W1.2

Latent heat of evaporation, enthalpy, saturated pressure

sr no title symbol unit equation

1 Latent heat of evaporation of water:

it is heat required to change 1 kg of boiling water to 1 kg of steam

temp. of water at boiling ^{o} c	Latent heat of evaporation kcal/kg
0	597.7
10	592
20	586.4
30	580.7
40	574.9
50	569.2
60	563.4
70	557.5
80	551.5
90	545.3
100	**539.1**
150	504.8
200	463.1
250	409.4
300	330.1
350	212.8

2 Enthalpy

enthalpy is heat required to change state of water or ice

enthalpy of liquid	to raise water from 0 ^{o} c to boling point at 100 ^{o} c is	100 kcal/kg
enthalpy of vaporisation	to change kg of water at 100 ^{o} c to steam (latent heat) at 100 ^{o} c	539.1 kcal/kg

enthalpy of fusion — to change 1 kg water into ice at 0 ^{o} c
80 kcal/kg

3 superheated steam — saturated steam has the same temp. as water during evaporation
steam is superheated when all water is evaporated and temp. of steam is raised further

V = 0.591*(T*W)/P – 0.135 W
V= volume of steam in cft
T = absolute temp. (t+460)
P = absolute pressure (psi+14.7)
W= wt.of steam in lbs
P = pressure of steam in lb/ft^2
Q = Heat required in btus

4 saturated steam

temp. in ^{o} c	Pr. kg/cm^2	enthalpy of sat/ steam kcal/kg	sp. Volume m^3/kg
0	0.006	597.7	206.39
10	0.0121	602.2	106.33
21	0.0247	606.6	54.18
38	0.0646	613.3	21.87
60	0.1966	622.7	7.68
82	0.511	631.6	3.14
100	1.0	638.25	1.67
127	2.411	647.7	0.73
149	4.56	654.3	0.404
171	8.03	660.5	0.237
193	13.32	664.9	0.146
232	28.72	668.2	0.069

Source Cement Manufacturers Hand book