Time-to-Temperature Calculator

Carbon Steel

Issued May 2000

Time-to-Temperature Equation

$$T = \frac{.00222 \times M \times \Delta T}{P}$$

T = Heating time (minutes)

M = Mass of material to be heated (lb)

ΔT = Change in temperature (°F)

P = Power source output (kW)

STEP 1: Determine part configuration. *(Pipe or flat plate.)*

If pipe: Record pipe outside diameter (O.D.) = _____ in.

Record pipe inside diameter (I.D.) = _____ in.

Record pipe wall thickness = _____ in.

STEP 2: Select appropriate blanket configuration.

(See Induction Heating Blanket spec sheet.)

Record blanket length _____ (in.), width _____ (in.)

STEP 3: Calculate mass of material to be heated.

Pipe: $M = 3.1416 \left[\frac{\text{pipe O.D. \_\_\_\_\_ (in.) + pipe I.D. \_\_\_\_\_ (in.)}}{2} \right] \times$

wall thickness _____ (in.) x blanket width _____ (in.) x .284 = _____ lb.

or

Flat Plate: M = blanket length _____ (in.) x

blanket width _____ (in.) x material thickness _____ (in.) x .284 = _____ lb.

STEP 4: Determine change in temperature.

ΔT = Desired part temp. _____ (°F) - ambient part temp. _____ (°F) = _____ °F

STEP 5: Select power source output.

5 kW power source or 25 kW power source = _____ kW

STEP 6: Substitute variables and calculate time.

$$T = \frac{.00222 \times (\text{STEP 3}) \times (\text{STEP 4})}{(\text{STEP 5})}$$

= _____ **minutes**

Note: All calculated times are based on controlled environmental conditions and are approximate. Actual heating times may vary from the time calculated above.

Miller Electric Mfg. Co.
An Illinois Tool Works Company
1635 West Spencer Street, Appleton, WI 54914 USA
Phone: 920-735-4001 Fax: 920-735-4168

Web Site
www.MillerWelds.com

Time-to-Temperature Equation (Metric)

$$T = \frac{.01038 \times M \times \Delta T}{P}$$

T = Heating time (minutes)

M = Mass of material to be heated (kg)

ΔT = Change in temperature (°C)

P = Power source output (kW)

STEP 1: Determine part configuration. *(Pipe or flat plate.)*

If pipe: Record pipe outside diameter (O.D.) = _____ cm

Record pipe inside diameter (I.D.) = _____ cm

Record pipe wall thickness = _____ cm

STEP 2: Select appropriate blanket configuration.
(See Induction Heating Blanket spec sheet.)

Record blanket length _____ (cm), width _____ (cm)

STEP 3: Calculate mass of material to be heated.

Pipe: $M = 3.1416 \left[\frac{\text{pipe O.D. \_\_\_\_\_ (cm) + pipe I.D. \_\_\_\_\_ (cm)}}{2}\right] \times$

wall thickness _____ (cm) x blanket width _____ (cm) x .00786 = _____ kg

or

Flat Plate: M = blanket length _____ (cm) x

blanket width _____ (cm) x material thickness _____ (cm) x .00786

= _____ kg

STEP 4: Determine change in temperature.

ΔT = Desired part temp. _____ (°C) - ambient part temp. _____ (°C) = _____ °C

STEP 5: Select power source output.

5 kW power source or 25 kW power source = _____ kW

STEP 6: Substitute variables and calculate time.

$$T = \frac{.01038 \times (\text{STEP 3}) \times (\text{STEP 4})}{(\text{STEP 5})}$$

= _____ minutes

Note: All calculated times are based on controlled environmental conditions and are approximate. Actual heating times may vary from the time calculated above.

Miller
The Power of Blue.

Distributed by:

Litho in USA