SI UNITS & USEFUL DEFINITIONS

Some of the useful definitions related to the basic refrigeration cycle are shown below:

Saturated Vapour
A vapour which has an element of its liquid form contained in it and is sometimes described as "wet".

Sensible Heat
Sensible heat is where a body or substance has become hotter or colder to the extent that it can be perceived by the senses (ie to the touch), to apreciate if it feels hotter or colder or by sight by observing the change in degrees on a thermometer. Sub cooling of a liquid refrigerant is the result of a reduction of sensible heat.

Latent Heat
Latent heat is the heat that has been absorbed by or given up from a substance where there is no apparent change in temperature. This happens when liquids freeze and boil. For example when water freezes it gives up heat but the thermometer stops at 0°C and when it boils the thermometer stops at 100°C at atmospheric pressure. Latent heat is absorbed in the evaporator and dissipated in the condenser with no difference in temperature thoughout the majority of either.

Evaporating Tempeature
Is the temperature at which liquid turns into a vapour at a given pressure.

Condensing Temperature
Is the temperature at which vapour turns into a liquid at a given pressure.

Boiling Point
Is the temperature at which a liquid turns into a vapour at atmospheric pressure.

Enthalpy
Enthalpy is a measurement of the amount of energy, measured in joules (J) or kilojoules (kJ) contained in 1kg of a substance, and is determined by the temperature and pressure of that substance, calculated from a base reference temperature of 0°C for water and –40°C for refrigerants.

Pressure-Enthalpy Diagram
There is a pressure-enthalpy diagram for each refrigerant. This diagram shows the amount of heat contained in one unit of weight of the refrigerant in its saturated liquid state and also its vapour state at different pressures, their corresponding temperatures, in a scale called enthalpy. In the next issue we will explain how to use pressure-enthalpy diagrams to measure the efficiency of a refrigeration system.

The accepted units of measurement in the refrigeration and air conditioning industries throughout Europe are those that have been harmonised by the International Organisation of Standardisation (ISO). ISO 1000 recommends that the International System of Units (SI) is used.

Temperature
The Kelvin scale (k) is an SI base unit and uses the degree celcius (°C) for its unit.

Pressure
Pascal (Pa)
100kPa = 1 bar

Mass
Kilogram (kg) - base unit

Length
Metre (m) - base unit

Time
Second (s) - base unit

Volume
Cubic metres (m^3)
Litre (l) is a 1/1000th of a cubic metre of water or 1 cubic decimeter (dm^3) which is $1cm^3$

Speed/velocity
Metres per second (m/s)

Mass flow rate
Cubic metres per second (m^3/s)

Density
Density is the ratio of the mass (weight) of a substance compared with its volume
$= \frac{\text{mass}}{\text{Volume}} = \frac{kg}{m^3}$ (kg/m^3)

Energy
Joule (J)

Power
Watt (w) is the equivalent of 1 joule per second
1kW = 1000w = 1000J/s.