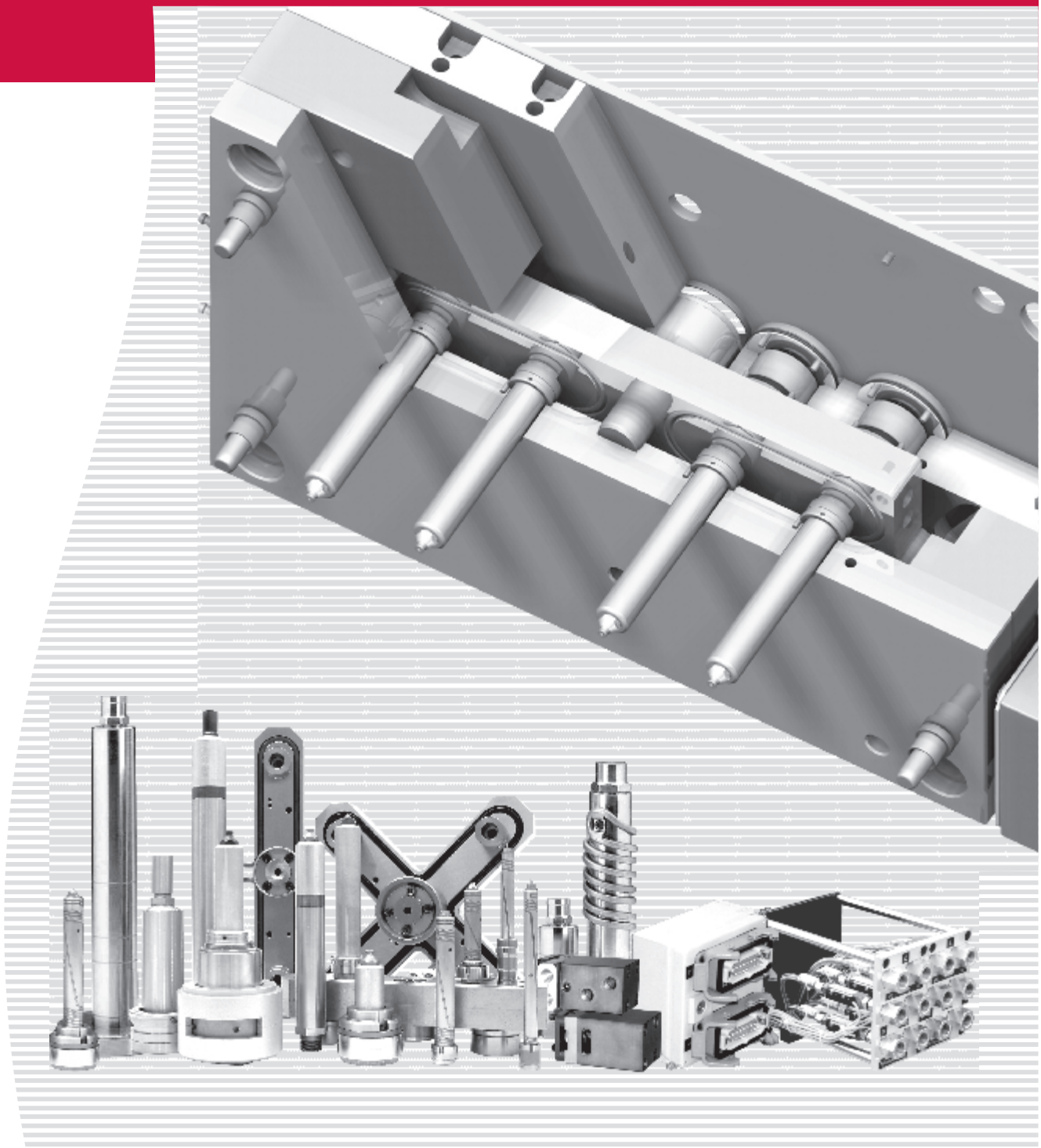
Hot Runner Guide

1.Layout and Design



C Company
P Products
T Technology
A Application

Synventive
molding solutions

The purpose of this Hot Runner Guide

The Hot Runner Guide - Layout and Design is intended to help everyone who designs feed systems for injection moulds or simply wants to find out about designing feed systems in the following way:

➔Overview of the Synventive hot runner product range
➔Insight into the layout of feed systems with hot runner technology
➔Help to select suitable hot runner components

Important note

All the information contained in these pages is based upon our current knowledge and experience gained from both theory and practise. However because of many factors outside our control they do not guarantee the suitability of our products for any particular application. Always consult Synventive for your specific application.

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For a specific application, please consult Synventive.

1. Hot Runner Components

2. Product Range Structure

Each hot runner system is made from a set of componenst.
The range of Synventive hot runner components is structured according to the work flow of how

a) Hot runner nozzles

Nozzle ranges with flow bores from 3.5 to 25 mm, as single or manifold nozzles, make it possible to implement a very wide range of applications.

b) Hot runner manifolds

Available in standard shapes - I, H, X, Y - and in any realisable custom shape, the ranges of manifolds cover all possible injection configurations and mould concepts.

c) Melt flow control technology

Valve technology to control the melt flow has long been established in the form of valve gate nozzles. In addition, Synventive supplies Dynamic Feed, the innovative, real-time, on-line, high-speed regulation of the melt pressure in each cavity.

d) Connections

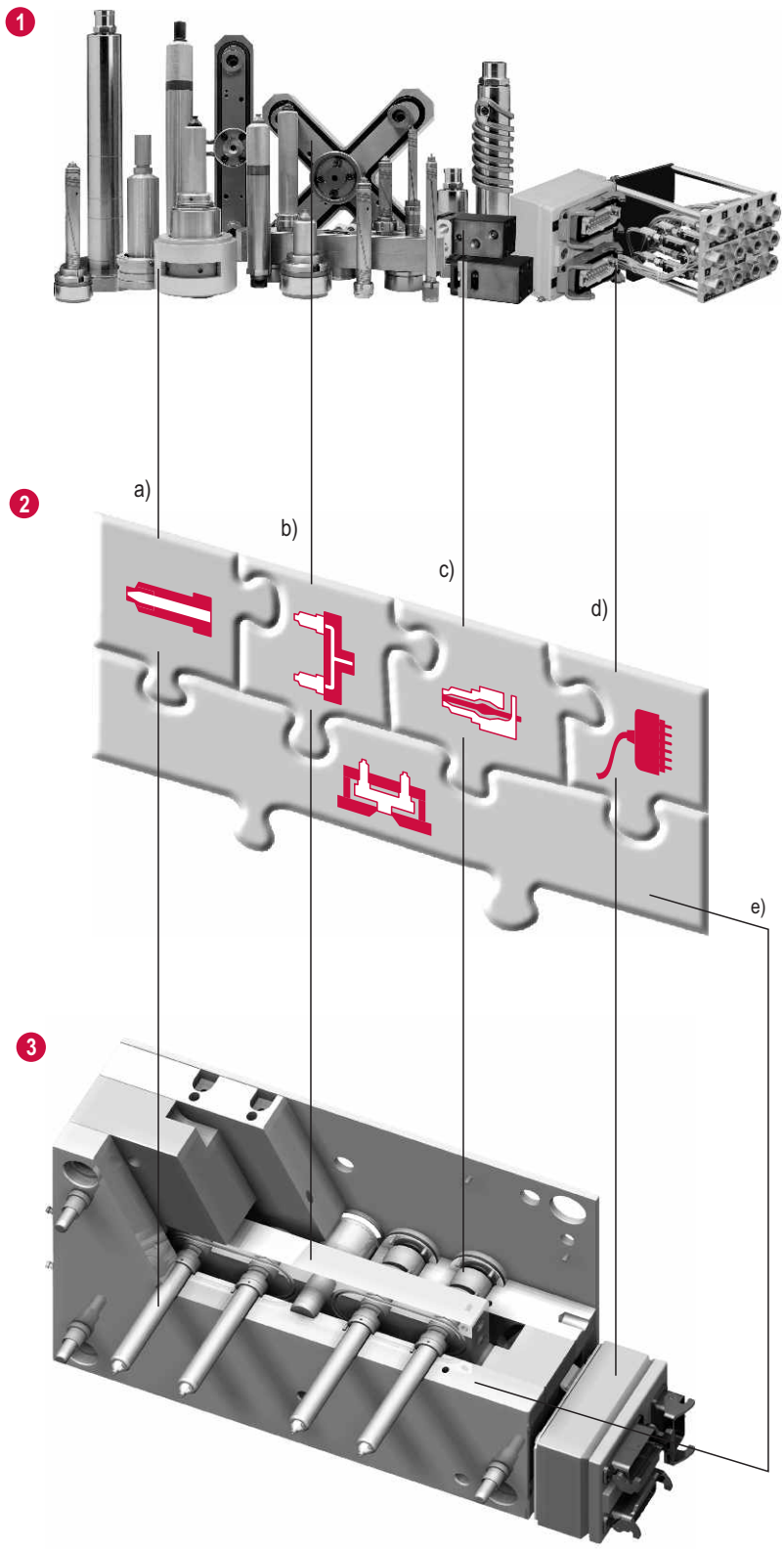
To customer specification or Synventive standard, Synventive hot runner systems are available pre-wired and pre-piped. All relevant connections - electrical, thermocouple, hydraulic, pneumatic, coolant - are brought out to the connection box and/or connection plate with appropriate connectors.

e) Hot halves

In the form of hot halves, the pre-stage of a complete half of a mould, hot runner systems are supplied completely mounted in mould plates, pre-wired, pre-piped if required and fully adjusted.

3. Customer solution

Using standard components almost any individual customised system can be created.



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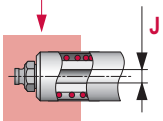
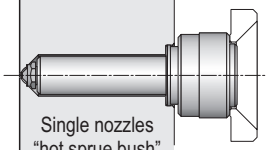
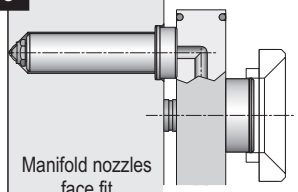
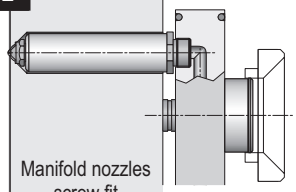
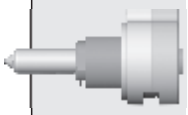
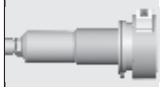
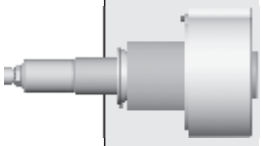
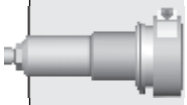
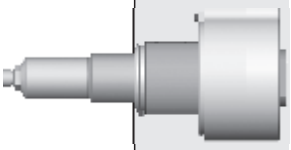
For a specific application, please consult Synventive.

Nozzle style

Nozzle size



	S	C	E
	 Single nozzles "hot sprue bush"	 Manifold nozzles face fit	 Manifold nozzles screw fit
03 J = Ø 3.0 (Standard flow bore-Ø[1])	**03 S01** open	**03 C01** open	
04 J = Ø 4.0 (Nozzle series and gating type)	**04 S01** open	**04 C01** open / valve gate **04 C03** open / valve gate	**04 E01** open / valve gate
07 J = Ø 7.0	**CB ... E** open  **CB N ... S** valve gate	**(N) CB ... M** open / valve gate **SR 8** open / valve gate	**07 E01** open / valve gate
12 J = Ø 12	 **GA ... E** open  **GA N ... S** **12 S01 ...V** valve gate	**(N) GA ... M** open / valve gate	**12 E01** open / valve gate
16 J = Ø 16	 **GB ... E** open  **GB N ... S** **16 S01 ... V** valve gate	**(N) GB ... M** open / valve gate	**16 E01** open / valve gate **16 E02** open / valve gate
22 J = Ø 22			**22 E01** open / valve gate **22 E02** open / valve gate

1) Depending on nozzle series and application different flow bore diameters are possible.

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For a specific application, please consult Synventive.

Nozzle key data

Nozzle style
Nozzle series

		Max. shot weight per nozzle (g) open			Max. shot weight per nozzle (g) valve gate			Major dimensions				Heater zones	
		high a)	medium b)	low c)	high a)	medium b)	low c)	J	L	D	Xn	No.	Power (W)
S	03 S01	2	5	10	-	-	-	Ø3	36...186	Ø14	-	2	360...460
	04 S01	20	40	70	-	-	-	Ø4	36...126	Ø18	-	2	360...410
	CB ... E	50	100	150	-	-	-	Ø7	36...246	Ø27	-	2...3	565...815
	CB N ... S	-	-	-	10	50	80	Ø7	33.5...243.5	Ø27	-	2...3	750...1000
	GA ... E	500	800	1500	-	-	-	Ø12	48...380	Ø40	-	2...4	1030...1930
	GA N ... S	-	-	-	80	150	300	Ø12	48...297	Ø40	-	2...3	1050...1650
	12 S01 V	-	-	-	80	150	300	Ø12	48...297	Ø40		2...4	1200...2430
	GB ... E	1000	1500	2500	-	-	-	Ø12	96...627	Ø40	-	2...4	1200...2430
	GB N ... S	-	-	-	250	600	1500	Ø16	48...380	Ø48	-	2...4	1200...2430
	16 S01 V	-	-	-	250	600	1500	Ø16	96...627	Ø50	-	2...4	1080...1810
C	03 C01	2	5	10	-	-	-	Ø3	36...186	Ø14	23	1	180...280
	04 C01	20	40	70	8	15	20	Ø4	36...126	Ø18	27	1	180...230
	04 C03	20	40	70	8	15	20	Ø4	86...186	Ø18	27	1	230...280
	(N) CB ... M	50	100	150	10	50	80	Ø7	36...246	Ø27	39	1...2	250...500
	(N) GA ... M	500	800	1500	100	250	500	Ø12	48...387	Ø40	65,5	1...3	400...1300
	(N) GB ... M	1000	1500	2500	500	800	1500	Ø16	48...387	Ø48	75,5	1...3	400...1630
E	07 E01	50	100	150	10	50	80	Ø7	66...386	Ø30	36.5	1...2	180...580
	12 E01	500	800	1500	100	250	500	Ø12	96...627	Ø40	46.5	1...3	315...1115
	16 E01	1000	1500	2500	500	800	1500	Ø16	96...627	Ø50	57	1...3	400...1660
	16 E02	700	1000	2000	100	200	400	Ø16 & Ø12	196...647	Ø40	57	2...3	515...1445
	22 E01	1500	2500	5000	800	1200	2000	Ø22	96...627	Ø60	67	1...3	500...1760
	22 E02	1200	2000	3500	300	800	1500	Ø22 & Ø18	196...647	Ø50	67	2...3	815...1760

1 2

Single Nozzles

Single nozzles are hortunners with surface for machine nozzle directly on the nozzle head. For that these nozzles are also known as Hot sprue bushings.

1. Shot weight based on gating type and viscosity of melt

2. Major dimensions and heater zones

Minimum and maximum value of nozzle length depend on the selected tip shape. Intermediate values can be found from the dimensional table of each nozzle series. All nozzles are externally heated. The numbering of the heater zones starts at the nozzle tip and ends at the nozzle head.

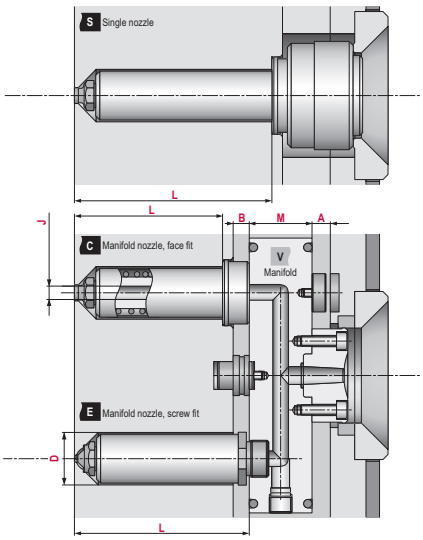
Viscosity of melt*

> 150 Pa s — a) high: PC, PMMA PEEK, PES, PSU, PEI, POM

= 60...150 Pa s — b) medium: ABS, SAN, ASA, PBT, PET, POM (Copo), PA, PPE, PPO, PPS, PC/ABS, PC/PBT

< 60 Pa s — c) low: PP, PE, PS, LCP, TPE

*at medium melt temperature and at a shear rate of 1000 1/s



Xn - minimal distance between nozzles

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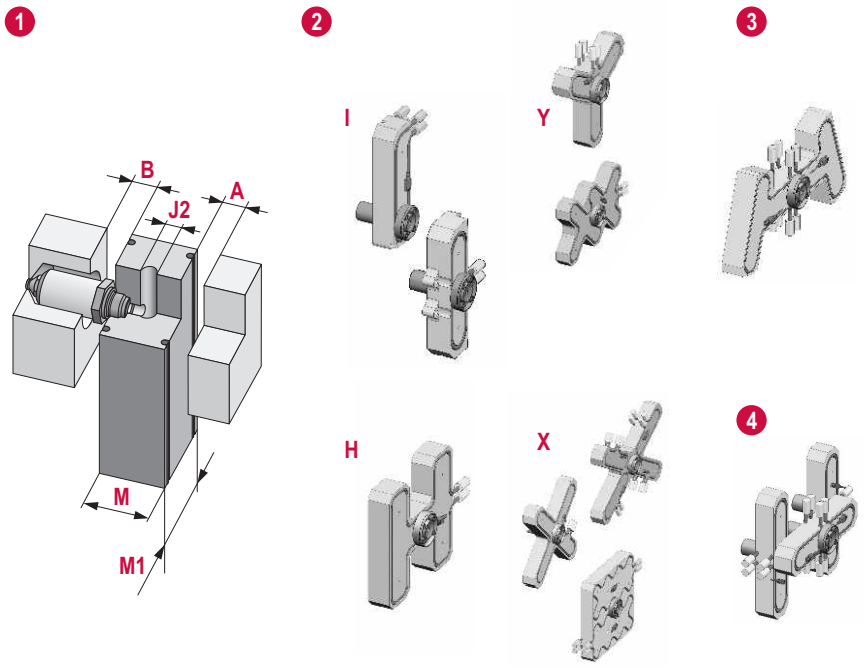
For a specific application, please consult Synventive.

Available manifold series

Nozzle size
Nozzle series

		VC M=37, M1=56				VD M=42, M1=56				VE M=50, M1=80				VF M=65, M1=80			
		J2 max		A	B	J2 max		A	B	J2 max		A	B	J2 max		A	B
		NT	V			NT	V			NT	V			NT	V		
03	03 C01	12	-	12	16.5	-	-	-	-	-	-	-	-	-	-	-	-
04	04 C01	12	12	17	11.5	-	-	-	-	-	-	-	-	-	-	-	-
	04 C03	12	12	17	11.5	-	-	-	-	-	-	-	-	-	-	-	-
07	(N) CB ... M	12	12	12	K-5	-	-	-	-	-	-	-	-	-	-	-	-
	07 E01	-	-	-	-	10	10	14	20	18	12	20	20	22	22	20	20
12	(N) GA ... M	12	-	-	-	-	-	-	-	18	12	20	28	-	-	-	-
	12 E01	-	-	-	-	-	-	-	-	18	12	20	20	22	22	20	20
16	(N) GB ... M	-	-	-	-	-	-	-	-	18	12	20	32	22	22	20	32
	16 E01	-	-	-	-	-	-	-	-	18	12	20	20	22	22	20	20
	16 E02	-	-	-	-	-	-	-	-	18	12	20	20	22	22	20	20
22	22 E01	-	-	-	-	-	-	-	-	18	12	20	20	22	22	20	20
	22 E02	-	-	-	-	-	-	-	-	18	12	20	20	22	22	20	20

1. Major dimensions
2. Manifolds in standard shape
3. Manifolds in customised shape
4. Bridge manifolds



NT: open nozzles **V**: valve gate nozzles

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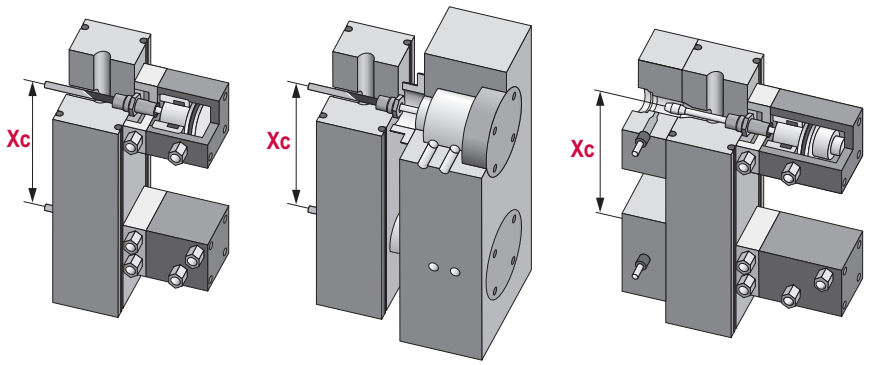
For a specific application, please consult Synventive.

Available actuators →

Nozzle size
Nozzle series

		HYC 2508M 01	HYC 4018M 01	HYC 4018M 02	HYC 4520M 03	PNC 3008B 01	PNC 4508M 01	PNC 7518M 01	PNC 7518M 02	HYZ 3908 01	QCVG	LCP 4008 02	LCP 8014 01	HYC 4520M 03
		Xc	Xc	Xc	Xc	Xc	Xc	Xc	Xc	Xc	Xc	Xc	Xc	Xc
04	04 C01	41	-	-	-	40	62	-	-	58	-	55	-	-
	04 C03	41	-	-	-	40	62	-	-	58	-	55	-	-
07	(N) CB ... M	41	-	-	-	40	62	-	-	58	-	55	-	-
	07 E01	41	-	-	-	40	62	-	-	58	-	55	-	-
12	(N) GA ... M	-	70	70	70	-	-	90	90	-	100	-	101	-
	12 E01	-	61	61	61	-	-	90	90	-	100	-	101	96
16	(N) GB ... M	-	80	80	80	-	-	90	90	-	100	-	101	-
	16 E01	-	70	70	70	-	-	90	90	-	100	-	101	140
	16 E02	-	70	70	70	-	-	90	90	-	100	-	101	140
22	22 E01	-	75	75	75	-	-	90	90	-	100	-	101	140
	22 E02	-	75	75	75	-	-	90	90	-	100	-	101	140

1. Actuator bolted to the manifold
2. Actuator in mould plate
3. Dynamic Feed® actuator



pneumatic hydraulic

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For a specific application, please consult Synventive.

Tip shape	W	W	Y	Y	Y	W
Version	-	01	10	04	01	01
Gating	T	T	T	T	V	V

Related nozzle series						
03 — 03 C01	●					
03 — 03 S01	●					
04 — 04 C01		●	●	●	●	●
04 — 04 C03		●	●	●	●	●
04 — 04 S01		●	●	●		

Additional suitability

Application	polyolefines and amorphous thermoplastics	all thermoplastics, use tool insert	semi-crystalline and cold runner	amorphous thermoplastics and cold runner	amorphous thermoplastics and cold runner	all thermoplastics, use tool insert
Material						
semi-crystalline thermoplastics						
PE	■■■□	■■■■	■ 5 5 5	■ 5 5 5	■■ 5 5	■■■■
PP	■■■□	■■■■	■ 5 5 5	■ 5 5 5	■■ 5 5	■■■■
PEEK	□□□□	■■ 2 □	■■□□	■□□□	■■□□	■■■ 2
PPS	□□□□	■■ 2 □	■■□□	■□□□	■■□□	■■■ 2
PET	1 □□□	■■ 2 □	■■□□	■□□□	■■□□	■■■ 2
PBT	■□□□	■■■ 2	■■■ 5	■□□□	■■■□	■■■ 2
LCP	1 □□□	1 □□□	1 □□□	1 □□□	1 □□□	1 □□□
PPE/PA	1 □□□	■■□□	■■■ 5	1 □□□	■■■□	■■■ 5
PA6	■■□□	■■■□	■■■ 5	■□□□	■■□□	■■■ 2
PA6.6	■■□□	■■■□	■■■ 5	■□□□	■■■□	■■■ 2
PA 4.6	□□□□	■■□□	■■□□	□□□□	■■□□	■■ 2 □
PPA	□□□□	■■□□	■■□□	□□□□	■□□□	■■ 2 □
POM Homo	■□□□	■■■□	■■■□	■■□□	■■■□	■■■□
POM Copo	■□□□	■■■□	■■■□	■■□□	■■■□	■■■□
amorphous thermoplastics						
PMMA	□□□□	■■■ 3 4	■ 5 5 5	■■ 5 5	■ 5 5 □	■■■■
ABS	■■□□	■■■ 3	■■ 5 5	■■ 5 5	■ 5 5 □	■■■■
ASA	■■□□	■■■ 3	■■ 5 5	■■ 5 5	■ 5 5 □	■■■■
SAN	■■□□	■■■ 3	■■ 5 5	■■ 5 5	■ 5 5 □	■■■■
PS	■■□□	■■■ 3	■■ 5 5	■■ 5 5	■ 5 5 □	■■■■
PPE	□□□□	■■■□	■■ 5 5	■■ 5 5	■ 5 5 □	■■■■
PC	1 □□□	■■■ 3 4	■ 5 5 5	■■ 5 5	■ 5 □ □	■■■■
PES	□□□□	■■□□	■ 5 □ □	■■□□	■□□□	■■ 2 □
PSU	□□□□	■■□□	■ 5 □ □	■■□□	■□□□	■■ 2 □
PEI	□□□□	■■□□	■ 5 □ □	■■□□	■□□□	■■ 2 □
PVC soft	□□□□	1 □□□	1 □□□	1 □□□	1 □□□	1 □□□
SMA	■■□□	■■■■	■■ 5 □	■■□□	■■□□	■■■■
thermopl. blends						
PC/ABS	1 □□□	■■■■	■■ 5 □	■■□□	■■ 5 5	■■■■
PC/PBT	1 □□□	■■■□	■■ 5 □	■■□□	■■ 5 □	■■■□
thermopl. elastomers						
TPE-O/S/V	■■■□	■■■■	■■ 5 5	■ 5 5 □	■ 5 5 5	■■■■
TPE-U	■■□□	■■■□	■■ 5 5	■ 5 5 □	■ 5 5 5	■■■■
other properties						
fast cycle	■■■■	■■■■	■■□□	■■■□	■■■□	■■■■
colorchange	■ 1 2 □	■■ 1 □	■■□□	■■■□	■■■□	■■ 1 1
flame retardant	■ 1 □□	■■ 1 □	■■■□	■■■□	■■■□	■ 1 1
mineral filed	1 □□□	■■ 1 □	■■■□	■■■□	■■ 1 □	■■ 1 □
glasfiber	1 □□□	■■ 1 □	■■■□	■■■□	■■ 1 □	■■ 1 □

■■■■ suitable ▪▪▪▪ additional suitability □□□□ not suitable

1) consult Synventive 2) use toolinsert 3) use cooled insert 4) direct gating or cosmetic surface 5) coldrunner application

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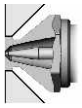
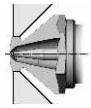
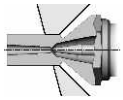
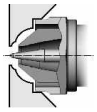
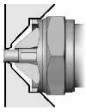
For a specific application, please consult Synventive.

Tip shape	Y	F	L	W	X
Version	- / 01	- / 01	- / 01	- / 01	- / 01
Gating	T	T	T	T	T
					
Related nozzle series					
07 CB ... E	●	●	●	●	●
(N) CB ... M	●	●	●	●	●
SR 8	●	●	●	●	●
07 E01	●	●	●	●	●
Material suitability					
Application	for narrow to medium process window	for narrow to medium process window	for narrow to medium process window	for narrow to medium process window	for medium to wide process window
Material / Additives	A B C D	A B C D	A B C D	A B C D	A B C D
semi-crystalline thermoplastics: PE	o o + o	o o + o	o o + o	o o + o	+ + o o
PP	x x + x	x x + x	x x + x	o o + o	+ + o o
PEEK	x x x x	x x x x	x x x x	o o o o	- - - -
PPS	+ + + +	+ + + +	+ + + +	x x x o	- - - -
PET	+ + + +	+ + + +	+ + + +	x x x o	- - - -
PBT	+ + + +	+ + + +	+ + + +	x x x o	- - - -
LCP	+ + + +	+ + + +	+ + + +	x x x o	- - - -
PPE/PA	+ + + +	+ + + +	+ + + +	x x x o	- - - -
PA6	+ + + +	+ + + +	+ + + +	x x x o	- - - -
PA6.6	+ + + +	+ + + +	+ + + +	o o o o	- - - -
PA 4.6	x x x x	x x x x	x x x x	- - - -	- - - -
PPA	x x x x	x x x x	x x x x	- - - -	- - - -
POM Homo	x x x x	x x x x	x x x x	o o o o	- - - -
POM Copo	+ + + +	+ + + +	+ + + +	x x x x	- - - -
amorphous thermoplastics: PMMA	x x + x	x x + x	x x + x	o o x o	+ + o o
ABS	x x + x	x x + x	x x + x	o o x o	+ + o o
ASA	x x + x	x x + x	x x + x	o o x o	+ + o o
SAN	x x + x	x x + x	x x + x	o o x o	+ + o o
PS	x x + x	x x + x	x x + x	o o x o	+ + o o
PPE	x x + x	x x + x	x x + x	o o x o	+ + o o
PC	x x + x	x x + x	x x + x	o o x o	+ + o o
PES	x x + x	x x + x	x x + x	x x x o	o o o o
PSU	x x + x	x x + x	x x + x	x x x o	o o o o
PEI	x x + x	x x + x	x x + x	x x x o	o o o o
PVC soft	o o o o	o o o o	o o o o	o o o o	- - - -
PC/ABS	x x + x	x x + x	x x + x	o o x o	+ + o o
SMA	x x + x	x x + x	x x + x	+ + x o	o o o o
PC/PBT	x x + x	x x + x	x x + x	+ + x o	o o o o
thermopl. elastomers: TPE-O/S/V	o o o o	o o o o	o o o o	- - x -	+ + o o
TPE-U	+ + + +	+ + + +	+ + + +	+ + + o	- - - -

A: unfilled **B**: fillers **C**: glass fibres **D**: flame retardants

+ : highly suitable **x** : suitable **o** : depending on application **-** : unsuitable

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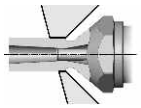
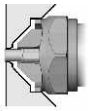
For a specific application, please consult Synventive.

Tip shape	Y	L	W	X
Version	- / 01	- / 01	- / 01	- / 01
Gating	V	V	V	V
Related nozzle series				
07 CB N ... S	●	●	●	●
(N) CB ... M	●	●	●	●
SR 8	●	●	●	●
07 E01	●	●	●	●
Material suitability				
Application	for narrow to medium process window	for narrow to medium process window	for narrow to medium process window	for narrow to medium process window
Material / Additives	A B C D	A B C D	A B C D	A B C D
semi-crystalline thermoplastics: PE	x x + x	x x + x	o o x o	+ + o o
PP	x x + x	x x + x	o o x o	+ + o o
PEEK	x x x x	x x x x	x x o o	- - - -
PPS	+ + + +	+ + + +	+ x o o	- - - -
PET	+ + + +	+ + + +	+ x x o	- - - -
PBT	+ + + +	+ + + +	+ x x o	- - - -
LCP	+ + + +	+ + + +	+ x x o	- - - -
PPE/PA	+ + + +	+ + + +	+ x o o	- - - -
PA6	+ + + +	+ + + +	+ x o o	- - - -
PA6.6	+ + + +	+ + + +	+ x o o	- - - -
PA 4.6	+ + + +	+ + + +	x x - o	- - - -
PPA	+ + + +	+ + + +	x x - o	- - - -
POM Homo	x x x x	x x x x	o o o o	- - - -
POM Copo	+ + + +	+ + + +	x x x x	- - - -
amorphous thermoplastics: PMMA	x x + x	x x + x	+ + + o	x x o o
ABS	x x + +	x x + +	+ + + o	x x o o
ASA	x + + +	x + + +	o o + o	+ + o o
SAN	x + + +	x + + +	o o + o	+ + o o
PS	x + + +	x + + +	o o + o	+ + o o
PPE	x x + x	x x + x	o o + o	+ + o o
PC	x o + x	x o + x	+ + + o	o o o o
PES	+ + + +	+ + + +	x x x o	- - - -
PSU	+ + + +	+ + + +	x x x o	- - - -
PEI	+ + + +	+ + + +	x x x o	- - - -
PVC soft	o o o o	o o o o	o o o o	- - - -
PC/ABS	x x + x	x x + x	+ + + o	x x - o
SMA	x x + x	x x + x	+ + x o	o o - o
PC/PBT	x x + x	x x + x	+ + x o	o o - o
thermopl. elastomers: TPE-O/S/V	o o o o	o o o o	- - x -	+ + o o
TPE-U	x x + o	x x + o	+ + + o	- - - -

A: unfilled **B**: fillers **C**: glass fibres **D**: flame retardants

+ : highly suitable **x** : suitable **o** : depending on application **-** : unsuitable

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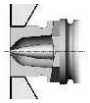
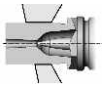
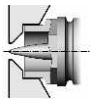
For a specific application, please consult Synventive.

Tip shape	Y	U	F	P	K	L	S	W
Version	- / 01	- / 01	- / 01	- / 01	- / 01	- / 01	- / 01	- / 01
Gating	T	T	T	T	T	T	T	T
Related nozzle series								
12 GA ... E	●	●	●	●	●	●	●	●
(N) GA ... M	●	●	●	●	●	●	●	●
12 E01	●	●		●	●	●	●	●
16 E02	●	●		●	●	●	●	●
Material suitability								
Application	for narrow to medium process window	for medium to wide process window	for narrow to medium process window	for medium to wide process window	for all usual thermoplastics	for narrow to medium process window	for medium to wide process window	for medium to wide process window
Material / Additives	A B C D	A B C D	A B C D	A B C D	A B C D	A B C D	A B C D	A B C D
semi-crystalline thermoplastics: PE	- - x -	+ + + +	- - x -	+ + + +	+ + + +	x x x x	x x x x	+ + + o
PP	- - x -	x x o x	- - x -	x x x x	+ + + +	o x x o	x x o x	+ + + o
PEEK	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	- - - o
PPS	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	o o o o
PET	x x x x	- - - -	x x x x	- - - -	+ + + +	x x x x	- - - -	x o o o
PBT	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	o o o o
LCP	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -
PPE/PA	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	o o o o
PA6	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	x x x o
PA6.6	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	o o o o
PA 4.6	x x x x	- - - -	x x x x	- - - -	o o o o	x x x x	- - - -	- - - -
PPA	x x x x	- - - -	x x x x	- - - -	o o o o	x x x x	- - - -	- - - -
POM Homo	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	o o o o
POM Copo	x x x x	- - - -	x x x x	- - - -	+ + + +	x x x x	- - - -	x x x x
amorphous thermoplastics: PMMA	- - x -	x x x x	- - o -	x x x x	+ + + +	o o x o	x x o x	+ + x o
ABS	- - x -	x x x x	- - o -	x x x x	+ + + +	o o x o	x x o x	+ + x o
ASA	- - x -	x x x x	- - o -	x x x x	+ + + +	o o x o	x x o x	+ + x o
SAN	- - x -	x x x x	- - o -	x x x x	+ + + +	o o x o	x x o x	+ + x o
PS	- - x -	x x x x	- - o -	x x x x	+ + + +	o o x o	x x o x	+ + x o
PPE	- - x -	x x x x	- - o -	x x x x	+ + + +	o o x o	x x o x	+ + x o
PC	- - x -	x x o x	- - o -	x x x x	+ + + +	o o x o	x x o x	x + x o
PES	x x x x	o o o o	x x x x	o o o o	o o o o	x x x x	o o o o	o o o o
PSU	x x x x	- - - -	x x x x	o o o o	x x x x	x x x x	o o o o	o o o o
PEI	x x x x	- - - -	x x x x	o o o o	x x x x	x x x x	o o o o	o o o o
PVC soft	- - - -	o o o o	- - - -	o o o o	o o o o	o o o o	o o o o	- - - -
PC/ABS	- - x -	x x o x	- - o -	x x x x	+ + + +	o o x o	x x o x	x x x o
SMA	x x x x	o o o o	x x x x	- - - -	x x x x	x x x x	- - - -	x x o o
PC/PBT	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	x x o o
thermopl. elastomers: TPE-O/S/V	- - - -	o o o o	- - - -	o o o o	x x x x	- - - -	o o o o	+ + + o
TPE-U	- - - -	- - - -	- - - -	o o o o	+ + + +	+ + + +	- - - -	x x x o

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+ : highly suitable **x** : suitable **o** : depending on application **-** : unsuitable

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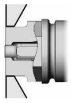
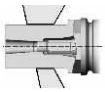
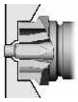
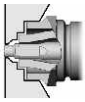
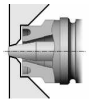
Tip shape	Y	L	S	V	W	W	X
Version	- / 01	- / 01	- / 01	- / 01	01	02	01
Gating	V	V	V	V	V	V	V
							
Related nozzle series							
12 GA N ... S	●	●	●	●	●	●	●
(N) GA ... M	●	●	●	●	●	●	●
12 E01	●	●	●	●	●	●	●
16 E02	●	●	●	●	●	●	●
Material suitability							
Application	for narrow to medium process window	for narrow to medium process window	for medium to wide process window	for medium to wide process window	for medium to wide process window	for wide process window when installation space is limited	for medium to wide process window
Material / Additives	A B C D	A B C D	A B C D	A B C D	A B C D	A B C D	A B C D
semi-crystalline thermoplastics: PE	o o o o	o o o o	x x x x	o o o o	o o x o	+ + o o	o o - x
PP	o o o o	o o o o	x x x x	o o o o	o o x o	+ + o o	o o - x
PEEK	o o o o	o o o o	x x x x	- - - -	o o o o	- - - -	- - - -
PPS	o o o o	o o o o	x x x x	- - - -	+ x o o	- - - -	- - - -
PET	x x x x	x x x x	o o o o	- - - -	+ x x o	- - - -	- - - -
PBT	+ x x x	+ x x x	x o o o	- - - -	x x x o	- - - -	- - - -
LCP	x x x x	x x x x	o o o o	- - - -	x x x o	- - - -	- - - -
PPE/PA	+ + + +	+ + + +	o o o o	- - - -	x x o o	- - - -	- - - -
PA6	+ + + +	+ + + +	o o o o	- - - -	x x o o	- - - -	- - - -
PA6.6	+ + + +	+ + + +	- - - -	- - - -	x x o o	- - - -	- - - -
PA 4.6	+ + + +	+ + + +	- - - -	- - - -	x x - o	- - - -	- - - -
PPA	+ + + +	+ + + +	- - - -	- - - -	x x - o	- - - -	- - - -
POM Homo	x x x x	x x x x	o o o o	- - - -	o o o o	- - - -	- - - -
POM Copo	o o o o	o o o o	x x x x	- - - -	x x x x	- - - -	- - - -
amorphous thermoplastics: PMMA	- - o -	- - o -	x x x x	o o - o	o + + o	o o o o	+ + + +
ABS	- - o -	- - o -	x x x x	o o - o	o + + o	+ + + +	+ + + +
ASA	- - o -	- - o -	x x x x	o o - o	o o + o	+ + + +	+ + + +
SAN	- - o -	- - o -	x x x x	o o - o	o o + o	+ + + +	+ + + +
PS	- - o -	- - o -	x x x x	o o - o	o o + o	+ + + +	+ + + +
PPE	- - o -	- - o -	x x x x	o o - o	+ + + o	o o o o	o o o o
PC	- - o -	- - o -	x x x x	o o - o	o + + o	o o o o	+ o o o
PES	o o o o	o o o o	x x x x	- - - -	o x x o	- - - -	- - - -
PSU	o o o o	o o o o	x x x x	- - - -	x x x o	- - - -	- - - -
PEI	o o o o	o o o o	x x x x	- - - -	x x x o	- - - -	- - - -
PVC soft	o o o o	o o o o	o o o o	- - - -	o o o o	o o o o	o o o o
PC/ABS	x x + x	x x + x	+ + x +	o o - o	+ + + o	o o o o	o o o o
SMA	x x + x	x x + x	+ + x +	o o - o	+ + + o	- - - -	- - - -
PC/PBT	x x + x	x x + x	+ + x +	o o - o	+ + x o	- - - -	- - - -
thermopl. elastomers: TPE-O/S/V	- - o -	- - o -	o o o o	x x x x	- - x -	+ + + o	o o o o
TPE-U	x x + o	x x + o	+ + o +	o o o o	+ + + o	o o o o	- - - -

A: unfilled **B**: fillers **C**: glass fibres **D**: flame retardants

+ : highly suitable **x** : suitable **o** : depending on application **-** : unsuitable

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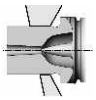
For a specific application, please consult Synventive.

Tip shape	Y	U	F	P	K	L	S	W
Version	- / 01	- / 01	- / 01	- / 01	- / 01	- / 01	- / 01	- / 01
Gating	T	T	T	T	T	T	T	T
Related nozzle series								
16 GB ... E	●	●	●	●	●	●	●	●
(N) GB ... M	●	●	●	●	●	●	●	●
16 E01	●	●		●	●	●	●	●
22 E02	●	●		●	●	●	●	●
Material suitability								
Application	for narrow to medium process window	for medium to wide process window	for narrow to medium process window	for medium to wide process window	for all usual thermoplastics	for narrow to medium process window	for medium to wide process window	for medium to wide process window
Material / Additives	A B C D	A B C D	A B C D	A B C D	A B C D	A B C D	A B C D	A B C D
semi-crystalline thermoplastics: PE	- - x -	+ + + +	- - x -	+ + + +	+ + + +	x x x x	x x x x	+ + + o
PP	- - x -	x x o x	- - x -	x x x x	+ + + +	o x x o	x x o x	+ + + o
PEEK	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	- - - o
PPS	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	o o o o
PET	x x x x	- - - -	x x x x	- - - -	+ + + +	x x x x	- - - -	x o o o
PBT	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	o o o o
LCP	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -
PPE/PA	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	o o o o
PA6	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	x x x o
PA6.6	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	o o o o
PA 4.6	x x x x	- - - -	x x x x	- - - -	o o o o	x x x x	- - - -	- - - -
PPA	x x x x	- - - -	x x x x	- - - -	o o o o	x x x x	- - - -	- - - -
POM Homo	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	o o o o
POM Copo	x x x x	- - - -	x x x x	- - - -	+ + + +	x x x x	- - - -	x x x x
amorphous thermoplastics: PMMA	- - x -	x x x x	- - o -	x x x x	+ + + +	o o x o	x x o x	+ + x o
ABS	- - x -	x x x x	- - o -	x x x x	+ + + +	o o x o	x x o x	+ + x o
ASA	- - x -	x x x x	- - o -	x x x x	+ + + +	o o x o	x x o x	+ + x o
SAN	- - x -	x x x x	- - o -	x x x x	+ + + +	o o x o	x x o x	+ + x o
PS	- - x -	x x x x	- - o -	x x x x	+ + + +	o o x o	x x o x	+ + x o
PPE	- - x -	x x x x	- - o -	x x x x	+ + + +	o o x o	x x o x	+ + x o
PC	- - x -	x x o x	- - o -	x x x x	+ + + +	o o x o	x x o x	x + x o
PES	x x x x	o o o o	x x x x	o o o o	o o o o	x x x x	o o o o	o o o o
PSU	x x x x	- - - -	x x x x	o o o o	x x x x	x x x x	o o o o	o o o o
PEI	x x x x	- - - -	x x x x	o o o o	x x x x	x x x x	o o o o	o o o o
PVC soft	- - - -	o o o o	- - - -	o o o o	o o o o	o o o o	o o o o	- - - -
PC/ABS	- - x -	x x o x	- - o -	x x x x	+ + + +	o o x o	x x o x	x x x o
SMA	x x x x	o o o o	x x x x	- - - -	x x x x	x x x x	- - - -	x x o o
PC/PBT	x x x x	- - - -	x x x x	- - - -	x x x x	x x x x	- - - -	x x o o
thermopl. elastomers: TPE-O/S/V	- - - -	o o o o	- - - -	o o o o	x x x x	- - - -	o o o o	+ + + o
TPE-U	- - - -	- - - -	- - - -	o o o o	+ + + +	o o o o	- - - -	x x x o

A: unfilled **B**: fillers **C**: glass fibres **D**: flame retardants

+ : highly suitable **x** : suitable **o** : depending on application **-** : unsuitable

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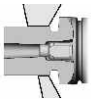
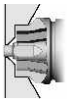
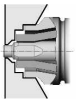
For a specific application, please consult Synventive.

Tip shape	Y	L	S	V	W	W	X
Version	- / 01	- / 01	- / 01	- / 01	01	02	01
Gating	V	V	V	V	V	V	V
Related nozzle series							
16 GB N ... S	●	●	●	●	●	●	●
(N) GB ... M	●	●	●	●	●	●	
16 E01	●	●	●	●	●	●	
22 E02	●	●	●	●	●	●	
Material suitability							
Application	for narrow to medium process window	for narrow to medium process window	for medium to wide process window	for medium to wide process window	for medium to wide process window	for wide process window when installation space is limited	for medium to wide process window
Material / Additives	A B C D	A B C D	A B C D	A B C D	A B C D	A B C D	A B C D
semi-crystalline thermoplastics: PE	o o o o	o o o o	x x x x	o o o o	o o x o	+ + o o	o o - x
PP	o o o o	o o o o	x x x x	o o o o	o o x o	+ + o o	o o - x
PEEK	o o o o	o o o o	x x x x	- - - -	o o o o	- - - -	- - - -
PPS	o o o o	o o o o	x x x x	- - - -	+ x o o	- - - -	- - - -
PET	x x x x	x x x x	o o o o	- - - -	+ x x o	- - - -	- - - -
PBT	+ x x x	+ x x x	x o o o	- - - -	x x x o	- - - -	- - - -
LCP	x x x x	x x x x	o o o o	- - - -	x x x o	- - - -	- - - -
PPE/PA	+ + + +	+ + + +	o o o o	- - - -	x x o o	- - - -	- - - -
PA6	+ + + +	+ + + +	o o o o	- - - -	x x o o	- - - -	- - - -
PA6.6	+ + + +	+ + + +	- - - -	- - - -	x x o o	- - - -	- - - -
PA 4.6	+ + + +	+ + + +	- - - -	- - - -	x x - o	- - - -	- - - -
PPA	+ + + +	+ + + +	- - - -	- - - -	x x - o	- - - -	- - - -
POM Homo	x x x x	x x x x	o o o o	- - - -	o o o o	- - - -	- - - -
POM Copo	o o o o	o o o o	x x x x	- - - -	x x x x	- - - -	- - - -
amorphous thermoplastics: PMMA	- - o -	- - o -	x x x x	o o - o	o + + o	o o o o	+ + + +
ABS	- - o -	- - o -	x x x x	o o - o	o + + o	+ + + +	+ + + +
ASA	- - o -	- - o -	x x x x	o o - o	o o + o	+ + + +	+ + + +
SAN	- - o -	- - o -	x x x x	o o - o	o o + o	+ + + +	+ + + +
PS	- - o -	- - o -	x x x x	o o - o	o o + o	+ + + +	+ + + +
PPE	- - o -	- - o -	x x x x	o o - o	+ + + o	o o o o	o o o o
PC	- - o -	- - o -	x x x x	o o - o	o + + o	o o o o	+ o o o
PES	o o o o	o o o o	x x x x	- - - -	o x x o	- - - -	- - - -
PSU	o o o o	o o o o	x x x x	- - - -	x x x o	- - - -	- - - -
PEI	o o o o	o o o o	x x x x	- - - -	x x x o	- - - -	- - - -
PVC soft	o o o o	o o o o	o o o o	- - - -	o o o o	o o o o	o o o o
PC/ABS	x x + x	x x + x	+ + x +	o o - o	+ + + o	o o o o	o o o o
SMA	x x + x	x x + x	+ + x +	o o - o	+ + + o	- - - -	- - - -
PC/PBT	x x + x	x x + x	+ + x +	o o - o	+ + x o	- - - -	- - - -
thermopl. elastomers: TPE-O/S/V	- - o -	- - o -	o o o o	x x x x	- - x -	+ + + o	o o o o
TPE-U	x x + o	x x + o	+ + o +	o o o o	+ + + o	o o o o	- - - -

A: unfilled **B**: fillers **C**: glass fibres **D**: flame retardants

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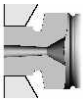
For a specific application, please consult Synventive.

Tip shape	Y	U	P	K	L	S	W
Version	- / 01	- / 01	- / 01	- / 01	- / 01	- / 01	01
Gating	T	T	T	N	T	T	T
Related nozzle series							
22 — 22 E01	●	●	●	●	●	●	●
22 E02							
Material suitability							
Application	for narrow to medium process window	for medium to wide process window	for medium to wide process window	for all usual thermoplastics	for narrow to medium process window	for medium to wide process window	for medium to wide process window
Material / Additives	A B C D	A B C D	A B C D	A B C D	A B C D	A B C D	A B C D
semi-crystalline thermoplastics: PE	- - x -	+ + + +	+ + + +	+ + + +	x x x x	x x x x	+ + + o
PP	- - x -	x x o x	x x x x	+ + + +	o x x o	x x o x	+ + + o
PEEK	x x x x	- - - -	- - - -	x x x x	x x x x	- - - -	- - - o
PPS	x x x x	- - - -	- - - -	x x x x	x x x x	- - - -	o o o o
PET	x x x x	- - - -	- - - -	+ + + +	x x x x	- - - -	x o o o
PBT	x x x x	- - - -	- - - -	x x x x	x x x x	- - - -	o o o o
LCP	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -
PPE/PA	x x x x	- - - -	- - - -	x x x x	x x x x	- - - -	o o o o
PA6	x x x x	- - - -	- - - -	x x x x	x x x x	- - - -	x x x o
PA6.6	x x x x	- - - -	- - - -	x x x x	x x x x	- - - -	o o o o
PA 4.6	x x x x	- - - -	- - - -	o o o o	x x x x	- - - -	- - - -
PPA	x x x x	- - - -	- - - -	o o o o	x x x x	- - - -	- - - -
POM Homo	x x x x	- - - -	- - - -	x x x x	x x x x	- - - -	o o o o
POM Copo	x x x x	- - - -	- - - -	+ + + +	x x x x	- - - -	x x x x
amorphous thermoplastics: PMMA	- - x -	x x x x	x x x x	+ + + +	o o x o	x x o x	+ + x o
ABS	- - x -	x x x x	x x x x	+ + + +	o o x o	x x o x	+ + x o
ASA	- - x -	x x x x	x x x x	+ + + +	o o x o	x x o x	+ + x o
SAN	- - x -	x x x x	x x x x	+ + + +	o o x o	x x o x	+ + x o
PS	- - x -	x x x x	x x x x	+ + + +	o o x o	x x o x	+ + x o
PPE	- - x -	x x x x	x x x x	+ + + +	o o x o	x x o x	+ + x o
PC	- - x -	x x o x	x x x x	+ + + +	o o x o	x x o x	x + x o
PES	x x x x	o o o o	o o o o	o o o o	x x x x	o o o o	o o o o
PSU	x x x x	- - - -	o o o o	x x x x	x x x x	o o o o	o o o o
PEI	x x x x	- - - -	o o o o	x x x x	x x x x	o o o o	o o o o
PVC soft	- - - -	o o o o	o o o o	o o o o	o o o o	o o o o	- - - -
PC/ABS	- - x -	x x o x	x x x x	+ + + +	o o x o	x x o x	x x x o
SMA	x x x x	o o o o	- - - -	x x x x	x x x x	- - - -	x x o o
PC/PBT	x x x x	- - - -	- - - -	x x x x	x x x x	- - - -	x x o o
thermopl. elastomers: TPE-O/S/V	- - - -	o o o o	o o o o	x x x x	- - - -	o o o o	+ + + o
TPE-U	- - - -	- - - -	o o o o	+ + + +	o o o o	- - - -	x x x o

A: unfilled **B**: fillers **C**: glass fibres **D**: flame retardants

+ : highly suitable **x** : suitable **o** : depending on application **-** : unsuitable

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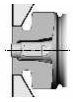
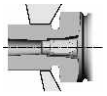
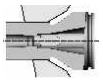
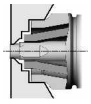
For a specific application, please consult Synventive.

Tip shape	Y	L	S	V	W	W
Version	- / 01	- / 01	- / 01	- / 01	01	02
Gating	V	V	V	V	V	V
Related nozzle series						
22 — 22 E01	●	●	●	●	●	●
22 — 22 E02						
Material suitability						
Application	for narrow to medium process window	for narrow to medium process window	for medium to wide process window	for medium to wide process window	for medium to wide process window	for wide process window when installation space is limited
Material / Additives	A B C D	A B C D	A B C D	A B C D	A B C D	A B C D
semi-crystalline thermoplastics: PE	o o o o	o o o o	x x x x	o o o o	o o x o	+ + o o
PP	o o o o	o o o o	x x x x	o o o o	o o x o	+ + o o
PEEK	o o o o	o o o o	x x x x	- - - -	o o o o	- - - -
PPS	o o o o	o o o o	x x x x	- - - -	+ x o o	- - - -
PET	x x x x	x x x x	o o o o	- - - -	+ x x o	- - - -
PBT	+ x x x	+ x x x	x o o o	- - - -	x x x o	- - - -
LCP	x x x x	x x x x	o o o o	- - - -	x x x o	- - - -
PPE/PA	+ + + +	+ + + +	o o o o	- - - -	x x o o	- - - -
PA6	+ + + +	+ + + +	o o o o	- - - -	x x o o	- - - -
PA6.6	+ + + +	+ + + +	- - - -	- - - -	x x o o	- - - -
PA 4.6	+ + + +	+ + + +	- - - -	- - - -	x x - o	- - - -
PPA	+ + + +	+ + + +	- - - -	- - - -	x x - o	- - - -
POM Homo	x x x x	x x x x	o o o o	- - - -	o o o o	- - - -
POM Copo	o o o o	o o o o	x x x x	- - - -	x x x x	- - - -
amorphous thermoplastics: PMMA	- - o -	- - o -	x x x x	o o - o	o + + o	o o o o
ABS	- - o -	- - o -	x x x x	o o - o	o + + o	+ + + +
ASA	- - o -	- - o -	x x x x	o o - o	o o + o	+ + + +
SAN	- - o -	- - o -	x x x x	o o - o	o o + o	+ + + +
PS	- - o -	- - o -	x x x x	o o - o	o o + o	+ + + +
PPE	- - o -	- - o -	x x x x	o o - o	+ + + o	o o o o
PC	- - o -	- - o -	x x x x	o o - o	o + + o	o o o o
PES	o o o o	o o o o	x x x x	- - - -	o x x o	- - - -
PSU	o o o o	o o o o	x x x x	- - - -	x x x o	- - - -
PEI	o o o o	o o o o	x x x x	- - - -	x x x o	- - - -
PVC soft	o o o o	o o o o	o o o o	- - - -	o o o o	o o o o
PC/ABS	x x + x	x x + x	+ + x +	o o - o	+ + + o	o o o o
SMA	x x + x	x x + x	+ + x +	o o - o	+ + + o	- - - -
PC/PBT	x x + x	x x + x	+ + x +	o o - o	+ + x o	- - - -
thermopl. elastomers: TPE-O/S/V	- - o -	- - o -	o o o o	x x x x	- - x -	+ + + o
TPE-U	x x + o	x x + o	+ + o +	o o o o	+ + + o	o o o o

A: unfilled **B**: fillers **C**: glass fibres **D**: flame retardants

+ : highly suitable **x** : suitable **o** : depending on application **-** : unsuitable

Choose gating type

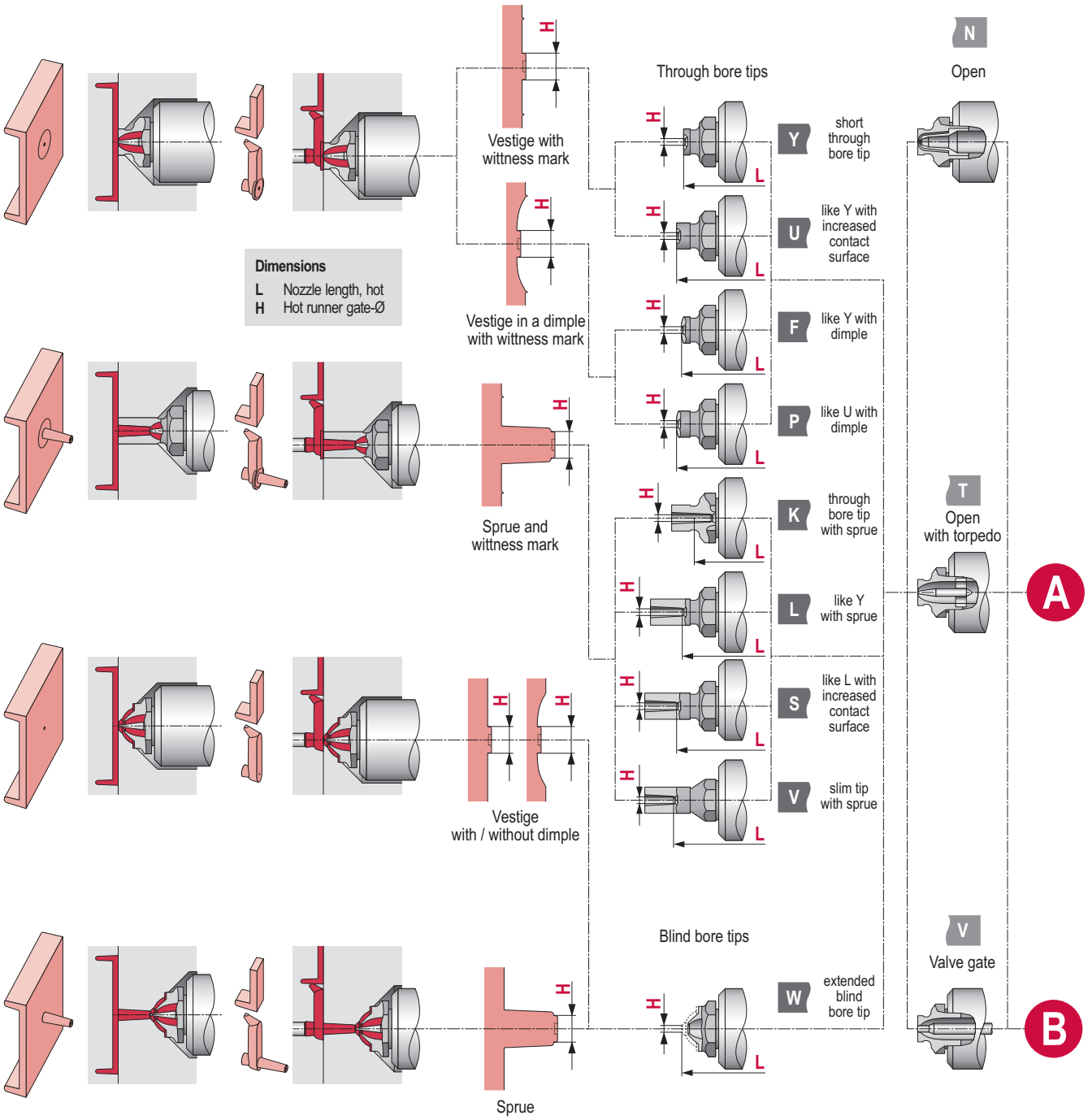
Criteria:
➔Optimum mould filling by optimum number, position, shape and size of gates
➔Use best mould concept for an economic production

Direct gating | **Gating on cold sub runner** | **Gate mark on part or sub runner**

Choose nozzle type

Criteria
➔Gating type needed
➔Material suitability of selected nozzle type

Shape of nozzle tip | **Gating of nozzle tip**



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For a specific application, please consult Synventive.

Choose the nozzle

Criteria:
➔Kind of hot runner system and gating configuartion
➔Maximum shot weight per nozzle

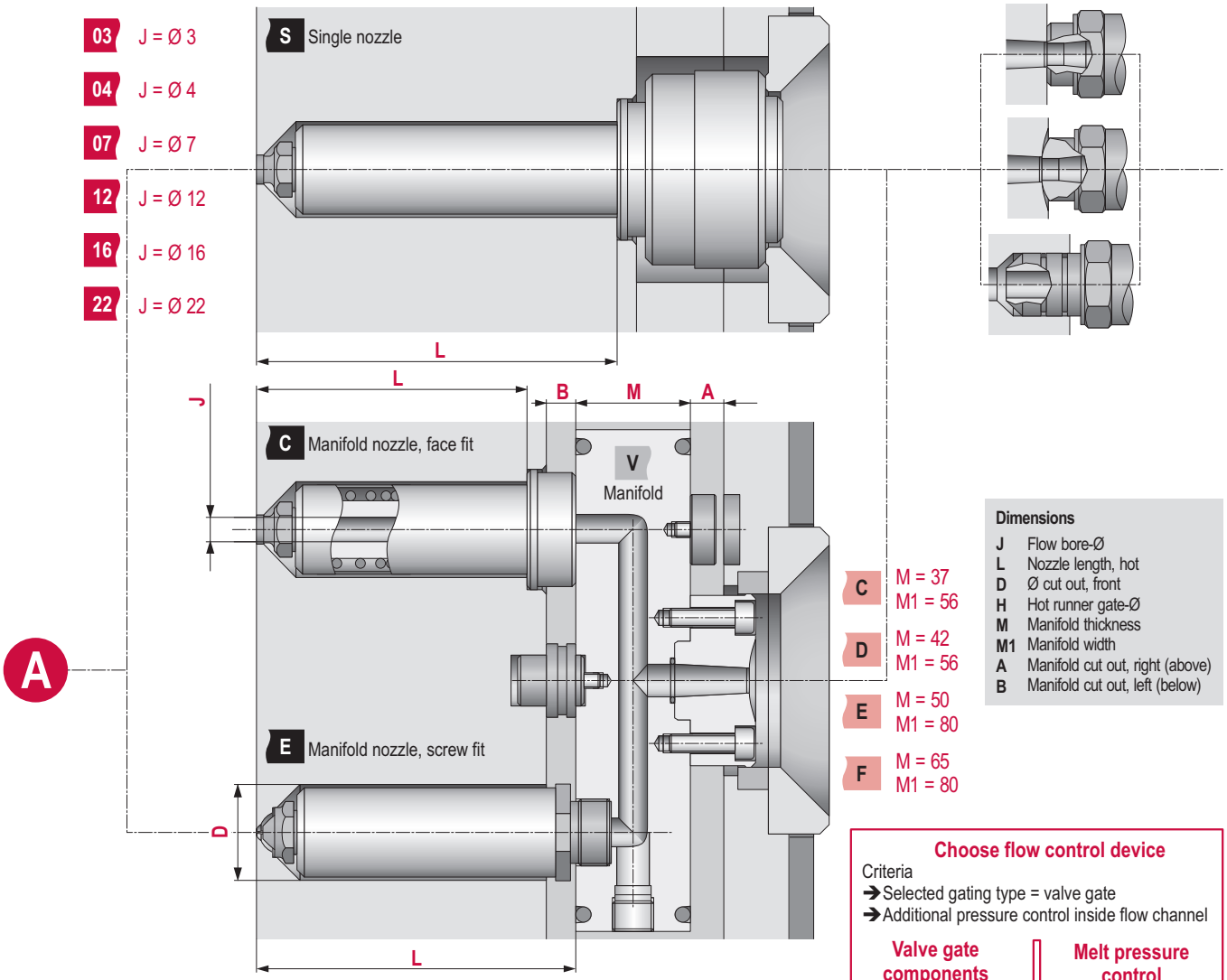
Nozzle size | **Nozzle style**

Choose manifold and / or inlet bushing

Criteria
➔Associated nozzles actuators etc.
➔Gating configuration

Criteria
➔Machine
➔Process

Thickness x width of manifold | **Machine nozzle contact**



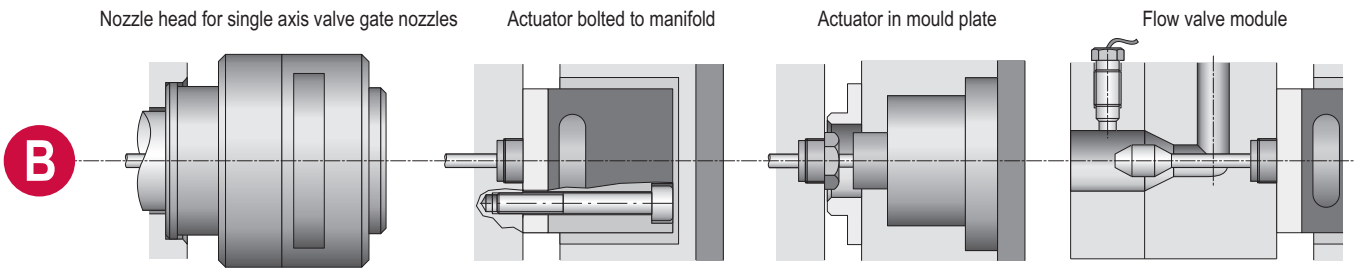
Dimensions

J	Flow bore-Ø
L	Nozzle length, hot
D	Ø cut out, front
H	Hot runner gate-Ø
M	Manifold thickness
M1	Manifold width
A	Manifold cut out, right (above)
B	Manifold cut out, left (below)

Choose flow control device

Criteria
➔Selected gating type = valve gate
➔Additional pressure control inside flow channel

Valve gate components | **Melt pressure control**



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For a specific application, please consult Synventive.

The cavity gate (a) is the last section of the flow channel where it gates into the cavity. Number, size, shape and positions of the gates inside the cavity have great influence on the filling of the cavity and the features of the moulded part.

For hot runner nozzles two case can apply:

1. Gating on cold sub runner

When gated via a cold sub runner the hot runner gate at the nozzle tip is just another section of the flow channel of the complete feed system. The gate mark on the cold sub runner does not have to meet very high demands. Therefore the hot runner gate can as big as possible.

2. Direct gating on the part surface

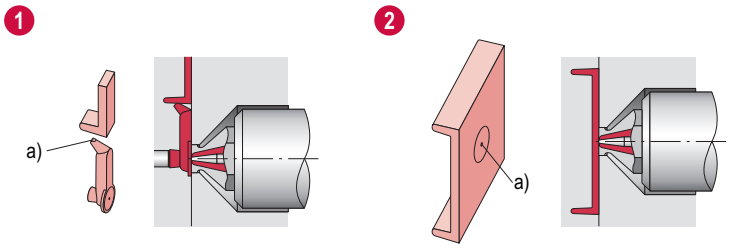
When gated directly on the part surface the hot runner gate is also the cavity gate which has to meet very high demands related to appearance and quality. The gate mark quality is influenced by several factors:

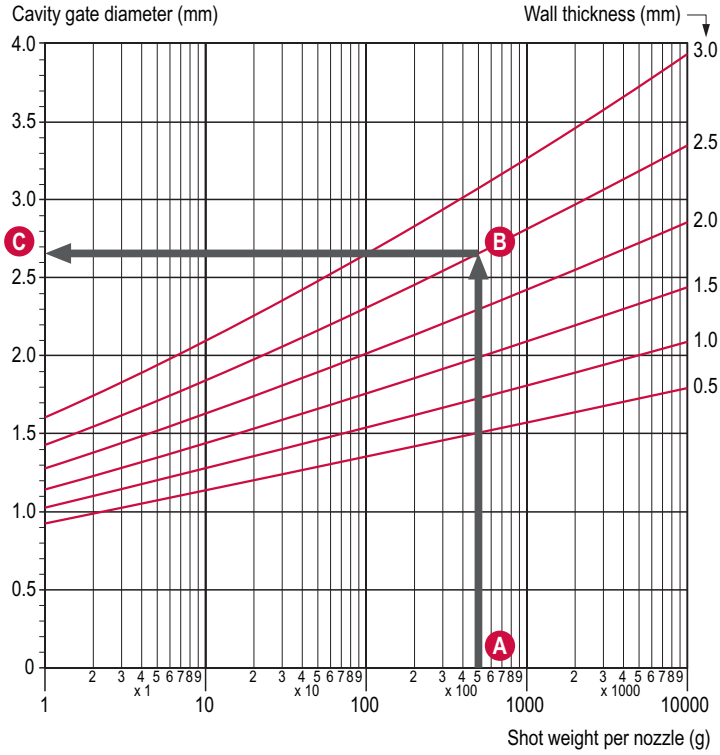
→Gate diameter
→Wall thickness of the moulded part
→Part weight
→Type of plastic
→Flow rate
→Temperature control around the gate
→Geometry of moulded part

To choose the cavity gate diameter the graph shown on the right can be used as a guide line. It is based on practical experience as well as theoretical studies. They are valid for non filled materials. For a specific application, please always consult Synventive.

Boundary conditions for the graph:
→Direct gating via hot runner
→Thermoplastic material
→No fillers or additives
→Medium melt temperature
→Medium injection time

Illustrations simplified, schematically drawn and not to scale.





Example

A	Shot weight per nozzle:	500 g
B	Wall thickness:	2.5 mm
C	Gate diameter:	
	- found in the graph:	2.65 mm
	- chosen Standard gate for. PP:	2.7 mm
	- chosen Standard gate ffor. PP + 30% GF:	3.0 mm

General remaks

For reinforced ratios higher than 20% the gate diameter should be be increased by 10 - 20%.

If the gate is too **small**:
→high shear rate
→high pressure loss
→much heat caused by friction

If the gate is too **big**:
→high vestige
→bad gate mark quality

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The term “maximum shot size per nozzle” denotes the performance capacity of a hot-runner nozzle, that is, the maximum quantity of plastic melt that can pass through the nozzle during operation without damaging the nozzle or plastic material.

The reason performance capacity is specified in terms of weight rather than volume flow is that it is more readily understandable to the user, who has usually received information on the weight of the moulded parts to be produced.

How to find the shot weight per nozzle (W) is shown on the right for three different applications.

1. Several parts per nozzle

➔Multi cavity mould with single nozzle
➔Gating on cold sub runner
➔Shot weight per nozzle
= Parts + runner

2. One part per nozzle

➔Multi cavity mould with manifold system
➔Direct gating on to the part
➔Shot weight per nozzle = part

3. Several nozzles per part

➔Single cavity mould with manifold system
➔Direct gating on the part
➔Shot weight per nozzle = Section of the cavity which is filled by one nozzle

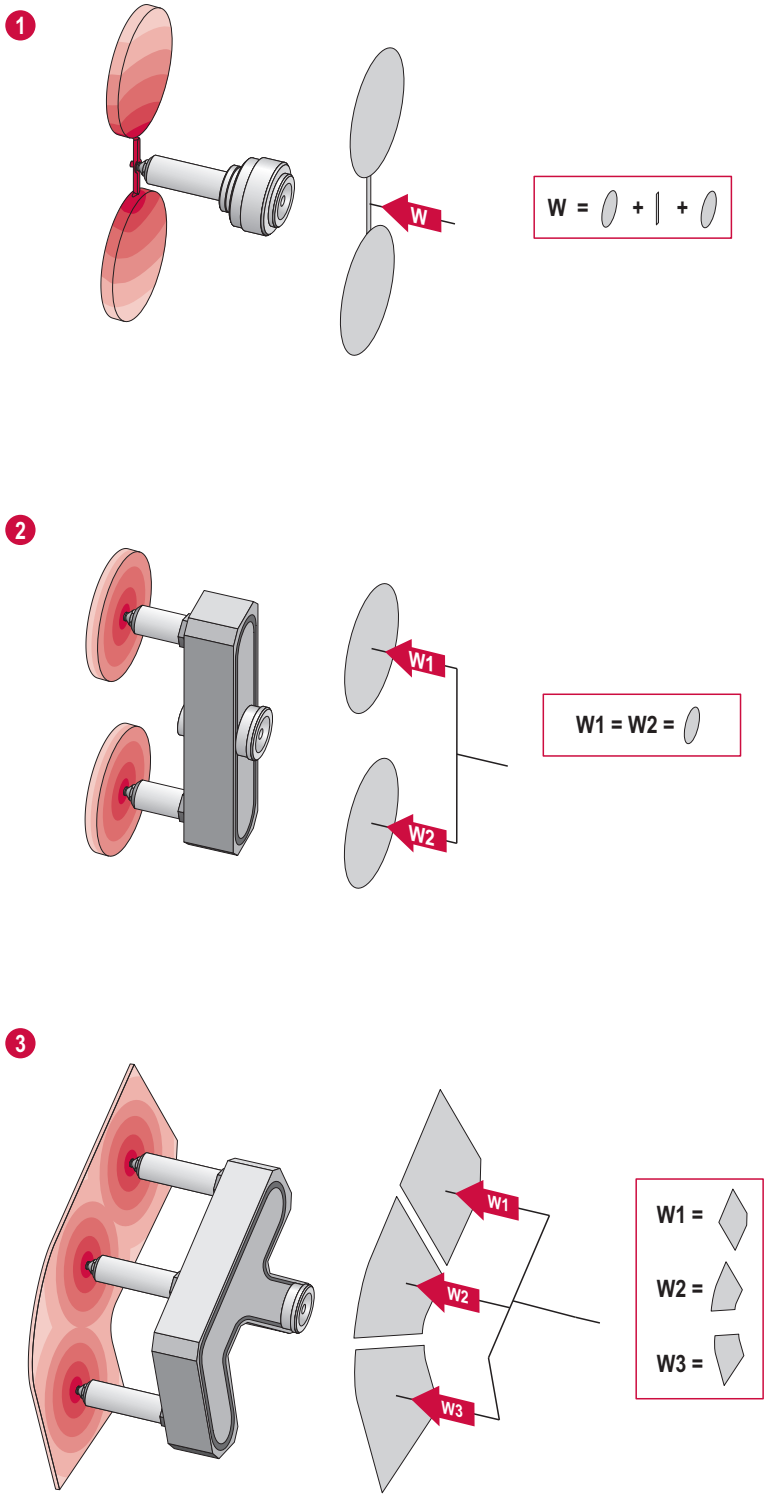
The maximum shot size that can be achieved depends on several factors:

→Injection time
→Type of plastic: viscosity, additives, etc.
→Runner length/diameter
→Maximum permitted pressure loss
→Residence time

When the above factors are taken into consideration, conflicting requirements may arise in some cases.

Flow channel as **big** as possible:
→low pressure loss
→low shear rate
Flow channel as **small** as possible:
→low residence time
→good melt exchange

The values for the maximum shot weight of Synventive nozzle have been derived from practical experience as well as theoretical studies. They are valid for non filled materials. For a specific application, please always consult Synventive.



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During production the temperature of the hot runner system will be much higher than the mould. This temperature difference results in a higher thermal expansion of the hot runner manifold relative to the mould. This difference must be allowed for in the design of the hot runner to ensure correct alignment accuracy for sealing and thus correct function of the hot runner system. All guidelines shown here are based on the following criteria.

➔1.2311, $\alpha = 12.9 * 10^{-6}$ 1/K (Standard)
➔1.2316, $\alpha = 10.8 * 10^{-6}$ 1/K

1. Adjusting the nozzle length

When at operating temperature the nozzle must fit accurately into the mould cut out. It must not touch the mould except for the fitting diameter and should be the correct length so that it is neither protruding nor standing back. This is achieved by designing the nozzle shorter, considering the expansion when it is heated. The nozzle length "L" in the catalogue always refers to the hot condition which should also be the mould dimension at operating temperatures.

Example

$\Delta T = 200°$ C
L = 226 mm ➔ $Lrt = \frac{226 \text{ mm}}{1.00258} = 225.418$ mm

2. Pre-load on the manifold when face fit manifold nozzles are used

The sealing interface between face fit manifold nozzles and the manifold depends upon the correct load applied by the manifold due to thermal expansion. This is achieved by having the an expansion gap between the manifold support pads and back plate when cold to allow for thermal expansion but also to apply the correct load when the system is hot. The correct expansion gap "Z" can be calculated by using the rules shown on the right.

Example

$\Delta T = 200°$ C
M = 50 mm ➔ Z = 50 mm * 0.00258 = 0.079 mm

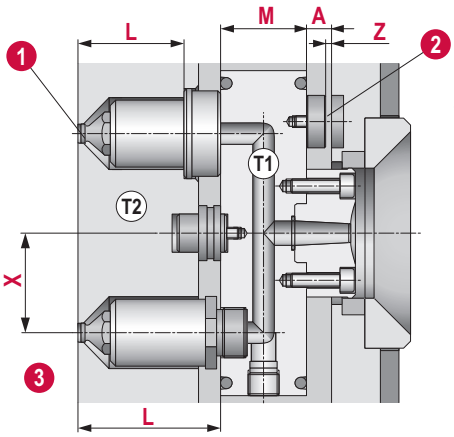
3. Ratio of pitch dimension and nozzle length for screw fit nozzles

The thermal expansion of the manifold makes the nozzle head of screw fit manifold nozzles move while the nozzle tip is fixed inside the mould cut out. This leads to the nozzle being bent. In order to allow the nozzle to bend without being damaged the nozzle must be of a certain minimum length. As shown on the right, the minimum lenght of a screw fit manifold nozzle must be half the size of its pitch dimension.

Example

➔ X = 500 mm L = min. 250 mm

The information shown here refer mainly to API proudcts.
For APT products please refer direclty to the technical documentation or consult Synventive.

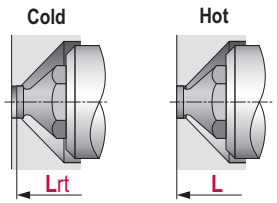


Cold — T1 = T2 = Room temperature

Hot — T1 > T2
T1 = Melt temperature
T2 = Mould temperature

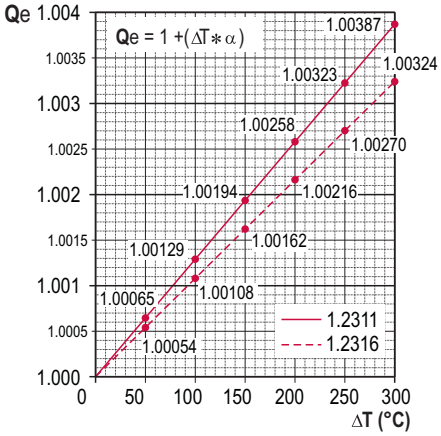
$\Delta T = T1 - T2$
$\Delta T = 100 \ldots 300$ K

1

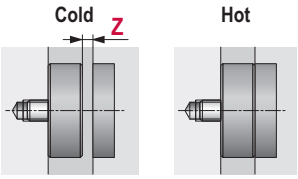


$L = Lrt * [1 + (\Delta T * \alpha)]$

$L = Lrt * Qe \qquad Lrt = \frac{L}{Qe}$



2



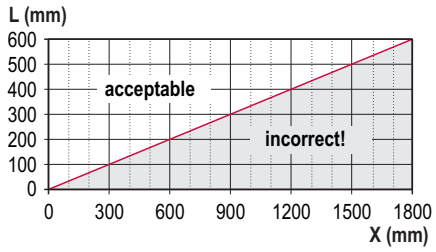
$Z = (M * \Delta T * \alpha) - 0.05$ mm

$Z = [M * (Qe-1)] - 0.05$ mm

M (mm)	Steel	Z (mm) for ΔT = 100	150	200	250	300
37	1.2311	0.00	0.02	0.05	0.07	0.09
	1.2316	0.00	0.01	0.03	0.05	0.07
43	1.2311	0.00	0.03	0.06	0.09	0.12
	1.2316	0.00	0.02	0.04	0.07	0.09
50	1.2311	0.01	0.05	0.08	0.11	0.14
	1.2316	0.00	0.03	0.06	0.09	0.11
65	1.2311	0.03	0.08	0.12	0.16	0.20
	1.2316	0.02	0.06	0.09	0.13	0.16

3

$L \geq \frac{X}{3} \qquad X \leq 3 * L$



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For a specific application, please consult Synventive.

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