Liquid Silicone Rubber Cold Deck

Operator Manual

HUSKY

Keeping our customers in the lead

Original Instructions

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

General Information

Telephone Support Numbers

North America	**Toll free**	1-800-465-HUSKY (4875)
	Direct	437-781-8572
Europe	**EC (most countries)**	008000 800 4300
	Direct and Non-EC	+ 352 2786 7967
Asia	**Toll Free**	400 021 0557
	Direct:	+86 21 6146 9058
	Japan Toll Free	0120988896
	Japan Direct	+03 6316 2444
Latin America	**Brazil Toll Free**	+55 11 4589-7200
	Brazil Direct	+55 11 3181-0607
	Mexico Toll Free	+52 80 0024-0580
	Mexico and Latin America Direct	+52 55 9085 3008

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.

LSR Cold Deck Refurbishing

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

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Chapter 1 Introduction

This chapter provides general information about the cold deck assembly, available equipment manuals, and training opportunities

IMPORTANT!

This manual is intended for cold deck operators and assumes the cold deck has been properly installed.

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 Nameplates

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

IMPORTANT!

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

Immediately order a new nameplate for the cold deck if it is missing or damaged.

1.5.1 Cold Deck Nameplate

Every cold deck nameplate lists the following information:

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

NOTE:

Other details and specifications may be required.

IMPORTANT!

Each cold deck is designed to process a specific type and grade of liquid silicone rubber (LSR) based on the customer's requirements. Use of any other type or grade of LSR could affect part quality and/or the performance of the cold deck. Before using a different type or grade of LSR, contact Husky.

CAUTION!

Mechanical hazard – risk of damage to the cold deck. Never operate the cold deck outside of the temperature ranges indicated on the nameplate. Internal resin leakage or component damage could occur.

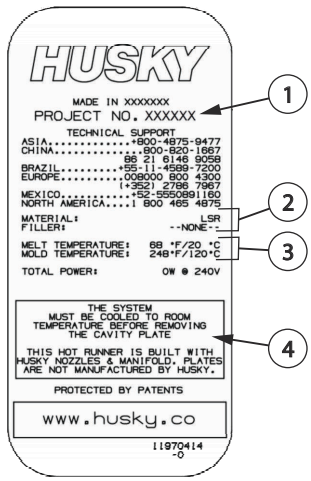

Figure 1-1: Cold Deck Nameplate (Sample)

1. Project Number **2.** Liquid Silicone Rubber (LSR) Type Allowed **3.** Operating Temperature **4.** Temperature Warning

1.6 Installing and Maintaining the Cold Deck

Full procedures for assembling, installing, maintaining and troubleshooting the cold deck are provided in the LSR Cold Deck *Service Manual*.

1.7 Documentation

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

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.

1.7.1 Manuals

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

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

IMPORTANT!

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

The following manuals are available for each cold deck:

Operator Manual	Describes the basic startup, operation, shut down and daily maintenance of the cold deck.
Service Manual	Describes the installation, startup, operation, shut down and maintenance the cold deck. Refer to the *LSR Cold Deck Service Manual* for product specific instructions.

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

IMPORTANT!

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

1.8 Engineering Drawings and Schematics

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

Each drawing and schematic is specific to the cold deck it is provided with.

1.9 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.

1.10 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.

Chapter 2 Safety Summary

This chapter describes the general requirements and conditions for safe installation, operation and maintenance of the cold deck.

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/cold deck or entering the mold area
- Do not operate the mold/cold deck if scheduled preventive maintenance has not been performed
- Do not use a magnetic platen without approval from Husky and the magnetic platen supplier/manufacturer
- Do not operate a cold deck outside the temperature ranges specified on the cold deck nameplate

2.3 Safety Hazards

Some common safety hazards associated with injection molding equipment are:

- Mechanical
- Electrical
- Burn
- High pressure (hydraulic system pressure)
- 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.
- **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 High Pressure Hazards

WARNING!

High pressure spray hazard – risk of serious injury and/or damage to the cold deck. All nozzle and sprue water must be turned on when manifold water is 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 pressurized water.

Pressure inside the cold deck manifold(s) can increase to dangerous levels if the nozzle and sprue water is 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 liquid LSR and the cured LSR in the manifold. This pressure can release suddenly causing LSR to leak through the O-Ring sealing surfaces.

Always make sure all nozzle and sprue water is turned on any time manifold water is turned on. The nozzle and sprue water can be turned on independently of the manifold water, however, it is recommended that water circulates first or slaved to the manifold waterline so they can regulate in unison.

IMPORTANT!

In the event of water leaking onto or into the cold deck, 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.

2.3.3 Burn Hazards

Hot Surfaces

The mold area, auxiliary and mold equipment 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

2.3.4 Electrical Hazards

Water

Water on the cold deck 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.

2.3.8 Pneumatic Hazards

- **Air Supply Hoses**

  Make sure air supply hoses connected to the cold deck do not interfere with moving parts of the mold or the machine during operation. All air hoses must be sufficiently long so they will not be strained when the mold halves separate.
- **Compressed Air**

  Never use compressed air to clear valve gates. A piece of resin can fly out and injure a bystander.

  Always use a brass tool and vacuum cleaner to clear valve gates.

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

Safety Symbol (ANSI)	Safety Symbol (ISO)	General Description of Symbol
		**Slip, Trip or Fall Hazard** This symbol indicates a slip, trip or fall hazard that could cause injury.
		**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.
		**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.
		**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.
		**Class 2 Laser Beam** This symbol indicates a laser beam hazard that could cause personal injury with prolonged exposure.
		**Barrel Cover Grounding Strap** This symbol indicates an electrical hazard related to the barrel cover grounding strap that could cause death or serious injury.
		**Do Not Grease** This symbol indicates greasing is not required under normal operating conditions. Greasing could cause equipment failure.

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

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

2.6.2 Safety Equipment

Use appropriate safety equipment when working on or near equipment.

Standard safety equipment includes:

- **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 LSR
- 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

Chapter 3 Startup and Operation

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

IMPORTANT!

Refer to the cold deck *Service Manual* for additional, system-specific startup instructions.

To startup the cold deck for operation, perform the following procedures in order:

Step	Task	Reference
1	Prepare the cold deck	Section 3.1
2	Bring the machine mold and cold deck to operating temperature	Section 3.2
3	Precharge the cold deck with LSR	Section 3.1
4	Produce test parts	Section 3.4

IMPORTANT!

The mold and cold deck must be installed properly by qualified personnel before production begins

IMPORTANT!

Cold decks 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.

3.1 Preparing the Cold Deck

To prepare the cold deck for startup, do the following:

1. Lock out and tag the machine and controller (if equipped). Refer to Section 2.5 for more information.
2. Make sure the mold and cold deck are installed properly.
3. Make sure the water and thermocouples are connected to the machine or a controller.

4. Make sure the LSR type in the machine matches the required type indicated on the cold deck nameplate. Refer to Section 2.5 for more information about the nameplate.

CAUTION!

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

5. Using compressed air, remove any water around the nozzle tips and parting lines.
6. Make sure all safety latches have been removed from the mold and cold deck.
7. Remove all locks and tags.

3.2 Bringing the Cold Deck, Mold and Machine to Operating Temperatures

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

1. Make sure the water chiller is enabled and adjusted to the proper operating temperature
2. If equipped, make sure the mold enclosure de-humidifier, air compressor and water tower supplies are enabled.
3. Make sure the compressed air for the mold is turned off. If the compressed air is left on as the mold heats up, air will leak from the system. This will cool the mold and delay the startup.
4. Slowly open the clamp to full shutheight.
5. Turn on the cold deck cooling system.
6. If equipped, turn on the controller.
7. Set the temperature of the main manifold and sprue in cooling system to the LSR temperature indicated on the nameplate. Refer to Section 1.5 for more information about the nameplate.

   Wait an additional 10 minutes or more of soak time to make sure the manifold has reached the operating temperature.
8. Make sure the main manifold heaters and the sprue and the nozzles reached the set temperature.
9. Open the process material feed. Refer to the machine manufacturer's documentation more information.

3.3 Precharging the Cold Deck

To precharge the cold deck with LSR, do the following:

1. Close the clamp and apply tonnage.

WARNING!

Liquid silicone rubber spray hazard – risk of serious injury. LSR under pressure can suddenly release and spray out from the machine nozzle. Before purging the injection unit, clear the area of all non-essential personnel and wear Personal Protective Equipment (PPE) consisting of a coat, gloves and a full face shield over safety glasses.

2. Purge the injection unit. Refer to the machine manufacturer's documentation for more information.
3. Clean the machine nozzle, stationary platen and purge guard of any LSR deposits. Refer to the machine manufacturer's documentation for more information.
4. Make sure the machine nozzle is firmly seated against the sprue bushing.
5. While the mold is reaching operating temperature, do the following:
   a. Turn on the extruder screw to start plasticizing the resin.
   b. Repeat step 2 to step 3.
6. Make sure the valve gates are in the open position or open automatically during injection.
7. Move the machine nozzle forward until it is firmly seated against the sprue bushing.

NOTE:

The cold deck channels are properly filled with LSR when the injection piston stops before making contact with the injection housing.

8. Slowly inject LSR into the cold deck until the injection piston stops. The piston must stop before it makes contact with the injection housing. If the piston makes contact with the injection housing, inject LSR again.
9. Once the injection piston stops, start the extruder screw and make sure it retracts fully.

3.4 Producing Test Parts

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

1. Make sure the nozzle is at specified temperature with acceptable deviation of 5°C. If the nozzle temperature is above specification, do the following:
   - Enable higher flow rates of the water or set the temperature on the controller at lower temperature.
2. Close the clamp and apply tonnage.
3. Make sure the machine nozzle is firmly seated against the sprue bushing.
4. Disable all ejector functions to prevent the machine from automatically ejecting parts.
5. Cycle the machine once in normal mode to produce a set of parts.
6. Check that all parts have been properly molded.
7. Manually control the ejector functions to eject the parts.
8. If all cavities are producing parts, reset the injection pressure to the recommended value.

9. Cycle the machine four times in normal mode to produce parts. This will remove any air trapped in the resin.
10. Visually inspect the last set of parts to verify the part quality. Repeat step 9 until the part quality is satisfactory
11. Enable the ejector functions.
12. If equipped, enable the product handling equipment.
13. Cycle the machine 10 times in semi-cycle mode. During each cycle, if equipped, make sure the product handling equipment properly transfers the parts to the conveyor.
14. Enable the auto-cycle mode for the machine and begin production.

Chapter 4 Maintenance

As part of a preventive maintenance program, the following is a list of standard maintenance tasks that should be performed on a regular basis. Some tasks may not be applicable to all cold decks. Refer to the LSR cold deck Service Manual for a list of specific maintenance tasks, as well as detailed instructions on how to perform each task.

WARNING!

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

WARNING!

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

Interval	Cycles	Task Description	Reference
Every 6 Months	800,000	Check the waterlines and remove any debris	*Service Manual*
Every 12 Months	1,600,000	Inspect the valve stem and piston assemblies Exchange the O-Ring seal between Valve Stem and Manifold Bushing	*Service Manual*
Every 18 Months	2,000,000	Replace the double delta seals Replace O-Ring between Tip and Nozzle Housing	*Service Manual*