Unit 5
Lubricating system of IC engine

Lubricating system

- Lubrication is essentially required for proper tractor maintenance.

- It is defined as supply of lubricating oil between the moving parts.

Objectives of lubrication

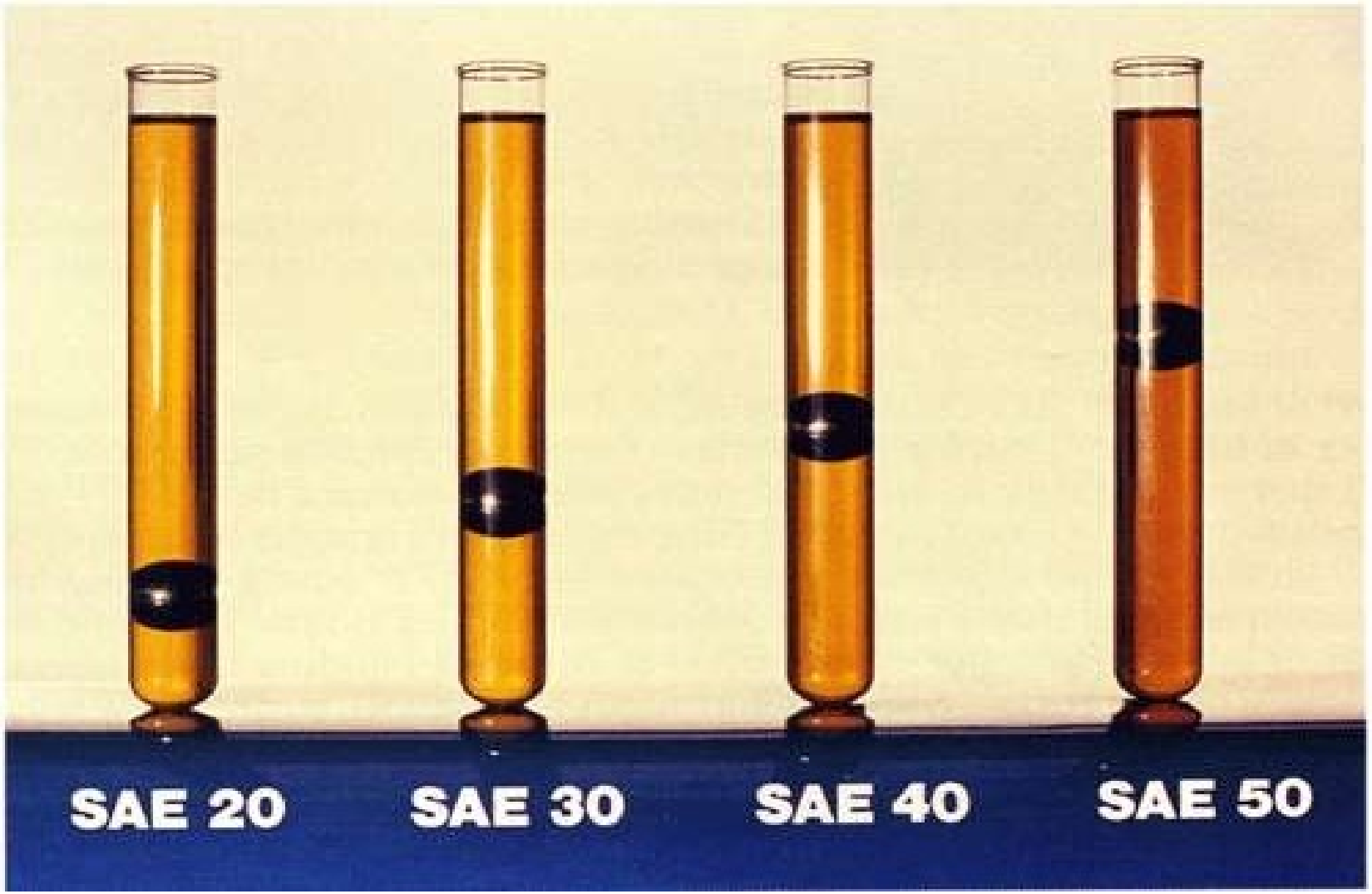
- To reduce the friction between the moving parts.
- To reduce wear of the moving parts.
- To act as a cooling medium.
- To keep the engine parts clean.
- To absorb shocks between bearings and other engine parts .
- To form good seal b\w piston rings and cylinder walls.
- To prevent deposition of carbon and metallic components from corrosive attack.
- To resist oxidation.

Properties of Lubricants

- Viscosity
- Flash point
- Fire point
- Oiliness
- Corrosion
- Pour point
- Color
- Sulphur content
- Specific gravity
- Neutralization number
- Adhesiveness

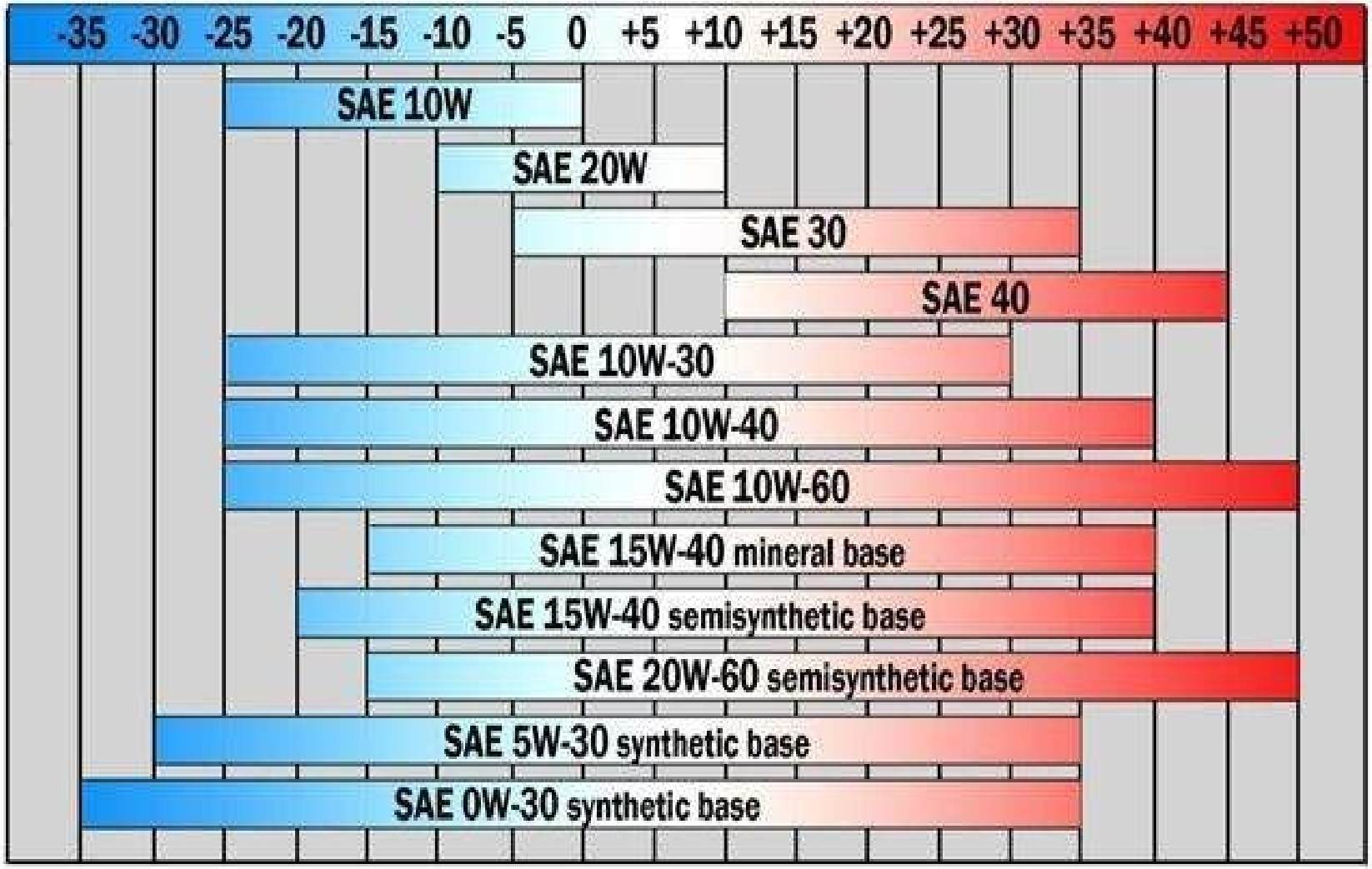
SAE Number

- Society of Automotive Engineer has recommended SAE viscosity number for lubricating oils.
- viscosity number is determined by the range of viscosities within it fall at the given temperature.
- For winter use 5W,10W,20W
- For normal use 20,30,40


SAE 20
SAE 30
SAE 40
SAE 50

SAE Grades

For Engine Oils Recommended in Relation with the Outside Temperatures (°C)



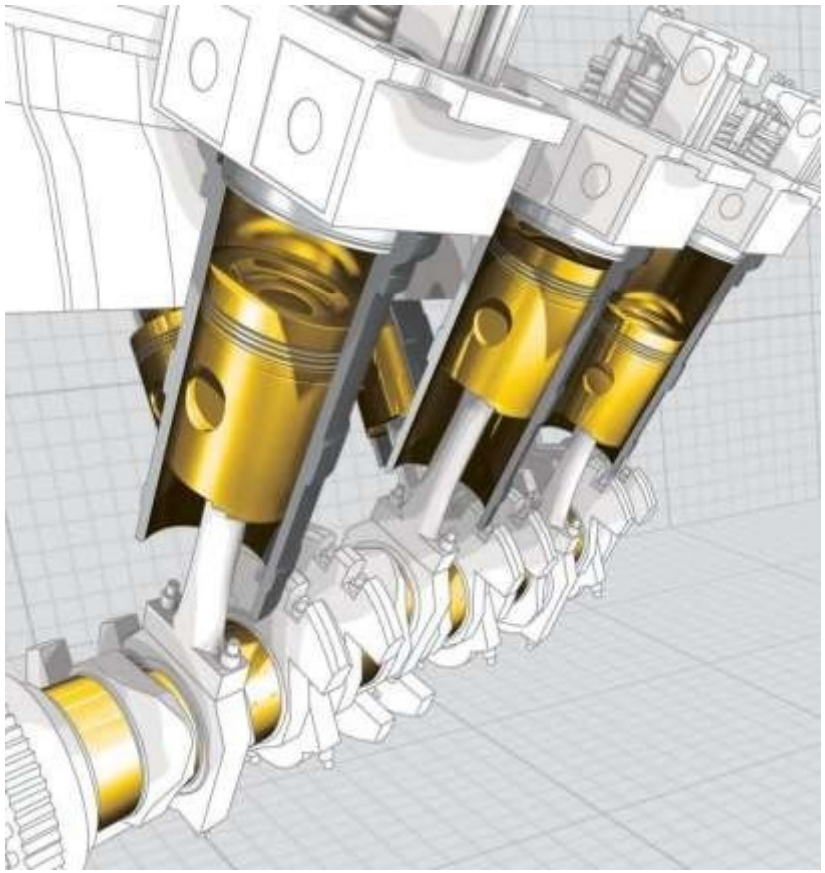
Types of Lubricants

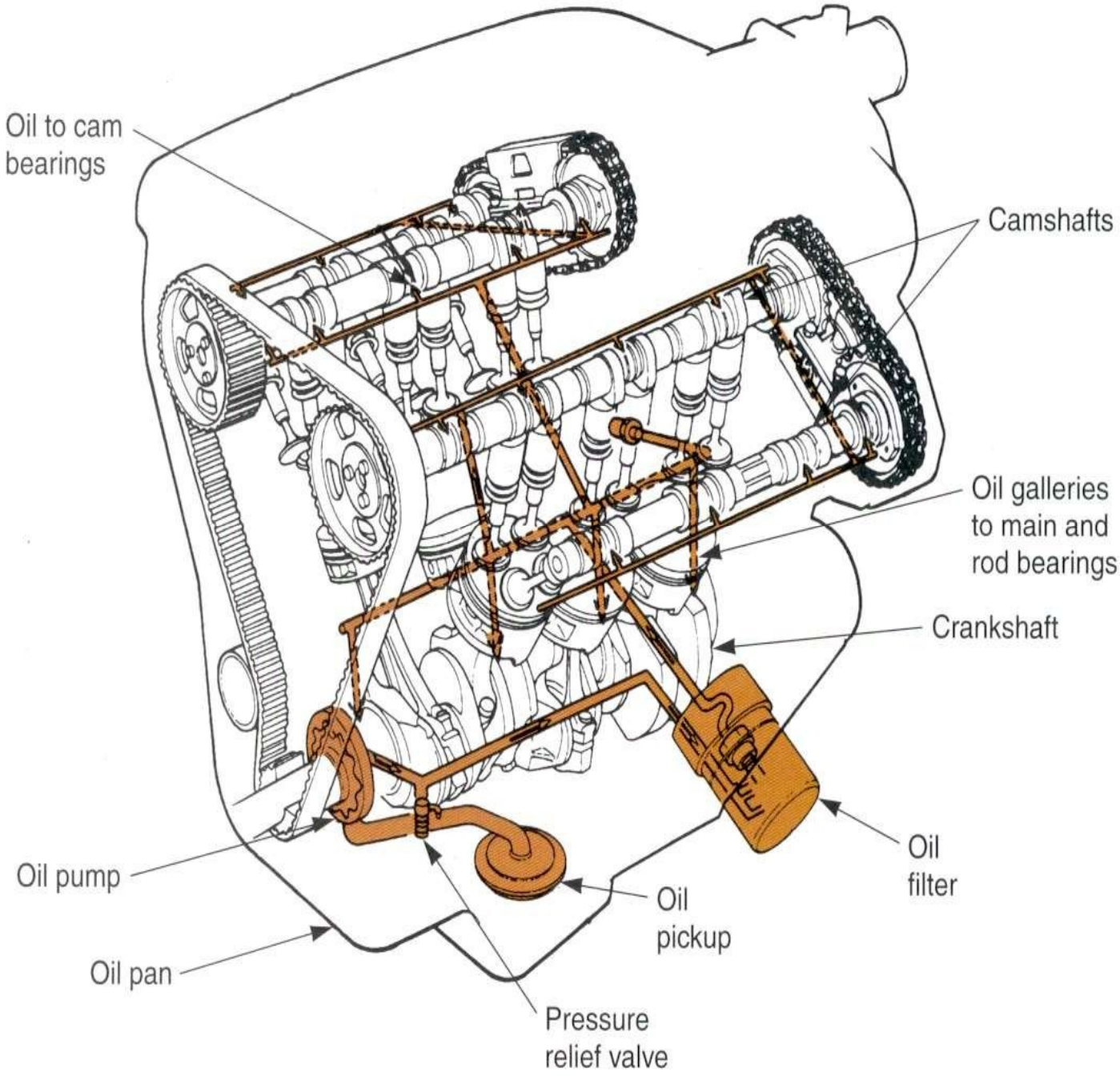
Three types

- Solid – graphite, mica , soap stone
- Semi-solid – grease
- Liquid – mineral, vegetable and animal oils

Lubricating Parts of Engine

- Main crankshaft bearings
- Big end bearings
- Small end bearings
- Camshaft bearings
- Piston rings and cylinder walls
- Timing gears
- Valve mechanisms



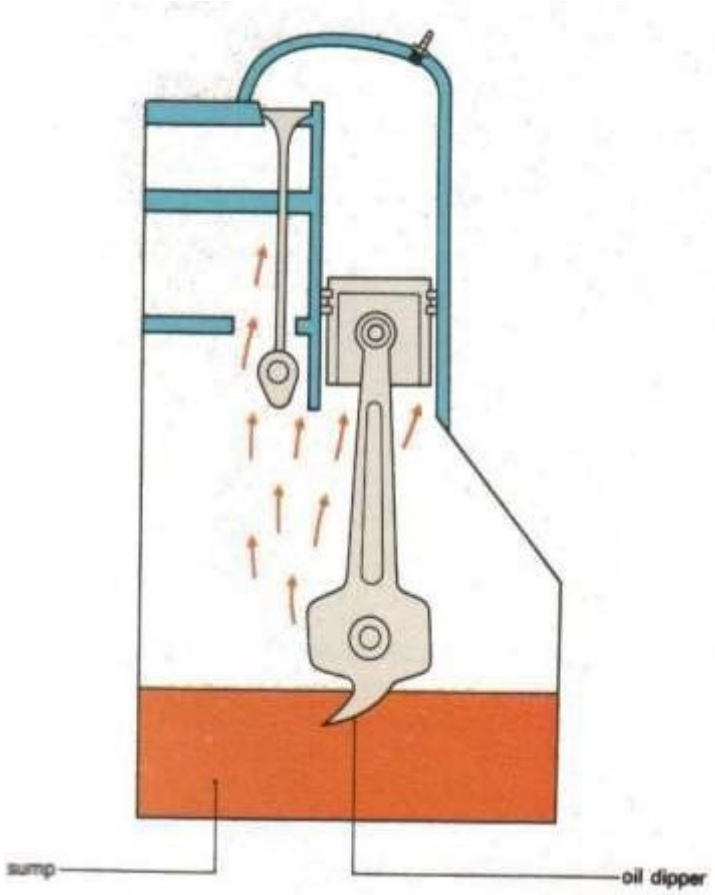

Oil to cam bearings
Camshafts
Oil galleries to main and rod bearings
Crankshaft
Oil filter
Oil pump
Oil pickup
Oil pan
Pressure relief valve

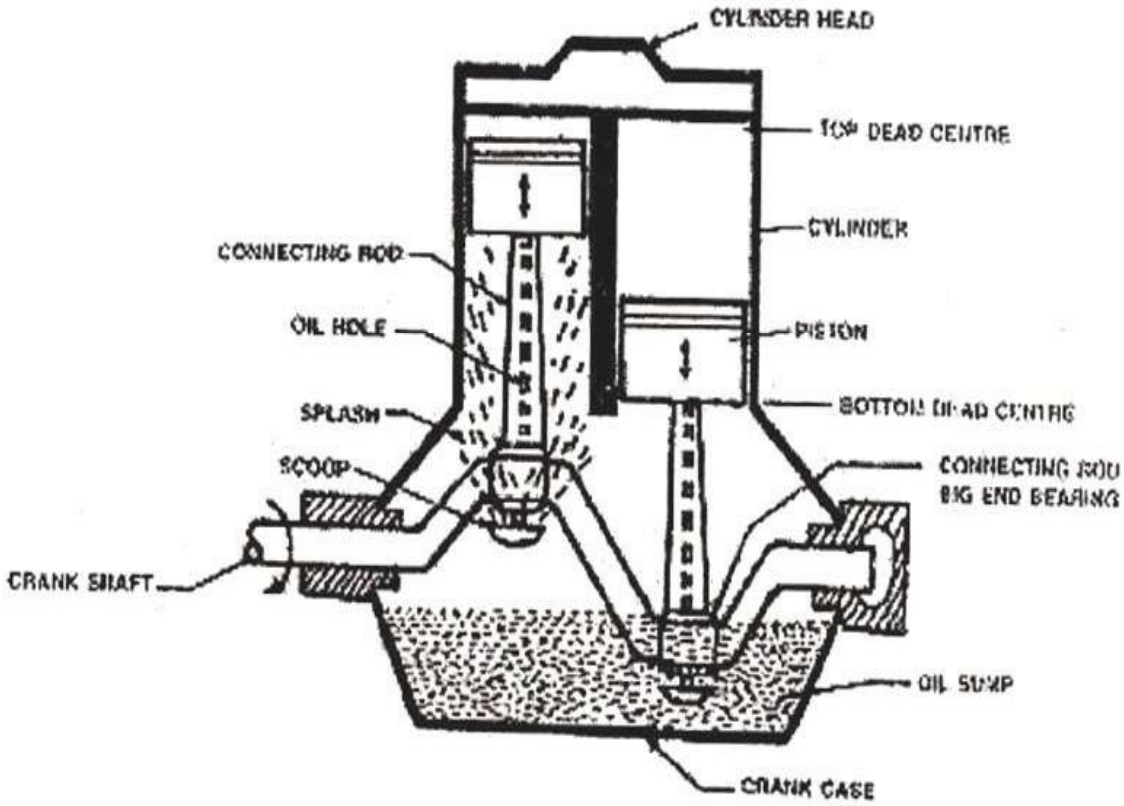
Lubricating systems

- Splash system
- Pressure system
- Semi pressure system

Splash system

- In this system , the lubricating oil Is stored in an oil trough or sump.
- A scoop or dipper is made in the lowest part of the connecting rod.
- When the engine runs , the dipper dips in the oil once in every revolution of the crankshaft and causes the oil to splash on the cylinder walls.
- The main bearings , camshaft bearings , timing gears , piston, cylinder liners , etc.. are lubricated by this system.





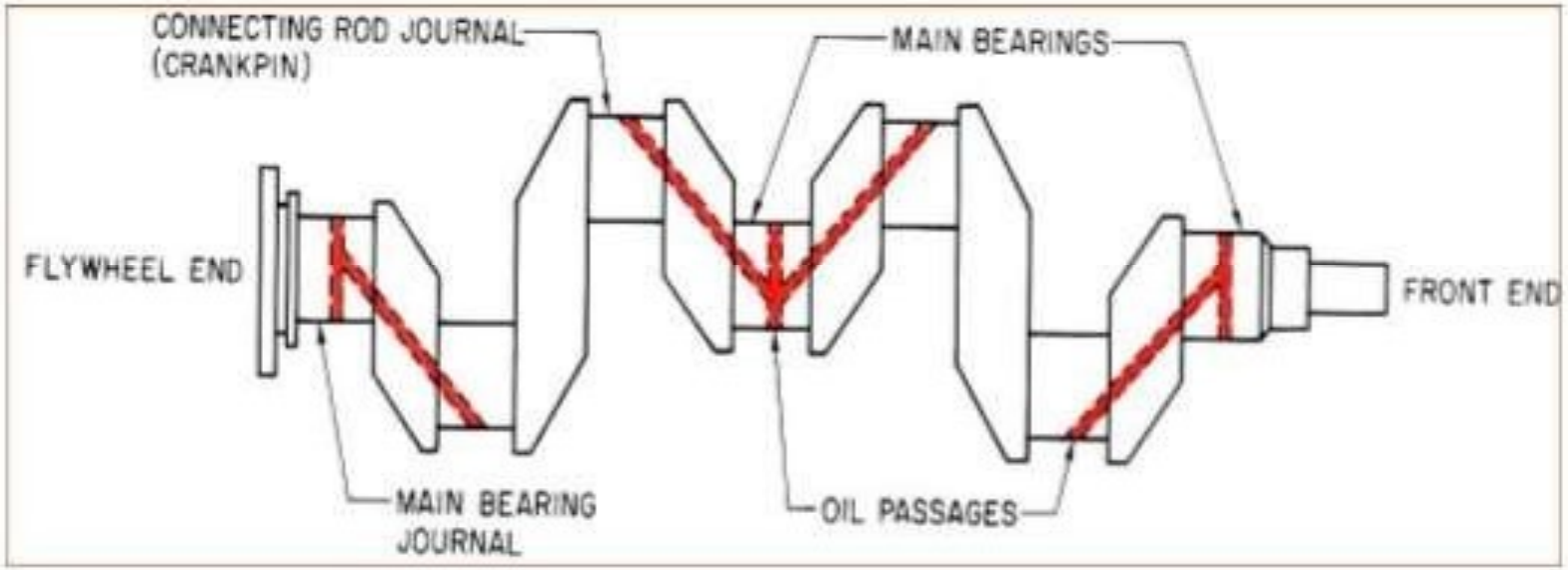
SPLASH LUBRICATION

Pressure system

- In this system, the engine parts are lubricated under pressure feed.
- The lubricating oil is stored in a separate tank, from where an oil pump takes the oil through a strainer and delivers it through a filter to the main oil gallery at a pressure of **2-4 kg/cm^2**.

LUBRICATING SYSTEM OPERATION

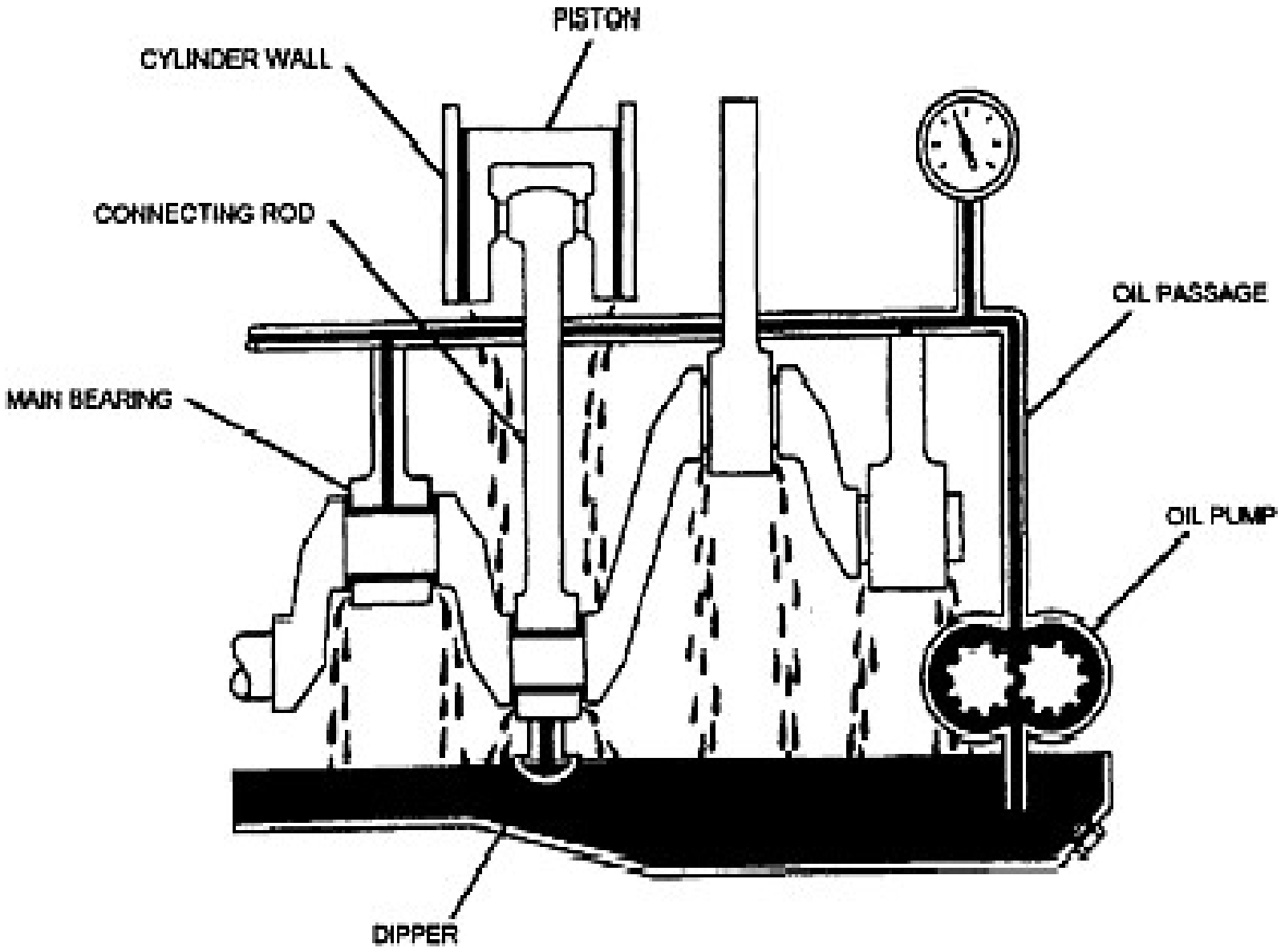
Oil Flow System



- Oil from main gallery is sent through passages into the crankshaft.

Semi- pressure system

- It is the combination of splash system and pressure system.
- Some parts are lubricated by splash system and some parts by pressure system .
- Almost all the four stroke engines are lubricated by this system.


PISTON
CYLINDER WALL
CONNECTING ROD
OIL PASSAGE
MAIN BEARING
OIL PUMP
DIPPER

LUBRICATION POINTS OF COMPRESSORS

- **CYLINDERS : FORCE FEED LUBRICATION**
  A) HORIZONTAL
  B) VERTICAL DOUBLE ACTING

  SPLASH LUBRICATION FOR VERTICAL SINGLE ACTING

- **BEARINGS : FORCE FEED**
  CIRCULATORY LUBRICATION
  PRESSURE LUBRICATION

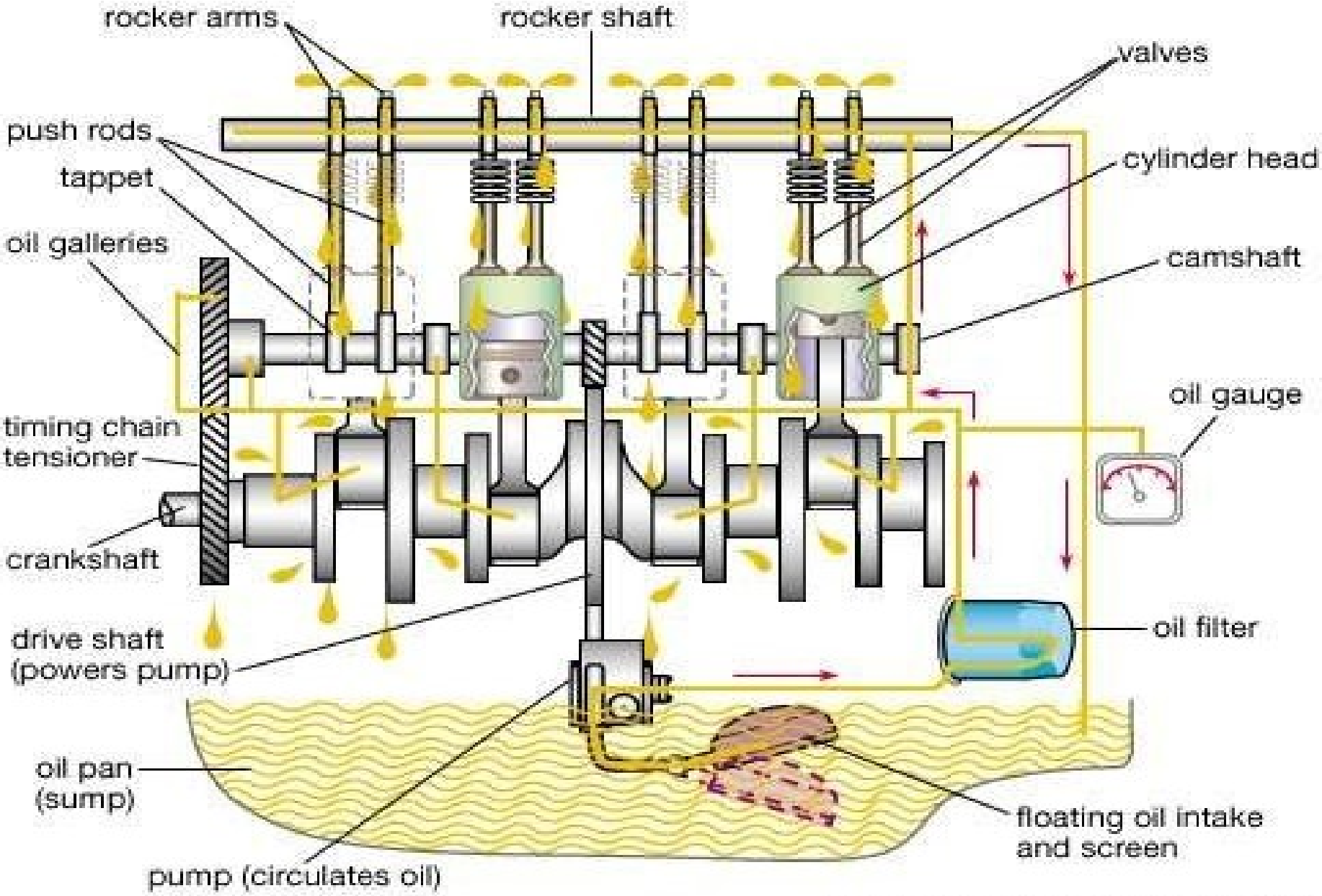
- **VALVES : FORCE FEED WHERE GREAT AMOUNT OF MOISTURE IS PRESENT**

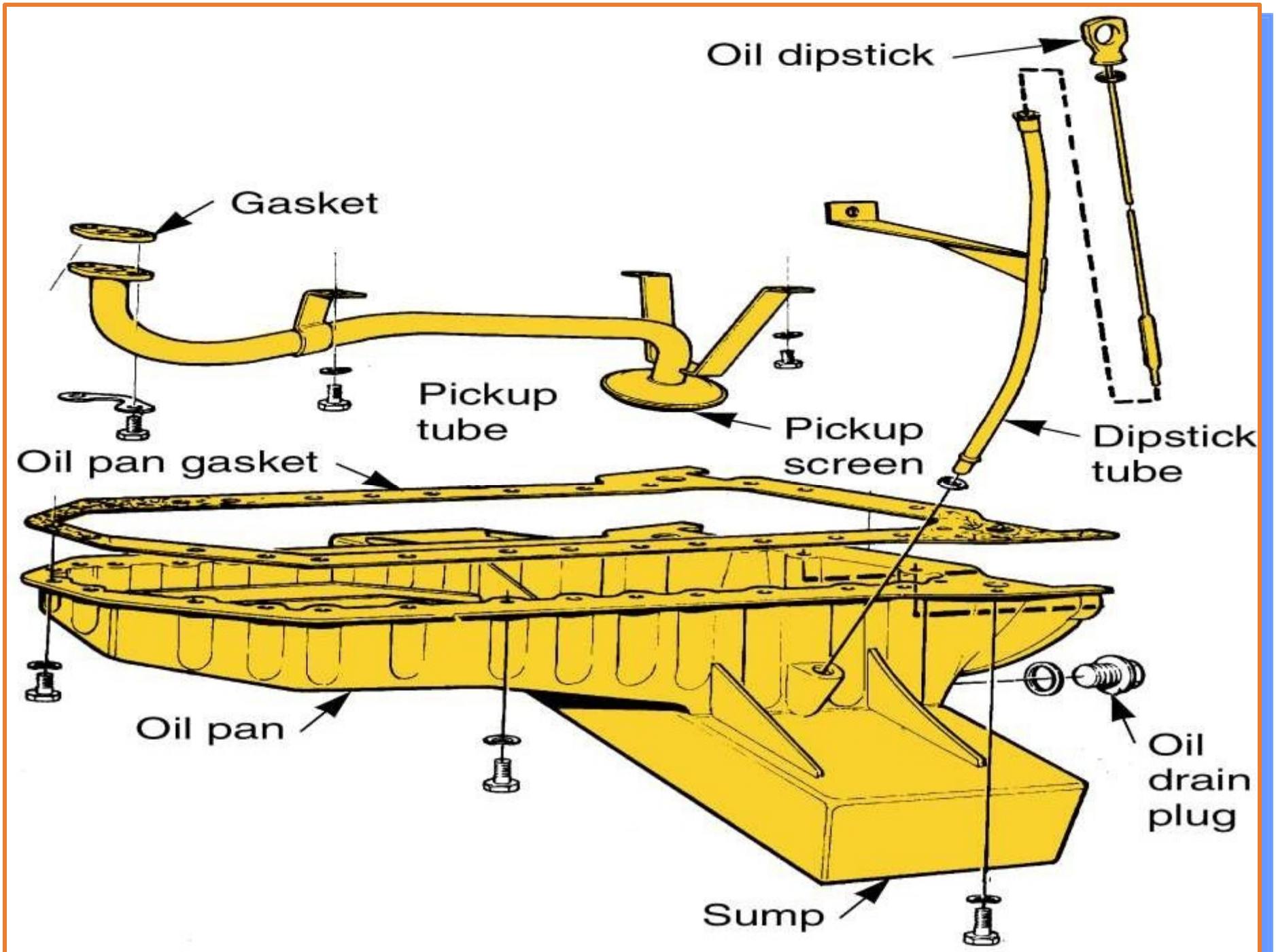
Parts of Lubricating system

- Oil sump
- Oil pump
- Oil cooler
- Oil filter and strainer
- Oil pressure gauge
- Oil pressure indicating light
- Oil level indicator

Oil Sump

- Lowest part of the crank chamber.
- Provides a covering for the crankshaft and contains oil in it.
- It is also known as oil pan.
- It is made of steel pressings and also by aluminium or cast iron.
- It contains drain plug at its lowest part to drain out the oil.



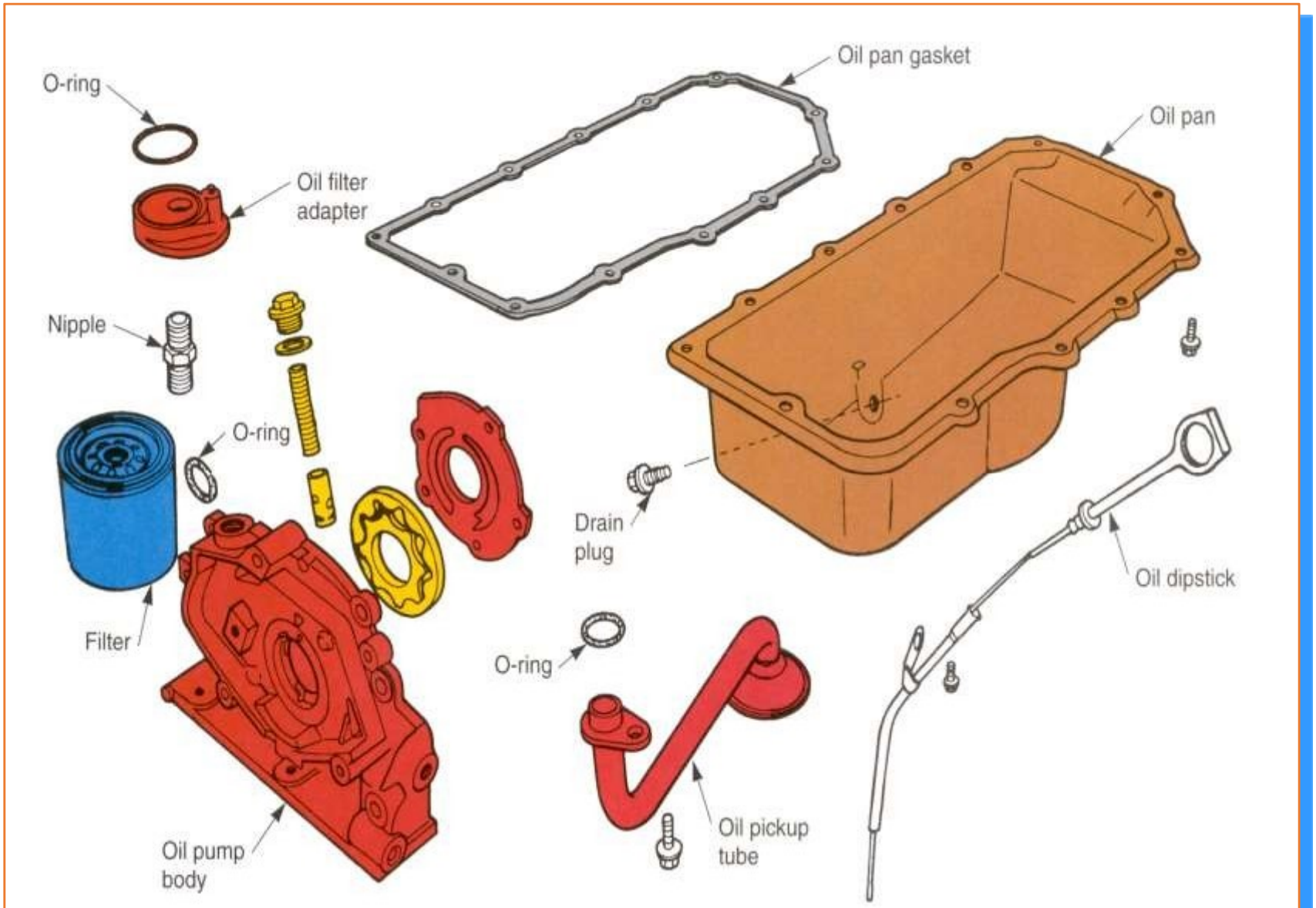

Oil dipstick
Gasket
Pickup tube
Pickup screen
Dipstick tube
Oil pan gasket
Oil pan
Oil drain plug
Sump

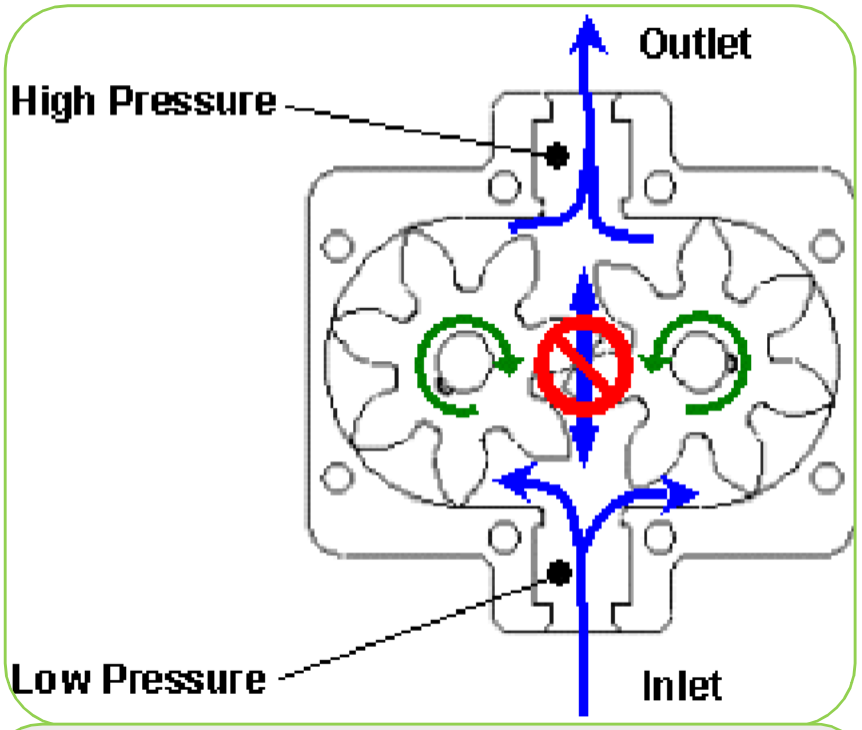
Oil pump

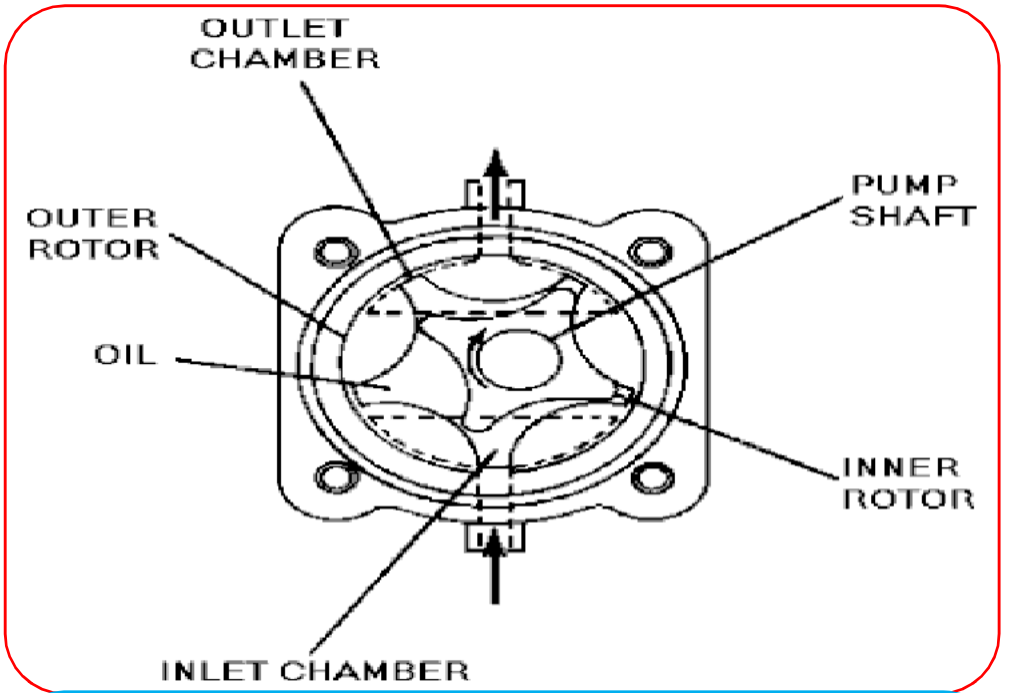
- Located inside the crankcase .
- Function is to supply oil under pressure to various engine parts to be lubricated.

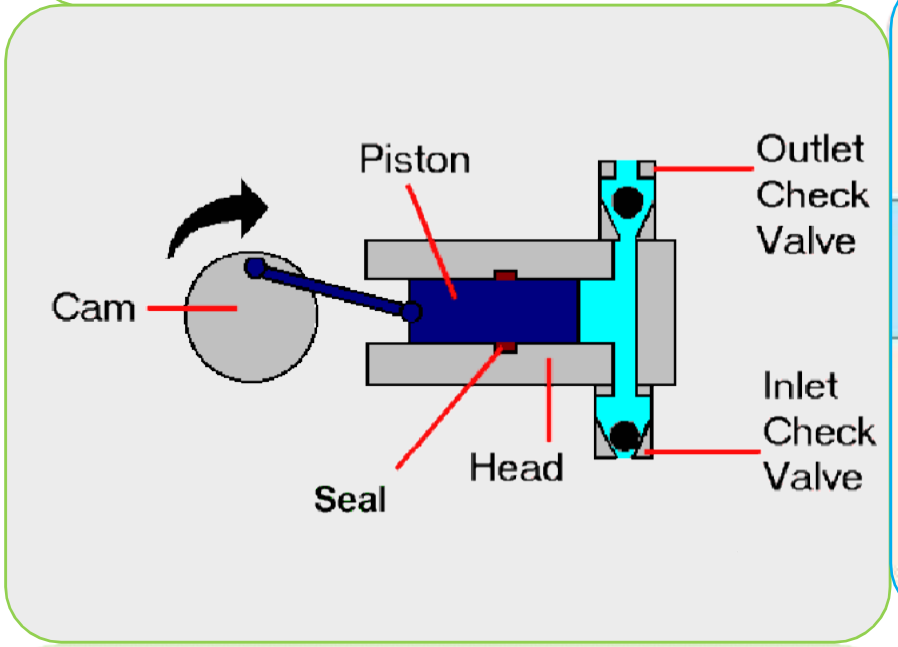
Types

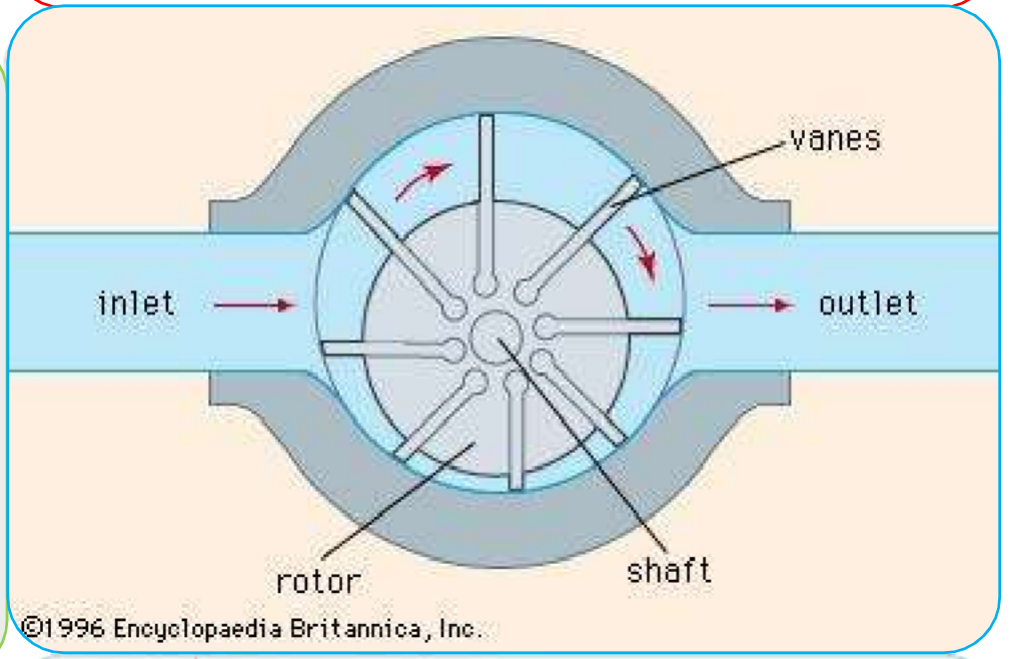
- Gear pump
- Rotor pump
- Plunger pump
- Vane pump


O-ring
Oil filter adapter
Oil pan gasket
Oil pan
Nipple
O-ring
Drain plug
Filter
Oil dipstick
O-ring
Oil pump body
Oil pickup tube


Outlet
High Pressure
Low Pressure
Inlet


OUTLET CHAMBER
OUTER ROTOR
OIL
PUMP SHAFT
INNER ROTOR
INLET CHAMBER


Piston
Outlet Check Valve
Cam
Inlet Check Valve
Seal
Head


vanes
inlet
outlet
rotor
shaft
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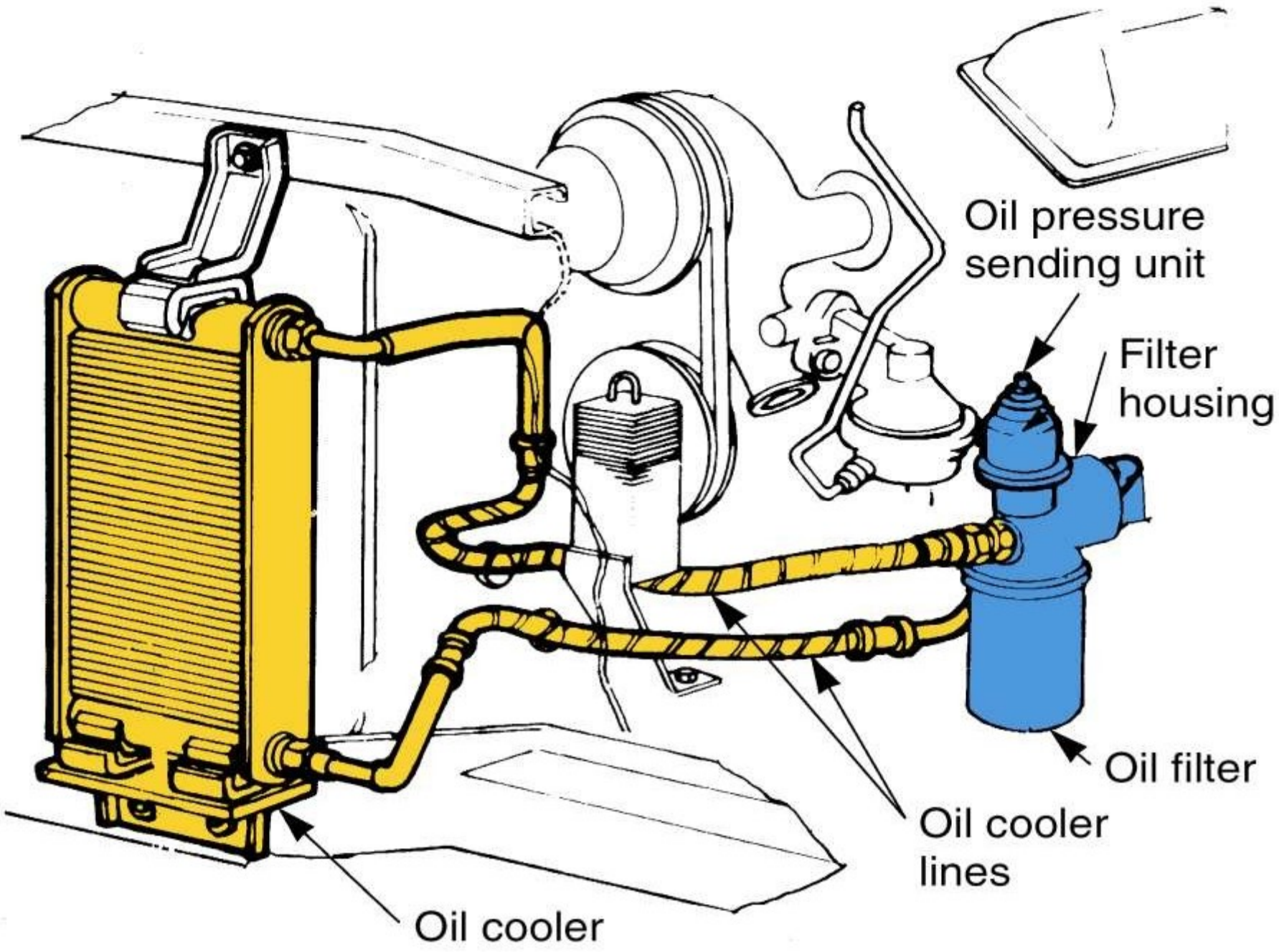
Oil cooler

- To cool the lubricating oil in heavy duty engines .
- It is just like a simple heat exchanger.
- Oil is cooled either by cold water from the radiator or by the air stream.
- Water type oil cooler are most commonly used because they act as reversible cooler.

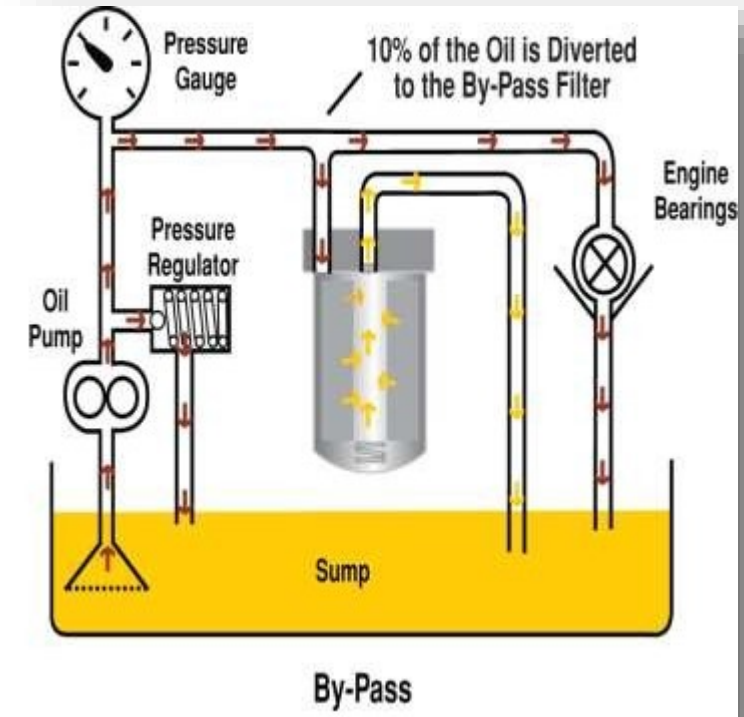

Oil pressure sending unit
Filter housing
Oil filter
Oil cooler lines
Oil cooler

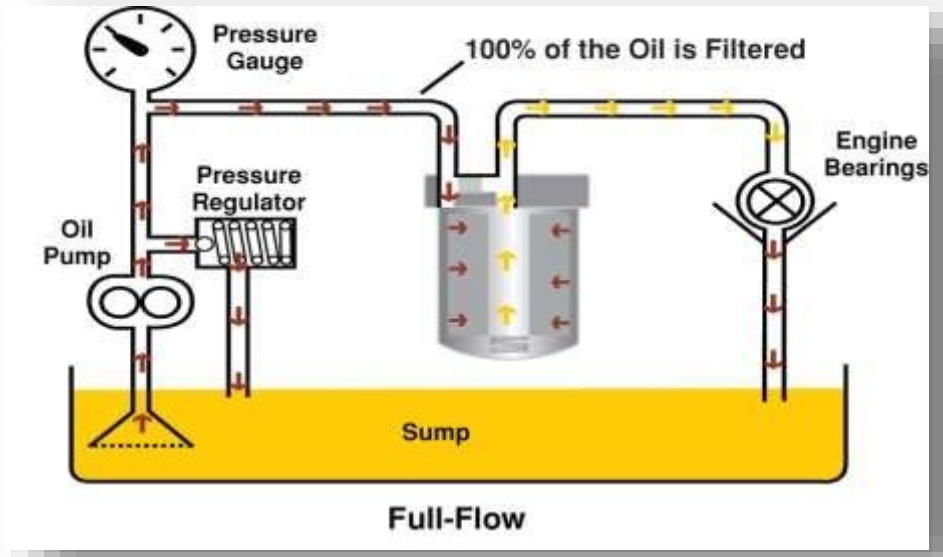
Oil filter

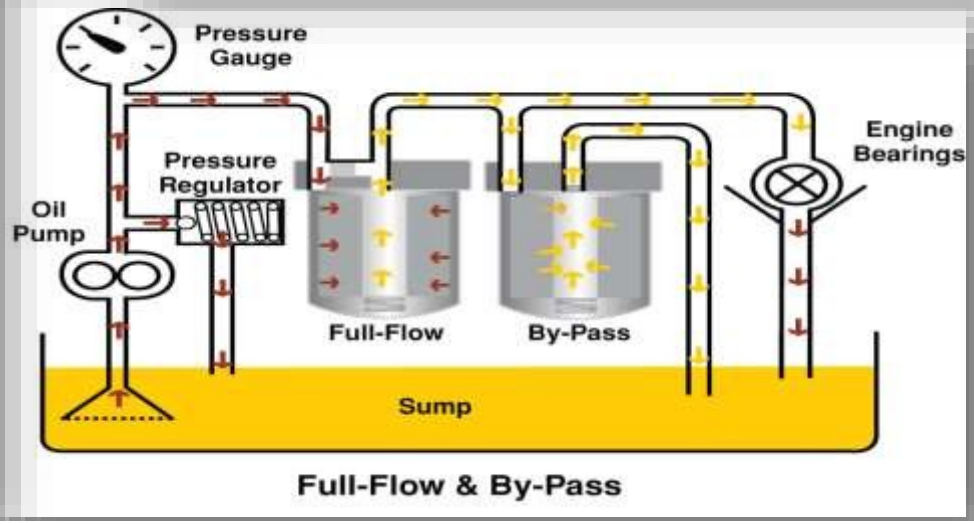
•To filter out the dirt material from the oil.

Two types

- By pass system
- Full- flow system







Oil strainer

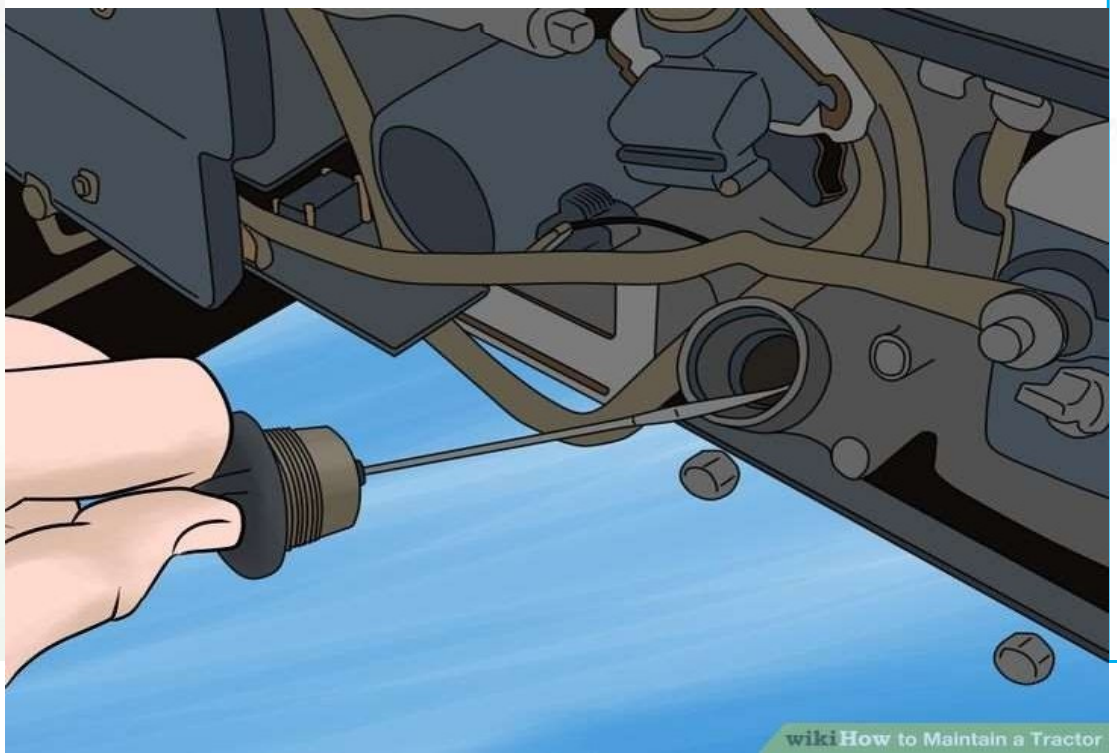
- It is simply a wire mesh screen.
- It is attached to the inlet of the oil pump and retains the dirt present in the oil.
- Usually a floating strainer is installed.

Oil pressure gauge

- It is used to indicate the oil pressure in the engine.

Oil level indicator

- The level of the oil in the crankcase is checked by dip stick.
- To check the oil level the long stick is dipped into the crankcase and taken out.



Engine Lubricating Troubles

It may be due to

- Failure of oil pump
- Clogged oil lines and oil passages
- Contaminated oil

Maintenance of Lubricating System

- Maintaining Proper oil level.
- Choose proper grade of oil.
- By keeping the breather clean in the sump.

Top Lubricant Companies

1. **Indian Oil corporation Limited – Servo Lubricant**
   Corporate office – New Delhi, India

   Establishment – 1964
   Business – Oil and Gas

2. **Bharat Petroleum Corporation Limited – MAK Lubricant**
   Corporate office – Mumbai, Maharashtra

   Establishment – 1991

   Business – Lubricants, Oil and Gas

3. **Castrol India limited Corporate office** – Mumbai, Maharashtra
   Establishment – 1910
   Business – Motor oil and Lubricant

4. **Shell India markets private limited Corporate office** –
   The Hague, Netherlands
   Establishment – 1907
   Business – Oil, Grease and Lubricants

5. **Gulf lubricants Corporate office** – Gulf Tower, Pittsburgh
   Establishment – 1901
   Business – Lubricants

6. **Valvoline Cummins Ltd Corporate office** – Gurgaon, Haryana
   Establishment – 1866
   Business – Motor oil

7. ExxonMobil Lubricants Private Limited Corporate office – Gurgaon, Haryana

Establishment – 1911

Business – Oil and Gas

ExxonMobil

Energy lives here™

8. GS Caltex India private limited Corporate office – Mumbai, India

Establishment – 1966

Business – Lubricant, Petroleum and Petrochemical

GS Caltex India

9. **ELF India Corporate office** Mumbai, Maharashtra

Establishment – 2003
Business –Lubricants

10. **Tide water oil co India limited Corporate office** –

Kolkata, West Bengal

Establishment – 1928
Business – Lubricants

Indian Oil corporation Limited – Servo Lubricant Grade & Paramaters

Parameters	Servo transtac	Servo unitrac	Servo Tractor oil
SAE GRADE	Transtrac 30	15W-30	20W-40
Kin. Viscosity @ 100ºC, cSt	10 – 10.5	10.0 – 11.0	14.5 – 16.3
Viscosity Index, Min	95	140	110
Flash Point , °C Min	190	200	200
Pour Point, Deg C, Max	(-) 30	(-) 30	(-) 24

THANK YOU