

Ultra SideGate Hot Runner

Hot Runner Service Manual

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This product manual is intended to provide information for safe operation and/or maintenance. Husky reserves the right to make changes to products in an effort to continually improve the product features and/or performance. These changes may result in different and/or additional safety measures that are communicated to customers through bulletins as changes occur.

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General Information

Telephone Support Numbers

| | | |
|----------------------|----------------------------|-------------------------|
| North America | Toll free | 1-800-465-HUSKY (4875) |
| Europe | EC (most countries) | 008000 800 4300 |
| | Direct and Non-EC | + (352) 52115-4300 |
| Asia | Toll Free | 800-820-1667 |
| | Direct: | +86-21-3849-4520 |
| Latin America | Brazil | +55-11-4589-7200 |
| | Mexico | +52-5550891160 option 5 |

For on-site service, contact your nearest Husky Regional Service and Sales office.

For non-emergency questions and issues you may also e-mail Husky at techsupport@husky.ca.

Husky Regional Service and Sales Offices

For the location closest to you, please visit www.husky.co.

Product Upgrades

Upgrades are available that can improve your output, reduce cycle times, and add functionality to your Husky equipment.

To see what upgrades are available for your Husky equipment, visit our website at www.husky.co or call your nearest Husky Regional Service and Sales Office.

Ordering Spare Parts

All spare parts for Husky equipment can be ordered through your nearest Husky Parts Distribution Center or online at www.husky.co.

Hot Runner Refurbishing

Husky offers services for repairing, modifying, and retrofitting Husky hot runners. Contact your Husky Regional Service and Sales office for details.

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Chapter 1 Introduction

This chapter describes the hot runner, training opportunities, and the available equipment manuals.

1.1 Purpose of the Equipment

Husky equipment and systems are designed for injection molding applications only, using approved materials and operating within design guidelines.

Contact your nearest Husky Regional Service and Sales office if you plan to use a Husky product for anything other than its intended use.

1.2 Restrictions of Use

Husky injection molding equipment must never be:

- operated by more than one person
- used for any purpose other than that described in [Section 1.1](#), unless otherwise approved by Husky
- used to extrude any materials not outlined in the scope of the harmonized EN201 or ANSI B151.1 standard
- operated or serviced by personnel unfamiliar with the inherent risks and necessary precautions related to injection molding equipment
- operated at temperatures higher than the maximum permissible temperature for the resin

1.3 Unauthorized Modifications

Unauthorized modifications or reconstruction of any Husky injection molding system is strictly prohibited. Modifications can be unsafe and/or void warranty.

Contact your nearest Husky Regional Service and Sales office to discuss modifications or requirements for Husky systems.

1.4 Auxiliary Equipment

Husky is only responsible for the interaction of Husky equipment and systems with auxiliary equipment when Husky is the system integrator. If auxiliary equipment is removed, the user must install proper safeguards to prevent access to the hazards.

For information about integrating non-Husky auxiliary equipment, contact your nearest Husky Regional Service and Sales office.

1.5 Documentation

A full set of manuals, drawings, schematics, certificates and other documentation are available for every Husky hot runner.

The following describes the documentation provided with each system, along with common conventions all readers should be familiar with.



IMPORTANT!

Keep all manuals in a convenient location for future reference.

1.5.1 Manuals

Husky manuals aid in the safe and proper use of Husky products. Where applicable, the manuals provide instructions on installation, operation and maintenance.

Personnel should thoroughly review all manuals provided with their Husky equipment prior to performing any tasks. Proceed with tasks only if all instructions are understood and always follow applicable workplace safety requirements.



IMPORTANT!

Images in the manuals are for reference only and may not represent specific equipment details. Refer to engineering drawings and schematics for specific details.

The following manuals are available for each hot runner system:

| | |
|------------------------|--|
| Operator Manual | Describes the basic startup, operation, shut down and daily maintenance of the hot runner |
| Service Manual | Describes the installation, startup, operation, shut down and maintenance the hot runner NOTE: Refer to the hot runner <i>Service Manual</i> for product specific instructions. |

These manuals are available online through www.husky.co.

**IMPORTANT!**

Some manuals may contain addendums that detail new or updated information. Before reading a manual, make sure to review all available addendums located at the end of the manual.

1.5.2 Engineering Drawings and Schematics

Each Husky hot runner is provided with a set of drawings and schematics specific to the hot runner. These are used for troubleshooting the hot runner and ordering spare parts.

NOTE:

Each drawing and schematic is specific to the hot runner it is provided with.

1.5.3 Safety Alert Conventions

Safety alerts highlight hazardous conditions that may arise during installation, operation or maintenance and describe methods for avoiding personal injury and/or property damage.

Depending on the severity of the hazard, safety alerts start with one of the following signal words: Danger, Warning or Caution.

**DANGER!**

The DANGER safety alert indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

**WARNING!**

The WARNING safety alert indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION!

The CAUTION safety alert indicates a potentially hazardous situation that, if not avoided, could result in property damage.

Other non-safety related alert types used in the manuals highlight important information needed by the user to install, operate or maintain the equipment properly. They may also, in some cases, describe best practices, offer an expanded explanation, or reference a related section in the manual.

Non-safety related alerts start with one of the following signal words: Note or Important.

NOTE:

The NOTE alert is used to add information to a subject that does not fit within the general flow of the document.

**IMPORTANT!**

The IMPORTANT alert is used to highlight important steps, conditions, or considerations related to the subject.

1.6 Training

All designated operators and maintenance personnel must be fully trained before using or servicing Husky injection molding systems.

If training is required, visit www.husky.co or contact your nearest Husky Regional Service and Sales office to learn more about Husky's training solutions.

**IMPORTANT!**

It is the obligation of the employer to properly train and instruct all personnel in the safe methods of operation and maintenance. Manuals and other reference material, which have been prepared by Husky for the operation and maintenance of Husky equipment, do not in any way absolve the employer from fulfilling these obligations and Husky disclaims liability for injury to personnel which is attributable to the employer's failure to do so.

1.7 Nameplates

Nameplates are affixed to the operator's side of the mold and hot runner for quick identification of the equipment type, source and general specifications.

**IMPORTANT!**

The mold and hot runner nameplates must never be removed. The information on the nameplates is necessary for mold selection, setup, parts ordering and troubleshooting.

Immediately order a new nameplate for the mold or hot runner if it is missing or damaged.

1.7.1 Hot Runner Nameplate

Every hot runner nameplate lists the following information:

- the location where the hot runner was manufactured
- the project number
- the material type allowed to be used in the hot runner
- the melt and mold temperatures
- electrical requirements and specifications

NOTE:

Other details and specifications may be required.

**IMPORTANT!**

Each hot runner is designed to process a specific type and grade of resin/filler based on the customer's requirements. Use of any other type or grade of resin/filler could affect part quality and/or the performance of the hot runner. Before using a different type or grade of resin/filler, contact Husky.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Never operate the hot runner outside of the melt and mold temperatures indicated on the nameplate. Internal resin leakage or component damage could occur.

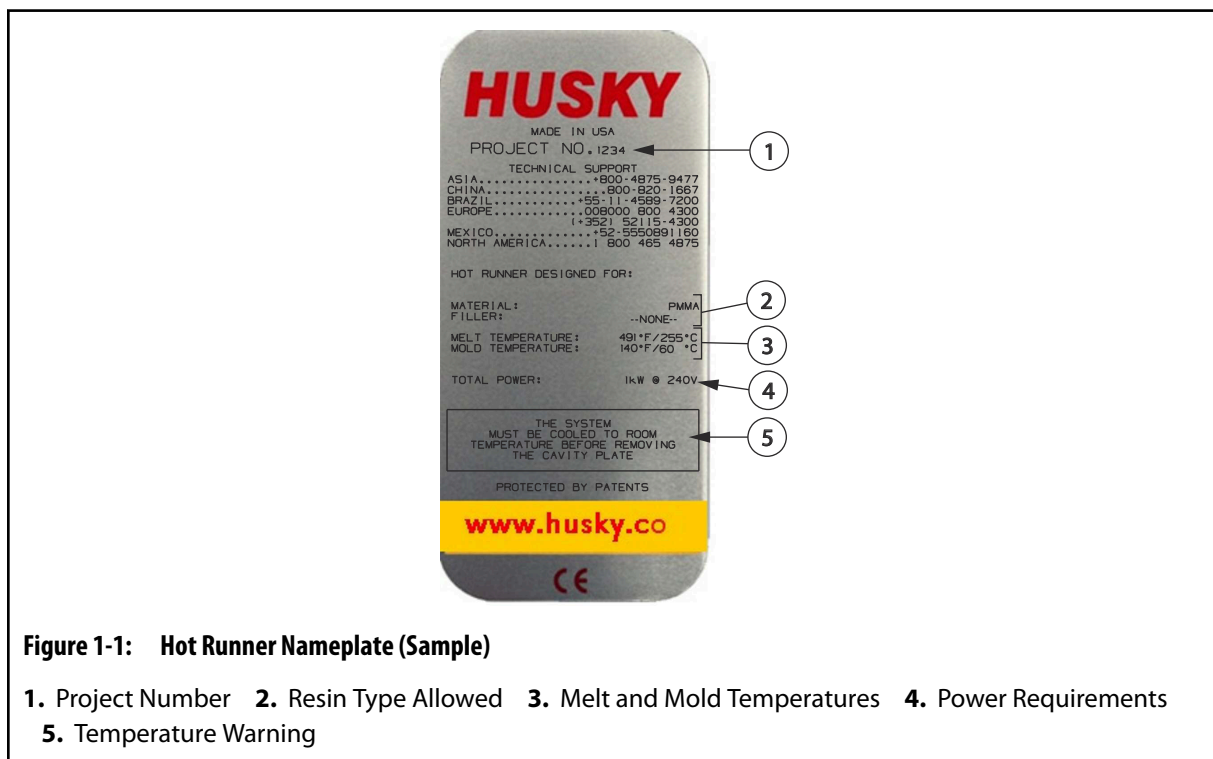


Figure 1-1: Hot Runner Nameplate (Sample)

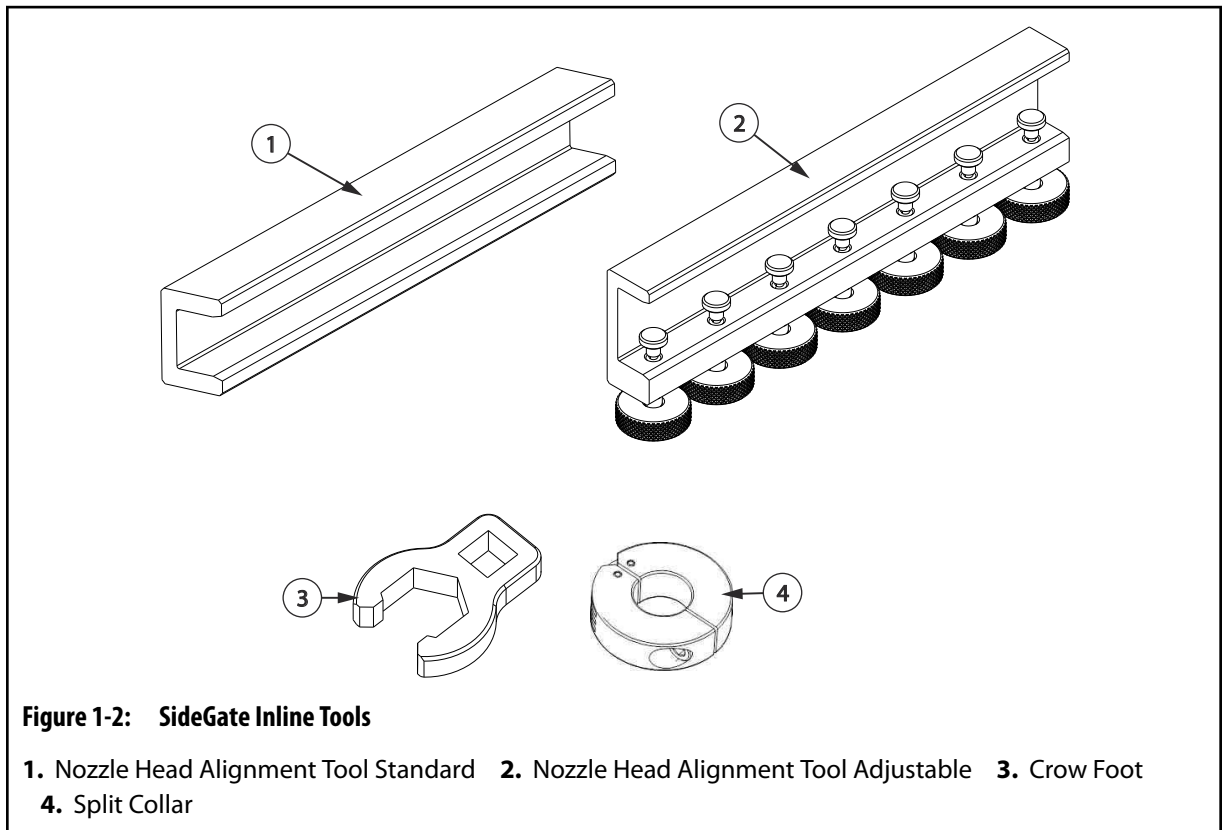
- 1.** Project Number **2.** Resin Type Allowed **3.** Melt and Mold Temperatures **4.** Power Requirements
5. Temperature Warning

1.8 Special Tools

The following sections list various component-specific tools developed by Husky for use during maintenance of hot runner systems. Contact Husky to order special tools applicable to your hot runner system.

1.8.1 SideGate Inline Tools

| Description | Part Number |
|---------------------------------------|-------------|
| Nozzle Head Alignment Tool Standard | 8417582 |
| Nozzle Head Alignment Tool Adjustable | 8496830 |
| Crows Foot (For Retainer Nut) | 7950019 |
| Split Collar | 8079039 |



1.8.2 Thermocouple Wire Stripping Tools

| Description | Part Number |
|----------------------------------|-------------|
| Strippers for Thermocouple Wires | 4240042 |

1.8.3 Single Probe Thermocouple Removal Tools

| Description | Part Number |
|--------------------|-------------|
| 11 mm Split Socket | 4395427 |

1.8.4 Crimping Tools for Contact Pins (25 or 64 Pin Connectors)

| Description | Part Number | |
|--------------|---|---------|
| Crimp Tool | 2292562 | |
| Locator | 2292574 | |
| Removal Tool | 534645 | |
| Crimp Dies | 0.5 to 1.5 mm ² (20 to 16 AWG) ^[1] | 238569 |
| | 4.0 to 10 mm ² (12 to 8 AWG) ^[1] | 2292575 |
| | 0.14 to 4.0 mm ² (26 to 12 AWG) ^[2] | 2292576 |
| | 0.14 to 0.5 mm ² (26 to 20 AWG) ^[1] | 2748316 |
| | 1.5 to 2.5 mm ² (16 to 14 AWG) ^[1] | 2748326 |

^[1] Stamped crimp pins.

^[2] Machined crimp pins.

Chapter 2 Safety Summary

This chapter describes the general requirements and conditions for safe installation, operation and maintenance of the mold and hot runner.

**IMPORTANT!**

Personnel must read, understand and follow all safety precautions.

**IMPORTANT!**

Personnel must follow applicable industry and regulatory safety requirements for safe installation, operation and maintenance of equipment.

2.1 Qualified Personnel

Only fully trained and qualified personnel should be permitted to maintain equipment. Qualified personnel must have demonstrated skills and knowledge related to the construction, installation and operation of the injection molding equipment and have received safety training on the hazards involved.

2.2 Safety Guidelines

Personnel operating, installing, maintaining or servicing Husky equipment must adhere to safe working practices that are in compliance with the following guidelines:

- Lockout and tag electrical, pneumatic and hydraulic energy sources before servicing the mold/hot runner or entering the mold area
- Do not operate the mold/hot runner if scheduled preventive maintenance has not been performed
- Do not use a magnetic platen without approval from Husky and the magnetic platen supplier/manufacture
- Do not operate a hot runner outside the maximum melt and mold temperatures specified on the hot runner nameplate

2.3 Safety Hazards

Some common safety hazards associated with injection molding equipment are:

- Mechanical
- Electrical
- Burn
- High pressure (hydraulic system pressure and molten material spray)
- Slip, trip or fall
- Lifting
- Gas, vapor and dust emissions
- Noise

2.3.1 Mechanical Hazards

- **Worn Hoses and Safety Restraints**
Regularly inspect and replace all flexible hose assemblies and restraints.
- **Cooling Water Hoses**
Cooling water hoses degrade over time and need to be replaced on a yearly basis. Degraded hoses become brittle and can break or separate from the fitting when manipulated. To minimize the risk of failure, inspect the hoses regularly and replace as required.
Wait until the machine has cooled down before servicing cooling water hoses.
- **Seized Screws or Plugs**
If screws or plugs cannot be removed by normal methods using standard tooling and force, there is a high possibility these items have become seized; contact Husky for repair recommendation.



WARNING!

Mechanical and/or flying debris hazard - Tool breakage: risk projectile debris, serious injury and/or mechanical damage. Do not use excessive force and/or use tools beyond their designated limits. Do not use torque multiplying bars. Failure of tools may produce fragments that can become projectiles that may cause injury. For seized parts, consult Husky for safe disassembly instructions.

NOTE:

Manifold plugs are not a field repairable item and should never be removed. These items can only be serviced at a Husky manufacturing location.

2.3.2 Burn Hazards

- **Hot Surfaces**
The mold area, auxiliary mold equipment, and injection unit heating elements have numerous high temperature surfaces. At normal operating temperatures, contact with these surfaces will cause severe skin burns. These areas are clearly marked with safety signs. Wear personal protective equipment when working in these areas.

- **Molten Material**
Never touch process material purged or otherwise flowing from the nozzle, mold, hot runner or feed throat area. Molten material can appear cool on the surface, but remain very hot on the inside. Wear personal protective equipment when handling purged material.

2.3.3 High Pressure Hazards



WARNING!

Burn and hot resin spray hazard – risk of death, serious injury and/or damage to the hot runner. All nozzle and sprue heaters (if equipped) must be turned on when manifold heaters are turned on. Failure to do so could result in generation of dangerous pressure levels in the manifold, resulting in component failure and/or sudden release of hot resin.

Pressure inside the hot runner manifold(s) can increase to dangerous levels if the nozzle and sprue heaters (if equipped) are not turned on before or at the same time as the nozzle sprue.

The pressure is generated when the injection nozzle sprue is plugged with frozen resin and the residual resin in the manifold is heated. This pressure can release suddenly causing the resin plug to eject from the sprue and hot resin to spray from the nozzle tips. The risk of serious burn injuries as a result is increased.

Moisture that infiltrates and is trapped in the hot runner molten material can also increase the risks of this potential hazard. If the temperature of the water in the molten material becomes greater than 400 °C (725 °F), the pressure of this trapped water can be significant enough to rupture the metal housing and cause serious injury to personnel.

To avoid this hazard, do the following:

1. Always make sure all nozzle and sprue heaters (if equipped) are turned on any time manifold heaters are turned on outside of the mold. The nozzle and sprue heaters can be turned on independently of the manifold heaters, however, it is recommended that they be heated first or slaved to the manifold heaters so they heat up in unison.
2. Always make sure the nozzle tips are open and the nozzle housings are dry prior to applying heat to the manifold.



IMPORTANT!

In the event of water leaking onto or into the hot runner, the nozzle tips must be removed (cold) and the plastic in the nozzles drilled out to ensure they are open to atmosphere. This can be done using a standard twist drill with the cutting edges removed to prevent damage to the melt channel.

Replace the cavity plate prior to heating the system.

2.3.4 Electrical Hazards

- **Power Supply**
Molding equipment draws high amperage current at high voltage. The electrical power requirements are indicated on the nameplate and in the electrical schematics. Connect equipment to a suitable power supply as specified in the electrical schematics and in compliance with all applicable local regulations.
- **Water**
Water on the hot runner can be in close proximity to electrical connections and equipment. This can lead to a short circuit, resulting in serious electrical damage to the equipment. Always keep water lines, hoses, and hose fittings in good condition to avoid leaks.

2.3.5 Gas, Vapor and Dust Emissions

Certain processed materials release harmful gas, vapors or dust. Install an exhaust system according to local codes.

2.3.6 Slip, Trip or Fall Hazards

Do not walk, stand, climb or sit on machine surfaces not approved for safe access.

Do not step on the tie bar or any surfaces with grease and/or oil.

Use a safety approved platform, walkway and step ladders designated to access areas that are not accessible from the floor.

2.3.7 Lifting Hazards

When lifting equipment, use suitable lifting devices, proper balancing techniques and designated lifting points. Refer to the installation details, and to handling and lifting instructions. Do not exceed the rated capacity of the lifting equipment.

2.4 Safety Signs














Safety signs clearly mark potentially hazardous areas in or around equipment. For the safety of personnel involved in equipment installation, operation and maintenance, use the following guidelines:






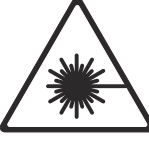



- Verify that all signs are in the proper locations. Refer to the drawing package for details.
- Do not alter signs.
- Keep signs clean and visible.
- Order replacement signs when necessary. Refer to the drawing package for part numbers.

The following safety symbols may appear on safety signs:

NOTE:

Safety signs may include a detailed explanation of the potential hazard and associated consequences.

| Safety Symbol (ANSI) | Safety Symbol (ISO) | General Description of Symbol |
|---|---|---|
|  | | <p>General</p> <p>This symbol indicates a potential personal injury hazard. It is usually accompanied by another pictogram or text to describe the hazard.</p> |
|  | | <p>Hazardous Voltage</p> <p>This symbol indicates a potential electrical hazard that will cause death or serious injury.</p> |
|  |  | <p>High Pressure Molten Material</p> <p>This symbol indicates the presence of a high pressure molten material hazard that could cause death or severe burns.</p> |
|  |  | <p>Lockout/Tagout</p> <p>This symbol identifies an energy source (electrical, hydraulic or pneumatic) that must be de-energized before maintenance is performed.</p> |
|  |  | <p>Crushing and/or Impact Points</p> <p>This symbol indicates a crushing and/or impact area that could cause serious crushing injury.</p> |
|  |  | <p>High Pressure</p> <p>This symbol indicates a heated water, steam or gas hazard that could cause severe injury.</p> |
|  |  | <p>High Pressure Accumulator</p> <p>This symbol indicates the sudden release of high pressure gas or oil could cause death or serious injury.</p> |
|  | | <p>Hot Surfaces</p> <p>This symbol identifies the presence of exposed hot surfaces that could cause serious burn injuries.</p> |

| Safety Symbol (ANSI) | Safety Symbol (ISO) | General Description of Symbol |
|---|---|---|
|  | | <p>Slip, Trip or Fall Hazard This symbol indicates a slip, trip or fall hazard that could cause injury.</p> |
|  | | <p>Do Not Step This symbol identifies a location that should not be used as a step because it may be a slip, trip or fall hazard and could cause injury.</p> |
|  | | <p>Crushing and/or Shearing Hazard This symbol indicates the presence of a crushing and/or shearing hazard at the rotating screw that could cause serious injury.</p> |
|  |  | <p>Read Manual Before Operation This symbol indicates that qualified personnel should read and understand all instructions in the equipment manuals before working on the equipment.</p> |
|  | | <p>Class 2 Laser Beam This symbol indicates a laser beam hazard that could cause personal injury with prolonged exposure.</p> |
|  |  | <p>Barrel Cover Grounding Strap This symbol indicates an electrical hazard related to the barrel cover grounding strap that could cause death or serious injury.</p> |
|  | | <p>Do Not Grease This symbol indicates greasing is not required under normal operating conditions. Greasing could cause equipment failure.</p> |

2.5 Lockout and Tagout

A lockout/tagout procedure in accordance with local codes must be performed on the machine, controller and auxiliary equipment before any maintenance activities are performed while in the machine or connected to an external energy source.



WARNING!

Complete the Lockout/Tag out of all energy sources in accordance with applicable local codes before performing maintenance activities. Failure to do so could result in serious injury or death. Refer to the machine and associated equipment manufacturer’s manual for instructions.

Only qualified personnel should be permitted to install and remove locks and tags.





Lockout and tagout includes: the isolation of energy; depletion of stored energy; and prevention of re-energization from all energy sources.



2.6 Personal Protective Equipment and Safety Equipment

Personal injury can be avoided when personnel wear appropriate protective gear and use special safety equipment. The following describes the safety gear and equipment that should be used when working with the machine and any auxiliary equipment.

2.6.1 Personal Protective Equipment (PPE)

Wear appropriate personal protective equipment when working on or near equipment. Standard personal protective equipment includes:

| Item | Description |
|---|---|
|  | <p>Safety Glasses For protecting the eyes from flying objects/particles, heat, sparks, splash from molten material, and more.</p> |
|  | <p>Face Shield For protecting the entire face area from flying objects/particles, heat, sparks, splash from molten material, and more.</p> |
|  | <p>Heat Resistant Gloves For protecting the hands from extreme heats.</p> |
|  | <p>Hearing Protection For protecting the ears from loud ambient noise.</p> |

| Item | Description |
|---|---|
|  | <p>Safety Shoes For protecting the feet from electrical shocks, crushing hazards, puncture hazards, splash from molten material, and more.</p> |
|  | <p>Non-Melting Natural Fiber Pants and Long Sleeved Shirt For protecting the body from abrasions, cuts, and potential splash from molten material.</p> |

2.6.2 Safety Equipment

Use appropriate safety equipment when working on or near equipment.

Standard safety equipment includes:

- **Exhaust Fan**
For collecting potentially harmful plastic fumes
- **Purging Container**
For containing hot resin purged from the injection unit
- **Vacuum Cleaner**
For collecting spilled resin pellets and other debris that may create a falling hazard
- **Stairs and Ladders**
For ensuring safe access to areas of the machine
- **Danger Signs**
For warning other personnel to stand clear of a component or area of the machine
- **Locks and Tags**
For preventing the use of specific systems and components
- **Fire Extinguishers**
For the expedient suppression of small fires
- **Telescopic Mirror**
For safely inspecting hot runner nozzle tips from outside the mold area
- **Brass Hammers and Brass Rods**
For safely removing dried resin deposits

2.7 Material Safety Data Sheet (MSDS)



WARNING!

Chemical hazard - Some of the chemicals used with Husky equipment are potentially hazardous and could cause injury and illness. Before storing, handling, or working with any chemical or hazardous material, thoroughly read and understand each applicable Material Safety Data Sheet (MSDS), use recommended personal protective equipment and follow the manufacturer's instructions.

The Material Safety Data Sheet (MSDS) is a technical document which indicates the potential health effects of a hazardous product. It contains safety guidelines to protect personnel, as well as information about use, storage, handling, and emergency procedures.

Always refer to the applicable Material Safety Data Sheet before doing the following:

- handling a chemical product
- disassembling any portion of Husky equipment that may result in exposure to a chemical product

Contact the material supplier to obtain a copy of the MSDS sheet.

2.8 Materials, Parts and Processing

To prevent personal injury or damage to the equipment, make sure of the following:

- The equipment is only used for its intended purpose, as described in the manuals
- The operating temperatures do not exceed the specified permissible maximum value for the resin
- The maximum temperature set point is set below the flash point of the material being processed
- Lubricants, oils, process materials and tools used on equipment meet Husky specifications
- Only authentic Husky parts are used

2.9 Safety Latch Bars

All mold and hot runner assemblies are delivered with safety latch bars installed on the operator and non-operator side of the assembly.

Safety latch bars are used to hold plates together for maintenance and installation purposes. They provide a safe means for transporting and handling the assembly, and for securing plates that are normally fastened together during normal operation.

**WARNING!**

Crushing hazard – risk of death or serious injury. Plates could separate from each other and fall during handling if not properly secured. Under no circumstances are multiple plates to be handled with only one safety latch bar installed.

Safety latch bars must always be installed in pairs on diagonally opposite sides of the mold and hot runner assembly to provide equal pull on the plates.

NOTE:

Specific instructions on how to install safety latch bars are provided when needed in this manual.

2.10 Lift Bars and Swivel Hoist Rings

Every mold and hot runner assembly is equipped with tapped lift holes for lifting either the complete assembly or individual plates. Husky only supplies special lifting equipment (including a lift bar and swivel hoist rings) when required. This lifting equipment is designed specifically for the mold/hot runner assembly. When Husky provides special lifting equipment, use only Husky specified and supplied lifting equipment.

NOTE:

Separate lift bars for the hot and cold halves of the mold and hot runner assembly may be provided based on the requirements of the assembly.

**IMPORTANT!**

Make sure all lifting equipment is rated for the load and in safe operating condition. Follow the recommendations and use care when moving or handling plates or assemblies.

For instructions about lifting plates and plate assemblies and using the Husky provided lift bar and swivel hoist rings, refer to [Section 4.1](#).

NOTE:

The Husky provided lift bar, swivel hoist rings and associated hardware must be stored together while the mold, hot runner, tooling plate and CoolPik plate are in operation.

Chapter 3 Specifications

This chapter outlines the necessary temperature, electrical, air and lubricant information needed to operate and maintain the hot runner.

3.1 Weight

The full weight of the hot runner assembly is listed on the assembly drawings.

3.2 Operating Temperature

The hot runner must operate within a specific temperature range to prevent internal resin leakage and damage to internal components as the result of thermal expansion. This temperature range is listed on the hot runner nameplate as the temperature difference between the manifold and the mold.



IMPORTANT!

The temperature range is critical for the hot runner system to be able to create a proper seal. It is important the designed operating temperature window be observed at all times.

For more information about the nameplate, refer to [Section 1.7.1](#).

3.3 Electrical System Specifications

Refer to the electrical schematic for the following information:

- Control zones
- Multi-pin connector and pin positions for each heater and thermocouple wire
- Connecting heater wiring in parallel (if applicable)
- Amperage, wattage and resistance of each heater
- Keypin locations

3.3.1 Controller Requirements

The number of control zones required for the heaters will depend on the size and requirements of the basic system.

**DANGER!**

Electrical hazard – risk of serious injury, fire and/or overload of electrical components. Do not use a controller with an amperage rating less than that required by the heaters. Do not use a controller with a higher amperage rating than the connectors or cables to the hot runner.

The type of controller can be either:

- Automatic control using a thermocouple to sense the nozzle tip temperature
- Manual control where the controller is set to provide power during a percentage of time

There may be an optional switchbox for turning ON or OFF the power to individual nozzle heaters.

NOTE:

The controller output to the heaters must be set to 220 to 240 V, 50 to 60 Hz single phase.

3.3.2 Nozzle Heaters

The nozzle heaters can be controlled separately or in zones by manual controllers. Refer to the electrical schematic for the correct configuration.

3.3.3 Manifold Heaters

Whenever possible, the manifold heaters are wired in parallel and controlled by a single controller zone. The circuit will be completed either at the cable connector or at the manifold.

The heaters are connected in multiple zones if the total amperage of all the heaters connected in parallel exceeds the capacity of a single controller zone.

Each zone is connected to a separate controller zone with its own thermocouple.

3.3.3.1 Spare Thermocouple Wires

The temperature of each manifold heater zone is sensed by a J-type thermocouple.

NOTE:

Special order thermocouples may be other types.

A spare thermocouple for each zone is also be routed to the base of the multi-pin connector to minimize down time. Should the main thermocouple fail, the spare can be easily connected without having to disassemble the mold. The failed thermocouple can be replaced at the next maintenance interval.

The spare thermocouples can also be used to verify the condition of the first thermocouple should a sensing problem develop.

NOTE:

To establish proper polarity when connecting thermocouples, follow the electrical schematic. For J-type thermocouples, the white wire is positive (+) and the red wire is negative (-). This wire color coding follows the ANSI J-Type North American Standard. The color coding and wire composition for J-type thermocouples in other parts of the world may be different and produce different readings.

3.3.4 Power Fluctuation

Hot runner systems are sensitive to fluctuations in power supply voltage. The nozzle and manifold heaters are rated for 240 V. The hot runner is designed to operate at 200 V and 240 V.

NOTE:

Always refer to the hot runner nameplate on the operator's side of the clamp before installing a hot runner. Refer to [Section 1.7](#) for more information about the nameplate.

The manifold is always controlled by thermocouples and will compensate for minor voltage fluctuations.

Where the nozzle heaters are regulated by percentage timers, the heat output will be directly affected by voltage fluctuations. For example, a reduction of the voltage by only 10% will affect output (in Watts) by approximately 20%, which will reduce the nozzle temperatures considerably. Adjustment is required.

In severe cases where the stability of the power supply is known to be unreliable, it may be advisable to install an automatic voltage stabilizer rated for the power requirements of the controller.

3.4 Recommended Lubricants

The following are recommended lubricants to be used during the assembly and maintenance of Husky hot runners:

NOTE:

Husky recommends only the following lubricants and assumes no responsibility for lubricants not specified. It is the customer's responsibility when consulting with an alternate supplier to make sure a suitable equivalent is used.

NOTE:

Lubricants of inferior quality can cause premature wear of components.



WARNING!

Chemical hazard - Some of the chemicals used with Husky equipment are potentially hazardous and could cause injury and illness. Before storing, handling, or working with any chemical or hazardous material, thoroughly read and understand each applicable Material Safety Data Sheet (MSDS), use recommended personal protective equipment and follow the manufacturer’s instructions.

CAUTION!

Contamination hazard – risk of contaminating lubricants or greases. Do not mix different brands or grades of lubricants or greases. Mixing lubricants or greases can cause premature breakdown of the lubricant or grease and could result in equipment damage.



WARNING!

Poison hazard – risk of death or serious injury. Some recommended lubricants may contain toxic and/or non-ingestible additives and may not be Food and Drug Administration (FDA) approved under the United States Department of Agriculture (USDA) rating H1 (formerly AA). Consult with the lubricant manufacturer for specific details.

| Type/ Description | Trade Name | Part Number | Quantity | Used For |
|---|---|----------------|--|---|
| Static application Grease | Kem-A-Trix Fahrenheit 800 Bearing Gel | 3936720 | 113 g (4 oz) Squeeze Tube | Guide pins, alignment dowels, screw heads and threads, O-ring seals ^[1] |
| | | 3936725 | 397 g (14 oz) Grease Gun Tube | |
| High temperature Anti-seize lubricant | Loctite Nickel Anti- Seize 771 | 5541918 | 225 g (8 oz) Can | Screws installed into the manifold |
| Protective spray | LPS 2 Lubricant | 1501808 | 566 g (20 oz) Non- Aerosol Spray Bottle | Hot runner plates |
| Thread-locking fluid | Loctite 248 | 5541916 | 9 g (0.32 oz) Glue Stick | Screws that secure the manifold |

^[1] Apply only as directed. Refer to maintenance procedures and/or assembly drawings for more information.

3.5 Rust Inhibitor Specifications

Any rust inhibitor used on the mold must meet the following specifications:

| Type | Trade Name |
|------------------|------------------------|
| Protective Spray | LPS 2 Protective Spray |

3.6 Torque Specifications

Torque specifications are provided on the assembly drawings.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Use of improper torque can result in equipment damage. Always consult the assembly drawings for torque specifications.

Chapter 4 Installation and Removal

This chapter describes how to install and remove the hot runner assembly.



IMPORTANT!

The procedures contained in this chapter were written for a standard hot runner and do not take special options into consideration.

4.1 Lifting and Handling

The following procedures describe how to safely lift plates and plate assemblies.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Do not lift plates using magnetic lifting devices. These devices could potentially scratch a finely ground plate.



IMPORTANT!

Safety must be the primary consideration when lifting and moving a plate. Make sure to always use suitable lifting equipment that is inspected regularly and follow the recommendations outlined in this manual.



IMPORTANT!

Every mold and hot runner assembly is equipped with tapped lift holes for lifting either the complete assembly or individual plates. Husky only supplies special lifting equipment (including a lift bar and swivel hoist rings) when required. This lifting equipment is designed specifically for the mold/hot runner assembly. When Husky provides special lifting equipment, use only Husky specified and supplied lifting equipment. Use Husky special lifting equipment to lift only the designated mold or hot runner or component.



WARNING!

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment could fail and cause death or serious injury. Use only Husky specified or supplied lifting equipment.



WARNING!

Crushing hazard – risk of death or serious injury. Misuse of lifting equipment could lead to equipment failure and cause death or serious injury. Use Husky only specified or supplied lifting equipment for lifting the assembly or the component for which the equipment has been designated by Husky.

4.1.1 Lifting and Handling Using a Single Lifting Point

The following procedures describe how to lift and lower plates using a single lifting point.

4.1.1.1 Laying Down Plates Using a Single Lifting Point

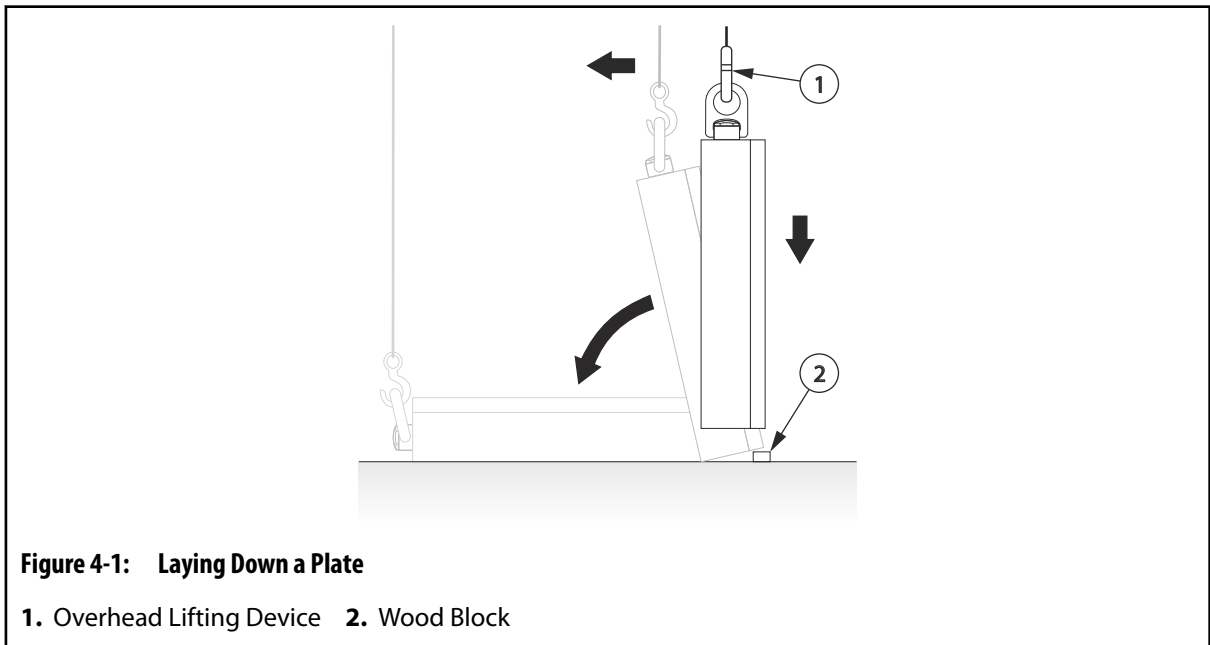
To properly lay a plate on a work surface using a single lifting point, do the following:



WARNING!

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment can fail and could cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

1. Install a lift bar or swivel hoist ring and connect it to an overhead lifting device.
 - For information about lifting using a lift bar, refer to [Section 4.1.3](#).
 - For information about lifting using swivel hoist rings, refer to [Section 4.1.4](#).
2. Lift the plate above the work surface.



3. Secure a wood block to the work surface on the side opposite the area where the plate will be laid down.

4. Lower the plate slowly onto the edge of the secured wood block.
5. Continue to slowly lower the plate until it tips over towards the work surface.
6. Lay the plate down on the work surface.

4.1.1.2 Picking Up Plates Using a Single Lifting Point

When lifting a plate that has been laid down using a single lifting point, the lifting device may go slack just as the load is in its full vertical position. This may cause the plate to swing over-center in the opposite direction.

To prevent this from happening, do the following:



WARNING!

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment can fail and could cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

1. Install a lift bar or swivel hoist ring and connect it to an overhead lifting device.
 - For information about lifting using a lift bar, refer to [Section 4.1.3](#).
 - For information about lifting using swivel hoist rings, refer to [Section 4.1.4](#).
2. Secure a wood block to the work surface near the foot of the plate. This will prevent the plate from going over-center.

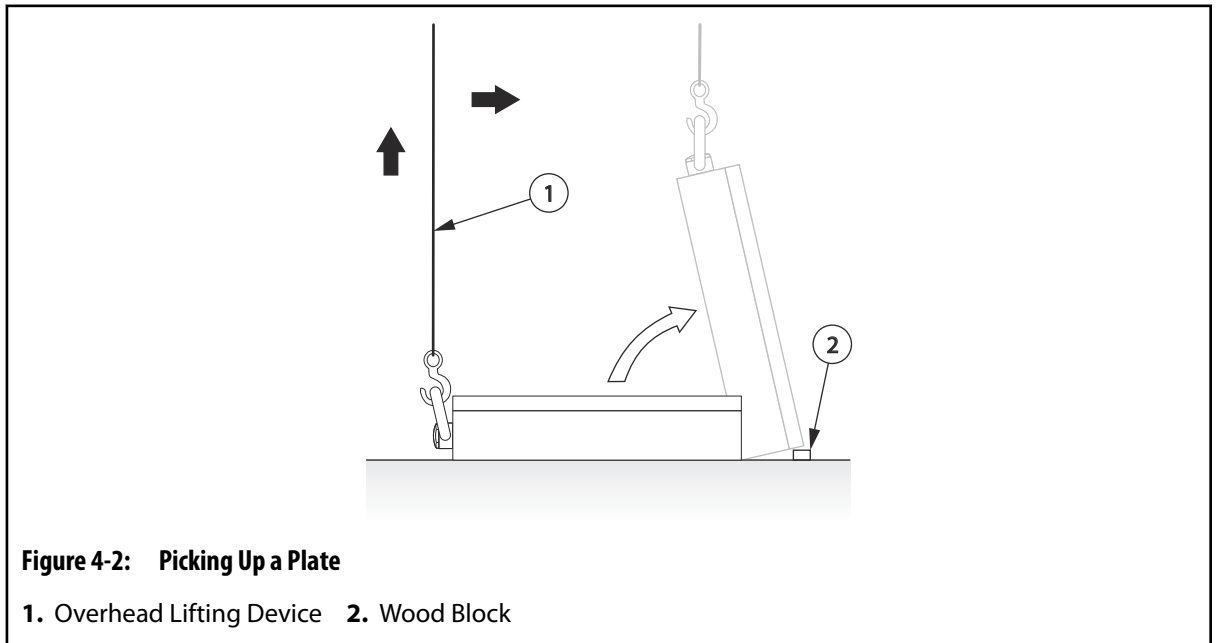


Figure 4-2: Picking Up a Plate

1. Overhead Lifting Device 2. Wood Block

3. Lift the plate until it touches the secured wood block.



WARNING!

Impact hazard – risk of serious injury. The plate could swing in a pendulum motion just as the plate is lifted off of the wood block. Lift slowly to reduce the pendulum motion. Stand clear of the possible swing area to prevent injury.

4. Continue to lift the plate, keeping the tension on the lifting cable.

CAUTION!

Mechanical hazard – risk of damage to equipment. When storing the plate, make sure it is secured in the vertical or horizontal position. Do not rest the plate against another object.

5. After the plate has stabilized, move it to a safe location and remove the wood block.

4.1.2 Lifting and Handling Using Multiple Lifting Points

To lift a plate using more than one lifting point, do the following:

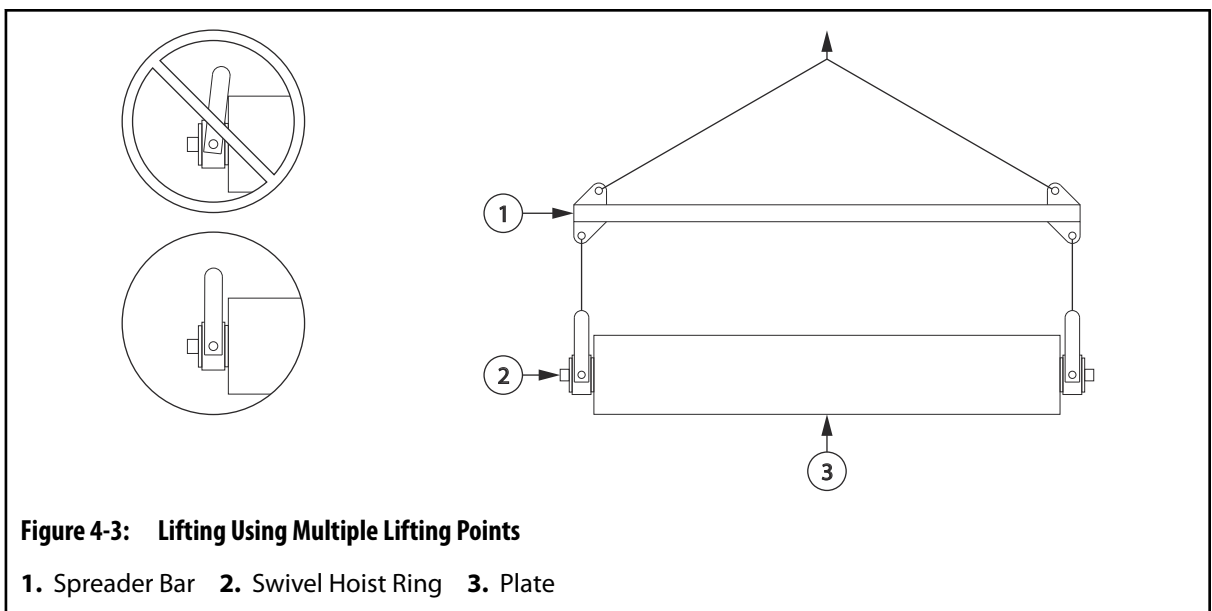


WARNING!

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment can fail and could cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

1. Install the swivel hoist rings in the designated lifting points. Make sure the swivel hoist rings are positioned on opposite sides of the plate to evenly distribute the weight when the plate is lifted vertically.

For information about lifting using swivel hoist rings, refer to [Section 4.1.4](#).



2. Connect the swivel hoist rings to an overhead lifting device. Use a spreader bar if either of the following conditions occur:
 - The pivot angle of any swivel hoist ring exceeds 90°.
 - The angle of lifting cables, slings or chains is less than 45°.
3. Lift the plate and move it to a safe location.

4.1.3 Lifting Using a Lift Bar

To properly lift plates and assemblies using a lift bar, do the following:

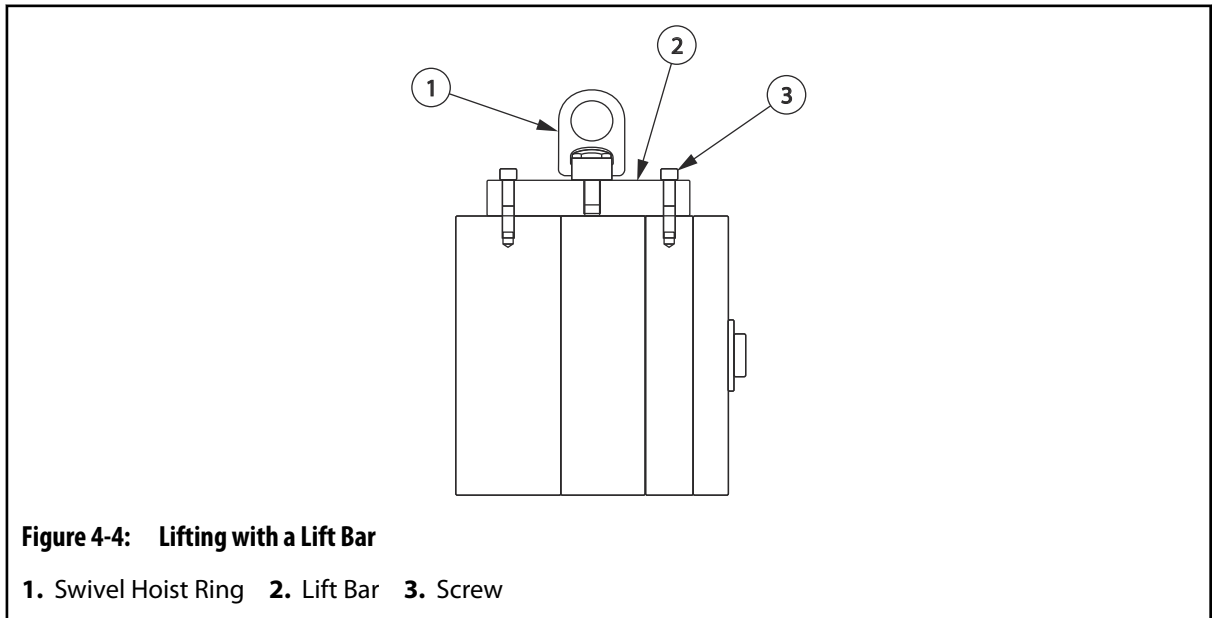
NOTE:

For the installation locations of the lift bars, refer to the hot runner for the markings “Lift Bar Only” or to the assembly drawings.

NOTE:

The maximum weight the bar can lift is stamped on the Husky lift bar. If using a lift bar that is not provided by Husky, make sure the lift bar is suitably rated for the weight of the mold/hot runner assembly.

1. Install the lift bar to the lifting holes on the top of the component.



2. Torque the hoist ring to the specified value. Refer to [Section 3.6](#) for torque requirements.
3. Attach a suitable overhead lifting device to the swivel hoist ring and lift the plate or plate assembly vertically.
4. While the mold and hot runner are in operation, store the Husky provided lifting equipment together and in a readily accessible area.

4.1.4 Lifting Using Swivel Hoist Rings

When using swivel hoist rings, remember the following:

- For the installation locations of the swivel hoist rings, refer to the hot runner for the markings “Hoist Ring Only” or to the assembly drawings.
- Always make sure the swivel hoist ring is properly torqued before lifting.
- Make sure the swivel hoist ring used can support the weight of the plate or component at the chosen angle of attack.
- Do not lift more than the rated capacity.
- Depending upon the sling angle, the applied load may be more than the weight being lifted. Two point lifting of a 1000 kg (2000 lb) weight, with a sling angle of 30°, will result in an applied load of 1000 kg (2000 lb) to each hoist ring.
- After installation, make sure the hoist ring swivels and pivots freely in all directions. The side of the ring must not contact anything.
- After installation and during operation, store the Husky provided lifting equipment together and in a readily accessible area.
- Never use a hook or other lifting device which will pry or open the “U” shaped bar on center-pull hoist rings.
- Screws must be tightened to the recommended torque values.
- Do not apply shock loads. When lifting, apply force gradually.
- Do not use spacers between the hoist ring bushing and the work piece surface.
- The work piece surface must be flat, providing complete contact for the hoist ring bushing.

Metric and Imperial swivel hoist rings are available through your nearest Husky Parts Distribution Center.

Swivel hoist rings purchased from other suppliers must meet or exceed the following specifications.

Table 4-1: General Hoist Ring Specifications

| Category | Specification |
|----------------------|---|
| Material | 4140 certified aircraft quality |
| Type | Forged hoist ring |
| Finish | Phosphate per DOD-P-16232F |
| Safety Factor | 5:1 |
| Swivel | Pivot 180° and swivel 360° |
| Thread | ISO 261 and ISO 965 - Coarse |
| Surface | Magnetic particle inspected (ASTM E709-80) |
| Certification | Individual certificate of conformance with the serial number specified on the hoist ring for traceability |

Table 4-2: Specifications for Metric Coarse Swivel Hoist Rings

| Part Number | Rated Capacity ^[1] | Torque | Thread Ø | Minimum Full Thread Depth | Pitch |
|-------------|-------------------------------|-----------------------|----------|---------------------------|-------|
| 2761800 | 1050 kg (2315 lb) | 37 N·m (27 lbf·ft) | M12 | 24 | 1.75 |
| 2770570 | 1900 kg (4189 lb) | 80 N·m (59 lbf·ft) | M16 | 32 | 2.00 |
| 2502267 | 4200 kg (9259 lb) | 311 N·m (229 lbf·ft) | M24 | 48 | 3.00 |
| 536013 | 7000 kg (15432 lb) | 637 N·m (470 lbf·ft) | M30 | 60 | 3.50 |
| 2761801 | 11000 kg (24250 lb) | 1085 N·m (800 lbf·ft) | M36 | 72 | 4.00 |
| 2761803 | 12500 kg (27558 lb) | 1085 N·m (800 lbf·ft) | M42 | 84 | 4.50 |

^[1] Minimum rated capacity at any pull angle (between 0° horizontal pull and 90° vertical pull)

Table 4-3: Specifications for Inch UNC Swivel Hoist Rings

| Part Number | Rated Capacity ^[2] | Torque | Thread Ø | Minimum Full Thread Depth | Pitch |
|-------------|-------------------------------|-----------------------|----------|---------------------------|-------|
| 2732764 | 1130 kg (2500 lb) | 38 N·m (28 lbf·ft) | 1/2 | 1.0 | 13 |
| 2732765 | 2260 kg (5000 lb) | 135 N·m (100 lbf·ft) | 3/4 | 1.5 | 10 |
| 2760517 | 4530 kg (10000 lb) | 310 N·m (229 lbf·ft) | 1 | 2.0 | 8 |
| 2732766 | 6800 kg (15000 lb) | 640 N·m (472 lbf·ft) | 1 1/4 | 2.5 | 7 |
| 2732767 | 10880 kg (24000 lb) | 1080 N·m (797 lbf·ft) | 1 1/2 | 3.0 | 6 |

^[2] Minimum rated capacity at any pull angle (between 0° horizontal pull and 90° vertical pull)

4.2 Mounting Methods

Each hot runner is designed to be mounted to the machine using a specific method. The following describes the various methods that can be used.

4.2.1 Direct Bolting

The direct bolting method uses screws to secure the hot runner to the stationary platen. The screws are either installed through the hot runner into threaded holes in the stationary platen, or through the stationary platen into threaded holes in the hot runner.

In this method, the screws are able to carry the maximum possible load while resisting the opening force of the mold.

When using the direct bolting method, adhere to the following guidelines:

- All screws must be lubricated.
- The size, quantity and spacing of the screws must be suitable for the machine.

CAUTION!

Crushing hazard – risk of damage to equipment. Screws used to secure the hot runner to the stationary platen must meet specific requirements. Only use the screws specified in the assembly drawings. Failure to use these screws could result in equipment damage.

- Make sure only the screws specified in the assembly drawings are used.
- Torque each screw starting from the center of the hot runner and working outwards.

CAUTION!

Mechanical hazard – risk of damage to equipment. Air impact guns could produce excessive torque and damage the hot runner. Use only a torque wrench to install the hot runner.

- Use a torque wrench to install the screws and verify the torque.

4.2.2 Clamping

The clamping method uses clamps to hold the hot runner to the stationary platen. The clamps are secured to the stationary platen with screws and hold the hot runner at the operator and non-operator side clamp slots.

In this method, the clamps must be properly secured to prevent the hot runner from slipping. This may cause damage as the mold closes or cause the mold and hot runner to fall completely from the stationary platen.



WARNING!

Crushing hazard – risk of serious injury, death and/or damage to the hot runner. Clamps could loosen allowing the mold and hot runner to slip or fall completely from the stationary platen. Make sure the type, quantity, size and position of the clamps is sufficient for mounting the mold and hot runner.



IMPORTANT!

Husky assumes no responsibility for the type, quantity, size or position of the clamping equipment used and does not recommend the clamping method for securing the hot runner to the machine. It is the responsibility of the customer to make sure the clamping equipment and its installation is adequate for safely securing the hot runner.

Whenever possible, use the direct bolting method. Refer to [Section 4.2.1](#) for more information.

When using the clamping method, adhere to the following guidelines:

- Make sure the screws used to secure the clamps to the stationary platen are torqued.
- A sufficient number of clamps must be used to safely secure the mold and hot runner.
- The clamps must be positioned as close as possible to each other.
- Verify with the clamp supplier the number of clamps to use, the position and the required torque.
- Only use high strength screws with a minimum yield strength of 690 MPa (100000 psi)
- Inspect and torque the clamps regularly.

4.2.3 Quick Mold Changers and Clamping Systems

Refer to the quick mold changer or clamping system manufacturer's documentation for installation information.



IMPORTANT!

Any quick mold changer or clamping system must be interlocked appropriately with the machine's logic and guarding interlock system.

4.3 Removing and Installing the Hot Runner

The following procedures describe how to remove and install the hot runner.

4.3.1 Installing the Hot Runner



IMPORTANT!

Hot runners may not be put into service in a machine that does not comply with the provisions of Machinery Directive 2006/42/EC, as amended, and with the regulations transposing it into national law.

To install the hot runner in the machine, do the following:

1. Verify the machine nozzle orifice and radius match the sprue bushing in the hot runner. Processing problems can occur if the two systems do not match.
2. Make sure the clamp is open to maximum daylight.
3. Lock out and tag the machine and controller (if equipped). Refer to [Section 2.5](#) for more information.

CAUTION!

Mechanical hazard – risk of damage to equipment. An improperly leveled machine could make the hot runner installation difficult and cause premature component wear. Make sure the machine is leveled before installing the hot runner.

4. Make sure the machine is level and the platens are parallel. Refer to the machine manufacturer’s documentation for more information.

NOTE:

The cavity plate may be attached to the hot runner during installation.

5. Install or remove the cavity plate as needed. Refer to [Section 6.6.2.2](#) for more information.
6. Using a protective spray and a lint-free cloth, clean all mounting surfaces on the hot runner and stationary platen. Refer to [Section 3.4](#) for a list of recommended lubricants.

Remove any hard dirt, nicks or burrs with a medium India stone (240 grit oil stone).
7. Spray all mounting surfaces on the hot runner and stationary platen with a protective spray. Refer to [Section 3.4](#) for a list of recommended lubricants.
8. Inspect all fittings and electrical connections on the hot runner for damage. Repair or replace as necessary.



WARNING!

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment could fail and cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

9. Install and torque the lift bar to the hot runner. Refer to [Section 4.1.3](#) for more information.



WARNING!

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment could fail and cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

10. Attach an overhead lifting device to the lift bar and lift the hot runner over the mold area. Make sure the locating ring faces the stationary platen.
11. Lower the hot runner into the mold area. If necessary, rotate the assembly 90° to fit it between the tie bars.
12. Align the locating ring with the sprue nozzle and position the backing plate against the stationary platen.

CAUTION!

Crushing hazard – risk of damage to equipment. Screws used to secure the hot runner to the stationary platen must meet specific requirements. Only use the screws specified in the assembly drawings. Failure to use these screws could result in equipment damage.

-
13. Secure the backing plate to the stationary platen. Refer to [Section 4.2](#) for information about various mounting methods.
 14. Disconnect the overhead lifting device and remove the lift bar.

CAUTION!

Mechanical hazard – risk of damage to equipment. When installing hoses, make sure they are not routed over edges or positioned where they could rub together, causing motion or vibration damage.

-
15. Connect the cooling hoses to the hot runner.
 16. Connect the supplied heater and thermocouple cables to the designated ports on the hot runner and controller.

CAUTION!

Mechanical hazard – risk of damage to equipment. When installing cables, make sure they are not routed over edges, positioned where they could rub together, or near moving parts. The resulting motion or vibrations could damage the cable insulation.

-
17. Arrange the cables, using clamps or ties if necessary, to avoid contact with moving parts or sharp edges.

**WARNING!**

Poison hazard – risk of death or serious injury. The mold may have been sprayed with a rust inhibitor that could be toxic if ingested. To avoid contamination of food packaging products, this inhibitor must be completely removed. Clean all molding surfaces with an appropriate molding surface cleaner and discard all molded products until all traces of the rust inhibitor are removed.

-
18. If the cavity plate is installed on the hot runner, remove the rust inhibitor from all molding surfaces on the cavity plate using an appropriate molding surface cleaner.
 19. Remove all locks and tags. Refer to [Section 2.5](#) for more information.

4.3.2 Removing the Hot Runner

To remove the hot runner from the machine, do the following:

1. Open the mold and turn off all heaters.

2. Cool the hot runner by running coolant through it until the nozzles and manifold are at room temperature (< 25 °C or < 77 °F). This may take 1/2 to 4 hours depending on the size of the hot runner.
3. Lock out and tag the machine and controller (if equipped). Refer to [Section 2.5](#) for more information.
4. Purge all cooling water from the cooling hoses to minimize the risk of a coolant spill should a hose come loose during maintenance. Refer to the machine manufacturer’s documentation for more information.
5. Disconnect all cooling hoses from the hot runner.
6. Disconnect all electrical cables and connectors from mold and hot runner.



WARNING!

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment could fail and cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

7. Install and torque the lift bar to the hot runner. Refer to [Section 4.1.3](#) for more information.
8. Attach an overhead lifting device to the hoist ring and lift only until the lifting chain has a slight tension on it.
9. Disconnect the backing plate from the stationary platen starting on the non-operator side, followed by the operator side.
10. Lift the hot runner out of the clamp. If necessary, rotate the hot runner 90° to fit it between the tie bars.



WARNING!

Crushing hazard – risk of death or serious injury. Do not work under suspended loads. To prevent injury, install safety blocks.

11. Install feet on the bottom of the hot runner to protect the hose fittings.

CAUTION!

Mechanical hazard – risk of damage to equipment. When storing the hot runner, make sure it is secured in the vertical or horizontal position. Do not rest the assembly against another object.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. The hot runner must be set on supports if it is laid down horizontally, such as on a work bench. Damage to the nozzle tips, sprue bushing and/or wires could occur.

12. Move the hot runner to a safe location.

Chapter 5 Startup and Operation

This chapter describes how to safely startup and operate the hot runner. Follow these instructions along with any in the machine manufacturer's documentation.

NOTE:

If the hot runner is installed in a Husky machine, refer to the startup instructions in the machine manufacturer's documentation.

To startup the hot runner for operation, perform the following procedures in order:

| Step | Task | Reference |
|------|--|-----------------------------|
| 1 | Prepare the hot runner | Section 5.1 |
| 2 | Heat up the mold, hot runner and machine | Section 5.2 |
| 3 | Precharge the hot runner with resin | Section 5.3 |
| 4 | Produce test parts | Section 5.4 |



IMPORTANT!

The mold and hot runner must be installed properly by qualified personnel before production begins.

5.1 Preparing the Hot Runner

To prepare the hot runner for startup, do the following:

1. Lock out and tag the machine and controller (if equipped). Refer to [Section 2.5](#) for more information.
2. Make sure the mold and hot runner are installed properly.
3. Make sure the heaters and thermocouples are connected to the machine or a controller.
4. Make sure the resin type in the machine matches the required type indicated on the hot runner nameplate. Refer to [Section 1.7](#) for more information about the nameplate.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. In the event of water leaking into the hot runner, the nozzle heaters could fail. Make sure all water is removed before starting up the hot runner.

5. Using compressed air, remove any water around the nozzle tips and parting lines.
6. Make sure all safety latches have been removed from the mold and hot runner.
7. Remove all locks and tags. Refer to [Section 2.5](#) for more information.

5.2 Heating Up the Hot Runner, Mold and Machine

To bring the hot runner, mold and machine up to operating temperature, do the following:

1. If equipped, make sure the dryer is enabled and adjusted to the proper operating temperature.
2. Make sure the water chiller is enabled and adjusted to the proper operating temperature.
3. If equipped, make sure the mold enclosure de-humidifier, air compressor and water tower supplies are enabled.
4. Slowly open the clamp to full shutheight.
5. Turn on the mold/hot runner cooling system.



WARNING!

Hot resin spray hazard – risk of death or serious injury. Overheated resin could generate pressurized gas that, when suddenly released, could cause material to spray out. Do not allow resin to overheat. If the startup process is interrupted, turn off all barrel heaters and retract the injection unit to allow the hot runner to vent between the machine nozzle and the sprue bushing. For extended delays, follow the machine manufacturer's and resin supplier's procedures for machine shutdown.

6. Turn on the machine barrel heaters and allow them approximately 1/2 to 1 1/2 hours to reach operating temperature, depending on the size of the injection unit.
7. If equipped, turn on the controller.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Never operate the hot runner outside of the melt and mold temperatures indicated on the nameplate. Internal resin leakage or component damage could occur.

8. Set the temperature of the manifold heaters and sprue heater (if equipped) to the melt temperature indicated on the nameplate. Refer to [Section 1.7.1](#) for more information about the nameplate.

**WARNING!**

Hot resin spray hazard – risk of death or serious injury. The sprue heater (if equipped) must be turned on when the manifold heaters are turned on. Failure to do so could result in the generation of dangerous pressure levels in the manifold, resulting in the sudden release of hot resin.

9. Turn on the manifold heaters and sprue heater (if equipped) zones. Wait for the heaters to reach operating temperature. Wait an additional 10 minutes or more of soak time to make sure the resin has reached the operating temperature.
10. Open the process material feed. Refer to the machine manufacturer's documentation for more information.

5.3 Precharging the Hot Runner

To precharge the hot runner with resin, do the following:

1. Close the clamp and apply tonnage.

**WARNING!**

Hot resin spray hazard – risk of death or serious injury. Molten resin under high pressure can suddenly release and spray out from the machine nozzle. Before purging the barrel or shooting pot, clear the area of all non-essential personnel and wear personal protective equipment consisting of a heat-resistant coat, heat-resistant gloves and a full face shield over safety glasses.

2. Purge the injection unit. Refer to the machine manufacturer's documentation for more information.
3. Clean the machine nozzle, stationary platen and purge guard of any resin deposits. Refer to the machine manufacturer's documentation for more information.
4. Turn on the nozzle heaters and allow them approximately 5 to 7 minutes before mold operation to reach operating temperature.

CAUTION!

Mechanical hazard – risk of damage to equipment. Do not allow nozzle tips to stay energized for more than 10 minutes without injecting resin. Resin residing in the nozzle tip area will degrade.

5. While the nozzle heaters are reaching operating temperature, do the following:
 - a. Turn on the extruder screw to start plasticizing the resin.
 - b. Repeat [step 2](#) to [step 3](#).
6. Move the machine nozzle forward until it is firmly seated against the sprue bushing.

7. Inject resin into the hot runner until the injection piston stops. The piston must stop before it makes contact with the injection housing. If the piston makes contact with the injection housing, inject resin again.

NOTE:

The hot runner channels are properly filled with resin when the injection piston stops before making contact with the injection housing.

8. Once the injection piston stops, start the extruder screw and make sure it retracts fully.

5.4 Producing Test Parts

To produce test parts that will verify the settings and functions for the machine and mold, do the following:

1. Make sure the nozzle heaters have not timed out. If the nozzle heaters have timed out, do the following:
 - a. Enable the heaters and allow them approximately 5 to 7 minutes to reach operating temperature.
 - b. Purge the injection unit. Refer to the machine manufacturer's documentation for more information.
 - c. Clean the machine nozzle, stationary platen and purge guard of any resin deposits. Refer to the machine manufacturer's documentation for more information.
2. Close the mold and apply clamp tonnage.
3. Make sure the machine nozzle is firmly seated against the sprue bushing.
4. Reduce the injection pressure to 70 bar (1000 psi) .
5. Disable all ejector functions to prevent the machine from automatically ejecting parts.
6. Cycle the machine once in normal mode to produce a set of parts.
7. Check that all parts have been properly molded.
8. Manually control the ejector functions to eject the parts.
9. If all cavities are producing parts, reset the injection pressure to the recommended value.
10. Cycle the machine four times in normal mode to produce parts. This will remove any air trapped in the resin.
11. Visually inspect the last set of parts to verify the part quality. Repeat [step 10](#) until the part quality is satisfactory.
12. Enable the ejector functions.
13. Enable the product handling equipment.
14. Cycle the machine 10 times in semi-cycle mode. During each cycle, make sure the product handling equipment properly transfers the parts to the conveyor.
15. Enable the auto-cycle mode for the machine and begin production.

Chapter 6 Maintenance

This chapter describes the maintenance tasks required to maintain the hot runner. Refer to [Section 6.1](#) for a full list of maintenance procedures.

NOTE:

Unless specified otherwise, all bolts, screws, fittings and other hardware should be torqued to the values listed on the assembly drawings specific to the hot runner.

**WARNING!**

Risk of injury. When entering the molding area, personal protective equipment must be worn to guard against burns, abrasions, hearing, foot, eye, and face hazards and any other procedure specific hazards listed in the manual.

**WARNING!**

Chemical hazard - Some of the chemicals used when servicing or maintaining Husky equipment are potentially hazardous and could cause injury and illness. Before storing, handling, or working with any chemical or hazardous material, thoroughly read and understand each applicable Material Safety Data Sheet (MSDS), use recommended personal protective equipment and follow the manufacturer's instructions.

**IMPORTANT!**

The procedures contained in this chapter were written for a standard hot runner and do not take special options into consideration.

6.1 Scheduled and Non-Scheduled Maintenance

Throughout the life of the mold and hot runner, various systems and components will need to be inspected and serviced on a scheduled or non-scheduled basis.

There are two types of maintenance procedures:

- Preventive procedures are performed at scheduled intervals
- Service procedures are performed when required

6.1.1 Preventive Maintenance

The following procedures must be performed when indicated as part of the recommended preventive maintenance program for the mold and hot runner.

| Interval | Cycles | Task Description | Reference |
|-----------------|-----------|---|------------------------------|
| Every 6 Months | 800,000 | Test the hot runner heaters | Section 6.5 |
| Every 12 Months | 1,600,000 | Remove excess resin from the manifold plate | Section 6.20 |

6.1.2 Service Procedures

The following procedures are to be performed only when needed.

| Procedure | Reference |
|--|--------------------------------|
| Adjusting the thermocouple wire length | Section 6.17 |
| Changing the resin color | Section 6.2 |
| Extending nozzle and sprue heater (if equipped) wire leads | Section 6.3 |
| Measuring preload | Section 6.4 |
| Removing insulating gate bubbles | Section 6.14 |
| Removing resin from the hot runner | Section 6.19 |
| Removing resin from the manifold plate | Section 6.20 |
| Removing and installing nozzle heaters | Section 6.13 |
| Removing and installing nozzle housings | Section 6.12 |
| Removing and installing nozzle tips | Section 6.10 |
| Installing a Blank Nozzle Tip to Run With a Cavity Down | Section 6.10.3 |
| Removing and installing the backing plate | Section 6.7 |
| Removing and installing the cavity inserts | Section 6.9 |
| Removing and installing the cavity plate | Section 6.6 |
| Removing and installing the manifolds | Section 6.8 |
| Removing and installing the sprue bushing | Section 6.16 |
| Removing and installing the sprue heater (if equipped) | Section 6.15 |
| Removing air and water plugs | Section 6.18 |

6.2 Changing the Resin Color

To change the color of the resin, do the following:

1. Lock out and tag the machine and controller (if equipped). For machine lockout and tag procedures refer to the machine documentation.
2. Remove all traces of the original resin from the material feed equipment.
3. Depending on application restrictions, add one of the following to the material feed equipment to reduce the cleaning time required:
 - Purge compound
 - Natural (uncolored) resin
 - New colored resin
4. Remove all locks and tags. For machine lockout and tag procedures refer to the machine documentation.
5. Power up the machine and turn on the controller (if equipped).



WARNING!

Hot resin spray hazard – risk of serious injury. Molten resin under high pressure can suddenly release and spray out from the machine nozzle. Before purging the injection unit, clear the area of all non-essential personnel and wear personal protective equipment consisting of a heat-resistant coat, heat-resistant gloves and a full face shield over safety glasses.

6. Purge the injection unit until all traces of the old color are eliminated. For instructions, refer to the machine manufacturer's documentation.
7. Increase the injection speed to the maximum value allowed by the application.
8. Reduce the hold time and cooling time to the minimum values allowed by the application.
9. Increase the temperature of the hot runner nozzle tips, manifold and sprue by 20 to 30 °C (68 to 86 °F).
10. Repeat [step 3](#) to replenish the material feed system, if required.
11. Produce a series of test parts until all traces of the old color are eliminated.
12. When the color change is complete, decrease the temperature of the nozzle tips, manifold and sprue by 20 to 30 °C (68 to 86 °F).
13. Return the hold time, cooling time and injection speed back to their original values.
14. Fill the material feed equipment with the new resin.

6.3 Extending Nozzle and Sprue Heater Wire Leads

The following procedure describes how to install the nozzle and sprue heater lead splice kit (P/N 4047310) to extend the length of the nozzle and sprue heater wires. This kit may be required on systems where the wire leads are not long enough to reach the electrical connectors.



IMPORTANT!

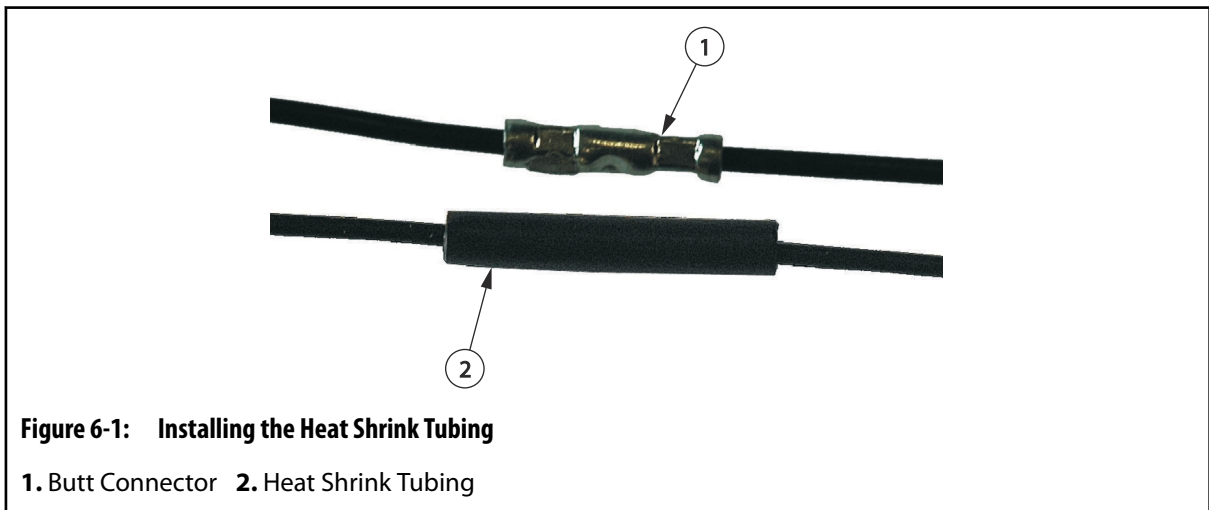
This procedure is only for nozzle and sprue heater leads when standard lead lengths are not long enough.

This procedure is not to be used for extending thermocouple wire leads. Splicing thermocouple wires will cause false and/or erratic temperature readings.

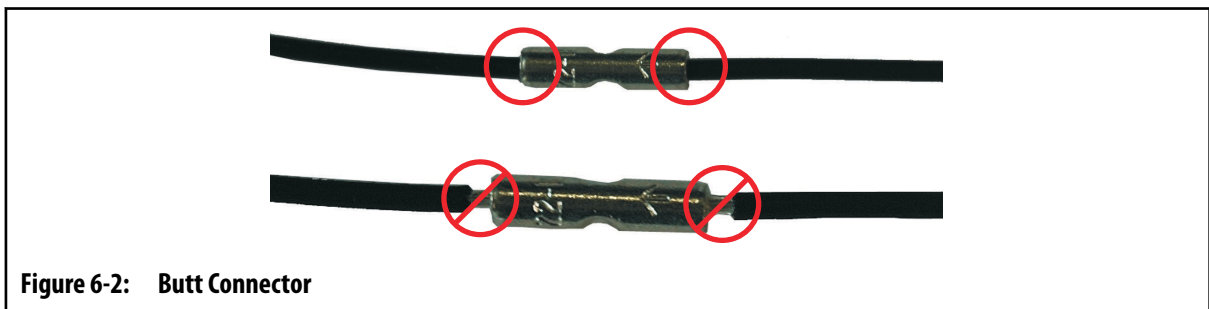
When required, standard thermocouples are available with longer wire lead lengths.

To install the kit, do the following:

1. Strip the ends of the wire and the wire supplied with the kit until 6 mm (0.2 in) of wire lead is exposed on both.
2. Slide heat shrink tubing over the butt connector. Make sure the butt connector is centered in the tubing.



3. Insert the wires into both ends of the butt connector until no wire lead is visible.



4. Using a crimping tool, crimp one end of the butt connector at a time.
5. Shrink the tubing using a heat gun.
6. Seal the ends of the heat shrink tubing where the tubing meets the wire lead insulation.



6.4 Measuring Preload for Manifolds

Preload measurements from various sections of the hot runner must be taken and verified before the plates are assembled and when the hot runner is at room temperature (< 25 °C or < 77 °F). Damage to the plates, backup insulators and nozzle stacks could occur if the preload measurements are not within the allowed tolerance.



IMPORTANT!

Always measure preload in more than one section of the hot runner to make sure preload is consistent.

Maintaining proper preload will help prevent molten plastic from leaking inside the hot runner. To measure the preload on a manifold, do the following:

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Do not tighten the manifold or cross manifold hold down bolts to reduce the preload values. Manifold and cross manifold hold down bolts should be hand tightened and then turned counter-clockwise 1/4 turn before preload measurements are taken.

1. Determine the height of the backup insulators from the assembly drawings. Record the value as measurement *A*.
2. Using a depth micrometer, measure the distance from the top face of the manifold plate to the face of the manifold. Record this value as measurement *B*.

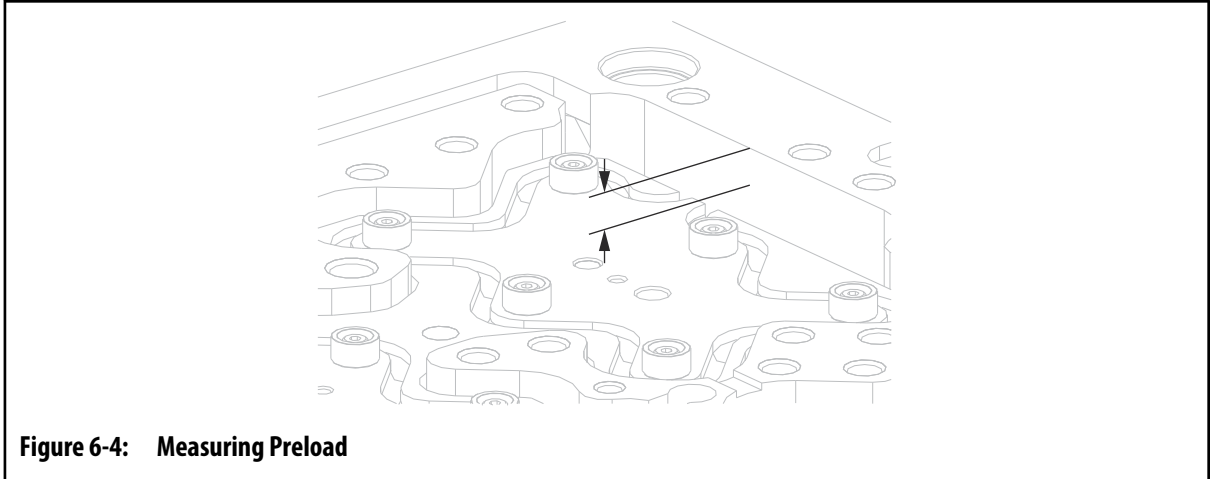


Figure 6-4: Measuring Preload

3. Complete the following calculation to determine the preload:
 $A - B = \text{Preload}$
4. Repeat [step 1](#) to [step 3](#) for all other corners of the cross manifold to make sure the preload measurements are consistent.
5. Compare the preload values to the C or C1 dimension values listed on the Tip Chart on the assembly drawings.

If the measured preload is not within the tolerances given on the Tip Chart, check all measurements and review the assembly for obstructions or debris. Repeat [step 1](#) to [step 5](#) until the preload measurements are within tolerance.

6.5 Testing Heaters

To confirm a heater is functioning properly, do the following:

1. With the heater at or near room temperature, use an ohmmeter to measure the resistance through the heater. Refer to the electrical schematic for the required ohms measurement.
 The normal tolerance for all heaters is $\pm 15\%$.



IMPORTANT!

A common problem with heaters is moisture absorption due to the hygroscopic nature of the insulation. A heater with a low case to center conductor insulation reading ($< 10K \Omega$) should be baked out and retested to determine if moisture was the cause. Contact Husky for more information.

2. Using an ohmmeter, measure the resistance through each lead to ground. A measurement from either lead to ground that is below $100K \Omega$ indicates a short to ground. A measurement from $100K \Omega$ to $1M \Omega$ is often associated with a wet heater.
 A measurement greater than $1M \Omega$ is good.

NOTE:

A short reading can be the result of either a pinched wire or a broken heater element. Inspect the wires first to make sure there are no pinched or damaged lead wires. A heater wire can be spliced, however, this should only be done by a certified electrician. The splice should include dual layer heat shrink tubing with an adhesive inner layer to avoid potential water shorts. The heat shrink should be rated for 150 °C (203 °F) minimum.

NOTE:

Refer to the electrical schematics for resistance information.

6.6 Removing and Installing the Cavity Plate

The following procedures describe how to remove and install the cavity plate. Removing the cavity plate provides access to wiring, nozzle heaters and gates.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Do not remove the cavity plate while the hot runner is in the machine. Damage to the nozzle tips could occur.

6.6.1 Removing the Cavity Plate

To remove the cavity plate from the hot runner, do the following:

NOTE:

The following procedure requires the use of an overhead lifting device. Refer to [Section 4.1](#) for lifting and handling instructions.

1. Remove the hot runner and cavity plate assembly from the machine and set it on a work bench with the nozzles facing up. Refer to [Section 4.3.2](#) for more information.
-

CAUTION!

Mechanical hazard – risk of damage to the nozzle sealing surfaces. The temperature of the nozzle tips must cool to room temperature <25 °C (<77 °F) before the cavity plate is removed. Damage to the nozzle sealing surfaces could occur if the temperature is too high.

2. Remove the screws that secure the cavity plate to the hot runner.



WARNING!

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment could fail and cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

3. Install hoist rings in the designated lifting points marked on the cavity plate.

CAUTION!

Lifting hazard – risk of damage to the hot runner. The cavity plate may not separate from the hot runner until the spring load between the nozzle tips and nozzle housings releases. The hot runner could lift with the cavity plate. Use the pry slots between the plate and hot runner to help separate the cavity plate.

CAUTION!

Mechanical hazard - risk of damage to the mold and hot runner. Lift the cavity plate slowly until the alignment dowels are cleared. Damage to the cavity plate and/or alignment dowels could occur.

4. Attach an overhead lifting device to the hoist rings and lift the cavity plate.



WARNING!

Crushing hazard – risk of death or serious injury. Do not work under suspended loads. To prevent injury, install safety blocks.

Install feet on the bottom of the cavity plate to protect the hose fittings.

5. Move the cavity plate out of the work area. Store the plate in a location where the plate cannot fall or tip over.
6. Remove any insulating gate bubbles on the nozzle tips or in the cavity plate gate details. Refer to [Section 6.14](#) for more information.

6.6.2 Installing the Cavity Plate Assembly

Perform the following procedures in order to install the cavity plate:

NOTE:

The following procedures assume the cavity plate was removed as described in [Section 6.6.1](#).

| Step | Procedure | Reference |
|------|-----------------------------|---------------------------------|
| 1 | Preparing the hot runner | Section 6.6.2.1 |
| 2 | Installing the cavity plate | Section 6.6.2.2 |

| Step | Procedure | Reference |
|------|-------------------------|---------------------------------|
| 3 | Completing the assembly | Section 6.6.2.3 |

6.6.2.1 Preparing the Hot Runner

The following procedure describes how to prepare the hot runner before the cavity plate is installed. This procedure must be performed:

- if the backing plate was removed or loosened since the cavity plate was removed
- when the cavity plate is installed for the first time

Cavity plate installation requires the nozzle housings and cavity inserts to be perfectly aligned. The nozzle housings may be out of alignment if any maintenance has been done to the hot runner.

CAUTION!

Mechanical hazard - risk of damage to the nozzle tips and cavity inserts.

For multi-material systems where the second set of nozzles are standard hot tip or valve gate nozzles, the cavity insert installation must be performed in two steps. The backing plate must be closed (cams disengaged) for the installation of the non-side gate nozzles, and must be open (cams engaged) for the installation of the side gate nozzles.

If the cavity inserts are installed in the injection side of the cavity plate, then [Section 6.6.2.2](#) (installing the cavity plate), must be performed first, with the backing plate closed.

If the cavity inserts are accessible from the parting line, then the non-side gate cavity inserts may be installed after [Section 6.6.2.3](#) (completing the assembly).

Failure to follow this procedure could cause serious damage to the nozzle tips and cavity inserts.

To prepare the hot runner before the cavity plate is installed, do the following:

NOTE:

The following procedure requires the use of an overhead lifting device. Refer to [Section 4.1](#) for lifting and handling instructions.



WARNING!

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment could fail and cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

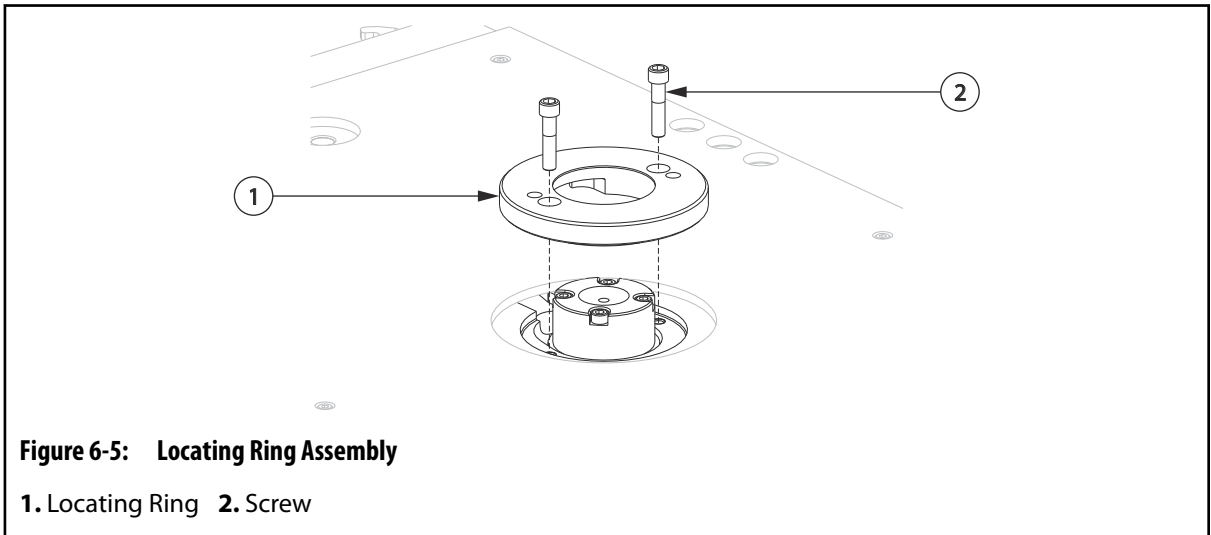
1. Install and torque the lift bar to the hot runner. Refer to [Section 4.1.3](#) for more information.



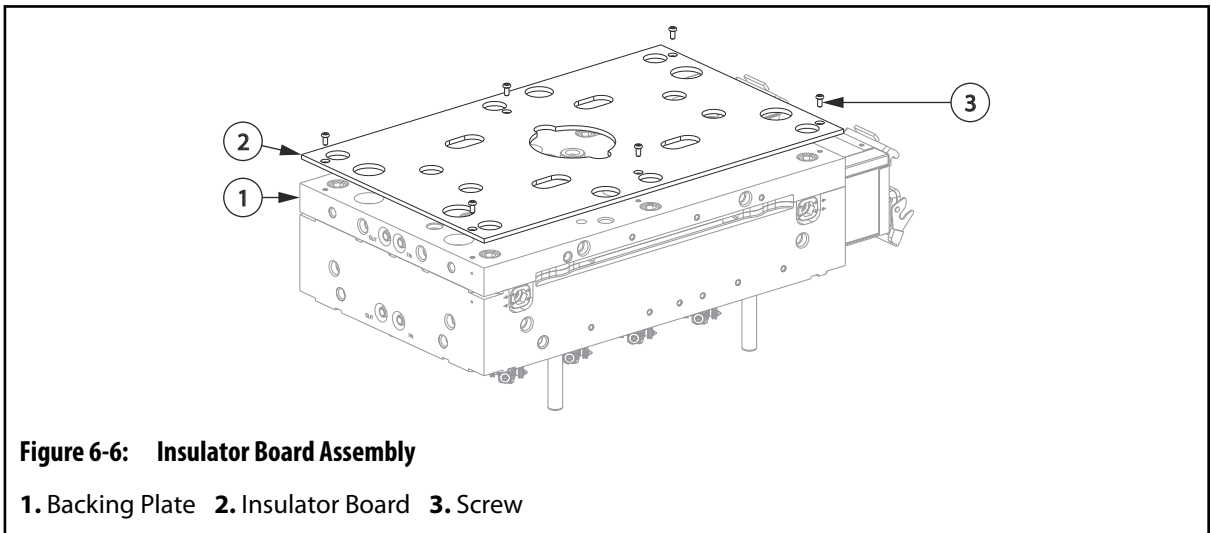
WARNING!

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment could fail and cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

2. Attach an overhead lifting device to the lift bar and lift the hot runner until it sits vertically on the work bench.
3. Remove the locating ring.



4. If equipped, remove the insulator board from the back of the backing plate.



5. Remove the screws that secure the backing plate to the manifold plate. Do not remove the shoulder screws.

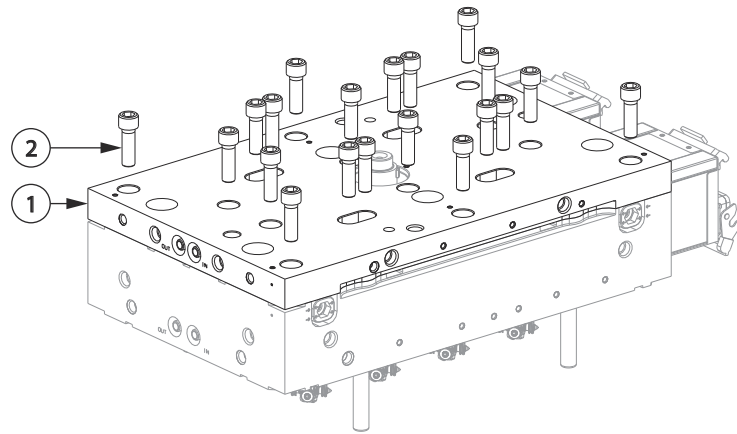


Figure 6-7: Removing the Backing Plate Screws

1. Backing Plate 2. Screw

CAUTION!

Mechanical hazard - risk of damage to the cams or plates. The cams must not be rotated with the full weight of the hot runner applied. Rotate the cams with the hot runner positioned with the nozzles facing down, with the hot runner standing vertically, or with the hot runner weight supported by an overhead crane.

6. Rotate the cam jacks 1/4 turn until the arrows point towards the backing plate. The backing plate is separated from the manifold plate 0.25 mm (0.01 in), allowing the nozzle housings to rotate for slight adjustments.

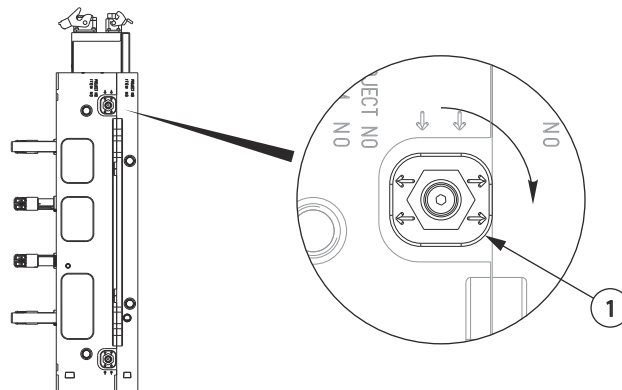


Figure 6-8: Cam Jacks

1. Cam Jack

7. Make sure the nozzle housings can be turned slightly by hand.
8. Using the overhead lifting device, lower the hot runner until it lies horizontally on the work bench with the nozzle housings facing up. The hot runner must be supported by at least two blocks.
9. Disconnect the overhead lifting device.

6.6.2.2 Installing the Cavity Plate

To secure the cavity plate to the hot runner, do the following:

NOTE:

The following procedure requires the use of an overhead lifting device. Refer to [Section 4.1](#) for lifting and handling instructions.

1. If the backing plate was removed or loosened since the cavity plate was removed, make sure the backing plate has been loosened. This will allow the nozzle housings to be aligned with the cavity inserts during the installation of the cavity plate. Refer to [Section 6.6.2.1](#) for more information.
2. Make sure the nozzle housing and cavity insert sealing diameters are clean and free of burrs or oil.
3. Make sure all wires are secured within the wire channels and do not protrude past the plate surface.
4. If necessary, remove the cavity inserts from the cavity plate. Refer to [Section 6.9.1](#) for more information.
5. Apply a static application grease to the cavity plate alignment dowels in the manifold plate. Refer to [Section 3.4](#) for information about recommended lubricants.



WARNING!

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment could fail and cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

6. Install hoist rings in the designated lifting points marked on the cavity plate.
7. Attach an overhead lifting device to the hoist rings and lift the cavity plate over the hot runner.



IMPORTANT!

When assembling the cavity plate to the hot runner, special attention should be given to preventing damage to the nozzle tips and wires. The cavity plate should mate with the hot runner without any resistance. If resistance is encountered, remove the plate and check for any interference points.

CAUTION!

Mechanical hazard – risk of damage to equipment. Do not force the plate into position as serious damage to the nozzle tips and wires could result.

CAUTION!

Mechanical hazard – risk of damage to the mold and hot runner. The nozzles and manifold must be at room temperature (< 25 °C or < 77 °F) before the cavity plate is connected to the hot runner. Severe damage to the nozzle and cavity plate sealing diameters could result if the mold is still hot.

8. Align the cavity plate with the alignment dowels and lower the plate onto the hot runner.
9. Install the screws that secure the cavity plate to the manifold plate. Torque each screw to its specified value starting from the center and working outwards in a cross pattern. Refer to the manufacturer's documentation for torque requirements.

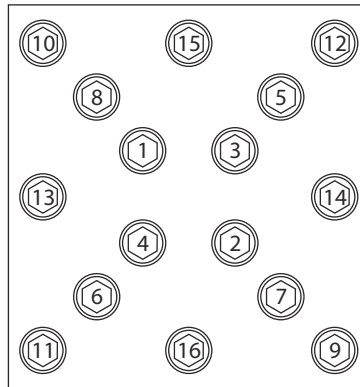


Figure 6-9: Torque Sequence (Example)

10. If the cavity inserts were removed previously, do the following:
 - a. Install the cavity inserts into the cavity plate. Do not install the cover plates. Refer to [Section 6.9.2](#) for more information.
 - b. Inspect the cavity inserts and make sure all nozzle tips are evenly aligned with the nozzle housings. If necessary, rotate the nozzle housings to adjust the alignment.

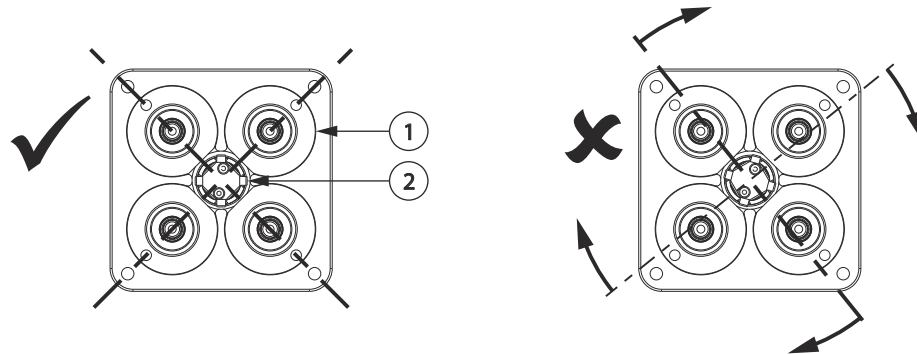
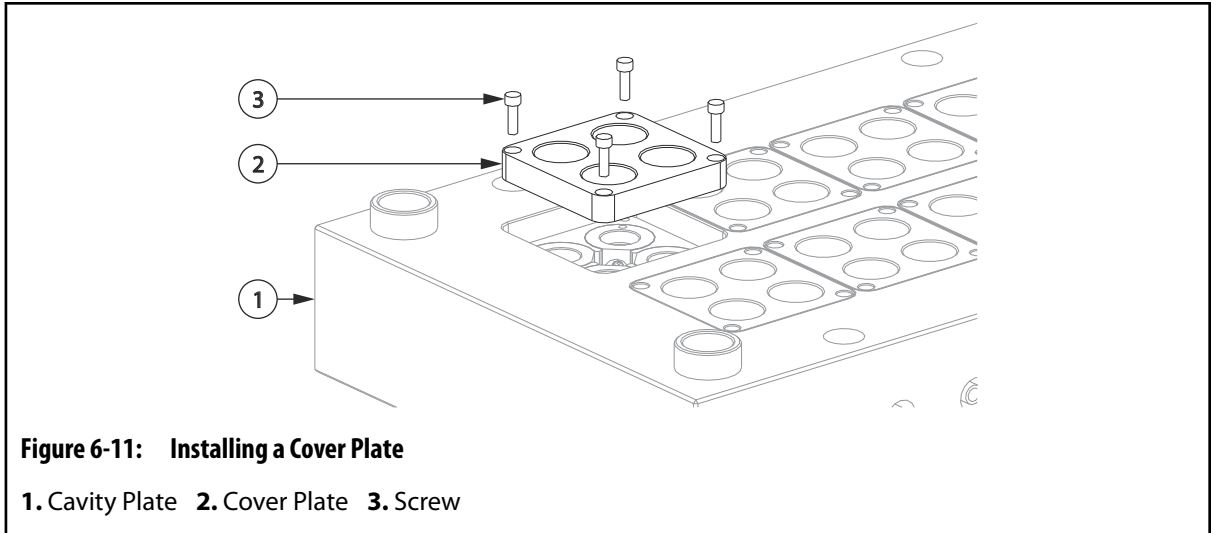


Figure 6-10: Nozzle Tip Alignment

1. Cavity Insert 2. Nozzle Housing

- c. Install the cover plates into the cavity plate. Make sure the screws are torqued in a cross pattern to the specified value. Refer to the assembly drawings for torque requirements.



11. Disconnect the overhead lifting device and remove the hoist rings from the cavity plate.
12. If the backing plate was removed or loosened before the cavity plate was installed, secure the backing plate to the hot runner. Refer to [Section 6.6.2.3](#) for more information.

6.6.2.3 Completing the Assembly

To secure the backing plate to the hot runner after the cavity plate has been installed, do the following:



IMPORTANT!

Perform this procedure only if:

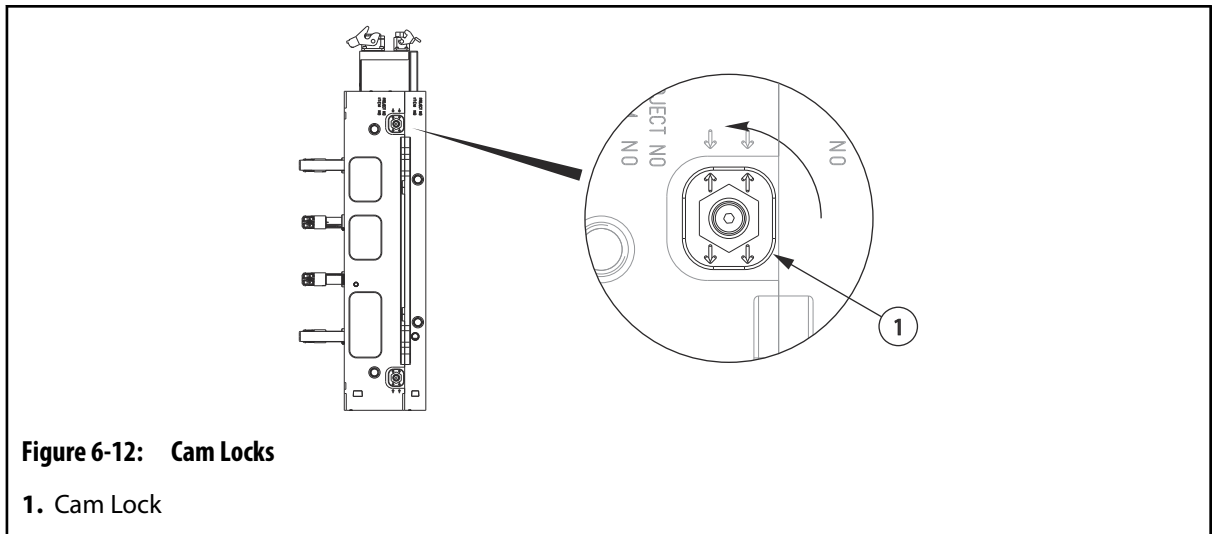
- if the backing plate was removed or loosened since the cavity plate was removed
- when the cavity plate is installed for the first time



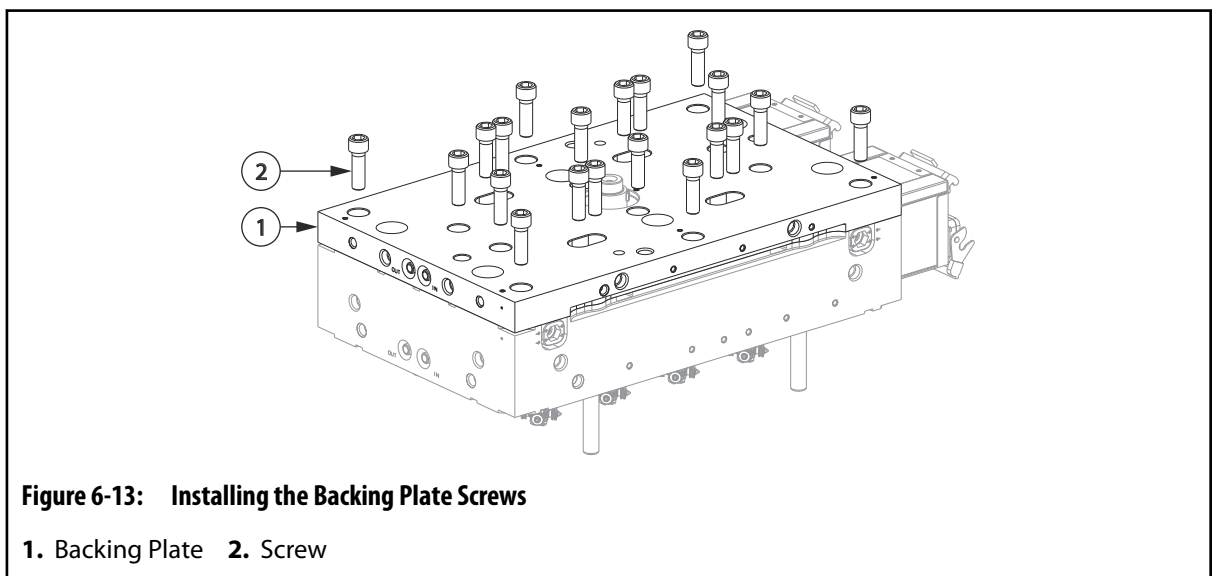
IMPORTANT!

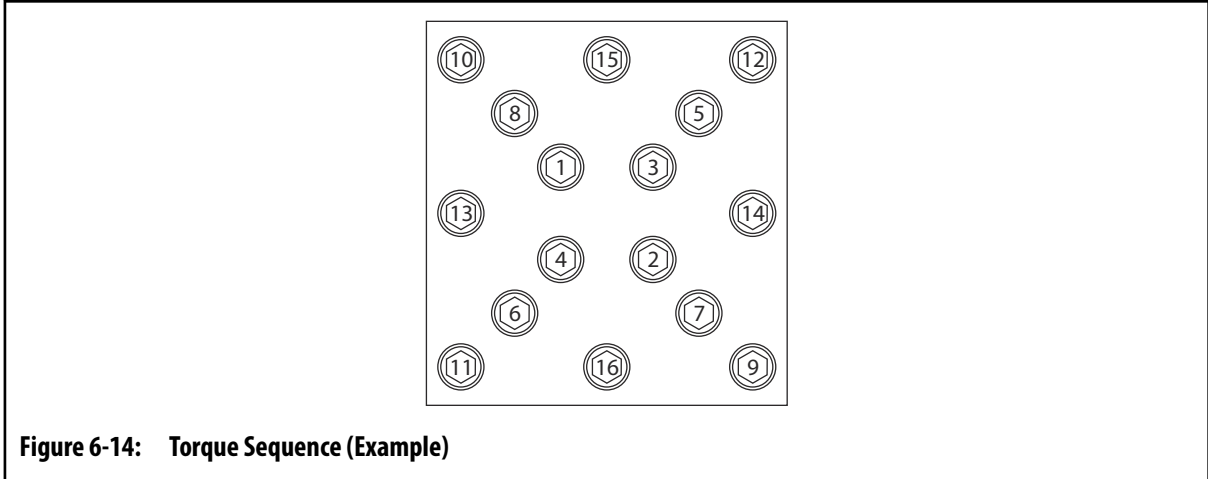
Before rotating the cam locks, the hot runner must be standing vertically and no load applied to the backing plate.

1. Rotate the cam locks 1/4 turn until the arrows are aligned with the arrows on the manifold plate.

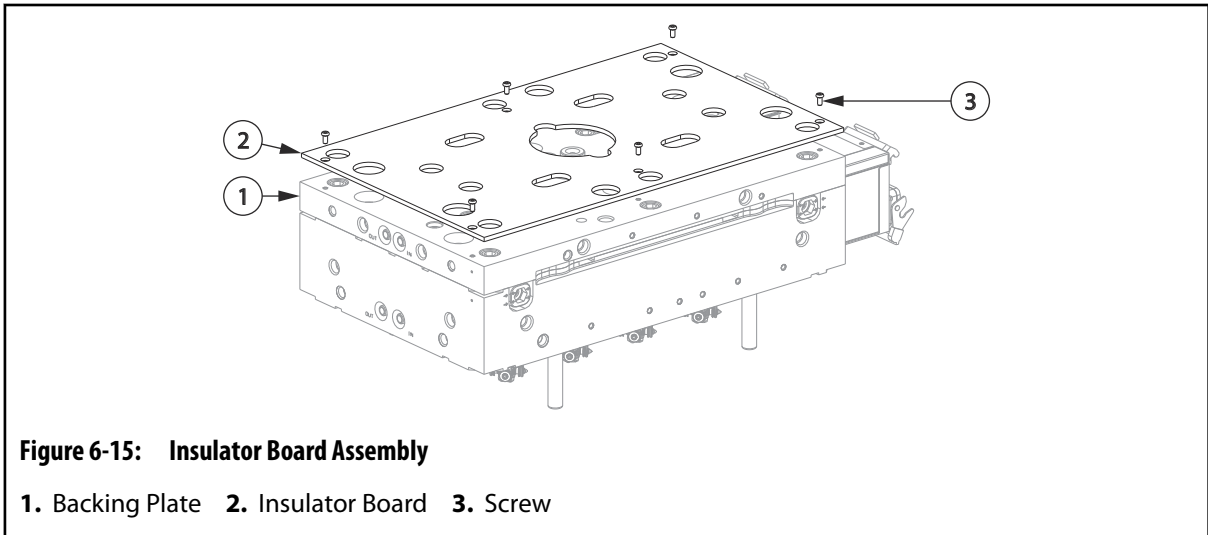


2. Install the screws that secure the backing plate to the manifold plate. Torque each screw to its specified value starting from the center and working outwards in a cross pattern. Refer to the assembly drawings for torque requirements.

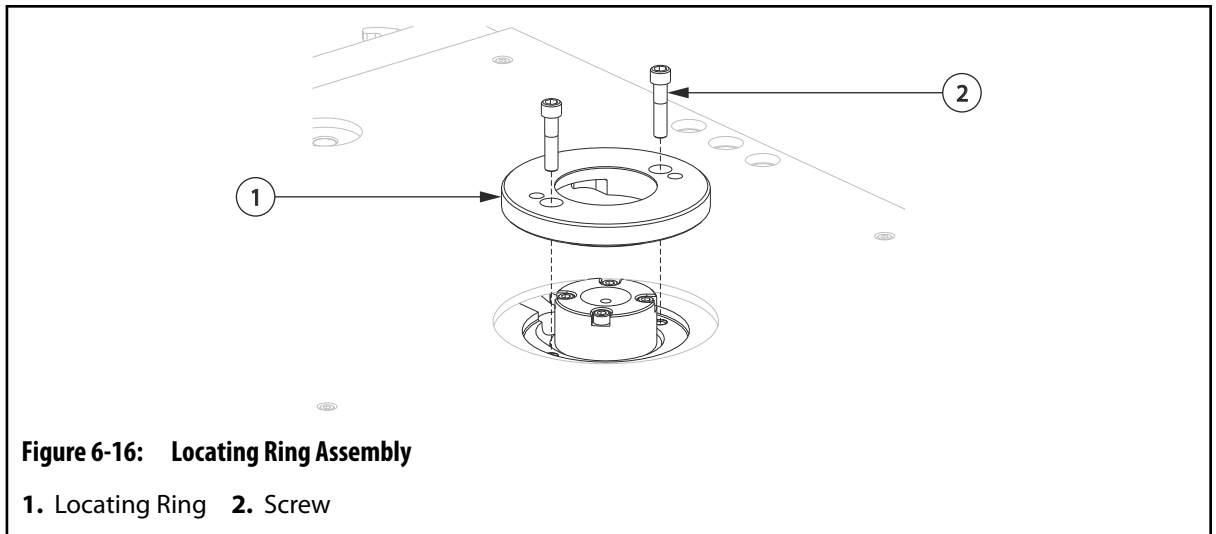




- Figure 6-14: Torque Sequence (Example)**
3. Check the electrical circuit with an ohmmeter to make sure no wires were damaged during installation. Refer to the electrical schematic to identify each zone.
 4. If equipped, install the insulator board and torque the screws to the specified value. Refer to the assembly drawings for torque requirements.



5. Install the locating ring.



6.7 Removing and Installing the Backing Plate

The following procedures describe how to remove and install the backing plate.

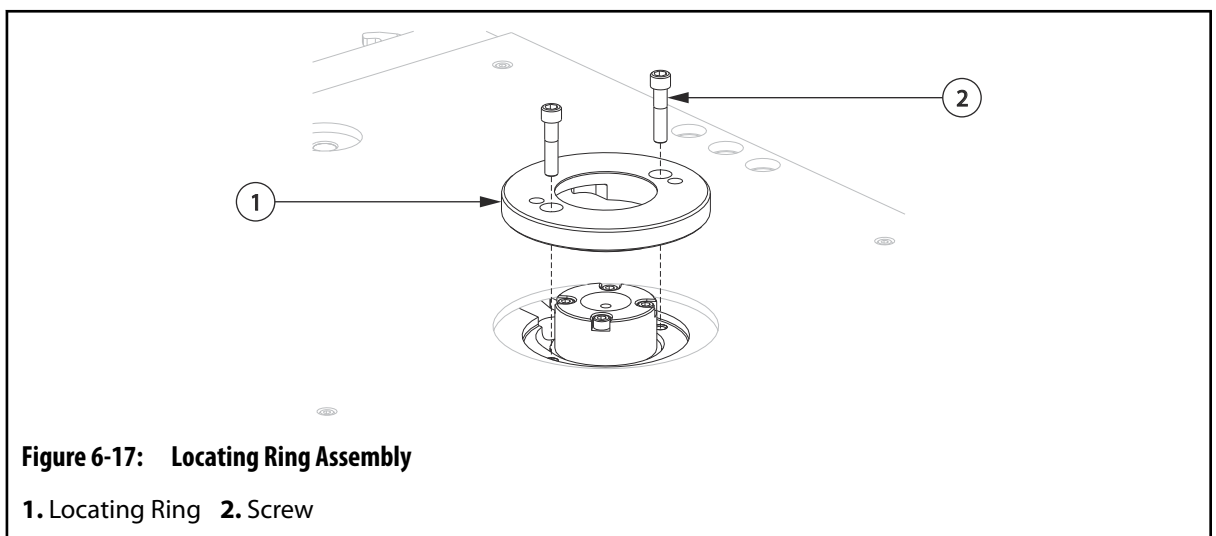
6.7.1 Removing the Backing Plate

To remove the backing plate, do the following:

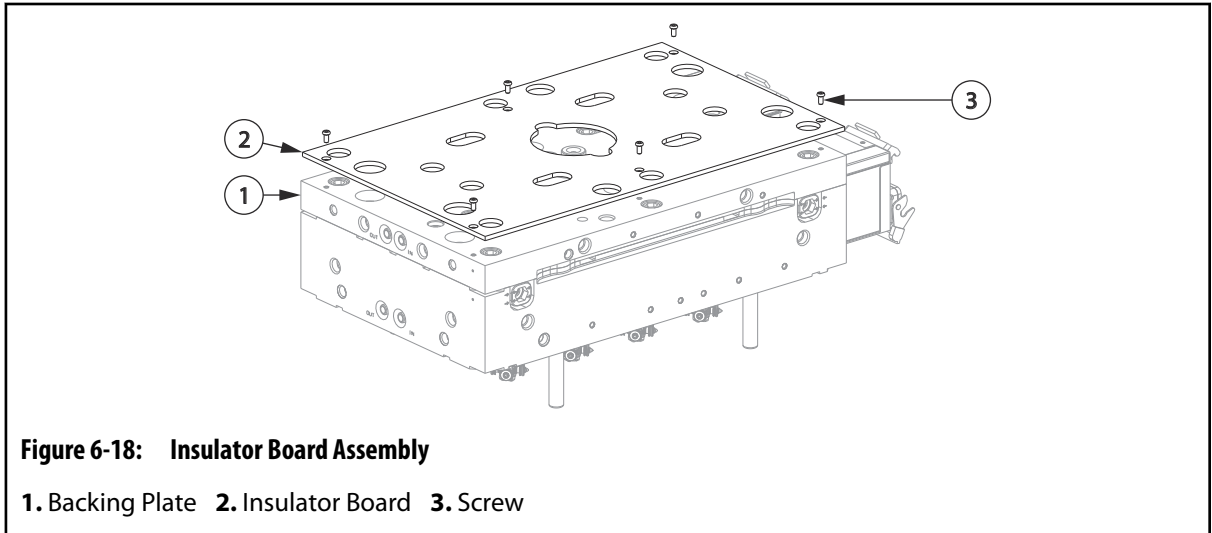
NOTE:

The following procedure requires the use of an overhead lifting device. Refer to [Section 4.1](#) for lifting and handling instructions.

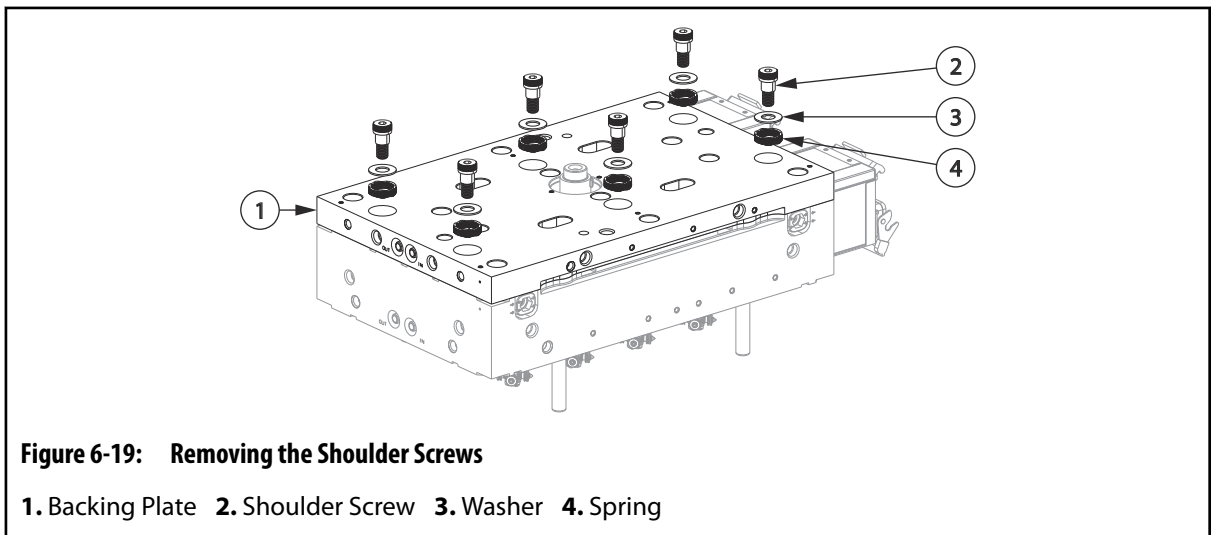
1. Remove the hot runner from the machine. Refer to [Section 4.3.2](#) for more information.
2. Remove the locating ring.



3. If equipped, remove the insulator board from the back of the backing plate.



4. If the backing plate has wire grooves, do the following:
 - a. Disconnect the wires and thermocouples routed through the backing plate from the multi-pin connectors.
 - b. Remove the wires and thermocouples from the wire grooves.
5. Remove the shoulder screws, washers and springs from the backing plate.



6. Remove the remaining screws that connect the backing plate to the manifold plate.

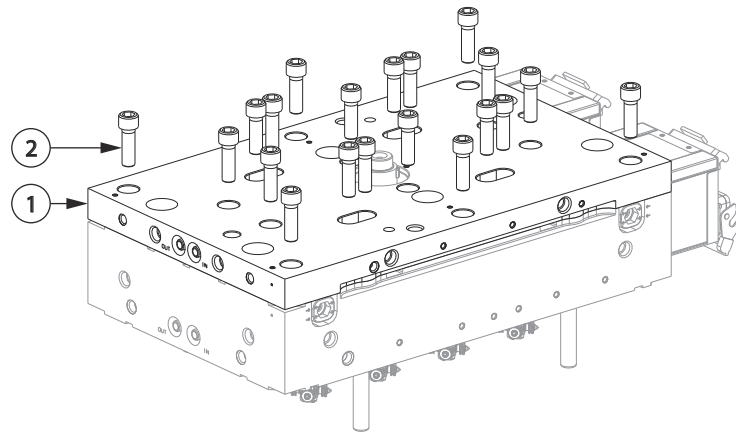


Figure 6-20: Removing the Backing Plate Screws

1. Backing Plate 2. Screw



WARNING!

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment could fail and cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

7. Install hoist rings in the designated lifting points marked on the backing plate.
8. Attach an overhead lifting device to the hoist rings and lift the backing plate in stages. Use the pry slots between the manifold plate and backing plate to assist in separation.

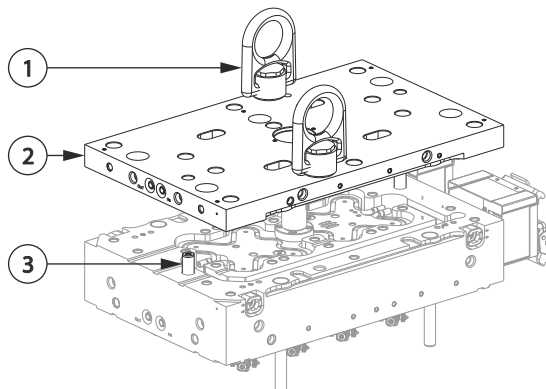


Figure 6-21: Removing the Backing Plate

1. Hoist Ring 2. Backing Plate 3. Guide Pin

9. Moving the backing plate to a clean work area and set it on supports.

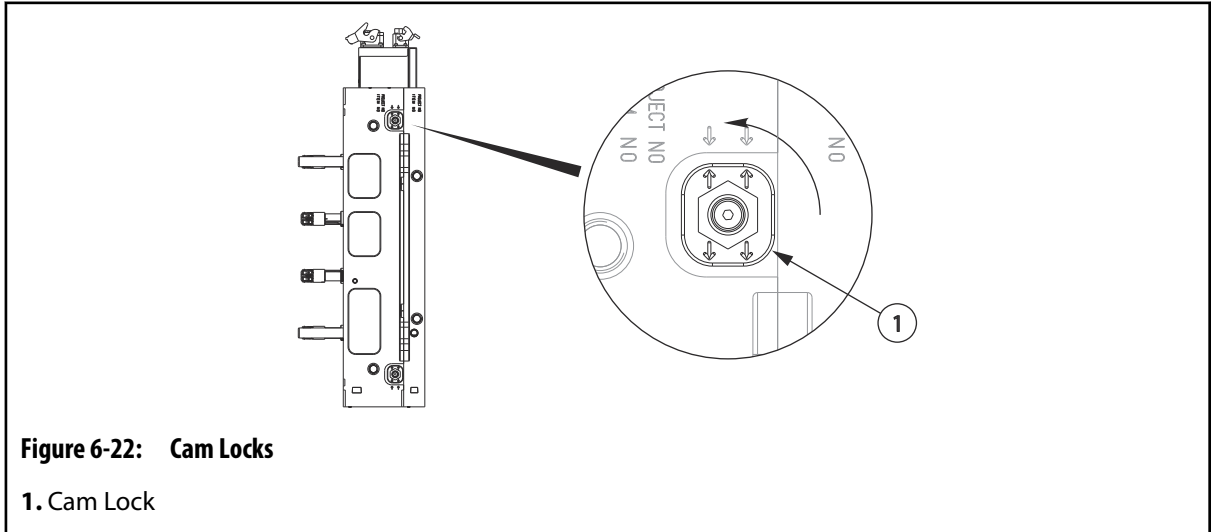
6.7.2 Installing the Backing Plate

To install the backing plate, do the following:

NOTE:

The following procedure requires the use of an overhead lifting device. Refer to [Section 4.1](#) for lifting and handling instructions.

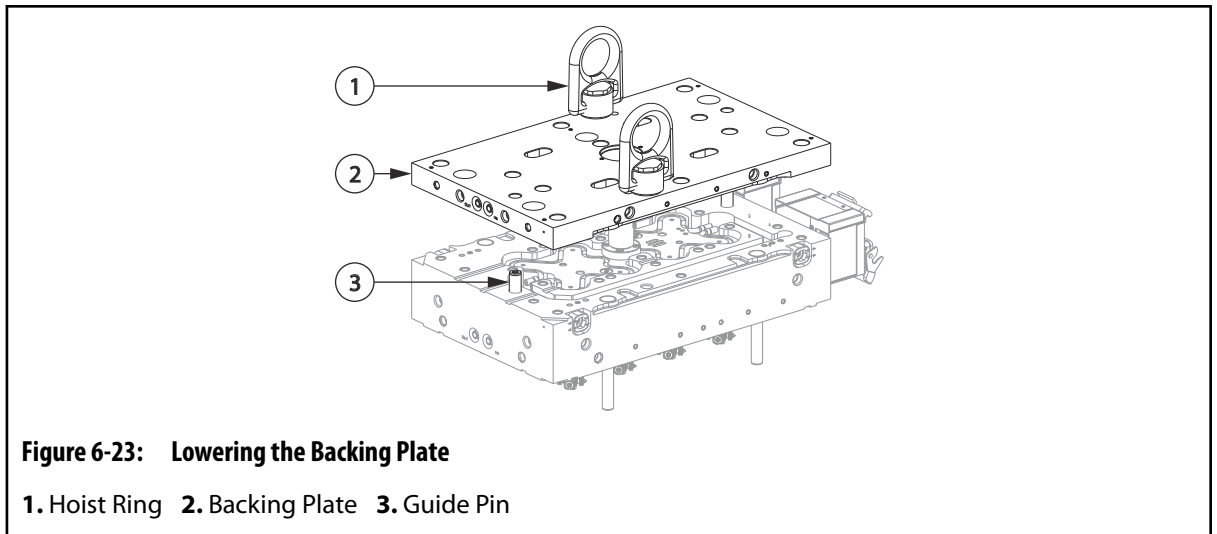
1. Make sure the backing plate and manifold plate are clean and free of pry marks around the pry slots.
2. Clean the backing plate and manifold plate mounting surfaces with a medium India stone (240 grit oilstone) as needed.
3. Make sure the arrows on the cam locks are aligned with the arrows on the manifold plate.



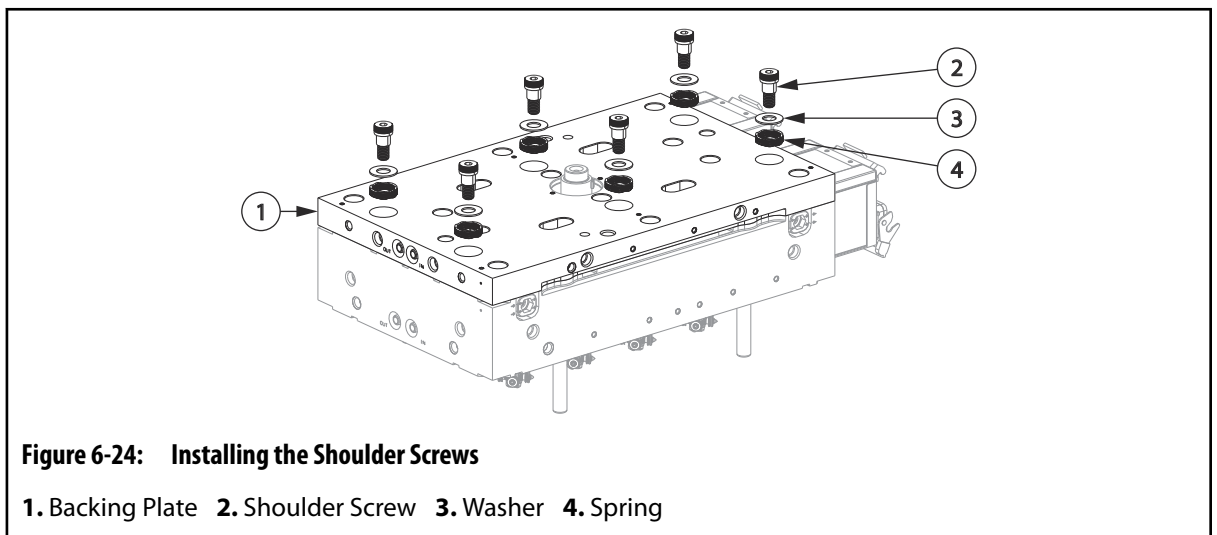
WARNING!

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment could fail and cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

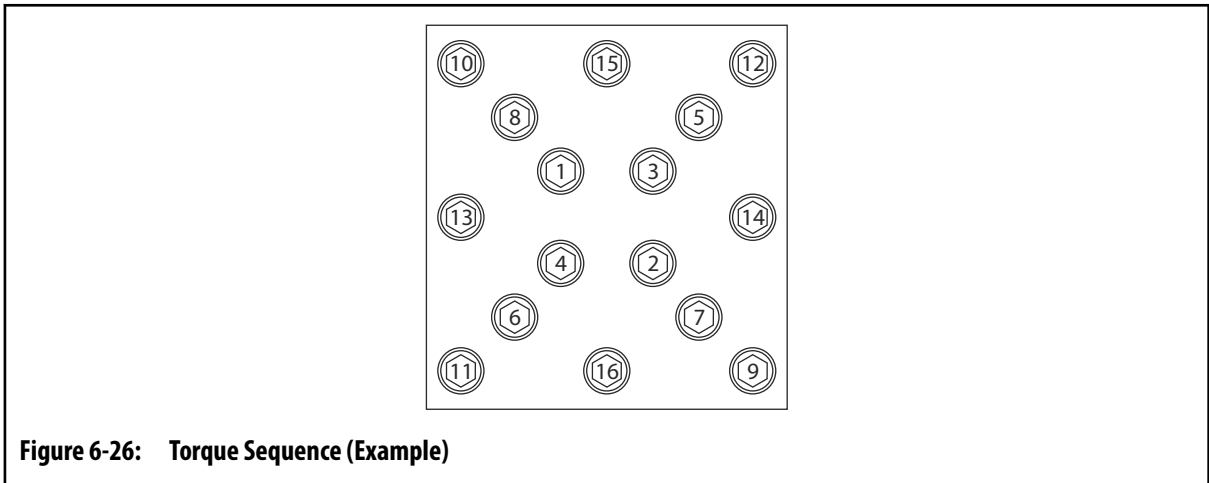
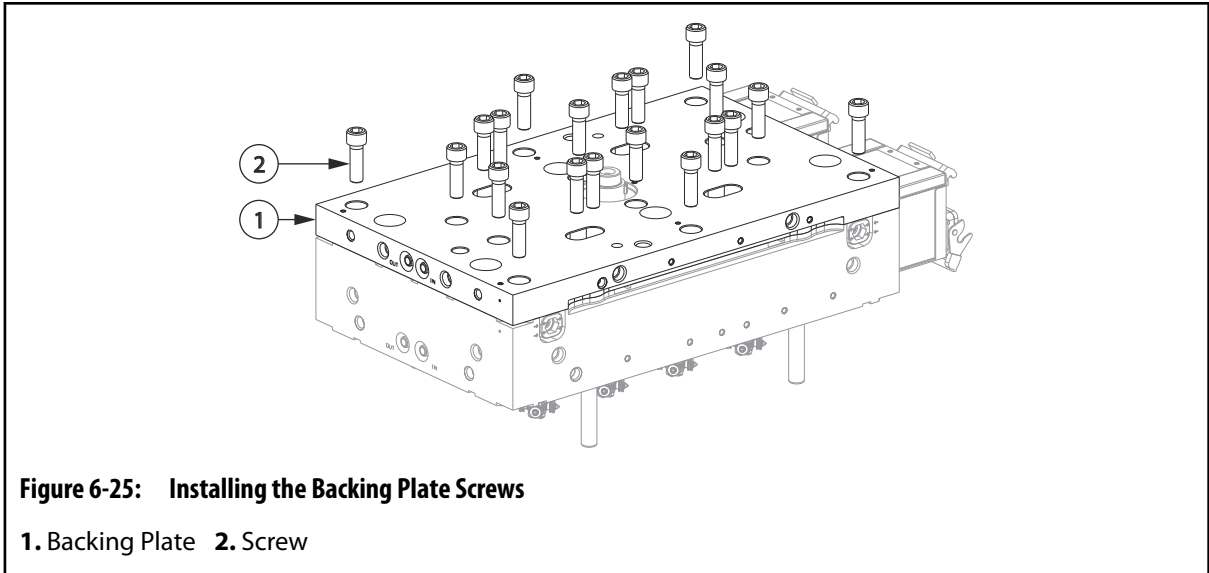
4. Install hoist rings in the designated lifting points marked on the backing plate.
5. Attach an overhead lifting device to the hoist rings and lift the backing plate.
6. Slowly lower the backing plate onto the manifold plate. Make sure the guide pins align with the backing plate locating bores.



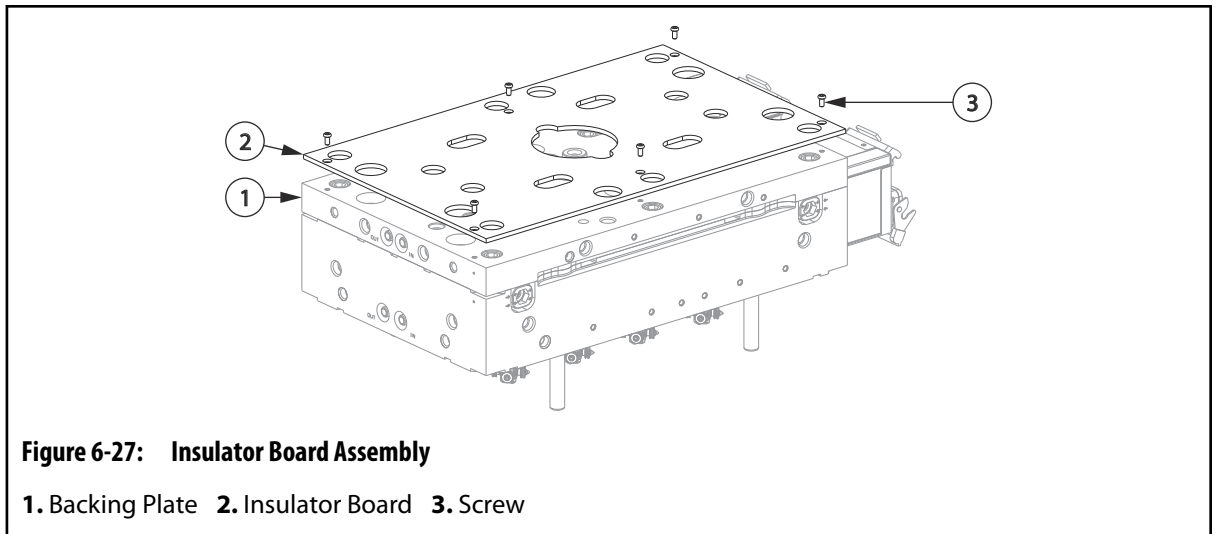
7. Disconnect the overhead lifting device and remove the hoist rings.
8. Apply a high temperature anti-seize lubricant to the threads of the shoulder screws. Refer to [Section 3.4](#) for information about recommended lubricants.
9. Install the shoulder screws, washers and springs. Make sure the screws are hand tight.



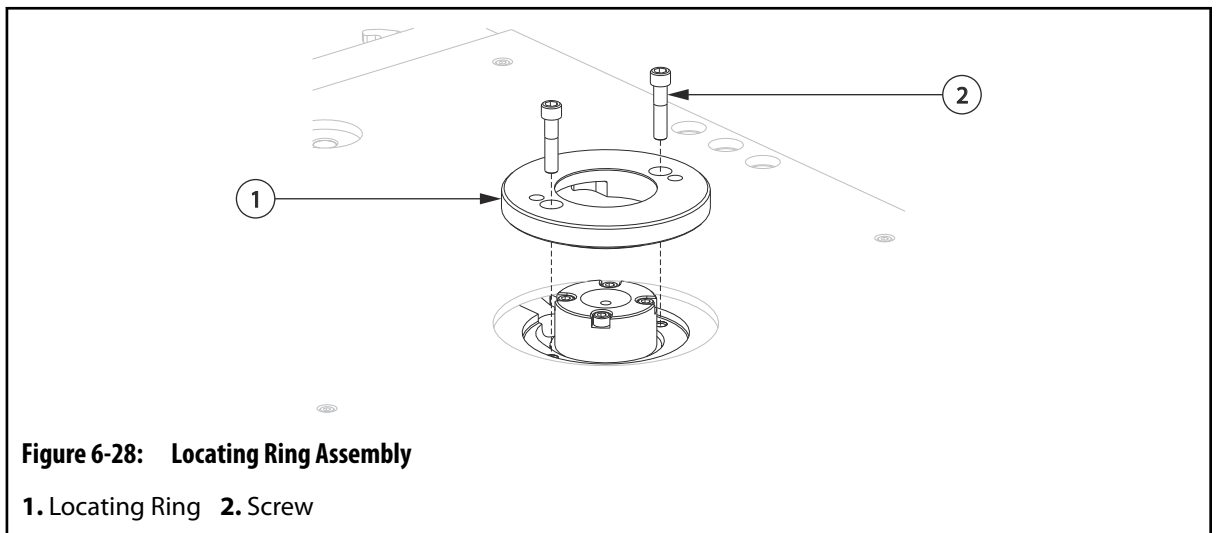
10. Install the screws that secure the backing plate to the center plate. Torque each screw to its specified value starting from the center and working outwards. Refer to the assembly drawings for torque requirements.



11. If the backing plate has wire grooves, do the following:
 - a. Secure all wires and thermocouples routed through the backing plate into the wire grooves.
 - b. Connect the wires and thermocouples to the multi-pin connectors.
12. If equipped, install the insulator board and torque the screws to the specified value. Refer to the assembly drawings for torque requirements.



13. Install the locating ring.



6.8 Removing and Installing Manifolds

The following procedures describe how to remove, maintain and install the manifolds.

6.8.1 Removing a Manifold

To remove a manifold, do the following:

NOTE:

The following procedure requires the use of an overhead lifting device. Refer to [Section 4.1](#) for lifting and handling instructions.

1. Remove the hot runner from the machine. Refer to [Section 4.3.2](#) for more information.

2. Remove the backing plate. Refer to [Section 6.7.1](#) for more information.

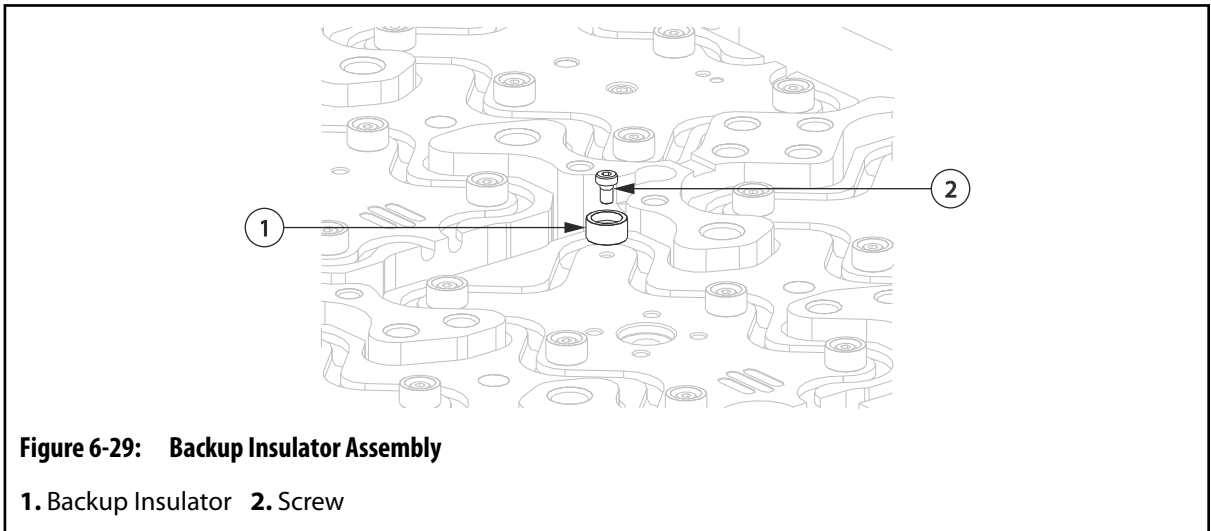


IMPORTANT!

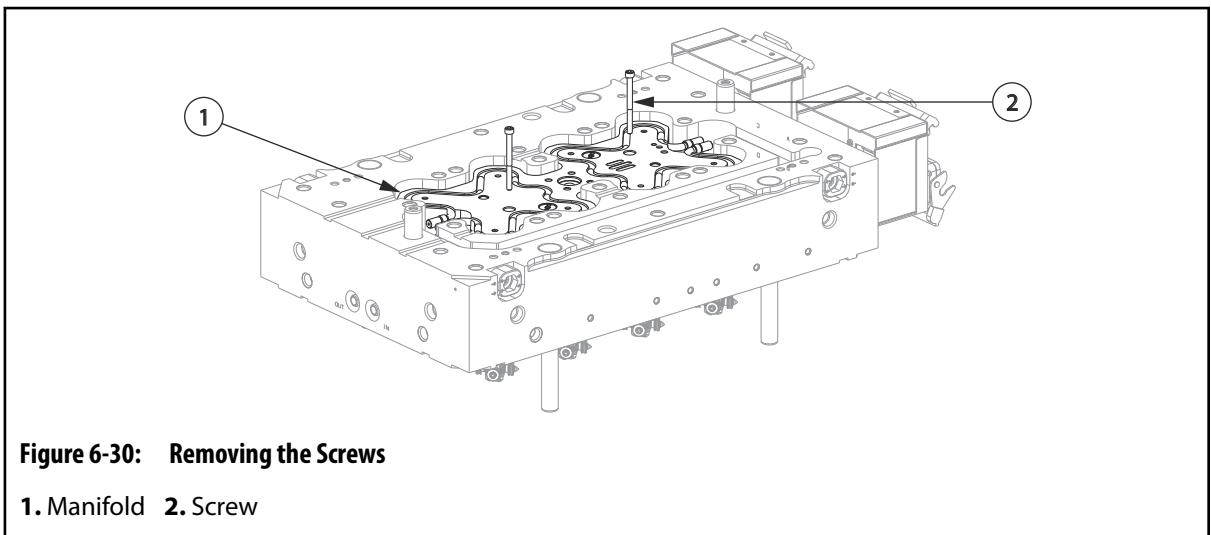
There is no need to remove the sprue bushing (if equipped) from the manifold unless the following conditions occur:

- There is contaminated material in the sprue bushing melt channel
- The material in the sprue bushing melt channel has been degraded by overheating
- A complete disassembly is required for cleaning the manifold melt channels

3. Remove the sprue bushing. Refer to [Section 6.15](#) for more information.
4. Remove the backup insulators from the manifold.



5. Disconnect all manifold heater and related thermocouple wires from the multi-pin connectors and wire channels.
6. Remove the screws that secure the manifold to the manifold plate.

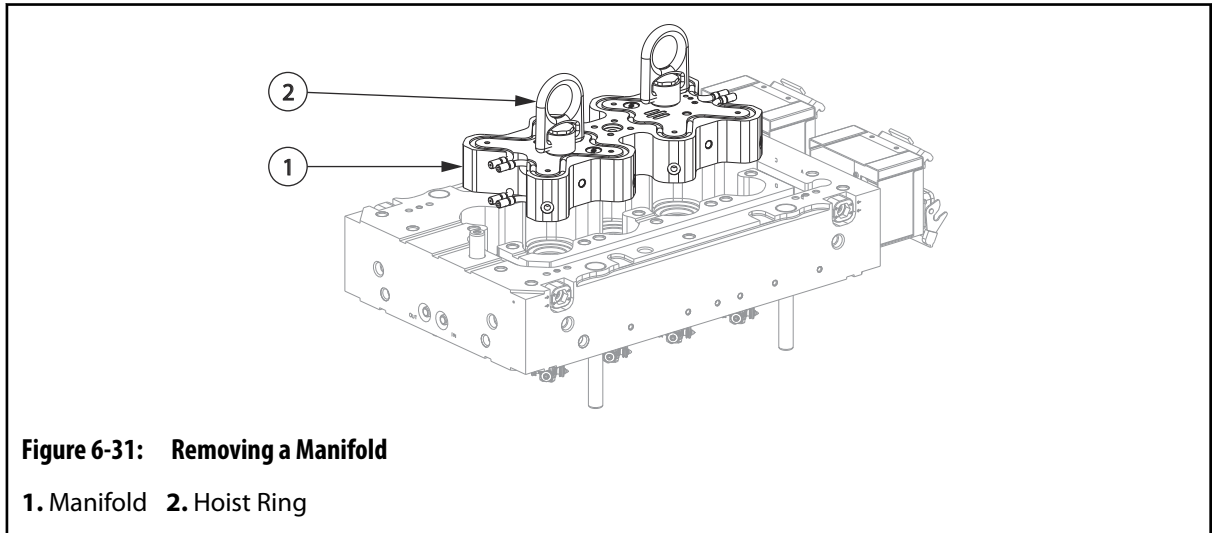


7. If the manifold has lifting points, do the following:

**WARNING!**

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment could fail and cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

- a. Install hoist rings in the designated lifting points marked on the manifold.



- b. Attach an overhead lifting device to the hoist rings.
8. Lift the manifold and place it on a clean, flat work surface.
9. If hoist rings are installed, disconnect the overhead lifting device and remove the hoist rings.
10. If necessary, remove the nozzle housings. Refer to [Section 6.12](#) for more information.

NOTE:

A fluidized bed cleaning process is recommended for cleaning manifolds and manifold components.

11. Clean the manifold in a fluidized bed. Refer to [Section 6.19.2](#) for more information.
However, if fluidized bed cleaning is unavailable, do the following:
 - a. Using brass scrapers, remove any resin left protruding from the manifold. Do not damage the sharp corners or sealing surfaces.
 - b. Clean the manifold bushing and seating surfaces using brass scrapers. Do not damage the sharp corners or sealing surfaces.
 - c. Remove all resin from the backup pads and manifold pocket. Refer to [Section 6.20](#) for more information.
12. Clean the mating surfaces on the manifold with a medium India stone (240 grit oilstone). Do not scratch the manifold.
13. Make sure all contact surfaces on the manifold plate and backup insulators are clean and free of resin, scratches, nicks or burrs.
14. Clean the mating surfaces on the manifold insulators with a medium India stone (240 grit oilstone). Do not scratch the manifold insulators.

CAUTION!

Mechanical hazard – risk of damage to the nozzle housings. Do not hone the back surface of the nozzle housing to remove nicks and burrs. The back surface is a precision made section of the housing with a contoured surface. Honing this section will cause the system to leak and void the leak proof guarantee for the hot runner.

15. Inspect the nozzle housings. Make sure they are free of nicks, burrs and any resin, especially in the melt channels. If the sealing surfaces are damaged in any way, replace the nozzle housings.
16. Make sure the manifolds are clean and flat.

NOTE:

Use only Husky recommended high temperature power and thermocouple wire.

NOTE:

Refer to the electrical schematic when replacing wiring.

17. Check all manifold, heater and thermocouple wiring. Replace as necessary.

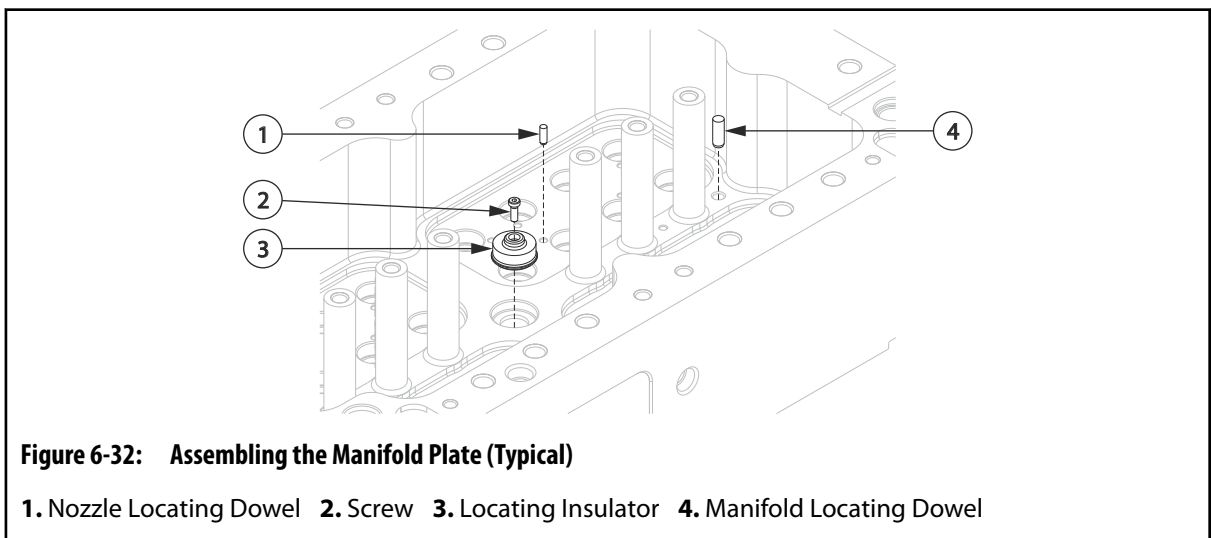
6.8.2 Installing a Manifold

To install a manifold, do the following:

NOTE:

The following procedure requires the use of an overhead lifting device. Refer to [Section 4.1](#) for lifting and handling instructions.

1. Install the locating insulator, manifold locating dowel(s) and nozzle locating dowels into the manifold plate pocket.

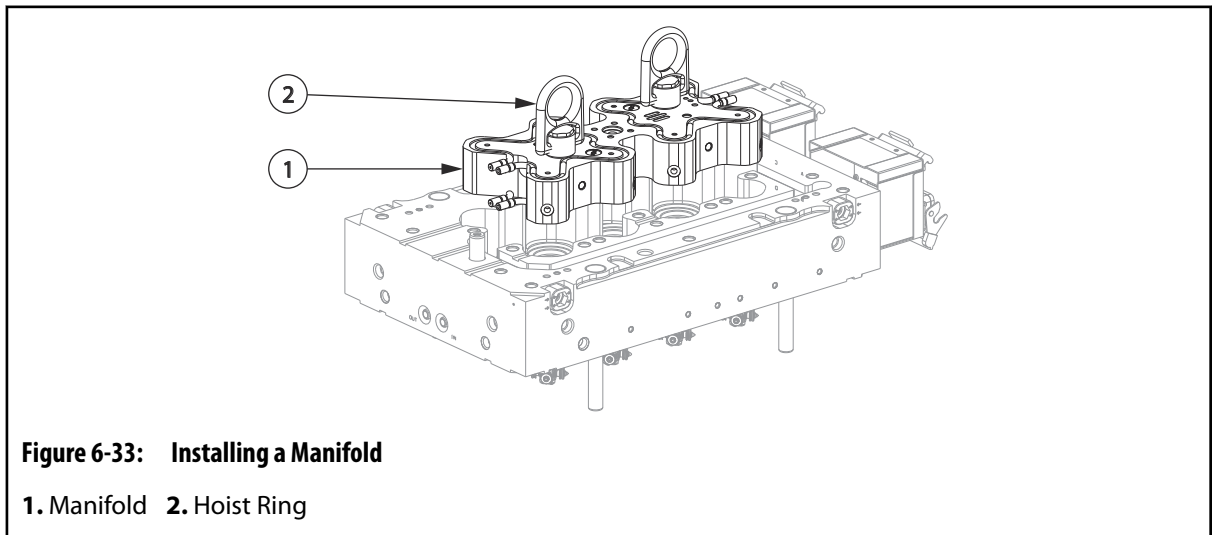


2. If removed previously, install the nozzle housings in the manifold plate. Refer to [Section 6.12.2](#) for more information.
3. If the manifold has lifting points, do the following:

**WARNING!**

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment could fail and cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

- a. Install hoist rings in the designated lifting points marked on the manifold.



- b. Attach an overhead lifting device to the hoist rings.
4. Lift the manifold over the manifold plate pocket.
5. Lower the manifold into position onto the locating insulator and locating dowel. Adjust the manifold to engage the locating features.
6. If hoist rings are installed, disconnect the overhead lifting device and remove the hoist rings.
7. Apply a thread-locking fluid to the threads of the screws that secure the manifold to the manifold plate. Refer to [Section 3.4](#) for information about recommended lubricants.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Screws used to secure the manifolds must remain loose until the preload is measured. Overtightening the screws could over-extend the nozzle housings or damage components under the manifold that are not properly seated.

8. Install and hand tighten the screws. Do not apply torque.

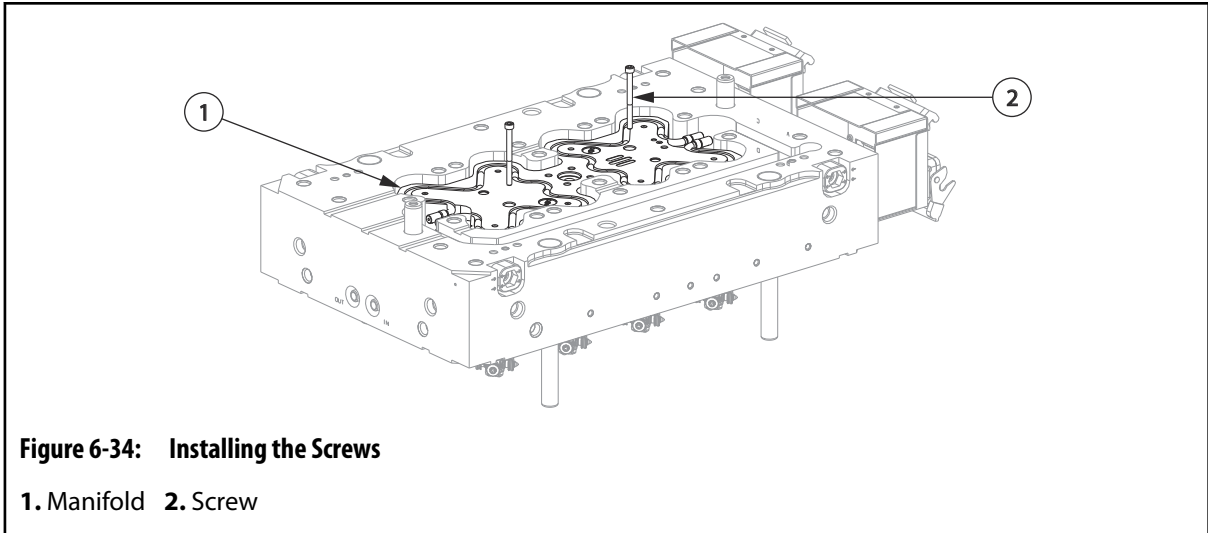


Figure 6-34: Installing the Screws

1. Manifold 2. Screw

- 9. Turn the manifold hold down screws counter-clockwise 1/4 turn.
- 10. Measure the preload for the manifold. Refer to [Section 6.4](#) for more information.



IMPORTANT!

All wiring near the manifold heater must be either a high temperature braid or sleeved using high temperature sleeving.

- 11. Route the manifold heater and thermocouple wires through the exit channels at the top of the manifold plate.
- 12. Label each wire with the heater zone number. Refer to the electrical schematic for the zone number.
- 13. Crimp the wire ends and connect the wires to the appropriate multi-pin connectors. Refer to the electrical schematic for more information.
- 14. Apply a high temperature anti-seize lubricant to the screws used to install the backup insulators. Refer to [Section 3.4](#) for information about recommended lubricants.
- 15. Install the backup insulators.

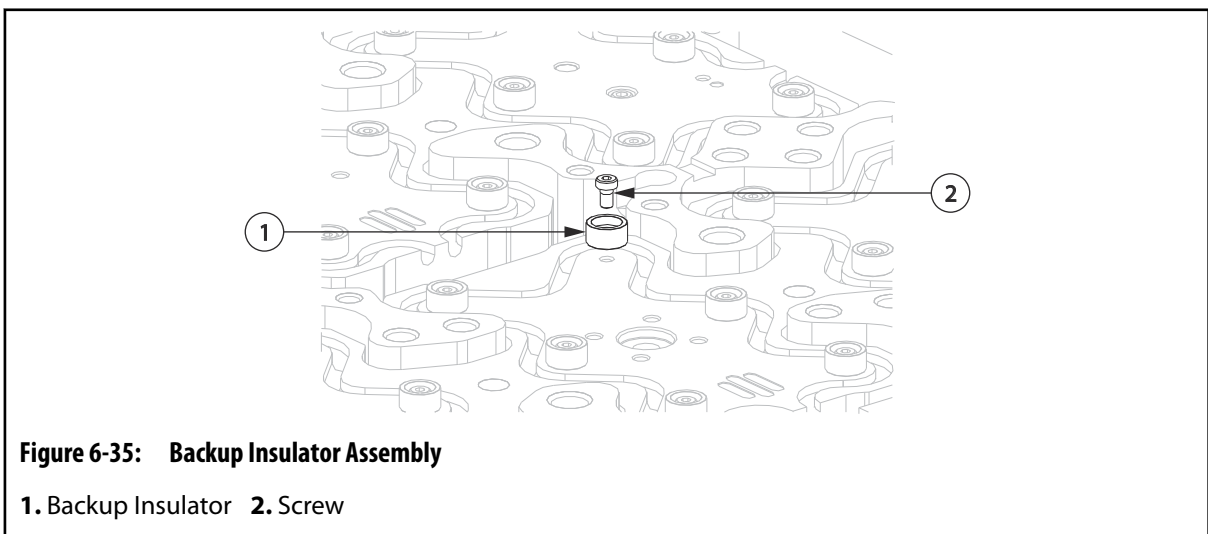


Figure 6-35: Backup Insulator Assembly

1. Backup Insulator 2. Screw

16. Install the sprue bushing. Refer to [Section 6.15](#) for more information.
17. Install the backing plate. Refer to [Section 6.7.2](#) for more information.
18. Install the hot runner in the machine. Refer to [Section 4.3.1](#) for more information.

6.9 Removing and Installing Cavity Inserts

The following procedures describe how to remove and install the cavity inserts.



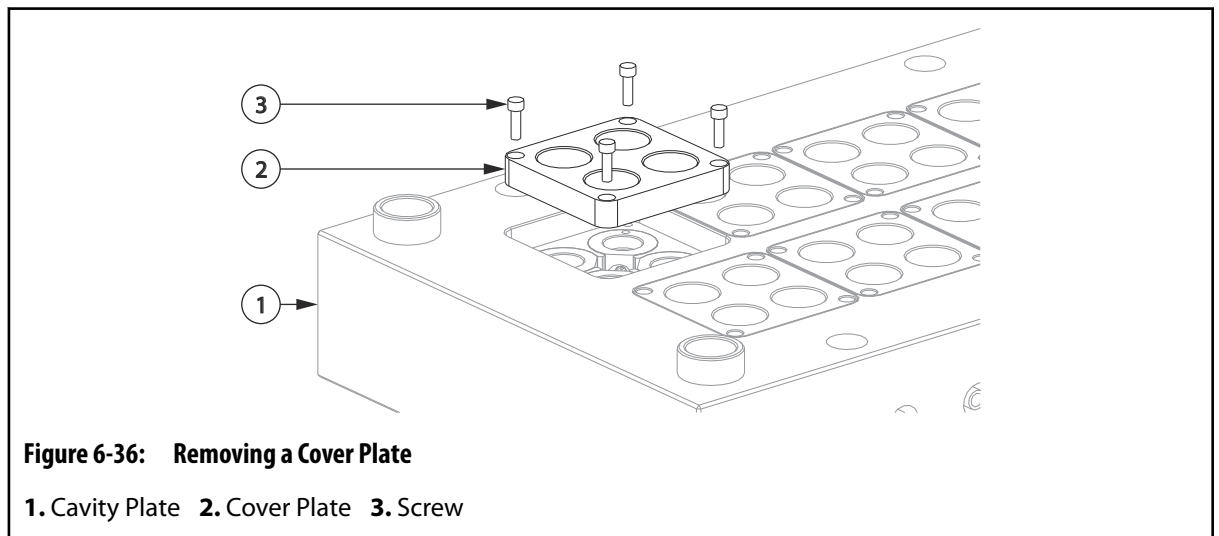
IMPORTANT!

The following procedures are provided for reference only. Cavity insert designs are not controlled by Husky and may vary depending on customer requirements.

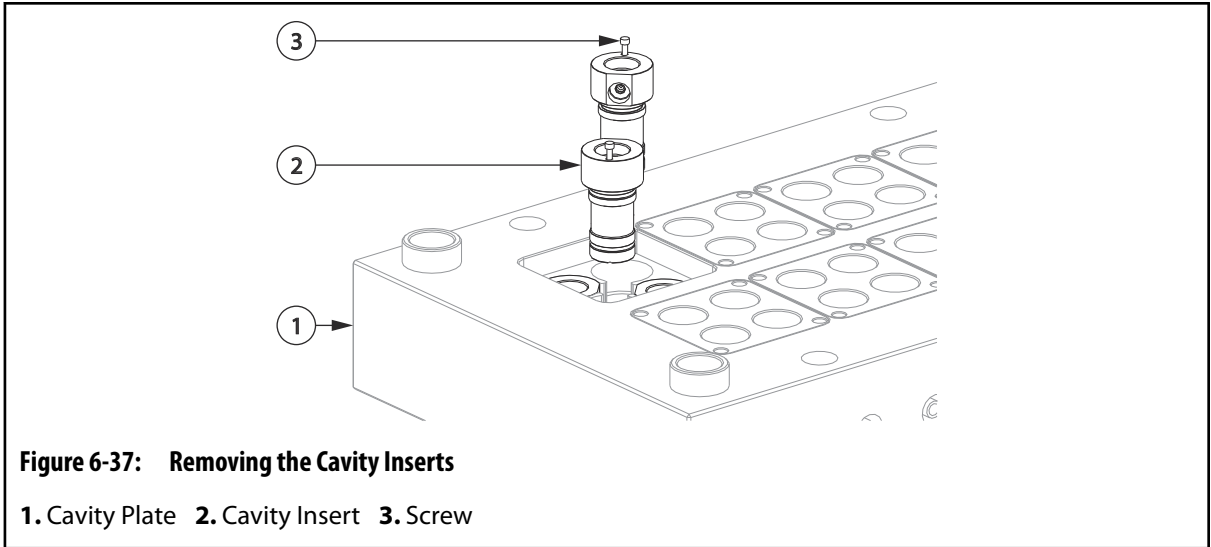
6.9.1 Removing the Cavity Inserts

To remove the cavity inserts, do the following:

1. If the hot runner is in the machine, lock out and tag the machine and controller (if equipped). Refer to [Section 2.5](#) for more information.
2. Remove the cover plate from the cavity plate.



3. Install a screw in the body of each cavity insert in the set.



CAUTION!

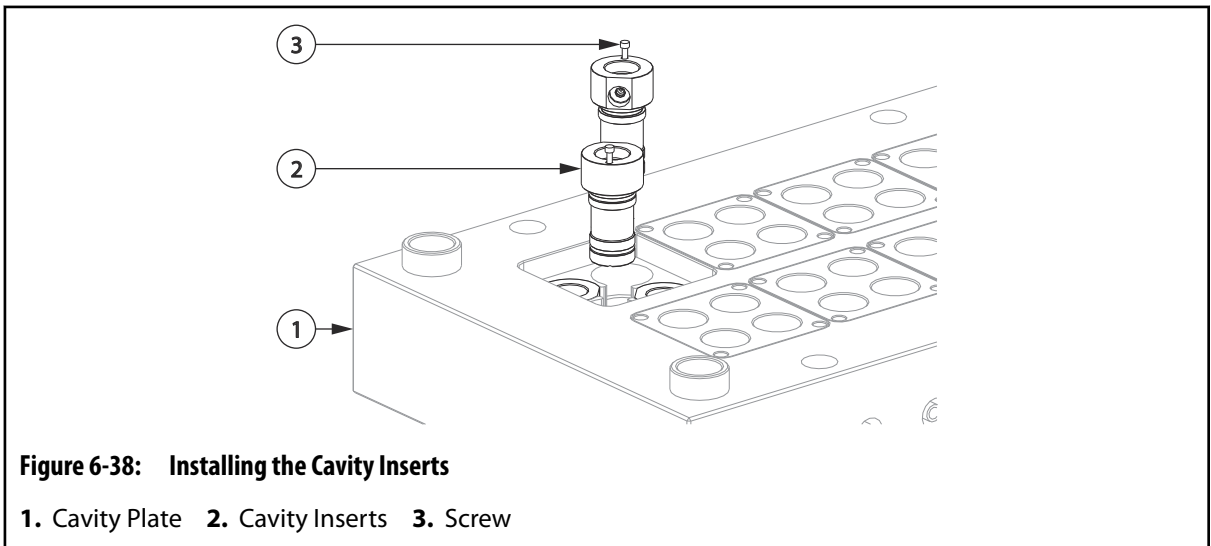
Mechanical hazard – risk of damage to the hot runner. Do not remove cavity inserts individually. Unequal force on the nozzle housing could damage components. Always remove a cavity insert and the insert diagonally opposite to it at the same time.

- Using the screws, pull the cavity inserts out of the cavity plate. A slide hammer can be used to facilitate the operation.

6.9.2 Installing the Cavity Inserts

To install the cavity inserts, do the following:

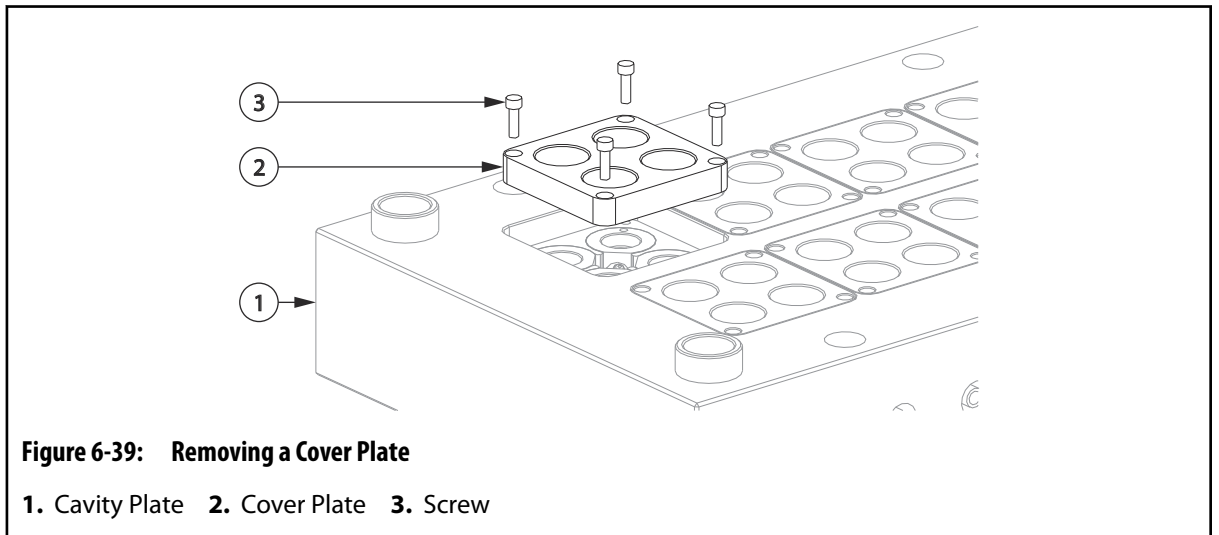
- Make sure a screw is installed in the body of each cavity insert in the set.



CAUTION!

Mechanical hazard – risk of damage to the hot runner. Do not install cavity inserts individually. The nozzle housing will deflect and damage the other nozzle tips and cavity inserts. Always install the cavity inserts in pairs.

2. Using the screws, insert two cavity inserts at the same time into the cavity plate until the nozzle tips start to engage the nozzle housing. The cavity inserts will be pushed into place when the cover plate is installed.
3. Remove the screws from the cavity inserts.
4. Install the cover plate and torque the screws to the specified torque value. Refer to the assembly drawings for torque requirements.



6.10 Removing and Installing Nozzle Tips

The following procedures describe how to remove and install nozzle tips.

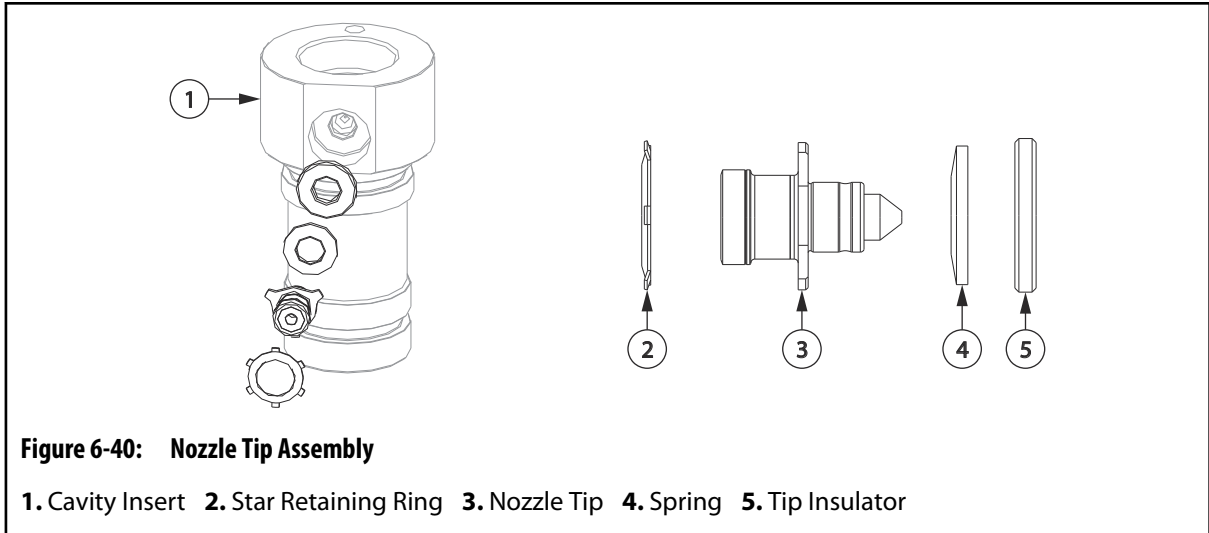
**WARNING!**

Burn and mechanical hazard - risk of serious injury and/or damage to the nozzle tips. When removing the nozzle tips, wait for the corresponding nozzle heater front zone to reach a temperature lower than the resin freezing point.

6.10.1 Removing the Nozzle Tips

To remove the nozzle tips, do the following:

1. Removing the cavity inserts as needed. Refer to [Section 6.9](#) for more information.
2. For each cavity insert, do the following:
 - a. Remove the star retaining ring that retains the nozzle tip.



CAUTION!

Mechanical hazard – risk of damage to the hot runner. Remove nozzle tips by hand or using brass pliers. Use of any other tool could damage the nozzle tip or nozzle sealing surfaces.

- b. Remove the nozzle tip by hand or using brass pliers.
- c. Remove the spring and tip insulator. Store them with the nozzle tip.
- 3. Remove any resin from the interior and exterior of the nozzle housings using a soft wire brush or equivalent.

NOTE:

Do not remove locks and tags until the nozzle tips are installed.

6.10.2 Installing the Nozzle Tips

To install the nozzle tips, do the following:

NOTE:

Nozzle tips must be installed when the resin and nozzle housings are cold.

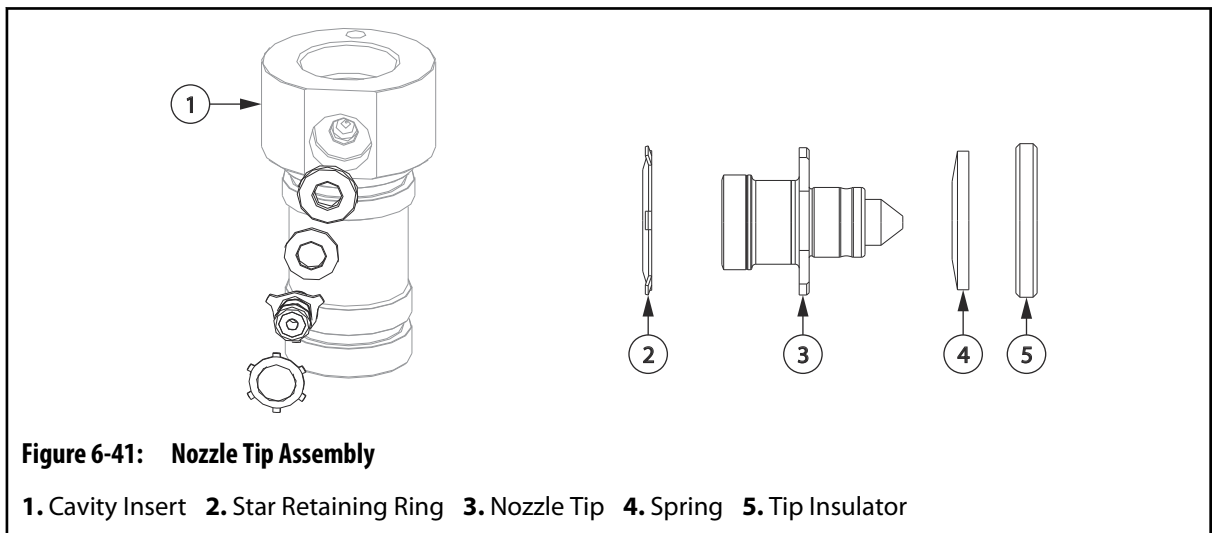
- 1. If the hot runner is in the machine, lock out and tag the machine and controller (if equipped). Refer to [Section 2.5](#) for more information.

**IMPORTANT!**

If resin or other residues are not thoroughly cleaned off the threads and seating areas of both the nozzle tip and nozzle housing, the result could lead to the following:

- Compressive overload of the tip, even at the correct torque recommendation, causing damage to the tip (permanently shortened)
- A tip which is no longer tight after it has been heated up and cooled down
- Poor performance or quality of the gate due to the incorrect tip position (too far back or too far forward)
- Leakage between the nozzle tip and cavity plate gate detail, permitting the formation of degraded resin

2. Remove any resin or other residue found on the nozzle tips and nozzle housings.
3. Remove any insulating gate bubbles. Refer to [Section 6.14](#) for more information.
4. For each cavity insert, do the following:
 - a. Assemble the nozzle tip, spring and tip insulator together. Make sure the concave side of the spring faces the tip insulator.



- b. Insert the nozzle tip assembly into the cavity insert. Make sure the assembly is seated fully in the gate detail.
 - c. Insert the star retaining ring into the cavity insert to secure the nozzle tip. Make sure the ring presses against the nozzle tip. If necessary, use a socket to evenly push the star retaining ring against the nozzle tip.
 - d. Make sure the alignment dowel is installed in the side of the cavity insert.
5. Install the cavity inserts. Refer to [Section 6.9.2](#) for more information.

6.10.3 Installing a Blank Nozzle Tip to Run With a Cavity Down

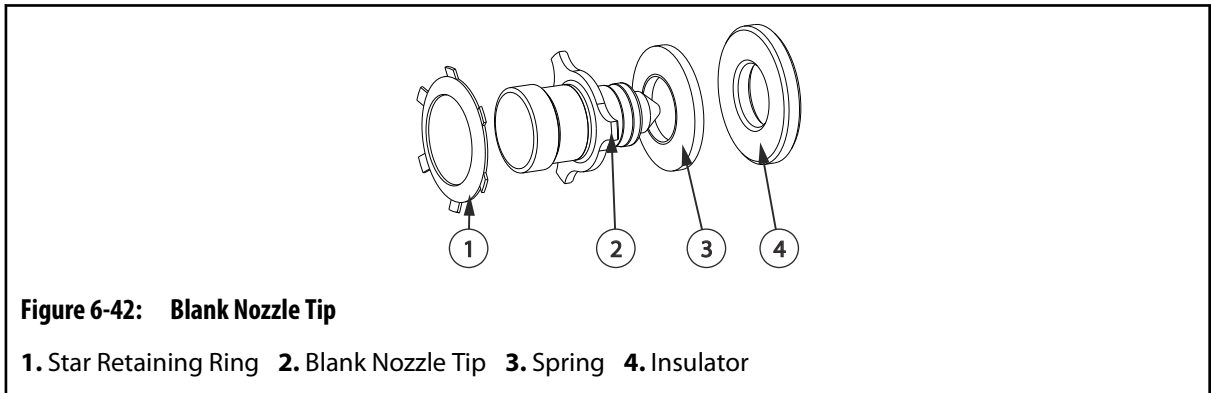
In the case when a cavity needs to be shut down for any reason (such as cavity damage or part flash), an available blank nozzle tip with no melt channel can be used. The blank nozzle tip can be ordered from Husky.

NOTE:

When removing the nozzle tips, it is recommended they be removed when the hot runner is at room temperature (< 25 °C or < 77 °F).

To install the blank nozzle tip and run with a cavity down, do the following:

1. Remove the nozzle tip keeping the star retaining ring, spring and insulator for use with the blank nozzle tip. Refer to [Section 6.10.1](#) for instructions.
2. Install the blank nozzle tip for the affected cavity using the insulator, spring, and star retaining ring from the nozzle tip removed in [step 1](#).



3. Install the cavity inserts. Refer to [Section 6.9.2](#) for more information.



IMPORTANT!

When using a blank nozzle tip, the part balance will be negatively affected for the remaining cavities.

4. Start and run the system as normal.

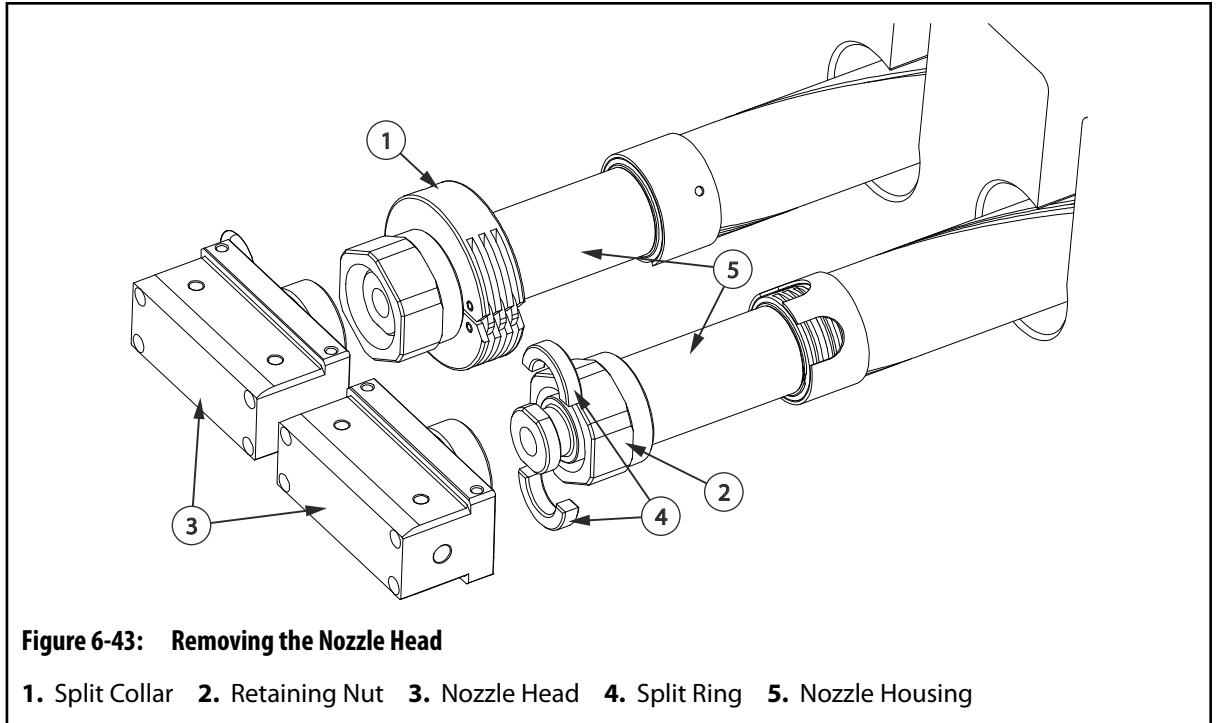
6.11 Removing and Installing the Nozzle Head (Ultra SideGate Inline Only)

The following procedures describe how to remove and install the nozzle head for an Ultra SideGate Inline hot runner

6.11.1 Removing the Nozzle Head (Ultra SideGate Inline Only)

To remove the nozzle head, do the following:

1. Remove the nozzle heaters and thermocouples. Refer to [Section 6.13.3](#) for more information.



2. Install the split collar beneath the retaining nut. Refer to [Section 1.8](#) for a list of special Husky tools and order numbers.
3. Unthread the nozzle head retaining nut against the split collar.
Retaining nut uses a standard 24mm crows foot or crows foot (for retainer nut) for minimum pitch applications. Refer to [Section 1.8](#) for a list of special Husky tools and order numbers
Retaining nut will jack the nozzle head off of the housing.
4. Once the retaining nut is completely unthreaded, slide the retaining nut away from the nozzle head threads.
5. Remove the split ring from the nozzle housing.
6. Remove the nozzle head from the nozzle housing.
7. Remove the retaining nut from the nozzle housing.

6.11.2 Installing the Nozzle Head (Ultra SideGate Inline Only)

To install the nozzle head, do the following:

1. Apply anti-seize to the threads of retaining nut. Refer to [Section 3.4](#) for information about recommended lubricants.

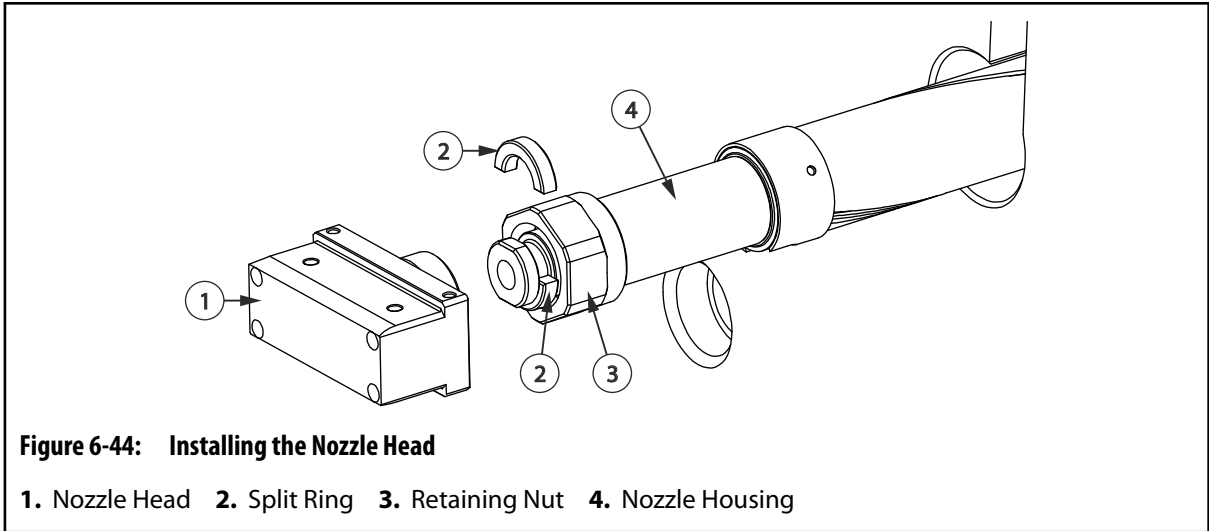


Figure 6-44: Installing the Nozzle Head

1. Nozzle Head 2. Split Ring 3. Retaining Nut 4. Nozzle Housing

2. Install the retaining nut onto nozzle housing.
3. Install the split ring onto nozzle housing.
4. Install the nozzle head onto nozzle housing.
5. Thread the retaining nut onto nozzle head.



IMPORTANT!

The nozzle head alignment tool or nozzle head alignment tool adjustable can be used to align the Nozzle heads. Refer to [Section 1.8](#) for a list of special Husky tools and order numbers.

- The nozzle head alignment tool will fit the standard width head.
- The nozzle head alignment tool adjustable is adjustable for heads with a customize width. The swivel head screws can be used to adjust to the width.

6. Slide the alignment tool over two nozzle heads. This will maintain the heads in a parallel orientation while the retaining nut is torqued
7. Torque the retaining nut to 47 N·m (35 lbf·ft) .

NOTE:

The retaining nut uses a standard 24mm crows foot or crows foot (for retainer nut) for minimum pitch applications. Refer to [Section 1.8](#) for a list of special Husky tools and order numbers.

6.12 Removing and Installing Nozzle Housings

The following procedures describe how to remove, maintain and install nozzle housings.

6.12.1 Removing Nozzle Housings

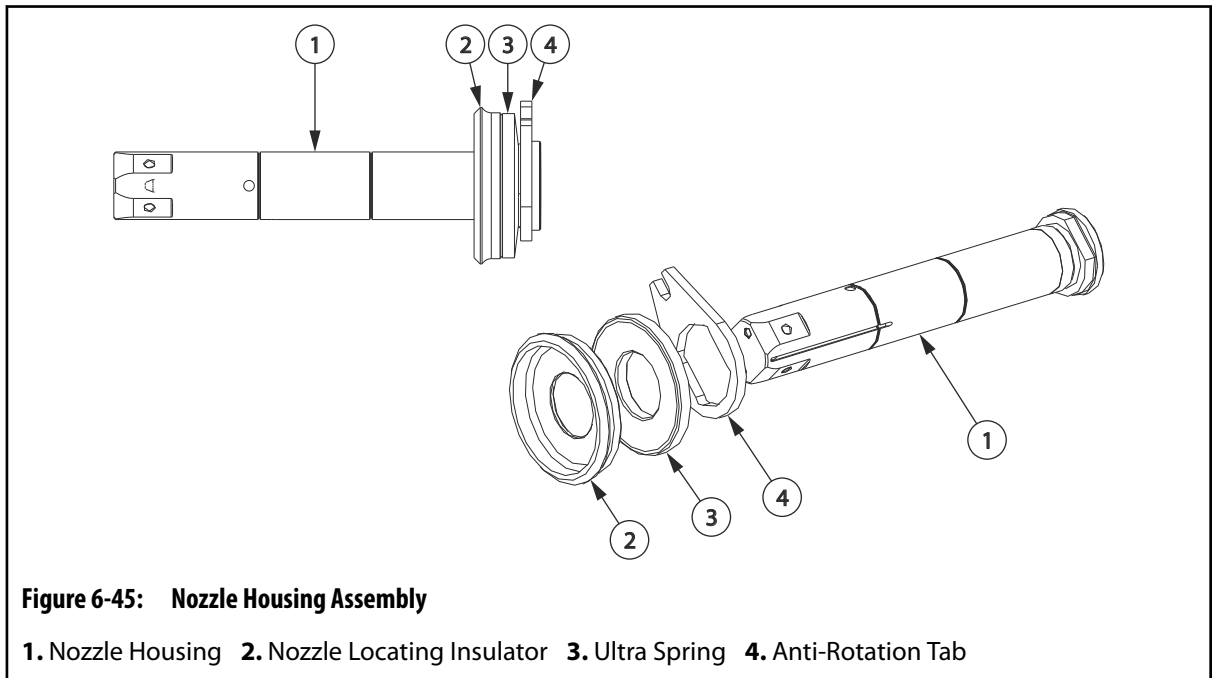
To remove a nozzle housing, do the following:

1. Remove the hot runner from the machine. Refer to [Section 4.3.2](#) for more information.
2. Remove the cavity plate. Refer to [Section 6.6.1](#) for more information.
3. Remove the nozzle heaters and thermocouples. Refer to [Section 6.13.1](#) for more information.
4. Remove the backing plate. Refer to [Section 6.7](#) for more information.
5. Remove the manifolds. Refer to [Section 6.8](#) for more information.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Use a brass rod to protect the manifold plate and nozzle from damage.

6. Break the resin around the nozzle housing with a side impact against the nozzle flange at the manifold face.
7. Pull the nozzle stack assembly out of the manifold pocket and disassemble.



6.12.2 Installing Nozzle Housings

To install the nozzle housings, do the following:

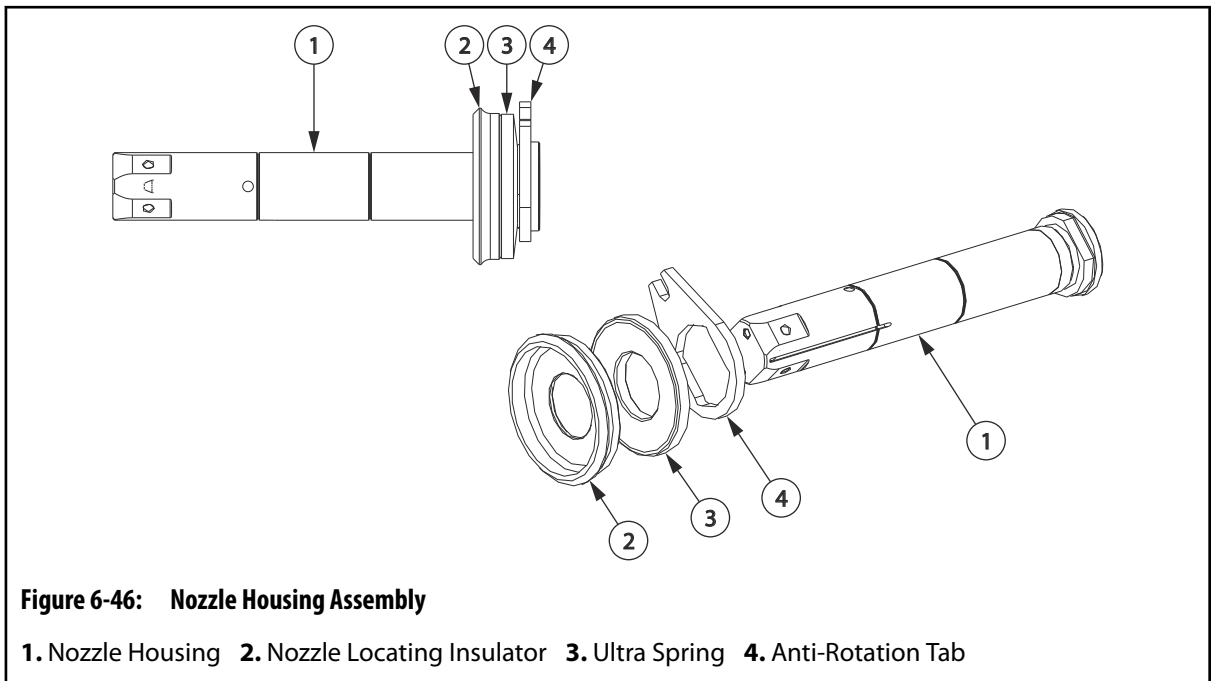
CAUTION!

Mechanical hazard – risk of damage to the hot runner. Do not hone the back surface of the nozzle housing to remove nicks and burrs. The back surface is a precision made section of the housing with a contoured surface. Honing this section could cause the system to leak and void the leak proof guarantee for the hot runner.

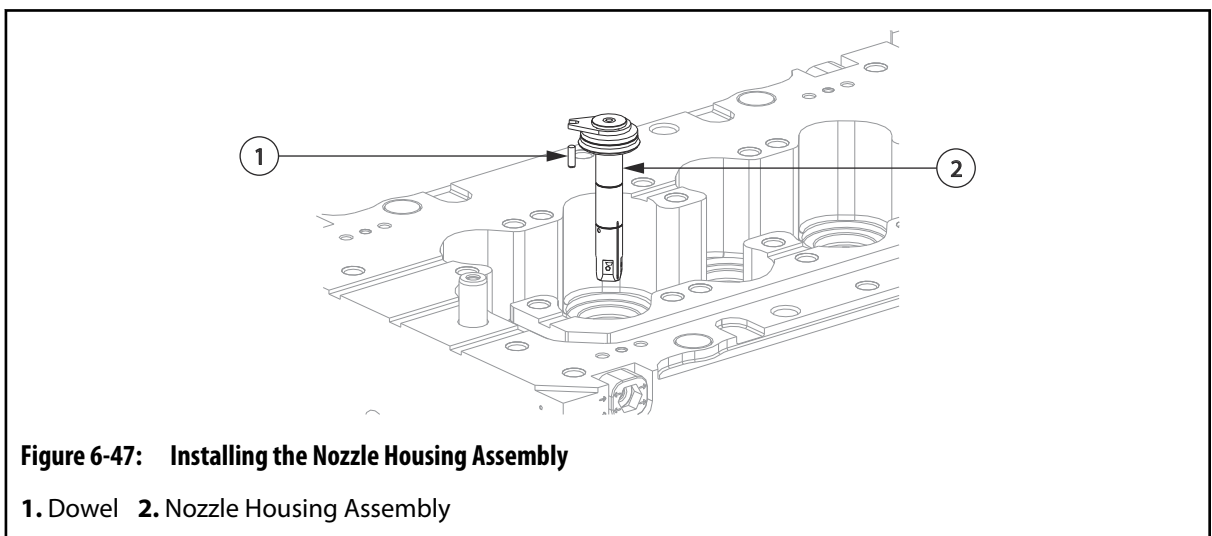
1. Inspect all nozzle stack components for damage or wear. Replace as necessary.
2. Remove all resin from the melt channel in the nozzle housing.
3. Remove all resin from the nozzle housing bore in the manifold plate.
4. Assemble each nozzle housing.

NOTE:

Refer to the assembly drawings to verify the orientation and correct number of Ultra springs.



5. Place all housing assemblies into the nozzle bores in the manifold plate. Make sure the housing assemblies are properly aligned with the nozzle locating dowels to prevent rotation.



6. Install the manifolds. Refer to [Section 6.8.2](#) for more information.
7. Install the backing plate. Refer to [Section 6.7.2](#) for more information.

8. Install the nozzle heaters and thermocouples. Refer to [Section 6.13](#) for more information.
9. Install the nozzle tip. Refer to [Section 6.10.2](#) for more information.
10. Install the cavity plate. Refer to [Section 6.6.2.2](#) for more information.
11. Install the hot runner into the machine. Refer to [Section 4.3.1](#) for more information.

6.13 Removing and Installing Nozzle Heaters

The following procedures describe how to remove and install nozzle heaters.



IMPORTANT!

Husky nozzle heaters are rugged and have a long service life. Only replace nozzle heaters with Husky approved parts. Use of components not sold or approved by Husky will void the hot runner warranty.

6.13.1 Removing the Nozzle Heaters

To remove the nozzle heaters, do the following:

1. Separate or remove the cavity plate from the hot runner. Refer to [Section 6.6](#) for more information.
2. Remove the outside nozzle heater by doing the following:
 - a. Remove the cap and screws.

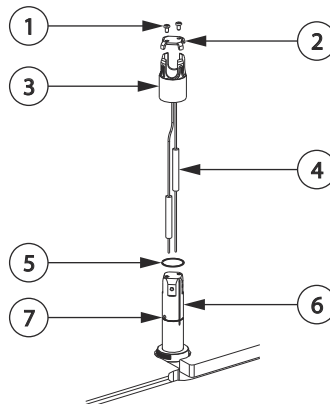
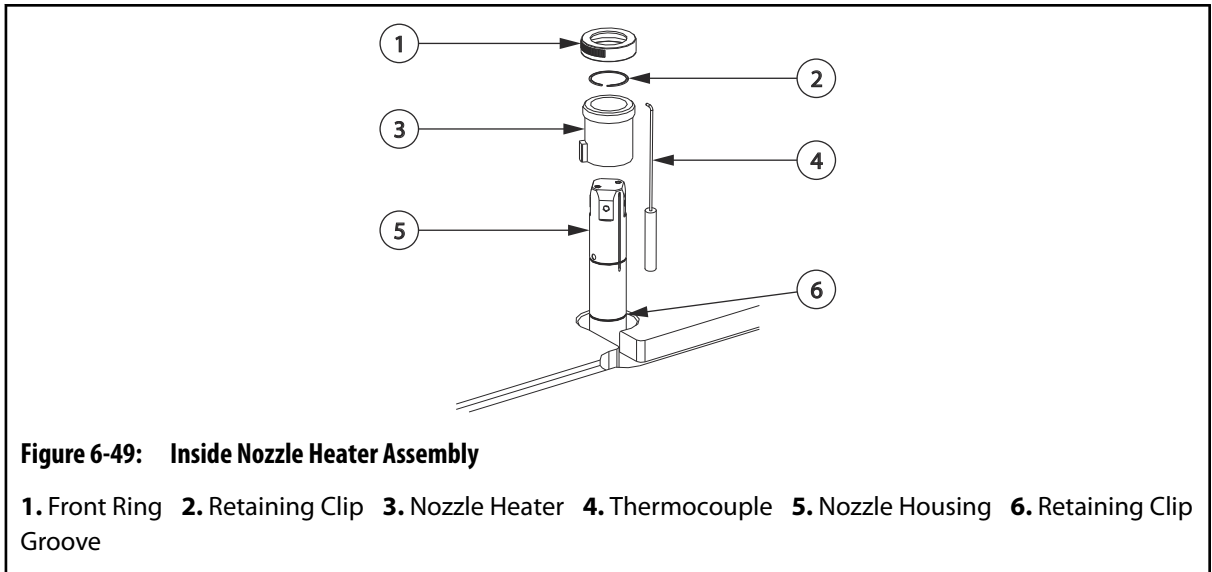


Figure 6-48: Outside Nozzle Heater Assembly

1. Screw 2. Cap 3. Nozzle Heater 4. Thermocouple 5. Retaining Ring 6. Nozzle Housing 7. Retaining Clip Groove

- b. Remove the necessary wire clips to expose the nozzle heater and thermocouple wires.
- c. Loosen the set screws in the nozzle heater.
- d. Remove the nozzle heater from the nozzle housing.
- e. Remove the retaining clip from the nozzle housing.

- f. Disconnect the thermocouple from the nozzle housing.
- 3. Remove the inside nozzle heater by doing the following:
 - a. Remove the front ring.

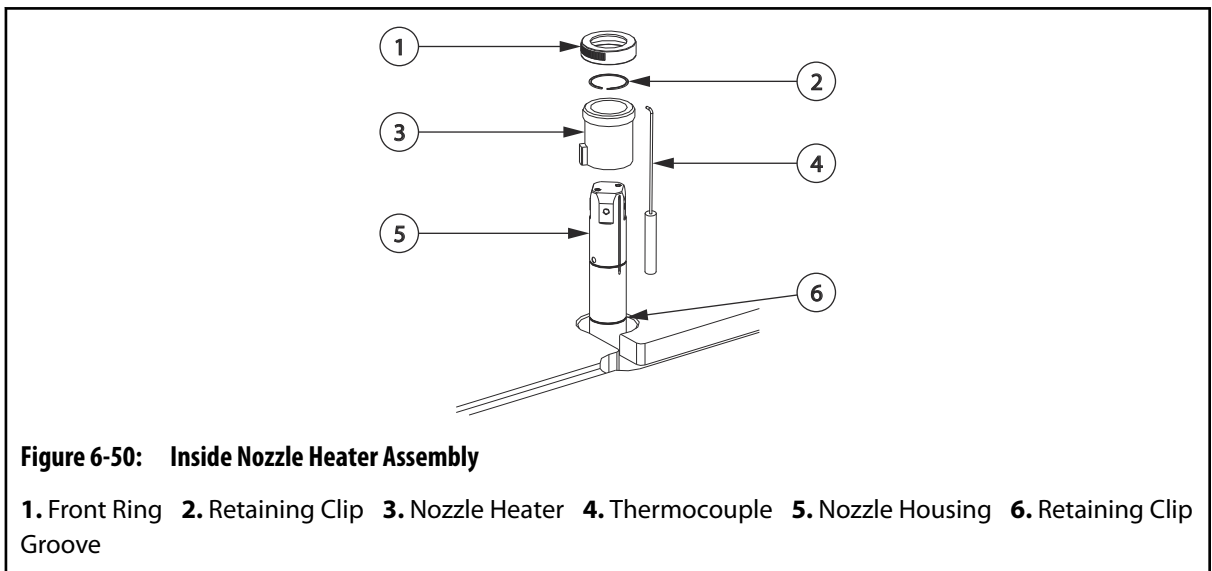


- b. Disconnect the thermocouple from the nozzle heater.
- c. Remove the retaining clip from the nozzle housing.
- d. Remove the necessary wire clips to expose the nozzle heater and thermocouple wires.
- e. Remove the nozzle heater and thermocouple.

6.13.2 Installing the Nozzle Heaters

To install the nozzle heaters, do the following:

- 1. Install the inside nozzle heater by doing the following:
 - a. Slide the nozzle heater onto the nozzle housing and position it below the inside retaining clip groove.



- b. Install the retaining clip in the inside retaining clip groove.
 - c. Connect the thermocouple to the nozzle heater.
 - d. Pull the nozzle heater up against the retaining clip.
 - e. Install the front ring and tighten by hand.
2. Install the outside nozzle heater by doing the following:
 - a. Install the thermocouple in the nozzle housing groove.
 - b. Install the retaining clip in the outside retaining clip groove.

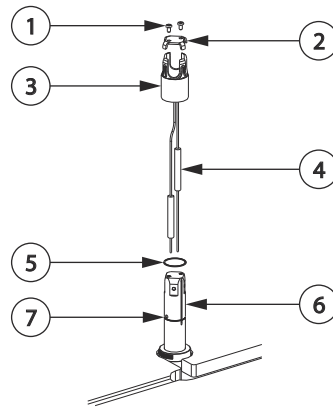


Figure 6-51: Outside Nozzle Heater Assembly

1. Screw 2. Cap 3. Nozzle Heater 4. Thermocouple 5. Retaining Ring 6. Nozzle Housing 7. Retaining Clip Groove

- c. Slide the nozzle heater onto the nozzle housing. Make sure it is seated against the retaining clip.
 - d. Make sure the set screw in the nozzle heater is aligned with the counter-sink in the nozzle housing.
 - e. Tighten the set screw in the nozzle heater.
 - f. Apply a high temperature anti-seize lubricant to the screws used to secure the cap. Refer to [Section 3.4](#) for information about recommended lubricants.
 - g. Install the cap and tighten the screws by hand.
3. Route the nozzle heater and thermocouple wires through the wire channels in the manifold plate. Make sure all wiring is properly retained in the wire channels using wire clips.
 4. Make sure to stagger the knuckles in the wire grooves.



Figure 6-52: Staggering the Knuckles in the Wire Grooves

NOTE:

All wire, including heater or thermocouple wire, that could contact a heated component such as a nozzle housing or manifold must be mineral insulated high temperature wire (hard lead). If the mineral insulated lead is not long enough to allow this, additional steps must be taken, such as using high temperature sleeving, to prevent the knuckles and PTFE or Kapton insulated wire (soft lead) from overheating.

-
5. Label each wire with the nozzle heater zone number. Refer to the electrical schematic for the zone number.
 6. Crimp the wire ends and connect the wires to the appropriate multi-pin connectors. Refer to the electrical schematic for more information.
 7. Test each nozzle heater. Refer to [Section 6.5](#) for more information.
 8. Remove all locks and tags. Refer to [Section 2.5](#) for more information.

6.13.3 Removing the Nozzle Head Cartridge Heater and Thermocouple (Ultra SideGate Inline only)

To remove the nozzle head cartridge heater and thermocouple, do the following:

1. Power down the controller.
2. Lock out and tag the machine and the controller (if equipped).

**WARNING!**

Mechanical hazard – risk of damage to the nozzle sealing surfaces. The temperature of the nozzle tips must cool to room temperature < 25 °C (<77 °F) before the cavity plate is removed. Damage to the nozzle sealing surfaces could occur if the temperature is too high.

-
3. Separate or remove the cavity plate from the hot runner. Refer to [Section 6.6](#) for more information

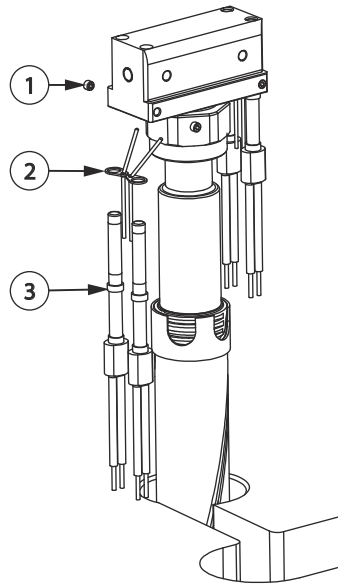


Figure 6-53: Removing Nozzle Head Cartridge Heater and Thermocouple

1. Set Screw 2. Thermocouple 3. Cartridge Heater

4. Loosen the set screw that secures cartridge heater.
5. Remove the cartridge heater.
6. Remove the thermocouple.

6.13.4 Installing the Nozzle Head Cartridge Heater and Thermocouple (Ultra SideGate Inline only)

To install the nozzle head cartridge heater and thermocouple, do the following:

1. Insert the thermocouple into the corresponding thermocouple bore in the nozzle head.

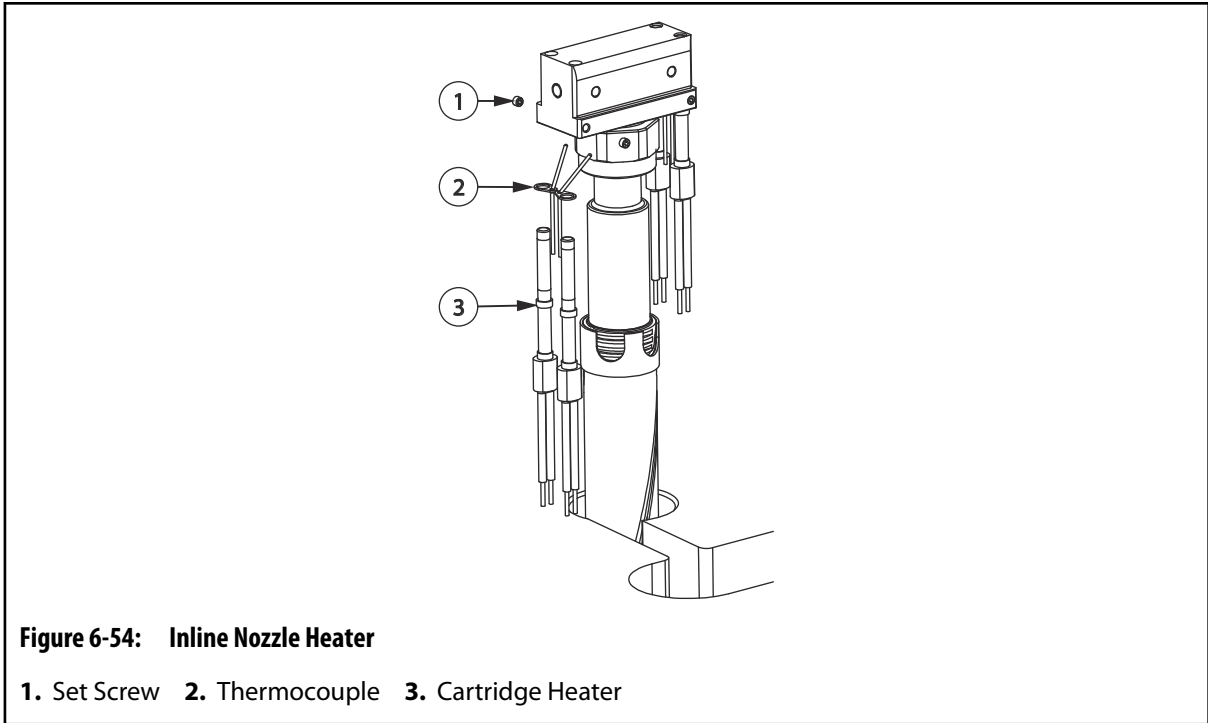


Figure 6-54: Inline Nozzle Heater

1. Set Screw 2. Thermocouple 3. Cartridge Heater

2. Insert the cartridge heater through the thermocouple tab and into the corresponding heater bore in the nozzle head.
3. Torque the cartridge heater retaining set screw to 25 ozf-in.
4. Route the nozzle heater and thermocouple wires through the wire channels in the manifold plate. Make sure all wiring is properly retained in the wire channels using wire clips.
5. Make sure to stagger the knuckles in the wire grooves.



Figure 6-55: Staggering the Knuckles in the Wire Grooves

NOTE:

All wire, including heater or thermocouple wire, that could contact a heated component such as a nozzle housing or manifold must be mineral insulated high temperature wire (hard lead). If the mineral insulated lead is not long enough to allow this, additional steps must be taken, such as using high temperature sleeving, to prevent the knuckles and PTFE or Kapton insulated wire (soft lead) from overheating.

6. Label each wire with the nozzle heater zone number. Refer to the electrical schematic for the zone number.
7. Crimp the wire ends and connect the wires to the appropriate multi-pin connectors. Refer to the electrical schematic for more information.
8. Test each nozzle heater. Refer to [Section 6.5](#) for more information
9. Remove all locks and tags.

6.14 Removing Insulating Gate Bubbles (If Equipped)

During operation, bubbles of resin form within the space between the cavity plate and the nozzle tips. These bubbles, referred to as insulating gate bubbles, provide thermal insulation between the nozzle tip and the cold cavity plate steel. They also increase the speed of color changes and prevent the degradation of some heat sensitive resins.

To remove the insulating gate bubbles, do the following:

1. Remove the nozzle tips from the cavity inserts. Refer to [Section 6.10.1](#) for more information.
2. Place the nozzle tips in a vise with aluminum or brass jaws. Make sure the tip is facing up.



WARNING!

Burn, fire and gas hazard – risk of death or serious injury, and property damage. Use of an open flame to remove resin could produce harmful gases (depending on the resin type), damage components and increase the risk of fire. Only use open flames sparingly and in a controlled environment.



WARNING!

Burn hazard – risk of serious injury. To avoid serious burns, wear personal protective equipment consisting of a heat-resistant coat, heat-resistant gloves, and a full face shield over safety glasses. Use adequate ventilation for fumes.

CAUTION!

Mechanical hazard – risk of damage to the equipment. Abrasives should never be used to clean the nozzle tips, as this could damage the critical sealing surfaces.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Do not allow the nozzle tips to overheat. The nozzle tip material could degrade.

3. Using a propane torch, carefully heat the resin deposits on the nozzle tip and then wipe the deposits away with a clean, soft cloth. This may have to be repeated several times.
4. Remove any resin deposits from the cavity inserts. If required, carefully heat the resin deposits with a propane torch and then wipe the deposits away with a clean, soft cloth. This may have to be repeated several times.
5. Install the nozzle tips. Refer to [Section 6.10.2](#) for more information.

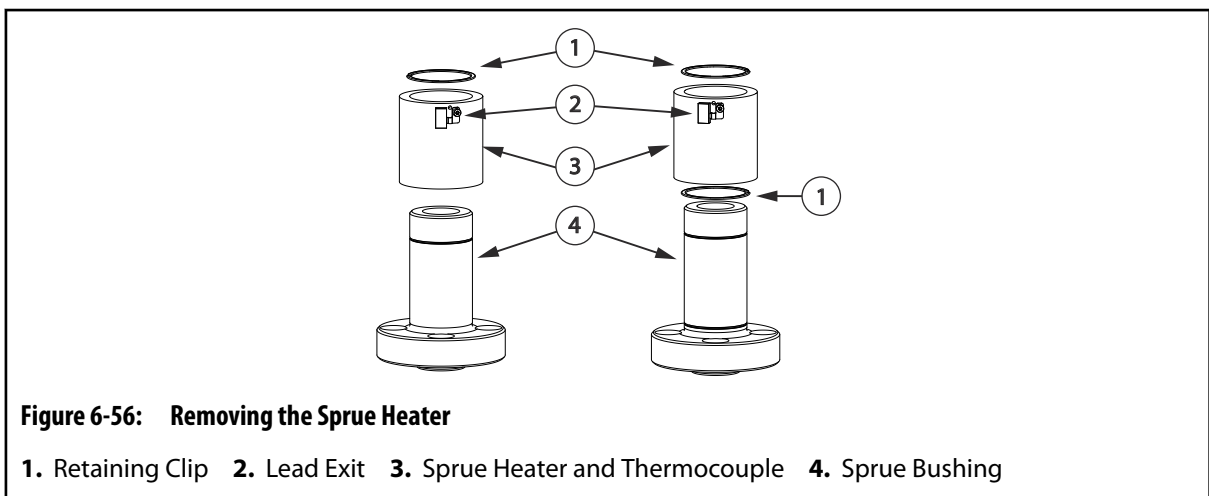
6.15 Removing and Installing the Sprue Heater (If Equipped)

The following procedures describe how to remove and install a sprue heater with a built-in thermocouple or a separate thermocouple.

6.15.1 Removing a Sprue Heater with a Built-In Thermocouple

To remove a sprue heater that has a built-in thermocouple, do the following:

1. Remove the hot runner from the machine. Refer to [Section 4.3](#) for more information.
2. Remove the backing plate. Refer to [Section 6.7](#) for more information.
3. Disconnect the sprue heater and thermocouple wires from the multi-pin connectors.

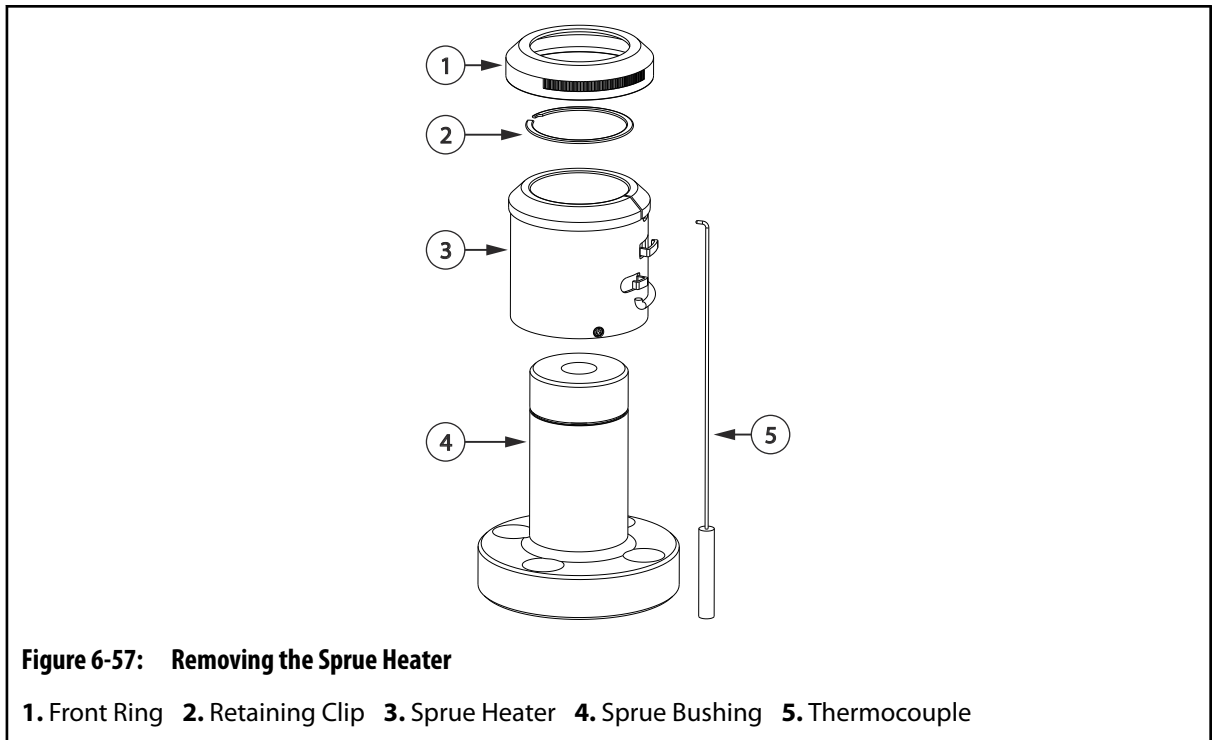


4. Remove the sprue heater and thermocouple wires from the wire channels in the manifold plate.
5. Remove the retaining clip from the sprue bushing.
6. Remove the sprue heater and thermocouple from the sprue bushing.

6.15.2 Removing a Sprue Heater with a Separate Thermocouple

To remove a sprue heater that has a separate thermocouple, do the following:

1. Remove the hot runner from the machine. Refer to [Section 4.3](#) for more information.
2. Remove the backing plate. Refer to [Section 6.7](#) for more information.
3. Disconnect the sprue heater and thermocouple wires from the multi-pin connectors.



4. Remove the sprue heater and thermocouple wires from the wire channels in the manifold plate.
5. Remove the front ring, retaining clip and thermocouple.
6. Using a heater removal tool, remove the sprue heater from the sprue bushing. Refer to [Section 1.8](#) for a list of special Husky tools and order numbers.

6.15.3 Installing a Sprue Heater with a Built-In Thermocouple

To install a sprue heater with a built-in thermocouple, do the following:

1. If there are two retaining clip grooves, install a retaining clip in the groove closest to the manifold.
2. With the lead exit facing away from the manifold, slide the sprue heater onto the sprue bushing. Make sure the sprue heater is below the retaining clip groove in the sprue bushing.

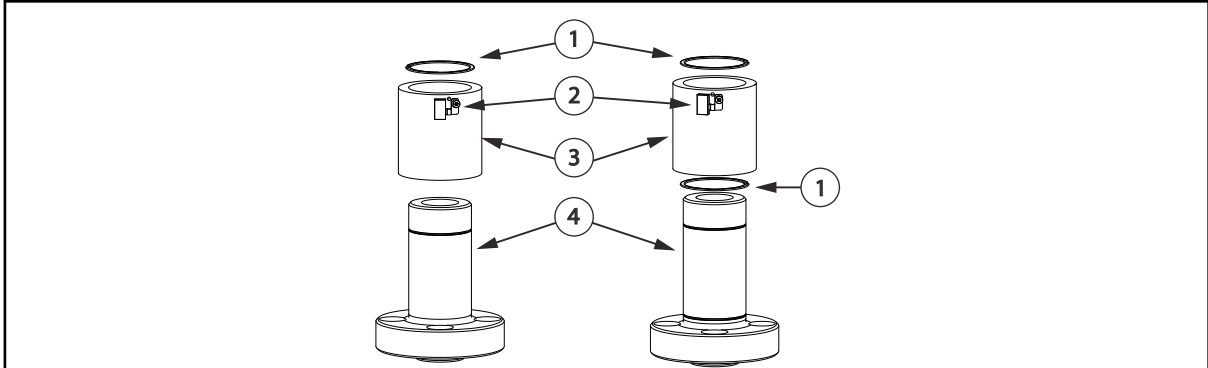


Figure 6-58: Installing the Sprue Heater

1. Retaining Clip 2. Lead Exit 3. Sprue Heater and Thermocouple 4. Sprue Bushing

3. Align the thermocouple wires with the wire channels in the manifold plate.
4. Install the retaining clip into the groove on the sprue bushing.
5. Pull the sprue heater up until it makes contact with the retaining clip.

NOTE:

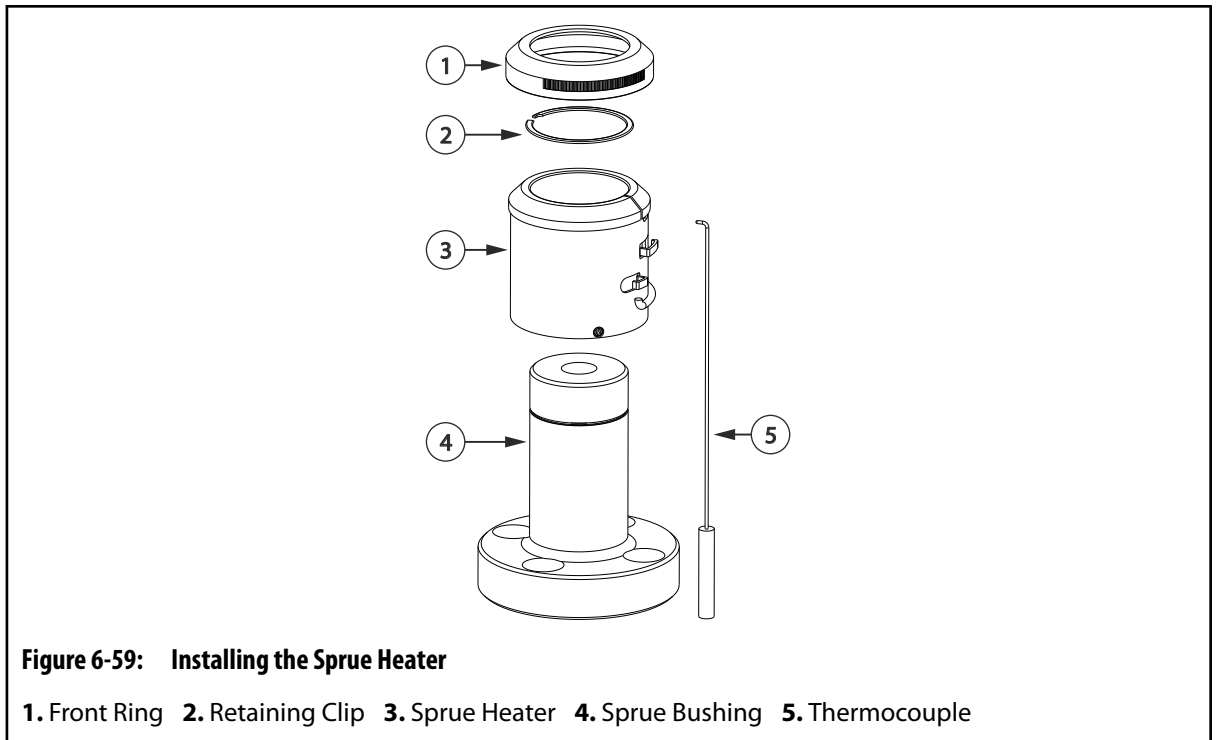
All wiring near the sprue heater must be either a high temperature braid or sleeved using a high temperature sleeving.

6. Route the sprue heater and thermocouple wires through the wire channels in the manifold plate. Make sure all wiring is properly retained in the wire channels using wire clips.
If the wire length is too long or too short, refer to [Section 6.17](#) for information about adjusting the wire length.
7. Label each wire with the heater zone number. Refer to the electrical schematic for the zone number.
8. Crimp the wire ends and connect them to the appropriate multi-pin connectors. Refer to the electrical schematic for more information.
9. Test the sprue heater. Refer to [Section 6.5](#) for more information.
10. Install the backing plate. Refer to [Section 6.7](#) for more information.
11. Install the hot runner into the machine. Refer to [Section 4.3](#) for more information.

6.15.4 Installing a Sprue Heater with a Separate Thermocouple

To install a sprue heater with a separate thermocouple, do the following:

1. Slide the sprue heater onto the sprue bushing. Make sure the sprue heater is below the retaining clip groove in the sprue bushing.



2. Install the retaining clip into the groove on the sprue bushing.
3. Using a heater removal tool, pull the sprue heater up until it makes contact with the retaining clip. Refer to [Section 1.8](#) for a list of special Husky tools and order numbers.

NOTE:

All wiring near the sprue heater must be either a high temperature braid or sleeved using a high temperature sleeving.

4. Connect the thermocouple to the sprue heater.
5. Route the sprue heater and thermocouple wires through the wire channels in the manifold plate. Make sure all wiring is properly retained in the wire channels using wire clips.
 If the wire length is too long or too short, refer to [Section 6.17](#) for information about adjusting the wire length.
6. Thread the front ring onto the sprue heater and tighten by hand.
7. Label each wire with the heater zone number. Refer to the electrical schematic for the zone number.
8. Crimp the wire ends and connect them to the appropriate multi-pin connectors. Refer to the electrical schematic for more information.
9. Test the sprue heater. Refer to [Section 6.5](#) for more information.
10. Install the backing plate. Refer to [Section 6.7](#) for more information.
11. Install the hot runner into the machine. Refer to [Section 4.3](#) for more information.

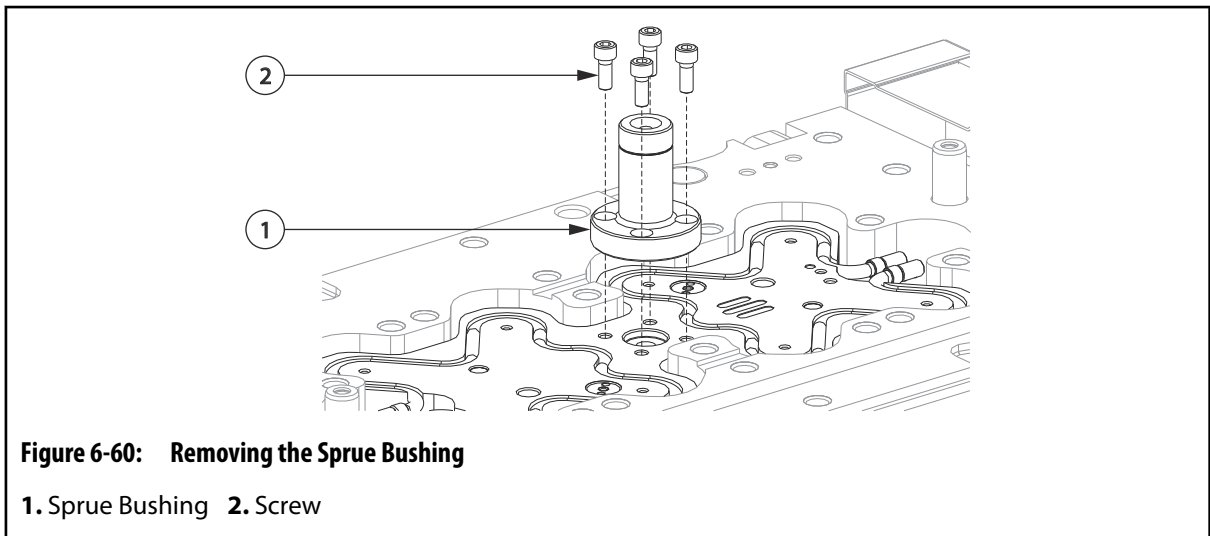
6.16 Removing and Installing the Sprue Bushing

The following procedures describe how to remove, maintain and install the sprue bushing.

6.16.1 Removing the Sprue Bushing

To remove the sprue bushing, do the following

1. Remove the hot runner from the machine. Refer to [Section 4.3](#) for more information.
2. Remove the backing plate. Refer to [Section 6.7](#) for more information.
3. Remove the sprue heater. Refer to [Section 6.15](#) for more information.
4. Remove the screws that secure the sprue bushing to the manifold.



5. Remove the sprue bushing.
6. Using a brass rod, remove the resin slug from the sprue bushing melt channel.
7. Clean the sprue bushing. Do not damage any sealing surfaces.
8. Check and repair the nozzle radius, if required.

6.16.2 Installing the Sprue Bushing

To install the sprue bushing, do the following:



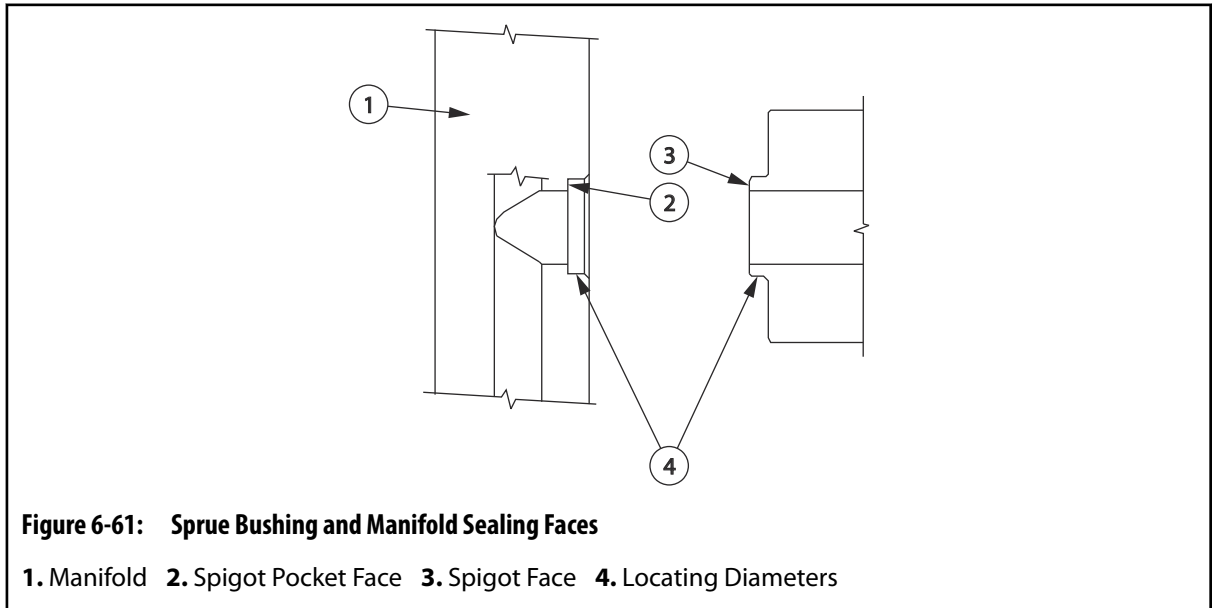
WARNING!

Hot resin spray hazard – risk of serious injury. Any contamination or damage at the sprue bushing and manifold interface could cause hot resin to spray out of the mold, possibly resulting in serious burns. Both the mounting faces of the sprue bushing and manifold must be spotlessly clean and undamaged. The mounting screws must also be torqued to the specified value.

NOTE:

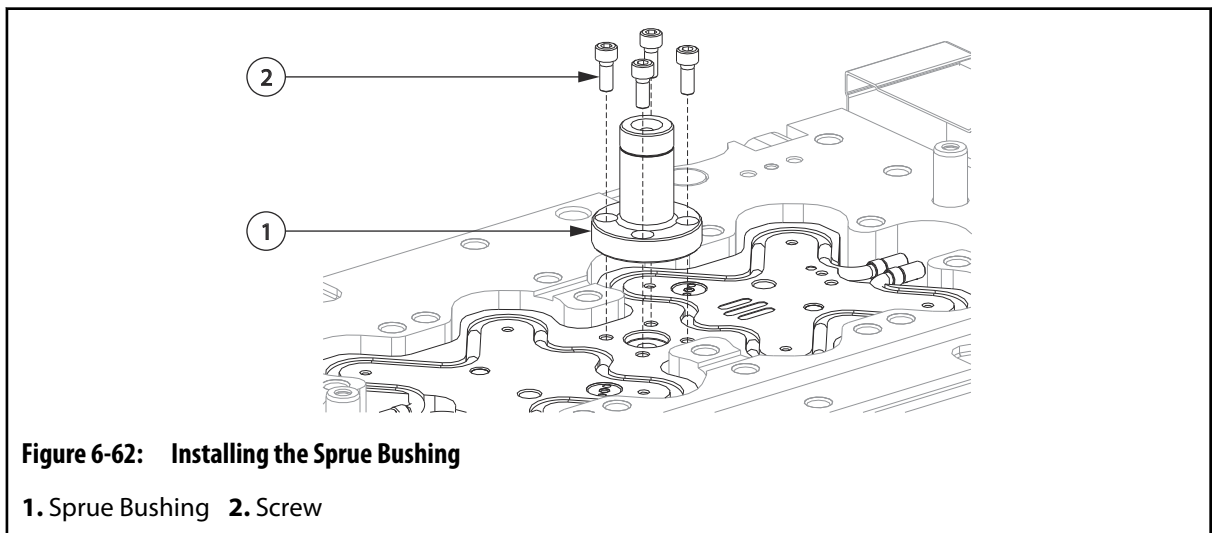
The supplied screws used to install the sprue bushing are of a special quality and must not be substituted.

1. Clean the surfaces on the sprue bushing and manifold where the two components will interface.

**CAUTION!**

Crushing hazard – risk of damage to equipment. Screws used to install sprue bushings must meet specific requirements. Only use the screws specified in the assembly drawings. Failure to use these screws could result in equipment damage.

2. Apply a high temperature anti-seize lubricant to the screws used to install the sprue bushing. Refer to [Section 3.4](#) for information about recommended lubricants.



3. Install the sprue bushing and torque all screws to half the specified value in a cross pattern. Refer to the assembly drawings for torque requirements.
4. Torque the screws fully to the specified value to make sure an even seal is made between the sprue bushing and manifold. Refer to the assembly drawings for torque requirements.
5. Install the sprue heater. Refer to [Section 6.15](#) for more information.
6. Install the backing plate. Refer to [Section 6.7](#) for more information.
7. Install the hot runner into the machine. Refer to [Section 4.3](#) for more information.

6.17 Adjusting the Thermocouple Wire Length

In some cases, the length of a thermocouple wire may be too long or too short depending on the size of the hot runner. The following are recommendations for adjusting the wire length:

1. Long Thermocouple Wires

For small hot runners where the lead length is greater than required, wrap the wires around the heater body to reduce slack and make sure the wires fit properly in the wire channel.



Figure 6-63: Wire Wrapped Around Sprue Heater (Example)

2. Short Thermocouple Wires

For large hot runners where the lead length is insufficient to reach a wire channel, cut and install a length of fiberglass sleeving to protect the wire.

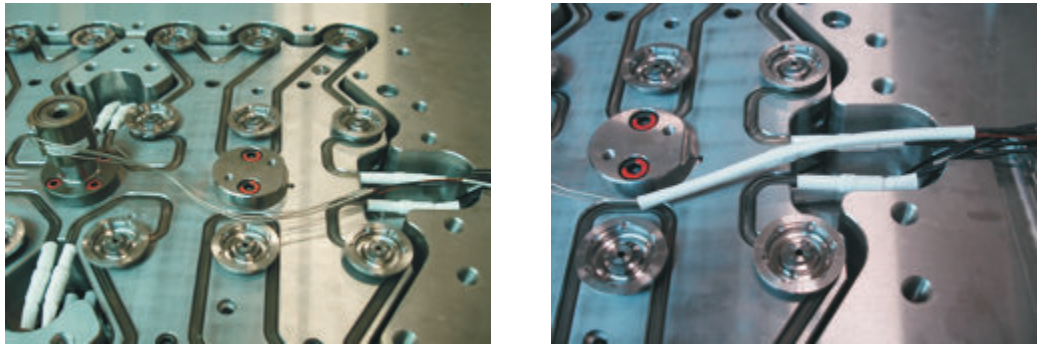


Figure 6-64: Fiberglass Sleeving (Example)

6.18 Removing Air and Water Plugs



IMPORTANT!

Husky does not recommend the removal of seized air and water plugs in the field. Contact Husky to arrange returning the hot runner for repair and/or rework. This procedure was prepared by Husky at the request of the customer, and does not in any way absolve the customer from fulfilling their usual obligations, including those mentioned above. Husky disclaims liability for damage to property or injury to personnel caused by the customer attempting the procedure. It is the obligation of the customer to confirm that personnel are trained and have appropriate qualifications including: understanding the safe methods and using the correct personal protective equipment prior to performing this procedure.



WARNING!

Burn and mechanical hazard - risk of serious injury and/or damage to the equipment. Only qualified personnel should perform this procedure using the appropriate personal protective equipment.



WARNING!

Burn hazard – risk of serious injury. To avoid serious burns, do not touch the plate or plug after heating and wear personal protective equipment consisting of a heat-resistant coat, heat-resistant gloves, and a full face shield over safety glasses.

1. Heat the plate area surrounding the stainless steel plug with a hand held torch for 1-2 minutes. Do not heat the plug directly.



IMPORTANT!

Do not use an impact gun or impact driver as the plug will seize.

2. Once the plate is heated, use a safety-rated breaker bar and the appropriate Hex socket adapter to apply pressure and back the plug out.

If the plug does not move, repeat [step 1](#) and [step 2](#).

3. If the plug cannot be removed manually using [step 1](#) and [step 2](#), the use of a magnetic drill or milling out the plug will be required.

If you are unable to safely remove the plug as described in this procedure, return the part to Husky for rework and/or repair. Contact Husky for more information.



IMPORTANT!

Do not use an impact gun or impact driver as the plug will seize.

4. Clean the threads on the plug and then, if required, apply the appropriate plug sealant to the threads.
5. Install the new plug. Refer to [Table 6-1](#) for the recommended torque. Contact Husky for appropriate part number

Table 6-1: Pipe Threads, Taps and Torques

| Pipe Thread †STAINLESS STEEL | Tap Drill | Torque |
|---------------------------------|---------------------|----------------------|
| 1 - 11 1/2 | 29.36 mm (1.156 in) | 108 N·m (80 lbf·ft) |
| 1 1/4 - 11 1/2 | 38.10 mm (1.50 in) | 136 N·m (100 lbf·ft) |
| 1 1/2 - 11 1/2 | 44.05 mm (1.734 in) | 163 N·m (120 lbf·ft) |
| 2 - 11 1/2 | 56.36 mm (6.35 in) | 203 N·m (150 lbf·ft) |
| 1/16 - 27 | 6.35 mm (0.250 in) | 11 N·m (8 lbf·ft) |
| 1/8 - 27 | 8.73 mm (0.344 in) | 14 N·m (10 lbf·ft) |
| 3/8 - 18 | 14.29 mm (0.563 in) | 27 N·m (20 lbf·ft) |
| 1/2 - 14 | 18.25 mm (0.718 in) | 34 N·m (25 lbf·ft) |
| 3/4 - 14 | 23.42 mm (0.922 in) | 47 N·m (35 lbf·ft) |

6. If you are unable to safely complete the steps in this procedure, return the part to Husky for rework and/or repair. Contact Husky for more information.

6.19 Removing Resin from the Hot Runner

Occasionally, resin may be left in the hot runner or a leakage of resin may occur due to a component failure. The resin will have to be removed at this point. However, removing the resin without damaging components requires careful attention.

The following procedures describe how to carefully remove resin from the hot runner and hot runner components.

6.19.1 Plate Cleaning and Inspection

The following procedure describes a general cleaning and inspection process for plates. After this procedure has been completed, the application of a fluidized bed process heat is recommended.

NOTE:

The recommended procedure for removing resin from hot runner components is a controlled fluidized bed process heat. Refer to [Section 6.19.2](#) for more information.

To inspect and clean plates, do the following:



IMPORTANT!

The use of an open flame to remove resin is not recommended due to the possible gases given off by some resins and the risk of burns while working around hot resin. In addition, there exists a potential for fire when using a torch to heat and melt resin. The heat from the torch may also overheat and damage small components.

1. Using brass or hardwood scrapers, remove all resin deposits from the plates
2. Remove all cooling fittings and plugs.
3. Clean the deposits from the cooling hoses.

CAUTION!

Mechanical hazard – risk of equipment damage. Cleaning products such as scour pads and brushes can be abrasive. When using pads or brushes, do not damage surfaces. To avoid damaging surfaces, use non-abrasive products.

4. Clean the entire plate using a medium India stone (240 grit oilstone) on flat surfaces and Scotch-Brite™ No. 7447 (Maroon) on difficult to reach areas
5. Remove any deposits from the alignment bushings and alignment dowels.
6. Check the plate for the following:
 - Wear at the alignment bushings and alignment dowels
 - Corrosion in the cooling channels

- Cracks (especially around the mold mounting bolt holes or clamp mounting slots)
- Damage to the dowel holes
- Sharp edges around the wire grooves



WARNING!

Respiratory hazard – risk of serious injury. Use an appropriate breathing apparatus as protection while using a brass wire bush or wheel. See the material safety data sheet (MSDS) from the resin supplier. As a minimum, a particle mask is recommended.

7. Rework or replace the plates as required.

NOTE:

Before re-installing components, the plate pocket(s) must be thoroughly cleaned. An electric hand drill with a brass wire wheel or a brass chisel may be used. This will prevent unnecessary scratching.

8. Install the fittings with new pipe plugs.
9. Pressure test the cooling circuits to verify there are no coolant leaks.



WARNING!

Wear appropriate eye and face protection following the recommendations of the ABMA (American Brush Manufacturers Association) and ANSI (American National Standards Institute) following ANSI Z87.1 “Occupational Eye and Face Protection” ANSI B165.1 and ANSI B165.2 “Safety Requirements - Power Brushes”.



WARNING!

Respiratory hazard – risk of serious injury. Use an appropriate breathing apparatus as protection while using a brass wire bush or wheel. See the material safety data sheet (MSDS) from the resin supplier. As a minimum, a particle mask is recommended.

10. Brush the plate surfaces with a brass wire brush and collect any dust with a vacuum.

CAUTION!

Mechanical hazard – risk of equipment damage. Cleaning products such as scour pads and brushes can be abrasive. When using pads or brushes, do not damage, scratch, or score any sealing surfaces. To avoid damaging sealing surfaces, use non-abrasive products.

11. Clean the plate with Scotch-Brite No. 7447 (Maroon).

NOTE:

Resin on plates may also be removed using the fluidized bed cleaning process, provided that all brass and copper components are removed from the plate and the plate assembly is disassembled completely. Refer to [Section 6.19.2](#) for more information.

6.19.2 Cleaning Using a Fluidized Bed Process

The following sections describe fluidized bed cleaning and how to prepare the hot runner.

Cleaning the manifold passages is rarely required. However, if necessary, manifold passages must be cleaned using the fluidized bed process. Only the fluidized bed cleaning process will successfully remove the resin completely from the melt channels of the hot runner components.

Fluidized bed cleaning is a process with aluminum oxide particles in a high temperature retort. The heated air at 343 to 454 °C (650 to 850 °F) levitates the aluminum oxide particles creating a liquid-like behavior. The temperature and flow of the fluidized bed pyrolyzes (thermally decomposes) the polymer.

NOTE:

Husky does not recommend using a fluidized bed to clean mold plates and components.

6.19.2.1 Assistance

Husky provides a full system repair and cleaning service, in addition to helping customers find a local fluidized bed cleaning process.

Contact your nearest Husky Regional Service and Sales office for more information.

6.19.2.2 Disassembling the Hot Runner for Fluidized Bed Cleaning

When disassembling a hot runner for fluidized bed cleaning, do the following:

**IMPORTANT!**

Before disassembling a hot runner for fluidized bed cleaning, please note the following:

- When removing resin from the mold, make sure the faces of the manifold are kept scratch free. Scratches around the nozzle housing, valve bushing, manifold bushing and piston cylinder, or sprue bushing/sprue bar surfaces may cause severe resin leakage.
 - The thickness of the manifold(s) is extremely important for the performance of the hot runner. There is a risk that cleaning the surface through grinding or sanding would change the total height of the stack and thereby increase the cold clearance. This would result in a resin leak.
-



IMPORTANT!

The fluidized bed cleaning process will anneal Beryllium Copper (BeCu), causing rapid failure of the components when returned to service.

Mechanical cleaning of BeCu components must not damage any of the sealing surfaces. Use only soft brass, hardwood sticks, Scotch-Brite, or soft brass brushes. Do not use abrasive methods to clean BeCu components.



WARNING!

Poison hazard - risk of death or serious injury. Do not use abrasives in an open air environment to clean BeCu components. Airborne beryllium particles are known carcinogens. Only rework BeCu components using abrasives under flood coolants to prevent airborne particles.



IMPORTANT!

The Husky Warranty does not cover BeCu components used outside the operating temperature range, or cleaned using the fluidized bed process.

CAUTION!

Do not remove any surface or melt channel plugs. This will void the leak proof guarantee for the hot runner. Plugs can only be removed by Husky.

1. Any system that is to be sent for fluidized bed cleaning is to be completely disassembled. However do not send the following items for cleaning:
 - Set screws
 - Polyetheretherketone (PEEK) bushings (refer to [Section 6.19.2.3](#)) or ceramic bushings
 - Surface hex head plugs
 - Nozzle tip insulators
 - Nozzle heaters
 - Sprue bushing heaters
 - Beryllium Copper (BeCu) components, such as manifold bushings, manifold inserts, some nozzle tips and tip retainers, etc.

NOTE:

Contact Husky for verification of the component’s material before cleaning it with a fluidized bed process.

2. Make sure all electrical wiring and thermocouples are removed.
3. When packing for shipment, make sure the manifold heater ends do not get damaged during shipping.

The best method is to pack the manifold in a crate where it cannot move, or place the manifold between two pieces of plywood cut approximately 50 mm (2 in) larger all around. Hold the manifold and plywood pieces together with bolts using existing hold down holes or clearance holes in the manifold. Only use plywood thick enough to protect the manifold and absorb impacts if the manifold is dropped.

4. Send a complete packing list of all the components shipped to make sure nothing is overlooked when the components are returned.

6.19.2.3 Removing the PEEK Bushings

Due to the extreme temperatures in a fluidized bed (454 °C or 850 °F), Polyetheretherketone (PEEK) bushings must be removed from the manifold heater ends. The PEEK bushings will melt if subjected to the cleaning process.

To remove the PEEK bushings, twist the bushings 1/4 turn to break the adhesive used to attach it.



Figure 6-65: PEEK Bushing Removal and Installation

The bushings must be installed after the fluidized bed cleaning process. New adhesive is not necessary.

6.20 Removing Resin from the Manifold Plate

Excess resin can weep into the manifold plate during production. This can create manifold thermal control issues and damage electrical wiring.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Weepage must be cleaned before it completely fills the back side of the manifold pocket or covers any electrical wiring.



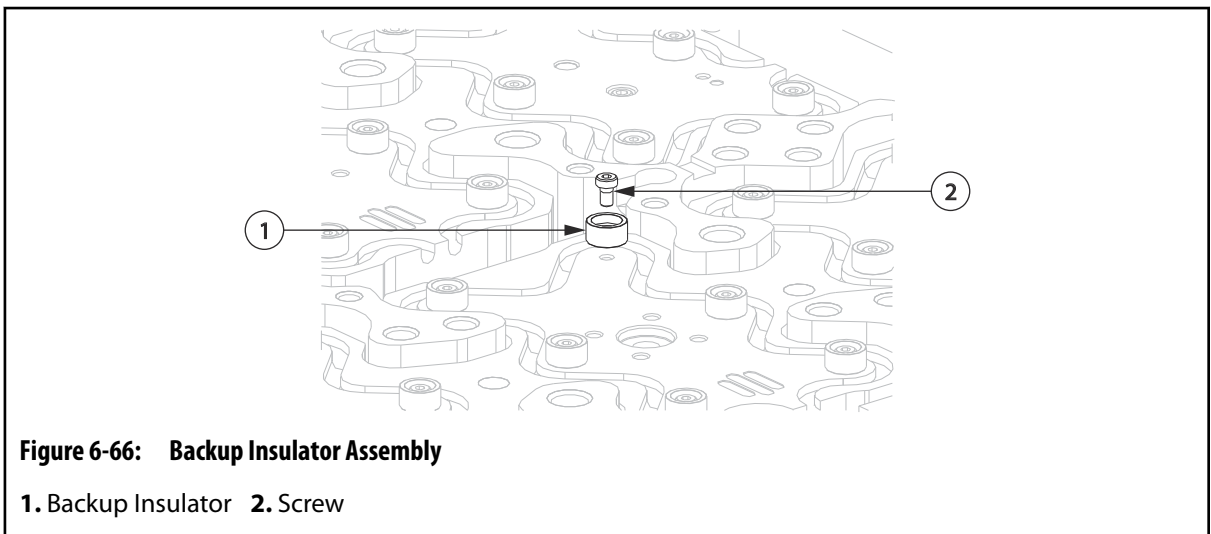
IMPORTANT!

Do not extend the cleaning interval beyond the interval recommended in the maintenance schedule. If the rate of weepage increases significantly, manifolds should be inspected for wear and replaced, if needed.

The manifold plate should be cleaned at the interval specified in the maintenance schedule. However, based on observations made during an inspection, an earlier interval may be required.

To remove resin from the manifold plate, do the following:

1. Remove the hot runner from the machine. Refer to [Section 4.3.2](#) for more information.
2. Remove the backing plate. Refer to [Section 6.7](#) for more information.
3. Remove the backup insulators from the manifold.



WARNING!

Burn, fire and gas hazard – risk of death or serious injury, and property damage. Use of an open flame to remove resin can produce harmful gases (depending on the resin type), damage components and increase the risk of fire. Only use open flames sparingly and in a controlled environment.



WARNING!

Burn hazard – risk of serious injury. To avoid serious burns, wear personal protective equipment consisting of a heat-resistant coat, heat-resistant gloves, and a full face shield over safety glasses. Use adequate ventilation for fumes.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Only use a soft brass or hardwood chisel to remove resin from the hot runner.

4. Remove the resin deposits or dust from the outside of the backup pads and manifold pocket area. If required, carefully heat the resin deposits with a propane torch and then wipe the deposits away with a clean, soft cloth. This may have to be repeated several times.
5. If required, use a brass rod to clean the inside of the backup pads. Do not scratch or score the backup pad surface.
6. Remove the resin deposits or dust from the sealing insert on the backup pad.
7. Check all manifold and nozzle heater wiring using an ohmmeter. Refer to the electrical schematic for specific wire and heater resistances.
8. Install the backup insulators on the manifold. Refer to [Figure 6-66](#) for more information.
9. Install the backing plate. Refer to [Section 6.7](#) for more information.
10. Install the hot runner into the machine. Refer to [Section 4.3.1](#) for more information.

Chapter 7 Storage and Shipping

Hot runner surfaces are sensitive to many environmental conditions and require special methods for storage and shipping to avoid damage.

NOTE:

The storage instructions in [Section 7.2](#) are recommended when shipping the hot runner by air.

NOTE:

The storage instructions in [Section 7.3](#) are recommended when shipping the hot runner overseas.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Store all hot runners in an air conditioned environment.

7.1 Corrosion Protection

Humidity, salt in the air, rapid weather changes, and even condensation that forms during operation can quickly damage an unprotected hot runner.

Use a protective spray that does not contain chlorofluorocarbons (CFCs), has good moisture and oxidation resistance, and is resistant to mild acids and alkaline.

For additional corrosion protection during storage, add a moisture-absorbing silicate bag before sealing the hot runner in a vacuum polyethylene bag.

**WARNING!**

Poison hazard – risk of death or serious injury. Before using any corrosion protection product, always follow the supplier's recommendations for use and thoroughly review the Material Safety Data Sheet (MSDS).

7.2 Short Term Storage

Short term storage is intended for periods less than three months and can be done either in the machine or separately.

7.2.1 Storing in the Machine

1. Open the clamp to full shutheight.
2. Lock out and tag the machine and controller (if equipped). Refer to [Section 2.5](#) for more information.
3. Clean the mold, hot runner and molding surfaces of dirt, debris and condensation.
4. Perform all required preventive maintenance procedures. Refer to [Section 6.1](#) for more information.
5. Inspect all moving components for damage. Replace or repair as needed.



WARNING!

Poison hazard – risk of death or serious injury. Protective sprays can cause headaches, dizziness, nausea and anesthetic effects. Wear a face shield and solvent resistant gloves. If used in an enclosed area, use an organic vapor respirator or self-contained breathing apparatus.

-
6. Spray all accessible faces and molding surfaces with a protective spray. Allow surfaces to dry for approximately two hours. Refer to [Section 3.4](#) for information about recommended lubricants.

If additional coats are required, make sure the hot runner has thoroughly dried before the next application.

7. Leave the mold open.

7.2.2 Storing Outside the Machine

To store the hot runner separately from the machine for a period of less than three months, do the following:

1. Open the clamp to full shutheight.
2. Lock out and tag the machine and controller (if equipped). Refer to [Section 2.5](#) for more information.
3. Purge all cooling water from the hot runner. Refer to the machine manufacturer's documentation for more information.
4. Clean the mold, hot runner and molding surfaces of dirt, debris and condensation.
5. Perform all required preventive maintenance procedures as required. Refer to [Section 6.1](#) for more information.
6. Inspect all moving components for damage. Replace or repair as needed.



WARNING!

Poison hazard – risk of death or serious injury. Protective sprays can cause headaches, dizziness, nausea and anesthetic effects. Wear a face shield and solvent resistant gloves. If used in an enclosed area, use an organic vapor respirator or self-contained breathing apparatus.

7. Spray all accessible faces and molding surfaces with LPS 2 protective spray. Allow surfaces to dry for approximately two hours. Refer to [Section 3.5](#) for specifications on protective spray.
If additional coats are required, make sure the hot runner has thoroughly dried before the next application.
8. Remove the hot runner from the machine. Refer to [Section 4.3.2](#) for more information
9. Place a cover over the hot runner to protect it during storage.
10. Store the hot runner in an air conditioned environment.

7.3 Long Term Storage

To store the mold and/or hot runner for a period of more than three months, do the following:

NOTE:

The following procedure can also be used to store spare parts.

1. Prepare the mold and/or hot runner for storage and remove it from the machine. Refer to [Section 7.2.2](#) for more information.
2. Place the mold and/or hot runner on a wooden platform.
3. Place the mold and/or hot runner in a 0.1 mm (0.004 in) or heavier (thicker) polyethylene bag along with a suitably sized moisture absorbing silicate bag.
The silicate bag offers additional corrosion protection.
4. Remove the lift bar and hoist ring.
5. Vacuum heat seal the polyethylene bag to retain the protective spray and prevent invasion of dirt or moisture.

7.4 Shipping the Hot Runner

The following guidelines should be followed when shipping a hot runner:

CAUTION!

Mechanical hazard – risk of damage to equipment. Residual coolant could freeze when transporting the hot runner in cold climates. Make sure all coolant is drained fully from the system before transporting it. Failure to do so could cause severe damage to the hot runner.

1. Before shipping the hot runner, check that all coolant has been drained fully.
2. Pack the hot runner, regardless of where it is being shipped, in a shipping crate. This will provide the best possible protection from any damage. For Cross Manifold design, and prior to manifold removal, make sure that the alignment pull dowels that keep the cross and main manifolds aligned during assembly are re-installed.

3. When returning a mold and/or hot runner to Husky for refurbishing, include the following items for testing purposes:
 - All electrical cables and switch boxes
 - All lift bars and latch bars installed in their shipping position on the hot runner
 - All mechanisms that had to be removed from the hot runner for any reason