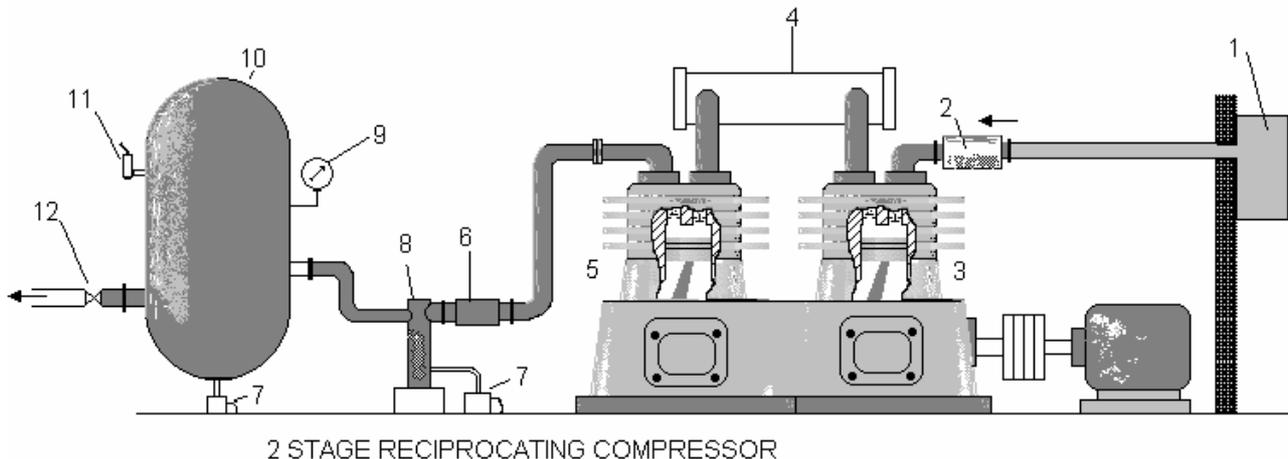


CASE STUDY 2 –RECIPROCATING AIR COMPRESSOR PLANT

START UP and SHUT DOWN PROCEDURE

A large 2 stage reciprocating air compressor installation as shown is part of a factory complex. The compressor is to be taken out of service for maintenance. You are required to produce a list of procedure for taking the compressor out of service, conduct a safety check and then bring it back into service. The compressor is electrically driven and has an inter-cooler (4) and after-cooler (8) with water cooling and drain traps (7). The air receiver is built to conform to national and international standards.



BEFORE DOING ANYTHING

Obtain a permit to work. This would normally be given in a planned maintenance outage so that the rest of the factory is unaffected.

SHUTTING DOWN

Closing down the compressor is basically the reverse of the start up procedure.

- If a standby compressor is to be used, this should be brought on line and then the compressor to be taken out of service should be isolated.
- Place warning notice and use locks to prevent anyone opening isolation valves.
- Vent all air pressures.
- Switch off power source following the recommended method.
- Place notices and use locks to stop anyone reconnecting the electrical supply.
- Close cooling water cocks.
- Open drain traps.

HAZARDS AND SAFETY

Dangers associated with air compressors are as follows.

- Pressure vessels may rupture.
- Oil leaks may burn or cause other accidents.
- Oil in the compressed air may explode.
- Water in the compressed air may damage equipment.

There are many regulations concerning the use, maintenance and inspection of pressure vessels. Vessels must have the safe working pressure marked on them. They must have a pressure gauge and be fitted with an isolating valve. They must also be fitted with a pressure release valve to prevent overpressure.

In particular, with reciprocating compressors, if water accumulates in the cylinder, it may fill the space so completely that it prevents the piston reaching the end of its travel and cause damage to the piston and head.

Oil in the cylinder can explode during compression. Normally the operating pressure is not high enough to produce the temperature required. However, if the outlet becomes blocked (e.g. the valve sticks or the outlet pipe is closed with an isolating valve), then the danger exists.

Oil or water in the air can also cause damage when supplied to some kinds of tools. For this reason a good installation fully conditions the air to remove water, dirt and oil.

The following is a list of precautions to be taken against fires and explosions.

- Avoid overheating.
- Keep discharge temperatures within the recommended limits.
- Keep the deposit formation to a minimum by using the correct lubricant.
- Ensure efficient filtration of the air. This reduces wear on the valves and pistons and reduces deposits of carbonised particles.
- Avoid over-feeding oil to the cylinders.
- Minimise the carry over of oil between stages.
- Avoid high temperatures and low airflow when idling.
- Keep the coolers in good condition.
- Do not use solvents for cleaning or use anywhere near to an installation as the vapour given off can ignite.
- Do not allow naked flames (e.g. smoking) near to an installation when it is opened.

START UP

Depending on the type of system in use, it would be normal to check the following before attempting to start the plant.

- Obtain permission to bring back on line.
- Check that there is sufficient lubricating oil.
- Check filters are not due for replacement.
- Check that the cooling water is flowing at the correct rate.
- Open all drain traps.
- Open inlet and outlet stop cocks.
- Start motor using correct starting procedure for the motor type.
- Close drain traps after blowing out water.
- Reconnect to system and take standby compressor off line if in use.

RUNNING

Once the compressor is running the following should be checked and monitored against the normal values.

- Oil Temperature.
- Air Temperatures.
- Cooling water flow rate and temperature.
- Operating pressure.

The pressure regulating system should be checked for correct working be it a cut out system or a throttling system.