



# THERMAL PIN™

## HEAT CONDUCTORS

for

**The Original  
Just Got  
BETTER**

INJECTION MOLDING

BLOW MOLDING

ROTATIONAL MOLDING

EXTRUSION MOLDING

THERMOSET



**NOREN PRODUCTS, INC.**

1010 O'Brien Drive Menlo Park, CA 94025

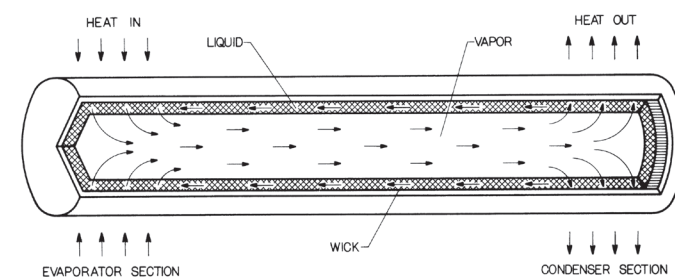
[www.norenproducts.com](http://www.norenproducts.com) (650) 322-9500

**TOLL FREE (866) 93NOREN**

# THERMAL PIN™ HEAT CONDUCTORS

## WHAT IS THE NOREN THERMAL PIN™ HEAT CONDUCTOR?

A **THERMAL PIN** is an extremely efficient thermal conductor. Typically, a **THERMAL PIN** consists of a sealed container (usually copper), a wicking structure, and a working fluid. The wicking material provides a capillary effect which allows fluid to travel along the wall of the container. The working fluid, under its own pressure, enters the pores of the capillary material, wetting all internal surfaces. Applying heat at any point along the surface of the **THERMAL PIN** causes the liquid at that point to boil and enter a vapor state. When that happens, the liquid picks up the latent heat of vaporization. The gas, which then has a high pressure, moves inside the sealed container to a colder location where it condenses. Thus, the gas gives up the latent heat of vaporization and moves heat from the input to the output end of the heat pipe. The condensed fluid travels back along the wick and repeats the process. **THERMAL PINS** have an effective thermal conductivity significantly greater than that of copper, while weighing far less. **THERMAL PINS** can be built in almost any size and shape.

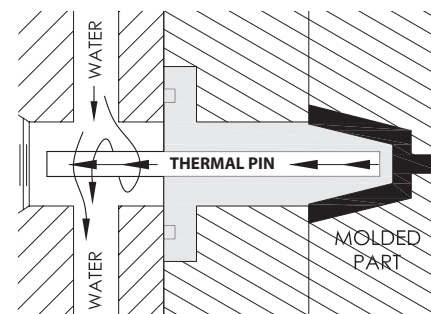


One thousand times more conductive than copper of the same weight, **THERMAL PINS** conduct large volumes of thermal energy away from the heat source. The **THERMAL PIN** design is so simple and efficient that its cooling is advantageous for maintenance retrofits as well as the OEM production applications.

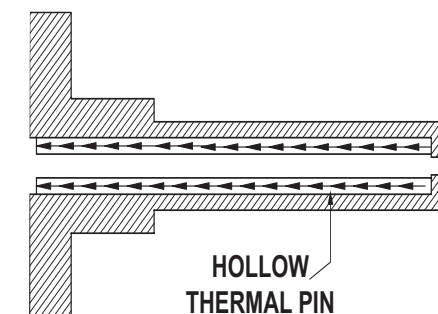
- Reduce Cycle Time
- Improve Part Quality
- Cut Molding Costs

- Eliminate Scale and Plugging
- Upgrade Molds
- Easy to Use

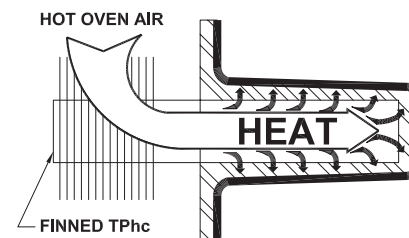
### FOR INJECTION MOLDING



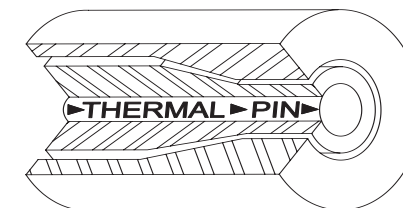
### FOR BLOW MOLDING



### FOR ROTATIONAL/RUBBER MOLDING



### FOR EXTRUSION



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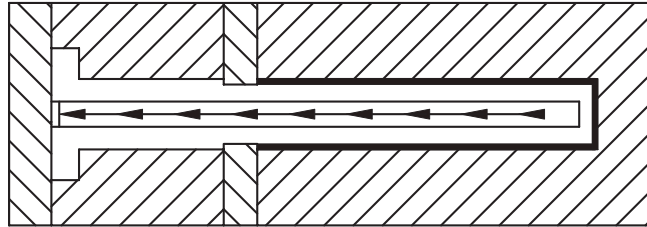
**CALL US TODAY AND SPEAK  
WITH OUR APPLICATION ENGINEERS  
REGARDING YOUR JOB!**

**COOL CORES FASTER & BETTER THAN WATER**

## COOL MOLDS FAST TO REDUCE CYCLE TIME

Because **THERMAL PIN** heat conductors always transfer heat towards the cooler end:

- In **small cores**, you can cool to a water channel in areas that had previously been inaccessible to water cooling.
- In **solid cores**, you can draw heat from the plastic to the mold base or to remote water channels. Most solid core applications pay for themselves in 4 to 12 weeks.



- In **blow molding**, the hollow **THERMAL PIN** heat conductor uniformly cools the end of the blow pin. Hollow **THERMAL PIN** heat conductors evenly cool the necks of blow molded bottles.

## LEVEL HOT SPOTS TO IMPROVE PART QUALITY

Because **THERMAL PIN** heat conductors are virtually isothermal, not only do they transfer heat fast, they do it evenly. They eliminate hot spots which cause sink marks, pulling and spotting.

## ELIMINATE SCALE AND PLUGGING TO REDUCE MAINTENANCE COSTS

Scale often plugs up the small diameter water channels going into the core. You don't need these narrow water channels when you use **THERMAL PIN** heat conductors.

## ELIMINATE WATER LINES TO REDUCE TOOLING COSTS

Rather than use a bubbler, which requires two sets of water lines, use **THERMAL PIN** heat conductor which need only one.

## TRANSFER HEAT WHERE YOU NEED IT TO REDUCE CYCLE TIME ON THERMOSETS

For example, finned **THERMAL PIN** heat conductors transfer heat into rotational and rubber molds to heat the plastic more quickly and evenly, regardless of variations in mold thickness.

## THERMAL PIN™ heat conductor TYPES AVAILABLE

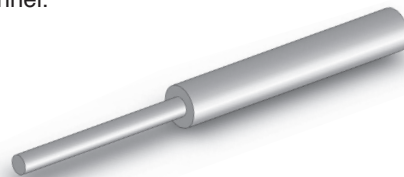
The **STANDARD TPhc** can be easily installed in round holes, in cores or cavities. Stock diameters begin at 5/64 inch. Lengths vary from 1 ½ to 18 inches. Metric diameters are available. Any special lengths can be ordered.



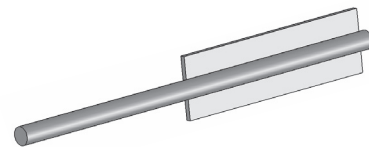
The **HOLLOW TPhc** should be installed where access through the core or a mold part is required for a blow hole in blow molding applications or for vending cores. Ejector pins and control rods can easily fit through the ID. This type is available in sizes from ¼ to ¾ inch O.D. and is made to order.



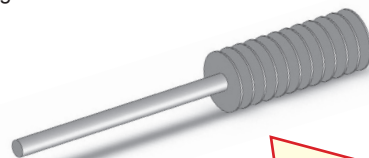
The **STEPPED TPhc** will fit into cores with small diameter tips. It provides a higher capacity than the **STANDARD THERMAL PIN** heat conductor because of its larger protrusion into the coolant channel.



The **BAFFLED TPhc** has an integral water baffle on it which makes it ideal for retrofitting into cores. The baffle greatly enhances heat transfer and allows more freedom in the design of water passages.



The **FINNED TPhc** has an integral cooling fin stack designed for either water or air cooling. It is ideal for retrofitting and slides. Round, square and rectangular fins are available.



**THOUSANDS OF THERMAL PINS IN STOCK**

The following guidelines are designed to point you in the right direction for using **THERMAL PIN™** heat conductors (TPhc's), but they are only guidelines. Changes in one variable can be used to offset problems you encounter meeting the specifications in the guidelines. Please call our sales engineers if you have any questions.

## COOL SMALL CORES

If you are cooling a small core, you should consider using a **Stepped TPhc** to allow maximum insert into the core AND maximum heat output through the water channel. The larger OD should be less than two times the smaller OD.

Another way to cool a small core is to make it a **THERMAL PIN core**. Rather than installing a TPhc into the core, we fill the core itself. The extension cap provides maximum heat transfer to the water channel. Where possible, you should install TPhc's rather than have your cores filled. TPhc's cost less and installation generally takes less time.

## OPERATE TPhc's IN A HORIZONTAL ORIENTATION OR TILTED WITH THE HEAT INPUT AT THE BOTTOM

TPhc's are usually installed so that they will operate in a position which is parallel to the floor, as is typical in injection molding. The TPhc's heat-carrying capacity can be increased by as much as 360% by situating it in a vertical position with the heat input at the bottom. Conversely, heat introduced at the upward end reduces the TPhc's effectiveness. The extent of that reduction depends on the distance that the heat must travel downward. That distance should be 6 inches or less. When ordering specify "Positive Lift" type. **TIP:** You can get extra performance out of your TPhc's by tipping the core so that the heat output end is higher than the input.

## COOL THE TPhc WITH WARM COOLANT

TPhc's work best when the coolant is between 60°F and 110°F and often higher. (Die casters can set the temperature of the coolant as high as 190°F.) For best results, start with the temperature high and then work down. Call our sales office if you need to run chilled coolant.

Model TPhcB - For chiller molds 30° to 70°F Water Temperature (400°F Max).

Model TPhcS - For tower / thermolated molds 70° to 190°F Water Temperature (400°F Max).

Model TPhcD - For any 400°F to 600°F application.

	5/64"	3/32"	1/8"	5/32"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"
1 1/2"	.078X1.50	.093X1.50	.125X1.50	.156X1.50	.187X1.50					
2"	.078X2.00	.093X2.00	.125X2.00	.156X2.00	.187X2.00	.250X2.00	.312X2.00	.375X2.00	.437X2.00	.500X2.00
2 1/2"	.078X2.50	.093X2.50	.125X2.50	.156X2.50	.187X2.50	.250X2.50	.312X2.50	.375X2.50	.437X2.50	.500X2.50
3"	.078X3.00	.093X3.00	.125X3.00	.156X3.00	.187X3.00	.250X3.00	.312X3.00	.375X3.00	.437X3.00	.500X3.00
3 1/2"	.078X3.50	.093X3.50	.125X3.50	.156X3.50	.187X3.50	.250X3.50	.312X3.50	.375X3.50	.437X3.50	.500X3.50
4"	.078X4.00	.093X4.00	.125X4.00	.156X4.00	.187X4.00	.250X4.00	.312X4.00	.375X4.00	.437X4.00	.500X4.00
4 1/2"	.078X4.50	.093X4.50	.125X4.50	.156X4.50	.187X4.50	.250X4.50	.312X4.50	.375X4.50	.437X4.50	.500X4.50
5"	.078X5.00	.093X5.00	.125X5.00	.156X5.00	.187X5.00	.250X5.00	.312X5.00	.375X5.00	.437X5.00	.500X5.00
5 1/2"	.078X5.50	.093X5.50	.125X5.50	.156X5.50	.187X5.50	.250X5.50	.312X5.50	.375X5.50	.437X5.50	.500X5.50
6"	.078X6.00	.093X6.00	.125X6.00	.156X6.00	.187X6.00	.250X6.00	.312X6.00	.375X6.00	.437X6.00	.500X6.00
6 1/2"		.093X6.50	.125X6.50	.156X6.50	.187X6.50	.250X6.50	.312X6.50	.375X6.50	.437X6.50	.500X6.50
7"		.093X7.00	.125X7.00	.156X7.00	.187X7.00	.250X7.00	.312X7.00	.375X7.00	.437X7.00	.500X7.00
7 1/2"			.125X7.50	.156X7.50	.187X7.50	.250X7.50	.312X7.50	.375X7.50	.437X7.50	.500X7.50
8"			.125X8.00	.156X8.00	.187X8.00	.250X8.00	.312X8.00	.375X8.00	.437X8.00	.500X8.00
8 1/2"			.125X8.50	.156X8.50	.187X8.50	.250X8.50	.312X8.50	.375X8.50	.437X8.50	.500X8.50
9"			.125X9.00	.156X9.00	.187X9.00	.250X9.00	.312X9.00	.375X9.00	.437X9.00	.500X9.00
10"			.125X10.0	.156X10.0	.187X10.0	.250X10.0	.312X10.0	.375X10.0	.437X10.0	.500X10.0
12"				.187X12.0	.250X12.0	.312X12.0	.375X12.0	.437X12.0	.500X12.0	
18"					.250X18.0	.312X18.0	.375X18.0	.437X18.0	.500X18.0	

Any diameter or length readily available, including metric.

Any stock diameter readily available in any length in two weeks.

Stepped, baffled, finned, hollow and flat type available.

Ultra HI Temp models to 700°F+ are also available.

**DETERMINE AND SPECIFY A TPhc TO THE FINAL SIZE AND CONFIGURATION. DO NOT MACHINE, CUT OR BEND TPhc's OR CORES AFTER TPhc's HAVE BEEN INSTALLED.**

Noren Products can supply you with the size you need (including metric and undersized) and the shape you want, e.g., bend or flattened. You should also be aware that you cannot mold onto TPhc's or apply force against them. If you need to rework your cores, we can advise you about the necessary procedures.

## ORDER THE RIGHT TEMPERATURE RANGE

The maximum "operating temperatures" of standard TPhc's are 400°F or 600°F. "Operating temperature" is dependent on the following temperature: injection, melt, mold surface and coolant. The TPhc can therefore be exposed to temperatures higher than the maximum operating temperature. If the TPhc overheats, it releases a small amount of non-toxic gas and becomes inoperative.

The 400°F TPhc covers the temperature range for most plastics processing. Die casting requires the 600°F TPhc. Please call if you have an application for a THERMAL PIN heat conductor for higher temperatures.

## FREE DESIGN REVIEW:

We will review your drawings and give you our recommendations **FREE OF CHARGE.**

## TO ORDER:

Refer to our size list and call for a quote. The size list includes only stock and standard sizes. Other sizes and types of TPhc's are available.

## INSTALLATION METHODS

The KOOL-FLOW solder contains a metal alloy and flux for soldering in the **THERMAL PIN™** heat conductor (TPhc™) at a low temperature.

**ADVANTAGES:** It gives the best possible thermal joint for fast heat transfer and, therefore, the fastest and most even cooling.

**THERMAL RESISTANCE:** 0.633 (°C) (in.)/w

**REMOVAL:** You can easily remove the TPhc by desoldering slowly.

The Noren Thermal Paste contains a silver or copper metal loaded thermal compound.

**ADVANTAGES:** The thermal joint to the TPhc is good if it is properly installed. You can remove the TPhc quickly and easily.

**THERMAL RESISTANCE:** 33 (°C) (in.)/w

**REMOVAL:** Remove the TPhc by pulling it out.

For completion, the resistance of silicon (thermal grease) is 54(°C) (in.)/w. For this reason, we do not normally recommend it for installation. Powder metal and epoxy is also not recommended.

**FACTORY INSTALLATION** is available. The core you send should be drilled out and ready for installation. Call us before making any modification to your cores.

Both of the methods mentioned above require a hole drilled .005" to .020" oversized, depending on the method of installation. Detailed instructions for installation and removal come with the installation materials.

**DIE CASTING APPLICATION** requires that the TPhc be ream-fitted into the hole where it's installed. The ream fit alone gives you the thermal conductivity you need since the copper shell of the TPhc expands faster than the mold. Drill for a ream fit after you have received and sized the TPhc's.

**CONVERT YOUR CORES TO THERMAL PIN** cores. Noren Products can fill your cores with the working fluid used in TPhc's. This process is particularly beneficial in cooling cores that are too small for TPhc installation or which have an odd size hole. Please contact us for instructions on preparing your cores for filling.