Technical

Wattage Calculation Formulas

Wattage Calculation Data

Basic Heating Formulas

The following formulae can be employed in determining wattage capacity required for different materials.

Formula A: Wattage required for heat-up = $\frac{\text{Weight of material (lbs) x Specific Heat x Temperature Rise °F}}{\text{3.412 x Time (Hours of fraction Thereof)}}$

For specific heat and weights of each material being heated, see tables 1, 2, and 3 on pages 145, 146, and 147

Formula B: Wattage losses at operating temperature = Wattage loss/sq. ft. x Area in sq. ft.
See curves on pages 150-151.

Formula C: Wattage for melting or vaporizing = $\frac{\text{Weight of material (lbs) x Heat of fusion or vaporization (BTU/lb)}}{\text{3.412 x Heat up time (Hours of fraction Thereof)}}$

When the specific heat of a material changes at some temperature during the heat-up, due to melting (fusion) or evaporation (vaporization), perform Formula A for heat absorbed from the initial temperature up to the temperature at the point of change, add Formula B, then repeat Formula A for heat absorbed from the point of change to the final operating temperature. See tables 1, 2, and 3 on pages 145-147, for heats of fusion and vaporization and temperatures at which these changes in state occur.

Specific Applications

For specific applications, substitute the Basic Heat Formulas (A, B, or C above) into the following:

To Heat Liquids
Wattage for initial heat-up = (a) + $\frac{(b)}{2}$

Wattage for operating requirements = (a) for new material added + (b)
To insure adequate capacity, add 20% to final wattage figures. This will compensate for added losses not readily computed.

To Melt Soft Metals
Wattage for initial heat-up = (a) to melting point + (c) to melt + (a) to heat above melting point + $\frac{(b)}{2}$

Wattage for operating requirements = [(a) to melting point + (c) to melt + (a) to heat above melting point] for added material + 11. To insure adequate capacity, add 20% to final wattage figures. This will compensate for added heat losses not really computed.

To Heat Ovens
Wattage = (a) (for air) + (a) (all material introduced into oven) + (b)
Add 25% to cover door heat losses

Forced Air Heating

Wattage = $\frac{\text{C.F.M. x temperature rise (°F)}}{3}$

For explanation of Basic Heat Formulas, see examples on pages 142-144.