

PHOTOGRAPHS OF CHARTS ON REFRIGERATION

REFRIGERATION (R - 1) VAPOUR COMPRESSION REFRIGERATION CYCLE

High side float valve
High pressure vapour
High pressure liquid
Low pressure vapour
Low pressure liquid

Compressor
Condenser
Throttle valve
Evaporator

VAPOUR COMPRESSION CYCLE ON T-s AND P-h DIAGRAMS

SUPERHEATING AND UNDER-COOLING ON T-s AND P-h DIAGRAMS

REFRIGERATION (R - 2) VAPOUR ABSORPTION REFRIGERATION CYCLE

Generator
Absorber
Condenser
Evaporator
Throttle valve
Pump
Cooling water
Brine

Pure NH_3 high pressure vapour enters the condenser at 1) and leaves the condenser at 2) as saturated NH_3 liquid. It is further throttled to low pressure and enters into the evaporator at 3) and leaves the evaporator as saturated vapour at 4) This vapour is absorbed by the weak NH_3 solution coming from the generator through throttle valve and becomes strong. The strong solution from the absorber is pumped to the generator with the help of pump through heat exchanger where strong solution is heated using weak solution coming out from generator. The strong solution is heated in the generator and then enters the condenser and cycle is completed.

REFRIGERATION (R - 3) WINDOW AIR CONDITIONER

Opening arrangement
Outlet opening
Inlet dampers
Drain
Wet opening

Vapour compression refrigeration cycle is used in window air conditioner. High pressure, high temperature refrigerant gas coming out of compressor is condensed in the condenser using outside air as coolant. The air from the room is passed over the evaporator where it is cooled to required temperature and then discharged in the room itself.

REFRIGERATION (R - 4) GENERAL LAYOUT OF ICE FAC.

Cooling water circuit
Brine circuit
Refrigerant circuit
Water tank
Pump
Air lift
Natural cooling tower
Ice cans
Brine tank
Brine pump

REFRIGERATION (R - 5) REF. AND AIR COND. CONT. - I ELECTRICALLY OPERATED FLOAT CONTROL

From power line
To pump motor
To compressor
From evaporator

This control is used to maintain the water level constant.

HIGH PRESSURE CONTROL

This control is used on the system using water cooled condenser because there is every possibility of sudden water supply failure which increases the discharge pressure rapidly.

LOW PRESSURE CONTROL

Low pressure control is necessary for the following two reasons:
As a safety control and
As a temperature control.

REFRIGERATION (R - 6) REF. AND AIR COND. CONT. - II

CAPILLARY TUBE

The flow of refrigerant can be controlled by capillary tube.

THERMOSTATIC EXPANSION VALVE

It controls the flow of refrigerant through the evaporator in such a way that the quantity of the vapour leaving the evaporator will be always in superheated condition.

AUTOMATIC EXPANSION VALVE

This valve maintains a constant pressure throughout the varying load operation in the evaporator controlling the quantity of refrigerant flowing into the evaporator.

REFRIGERATION (R - 7) DOMESTIC REFRIGERATOR PRINCIPLE OF OPERATION

Capillary
Filter or drier
Evaporator
Accumulator
Compressor
Discharge
Condenser
Receiver

Cold vapour
Ice Box
Heat flows into vapour
Vapour loses heat in pipes outside the refrigerator
Pump circulates vapour through pipes

REFRIGERATION (R - 8) WATER COOLER

Capillary tube
City water
Drain pipe
Condenser
Compressor

Water Coolers work on vapour compression refrigeration cycle. Water is cooled to $6^{\circ}C$ to $8^{\circ}C$ in the water coolers.

Water Coolers are of two types:
1. Instantaneous or pressure type and
2. Storage type coolers.

REFRIGERATION (R - 9) HERMETICALLY SEALED COMPRESSOR

A	Motor Rotor
B	Motor Stator
C	Compressor Cylinder
D	Compressor Pistons
E	Connecting Rod
F	Crank Shaft
G	Crank Throw
H	Compressor Shell

SMITHY (SM - 7) FLATTER AND SET HAMMER

BLACKSMITH'S FINISHING TOOLS

FLATTER

Blacksmiths use tools called flatters and set hammers to finish their work. The use of a flatter helps the blacksmith provide a finishing touch. She places the flatter on the work object and then strikes the flatter using a sledgehammer. This touch helps finish flat surfaces. The set hammer finds use in setting shoulders.

SET HAMMER

Used for setting open square shoulders or similar work.

USE OF A FLATTER

SMITHY (SM - 8) PUNCHES AND DRIFTING

ROUND PUNCH

SQUARE PUNCH

PUNCHING A HOLE

DRIFTING

SMITHY (SM - 9) BLACKSMITH'S WELDS

(A) BUTT WELD

(B) SCARP WELD

(C) WEE OR SPLICE

(D) ENDS PREPARED FOR SCARP WELD

(E) PREPARATION FOR SPLICE WELD

(F) APPLICATION OF SPLICE WELD

SMITHY (SM - 10) HAND FORGING OPERATIONS

CUTTING

SWAGING

UPSETTING

DRAWING DOWN

SMITHY (SM - 11) HAND TOOLS USED IN SMITHY

BLACKSMITH'S CHISEL

FLATTER AND SET HAMMER

SWAGES

DRIFT

FULLERS

FLAT TONG

ROUND PUNCH

SMITHY'S HAMMER