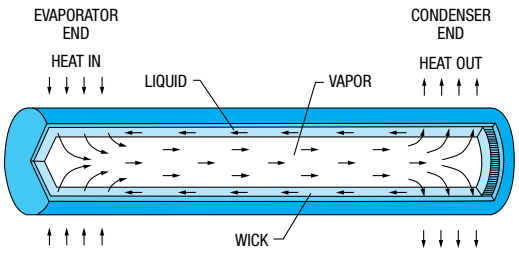
Heat Pipes

How and where heat pipes work

The D-M-E Heat Pipe is a heat transfer device specifically designed for optimal performance in plastic injection molds. It consists of a vacuum-tight copper tube containing a wick and a non-toxic working fluid. One end of the heat pipe is an evaporator, the opposite end is a condenser. Thermal energy is gathered at the evaporator end, vaporizing the working fluid. This vapor then travels through the Heat Pipe to the condenser end. At the condenser end the vapor condensates back into a liquid, giving up its latent heat in the process. To complete the cycle the condensed liquid then travels along the wick, via capillary action, back to the evaporator section. This process repeats itself continuously, transferring heat many times faster than pure copper.

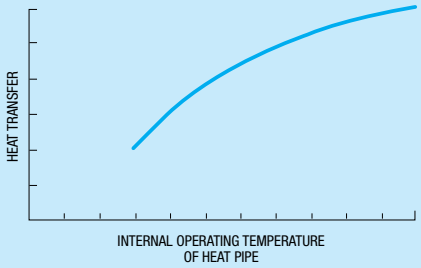
How heat pipes are used

Available in a variety of standard lengths and diameters, D-M-E Heat Pipes are used in cores, core slides, cavities and other areas of a mold or die requiring cooling or controlled temperatures. Commonly used in place of bubblers, baffles, fountains or blades, Heat Pipes transfer heat rapidly to the coolant, rather than requiring the coolant to flow into the heated area. They are also used to transfer heat to a cooler portion of the mold (which serves as a heat sink) or to open air, thereby permitting cooling of otherwise inaccessible areas and eliminating potential coolant leakage.



Standard injection molding heat pipes

The standard line of Heat Pipes for injection molding includes both a low-temperature (TPL) and a high-temperature (TPH) series. The TPL Series works most efficiently between the temperatures of 40° and 200°F with a coolant temperature of approximately 60° to 80°F, and the TPH Series between 150° and 400°F with a coolant temperature of approximately 90° to 110°F. The sealed end of each heat conductor is color-coded (BLACK for the TPL Series and WHITE for the TPH Series). Selection of the appropriate series is based on the application's melt, mold surface and coolant temperatures to which the Heat Pipe will be subjected.



MAXIMIZING EFFICIENCY WITH WARM COOLANT
Heat Pipes work best when the coolant is between 60° and 110°F, and sometimes higher. The graph illustrates how the Heat Pipe's heat transfer capability is dependent upon its internal operating temperature. It is best to start with the coolant temperature high, then reduce it if necessary.

Benefits of heat pipes

Cool molds faster and reduce cycle time

The Heat Pipe's ability to cool molds faster and thus reduce cycle time is due to a number of factors. First, waterlines throughout the entire mold can be larger in diameter, permitting a higher coolant velocity, which transfers heat faster. Second, the larger volume of fluid flowing through the waterline results in a lower overall coolant temperature rise, so that the last Heat Pipe in the system will transfer heat as efficiently as the first. Third, the extension of the Heat Pipe into the waterline promotes turbulent flow, which transfers heat faster than laminar flow. Fourth, the ability to transfer heat away from inaccessible areas improves the overall cooling rate and reduces cycle time, even if extension into a remote waterline is impractical or impossible.

Improve Part Quality

As the Heat Pipe transfers heat to the coolant, air or mold component, it also dissipates heat evenly along its entire length. This isothermal action provides faster and more uniform cooling, thus eliminating hot spots, which cause sink marks, pulling and spotting.

Simplify Mold Design and Lower Costs

With Heat Pipes, waterline design is greatly simplified since coolant flow into the heated area of the mold is not required. In addition, the ability to locate heat conductors in areas inaccessible to other cooling devices can further simplify the overall mold design. In most cases, the machining and construction time required for the mold is reduced, lowering moldmaking costs.

Heat Pipes

Reduce Maintenance and Operating Costs

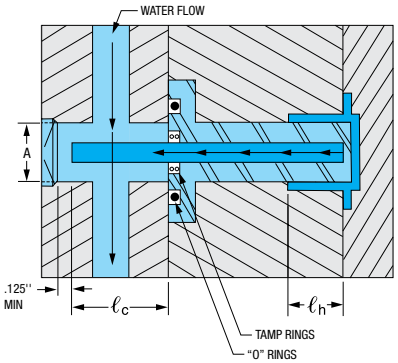
The increased waterline diameter, coolant velocity and heat capacity effectively eliminate scale formation, calcium deposits and the plugging up of small waterlines and ports. In addition, Heat Pipes operate in any coolant without corroding.

Upgrade Existing Molds and Dies

Heat Pipes effectively solve cooling, cycle time or part quality problems in existing molds. They can be retrofitted as replacements for bubblers or baffles and to provide heat transfer in previously uncooled areas.

Salvage Damaged Molds and Dies

In certain applications, Heat Pipes can even be used to salvage or repair molds that would otherwise have to be scrapped or extensively reworked.



Selecting the right size, shape and temperature range

The standard diameters, lengths and temperature ranges of TPL and TPH Series Heat Pipes will satisfy most applications.

TPL & TPH SERIES	TOLERANCES
DIAMETER (O.D.)	±.004
LENGTH	±.020

NOTE: Heat Pipes cannot be used as ejector pins and parts cannot be molded or cast against them. Also, Heat Pipes cannot be cut, machined, bent or plated. If a special size is required, contact D-M-E to discuss your application.

QUANTITY DISCOUNTS:
Discounts for all Heat Pipe sizes and series apply to current net prices.

8 to 20 . . . . . Less 5%
21 to 35 . . . . . Less 10%
36 to 60 . . . . . Less 15%
71 or more Quoted by request

QUANTITY DISCOUNTS:
(Heat Transfer Compounds)
Discounts apply to current net prices.

2 to 5 . . . . . Less 5%
6 to 9 . . . . . Less 10%
10 or more . . . . . Less 15%

Quantities of silver and copper compound may be combined for discounts.

TPL and TPH heat pipes for injection molding

For low-temperature Heat Pipes (40°-200°F) use TPL (color-coded BLACK) as a prefix in front of item number in the chart below. For high-temperature Heat Pipes (150°-400°F) use TPH (color-coded WHITE) as the prefix.
Examples: TPL8-600; TPH6-500.

LENGTH (INCHES)	TPL & TPH DIAMETER & ITEM NUMBER					
	1/8	3/16	1/4	5/16	3/8	1/2
3	4-300	6-300	8-300	10-300	12-300	16-300
4	4-400	6-400	8-400	10-400	12-400	16-400
5	4-500	6-500	8-500	—	—	—
6	4-600	6-600	8-600	10-600	12-600	16-600
7	4-700	6-700	8-700	—	—	—
8	4-800	6-800	8-800	10-800	12-800	16-800
10	—	—	—	10-1000	12-1000	16-1000
12	—	—	—	—	—	16-1200

Silver heat transfer compound* – HTC-06S

For TPL and TPH Series Heat Pipes

ITEM NUMBER
HTC-06S

Contains micronic particles of silver to provide a thermal resistance of 4.75°C in/watt. The compound is supplied in a 5cc plastic syringe. (D-M-E recommends the Silver Heat Transfer Compound because it has eight times lower thermal resistance than the copper equivalent.)

Copper heat transfer compound* – HTC-30C

For TPL and TPH Series Heat Pipes

ITEM NUMBER
HTC-30C

Contains micronic particles of copper to provide a thermal resistance of 38°C in/watt. The compound is supplied in a 5cc plastic syringe.

* For .125" diameter Heat Pipes, do not use applicator tube supplied with Heat Transfer Compound. Apply desired amount of compound directly into core hole.

Tamp ring sets – TARS

Each set includes 32 silver alloy tamp rings (enough for installing 16 Heat Pipes) and one hollow tamping tube. Select the required tamp ring set by its I.D. to match the O.D. of the Heat Pipe being used.

ITEM NUMBER	TARS-04	TARS-06	TARS-08	TARS-10	TARS-12	TARS-16
RING I.D.	1/8	3/16	1/4	5/16	3/8	1/2