Section 12 - Maintenance Procedures

Introduction

This chapter is a guide to maintaining selective components.
Repairs that should be performed by *Mold-Masters* personnel are not included.
If you need an item repaired that is not included in this section, please call *Mold-Masters* support. The phone number and system identifier is located on the mold.

Valve Disk Removal

Some valve disks may be difficult to remove, use the following procedure to extract the valve disk from the manifold.

NOTE
Check that the manifold is secure.
For “Cast in Systems” secure the manifold with clamps to prevent movement.
Never heat up the system without first clamping the main manifold, especially if the nozzles are not secured with the hot half. This prevents resin from leaking between the nozzle and hot half.

Figure 12-1 Manifold Clamps

WARNING
All maintenance on *Mold-Masters* products should be performed by properly trained personnel based on local law or regulation requirements. Electrical products may not be grounded when removed from the assembled or normal operating condition. Assure proper grounding of all electrical products before performing any maintenance to avoid potential risk of electrical shock.

To avoid serious burns wear safety clothing consisting of a protective heat resistant coat and heat-resistant gloves. Use adequate ventilation for fumes. Failure to do so can result in serious injury.

1. Heat the manifold to allow any plastic still in the system to become soft.
2. Attach the valve disk extraction tool to the valve disk.
3. Attach the extraction tool to the main assembly tool. Refer to the extraction tool chart on next page.
4. Extract the valve disk.

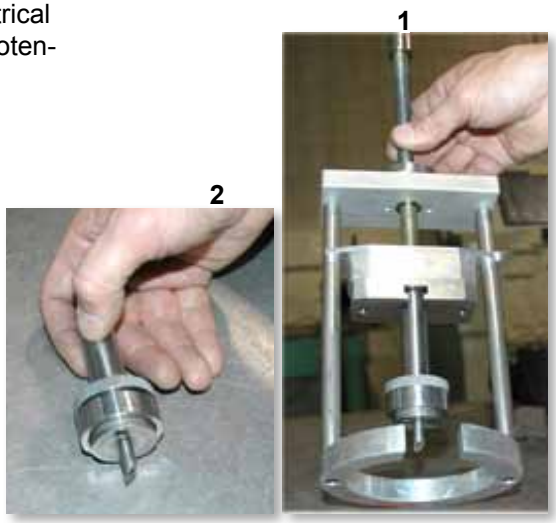

Figure 12-2 Valve Disk Extracted
1. Valve Disk Extraction Tool
2. Valve Disk

EXTRACTION TOOLS		
Part Number	Where Used	
	Valve Disk	Nozzle Type
EXTOOL07 (Ø35)	VD0035	Pico
	VD0033	Pico
	VD0085	Femto
	VD0089	Femto
	VD0102	Femto
EXTOOL08 (Ø39)	VD0013	Centi
	VD0022	Centi
	VD0069	Centi
EXTOOL12 (Ø49)	VD0034	Pico
	VD0036	Pico
	VD0037	Pico
	VD0038	Pico
	VD0027	Centi
	VD0028	Centi
	VD0031	Deci
	VD0032	Deci

EXTRACTION TOOLS		
Part Number	Where Used	
	Valve Disk	Nozzle Type
EXTOOL10P ('V' Guide)	VD0088B	Femto
	VD0094B	Femto
	VD0108B	Femto
	VD0109B	Femto
	VD0074B	Pico
	VD0110B	Pico
	VD0075B	Centi
	VD0111B	Centi
	VD0106B	Deci
EXTOOL10P1 ('V' Guide)	VD0087B	Femto
	VD0093B	Femto
	VD0065B	Pico
	VD0066B	Centi

Terminal End Removal and Installation

Although this procedure shows a nozzle terminal end, the process is the same for manifold terminal ends.

Terminal End Removal

1. If the terminal end is covered with plastic, warm the terminal end prior to removing the element sleeve.

CAUTION
Care must be taken when removing the element sleeve as not to damage the ceramic sleeve or terminal nut.

2. Grip the element sleeve at the threaded area and turn counter clockwise. If the wires rotate with the sleeve, damage may result.
3. Remove the seal.
4. Remove the set screw from the ceramic sleeve.
5. Remove the power leads.

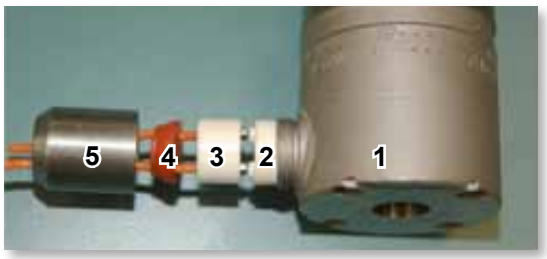

Figure 12-3 Nozzle Terminal Assembly
1. Nozzle Flange 2. Ceramic Insert
3. Ceramic Sleeve 4. Seal 5. Element Sleeve

Terminal Installation

Although this procedure shows a manifold, the process is the same for nozzle terminal ends.

NOTE
Please contact *Mold-Masters* Spare Parts Department to ensure you have the correct repair kit and crimping tool.

Terminal Assembly

1. Assemble the repair kit components.

Figure 12-4

2. Ensure the terminal end is clean.

Figure 12-5

3. Slide the element sleeve, silicon seal and ceramic insulator onto the wires.

Figure 12-6

4. Slide crimps onto leads. Stranded wire should extend beyond the crimp.

Figure 12-7

5. Spread the wire strands and insert the lead wire onto the terminal posts.

Figure 12-8

6. Grasp the crimp with the crimping tool, slide the crimp into position over the terminal post and crimp the connection.

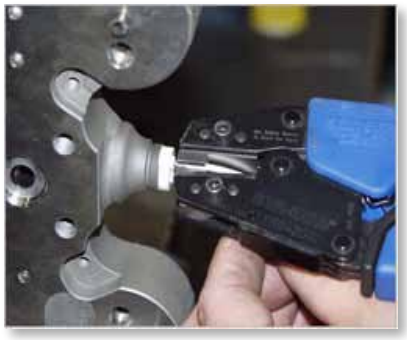

Figure 12-9

7. Slide the ceramic insulator and silicon seal into place.

Figure 12-10

8. Complete the repair by screwing the element sleeve into position.

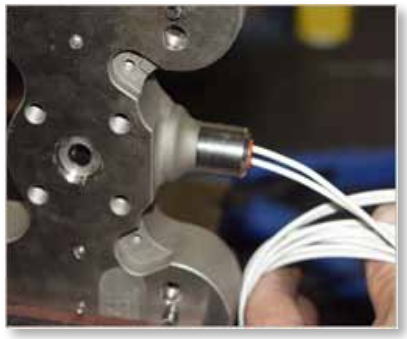

Figure 12-11

CAUTION
Keep an eye on the silicon seal. It should not rotate with the sleeve or the wires may break.

Crimping Tool Chart

Product Name	Description
PUNCHHANDLE01	Ratchet Crimp, tool for attaching dies to terminal end assemblies
CRIMPDIE01	4.0mm Heater Element (Mates with CRIMPPUNCH01)
CRIMPPUNCH01	4.0mm Heater Element (Mates with CRIMPDIE01)
CRIMPDIE02	2.5 - 3.0mm Heater Element (Mates with CRIMPPUNCH02)
CRIMPPUNCH02	2.5 - 3.0mm Heater Element (Mates with CRIMPDIE02)
CRIMPDIE03	1.8 - 2.0mm Heater Element (Mates with CRIMPPUNCH03)
CRIMPPUNCH03	1.8 - 2.0mm Heater Element (Mates with CRIMPDIE03)
CRIMPREMOVEB01	Bottom Crimp Removal Insert for shearing HE crimps (Mates with CRIMPREMOVET01)
CRIMPREMOVET01	Top Crimp Removal Insert for shearing HE crimps (Mates with CRIMPREMOVEB01)

NOTE
The above tools, along with the lead wire replacement kit, are available through *Mold-Masters* Spare Parts Department at 1-(800)-387-2483.

Heater Plate Power Lead Replacement

Removal

1. Remove the set screws.
2. Slide ceramic sleeve off.
3. Remove the power leads using crimp removal tool.

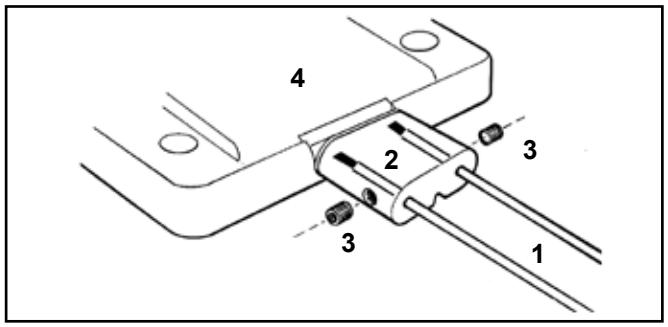

Figure 12-12 Terminal Ends Assembly
1. Power Leads 2. Ceramic Sleeve
3. Set Screws 4. Heater Plate

Installation

1. Push the replacement leads into the holes in the ceramic sleeve.
2. Crimp the leads to the terminal ends.
3. Slide ceramic sleeve over the terminal end.
4. Tighten the set screws on the ceramic sleeve to secure the terminal assembly.

Gate Seal Maintenance

Reasons for Gate Seal Maintenance

- Tip damage
- Obstruction to melt flow
- Gate seal damage
- Tip wear

Figure 12-13 Gate Seals

Multi-Cavity Systems

It is advisable to heat the system to ensure the temperature condition is met to remove the gate seals.

NOTE
Use the socket supplied in the *Mold-Masters* tool kit to loosen the gate seal.

It is recommended to use a temperature controller for this procedure. If a temperature controller is not available, contact your nearest *Mold-Masters* Service Department.

For gate seal installation and torquing procedures refer to "*Gate Seal Replacement*" section.

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Gate Seal Removal

The following procedure applies to all gate seals (including carbide) with threads larger than an M6 (Excluding TIT Edge).

NOTE
If the cavity plate is easily removed you can access the nozzle seals while still in the system.
Hot runner systems must be within 70°F (40°C) of mold temperature before the cavity plate can be removed.
It is recommended the nozzle be removed from the system before removing the gate seal.

CAUTION
Seals and liners for Accu-Valve EX & CX are a sub-assembly utilizing a manufactured interference fit. Disassembly of this sub-assembly may affect alignment of the valve pin to the gate, causing wear.

NOTE
Use the socket supplied in the *Mold-Masters* tool kit to loosen the gate seal.

Figure 12-14 Penetrating Lubricant

1. Apply penetrating lubricant to gate seal area.

WARNING
High temperature on the nozzle. Wear safety clothing such as heat-resistant coat and heat-resistant gloves. Failure to do so may cause serious injury.

CAUTION
The terminal end is a sensitive area and can easily break if not handled to specifications.

2. Leave the nozzle in the mold or remove it to a vice and clamp carefully.
3. Using the temperature controller, heat the nozzle body until all residual plastic is melted from the gate area. If the nozzle is inside the mold, heat up the whole system and turn on the cooling or remove all O-rings.
4. While the nozzle is still hot, apply a loosening pressure to the gate using the socket to remove the seal.
5. Turn off the controller and wait for 5 minutes.
6. Remove the gate seals.

Figure 12-15 Remove Gate Seal

Gate Seal Replacement

1. Clean the nozzle, especially the thread and runner.
2. Clean all residual plastic from the threads and counter bore of the gate seal.

WARNING
Ensure nozzles have cooled to room temperature. Failure to do so may cause serious injury.

CAUTION
It is critical that seal surface is perfectly clean. Failure to clean properly may result in nozzle and seal damage and leakage.

3. Check the bottom face of the nozzle counterbore for damage. If damaged, lap the bottom face of the nozzle in a circular fashion with a hardened tool and 300 grit lapping compound. If the nozzle counterbore is free of damage, proceed to step 5.

4. After lapping is complete, blue the liner to the nozzle to ensure proper mating. If the liner is making good contact, clean the bluing compound off both faces.

5. Apply anti-seize (nickel based) to the gate seal threads ONLY.

CAUTION
Carefully apply anti-seize to threads of the gate seal. Any anti-seize that enters the internal runner must be removed to prevent contamination of melt.

6. Using a socket wrench, re-install the gate seal being careful not to damage it.

7. Torque the gate seal to the appropriate value. Refer to "*Gate Seal Torque Settings*".

WARNING
High temperature on the nozzle. Wear safety clothing such as heat-resistant coat and heat-resistant gloves. Failure to do so may cause serious injury.

8. Check that the seal has bottomed out, heat nozzle to process temperature and re-torque seal.

WARNING
Failure to torque the gate seals at processing temperatures may result in leakage.

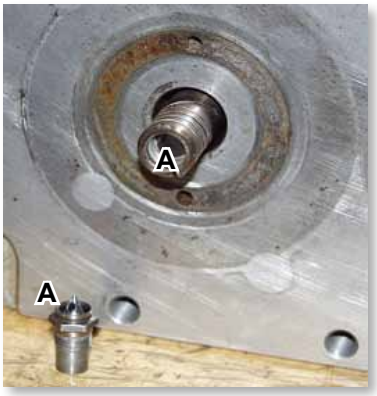

Figure 12-16 Cleaning Location Remove Plastic (A)

Figure 12-17 Nozzle Preparation

Sprint Gate Seal Maintenance

Reasons for Gate Seal Maintenance

- Tip damage
- Obstruction to melt flow
- Gate seal damage
- Tip wear

It is advisable to heat the nozzle to ensure the temperature condition is met to remove the gate seal.

CAUTION
Use the socket supplied in the tool kit to loosen the gate seal.

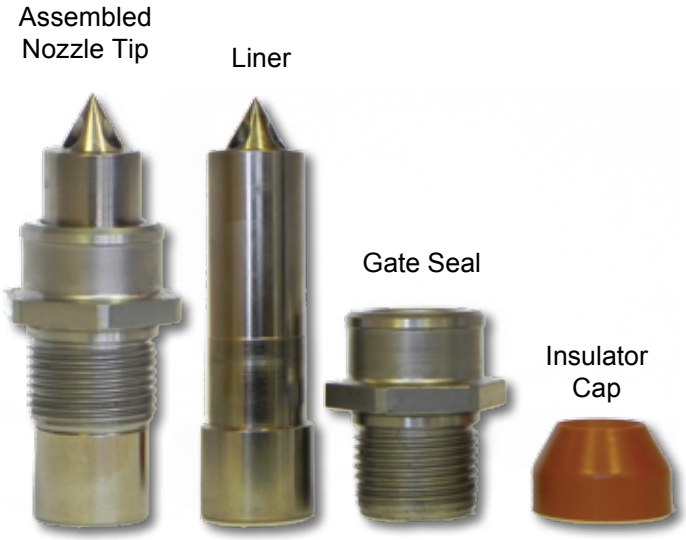

Figure 12-18 Sprint Gate Seal Components

Sprint Nozzle Tip Removal

IMPORTANT
The hot runner system must be turned off and cooled to below 38ºC (100ºF) before cavity plate is removed. The cavity plate can then be removed to expose the nozzle tips.

Figure 12-19 Tool Kit for Gate Seal Maintenance

1. After gate seals are exposed by removing the cavity plate, heat nozzles only to 290ºC (550°F) if nozzle thermocouples are present or set nozzle to 20% power until plastic softens in gate area.

2. Apply loosening torque to the gate seal using 6 point socket provided (16mm socket). If the seal starts to loosen, but starts to bind, apply some Pro-Long super lubricant to remove the gate seal more easily.

3. The gate seal, liner and insulator cap should come off the nozzle as an assembly. If the liner remains in the nozzle after the gate seal is removed, raise the nozzle temperature by 15ºC (25°F) or 5% power and remove the liner using soft jawed pliers.

4. Turn off heaters after gate seal removal.

Figure 12-20 Loosening Gate Seal

Sprint Nozzle Tip Installation

1. Clean all residual plastic from the nozzle threads and the liner/nozzle sealing surface.

2. Check the liner/nozzle sealing surface for damage. If damaged, lap the liner/nozzle sealing surface in a circular fashion with a hardened tool and 300 grit lapping compound.

3. After a smooth liner/nozzle contact surface is established, blue the liner to the nozzle surface to ensure proper mating.

Figure 12-21 Applying blue to liner surface

4. After ensuring good contact, clean bluing off both surfaces.

5. Apply nickel based anti-seize to the gate seal threads ONLY.

Figure 12-22 Applying anit-seize

6. Install gate seal / liner into nozzle using 6 point socket provided. Torque gate seal to 25-28 ft lb (34-38 Nm).

Figure 12-23 Torquing gate seal onto nozzle

Cleaning Nozzle Insulator Cap

1. Heat cap with heat gun.
2. Remove molten plastic and wipe remainder from insulator cap.

Figure 12-24 Cleaning Insulator Cap

Installing Nozzle Insulator Cap

1. Press fit insulator cap onto liner by hand.

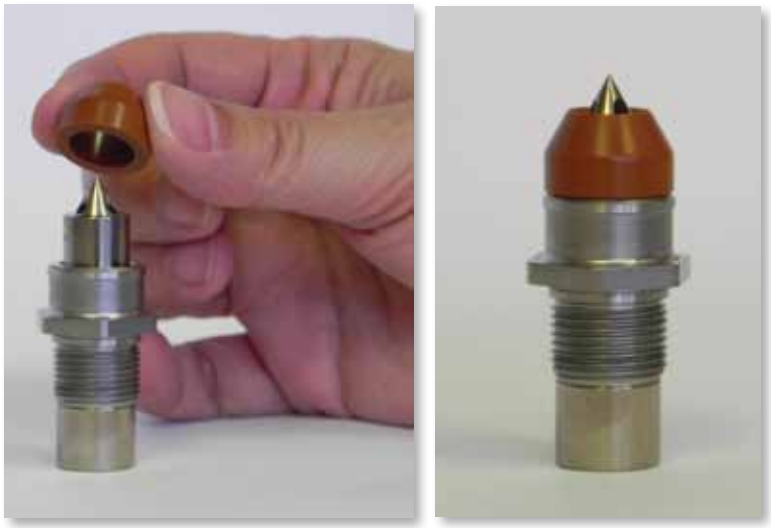

Figure 12-25 Installing Insulator Cap

Checking Nozzle Tip Height

1. Correct nozzle tip height and nozzle reference point is found on the gate detail of General Assembly Drawing.
2. Assemble spacer blocks to same value as correct nozzle tip height.
3. Zero vernier to spacer blocks.

4. Move vernier to correct reference point on nozzle tip (per drawing).
5. Check that nozzle height is within drawing specification.
6. Repeat for each nozzle.

Figure 12-26 Checking Nozzle Tip Height

Latching

Introduction

There are two reasons latches are used in a mold:

- To tie the mold halves together for transportation and handling.
- To gain access between two mold plates which are screwed together during normal mold operation.

Latches are always used in pairs mounted on diagonally opposite sides of the mold to provide equal pull on the plates.

The latches are located on:

- The operator's side.
- Non-operator's side of the mold.
- Top and bottom of the mold.

Under no circumstances are plates to be pulled or handled with only one latch attached.

Latch locations are shown on the assembly drawings. During mold operation the latches must be removed from the mold and stored elsewhere.

Latching the Cavity Plate to the Core Half (Cold Half)

Use this procedure for reference purposes only. For latch locations, refer to the assembly drawings.
For additional instructions on latching in the machine refer to the machine manufacturers manual.

WARNING
Make sure the machine has been locked out and tagged out in accordance to the machines documented procedures. Failure to do so may lead to serious injury or death.

1. Open the mold.
2. Ensure that the machine and hot runner controller has been locked out and tagged out.
3. Apply lock out / tag out to the machine power source and hot runner controller. Refer to the controller and machine manufacturers documentation for procedures.
4. Allow the mold to cool to room temperature. Continue to circulate the mold cooling water in all plates to cool the mold more quickly.

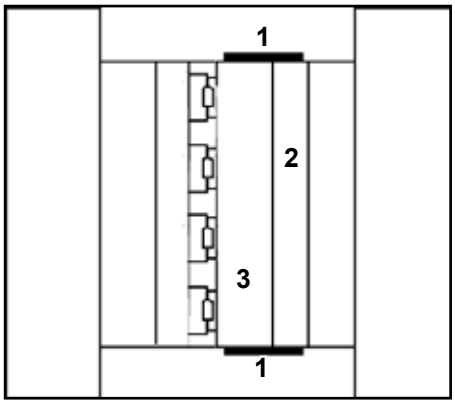

Figure 12-27 Latch Cavity Plate to Manifold Plate
1. Latches 2. Manifold Plate 3. Cavity Plate

WARNING
Make sure the lifting eyebolt, lifting chain and crane are rated to adequately support the weight of the plate(s). Failure to do so could cause serious injury.

5. If the mold has no leader pins, attach a crane that is rated to adequately support the weight of the cavity plate.

WARNING
Install latches before removing the cavity plate mounting screws. Failure to do so may lead to serious injury or death.

6. Latch the cavity plate to the manifold or manifold backing plate.
7. Check that the cavity plate hoses are long enough to allow the cavity plate to be latched over to the core half (cold half), without damaging the hoses.
8. Remove all cavity plate mounting screws.
9. Remove lockout / tagged out.
10. Place the machine in Mold Set mode.
11. Close the mold slowly.

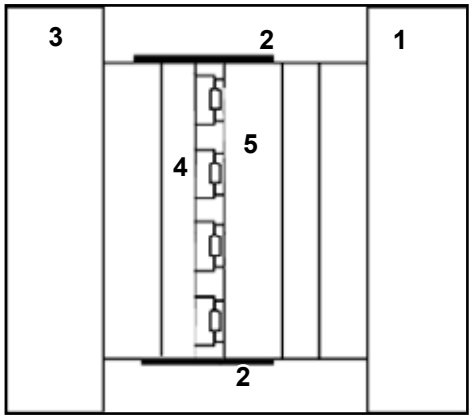

Figure 12-28 Cavity Plate to Core Plate
1. Stationary Platen 2. Latches
3. Moving Platen
4. Core Plate 5. Cavity Plate

WARNING
Make sure the machine has been locked out and tagged out in accordance to the machines documented procedures. Failure to do so may lead to serious injury or death.

12. Apply lockout / tagged out. Refer to machine manufacturers documentation for procedures.
13. Remove the latches.
14. Latch the cavity plate to the core plate or cold half.
15. Remove lockout / tagged out.
16. Check the machine is in Mold Set mode.
17. Open the mold moving the cavity plate away from the manifold plate.
18. Apply lockout / tagged out. Refer to the controller and machine manufacturers documentation for procedures.

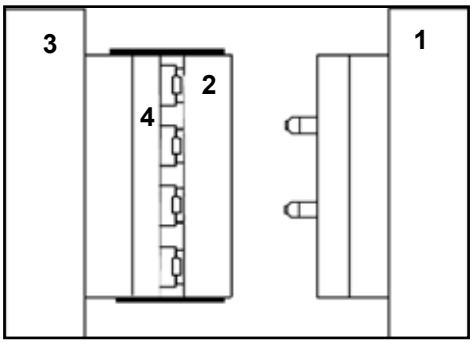

Figure 12-29 Latch Cavity Plate to Core Plate
1. Stationary Platen 2. Cavity Plate
3. Moving Platen 4. Core Plate

CAUTION
The nozzles must be within 100°F (55°C) of mold temperature to prevent damage to hot runner and mold components. For cylindrical valve gated systems, valve pins should be in the open position prior to removal of the cavity plate to prevent damage.

Latching the Cavity Plate to the Manifold Plate (Hot Half)

WARNING
Make sure the machine has been locked out and tagged out in accordance to the machines documented procedures. Failure to do so could lead to serious injury or death.

CAUTION
The nozzles must be within 100°F (55°C) of mold temperature to prevent damage to hot runner and mold components. For cylindrical valve gated systems, valve pins should be in the open position prior to removal of the cavity plate to prevent damage.

1. Check the machine is locked out / tagged out.
2. Lubricate the guide pins on the hot half.
3. Remove lock out / tag out.
4. Check the machine is in Mold Set mode.
5. Slowly close the mold.
6. Check the machine has been locked out / tagged out. Refer to the controller and machine manufacturers documentation for procedures.
7. Remove the latches on both sides of the mold.
8. Latch the cavity plate to manifold plate or manifold backing plate.
9. Remove lock out / tag out.
10. Open the mold.
11. Check the machine has been locked out / tagged out. Refer to the controller and machine manufacturers documentation for procedures.
12. Install and torque the cavity plate mounting screws. Torque to required specifications, refer to assembly drawings for required torque settings.
13. Install hoses if required.
14. Remove latches from both sides of the mold.

Not under documentation control if printed. May be revised without notice.
Electronic version is available at www.moldmasters.com
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Torque Settings

Gate Seal Torque Settings

Seal Torque Settings												
Gating Method	Femto-Lite		Femto		Pico		Centi		Deci		Hecto	
	Nm	ft-lb	Nm	ft-lb	Nm	ft-lb	Nm	ft-lb	Nm	ft-lb	Nm	ft-lb
E-Type Torpedo	8-9	6-7	8-9	6-7	16-18	12-13	27-30	20-22	34-38	25-28	47-54	35-40
Ext. E-Type Torpedo	8-9	6-7										
F-Type Torpedo	8-9	6-7	8-9	6-7	16-18	12-13	27-30	20-22	34-38	25-28	47-54	35-40
Hot Sprue			8-9	6-7	16-18	12-13	27-30	20-22	34-38	25-28	47-54	35-40
Extended Hot Sprue					16-18	12-13	27-30	20-22	34-38	25-28	47-54	35-40
Hot Valve			8-9	6-7	16-18	12-13	27-30	20-22	34-38	25-28	47-54	35-40
Bi-Metallic C-Sprue					16-18	12-13	27-30	20-22	34-38	25-28	47-54	35-40
Bi-Metallic Cylindrical Valve			8-9	6-7	16-18	12-13	27-30	20-22	34-38	25-28		
Bi-Metallic C-Valve					16-18	12-13	27-30	20-22	34-38	25-28	47-54	35-40
Spiral Hot Tip					16-18	12-13	27-30	20-22	34-38	25-28	47-54	35-40
Accu-Valve™			8-9	6-7	16-18	12-13	27-30	20-22	34-38	25-28		
TIT Edge					11-14	8-10	14-15	10-11	14-15	10-11		
Multi Tip							16-18	12-13	27-30	20-22		
Horizontal Hot Tip							15-18	11-13	15-18	11-13		
C-Sprue	8-9	6-7	8-9	6-7								
C-Valve			8-9	6-7								

NOTE
Gate seals are torqued at ambient (room) temperature at *Mold-Masters*. Please torque each seal at processing temperature to the torque value specified. This is to prevent material leakage from the gate seal.

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System Screw Torques

Quality and length of screws must be as specified on *Mold-Masters* general assembly drawings.

Torque Chart for System Assembly Screws			
Metric	Torque Setting	Imperial	Torque Setting
M5	7 Nm	#10-32	5 ft lbs
M6	14 Nm	1/4-20	10 ft lbs
M8	20 Nm	5/16-18	15 ft lbs
M10	40 Nm	3/8-16	30 ft lbs
M12	60 Nm	1/2-13	45 ft lbs
M16	145 Nm	5/8-11	107 ft lbs
M20	285 Nm	3/4-10	210 ft lbs

Exception to the above, bridge manifold mounting screws should be torqued 1/3 higher then specified on general assembly
drawings.

Torque Chart for Plate Assembly Screws			
Metric	Torque Setting	Imperial	Torque Setting
M5	10 Nm / 7 ft lbs	#10-32	9 Nm / 6 ft lbs
M6	16 Nm / 12 ft lbs	1/4-20	22 Nm / 16 ft lbs
M8	39 Nm / 29 ft lbs	5/16-18	48 Nm / 35 ft lbs
M10	77 Nm / 57 ft lbs	3/8-16	85 Nm / 63 ft lbs
M12	135 Nm / 100 ft lbs	1/2-13	209 Nm / 154 ft lbs
M16	330 Nm / 243 ft lbs	5/8-11	384 Nm / 283 ft lbs
M20	650 Nm / 479 ft lbs	3/4-10	678 Nm / 500 ft lbs

Component Torque Settings	
Valve Actuator	
Series 5500, 6500, 6600 and 6700	Torque Setting
Piston Top	20-27 Nm(15-20 ft-lbs)

NOTE

Torque sequence and step torquing:
It is recommended that system screws be torqued in a standard bolt pattern and that the specified torque is achieved in 3 steps (1/3, 2/3 and full torque).