muratec

MURATA TOOL, LTD.

MURATA TURRET PUNCH PRESS TOOLING GUIDEBOOK

MURATEC WIEDEMANN TOOLING

VERSION 2.03

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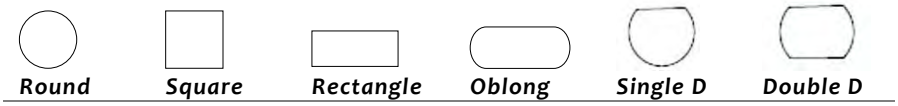
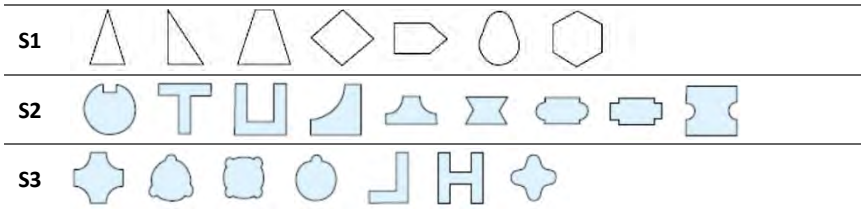
Materials and coatings

TYPES	ITEM	STAINLESS	MILD STEEL	ALUMINUM	FEATURES
SKD	Punch/Die	-	-	-	Harder, tougher, better abrasion-resistant than SKD11.
SKH	Punch	-	-	-	Tensile strength is better than SHK51
UHP	Punch	✓	✓✓	✓✓	Better machinability than SHK51.
UGP	Punch	✓✓	✓✓✓	✓✓	Tougher surface than UHP - longer life, preventing build-up edge (SKH Punches only)
TIN COATING	Punch	✓✓	-	✓✓	Finalized in gold. Titanium nitride coating reduces sliding resistance.
TICN COATING	Punch	✓✓✓	✓✓✓	✓✓✓	Finalized in gray. Coated with titanium carbide and titanium nitride - tougher and better abrasion resistance than TIN.

Standard shapes



Special shapes



S4 Other complicated shapes

Die clearance – Servo models

CLEARANCE	MILD STEEL	STAINLESS	ALUMINUM
0.2	~ 0.6	~ 0.5	~ 0.8
0.2	0.8	0.6	1
0.2	1	0.8	1.2
0.25	1.2	1 ~ 1.2	1.5
0.35	1.6	1.5	2
0.5	2.3	2	3
0.7	3.2	3	4
0.9	4.5	4	5
1.2	6	-	6
TO THICKNESS	**20~25%**	**25~30%**	**20~25%**

(mm)

- Minimum clearance varies among models.
- The listed clearance assume the fastest punching speed.
- For a slow mode, clearance should be larger by 2-5% than the listed.

Die clearance – Mechanical models

CLEARANCE	MILD STEEL	STAINLESS	ALUMINUM
0.2	~ 0.8	~ 0.6	~ 0.8
0.2	1	0.8	1
0.2	1.2	0.8	1.2
0.25	1.6	1.2	1.5
0.35	2.3	1.5	2
0.4	-	2	-
0.5	3.2	3	3
0.6	-	-	4
0.75	4.5	4	5
1.0	6	-	-
TO THICKNESS	**15~20%**	**20~25%**	**15~20%**

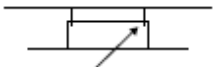
(mm)

Standard shear angles

Station	Cutting shapes and sizes		Shear angle
X, A, B, C, VARITOOL	ROUND ϕ38mm or smaller Standard shapes		No shear
D, E, F, G, H, J	Standard shape in X, A, B or VARI size		
	Standard shape in D, E, F, G, H, J	<15.0 mm	Roof top
		≥15.0 mm	Concave
	ROUND larger than ϕ38 mm		

A punch provided with shear is basically 2.4mm longer than those without shear. Shear height varies among the cutting shape and size.

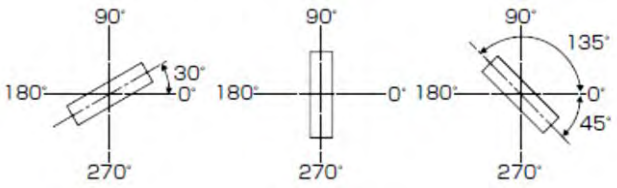
Slug Wiper die (SW) – optional

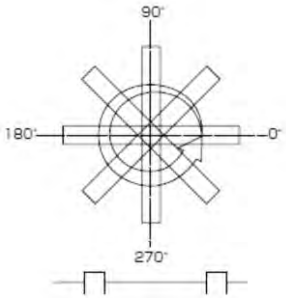
SLUG WIPER (SW)	 CLAW	A special claw is provided to remove the slug off the drawing punch.

Angles

- The below defines the angles of the shape when the processed work is seen from the top.
- A rectangle at 0 degree refers to the one laying horizontally.
- For additional angle(s), visual information is preferred to prevent from being occurred mutual misunderstanding.

30° 90° 135° or -45°





Work holder

Angles available with MURATA items

	0°	45°	90°	135°	180°	225°	270°	315°
114 PUNCH HOLDER	✓							
VULCAN PUNCH HOLDER	✓							
114 DIE HOLDER B~D	✓		✓		✓		✓	
114 DIE HOLDER E~	✓	✓	✓					
SLIDE IN DIE HOLDER B~D	✓		✓	✓	✓	✓	✓	
SLIDE IN DIE HOLDER E~	✓	✓	✓		✓		✓	✓
114 PUNCH B~C	✓		✓		✓		✓	
114 PUNCH D~	✓		✓					
VULCAN PUNCH	✓							
114 DIE	✓							
VARITOOL PUNCH & DIE	✓							
VULCAN STRIPPER B~F	✓	✓	✓	✓	✓	✓	✓	✓
VULCAN STRIPPER GHJ	✓		✓		✓		✓	

Station compatibility

		X	A, IA	B	INDEX FB	C	INDEX FC	D	INDEX D	E	F	INDEX F	G	H	J
114	Punch holder	-	-	-	-	-	-	-	-	✓	✓	-	✓	✓	-
	Punch	✓		✓		✓		✓		✓			✓		
	Urethane stripper	-	-	✓		✓		✓		-	✓		-	-	-
VULCAN	Punch holder	-	✓		-	-	-	-	-	✓		-	✓		
	Punch	-	✓			✓		✓		✓			✓		
	Metal stripper	-	✓			✓		✓		-	-	-	-	-	-
114	Die	✓				✓		✓		-	✓		-	-	-

Contact us for further information.

VULCANTOOL Guideline

GUIDED METAL STRIPPER

Guide-type of metal stripper is provided to 6.0mm wide or narrower standard shapes. Special shapes (see page 3) are exceptional.

GREASE APPLIED TO METAL STRIPPER

If your turret punch press is a grease model, metal strippers shall be covered with a grease.

VULCAN SIZE LIMIT BY SHEET THICKNESS

Cutting size with VULCANTOOL is limited by sheet material and thickness. For some metal sheets, tool shall be larger than the pre-determined.

(mm)

Mild steel	Stainless		X	AB	C	D	EF	GHJ
~ 2.3	~ 1.0	Diameter	**12.7**	**25.0**	**38.0**	**50.0**	**75.0**	**120.0**
		Perimeter	**39.9**	**78.5**	**119.0**	**157.0**	**235.5**	**376.8**
~ 3.2	~ 1.5	Diameter	**12.7**	**20.4**	**38.0**	**50.0**	**70.0**	**111.0**
		Perimeter	**39.9**	**64.0**	**119.0**	**157.0**	**219.8**	**348.5**
~ 4.5	~ 2.0	Diameter	**9.5**	**16.1**	**31.0**	**44.0**	**55.0**	**86.0**
		Perimeter	**29.8**	**50.5**	**97.0**	**138.0**	**172.7**	**270.0**
~ 6.0	~ 3.0	Diameter	**6.5**	**12.7**	**25.0**	**35.0**	**44.0**	**70.0**
		Perimeter	**20.0**	**39.9**	**78.5**	**110.0**	**138.0**	**219.8**

The values above is based on an unused punch and die with a recommended clearance. Except mentioned above, contact us for further information.

Punching tonnage

Tonnage of punching is determined by the perimeter of the shape to cut, as well as the thickness and the shearing resistance of the object to be processed. Shear angles (see page 4) help tonnage reduces.

WITHOUT SHEAR ON PUNCH

$$\text{Tonnage (kN)} = \frac{Perimeter\ (mm) \times Thickness\ (mm) \times Shearing\ Resistance\ (\frac{N}{mm^2})}{1000}$$

WITH SHEAR ON PUNCH

$$\text{Tonnage (kN)} = \frac{Perimeter\ (mm) \times Thickness\ (mm) \times Shearing\ Resistance\ \left(\frac{N}{mm^2}\right) \times Shear\ coefficient}{1000}$$

Shearing resistance

Mild Steel (SPCC)	260 N/mm2 as minimum (350 Nmm2)
Stainless steel	520~560 N/mm2
Aluminum (anti-corrosive)	150~220 N/mm2
Brass	220~400 N/mm2
Silicon steel	450~560 N/mm2
Hard Steel (SS4400)	420 N/mm2

Shear coefficient

MURATA cutting shears are applied to D and larger punches. Shear height is 2.4mm unless otherwise required. Shearing coefficient is determined by its depth as well as worksheet thickness. The coefficient below is based on a shear of 2.4mm.

THICKNESS (MM)	**1.2**	**1.6**	**2.0**	**2.3**	**3.0**	**3.2**	**1.0**	**4.5**	**6.3**	**9.5**
COEFFICIENT	**0.50**	**0.50**	**0.50**	**0.50**	**0.61**	**0.63**	**0.71**	**0.75**	**0.83**	**0.90**

Example)

What is the punching tonnage for Φ50 with a 2.4mm shear punch to process SPCC t3.2?

The shearing resistance is 350 N/mm and the coefficient is 0.63.

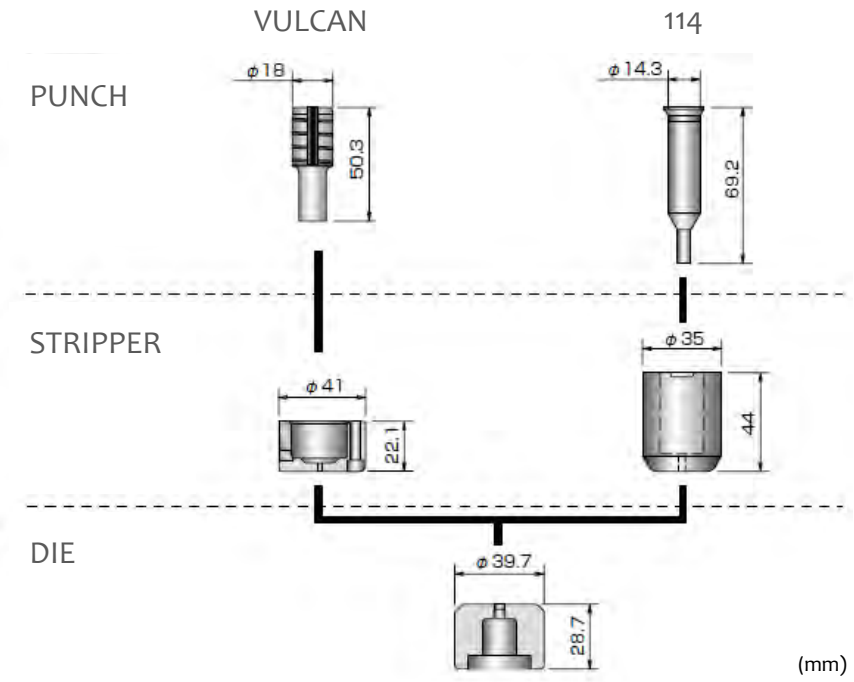
Punching Tonnage = (50 X π 3.2 X 350 X 0.63) / 1000 = 110 (kN)

STATION

X

NARROW

			
ROUND	**SQUARE**	**RECTANGLE**	**OBLONG**
~ 3.2 mm			



Round only

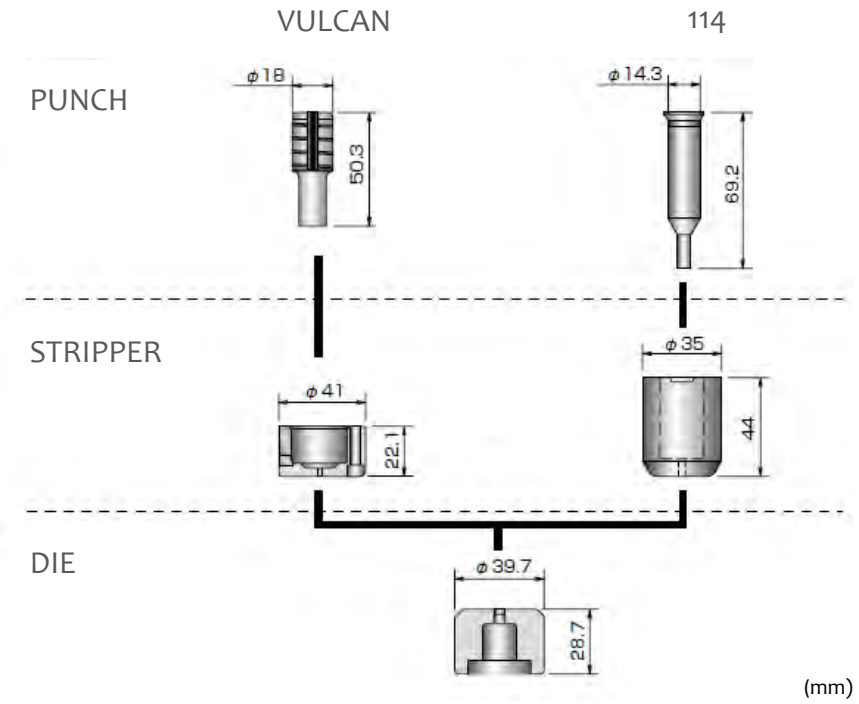
		Basic	Option	Coating (See page 3)
VULCAN	PUNCH	**SKH**	-	UHP, UGP, TIN, TICN
	STRIPPER	**METAL**	-	-
114	PUNCH	**SKD**	SKH	UHP, UGP, TIN, TICN
	STRIPPER	**URATHANE 4XXA**	-	-
114	DIE		SW, SA	-

SKH = High speed steel
SKD = Die steel
SA = Slug away
SW = Slug wiper (See page 4.)

STATION

X

			
ROUND	**SQUARE**	**RECTANGLE**	**OBLONG**
3.2 ~ 12.7 mm			



(mm)

Round only

		Basic	Option	Coating (See page 3)
VULCAN	PUNCH	**SKH**	-	UHP, UGP, TIN, TICN
	STRIPPER	**METAL**	-	-
114	PUNCH	**SKD**	SKH	UHP, UGP, TIN, TICN
	STRIPPER	**URATHANE 4XXA**	-	-
114	DIE		SW, SA	-

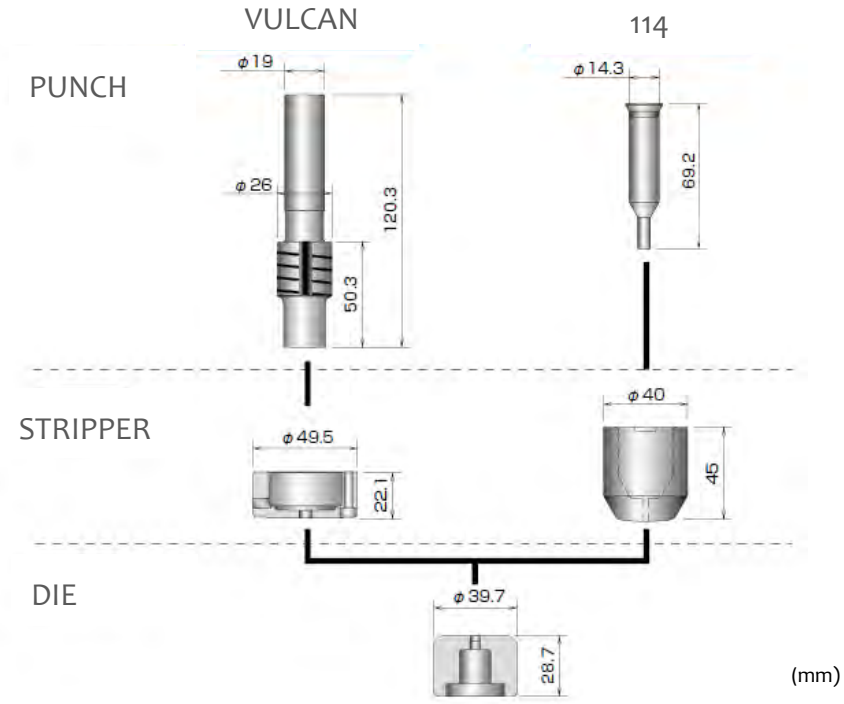
SKH = High speed steel
SKD = Die steel
SA = Slug away
SW = Slug wiper (See page 4)

STATION

A

NARROW

			
ROUND	**SQUARE**	**RECTANGLE**	**OBLONG**
~ 3.2 mm			



Round only

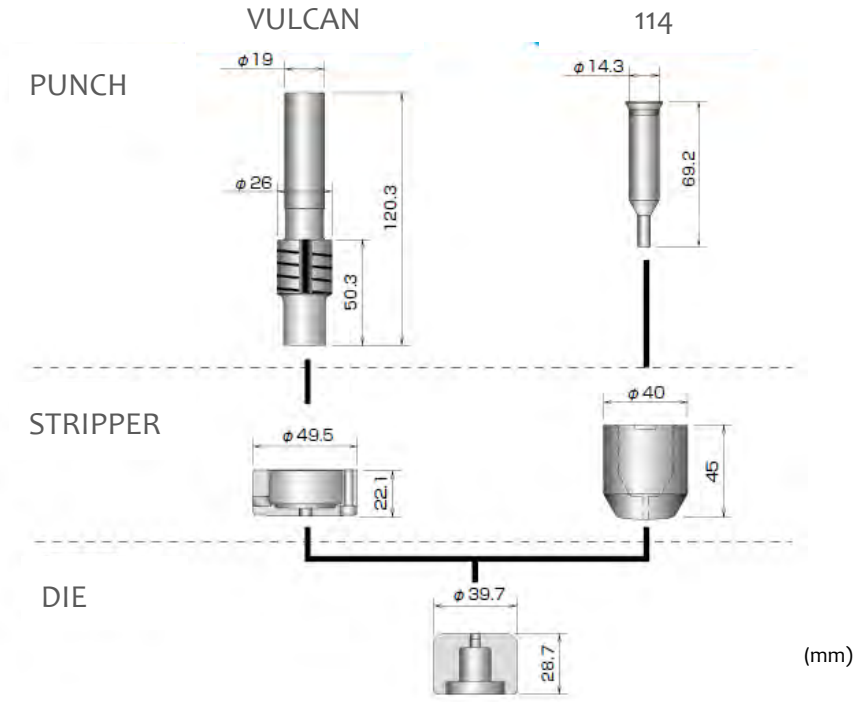
		Basic	Option	Coating (See page 3)
VULCAN	PUNCH	**SKH**	-	UHP, UGP, TIN, TICN
	STRIPPER	**METAL**	-	-
114	PUNCH	**SKD**	SKH	UHP, UGP, TIN, TICN
	STRIPPER	**URATHANE 4A**	-	-
114	DIE		SW, SA	-

SKH = High speed steel
SKD = Die steel
SA = Slug away
SW = Slug wiper (See page 4)

STATION

A

			
ROUND	**SQUARE**	**RECTANGLE**	**OBLONG**
3.2 ~ 12.7 mm			



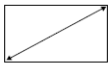
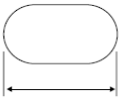
Round only

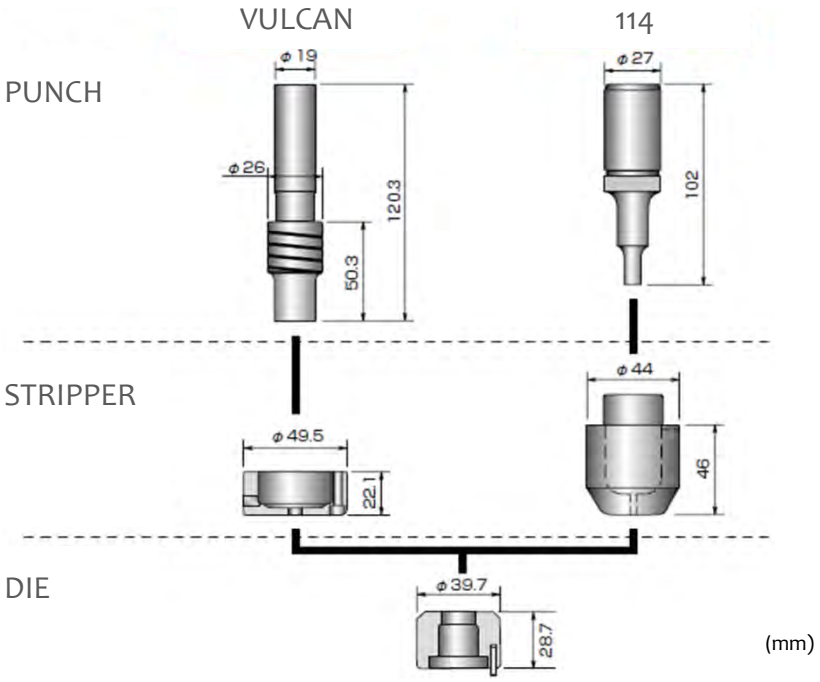
		Basic	Option	Coating (See page 3)
VULCAN	PUNCH	**SKH**	-	UHP, UGP, TIN, TICN
	STRIPPER	**METAL**	-	-
114	PUNCH	**SKD**	SKH	UHP, UGP, TIN, TICN
	STRIPPER	**URATHANE 4A**	-	-
114	DIE		SW, SA	-

SKH = High speed steel
SKD = Die steel
SA = Slug away
SW = Slug wiper (See page 4)

STATION

B

			
ROUND	**SQUARE**	**RECTANGLE**	**OBLONG**
~ 25 mm	~ 16 mm	~ 22 mm	~ 25mm

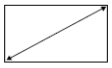
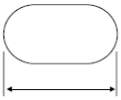


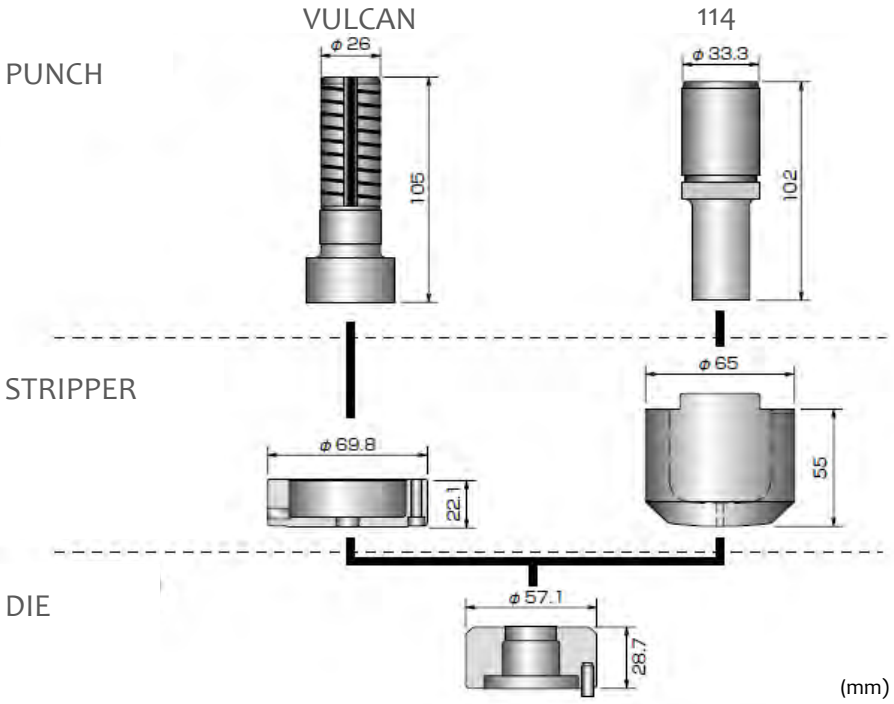
		Basic	Option	Coating (See page 3)	0°	90°	45°
VULCAN	PUNCH	**SKH**	-	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**METAL**	-	-	✓	✓	✓
114	PUNCH	**SKD**	SKH	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**URATHANE 4B**	-	-	✓	✓	
114	DIE		SW, SA	-	✓	✓	

SKH = High speed steel
SKD = Die steel
SA = Slug away
SW = Slug wiper (See page 4)
Rounded corners are possible.

STATION

C

			
ROUND	**SQUARE**	**RECTANGLE**	**OBLONG**
~ 38 mm	~ 22 mm	~ 32 mm	~ 38 mm

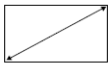
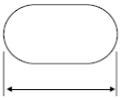


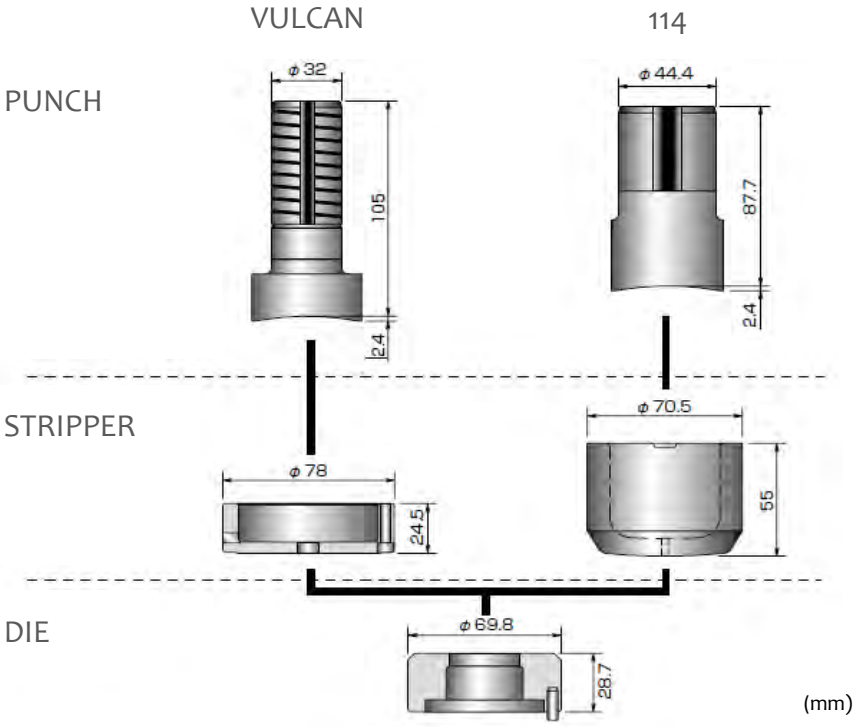
		Basic	Option	Coating (See page 3)	0°	90°	45°
VULCAN	PUNCH	**SKH**	-	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**METAL**	-	-	✓	✓	✓
114	PUNCH	**SKD**	SKH	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**URATHANE 4C**	-	-	✓	✓	
114	DIE		SW, SA	-	✓	✓	

SKH = High speed steel
SKD = Die steel
SA = Slug away
SW = Slug wiper (See page 4)
Rounded corners are possible.

STATION

D, INDEX D

			
ROUND	**SQUARE**	**RECTANGLE**	**OBLONG**
~ 50 mm	~ 32 mm	~ 44 mm	~ 50 mm



		Basic	Option	Coating (See page 3)	0°	90°	45°
VULCAN	PUNCH	**SKH**	-	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**METAL**	-	-	✓	✓	✓
114	PUNCH	**SKD**	SKH	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**URATHANE 4D, 4DR***	-	-	✓	✓	
114	DIE		SW, SA	-	✓	✓	

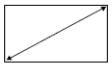
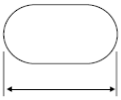
SKH = High speed steel
SKD = Die steel
SA = Slug away
SW = Slug wiper (See page 4)

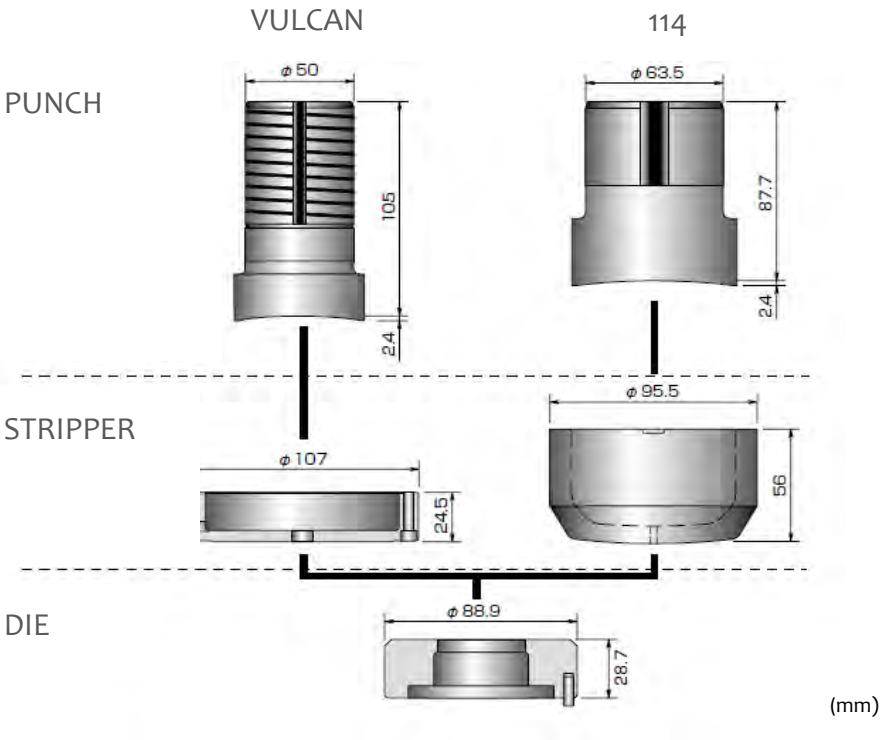
Rounded corners are possible.

*Ribbed stripper is for 16mm or narrower shapes only

STATION

E

			
ROUND	**SQUARE**	**RECTANGLE**	**OBLONG**
~ 64 mm	~ 41 mm	~ 57 mm	~ 64 mm



		Basic	Option	Coating (See page 3)	0°	90°	45°
VULCAN	PUNCH	**SKH**	-	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**METAL**	-	-	✓	✓	✓
114	PUNCH	**SKD**	SKH	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**URATHANE 4E, 4ER***	-	-	✓	✓	
114	DIE		SW, SA	-	✓	✓	

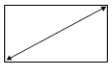
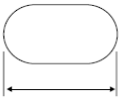
SKH = High speed steel
SKD = Die steel
SA = Slug away
SW = Slug wiper (See page 4)

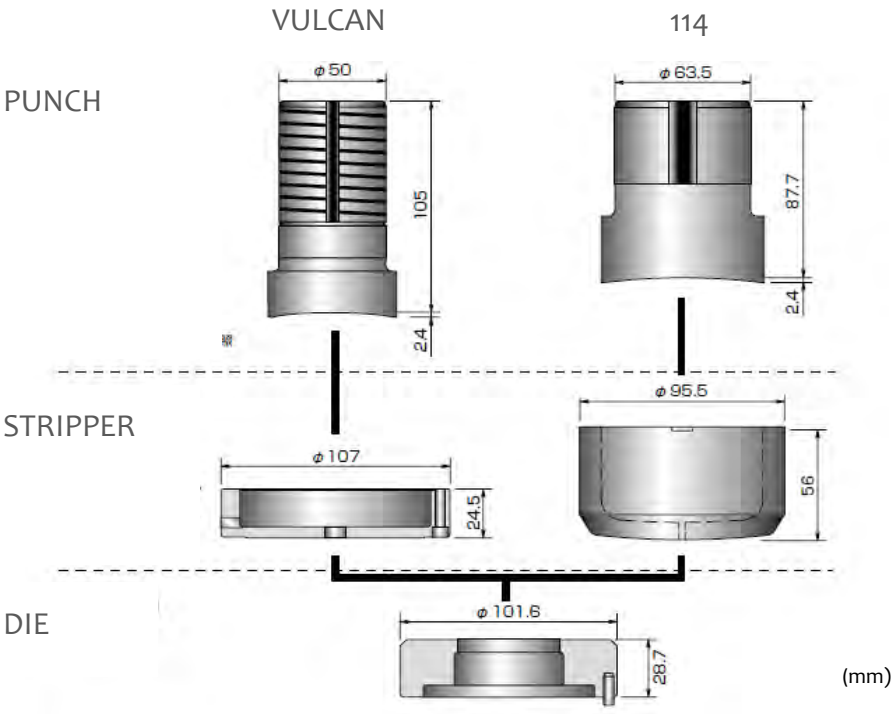
Rounded corners are possible.

*Ribbed stripper is for 16mm or narrower shapes only

STATION

F

			
ROUND	**SQUARE**	**RECTANGLE**	**OBLONG**
~ 75 mm	~ 48 mm	~ 67 mm	~ 75 mm



		Basic	Option	Coating (See page 3)	0°	90°	45°
VULCAN	PUNCH	**SKH**	-	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**METAL**	-	-	✓	✓	✓
114	PUNCH	**SKD**	SKH	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**URATHANE 4F, 4FR***	-	-	✓	✓	
114	DIE		SW, SA	-	✓	✓	

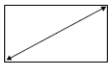
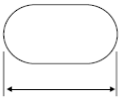
SKH = High speed steel
SKD = Die steel
SA = Slug away
SW = Slug wiper (See page 4)

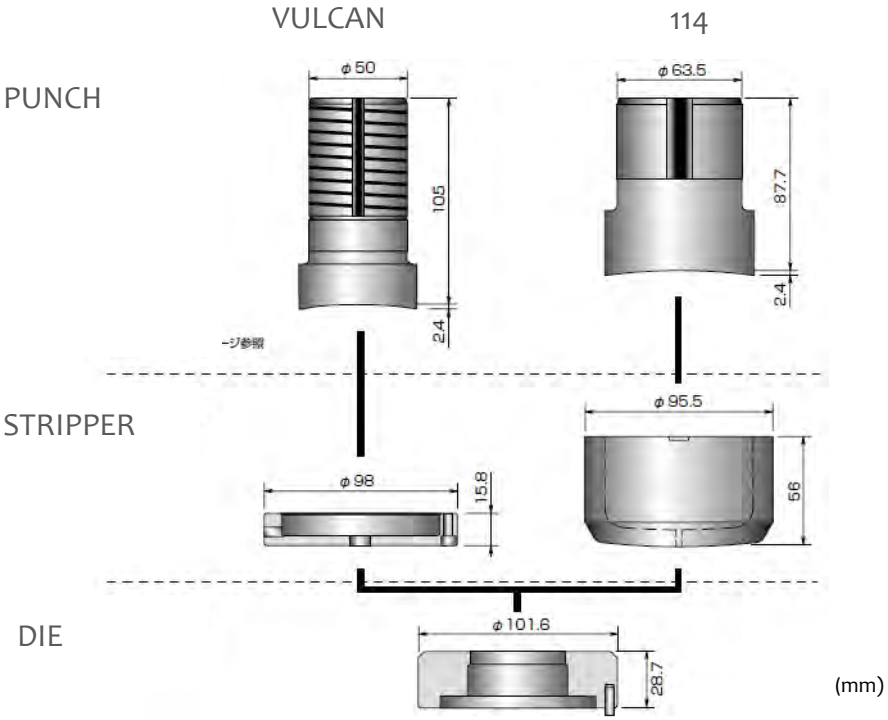
Rounded corners are possible.

*Ribbed stripper is for 16mm or narrower shapes only

STATION

INDEX F

			
ROUND	**SQUARE**	**RECTANGLE**	**OBLONG**
~ 75 mm	~ 48 mm	~ 67 mm	~ 75 mm



		Basic	Option	Coating (See page 3)	0°	90°	45°
VULCAN	PUNCH	**SKH**	-	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**METAL**	-	-	✓	✓	✓
114	PUNCH	**SKD**	SKH	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**URATHANE 4F, 4FR***	-	-	✓	✓	
114	DIE		SW, SA	-	✓	✓	

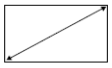
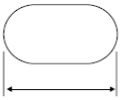
SKH = High speed steel
SKD = Die steel
SA = Slug away
SW = Slug wiper (See page 4)

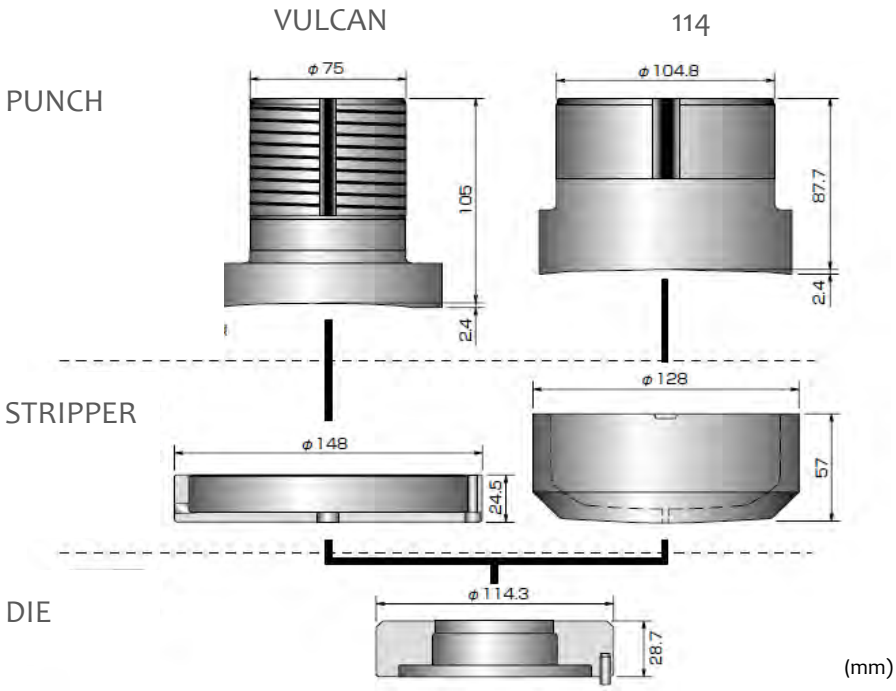
Rounded corners are possible.

*Ribbed stripper is for 16mm or narrower shapes only.

STATION

G

			
ROUND	**SQUARE**	**RECTANGLE**	**OBLONG**
~ 89 mm	~ 57 mm	~ 79 mm	~ 89 mm



		Basic	Option	Coating (See page 3)	0°	90°	45°
VULCAN	PUNCH	**SKH**	-	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**METAL**	-	-	✓	✓	✓
114	PUNCH	**SKD**	SKH	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**URATHANE 4G, 4GR*, 4G5**	-	-	✓	✓	
114	DIE		SW, SA	-	✓	✓	

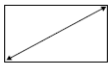
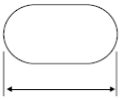
SKH = High speed steel
SKD = Die steel
SA = Slug away
SW = Slug wiper (See page 4)

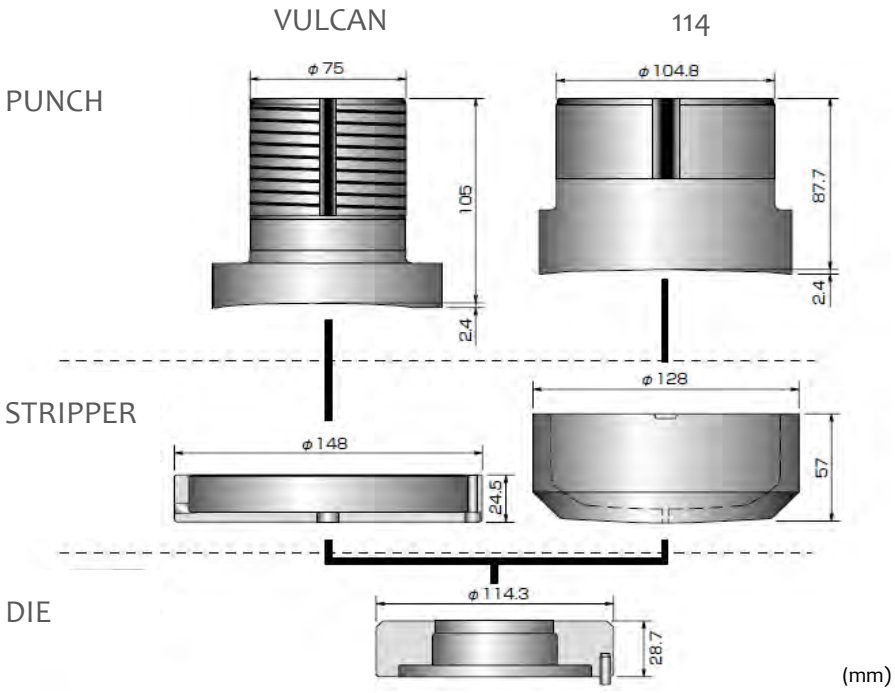
Rounded corners are possible.

*Ribbed stripper is for 16mm or narrower shapes only.

STATION

H

			
ROUND	**SQUARE**	**RECTANGLE**	**OBLONG**
~ 105 mm	~ 70 mm	~ 98 mm	~ 105 mm



(mm)

		Basic	Option	Coating (See page 3)	0°	90°	45°
VULCAN	PUNCH	**SKH**	-	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**METAL**	-	-	✓	✓	✓
114	PUNCH	**SKD**	SKH	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**URATHANE 4H, 4HR***	-	-	✓	✓	
114	DIE		SW, SA	-	✓	✓	

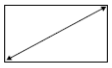
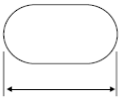
SKH = High speed steel
SKD = Die steel
SA = Slug away
SW = Slug wiper (See page 4)

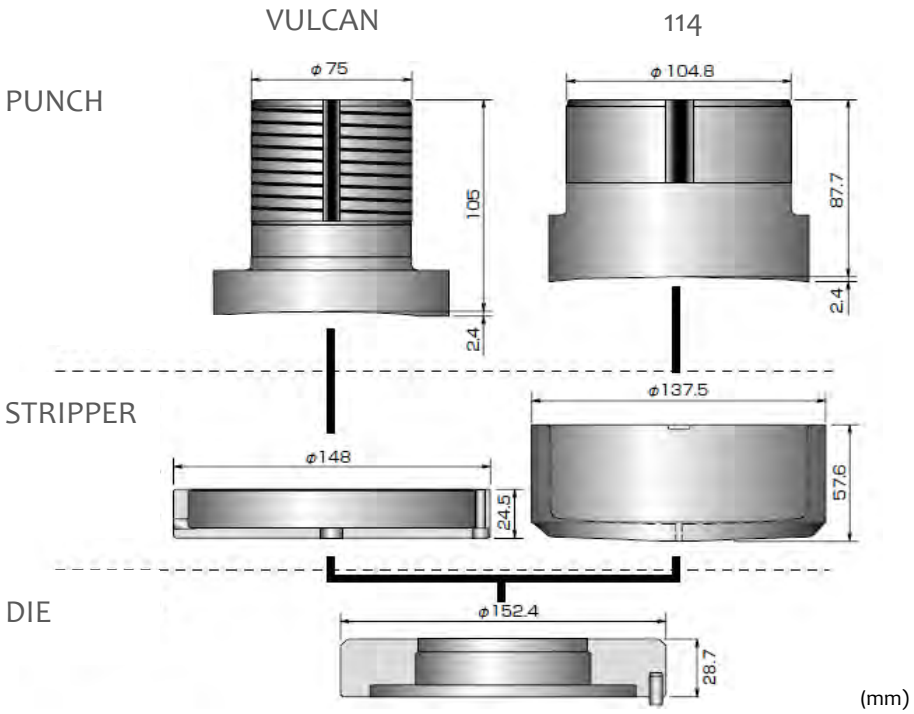
Rounded corners are possible.

*Ribbed stripper is for 16mm or narrower shapes only.

STATION

J

			
ROUND	**SQUARE**	**RECTANGLE**	**OBLONG**
~ 120 mm	~ 79 mm	~ 113 mm	~ 120 mm



(mm)

		Basic	Option	Coating (See page 3)	0°	90°	45°
VULCAN	PUNCH	**SKH**	-	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**METAL**	-	-	✓	✓	✓
114	PUNCH	**SKD**	SKH	UHP, UGP, TIN, TICN	✓	✓	
	STRIPPER	**URATHANE 4J, 4JR***	-	-	✓	✓	
114	DIE		SW, SA	-	✓	✓	

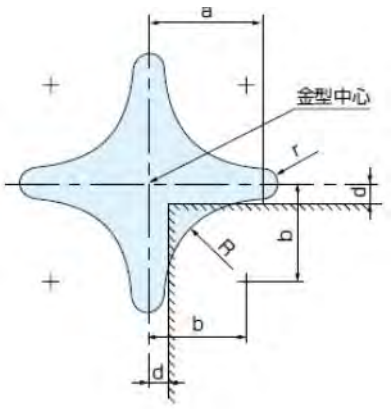
SKH = High speed steel
SKD = Die steel
SA = Slug away
SW = Slug wiper (See page 4)

Rounded corners are possible.

*Ribbed stripper is for 16mm or narrower shapes only.

OTHER SHAPES

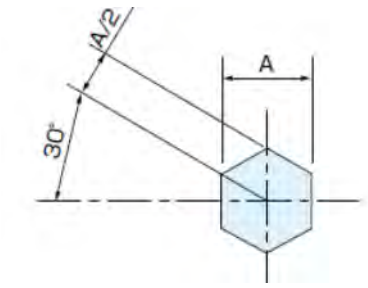
1. 4 WAY



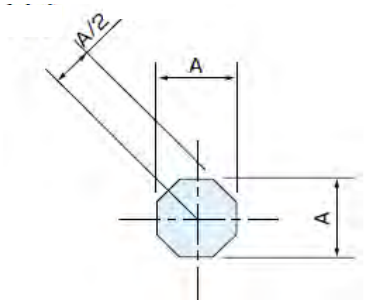
	R	a	b	r	d
B	2	6	4	1.59	2
	3	7	5	1.58	2
	4	8	6	1.56	2
	5	9	7.5	2.13	2.5
	6	10	8	1.53	2
C	8	12	10	1.5	2
	10	14.5	12.5	1.96	2.5
	13	17	15	1.43	2

(mm)

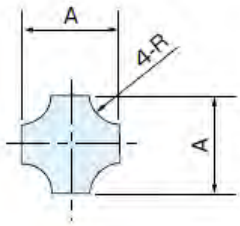
2. HEXAGON



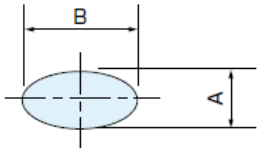
3. OCTAGON



4. CORNER RADIUS



5. ELLIPSE



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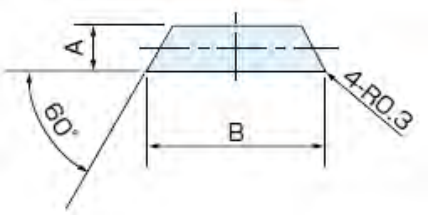
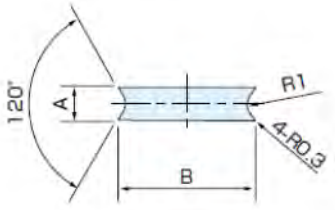
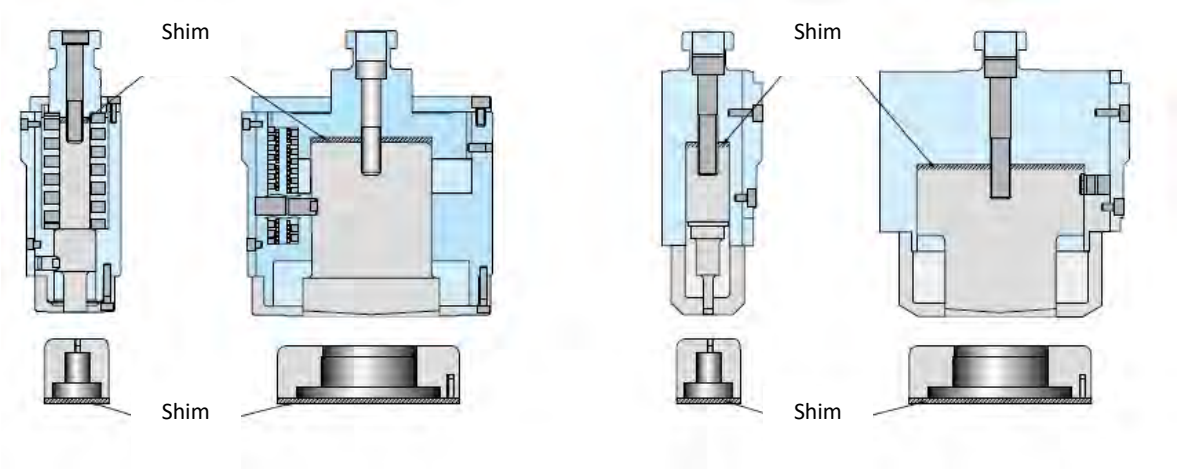


7. DIAMOND JOINT



SHIMS



VULCAN PUNCH		
X	t0.3	P52YA26360A
	t0.5	P52YA26360B
	t1.0	P52YA26360C
	t1.5	P52YA26360D
AB	t0.3	P52YA26460A
	t0.5	P52YA26460B
	t1.0	P52YA26460C
	t1.5	P52YA26460D
C	t0.3	P52YA26560A
	t0.5	P52YA26560B
	t1.0	P52YA26560C
	t1.5	P52YA26560D
D	t0.3	P52YA26660A
	t0.5	P52YA26660B
	t1.0	P52YA26660C
	t1.5	P52YA26660D
EF	t0.3	P52YA26760A
	t0.5	P52YA26760B
	t1.0	P52YA26760C
	t1.5	P52YA26760D
GHJ	t0.3	P52YA26860A
	t0.5	P52YA26860B
	t1.0	P52YA26860C
	t1.5	P52YA26860D

114 PUNCH		
XA	t0.3	P52YA07360A
	t0.5	P52YA07360B
	t1.0	P52YA07360C
	t1.5	P52YA07360D
B	t0.3	P52YA07460A
	t0.5	P52YA07460B
	t1.0	P52YA07460C
	t1.5	P52YA07460D
C	t0.3	P52YA07560A
	t0.5	P52YA07560B
	t1.0	P52YA07560C
	t1.5	P52YA07560D
D	t0.3	P52YA07660A
	t0.5	P52YA07660B
	t1.0	P52YA07660C
	t1.5	P52YA07660D
EF	t0.3	P52YA07760A
	t0.5	P52YA07760B
	t1.0	P52YA07760C
	t1.5	P52YA07760D
GHJ	t0.3	P52YA07860A
	t0.5	P52YA07860B
	t1.0	P52YA07860C
	t1.5	P52YA07860D

114 DIE		
X,A,B	t0.3	P52YA07960A
	t0.5	P52YA07960B
	t1.0	P52YA07960C
C	t0.3	P52YA08060A
	t0.5	P52YA08060B
	t1.0	P52YA08060C
D	t0.3	P52YA08160A
	t0.5	P52YA08160B
	t1.0	P52YA08160C
E	t0.3	P52YA08260A
	t0.5	P52YA08260B
	t1.0	P52YA08260C
F	t0.3	P52YA08360A
	t0.5	P52YA08360B
	t1.0	P52YA08360C
G	t0.3	P52YA08460A
	t0.5	P52YA08460B
	t1.0	P52YA08460C
H	t0.3	P52YA08560A
	t0.5	P52YA08560B
	t1.0	P52YA08560C
J	t0.3	P52YA08660A
	t0.5	P52YA08660B
	t1.0	P52YA08660C

(mm)

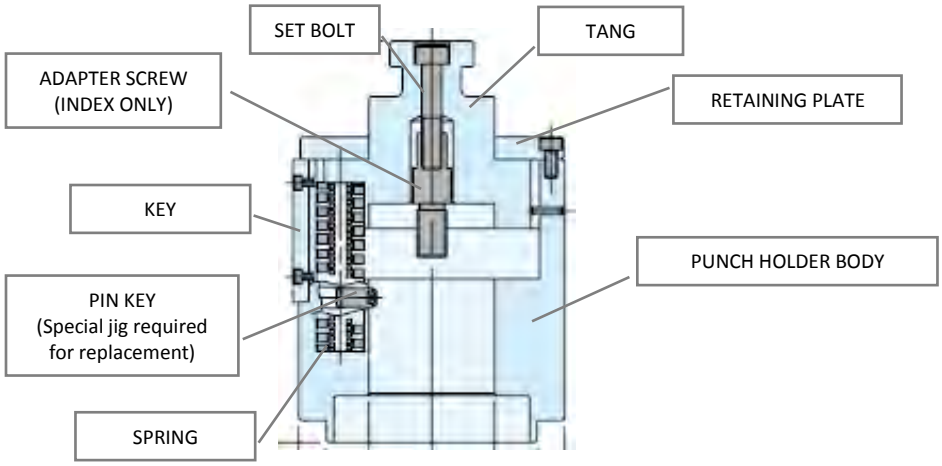
-

MACHINE AND HOLDERS

		PUNCH HOLDER			DIE HOLDER	
M/C		VULCAN PH	114 PH	114 PH INDEX	114	
C2000		C2	C2	C2	C2	6
C2500		C2	C2	C2	C2	6
C3000	40ST Single	C3	C3	P36	C3S - C3V3	7
	54ST Double	C3	C3	P36	C3W	10
C3500	40ST Single	C3	C3	P36	C3S - C3V3	7
	54ST Double	C3	C3	P36	C3W	10
FL1544		C3	C3	C3	C2	6
M1250		C3	C3	C3	C2	6
M2033	ETP BUSH D=19	C3	C3	C3	SLIDE IN 2 M2	3
	ETP BUSH D=15	C3	C3	C3	SLIDE IN 1 M2	5
M2034	ETP BUSH D=19	C3	C3	C3	SLIDE IN 2 M2	3
	ETP BUSH D=15	C3	C3	C3	SLIDE IN 1 M2	5
M2044		C3	C3	C3	SLIDE IN 2 M2	3
M2044EZ		C3	C3	C3	C2	6
M2044TC		C3	C3	C3	C2	6
M2044TS		C3	C3	C3	SLIDE IN 2 W	2
M2044UT		C3	C3	C3	SLIDE IN 2 W	2
M2048		C3	C3	C3	SLIDE IN 2 M2	3
M2048HL		C3	C3	C3	SLIDE IN 2 S	1
M2048HYB		C3	C3	C3	SLIDE IN 2 S	1
M2048LT		C3	C3	C3	SLIDE IN 2 W	2
	56ST	C3	C3	C3	SLIDE IN 2 M2	2
M2048ST		C3	C3	C3	C3S M2TE	8
M2048TE		C3	C3	C3	C3S M2TE	8
M2048TS		C3	C3	C3	SLIDE IN 2 W	2
M2048UT		C3	C3	C3	SLIDE IN 2 W	2
M2125		C3	C3	P36	C3S - M2125	9
M2125HYB		C3	C3	P36	C3S - M2125	9
M2544		C3	C3	C3	SLIDE IN 2 W	2
M2544TS		C3	C3	C3	SLIDE IN 2 W	2
M2548		C3	C3	C3	SLIDE IN 2 W	2
M2548TS		C3	C3	C3	SLIDE IN 2 W	2
M2558		C3	C3	C3	SLIDE IN 2 W	2
M2558HL		C3	C3	C3	SLIDE IN 2 W	2
M2558HYB		C3	C3	C3	SLIDE IN 2 W	2
M2558TS		C3	C3	C3	SLIDE IN 2 W	2
M3048TG		C3	C3	C3	SLIDE IN 2 W	2
M3058TG		C3	C3	C3	SLIDE IN 2 W	2
M5000		C3	C3	P36	C3W	10
M5000HYB		C3	C3	P36	C3W	10
V3000	40ST Single	C3	C3	P36	C3S - C3V3	7
	54ST Double	C3	C3	P36	C3W	10
V3000α	ETP BUSH D=19	C3	C3	C3	SLIDE IN 2 W	2
	ETP BUSH D=15	C3	C3	C3	SLIDE IN 1 V3α	4
V3046α	ETP BUSH D=19	C3	C3	C3	SLIDE IN 2 W	2
	ETP BUSH D=15	C3	C3	C3	SLIDE IN 1 V3α	4
V3046β		C3	C3	C3	SLIDE IN 2 W	2
V3056α		C3	C3	C3	SLIDE IN 2 W	2
V5000		C3	C3	P36	C3W	10
V5058		C3	C3	P36	C3W	10
W4560	40ST Single	C3	C3	P36	Contact us.	
	54ST Double	C3	C3	P36		

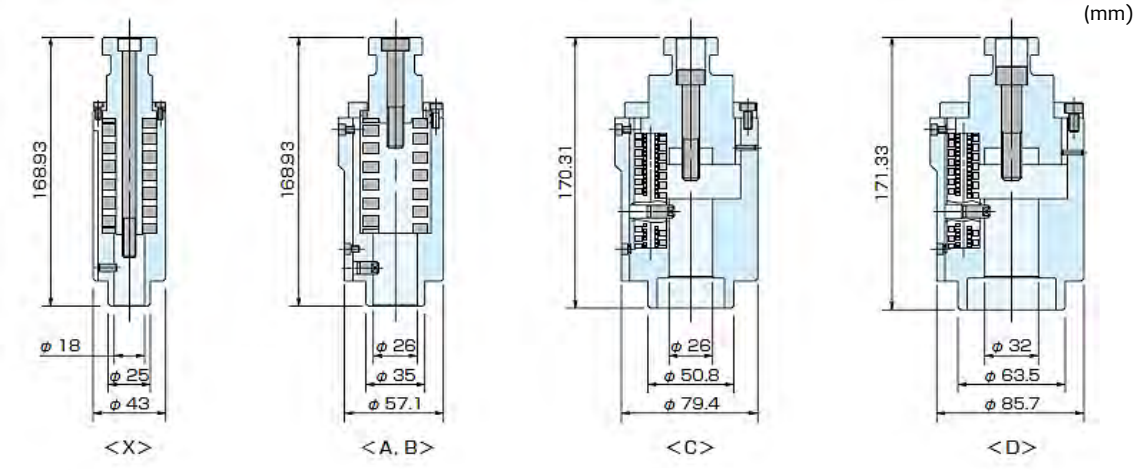
VULCANTOOL PUNCH HOLDER C3 Series

C3000, C3500, FL1544, M1250, M2033, M2034, M2044,M2044EZ, M2044TC, M2044TS, M2044UT, M2048, M2048HL, M2048HYB, M2048LT, M2048ST, M2048TE, M2048TS, M2048UT, M2125, M2125HYB, M2544, M2544TS, M2548, M2548TS, M2558, M2558HL, M2558HYB, M2558TS ,M3048TG, M3058TG, M5000, M5000HYB, V3000, V3000α, V3046α, V3046β, V3056α, V5000, V5058, W4560



C3 SERIES: X ~ D

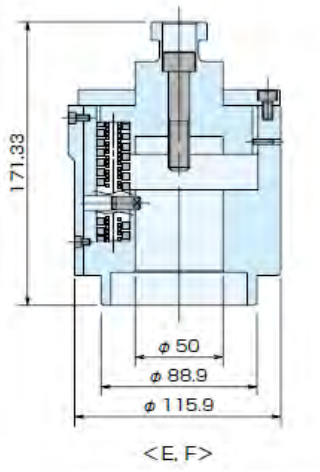
(mm)



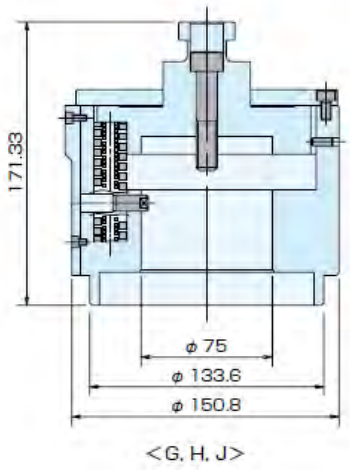
TLV-10012 TLV-11012 TLV-12012 TLV-13012

C3 SERIES: EF ~ INDEX

(mm)



TLV-14012



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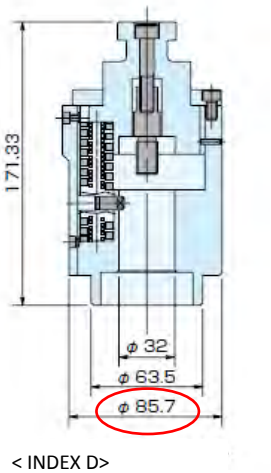

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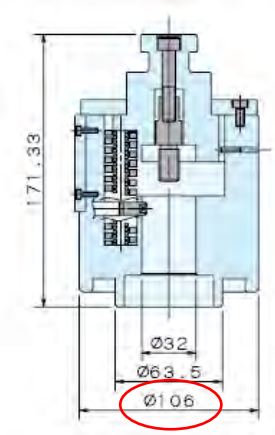
NON-VARI COMATIBLE
TLV-17012 (54ST)
TLV-17600 (40ST)



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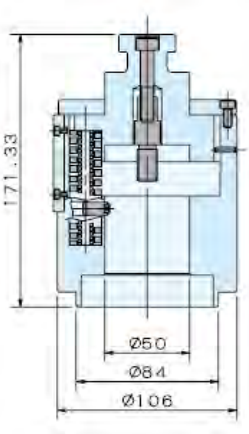
VARI COMPATIBLE

TLV-17412



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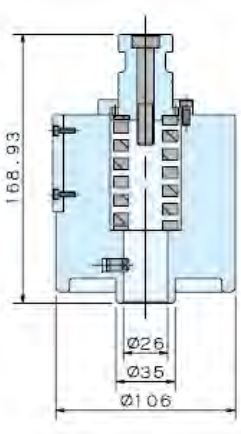
TLV-18012



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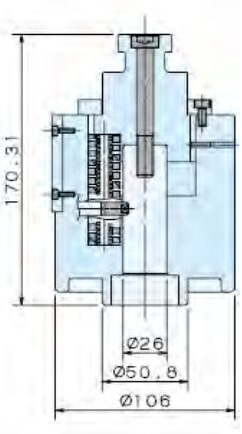
TLV-17212



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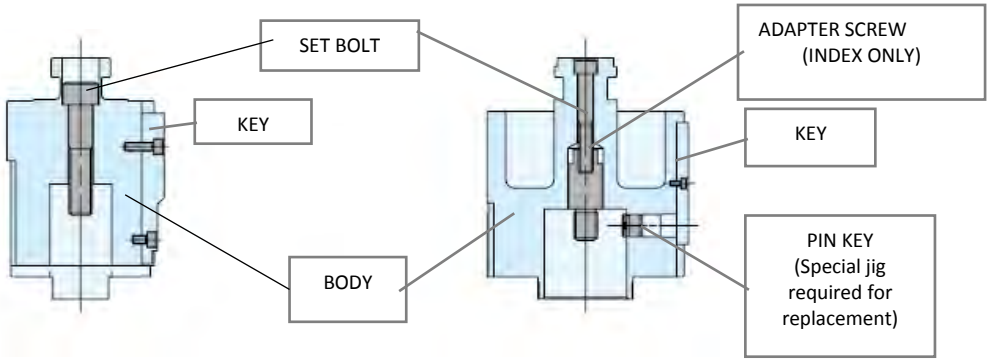
TLV-17312

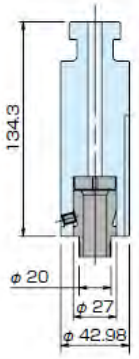
STYLE 114 PUNCH HOLDER C3 Series

C3000, C3500, FL1544, M1250, M2033, M2034, M2044,M2044EZ, M2044TC, M2044TS, M2044UT, M2048, M2048HL, M2048HYB, M2048LT, M2048ST, M2048TE, M2048TS, M2048UT, M2125, M2125HYB, M2544, M2544TS, M2548, M2548TS, M2558, M2558HL, M2558HYB, M2558TS ,M3048TG, M3058TG, M5000, M5000HYB, V3000, V3000α, V3046α, V3046β, V3056α, V5000, V5058, W4560

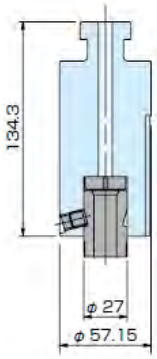


C3 SERIES X ~ GHJ

(mm)



<X>
P59-89101
P59-89111 (XB)
P52-83170 (M2125)



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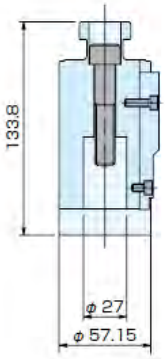
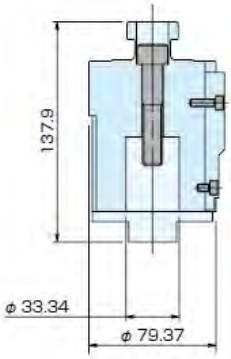
P59-89011 (C3W)
P58-89011 (C3S)



<B>
P59-89031
P59-89021 (M2125)
P59-89121 (IB)



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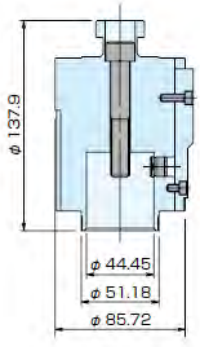
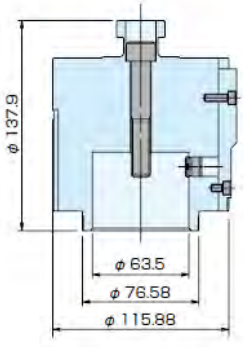
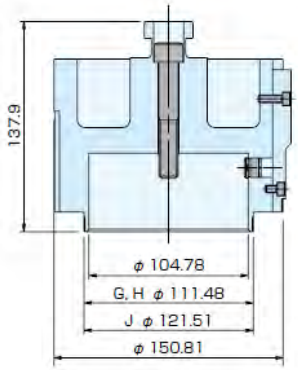
P59-89041



<D>
P59-89051



<E, F>
P59-89061

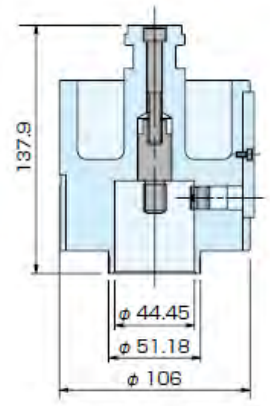


<G, H, J>
P59-89071(GH)
P59-89081(J)

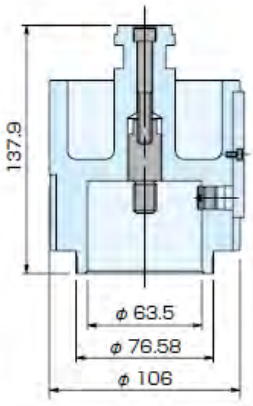
STYLE 114 INDEX PUNCH HOLDER C3 Series

FL1544, M2044TC, M2048LT, M2125HYB, M2558HL, V3046α, M1250, M2044TS, M2048ST, M2544, M2558HYB, V3046β, M2033, M2044UT, M2048TE, M2544TS, M2558TS, M2034, M2048, M2048TS, M2548, M3048TG, M2044, M2048HL, M2048UT, M2548TS, M3058TG, M2044EZ, M2048HYB, M2125, M2558, V3000α

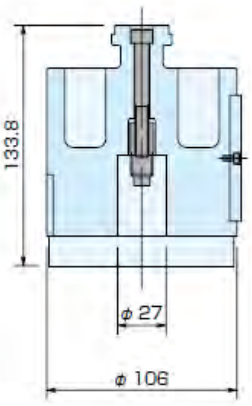
(mm)



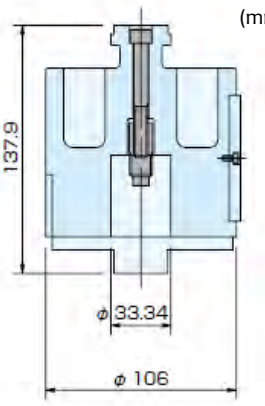
<INDEX D>
P63-79004



<INDEX F>
P63-79002



<INDEX FB>
P52-S9870

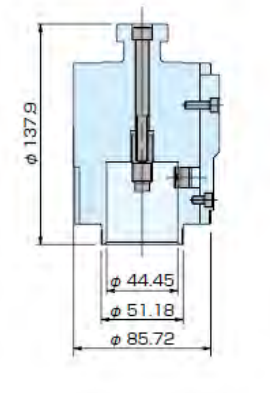


<INDEX FC>
P52-A0032

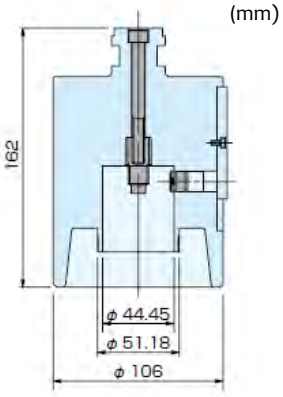
STYLE 114 INDEX PUNCH HOLDER P36 Series

C3000, C3500, M2125, M2125HYB, M5000HYB, M5000, V3000, V5000, V5000α, V5058, W4560

(mm)



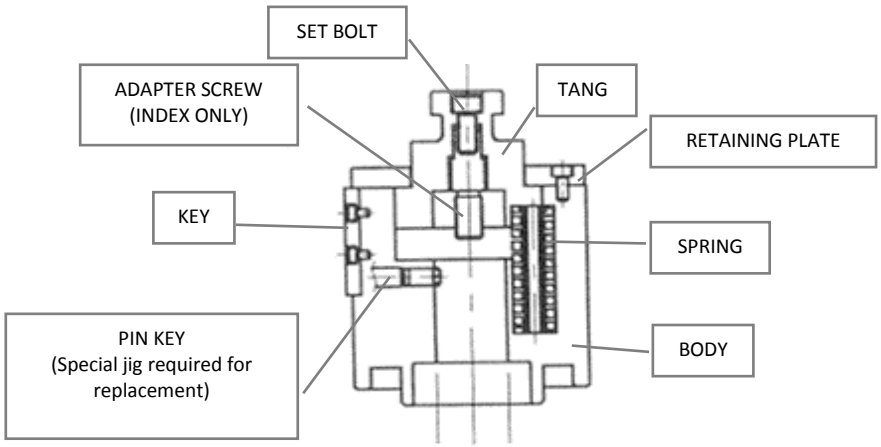
<INDEX D>
P36-79201 (40st)
P36-79211 (54st)



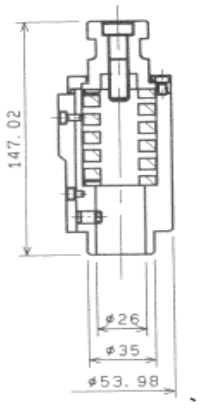
<INDEX D VARI-COMPATIBLE>
P36-79241

VULCANTOOL PUNCH HOLDER C2 Series

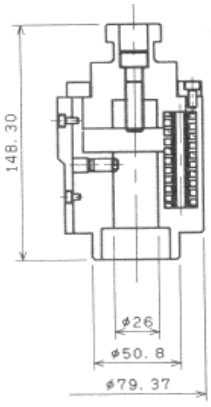
C2000, C2500



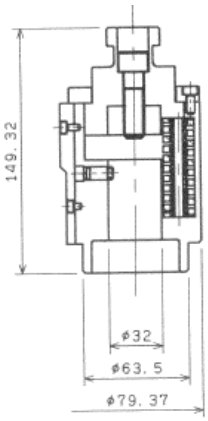
(mm)



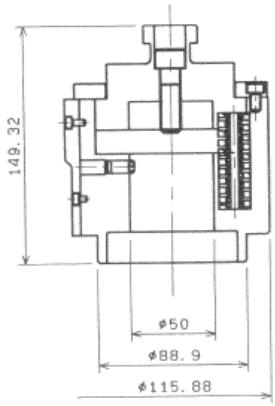
<AB>
TLV-21012



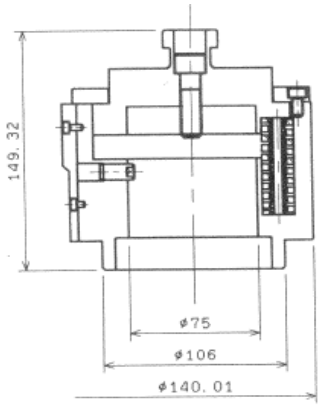
<C>
TLV-22012



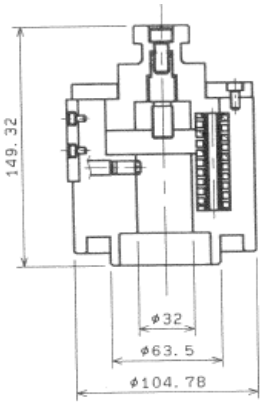
<D>
TLV-23012



<EF>
TLV-24012



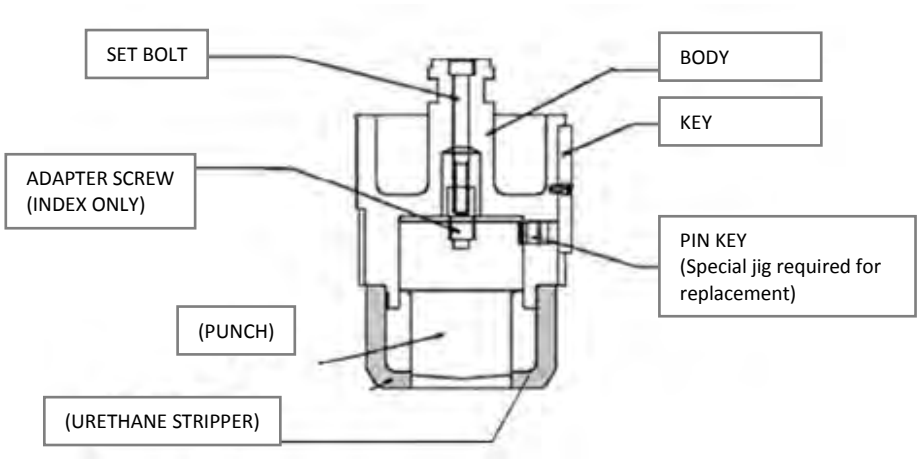
<G>
TLV-25012



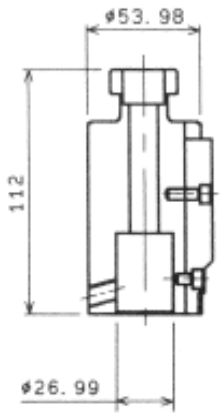
<INDEX D>
VARI COMPATIBLE
TLV-27412

STYLE 114 PUNCH HOLDER C2 Series

C2000, C2500



(mm)



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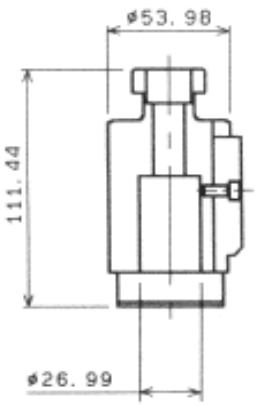
P54-89011



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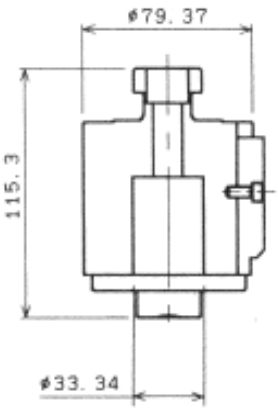
P54-89021



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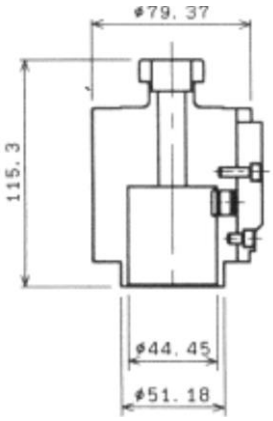

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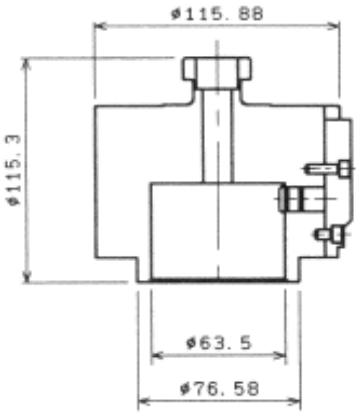
P54-89041



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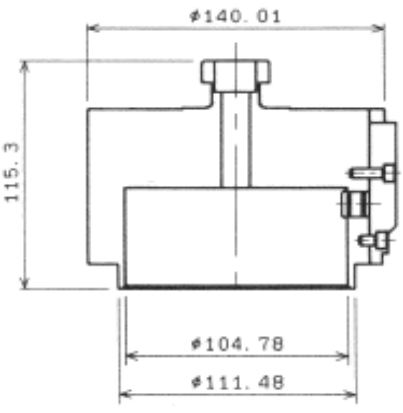
P54-89051



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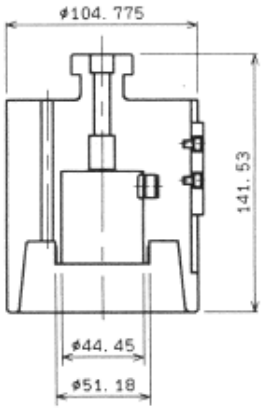
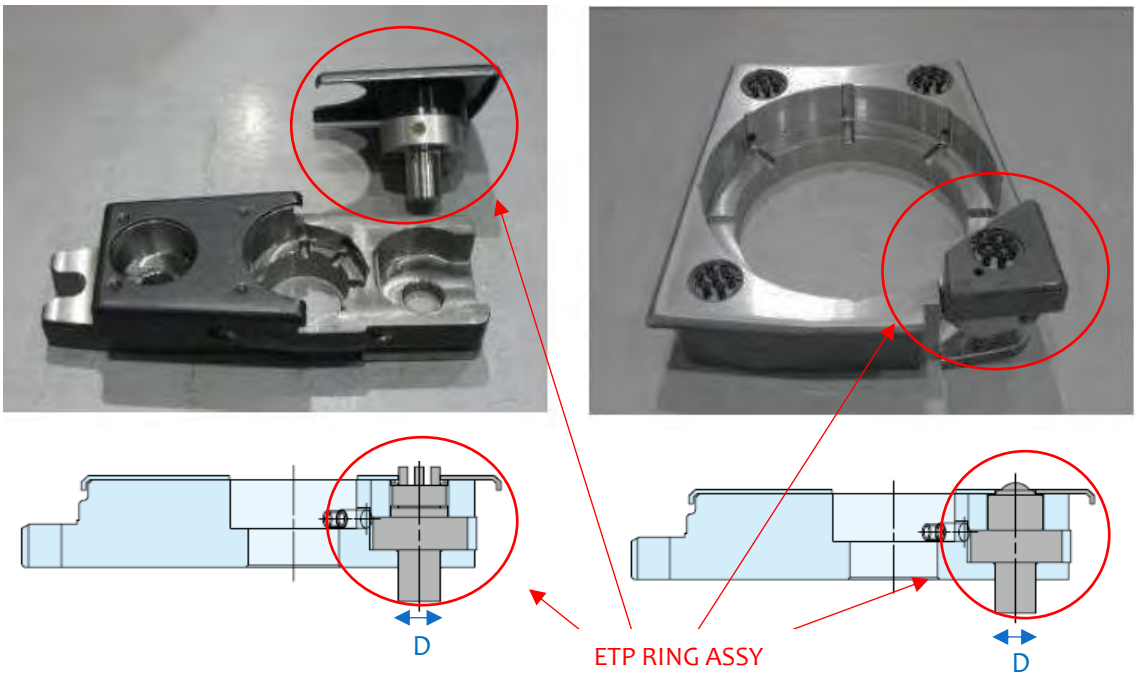
P54-89061



<INDEX>
VARI COMPATIBLE
P41-79821

SLIDE IN DIE HOLDER (STYLE 114)

BRUSH / STEEL BALL / URETHANE BALL



SELECTION

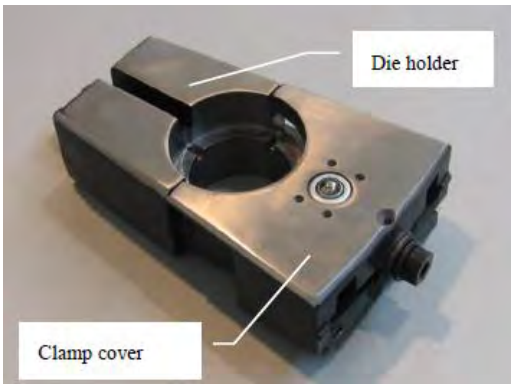
Complete assembly:

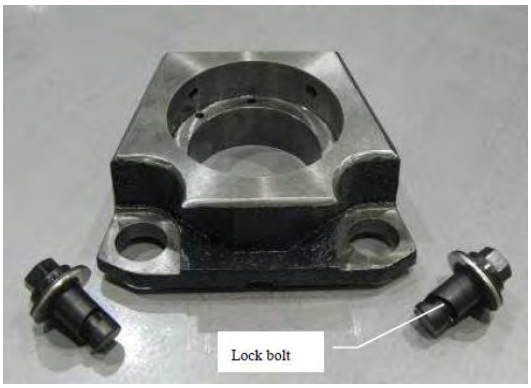
	1	2	3	4	5
	SLIDE IN 2 S	SLIDE IN 2 W	SLIDE IN 2 M2	SLIDE IN 1 V3α D=15.0 mm	SLIDE IN 1 M2 D=15.0 mm
B	**P52-86310**	**P52-86010**	**P52-86011**	**P52-85010**	**P52-86011**
C	**P52-86320**	**P52-86020**	**P52-86090**	**P52-85020**	**P52-85090**
D	**P52-86330**	**P52-86030**	**P52-86100**	**P52-85030**	**P52-85100**
E		**P52-86040**	**P52-86130**	**P52-85040**	
F		**P52-86050**	**P52-86140**	**P52-85050**	
G		**P52-86060**	**P52-86120**	**P52-85060**	**P52-85110**
GE			**P52-86130**		
GF			**P52-86140**		
H		**P52-86070**		**P52-85070**	
J		**P52-86080**		**P52-85080**	
Note	**BRUSH ONLY**				
	M2048HL, M2048HYB	M2044TS, 2044UT, M2048LT, M2048TS, M2048UT, M2544, M2544TS,M2548, M2548TS, M2558, M2558HL, M2558HYB, M2558TS, M3048TG, M3058TG, V3000α, V3046α, V3048α	M2033, M2034, M2044	V3000α, V3046α, V3048α	M2033, M2034,

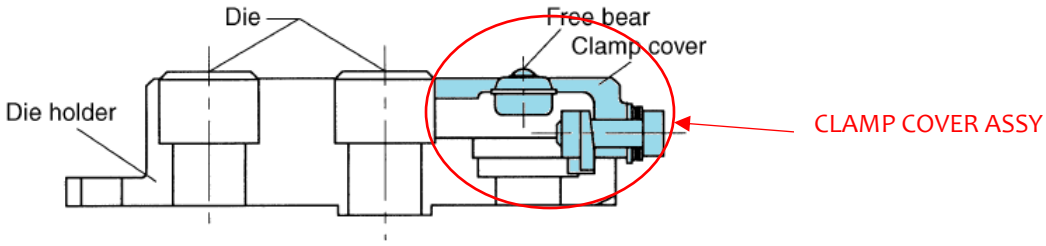
For 56ST turret table, the above is not applicable – contact us.

DIE HOLDER (STYLE 114)

STEEL BALL / URETHANE BALL







SELECTION

Complete assembly:

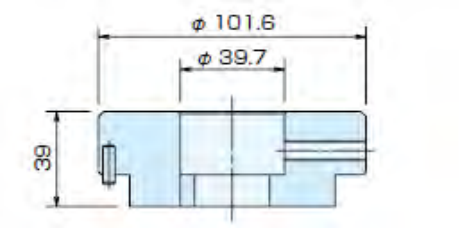
	6	7	8	9	10
	C2	C3S – C3V3S	C3S – M2TE	C3S – M2125	C3W
AB	**P54-83020**	**P52-83010**	**P52-83011**	**P52-83190**	**P59-85011**
C	**P54-83030**	**P52-83020**	**P52-83021**	**P52-83150**	**P59-85031**
D	**P54-83040**	**P52-83030**	**P52-83031**	**P52-83160**	**P59-85051**
E	**P54-83050**	**P52-83040**	**P52-83040**	**P52-83040**	**P59-85061**
F	**P54-83060**	**P52-83050**	**P52-83050**	**P52-83050**	**P59-85071**
G	**P54-83140**	**P52-83060**	**P52-83060**		**P59-85081**
H		**P52-83070**	**P52-83070**		**P59-85091**
J		**P52-83080**	**P52-83080**		**P59-85101**
Note	Brush only				
	C2000, C2500	C3000S, C3500S, V3000S	M2048ST, M2048UT	M2125, M2125HYB	C3000W, C3500W, M5000, M5000HYB, V5000, V5058

STYLE 114 INDEX DIE HOLDER

Inform us of your machine's KX number, or your machine's name and how many stations the table has.

STYLE 114 DIE ADAPTER

(mm)



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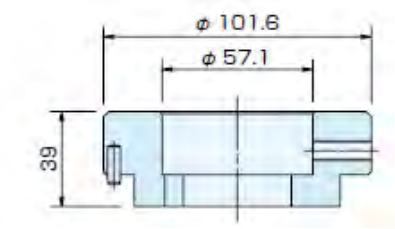
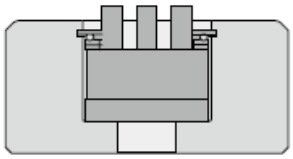
P52-S8623

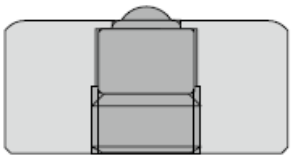


<INDEX FC>
P52-S8628

DIE HOLDER ACCESSARIES



Brush Die



STEEL BALL/ URETHANE BALL

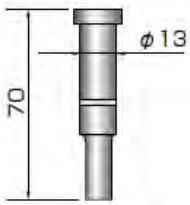
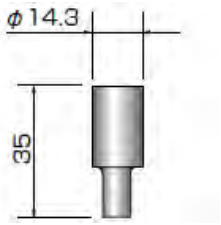
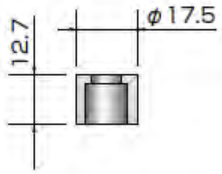
VARITOOL 12Z / VARITOOL 12S

VARITOOL 12Z

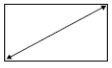
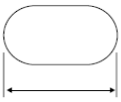
PUNCH HOLDER
DIE HOLDER
PUNCH
DIE
STRIPPER

VARITOOL 12S

PUNCH HOLDER
STEM ASSY
DIE HOLDER
PUNCH
DIE
STRIPPER

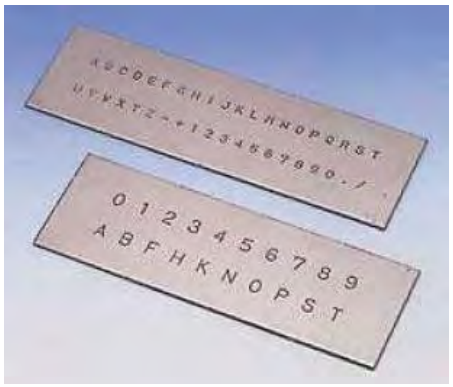
PUNCH		DIE
VARITOOL 12Z	**VARITOOL 12S**	
		

VARITOOL 12z/12s PUNCH is made of SKH. (mm)

			
ROUND	**SQUARE**	**RECTANGLE**	**OBLONG**
~ 12.7 mm	~ 7.7 mm	~ 11.0 mm	~ 12.7 mm

TONNAGE:	~ 4.5 TONS
MILD STEEL:	~3.2mm
STAINLESS STEEL:	~2.0mm

MARKING TOOL



SELECTION

	Letter size	Sheet (t)	Note
20 LETTERS	L5.0xW3.2	0.8 ~6.3	For some thickness, shims are required.
40 LETTERS	L3.2xW2.1	0.8 ~6.3	For some thickness, shims are required.

(mm)

STANDARD LETTERS TO CHOOSE:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

0 1 2 3 4 5 6 7 8 9

+ - / ,

Other characters are selectable.

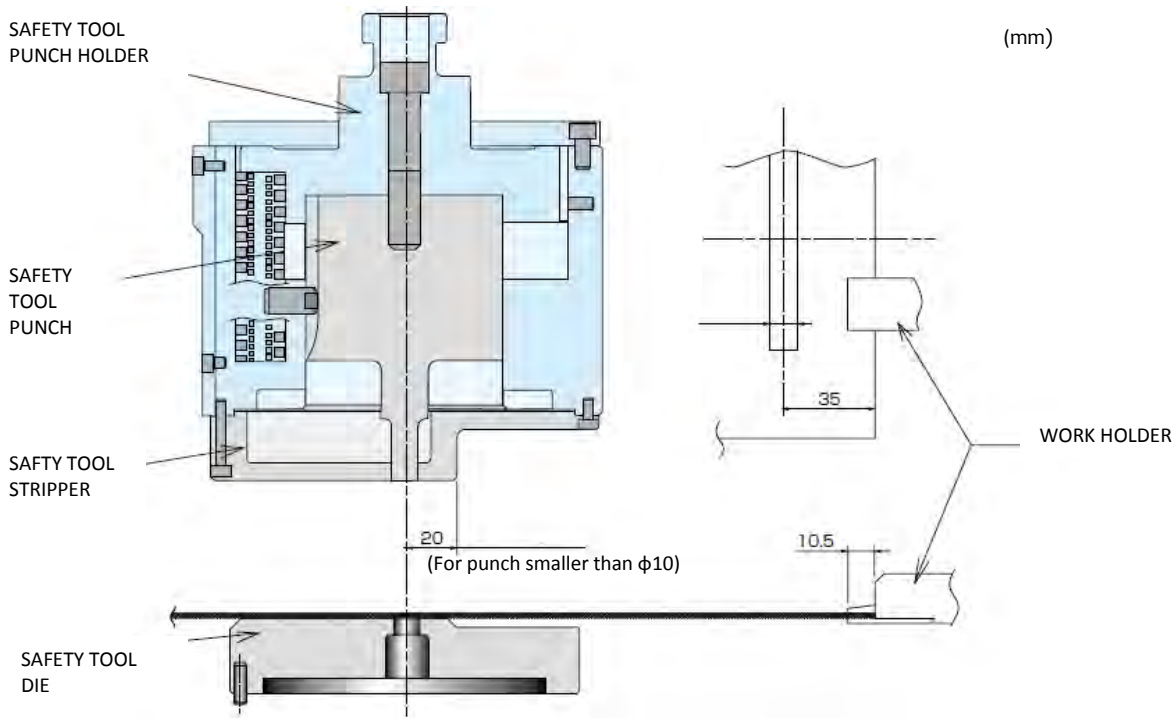
FOR INTRODUCTION

Contact Murata Machinery first for machine settings.

NOTE

MARKING TOOL is usable in MOTORUM and VECTRUM series. CENTRUM with VARI compatible also accept the option. C2000 and C2500 could take 40 letters only.

WORK HOLDER SAFETY TOOL (VULCANTOOL only)



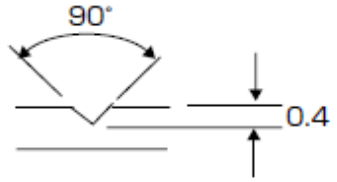
NOTE

Program settings are necessary.

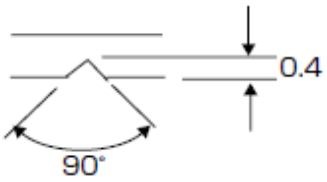
SELECTION

Model	Station	Unit	Code	Other
SAFETY TOOL (VULCAN)	D	Whole set (see above) or part to be replaced	**N.P.N**	Your machine name or KX number. Punch size, die size and clearance.
	E			
	F			
	G			
	H			
	J			
	INDEX D			
	INDEX F			

CENTER PUNCH



TOP MARKING



BOTTOM MARKING

(mm)

- Both direction OK
- Punch holder is included.

MODEL SELECTION

1. STANDARD

MTL's basic center point tool. There are two options in the height of the lower part for bottom marking.

	Lower	Sheet	Unit	114 X	114 AB C2	114 AB C3S	114 AB C3W	114 AB L10
TOP Marking	Flat	t1.0~t6.3	Set	**P52-HX014**	**P54-HA055**	**P52-HA145**	**P58-HA148**	**-**
BTM Marking	Normal	t1.0~t3.2	Set	**P52-HX015**	**P54-HA143**	**P52-HA147**	**P58-HA151**	**L10-HA130**
		t2.4~t6.3	Set	**P52-HX051**	**-**	**P52-HA562**	**P52-HA528**	**-**
	Short	t1.0~t2.3	Set	**P52-HX026**	**P54-HA461**	**P52-HA463**	**P52-HA464**	**L10-HA466**

(mm)

2. ADJUSTABLE

The level of pin is changeable as long as 1.5mm in projection. Short-type lower part only:

	Lower	Sheet	Unit	114 X	114 AB C2	114 AB C3S	114 AB C3W	114 AB L10
TOP Marking	Flat	t1.0~t6.3	Set	**P5Y-HX007**	**-**	**-**	**P5Y-HA036**	**-**
BTM Marking	Short	t1.0~t2.3	Set	**P5Y-HX006**	**-**	**-**	**P5Y-HA034**	**-**

(mm)

3. CROSS POINTER

A cross is marked. There are two options in the height of the lower part for bottom marking.

	Lower	Sheet	Unit	114 X	114 AB C2	114 AB C3S	114 AB C3W	114 AB L10
TOP Marking	Flat	t1.0~t6.3	Set	-	**P54-HB075**	**P52-HB076**	**P58-HB077**	**-**
BTM Marking	Short	t1.0~t2.3	Set	-	**P54-HB460**	**P52-HB462**	**P58-HB463**	-
	Normal	t1.0~t3.2	Set	-	**P54-HB072**	**P58-HB074**	**P58-HB073**	**-**

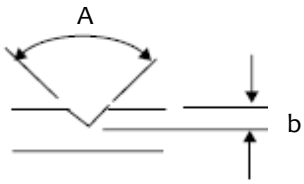
(mm)

CENTER PUNCH - CONTINUED

FOR FURTHER REQUIREMENT(S)

Let us know the following:

- ✓ Point dimensions
- ✓ Process direction; i.e. top marking or bottom marking
- ✓ Sheet material and thickness to be processed
- ✓ Machine's KX number
- ✓ Other requests: i.e. lower height, etc.

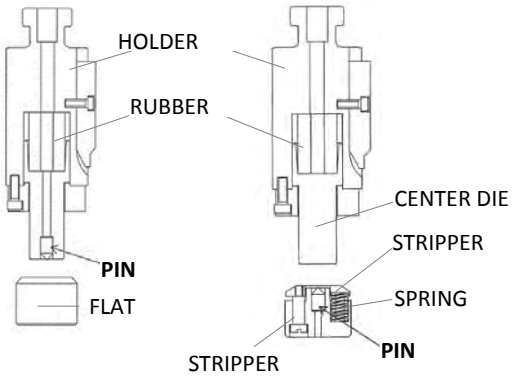


(mm)

FOR REPLACEMENT

Let us know the following:

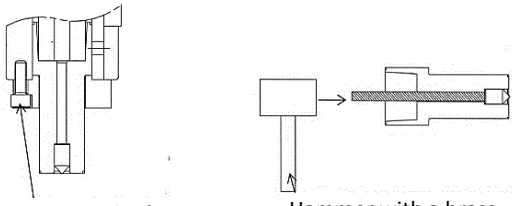
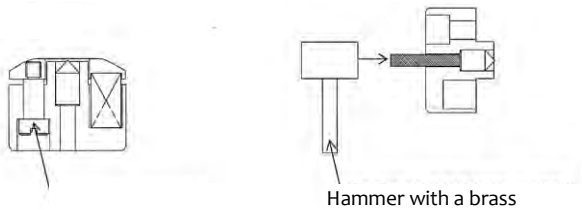
- ✓ Part name (see the right)
- ✓ Assembly code (engraved on the surface)



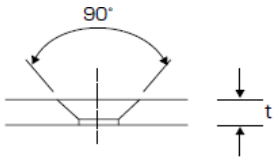
TOP MARKING **BOTTOM MARKING**

TIPS

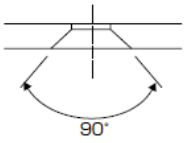
The pin is replaceable.

TOP MARKING	**BOTTOM MARKING**
 Loosen the fixtures. Hammer with a brass smaller than ϕ4.5.	 Loosen the fixtures. Hammer with a brass smaller than ϕ4.5.

COINED COUNTERSINK



TOP PUNCHING



BOTTOM PUNCHING

(mm)

- Both direction OK
- No punch holder is included.
- Pilot hole is needed.

SELECTION

TOP PUNCHING

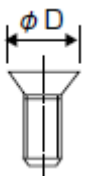
D	BOLT	PILOT	SHEET	114X	114A	114B	VUL X	VUL B
5	M2.5	4.7	t 1.2	**P52-ZX062**	**P52-ZA776**	**P52-ZBE64**	**P52-ZX017**	**P52-ZB243**
		4.5	t 1.6	**P52-ZX063**	**P52-ZA780**	**P52-ZBE66**	**P52-ZX020**	**P52-ZB245**
		4.2	t 2.0	**P52-ZX064**	**P52-ZA784**	**P52-ZBE68**	**P52-ZX022**	**P52-ZB247**
		4	t 2.3	**P52-ZX065**	**P52-ZA788**	**P52-ZBE70**	**P52-ZX024**	**P52-ZB249**
6	M3	5.7	t 1.2	**P52-ZX067**	**P52-ZA792**	**P52-ZBE72**	**P52-ZX026**	**P52-ZB251**
		5.3	t 1.6	**P52-ZX068**	**P52-ZA794**	**P52-ZBE74**	**P52-ZX029**	**P52-ZB253**
		5	t 2.0	**P52-ZX069**	**P52-ZA693**	**P52-ZBE76**	**P52-ZX031**	**P52-ZB255**
		4.7	t 2.3	**P52-ZX070**	**P52-ZA798**	**P52-ZBE78**	**P52-ZX033**	**P52-ZB257**
8	M4	7.7	t 1.2	**P52-ZX072**	**P52-ZA802**	**P52-ZBE80**	**P52-ZX035**	**P52-ZB259**
		7.3	t 1.6	**P52-ZX073**	**P52-ZA716**	**P52-ZBE82**	**P52-ZX038**	**P52-ZB261**
		6.8	t 2.0	**P52-ZX074**	**P52-ZA808**	**P52-ZBE84**	**P52-ZX040**	**P52-ZB263**
		6.5	t 2.3	**P52-ZX075**	**P52-ZA812**	**P52-ZBE86**	**P52-ZX042**	**P52-ZB265**
10	M5	9.6	t 1.2	**P52-ZX077**	**P52-ZA816**	**P52-ZBE88**	**P52-ZX044**	**P52-ZB267**
		9.2	t 1.6	**P52-ZX078**	**P52-ZA713**	**P52-ZBE90**	**P52-ZX047**	**P52-ZB269**
		8.7	t 2.0	**P52-ZX079**	**P52-ZA822**	**P52-ZBE92**	**P52-ZX049**	**P52-ZB271**
		8.4	t 2.3	**P52-ZX080**	**P52-ZA826**	**P52-ZBE94**	**P52-ZX051**	**P52-ZB273**
12	M6	11.5	t 1.2	**P52-ZX082**	**P52-ZA953**	**P52-ZBE96**	**P52-ZX053**	**P52-ZB275**
		11.1	t 1.6	**P52-ZX083**	**P52-ZA955**	**P52-ZBE98**	**P52-ZX056**	**P52-ZB277**
		10.6	t 2.0	**P52-ZX084**	**P52-ZA957**	**P52-ZBF01**	**P52-ZX058**	**P52-ZB279**
		10.3	t 2.3	**P52-ZX085**	**P52-ZA959**	**P52-ZBF03**	**P52-ZX060**	**P52-ZB281**

(mm)

BOTTOM PUNCHING

Inform us of the following:

- ✓ Bolt size or size D
- ✓ Sheet material and thickness to be processed
- ✓ Machine's KX number



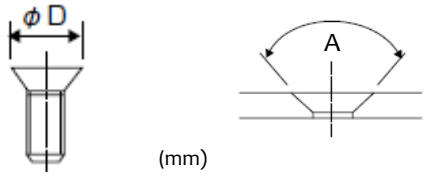
(mm)

COINED COUNTERSINK – CONTINUED

FOR FURTHER REQUIREMENT

Inform us of the following:

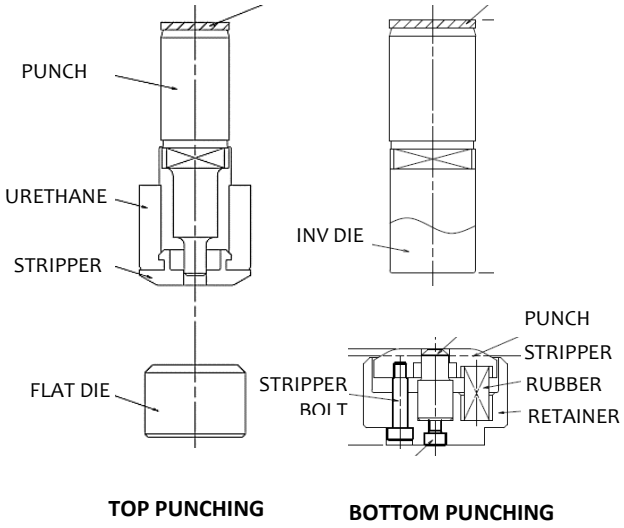
- ✓ Bolt size or size D
- ✓ Open angle A
- ✓ Side
- ✓ Sheet material and thickness to be processed
- ✓ Machine's KX number
- ✓ Other requests



FOR REPLACEMENT

Inform us of the following:

- ✓ Part name (see the previous page)
- ✓ Assembly code (engraved on the surface)



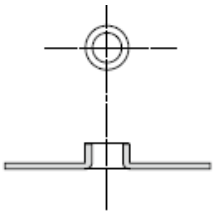
TOP PUNCHING **BOTTOM PUNCHING**

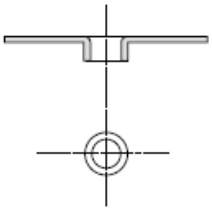
TIPS

A pilot hole and a result

Pilot hole is OK. Pilot hole is too large. Pilot hole is too small.

BURRING / EXTRUDED HOLE





- Both side is OK.
- No punch holder is included.
- Pilot hole is needed.

SELECTION

UPWARD PROCESS

		Tap to cut			Tap to form	
	SHEET	114B	114C	114D	114C	114D
M3	t0.6 - t1.0	**P52-FB277**	**P52-FC095**	**P52-FD819**	**P52-FC205**	**P52-FD602**
	t1.2 - t1.6	**P52-FB278**	**P52-FC096**	**P52-FD417**	**P52-FC870**	**P52-FD732**
M4	t0.8 - t1.0	**P52-FB279**	**P52-FC097**	**P52-FD418**	**P52-FC206**	**P52-FD603**
	t1.2 - t1.6	**P52-FB280**	**P52-FC098**	**P52-FD419**	**P52-FC869**	**P52-FD733**
	t2.0 - t2.3		**P52-FC099**	**P52-FD420**	**P52-FC592**	**P52-FD735**
M5	(t0.8) t1.0		**P52-FC100**	**P52-FD421**	**P52-FC207**	**P52-FD604**
	t1.2 - t1.6		**P52-FC101**	**P52-FD422**	**P52-FC208**	**P52-FD605**
	t2.0 - t2.3		**P52-FC102**	**P52-FD423**	**P52-FC595**	**P52-FD736**
M6	t1.0		**P52-FC103**	**P52-FD424**	**P52-FC209**	**P52-FD606**
	t1.2 - t1.6		**P52-FC104**	**P52-FD436**	**P52-FC210**	**P52-FD607**
	t2.0 - t2.3		**P52-FC105**	**P52-FD437**	**P52-FC630**	**P52-FD737**
M8	t1.6			**P52-FD439**		
	t2.0 - t2.3			**P52-FD440**		
	t3.2			**P52-FD441**		

(mm)

For mild steels, 114C is recommended: For stainless steels, 114 D is recommended.

BURRING - CONTINUED

DOWNWANRD PROCESS

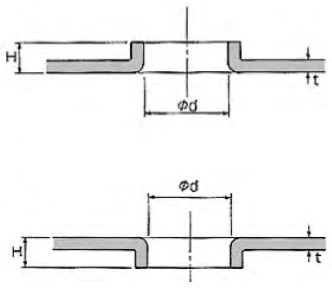
	SHEET	Tap to cut				Tap to form			
		114X	114A	114B	VUL AB	114X	114A	114B	VUL AB
M3	0.6-1.0	**P52-FX007**	**P52-FA581**	**P52-FB608**	**P52-FB049**	**P52-FX019**	**P52-FA313**	**P52-FB628**	**P52-FB120**
	1.2-1.6	**P52-FX008**	**P52-FA189**	**P52-FB609**	**P52-FB117**	**P52-FX020**	**P52-FA582**	**P52-FB629**	**P52-FB121**
M4	0.8-1.0	**P52-FX009**	**P52-FA190**	**P52-FB610**	**P52-FB066**	**P52-FX021**	**P52-FA314**	**P52-FB630**	**P52-FB122**
	1.2-1.6	**P52-FX010**	**P52-FA191**	**P52-FB611**	**P52-FB058**	**P52-FX022**	**P52-FA315**	**P52-FB631**	**P52-FB123**
	2.0-2.3	**P52-FX011**	**P52-FA192**	**P52-FB612**	**P52-FB118**	**P52-FX023**	**P52-FA316**	**P52-FB632**	**P52-FB124**
M5	(0.8) 1.0	**P52-FX012**	**P52-FA193**	**P52-FB613**	**P52-FB067**	**P52-FX024**	**P52-FA317**	**P52-FB633**	**P52-FB125**
	1.2-1.6	**P52-FX013**	**P52-FA194**	**P52-FB614**	**P52-FB062**	**P52-FX025**	**P52-FA318**	**P52-FB634**	**P52-FB126**
	2.0-2.3	**P52-FX014**	**P52-FA195**	**P52-FB615**	**P52-FB068**	**P52-FX026**	**P52-FA583**	**P52-FB635**	**P52-FB127**
M6	1.0	**P52-FX015**	**P52-FA196**	**P52-FB616**	**P52-FB119**	**P52-FX027**	**P52-FA584**	**P52-FB636**	**P52-FB128**
	1.2-1.6	**P52-FX016**	**P52-FA197**	**P52-FB617**	**P52-FB069**	**P52-FX028**	**P52-FA319**	**P52-FB637**	**P52-FB129**
	2.0-2.3	**P52-FX017**	**P52-FA198**	**P52-FB618**	**P52-FB070**	**P52-FX029**	**P52-FA320**	**P52-FB638**	**P52-FB130**

(mm)

FOR FURTHER REQUIREMENT

Inform us of the following:

- ✓ Hole dimensions
- ✓ Side
- ✓ Sheet material and thickness to be processed
- ✓ Machine's KX number
- ✓ Other requests; i.e. up/down (upward only), etc.

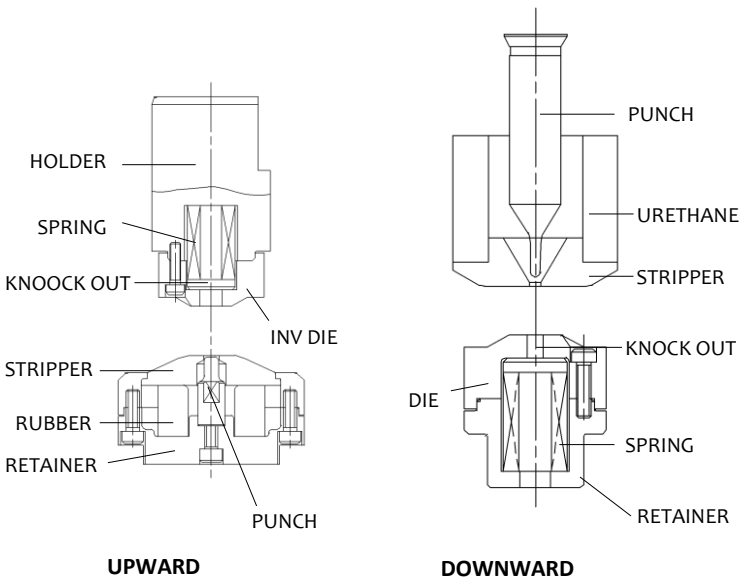


(mm)

FOR REPLACEMENT

Inform us of the following:

- ✓ Part name (see the previous page)
- ✓ Assembly code (engraved on the surface)

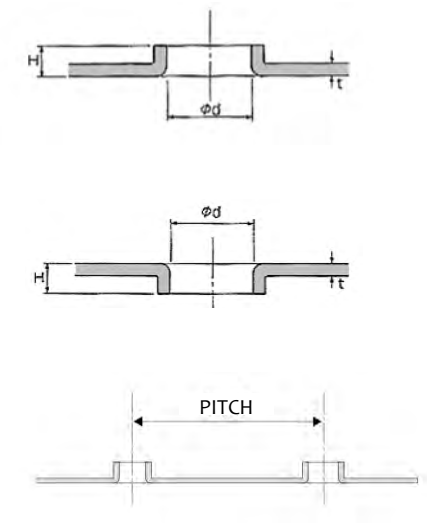


BURRING AND PILOT HOLE

TAP TO CUT

	t	PILOT	d	PITCH
M3	0.5-0.6	**1.0**	2.44	12
	0.8-1.0	**1.2**		
	1.2-1.6	**1.4**		
M4	0.5~0.6	**1.0**	3.33	14
	0.8	**1.2**		
	1.0	**1.4**		
	1.2	**1.7**		
	1.5-1.6	**1.9**		
	2.0-2.3	**2.2**		
M5	(0.8)	**1.4**	4.17	14
	1.0	**1.6**		
	1.2-1.4	**2.0**		
	1.5-1.6	**2.2**		
	2.0	**2.6**		
	2.3	**3**		
M6	(1.0) SUS 1.0	**1.8**	5.08	15
	1.2-1.4	**2.0**		
	1.5	**2.4**		
	1.6	**2.6**		
	2	**3**		
	2.3	**3.6**		

(mm)



TAP TO FORM

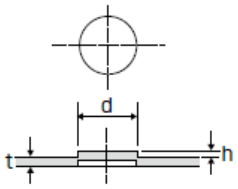
	t	PILOT	d	PITCH
M3	0.5-0.8	**1.2**	2.81	13
	1.0-1.6	**1.4**		
M4	0.5-1.0	**1.4**	3.7	15
	SUS 1.0	**1.9**		
	1.2-1.4	**1.9**		
	1.5-1.6	**1.9**		
	SUS 1.5	**1.9**		
	2.0-2.3	**2.2**		
	SUS 2.0	**2.2**		
M5	(0.8)-1.2	**2.1**	4.66	15
	SUS 1.0	**2.3**		
	1.4-1.6	**2.5**		
	SUS 1.5	**2.6**		
	2.0	**2.8**		
	2.3	**3.3**		
M6	(1.0)-1.4	**2.4**	5.57	16
	1.5-1.6	**2.6**		
	2.0	**3.3**		
	2.3	**3.8**		

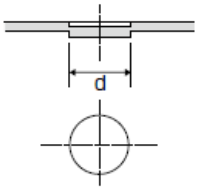
(mm)

NOTE

- A 0.1-0.2 difference in pilot hole size does not affect the height of an extrusion.
- More attention shall be paid to downward setting.
- Pitch is limited by sheet thickness and ϕd.
- Too large pilot hole for stainless steel may cause stripping failure.

LOCATER POINT





UPWARD **DOWNWARD** (mm)

- Both direction OK
- No punch holder is included.

MTL STOCK

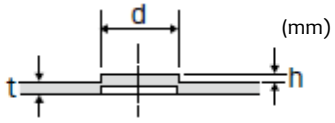
		Unit	3.0	4.0	5.0	NOTE
UPWARD	114 B	Set	**P52-JBN30**	**P52-JBN31**	**P52-JBN32**	Mild steel ~t2.3; Stainless ~t2.0
DOWNWARD	114 A	Set	**P52-JA474**	**P52-JA475**	**P52-JA476**	Mild steel ~t2.3; Stainless ~t2.0
DOWNWARD	114 B	Set	**P52-JBP17**	**P52-JBP18**	**P52-JBP19**	Mild steel ~t3.2; Stainless ~t2.0

(mm)

FOR CUSTOMIZATION

Inform us of the following:

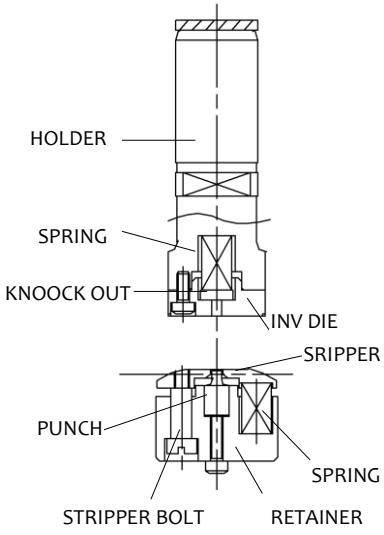
- ✓ Required dimensions (*h* shall be half of *t*: see above)
- ✓ Side
- ✓ Sheet material and thickness to be processed
- ✓ Machine's KX number
- ✓ Other requests; i.e. up/down, station, etc.
  - o *h* shall be half of *t* or shorter.



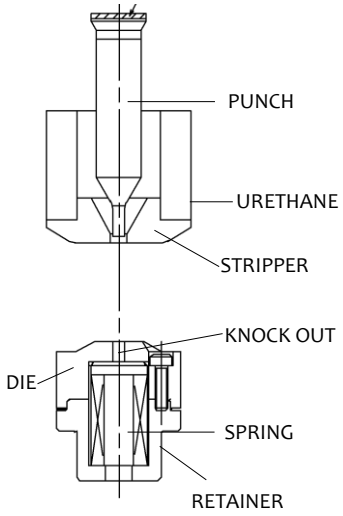
FOR REPLACEMENT

Inform us of the following:

- ✓ Part name (see the previous page)
- ✓ Assembly code (engraved on the surface

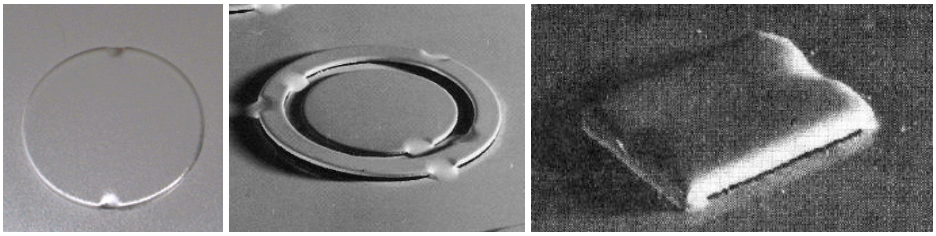


UPWARD



DOWNWARD

KNOCK OUT



- Make to order
- Upward only, Style 114 only
- No punch holder included.

SIZE LIMIT

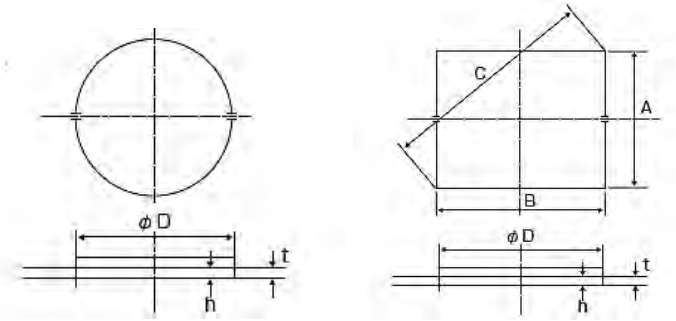
STATION	ROUND Φ	**SQUARE**	**RECTANGULAR**
B	8		
C	14	**13X13**	**5X18**
D	23	**17X17**	**10X20**
E	29	**20X20**	**15X44**
D	33	**23X23**	**17X55**
G	55	**38X38**	**17X64**
H	64	**45X45**	**22X77**
J	74	**52X52**	**24X92**

(mm)

FOR CUSTEMIZATION

Inform us of the following:

- ✓ Dimensions (see right)
- ✓ Sheet material and thickness
- ✓ Machine's KX number
- ✓ Number of connections
- ✓ Other preferences; i.e. Station, up/down, etc.

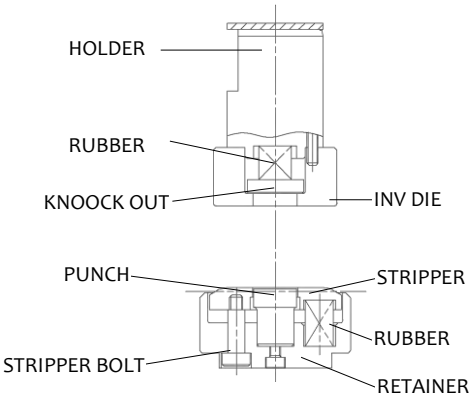


(mm)

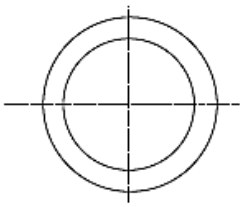
FOR REPLACEMENT

Inform us of the following:

- ✓ Part name (see the previous page)
- ✓ Assembly code (engraved on the surface)



COUNTERSINK (EMBOSS TYPE)

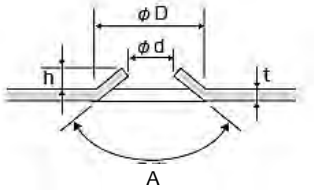


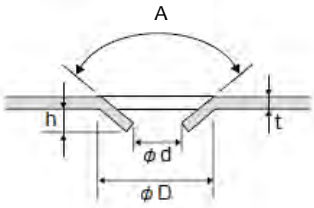
- Make to order
- Both direction OK
- A pilot hole is needed.
- No punch holder is not included.

SIZE LIMIT

STATION	UPWARD ΦD	DOWNWARD ΦD
X		**8**
A		**8**
B		**8**
C	**14**	
D	**23**	
E	**29**	
D	**33**	
G	**55**	
H	**64**	
J	**74**	

(mm)





FOR CUSTEMIZATION

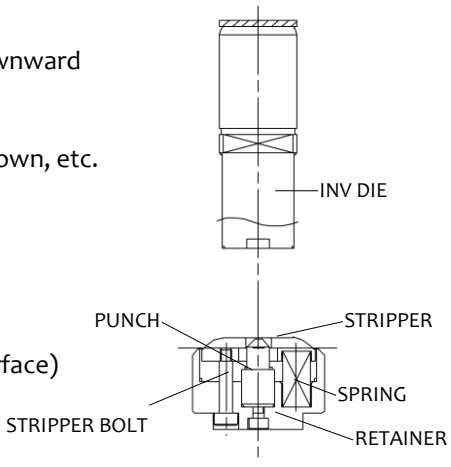
Inform us of the following:

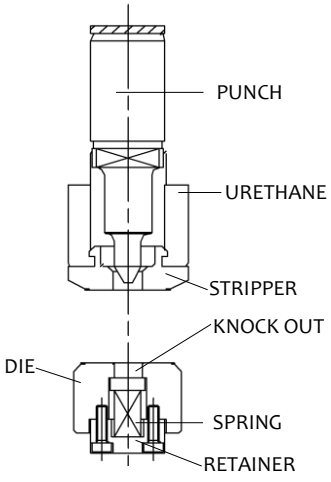
- ✓ Dimensions (see above)
- ✓ Process direction; i.e. upward or downward
- ✓ Sheet material and thickness
- ✓ Machine's KX number
- ✓ Other preferences; i.e. Station, up/down, etc.

FOR REPLACEMENT

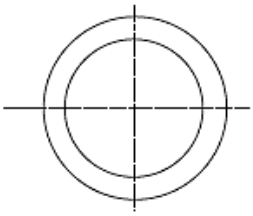
Inform us of the following:

- ✓ Part name (see right)
- ✓ Assembly code (engraved on the surface)





EMBOSS ROUND

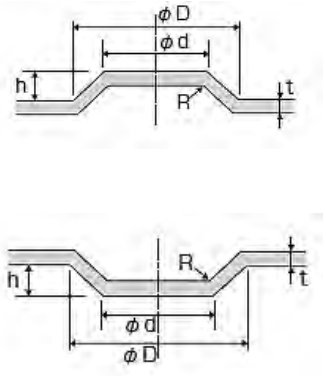


- Make to order
- Both direction OK
- No punch holder is included.

SIZE LIMIT

STATION	**UPWARD ΦD**	**DOWNWARD ΦD**
X		**8**
A		**8**
B		**8**
C	**14**	
D	**23**	
E	**29**	
D	**33**	
G	**55**	
H	**64**	
J	**74**	

(mm)



FOR CUSTEMIZATION

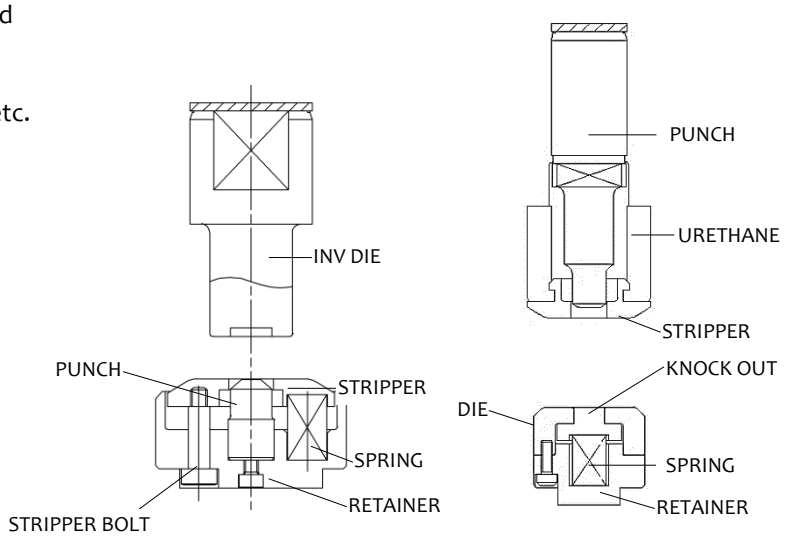
Inform us of the following:

- ✓ Dimensions (see above)
- ✓ Process direction; i.e. upward or downward
- ✓ Sheet material and thickness
- ✓ Machine's KX number
- ✓ Other preferences; i.e. Station, up/down, etc.

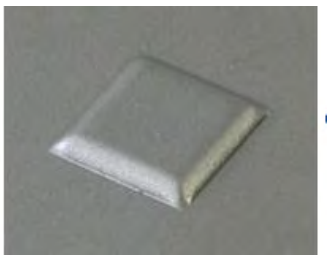
FOR REPLACEMENT

Inform us of the following:

- ✓ Part name (see the right)
- ✓ Assembly code (engraved on the surface)



EMBOSS SQUARE

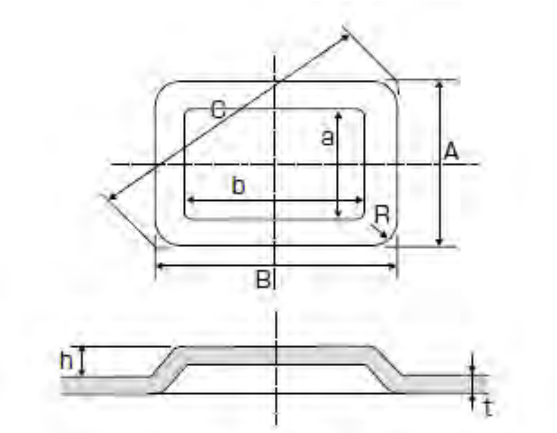


- Make to order
- Upward / Style 114 only
- No punch holder is included.

SIZE LIMIT

STATION	C	RECTANGLE
C	**13**	**5X18**
D	**17**	**10X20**
E	**20**	**15X44**
D	**23**	**17X55**
G	**38**	**17X64**
H	**45**	**22X77**
J	**52**	**24X92**

(mm)



FOR CUSTEMIZATION

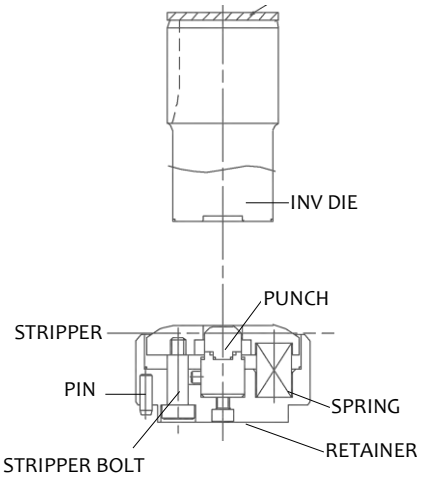
Inform us of the following:

- ✓ Dimensions (see above)
- ✓ Process direction; i.e. upward or downward
- ✓ Sheet material and thickness
- ✓ Machine's KX number
- ✓ Other preferences; i.e. Station, up/down, etc.

FOR REPLACEMENT

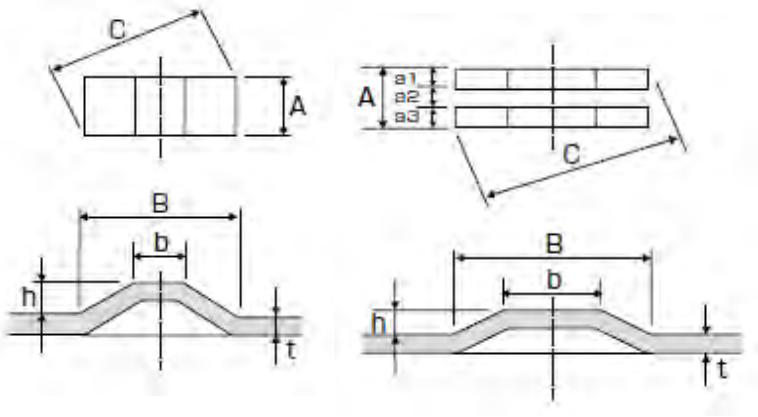
Inform us of the following:

- ✓ Part name (see right)
- ✓ Assembly code (engraved on the surface)



BRIDGE

- Make to order
- Upward / Style 114 only
- No punch holder is included.



SIZE LIMIT

STATION	**SINGLE C**	**DOUBLE C**
C	**5X12**	**5X12**
D	**7X23**	**7X23**

(mm)

FOR CUSTEMIZATION

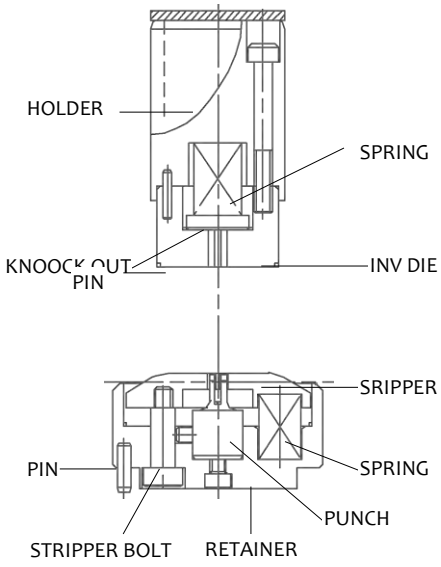
Inform us of the following:

- ✓ Dimensions (see above)
- ✓ Sheet material and thickness
- ✓ Machine's KX number
- ✓ Other preferences; i.e. Station, up/down, etc.

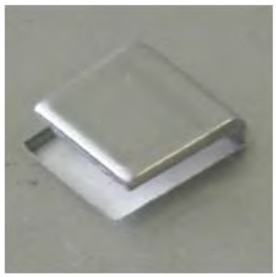
FOR REPLACEMENT

Inform us of the following:

- ✓ Part name (see the right)
- ✓ Assembly code (engraved on the surface)



LANCE

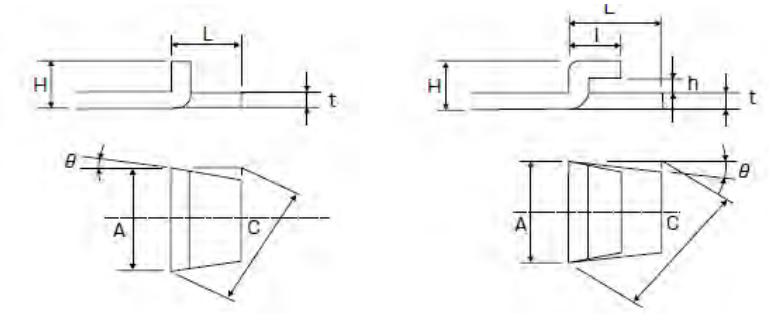


- Make to order
- Upward / Style 114 only
- No punch holder is included.

SIZE LIMIT

STATION	**SINGLE C**
D	**10X22**
E	**15X44**
F	**17X55**
G	**17X64**
H	**20X77**
J	**20X100**

(mm)



FOR CUSTEMIZATION

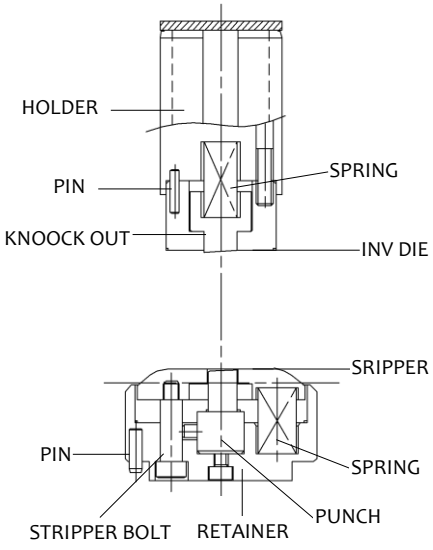
Inform us of the following:

- ✓ Dimensions (see above)
- ✓ Sheet material and thickness
- ✓ Machine's KX number
- ✓ Other preferences; i.e. Station, up/down, etc.

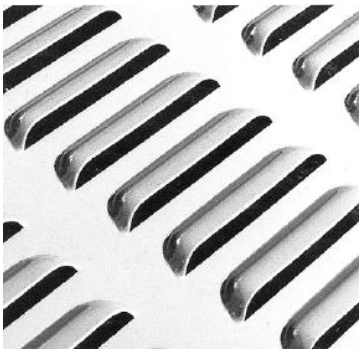
FOR REPLACEMENT

Inform us of the following:

- ✓ Part name (see the right)
- ✓ Assembly code (engraved on the surface)



LOUVER

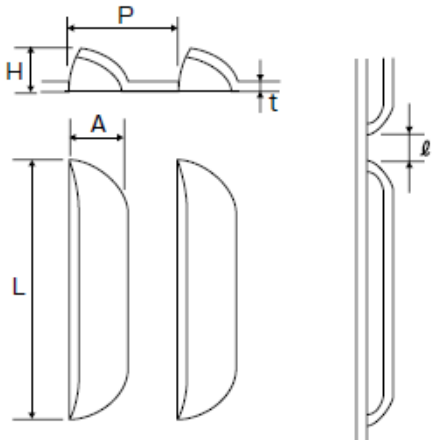


- Make to order
- Upward / Style 114 only
- No punch holder is included.

SIZE LIMIT

STATION	**SINGLE C**
D	**10X22**
E	**15X44**
F	**17X55**
G	**17X64**
H	**20X77**
J	**20X100**

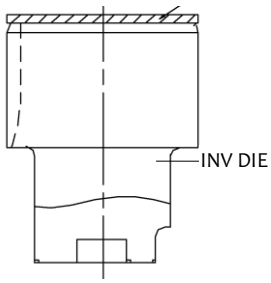
(mm)



FOR CUSTEMIZATION

Inform us of the following:

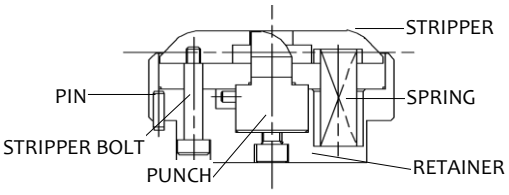
- ✓ Dimensions (see above)
- ✓ Sheet material and thickness
- ✓ Machine's KX number
- ✓ Other preferences; i.e. Station, up/down, etc.



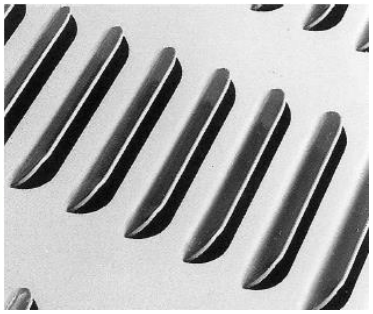
FOR REPLACEMENT

Inform us of the following:

- ✓ Part name (see the right)
- ✓ Assembly code (engraved on the surface)



HOOP

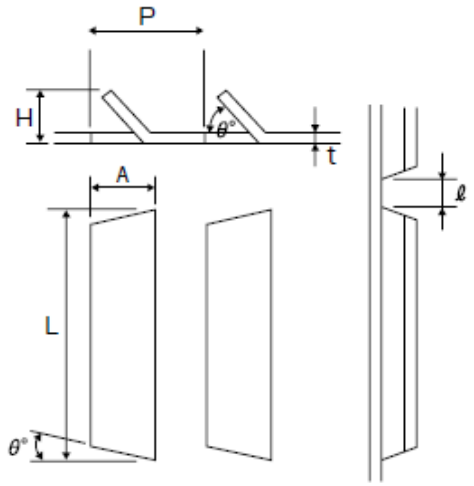



- Make to order
- Upward / Style 114 only
- No punch holder is included.

SIZE LIMIT

STATION	**SINGLE C**
D	**10X22**
E	**15X44**
F	**17X55**
G	**17X64**
H	**20X77**
J	**20X100**

(mm)



FOR CUSTEMIZATION

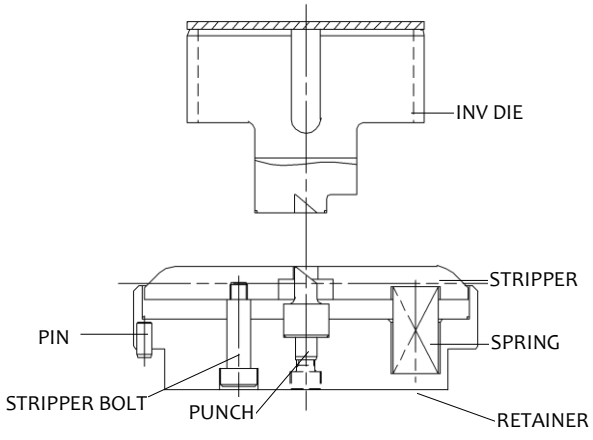
Inform us of the following:

- ✓ Dimensions (see above)
- ✓ Sheet material and thickness
- ✓ Machine's KX number
- ✓ Other preferences; i.e. Station, up/down, etc.

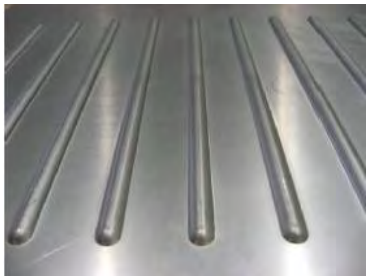
FOR REPLACEMENT

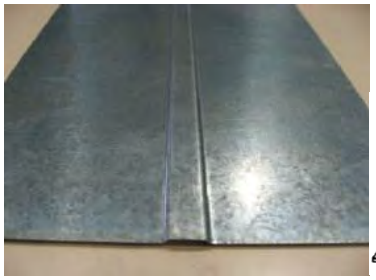
Inform us of the following:

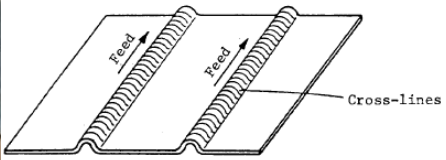
- ✓ Part name (see the right)
- ✓ Assembly code (engraved on the surface)



BEAD





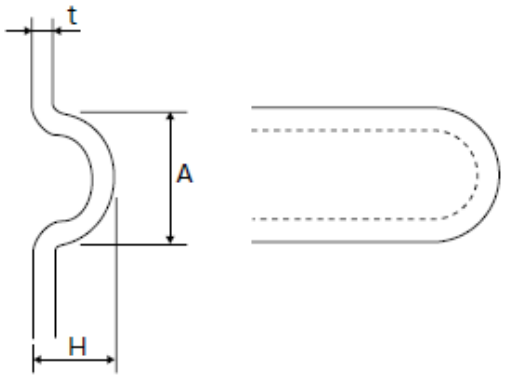


- Make to order
- Upward / Style 114 only
- No punch holder is included.

SIZE LIMIT

STATION	A	H
C	**6**	**A/5**
D	**10**	
E	**16**	
F	**20**	
G	**26**	
H	**32**	
J	**40**	

(mm)



FOR CUSTEMIZATION

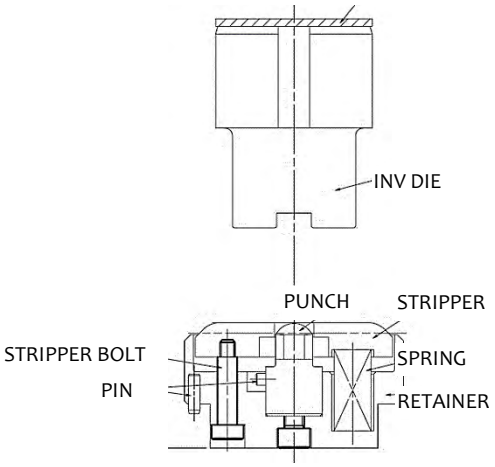
Inform us of the following:

- ✓ Dimensions (see above)
- ✓ Sheet material and thickness
- ✓ Machine's KX number
- ✓ Other preferences; i.e. Station, up/down, etc.

For replacement

Inform us of the following:

- ✓ Part name (see the right)
- ✓ Assembly code (engraved on the surface)



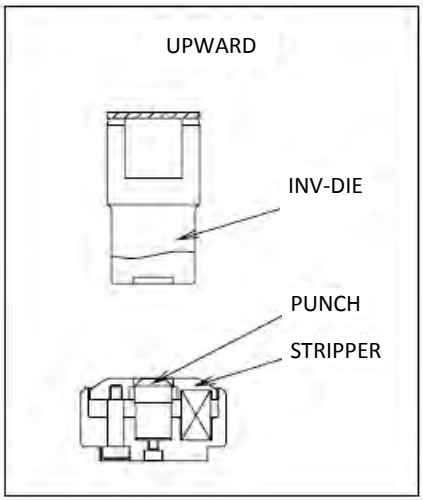
FORMING TOOL BASIC CONSTRUCTION

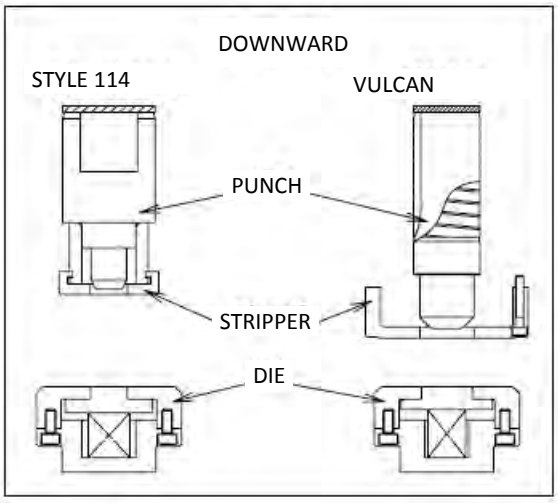
UPWARD

- Forming upper part fits in 114 PUNCH HOLDER.
- Most of non-UP/DOWN forming lower part fit in 114 DIE HOLDER except some special cases.
- Forming punch (pin) in the lower part is replaceable. The part can be sharpened.
- Non-UP/DOWN lower part is higher than the remaining surface.

DOWNWARD

- Forming upper part is selectable from VULCANTOOL or STYLE 114.
- Non-UP/DOWN lower part fits in 114 DIE HOLDER except some special cases.
- Lower part pushes up the sheet when the punch withdraws.
- Lower tool is as high as the surrounding surface, unlike upward tool, except some special cases.





UP/DOWN (RETRACTABLE) MODEL – Optional

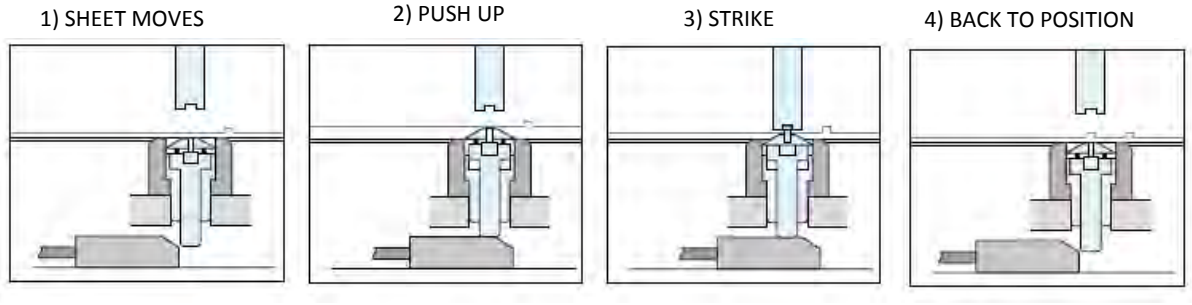
UP/DOWN FORMING TOOL is designed to be retractable when necessary. While a work is traversing, the lower part stays flush with the surrounding surface and pops up only when the punch strikes. There is less friction between the work and the part, and thus, less scratches are found on the backside of the sheet.

NOTE: Your machine must be ready for this option. Contact Murata Machinery for confirmation.

GOOD

- ✓ Fewer scratches on a metal sheet
- ✓ A metal sheet does not bend when punching takes place near the forming area.
- ✓ No limitation in table speed
- ✓ No interference with the work holder

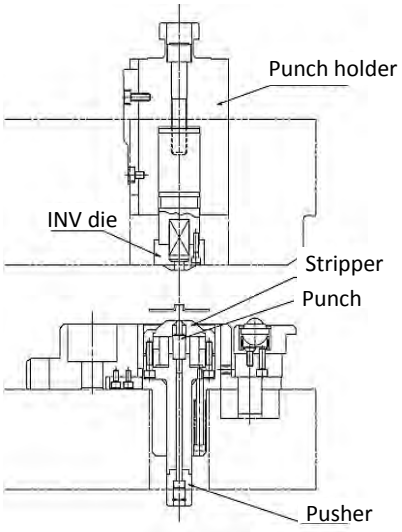
MECHANIZM



1. The sheet comes to position.
2. The machine's cylinder pushes the cam and the cam raises the lower part at the bottom.
3. Forming takes place.
4. The tools return to their position.

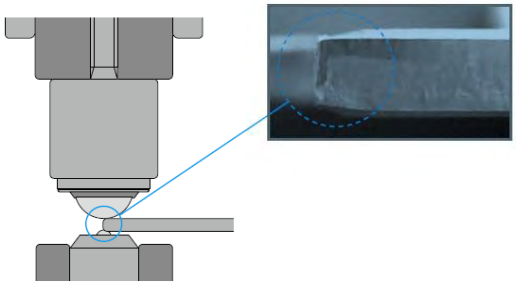
NOTE

- The first setting of NC parameters shall be done by MURATA engineer.
- Die holder is special to UP/DOWN.
- UP/DOWN operation must be done in outer-track only.
- Put the lower part through the upper turret for mounting.
- Keep a sufficient distance between two UP/DOWN operations.
- Do not use two UP/DOWN tool next to each other.
- The length of the lower part varies among machines. For sharing a tool among several machines, the pusher may be changed. Contact us for further information.



BALL TOOL BT-III (114 A)

BALL TOOL BT-III is MTL's original deburring tool. By rolling over the jagged surface, the balls constricts the slits on the both side and makes the cut surface milder and smoother. BT-III is an improved tool, more reachable even where the precedent model of 1-INCH BALL TOOL could not.



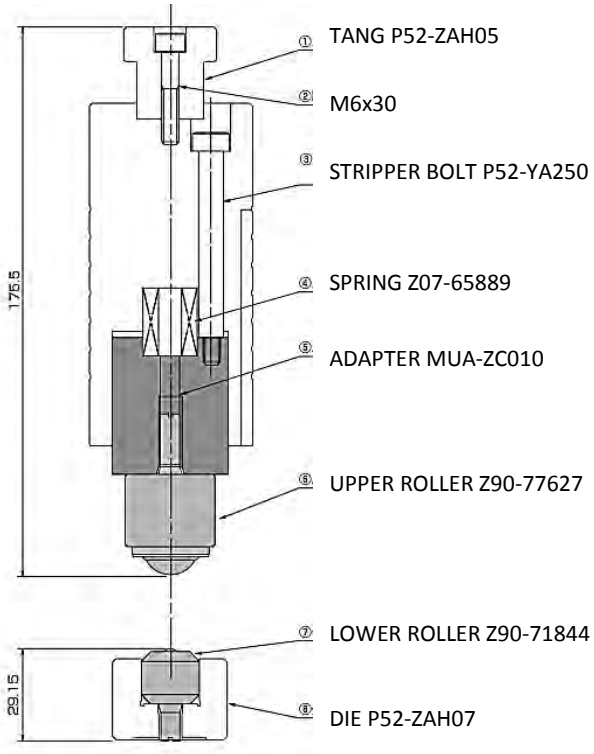
Sheet	Thick *t*
Mild steel	0.8 ~ 4.5
Stainless steel	0.8 ~ 3.0
Aluminum	0.8 ~ 3.0

(mm)

FOR INTRODUCTION

Contact Murata Machinery first for software preparation.

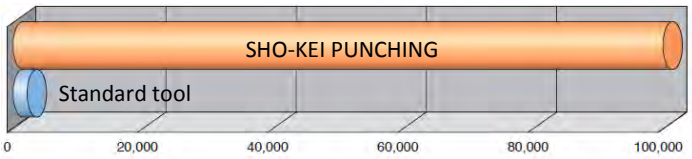
Model	Station	Unit	Code
BT-III	114 A	Whole set (see right)	**P52-ZAL29**



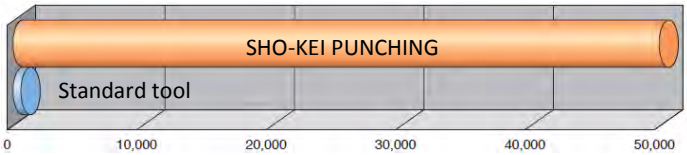
SHO-KEI PUNCHING SET (VULCANTOOL B)

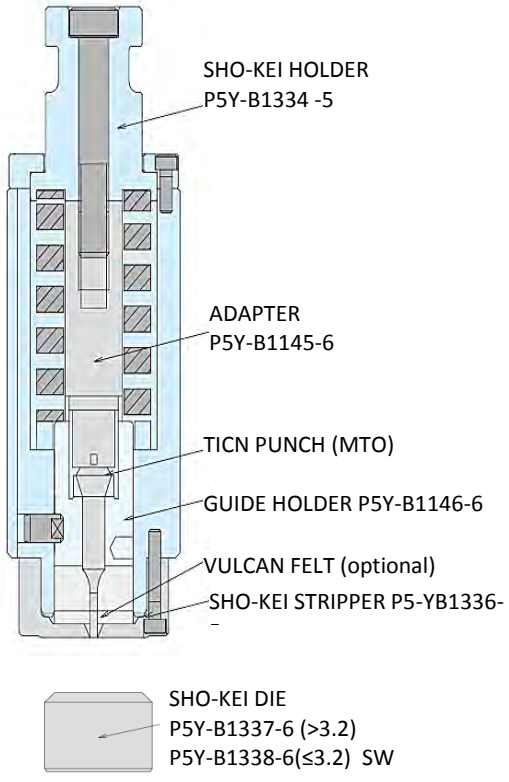
The tool is good at piercing an extremely small hole or a too-small-against-the-thickness hole, which so often breaks your punches. The SHO-KEI punch is made of stronger HSS steel and every other part is specially designed to help the fine cutting head penetrate a metal sheet safely.

Pierce ϕ3.6 on SPHC t6.0 with CL1.2 – over 100,000 hit successful!



Pierce ϕ3.3 on SUS304 t3.0 with CL0.7 – over 50,000 hit successful!





NOTE

- Do not use for nibbling.
- TICN PUNCH cannot be sharpened.
- VULCAN FELT and FELT OIL recommendable.

Sheet	Thick *t*	Hole size	Punch range	CL minimum	CL recommended
Mild steel	~ 6.0	*t* x0.6 ~	Φ1.6~ 6.0	0.5	*t* x0.2~0.25
stainless steel	~ 6.0	*t* x1.1 ~	Φ2.2~ 6.0	0.5	*t* x0.25~0.3
aluminum	~ 6.0	*t* x0.6 ~	Φ1.6~ 6.0	0.5	*t* x0.2~0.25

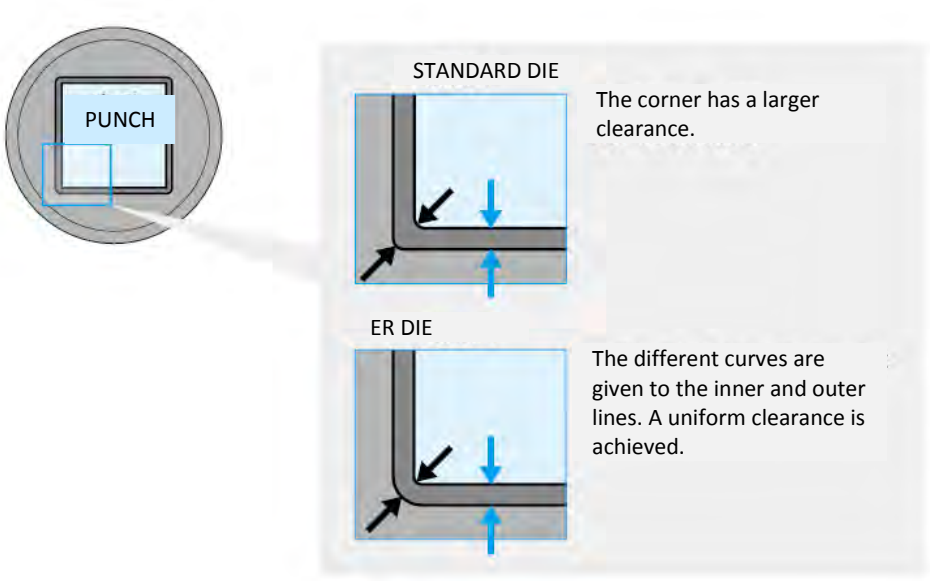
(mm)

Model	Station	Unit	Code	Other
SHO-KEI PUNCHING	VULCAN AB	Whole set (see above)	**P5Y-B1335**	Punch and die size, clearance

ER DIE

ER DIE has specially designed corners, in a way which a punch is surrounded by a perfectly even clearance. Even clearance reduces unwanted material effects during nibbling like burrs or projections on the backside of a sheet.

- Effective in nibbling operation
- To be used with MTL standard punches
- No additional cost



FOR ORDERING

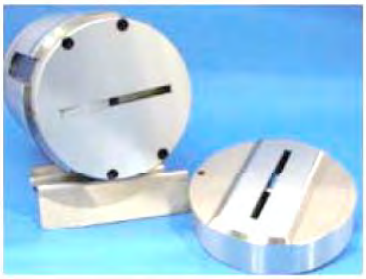
Just add *ER* to your die requirement.

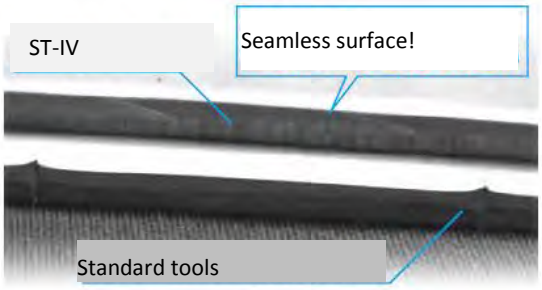
Example: 114 B DIE 5x5 RECT +CL0.25 **ER**

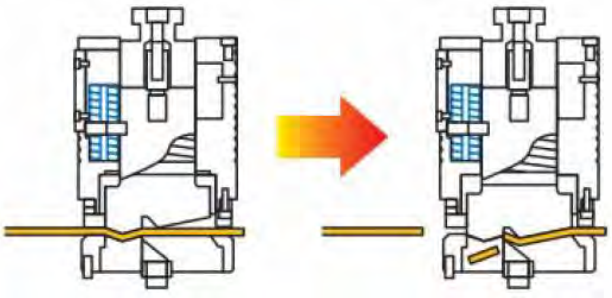
SEAMLESS TOOL ST-IV (VULCANTOOL F or INDEX F)

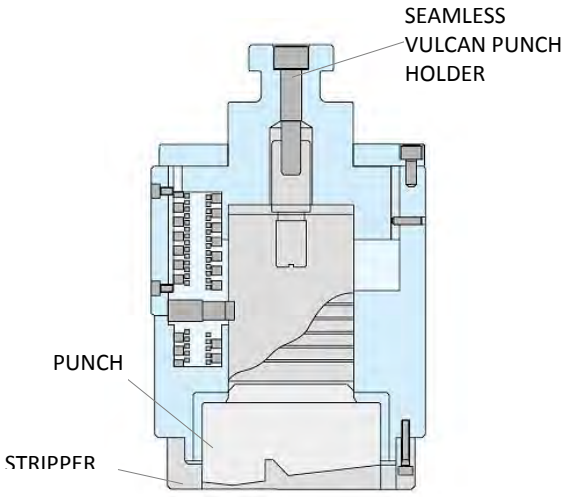
ST-IV is good for a smooth, seamless cutting surface in nibbling operation. For the first installation, contact your MURATA sales person for software preparation.

Machine operational: M2048TS, M2548TS, M2558TS, M3048TG, M3058TS, M2048HL, M2558HL









Sheet	Thick *t*	Pitch *p*
Mild steel	0.8 ~ 2.3	20 ~ 25
Stainless steel	0.8 ~ 2.0	20 ~ 25
Aluminum	0.8 ~ 3.0	20 ~ 25

(mm) Pitch is determined by material and thickness.

FOR INTRODUCTION

Contact Murata Machinery first for software preparation.

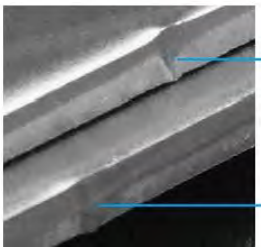
Model	Station	Punch*	Unit	Code	Other
SEAMLESS TOOL ST-IV	VULCAN F, INDEX F	5x70 10x70	Whole set (see above)	**N.P.N**	Sheet material and thickness (to determine clearance and pitch)

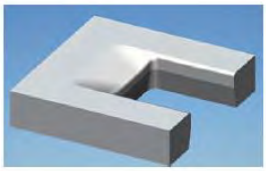
(mm)

***** For other sizes, contact us.

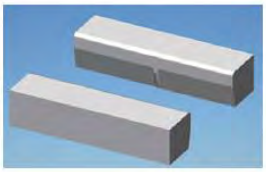
SMART SLITTING TOOL (VULCANTOOL D or larger)

SMART SLITTING TOOL is another solution for a smoother cut line after nibbling operation. This model is usable in standard holders and in all MURATA machines. Stations are selectable (see below).

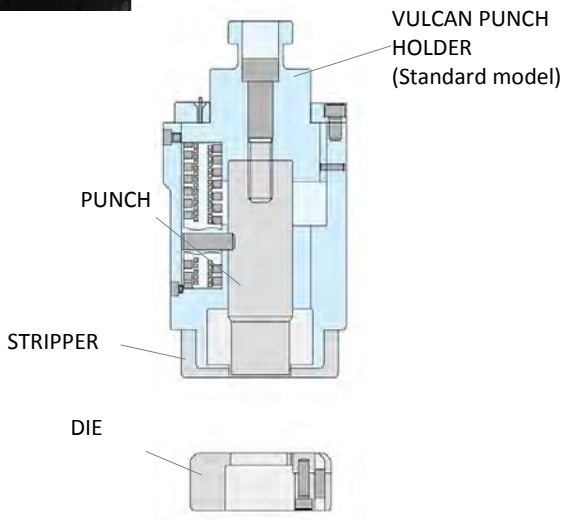




First hit



Second hit



Sheet	Thick *t*	CL to *t*	D	E	F, INDEX F	G	H	J
Mild steel	0.8 ~ 2.3	15% ~ 20%						
Stainless steel	0.8 ~ 2.0	20% ~ 25%	6X30	6X40	6X60	6X70	6X80	6X90
Aluminum	0.8 ~ 3.0	15% ~20%						

(mm)

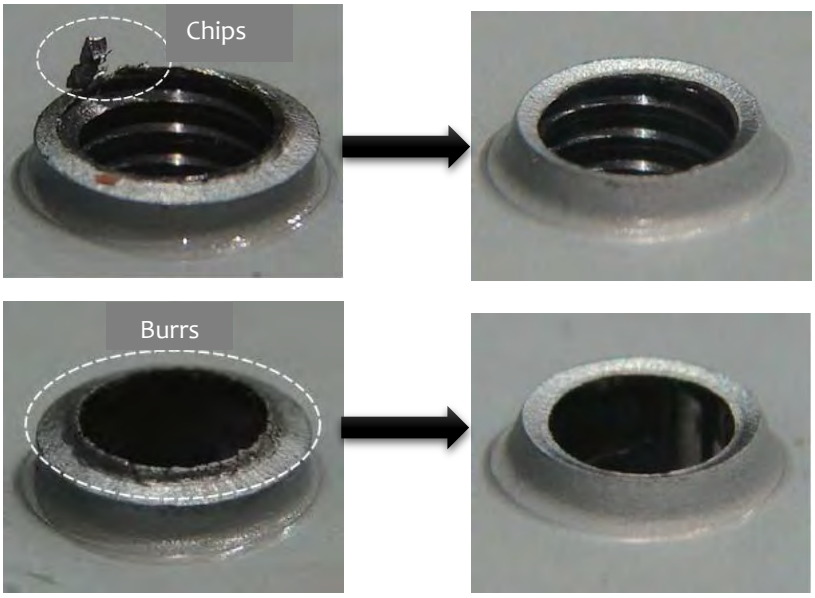
Sheet	Thick *t*	CL	D	E	F, INDEX F	G	H	J
Mild steel	0.8 ~ 6.0	15% ~ 20%						
Stainless steel	0.8 ~ 4.0	20% ~ 25%	10X30	10X40	10X60	10X70	10X80	10X90
Aluminum	0.8 ~ 6.0	15% ~20%						

(mm)

Model	Unit	Station	Size
SMART SLITTING TOOL	VULCAN Punch	See above	Pick up a size from the above and determine a die clearance.
	VULCAN Stripper		
	Style 114 Die		

HQ BURRING (EXTRUDED HOLE)

HQ BURRING is a higher quality of burring tool, which is designed to solve unfavorable byproducts after tapping – like chips and burrs. The surface of the tapped end is beautifully smooth.

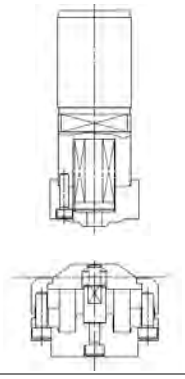


- Make to order
- No punch holder is included.
- Pilot hole is needed.

SELECTION

MILD STEEL UPWARD

Mild steel: 0.8~2.3; Aluminum: 0.8~2.0

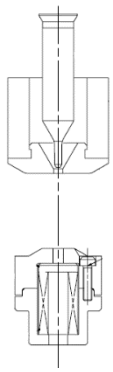
	Sheet *t*	Tap to cut		Tap to form		Unit
		114C	114D	114C	114D	
M3	0.8 - 1.0	**P5Y-FC014**	**P5Y-FD003**	**P5Y-FC022**	**P5Y-FD016**	
	1.2 - 1.6	**P5Y-FC015**	**P5Y-FD004**	**P5Y-FC023**	**P5Y-FD017**	
M4	0.8 - 1.0	**P5Y-FC016**	**P5Y-FD005**	**P5Y-FC024**	**P5Y-FD018**	
	1.2 - 1.6	**P5Y-FC017**	**P5Y-FD006**	**P5Y-FC025**	**P5Y-FD019**	
	2.0-2.3		**P5Y-FD007**		**P5Y-FD020**	
M5	0.8 - 1.0	**P5Y-FC018**	**P5Y-FD008**	**P5Y-FC026**	**P5Y-FD021**	
	1.2 - 1.6	**P5Y-FC019**	**P5Y-FD009**	**P5Y-FC027**	**P5Y-FD022**	
	2.0-2.3		**P5Y-FD010**		**P5Y-FD023**	
M6	0.8 - 1.0	**P5Y-FC020**	**P5Y-FD011**	**P5Y-FC028**	**P5Y-FD024**	
	1.2 - 1.6	**P5Y-FC021**	**P5Y-FD012**	**P5Y-FC029**	**P5Y-FD025**	
	2.0-2.3		**P5Y-FD013**		**P5Y-FD026**	

(mm)

HQ BURRING - CONTINUED

MILD STEEL DOWNWARD

Mild steel: 0.8~2.3; Aluminum: 0.8~2.0

	Sheet (t)	Tap to cut		Tap to form		Unit
		114 A	VULCAN AB	114 A	VULCAN AB	
M3	0.8 - 1.0	**P5Y-FA003**	**P5Y-FB005**	**P5Y-FA014**	**P5Y-FB016**	
	1.2 - 1.6	**P5Y-FA004**	**P5Y-FB006**	**P5Y-FA015**	**P5Y-FB017**	
M4	0.8 - 1.0	**P5Y-FA005**	**P5Y-FB007**	**P5Y-FA016**	**P5Y-FB018**	
	1.2 - 1.6	**P5Y-FA006**	**P5Y-FB008**	**P5Y-FA017**	**P5Y-FB019**	
	2.0-2.3	**P5Y-FA007**	**P5Y-FB009**	**P5Y-FA018**	**P5Y-FB020**	
M5	0.8 - 1.0	**P5Y-FA008**	**P5Y-FB010**	**P5Y-FA019**	**P5Y-FB021**	
	1.2 - 1.6	**P5Y-FA009**	**P5Y-FB011**	**P5Y-FA020**	**P5Y-FB022**	
	2.0-2.3	**P5Y-FA010**	**P5Y-FB012**	**P5Y-FA021**	**P5Y-FB023**	
M6	0.8 - 1.0	**P5Y-FA011**	**P5Y-FB013**	**P5Y-FA022**	**P5Y-FB024**	
	1.2 - 1.6	**P5Y-FA012**	**P5Y-FB014**	**P5Y-FA023**	**P5Y-FB025**	
	2.0-2.3	**P5Y-FA013**	**P5Y-FB015**	**P5Y-FA024**	**P5Y-FB026**	

(mm)

FOR STAINLESS STEEL

Contact us.

TOOLING SPECIFICATION

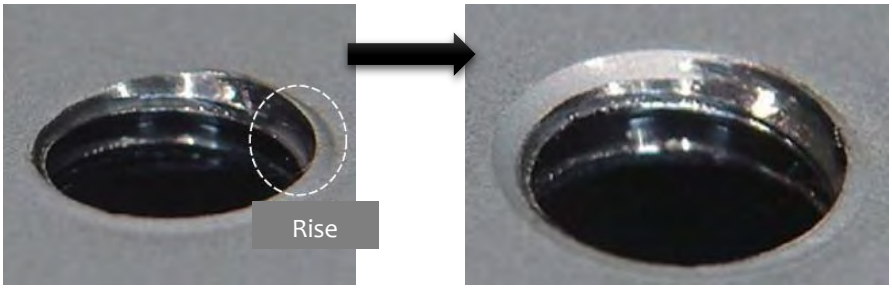
MILD STEEL, ALUMINIUM

	Sheet (t)	Tap to cut				Tap to steel			
		Pilot	Punch	Die	Pitch	Pilot	Punch	Die	Pitch
M3	0.8 - 1.0	1.6	2.44	3.9	12~	1.9	2.81	4.1	13~
	1.2 - 1.6	1.9	2.44	4.3	12~	2.2	2.81	4.9	13~
M4	0.8 - 1.0	1.9	3.33	4.7	14~	2.4	3.7	4.7	15~
	1.2 - 1.6	2.4	3.33	5.1	14~	2.8	3.7	5.3	15~
	2.0-2.3	2.7	3.33	5.7	14~	2.8	3.7	6.1	15~
M5	0.8 - 1.0	2.2	4.17	5.5	14~	2.8	4.66	5.9	15~
	1.2 - 1.6	2.7	4.17	5.9	14~	2.9	4.66	6.5	15~
	2.0-2.3	3.2	4.17	6.7	14~	3.3	4.66	7.3	15~
M6	0.8 - 1.0	2.4	5.08	6.5	15~	3.0	5.57	7.1	16~
	1.2	2.7	5.08	6.9	6.9~	3.6	5.57	7.3	16~
	1.6	3.2	5.08	6.9	6.9~	3.6	5.57	7.3	16~
	2.0	3.4	5.08	7.9	7.9~	4.0	5.57	8.3	16~
	2.3	3.6	5.08	7.9	7.9~	4.0	5.57	8.3	16~

(mm)

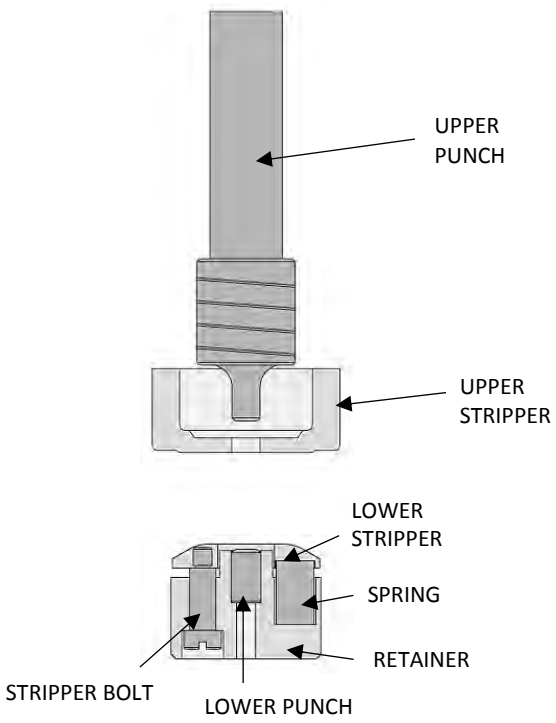
CHAMFER TOOL

CHAMFER TOOL prevents the rise of the material when a thread being formed. This is effective for a non-extruded tapping.



Sheet	Thick *t*
Mild steel	0.8 ~ 3.2
Stainless steel	0.8 ~ 2.0
Aluminum	0.8 ~ 3.0

(mm)



SELECTION

	VULCAN X	VULCAN AB	Unit	Hole
CHAMFER TOOL M3	**P5Y-ZX003**	**P5Y-ZB025**	Set (see above)	ϕ2.81
CHEMFER TOOL M4	**P5Y-ZX004**	**P5Y-ZB026**	Set (see above)	ϕ3.7
CHAMFER TOOL M5	**P5Y-ZX005**	**P5Y-ZB027**	Set (see above)	ϕ4.66
CHAMFER TOOL M6	**P5Y-ZX006**	**P5Y-ZB028**	Set (see above)	ϕ5.57

(mm)

MR STICKER (VULCANTOOL)

Have you troubled with punching traces? MR STICKER helps you.

NOTE

For Aluminum, a special care shall be necessary to keep the surface clean. Even a tiny amount of waste may affect.

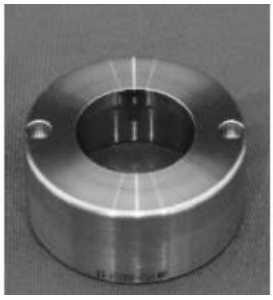
SELECTION

Station	Code	MOQ pcs.
X	**P52-YX001-60X**	10
AB	**P52-YB010-60B**	10
C	**P52-YC017-60C**	5
D	**P52-YD063-60D**	3
E	**P52-YE012-60E**	3
F	**P52-YF045-60F**	3
G	**P52-YG018-60G**	3
H	**P52-YH011-60H**	2
J	**P52-YJ045-60J**	2

VULCAN FELT (VULCANTOOL)

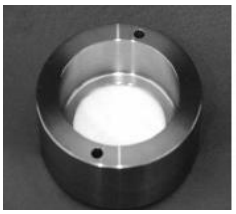
VULCAN FELT is one of the solutions for a longer tooling life. The felt serves as a protective cushion as well as a lubricant between VULCAN PUNCH and STRIPPER.

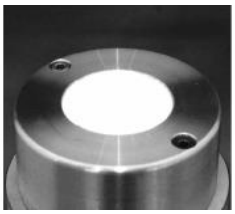
VULCAN FELT

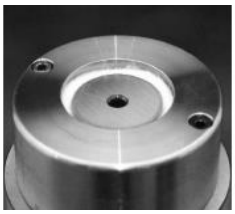


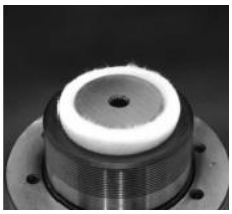
VULCAN FELT STRIPPER

VULCAN FELT OIL









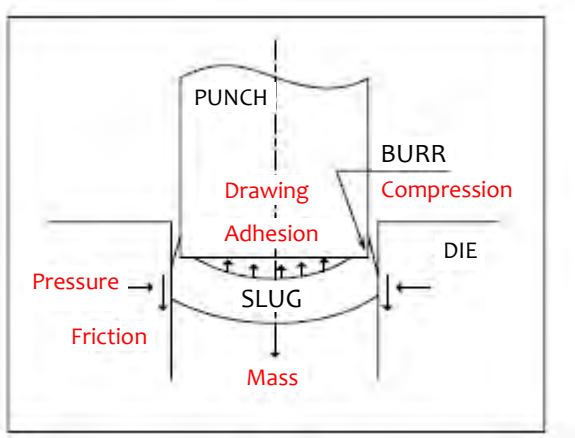
EXPECTED RESULT

- ✓ Longer punch life
- ✓ Fewer stripping failure
- ✓ Less contamination of a sheet metal with the grease
- ✓ More cut size accuracy
- ✓ Fewer intrusion s of foreign objects inside the stripper

SETECTION

	VULCAN FELT CODE	VULCAN FELT MOQ pcs.	VULCAN FELT STRIPPER CODE	 mm	 mm
X	**P52-YX002-60X**	10	**P52-WA177-60**	~12.7	-
B	**P52-YB011-60B**	10	**P5Y-B0207-60**	~20	~20
C	**P52-YC018-60C**	10	**P52-WA038-60**	~32	~30
D	**P52-YD064-60D**	10	**P52-WA039-60**	~45	~40
EF	**P52-YF046-60F**	10	**P52-WA039-60**	~70	~65
INDEX F			**P52-WA042-60**		
GHJ	**P52-YJ046-60J**	5	**P52-WA053-60**	~115	~110

SLUG TROUBLE



WHAT CAUSES SLUG TROUBLE?

1. The slug has burrs.
    a. The cutting head is not sharp enough.
    b. The clearance is too large.
    c. The punching speed is not fast enough.
2. The punch fails to insert the die sufficiently.
3. The punch is magnetized.
    a. Degaussing is skipped or not completed after the punch sharpened.
4. The physical force which incurs when the punch is drawing takes the slug.
5. Oil-related attaching
6. Improper positioning of replacements
    a. Individual part has an allowed tolerance. Unfortunate combination of these deviation would result in reducing the necessary abrasion between the die and the slug, or in creating the burrs on the slug.

HOW TO SHOP SLUG TROUBLE?

1. Punch
    a. Add SLUG EJECTER
    MTL standard punches larger than 6.0mm are provided with small urethane piece(s) which is called SLUG EJECTER on the top, which pushes away the processed object. Larger square or rectangle over 25mm are given four ejectors. The number is determined by size based on MURATA standard, but could be increased if desired.

    b. Special Shearing
    If the punch is smaller than 6.0mm, try a top-roof cutting shear. The curve deforms the slug when striking. The slug spring backs and take off the punch. However, this solution may create a dull edge around a hole, particularly with aluminum sheet. If appearance is important, this may not be a good choice.

2. Die
    a. Try SLUG WIPER
    SLUG WIPER die has a slightly tapered hole inside for constriction with a special claw attached to the land. The claw stops and takes the slug away from the punch. This solution works very well with 2.3mm or thinner sheet, but is not very effective in nibbling operation.

    b. Try SHO-KEI SLUG WIDER DIE
    The claw given to SHO-KEI DIE is specially designed to be suitable for every thickness of the sheet. This solution is effective with 3.2mm or thicker sheet in particular, with punching sizes of ϕ4.5~9.0.

    c. Review the die clearance

3. Tool Maintenance
    a. Sharpen a punch and a die constantly. Tool condition is important to prevent slug burrs.
    b. Remember to degauss after every sharpening.
    c. Complement the lost height after sharpened with shims. Make sure that the cutting head achieves an adequate insertion into the die.
4. Punching speed
    a. The faster the punch moves, the less burr on the slug is generated.

SCRATCHES

1. What causes scratches over the sheet surface?
    a. The die holder's urethane ball has been damaged, or been covered with waste.
    b. The die holder's brush has been worn or damaged.
    c. The forming tool's lower part is higher than the surrounding surface.

2. How to reduce scratches?
    a. Replace the defective free-bearing part (urethane ball or brush).
    b. Apply TIC coating to the lower surface of the forming tool.
    c. Choose a *Short* model of forming lower tool if available.
    d. Choose a retractable model (UP/DOWN) if available.

4

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