

Hot Sprue Bushings

Products/Technical Guide



SB13 HOT SPRUE BUSHINGS

22Notes

1. Cold bushing length must allow for thermal expansion to fit specified mold length. Allow $.003 \times ("A")$ for thermal expansion of bushing. When machining bushing "A" length for CV-10, 11 & 21 tips, bushing "A" (cold) = "A" (mold) $\times .997$. When machining bushing "A" length for CV-20 tips, bushing "A" cold = ("A" mold - 2.5) $\times .997$.
2. When using with stripper plate mold, moldmaker should machine a stripper sleeve (see Technical Guide "Section F"). This stripper sleeve is not provided by Synventive for SB13 bushings.
3. All dimensions are in mm.
4. 420 SS bushings are available on special order for processing PVC or other corrosive materials.

SB13

50mm Mold Diameter
26mm Tip Diameter
13mm Flow Bore Diameter

Ideal for High Capacity Molding

Synventive SB13 hot sprue bushings are specifically designed for use where high capacity, high quality melt transfer is necessary. These bushings are ideally suited for all combinations of large shot and/or viscous materials.

Each SB13 bushing is supplied with a 50mm machining allowance to adjust the bushing to desired mold depth.

All bushings come complete with replaceable hard radius seat, mineral insulated heater band and thermocouple hole. A .500, .750 or metric radius is provided per your specification.

Specifications

Max. Operating Pressure: 20,000 psi (1400 bar)

Max. Operating Temperature: 650°F (345°C)

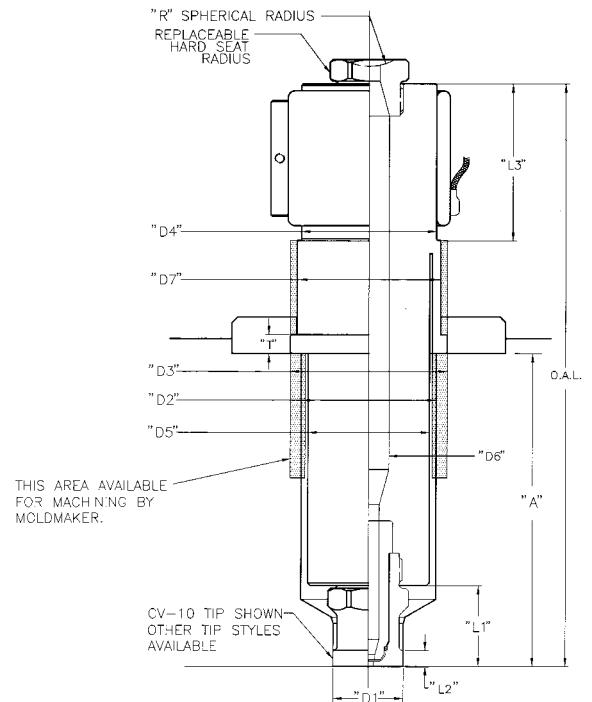
Mode of Operation: Horizontal

Heater: 50 x 50mm

750 W, 120 or 240 V

Heater Clearance Diameter: 89mm

	MM
"A" min.	26
"A" max.	226
"D1"	26 ^{h6}
"D2"	50
"D3"	57
"D4"	50
"D5"	44
"D6"	13
"D7"	53
"R"	To Suit
"L1"	30
"L2"	6
"L3"	58
"T"	6



30 ORDERING INFORMATION See Worksheet Page 20

To Order:

1. Choose bushing based on mold depth ("A" dimension on drawing).
2. Specify desired tip style (see p. 6 for tip descriptions)
3. Specify additional required information (based on tip style).
 - a. Please specify if material is glass filled. An abrasion-resistant insert will be supplied.
 - b. CV-10 tip has multiple insert orifice diameters. For optimum gate control, it is necessary to specify the required orifice diameter or specify the material, shot size and fill time for Synventive to determine what orifice diameter will best suit the application.
 - c. CV-11 tip requires that the exact tip orifice be specified on the order.
 - d. Specify 420 SS bushing if required.
 - e. See Technical Guide "Section C" for tip reduction/modification instructions.

Model	Model Length "A"	OAL ("O" Ext.)
SB13-076	26 ≤ 76	166
SB13-126	76 ≤ 126	216
SB13-176	126 ≤ 176	266
SB13-226	176 ≤ 226	316

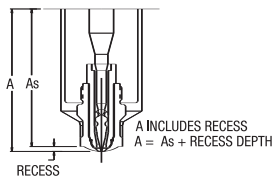
Tip Style ^a	Spherical Radius	Tip Extension	Tip Runner Radius	Tip Orifice
	.500 or .750 (12.7 or 19mm)	(8mm)	0-.187 (0-4.7mm)	
CV-10	Yes	Yes	Yes	No ^b
CV-11 ^a	Yes	Yes	No	Yes ^c
CV-20	Yes	No	No	No
CV-21 ^a	Yes	No	No	No

Tip Style	Description
CV-10	Gate/Full Flow
CV-11	Gate/Cone
CV-20	Open/Full Flow
CV-21	Open/Cone

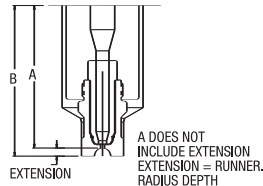
SB13 Cad Library Drawings

Tip Style	Drawing
CV-10	SB13CV10 (section)
CV-11	SB13CV11 (section)
CV-20	SB13CV20 (section)
CV-21	SB13CV21 (section)
Nozzle Style	Drawing
SB13-076	SB13076S (section) SB13T (top)
SB13-126	SB13126S (section) SB13T (top)
SB13-176	SB13176S (section) SB13T (top)
SB13-226	SB13226S (section) SB13T (top)

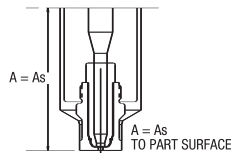
GATING INTO A RECESSED SURFACE



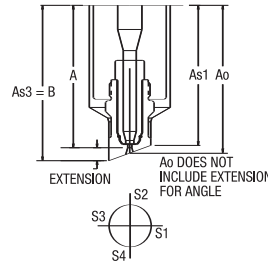
GATING INTO A RUNNER



GATING ONTO A FLAT SURFACE



GATING ONTO AN ANGLED SURFACE



"A" Dimension (Mold Depth)

For SB13 only, when tip extension is specified, mold length "A" and overall length ("OAL" on drawing) are the affected dimensions.

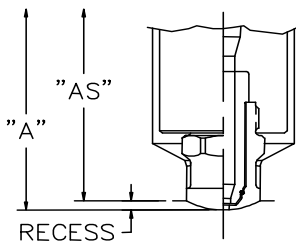
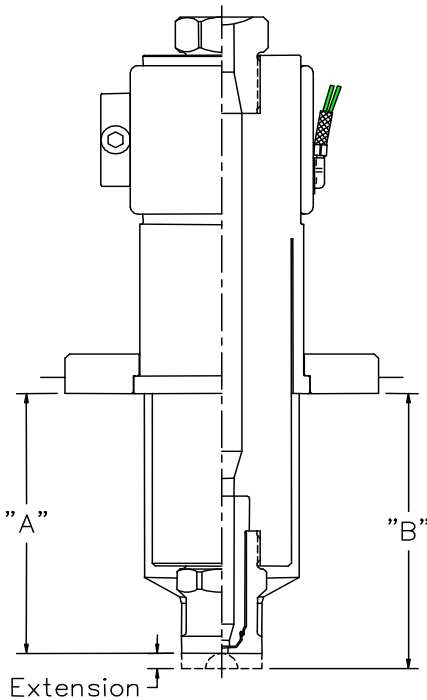
When gating into a runner CV-20 or -21 tip styles are recommended. If using a CV-10 or CV-11 tip, tip should be "moved back" 0.25mm from parting line, so a thin wafer is molded.

SB13/SBP13 Hot Sprue Bushing Worksheet

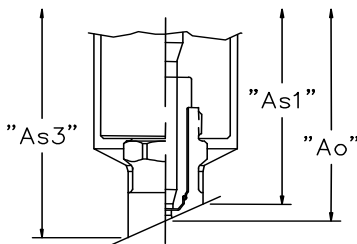
This worksheet needs to be filled out completely. Information not applicable, please fill in N/A.

Customer Information

Company: _____ _____ Address: _____ _____ End User: _____ _____	Contact: _____ Tel: _____ Fax: _____ Email: _____ Job #: _____ PO#: _____
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Gating into a recessed surface



Gating onto an angled surface

Bushing Style: SB13 SBP13 (Tip Heated)

Tip Style: CV-10 CV-20
 CV-11 CV-21

BUSHING BODY SIZE, SELECT ONE

	SB13-076	SB13-126	SB13-176	SB13-226
"A" Range:	26-76mm	76-126mm	126-176mm	176-226mm

Mold "A" Length "A": _____ **"B":** _____
 (If applicable)

Tip Extension: _____
 (If no extension is required, specify "0")

Tip Orifice Diameter: _____
Tip Diameter: Metric Fit 26mm English Fit 25.4mm

Molding Material:

Manufacture/Grade: _____
Filler: None Glass Other: _____
 _____ % of Filler
Flame Retardant: No Yes
Part Weight: _____ or Shot Size: _____
Number of Cavities: _____

Part; Average Wall Thickness:

Runner: No Yes, Runner Diameter: _____
Recess: No Yes, Recess Depth: _____
Angled Surface: No Yes "Ao": _____
 "As1": _____
 "As3": _____

Gating Opposite Cosmetic Surface: No Yes
Color Change: No Yes

Spherical Radius: (mates with machine nozzle tip)
 12.7 [.500] 19.05 [.750] Other: _____

Voltage: 120 240

Special Requirements (if any): _____

4BUSHING CAVITY REQUIREMENTS BY TIP STYLE

Notes

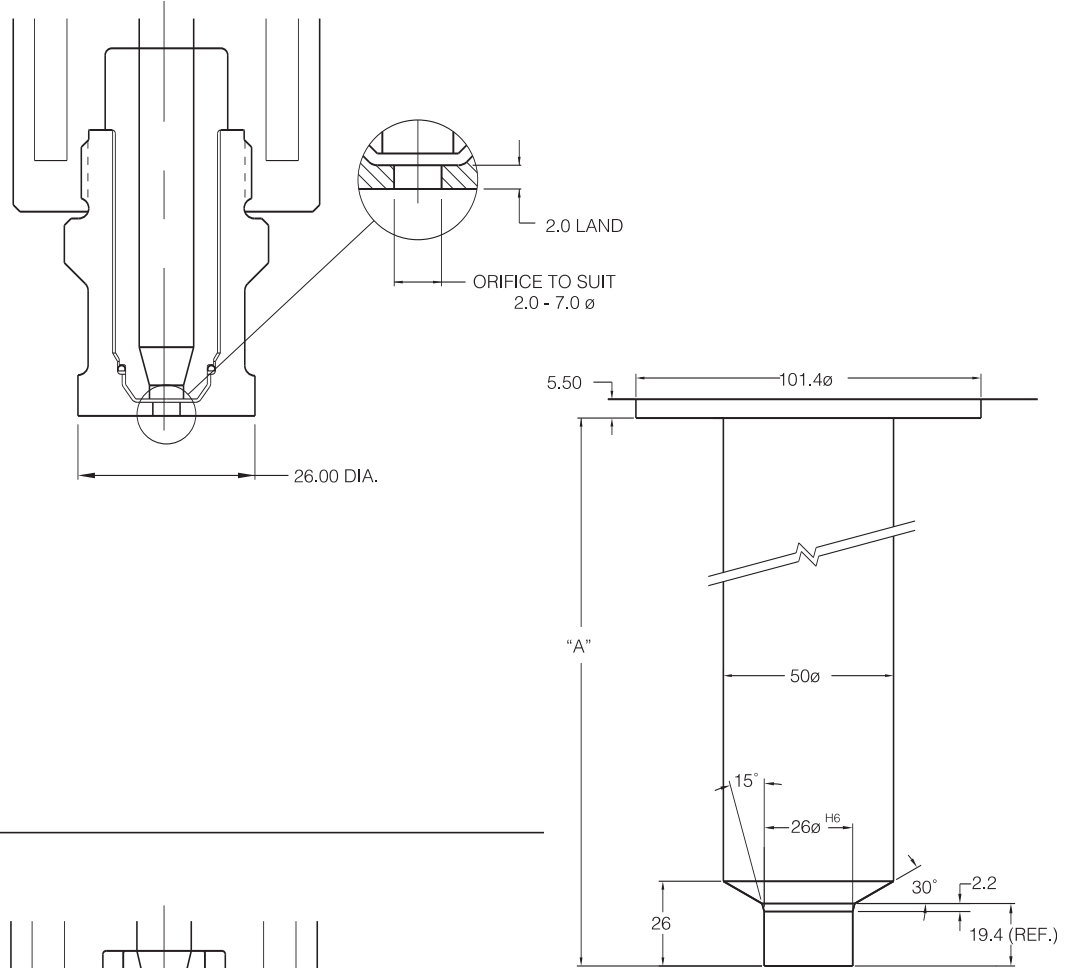
Gate Full Flow CV-10

Gate Orifice

2.0 – 7.0

(.079" – .275")

SB13 Bushing (metric)

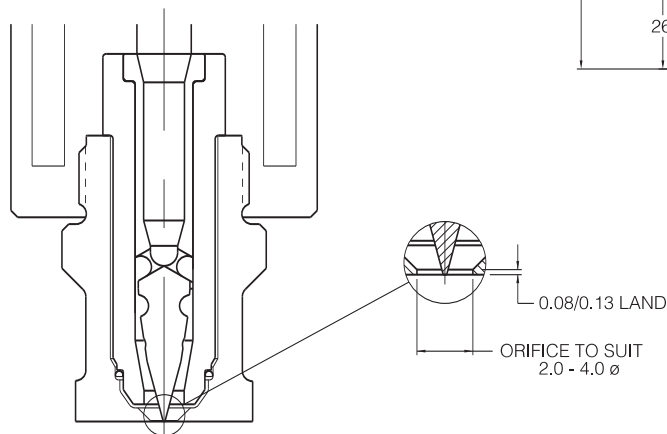


Gate Cone CV-11

Gate Orifice

2.0 – 4.0

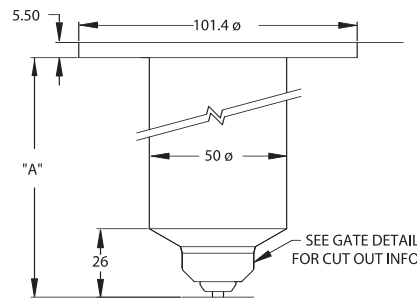
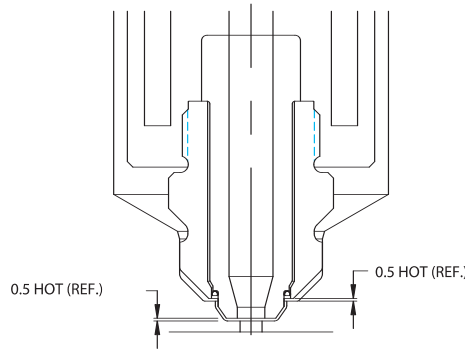
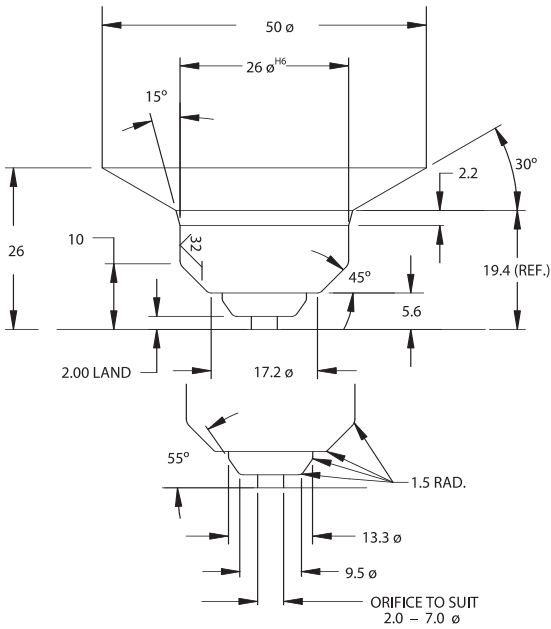
(.079" – .157")



5SB13 Bushing (metric)

Notes

Open Full Flow CV-20



Gate Orifice

$2.0 - 7.0$

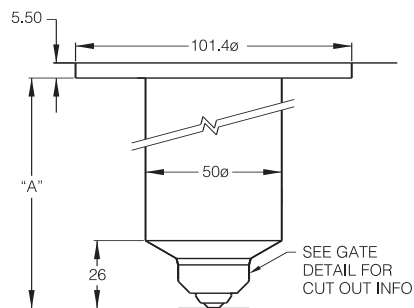
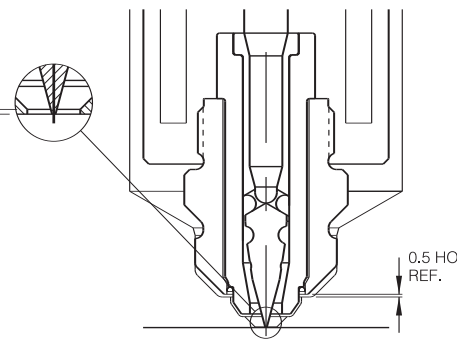
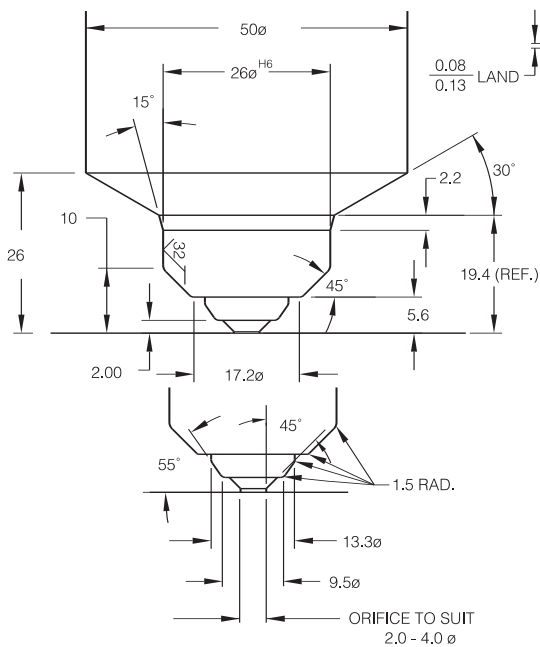
$(.080'' - .275'')$

Open Cone CV-21

Gate Orifice

$2.0 - 4.0$

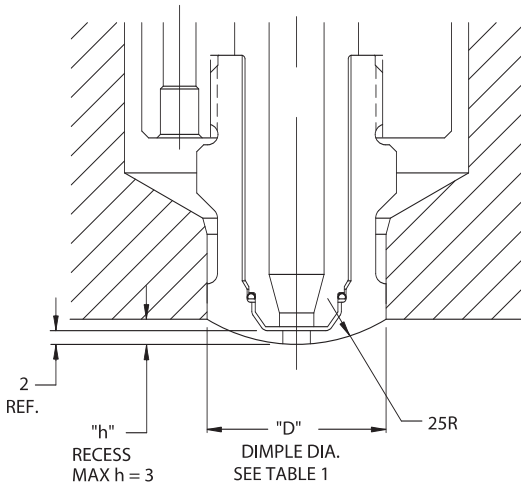
$(.079'' - .157'')$



GATE MACHINING LIMITS FOR FIELD MODIFICATIONS

SB13 Bushing (metric) With CV-10 Tip

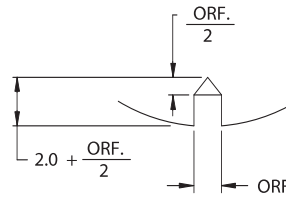
SPHERICAL GATE RECESS



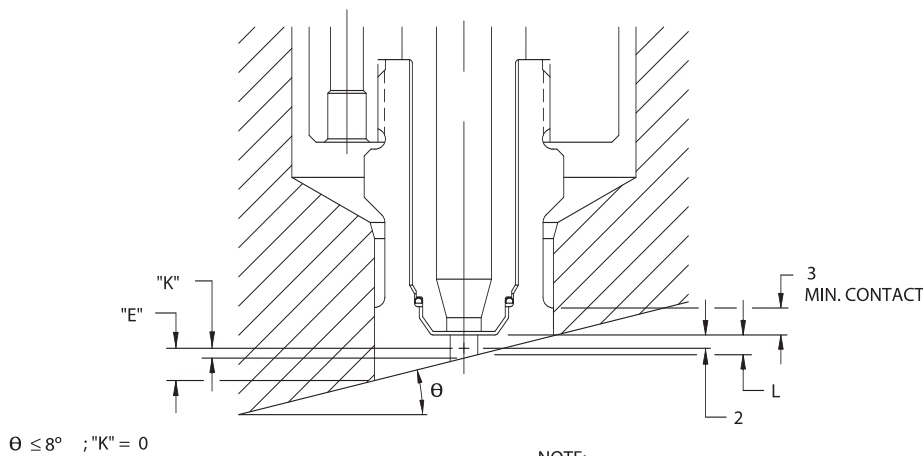
NOTE:
FOR MOST MATERIALS, CV-10 VESTIGE HEIGHT IS EQUAL TO (2.0mm + ORF/2).
IF VESTIGE HEIGHT RELATIVE TO THE POSSIBLE GATE RECESS DEPTH IS TOO GREAT, USE OF A CV-11 TIP IS RECOMMENDED TO PRODUCE A SHORTER VESTIGE HEIGHT.

$$"D" = 2\sqrt{"h"(50 - "h")}$$

TABLE 1	
RECESS "h"	D
2.0	19.6
2.5	21.8
3.0	23.7



ANGLED MOLD CONTOUR



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

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

$$"L" = 2 - \left(\frac{\text{ORIFICE DIA.}}{2} \right) \text{TAN } \theta$$

NOTE:

"K" IS THE INCREASE IN ORIFICE LAND NECESSARY TO MAINTAIN 3 MINIMUM CONTACT.

$$8^\circ < \theta < 13^\circ ; "K" = 4.75 \text{ TAN } \theta + \frac{1.3}{\text{COS } \theta} - 2$$

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

$$"L" = 2 + "K" - \left(\frac{\text{ORIFICE DIA.}}{2} \right) \text{TAN } \theta$$

$$\theta > 13^\circ ; "K" = 13 \text{ TAN } \theta - 3$$

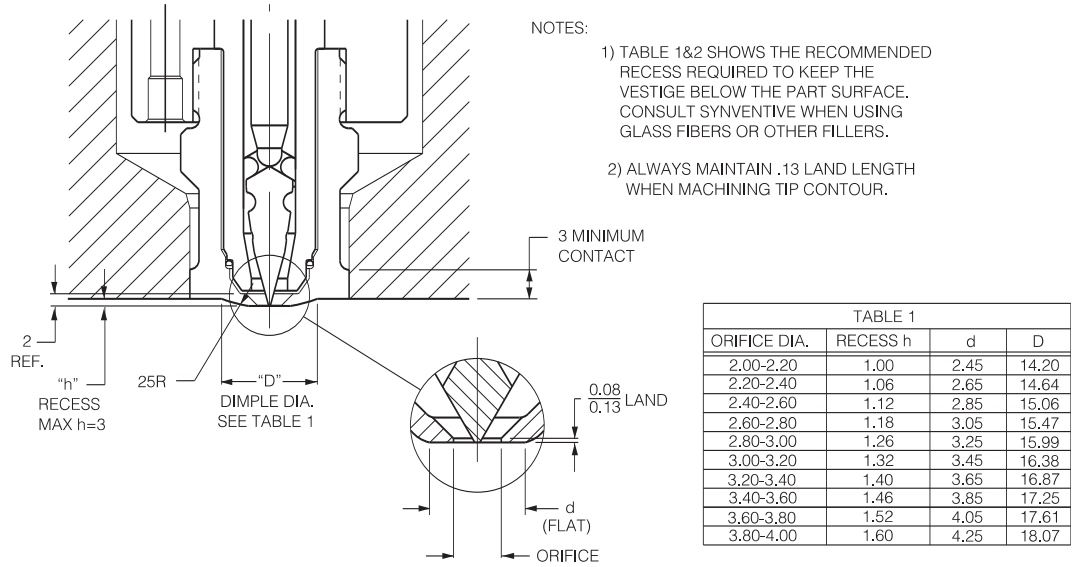
$$"E" = "K" + 13 \text{ TAN } \theta$$

$$"L" = 2 + "K" - \left(\frac{\text{ORIFICE DIA.}}{2} \right) \text{TAN } \theta$$

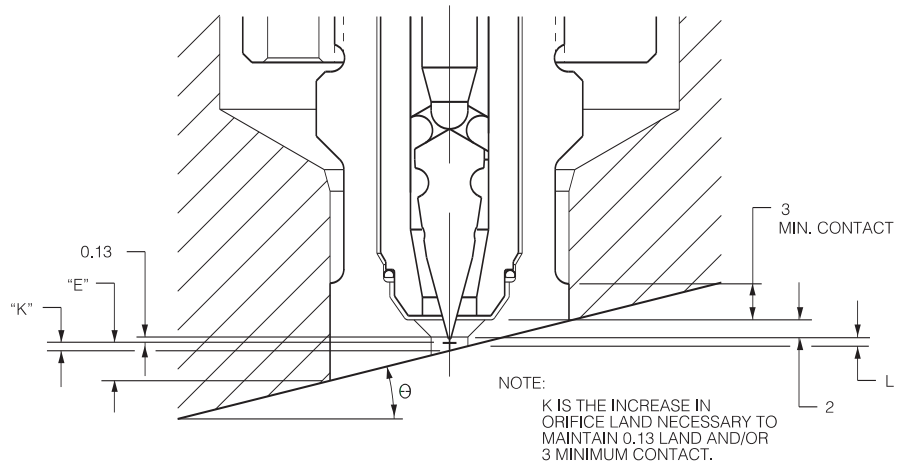
GATE MACHINING LIMITS FOR FIELD MODIFICATIONS

SB13 Bushing (metric) With CV-11 Tip

SPHERICAL GATE RECESS



ANGLED MOLD CONTOUR



$$\theta \leq 13^\circ ; "K" = \left(\frac{\text{ORIFICE DIA.}}{2} \right) \text{TAN } \theta$$

$$"E" = \left(\frac{.26 \text{ ORIFICE DIA.}}{2} \right) \text{TAN } \theta$$

$$"L" = 0.13$$

$$\theta > 13^\circ ; "K" = \left(\frac{.24 - \text{ORIFICE DIA.}}{2} \right) \text{TAN } \theta - 3$$

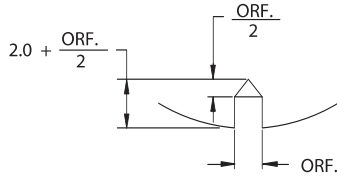
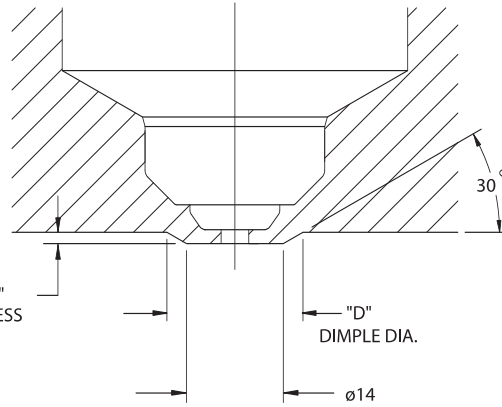
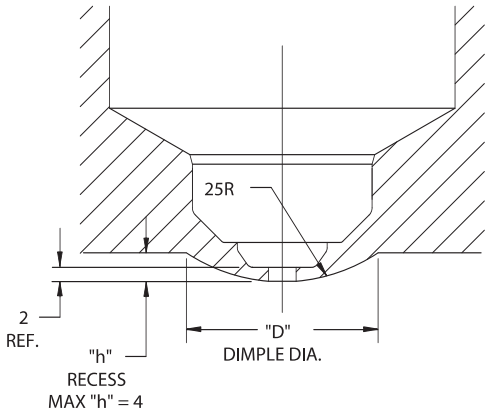
$$"E" = \left(\frac{.50 - \text{ORIFICE DIA.}}{2} \right) \text{TAN } \theta - 3$$

$$"L" = 0.13 + "K" \left(\frac{\text{ORIFICE DIA.}}{2} \right) \text{TAN } \theta$$

SB13 Bushing (metric) With CV-20 Tip

SPHERICAL GATE RECESS

CONICAL GATE RECESS



$"D" = 2\sqrt{"h"(50 - "h")}$

RECESS "h"	"D"
2.0	19.6
2.5	21.8
3.0	23.7
3.5	25.5
4.0	27.1

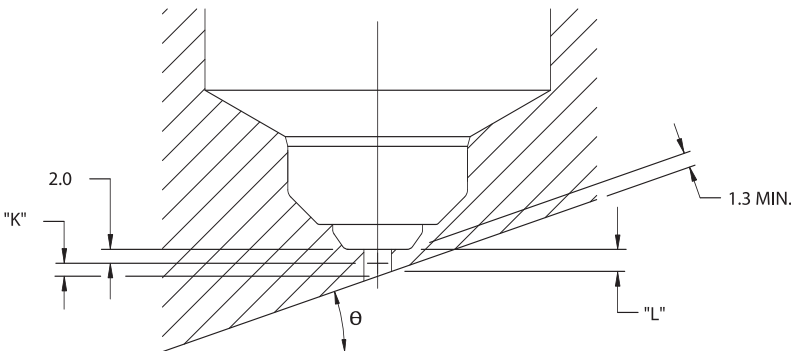
NOTE:

FOR MOST MATERIALS, CV-10 VESTIGE HEIGHT IS EQUAL TO (2.0mm + ORF/2). IF VESTIGE HEIGHT RELATIVE TO THE POSSIBLE GATE RECESS DEPTH IS TOO GREAT, USE OF A CV-11 TIP IS RECOMMENDED TO PRODUCE A SHORTER VESTIGE HEIGHT.

$"D" = 14 + 3.5 "h"$

RECESS "h"	"D"
2.0	21.0
2.5	22.8
3.0	24.5
3.5	26.3
4.0	28.0

ANGLED MOLD CONTOUR



NOTE:

"K" IS THE INCREASE IN ORIFICE LAND NECESSARY TO MAINTAIN 1.3 MINIMUM WALL THICKNESS.

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

$"L" = 2 - \left(\frac{\text{ORIFICE DIA.}}{2} \right) \text{TAN } \theta$

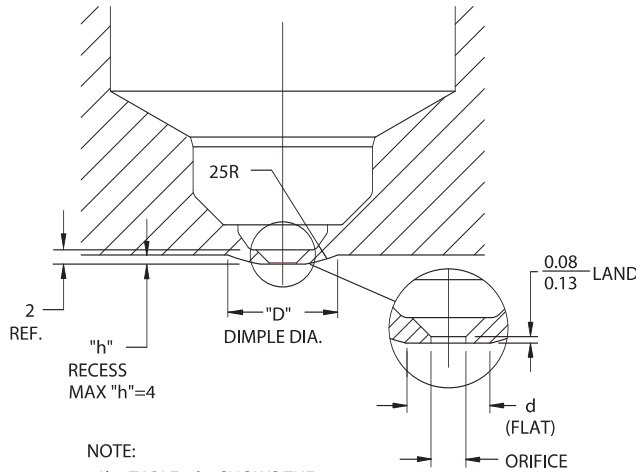
$\theta > 8^\circ ; "K" = 4.75 \text{TAN } \theta + \frac{1.3}{\text{COS } \theta} - 2$

$"L" = 2 + "K" - \left(\frac{\text{ORIFICE DIA.}}{2} \right) \text{TAN } \theta$

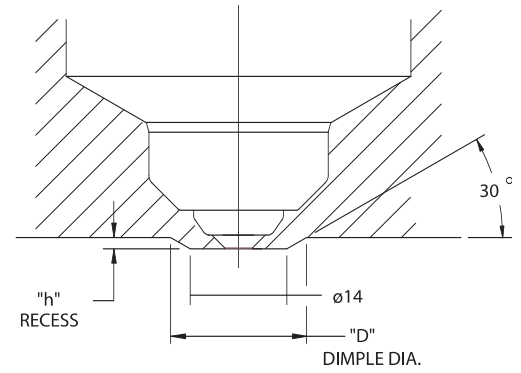
GATE MACHINING LIMITS FOR FIELD MODIFICATIONS

SB13 Bushing (metric) With CV-21 Tip

SPHERICAL
GATE RECESS



CONICAL
GATE RECESS

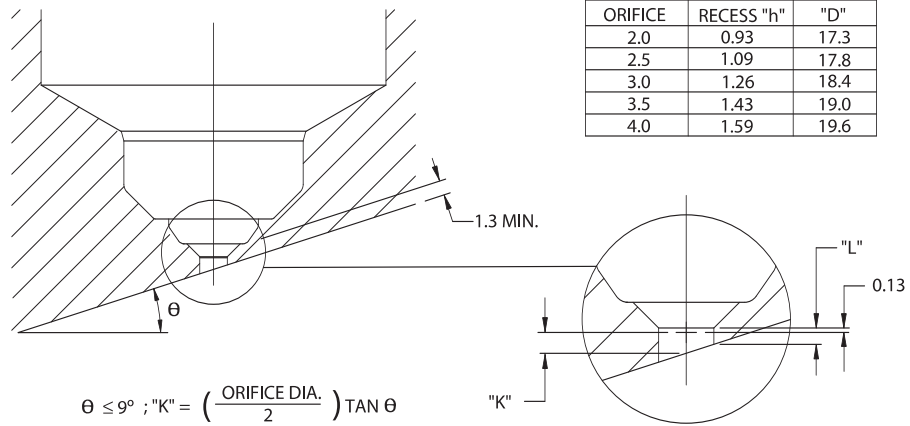


NOTE:

- 1) TABLE 1&2 SHOWS THE RECOMMENDED RECESS REQUIRED TO KEEP THE VESTIGE BELOW THE PART SURFACE. CONSULT SYNVENTIVE WHEN USING GLASS FIBERS OR OTHER FILLERS.
- 2) ALWAYS MAINTAIN .13 LAND LENGTH WHEN MACHINING GATE CONTOUR.

ORIFICE DIA.	RECESS 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

ANGLED MOLD CONTOUR



$$"D" = 14 + 3.5 "h"$$

ORIFICE	RECESS "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

$$\theta \leq 9^\circ ; "K" = \left(\frac{\text{ORIFICE DIA.}}{2} \right) \text{TAN } \theta$$

$$"L" = 0.13$$

$$\theta : 9^\circ \leq \theta \leq 13^\circ ; "K" = 4.75 \text{TAN } \theta + \frac{1.3}{\text{COS } \theta} + \left(\frac{\text{ORIFICE DIA.} - 1.5}{2} \right) \text{TAN } \theta - 2$$

$$"L" = 0.13 + "K" - \left(\frac{\text{ORIFICE DIA.}}{2} \right) \text{TAN } \theta$$

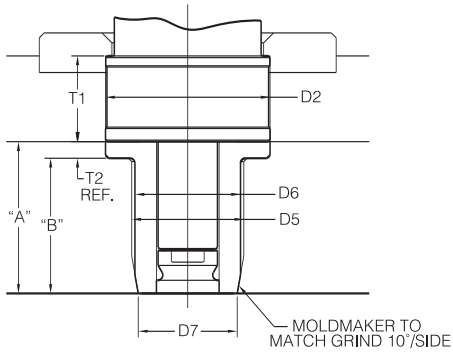
$$\theta > 13^\circ ; "K" = 4.75 \text{TAN } \theta + \frac{1.3}{\text{COS } \theta} - 2$$

$$"L" = 0.13 + "K" - \left(\frac{\text{ORIFICE DIA.}}{2} \right) \text{TAN } \theta$$

NOTE:

"K" IS THE INCREASE IN ORIFICE LAND NECESSARY TO MAINTAIN 0.13 LAND AND/OR 1.3 MINIMUM WALL THICKNESS.

For USB5 And SB5 Bushing

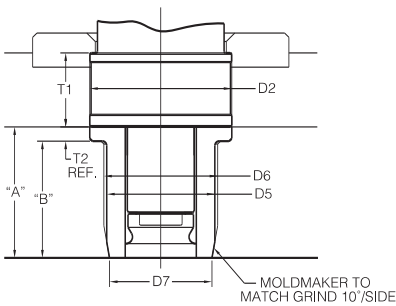


	SB5	USB5
T1	26.0	.875
T2	5.0	.187
D2	50.0	2.000
D5	32.0	1.250
D6	34.0	1.350
D7	30.0	1.187

MODEL #	A	B
USB5-0020	0.875	.688
USB5-1010	1.375	1.188
USB5-1020	1.875	1.688
USB5-2010	2.375	2.188
USB5-2020	2.875	2.688
USB5-3010	3.375	3.188
USB5-3020	3.875	3.688
USB5-4010	4.375	4.188

MODEL #	A	B
SB5-022	22.0	17.0
SB5-027	27.0	22.0
SB5-036	36.0	31.0
SB5-046	46.0	41.0
SB5-056	56.0	51.0
SB5-066	66.0	61.0
SB5-076	76.0	71.0
SB5-086	86.0	81.0
SB5-096	96.0	91.0
SB5-106	106.0	101.0

For USB8 And SB8 Bushing

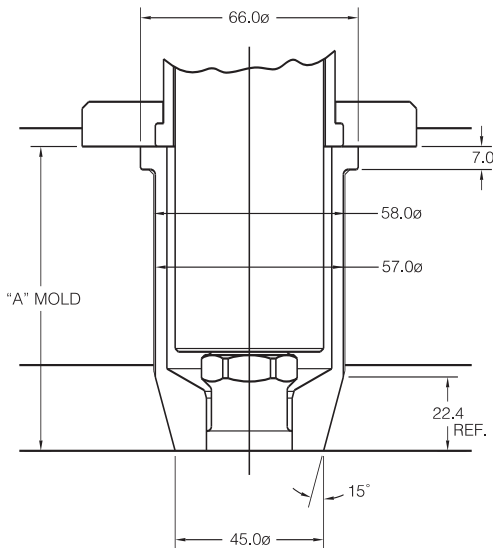


	SB8	USB8
T1	26.0	.875
T2	5.0	.187
D2	50.0	2.000
D5	38.0	1.500
D6	40.0	1.575
D7	36.0	1.420

MODEL #	A	B
USB8-1010	1.375	1.188
USB8-1020	1.875	1.688
USB8-2010	2.375	2.188
USB8-2020	2.875	2.688
USB8-3010	3.375	3.188
USB8-3020	3.875	3.688
USB8-4010	4.375	4.188
USB8-4020	4.875	4.688

MODEL #	A	B
SB8-027	27.0	22.0
SB8-036	36.0	31.0
SB8-046	46.0	41.0
SB8-056	56.0	51.0
SB8-066	66.0	61.0
SB8-076	76.0	71.0
SB8-086	86.0	81.0
SB8-096	96.0	91.0
SB8-106	106.0	101.0
SB8-116	116.0	111.0

For SB13 Bushing



NOTE

DUE TO NON-STANDARD CUSTOM "A" LENGTHS FOUND ON SB13 BUSHINGS THE MOLD MAKER MUST DESIGN AND MANUFACTURE A CUSTOM STRIPPER SLEEVE. THE FOLLOWING INFORMATION IS PROVIDED TO HELP DESIGN THE PROPER STRIPPER SLEEVE

110RIFICE DIAMETER GUIDELINES

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

Part Area inch ² /(mm ²)*	WALL THICKNESS inch/(mm)									
	.030 (.75)	.040 (1.0)	.050 (1.25)	.060 (1.50)	.070 (1.75)	.080 (2.0)	.090 (2.25)	.100 (2.50)	.125 (3.0)	.156 (4.0)
1.0 (600)	.035 (0.90)	.035 (0.90)	.035 (0.90)	.035 (0.90)	.035 (0.90)	.035 (0.90)	.037 (0.95)	.039 (2.00)	.044 (1.12)	.050 (1.27)
2.0 (1200)	.035 (0.90)	.035 (0.90)	.035 (0.90)	.036 (0.92)	.039 (1.00)	.041 (1.05)	.044 (1.12)	.046 (1.17)	.052 (1.32)	.059 (1.50)
3.0 (1800)	.035 (0.90)	.035 (0.90)	.037 (0.95)	.040 (1.02)	.043 (1.10)	.046 (1.17)	.049 (1.25)	.051 (1.30)	.058 (1.47)	.066 (1.68)
4.0 (2400)	.035 (0.90)	.035 (0.90)	.040 (1.02)	.043 (1.10)	.047 (1.20)	.049 (1.25)	.053 (1.35)	.055 (1.40)	.062 (1.58)	.070 (1.78)
5.0 (3000)	.035 (0.90)	.037 (0.95)	.042 (1.07)	.046 (1.17)	.049 (1.25)	.052 (1.32)	.056 (1.42)	.058 (1.47)	.065 (1.65)	.074 (1.88)
10.0 (6000)	.038 (1.00)	.044 (1.12)	.050 (1.27)	.054 (1.37)	.059 (1.50)	.062 (1.58)	.066 (1.68)	.069 (1.76)	.078 (1.98)	.089 (2.26)
20.0 (12,000)	.046 (1.17)	.052 (1.32)	.060 (1.53)	.065 (1.65)	.070 (1.78)	.074 (1.88)	.079 (2.00)	.082 (2.08)	.093 (2.36)	.105 (2.67)
30.0 (18,000)	.051 (1.30)	.058 (1.47)	.066 (1.68)	.072 (1.83)	.077 (1.96)	.081 (2.06)	.087 (2.21)	.091 (2.31)	.103 (2.62)	.117 (2.97)
40.0 (24,000)	.054 (1.37)	.062 (1.58)	.071 (1.80)	.077 (1.96)	.083 (2.10)	.088 (2.24)	.094 (2.39)	.098 (2.49)	.110 (2.80)	.125 (3.18)
50.0 (30,000)	.057 (1.45)	.065 (1.65)	.075 (1.90)	.081 (2.06)	.088 (2.24)	.093 (2.36)	.099 (2.51)	.104 (2.64)	.116 (2.95)	.132 (3.35)
60.0 (36,000)	.060 (1.53)	.068 (1.73)	.078 (1.98)	.085 (2.16)	.092 (2.34)	.097 (2.46)	.104 (2.64)	.109 (2.77)	.122 (3.10)	.139 (3.53)
70.0 (42,000)	.062 (1.58)	.071 (1.80)	.082 (2.08)	.089 (2.26)	.095 (2.41)	.101 (2.57)	.108 (2.75)	.113 (2.87)	.127 (3.23)	.144 (3.66)
80.0 (48,000)	.065 (1.65)	.074 (1.88)	.084 (2.13)	.092 (2.34)	.099 (2.51)	.104 (2.64)	.111 (2.82)	.117 (2.97)	.131 (3.33)	.149 (3.79)
90.0 (54,000)	.067 (1.70)	.076 (1.93)	.087 (2.21)	.094 (2.39)	.102 (2.60)	.107 (2.72)	.115 (2.92)	.120 (3.05)	.135 (3.43)	.153 (3.89)
100.0 (60,000)	.068 (1.73)	.078 (1.98)	.089 (2.26)	.097 (2.46)	.104 (2.64)	.110 (2.80)	.118 (3.00)	.123 (3.12)	.139 (3.53)	.157 (3.99)
150.0 (90,000)	.076 (1.93)	.086 (2.18)	.099 (2.51)	.107 (2.72)	.115 (2.92)	.122 (3.10)	.130 (3.30)	.136 (3.45)	.153 (3.89)	.174 (4.42)
200.0 (120,000)	-	.093 (2.36)	.106 (2.70)	.115 (2.92)	.124 (3.1)	.131 (3.33)	.140 (3.56)	.147 (3.73)	.165 (4.20)	.187 (4.75)
300.0 (180,000)	-	-	.117 (2.97)	.127 (3.23)	.137 (3.48)	.145 (3.68)	.155 (3.94)	.162 (4.15)	.182 (4.62)	.207 (5.26)
400.0 (240,000)	-	-	-	.137 (3.48)	.148 (3.76)	.156 (3.98)	.166 (4.22)	.174 (4.42)	.196 (4.98)	.218 (5.54)

* Part area is total outside surface area not projected area (i.e. includes side walls, etc.).

1. Material Factors:

- Use Tabulated Orifice for PE, PP, PS, SAN, PUR
- Use Tabulated Orifice x 1.15 for Acetal, PC, PPO, ABS
- Use Tabulated Orifice x 1.30 for Acrylic, Nylon, PET, PBT (see note 5)
- Use Tabulated Orifice x 1.50 for PVC

2. This diameter is based on the flow and freeze characteristics of each type of plastic at its normal processing conditions. It is not dependent on the type of nozzle or whether it is fed by a hot or cold runner system.

- Hot Runner Gates: CV-10, CV-11, CV-11S, CV-20, CV-21, CV-21S, EG-10
- Cold Runner Gates: Pin, Sub-Gate, Edge-Gate

This diameter size applies to most gate styles.

3. Some of the listed wall thickness and surface area combinations are not applicable to all plastics because of flow-length-to-wall ratios of each plastic – consult plastic supplier's processing recommendations (e.g. 400 inch² surface area of .060 (1.50 mm) wall is possible for some cavities with PE, but is not possible with most other plastics).

4. The gate diameter limitations – minimum and maximum – which apply to each Synventive hot runner nozzle may require the actual gate to be slightly smaller or larger than the tabulated orifice.

5. Due to the crystalline nature of Nylon, PET and PBT, the minimum orifice for non-reinforced grades should be .094 (2.39 mm) and for reinforced grades .156 (3.96 mm).

6. For filled crystalline materials, nylon, PET and PBT when using full flow inserts, the gate orifice should be 1mm smaller than the insert orifice.

These products may be covered by some or all of the following patents:
 US 6464909, US 6436320, US 6419840, US 6361300, US 6343921, US 6343922, US 6309208, US 6294122, US 6287107,
 US 6261084, US 6261075, US 6254377, US 6062840, US 5980237, US 5948448, US 5948450, US 5916605, US 5894025,
 US 5885628, US 5871786, US 5674439, US 5556582, US 5554395, US 5545028, US 5492467

Material Compatibility

MATERIAL	Synventive Hot Sprue Bushings USB5*, SB5*, USB8, SB8, SB13, SB15 & SB24**			
	Synventive Tip Styles			
	CV-10	CV-11	CV-20	CV-21
ABS	1	1	1	1
ABS GR ***	1	2	1	2
ACETAL (POM)	NR	1	NR	1
ACETAL GR	1	2	1	2
ACRYLIC	1	1	1	1
LCP	NR	1	NR	1
PPO	1	1	1	1
NYLON 6 ***	NR	1	NR	1
NYLON 6 GR ***	1	2	1	2
NYLON 66 ***	NR	1	NR	1
NYLON 66 GR ***	1	2	1	2
NYLON 66 (MINERAL FILLED) ***	NR	1	NR	1
POLYCARBONATE ***	1	1	1	1
POLYCARBONATE GR	1	2	1	2
PC/ABS BLEND	1	1	1	1
PC/POLYESTER BLEND	1	1	1	1
POLYESTER (PBT) ***	NR	1	NR	1
POLYESTER (PBT) GR ***	1	2	1	2
POLYESTER (PET) BOTTLE GRADE	1	1	1	1
POLYESTER (PET) GR ***	1	2	1	2
POLYETHYLENE	1	1	1	1
POLYPROPYLENE	1	1	1	1
POLYSTYRENE	1	1	1	1
STYRENE-ACRYLONITRILE (SAN)	1	1	1	1
STYRENE BUTADIENE	1	1	1	1
STYRENE MALEIC ANHYDRIDE (SMA)	1	1	1	1
SMA (GR)	1	2	1	2
POLYURETHANE	1	1	1	1
PVC RIGID ***	1	2	1	2
PVC FLEXIBLE ***	2	1	2	1
TPE	NR	1	NR	1
TPR	NR	1	NR	1
TPO	1	1	1	1

Notes

GR-Glass Reinforced

NR-Not Recommended for Most Applications

Recommended Tip/Bushing

1. Most Suitable
2. Suitable with some reservations:
e.g. Gate Control, etc.
(Not as good as category 1)
See page 24 for correct Orifice Sizing

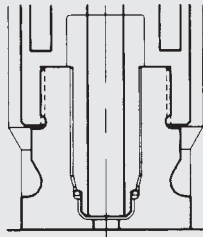
* USB5 & SB5 Bushings are NR-For Glass Filled Materials.

** SB24 Bushings are available with CV-10 & CV-20 tips only.

*** See Orifice Diameter Requirements, page 24.

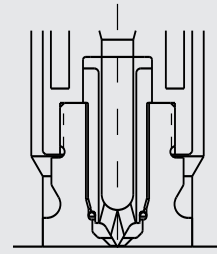
CONTROLLED VESTIGE (CV) TIPS

CV-10 Full-Flow



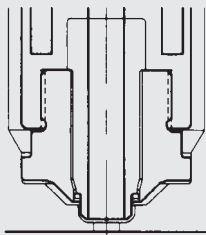
- This is the most widely used tip.
- Vestige height is equal to orifice diameter.
- Provides best gate control for most materials.
- Open flow bore provides low pressure drop.
- Tramp metal can usually flow through tip.
- Orifice is increased by simple straight reaming of diameter.

CV-11 Cone



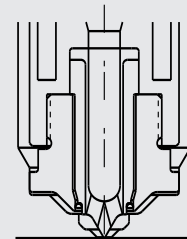
- This tip style is used primarily to provide reduced vestige height, 0.4- 0.9mm high for all materials.
- Cone Point adds heat to center of orifice for nylon, acetal and PBT.
- Orifice adjustment requires added machining to hold land length at 0.08/0.13mm.

CV-20 Full-Flow



- Same as CV-10 except gate orifice is machined into mold plate to eliminate circular witness mark of tip.
- For use in gating into runner or directly onto part surface.

CV-21 Cone



- Same as CV-11 except gate orifice is machined into mold plate to eliminate circular witness mark of tip.
- For use in gating into runner or directly onto part surface.

ACCESSORIES

REPLACEMENT BAND HEATERS

DESCRIPTION	PART NO.
USB5/SB5 and USB8/SB8	
45mm (1.75") I.D. x 35mm (1.38") wide, 450 Watts, 120 Volts	81-16-105
240 Volts	81-16-107
SB13	
50mm I.D. x 50mm wide, 750 Watts, 120 Volts	81-20-114
240 Volts	81-20-116
SB15	
44.5mm I.D. x 50mm wide, 750 Watts, 120 Volts	81-16-112
240 Volts	81-16-113
SB24B	
57mm I.D. x 64mm wide, 1000 Watts, 120 Volts	81-22-124
240 Volts	81-22-125

REPLACEMENT THERMOCOUPLES

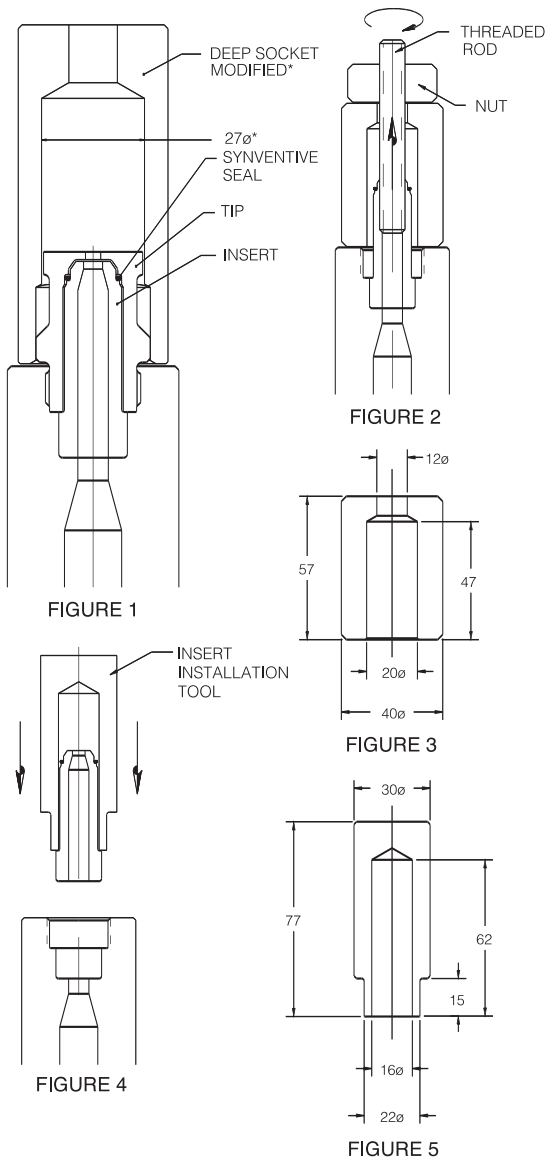
DESCRIPTION	PART NO.
T°C for USB5, SB5, USB8, SB8, SB13	83-192-048
T°C for SB15, SB24	83-187-120

TEMPERATURE CONTROLLERS

Single Zone 15 Amp Temperature Controller includes one thermocouple connector (80-M2MJ)

Catalog Number	Amp/Voltage	Input connector Catalog No.*	Output connector Catalog No.*
80-PIM1A15	15A/240V	80-AC1524F (NEMA 6-15)	80-AC1524M (NEMA 6-15)
80-PIM1A151	15A/120V	80-AC1512F (NEMA 5-15)	80-AC1512M (NEMA 5-15)

Synventive offers a complete line of single and multi-zone temperature control systems. For details, see Temperature Control Systems Design Manual.



Tip Removal

1. Place a 27mm 6 point deep socket wrench over split wrench. Torque off tip with wrench assembly. See Figure 1.
2. Tips are usually removed at room temperature. If tip does not break free, heat bushing to operating melt temperature.

Insert Removal

1. The conductive BeCu insert should only be removed if it is to be replaced by a new insert. Reinstallation of the same insert may affect the heat transfer from the steel body to the BeCu insert.
2. Using an 8.9mm dia. drill, machine into the center of the insert for a depth of 15mm, and then thread using a M10 tap.
3. After the insert is tapped, thread in an M10 rod. Place the insert removal tool (Figure 3) over the rod. Using a M10 nut, thread the nut against the removal tool to pull out the insert. See Figure 2.

Tip Replacement

1. Clean any and all plastic from SYNVENTIVE-SEAL and from the inside sealing diameter on tip. Care must be taken not to damage SYNVENTIVE-SEAL.
2. Verify seating between tip and body by the application of blueing to tip seat.
3. Verify that the SYNVENTIVE-SEAL is in place prior to tip installation.
4. Torque tip to the recommended torque of 27.7 kg.M (200 ft.lb) for all tip styles (see tip removal for wrenching information).

Insert Replacement

1. Clean any and all plastic from the insert counter bore, measure the insert counter bore diameter and insert press diameter.
2. The diameter of the insert should be .013-.030mm larger than the diameter of the mating counter bore in the steel body. This is necessary to assure proper heat transfer to the BeCu insert.
3. The insert must be pressed so that the insert shoulder is flush with the tip seat $\pm .013\text{mm}$ (Figure 4). This is achieved by using the insert installation tool as shown in Figure 5. Use a small arbor press.

SYNVENTIVE-SEAL Replacement

Always inspect the SYNVENTIVE-SEAL when replacing a tip. No plastic should have leaked past the seal, nor should there be scratches or dents in the seal O.D. Thermal operation of the gate will be affected by any damage or plastic leakage.

Remove a damaged SYNVENTIVE-SEAL by using a removal tool to avoid scratching the insert sealing diameter. Replace the SYNVENTIVE-SEAL only onto an insert sealing diameter that is smooth and free of plastic. Use a light arbor press and pressing tool to bottom the SYNVENTIVE-SEAL on the insert shoulder. Do not overpress.