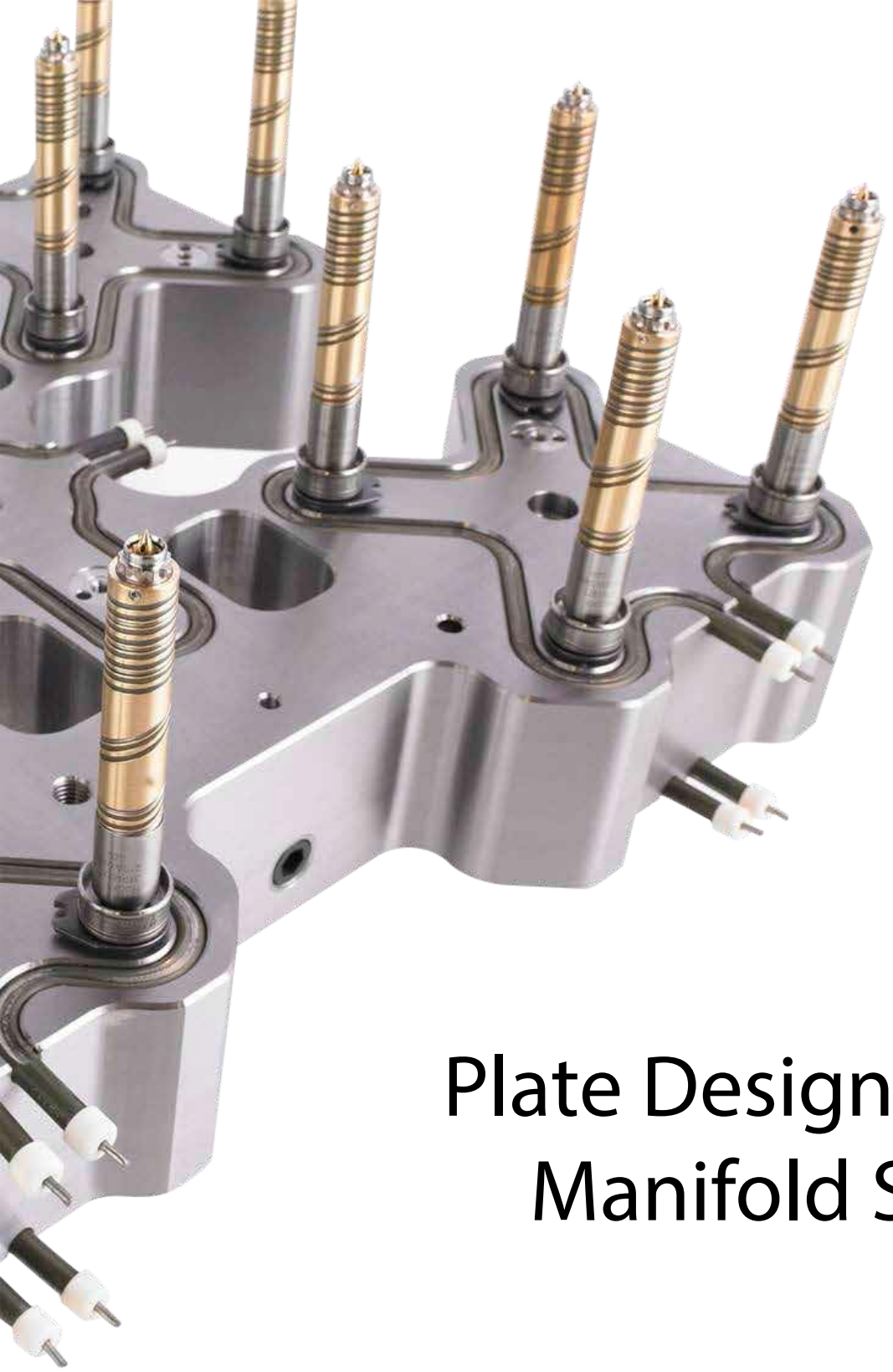


# Plate Design for Husky Manifold Systems

6762104-9

HUSKY®

*Keeping our customers in the lead*

# Table of Contents


How to Use This Guide ..... 3

Design package ..... 4

Nomenclature ..... 5

General Recommendations ..... 7

Installing Manifold Pocket in Plates ..... 8

Plate Bolts ..... 9

Mold Interfaces ..... 10

Backing Plate Cooling ..... 11

Manifold Plate Cooling ..... 12

Air Lines (if Valve Gate) ..... 13

Cylinder Installation Details ..... 14

Hot Runner Plate Alignment ..... 16

Wire Channels and Electrical ..... 17

Pry Slots and Drainage ..... 22

Lift Taps and Platen Mounting ..... 23

Nameplate ..... 24

Tolerance References ..... 25

UNIFY Specific Requirements ..... 29

Questions ..... 30

# How to Use This Guide

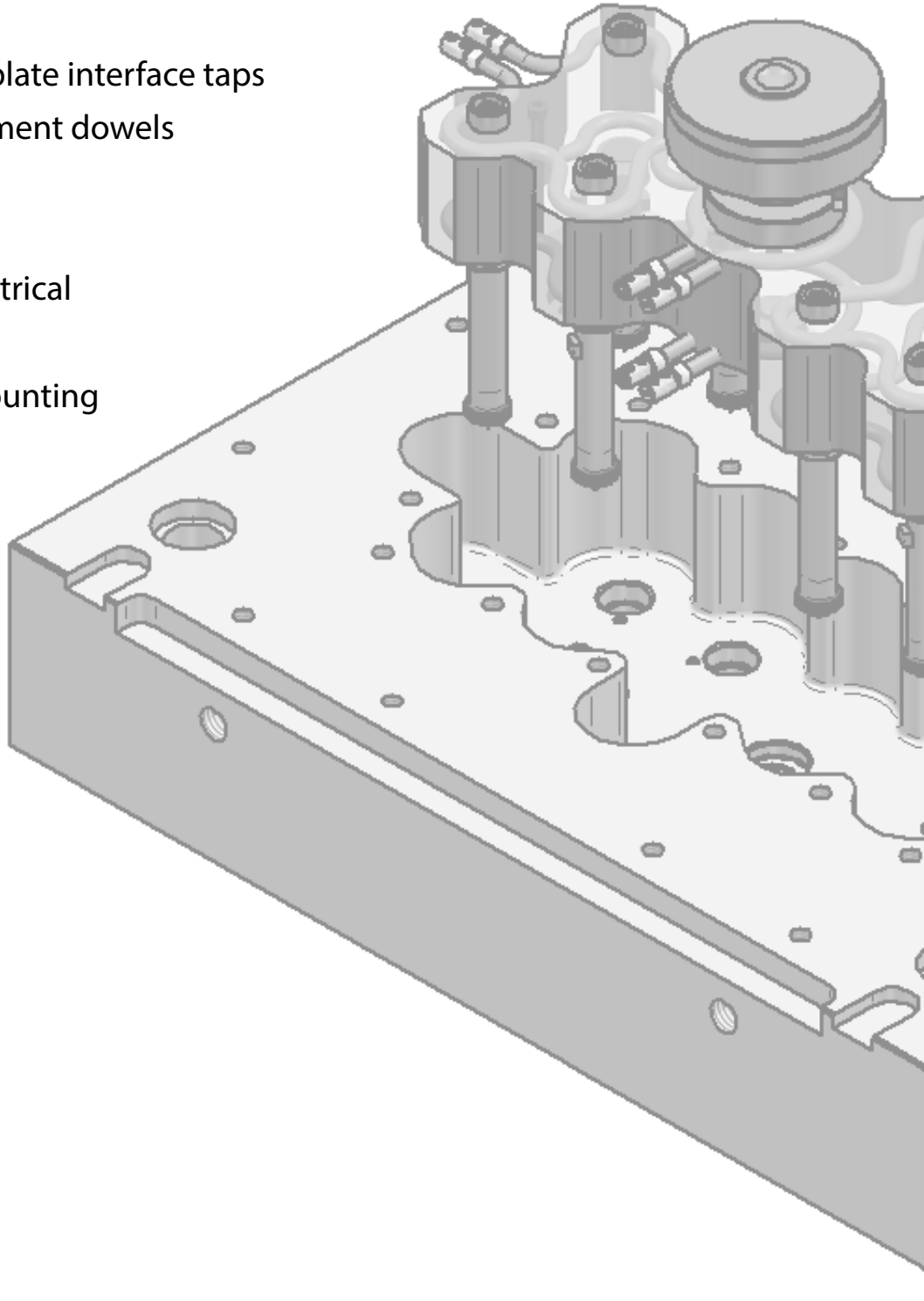
This guide is designed to help a mold maker integrate a Husky Manifold System into their plate and mold design. The guide is broken into three main sections:

1.) Nomenclature used with Husky Manifold Systems

2.) General Recommendations

3.) Plate design steps which include adding:

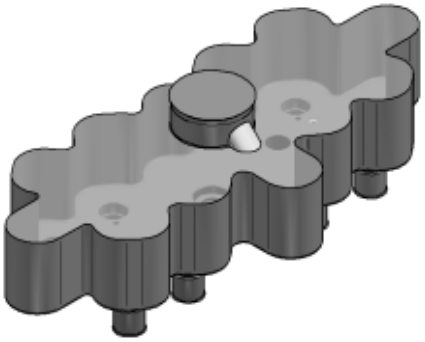
- Manifold pocket
- Plate bolts
- Guide pins and cavity plate interface taps
- Hot runner plate alignment dowels
- Plate cooling
- Air lines (if valve gate)
- Wire channels and electrical
- Pry slots and drainage
- Lift taps and platen mounting
- Nameplate



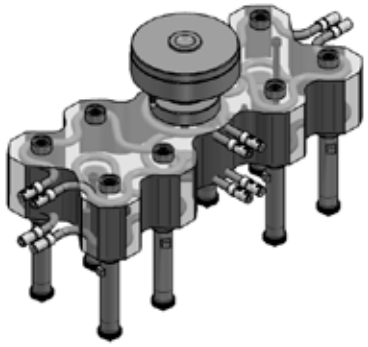
# Design Package

The following design items are provided by Husky with all manifold systems

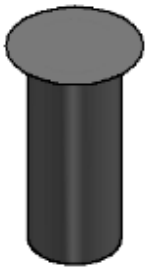
## 3D Models



Pocket Inverse

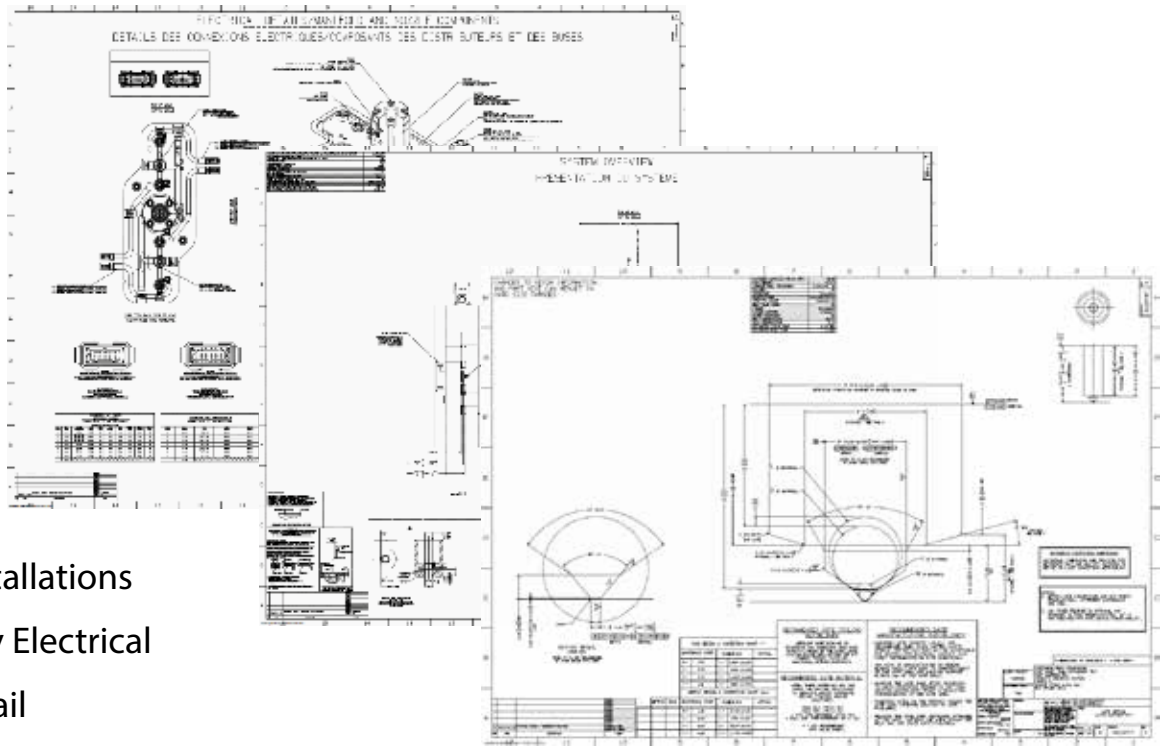


Manifold Assembly



Gate Detail Inverse

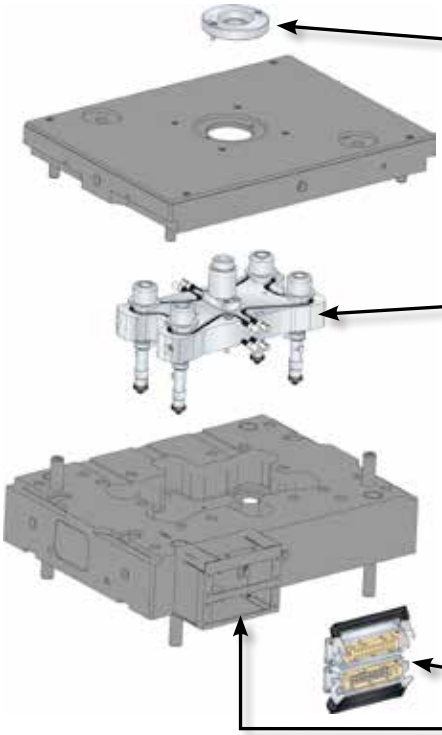
## 2D Print Package



- Plate Installations
- Assembly Electrical
- Gate Detail

# Nomenclature

## Supplied by Husky



Optional item for order:

- Locating Ring

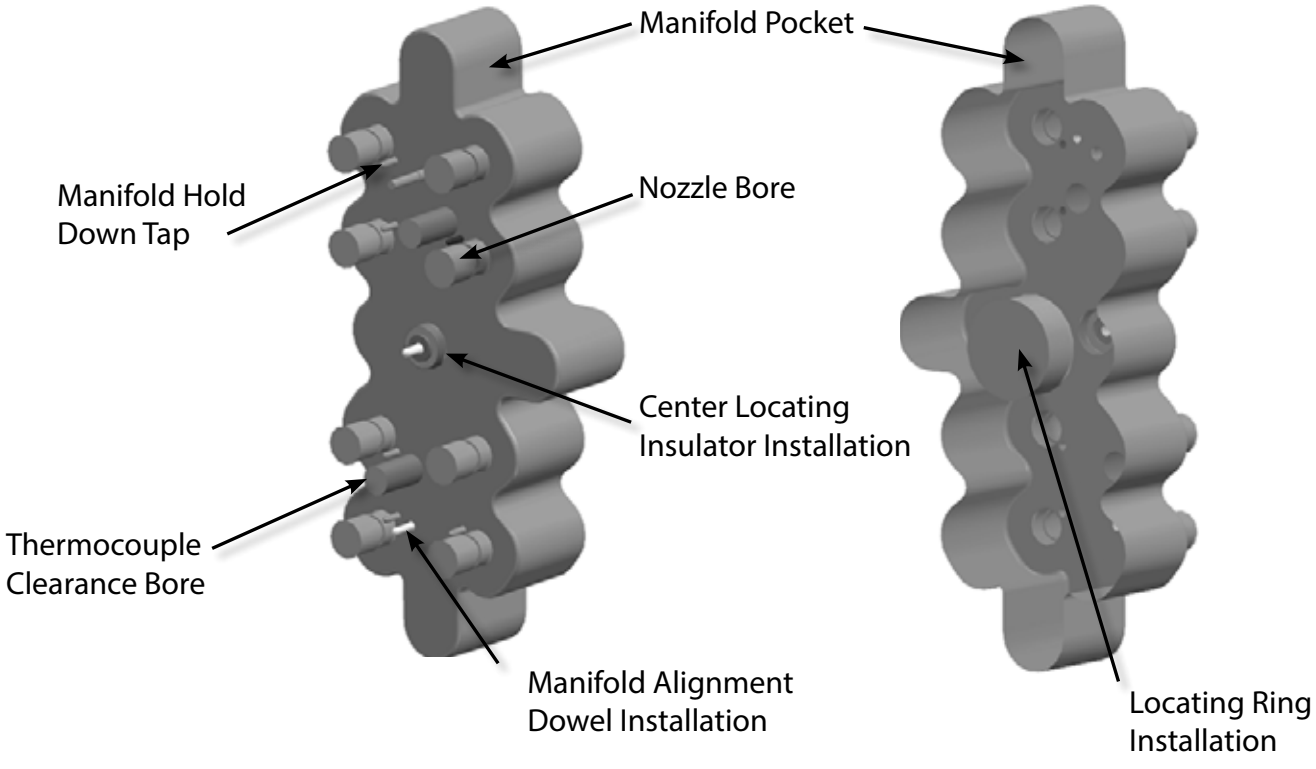
Standard:

- Manifold
- Complete Nozzle Assemblies
- Nameplate
- Design Package

Optional items for order:

- Electrical adaptor box
- Electrical Connectors and Wire Clamps

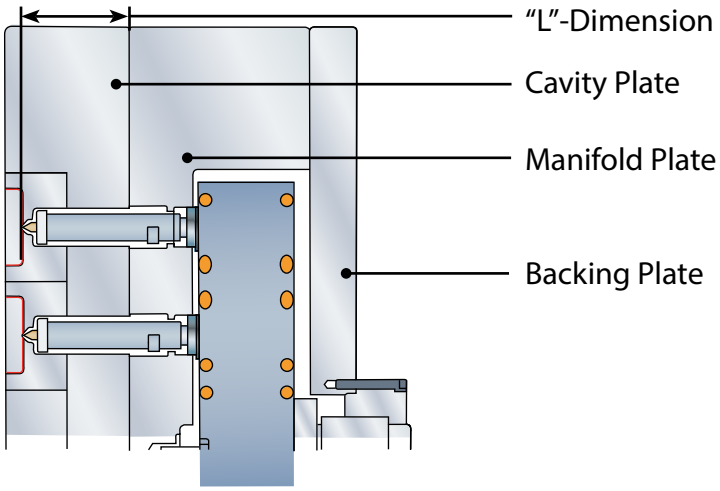
## 3D Pocket Geometry



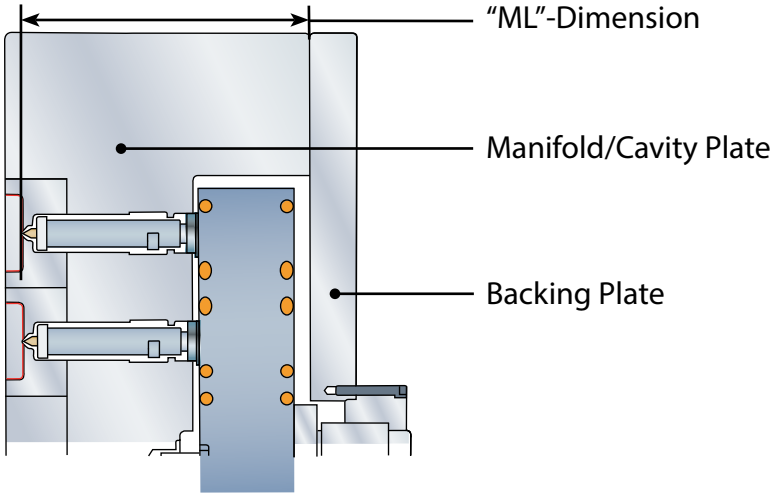
# Nomenclature

## Typical Plate Split Options*

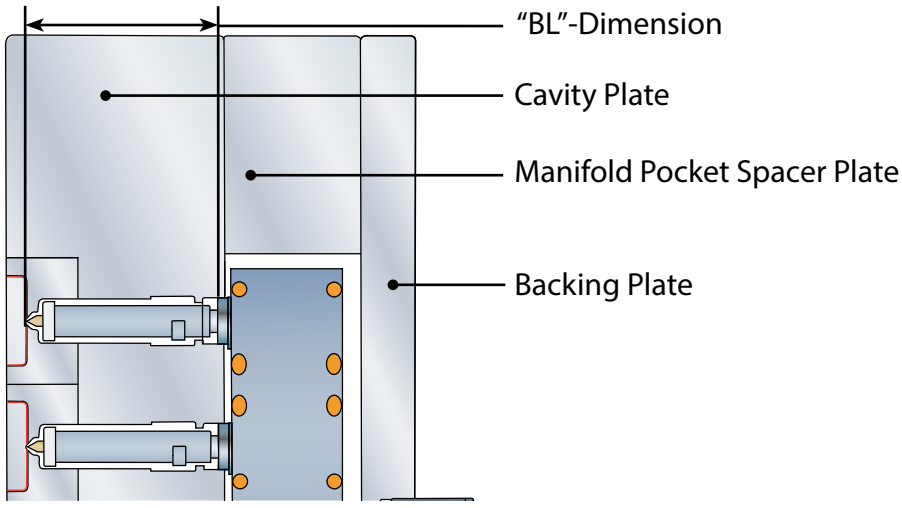
### Husky Standard




### Integrated Manifold and Cavity Plate




### Manifold Pocket Spacer Plate




*The remainder of this guide assumes "Husky Standard" installation. However, the basic steps are unchanged regardless of plate split option. Husky calculates and accounts for thermal expansion in manifold and nozzle design

**BL-dimension is to the bottom of the nozzle locating bore

# General Recommendations

## Plate Steel

Stainless steel is the recommended material for plate manufacture. Recommended plate material properties:

- Minimum Yield Strength 640 Mpa
- Hardness 24-36 HRC

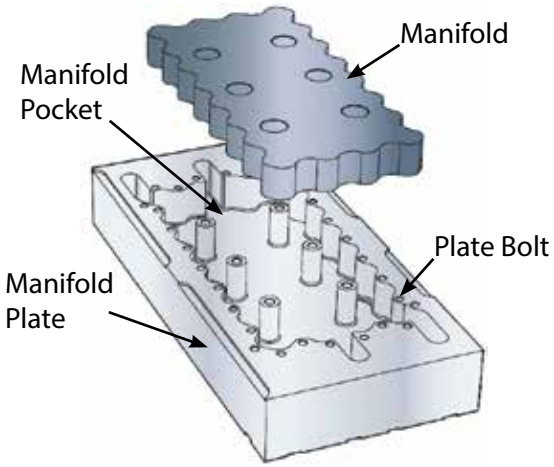
Examples of suitable steels types are listed below:

| Type | Hardness (HRC) |
|---|---|
| AISI 4140 | 30-35 HRC |
| AISI P20 | 30-35 HRC |
| AISI 420 | 30-35 HRC |
| DIN 1.2316 | 30-35 HRC |

## Manifold Pocket

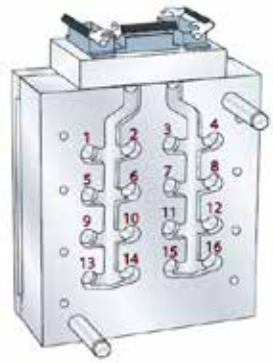
Husky recommends machining a pocket into the manifold plate for the manifold. The 3D model provided by Husky includes all necessary geometry. A pocket profiled to match the manifold:

- Allows close positioning of the plate bolts to the nozzle components, minimizing plate deflection
- Provides superior structural support for the mold and cavities
- Maintains a consistent air gap between the manifold and manifold pocket to thermally insulate the manifold from the surrounding plates



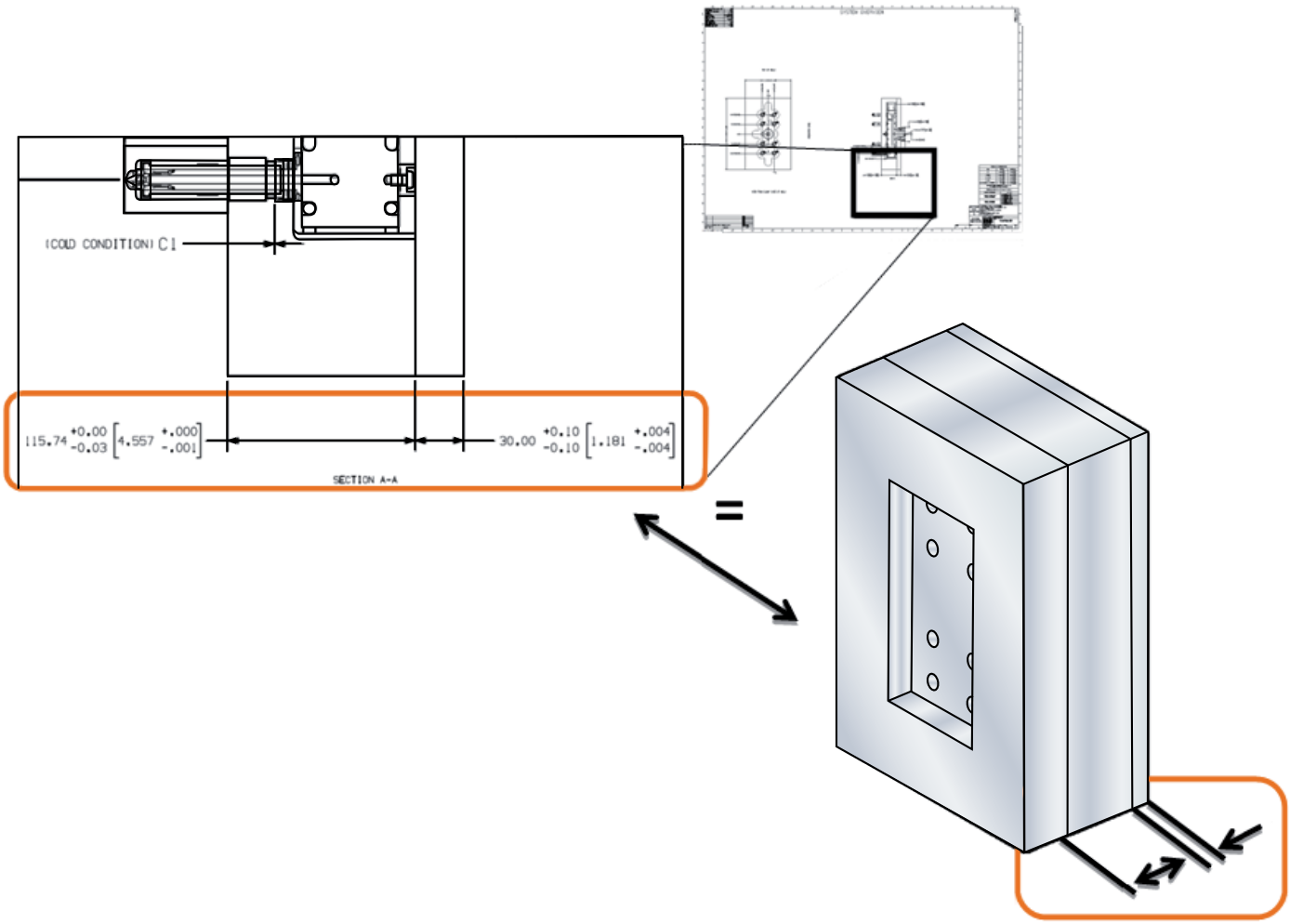

## Cavity Numbering

Clear nozzle identification is necessary to ensure the hot runner properly interfaces with the mold and that the nozzles are mapped correctly.

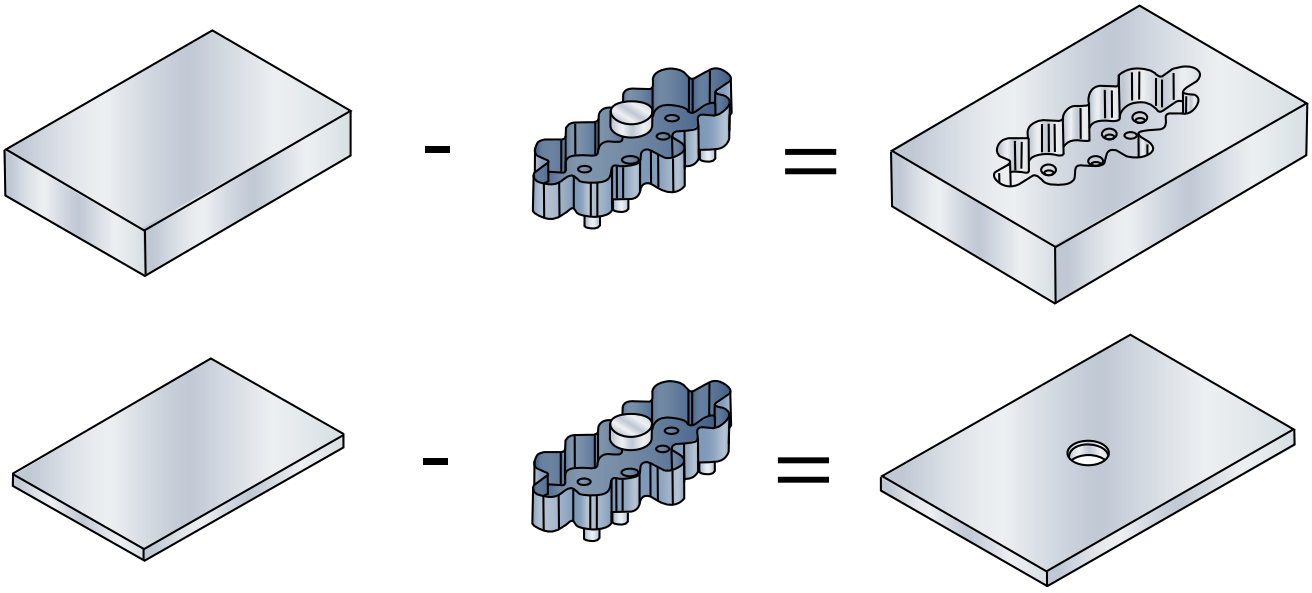


# Installing Manifold Pocket in Plates

## Step 1- Adjust Plate Thicknesses




## Step 2- Subtract Pocket Inverse from Plates



# Add Plate Bolts

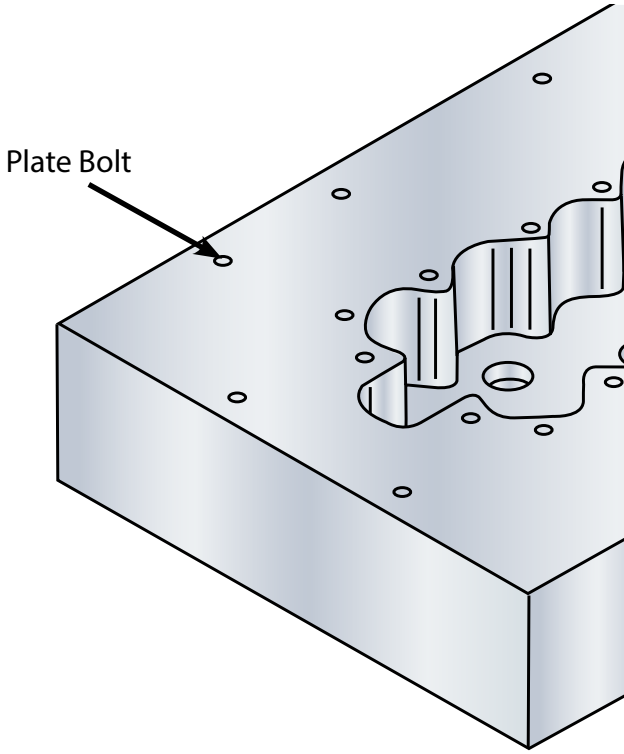
## Why good plate bolting is important

The function of the plate bolts is to resist plate separation forces generated under normal operation. If the forces are not balanced, they can bend (or "bow") the plates which in certain situations can cause:

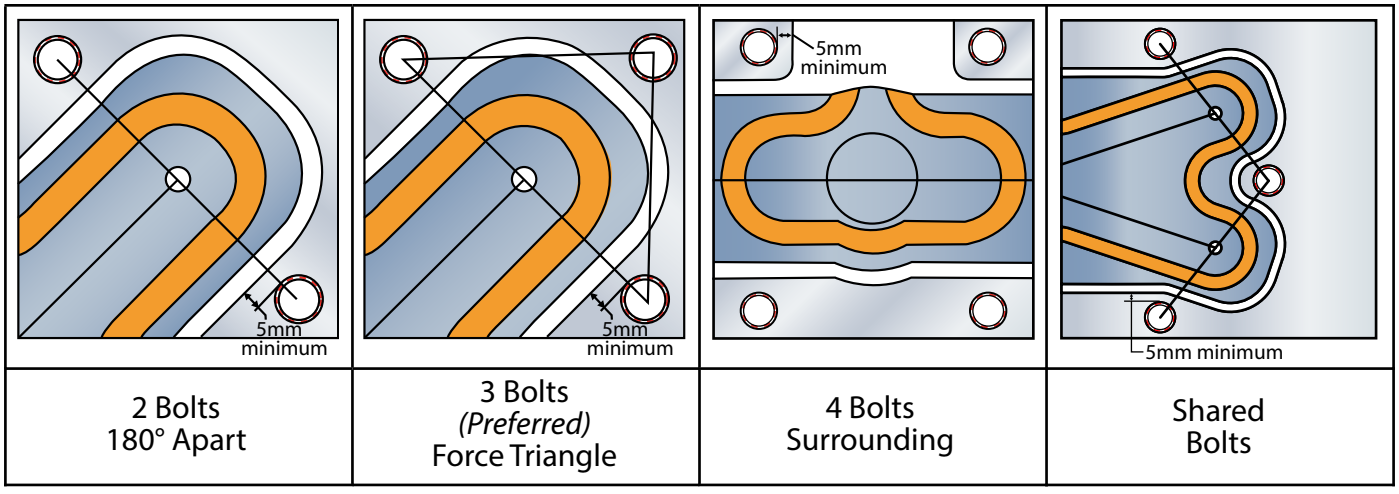
- Premature wear of tightly-toleranced mold and hot runner components
- Leakage in manifold pocket
- Part flash

## Step 1- Determine Bolt Size

| | Nozzle Size (Refer to Hot Runner Description) | Quantity x Size (minimums) |
|---|---|---|
| Nozzle | Ultra 250 | 2xM12 or 1/2" |
| | Ultra 350 | 2xM12 or 1/2" |
| | Ultra 500 | 2xM12 or 1/2" |
| | Ultra 750 | 2xM16 or 5/8" |
| | Ultra 750 and Injection Pressure >26K psi [1793 bar] | 3xM16 or 5/8" |
| | Ultra Packaging (UP) | 2xM16 or 5/8" |
| | U1000 | 3xM16 or 5/8" |
| | U1250 | 4xM20 or 3/4" |
| Other | Around Center Insulator | 4xM16 or 5/8" |
| | Cross Manifold Spring Pack | 4xM20 or 3/4" |




## Step 2- Position Bolts

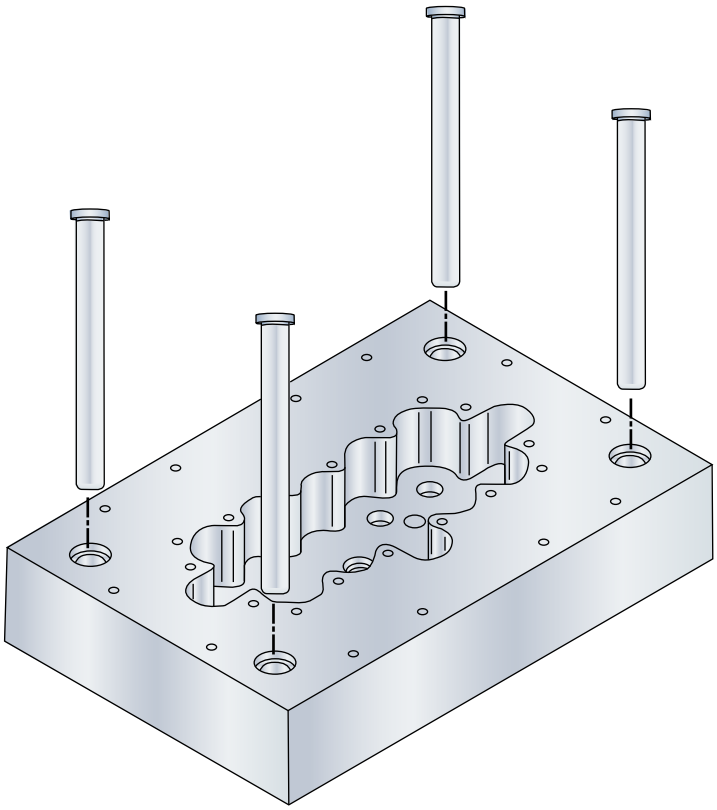



| 2 Bolts 180° Apart | 3 Bolts *(Preferred)* Force Triangle | 4 Bolts Surrounding | Shared Bolts |
|---|---|---|---|

# Add Mold Interfaces

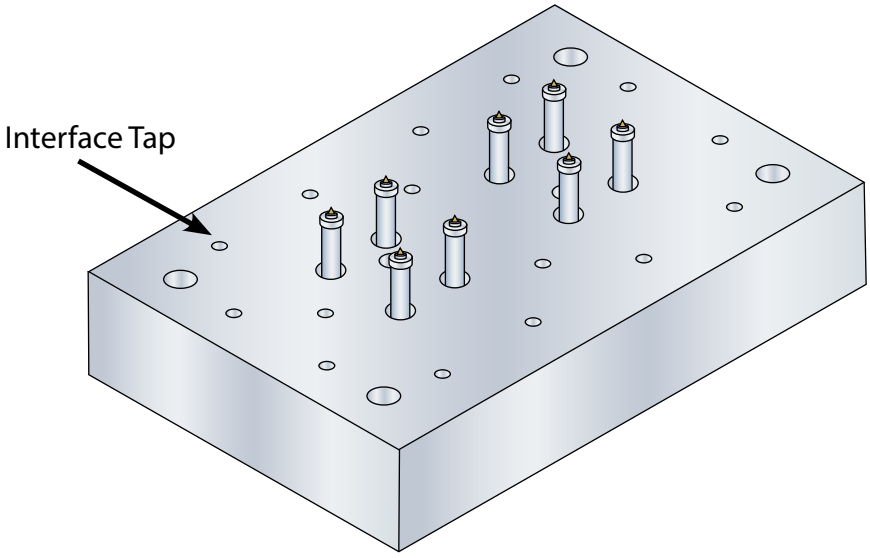
## Step 1- Add Guide Pin Installations

Guide pins align the hot runner manifold plate to the cavity plate and protect nozzle tips during lifting and handling (if hot runner built "hot half" style). Husky recommends guide pin protrusion greater than or equal to 5mm [0.19"] longer than the nozzle length in order to protect the tips



## Step 2- Add Cavity Plate Interface Taps

Interface taps secure the cavity plate to the hot runner manifold plate

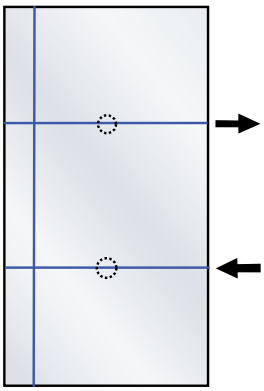


# Add Backing Plate Cooling

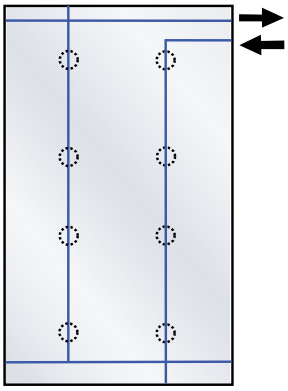
Plate cooling circuits maintain a uniform mold plate temperature and match thermal expansion of the mold plates. To design a uniformly cooled mold, consideration must be given to the cooling circuit layout, number of channels, lengths, and diameters. Apply cooling to all drops.

## Sample Layouts

### Thermal Gate Examples

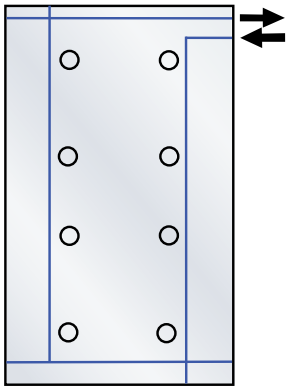


2-Drop
Thermal Gate

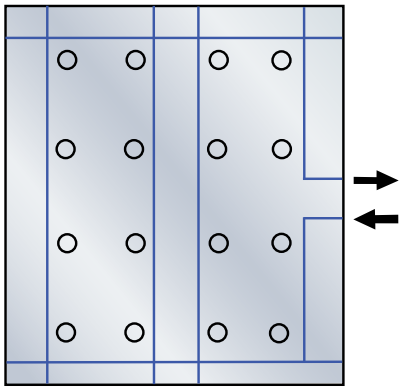


8-Drop
Thermal Gate

### Valve Gate Examples



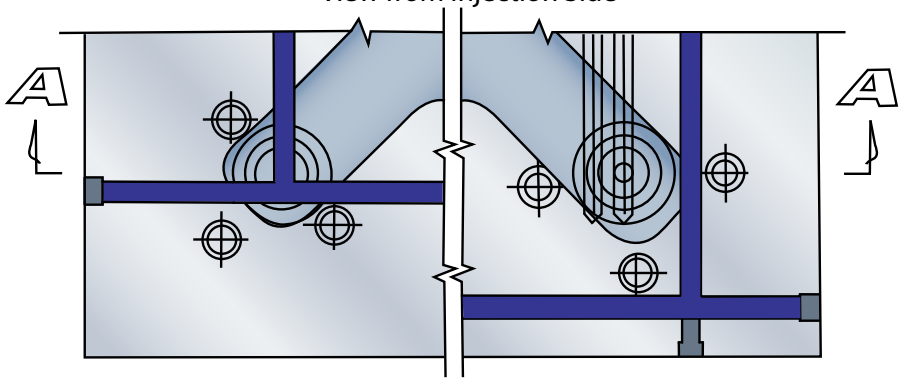
8-Drop
Valve Gate

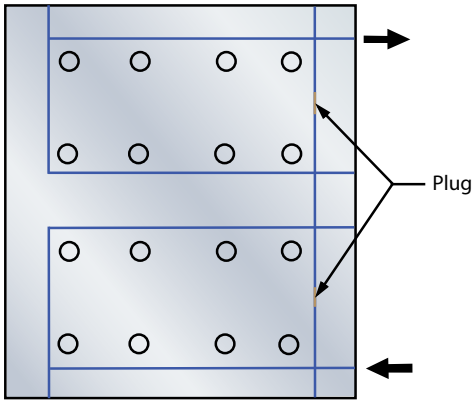


16-Drop
Valve Gate

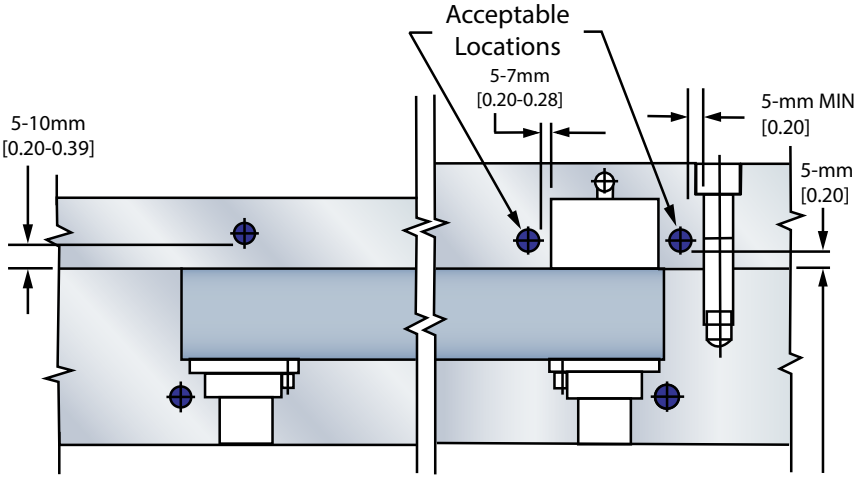
Thermal Gate Valve Gate

View from Injection Side



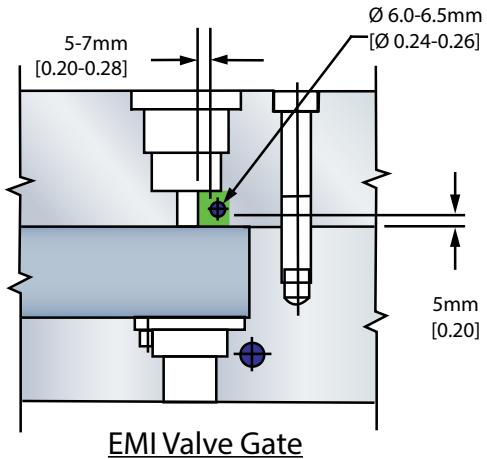

16-Drop
Valve Gate




Thermal Gate Valve Gate

Section A-A

IMPORTANT
Cooling lines should remain close to the contact area of the drop backup pad



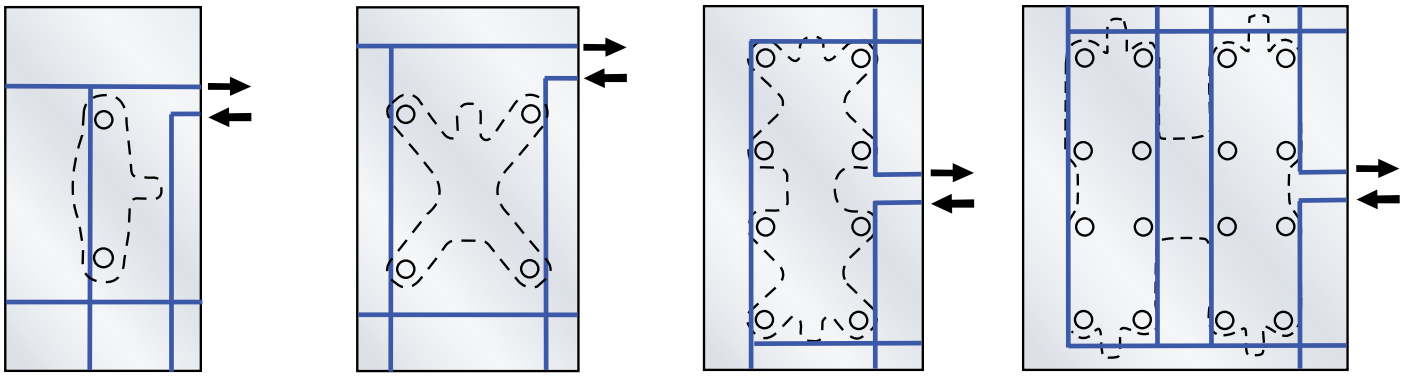

EMI Valve Gate

For best results, apply cooling in the green region shown above

# Add Manifold Plate Cooling

Plate cooling circuits maintain a uniform mold plate temperature and match thermal expansion of the mold plates. To design a uniformly cooled mold, consideration must be given to the cooling circuit layout, number of channels, lengths, and diameters. Apply cooling to all drops.

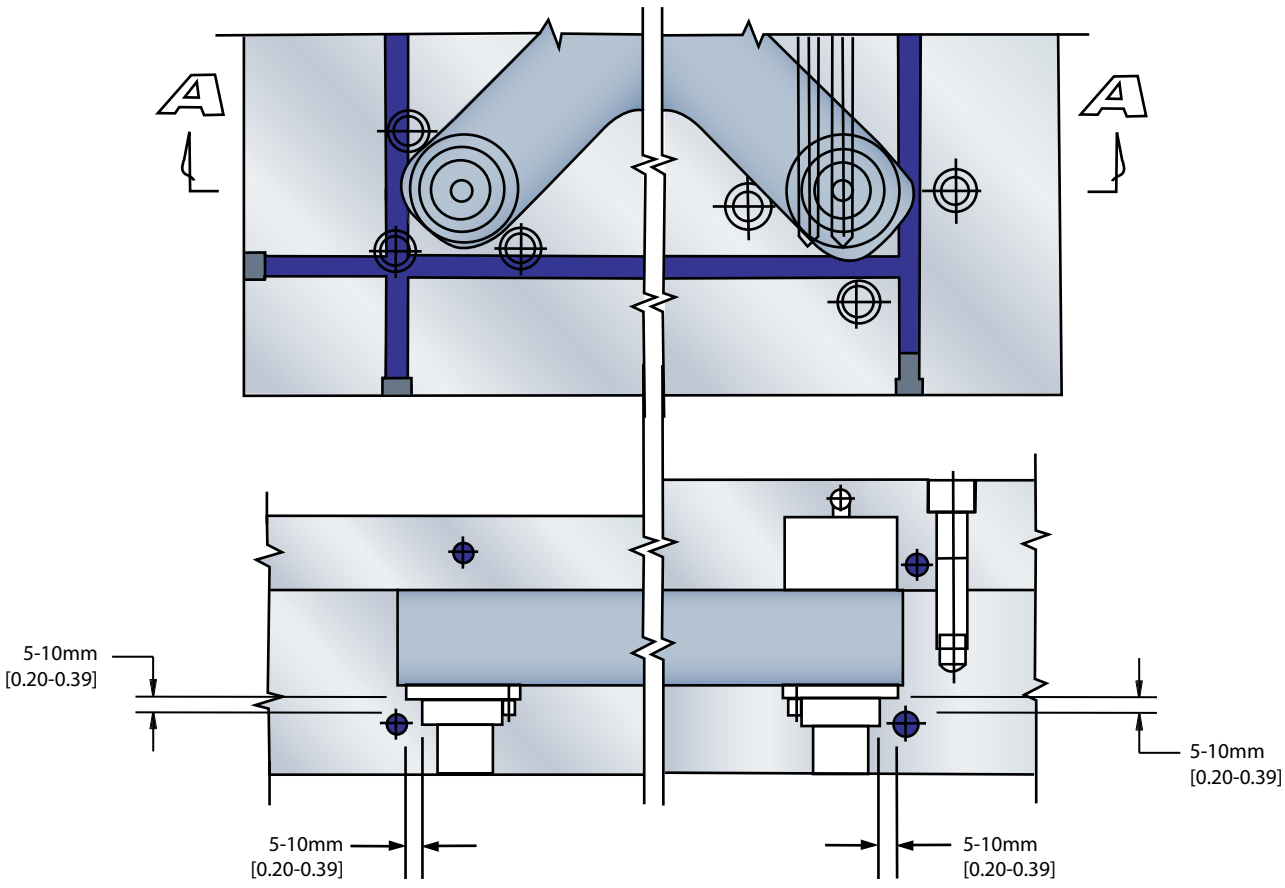
Sample Layouts




Thermal Gate

Valve Gate

View from Injection Side




Section A-A

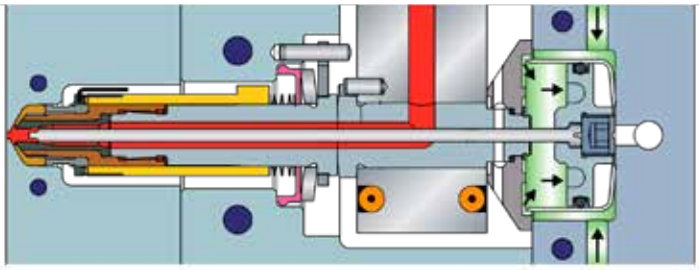
# Add Air Lines (if Valve Gate)

## Step 1- Add Air Lines for VG Open and Close

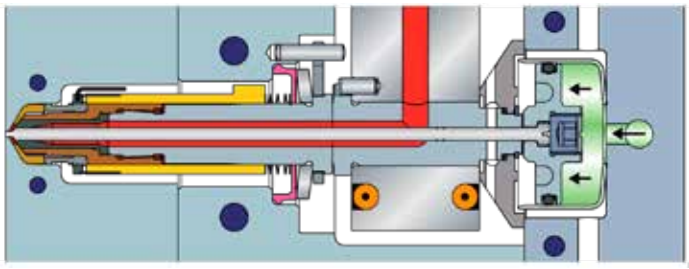
A maximum of 36 drops can be on one circuit. Use a balanced design wherever possible (same distance to each piston)
Air fittings on the Hot Runner should have an internal diameter of no smaller than 9.525mm [3/8″] and no larger than 15.875mm [5/8″]

Husky recommends using Quick Disconnect from:

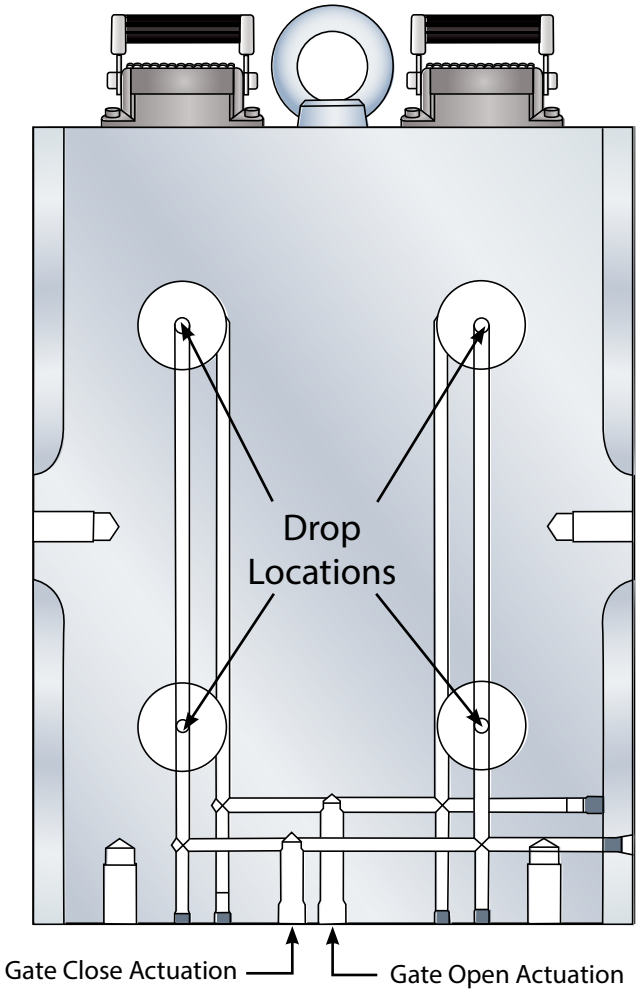
- DME, part number JP-353
- Hasco, part number Z81/19/24x1.5



Open Stroke



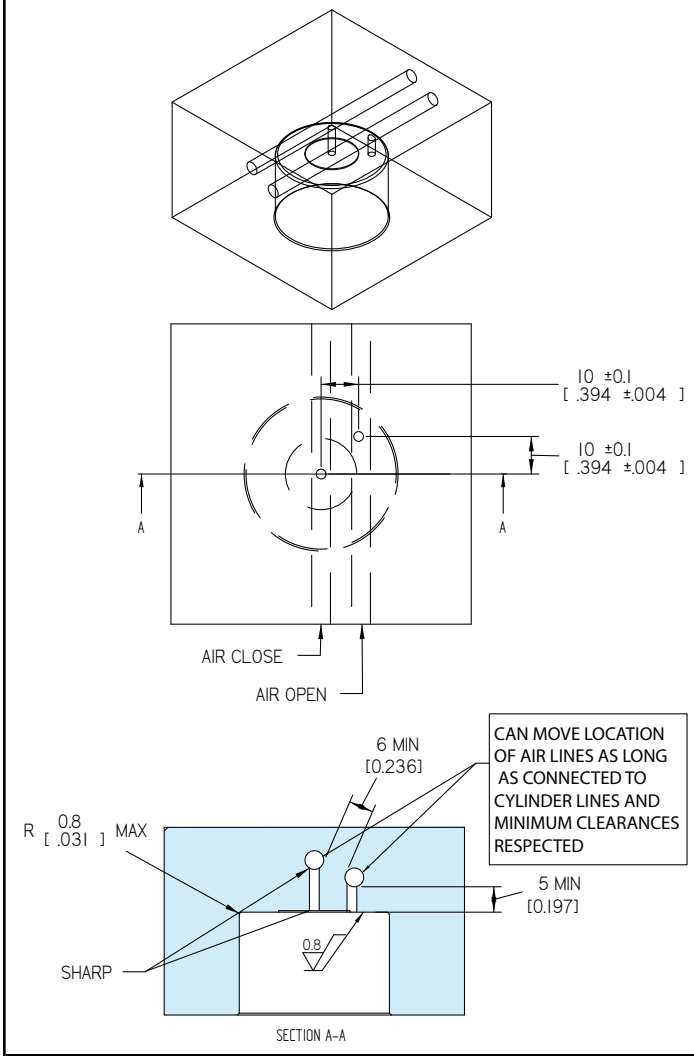
Close Stroke



# Cylinder Installation Details

Refer to 3D model for complete geometry

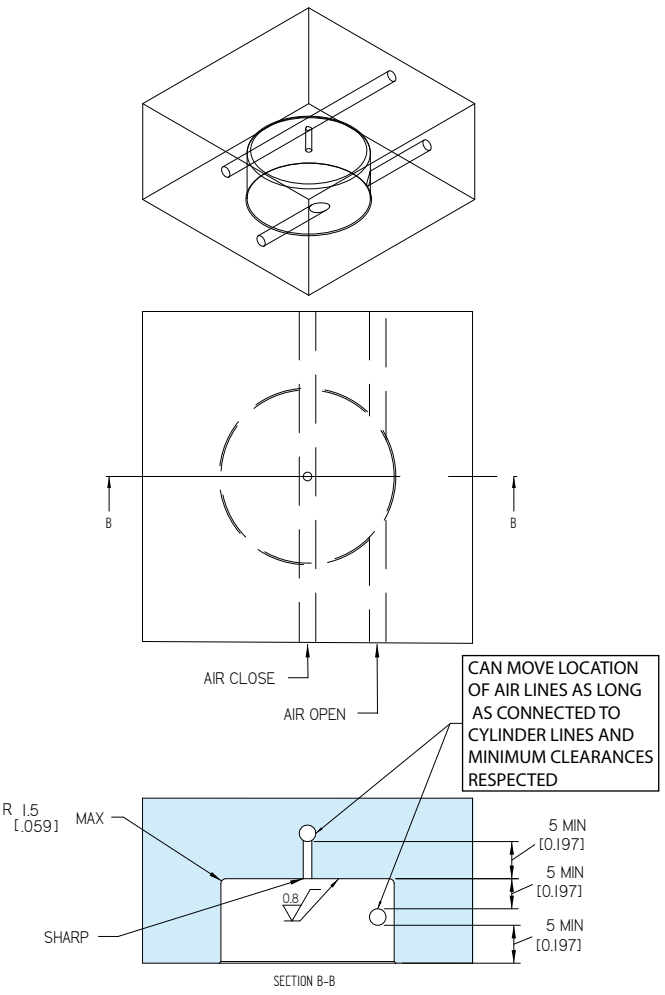
## SX Cylinders



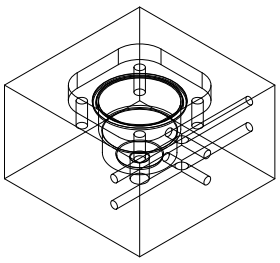


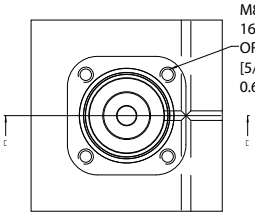


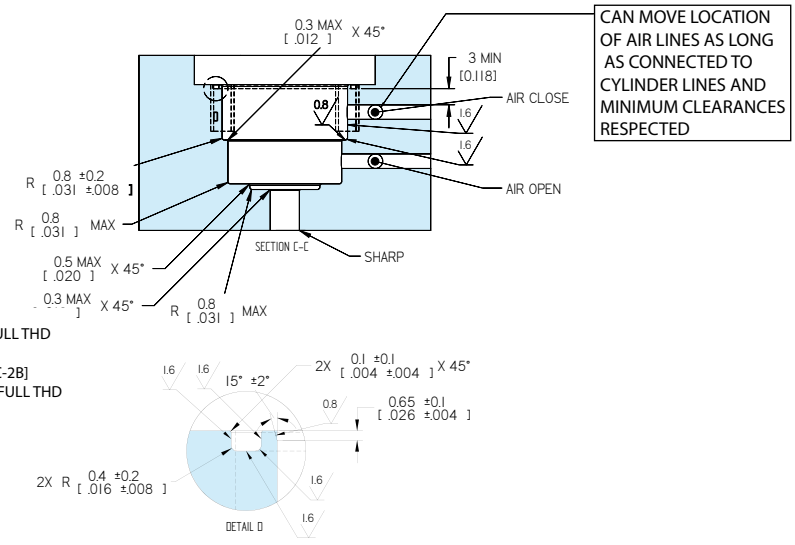
## LX , EX and Ultra 1000 Cylinders



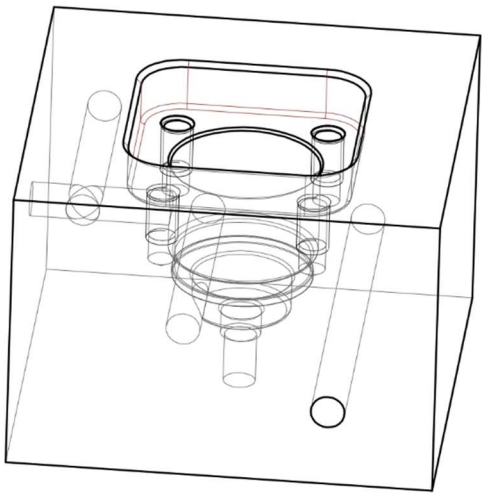

## EMI Cylinders

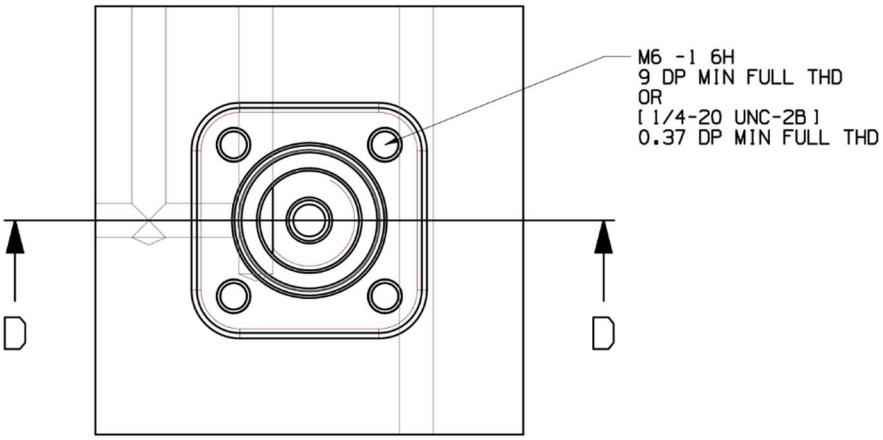




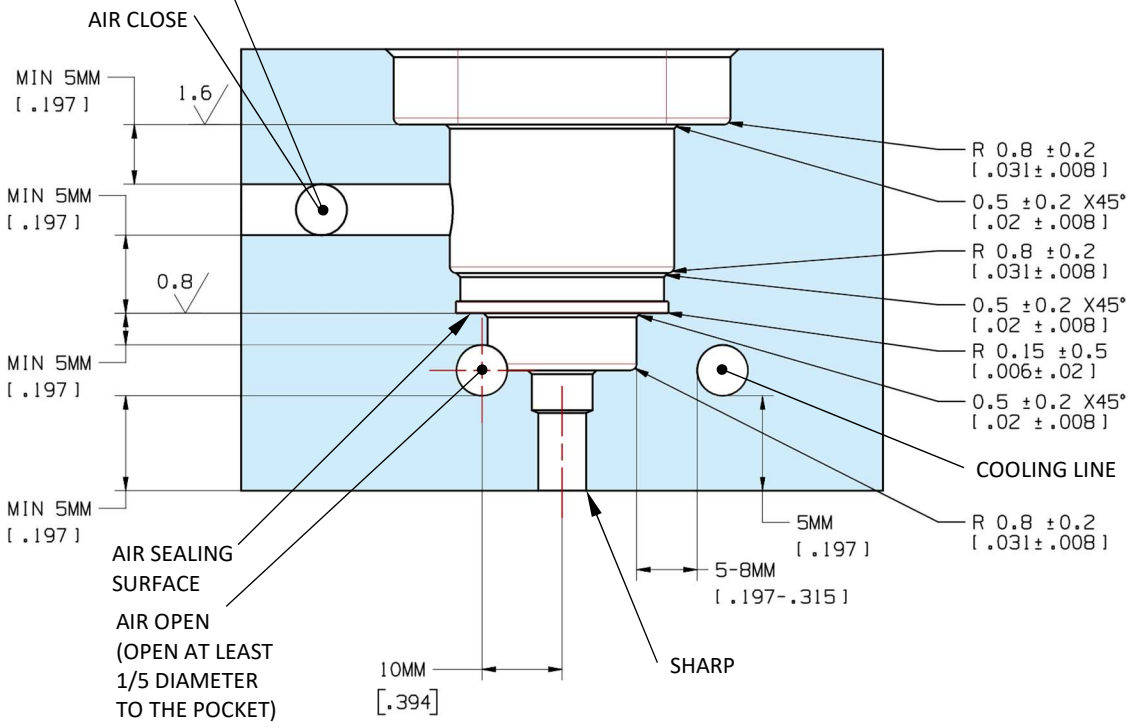



# PX Cylinder






CAN MOVE LOCATION OF AIR LINES AS LONG AS CONNECTED TO CYLINDER LINES AND MINIMUM CLEARANCES RESPECTED




SECTION D-D

# Add Hot Runner Plate Alignment

The alignment dowel provides precise alignment between the manifold plate and the backing plate. In doing so, the following are maintained:

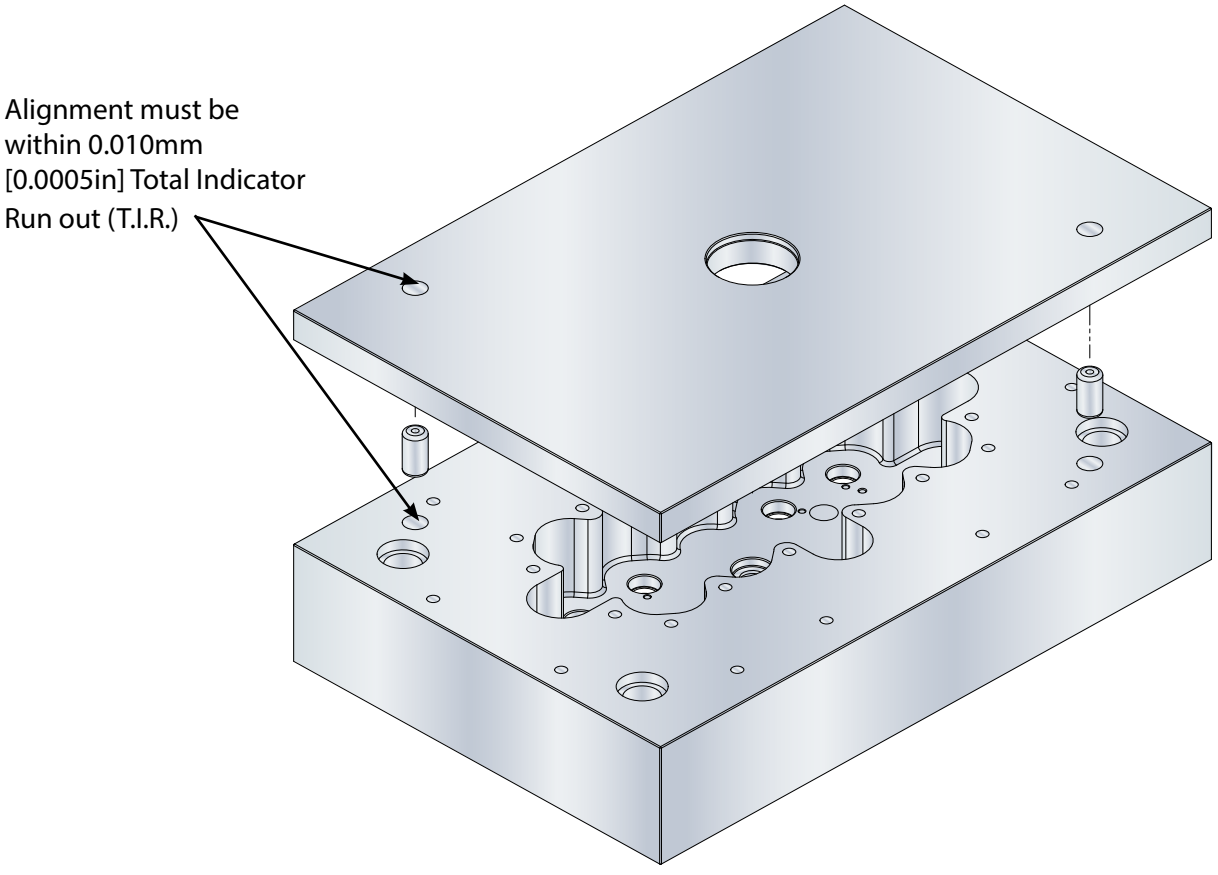
- Clearance fit between the sprue bushing and locating ring.
- Alignment between the sprue bushing and the machine nozzle (via the locating ring).
- In Valve Gate systems, alignment between valve gate piston cylinders and air open/close holes in the backing plate.

## Step 1- Add dowel installation to manifold plate

Husky recommends press fit installation in manifold plate

## Step 2- Add dowel installation to backing plate

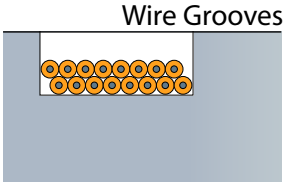
Husky recommends locational fit installation in backing plate

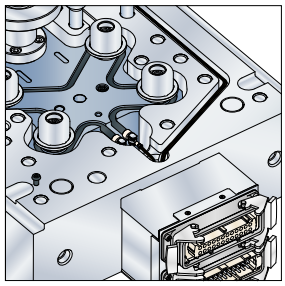


# Add Wire Channels and Electrical

Power and thermocouple wires are typically routed to the electrical connectors within wire grooves, providing the following benefits:

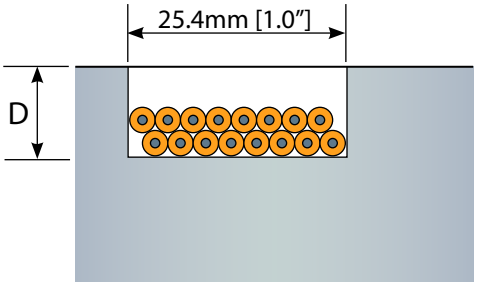
- Protect the machine operator from live wires
- Provide orderly routing of hot runner wires
- Prevent potential wire damage



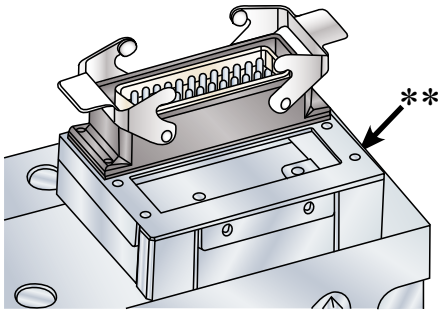



## Step 1- Determine Wire Groove Depth

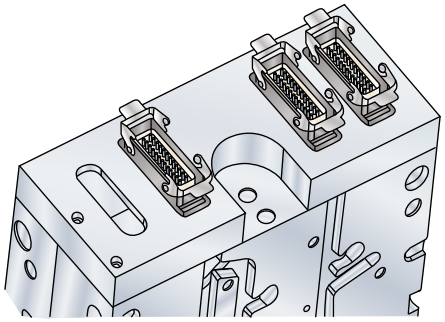
| Number of Heaters and Thermocouples (Nozzle and Manifold)* | Recommended Groove Depth |
|---|---|
| <=12 | 11mm |
| 13-24 | 18mm |
| 25-32 | 23mm |
| *Number of heaters and TCs, not the number of wires | |



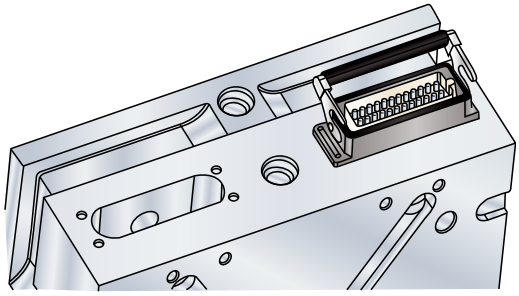

## Step 2- Add Electrical Connectors




Sheet Metal Adapter Box
*(**Husky can supply this box-Just ask!)*



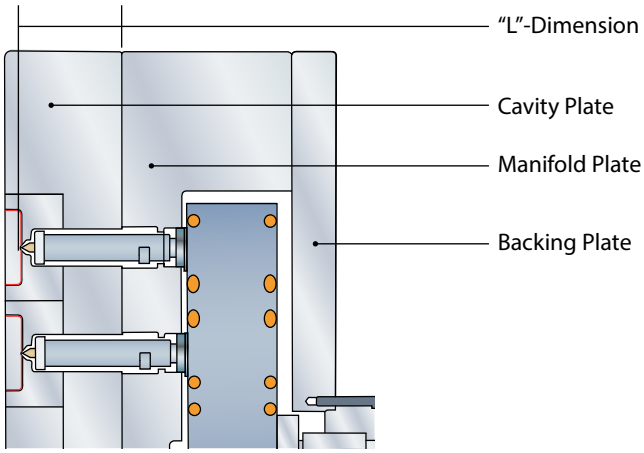
Machined Adaptor Box



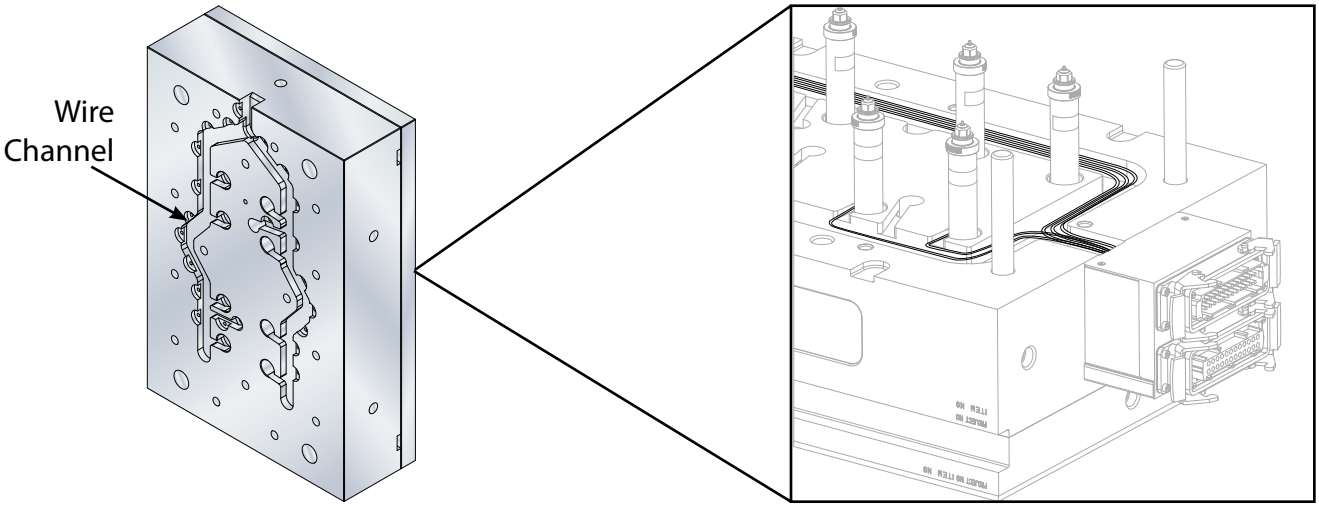
Direct Mounted

# Add Wire Channels and Electrical

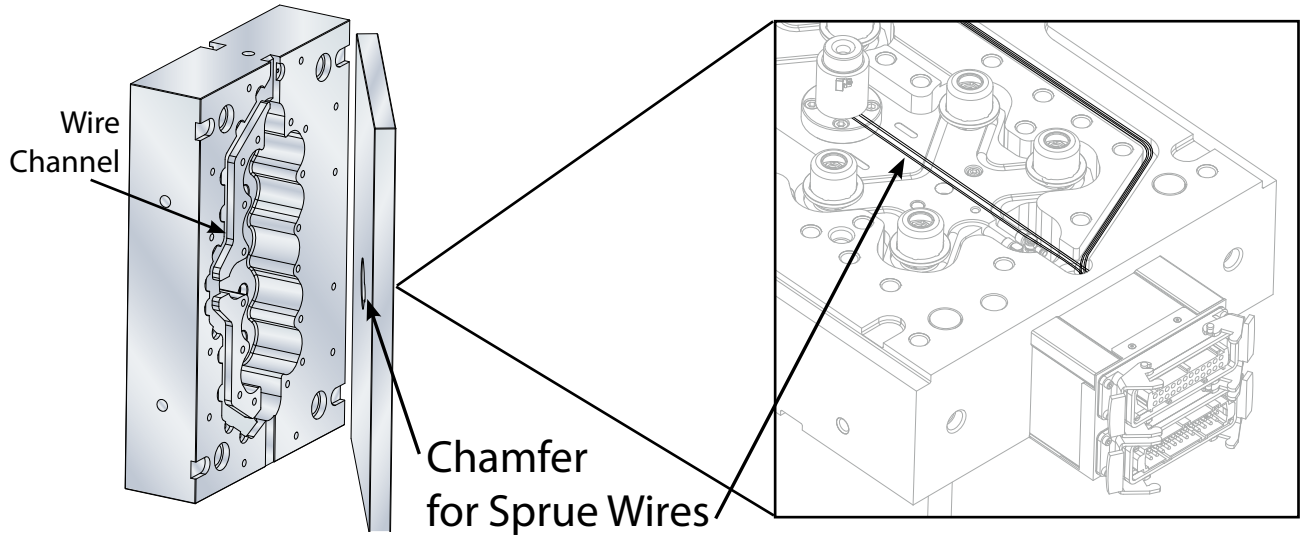
If plate split design is Husky Standard, the following wire routing is recommended




Step 3a - Route Wires for Nozzles and any Manifold TCs on Clamp Face of Manifold Plate



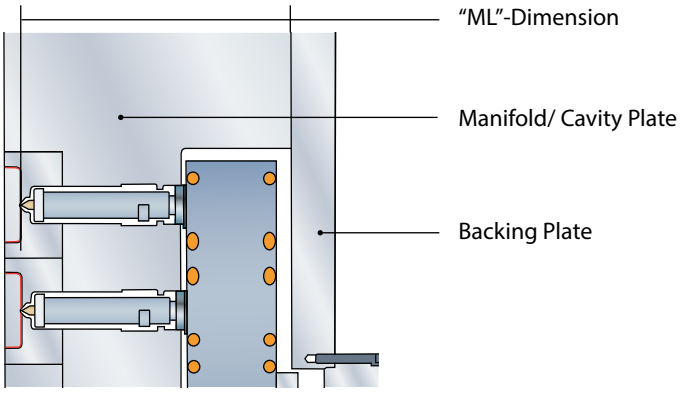

Step 4a - Route Wires for Manifold Heaters, Manifold TCs, Sprue Heater, and Sprue TC on Injection Face of Manifold Plate



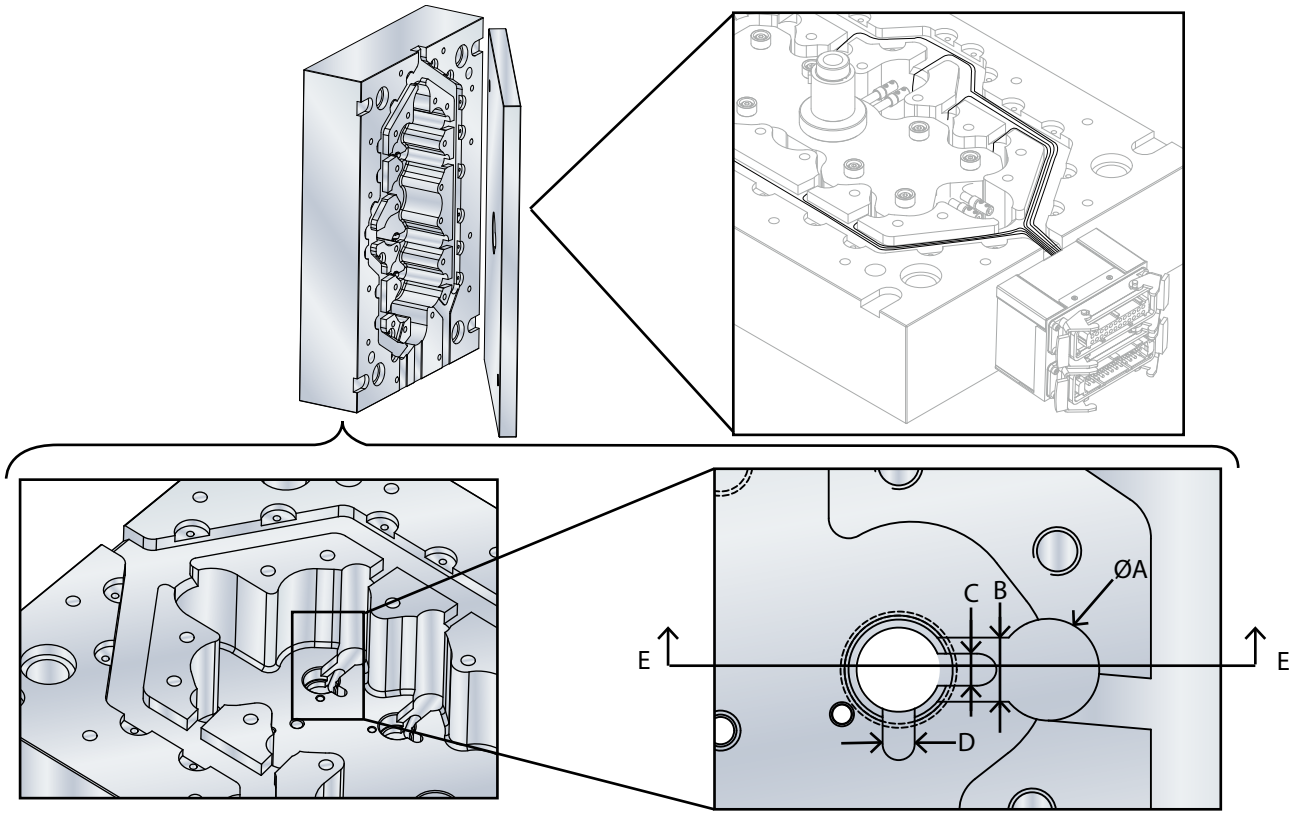
# Add Wire Channels and Electrical

If integrated cavity and manifold plate, the following wire routing is recommended.

*Note: This method is not suitable for Ultra 250, Ultra 350 and Ultra 500 high pressure systems*

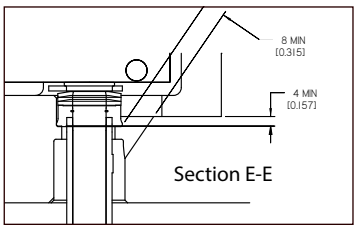



## Step 3b - Route Wires for Nozzles and any Manifold TCs on Injection Face of Manifold Plate

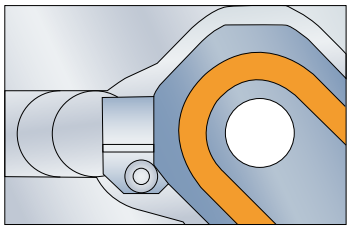



| Nozzle | A | Bmax | Cmax | D*max |
|---|---|---|---|---|
| U500 | 25.4mm [1.0"] | 12.7mm [0.5"] | 8mm [0.31"] | 8mm [0.31"] |
| U750 | 25.4mm [1.0"] | 16mm [0.63"] | 12.7mm [0.5"] | 12.7mm [0.5"] |
| U1000 | 25.4mm [1.0"] | 16mm [0.63"] | 12.7mm [0.5"] | 12.7mm [0.5"] |

*This feature is for condensation drainage from the nozzle bore



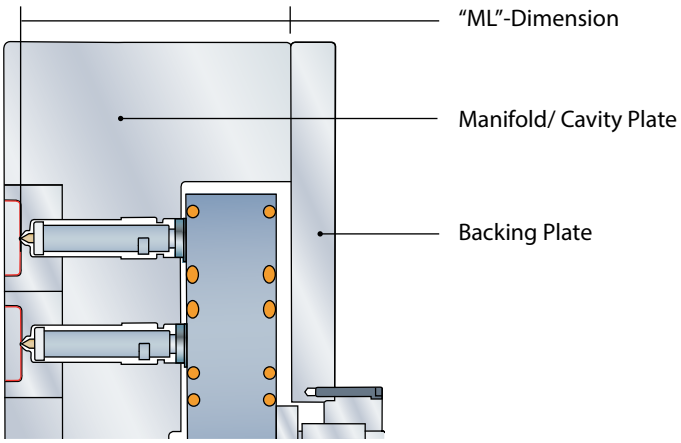

8mm [0.31"] min clearance for wires



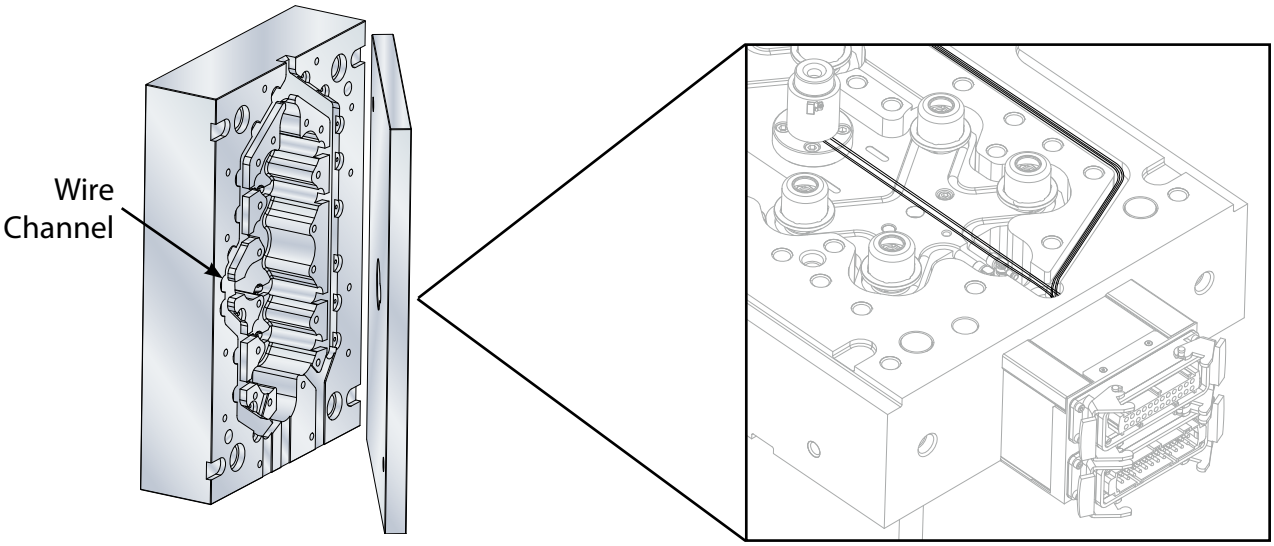
Add tap and wire clamp

# Add Wire Channels and Electrical

If integrated cavity and manifold plate, the following wire routing is recommended.



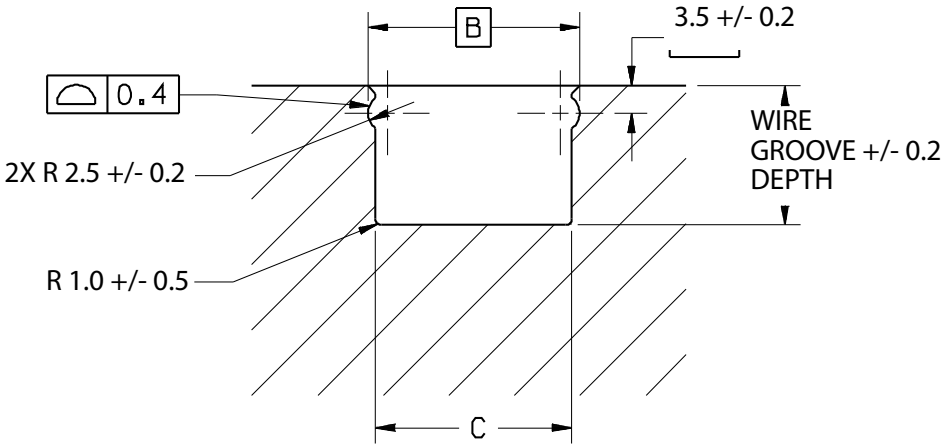

## Step 4b - Route Wires for Manifold Heaters and any Manifold TCs on Injection Face of Manifold Plate




## Step 5a – Add Wire Clip Installations (if using Wire Clamps see Step 5b)

Note: Wire clips are available from Husky

| B | C +/-0.2 |
|---|---|
| 14.7 | 12.7 |
| 21.1 | 19.05 |
| 27.4 | 25.4 |
| 40.1 | 38.1 |

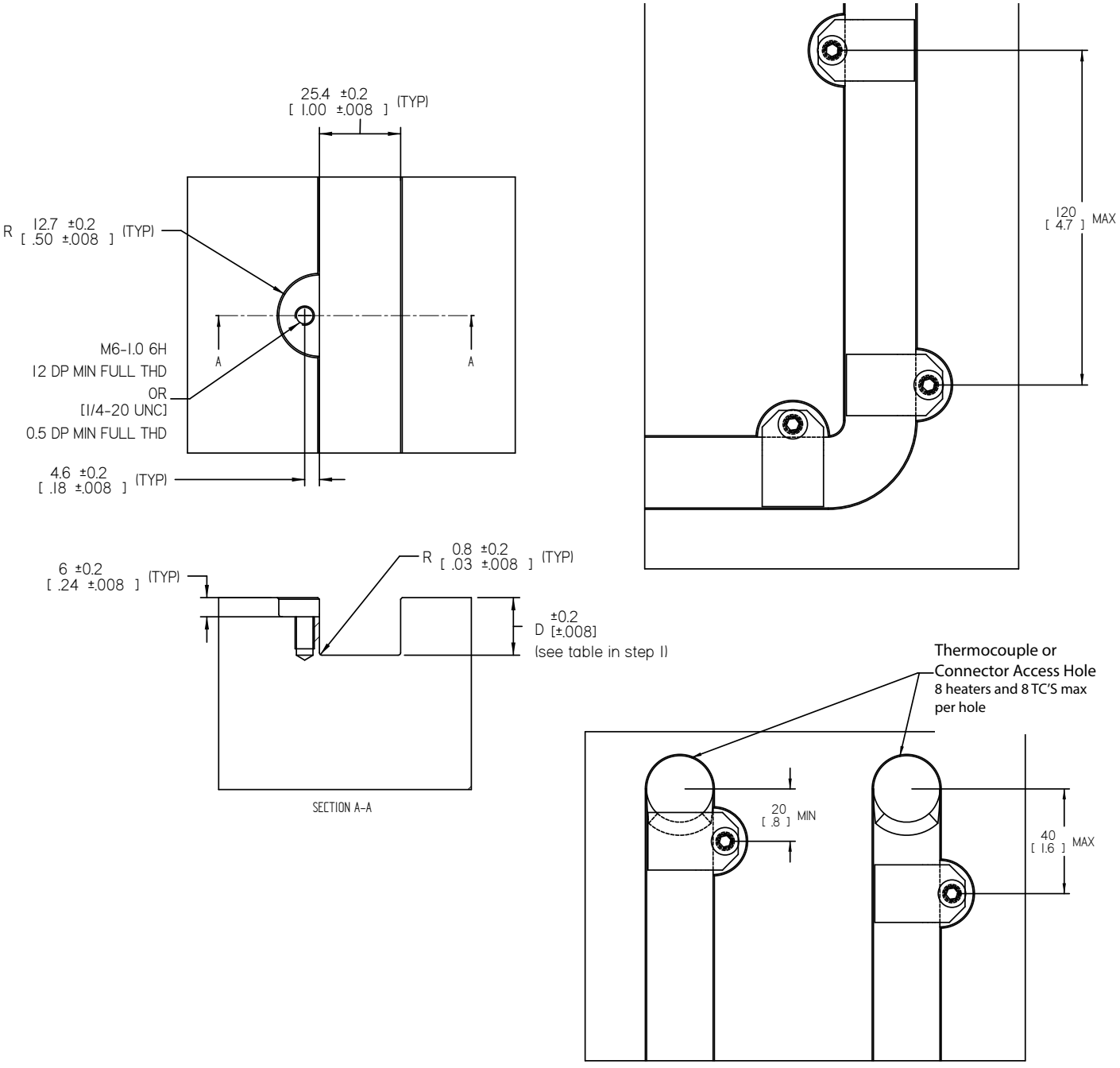


# Add Wire Channels and Electrical

## Step 5b – Add Wire Clamp Installations (if using Wire Clips see Step 5a)

Clamps should be positioned as close to the nozzle as possible and at every bend and/or interval of 120mm [4.7”]

Wire clamps for 25.4mm [1.0”] wire groves are available for Husky Manifold Systems (Suggested quantity: 40 or 2 times the number of drops, whichever is greater)



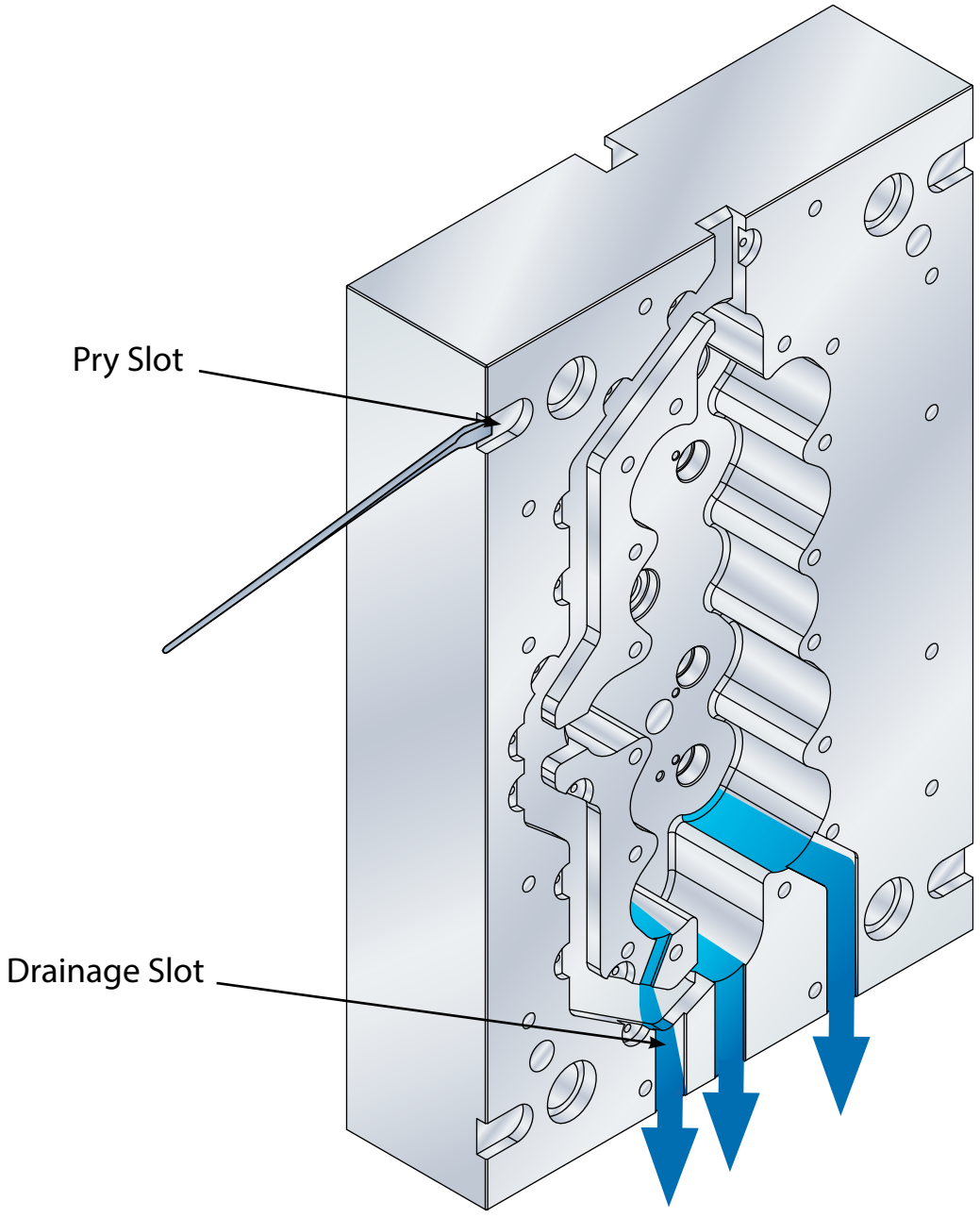
# Add Pry Slots and Drainage

## Step 1- Add Pry Slots

Pry slots allow easier separation of the plates. Position pry slots between all plate interfaces, near plate alignment features (guide pins, alignment dowels)

## Step 2- Add Drainage Slots

Drain slots (also referred to as condensation slots) allow any water which condenses on the cooled plates to drain out of the hot runner. Add these slots anywhere water can pool when the tool is oriented for production - bottom of manifold pocket and wire grooves.



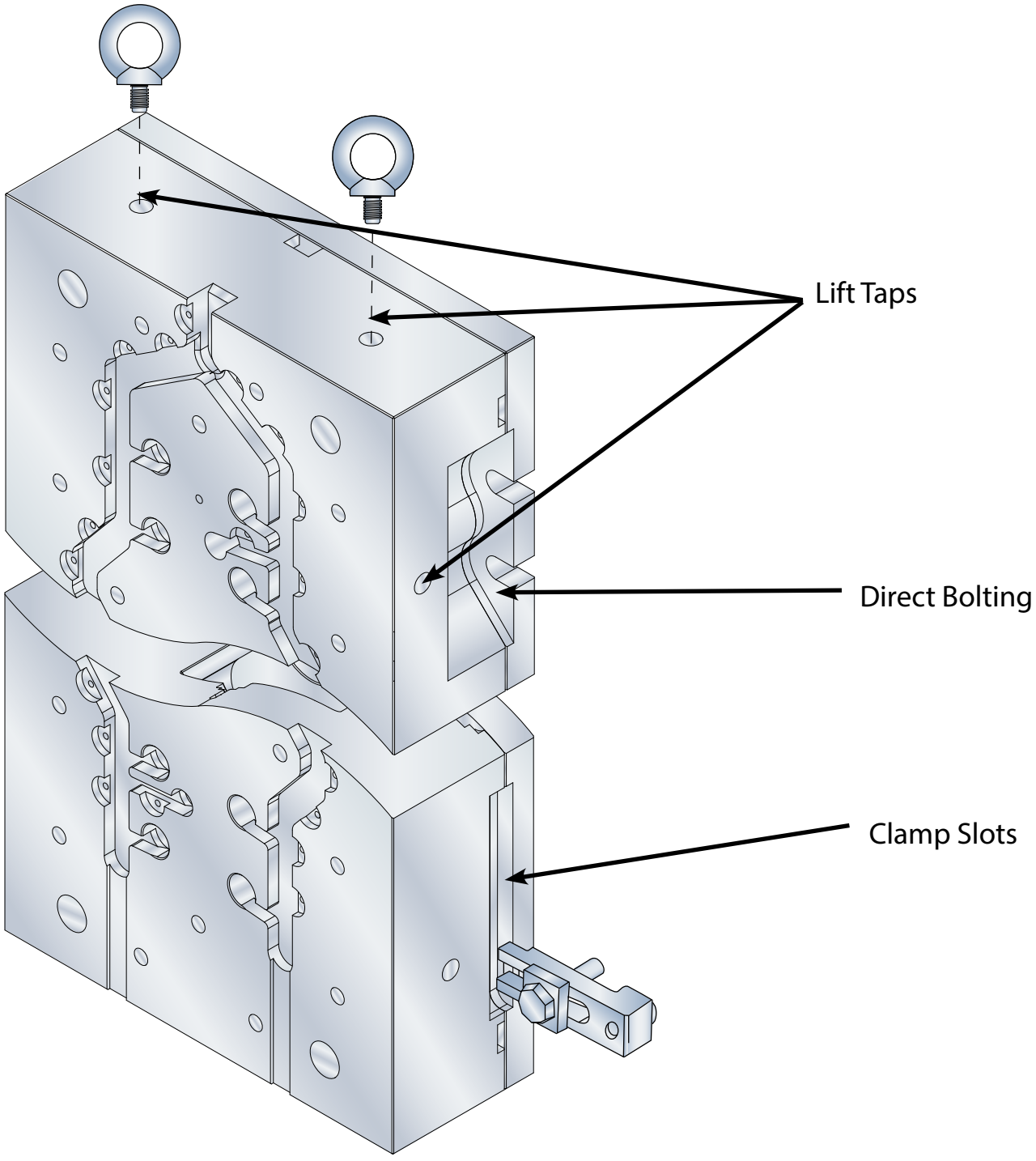
# Add Lift Taps and Platen Mounting

## Step 1- Add Lift Taps

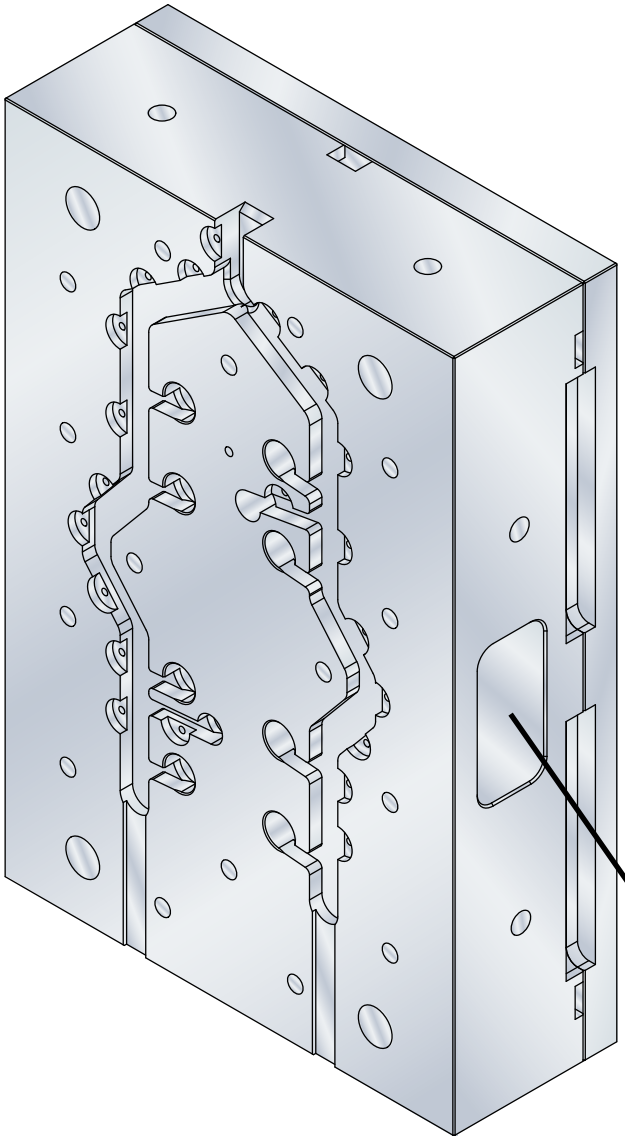
Add sufficient lift taps for handling individual plates as well as the assembly

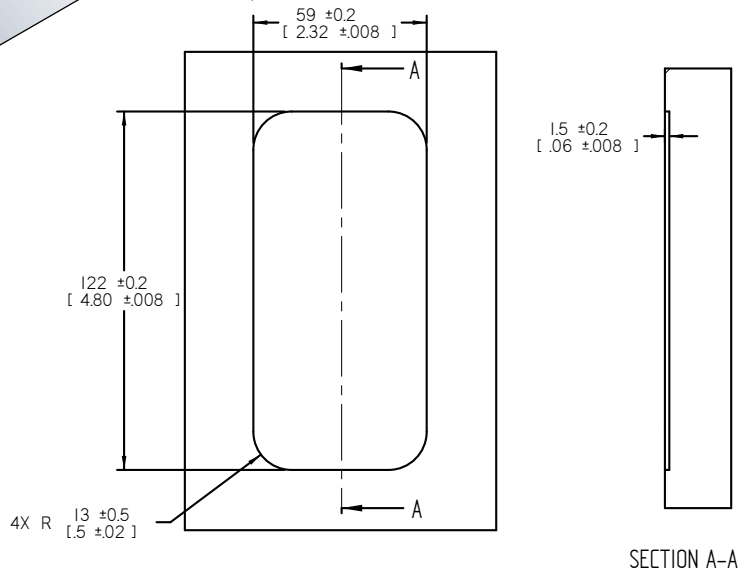
## Step 2- Add Platen Mounting

Platen mounting can either be clamp slots or direct bolting though an overhanging backing plate or cutouts



# Add Nameplate Installation







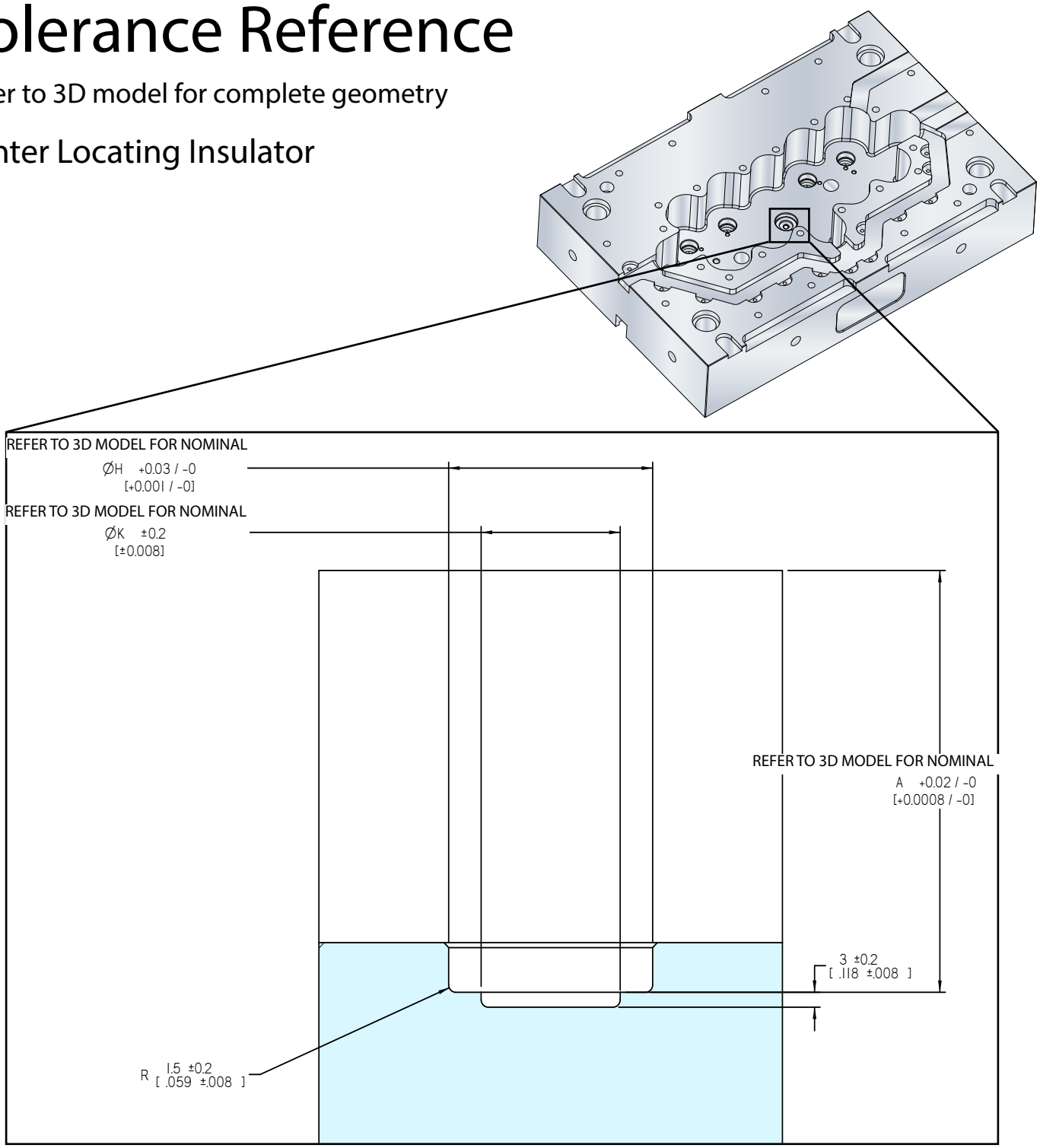


SECTION A–A

# Tolerance Reference

Refer to 3D model for complete geometry

## Center Locating Insulator



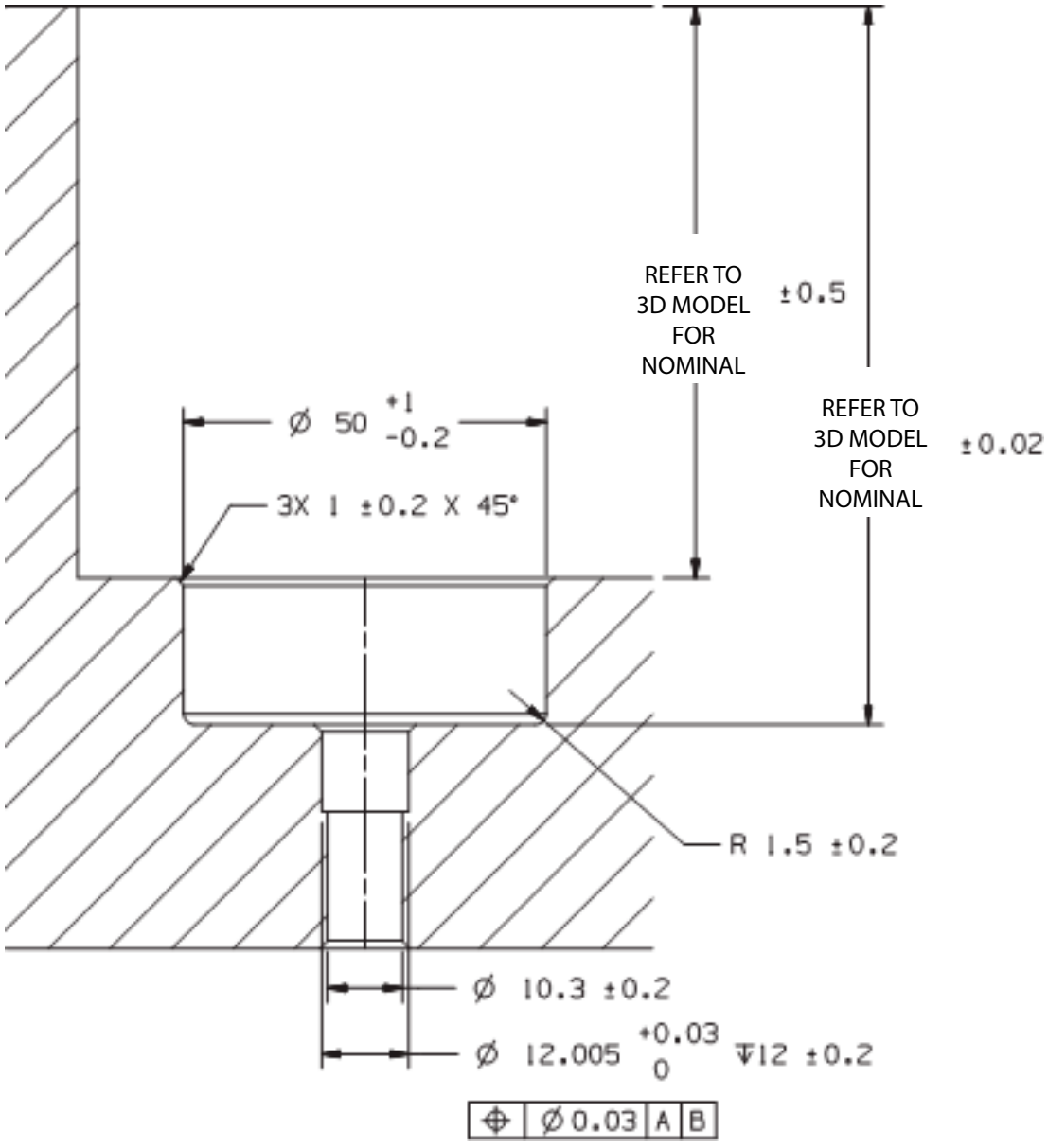

| Insulator Type | H | K |
|---|---|---|
| Small Pitch | 32.01mm [1.26″] | 20mm [0.78″] |
| Standard Pitch | 44.01mm [1.73″] | 30mm [1.29″] |
| Large Pitch | 64.01mm [2.52″] | 50mm [1.96″] |

# Tolerance Reference

Refer to 3D model for complete geometry

Center Locating Insulator

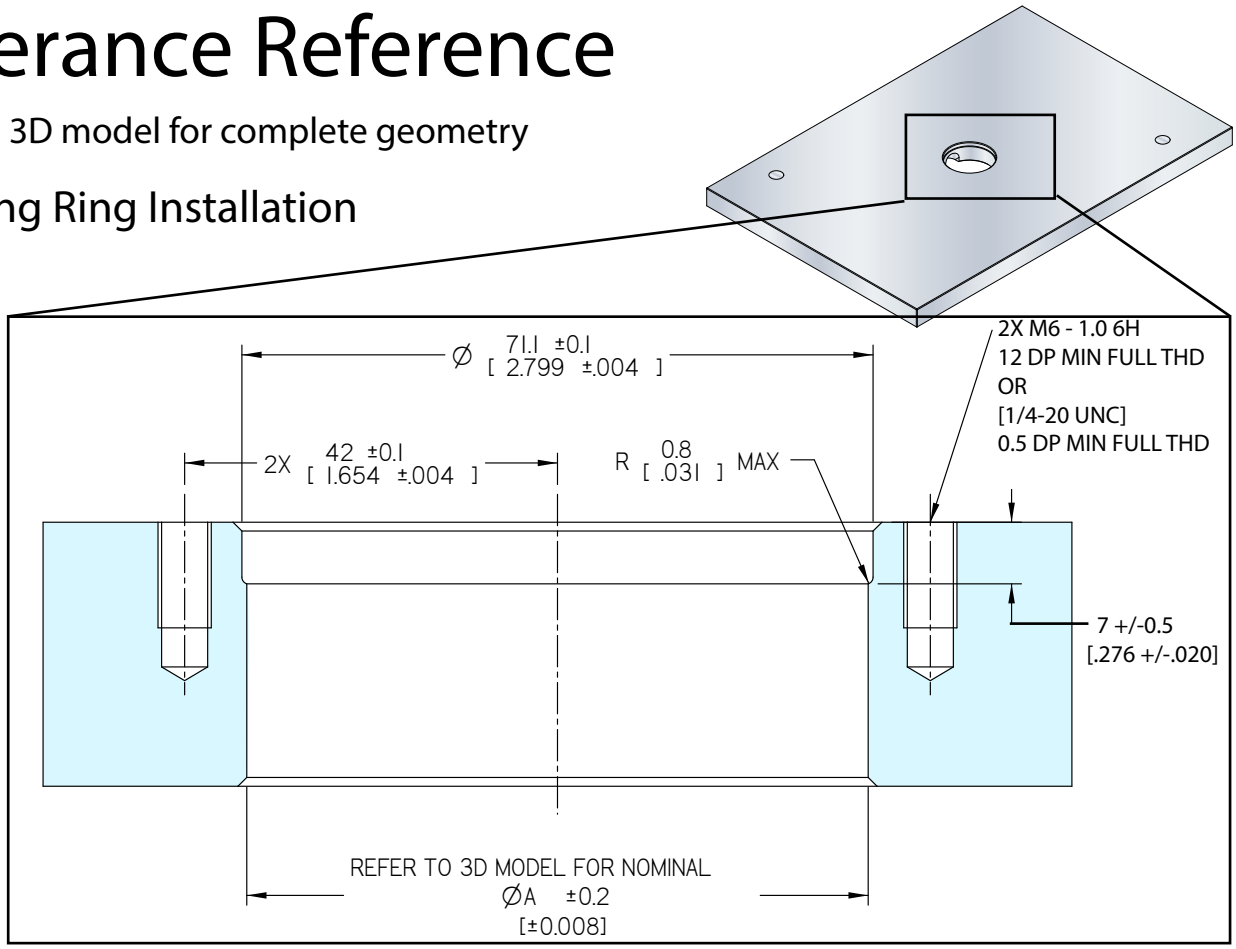
## UNIFY Specific Requirements



# Tolerance Reference

Refer to 3D model for complete geometry

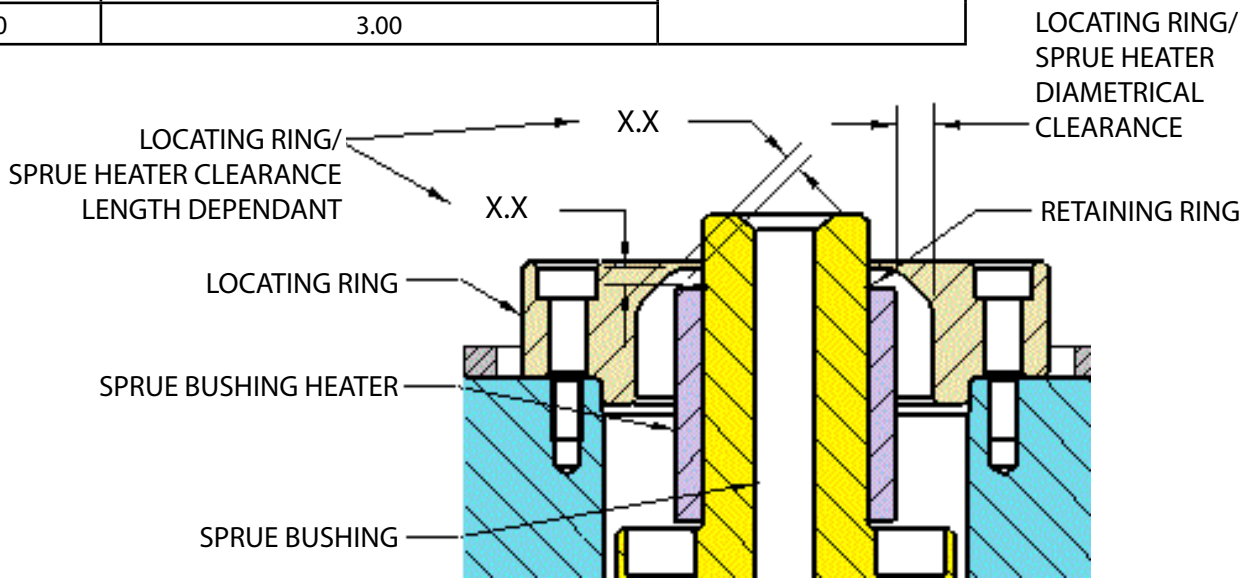
## Locating Ring Installation




## Locating Ring - Sprue Bushing Clearances

Husky recommends the diametrical clearance between the locating ring and sprue bushing to be 0.45 +0.10/-0.03 mm. Locating ring to Sprue Heater clearances should follow the table below.

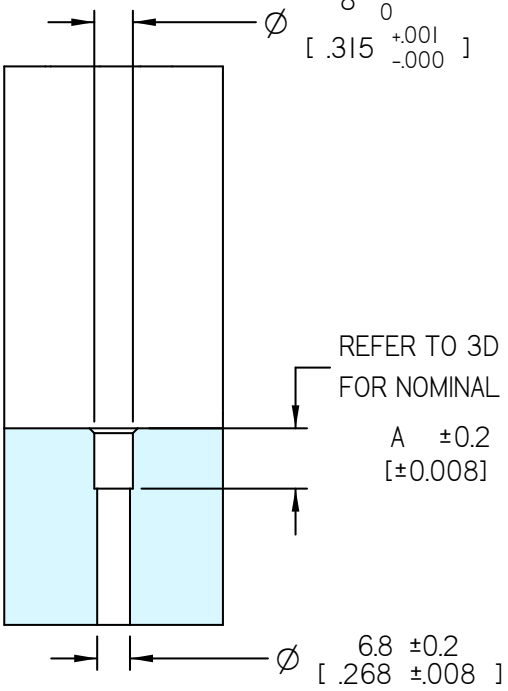
| LOCATING RING / SPRUE HEATER CLEARANCE | | |
|---|---|---|
| SPRUE BUSHING LENGTH (mm) | MINIMUM CLEARANCE (LENGTH-DEPENDENT) IN COLD CONDITION (mm) | MINIMUM DIAMETRICAL CLEARANCE (mm) |
| < 80 | 1.75 | 3.00 |
| 81-200 | 2.25 | |
| 201-300 | 2.75 | |
| >300 | 3.00 | |

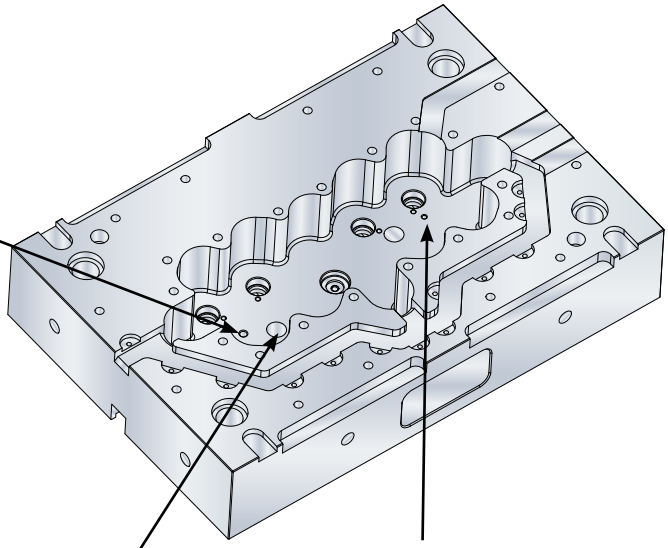


# Tolerance Reference

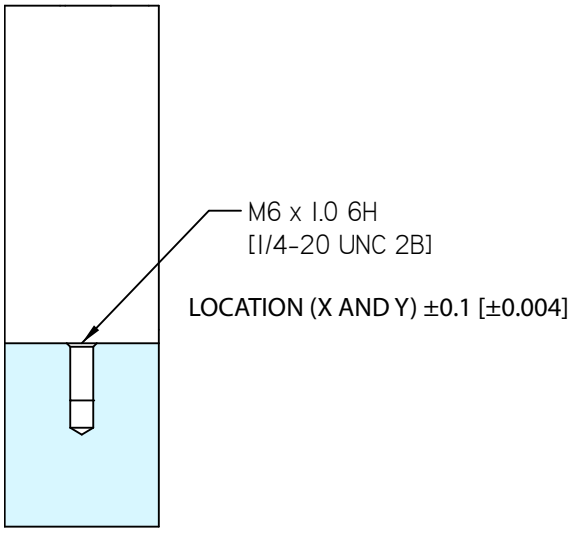
Refer to 3D model for complete geometry

## Manifold Alignment Dowel

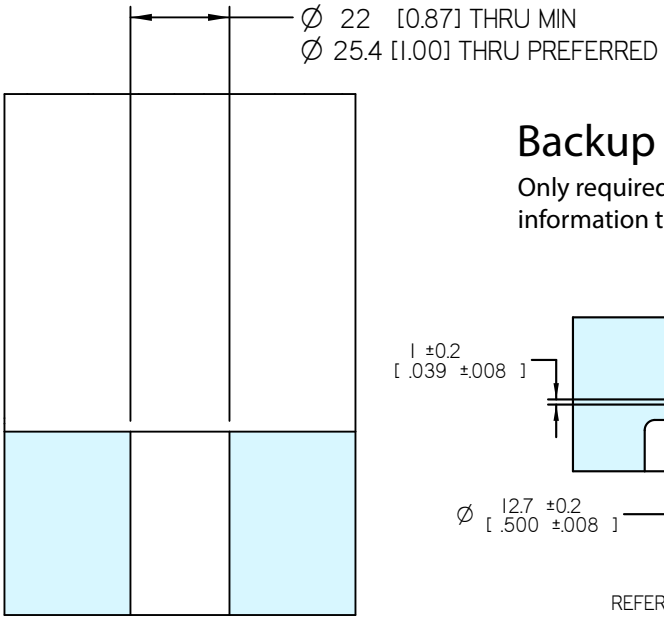


## Manifold Hold Down Tap

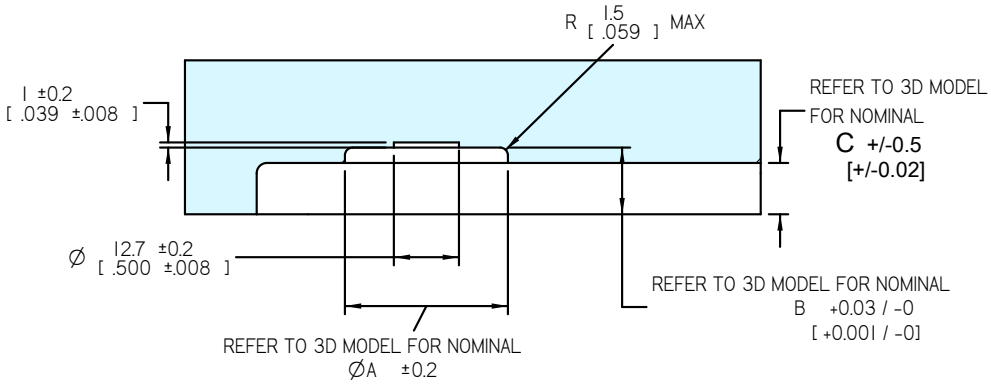



## Manifold Thermocouple Thru Hole

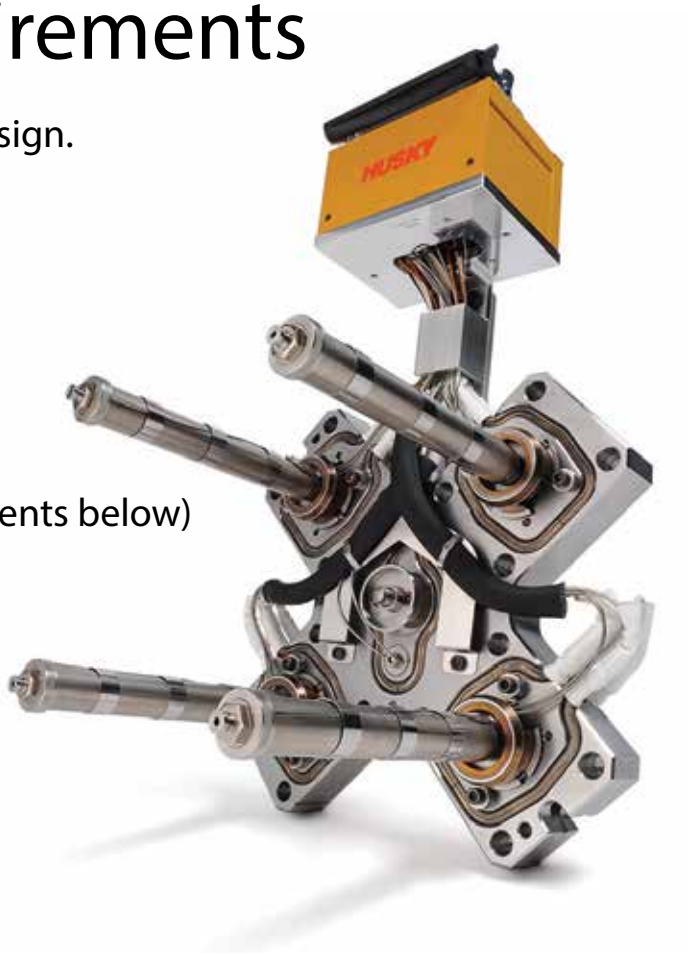



## Backup Pad Installation

Only required on select designs – refer to 3D model sent with project information to determine if required



# UNIFY Specific Requirements




UNIFY simplifies integration into the mold design.
Use this same guide, but only these steps:

1.) Install manifold pocket into plates

2.) Mold interfaces

3.) Manifold plate cooling

4.) Hot Runner plate alignment

5.) Plate bolts (Unique to UNIFY, see requirements below)

6.) Pry slots and drainage

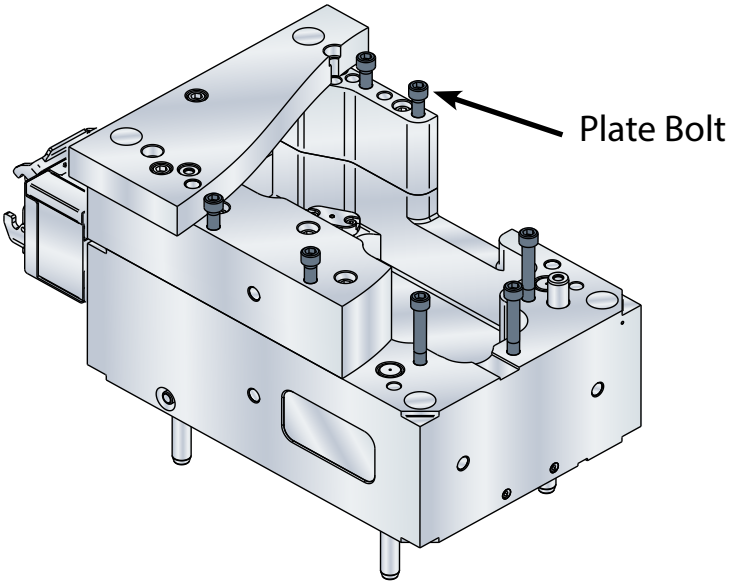
7.) Lift taps and platen mounting

8.) Nameplate

The following are NOT required for UNIFY:
- Backing plate cooling
- Air lines in backing plate
- Air cylinder installation
- Wire channels

UNIFY Plate Bolting:

Plate bolts on UNIFY Manifold Systems connect the backing plate to the manifold plate for adequate support when clamped to the machine platen. These bolts do not influence any sealing connections in the manifold. Add sufficient bolts per your mold design practices.



# Questions?

Contact your Husky Project Engineer or the general inquiry numbers below

Americas  Vermont - Tel. (802) 859 8000

Brazil  Sãn Paulo - Tel. (55) 11 4589 7200

Europe  Luxembourg - Tel. (352) 52 11 51

Asia  China – Tel. (86) 21 3850 8000