



THERMAL MANAGEMENT FOR MOLDING APPLICATIONS

As the demand for faster processing capability drives the industry to stay competitive, seconds off cycle times can result in considerable savings and increased efficiency. But thermal issues within injection molds often lead to poor quality and reduced productivity. The key to greater profitability is to address these thermal

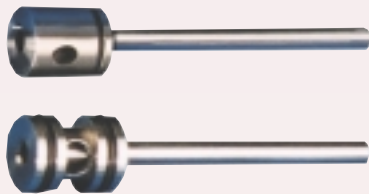
issues with higher performance solutions to help decrease cycle times and keep production costs low. Thermacore offers a complete line of thermal solutions such as Isopipes and Isojets for the mold industry designed to provide installation simplicity, ensure long life and maintain a strong competitive edge.

Commercial Applications



ISOPIPES

Thermacore Isopipe products are high-performance heat pipes specially crafted for use in molding applications. Isopipes provide highly efficient heat transfer capability to either move heat from the source to the sink or to isothermalize sections of a mold/tool. Isopipes can be utilized to solve thermal-related quality problems, reduce cycle times and lower water consumption.



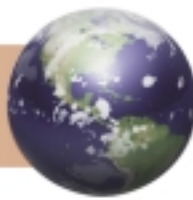
ISOJETS

The Thermacore Isojet provides effective spot cooling in many molding applications. Constructed from stainless steel, Isojets direct high velocity turbulent coolant to problematic hot spots. They are easy to install and provide a variety of thermal solutions.



ISOPLUGS

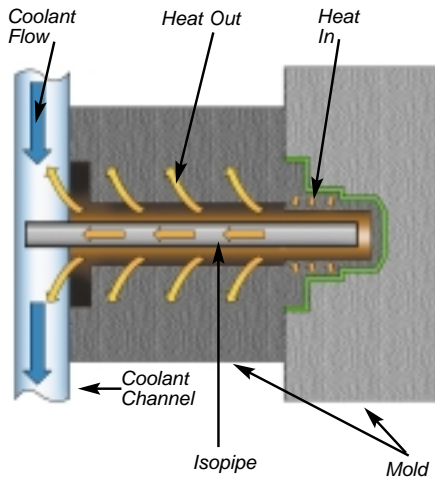
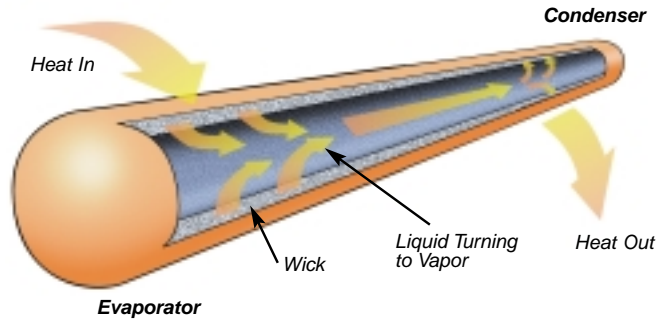
Thermacore Pressure Plugs are used to seal cooling channels within new and existing molds. The plugs are available in several sizes ranging from 6mm to 16mm. Made from high-quality precision brass and stainless steel, Pressure Plugs can be quickly installed and removed by a common screwdriver.



Heat Pipe Technology

A heat pipe is a two-phase heat transfer device with an extremely high effective thermal conductivity. Heat pipes can be circular or planar, and the inner surface is lined with a capillary wicking material. The heat pipe is evacuated and back-filled with a small quantity of a working fluid such as water, acetone or methanol.

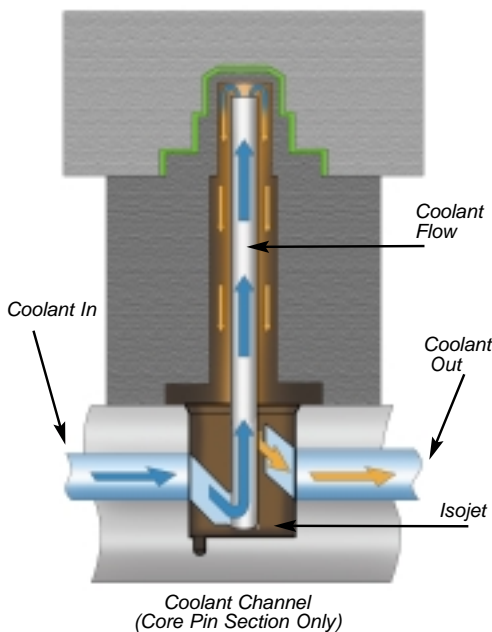
Heat pipes have a lower total thermal resistance than solid conductors enabling them to transfer heat more efficiently and evenly. They are totally passive heat transfer systems having no moving parts to wear out and requiring no energy to operate. Heat pipes offer the design engineer low-cost packaging flexibility because they can be manufactured in a number of shapes and sizes. Their light weight and compact size also make them the ideal choice for limited space situations.



Isopipe Cooling

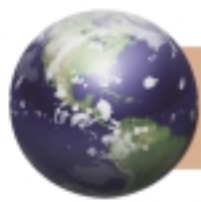
The Isopipe is a heat pipe used to cool (or heat) mold tools by using its very high thermal conductivity to transport heat from one end of the Isopipe to the other. The heat picked up from the mold is dissipated from the Isopipe by cooling water that is passed over the exposed end of the Isopipe, allowing the vapor inside the pipe to condense.

The liquid/vapor phase changes within the Isopipe allow large levels of thermal energy to be absorbed, transferred and rejected with a maximum temperature difference of only 5°C along the outer sheath.



Isojet Cooling

The Isojet directs high velocity turbulent coolant from a manifold system using a fountain design. Liquid is directed to the tip of the core pin for efficient heat removal and returned to the manifold body via an annular gap between the fountain tube and the core-pin hole. The Isojet plugs into the main coolant manifold plate and can accommodate a variety of coolant channel drilling configurations, including series and parallel layouts.



ISOPIPES



Isopipes

The Isopipe is an extremely effective method of cooling mold cores using heat pipe technology. It is a thermal super-conductor that passively transfers heat from the core into the body of the tool where adequate water-cooling is available. The Isopipe can also be used to isothermalize areas of a mold/tool since it is a near-perfect thermal conductor.

The Isopipe reduces high tooling costs associated with standard water circulation systems, and it eliminates the blockage of passageways due to contamination. The Isopipe works better than unchilled water because its power handling increases as temperatures rise. An Isopipe is isothermal, therefore it eliminates cold spots due to over-cooling when chilled waters are used. The Isopipe is an ideal replacement for fountains and cascades, and it can even be used in cracked molds because water never enters the cavity area. Isopipes are available in two operating temperatures: to 250°C and to 350°C.

BENEFITS:

- Fast cycle times
- More flexibility in product design
- Easy to install
- No sink marks
- Reduced tooling and operation costs
- Less waste and maintenance
- Simplifies tool construction
- Lower water consumption
- Can be used to heat, as well as cool, core-pins
- Uniform cooling

ISOPIPE SPECIFICATIONS:

Material: Copper

Finish: Tin Plate

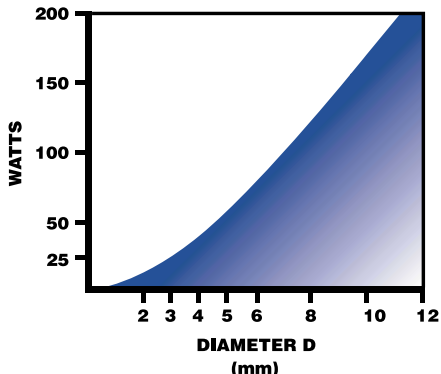
Diameter: + 0.0/0.004" // +0.0/-0.10mm

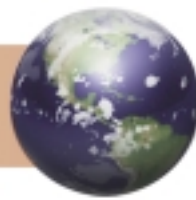
Length: +0.0/-0.02" // +0.0/-0.50mm

APPLICATION & INSTALLATION TIPS:

- Use the largest diameter possible.
- Utilize Isopipes to cool core pins and decrease cycle time.
- For molten aluminum applications, please call Thermacore for assistance.
- Use caution in choosing a system's operating temperature.
- Be careful when estimating the Isopipe operating temperature. If the estimated operating temperature is above 300°C, please contact Thermacore for assistance.

Maximum Heat Transport
Vs. Diameter



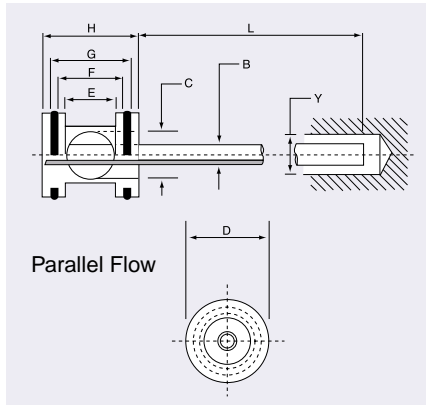
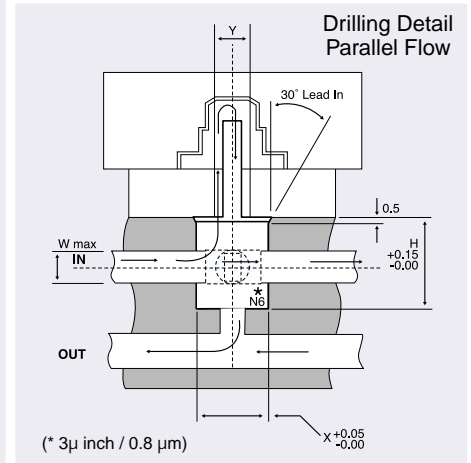


Isojets

The large range of series and parallel flow Isojet fountains from Thermacore provide balanced cooling within mold tooling. Isojet fountains are a convenient and effective method of coupling an array of core-pins into a very efficient cooling circuit. Isojets plug into the main manifold plate and are equipped with o-ring sealing to accommodate a variety of coolant channel drilling configurations. This technique of using parallel Isojets can eliminate temperature gradients and large back pressures to provide an easy-to-install, leak-free system over conventional series connected circuits.

BENEFITS:

- Cut-to-size fountain tube
- Works in any orientation
- Low system back pressure
- Fountain diameters 0.8 - 8.0 mm
- Stainless steel construction
- Simple installation
- Universal manifold feed and exit (parallel)
- Three gasket positions included
- Parallel flow Isojets for balanced cooling



Isojet Parallel Flow – Part Numbers and Dimensional Data

Part Number	B	L	C	D	E	F	G	H	W	X	Y
ISOJ-210-125	1.25										1.50
ISOJ-210-160	1.60	Cut-to-size									2.00
ISOJ-210-240	2.40	(max. 200mm)	4.0	9.9	4.0	7.0	11.2	15.0	6.0	10.0	3.20
ISOJ-210-300	3.00										3.70

Part Number	B	L	C	D	E	F	G	H	W	X	Y
ISOJ-216-300	3.00										3.70
ISOJ-216-330	3.30	Cut-to-size									4.00
ISOJ-216-400	4.00	(max. 200mm)	7.0	15.9	7.0	11.0	15.8	20.0	10.0	16.0	5.50
ISOJ-216-500	5.00										6.50
ISOJ-216-545	5.45										7.00

Part Number	B	L	C	D	E	F	G	H	W	X	Y
ISOJ-225-545	5.45										7.00
ISOJ-225-600	6.00	Cut-to-size									8.00
ISOJ-225-800	8.00	(max. 300mm)	12.0	24.9	12.0	18.6	23.4	30.0	16.0	25.0	11.00

Note: All dimensions in millimeters.

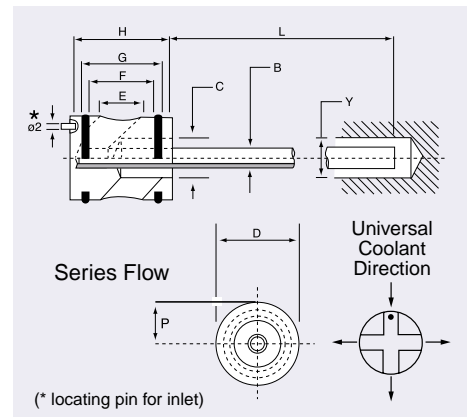
Isojet Series Flow – Part Numbers and Dimensional Data

Part Number	B	L	C	D	E	F	G	H	P	W	X	Y
ISOJ-110-080	0.80											1.00
ISOJ-110-125	1.25											1.50
ISOJ-110-160	1.60	Cut-to-size										2.00
ISOJ-110-240	2.40	(max. 200mm)	4.0	9.9	2.0	7.0	11.2	15.0	3.0	6.0	10.0	3.20
ISOJ-110-300	3.00											3.70
ISOJ-110-330	3.30											4.00

Part Number	B	L	C	D	E	F	G	H	P	W	X	Y
ISOJ-116-240	2.40											3.20
ISOJ-116-300	3.00											3.70
ISOJ-116-330	3.30	Cut-to-size										4.00
ISOJ-116-400	4.00	(max. 200mm)	6.0	15.9	3.0	11.0	15.8	20.0	5.5	10.0	16.0	5.50
ISOJ-116-500	5.00											6.50

Part Number	B	L	C	D	E	F	G	H	P	W	X	Y
ISOJ-125-545	5.45											7.00
ISOJ-125-600	6.00	Cut-to-size										8.00
ISOJ-125-800	8.00	(max. 300mm)	12.0	24.9	7.0	18.6	23.4	30.0	9.8	16.0	25.0	11.00

Note: All dimensions in millimeters.





ISOPLUGS



Isoplugs

Isoplugs are an effective method for sealing cooling channels in your new or existing mold tools, eliminating special machining. They are very simple to install into cooling channels which have been drilled to a nominal size. Isoplugs, constructed of brass and stainless steel, provide a cost-effective solution and are available in six component size diameters.

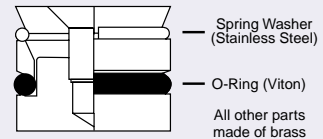
BENEFITS:

- Effective sealing up to 10 bars (150 psi)
- Saves time and effort over conventional methods
- Rapid installation and removal with no special tools required
- High quality precision construction

PART NUMBER AND DIMENSIONAL DATA:
(supplied in packs of 20 pcs)

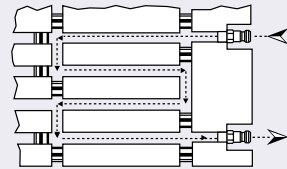
PIN			
PP 6	for	∅	6mm drilling
PP 8	for	∅	8mm drilling
PP 10	for	∅	10mm drilling
PP 12	for	∅	12mm drilling
PP 14	for	∅	14mm drilling
PP 16	for	∅	16mm drilling

Technical



Temperature Resistance:
 Water: Up to +100°C
 Oil: From -15° up to 150°C
 Bore hole tolerance: max. +0.5mm -0.00

Installation Example



ACCESSORIES

Thermal Interfacing Compounds

Thermoflex high thermal conductivity installation paste is essential when assembling mold tools with Isopipes because it provides exceptional thermal interfacing between heated and cooled parts of a mold. Optimal thermal interfacing is critical for a mold tool to consistently produce quality moldings in the shortest possible machine cycle time.

Thermobond high thermal conductivity epoxy is a convenient method of creating a permanent assembly between thermal interfaces. It should be used for the installation of Isojets and any other thermal interface where high heat flux has to be transferred with minimal temperature differential.

TECHNICAL SPECIFICATION

Compound:	THERMOBOND	THERMOFLEX
Product Description:	High Thermally Conductive Epoxy Adhesive	High Thermally Conductive Paste
Thermal Conductivity:	0.86 W/m°C	0.90 W/m°C
Color:	Grey	White
Thermal Component:	Aluminum	Aluminum Oxide
Base Component:	Epoxy Resin	Non-Silicon Fluid
Maximum Temperature:	+260°C	+300°C
Cure Time at 17°C:	24 hours	Not Applicable
Cure Time at 100°C:	10 minutes	Not Applicable
Pack Size:	5cc Paste + 1cc Activator (to be mixed in 5:1 vol. ratio)	10cc Syringe





Imperial Sizes: 50°F to 482°F Operating Temperature

		DIAMETER (inches)									
Inches		3/32	1/8	5/32	3/16	1/4	5/16	3/8	1/2	5/8	3/4
LENGTH	2	IMC-E03002	IMC-E04002	IMC-E05002	IMC-E06002	IMC-E08002					
	3	IMC-E03003	IMC-E04003	IMC-E05003	IMC-E06003	IMC-E08003	IMC-E10003	IMC-E12003			
	4	IMC-E03004	IMC-E04004	IMC-E05004	IMC-E06004	IMC-E08004	IMC-E10004	IMC-E12004	IMC-E16004	IMC-E20004	IMC-E24004
	5			IMC-E05005	IMC-E06005	IMC-E08005	IMC-E10005	IMC-E12005	IMC-E16005	IMC-E20005	IMC-E24005
	6			IMC-E05006	IMC-E06006	IMC-E08006	IMC-E10006	IMC-E12006	IMC-E16006	IMC-E20006	IMC-E24006
	8				IMC-E06008	IMC-E08008	IMC-E10008				
	8							IMC-E12010	IMC-E16010	IMC-E20010	IMC-E24010
	8							IMC-E12012	IMC-E16012	IMC-E20012	IMC-E24012

Notes:
 1. Above matrix is for standard isopipe P/N's; Std. O.D. tolerance = +/- 0.004" Standard length tolerance = +0.0"/0.02"
 2. Operating Temperature of IMC Exxxx is +10°C to +250°C
 3. Due to potential high operating pressure, Isopipes operating at temperatures > 300°C should be encased in steel.

Imperial Sizes: 50°F to 662°F Operating Temperature

		DIAMETER (inches)				
Inches		1/4	3/8	1/2	5/8	3/4
LENGTH	3	IMC-E08003HT	IMC-E12003HT			
	4	IMC-E08004HT	IMC-E12004HT	IMC-E16004HT	IMC-E20004HT	IMC-E24004HT
	5	IMC-E08005HT	IMC-E12005HT	IMC-E16005HT	IMC-E20005HT	IMC-E24005HT
	6	IMC-E08006HT	IMC-E12006HT	IMC-E16006HT	IMC-E20006HT	IMC-E24006HT
	8	IMC-E08008HT	IMC-E12008HT	IMC-E16008HT	IMC-E20008HT	IMC-E24008HT
	10		IMC-E12010HT	IMC-E16010HT	IMC-E20010HT	IMC-E24010HT
	12		IMC-E12012HT	IMC-E16012HT	IMC-E20012HT	IMC-E24012HT

Notes:
 1. Above matrix is for high temperature Isopipe P/N's; Std. O.D. tolerance = +/- 0.004" Standard length tolerance = +0.0"/0.02"
 2. Maximum Operating Temperature of High Temperature Isopipe is +350°C

Metric Sizes: +10°F to 250°C Operating Temperature

		DIAMETER (mm)									
mm		2.0	2.5	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0
LENGTH	75	IMC-M02075	IMC-M25075	IMC-M03075	IMC-M04075	IMC-M05075					
	100	IMC-M02100	IMC-M25100	IMC-M03100	IMC-M04100	IMC-M05100	IMC-M06100				
	125	IMC-M02125	IMC-M25125	IMC-M03125	IMC-M04125	IMC-M05125	IMC-M06125	IMC-M08125	IMC-M10125	IMC-M12125	
	150			IMC-M03150	IMC-M04150	IMC-M05150	IMC-M06150	IMC-M08150	IMC-M10150	IMC-M12150	IMC-M14150
	175			IMC-M03175	IMC-M04175	IMC-M05175	IMC-M06175	IMC-M08175	IMC-M10175	IMC-M12175	IMC-M14175
	200				IMC-M04200	IMC-M05200	IMC-M06200	IMC-M08200	IMC-M10200	IMC-M12200	IMC-M14200
	250						IMC-M06250	IMC-M08250	IMC-M10250	IMC-M12250	IMC-M14250
	300						IMC-M06300	IMC-M08300	IMC-M10300	IMC-M12300	IMC-M14300

Notes:
 1. Above matrix is for standard isopipe P/N 's; Std. O.D. tolerance = +0.0/-0.10mm Standard length tolerance = +0.0/-0.5mm
 2. Maximum Operating Temperature of High Temperature Isopipe is +350°C

Metric Sizes: +10°F to 350°C Operating Temperature

		DIAMETER (mm)				
mm		6.0	8.0	10.0	12.0	14.0
LENGTH	100	IMC-M06100HT				
	125	IMC-M06125HT	IMC-M08125HT	IMC-M10125HT	IMC-M12125HT	
	150	IMC-M06150HT	IMC-M08150HT	IMC-M10150HT	IMC-M12150HT	IMC-M14150HT
	175	IMC-M06175HT	IMC-M08175HT	IMC-M10175HT	IMC-M12175HT	IMC-M14175HT
	200	IMC-M06200HT	IMC-M08200HT	IMC-M10200HT	IMC-M12200HT	IMC-M14200HT
	250	IMC-M06250HT	IMC-M08250HT	IMC-M10250HT	IMC-M12250HT	IMC-M14250HT
	300	IMC-M06300HT	IMC-M08300HT	IMC-M10300HT	IMC-M12300HT	IMC-M14300HT

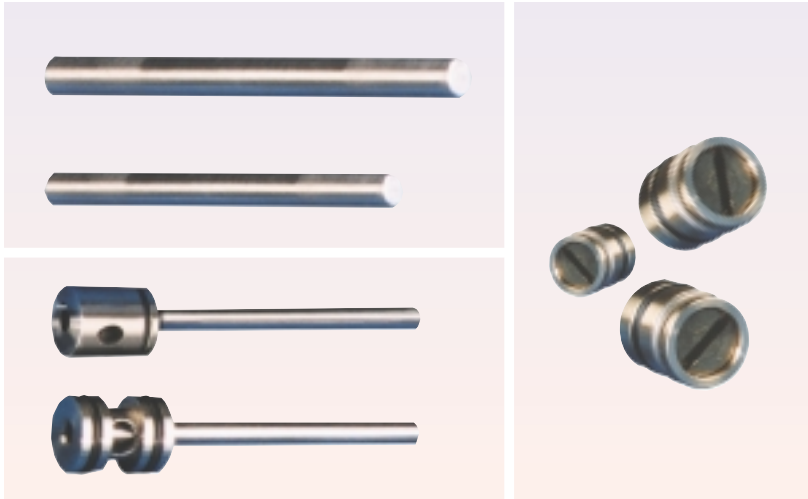
Notes:
 1. Above matrix is for High Temperature Isopipe P/N's; Std. O.D. tolerance = +0.0/-0.10 Standard length tolerance = +0.0/-0.5mm
 2. Maximum Operating Temperature of High Temperature Isopipes is +350°C

Note: Custom diameters, length and features (such as baffles, internal threads and annular isopipes) can be provided by special order. Minimum volumes may apply.



GLOBAL LEADERS IN HEAT TRANSFER TECHNOLOGY

Thermacore is a worldwide leader in the design and manufacture of thermal management solutions with over 30 years of experience. The company has 54 patents in the thermal design area and in excess of 600 combined man-years of thermal engineering expertise. With international manufacturing in the US, Mexico, Europe, and Asia, Thermacore provides quality manufacturing to OEMs worldwide.



You'll Find Thermacore Products in Today's Critical Electronics Cooling Applications

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- Power Electronics
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- Mold Cooling
- Consumer Electronics
- Automotive Electronics
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- Instrumentation
- Military



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