METRIC CATALOG

MOELLER™ PRECISION TOOL

YOUR GLOBAL PARTNER FOR STANDARD & SPECIAL DIE COMPONENTS

PUNCHES • DIE BUTTONS AND RETAINERS

VALUE • QUALITY & SERVICE TECHNOLOGY

ISO CERTIFIED

TRUE-FIT™

DURA PUNCH™

TRUE STRIP™

MOELLER™ PRECISION TOOL

Our commitment to continuous improvement is reflected in true innovation in our management, processes, equipment and facilities. We take pride in our reputation of excellent service, quality performance, value and the understanding that our own interests are best served when we best service our customers.

YOUR GLOBAL PARTNER FOR STANDARD & SPECIAL DIE COMPONENTS

HEADQUARTERS, WIXOM, MICHIGAN, U.S.A.

TENNESSEE

MEXICO

CANADA

CONVENIENCE - Fast, courteous, personalized attention to accommodate your special or emergency requirements.

CONFIDENCE - Performance guaranteed products, SPC controlled and ISO audited to exceed the industry's highest standards.

VALUE - The latest technology and innovative processes provide the world's highest performance tools priced to help your bottom line.

PMA PRECISION METALFORMING ASSOCIATION

INDUSTRIAL DISTRIBUTORS

International Organization for Standardization ISO CERTIFIED

INDEX

POLICIES, TERMS AND CONDITIONS

Moeller's "Purchase With Confidence" Guarantee!

- Customer satisfaction is Moeller's ultimate goal.
- Moeller was the first domestic punch manufacturer to receive its ISO certification. Moeller products are manufactured to NAPMA, NAAMS or other recognized industrial standards and are 100% interchangeable with all competing brands.
- Moeller uses only the highest commercially available grades of high speed and tool steels. The products are heat treated to exacting specifications then processed on some of the best equipment in the industry.
- Moeller products are warranted to meet or exceed the performance of like products from competing brands. If a customer is unsatisfied, Moeller will replace or allow the customer to return the product for full credit.

Over Shipments/Under Shipments for Per Print Special Items:

Because of normal part loss due to machine set-up on special items, Moeller requires that an over or undershipment of ± 10% be allowed on quantities of 13 pieces or more.

Partial Shipments:

Standard line items are batched together and shipped on the latest ship date by quoted lead time. Specials are shipped according to line item ship dates.

Note: Moeller will accommodate any partial shipment as requested by the customer.

Returns:

1. Catalog items that are custom ground to customer specifications are often non reusable; Moeller will apply discretion for a 15% credit for reusable items.
2. Unused, off the shelf items such as punch blanks and standard retainers can be returned for a 15% restocking charge. The item must be in the orignal packaging in resalable condition.
3. Special "make-to-print" items are not returnable.
4. Moeller reserves the discretion for all returns exceeding one year from invoice date.

Method of Shipment:

Moeller ships UPS or Federal Express whenever possible, unless weight requirements dictate truck delivery, or as specifically requested by the customer.

Cancellation:

If labor or material has been applied to a cancelled job, a prorated charge will be billed.

Prices/Standards:

See current price supplement in effect.

Prices/Specials:

Per factory quotation good for 90 days or as specified.

Terms:

Net 30 days, F.O.B. our plant. U.S. dollars.

Moeller "Customer Service Stock" Program:

Moeller is pleased to offer an exclusive Service Stock Program to select customers. The "Customer Service Stock" program offers many benefits to our valued customers, including product cost reduction, immediate "on hand" availability, and reduced customer inventory costs. Moeller will manufacture your annual or semi-annual requirements for Pierce Tooling and Die Components and make them available for immediate shipment. The parts are billed only as shipped. A written purchase order is required with inventory set-up and parts must be released in the subsequent year. Please contact your Moeller Sales Representative for more details.

- Moeller reserves the right to modify, correct or improve this literature or products without notice.

DELIVERY SCHEDULE/ EXPEDITED SERVICES

MOELLER™ PRECISION TOOL

STANDARD DELIVERY

SAME DAY / 1 DAY:

- Punch and Button Blanks, Standard Retainers and All Other Stocked Products

3 WORKING DAYS:

- Standard In-Range Punches and Die Buttons Includes one Standard Alteration
- Quantities of 23 Pieces or Less

5 WORKING DAYS:

- Nose Large Punches & Ultra Life Extended Range Buttons. Includes one Standard Alteration
- Quantities of 7 Pieces or Less

8 WORKING DAYS:

- Counter Bore Relief Extended Range Buttons
- Slip Fit Counterbore Relief Buttons Over 40mm Diameter

10 WORKING DAYS:

- Universal Shaped Punches and Die Buttons, Quill Punches & Closed End Strippers

PERFORMANCE ENHANCER:

- TiN, TiCN, MOST, CDF, MSP, TiAIN, Alcrona

NOTE: *2-10 Additional Work Days to the Standard Delivery Date*

ORDERS MUST BE RECEIVED BEFORE 11:00AM EST (OR AS APPROVED BY A CUSTOMER SERVICE REPRESENTATIVE) TO BE CONSIDERED A WORK DAY.

QUANTITIES LARGER THAN 23 PIECES MAY REQUIRE ADDITIONAL LEAD TIME. CUSTOMER SERVICE REPRESENTATIVE MUST CONSULT FACTORY.

E.D.S.

EXPEDITED DELIVERY SERVICE

Products Shipped Earlier Than Standard Delivery

LEAD TIME:

- As Negotiated with a Customer Service Representative

QUALIFYING PRODUCTS:

- All Standard Catalog Items

COST:

- List Price + 25% Net
- Minimum Order = $25.00

N.D.S.

NEXT DAY SERVICE

Standard Products Received by 5:30 p.m. EST

Will Ship Next Day

QUALIFYING PRODUCTS:

- Round Piercing Products (excluding Ultra Life)

REQUIRED SPECIFICATIONS:

1. N.D.S. Items MUST be on an Independent Order (i.e. they must be separate from other delivery items)
2. Service Limited to Quantities of 1-20 Pieces
3. MUST be within Standard Catalog Range
4. Customer MUST Specify Next Day Service
5. Customer SHOULD Specify Method of Shipment (e.g. UPS, UPS Next Day Air, Pick Up, etc.)

COST:

- No Additional Charge

REQUIRED SPECIFICATIONS MUST BE CLEARLY STATED ON INDEPENDENT PURCHASE ORDER(S) TO GUARANTEE NEXT DAY SERVICE.

S.D.S.

SAME DAY SERVICE

LEAD TIME:

- Orders MUST be received before 11:00 a.m. EST or as approved by a Customer Service Representative

QUALIFYING PRODUCTS:

1. Catalog Standard Products with Only One Standard Alteration
2. Round Products - 20 Piece Maximum
   Shaped Products - 10 Piece Maximum
3. Coating Excluded
4. Excluded Products:
   - Nose Large Punches, Large Buttons, Urethane, Close Space or Quill Punches
   - Some Descriptive Shaped Products

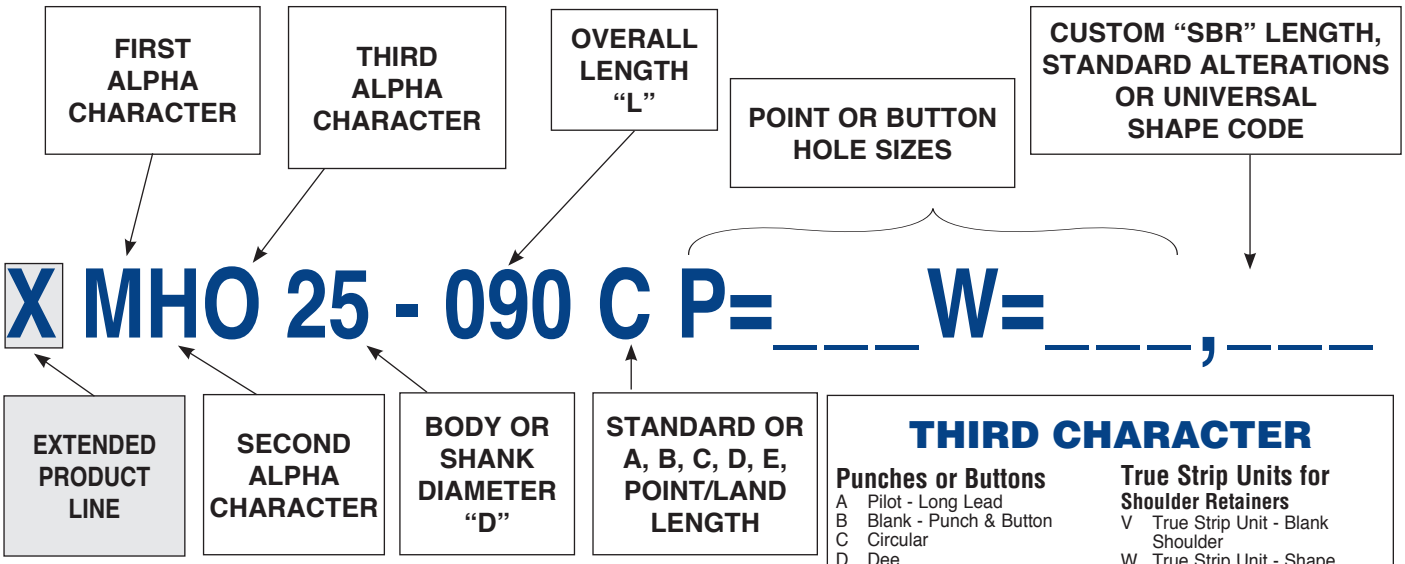
COST:

- List Price + 50% Net
- Minimum Order = $50.00

CUSTOMER SERVICE REPRESENTATIVE MUST RECEIVE APPROVAL FROM EITHER PRODUCTION CONTROL MANAGER OR PLANT SUPERINTENDENT.

CATALOG NOMENCLATURE

MOELLER™ PRECISION TOOL



FIRST CHARACTER

MEASUREMENT SYSTEM

I = Inch Products

M = Metric Products

SECOND CHARACTER

Product Type

- A Accessories
- B Ball Lock Buttons Counter Bore Relief
- C Shoulder Punch Ejector
- D Press Fit Button Counter Bore Relief
- E Ball Lock Punch Heavy Duty/Ejector
- F Ball Lock Button Ultra Life/Taper Relief
- H Ball Lock Punch Heavy Duty/Solid
- I Shoulder Button Counter Bore Relief
- J Ball Lock Punch Light Duty/Ejector
- K Slip Fit Button/Counter Bore
- L Ball Lock Punch Light Duty/Solid
- M Shoulder Button Press Fit Ultra Life/Taper Relief
- N Nose Large Punch Heavy Duty/Solid
- O Nose Large Punch Light Duty/Solid
- Q Quill Punch Square/Bevel Head
- R Retainers
- S Shoulder Punch Solid
- T Strippers
- U Press Fit Button Ultra Life/Taper Relief
- V Nose Large Punch Light Duty/Ejector
- W Nose Large Punch Heavy Duty/Ejector

THIRD CHARACTER

Punches or Buttons

- A Pilot - Long Lead
- B Blank - Punch & Button
- C Circular
- D Dee
- F Flatted Round
- H Hexagon
- K Key Flat
- O Oblong
- P Pilot Bullet Nose
- Q Thread Form
- R Rectangle
- S Square
- T Pilot Standard
- U Universal Shapes
- V Straight Compact Long Lead Pilot
- W Pointed Compact Long Lead Pilot
- X Reduced Body

Punch Retainers

Ball Lock

- A Retractable B/L
- H True Set Heavy Duty
- L True Set Light Duty
- M Mini True Set
- R True Set Economy Round Heavy Duty

Insertable True-Fit

- I True Set Style
- J Backing Plate Style

Shoulder

- B Retractable Shoulder Shaped
- C Retractable Shoulder Round
- N Shoulder Style - Round
- O Shoulder Style - Shaped
- P Shoulder Retainer - 3 Dowel - Round
- Q Shoulder Retainer - 3 Dowel - Shaped

Strippers

True Strip Units for Ball Lock Retainers

- J True Strip Unit - Economy Round Ball Lock
- L True Strip Unit - Economy Blank Ball Lock
- T True Strip Unit - Round Ball Lock
- U True Strip Unit - Blank Ball Lock
- Z True Strip Unit - Shape Ball Lock

True Strip Units for Shoulder Retainers

- V True Strip Unit - Blank Shoulder
- W True Strip Unit - Shape Shoulder
- X True Strip Unit - Round Shoulder

Urethane Strippers

- C Closed End Strippers
- O Open End Strippers
- S Strippers - True Set

Urethane Stripper Retainers

- B Nose Large
- M Mini True Set Stripper Retainer (Snap in)
- N Naams Stripper Retainer (2 Piece)
- P Economy (Snap in)
- R True Set Stripper Retainer (Snap in)

Accessories

- A True Strip Assembly Tool
- B Balls
- C Cap Screws, Ball Release Screws
- D Dowels
- E Ejector Component Assembly
- K Button Retention Key
- L Ejector Pin Lockout Kit
- M Mini True Set Retainer Shim Plates
- N Retainer Angle Hole Set Screw
- O Retainer Angle Hole Hex Wrench
- P Pins Ejectors
- R Relocation Bushings
- S Springs
- T Ball Release Tools
- W Shoulder Retainer Backing Plate
- X True Set Retainer Shim Plates
- Y Round Retainer Shim Plates

ORDER EXAMPLE: Ball lock punch heavy duty with oblong point and SBR Length of 25, standard alteration of ballseat rotated to 45° degrees

MHO 25-090 C P=22.0 W=15.3, BS@45°

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

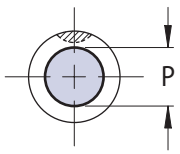
BALL LOCK PUNCHES

MOELLER™ PRECISION TOOL

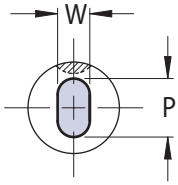
HEAVY DUTY/SOLID

90°

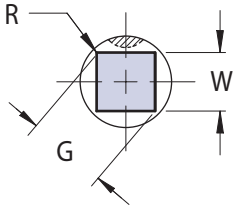
ROUND
MHC®



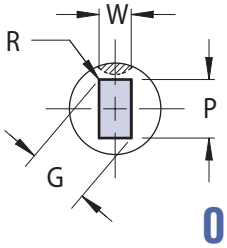
OBLONG
MHO®



SQUARE
MHS®



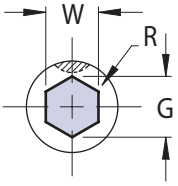
RECTANGLE
MHR®



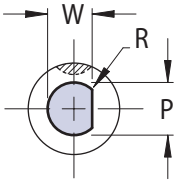
180°

0°

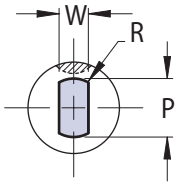
HEXAGON
MHH®



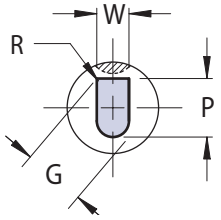
KEYFLAT
MHK®



FLATTED ROUND
MHF®

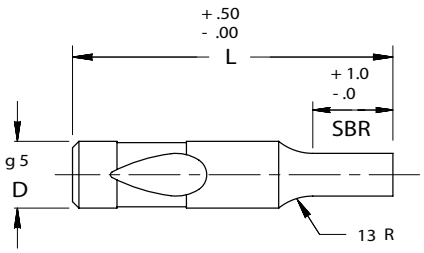


DEE
MHD®



270°

MH_®



ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	P(OR P&W) DIMENSIONS
EXAMPLE:	6	MHC	13	90	C	8.0
EXAMPLE:	6	MHO	16	80	STD	14.0 x 7.0

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

CATALOG TYPE	SHANK DIA D	ROUND RANGE P	SHAPE MIN W	SHAPE MAX G/P	OVERALL LENGTH "L" 71	80	90	100	110	125
MH_ 10	10	2.50 - 9.98	2.50	10.00	X	X	X	X	X	X
MH_ 13	13	5.00 - 12.98	4.50	13.00	X	X	X	X	X	X
MH_ 16	16	8.00 - 15.98	6.00	16.00	X	X	X	X	X	X
MH_ 20	20	12.00 - 19.98	8.00	20.00	X	X	X	X	X	X
MH_ 25	25	16.00 - 24.98	10.00	25.00		X	X	X	X	X
MH_ 32	32	24.00 - 31.98	12.00	32.00		X	X	X	X	X
MH_ 40	40	30.00 - 39.98	14.00	40.00		X	X	X	X	X

Material*

Steel: M2, HRC 60-63

Standard Point Tolerance

Round P $^{+.01}_{-.00}$

Shape P, W ± .01

When P = D Shank Tolerances Apply

◎	.01	P to D
◎	.02	P to D

*FOR PM4 MATERIAL PRODUCTS, SEE ADVANCED STAMPING APPLICATION TOOLING CATALOG

CATALOG TYPE	SHANK D	SBR NAPMA STD	SBR ALTERNATES B	SBR ALTERNATES C
MH_ 10	10	19	10	–
MH_ 13	13	19	13	25
MH_ 16	16	19	13	25
MH_ 20	20	19	13	25
MH_ 25	25	19	13	25
MH_ 32	32	19	13	25
MH_ 40	40	25	19	30

L=71 SBR MAX=19

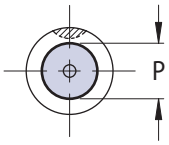
STANDARD BALL SEAT LOCATION IS AT 90° AS SHOWN. AVAILABLE AT 0°, 180°, 270°, FOR SAME PRICE.

BALL LOCK PUNCHES

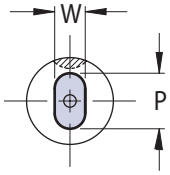
HEAVY DUTY/EJECTOR

90°

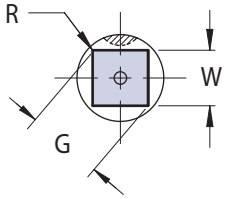
ROUND
MEC®



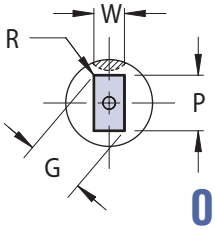
OBLONG
MEO®



SQUARE
MES®



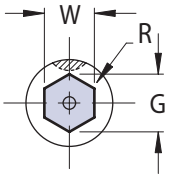
RECTANGLE
MER®



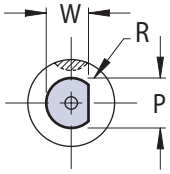
180°

0°

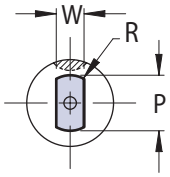
HEXAGON
MEH®



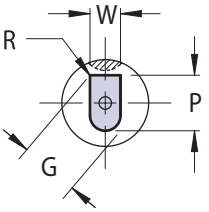
KEYFLAT
MEK®



FLATTED ROUND
MEF®

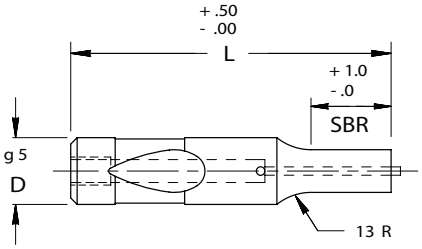


DEE
MED®



270°

ME_®



ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	P(OR P&W) DIMENSIONS
EXAMPLE:	6	MEC	10	90	B	5.0
EXAMPLE:	6	MEO	16	80	STD	14.0 x 8.0

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	SHANK DIA D	ROUND RANGE P	SHAPE MIN W	SHAPE MAX G/P	OVERALL LENGTH "L" 63	71	80	90	100	110	125
ME_ 10	10	2.50 - 9.98	2.50	10.00	X	X	X	X	X	X	
ME_ 13	13	5.00 - 12.98	4.50	13.00	X	X	X	X	X	X	X
ME_ 16	16	8.00 - 15.98	6.00	16.00	X	X	X	X	X	X	X
ME_ 20	20	12.00 - 19.98	8.00	20.00	X	X	X	X	X	X	X
ME_ 25	25	16.00 - 24.98	10.00	25.00			X	X	X	X	X
ME_ 32	32	24.00 - 31.98	12.00	32.00			X	X	X	X	X
ME_ 40	40	30.00 - 39.98	14.00	40.00			X	X	X	X	X

Material*
Steel: M2, HRC 60-63

Standard Point Tolerance

Round P $^{+.01}_{-.00}$ | ◎ .01 P to D

Shape P, W ± .01 | ◎ .02 P to D

When P = D Shank Tolerances Apply

*FOR PM4 MATERIAL PRODUCTS, SEE ADVANCED STAMPING APPLICATION TOOLING CATALOG

CATALOG TYPE	SHANK D	SBR NAPMA STD	SBR ALTERNATES B	SBR ALTERNATES C	EJECTOR SIZE
ME_ 10	10	19	10	—	MAE 4
ME_ 13	13	19	13	25	MAE 5
ME_ 16	16	19	13	25	MAE 5
ME_ 20	20	19	13	25	MAE 6
ME_ 25	25	19	13	25	MAE 6
ME_ 32	32	19	13	25	MAE 6
ME_ 40	40	25	19	30	MAE 6

L=63 SBR MAX=19
L=71 SBR MAX=19

XP ALTERATION NOT AVAILABLE IF L=63 AND SBR=19

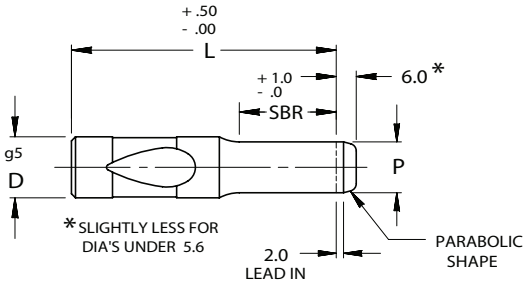
STANDARD BALL SEAT LOCATION IS AT 90° AS SHOWN. AVAILABLE AT 0°, 180°, 270°, FOR SAME PRICE.

BALL LOCK PILOTS

HEAVY DUTY

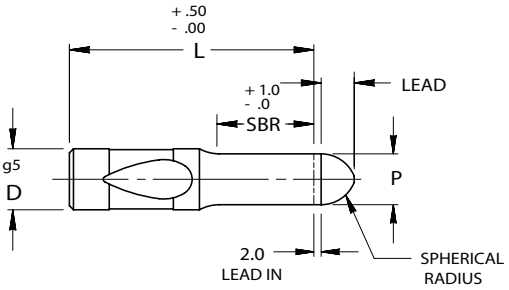
STANDARD STYLE

MHT™



BULLET NOSE STYLE

MHP™



ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	"P" DIMENSION
EXAMPLE:	6	MHT	20	80	B	16.0
EXAMPLE:	6	MHP	13	90	STD	9.0

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

MHP STYLE LEAD	
P DIM	LEAD
1.50-9.50	4
9.51-up	10

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	SHANK DIA D	RANGE P	LENGTH "L"					
			71	80	90	100	110	125
MH_ 10	10	2.50 - 10.00	X	X	X	X	X	X
MH_ 13	13	5.00 - 13.00	X	X	X	X	X	X
MH_ 16	16	8.00 - 16.00	X	X	X	X	X	X
MH_ 20	20	12.00 - 20.00	X	X	X	X	X	X
MH_ 25	25	16.00 - 25.00		X	X	X	X	X
MH_ 32	32	24.00 - 32.00		X	X	X	X	X
MH_ 40	40	30.00 - 40.00		X	X	X	X	X

Material*
Steel: M2, HRC 60-63

Standard Point Tolerance

Round P $^{+.01}_{-.00}$

◎	.01	P to D

When P = D Shank Tolerances Apply

*FOR PM4 MATERIAL PRODUCTS, SEE ADVANCED STAMPING APPLICATION TOOLING CATALOG

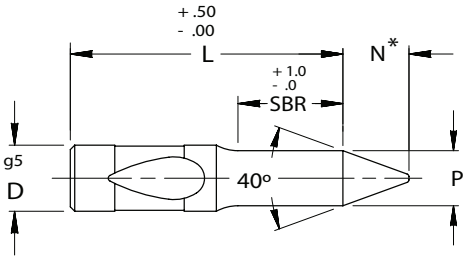
CATALOG TYPE	SHANK D	SBR		
		NAPMA	ALTERNATES	
		STD	B	C
MH_ 10	10	19	10	—
MH_ 13	13	19	13	25
MH_ 16	16	19	13	25
MH_ 20	20	19	13	25
MH_ 25	25	19	13	25
MH_ 32	32	19	13	25
MH_ 40	40	25	19	30

L=71 SBR MAX=19

BALL LOCK PILOTS

HEAVY DUTY

LONG LEAD STYLE



* N BECOMES 1.2 X P MIN WHEN P IS BELOW (SEE CHART)

ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	"P" DIMENSION
EXAMPLE:	6	MHA	25	100	B	20.0

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

Complete design & CAD files visit WWW.MOELLERMCAD.COM

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

CATALOG TYPE	SHANK DIA D	RANGE P	LEAD N	P BELOW SEE NOTE*	LENGTH "L"						
					80	90	100	110	125	140	150
MHA 10	10	5.90 - 10.00	8	5.64	X	X	X	X	X		
MHA 13	13	9.90 - 13.00	10	7.11	X	X	X	X	X	X	
MHA 16	16	12.90 - 16.00	15	10.74	X	X	X	X	X	X	X
MHA 20	20	15.90 - 20.00	20	14.38	X	X	X	X	X	X	X
MHA 25	25	19.90 - 25.00	25	18.00	X	X	X	X	X	X	X
MHA 32	32	24.90 - 32.00	30	21.67	X	X	X	X	X	X	X
MHA 40	40	31.90 - 40.00	40	28.96	X	X	X	X	X	X	X

Material*
Steel: M2, HRC 60-63

Standard Point Tolerance

Round P $^{+.01}_{-.00}$

◎	.01	P to D

When P = D Shank Tolerances Apply

*FOR PM4 MATERIAL PRODUCTS, SEE ADVANCED STAMPING APPLICATION TOOLING CATALOG

CATALOG TYPE	SHANK D	SBR	
		NAPMA STD	ALTERNATES B
MHA 10	10	19	32
MHA 13	13	19	32
MHA 16	16	25	38
MHA 20	20	25	38
MHA 25	25	25	38
MHA 32	32	25	38
MHA 40	40	30	45

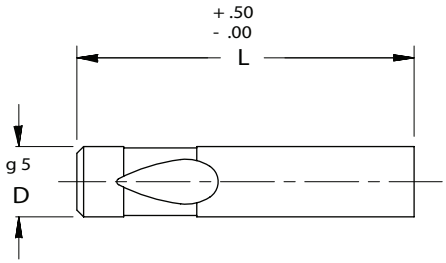
NOTE: MUST MAINTAIN MINIMUM SHANK LENGTH OF 38MM.

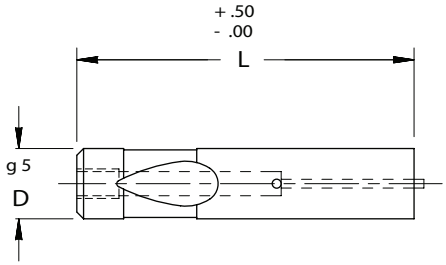
BALL LOCK PUNCH BLANKS

HEAVY DUTY/SOLID/EJECTOR

MHB™

MEB™





Material*
Steel: M2, HRC 60-63

*FOR PM4 MATERIAL PRODUCTS, SEE ADVANCED STAMPING APPLICATION TOOLING CATALOG

ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"
EXAMPLE:	6	MHB	20	110
EXAMPLE:	6	MEB	16	90

Complete design & CAD files visit WWW.MOELLERMCAD.COM

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

CATALOG NUMBER SOLID	SHANK DIA D	OVERALL LENGTH "L"											
		71	80	90	100	110	125	150	165	170	175	180	190
MHB 10	10	X	X	X	X	X	X	X					
MHB 13	13	X	X	X	X	X	X	X					
MHB 16	16	X	X	X	X	X	X	X	X				
MHB 20	20	X	X	X	X	X	X	X		X			
MHB 25	25		X	X	X	X	X	X			X		
MHB 32	32		X	X	X	X	X	X				X	
MHB 40	40		X	X	X	X	X	X					X

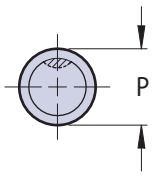
CATALOG NUMBER EJECTOR	SHANK DIA D	OVERALL LENGTH "L"							EJECTOR SIZE
		63	71	80	90	100	110	125	
MEB 10	10	X	X	X	X	X	X		MAE 4
MEB 13	13	X	X	X	X	X	X	X	MAE 5
MEB 16	16	X	X	X	X	X	X	X	MAE 5
MEB 20	20	X	X	X	X	X	X	X	MAE 6
MEB 25	25			X	X	X	X	X	MAE 6
MEB 32	32			X	X	X	X	X	MAE 6
MEB 40	40			X	X	X	X	X	MAE 6

NOSE LARGE PUNCHES

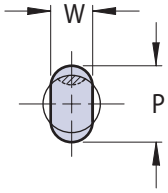
HEAVY DUTY/SOLID

90°

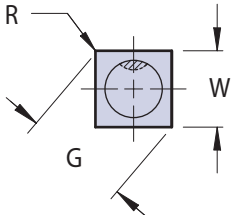
ROUND
MNC™



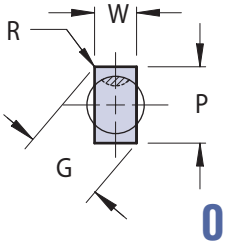
OBLONG
MNO™



SQUARE
MNS™



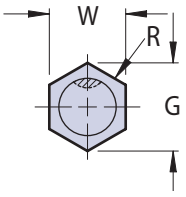
RECTANGLE
MNR™



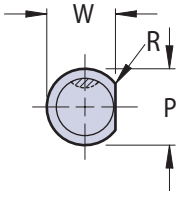
180°

0°

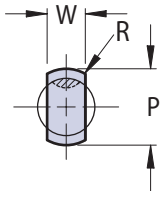
HEXAGON
MNH™



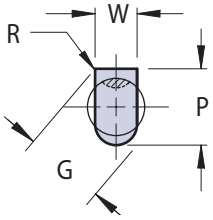
KEYFLAT
MNK™



FLATTED ROUND
MNF™

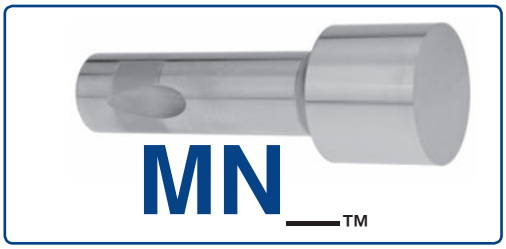


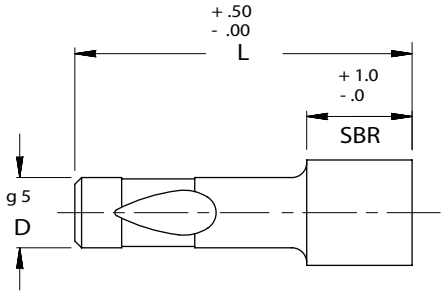
DEE
MND™



270°

VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.





ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	P(OR P&W) DIMENSIONS
EXAMPLE:	6	MNR	20	90	22.0 x 12.0

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	SHANK DIA D	POINT LENGTH "S.B.R."	ROUND	SHAPE		LENGTH "L"		
			RANGE P	MIN W	MAX G/P	80	90	100
MN_ 10	10	16	10.10 - 25.00	3.00	25.00	X	X	X
MN_ 13	13	20	13.10 - 32.00	5.00	32.00	X	X	X
MN_ 16	16	25	16.10 - 38.00	6.00	38.00	X	X	X
MN_ 20	20	25	20.10 - 40.00	8.00	40.00	X	X	X
MN_ 25	25	25	25.10 - 47.00	10.00	47.00	X	X	X
MN_ 32	32	32	32.10 - 63.00	11.50	63.00	X	X	X
MN_ 40	40	32	40.10 - 63.00	14.00	63.00	X	X	X

Material
Steel: M2, HRC 60-63

Standard Point Tolerance

Round P $^{+.01}_{-.00}$

Shape P, W ± .01

◎	.01	P to D
◎	.02	P to D

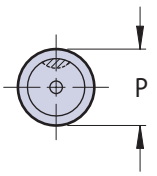
STANDARD BALL SEAT LOCATION IS AT 90° AS SHOWN. AVAILABLE AT 0°, 180°, 270°, FOR SAME PRICE.

NOSE LARGE PUNCHES

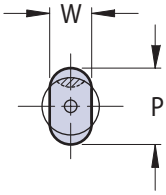
HEAVY DUTY/EJECTOR

90°

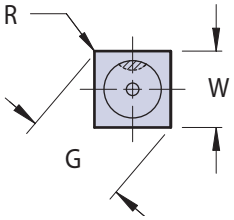
ROUND
MWC™



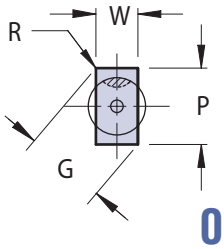
OBLONG
MWO™



SQUARE
MWS™



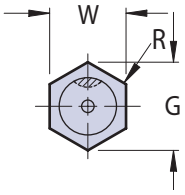
RECTANGLE
MWR™



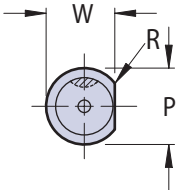
180°

0°

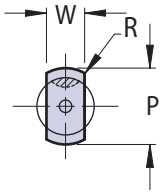
HEXAGON
MWH™



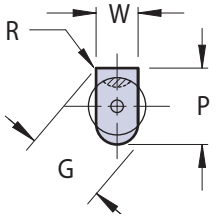
KEYFLAT
MWK™



FLATTED ROUND
MWF™

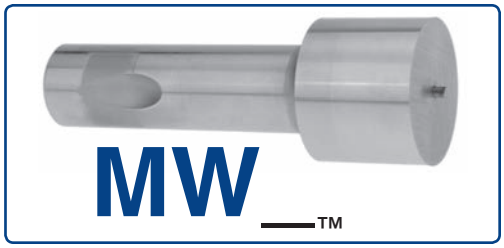


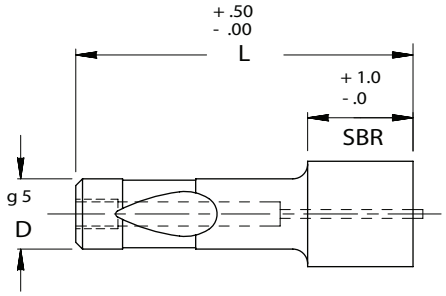
DEE
MWD™



270°

VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.





ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	P(OR P&W) DIMENSIONS
EXAMPLE:	6	MWO	16	90	19.0 x 13.0

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

Complete design & CAD files visit WWW.MOELLERMCAD.COM

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

CATALOG TYPE	SHANK DIA D	POINT LENGTH "S.B.R."	ROUND RANGE P	SHAPE MIN W	SHAPE MAX G/P	OVERALL LENGTH "L" 80	90	100	EJECTOR SIZE
MW_ 10	10	16	10.10 - 25.00	3.00	25.00	X	X	X	MAE 4
MW_ 13	13	20	13.10 - 32.00	5.00	32.00	X	X	X	MAE 5
MW_ 16	16	25	16.10 - 38.00	6.00	38.00	X	X	X	MAE 5
MW_ 20	20	25	20.10 - 40.00	8.00	40.00	X	X	X	MAE 6
MW_ 25	25	25	25.10 - 47.00	10.00	47.00	X	X	X	MAE 6
MW_ 32	32	32	32.10 - 63.00	11.50	63.00	X	X	X	MAE 6
MW_ 40	40	32	40.10 - 63.00	14.00	63.00	X	X	X	MAE 6

Material
Steel: M2, HRC 60-63

Standard Point Tolerance

Round P $^{+.01}_{-.00}$

Shape P, W ± .01

◎	.01	P to D
◎	.02	P to D

STANDARD BALL SEAT LOCATION IS AT 90° AS SHOWN. AVAILABLE AT 0°, 180°, 270°, FOR SAME PRICE.

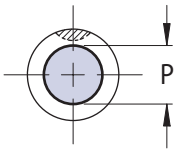
BALL LOCK PUNCHES

MOELLER™ PRECISION TOOL

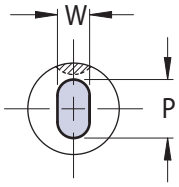
LIGHT DUTY/SOLID

90°

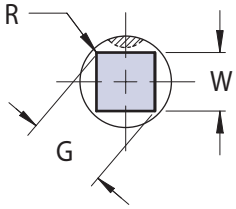
ROUND
MLC™



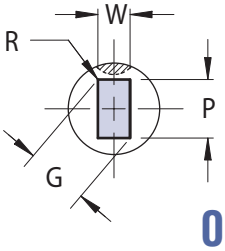
OBLONG
MLO™



SQUARE
MLS™

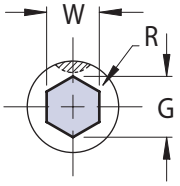


RECTANGLE
MLR™

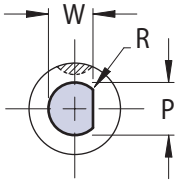


180°

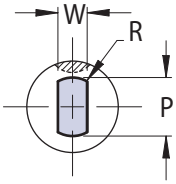
HEXAGON
MLH™



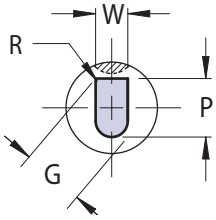
KEYFLAT
MLK™



FLATTED ROUND
MLF™

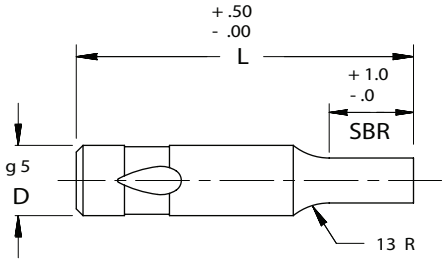


DEE
MLD™



270°

0°



ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	P(OR P&W) DIMENSIONS
EXAMPLE:	6	MLO	16	80	B	14.0 x 7.0
EXAMPLE:	6	MLC	10	90	STD	8.0

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

CATALOG TYPE	SHANK DIA D	ROUND RANGE P	SHAPE MIN W	SHAPE MAX G/P	OVERALL LENGTH "L" 63	71	80	90	100
ML_ 06	6	2.20 - 5.98	2.20	6.00	X	X	X	X	X
ML_ 10	10	2.50 - 9.98	2.50	10.00	X	X	X	X	X
ML_ 13	13	5.00 - 12.98	4.50	13.00	X	X	X	X	X
ML_ 16	16	8.00 - 15.98	6.00	16.00	X	X	X	X	X
ML_ 20	20	12.00 - 19.98	8.00	20.00	X	X	X	X	X
ML_ 25	25	16.00 - 24.98	10.00	25.00	X	X	X	X	X

Material
Steel: M2, HRC 60-63

Standard Point Tolerance

Round P $^{+.01}_{-.00}$ | ◎ .01 P to D

Shape P, W ± .01 | ◎ .02 P to D

When P = D Shank Tolerances Apply

CATALOG TYPE	SHANK D	SBR NAPMA STD	SBR ALTERNATES B	SBR ALTERNATES C
ML_ 06	6	13	10	—
ML_ 10	10	19	10	—
ML_ 13	13	19	13	25
ML_ 16	16	19	13	25
ML_ 20	20	19	13	25
ML_ 25	25	19	13	25

L=63 SBR MAX=19

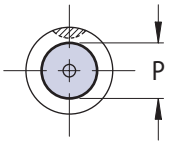
STANDARD BALL SEAT LOCATION IS AT 90° AS SHOWN. AVAILABLE AT 0°, 180°, 270°, FOR SAME PRICE.

BALL LOCK PUNCHES

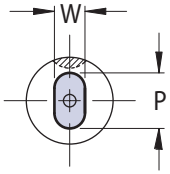
LIGHT DUTY/EJECTOR

90°

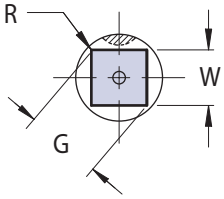
ROUND
MJC™



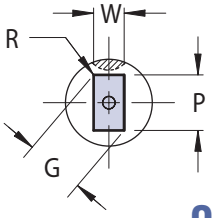
OBLONG
MJO™



SQUARE
MJS™

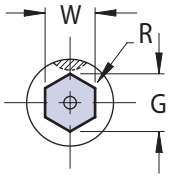


RECTANGLE
MJR™

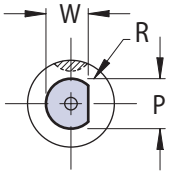


180°

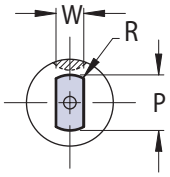
HEXAGON
MJH™



KEYFLAT
MJK™

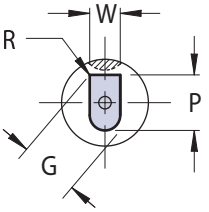


FLATTED ROUND
MJF™



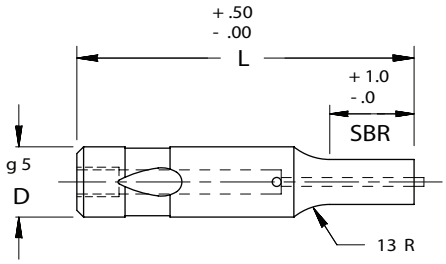
0°

DEE
MJD™



270°

MJ___™



ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	P(OR P&W) DIMENSIONS
EXAMPLE:	6	MJC	16	90	STD	10.0
EXAMPLE:	6	MJO	13	80	B	10.0 x 7.0

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

CATALOG TYPE	SHANK DIA D	ROUND	SHAPE		OVERALL LENGTH "L"				
		RANGE P	MIN W	MAX G/P	63	71	80	90	100
MJ_ 06	6	2.20 - 5.98	2.20	6.00	X	X	X	X	X
MJ_ 10	10	2.50 - 9.98	2.50	10.00	X	X	X	X	X
MJ_ 13	13	5.00 - 12.98	4.50	13.00	X	X	X	X	X
MJ_ 16	16	8.00 - 15.98	6.00	16.00	X	X	X	X	X
MJ_ 20	20	12.00 - 19.98	8.00	20.00	X	X	X	X	X
MJ_ 25	25	16.00 - 24.98	10.00	25.00	X	X	X	X	X

Material
Steel: M2, HRC 60-63

Standard Point Tolerance

Round P $^{+.01}_{-.00}$ | ◎ | .01 | P to D

Shape P, W ± .01 | ◎ | .02 | P to D

When P = D Shank Tolerances Apply

CATALOG TYPE	SHANK D	SBR			EJECTOR SIZE
		NAPMA	ALTERNATES		
		STD	B	C	
MJ_ 06	6	13	10	—	MAE 3
MJ_ 10	10	19	10	—	MAE 4
MJ_ 13	13	19	13	25	MAE 5
MJ_ 16	16	19	13	25	MAE 5
MJ_ 20	20	19	13	25	MAE 6
MJ_ 25	25	19	13	25	MAE 6

L=63 SBR MAX=19
L=71 SBR MAX=19

STANDARD BALL SEAT LOCATION IS AT 90° AS SHOWN. AVAILABLE AT 0°, 180°, 270°, FOR SAME PRICE.

BALL LOCK PILOTS

LIGHT DUTY

STANDARD STYLE

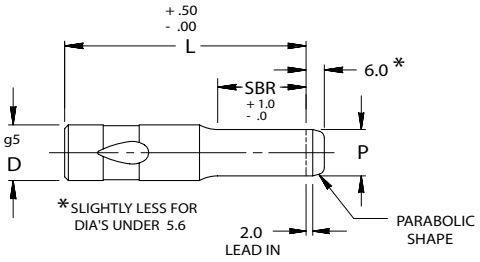
MLT™

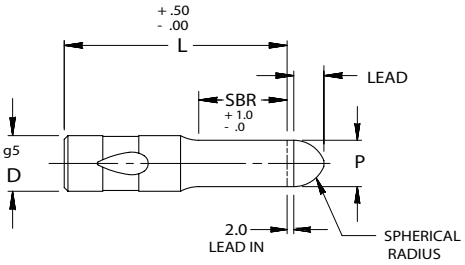
BULLET NOSE STYLE

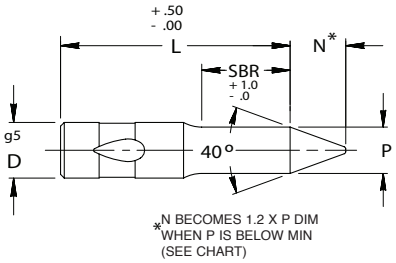
MLP™

LONG LEAD STYLE

MLA™







ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	"P" DIMENSIONS
EXAMPLE:	6	MLT	10	80	B	7.0
EXAMPLE:	6	MLA	13	90	STD	10.0

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

MLP STYLE LEAD	
P DIM	LEAD
1.50-9.50	4
9.51-up	10

SHANK DIA DIM	MLA STYLE N DIM
10	8
13	10
16	15
20	20
25	25

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	SHANK DIA D	RANGE	P BELOW SEE NOTE*	LENGTH "L"				
				63	71	80	90	100
ML_ 06	6	2.20 - 6.00	—	X	X	X	X	X
ML_ 10	10	2.50 - 10.00	5.64	X	X	X	X	X
ML_ 13	13	5.00 - 13.00	7.11	X	X	X	X	X
ML_ 16	16	8.00 - 16.00	10.74	X	X	X	X	X
ML_ 20	20	12.00 - 20.00	14.38	X	X	X	X	X
ML_ 25	25	16.00 - 25.00	18.00	X	X	X	X	X

Material

Steel: M2, HRC 60-63

Standard Point Tolerance

Round P $^{+.01}_{-.00}$

◎	.01	P to D

When P = D Shank Tolerances Apply

CATALOG TYPE	SHANK D	SBR		
		NAPMA	ALTERNATES	
		STD	B	C
ML_ 06	6	13	10	—
ML_ 10	10	19	10	—
ML_ 13	13	19	13	25
ML_ 16	16	19	13	25
ML_ 20	20	19	13	25
ML_ 25	25	19	13	25

L=63 SBR MAX=19

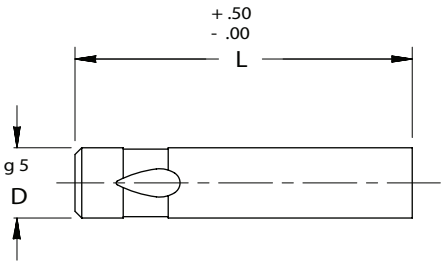
BALL LOCK PUNCH BLANKS

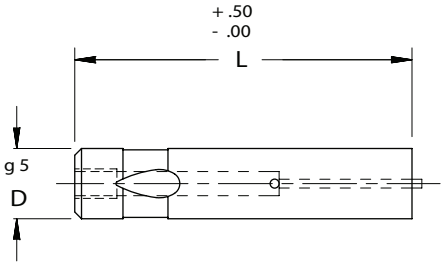
MOELLER™ PRECISION TOOL

LIGHT DUTY/SOLID/EJECTOR

MLB™

MJB™





Material
Steel: M2, HRC 60-63

ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"
EXAMPLE:	6	MLB	20	90
EXAMPLE:	6	MJB	16	80

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

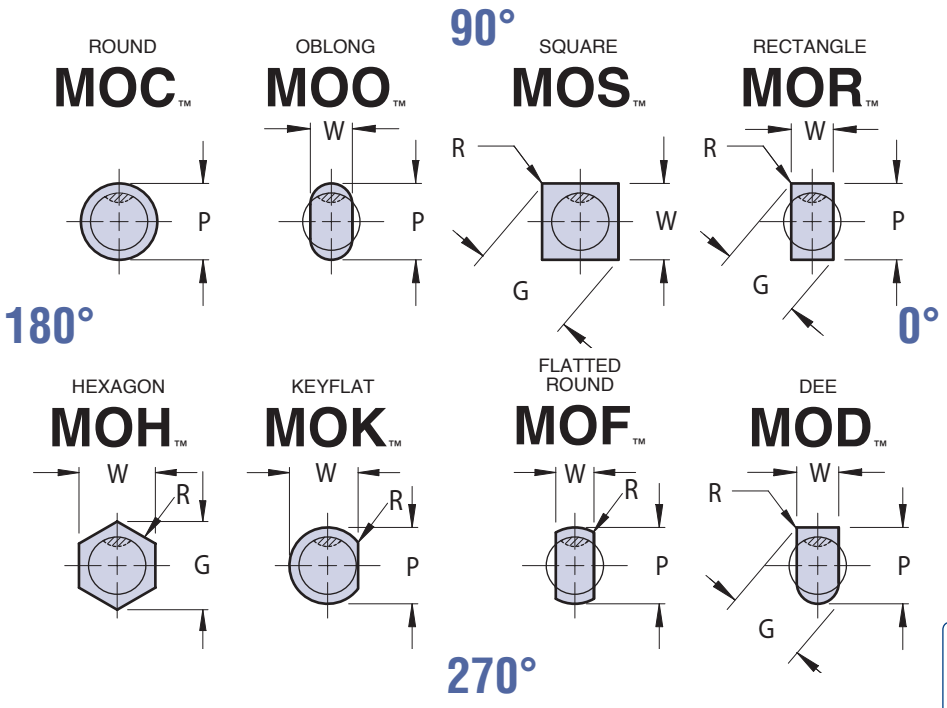
Complete design & CAD files visit WWW.MOELLERMCAD.COM

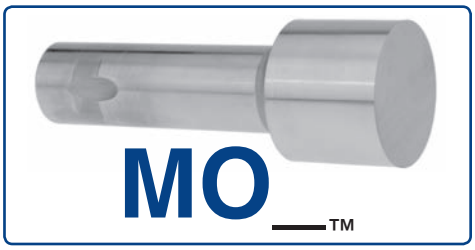
CATALOG NUMBER SOLID	SHANK DIA D	OVERALL LENGTH "L"					
		63	71	80	90	100	125
MLB 06	6	X	X	X	X	X	X
MLB 10	10	X	X	X	X	X	X
MLB 13	13	X	X	X	X	X	X
MLB 16	16	X	X	X	X	X	X
MLB 20	20	X	X	X	X	X	X
MLB 25	25	X	X	X	X	X	X

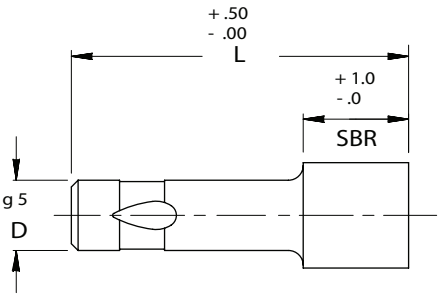
CATALOG NUMBER EJECTOR	SHANK DIA D	OVERALL LENGTH "L"					EJECTOR SIZE
		63	71	80	90	100	
MJB 06	6	X	X	X	X	X	MAE 3
MJB 10	10	X	X	X	X	X	MAE 4
MJB 13	13	X	X	X	X	X	MAE 5
MJB 16	16	X	X	X	X	X	MAE 5
MJB 20	20	X	X	X	X	X	MAE 6
MJB 25	25	X	X	X	X	X	MAE 6

NOSE LARGE PUNCHES

LIGHT DUTY/SOLID







ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	P(OR P&W) DIMENSIONS
EXAMPLE:	6	MOO	16	90	22.0 x 11.0

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	SHANK DIA D	POINT LENGTH "S.B.R."	ROUND RANGE P	SHAPE MIN W	SHAPE MAX G/P	LENGTH "L" 80	90	100
MO_ 10	10	16	10.10 - 25.00	3.00	25.00	X	X	X
MO_ 13	13	20	13.10 - 32.00	5.00	32.00	X	X	X
MO_ 16	16	25	16.10 - 38.00	6.00	38.00	X	X	X
MO_ 20	20	25	20.10 - 40.00	8.00	40.00	X	X	X
MO_ 25	25	25	25.10 - 47.00	10.00	47.00	X	X	X
MO_ 32	32	32	32.10 - 63.00	11.50	63.00	X	X	X

Material
Steel: M2, HRC 60-63

Standard Point Tolerance

Round P $^{+.01}_{-.00}$	◎	.01	P to D
Shape P, W ± .01	◎	.02	P to D

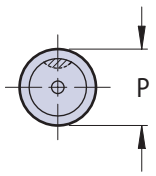
STANDARD BALL SEAT LOCATION IS AT 90° AS SHOWN. AVAILABLE AT 0°, 180°, 270°, FOR SAME PRICE.

NOSE LARGE PUNCHES

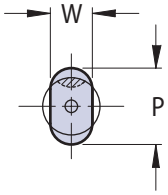
LIGHT DUTY/EJECTOR

90°

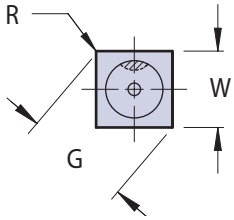
ROUND
MVC™



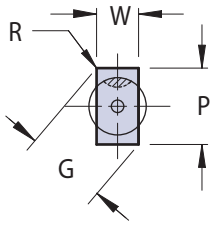
OBLONG
MVO™



SQUARE
MVS™



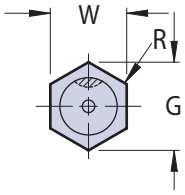
RECTANGLE
MVR™



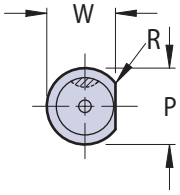
180°

0°

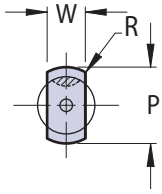
HEXAGON
MVH™



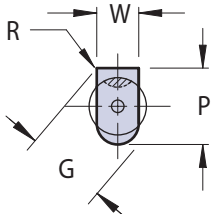
KEYFLAT
MVK™



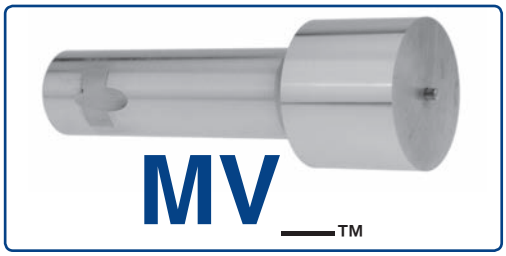
FLATTED ROUND
MVF™

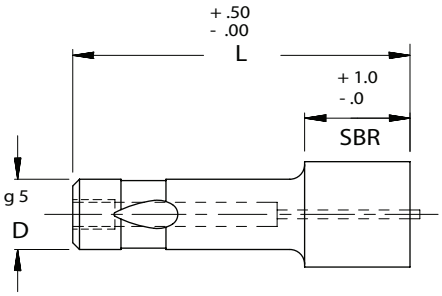


DEE
MVD™



270°





ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	P(OR P&W) DIMENSIONS
EXAMPLE:	6	MVR	16	90	21.0 x 7.0

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	SHANK DIA D	POINT LENGTH "S.B.R."	ROUND RANGE P	SHAPE MIN W	SHAPE MAX G/P	LENGTH "L" 80	LENGTH "L" 90	LENGTH "L" 100	EJECTOR SIZE
MV_ 10	10	16	10.10 - 25.00	3.00	25.00	X	X	X	MAE 4
MV_ 13	13	20	13.10 - 32.00	5.00	32.00	X	X	X	MAE 5
MV_ 16	16	25	16.10 - 38.00	6.00	38.00	X	X	X	MAE 5
MV_ 20	20	25	20.10 - 40.00	8.00	40.00	X	X	X	MAE 6
MV_ 25	25	25	25.10 - 47.00	10.00	47.00	X	X	X	MAE 6
MV_ 32	32	32	32.10 - 63.00	11.50	63.00	X	X	X	MAE 6

Material
Steel: M2, HRC 60-63

Standard Point Tolerance

Round P $^{+.01}_{-.00}$ | ◎ .01 P to D

Shape P, W ± .01 | ◎ .02 P to D

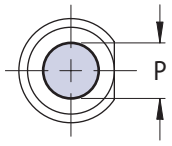
STANDARD BALL SEAT LOCATION IS AT 90° AS SHOWN. AVAILABLE AT 0°, 180°, 270°, FOR SAME PRICE.

SHOULDER PUNCHES

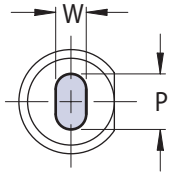
MOELLER™ PRECISION TOOL

SOLID

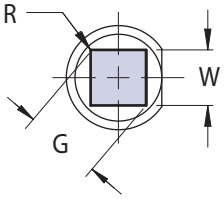
ROUND
MSC™



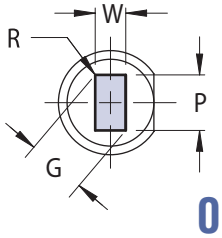
OBLONG
MSO™



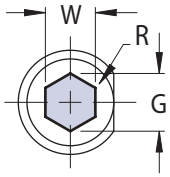
90°
SQUARE
MSS™



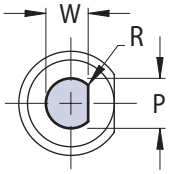
RECTANGLE
MSR™



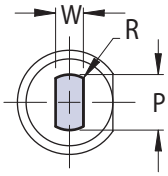
180°
HEXAGON
MSH™



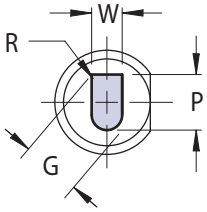
KEYFLAT
MSK™



FLATTED ROUND
MSF™



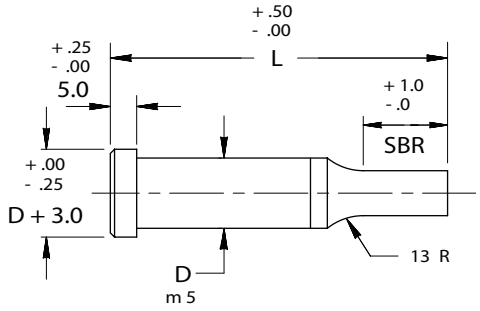
DEE
MSD™



270°

0°

MS_____™



ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	P(OR P&W) DIMENSIONS	ALTERATION CODE	ALTERNATE POINT TOLERANCE
EXAMPLE:	6	MSC	13	90	13	10.0	F1	T2
EXAMPLE:	6	MSO	16	80	STD	14.0 x 8.0	F1	STD

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.

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FOR STANDARD ALTERATIONS SEE PAGES 68-73.

CATALOG TYPE	SHANK DIA D	ROUND RANGE P	SHAPE MIN W	SHAPE MAX G/P	OVERALL LENGTH "L" 40	50	56	60	63	70	71	80	90	100	110	120	125	150
MS_ 04	4	1.60 - 3.99	1.60	4.00	X	X	X	X	X	X	X	X	X	X		X	X	
MS_ 05	5	1.60 - 4.99	1.60	5.00	X	X	X	X	X	X	X	X	X	X		X	X	
MS_ 06	6	1.60 - 5.99	1.60	6.00		X	X	X	X	X	X	X	X	X		X	X	
MS_ 08	8	2.50 - 7.99	2.50	8.00		X	X	X	X	X	X	X	X	X	X	X	X	
MS_ 10	10	3.20 - 9.99	3.20	10.00		X	X	X	X	X	X	X	X	X	X	X	X	X
MS_ 13	13	5.00 - 12.99	4.50	13.00		X	X	X	X	X	X	X	X	X	X	X	X	X
MS_ 16	16	8.00 - 15.99	6.00	16.00		X	X	X	X	X	X	X	X	X	X	X	X	X
MS_ 20	20	10.00 - 19.99	8.00	20.00			X	X	X	X	X	X	X	X	X	X	X	X
MS_ 25	25	12.00 - 24.99	9.00	25.00			X	X	X	X	X	X	X	X	X	X	X	X
MS_ 32	32	16.00 - 31.99	10.00	32.00					X	X	X	X	X	X	X	X	X	X
MS_ 40	40	30.00 - 39.99	14.00	40.00								X	X	X	X		X	X

NOTE: FOR EXTENDED RANGE SHANK DIAMETERS OF 45, 50, 56 & 63, SEE PAGE NO. 20, 21

*FOR PM4 MATERIAL PRODUCTS, SEE ADVANCED STAMPING APPLICATION TOOLING CATALOG

Material*
Steel: M2, HRC 60-63
Heads HRC 45-55

Standard Point Tolerance

Round P +.01 -.00	◎	.01	P to D
Shape P, W ± .01	◎	.02	P to D

Alternate Point Tolerance	T2
P, W TOLERANCE +.005 -.000	
P to D .008 ◎	

CATALOG TYPE	SHANK D	SBR NAPMA STD	SBR ALTERNATES B	SBR ALTERNATES C
MS_ 04	4	8	10	—
MS_ 05	5	13	10	—
MS_ 06	6	13	10	—
MS_ 08	8	19	13	—
MS_ 10	10	19	13	25
MS_ 13	13	19	13	25
MS_ 16	16	19	13	25
MS_ 20	20	19	13	25
MS_ 25	25	19	13	25
MS_ 32	32	25	19	30
MS_ 40	40	25	19	30

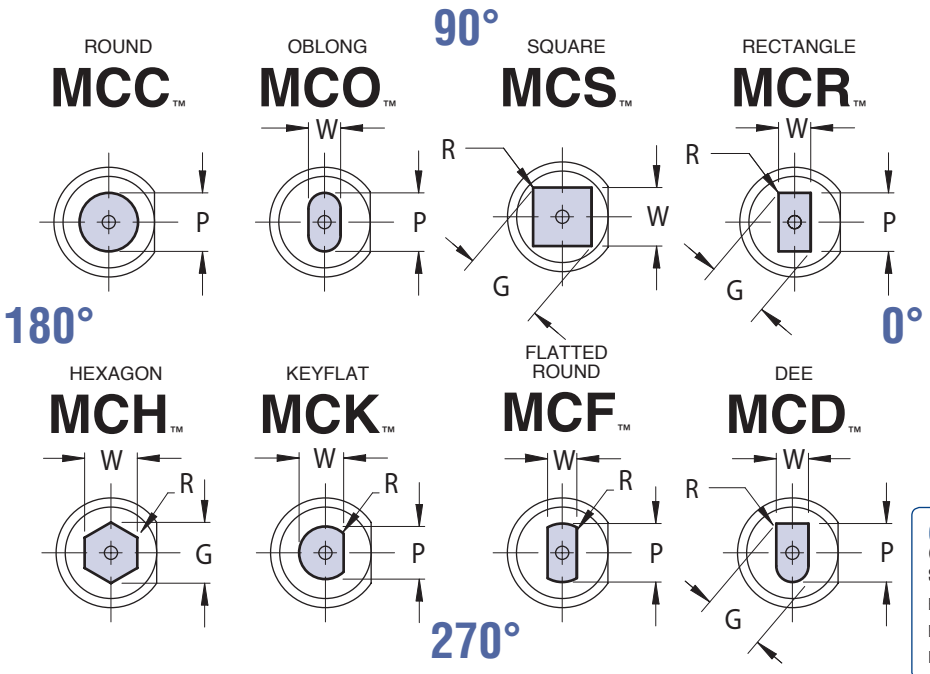
L=50 SBR MAX=13 L=60 SBR MAX=19
L=56 SBR MAX=19 L=63 SBR MAX=25

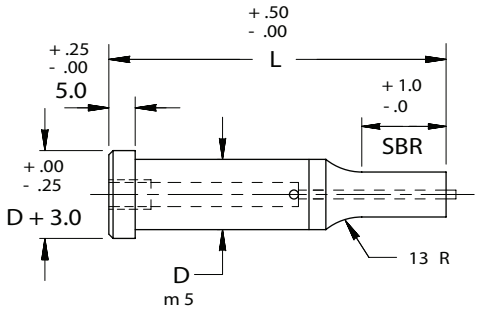
STANDARD FLAT LOCATION IS AT 0° AS SHOWN.
AVAILABLE AT 90°, 180°, 270°, FOR SAME ALTERATION PRICE.

SHOULDER PUNCHES

MOELLER™ PRECISION TOOL

EJECTOR





ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	P(OR P&W) DIMENSIONS	ALTERATION CODE	ALTERNATE POINT TOLERANCE
EXAMPLE:	6	MCC	13	90	STD	10.0	F1	STD
EXAMPLE:	6	MCO	16	80	B	13.0 x 9.0	F1	T2

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

CATALOG TYPE	SHANK DIA D	ROUND RANGE P	SHAPE MIN W	SHAPE MAX G/P	OVERALL LENGTH "L" 50	56	60	63	70	71	80	90	100	110	125
MC_ 05	5	1.60 - 4.99	1.60	5.00	X	X	X	X	X	X	X	X	X		
MC_ 06	6	2.50 - 5.99	2.50	6.00	X	X	X	X	X	X	X	X	X		
MC_ 08	8	3.20 - 7.99	3.20	8.00	X	X	X	X	X	X	X	X	X	X	X
MC_ 10	10	4.50 - 9.99	4.50	10.00	X	X	X	X	X	X	X	X	X	X	X
MC_ 13	13	6.00 - 12.99	6.00	13.00	X	X	X	X	X	X	X	X	X	X	X
MC_ 16	16	8.00 - 15.99	7.50	16.00	X	X	X	X	X	X	X	X	X	X	X
MC_ 20	20	10.00 - 19.99	8.00	20.00		X	X	X	X	X	X	X	X	X	X
MC_ 25	25	12.00 - 24.99	9.00	25.00		X	X	X	X	X	X	X	X	X	X
MC_ 32	32	16.00 - 31.99	10.00	32.00				X	X	X	X	X	X	X	X
MC_ 40	40	30.00 - 39.99	14.00	40.00							X	X	X	X	X

NOTE: FOR EXTENDED RANGE SHANK DIAMETERS OF 45, 50, 56 & 63, SEE PAGE NO. 20, 21

*FOR PM4 MATERIAL PRODUCTS, SEE ADVANCED STAMPING APPLICATION TOOLING CATALOG

Material*
Steel: M2, HRC 60-63
Heads HRC 45-55

Standard Point Tolerance

Round P +.01 -.00 — ◎ .01 P to D

Shape P, W ± .01 — ◎ .02 P to D

Alternate Point Tolerance	T2
P, W TOLERANCE	+.005 -.000
P to D	◎ .008

CATALOG TYPE	SHANK D	SBR NAPMA STD	SBR ALTERNATES B	SBR ALTERNATES C	EJECTOR SIZE
MC_ 05	5	13	10	—	MAE 2
MC_ 06	6	13	10	—	MAE 3
MC_ 08	8	19	13	—	MAE 4
MC_ 10	10	19	13	25	MAE 5
MC_ 13	13	19	13	25	MAE 5
MC_ 16	16	19	13	25	MAE 6
MC_ 20	20	19	13	25	MAE 6
MC_ 25	25	19	13	25	MAE 6
MC_ 32	32	25	19	30	MAE 6
MC_ 40	40	25	19	30	MAE 6

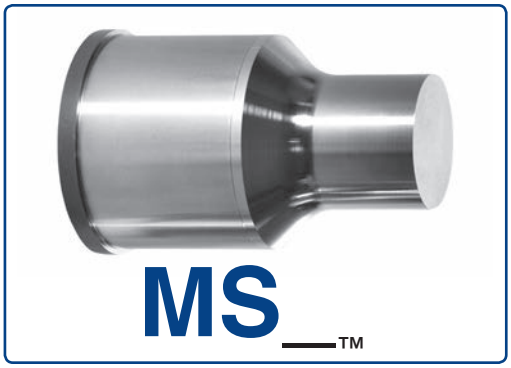
L=50 SBR MAX=13 L=60 SBR MAX=19
L=56 SBR MAX=19 L=63 SBR MAX=25

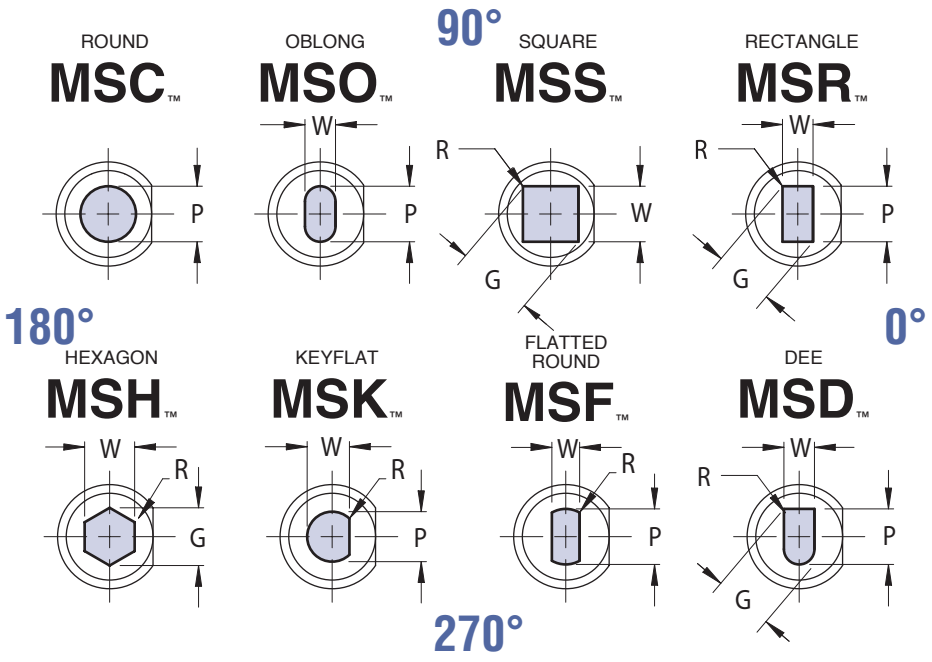
STANDARD FLAT LOCATION IS AT 0° AS SHOWN.
AVAILABLE AT 90°, 180°, 270°, FOR SAME ALTERATION PRICE.

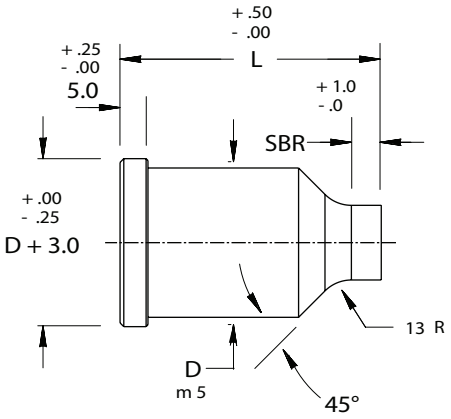
LARGE SHOULDER PUNCHES

MOELLER™ PRECISION TOOL

SOLID/EXTENDED RANGE







VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	SHANK DIA D	ROUND RANGE P	SHAPES MIN W	SHAPES MAX G/P	OVERALL LENGTH "L" 80	90	100	SBR NAPMA STD	ALTERNATES B	C
MS_ 45	45	25.00 - 44.99	10.00	45.00	X	X	X	25	19	30
MS_ 50	50	30.00 - 49.99	12.00	50.00	X	X	X	25	19	30
MS_ 56	56	35.00 - 55.99	13.00	56.00	X	X	X	25	19	30
MS_ 63	63	40.00 - 62.99	14.00	63.00	X	X	X	25	19	30

Material
Steel: M2, HRC 60-63

Standard Point Tolerance

Round P $^{+.01}_{-.00}$ | ◎ .01 P to D

Shape P, W ± .01 | ◎ .02 P to D

ORDER EXAMPLE:

(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	P(OR P&W) DIMENSIONS	ALTERATION CODE	ALTERNATE POINT TOLERANCE
EXAMPLE:	6	MSC	50	90	STD	40.0	F1	STD
EXAMPLE:	6	MSO	63	100	B	50.0 x 20.0	F1	T2

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

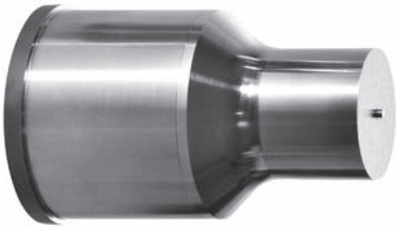
STANDARD FLAT LOCATION IS AT 0° AS SHOWN.
AVAILABLE AT 90°, 180°, 270°, FOR SAME ALTERATION PRICE.

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

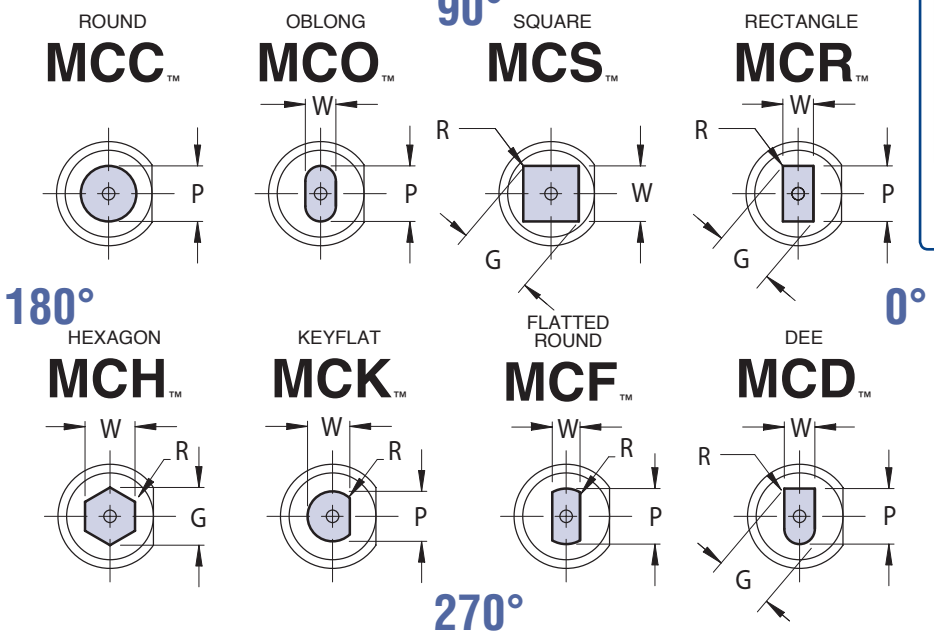
LARGE SHOULDER PUNCHES

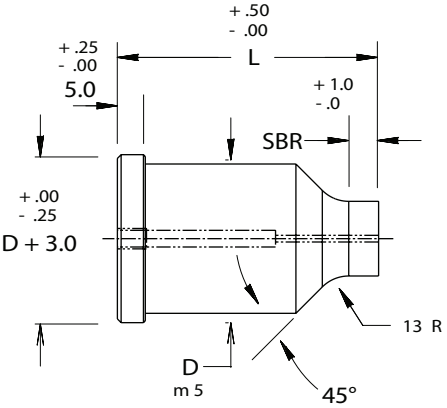
MOELLER™ PRECISION TOOL

EJECTOR/EXTENDED RANGE



MC_ ™





VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	SHANK DIA D	ROUND RANGE P	SHAPES MIN W	SHAPES MAX G/P	OVERALL LENGTH "L" 80	90	100	SBR NAPMA STD	SBR ALTERNATES B	C	EJECTOR SIZE
MC_ 45	45	25.00 - 44.99	10.00	45.00	X	X	X	25	19	30	MAE 12
MC_ 50	50	30.00 - 49.99	12.00	50.00	X	X	X	25	19	30	MAE 12
MC_ 56	56	35.00 - 55.99	13.00	56.00	X	X	X	25	19	30	MAE 12
MC_ 63	63	40.00 - 62.99	14.00	63.00	X	X	X	25	19	30	MAE 12

Material
Steel: M2, HRC 60-63

Standard Point Tolerance

Round P $^{+.01}_{-.00}$	◎	.01	P to D
Shape P, W ± .01	◎	.02	P to D

ORDER EXAMPLE:

(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	P(OR P&W) DIMENSIONS	ALTERATION CODE	ALTERNATE POINT TOLERANCE
EXAMPLE:	6	MCC	50	90	STD	40.0	F1	STD
EXAMPLE:	6	MCO	63	100	B	50.0 x 20.0	F1	T2

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

STANDARD FLAT LOCATION IS AT 0° AS SHOWN.
AVAILABLE AT 90°, 180°, 270°, FOR SAME ALTERATION PRICE.

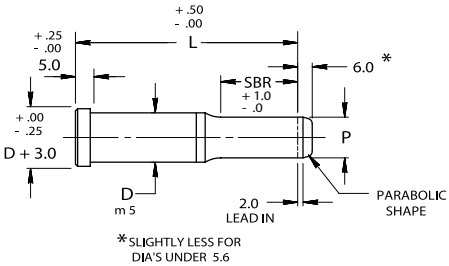
FOR STANDARD ALTERATIONS SEE PAGES 68-73.

SHOULDER PILOTS

PILOT

STANDARD STYLE

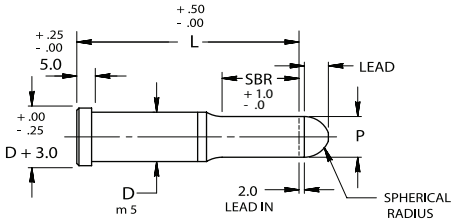
MST™



*SLIGHTLY LESS FOR DIA'S UNDER 5.6

BULLET NOSE STYLE

MSP™



ORDER EXAMPLE:

(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	"P" DIMENSION	ALTERNATE TOLERANCE
EXAMPLE:	6	MST	13	71	STD	10.0	T2
EXAMPLE:	6	MSP	20	80	B	18.0	STD

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

MSP STYLE LEAD	
P DIM	LEAD
1.50-9.50	4
9.51-up	10

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CATALOG TYPE	SHANK DIA D	RANGE P	OVERALL LENGTH "L"									
			40	50	56	60	63	70	71	80	90	100
MS_ 04	4	1.55 - 4.00	X	X	X	X	X	X	X	X	X	X
MS_ 05	5	1.55 - 5.00	X	X	X	X	X	X	X	X	X	X
MS_ 06	6	1.55 - 6.00		X	X	X	X	X	X	X	X	X
MS_ 08	8	2.45 - 8.00		X	X	X	X	X	X	X	X	X
MS_ 10	10	3.15 - 10.00		X	X	X	X	X	X	X	X	X
MS_ 13	13	4.95 - 13.00		X	X	X	X	X	X	X	X	X
MS_ 16	16	7.95 - 16.00		X	X	X	X	X	X	X	X	X
MS_ 20	20	9.95 - 20.00			X	X	X	X	X	X	X	X
MS_ 25	25	11.95 - 25.00			X	X	X	X	X	X	X	X
MS_ 32	32	15.95 - 32.00					X	X	X	X	X	X

*FOR PM4 MATERIAL PRODUCTS, SEE ADVANCED STAMPING APPLICATION TOOLING CATALOG

Material*

Steel: M2, HRC 60-63
Heads HRC 45-55

Standard Point Tolerance

Round P +.01 -.00 | ◎ .01 P to D

When P = D Shank Tolerances Apply

Alternate Point Tolerance	T2
P, W TOLERANCE	+.005 -.000
P to D	.008 ◎

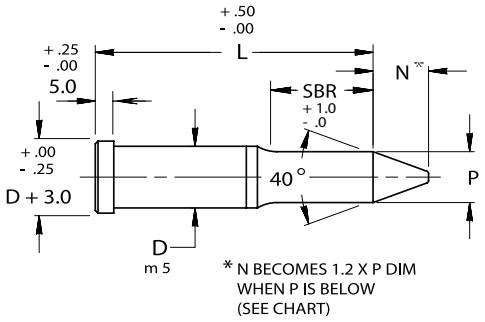
CATALOG TYPE	SHANK D	SBR		
		NAPMA	ALTERNATES	
		STD	B	C
MS_ 04	4	8	10	—
MS_ 05	5	13	10	—
MS_ 06	6	13	10	—
MS_ 08	8	19	13	—
MS_ 10	10	19	13	25
MS_ 13	13	19	13	25
MS_ 16	16	19	13	25
MS_ 20	20	19	13	25
MS_ 25	25	19	13	25
MS_ 32	32	25	19	30

L=50 SBR MAX=13 L=60 SBR MAX=19
L=56 SBR MAX=19 L=63 SBR MAX=25

SHOULDER PILOTS

PILOT

LONG LEAD STYLE



ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	"P" DIMENSION	ALTERNATE TOLERANCE
EXAMPLE:	6	MSA	20	90	STD	17.0	STD

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

Complete design & CAD files visit WWW.MOELLERMCAD.COM

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

CATALOG TYPE	SHANK DIA D	RANGE P	LEAD N	P BELOW SEE NOTE*	LENGTH "L"								
					63	70	71	80	90	100	110	125	140
MS_ 10	10	4.85 - 10.00	8	5.64	X	X	X	X	X	X	X		
MS_ 13	13	6.30 - 13.00	10	7.11	X	X	X	X	X	X	X	X	X
MS_ 16	16	9.95 - 16.00	15	10.74		X	X	X	X	X	X	X	X
MS_20	20	13.60 - 20.00	20	14.38		X	X	X	X	X	X	X	X
MS_ 25	25	17.25 - 25.00	25	18.00		X	X	X	X	X	X	X	X
MS_ 32	32	20.85 - 32.00	30	21.67			X	X	X	X	X	X	X

*FOR PM4 MATERIAL PRODUCTS, SEE ADVANCED STAMPING APPLICATION TOOLING CATALOG

Material*
Steel: M2, HRC 60-63
Heads HRC 45-55

Standard Point Tolerance
Round P $^{+.01}_{-.00}$ | ◎ | .01 | P to D

When P = D Shank Tolerances Apply

Alternate Point Tolerance	T2

P, W TOLERANCE $^{+.005}_{-.000}$

P to D | .008 | ◎

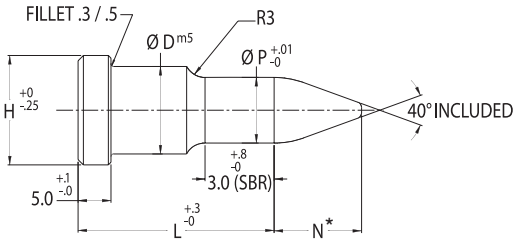
CATALOG TYPE	SHANK D	SBR	
		NAPMA STD	ALTERNATES B
MS_ 10	10	19	25
MS_ 13	13	19	25
MS_ 16	16	19	25
MS_ 20	20	19	25
MS_ 25	25	19	25
MS_ 32	32	25	30

SHOULDER PILOTS

PILOT/COMPACT/POINTED

POINTED STYLE

MSW™



* N BECOMES 1.2 X P DIM WHEN P IS BELOW (SEE CHART)

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE POINTED	SHANK DIA D	DIA P RANGE	LEAD N	P BELOW SEE NOTE	H	OVERALL LENGTH "L"						
						16	20	22	25	28	32	35
MSW 04	4	1.95 - 3.99	4	4.00	7.0	X	X	X	X	X	X	X
MSW 05	5	2.65 - 4.99	5	4.19	8.0	X	X	X	X	X	X	X
MSW 06	6	3.30 - 5.99	6	4.19	9.0	X	X	X	X	X	X	X
MSW 08	8	4.10 - 7.99	7	4.19	11.0	X	X	X	X	X	X	X
MSW 10	10	4.80 - 9.99	8	5.64	13.0	X	X	X	X	X	X	X
MSW 13	13	6.25 - 12.99	10	7.11	16.0	X	X	X	X	X	X	X
MSW 16	16	9.85 - 15.99	15	10.74	19.0	X	X	X	X	X	X	X
MSW 20	20	13.50 - 19.99	20	14.38	23.0		X	X	X	X	X	X
MSW 25	25	17.20 - 24.99	25	18.00	28.0		X	X	X	X	X	X
MSW 32	32	20.80 - 31.99	30	21.67	35.0		X	X	X	X	X	X

Material

Steel: M2, HRC 60-63

Standard Point Tolerance

Round P +.01 -.00 | ◎ .01 P to D

When P = D Shank Tolerances Apply

Alternate Point Tolerance	T2
P, W TOLERANCE	+.005 -.000
P to D	.008 ◎

ORDER EXAMPLE:

(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	"P" DIMENSION	ALTERNATE TOLERANCE
EXAMPLE:	6	MSW	13	25	10.0	STD

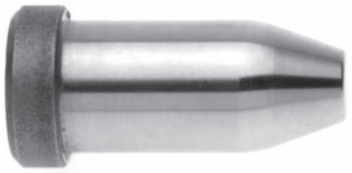
Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

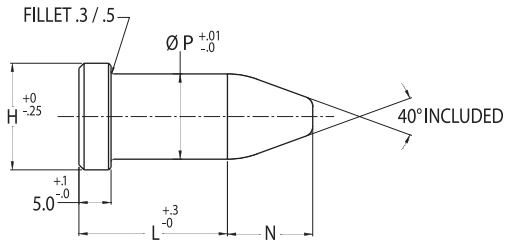
SHOULDER PILOTS

PILOT/COMPACT/STRAIGHT

STRAIGHT STYLE



MSV™



Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE STRAIGHT	DIA P RANGE	LEAD N	H	OVERALL LENGTH "L"						
				16	20	22	25	28	32	35
MSV 04	3.01 - 4.00	4	7.0	X	X	X	X	X	X	X
MSV 05	4.01 - 5.00	5	8.0	X	X	X	X	X	X	X
MSV 06	5.01 - 6.00	6	9.0	X	X	X	X	X	X	X
MSV 08	6.01 - 8.00	7	11.0	X	X	X	X	X	X	X
MSV 10	8.01 - 10.00	8	13.0	X	X	X	X	X	X	X
MSV 13	10.01 - 13.00	10	16.0	X	X	X	X	X	X	X
MSV 16	13.01 - 16.00	15	19.0	X	X	X	X	X	X	X
MSV 20	16.01 - 20.00	20	23.0		X	X	X	X	X	X

Material
Steel: M2, HRC 60-63

Standard Point Tolerance
Round P +.01 -.00 | ◎ | .01 | P to D

Alternate Point Tolerance	T2
P, W TOLERANCE	+.005 -.000

ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"L"	"P" DIMENSION	ALTERNATE TOLERANCE
EXAMPLE:	6	MSV 10	30	9.0	STD

Note: When ordering, standard quantity breaks are:
1, 2-3, 4-11, 12-23, 24-49, 50-99

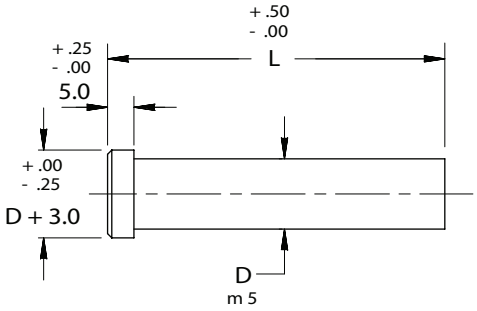
FOR STANDARD ALTERATIONS SEE PAGES 68-73.

SHOULDER PUNCH BLANKS

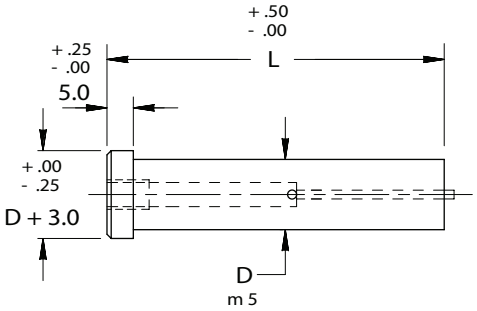
MOELLER™ PRECISION TOOL

SOLID/EJECTOR

MSB™



MCB™



Material*
Steel: M2, HRC 60-63
Heads HRC 45-55

*FOR PM4 MATERIAL PRODUCTS, SEE ADVANCED STAMPING APPLICATION TOOLING CATALOG

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG NUMBER SOLID	SHANK DIA D	OVERALL LENGTH "L"																
		40	50	56	60	63	70	71	80	90	100	120	125	150	155	160	165	170
MSB 04	4	X	X	X	X	X	X	X	X	X	X	X	X					
MSB 05	5	X	X	X	X	X	X	X	X	X	X	X	X					
MSB 06	6		X	X	X	X	X	X	X	X	X	X	X					
MSB 08	8		X	X	X	X	X	X	X	X	X	X	X					
MSB 10	10		X	X	X	X	X	X	X	X	X	X	X	X				
MSB 13	13		X	X	X	X	X	X	X	X	X	X	X	X				
MSB 16	16		X	X	X	X	X	X	X	X	X	X	X	X	X			
MSB 20	20			X	X	X	X	X	X	X	X	X	X	X		X		
MSB 25	25			X	X	X	X	X	X	X	X	X	X	X			X	
MSB 32	32					X	X	X	X	X	X	X	X	X				X
MSB 40	40								X	X	X		X	X				

ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"
EXAMPLE:	6	MSB	8	100
EXAMPLE:	6	MCB	16	125

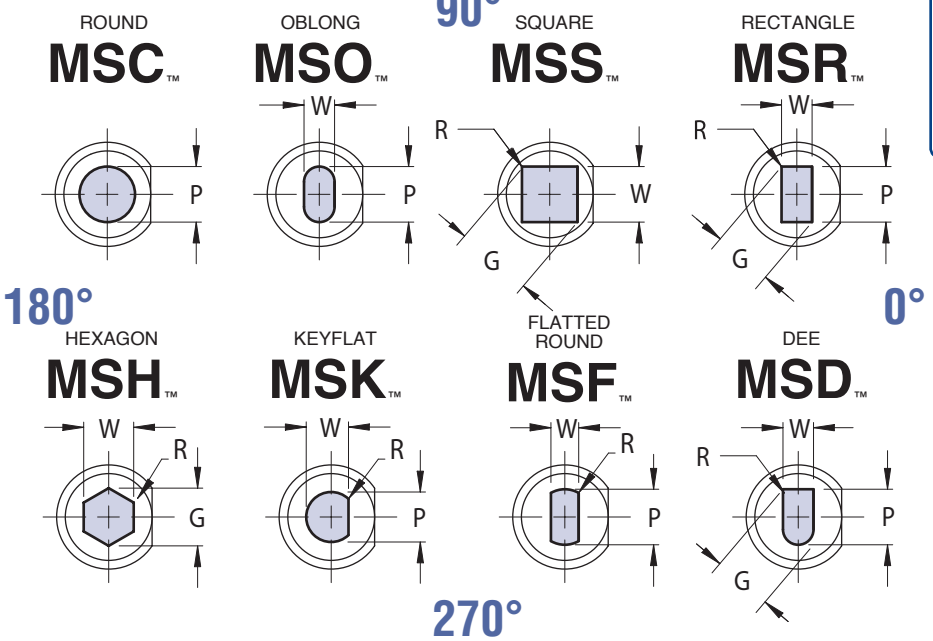
FOR STANDARD ALTERATIONS SEE PAGES 68-73.

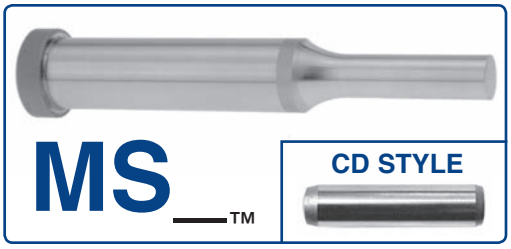
CATALOG NUMBER EJECTOR	SHANK DIA D	OVERALL LENGTH "L"										
		50	56	60	63	70	71	80	90	100	110	125
MCB 05	5	X	X	X	X	X	X	X	X	X		
MCB 06	6	X	X	X	X	X	X	X	X	X		
MCB 08	8	X	X	X	X	X	X	X	X	X		
MCB 10	10	X	X	X	X	X	X	X	X	X	X	X
MCB 13	13	X	X	X	X	X	X	X	X	X	X	X
MCB 16	16	X	X	X	X	X	X	X	X	X	X	X
MCB 20	20		X	X	X	X	X	X	X	X	X	X
MCB 25	25		X	X	X	X	X	X	X	X	X	X
MCB 32	32				X	X	X	X	X	X	X	X
MCB 40	40							X	X	X	X	X

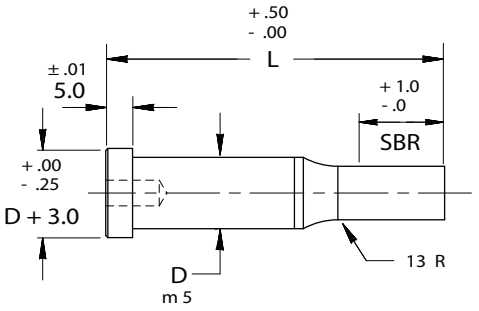
SHOULDER PUNCHES

MOELLER™ PRECISION TOOL

SOLID/WITH CENTER DOWEL







VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.

NOTE: MUST SPECIFY CD AND X4=5.0 ALTERATION

Complete design & CAD files visit WWW.MOELLERMCAD.COM

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

CATALOG TYPE	SHANK DIA D	ROUND RANGE P	SHAPE MIN W	SHAPE MAX G/P	OVERALL LENGTH "L" 70	71	80	90	100	110	120	125	150
MS_ 10	10	3.20 - 9.99	3.20	10.00	X	X	X	X	X	X	X	X	X
MS_ 13	13	5.00 - 12.99	4.50	13.00	X	X	X	X	X	X	X	X	X
MS_ 16	16	8.00 - 15.99	6.00	16.00	X	X	X	X	X	X	X	X	X
MS_ 20	20	10.00 - 19.99	8.00	20.00	X	X	X	X	X	X	X	X	X
MS_ 25	25	12.00 - 24.99	9.00	25.00	X	X	X	X	X	X	X	X	X
MS_ 32	32	16.00 - 31.99	10.00	32.00	X	X	X	X	X	X	X	X	X
MS_ 40	40	30.00 - 39.99	14.00	40.00			X	X	X	X		X	X

Material*

Steel: M2, HRC 60-63
Heads HRC 45-55

Standard Point Tolerance

Round P +.01 -.00 — ◎ .01 P to D

Shape P, W ± .01 — ◎ .02 P to D

Alternate Point Tolerance	T2
P, W TOLERANCE	+.005 -.000
P to D	.008 ◎

*FOR PM4 MATERIAL PRODUCTS, SEE ADVANCED STAMPING APPLICATION TOOLING CATALOG

STANDARD FLAT LOCATION IS AT 0° AS SHOWN.
AVAILABLE AT 90°, 180°, 270°, FOR SAME ALTERATION PRICE.

CATALOG TYPE	SHANK D	SBR NAPMA STD	SBR ALTERNATES B	SBR ALTERNATES C
MS_ 10	10	19	13	25
MS_ 13	13	19	13	25
MS_ 16	16	19	13	25
MS_ 20	20	19	13	25
MS_ 25	25	19	13	25
MS_ 32	32	25	19	30
MS_ 40	40	25	19	30

L=50 SBR MAX=13 L=60 SBR MAX=19
L=56 SBR MAX=19 L=63 SBR MAX=25

ORDER EXAMPLE:

(Reference page 4)

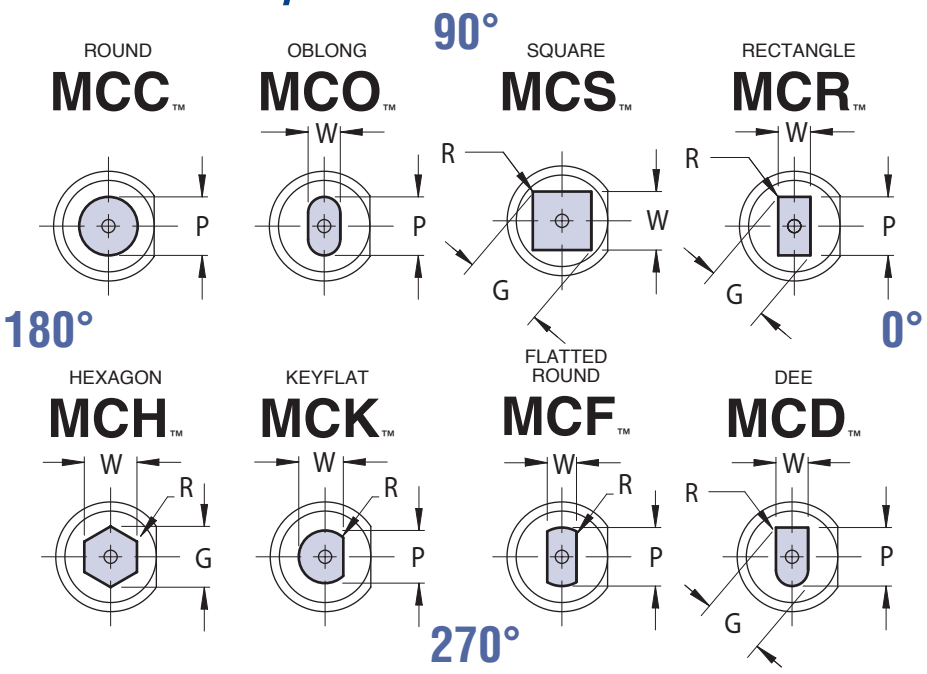
SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	P(OR P&W) DIMENSIONS	ALTERATION CODE	ALTERNATE POINT TOLERANCE
EXAMPLE:	6	MSC	13	90	13	10.0	CD X4=5.0	T2
EXAMPLE:	6	MSO	16	80	STD	14.0 x 8.0	CD X4=5.0	STD

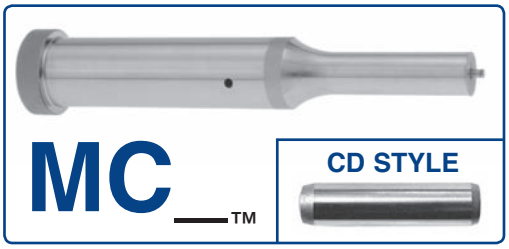
Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

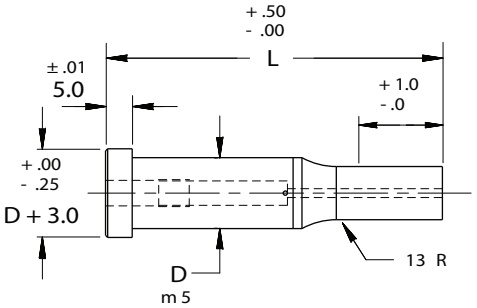
SHOULDER PUNCHES

MOELLER™ PRECISION TOOL

EJECTOR/WITH CENTER DOWEL







VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

NOTE: MUST SPECIFY CD AND X4=5.0 ALTERATION

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	SHANK DIA D	ROUND RANGE P	SHAPE MIN W	SHAPE MAX G/P	OVERALL LENGTH "L" 70	71	80	90	100	110	125
MC_ 10	10	4.50 - 9.99	4.50	10.00	X	X	X	X	X	X	X
MC_ 13	13	6.00 - 12.99	6.00	13.00	X	X	X	X	X	X	X
MC_ 16	16	8.00 - 15.99	7.50	16.00	X	X	X	X	X	X	X
MC_ 20	20	10.00 - 19.99	8.00	20.00	X	X	X	X	X	X	X
MC_ 25	25	12.00 - 24.99	9.00	25.00	X	X	X	X	X	X	X
MC_ 32	32	16.00 - 31.99	10.00	32.00	X	X	X	X	X	X	X
MC_ 40	40	30.00 - 39.99	14.00	40.00			X	X	X	X	X

Material*

Steel: M2, HRC 60-63
Heads HRC 45-55

Standard Point Tolerance

Round P $^{+.01}_{-.00}$ — ◎ .01 P to D

Shape P, W ± .01 — ◎ .02 P to D

Alternate Point Tolerance	T2
P, W TOLERANCE	$^{+.005}_{-.000}$
P to D	.008 ◎

CATALOG TYPE	SHANK D	SBR NAPMA STD	SBR ALTERNATES B	SBR ALTERNATES C	EJECTOR SIZE
MC_ 10	10	19	13	25	MAE 5
MC_ 13	13	19	13	25	MAE 5
MC_ 16	16	19	13	25	MAE 6
MC_ 20	20	19	13	25	MAE 6
MC_ 25	25	19	13	25	MAE 6
MC_ 32	32	25	19	30	MAE 6
MC_ 40	40	25	19	30	MAE 6

L=70 SBR MAX=19
L=71 SBR MAX=19

*FOR PM4 MATERIAL PRODUCTS, SEE ADVANCED STAMPING APPLICATION TOOLING CATALOG

STANDARD FLAT LOCATION IS AT 0° AS SHOWN.
AVAILABLE AT 90°, 180°, 270°, FOR SAME ALTERATION PRICE.

ORDER EXAMPLE:

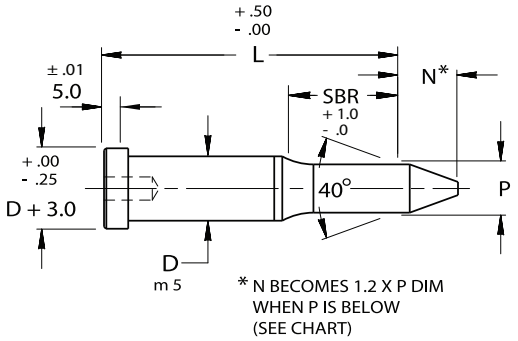
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	P(OR P&W) DIMENSIONS	ALTERATION CODE	ALTERNATE POINT TOLERANCE
EXAMPLE:	6	MCC	13	90	STD	10.0	CD X4=5.0	STD
EXAMPLE:	6	MCO	16	80	B	13.0 x 9.0	CD X4=5.0	T2

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

SHOULDER PILOTS

PILOT/WITH CENTER DOWEL



LONG LEAD STYLE

ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	"P" DIMENSION	ALTERATION CODE	ALTERNATE TOLERANCE
EXAMPLE:	6	MSA	20	90	STD	17.0	CD X4=5.0	STD

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

NOTE: MUST SPECIFY CD AND X4=5.0 ALTERATION

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	SHANK DIA D	RANGE P	LEAD N	P BELOW SEE NOTE*	LENGTH "L"								
					63	70	71	80	90	100	110	125	140
MS_ 10	10	4.85 - 10.00	8	5.64	X	X	X	X	X	X	X		
MS_ 13	13	6.30 - 13.00	10	7.11	X	X	X	X	X	X	X	X	X
MS_ 16	16	9.95 - 16.00	15	10.74		X	X	X	X	X	X	X	X
MS_20	20	13.60 - 20.00	20	14.38		X	X	X	X	X	X	X	X
MS_ 25	25	17.25 - 25.00	25	18.00		X	X	X	X	X	X	X	X
MS_ 32	32	20.85 - 32.00	30	21.67			X	X	X	X	X	X	X

*FOR PM4 MATERIAL PRODUCTS, SEE ADVANCED STAMPING APPLICATION TOOLING CATALOG

Material*
Steel: M2, HRC 60-63
Heads HRC 45-55

Standard Point Tolerance
Round P $^{+.01}_{-.00}$ | ◎ | .01 | P to D

When P = D Shank Tolerances Apply

Alternate Point Tolerance	T2
P, W TOLERANCE $^{+.005}_{-.000}$	
P to D .008 ◎	

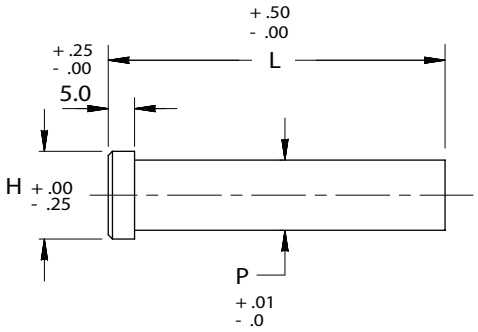
CATALOG TYPE	SHANK D	SBR	
		NAPMA	ALTERNATES
		STD	B
MS_ 10	10	19	25
MS_ 13	13	19	25
MS_ 16	16	19	25
MS_ 20	20	19	25
MS_ 25	25	19	25
MS_ 32	32	25	30

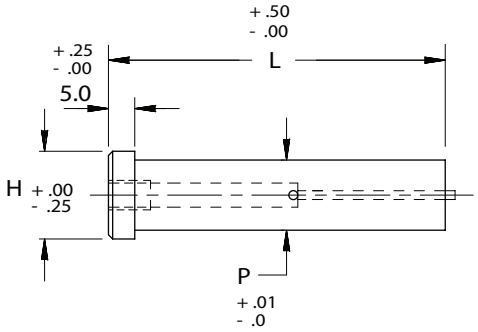
REDUCED SHANK PUNCHES

SOLID/EJECTOR

MSX™

MCX™





Material

Steel: M2, HRC 60-63
Heads HRC 45-55

ORDER EXAMPLE:

(Reference page 4)

SPECIFY:	QTY:	TYPE	"L"	"P" DIMENSION
EXAMPLE:	6	MSX 10	80	8.50
EXAMPLE:	6	MCX 16	70	14.0

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

Complete design & CAD files visit WWW.MOELLERMCAD.COM

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

CATALOG TYPE SOLID	SHANK DIA D RANGE	HEAD DIA H	OVERALL LENGTH "L"										
			50	56	60	63	70	71	80	90	100	120	125
MSX 04	3.01 - 4.00	7	X	X	X	X	X	X	X	X	X	X	X
MSX 05	4.01 - 5.00	8	X	X	X	X	X	X	X	X	X	X	X
MSX 06	5.01 - 6.00	9	X	X	X	X	X	X	X	X	X	X	X
MSX 08	6.01 - 8.00	11	X	X	X	X	X	X	X	X	X	X	X
MSX 10	8.01 - 10.00	13	X	X	X	X	X	X	X	X	X	X	X
MSX 13	10.01 - 13.00	16	X	X	X	X	X	X	X	X	X	X	X
MSX 16	13.01 - 16.00	19	X	X	X	X	X	X	X	X	X	X	X

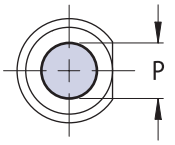
CATALOG TYPE EJECTOR	SHANK DIA D RANGE	HEAD DIA H	OVERALL LENGTH "L"									EJECTOR SIZE
			50	56	60	63	70	71	80	90	100	
MCX 05	4.01 - 5.00	8	X	X	X	X	X	X	X	X	X	MAE 2
MCX 06	5.01 - 6.00	9	X	X	X	X	X	X	X	X	X	MAE 3
MCX 08	6.01 - 8.00	11	X	X	X	X	X	X	X	X	X	MAE 4
MCX 10	8.01 - 10.00	13	X	X	X	X	X	X	X	X	X	MAE 5
MCX 13	10.01 - 13.00	16	X	X	X	X	X	X	X	X	X	MAE 5
MCX 16	13.01 - 16.00	19	X	X	X	X	X	X	X	X	X	MAE 6

DURA PUNCHES

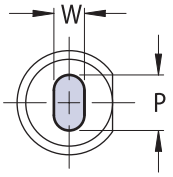
SOLID

90°

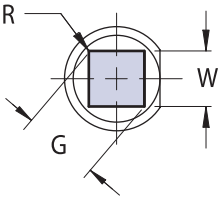
ROUND
XMSC™



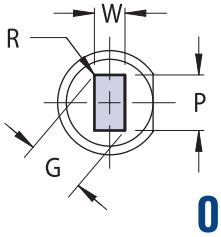
OBLONG
XMSO™



SQUARE
XMSS™



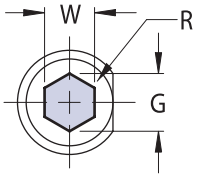
RECTANGLE
XMSR™



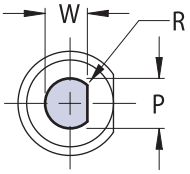
XMS_™

180°

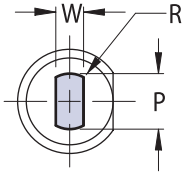
HEXAGON
XMSH™



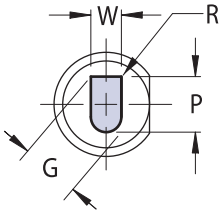
KEYFLAT
XMSK™



FLATTED ROUND
XMSF™

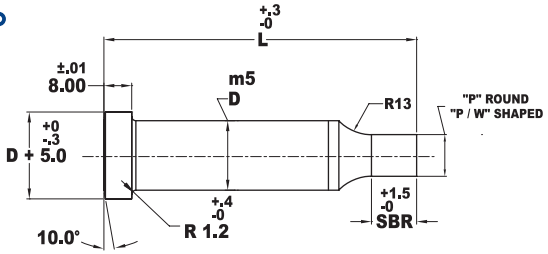


DEE
XMSD™



270°

0°



FOR CENTER DOWEL ALTERATION, SEE PAGE 71.

VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.

FOR OTHER STANDARD ALTERATIONS, SEE PAGES 68-73.

SHANK CATALOG TYPE	ROUND DIA D	ROUND RANGE P	SHAPE MIN W	SHAPE MAX G/P	OVERALL LENGTH "L" 70	80	90	100	110	125	150
XMS_ 08	08	3.10 - 7.99	3.10	8.00	X	X	X	X	X	X	X
XMS_ 10	10	3.20 - 9.99	3.20	10.00	X	X	X	X	X	X	X
XMS_ 13	13	5.00 - 12.99	4.50	13.00	X	X	X	X	X	X	X
XMS_ 16	16	8.00 - 15.99	6.00	16.00	X	X	X	X	X	X	X
XMS_ 20	20	10.00 - 19.99	8.00	20.00	X	X	X	X	X	X	X
XMS_ 25	25	12.00 - 24.99	9.00	25.00	X	X	X	X	X	X	X
XMS_ 32	32	16.00 - 31.99	10.00	32.00	X	X	X	X	X	X	X

Material

Steel: PM4 HRC 60-62
Heads HRC 40-55

Standard Point Tolerance

Round P	+.01 -.00	◎ .01	P to D
Shape P, W ± .01		◎ .025	P to D

ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	P(OR P&W) DIMENSIONS	ALTERATION CODE
EXAMPLE:	6	XMSC	13	90	13	10.0	CD
EXAMPLE:	6	XMSO	16	80	STD	14.0 x 8.0	F1 @ 90

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

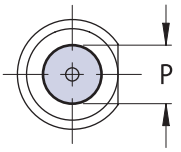
CATALOG TYPE	SHANK D	POINT LENGTH "SBR" STD	ALTERNATE B
XMS_08	10	13	19
XMS_10	10	13	19
XMS_13	13	13	19
XMS_16	16	19	25
XMS_20	20	19	25
XMS_25	25	19	25
XMS_32	32	19	25

STANDARD FLAT LOCATION IS AT 0° AS SHOWN.
AVAILABLE AT 90°, 180°, 270°, FOR SAME ALTERATION PRICE.

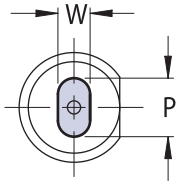
EJECTOR

90°

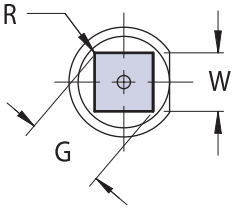
ROUND
XMCC™



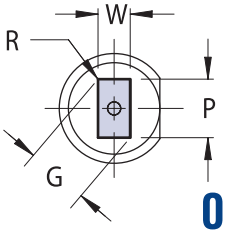
OBLONG
XMCO™



SQUARE
XMCS™

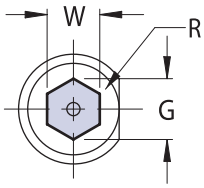


RECTANGLE
XMCR™

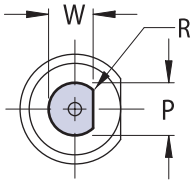


180°

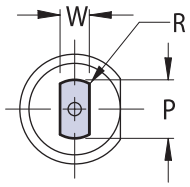
HEXAGON
XMCH™



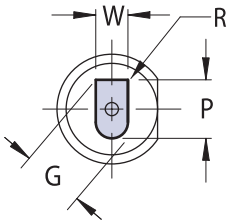
KEYFLAT
XMCK™



FLATTED ROUND
XMCF™

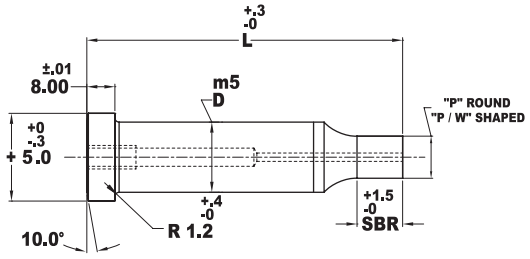


DEE
XMCD™



270°

0°



FOR CENTER DOWEL ALTERATION, SEE PAGE 71.

VIEWS ARE SHOWN LOOKING THROUGH THE SHANK BUT DRAWN WITH SOLID LINES FOR CLARITY.

FOR OTHER STANDARD ALTERATIONS, SEE PAGES 68-73.

SHANK CATALOG TYPE	ROUND DIA D	ROUND RANGE P	SHAPE MIN W	SHAPE MAX G/P	OVERALL LENGTH "L" 70	80	90	100	110	125
XMC_ 08	08	4.00 - 7.99	4.00	8.00	X	X	X	X	X	X
XMC_ 10	10	4.50 - 9.99	4.50	10.00	X	X	X	X	X	X
XMC_ 13	13	6.00 - 12.99	6.00	13.00	X	X	X	X	X	X
XMC_ 16	16	8.00 - 15.99	7.50	16.00	X	X	X	X	X	X
XMC_ 20	20	10.00 - 19.99	8.00	20.00	X	X	X	X	X	X
XMC_ 25	25	12.00 - 24.99	9.00	25.00	X	X	X	X	X	X
XMC_ 32	32	16.00 - 31.99	10.00	32.00	X	X	X	X	X	X

Material

Steel: PM4 HRC 60-62
Heads HRC 40-55

Standard Point Tolerance

Round P + .01 - .00 — ◎ .01 P to D
Shape P, W ± .01 — ◎ .025 P to D

ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	POINT LENGTH	P(OR P&W) DIMENSIONS	ALTERATION CODE
EXAMPLE:	6	XMCC	13	90	13	10.0	CD
EXAMPLE:	6	XMCO	16	80	STD	14.0 x 8.0	F1 @ 90

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

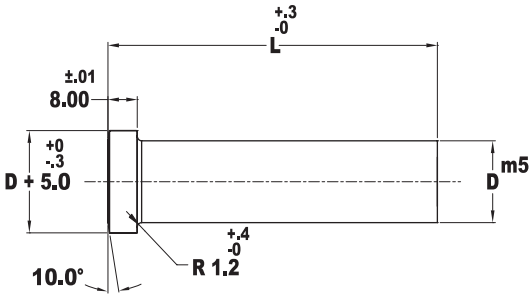
CATALOG TYPE	SHANK D	POINT LENGTH "SBR" STD	POINT LENGTH "SBR" ALTERNATE B	EJECTOR SIZE
XMC_08	10	13	19	MAE 4
XMC_10	10	13	19	MAE 5
XMC_13	13	13	19	MAE 5
XMC_16	16	19	25	MAE 6
XMC_20	20	19	25	MAE 6
XMC_25	25	19	25	MAE 6
XMC_32	32	19	25	MAE 6

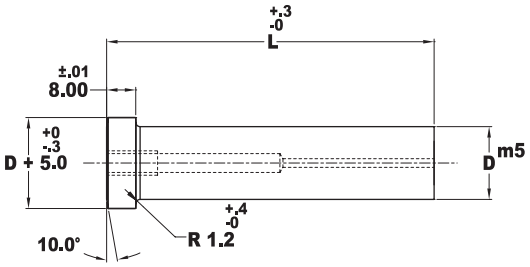
STANDARD FLAT LOCATION IS AT 0° AS SHOWN.
AVAILABLE AT 90°, 180°, 270°, FOR SAME ALTERATION PRICE.

SOLID/EJECTOR

XMSB™

XMCB™





Material

Steel: PM4 HRC 60-62
Heads HRC 40-55

FOR STANDARD ALTERATIONS SEE PAGES 68-73.

CATALOG NUMBER SOLID	SHANK DIA D	OVERALL LENGTH "L"						
		70	80	90	100	110	125	150
XMSB 08	08	X	X	X	X	X	X	X
XMSB 10	10	X	X	X	X	X	X	X
XMSB 13	13	X	X	X	X	X	X	X
XMSB 16	16	X	X	X	X	X	X	X
XMSB 20	20	X	X	X	X	X	X	X
XMSB 25	25	X	X	X	X	X	X	X
XMSB 32	32	X	X	X	X	X	X	X

ORDER EXAMPLE:

(Reference page 4)

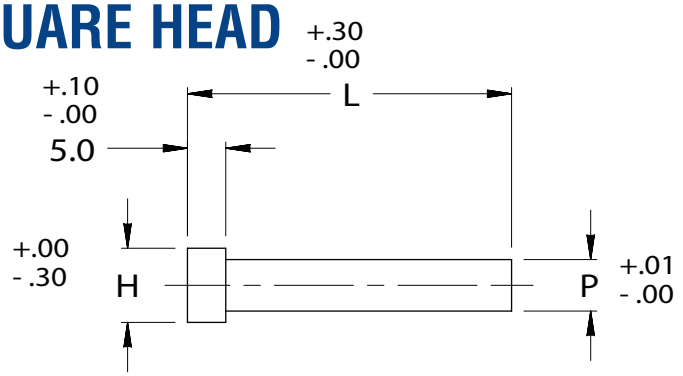
SPECIFY:	QTY:	TYPE	"D"	"L"
EXAMPLE:	6	XMSB	8	100
EXAMPLE:	6	XMCB	16	90

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

CATALOG NUMBER EJECTOR	SHANK DIA D	OVERALL LENGTH "L"						EJECTOR SIZE
		70	80	90	100	110	125	
XMCB 08	08	X	X	X	X	X	X	MAE 4
XMCB 10	10	X	X	X	X	X	X	MAE 5
XMCB 13	13	X	X	X	X	X	X	MAE 5
XMCB 16	16	X	X	X	X	X	X	MAE 6
XMCB 20	20	X	X	X	X	X	X	MAE 6
XMCB 25	25	X	X	X	X	X	X	MAE 6
XMCB 32	32	X	X	X	X	X	X	MAE 6

QUILL PUNCHES

SQUARE HEAD



MQS™

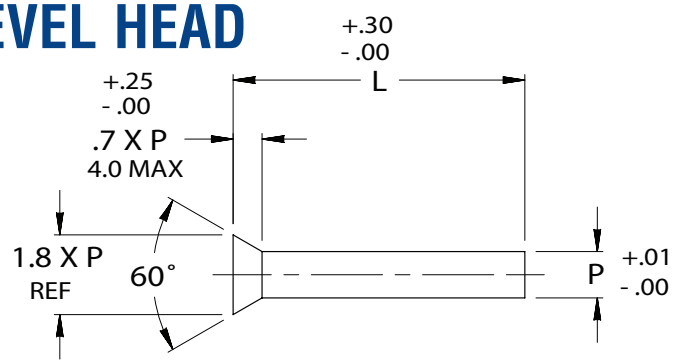
Material
Steel: M2, HRC 60-63

Complete design & CAD files visit WWW.MOELLERMCAD.COM

"P" Dimension must be ordered in .01 increments. Other three place sizes are P.O.R.

CATALOG TYPE	RANGE P	HEAD DIA. H	OVERALL LENGTH "L"				
			STD. LENGTHS		OPTIONAL LENGTHS		
			50	63	40	45	56
MQS 01	.80 - 1.60	3	X	X	X	X	X
MQS 02	1.61 - 2.00	4	X	X	X	X	X
MQS 03	2.01 - 3.00	5	X	X	X	X	X
MQS 04	3.01 - 4.00	6	X	X	X	X	X
MQS 05	4.01 - 5.00	7	X	X	X	X	X
MQS 06	5.01 - 6.00	8	X	X	X	X	X
MQS 07	6.01 - 7.00	9	X	X	X	X	X

BEVEL HEAD



MQB™

Material
Steel: M2, HRC 60-63

Complete design & CAD files visit WWW.MOELLERMCAD.COM

*"P" Dimension must be ordered in .01 increments. Other three place sizes are P.O.R.

CATALOG TYPE	RANGE P	OVERALL LENGTH "L"				
		STD. LENGTHS		OPTIONAL LENGTHS		
		50	63	40	45	56
MQB 01	.80 - 1.60	X	X	X	X	X
MQB 02	1.61 - 2.00	X	X	X	X	X
MQB 03	2.01 - 3.00	X	X	X	X	X
MQB 04	3.01 - 4.00	X	X	X	X	X
MQB 05	4.01 - 5.00	X	X	X	X	X
MQB 06	5.01 - 6.00	X	X	X	X	X
MQB 07	6.01 - 7.00	X	X	X	X	X

*All metric quill punches are P.O.R.

ORDER EXAMPLE:
(Reference page 4)

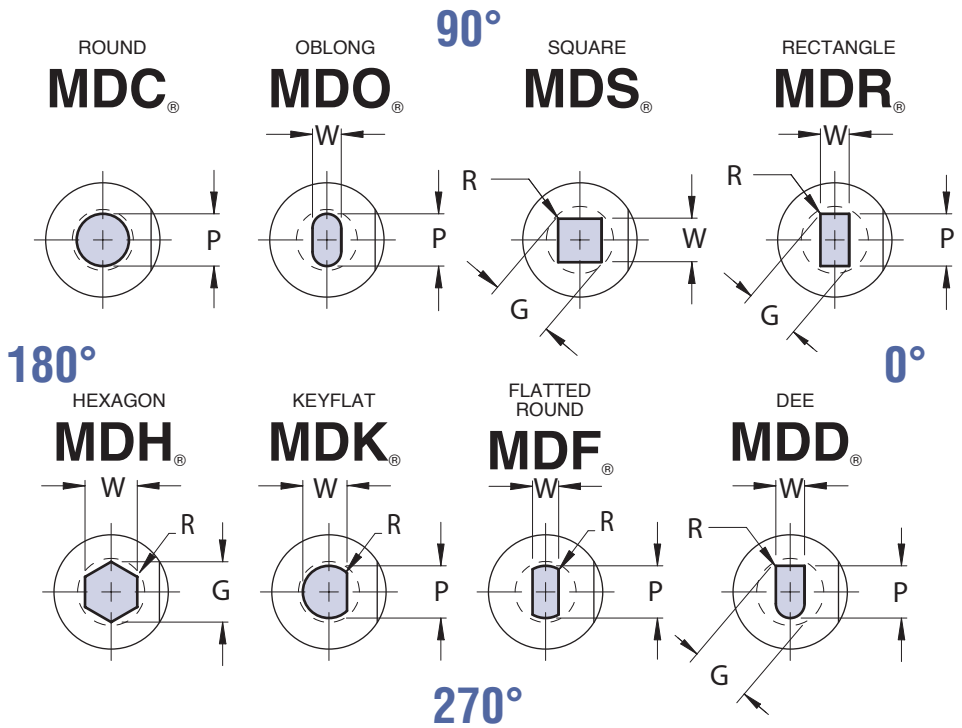
SPECIFY:	QTY:	TYPE	"D"	"L"	"P" DIMENSION
EXAMPLE:	6	MQS	04	40	3.50
EXAMPLE:	6	MQB	05	50	4.50

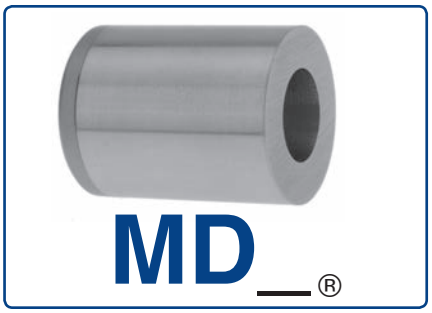
Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

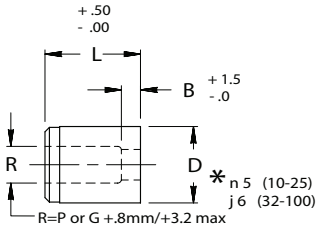
FOR STANDARD ALTERATIONS SEE PAGES 68-73.

PRESS FIT BUTTONS

COUNTER BORE RELIEF







VIEWS ARE SHOWN LOOKING AT TOP FACE OF BUTTON.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	BODY DIA D	LAND LENGTH "B"			MAX DIA R	ROUND RANGE P	SHAPE		OVERALL LENGTH "L"						
		STD	ALT A	ALT B			MIN W	MAX G/P	20	22	25	28	30	32	35
MD_ 08	8	4.0	8.0		4.0	1.50 - 3.20	1.50	3.20	X	X	X	X	X	X	X
MD_ 10	10	4.0	8.0		6.0	1.60 - 5.00	1.60	5.00	X	X	X	X	X	X	X
MD_ 13	13	5.0	8.0		8.0	1.80 - 7.20	1.80	7.20	X	X	X	X	X	X	X
MD_ 16	16	5.0	8.0		9.5	5.00 - 8.80	2.50	8.80	X	X	X	X	X	X	X
MD_ 20	20	5.0	12.0		12.0	5.50 - 11.00	3.20	11.00	X	X	X	X	X	X	X
MD_ 22	22	6.0	12.0		15.0	7.50 - 14.00	4.00	14.00	X	X	X	X	X	X	X
MD_ 25	25	6.0	12.0		17.5	9.50 - 16.50	4.80	16.50	X	X	X	X	X	X	X
MD_ 32	32	6.0	12.0		21.0	13.00 - 20.00	5.50	20.00	X	X	X	X	X	X	X
MD_ 38	38	8.0	12.0		27.0	16.00 - 26.00	6.40	26.00	X	X	X	X	X	X	X
MD_ 40	40	8.0	12.0		27.0	16.00 - 26.00	6.40	26.00	X	X	X	X	X	X	X

Material

Steel: A2, HRC 58-60
Alternate M2, HRC 60-63

Standard Point Tolerance

Round P +.01 -.00 — ◎ .01 P to D

Shape P, W +.02 -.0 — ◎ .02 P to D

STANDARD FLAT LOCATION IS AT 0° AS SHOWN. AVAILABLE AT 90°, 180°, 270°, FOR SAME ALTERATION PRICE.

ORDER EXAMPLE:
(Reference page 4)

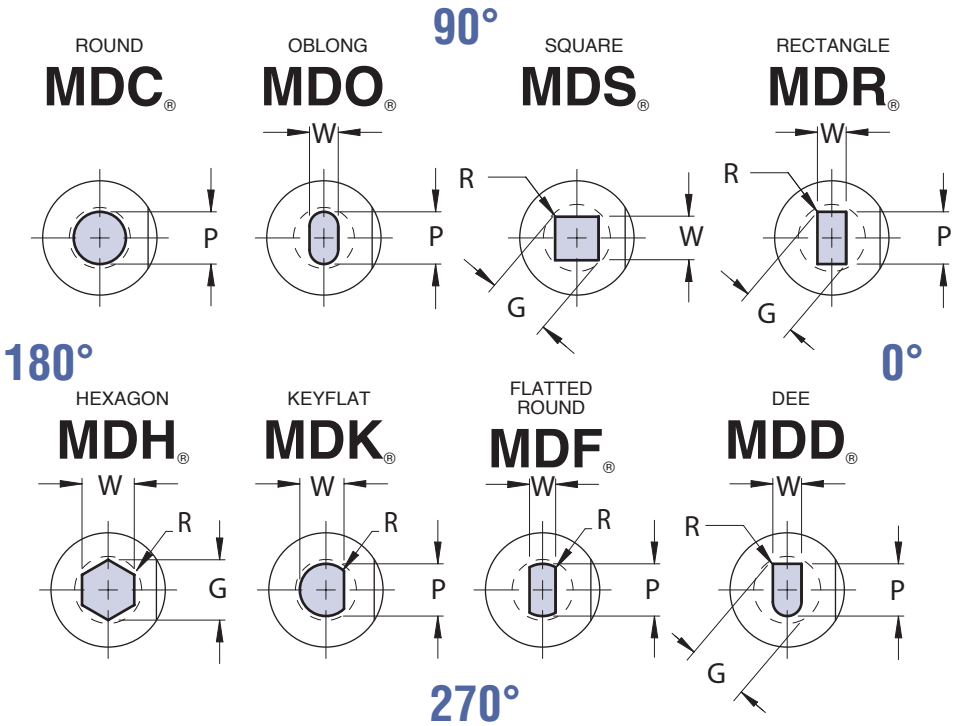
SPECIFY:	QTY:	TYPE	"D"	"L"	LAND LENGTH "B"	P(OR P&W) DIMENSIONS	ALTERATION CODE	STEEL
EXAMPLE:	6	MDC	20	30	A	9.0	F2	A-2
EXAMPLE:	6	MDO	13	20	STD	6.0 x 3.0	F2	M-2

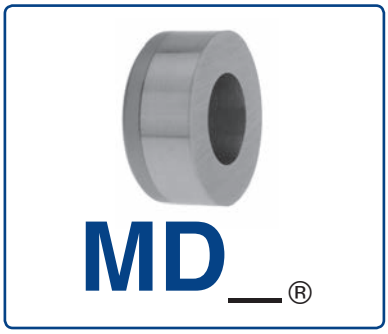
Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

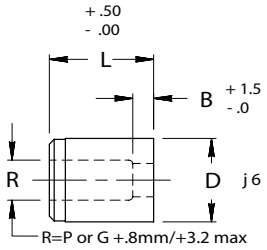
FOR SLUG CONTROL AND STANDARD ALTERATIONS SEE PAGES 68-73.

PRESS FIT BUTTONS

COUNTER BORE RELIEF/EXTENDED RANGE







VIEWS ARE SHOWN LOOKING AT TOP FACE OF BUTTON.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	BODY DIA D	LAND LENGTH "B"			MAX DIA R	ROUND RANGE P	SHAPE		OVERALL LENGTH "L"					
		STD	ALT A	ALT B			MIN W	MAX G/P	22	25	28	30	32	35
MD_ 45	45	8.0	12.0	20.0	36.0	17.50 - 35.00	7.50	35.00	X	X	X	X	X	X
MD_ 50	50	8.0	12.0	20.0	41.0	20.00 - 40.00	8.00	40.00	X	X	X	X	X	X
MD_ 56	56	8.0	12.0	20.0	46.0	22.50 - 45.00	9.00	45.00	X	X	X	X	X	X
MD_ 63	63	8.0	12.0	20.0	51.0	25.00 - 50.00	10.00	50.00	X	X	X	X	X	X
MD_ 71	71	8.0	12.0	20.0	57.0	27.50 - 56.00	11.00	56.00	X	X	X	X	X	X

Material

Steel: A2, HRC 58-60
Alternate M2, HRC 60-63

Standard Point Tolerance

Round P +.01 -.00 — ◎ .01 P to D

Shape P, W + .02 -.0 — ◎ .02 P to D

STANDARD FLAT LOCATION IS AT 0° AS SHOWN. AVAILABLE AT 90°, 180°, 270°, FOR SAME ALTERATION PRICE.

ORDER EXAMPLE:
(Reference page 4)

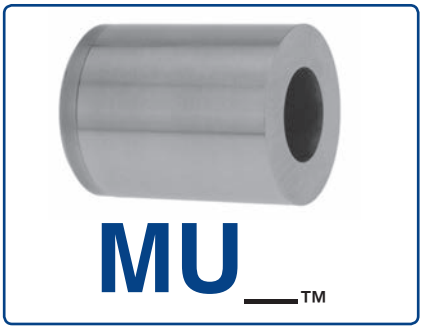
SPECIFY:	QTY:	TYPE	"D"	"L"	LAND LENGTH "B"	P(OR P&W) DIMENSIONS	ALTERATION CODE	STEEL
EXAMPLE:	6	MDC	50	30	A	35.0	F2	A-2
EXAMPLE:	6	MDO	63	25	STD	42.5 x 18.3	F2	M2

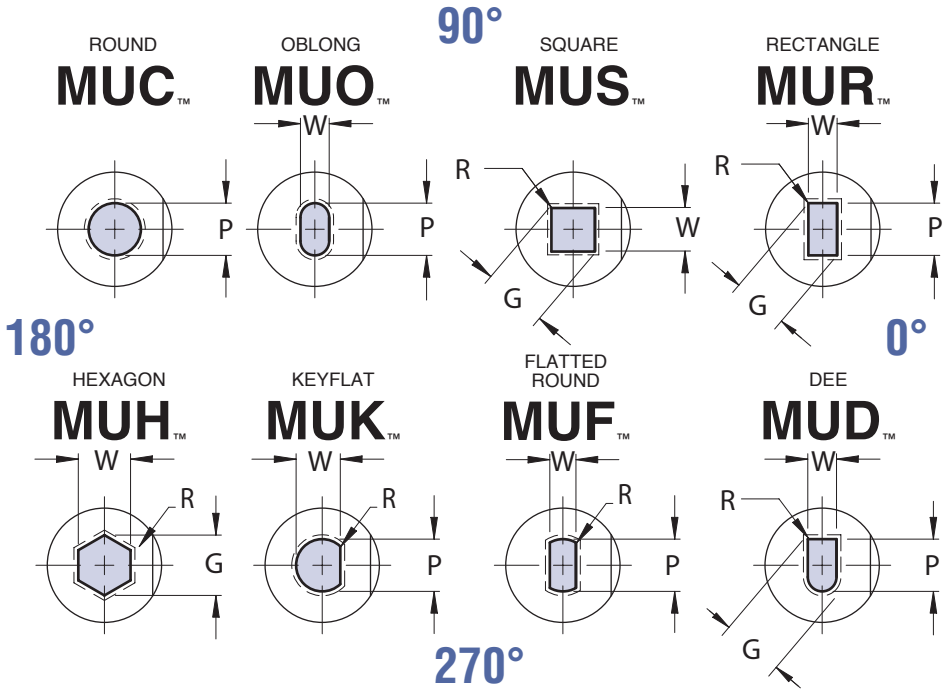
Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

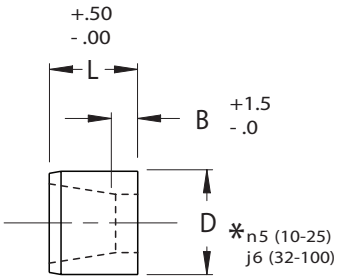
FOR SLUG CONTROL AND STANDARD ALTERATIONS SEE PAGES 68-73.

PRESS FIT BUTTONS

ULTRA LIFE/TAPER RELIEF







VIEWS ARE SHOWN LOOKING AT TOP FACE OF BUTTON.

STANDARD TAPER: ROUND 1° PER SIDE/SHAPED 1-1/2° PER SIDE

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	BODY DIA D	LAND LENGTH "B"				ROUND	SHAPE		OVERALL LENGTH "L"							
		NAPMA	ALTERNATES													
		STD	A	B	C	RANGE P	MIN W	MAX G/P	20	22	25	28	30	32	35	40
MU_ 08	8	4.0	8.0		3.0	1.5 - 3.20	1.5	3.20	X	X	X	X	X	X	X	
MU_ 10	10	4.0	8.0		3.0	1.6 - 5.0	1.6	5.0	X	X	X	X	X	X	X	X
MU_ 13	13	5.0	8.0		3.0	3.0 - 7.2	1.8	7.2	X	X	X	X	X	X	X	X
MU_ 16	16	5.0	8.0		3.0	5.0 - 8.8	2.5	8.8	X	X	X	X	X	X	X	X
MU_ 20	20	5.0	12.0	20.0	3.0	5.5 - 11.0	3.2	11.0	X	X	X	X	X	X	X	X
MU_ 22	22	6.0	12.0	20.0	3.0	7.5 - 14.0	4.0	14.0	X	X	X	X	X	X	X	X
MU_ 25	25	6.0	12.0	20.0	3.0	9.5 - 16.5	4.8	16.5	X	X	X	X	X	X	X	X
MU_ 32	32	6.0	12.0	20.0	3.0	13.0 - 20.0	5.5	20.0	X	X	X	X	X	X	X	X
MU_ 38	38	8.0	12.0	20.0	3.0	16.0 - 26.0	6.4	26.0	X	X	X	X	X	X	X	
MU_ 40	40	8.0	12.0	20.0	3.0	16.0 - 26.0	6.4	26.0	X	X	X	X	X	X	X	

Material

Steel: STD A2, HRC 58-60
Alternate M2, HRC 60-63

Standard Point Tolerance

Round P +.01 -.00 — ◎ .01 P to D

Shape P, W +.02 -.00 — ◎ .02 P to D

Alternate Point Tolerance **T2**

P, W TOLERANCE +.005 -.000

P to D ◎ .008

ONLY AVAILABLE BELOW 45 BODY DIAMETER

STANDARD FLAT LOCATION IS AT 0° AS SHOWN. AVAILABLE AT 90°, 180°, 270°, FOR SAME ALTERATION PRICE.

ORDER EXAMPLE:

(Reference page 4)

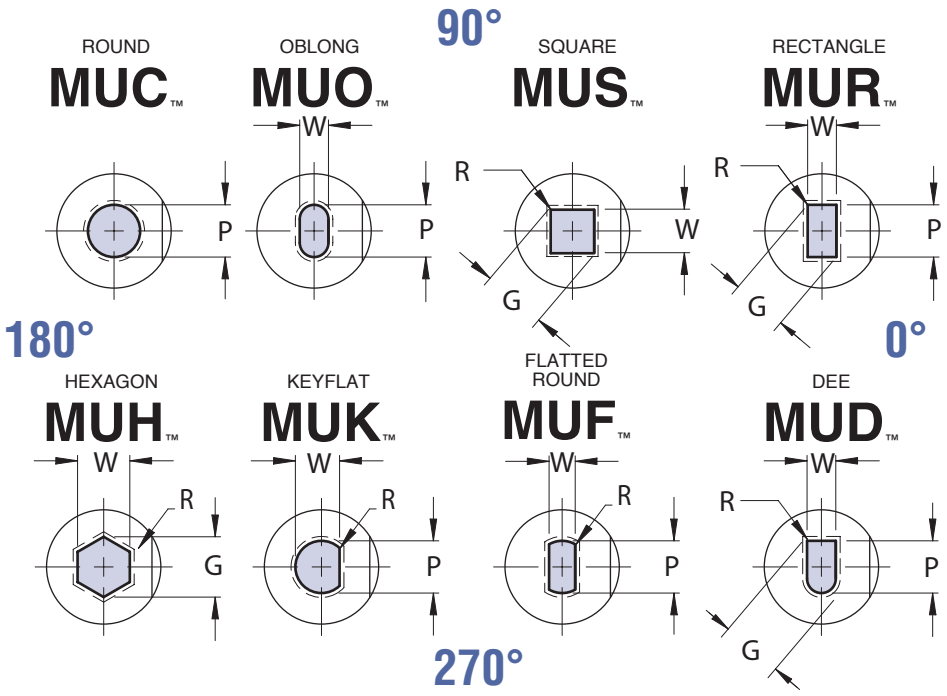
SPECIFY:	QTY:	TYPE	"D"	"L"	LAND LENGTH "B"	P(OR P&W) DIMENSIONS	ALTERNATE TOLERANCE	ALTERATION CODE	STEEL
EXAMPLE:	6	MUC	25	30	A	15.0	T2	F2	A2
EXAMPLE:	6	MUO	20	30	STD	10.0 x 5.0	STD	F2	M-2

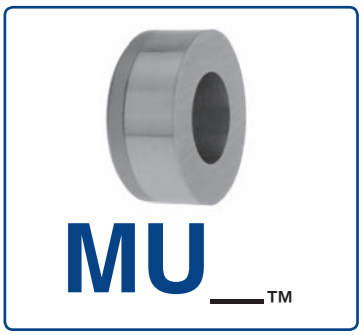
Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

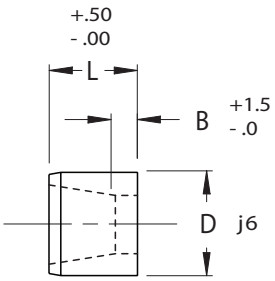
FOR SLUG CONTROL AND STANDARD ALTERATIONS SEE PAGES 68-73.

PRESS FIT BUTTONS

ULTRA LIFE/TAPER RELIEF/EXTENDED RANGE







VIEWS ARE SHOWN LOOKING AT TOP FACE OF BUTTON.

STANDARD TAPER: ROUND 1° PER SIDE/SHAPED 1-1/2° PER SIDE

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	BODY DIA D	LAND LENGTH "B"				ROUND	SHAPE		OVERALL LENGTH "L"				
		NAPMA	ALTERNATES										
		STD	A	B	C	RANGE P	MIN W	MAX G/P	25	28	30	32	35
MU_ 45	45	8.0	12.0	20.0	3.0	22.0 - 31.0	7.5	31.0	X	X	X	X	X
MU_ 50	50	8.0	12.0	20.0	3.0	24.0 - 34.0	8.0	34.0	X	X	X	X	X
MU_ 56	56	8.0	12.0	20.0	3.0	26.0 - 38.0	8.5	38.0	X	X	X	X	X
MU_ 63	63	8.0	12.0	20.0	3.0	30.0 - 43.0	9.0	43.0	X	X	X	X	X
MU_ 71	71	8.0	12.0	20.0	3.0	34.0 - 48.0	9.5	48.0	X	X	X	X	X
MU_ 76	76	8.0	12.0	20.0	3.0	36.0 - 52.0	10.0	52.0					X
MU_ 85	85	8.0	12.0	20.0	3.0	40.0 - 58.0	11.0	58.0					X
MU_ 90	90	8.0	12.0	20.0	3.0	43.0 - 61.0	12.0	61.0					X
MU_100	100	8.0	12.0	20.0	3.0	48.0 - 68.0	13.0	68.0					X

Material

Steel: STD A2, HRC 58-60
Alternate M2, HRC 60-63

Standard Point Tolerance

Round P +.01 -.00	◎	.01	P to D
Shape P, W +.02 -.00	◎	.02	P to D

STANDARD FLAT LOCATION IS AT 0° AS SHOWN. AVAILABLE AT 90°, 180°, 270°, FOR SAME ALTERATION PRICE.

ORDER EXAMPLE:

(Reference page 4)

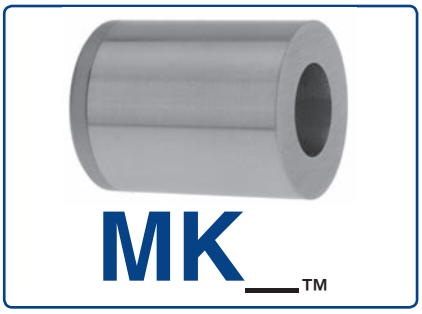
SPECIFY:	QTY:	TYPE	"D"	"L"	LAND LENGTH "B"	P(OR P&W) DIMENSIONS	ALTERNATE TOLERANCE	ALTERATION CODE	STEEL
EXAMPLE:	6	MUC	50	30	A	35.0	T2	F2	A-2
EXAMPLE:	6	MUO	63	25	STD	42.5 x 18.3	STD	F2	M-2

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

FOR SLUG CONTROL AND STANDARD ALTERATIONS SEE PAGES 68-73.

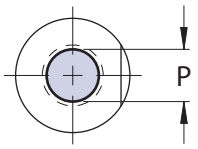
SLIP-FIT BUTTONS

COUNTER BORE RELIEF

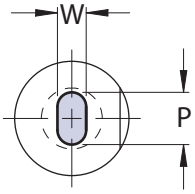


90°

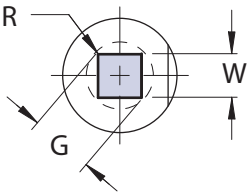
ROUND **MKC**™



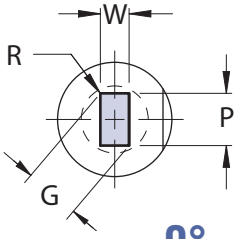
OBLONG **MKO**™



SQUARE **MKS**™

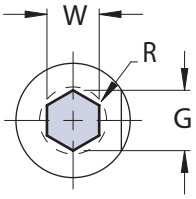


RECTANGLE **MKR**™

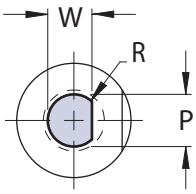


180°

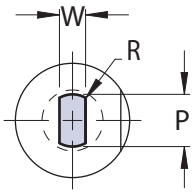
HEXAGON **MKH**™



KEYFLAT **MKK**™

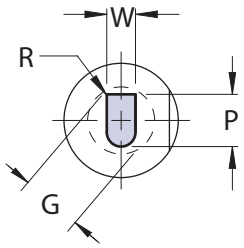


FLATTED ROUND **MKF**™



0°

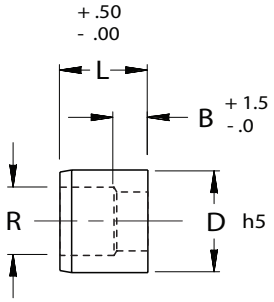
DEE **MKD**™



270°

VIEWS ARE SHOWN LOOKING AT TOP FACE OF BUTTON.

Complete design & CAD files visit WWW.MOELLERMCAD.COM



STANDARD FLAT LOCATION IS AT 0° AS SHOWN. AVAILABLE AT 90°, 180°, 270°, FOR SAME ALTERATION PRICE.

*THESE LENGTHS ARE AVAILABLE WITH VDI STYLE RELIEF ONLY

CATALOG TYPE	BODY DIA	LAND LENGTH "B"		ROUND	SHAPE		RELIEF DIA	OVERALL LENGTH "L"	
		STANDARD	ALT A	RANGE P	MIN W	MAX P/G		25	32
MK_ 13	13	5	8	1.80 - 3.00	1.80	3.00	5.2	X	
		5	8	3.01 - 6.20	1.80	6.20	7.0	X	
MK_ 16	16	5	9	5.00 - 6.20	2.50	6.20	7.2	X	
		5	9	6.21 - 8.00	2.50	8.00	8.7	X	
MK_ 20	20	5	9	5.40 - 8.30	3.20	8.30	9.1	X	
		5	9	8.31 - 11.00	3.20	11.00	11.9	X	
MK_ 25	25	5	12	9.40 - 13.00	4.80	13.00	13.9	X*	X
		5	12	13.01 - 16.00	4.80	16.00	16.7	X*	X
MK_ 32	32	5	12	13.00 - 16.50	5.50	16.50	17.5	X*	X
		5	12	16.51 - 20.00	5.50	20.00	21.5	X*	X
MK_ 40	40	5	15	15.80 - 21.40	6.40	21.40	22.2	X*	X
		5	15	21.41 - 26.00	6.40	26.00	27.0	X*	X
MK_ 50	50	5	20	20.00 - 26.00	9.00	26.00	27.0		X
		5	20	26.01 - 37.00	9.00	37.00	38.0		X
MK_ 56	56	5	20	25.00 - 35.00	10.00	35.00	36.0		X
		5	20	35.01 - 44.00	10.00	44.00	45.0		X
MK_ 63	63	5	20	28.00 - 40.00	11.00	40.00	41.0		X
		5	20	40.01 - 50.00	11.00	50.00	51.0		X

Material

Steel: A2, HRC 59-61

M2 - CONSULT FACTORY

Standard Point Tolerance

Round P +.01 -.00 — ◎ .01 P to D

Shape P, W + .02 -.0 — ◎ .02 P to D

VDI ALTERATION -

FOR VDI STYLE RELIEF +.2/.3 OVER "P" OR "G" ADD VDI AT END OF DESCRIPTION

ORDER EXAMPLE:

(Reference page 4)

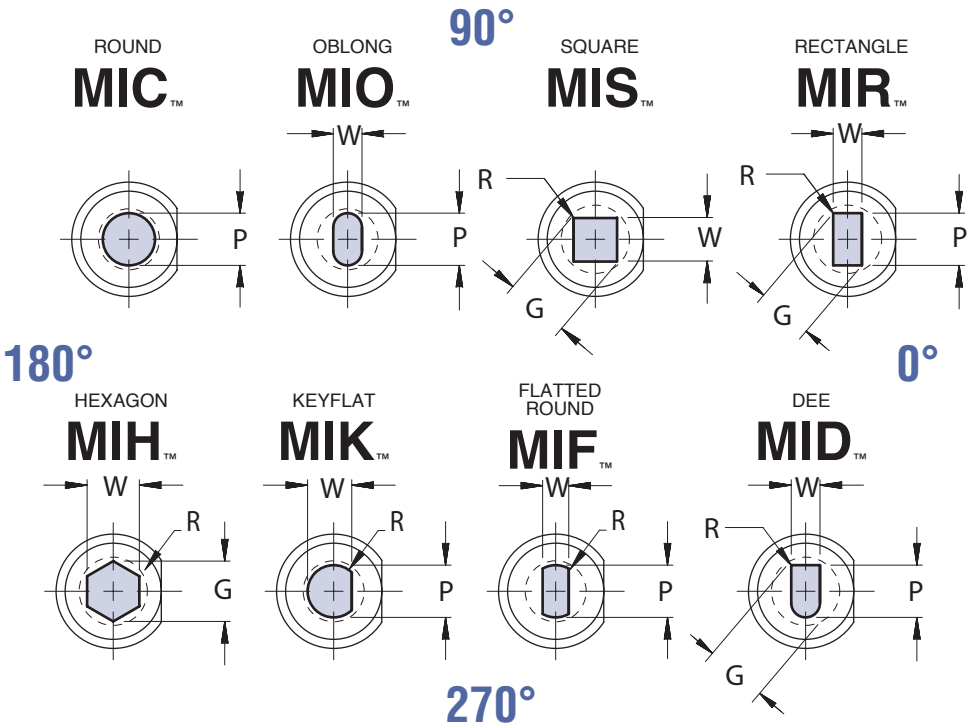
SPECIFY:	QTY:	TYPE	"D"	"L"	LAND LENGTH "B"	P(OR P&W) DIMENSIONS	ALTERNATE TOLERANCE	ALTERATION CODE	STEEL
EXAMPLE:	6	MKC	25	32	A	15.0		F2	A-2
EXAMPLE:	6	MKO	20	25	STD	10.0 x 5.0	STD	F2	M-2

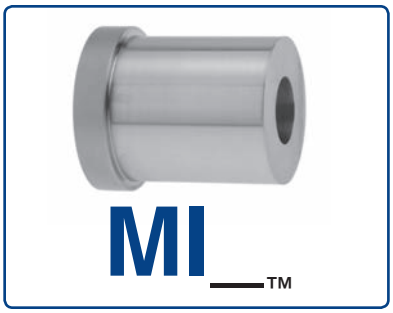
Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

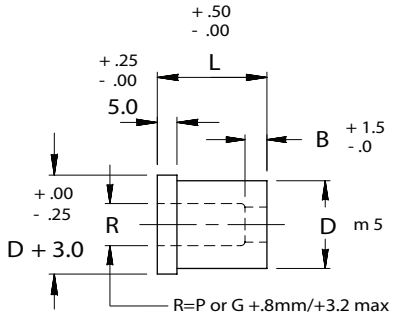
FOR SLUG CONTROL AND STANDARD ALTERATIONS SEE PAGES 68-73.

SHOULDER BUTTONS

COUNTER BORE RELIEF







VIEWS ARE SHOWN LOOKING AT TOP FACE OF BUTTON.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	BODY DIA D	LAND LENGTH "B"		MAX DIA R	ROUND	SHAPE		OVERALL LENGTH "L"						
		STD	ALT A		RANGE P	MIN W	MAX G/P	20	22	25	28	30	32	35
MI_ 08	8	4.0	8.0	4.0	1.50 - 3.20	1.50	3.20	X	X	X	X	X	X	X
MI_ 10	10	4.0	8.0	6.0	1.60 - 5.00	1.60	5.00	X	X	X	X	X	X	X
MI_ 13	13	5.0	8.0	8.0	1.80 - 7.20	1.80	7.20	X	X	X	X	X	X	X
MI_ 16	16	5.0	8.0	9.5	5.00 - 8.80	2.50	8.80	X	X	X	X	X	X	X
MI_ 20	20	5.0	12.0	12.0	5.50 - 11.00	3.20	11.00	X	X	X	X	X	X	X
MI_ 22	22	6.0	12.0	15.0	7.50 - 14.00	4.00	14.00	X	X	X	X	X	X	X
MI_ 25	25	6.0	12.0	17.5	9.50 - 16.50	4.80	16.50	X	X	X	X	X	X	X
MI_ 32	32	6.0	12.0	21.0	13.00 - 20.00	5.50	20.00	X	X	X	X	X	X	X
MI_ 38	38	8.0	12.0	27.0	16.00 - 26.00	6.40	26.00	X	X	X	X	X	X	X
MI_ 40	40	8.0	12.0	27.0	16.00 - 26.00	6.50	26.00	X	X	X	X	X	X	X

Material

Steel: A2, HRC 58-60
Alternate M2, HRC 60-63

Standard Point Tolerance

Round P $^{+.01}_{-.00}$	◎ .01	P to D
Shape P, W $^{+.02}_{-.0}$	◎ .02	P to D

ORDER EXAMPLE:

(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	LAND LENGTH "B"	P(OR P&W) DIMENSIONS	ALTERATION CODE	STEEL
EXAMPLE:	6	MIC	13	25	A	6.0	F1	M-2
EXAMPLE:	6	MIO	20	25	STD	9.0 x 4.0	F1	A-2

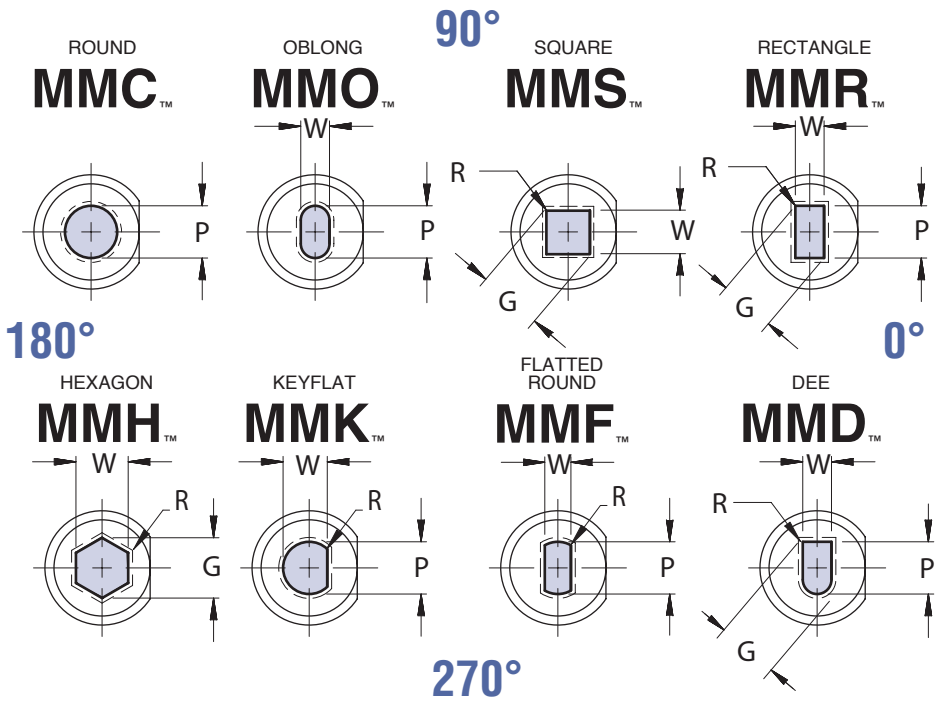
Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

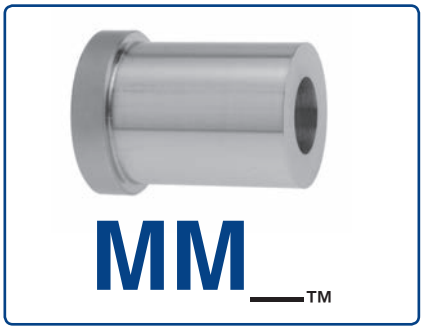
FOR SLUG CONTROL AND
STANDARD ALTERATIONS SEE PAGES 68-73.

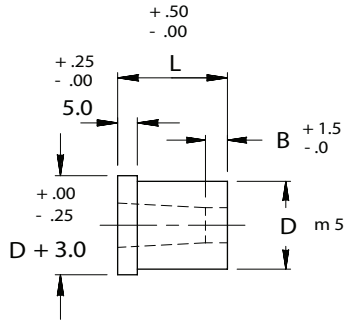
STANDARD FLAT LOCATION IS AT 0° AS SHOWN. AVAILABLE AT 90°, 180°, 270°, FOR SAME ALTERATION PRICE.

SHOULDER BUTTONS

ULTRA LIFE/TAPER RELIEF







VIEWS ARE SHOWN LOOKING AT TOP FACE OF BUTTON.

STANDARD TAPER: ROUND 1° PER SIDE/SHAPED 1-1/2° PER SIDE

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	BODY DIA D	LAND LENGTH "B"				ROUND	SHAPE		OVERALL LENGTH "L"						
		NAPMA	ALTERNATES			RANGE P	MIN W	MAX G/P	20	22	25	28	30	32	35
		STD	A	B	C										
MM_ 08	8	4.0	8.0		3.0	1.50- 3.20	1.50	3.20	X	X	X	X	X	X	X
MM_ 10	10	4.0	8.0		3.0	1.60- 5.00	1.60	5.00	X	X	X	X	X	X	X
MM_ 13	13	5.0	8.0		3.0	1.80 - 7.20	1.80	7.20	X	X	X	X	X	X	X
MM_ 16	16	5.0	8.0		3.0	5.00 - 8.80	2.50	8.80	X	X	X	X	X	X	X
MM_ 20	20	5.0	12.0	20.0	3.0	5.50 - 11.00	3.20	11.00	X	X	X	X	X	X	X
MM_ 22	22	6.0	12.0	20.0	3.0	7.50 - 14.00	4.00	14.00	X	X	X	X	X	X	X
MM_ 25	25	6.0	12.0	20.0	3.0	9.50 - 16.50	4.80	16.50	X	X	X	X	X	X	X
MM_ 32	32	6.0	12.0	20.0	3.0	13.00 - 20.00	5.50	20.00	X	X	X	X	X	X	X
MM_ 38	38	8.0	12.0	20.0	3.0	16.00 - 26.00	6.40	26.00	X	X	X	X	X	X	X
MM_ 40	40	8.0	12.0	20.0	3.0	16.00 - 26.00	6.50	26.00	X	X	X	X	X	X	X
MM_ 45	45	8.0	12.0	20.0	3.0	22.00 - 31.00	7.50	31.00		X	X	X	X	X	X

Material

Steel: M2, HRC 60-63

Standard Point Tolerance

Round P +.01 -.00 — ◎ .01 P to D

Shape P, W + .02 -.00 — ◎ .02 P to D

Alternate Hole Tolerance	T2
P, W TOLERANCE	+.005 -.000
P to D	.008 ◎

ORDER EXAMPLE:

(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	LAND LENGTH "B"	P(OR P&W) DIMENSIONS	ALTERNATE TOLERANCE	ALTERATION CODE
EXAMPLE:	6	MMC	13	25	C	6.0	STD	F1
EXAMPLE:	6	MMS	20	30	A	9.0	T2	F1

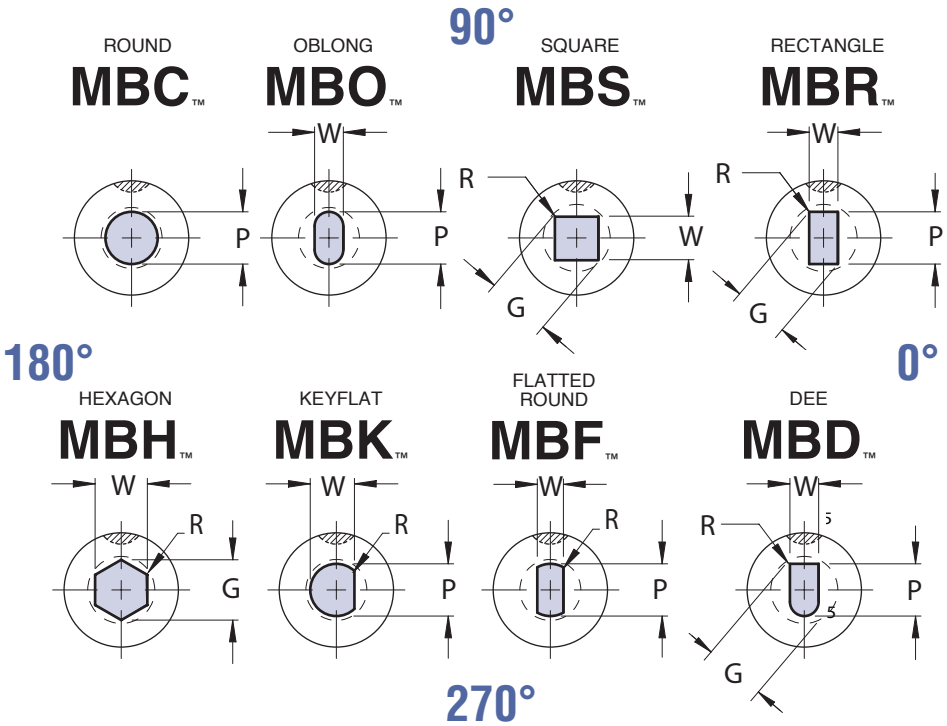
Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

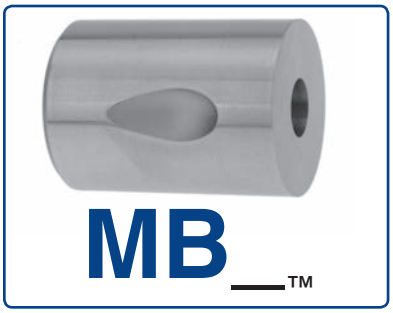
FOR SLUG CONTROL AND STANDARD ALTERATIONS SEE PAGES 68-73.

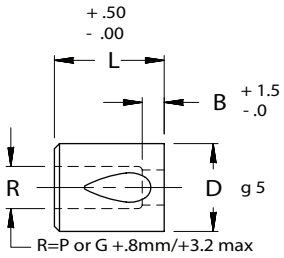
STANDARD FLAT LOCATION IS AT 0° AS SHOWN. AVAILABLE AT 90°, 180°, 270°, FOR SAME ALTERATION PRICE.

BALL LOCK BUTTONS

COUNTER BORE RELIEF







VIEWS ARE SHOWN LOOKING AT TOP FACE OF BUTTON.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG TYPE	BODY DIA D	DIE LAND B	MAX DIA R	ROUND RANGE P	SHAPE MIN W	SHAPE MAX G/P	OVERALL LENGTH "L" 32
MB_ 13	13	4.0	6.0	1.60 - 5.00	1.60	5.00	X
MB_ 16	16	5.0	8.0	3.20 - 7.20	2.00	7.20	X
MB_ 20	20	5.0	12.0	4.00 - 11.00	2.50	11.00	X
MB_ 25	25	6.0	16.0	8.00 - 15.00	4.00	15.00	X
MB_ 32	32	6.0	20.0	11.00 - 19.00	5.00	19.00	X

Material

Steel: A2, HRC 58-60

Standard Point Tolerance

Round P	+.01 -.00	.01	P to D
Shape P, W	+ .02 -.00	.02	P to D

ORDER EXAMPLE:

(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"	P(OR P&W) DIMENSIONS
EXAMPLE:	6	MBC	16	32	5.0
EXAMPLE:	6	MBO	20	32	9.0 x 4.0

Note: When ordering, standard quantity breaks are: 1, 2-3, 4-11, 12-23, 24-49, 50-99

FOR SLUG CONTROL AND STANDARD ALTERATIONS SEE PAGES 68-73.

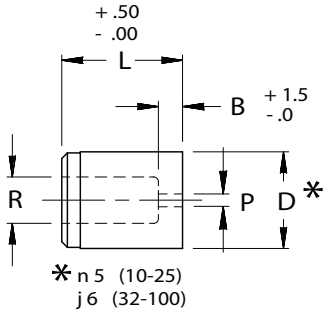
STANDARD BALL SEAT LOCATION IS AT 90° AS SHOWN. AVAILABLE AT 0°, 180°, 270°, FOR SAME ALTERATION PRICE.

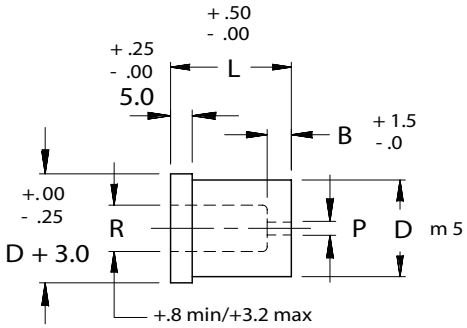
BUTTON BLANKS

WITH COUNTER BORE RELIEF

MDB™

MIB™





Material
Steel: A2, HRC 58-60

ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"
EXAMPLE:	6	MDB	16	28
EXAMPLE:	6	MIB	25	30

STANDARD ALTERATIONS SEE PAGES 68-73.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

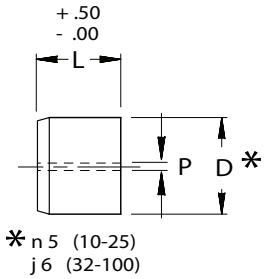
CATALOG NUMBER	BODY DIA D	DIE LAND B	RLF DIA R	DRILL SIZE P	OVERALL LENGTH "L"						
					20	22	25	28	30	32	35
M_B 08	8	4.0	4.0	1.2	X	X	X	X	X	X	X
M_B 10	10	4.0	6.0	1.2	X	X	X	X	X	X	X
M_B 13	13	5.0	8.0	1.4	X	X	X	X	X	X	X
M_B 16	16	5.0	9.5	2.0	X	X	X	X	X	X	X
M_B 20	20	5.0	12.0	2.8	X	X	X	X	X	X	X
M_B 22	22	6.0	15.0	2.8	X	X	X	X	X	X	X
M_B 25	25	6.0	17.5	4.4	X	X	X	X	X	X	X
M_B 32	32	6.0	21.0	5.2	X	X	X	X	X	X	X
M_B 38	38	8.0	27.0	5.6		X	X	X	X	X	X
M_B 40	40	8.0	27.0	5.6		X	X	X	X	X	X

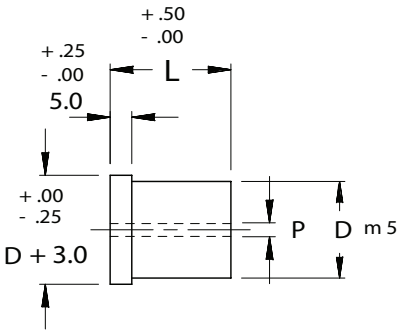
BUTTON BLANKS

WITH STRAIGHT THRU HOLE

MUB™

MMB™





Material
Steel: M2, HRC 60-63

ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"
EXAMPLE:	6	MUB	40	30
EXAMPLE:	6	MMB	20	32

Complete design & CAD files visit WWW.MOELLERMCAD.COM

STANDARD ALTERATIONS SEE PAGES 68-73.

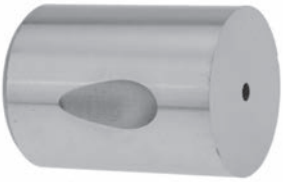
CATALOG NUMBER	BODY DIA D	DRILL SIZE P	OVERALL LENGTH "L"						
			20	22	25	28	30	32	35
M_B 08	8	1.2	X	X	X	X	X	X	X
M_B 10	10	1.2	X	X	X	X	X	X	X
M_B 13	13	1.4	X	X	X	X	X	X	X
M_B 16	16	2.0	X	X	X	X	X	X	X
M_B 20	20	2.4	X	X	X	X	X	X	X
M_B 22	22	2.4	X	X	X	X	X	X	X
M_B 25	25	2.4	X	X	X	X	X	X	X
M_B 32	32	2.4	X	X	X	X	X	X	X
M_B 38	38	2.4	X	X	X	X	X	X	X
M_B 40	40	2.4	X	X	X	X	X	X	X
M_B 45	45	2.4			X	X	X	X	X
MUB 50*	50	2.4			X	X	X		X
MUB 56*	56	2.4			X	X	X		X
MUB 63*	63	2.4			X	X	X		X
MUB 71*	71	2.4			X	X	X		X
MUB 76*	76	2.4			X	X	X		X
MUB 85*	85	2.4			X	X	X		X
MUB 90*	90	2.4			X	X	X		X
MUB 100*	100	2.4			X	X	X		X

*Available in MUB Only

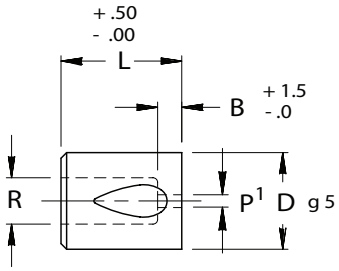
BUTTON BLANKS

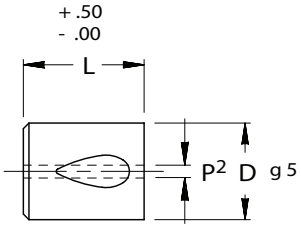
BALL LOCK WITH COUNTER BORE RELIEF AND STRAIGHT THRU HOLE

MBB™



MFB™





Material
Steel: A2, HRC 58-60

Material
Steel: M2, HRC 60-63

ORDER EXAMPLE:
(Reference page 4)

SPECIFY:	QTY:	TYPE	"D"	"L"
EXAMPLE:	6	MBB	16	32
EXAMPLE:	6	MFB	20	32

Complete design & CAD files visit WWW.MOELLERMCAD.COM

STANDARD ALTERATIONS SEE PAGES 68-73.

CATALOG NUMBER	BODY DIA D	DIE LAND B	RLF DIA R	DRILL SIZE P^1	DRILL SIZE P^2	OVERALL LENGTH "L" 32
M_B 13	13	4.0	5.8	1.2	1.2	X
M_B 16	16	5.0	8.0	1.6	1.6	X
M_B 20	20	5.0	11.9	2.0	2.0	X
M_B 25	25	6.0	16.0	3.6	2.4	X
M_B 32	32	6.0	20.0	4.4	2.4	X

UNIVERSAL SHAPES

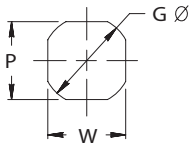
Views are shown looking through the shank of punch and top of button, as in true die position. Standard ballseat location is at 90°, standard flat location is at 0°. Points are centered on shanks unless noted by drawing. Female corners on buttons will be furnished with a .2 radius to facilitate wire EDM. To order the first character is M, then specify body type similar to other standard items, (second alpha characters), then "U" as the third alpha character. ADD an alteration code U- _ _ to describe universal shape.

ORDER EXAMPLE: MHU 32-090 P=24.5 W=16.6 R=1.5, U-17

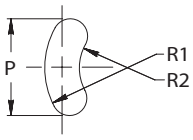
MISCELLANEOUS

90°

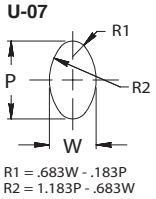
U-05



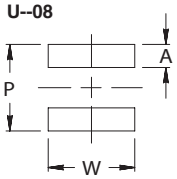
U-06



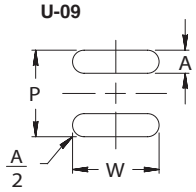
U-07



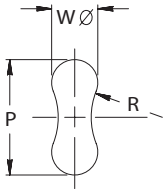
U--08



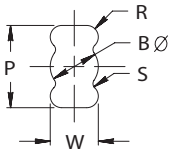
U-09



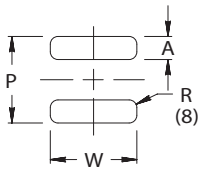
U-10



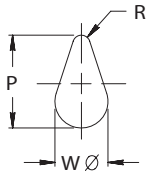
U-11



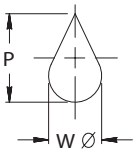
U-12



U-13

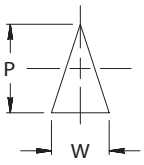


U-14

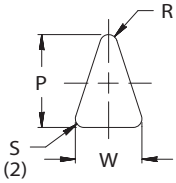


TRIANGLES/TRAPEZOIDS

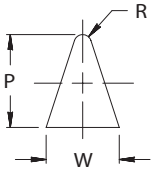
U-15



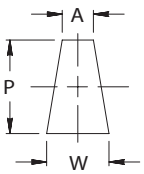
U-16



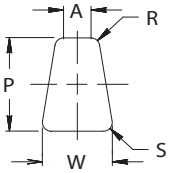
U-17



U-18



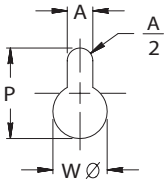
U-19



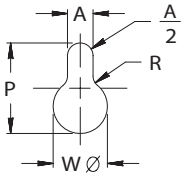
MONO LOBES

180°

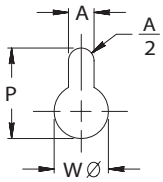
U-20



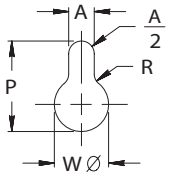
U-21



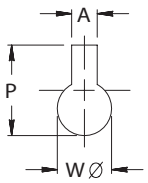
U-22



U-23

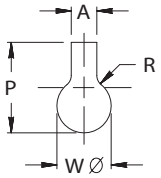


U-24

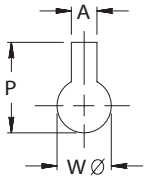


0°

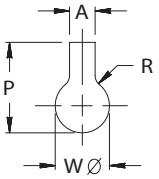
U-25



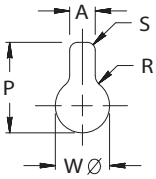
U-26



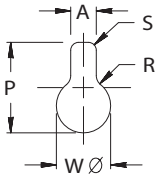
U-27



U-28

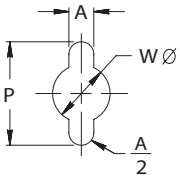


U-29

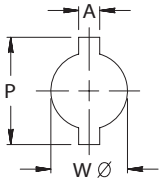


MULTI LOBES

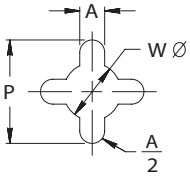
U-30



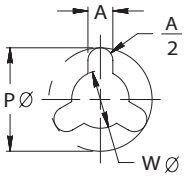
U-31



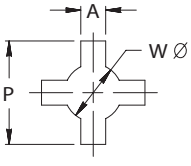
U-32



U-33



U-34



270°

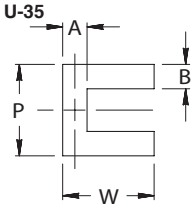
UNIVERSAL SHAPES

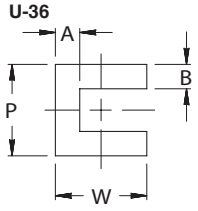
Views are shown looking through the shank of punch and top of button, as in true die position. Standard ballseat location is at 90°, standard flat location is at 0°. Points are centered on shanks unless noted by drawing. Female corners on buttons will be furnished with a .2 radius to facilitate wire EDM. To order, the first character is M, then specify body type similar to other standard items, (second alpha characters), then "U" as the third alpha character. ADD an alteration code U- _ _ to describe universal shape.

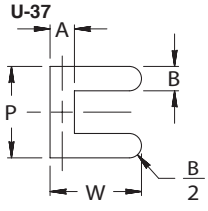
ORDER EXAMPLE: MHU32-090 P=24.5 W=16.6 B=5.5 A=5.5, U-38

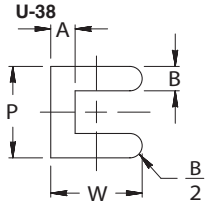
U's

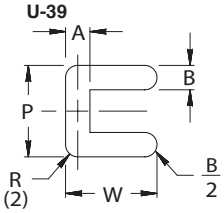
90°

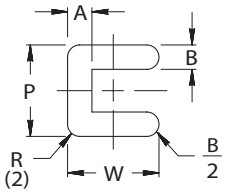
U-35


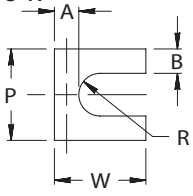
U-36


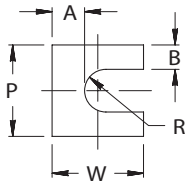
U-37


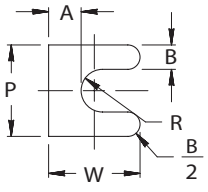
U-38


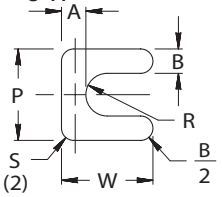
U-39


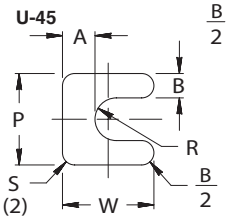
U-40


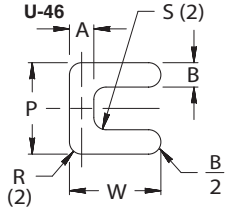
U-41


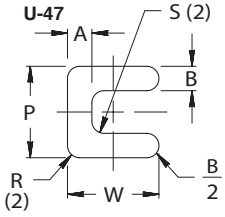
U-42


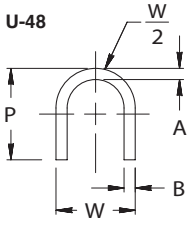
U-43


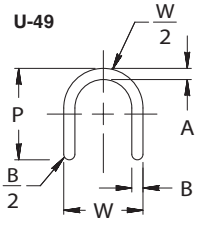
U-44


U-45


U-46


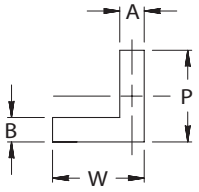
U-47


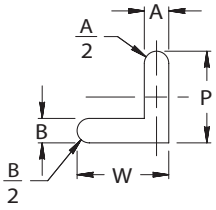
U-48


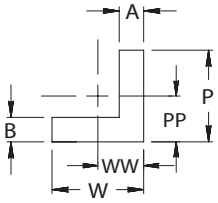
U-49


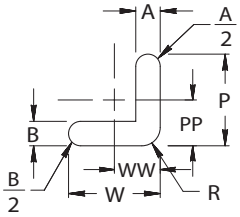
L's

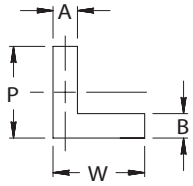
180°

U-50


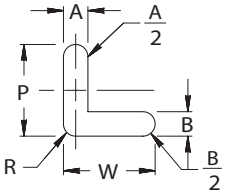
U-51


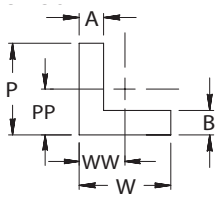
U-52


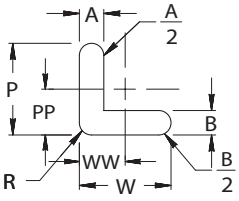
U-53


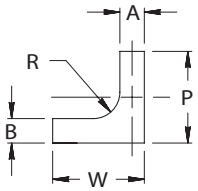
U-54


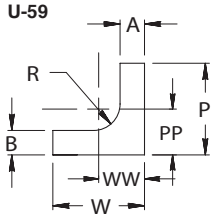
0°

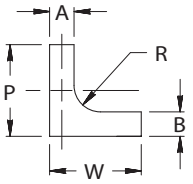
U-55


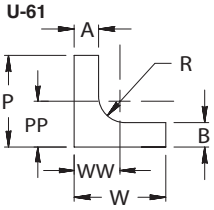
U-56


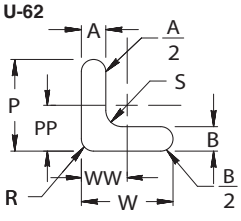
U-57


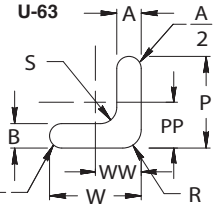
U-58


U-59


U-60


U-61


U-62


U-63


270°

UNIVERSAL SHAPES

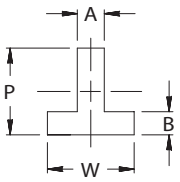
Views are shown looking through the shank of punch and top of button, as in true die position. Standard ballseat location is at 90°, standard flat location is at 0°. Points are centered on shanks unless noted by drawing. Female corners on buttons will be furnished with a .2 radius to facilitate wire EDM. To order, the first character is M, then specify body type similar to other standard items, (second alpha characters), then "U" as the third alpha character. ADD an alteration code U- _ _ to describe universal shape.

ORDER EXAMPLE: MHU25-100 P=23.5 W=16 R=1.5, U-81

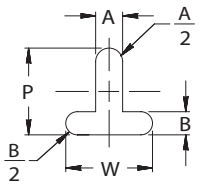
T's

90°

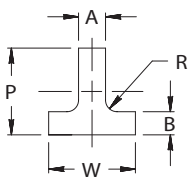
U-65



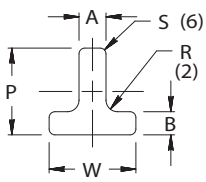
U-66



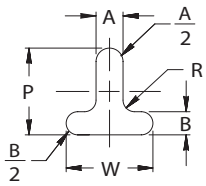
U-67



U-68

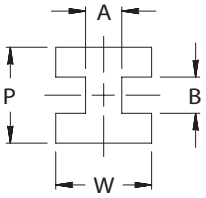


U-69

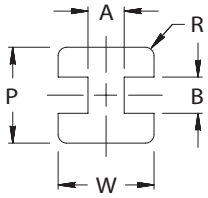


DUO TEES

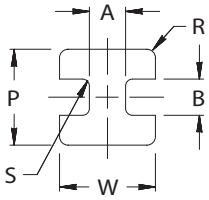
U-70



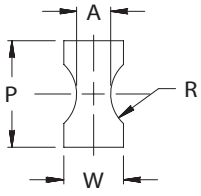
U-71



U-72

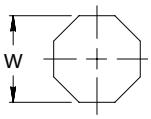


U-73



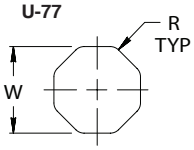
POLYGONS

U-76



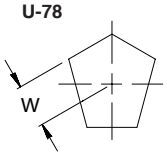
A = EVEN NO. OF SIDES

U-77



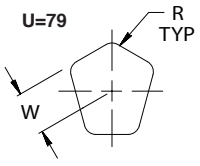
A = EVEN NO. OF SIDES

U-78



A = ODD NO. OF SIDES

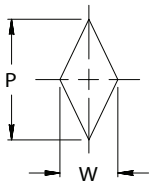
U=79



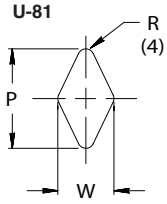
A = ODD NO. OF SIDES

180°

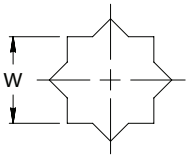
U-80



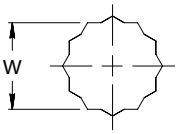
U-81



U-82

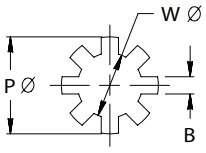


U-83



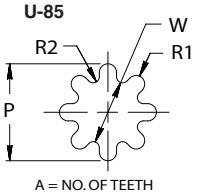
0°

U-84



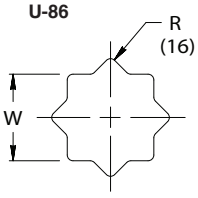
A = NO. OF TEETH
3, 4, 6 OR 8 ONLY
FIRST TOOTH AT 0°

U-85

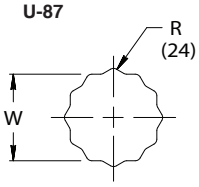


A = NO. OF TEETH
3, 4, 6 OR 8 ONLY
FIRST TOOTH AT 0°

U-86

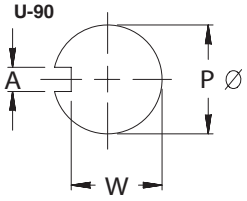


U-87

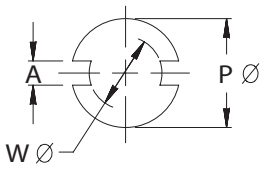


KEYS

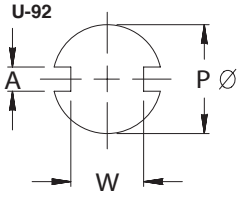
U-90



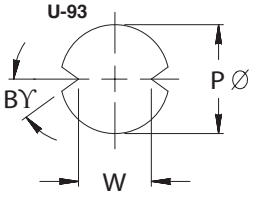
U-91



U-92

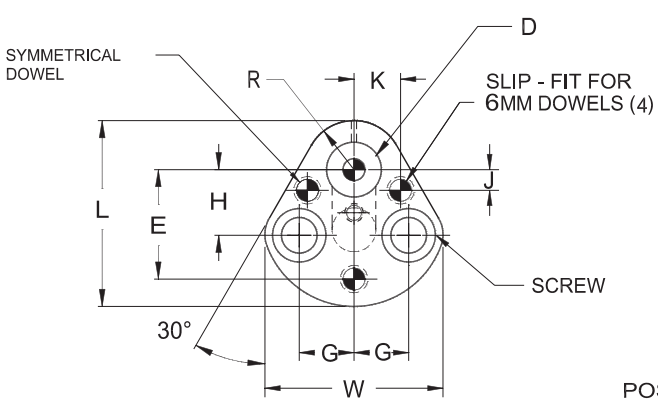


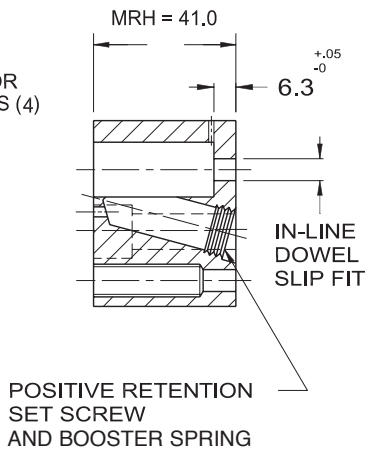
U-93



270°

TRUE SET-*ADVANCED*





Manufactured under Patent No.'s 0351395, 5357835

FOR ACCESSORIES AND SHIM PLATES, SEE PAGES 60-61.

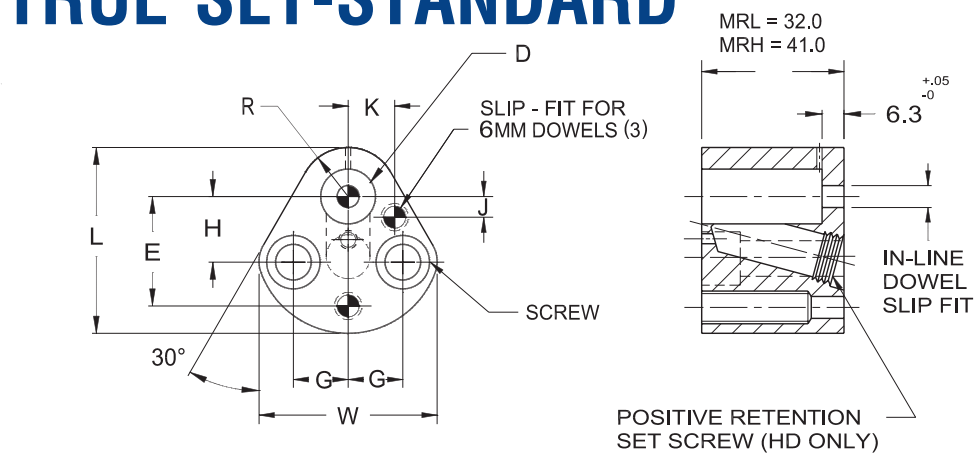
- Advanced Design for the most demanding stamping applications, such as AHSS and Aluminum.
- The Industry's only True One-Piece construction produced from through-hardened shock resistant Tool steel.
- *True Set Exclusive* - Booster spring & positive Ball-Lock retention system resistant to shock resulting to Punch retention failure.
- Symmetrical 4th dowel providing increased versatility. Compatible with all predominant Global OEM Die Standards.

Heavy Duty

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG NUMBER	D DIA.	±.01 E	G	L	W	R	H	±.01 J	±.01 K	IN-LINE DOWEL	SCREW SIZE
MRH 10A	10	26.924	11.12	44.5	39.9	9.5	19.05	7.50	9.00	6	M8
MRH 13A	13	29.972	14.27	50.8	48.3	12.7	19.05	6.50	12.00	6	M8
MRH 16A	16	31.750	15.87	54.0	51.6	14.3	19.05	6.00	13.50	6	M8
MRH 20A	20	33.528	17.47	60.3	58.2	17.5	19.05	5.00	16.50	6	M10
MRH 25A	25	40.640	19.84	69.9	66.5	22.2	23.82	7.00	22.00	6	M12
MRH 32A	32	40.640	19.84	69.9	66.5	22.2	23.82	7.00	22.00	6	M12
MRH 40A	40	43.993	24.00	77.4	77.8	26.0	27.00	10.00	26.00	6	M12

TRUE SET-STANDARD



Manufactured under Patent No.'s 0351395, 5357835

FOR ACCESSORIES AND SHIM PLATES, SEE PAGES 60-61.

Heavy Duty

Complete design & CAD files visit WWW.MOELLERMCAD.COM

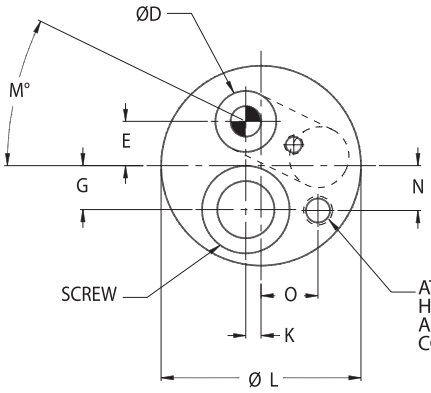
CATALOG NUMBER	D DIA.	±.01 E	G	L	W	R	H	±.01 J	±.01 K	IN-LINE DOWEL	SCREW SIZE
MRH 10	10	26.924	11.12	44.5	39.9	9.5	19.05	7.50	9.00	6	M8
MRH 13	13	29.972	14.27	50.8	48.3	12.7	19.05	6.50	12.00	6	M8
MRH 16	16	31.750	15.87	54.0	51.6	14.3	19.05	6.00	13.50	6	M8
MRH 20	20	33.528	17.47	60.3	58.2	17.5	19.05	5.00	16.50	6	M10
MRH 25	25	40.640	19.84	69.9	66.5	22.2	23.82	7.00	22.00	6	M12
MRH 32	32	40.640	19.84	69.9	66.5	22.2	23.82	7.00	22.00	6	M12
MRH 40	40	43.993	24.00	77.4	77.8	26.0	27.00	10.00	26.00	6	M12

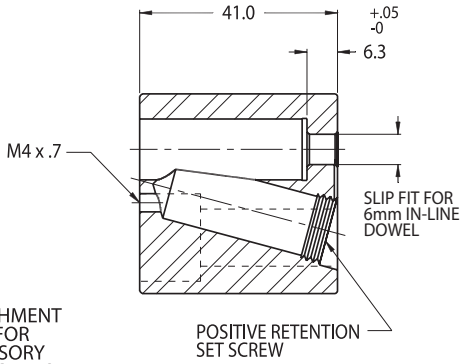
Light Duty

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG NUMBER	D DIA.	±.01 E	G	L	W	R	H	±.01 J	±.01 K	IN-LINE DOWEL	SCREW SIZE
MRL 06	06	23.000	11.10	41.3	37.8	8.0	19.00	9.00	8.00	3*	M6
MRL 10	10	26.924	11.12	44.5	39.9	9.5	19.05	7.50	9.00	6	M8
MRL 13	13	29.972	14.27	50.8	48.3	12.7	19.05	6.50	12.00	6	M8
MRL 16	16	31.750	15.87	54.0	51.6	14.3	19.05	6.00	13.50	6	M8
MRL 20	20	33.528	17.47	60.3	58.2	17.5	19.05	5.00	16.50	6	M10
MRL 25	25	40.640	19.84	69.9	66.5	22.2	23.82	7.00	22.00	6	M12
MRL 32	32	40.640	19.84	69.9	66.5	22.2	23.82	7.00	22.00	6	M12
MRL 38	38	43.993	24.00	77.4	77.8	26.0	27.00	10.00	26.00	6	M12

ECONOMY ROUND TRUE SET HEAVY DUTY





MRR™

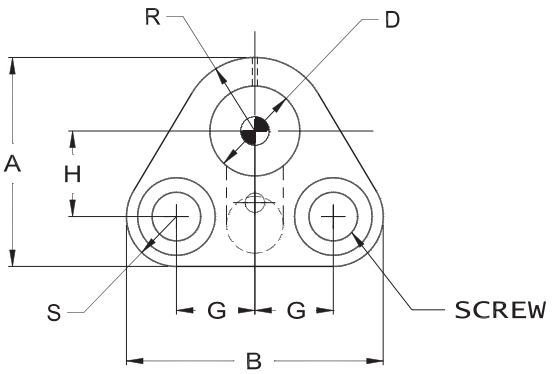
Manufactured under US Patent 8,459,161 B2
European Patent EP 2004368

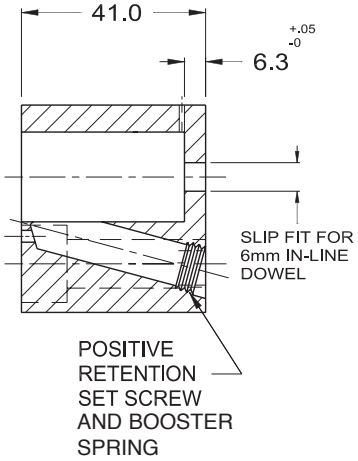
FOR ACCESSORIES AND SHIM PLATES SEE PAGE 60-61.

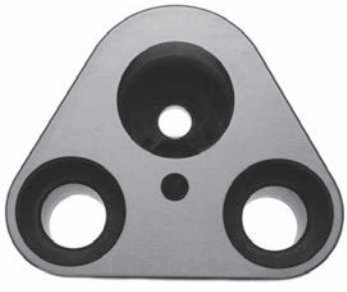
Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG NUMBER	ØD	ØL	E	G	K	M	N	O	SCREW SIZE	IN-LINE DOWEL	ATTACHMENT HOLE
MRR 10	10.00	38.1	9.86	7.10	2.65	20.5°	4.47	12.72	M12	6	M6 x 1.0
MRR 13	13.00	41.3	9.25	9.17	3.18	26°	9.35	11.88	M12	6	M6 x 1.0
MRR 16	16.00	44.5	9.10	11.07	1.93	33.5°	10.21	13.16	M12	6	M6 x 1.0
MRR 20	20.00	57.2	12.20	14.30	0	30°	9.35	19.40	M16	6	M8 x 1.25
MRR 25	25.00	63.5	12.51	17.50	0	30°	14.27	20.17	M16	6	M8 x 1.25
MRR 32	32.00	76.2	15.67	20.83	0	30°	15.46	26.12	M20	6	M8 x 1.25
MRR 40	40.00	82.6	15.39	23.55	0	30°	15.46	26.12	M20	6	M8 x 1.25

MINI TRUE SET







MRM™

Manufactured under Patent No.'s 0351395, 5357835

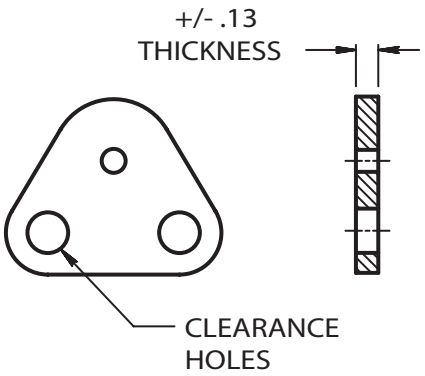
FOR ACCESSORIES SEE PAGE 61.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

Heavy Duty

CATALOG NUMBER	DIA.	A	B	G	H	R	S	SCREW SIZE
MRM 10	10	37.8	40.6	11.1	19.0	9.5	9.2	M8
MRM 13	13	40.3	47.6	14.3	19.0	11.7	9.5	M8
MRM 16	16	42.1	50.8	15.9	19.0	13.5	9.5	M8
MRM 20	20	46.5	57.1	17.5	19.0	16.4	11.1	M10
MRM 25	25	56.5	65.1	19.8	23.8	20.0	12.7	M12
MRM 32	32	58.2	64.0	19.8	23.8	22.2	12.2	M12
MRM 40	40	67.3	76.2	24.0	27.0	26.0	14.3	M12

SHIM PLATES



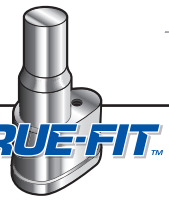
Available Thickness	Ordering Number
3.0	030
6.0	060
10.0	100
13.0	130

CATALOG NUMBER
MAM 10-
MAM 13-
MAM 16-
MAM 20-
MAM 25-
MAM 32-
MAM 40-

INSERT SHIM ORDERING NUMBER

ORDERING EXAMPLE
MAM 16-060

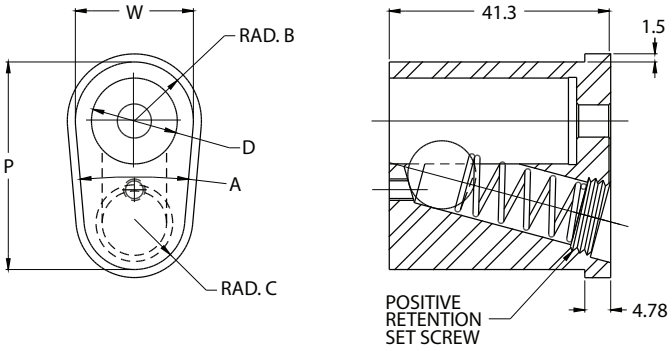
INSERTABLE PUNCH RETAINERS



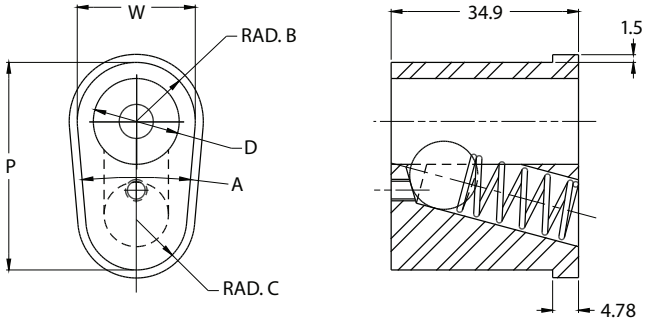
MOELLER™ PRECISION TOOL

TRUE-FIT

MRI TRUE-SET STYLE

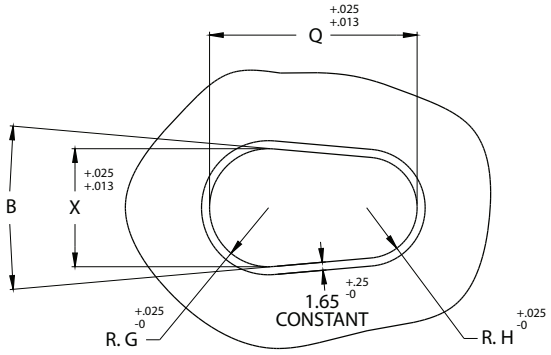


MRJ BACKING PLATE STYLE



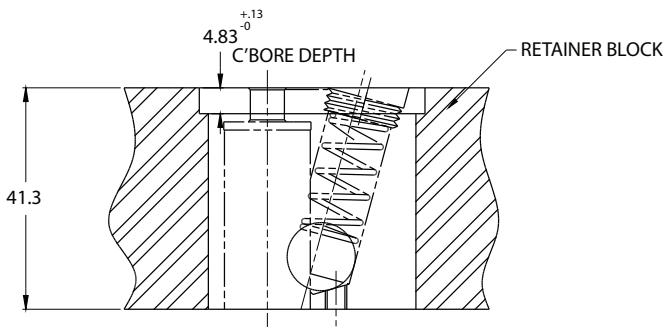
CATALOG TYPE	D	P	W	A	RAD. B	RAD. C
MR__010	10	29.48	15.88	5°	7.94	7.32
MR__013	13	36.04	19.05	5°	9.53	8.75
MR__016	16	39.21	22.23	10°	11.11	9.49
MR__020	20	42.39	25.4	10°	12.70	11.08
MR__025	25	48.74	31.75	30°	15.88	9.94
MR__032	32	55.09	38.10	30°	19.05	13.12
MR__040	40	63.69	48.00	30°	24.00	18.52

HOLE DIMENSIONS FOR TRUE-FIT INSERTS

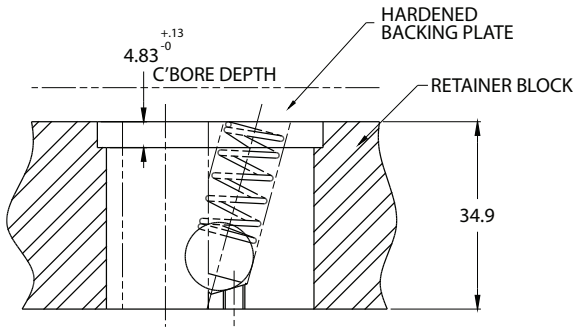


PUNCH SHANK Ø	Q	X	B	RAD. G	RAD. H
10	29.494	15.885	5°	7.943	7.323
13	36.048	19.060	5°	9.530	8.755
16	39.223	22.235	10°	11.118	9.497
20	42.398	25.410	10°	12.705	11.085
25	48.748	31.760	30°	15.880	9.949
32	55.098	38.110	30°	19.055	13.124
40	63.699	48.010	30°	24.005	18.526

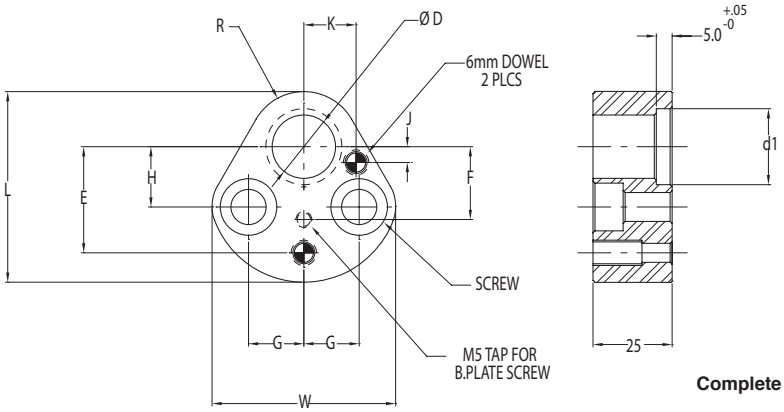
MRI TRUE-SET STYLE



MRJ BACKING PLATE STYLE



TRUE SET
MRN STYLE
For Round Punches

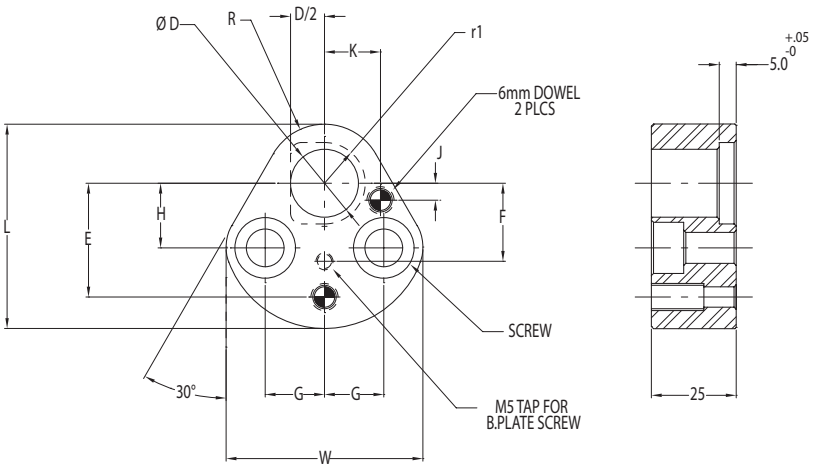


FOR ACCESSORIES AND BACKING PLATES
SEE PAGE 61.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG NUMBER	D	d1	L	W	R	H	±.01 J	±.01 K	G	±.01 E	F	SCREW SIZE
MRN 10	10	14.0	44.5	39.9	9.5	19.05	7.50	9.00	11.12	26.924	16.00	M8
MRN 13	13	17.0	50.8	48.3	12.7	19.05	6.50	12.00	14.27	29.972	16.00	M8
MRN 16	16	20.0	54.0	51.6	14.3	19.05	6.00	13.50	15.87	31.750	16.00	M8
MRN 20	20	24.0	60.3	58.2	17.5	19.05	5.00	16.50	17.47	33.528	23.00	M10
MRN 25	25	29.0	69.9	66.5	22.2	23.82	7.00	22.00	19.84	40.640	30.00	M12
MRN 32	32	36.0	69.9	66.5	22.2	23.82	7.00	22.00	19.84	40.640	30.00	M12

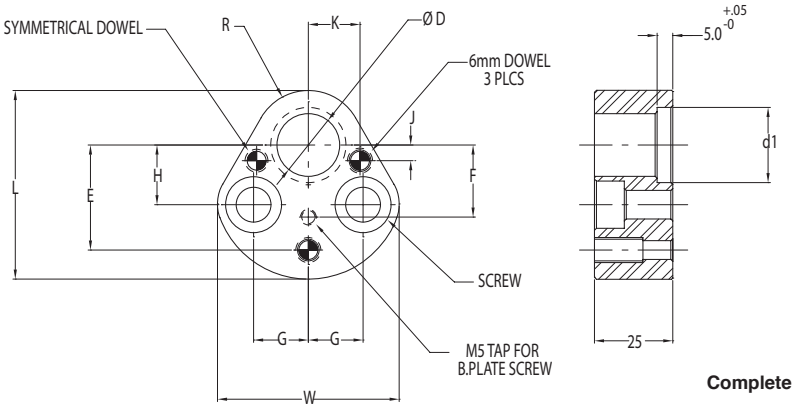
MRO STYLE
For Shaped Punches



Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG NUMBER	D	r1	L	W	R	H	±.01 J	±.01 K	G	±.01 E	F	SCREW SIZE
MRO 10	10	7.0	44.5	39.9	9.5	19.05	7.50	9.00	11.12	26.924	16.00	M8
MRO 13	13	8.5	50.8	48.3	12.7	19.05	6.50	12.00	14.27	29.972	16.00	M8
MRO 16	16	10.0	54.0	51.6	14.3	19.05	6.00	13.50	15.87	31.750	16.00	M8
MRO 20	20	12.0	60.3	58.2	17.5	19.05	5.00	16.50	17.47	33.528	23.00	M10
MRO 25	25	14.5	69.9	66.5	22.2	23.82	7.00	22.00	19.84	40.640	30.00	M12
MRO 32	32	18.0	69.9	66.5	22.2	23.82	7.00	22.00	19.84	40.640	30.00	M12

TRUE SET
MRP STYLE
with Symmetrical 3rd Dowel
For Round Punches

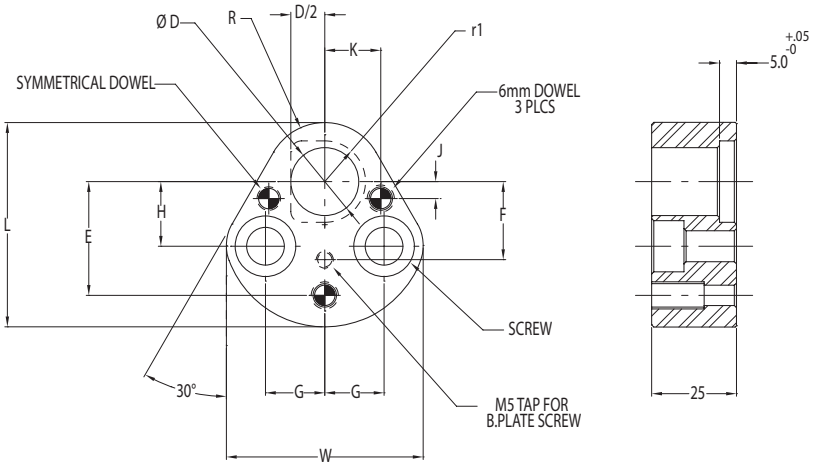


FOR ACCESSORIES AND BACKING PLATES
SEE PAGE 61.

Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG NUMBER	D	d1	L	W	R	H	±.01 J	±.01 K	G	±.01 E	F	SCREW SIZE
MRP 10	10	14.0	44.5	39.9	9.5	19.05	7.50	9.00	11.12	26.924	16.00	M8
MRP 13	13	17.0	50.8	48.3	12.7	19.05	6.50	12.00	14.27	29.972	16.00	M8
MRP 16	16	20.0	54.0	51.6	14.3	19.05	6.00	13.50	15.87	31.750	16.00	M8
MRP 20	20	24.0	60.3	58.2	17.5	19.05	5.00	16.50	17.47	33.528	23.00	M10
MRP 25	25	29.0	69.9	66.5	22.2	23.82	7.00	22.00	19.84	40.640	30.00	M12
MRP 32	32	36.0	69.9	66.5	22.2	23.82	7.00	22.00	19.84	40.640	30.00	M12
MRP 40	40	44.0	77.4	77.8	26.0	27.00	10.00	26.00	24.00	43.993	33.35	M12

MRQ STYLE
with Symmetrical
3rd Dowel For
Shaped
Punches

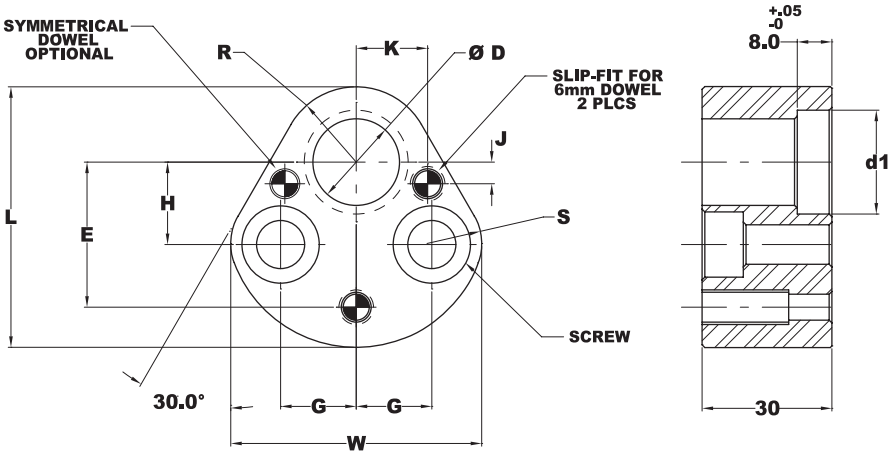


Complete design & CAD files visit WWW.MOELLERMCAD.COM

CATALOG NUMBER	D	r1	L	W	R	H	±.01 J	±.01 K	G	±.01 E	F	SCREW SIZE
MRQ 10	10	7.0	44.5	39.9	9.5	19.05	7.50	9.00	11.12	26.924	16.00	M8
MRQ 13	13	8.5	50.8	48.3	12.7	19.05	6.50	12.00	14.27	29.972	16.00	M8
MRQ 16	16	10.0	54.0	51.6	14.3	19.05	6.00	13.50	15.87	31.750	16.00	M8
MRQ 20	20	12.0	60.3	58.2	17.5	19.05	5.00	16.50	17.47	33.528	23.00	M10
MRQ 25	25	14.5	69.9	66.5	22.2	23.82	7.00	22.00	19.84	40.640	30.00	M12
MRQ 32	32	18.0	69.9	66.5	22.2	23.82	7.00	22.00	19.84	40.640	30.00	M12
MRQ 40	40	22.0	77.4	77.8	26.0	27.00	10.00	26.00	24.00	43.993	33.35	M12

XMRN STYLE

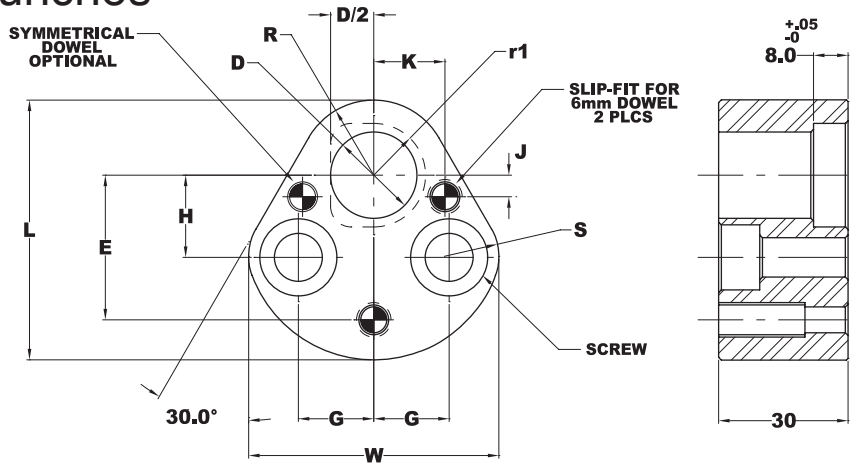
For Round Punches



PART NUMBER	D	d1	L	W	R	H	± .01 J	± .01 K	S	G	± .01 E	SCREW SIZE
XMRN 010	10.00	15.5	44.5	39.9	9.5	19.05	7.5	9.0	12.0	11.12	26.924	M8
XMRN 013	13.00	18.5	50.8	48.3	12.7	19.05	6.5	12.0	15.2	14.27	29.972	M8
XMRN 016	16.00	21.5	54.0	51.6	14.3	19.05	6.0	13.5	16.8	15.87	31.750	M8
XMRN 020	20.00	25.5	60.3	58.2	17.5	19.05	5.0	16.5	20.0	17.47	33.528	M10
XMRN 025	25.00	30.5	69.9	66.5	22.2	23.82	7.0	22.0	24.7	19.84	40.640	M12

XMRO STYLE

For Shaped Punches

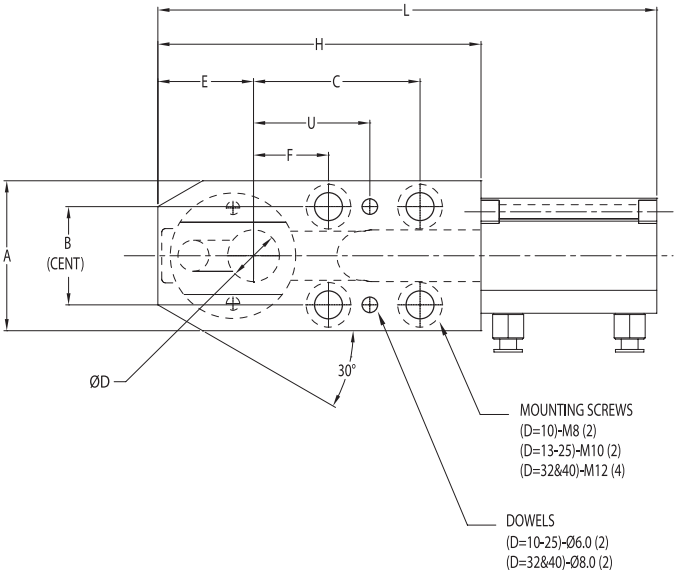


PART NUMBER	D	r1	L	W	R	H	± .01 J	± .01 K	S	G	± .01 E	SCREW SIZE
XMRO 010	10.00	7.75	44.5	39.9	9.5	19.05	7.5	9.0	12.0	11.12	26.924	M8
XMRO 013	13.00	9.25	50.8	48.3	12.7	19.05	6.5	12.0	15.2	14.27	29.972	M8
XMRO 016	16.00	10.75	54.0	51.6	14.3	19.05	6.0	13.5	16.8	15.87	31.750	M8
XMRO 020	20.00	12.75	60.3	58.2	17.5	19.05	5.0	16.5	20.0	17.47	33.528	M10
XMRO 025	25.00	15.25	69.9	66.5	22.2	23.82	7.0	22.0	24.7	19.84	40.640	M12

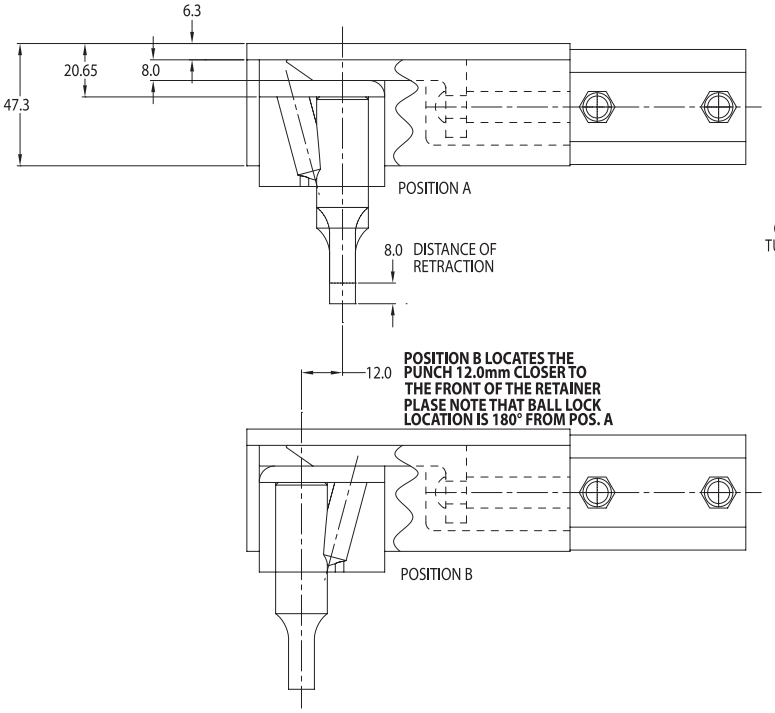
RETRACTABLE RETAINERS

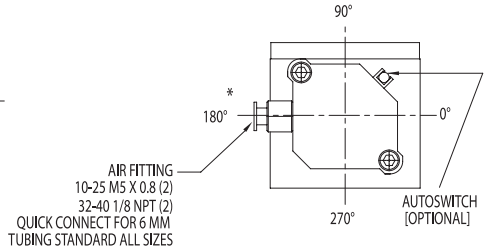
MOELLER™ PRECISION TOOL

BALL-LOCK STYLE/HEAVY DUTY



Moeller dual-position ball lock retractable retainers provide the capability to add, or subtract, holes quickly without affecting demanding production schedules, and without the added cost of additional tooling. Moeller dual-position ball lock retractable retainers are available to conform to NAAMS, and leading automotive standards. Position B facilitates close-space applications by moving the punch 12mm closer to the front end of the retainer. Moeller dual-position ball lock retainers feature a strong and convenient one- piece body, eliminating the need for a separate safety shield.





RECOMMENDED AIR PRESSURE:
4.60-5.3 kgf/cm² (65-75 PSI)

MINIMUM PRESSURE:
3.2 kgf/cm² (45 PSI)

MAXIMUM PRESSURE:
10.2 kgf/cm² (145 PSI)

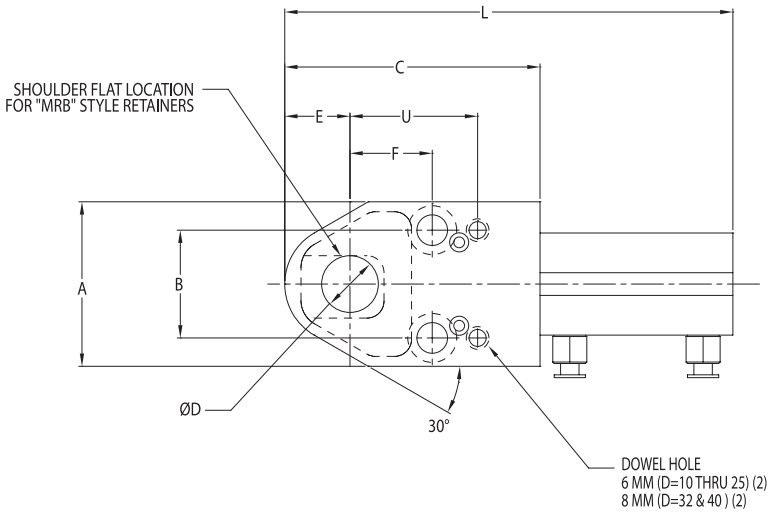
NOTE:
CHANGE RETAINER SET INCLUDES ALL NECESSARY SCREWS AND DOWELS,AIR CYLINDER AND FITTINGS. TUBING FOR AIR SUPPLY AND AUTOSWITCH ARE NOT INCLUDED AND MUST BE ORDERED SEPARATELY.
CONSULT FACTORY FOR ADDITIONAL ACCESSORIES.

CATALOG NUMBER	D	L	A	±.01 B	C		E		F		H	U ±.01		SCREW SIZE
					POS.A	POS.B	POS.A	POS.B	POS.A	POS.B		POS.A	POS.B	
MRA 10	10	161	46	30			28	16	21	33	93.5	37	49	M8
MRA 13	13	172.5	50	30			28	16	25	37	100	41	53	M10
MRA 16	16	177	50	30			31	19	25	37	104.5	41	53	M10
MRA 20	20	191.5	58	38			32.5	20.5	29	41	113.5	45	57	M10
MRA 25	25	206.5	58	38			35	23	29	41	123.5	45	57	M10
MRA 32	32	260	80	56	100	112	38	26	38	50	152	60	72	M12
MRA 40	40	264	80	56	100	112	42	30	38	50	156	60	72	M12

ORDERING EXAMPLE: MRA 13, OR MRA 13 POSITION B

RETRACTABLE RETAINERS

SHOULDER STYLE



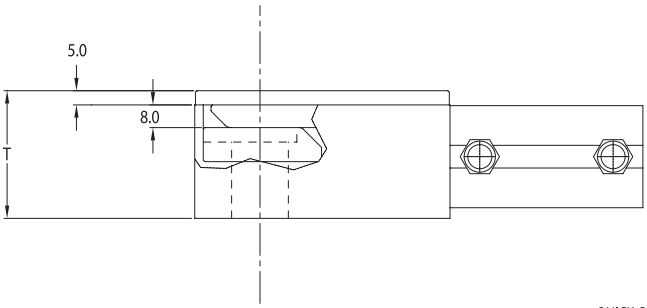
Moeller shoulder retractable retainers provide the capability to add, or subtract, holes quickly without affecting demanding production schedules, and without the added cost of additional tooling. Moeller shoulder retractable retainers feature a strong and convenient one- piece body, eliminating the need for a separate safety shield.

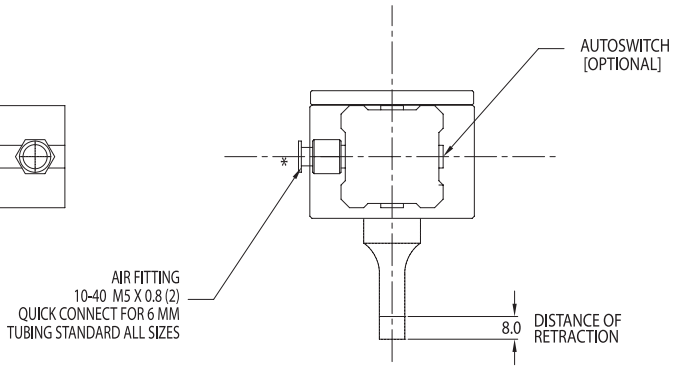
RECOMMENDED AIR PRESSURE:
4.60-5.3 kgf/cm² (65-75 PSI)

MINIMUM PRESSURE:
3.2 kgf/cm² (45 PSI)

MAXIMUM PRESSURE:
10.2 kgf/cm² (145 PSI)

NOTE:
CHANGE RETAINER SET INCLUDES ALL NECESSARY SCREWS AND DOWELS,AIR CYLINDER AND FITTINGS. TUBING FOR AIR SUPPLY AND AUTOSWITCH ARE NOT INCLUDED AND MUST BE ORDERED SEPARATELY. CONSULT FACTORY FOR ADDITIONAL ACCESSORIES.





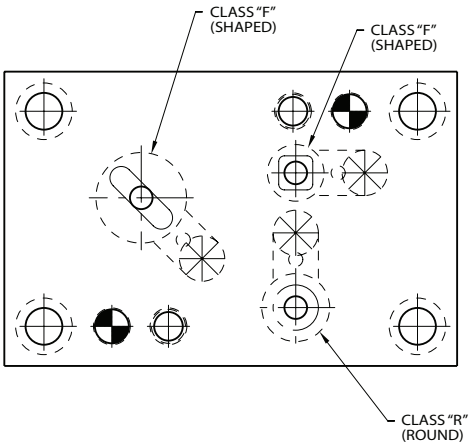
ROUND PUNCH CATALOG NUMBER	SHAPED PUNCH CATALOG NUMBER	D	L	A	±.01 B	C	E	F	T	±.01 U	SCREW SIZE
MRC 10	MRB 10	10	128	46	30	73	18	25	45	41	M8
MRC 13	MRB 13	13	128	49	30	73	18	25	45	41	M10
MRC 16	MRB 16	16	128	49	30	73	18	25	45	41	M10
MRC 20	MRB 20	20	155	58	38	90	23	29	45	45	M10
MRC 25	MRB 25	25	155	58	38	90	23	29	45	45	M10
MRC 32	MRB 32	32	208	80	56	125	33	38	55	60	M12
MRC 40	MRB 40	40	208	80	56	125	33	38	55	60	M12

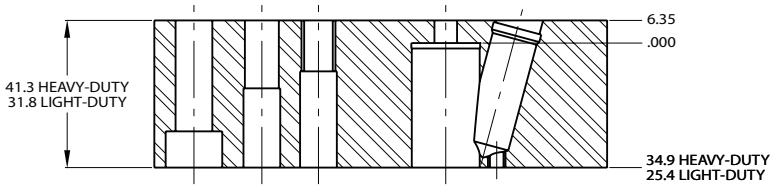
ORDERING EXAMPLE: MRC 13 (FOR ROUND POINT PUNCH)
ORDERING EXAMPLE: MRB 13 (FOR SHAPED POINT PUNCHES – PLEASE NOTE FLAT LOCATION WHEN ORDERING PUNCHES)

SPECIAL MULTI HOLE
BALL-LOCK RETAINERS

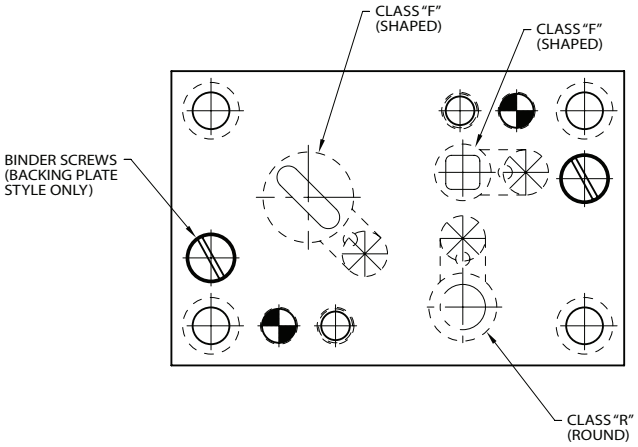
Shown below are examples of the two styles of Special Multi-Hole Ball Lock Retainers offered by Moeller Precision Tool. The True Set Style is Moeller's patented one piece construction, through hardened retainer. The conventional Backing Plate Style is supplied with a hardened Backing Plate attached by fasteners to the Retainer. All Ball Lock retainer punch or button holes must be designated as Round, class "R" or Shaped, class "F". Where shaped components are being used, the angle holes are precision ground. This guarantees radial location, buts adds cost to the retainer. **Note: Ball-Seat class "R" will be supplied unless otherwise specified.**

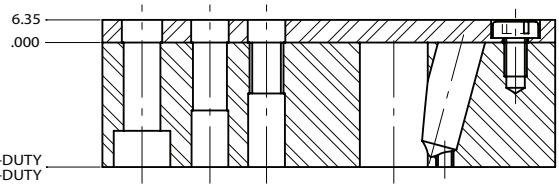
TRUE SET STYLE

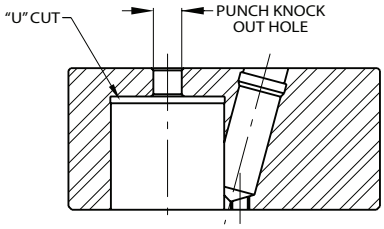




BACKING PLATE STYLE







DETAIL VIEW OF PUNCH HOLE

SPECIAL FEATURES:

*AN EXCLUSIVE PATENTED MOELLER PRODUCT PATENT NO.'s 0351395 & 5357835
INTERNATIONAL PATENT PENDING
*ONE-PIECE CONSTRUCTION

TOLERANCES ALL TYPES

OUTSIDE EDGES	± .5
DOWEL HOLE LOCATIONS	± .01
SCREW HOLE LOCATIONS	± .1
COMPONENT HOLE LOCATIONS	± .01

BALL-HOLES	
CLASS	RADIAL TOL.
R	± 5°
F	± .0°5'

RETAINER COMPONENTS

TRUE SET RETAINER COMPONENTS

	TRUE SET RETAINER	SOC.HD. CAP SCREW	DOWELS	BALL	SPRING	BALL RELEASE SCREW	ANGLE HOLE SET SCREW
HEAVY DUTY	MRH 10	MAC 8-45 M8 x 45	MAD 6-20 6mm x 20	MAB 10 10mm	MAS 10 (W/CLIP) MAS 10T (W/SCREW) 10mm	MAC 4-20 M4 X 20	MAN 10
	MRH 13			MAB 12 12mm	MAS 12 (W/CLIP) MAS 12T (W/SCREW) 12mm 13mm/40mm		MAN 12
	MRH 16						
	MRH 20	MAC 10-50 M10 x 50					
	MRH 25	MAC 12-50 M12 x 50					
	MRH 32						
	MRH 40						
LIGHT DUTY	MRL 06	MAC 6-35 M6 X 35	MAD 3-20 3mm x 20 MAD 6-20 6mm x 20	MAB 6 6mm	MAS 6 6mm	MAC 3-15 M3 x 15	
	MRL 10	MAC 8-35 M8 x 35	MAD 6-20 6 mm x 20	MAB 8 8mm	MAS 8 8mm	MAC 4-20 M4 x 20	
	MRL 13						
	MRL 16						
	MRL 20	MAC 10-40 M10 x 40					
	MRL 25	MAC 12-40 M12 x 40					
	MRL 32						
	MRL 38						

SPECIAL BACKING PLATE RETAINER ACCESSORIES

	SPRINGS	BALLS
6 DIA.	MAS 6S	MAB 6
8 DIA.	MAS 8S	MAB 8
10 DIA.	MAS 10S	MAB 10
12 DIA.	MAS 12S	MAB 12

BOOSTER SPRINGS

	PUNCH SIZE 10 MM HDBL CATALOG # MAS010B
	PUNCH SIZE 13 THRU 40 MM HDBL CATALOG # MAS012B

ECONOMY ROUND TRUE SET RETAINER COMPONENTS

TRUE SET ROUND RETAINER	SOC. HD. CAP SCREW	DOWELS	BALL	SPRING	BALL RELEASE SCREW	ANGLE HOLE SET SCREW
MRR 10	MAC 12-50 TL M12-1.75 x 50mm	MAD 6-20 6mm X 20	MAB 10 10mm	MAS 10T 10 mm	MAC 4-20 4mm X 20	MAN 10
MRR 13			MAB 12 12mm	MAS 12T 12mm		MAN 12
MRR 16						
MRR 20	MAC 16-50 TL M16-2.0 x 50mm					
MRR 25						
MRR 32	MAC 20-50 TL M20-2.5 x 50mm					
MRR 40						

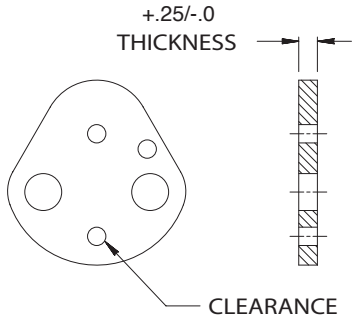
SHOULDER TRUE SET RETAINER COMPONENTS

TRUE SET SHOULDER RETAINER	SOC. HD. CAP SCREW	DOWELS
MRN 10	CAT#: MAC 8-35 DESC: M8 x 35	MAD 6-20 6mm x 20
MRN 13		
MRN 16		
MRN 20	CAT#: MAC 10-40 DESC: M10 x 40	
MRN 25	CAT#: MAC 12-40 DESC: M12 x 40	
MRN 32		

TRUE SET SHOULDER RETAINER	SOC. HD. CAP SCREW	DOWELS
MRO-10	CAT#: MAC 8-35 DESC: M8 x 35	MAD 6-20 6mm x 20
MRO-13		
MRO-16		
MRO-20	CAT#: MAC 10-40 DESC: M10 x 40	
MRO-25	CAT#: MAC 12-40 DESC: M12 x 40	
MRO-32		

RETAINER ACCESSORIES

TRUE SET SHIM PLATES

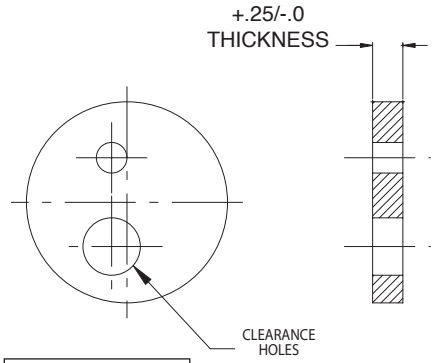


Available Thickness	Ordering Number
1.80	018
3.00	030
3.18	031
4.75	047
6.00	060
6.35	063
10.00	100
13.00	130

CATALOG NUMBER
MAX 10-
MAX 13-
MAX 16-
MAX 20-
MAX 25-
MAX 32-
MAX 40-

INSERT SHIM THICKNESS

ORDERING EXAMPLE
MAX 13-031

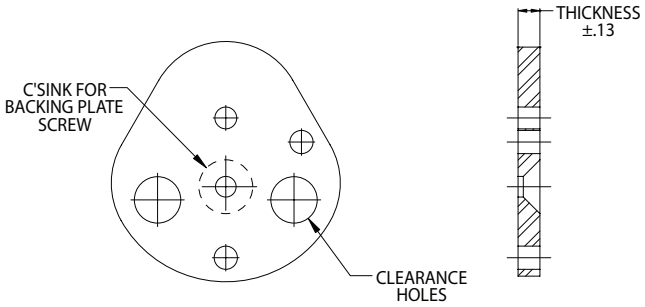


CATALOG NUMBER
MAY 10-
MAY 13-
MAY 16-
MAY 20-
MAY 25-
MAY 32-
MAY 40-

INSERT SHIM THICKNESS

ORDERING EXAMPLE
MAY 13-031

TRUE SET SHOULDER RETAINER BACKING PLATES



CATALOG NUMBER
MAW 10-
MAW 13-
MAW 16-
MAW 20-
MAW 25-
MAW 32-
MAW 40-

Available Thickness	Ordering Number
4.75	047
6.35	063

HARDENED TO R/C 50-52

ORDERING EXAMPLE
MAW 13-047

INSERT BACKING PLATE THICKNESS

BALL RELEASE TOOLS

ANGLE TIP
(for all Retainers) Cat. No. MAT 01

STRAIGHT TIP
(for all Retainers) Cat. No. MAT 02

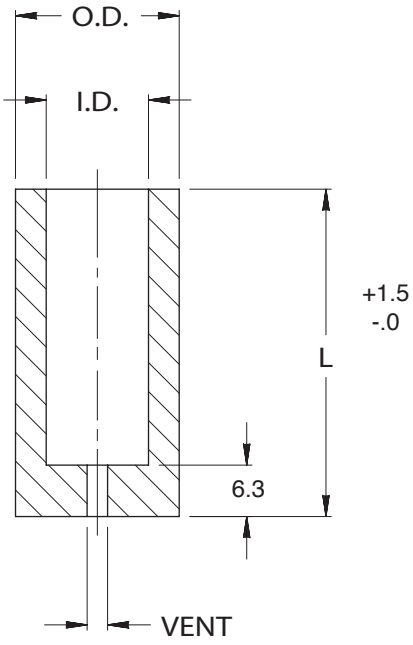
THREADED TIP HEAVY DUTY
(for True Set Retainers) 10-40 Diameter Cat. No. MAT 03

THREADED TIP LIGHT DUTY
(for True Set Retainers) 10-25 Diameter Cat. No. MAT 04

ANGLE HOLE SET SCREW TOOL
(for True Set Retainers) Cat. No. MAO 01

URETHANE STRIPPERS

CLOSED END



CATALOG NUMBER	I.D.	O.D.	LENGTH L	APPROXIMATE PRESSURE AVAILABLE AT DEFLECTION OF		
				3.0	6.5	9.5
MTC 06-45	06	19	45	1324	2256	—
MTC 06-53			53	1079	1863	—
MTC 06-71			71	686	1079	1765
MTC 08-45	08	21	45	1471	2207	—
MTC 08-53			53	1324	1961	2942
MTC 08-71			71	981	1618	2648
MTC 10-45	10	23	45	1716	2795	—
MTC 10-53			53	1422	2452	3187
MTC 10-56			56	1422	2452	3187
MTC 10-71			71	1128	2010	2697
MTC 13-45	13	26	45	2109	3334	—
MTC 13-53			53	1471	2354	3432
MTC 13-56			56	1471	2354	2942
MTC 13-71			71	1275	1961	2452
MTC 16-45	16	30	45	2354	3825	—
MTC 16-53			53	2158	3531	4511
MTC 16-56			56	2158	3431	4511
MTC 16-71			71	1814	2942	3825
MTC 20-45	20	38	45	2452	3923	—
MTC 20-53			53	2158	3629	5590
MTC 20-71			71	1618	2942	4658
MTC 25-45	25	50	45	9317	14318	—
MTC 25-53			53	7355	11572	15985
MTC 25-71			71	4904	8336	13485

VENT	I.D.'s
1.6	06-10
3.2	13-25

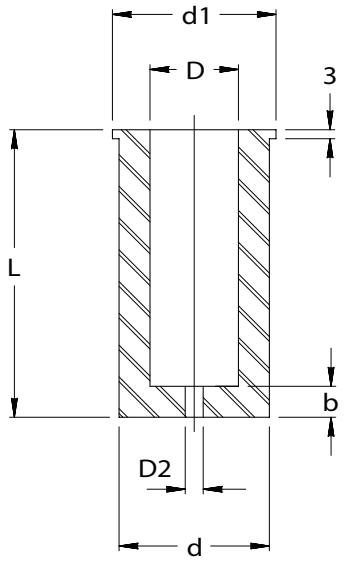
CLOSED END urethane strippers are shaped to suit the punch point by closing the die – without the material – the point and the die cavity provide the shearing action to shape the closed end.

Urethane provides an excellent balance of load bearing and memory rate, with a tensile strength of 30,250 newtons. Deflections greater than 25% are not recommended. For optimum life in high speed continuous operations, a 15% deflection is suggested.

Durometer hardness 95 Shore A.

TRUE SET STRIPPERS

- Innovative One-Piece construction
- Patented cost savings “Snap in” retention feature
- Interchangeable and complies with NAAMS standards
- Precision machined to assure perpendicularity resulting in prolonged Urethane life



URETHANE HARDNESS 95 SHORE A

Heavy Duty Ball Lock Punch Length	Light Duty Ball Lock Punch Length	Recommended Stripper Length “L”
80	71	44
90	80	54
100	90	64
110	100	74

Moeller reserves the right to modify, correct or improve this literature or products without notice.

URETHANE STRIPPERS

Stripper Catalog Number	Punch Shank	Press Fit D	d	L	d1	d2	b
MTS10 - 44	10	9.75	18	44	21	1.6	6
MTS10 - 54	10	9.75	18	54	21	1.6	6
MTS10 - 64	10	9.75	18	64	21	1.6	6
MTS10 - 74	10	9.75	18	74	21	1.6	6
MTS13 - 44	13	12.75	23	44	26	3.0	6
MTS13 - 54	13	12.75	23	54	26	3.0	6
MTS13 - 64	13	12.75	23	64	26	3.0	6
MTS13 - 74	13	12.75	23	74	26	3.0	6
MTS16 - 44	16	15.75	28	44	31	3.0	6
MTS16 - 54	16	15.75	28	54	31	3.0	6
MTS16 - 64	16	15.75	28	64	31	3.0	6
MTS16 - 74	16	15.75	28	74	31	3.0	6
MTS20 - 44	20	19.75	33	44	36	3.0	7
MTS20 - 54	20	19.75	33	54	36	3.0	7
MTS20 - 64	20	19.75	33	64	36	3.0	7
MTS20 - 74	20	19.75	33	74	36	3.0	7
MTS25 - 44	25	24.75	40	44	43	3.0	7
MTS25 - 54	25	24.75	40	54	43	3.0	7
MTS25 - 64	25	24.75	40	64	43	3.0	7
MTS25 - 74	25	24.75	40	74	43	3.0	7
MTS32 - 44	32	31.70	50	44	55	3.0	7
MTS32 - 54	32	31.70	50	54	55	3.0	7
MTS32 - 64	32	31.70	50	64	55	3.0	7
MTS32 - 74	32	31.70	50	74	55	3.0	7
MTS40 - 44	40	39.70	60	44	65	3.0	8
MTS40 - 54	40	39.70	60	54	65	3.0	8
MTS40 - 64	40	39.70	60	64	65	3.0	8

TRUE SET STRIPPER RETAINERS

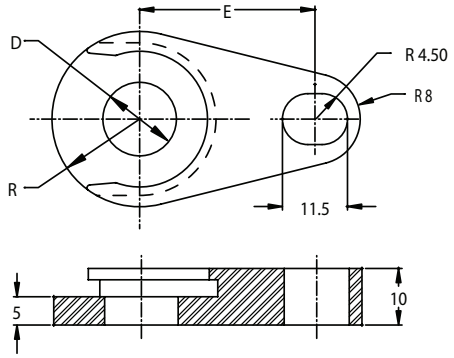
MOELLER™ PRECISION TOOL

- Innovative One-Piece construction
- Patented cost savings “Snap in” retention feature
- Interchangeable and complies with NAAMS standards
- Precision machined to assure perpendicularity resulting in prolonged Urethane life
- Adaptable to special multi-hole Retainers

TRUE SET™

MTR STYLE STRIPPER RETAINER

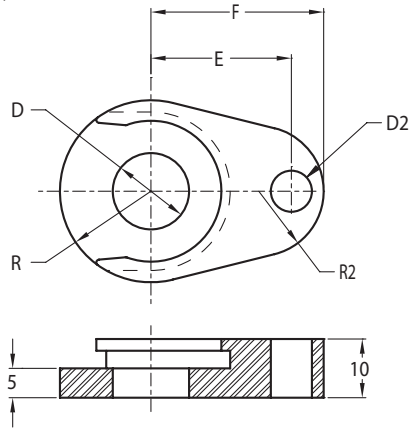
(To be used with Standard MRH True Set Retainer)



Catalog No.	D	R	E
MTR 10	10	13	28
MTR 13	13	15.5	31
MTR 16	16	18	32.9
MTR 20	20	20.5	34.8
MTR 25	25	24	39.8
MTR 32	32	31	41.3
MTR 40	40	36	45

MTP STYLE STRIPPER RETAINER

(To be used with the Round MRR True Set Retainer)

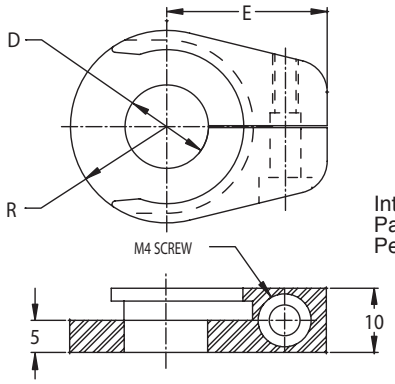


Catalog No.	D	R	E	F	D2	R2
MTP 10	10	13.0	21.0	26.5	7	10.0
MTP 13	13	15.5	23.9	29.4	7	11.0
MTP 16	16	18.0	24.5	30.0	7	12.8
MTP 20	20	20.5	29.0	36.0	9	11.8
MTP 25	25	24.0	33.5	40.5	9	12.9
MTP 32	32	31.0	40.6	49.3	9	8.0
MTP 40	40	36.0	44.0	53.0	9	8.0

U.S. Patent No. 7,707,919B1 International Patents Pending.

MTM STYLE STRIPPER RETAINER

(To be used with MRM and Multi Hole Retainer)



International Patents Pending.

Catalog No.	D	R	E
MTM 10	10	13	22.5
MTM 13	13	15.5	25
MTM 16	16	18	27.5
MTM 20	20	20.5	30
MTM 25	25	24	35.5
MTM 32	32	31	37.5
MTM 40	40	36	42.3

NOSE LARGE STRIPPER RETAINERS

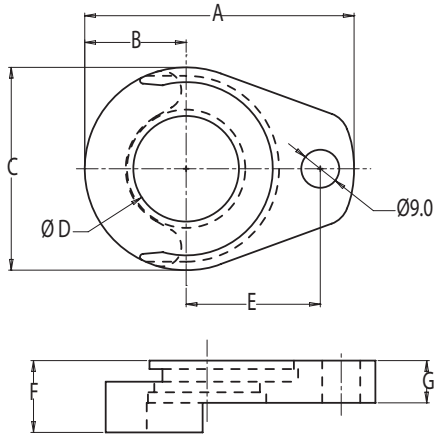
MOELLER™ PRECISION TOOL

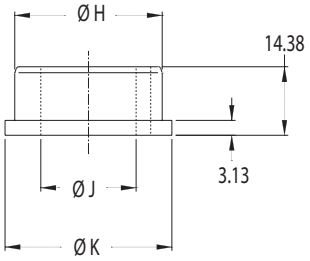
- Innovative One-Piece construction
- Patented cost savings “Snap in” retention feature
- Interchangeable and complies with NAAMS standards
- Precision machined to assure perpendicularity resulting in prolonged Urethane life

TRUE SET™

NOSE LARGE STRIPPER RETAINER

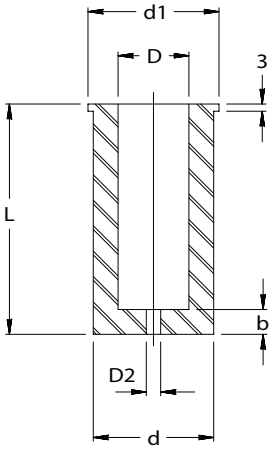
(To be used with the Standard MRH True Set Retainer)





U.S. Patent No. 7,707,919B1 International Patents Pending.
*XX = “L” DIMENSION OF URETHANE

CATALOG TYPE	SHANK Ø	MAX P/G	A	B	C	D	E	F	G	H	J	K	*USE WITH URETHANE
MTB010016	10.0	15.75	53.18	18.0	36	16	26.93	17	10	15.75	10	19	MTS16-XX
MTB013020	13.0	19.75	58.60	20.5	41	20	29.97	17	10	19.75	13	23	MTS20-XX
MTB016025	16.0	24.75	63.75	24.0	48	25	31.75	17	10	24.75	16	28	MTS25-XX
MTB020032	20.0	31.75	73.86	31.0	62	32	33.53	17	10	31.70	20	34	MTS32-XX
MTB025040	25.0	39.75	83.63	36.0	72	40	40.64	17	10	39.70	25	44	MTS40-XX
MTB032040	32.0	39.75	83.63	36.0	72	40	40.64	18	10	39.70	32	44	MTS40-XX



URETHANE HARDNESS 95 SHORE A

Heavy Duty Ball Lock Punch Length	Recommended Stripper Length “L”
80	44
90	54
100	64

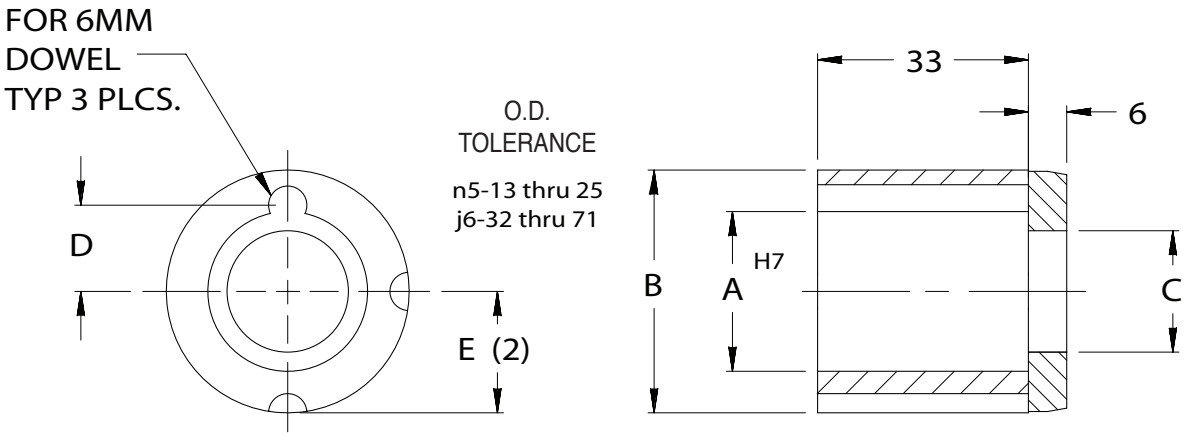
NOTE: THE FOLLOWING CHART DENOTES THE REQUIRED URETHANE FOR CORRESPONDING STRIPPER RETAINER ABOVE.

CATALOG TYPE	SHANK Ø	L +1.0/-0.6 STRIPPER LENGTHS	D	d1	d	b	D2
*MTS16-XX TO BE USE ON MTB010016	10.0	44	15.75	31	28	6	3
		54					
		64					
*MTS20-XX TO BE USE ON MTB013020	13.0	44	19.75	36	33	7	3
		54					
		64					
*MTS25-XX TO BE USE ON MTB016025	16.0	44	24.75	43	40	7	3
		54					
		64					
*MTS32-XX TO BE USE ON MTB020032	20.0	44	31.7	55	50	7	3
		54					
		64					
*MTS40-XX TO BE USE ON MTB025040	25.0	44	39.7	65	60	8	3
		54					
		64					
*MTS40-XX TO BE USE ON MTB032040	32.0	44	39.7	65	60	8	3
		54					
		64					

SPECIAL TOOLING

RELOCATION BUSHINGS

- Relocate Die Buttons up to 5mm eliminating the need of plugging or welding existing hole.
- Maintain the use of pre-existing Die Buttons.
- Cost effective method to relocate a Dowel Location.



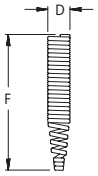
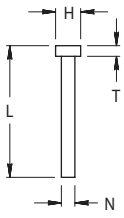
CATALOG TYPE	A	B	C	D	E
MAR 13	13	25	9	8.2	13.5
MAR 16	16	32	10	9.0	16.0
MAR 20	20	32	14	11.0	16.0
MAR 25	25	38	19	13.5	19.0
MAR 32	32	45	26	16.0	22.5
MAR 38	38	50	32	19.0	25.0
MAR 45	45	56	39	22.5	28.0
MAR 50	50	63	44	25.0	31.5
MAR 56	56	71	50	28.0	35.5
MAR 63	63	82	57	31.5	41.0
MAR 71	71	89	65	35.5	44.5

PUNCH EJECTOR COMPONENTS

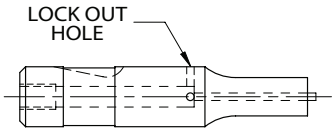
Ejector Punch Dimensional Specifications

SHANK DIA. D	EJECTOR SPECIFICATION	DRILL PIN HOLE	SIZE SPRING HOLE	SCREW SIZE	CROSS HOLE SIZE	PIN EXTENSION
5.0 SHOULDER	MAE 2	.64	2.18	M2.6	.81	.81±.25
6.0 ALL	MAE 3	.79	2.64	M3	.81	.81±.25
8.0 SHOULDER 10.0 BALL-LOCK	MAE 4	1.17	3.45	M4	1.57	1.57±.38
10.0 SHOULDER 13.0 ALL 16.0 BALL-LOCK	MAE 5	1.58	4.37	M5	1.57	1.57±.38
16.0 SHOULDER 20.0 ALL 25.0 ALL 32.0 ALL 40.0 ALL	MAE 6	2.36	5.18	M6	1.57 — —	1.57±.38
CONSULT FACTORY	MAE 12	3.18	7.13	M8 X 1.25	—	

Ejector Component Specifications

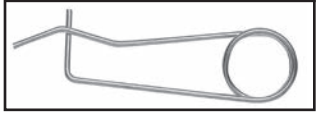
PART DESCRIPTION	SPEC. DESCRIPTION	MAE 2	MAE 3	MAE 4	MAE 5	MAE 6	MAE 12
SET SCREW 	THREAD SIZE "T"	M2.6	M3	M4	M5	M6	M8
	LENGTH "L"	5.0	5.0	5.0	5.0	6.0	6.0
SPRING 	DIAMETER "D" +.0 -.25	1.98	2.38	3.30	4.16	5.05	6.86
	FREE-LENGTH "F" +1.5 -0	60.4	60.4	81.0	81.0	81.0	81.0
	PRESSURE (3.0 PRE-LOAD)	2.22	3.34	4.45	6.67	8.9	8.9
PIN 	BODY DIAMETER "N" ±.025	.48	.69	1.04	1.47	2.26	3.05
	LENGTH "L" +1.5 -0	35.0	35.0	49.3	49.3	63.5	76.20
	HEAD DIAMETER "H" +.025	1.20	1.98	2.39	3.18	4.01	4.75
	HEAD THICKNESS "T" ±.13	.81	1.17	1.57	1.57	2.39	2.39

CATALOG NUMBERS			
ASSEMBLY	PIN	SPRING	SCREW
MAE 2	MAE 2P	MAE 2S	MAE 2C
MAE 3	MAE 3P	MAE 3S	MAE 3C
MAE 4	MAE 4P	MAE 4S	MAE 4C
MAE 5	MAE 5P	MAE 5S	MAE 5C
MAE 6	MAE 6P	MAE 6S	MAE 6C
MAE 12	MAE 12P	MAE 12S	MAE 12C



Note: Not available on shank diameters of 32mm and above, shoulder and ball lock.

EJECTOR PIN LOCK OUT KIT CAT. NO. MAL 01



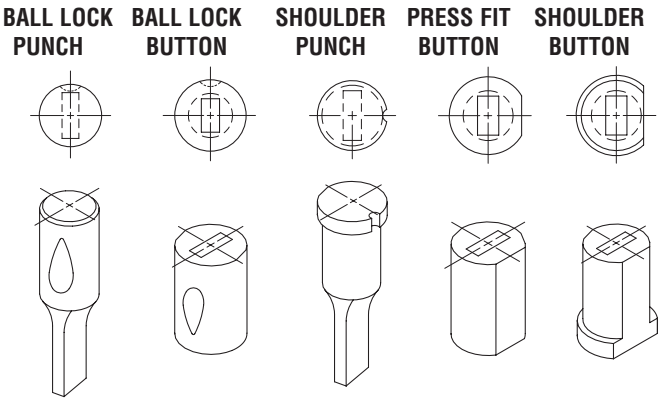
Set includes 12 pcs. of each size.

LOCATING DEVICES

STANDARD LOCATION

Standard ballseat location for all ball lock products is 90°. Standard flat, dowel groove and Windsor Lock location is at 0°. Note: 0° is at 3:00. Alternate no charge locations are 0°, 90°, 180°, 270° (see drawing). To order alternate locations specify locating device type @ _ _ _°.

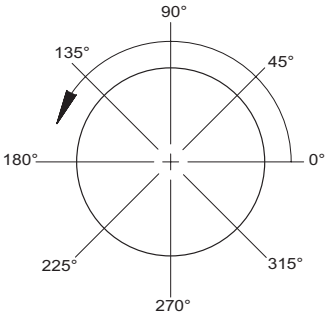
Ball lock punch example: MHR 13-08 P=6.0 W=5.5 B/S @ 0°
Button flat example: MDO25-32 P=13.0 W=10.5 F1@90°



CUSTOM LOCATIONS

Any locating device can be radially positioned by specifying the appropriate device and it's desired angle. The appropriate angle is defined by a counter clockwise rotation from 0°.

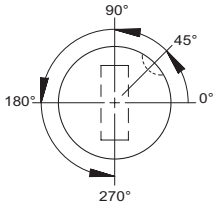
Note: Parts are viewed in die position looking from above the die. Punches are viewed looking through the shanks. Buttons are viewed through top face.



TYPICAL EXAMPLES:

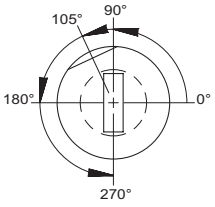
CUSTOM BALL SEAT LOCATION PUNCH

BS@45°

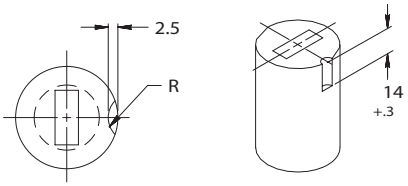


CUSTOM FLAT LOCATION DIE BUTTON

F2@105°



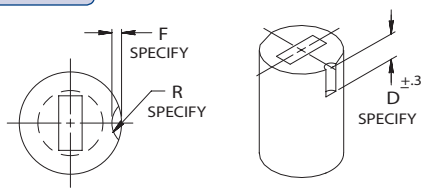
WINDSOR LOCK



W6 6.0 WINDSOR LOCK R = 3.0 RAD

W10 10.0 WINDSOR LOCK R = 5.0 RAD

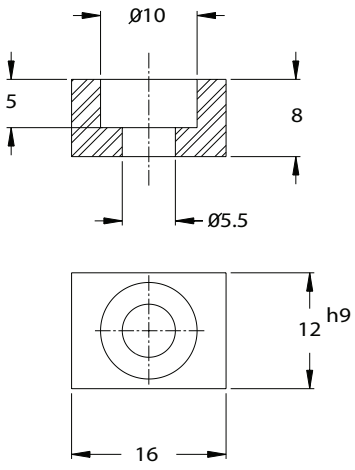
W13 13.0 WINDSOR LOCK R = 6.5 RAD



WX USER DEFINED -
Must specify "F", "R" and "D" dimensions

BUTTON RETENTION KEY

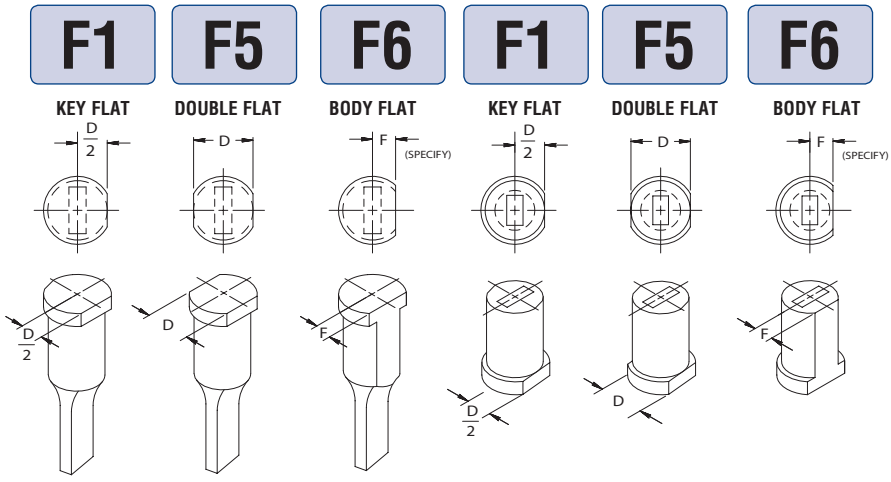
MAK-01



LOCATING DEVICES

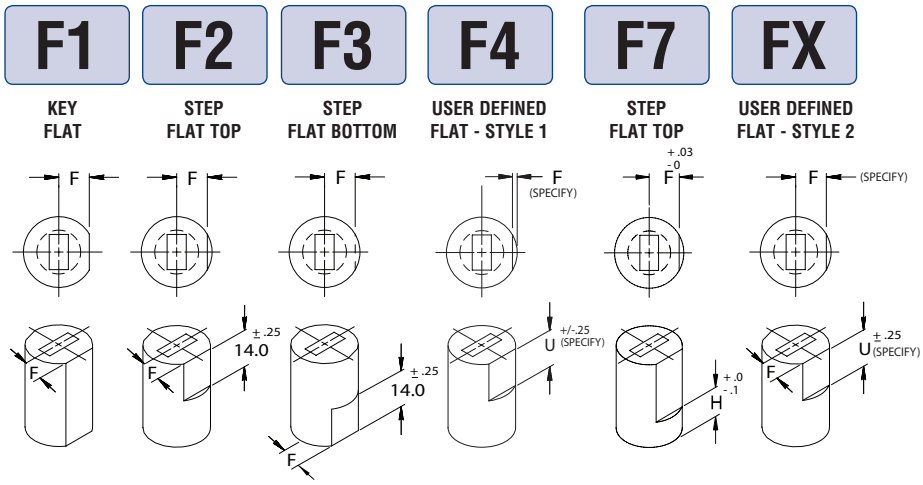
FLATS ON SHOULDER PRODUCTS

F1, F5 are ground flush to shank. F6 is a user defined flat and requires an “F” dimension specified with order. F5 flats are standard 180° apart.



FLATS ON PRESS FIT BUTTONS

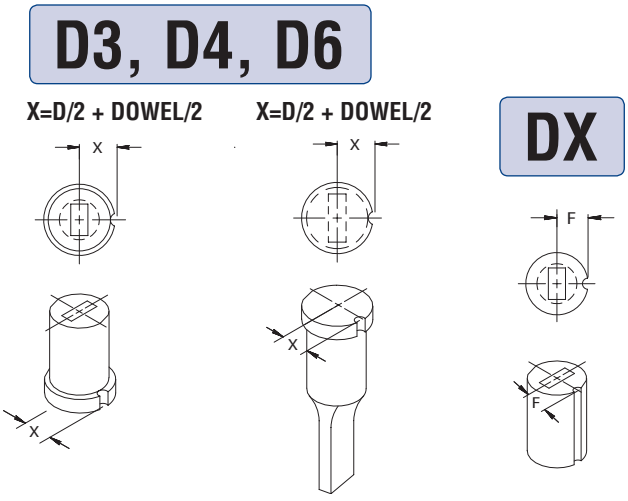
F1 uses “F” dimension as defined in chart, unless an alternate “F” dimension is specified with order. F2, F3 use “F” dimensions as defined in chart. F4, FX are user defined flats and requires “F” and “U” dimension specified with order.



F1, F2, F3		F7	
BODY DIA	“F” +0.02 -0.00	F	H
8	3.5		
10	4.0		
13	5.5	5.0	9
16	7.0	6.5	9
20	8.5	8.5	9
22	9.5		
25	11.0	10.5	16
32	14.0	14.0	16
38	17.0		
40	18.0	18.0	16
45	20.5		
50	23.0	23.0	16
56	26.0		
63	29.5	29.5	16
71	33.5		
76	35.5		
85	40.0		
90	42.5		
100	47.5		

DOWEL GROOVES

D3, D4, D6 are standard 3, 4, 6, dowel grooves. On shoulder products, the groove is positioned tangent to shank. On all other products the dowel is ground to an “F” dimension as shown on chart. DX is a user defined dowel groove and requires an “F” dimension and dowel size specified with the order.



BODY DIAMETER “D”	DX SPECIFY DOWEL “F” DIM	D3 3.0 DOWEL “F” DIM	D4 4.0 DOWEL “F” DIM	D6 6.0 DOWEL “F” DIM
8	SPECIFY	4.7	5.2	6.2
10	SPECIFY	5.5	6.0	7.0
13	SPECIFY	6.7	7.2	8.2
16	SPECIFY	8.0	8.0	9.0
20	SPECIFY	10.0	10.0	11.0
22	SPECIFY	11.0	11.0	12.0
25	SPECIFY	12.5	12.5	13.5
32-UP	SPECIFY	D/2	D/2	D/2

X/F DIMS. + / -.013

STANDARD ALTERATIONS

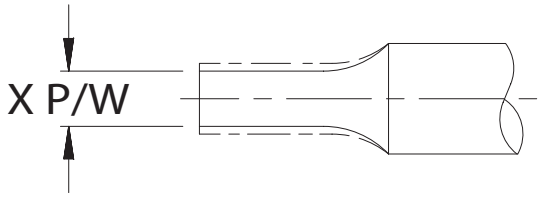
MOELLER™ PRECISION TOOL

XP

XW

OUT OF RANGE PUNCH POINT

Point “P” or “W” dimensions below catalog standard. The minimums (see charts) apply to standard catalog point lengths and overall lengths. Extended B lengths and reduced overall lengths do not apply.



BALL LOCK AND SHOULDER PUNCHES SOLID

MAX S.B.R

SHANK D	MIN P ROUNDS 13	19	25
4	1.20		
5	1.30	1.30	
6	1.40	1.40	1.40
8	1.70	1.70	1.70
10	2.00	2.00	2.00
13	2.50	2.50	2.50
16	3.50	3.50	3.50
20	5.00	5.00	5.00
25	8.00	8.00	8.00
32	12.00	12.00	12.00
40	16.00	16.00	16.00
45	18.00	18.00	18.00
50	23.00	23.00	23.00
56	28.00	28.00	28.00
63	33.00	33.00	33.00

MAX S.B.R

SHANK D	MIN W SHAPES 13	19	25
4	1.20		
5	1.30	1.30	
6	1.40	1.40	
8	1.70	1.70	1.70
10	2.00	2.00	2.00
13	2.50	2.50	2.50
16	3.50	3.50	3.50
20	4.50	4.50	4.50
25	4.50	4.50	4.50
32	5.00	5.00	5.00
40	6.00	6.00	6.00
45	6.00	6.00	6.00
50	8.00	8.00	8.00
56	9.00	9.00	9.00
63	10.00	10.00	10.00

LIGHT DUTY EJECTOR PUNCHES

MAX S.B.R

SHANK D	MIN P ROUNDS 13 63.0 MIN O.A.L.	19 63.0 MIN O.A.L.	25 71.0 MIN O.A.L.
6	2.00		
10	2.70	2.70	
13	3.20	3.20	3.20
16	3.50	3.50	3.50
20	5.00	5.00	5.00
25	8.00	8.00	8.00

MAX S.B.R

SHANK D	MIN W SHAPES 13 63.0 MIN O.A.L.	19 63.0 MIN O.A.L.	25 71.0 MIN O.A.L.
6	2.00		
10	2.70	2.70	
13	3.20	3.20	3.20
16	3.50	3.50	3.50
20	4.00	4.00	4.00
25	5.00	5.00	5.00

HEAVY DUTY EJECTOR PUNCHES

MAX S.B.R

SHANK D	MIN P ROUNDS 13 63.0 MIN O.A.L.	19 63.0 MIN O.A.L.	25 71.0 MIN O.A.L.
10	2.70	2.70	
13	3.20	3.20	3.20
16	3.50	3.50	3.50
20	5.00	5.00	5.00
25	8.00	8.00	8.00
32	12.00	12.00	12.00
40	16.00	16.00	16.00

MAX S.B.R

SHANK D	MIN W SHAPES 13 63.0 MIN O.A.L.	19 63.0 MIN O.A.L.	25 71.0 MIN O.A.L.
10	2.50	2.50	
13	3.20	3.20	3.20
16	3.50	3.50	3.50
20	4.00	4.00	4.00
25	5.00	5.00	5.00
32	6.00	6.00	6.00
40	8.00	8.00	8.00

SHOULDER EJECTOR PUNCHES

MAX S.B.R

SHANK D	MIN P ROUNDS 13 63.0 MIN O.A.L.	19 63.0 MIN O.A.L.	25 71.0 MIN O.A.L.
5	1.60		
6	2.00		
8	3.00	3.00	
10	3.20	3.20	3.20
13	3.20	3.20	3.20
16	4.00	4.00	4.00
20	4.00	4.00	4.00
25	5.00	5.00	5.00
32	6.00	6.00	6.00
40	8.00	8.00	8.00
45	18.00	18.00	18.00
50	23.00	23.00	23.00
56	28.00	28.00	28.00
63	33.00	33.00	33.00

MAX S.B.R

SHANK D	MIN W SHAPES 13 63.0 MIN O.A.L.	19 63.0 MIN O.A.L.	25 71.0 MIN O.A.L.
5	1.60		
6	2.00		
8	3.00	3.00	
10	3.20	3.20	3.20
13	3.20	3.20	3.20
16	4.00	4.00	4.00
20	4.00	4.00	4.00
25	4.50	4.50	4.50
32	5.00	5.00	5.00
40	6.00	6.00	6.00
45	6.00	6.00	6.00
50	8.00	8.00	8.00
56	9.00	9.00	9.00
63	10.00	10.00	10.00

STANDARD ALTERATIONS

MOELLER™ PRECISION TOOL

XP / XW OUT OF RANGE BUTTON DIMENSIONS

Hole "P" or W" dimension above or below catalog standard range (see charts) available on Ultra Life style button only.

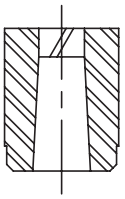
PRESS FIT ULTRA LIFE TAPER RELIEF

CATALOG TYPE	MIN P	MIN W	MAX P/G
MU_08	1.50	1.50	3.60
MU_10	1.60	1.60	5.80
MU_13	1.80	1.80	8.00
MU_16	2.50	2.50	10.00
MU_20	2.80	2.80	13.00
MU_22	3.10	3.10	16.00
MU_25	3.20	3.20	18.50
MU_32	3.20	3.20	22.00
MU_38	3.20	3.20	29.00
MU_40	3.20	3.20	30.00
MU_45	3.20	3.20	34.00
MU_50	3.20	3.20	37.00
MU_56	3.20	3.20	41.00
MU_63	3.20	3.20	47.00
MU_71	3.20	3.20	52.00
MU_76	3.20	3.20	56.00
MU_85	3.20	3.20	62.00
MU_90	3.20	3.20	65.00
MU_100	3.20	3.20	73.00

SHOULDER ULTRA LIFE TAPER RELIEF

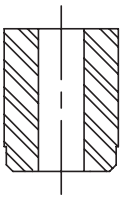
CATALOG TYPE	MIN P	MIN W	MAX P/G
MM_08	1.50	1.50	3.60
MM_10	1.60	1.60	5.80
MM_13	1.80	1.80	8.00
MM_16	2.50	2.50	10.00
MM_20	2.80	2.80	13.00
MM_22	3.10	3.10	16.00
MM_25	3.20	3.20	18.50
MM_32	3.20	3.20	22.00
MM_38	3.20	3.20	29.00
MM_40	3.20	3.20	30.00
MM_45	3.20	3.20	34.00

XS SLUG CONTROL ALTERATION



NOTE: Advise material thickness and die clearance, per side at time of order.

XR

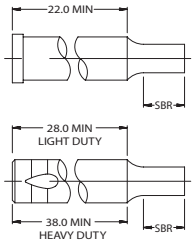


Button round or shape/I.D. through hole no relief

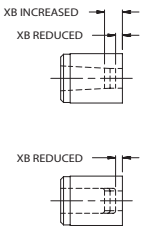
ALTERED POINT LENGTH OR LAND DIMENSION

This is a customer specific alteration and a dimension must be supplied.

XBR



XB



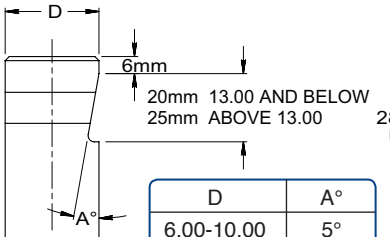
AE AIR EJECTOR APPLICATION

Filled cross pin hole with no ejector components.

W1 WHISTLE NOTCH

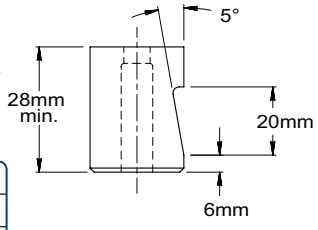
NOTE:
For light-duty punches only

PUNCHES

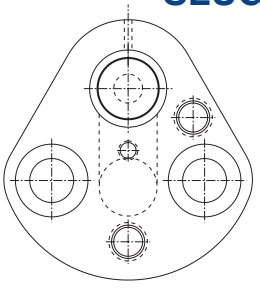


D	A°
6.00-10.00	5°
13.00	7.50°
16.00-40.00	10°

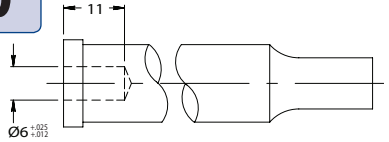
BUTTONS



SR OPEN IN-LINE DOWEL FOR SLUG RELIEF



CD CENTER DOWEL



NOTE: SEE PAGES 27-29 FOR CENTER DOWEL PRODUCTS. Available on all length shoulder punches in diameters of 10mm through 40mm. Available on 70mm or longer ejector style shoulder punches in diameters of 10mm through 40mm.

SD SYMMETRICAL RETAINER DOWEL

GB BALL SEAT

BALL SEAT
GRIND CHARGE

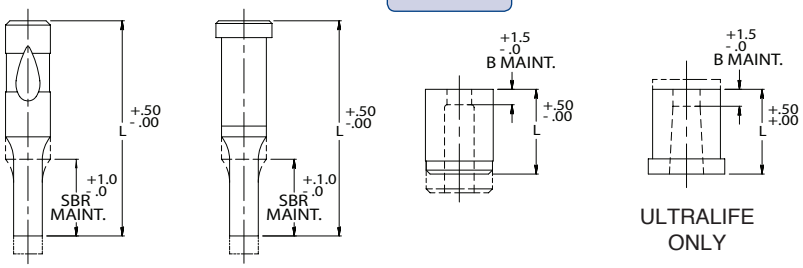
NOTE: Specify a radial location if a double ballseat is required.

STANDARD ALTERATIONS

OVERALL LENGTH REDUCTIONS

Reduces punch or button length maintaining “B” point or land length. Not available in counter bore style on shoulder or ball lock buttons.

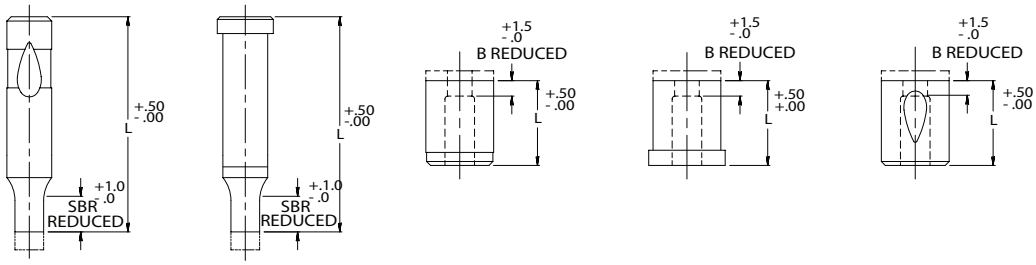
X1



ULTRALIFE ONLY

X2

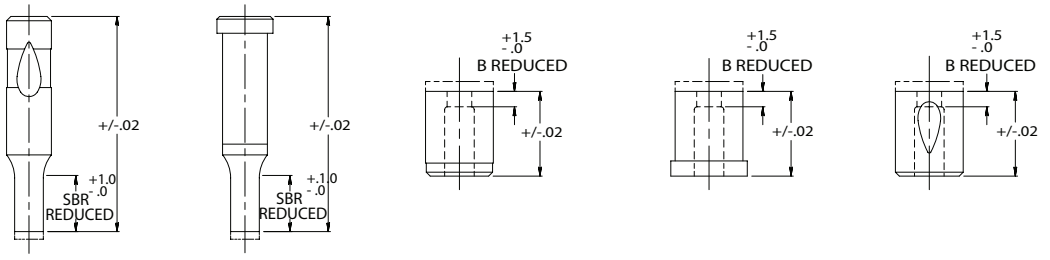
Reduces punch or button length but also reduces “B” dimension or land length.



X3

Provides a precision overall length of +/-.02

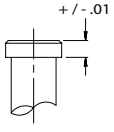
Note: .5 maximum stock removal



HEAD ALTERATIONS

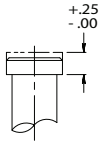
X4

Provides a precision head length but reduces overall length



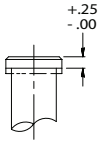
X5

Reduces head length but reduces overall length



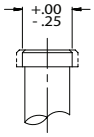
X6

Reduces head length while maintaining overall length



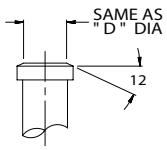
X7

Reduces head diameter



X8

Angle on head face to improve strength

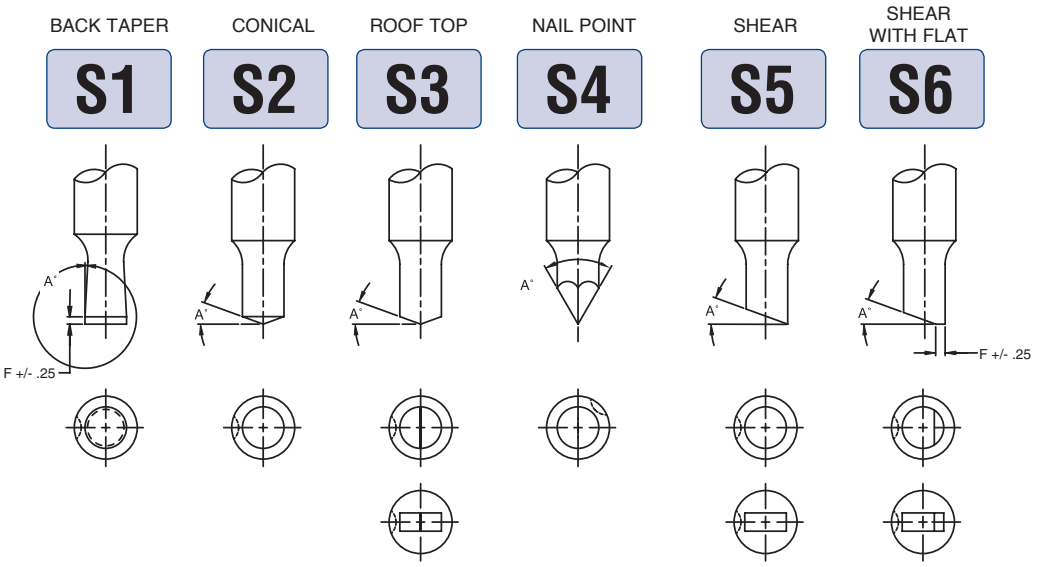


SPECIAL ALTERATIONS

SHEAR ANGLES

Angle “A” and dimension “F” are user defined and must be specified with order.

STANDARD LOCATION DEVICES:
Standard Ball Seat location as shown.
Shoulder Flat location counter clockwise 90°.

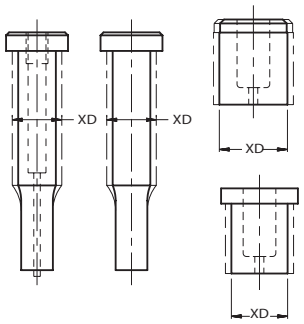


XD REDUCTION OF SHANK DIMENSION

Reduce shank to customer specific size. Does not alter head diameter.

Example: MDO 20-32
P=10.0, W=5.0, XD=19.0

BODY	5	6	8	10	13	16	20	22	25	32	38	40
PUNCH SOLID MIN D	3.5	5.0	6.5	8.5	11.5	14.5	18.5		23.5	30.5		38.5
PUNCH EJECTOR MIN D	4.5	5.0	6.8	9.0	11.5	14.5	18.5		23.5	30.5		38.5
BUTTON MIN D			6.5	8.5	11.5	14.5	18.5	20.5	23.0	30.0	36.0	38.0

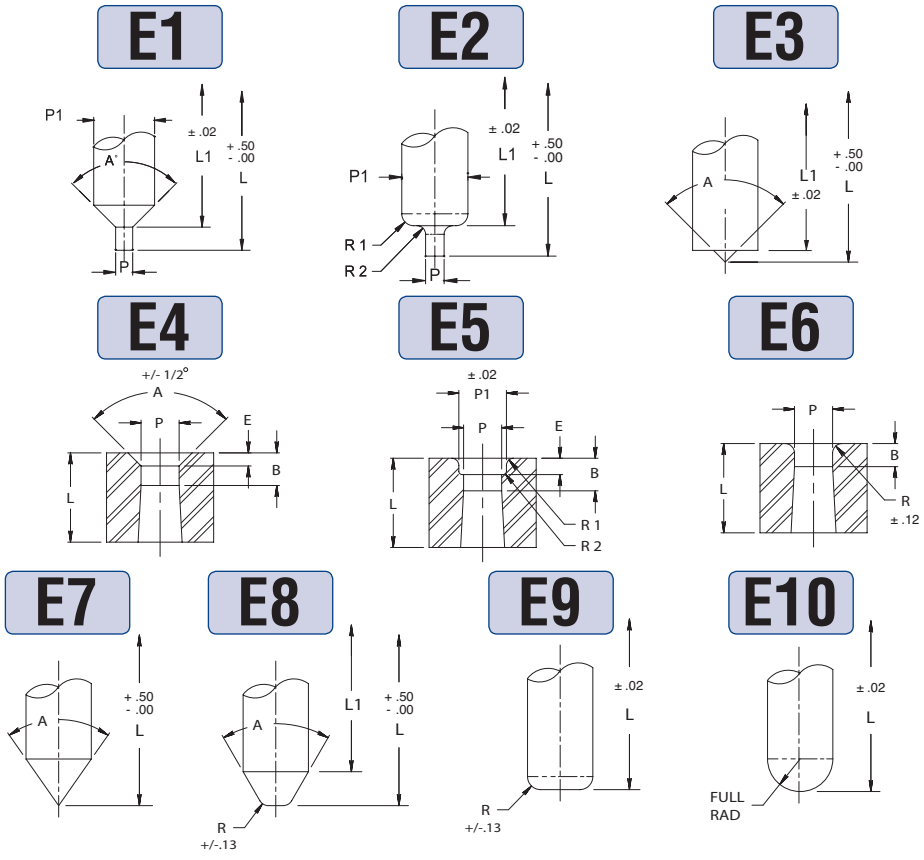


EXTRUSION TOOLS

How precise L1 and E dimensions need to be is application specific. Please specify tolerance with order.

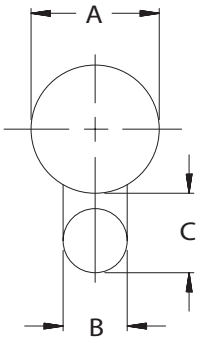
For a precision “L” dimension add alteration code X3.

For strength, all extrusion buttons are produced in the “Ultralife” style.



BALL LOCK RETAINER SPACE REQUIREMENTS

True-Set Style Ball Lock Space Requirements



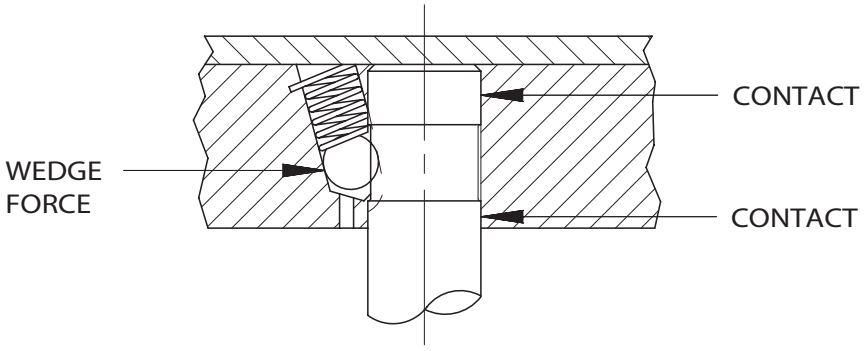
DIE BUTTON AND LIGHT-DUTY PUNCH - TRUE-SET STYLE FOR PIERCING STOCK UP TO 3.0			HEAVY-DUTY PUNCH - TRUE-SET STYLE FOR PIERCING STOCK UP TO 10.0		
DIA. PUNCH SHANK OR DIE BUTTON O.D. A	BALL DIA. B	CLEARANCE C	DIA. PUNCH SHANK A	BALL DIA. B	CLEARANCE C
6	6.0	11.4	10	10.0	15.7
10	8.0	12.9	13	12.0	18.4
13	8.0	12.9	16	12.0	18.4
16	8.0	12.9	20	12.0	18.4
20	8.0	12.9	25	12.0	18.4
25	8.0	12.9	32	12.0	18.4
32	8.0	12.9	40	12.0	18.4
38	8.0	12.9			

Backing Plate Style Ball Lock Space Requirements

DIE BUTTON AND LIGHT-DUTY PUNCH FOR PIERCING STOCK UP TO 3.0			HEAVY-DUTY PUNCH FOR PIERCING STOCK UP TO 10.0		
DIA. PUNCH SHANK OR DIE BUTTON O.D. A	BALL DIA. B	CLEARANCE C	DIA. PUNCH SHANK A	BALL DIA. B	CLEARANCE C
6	6.0	10.0	10	10.0	13.0
10	8.0	11.0	13	12.0	15.0
13	8.0	11.0	16	12.0	15.0
16	8.0	11.0	20	12.0	15.0
20	8.0	11.0	25	12.0	15.0
25	8.0	11.0	32	12.0	15.0
32	8.0	11.0	40	12.0	15.0
38	8.0	11.0			

Body Band Ball Relief

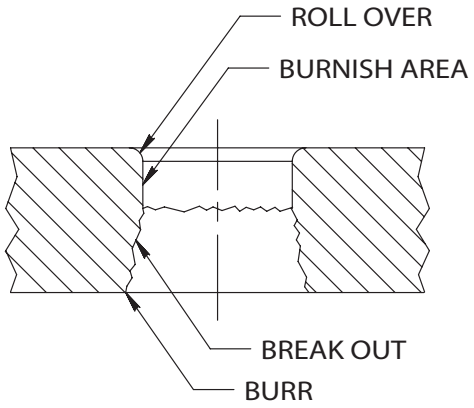
Moeller incorporates a body band ball relief on all ball lock punches. This type of relief facilitates a rounder shank diameter, thusly improving the "fit" between the tool and its mating retainer. When centerless grinding, the interruption of contact caused by the ball-seat, generates a slight "hump" 180° opposite the ball-seat. Moeller's process includes grinding or precision turning the ball-relief area, thusly removing this out of round condition. This band relief also produces a balanced three point contact condition, improving the punches stability while in die position (see illustration).



TECHNICAL TOPICS

Punch & Die Clearances

Clearance between punch and die is based upon type of material being stamped, material thickness, finish requirement of hole and anticipated tool life. It is expressed as a total percentage of material thickness being stamped. It is important to remember that the punch determines hole size and the die determines slug size. As a rule, optimal clearance provides flat, sharp and clean punching with minimum tool load. Insufficient clearance results in minimum burr and rollover, but tool life is shortened due to high tool loads. Excessive clearance results in deformation and larger rollover but increased tool life. Below are some general guidelines for different types of material being stamped. The values shown are recommended total die clearance for general purpose holes using non-ejector punches. By doubling the amount of clearance and using ejector punches, anticipated tool life will be greatly increased. Most of the punch wear is produced by stripping forces when the punch is being withdrawn. The increased clearance by using ejector punches helps keep tool wear to a minimum.



Suggested Die Clearance

Material	Soft	Hard
Aluminum	10%	20%
Brass/Copper	6%	15%
Steel (Low Carbon)	10%	12%
Steel (High Carbon)	18%	20%

Suggested Surface Treatment Applications

	FORMING & EXTRUDING					PIERCING & TRIMMING			
	Draw/Flange	Extruding	Forging	Hot Forming	Coin/Emboss	Pierce & Trim	Hot Stamping	Fine Blanking	Shave/Lance
Non-alloyed Steel	TAN	TAN MWU* ACD	TAN MWU* ACD	TAN MWU* ACD	TCN TAN MWE MTN	TAN ACN	ACN TAN TCN	TCN ACN ACA	TCN ACN
Steel < 250 Mpa	TIN TCN	ACN MWU* ACD MWE MTN			TCN MWN MWE MTD	TIN TCN		TIN ACN	TIN TCN ACN
Steel < 400 Mpa	TCN ACN	ACN MWU*			TCN ACN	ACN MWU* ACA		TAN ACN	TAN TCN ACN
High Strength Steels	TCN ACN	ACN TCN TAN		ACN MWU* ACD	TCN ACN MWU*	ACN MWU* ACA	ACN TCN MWU* ACA	TAN ACN	TAN ACN
Aluminum**	HCB DLC	HCB DLC	HCB MWU* ACD		HCB DLC TCN	HCB DLC		HCB DLC	HCB DLC
Stainless Steels	TCN ACN MWU* FMP ACD	TCN ACN MWU* FMP ACD	TCN ACN MWU* FMP ACD		TCN MWU* ACD	ACN TCN MWU* ACA MSP		ACN TCN	ACN TCN
Brass/Bronze/Copper	CRN ACD	CRN MWU* ACD	CRN MWU* ACD		CRN MWU* ACD	CRN ACN TAN		CRN ACN TAN	CRN ACN TAN

** M-Wear Ultra includes Moeller's Enhanced Surface Finish ** Moeller Enhanced Surface Finish is recommended for all aluminum applications*

TIN - TiN
TCN - TiCN
TAN - TiAlN
ACN - Alcronoa Pro
ACD- Alcrona Pro Duplex
ACA - Alcrona Pro Advanced
FMP - Formera Plus
MST - MoST
CRN - CrN
DLC - a-C:H
HCB - Hard Carbon
MWU* - M-Wear Ultra
MSP - Moeller Special Process
MWN - M-Wear
MWE - M-Wear Extreme
LAP - M-LAP
MTN - M-Tride
ESF - Enhanced Surface Finish
EGB - Edge Break
CDF - Cryogenic Deep Freeze

Note: Please reference the Moeller Performance Enhancement Coatings Brochure for additional surface treatments.

PERFORMANCE ENHANCEMENT COATINGS

MOELLER™ PRECISION TOOL

TiN – Titanium Nitride

Alteration Order Code: TIN • *Add 3 days to Delivery*

TiN is the least expensive and most commonly used PVD, wear resistant, coating.

Technical Information:

Thickness 2-4µ
Hardness 2300HV
Coefficient of Friction ~0.6
Max. Service Temp. 600°C/1112°F

- Improved wear resistance on cutting edges and wear surfaces
- Improved lubricity for a reduction of adhesive wear
- Suitable thermal stability for most cold work metalworking applications

Note: TiN should be reserved for light stamping operations with use of stamping lubricants, and is not compatible for use with stainless steel, nickel, or copper applications.

TiCN – Titanium CarboNitride

Alteration Order Code: TCN • *Add 3 days to Delivery*

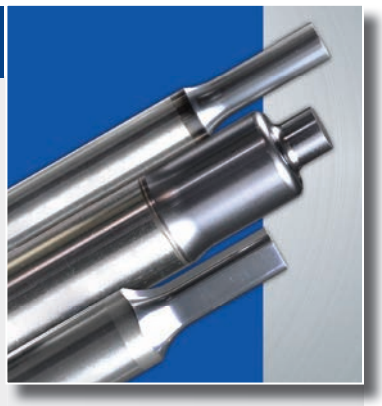
TiCN has a broad range of applications, including piercing and forming of carbon and stainless steels, nickel and copper.

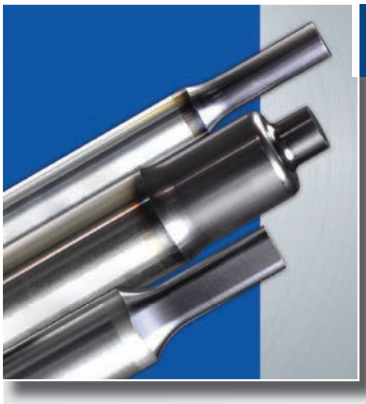
Technical Information:

Thickness 2-4µ
Hardness 3000HV
Coefficient of Friction ~0.4
Max. Service Temp. 400°C/752°F

- High wear resistance on cutting edges and wear surfaces
- Excellent toughness for high pressure applications
- Provides improved lubricity over TiN
- High micro hardness of 3000HV

Note: TiCN is suitable for forming and piercing both ferritic and austenitic stainless steel, but will perform better when forming. TiCN is also suitable for nickel and copper applications.





TiAlN - Titanium Aluminum Nitride

Alteration Order Code: TAN • *Add 3 days to Delivery*

TiAlN provides excellent protection against wear on cutting edges in applications where surface heat is generated.

Technical Information:

Thickness 3-6µ
Hardness 3400HV
Coefficient of Friction 0.3-0.35
Max. Service Temp. 900°C/1652°F

- Excellent protection against abrasive wear
- Can be used with minimum lubrication
- Ideal for high heat applications, and highly stressed components
- Excellent for medium strength steels
- Allows increased press stroke speed

Alcrona Pro™ – Aluminum Chromium Nitride Based

Alteration Order Code: ACN • *Add 3 days to Delivery*

Oerlikon Blazers Alcrona Pro provides excellent all-around performance, thermal stability, and low coefficient of friction, for most piercing and forming applications, including high-strength steels

Technical Information:

Thickness 2-5µ
Hardness 3200HV
Coefficient of Friction ~0.35
Max. Service Temp. 1,100°C/2012°F

- Recommended for piercing and forming high-strength steels
- Excellent for hot stamping applications and applications which introduce thermal shock
- Exceptionally low coefficient of friction
- Extraordinarily high wear resistance and thermal stability
- Excellent for applications with high mechanical loads
- Allows increased press stroke speeds

PERFORMANCE ENHANCEMENT COATINGS

MOELLER™ PRECISION TOOL

Oerlikon Balzers Alcrona Pro Advanced

Alteration Code: ACA • *Add 7 days to Delivery*

Oerlikon Balzers Alcrona Pro Advanced combines the benefits of Alcrona Pro with "Advanced" thin-layer nitride technology to provide increased tool life over Alcrona Pro for tough piercing applications.

Technical Information:

Thickness 2-5µ
Nitride Case Depth Approx. 30µ
Hardness 3200HV
Coefficient of Friction ~0.35
Max. Service Temp. 1,100°C/2012°F

- Thin nitride layer provides excellent toughness for piercing application
- Exceptionally low coefficient of friction
- Extraordinarily high toughness, wear resistance, and thermal stability

Oerlikon Balzers Alcrona Pro Duplex

Alteration Code: ACD • *Add 5 days to Delivery*

Oerlikon Balzers Alcrona Pro Duplex combines the benefits of Alcrona Pro with "Duplex" deep-layer nitride technology to provide increased tool life over Alcrona Pro for tough forming applications.

Technical Information:

Thickness 2-5µ
Nitride Case Depth Approx. 200µ
Hardness 3200HV
Coefficient of Friction ~0.35
Max. Service Temp. 1,100°C/2012°F

- Deep nitride layer provides excellent toughness for forming application
- Exceptionally low coefficient of friction
- Extraordinarily high wear resistance and thermal stability

Oerlikon Balzers Formera Plus

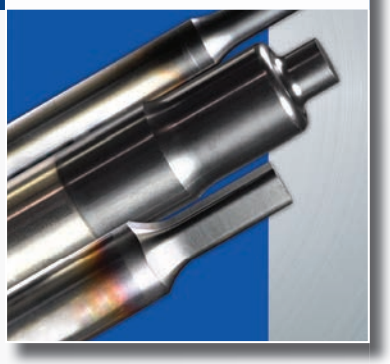
Alteration Code: FMP • *Add 3 days to Delivery*

Technical Information:

Thickness 6.5-8u
Nitride Case Depth Approx..003"-.004"
Hardness 3000HV
Coefficient of Friction 0.35
Max. Service Temp. 900°+C/1652°+F

- Works excellent on any draw application of steel or stainless part material
- Duplex nitride process is applied prior to Formera Plus
- Superior to any other coatings available on AHSS Forming Applications up to 1180DP
- Works excellent on all Stainless Steel forming applications–exception 409 stainless

MoST™ – Titanium CarboNitride with Molybdenum Disulfide



Alteration Order Code: MST • *Add 10 days to Delivery*

MoST is a two layer coating that reduces operating friction and galling through the use of a very lubricious top layer, which is idea for pre-painted and plated materials

Technical Information:

Thickness 3-5µ
Hardness TiCN layer 3000HV MoST layer 2000HV
Coefficient of Friction 0.06
Max. Service Temp. 500°C/932°F

- Extremely high lubricity
- Ideal for pre-painted and plated materials

PERFORMANCE ENHANCEMENT COATINGS

MOELLER™ PRECISION TOOL

CrN – Chromium Nitride

Alteration Code: CRN • *Add 5 days to Delivery*

Chromium Nitride is an excellent substitute for applications where hard chrome is preferred, but is significantly harder, has better coating adhesion. Chromium Nitride is foodstuff-neutral.

Technical Information:

Thickness 2-5µ
Hardness 2000HV
Coefficient of Friction ~0.5
Max. Service Temp. 700°C/1292°F

- Superior substitute to hard chrome
- Very high coating adhesion and hardness
- Excellent for forming low strength steels and copper
- Resistant to corrosion and aggressive chemicals

COATINGS FOR ALUMINUM APPLICATIONS

DLC – Diamond Like Carbon (a-C:H)

Alteration Code: DLC • *Add 10 days to Delivery*

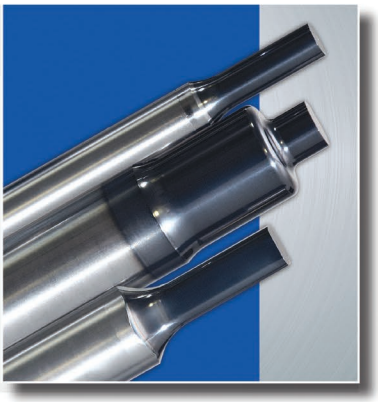
Diamond-Like coatings are perfectly suited for applications that incur the most extreme wear and galling, such as when piercing and forming todays most advanced aluminums

Technical Information:

Thickness 1-3µ
Hardness 2500HV
Coefficient of Friction 0.1-0.2
Max. Service Temp. 300°C/572°F

- Excellent for piercing and forming aluminum
- Superior resistance to abrasive wear and galling
- Superior coefficient of friction

Note: DLC performs best when combined with "pre and post polish"



Oerlkon Balzers Hard Carbon (ta-C)

Alteration Code: HCB • *Add 5 days to Delivery*

Oerlikon Balzers Hard Carbon is the premier coatings for piercing and forming aluminum, as well as other non-ferrous materials, such as copper and plastics.

Technical Information:

Thickness 1-2µ
Hardness 5000HV
Coefficient of Friction 0.15
Max. Service Temp. 500°C/932°F

- The ultimate solution for piercing and forming aluminum, and other non-ferrous materials
- Extreme protection against abrasive wear and galling
- Smooth coating surface provides a low coefficient of friction
- Retains sharp cutting edges
- High thermal stability

MOELLER EXCLUSIVE MULTI-PART SURFACE TREATMENTS

M-WEAR ULTRA

Alteration Code: MWU • *Add 7 days to Delivery*

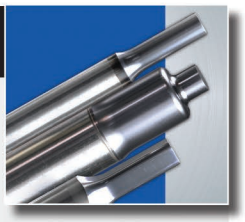
Moeller exclusive tooling solution combines multi-part surface treatments and advanced coating technology to meet the demands of today's toughest piercing and forming applications.

- Tailored to both piercing and forming applications
- High wear resistance for increased tool life
- Resists fatigue due to increased toughness
- Superior finish reduces the coefficient of friction
- Proven to increase tool life up to five times in high strength and stainless applications

PERFORMANCE ENHANCEMENT COATINGS

MOELLER™ PRECISION TOOL

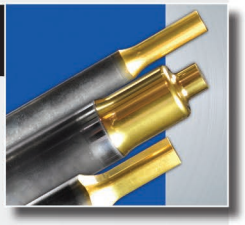
MSP – Moeller Special Process with TiCN



Alteration Code: MSP • *Add 5 days to Delivery*
Moeller Special Process (MSP) offers the ultimate in cutting edge longevity and resistance to galling, while providing the benefits of TiCN coating

- Superior Surface finish provides increased lubricity and resistance to galling
- Treatment to cutting edge increases cutting edge longevity

M-Wear

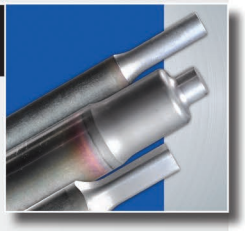


Alteration Code: MWN • *Add 7 days to Delivery*
This dual process surface treatment and coating provides a hard top coating on top of a less hard, but very tough surface treatment

- Beneficial for extruding and forming applications
- Helps distribute stress and load applied to small areas of the tool

Note: Use of stamping lubricants is recommended with M-Wear. M-Wear is not compatible with stainless steels, nickel, or copper.

M-Wear Extreme



Alteration Code: MWE • *Add 7 days to Delivery*
M-Wear Extreme is similar to M-Wear, but has a lower coefficient of friction and higher wear resistance.

- Beneficial for extruding and forming applications
- Helps distribute stress and load applied to small areas of the tool
- Improved coefficient of friction over Moeller M-Wear
- Suitable for stainless, nickel, and copper applications

SURFACE FINISH UPGRADES

Enhanced Surface Finish

Alteration Code: ESF • *Add 2 days to Delivery*
Available as a stand alone alteration, or in combination with any of our performance enhancement coatings, Moeller's team of polishing experts will improve the working surfaces of punch points and extrusion buttons to 6 Ra or better, which reduces galling by improving the coefficient of friction.

M-Lap

Alteration Code: LAP • *Add 1 day to Delivery*
Moeller M-Lap uses a unique media that includes diamond particles to polish even the most irregular surfaces and hard to reach areas.

- Enhances durability of pierce and forming tools
- Uniform surface finishing without misshaping, or marring
- Provides improved finish and increased adhesion for PVD/CVD coatings
- Virtually no material is removed allowing tight tolerance to be held consistently

SURFACE AND EDGE ENHANCEMENTS

MTN – M-Tride – Nitride

Alteration Code: MTN • *Add 5 days to Delivery*
M-Tride is a case hardening surface treatment that is applied to all outer surfaces of the tool.

- Provides a tough outer layer
- Increases surface hardness by approximately 10 points HRC
- Ideal for die buttons with internal features that are difficult to coat using the PVD line of sight process

Edge Break

Alteration Code: EDG • *Add 1 day to Delivery*
Adds a small edge break to the cutting edge of pierce tools to prevent premature breakdown

- Prevents premature breakdown of the cutting edge on pierce punches

Cryogenic Deep Freeze

Alteration Code: CDF • *Add 2 days to Delivery*
This process is an effective way to achieve optimum toughness and dimensional stability, even when exposed to up to fifty degrees Fahrenheit above the steels original tempering temperature

MOELLER™
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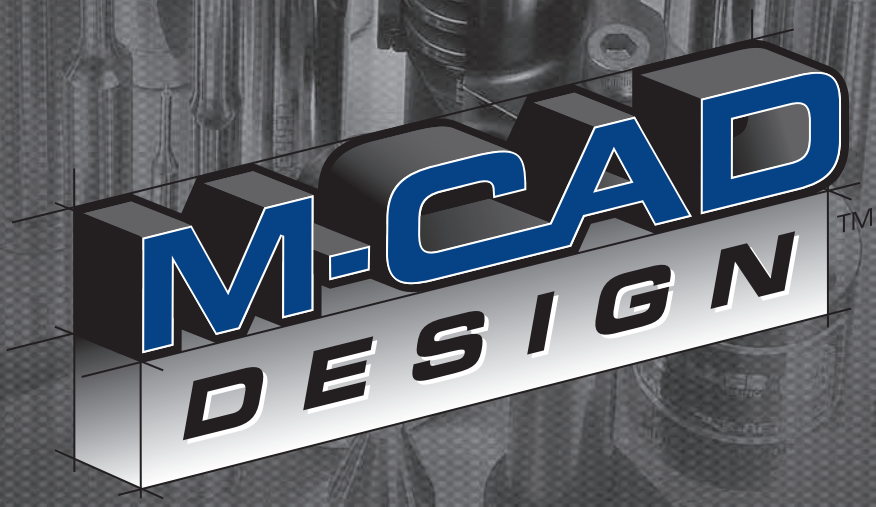

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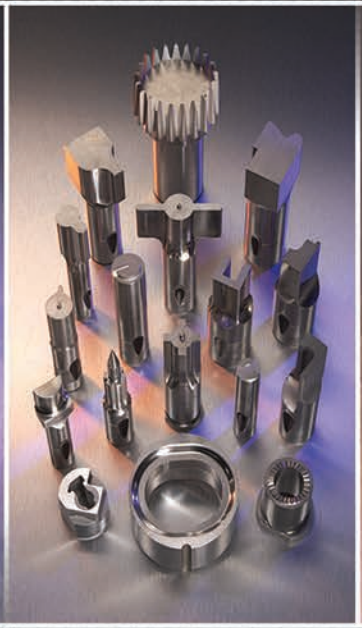

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