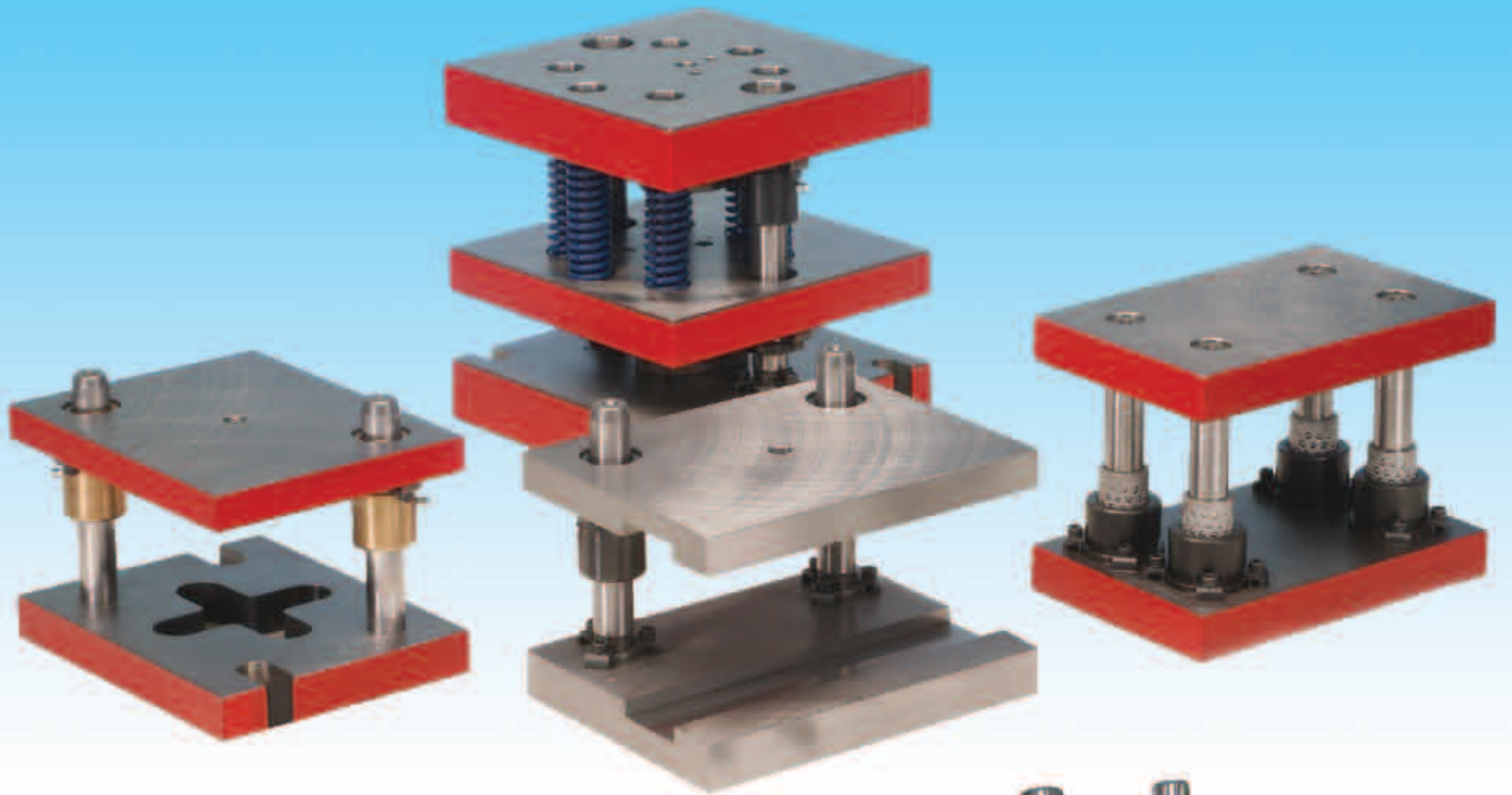
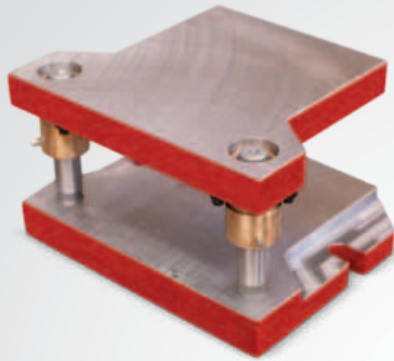
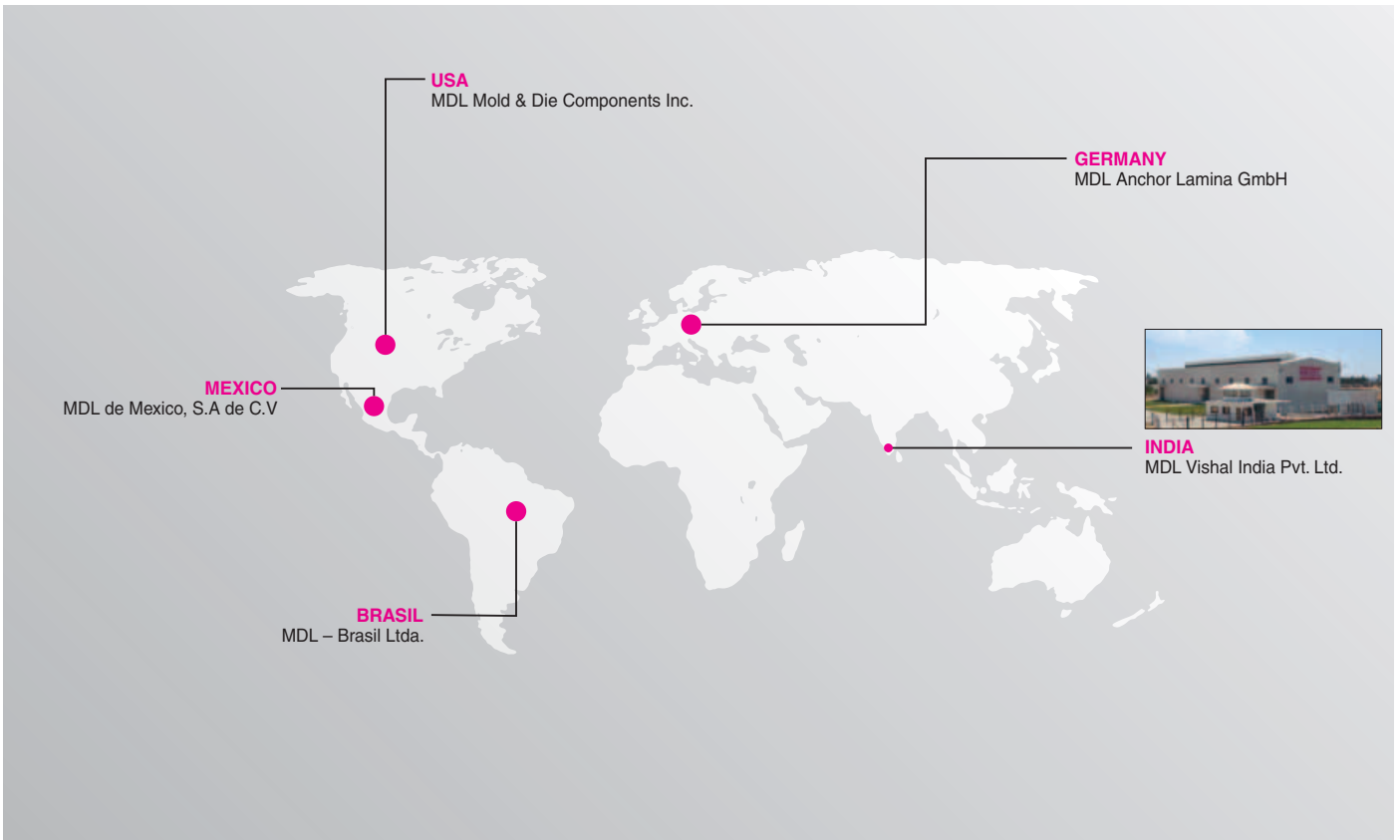




# DIE SETS & GUIDING COMPONENTS





## DIE SETS

- Standard sizes available from stock
- Customized sizes up to 3000 x 1500 mm
- Shorter delivery times mean more projects



## GUIDING COMPONENTS

- Large stock in India
- For all stamping applications
- Interchangeable guiding components

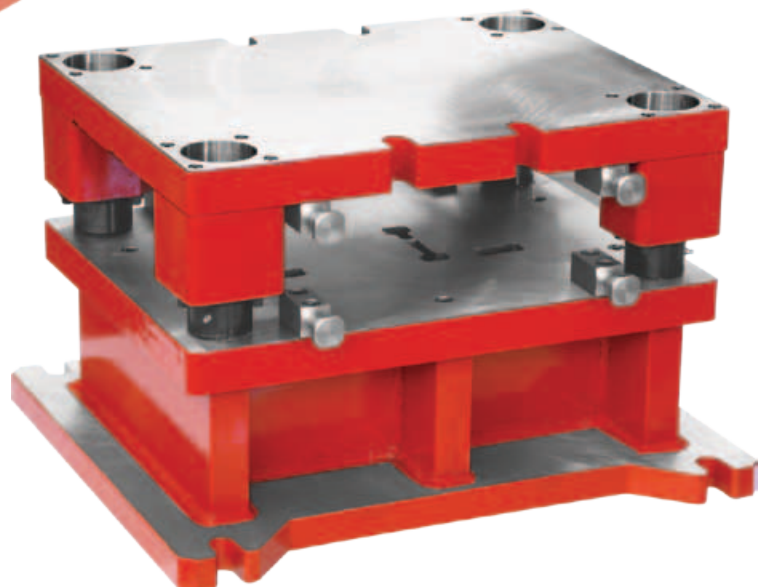
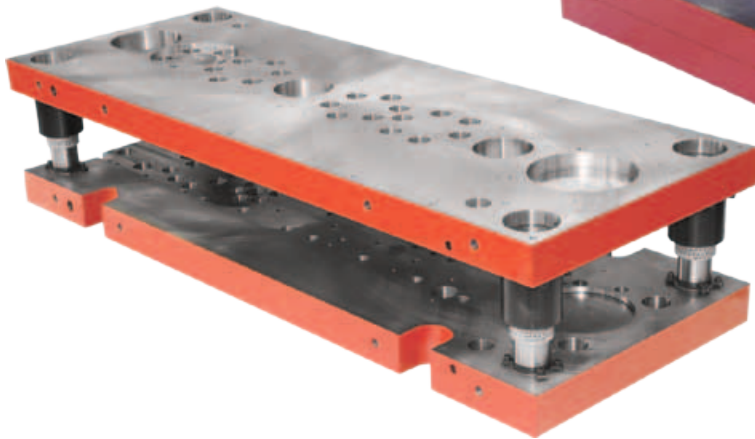
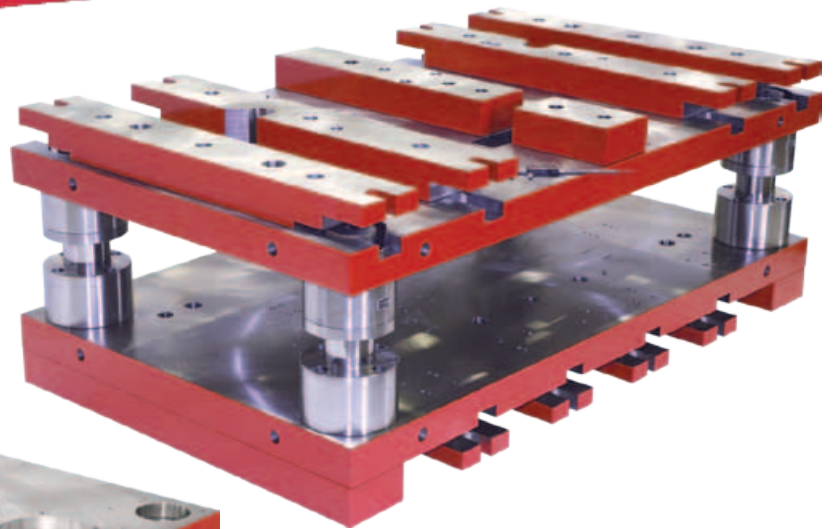
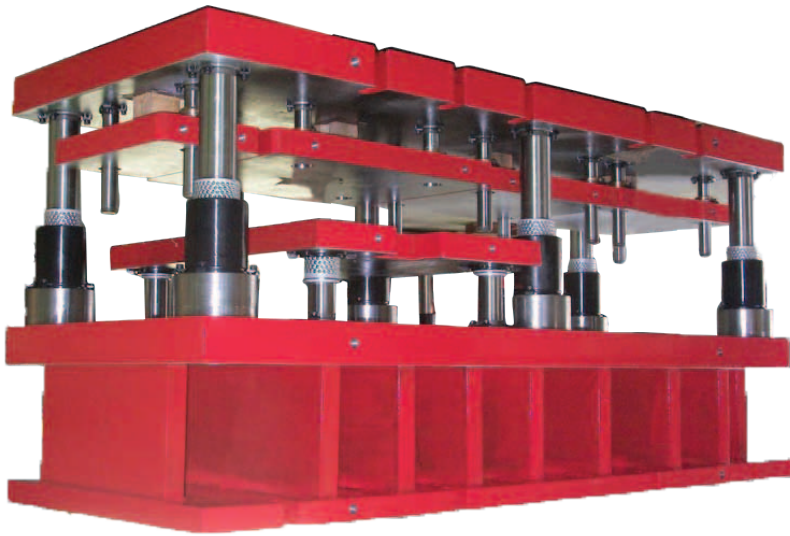
## SPRINGS

- Large stock in India
- According to ISO 10243
- Chrome silicon and trapezoidal wire

## SPECIAL MACHINING

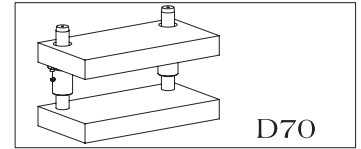
- Large and small plate grinding and CNC machining
- Gun drilling
- New projects or reworking existing plates





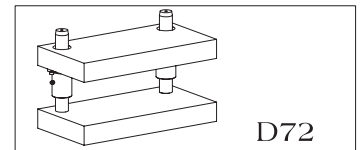
Die Sets..... 6

Standard Die Sets with Rear Pillars(D70)..... 7



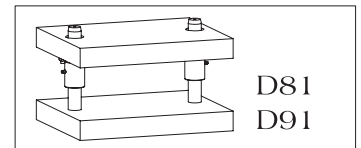
D70

Rectangular Die Sets with Rear Pillars(D72)..... 8



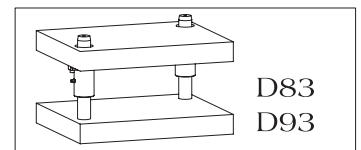
D72

Rectangular Die Sets with Centre Pillars(D81 & D91)..... 10



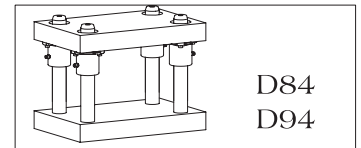
D81  
D91

Rectangular Die Sets with Diagonal Pillars(D83 & D93)..... 12



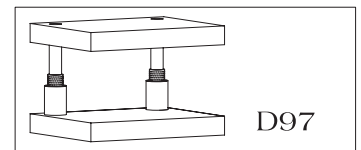
D83  
D93

Rectangular Die Sets with Four Pillars(D84 & D94)..... 14



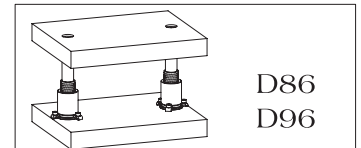
D84  
D94

Rectangular Die Sets with Rear Pillars and Ball Cages(D97)..... 16



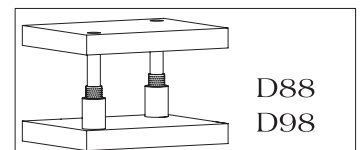
D97

Rectangular Die Sets with Centre Pillars and Ball Cages(D86 & D96)..... 18



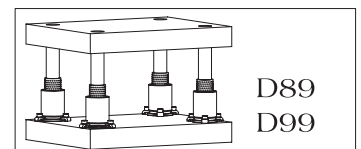
D86  
D96

Rectangular Die Sets with Diagonal Pillars and Ball Cages(D88 & D98)..... 20



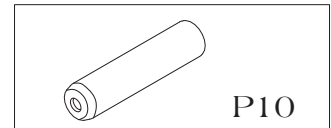
D88  
D98

Rectangular Die Sets with Four Pillars and Ball Cages(D89 & D99)..... 22

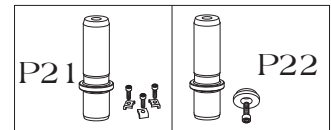


D89  
D99

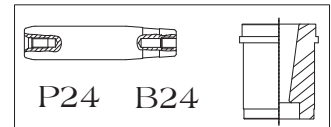
Straight Guide Pillars ..... 24



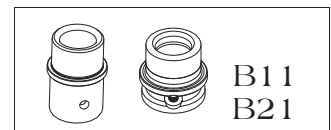
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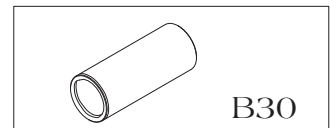
Demountable Shoulder Bushings ..... 28



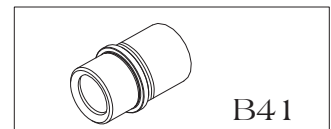
Low Profile Bushings ..... 30



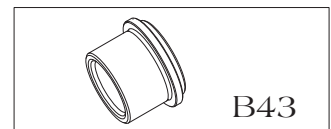
Straight Sleeve Ball Bearing Bushings ..... 31



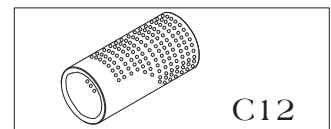
Ball Bearing Bushings ..... 32



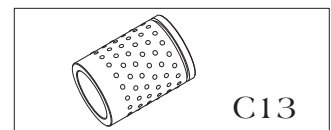
Stripper Plate Ball Bearing Bushings ..... 33



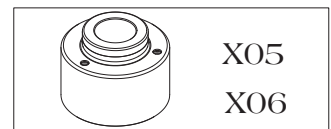
Ball Bearing Cages Type 2 ..... 34



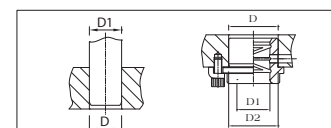
Stripper Plate Ball Bearing Cages Type 3 ..... 36



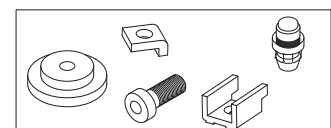
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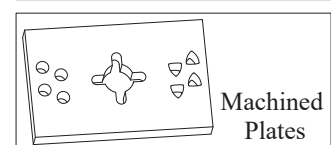
Bore Sizes Recommendations ..... 39



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How to Order Steel Machined Plates..... 41



In order to provide a better response to your urgent ordering requirements, we can offer you three new die set solutions:

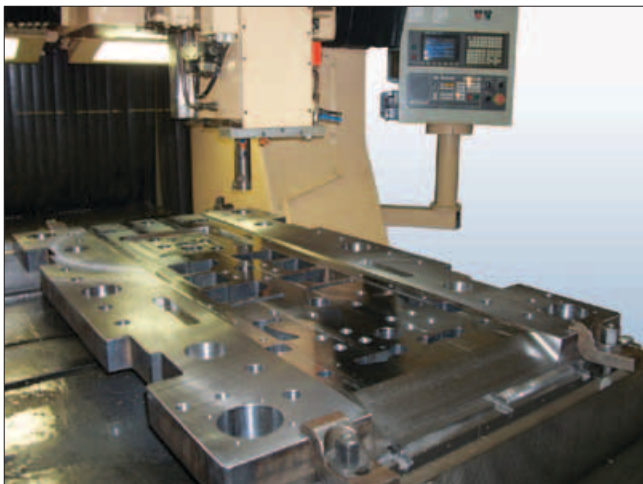
- Standard small die sets: 48 hours delivery ex works (See page 7)
- Rectangular die sets: 72 hours delivery ex works (See odd pages 9 to 23)
- Special die sets: according to your drawings and specifications (See even pages 8 to 22)

Matching bushes and pillars, we can offer you three fits:

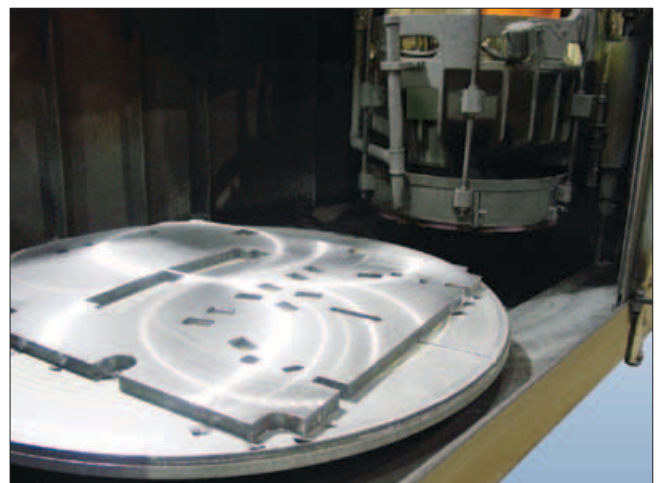
Category I: For tooling processing of very thin sheet metal.  
For very fine clearance between punch and die sections. Where clearance per side is less than 0.02mm.

Category II: For tooling processing of sheet metal more than 0.4mm thick.  
For clearance between punch and die sections from 0.02 to 0.06mm per side.  
For most applications.

Category III: For clearance between punch and die sections of 0.08mm per side.  
For automotive, forming dies.



CNC Double Column Machining  
Center Onsrud R48 Vertical Spindle  
Table Size 3000 x 1500(mm)

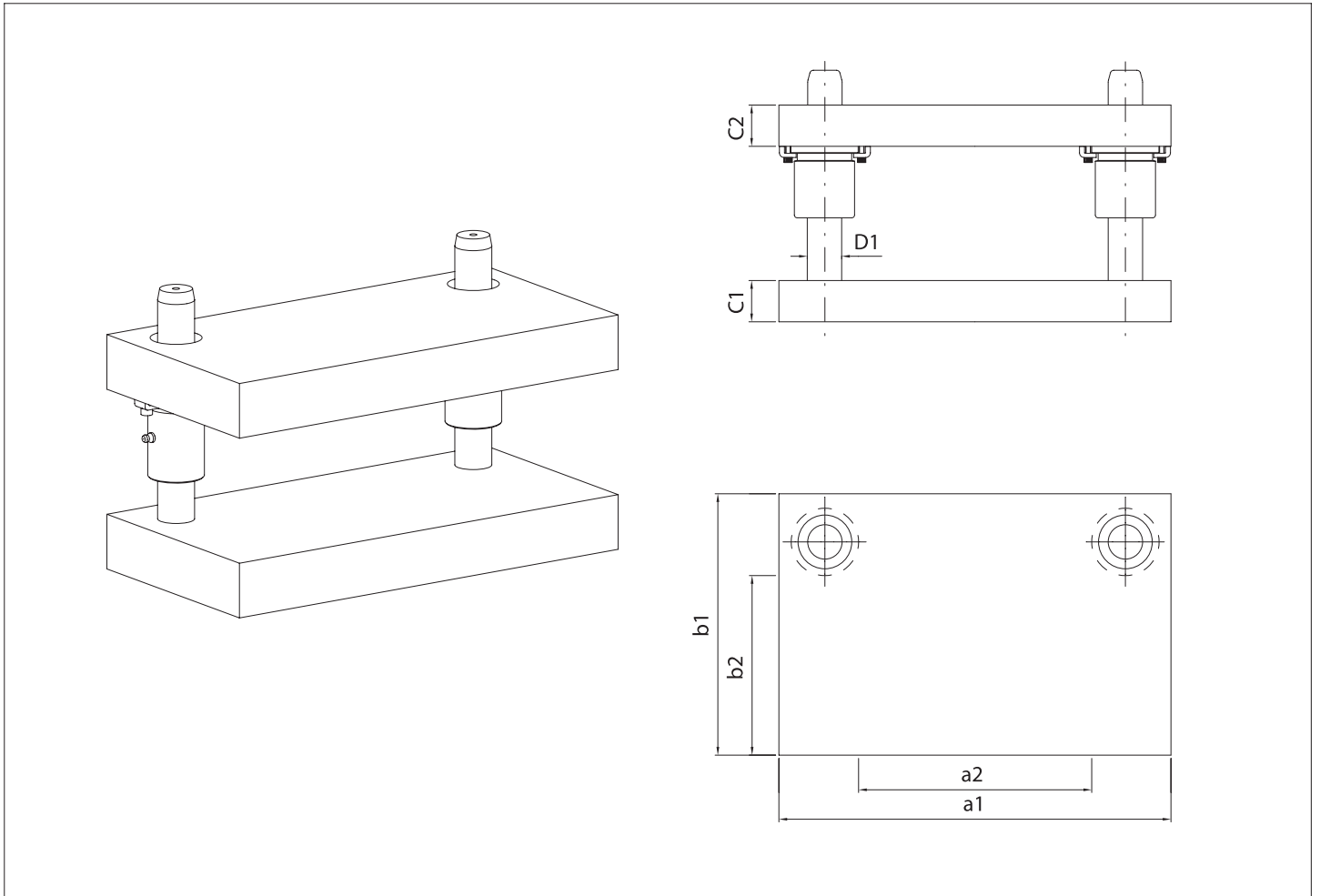


42HD-84 Blanchard Grinder  
Max. Diagonal 2100(mm)  
Max. Height 900(mm)

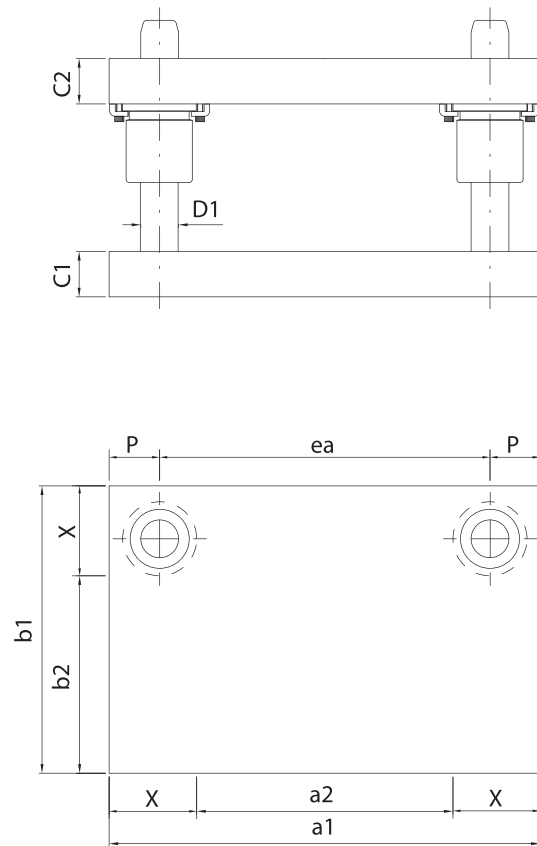
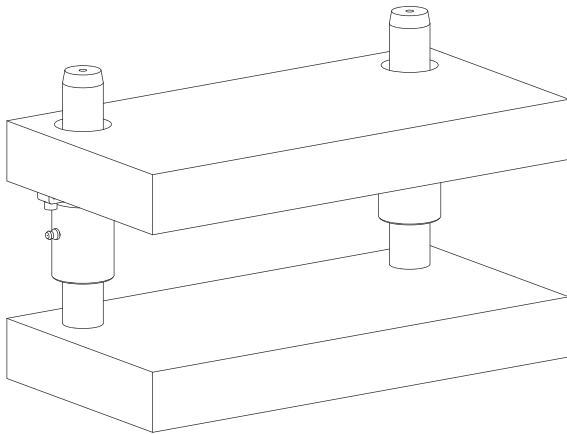


## Standard Die Sets with Rear Pillars(D70)

D70a<sub>1</sub>a<sub>1</sub>a<sub>1</sub>b<sub>1</sub>b<sub>1</sub>b<sub>1</sub>



$a_1$	$b_2$	$b_1$	$a_2$	$C_1$	$C_2$	$D_1$	CATALOG NUMBER
136 156 181	63	108	47.5 67.5 92.5	24	19	20	D70136108 D70156108 D70181108
178 203 238	80	143	53 78 113	30	24	25	D70178143 D70203143 D70238143
203 238 278	100	163	78 113 153				D70203163 D70238163 D70278163
246 286 336	125	195	106 146 196	39	30	32	D70246195 D70286195 D70336195
286 336	160	230	146 196				D70286230 D70336230
354	200	284	187	49	39	40	D70354284



DIMENSIONS, MINIMUM COMPONENTES AND THICKNESS(RECOMMENDED) FOR SPECIAL DIE SETS

$\frac{a_1}{b_2}$	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	mm
125														
160														
200														
250														
315														
400														
500														
630														
800														
1000														
mm	$D_1$	$C_1$	$C_2$	X	P			$D_1$	$C_1$	$C_2$	X	P		
	25	30	24	62.5	39			50	55	49	95	57.5		
	32	39	30	70	43			63	75	62	114	67.5		
	40	49	39	82.5	51									

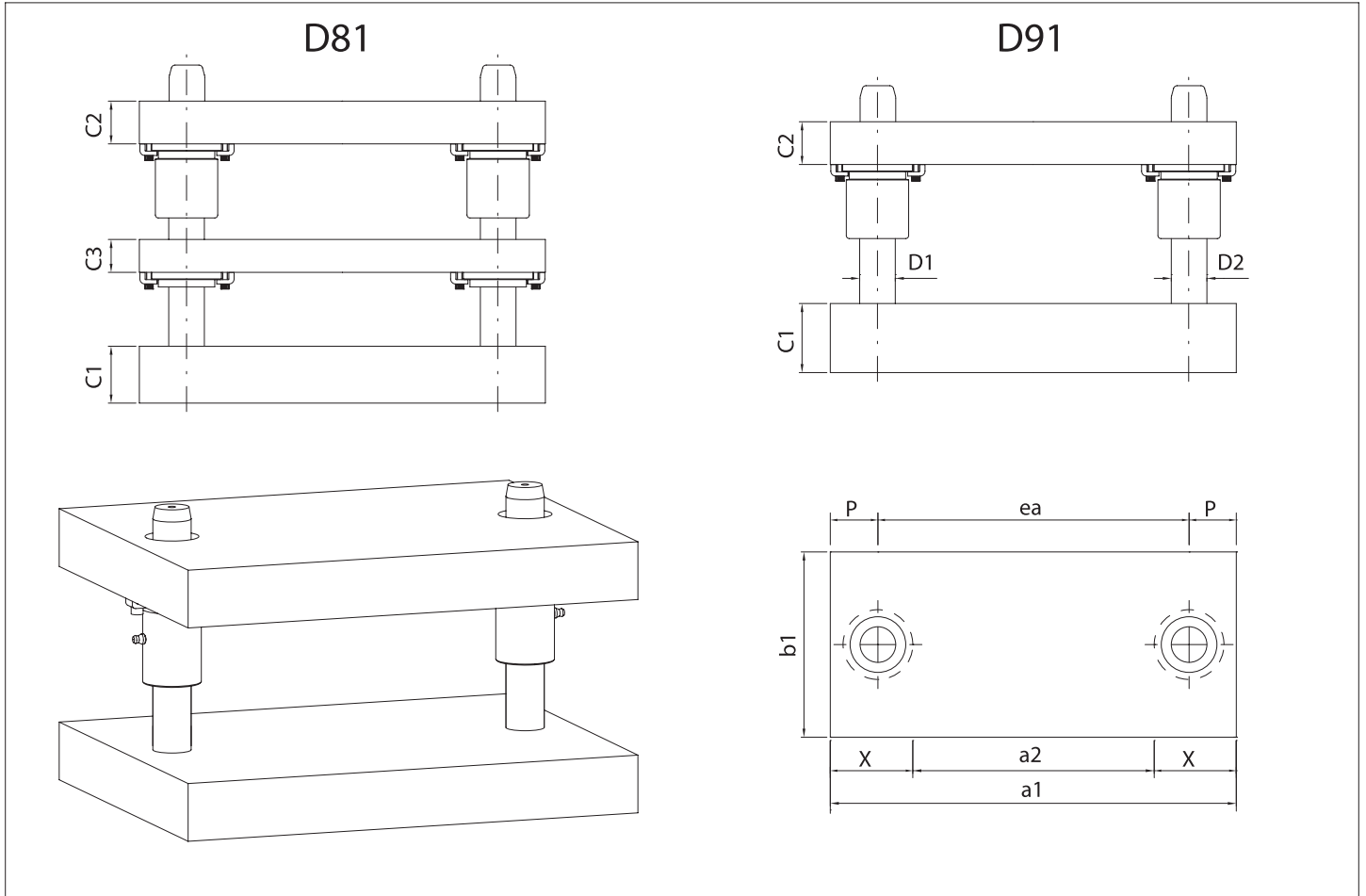
Note: For dimensions larger than the ones shown above, we recommend  $D_1 = 80\text{mm}$



## Rectangular Die Sets with Rear Pillars(D72)

D72xa1a1b2b2b2

$a_1$	$b_2$	$b_1$	$a_2$	$C_1$	$C_2$	$D_1$	$e_a$	CATALOG NUMBER
250	97.5	160	125	30	24	25	172	D72125097
				30	30			D72225097
				24	24			D72325097
	137.5	200	110	30	24	32	164	D72125137
				30	30			D72225137
				24	24			D72325137
180	250	39	30	32	164	D72125180		
39	39	D72225180						
30	30	D72325180						
315	130	200	175	39	30	32	229	D72131130
				39	39			D72231130
				30	30			D72331130
	180	250	150	39	30	40	213	D72131180
				39	39			D72231180
				30	30			D72331180
232.5	315	49	39	40	213	D72131232		
49	49	D72231232						
39	39	D72331232						
400	130	200	260	49	39	32	314	D72140130
				49	49			D72240130
				39	39			D72340130
	167.5	250	235	49	39	40	298	D72140167
				49	49			D72240167
				39	39			D72340167
232.5	315	310	49	39	50	385	D72140232	
			49	49			D72240232	
			39	39			D72340232	
317.5	400	465	49	39	50	528	D72140317	
			49	49			D72240317	
			39	39			D72340317	
500	167.5	250	335	49	39	40	398	D72150167
				49	49			D72250167
				39	39			D72350167
	232.5	315	440	49	39	50	515	D72150232
				49	49			D72250232
				39	39			D72350232
305	400	528	55	49	40	528	D72150305	
			55	55			D72250305	
			49	49			D72350305	
405	500	630	55	49	50	515	D72150405	
			55	55			D72250405	
			49	49			D72350405	
630	232.5	315	465	55	49	50	515	D72163232
				55	55			D72263232
				49	49			D72363232
	305	400	515	55	49	50	515	D72163305
				55	55			D72263305
				49	49			D72363305
405	500	630	55	49	50	515	D72163405	
			55	55			D72263405	
			49	49			D72363405	
535	630	630	55	49	50	515	D72163535	
			55	55			D72263535	
			49	49			D72363535	



DIMENSIONS, MINIMUM COMPONENTES AND THICKNESS(RECOMMENDED) FOR SPECIAL DIE SETS

$\frac{a_2}{b_1}$	mm														
	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	
125															
160															
200															
250															
315															
400															
500															
630															
800															
1000															
mm	D <sub>1</sub>	D <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	X	P		D <sub>1</sub>	D <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	X	P
	20	25	30	24	24	62.5	39		40	50	55	49	39	95	57.5
	25	32	39	30	30	70	43		50	63	75	62	49	114	67.5
	32	40	49	39	30	82.5	51								

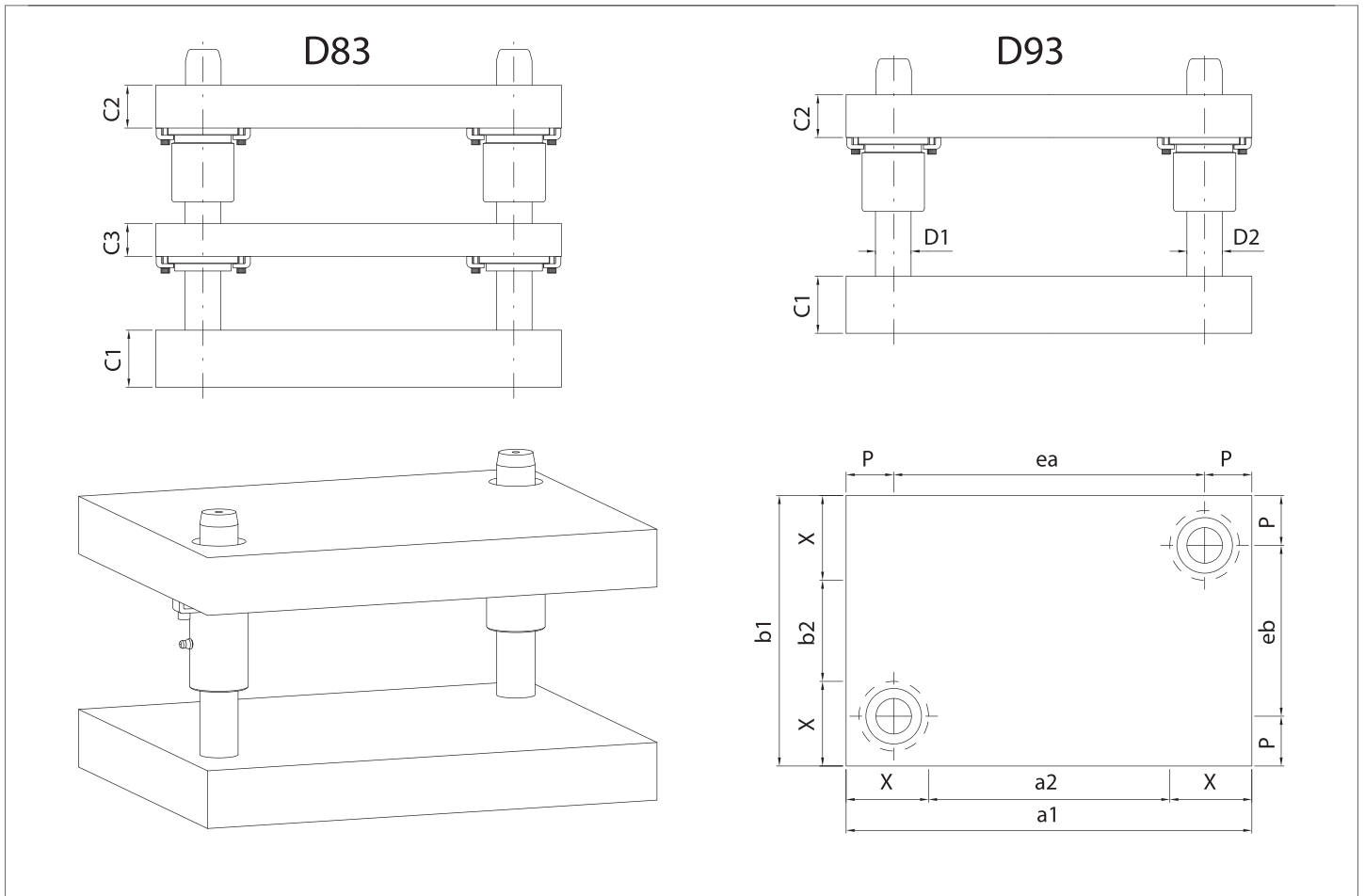
Note: For dimensions larger than the ones shown above, we recommend D1=63mm and D2=80mm



## Rectangular Die Sets with Centre Pillars(D81 & D91)

D81xa2a2b1b1b1  
D91xa2a2b1b1b1

a <sub>2</sub>	b <sub>1</sub>	a <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	e <sub>a</sub>	CATALOG NUMBER	WITH C3						
									C3	CATALOG NUMBER					
110	160	250	30	24	25	32	164	D91111160	24	D81111160					
			30	30				D91211160		D81211160					
			24	24				D91311160		D81311160					
	30		24	D91111200				D81111200							
	30		30	D91211200				D81211200							
	24		24	D91311200				D81311200							
250	250	39	30	30	39	30	D91111250	30	D81111250						
		39	39				D91211250		D81211250						
		30	30				D91311250		D81311250						
175	200	315	39	30	25	32	229	D91117200	30	D81117200					
			39	39				D91217200		D81217200					
			30	30				D91317200		D81317200					
	39		30	D91117250				D81117250							
	39		39	D91217250				D81217250							
	30		30	D91317250				D81317250							
	315		315	49				39		39	49	39	D91117315	30	D81117315
				49				49					D91217315		D81217315
				39				39					D91317315		D81317315
235	200	400	49	39	32	40	298	D91123200	30	D81123200					
			49	49				D91223200		D81223200					
			39	39				D91323200		D81323200					
	250		250	49				39		39	49	39	D91123250	30	D81123250
				49				49					D91223250		D81223250
				39				39					D91323250		D81323250
	315		315	49				39		39	49	39	D91123315	30	D81123315
				49				49					D91223315		D81223315
				39				39					D91323315		D81323315
	400		400	49				39		39	49	39	D91123400	30	D81123400
				49				49					D91223400		D81223400
				39				39					D91323400		D81323400
335	250	500	49	39	32	40	398	D91133250	30	D81133250					
			49	49				D91233250		D81233250					
			39	39				D91333250		D81333250					
	315		315	49				39		39	49	39	D91133315	30	D81133315
				49				49					D91233315		D81233315
				39				39					D91333315		D81333315
	400		400	55				49		49	55	49	D91133400	39	D81133400
				55				55					D91233400		D81233400
500	500	49	49	49	55	49	D91333400	39	D81333400						
		55	49				D91133500		D81133500						
		55	55				D91233500		D81233500						
440	315	630	55	49	40	50	515	D91144315	39	D81144315					
			55	55				D91244315		D81244315					
			49	49				D91344315		D81344315					
	400		400	55				49		49	55	49	D91144400	39	D81144400
				55				55					D91244400		D81244400
				49				49					D91344400		D81344400
	500		500	55				49		49	55	49	D91144500	39	D81144500
				55				55					D91244500		D81244500
				49				49					D91344500		D81344500
	630		630	55				49		49	55	49	D91144630	39	D81144630
				55				55					D91244630		D81244630
				49				49					D91344630		D81344630



DIMENSIONS, MINIMUM COMPONENTES AND THICKNESS(RECOMMENDED) FOR SPECIAL DIE SETS

$\frac{a_2}{b_1}$	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	mm
125															
160															
200															
250															
315															
400															
500															
630															
800															
1000															
mm	D <sub>1</sub>	D <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	X	P		D <sub>1</sub>	D <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	X	P
	20	25	30	24	24	62.5	39		40	50	55	49	39	95	57.5
	25	32	39	30	30	70	43		50	63	75	62	49	114	67.5
	32	40	49	39	30	82.5	51								

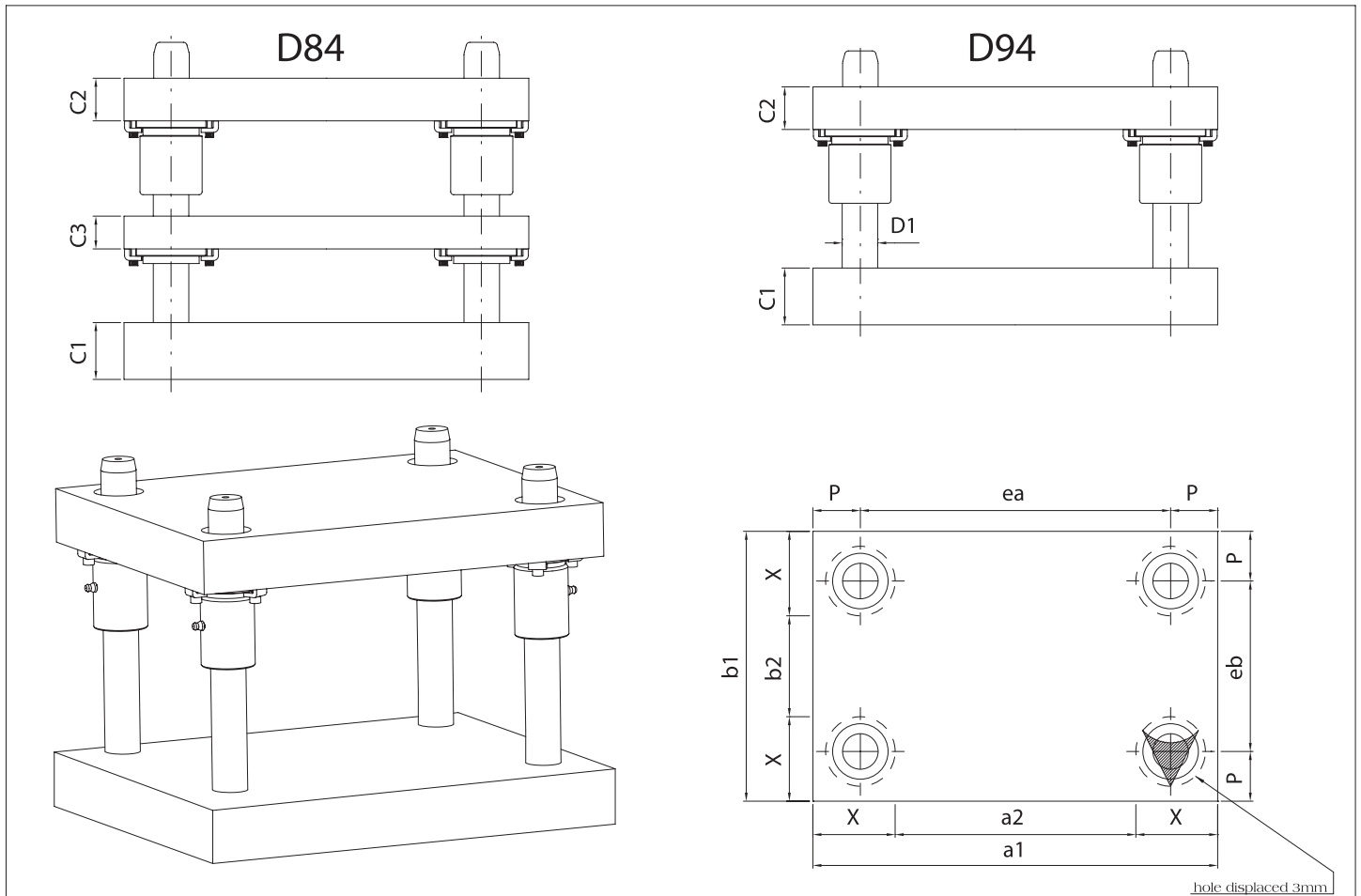
Note: For dimensions larger than the ones shown above, we recommend D1=63mm and D2=80mm



## Rectangular Die Sets with Diagonal Pillars(D83 & D93)

D83xa2a2b1b1b1  
D93xa2a2b1b1b1

a <sub>2</sub>	b <sub>1</sub>	a <sub>1</sub>	b <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	e <sub>a</sub>	e <sub>b</sub>	CATALOG NUMBER	WITH C3	
											C3	CATALOG NUMBER
110	160	250	20	30	24	25	32	164	74	D93111160	24	D83111160
				30	30					D93211160		D83211160
				24	24					D93311160		D83311160
	200		60	30	24					D93111200	30	D83111200
				30	30					D93211200		D83211200
				24	24					D93311200		D83311200
250	110	39	30	D93111250	30	D83111250						
		39	39	D93211250		D83211250						
		30	30	D93311250		D83311250						
175	200	315	60	39	30	25	32	229	114	D93117200	30	D83117200
				39	39					D93217200		D83217200
				30	30					D93317200		D83317200
	250		110	39	30				D93117250	30	D83117250	
				39	39				D93217250		D83217250	
				30	30				D93317250		D83317250	
315	175	49	39	D93117315	30	D83117315						
		49	49	D93217315		D83217315						
		39	39	D93317315		D83317315						
235	200	400	35	49	39	32	40	298	98	D93123200	30	D83123200
				49	49					D93223200		D83223200
				39	39					D93323200		D83323200
	250		85	49	39				D93123250	30	D83123250	
				49	49				D93223250		D83223250	
				39	39				D93323250		D83323250	
315	150	49	39	D93123315	30	D83123315						
		49	49	D93223315		D83223315						
		39	39	D93323315		D83323315						
400	235	49	39	D93123400	30	D83123400						
		49	49	D93223400		D83223400						
		39	39	D93323400		D83323400						
335	250	500	85	49	39	32	40	398	148	D93133250	30	D83133250
				49	49					D93233250		D83233250
				39	39					D93333250		D83333250
	315		150	49	39				D93133315	30	D83133315	
				49	49				D93233315		D83233315	
				39	39				D93333315		D83333315	
400	235	55	49	D93133400	39	D83133400						
		55	55	D93233400		D83233400						
		49	49	D93333400		D83333400						
500	335	55	49	D93133500	39	D83133500						
		55	55	D93233500		D83233500						
		49	49	D93333500		D83333500						
440	315	630	125	55	49	40	50	515	200	D93144315	39	D83144315
				55	55					D93244315		D83244315
				49	49					D93344315		D83344315
	400		210	55	49				D93144400	39	D83144400	
				55	55				D93244400		D83244400	
				49	49				D93344400		D83344400	
500	310	55	49	D93144500	39	D83144500						
		55	55	D93244500		D83244500						
		49	49	D93344500		D83344500						
630	440	55	49	D93144630	39	D83144630						
		55	55	D93244630		D83244630						
		49	49	D93344630		D83344630						



DIMENSIONS, MINIMUM COMPONENTES AND THICKNESS(RECOMMENDED) FOR SPECIAL DIE SETS

$\frac{a_2}{b_1}$	mm													
	160	200	250	315	400	500	630	800	1000	1250	1600	2000		
160														
200														
250														
315														
400														
500														
630														
800														
1000														
1250														
mm	D <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	X	P		D <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	X	P	
	25	30	24	24	62.5	39		50	55	49	39	95	57.5	
	32	39	30	30	70	43		63	75	62	49	114	67.5	
	40	49	39	39	82.5	51								

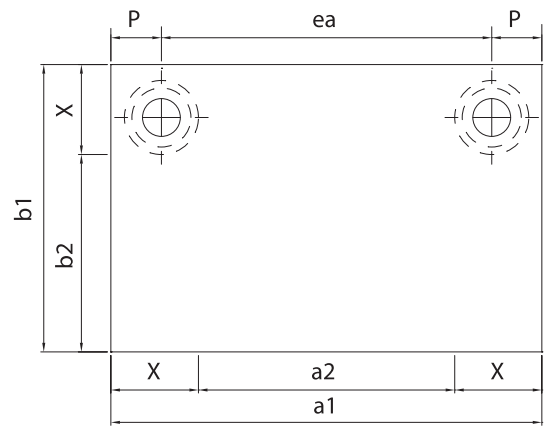
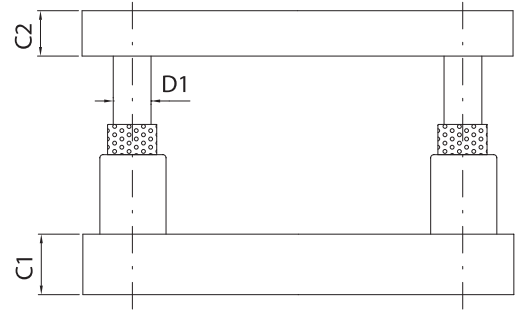
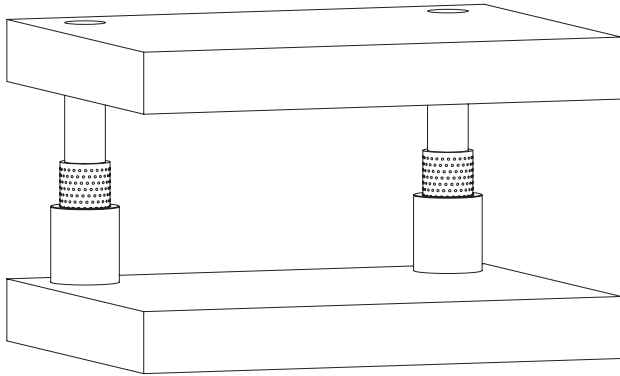
Note: For dimensions larger than the ones shown above, we recommend D<sub>1</sub> = 80mm



## Rectangular Die Sets with Four Pillars(D84 & D94)

D84xa1a1b1b1b1  
D94xa1a1b1b1b1

a <sub>1</sub>	b <sub>1</sub>	a <sub>2</sub>	b <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	D <sub>1</sub>	e <sub>a</sub>	e <sub>b</sub>	CATALOG NUMBER	WITH C3		
										C3	CATALOG NUMBER	
250	160	125	35	30	24	25	172	82	D94125160	24	D84125160	
				30	30				D94225160		D84225160	
				24	24				D94325160		D84325160	
	200		75	30	24			D94125200	D84125200			
				30	30			D94225200	D84225200			
				24	24			D94325200	D84325200			
250	125	125	39	30	30	30	172	D94125250	30	D84125250		
			39	39				D94225250		D84225250		
			30	30				D94325250		D84325250		
315	200	190	75	39	30	25	237	122	D94131200	30	D84131200	
				39	39				D94231200		D84231200	
				30	30				D94331200		D84331200	
	250		125	39	30			D94131250	D84131250			
				39	39			D94231250	D84231250			
				30	30			D94331250	D84331250			
315	190	190	49	39	39	39	237	D94131315	30	D84131315		
			49	49				D94231315		D84231315		
			39	39				D94331315		D84331315		
400	200	275	75	49	39	25	322	122	D94140200	30	D84140200	
				49	49				D94240200		D84240200	
				39	39				D94340200		D84340200	
	250		125	49	39			D94140250	D84140250			
				49	49			D94240250	D84240250			
				39	39			D94340250	D84340250			
315	260	175	49	39	32	314	229	D94140315	30	D84140315		
			49	49				D94240315		D84240315		
			39	39				D94340315		D84340315		
400	260	260	49	39	39	39	314	D94140400		30	D84140400	
			49	49				D94240400			D84240400	
			39	39				D94340400			D84340400	
500	250	360	110	49	39	32	414	164	D94150250		30	D84150250
				49	49				D94250250			D84250250
				39	39				D94350250			D84350250
	315		175	49	39			D94150315	D84150315			
				49	49			D94250315	D84250315			
				39	39			D94350315	D84350315			
400	260	260	49	39	39	39	314	D94150400	39	D84150400		
			49	49				D94250400		D84250400		
			49	39				D94350400		D84350400		
500	360	360	49	39	39	39	414	D94150500		39	D84150500	
			49	49				D94250500			D84250500	
			39	39				D94350500			D84350500	
630	315	465	150	49	39	40	528	213	D94163315		39	D84163315
				49	49				D94263315			D84263315
				39	39				D94363315			D84363315
	400		235	49	39			D94163400	D84163400			
				49	49			D94263400	D84263400			
				39	39			D94363400	D84363400			
500	310	310	55	49	49	55	385	D94163500	39	D84163500		
			49	49				D94263500		D84263500		
			49	49				D94363500		D84363500		
630	440	440	55	49	49	55	515	D94163630		39	D84163630	
			55	55				D94263630			D84263630	
			49	49				D94363630			D84363630	



DIMENSIONS, MINIMUM COMPONENTES AND THICKNESS(RECOMMENDED) FOR SPECIAL DIE SETS

$\frac{a_1}{b_2}$	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000
mm	D <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	*X	**X	P		D <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	*X	**X	P
125	25	30	24	66.5	71	44	50	55	49	104.5	110.5	64	
160	32	39	30	75	79.5	48	63	75	62	120.5	127	73	
200	40	49	39	88.5	93.5	56							

Note: For dimensions larger than the ones shown above, we recommend D1 = 80mm

\*X= With Straight Sleeve Ball Cage Bushings  
 \*\*X= With Shoulder Sleeve Ball Cage Bushings



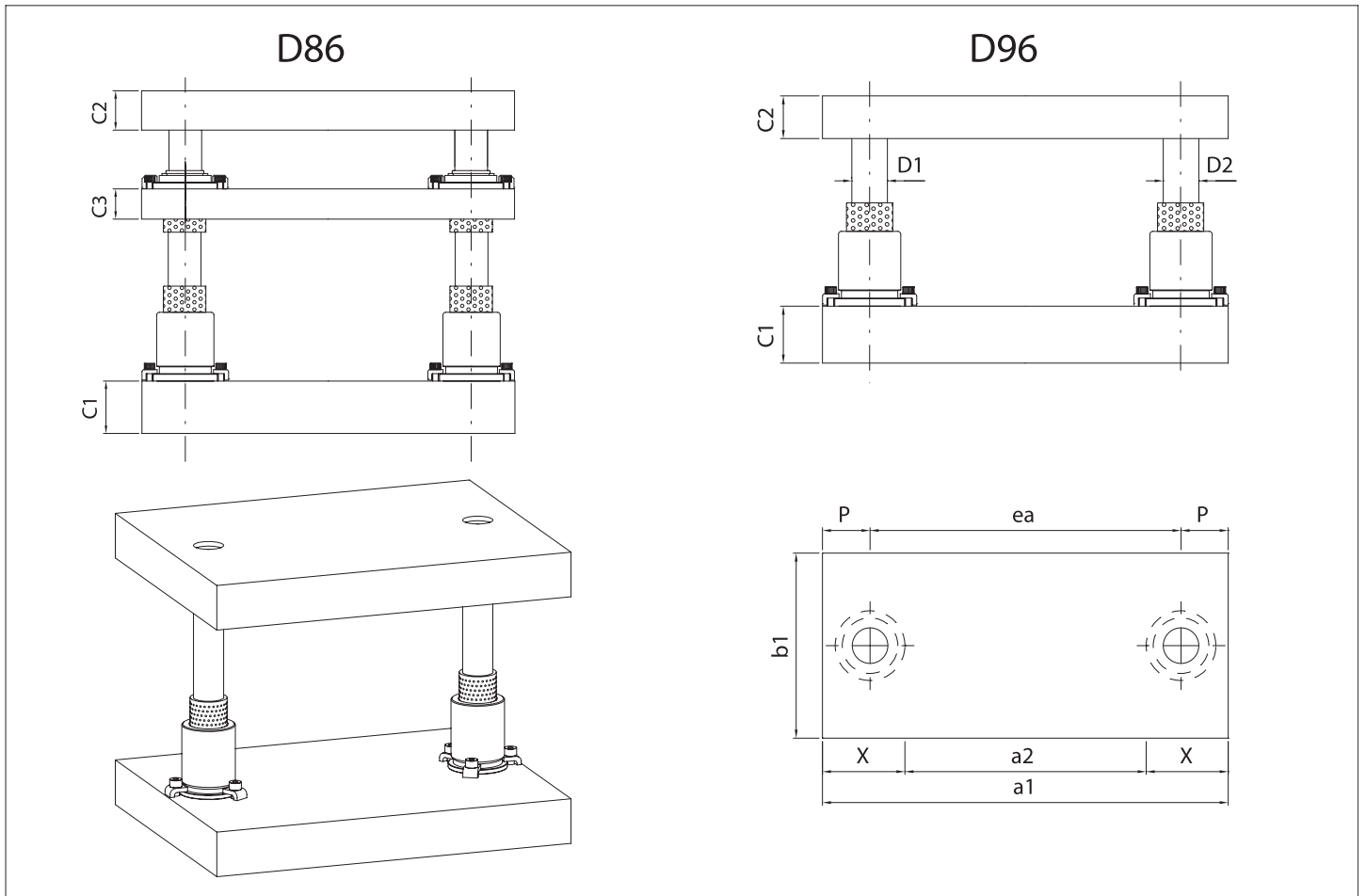
## Rectangular Die Sets with Rear Pillars and Ball Cage(D97)

D97xa1a1b2b2b2

$a_1$	$b_2$	$b_1$	$a_2$	$C_1$	$C_2$	$D_1$	$e_a$	CATALOG NUMBER	
250	*93.5 **89.0	160	*117 **108	30	24	25	162	D97125093	
				30	30			D97225093	
				24	24			D97325093	
		*133.5 **129.0	200		30	30		D97125133	
					30	24		D97225133	
					24	24		D97325133	
	*175.0 **170.5	250	*100 **91	39	30	32	154	D97125175	
				39	39			D97225175	
				30	30			D97325175	
315	*125.0 **120.5	200	*165 **156	39	30	32	219	D97131125	
				39	39			D97231125	
				30	30			D97331125	
		*175.0 **170.5	250		39	30		D97131175	
					39	39		D97231175	
					30	30		D97331175	
	*226.5 **221.5	315	*138 **128	49	39	40	203	D97131226	
				49	49			D97231226	
				39	39			D97331226	
400	*125.0 **120.5	200	*250 **241	49	39	32	304	D97140125	
				49	49			D97240125	
				39	39			D97340125	
		*161.5 **156.5	250	*223 **213	49	39	40	288	D97140161
					49	49			D97240161
					39	39			D97340161
	*226.5 **221.5	315		49	39			D97140226	
				49	49			D97240226	
				39	39			D97340226	
	*311.5 **306.5	400		49	39			D97140311	
				49	49			D97240311	
				39	39			D97340311	
500	*161.5 **156.5	250	*323 **313	49	39	40	388	D97150161	
				49	49			D97250161	
				39	39			D97350161	
		*226.5 **221.5	315		49	39			D97150226
					49	49			D97250226
					39	39			D97350226
	*295.5 **289.5	400	*291 **279	55	49	50	372	D97150295	
				55	55			D97250295	
				49	49			D97350295	
	*395.5 **389.5	500		55	49			D97150395	
				55	55			D97250395	
				49	49			D97350395	
630	*226.5 **221.5	315	*453 **443	55	49	40	518	D97163226	
				55	55			D97263226	
				49	49			D97363226	
		*295.5 **289.5	400	*421 **409	55	49	50	502	D97163295
					55	55			D97263295
					49	49			D97363295
	*395.5 **389.5	500		55	49			D97163395	
				55	55			D97263395	
				49	49			D97363395	
	*525.5 **519.5	630		55	49			D97163525	
				55	55			D97263525	
				49	49			D97363525	

\* = Using Straight Sleeve Ball Cage Bushings

\*\* = Using Shoulder Sleeve Ball Cage Bushings



DIMENSIONS, MINIMUM COMPONENTES AND THICKNESS(RECOMMENDED) FOR SPECIAL DIE SETS

$\frac{a_2}{b_1}$	mm																
	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000			
125	Grey									Dark Blue					Blue		
160	Grey									Dark Blue					Blue		
200	Grey			Light Blue		Dark Blue			Blue					Dark Blue			
250	Grey			Light Blue		Dark Blue			Blue					Dark Blue			
315	Grey			Light Blue		Dark Blue			Blue					Dark Blue			
400	Grey			Light Blue		Dark Blue			Blue					Dark Blue			
500	Grey			Light Blue		Dark Blue			Blue					Dark Blue			
630	Grey			Light Blue		Dark Blue			Blue					Dark Blue			
800	Grey			Light Blue		Dark Blue			Blue					Dark Blue			
1000	Grey			Light Blue		Dark Blue			Blue					Dark Blue			
mm	D <sub>1</sub>	D <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	*X	**X	P		D <sub>1</sub>	D <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	*X	**X	P
Grey	20	25	30	24	24	66.5	71	44		40	50	55	49	39	104.5	110.5	64
Light Blue	25	32	39	30	30	75	79.5	48		50	63	75	62	49	120.5	127	73
Dark Blue	32	40	49	39	30	88.5	93.5	56									

Note: For dimensions larger than the ones shown above, we recommend D1=63mm and D2=80mm

\*X= With Straight Sleeve Ball Cage Bushings  
\*\*X= With Shoulder Sleeve Ball Cage Bushings



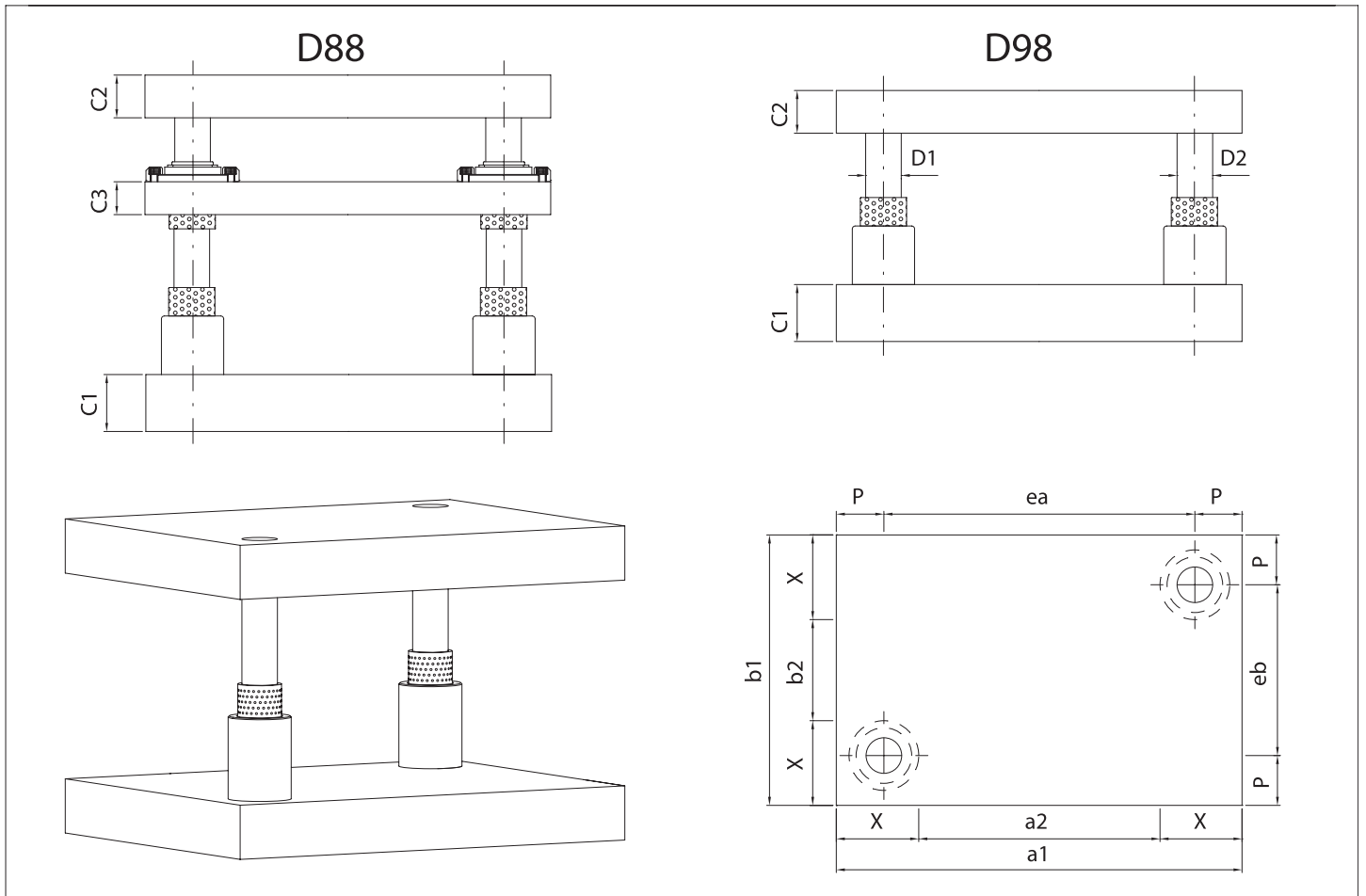
## Rectangular Die Sets with Centre Pillars and Ball Cage(D86 & D96)

D86xa2a2b1b1b1  
D96xa2a2b1b1b1

a <sub>2</sub>	b <sub>1</sub>	a <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	e <sub>a</sub>	CATALOG NUMBER	WITH C3	
									C3	CATALOG NUMBER
*110 **91	160	250	30	24	25	32	154	D96110160	24	D86110160
			30	30				D96210160		D86210160
			24	24				D96310160		D86310160
	30		24	D96110200				D86110200		
	30		30	D96210200				D86210200		
	24		24	D96310200				D86310200		
250	250	39	30	30	39	30	D96110250	30	D86110250	
		39	39				D96210250		D86210250	
		30	30				D96310250		D86310250	
*165 **156	200	315	39	30	25	32	219	D96116200	30	D86116200
			39	39				D96216200		D86216200
			30	30				D96316200		D86316200
	39		30	D96116250				D86116250		
	39		39	D96216250				D86216250		
	30		30	D96316250				D86316250		
315	315	49	39	39	49	39	D96116315	30	D86116315	
		49	49				D96216315		D86216315	
		39	39				D96316315		D86316315	
*223 **213	200	400	49	39	32	40	288	D96122200	30	D86122200
			49	49				D96222200		D86222200
			39	39				D96322200		D86322200
	49		39	D96122250				D86122250		
	49		49	D96222250				D86222250		
	39		39	D96322250				D86322250		
315	315	49	39	39	49	39	D96122315	30	D86122315	
		49	49				D96222315		D86222315	
		39	39				D96322315		D86322315	
400	400	49	39	39	49	39	D96122400	30	D86122400	
		49	49				D96222400		D86222400	
		39	39				D96322400		D86322400	
*223 **313	250	500	49	39	32	40	388	D96132250	30	D86132250
			49	49				D96232250		D86232250
			39	39				D96332250		D86332250
	49		39	D96132315				D86132315		
	49		49	D96232315				D86232315		
	39		39	D96332315				D86332315		
400	400	55	49	55	55	49	D96132400	39	D86132400	
		55	55				D96232400		D86232400	
		49	49				D96332400		D86332400	
500	500	55	49	55	55	49	D96132500	39	D86132500	
		55	55				D96232500		D86232500	
		49	49				D96332500		D86332500	
*421 **409	315	630	55	49	40	50	502	D96142315	39	D86142315
			55	55				D96242315		D86242315
			49	49				D96342315		D86342315
	55		49	D96142400				D86142400		
	55		55	D96242400				D86242400		
	49		49	D96342400				D86342400		
500	500	55	49	55	55	49	D96142500	39	D86142500	
		55	55				D96242500		D86242500	
		49	49				D96342500		D86342500	
630	630	55	49	55	55	49	D96142630	39	D86142630	
		55	55				D96242630		D86242630	
		49	49				D96342630		D86342630	

\* = Using Straight Sleeve Ball Cage Bushings

\*\* = Using Shoulder Sleeve Ball Cage Bushings



DIMENSIONS, MINIMUM COMPONENTES AND THICKNESS(RECOMMENDED) FOR SPECIAL DIE SETS

$\frac{a_2}{b_1}$	mm																
	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000			
125	Light Blue								Dark Blue								
160	Light Blue				Dark Blue				Dark Blue								
200	Light Blue			Dark Blue			Dark Blue										
250	Light Blue		Dark Blue		Dark Blue			Dark Blue									
315	Light Blue		Dark Blue		Dark Blue			Dark Blue									
400	Light Blue		Dark Blue		Dark Blue			Dark Blue									
500	Light Blue		Dark Blue		Dark Blue			Dark Blue									
630	Light Blue		Dark Blue		Dark Blue			Dark Blue									
800	Light Blue		Dark Blue		Dark Blue			Dark Blue									
1000	Light Blue		Dark Blue		Dark Blue			Dark Blue									
mm	D <sub>1</sub>	D <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	*X	**X	P	D <sub>1</sub>	D <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	*X	**X	P	
Light Blue	20	25	30	24	24	66.5	71	44	Dark Blue	40	50	55	49	39	104.5	110.5	64
Light Blue	25	32	39	30	30	75	79.5	48	Dark Blue	50	63	75	62	49	120.5	127	73
Dark Blue	32	40	49	39	30	88.5	93.5	56									

Note: For dimensions larger than the ones shown above we recommend the use of D1= 63mm and D2= 80mm

\*X= With Straight Sleeve Ball Cage Bushings  
\*\*X= With Shoulder Sleeve Ball Cage Bushings



## Rectangular Die Sets with Diagonal Pillars and Ball Cage(D88 & D98)

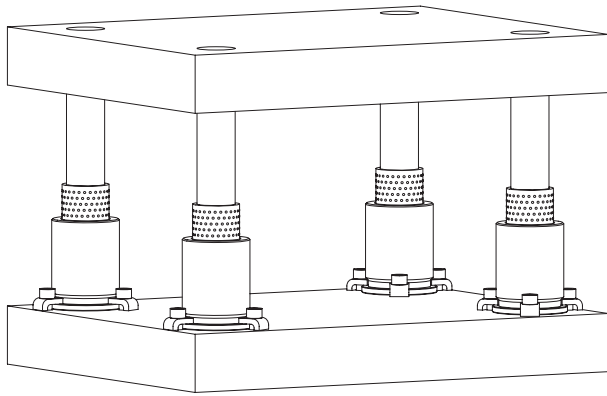
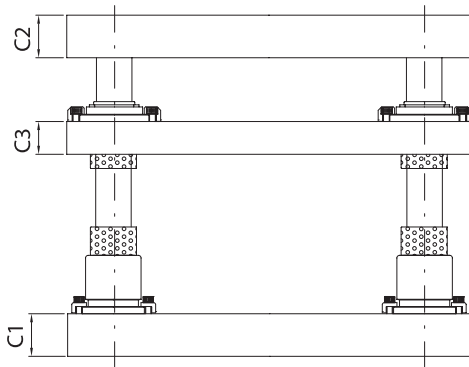
D88xa2a2b1b1b1  
D98xa2a2b1b1b1

a <sub>2</sub>	b <sub>1</sub>	a <sub>1</sub>	b <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	e <sub>a</sub>	e <sub>b</sub>	CATALOG NUMBER	WITH C3	
											C3	CATALOG NUMBER
*100 **91	160	250	*10 **1	30 30 24	24 30 24	25	32	154	64	D98110160 D98210160 D98310160	24	D88110160 D88210160 D88310160
	200		*50 **41	30 30 24	24 30 24					D98110200 D98210200 D98310200		D88110200 D88210200 D88310200
	250		*100 **91	39 39 30	30 39 30					D98110250 D98210250 D98310250		30 D88110250 D88210250 D88310250
*165 **156	200	315	*50 **41	39 39 30	30 39 30	25	32	219	104	D98116200 D98216200 D98316200	30	D88116200 D88216200 D88316200
	250		*100 **91	39 39 30	30 39 30					D98116250 D98216250 D98316250		D88116250 D88216250 D88316250
	315		*165 **156	49 49 39	39 49 39					D98116315 D98216315 D98316315		D88116315 D88216315 D88316315
*223 **213	200	400	*23 **13	49 49 39	39 49 39	32	40	288	88	D98122200 D98222200 D98322200	30	D88122200 D88222200 D88322200
	250		*73 **63	49 49 39	39 49 39					D98122250 D98222250 D98322250		D88122250 D88222250 D88322250
	315		*138 **128	49 49 39	39 49 39					D98122315 D98222315 D98322315		D88122315 D88222315 D88322315
	400		*223 **213	49 49 39	39 49 39					D98122400 D98222400 D98322400		D88122400 D88222400 D88322400
*323 **313	250	500	*73 **63	49 49 39	39 49 39	32	40	388	138	D98132250 D98232250 D98332250	30	D88132250 D88232250 D88332250
	315		*138 **128	49 49 39	39 49 39					D98132315 D98232315 D98332315		D88132315 D88232315 D88332315
	400		*223 **213	55 55 49	49 55 49					D98132400 D98232400 D98332400		39 D88132400 D88232400 D88332400
	500		*323 **313	55 55 49	49 55 49					D98132500 D98232500 D98332500		D88132500 D88232500 D88332500
*421 **409	315	630	*106 **94	55 55 49	49 55 49	40	50	502	187	D98142315 D98242315 D98342315	39	D88142315 D88242315 D88342315
	400		*191 **179	55 55 49	49 55 49					D98142400 D98242400 D98342400		D88142400 D88242400 D88342400
	500		*291 **279	55 55 49	49 55 49					D98142500 D98242500 D98342500		D88142500 D88242500 D88342500
	630		*421 **409	55 55 49	49 55 49					D98142630 D98242630 D98342630		D88142630 D88242630 D88342630

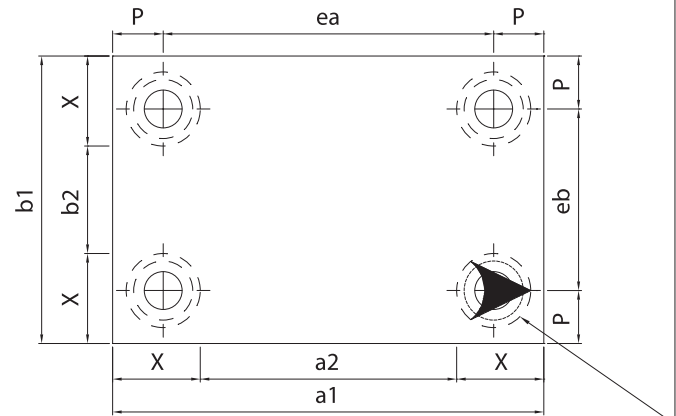
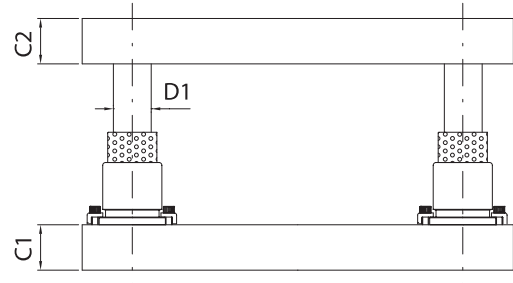
\* = Using Straight Sleeve Ball Cage Bushings

\*\* = Using Shoulder Sleeve Ball Cage Bushings

### D89



### D99



hole displaced 6mm

## DIMENSIONS, MINIMUM COMPONENTES AND THICKNESS(RECOMMENDED) FOR SPECIAL DIE SETS

$\frac{a_2}{b_1}$	mm													
	160	200	250	315	400	500	630	800	1000	1250	1600	2000		
160														
200														
250														
315														
400														
500														
630														
800														
1000														
1250														
mm	D <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	*X	**X	P	D <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	*X	**X	P
	25	30	24	24	66.5	71	44	50	55	49	39	104.5	110.5	64
	32	39	30	30	75	79.5	48	63	75	62	49	120.5	127	73
	40	49	39	39	88.5	93.5	56							

Note: For dimensions larger than the ones shown above, we recommend D1 = 80mm

\*X= With Straight Sleeve Ball Cage Bushings  
\*\*X= With Shoulder Sleeve Ball Cage Bushings



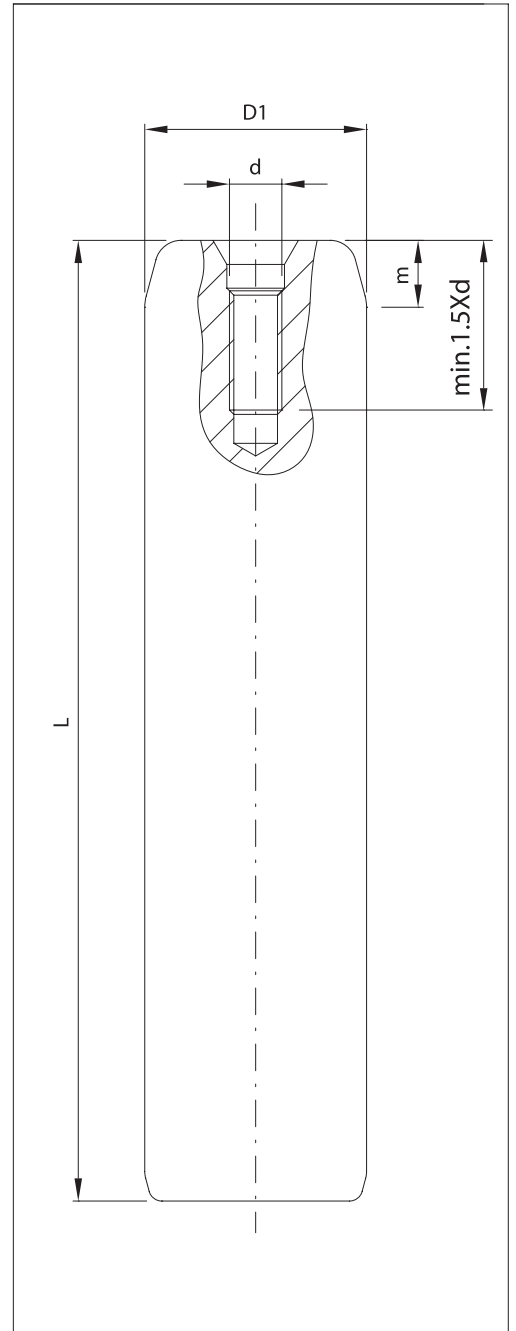
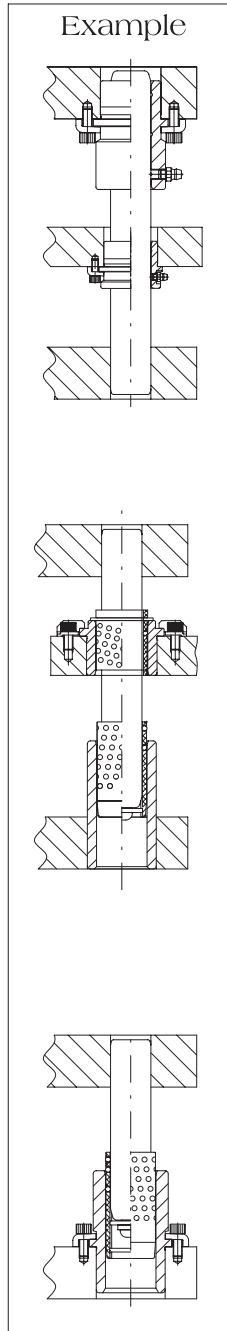
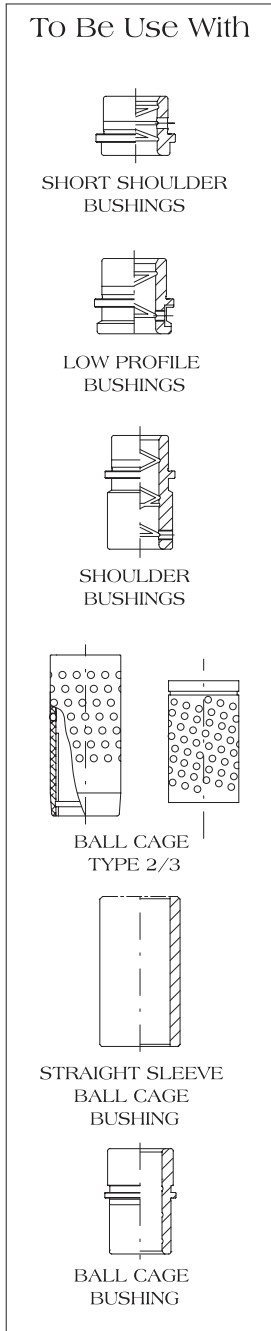
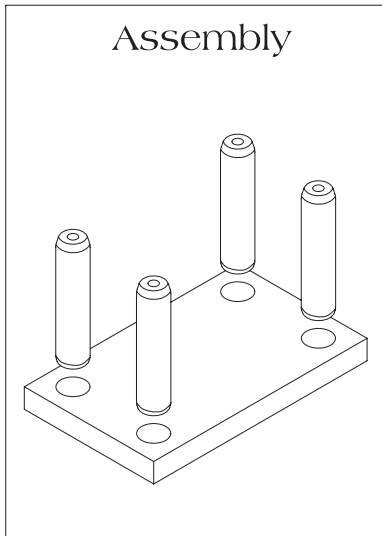
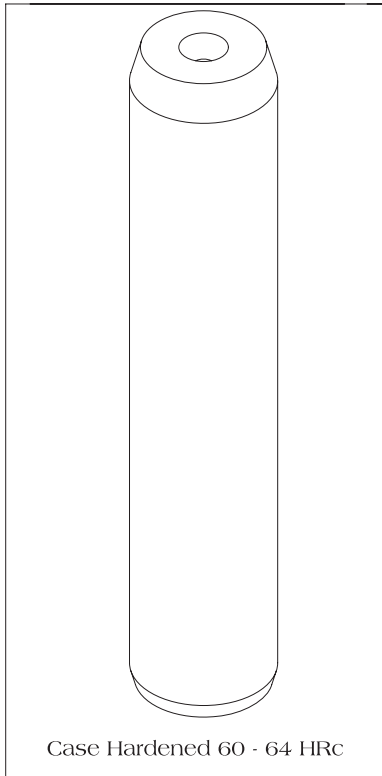
## Rectangular Die Sets with Four Pillars and Ball Cage(D89 & D99)

D89xa1a1b1b1b1  
D99xa1a1b1b1b1

a <sub>1</sub>	b <sub>1</sub>	a <sub>2</sub>	b <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	D <sub>1</sub>	e <sub>a</sub>	e <sub>b</sub>	CATALOG NUMBER	WITH C3	
										C3	CATALOG NUMBER
250	160	*117 **108	*27 **18	30 30 24	24 30 24	25	162	72	D99125160 D99225160 D99325160	24	D89125160 D89225160 D89325160
	200		*67 **58	30 30 24	24 30 24				D99125200 D99225200 D99325200		D89125200 D89225200 D89325200
	250		*117 **108	39 39 30	30 39 30				D99125250 D99225250 D99325250		30
315	200	*182 **173	*67 **58	39 39 30	30 39 30	25	227	112	D99131200 D99231200 D99331200	30	D89131200 D89231200 D89331200
	250		*117 **108	39 39 30	30 39 30				D99131250 D99231250 D99331250		D89131250 D89231250 D89331250
	315		*182 **173	49 49 39	39 49 39				D99131315 D99231315 D99331315		D89131315 D89231315 D89331315
400	200	*267 **258	*67 **58	49 49 39	39 49 39	25	312	112	D99140200 D99240200 D99340200	30	D89140200 D89240200 D89340200
	250		*117 **108	49 49 39	39 49 39				D99140250 D99240250 D99340250		D89140250 D89240250 D89340250
	315	*250 **241	*165 **156	49 49 39	39 49 39	32	304	219	D99140315 D99240315 D99340315		D89140315 D89240315 D89340315
	400		*250 **241	49 49 39	39 49 39				D99140400 D99240400 D99340400		D89140400 D89240400 D89340400
500	250	*350 **341	*100 **91	49 49 39	39 49 39	32	404	154	D99150250 D99250250 D99350250	30	D89150250 D89250250 D89350250
	315		*165 **156	49 49 39	39 49 39				D99150315 D99250315 D99350315		D89150315 D89250315 D89350315
	400		*250 **241	49 49 49	39 49 39				D99150400 D99250400 D99350400		39
	500		*350 **341	49 49 39	39 49 39			D99150500 D99250500 D99350500	D89150500 D89250500 D89350500		
630	315	*453 **443	*138 **128	49 49 39	39 49 39	40	518	203	D99163315 D99263315 D99363315	39	D89163315 D89263315 D89363315
	400		*223 **213	49 49 39	39 49 39				D99163400 D99263400 D99363400		D89163400 D89263400 D89363400
	500	*421 **409	*291 **279	55 55 49	49 55 49	50	502	372	D99163500 D99263500 D99363500		D89163500 D89263500 D89363500
	630		*421 **409	55 55 49	49 55 49				D99163630 D99263630 D99363630		D89163630 D89263630 D89363630

\* = Using Straight Sleeve Ball Cage Bushings

\*\* = Using Shoulder Sleeve Ball Cage Bushings

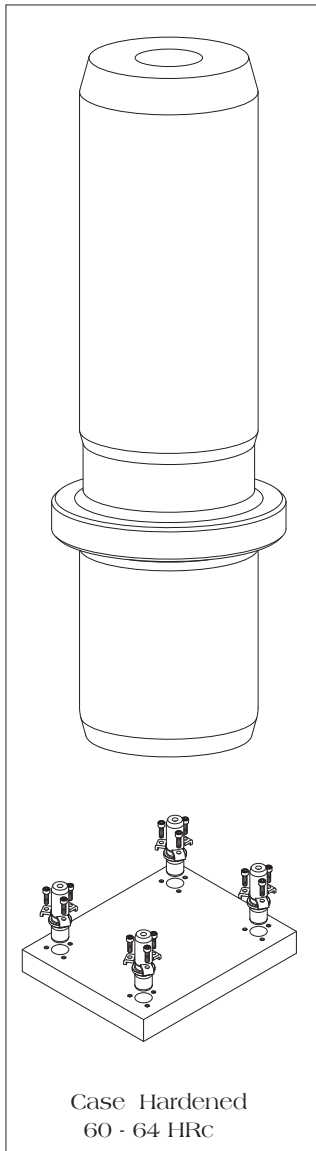


$D_1$	20	25	32	40	50	63	80*
L	CATALOG NUMBER						
100	P10020100	P10025100					
110	P10020110	P10025110	P10032110				
125	P10020125	P10025125	P10032125	P10040125			
140	P10020140	P10025140	P10032140	P10040140			
160	P10020160	P10025160	P10032160	P10040160	P10050160		
180	P10020180	P10025180	P10032180	P10040180	P10050180		
200	P10020200	P10025200	P10032200	P10040200	P10050200	P10063200	P10080200
220		P10025220	P10032220	P10040220	P10050220	P10063220	P10080220
250		P10025250	P10032250	P10040250	P10050250	P10063250	P10080250
280		P10025280	P10032280	P10040280	P10050280	P10063280	P10080280
315			P10032315	P10040315	P10050315	P10063315	P10080315
355				P10040355	P10050355	P10063355	P10080355
400					P10050400	P10063400	P10080400
450					P10050450	P10063450	P10080450
500							P10080500
d	M5	M6	M8	M10	M12	M16	M20
m	7.3	9.6	10.1	10.6	11.3	12.1	13.3

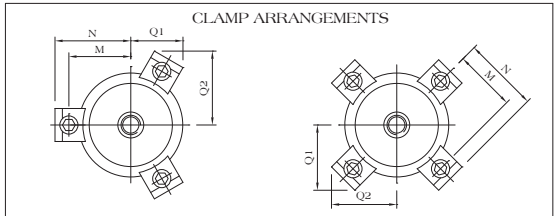
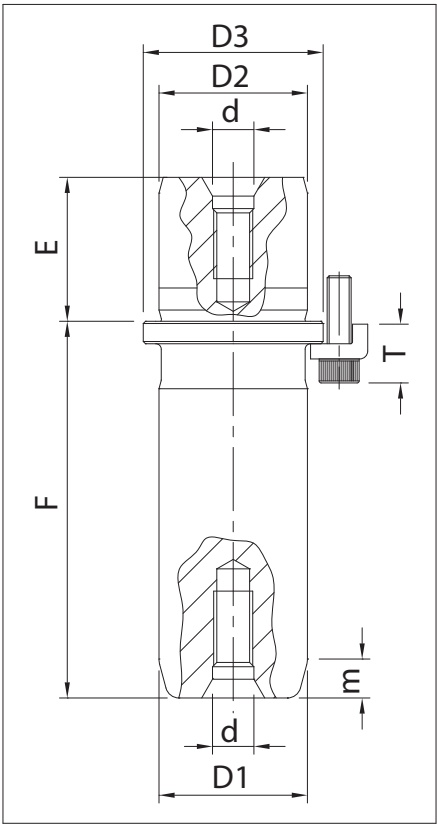
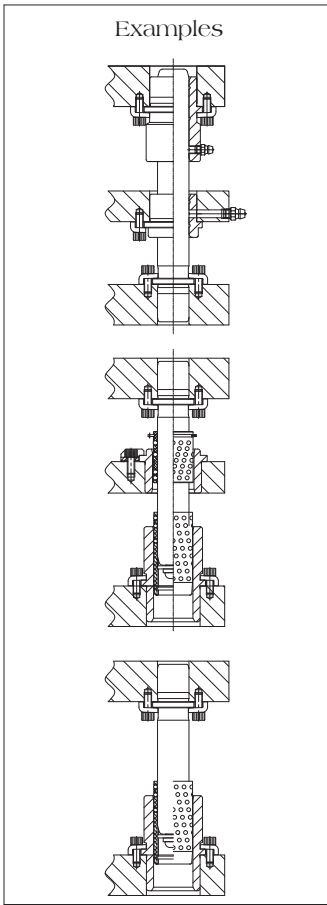
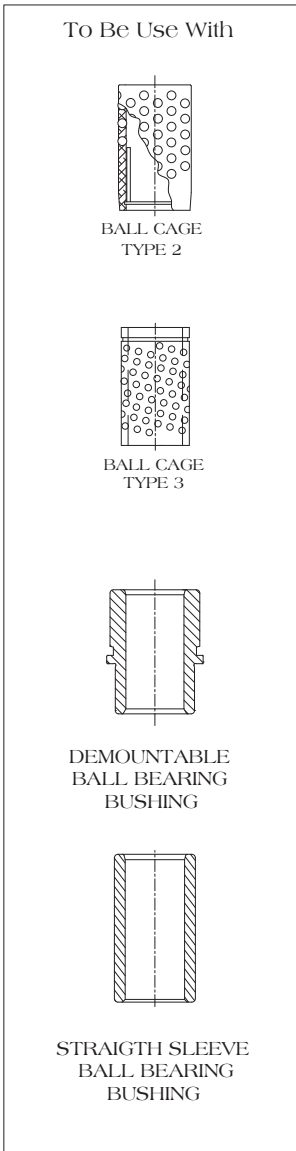


# Demountable Guide Pillar Locked by Clamp

P21.DDD.FFF

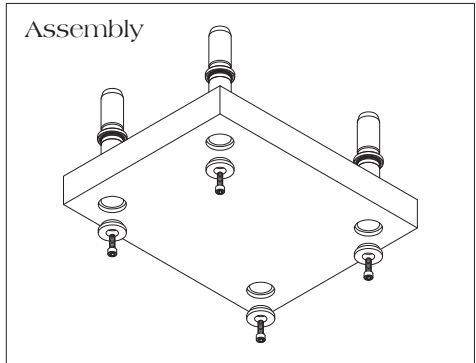
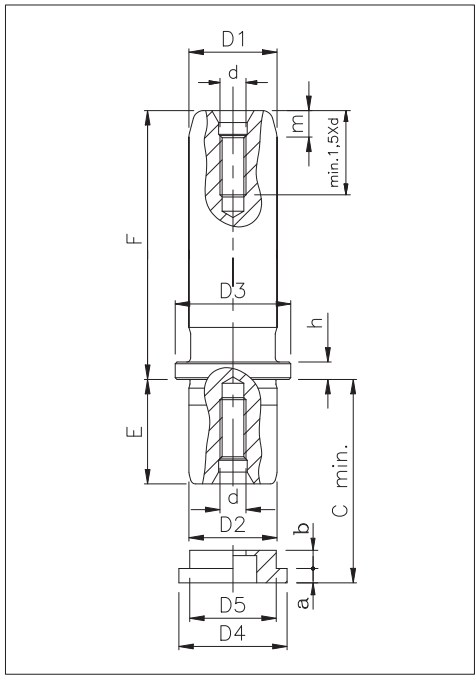
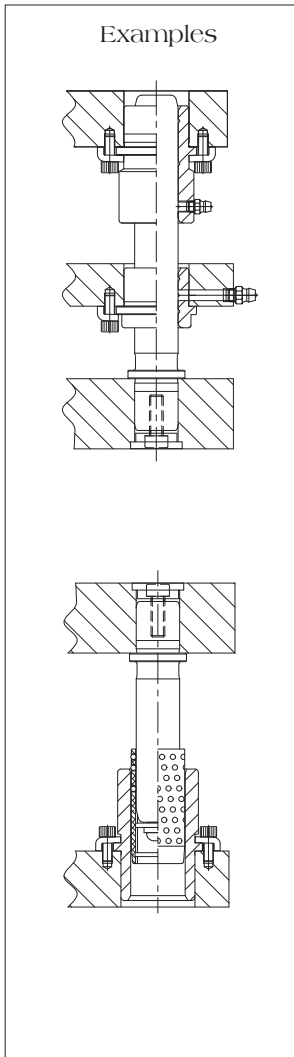
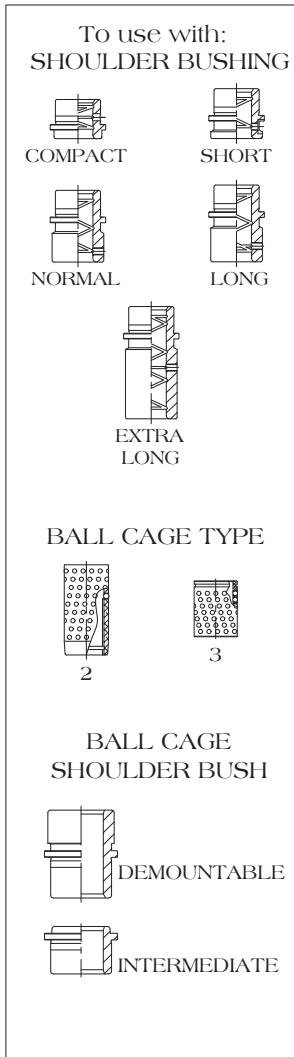
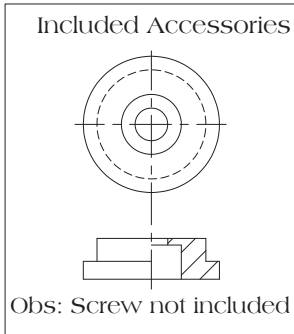
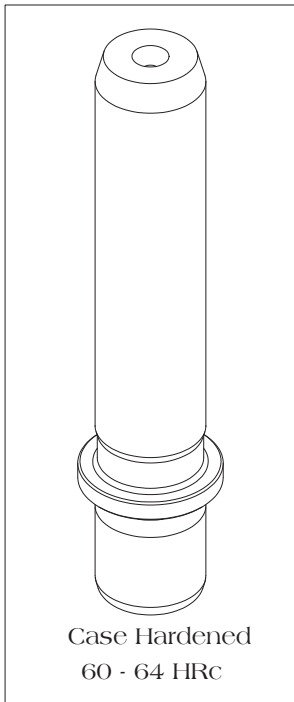


Case Hardened  
60 - 64 HRC



$D_1=D_2$	25	32	40	50	63	80*
F	CATALOG NUMBER					
80	P21.025.080					
90	P21.025.090					
100	P21.025.100	P21.032.100	P21.040.100			
110	P21.025.110	P21.032.110	P21.040.110	P21.050.110		
125	P21.025.125	P21.032.125	P21.040.125	P21.050.125	P21.063.125	
140	P21.025.140	P21.032.140	P21.040.140	P21.050.140	P21.063.140	
160	P21.025.160	P21.032.160	P21.040.160	P21.050.160	P21.063.160	
180	P21.025.180	P21.032.180	P21.040.180	P21.050.180	P21.063.180	
200	P21.025.200	P21.032.200	P21.040.200	P21.050.200	P21.063.200	P21.080.200
220		P21.032.220	P21.040.200	P21.050.220	P21.063.220	P21.080.220
250		P21.032.250	P21.040.250	P21.050.250	P21.063.250	P21.080.250
280		P21.032.280	P21.040.280	P21.050.280	P21.063.280	P21.080.280
315				P21.050.315	P21.063.315	P21.080.315
355				P21.050.355	P21.063.355	P21.080.355
400				P21.050.400	P21.063.400	P21.080.400
500						P21.080.500
$D_3$	32	40	50	63	76	93
E	25	32	40	45	50	60
d	M6	M8	M10	M12	M16	M20
m	8					
M	20,3	24,0	30,0	36,5	42,5	51,0
N	28,7	32,3	41,1	47,5	53,4	61,8
$Q_1$	20,7	22,5	27,0	38,7	43,0	49,0
$Q_2$	27,9	31,3	38,9			
T	14,7			17,5		
CLAMPS	B01.006.000			B01.008.000		
SCREWS	A05.006.016 (M6 X 16)			A05.008.020 (M8 X 20)		
Qty	3			4		

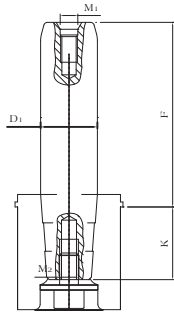
\* Dia. 80[mm], Special Item.



D <sub>1</sub> =D <sub>2</sub>	20	25	32	40	50	63	80*
F	CATALOG NUMBER						
80	P22.020.080	P22.025.080					
90	P22.020.090	P22.025.090					
100	P22.020.100	P22.025.100	P22.032.100	P22.040.100			
110	P22.020.110	P22.025.110	P22.032.110	P22.040.110	P22.050.110		
125	P22.020.125	P22.025.125	P22.032.125	P22.040.125	P22.050.125	P22.063.125	P22.080.125
140	P22.020.140	P22.025.140	P22.032.140	P22.040.140	P22.050.140	P22.063.140	P22.080.140
160	P22.020.160	P22.025.160	P22.032.160	P22.040.160	P22.050.160	P22.063.160	P22.080.160
180		P22.025.180	P22.032.180	P22.040.180	P22.050.180	P22.063.180	P22.080.180
200		P22.025.200	P22.032.200	P22.040.200	P22.050.200	P22.063.200	P22.080.200
220			P22.032.220	P22.040.220	P22.050.220	P22.063.220	P22.080.220
250			P22.032.250	P22.040.250	P22.050.250	P22.063.250	P22.080.250
280			P22.032.280	P22.040.280	P22.050.280	P22.063.280	P22.080.280
315					P22.050.315	P22.063.315	P22.080.315
355					P22.050.355	P22.063.355	P22.080.355
400					P22.050.400	P22.063.400	P22.080.400
500							P22.080.500
D <sub>3</sub> =D <sub>4</sub>	25	32	40	50	63	76	93
D <sub>5</sub>	19	24	30	38	48	63	80
E	20	25	32	40	45	50	60
d	M5	M6	M8	M10	M12	M16	M20
m	7,3	9,6	10,1	10,6	11,3	12,1	13,3
a	3,3	5,0					
b	4,2	4,0	7,0	10	13	19	25
C min.	28	35	45	56	64	75	91
h	3,3	5,0					
Washer	P02.020.000	P02.025.000	P02.032.000	P02.040.000	P02.050.000	P02.063.000	P02.080.000

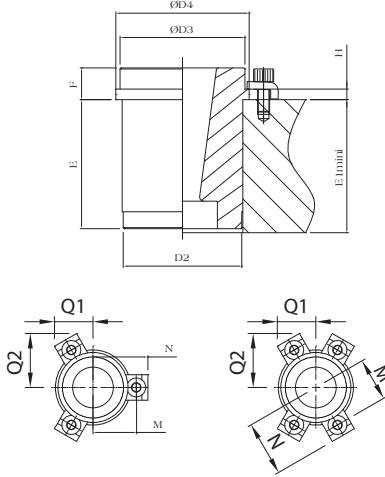
\* Guide post 80mm will be manufactured under request

## Conic Pin P24

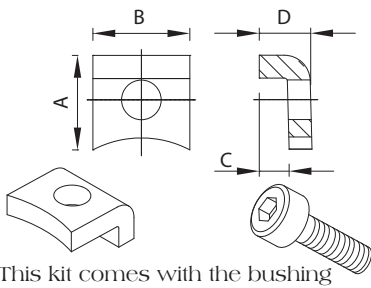


P24 DDD FFF					
ØD1	25	32	40	50	63
F	REFERENCE				
100	P24 025 100	P24 032 100	P24 040 100		
125	P24 025 125	P24 032 125	P24 040 125	P24 050 125	P24 063 125
160	P24 025 160	P24 032 160	P24 040 160	P24 050 160	P24 063 160
200	P24 025 200	P24 032 200	P24 040 200	P24 050 200	P24 063 200
250		P24 032 250	P24 040 250	P24 050 250	P24 063 250
315				P24 050 315	P24 063 315
M1	M6	M8	M10	M12	M16
M2	M8	M8	M8	M10	M12
K	23	33	33	43	57

## Bushings B24

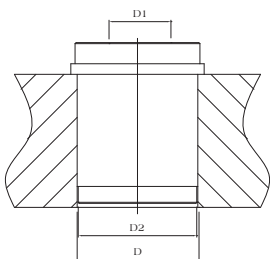


B24 DDD FFF						
ØD1		25	32	40	50	63
E	E1	REFERENCE				
38	40	B24 025 038				
48	50		B24 032 048	B24 040 048		
61	63				B24 050 061	
78	80					B24 063 078
F		12	15	15	18	20
H		5				
D2		45	54	65	81	95
D3		45	54	66	84	99
D4		54	63	75	93	108
Kit Clamps		B01 006 0M3	B01 008 0M3	B01 008 0M4	B01 008 0M4	B01 008 0M4
M		31	37	43	52	60
N		39.1	48	53.9	62.8	70.8
Q1		26	30.5	33.5	38	42
Q2		37.1	44.9	50.1	57.9	64.9

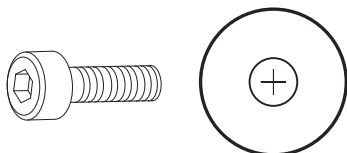


This kit comes with the bushing

CODE	B01 006 000	B01 008 000	
A	15,5	19,8	
B	15,9	15,9	
C	4,9	4,9	
D	8,7	9,5	
Screw	A05 006 016 (M6 x 16)	A05 008 020 (M8 x 20)	
T	15.1	18.1	

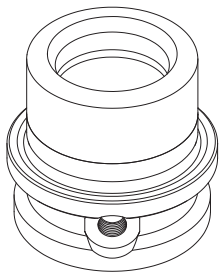


Bore Sizes					
ØD1	25	32	40	50	63
D2	45	54	65	81	95
D	$\frac{45.016}{45.000}$	$\frac{54.019}{54.000}$	$\frac{65.019}{65.000}$	$\frac{81.022}{81.000}$	$\frac{95.022}{95.000}$

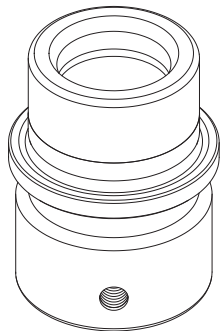


This kit comes with the bushing

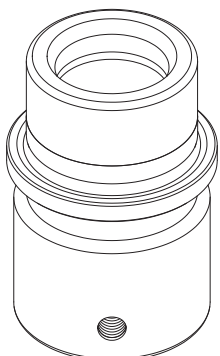
Screw & Washer to fix pin					
ØD1	25	32	40	50	63
Screw	A05 008 016			A05 010 020	A05 012 020
Washer	P03 025 000	P03 032 000	P03 040 000	P03 050 000	P03 063 000



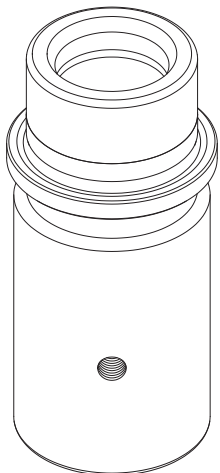
Short Shoulder Bushings



Shoulder Bushings



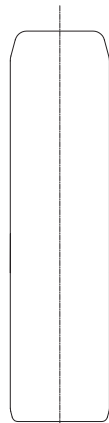
Long Shoulder Bushings



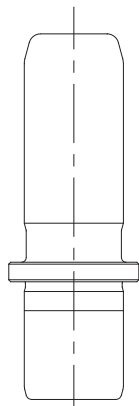
Extra Long Shoulder Bushings

Case Hardened  
60 - 64 HRC

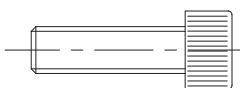
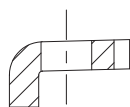
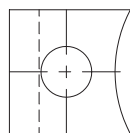
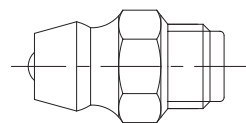
To be used with



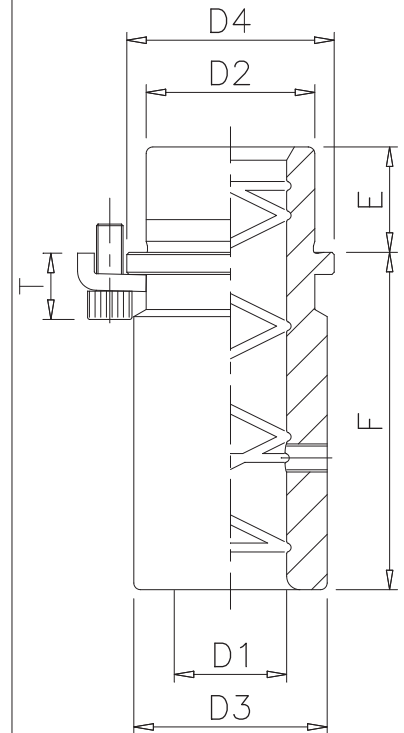
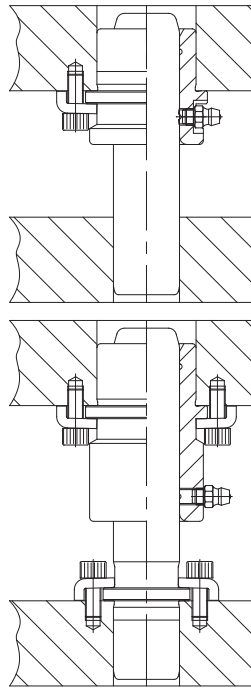
Straight Guide Pillar



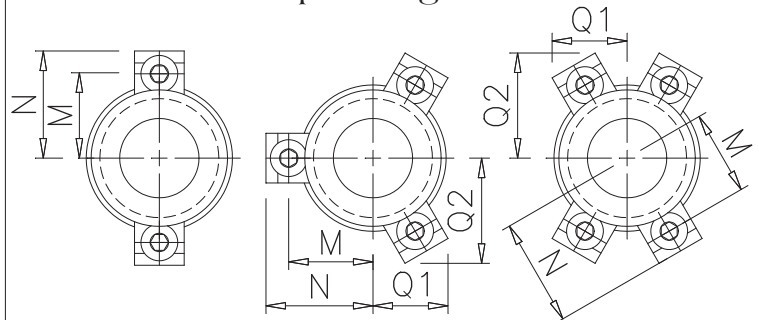
Demountable Guide Pillar



Examples



### Clamp Arrangements



MDL Demountable Steel Bushings feature bearing quality alloy steel, case hardened. ID is precision ground and hone assuring interchangeability with Guide Posts.

Shoulder face and OD are ground in the same operation over an arbor to guarantee the concentricity and perpendicularity of the Bushings.

MDL Demountable Bronze Plated Bushings are manufactured using the same material and process as the steel bushings being electrolytic plated with Bronze before the honing operation.

The plating thickness is approximately 0,015mm which assures the low coefficient of friction of the bronze with the rigidity of the steel.

- 0 - 100 Strokes/min = Steel-Steel
- 100 - 200 Strokes/min = Steel-Bronze



# Demountable Shoulder Bushings

STEEL  
B11.DDD.FFF  
BRONZE PLATED  
B21.DDD.FFF

D <sub>1</sub>	20	25	32	40	50	63	80*
F	SHORT SHOULDER BUSHINGS						
16	B11.020.016						
	B21.020.016						
20		B11.025.020	B11.032.020	B11.040.020	B11.050.020	B11.063.020	B11.080.020
		B21.025.020	B21.032.020	B21.040.020	B21.050.020	B21.063.020	B21.080.020
F	SHOULDER BUSHINGS						
32	B11.020.032						
	B21.020.032						
50		B11.025.050	B11.032.050	B11.040.050	B11.050.050	B11.063.050	B11.080.050
		B21.025.050	B21.032.050	B21.040.050	B21.050.050	B21.063.050	B21.080.050
F	LONG SHOULDER BUSHINGS						
75		B11.025.075	B11.032.075	B11.040.075	B11.050.075	B11.063.075	B11.080.075
		B21.025.075	B21.032.075	B21.040.075	B21.050.075	B21.063.075	B21.080.075
F	EXTRA LONG SHOULDER BUSHINGS						
100			B11.032.100	B11.040.100	B11.050.100	B11.063.100	B11.080.100
			B21.032.100	B21.040.100	B21.050.100	B21.063.100	B21.080.100
DIMENSIONAL DATA							
D <sub>2</sub>	28	38	45	54	65	81	100
D <sub>3</sub>	29	42	49	58	70	88	110
D <sub>4</sub>	32,5	47,0	54,0	63,0	75,0	93,0	115,0
E	18	22	25	30	35	48	
M	19,5	27,5	31,0	37,0	43,0	52,0	63,0
N	26,3	35,7	39,1	48,0	53,9	62,8	73,7
Q <sub>1</sub>	-	24,3	26,0	30,5	33,5	38,0	43,5
Q <sub>2</sub>	-	34,1	37,1	44,9	50,1	57,9	67,5
T	11,3	15,1		18,1			
CLAMPS	B01.005.000	B01.006.000		B01.008.000			
SCREWS	A05.005.012 (M5 X 12)	A05.006.016 (M6 X 16)		A05.008.020 (M8 X 20)			
QTY	2	3			4		

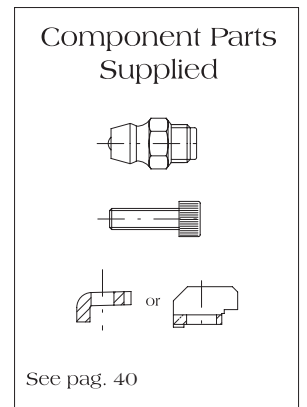
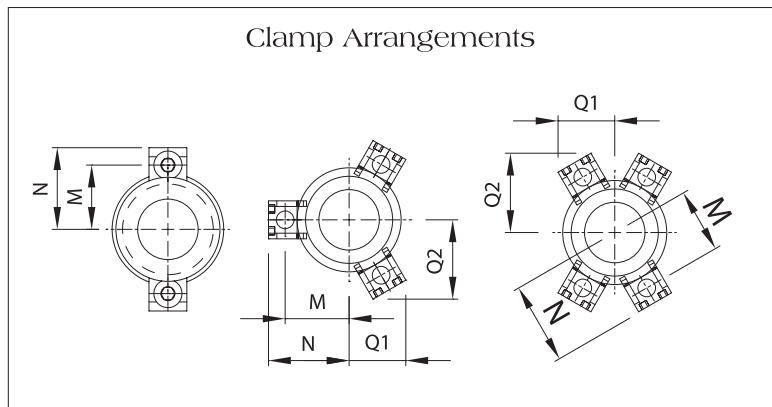
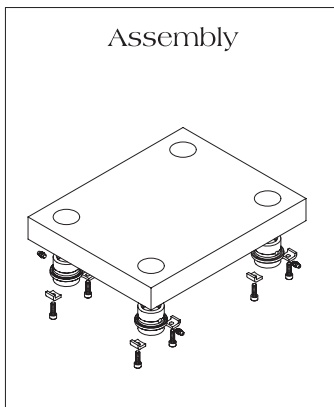
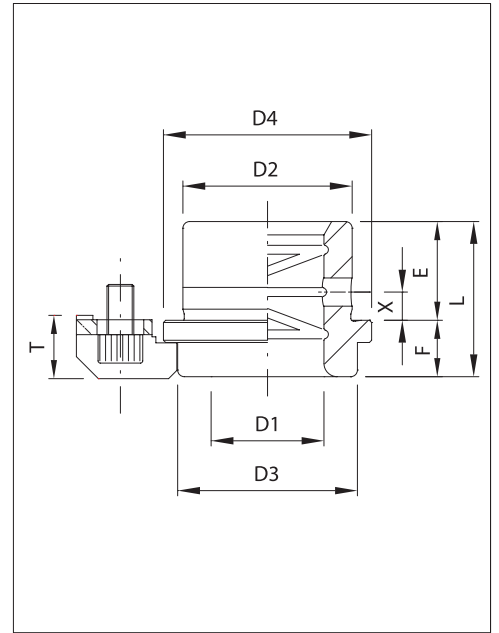
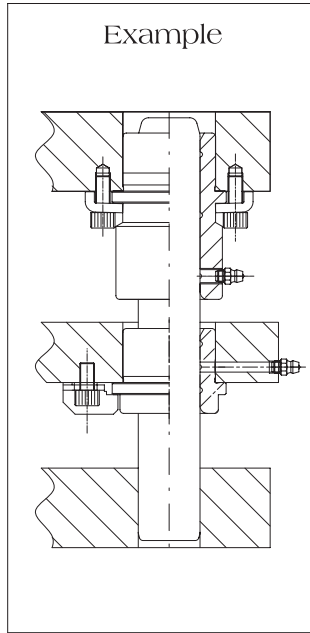
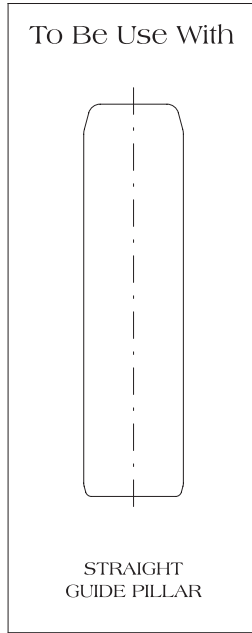
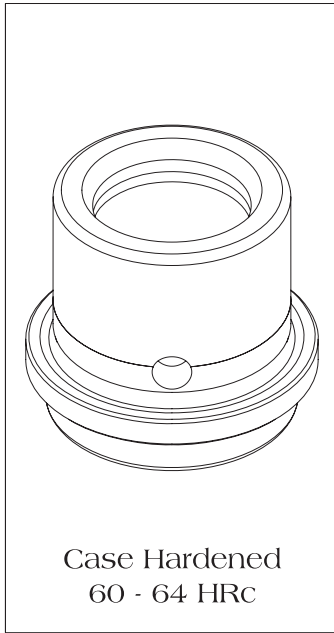
\* Dia. 80[mm], Special Item.



# Low Profile Bushings (Stripper Plate Bushing)

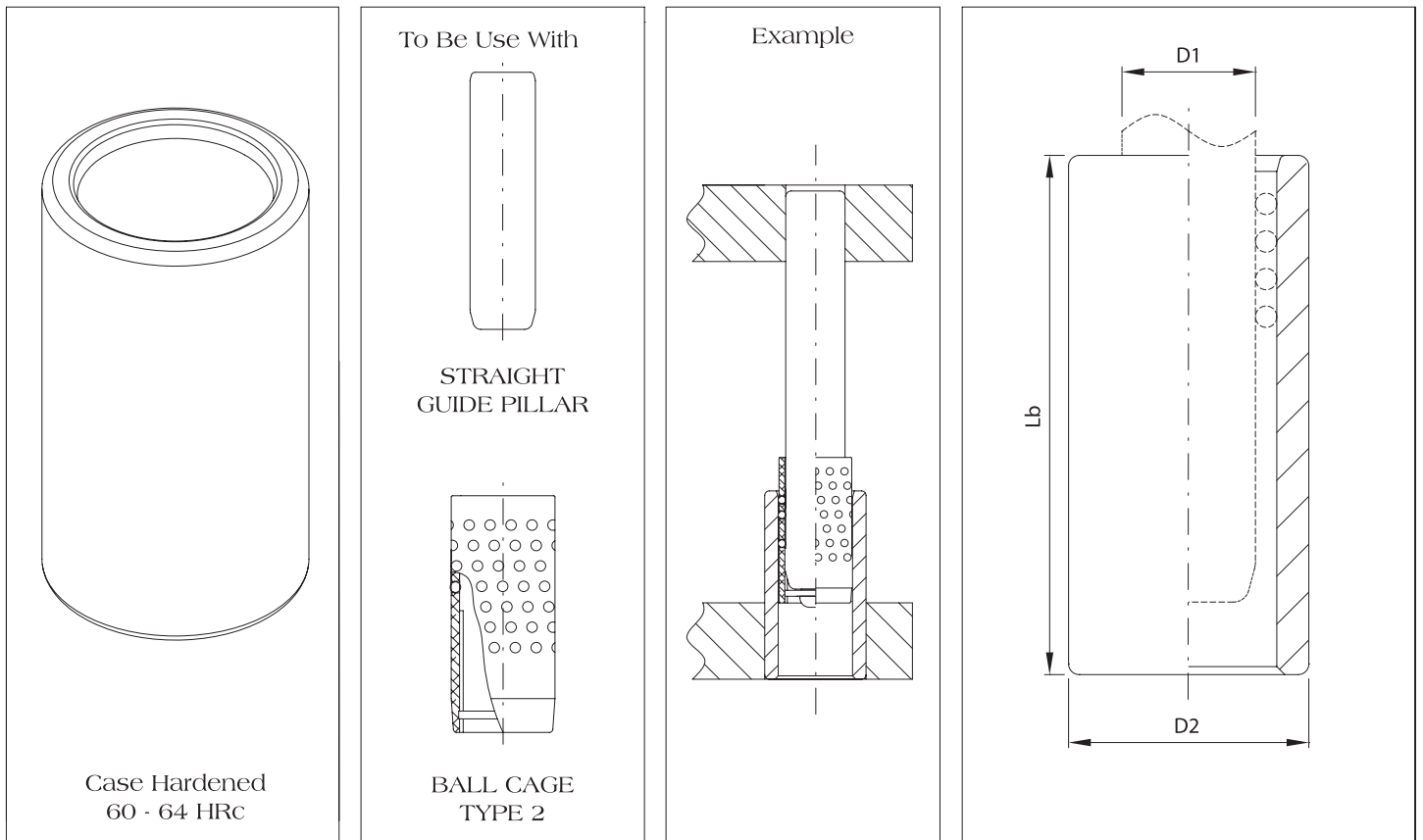
STEEL  
B13DDDDFFF

BRONZE PLATED  
B23DDDDFFF



D <sub>1</sub>	20	25	32	40	50	63	80*
F	CATALOG NUMBER						
10	B13020010	B13025010	B13032010				
	B23020010	B23025010	B23032010				
14				B13040014	B13050014	B13063014	B13080014
				B23040014	B23050014	B23063014	B23080014

DIMENSIONAL DATA							
E	18	23	30	38	48	61	78
L	28	33	40	52	62	75	92
D <sub>2</sub>		38	45	54	65	81	100
D <sub>3</sub>	29	36	43	50	64	79	99
D <sub>4</sub>	32.5	47	54	63	75	93	115
M	19.5	30	33.5	40	46	55	66
N	26.3	38.6	42	52	57.9	66.8	77.7
Q <sub>1</sub>	-	25.2	27	33.7	36.7	41.2	46.7
Q <sub>2</sub>		36.4	39.5	49	54.2	61.9	71.5
T	11.3	10.2		13.2			
X	6		10		20		32
KITS	B010050M2 + B05006001	B020060M3 + B05006001		B020080M3 + B05006001		B020080M4 + B05006001	



D <sub>1</sub>	25	32	40	50	63	80*
Lb	CATALOG NUMBER					
65	B30025065					
80	B30025080	B30032080	B30040080			
95	B30025095	B30032095	B30040095			
110	B30025110	B30032110	B30040110	B30050110		
130	B30025130	B30032130	B30040130	B30050130		
150		B30032150	B30040150	B30050150	B30063150	B30080150
170		B30032170	B30040170	B30050170	B30063170	B30080170
190			B30040190	B30050190	B30063190	B30080190
215			B30040215	B30050215	B30063215	B30080215
240				B30050240	B30063240	B30080240
265				B30050265	B30063265	B30080265
D <sub>2</sub>	45	54	65	81	95	112

MDL Straight Sleeve Ball Cage Bushings should not be press-fit since close-in may occur. If properly installed, no honing is necessary.

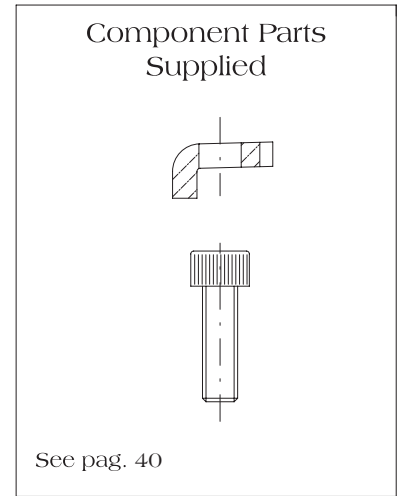
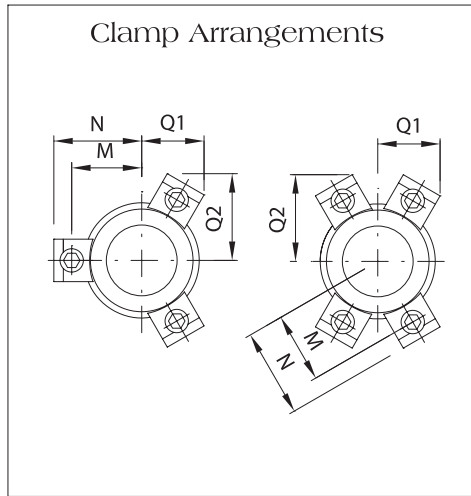
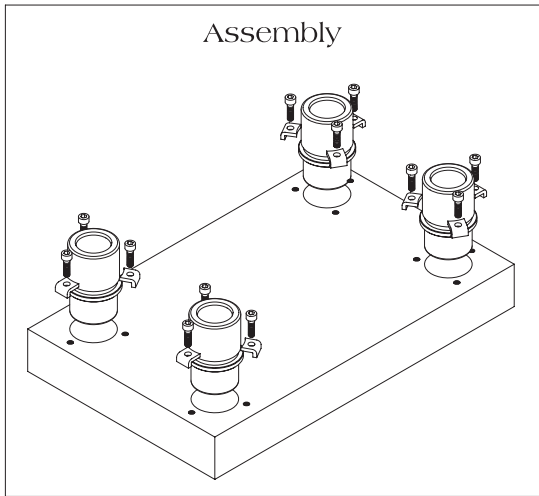
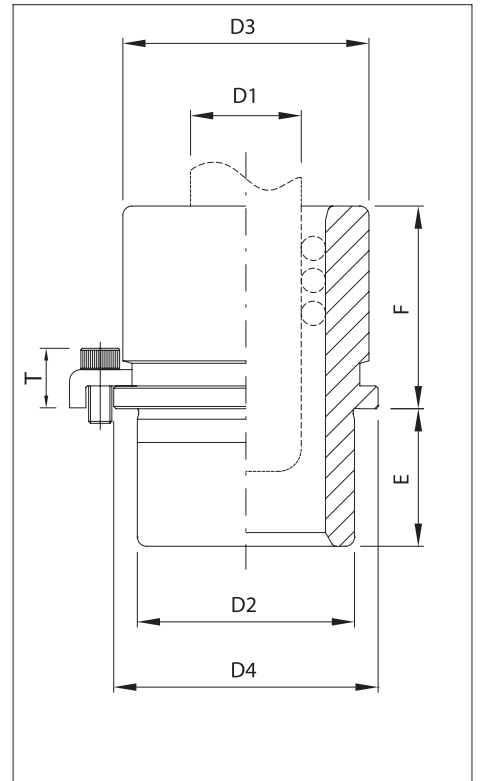
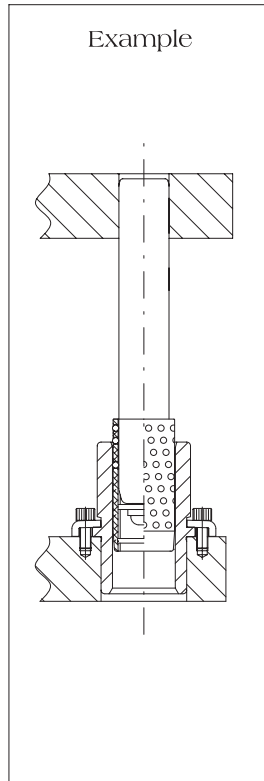
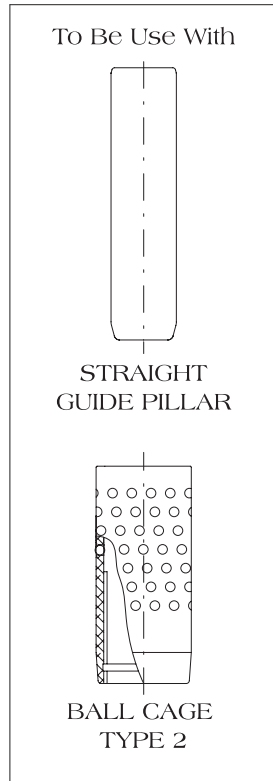
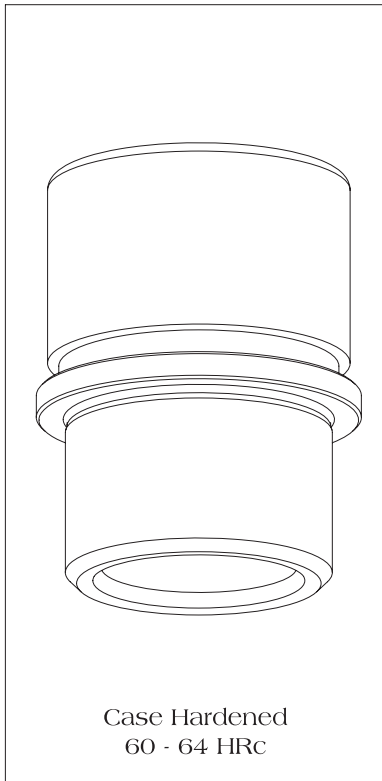
MDL recommends that Straight Sleeve Ball Cage Bushings should be installed using Loctite 603.

For selection of appropriate Sleeve Ball Cage Bushings length, see page 42/43.

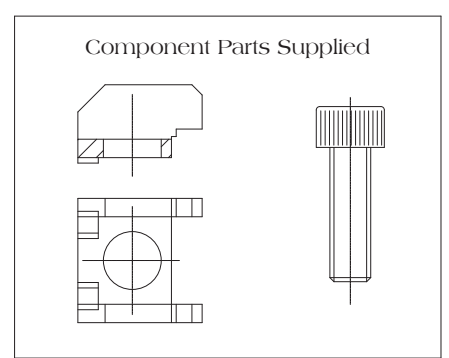
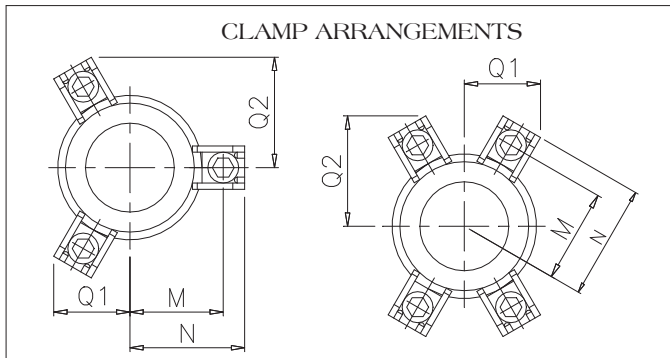
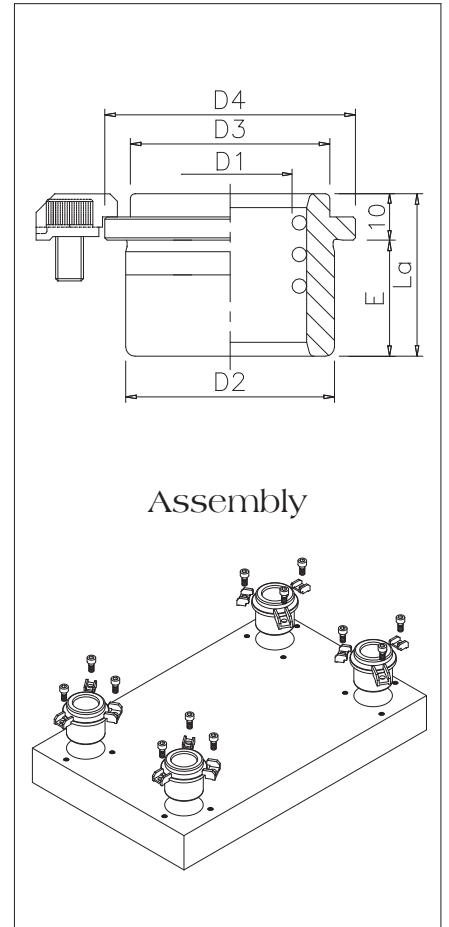
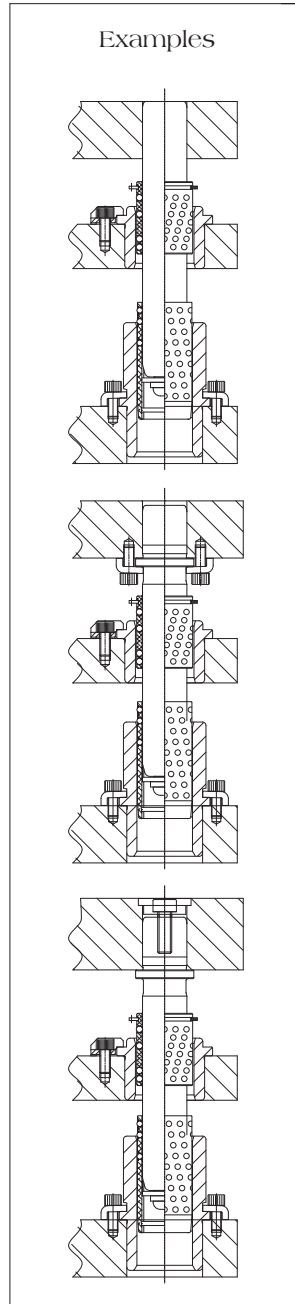
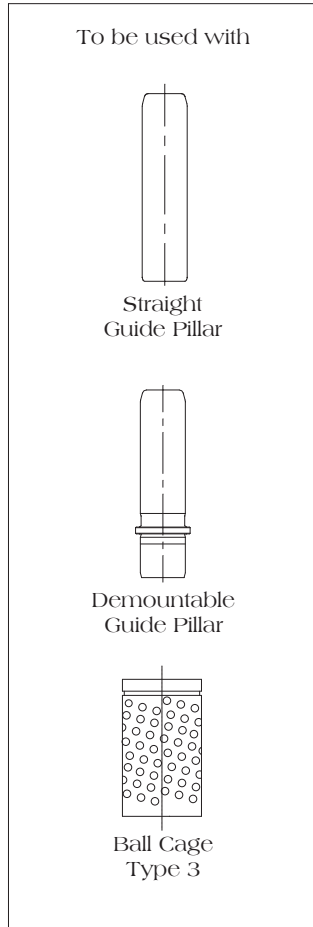
**Assembly Instructions:**

1. Press Guide Posts into Punch Holder Plate. End of Guide Posts with drill and tapped hole should not be pressed in.
2. Be sure Guide Posts are perpendicular to the surface of the Punch Holder (0.025 in 150 mm).
3. Mount Ball Cages on the Guide Pillar using Retainer Assembly supplied.
4. Place Die Shoe on a flat surface. For Big Die Sets we recommend using two horses to keep the bores accessible on both ends.
5. Place on Die Shoe two parallels having height as close as possible Minimum Shut Height.
6. Degrease Sleeve and Die Shoe Bore using appropriate solvent and wipe carefully.
7. Apply a thin layer of Loctite 603 on the Bores and Sleeves.
8. Position the Sleeve into Bore.
9. Bring the Punch Holder into position until it rests on the two parallels.
10. Check that the Sleeves are in the right position.
11. Allow the required time to harden: 4 hours at 22°C. Do not use Die Set during hardening process.

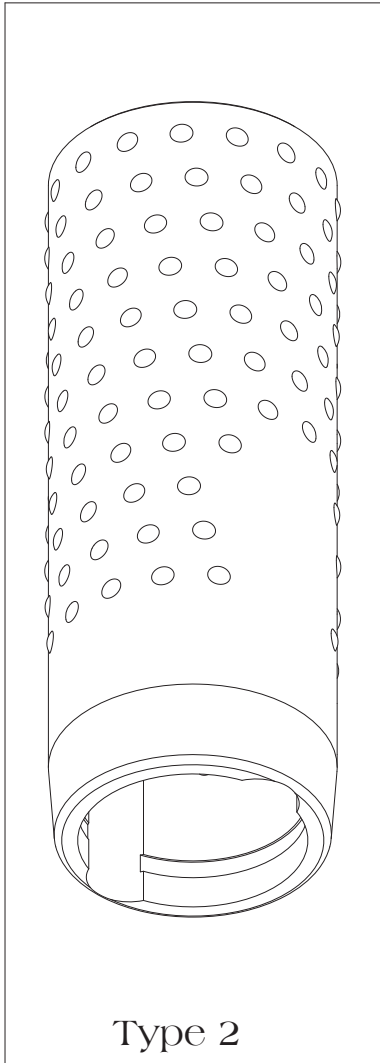
\* Dia. 80(mm), Special Item.



D <sub>1</sub>	25	32	40	50	63	80*	
F	CATALOG NUMBER						
35	B41025035						
50	B41025050	B41032050	B41040050				
65	B41025065	B41032065	B41040065	B41050065			
80		B41032080	B41040080	B41050080			
100			B41040100	B41050100	B41063100	B41080100	
120				B41050120	B41063120	B41080120	
140					B41063140	B41080140	
D <sub>2</sub>	45	54	65	81	95	112	
D <sub>3</sub>	49	58	70	88	103	120	
D <sub>4</sub>	54	63	75	93	108	125	
E					50		
M	31	37	43	52	60	68	
N	39.1	48.0	53.9	62.8	70.8	78.7	
Q <sub>1</sub>	26.0	30.5	33.5	38.0	42.0	46.0	
Q <sub>2</sub>	37.1	44.9	50.1	57.9	64.9	71.8	
T	15.1					18.1	
KITS	B010060M3	B010080M3	B010080M4				

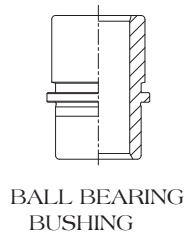
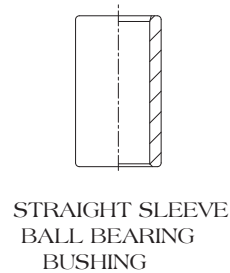
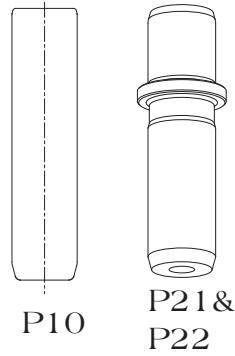


$D_1$	25	32	40	50
E	CATALOG NUMBER			
20	B43.025.030	B43.032.030		
25	B43.025.035	B43.032.035		
29		B43.032.039	B43.040.039	
32		B43.032.042	B43.040.042	
36			B43.040.046	B43.050.046
44			B43.040.054	B43.050.054
$D_2$	45	54	65	81
$D_3$	43	50	64	79
$D_4$	54	63	75	93
M	33,5	38,0	44,0	53,0
N	42,1	46,5	52,4	61,4
$Q_1$	27,0	29,3	32,3	36,8
$Q_2$	39,6	43,4	48,6	56,4
CLAMPS	B02.006.000			
SCREWS	A05.006.012 (M6 X 12)			
Qty	3		4	

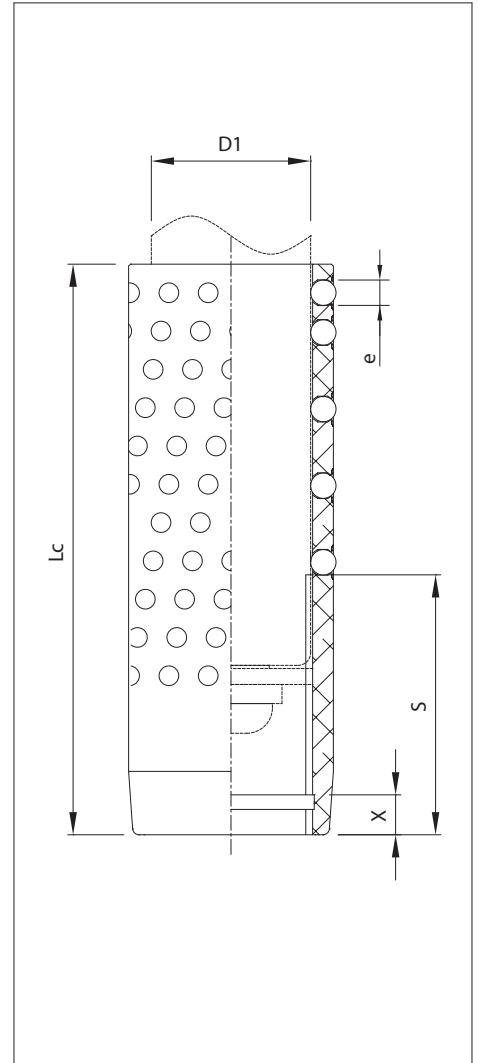
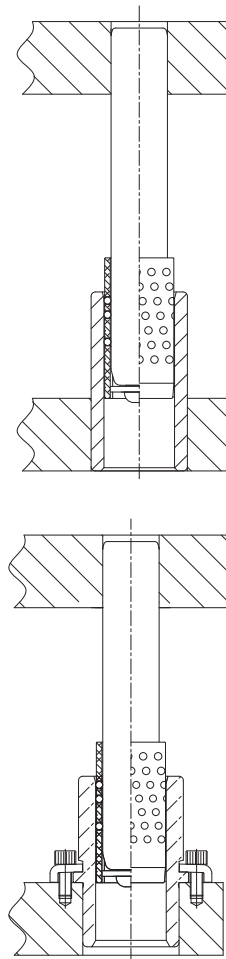


Type 2

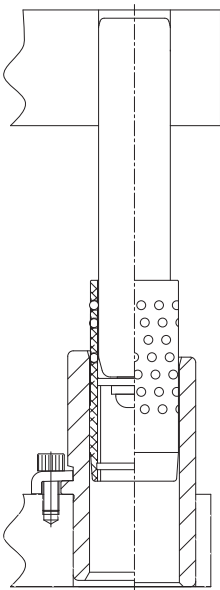
To Be Use With



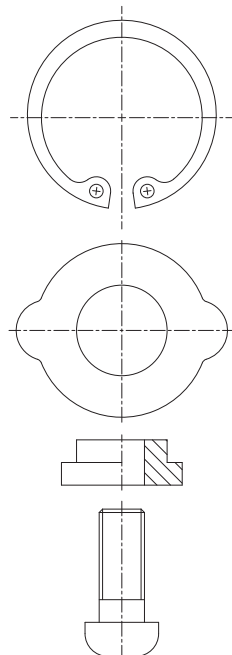
Examples



## Assembly Type 2



## Type 2 Retainer Assembly C02DDD000



MDL Ball Bearing Cages are manufactured from aluminium alloy heat treated tubing with tough and wear-resistant properties. Balls are made of bearing quality alloy steel through hardened and thoroughly inspected.

### Operating Conditions:

#### Type 2:

In this condition at the upper end of the stroke, the Guide Post may leave the top end of the Bushing. When this happens the Cage starts to travel with the Guide Post. At the bottom end of stroke, the Guide Post and the Retainer Assembly cannot leave the lower end of the Cage due to a Snap Ring.

On type 2 condition, the Cage remains under pre-load with the Guide Post and the Bushing only when the lower end of the Guide Post goes below the top end of the Bushing.

**To select Ball Bearing Cages length, see page 42/43.**

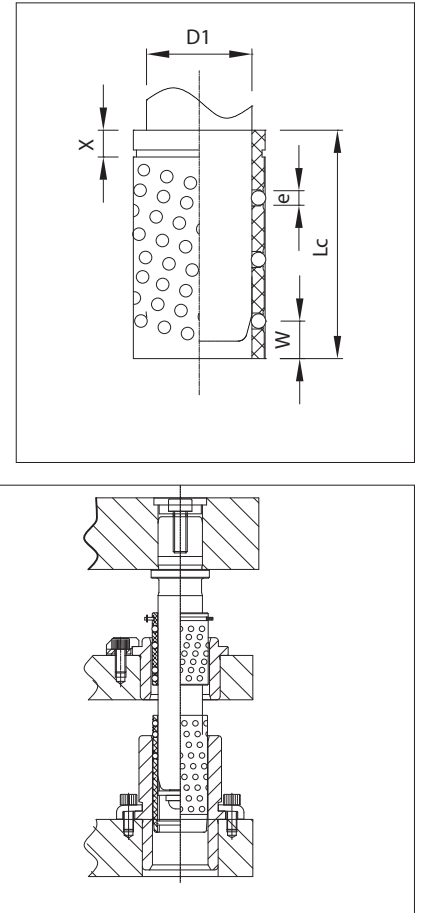
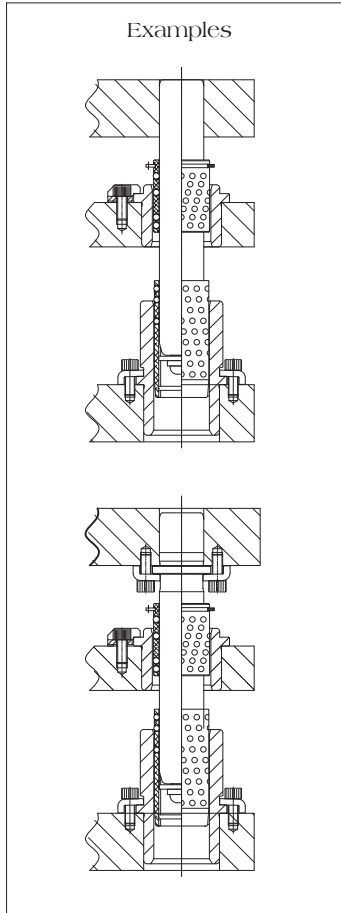
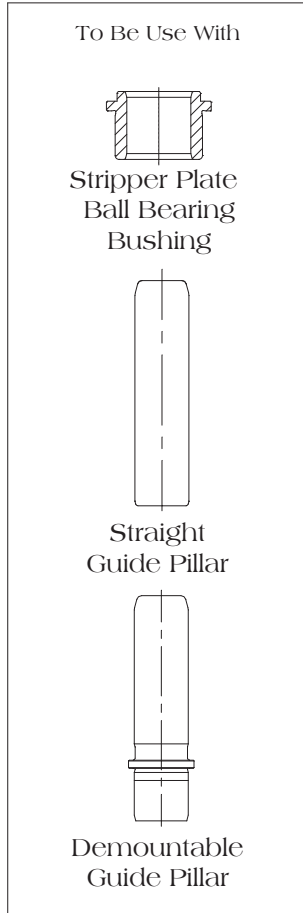
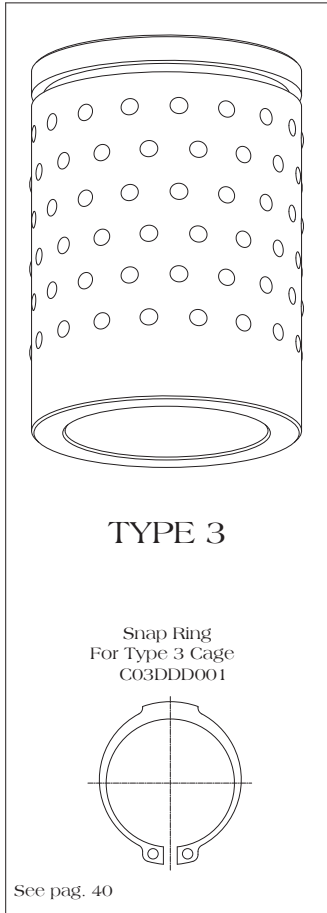


## Ball Cages Type 2(Internal Circlip)

C12DDDLcLcLc

D <sub>1</sub>		25	32	40	50	63	80*
Lc	S	CATALOG NUMBER					
55	27	C12025055					
70	35	C12025070	C12032070				
	36			C12040070			
85	43			C12040085			
90	42	C12025090					
	43		C12032090				
100	50	C12025100					
105			C12032105				
	51			C12040105	C12050105		
110	60	C12025110					
115			C12032115				
	61			C12040115			
120					C12050120		
125	70		C12032125				
	71			C12040125			
135	80		C12032135				
	81			C12040135			
140	71				C12050140		
145	72					C12063145	C12080145
	91			C12040145			
150	81				C12050150		
155	103			C12040155			
160	91				C12050160		
165	82					C12063165	C12080165
170	103				C12050170		
180	92					C12063180	C12080180
185	116				C12050185		
190	105					C12063190	C12080190
195	128				C12050195		
205	117					C12063205	C12080205
215	130					C12063215	C12080215
X		4.2		5.8	7.0		8.5
e		4.0			6.0		

\* Dia. 80[mm], Special Item.



D <sub>i</sub>	25	32	40	50
L <sub>c</sub>	CATALOG NUMBER			
40	C13025040	C13032040		
52	C13025052	C13032052	C13040052	
63	C13025063	C13032063	C13040063	C13050063
80	C13025080	C13032080	C13040080	C13050080
100		C13032100	C130400100	
125			C13040125	
140				
X	4.2	4.9	5.7	6.7
e	4		6	
w	5.0	5.3	4.8	5.6

Selection of Stripper Plate Ball Bearing Cage is based on Guide Post diameter, stroke of Stripper Plate (C) in relation to Plate where Guide Post is attached and length of Stripper Plate Ball Bearing Bushing used, according to the following formula:

$$Lc \geq \frac{C}{2} + E + 10 + X$$

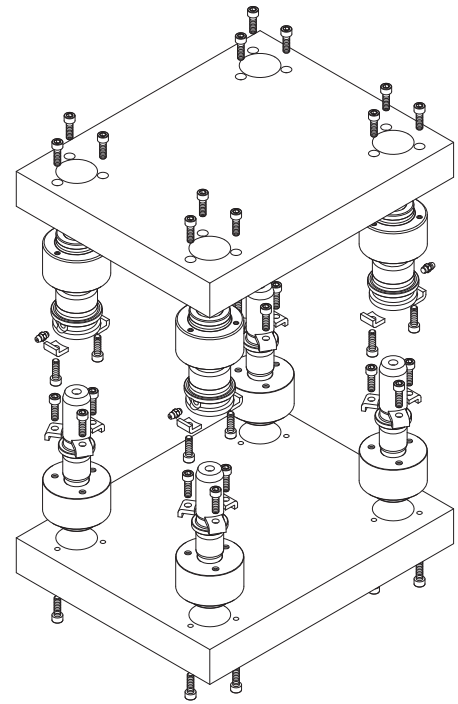
## MAIN ADVANTAGES AND OBSERVATIONS

- I The “x” series stamp base pads, being stock products, have lower prices and delivery times.
- II As they are interchangeable, they can be replaced, assembled and disassembled, without affecting the operation of the tool.
- III Unpublished rental system avoiding the use of guide pins, providing greater rigidity.
- IV Made of cold rolled steel in round and square formats and thus available in various heights.

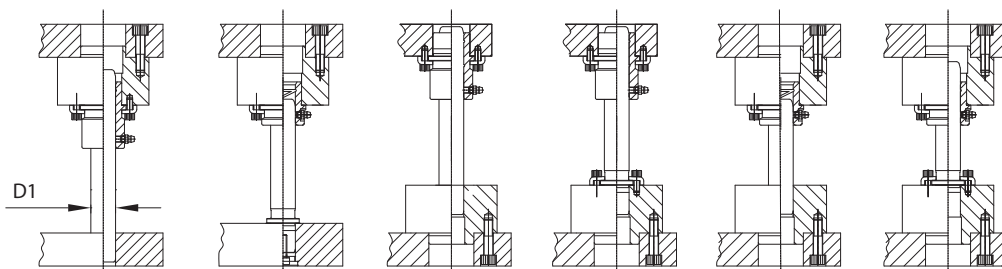
Note: - D1 dimension indicates the diameter of the pin used with its respective demountable bushing MDL.

- The length of the screws will be determined according to the thickness of the plates where the shims will be mounted.
- On request the shims can be used with components for ball gluing.

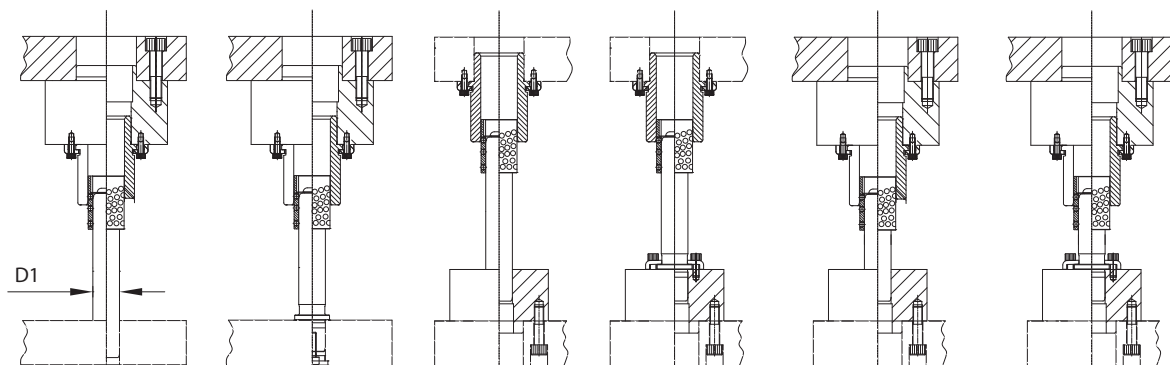
## Assembly



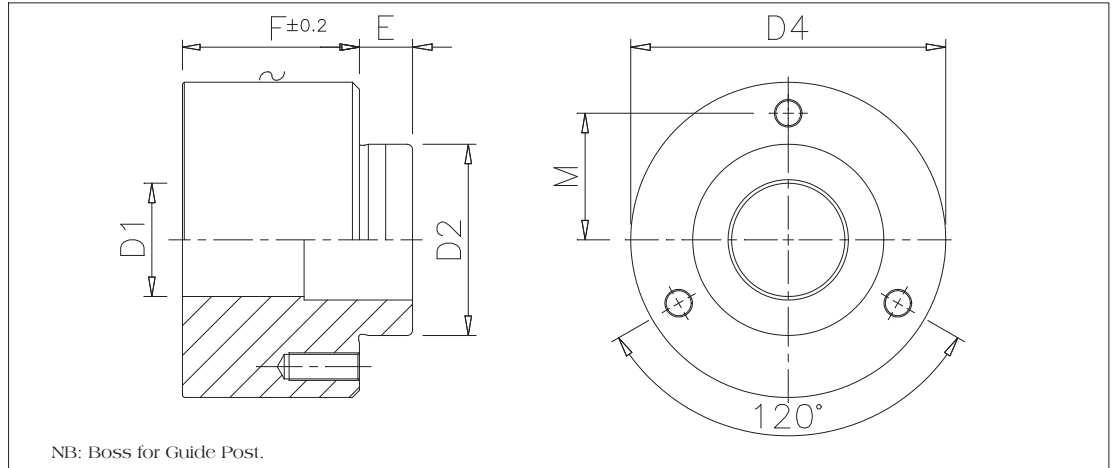
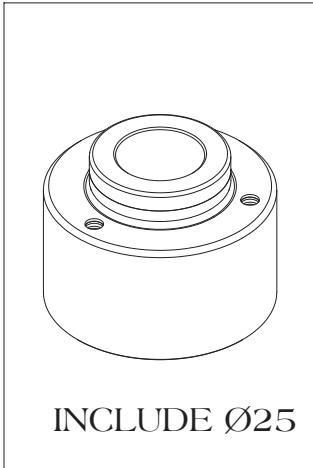
## ASSEMBLY OPTIONS WITH BOSSES



## ASSEMBLY OPTIONS WITH BOSSES AND BALL CAGE



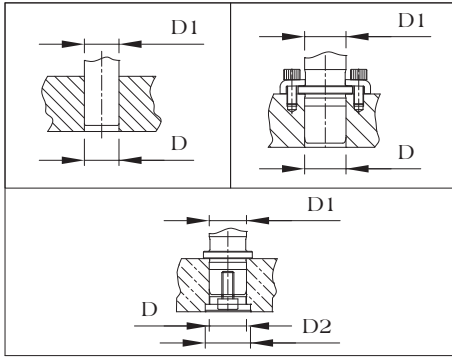
MDL RESERVES THE RIGHT TO CHANGE THIS CATALOG WITHOUT NOTICE



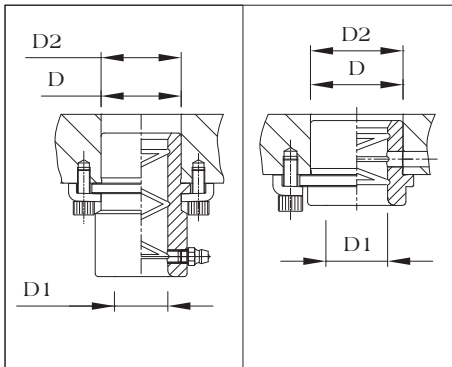
D <sub>1</sub>	32	40	50	63	80
F	ROUND BOSSES FOR GUIDE POSTS				
40	X05.032.040				
50	X05.032.050				
63		X05.040.063			
80		X05.040.080	X05.050.080		
100			X05.050.100	X05.063.100	
125				X05.063.125	X05.080.125
F	ROUND BOSSES FOR BUSHINGS				
40	X06.032.040				
50	X06.032.050				
63		X06.040.063			
80		X06.040.080	X06.050.080		
100			X06.050.100	X06.063.100	
125				X06.063.125	X06.080.125
DIMENSIONAL DATA					
D <sub>2</sub>	54	65	81	100	118
D <sub>4</sub>	89	102	114	140	165
E	15				
M	35,75	41,75	48,75	60,00	70,75
THREAD	M6	M8			M10



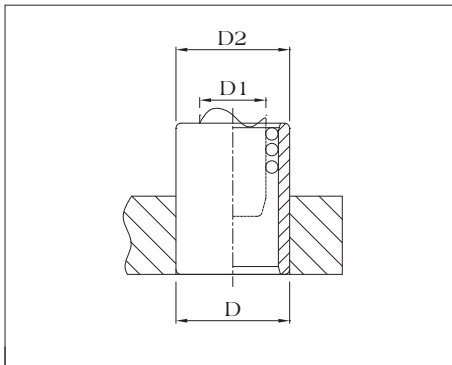
## Bore Sizes Recommendations For MDL Components



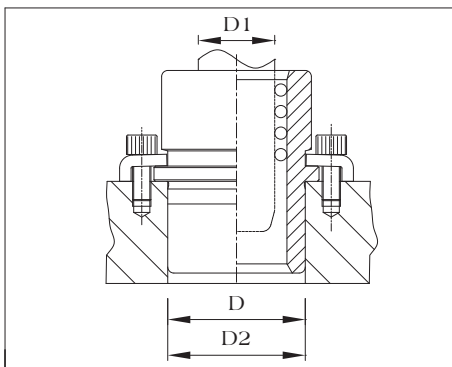
STRAIGHT GUIDE POSTS P10,P21,P22							
D <sub>1</sub>	20	25	32	40	50	63	80
D	$\frac{19.976}{19.963}$	$\frac{24.976}{24.963}$	$\frac{31.971}{31.955}$	$\frac{39.971}{39.955}$	$\frac{49.971}{49.955}$	$\frac{62.965}{62.946}$	$\frac{79.963}{79.944}$



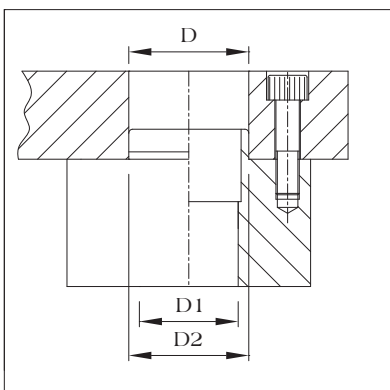
SHOULDER BUSHINGS (B11,B21&B13,B23)							
D <sub>1</sub>	20	25	32	40	50	63	80
D <sub>2</sub>	28	38	45	54	65	81	100
D	$\frac{28.013}{28.000}$	$\frac{38.016}{38.000}$	$\frac{45.016}{45.000}$	$\frac{54.019}{54.000}$	$\frac{65.019}{65.000}$	$\frac{81.022}{81.000}$	$\frac{100.022}{100.000}$



STRAIGHT SLEEVE BALL BEARING BUSHING B30						
D <sub>1</sub>	25	32	40	50	63	80
D <sub>2</sub>	45	54	65	81	95	112
D	$\frac{45.016}{45.000}$	$\frac{54.019}{54.000}$	$\frac{65.019}{65.000}$	$\frac{81.022}{81.000}$	$\frac{95.022}{95.000}$	$\frac{112.022}{112.000}$

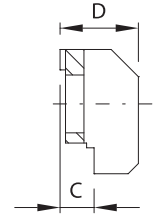
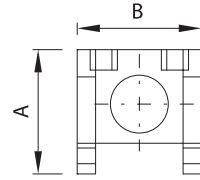
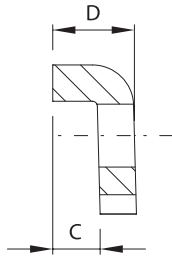
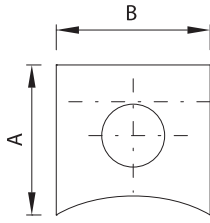


BALL BEARING BUSHING B41 / B43						
D <sub>1</sub>	25	32	40	50	63	80
D <sub>2</sub>	45	54	65	81	95	112
D	$\frac{45.016}{45.000}$	$\frac{54.019}{54.000}$	$\frac{65.019}{65.000}$	$\frac{81.022}{81.000}$	$\frac{95.022}{95.000}$	$\frac{112.022}{112.000}$



ROUND BOSSES (X05,X06)		
D <sub>1</sub>	32	40
D <sub>2</sub>	54	65
D	$\frac{54,019}{54,000}$	$\frac{65,019}{65,000}$
D <sub>1</sub>	50	63 80
D <sub>2</sub>	81	100 118
D	$\frac{81,022}{81,000}$	$\frac{100,022}{100,000}$ $\frac{118,022}{118,000}$

## CLAMPS



Clamps	B01005000	B01006000	B01008000		B02006000		B02008000	
A	12.3	15.5	19.8		18.3		24.6	
B	12.7	15.9	15.9		14.5		18.8	
C	3.2	4.9	4.9		5.0		5.0	
D	5.6	8.7	9.5		10.0		13.0	
Screws	A05005012 (M5x12)	A05006016 (M6x16)	A05008020 (M8x20)		A05006012 (M6x12)		A05008016 (M8x16)	
Quant.	2	3	3	4	3	4	3	4
KITS	B010050M2	B010060M3	B010080M3	B010080M4	B020060M3	B020060M4	B020080M3	B020080M4

LUBRIFICATION FITTING	B05006001
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## Used With Assembly Parts Type 2

Ø Post	 A06 DIN 7380 A07 DIN 7984 Screws	 Retaining Washes Type 2	 Bushing Type 2	 Snap Ring Type 2	Type 2 Retainer Assembly (Screw, washer, Bushing and Snap Ring).	 Snap Ring Type 3
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## Used With Assembly Type

D <sub>1</sub> Type	2	2	2	2	Kit Type 2	Kit Type 3
25	A06006020 (M6x20)	C02025001	C02025002	C02025003	C02025000	C03025001
32	A06008020 (M8x20)	C02032001	C02032002	C02032003	C02032000	C03032001
40	A06010025 (M10x25)	C02040001	C02040002	C02040003	C02040000	C03040001
50	A06012030 (M12x30)	C02050001	C02050002	C02050003	C02050000	C03050001
63	A07016035 (M16x35)	C02063001	C02063002	C02063003	C02063000	C03063001
80	A07020040 (M20x40)	C02080001	C02080002	C02080003	C02080000	C03080001

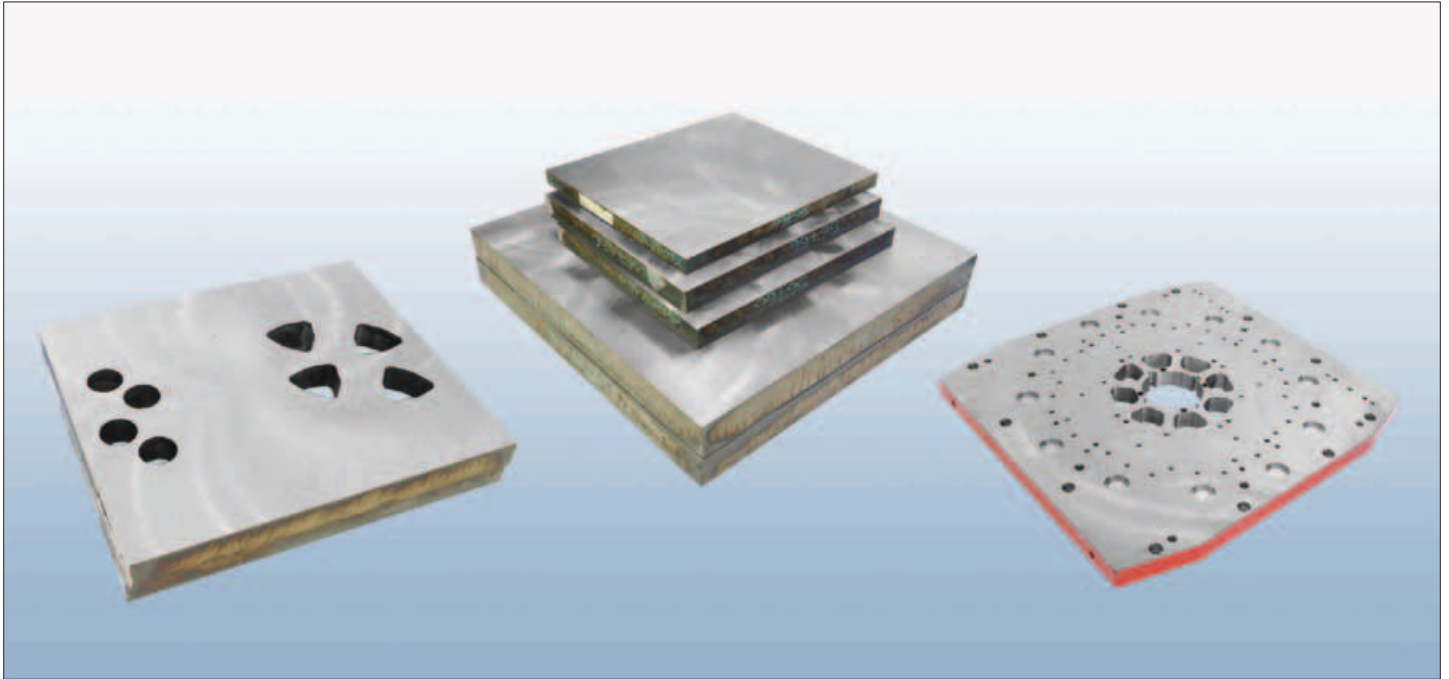


PLATE TYPES	FINISHES TYPES
P1	EDGES TORCH/GAS CUT. GROUND TOP AND BOTTOM TO CLEAN UP.
P3	EDGES MACHINED. GROUND TOP AND BOTTOM TO CLEAN UP.
P7	EDGES TORCH/GAS CUT. GROUND TOP AND BOTTOM TO SPECIFIC TOLERANCE.
P9	EDGES MACHINED. GROUND TOP AND BOTTOM TO SPECIFIC TOLERANCE.

**SERVICE LINE**

- "BLANCHARD" GRINDER  
(UP TO 2100[mm] OF DIAGONAL X 900[mm] OF HEIGHT).
- MACHINING CENTER  
(UP TO 3000[mm] X 1500[mm] X 500[mm]).

TOLERANCES TO GROUND SURFACES [mm] (VALID TO RATIO: DIAGONAL / THICKNESS < 30)			
PARALLELISM	FLATNESS	THICKNESS (ONLY FOR P1 E P3)	THICKNESS (ONLY FOR P7 E P9)
0.008 / 100	0.010 / 100	±3	0 / +0.2

**PRODUCT LINE**

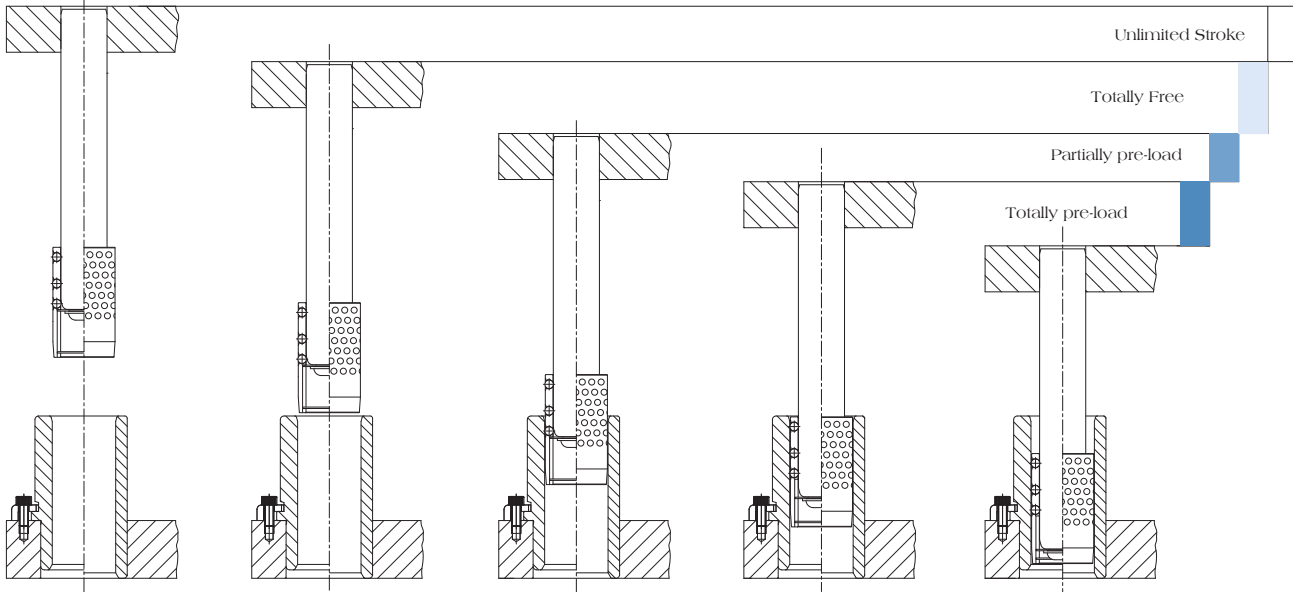
- \* DIE SETS.
- \* DIE SETS COMPONENTS.
- \* COMPRESSION SPRINGS.
- \* PROVIDE STEEL PLATES MACHINED ACCORDING TO DRAWING.
- \* STEEL PLATE MACHINING.
- WITH ONLY ONE CALL YOU CAN ORDER YOUR STEEL PLATE QUICKLY, THEN SEND US A DRAWING AND WE CAN, TORCH/GAS CUT, NORMALIZE, GRIND (BLANCHARD), DRILL, MILL, BORE AND TAP YOUR PLATE TO SUIT YOUR SPECIFY REQUIREMENTS.

TOLERANCES FOR EDGES MACHINED [mm]			
LENGTH AND WIDTH		SQUARENESS BETWEEN SURFACES AND EDGES	SQUARENESS OF EDGES
UP TO 650	0 / +0.2	0.025 / 100	0.015 / 100
OVER 650-1000	0 / +0.4		
OVER 1000	0 / +0.5		

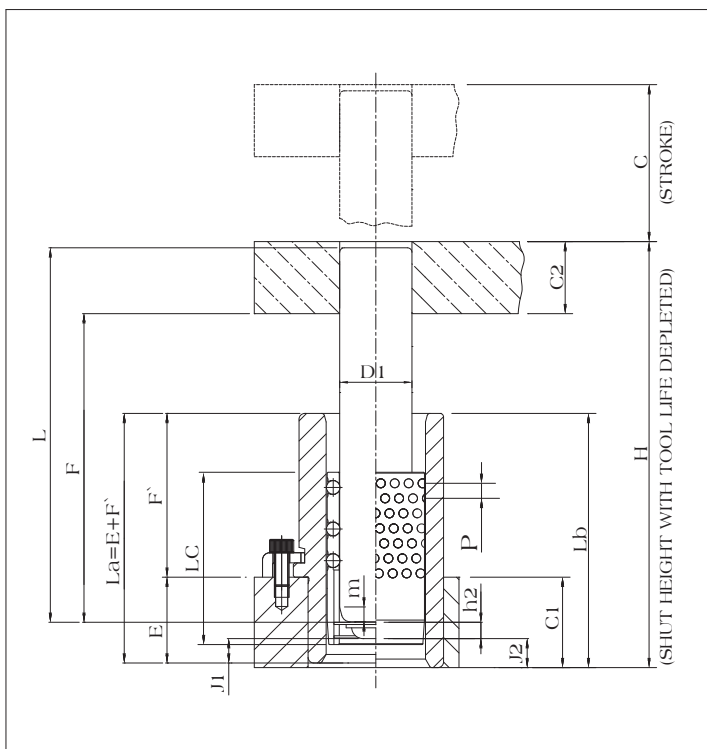
TORCH/GAS CUT TOLERANCES[mm]			
PLATE THICKNESS	SLOT DIMENSION	SLOT LOCATION	MINIMUM SLOT WIDTH
UP TO 45	±1	±1	10
OVER 45-75	±2	±2	15
OVER 75	±3	±3	20

Type 2: The cage pre-load can vary from partial pre-load up to totally free, according to selected conditions.

Operating Conditions



Guide Post Length Calculation See Below.



Selection of Ball Bearing Bushings (Straight Sleeve or Ball Bearing Bushing) and Cages for Type 2 is based on Guide Post diameter and stroke of tool using chart of page 43:

1. Select desired Guide Post diameter "D1".
2. Select required stroke of tool "C"(do not forget to add grinding allowance of tool to press stroke).
3. Move down the stroke column until you reach the color of desired operating condition.
4. Move horizontally to the left to select the length of Ball Bearing Bushing (Straight Sleeve or Ball Bearing Bushing) and Cage.

On Type 2, each Ball Bearing Cage length corresponds to one Ball Bearing Bushing length.

Caution: Length of Ball Bearing Bushing is limited by space available between the plates of the Die Set. To check interference, use formula on page down label as "CAUTION".

### Calculations for Guide Post Length

Straight Sleeve	Ball Bearing Bushing
$L = H - h - J2$	$L = H - J1 - h - C1 + E$
CAUTION: $H > C2 + Lb$	CAUTION: $H > C1 + C2 + F'$

NB:  $h = h2$  (for type 2); for E see page 32;  $J1 = J2 = 4$

For Straight Guide Post, if calculated length (L) is not available: Select the immediately longer Guide Post and cut it or select the immediately shorter Guide Post and press it on the Punch Holder of Die Set until exact length is obtained.

D1	25	32	40	50	63	80
a	14.5	14.0	14.5	15.5		
h1	5.8	6.9	8.0	9.1	12.5	15.0
h2	9.3	10.4	11.5	12.6	16.0	18.5



# Type 2 Bushing & Ball Cage Selection Chart



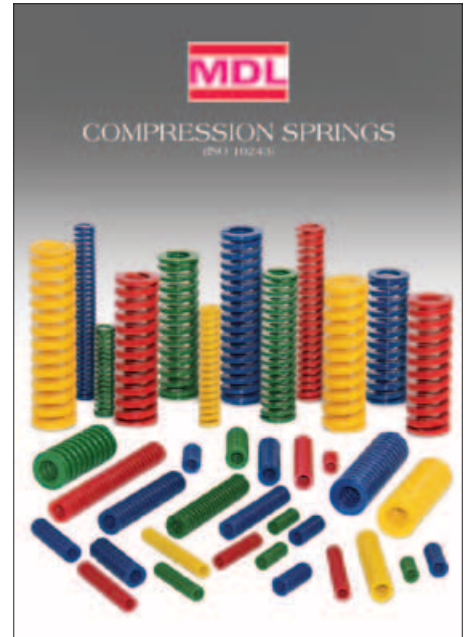
PILLAR Dia.	Ball Cage Bushing		Ball Cage (pag. 34)	Stroke "C" Including Die Grinding Allowance															
	Shoulder Sleeve (pag. 32)	Straight Sleeve (pag. 31)		10	50	100	150												
D1	F	Lb	Lc																
25	35	65	55	[Grid with blue shading]															
	50	80	70	[Grid with blue shading]															
	65	95	90	[Grid with blue shading]															
		110	100	[Grid with blue shading]															
		130	110	[Grid with blue shading]															
32	50	80	70	[Grid with blue shading]															
	65	95	90	[Grid with blue shading]															
	80	110	105	[Grid with blue shading]															
		130	115	[Grid with blue shading]															
		150	125	[Grid with blue shading]															
		170	135	[Grid with blue shading]															
40	50	80	70	[Grid with blue shading]															
	65	95	85	[Grid with blue shading]															
	80	110	105	[Grid with blue shading]															
	100	130	115	[Grid with blue shading]															
		150	125	[Grid with blue shading]															
		170	135	[Grid with blue shading]															
		190	145	[Grid with blue shading]															
		215	155	[Grid with blue shading]															
50	65	110	105	[Grid with blue shading]															
	80	130	120	[Grid with blue shading]															
	100	150	140	[Grid with blue shading]															
	120	170	150	[Grid with blue shading]															
		190	160	[Grid with blue shading]															
		215	170	[Grid with blue shading]															
		240	185	[Grid with blue shading]															
		265	195	[Grid with blue shading]															
63	100	150	145	[Grid with blue shading]															
	120	170	165	[Grid with blue shading]															
	140	190	180	[Grid with blue shading]															
		215	190	[Grid with blue shading]															
		240	205	[Grid with blue shading]															
		265	215	[Grid with blue shading]															
80	100	150	145	[Grid with blue shading]															
	120	170	165	[Grid with blue shading]															
	140	190	180	[Grid with blue shading]															
		215	190	[Grid with blue shading]															
		240	205	[Grid with blue shading]															
	265	215	[Grid with blue shading]																

## PRODUCT LINE

- Compression Springs
- Die Sets
- Die Sets Components

## SERVICE LINE

- "Blanchard" Grinder  
(Up to 2100(mm) of Diagonal x 900(mm) of Height)
- Surface Grinder  
(Up to 1700(mm) x 625(mm) x 350(mm))
- Gundrilling Machine  
(Ø6(mm) to Ø32(mm) Up to 2000(mm))
- Machining Center  
(Up to 3000(mm) x 1500(mm) x 500(mm))
- Provide Steel Plates Machined According to Drawing
- Steel Plate Machining



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**MDL Anchor Lamina Gmbh**  
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