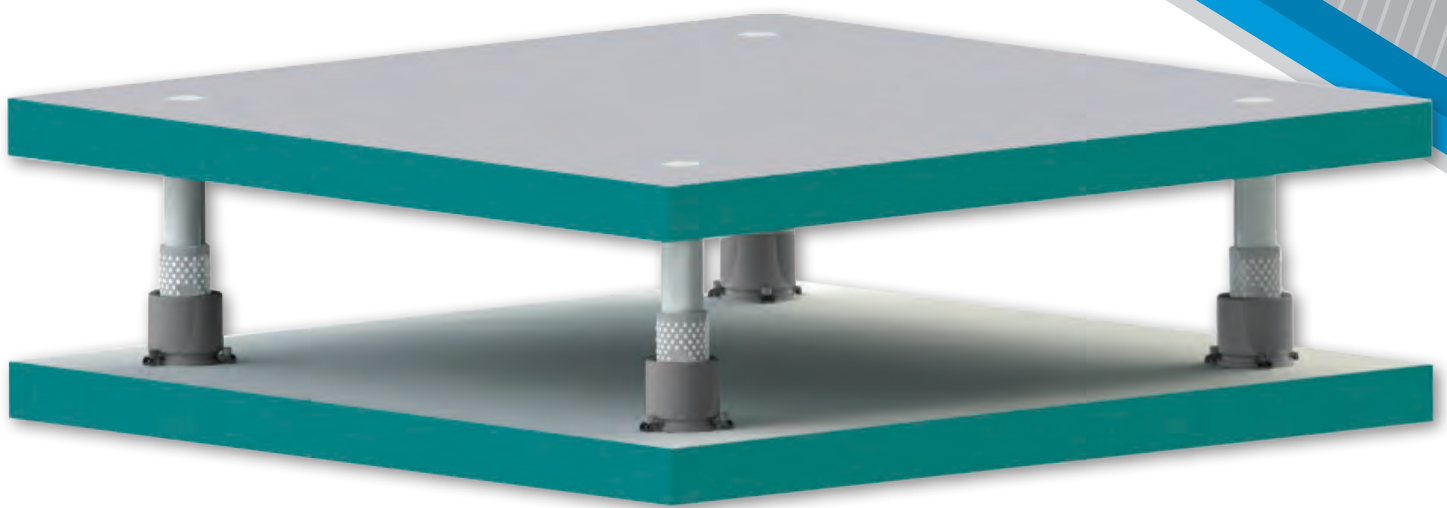




TYPE D DIE SETS





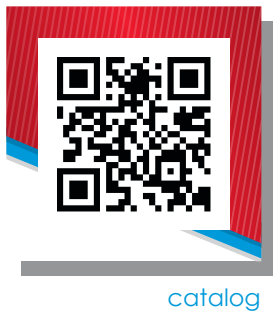
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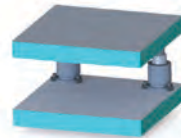
Finish your product configuration



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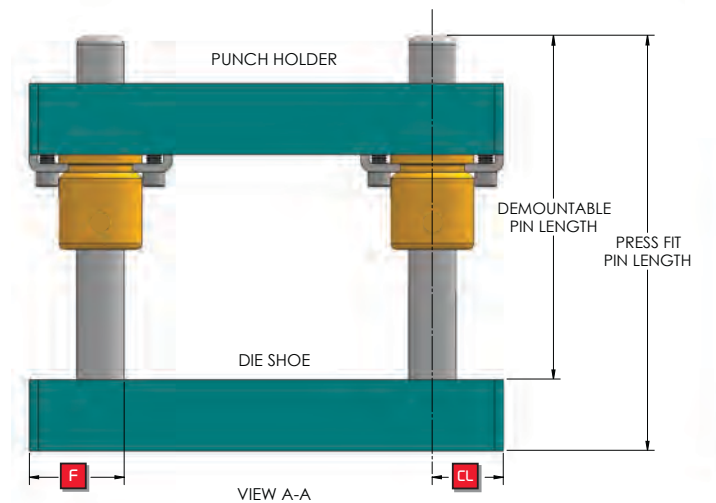
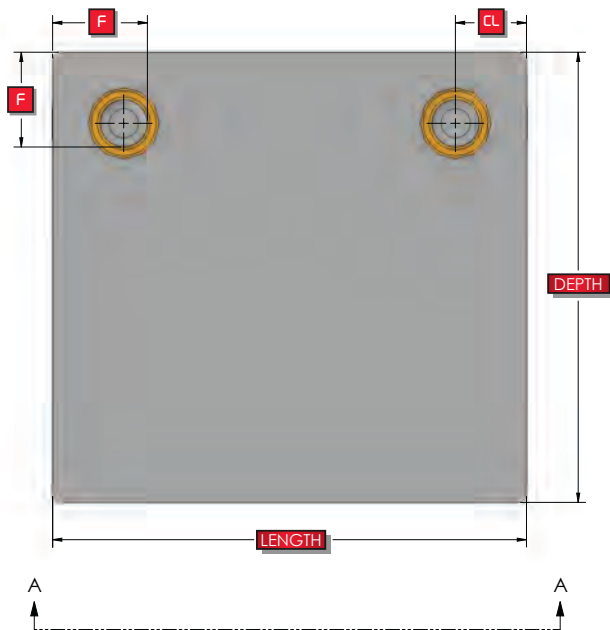
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STYLE 25 D DIE SET

Superior Style 25 D Two-Pin Rectangular Die Sets have guide pins located to the rear, an ideal design for progressive dies. With stock flow from one side in front of the pins, this style affords maximum work area. Left to Right feed (System LR) bushing clamp locations are standard. Style 25 D die sets are available in friction or ball bearing types.



STANDARD PIN LOCATION - FRICTION BEARING

PIN DIA.	1	1¼	1½	1¾	2	2½	3
F	2	2¼	2½	2¾	3	3¾	4¼
CL	1½	1⅝	1¾	1⅞	2	2½	2¾

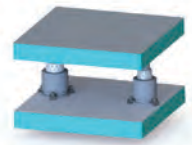
STANDARD PIN LOCATION - FRICTION BEARING - METRIC

PIN DIA.	24/25mm	30/32mm	38/40mm	48/50mm	63mm	80mm
F	50,80	57,15	63,50	76,20	95,25	107,95
CL	38,10	41,28	44,45	50,80	63,50	69,85

WHEN ORDERING PLEASE SPECIFY:

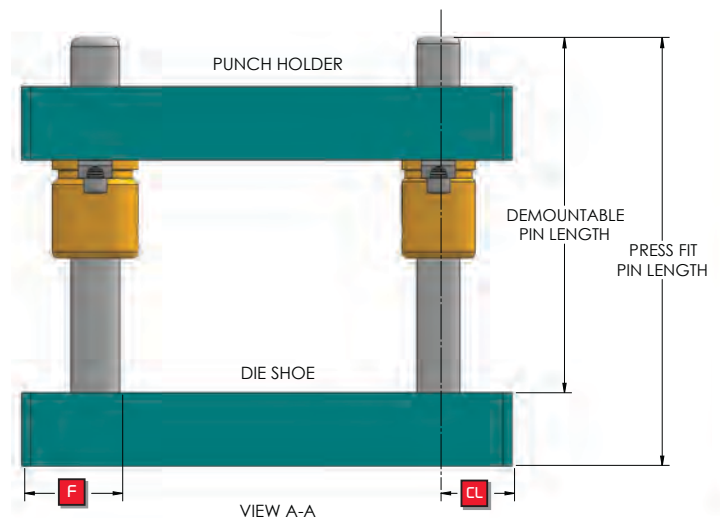
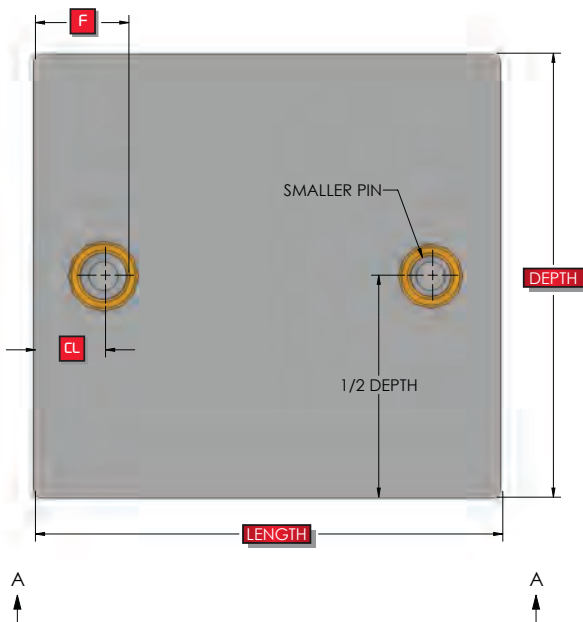
1. Style 25 D, Friction or Ball Bearing
2. Quantity
3. Punch Holder (PH)
Thickness Depth Length
4. Die Shoe (DS)
Thickness Depth Length
5. Pin Type and Size
6. Bushing Type and Size
(2" Steel Shoulder Standard)
7. Shank Type and Size (if required)
8. For Ball Bearing Die Set Information,
See Page 7245

NOTE: Optional shank is located in center of work area
All punch holder and die shoes stamped MC
"Matched Corner" regardless of pin location.



STYLE 35 D DIE SET

Superior Style 35 D Two-Pin Rectangular Die Sets have guide pins located to the centerline of the depth dimensions. Work area is centered between the pins and stock flow is usually front to back. Style 35 D Die Sets are furnished with guide pins of differing diameters to prevent reversing of the plates during assembly. Front to Back feed (System FB) bushing clamp locations are standard. Style 35 D die sets are available in friction or ball bearing types.



STANDARD PIN LOCATION - FRICTION BEARING

PIN DIA.	1	1¼	1½	1¾	2	2½	3
F	2	2¼	2½	2¾	3	3¾	4¼
CL	1½	1⅝	1¾	1⅞	2	2½	2¾

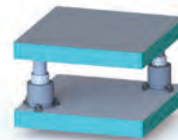
STANDARD PIN LOCATION - FRICTION BEARING - METRIC

PIN DIA.	24/25mm	30/32mm	38/ 40mm	48/50mm	63mm	80mm
F	50,80	57,15	63,50	76,20	95,25	107,95
CL	38,10	41,28	44,45	50,80	63,50	69,85

WHEN ORDERING PLEASE SPECIFY:

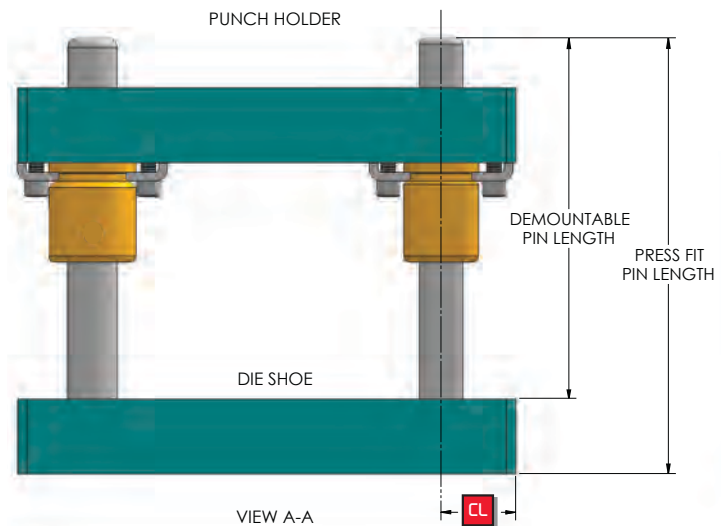
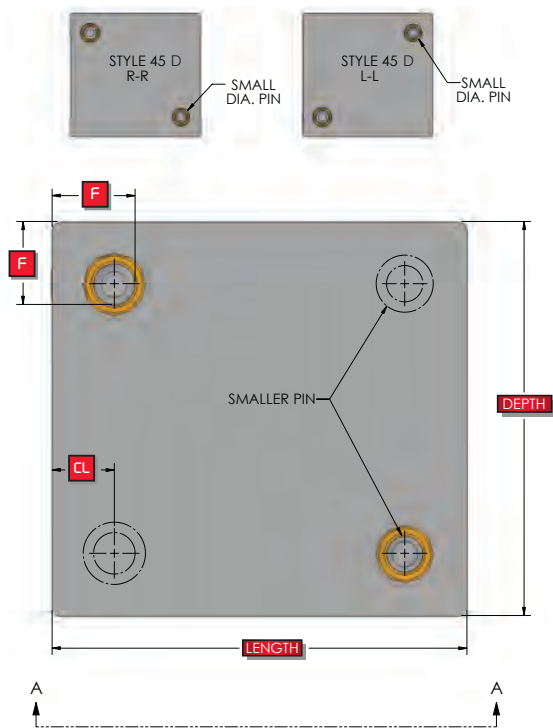
1. Style 35 D, Friction or Ball Bearing
2. Quantity
3. Punch Holder (PH)
Thickness Depth Length
4. Die Shoe (DS)
Thickness Depth Length
5. Pin Type and Size
6. Bushing Type and Size
(2" Steel Shoulder Standard)
7. Shank Type and Size (if required)
8. For Ball Bearing Die Set Information,
See Page 7245

NOTE: Optional shank is located in center of work area
All punch holder and die shoes stamped MC
"Matched Corner" regardless of pin location.



STYLE 45 D DIE SET

Superior Style 45 D Two-Pin Rectangular Die Sets have guide pins located diagonally opposite at positions "RR" or "LL" (see below). Style 45 D Die Sets are furnished with guide pins of differing diameters to prevent reversing of the plates during assembly. Left to Right feed (System LR) bushing clamp locations is standard. Style 45 D die sets are available in friction or ball bearing types.



STANDARD PIN LOCATION - FRICTION BEARING

PIN DIA.	1	1¼	1½	1¾	2	2½	3
F	2	2¼	2½	2¾	3	3¾	4¼
CL	1½	1⅝	1¾	1⅞	2	2½	2¾

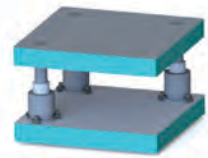
STANDARD PIN LOCATION - FRICTION BEARING - METRIC

PIN DIA.	24/25mm	30/32mm	38/40mm	48/50mm	63mm	80mm
F	50,80	57,15	63,50	76,20	95,25	107,95
CL	38,10	41,28	44,45	50,80	63,50	69,85

NOTE: Optional shank is located in center of work area
All punch holder and die shoes stamped MC
"Matched Corner" regardless of pin location.

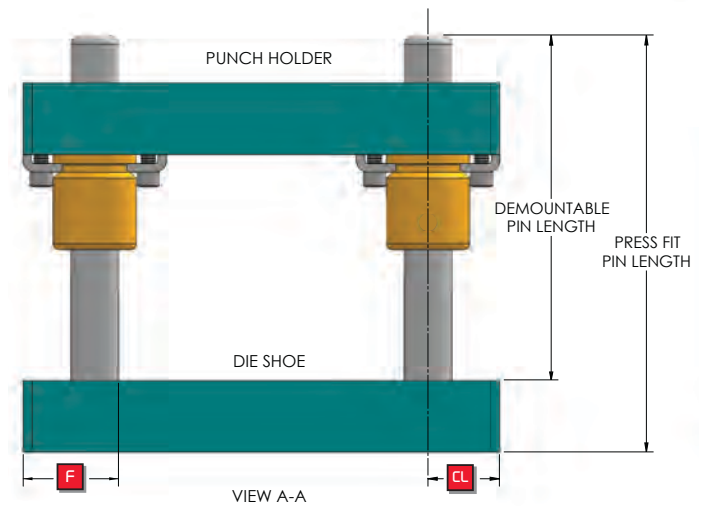
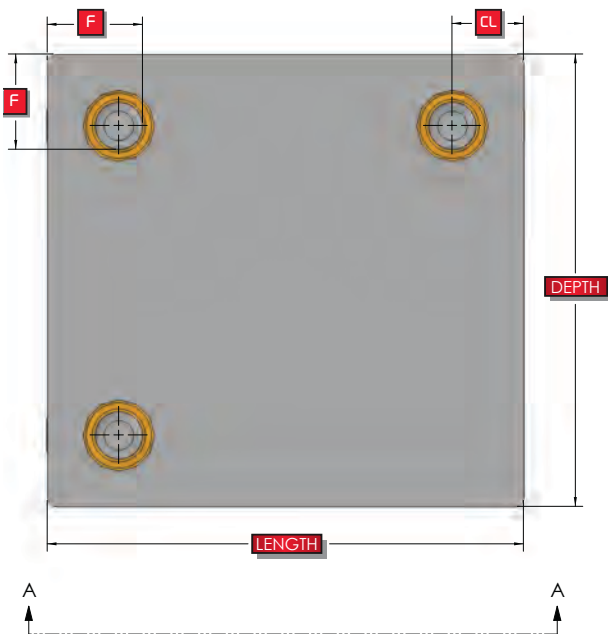
WHEN ORDERING PLEASE SPECIFY:

1. Style 45 D, Friction or Ball Bearing
2. Quantity
3. Punch Holder (PH)
Thickness Depth Length
4. Die Shoe (DS)
Thickness Depth Length
5. Pin Type and Size
6. Pin Configuration (RR or LL)
7. Bushing Type and Material
(2" Steel Shoulder Standard)
8. Shank Type and Size (if required)
9. For Ball Bearing Die Set Information,
See Page 7245



STYLE 50 D DIE SET

Superior Style 50 D Three-Pin Rectangular Die Sets have guide pins located at any three corners. The three-pin layout allows free movement of stock in the corner area wherever the pin is omitted. There is no offset pin on Style 50 D Die Sets. Left to Right feed (System LR) bushing clamp locations is standard. Style 50 D die sets are available in friction or ball bearing types.



STANDARD PIN LOCATION - FRICTION BEARING

PIN DIA.	1	1¼	1½	1¾	2	2½	3
F	2	2¼	2½	2¾	3	3¾	4¼
CL	1½	1⅝	1¾	1⅞	2	2½	2¾

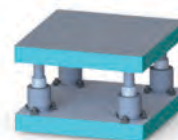
STANDARD PIN LOCATION - FRICTION BEARING - METRIC

PIN DIA.	24/25mm	30/32mm	38/40mm	48/50mm	63mm	80mm
F	50,80	57,15	63,50	76,20	95,25	107,95
CL	38,10	41,28	44,45	50,80	63,50	69,85

NOTE: Optional shank is located in center of work area
All punch holder and die shoes stamped MC
"Matched Corner" regardless of pin location.

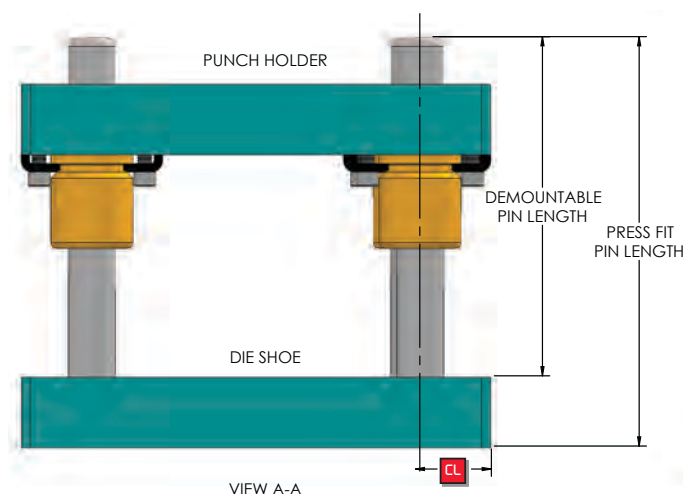
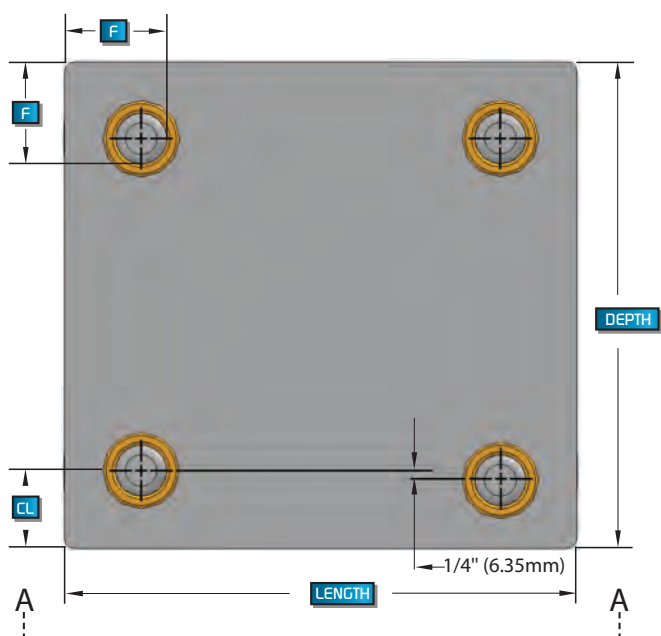
WHEN ORDERING PLEASE SPECIFY:

1. Style 50 D, Friction or Ball Bearing
2. Quantity
3. Punch Holder (PH)
Thickness Depth Length
4. Die Shoe (DS)
Thickness Depth Length
5. Pin Type and Size
6. Bushing Type and Material
(2" Steel Shoulder Standard)
7. Shank Type and Size (if required)
8. Which Pin to Omit
(ex. Omit Right Front)
9. For Ball Bearing Die Set Information,
See Page 7245



STYLE 75 D DIE SET

Superior Style 75 D Four-Pin Rectangular Die Sets are designed to provide maximum resistance to side thrust and misalignment. On Style 75 D Die Sets, the right front pin is offset 1/4" to front to prevent reversing of the plates during assembly. On "Inverted" die sets (pins in die shoe of ball bearing sets), the right rear pin is offset. Left to Right feed (System LR) bushing clamp locations is standard. Style 75 D die sets are available in friction or ball bearing types.



STANDARD PIN LOCATION - FRICTION BEARING

PIN DIA.	1	1 1/4	1 1/2	1 3/4	2	2 1/2	3
F	2	2 1/4	2 1/2	2 3/4	3	3 3/4	4 1/4
CL	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/2	2 3/4

STANDARD PIN LOCATION - FRICTION BEARING - METRIC

PIN DIA.	24/25mm	30/32mm	38/40mm	48/50mm	63mm	80mm
F	50,80	57,15	63,50	76,20	95,25	107,95
CL	38,10	41,28	44,45	50,80	63,50	69,85

NOTE: Optional shank is located in center of work area
All punch holder and die shoes stamped MC
"Matched Corner" regardless of pin location.

WHEN ORDERING PLEASE SPECIFY:

1. Style 75 D, Friction or Ball Bearing
2. Quantity
3. Punch Holder (PH)
Thickness Depth Length
4. Die Shoe (DS)
Thickness Depth Length
5. Pin Type and Size
6. Bushing Type and Material
(2" Steel Shoulder Standard)
7. Shank Type and Size (if required)
8. For Ball Bearing Die Set Information,
See Page 7245

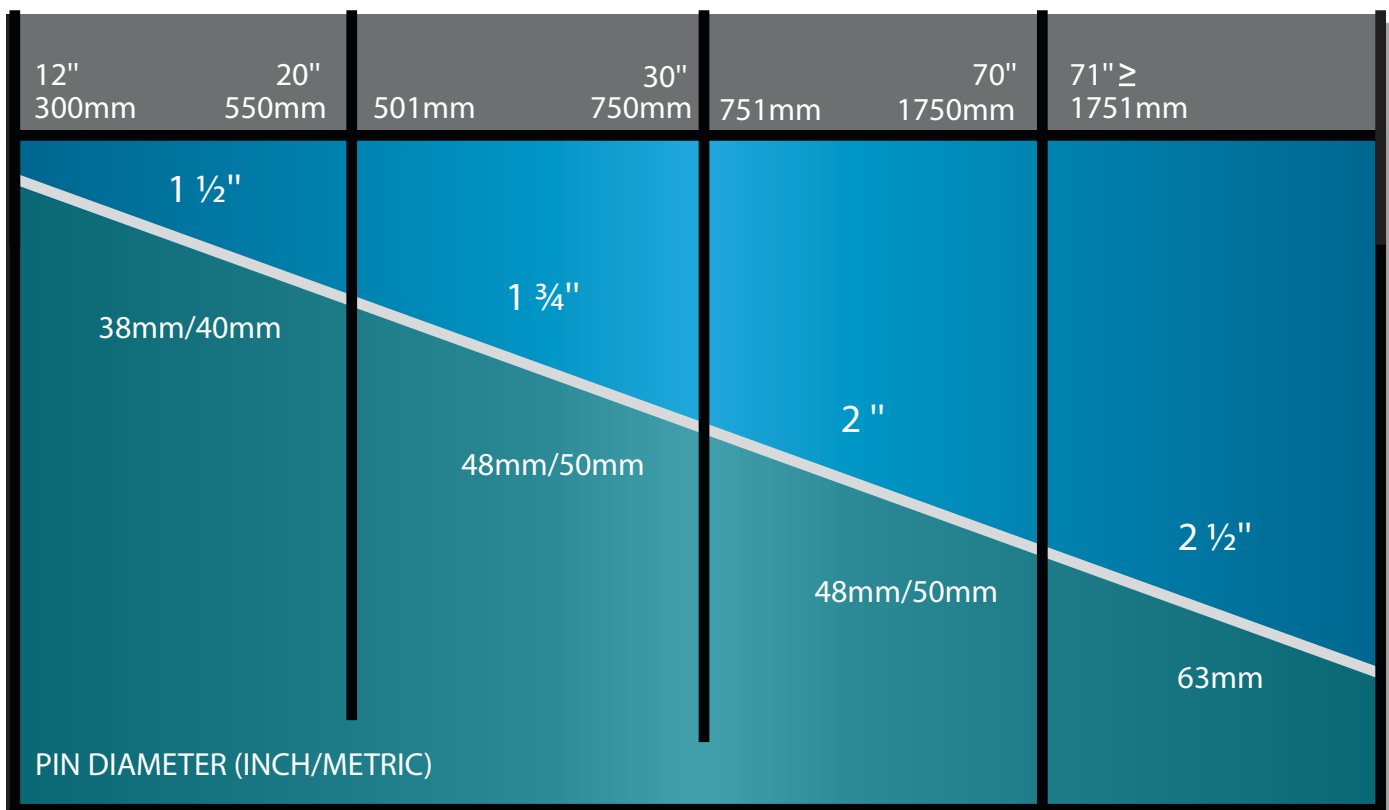


STANDARD GUIDE PIN SIZES

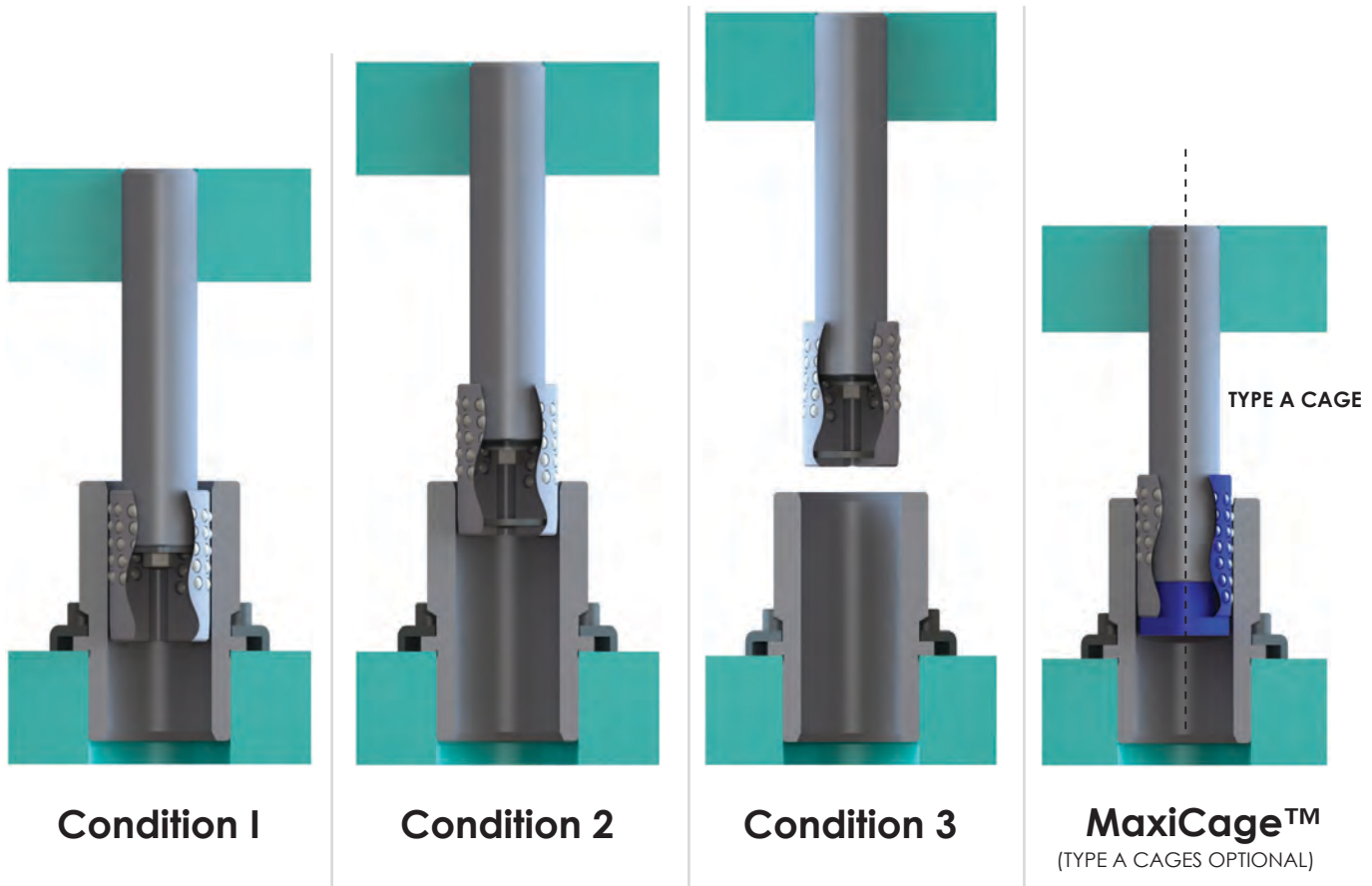
Superior Die Set standard guide pin diameters for friction or ball bearing die sets are determined by the longest overall dimension of the die set. The standard guide pin diameter is provided unless otherwise specified when ordering. Charts shown are commonly used guidelines. Specific tooling forces should be calculated when determining die set styles, component types and sizes, and plate thickness. Superior recommends a minimum plate thickness to pin diameter of 1:1.

STANDARD GUIDE PIN SIZES (INCH/METRIC)

LONGEST DIE SET DIMENSION →



TYPE D BALL CAGE RETENTION METHODS



Superior Die Set offers several ball cage retention methods with our Type D ball bearing system.

The **Condition 1** method is for dies that maintain constant pin-bushing-ball engagement even at the maximum die open height.

The **Condition 2** method is for dies designed so the ball cage never leaves the bushing, but allows the pin to disengage the bushing at the beginning of each stroke.

The **Condition 3** method is for dies that disengage the ball cage completely from the bushing.

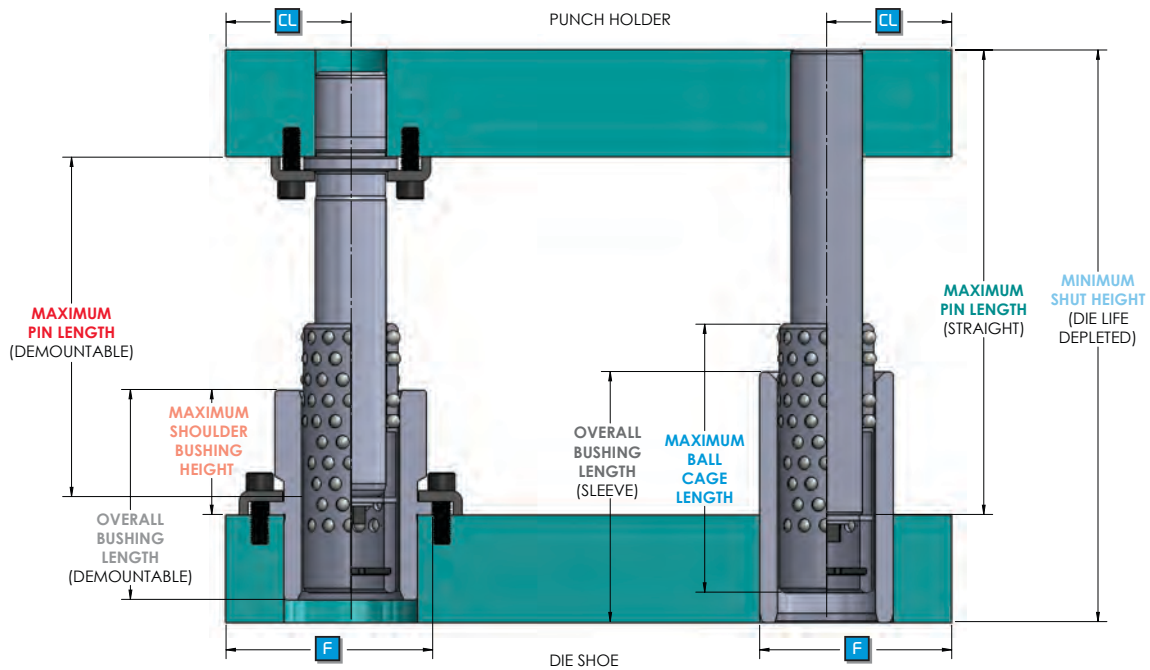
Both Condition 2 & 3 methods allow the cage to rotate freely around the pin while not under pre-load.

Also available, is our original **Maxi-Cage™** End Cap to retain the ball cage on the pin. This method maximizes ball bearing engagement by utilizing cages with full coverage of ball bearings unlike most Type D cages. Substitute our Type A cages (see page 5150) when Type D cages lack ball bearing coverage.

The Maxi-Cage system increases the maximum stroke offered by our Type D system, too, along with allowing the cage to rotate freely around the pin while not under pre-load.

BALL BEARING DIE SETS

Superior Type D Ball Bearing Die Sets are manufactured with multiple cage retention methods (See page 7240). These components are used instead of friction guide pins and bushings and contribute to longer die life. Ideal applications for Ball Bearing Die Sets are those which require high press speeds and easier assembly/disassembly of the die set.



STANDARD PIN LOCATION - FRICTION BEARING

PIN DIAMETER	1	1¼	1½	1¾	2	2½	3
STRAIGHT SLEEVE (F)	2.688	2.938	3.375	3.625	4.125	4.750	5.375
DEMOUNT. BUSHINGS (F)	2.875	3.063	3.563	3.813	4.313	5.000	5.625
CL DIMENSION	1.750	1.875	2.125	2.250	2.500	2.875	3.250

STANDARD PIN LOCATION - FRICTION BEARING - METRIC

PIN DIAMETER	24/25mm	30/32mm	38/40mm	48/50mm	63mm	80mm
STRAIGHT SLEEVE (F)	68,28	74,61	85,73	104,78	120,65	136,53
DEMOUNT. BUSHINGS (F)	73,03	77,79	90,49	109,54	127,00	142,88
CL DIMENSION	44,45	47,63	53,98	63,50	73,03	82,55

NOTE: F Dimension for STRAIGHT SLEEVE BUSHINGS- refers to distance from edge of die shoe to the inside edge of the bushing. DEMOUNTABLE BUSHING- refers to distance from edge of die shoe to inside edge of bushing flange.

BALL BEARING DIE DETS - TYPE D

MAXIMUM PIN LENGTH

NOTE: SELECT NEAREST SHORTER STOCKED PIN LENGTH



**Straight
Guide Pins**

$$\left[\begin{array}{l} \text{Maximum} \\ \text{Pin Length} \end{array} = \begin{array}{l} \text{Minimum} \\ \text{Shut Height} \end{array} - Z - 1/4" (6.35\text{mm}) \right]$$



**Dem't
Guide Pins**

$$\left[\begin{array}{l} \text{Maximum} \\ \text{Pin Length} \end{array} = \begin{array}{l} \text{Minimum} \\ \text{Shut Height} \end{array} - \begin{array}{l} \text{Punch} \\ \text{Holder} \\ \text{Thickness} \end{array} - Z - 1/4" (6.35\text{mm}) \right]$$

**INCH
PIN
FORMULA**

Dia.	Z [TYPE 1]	Z [TYPE 2,3]
1	5/16	15/32
1 1/4	5/16	15/32
1 1/2	3/8	1/2
1 3/4	3/8	1/2
2	3/8	1/2
2 1/2	1/2	9/16
3	1/2	9/16

Dia.	Z [TYPE 1]	Z [TYPE 2,3]
25	7	10.5
32	7	10.5
40	9.5	13
50	9.5	13
63	9.5	13
80	9.5	13
---	---	---

**METRIC
PIN
FORMULA**

MAXIMUM SHOULDER BUSHING HEIGHT

NOTE: SELECT NEAREST SHORTER STOCKED SHOULDER HEIGHT



**Straight
Guide Pins**

$$\left[\begin{array}{l} \text{Maximum} \\ \text{Bushing} \\ \text{Length} \end{array} = \begin{array}{l} \text{Minimum} \\ \text{Shut Height} \end{array} - \left(\begin{array}{l} \text{Punch} \\ \text{Holder} \\ \text{Thickness} \end{array} + \begin{array}{l} \text{Die Shoe} \\ \text{Thickness} \end{array} \right) - 1/4" (6.35\text{mm}) \right]$$

**Dem't
Guide Pins**

$$\left[\begin{array}{l} \text{Maximum} \\ \text{Bushing} \\ \text{Length} \end{array} = \begin{array}{l} \text{Minimum} \\ \text{Shut Height} \end{array} - \left(\begin{array}{l} \text{Punch} \\ \text{Holder} \\ \text{Thickness} \end{array} + \begin{array}{l} \text{Die Shoe} \\ \text{Thickness} \end{array} \right) - 1" (25.4\text{mm}) \right]$$

MAXIMUM STRAIGHT SLEEVE BUSHING LENGTH

NOTE: SELECT NEAREST SHORTER BUSHING LENGTH



**Straight
Guide Pins**

$$\left[\begin{array}{l} \text{Maximum} \\ \text{Sleeve Bushing} \\ \text{Length} \end{array} = \begin{array}{l} \text{Minimum} \\ \text{Shut Height} \end{array} - \begin{array}{l} \text{Punch} \\ \text{Holder} \\ \text{Thickness} \end{array} - 1/4" (6.35\text{mm}) \right]$$

**Dem't
Guide Pins**

$$\left[\begin{array}{l} \text{Maximum} \\ \text{Sleeve Bushing} \\ \text{Length} \end{array} = \begin{array}{l} \text{Minimum} \\ \text{Shut Height} \end{array} - \begin{array}{l} \text{Punch} \\ \text{Holder} \\ \text{Thickness} \end{array} - 1" (25.4\text{mm}) \right]$$

MAXIMUM BALL CAGE LENGTH



- 1) Calculate bushing part number, as described above
- 2) Calculate stroke of die
- 3) Locate bushing part number on tables from selected pages:
Condition 1 (pages 7255 & 7260), Condition 2 & 3 (pages 7265 & 7270)
- 4) Choose respective cage part number.
Apply maximum stroke length for Condition 1 only



BALL BEARING DIE SETS

INCH

TYPE D - INCH - CAGE SELECTION CHART- CONDITION 1

Diameter	Bushing Part Number		Maximum Stroke	Cage Part Number	Maximum Stroke	Cage Part Number
	Demountable	Straight				
1"	536-0813	537-0812			0.75	535-0806-1
	536-0821	537-0814	0.75	535-0808-1	1.25	535-0806-1
	536-0823	537-0816	1.25	535-0808-1	1.75	535-0806-1
		537-0818	1.75	535-0808-1	2.25	535-0806-1
		537-0820	2.25	535-0808-1	2.75	535-0806-1
1 1/4"	536-1013	537-1012			0.75	535-1006-1
	536-1021	537-1014	0.75	535-1008-1	1.25	535-1006-1
	536-1023	537-1016	1.25	535-1008-1	1.75	535-1006-1
		537-1018	1.75	535-1008-1	2.25	535-1006-1
		537-1020	2.25	535-1008-1	2.75	535-1006-1
1 1/2"		537-1024	3.25	535-1008-1	3.75	535-1006-1
	536-1221	537-1215			0.75	535-1208-1
	536-1230	537-1218	1.00	535-1210-1	1.50	535-1208-1
	536-1232	537-1220	1.50	535-1210-1	2.00	535-1208-1
		537-1222	2.00	535-1210-1	2.50	535-1208-1
1 3/4"		537-1224	2.50	535-1210-1	3.00	535-1208-1
		537-1228	3.50	535-1210-1	4.00	535-1208-1
		537-1232	4.50	535-1210-1	5.00	535-1208-1
	536-1422	537-1417			1.00	535-1410-1
	536-1431	537-1420	1.00	535-1412-1	1.50	535-1410-1
2"		537-1422	1.50	535-1412-1	2.00	535-1410-1
		537-1424	2.00	535-1412-1	2.50	535-1410-1
		537-1428	3.00	535-1412-1	3.50	535-1410-1
		537-1432	4.00	535-1412-1	4.50	535-1410-1
		537-1436	5.00	535-1412-1	5.50	535-1410-1
2 1/2"	536-1623	537-1619			0.75	535-1612-1
	536-1632	537-1622	0.75	535-1614-1	1.50	535-1612-1
	536-1641	537-1625	1.50	535-1614-1	2.25	535-1612-1
	536-1650	537-1628	2.25	535-1614-1	3.00	535-1612-1
		537-1632	3.25	535-1614-1	4.00	535-1612-1
3"		537-1636	4.25	535-1614-1	5.00	535-1612-1
		537-1640	5.25	535-1614-1	6.00	535-1612-1
	536-2040	537-2024	0.75	535-2016-1		
	536-2043	537-2027	1.50	535-2016-1		
	536-2052	537-2030	2.25	535-2016-1		
		537-2034	3.25	535-2016-1		
		537-2038	4.25	535-2016-1		
		537-2042	5.25	535-2016-1		
	536-2440	537-2424	0.75	535-2416-1		
	536-2443	537-2427	1.50	535-2416-1		
	536-2452	537-2430	2.25	535-2416-1		
		537-2434	3.25	535-2416-1		
		537-2438	4.25	535-2416-1		
		537-2442	5.25	535-2416-1		



BALL BEARING DIE SETS

METRIC

TYPE D - METRIC - CAGE SELECTION CHART- CONDITION 1

Diameter	Bushing Part Number		Maximum Stroke	Cage Part Number	Maximum Stroke	Cage Part Number
	Demountable	Straight				
25	636-25035	637-25065			10mm	635-25036-1
	636-25050	637-25080	15mm	635-25048-1	25mm	635-25036-1
	636-25065	637-25095	30mm	635-25048-1	40mm	635-25036-1
		637-25110	45mm	635-25048-1	55mm	635-25036-1
		637-25130	60mm	635-25048-1	75mm	635-25036-1
32	636-32050	637-32080	15mm	635-32048-1	25mm	635-32036-1
	636-32065	637-32095	30mm	635-32048-1	40mm	635-32036-1
	636-32080	637-32110	45mm	635-32048-1	55mm	635-32036-1
		637-32130	60mm	635-32048-1	75mm	635-32036-1
		637-32150	80mm	635-32048-1	95mm	635-32036-1
		637-32170	100mm	635-32048-1	115mm	635-32036-1
40	636-40050	637-40080			15mm	635-40048-1
	636-40065	637-40095	15mm	635-40060-1	25mm	635-40048-1
	636-40080	637-40110	30mm	635-40060-1	40mm	635-40048-1
	636-40100	637-40130	45mm	635-40060-1	60mm	635-40048-1
		637-40150	65mm	635-40060-1	80mm	635-40048-1
		637-40170	85mm	635-40060-1	100mm	635-40048-1
		637-40190	105mm	635-40060-1	120mm	635-40048-1
		637-40215	125mm	635-40060-1	145mm	635-40048-1
50	636-50060	637-50110			20mm	635-50070-1
	636-50080	637-50130	25mm	635-50084-1	40mm	635-50070-1
	636-50100	637-50150	45mm	635-50084-1	60mm	635-50070-1
	636-50120	637-50170	65mm	635-50084-1	80mm	635-50070-1
		637-50190	85mm	635-50084-1	100mm	635-50070-1
		637-50215	105mm	635-50084-1	125mm	635-50070-1
		637-50240	130mm	635-50084-1	150mm	635-50070-1
		637-50265	155mm	635-50084-1	175mm	635-50070-1
63	636-63100	637-63150	25mm	635-63098-1		
	636-63120	637-63170	45mm	635-63098-1		
	636-63140	637-63190	65mm	635-63098-1		
		637-63215	90mm	635-63098-1		
		637-63240	115mm	635-63098-1		
		637-63265	140mm	635-63098-1		
80		637-80150	25mm	635-80098-1		
	636-80100		35mm	635-80098-1		
		637-80170	45mm	635-80098-1		
	636-80117		55mm	635-80098-1		
		637-80190	65mm	635-80098-1		
	636-80140		75mm	635-80098-1		
		637-80215	90mm	635-80098-1		
		637-80240	115mm	635-80098-1		
		637-80265	140mm	635-80098-1		



BALL BEARING DIE SETS

INCH

TYPE D BALL CAGE PART NUMBER- CONDITION 2 & 3

Diameter	Bushing Part Number		Cage Part Number
	Demountable	Straight	
1"	536-0811	537-0810	535-0808-2
	536-0813	537-0812	535-0810-2
	536-0821	537-0814	535-0812-2
	536-0823	537-0816	535-0813-2
		537-0818	535-0814-2
		537-0820	535-0815-2
1 1/4"	536-1013	537-1012	535-1011-2
	536-1021	537-1014	535-1013-2
	536-1023	537-1016	535-1015-2
		537-1018	535-1016-2
		537-1020	535-1017-2
		537-1024	535-1019-2
1 1/2"	536-1212	537-1212	535-1211-2
	536-1221	537-1215	535-1214-2
	536-1230	537-1218	535-1217-2
	536-1232	537-1220	535-1218-2
		537-1222	535-1220-2
		537-1224	535-1220-2
		537-1228	535-1222-2
1 3/4"		537-1232	535-1224-2
	536-1413	537-1414	535-1413-2
	536-1422	537-1417	535-1416-2
	536-1431	537-1420	535-1419-2
		537-1422	535-1421-2
		537-1424	535-1421-2
		537-1428	535-1423-2
		537-1432	535-1425-2
2"		537-1436	535-1427-2
	536-1620	537-1619	535-1615-2
	536-1623	537-1622	535-1618-2
	536-1632	537-1625	535-1621-2
	536-1641	537-1628	535-1623-2
	536-1650	537-1632	535-1624-2
		537-1636	535-1626-2
2 1/2"			535-1628-2
		537-1640	535-1630-2
	536-2040	537-2024	535-2023-2
	536-2043	537-2027	535-2026-2
	536-2052	537-2030	535-2029-2
		537-2034	535-2031-2
3"		537-2038	535-2033-2
		537-2042	535-2035-2
	536-2440	537-2424	535-2423-2
	536-2443	537-2427	535-2426-2
	536-2452	537-2430	535-2429-2
		537-2434	535-2431-2
		537-2438	535-2433-2
		537-2442	535-2435-2



BALL BEARING DIE DETS

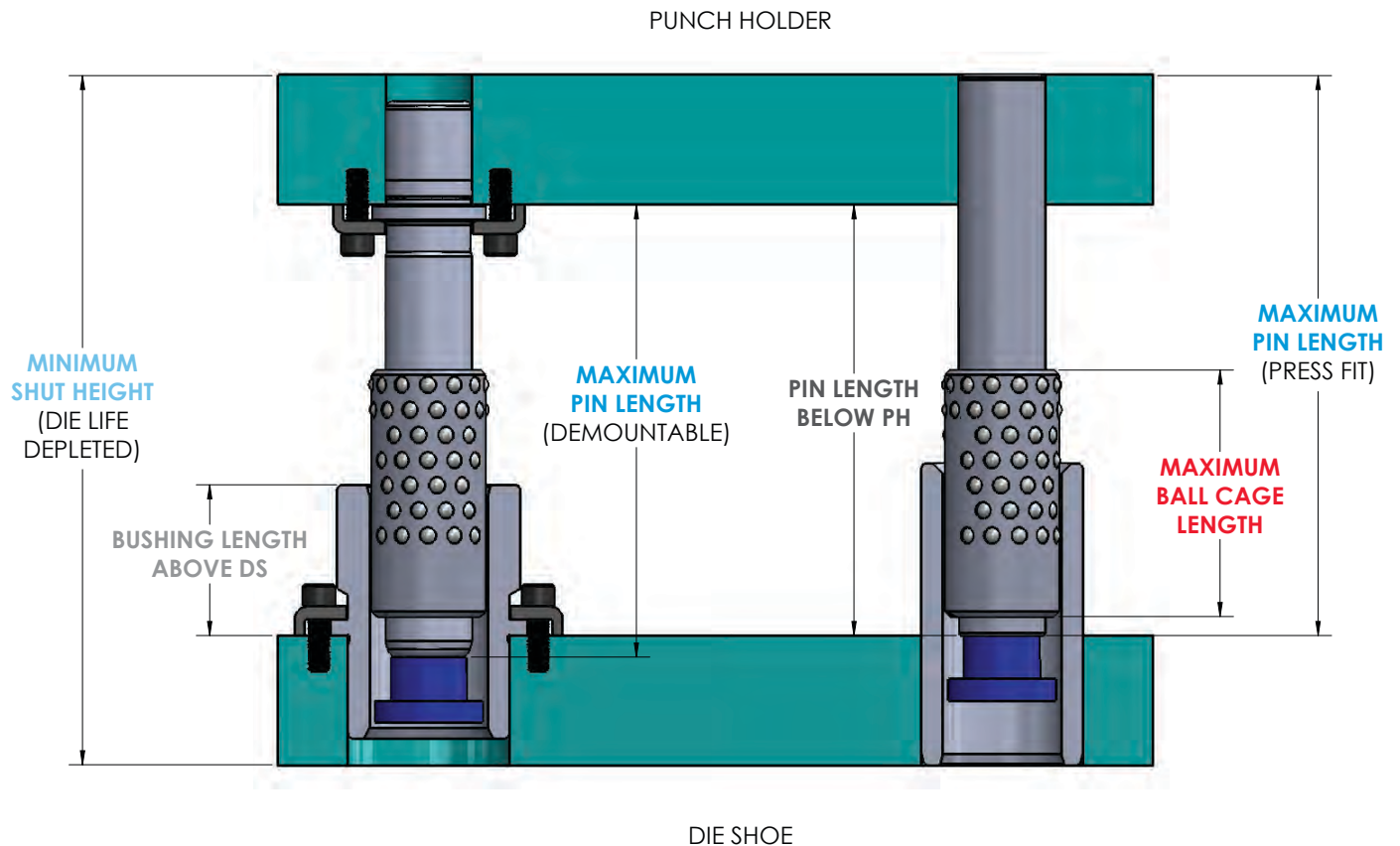
METRIC

TYPE D - METRIC - CAGE SELECTION CHART- CONDITION 2 & 3

Diameter	Bushing Part Number		Cage Part Number
	Demountable	Straight	
25	636-25035	637-25065	635-25055-2
	636-25050	637-25080	635-25070-2
	636-25065	637-25095	635-25090-2
		637-25110	635-25100-2
		637-25130	635-25110-2
32	636-32050	637-32080	635-32070-2
	636-32065	637-32095	635-32090-2
	636-32080	637-32110	635-32105-2
		637-32130	635-32115-2
		637-32150	635-32125-2
40		637-32170	635-32135-2
	636-40050	637-40080	635-40070-2
	636-40065	637-40095	635-40085-2
	636-40080	637-40110	635-40105-2
	636-40100	637-40130	635-40115-2
		637-40150	635-40125-2
		637-40170	635-40135-2
50		637-40190	635-40145-2
		637-40215	635-40155-2
	636-50060	637-50110	635-50105-2
	636-50080	637-50130	635-50120-2
	636-50100	637-50150	635-50140-2
	636-50120	637-50170	635-50150-2
		637-50190	635-50160-2
		637-50215	635-50170-2
63		637-50240	635-50185-2
		637-50265	635-50195-2
	636-63100	637-63150	635-63145-2
	636-63120	637-63170	635-63165-2
	636-63140	637-63190	635-63180-2
		637-63215	635-63190-2
80		637-63240	635-63205-2
		637-63265	635-63215-2
		637-80150	635-80145-2
	636-80100		635-80145-2
		637-80170	635-80165-2
	636-80117		635-80165-2
		637-80190	635-80180-2
	636-80140		635-80180-2
		637-80215	635-80190-2
		637-80240	635-80205-2
		637-80265	635-80215-2

BALL BEARING DIE SETS MAXICAGE™ SYSTEM

The Superior MaxiCage™ System is typically used when there is partial or full disengagement of the guide pin and bushing. While under this no-preload condition, the end cap permits the ball cage to rotate freely about the guide pin. Type D or Type A ball cages can be used in this system. The MaxiCage™ System maximizes Type A Ball Cage surface bearing efficiency - with complete ball coverage throughout the cage.



NOTE: For end cap dimensions see page 7290

BALL BEARING DIE SETS MAXICAGE™ SYSTEM

MAXIMUM PIN LENGTH

NOTE: SELECT NEAREST SHORTER STOCKED PIN LENGTH



**Straight
Guide Pins**

$$\left[\begin{array}{l} \text{Maximum} \\ \text{Pin Length} \end{array} = \begin{array}{l} \text{Minimum} \\ \text{Shut Height} \end{array} - 1" (25.4\text{mm}) \right]$$



**Dem't
Guide Pins**

$$\left[\begin{array}{l} \text{Maximum} \\ \text{Pin Length} \end{array} = \begin{array}{l} \text{Minimum} \\ \text{Shut Height} \end{array} - (PH + 1" (25.4\text{mm})) \right]$$

MAXIMUM BUSHING LENGTH

NOTE: SEE TYPE D BALL BEARING



MAXIMUM BALL CAGE LENGTH

NOTE: SELECT NEAREST SHORTER STOCKED BALL CAGE LENGTH



**STEP
1**

$$\left[C = \begin{array}{l} \text{Pin Length} \\ \text{Below PH} \end{array} + .375" (9.52\text{mm}) \right]$$

**STEP
2**

$$\left[E = \begin{array}{l} \text{Pin Length} \\ \text{Below PH} \end{array} + \begin{array}{l} \text{Bushing} \\ \text{Length} \\ \text{Above DS} \end{array} + \begin{array}{l} \text{PH} \\ \text{Thickness} \end{array} + \begin{array}{l} \text{DS} \\ \text{Thickness} \end{array} + .500" (12.70\text{mm}) \right]$$

OR

**STEP
3**

$$\left[A = E - \begin{array}{l} \text{Minimum} \\ \text{Shut Height} \end{array} \right]$$



**STEP
4**

**Straight
Guide Pins**

$$\left[\begin{array}{l} \text{Maximum} \\ \text{Ball Cage} \\ \text{Length} \end{array} = C - \frac{A}{2} \right]$$

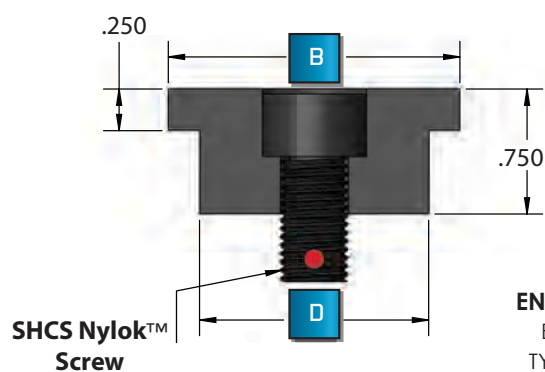
**Dem't
Guide Pins**

$$\left[\begin{array}{l} \text{Maximum} \\ \text{Ball Cage} \\ \text{Length} \end{array} = \left(C - \frac{A}{2} \right) - .625" (15.88\text{mm}) \right]$$

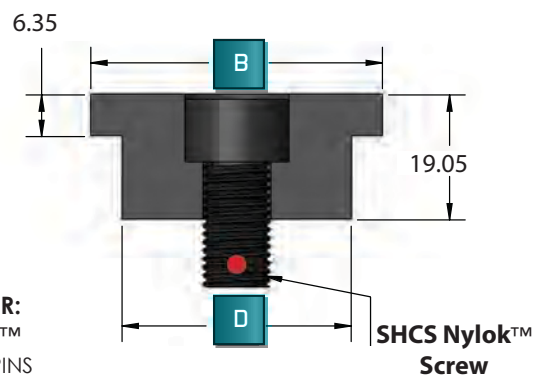


BALL BEARING MAXICAGE™ END CAP DIMENSIONS

INCH/METRIC



END CAP DIMENSIONS FOR:
BALL BEARING MAXICAGE™
TYPE D PRESS FIT STRAIGHT PINS
& TYPE D DEMOUNTABLE PINS
(INCH & METRIC)



TYPE D - INCH END CAP DIMENSIONS							
Pin Dia.	1	1 1/4	1 1/2	1 3/4	2	2 1/2	3
Part No.	534-0804	534-1004	534-1204	534-1404	534-1604	534-2004	534-2404
D	7/8	1 1/8	1 3/8	1 5/8	1 7/8	2 3/8	2 7/8
B	1 1/4	1 1/2	1 3/4	2	2 3/8	2 7/8	3 3/8
SHCS	5/16"-18 SHCS 1" LONG	5/16"-18 SHCS 1" LONG	3/8"-16 SHCS 1" LONG	3/8"-16 SHCS 1" LONG	3/8"-16 SHCS 1" LONG	1/2"-13 SHCS 1" LONG	1/2"-13 SHCS 1" LONG

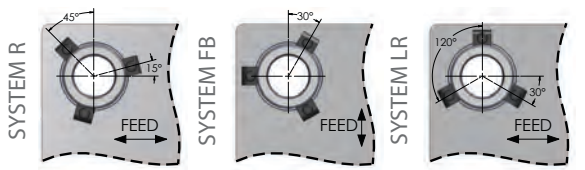
TYPE D - METRIC END CAP DIMENSIONS						
Pin Dia.	25	32	40	50	63	80
Part No.	634-2512	634-3212	634-4012	634-5012	634-6312	634-8012
D	22,23	28,58	34,93	47,63	60,33	73,03
B	31,75	38,10	44,45	60,33	73,03	85,73
SHCS	M6x1.0 SHCS 20MM LONG	M6x1.0 SHCS 20MM LONG	M10x1.5 SHCS 25MM LONG	M10x1.5 SHCS 25MM LONG	M10x1.5 SHCS 25MM LONG	M10x1.5 SHCS 25MM LONG

BUSHING CLAMP ORIENTATIONS

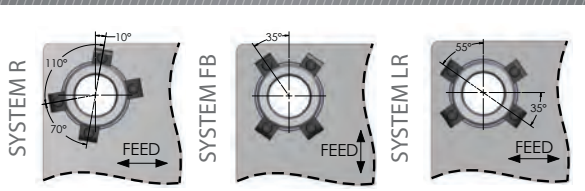
FRICION BUSHING



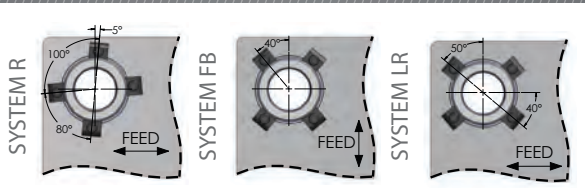
INCH 3/4" TO 1" NOM. DIA SHORT-MED-LONG
 METRIC 18, 19, 24, 25mm NOM. DIA SHORT-MED-LONG
 METRIC 18, 19mm NOM. DIA LOW PROFILE



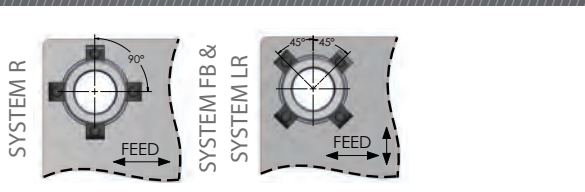
INCH 1 1/4" TO 1 1/2" NOM. DIA SHORT-MED-LONG
 INCH 1" TO 1 1/2" STEEL/BRONZE/BRONZE RITE LOW PROFILE
 INCH ALL DIAMETER - SELF LUBRICATING LOW PROFILE
 METRIC 30, 32, 38, 40mm NOM. DIA SHORT-MED-LONG
 METRIC 24, 25, 30, 32mm NOM. DIA LOW PROFILE



INCH 1 3/4" TO 2" NOM. DIA SHORT-MED-LONG
 INCH 1 3/4" TO 2" NOM. DIA STEEL/BRONZE/BRONZE RITE
 LOW PROFILE



INCH 2' 1/2" NOM. DIA SHORT-MED-LONG
 INCH 2' 1/2" NOM. DIA STEEL/BRONZE/BRONZE RITE
 LOW PROFILE

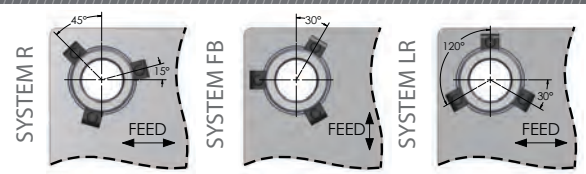


INCH 3" TO 4" NOM. DIA SHORT-MED-LONG
 METRIC 48, 50, 63, 80mm NOM. DIA SHORT-MED-LONG
 METRIC 38, 40, 48, 50, 63, 80mm NOM. DIA LOW PROFILE

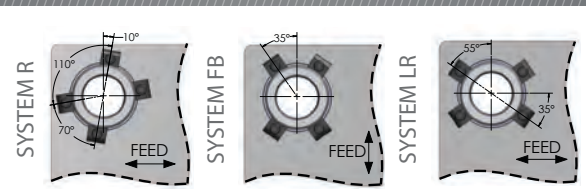
BALL BEARING BUSHING



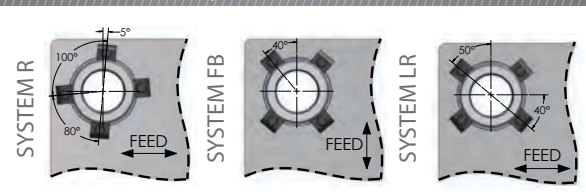
METRIC 18, 19, 24, 25mm NOM. DIA
 METRIC 18, 19mm NOM. DIA



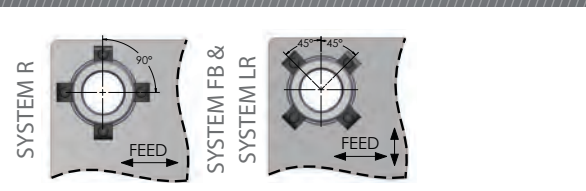
INCH 1" & 1 1/4" NOM. DIA
 METRIC 30, 32, 38, 40mm NOM. DIA
 METRIC 24, 25, 30, 32mm NOM. DIA



INCH 1 1/2" TO 2" NOM. DIA



INCH 2 1/2" NOM. DIA



INCH 3" NOM. DIA
 METRIC 48, 50, 63, 80mm NOM. DIA
 METRIC 38, 40, 48, 50, 63, 80mm NOM. DIA

WHEN ORDERING PLEASE SPECIFY:

1. Clamp Part Number, Chart On Page 7305 & 7310
2. Quantity

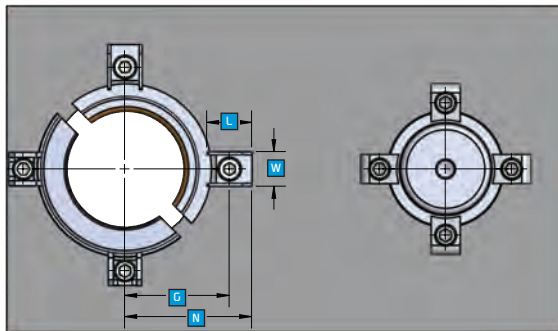
CLAMP TYPES

INCH

FRICION - INCH

TYPE D BUSHING

TYPE D PIN



BUSHING CLAMP

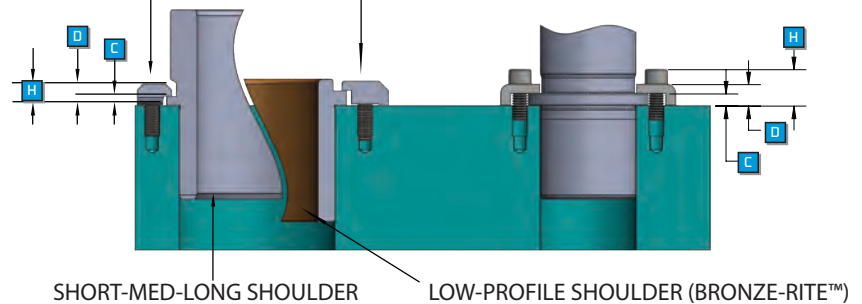
BUSHING CLAMP

PIN CLAMP

PART NO.
C-DX 3/4-7/8"
C-S 1" & up

PART NO.
C-DX 1"-1 1/4"
C-DNI 1 1/2 -2 1/2"

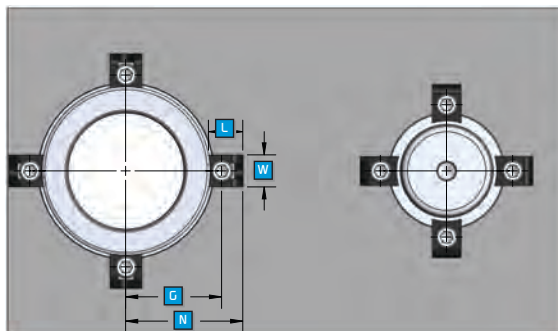
PART NO.
C-S (7/8"-1" Dia. only)
C-DL (1 1/4" Dia. & up)



BALL BEARING - INCH

TYPE D BUSHING

TYPE D PIN

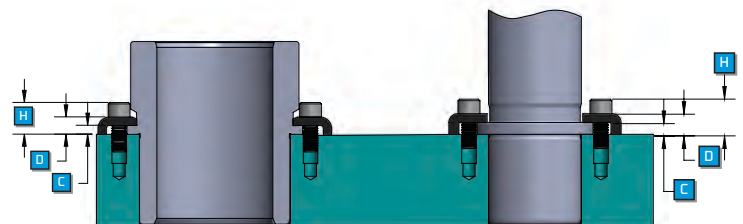


BUSHING CLAMP

PIN CLAMP

PART NO.
C-S

PART NO.
C-S (1" Dia. only)
C-DL (1 1/4" Dia. & up)



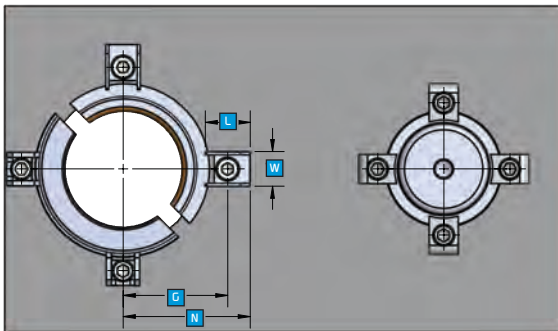
CLAMP TYPES

METRIC

FRICION - METRIC

TYPE D BUSHING

TYPE D PIN



BUSHING CLAMP

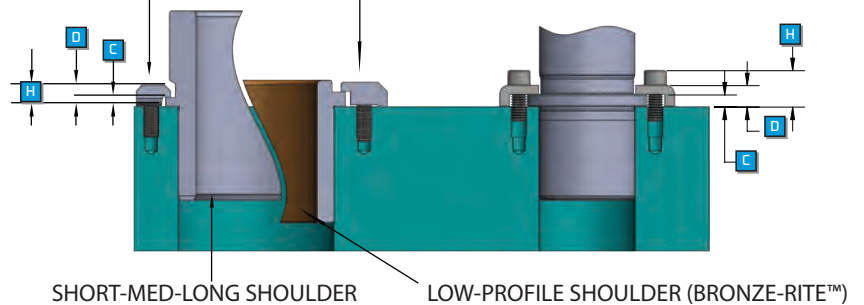
BUSHING CLAMP

PIN CLAMP

PART NO.
C-DX 18/19 mm
C-S 24 mm & up

PART NO.
C-DX 18/19 mm
C-DNM-96 24mm-32mm
C-DNM-97 38mm-80mm

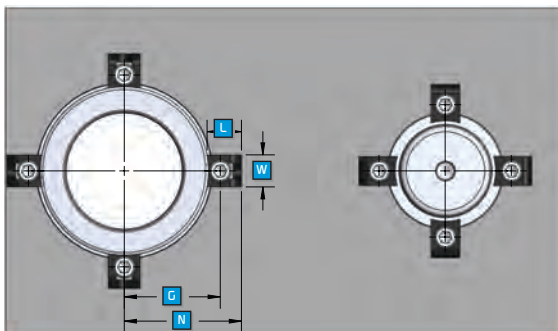
PART NO.
C-DX (18/19 mm Dia. only)
C-S (24/25 mm Dia. only)
C-DL (30 mm Dia. & up)



BALL BEARING - METRIC

TYPE D BUSHING

TYPE D PIN

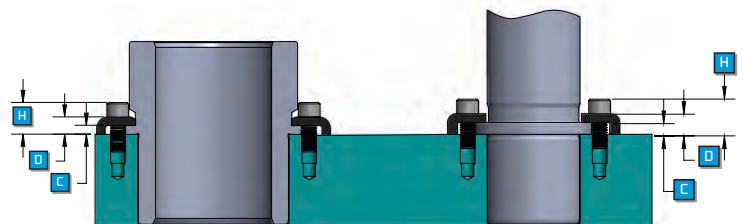


BUSHING CLAMP

PIN CLAMP

PART NO.
C-S

PART NO.
C-DX (18/19 mm Dia. only)
C-S (24/25 mm Dia. only)
C-DL (30 mm Dia. & up)





PIN & BUSHING CLAMP LOCATIONS

INCH

CLAMP DIMENSIONS

COMPONENT	NOM. DIA	LOCATION		SIZE					CLAMP NO.	QTY	SCREW SIZE	BORING SIZE FOR PIN OR BUSHING +.0005/-0.0000
	BUSH I.D. PIN O.D.											
BUSHINGS: DEMOUNTABLE SHORT-MED-LONG SHOULDER ALL MATERIAL	3/4	0.791	1.025	0.469	0.500	0.125	0.219	0.469	C-DX	2	1/4"-20 x 5/8"	1.1250
	7/8	0.916	1.150	0.469	0.500	0.125	0.219	0.469	C-DX	2	1/4"-20 x 5/8"	1.3750
	1	1.175	1.560	0.745	0.688	0.188	0.370	0.688	C-S	2	5/16"-18 x 3/4"	1.5000
	1 1/4	1.300	1.685	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	1.7500
	1 1/2	1.425	1.810	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	2.0000
	1 3/4	1.580	1.965	0.745	0.688	0.188	0.370	0.688	C-S	4	5/16"-18 x 3/4"	2.2500
	2	1.780	2.165	0.745	0.688	0.188	0.370	0.688	C-S	4	5/16"-18 x 3/4"	2.5000
	2 1/2	2.135	2.520	0.745	0.688	0.188	0.370	0.688	C-S	4	5/16"-18 x 3/4"	3.2500
	3	2.370	2.755	0.745	0.688	0.188	0.370	0.688	C-S	4	5/16"-18 x 3/4"	3.7500
BUSHINGS: DEMOUNTABLE LOW PROFILE SHOULDER SELF LUBRICATING	1	1.157	1.542	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	1.5000
	1 1/4	1.347	1.732	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	1.7500
	1 1/2	1.467	1.852	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	2.0000
	1 3/4	1.597	1.982	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	2.2500
	2	1.772	2.157	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	2.5000
	2 1/2	1.987	2.372	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	3.0000
	3	2.237	2.622	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	3.5000
	3 3/4	2.737	3.122	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	4.5000
	4 1/2	3.237	3.622	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	5.5000
BUSHINGS: DEMOUNTABLE LOW PROFILE SHOULDER BRONZE RITE	1	1.063	1.297	0.469	0.500	0.125	0.219	0.469	C-DX	3	1/4"-20 x 5/8"	1.5000
	1 1/4	1.188	1.422	0.469	0.500	0.125	0.219	0.469	C-DX	3	1/4"-20 x 5/8"	1.7500
	1 1/2	1.438	1.750	0.719	0.719	0.193	0.453	0.453	C-DNI	3	5/16"-18 x 3/4"	2.0000
	1 3/4	1.594	1.906	0.719	0.719	0.193	0.453	0.453	C-DNI	4	5/16"-18 x 3/4"	2.2500
	2	1.781	2.094	0.719	0.719	0.193	0.453	0.453	C-DNI	4	5/16"-18 x 3/4"	2.5000
	2 1/2	2.141	2.453	0.719	0.719	0.193	0.453	0.453	C-DNI	4	5/16"-18 x 3/4"	3.2500



PIN & BUSHING CLAMP LOCATIONS

INCH

CLAMP DIMENSIONS

COMPONENT	NOM. DIA	LOCATION		SIZE					CLAMP NO.	QTY	SCREW SIZE	BORING SIZE FOR PIN OR BUSHING +.0005/-0.0000
	BUSH I.D. PIN O.D.											
		G	N	L	W	C	D	H				
BUSHINGS: DEMOUNTABLE BALL BEARING	1	1.313	1.698	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	1.8750
	1 1/4	1.438	1.823	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	2.1250
	1 1/2	1.688	2.073	0.745	0.688	0.188	0.370	0.688	C-S	4	5/16"-18 x 3/4"	2.5000
	1 3/4	1.813	2.198	0.745	0.688	0.188	0.370	0.688	C-S	4	5/16"-18 x 3/4"	2.7500
	2	2.063	2.448	0.745	0.688	0.188	0.370	0.688	C-S	4	5/16"-18 x 3/4"	3.2500
	2 1/2	2.313	2.698	0.745	0.688	0.188	0.370	0.688	C-S	4	5/16"-18 x 3/4"	3.7500
	3	2.625	3.010	0.745	0.688	0.188	0.370	0.688	C-S	4	5/16"-18 x 3/4"	4.2500
GUIDE PINS: DEMOUNTABLE FRICTION	7/8	0.844	1.229	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	0.8752
	1	0.906	1.291	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	1.0002
	1 1/4	0.985	1.391	0.822	0.625	0.250	0.443	0.752	C-DL	3	5/16"-18 x 3/4"	1.2502
	1 1/2	1.125	1.531	0.822	0.625	0.250	0.443	0.752	C-DL	3	5/16"-18 x 3/4"	1.5002
	1 3/4	1.297	1.703	0.822	0.625	0.250	0.443	0.752	C-DL	4	5/16"-18 x 3/4"	1.7502
	2	1.422	1.828	0.822	0.625	0.250	0.443	0.752	C-DL	4	5/16"-18 x 3/4"	2.0002
	2 1/2	1.672	2.078	0.822	0.625	0.250	0.443	0.752	C-DL	4	5/16"-18 x 3/4"	2.5002
GUIDE PINS: DEMOUNTABLE BALL BEARING	3	1.922	2.328	0.822	0.625	0.250	0.443	0.752	C-DL	4	5/16"-18 x 3/4"	3.0002
	1	0.906	1.291	0.745	0.688	0.188	0.370	0.688	C-S	3	5/16"-18 x 3/4"	0.9980
	1 1/4	0.985	1.391	0.822	0.625	0.250	0.443	0.752	C-DL	3	5/16"-18 x 3/4"	1.2480
	1 1/2	1.125	1.531	0.822	0.625	0.250	0.443	0.752	C-DL	3	5/16"-18 x 3/4"	1.4975
	1 3/4	1.297	1.703	0.822	0.625	0.250	0.443	0.752	C-DL	4	5/16"-18 x 3/4"	1.7475
	2	1.422	1.828	0.822	0.625	0.250	0.443	0.752	C-DL	4	5/16"-18 x 3/4"	1.9975
	2 1/2	1.672	2.078	0.822	0.625	0.250	0.443	0.752	C-DL	4	5/16"-18 x 3/4"	2.4970
	3	1.922	2.328	0.822	0.625	0.250	0.443	0.752	C-DL	4	5/16"-18 x 3/4"	2.9970



PIN & BUSHING CLAMP LOCATIONS

METRIC

CLAMP DIMENSIONS												
COMPONENT	NOM. DIA	LOCATION		SIZE					CLAMP NO.	QTY	SCREW SIZE	BORING SIZE FOR PIN OR BUSHING +0.005/-0.000
	BUSH I.D. PIN O.D.											
BUSHINGS: DEMOUNTABLE SHORT-MED- LONG SHOULDER FRICTION	18mm / 19mm	19,55	25,5	12,3	12,7	3,2	5,6	11,6	C-DX	2	M6x1.0 x 20mm	28,008
	24mm / 25mm	30,51	40,3	18,92	17,46	4,76	9,38	17,32	C-S	2	M8x1.25 x 20mm	38,008
	30mm / 32mm	34,01	43,8	18,92	17,46	4,76	9,38	17,32	C-S	3	M8x1.25 x 20mm	45,008
	38mm / 40mm	38,51	48,3	18,92	17,46	4,76	9,38	17,32	C-S	3	M8x1.25 x 20mm	54,010
	48mm / 50mm	44,51	54,3	18,92	17,46	4,76	9,38	17,32	C-S	4	M8x1.25 x 20mm	65,011
	63mm	53,51	63,3	18,92	17,46	4,76	9,38	17,32	C-S	4	M8x1.25 x 20mm	81,013
	80mm	64,51	74,3	18,92	17,46	4,76	9,38	17,32	C-S	4	M8x1.25 x 20mm	100,013
BUSHINGS: DEMOUNTABLE LOW PROFILE SHOULDER FRICTION	18mm / 19mm	19,55	25,5	12,3	12,7	3,2	5,6	11,6	C-DX	2	M6x1.0 x 20mm	28,008
	24mm / 25mm	30,84	37,94	17,5	14,5	5,0	10,0	10,0	C-DNM-96	3	M6x1.0 x 20mm	38,008
	30mm / 32mm	34,34	41,44	17,5	14,5	5,0	10,0	10,0	C-DNM-96	3	M6x1.0 x 20mm	45,008
	38mm / 40mm	41,0	52,1	24,6	18,9	7,9	13,0	13,0	C-DNM-97	4	M8x1.25 x 20mm	54,010
	48mm / 50mm	47,0	58,1	24,6	18,9	7,9	13,0	13,0	C-DNM-97	4	M8x1.25 x 20mm	65,011
	63mm	56,0	67,1	24,6	18,9	7,9	13,0	13,0	C-DNM-97	4	M8x1.25 x 20mm	81,013
	80mm	67,0	78,1	24,6	18,9	7,9	13,0	13,0	C-DNM-97	4	M8x1.25 x 20mm	100,013
BUSHINGS: DEMOUNTABLE BALL BEARING	25mm	34,91	44,7	18,92	17,46	4,76	9,38	17,32	C-S	3	M8x1.25 x 20mm	45,001
	32mm	38,41	48,2	18,92	17,46	4,76	9,38	17,32	C-S	3	M8x1.25 x 20mm	54,000
	40mm	45,91	55,7	18,92	17,46	4,76	9,38	17,32	C-S	4	M8x1.25 x 20mm	65,001
	50mm	53,91	63,7	18,92	17,46	4,76	9,38	17,32	C-S	4	M8x1.25 x 20mm	81,000
	63mm	61,91	71,7	18,92	17,46	4,76	9,38	17,32	C-S	4	M8x1.25 x 20mm	95,001
	80mm	67,91	77,7	18,92	17,46	4,76	9,38	17,32	C-S	4	M8x1.25 x 20mm	108,000
GUIDE PINS: DEMOUNTABLE	18mm	16,05	22,0	12,3	12,7	3,2	5,6	11,6	C-DX	3	M6x1.0 x 20mm	17,963
	19mm	16,05	22,0	12,3	12,7	3,2	5,6	11,6	C-DX	3	M6x1.0 x 20mm	18,956
	24mm	23,01	32,8	18,92	17,46	4,76	9,38	17,32	C-S	3	M8x1.25 x 20mm	23,957
	25mm	23,01	32,8	18,92	17,46	4,76	9,38	17,32	C-S	3	M8x1.25 x 20mm	24,956
	30mm	25,9	36,2	19,6	15,9	6,3	10,9	18,9	C-DL	3	M8x1.25 x 20mm	29,957
	32mm	25,9	36,2	19,6	15,9	6,3	10,9	18,9	C-DL	3	M8x1.25 x 20mm	31,946
	38mm	30,9	41,2	19,6	15,9	6,3	10,9	18,9	C-DL	4	M8x1.25 x 20mm	37,950
	40mm	30,9	41,2	19,6	15,9	6,3	10,9	18,9	C-DL	4	M8x1.25 x 20mm	39,947
	48mm	37,4	47,7	19,6	15,9	6,3	10,9	18,9	C-DL	4	M8x1.25 x 20mm	47,950
	50mm	37,4	47,7	19,6	15,9	6,3	10,9	18,9	C-DL	4	M8x1.25 x 20mm	49,947
	63mm	43,4	53,7	19,6	15,9	6,3	10,9	18,9	C-DL	4	M8x1.25 x 20mm	62,934
	80mm	51,9	62,2	19,6	15,9	6,3	10,9	18,9	C-DL	4	M8x1.25 x 20mm	79,929



CURRENT STOCK
For current stock plate
inventory, see website:
www.superiordieset.com

STANDARD STEEL TYPES

A36 MOD STEEL (#1)

A modified A36 steel with a restricted carbon range that is centered on 1020. It is a hot-rolled mild steel with greater tensile strength than typical low carbon warehouse steels. It has consistent machinability permitting economic stock removal.

C	.15/.25
Mn	.60/.90
P	.04 Max.
S	.05 Max.

4130 STEEL (#2)

An AISI 4130 alloy steel that is supplied heat treated to 300 Bhn (262-321). This holder block quality type of steel has an optimum balance between machinability and hardness while possessing excellent qualities for retainer and back up plate applications.

C	.27/.33 (.29 Typ.)
Mn ...	.91/1.30 (1.15 Typ.)
P	.035 Max.
S	.040 Max.
Cr	.60/.90 (.75 Typ.)
Mo.. ...	.15/.25 (.20 Typ.)
Si	.15/.40 (.28 Typ.)
V	.02 Min. (.04 Typ.)

P-20 STEEL (#3)

A premium AISI 4130 alloy steel with reduced sulfur for cleanliness and excellent polishing ability. Supplied at 300 Bhn (262-321), this P20 type steel offers consistent machinability while maintaining superb mechanical properties.

C	.24/.35 (.29 Typ.)
Mn ...	.75/1.00 (.90 Typ.)
P	.025 Max.
S	.010 Max.
Cr ...	.90/1.20 (1.05 Typ.)
Mo.....	.45/.65 (.55 Typ.)
Si	.15/.40 (.28 Typ.)
V	.04 Min. (.06 Typ.)

4140 AS ROLLED

An AISI 4140 chrome alloy steel supplied at 22-26 Rc (245 Bhn) typical. This hot-rolled steel provides vastly superior mechanical properties in comparison to typically used A36 plate with economical value against prehard alloys. Stocked in 1/8" oversized thickness up to 4.125".

C	0.38/0.43
Mn	0.75/1.00
Cr	0.80/1.10
Mo	0.15/0.25
Si	0.15/0.30
P	0.035 Max.
S	0.040 Max.

SUPERPLAST®STAINLESS STEEL

Superplast® SP Stainless (420 F Mod.) is a new 290-330 Bhn prehardened free machining mold steel. It has been specially designed for plastic mold bases, holders and unetched/unpolished inserts and dies. Superplast® offers improved machinability, consistency and wearability. Moreover, the special chemistry, based on low carbon and 12% Chromium content, confers to the steel a good corrosion resistance to different media. Superplast® Stainless is not designed for highly polished or textured surfaces.

C	0.07
S	0.15 Max.
Si	0.10
Cr	12.0

FORGE-RITE™

This hot-rolled 4340 alloy steel is a proprietary material specially formulated for the manufacture of forging equipment and tooling. It is a tough, shock resistant nickel-chrome-moly steel with optimum grain flow characteristics. It is supplied "Stress relieved" at 215-255 Bhn with improved machinability. Typical applications include those with severe impact, heat, wear, and stress.

C	.35/.45
Mn	.60/.90
Cr	.60/.90
Mo	.25/.35
Si	.40/.60
Ni	1.65/2.00

FORTAL®ALUMINIUM

This exclusive 7000 series aluminum alloy offers high strength, light weight, and exceptional machinability. Low residual stress and modulus of elasticity prevents premature deformation. Its uniform cross-section is harder than mild steel. The thermal conductivity being greater than steel along with excellent polishing characteristics, makes Fortal a good choice for plastic mold use.

Cu	1.6
Mg	2.5
Cr	.23
Zn	5.6
Al	90.07

TOOLOX®44

A low carbon premium alloy steel designed to have high impact strength (Charpy tested at 20ft lbs) and low residual stresses and therefore good dimensional stability. At 45 HRC, this steel can be readily machined compared to steels of like hardness. Toolox 44 is formulated to ERS properties and can be polished to a LENS quality finish.

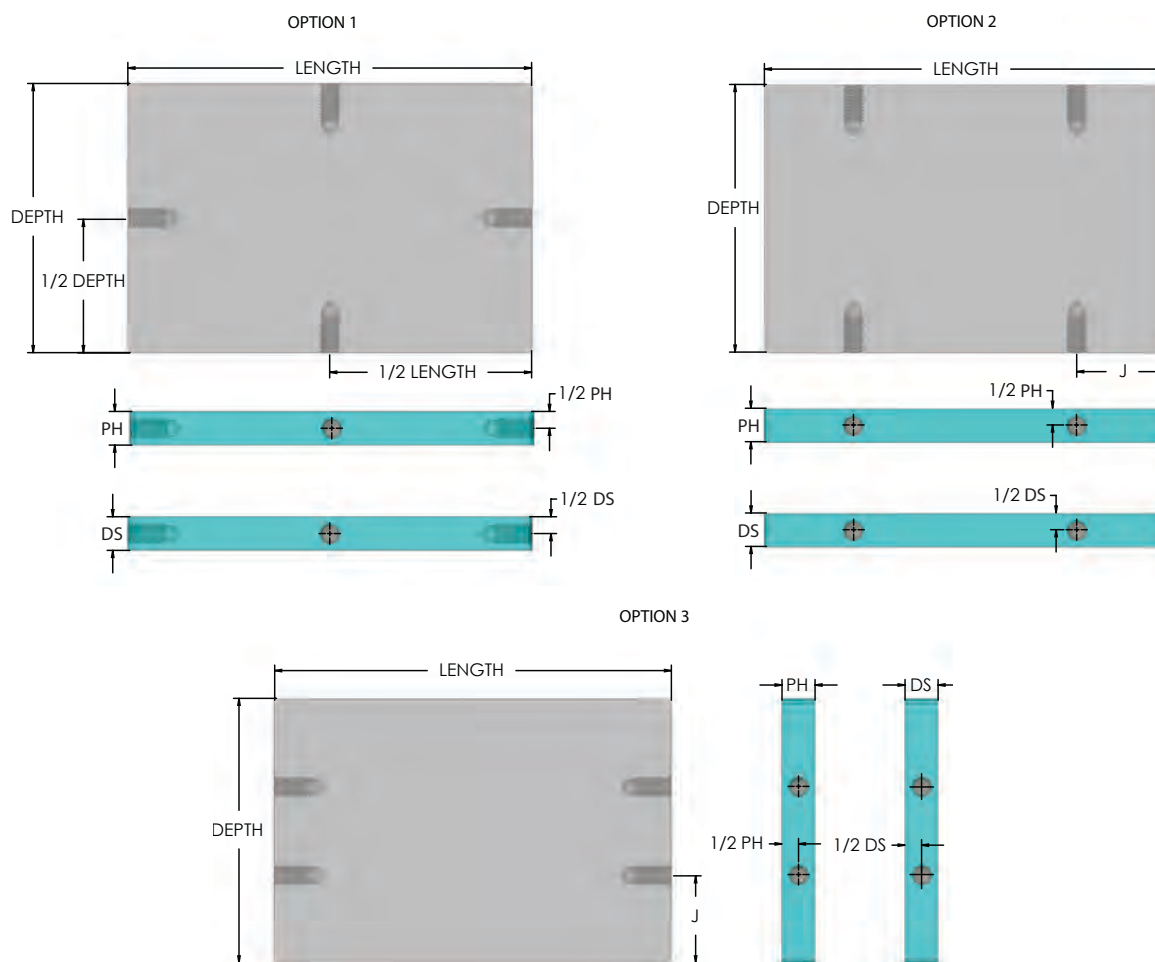
C	0.31
Mn	0.90
S	.003 Max.
Cr	1.35
Mo	.80
Si	.60
V	.145
Ni	.70

OTHER METALS - Superior supplies products in other metals on special order with a variety of machining options. Non-stock materials may require extra lead time.

HANDLING HOLES

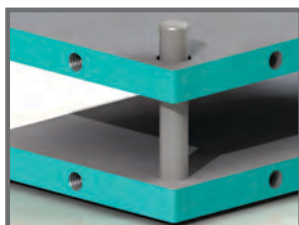
For easy and safe handling, drilled and tapped Handling Holes can be put into the punch holder and die shoe. Three options are available for use with standard lifting eyebolts.

Optional Handling (eyebolt) Holes may be added to die sets by specifying the diameter desired and one of the locational options shown. The diameter of the Handling Holes must always be specified. Any other configurations may be requested.



OPTION 1:

NOTE: 1. Handling Holes are centered on length and depth edges



OPTION 2 AND 3:

NOTE: 1. J Dimension 4 inches minimum, on die sets up to and including 29 inch length or depth

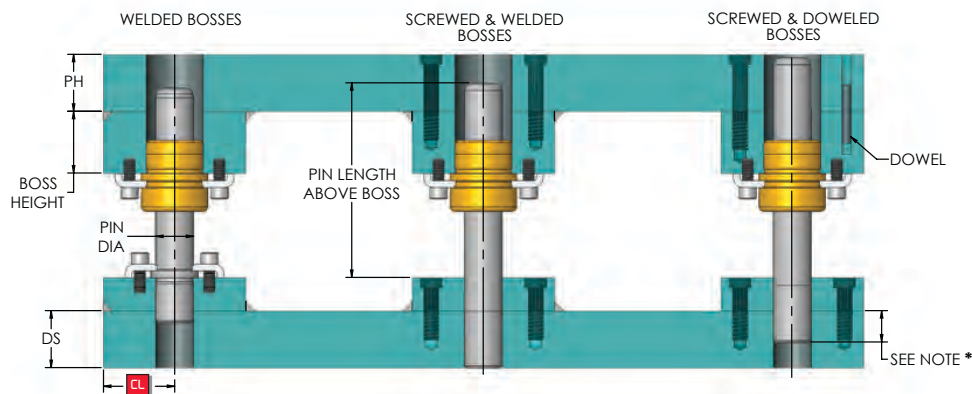
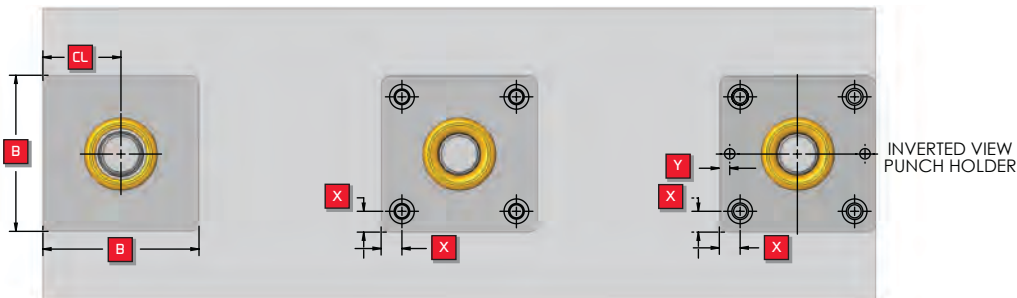
NOTE: 2. J Dimensions equals 3 times guide pin diameter, on die sets over 29 inch length to and including 57 inch length or depth.

NOTE: 3. J Dimension equals 1/6 of length, on die sets over 57 inch length or depth.



BOSS DIE SETS

Superior Bosses are available on all friction or ball bearing die sets and can be applied to the punch holder or die shoe. Bosses help to support the guide pin to reduce deflection, and are commonly used when the pin diameter is greater than the plate thickness or when long guide pins are required. Specific tooling forces should be taken into account when ordering boss sizes, guide pin size, and plate thicknesses. Special bosses can be ordered in almost any height, size, and type.



WHEN ORDERING PLEASE SPECIFY:

1. Boss Type (ie. Welded)
2. Boss Size and Height
3. Location, Punch Holder and/or Die Shoe
4. For Guide Pin Bosses
Specify Pin Length Above Boss

NOTE: **Dowels are not used when component extends past the Boss by a minimum of 1". The tap hole will be in the thicker of plate or Boss with c'bore in opposite. If thickness is equal, then tap hole will be in Boss.

-When punch holder or die shoe thickness is 1.25" or less Screwed & Doweled Bosses are standard.

-Overall pin length = Pin above Boss (+) Pin 'S' dimension (Select nearest longer standard size)

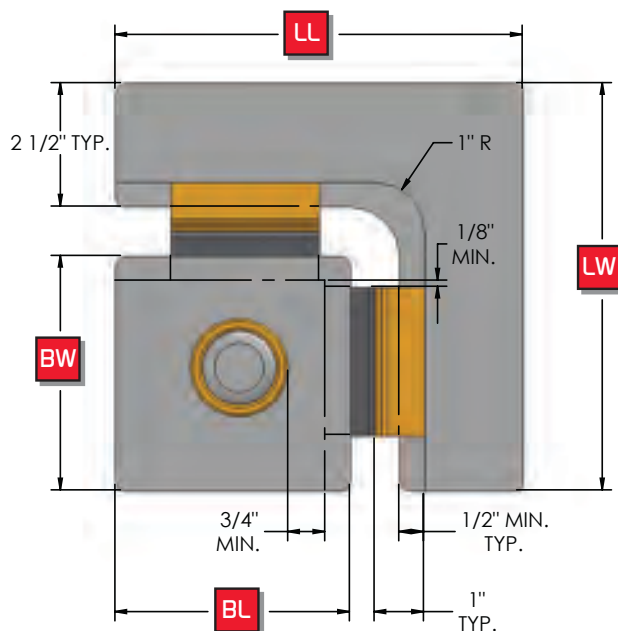
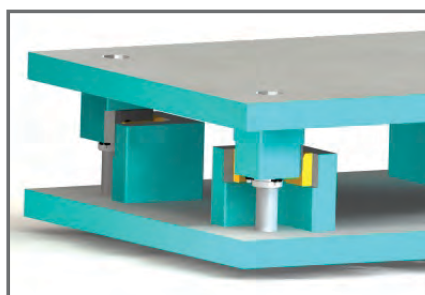
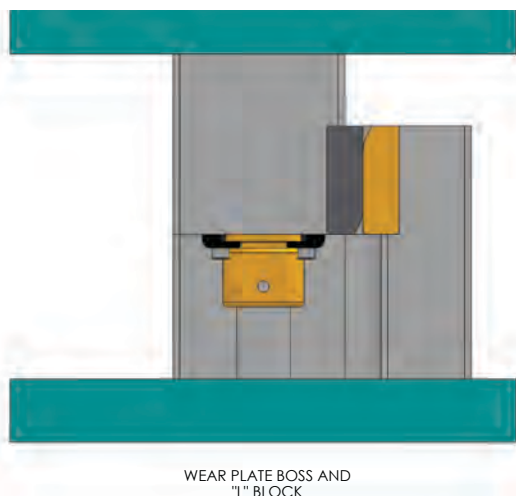
BOSS DIE SETS

Nominal Dia.	FRICTION DIE SET				BALL BEARING DIE SET				SCREW SIZE	DOWEL PIN SIZE
	B	CL	X	Y	B	CL	X	Y		
1"	3.00	1.500	0.563	0.375	3.00	1.500	0.500	0.313	1/2"-13	0.375"
1.25"	3.25	1.625	0.563	0.375	3.50	1.750	0.563	0.375	1/2"-13	0.375"
1.5"	3.50	1.750	0.625	0.375	4.00	2.000	0.625	0.375	1/2"-13	0.375"
1.75"	3.75	1.875	0.625	0.375	4.25	2.125	0.625	0.375	1/2"-13	0.375"
2"	4.00	2.000	0.625	0.375	4.75	2.375	0.625	0.375	1/2"-13	0.375"
2.5"	5.00	2.500	0.750	0.500	5.25	2.625	0.750	0.375	5/8"-11	0.500"
3"	5.50	2.750	0.750	0.500	5.75	2.875	0.750	0.375	5/8"-11	0.500"



WEAR PLATE DIE SET L-SYSTEM

Three typically used boss and heel block wear plate systems (U, L, and V) are available from Superior. Proper wear plate design substantially reduces wear on the die blocks, punches, and other die components. The L system utilizes four right angle blocks located on each corner of the die set. This allows multiple feed directions and maximum work area inside the blocks and offers the most rigidity considering the 8 wear plate intersections. The 'L' block can be mounted inside or outside the boss that typically contains the bushings. Ball bearing components or friction type (as shown here) can be used in any of our wear plate designs.



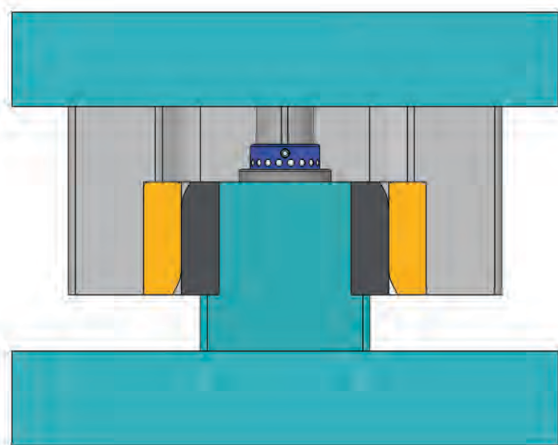
NOTE: -Wear plates are available in hardened steel, solid bronze, or self-lubricating types.
-Each wear plate is custom fit to ensure mating accuracy. Proper re-installation is required if ever removed.
-Bosses over 7" in height are screwed and welded as standard

L - SYSTEM DIMENSIONS

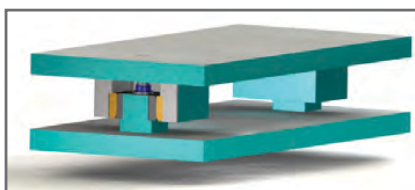
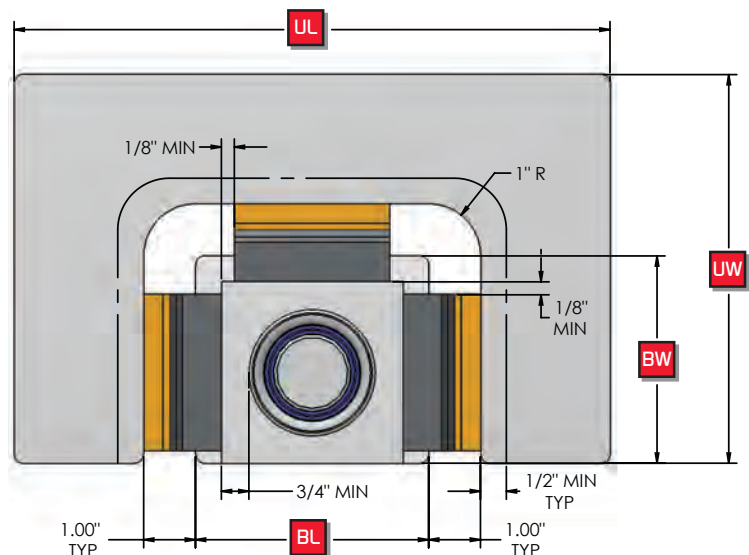
Nominal Dia.	TYPICAL BLOCK & BOSS SIZES -FRICTION BEARING PIN/BUSHINGS				TYPICAL BLOCK & BOSS SIZES - BALL BEARING			
	LL	LW	BL	BW	LL	LW	BL	BW
1 1/2"	7 1/2	7 1/2	4	4	8 1/4	8 1/4	4 3/4	4 3/4
1 3/4"	7 3/4	7 3/4	4 1/4	4 1/4	8 1/4	8 1/4	4 3/4	4 3/4
2"	8 1/4	8 1/4	4 3/4	4 3/4	8 3/4	8 3/4	5 1/4	5 1/4
2 1/2"	9	9	5 1/2	5 1/2	9 1/4	9 1/4	5 3/4	5 3/4
3"	9 1/2	9 1/2	6	6	9 3/4	9 3/4	6 1/4	6 1/4

WEAR PLATE DIE SET U-SYSTEM

Three typically used boss and heel block wear plate systems (U, L, and V) are available from Superior. These approaches to die set construction allow the designer to build rigidity at any given point in the press stroke. The U system is generally used on front to back feed designs or narrow dies that require maximum stiffness. The unique opposing 'U' shaped bosses guide the die set in all directions. Ball bearing components (as shown here) or friction type can be used in any of our wear plate designs. The bushing is typically installed in the boss in either component system.



WEAR PLATE BOSS AND "U"
SHAPE HEEL BLOCK



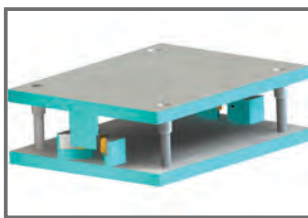
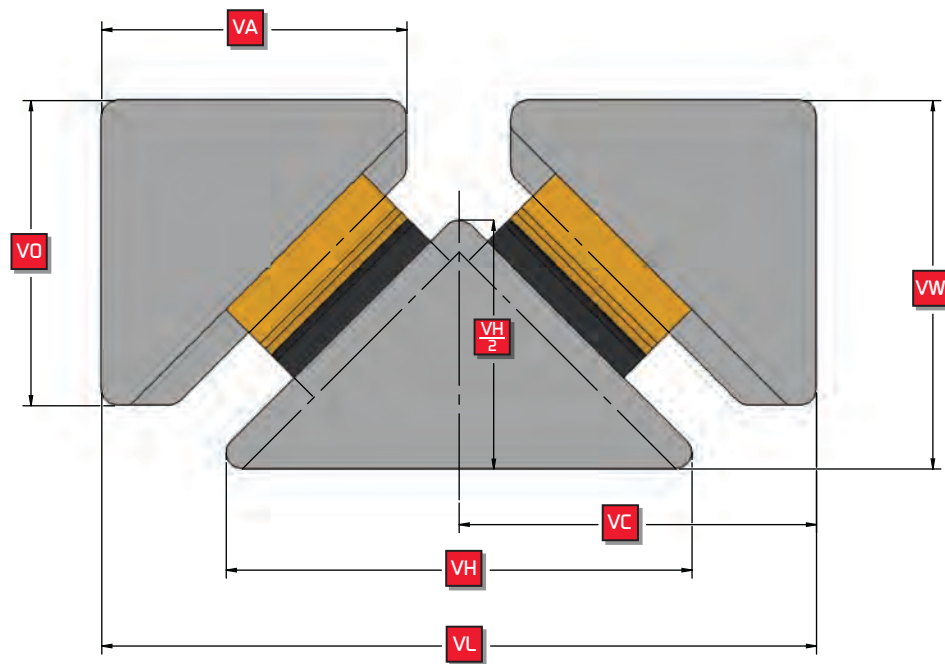
NOTE: -Wear plates are available in hardened steel, solid bronze, or self-lubricating types.
-Each wear plate is custom fit to ensure mating accuracy. Proper re-installation is required if ever removed.

U - SYSTEM DIMENSIONS

Nominal Pin Dia.	TYPICAL BLOCK & BOSS SIZES - FRICTION BEARING PIN/BUSHINGS				TYPICAL BLOCK & BOSS SIZES - BALL BEARING			
	UL	UW	BL	BW	UL	UW	BL	BW
1 1/2"	11 1/2	7 1/2	4 1/2	4	8 1/4	8 1/4	4 3/4	4 3/4
1 3/4"	12	7 3/4	5	4 1/4	8 1/4	8 1/4	4 3/4	4 3/4
2"	12 1/2	8	5 1/2	4 3/4	8 3/4	8 3/4	5 1/4	5 1/4
2 1/2"	13	9	6	5 1/2	9 1/4	9 1/4	5 3/4	5 3/4
3"	13 1/2	9 1/2	6 1/2	6	9 3/4	9 3/4	6 1/4	6 1/4

WEAR PLATE DIE SET V-SYSTEM

Three typically used boss and heel block wear plate systems (U, L, and V) are available from Superior. Wear plates are uniquely positioned to offset die forces and help to maintain die life even though the press-ram may be poorly aligned. The V System is often used on standard pin and bushing type die sets where the extra components function similar to a thrust block to aid in die alignment. The system is also excellent for retrofitting existing dies by adding the V System where space permits.



NOTE: -Wear plates are available in hardened steel, solid bronze, or self-lubricating types.
-Each wear plate is custom fit to ensure mating accuracy. Proper re-installation is required if ever removed.

V SYSTEM DIMENSION

	VL	VW	VD	VA	VC	VH
V1	11 1/8	5 3/4	4 3/4	4 3/4	5 9/16	7 1/4
V2	13	4 3/4	4 3/4	5 3/4	6 1/2	7 1/4

Maximum recommended height= 6"



TOLERANCES

FRICTION PIN AND BUSHING CLEARANCE

PIN DIAMETER	CLEARANCE (IN)
3/4"	0.0001 to 0.0006
1"	0.0001 to 0.0006
1 1/4"	0.0002 to 0.0007
1 1/2"	0.0003 to 0.0008
1 3/4"	0.0004 to 0.0009
2"	0.0005 to 0.0010
2 1/2"	0.0006 to 0.0011
3"	0.0008 to 0.0013

PIN SQUARENESS

.001" IN 6" OF PIN LENGTH

FLAT AND PARALLEL

		DIE SET TYPE STANDARD	DIE SET TYPE BOSS
PUNCH HOLDER OR DIE SHOE	FLATNESS - (PER 12")	.001"	.002"
	PARALLELISM - (PER 12")	.001"	.002"
ASSEMBLED DIE SET	PARALLELISM - (PER 12")	.0015"	.002"

To calculate flatness/parallelism, divide diagonal of die set by 12". Then multiply by value indicated above.
(Example : 48" diagonal divided by 12" = (4). (4) x .001" = .004" TIR (flat or parallel).

NOTE: -Plates greater than 120" diagonal or less than 1.25" thick calculated upon application

OVERALL TOLERANCES FOR GAS CUT STEEL PLATE EXTERNAL AND INTERNAL SHAPES-MEASURED AT PLATE SURFACE

PLATE THICKNESS	SIZE B/O OR PLATE	TOLERANCE		MAXIMUM PIERCE AREA		MINIMUM INTERNAL RADIUS	MINIMUM B/O WIDTH	CLEARANCE PER SIDE	SQUARENESS TO SURFACE OF PLATE	MINIMUM DISTANCE BETWEEN B/O'S
		Plate	Burnout	W x L	Diameter					
1/4" - 2"	≤ 30" >30" ≤ 60" >60" ≤ 100"	+/- .030 +/- .060 +/- .090	+ .060/- .000 + .120/- .000 + .180/- .000	0.312 x 0.750	0.750	0.160	0.125	0.060	0.030 TIR	.125*
>2" - 3"	≤ 30" >30" ≤ 60" >60" ≤ 100"	+/- .030 +/- .060 +/- .090	+ .060/- .000 + .120/- .000 + .180/- .000	0.375 x 0.875	0.875	0.160	0.125	0.060	0.030 TIR	.188*
> 3" - 4 1/2"	≤ 30" >30" ≤ 60" >60" ≤ 100"	+/- .045 +/- .090 +/- .125	+ .090/- .000 + .180/- .000 + .250/- .000	0.500 x 1.000	1.125	0.190	0.180	0.090	0.045 TIR	.250*
>4 1/2" - 6"	≤ 30" >30" ≤ 60" >60" ≤ 100"	+/- .060 +/- .090 +/- .125	+ .120/- .000 + .180/- .000 + .250/- .000	0.625 x 1.250	1.250	0.190	0.250	0.125	0.060 TIR	.312*
>6" - 7 1/2"	≤ 30" >30" ≤ 60" >60" ≤ 100"	+/- .090 +/- .125 +/- .160	+ .180/- .000 + .250/- .000 + .320/- .000	1.000 x 1.750	1.750	0.250	0.375	0.138	0.075 TIR	.438*
>7 1/2" - 10"	≤ 30" >30" ≤ 60" >60" ≤ 100"	+/- .100 +/- .160 +/- .190	+ .200/- .000 + .320/- .000 + .380/- .000	1.750 x 2.500	2.500	0.250	0.500	0.250	0.100 TIR	.625*
>10" THICK OR OVER 100" LENGTH				UPON APPLICATION					0.010/INCH	.875*



GLOSSARY OF TERMS

AIR VENTS – slots cut in the plate surface near the bushings to relieve pressure caused by compression of the pin in the bushing.

BURN-OUT – an interior torch-cut opening of any shape. See our "Torch-cut Tolerance Chart" (see page 7370) for minimum burn-out sizes.

CLEAN-UP GRIND (MILL) – plate thickness is ground (milled) to a tolerance of $+.062/- .125$ " and no raw stock is visible.

DECIMAL GRIND (MILL) – plate thickness is ground (milled) to a tolerance other than a clean-up grind.

FINISHED EDGES – an edge of a plate that is machined (milled or ground). A torch-cut (or saw-cut) edge is standard unless otherwise specified to be finished.

GRINDING STANDARD – Superior has numerous Blanchard grinders (rotary) with a maximum capacity of 160" diagonal and a standard micro-finish of 125 maximum. Also, Superior can surface grind (reciprocating) plates up to 60 x 80" and a standard micro-finish of 63 maximum.

INVERTED DIE SET – a die set with the pins and bushings installed in opposite plates. On friction die sets, the pins are installed in the punch holder (top). On ball bearing die sets, the pins are installed in the die shoe (bottom). It is also recommended to use the "S" springs with ball bearing components (see page 1150).

OPEN DIE SET – a die set without the pin and bushing holes drilled & bored. The components are shipped loose with the plates. Note: pin diameter must be equal or less than plate thicknesses.

REVERSE DIE SET – a die set where the die shoe plate depth (front to back) is greater than the length (left to right).

SHAPE-CUT PLATE – a plate with a torch-cut exterior that is neither a perfect rectangle or circle. See our "Torch-cut Tolerance Chart" (page 7370) for minimum shape-cut sizes.

Note: a rectangle with torch-cut bolt slots or radiuses on corners is still considered shape-cut.

STRESS RELIEVING (THERMAL) – performed to all A36 torch-cut plates under the following circumstances: customer request, ground plate $< 1 \frac{1}{4}$ " thick, ground plate with length to depth ratio $> 3:1$, welded bosses, severe torch-cutting application, special machining applied. Also, all 4340 and 1045 material plates are stress relieved after torch-cutting.

SLUG CHUTE – an angled surface on the edge of a plate that can be supplied torch-cut (standard) or machined. Torch-cut slug chutes must have a minimum angle of 28 degrees.



NOTES:



NOTES:



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