

Different Components of Diesel Power Station

• Fuel Supply System

- In fuel supply system there are one storage tank strainers, fuel transfer pump & day fuel tank.
- Storage tank is a component where oil is stored.

• Strainer :

This oil is then pumped to dry tank, by means of transfer pump. During transferring from main tank to smaller dry tank, the oil passes through strainer to remove solid impurities.

- From dry tank to main tank, there is another pipe connection. This is overflow pipe. This pipe connection is used to return the oil from dry tank to main tank in the event of overflowing. From dry tank the oil is injected in the diesel engine by means of fuel injection pump.

Air Intake System

- This system supplies necessary air to the engine for fuel combustion. It consists of a pipe for supplying of fresh air to the engine. Filters are provided to remove dust particles from air because these particles can act as an abrasive in the engine cylinder.

• Exhaust System

- The exhaust gas is removed from engine, to the atmosphere by means of an exhaust system. A silencer is normally used in this system to reduce noise level of the engine.

Cooling System

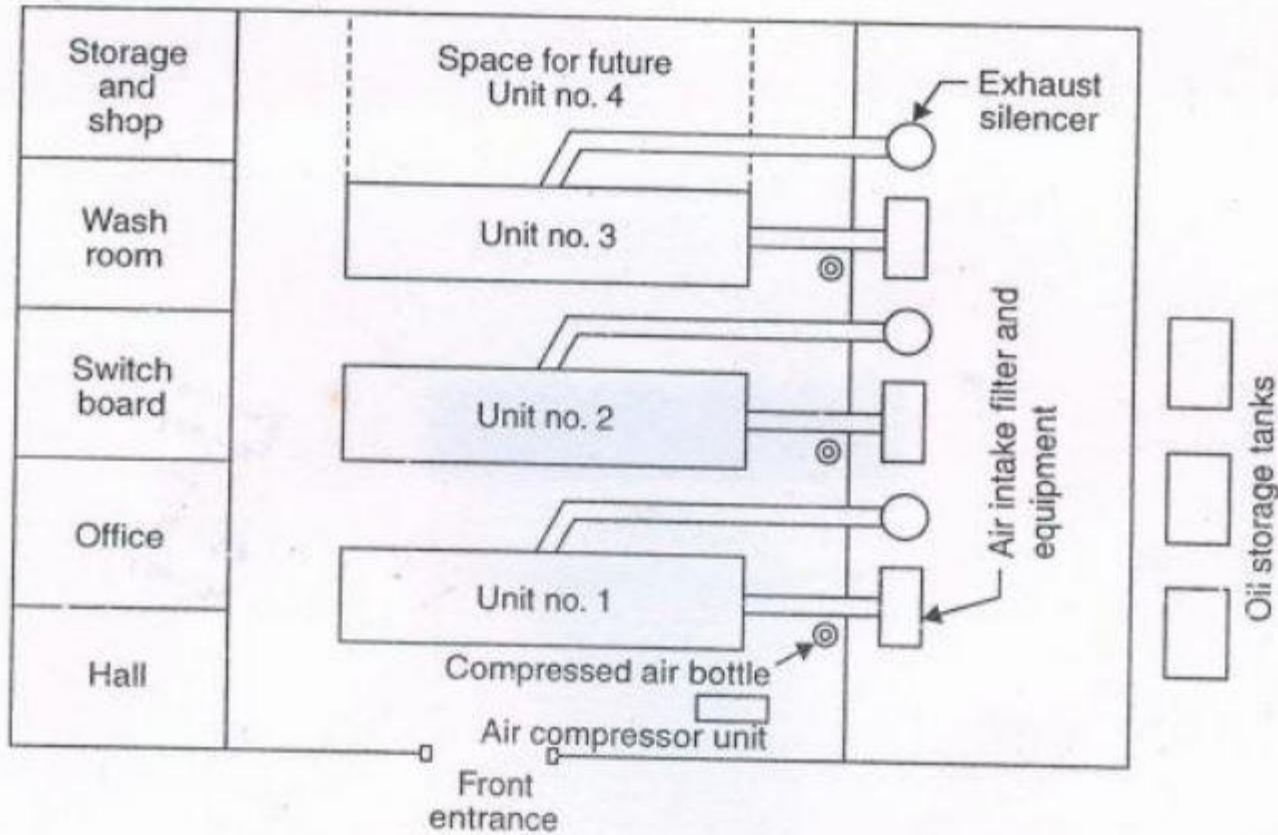
- The heat produced due to internal combustion, drives the engine. But some of this heat raise the temperature of different parts of the engine. High temperature may cause permanent damage to the machine. Hence, it is essential to maintain the overall temperature of the engine to a tolerable level. Cooling system of diesel power station does exactly so.
- The cooling system requires a water source, water pump and cooling towers. The pump circulates water through cylinder and head jacket. The water takes away heat from the engine and it becomes hot. The hot water is cooled by cooling towers and is re-circulated for cooling.

Lubricating System

- This system minimizes the wear of rubbing surface of the engine. Here lubricating oil is stored in main lubricating oil tank. This lubricating oil is drawn from the tank by means of oil pump. Then the oil is passed through the oil filter for removing impurities. From the filtering point, this clean lubricating oil is delivered to the different points of the machine where lubrication is required. The oil cooler is provided in the system to keep the temperature of the lubricating oil as low as possible

LAYOUT OF A DIESEL ENGINE POWER PLANT

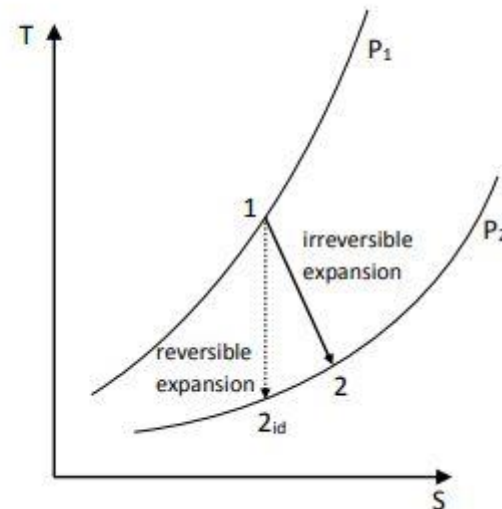
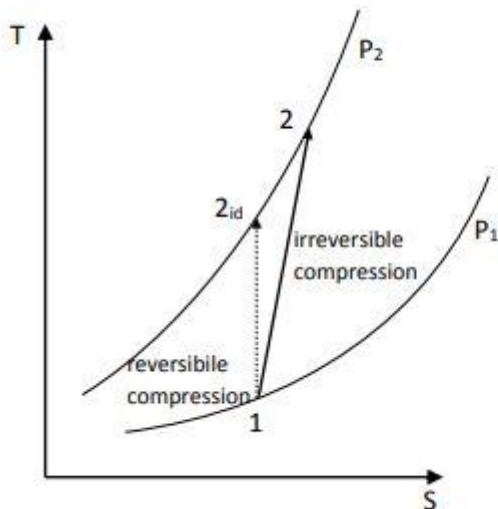
Fig. 4.32 shows the layout of a diesel engine power plant.



THE ISENTROPIC EFFICIENCY FOR GAS TURBO MACHINERY

As we said before turbo machines are adiabatic, if the thermodynamic transformation of the gas in the machines was reversible it would be isentropic. Since the fluid-dynamic friction can never be neglected in fast machines, the real thermodynamic transformation is irreversible with increasing entropy. The isentropic efficiency compares a real machine with an ideal one.

Figure 1 and Figure 2 represent the real (irreversible) and ideal (reversible) transformations for turbines and turbo compressors in temperature-entropy diagrams.





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GENERALITIES ABOUT GAS-TURBINE POWER PLANTS

The purpose of gas-turbine power plants is to produce mechanical power from the expansion of hot gas in a turbine. In these notes we will focus on stationary plants for electric power generation, however, gas turbines are also used as jet engines in aircraft propulsion. The simplest plant is the open turbine gas cycle used to produce electrical power as shown in figure

The net power available on the shaft is transformed into electrical power by the generator while the electrical starter is an electrical engine which is only used when the plant is turned on. The schematic picture of the previous plant, non including electrical starter and generator, is shown in figure

