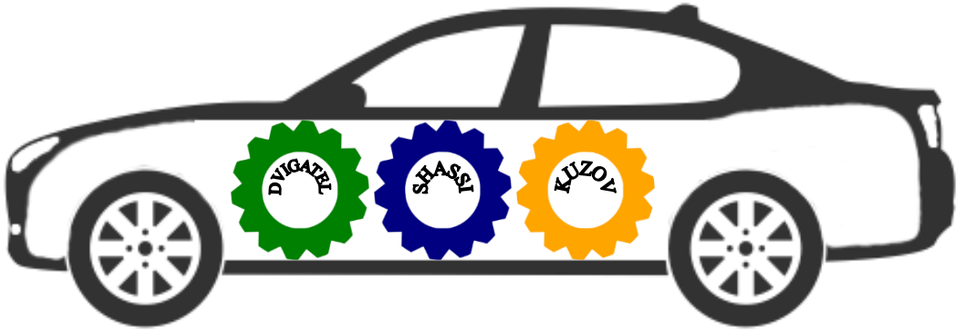
AVTOMOBILLAR KONSTRUKSIYASI



7th Topic: Fuel System.

(7-Mavzu: Ta’minlash tizimi)

Part 2

Associate Professor: Yusupov Sarvarbek

7-Mavzu: Ta’minlash tizimi

(7th Topic: Fuel System.)

O‘quv rejasi:

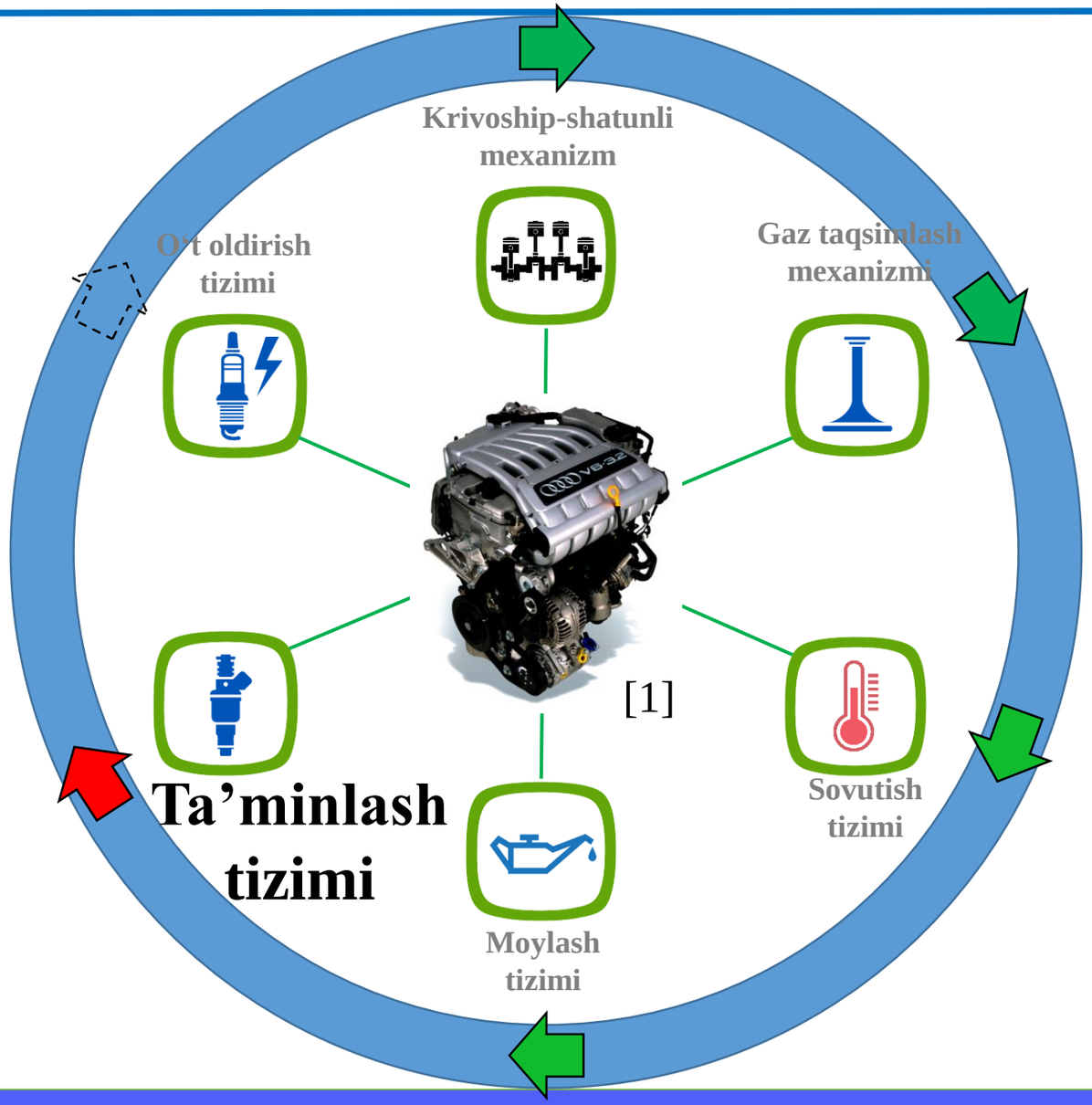
7.1. Karbyuratorli dvigatellarning ta’minlash tizimi.

7.2. Ta’minlash tizimi qismlarining konstruksiyasi va ishlashi.

7.3. Dizel dvigatelining ta’minlash tizimi.

7.4. Dizel dvigateli ta’minlash tizimi qismlarining konstruksiyasi va ishlashi.

- Karbyuratorli dvigatel;
- **Dizel dvigatel.**
- Gazli dvigatel;
- Injektorli dvigatel;



7.3. Dizel dvigatelining ta’minlash tizimi.

Dizel dvigatelining ta’minlash tizimi **karbyuratorli dvigatel ta’minlash tizimidan farqi ish aralashmasini hosil qilishi** va **uni alangalatish** usulidadir.

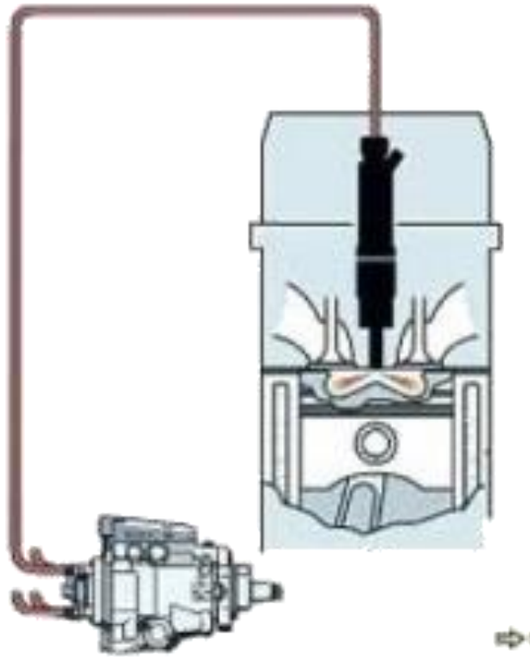
Karbyuratorli dvigatelda kiritish taktida silindrlarga karbyuratorda **havo** va **benzindan tayyorlangan yonuvchi aralashma kiritilsa**, dizelda esa **sof havo kiritiladi.**

Siqish taktining oxirida karbyuratorli dvigatelda ish aralashmasi **elektr uchqunidan alangalansa,**

Dizelda esa silindrda siqilgan **havoga dizel yonilg‘isi purkaladi.**

Dizel dvigatelining ta’minlash tizimining turlari:

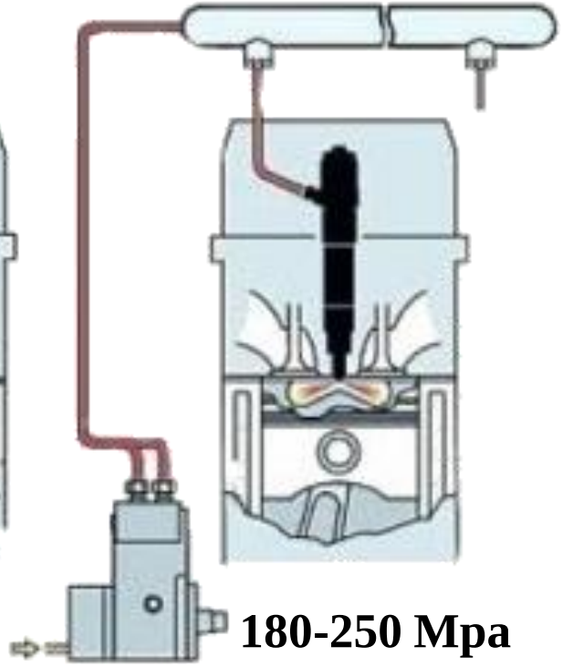
Klassik



YuBYoN

40-100 MPa

Common Rail

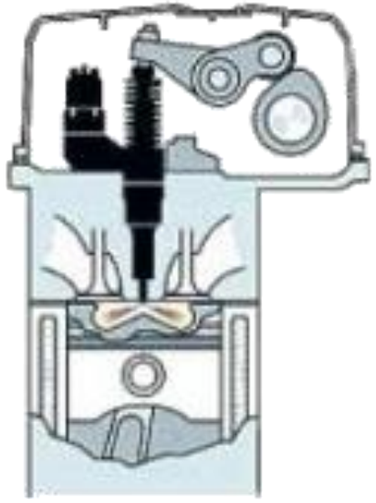


180-250 Mpa

YuBYoN

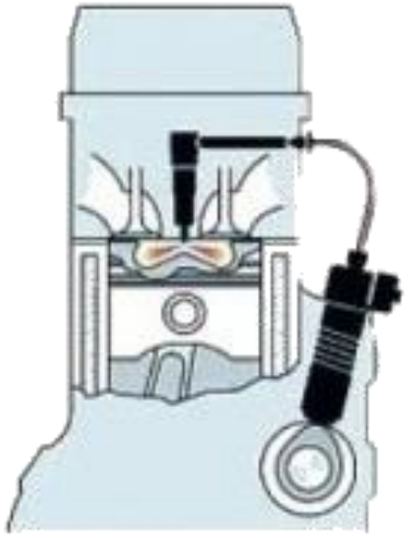
Nasos-fursunkali

Birgalikda



130-205 MPa

Ajratilgan



120-180 MPa

[43]

[44]

Dizelda **yonilg‘ini yetarli** darajada **mayda zarrachalarga ajratish** va **yonilg‘i mash‘alini uzoqqa otiluvchanligini ta’minlashga**, **yonilg‘ini yuqori bosim ostida** purkalishi evaziga erishiladi.

Dizel ta’minlash tizimi samaradorligini oshirishda yonilg‘i uzatuvchi va

aralashma tayyorlash asboblari bilan birgalikda

yonish kamerasining shakli,

ularda havo harakati va

yonilg‘i kiritishni tashkil qilishning ta’siri alohida ahamiyatga egadir.

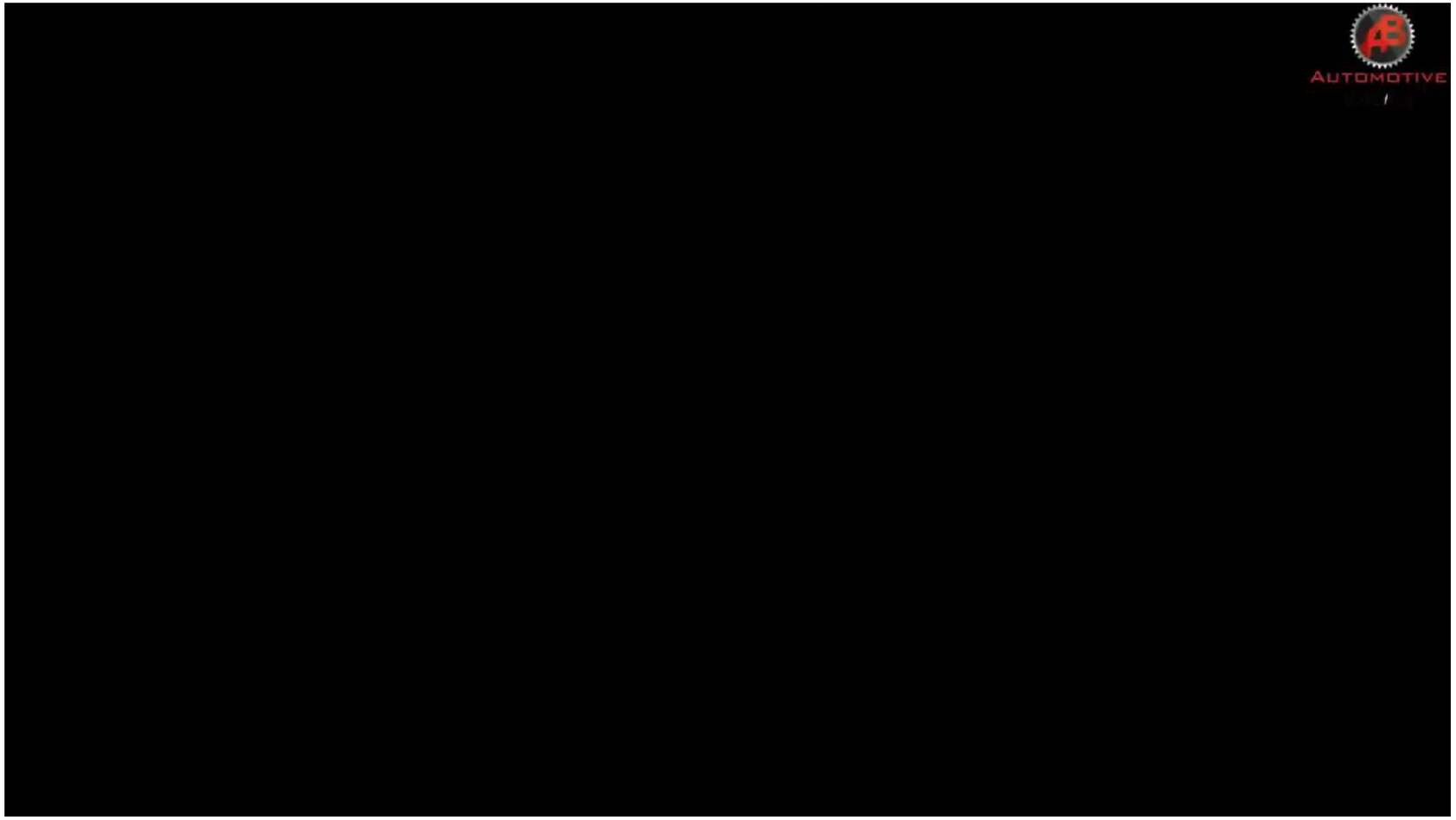
Keltirilgan omillar birgalikda quyidagilarni ta’minlashi lozim:

- Dvigatel tirsakli valining aylanishlar chastotasi va yuklanmaga bog‘liq ravishda yonilg‘ini mumkin qadar aniq dozalash;
- Yonilg‘ini muayyan paytda, ya’ni porshenni YuChN ga kelishini o‘rnatilgan burchagida uzatish;
- Uzatishni tirsakli valning buralish burchagi bo‘yicha optimallash;
- Yonilg‘ining yonish kamerasini butun hajmi bo‘yicha yaxshi to‘zitish va taqsimlash;
- Nasos va forsunkalarning dastlabki sozlangan holatini buzmasdan dvigatelni uzoq vaqt ishlatish.

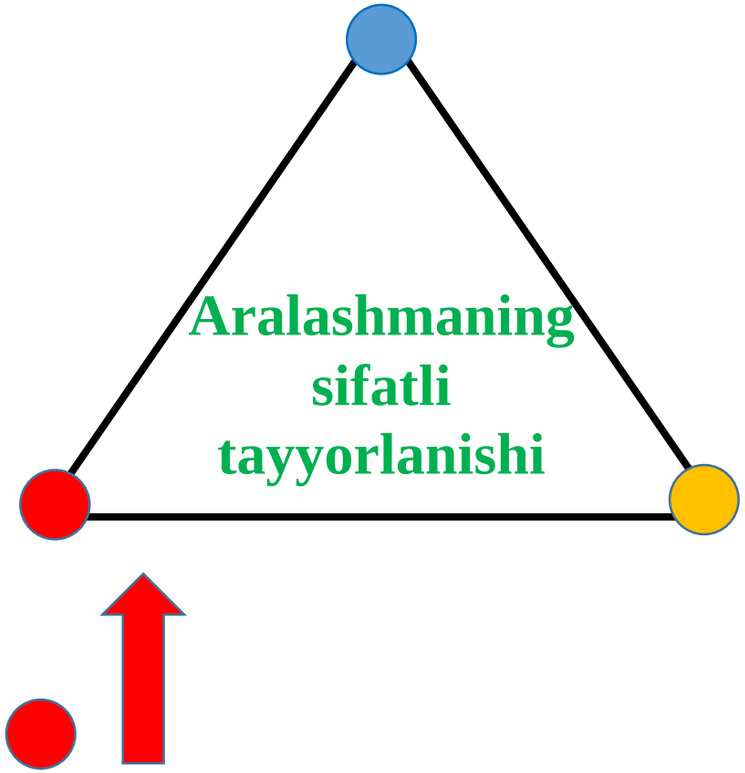
Aralashma hosil qilish usullari va purkash jarayoni.

Dizel dv. Karbyuratorli dv.ga nisbatan **10** marta **kam vaqt ichida sodir bo'ladi**.

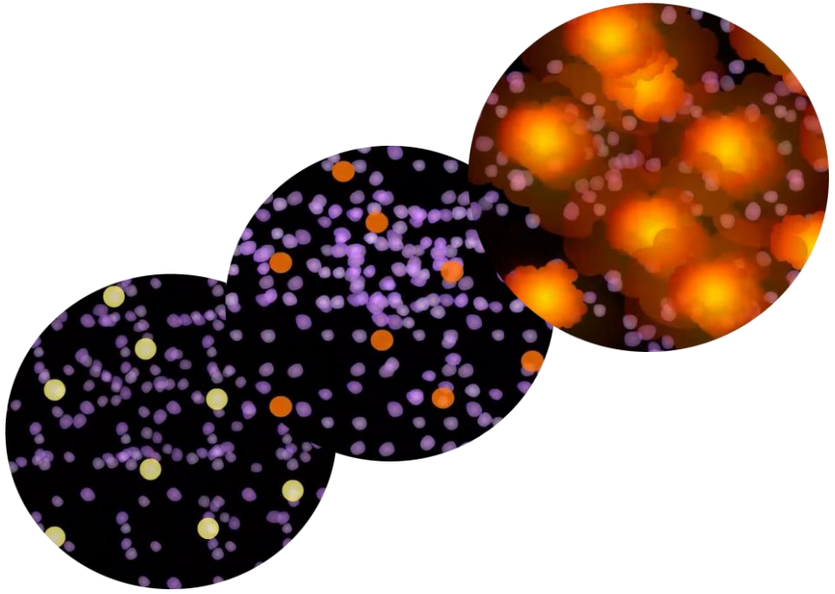
Natijada silindrlarga purkalgan yonilg'i bo'linmaning butun hajmini egallab, **bir tekis aralashma hosil qila olmaydi.**



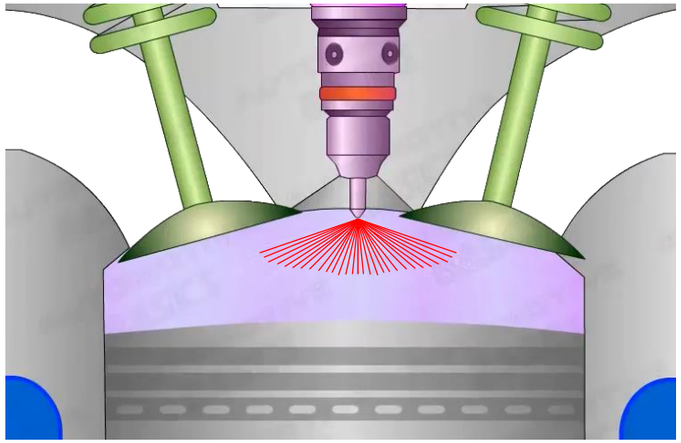
[45]



- **Yonilg‘i purkash bosimi**
- **Forsunka to‘zitgichning konstruksiyasi**
- **Yonilg‘i sifati**



Yonilg‘ining bir xilda mayda zarrachalarga bo’linishini tezlatadi.



[46]

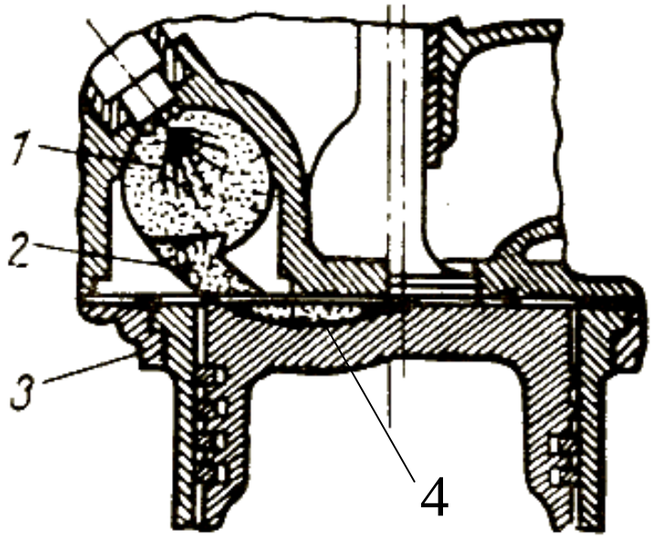
Natijada **sifatli aralashma** hosil bo‘ladi.

Yonish kamerasining konstruksiyasiga o‘zgartirish kiritib aralashma sifatini yaxshilash va yonilg‘ining to‘la yonishini ta’minlash mumkin.

Konstruksiya bo‘yicha yonish kameralari **ajratilgan** va **ajratilmagan** bo‘ladi.

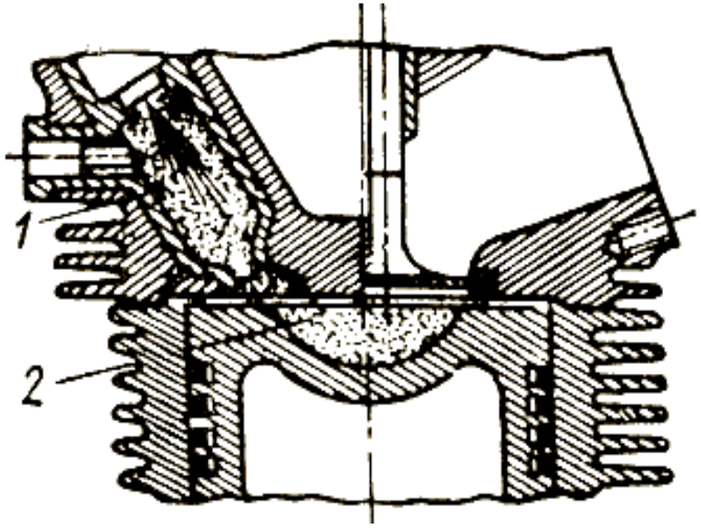
Indirect Injection

Uyurma turli ajratilgan



1-yuqori yarim sfera, 2-quyi yarim sfera,
3-bo‘g‘iz, 4-porshen tubidagi kameraning asosiy qismi.

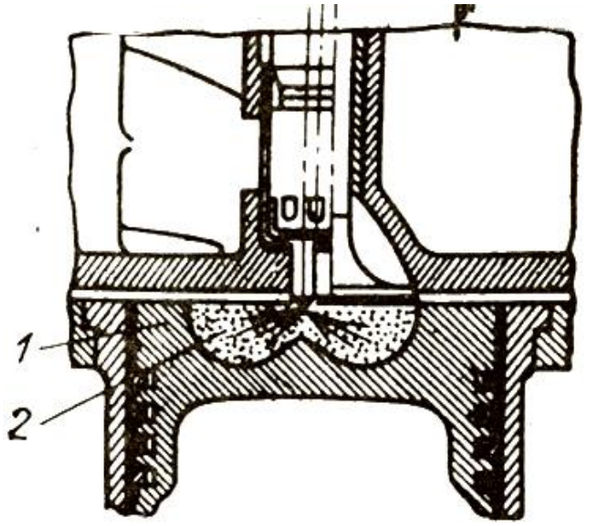
Old kamera turli ajratilgan



1-old kamera,
2-kameraning asosiy qismi.

Direct Injection

Ajratilmagan

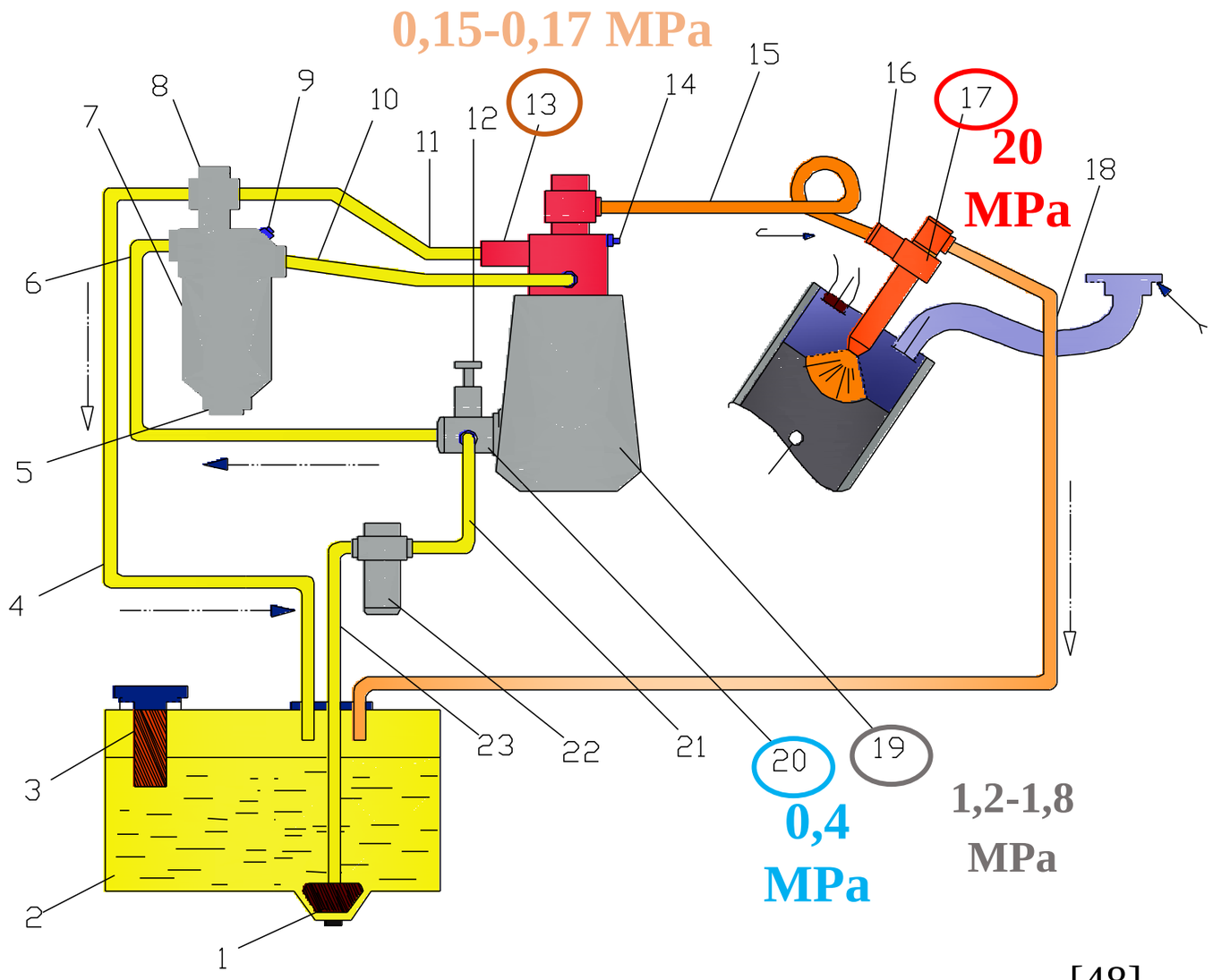


1-forsunka, 2-porshen tubidagi
yonish kamerasi.

[47]

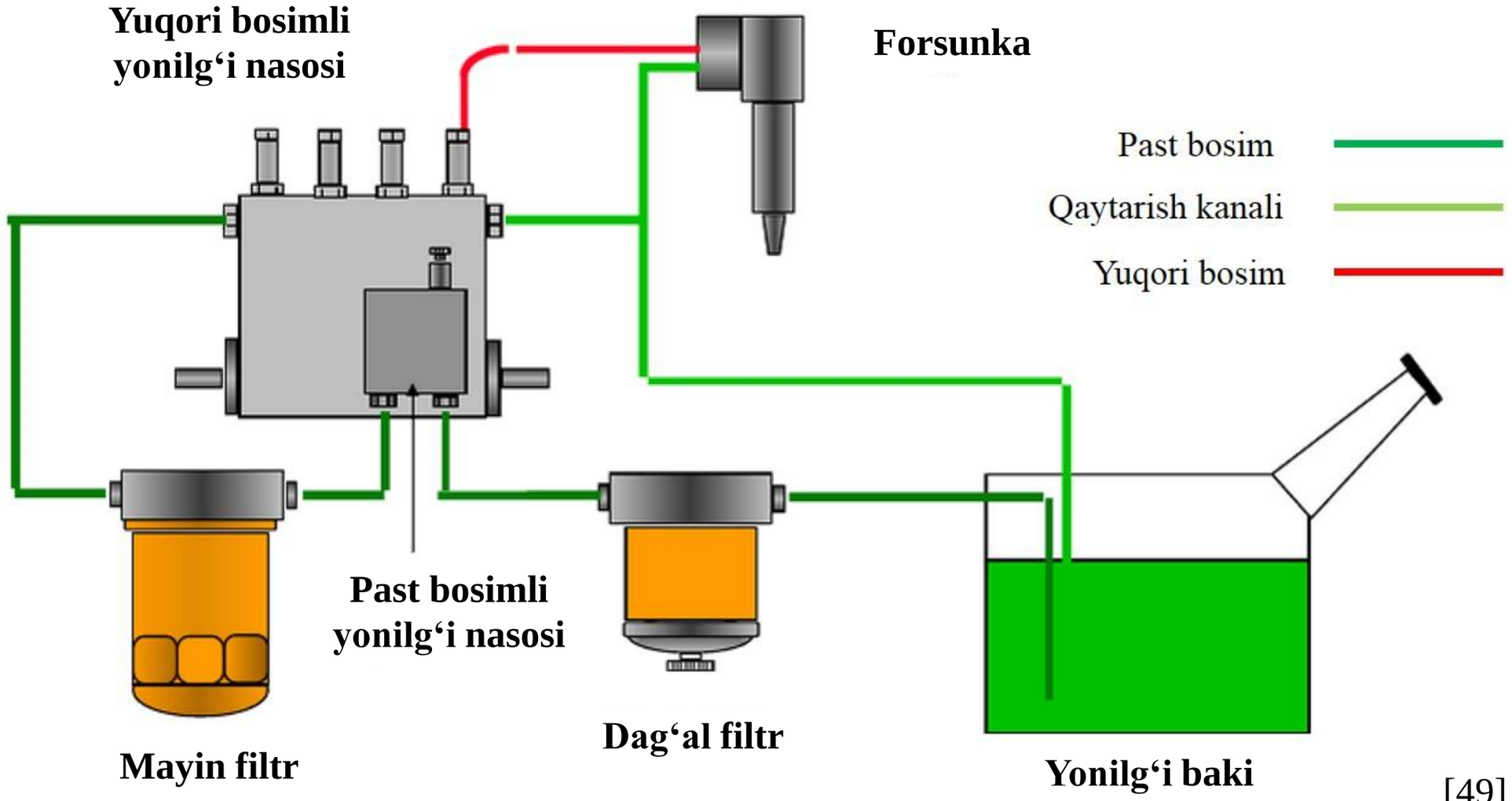
7.4. Dizel dvigateli ta’minlash tizimi qismlarining konstruksiyasi va ishlashi.

1-yonilg‘i qabul qilgich;
2-yonilg‘i baki;
3-to‘r simli tozalagich;
4,11,18-qaytarish naychalari;
5-jo‘mrak;
6;10;21;23-past bosim naychalari;
7-mayin tozalash filtri;
8-shtutser; 9,14-tiqinlar;
12-qo‘l nasosi;
13-o‘tkazib yuborish klapani;
15-yuqori bosim naychasi;
16-shtutser; 17-forsunka;
19-yuqori bosim yonilg‘i nasosi;
20-yonilg‘i haydash nasosi;
22-dag‘al filtr.



[48]

Dizel dvigateli ta’minlash tizimining sodda konstruksiyasi:



[49]

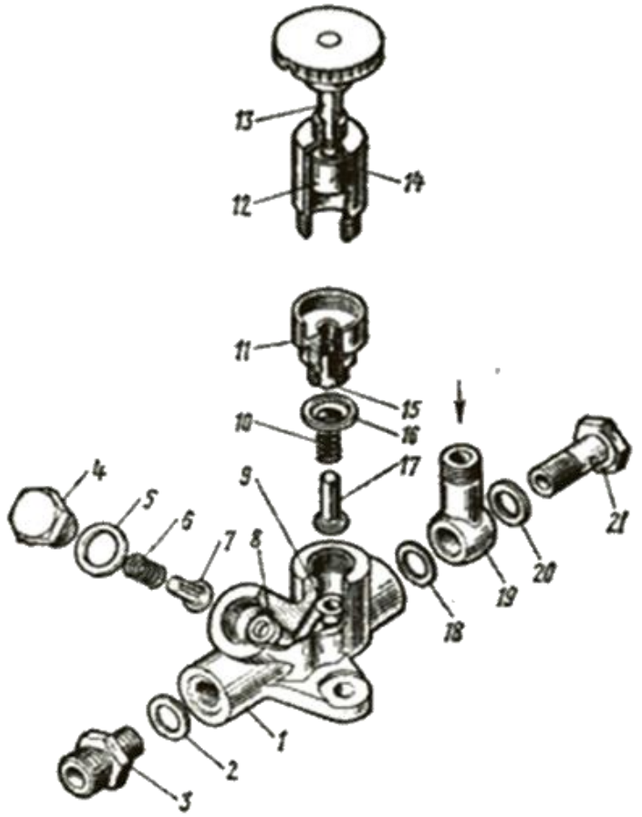
Yonilg‘i haydash qo‘l nasosi -

dvigatelni ishga tushirishdan avval

tizimdan **havoni chiqarib yuborish** va

yuqori bosimli yonilg‘i nasosiga

yonilg‘i uzatish uchun **xizmat qiladi.**



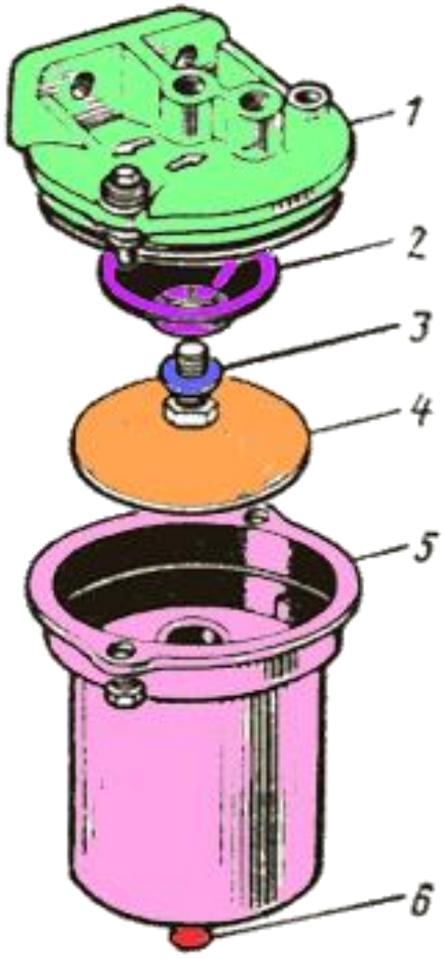
[50]

1,11-nasos va silindr korpusi; 2,5,16,18,20-zichlovchi shaybalar; 3-shtutser; 4-haydash klapanining tiqini (probkasi); 6,10-prujinalar; 7,17-haydash va so‘rish klapanlari; 8,9-haydash va so‘rish klapanlarining egarlari; 12-porshen; 13-porshenning dastali (sopli) shtogi; 14-silindr; 15-vtulka; 19-snakonechnik; 21-kovak bolt.

Dag‘al filtr -

filtr tindirgich ko‘rinishida bo‘lib, korpus teshigidan taqsimlagichga uzatilgan yonilg‘i stakanga oqib tushadi va bu yerda tindiriladi, ayni bir vaqtda yirik zarrachalar va suv cho‘kadi.

Tozalangan yonilg‘i to‘rli filtr orqali magistralga o ‘tadi.



[51]

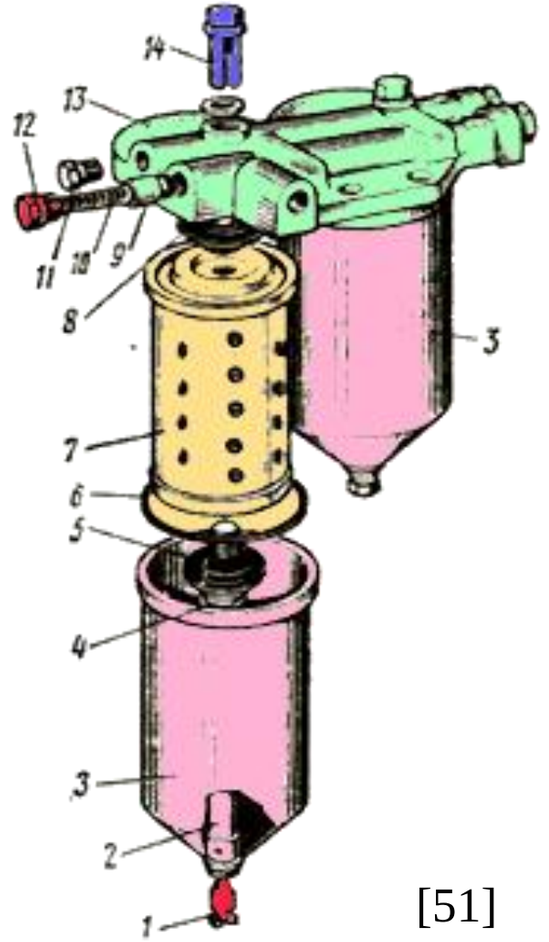
1-korpus; 2-taqsimlagich; 3-shayba; 4-to‘rli filtr ; 5-stakan; 6-to‘kish teshigining tiqini (probkasi).

Mayin tozalash filtr -

Yonilg‘ining yuqori bosimli yonilg‘i nasosiga o‘tishidan avval **batamom tozalaydi.**

Tizimga kirib qolgan **havoni** to‘plab, qisman **yonilg‘i** bilan birga to‘kish klapan-jiklyor orqali bakka chiqarib yuborish uchun xizmat qiladi.

Klapan jiklyorning ochilishi bo‘shliqdagi bosim **150 ± 20 kPa** bo‘linganda sodir bo‘ladi.



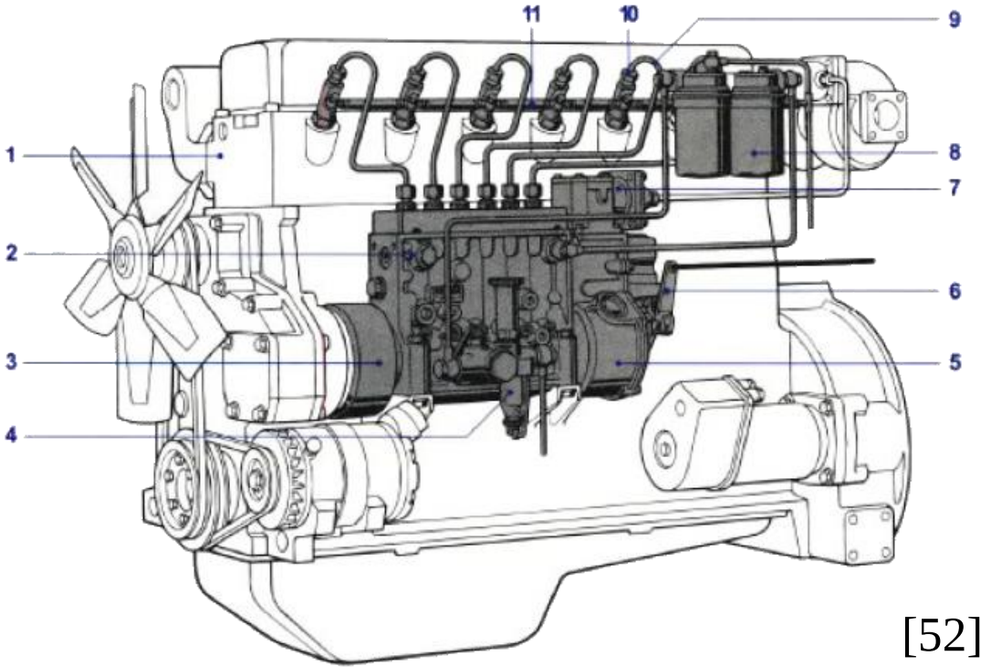
[51]

1,12-to‘kish teshiklari va klapan tiqinlari; 2-sterjen; 3-stakanlar; 4-prujina; 5,8-zichlovchi qistirmalar; 6-kolpak qistirmasi; 7-filtrlovchi element; 9-to‘kish klapan-jiklyori; 10-to‘kish klapan-jiklyorining prujinasi; 11-rostlovchi shayba; 13-korpus; 14-tiqin.

Yuqori bosimli yonilg‘i nasosi -

Dizel ta’minlash tizimining eng murakkab va nozik elementlaridan hisoblanadi.

YuBYoN yonilg‘ini dvigatelning **yuklanmasiga mos ravishda dozalash** va **uni kerakli bosimgacha ko‘tarib**, **forsunkalarga silindrlarni ishlash tartibiga ko‘ra uzatish** **uchun xizmat qiladi.**



[52]

1-dizel; 2-standart qatorli YuBYoN; 3-yonilg‘i purkalishini ilgarilatish avtomatik muftasi; 4-yonilg‘ini uzatish nasos; 5-tirsakli val aylanishlar sonining rostlagichi; 6-gaz pedali richagini o‘rnatish tortqisi; 7-to‘la uzatishni cheklagich; 8-filtr; 9-yuqori bosim liniyasi; 10-forsunka; 11-yonilg‘ini magistral qaytarish liniyasi.

TS130 New Holland traktorining yonilg‘i nasosi

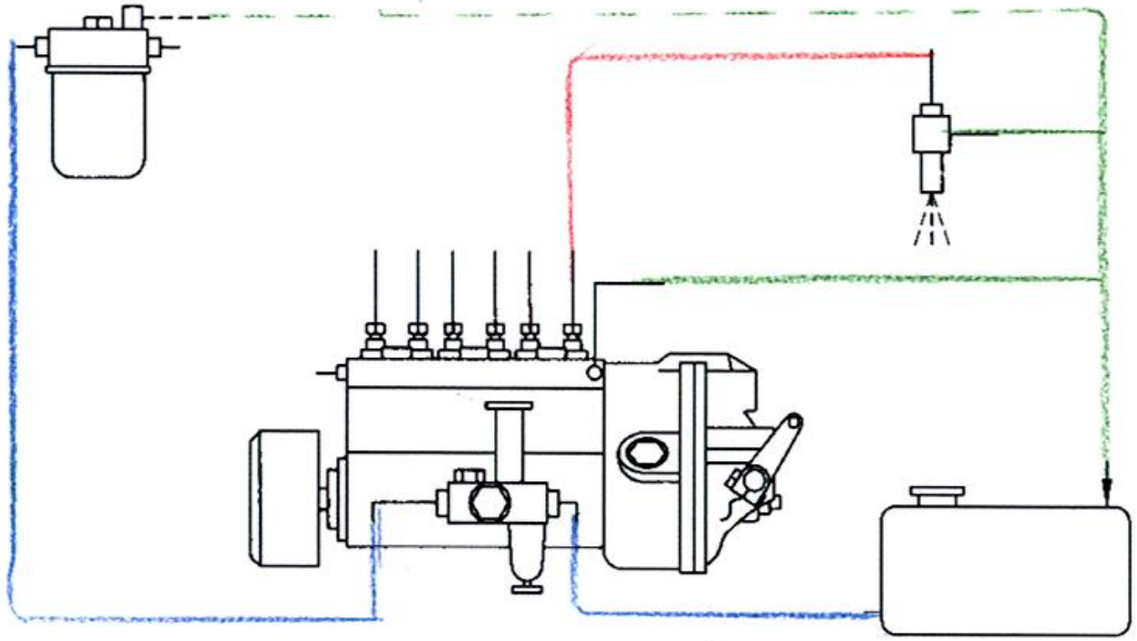
[53]

YuBYoN dvigatel silindrlar bloki qatori orasida o‘rnatilgan va taqsimlash vali shesternasidan ishga tushiriladi.

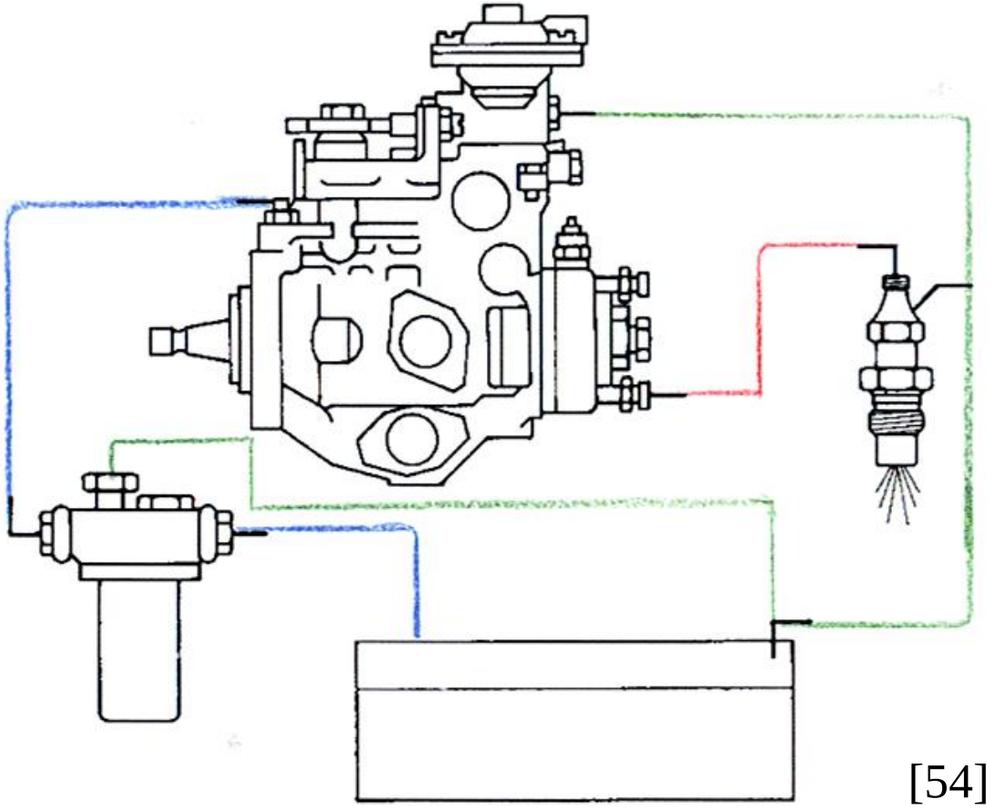
- **U haydash seksiyalardan iborat korpusdan;**
- **Mushtchali val;**
- **Yonilg‘i haydash nasosi (past bosimli va qo‘l nasosi bilan);**
- **Tirsak valining aylanishlar chastotasining barcha rejimli rostlagichi;**
- **Yonilg‘i purkalishini ilgarilatish avtomatik muftasidan tashkil topgan.**

Dizellarda YuBYoNning ikki turi mavjud:

Bir qatorli

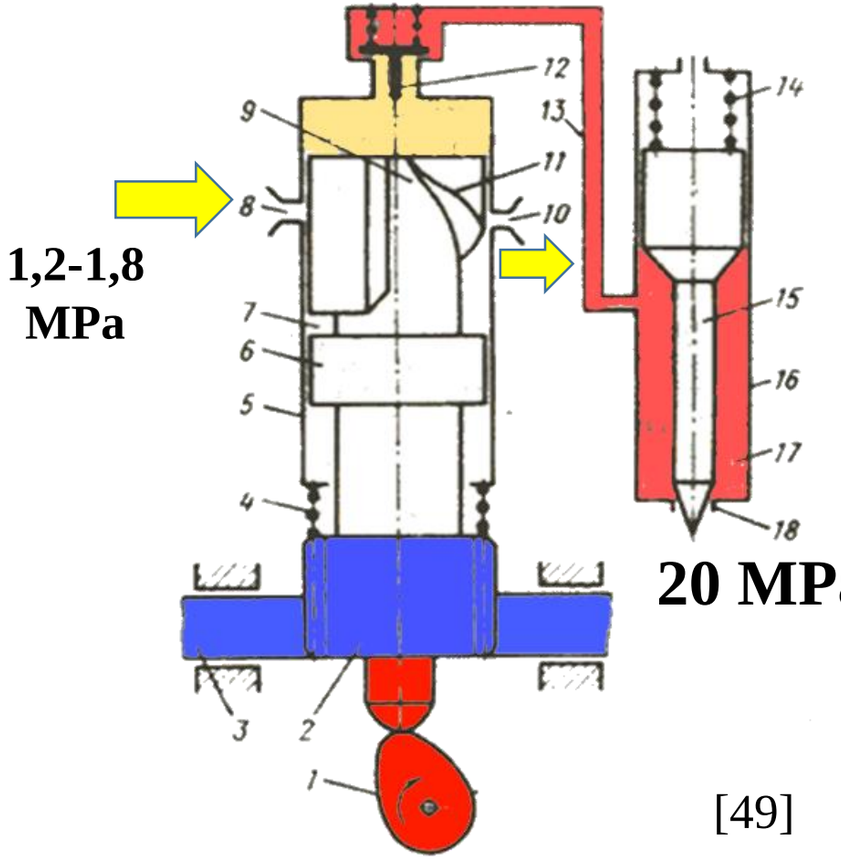


Taqsimlagichli



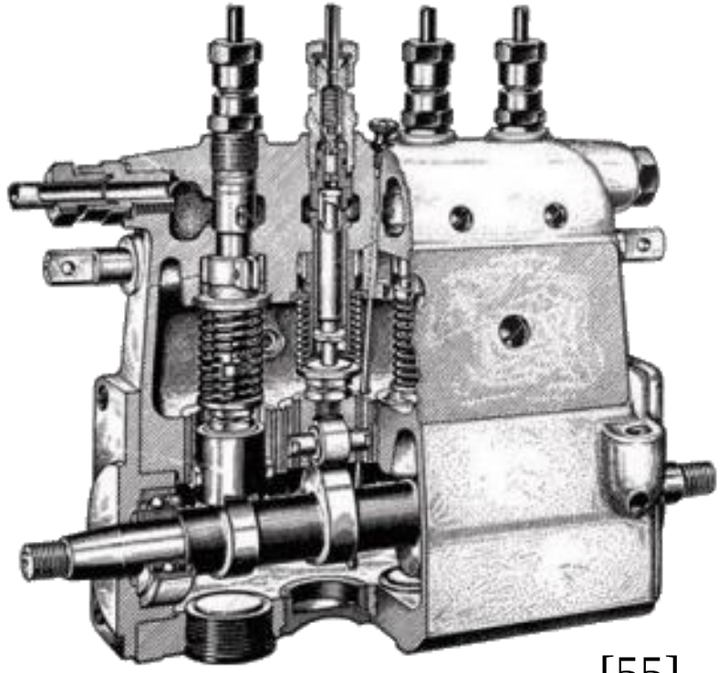
[54]

Dizel silindriga yonilg‘i uzatish sxemasi:

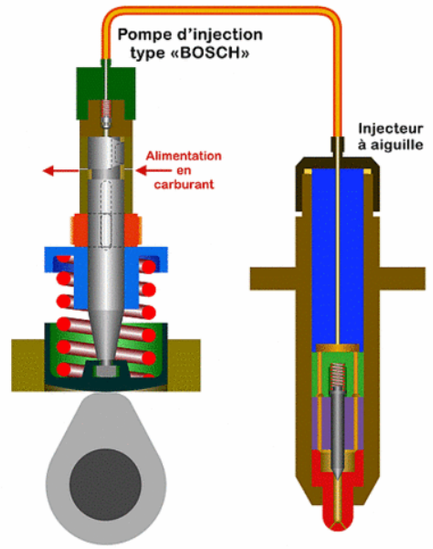


[49]

Plunjer juftligidagi tirqish **1-2 mkm**



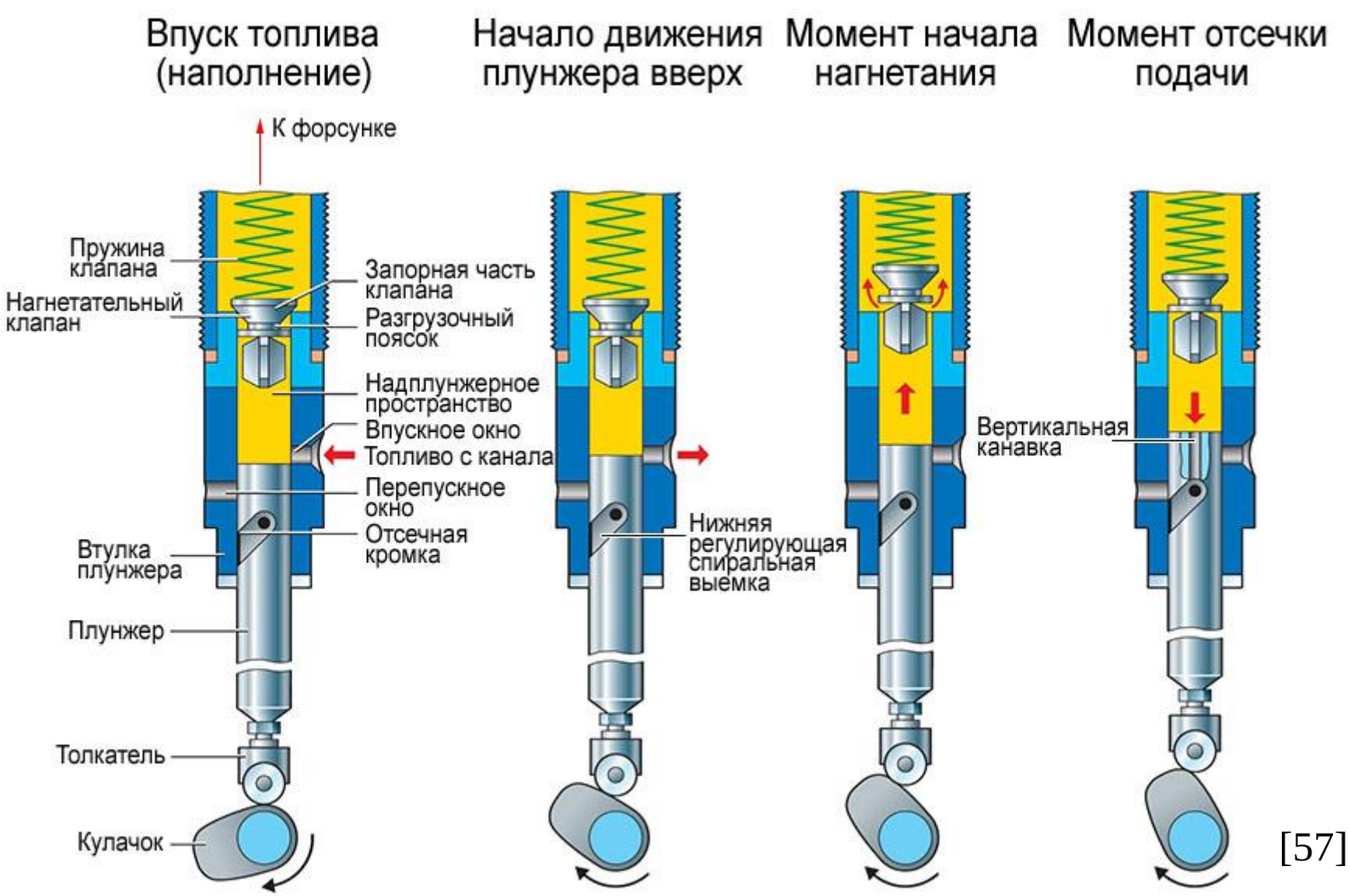
[55]



[56]

1-mushtchali val; 2-shesterna; 3-reyka; 4-qaytarish prujinasi; 5-gilza; 6-plunjer; 7-aylanma yo‘nma; 8-kiritish teshigi; 9-vertikal paz; 10-chiqarish teshigi; 11-qiyalatilgan qirra; 12-haydash klapani; 13-yuqori bosim naychasi; 14-qaytarish prujinasi; 15-igna; 16-forsunka; 17-forsunka bo‘shlig‘i; 18-to‘zitgich soplosi.

Plunjer juftliklarida yonilg‘ini uzatilish:



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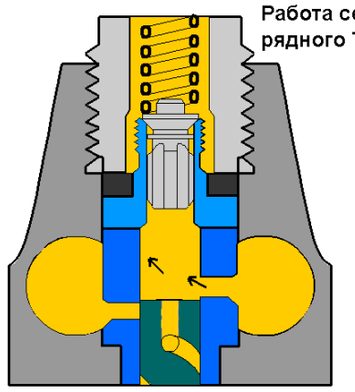
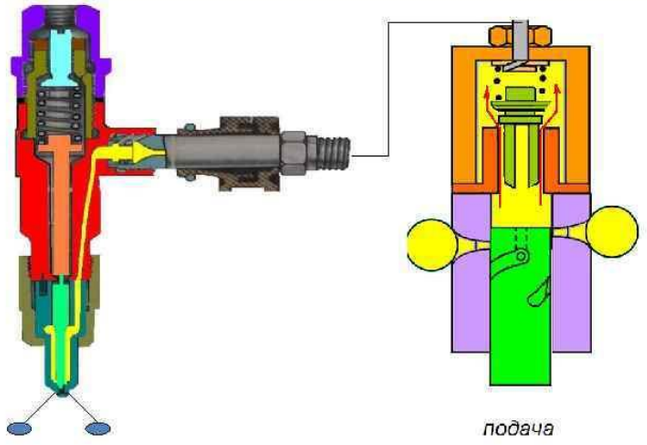


[58]

Совместная работа ТНВД и форсунки



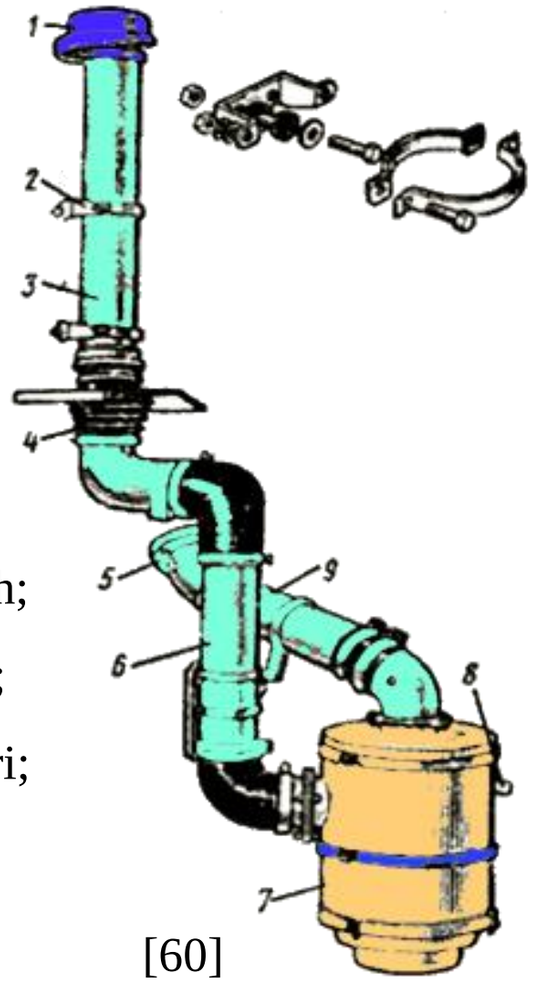
[59]

Dvigatelga havo uzatish qurilmasi -

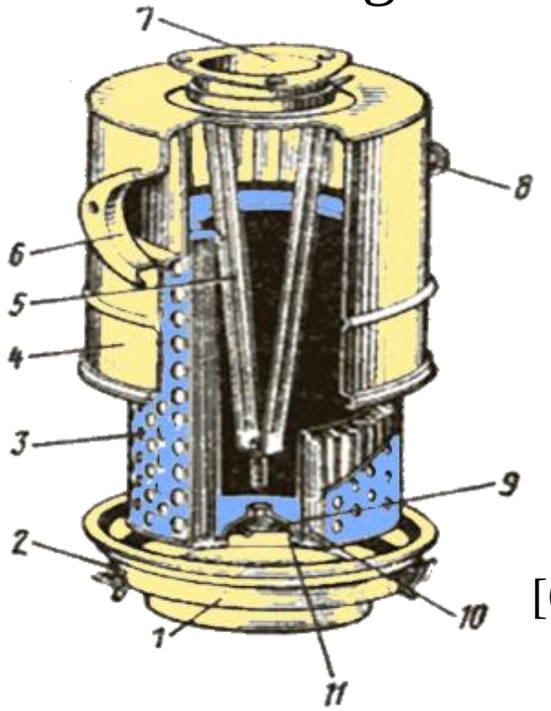
Atmosferadan havo olish, uni chang va namdan tozalash hamda silindrlarga uzatishni amalga oshiradi.

Dvigatelga havo uzatish qurilmasi:

1-kolpak; 2-kronshteyn; 3-havo olgich trubasi; 4-havo olgich; 5-chiqarish patrubkasining flanesi; 6,9-kiritish va chiqarish patrubkalari; 7-havo filtri; 8-changni chiqarish patrubkasi.



[60]



[60]

Havo filtri:

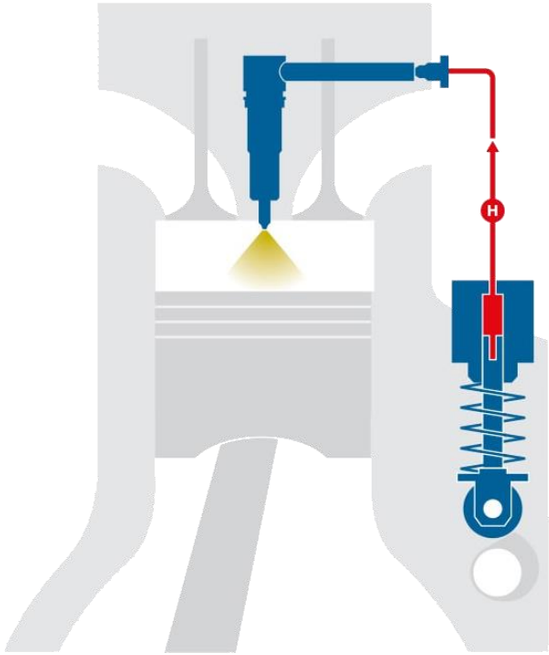
1-filtrlovchi element tutqichi; 2-qotirish ilgagi; 3,11-inversion panjaraning tashqi va ichki kojuxlari; 4-korpus; 5-markaziy kronshteyn; 6 ,7-kiritish va chiqarish patrubkalari; 8-ejeksion chang chiqarish patrubkasi; 9 -filtrlovchi elementni qotirish gaykasi; 10-filtrlovchi karton.

Forsunka -

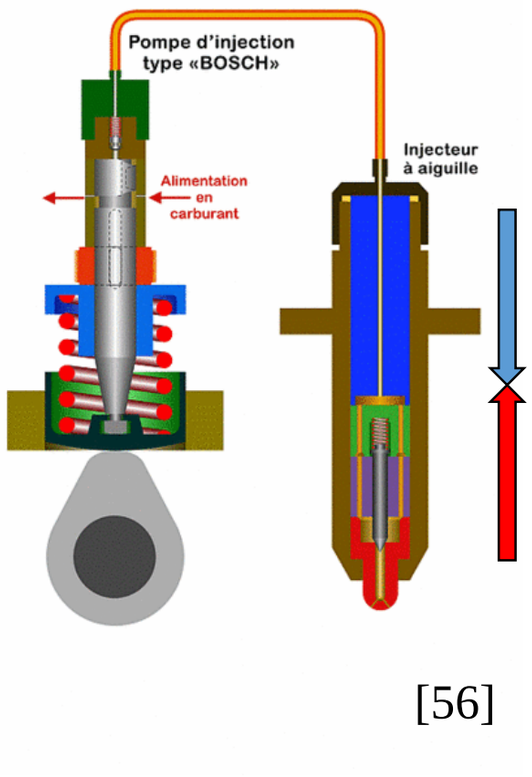
Aralashma hosil qilish jarayonini tashkil qilishda forsunka to‘zitgichining soplosini konstruksiyasi muhim ahamiyatga egadir.

Ushbu belgisiga ko‘ra, forsunkalar:

- **ochiq;**
- **yopiq.**



[61]



[56]

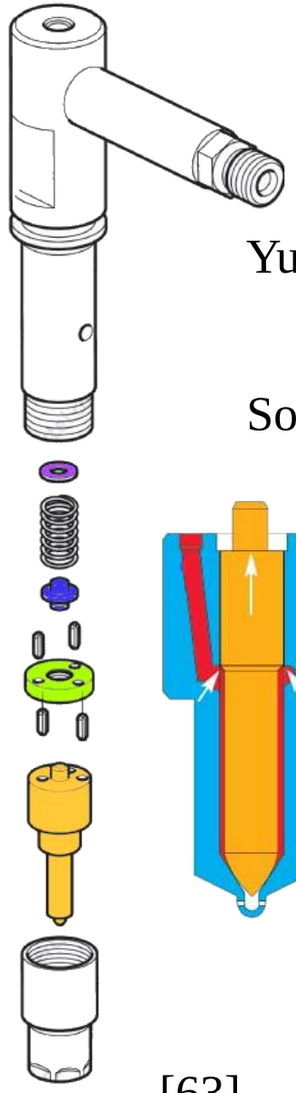
Gidravlik kuch

Prujina kuchi

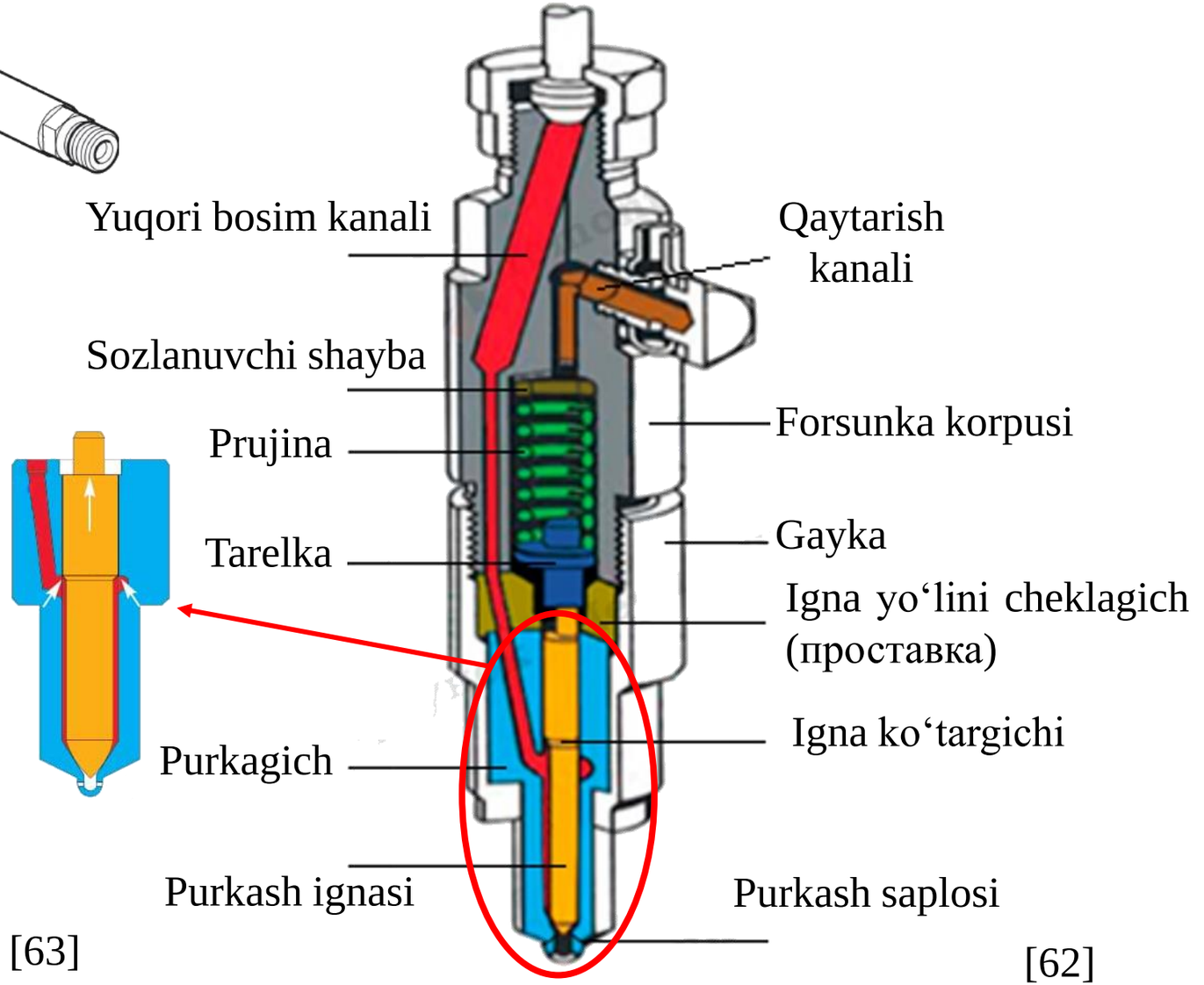
Mexanikli bir prujinali ochiq turidagi forsunkaning konstruksiyasi.

➢ **Ochiq** forsunkalarda to‘zituvchi teshigi yuqori bosim naychasi bilan doimiy tutashgan.

Shuning uchun ham ochiq forsunkali tizimlarda silindr bo‘shlig‘i va **yuqori bosim magistrali** o‘zaro hech qachon **bir-biridan aloqasini uzmaydi.**

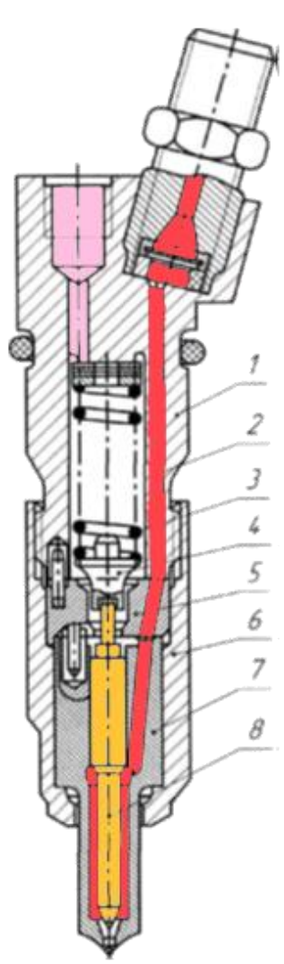


[63]

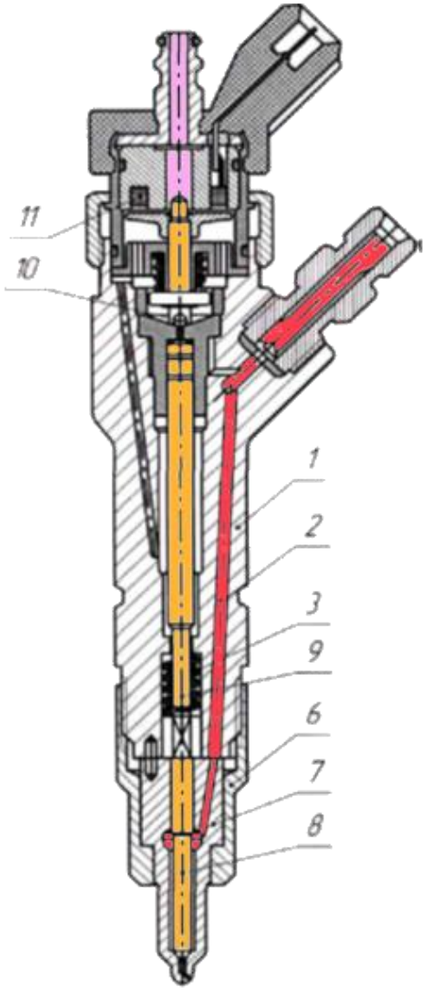


[62]

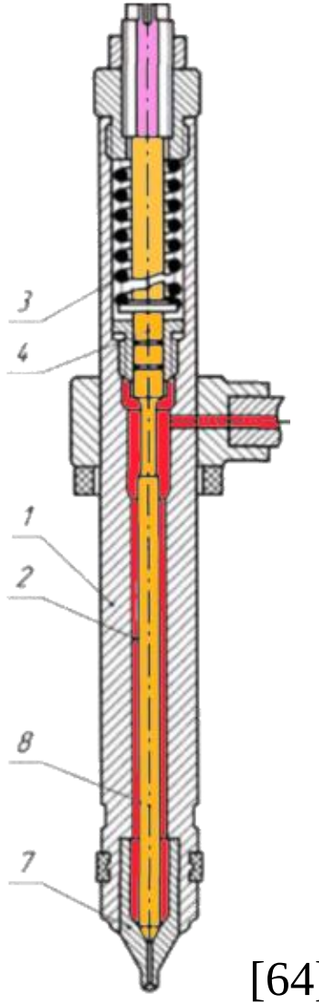
Yopiq turidagi forsunkaning konstruksiyasi.



ЯЗДА



Bosch



Rikardo

[64]

➢ **Yopiq** forsunkalar tirgakli qulflanuvchi igna yoki klapan bilan ta’minlangan va ular yonish kamerasining bo‘shligini forsunka bo‘shlig‘idan ajratib turadi.

Faqat yonilg‘i uzatish paytidagina ular tutashadi.

1 - forsunka korpusi; 2 - yonilg‘i bilan ta’minlash kanali; 3 - prujina; 4 - shtabga; 5 - forsunka igna yo‘lini cheklagich (проставка); 6 - to‘zitgich gaykasi; 7 - to‘zitgich korpusi; 8 - to‘zitgich ignasi; 9 - bloklash multiplikatori; 10 - sharikli boshqarish klapani; 11 - elektromagnit klapani.

Yopiq forsunkalar yopiq shtiftsiz, yopiq shtiftli, klapanli va klapan-soploli

turlarga bo‘linadi.

Hozirgi vaqtda klapani elektromagnit va elektrogidravlik yuritma yordamida boshqariluvchi forsunkalar ishlab chiqilgan.

Bu esa ta’minlash tizimini elektronika yordamida boshqarish imkonini beradi.

Benzinli IYoD

Dizelli IYoD

Elektromagnit forsunka

Mexanikli forsunka

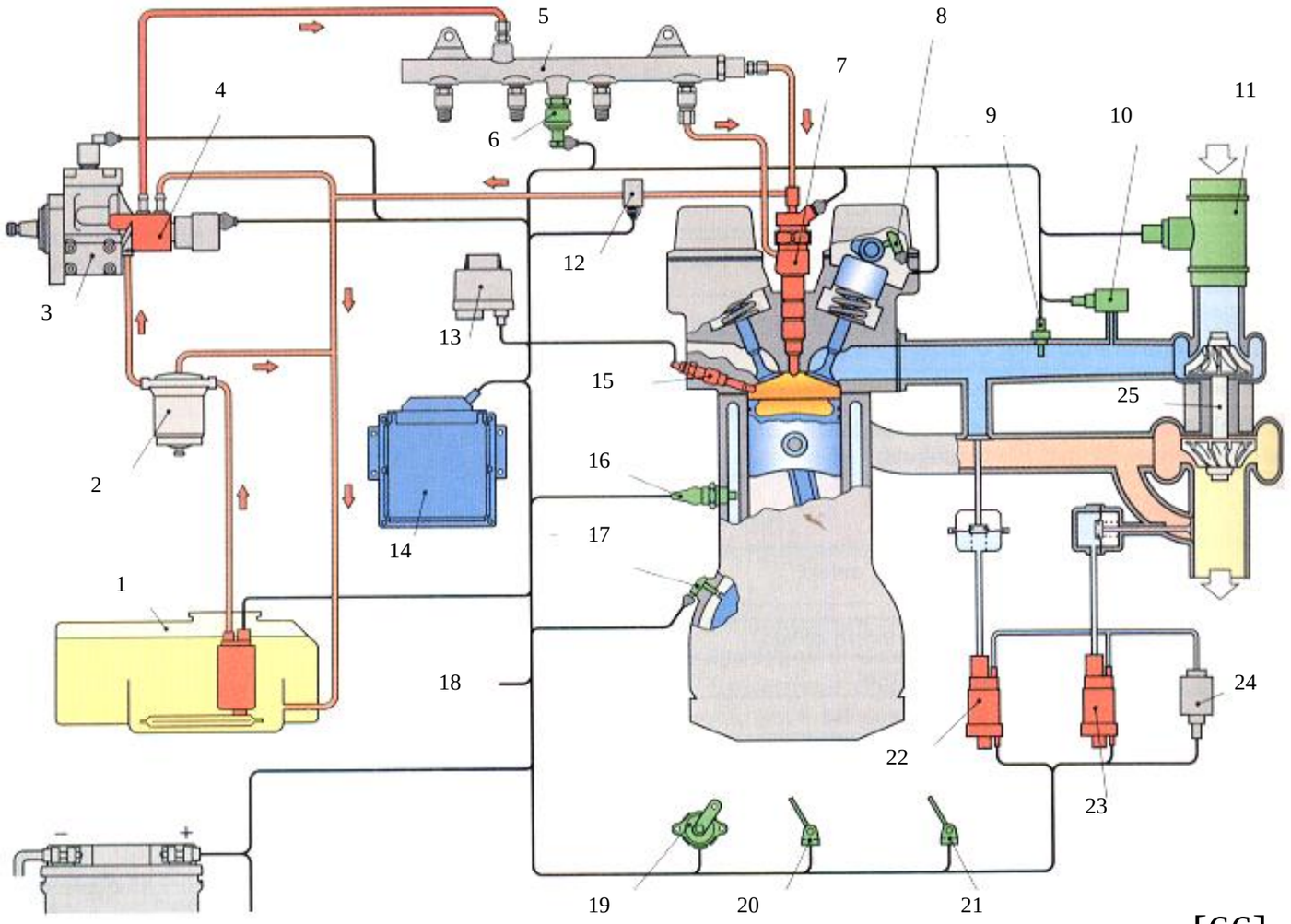
Elektrogidravlik forsunka

Piezoelektrik forsunka

Nasos-forsunka (Elektrogidravlikli / Piezoelektrik)

[65]

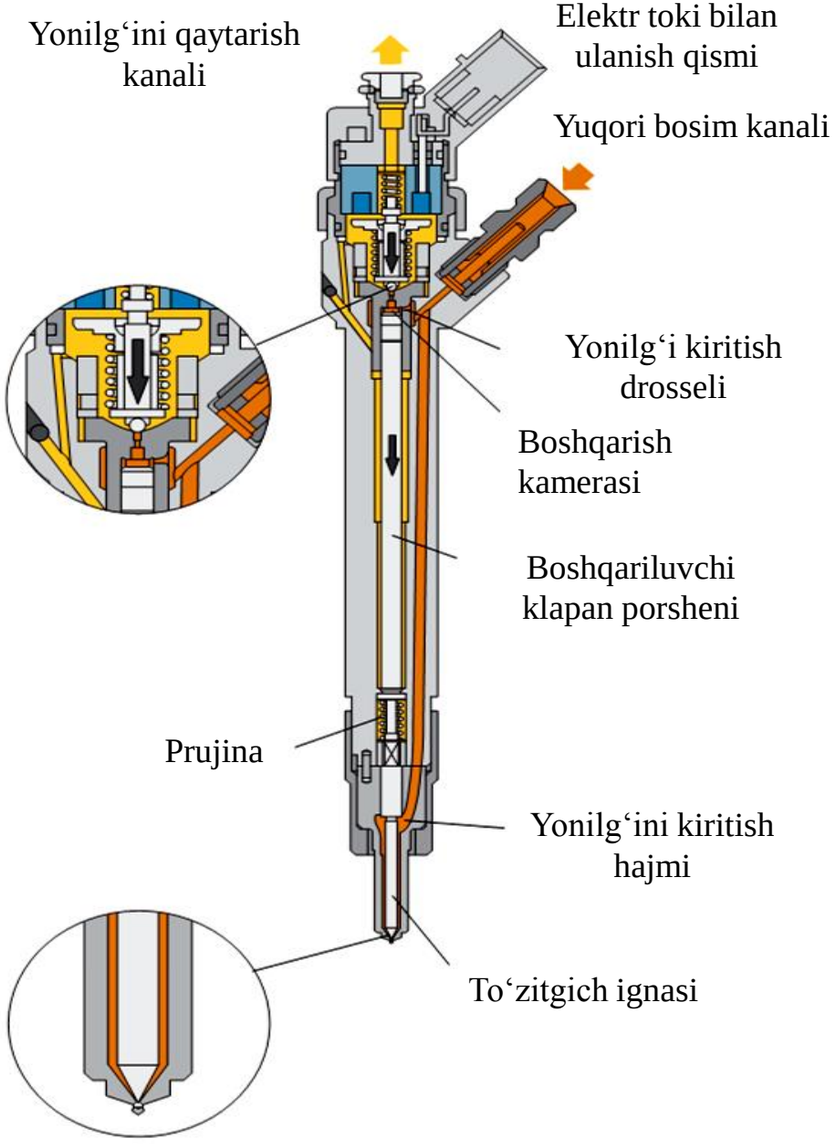
“Common-Rail” yonilg‘i purkash tizimi.



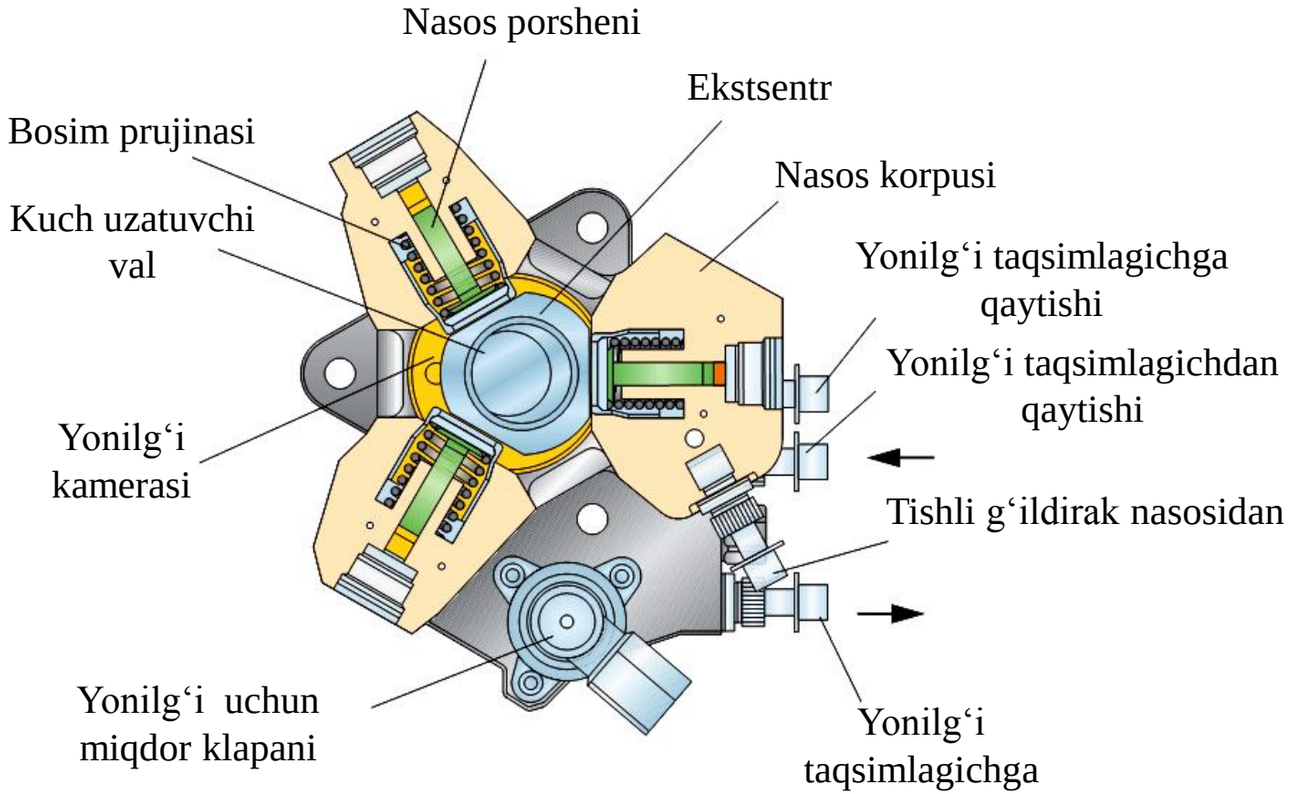
[66]

1-yonilg‘i baki, 2-yonilg‘i filtri, 3-yuqori bosimli yonilg‘i nasosi, 4-yonilg‘i trubasini sozlagich, 5-yonilg‘i rampasi, 6-rampaning bosim datchigi, 7-forsunka, 8-gaz taqsimlash valining holati datchigi, 9-kiritish quvuri tadchigi, 10-yuklanish bosimi datchigi, 11-havo massasini o‘lchagich, 12-yonilg‘i temperature datchigi, 13-cho‘g‘lanish shamining boshqaruvchisi, 14-elektron boshqaruv bloki, 15-cho‘g‘lanish shami, 16-dvigatelning temperatora datchigi, 17-tirsakli valning aylanishlar soni datchigi, 18-CAN, 19-haydovchining gaz pedal datchigi, 20-tormoz pedali yoqgichi, 21-mufta pedal yoqgichi, 22-EGR-klapani, 23-yuklama klapani, 24-past bosimli nasos, 25-turonadduv.

Piezoelektrik forsunka

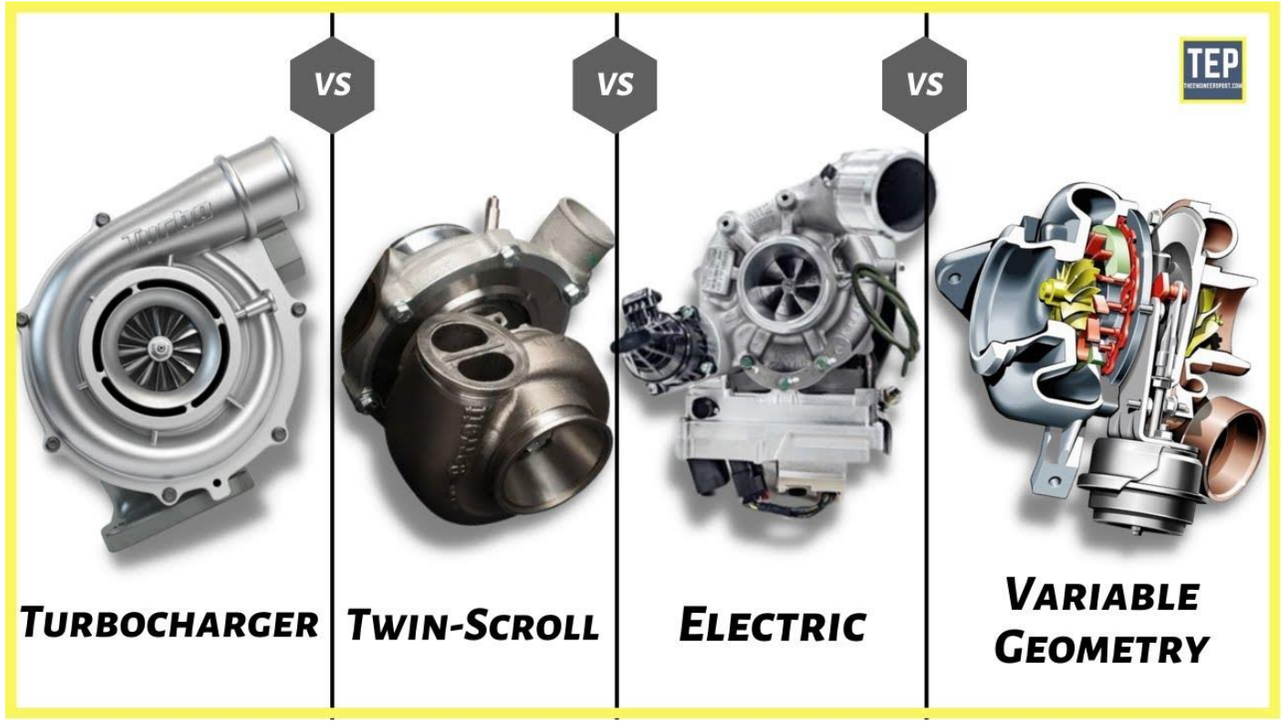


Taqsimlagichli YuBYoN

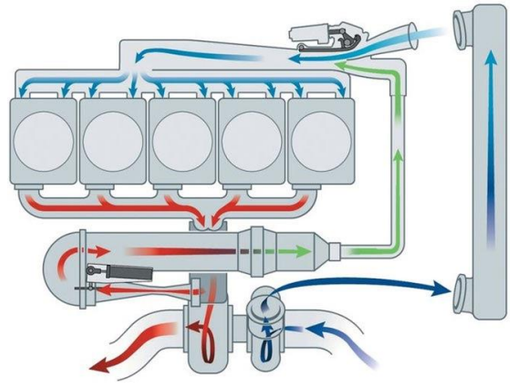


[66]

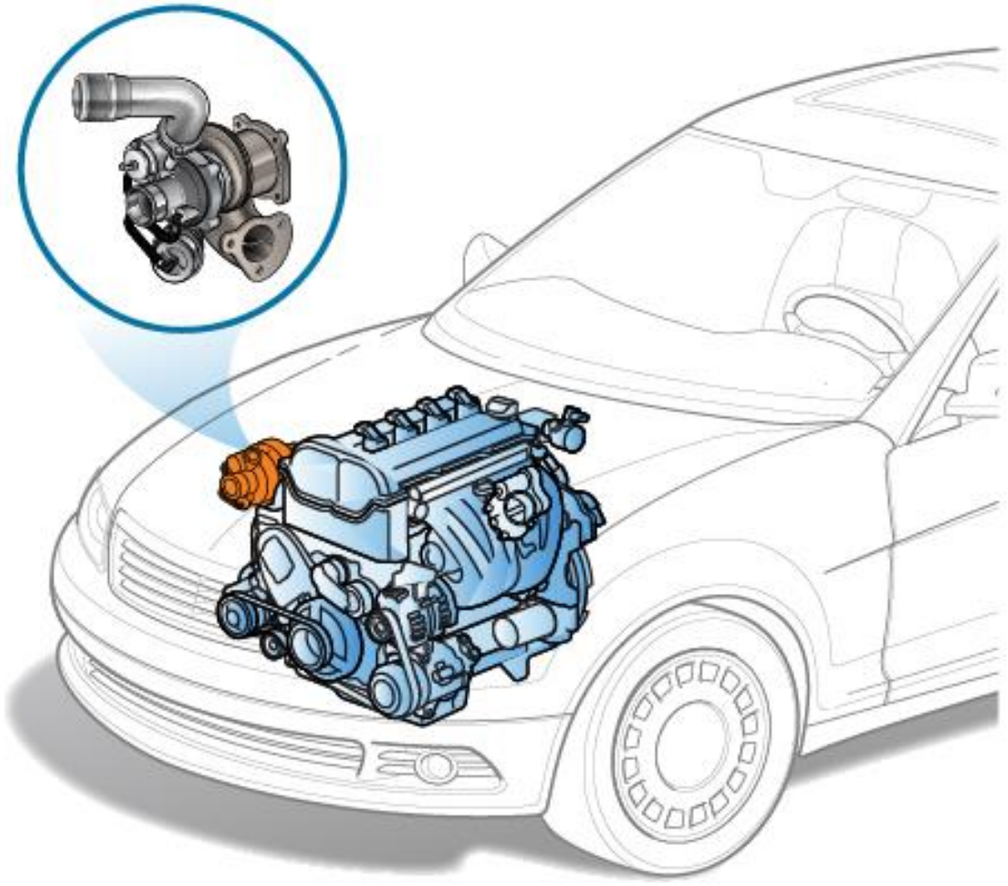
Turbo nadduv.



[68]



[69]



Litr quvvatini 20-45 kW/l gacha,
20-40 % quvvat ortadi [67]

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E'TIBORINGIZ UCHUN RAHMAT!!!