Calculating Heater Capacity Requirements

Formula

Heater capacity (W) = \( \frac{W}{\text{kg}} \times C \times \text{G} \times C \times (T1 - T2) \)

\( W \): Total weight of the heated section
\( C \): Specific heat (kJ/(kg°C))
\( \text{G} \): Ambient temperature (°C)
\( T1 \): Desired temperature (°C)
\( T2 \): Ambient temperature (°C)
\( C \): Heat capacity coefficient

Example

Suppose that an entire mold is controlled by the heater, and that the weight of the mold is 130 kg, the ambient temperature is 21°C, the target temperature of the mold is 110°C, and heating time is 30 minutes.

The heater capacity that is required for the mold in this case is calculated as follows.

\( W = 130 \text{ kg} \times C \times 0.11 \text{ kJ/kg°C} \times (110 - 21) \)

\( W = 860 \text{ W} \times 0.5 \times 0.5 \)

The heater capacity is 6 kW.

Heater Selection

Suppose a mold size of 230x230 and the outside diameter of the heater to be used as 12.6 ø and its length as 250 mm. The wattage of the MCH12.6-250 is 950 W. Therefore, the required number of heaters would be

6000W ÷ 950W ÷ 6 (heaters).

This was a rather simple example. In actual practice, it is difficult to compute (efficiency); it is necessary to raise (efficiency) by using the heat exchanger and through uniform positioning of the heaters. Generally, a value between 0.2 to 0.5 is appropriate for (efficiency). In addition, please be aware of the fact that

Terminology

Specific heat: With a unit of (kJ/(kg°C)), it is the amount of heat required to raise the temperature of mass m by 1°C within the specified time unit.

If the temperature of a mass m, specific heat \( c \) (kJ/kg°C), subject rises by 1°C, with absorbed heat \( Q \) (kJ), the relationship would be

\[ Q = m \times c \times 1 \]

Dimensions of The Prepared Hole for JIS Tapered Internal Threads

Recommended Value

<table>
<thead>
<tr>
<th>Size</th>
<th>Tapered thread (PT)</th>
<th>Tapered hole (PT)</th>
<th>Recommended value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PT 1/8</td>
<td>13.5</td>
<td>0.54</td>
</tr>
<tr>
<td>2</td>
<td>PT 1/4</td>
<td>13.5</td>
<td>0.54</td>
</tr>
<tr>
<td>3</td>
<td>PT 3/8</td>
<td>13.5</td>
<td>0.54</td>
</tr>
</tbody>
</table>

Tapered External Threads for JIS Tubing – Differences in Appearance Stemming from Processing Methods – (reference data)

1. Thread produced by rolling

Example:

The above photo shows MISUMI MSWT (PT 1/4) screw plug.

2. Thread produced by NC lathes

Example:

The above photo shows MISUMI standard type JPS (PT 1/4) cooling-use plug.

3. Thread produced by dies

Example:

The above photo shows MISUMI long type LPS (PT 1/4) cooling-use plug.

8.5

The Simple Method for Calculating JIS Tapered Internal Threads

\[ Q = \frac{m \times c \times 1}{12} \]

Regarding the after finish processing of tapered internal threads, JIS recommends confirmation

"Using a JIS-standard testing gauge (PT 1/4) –

"Simple Test Method for JIS Tapered Internal Threads" which was researched and developed by MISUMI for use as a guideline for simplified testing following internal thread standards,

"JIS taper plug for use with plastic molds and for cooling use".

Mold Division: MISUMI