



smart hot runner solutions

# System Selection Guide




Your Complete Hot Runner Configuration Guide








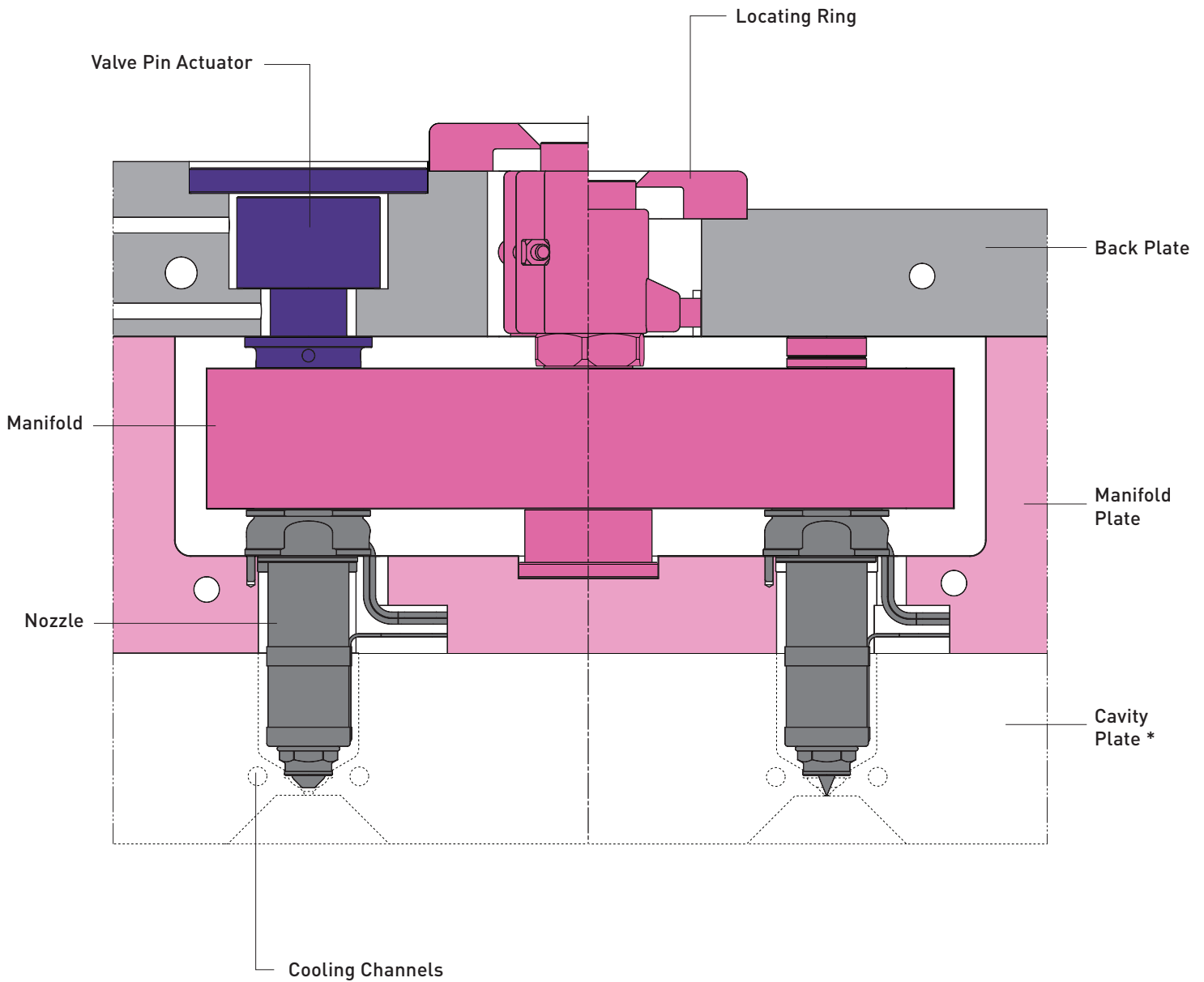
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Standard Hot Runner Configuration

KEY	
	Valve Gate Assembly
	Manifold Assembly
	Nozzle Assembly

KEY	
	Back Plate
	Manifold Plate
	Cavity Plate*

\*Supplied by Customer



## Hot Runner System Overview

A Hot Runner System maintains a molten flow of plastic from the moulding machine nozzle to the gate of a plastic injection mould.

### Mastip Hot Runner System Benefits

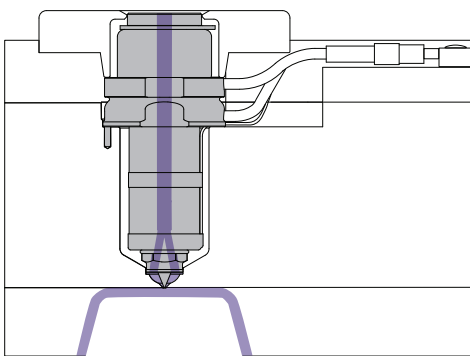
- Efficient cycle times
- Improves part consistency and quality
- Minimised gate vestige
- Reduced injection pressure
- Valve gates implement sequential filling and allow family part moulds
- Eliminates the cold runner that would be scrap or require re-grind
- Increased process control for fine tuning of mould and part

### Hot Runner System Critical Areas of Performance

Manifold design considerations:

- Precise temperature control of the molten plastic
- Balanced flow to all cavities for even part filling
- Nozzle sizing for maintaining sufficient molten material flow
- Gate detail required to correctly fill the part and shut the gate
- No material traps or areas of flow hesitation to ensure quick colour change and prevent material degradation
- Minimum pressure drop across the Hot Runner System
- Reasonable melt residence time
- Maximum cooling of gate areas to ensure effective shut off to gates

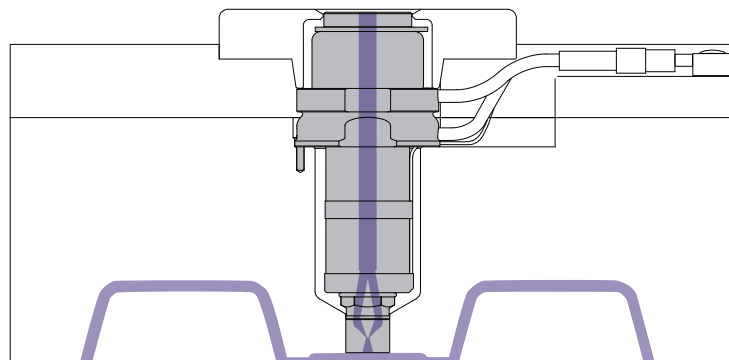
## Fully Hot Versus Semi Hot Configuration



Single Nozzle Gating Directly onto Part

Fully Hot advantages:

- No material wastage
- Low cycle times
- Low part stress







Single Nozzle Gating into a Cold Runner

Semi Hot advantages:

- Reduces cold runner weight
- Reduces cost of mould
- Suitable for difficult gate locations

Nozzle Range and Series Options

Key	Suitability
✓	Available / Suitable
⊙	Application dependant
✗	Not available / Not suitable




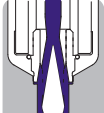







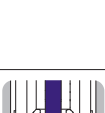







Nozzle Range			Nozzle Series					Valve Gate	Front Loading	Single Nozzle
			09	13	16	19	27			
MJ		Front loading heater for Hot Half use Confined gate area Close cavity pitching	✓	✗	✗	✗	✗	✗	✓	✗
MX		Front loading heater for Hot Half use Close cavity pitching	✗	✓	✓	✓	✗	✓	✓	✗
BX		Cost effective solution Special length nozzles available Robust heater design Limited single nozzle use	✗	✓	✓	✓	✓	✓	✗	⊙
SX		Dedicated single nozzle solution Two heaters for optimum control	✗	✓	✓	✓	✓	✗	✗	✓

Tip and Nut Options

Key	Tip Suitability
✓	Available
★★★★	Highest rating
×	Not Available

1 Not available in X13

2 Not available in X27

TIPS	Grades			Nut Style			Features		Plastic (Refer to page 13)			
	G1	G2	G5	ONT	BN BE	SN SX / SL	Gate Quality	Flow Rate	Easy	Medium	Difficult	
Thermal Gate	TT Multi Hole Torpedo Tip	✓	✓	✓				★★★★	★★	★★★★★	★★★★★	★★★★★
	TT+5 Extended Torpedo Tip	✓	✓	×		×	×	★★★★	★★	★★★★★	★★	×
	TT+10 Extended Torpedo Tip	✓	✓	×		×	×	★★★★	★	★★★★★	★	×
	IT Single Hole Torpedo Tip	✓	✓	✓				★★★★	★★	★★★★★	★★★★★	★★★★
	IT+5 Extended Torpedo Tip	✓	✓	×		×	×	★★★★	★★	★★★★★	★★	×
	IT+10 Extended Torpedo Tip	✓	✓	×		×	×	★★★★	★	★★★★★	★	×
	OT Open Tip	✓	×	✓				★★	★★★★	★★★★★	★★★★	★
Valve Gate	TV Torpedo Tip	✓	×	×				★★★★★	★★★★★	★★★★★	★★★★	★
	OV Open Tip	✓	×	✓				★★★★★	★★★★★	★★★★★	★★★★	★

**Selection Overview**

The easiest way to select the correct hot runner system is to follow the eight steps below.

**ONE**

Fill in part and material details for later reference

Part Specification	Value	Unit
Part Description		
Part Weight		g
Cold runner weight (if applicable)		g
Overall size of part L x W x H		mm
Nominal Wall Thickness		mm
Minimum Wall Thickness		mm

Gate Requirements	Value	Material Specifications	Value
Cosmetic?	Y / N	Material Type	
Flat or recessed gate for label / printing?	Y / N	Filler or Glass Fibre %	
		Manufacturer and grade OR MFI - Value, Temperature & load	

Mould Specifications	Value
Number of Cavities?	
Hot Half Construction?	Y / N

**TWO**

Using the flow chart "Nozzle Range Selection" on page 9 select the required Nozzle Range.

Nozzle Range	MX / BX / SX / MJ
--------------	-------------------

**THREE**

Using the flow chart "Nozzle Series Selection" on page 10 and the associated tables on page 11 select the appropriate nozzle series.

Nozzle Series	09 / 13 / 16 / 19 / 27
---------------	------------------------

**FOUR**

Using the flow chart "Tip Grade Selection" on page 12 and the associated table select the appropriate tip grade.

Tip Grade	G1 / G2 / G5
-----------	--------------

**FIVE**

Using the flow chart "Tip Style Selection" on page 13 and the associated table on page 14 select the appropriate tip style.

Thermal Gate	
Tip Style	TT / IT / OT
Tip Extension (if applicable)	+5 / +10
Valve Gate	
Tip Style	TV / OV

**SIX**

Using the flow chart "Nut Style Selection" on page 15 and the associated tables on page 16 select the appropriate nut style.

Thermal Gate	
Nut Style	ONT / BN / BE / SN / SX / SL / RN / RSN
Valve Gate	
Nut Style	ONT / VBE / VSN

**SEVEN**

Using the flow chart "Gate Geometry Selection" on page 17 select the appropriate gate geometry.

	units
Gate Diameter (mm)	mm
Gate Land (0.2mm max)	mm

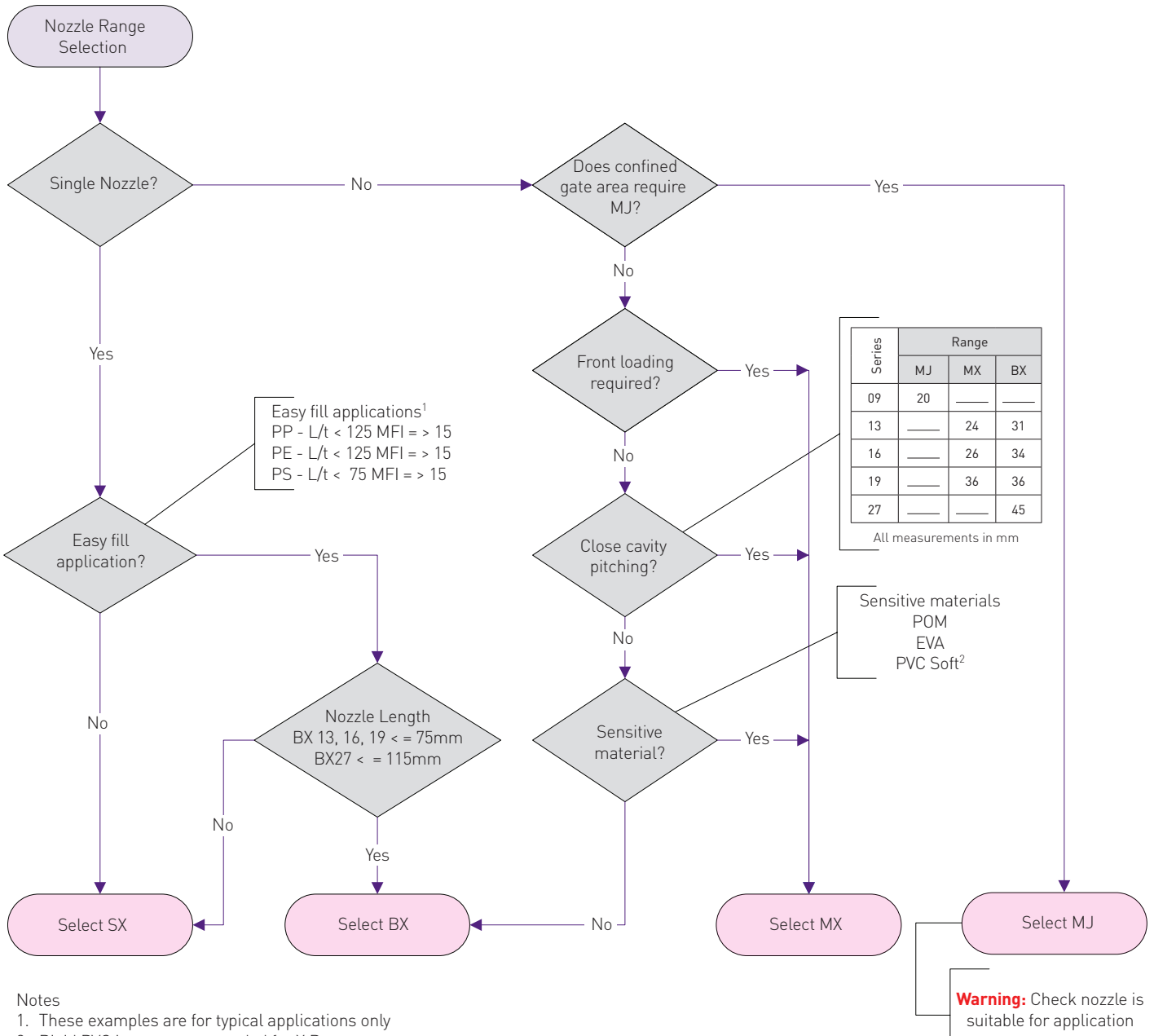
**EIGHT**

Based on the number of cavities and/or the injection points required per part specify your manifold by attaching a drawing showing the required positions or using the L & R references as per the manifold section of the Technical Guide.

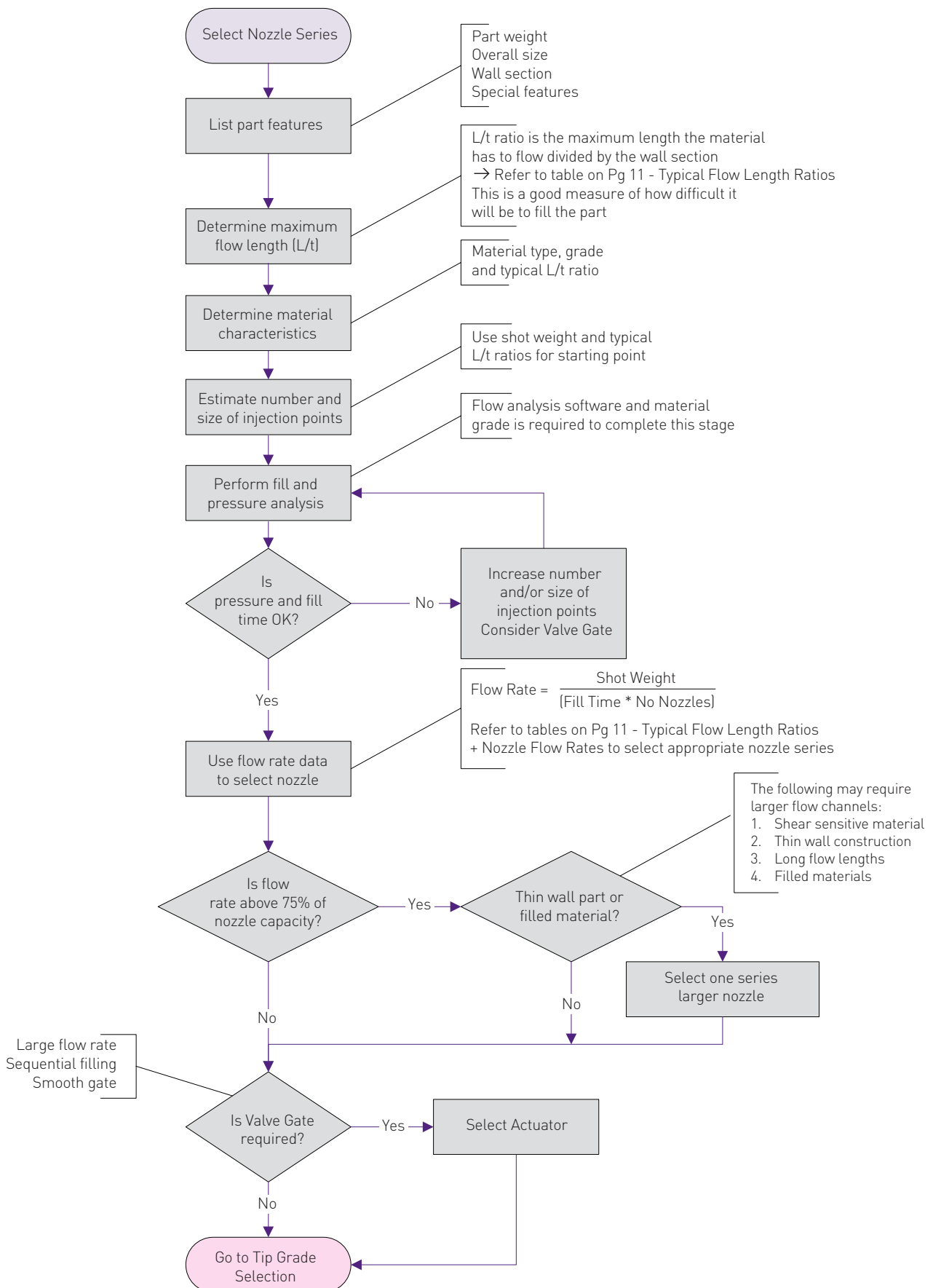
Number of nozzles on manifold	
-------------------------------	--



Nozzle Range Selection



Nozzle Series Selection



## Typical Flow Length Ratios (L/t)

Material	Wall Section							
	2.0	1.5	1.0	0.8	0.7	0.6	0.5	0.4
ABS	170	96	43	27	21	15	11	7
CA	150	84	38	24	18	14	9	6
EVA	175	98	44	28	21	16	11	7
SAN	120	68	30	19	15	11	8	5
PA	150	84	38	24	18	14	9	6
PC	100	56	25	16	12	9	6	4
HDPE	225	127	56	36	28	20	14	9
LDPE	275	155	69	44	34	25	17	11
PMMA	130	73	33	21	16	12	8	5
POM	150	84	38	24	18	14	9	6
PP	250	141	63	40	31	23	16	10
UPVC	100	56	25	16	12	9	6	4

All flow lengths greater than this must be considered thin wall and the nozzle series selected accordingly.

## Nozzle Flow Rates

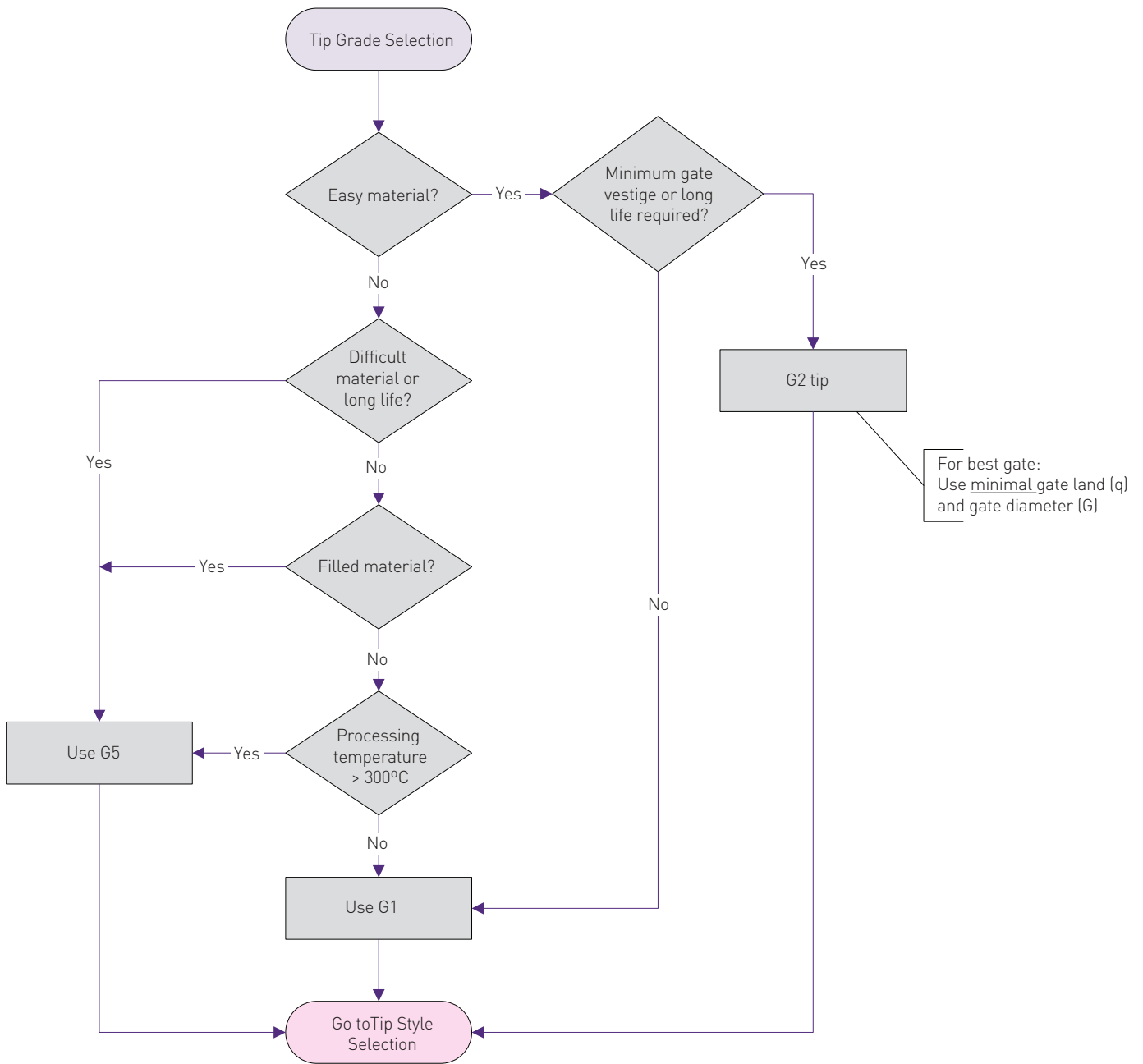
Use the table below to select the correct nozzle series based on the flow rate required and the material category. If the material is a blend material (for example Medium-Difficult or Easy-Medium) always select the higher category to ensure the part can be filled.

Nozzle Series	Material Specifications		Material Category <sup>2</sup>		
			Easy	Medium	Difficult
09	Flow Rate <sup>1</sup>	g/s	15	7	—
	Shot Weight <sup>1</sup>	g	0.5 - 15	0.5 - 10	—
	Gate Size	mm	0.6 - 1.0	0.6 - 1.0	—
13	Flow Rate <sup>1</sup>	g/s	30	15	5
	Shot Weight <sup>1</sup>	g	0.5 - 45	0.5 - 30	0.5 - 15
	Gate Size	mm	0.7 - 1.4	0.7 - 1.4	0.7 - 1.4
16	Flow Rate <sup>1</sup>	g/s	125	65	25
	Shot Weight <sup>1</sup>	g	1 - 200	1 - 125	1 - 60
	Gate Size	mm	0.8 - 1.5	0.8 - 1.5	0.8 - 1.5
19	Flow Rate <sup>1</sup>	g/s	300	150	60
	Shot Weight <sup>1</sup>	g	2 - 625	2 - 300	2 - 150
	Gate Size	mm	1.0 - 1.8	1.0 - 1.8	1.0 - 1.8
27	Flow Rate <sup>1</sup>	g/s	600	300	125
	Shot Weight <sup>1</sup>	g	10 - 2000	10 - 1200	10 - 800
	Gate Size	mm	1.8 - 3.0	1.8 - 3.0	1.8 - 3.0

<sup>1</sup> Additives, flow length and thin wall sections all reduce the effective flow rate and shot weight. To counter the reduced flow rate and shot weight select one nozzle series larger.

<sup>2</sup> Refer to table on Pg 13 - Plastic Material and Tip Suitability.

Tip Grade Selection



Tip Grades

Tips are manufactured in various grades designed for different applications and wear resistance.

Tip Grade	Recommended use	Manufactured Material	Tip Style Options
G1	Default grade suitable for easy materials	Beryllium Copper with Nickel coating	TT, IT, OT, TV, OV
G2	Long life tip suitable for easy unfilled materials	Beryllium Copper tipped with Steel, Nickel coating	TT,IT
G5	Long life tip suitable for difficult and abrasive materials	Carbide	TT, IT
		D2 Hard liner	OT, OV

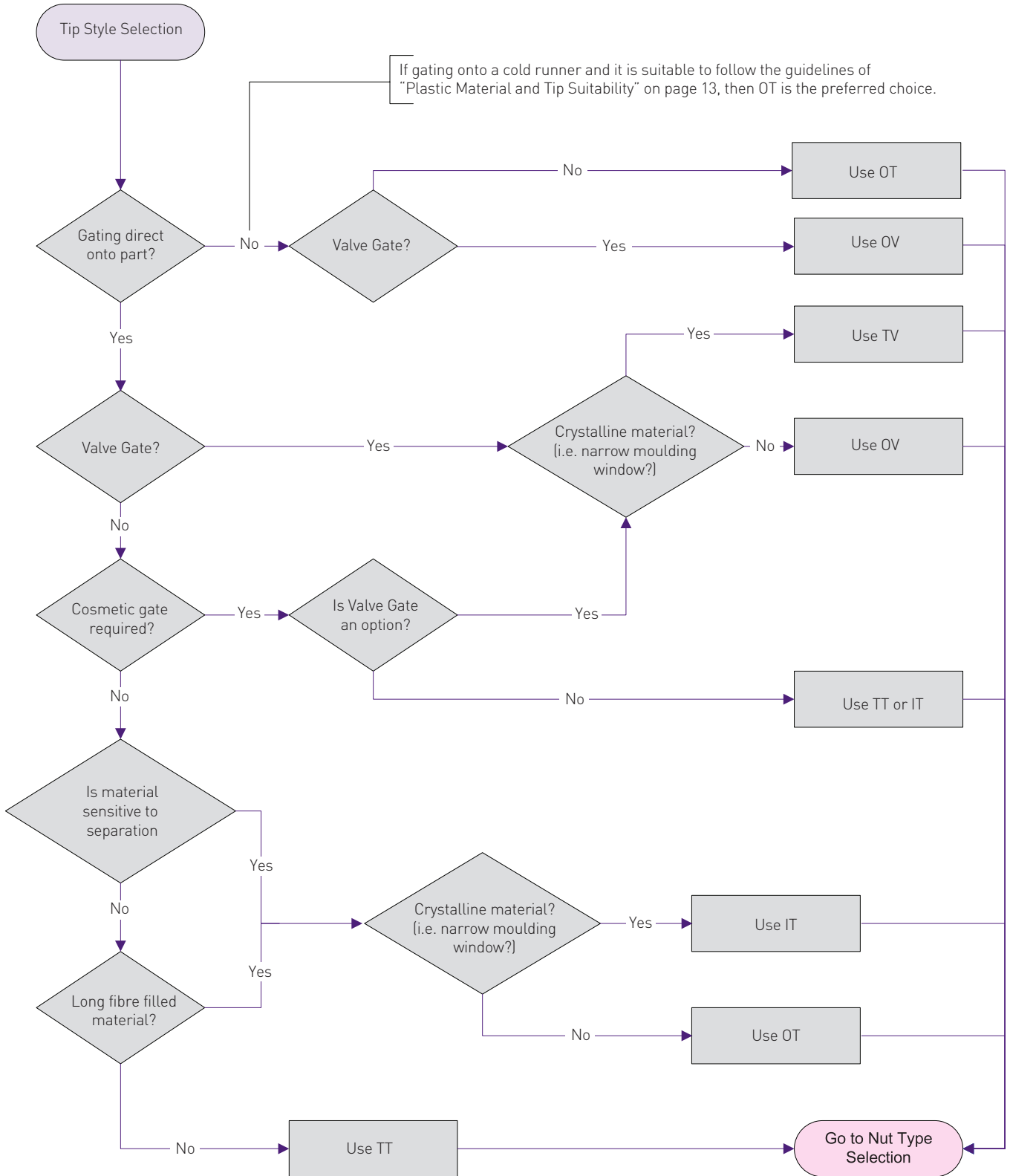
Plastic Material and Tip Suitability

- 1** Not available in G5
- 2** Only available in G2

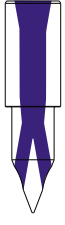
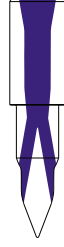
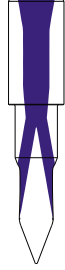
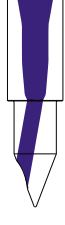


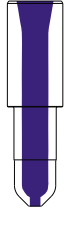
Key	Tip Suitability
✓	Suitable
G5	Very suitable with Grade 5 tips only
⊙	Application dependant
G5	Application dependant and Grade 5 tip only
✗	Not suitable

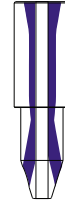

Material Category		Nozzle Series and Tip									
		09		13		16		19		27	
		TT <b>1</b> <b>2</b>	IT	OT	IT	OT	IT	OT	IT	OT	IT
Easy	PP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	PE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	PS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	SB	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	EVA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Medium	ABS	⊙	✓	✓	✓	✓	✓	✓	✓	✓	✓
	AS	⊙	✓	✓	✓	✓	✓	✓	✓	✓	✓
	POM	⊙	✓	✓	✓	✓	✓	✓	✓	✓	✓
	SAN	⊙	✓	✓	✓	✓	✓	✓	✓	✓	✓
	PA6	⊙	✓	✗	✓	✗	✓	⊙	✓	⊙	✓
	PMMA	⊙	✓	⊙	✓	✓	✓	✓	✓	✓	✓
	ASA	⊙	✓	⊙	✓	✓	✓	✓	✓	✓	✓
TPE	⊙	✓	⊙	✓	✓	✓	✓	✓	✓	✓	
Difficult	PA66	⊙	✓	✗	✓	✗	✓	⊙	✓	⊙	✓
	PBT	✗	✓	✗	✓	✗	✓	⊙	✓	⊙	✓
	PC	✗	✓	⊙	✓	⊙	✓	⊙	✓	⊙	✓
	PPS	✗	✓	⊙	✓	⊙	✓	⊙	✓	⊙	✓
	PPE	✗	✓	⊙	✓	⊙	✓	⊙	✓	⊙	✓
	PPU	✗	✓	⊙	✓	⊙	✓	⊙	✓	⊙	✓
	PET	✗	✓	⊙	✓	⊙	✓	⊙	✓	⊙	✓
	PES	✗	✓	⊙	✓	⊙	✓	⊙	✓	⊙	✓
	PPO	✗	✓	⊙	✓	⊙	✓	⊙	✓	⊙	✓
	LCP	✗	✓	⊙	✓	⊙	✓	⊙	✓	⊙	✓
	PEI	✗	✓	⊙	✓	⊙	✓	⊙	✓	⊙	✓
	PP + FILL	✗	G5	G5	G5	G5	G5	G5	G5	G5	G5
	PA + FILL	✗	G5	G5	G5	G5	G5	G5	G5	G5	G5
	SAN + FILL	✗	G5	G5	G5	G5	G5	G5	G5	G5	G5
	PA66 + FILL	✗	G5	G5	G5	G5	G5	G5	G5	G5	G5
	PBT + FILL	✗	G5	G5	G5	G5	G5	G5	G5	G5	G5
	PC + FILL	✗	G5	G5	G5	G5	G5	G5	G5	G5	G5
	PPS + FILL	✗	G5	G5	G5	G5	G5	G5	G5	G5	G5
	PPE + FILL	✗	G5	G5	G5	G5	G5	G5	G5	G5	G5
	PPU + FILL	✗	G5	G5	G5	G5	G5	G5	G5	G5	G5
PET + FILL	✗	G5	G5	G5	G5	G5	G5	G5	G5	G5	

Tip Style Selection

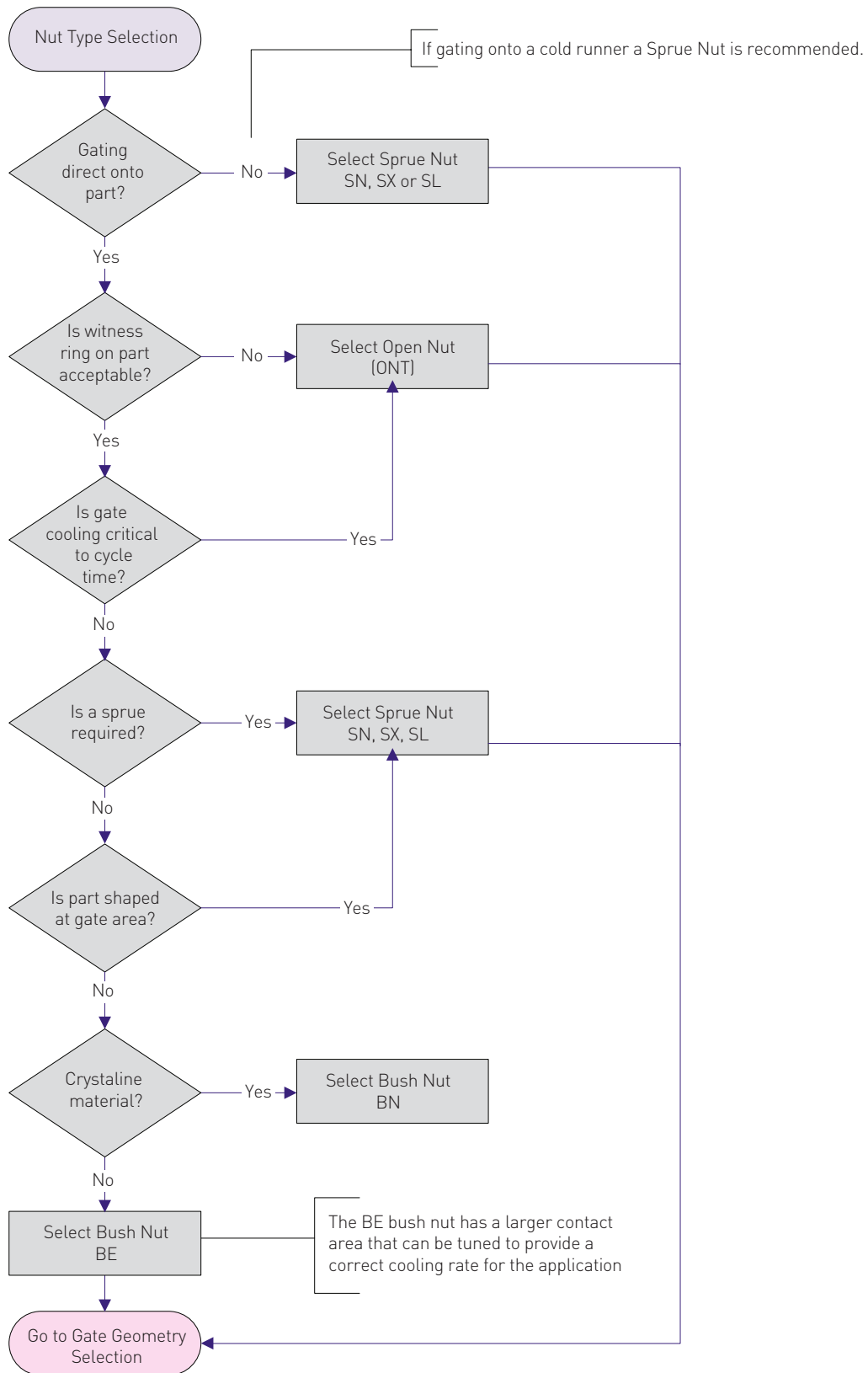


Tip Styles

Thermal Gate Tip Styles		
Multi Hole Torpedo Tip (TT)	Extended Torpedo Tip (TT+5)	Extended Torpedo Tip (TT+10)
		
Single Hole Torpedo Tip (IT)	Extended Single Hole Torpedo Tip (IT +5)	Extended Single Hole Torpedo Tip (IT +10)
		
Open Tip (OT)		
		

Valve Gate Tip Styles	
Torpedo Tip (TV)	Open Tip (OV)
	

Nut Type Selection





Nut Options

Key	Value
✓	Yes
✗	No
Witness	Nut will leave a circular witness mark on part
Modify	Nut must be modified to suit application

**Thermal Gate Nut Types**

Bush Nut Full Contact (BE)		Bush Nut (BN)		Sprue Nut +5 (SN)		Sprue Nut +20 (SX)		Sprue Nut +35 (SL)		Retro Sprue Nut (SN-R)		Dome Nut (BD)	
Witness	✓	Witness	✓	Witness	✓	Witness	✓	Witness	✓	Witness	✓	Witness	✓
Modify	✓	Modify	✗	Modify	✓	Modify	✓	Modify	✓	Modify	✓	Modify	✓
												<p>For a Dome Nut supply R1, K and dimensions at time of order.</p>	

**Valve Gate Nut Types**

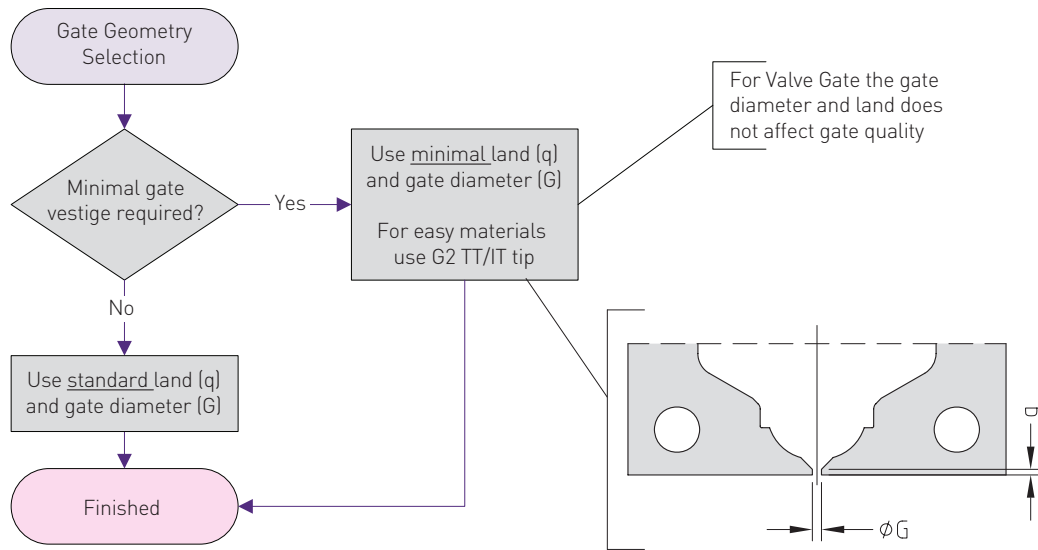
Valve Bush Nut Full Contact (VBE)		Valve Sprue Nut (VSN)	
Witness	✓	Witness	✓
Modify	✓	Modify	✓

**Thermal Gate and Valve Gate Nut Types**

Open Nut (ONT)		Retro Nut (ONT-R)	
Witness	✗	Witness	✗
Modify	✗	Modify	✓

	Series	Standard Nut Ød4	Retro Nut Ød4
	13	10	13.1
	16	12	16.1
	19	15	19.1
	27	23	27.1

Gate Geometry Selection



Thermal Gate Land Length (q)

Gate land ('q') Size	Cosmetic Gate	Gate Life	Other Factors
→0.20mm	Not Recommended		Increased injection pressure, premature gate freeze off
0.20mm	*	****	Recommended for materials with high % filler
0.15mm	**	***	Recommended for materials with medium % filler
0.10mm	***	**	Good balance between gate cosmetics and life
0.05mm	****	*	Strong cavity steel required. Cooled inserts required near to gate
←0.05mm	Not Recommended		Sharp edge breaks on first few shots, poor wear resistance Limited cooling at gate can result in stringing

Recommended Thermal Gate Diameter (ØG)

Material	Tip Grade	Nozzle Series				
		09	13	16	19	27
Unfilled	G1	-	0.8 - 0.9	0.9 - 1.0	1.1 - 1.2	1.8 - 2.0
	G2	0.7 - 0.8	0.7 - 0.8	0.8 - 0.9	1.0 - 1.1	1.6 - 1.8
	G5	-	0.9 - 1.0	1.0 - 1.1	1.2 - 1.3	2.0 - 2.2
Filled	G5	-	1.0 - 1.4	1.2 - 1.5	1.5 - 1.8	2.4 - 3.0

It is always recommended to start with a small gate and adjust as required.



## MX Nozzle Overview

MX nozzle, specifically designed for multi cavity manifold systems and hot halves.

### MX FEATURES

#### Mould design

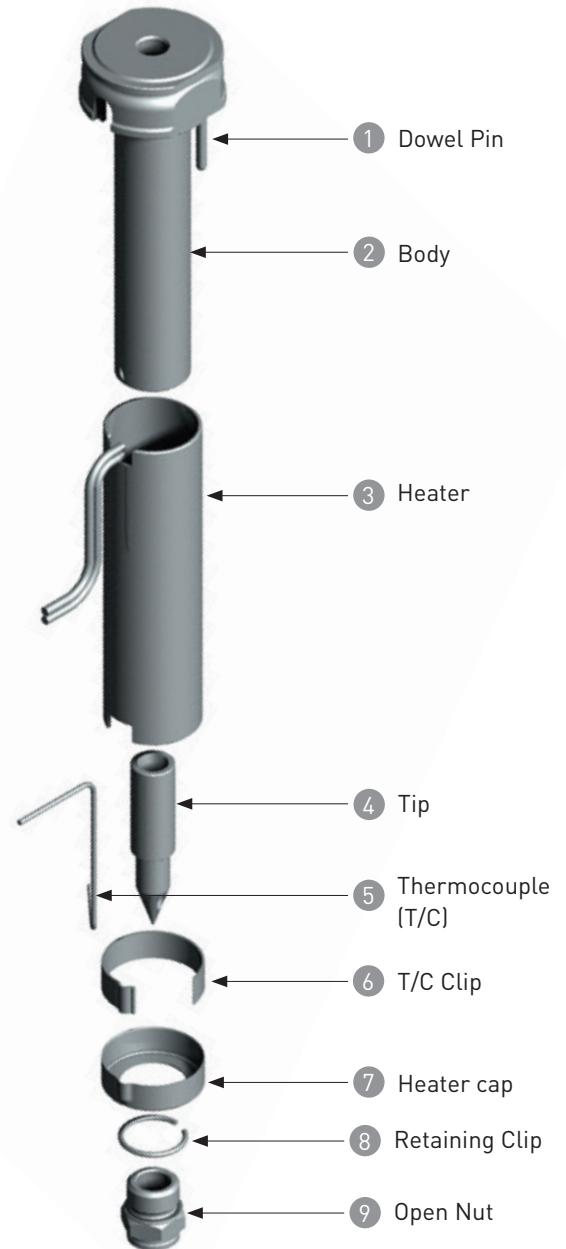
- Efficiently designed profile to allow closer cavity pitching
- Shares the same gate profiles as BX and SX
- Available in both thermal and valve gate options
- Consistent nozzle lengths across the range
- Ability to mould large parts with smaller nozzles due to optimum flow characteristics

#### Operation

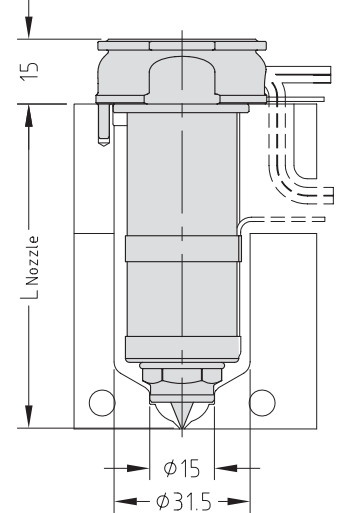
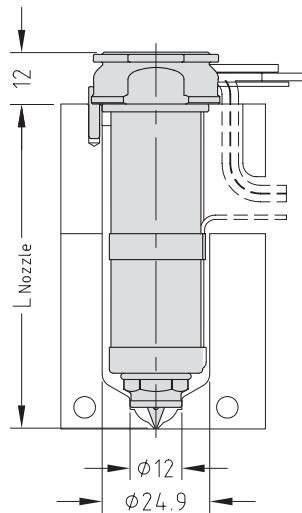
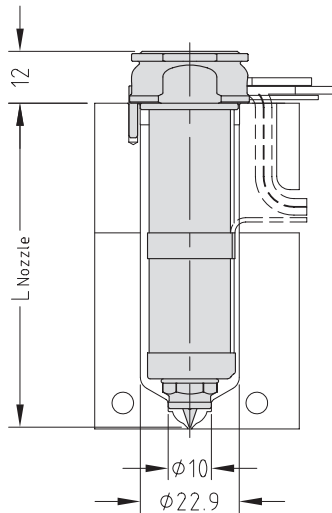
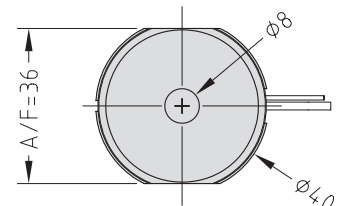
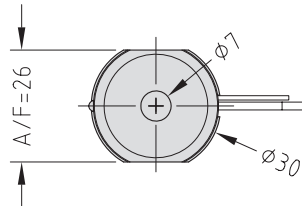
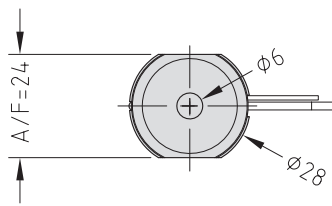
- Wide moulding window
- Excellent temperature profile and thermal stability
- Operates at low moulding pressure and temperature
- Optimum cycle times due to superior thermal insulation
- Uses an advanced micro coil heater with integrated heat deflection tube

#### Installation and maintenance

- Front loading capability for easier servicing of tips, heaters and thermocouples
- Simple machining and installation requirements
- Improved reliability due to the use of advanced materials
- Common tip and nut options provide ready availability of spare parts



**MX Nozzle Series**



**MX13**

**MX16**

**MX19**

MX Standard Lengths									
Series	L Nozzle*								
13 Series	45	55	65	75	95	115	130	145	175
16 Series	45	55	65	75	95	115	130	145	175
19 Series	—	55	65	75	95	115	130	145	175

\* Custom lengths available on request

**BX Nozzle Overview**

BX nozzle is designed to provide cost sensitive solutions for low to medium cavitation applications, not requiring hot half construction.

**BX FEATURES**

**Mould Design**

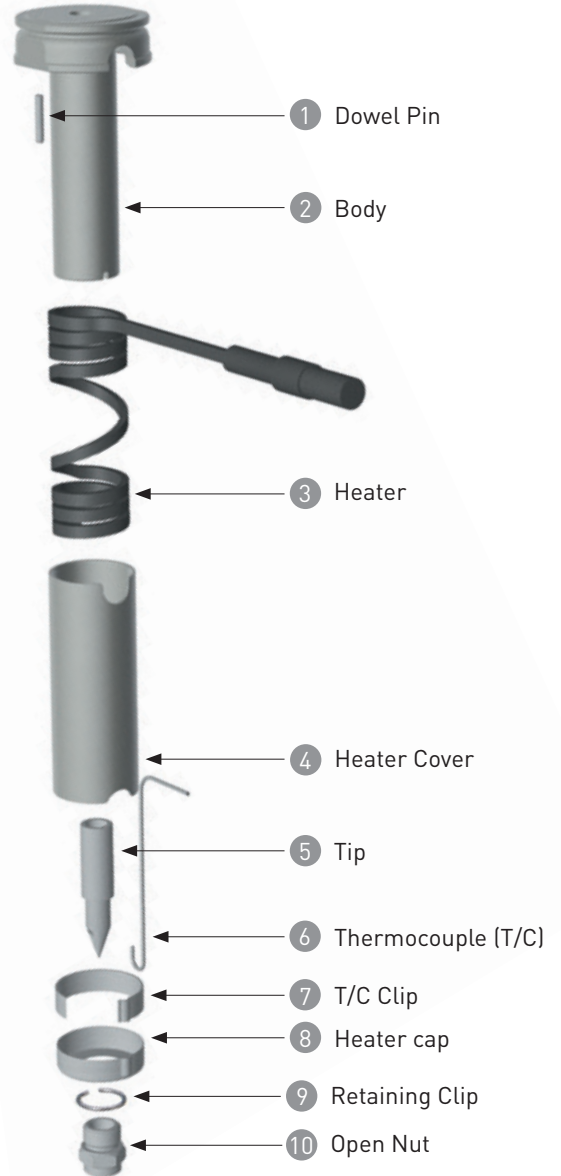
- Ability to easily order special length nozzles
- Shares the same gate profiles as MX and SX
- Available in both thermal and valve gate options
- Consistent nozzle lengths across the range
- Ability to mould large parts with smaller nozzles due to optimum flow characteristics

**Operation**

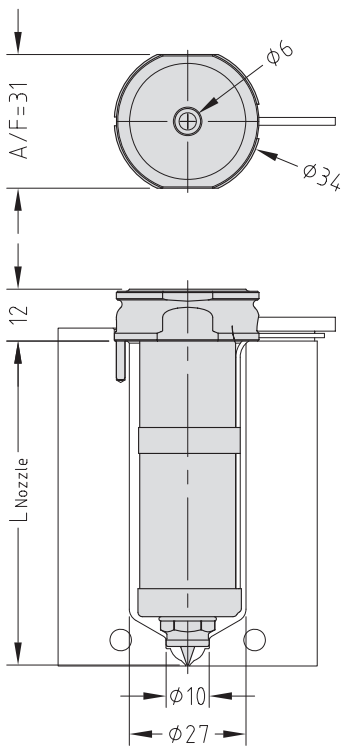
- Wide moulding window
- Excellent temperature profile and thermal stability
- Operates at low moulding pressure and temperature
- Optimum cycle times due to superior thermal insulation
- Uses an economical and robust coil heater

**Installation and Maintenance**

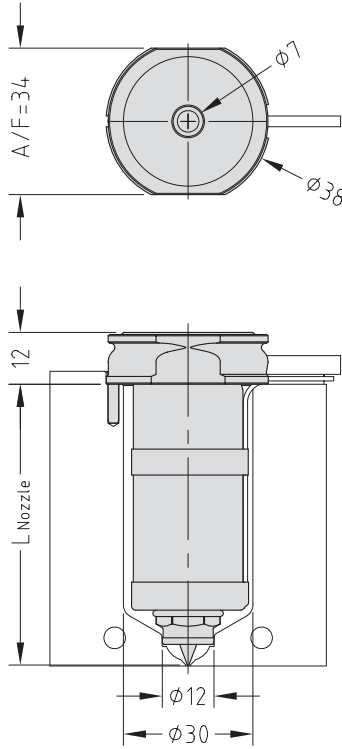
- Simple machining and installation requirements
- Improved reliability due to the use of advanced materials
- Common tip and nut options provide ready availability of spare parts



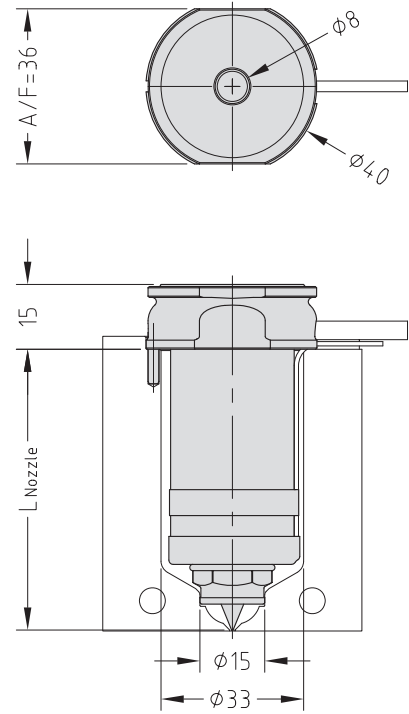
**BX Nozzle Series**



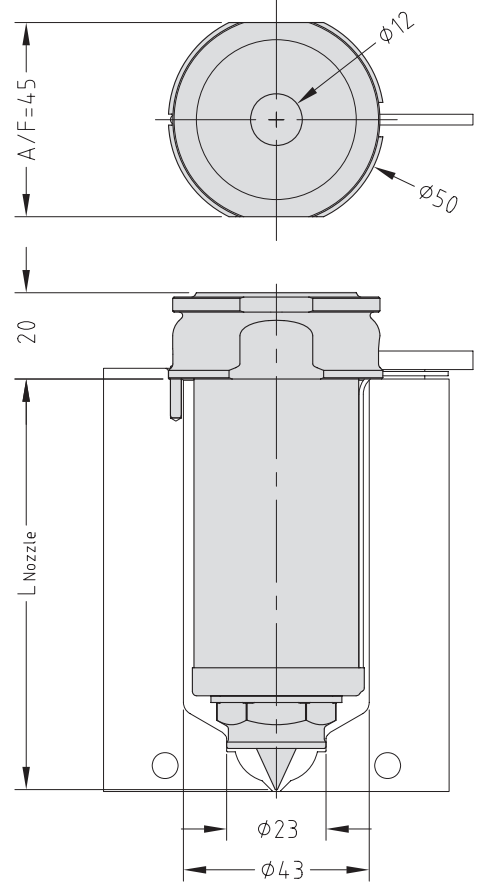
**BX13**



**BX16**



**BX19**



**BX27**

BX Standard Lengths										
Series	$L_{Nozzle}^*$									
13 Series	45	55	65	75	95	115	145	175	—	—
16 Series	45	55	65	75	95	115	145	175	—	—
19 Series	—	55	65	75	95	115	145	175	—	—
27 Series	—	—	—	75	95	115	145	175	225	275

\* Custom lengths available on request

SX Nozzle Overview

With two heaters the SX nozzle is perfectly suited for all single nozzle applications.

SX FEATURES

Mould Design

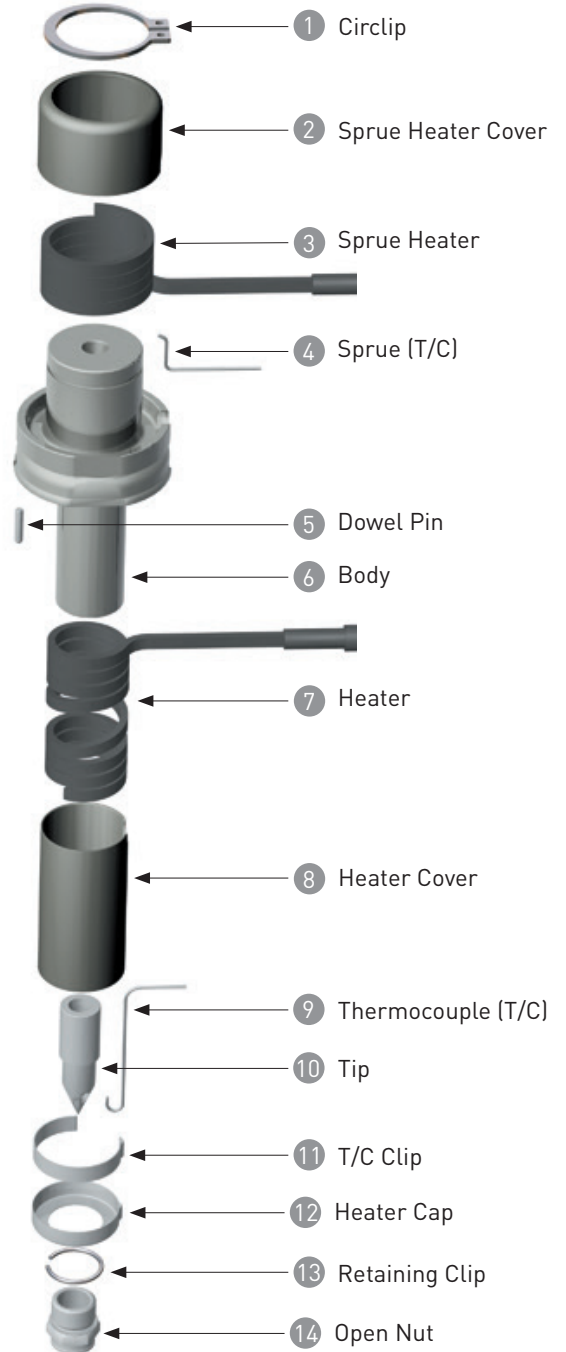
- Ability to easily order special length nozzles
- Shares the same gate profiles as MX and BX
- Consistent nozzle lengths across the range
- Ability to mould large parts with smaller nozzles due to optimum flow characteristics

Operation

- Separate heater for the nozzle head for maximum temperature control
- Wide moulding window
- Excellent temperature profile and thermal stability
- Operates at low moulding pressure and temperature
- Optimum cycle times due to superior thermal insulation
- Uses economical and robust coil heaters

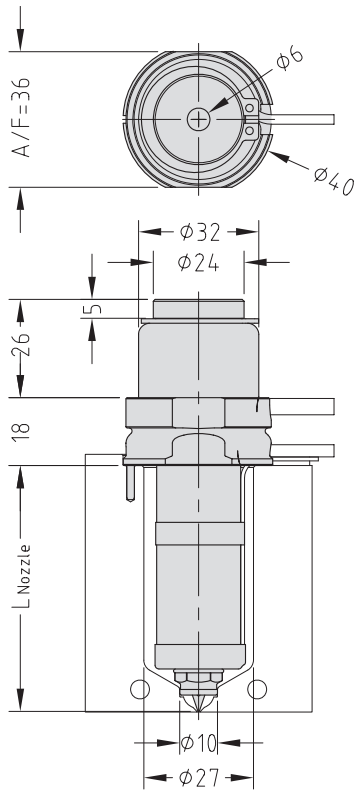
Installation and Maintenance

- Simple machining and installation requirements
- Improved reliability due to the use of advanced materials
- Common tip and nut options provide ready availability of spare parts

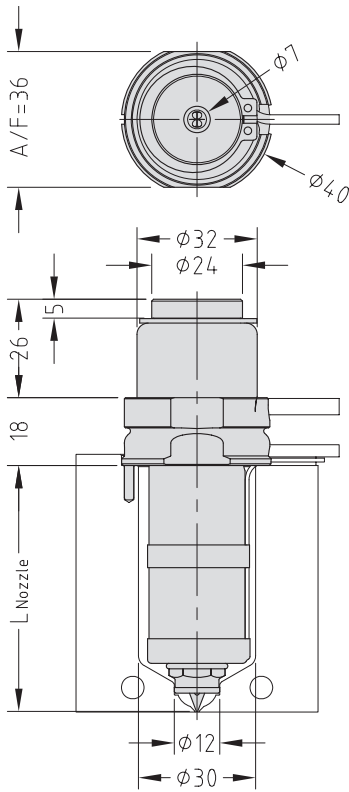




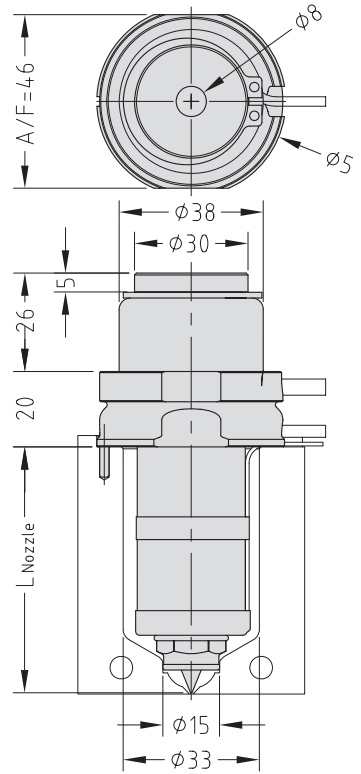
SX Nozzle Series



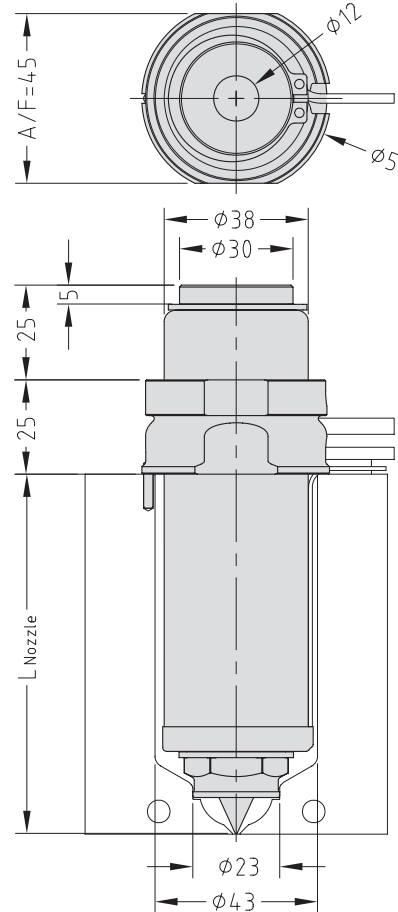
SX13



SX16



SX19



SX27

SX Standard Nozzle Lengths										
Series	L Nozzle *									
13 Series	45	55	65	75	95	115	145	175	—	—
16 Series	45	55	65	75	95	115	145	175	—	—
19 Series	—	55	65	75	95	115	145	175	—	—
27 Series	—	—	—	75	95	115	145	175	225	275

\* Custom lengths available on request

Gating Options - MX / BX / SX

Standard Sealing Diameter				
Series	13	16	19	27
Ød4	10	12	15	23

ONT				ONT +5				ONT +10			
13	16	19	27	13	16	19	27	13	16	19	27
✓	✓	✓	✓	✓	✓	✓	×	✓	✓	✓	✓
SN +5				SX +20				SL +35			
13	16	19	27	13	16	19	27	13	16	19	27
✓	✓	✓	✓	✓	✓	✓	×	✓	✓	✓	✓
BN / BE				VBE				VSN			
13	16	19	27	13	16	19	27	13	16	19	27
✓	✓	✓	✓	×	✓	✓	✓	×	✓	✓	✓



## MJ Nozzle Overview

MJ nozzle, specifically designed for close cavity pitching

## MJ FEATURES

**Mould design**

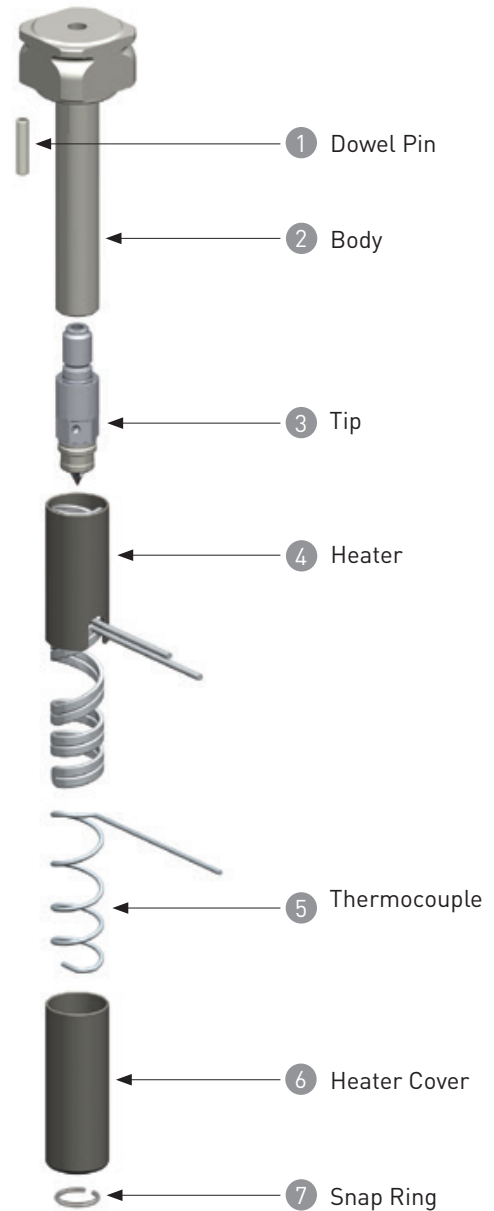
- Nozzle pocket profile for improved cooling performance and gate strength
- Optimal flow characteristics for ease of moulding
- Close cavity pitching

**Operation**

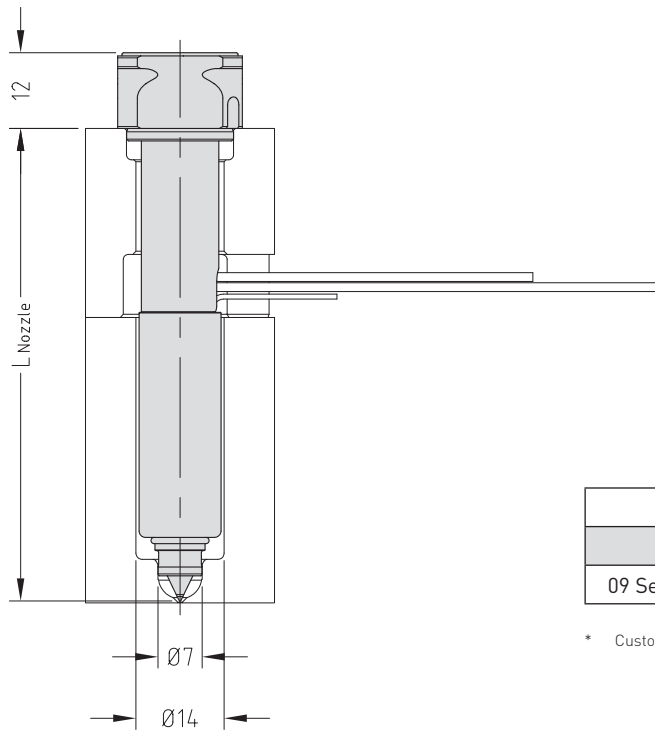
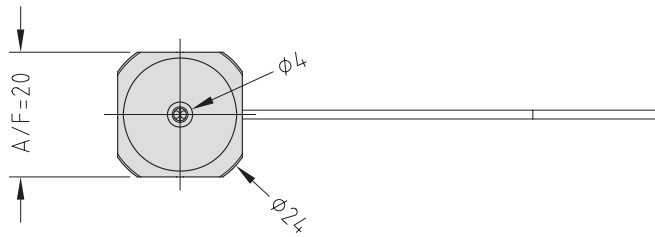
- Wide moulding window
- Excellent temperature profile and thermal stability
- Operates at low moulding pressure and temperature
- Short cycle times

**Installation and maintenance**

- Simple installation
- Front loading for ease of servicing
- Improved reliability



MJ Nozzle Series



MJ Standard Lengths						
$L_{\text{Nozzle}}^*$						
09 Series	75	95	115	130	145	175

\* Custom lengths available on request

MJ Gating Options		
ONT	ONT +5	ONT +10
<p>Diagram showing the ONT (Nozzle On Top) gating option. The nozzle tip is positioned at the base of the U-shaped cavity. The nozzle length is labeled as <math>L_{\text{Nozzle}}</math>.</p>	<p>Diagram showing the ONT +5 gating option. The nozzle tip is positioned 5 units above the base of the U-shaped cavity.</p>	<p>Diagram showing the ONT +10 gating option. The nozzle tip is positioned 10 units above the base of the U-shaped cavity.</p>

SVG Valve Gate System

SVG FEATURES

Mould Design

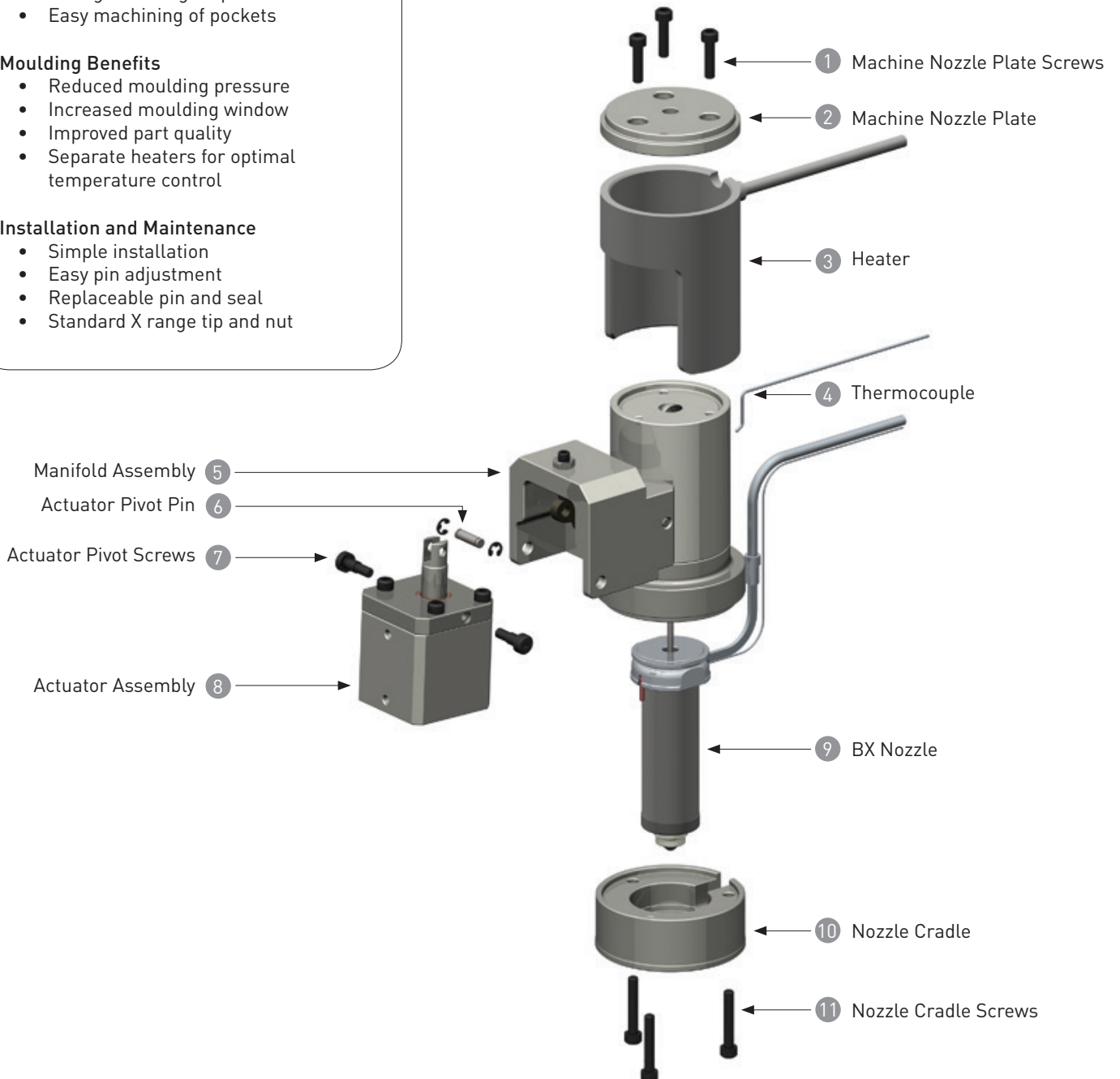
- Available to suit BX16, 19 & 27 series nozzles
- X range nozzle gate profiles
- Easy machining of pockets

Moulding Benefits

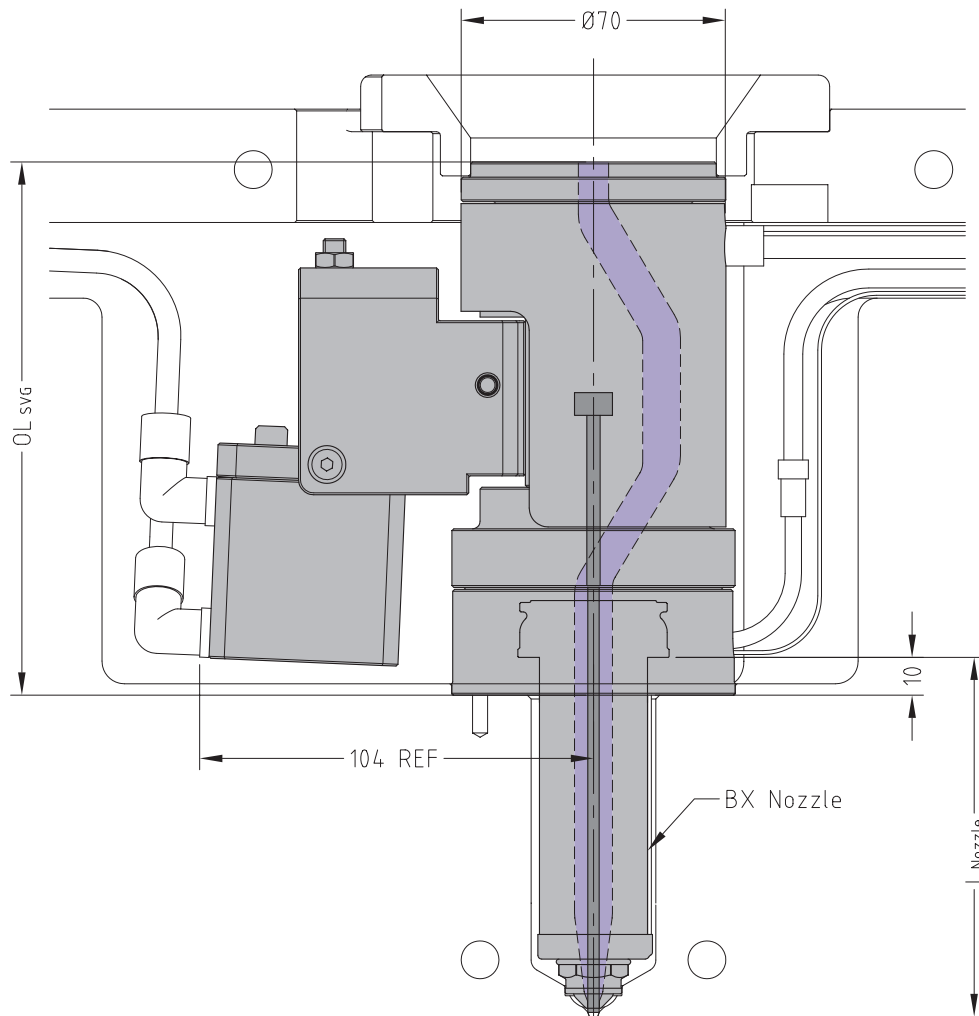
- Reduced moulding pressure
- Increased moulding window
- Improved part quality
- Separate heaters for optimal temperature control

Installation and Maintenance

- Simple installation
- Easy pin adjustment
- Replaceable pin and seal
- Standard X range tip and nut



## SVG Valve Gate System



SVG Nozzle Compatibility					
Description	OL <sub>SVG</sub>	Tip	Supplied Pin Size	Nozzle	L <sub>Nozzle</sub>
SVG 33 - 2.5	138	OV / TV	Ø2.5	BX16	55 - 145
SVG 33 - 3.0	141	OV / TV	Ø3.0	BX19	55 - 145
SVG 33 - 5.0	146	OV / TV	Ø5.0	BX27	75 - 145

MVG25 Valve Gate System

MVG25 FEATURES

**Mould Design**

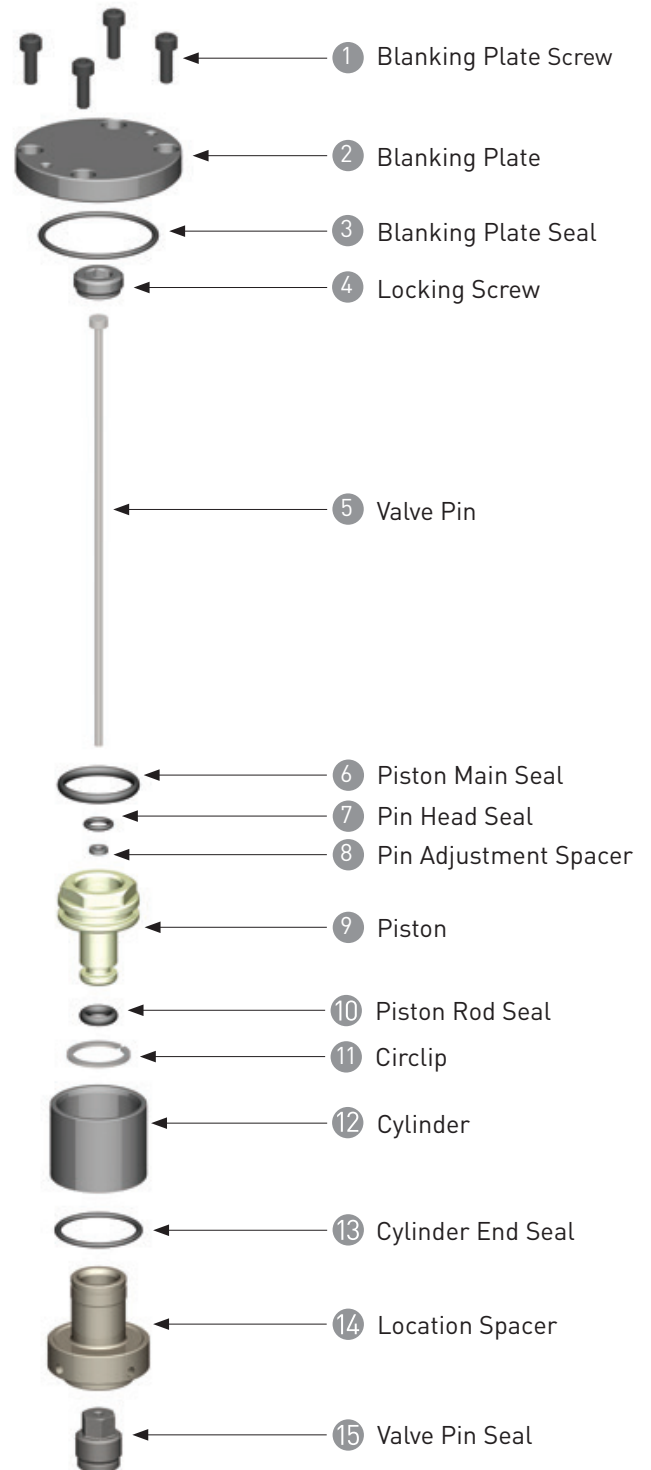
- Available to suit MX and BX Nozzles
- Standard minimal pitching is 55mm – can be modified to fit 43mm
- Backplates 50mm minimum
- Conical or Cylindrical shut off
- Easy machining of the pockets
- Pneumatic circuit integrated with the backplate

**Moulding Benefits**

- Reduced moulding pressure
- Increased moulding window
- Lower mould filling stress results in better part quality
- Reduced gate cooling requirements

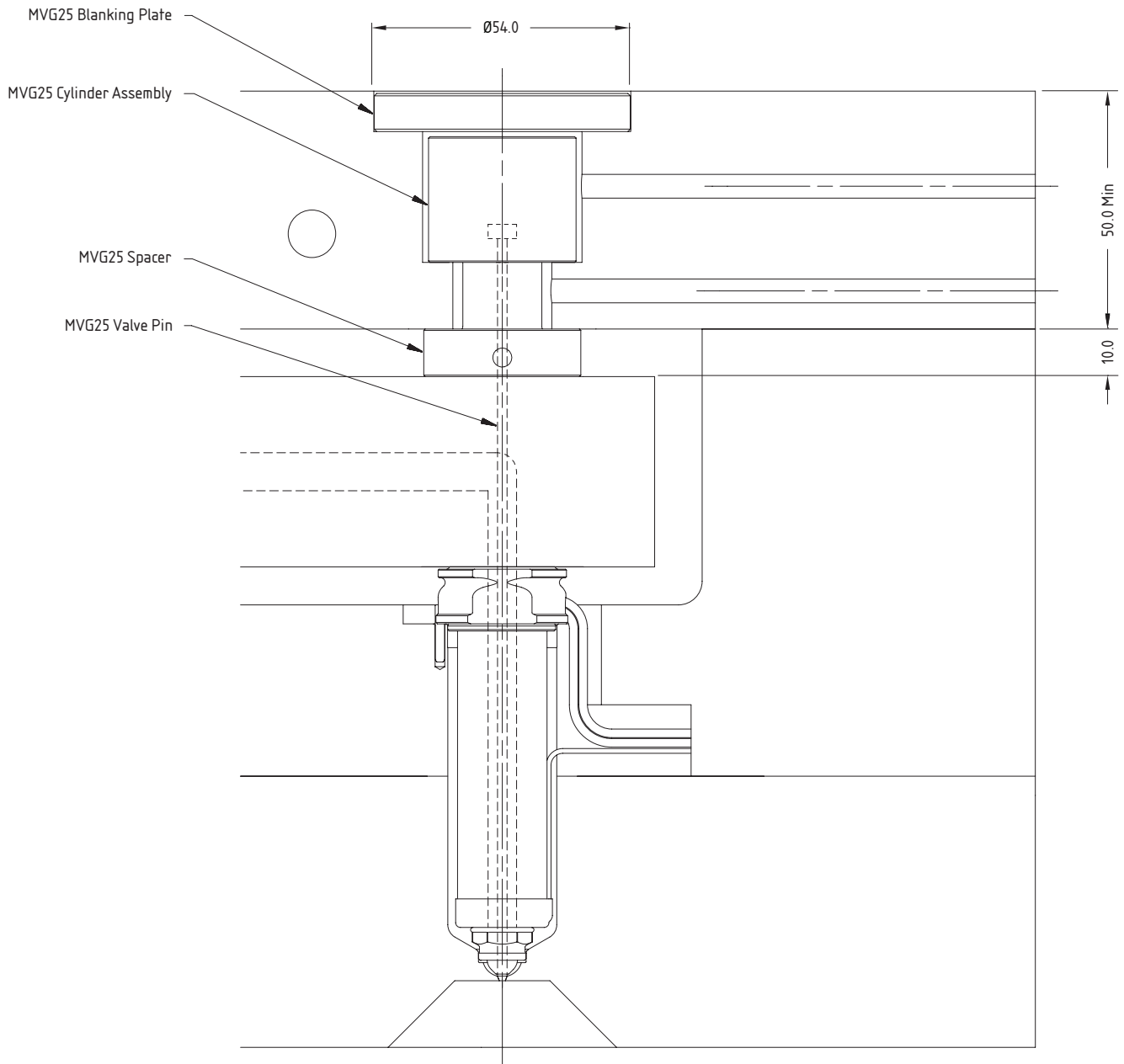
**Installation and Maintenance**

- Easy machining and installation
- Easy seal replacement





MVG25 Valve Gate System



MVG25 Nozzle Compatibility				
Description	Nozzle	Tip	Nozzle Length	Supplied Pin Size
MVG25 - 2.0	MX13 / BX13	OV	45 - 175	Ø2.0
MVG25 - 2.5	MX16 / BX16	OV / TV	45 - 175	Ø2.5

MVG40 Valve Gate System

**MVG40 FEATURES**

**Mould Design**

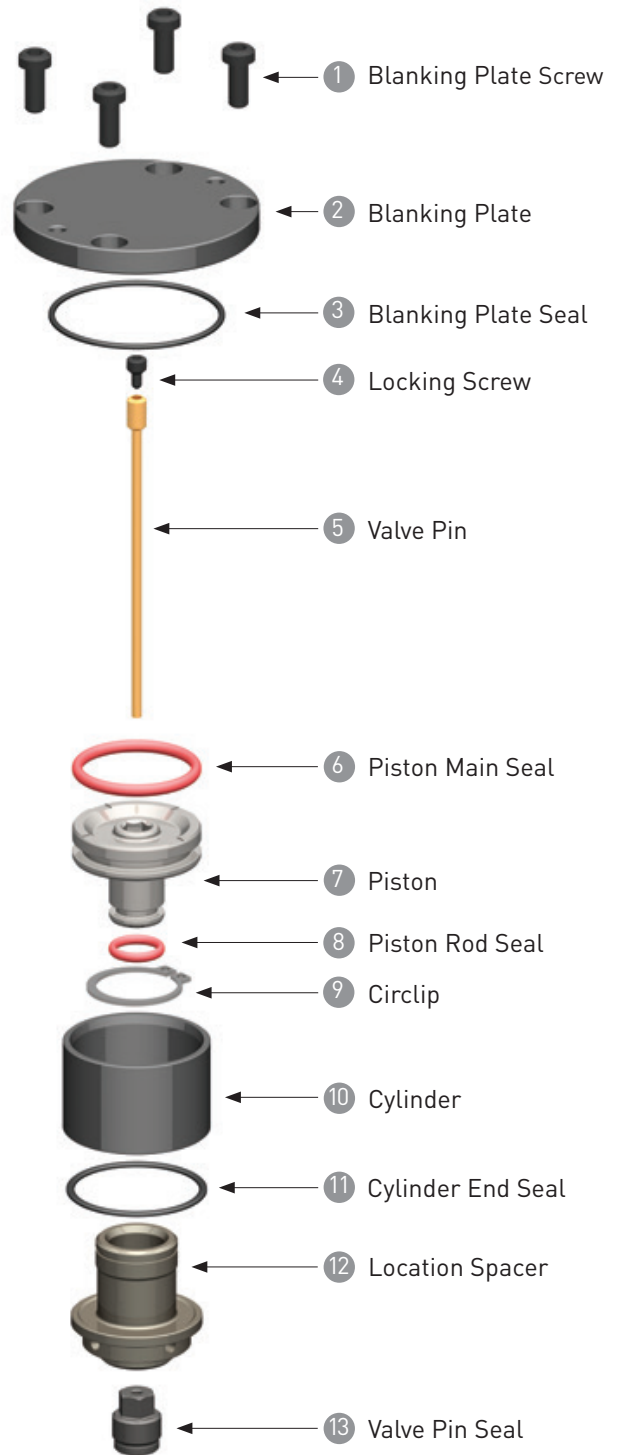
- Available to suit MX and BX Nozzles
- Standard minimal pitching is 75mm  
- can be modified to fit 58mm pitching
- Backplates 55mm minimum
- Conical or Cylindrical shut off
- Easy machining of the pockets
- Pneumatic circuit integrated with the backplate

**Moulding Benefits**

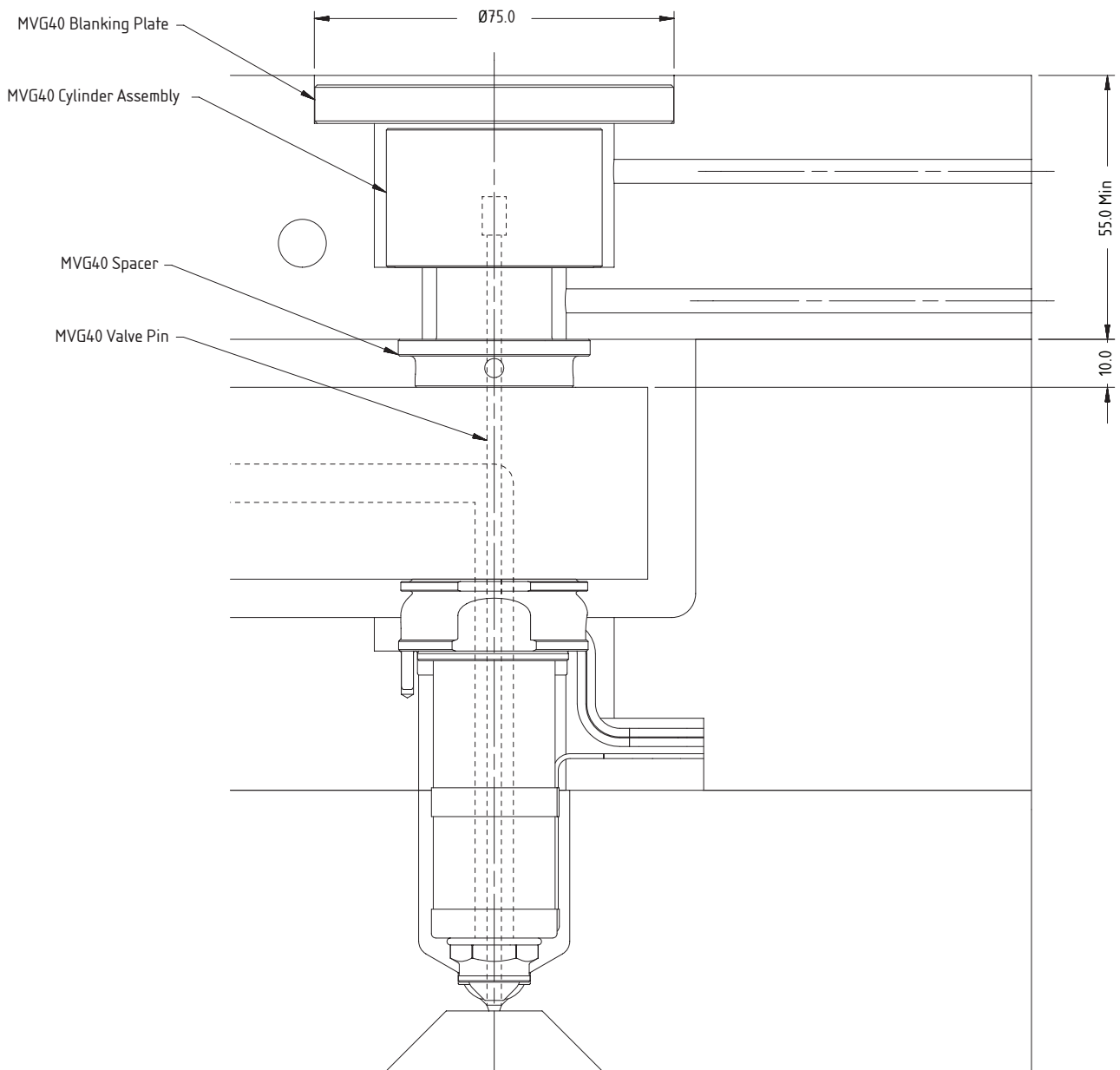
- Reduced moulding pressure
- Increased moulding window
- Lower mould filling stress results in better part quality
- Reduced gate cooling requirements

**Installation and Maintenance**

- Easy machining and installation
- Easy pin adjustment and seal replacement while the mould remains assembled



## MVG40 Valve Gate System



MVG40 Nozzle Compatibility				
Description	Nozzle	Tip	Nozzle Length	Supplied Pin Size
MVG40 - 2.0	MX13 / BX13	OV	45 - 145	Ø2.0
MVG40 - 2.5	MX16 / BX16	OV / TV	45 - 145	Ø2.5
MVG40 - 3.0	MX19 / BX19	OV / TV	55 - 175	Ø3.0
MVG40 - 5.0	BX27	OV / TV	75 - 275	Ø5.0

\* Custom lengths available on request

MVG55 Valve Gate System

MVG55 FEATURES

**Mould Design**

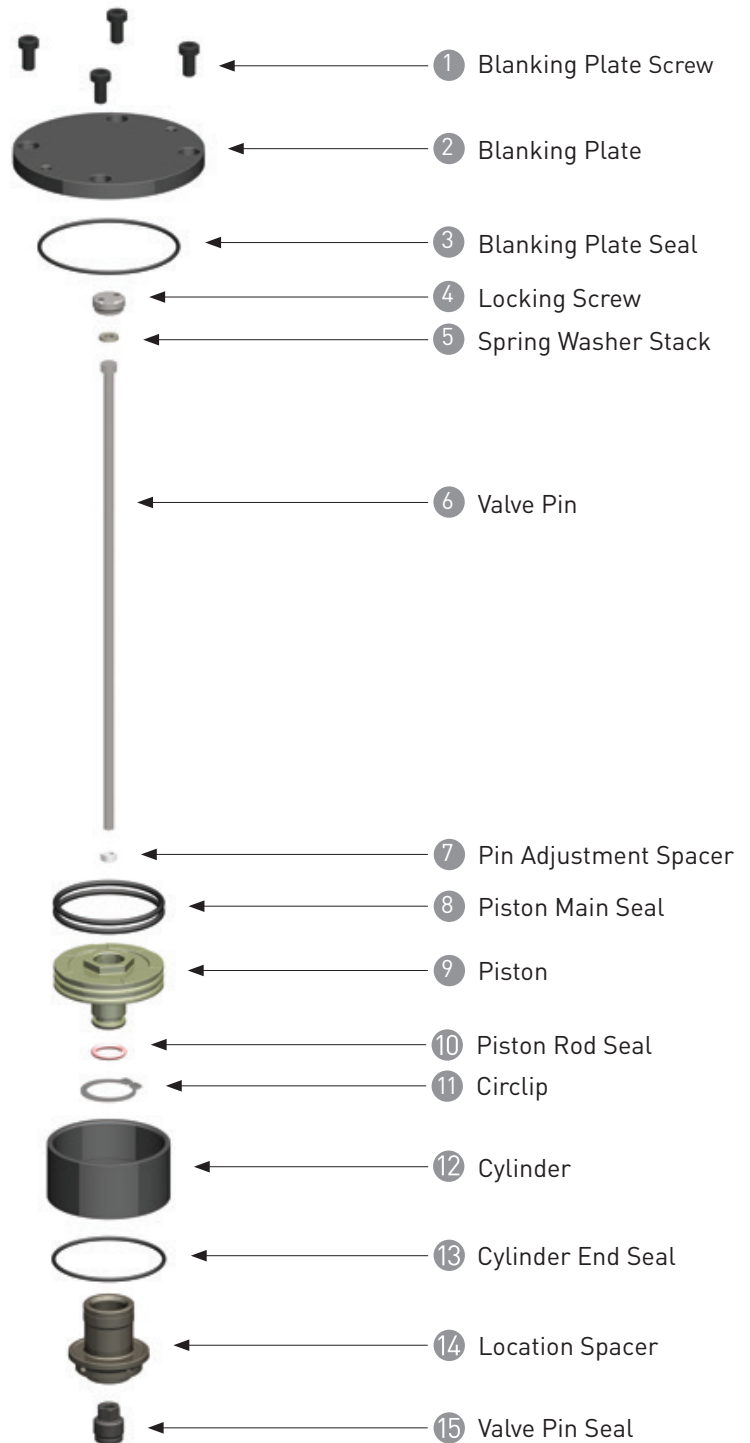
- Available to suit BX Nozzle in 27 Series
- Standard minimal pitching is 95mm  
– can be modified to fit 74mm
- Backplates 55mm minimum
- Easy machining of the pockets
- Pneumatic circuit integrated with the backplate

**Moulding Benefits**

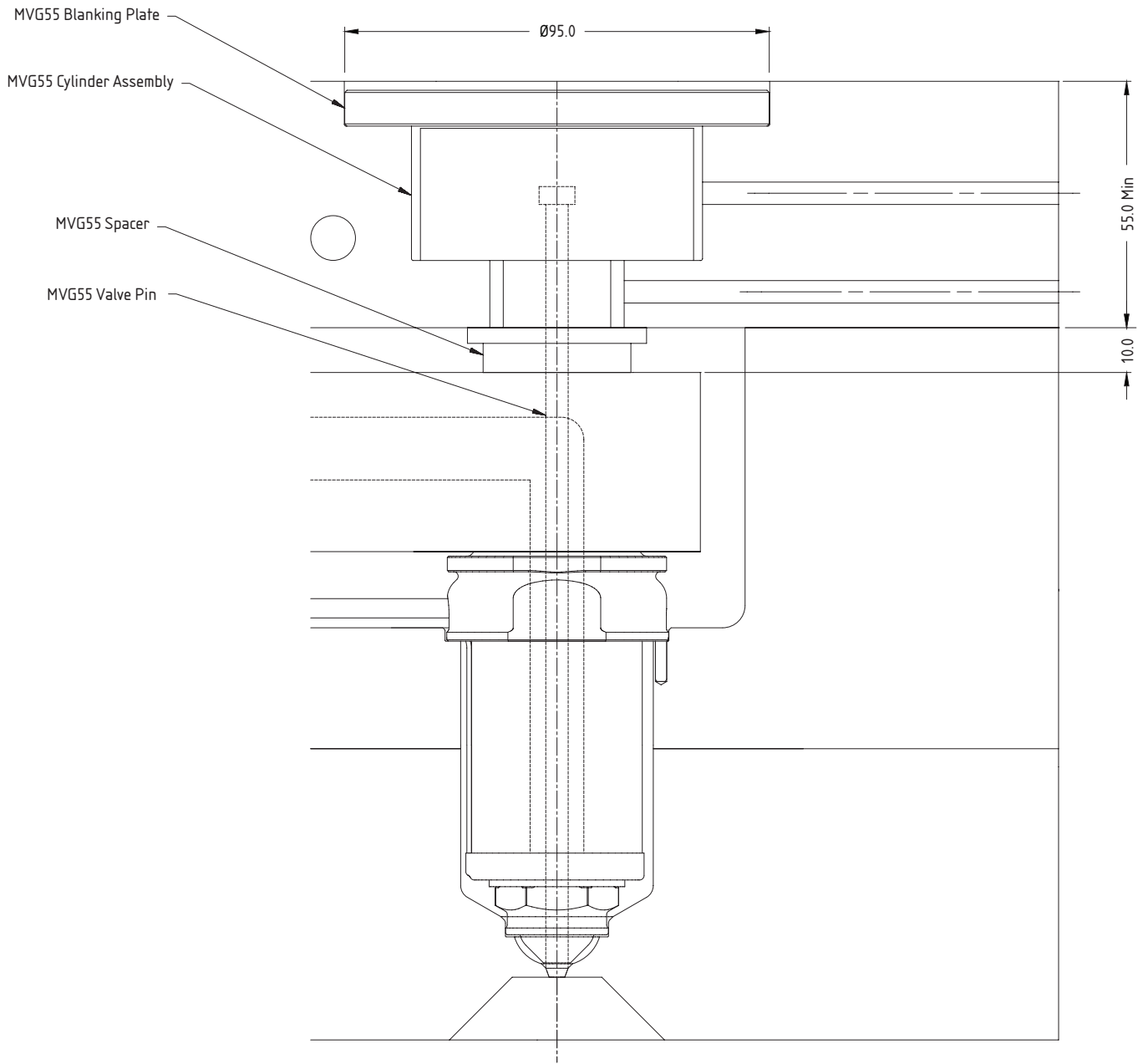
- Reduced moulding pressure
- Increased moulding window
- Lower mould filling stress results in better part quality
- Reduced gate cooling requirements

**Installation and Maintenance**

- Easy machining and installation
- Easy seal replacement



MVG55 Valve Gate System



MVG55 Nozzle Compatibility				
Description	Nozzle	Tip	Nozzle Length	Supplied Pin Size
MVG55 - 5.0	BX27	OV / TV	75 - 275	Ø5.0

MVCH Valve Gate System

**MVCH FEATURES**

**Mould Design**

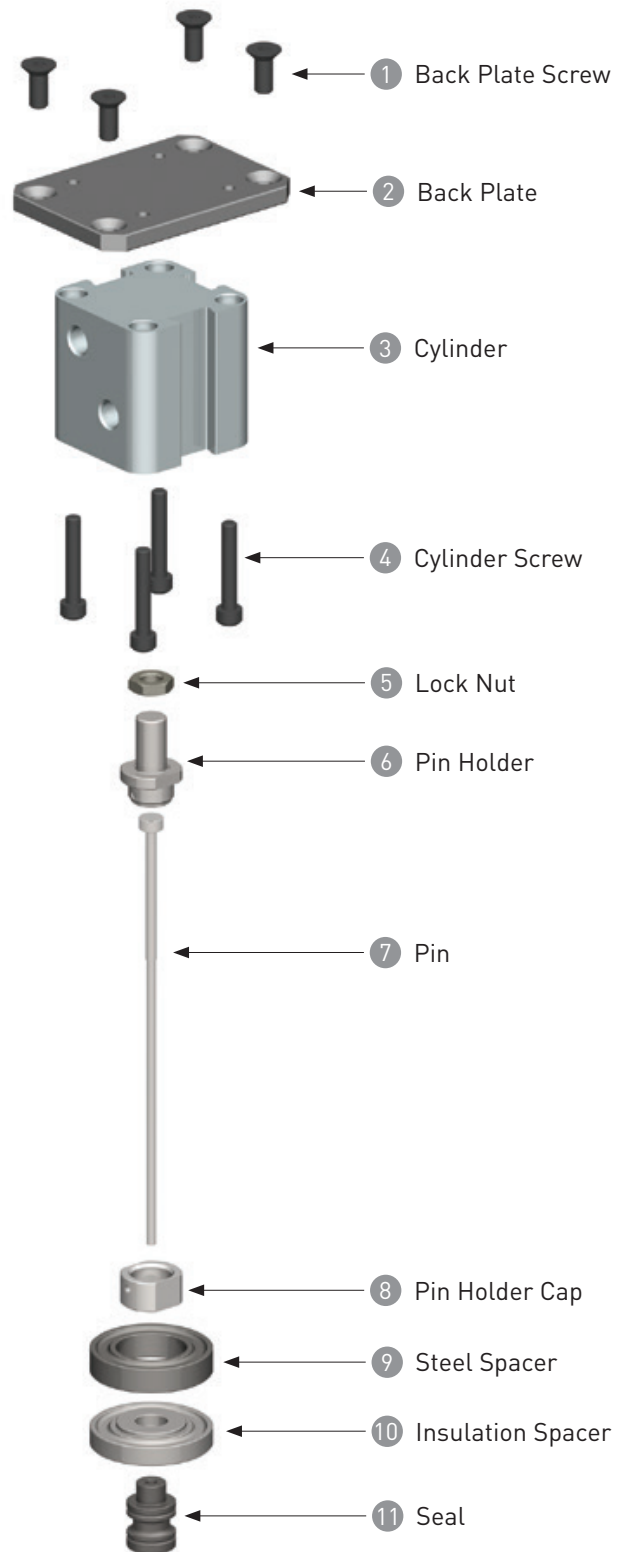
- Available to suit MX 16, 19 and BX 16, 19 and 27 series
- Standard minimal pitching is 58mm
- Backplates 86mm minimum
- Easy machining of pockets
- Hydraulic actuation

**Moulding Benefits**

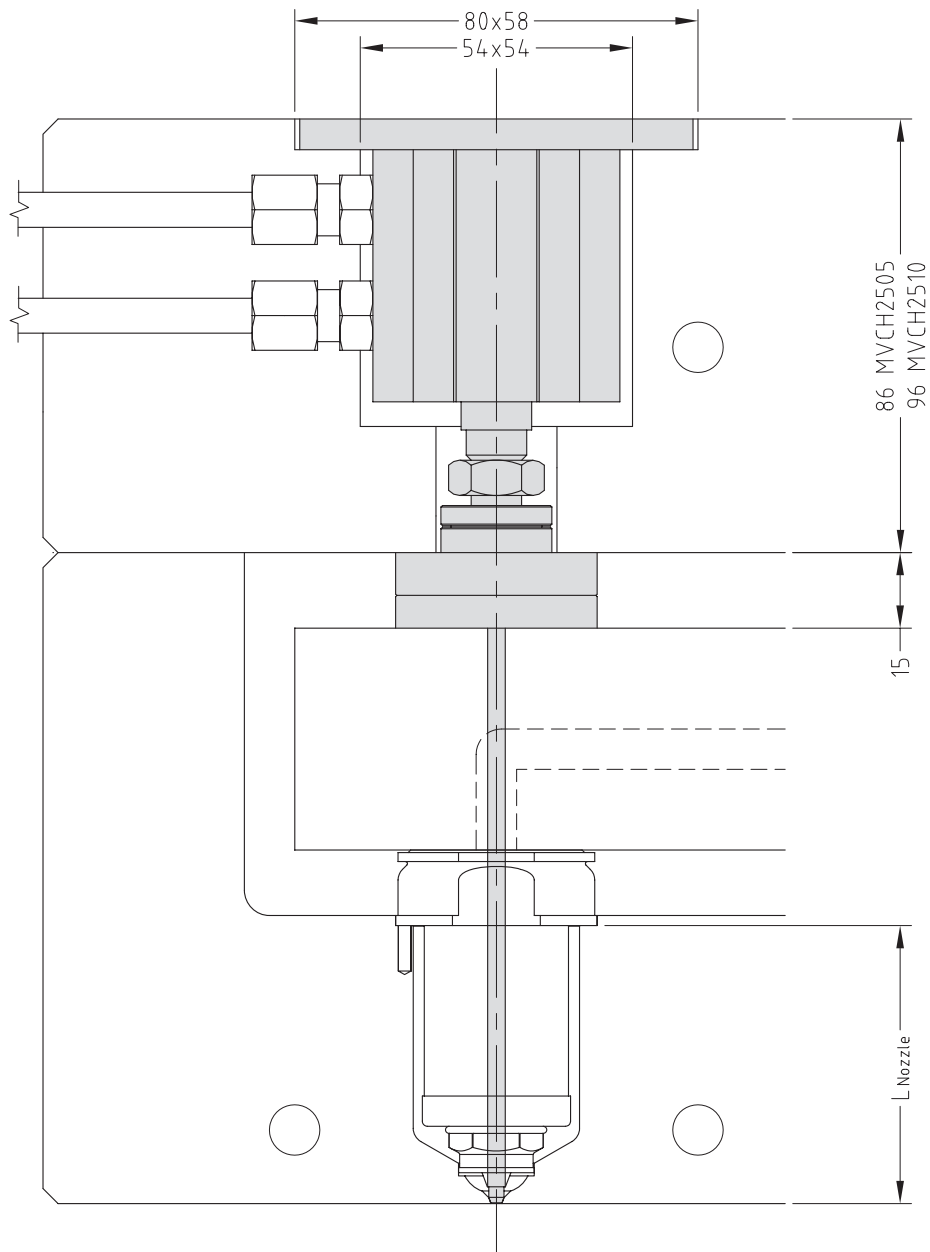
- Improved part quality
- Reduced moulding pressure
- Increased moulding window
- Lower mould filling stress results in better part quality
- Reduced gate cooling requirements

**Installation and Maintenance**

- Adjustable pin length



MVCH Valve Gate System

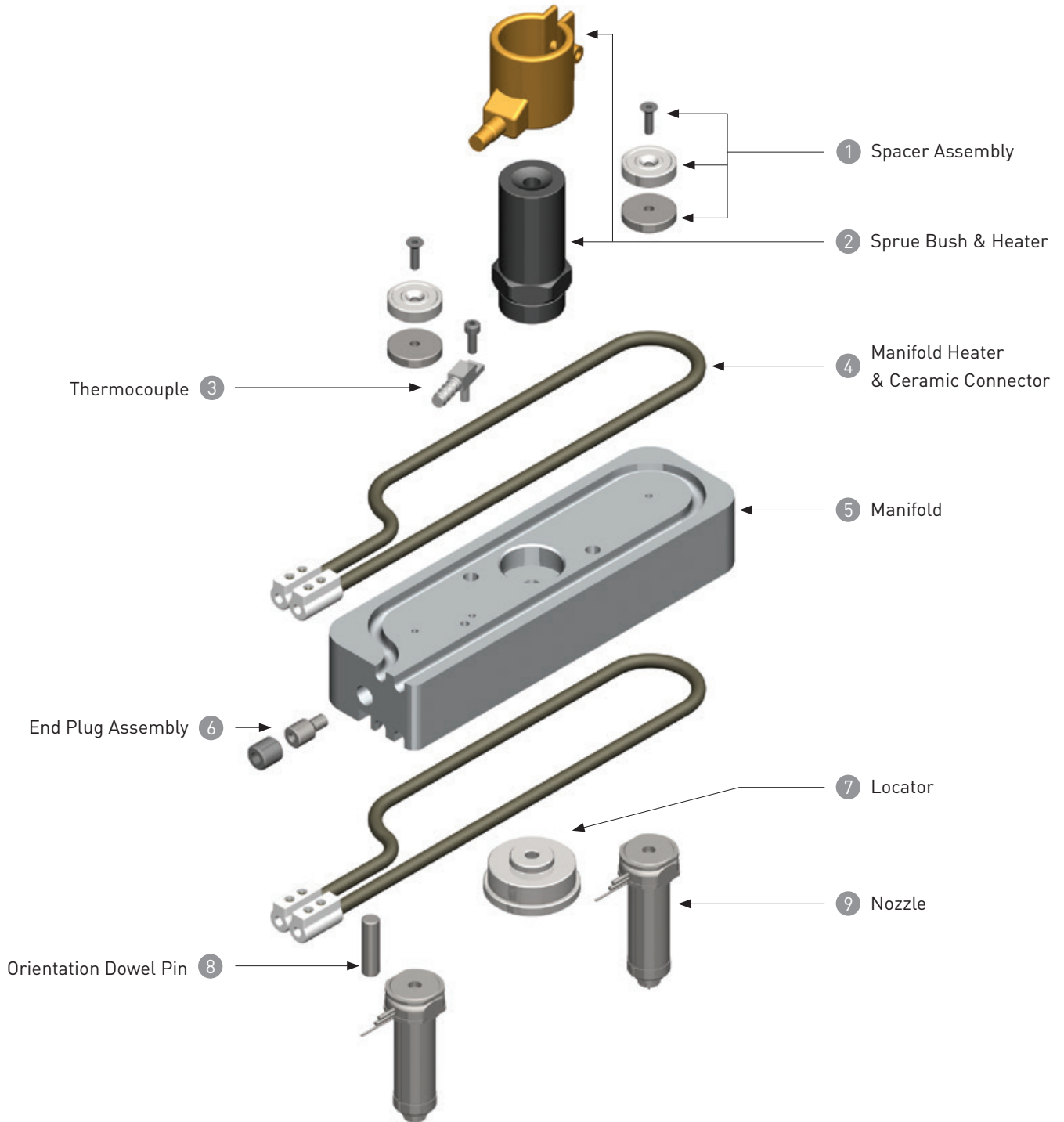


MVCH Nozzle Compatibility					
Description	Stroke	Tip	Supplied Pin Size	Nozzle	$L_{Nozzle}$
MVCH2505-2.5	5	TV	Ø2.5	MX16 / BX16	45 - 115
MVCH2510-2.5	10	OV			
MVCH2505-3	5	TV	Ø3.0	MX19 / BX19	45 - 115
MVCH2510-3	10	OV			
MVCH2505-5	5	TV	Ø5.0	BX27	75 - 225
MVCH2510-5	10	OV			

\* Custom lengths available on request

Manifold Configuration

Exploded view of a Standard 2 Drop Hot Runner System





## Selecting a Manifold Configuration

When deciding on a manifold layout it is important to consider the following:

- The number of injection points required per cavity
- The number of cavities in the mould
- Minimum distance between nozzles
- Balancing of the manifold
- Spacing of cavities to provide adequate room for cooling
- Gate and cavity
- Strength of the mould
- Sufficient steel between cavities
- Mould size versus machine platen size
- Total shot weight

**For multi-cavity moulds** balancing is critical to achieve consistent dimensions, cosmetic appearance and processing conditions across cavities. It is therefore strongly recommended that for multi-cavity moulds a manifold layout providing natural balancing is used.

**Natural Balancing:** In order to achieve natural balance, the material must flow through identical geometry from the machine nozzle to each of the gates.

This means identical:

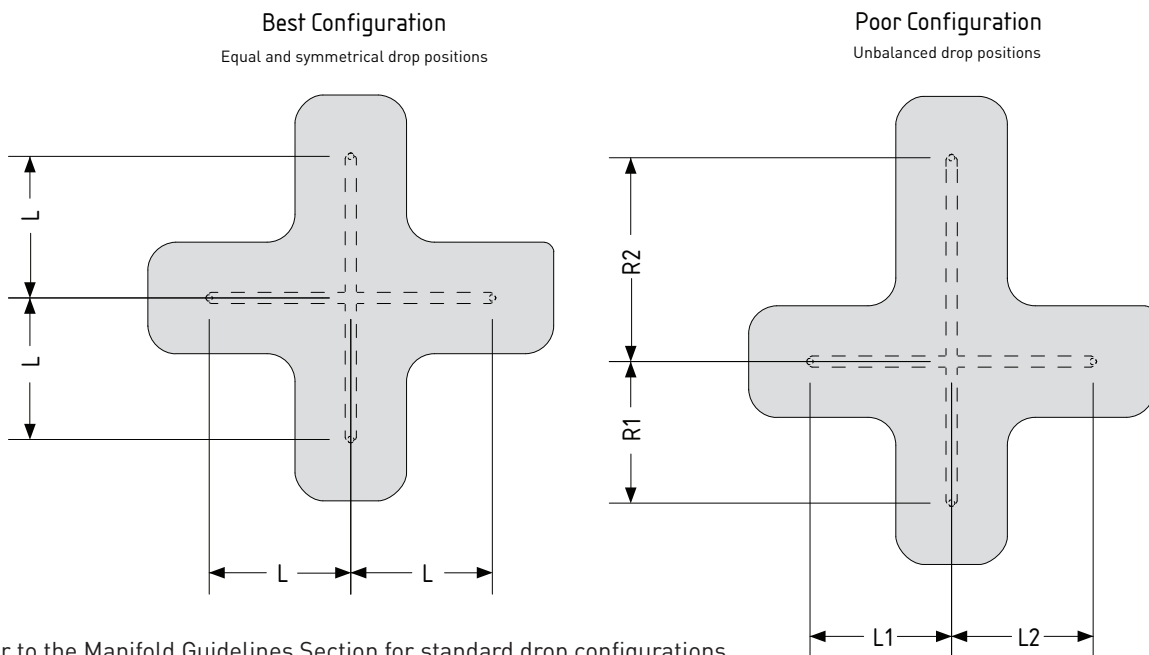
- Flow distance
- Runner diameters
- Number and angle of bends

This ensures that every gate receives material in exactly the same condition. With natural balance, the balance is inherent in the design, and is not based on a specific material or processing temperature.

**Rheological balancing:** Is a method of balancing by using different runner sizes to artificially provide identical pressure drop at each gate. To accurately predict this, the flow properties of the material must be known, along with the flow rate and anticipated processing temperature. Any variation from the processing conditions used during design will result in an unbalanced system.

Some drop configurations can not be naturally balanced unless the drops are on a PCD and must therefore be rheologically balanced. E.g. 3, 5, 7, 9, 10, 11, 13, 14, 15, 17-23 etc

All standard Mastip manifolds (except 3 Drop 3x1) are naturally balanced.



→ Refer to the Manifold Guidelines Section for standard drop configurations.

## Additional Considerations

---

To select a Hot Runner System to match your part and material specifications consideration must be given to the following:

- Gate type
- Gate size
- Nozzle range and series
- Nozzle tip style
- Nozzle nut type

## Selecting Material

---

There are three broad categories of materials each relating to its moulding characteristics:

- Easy
- Medium
- Difficult

When selecting material consider the following:

- Materials with large percentages of filler (for example, →15%) or very low MFI, the material classification moves up a grade (for example, easy to medium).

## Selecting a Gate Type

---

The following factors must be considered when selecting a gate type:

- Shot size of part
- Material to be moulded
- Material
- Viscosity
- Additives
- Glass fibre
- Flame retardant
- Gate surface finish
- Thickness of part walls
- Longest flow length of part
- Required cycle time

When designing an injection mould, the type, size and location of the gate is one of the most important consideration for correct moulding of the part. Incorrect gate position can result in uneven filling, over packing, and dimensional instability.

Available gate types include:

- Direct gating
- Side gating
- Edge gating
- Valve gating

Direct gating is the most common gate type as it offers simple construction and reliability.

→ Refer to the Nozzle Section for more information about Gate Types

## Gate Size

The correct gate size ensures a good thermal gate is achieved and minimises the pressure drop across the gate while maintaining its structural integrity. Parts with very thin wall sections or very long flow lengths need a larger nozzle and gate to achieve proper filling, this may require increasing the nozzle by one to two series.

The gate sizes effects the:

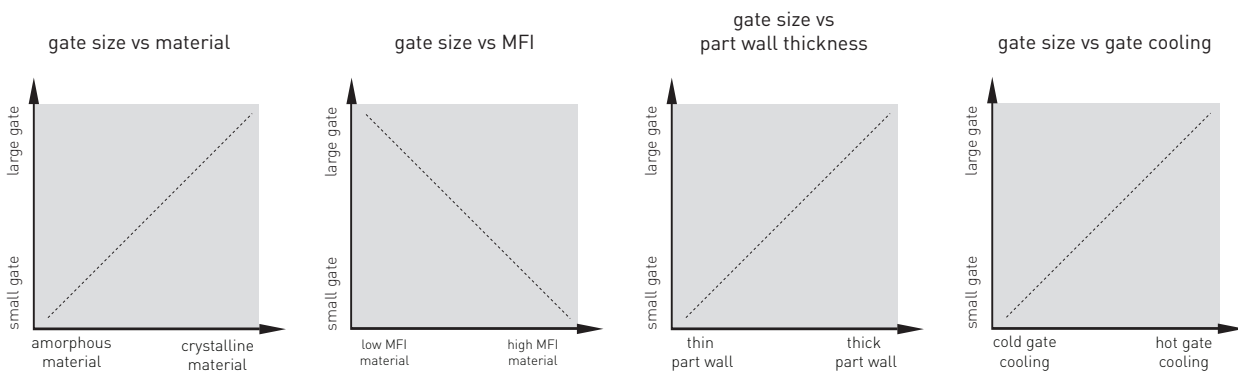
- Flow rate
- Pressure drop through the system
- Cycle time
- Thermal gate shut off after filling
- Cosmetic impact of the gate on the part
- Cooling in the gate area

The gate size is dependent on the:

- Material
- Material viscosity
- Part wall thickness
- Gate cooling\*

\* Gate cooling is a complex variable and consideration must also be given to cycle time, gate profile, and land length.

### Gate Size Variables



MMA15 Modular Temperature Controller

MMA15 FEATURES

Benefits

- Soft Start function to protect heaters during startup
- Idle mode after power failure, to protect module and Hot Runner System
- Open Thermocouple and reversed Thermocouple detection
- Self test on startup

Single Zone Temperature Controller (MSA)

- Uses standard MMA15 modules
- Supplied with 3m cable and mould end connectors
- 10A rating

Multi Zone Temperature Controller (MMA)

- Standard MMA cabinet configurations are 1 to 12 zones
- Supplied with 3m cables and mould end connectors
- 15A rating on all zones



Technical Specifications

Mains input power	240Vac / 50-60 Hz
Output current capability	MMA=15A MSA=10A
Thermocouple	“J” and “K” type, selectable by DIP switch
User interface: output	SV and PV LED
Temperature control range	0°C to 537°C (32°F to 999°F)
Temperature control accuracy	±1°C
Thermocouple open detect	Yes
Thermocouple reversed detect	Yes
Start up self test	Yes
Standby Mode	Yes, selectable by DIP switch
Auto tune	Once or every time (user selectable)

## i-Series iB6 and iB12 Integrated Temperature Controllers

**iB6/iB12 FEATURES****Features**

- iB6 - 1 to 6 zones
- iB12 - 1 to 12 zones
- Supplied with 3m cables and mould end connectors

**Benefits**

- CE Compliant
- Compact package design
- Improved temperature control
- Soft start function
- Heater short detection
- Open thermocouple and reversed thermocouple detection
- 'Boost' mode for temporary power output increase
- Remote input standby function

**Technical Specifications**

Mains input power	100 – 240Vac
Output current capability	15A
Thermocouple	“J” and “K” type, grounded or ungrounded
User interface: output	SP and PV LED
Temperature control range	0°C to 537°C (32°F to 999°F)
Temperature control accuracy	±1°C
Thermocouple open detect	Yes
Thermocouple reversed detect	Yes

G-Series GV24 Modular Sequential Control System

**GV24 FEATURES**

**Benefits**

- Regulation of the injection quantity from each individual gate
- Quality of the moulded part can be improved by removing or repositioning of weld lines
- Injection is performed with minimum clamping force due to the gates not all opening simultaneously
- Optimum control over part fill
- Standard GV24 cabinet configurations are 2 to 8 zones
- Supplied with 3m cable and mould end connectors



**Technical Specifications**

Mains input power	Single phase AC 90-250V (50/60 Hz)
Injection signal input power supply	24VDC, 110VAC, 220VAC
Solenoid valve voltage	24VDC, 110VAC, 220VAC
Operating temperature range	-10 °C to 50 °C
Operating modes	Three modes (Continuous Sequence, Intermittent Sequence and Delay Sequence)
Timer Increment	0.1 seconds
Timer Range	0 - 999 seconds
Start up self diagnosis	Yes
Automatic input voltage	Yes
Manual override	Yes

### Working Example of a System Selection

To calculate the number and size of nozzles required to fill a part an initial estimate of the number of nozzles or injection points must be made. A good starting point is to limit the flow length / part thickness (L/t) ratio to the typical values for that type of material. → Refer table on Pg11 - Typical Flow Length Ratios.

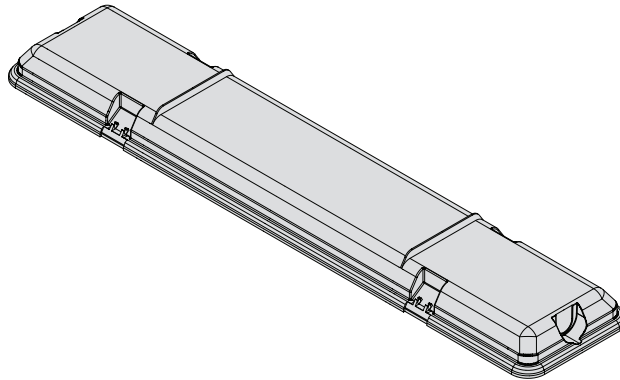
1	Part Details	
	Description	Fluorescent Light Base
	Overall Size	700 x 150 x 40 mm
	Wall thickness (t)	1.5mm
	Part Volume (V)	220ml

2	Material	
	Type	ABS
	Grade	Cycolac T-XS 30001
	Flame retardant	Yes
	Specific Gravity (SG)	1.3
	L/t for wall thickness	96
	Material Category	Medium - due to flame retardant move up one grade to difficult.

3	Hot Runner System Initial Estimates	
	Number of Nozzles (N)	4
	L/t	87.5 with 4 Nozzles

4	Hot Runner System Analysis Results	
	Injection Pressure	93.65MPa
	Injection Time (T)	1.36
	Total Flow Rate (F)	$(V*SG)/T=(220*1.3)/1.36=210\text{g/s}$
	Flow Rate per Nozzle	$(F/N)=210/4=52.5\text{g/s}$

Part Model - Fluorescent Light Base



#### Nozzle Series Selection

19 Series Nozzle is best suited due to the required flow rate of 52.5 g/sec. and the ABS material fitting the medium to difficult material category.



smart hot runner solutions

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