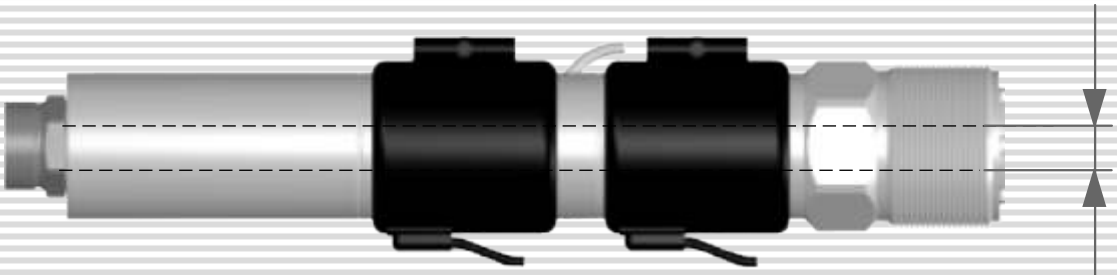
T16 Hot Runner Nozzle

Manifold Nozzles, Threaded



Ø8-16

C Company
P Products
T Technology
A Application

Synventive
molding solutions

Synventive molding solutions

Series T16
Manifold nozzles, threaded, open / closed / valve gate

Product type

Hot runner nozzle, T (threaded)
➔Manifold nozzle, threaded
➔Utilizes heat pipe technology to ensure uniform temperature
➔Patented seal technology
➔Replaceable threaded tips

Available with eight Controlled Vestige (CV) tip options including valve gates for zero vestige applications. See table at right.

Available gating types
➔Full flow
➔Cone point
➔Valve gate:
VG12 & VG23 tapered gate
VG12S & VG23S Straight gate

Major Dimensions (mm)

	J Nozzle length	75-375
	Nozzle flow bore	Ø8-16
*	D	Ø46
*	D1	Ø68
	Dt	Ø24
	Z	18
	L1	= 48 (J 75-149.9) = 122 (J 150-375)

* When the distance from the manifold center locator to the hot runner nozzle center line exceeds 650 the Ø46 clearance hole must be increased to Ø50 and the Ø68 hole increased to Ø72.

Heating

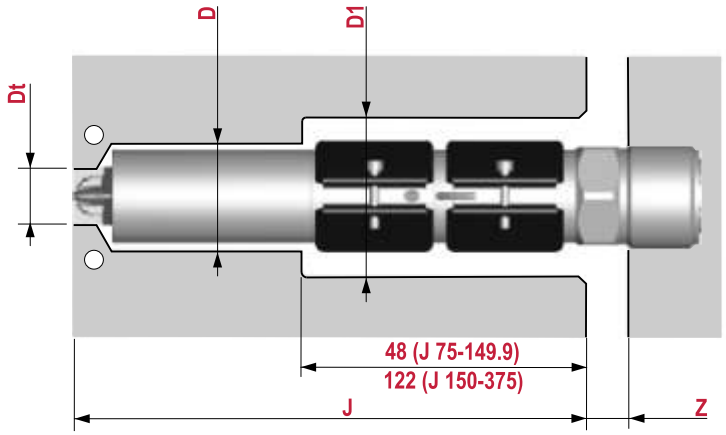
➔Externally heated, 240V/500W and 600W
➔One heater for operation
➔Installed spare heater and TC when space permits (J 150-375)

Application

➔Suitable for all filled and unfilled materials

8 page no. of related data sheets

Illustrations simplified, schematically drawn and not to scale.



Available tip styles for T16 Nozzles
Gating of nozzle tip

	Full flow thermal gate	Cone point thermal gate	Valve Gate
Witness Mark	CV-10 Gate:Ø1.5-5.2 Dt:Ø24  4	CV-11 Gate:Ø1.0-3.5 Dt:Ø24  6	VG-12 Gate:Ø3.9 Dt:Ø24  12
			VG-12S Gate:Ø5 Dt:Ø24  13
No Witness Mark	CV-20 Gate:Ø1.5-5.2 Dt:Ø24  8	CV-21 Gate:Ø1.0-3.5 Dt:Ø24  10	VG-23 Gate:Ø3.9 Dt:Ø24  14
			VG-23S Gate:Ø5 Dt:Ø24  15

For design and application information, see the Synventive Hot Runner Guide.

Illustrations simplified, schematically drawn and not to scale.

1. Cut out for the nozzle

J Length from back of cavity plate to Gate location

General tolerances: DIN ISO 2768-mK

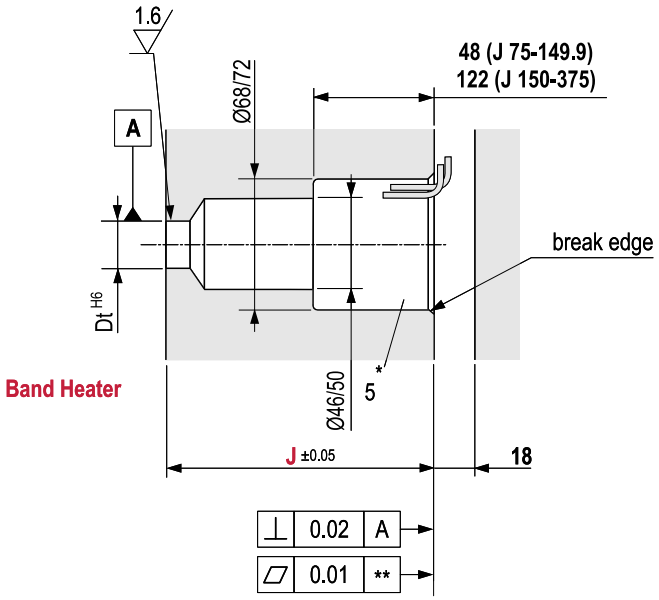
Surfaces: 3.2 (1.6 0.8)

Values of the dimension J can be found in the data sheet for the selected nozzle type.

1

* drawn offset

** to all other pocket surfaces



4. Cut out for the nozzle tip

A) Through bore nozzle tip (CV10, CV11, VG12 and VG12S
b) Blind bore nozzle tip (CV20, CV21, VG23 & VG23S)

Dt Tip Ø
H Hot runner gate Ø

Depending on the selected nozzle type, different cut outs are required for the nozzle tip.

The dimensions of the cut out for the nozzle tip used can be found in the nozzle data sheet.

1) Applies to valve gate nozzles.

For design and application information, see the Synventive Hot Runner Guide.

T16s Serie

T16 manifold criteria:

➔T16 hot runner systems do not require preload because they are threaded directly into the manifold.

➔The systems have a clearance between the thrust pads and mold plates in the cold condition. As the manifold heats and expands the thrust pads contact the plates.

➔Thrust pads are made of a low conductivity material and should only be replaced with an equivalent Synventive part

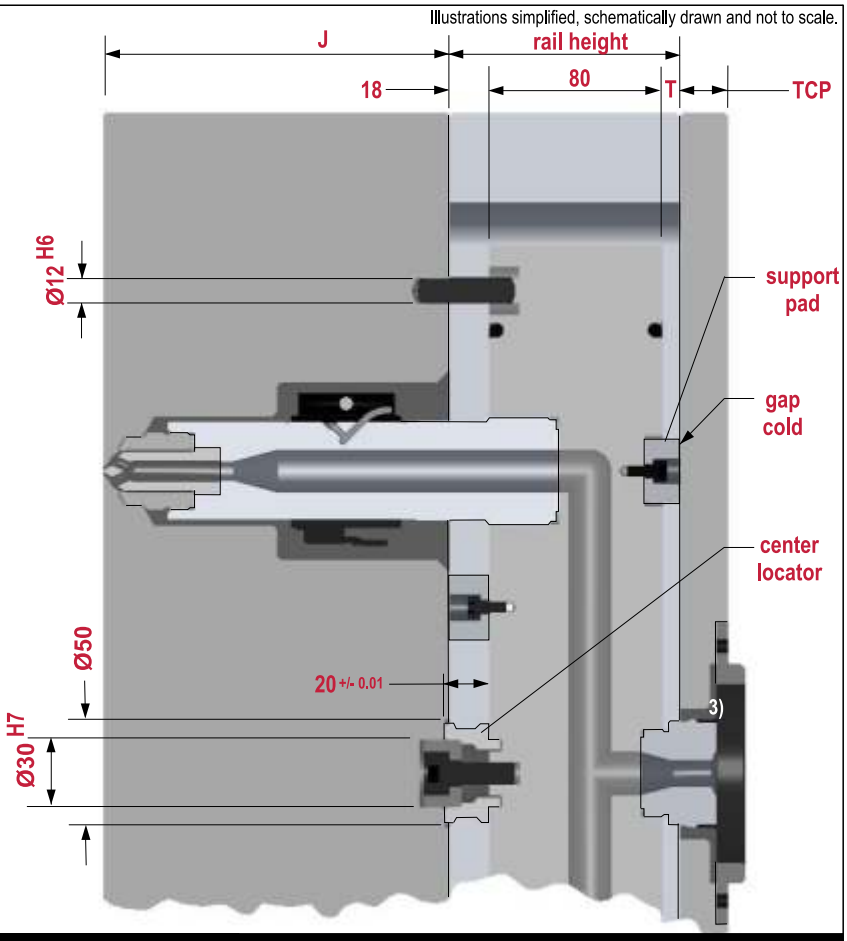
➔Excessive contact with the mold will cause heat sinks and affect system performance. Contact with the mold must be limited to specified areas.

➔Minimum rail height:
108 (thermal gates)
120 (valve gates)

➔T :
Rail height - 18 - 80 (thermal Gate)
22 (Valve Gate)

➔Minimum T (thermal gates) = 10

Illustrations simplified, schematically drawn and not to scale.

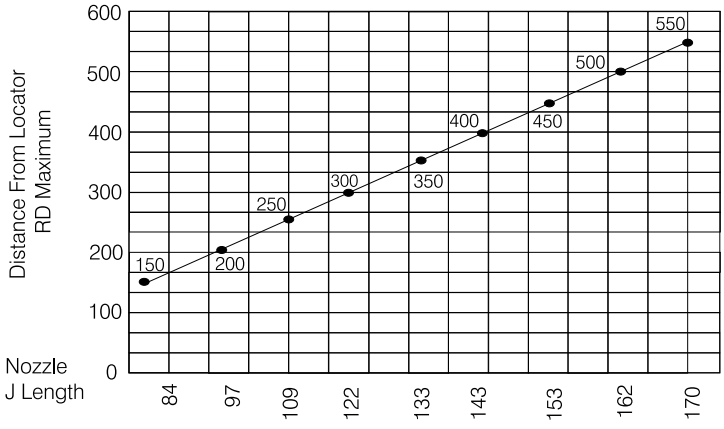


Variable	Description
T	Top Air Gap
J	Mold Depth
TCP	Top Clamp Plate

➔Threaded nozzles line up with the gate locations in the mold in the cold condition. As the manifold heats and expands the nozzles flex. The distance from the center locator (RD) determines the amount of nozzle flex. The table to the right defines the maximum allowable distance from the nozzle to the center locator.

➔RD is the radial distance from the manifold center locator to the manifold nozzle center line.

T16 Maximum Radial Distance From Nozzle Centerline to Center Locator "RD"



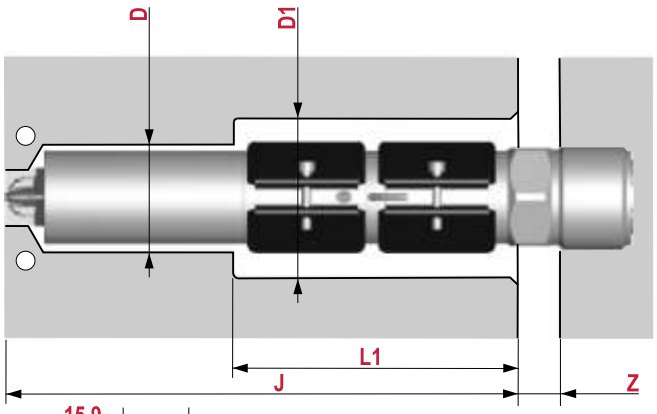
For design and application information, see the Synventive Hot Runner Guide.

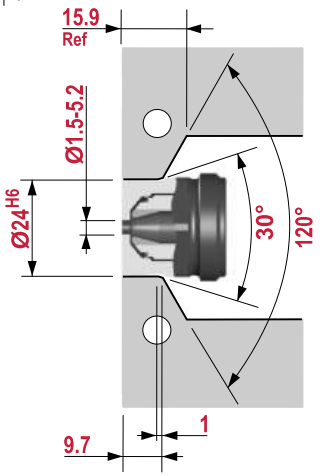
Illustrations simplified, schematically drawn and not to scale.

T16 CV10

General:
➔Filled and unfilled materials
➔Easy orifice changes by straight reaming
➔Heat pipes for isothermal operation

Nozzle Criteria:
➔Orifice Ø1.5-5.2
➔J length 75-375
➔Open flow bore
➔Patented seal





➔ Information regarding
➔tolerances and surfaces
➔shape and position tolerances
please see page 2
"Cut out in mould plate for nozzle and connections"

➔ Cooling required
➔around the nozzle tip
➔opposite to the nozzle tip

➔ The front of the nozzle tip must always be against plastic.

➔ General tolerances according to DIN ISO 2768-mK

RD	150	200	250	300	350	400	450	500	550	600
J Min	84	97	109	122	133	143	153	162	170	179

➔RD is the radial distance from the manifold center locator to the manifold nozzle center line.

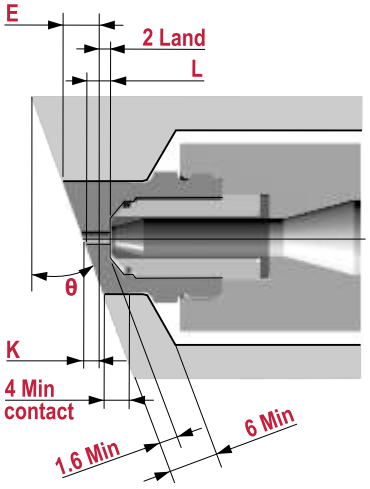
T16 contour criteria:
➔When gating on an angled mold contour the vestige height may be increased depending on the angle
➔K is the increase in vestige height required to maintain a 1.6 wall, 6 wall and/or 4 minimum contact

Heater Style	J Min	J Max	Heater Qty	Watts/Volts
Band (38 long)	75	149.9	1	500W/240V
Band (51 long)	150	375	2 (one spare)	600W/240V (each)

θ≤6°;
K=0
E=12TANθ
L=2-(Ø Orifice/2)*TANθ

6°<θ ≥26°;
K=4.2TANθ+1.6/COSθ-2
E=K+12TANθ
L=2+K-(Ø Orifice/2)*TANθ

θ>26°;
K=23TANθ-9.9
E=K+12TANθ
L=2+K-(Ø Orifice/2)*TANθ



Angled Mold Contour

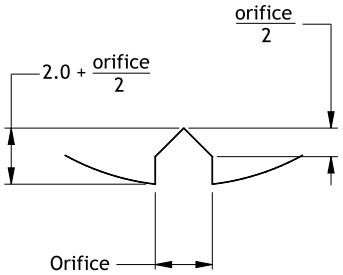
For design and application information, see the Synventive Hot Runner Guide.

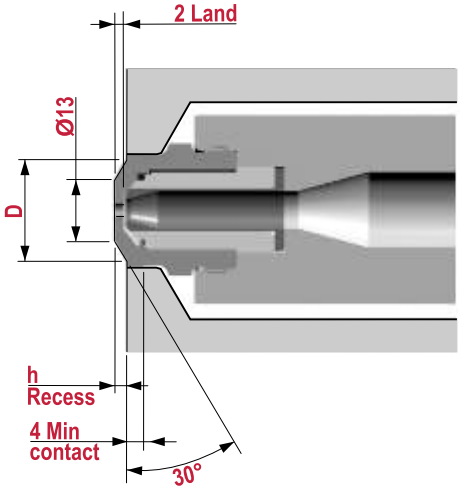
Illustrations simplified, schematically drawn and not to scale.

T16 CV10

T16 recess criteria:

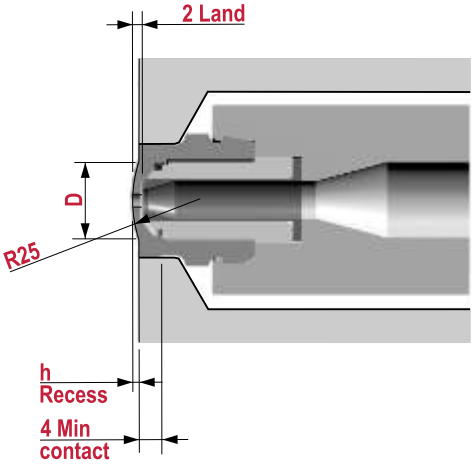
- ➔Values in tables are for materials not having glass fibers. Consult Synventive for vestige height when using glass fillers
- ➔Recessed gates are used to reduce vestige height above the part surface or keep the vestige below the part surface
- ➔For most materials CV10 vestige height is equal to 2 + (orifice Ø /2). If the vestige height, relative to the possible gate recess depth (h), is too great, use of a CV11 tip is recommended





Conical Recess

h (recess depth)	1.0	1.5	2.0	2.5	3.0
D	16.5	18.2	19.9	21.7	23.4



Spherical Recess

h (recess depth)	1.0	1.5	2.0	2.5	3.0
D	14.0	17.1	19.6	21.8	23.8

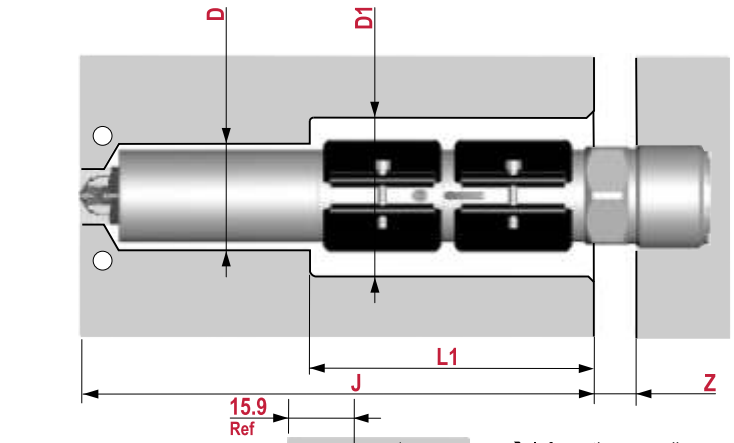
For design and application information, see the Synventive Hot Runner Guide.

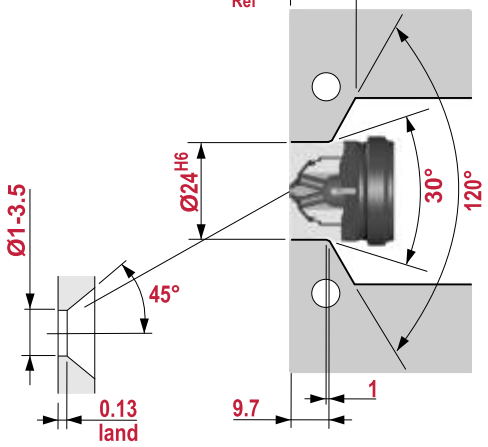
Illustrations simplified, schematically drawn and not to scale.

T16 CV11

General:
➔Filled and unfilled materials
➔More heat in gate area for semi-crystalline materials
➔Heat pipes for isothermal operation

Nozzle Criteria:
➔Orifice Ø1.0-3.5
➔J length 75-375
➔Patented seal





➔ Information regarding
- ➔tolerances and surfaces
- ➔shape and position tolerances
- ➔cut out for connections
- ➔groove/bore for locking pin

please see page 2

"Cut out in mould plate for nozzle and connections"

➔ Cooling required
- ➔around the nozzle tip
- ➔opposite to the nozzle tip

➔ The front of the nozzle tip must always be against plastic.

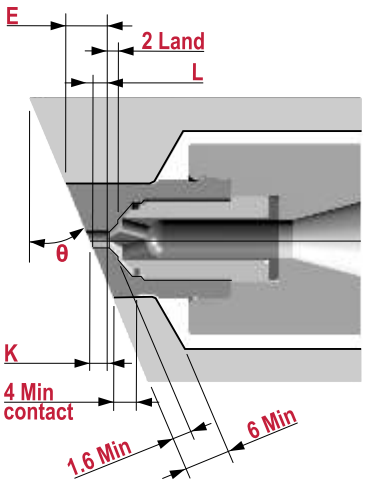
➔ General tolerances according to DIN ISO 2768-mK

RD	150	200	250	300	350	400	450	500	550	600
J Min	84	97	109	122	133	143	153	162	170	179

➔RD is the radial distance from the manifold center locator to the manifold nozzle center line.

T16 contour criteria:
➔When gating on an angled mold contour the vestige height may be increased depending on the angle
➔K is the increase in vestige height required to maintain a 0.13 land, 1.6 wall, 6 wall and/or 4 minimum contact

Heater Style	J Min	J Max	Heater Qty	Watts/Volts
Band (38 long)	75	149.9	1	500W/240V
Band (51 long)	150	375	2 (one spare)	600W/240V (each)



Angled Mold Contour

θ≤7°;
K=(Ø Orifice/2)*TANθ
E=(24+Ø Orifice/2)*TANθ
L=0.13

7°<θ ≥27°;
K=4.2TANθ+1.6/COSθ+
(Ø Orifice-1)/2*TANθ-2
E=K+12TANθ
L=0.13+K-(Ø Orifice/2)*TANθ

θ>26°;
K=23TANθ-9.9
E=K+12TANθ
L=0.13+K-(Ø Orifice/2)*TANθ

For design and application information, see the Synventive Hot Runner Guide.

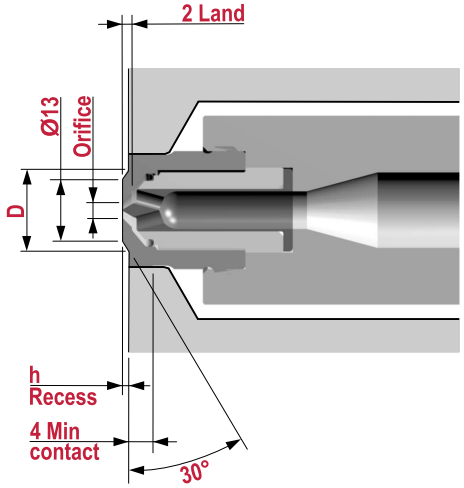
Illustrations simplified, schematically drawn and not to scale.

T16 CV11

T16 recess criteria:

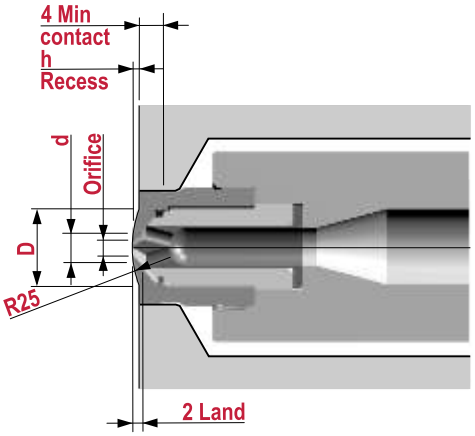
➔Values in tables are for materials not having glass fibers. Consult Synventive for vestige height when using glass fillers

➔Recessed gates are used to reduce vestige height above the part surface or keep the vestige below the part surface



Conical Recess

Orifice	1.0	1.5	2.0	2.5	3.0	3.5
h (recess depth)	0.59	0.76	0.93	1.09	1.26	1.43
D	15.04	15.63	16.22	16.78	17.36	17.95



Spherical Recess

Orifice	1.0-1.2	1.2-1.4	1.4-1.6	1.6-1.8	1.8-2.0	2.0-2.2
h	0.65	0.72	0.79	0.86	0.93	1.00
d	1.45	1.65	1.85	2.05	2.25	2.45
D	11.33	11.91	12.47	13.00	13.51	14.00
Orifice	2.2-2.4	2.4-2.6	2.6-2.8	2.8-3.0	3.0-3.2	3.2-3.5
H	1.06	1.12	1.18	1.26	1.32	1.40
d	2.65	2.85	3.05	3.25	3.45	3.65
D	14.41	14.80	15.18	15.67	16.03	16.50

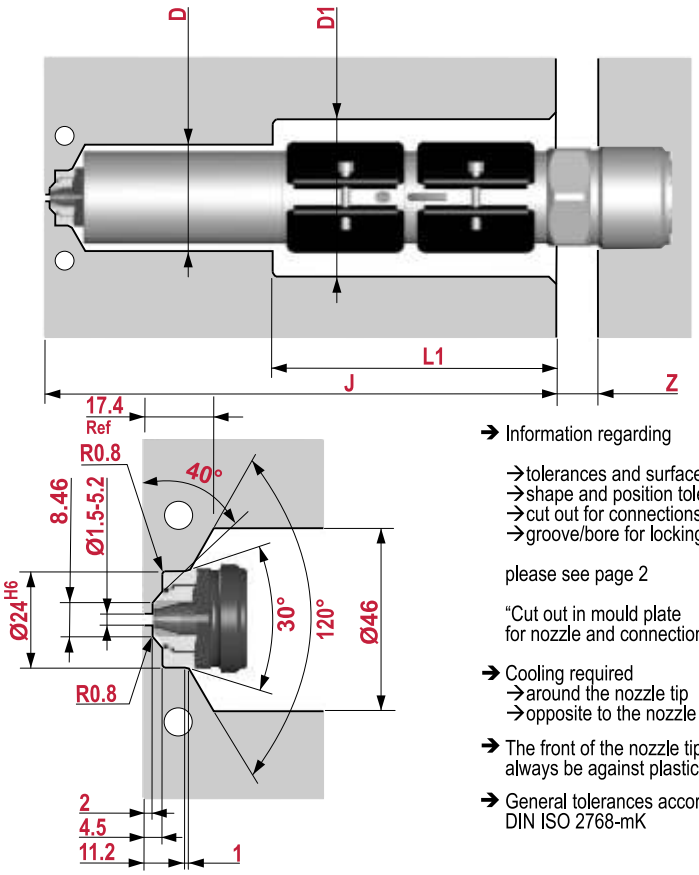
For design and application information, see the Synventive Hot Runner Guide.

Illustrations simplified, schematically drawn and not to scale.

T16 CV20

General:
- ➔Filled and unfilled materials
- ➔Easy orifice changes by straight reaming
- ➔Heat pipes for isothermal operation
- ➔No witness mark on part
- ➔Easier removal of frozen material around tip for color change

Nozzle Criteria:
- ➔Orifice Ø1.5-5.2
- ➔J length 75-375
- ➔Open flow bore
- ➔Patented seal



- ➔ Information regarding
  - ➔tolerances and surfaces
  - ➔shape and position tolerances
  - ➔cut out for connections
  - ➔groove/bore for locking pin

  please see page 2

  "Cut out in mould plate for nozzle and connections"
- ➔ Cooling required
  - ➔around the nozzle tip
  - ➔opposite to the nozzle tip
- ➔ The front of the nozzle tip must always be against plastic.
- ➔ General tolerances according to DIN ISO 2768-mK

RD	150	200	250	300	350	400	450	500	550	600
J Min	84	97	109	122	133	143	153	162	170	179

Heater Style	J Min	J Max	Heater Qty	Watts/Volts
Band (38 long)	75	149.9	1	500W/240V
Band (51 long)	150	375	2 (one spare)	600W/240V (each)

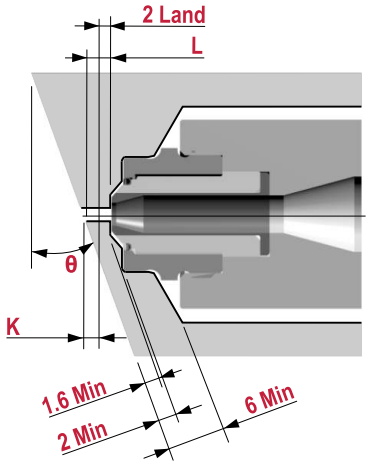
- ➔RD is the radial distance from the manifold center locator to the manifold nozzle center line.

T16 contour criteria:
- ➔When gating on an angled mold contour the vestige height may be increased depending on the angle
- ➔K is the increase in vestige height required to maintain a 1.6 wall, 2 wall and/or 6 wall thickness

θ≤6°;
K=0
L=2-(Ø Orifice/2)*TANθ

6°<θ ≥16°;
K=4.2TANθ+1.6/COSθ-2
L=2+K-(Ø Orifice/2)*TANθ

θ>16°;
K=12TANθ+2/COSθ-4.5
L=2+K-(Ø Orifice/2)*TANθ



Angled Mold Contour

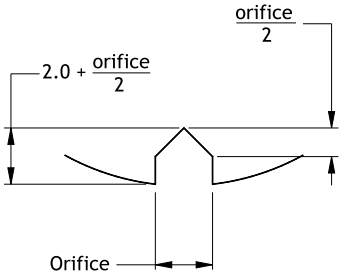
For design and application information, see the Synventive Hot Runner Guide.

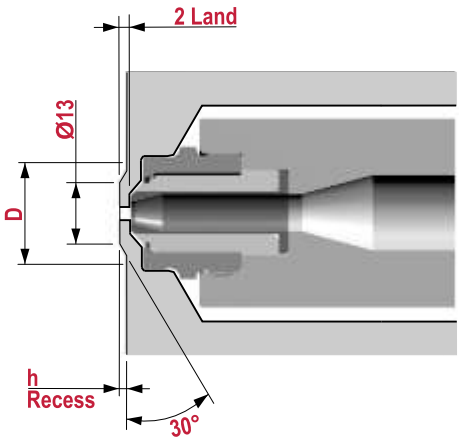
Illustrations simplified, schematically drawn and not to scale.

T16 CV20

T16 recess criteria:

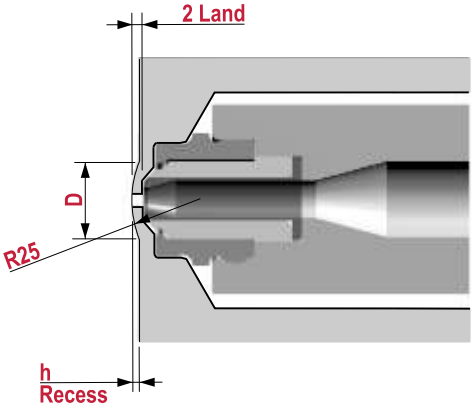
- ➔Values in tables are for materials not having glass fibers. Consult Synventive for vestige height when using glass fillers
- ➔Recessed gates are used to reduce vestige height above the part surface or keep the vestige below the part surface
- ➔For most materials CV20 vestige height is equal to 2 + (orifice Ø /2). If the vestige height, relative to the possible gate recess depth (h), is too great, use of a CV11 tip is recommended





Conical Recess

h (recess depth)	1.0	1.5			
D	16.5	18.2			



Spherical Recess

h (recess depth)	1.0	1.5			
D	14.0	17.1			

For design and application information, see the Synventive Hot Runner Guide.

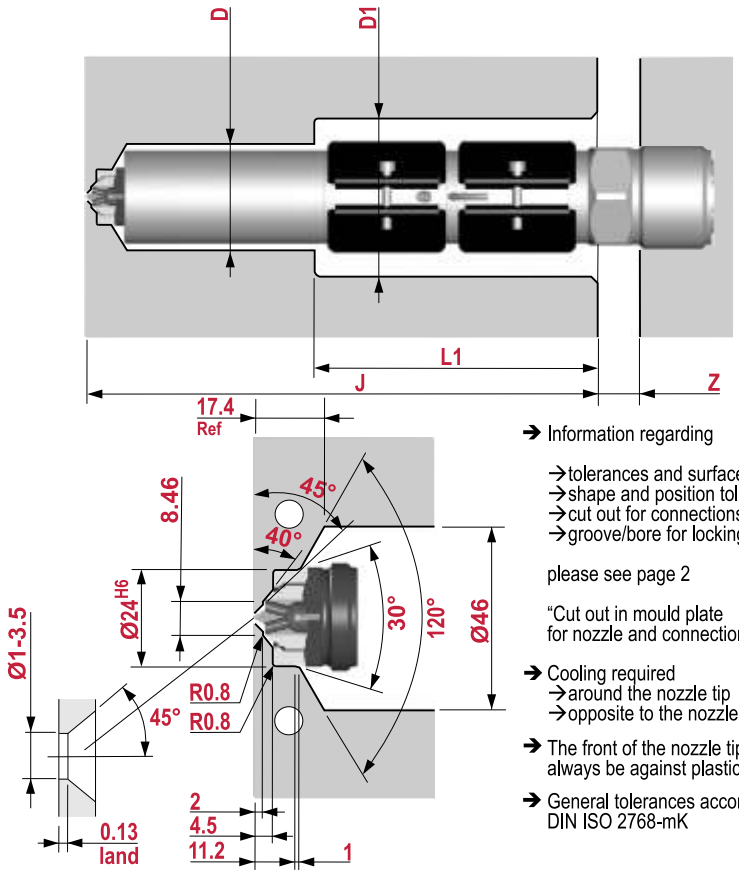
Synventive molding solutions

Illustrations simplified, schematically drawn and not to scale.

T16 CV21

General:
- ➔Filled and unfilled materials
- ➔No tip witness mark on part
- ➔More heat in gate area for semi-crystalline materials
- ➔Heat pipes for isothermal operation
- ➔Easier removal of frozen material around tip for color change

Nozzle Criteria:
- ➔Orifice Ø1.0-3.5
- ➔J length 75-375
- ➔Patented seal



- ➔ Information regarding
  - ➔tolerances and surfaces
  - ➔shape and position tolerances
  - ➔cut out for connections
  - ➔groove/bore for locking pin

  please see page 2

  "Cut out in mould plate for nozzle and connections"
- ➔ Cooling required
  - ➔around the nozzle tip
  - ➔opposite to the nozzle tip
- ➔ The front of the nozzle tip must always be against plastic.
- ➔ General tolerances according to DIN ISO 2768-mK

RD	150	200	250	300	350	400	450	500	550	600
J Min	84	97	109	122	133	143	153	162	170	179

- ➔RD is the radial distance from the manifold center locator to the manifold nozzle center line.

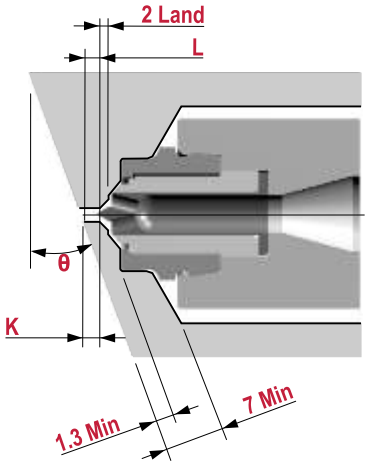
T16 contour criteria:
- ➔When gating on an angled mold contour the vestige height may be increased depending on the angle
- ➔K is the increase in vestige height required to maintain 0.13 land, 2 wall and/or 7 minimum wall thickness

Heater Style	J Min	J Max	Heater Qty	Watts/Volts
Band (38 long)	75	149.9	1	500W/240V
Band (51 long)	150	375	2 (one spare)	600W/240V (each)

θ≤6°;
K=(Ø Orifice/2)/TANθ
L=0.13

6°<θ ≥16°;
K=4.2TANθ+1.6/COSθ+
(Ø Orifice-1)/2*TANθ
L=0.13+K-(Ø Orifice/2)*TANθ

θ>16°;
K=12TANθ+2/COSθ-4.5
L=.013+K-(Ø Orifice/2)*TANθ



Angled Mold Contour

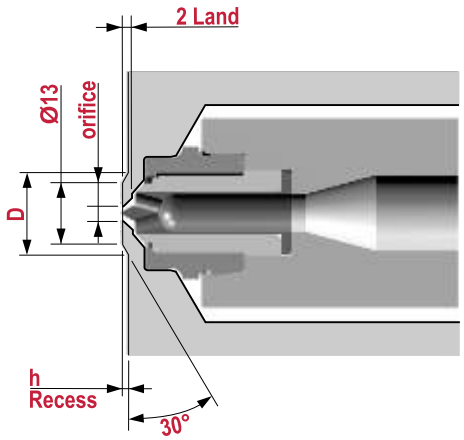
For design and application information, see the Synventive Hot Runner Guide.

Illustrations simplified, schematically drawn and not to scale.

T16 CV21

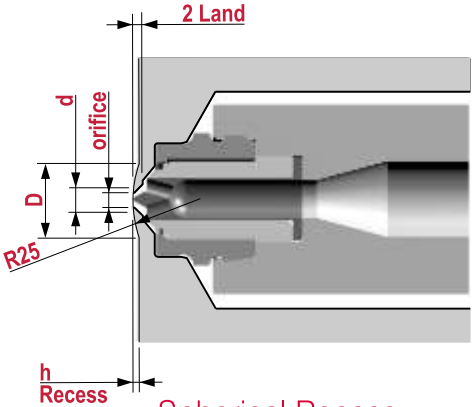
T16 recess criteria:

- ➔ Values in tables are for materials not having glass fibers. Consult Synventive for vestige height when using glass fillers
- ➔ Recessed gates are used to reduce vestige height above the part surface or keep the vestige below the part surface
- ➔ Maintain 0.13 land when machining gate recess or contour



Conical Recess

Orifice	1.0	1.5	2.0	2.5	3.0	3.5
h (recess depth)	0.59	0.76	0.93	1.09	1.26	1.43
D	15.04	15.63	16.22	16.78	17.36	17.95



Spherical Recess

Orifice	1.0-1.2	1.2-1.4	1.4-1.6	1.6-1.8	1.8-2.0	2.0-2.2
h	0.65	0.72	0.79	0.86	0.93	1.00
d	1.45	1.65	1.85	2.05	2.25	2.45
D	11.33	11.91	12.47	13.00	13.51	14.00
Orifice	**2.2-2.4**	**2.4-2.6**	**2.6-2.8**	**2.8-3.0**	**3.0-3.2**	**3.2-3.5**
H	1.06	1.12	1.18	1.26	1.32	1.40
d	2.65	2.85	3.05	3.25	3.45	3.65
D	14.41	14.80	15.18	15.67	16.03	16.50

For design and application information, see the Synventive Hot Runner Guide.

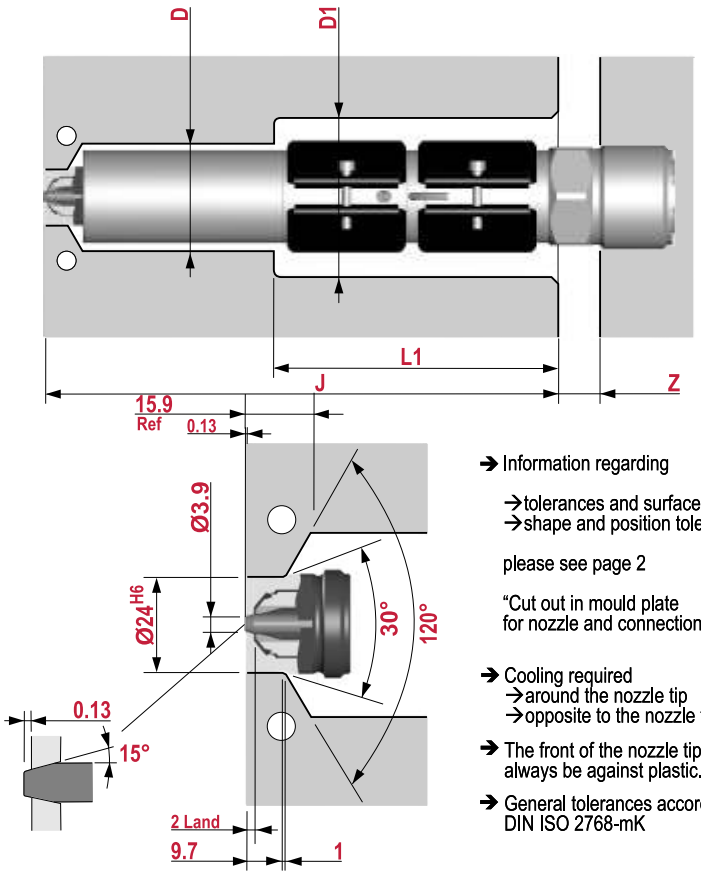
Illustrations simplified, schematically drawn and not to scale.

T16 VG12

General:
- ➔Filled and unfilled materials
- ➔Tapered valve pin to eliminate gate flash
- ➔Heat pipes for isothermal operation

S

Nozzle Criteria:
- ➔Orifice Ø3.9
- ➔J length 75-375
- ➔Patented seal



- ➔ Information regarding
  - ➔tolerances and surfaces
  - ➔shape and position tolerances

  please see page 2

  "Cut out in mould plate for nozzle and connections"
- ➔ Cooling required
  - ➔around the nozzle tip
  - ➔opposite to the nozzle tip
- ➔ The front of the nozzle tip must always be against plastic.
- ➔ General tolerances according to DIN ISO 2768-mK

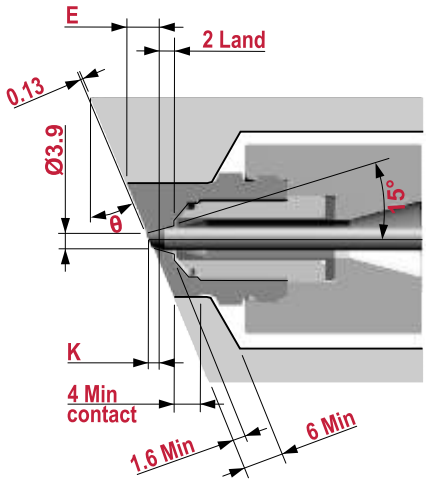
C

- ➔RD is the radial distance from the manifold center locator to the manifold nozzle center line.

RD	150	200	250	300	350	400	450	500	550	600
J Min	84	97	109	122	133	143	153	162	170	179

T16 contour criteria:
- ➔When gating on an angled mold contour the vestige height may be increased depending on the angle
- ➔K is the increase in vestige height required to maintain a 1.6 wall, 6 wall and/or 4 minimum contact

Heater Style	J Min	J Max	Heater Qty	Watts/Volts
Band (38 long)	75	149.9	1	500W/240V
Band (51 long)	150	375	2 (one spare)	600W/240V (each)



Angled Mold Contour

$\theta \leq 6°$;
K=0
E=12*TANθ

$6° < \theta \geq 27°$;
K=4.2TANθ+1.6/COSθ-2
E=K+12TANθ

θ>27°;
K=23TANθ-9.9
E=K+12TANθ

E

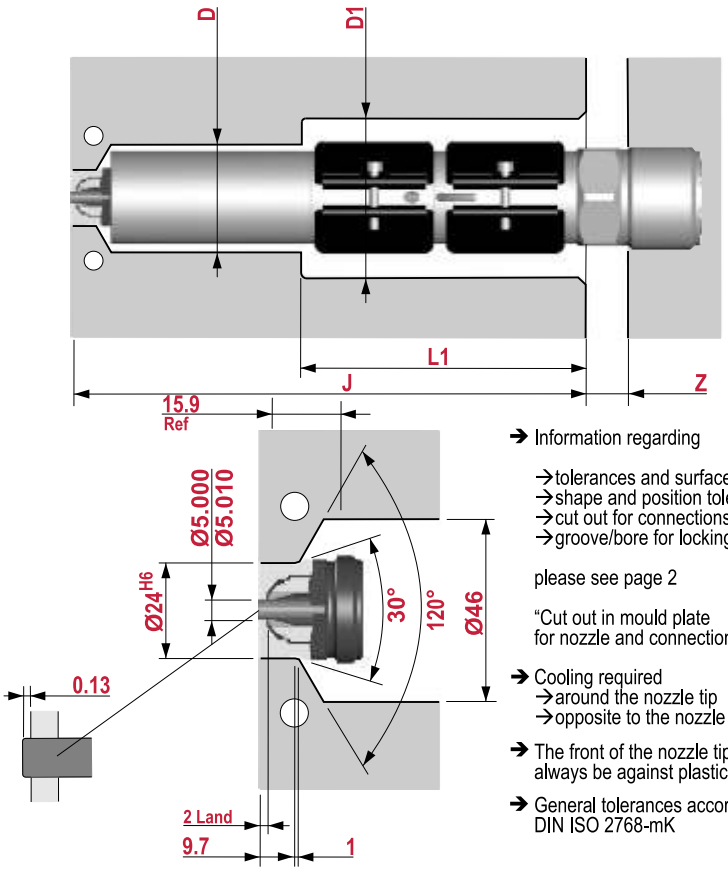
For design and application information, see the Synventive Hot Runner Guide.

Illustrations simplified, schematically drawn and not to scale.

T16 VG12S

General:
➔Filled and unfilled materials
➔Straight valve pin for non-adjustable actuators and glass filled materials
➔Heat pipes for isothermal operation

Nozzle Criteria:
➔Orifice Ø5
➔J length 75-375
➔Patented seal



➔ Information regarding
→tolerances and surfaces
→shape and position tolerances
→cut out for connections
→groove/bore for locking pin

please see page 2

"Cut out in mould plate for nozzle and connections"

➔ Cooling required
→around the nozzle tip
→opposite to the nozzle tip

➔ The front of the nozzle tip must always be against plastic.

➔ General tolerances according to DIN ISO 2768-mK

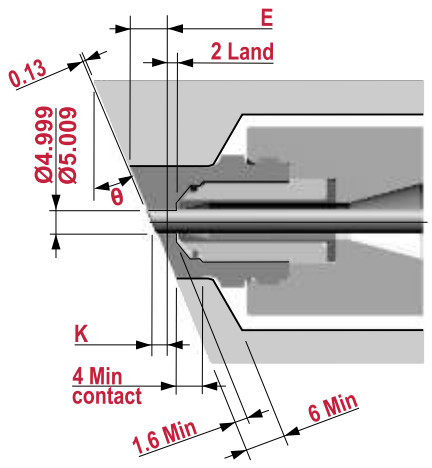
RD	150	200	250	300	350	400	450	500	550	600
J Min	84	97	109	122	133	143	153	162	170	179

➔RD is the radial distance from the manifold center locator to the manifold nozzle center line.

T16 recess criteria:
➔When gating on an angled mold contour the vestige height may be increased depending on the angle
➔K is the increase in vestige height required to maintain a 1.6 wall, 2 wall and/or 4 wall thickness

Heater Style	J Min	J Max	Heater Qty	Watts/Volts
Band (38 long)	75	149.9	1	500W/240V
Band (51 long)	150	375	2 (one spare)	600W/240V (each)

θ≤6°;
K=0
E=12TANθ
6°<θ ≥27°;
K=4.2TANθ+1.6/COSθ-2
E=K+12TANθ
θ>27°;
K=23TANθ-9.9
E=K+12TANθ



Angled Mold Contour

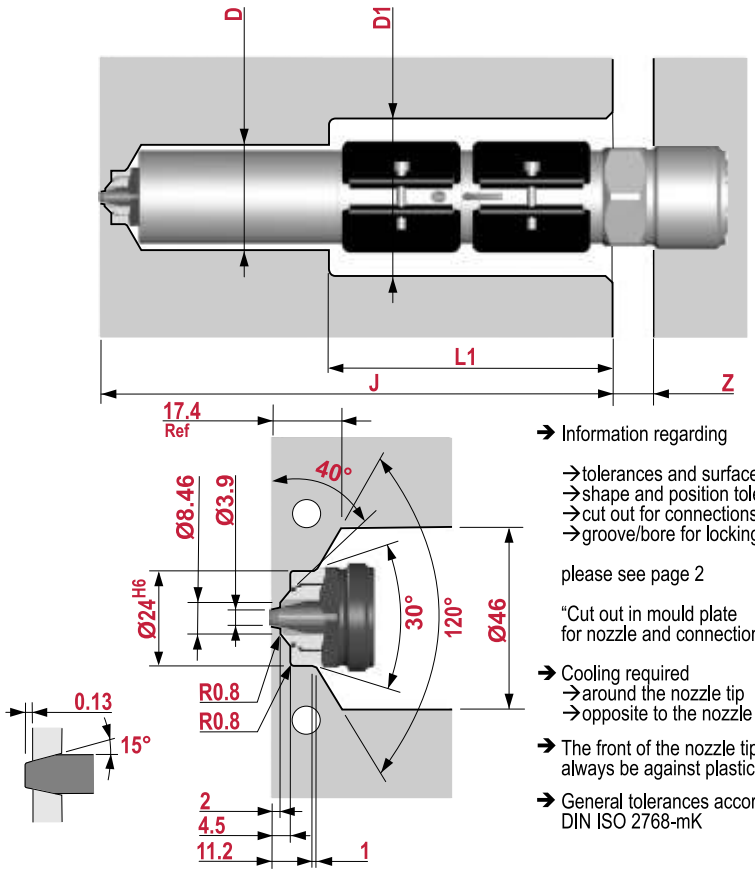
For design and application information, see the Synventive Hot Runner Guide.

Illustrations simplified, schematically drawn and not to scale.

T16 VG23

General:
- ➔Filled and unfilled materials
- ➔Tapered valve pin to eliminate gate flash
- ➔Heat pipes for isothermal operation
- ➔No witness mark on part

Nozzle Criteria:
- ➔Orifice Ø3.9
- ➔J length 75-375
- ➔Patented seal



- ➔ Information regarding
  - ➔tolerances and surfaces
  - ➔shape and position tolerances
  - ➔cut out for connections
  - ➔groove/bore for locking pin

  please see page 2

  "Cut out in mould plate for nozzle and connections"
- ➔ Cooling required
  - ➔around the nozzle tip
  - ➔opposite to the nozzle tip
- ➔ The front of the nozzle tip must always be against plastic.
- ➔ General tolerances according to DIN ISO 2768-mK

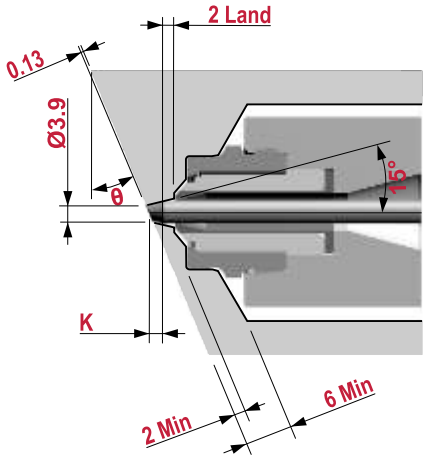
RD	150	200	250	300	350	400	450	500	550	600
J Min	84	97	109	122	133	143	153	162	170	179

- ➔RD is the radial distance from the manifold center locator to the manifold nozzle center line.

T16 recess criteria:
- ➔When gating on an angled mold contour the vestige height may be increased depending on the angle
- ➔K is the increase in vestige height required to maintain a 1.6 wall, 2 wall and/or 6 wall

Heater Style	J Min	J Max	Heater Qty	Watts/Volts
Band (38 long)	75	149.9	1	500W/240V
Band (51 long)	150	375	2 (one spare)	600W/240V (each)

θ≤6°;
K=0
6°<θ≥16°;
K=4.2TANθ+1.6/COSθ-2
θ>16°;
K=12TANθ+2/COSθ-4.5



Angled Mold Contour

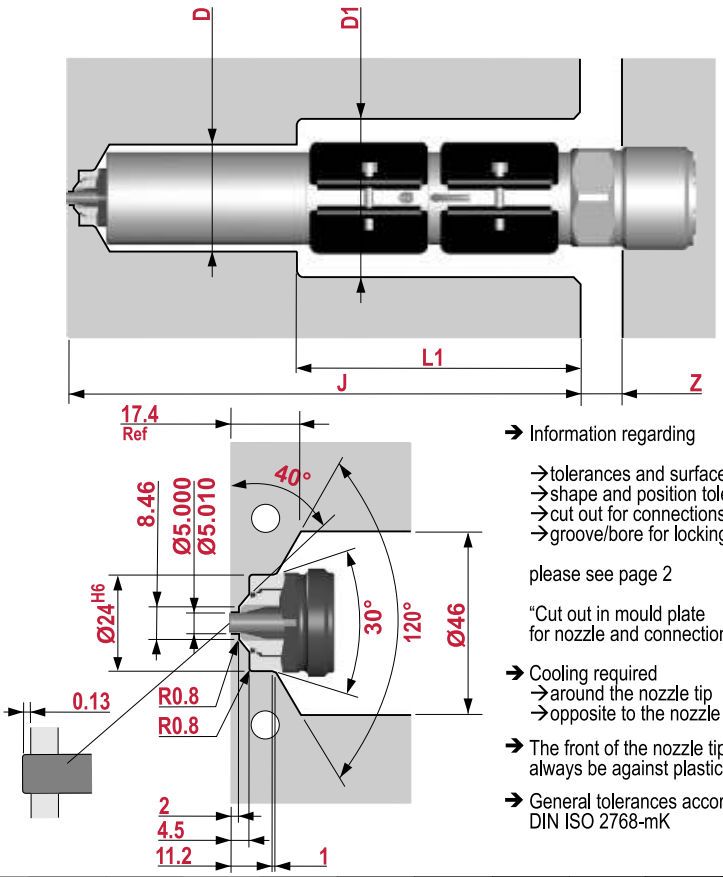
For design and application information, see the Synventive Hot Runner Guide.

Illustrations simplified, schematically drawn and not to scale.

T16 VG23S

General:
➔Filled and unfilled materials
➔Tapered valve pin to eliminate gate flash
➔Heat pipes for isothermal operation

Nozzle Criteria:
➔Orifice Ø3.9
➔J length 75-375
➔Patented seal



➔ Information regarding

➔tolerances and surfaces
➔shape and position tolerances
➔cut out for connections
➔groove/bore for locking pin

please see page 2

"Cut out in mould plate for nozzle and connections"

➔ Cooling required
➔around the nozzle tip
➔opposite to the nozzle tip

➔ The front of the nozzle tip must always be against plastic.

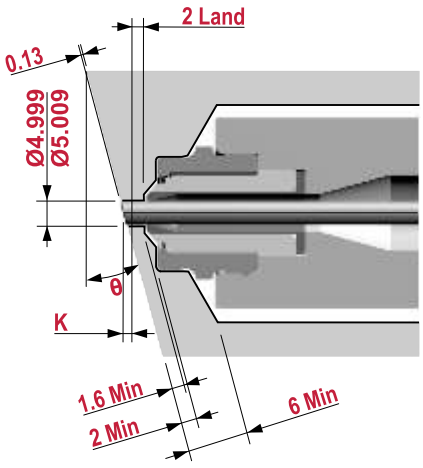
➔ General tolerances according to DIN ISO 2768-mK

➔RD is the radial distance from the manifold center locator to the manifold nozzle center line.

RD	150	200	250	300	350	400	450	500	550	600
J Min	84	97	109	122	133	143	153	162	170	179

T16 contour criteria:
➔When gating on an angled mold contour the vestige height may be increased depending on the angle
➔K is the increase in vestige height required to maintain a 1.6 wall, 2 wall and/or 6 wall

Heater Style	J Min	J Max	Heater Qty	Watts/Volts
Band (38 long)	75	149.9	1	500W/240V
Band (51 long)	150	375	2 (one spare)	600W/240V (each)



Angled Mold Contour

θ≤6°;
K=0
6°<θ≥16°;
K=4.2TANθ+1.6/COSθ-2
θ>16°;
K=12TANθ+2/COSθ-4.5

For design and application information, see the Synventive Hot Runner Guide.