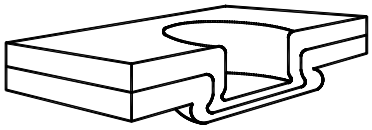
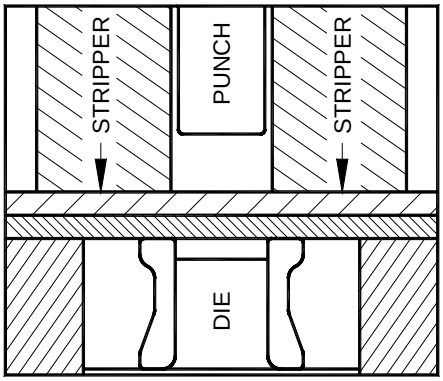
Tog-L-Loc



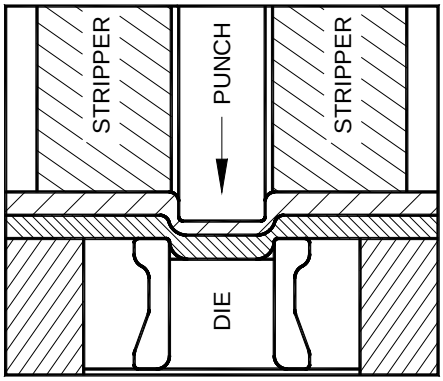
Tog-L-Loc is a circular, leakproof joint formed by drawing the metals into a circular "cup" and then expanding the diameter to form a 360° radial lock below the bottom sheet.

How The Joining Process Works



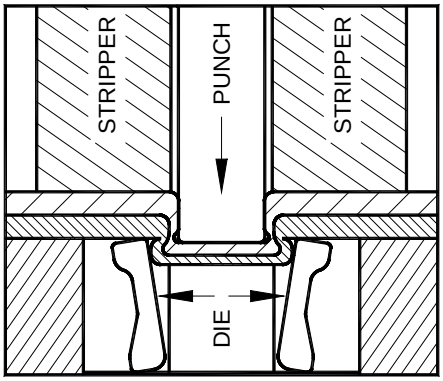
1. CLAMPS

A stripper clamps the metals between the punch and die guard.



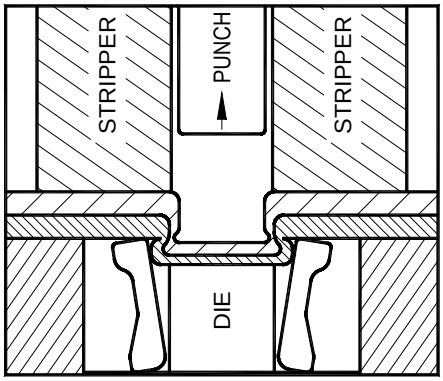
2. DRAWS

The non-piercing punch draws the metals into the die.



3. LOCKS

The punch continues to travel, squeezing the metals.

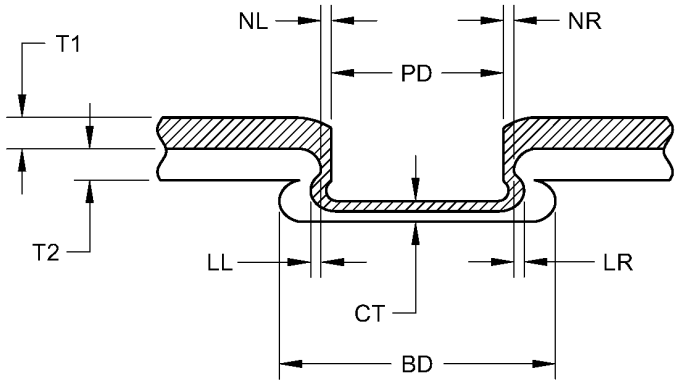


4. STRIPS

As the punch retracts, the stripper allows the punch to be removed.

The lateral flow of metal is accommodated by the patented moving (self-cleaning) die blades, forming a lock of greater diameter than the drawn section which accounts for the high strength and vibration resistance of Tog-L-Loc. This entire sequence takes place in a single motion or press stroke.

TECHNICAL DESCRIPTION
TOG-L-LOC JOINT

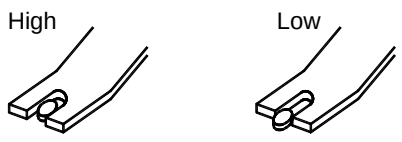


CT = **C**ap **T**hickness
BD = **B**utton **D**iameter
LL = inter**L**ock **L**eft
LR = inter**L**ock **R**ight
NL = **N**eck **L**eft
NR = **N**eck **R**ight
PD = **P**unch **D**iameter [mm] (nominal joint size [mm])
T1 = **T**hickness punch side material
T2 = **T**hickness die side material

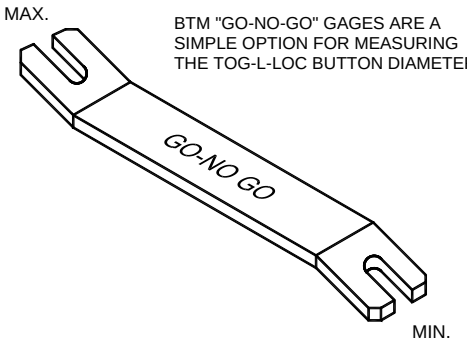
Note: The preferred method by which joint quality is verified is measuring the “Cap Thickness” (ref. “CT” in diagram above) to ensure compliance with prescribed joint data parameters.

An alternative method by which joint quality is verified is measurement of “Button Diameter” (BD) with a Go-No Go Gage:

TOG-L-LOC JOINTS CAN BE CHECKED NON-DESTRUCTIVELY USING THIS SIMPLE GAGE. THE ``BUTTON'' MUST MEASURE WITHIN THE TOLERANCE OF THE GAGE.



MEASURING JOINT BUTTON DIAMETER (BD).



BTM "GO-NO-GO" GAGES ARE A SIMPLE OPTION FOR MEASURING THE TOG-L-LOC BUTTON DIAMETER.

TOG-L-LOC | V-LOC | LANCE-N-LOC INFORMATION

TOG-L-LOC FORCE REQUIREMENTS

JOINT SIZE	PREFERRED STRIPPER SIZE	STRIPPER CONTACT FORCE	STYLE	MATERIAL THICKNESS (STEEL)	FORCE REQUIRED	ACCEPTABLE POWER SOURCES		
						AIR	A/O	HYD.
3.0mm TL [.12"]	SS-10 YELLOW	0.89kN [200 lbs.]	ELASTOMER	0.5mm to 0.5mm [.020" to .020"]	18.3kN [4,117 lbs.]	44.5kN [5 TON] TOGGLE PRESS	26.7kN [3 TON]	Ø44.5mm [1.75"] BORE @ 170 BAR [2500PSI] MIN.
				0.9mm to 0.9mm [.034" to .034"]	16.5kN [3,711 lbs.]			
				1.4mm to 1.4mm [.057" to .057"]	14.9kN [3,340 lbs.]			
			940	0.5mm to 0.5mm [.020" to .020"]	17.6kN [3,963 lbs.]			
				0.9mm to 0.9mm [.034" to .034"]	16.8kN [3,766 lbs.]			
				1.4mm to 1.4mm [.057" to .057"]	16.6kN [3,723 lbs.]			
3.8mm TL [.15"]	SS-20 YELLOW	1.1kN [250 lbs.]			22.2kN [5,000 lbs.]	Charted force values for TL-3.8 joint are calculated. Data obtained from testing will be entered as it becomes available.		

JOINT SIZE	PREFERRED STRIPPER SIZE	STRIPPER CONTACT FORCE	STYLE	MATERIAL THICKNESS (STEEL)	FORCE REQUIRED	ACCEPTABLE POWER SOURCES		
						AIR	A/O	HYD.
4.6mm TL [.18"]	SS-20 YELLOW	1.3kN [300 lbs.]	ELASTOMER	0.5mm to 0.5mm [.020" to .020"]	27.6kN [6,202 lbs.]	88.9kN [10 TON] TOGGLE PRESS	44.5kN [5 TON]	Ø50.8mm [2.00"] BORE @ 170 BAR [2500PSI] MIN.
				1.1mm to 1.1mm [.045" to .045"]	27.5kN [6,192 lbs.]			
				2.2mm to 2.2mm [.087" to .087"]	27.1kN [6,101 lbs.]			
			940	0.5mm to 0.5mm [.020" to .020"]	31.8kN [7,150 lbs.]			
				1.1mm to 1.1mm [.045" to .045"]	27.3kN [6,134 lbs.]			
				2.2mm to 2.2mm [.087" to .087"]	26.8kN [6,034 lbs.]			

JOINT SIZE	PREFERRED STRIPPER SIZE	STRIPPER CONTACT FORCE	STYLE	MATERIAL THICKNESS (STEEL)	FORCE REQUIRED	ACCEPTABLE POWER SOURCES		
						AIR	A/O	HYD.
5.5mm TL [.22"]	SS-25 RED	2.3kN [525 lbs.]	940	0.7mm to 0.7mm [.028" to .028"]	41.6kN [9,350 lbs.]	88.9kN [10 TON] TOGGLE PRESS	106.8kN [12 TON]	Ø63.5mm [2.50"] BORE @ 164 BAR [2410PSI] MIN.
				1.4mm to 1.4mm [.057" to .057"]	38.0kN [8,537 lbs.]			
				3.0mm to 3.0mm [.120" to .120"]	42.2kN [9,478 lbs.]			

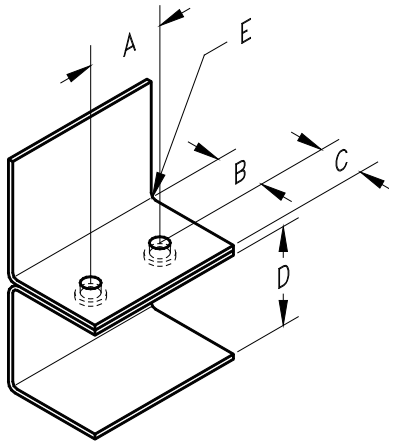
JOINT SIZE	PREFERRED STRIPPER SIZE	STRIPPER CONTACT FORCE	STYLE	MATERIAL THICKNESS (STEEL)	FORCE REQUIRED	ACCEPTABLE POWER SOURCES		
						AIR	A/O	HYD.
6.4mm TL [.25"]	SS-30 YELLOW	3.3kN [750 lbs.]	ELASTOMER	0.7mm to 0.7mm [.028" to .028"]	63.9kN [14,364 lbs.]	107.9kN [20 TON] TOGGLE PRESS	106.8kN [12 TON]	Ø82.6 [3.25"] BORE @ 148 BAR [2170PSI] MIN.
				1.9mm to 1.9mm [.074" to .074"]	45.7kN [10,280 lbs.]			
				3.0mm to 3.0mm [.120" to .120"]	57.4kN [12,913 lbs.]			
			940	0.7mm to 0.7mm [.028" to .028"]	63.8kN [14,338 lbs.]			
				1.9mm to 1.9mm [.074" to .074"]	43.4kN [9,752 lbs.]			
				3.0mm to 3.0mm [.120" to .120"]	56.9kN [12,789 lbs.]			
7.6mm TL [.30"]	SPECIAL	4.4kN [1000 lbs.]			80.0kN [18,000 lbs.]	Charted force values for TL-7.6 joint are calculated. Data obtained from testing will be entered as it becomes available.		

Notes: The chart should be used as a guide for power source selection only.

The forces listed in the chart are based on a test conducted 2000-10-24 with BTM mild steel coupons. The press was a BTM 12 Ton A/O equipped with an AccuForce system. Each force value is the average of 10 samples.

TOG-L-LOC | V-LOC | LANCE-N-LOC INFORMATION

TOG-L-LOC STANDARD DIE JOINT CENTERS Minimum Distances



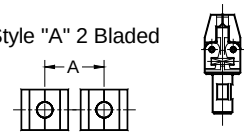
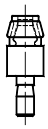
Notes:

— As "E" (bend radius) increases from 0.8 [.03"], add amount of increase to "B" dimension.

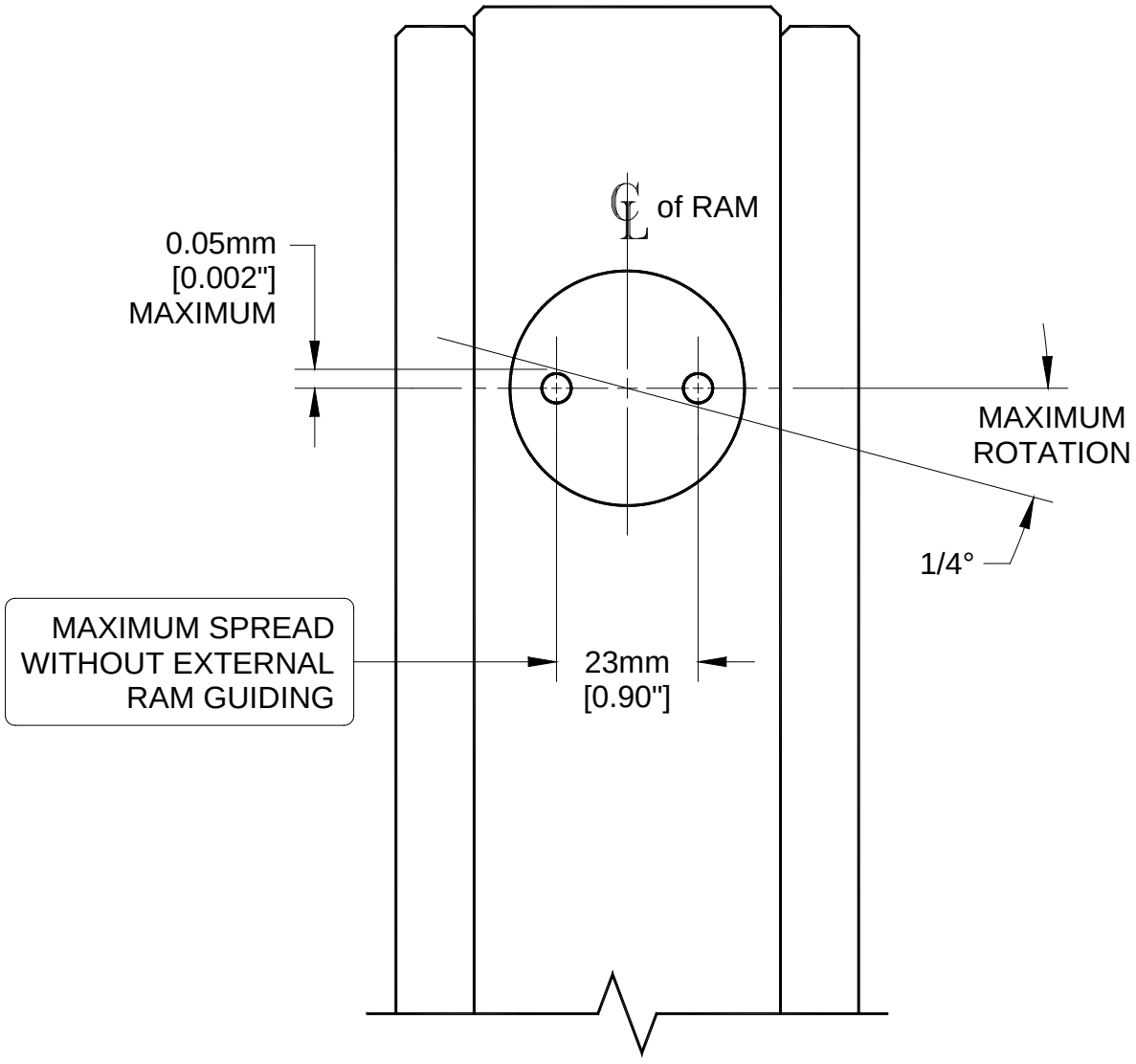
— All noted dimensions are minimum values unless otherwise specified.

— If "C" dimension increases, "D" dimension may also be affected.

* Making Tog-L-Loc joints with noted minimum distances requires a special stripper block.

Tog-L-Loc Tool	DIM	3.0mm [.12"]	3.8mm [.15"]	4.6mm [.18"]	5.5mm [.22"]	6.4mm [.25"]
Short Insert 3 Bladed Elastomer 	*A	14.73 [.580"]	12.70 [.500"]	14.73 [.580"]	19.05 [.750"]	22.22 [.875"]
	B	8.1 [.32"]	7.1 [.28"]	8.1 [.32"]	10.3 [.41"]	12.0 [.47"]
	C	3.0 [.12"]	3.8 [.15"]	4.6 [.18"]	5.5 [.22"]	6.4 [.25"]
	D	26.0 [1.02"]	26.0 [1.02"]	26.0 [1.02"]	32.0 [1.26"]	35.0 [1.38"]
	E	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]
Style "A" 2 Bladed 	*A	14.50 [.571"]	14.50 [.571"]	16.00 [.630"]	18.00 [.709']	20.30 [.799"]
	B	5.8 [.23"]	5.8 [.23"]	5.8 [.23"]	6.9 [.27"]	8.4 [.33"]
	C	3.0 [.12"]	3.8 [.15"]	4.6 [.18"]	5.5 [.22"]	6.4 [.25"]
	D	35.0 [1.38"]	35.0 [1.38"]	35.0 [1.38"]	38.1 [1.50"]	47.6 [1.88"]
	E	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]
Style "A" 3 Bladed Elastomer 	*A	11.18 [.440"]	12.70 [.500"]	14.73 [.580"]	19.05 [.750"]	22.22 [.875"]
	B	6.4 [.25"]	7.1 [.28"]	8.1 [.32"]	10.3 [.41"]	12.0 [.47"]
	C	3.0 [.12"]	3.8 [.15"]	4.6 [.18"]	5.5 [.22"]	6.4 [.25"]
	D	35 [1.38"]	35 [1.38"]	35 [1.38"]	35 [1.38"]	52.3 [2.06"]
	E	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]
940 Series Short Insert (or SSI) 	*A	12.50 [.492"]	14.00 [.551"]	16.50 [.650"]	19.50 [.768"]	22.50 [.886"]
	B	6.8 [.27"]	7.5 [.30"]	8.8 [.35"]	10.3 [.41"]	11.8 [.46"]
	C	3.0 [.12"]	3.8 [.15"]	4.6 [.18"]	5.5 [.22"]	6.4 [.25"]
	D	24.0 [.94"]	28.5 [1.12"]	28.5 [1.12"]	35.5 [1.40"]	40.0 [1.57"]
	E	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]
940 Series "Mini" Short Insert 	*A	11.00 [.433"]	12.50 [.492"]	14.00 [.551"]	16.50 [.650"]	21.00 [.827"]
	B	6.1 [.24"]	6.8 [.27"]	7.5 [.30"]	8.8 [.35"]	11.0 [.43"]
	C	3.0 [.12"]	3.8 [.15"]	4.6 [.18"]	5.5 [.22"]	6.4 [.25"]
	D	24.0 [.94"]	24.5 [.96"]	28.5 [1.12"]	35.5 [1.40"]	40.0 [1.57"]
	E	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]
Joint Data Limits - "Mini" 940						
Max. Total Mat'l Thickness		1.8 [.07"]	---	2.0 [.08"]	2.5 [.10"]	3.3 [.13"]
Max. Anvil Depth		1.02 [.040"]	1.27 [.050"]	1.14 [.045"]	1.4 [.055"]	1.65 [.065"]
Max. Button Dia.		4.95 [.195"]	6.10 [.240"]	7.11 [.280"]	8.64 [.340"]	10.16 [.400"]

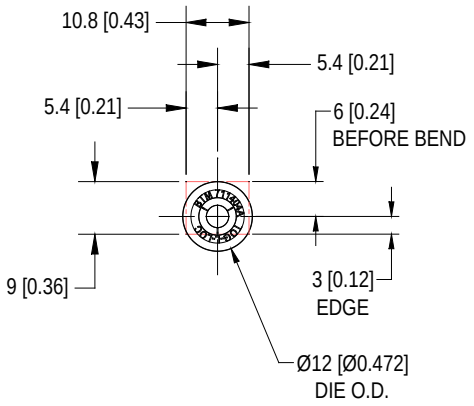
AIR TOGGLE PRESS
TOG-L-LOC JOINT CENTERS



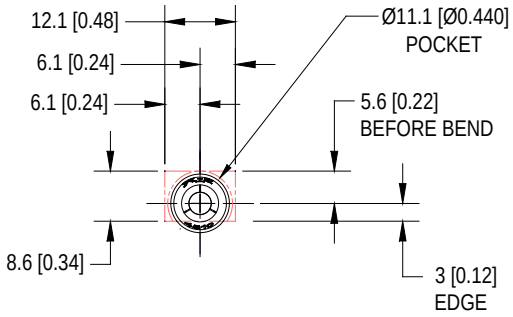
3.0 TOG-L-LOC JOINT FLANGE

MINIMUM DISTANCES
(FOR SINGLE JOINTS)

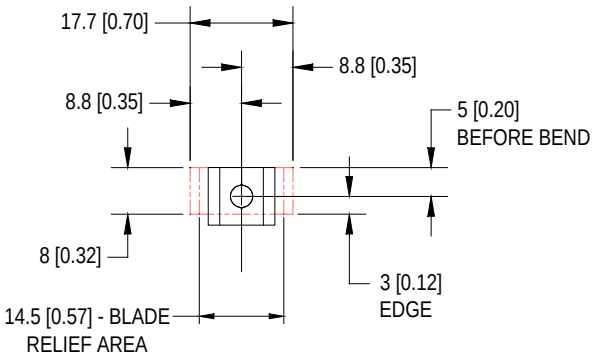
TL-3.0-940
REF. 718200AE ASS'Y



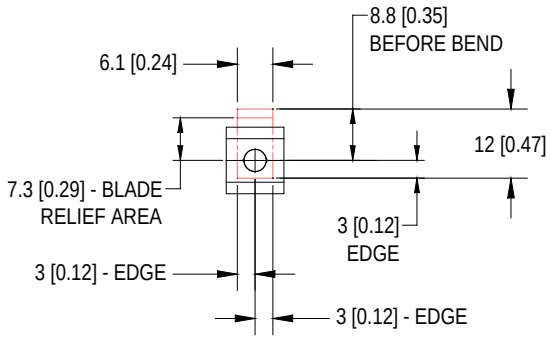
TL-3.0-3B
REF. 006707 ASS'Y
(STYLE "A" DIE)



TL-3.0-2B
REF. 000474 ASS'Y



TL-3.0-2B
REF. 000474 ASS'Y



NOTES:

-"EDGE" NOTATION REFERS TO MINIMUM DISTANCE FROM JOINT CENTER TO EDGE OF PART.
-"BEFORE BEND" REFERS TO DISTANCE TO BEGINNING OF RADIUS ON A BENT FLANGE IF TOG-L-LOC DIE IS ON THE INSIDE OF A BEND ON THE CUSTOMER PART.
-MINIMUM 1.5mm [.06"] PART SUPPORT SHOWN ADJACENT TO "BLADE RELIEF AREA" ON VIEWS FOR 2 BLADED DIE ASSEMBLIES.

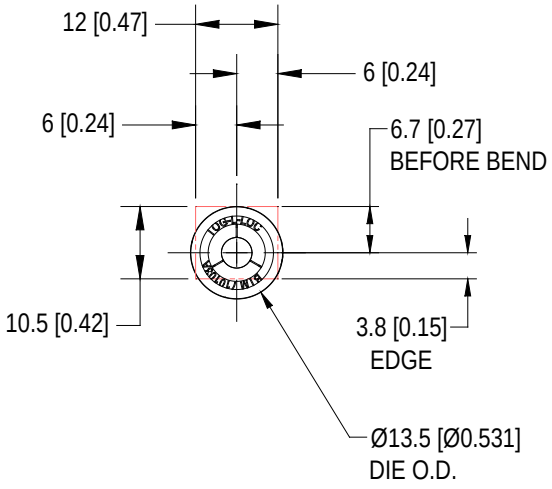
3.8 TOG-L-LOC JOINT FLANGE

MINIMUM DISTANCES

(FOR SINGLE JOINTS)

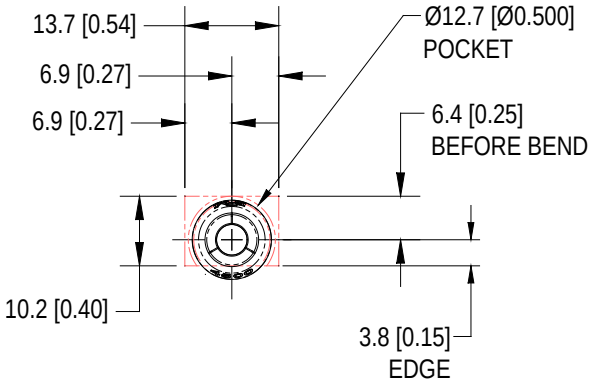
TL-3.8-940

REF. 794600AE ASS'Y



TL-3.8-3B

REF. 796900A ASS'Y



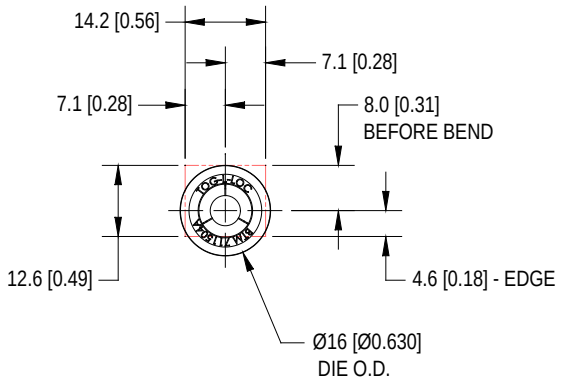
NOTES:

-"EDGE" NOTATION REFERS TO MINIMUM DISTANCE FROM JOINT CENTER TO EDGE OF PART.
-"BEFORE BEND" REFERS TO DISTANCE TO BEGINNING OF RADIUS ON A BENT FLANGE IF TOG-L-LOC DIE IS ON THE INSIDE OF A BEND ON THE CUSTOMER PART.
-MINIMUM 1.5mm [.06"] PART SUPPORT SHOWN ADJACENT TO "BLADE RELIEF AREA" ON VIEWS FOR 2 BLADED DIE ASSEMBLIES.

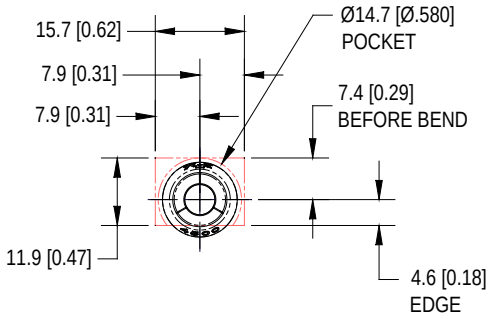
4.6 TOG-L-LOC JOINT FLANGE

MINIMUM DISTANCES
(FOR SINGLE JOINTS)

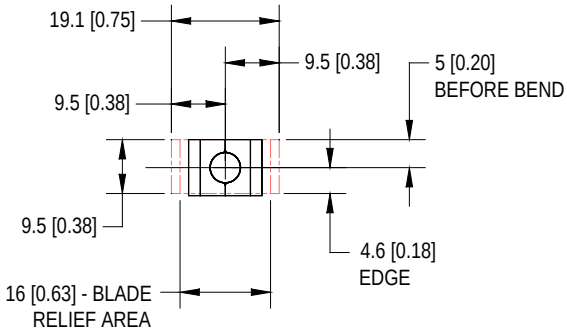
TL-4.6-940
REF. 716000AE ASS'Y



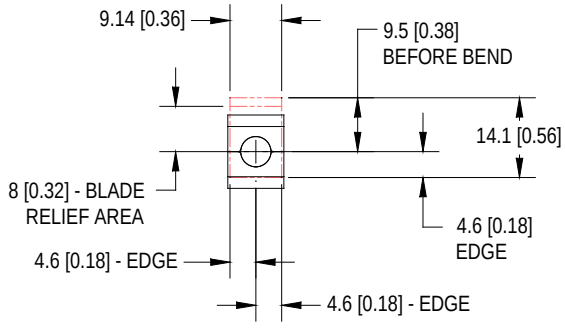
TL-4.6-3B
REF. 004223 ASS'Y



TL-4.6-2B
REF. 001221 ASS'Y



TL-4.6-2B
REF. 001221 ASS'Y



NOTES:

-"EDGE" NOTATION REFERS TO MINIMUM DISTANCE FROM JOINT CENTER TO EDGE OF PART.
-"BEFORE BEND" REFERS TO DISTANCE TO BEGINNING OF RADIUS ON A BENT FLANGE IF TOG-L-LOC DIE IS ON THE INSIDE OF A BEND ON THE CUSTOMER PART.
-MINIMUM 1.5mm [.06"] PART SUPPORT SHOWN ADJACENT TO "BLADE RELIEF AREA" ON VIEWS FOR 2 BLADED DIE ASSEMBLIES.

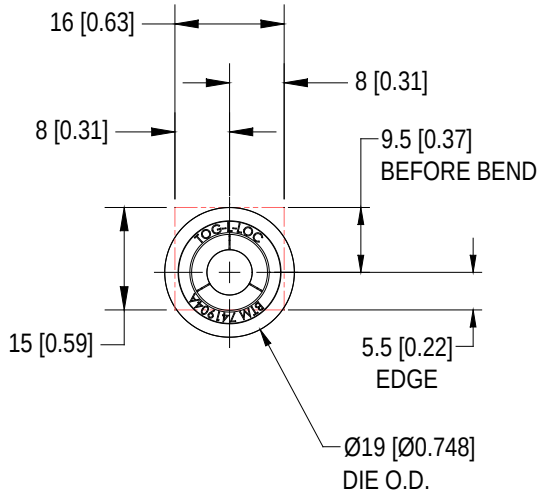
5.5 TOG-L-LOC JOINT FLANGE

MINIMUM DISTANCES

(FOR SINGLE JOINTS)

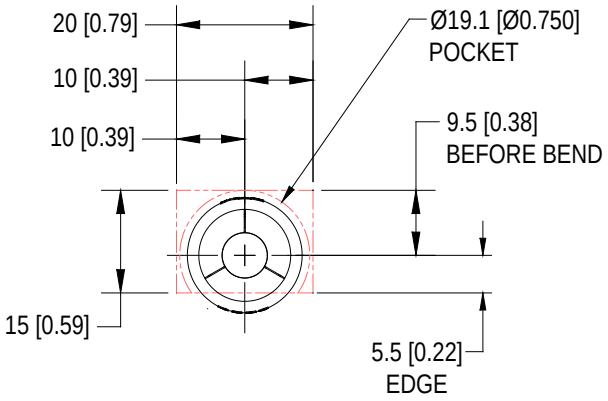
TL-5.5-940

REF. 742100AE ASS'Y



TL-5.5-3B

REF. 739100A ASS'Y



NOTES:

-"EDGE" NOTATION REFERS TO MINIMUM DISTANCE FROM JOINT CENTER TO EDGE OF PART.
-"BEFORE BEND" REFERS TO DISTANCE TO BEGINNING OF RADIUS ON A BENT FLANGE IF TOG-L-LOC DIE IS ON THE INSIDE OF A BEND ON THE CUSTOMER PART.
-MINIMUM 1.5mm [.06"] PART SUPPORT SHOWN ADJACENT TO "BLADE RELIEF AREA" ON VIEWS FOR 2 BLADED DIE ASSEMBLIES.

TOG-L-LOC | V-LOC | LANCE-N-LOC INFORMATION

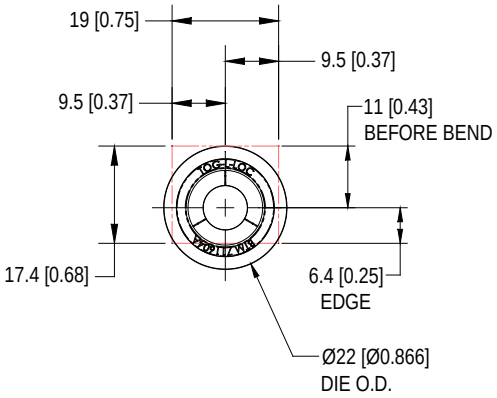
6.4 TOG-L-LOC JOINT FLANGE

MINIMUM DISTANCES

(FOR SINGLE JOINTS)

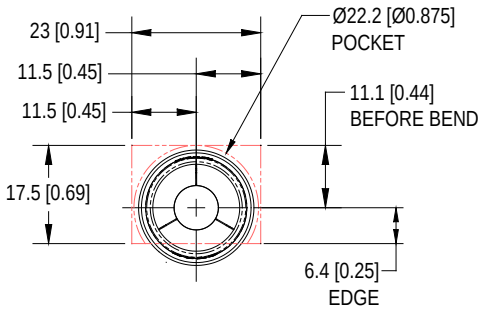
TL-6.4-940

REF. 744700AE ASS'Y



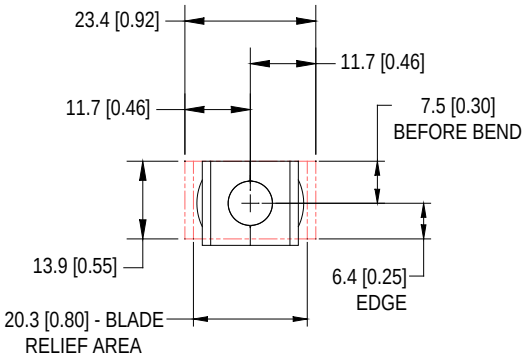
TL-6.4-3B

REF. 013907 ASS'Y



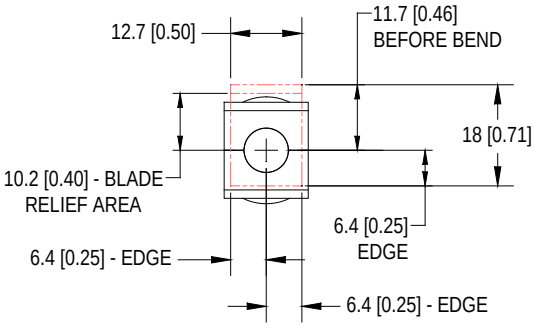
TL-6.4-2B

REF. 799500A ASS'Y



TL-6.4-2B

REF. 799500A ASS'Y

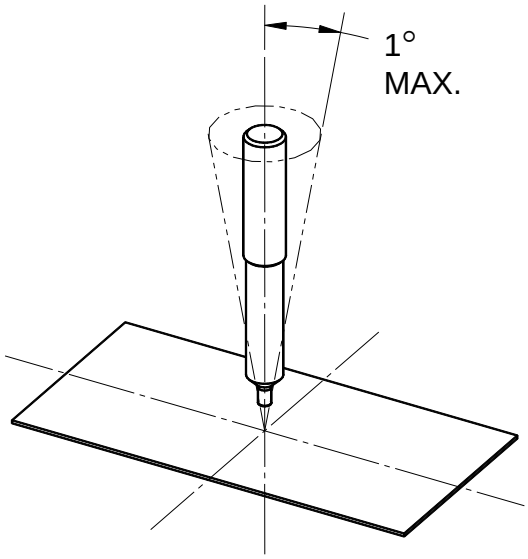


NOTES:

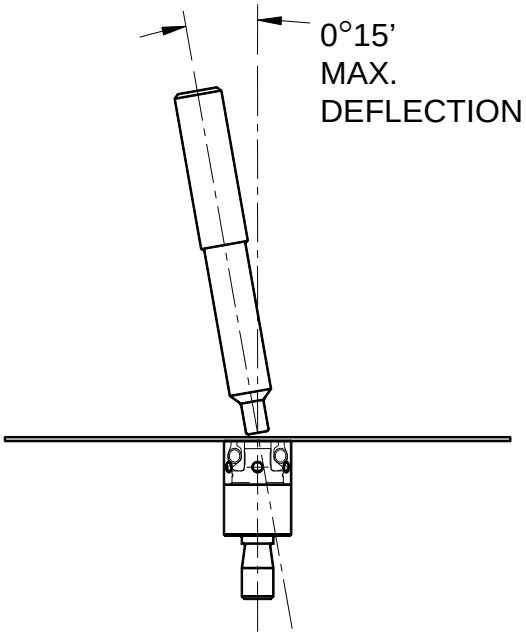
-"EDGE" NOTATION REFERS TO MINIMUM DISTANCE FROM JOINT CENTER TO EDGE OF PART.
-"BEFORE BEND" REFERS TO DISTANCE TO BEGINNING OF RADIUS ON A BENT FLANGE IF TOG-L-LOC DIE IS ON THE INSIDE OF A BEND ON THE CUSTOMER PART.
-MINIMUM 1.5mm [.06"] PART SUPPORT SHOWN ADJACENT TO "BLADE RELIEF AREA" ON VIEWS FOR 2 BLADED DIE ASSEMBLIES.

TOG-L-LOC DESIGN PARAMETERS

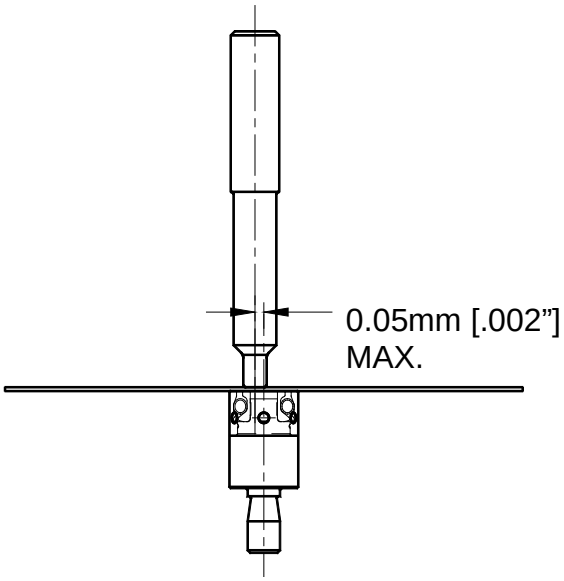
PERPENDICULARITY TO WORK SURFACE



PUNCH TO DIE LINEAR ALIGNMENT



PUNCH TO DIE CONCENTRICITY

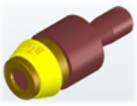


TOG-L-LOC JOINT DATA
MAXIMUM BUTTON DIAMETER

Values in the chart below, for maximum Button Diameter (BD), are the absolute maximum --- including any tolerance noted in the Button Diameter specification (ex: BD spec of Ø7.75 +0.25/-0.00 = maximum BD value of Ø8.00mm).

Max. Button Diameter (BD)

940 Dies 	Style "A" Die Ass'y No.	Max. BD (Including Tolerance)
TL-3.0-940M	710200AE	4.95 [.195]
TL-3.0-940	718200AE	5.84 [.230]
TL-3.8-940M	PD220800AE	6.10 [.240]
TL-3.8-940	794600AE	6.35 [.250]
TL-4.6-940M	710100AE	7.11 [.280]
TL-4.6-940	716000AE	8.00 [.315]
TL-5.5-940M	767500AE	8.64 [.340]
TL-5.5-940	742100AE	9.78 [.385]
TL-6.4-940M	710900AE	10.16 [.400]
TL-6.4-940	747700AE	11.18 [.440]
TL-7.6-940M	767700A (SSI Only)	12.50 [.492]
TL-7.6-940	779600AE (SSI Only)	14.22 [.560]

3 Bladed Elastomer Die 	Style "A" Die Ass'y No.	Max. BD (Including Tolerance)
TL-3.0-3B	006707	6.35 [.250]
TL-3.8-3B	796900A	7.11 [.280]
TL-4.6-3B	004223	8.13 [.320]
TL-5.5-3B	739100A	10.03 [.395]
TL-6.4-3B	013907	12.06 [.475]

TOG-L-LOC PUNCH INFORMATION

General Design Guidelines

- The Punch should be guided a minimum of 28.5mm [1.12”] in the Punch Retainer.
- The location tolerance to the centerline of the Punch hole should be 0.013mm [±.0005”].
- The “940” Punch mounting is preferred. While the set screw method is still acceptable.
- If possible use an M8x1.25 (or $^{5}/_{16}$ – 24) set screw to retain a whistle notch Punch, M6x1.0 (or ¼ - 28) should be the minimum. The set screw should be perpendicular to the centerline of the Punch.
- The Punch should have some means of adjustment. A Backing Plate or set screw behind the Holder would be an example.
- The hole size and tolerance for a standard 3/8” diameter Punch would be: Ø9.525 +0.005/-0.000 mm (or Ø.3750 +.0002 /-.0000 In.)
- The hole size and tolerance for a standard 1/2” diameter Punch would be: Ø12.700 +0.005/-0.000 mm (or Ø.5000 +.0002 /-.0000 In.)
- The hole size and tolerance for a standard 10mm diameter 940 Punch would be: Ø10H6 (or Ø.3937 +.0004 /-.0000 In.)
- The hole size and tolerance for a standard 13mm diameter 940 Punch would be: Ø13H6 (or Ø.5118 +.0004 /-.0000 In.)
- The surface that the Punch seats on should be through hardened. Typically, this material is 6150 with a hardness of 50-54 on the Rockwell “C” scale.

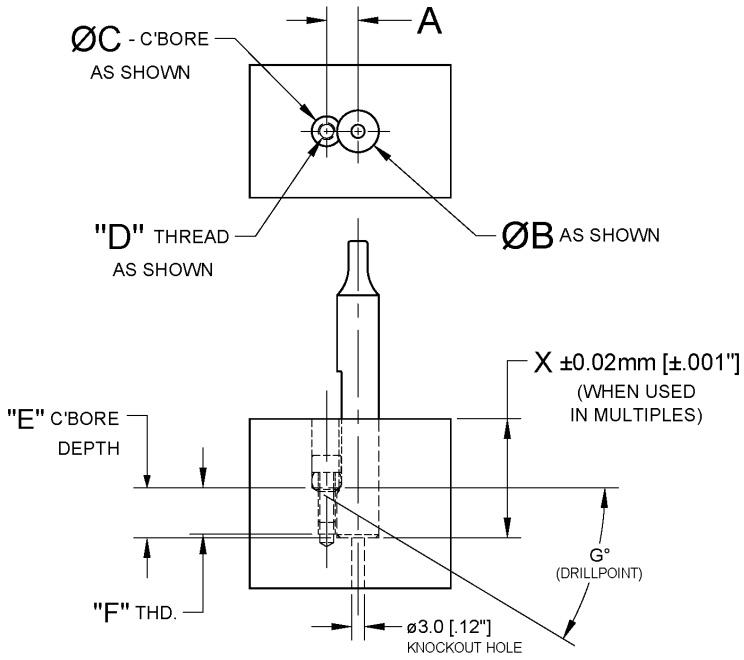
TOG-L-LOC PUNCH INFORMATION

940 Series Punch Retention

(With "wrap" between Punch and 940 Retaining Washer)

REF. PUNCH DRAWING NUMBERS:

3.0 TOG-L-LOC: 713800A
3.8 TOG-L-LOC: 793600A
4.6 TOG-L-LOC: 713900A
5.5 TOG-L-LOC: 739000A
6.4 TOG-L-LOC: PD201200A
7.6 TOG-L-LOC: 780100A



	3.0 Tog-L-Loc	3.8 Tog-L-Loc	4.6 Tog-L-Loc	5.5 Tog-L-Loc	6.4 Tog-L-Loc	7.6 Tog-L-Loc
A	7.49 $^{+0.13}_{-0.00}$ [.295 $^{+.005}_{-.000}$]	7.49 $^{+0.13}_{-0.00}$ [.295 $^{+.005}_{-.000}$]	7.49 $^{+0.13}_{-0.00}$ [.295 $^{+.005}_{-.000}$]	7.49 $^{+0.13}_{-0.00}$ [.295 $^{+.005}_{-.000}$]	10.03 $^{+0.13}_{-0.00}$ [.395 $^{+.005}_{-.000}$]	11.51 $^{+0.13}_{-0.00}$ [.453 $^{+.005}_{-.000}$]
B	Ø10H6 [.3937 $^{+.0004}_{-.0000}$]	Ø10H6 [.3937 $^{+.0004}_{-.0000}$]	Ø10H6 [.3937 $^{+.0004}_{-.0000}$]	Ø10H6 [.3937 $^{+.0004}_{-.0000}$]	Ø13H6 [.5118 $^{+.0004}_{-.0000}$]	Ø16H6 [.6299 $^{+.0004}_{-.0000}$]
C	7.14 $^{+0.05}_{-0.00}$ [.281 $^{+.002}_{-.000}$]	7.14 $^{+0.05}_{-0.00}$ [.281 $^{+.002}_{-.000}$]	7.14 $^{+0.05}_{-0.00}$ [.281 $^{+.002}_{-.000}$]	7.14 $^{+0.05}_{-0.00}$ [.281 $^{+.002}_{-.000}$]	10.16 $^{+0.05}_{-0.00}$ [.400 $^{+.002}_{-.000}$]	10.16 $^{+0.05}_{-0.00}$ [.400 $^{+.002}_{-.000}$]
D	M4x0.7-6H	M4x0.7-6H	M4x0.7-6H	M4x0.7-6H	M6x1.0-6H	M6x1.0-6H
E	11.81 $^{+0.00}_{-0.13}$ [.465 $^{+.000}_{-.005}$]	11.81 $^{+0.00}_{-0.13}$ [.465 $^{+.000}_{-.005}$]	11.81 $^{+0.00}_{-0.13}$ [.465 $^{+.000}_{-.005}$]	11.81 $^{+0.00}_{-0.13}$ [.465 $^{+.000}_{-.005}$]	11.63 [.458]	13.13 [.517]
F	11.2 [.44]	11.2 [.44]	11.2 [.44]	11.2 [.44]	15.2 [.60]	15.2 [.60]
G	20°	20°	20°	20°	31°	31°

Set Screw Punch Retention

Ø9.52 [3/8"] PUNCH:

HOLE SIZE:

Ø9.525 +0.005/-0.000 mm
Ø.3750 +.0002/-.0000 In.

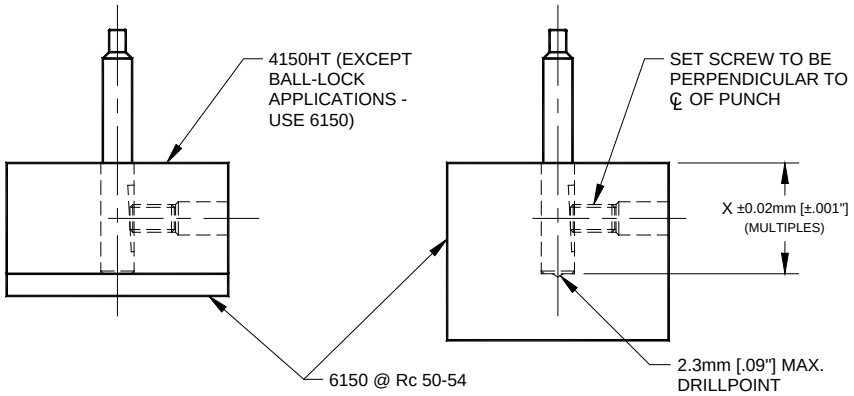
3.0 Tog-L-Loc: 004933/006622
3.8 Tog-L-Loc: 797001A/797001C
4.6 Tog-L-Loc: 002798/006624
5.5 Tog-L-Loc: 018934/018936

Ø12.7 [1/2"] PUNCH:

HOLE SIZE:

Ø12.700 +0.005/-0.000 mm
Ø.5000 +.0002/-.0000 In.

6.4 Tog-L-Loc: 012121/014708



TOG-L-LOC DIE INFORMATION

"940" Series Die Assembly

- The location tolerance to the centerline of the Die hole should be ±0.013mm [±.0005"].
- 940 Series Dies require a knock out hole from the back side.
- Because the 940 Die has a built in Blade Shield the top of the Die should not be flush with the detail it's mounted in. If Anvil strength is not an issue, the typical design method would expose the ring of small holes in the Guard Can.
- The 940 Die is better suited for applications exposed to coolants and lubricants.
- Compared with a set screw, the 940 retention method is less likely to come loose during normal machine cycling.

3 Bladed Elastomer

- The location tolerance to the centerline of the Die hole should be ±0.013mm [±.0005"].
- 3 Bladed Style "A" Dies require a knock out hole from the back side.
- 3 Bladed Style "A" Dies should have as much material protecting the Blades as possible.
- Due to incompatibility between specific components of die compounds and the standard Polyurethane (Yellow) Elastomer Rings, (2) alternative Elastomer Rings may be used.

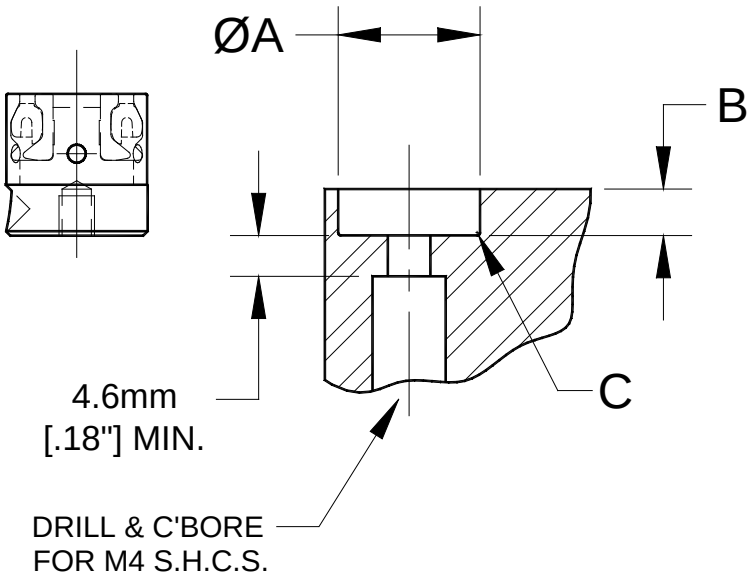
Following is a basic guide for usage of the alternatives.

Problem Die Compound Component	Elastomer Type to Use
Isopropanol	Butyl (Black)
Vanishing Oil	Nitrile (blue)

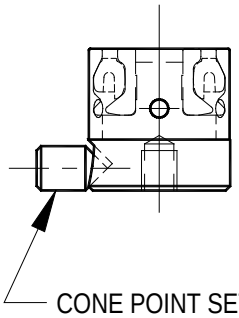
TOG-L-LOC DIE INFORMATION

TOG-L-LOC "940" SERIES SHORT INSERT DIE ASSEMBLY

Preferred Retention Method:



Acceptable Retention Method:



CONE POINT SET SCREW MAY BE USED TO RETAIN DIE ON NOTCH

Note:

Only use this means of retention in cases where there is insufficient room for the head of the S.H.C.S. (as shown in the "Preferred Retention Method").

	3.0 Tog-L-Loc	4.6 Tog-L-Loc	5.5 Tog-L-Loc	6.4 Tog-L-Loc
A	Ø12H6 [.4724 $^{+.0004}_{-.0000}$]	Ø16H6 [.6299 $^{+.0004}_{-.0000}$]	Ø19H6 [.7480 $^{+.0005}_{-.0000}$]	Ø22H6 [.8661 $^{+.0005}_{-.0000}$]
B	5.0 [.20"]	5.7 [.22"]	7.0 [.28"]	8.0 [.31"]
C	0.50 $^{+0.00}_{-0.25}$ [.020 $^{+.000}_{-.010}$]	0.50 $^{+0.00}_{-0.25}$ [.020 $^{+.000}_{-.010}$]	0.50 $^{+0.00}_{-0.25}$ [.020 $^{+.000}_{-.010}$]	0.50 $^{+0.00}_{-0.25}$ [.020 $^{+.000}_{-.010}$]

Note: "B" dimension denotes minimum guide on die assembly. Pocket depth may exceed "B" dimension, but should remain below the top of the 940 die guard.

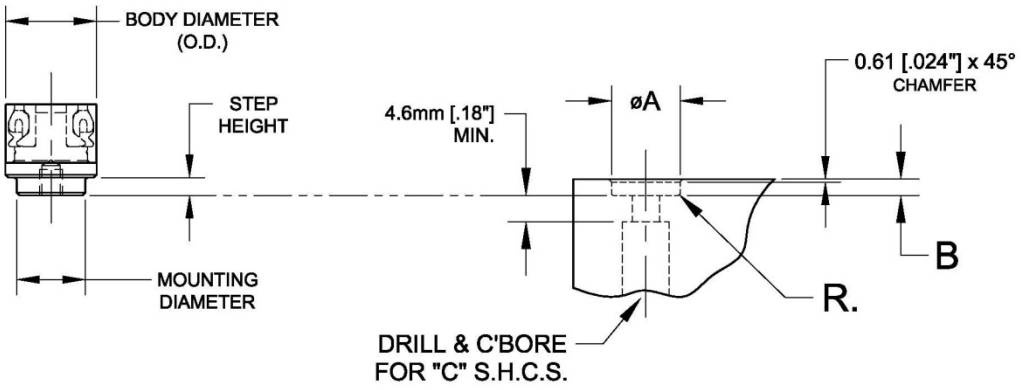
TOG-L-LOC DIE INFORMATION

940 TOG-L-LOC "SSI" (STEPPED SHORT INSERT) DIE MOUNTING

FOR ALL TOG-L-LOC JOINT SIZES

REF. DIE NUMBERS:

940 MINI DIE ASSY'S	940 "STANDARD" DIE ASSY'S
3.0 TOG-L-LOC: 751800AE	3.0 TOG-L-LOC: 751000AE
3.8 TOG-L-LOC: PD220000AE	3.8 TOG-L-LOC: 793700AE
4.6 TOG-L-LOC: 751900AE	4.6 TOG-L-LOC: 751100AE
5.5 TOG-L-LOC: 752000AE	5.5 TOG-L-LOC: 743400AE
6.4 TOG-L-LOC: 752100AE	6.4 TOG-L-LOC: 751200AE
7.6 TOG-L-LOC: 767700A	7.6 TOG-L-LOC: 779600AE

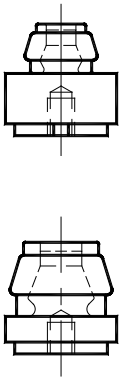


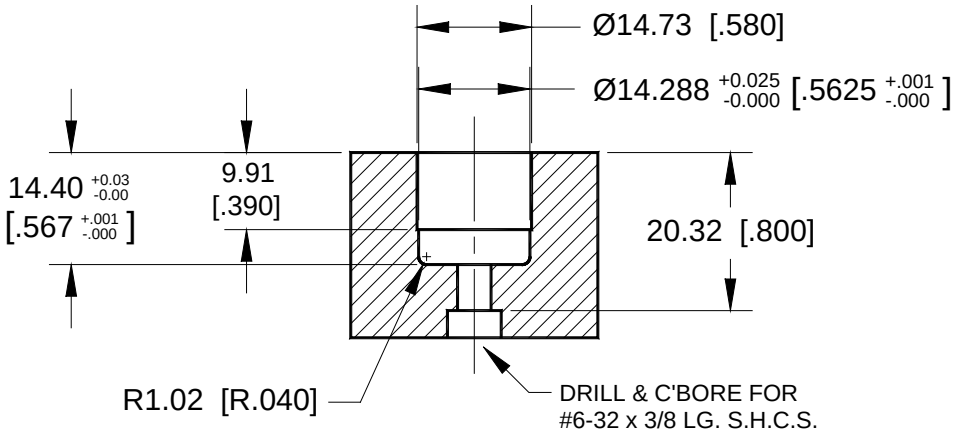
940 MINI & STANDARD DIES						
	3.0 Tog-L-Loc	3.8 Tog-L-Loc	4.6 Tog-L-Loc	5.5 Tog-L-Loc	6.4 Tog-L-Loc	7.6 Tog-L-Loc
A	Ø8H6 [.3150 $^{+.0003}_{-.0000}$]	MINI = Ø10H6 [.3937 $^{+.0004}_{-.0000}$] STD. = Ø12H6 [.4724 $^{+.0004}_{-.0000}$]	Ø12H6 [.4724 $^{+.0004}_{-.0000}$]	Ø14H6 [.5512 $^{+.0004}_{-.0000}$]	Ø18H6 [.7087 $^{+.0005}_{-.0000}$]	Ø20H6 [.7874 $^{+.0005}_{-.0000}$]
B	2.24 ±0.13 [.088 ±.005]	2.84 ±0.13 [.112 ±.005]	2.84 ±0.13 [.112 ±.005]	2.84 ±0.13 [.112 ±.005]	3.84 ±0.13 [.151 ±.005]	3.84 ±0.13 [.151 ±.005]
C	M4x0.7	M4x0.7	M4x0.7	M4x0.7	M4x0.7	M5x0.8
R	---	R0.25 [.010] MAX.	MINI = R0.25 [.010] MAX. STD. = R.0.33 ±0.13 [.013 ±.005]	R0.33 ±0.13 [.013 ±.005]	R0.33 ±0.13 [.013 ±.005]	R0.36 ±0.13 [.014 ±.005]

NOTES: 940 MINI DIES HAVE A SMALLER BODY DIAMETER (O.D.) THAN THE 940 "STANDARD" DIES, AND HAVE CORRESPONDING LIMITATIONS ON THE TOG-L-LOC JOINT BUTTON DIAMETER THAT CAN BE PRODUCED WITH THE DIE. SEE THE CUSTOMER TEMPLATE OR DESIGN GUIDE DOCUMENT FOR MORE INFORMATION.

TOG-L-LOC DIE POCKET INFORMATION

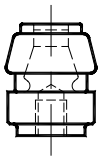
3.0 [.12"] Tog-L-Loc Short Insert 3 Bladed Elastomer Die (Ref. BTM #013310)

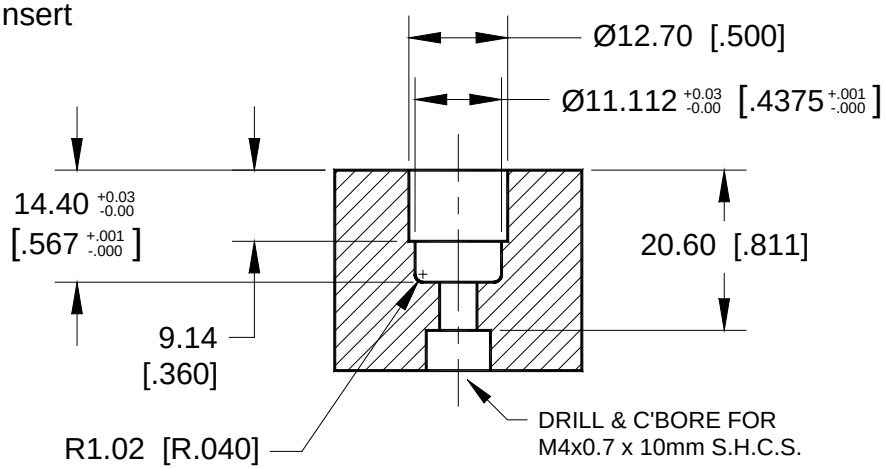




4.6 [.18"] Tog-L-Loc Short Insert 3 Bladed Elastomer Die (Ref. BTM #013263)

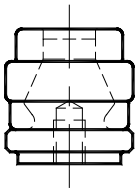
3.8 [.15"] Tog-L-Loc Short Insert
3 Bladed Elastomer Die
(Ref. BTM #PD217300A)

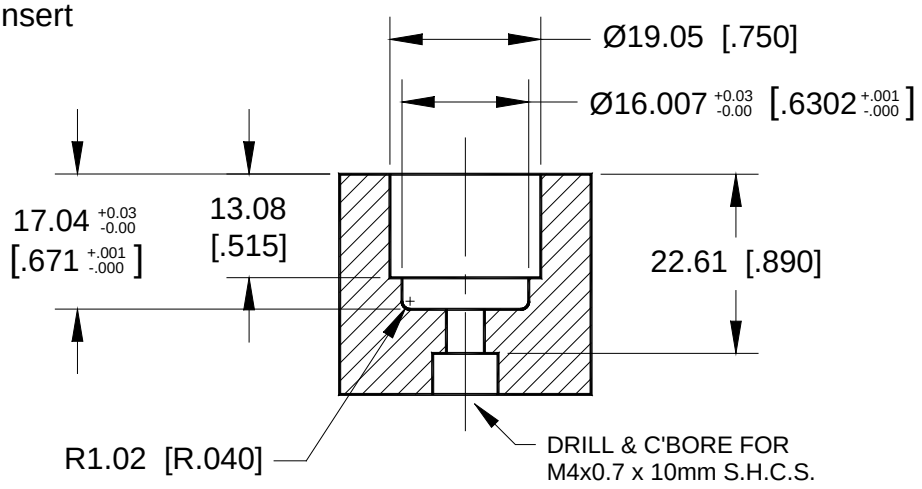




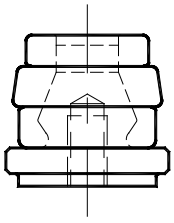
TOG-L-LOC DIE POCKET INFORMATION

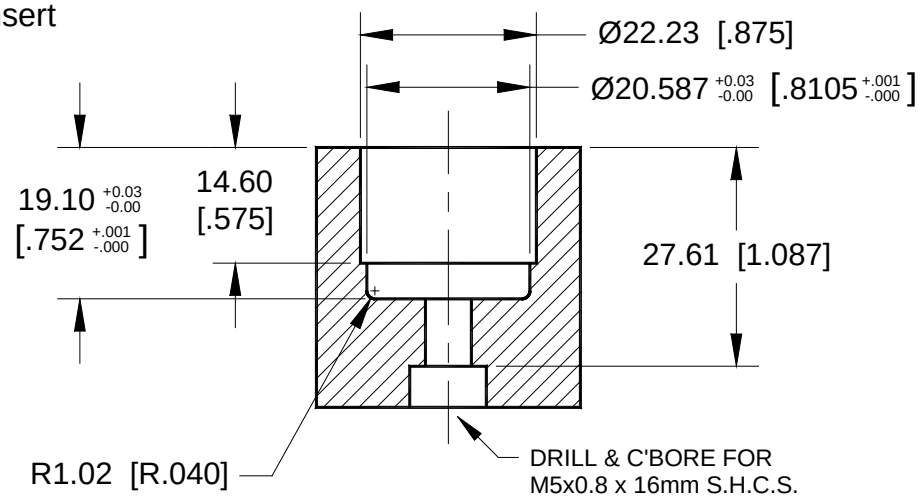
5.5 [.22"] Tog-L-Loc Short Insert
3 Bladed Elastomer Die
(Ref. BTM #742200A)





6.4 [.25"] Tog-L-Loc Short Insert
3 Bladed Elastomer Die
(Ref. BTM #015071)





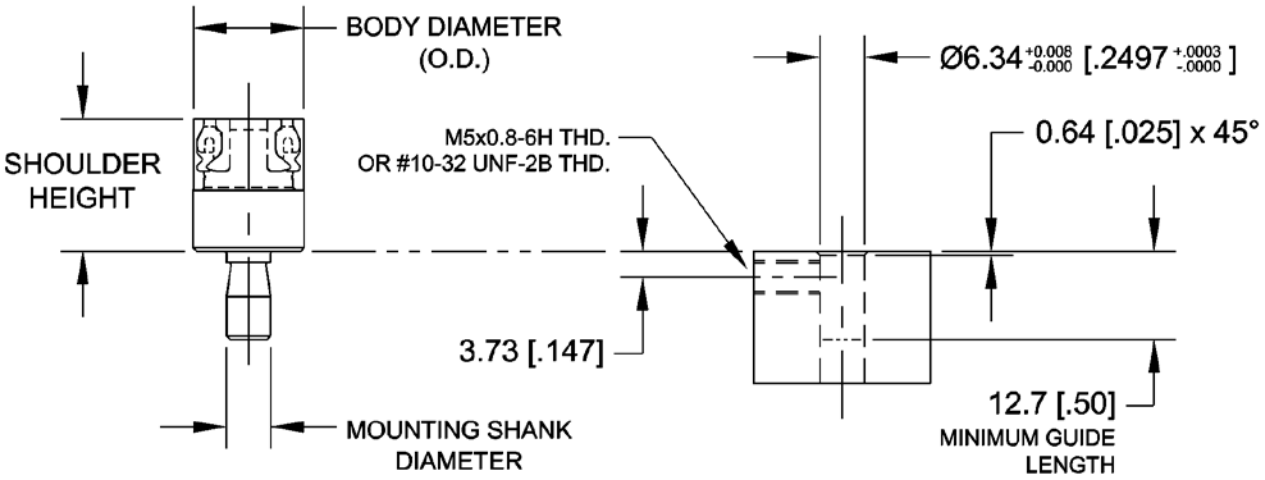
TOG-L-LOC DIE MOUNTING INFORMATION

940 TOG-L-LOC STYLE "A" DIE MOUNTING

FOR 3.0, 3.8, 4.6 & 5.5 TOG-L-LOC JOINTS

REF. DIE NUMBERS:

940 MINI DIE ASSY'S	940 "STANDARD" DIE ASSY'S
3.0 TOG-L-LOC: 710200AE	3.0 TOG-L-LOC: 718200AE
3.8 TOG-L-LOC: PD220800AE	3.8 TOG-L-LOC: 794600AE
4.6 TOG-L-LOC: 710100AE	4.6 TOG-L-LOC: 716000AE
5.5 TOG-L-LOC: 767500AE	5.5 TOG-L-LOC: 742100AE



NOTES: 940 MINI DIES HAVE A SMALLER BODY DIAMETER (O.D.) THAN THE 940 "STANDARD" DIES, AND HAVE CORRESPONDING LIMITATIONS ON THE TOG-L-LOC JOINT BUTTON DIAMETER THAT CAN BE PRODUCED WITH THE DIE. SEE THE CUSTOMER TEMPLATE OR DESIGN GUIDE DOCUMENT FOR MORE INFORMATION.

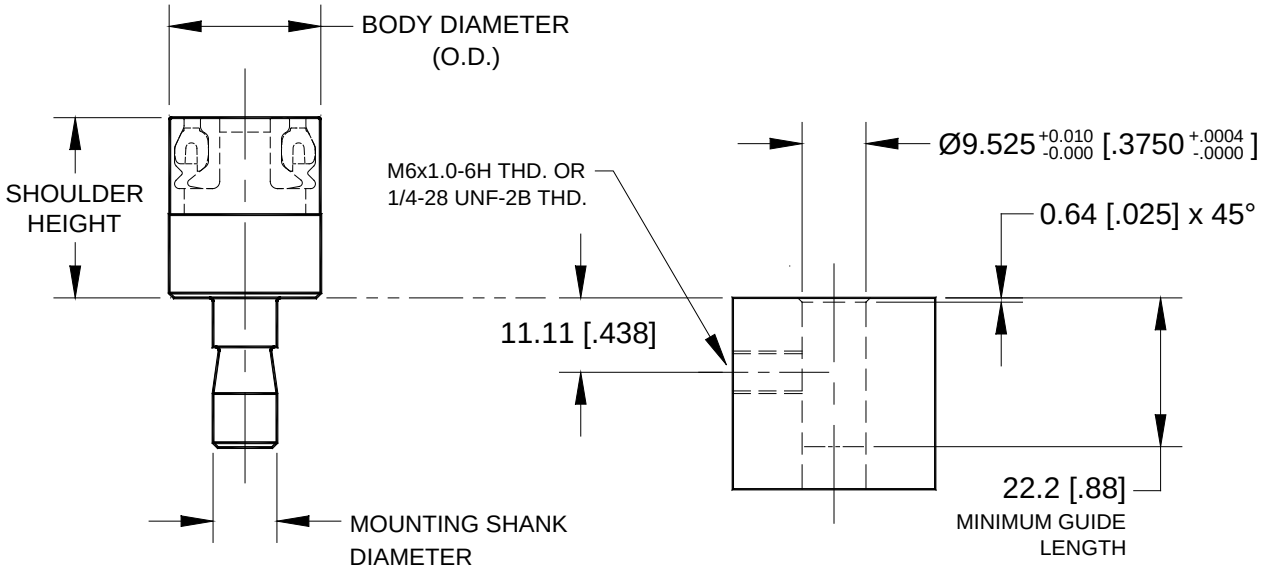
TOG-L-LOC DIE MOUNTING INFORMATION

940 TOG-L-LOC STYLE "A" DIE MOUNTING

FOR 6.4 TOG-L-LOC JOINTS

REF. DIE NUMBERS:

940 MINI DIE ASSY'S	940 "STANDARD" DIE ASSY'S
6.4 TOG-L-LOC: 710900A	6.4 TOG-L-LOC: 744700A

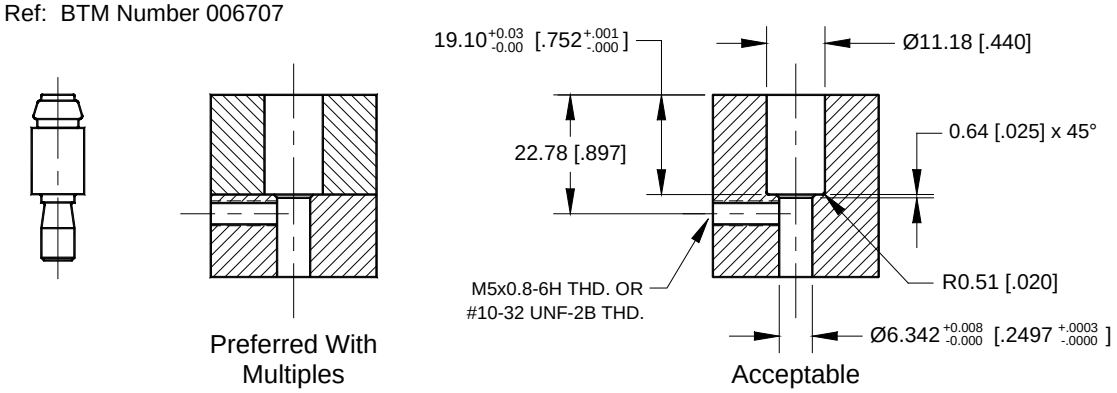


NOTES: 940 MINI DIES HAVE A SMALLER BODY DIAMETER (O.D.) THAN THE 940 "STANDARD" DIES, AND HAVE CORRESPONDING LIMITATIONS ON THE TOG-L-LOC JOINT BUTTON DIAMETER THAT CAN BE PRODUCED WITH THE DIE. SEE THE CUSTOMER TEMPLATE OR DESIGN GUIDE DOCUMENT FOR MORE INFORMATION.

TOG-L-LOC DIE POCKET INFORMATION

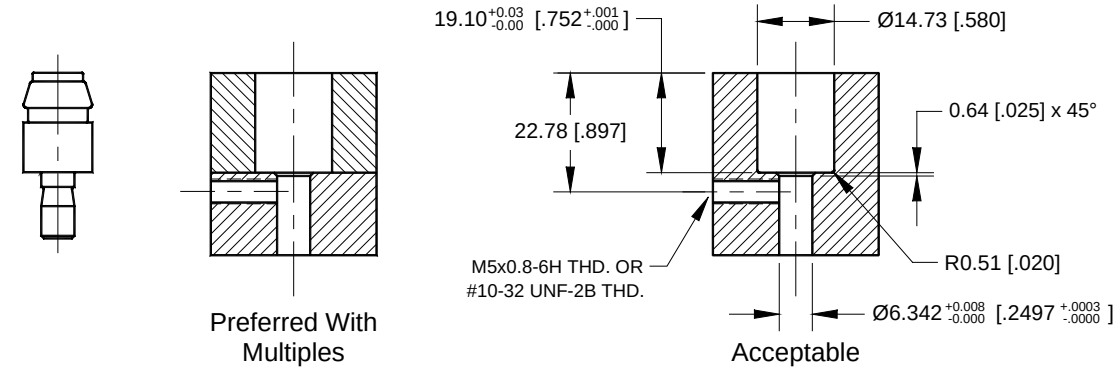
3.0 [.12"] Tog-L-Loc Style "A" 3 Bladed Elastomer Die

Ref: BTM Number 006707



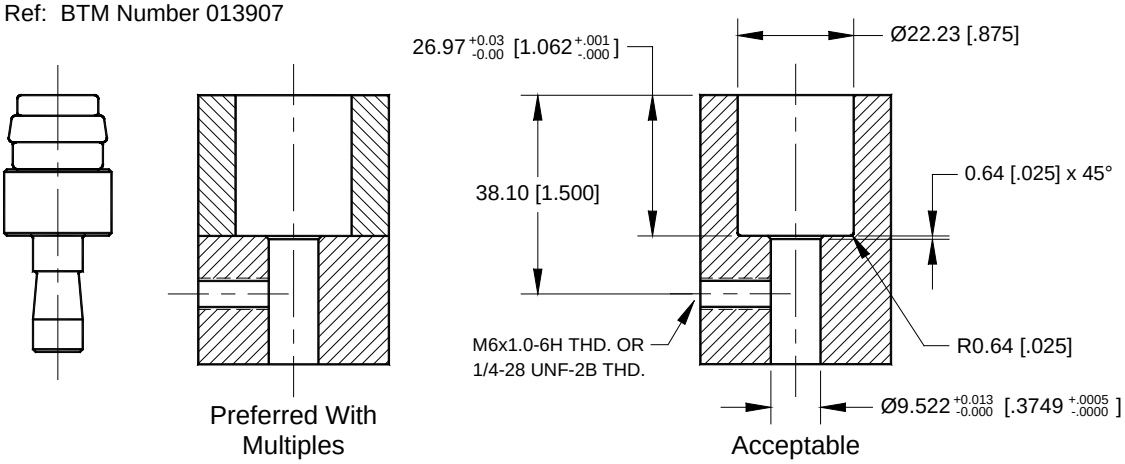
4.6 [.18"] Tog-L-Loc Style "A" 3 Bladed Elastomer Die

Ref: BTM Number 004223



6.4 [.25"] Tog-L-Loc Style "A" 3 Bladed Elastomer Die

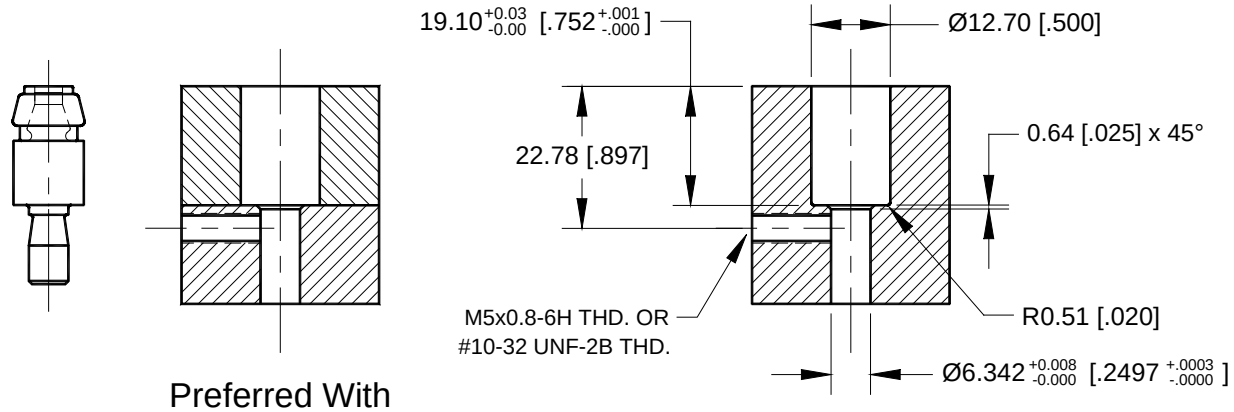
Ref: BTM Number 013907



TOG-L-LOC DIE POCKET INFORMATION

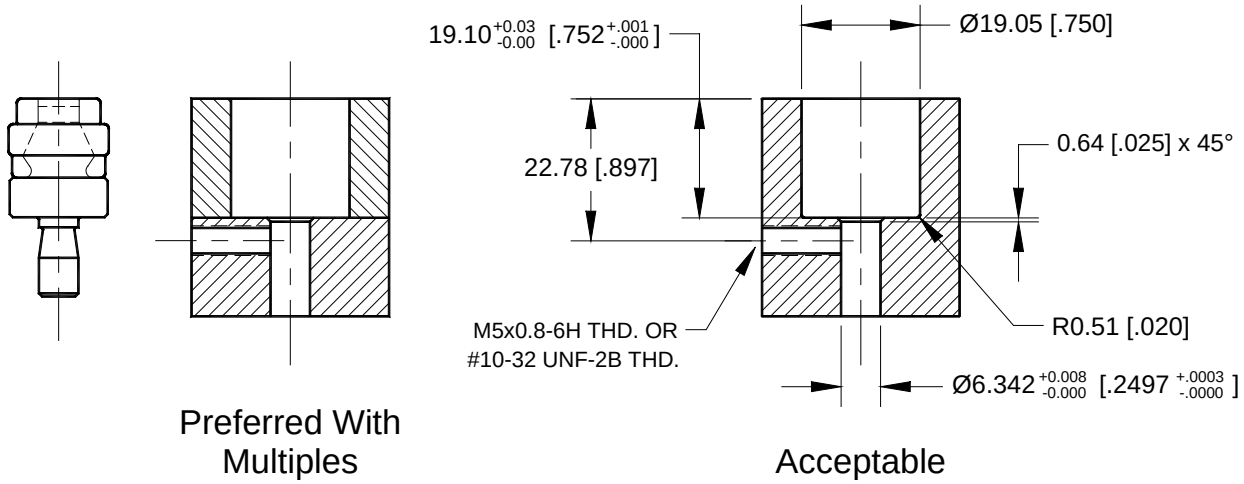
3.8 [.15"] Tog-L-Loc Style "A" 3 Bladed Elastomer Die

Ref: BTM Number 796900A



5.5 [.22"] Tog-L-Loc Style "A" 3 Bladed Elastomer Die

Ref: BTM Number 739100A

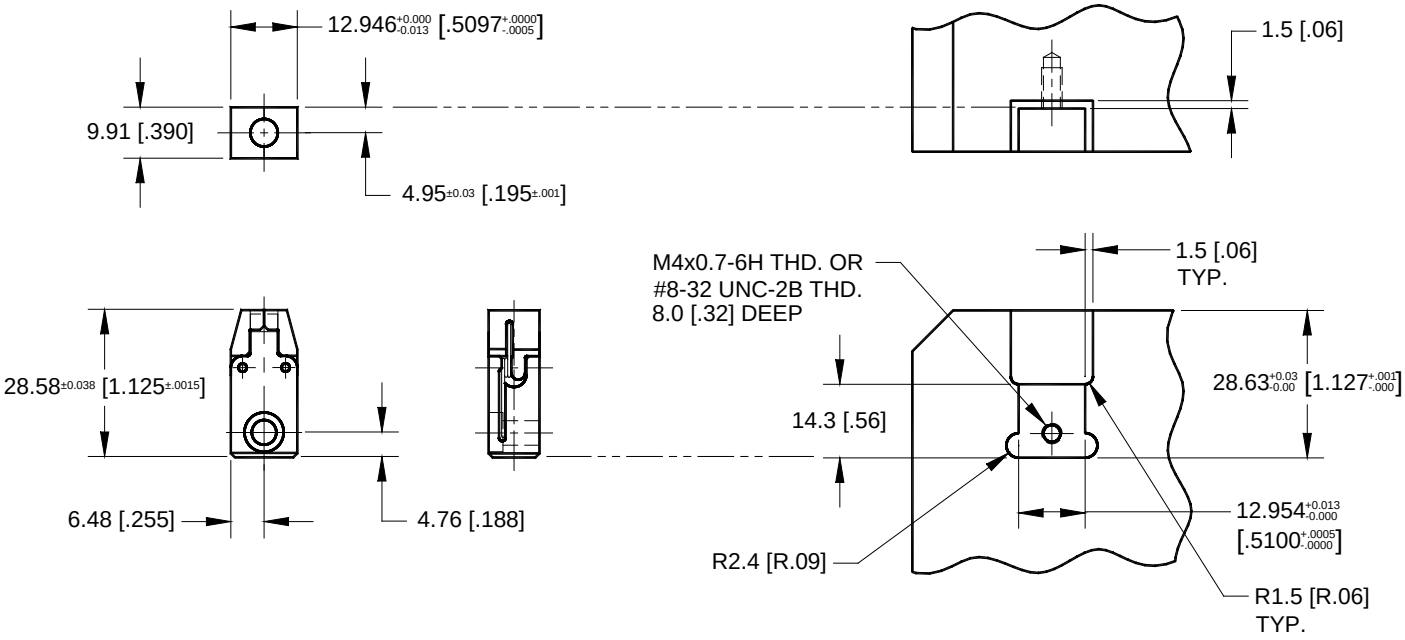


TOG-L-LOC DIE POCKET INFORMATION

2 Bladed Tog-L-Loc Style “A” Combo Block Die Assembly

- 2 Bladed Dies require a clearance pocket for the Blades to open freely.
- The locational tolerance to the centerline of the Die should be ±0.013 [.0005″].
- A hardened Die Block or Anvil should be used; preferably 4150HT steel.
- Style “A” Combo Block Die pocket dimensions are shown below.

TOP OF DIE BLADES MUST BE FLUSH WITH SURROUNDING AREA FOR PROTECTION.



Style "A" Combo Block Die Assemblies

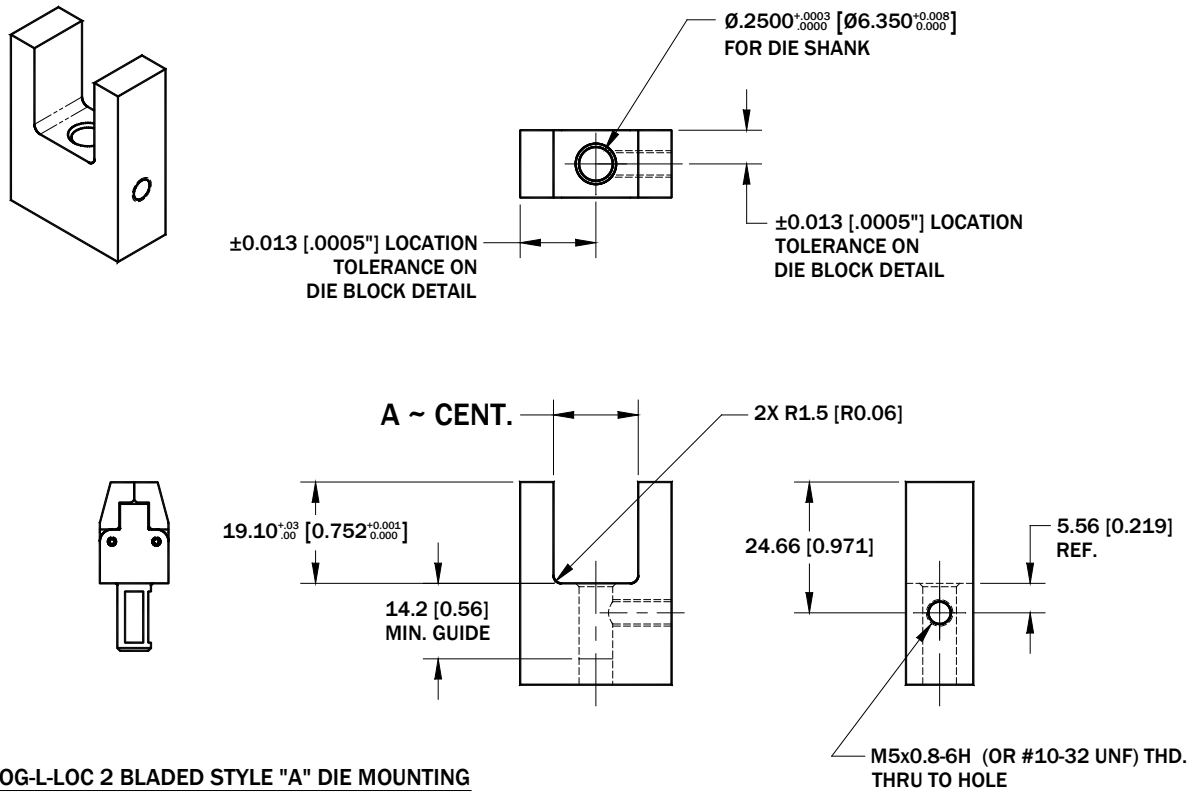
3.0 [.12"] Tog-L-Loc - Ref. BTM Number 013765
4.6 [.18"] Tog-L-Loc - Ref. BTM Number 006040

Style "A" Combo Block Die Set Up

TOG-L-LOC DIE POCKET INFORMATION

2 Bladed Tog-L-Loc Style “A” Die Assembly

- 2 Bladed Dies require a clearance pocket for the Blades to open freely.
- The locational tolerance to the centerline of the Die should be ±0.013 [.0005″].
- A hardened Die Block or Anvil should be used.
- Style “A” Die pocket dimensions are shown below.



TOG-L-LOC 2 BLADED STYLE "A" DIE MOUNTING

DIE BLOCK MAT'L - 6150
DIE BLOCK HARDNESS - Rc 50-54

JOINT SIZE	REF. ASSEMBLY NO.	"A" DIMENSION
3.0 TOG-L-LOC	000474	.57 +.02 -.00 [14.5 +0.5 -0.0]
3.8 TOG-L-LOC	PD204200A	.57 +.02 -.00 [14.5 +0.5 -0.0]
4.6 TOG-L-LOC	001221	.63 +.02 -.00 [16.0 +0.5 -0.0]

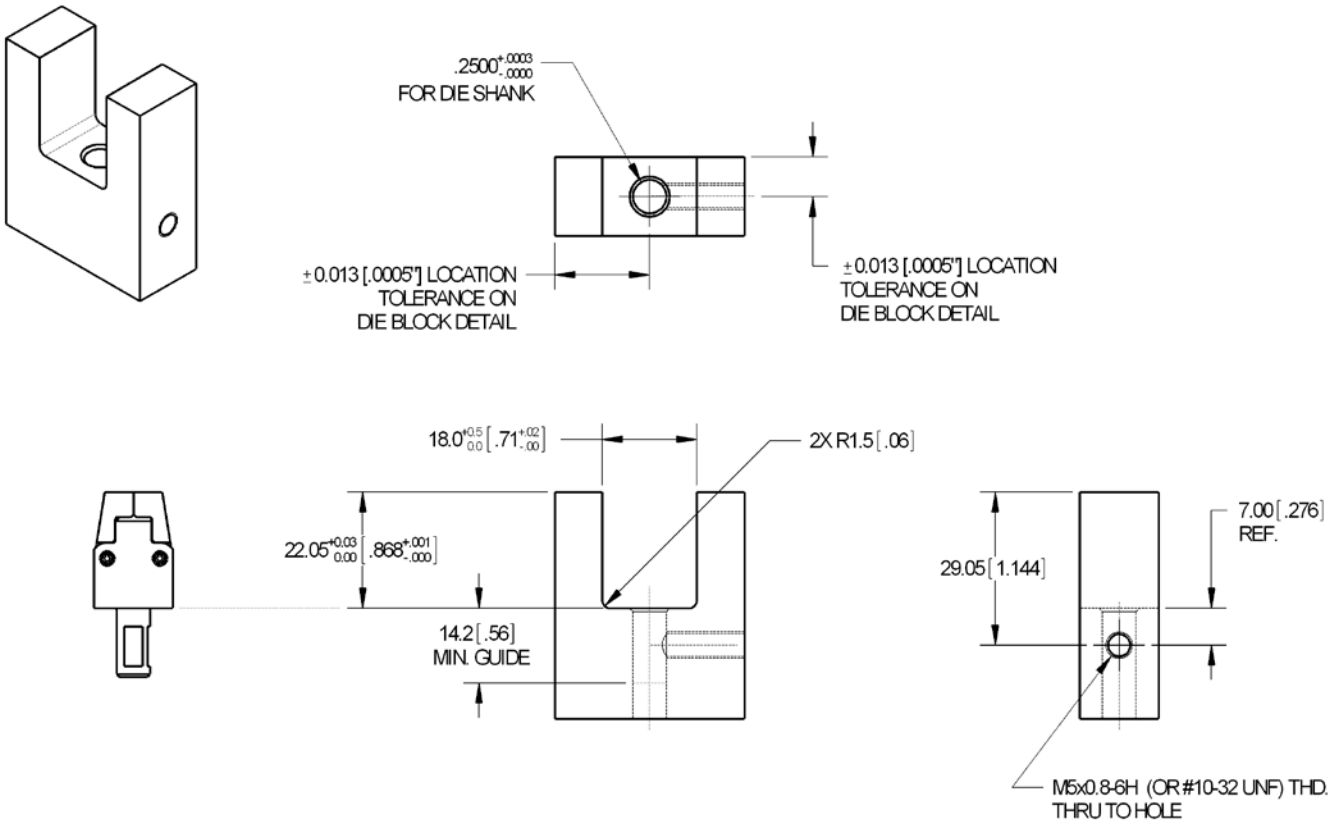
NOTE:

DRAWING PROVIDES DIE MOUNTING DIMENSIONS AND SPECIFICATIONS ONLY. DESIGN OF REMAINDER OF DIE BLOCK IS BASED ON INDIVIDUAL CUSTOMER APPLICATION.

TOG-L-LOC DIE POCKET INFORMATION

2 Bladed 5.5 Tog-L-Loc Style “A” Die Assembly

- 2 Bladed Dies require a clearance pocket for the Blades to open freely.
- The locational tolerance to the centerline of the Die should be ±0.013 [.0005″].
- A hardened Die Block or Anvil should be used.
- Style “A” Die pocket dimensions are shown below.



5.5 TOG-L-LOC 2 BLADED STYLE "A" DIE MOUNTING

REF. BTM DIE ASSEMBLY #PD239200A

DIE BLOCK MAT'L - 6150
DIE BLOCK HARDNESS - Rc 50-54

NOTE:

DRAWING PROVIDES DIE MOUNTING DIMENSIONS AND SPECIFICATIONS ONLY. DESIGN OF REMAINDER OF DIE BLOCK IS BASED ON SPECIFIC CUSTOMER APPLICATION.

TOG-L-LOC | V-LOC | LANCE-N-LOC INFORMATION

TOG-L-LOC STRIPPER INFORMATION

Stripper blocks should be made of 6150 steel, with a Rockwell hardness of Rc 50-54.

Contact Force is measured when the Tog-L-Loc Punch contacts the work piece.

The recommended Stripper contact force for 3.0 [.12”] TL is 0.89kN [200lbs] per joint.

The recommended Stripper contact force for 3.8 [.15”] TL is 1.1kN [250lbs] per joint.

The recommended Stripper contact force for 4.6 [.18”] TL is 1.3kN [300lbs] per joint.

The recommended Stripper contact force for 5.5 [.22”] TL is 2.3kN [525lbs] per joint.

The recommended Stripper contact force for 6.4 [.25”] TL is 3.3kN [750lbs] per joint.

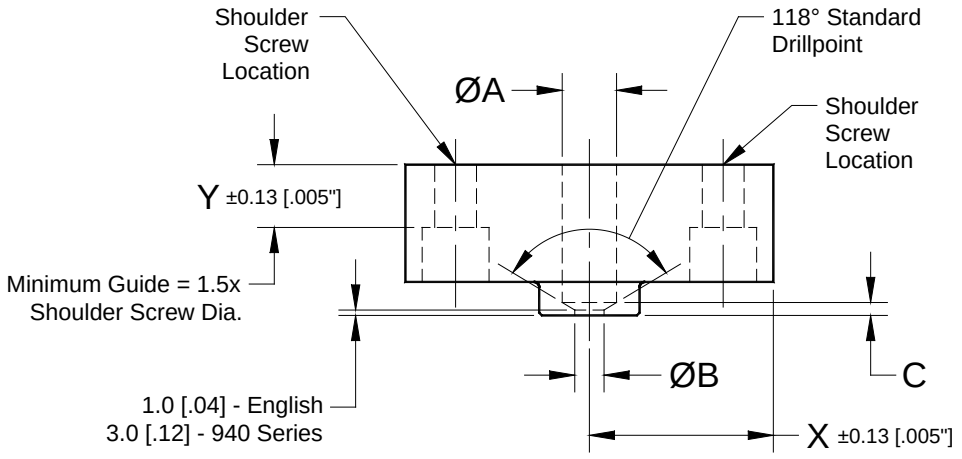
The location tolerance to the centerline of Punch clearance hole(s) should be ±0.13 [.005″].

The location tolerance to the centerline of the Shoulder Screws should be ±0.013 [.0005″].

The basic dimensions for Strippers are shown below.

When using round tip strippers, tip diameter should be larger than the die pocket diameter.

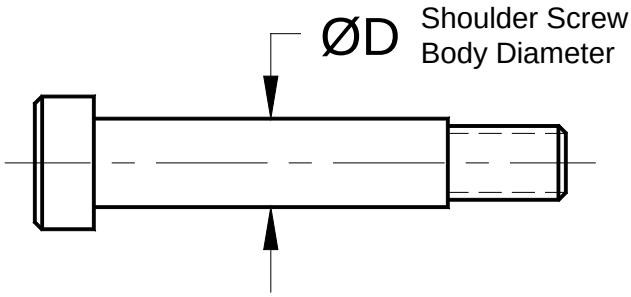
The tolerance on shoulder screw holes can be found on the Shoulder Screw Dimensions & Tolerances page in this section.



Note: See chart for A, B, and C dimensions. X and Y dimensions determined per application.

Punch Size	A	A "940"	B	C	C "940"
3.0mm [.12"]	Ø10.3 [13/32"]	Ø11.1 [7/16"]	Ø4.0 [5/32"]	2.9 [.12"]	5.2 [.20"]
3.8mm [.15"]	Ø10.3 [13/32"]	Ø11.1 [7/16"]	Ø4.8 [3/16"]	2.7 [.11"]	4.9 [.19"]
4.6mm [.18"]	Ø10.3 [13/32"]	Ø11.1 [7/16"]	Ø5.6 [7/32"]	2.5 [.10"]	4.7 [.18"]
5.5mm [.22"]	Ø10.3 [13/32"]	Ø11.1 [7/16"]	Ø6.4 [1/4"]	2.2 [.09"]	4.4 [.17"]
6.4mm [.25"]	Ø13.5 [17/32"]	Ø14.3 [9/16"]	Ø7.1 [9/32"]	2.0 [.08"]	4.2 [.16"]

SOCKET HEAD SHOULDER SCREW DIMENSIONS & TOLERANCES



ANSI Inch Shoulder Screws

"D" Dia.			Hole Callout	Recommended Seating Torque	
Basic	Max.	Min.*	Inch	in-lbs.	N-m
1/4	.248	.247	.250±.001	45	5
5/16	.3105	.3095	.3125±.001	112	13
3/8	.373	.372	.375±.001	230	26
1/2	.498	.497	.500±.001	388	44
5/8	.623	.622	.625±.001	990	112
3/4	.748	.747	.750±.001	1,975	223
7/8	.873	.872	.875±.001	3,490	394
1	.998	.997	1.000±.001	3,490	394
1 1/4	1.248	1.247	1.250±.001	5,610	634
1 1/2	1.498	1.496	1.500±.001	12,000	1356
1 3/4	1.748	1.746	1.750±.001	16,000	1808
2	1.998	1.996	2.000±.001	30,000	3390

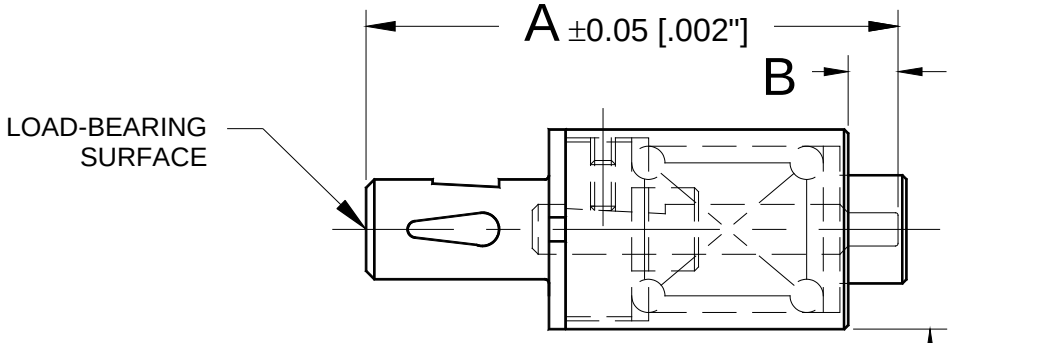
* Min. for Holo-Krome sizes 1/4 thru 1 1/4
is .001 less than Unbrako min.

ANSI Metric Shoulder Screws

"D" Dia.			Hole Callout			Recommended Seating Torque	
Max.	Min.	ISO	Metric	ISO	Inch	N-m	in-lbs.
6.00	5.982	h8	6.020 $^{+.048}_{-.000}$	E10	.238±.001	7	60
8.00	7.978	h8	8.025 $^{+.058}_{-.000}$	E10	.317±.001	12	105
10.00	9.978	h8	10.025 $^{+.058}_{-.000}$	E10	.396±.001	29	255
12.00	11.973	h8	12.032 $^{+.043}_{-.000}$	E9	.475±.001	57	500
16.00	15.973	h8	16.032 $^{+.043}_{-.000}$	E9	.632±.001	100	885
20.00	19.967	h8	20.040 $^{+.052}_{-.000}$	E9	.790±.001	240	2125
24.00	23.967	h8	24.040 $^{+.052}_{-.000}$	E9	.948±.001	470	4160

Shoulder screw Diameters & Seating Torques taken from Unbrako catolog

STANDARD STRIPPER ASSEMBLY DIMENSIONS & TOLERANCES



SS-5 THROUGH SS-30
STRIPPER ASSEMBLIES
(WITH SET SCREW PUNCH RETENTION)

Standard Tog-L-Loc Stripper Package

Stripper Package	Tip Length	A	B	C
SS-5	Short Tip	101.60 [4.000]	9.5 [.38]	19.1 [.75]
SS-5	Extended Tip	127.00 [5.000]	34.9 [1.38]	19.1 [.75
SS-10	Short Tip	101.60 [4.000]	9.5 [.38]	25.4 [1.00]
SS-10	Extended Tip	127.00 [5.000]	34.9 [1.38]	25.4 [1.00]
SS-20	Short Tip	101.60 [4.000]	9.5 [.38]	38.1 [1.50]
SS-20	Extended Tip	127.00 [5.000]	34.9 [1.38]	38.1 [1.50]
SS-30	Short Tip	139.70 [5.500]	12.7 [.50]	57.1 [2.25]
SS-30	Extended Tip	165.10 [6.500]	38.1 [1.50]	57.1 [2.25]

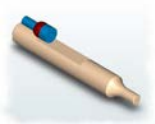
3.0 Tog-L-Loc Tooling

Punch Side

Note: Information provided for reference when applying Tog-L-Loc tooling. When ordering assemblies (or individual components), refer to the BTM drawing number noted in the chart for order numbers.

BTM Corporation
300 Davis Rd.
Marysville, MI USA
48040
Ph: 810-364-4567
Fax: 810-364-6178
www.btmcorp.com

Punches



940 & Ball Lock 10mm Mounting Dia.		Punch Length 71mm [2.795"] Lg.	80mm [3.150"] Lg.	90mm [3.543"] Lg.	100mm [3.937"] Lg.
0.25 [.010"] PTR	940	713800A	713800B	713800C	713800D
	Ball Lock	769000A	769000B	769000C	769000D
0.51 [.020"] PTR	940	713800E	713800F	713800G	713800H
	Ball Lock	769000E	769000F	769000G	769000H

WNF 9.52 [.375"] Mounting Dia.	Punch Length 69.85mm [2.750"] Lg.	95.25mm [3.750"] Lg.
0.25 [.010"] PTR	004933	006622
0.51 [.020"] PTR	006011	006623

940 Retainer Screw Sub-Assembly		BTM Assembly Number
		018217

Punch Holder Assemblies

Punch Retention Method		SS20 Die Set Mounting	Ø19.05 [.750"] Shank English Mounting	Ø20mm Shank Metric Mounting	Thin Holder Die Set Mounting
940	SS10	---	PD258800J	787700J	737400B
	SS20	713400A	020540	022516	
WNF	SS10	---	006644	018879	---
	SS20	---	---	---	
Ball Lock	SS10	---	---	---	737400J
	SS20	772100A	---	PD264000A	

Notes:

WNF = Whistle Notch Flat (set screw) retention.

940 **Retainer Screw Sub-Assembly** is not included with 940 punches and must be ordered separately.

Punch holders with shank mounting have both ball lock and whistle notch flat retention.

3.0 Tog-L-Loc Requirements:
Force Req'd = 18kN [2 tons] in typical mild steel application.
Stripper Contact Force = 0.9kN [200 lbs.] in typical mild steel application.

SS10 - 0.9kN [200 lbs.] Contact - Punch Holder Ass'y - Spring Life:
Long life: 1.8mm [.07"] max. total material joined.
Average life: 3.0mm [.11"] max. total material joined.

SS20 - 1.2kN [300 lbs.] Contact - Punch Holder Ass'y Spring Life:
Long life: 2.8mm [.11"] max. total material joined.
Average life: 4.0mm [.16"] max. total material joined.

3.0 Tog-L-Loc Tooling

Die Side

BTM Corporation
300 Davis Rd.
Marysville, MI USA
48040
Ph: 810-364-4567
Fax: 810-364-6178
www.btmcorp.com

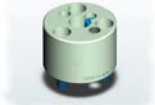
Note: Information provided for reference when applying Tog-L-Loc tooling. When ordering assemblies (or individual components), refer to the BTM drawing number noted in the chart for order numbers.

Die Assemblies

940		940M (Mini)	Standard 940	Joining Aluminum
Style "A"		710200AE	718200AE	---
Short Insert		710300AE	711400AE	---
Stepped Short Insert (SSI)		751800AE	751000AE	---
40mm Lg. (Extension Assembly)		PD220200A	PD220300A	N/A
60mm Lg. (Extension Assembly)		PD220200B	PD220300B	N/A
80mm Lg. (Extension Assembly)		PD220200C	PD220300C	N/A
100mm Lg. (Extension Assembly)		PD220200D	PD220300D	N/A

Note: Mount SSI Die Assembly (select Die Assembly based on joining requirements) in Extension Assembly. The overall length of Extension Assembly noted in the left column (above) is the combined height of the Die Assembly and Extension.

Die Holders & Assemblies

				
Die Style	Style "A" Ø19.05 [.750"] Shank 50.8mm [2.000"] OAL English Mounting	Style "A" Ø20mm Shank 50.8mm [2.000"] OAL Metric Mounting	Round Holder For 40mm, 60mm, 80mm & 100mm 940 & 940M Extension Assemblies	Thin Holder For 40mm, 60mm, 80mm & 100mm 940 & 940M Extension Assemblies
940	017838	019467	715500A	737400A
3B	013681	018891	---	---

2B (2 Pivoting Blades)

Style "A"		000474
Style "A" Combo Block		013765

3B (3 Bladed Elastomer)

Style "A"		Standard	006707
		Aluminum	---
Short Insert		Standard	013310
		Aluminum	---

940 Retainer Screw Sub-Assembly		BTM Assembly Number	
		018217	
940 Elastomer Assembly Tool		BTM Assembly Number	
		Mini 940	710200G
		Standard	711400J

Notes:

940 **Retainer Screw Sub-Assembly** is not included with 940 dies and must be ordered separately.

Die holders with shank mounting have both ball lock and whistle notch flat retention.

3.0 Tog-L-Loc Requirements:
Force Req'd = 18kN [2 tons] in typical mild steel application.

Maximum BD (Button Diameter) - Including tolerance:
940M (Mini) = 4.9mm [.195"]
940 = 5.8mm [.230"]
3B = 6.4mm [.250"]

3.8 Tog-L-Loc Tooling

Punch Side

Note: Information provided for reference when applying Tog-L-Loc tooling. When ordering assemblies (or individual components), refer to the BTM drawing number noted in the chart for order numbers.

BTM Corporation
300 Davis Rd.
Marysville, MI USA
48040
Ph: 810-364-4567
Fax: 810-364-6178
www.btmcorp.com

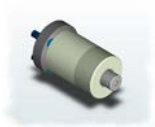
Punches


940 & Ball Lock 10mm Mounting Dia.		Punch Length 71mm [2.795"] Lg.	80mm [3.150"] Lg.	90mm [3.543"] Lg.	100mm [3.937"] Lg.
0.25 [.010"] PTR	940	793600A	793600C	793600E	793600G
	Ball Lock	PD261200A	PD261200C	PD261200E	PD261200G
0.51 [.020"] PTR	940	793600B	793600D	793600F	793600H
	Ball Lock	PD261200B	PD261200D	PD261200F	PD261200H

WNF 9.52 [.375"] Mounting	Punch Length 69.85mm [2.750"] Lg.	95.25mm [3.750"] Lg.
0.25 [.010"] PTR	797001A	797001C
0.51 [.020"] PTR	797001B	797001D

940 Retainer Screw Sub-Assembly	BTM Assembly Number
	018217

Punch Holder Assemblies




Punch Retention Method		Die Set Mounting	Ø19.05 [.750"] Shank English Mounting	Ø20mm Shank Metric Mounting	Thin Holder Die Set Mounting
940	SS10	---	---	PD237700A	737400D
	SS20	794500A	793900A	793900K	
WNF	SS10	---	PD235500A	---	---
	SS20	---	797000A	797000E	
Ball Lock		PD266600A	---	PD264100A	737400J

Notes:

WNF = Whistle Notch Flat (set screw) retention.

940 **Retainer Screw Sub-Assembly** is not included with 940 punches and must be ordered separately.

Punch holders with shank mounting have both ball lock and whistle notch flat retention.

3.8 Tog-L-Loc Requirements:
Force Req'd = 22kN [2.5 tons] in typical mild steel application.
Stripper Contact Force = 1.1kN [250 lbs]. in typical mild steel application.

SS20 Punch Holder Ass'y Spring Life:
Long life: 2.8mm [.11"] max. total material joined.
Average life: 4.0mm [.16"] max. total material joined.

3.8 Tog-L-Loc Tooling

Die Side

Note: Information provided for reference when applying Tog-L-Loc tooling. When ordering assemblies (or individual components), refer to the BTM drawing number noted in the chart for order numbers.

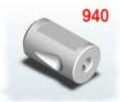
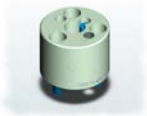
BTM Corporation
300 Davis Rd.
Marysville, MI USA
48040
Ph: 810-364-4567
Fax: 810-364-6178
www.btmcorp.com

Die Assemblies

940		940M (Mini)	Standard 940	Joining Aluminum
Style "A"		PD220800AE	794600AE	PD214300AE
Short Insert		N/A	N/A	N/A
Stepped Short Insert (SSI)		PD220000AE	793700AE	---
40mm Lg. (Extension Assembly)		PD220400A	796800A	N/A
60mm Lg. (Extension Assembly)		PD220400B	796800B	N/A
80mm Lg. (Extension Assembly)		PD220400C	796800C	N/A
100mm Lg. (Extension Assembly)		PD220400D	796800D	N/A

Note: Mount SSI Die Assembly (select Die Assembly based on joining requirements) in Extension Assembly. The overall length of Extension Assembly noted in the left column (above) is the combined height of the Die Assembly and Extension.

Die Holders & Assemblies

				
Die Style	Style "A" Ø19.05 [.750"] Shank 50.8mm [2.000"] OAL English Mounting	Style "A" Ø20mm Shank 50.8mm [2.000"] OAL Metric Mounting	Round Holder For 40mm, 60mm, 80mm & 100mm Standard 940 Extension Assembly	Thin Holder For 40mm, 60mm, 80mm & 100mm Standard 940 Extension Assembly
940	017838	019467	796800E	---
3B	034476	018892	---	---

2B (2 Pivoting Blades)

Style "A"		PD204200A
Style "A" Combo Block		---

3B (3 Bladed Elastomer)

Style "A"		Standard	796900A
		Aluminum	---
Short Insert		Standard	PD217300A
		Aluminum	---

940 Retainer Screw Sub-Assembly		BTM Assembly Number
		018217

940 Elastomer Assembly Tool		BTM Assembly Number	
		Mini 940	---
		Standard	793900J

Notes:

940 **Extension Assemblies** are used to mount 940 SSI die assemblies (height of extension plus die ass'y equals noted length - 40, 60, 80 or 100mm).

940 **Retainer Screw Sub-Assembly** is not included with 940 dies and must be ordered separately.

Die holders with shank mounting have both ball lock and whistle notch flat retention.

3.8 Tog-L-Loc Requirements:
Force Req'd = 22kN [2.5 tons] in typical mild steel application.

Maximum BD (Button Diameter) - Including tolerance:
940M (Mini) = 6.1mm [.240"]
940 = 6.4mm [.250"]
3B = 7.1mm [.280"]

4.6 Tog-L-Loc Tooling

Punch Side

Note: Information provided for reference when applying Tog-L-Loc tooling. When ordering assemblies (or individual components), refer to the BTM drawing number noted in the chart for order numbers.

BTM Corporation
300 Davis Rd.
Marysville, MI USA
48040
Ph: 810-364-4567
Fax: 810-364-6178
www.btmcorp.com

Punches



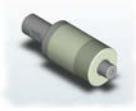
940 & Ball Lock 10mm Mounting Dia.		71mm [2.795"] Lg.	80mm [3.150"] Lg.	90mm [3.543"] Lg.	100mm [3.937"] Lg.
		Punch Length			
0.25 [.010"] PTR	940	713900A	713900B	713900C	713900D
	Ball Lock	769100A	769100B	769100C	769100D
0.51 [.020"] PTR	940	713900E	713900F	713900G	713900H
	Ball Lock	769100E	769100F	769100G	769100H

WNF 9.52 [.375"] Mounting	69.85mm [2.750"] Lg.	95.25mm [3.750"] Lg.
	Punch Length	
0.25 [.010"] PTR	002798	006624
0.51 [.020"] PTR	002992	006636

940 Retainer Screw Sub-Assembly	BTM Assembly Number
	018217

Punch Holder Assemblies






Punch Retention Method		SS20 Die Set Mounting	Ø19.05 [.750"] Shank English Mounting	Ø20mm Shank Metric Mounting	Thin Holder Die Set Mounting
940	SS10	---	---	787700A	737400D
	SS20	713400A	018855	018925	
WNF	SS10	---	006746	---	---
	SS20	---	015405	021745	
Ball Lock	SS10	---	---	---	737400J
	SS20	772200A	---	PD263900A	

Notes:

WNF = Whistle Notch Flat (set screw) retention.

940 **Retainer Screw Sub-Assembly** is not included with 940 punches and must be ordered separately.

Punch holders with shank mounting have both ball lock and whistle notch flat retention.

4.6 Tog-L-Loc Requirements:
Force Req'd = 28kN [3.1 tons] in typical mild steel application.
Stripper Contact Force = 1.2kN [300 lbs.] in typical mild steel application.

SS10 - 0.9kN [200 lbs.] Contact - Punch Holder Ass'y - Spring Life:
(For light duty application)
Long life: 1.8mm [.07"] max. total material joined.
Average life: 3.0mm [.11"] max. total material joined.

SS20 - 1.2kN [300 lbs.] Contact - Punch Holder Ass'y Spring Life:
Long life: 2.8mm [.11"] max. total material joined.
Average life: 4.0mm [.16"] max. total material joined.

4.6 Tog-L-Loc Tooling

Die Side

BTM Corporation
300 Davis Rd.
Marysville, MI USA
48040
Ph: 810-364-4567
Fax: 810-364-6178
www.btmcorp.com

Note: Information provided for reference when applying Tog-L-Loc tooling. When ordering assemblies (or individual components), refer to the BTM drawing number noted in the chart for order numbers.

Die Assemblies

940		940M (Mini)	Standard 940	Joining Aluminum
Style "A"		710100AE	716000AE	761700AE
Short Insert		710400AE	711500AE	760100AE
Stepped Short Insert (SSI)		751900AE	751100AE	793300AE
40mm Lg. (Extension Assembly)		796800A	N/A	N/A
60mm Lg. (Extension Assembly)		796800B	PD220900B	N/A
80mm Lg. (Extension Assembly)		796800C	PD220900C	N/A
100mm Lg. (Extension Assembly)		796800D	PD220900D	N/A

Note: Mount SSI Die Assembly (select Die Assembly based on joining requirements) in Extension Assembly. The overall length of Extension Assembly noted in the left column (above) is the combined height of the Die Assembly and Extension.

Die Holders & Assemblies


Die Style	Style "A" Ø19.05 [.750"] Shank 50.8mm [2.000"] OAL English Mounting	Style "A" Ø20mm Shank 50.8mm [2.000"] OAL Metric Mounting	Round Holder For 60mm, 80mm & 100mm Standard 940 Extension Ass'y	Thin Holder For 60mm, 80mm & 100mm Standard 940 Extension Ass'y
940	017838	019467	713600A	737400C
3B	007689	018892	---	---

2B (2 Pivoting Blades)

Style "A"		001221
Style "A" Combo Block		006040

3B (3 Bladed Elastomer)

Style "A"		Standard	004223
		Aluminum	017896
Short Insert		Standard	013263
		Aluminum	017916

940 Retainer Screw Sub-Assembly		BTM Assembly Number: 018217
940 Elastomer Assembly Tool		BTM Assembly Number: Mini 940 — 710100U; Standard — 711500L

Notes:

940 **Retainer Screw Sub-Assembly** is not included with 940 dies and must be ordered separately.

Die holders with shank mounting have both ball lock and whistle notch flat retention.

4.6 Tog-L-Loc Requirements:
Force Req'd = 28kN [3.1 tons] in typical mild steel application.

Maximum BD (Button Diameter) - Including tolerance:
940M (Mini) = 7.1mm [.280"]
940 = 8.0mm [.315"]
3B = 8.1mm [.320"]

5.5 Tog-L-Loc Tooling

Punch Side

Note: Information provided for reference when applying Tog-L-Loc tooling. When ordering assemblies (or individual components), refer to the BTM drawing number noted in the chart for order numbers.

BTM Corporation
300 Davis Rd.
Marysville, MI USA
48040
Ph: 810-364-4567
Fax: 810-364-6178
www.btmcorp.com

Punches


940 & Ball Lock 10mm Mounting Dia.		Punch Length 71mm [2.795"] Lg.	80mm [3.150"] Lg.	90mm [3.543"] Lg.	100mm [3.937"] Lg.
0.25 [.010"] PTR	940	739000A	739000C	739000E	739000G
	Ball Lock	PD237400A	PD237400C	PD237400E	PD237400G
0.51 [.020"] PTR	940	739000B	739000D	739000F	739000H
	Ball Lock	PD237400B	PD237400D	PD237400F	PD237400H

WNF 9.52 [.375"] Mounting	Punch Length 69.85mm [2.750"] Lg.	95.25mm [3.750"] Lg.
0.25 [.010"] PTR	018934	018936
0.51 [.020"] PTR	018935	018937

940 Retainer Screw Sub-Assembly		BTM Assembly Number 018217

Punch Holder Assemblies




Punch Retention Method		Die Set Mounting	Ø19.05 [.750"] Shank English Mounting	Ø20mm Shank Metric Mounting	Thin Holder Die Set Mounting
940	SS20	PD244300A	PD241400A	PD244200A	737400D
	SS25	PD241800A	PD244400A	PD244500A	
WNF	SS20	---	PD244600A	PD244800A	---
	SS25	---	---	---	
Ball Lock	SS20	PD244900A	---	PD266000A	737400J
	SS25	PD265900A	---	PD265800A	

Notes:

WNF = Whistle Notch Flat (set screw) retention.

940 **Retainer Screw Sub-Assembly** is not included with 940 punches and must be ordered separately.

Punch holders with shank mounting have both ball lock and whistle notch flat retention.

5.5 Tog-L-Loc Requirements:
Force Req'd = 42kN [4.7 tons] in typical mild steel application.
Stripper Contact Force = 2.3kN [525 lbs.] in typical mild steel application.

SS20 - 1.2kN [300 lbs.] Contact - Punch Holder Ass'y Spring Life:
(For light duty application)
Long life: 2.8mm [.11"] max. total material joined.
Average life: 4.0mm [.16"] max. total material joined.

SS25 - 2.3kN [525 lbs.] Contact - Punch Holder Ass'y Spring Life:
Long life: 2.5mm [.10"] max. total material joined.
Average life: 5.0mm [.20"] max. total material joined.

5.5 Tog-L-Loc Tooling

Die Side

BTM Corporation
300 Davis Rd.
Marysville, MI USA
48040
Ph: 810-364-4567
Fax: 810-364-6178
www.btmcorp.com

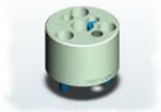
Die Assemblies

Note: Information provided for reference when applying Tog-L-Loc tooling. When ordering assemblies (or individual components), refer to the BTM drawing number noted in the chart for order numbers.

940		940M (Mini)	Standard 940	Joining Aluminum
Style "A"		767500AE	742100AE	762100AE
Short Insert		747700AE	741900AE	762200AE
Stepped Short Insert (SSI)		752000AE	743400AE	779300AE
40mm Lg. (Extension Assembly)		N/A	N/A	N/A
60mm Lg. (Extension Assembly)		PD220500B	PD220600B	N/A
80mm Lg. (Extension Assembly)		PD220500C	PD220600C	N/A
100mm Lg. (Extension Assembly)		PD220500D	PD220600D	N/A

Note: Mount SSI Die Assembly (select Die Assembly based on joining requirements) in Extension Assembly. The overall length of Extension Assembly noted in the left column (above) is the combined height of the Die Assembly and Extension.

Die Holders & Assemblies

Die Style	 Style "A" Ø19.05 [.750"] Shank 50.8mm [2.000"] OAL English Mounting	 Style "A" Ø20mm Shank 50.8mm [2.000"] OAL Metric Mounting	 Round Holder For 60mm, 80mm & 100mm Standard 940 Extension Ass'y	 Thin Holder For 60mm, 80mm & 100mm Standard 940 Extension Ass'y
940	017838	019467	743500A	737400H
3B	013888	018893	---	---

2B (2 Pivoting Blades)

Style "A"		PD239200A
Style "A" Combo Block		---

3B (3 Bladed Elastomer)

Style "A"		Standard	739100A
		Aluminum	---
Short Insert		Standard	742200A
		Aluminum	---

940 Retainer Screw Sub-Assembly		BTM Assembly Number	
		018217	
940 Elastomer Assembly Tool		BTM Assembly Number	
		Mini 940	747700K
		Standard	741900N

Notes:

940 **Retainer Screw Sub-Assembly** is not included with 940 dies and must be ordered separately.

Die holders with shank mounting have both ball lock and whistle notch flat retention.

5.5 Tog-L-Loc Requirements:
Force Req'd = 42kN [4.7 tons] in typical mild steel application.

Maximum BD (Button Diameter) - Including tolerance:
940M (Mini) = 8.6mm [.340"]
940 = 9.8mm [.385"]
3B = 10.0mm [.395"]

6.4 Tog-L-Loc Tooling

Punch Side

Note: Information provided for reference when applying Tog-L-Loc tooling. When ordering assemblies (or individual components), refer to the BTM drawing number noted in the chart for order numbers.

BTM Corporation
300 Davis Rd.
Marysville, MI USA
48040
Ph: 810-364-4567
Fax: 810-364-6178
www.btmcorp.com

Punches


940 & Ball Lock 13mm Mounting Dia.		Punch Length 100mm [3.937"] Lg.	Punch Length 125mm [4.921"] Lg.
0.25 [.010"] PTR	940	PD201200A	PD201200B
	Ball Lock	792901A	792901B
0.51 [.020"] PTR	940	PD201200C	PD201200D
	Ball Lock	792901C	792901D

BW BALL LOCK & WHISTLE NOTCH FLAT (ON SAME PUNCH) 12.70 [.500"] Mounting Dia.	Punch Length 95.25mm [3.750"] Lg.	Punch Length 120.65mm [4.750"] Lg.
0.25 [.010"] PTR	014707	014708
0.51 [.020"] PTR	012121	013905

940 Retainer Screw Sub-Assembly (M6)		BTM Assembly Number
		023228

Punch Holder Assemblies




Punch Retention Method		Die Set Mounting	Ø19.05 [.750"] Shank English Mounting	Ø20mm Shank Metric Mounting	Thin Holder Die Set Mounting
940	SS20	---	---	020533	PD214600A
	SS30	PD214400A	PD214500A	---	
WNF	SS20	---	013737	---	---
	SS30	---	013732	---	
Ball Lock	SS20	---	---	---	737400K
	SS30	792900A	---	PD266100A	

Notes:

WNF = Whistle Notch Flat (set screw) retention.

940 **Retainer Screw Sub-Assembly (M6) - BTM #023228** is not included with 940 punches and must be ordered separately.

Punch holders with shank mounting have both ball lock and whistle notch flat retention.

6.4 Tog-L-Loc Requirements:
Force Req'd = 58kN [6.5 tons] in typical mild steel application.
Stripper Contact Force = 3.3kN [750 lbs.] in typical mild steel application.

SS20 - 1.2kN [300 lbs.] Contact - Punch Holder Ass'y Spring Life:
(For light duty application)
Long life: 2.8mm [.11"] max. total material joined.
Average life: 4.0mm [.16"] max. total material joined.

SS30 - 3.3kN [750 lbs.] Contact - Punch Holder Ass'y Spring Life:
Long life: 5.1mm [.20"] max. total material joined.
Average life: 6.9mm [.27"] max. total material joined.

6.4 Tog-L-Loc Tooling

Die Side

Note: Information provided for reference w hen applying Tog-L-Loc tooling. When ordering assemblies (or individual components), refer to the BTM drawing number noted in the chart for order numbers.

BTM Corporation
300 Davis Rd.
Marysville, MI USA
48040
Ph: 810-364-4567
Fax: 810-364-6178
www.btmcorp.com

Die Assemblies

940		940M (Mini)	Standard 940	Joining Aluminum
Style "A"		710900AE	744700AE	744800AE
Short Insert		710500AE	711600AE	760400AE
Stepped Short Insert (SSI)		752100AE	751200AE	779400AE
40mm Lg. (Extension Assembly)		N/A		N/A
60mm Lg. (Extension Assembly)		PD214700B		N/A
80mm Lg. (Extension Assembly)		PD214700C		N/A
100mm Lg. (Extension Assembly)		PD214700D		N/A

Note: Mount SSI Die Assembly (select Die Assembly based on joining requirements) in Extension Assembly. The overall length of Extension Assembly noted in the left column (above) is the combined height of the Die Assembly and Extension.

Die Holders & Assemblies

Die Style		 Ø19.05 [.750"] Shank 50.8mm [2.000"] OAL English Mounting	 Ø25.4 [1.000"] Shank 50.8mm [2.000"] OAL English Mounting	 Ø20mm Shank 50.8mm [2.000"] OAL Metric Mounting	 Round Holder For 60mm, 80mm & 100mm 940 Extension Assemblies	 Thin Holder For 60mm, 80mm & 100mm 940 Extension Assemblies
940	Style "A"	---	---	---	PD214800A	PD214900A
	Short Insert	---	---	---		
3B	Style "A"	---	013906	---	---	---
	Short Insert	015097	---	---		

2B (2 Pivoting Blades)

Style "A"		---
Style "A" Combo Block		---

3B (3 Bladed Elastomer)

Style "A"		Standard	013907
		Aluminum	018308
Short Insert		Standard	015071
		Aluminum	018177

		BTM Assembly Number	
940 Retainer Screw Sub-Ass'y (M6)		023228	
940 Elastomer Assembly Tool		BTM Assembly Number	
		Mini 940	710500X
		Standard	711600N

Notes:

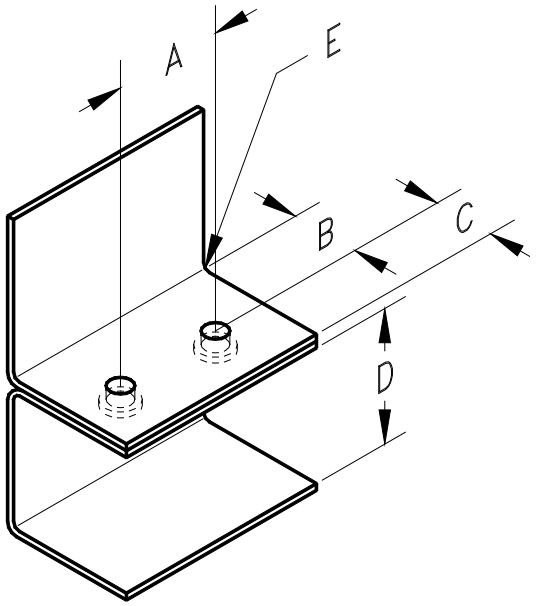
940 **Retainer Screw Sub-Assembly (M6) - BTM #023228** is not included with 940 dies and must be ordered separately.

Die holders with shank mounting have both ball lock and whistle notch flat retention.

6.4 Tog-L-Loc Requirements:
Force Req'd = 58kN [6.5 tons] in typical mild steel application.

Maximum BD (Button Diameter) - Including tolerance:
940M (Mini) = 10.2mm [.400"]
940 = 11.2mm [.440"]
3B = 12.1mm [.475"]

V-LOC STANDARD DIE JOINT CENTERS Minimum Distances



Notes:

— As "E" (bend radius) increases from 0.8 [.03"], add amount of increase to "B" dimension.

— All noted dimensions are minimum values unless otherwise specified.

— If "C" dimension increases, "D" dimension may also be affected.

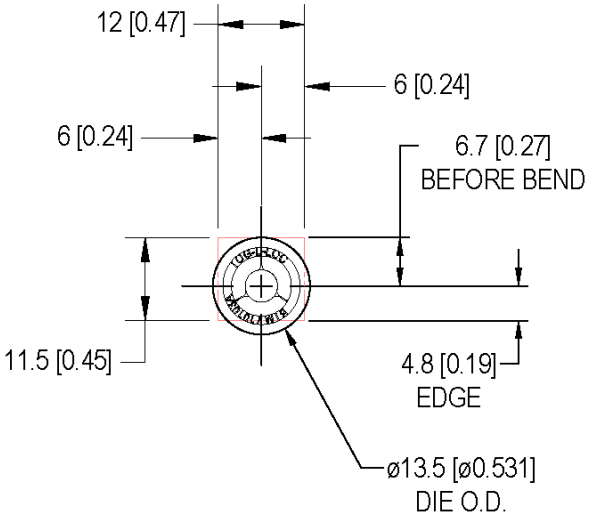
* V-Loc joints formed utilizing single point tooling.

V-Loc Tool	DIM	3.8mm [.15"]	4.6mm [.18"]	5.5mm [.22"]	6.4mm [.25"]
940-SSI (Stepped Short Insert)	*A	11.4 [.45"]	13.5 [.53"]	15.9 [.62"]	18.1 [.71"]
	B	7.5 [.30"]	8.8 [.35"]	10.3 [.41"]	11.8 [.46"]
	C	4.8 [19"]	5.6 [.22"]	6.5 [.26"]	10 [.39"]
	D	28.5 [1.12"]	28.5 [1.12"]	35.5 [1.40"]	40.0 [1.57"]
	E	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]	0.8 [.03"]

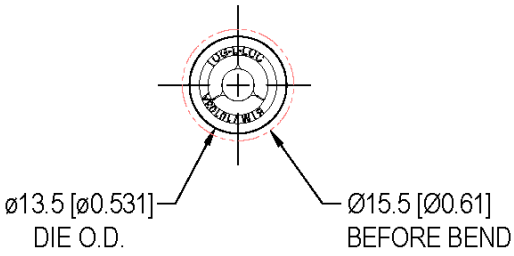
3.8 V-LOC

MINIMUM DISTANCES
(FOR SINGLE JOINTS)

FLANGE
VL-3.8-940



INSIDE BOSS
VL-3.8-940



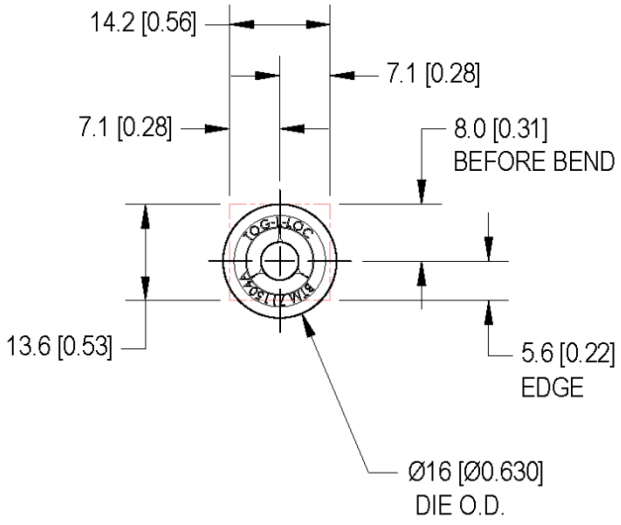
NOTES:

-"EDGE" NOTATION REFERS TO MINIMUM DISTANCE FROM JOINT CENTER TO EDGE OF PART.
-"BEFORE BEND" REFERS TO DISTANCE TO BEGINNING OF RADIUS ON A BENT FLANGE IF V-LOC DIE IS ON THE INSIDE OF A BEND ON THE CUSTOMER PART.

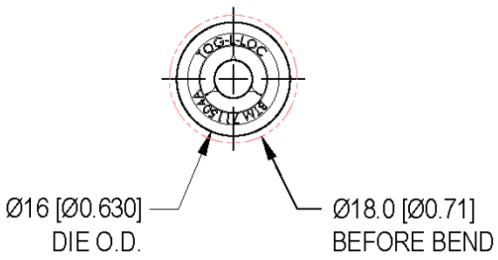
4.6 V-LOC

MINIMUM DISTANCES
(FOR SINGLE JOINTS)

FLANGE
VL-4.6-940



INSIDE BOSS
VL-4.6-940



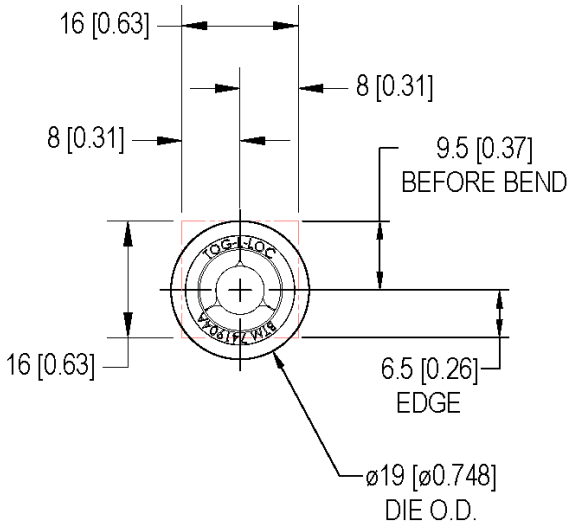
NOTES:

-"EDGE" NOTATION REFERS TO MINIMUM DISTANCE FROM JOINT CENTER TO EDGE OF PART.
-"BEFORE BEND" REFERS TO DISTANCE TO BEGINNING OF RADIUS ON A BENT FLANGE IF V-LOC DIE IS ON THE INSIDE OF A BEND ON THE CUSTOMER PART.

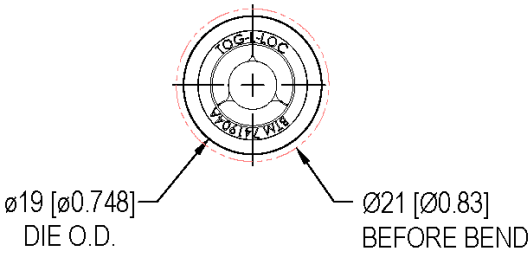
5.5 V-LOC

MINIMUM DISTANCES
(FOR SINGLE JOINTS)

FLANGE
VL-5.5-940



INSIDE BOSS
VL-5.5-940



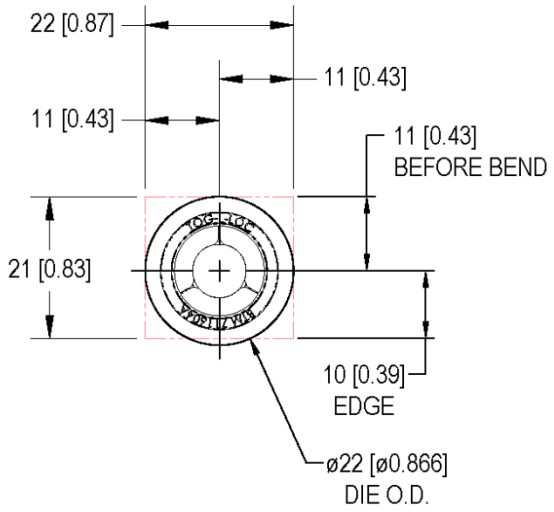
NOTES:

-"EDGE" NOTATION REFERS TO MINIMUM DISTANCE FROM JOINT CENTER TO EDGE OF PART.
-"BEFORE BEND" REFERS TO DISTANCE TO BEGINNING OF RADIUS ON A BENT FLANGE IF V-LOC DIE IS ON THE INSIDE OF A BEND ON THE CUSTOMER PART.

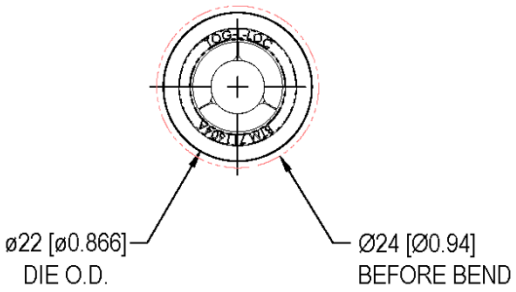
6.4 V-LOC

MINIMUM DISTANCES
(FOR SINGLE JOINTS)

FLANGE
VL-6.4-940



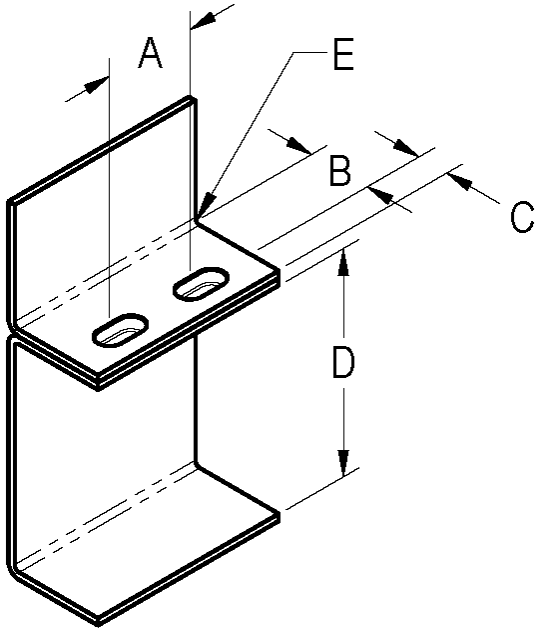
INSIDE BOSS
VL-6.4-940



NOTES:

-"EDGE" NOTATION REFERS TO MINIMUM DISTANCE FROM JOINT CENTER TO EDGE OF PART.
-"BEFORE BEND" REFERS TO DISTANCE TO BEGINNING OF RADIUS ON A BENT FLANGE IF V-LOC DIE IS ON THE INSIDE OF A BEND ON THE CUSTOMER PART.

OVAL-LOC STANDARD DIE JOINT CENTERS Minimum Distances



Notes:

— As "E" (bend radius) increases from 0.8 [.03"], add amount of increase to "B" dimension.

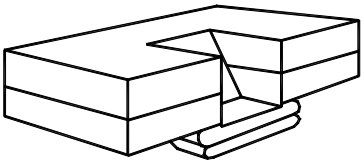
— All noted dimensions are minimum values unless otherwise specified.

— If "C" dimension increases, "D" dimension may also be affected.

* Oval-Loc joints formed utilizing single point tooling.

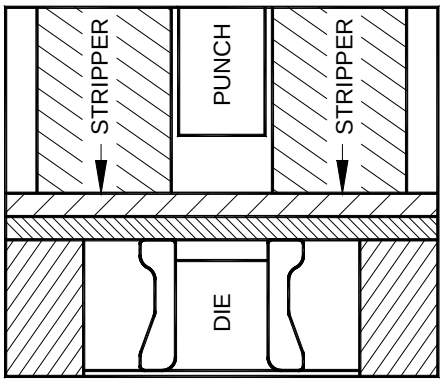
Oval-Loc Tool	DIM	3x6	4x8
940-SSI (Stepped Short Insert)	*A	14.5 [.57"]	17.5 [.69"]
	B	10.3 [.41"]	11.8 [.46"]
	C	4.0 [.16"]	5.0 [.20"]
	D	35.5 [1.40"]	40.0 [1.57"]
	E	0.8 [.03"]	0.8 [.03"]

Lance-N-Loc



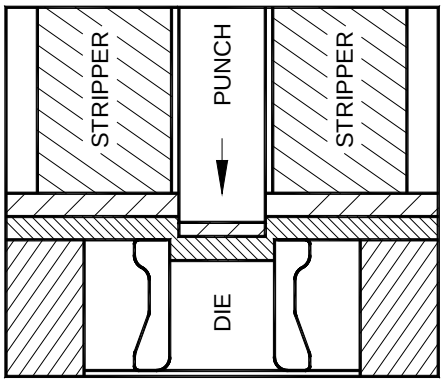
Lance-N-Loc is a rectangular joint formed by drawing the metals into a rectangular "cup" and then expanding the sides to form a lock below the bottom sheet.

How The Joining Process Works



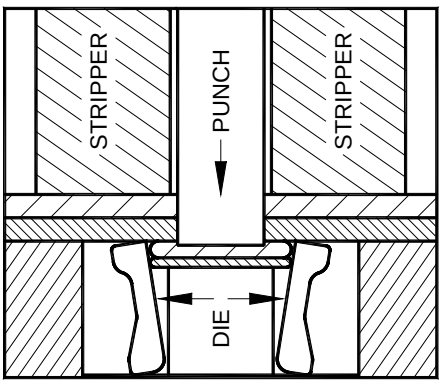
1. CLAMPS

A stripper clamps the metals between the punch and die guard.



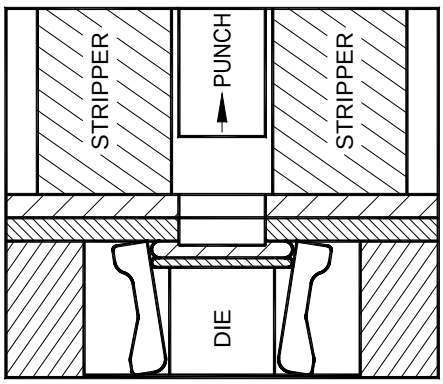
2. DRAWS

The punch shears two edges & draws the metals into the die.



3. LOCKS

The punch continues to travel, squeezing the metals.

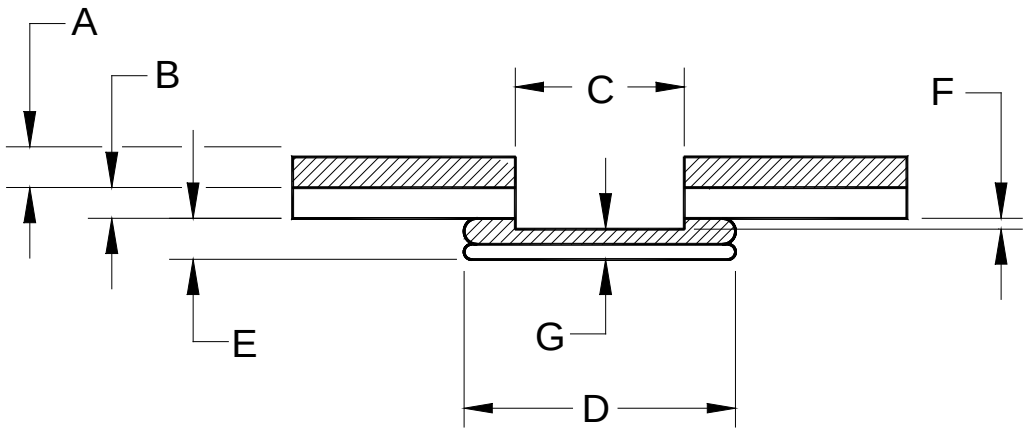


4. STRIPS

As the punch retracts, the stripper allows the punch to be removed.

The lateral flow of metal is accommodated by the patented moving (self-cleaning) die blades, forming a lock of greater width than the drawn section which accounts for the high strength of Lance-N-Loc. This entire sequence takes place in a single motion or press stroke.

LANCE-N-LOC JOINT TECHNICAL DESCRIPTION



A = PUNCH SIDE MATERIAL

B = DIE SIDE MATERIAL

C = JOINT SIZE (PUNCH TIP)

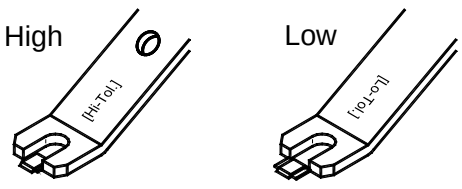
D = BUTTON DIMENSION

E = CAP HEIGHT

F = PUNCH ENTRY INTO DIE (ESTIMATED 2/3 OF ANVIL DEPTH)

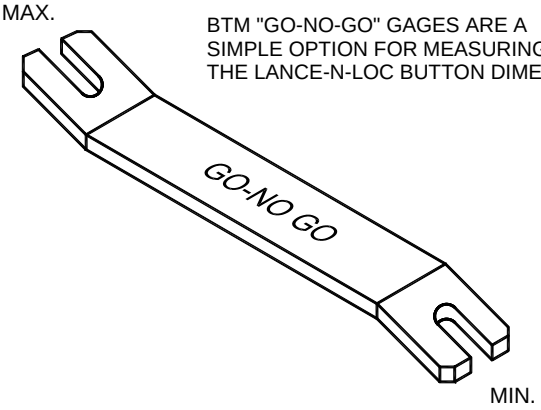
G = CAP THICKNESS

LANCE-N-LOC JOINTS CAN BE CHECKED NON-DESTRUCTIVELY USING THIS SIMPLE GAGE. THE "BUTTON" MUST MEASURE WITHIN THE TOLERANCE OF THE GAGE.



MAX.

BTM "GO-NO-GO" GAGES ARE A SIMPLE OPTION FOR MEASURING THE LANCE-N-LOC BUTTON DIMENSION.



MEASURING JOINT BUTTON DIMENSION (BD).

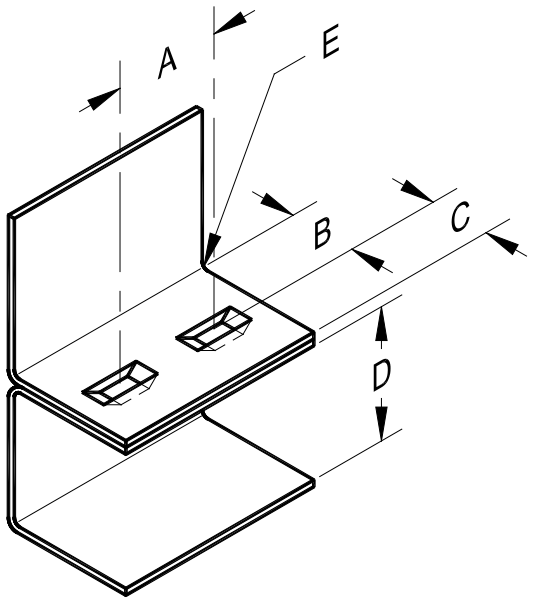
LANCE-N-LOC FORCE REQUIREMENTS

JOINT SIZE	PREFERRED STRIPPER SIZE	STRIPPER CONTACT FORCE	STYLE	MATERIAL THICKNESS (STEEL)	FORCE REQUIRED	ACCEPTABLE POWER SOURCES		
						AIR	A/O	HYD.
3.0mm LL [.12"]	SS-10 YELLOW	0.89kN [200 lbs.]	ELASTOMER	0.4mm to 0.4mm [.017" to .017"]	19.5kN [4,386 lbs.]	44.5kN [5 TON] TOGGLE PRESS	44.5kN [5 TON]	Ø44.5mm [1.75"] BORE @ 170 BAR [2500PSI] MIN.
				1.9mm to 1.9mm [.074" to .074"]	29.3kN [6,578 lbs.]			
4.6mm LL [.18"]	SS-20 YELLOW	1.3kN [300 lbs.]	ELASTOMER	0.6mm to 0.6mm [.022" to .022"]	30.0kN [6,741 lbs.]	88.9kN [10 TON] TOGGLE PRESS	106.8kN [12 TON]	Ø82.6mm [3.25"] BORE @ 117.7 BAR [1730PSI] MIN.
				3.0mm to 3.0mm [.120" to .120"]	51.2kN [11,512 lbs.]			

Notes:

- The chart should be used as a guide for power source selection only.
- The forces listed in the chart are based on a test conducted 10/24/00 with BTM mild steel coupons. The press was a BTM 12 Ton A/O equipped with an AccuForce system.
- Each force value is the average of 10 samples.

LANCE-N-LOC STANDARD DIE JOINT CENTERS
Minimum Distances



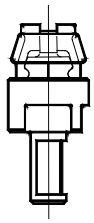
NOTES:

— AS “E” RADIUS INCREASES FROM .03 ADD INCREASE TO “B”.

— ALL DIMENSIONS ARE MINIMUM UNLESS SPECIFIED.

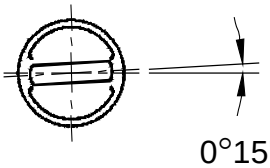
— IF “C” DIMENSION INCREASES “D” COULD BE AFFECTED

* MAKING JOINTS WITH THESE MINIMUM DISTANCES REQUIRES A SPECIAL STRIPPER

Tool	Dimension	Joint Size	
		3.0 [.12"]	4.6 [.18"]
Style "A" 2 Bladed Elastomer Die Ass'y 	*A	14.7 [.58"]	19.0 [.75"]
	B	8.1 [.32"]	10.4 [.41"]
	C	3.0 [.12"]	4.6 [.18"]
	D	35.0 [1.38"]	35.0 [1.38"]
	E	0.8 [.03"]	0.8 [.03"]

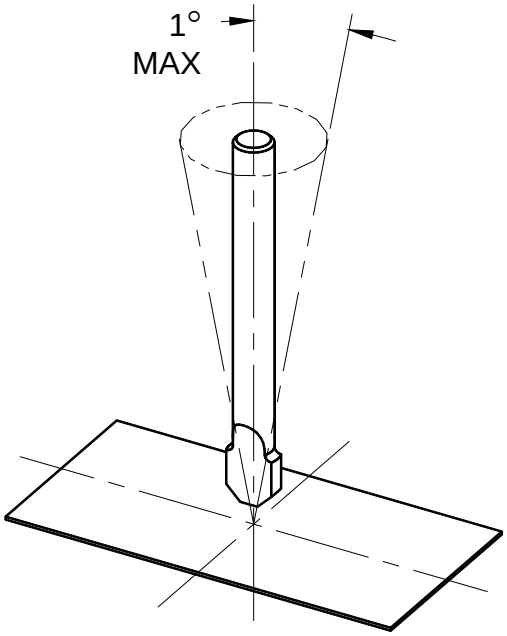
LANCE-N-LOC DESIGN PARAMETERS

PUNCH TO DIE RADIAL ORIENTATION

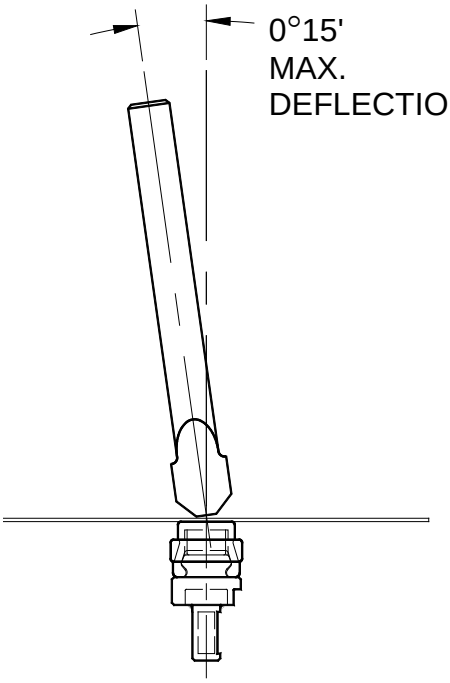


0°15' MAX.

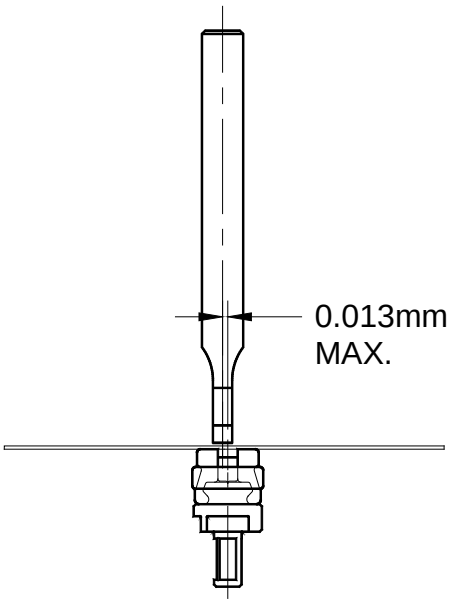
PERPENDICULARITY TO WORK SURFACE



PUNCH TO DIE LINEAR ALIGNMENT



PUNCH TO DIE CONCENTRICITY



LANCE-N-LOC PUNCH INFORMATION

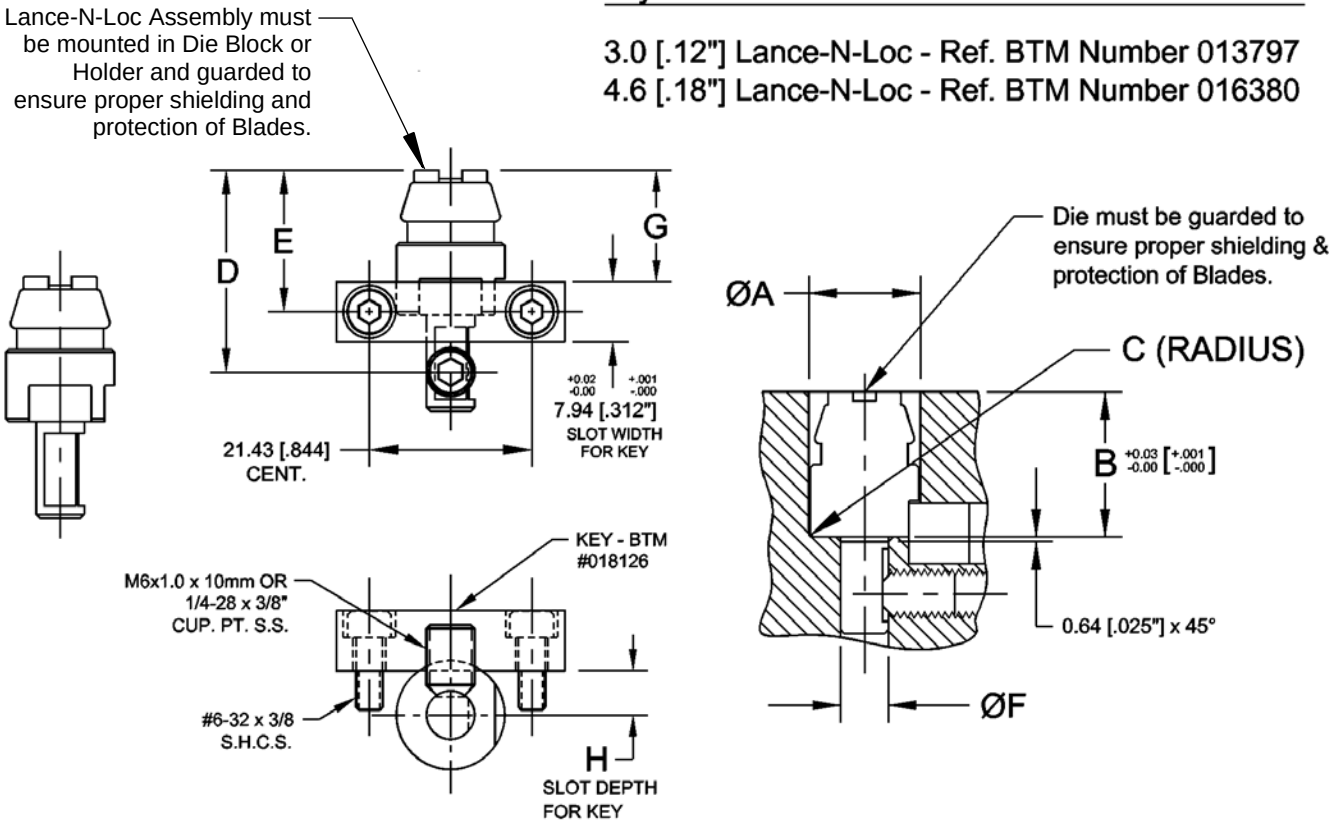
General Design Guidelines

- The Punch should be guided a minimum of 28.5mm [1.12”] in the Punch Retainer.
- The location tolerance to the centerline of the Punch hole should be 0.013mm [±.0005”].
- The Ball Lock Punch mounting is preferred.
- The Punch should have some means of adjustment. A Backing Plate or set screw behind the Holder would be an example.
- The hole size and tolerance for a standard 3/8” diameter Punch would be: Ø9.525 +0.005/-0.000 mm (or Ø.3750 +.0002 /-.0000 In.)
- The hole size and tolerance for a standard 1/2” diameter Punch would be: Ø12.700 +0.005/-0.000 mm (or Ø.5000 +.0002 /-.0000 In.)
- The surface that the Punch seats on should be through hardened. Typically, this material is 6150 with a hardness of 50-54 on the Rockwell “C” scale.

LANCE-N-LOC DIE POCKET INFORMATION

Style "A" 2 Bladed Elastomer Die Assemblies

3.0 [.12"] Lance-N-Loc - Ref. BTM Number 013797
4.6 [.18"] Lance-N-Loc - Ref. BTM Number 016380



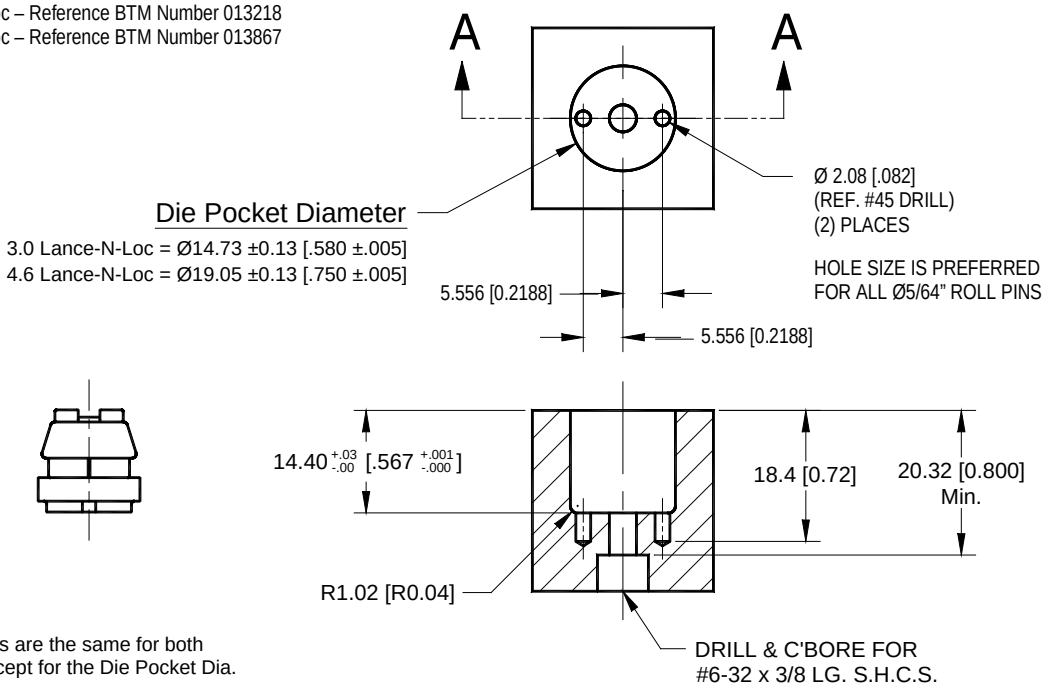
	Lance-N-Loc Joint Size	
	3.0 [.12"]	4.6 [.18"]
A	14.73 [.580"]	19.05 [.750"]
B	19.10 [.752"]	19.10 [.752"]
C	0.51 [.020"]	0.64 [.025"]
D	26.59 [1.047"]	27.79 [1.094"]
E	18.64 [.734"]	19.84 [.781"]
F	6.342+0.008/-0.000 [.2497+.0003/-.0000]	6.342+0.008/-0.000 [.2497+.0003/-.0000]
G	14.68 [.578"]	15.88 [.625"]
H	5.84±0.02 [.230±.001]	6.22±0.02 [.245±.001]

LANCE-N-LOC DIE POCKET INFORMATION

LANCE-N-LOC 2 BLADED ELASTOMER (2BE) SHORT INSERT (SI) DIE MOUNTING

FOR NOTED LANCE-N-LOC DIES WITH Ø5/64" ROLL PINS ONLY (NOT FOR 940 DIE ASSEMBLIES)

3.0 Lance-N-Loc – Reference BTM Number 013218
4.6 Lance-N-Loc – Reference BTM Number 013867



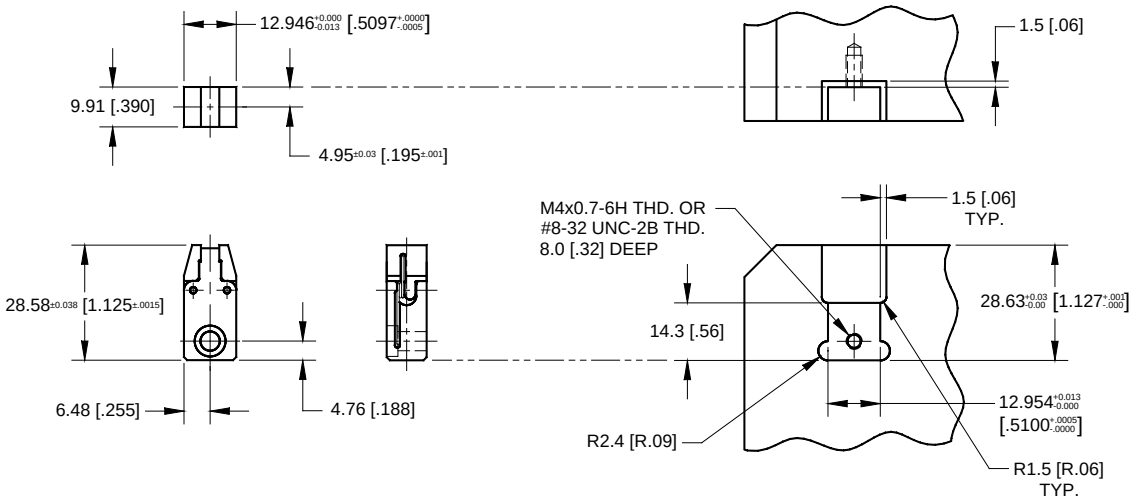
Die Pocket Diameter

3.0 Lance-N-Loc = Ø14.73 ±0.13 [.580 ±.005]
4.6 Lance-N-Loc = Ø19.05 ±0.13 [.750 ±.005]

Note:

All dimensions are the same for both joint sizes except for the Die Pocket Dia.

Style "A" Combo Block Die Set Up



Style "A" Combo Block Die Assemblies

3.0 [.12"] Lance-N-Loc - Ref. BTM Number 013781
4.6 [.18"] Lance-N-Loc - Ref. BTM Number 013847

2 bladed dies require a clearance pocket for the blades to open freely.
The location tolerance to the centerline of die should be ±.013 [.0005"]
A hardened die block is required; preferably a minimum of 4150HT steel.

LANCE-N-LOC DIE POCKET INFORMATION

940 LANCE-N-LOC "SSI" (STEPPED SHORT INSERT) DIE MOUNTING

FOR NOTED LANCE-N-LOC DIES WITH Ø2mm ROLL PIN ONLY

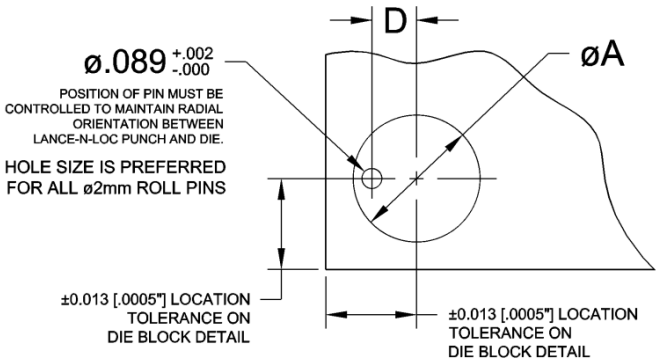
REF. DIE NUMBERS:

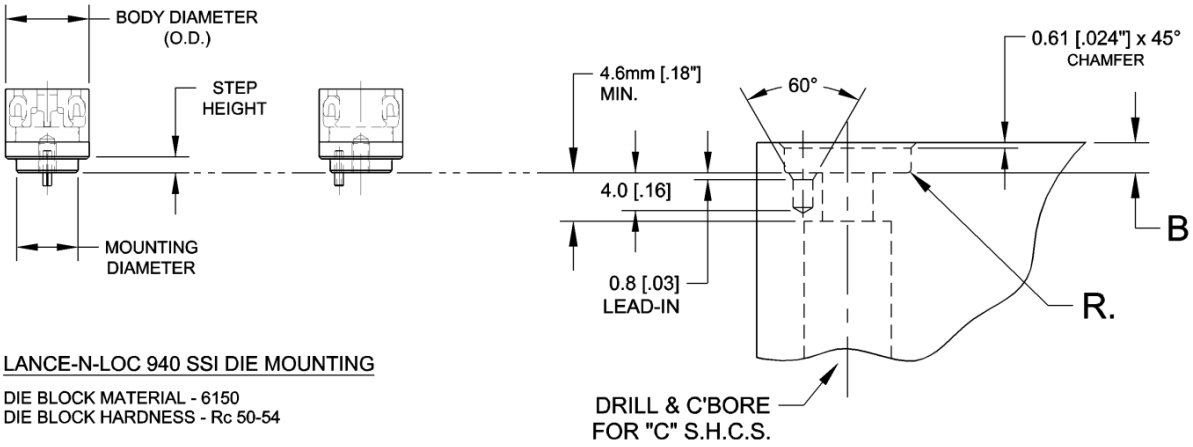
940 DIE ASSEMBLIES

4.6 LANCE-N-LOC: PD265000AE
5.5 LANCE-N-LOC: PD267500AE

NOTE:

NOT ALL DIES NOTED ABOVE ARE "BTM STANDARD." VERIFY AVAILABILITY WITH BTM USA PRIOR TO DESIGNING INTO LANCE-N-LOC JOINING APPLICATION.





LANCE-N-LOC 940 SSI DIE MOUNTING

DIE BLOCK MATERIAL - 6150
DIE BLOCK HARDNESS - Rc 50-54

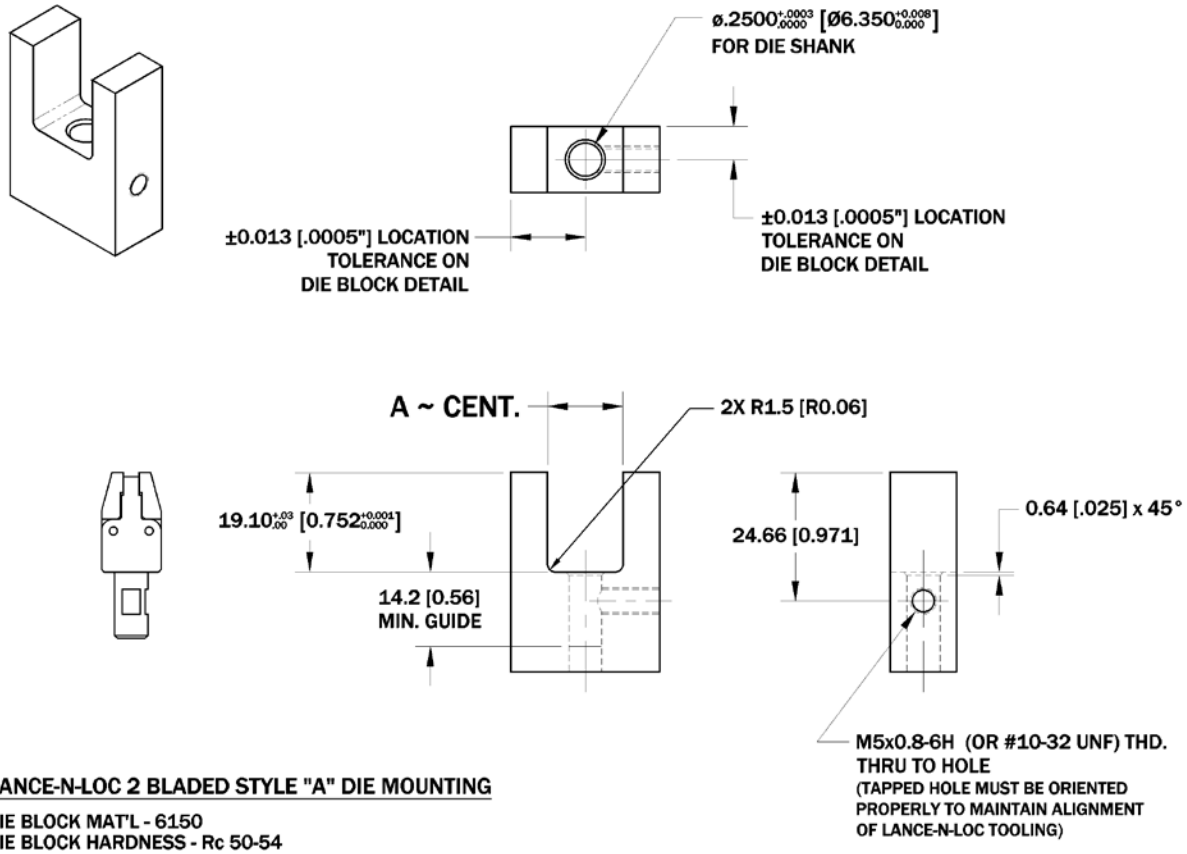
940 LANCE-N-LOC DIES					
	3.0 Lance-N-Loc	3.8 Lance-N-Loc	4.6 Lance-N-Loc	5.5 Lance-N-Loc	6.4 Lance-N-Loc
A	---	---	Ø14H6 [.5512 +.0004 -.0000]	Ø18H6 [.7087 +.0005 -.0000]	---
B	---	---	2.84 ±0.13 [.112 ±.005]	3.84 ±0.13 [.151 ±.005]	---
C	---	---	M4x0.7	M4x0.7	---
D	---	---	5.000±0.013 [.1969±.0005]	6.500±0.013 [.2559±.0005]	---
R	---	---	R0.33 ±0.13 [.013 ±.005]	R0.33 ±0.13 [.013 ±.005]	---

NOTES: ENGINEERING GUIDE PROVIDES DIE MOUNTING DIMENSIONS AND REFERENCE SPECS ONLY. DESIGN OF REMAINDER OF DIE BLOCK IS BASED ON INDIVIDUAL CUSTOMER APPLICATION.

LANCE-N-LOC DIE POCKET INFORMATION

2 Bladed Lance-N-Loc Style “A” Die Assembly

- 2 Bladed Die Assemblies must be mounted in a pocket that provides shielding and protection (for Die Blades) along with sufficient clearance for Blades to open freely as Lance-N-Loc joint button is formed.
- The locational tolerance to the centerline of Die should be ±0.013 [.0005”].
- A hardened Die Block or Anvil must be used (see specification below).
- All Lance-N-Loc design parameters, previously noted, must be met or exceeded when applying tooling.
- Style “A” Die Pocket dimensions are shown below.



LANCE-N-LOC 2 BLADED STYLE "A" DIE MOUNTING

DIE BLOCK MAT'L - 6150
DIE BLOCK HARDNESS - Rc 50-54

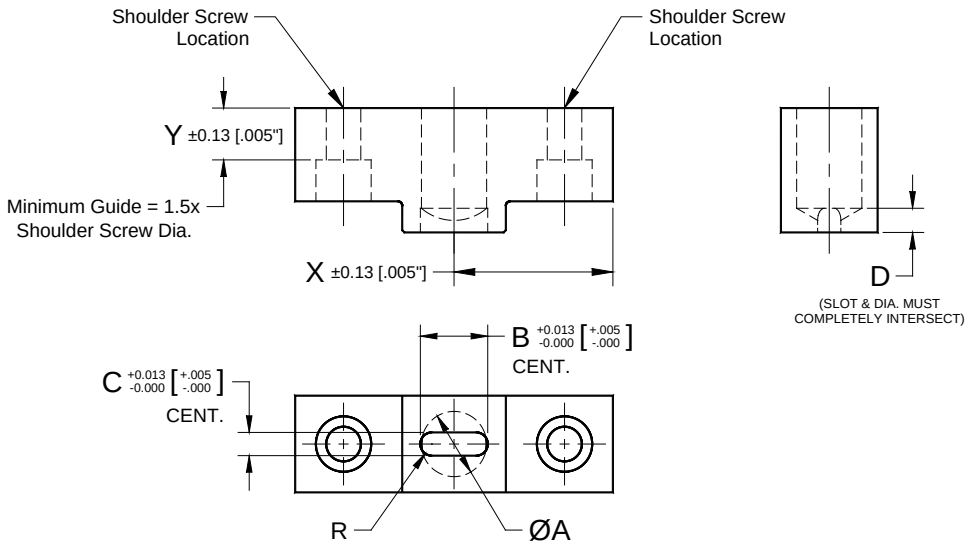
JOINT SIZE	REF. ASSEMBLY NO.	"A" DIMENSION
3.0 LANCE-N-LOC	000699	.57 +.02 -.00 [14.5 +0.5 -0.0]
4.6 LANCE-N-LOC	001277	.60 +.02 -.00 [15.2 +0.5 -0.0]

NOTE:

DRAWING PROVIDES DIE MOUNTING DIMENSIONS AND SPECIFICATIONS ONLY. DESIGN OF REMAINDER OF DIE BLOCK IS BASED ON INDIVIDUAL CUSTOMER APPLICATION.

LANCE-N-LOC STRIPPER INFORMATION

- Strippers should be made of 6150 steel, with a Rockwell hardness of Rc 50-54.
- Contact Force is measured when the Lance-N-Loc Punch contacts the work piece.
- The recommended Stripper contact force for 3.0 [.12”] LL is 0.89kN [200lbs] per joint.
- The recommended Stripper contact force for 4.6 [.18”] LL is 1.3kN [300lbs] per joint.
- The recommended Stripper contact force for 6.4 [.25”] LL is 3.3kN [750lbs] per joint.
- The location tolerance to the centerline of the Punch clearance hole(s) should be ±0.13 [.005”].
- The location tolerance to the centerline of the Shoulder Screws should be ±0.013 [.0005”].
- The basic dimensions for Strippers are shown below.
- When using round tip Strippers, tip diameter should be larger than the Die pocket diameter.
- The tolerance on Shoulder Screw holes can be found on the Shoulder Screw Dimensions & Tolerances page in this section.



Note: See chart for A, B, C and D dimensions. X and Y dimensions determined per application.

Punch Size	A	B	C	D
3.0mm [.12"]	Ø15.1 [19/32"]	14.99 [.590"]	3.81 [.150"]	6.1 [.24"]
4.6mm [.18"]	Ø15.1 [19/32"]	14.99 [.590"]	5.33 [.210"]	5.6 [.22"]