■Calculating Heater Capacity Requirements

■Formula

$$\text{Heater capacity }\{kW\} = \frac{W_1(kg) \times C(kcal/m \cdot h \cdot ℃) \times (T1 - T2)}{860 \times h\ (Hour) \times \eta\ (efficiency)}$$

W_1(kg): total weight of the heated section　C(kcal/m・h・℃): specific heat　T1(℃): risen temperature　T2(℃): ambient temperature

860: 1kWh=860kcal　h(Hour): heating time　η (efficiency): an effective percentage contributing to heating

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℃, the target temperature of the mold is 110℃, and heating time is 30 minutes. The heater capacity that is required for the mold in this case is calculated as follows.

$$\frac{130 \times 0.11 \times (110-21)}{860 \times 0.5(h) \times ※0.5} \fallingdotseq 6\ \{kW\}$$

(※Efficiency is assumed to by 0.5.)

W_1=130(kg)
C=0.11(kcal/h・m・℃)
T1=110(℃)
T2=20(℃)
h=0.5(30minutes)
η(efficiency)=0.5

■Heater Selection

Suppose a mold size of 230×270 and the outside diameter of the heater to be used as ϕ12.6 and it's length as 250 mm. The wattage of the MCH12.6−250 is 950W. 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 insulating the heated area 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 (kcal/h・m・℃), it is the amount of heat required to raise the temperature of mass m by 1℃ within the specified time unit.
If the temperature of a mass m, specific heat C(kcal/h・m・℃) object rises by t (℃), with absorbed heat of Q(kcal), the relationship would be
Q=m・C・t

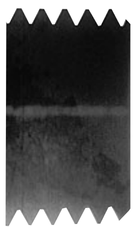
■Tapered External Threads for JIS Tubing—Differences in Appearance Stemming from Processing Methods—(reference data)

①Thread produced by rolling

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

●Processing of external thread by rolling is normally used in mass-production (reference volume: several tens of thousand units).

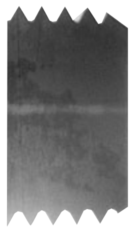
②Thread produced by NC lathes



※The above photo shows MISUMI standard type JPS (PT 1/4) Cooling-use Plug.

●Processing of external thread by NC lathes is normally used in semi mass-production (reference volume: several hundred units and above).

③Thread produced by dies



※The above photo shows MISUMI long type LJPS (PT 1/4) Cooling-use Plug.

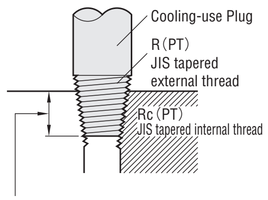
●Processing of external thread by dies is normally used in large-variety, small-Lot production (reference volume: 1 unit and above).

●The appearance of the various types of external threads may differ somewhat depending on the method of production employed; however, all conform to standards for use with JIS tubes (in accordance with JIS screw gauge testing).
Normally, the order of difficulty of hand tightening screws using these tapered threads is ①→②→③, with ① being comparatively the easiest and ③ being comparatively the most difficult to hand tighten. All can be tightened with Allen wrenches without problem using the proper torque.

Note that hand tightening alone may lead to water leakage.

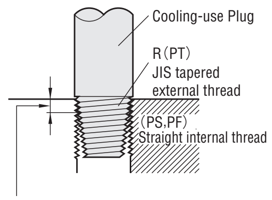
■Explanation of Cooling-use Plug Attachment Threads

○When used with a JIS tapered thread (PT) tap



Threads are seated.

×When used with a JIS straight thread (PS, PF) tap



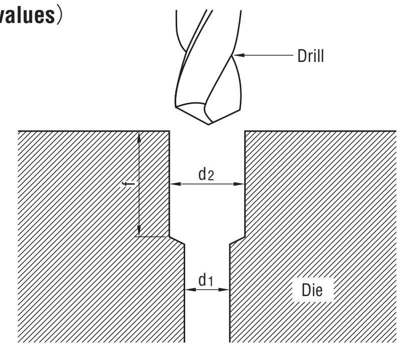
Only a few threads are seated.

- Please tap the thread using a tap meant for JIS tapered thread (PT).
- Please note that tapping the thread with a straight thread tap meant for use with (PS, PF) will result in only several threads being seated when the joint plug is screwed in, as shown in the illustration, which could lead to leakage of water.
- Please note that the (NPT) tapered thread for use with American tubing has a different number of threads than the (PT) tapered thread for use with JIS tubing, making them completely incompatible.

■Dimensions of The Prepared Hole for JIS Tapered Internal Threads (reference values)

Size (No.)	Tapered thread (PT)	Prepared hole depth (f)	Prepared holediameter-recommended value (d_2)	① Unsuitable / ② Dangerous / ③ Optimum / ④ Dangerous / ⑤ or greater
1	PT 1/8	17 or greater	8.5	Recommended value: 8.0 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8
2	PT 1/4	25 or greater	11.4	Recommended value: 10.8 10.9 11.0 11.1 11.2 11.3 11.4 11.5 11.6 11.7
3	PT 3/8	25 or greater	14.9	Recommended value: 14.2 14.3 14.4 14.5 14.6 14.7 14.8 14.9 15.0 15.1 15.2

①Unsuitable: Unsuitable for setting up the tap because the prepared hole is too small.
②Dangerous: Damage to the tap when setting it up occurs with great frequency because the prepared hole is small. Setting up the tap requires a high level of skill and technique, and painstaking care; because of the danger, therefore, this cannot be recommended.
③Optimum: The prepared hole is the ideal size for tapping.
④Dangerous: It is not possible to tap a thread that conforms to JIS standards because the prepared hole is large; and the probability of water leakage problems occurring is high. Setting up the tap requires a high level of skill and technique, and painstaking care; because of the danger, therefore, this cannot be recommended.
⑤Unsuitable: Unsuitable for setting up the tap because the prepared hole is too large.
※Sizes at which problems occur at a high frequency rate, even when tapped by a skilled technician exercising painstaking caution, have been classified "unsuitable," although they may fall within the realm of theoretical possibility.



Prepared internal thread hole diameter (d_2) ≧ Water hole diameter (d_1)

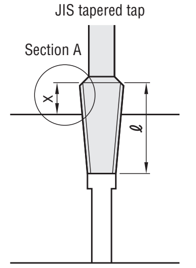
Regarding dimensions of prepared holes for internal threading, JIS recommends "setting prepared hole dimension based on thread seating," but does not delineate a recommended value for the hole.
"Dimensions of the Prepared Hole for JIS Tapered Internal Threads" are values that MISUMI has investigated and prepared on its own, using plastic mold/cooling-use plug female screw joint threading as a point of reference.

Mold Division, MISUMI.

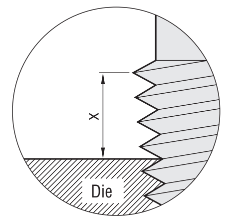
■Simple Test Method for JIS Tapered Internal Threads (reference data)

Size (No.)	Tapered thread (PT)	JIS Tapered Tap Blade Length (ℓ) (from JIS B4446): Regular Type (for long threads)	Short-Thread Type (for short threads)	x
1	PT 1/8	19	16.5	6±1.13
2	PT 1/4	28	19.5	7±1.67
3	PT 3/8	28	21.0	7±1.67

JIS tapered tap



Detailed view of section A



- It is possible to confirm that the amount of thread-cut is proper and that the thread is in conformance with JIS standards, where a JIS-standard (B4446) tapered tap is used to achieve a condition in which dimension x is left from the maximum diameter of the tap thread ridge.
- Dimension x is the same, regardless of whether a regular or short JIS-type tapered tap is used. Please note that use of a tapered tap with a blade length (ℓ) that does not conform with JIS standards may result in a change in dimension x. For details, please consult the user's manual, catalog and other material for the tap you are using.

※If dimension x is long, the amount of the tap thread-cut will become small. Please note that this will result in a smaller thread-seating area, which may result in water leakage. Note that screwing in the male threaded screw too tightly may damage the threads and result in water leakage.
※If dimension x is short, the amount of the tap thread-cut will become large. Note that this will result in the internal thread becoming wider than JIS standards, which may result in water leakage.
※Dimension x can be used as a guide for tap thread-cut dimensions; however, we recommend for safety's sake that you inspect and test after tapping.

Regarding testing after finish processing of tapered internal threads, JIS recommends confirmation "using a JIS-standard testing gauge (B0253)."
"Simple Test Method for JIS Tapered Internal Threads" was researched and developed by MISUMI for use as a guideline for simplified testing following internal thread-cut processing of joint plugs for use with plastic molds and for cooling-use.

Mold Division, MISUMI.