gazlardan to‘la tozalana olmaydi.**

Bu jarayonlarning o‘tishini yaxshilash uchun **klapanlar porshen yuqori chekka nuqtaga yetmasdan oldinroq ochilishi** va **pastki chekka nuqtadan o‘tgandan keyinroq yopilishi kerak**.

Natijada klapanlarning ochiqlik davri tirsakli valning **180º** burilishiga nisbatan ko‘proq bo‘ladi.

Klapanlarning

Ochilishi

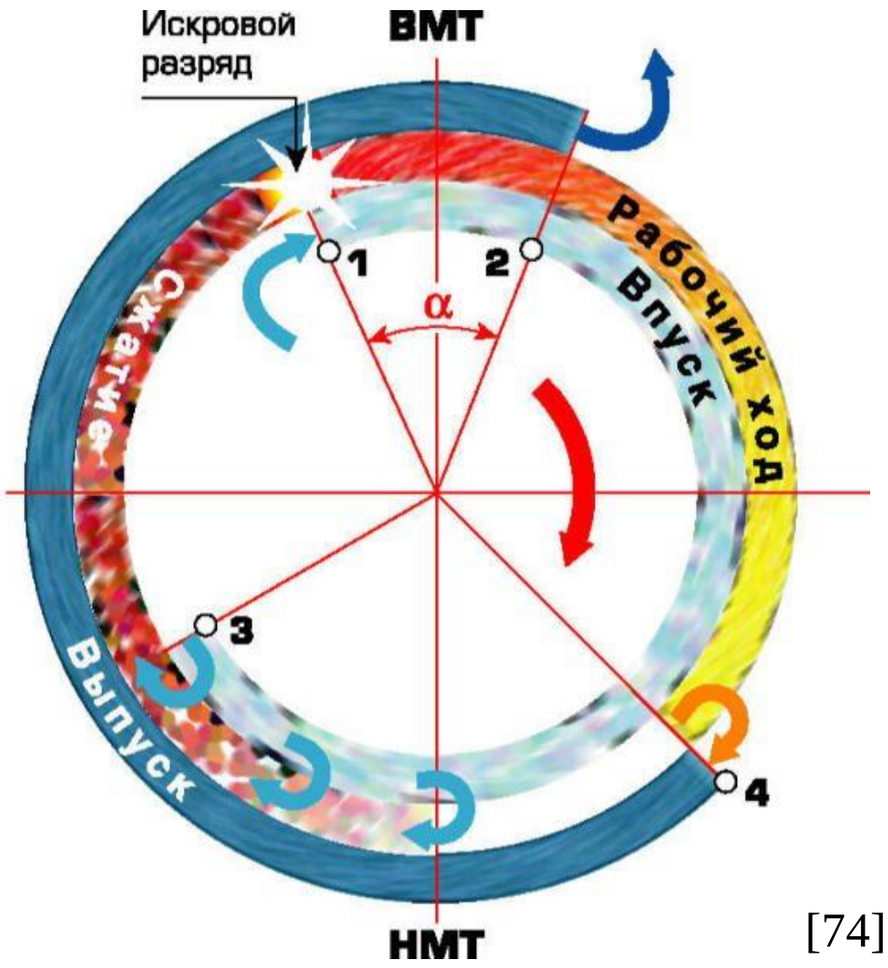
Tirsakli valning aylanish burchagi

Yopilishi

Yu.Ch. N / P.Ch.N → graduslarda

Bunday ifodalanish ***gaz taqsimlash fazalari*** deb ataladi.

Ko‘pincha gaz taqsimlash fazalari doiraviy tasviriy chiziq (diagramma) shaklida ifodalanadi va u ***gaz taqsimlash diagrammasi*** deb ataladi.



[74]

1 — открытие впускного клапана; 2 — закрытие впускного клапана; 3 — закрытие выпускного клапана; 4 — открытие выпускного клапана; угол «a » — перекрытие клапанов

Avtomobil dvigatellarning gaz taqsimlash fazalari

Dvigatel	Kiritish klapani		*Kiritish davri*	Chiqarish klapani		*Chiqa-rish davri*	Ikki klapan-ning barava-riga ochiq turishi
	yu.ch.n. gacha ochilis-hi	p.ch.n. dan so'ng yopili-shi		yu.ch.n. gacha ochili-shi	p.ch.n. dan so'ng yopili-shi		
Tiko	12	36	228	46	10	236	22
VAZ-2101	9	51	240	47	1	240	22
GAZ-53A	24	64	268	50	22	252	46
ZIL-130	31	83	204	67	47	295	78
GAZ-24 L	12	60	252	54	18	252	30
YAMZ-236	20	56	256	56	20	256	40
VAZ-2106	12	40	232	42	10	232	22
SamKochAvto	12	31	223	50	16	246	28
MATIZ	12	36	228	46	10	236	22
DAMAS	12	36	228	46	10	236	22

[75]

To‘rt taktli benzinli va dizelli dvigatellarning gaz taqsimlash fazalari

[76]

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