

Ultra Valve Gate Manifold System

Hot Runner Installation Manual

Issue: v 2.2 — March 2021

Document No.: 6171109

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.

This document contains information which is the exclusive property of Husky Injection Molding Systems Limited. Except for any rights expressly granted by contract, no further publication or commercial use may be made of this document, in whole or in part, without the prior written permission of Husky Injection Molding Systems Limited.

Notwithstanding the foregoing, Husky Injection Molding Systems Limited grants permission to its customers to reproduce this document for limited internal use only.

Husky[®] product or service names or logos referenced in these materials are trademarks of Husky Injection Molding Systems Ltd. and may be used by certain of its affiliated companies under license.

All third-party trademarks are the property of the respective third-party and may be protected by applicable copyright, trademark or other intellectual property laws and treaties. Each such third-party expressly reserves all rights into such intellectual property.

©2010 – 2021 Husky Injection Molding Systems Ltd. All rights reserved.

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.

Table of Contents

General Information.....	iii
Telephone Support Numbers.....	iii
Husky Regional Service and Sales Offices.....	iii
Product Upgrades.....	iii
Ordering Spare Parts.....	iii
Hot Runner Refurbishing.....	iv
Chapter 1: Introduction.....	9
1.1 Purpose of the Equipment.....	9
1.2 Restrictions of Use.....	9
1.3 Unauthorized Modifications.....	9
1.4 Auxiliary Equipment.....	9
1.5 Documentation.....	10
1.5.1 Manuals.....	10
1.5.2 Engineering Drawings and Schematics.....	11
1.5.3 Safety Alert Conventions.....	11
1.6 Training.....	12
1.7 Nameplates.....	12
1.7.1 Hot Runner Nameplate.....	12
1.8 Special Tools.....	14
1.8.1 Nozzle Tip Sockets and Heater Removal Tools.....	14
1.8.2 Valve Stem Removal Tools.....	15
1.8.3 Backup Pad Removal Tools.....	15
1.8.4 Alignment Bushing Installation Tool.....	15
1.8.5 Front Ring Removal Tools.....	16
1.8.6 Double Delta Seal Installation Tools.....	16
1.8.7 Retaining Clip Installation Tool.....	16
1.8.8 Standard Nozzle Tip Sockets.....	16
1.8.9 Thermocouple Wire Stripping Tools.....	17
1.8.10 Single Probe Thermocouple Removal Tools.....	18
1.8.11 Crimping Tools for Contact Pins (25 or 64 Pin Connectors).....	18
Chapter 2: Safety Summary.....	19
2.1 Qualified Personnel.....	19
2.2 Safety Guidelines.....	19
2.3 Safety Hazards.....	19
2.3.1 Mechanical Hazards.....	20
2.3.2 Burn Hazards.....	20
2.3.3 High Pressure Hazards.....	21
2.3.4 Electrical Hazards.....	22
2.3.5 Gas, Vapor and Dust Emissions.....	22
2.3.6 Slip, Trip or Fall Hazards.....	22
2.3.7 Lifting Hazards.....	22

2.4	Safety Signs.....	22
2.5	Lockout and Tagout.....	24
2.6	Personal Protective Equipment and Safety Equipment.....	25
2.6.1	Personal Protective Equipment (PPE).....	25
2.6.2	Safety Equipment.....	26
2.7	Material Safety Data Sheet (MSDS).....	27
2.8	Materials, Parts and Processing.....	27
2.9	Safety Latch Bars.....	27
2.10	Lift Bars and Swivel Hoist Rings.....	28
Chapter 3: Specifications.....		29
3.1	Weight.....	29
3.2	Operating Temperature.....	29
3.3	Electrical System Specifications.....	29
3.3.1	Controller Requirements.....	29
3.3.2	Nozzle Heaters.....	30
3.3.3	Manifold Heaters.....	30
3.3.3.1	Spare Thermocouple Wires.....	30
3.3.4	Power Fluctuation.....	31
3.4	Pneumatic Specifications.....	31
3.5	Recommended Lubricants.....	32
3.6	Rust Inhibitor Specifications.....	33
3.7	Torque Specifications.....	34
Chapter 4: Lifting and Handling.....		35
4.1	Lifting and Handling.....	35
4.1.1	Lifting and Handling Using a Single Lifting Point.....	36
4.1.1.1	Laying Down Plates Using a Single Lifting Point.....	36
4.1.1.2	Picking Up Plates Using a Single Lifting Point.....	37
4.1.2	Lifting and Handling Using Multiple Lifting Points.....	38
4.1.3	Lifting Using a Lift Bar.....	39
4.1.4	Lifting Using Swivel Hoist Rings.....	40
Chapter 5: Manifold System Assembly.....		43
5.1	Assembly Procedures Summary.....	43
5.2	Installing Nozzle Housings.....	44
5.2.1	Installing VG-LX and EX and SX Nozzle Housings.....	45
5.2.2	Installing VG-HP and VX-HP Nozzle Housings.....	46
5.3	Installing Manifold Bushings.....	47
5.3.1	Installing Press Fit Manifold Bushings.....	47
5.3.2	Installing Slip Fit Manifold Bushings.....	47
5.4	Installing VG-LX and EX Backup Pads.....	48
5.4.1	Installing Backup Pads.....	48
5.5	Installing VG-SX Cylinders.....	49
5.5.1	Installing Cylinders.....	49
5.6	Installing Manifolds.....	50
5.6.1	Installing a Manifold.....	50

5.6.2	Installing a Cross Manifold (If Equipped).....	52
5.7	Installing the Sprue Bushing.....	54
5.7.1	Installing the Sprue Bushing.....	54
5.8	Installing the Sprue Heater.....	56
5.8.1	Installing a Sprue Heater with a Built-In Thermocouple.....	56
5.8.2	Installing a Sprue Heater with a Separate Thermocouple.....	57
5.9	Installing Transfer Bushings (If Equipped).....	58
5.9.1	Installing Transfer Bushings (If Equipped).....	58
5.10	Measuring Preload.....	60
5.10.1	Measuring Preload for Manifolds in VG-LX and EX Systems.....	61
5.10.2	Measuring Preload for Manifolds in VG-SX Systems.....	62
5.10.3	Measuring Preload for Cross Manifolds in Two Plate Systems (If Equipped).....	63
5.10.4	Measuring Preload for Cross Manifolds in Three Plate Systems (If Equipped).....	64
5.11	Testing Heaters.....	66
5.12	Adjusting Heater and Thermocouple Wire Length.....	66
5.13	Installing Double Delta Piston Seals.....	67
5.14	Installing Valve Stems.....	68
5.14.1	Installing the Valve Stems for U350 and U500 VG-SX Systems.....	69
5.14.2	Installing the Valve Stems for U500 and U750 VG-LX and EX Systems.....	70
5.14.3	Installing the Valve Stems for U1000 VG-LX Systems.....	74
5.15	Installing the Center Plate (If Equipped).....	75
5.15.1	Installing the Center Plate (If Equipped).....	75
5.16	Installing the Backing Plate.....	78
5.16.1	Installing the Backing Plate.....	78
5.17	Installing Nozzle Tips.....	80
5.17.1	Installing the Nozzle Tips.....	81
5.17.2	Troubleshooting Nozzle Tip Heights.....	82
5.18	Installing Nozzle Heaters.....	83
5.18.1	Installing HTM Nozzle Heaters for U350, U500 and U750 Systems.....	83
5.18.2	Installing HTM Nozzle Heaters for U1000 Systems.....	85
5.18.3	Installing Copper Nozzle Heaters.....	86
5.18.4	Installing Ultra Nozzle Heaters (UNH) with Front Rings.....	87
5.18.5	Installing Ultra Nozzle Heaters (UNH) With Ring Thermocouples.....	89
5.18.6	Installing Bi-Metal Nozzle Heaters.....	94
5.18.7	Installing VG-HP Nozzle Heaters.....	95
5.19	Removing and Installing Nozzle Tip Insulators (If Equipped).....	96
5.19.1	Installing the Nozzle Tip Insulators.....	96
5.20	Installing the Cavity Plate.....	97
5.20.1	Installing the Cavity Plate On a Work Bench.....	97
5.20.2	Installing the Cavity Plate In the Machine.....	99

Chapter 1 Introduction

This chapter describes the manifold system, 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 and the HMI for specific details.

The following manuals are provided with each Husky machine upon delivery:

Installation Manual	Describes the basic installation of the manifold system.
Service Manual	Describes the installation, startup, operation, shut down and maintenance of the hot runner system. NOTE: Refer to the hot runner <i>Service Manual</i> for specific removal and maintenance 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:

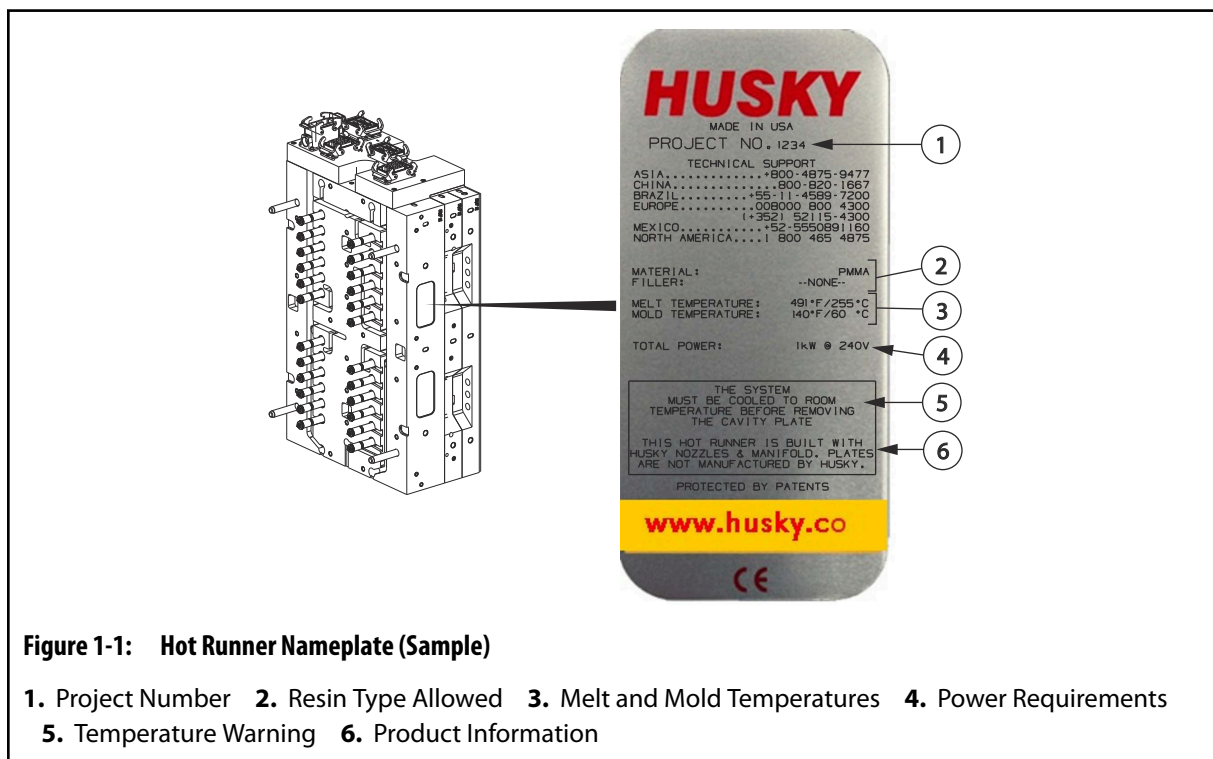
Other details and specifications may be required.

**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.



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 Nozzle Tip Sockets and Heater Removal Tools

Nozzle	Tip	Part Number		
		Nozzle Tip Socket	Heater Removal Tool	
U350	All	3872686 8 mm (0.25 in) 12 points	3163811 (Hex Key) OR 7287617 (Torque Wrench Assembly), 0.45 N·m (4 lbf·ft) OR 4715152 (Hex Driver)	3734732 Large Pitch >28 mm (1.1 in) OR 6599345 Small Pitch ≤28 mm (1.1 in)
U500	VG	2338059 12 mm (0.47 in) 6 points	2341532 (Bi-Metal and UNH with Front Ring) 3163811 (HTM Heater) Hex Key 4715152 (HTM Heater) Hex Driver 7307376 (UNH with Ring Thermocouple) 7287617 (HTM Heater) Torque Wrench Assembly, 0.45 N·m (4 lbf·ft)	
		531983 11 mm (0.43 in) 12 points		
	VG-X	3436695		
	VG-XX			
	VX	3253169		
U750	VG-R	531983	3163811 (HTM Heater) Hex Key 4715152 (HTM Heater) Hex Driver 535160 (Bi-Metal and UNH with Front Ring) 7298786 (UNH with Ring Thermocouple) 7287617 (HTM Heater) Torque Wrench Assembly, 0.45 N·m (4 lbf·ft)	
	VG	2338059		
	VX	3253170		
	VG-EXX RGA	22 mm (0.87 in) socket to remove nozzle tip adapter		

Nozzle	Tip	Part Number	
		Nozzle Tip Socket	Heater Removal Tool
U750-UP	Ultra Packaging (UP)	3722920	3756216
U1000	VG	2449784	2410903 (Bi-Metal)
	VX	2816672	

1.8.2 Valve Stem Removal Tools

Description	Part Number
VG-LX	4793599
VG-EX	4793600
VG-SX	4793598

1.8.3 Backup Pad Removal Tools

Description	Part Number
U350	2603927
U500	
U750	
U1000	2948588

1.8.4 Alignment Bushing Installation Tool

Description	Part Number
For 25mm ID Plate Alignment Bushings	7568206

1.8.5 Front Ring Removal Tools

Description	Part Number
U500	3634736
U750	4925394

1.8.6 Double Delta Seal Installation Tools

Description	Part Number
U350 VG-SX	3446999
U500 VG-SX	
U350 VG-LX	3087823
U500 VG-LX	
U750 VG-LX	
U500 VG-EX	3446982
U750 VG-EX	
U1000 VG-LX	3500798

1.8.7 Retaining Clip Installation Tool

Description	Part Number
U350	4405801

1.8.8 Standard Nozzle Tip Sockets

Size	Points	Drive	Part Number
4 mm	6 (Allen Key)	3/8 inch	622974
6 mm	6 (Allen Key)	3/8 inch	622972
6mm	6	3/8 inch	533942
8 mm	6	1/4 inch	2996145

Size	Points	Drive	Part Number
8 mm	12	1/4 inch	3436695
8 mm	6	3/8 inch	1501813
10 mm	12	3/8 inch	3253169
11 mm	6	3/8 inch	3320712
11 mm	12	3/8 inch	531983
12 mm	6	3/8 inch	2338059
13 mm	6	3/8 inch	536678
14 mm	12	3/8 inch	533533
15 mm	6	3/8 inch	2449784
15 mm	12	3/8 inch	3253170
16 mm	6	3/8 inch	2402461
16 mm	12	3/8 inch	2816670
17 mm	6	3/8 inch	2308879
20 mm	6	1/2 inch	3722920
21 mm	12	1/2 inch	3274535
22 mm	6	1/2 inch	3311845
22 mm	12	1/2 inch	2816672
29 mm	6	1/2 inch	1502743
30 mm	6	1/2 inch	535571
1/2 inch	6	3/8 inch	2192309

1.8.9 Thermocouple Wire Stripping Tools

Description	Part Number
Strippers for Thermocouple Wires	4240042

1.8.10 Single Probe Thermocouple Removal Tools

Description	Part Number
11 mm Split Socket	4395427

1.8.11 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 manifold system.

3.1 Weight

The full weight of the manifold system 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 (or 200 V in special applications).

NOTE:

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

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 Pneumatic Specifications

Pneumatic pressure is used to actuate the valve stems. Compressed air for the pneumatic system must meet the following requirements:

- The pressure dew points must be set to 11 °C (20 °F) below the lowest ambient temperature of the pneumatic system in order to keep compressed air clean and dry.
- Compressed air quality must meet the standards specified in DIN ISO 8573-1.
 - Solid particles - Class 1
 - Humidity - Class 4
 - Oil - Class 1
- Typical air pressure required is 5.52 to 8.27 bar (80 to 120 psi) , unless otherwise specified in the mold manufacturer's documentation.

NOTE:

For optimal performance, air pressure up to 10 bar (150 psi) for VG-LX pistons and 12.41 bar (180 psi) for VG-SX pistons may be required. VG-EX pistons are optimized at 8.27 bar (120 psi) .

- Compressed air hoses must be large enough to permit adequate flow to the locations where air is required.
- Compressed air used for mold actuators must be interlocked with the machine operator’s gate, so opening the gate prevents any motion.
- Quick exhaust valves must be located close to the actuators they control, so the compressed air in the mold will decompress rapidly and speed operation of the actuator.
- Lockout valves must be installed (according to ANSI Z244.1 or local regulations) to the air supply for use when:
 - Serving the mold
 - Performing maintenance
 - Installing and removing the mold

3.5 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 customers 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.

3.6 Rust Inhibitor Specifications

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

Type	Trade Name
Protective Spray	LPS 2 Protective Spray

3.7 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 Lifting and Handling

This chapter describes how to safely lift and handle 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

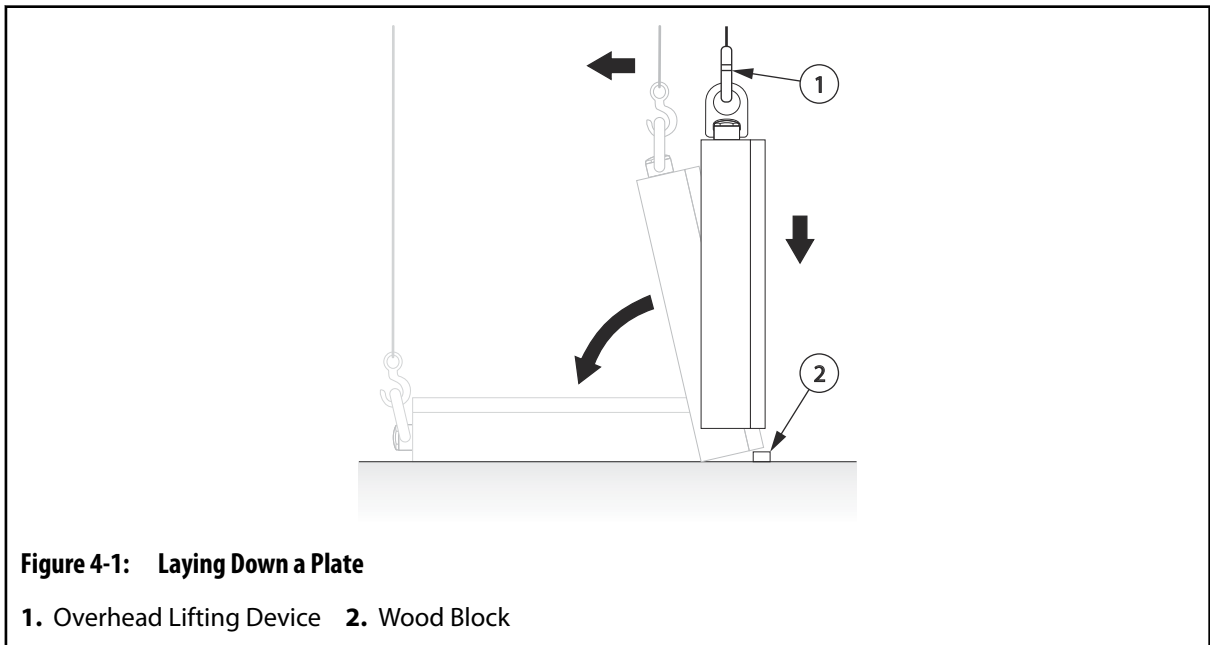
To properly lay a plate on a work surface using a single lifting point, do the following:



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.

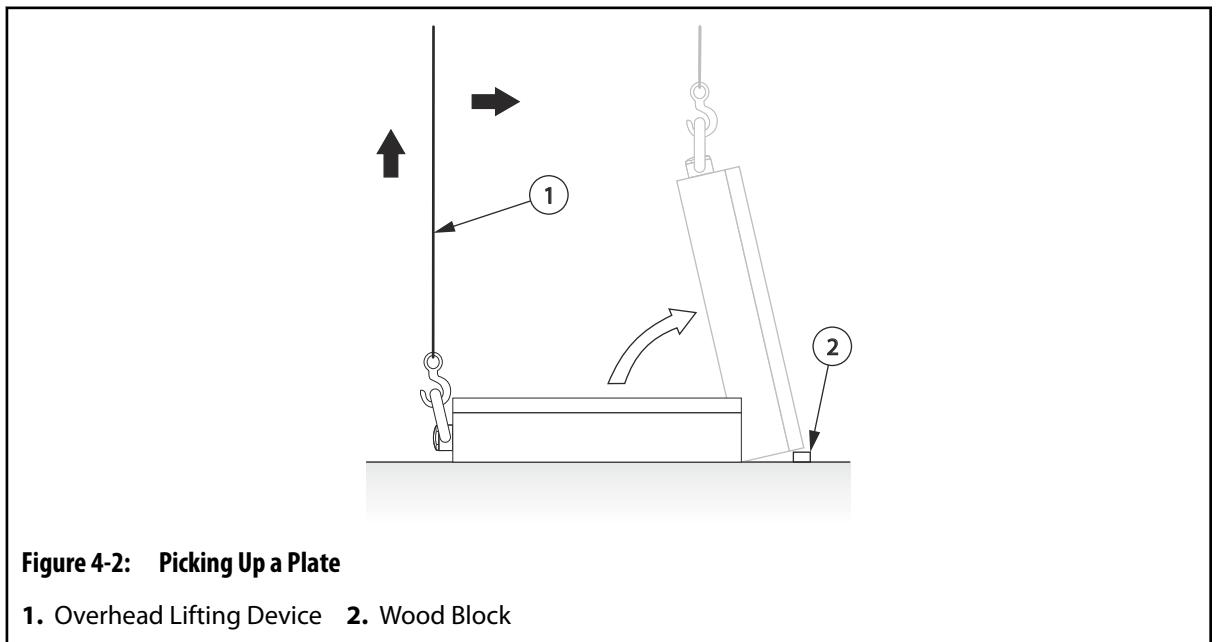


Figure 4-2: Picking Up a Plate

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.

- 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.

- 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:

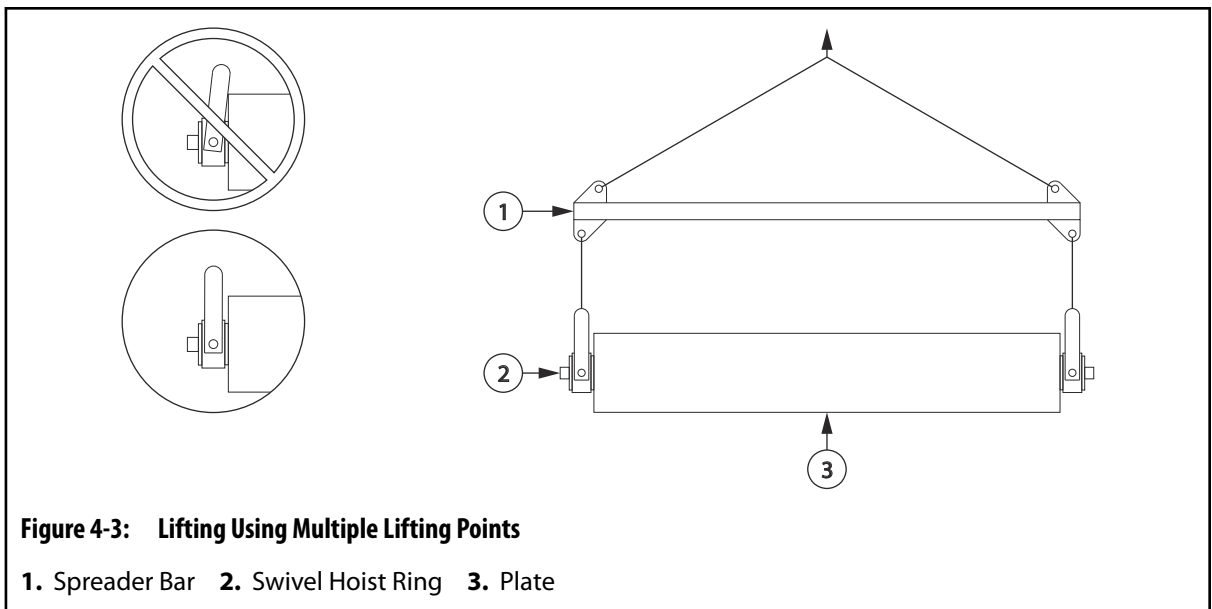


WARNING!

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.

- 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:

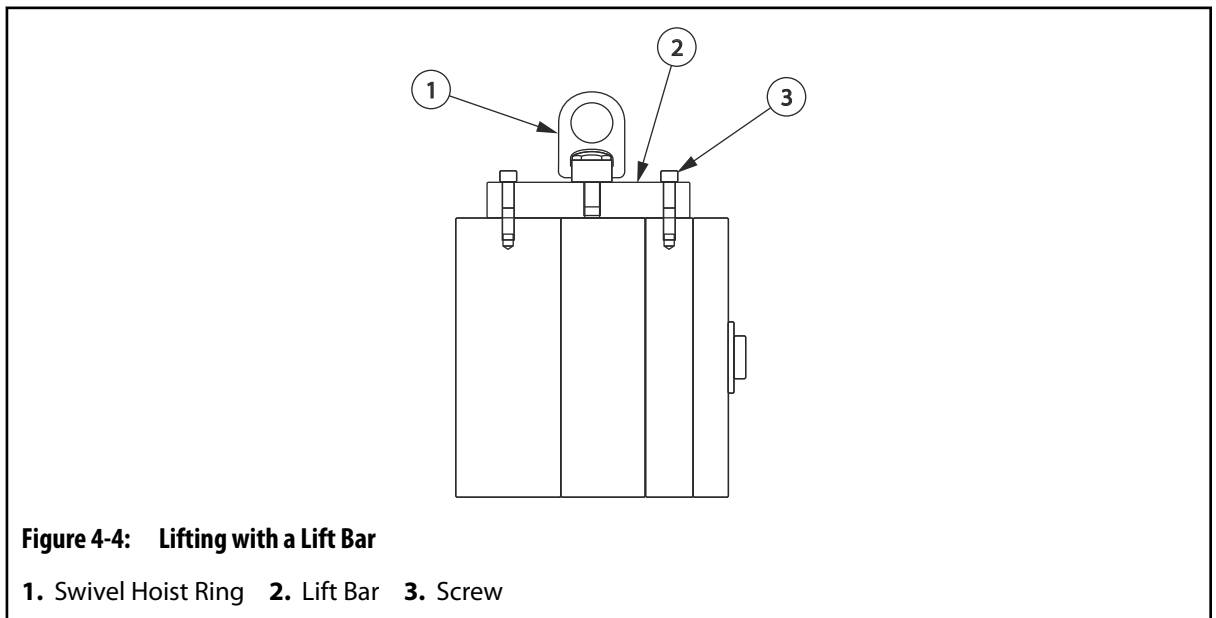
NOTE:

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 3.7](#) 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)

Chapter 5 Manifold System Assembly

This chapter describes the tasks required to assemble the manifold system. Refer to [Section 5.1](#) for a full list of assembly procedures.

NOTE:

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

**WARNING!**

Chemical hazard - Some of the chemicals used with Husky equipment are potentially hazardous and may 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 manifold and do not take special options into consideration.

**IMPORTANT!**

For maintenance recommendations and procedures, please refer to the appropriate Service Manual.

**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.

5.1 Assembly Procedures Summary

The following procedures are to be performed when installing the manifold system.

Procedure	Reference
Installing nozzle housings	Section 5.2
Installing manifold bushings	Section 5.3
Installing VG-LX and EX backup pads	Section 5.4
Installing VG-SX cylinders	Section 5.5
Installing manifolds	Section 5.6
Installing the sprue bushing	Section 5.7
Installing the sprue heater	Section 5.8
Installing transfer bushings (if equipped)	Section 5.9
Measuring preload	Section 5.10
Testing Heaters	Section 5.11
Adjusting the thermocouple wire length	Section 5.12
Installing double delta piston seals	Section 5.13
Installing valve stems	Section 5.14
Installing the center plate (if equipped)	Section 5.15.1
Installing the backing plate	Section 5.16.1
Installing nozzle tips	Section 5.17.1
Installing nozzle heaters	Section 5.18
Installing nozzle tip insulators (if equipped)	Section 5.19
Installing the cavity plate	Section 5.20

5.2 Installing Nozzle Housings

The following procedures describe how to install nozzle housings.

5.2.1 Installing VG-LX and EX and SX Nozzle Housings

CAUTION!

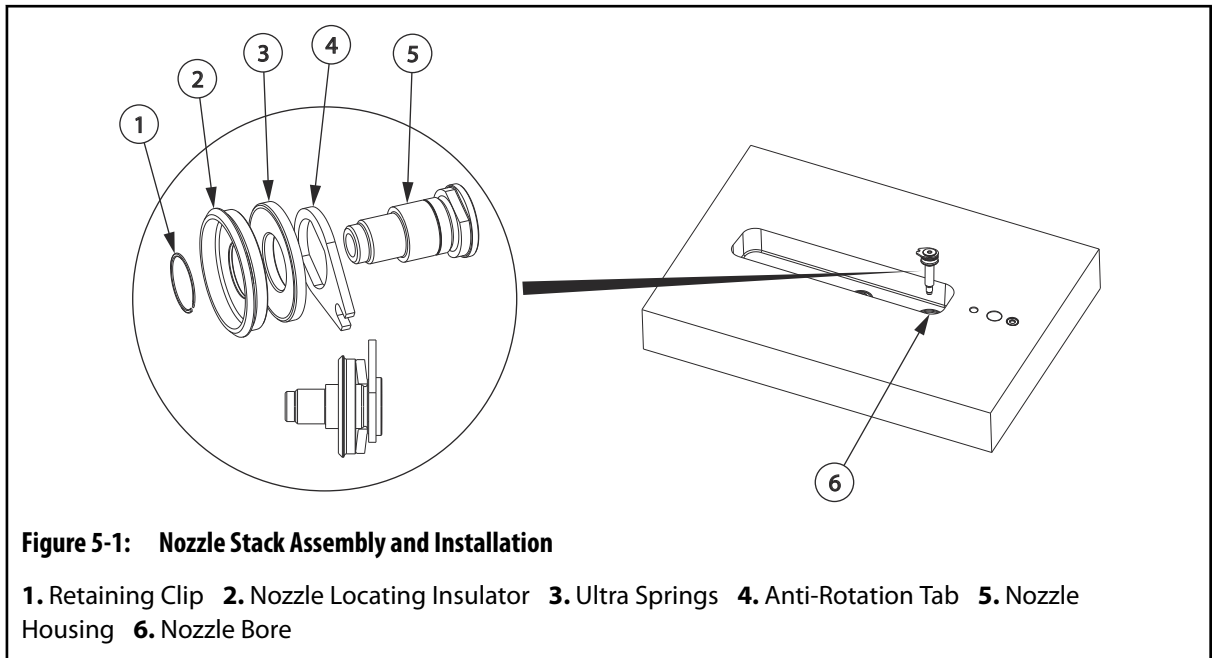
Mechanical hazard – risk of damage to the nozzle housings. Do not hone the back surface of the nozzle housing to remove nicks and burrs. The back surface is a precision made section of the housing with a contoured surface. Honing this section will cause the system to leak and void the leak proof guarantee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

To install the nozzle housings, do the following:

1. Assemble each nozzle housing.

NOTE:

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



2. 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.
3. Install the manifolds and cross manifold (if equipped). Refer to [Section 5.6](#) for more information.
4. If equipped, install the center plate. Refer to [Section 5.15.1](#) for more information.
5. Install the backing plate. Refer to [Section 5.16.1](#) for more information.
6. Install the nozzle tip. Refer to [Section 5.17](#) for more information.
7. Install the nozzle heaters and thermocouples. Refer to [Section 5.18](#) for more information.
8. Install the cavity plate. Refer to [Section 5.20](#) for more information.

5.2.2 Installing VG-HP and VX-HP Nozzle Housings

CAUTION!

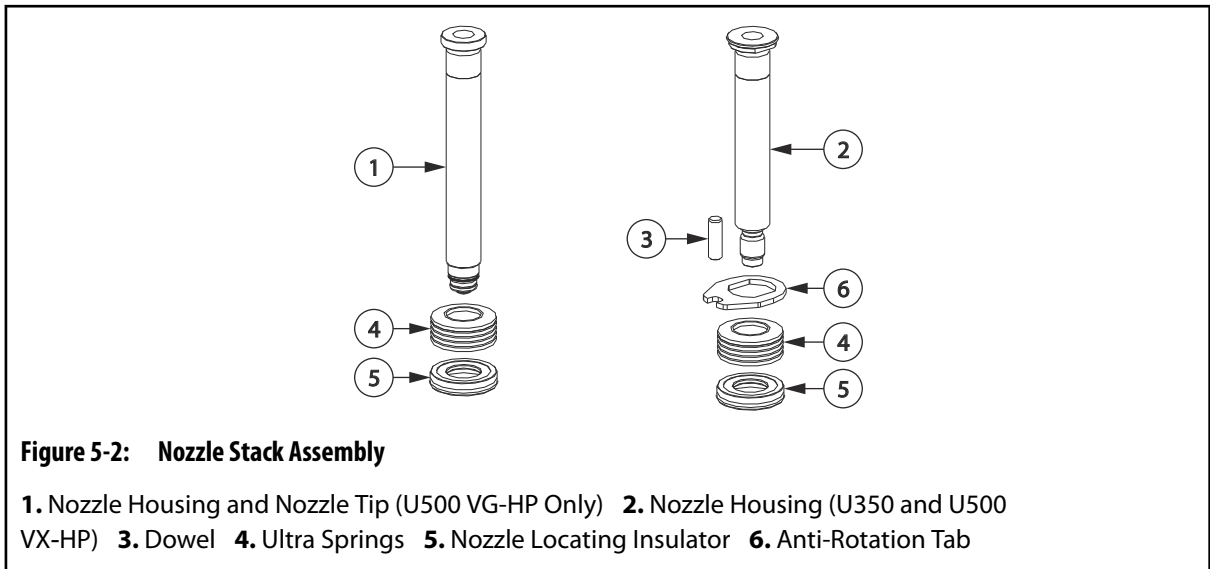
Mechanical hazard – risk of damage to the nozzle housings. Do not hone the back surface of the nozzle housing to remove nicks and burrs. The back surface is a precision made section of the housing with a contoured surface. Honing this section will cause the system to leak and void the leak proof guarantee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

To install the nozzle housings, do the following:

1. Assemble each nozzle housing.

NOTE:

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



2. 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.
3. Install the manifolds and cross manifold (if equipped). Refer to [Section 5.6](#) for more information.
4. If equipped, install the center plate. Refer to [Section 5.15.1](#) for more information.
5. Install the backing plate. Refer to [Section 5.16.1](#) for more information.
6. Install the nozzle. Refer to [Section 5.17.1](#) for more information.
7. Install the nozzle heaters and thermocouples. Refer to [Section 5.18](#) for more information.
8. Install the cavity plate. Refer to [Section 5.20](#) for more information.

5.3 Installing Manifold Bushings

The following procedures describe how to install manifold bushings if not already installed by Husky.

NOTE:

Husky provides two styles of manifold bushings: press fit or slip fit. Press fit manifold bushings are typically used in systems designed to process heat-sensitive resins. Slip fit manifold bushings are used in systems designed to process resins that are not heat-sensitive. Refer to the assembly drawings to determine if the manifold bushings are press fit or slip fit.

5.3.1 Installing Press Fit Manifold Bushings

It is recommended that press fit bushings be installed by Husky. The manifold system will come pre-assembled with the press-fit manifold bushing. Contact Husky if you require information about removing press fit manifold bushings.

5.3.2 Installing Slip Fit Manifold Bushings

To install slip fit manifold bushings, do the following:

1. Clean the stem bore in the manifold bushing with alcohol and cotton swabs. The interior is clean when a cotton swab can be removed from the bushing without any dirt on it.
2. Use a medium India stone (240 grit oil stone) to clean all mating surfaces on the manifold. Do not scratch the manifold.
3. Check that all contact surfaces on the manifold plate, center plate and manifold bushings are clean and free of residue, scratches, nicks, or burrs.
4. Make sure the manifold bushing locating dowel is installed in the manifold.

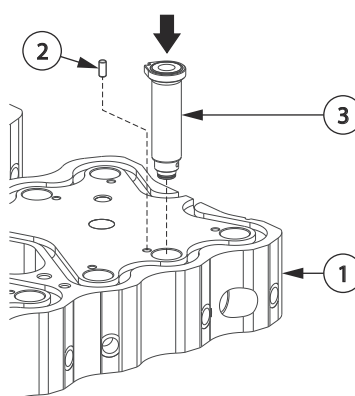


Figure 5-3: Installing a Manifold Bushing (Typical)

1. Manifold 2. Locating Dowel 3. Manifold Bushing

5. Align the manifold bushing with the locating dowel and press the bushing into the manifold until the bushing bottoms out on the manifold. Repeat this step for all manifold bushings.

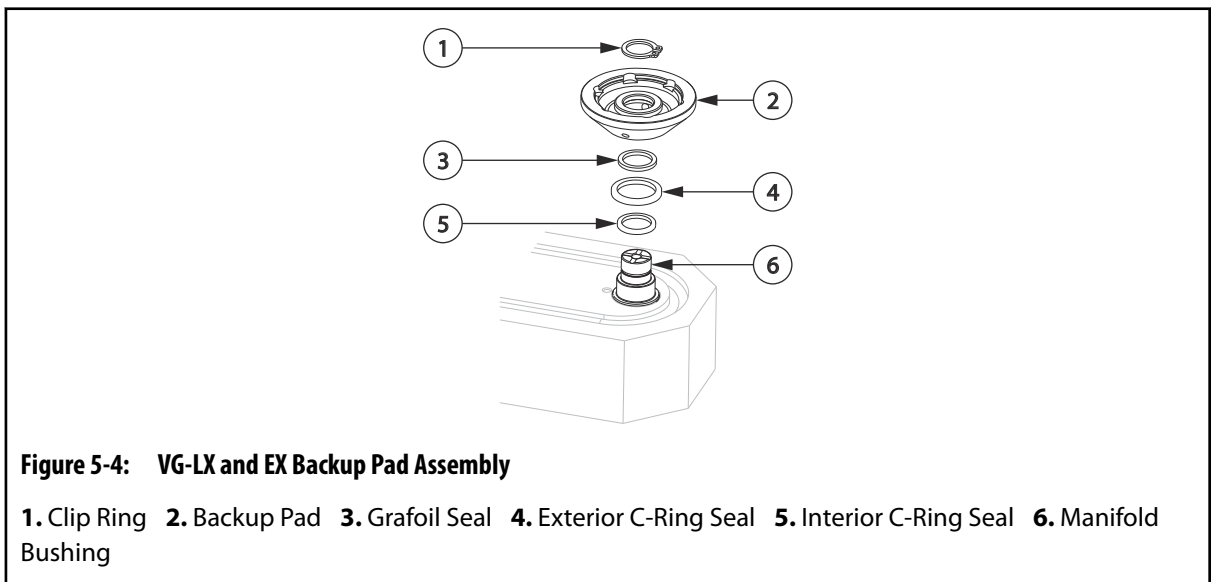
5.4 Installing VG-LX and EX Backup Pads

The following procedures describe how to install the backup pads from the manifold if not already installed by Husky. Backup pads are specific to VG-LX/EX hot runners.

5.4.1 Installing Backup Pads

To install the backup pads, do the following:

1. For each backup pad, do the following:
 - a. Install new interior and exterior C-ring seals over the manifold bushing.



- b. Install a new Grafoil seal over the manifold bushing.
 - c. Install the backup pad. Make sure the backup pad contacts the metal O-ring seal.
 - d. Install the clip ring.
2. Install the manifolds and cross manifold (if equipped). Refer to [Section 5.6](#) for more information.
3. Measure the preload for the manifold. Refer to [Section 5.10](#) for more information.
4. Install the valve stem assemblies. Refer to [Section 5.14](#) for more information.
5. If equipped, install the center plate. Refer to [Section 5.15.1](#) for more information.
6. Install the backing plate. Refer to [Section 5.16.1](#) for more information.

5.5 Installing VG-SX Cylinders

The following procedures describe how to install the cylinders from the manifold if not already installed by Husky. Cylinders are specific to VG-SX hot runners.

5.5.1 Installing Cylinders

To install a cylinder, do the following:

1. For each cylinder, do the following:
 - a. Clean the cylinders as needed.

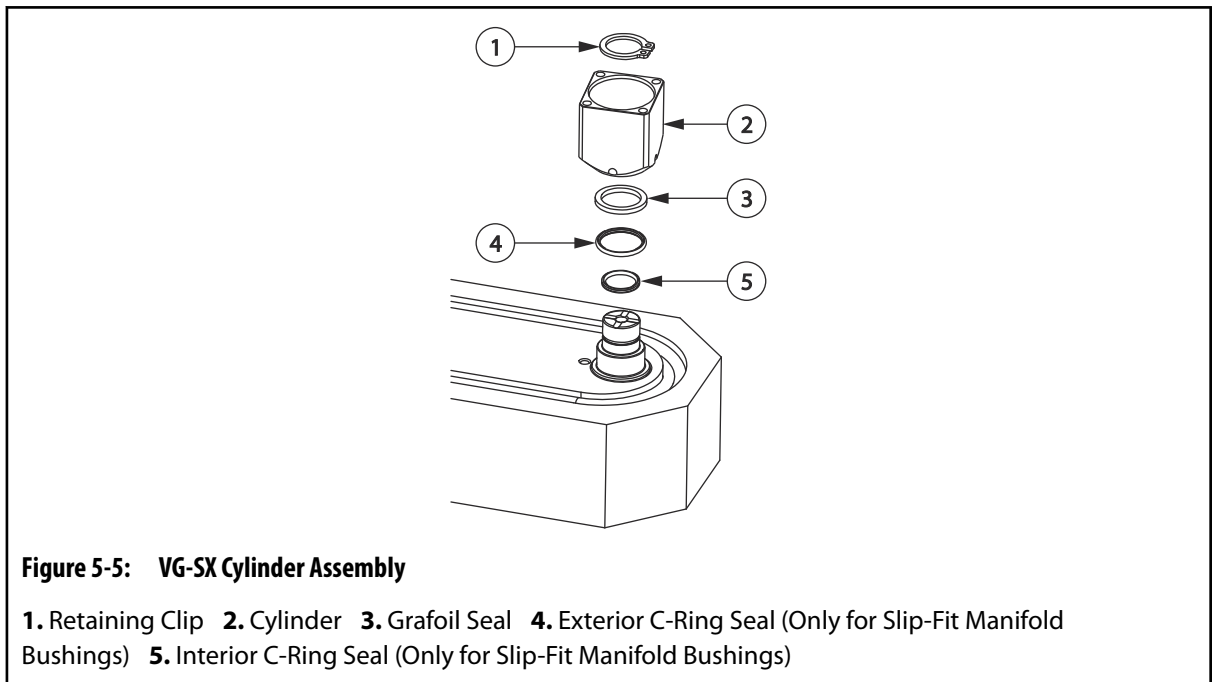


Figure 5-5: VG-SX Cylinder Assembly

1. Retaining Clip 2. Cylinder 3. Grafoil Seal 4. Exterior C-Ring Seal (Only for Slip-Fit Manifold Bushings) 5. Interior C-Ring Seal (Only for Slip-Fit Manifold Bushings)

- b. Place a new Grafoil seal over the manifold bushing.
- c. For slip-fit manifold bushings only, do the following:
 - i. Place a new interior C-ring seal over the manifold bushing.
 - ii. Coat the bottom of the cylinder with a high temperature lubricant and insert a new exterior C-ring seal.

NOTE:

Interior and exterior C-ring seals are only required when slip-fit manifold bushings are installed. Refer to [Section 5.3](#) for more information.

- d. Align the cylinder with the locating dowel and press it onto the manifold until the cylinder is fully seated.
 - e. Install the retaining clip into the groove at the end of the manifold bushing.
2. Measure the preload for the manifold. Refer to [Section 5.10](#) for more information.

3. Install the valve stem assemblies. Refer to [Section 5.14](#) for more information.
4. If equipped, install the center plate. Refer to [Section 5.15.1](#) for more information.
5. Install the backing plate. Refer to [Section 5.16.1](#) for more information.

5.6 Installing Manifolds

The following procedures describe how to install the manifolds.

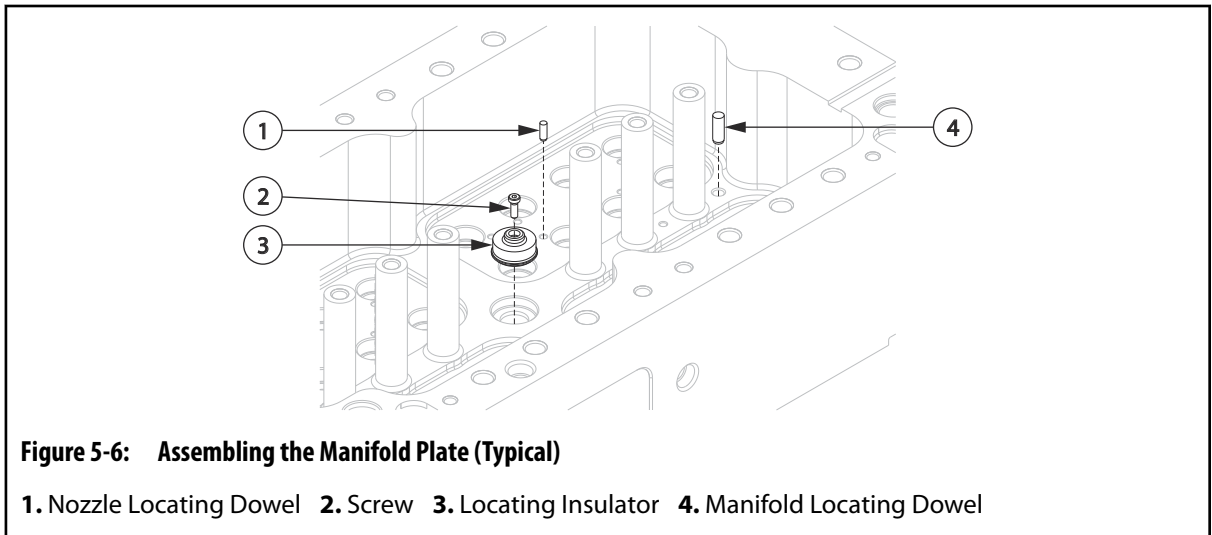
5.6.1 Installing a Manifold

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.



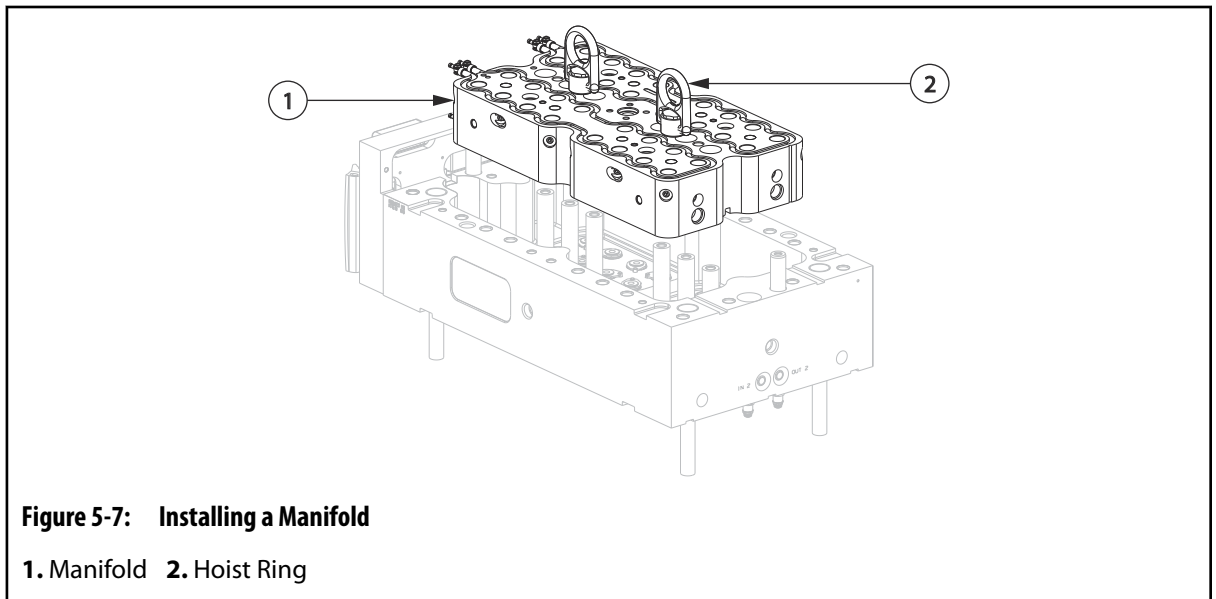
2. If removed previously, install the nozzle housings in the manifold plate. Refer to [Section 5.2](#) for more information.
3. If the manifold has lifting points, do the following:



WARNING!

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment can 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 3.5](#) 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.

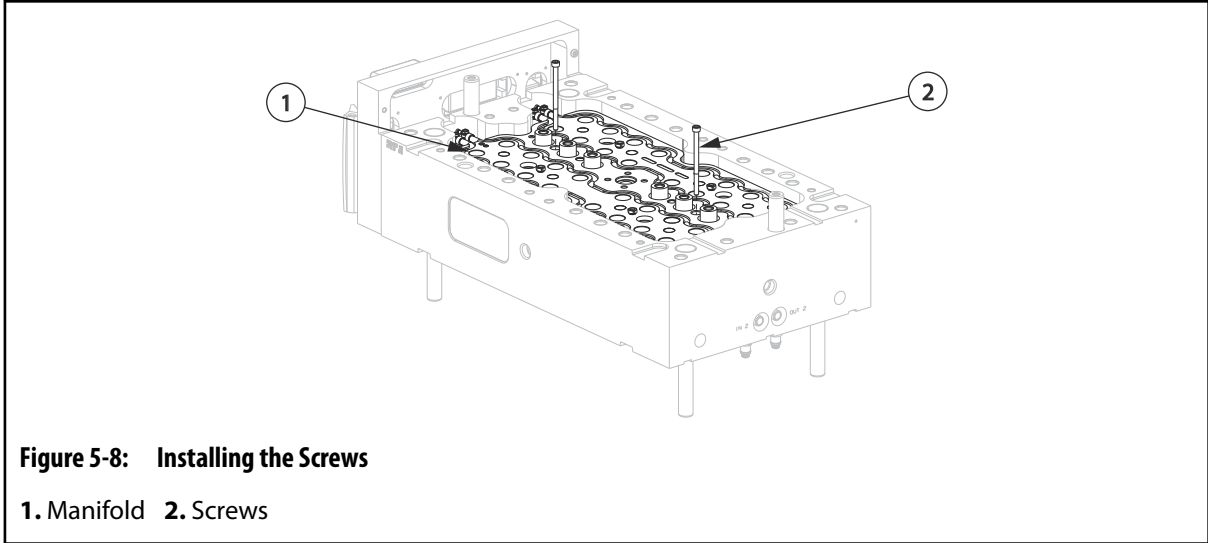


Figure 5-8: Installing the Screws

1. Manifold 2. Screws

9. Turn the screws counter-clockwise 1/4 turn.
10. Measure the preload for the manifold. Refer to [Section 5.10](#) 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. Install the backup pads or cylinders on the manifold, if not already installed.
 - For information about installing backup pads, refer to [Section 5.4](#)
 - For information about installing cylinders, refer to [Section 5.5](#)
15. If equipped, install the transfer bushings. Refer to [Section 5.9.1](#) for more information.
16. If equipped, install the center plate. Refer to [Section 5.16.1](#) for more information.
17. If equipped, install the sprue bushing or cross manifold.
 - For information about installing the sprue bushing, refer to [Section 5.8](#)
 - For information about installing the cross manifold, refer to [Section 5.6.2](#)
18. Install the backing plate. Refer to [Section 5.16](#) for more information.

5.6.2 Installing a Cross Manifold (If Equipped)

To install the cross manifold, do the following:

NOTE:

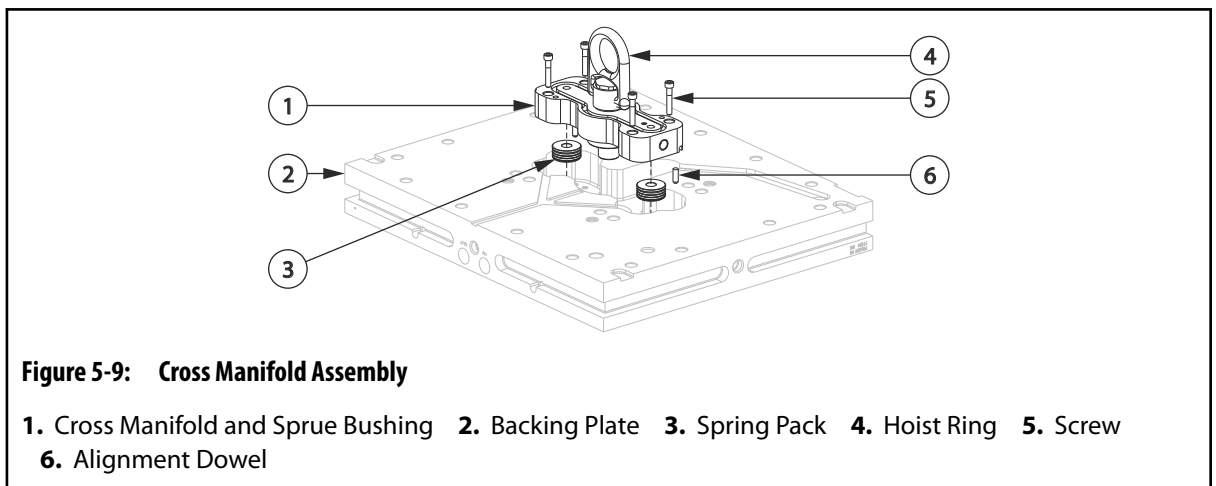
The following procedure requires the use of an overhead lifting device. Refer to [Section 4.1](#) for lifting and handling instructions.

1. Make sure the manifolds are installed. Refer to [Section 5.6.1](#) for more information.
2. Insert the spring packs and alignment dowels into the cross manifold pocket in the backing plate.
3. Install the sprue bushing. Refer to [Section 5.7.1](#) for more information.
4. If the cross manifold has lifting points, do the following:

**WARNING!**

Crushing hazard – risk of death or serious injury. Inadequate lifting equipment can 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 cross manifold.



- b. Attach an overhead lifting device to the hoist rings.
5. Lift the cross manifold and sprue bushing over the backing plate pocket.
6. Lower the cross manifold onto the spring packs and alignment dowels. Adjust the cross manifold to engage the locating features.
7. If hoist rings are installed, disconnect the overhead lifting device and remove the hoist rings.
8. Apply a thread-locking fluid to the threads of the screws that secure the cross manifold to the backing plate. Refer to [Section 3.5](#) 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.

- 9. Install and hand tighten the screws. Do not apply torque.
- 10. Turn the screws counter-clockwise 1/4 turn.
- 11. Measure the preload for the cross manifold. Refer to [Section 5.10](#) for more information.



IMPORTANT!

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

- 12. Route the cross manifold heater and thermocouple wires through the wire channels in the backing plate. Make sure all wiring is properly retained in the wire channels using wire clips.
- 13. Label each wire with the heater zone number. Refer to the electrical schematic for the zone number.
- 14. Crimp the wire ends and connect the wires to the appropriate multi-pin connectors. Refer to the electrical schematic for more information.
- 15. Test each cross manifold heater. Refer to [Section 5.11](#) for more information.
- 16. Install the backing plate. Refer to [Section 5.16.1](#) for more information.

5.7 Installing the Sprue Bushing

The following procedure describes how to install the sprue bushing.

5.7.1 Installing the Sprue Bushing

To install the sprue bushing, do the following:



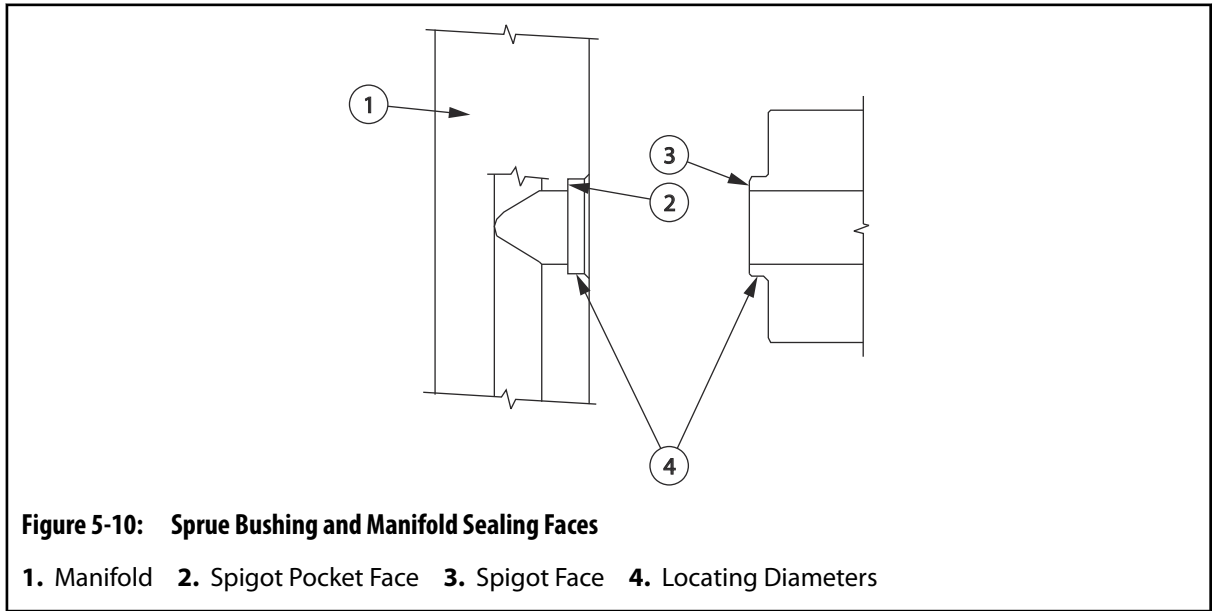
WARNING!

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:

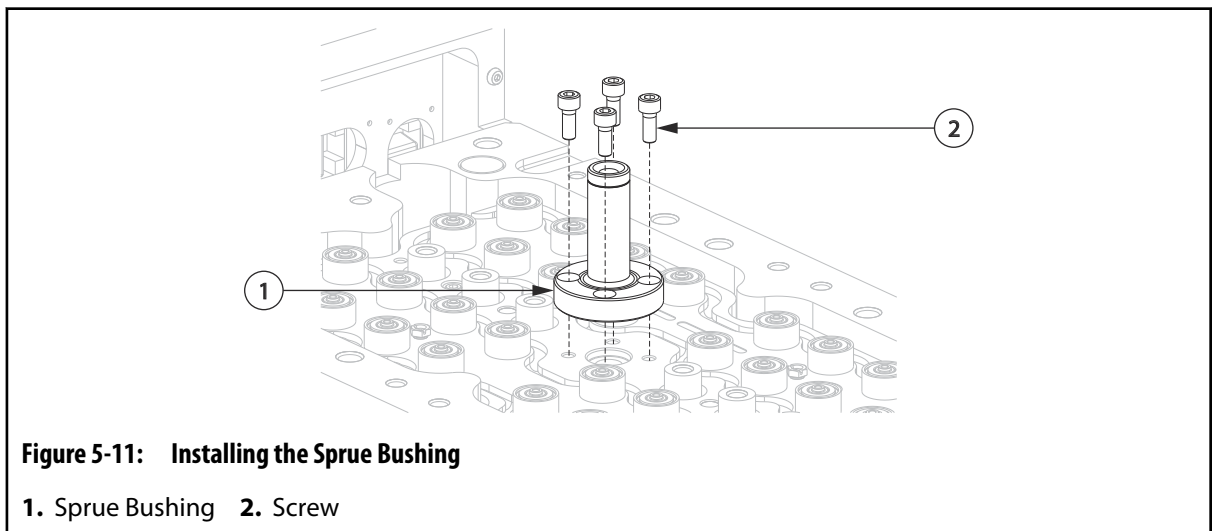
The supplied screws used to install the sprue bushing are of a special quality and must not be substituted.

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 may result in equipment damage.

2. Apply a high temperature anti-seize lubricant to the screws used to install the sprue bushing. Refer to [Section 3.5](#) 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 5.8](#) for more information.
6. If equipped, install the center plate. Refer to [Section 5.15.1](#) for more information.
7. Install the backing plate. Refer to [Section 5.16.1](#) for more information.

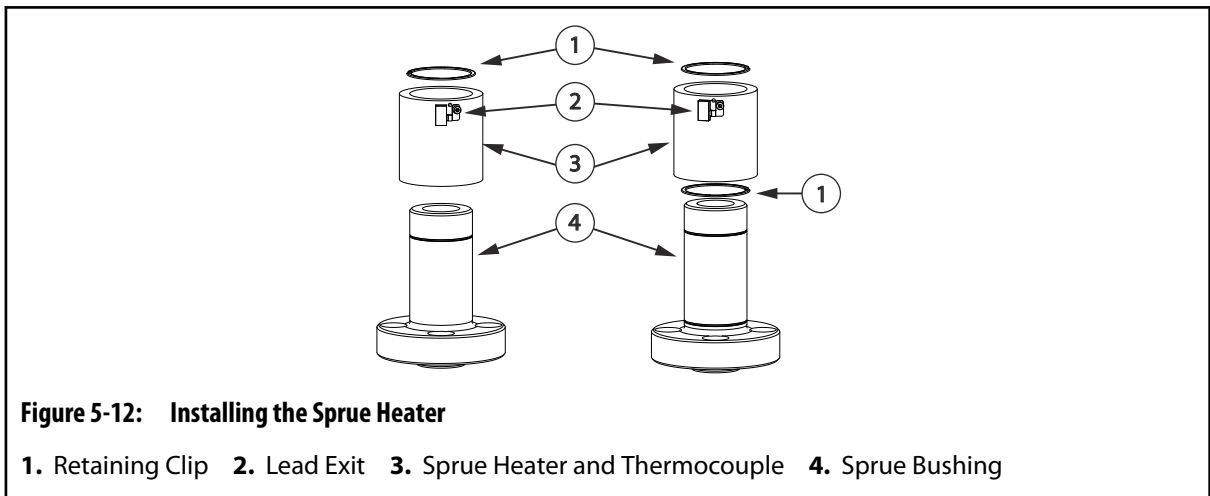
5.8 Installing the Sprue Heater

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

5.8.1 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.



3. Align the heater and thermocouple wires with the wire channels in the backing 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.

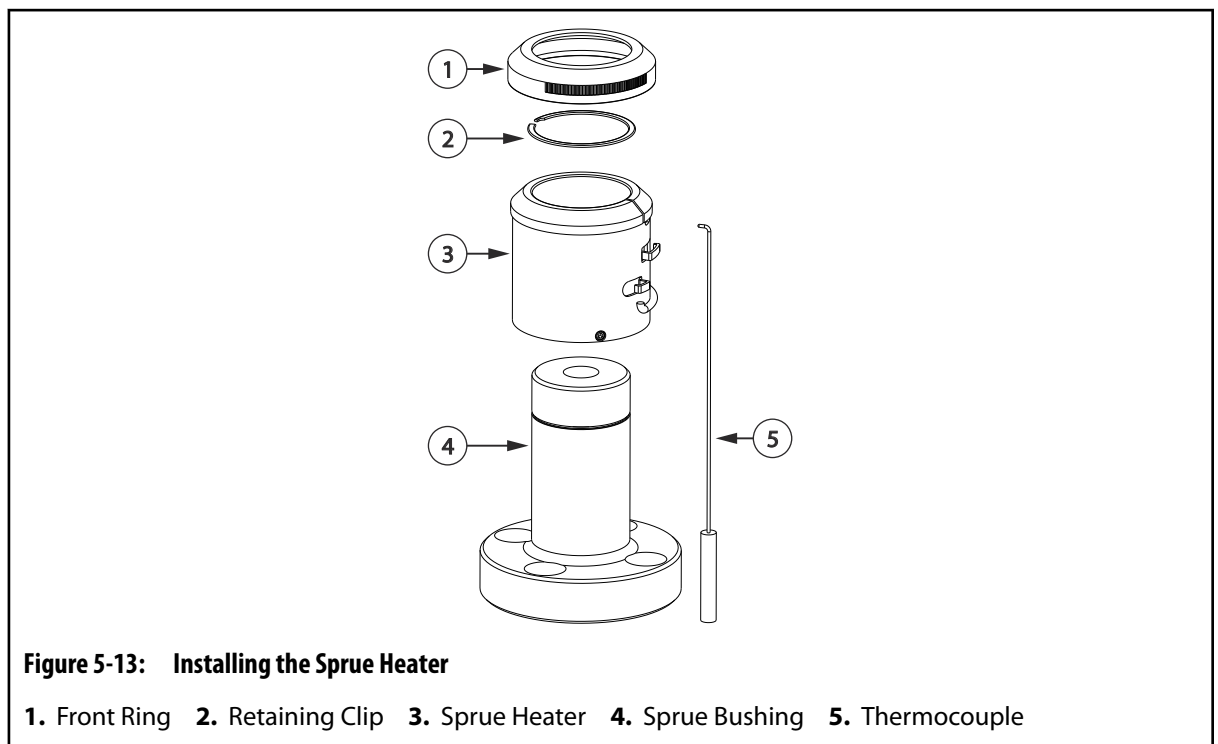
If the wire length is too long or too short, refer to [Section 5.12](#) for information about adjusting the wire length.

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 5.11](#) for more information.
10. If a center plate is not equipped, install the backing plate. Refer to [Section 5.16.1](#) for more information.

5.8.2 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 5.12](#) 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 5.11](#) for more information.
10. If a center plate is not equipped, install the backing plate. Refer to [Section 5.16.1](#) for more information.

5.9 Installing Transfer Bushings (If Equipped)

The following procedures describe how to install transfer bushings.

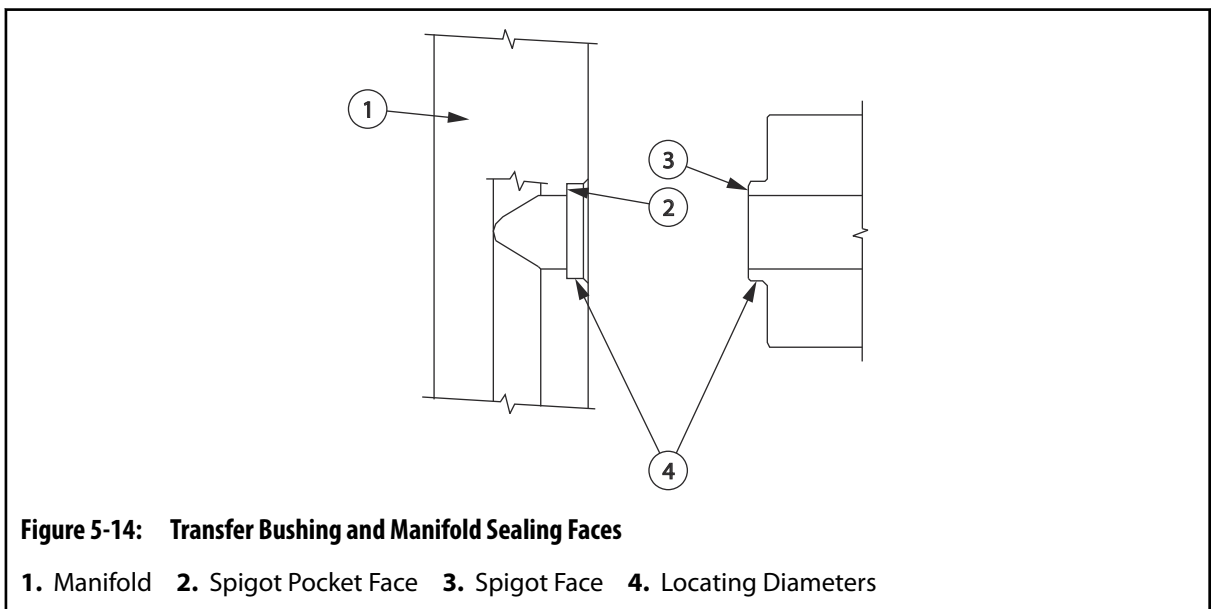
5.9.1 Installing Transfer Bushings (If Equipped)

To Install a transfer bushing, do the following:

NOTE:

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

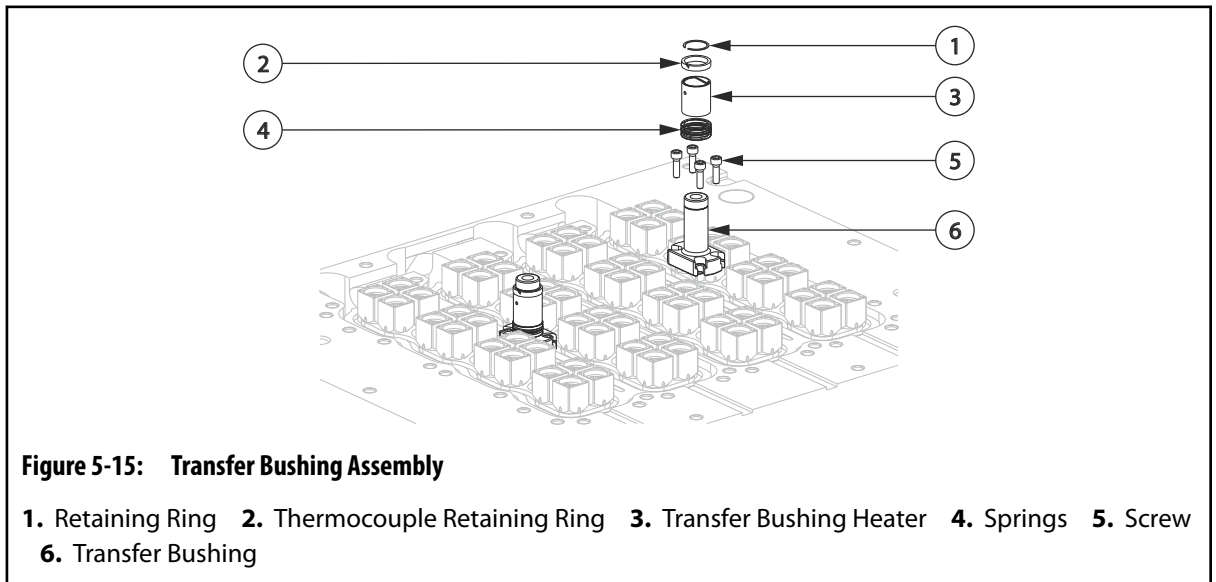
1. Clean the surfaces on the transfer bushing and manifold where the two components will interface.



CAUTION!

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

- Apply a high temperature anti-seize lubricant to the screws used to install the transfer bushing. Refer to [Section 3.5](#) for information about recommended lubricants.



- Install the transfer bushing and torque all screws to half the specified value in a cross pattern. Refer to the assembly drawings for torque requirements.
- Torque the screws fully to the specified value to make sure an even seal is made between the transfer bushing and manifold. Refer to the assembly drawings for torque requirements.
- Slide springs onto the transfer bushing.
- Slide the transfer bushing heater onto the transfer bushing. Make sure the transfer bushing heater is below the retaining clip groove in the transfer bushing.
- Snap the thermocouple ring onto the transfer bushing heater.
- Install the retaining clip into the groove on the transfer bushing.

NOTE:

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

- Route the transfer bushing 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 5.12](#) for information about adjusting the wire length.
- Label each wire with the heater zone number. Refer to the electrical schematic for the zone number.
- Crimp the wire ends and connect them to the appropriate multi-pin connectors. Refer to the electrical schematic for more information.

- 12. Test the transfer bushing heater. Refer to [Section 5.11](#) for more information.
- 13. Install the center plate. Refer to [Section 5.15.1](#) for more information.
- 14. Install the transfer bushing cover plates.

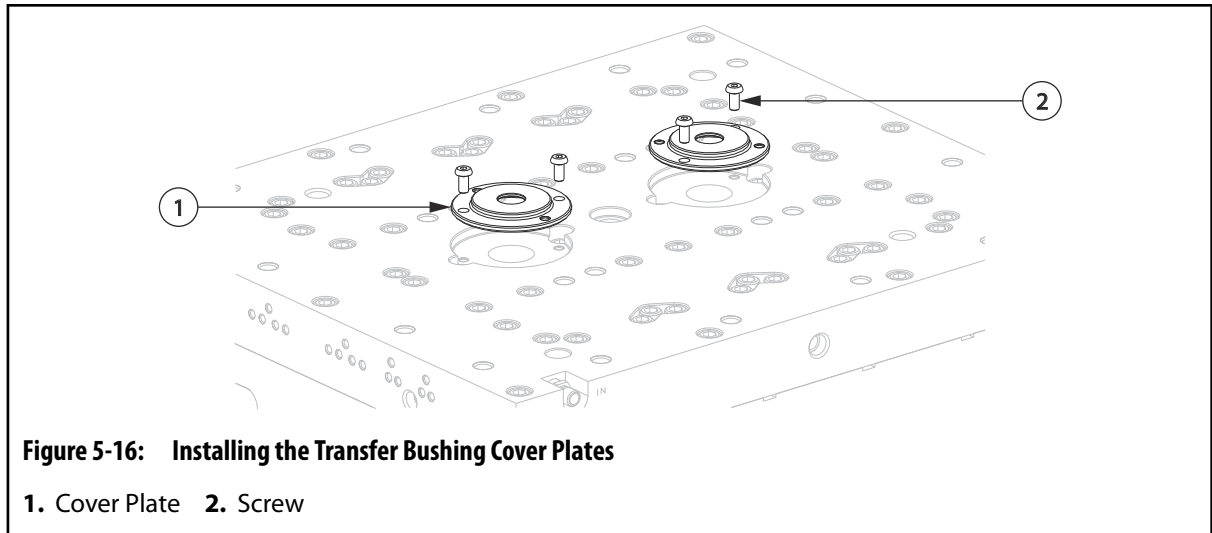


Figure 5-16: Installing the Transfer Bushing Cover Plates

1. Cover Plate 2. Screw

- 15. Install the backing plate. Refer to [Section 5.16.1](#) for more information.

5.10 Measuring Preload

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 pads or cylinders, 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.

Perform the following procedures as applicable to determine the preload on the manifolds and/or cross manifold (if equipped):

Procedure	Reference
Measuring Preload for Manifolds in VG-LX/EX Systems	Section 5.10.1
Measuring Preload for Manifolds in VG-SX Systems	Section 5.10.2
Measuring Preload for Cross Manifolds (If Equipped) in Two Plate System	Section 5.10.3
Measuring Preload for Cross Manifolds (If Equipped) in Three Plate System	Section 5.10.4

5.10.1 Measuring Preload for Manifolds in VG-LX and EX Systems

To measure the preload on a manifold, do the following:

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Do not tighten the screws that secure the manifolds to reduce the preload values. These screws should be hand tightened and then turned counter-clockwise 1/4 turn before preload measurements are taken.

1. Make sure the screws that secure the manifold to the manifold plate are hand-tightened and then turned counter-clockwise 1/4 turn.
2. Determine the height of the backup pads from the assembly drawings. Record the value as measurement *A*.
3. 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*.

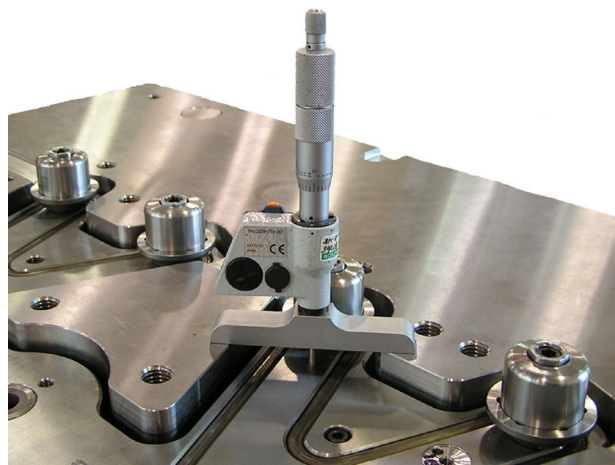


Figure 5-17: Measuring Preload

4. Complete the following calculation to determine the preload:
$$A - B = \text{Preload}$$
5. Repeat [step 2](#) to [step 4](#) for all other corners of the manifold to make sure the preload measurements are consistent.
6. 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 2](#) to [step 6](#) until the preload measurements are within tolerance.

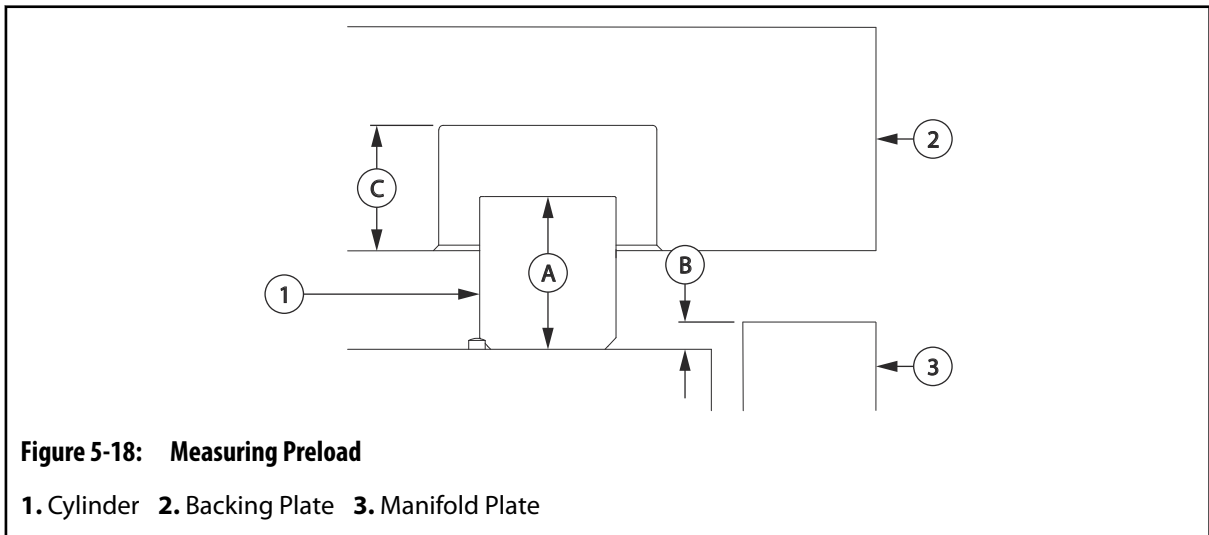
5.10.2 Measuring Preload for Manifolds in VG-SX Systems

To measure the preload on a manifold, do the following:

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Do not tighten the screws that secure the manifolds to reduce the preload values. These screws should be hand tightened and then turned counter-clockwise 1/4 turn before preload measurements are taken.

1. Make sure the screws that secure the manifold to the manifold plate are hand-tightened and then turned counter-clockwise 1/4 turn.
2. Determine the height of the cylinders from the assembly drawings. Record the height as measurement A.
3. Using a depth micrometer, measure the distance from the top face of the manifold plate to the face of the manifold(s). Subtract this value from the height of the cylinders and record the measurement as measurement B.



4. On the backing plate, measure the distance from the manifold-plate-to-backing-plate surface to the sealing surface in the cylinder bore. Record the distance as measurement C.

NOTE:

The sealing surface is where the cylinder contacts the backing plate.

5. Complete the following calculation to determine the preload:
 $A - (B + C) = \text{Preload}$
6. Repeat [step 2](#) to [step 5](#) for all other corners of the manifold to make sure the preload measurements are consistent.
7. 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 2](#) to [step 7](#) until the preload measurements are within tolerance.

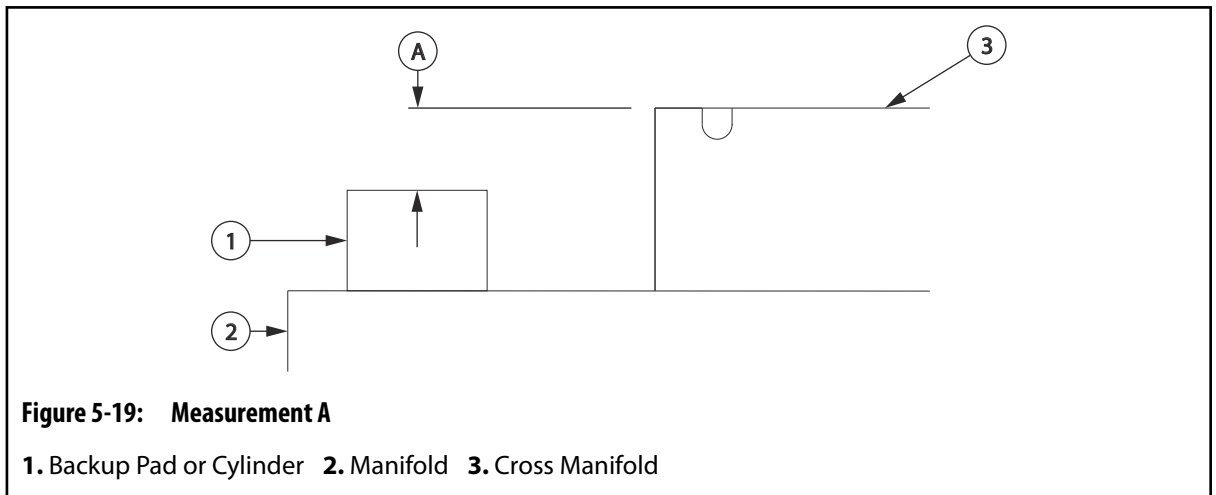
5.10.3 Measuring Preload for Cross Manifolds in Two Plate Systems (If Equipped)

To measure the preload on a cross-manifold, do the following:

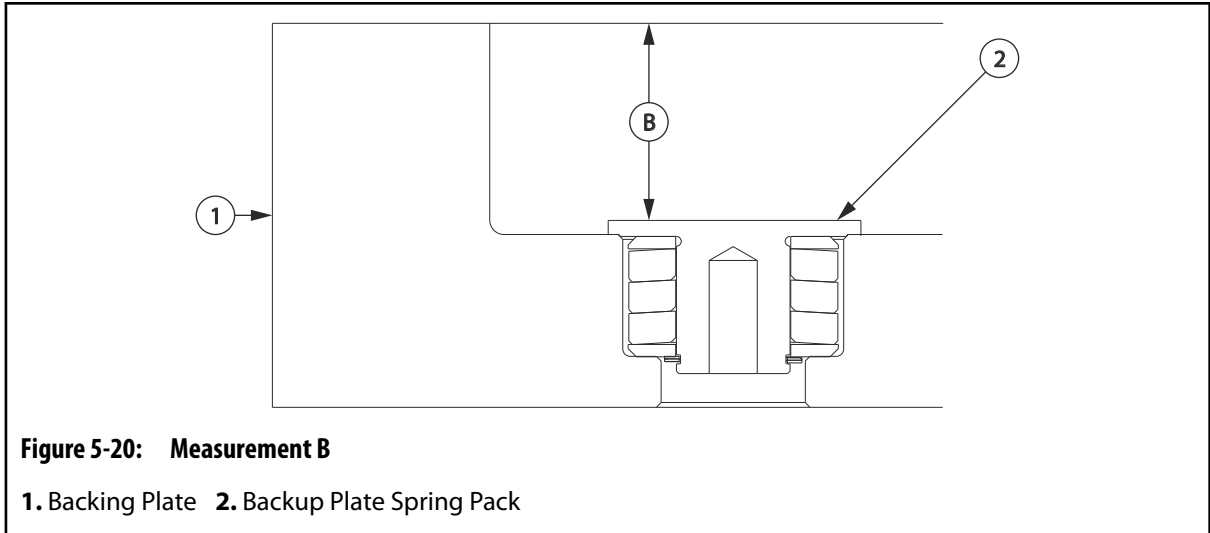
CAUTION!

Mechanical hazard – risk of damage to the hot runner. Do not tighten the screws that secure the manifolds to reduce the preload values. These screws should be hand tightened and then turned counter-clockwise 1/4 turn before preload measurements are taken.

1. Make sure the screws that secure the cross manifold to the manifolds are hand-tightened and then turned counter-clockwise 1/4 turn.
2. Remove the C-rings, if equipped.
3. Using a depth micrometer, measure the distance from the top face of the cross manifold to the top face of the backup pad (LX or EX) or cylinder (SX). Record value as measurement A.



4. Make sure the backing plate is laying on a work bench with the pocket facing up.
5. Using a depth micrometer, measure the distance from the top face of the backing plate to the face inside the bore where the backup plate spring pack will make contact. Record value as measurement B.



6. Complete the following calculation to determine the preload:
 $A - B = \text{Preload}$
7. Repeat [step 1](#) to [step 6](#) for all other corners of the cross manifold to make sure the preload measurements are consistent.
8. Compare the preload measurements to the C2 dimension value 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 8](#) until the preload measurements are within tolerance.

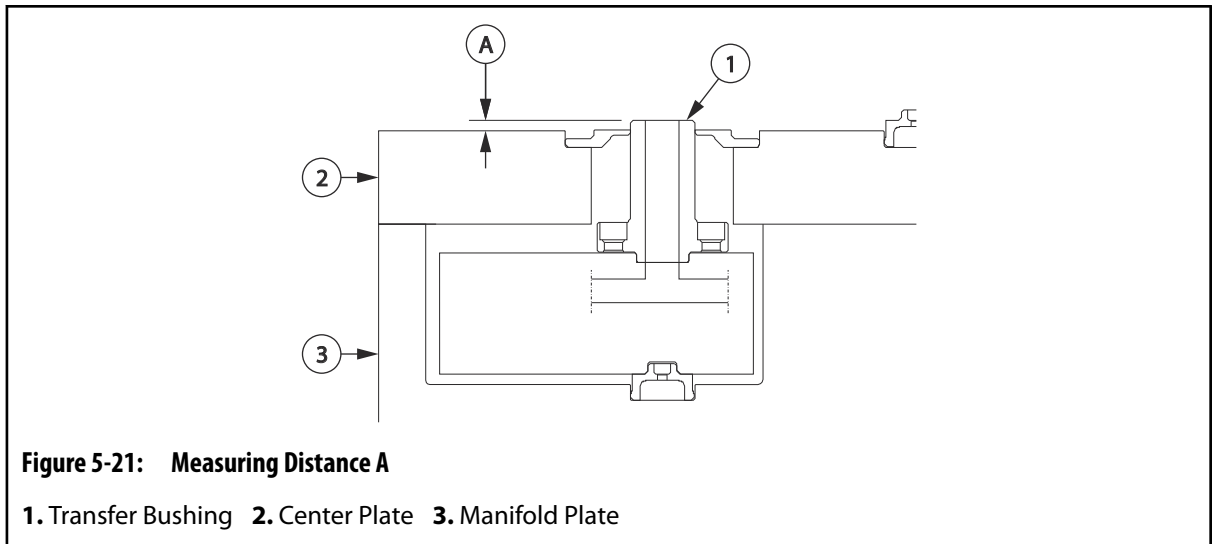
5.10.4 Measuring Preload for Cross Manifolds in Three Plate Systems (If Equipped)

To measure the preload on a cross-manifold, do the following:

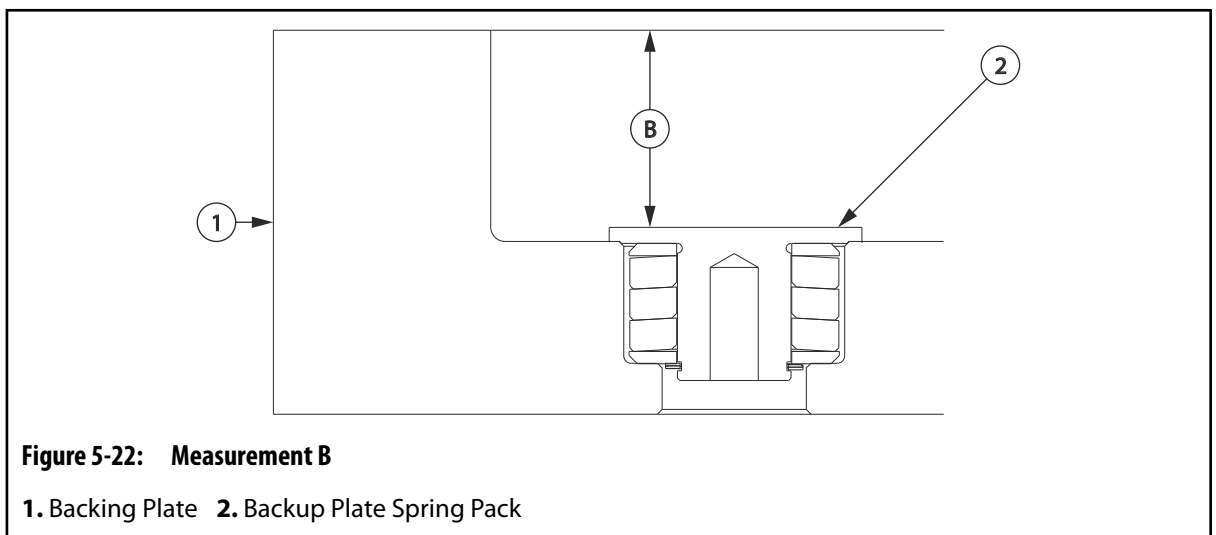
CAUTION!

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. Using a depth micrometer, measure the distance from the top of the transfer bushing to the top face of the center plate. Record the value as measurement A.



- Using a depth micrometer, measure the distance from the top face of the backing plate to the face inside the bore where the backup plate spring pack will make contact. Record value as measurement *B*.



- Measure the thickness of the center plate and record the value as measurement *C*.
- Determine the cold clearance between the cross manifold and the transfer bushing listed on the Tip Chart in the assembly drawings. Refer to [Section 5.10.1](#) for more information. Record the value as measurement *D*.
- Complete the following calculation to determine the preload:

$$A - (B + C + D) = \text{Preload}$$
- Repeat [step 1](#) to [step 5](#) for all other corners of the cross manifold to make sure the preload measurements are consistent.
- Compare the preload measurements to the C2 dimension value 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 7](#) until the preload measurements are within tolerance.

5.11 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 $150 \text{ }^\circ\text{C}$ ($203 \text{ }^\circ\text{F}$) minimum.

NOTE:

Refer to the electrical schematics for resistance information.

5.12 Adjusting Heater and Thermocouple Wire Length

In some cases, the length of a heater or 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 Heater and Thermocouple Wires

For small hot runners where the mineral insulated 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.

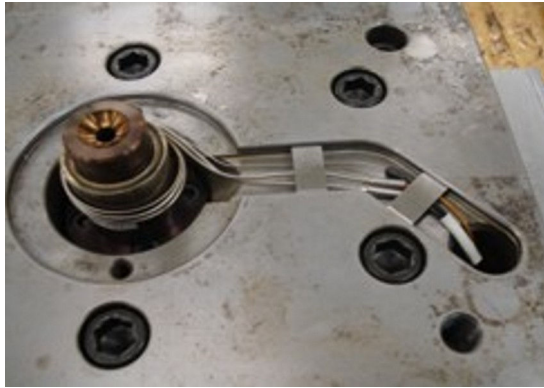


Figure 5-23: Wire Wrapped Around Sprue Heater (Example)

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.

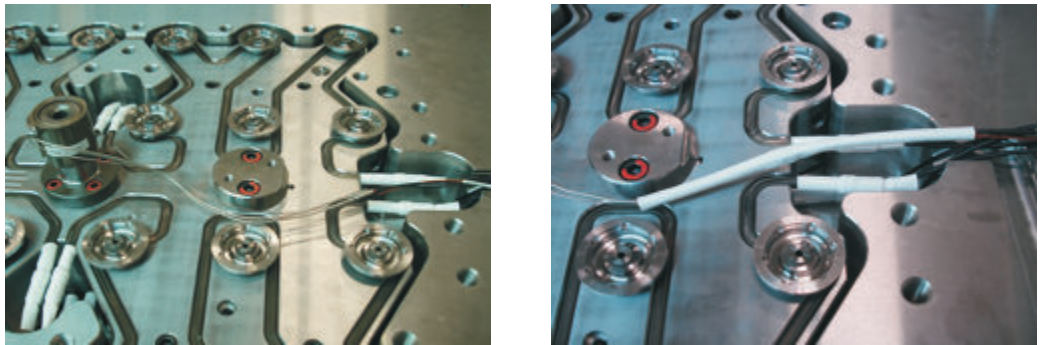


Figure 5-24: Fiberglass Sleeving (Example)

5.13 Installing Double Delta Piston Seals

To install double delta piston seals perform the following:

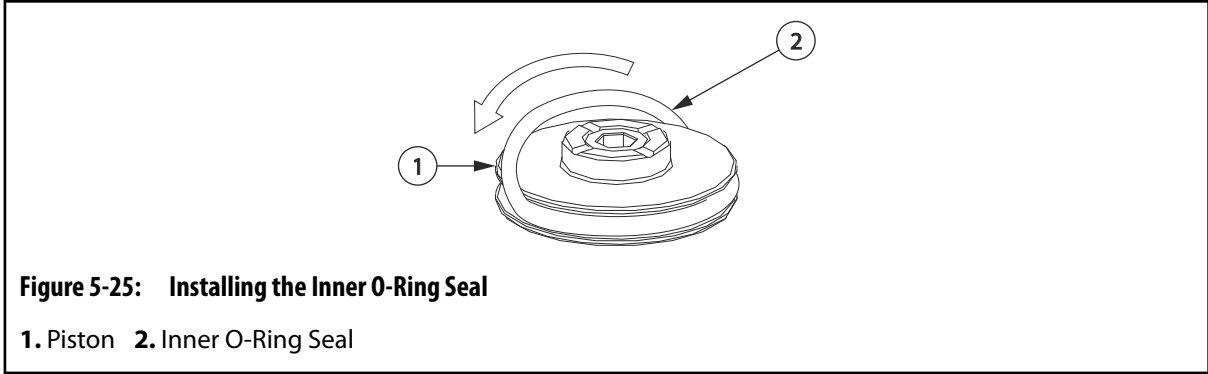
1. Remove any loose debris or grease from the piston and surrounding area.



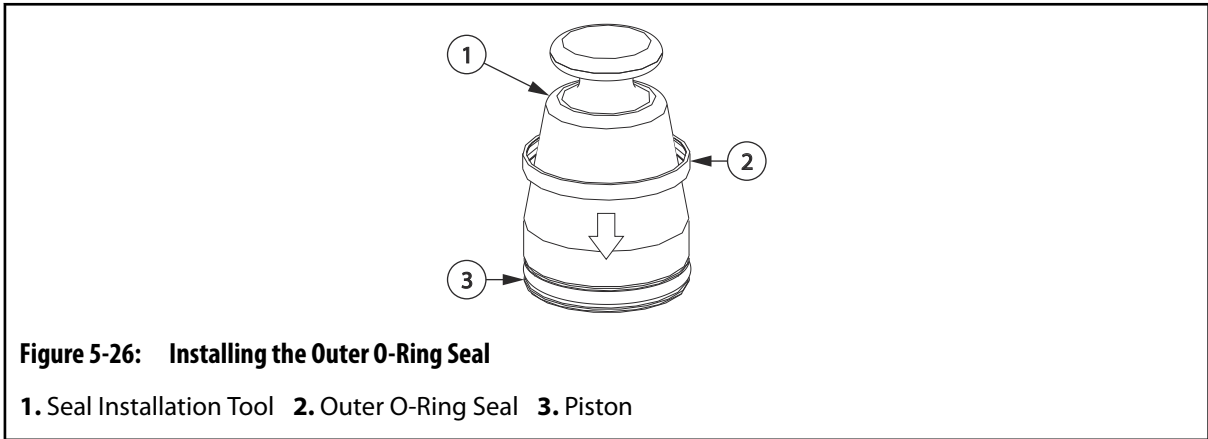
IMPORTANT!

Pistons must be cleaned before new seals are installed. Any debris or grease present will shorten the service life of the seals.

2. Install the interior O-ring seal into the seal groove by rolling it over the piston. No tools are required.



3. Place the seal installation tool on top of the piston.



4. Install the outer O-ring seal by pushing the seal over the seal installation tool until it sits over the interior O-ring seal.
5. Remove the seal installation tool.
6. Slide the piston installation tool over the piston to compress the seals. This will protect the seals from damage when the piston cylinder is installed.
7. Inspect the piston assembly for damage, debris or grease.

NOTE:

The piston cylinder is easier to install when it is installed shortly after the piston installation tool is removed.

8. For VG-LX/EX hot runners only, install the piston cylinder.
9. Install the valve stem assemblies. Refer to [Section 5.14](#) for more information.
10. If equipped, install the center plate. Refer to [Section 5.15.1](#) for more information.
11. Install the backing plate. Refer to [Section 5.16.1](#) for more information.

5.14 Installing Valve Stems

The following procedures describe how to install the valve stems.

5.14.1 Installing the Valve Stems for U350 and U500 VG-SX Systems

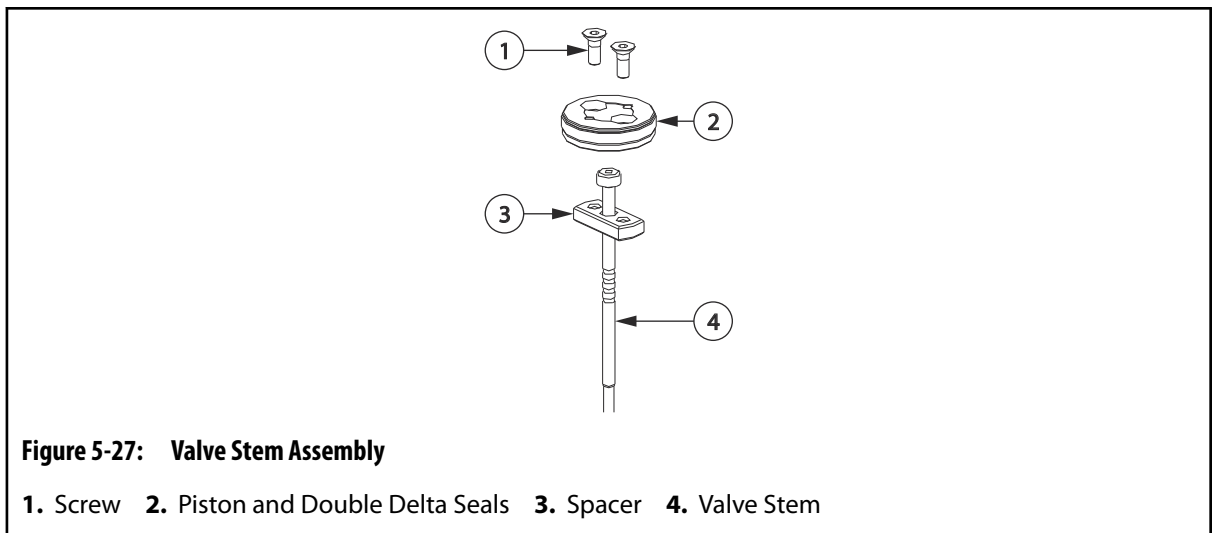


IMPORTANT!

Husky recommends that the Ultra Helix valve gate nozzle tip be removed before the installation of the valve stem.

To install valve stems into the hot runner, do the following:

1. For each valve stem assembly, do the following:
 - a. Make sure all components are clean and free of resin, scratches, nicks or burrs.



- b. Insert the valve stem through the spacer.
 - c. Apply a static application grease to the threads of the screws. Refer to [Section 3.5](#) for a list of recommended lubricants.
 - d. Place the valve stem and spacer against the bottom of the piston and install the screws. Torque the screws to the value specified on the assembly drawings.
 - e. Rotate the valve stem to make sure no binding has occurred. The valve stem should rotate freely.
 - f. Install the double delta seals. Refer to [Section 5.13](#) for more information.
2. Carefully insert the valve stem assemblies into the cylinder. Make sure the pistons are seated below the top surface of the cylinders.
3. If equipped, install the center plate. Refer to [Section 5.15.1](#) for more information.
4. Install the backing plate. Refer to [Section 5.16.1](#) for more information.

5.14.2 Installing the Valve Stems for U500 and U750 VG-LX and EX Systems

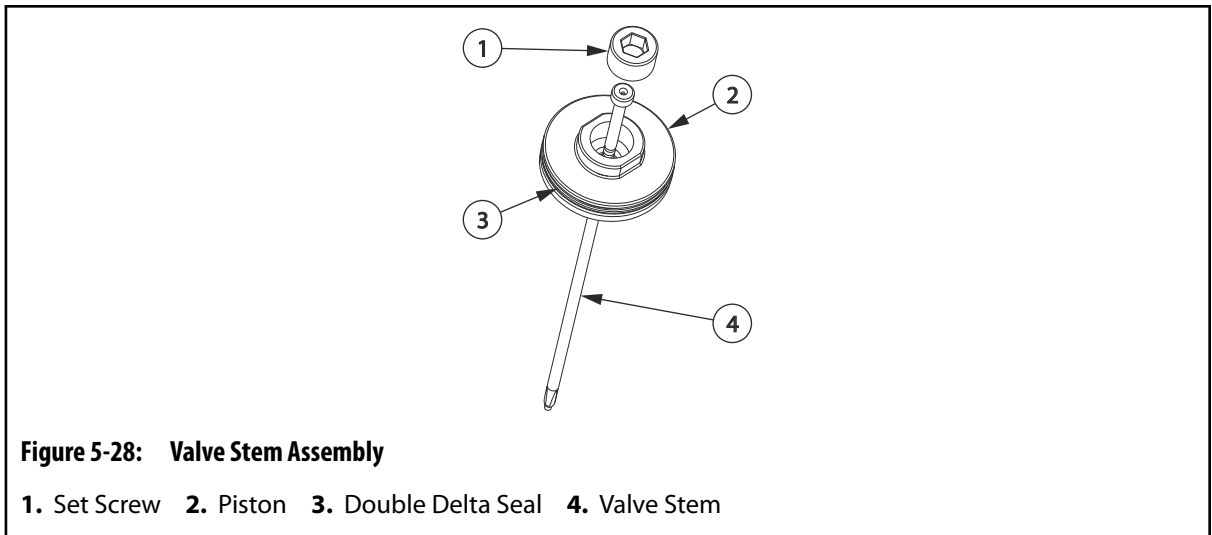


IMPORTANT!

Husky recommends that the Ultra Helix valve gate nozzle tip be removed before the installation of the valve stem.

To install valve stems into the hot runner, do the following:

1. For each valve stem assembly, do the following:
 - a. Make sure all components are clean and free of resin, scratches, nicks or burrs.



- b. Insert the valve stem through the piston.
 - c. Apply a static application grease to the threads of the set screw. Refer to [Section 3.5](#) for a list of recommended lubricants.
 - d. Install the set screw into the piston and hand tighten.
 - e. While holding the piston with a wrench or vice, torque the set screw to the specified value. Refer to the assembly drawings for torque values.
 - f. Rotate the valve stem to make sure no binding has occurred. The valve stem should rotate freely.
 - g. Install the double delta seals and install the piston cylinder. Refer to [Section 5.13](#) for more information.
 2. If the valve stems will be installed while the hot runner is cold, proceed to [step 3](#). However, if the valve stems will be installed while the hot runner is hot, do the following:
 - a. Reconnect any thermocouples that were disconnected during the disassembly.
 - b. Connect the hot runner to a controller.
 - c. Turn on the controller.

**DANGER!**

Electrocution hazard - risk of death, serious injury and/or damage to the hot runner. Do not turn on the heaters if water has leaked into the hot runner. If water has leaked into the hot runner, the hot runner must be completely disassembled, dried and assembled before the heaters are turned on.

**WARNING!**

Hot resin spray hazard - risk of serious injury. Hot resin may unexpectedly spray from the nozzle tips while the hot runner is reaching operating temperature. To avoid serious burns, wear personal protective equipment consisting of a heat-resistance coat, heat-resistant gloves and a full face shield over safety glasses. Use adequate ventilation for fumes.

**WARNING!**

Burn hazard - risk of serious injury. Hot runner components stay hot for long periods of time after heaters have been turned off. Wear personal protective equipment when working near the hot runner and place a warning sign in the area before leaving the hot runner unattended.

- d. Increase the temperature of the hot runner to a temperature high enough to soften the resin in the melt channels.

NOTE:

Heating the nozzles will minimize the misalignment between the manifold bushings and nozzles and will guarantee that the plastic in the system is soft enough not to deflect the stem during installation.

NOTE:

The Vicat Softening Temperature for the resin type is recommended. Refer to the resin supplier's documentation for more information.

**WARNING!**

Electrocution hazard - risk of death or serious injury. Complete the lockout/tagout procedure of the electrical power source before disconnecting the electrical connectors.

- e. Lock out and tag the electrical power source.

**IMPORTANT!**

Do not allow the nozzle tips to overheat or degraded material will have to be cleaned out of the nozzle housing before a new nozzle tip can be installed.

- f. Disconnect the controller.
- g. Verify that the manifold hold down screws are fastened securely.
- h. Insert the alignment tool until the small diameter starts to engage the tip (approximately 10 mm (0.4 in) from the end of insertion) to pre-align the tip.

NOTE:

If an alignment tool is not available, an old stem with the plunger section removed may be used.

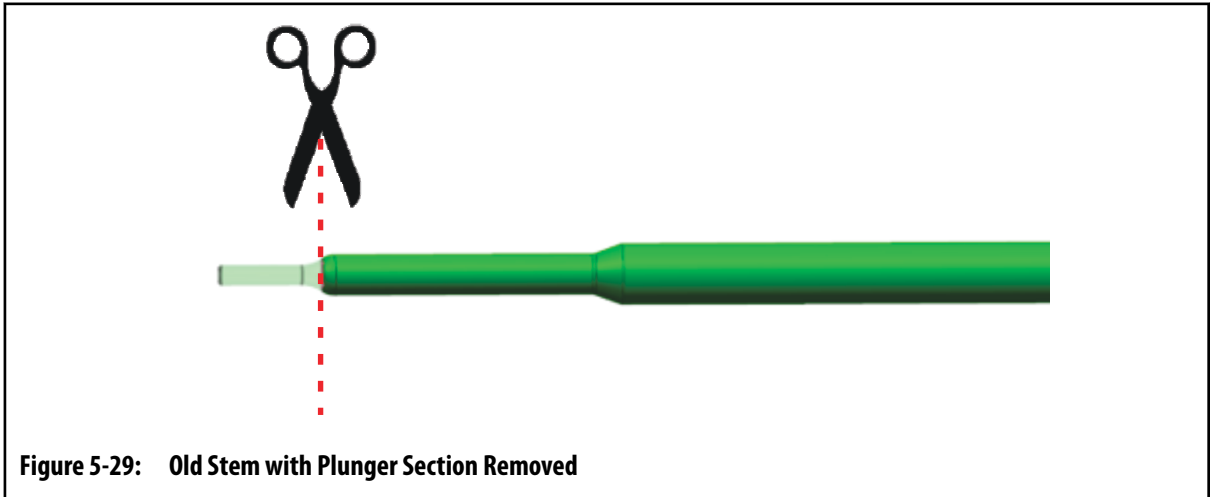


Figure 5-29: Old Stem with Plunger Section Removed



IMPORTANT!

Some resistance may be felt while inserting the alignment tool. If this occurs, rotate the tool slightly and then continue the installation.

- i. When the tool slides back and forth easily in the guide, remove the tool.

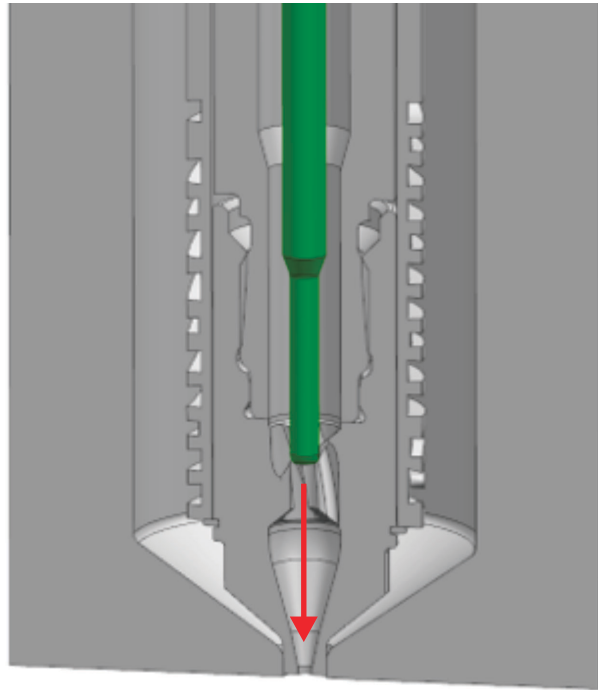


Figure 5-30: Alignment Tool Inserted Correctly



IMPORTANT!

The stem should be installed promptly after removing the alignment tool to minimize the flow of molten plastic into the void created.

CAUTION!

Mechanical hazard - risk of damage to the equipment. Never try to force the valve stem forward if resistance is felt. Doing so may result in the plunger and guide being damaged.

- j. Install the valve stem by hand until the head is 15 mm (0.6 in) from being fully seated in the actuation plate or cylinder.

NOTE:

Resistance should not be felt when the stem encounters the scraper or manifold bushing. If resistance is felt, rotate the stem while continuing to apply slight pressure until resistance is no longer felt.

- k. Carefully insert the stem for the final 10 mm (0.4 in) .



IMPORTANT!

If the stem is severely misaligned, there is a possibility that the plunger has entered one of the helical grooves in the tip. If this happens, pull the stem back and rotate it slightly, then continue the installation.

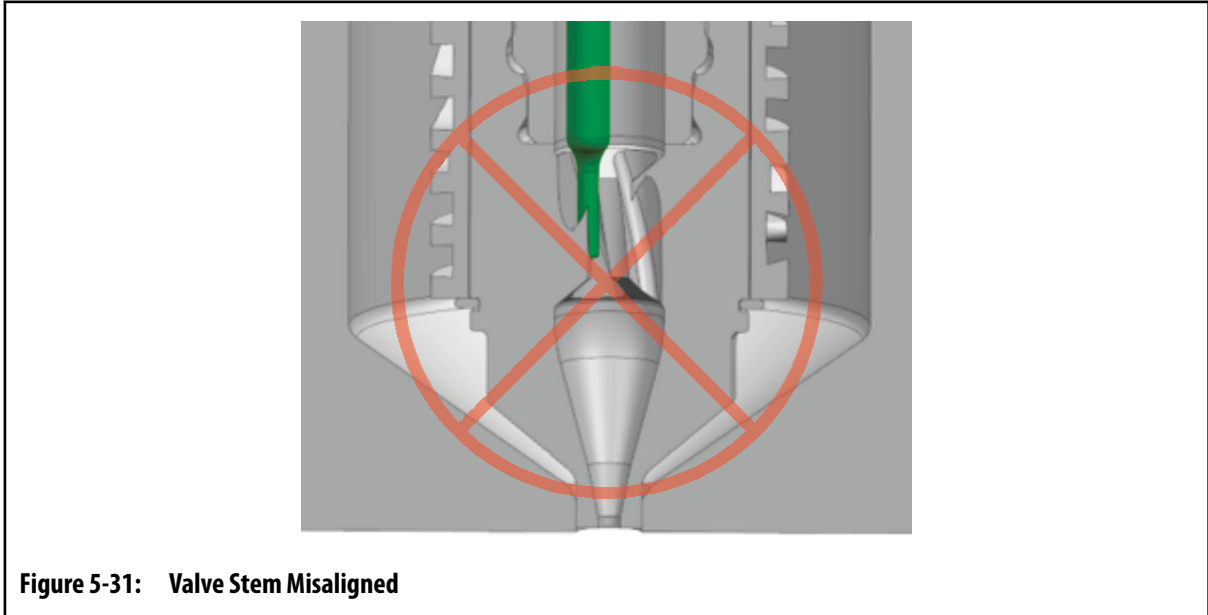


Figure 5-31: Valve Stem Misaligned

- 1. Proceed to [step 4](#)
- 3. Carefully insert the valve stem assemblies into the manifold(s). Make sure the piston cylinders are fully seated in the backup pads.
- 4. If equipped, install the center plate. Refer to [Section 5.15.1](#) for more information.
- 5. Install the backing plate. Refer to [Section 5.16.1](#) for more information.

5.14.3 Installing the Valve Stems for U1000 VG-LX Systems

To install valve stems into the hot runner, do the following:

- 1. For each valve stem assembly, do the following:
 - a. Make sure all components are clean and free of resin, scratches, nicks or burrs.

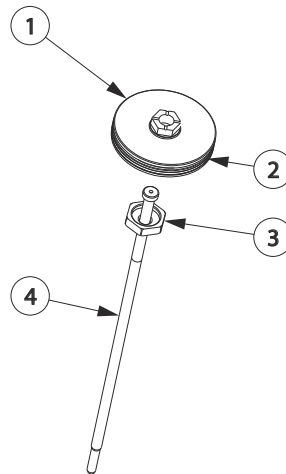


Figure 5-32: Valve Stem Assembly

1. Piston 2. Double Delta Seal 3. Piston Spacer 4. Valve Stem

- b. Insert the valve stem through the piston.
 - c. Apply a static application grease to the inside threads of the piston spacer. Refer to [Section 3.5](#) for a list of recommended lubricants.
 - d. Slide the piston spacer over the valve stem tip and thread it onto the bottom of the piston.
 - e. While holding the piston with a wrench or vice, torque the piston spacer to the specified value. Refer to the assembly drawings for torque values.
 - f. Rotate the valve stem to make sure no binding has occurred. The valve stem should rotate freely.
 - g. Install the double delta seals and install the piston cylinder. Refer to [Section 5.13](#) for more information.
2. Carefully insert the valve stem assemblies into the manifold(s). Make sure the piston cylinders are fully seated in the backup pads.
 3. If equipped, install the center plate. Refer to [Section 5.15.1](#) for more information.
 4. Install the backing plate. Refer to [Section 5.16.1](#) for more information.

5.15 Installing the Center Plate (If Equipped)

The following procedures describe how to install the center plate.

5.15.1 Installing the Center Plate (If Equipped)

To install the center 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.

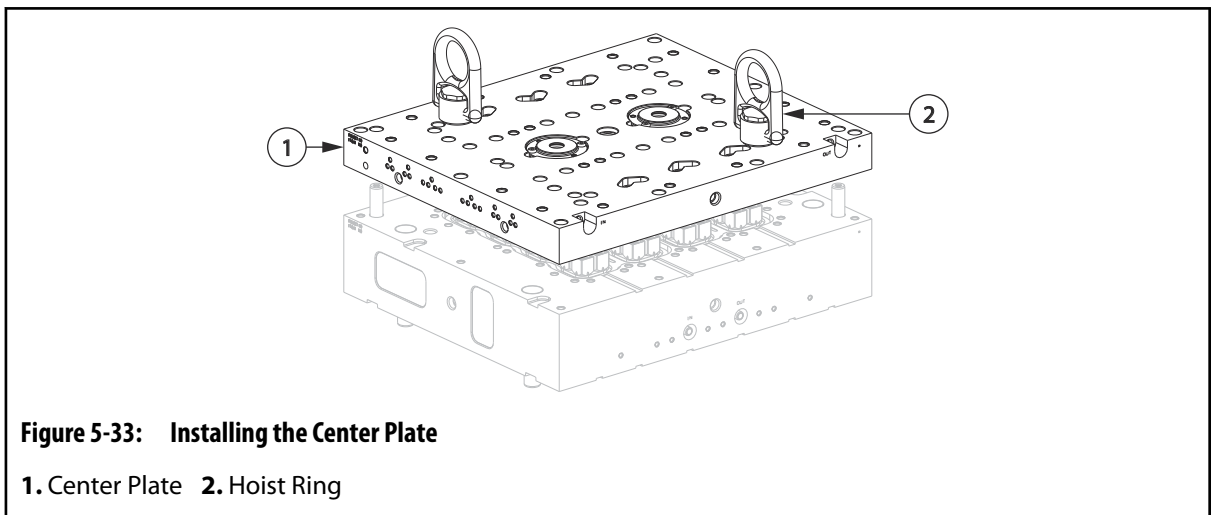
1. Make sure the manifold plate and center plate are clean and free of pry marks around the pry slots.
2. Clean the center plate surface with a medium India stone (240 grit oilstone) as needed.
3. Measure the dimensions of the backup pad bore depth and verify them with those in the assembly drawings.
4. Apply a static application grease to the guide pins in the manifold plate. Refer to [Section 3.5](#) for information about recommended lubricants.



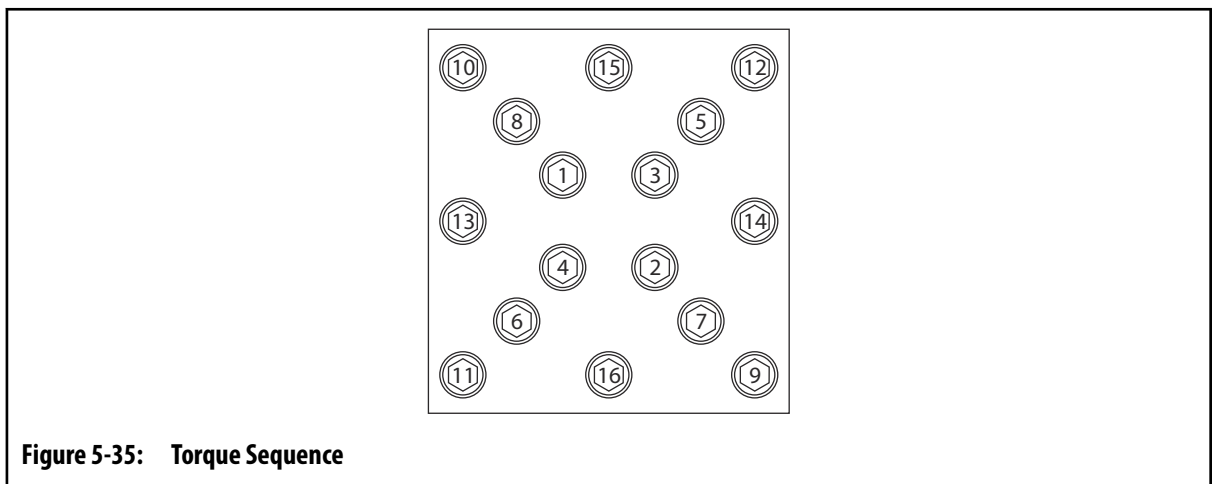
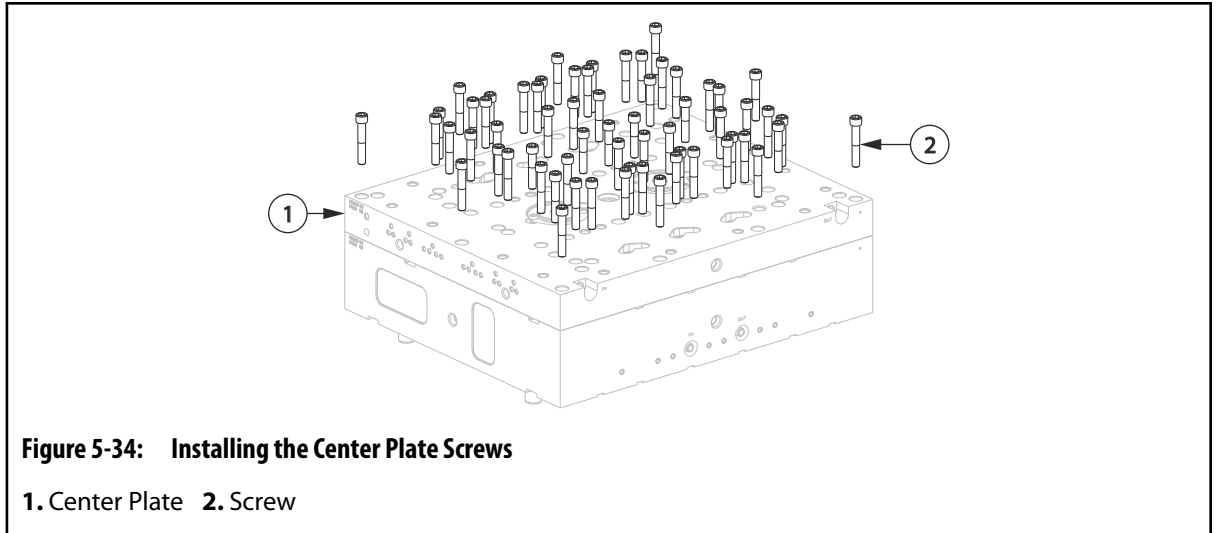
WARNING!

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

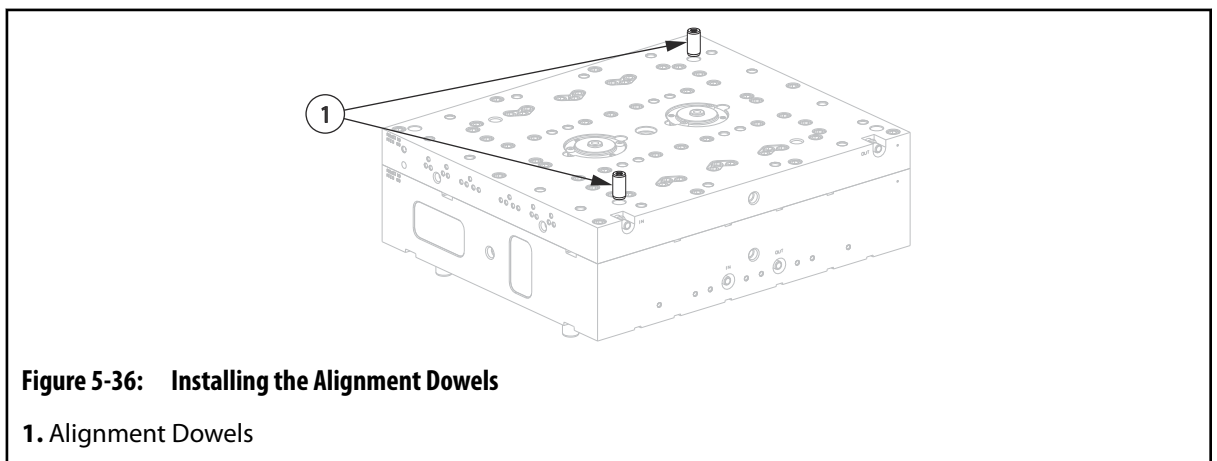
5. Install hoist rings in the designated lifting points marked on the center plate.



6. Attach an overhead lifting device to the hoist rings and lift the center plate.
7. Slowly lower the center plate onto the manifold plate. Make sure the guide pins align with the center plate locating bores.
8. Disconnect the overhead lifting device and remove the hoist rings.
9. Install the screws that secure the center plate to the manifold plate. Torque the screws to the specified value starting from the center and working outwards in a cross pattern. Refer to the assembly drawings for torque requirements.



10. Install the alignment dowels.



11. Install the backing plate. Refer to [Section 5.16.1](#) for more information.

5.16 Installing the Backing Plate

The following procedure describes how to install the backing plate.

5.16.1 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.

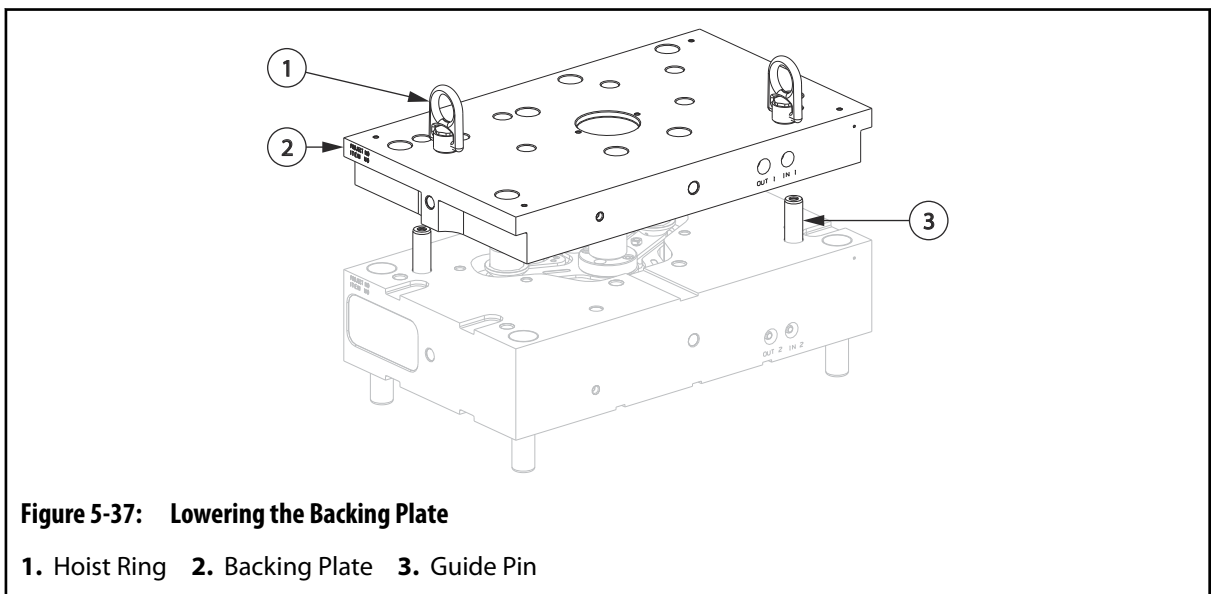
1. Make sure the backing plate and manifold plate are clean and free of pry marks around the pry slots.
2. Clean the backing plate and manifold plate mounting surfaces with a medium India stone (240 grit oilstone) as needed.



WARNING!

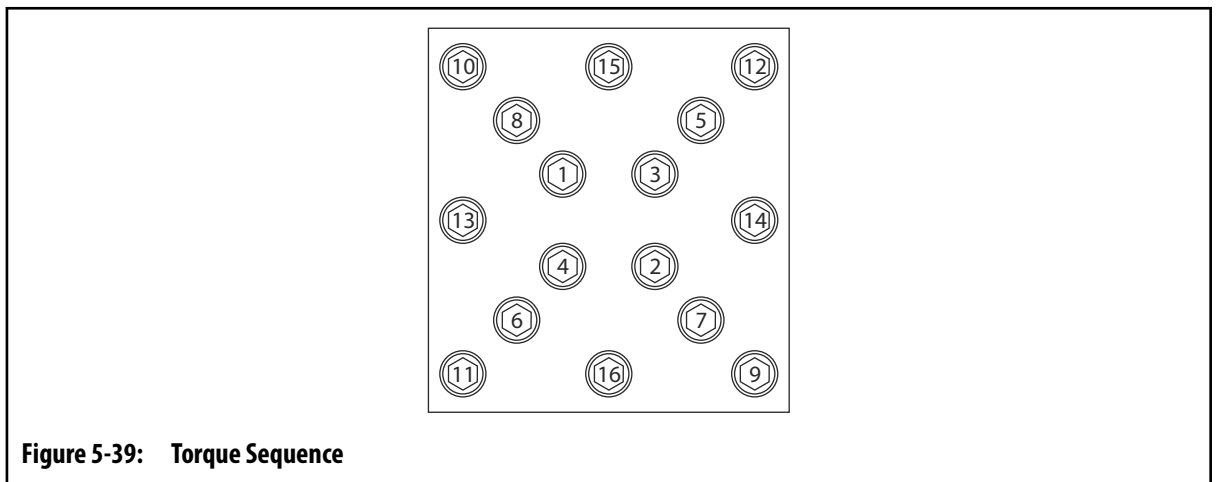
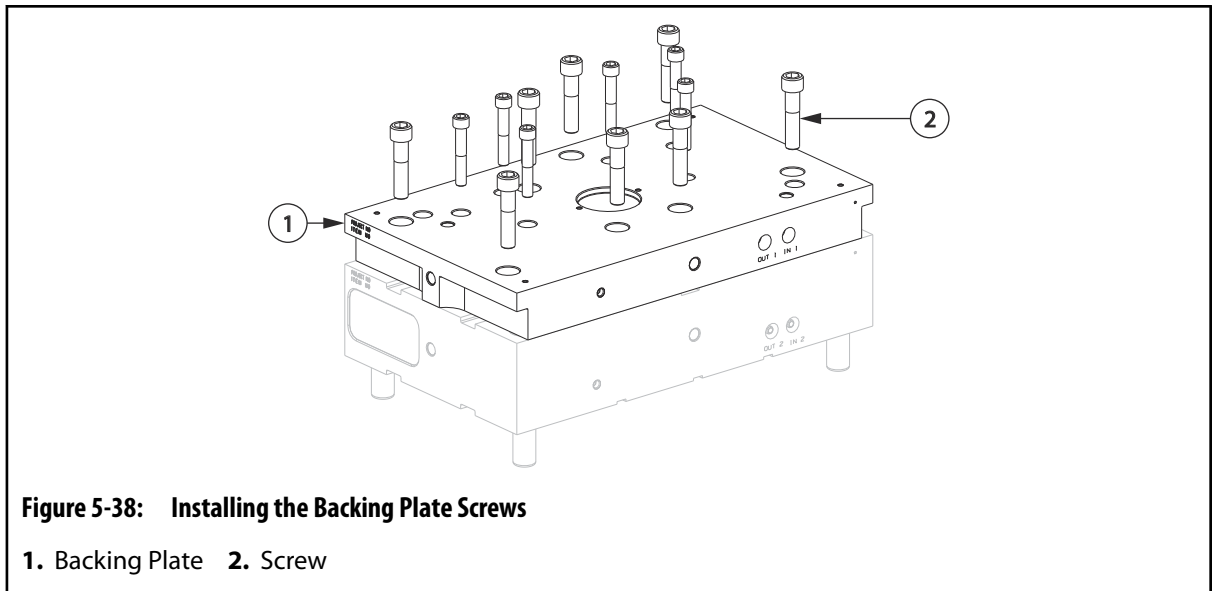
Crushing hazard – risk of death or serious injury. Inadequate lifting equipment can fail and cause death or serious injury. Make sure all lifting equipment is rated for the load and in safe operating condition.

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

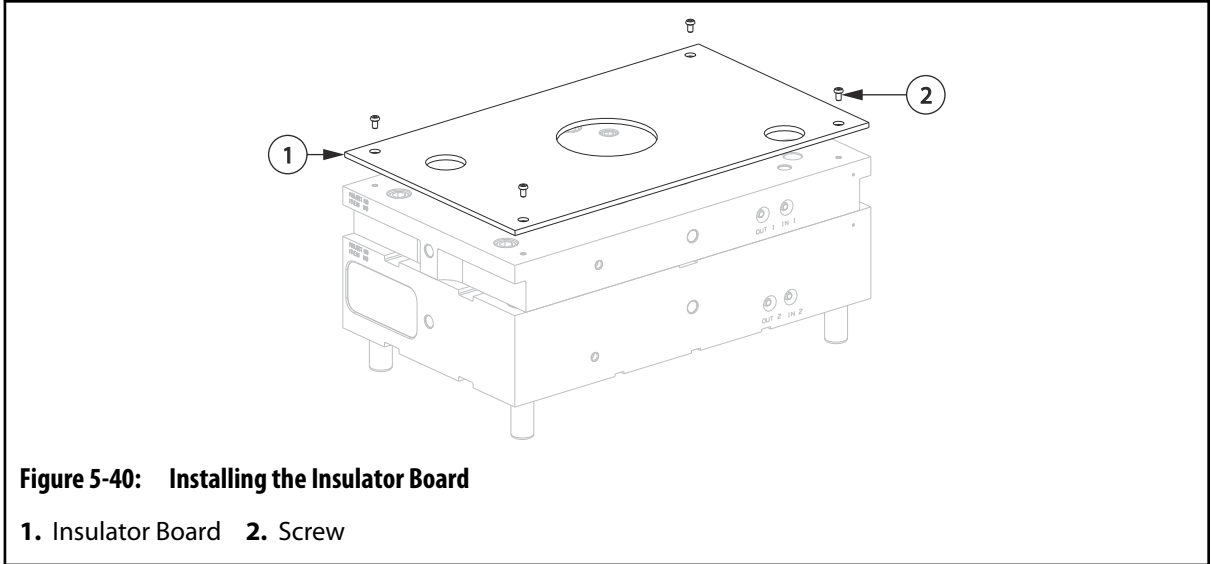


6. Disconnect the overhead lifting device and remove the hoist rings.

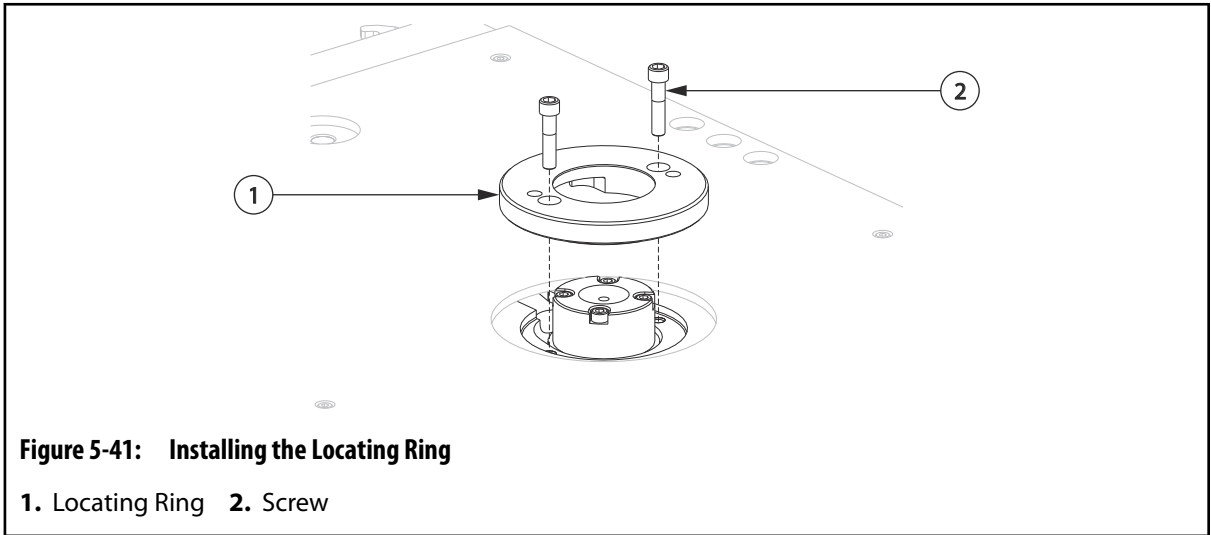
7. Install the screws that secure the backing plate to the manifold plate. Torque each screw to its specified value starting from the center and working outwards in a cross pattern. Refer to the assembly drawings for torque requirements.



8. If equipped, install the insulator board and torque the screws to the specified value. Refer to the assembly drawings for torque requirements.



9. Install the locating ring.



5.17 Installing Nozzle Tips

The following procedures describe how to install nozzle tips.

NOTE:

On VG-HP systems, the nozzle tip and nozzle housing are one piece.

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).

5.17.1 Installing the Nozzle Tips

To install a nozzle tip, do the following:



IMPORTANT!

UltraHelix VG nozzle tips need to be installed after the valve stems are installed to reduce the risk of stem damage in cold condition, especially with drop locations farther away from the center of expansion. UltraHelix is especially susceptible to damage due to the smaller diameter of the Helix guiding feature.



IMPORTANT!

Make sure the Ultra Helix valve stem is installed in the closed position before fastening the nozzle tip to the nozzle housing body. This prevents the valve stem from binding in the spiraled portion of the Ultra Helix nozzle tips.

NOTE:

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

1. Remove any resin or other residue found on the nozzle tips and nozzle housings.
-

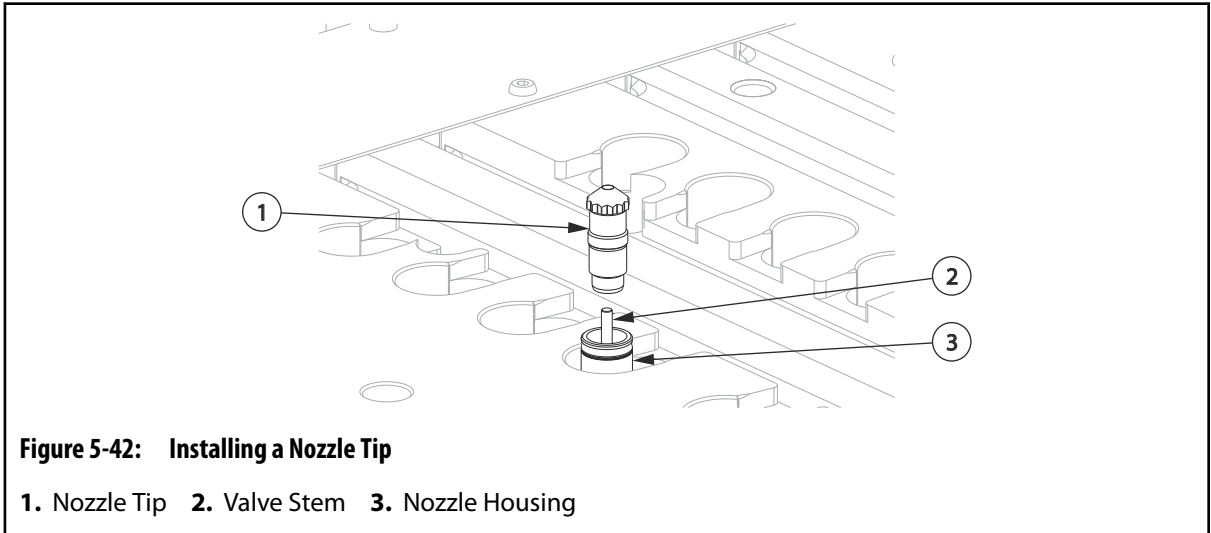


IMPORTANT!

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
 - Thread stripping
-
2. If the nozzle housing has an external thread, proceed to [step 3](#). Otherwise, clean the nozzle tip seating surface at the bottom of the nozzle housing bore with a soft wire brush.
 3. Make sure the nozzle tip and nozzle housing are clean and dry.
 4. For Ultra Helix Valve Gate, make sure the valve stem is fully forward in the closed position. The valve stem should slide smoothly into the stem guide. If there is any resistance, the guide is not properly engaged and the tip should be re-positioned or the valve stem will be damaged.
-

5. Using a nozzle tip socket, install the nozzle tip and torque it to the value printed on the nozzle tip. Refer to [Section 1.8](#) for a list of available nozzle tip sockets.



6. Install the nozzle heater. Refer to [Section 5.18](#) for more information.
7. Measure the height of the nozzle tip using a depth micrometer and compare the measurement to the tip height listed on the Tip Chart in the assembly drawings.
If the nozzle tip height is outside the tolerances listed on the Tip Chart, refer to [Section 5.17.2](#).



8. Install the cavity plate. Refer to [Section 5.20](#) for more information.

5.17.2 Troubleshooting Nozzle Tip Heights

The following describes reasons and corrective action for nozzle heights that are less or more than the values listed on the Tip Chart.

Problem	Reason	Action
Dimension is shorter than required tip height	Nozzle tip has been over-tightened, worn, or damaged	<ol style="list-style-type: none"> 1. Remove the nozzle tip 2. Clean resin from the nozzle tip and nozzle housing 3. Replace or install new nozzle tip
Dimension is longer than required tip height	Nozzle tip is damaged OR Nozzle tip is being prevented from seating in the nozzle housing by resin under the nozzle tip seating surface.	<ol style="list-style-type: none"> 1. Remove the nozzle tip 2. Clean resin from the nozzle tip and nozzle housing 3. Re-apply the torque to the nozzle tip 4. Verify the nozzle tip height

5.18 Installing Nozzle Heaters

The following procedures describe how to install nozzle heaters. The following types of nozzle heaters are supported:

- HTM heaters for U350, U500 and U750 systems
- HTM heaters for U1000 systems
- Copper heaters for U500 systems
- Ultra Nozzle Heaters (UNH) with front rings for U500 and U750 systems
- Ultra Nozzle Heaters (UNH) with ring thermocouples for U500 and U750 systems
- Bi-metal heaters for U500, U750 and U1000 systems
- VG-HP heaters for U500 systems



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.

5.18.1 Installing HTM Nozzle Heaters for U350, U500 and U750 Systems

To install an HTM nozzle heater for U350, U500 and U750 systems, do the following:

1. Install new wave springs over the nozzle housing and nozzle tip.

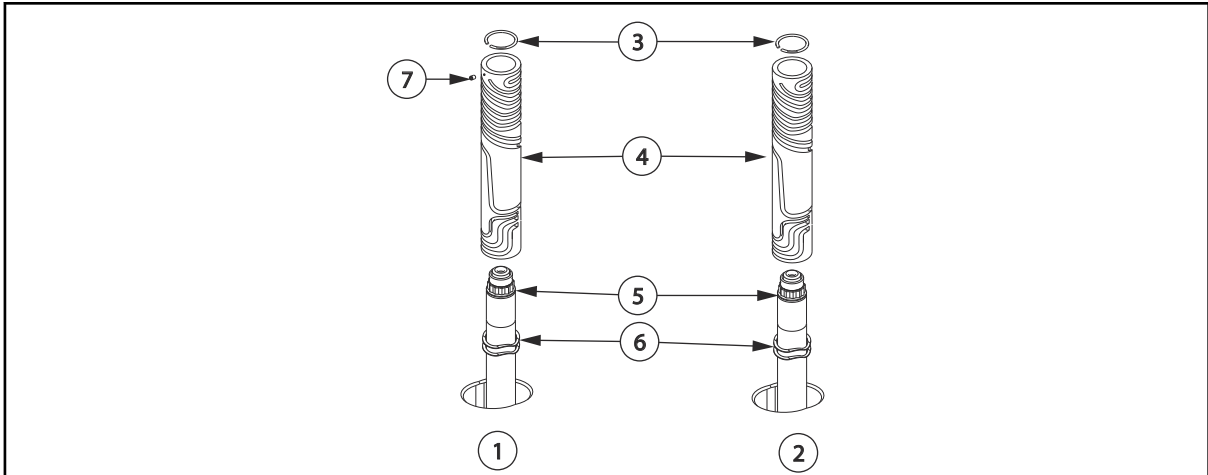


Figure 5-44: HTM Nozzle Heater Assembly

1. HTM Heater with Set Screw 2. HTM Heater without Set Screw 3. Retaining Clip 4. HTM Nozzle Heater 5. Nozzle Tip 6. Wave Springs 7. Set Screw

2. Slide the nozzle heater assembly over the nozzle housing far enough to show the retaining clip groove on the nozzle tip.
3. Install the retaining clip on the nozzle tip and pull the nozzle heater assembly up against it.
4. Install the set screw, if applicable.
5. 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.
6. Make sure to stagger the knuckles in the wire grooves.



Figure 5-45: Staggering the Knuckles in the Wire Grooves

NOTE:

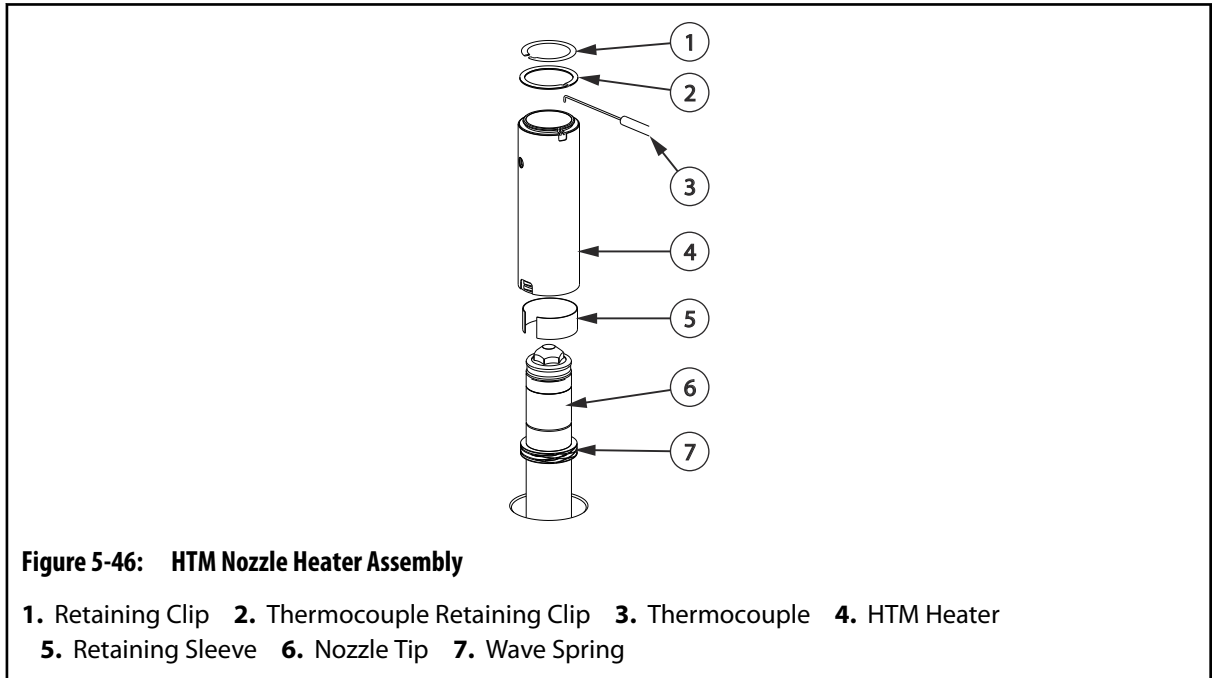
All wire, including heater or thermocouple wire, that could contact a heated component such as a nozzle housing or manifold must be mineral insulated high temperature wire (hard lead). If the mineral insulated lead is not long enough to allow this, additional steps must be taken, such as using high temperature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

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 the wires to the appropriate multi-pin connectors. Refer to the electrical schematic for more information.
9. Test each nozzle heater. Refer to [Section 5.11](#) for more information.
10. Install the cavity plate. Refer to [Section 5.20](#) for more information.

5.18.2 Installing HTM Nozzle Heaters for U1000 Systems

To install an HTM heater for a U1000 system, do the following:

1. Install new wave springs over the nozzle housing and nozzle tip.

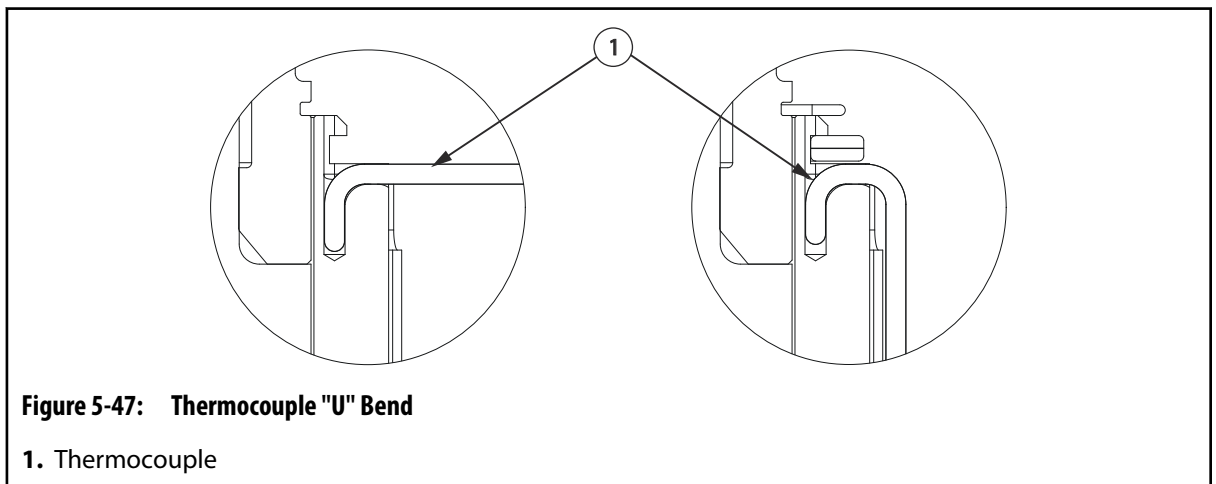


2. Slide the nozzle heater assembly over the nozzle housing.
3. Insert the tip of the thermocouple with a downward motion into one of the thermocouple probe holes.



IMPORTANT!

Make sure that the tip of the thermocouple is pressed all the way down into the hole in the heater body. This will help to secure the thermocouple effectively.



4. Install the thermocouple retaining clip on the nozzle heater.
5. Install the retaining clip on the nozzle tip.
6. Bend the thermocouple so it is tight to the heater body (the end of the thermocouple should now be bent in a U-shape).
7. Install the retaining sleeve over the nozzle heater and thermocouple, if applicable.
8. 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.
9. Pull the heater away from the retaining clip and release it. Make sure the heater moves back into place and contacts the retaining clip.
10. Make sure to stagger the knuckles in the wire grooves.



NOTE:

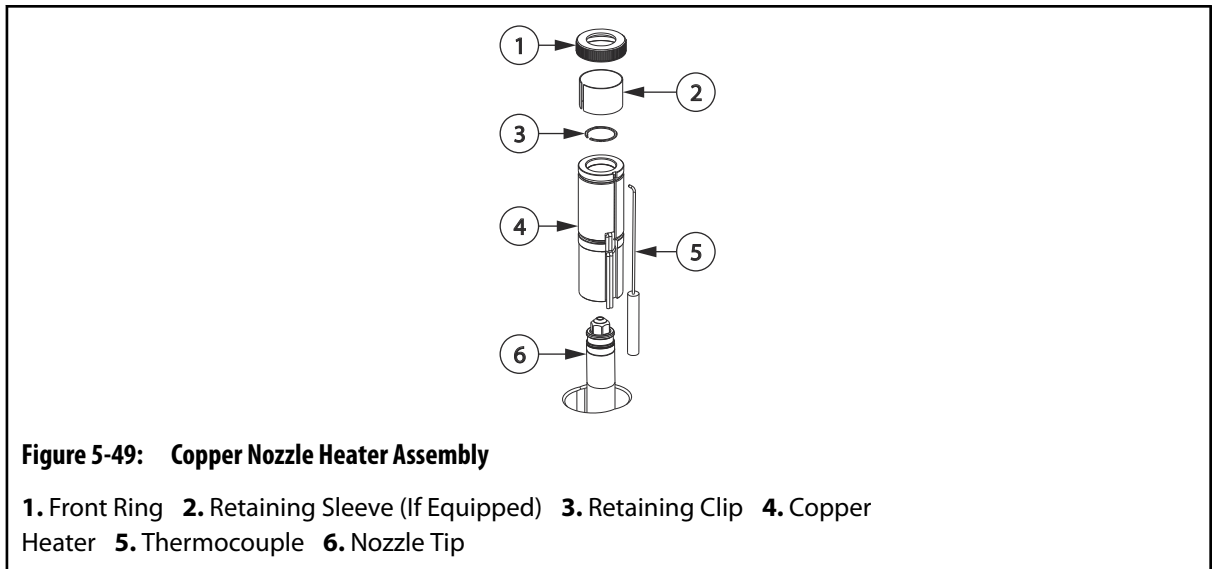
All wire, including heater or thermocouple wire, that could contact a heated component such as a nozzle housing or manifold must be mineral insulated high temperature wire (hard lead). If the mineral insulated lead is not long enough to allow this, additional steps must be taken, such as using high temperature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

11. Label each wire with the heater zone number. Refer to the electrical schematic for the zone number.
12. Crimp the wire ends and connect the wires to the appropriate multi-pin connectors. Refer to the electrical schematic for more information.
13. Test each nozzle heater. Refer to [Section 5.11](#) for more information.
14. Install the cavity plate. Refer to [Section 5.20](#) for more information.

5.18.3 Installing Copper Nozzle Heaters

To install a copper nozzle heater, do the following:

1. Slide the nozzle heater over the nozzle housing and nozzle tip.



2. Install the retaining clip around the nozzle tip.
3. Connect the thermocouple to the nozzle heater.
4. Pull the nozzle heater up against the retaining clip.
5. If equipped, install the retaining sleeve over the nozzle heater and thermocouple.
6. Install the front ring and tighten by hand.
7. Route the nozzle heater and thermocouple wires through the wire grooves in the manifold plate. Make sure all wiring is properly retained in the wire grooves using wire clips.
8. Make sure to stagger the knuckles in the wire grooves.



NOTE:

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

9. Label each wire with the heater zone number. Refer to the electrical schematic for the zone number.
10. Crimp the wire ends and connect the wires to the appropriate multi-pin connectors. Refer to the electrical schematic for more information.
11. Test each nozzle heater zone. Refer to [Section 5.11](#) for more information.

5.18.4 Installing Ultra Nozzle Heaters (UNH) with Front Rings

To install an Ultra Nozzle Heater (UNH) with a front ring, do the following:

1. Slide the nozzle heater over the nozzle housing and nozzle tip.

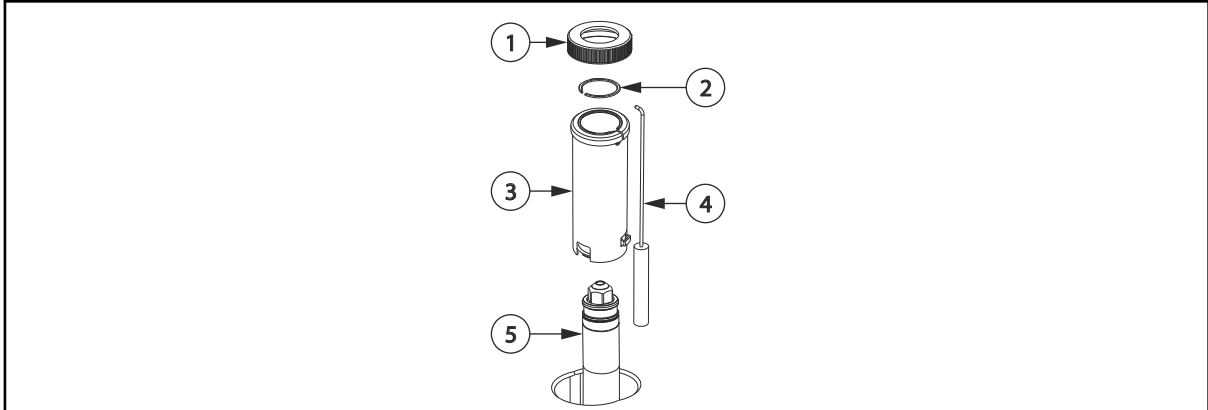


Figure 5-51: Ultra Nozzle Heater (UNH) Assembly with a Front Ring

1. Front Ring 2. Retaining Clip 3. Ultra Nozzle Heater (UNH) 4. Thermocouple 5. Nozzle Tip

2. Install the retaining clip around the nozzle tip.
3. Connect the thermocouple to the nozzle heater.
4. Pull the nozzle heater up against the retaining clip.
5. Install the front ring and tighten by hand.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Do not bend the nozzle heater wires at a 90° angle. Do not bend the nozzle heater wires directly at the lead exit of the heater body. The wires will crack or break over time.

6. On the U750 heaters, bend the nozzle heater wires in an arc against the heater body. Make sure each bend has a minimum 10 mm (0.4 in) radius.

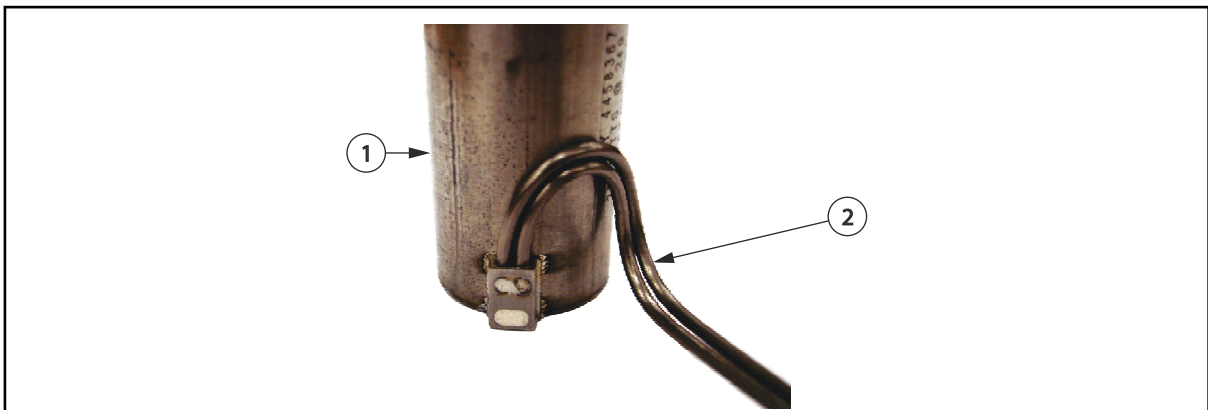


Figure 5-52: Ultra Nozzle Heater - U750

1. Ultra Nozzle Heater 2. Nozzle Heater Wires

7. On U500 heaters, first bend the leads along the curvature of the heater, and then bend them up or down (away from the lead exit of the heater body) to meet the manifold plate wire groove as required.

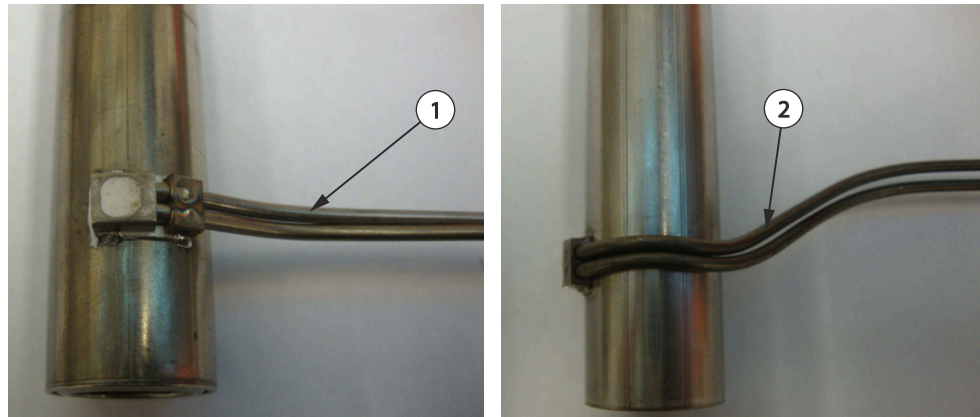


Figure 5-53: Ultra Nozzle Heater - U500

1. Heater leads before bending **2.** Heater leads after bending

- 8.** 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.
- 9.** Make sure to stagger the knuckles in the wire grooves.



Figure 5-54: 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.

- 10.** Label each wire with the heater zone number. Refer to the electrical schematic for the zone number.
- 11.** Crimp the wire ends and connect the wires to the appropriate multi-pin connectors. Refer to the electrical schematic for more information.
- 12.** Test each nozzle heater. Refer to [Section 5.11](#) for more information.

5.18.5 Installing Ultra Nozzle Heaters (UNH) With Ring Thermocouples

To install an Ultra Nozzle Heater (UNH) with a ring thermocouple, do the following:

- 1.** Install new wave springs over the nozzle housing and nozzle tip.

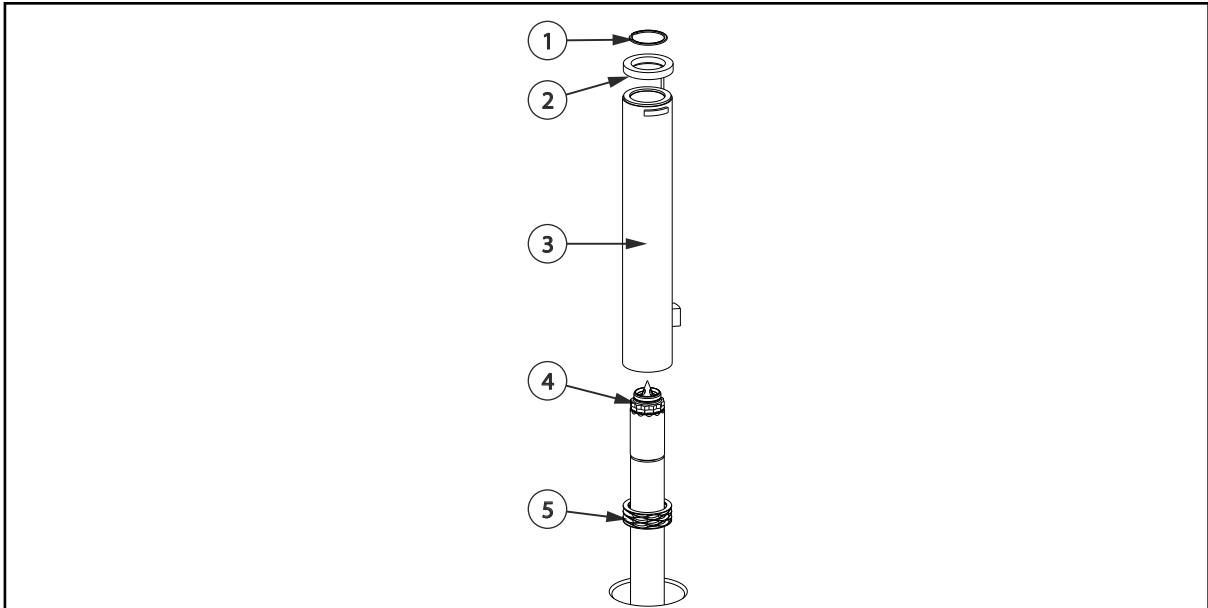


Figure 5-55: Ultra Nozzle Heater (UNH) Assembly With a Ring Thermocouple

- 1. Retaining Clip 2. Ring Thermocouple 3. Ultra Nozzle Heater (UNH) 4. Nozzle Tip
- 5. Wave Spring

- 2. Slide the nozzle heater over the nozzle housing far enough to show the retaining clip groove on the nozzle tip.
- 3. Slide the ring thermocouple over the nozzle tip, on to the nozzle heater, far enough to show the retaining clip groove on the nozzle tip.
- 4. Install the retaining clip on the nozzle tip and pull the nozzle heater and ring thermocouple up against it.



IMPORTANT!

Make sure the retaining ring is snapped fully into the retaining clip groove around the whole diameter of the nozzle tip. Refer to the following figure.

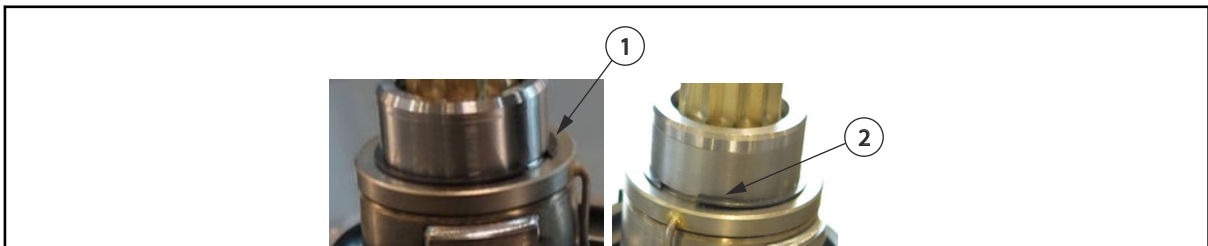


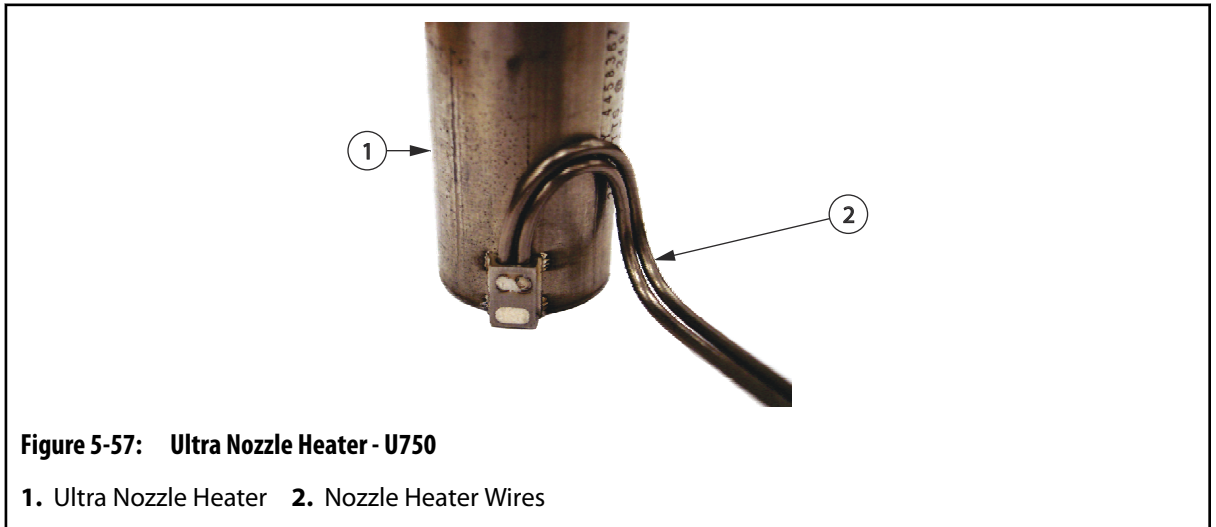
Figure 5-56: Retaining Ring in Nozzle Tip Groove

- 1. Retaining Clip Fully Seated in Groove (Correct)
- 2. Retaining Clip Not Fully Seated in Groove (Incorrect)

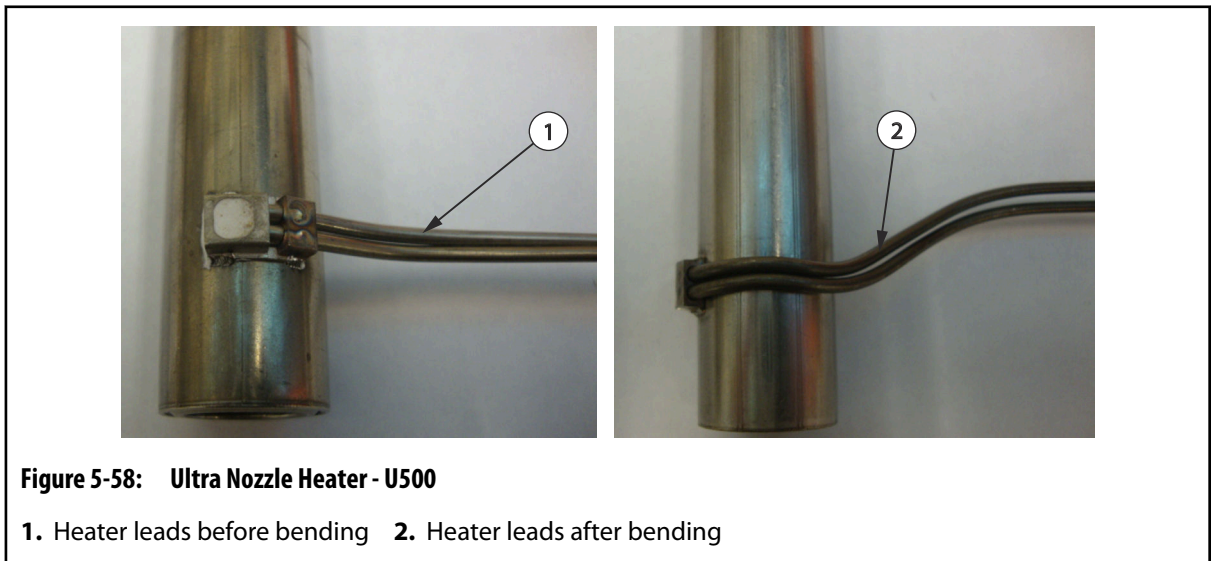
CAUTION!

Mechanical hazard – risk of damage to the hot runner. Do not bend the nozzle heater wires at a 90° angle. Do not bend the nozzle heater wires directly at the lead exit of the heater body. The wires will crack or break over time.

5. On U750 heaters, bend the nozzle heater wires in an arc against the heater body. Make sure each bend has a minimum 10 mm (0.4 in) radius.



6. On U500 heaters, first bend the leads along the curvature of the heater, and then bend them up or down (away from the lead exit of the heater body) to meet the manifold plate wire groove as required.



7. 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. Make sure of the following:
 - a. Wiring does not protrude above the plate surface.

- b. The heater and thermocouple spring back to the retaining ring and maintain contact with each other after being pushed down (0.5 to 2mm) on the housing. See the following figure.

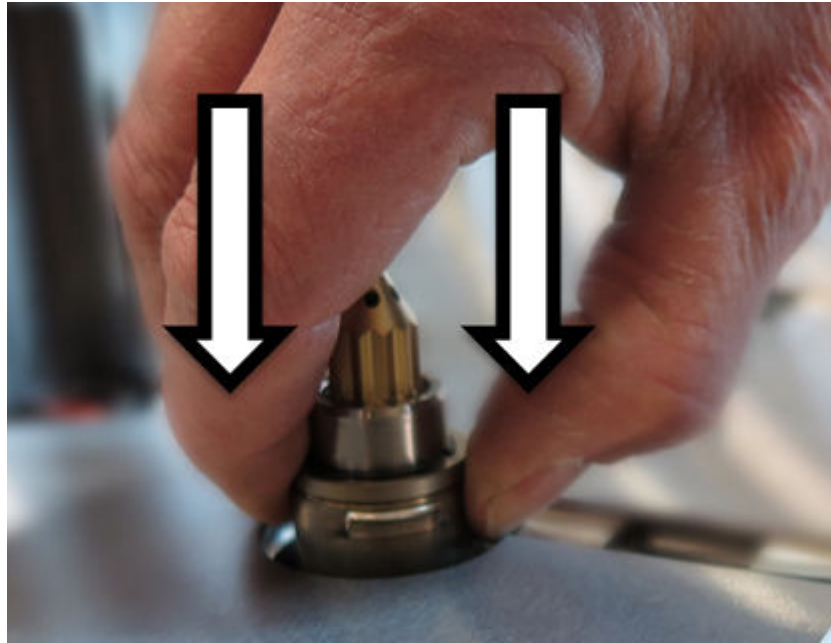


Figure 5-59: Heater/ Thermocouple Spring Back to Retaining Ring

NOTE:

If the heater and thermocouple do not spring back to the snap ring or maintain contact with each other, the bends in the wiring may be at fault.

- Wire routing must not over constrain heater positioning on nozzle.
- Wiring contacting a wire groove clip can restrict spring-back motion.
- Adjust wiring by pushing it down towards the bottom of the wire groove.
- Wiring must not protrude above the plate surface.

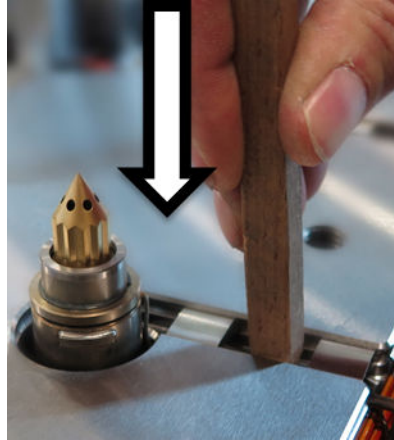


Figure 5-60: Wiring Placement in Groove

NOTE:

Proper operation of the Ultra Nozzle Heater requires the force of the wave spring to maintain contact between the thermocouple ring and nozzle heater. Improper installation may result in processing issues.

8. Make sure to stagger the knuckles in the wire grooves.



Figure 5-61: 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.

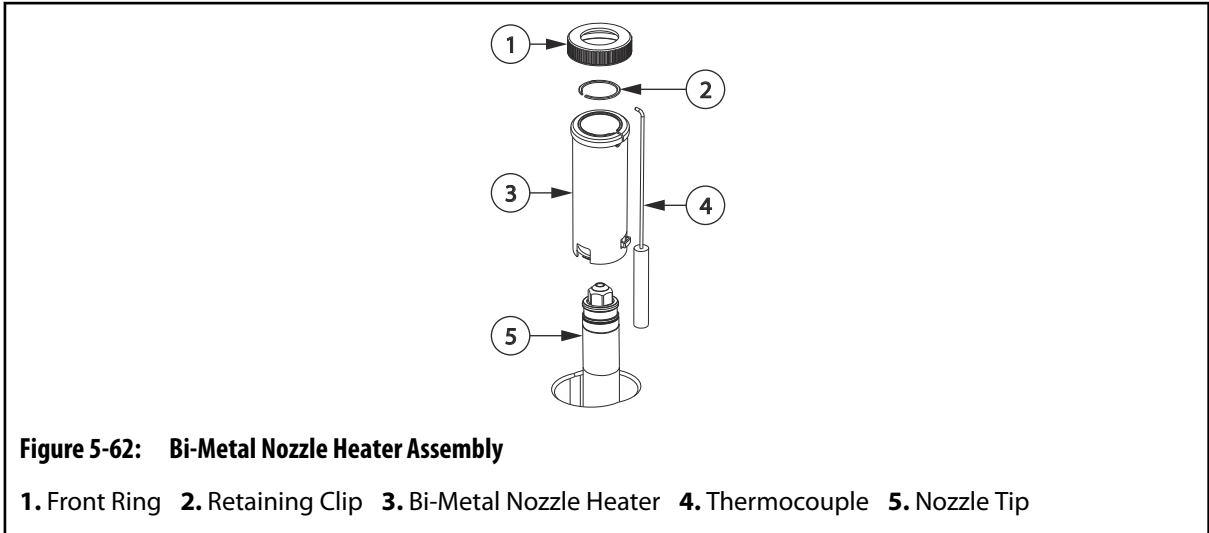
9. Label each wire with the heater zone number. Refer to the electrical schematic for the zone number.

10. Crimp the wire ends and connect the wires to the appropriate multi-pin connectors. Refer to the electrical schematic for more information.
11. Test each nozzle heater. Refer to [Section 5.11](#) for more information.
12. Remove all locks and tags. Refer to [Section 2.5](#) for more information.

5.18.6 Installing Bi-Metal Nozzle Heaters

To install a bi-metal nozzle heater, do the following:

1. Slide the nozzle heater over the nozzle housing and nozzle tip.



2. Install the retaining clip around the nozzle tip.
3. Connect the thermocouple to the nozzle heater.
4. Pull the nozzle heater up against the retaining clip.
5. Install the front ring and tighten by hand.
6. 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.
7. Make sure to stagger the knuckles in the wire grooves.



NOTE:

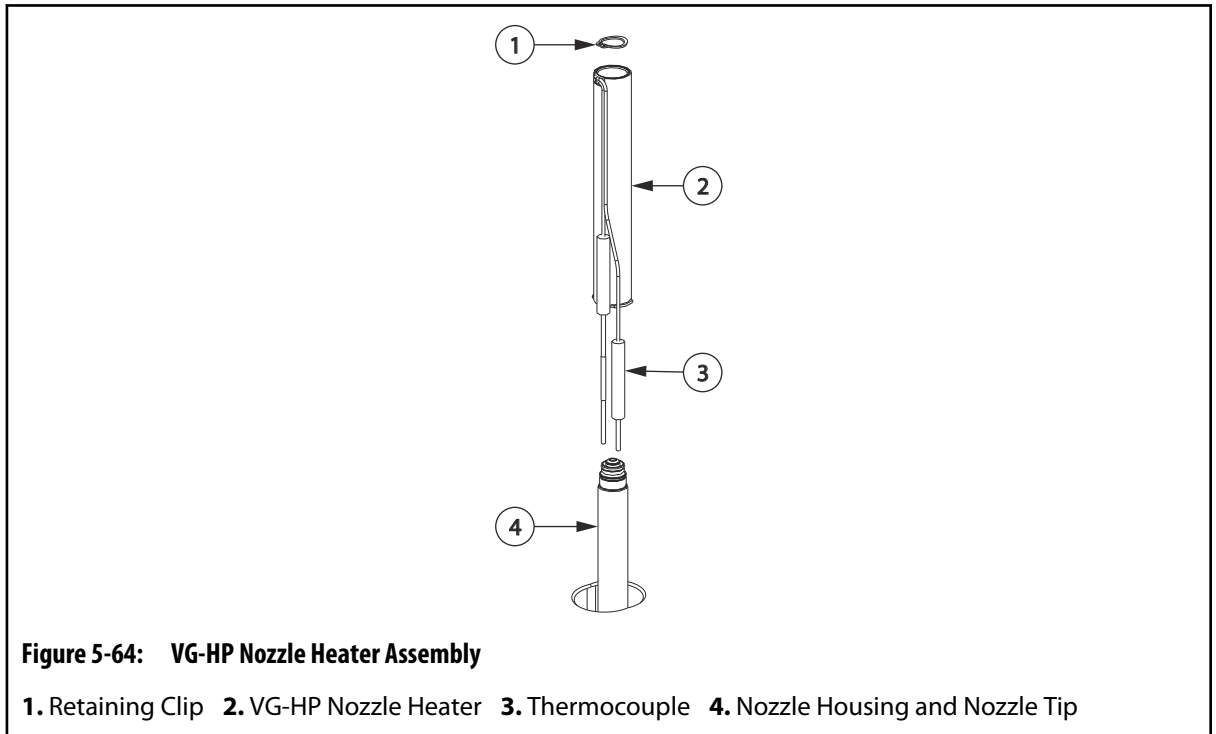
All wire, including heater or thermocouple wire, that could contact a heated component such as a nozzle housing or manifold must be mineral insulated high temperature wire (hard lead). If the mineral insulated lead is not long enough to allow this, additional steps must be taken, such as using high temperature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

8. Label each wire with the heater zone number. Refer to the electrical schematic for the zone number.
9. Crimp the wire ends and connect the wires to the appropriate multi-pin connectors. Refer to the electrical schematic for more information.
10. Test each nozzle heater. Refer to [Section 5.11](#) for more information.

5.18.7 Installing VG-HP Nozzle Heaters

To install a VG-HP nozzle heater, do the following:

1. Slide the nozzle heater assembly over the nozzle housing far enough to show the retaining clip groove on the nozzle tip.



2. Install the retaining clip on the nozzle tip and pull the nozzle heater assembly up against it.
3. Route the 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.



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 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 5.11](#) for more information.

5.19 Removing and Installing Nozzle Tip Insulators (If Equipped)

Nozzle tip insulators protect the gate details and nozzle tips from damage and prevent resin leaks. The following procedures describe how to remove and install nozzle tip insulators.

5.19.1 Installing the Nozzle Tip Insulators

To install the nozzle tip insulators, do the following:

**IMPORTANT!**

Due to geometric variations between the gate details and the witness marks left in the nozzle tip insulators by the nozzle tips, Husky does not recommend reusing nozzle tip insulators. Previously used nozzle tip insulators should always be replaced with new nozzle tip insulators. If reuse is absolutely necessary (i.e. unscheduled maintenance with no spares on hand), order new nozzle tip insulators and replace as soon as possible. Contact your nearest Husky Regional Service and Sales Office or www.husky.co.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Make sure all nozzle tip insulators are clean before they are installed. Any additional material on the nozzle tip insulator will increase the calculated preload and damage the hot runner during assembly with the cavity plate.

-
1. Make sure the hot runner is either installed in the machine or laying on a work bench with the nozzle tips facing up.
 2. Make sure all nozzle tip insulators are clean and in good condition.

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Nozzle tip insulators form to the dimensions of the nozzle tip and gate detail when compressed. Make sure previously used nozzle tips are installed on the same nozzle tip in the same orientation. Resin leakage will occur otherwise.

3. Place a nozzle tip insulator on each nozzle tip. If used nozzle tip insulators are being installed, make sure they are installed on the same nozzle tip as previously removed and in the same orientation.



4. Make sure there are no nozzle tip insulators in the gate inserts.
5. Install the cavity plate. Refer to [Section 5.20](#) for more information.

5.20 Installing the Cavity Plate

The following procedures describe how to install the cavity plate.

5.20.1 Installing the Cavity Plate On a Work Bench

To secure the cavity plate to the hot runner when the assembly is on a work bench, do the following:

NOTE:

The following procedure assumes the cavity plate was removed as described in the applicable Service Manual.

NOTE:

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

CAUTION!

Mechanical hazard – risk of damage to the hot runner. Make sure all valve stems are in the still in the open position prior to installation.

1. Make sure the hot runner is on a work bench with the nozzle tips facing up. The hot runner must be supported by two blocks.
2. Make sure the nozzle and cavity plate sealing diameters are clean and free of burrs or oil.

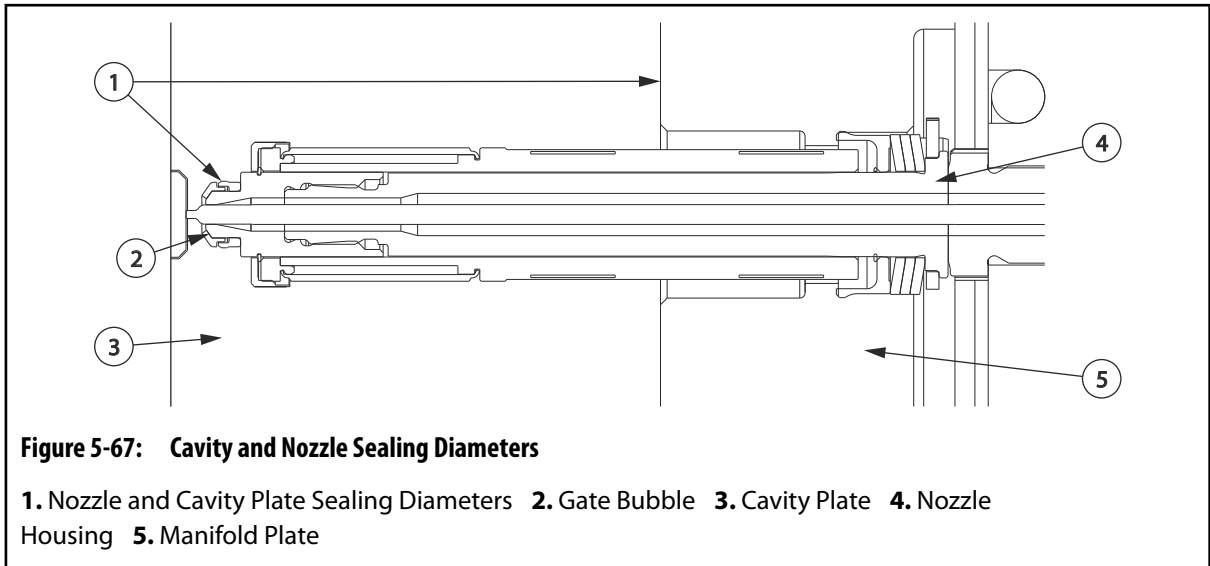


Figure 5-67: Cavity and Nozzle Sealing Diameters

1. Nozzle and Cavity Plate Sealing Diameters 2. Gate Bubble 3. Cavity Plate 4. Nozzle Housing 5. Manifold Plate

3. Apply a static application grease to the hot runner alignment dowels. Refer to [Section 3.5](#) for information about recommended lubricants.
4. If equipped, install a nozzle tip insulator on each nozzle tip. Refer to [Section 5.19](#) for more information.



WARNING!

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

5. Install hoist rings in the designated lifting points marked on the cavity plate.
6. 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, valve stems 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, valve stems and wires can 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 can result if the mold is still hot.

7. Align the cavity plate with the alignment dowels and lower the plate onto the hot runner. Make sure the wires in the wire channels are not pinched between the plates while closing.
8. Disconnect the overhead lifting device and remove the hoist rings.
9. Remove the feet from the bottom of the cavity plate.
10. Install safety latch bars between the cavity plate and hot runner on both sides of the assembly. A minimum of two safety latch bars are required.
11. Install the screws that secure the cavity plate to the hot runner and torque them to the specified value. Refer to the manufacturer's documentation for torque requirements.
12. 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.

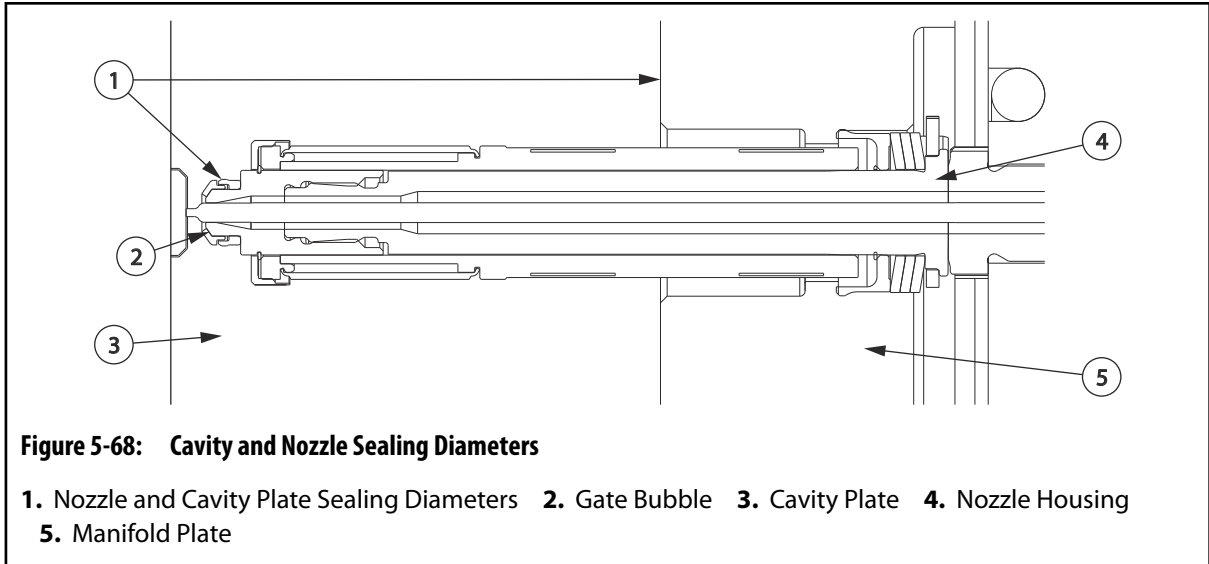
5.20.2 Installing the Cavity Plate In the Machine

To secure the cavity plate to the hot runner when the assembly is in the machine, do the following:

NOTE:

The following procedure assumes the cavity plate was removed as described in the applicable Service Manual.

1. Lock out and tag the machine and controller (if equipped). Refer to [Section 2.5](#) for more information.
2. Make sure the nozzle and cavity plate sealing diameters are clean and free of burrs or oil.



3. Apply a static application grease to the hot runner alignment dowels. Refer to [Section 3.5](#) for information about recommended lubricants.
4. If equipped, install the nozzle tip insulators. Refer to [Section 5.19.1](#) for more information.
5. Remove all locks and tags.
6. Reduce the clamp opening and closing speed.

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 can result if the mold is still hot.

7. Slowly close the clamp to move the cavity plate into position. Make sure the wires in the wire channels are not pinched between the plates while closing.
8. Lock out and tag the machine and controller (if equipped).
9. Remove all safety latch bars.
10. Install safety latch bars between the cavity plate and hot runner on both sides of the assembly. A minimum of two safety latch bars are required.

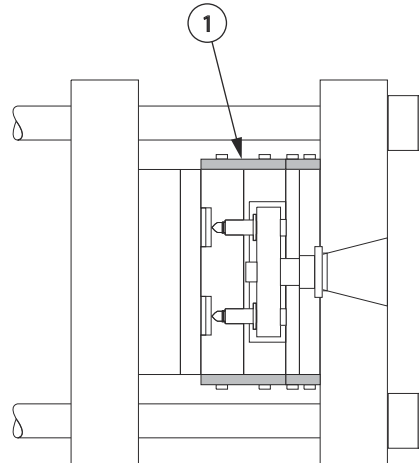


Figure 5-69: Latching the Cavity Plate to the Hot Runner (Overhead View)

1. Safety Latch Bar

- 11.** Remove all locks and tags.
- 12.** Reduce the clamp opening and closing speed.
- 13.** Slowly open the clamp to move the cavity plate away from the core plate.
- 14.** Lock out and tag the machine and controller (if equipped).
- 15.** Install the screws that secure the cavity plate to the hot runner and torque them to the specified value. Refer to the manufacturer's documentation for torque requirements.
- 16.** Remove all safety latch bars.
- 17.** 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.

