

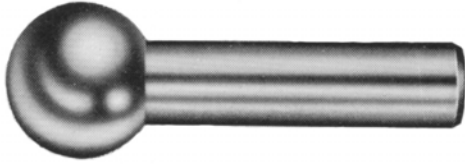
Tooling Balls

Locate Best With Balls

Hardened Ground Steel — 360° Preferences

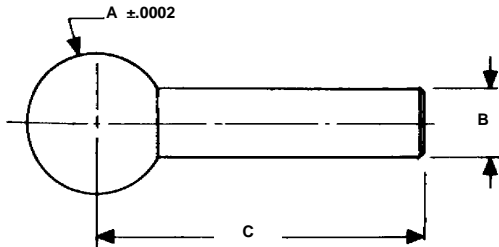
UNITED's Tooling Balls provide a precision reference point for critical machining. The precision balls are held within plus or minus .0002 in ball diameter and in the location from the ball to centerline. *UNITED* Tooling Balls are rugged, precise and guaranteed for normal wear.

STANDARD TOOLING BALLS



ADJUSTABLE TYPE
Excellent referencing in construction and locations for jigs, fixtures and tools.

Set at any height and lock in with set screw.



* PRESS FIT +.0003 -.0000	* SLIP FIT +.0000 -.0004	BALL A	SELECT SHANK * B PRESS OR SLIP	LENGTH C
UDB-926705	UDB-926706	.2500	.1250	.563
UDB-926710	UDB-926711	.3750	.1875	.750
UDB-926715	UDB-926716	.5000	.2500	.940
UDB-926720	UDB-926721	.5000	.2500	1.500
UDB-926724	UDB-926725	.5000	.2500	2.875
UDB-926726	UDB-926727	.5000	.3125	1.500
UDB-926730	UDB-926731	.5000	.3750	1.500
UDB-926735	UDB-926736	.6250	.3125	1.063
UDB-926740	UDB-926741	.7500	.3750	1.250
UDB-926745	UDB-926746	.8750	.4375	1.440
UDB-926750	UDB-926751	1.0000	.5000	1.625

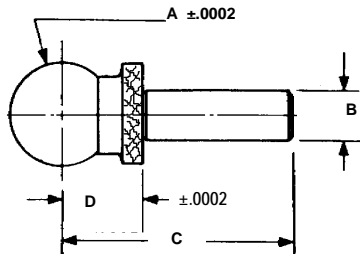
* .0002 T.I.R. BALL TO SHANK

SHOULDER TOOLING BALLS Without Tapped Shanks

Knurled Shoulder



The center of construction ball accurately locates other fixture factors.



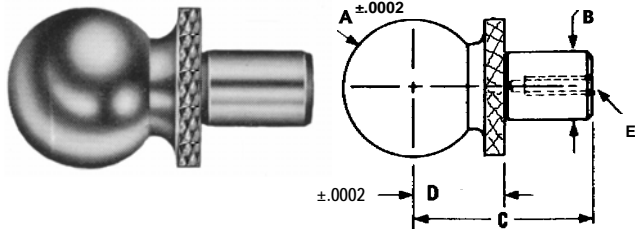
PRESS FIT +.0003 -.0000	SLIP FIT +.0000 -.0004	BALL A	SELECT SHANK B PRESS OR SLIP	LENGTH C	SHOULDER TO BALL D
UDB-926805	UDB-926806	.2500	.1250	.560	.2000
UDB-926810	UDB-926811	.3750	.1875	.750	.3000
	UDB-926977	.5000	.2500	.625	.3125
UDB-926815	UDB-926816	.5000	.2500	.940	.4000
UDB-926818	UDB-926819	.5000	.2500	1.125	.5000
UDB-926820	UDB-926821	.5000	.2500	1.375	.5000
	UDB-926981	.5000	.2500	1.500	.5000
UDB-926822	UDB-926823	.5000	.2500	1.625	1.000
UDB-926824	UDB-926825	.5000	.2500	1.875	1.2500
	UDB-926982	.5000	.3125	1.500	.5000
	UDB-926983	.5000	.3750	1.500	.5000
UDB-926826	UDB-926827	.6250	.3125	1.050	.4500
UDB-926830	UDB-926831	.7500	.3750	1.250	.5000
UDB-926835	UDB-926836	1.0000	.5000	1.625	.7000

TOOLMAKER'S CONSTRUCTION BALLS

With Tapped Shanks — Knurled Shoulder

A precise height reference shoulder locates ball in 3 thread dimensions.

The Construction Ball can be pulled into a hole or bushing from below without applying pressure on the ball by using a cap screw in the internally tapped shank.



UNITED PART NO.	BALL A	SHANK B +.0000 -.0004	LENGTH C	SHOULDER TO BALL D	THRD x DEPTH E
UDB-926870	.5000	.2500	.875	.5000	6-32 x 1/4 D.P.
UDB-926875	.5000	.2500	.625	.3125	6-32 x 1/4 D.P.
UDB-926979	.5000	.3125	.940	.5000	6-32 x 5/16 D.P.
UDB-926984	.5000	.2500	.940	.5000	6-32 x 5/16 D.P.

See page D42 for Tooling Ball Pads.

UNITED's proprietary welding method combined with **UNITED's** exclusive shank design produces precise dimensions while retaining brilliant finishes of balls and shanks. **IN THE EVENT AN ABNORMALLY HEAVY LATERAL PRESSURE IS APPLIED, THE BALL WILL UNIQUELY DROP OFF PRIOR TO BENDING THE SHANK OR DISTORTING THE TOOLING BALL'S TOLERANCES.** Thus inspection error is prevented!

UNITED Has the Best Ball!

Precision Ground-Luster Finish-Single Ball Construction
Tool Steel RC-58-62

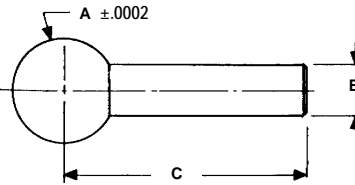
Send us you specific requirements.

One Piece Construction
Tooling Balls

ONE PIECE CONSTRUCTION

PRESS FIT +.0003 -.0000 PART NO.	SLIP FIT +.0000 -.0004 PART NO.	A ±.0002 BALL	SELECT B SHANK O.D. PRESS OR SLIP	C LENGTH
UDB-826705	UDB-826706	.2500	.1250	9/16
UDB-826710	UDB-826711	.3750	.1875	3/4
UDB-826715	UDB-826716	.5000	.2500	15/16
UDB-826720	UDB-826721	.5000	.2500	1-1/2
UDB-826725	UDB-826726	.5000	.3125	1-1/2
UDB-826730	UDB-826731	.5000	.3750	1-1/2

Tough and
Durable



STANDARD TOOLING BALLS

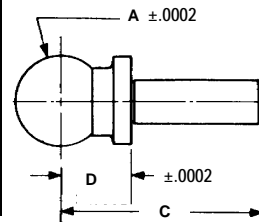
Strong Solid One-Piece



ONE PIECE CONSTRUCTION

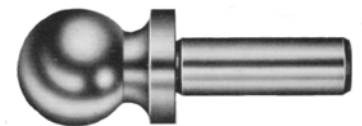
PRESS FIT +.0003 -.0000 PART NO.	SLIP FIT +.0000 -.0004 PART NO.	A ±.0002 BALL	SELECT B SHANK O.D. PRESS OR SLIP	C LENGTH	D ±.0002 SHOULDER TO BALL
UDB-826805	UDB-826806	.2500	.1250	9/16	.200
UDB-826810	UDB-826811	.3750	.1875	3/4	.300
UDB-826815	UDB-826816	.5000	.2500	15/16	.400
UDB-826820	UDB-826821	.5000	.2500	1-3/8	.500
UDB-826825	UDB-826826	.5000	.2500	1-1/2	.500
UDB-826830	UDB-826831	.7500	.3750	1-1/4	.500

Shoulder provides precise
base to center line, assuring
exact location.



SHOULDER TOOLING BALLS

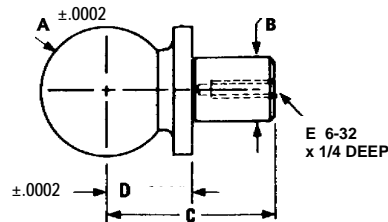
Strong Solid One-Piece — No-Knurl



ONE PIECE CONSTRUCTION

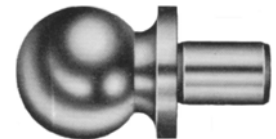
UNITED PART NO.	A BALL ±.0002	B SHANK O.D. +.0000 -.0004 SLIP FIT	C LENGTH	D SHOULDER TO BALL ±.0002
UDB-826875	.5000	.2500	5/8	.3125
UDB-826885	12 mm ± .010	6 mm + .000 -.010	22 mm ± .005	12 mm

Tapped hole for
screw mounting.



TOOLMAKER'S CONSTRUCTION BALLS

Strong Solid One-Piece — No-Knurl



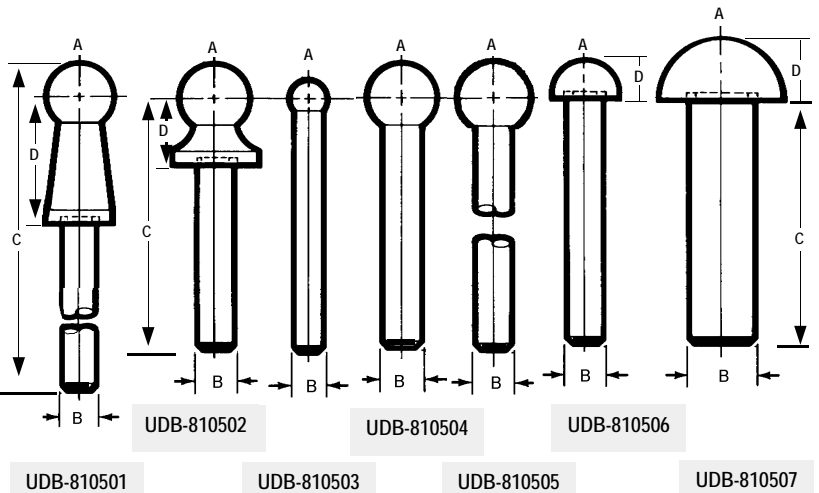
UNITED'S SUPREME LONG SHANK DESIGN

With Close Tolerances — Ideal for

UNITED PART NO.	A ±.0002 Ball Dia.	B ±.0001 -.0002 Shank Dia.	C Length	D ±.0002 Shoulder to Ball
UDB-810508	KIT of all 7 Long Shank Supreme Inspection Balls..			
UDB-810501	.5000	.2497	2-1/2	1.000
UDB-810502	.5000	.2497	2	.5000
UDB-810503	.2500	.1872	2	—
UDB-810504	.5000	.2497	2	—
UDB-810505	.5000	.2497	4	—
UDB-810506	.5000	.2497	2	.2500
UDB-810507	1.000	.4997	2	.5000

SUPREME LONG SHANK INSPECTION BALLS

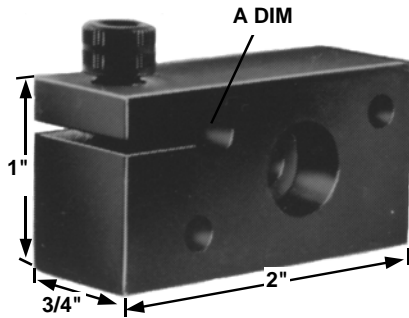
UDB-810508 KIT OF ALL 7 BALLS



Tooling Ball Pads

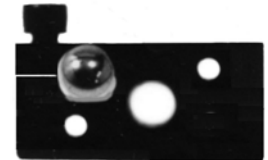
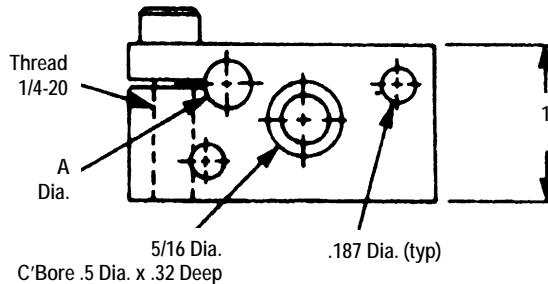
Three Distinct Accurate Pads

RECTANGULAR TOOLING PAD



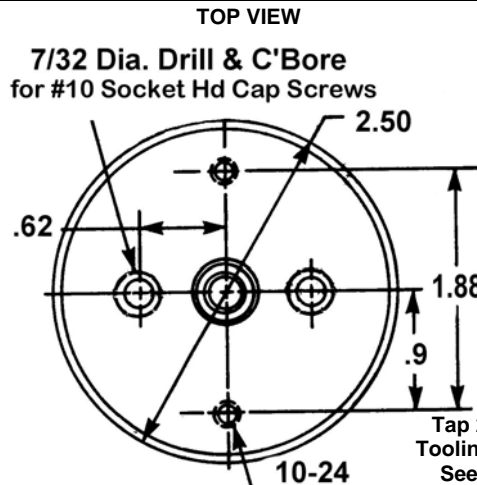
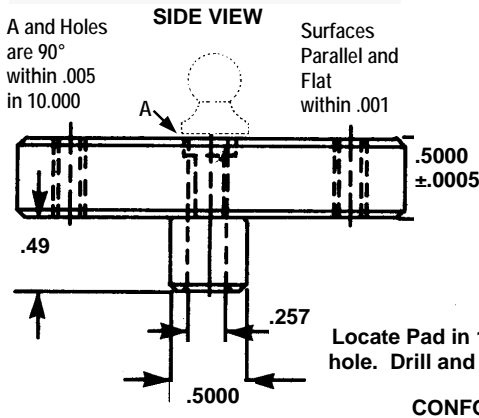
UNITED Pads were designed for easy insertion and removal of tooling balls. Provided with drilled holes for mounting by cap screws and dowels, the Tooling Ball is adjusted to the exact position required and then locked securely in place by a cap screw without marring the shank of the tooling ball.

UNITED PART NO.	A +.0005 DIA. -.0000
UDB-919075-25	.2500
UDB-919075-31	.3125
UDB-919075-37	.3750



BLACK OXIDE FINISH

ROUND TOOLING PAD



UNITED PART NO.	A +.0005 DIA. -.0000
UDB-919078	.2500
UDB-919079	.3125
UDB-919080	.3750

CONCENTRIC WITHIN .002 T.I.R. BLACK OXIDE FINISH

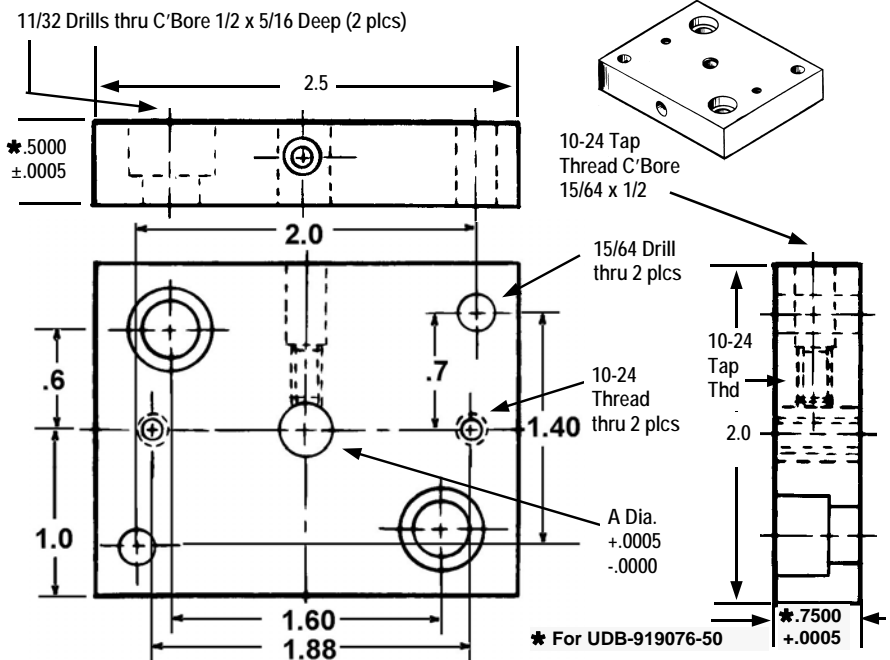
TOOLING PAD



UNITED PART NO.	A +.0005 DIA. -.0000
UDB-919076-25	.2500
UDB-919076-31	.3125
UDB-919076-37	.3750
*UDB-919076-50	.5000

CONFORMS TO CTS 136A - 1 & 2

BLACK OXIDE FINISH

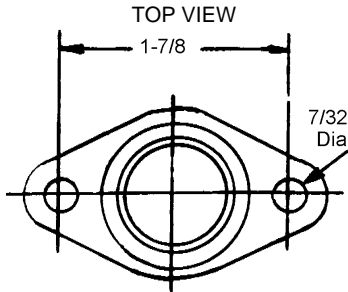


Tooling Ball Covers and Premium Tooling Balls

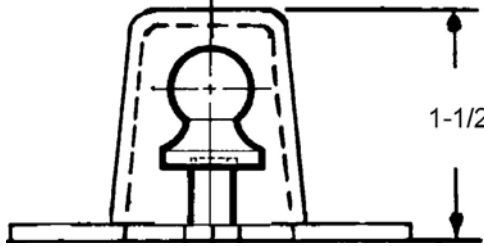


Protects your Precision Measuring Tooling Ball

CONSTRUCTION TOOLING BALL COVERS



REF STD-132A, T-53026, CTS-137AB



UDB-653041



DIE CAST ZINC ALLOY

Also used with Short Construction Tooling Balls

INSTALLED VIEW

UNITED TOOLING BALL SET 810508

LONG SHANK PREMIUM TOOLING BALLS



UDB-810501



UDB-810502



UDB-810503



UDB-810504



UDB-810505



UDB-810506



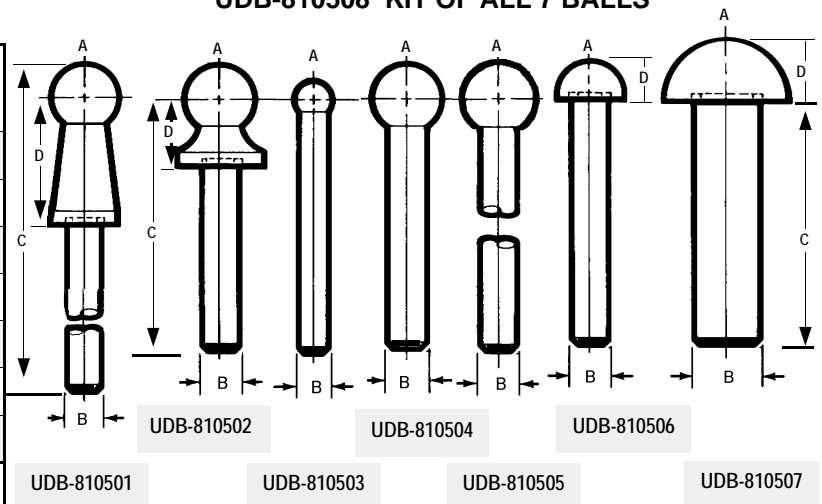
UDB-810507

UNITED'S SUPREME LONG SHANK DESIGN
With Close Tolerances — Ideal for

SUPREME LONG SHANK INSPECTION BALLS

UDB-810508 KIT OF ALL 7 BALLS

UNITED PART NUMBER	Ball Dia. A ±.0002	Shank Dia. B +.0001 - .0002	Length C	Shoulder to Ball D ±.0002
UDB-810508	KIT of all 7 Long Shank Supreme Inspection Balls..			
UDB-810501	.5000	.2497	2-1/2	1.000
UDB-810502	.5000	.2497	2	.5000
UDB-810503	.2500	.1872	2	
UDB-810504	.5000	.2497	2	
UDB-810505	.5000	.2497	4	
UDB-810506	.5000	.2497	2	.2500
UDB-810507	1.000	.4997	2	.5000



Die Pad Retainers Cap & Lock Screws

Die Pad Retainers, Bushings and Screws

LOCK SCREWS

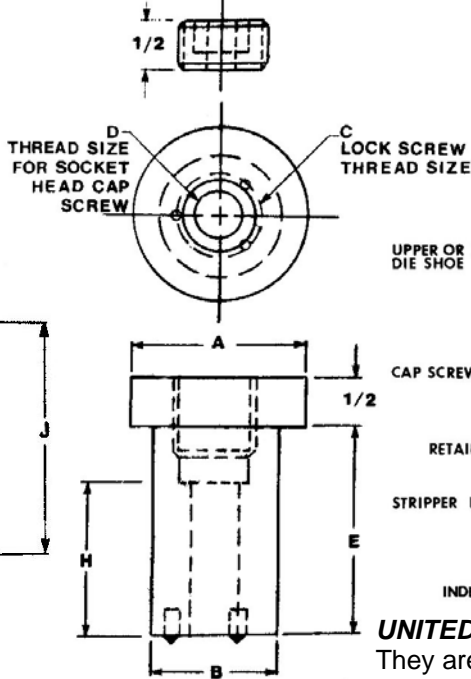
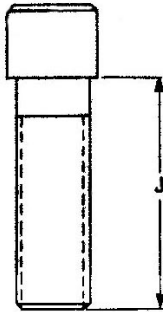


DIE PAD LOCK SCREWS		
PART NO.	F	G
UDB-970500	7/8 - 14	3/8
UDB-970505	1 - 14	1/2

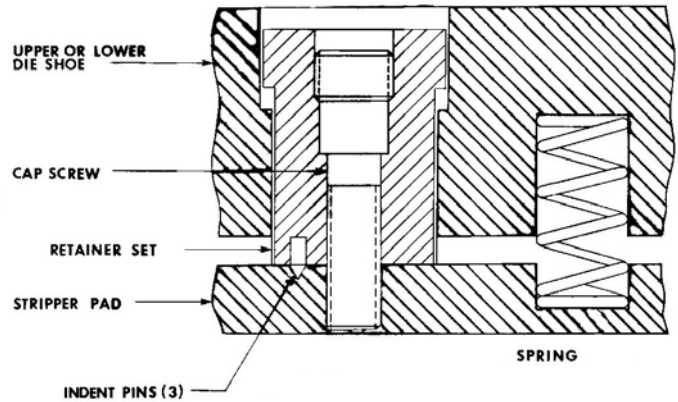
UNITED

DIE PAD RETAINERS are furnished complete as shown.

SOCKET HEAD CAP SCREWS



Includes Lock Screw, Cap Screw, Retainer with indent pins.



RETAINERS



Each RETAINER consists of a hard Bushing Retainer Sleeve with three indent pins, an alloy steel Cap Screw and a Lock Screw with National Fine threads.

UNITED DIE PAD RETAINERS hold die pads firmly. They are stronger and handle heavier loads than stripper bolts.

USED FOR PRODUCTION DIE STAMPING—Available in outside body diameters of 1-1/4" and 1-3/8" and lengths up to 6" long. Each retainer uses the same size hex cap and lock series to facilitate insertion and removal with the same wrench.

COMPLETE DIE PAD RETAINERS INCLUDE ALL PARTS SHOWN

A = 1-5/8	B = 1-1/4	C = 7/8 - 14	D = 1/2 - 13
PART NO.	E	H	J
UDB-986000	1	3/8	1-1/4
UDB-986005	1-1/4	5/8	1-1/2
UDB-986010	1-1/2	7/8	1-3/4
UDB-986015	1-3/4	1-1/8	2
UDB-986020	2	1-3/8	2-1/4
UDB-986025	2-1/4	1-5/8	2-1/2
UDB-986030	2-1/2	1-7/8	2-3/4
UDB-986035	2-3/4	2-1/8	3
UDB-986040	3	2-3/8	3-1/4
UDB-986045	3-1/4	2-5/8	3-1/2
UDB-986050	3-1/2	2-7/8	4
UDB-986055	4	3-1/8	4
UDB-986060	4	3-3/8	4-1/2
UDB-986065	4-1/2	3-7/8	5
UDB-986070	5	4-3/8	5-1/2
UDB-986075	5-1/2	4-7/8	6
UDB-986080	6	5-1/2	6-1/2

A = 1-3/4	B = 1-3/8	C = 1 - 14	D = 5/8 - 11
PART NO.	E	H	J
UDB-986100	1	1/4	1-1/4
UDB-986105	1-1/4	1/2	1-1/2
UDB-986110	1-1/2	3/4	1-3/4
UDB-986115	1-3/4	1	2
UDB-986120	2	1-1/4	2-1/4
UDB-986125	2-1/4	1-1/2	2-1/2
UDB-986130	2-1/2	1-3/4	2-3/4
UDB-986135	2-3/4	2	3
UDB-986140	3	2-1/4	3-1/4
UDB-986145	3-1/4	2-1/2	3-1/2
UDB-986150	3-1/2	2-3/4	4
UDB-986155	4	3	4
UDB-986160	4	3-1/4	4-1/2
UDB-986165	4-1/2	3-3/4	5
UDB-986170	5	4-1/4	5-1/2
UDB-986175	5-1/2	4-3/4	6
UDB-986180	6	5-1/4	6-1/2

UNITED's DIE PAD RETAINER

- Absorbs Side Thrust
- Reduces Stress
- Distributes Load Over Wider Area
- Reduces Number of Ball Points Per Die