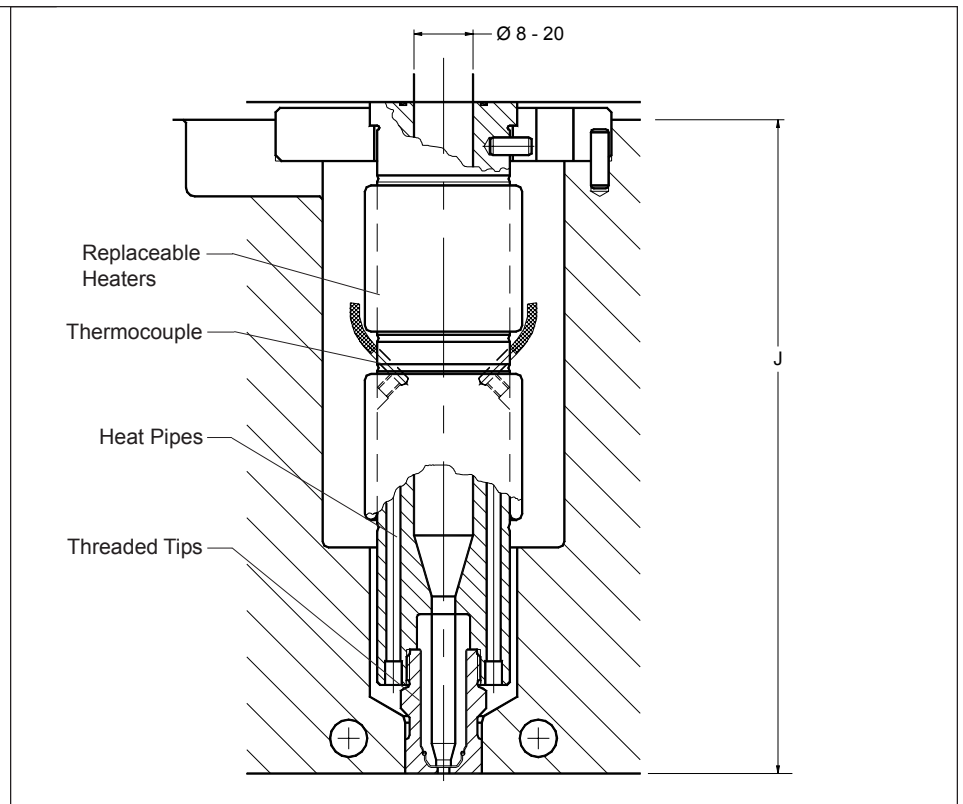


SR20 Hot Runner Nozzles are for medium to large part applications and are available with band or helical heaters. In most cases one band heater is required for operation but an installed spare may be provided if space allows. They are available in lengths from 106 to 500 ("J" dimension)

Suitable for all materials and available with ten Synventive Controlled Vestige (CV) tip options including valve gates for zero gate vestige applications.



**Features:**

20mm flow channel maximum

106 - 500 mold depth ("J" dimension)

Replaceable long life heater(s) and thermocouple

240V heaters

10 controlled vestige tip styles

Replaceable threaded tips

Internal heat pipes for temperature uniformity

For all plastics including those with fillers

26mm tip dia

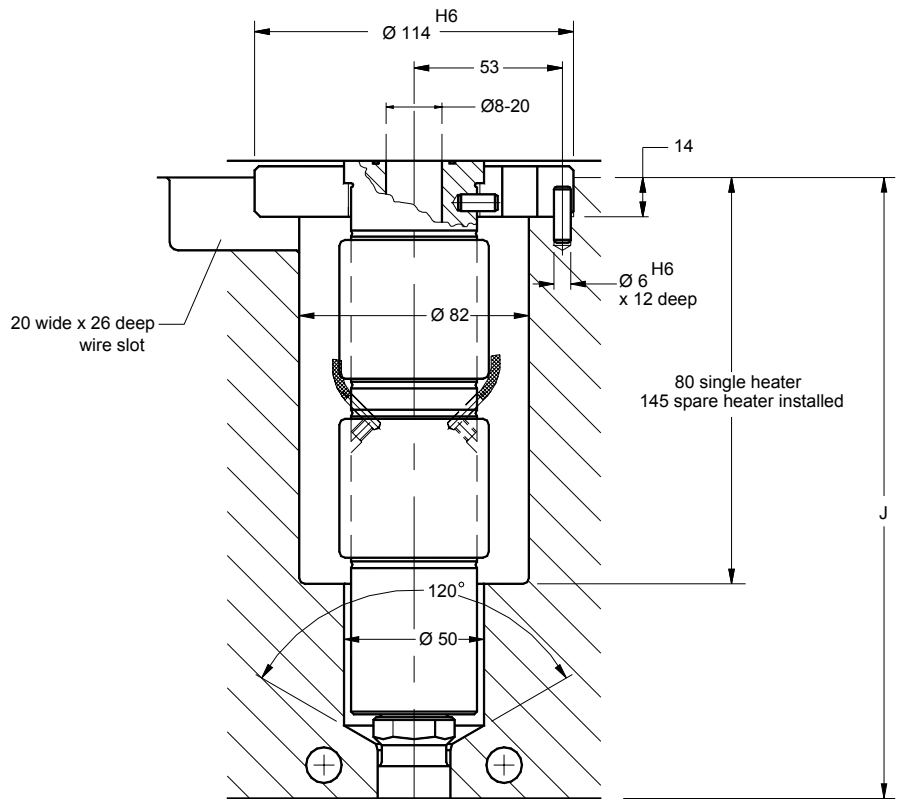


### Band Heater

With the exception of PA and PBT one heater required for operation. If mold thickness allows a spare band heater will be installed. When using CV11NS and CV21NS tip styles the 82 diameter heater clearance hole depth increases eliminating the 50mm diameter clearance hole. See SR20-14 and SR20-22.

J Minimum = 106

J Maximum = 380

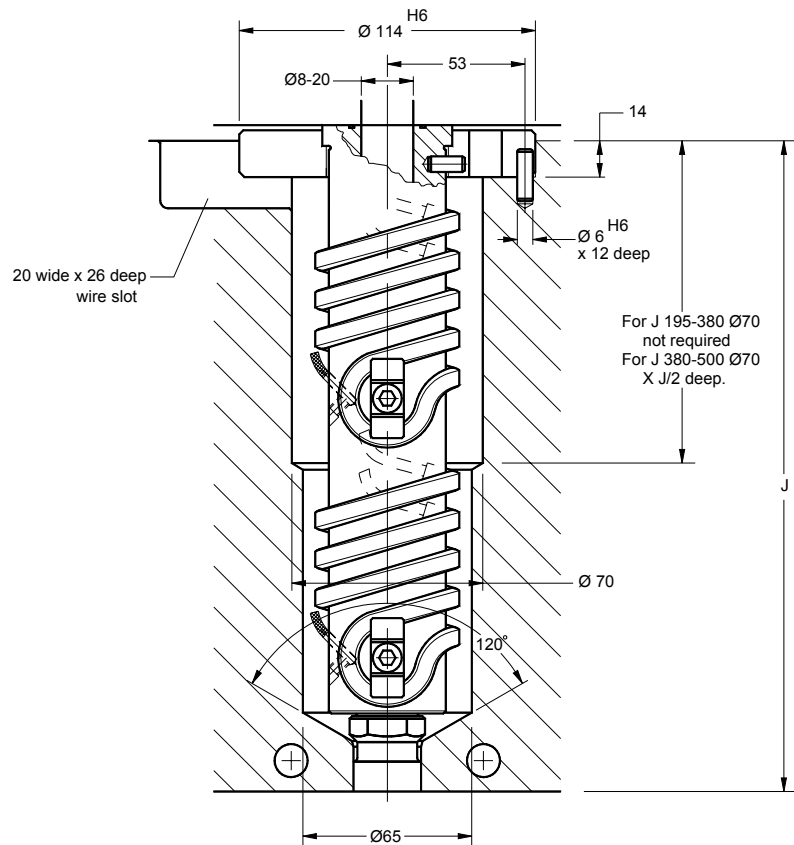


### Helical Heater

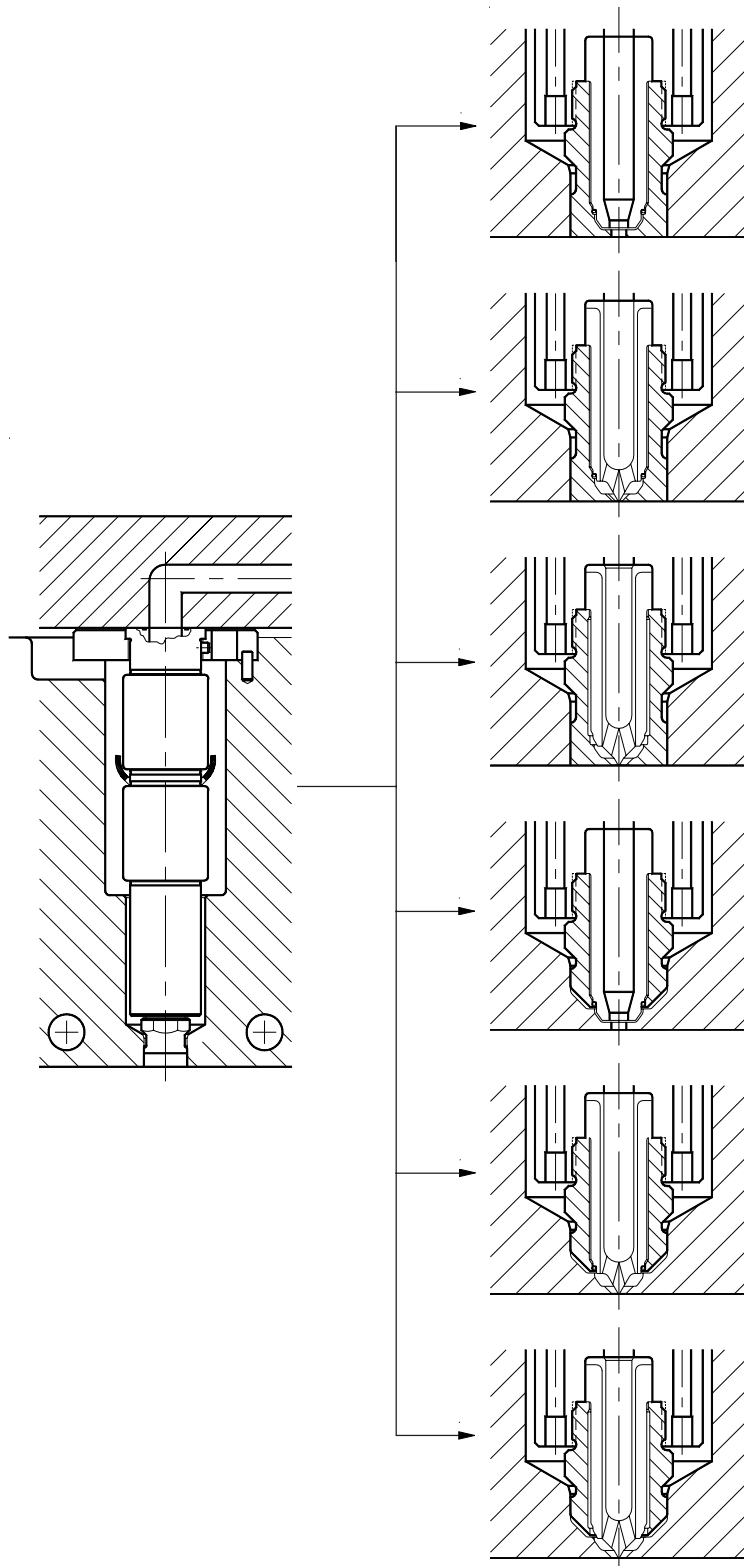
When J is greater than 380 two heaters are required for operation.

J Minimum = 195

J Maximum = 500



**Thermal Gate  
Nozzle**



**CV10**

- Filled and unfilled materials
- Open flow channel/Higher flow
- 2.0 to 7.0 Orifice diameter
- Patented seal
- Easier mold geometry

**Dimensional data on Pages SR20-10 & 11**

**CV11**

- Filled and unfilled materials
- Cone point delivers more heat to gate.
- 2.0 to 4.0 Orifice diameter
- Patented seal
- Reduced vestige
- Easier mold geometry

**Dimensional data on Pages SR20-12 & 13**

**CV11CM**

- Filled and unfilled materials
- Developed for PA and PBT
- 3.0 to 4.0 Orifice diameter
- Reduced vestige
- Easier mold geometry

**CV20**

- Filled and unfilled materials
- Open flow channel/Higher flow
- 2.0 to 7.0 Orifice diameter
- Patented seal
- No witness mark
- Easier color change

**Dimensional data on Pages SR20-16, 17 & 18**

**CV21**

- Filled and unfilled materials
- Cone point delivers more heat to the gate
- 2.0 to 4.0 Orifice diameter
- Patented seal
- Reduced vestige
- No witness mark

**Dimensional data on Pages SR20-19, 20 & 21**

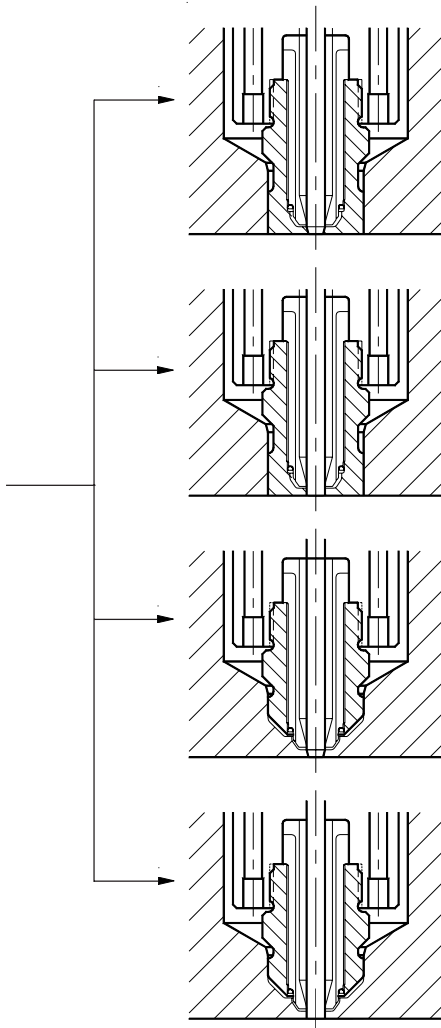
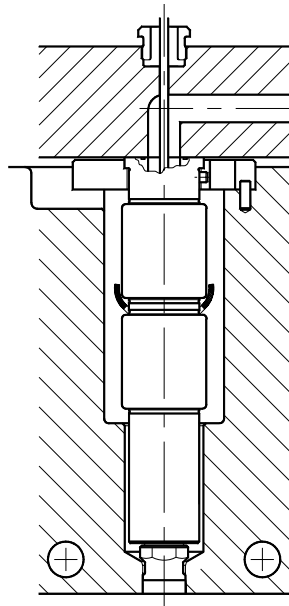
**CV21CM**

- Filled and unfilled materials
- Developed for PA and PBT
- 3.0 to 4.0 Orifice diameter
- Reduced vestige
- No witness mark

**Dimensional data on Pages SR20-22, 23 & 24**

See page SR20-5 to select a tip that suits your application

**Valve Gate  
Nozzle**



**VG12**

- Filled and unfilled materials
- "0" vestige
- Tapered shut off
- 3.9 Orifice diameter
- Patented seal
- Easier mold geometry

Dimensional data on Pages SR20-25 & 26

**VG12S**

- Filled and unfilled materials
- "0" vestige
- Diametric shut off
- Materials having glass fiber fillers
- 5.0 Orifice diameter
- Patented seal
- Easier mold geometry

Dimensional data on Pages SR20-27 & 28

**VG23**

- Filled and unfilled materials
- "0" Vestige
- Tapered shut off
- 3.9 Orifice diameter
- Patented seal
- No witness mark

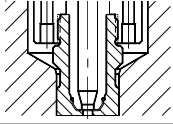
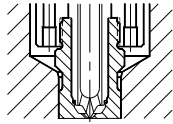
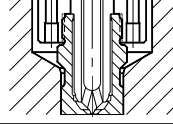
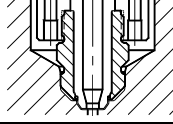
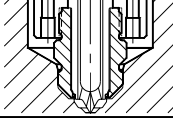
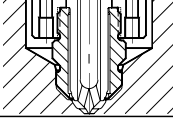
Dimensional data on Pages SR20-29 & 30

**VG23S**

- Filled and unfilled materials
- Materials having glass fibers
- Diametric shut off
- "0" Vestige
- 5.0 Orifice diameter
- Patented seal
- No witness mark

Dimensional data on Pages SR20-31 & 32

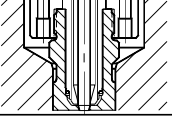
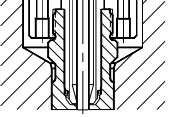
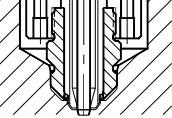
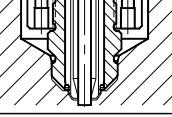
See page SR20-6 to  
select a tip that suits  
your application

Material	Tip Style	Additives	Semi-crystalline										Amorphous											
			PE	PP	PEEK	PPS	PET	PBT	PPO/PA	PA	PPA	POM	PMMA	ABS	ASA	SAN	PS	PC/ABS	PC	PES	PSU	PEI	PPO	TPE
	<b>CV10</b>	A	+	+	-	-	-	-	-	-	-	-	+	+	+	+	+	+	-	-	-	+	-	
	B	+	+	-	-	-	-	-	-	-	-	-	+	-	-	-	+	+	-	-	-	+	-	
	C	+	+	-	-	+	-	+	+	-	+	-	+	-	-	-	+	+	-	-	-	+	-	
	D	+	+	-	-	-	-	-	-	-	-	-	+	-	-	-	+	+	-	-	-	+	-	
	<b>CV11</b>	A	+	+	-	-	-	-	-	-	-	+	+	+	+	+	+	-	-	-	+	+		
	B	0	0	-	-	-	-	-	-	-	-	+	-	+	+	-	-	+	+	-	-	-	+	+
	C	0	0	-	-	-	-	-	-	-	-	+	-	+	+	-	-	+	+	-	-	-	+	+
	D	+	+	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	-	-	-	+	+	
	<b>CV11CM</b>	A	-	-	-	-	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	
	B	-	-	-	-	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	C	-	-	-	-	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	D	-	-	-	-	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	<b>CV20</b>	A	+	+	-	-	-	-	-	-	-	0	+	+	+	+	+	+	-	-	-	+	-	
	B	+	+	-	-	-	+	-	-	-	-	0	-	+	-	-	+	+	+	-	-	-	+	-
	C	+	+	-	+	+	+	+	+	-	-	0	-	+	-	-	+	+	-	-	-	+	-	
	D	+	+	-	-	-	-	-	-	-	-	0	+	+	+	-	+	+	+	-	-	-	+	-
	<b>CV21</b>	A	+	+	-	-	-	-	-	-	-	+	0	+	+	+	+	+	-	-	-	+	+	
	B	+	+	-	-	-	-	-	-	-	-	+	0	0	-	+	+	0	0	-	-	-	+	+
	C	+	+	-	-	-	-	-	-	-	-	+	0	0	-	+	+	0	0	-	-	-	+	+
	D	+	+	-	-	-	-	-	-	-	-	+	0	0	-	-	+	0	0	-	-	-	+	+
	<b>CV21CM</b>	A	-	-	-	-	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	
	B	-	-	-	-	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	C	-	-	-	-	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	D	-	-	-	-	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

The above table defines which tip styles are best suited for a given material.

Note:  
The selection table is meant to be a guide for the initial selection of the tip style. It is based on the more common grades of material. Synventive will verify the correct tip selection as part of the quote/order process.

Additive Index	
A	None
B	Fillers
C	Glass Fiber
D	Flame retardants
+	Very suitable
0	Suitable
-	Not suitable

Material	Tip Style	Additives	Semi-crystalline										Amorphous										
			PE	PP	PEEK	PPS	PET	PBT	PPO/PA	PA	PPA	POM	PMMA	ABS	ASA	SAN	PS	PC/ABS	PC	PES	PSU	PEI	PPO
	<b>VG12</b>	A	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	-	-	-	+	+	
	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	D	0	0	-	-	0	0	-	0	-	0	0	0	0	0	0	0	-	-	-	-	+	0
	<b>VG12S</b>	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	B	+	+	-	-	0	0	0	0	-	+	-	+	-	+	+	+	-	-	-	+	0	
	C	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	+	0	
	D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<b>VG23</b>	A	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	-	-	-	+	+	
	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	D	+	+	-	-	0	0	0	0	-	0	0	+	0	0	+	+	+	-	-	-	+	+
	<b>VG23S</b>	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	B	+	+	-	-	+	+	0	+	-	0	0	+	-	0	+	+	+	-	-	-	+	0
	C	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	+	0	
	D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

The above table defines which tip styles are best suited for a given material.

Note:  
The selection table is meant to be a guide for the initial selection of the tip style. It is based on the more common grades of material. Synventive will verify the correct tip selection as part of the quote/order process.

Additive Index	
A	None
B	Fillers
C	Glass Fiber
D	Flame retardants

+	Very suitable
0	Suitable
-	Not suitable

Maximum flow rate of hot runner nozzles varies depending on the melt index of the material being processed.

The flow rate of any hot runner nozzle is controlled by three factors:

- 1) Flow bore size
- 2) Melt temperature, viscosity vs shear rate relationship.
- 3) The cavity wall thickness, flow length from the gate, mold temperature and required fill rate.

The last two factors can combine to change the maximum shot capacity by a factor of 5 or more. Synventive uses computerized flow analysis to assure the correct nozzle is chosen.

Material	Tip Style		
	CV10/CV20	CV11(NS)/CV21(NS)	VG12(S)/VG23(S)
ABS	550 gm/sec	300 gm/sec	200 gm/sec
PC	300 gm/sec	300 gm/sec	50 gm/sec
PPO	350 gm/sec	350 gm/sec	50 gm/sec
PBT	250 gm/sec	250 gm/sec	50 gm/sec
PBT/PC	300 gm/sec	300 gm/sec	50 gm/sec
PC/ABS	300 gm/sec	300 gm/sec	50 gm/sec
PS	500 gm/sec	500 gm/sec	300 gm/sec
PP	750 gm/sec	750 gm/sec	300 gm/sec
PA	300 gm/sec	300 gm/sec	200 gm/sec
POM	200 gm/sec	200 gm/sec	100 gm/sec
PE	500 gm/sec	500 gm/sec	300 gm/sec
Acrylic	300 gm/sec	300 gm/sec	150 gm/sec
PVC	200 gm/sec	200 gm/sec	100 gm/sec
TPR	-	500 gm/sec	300 gm/sec

#### Example

Material: PE

Tip style: CV10

Maximum flow rate:  
500 grams/second

#### Note:

Values in the table do not include reinforced materials or materials with fillers.

This table lists the normal gate orifice required to fill an average cavity of the listed wall thickness and surface area.

The orifice diameter is based on the flow and freeze characteristics of each type of plastic at its normal processing conditions. It is not dependent on whether the cavity is fed by a hot or cold runner.

Some of the listed wall thickness and surface area combinations are not applicable to all plastics because of the flow length to wall ratios of each material. Consult plastic supplier's processing recommendations.

Due to the gate limitations of each hot runner nozzle, the actual gate may be slightly smaller or larger than the tabulated orifice.

Part Area		Orifice Diameter Guideline mm(inch)									
		Wall thickness mm/(inch)									
sq mm	sq inch	0.75 (0.03)	1.00 (0.04)	1.25 (0.05)	1.50 (0.06)	1.75 (0.07)	2.00 (0.08)	2.25 (0.09)	2.50 (0.10)	3.00 (0.13)	4.00 (0.16)
600		0.90	0.90	0.90	0.90	0.90	0.90	0.95	1.00	1.12	1.27
	1.0	0.035	0.035	0.035	0.035	0.035	0.035	0.037	0.039	0.044	0.050
1200		0.90	0.90	0.90	0.92	1.00	1.05	1.12	1.17	1.32	1.50
	2.0	0.035	0.035	0.035	0.036	0.039	0.041	0.044	0.046	0.052	0.059
1800		0.90	0.90	0.95	1.02	1.10	1.17	1.25	1.30	1.47	1.68
	3.0	0.035	0.035	0.037	0.040	0.043	0.046	0.049	0.051	0.058	0.066
2400		0.90	0.90	1.02	1.10	1.20	1.25	1.35	1.40	1.58	1.78
	4.0	0.035	0.035	0.040	0.043	0.047	0.049	0.053	0.055	0.062	0.070
3000		0.90	0.95	1.07	1.17	1.25	1.32	1.42	1.47	1.65	1.88
	5.0	0.035	0.037	0.042	0.046	0.049	0.052	0.056	0.058	0.065	0.074
6000		1.00	1.12	1.27	1.37	1.50	1.58	1.68	1.76	1.98	2.26
	10.0	0.038	0.044	0.050	0.054	0.059	0.062	0.066	0.069	0.078	0.089
12,000		1.17	1.32	1.53	1.65	1.78	1.88	2.00	2.08	2.36	2.67
	20.0	0.046	0.052	0.060	0.065	0.070	0.074	0.079	0.082	0.093	0.105
18,000		1.30	1.47	1.68	1.83	1.96	2.06	2.21	2.31	2.62	2.97
	30.0	0.051	0.058	0.066	0.072	0.077	0.081	0.087	0.091	0.103	0.117
24,000		1.37	1.58	1.80	1.96	2.10	2.24	2.39	2.49	2.80	3.18
	40.0	0.054	0.062	0.071	0.077	0.083	0.088	0.094	0.098	0.110	0.125
30,000		1.45	1.65	1.90	2.06	2.24	2.36	2.51	2.64	2.95	3.35
	50.0	0.057	0.065	0.075	0.081	0.088	0.093	0.099	0.104	0.116	0.132
36,000		1.53	1.73	1.98	2.16	2.34	2.46	2.64	2.77	3.10	3.53
	60.0	0.060	0.068	0.078	0.085	0.092	0.097	0.104	0.109	0.122	0.139
42,000		1.58	1.80	2.08	2.26	2.41	2.57	2.75	2.87	3.23	3.66
	70.0	0.062	0.071	0.082	0.089	0.095	0.101	0.108	0.113	0.127	0.144
48,000		1.65	1.88	2.13	2.34	2.51	2.64	2.82	2.97	3.33	3.79
	80.0	0.065	0.074	0.084	0.092	0.099	0.104	0.111	0.117	0.131	0.149
54,000		1.70	1.93	2.21	2.39	2.60	2.72	2.92	3.05	3.43	3.89
	90.0	0.067	0.076	0.087	0.094	0.102	0.107	0.115	0.120	0.135	0.153
60,000		1.73	1.98	2.26	2.46	2.64	2.80	3.00	3.12	3.53	3.99
	100.0	0.068	0.078	0.089	0.097	0.104	0.110	0.118	0.123	0.139	0.157
90,000		1.93	2.18	2.51	2.72	2.92	3.10	3.30	3.45	3.89	4.42
	120.0	0.076	0.086	0.099	0.107	0.115	0.122	0.130	0.136	0.153	0.174
120,000		-	2.36	2.70	2.92	3.10	3.33	3.56	3.73	4.20	4.75
	200.0	-	0.093	0.106	0.115	0.124	0.131	0.155	0.147	0.165	.187
180,000		-	-	2.97	3.23	3.48	3.68	3.94	4.15	4.62	5.26
	300.0	-	-	0.117	0.127	0.137	0.145	0.155	0.162	0.182	0.207
240,000		-	-	-	3.48	3.76	3.98	4.22	4.42	4.98	5.54
	400.0	-	-	-	0.137	.148	0.156	0.166	0.174	0.196	0.218

**Material Factors**

Use tabulated orifice for PE, PP, PS, SAN and PUR.

Use tabulated orifice x 1.15 for POM, PC, PPO and ABS.

Use tabulated orifice x 1.30 for Acrylic, PA, PET, and PBT

Use tabulated orifice x 1.50 for PVC.

For non-reinforced PA, PET and PBT the minimum orifice diameter should be 3.0. For reinforced PA, PET and PBT the minimum orifice diameter should be 4.0.

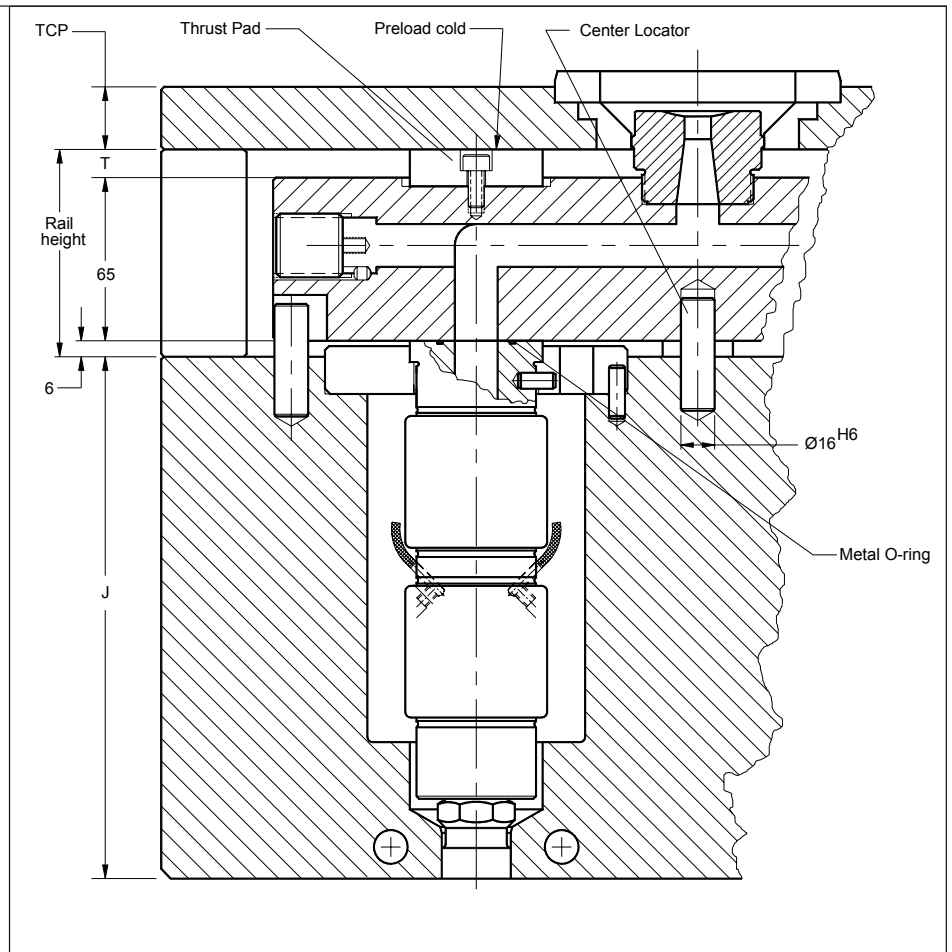
Part Area is total outside area and not the projected area of the part.



SR20 hot runner systems are designed with a preload between the thrust pads and the mold plates in the cold condition. As the manifold heats an additional sealing force is created.

The 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 the system performance. Contact with the mold must be limited to specified areas.



Minimum rail height = 81 (thermal gates).

Support ring nozzles do not line up with the sub-runners in the manifold in the cold condition. As the manifold heats up the manifold sub-runner locations expand to the correct location.

Variable	Description
T	Top air gap
J	Mold depth
TCP	Top clamp plate

$T = \text{Rail height} - 6 - 65$  (manifold)

Minimum  $T = 10$  (thermal gates)

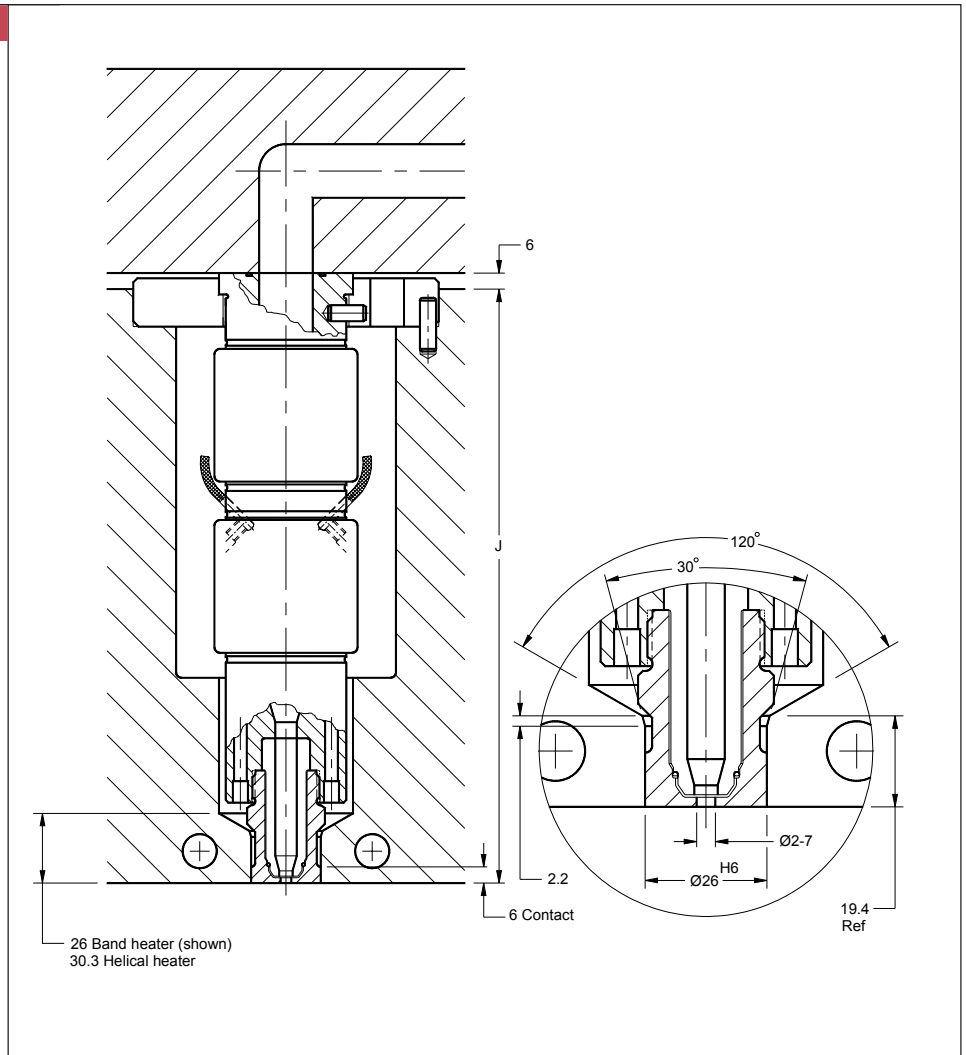
**SR20 CV10**

Filled and unfilled materials.

Easy orifice size changes by straight reaming

Open flow bore

Heat pipes for isothermal operation.



The front face of the tip must be in contact with plastic.

Cooling is required in the gate area.

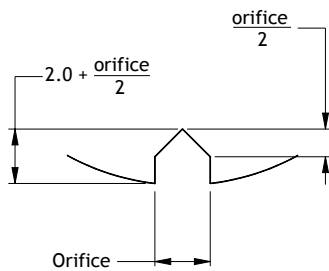
Heater Style	J Min	J Max	Heater Qty (Zones)	Watts/Volts
Band	106	380	1	750W/240V
Helical	195	380	1	750W/240V
Helical	380	500	2	750W/240V (each)

When gating on an angled mold contour the vestige height may be increased depending on the angle.

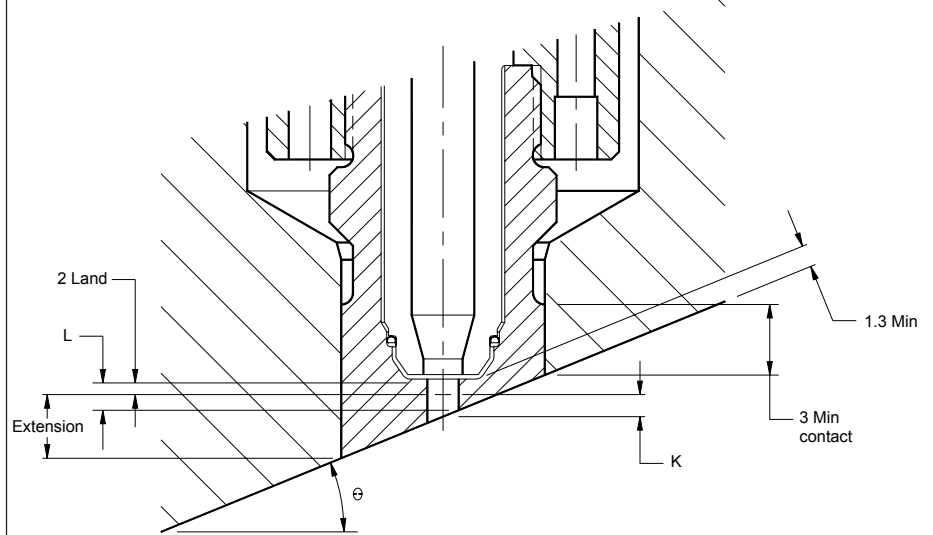
K is the increase in vestige height required to maintain 1.3 minimum wall thickness.

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

For most materials CV10 vestige height is equal to  $2.0 + \text{orifice}/2$ . If the vestige height relative to the possible gate recess depth (h) is too great, use of a CV11 tip is recommended.



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



$$\theta \leq 8^\circ; K = 0$$

$$E = 13 \text{TAN} \theta$$

$$L = 2 - \frac{\text{Orifice Dia.}}{2} \cdot \text{TAN} \theta$$

$$\theta > 8^\circ; K = 4.75 \text{TAN} \theta + \frac{1.3}{\text{COS} \theta} - 2$$

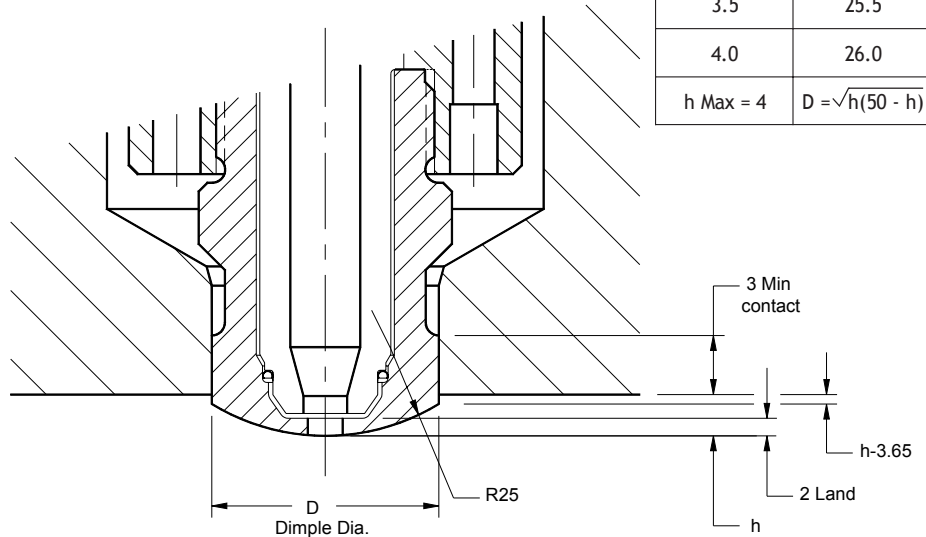
$$E = K + 13 \text{TAN} \theta$$

$$L = 2 + K - \frac{\text{Orifice Dia.}}{2} \cdot \text{TAN} \theta$$

### Angled Mold Contour

### Spherical Recess

h	D
2.0	19.6
2.5	21.8
3.0	23.7
3.5	25.5
4.0	26.0
h Max = 4	$D = \sqrt{h(50 - h)}$



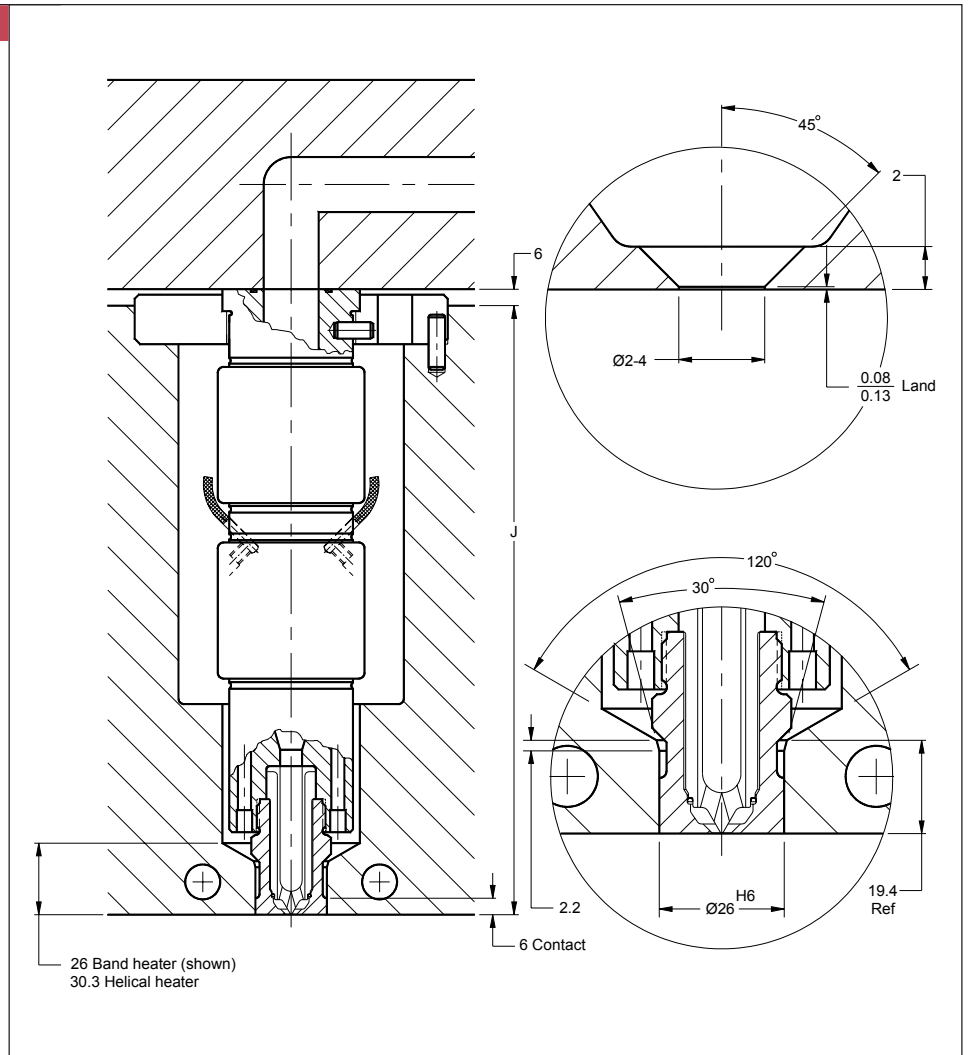
### Spherical Recess

**SR20 CV11**

Filled and unfilled materials.

More heat in the gate area for semi-crystalline materials

Heat pipes for isothermal operation.



The front face of the tip must be in contact with plastic.

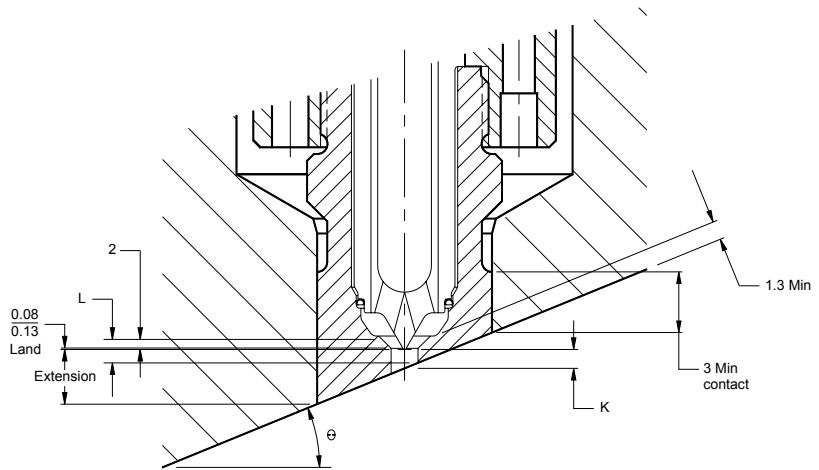
Cooling is required in the gate area.

Heater Style	J Min	J Max	Heater Qty (Zones)	Watts/Volts
Band	106	380	1	750W/240V
Helical	195	380	1	750W/240V
Helical	380	500	2	750W/240V (each)

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 and/or 1.3 minimum wall thickness.

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



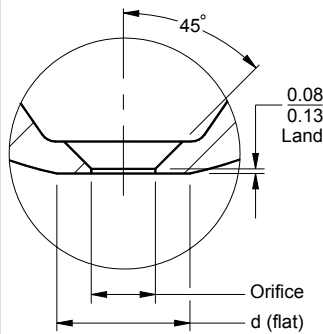
$$\theta \leq 9^\circ: K = \frac{\text{Orifice Dia.}}{2} \cdot \text{TAN} \theta \quad 9 < \theta \leq 13^\circ: K = 4.75 \text{TAN} \theta + \frac{1.3}{\text{COS} \theta} + \frac{\text{Orifice Dia.} - 2}{2} \text{TAN} \theta - 2 \quad \theta > 13^\circ: K = 4.75 \text{TAN} \theta + \frac{1.3}{\text{COS} \theta} - 2$$

$$E = \frac{26 + \text{Orifice Dia.}}{2} \cdot \text{TAN} \theta \quad E = K + 13 \text{TAN} \theta \quad E = K + 13 \text{TAN} \theta$$

$$L = 0.13 \quad L = 0.13 + K - \frac{\text{Orifice Dia.}}{2} \cdot \text{TAN} \theta \quad L = 0.13 + K - \frac{\text{Orifice Dia.}}{2} \cdot \text{TAN} \theta$$

Angled Mold Contour

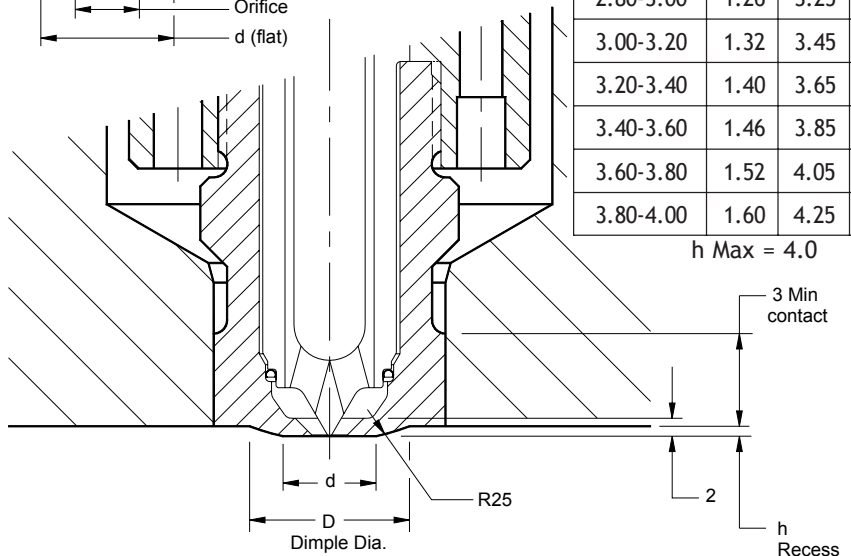
Values in tables are for materials not having glass fibers. Consult Synventive for vestige height when using glass fillers.



Spherical Recess

Orifice Dia.	h	d	D
2.00-2.20	1.00	2.45	14.20
2.20-2.40	1.06	2.65	14.64
2.40-2.60	1.12	2.85	15.06
2.60-2.80	1.18	3.05	15.47
2.80-3.00	1.26	3.25	15.99
3.00-3.20	1.32	3.45	16.38
3.20-3.40	1.40	3.65	16.87
3.40-3.60	1.46	3.85	17.25
3.60-3.80	1.52	4.05	17.61
3.80-4.00	1.60	4.25	18.07

h Max = 4.0



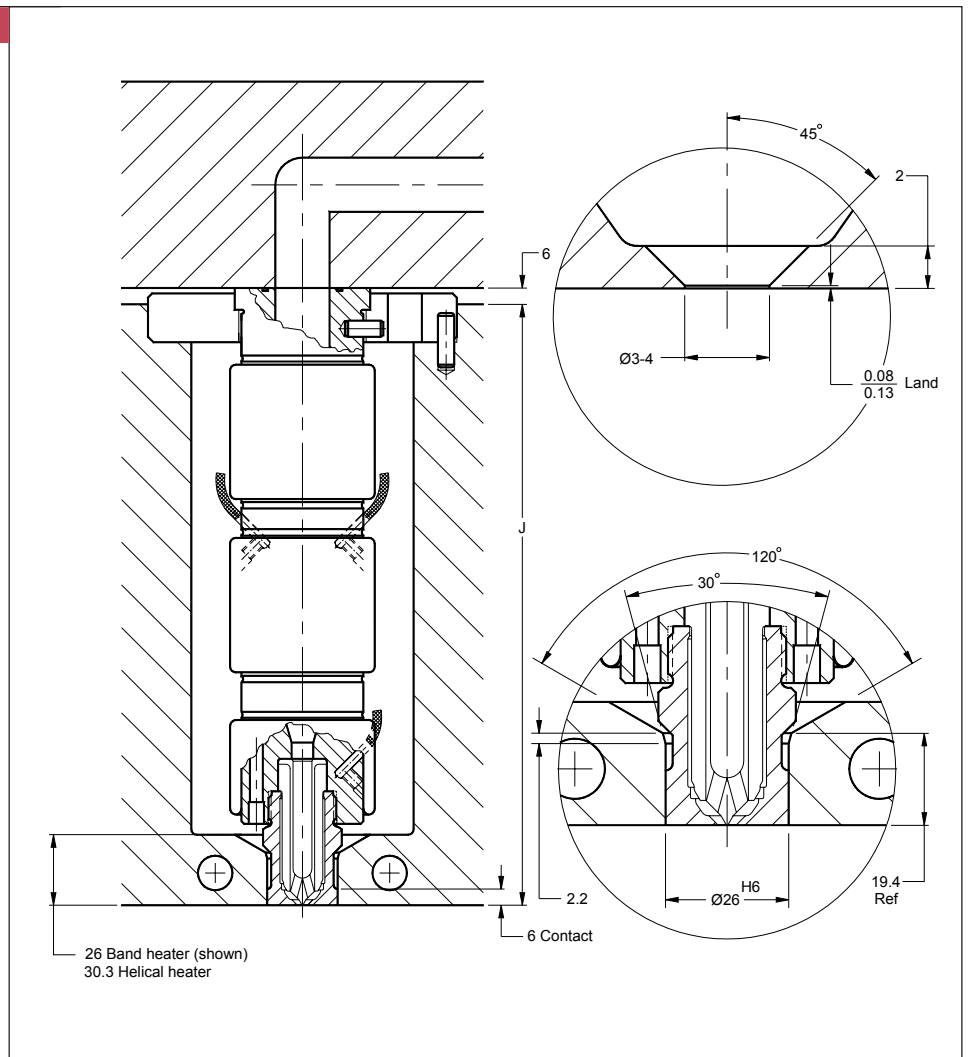
Spherical Recess

**SR20 CV11CM**

Filled and unfilled materials.

Developed for PA and PBT.

Heat pipes for isothermal operation.



The front face of the tip must be in contact with plastic.

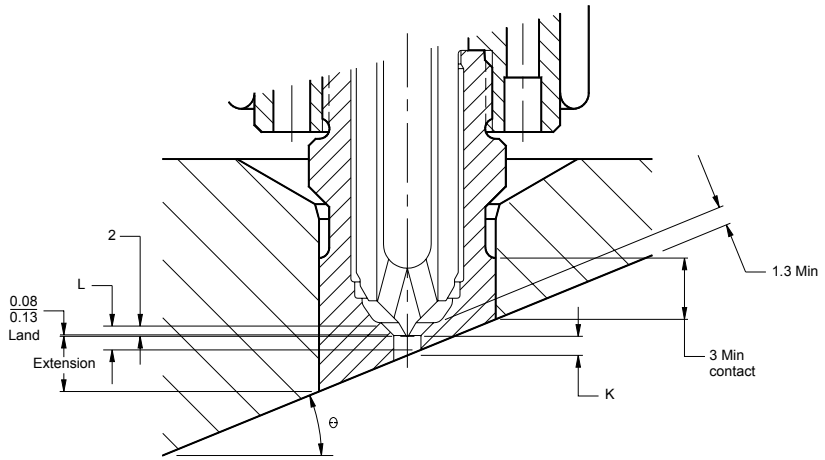
Cooling is required in the gate area.

Heater Style	J Min	J Max	Heater Qty	Watts/Volts
Band	106	380	1	750W/240V
Band (tip)	200	380	1	450W/240V
Helical	195	380	1	750W/240V
Helical	380	500	2	750W/240V (each)

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 and/ or 1.3 minimum wall thickness.

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



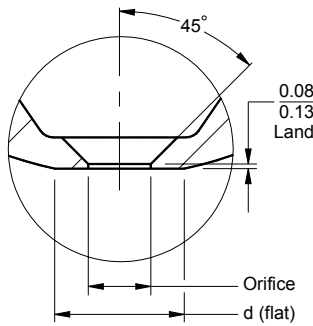
$$\theta \leq 9^\circ: K = \frac{\text{Orifice Dia.}}{2} \cdot \text{TAN} \theta \quad < \theta \leq 13^\circ: K = 4.75 \text{TAN} \theta + \frac{1.3}{\text{COS} \theta} + \frac{\text{Orifice Dia.} - 2}{2} \text{TAN} \theta - 2 \quad \theta > 13^\circ: K = 4.75 \text{TAN} \theta + \frac{1.3}{\text{COS} \theta} - 2$$

$$E = \frac{26 + \text{Orifice Dia.}}{2} \cdot \text{TAN} \theta \quad E = K + 13 \text{TAN} \theta \quad E = K + 13 \text{TAN} \theta$$

$$L = 0.13 \quad L = 0.13 + K \cdot \frac{\text{Orifice Dia.}}{2} \cdot \text{TAN} \theta \quad L = 0.13 + K - \frac{\text{Orifice Dia.}}{2} \cdot \text{TAN} \theta$$

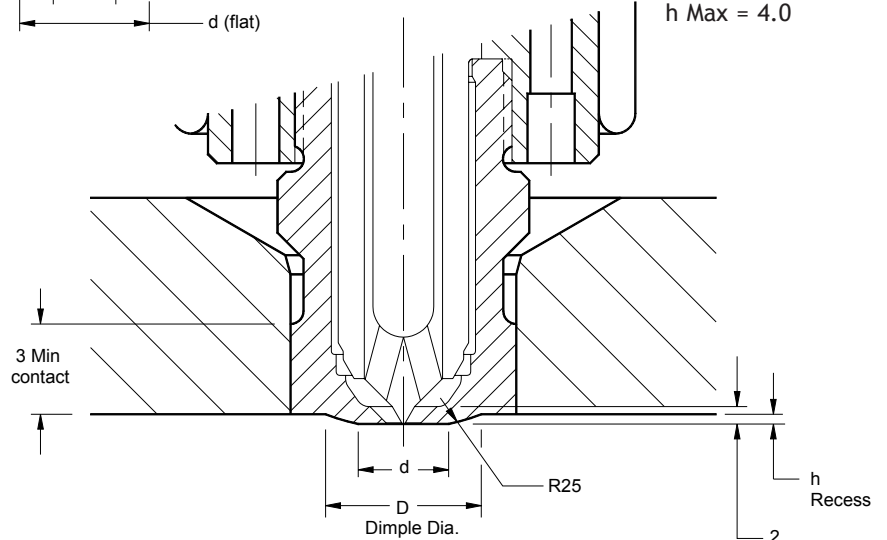
Angled Mold Contour

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



Spherical Recess			
Orifice Dia.	h	d	D
3.00-3.20	1.32	3.45	16.38
3.20-3.40	1.40	3.65	16.87
3.40-3.60	1.46	3.85	17.25
3.60-3.80	1.52	4.05	17.61
3.80-4.00	1.60	4.25	18.07

h Max = 4.0



Spherical Recess

**SR20 CV20**

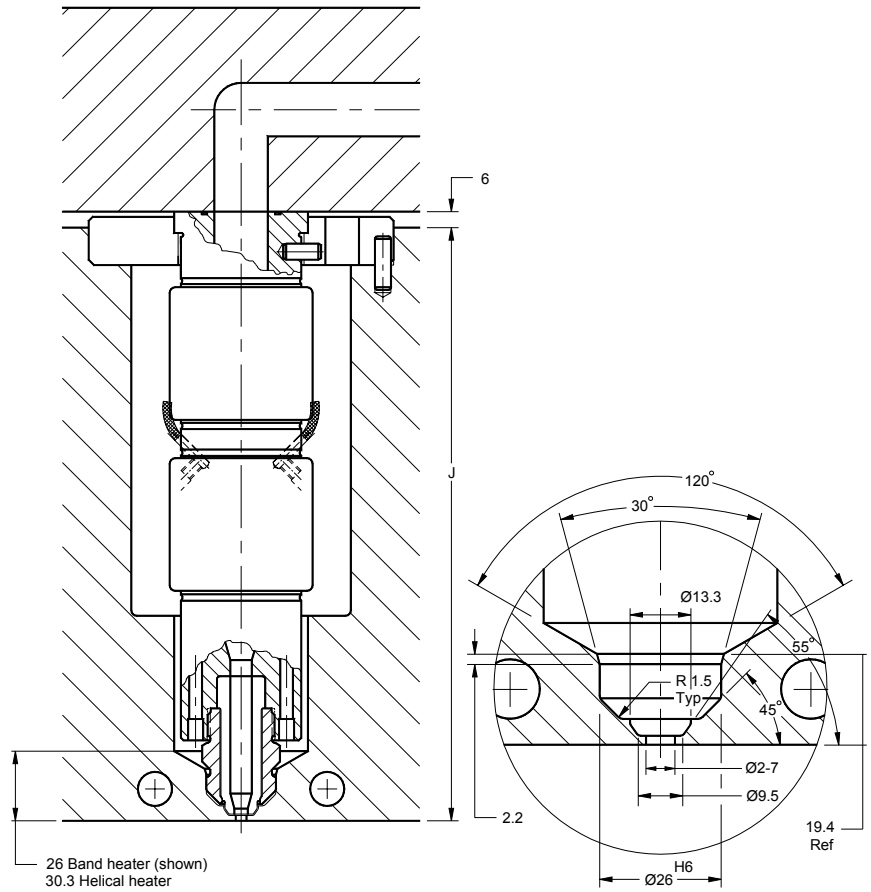
Filled and unfilled materials.

Easy orifice size changes by straight reaming .

No tip witness mark on part.

Open flow bore.

Heat pipes for isothermal operation.



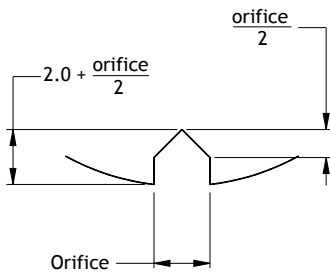
Cooling is required in the gate area.

Heater Style	J Min	J Max	Heater Qty (Zones)	Watts/ Volts
Band	106	380	1	750W/240V
Helical	195	380	1	750W/240V
Helical	380	500	2	750W/240V (each)



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  $2.0 + \text{orifice}/2$ . If the vestige height relative to the possible gate recess depth (h) is too great, use of a CV21 tip is recommended.



Conical Recess	
h	D
2.0	21.0
2.5	22.8
3.0	24.5
3.5	26.3
4.0	28.0

A detailed cross-sectional diagram of a conical recess. The recess has a 30-degree angle. The diameter of the recess is labeled as D. The diameter of the dimple is labeled as Dimple Dia. (Ø14). The depth of the recess is labeled as h. The depth of the recess below the part surface is labeled as h Recess. The width of the land is labeled as 2 Land.

**Conical Recess**  
 $h \text{ Max} = 4$   
 $D = 14 + 3.5(h)$

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

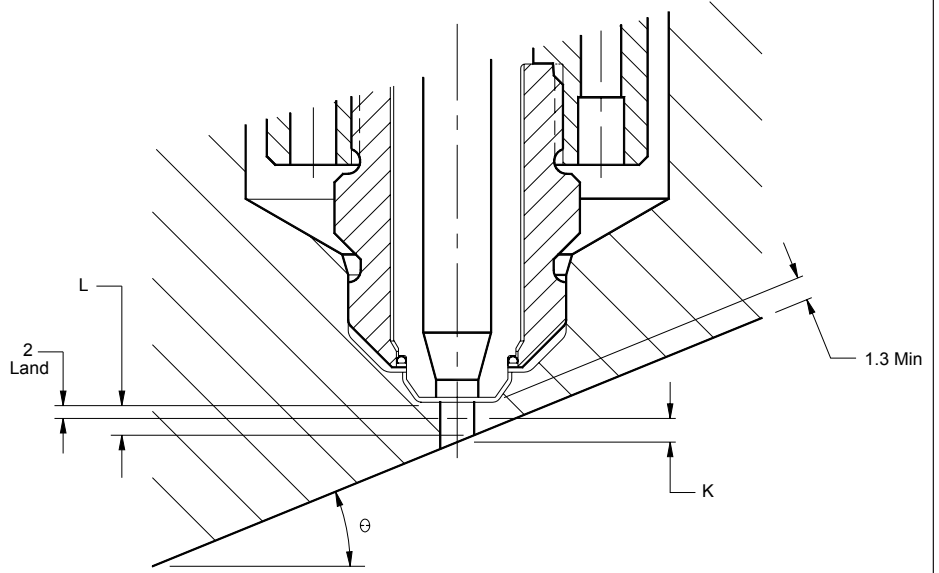
Spherical Recess	
h	D
2.0	19.6
2.5	21.8
3.0	23.7
3.5	25.5
4.0	27.1

A detailed cross-sectional diagram of a spherical recess. The recess has a spherical shape with a radius of R25. The diameter of the recess is labeled as D. The diameter of the dimple is labeled as Dimple Dia. The depth of the recess is labeled as h. The depth of the recess below the part surface is labeled as h Recess. The width of the land is labeled as 2 Land.

**Spherical Recess**  
 $h \text{ Max} = 4$   
 $D = 2\sqrt{h(50-h)}$

When gating onto an angled mold contour the vestige height may be increased depending on the angle.

K is the increase in vestige height required to maintain 1.3 minimum wall thickness.



$$\theta \leq 8^\circ; K = 0$$

$$\theta > 8^\circ; K = 4.75 \text{TAN} \theta + \frac{1.3}{\text{COS} \theta} - 2$$

$$L = 2 - \frac{\text{Orifice Dia.}}{2} \cdot \text{TAN} \theta$$

$$L = 2 + K - \frac{\text{Orifice Dia.}}{2} \cdot \text{TAN} \theta$$

Angled Mold Contour

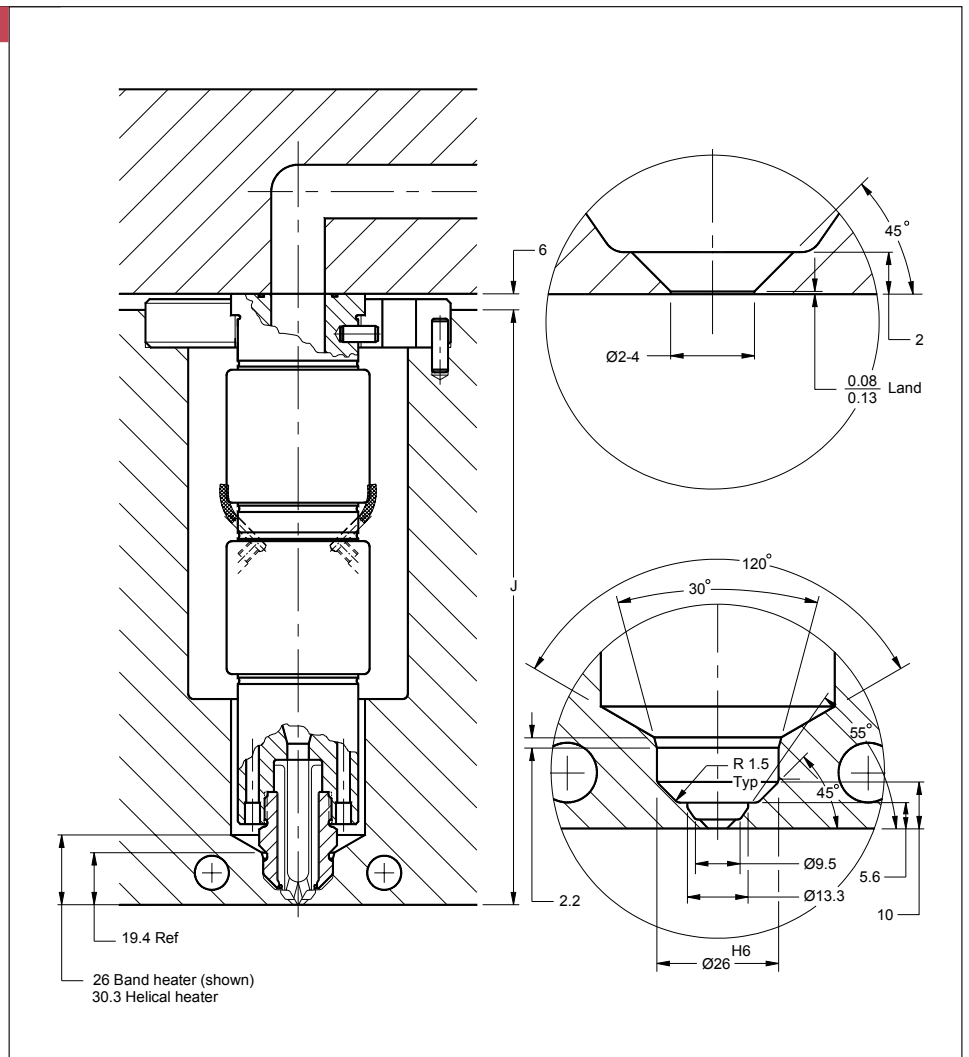
**SR20 CV21**

Filled and unfilled materials.

More heat in the gate area for semi-crystalline materials.

No tip witness mark.

Heat pipes for isothermal operation.

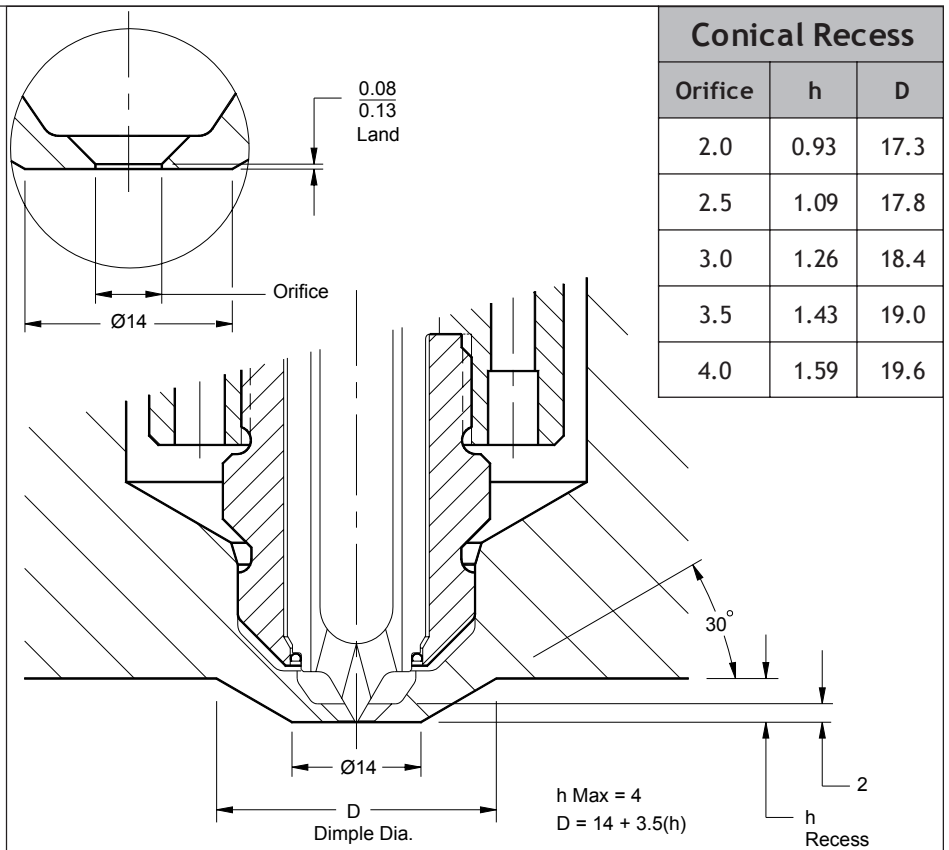


Cooling is required in the gate area.

Heater Style	J Min	J Max	Heater Qty (Zones)	Watts/Volts
Band	106	380	1	750W/240V
Helical	195	380	1	750W/240V
Helical	380	500	2	750W/240V (each)

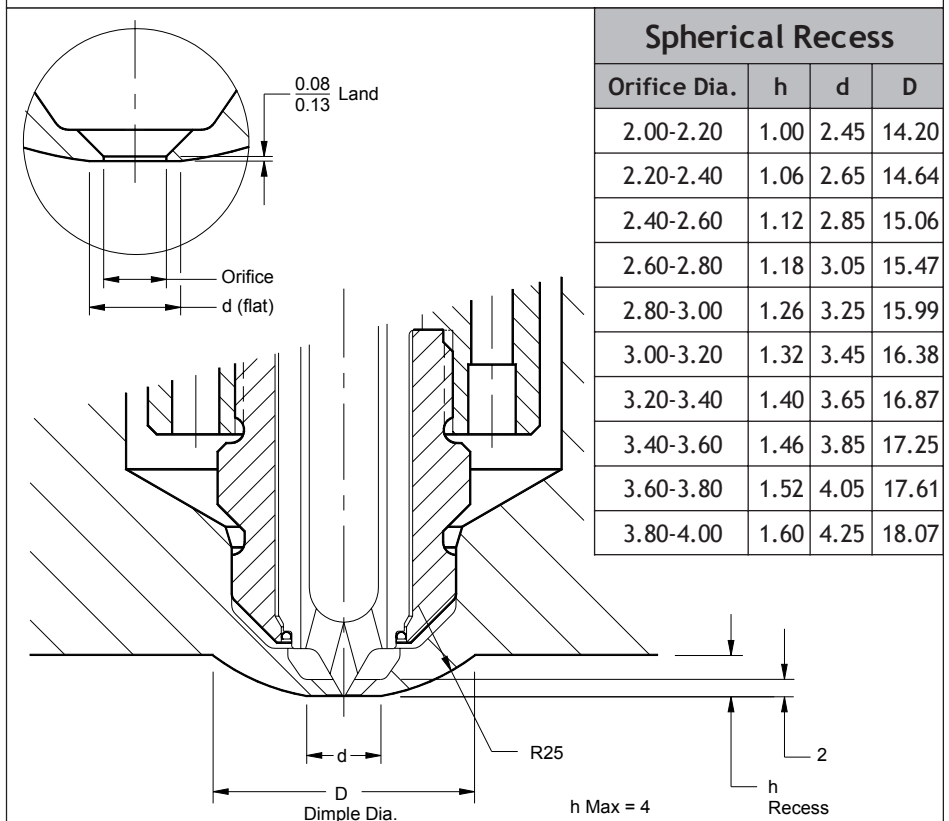
Recessed gates are used to reduce the vestige height above the part surface or keep the vestige below the part surface.

Maintain 0.13 land when machining gate orifice.



**Conical Recess**

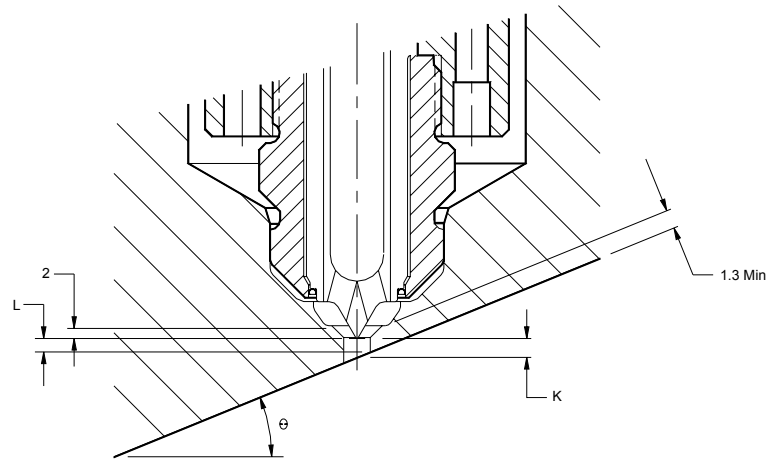
Values in tables are for materials not having glass fibers. Consult Synventive for vestige height when using glass fillers.



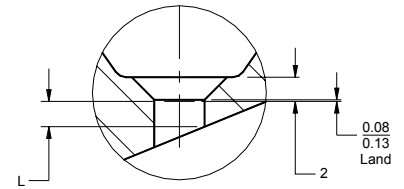
**Spherical Recess**

When gating onto an angled mold contour the vestige height may be increased depending on the angle.

K is the increase in vestige height required to maintain 1.3 minimum wall thickness.



Angled Mold Contour



$$\begin{aligned}
 \theta \leq 9^\circ; K &= \frac{\text{Orifice Dia.} - 2}{2} \cdot \text{TAN } \theta & 9 < \theta \leq 13^\circ; K &= 4.75 \text{TAN } \theta + \frac{1.3}{\text{COS } \theta} + \frac{\text{Orifice Dia.} - 2}{2} \cdot \text{TAN } \theta - 2 & \theta > 13^\circ; K &= 4.75 \text{TAN } \theta + \frac{1.3}{\text{COS } \theta} - 2 \\
 L &= 0.13 & L &= 0.13 + K - \frac{\text{Orifice Dia.} \cdot \text{TAN } \theta}{2} & L &= 0.13 + K - \frac{\text{Orifice Dia.} \cdot \text{TAN } \theta}{2}
 \end{aligned}$$

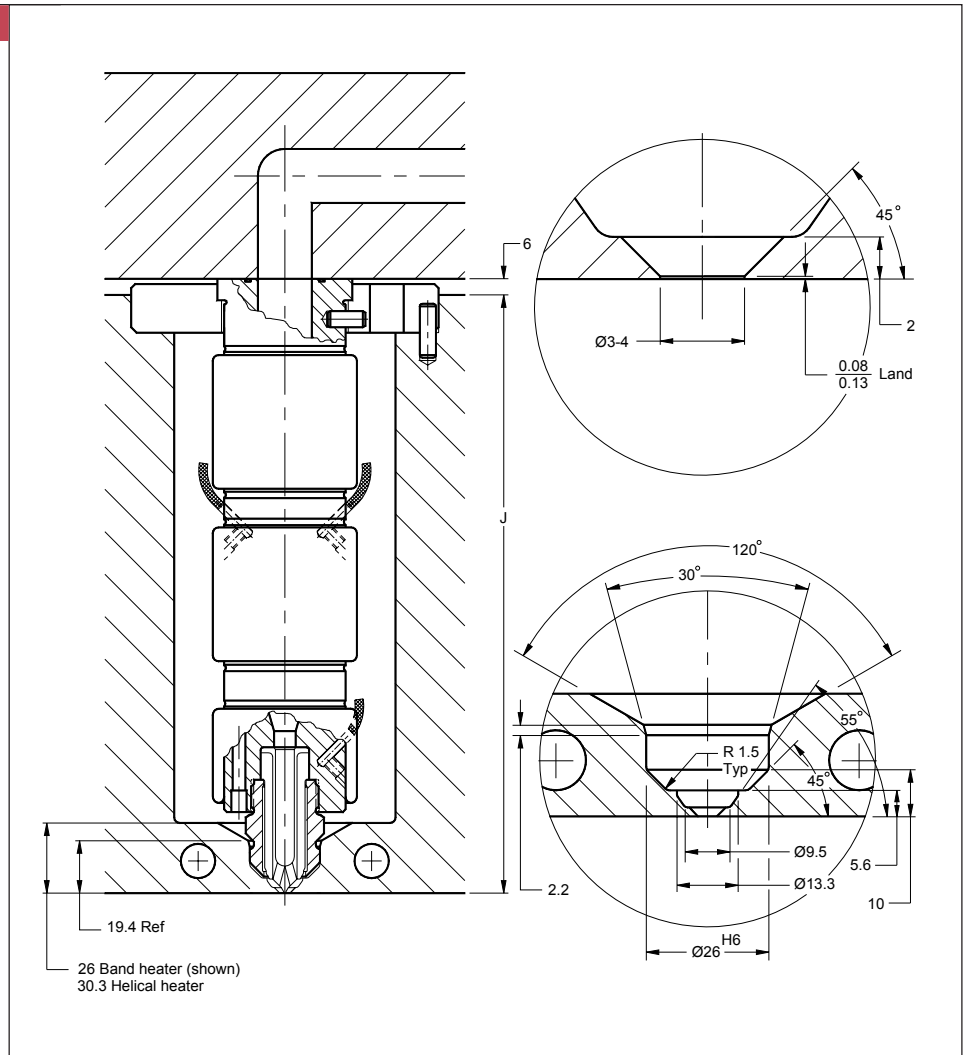
**SR20 CV21CM**

Filled and unfilled materials.

Developed for PA and PBT.

No tip witness mark.

Heat pipes for isothermal operation.



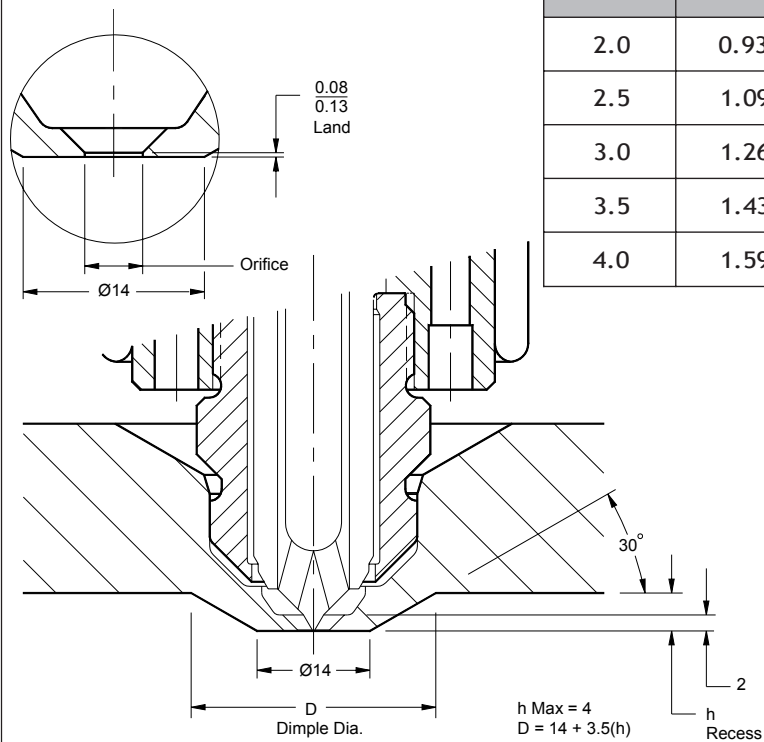
Cooling is required in the gate area.

Heater Style	J Min	J Max	Heater Qty	Watts/Volts
Band	106	380	1	750W/240V
Band (tip)	200	380	1	450W/240V
Helical	195	380	1	750W/240V
Helical	380	500	2	750W/240V (each)

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

Maintain 0.13 land when machining gate orifice.

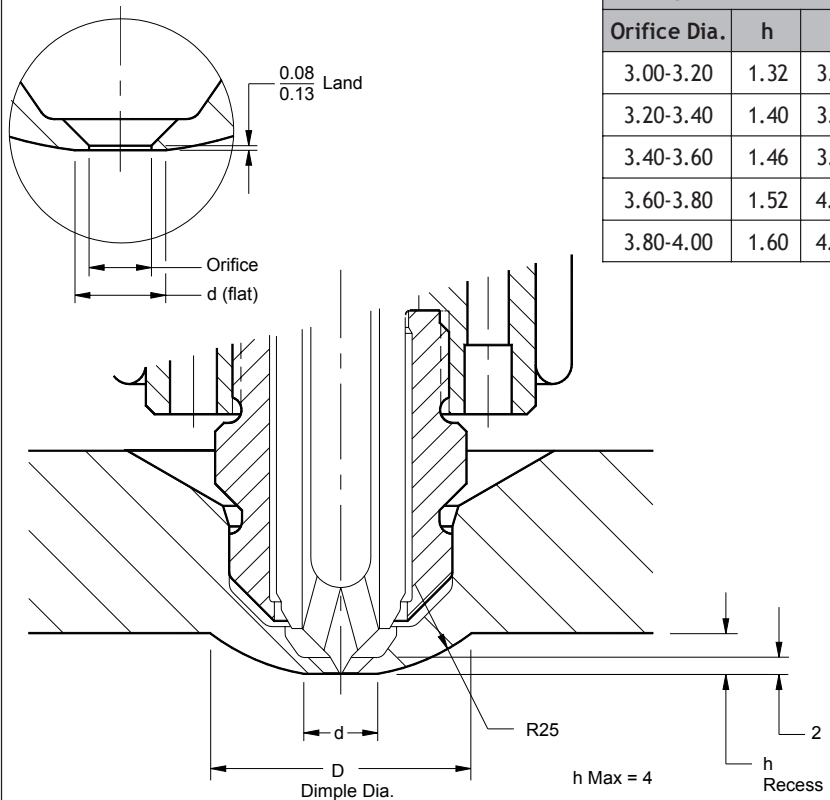
See tables for recommended dimensions when vestige must be below part surface. Consult Synventive when using glass fibers or other fillers.



Conical Recess		
Orifice	h	D
2.0	0.93	17.3
2.5	1.09	17.8
3.0	1.26	18.4
3.5	1.43	19.0
4.0	1.59	19.6

Conical Recess

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

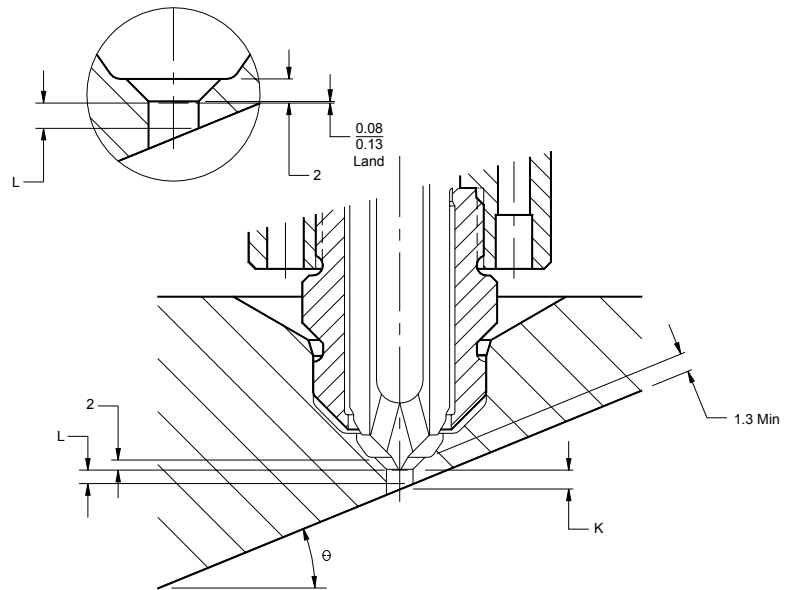


Spherical Recess			
Orifice Dia.	h	d	D
3.00-3.20	1.32	3.45	16.38
3.20-3.40	1.40	3.65	16.87
3.40-3.60	1.46	3.85	17.25
3.60-3.80	1.52	4.05	17.61
3.80-4.00	1.60	4.25	18.07

Spherical Recess

When gating onto an angled mold contour the vestige height may be increased depending on the angle.

K is the increase in vestige height required to maintain 1.3 minimum wall thickness.



$$\theta \leq 9^\circ; K = \frac{\text{Orifice Dia.}}{2} \cdot \text{TAN } \theta$$

$$L = 0.13$$

$$9 < \theta \leq 13^\circ; K = 4.75 \text{TAN } \theta + \frac{1.3}{\text{COS } \theta} + \frac{\text{Orifice Dia.} - 2}{2} \text{TAN } \theta - 2$$

$$L = 0.13 + K - \frac{\text{Orifice Dia.}}{2} \cdot \text{TAN } \theta$$

$$\theta > 13^\circ; K = 4.75 \text{TAN } \theta + \frac{1.3}{\text{COS } \theta} - 2$$

$$L = 0.13 + K - \frac{\text{Orifice Dia.}}{2} \cdot \text{TAN } \theta$$

Angled Mold Contour

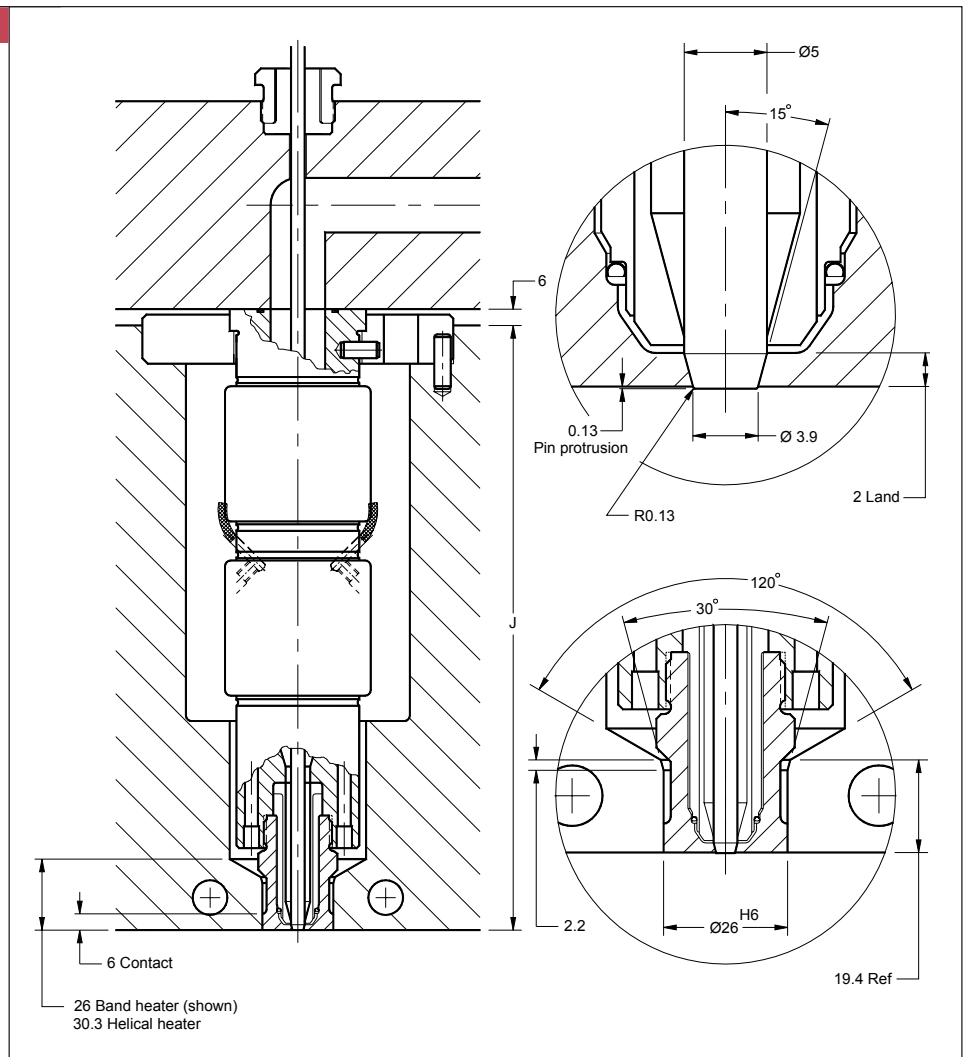


**SR20 VG12 Tapered**

Filled and unfilled materials.

Heat pipes for isothermal operation.

Tapered valve pin to eliminate gate flash.



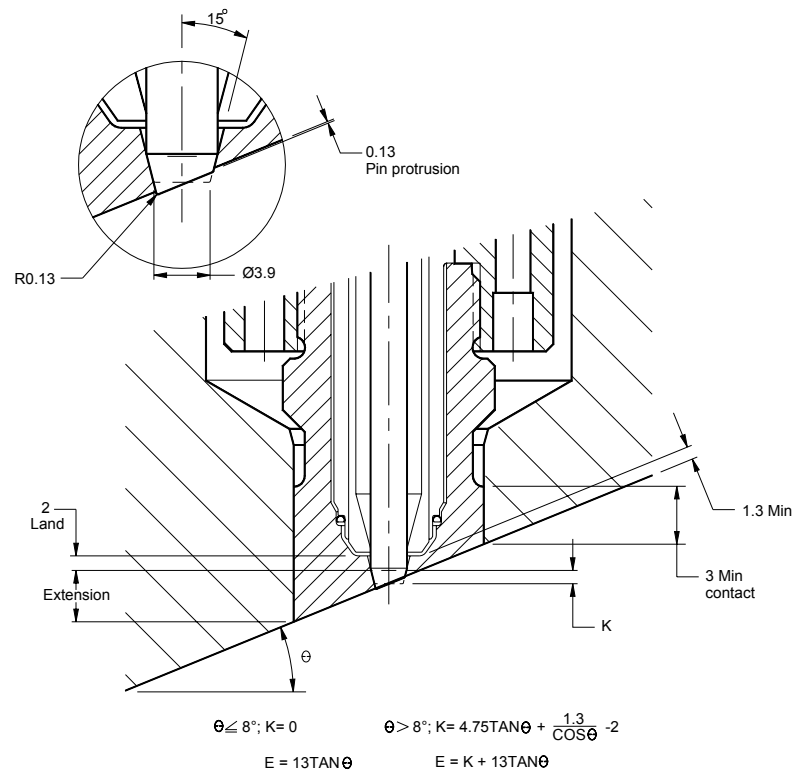
The front face of the tip must be in contact with plastic.

Cooling is required in the gate area.

Heater Style	J Min	J Max	Heater Qty (Zones)	Watts/Volts
Band	106	380	1	750W/240V
Helical	195	380	1	750W/240V
Helical	380	500	2	750W/240V (each)

When gating on an angled mold contour the vestige height may be increased depending on the angle.

K is the increase in land required to maintain 1.3 minimum wall thickness.



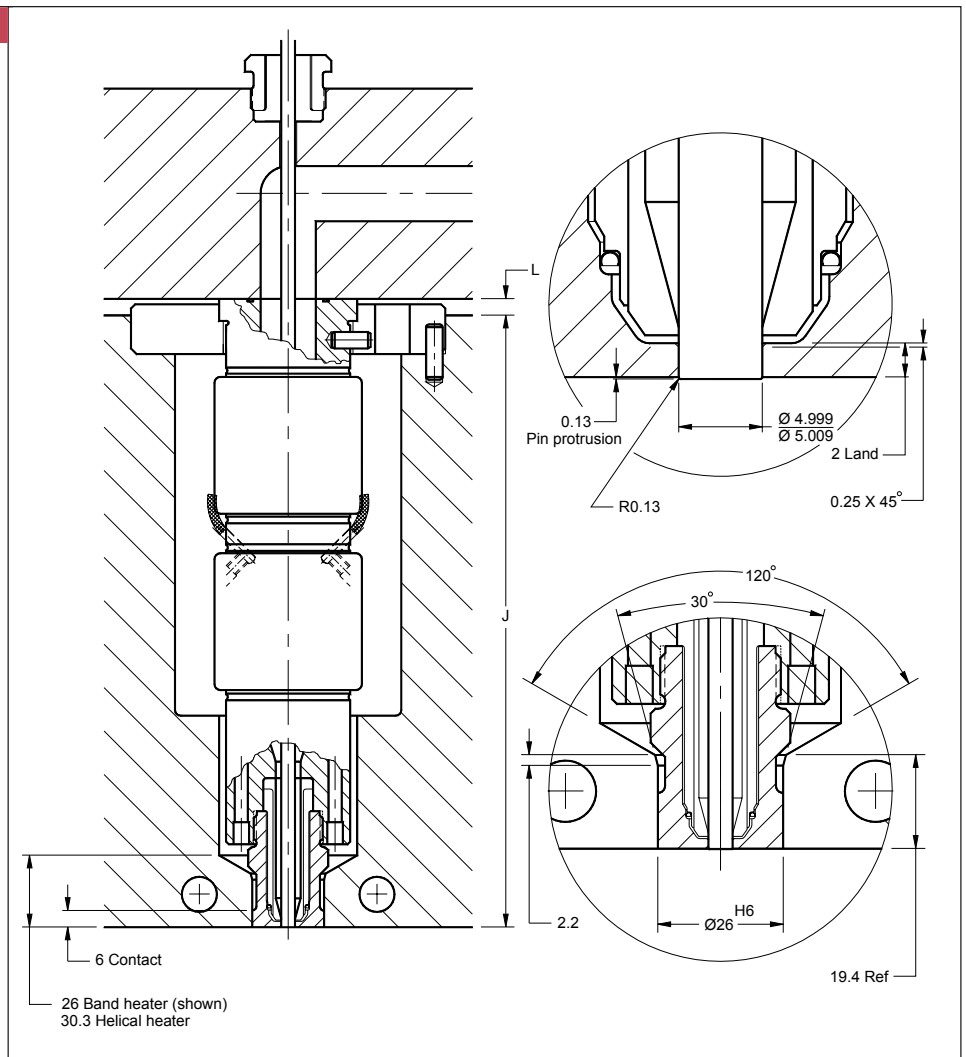
Angled Mold Contour

**SR20 VG12S Straight**

Filled and unfilled materials.

Heat pipes for isothermal operation.

Straight valve pin in gate for non-adjustable actuators and glass filled materials.



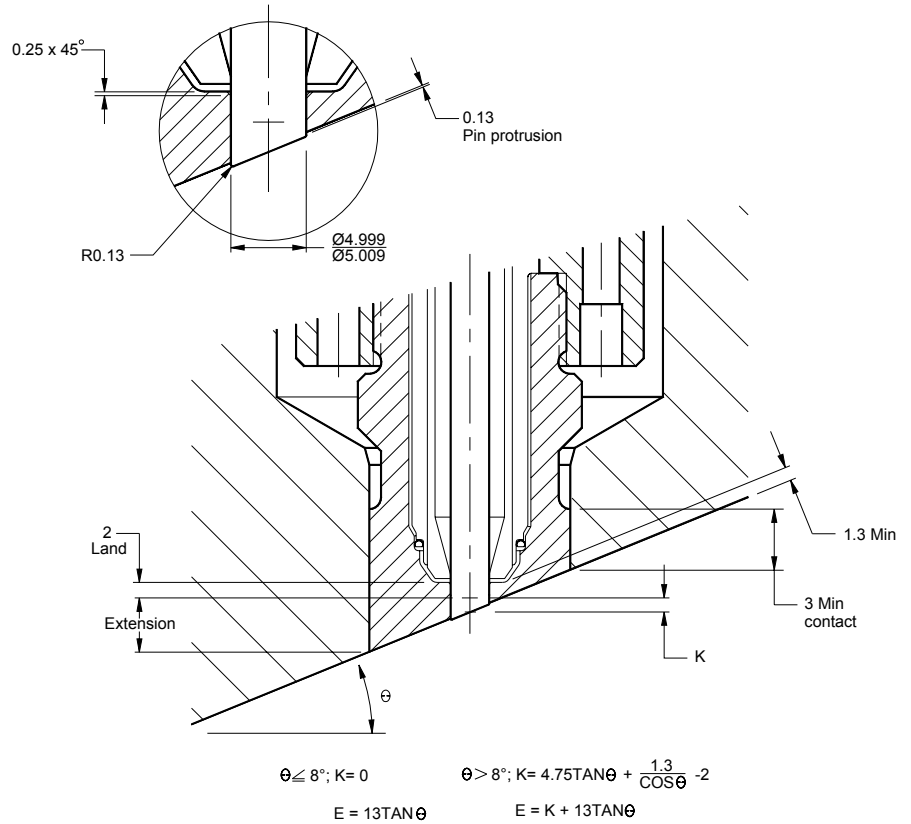
The front face of the tip must be in contact with plastic.

Cooling is required in the gate area.

Heater Style	J Min	J Max	Heater Qty (Zones)	Watts/Volts
Band	106	380	1	750W/240V
Helical	195	380	1	750W/240V
Helical	380	500	2	750W/240V (each)

When gating on an angled mold contour the vestige height may be increased depending on the angle.

K is the increase in land required to maintain 1.3 minimum wall thickness.



Angled Mold Contour

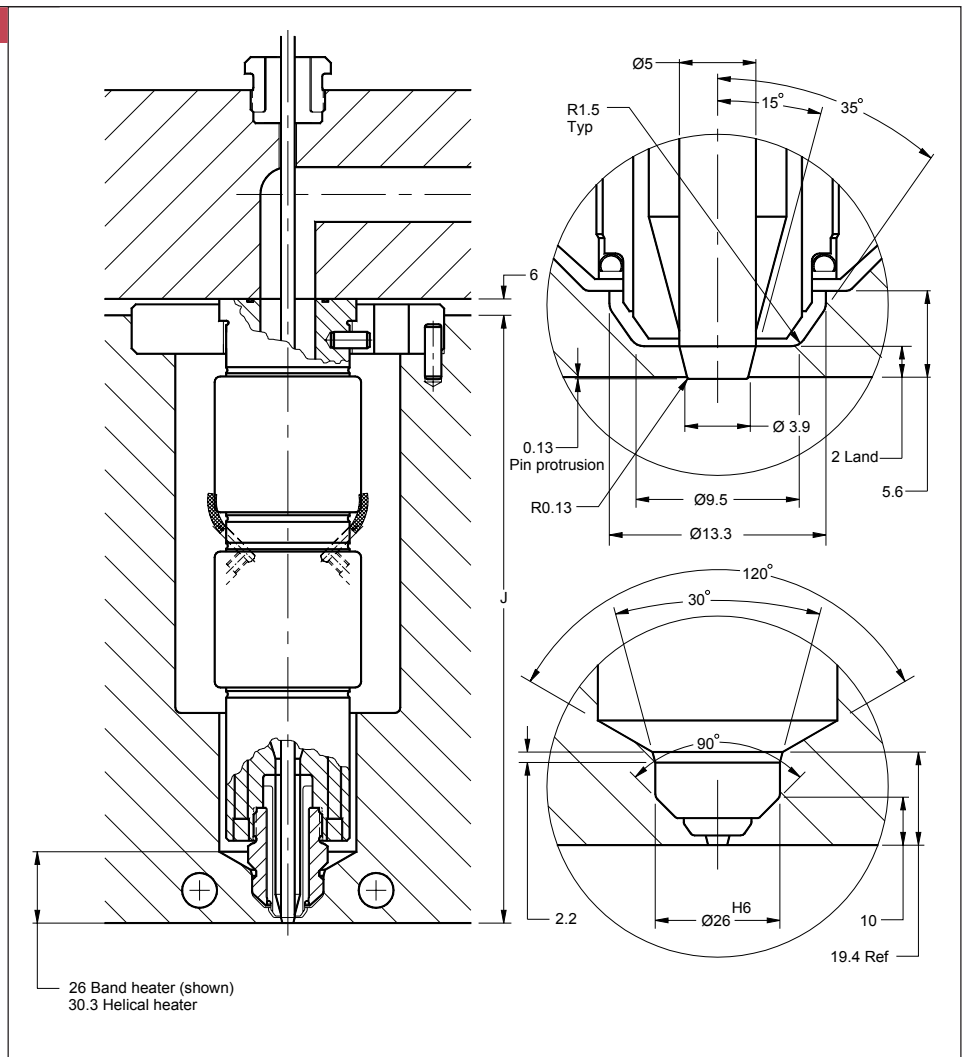
**SR20 VG23 Tapered**

Filled and unfilled materials.

No tip witness mark on part.

Heat pipes for isothermal operation.

Tapered valve pin to eliminate gate flash.

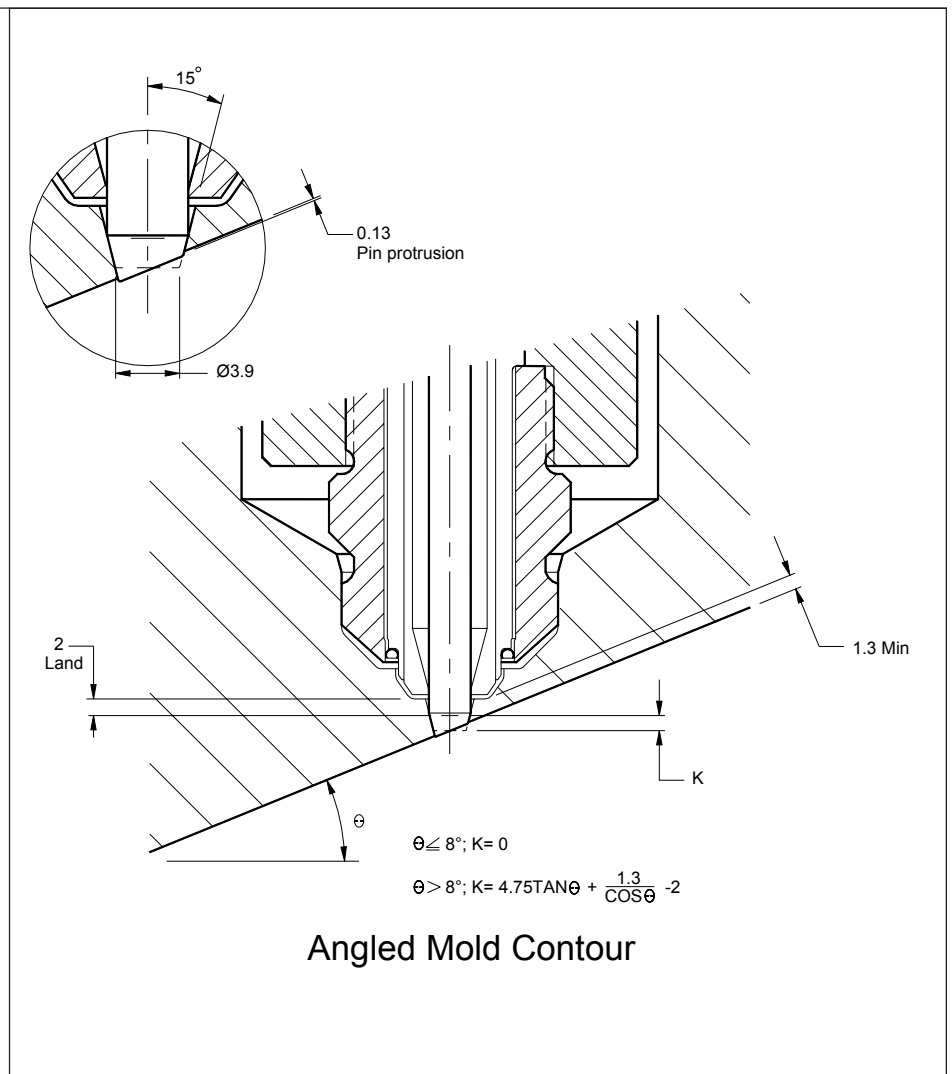


Cooling is required in the gate area.

Heater Style	J Min	J Max	Heater Qty (Zones)	Watts/Volts
Band	106	380	1	750W/240V
Helical	195	380	1	750W/240V
Helical	380	500	2	750W/240V (each)

When gating on an angled mold contour the vestige height may be increased depending on the angle.

K is the increase in land required to maintain 1.3 minimum wall thickness.



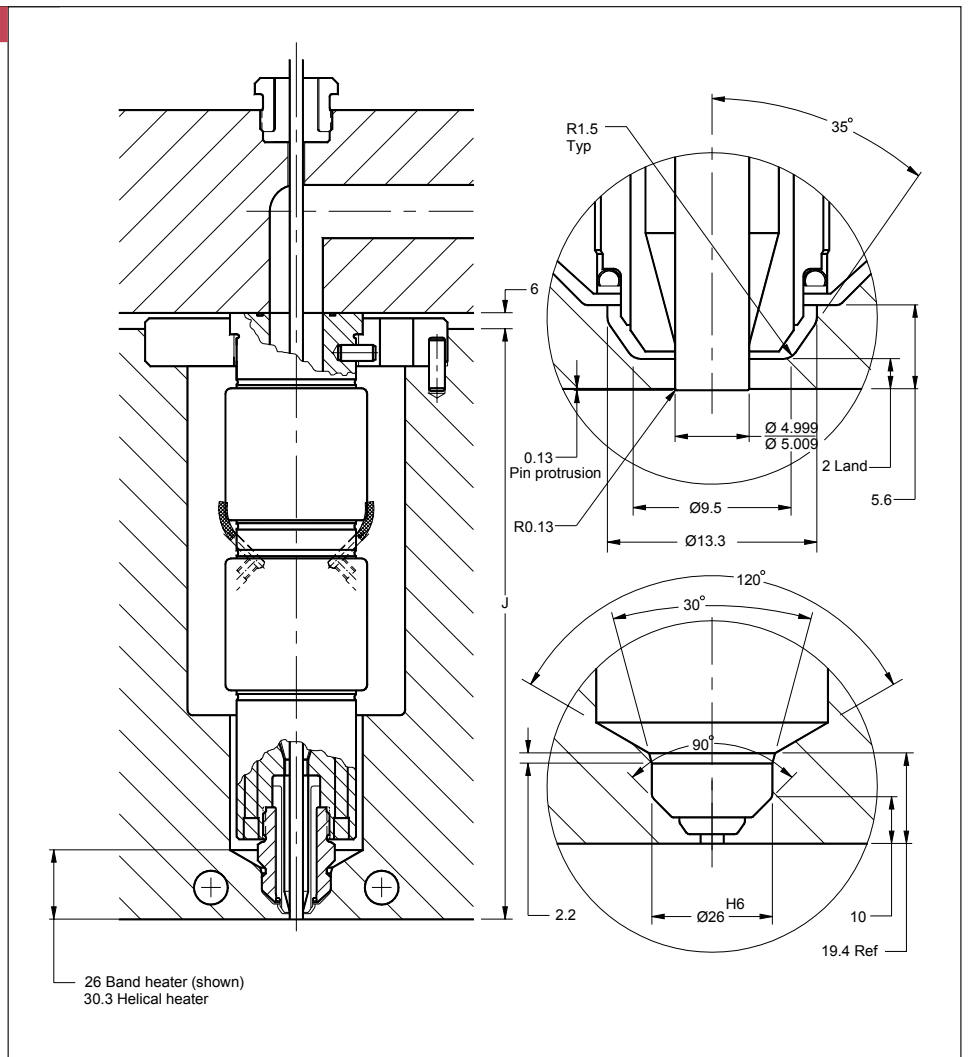
**SR20 VG23S Straight**

Filled and unfilled materials.

No tip witness mark on part.

Heat pipes for isothermal operation.

Straight valve pin in gate for non-adjustable actuators and glass filled materials.

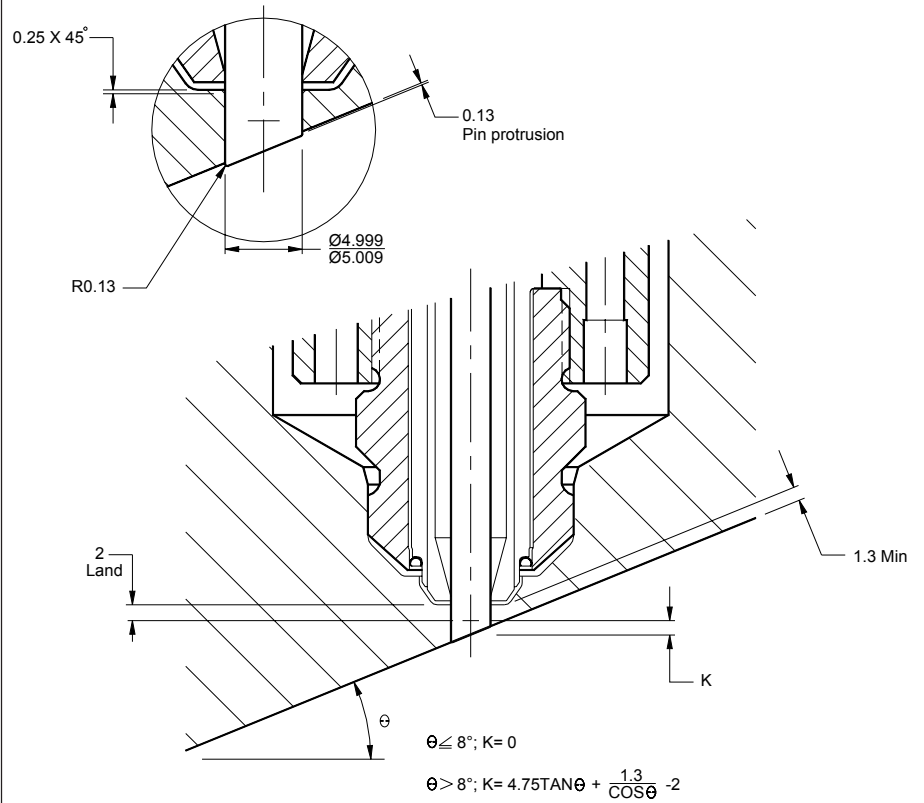


Cooling is required in the gate area.

Heater Style	J Min	J Max	Heater Qty (Zones)	Watts/Volts
Band	106	380	1	750W/240V
Helical	195	380	1	750W/240V
Helical	380	500	2	750W/240V (each)

When gating on an angled mold contour the vestige height may be increased depending on the angle.

K is the increase in land required to maintain 1.3 minimum wall thickness.



Angeled Mold Contour