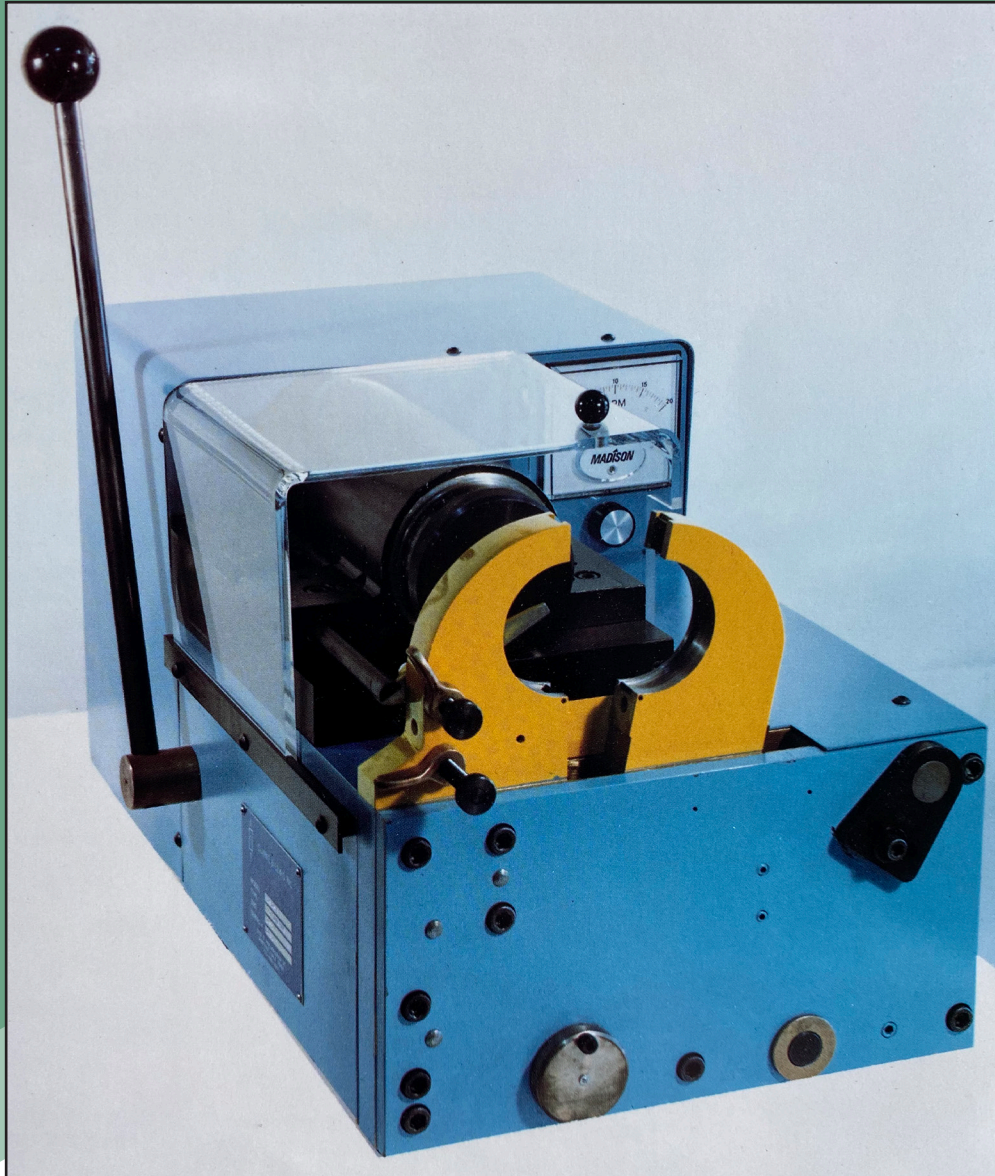
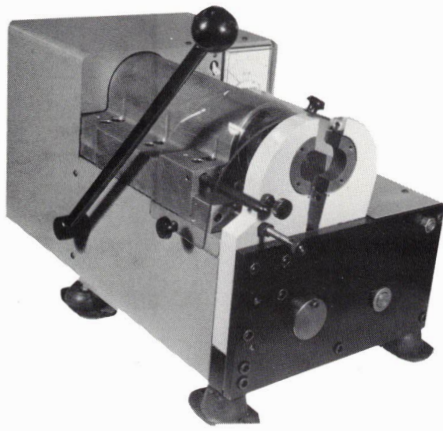


Tube End Finishing



ULTIMATE
TUBE BENDER
PARTS PLUS, INC.

dave@benderparts.com • www.benderparts.com
3245 Sandpointe Dr | Brighton MI 48114

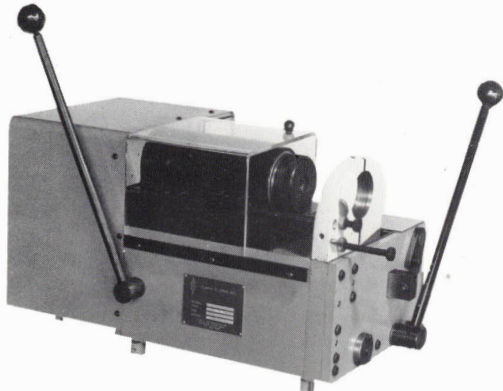


**2SD-3
AUTO JAW CLOSE**

The 2SD-3 tube end finishing machine performs squaring, deburring, beading and flaring on tubes up to 2 inches O.D. The standard machine is equipped with a two-speed spindle, either 600 RPM or 1500 RPM, switch selectable. Also included is automatic pneumatic jaw closing controlled by a side mounted lever. The lever also advances the spindle into the holding jaws. The spindle assembly rides on hardened "V" roller bearing ways. Adjustable gibs permit alignment of the spindle and jaws as a maintenance procedure. An optional continuously variable speed spindle is available, 0-600 RPM or 0-1500 RPM. The continuously variable speed option provides switch selection of speed range and includes an analog display.

The 3SD end finishing machine provides squaring, deburring, beading and flaring for tubes up to 3 inches O.D. Standard features include a powered beading cycle, heavy duty spindle traverse for heavy wall flaring, variable spindle speed, 0-500 RPM and pneumatic jaw closing.

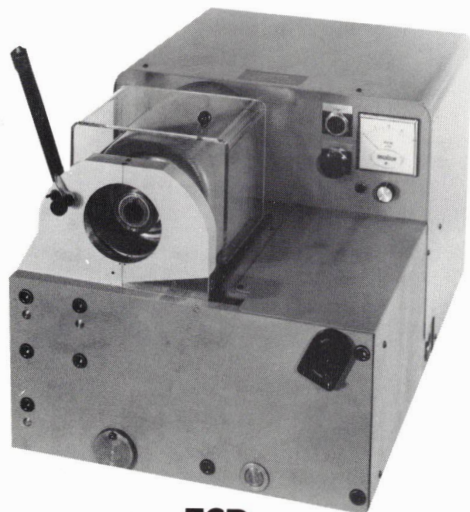
Safety features on both the 2SD-3 and 3SD include a chip guard and a "soft jaw" closer which prevents application of full closing force until the jaws are fully shut. Hardened steel alloy jaws ensure long life and accurate die registry. As an option, a velocity dampener is available on both machines that cushions the spindle and blades when you are squaring and deburring.



**2SD-3
MANUAL JAW CLOSE**

SPECIFICATIONS

Function	2SD-3	3SD
Square & Deburr	Non-Ferrous & Annealed Ferrous 1/8"-2" OD	Non-Ferrous & Annealed Ferrous 1/8"-3" OD
Flare	Non-Ferrous 1/8"-2" OD x .065" max W.T. Annealed Ferrous 1/8"-2" OD x .049" max W.T.	Non-Ferrous 1/8"-3" OD x .125" max W.T. Annealed Ferrous 1/8"-3" OD x .125" max W.T.
Bead	Non-Ferrous 1/4"-3/8" OD x .035" max W.T. 7/16"-1 1/2" OD x .065" max W.T. Annealed Ferrous 1/4"-3/8" OD x .035" max W.T. 7/16"-1 1/2" OD x .035" max W.T.	Non-Ferrous 1/4"-3/8" OD x .035" max W.T. 7/16"-3" OD x .065" max W.T. Annealed Ferrous 1/4"-3/8" OD x .035" max W.T. 7/16"-3" OD x .065" max W.T.
Electrical	115VAC 1 phase 60 hertz	230VAC 1 phase 60 hertz
Pneumatic	80-120 PSIG	80-120 PSIG
Spindle Speed	Fixed Speed 600 RPM or 1500 RPM OR Variable 0-600 RPM or 0-1500 RPM	Variable Speed 0-500 RPM
Jaws	Heat treated alloy steel Manual or pneumatic close	Heat treated alloy steel Pneumatic close
Dimensions	20"W x 22"D x 12"H	22"W x 31"D x 12"H
Shipping Weight	300 pounds	500 pounds
Options	Cabinet stand Velocity damper Foot switch Auto operated Electrical 230 / 460 single or three phase	Cabinet stand Velocity damper Foot switch Auto operated Electrical 230 / 460 single or three phase



3SD

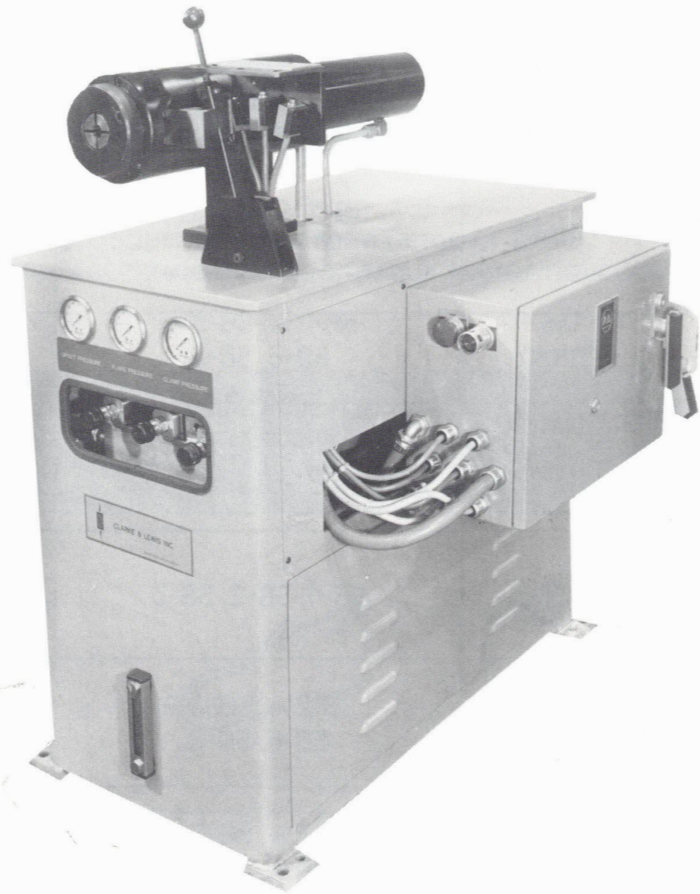
The CL-DF1 model is a hydraulic machine designed to produce double thickness flares, single flares and upset beads.

The hydraulic operation provides controlled pressure for uniform upset production. The tooling is interlocked for sequential operation, controlled by a single lever. Production rate for double flares is 600 per hour.

The CL-DF-1 is a two-cylinder press. The front cylinder clamps the tube in the holding die and the rear cylinder advances forming punches through a hole in the rod of the front cylinder.

An accumulator maintains constant clamp force when the punch cylinder advances.

Three pressure settings are provided for clamping, upset and flare pressures, each with a gage. Clamping pressure holds the tube in place in the tapered holding die. The upset pressure is the first operation in double flaring to upset the tube end, and the flare pressure forms the double flare. Flares can be formed to 37° or 45°.



SPECIFICATIONS

DF-1	
Capacity	Double flare — 1/8" to 1/2" OD Single flare — 1/8" to 3/4" OD Bead — 3/16" to 1/2" OD For annealed ferrous and non-ferrous tubing.
Operation	Single lever operation.
Power	5HP, 230 / 460 VAC, 3φ, 60 Hertz.
Standard Tooling	For MS, AN / JIC and SAE Flare Specification
Dimensions	Length 37", height 47 1/2" width 28 1/2".
Shipping Weight	800 pounds.

BLADE TYPE	HEAD TYPE	REPLACES	TYPE OF MATERIAL
TS-1 (1/16 Thick)	SB-1, SB-2, SB-3	K1	High Speed Steel
TS-1 1/8 (1/8 Thick)	SB-2 1/8, SB-3 1/8 SB-6, SB-8	K2	High Speed Steel
TS-2 (1/8 Thick)	SB-2 1/8, SB-3 1/8 SB-6, SB-8	K2	High Speed Steel
VS-1 (1/16 Thick)	SB-1, SB-2, SB-3	TK1	Tantalum / Tungsten Carbide
VS-1 1/8 (1/8 Thick)	SB-2 1/8, SB-3 1/8 SB-6, SB-8	TK2	Tantalum / Tungsten Carbide
VS-2 (1/8 Thick)	SB-2 1/8, SB-3 1/8 SB-6, SB-8	TK2	Tantalum-Tungsten Carbide
CS-1 (1/16 Thick)	SB-1, SB-2, SB-3	CK1	Tungsten Carbide
CS-1 1/8 (1/8 Thick)	SB-2 1/8, SB-3 1/8 SB-6, SB-8	—	Tungsten Carbide
CS-2 (1/8 Thick)	SB-2 1/8, SB-3 1/8 SB-6, SB-8	—	Tungsten Carbide
TS-5 (1/8 Thick)	SB-5	K5	High Speed Steel
VS-5 (1/8 Thick)	SB-5	TK5	Tantalum / Tungsten Carbide
CS-5 (1/8 Thick)	SB-5	—	Tungsten Carbide

Resharpener Available on VS and CS Series Blades

SQUARING & DEBURRING BLADES Models 2SD, 2CP, 3SD, 3CP, 5CP, 8CP

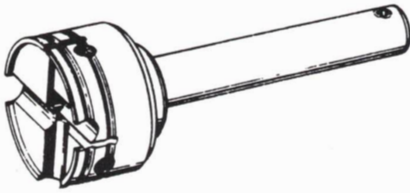
OPERATION	TOOLING REQUIRED
Square & Debur	1 each holding die for each TOD. 1 each squaring / deburring head for a range of TOD's. 1 each blades — set (inside, outside and squaring) or individual.

BLADE TYPE	OUTSIDE DEBURRING BLADE	INSIDE DEBURRING BLADE	SQUARING BLADE
CS-1 VS-1 or TS-1			
CS-1 1/8 VS-1 1/8 or TS-1 1/8			
CS-2 VS-2 or TS-2			
CS-5 VS-5 or TS-5			

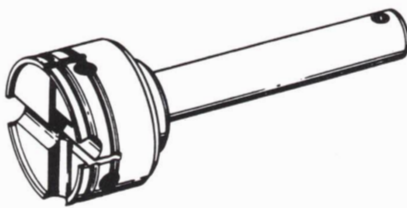
Blades are sold as a set of three, or separately (Inside, outside, and squaring).
For use on Clarke & Lewis, Inc., Leonard, or Conrac Squaring & Deburring Machines.

SQUARING / DEBURRING Models 2C, 2SD, 2CP, 3SD, 3CP, 6CP, 8CP

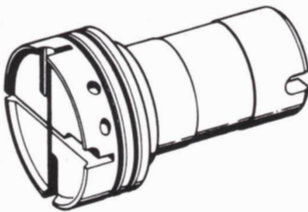
SQUARING & DEBURRING HEADS



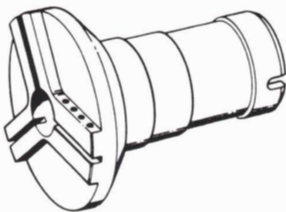
Tube OD	Blade Thickness	No.	Machine Mounting
1/8 to 1 1/2 1/4 to 2	1/16 1/16	CL SB-1 CL SB-2 1/16	Direct mount 2SD-2CP mount on 3SD-3CP with spindle adaptor 35CP-1



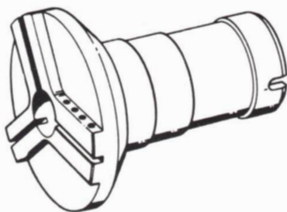
Tube OD	Blade Thickness	No.	Machine Mounting
5/8 to 2	1/8	CL SB-2 1/8	Direct mount 2SD-2CP mount on 3SD-3CP with spindle adaptor 35CP-1



Tube OD	Blade Thickness	No.	Machine Mounting
1 1/4 to 3	1/16 1/8	CL SB-3 1/16 CL SB-3 1/8	Direct mount 3SD-3CP mount on 6CP / 8CP with spindle adaptor 6CP-101



Tube OD	Blade Thickness	No.	Machine Mounting
2 1/4 to 6	1/8	CL SB-6	Direct Mount 6CP 8CP

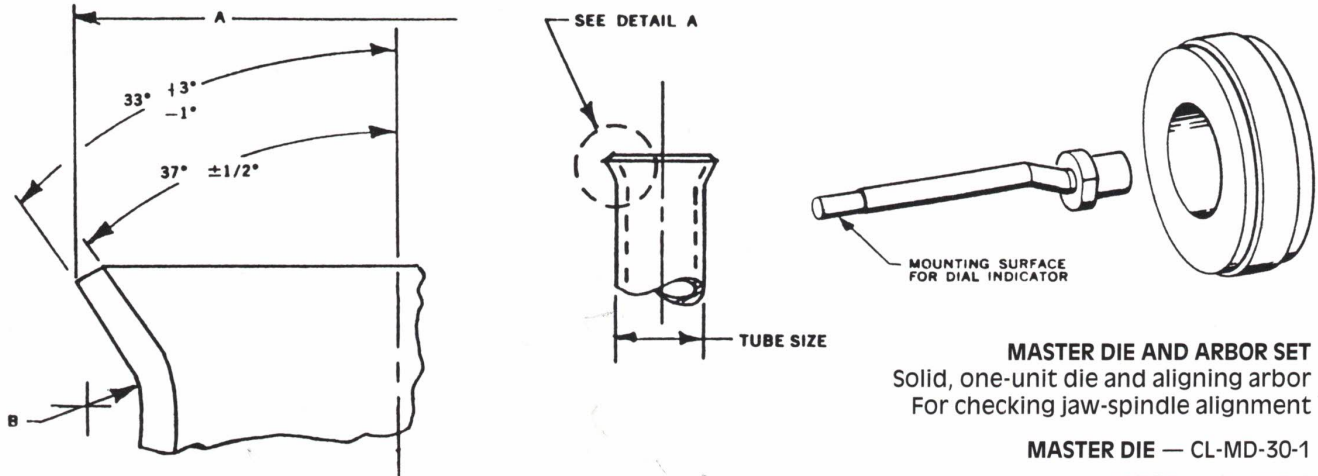


Tube OD	Blade Thickness	No.	Machine Mounting
3 to 8	1/8	CL SB-8 1/8	Direct Mount 8CP

FLARING

Meets Specification
OF MS33584

OPERATION	TOOLING REQUIRED
Flare	1 each flare die for each TOD. 1 each flare center for a range of TOD's. (In addition, a flare head may be required, and in some cases adapters are required.)



MASTER DIE AND ARBOR SET
Solid, one-unit die and aligning arbor
For checking jaw-spindle alignment

MASTER DIE — CL-MD-30-1

ARBOR — CL-ARB-1

For 45° flare dimensions see SAE Standard J533.

STANDARD DIMENSIONS FOR FLARED TUBING END MS-33584

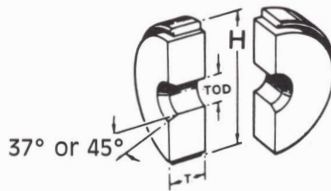
Tube Size Nominal OD Inches	A Diameter		B ±.010 Radius Inches
	Aluminum Alloy Tubing Inches	Steel Tubing Inches	
1/8	.200	.200	.032
3/16	.302	.302	
1/4	.359	.359	
5/16	.421	.421	
3/8	.484	.484	
1/2	.656	.656	
5/8	.781	.781	
3/4	.937	.937	
1	1.187	1.187	.093
1 1/4	1.500	1.500	
1 1/2	1.721	1.721	
1 3/4	2.106	2.106	
2	2.356	2.356	
2 1/2	2.856	2.856	
3	3.356	3.356	

STANDARD FLARE DIES

 For soft materials such as aluminum, brass, mild steel, etc.

TOD-Inches	37° Die No.	45° Die No.	T-Inches	H-Inches	Machine Mounting
1/8	CL30-3702	CL30-4502	3/4	3.0	Direct Mount 2SD-2CP
3/16	CL30-3703	CL30-4503	3/4		
1/4	CL30-3704	CL30-4504	3/4		
5/16	CL30-3705	CL30-4505	3/4		
3/8	CL30-3706	CL30-4506	3/4		
7/16	CL30-3707	CL30-4507	3/4		
1/2	CL30-3708	CL30-4508	3/4		
5/8	CL30-3710	CL30-4510	3/4		
3/4	CL30-3712	CL30-4512	7/8		Mount on 3SD-3CP with die adaptor CL 45-30-2
7/8	CL30-3714	CL30-4514	7/8		
1	CL30-3716	CL30-4516	7/8		
1 1/8	CL30-3718	CL30-4518	1		
1 1/4	CL30-3720	CL30-4520	1		
1 3/8	CL30-3722	CL30-4522	1		
1 1/2	CL30-3724	CL30-4524	1		
1 5/8	CL30-3726	CL30-4526	1 1/4		
1 3/4	CL30-3728	CL30-4528	1 1/4	Mount on 6 CP with die adaptor CL-75-30-2	
2	CL30-3732	CL30-4532	1 1/4		

TOD-Inches	37° Die No.	45° Die No.	T-Inches	H-Inches	Machine Mounting
1	CL45-3716	CL45-4516	1 1/4	4.50	Direct Mount 3SD-3CP
1 1/8	CL45-3718	CL45-4518	1 1/4		
1 1/4	CL45-3720	CL45-4520	1 1/4		
1 3/8	CL45-3722	CL45-4522	1 1/4		
1 1/2	CL45-3724	CL45-4524	1 1/4		Mount on 6 CP with die adaptor CL-75-45-4
1 5/8	CL45-3726	CL45-4526	1 1/4		
1 3/4	CL45-3728	CL45-4528	1 1/4		
2	CL45-3732	CL45-4532	1 1/4		
2 1/4	CL45-3736	CL45-4536	1 3/4		
2 1/2	CL45-3740	CL45-4540	1 3/4		
2 3/4	CL45-3744	CL45-4544	1 3/4		
3	CL45-3748	CL45-4548	1 3/4		



TOD-Inches	37° Die No.	45° Die No.	T-Inches	H-Inches	Machine Mounting
2	CL75-3732	CL75-4532	2.9	7.50	Direct Mount 6 CP
2 1/4	CL75-3736	CL75-4536	2.9		
2 1/2	CL75-3740	CL75-4540	2.9		
2 3/4	CL75-3744	CL75-4544	2.9		
3	CL75-3748	CL75-4548	3.9		
3 1/4	CL75-3752	CL75-4552	3.9		
3 1/2	CL75-3756	CL75-4556	3.9		Mount on 8 CP with die adaptor CL-100-75-6
3 3/4	CL75-3760	CL75-4560	3.9		
4	CL75-3764	CL75-4564	3.9		
4 1/4	CL75-3768	CL75-4568	3.9		
4 1/2	CL75-3772	CL75-4572	3.9		
4 3/4	CL75-3776	CL75-4576	3.9		
5	CL75-3780	CL75-4580	3.9		
5 1/4	CL75-3784	CL75-4584	3.9		
5 1/2	CL75-3788	CL75-4588	3.9		
5 3/4	CL75-3792	CL75-4592	3.9		
6	CL75-3796	CL75-4596	3.9		

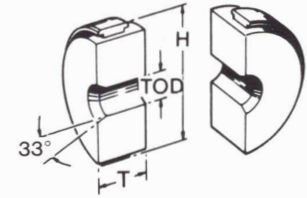
TOD-Inches	37° Die No.	45° Die No.	T-Inches	H-Inches	Machine Mounting
6 1/4	CL10-37100	CL10-45100	3.9	10.0	Direct Mount 8 CP
6 1/2	CL10-37104	CL10-45104	5.9		
6 3/4	CL10-37108	CL10-45108	5.9		
7	CL10-37112	CL10-45112	5.9		
7 1/2	CL10-37120	CL10-45120	5.9		
8	CL10-37128	CL10-45128	5.9		

FLARING Models 2C, 2SD, 2CP, 3CP, 3SD, 6CP, 8CP

Meets Specifications of MS33584-37°

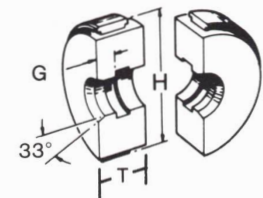
HEAVY DUTY FLARE DIES For hard materials such as stainless steel and titanium.

TOD-Inches	Die No.	T-Inches	H-Inches	Machine Mounting
3/8	CL30-3706HD	1 1/4	3.0	Direct Mount 2SD-2CP Mount on 3SD-3CP with die adaptor CL-45-30-2
7/16	CL30-3707HD	1 1/4		
1/2	CL30-3708HD	1 3/4		
5/8	CL30-3710HD	1 3/4		
3/4	CL30-3712HD	2		
7/8	CL30-3714HD	2		
1	CL30-3716HD	2		
7/8	CL45-3714HD	3	4.5	Direct mount 3SD-3CP
1	CL45-3716HD	3		
1 1/8	CL45-3718HD	3		
1 1/4	CL45-3720HD	3		Mount on 6CP with die adaptor CL-75-45-4
1 3/8	CL45-3722HD	3		
1 1/2	CL45-3724HD	3		Mount on 8 CP with die adaptor CL-100-45-6
1 5/8	CL45-3726HD	3		
1 3/4	CL45-3728HD	3		
2	CL45-3732HD	3		
2 1/4	CL45-3736HD	3		
2 1/2	CL45-3740HD	3		
2 3/4	CL45-3744HD	3		
3	CL45-3748HD	3		



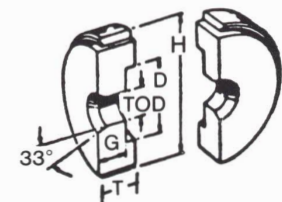
T-SLEEVE FLARE DIES For flaring when T-Sleeve is affixed.

TOD-Inches	Die No.	G	T-Inches	H-Inches	Machine Mounting	
1/8	CL30-3702T	.335	.75	3.0	Direct Mount 2SD-2CP	
3/16	CL30-3703T	.350				
1/4	CL30-3704T	.340			Mount on 3SD-3CP with die adaptor CL-45-30-2	
5/16	CL30-3705T	.340				
3/8	CL30-3706T	.340				
7/16	CL30-3707T	.340				
1/2	CL30-3708T	.375				
5/8	CL30-3710T	.375				Mount on 6CP with die adaptor CL-75-30-2
3/4	CL30-3712T	.405				
7/8	CL30-3714T	.405				
1	CL30-3716T	.405				1.25
1 1/8	CL30-3718T	.428				
1 1/4	CL30-3720T	.450			1.50	
1 3/8	CL30-3722T	.440				
1 1/2	CL45-3724T	.425			1.75	
1 3/4	CL30-3728T	.675				
2	CL30-3732T	.800			2.0	4.5
2	CL45-3732T	.800	2.00			
2 1/4	CL45-3736T	.800	2.06			
2 1/2	CL45-3740T	.800	2.19			
2 3/4	CL45-3744T	.800	2.19			
3	CL45-3748T	.800	2.19			



RECESSED FLARE DIES For tubes with short straight sections at the flare end.

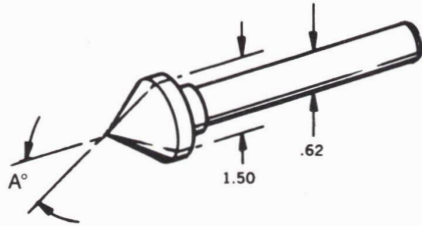
TOD-Inches	Die No.	G	D	T-In.	H-In.	Machine Mounting
1/8	CL30-3702R	.475	1.00	.75	3.0	Direct Mount 2SD-2CP Mount on 3SD-3CP with die adaptor CL-45-30-2
3/16	CL30-3703R	.475	1.00			
1/4	CL30-3704R	.475	1.00			
5/16	CL30-3705R	.475	1.00			
3/8	CL30-3706R	.475	1.00			
7/16	CL30-3707R	.475	1.00			
1/2	CL30-3708R	.475	1.00			
5/8	CL30-3710R	.475	1.00			
3/4	CL30-3712R	.525	1.50			
7/8	CL30-3714R	.525	1.50			
1	CL30-3716R	.525	1.50			
1 1/8	CL30-3718R	.525	2.00			
1 1/4	CL30-3720R	.575	2.00			
1 3/8	CL30-3722R	.575	2.00			
1 1/2	CL30-3724R	.575	2.00			
1 5/8	CL30-3726R	.575	2.00			
1 3/4	CL30-3728R	.750	2.50			
2	CL30-3732R	.750	2.50			



FLARE CENTERS Models 2C, 2SD, 2CP, 3CP, 3SD, 6CP, 8CP

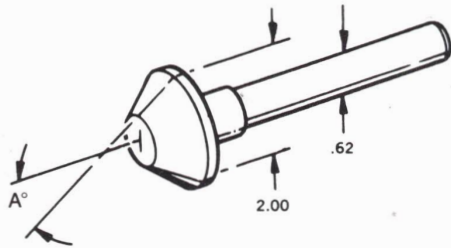
TOOL STEEL OR TUNGSTEN CARBIDE (TC)

TOD 1/8" to 1 1/2"



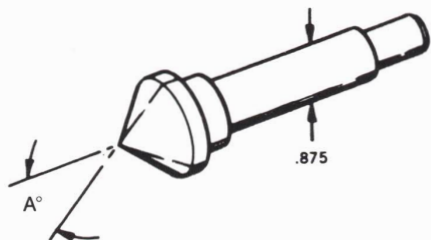
Application	A°	No.	Machine Mounting
Copper, Brass, Mild Steel & Aluminum Stainless Steel & Titanium	37° 45° 37°	CLFC370 CLFC450 CLFC3724TC	Direct mount 2SD-2CP for 3SD-3CP use spindle adaptor 35CP-1

TOD 1 5/8" to 2"



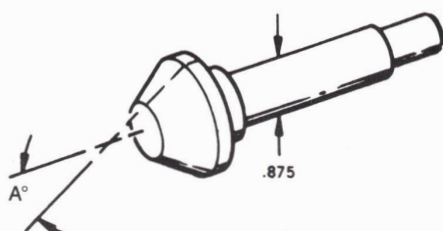
Application	A°	No.	Machine Mounting
Copper, Brass, Mild Steel & Aluminum Stainless Steel & Titanium	37° 45° 37°	CLFC372 CLFC452 CLFC3732TC	Direct mount 2SD-2CP for 3SD-3CP use spindle adaptor 35CP-1

TOD 1/8" to 1 1/2" HEAVY WALL



Application	A°	No.	Machine Mounting
Stainless Steel & Titanium	37°	CLFC3724TCHD	For 3SD-3CP use spindle adaptor 35CP-10 For 6CP-8CP use spindle adaptor 6CP-101

TOD 1 5/8" to 2" HEAVY WALL



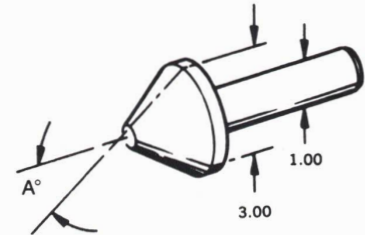
Application	A°	No.	Machine Mounting
Stainless Steel & Titanium	37°	CLFC3732TCHD	For 3SD-3CP use spindle adaptor 35CP-10 For 6CP & 8CP use spindle adaptor 6CP-101

FLARE CENTERS Models 3CP, 3SD, 6CP, 8CP

TOOL STEEL OR TUNGSTEN CARBIDE (TC)

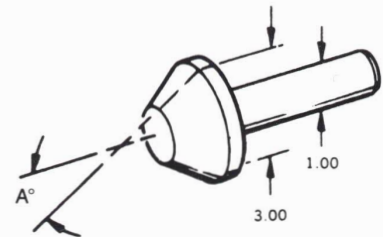
TOD 1 1/2" to 3"

Application	A°	No.	Machine Mounting
Copper, Brass, Mild Steel & Aluminum	37°	CLFC373	Direct mount FCH-30 Flare Head
Stainless Steel & Titanium	45°	CLFC453	
	37°	CLFC373TC	



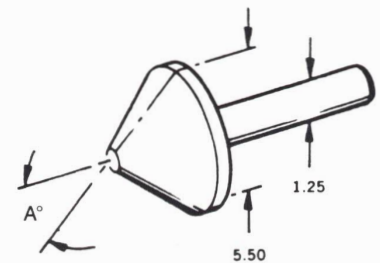
TOD 2 1/4" to 3"

Application	A°	No.	Machine Mounting
Stainless Steel & Titanium	37°	CLFC3748TC	Direct mount FCH-30 Flare Head



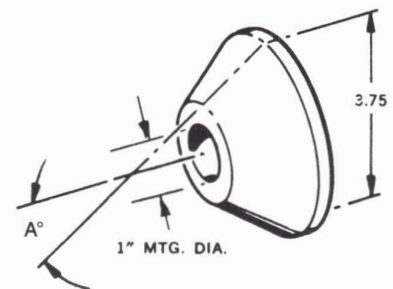
TOD 2 1/2" to 6"

Application	A°	No.	Machine Mounting
Copper, Brass, Mild Steel & Aluminum	37°	CLFC376	Direct mount FCH-60 Flare Head

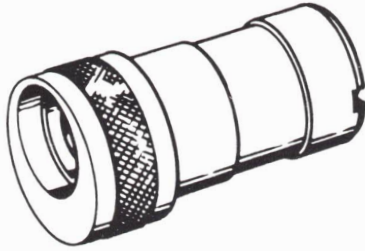


TOD 4" to 8"

Application	A°	No.	Machine Mounting
Copper, Brass, Mild Steel & Aluminum	37°	CLFC378	Direct mount with adaptor BH5-45 & FCH-80 Flare Head

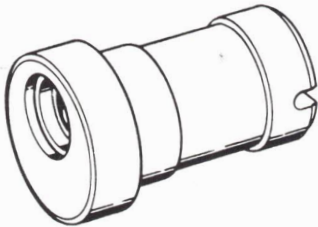


FLARE HEADS Models 3CP, 3SD, 6CP, 8CP



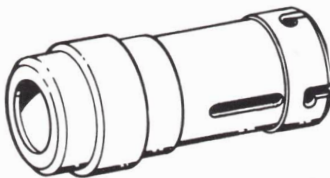
CLFCH 30 Flaring Head

Direct Mount 3SD-3CP
For 6CP and 8CP use spindle adaptor 6CP-101



CLFCH 60 Flaring Head

Direct Mount 6CP



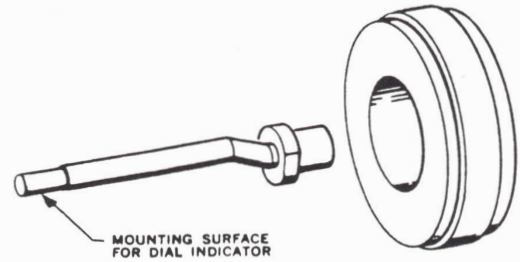
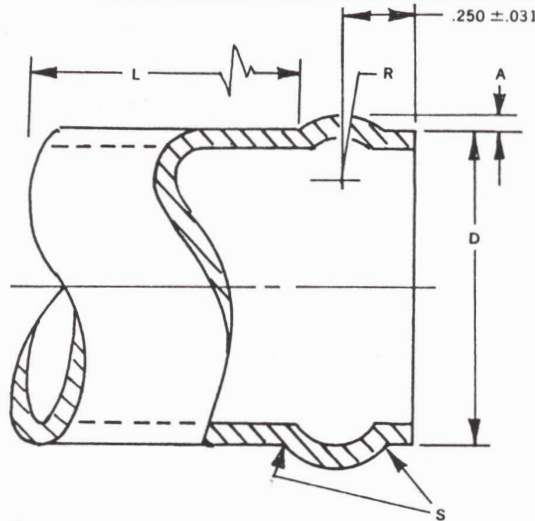
CLFCH 80 Flaring Head

Direct Mount 8CP

BEADING

Meets Specification Of
MS33660

OPERATION	TOOLING REQUIRED
Bead	1 each bead die for each TOD. 1 each bead head for a range of TOD. 1 each bead tip, arbor or roller for each TOD and wall thickness combination.



MASTER DIE AND ARBOR SET
Solid, one-unit die and aligning arbor
For checking jaw-spindle alignment

MASTER DIE — CL-MD-30-1

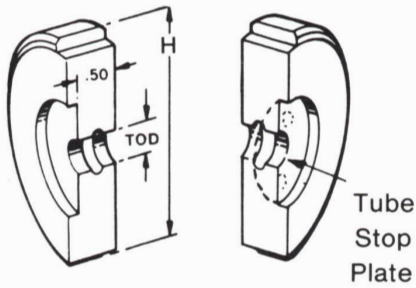
ARBOR — CL-ARB-1

STANDARD MS-33660 DIMENSIONS FOR BEADING

Size Number	D		A ±.003 Bead Height Inches	L Mini- mum Length	R Maxi- mum Radius	S Maxi- mum Radius		
	Tube OD Inches	Tolerance for Length L Type A End Inches						
4	1/4	+.003 -.010	.031	.750	.125	.062		
5	5/16		.033					
6	3/8		.035					
8	1/2		.038					
10	5/8		.038					
12	3/4		.038					
16	1	+.005 -.010	.062		.156	.093		
20	1 1/4		.072					
24	1 1/2		.072					
28	1 3/4		.072					
32	2		.082					
40	2 1/2		.082					
46	3	+.008 -.010	.088	.088			.088	
52	3 1/4							.088
56	3 1/2							.088
60	3 3/4							.088
64	4							.088
68	4 1/4							.088
72	4 1/2	±.010	±.010		±.010	±.010		
76	4 3/4							±.010
80	5							±.010
84	5 1/4							±.010
88	5 1/2							±.010
92	5 3/4							±.010
96	6	±.010	±.010	±.010			±.010	

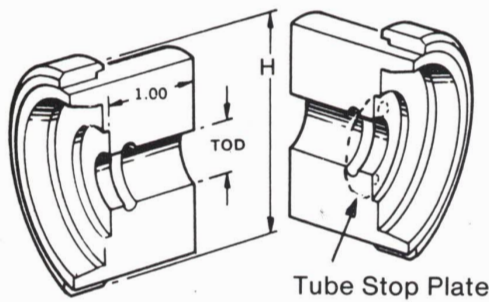
BEADING DIES

Use with 100 series bead tips



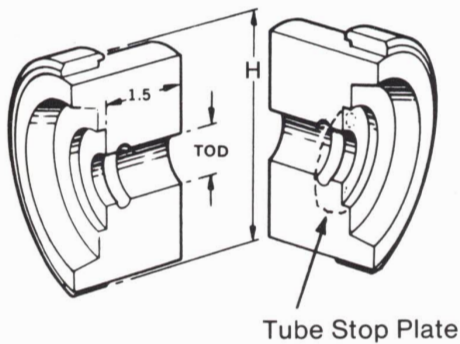
TOD-Inches	Die No.	H-Inches	Machine Mounting
1/4	CL2104	3.0	Direct mount 2SD-2CP Mount on 3SD-3CP with die adaptor CL 45-30-2
5/16	CL2105		
3/8	CL2106		

Use with 200 series bead arbors



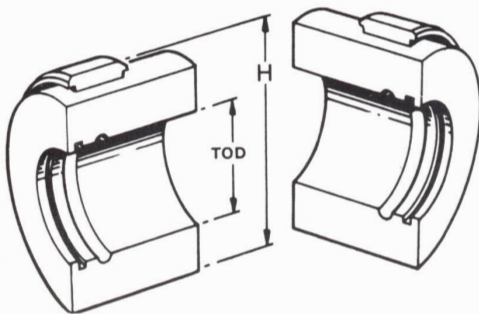
TOD-Inches	Die No.	H-Inches	Machine Mounting
7/16	CL2207	3.0	Direct mount 2SD-2CP Mount on 3SD-3CP with die adaptor CL 45-30-2
1/2	CL2208		
5/8	CL2210		
3/4	CL2212		
7/8	CL2214		
1	CL2216		
1 1/8	CL2218		
1 1/4	CL2220		
1 3/8	CL2222		
1 1/2	CL2224		

Use with 300 series bead arbors



TOD-Inches	Die No.	H-Inches	Machine Mounting
5/8	CL3310	4.5	Direct mount 3SD-3CP Mount on 6CP with die adaptor CL 75-45-4 Mount on 8CP with die adaptor CL 100-45-6
3/4	CL3312		
7/8	CL3314		
1	CL3316		
1 1/8	CL3318		
1 1/4	CL3320		
1 3/8	CL3322		
1 1/2	CL3324		

Use with 400 series bead rollers



TOD-Inches	Die No.	H-Inches	Machine Mounting
1 5/8	CL3426	4.5	Direct mount 3SD-3CP Mount 6CP with die adaptor CL 75-45-4 Mount on 8CP with die adaptor CL 100-45-6
1 3/4	CL3428		
2	CL3432		
2 1/4	CL3436		
2 1/2	CL3440		
2 3/4	CL3444		
3	CL3448		

BEADING DIES

Use with 500 series bead rollers

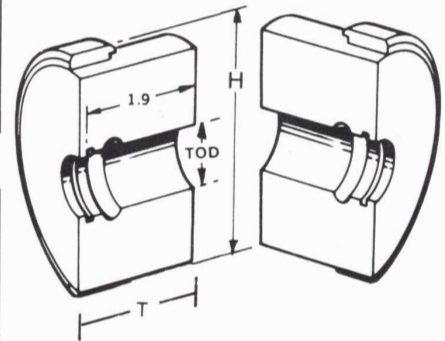
TOD-Inches	Die No.	T-Inches	H-Inches	Machine Mounting
1¼	CL5520	2	7.5	Direct mount 6CP Mount on 8CP with die adaptor CL 100-75-6
1½	CL5524	2		
1¾	CL5528	2		

Use with 600 series bead rollers

TOD-Inches	Die No.	T-Inches	H-Inches	Machine Mounting
2	CL5632	3.4	7.5	Direct mount 6CP Mount on 8CP with die adaptor CL 100-75-6
2¼	CL5636	3.4		
2½	CL5640	3.4		
2¾	CL5644	3.4		
3	CL5648	3.4		
3¼	CL5652	3.9		
3½	CL5656	3.9		
3¾	CL5660	3.9		
4	CL5664	3.9		
4½	CL5672	3.9		
5	CL5680	3.9		
5½	CL5688	3.9		
6	CL5696	3.9		

Use with 600 series bead rollers

TOD-Inches	Die No.	T-Inches	H-Inches	Machine Mounting
2	CL8632	3.4	10.0	Direct mount 8CP
2¼	CL8636	3.4		
2½	CL8640	3.4		
2¾	CL8644	3.4		
3	CL8648	3.4		
3¼	CL8652	3.9		
3½	CL8656	3.9		
3¾	CL8660	3.9		
4	CL8664	3.9		
4½	CL8672	3.9		
5	CL8680	3.9		
5½	CL8688	3.9		
6	CL8696	3.9		

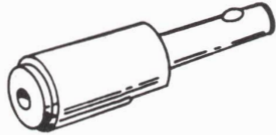


Use with 800 series bead rollers

TOD-Inches	Die No.	T-Inches	H-Inches	Machine Mounting
6¼	CL88100	6.0	10.0	Direct mount 8CP
6½	CL88104			
6¾	CL88108			
7	CL88112			
7¼	CL88116			
7½	CL88120			
7¾	CL88124			
8	CL88128			

BEADING Models 2C, 2SD, 2CP, 3SD, 3CP

1 EACH BEAD TIP, ARBOR, OR ROLLER FOR EACH TOD AND WALL THICKNESS COMBINATION.



BEADING TIPS

Use with 2100 series bead dies

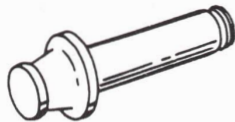
TOD-Inches	Tip No.	Mounting
1/4 5/16 3/8	CL104 CL105 CL106	BH-1 Bead Head

NOTE: Add to the tip no. the tube wall thickness in thousandths. i.e. 104-028

BEADING TIPS 104-042 AND 104-049 ARE NOT AVAILABLE

BEADING ARBORS

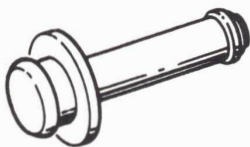
Use with 2200 series bead dies



TOD-Inches	Tip No.	Mounting
7/16 1/2 5/8 3/4 7/8 1 1 1/8 1 1/4 1 3/8 1 1/2	CL207 CL208 CL210 CL212 CL214 CL216 CL218 CL220 CL222 CL224	BH-2 Bead Head

NOTE: Add to the arbor no. the tube wall thickness in thousandths. i.e. 207-028

Use with 3300 series bead dies



TOD-Inches	Tip No.	Mounting
5/8 3/4 7/8 1 1 1/8 1 1/4 1 3/8 1 1/2	CL310 CL312 CL314 CL316 CL318 CL320 CL322 CL324	BHA-30 Arbor adaptor with BH-3 Bead Head

NOTE: Add to the arbor no. the tube wall thickness in thousandths. i.e. 310-028

BEADING Models 3SD, 3CP, 6CP, 8CP

BEADING ROLLERS

Use with 3400 series bead dies

TOD-Inches	Roller No.	Mounting
1 5/8	CL426	BHA-35 Roller adaptor with BH-3 Bead Head
1 3/4	CL428	
2	CL432	
2 1/4	CL436	
2 1/2	CL440	
2 3/4	CL444	
3	CL448	

NOTE: Add to the roller no. the tube wall thickness in thousandths. i.e. 426-028

Use with 5500 series bead dies

TOD-Inches	Roller No.	Mounting
1 1/4	CL520	BHA--5-20 Roller adaptor with BH-5 Bead Head
1 3/8	CL522	
1 1/2	CL524	
1 5/8	CL526	
1 3/4	CL528	
	CL528	

NOTE: Add to the roller no. the tube wall thickness in thousandths. i.e. 520-028

Use with 5600 series bead dies

TOD-Inches	Roller No.	Mounting
2	CL632	BHA-5--25 Roller adaptor with BH-5 Bead Head
2 1/4	CL636	
2 1/2	CL640	
2 3/4	CL644	
3	CL648	
3 1/4	CL652	
3 1/2	CL656	
3 3/4	CL660	
4	CL664	
4 1/2	CL672	
5	CL680	
5 1/2	CL688	
6	CL696	

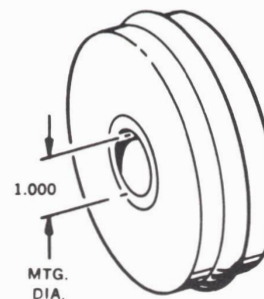
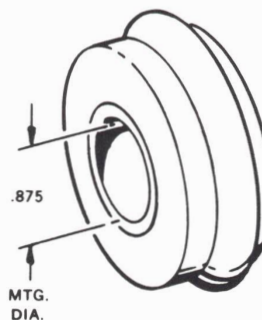
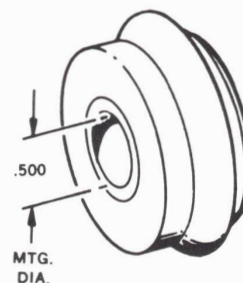
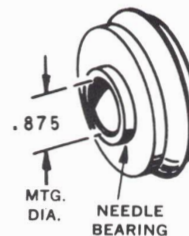
NOTE: Add to the roller no. the tube wall thickness in thousandths. i.e. 632-028

Use with 88000 series bead dies

TOD-Inches	Roller No.	Mounting
6 1/4	CL88100	BH5-45 Roller adaptor with BH-8 Bead Head
6 1/2	CL88104	
6 3/4	CL88106	
7	CL88112	
7 1/4	CL88116	
7 1/2	CL88120	
7 3/4	CL88124	
8	CL88128	

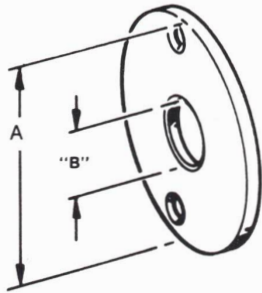
NOTE: Add to the roller no. the tube wall thickness in thousandths. i.e. 88100-028

1 EACH BEAD TIP, ARBOR, OR ROLLER FOR EACH TOD AND WALL THICKNESS COMBINATION.



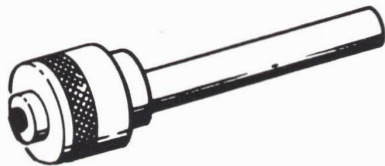
TUBE STOP PLATES

(NOTE: One furnished with each bead die)



TOD-Inches	Washer No.	A-Diameter	B-Inches
1/4	CL2104W	1 3/8"	7/32
5/16	CL2105W		17/64
3/8	CL2106W		21/64
7/16	CL2107W		25/64
1/2	CL2108W		29/64
5/8	CL2210W		37/64
3/4	CL2212W		45/64
7/8	CL2114W		2 5/32"
1	CL2216W	61/64	
1 1/8	CL2218W	15/64	
1 1/4	CL2220W	113/64	
1 3/8	CL2222W	121/64	
1 1/2	CL2224W	129/64	

BEADING HEADS



CL BH-1

(For 100 series Bead Tips)

Direct Mount 2SD, 2CP
For 3SD, 3CP use spindle adaptor 35CP-1



CL BH-2

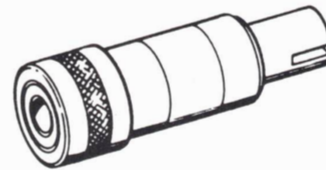
(For 200 Series Bead Arbors)

Direct Mount 2SD, 2CP
For 3SD, 3CP use spindle adaptor 35CP-1

BEADING HEADS

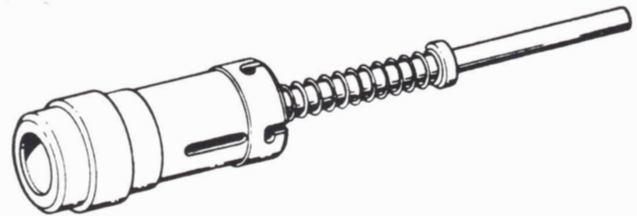
CL BH-3 Beading Head Set (For 300 Series Bead Arbor or 400 Series Roller)

Direct Mount 3SD, 3CP
(Includes adaptors CLBHA-30 and CLBHA-35)



CL BH-5 Beading Head Set (For 500 or 600 Series Roller)

Direct Mount 6CP
(Includes adaptors CLBH5-20 and CLBH5-25)



CL BH-8 Beading Head Set (For 500, 600 or 88000 Series Roller)

Direct Mount 8CP
(Includes adaptors CLBH5-20, CLBH5-25 and CLBH-45)

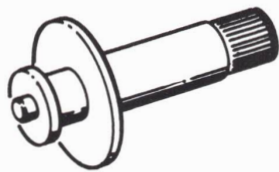


BEADING HEAD ADAPTORS



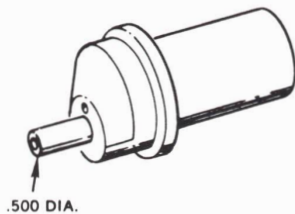
CL-BHA-30 Arbor Adaptor

Mount on CLBH-3 head
(For 300 series Bead Arbors)



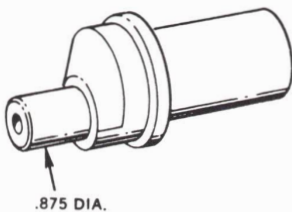
CL-BHA-35 Roller Adaptor

Mount on CLBH-3 head
(For 400 series Bead Rollers)



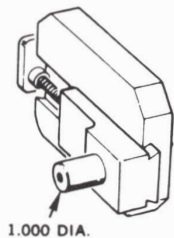
CL-BHA-5-20 Roller Adaptor

Mount on CLBH-5 and CLBH-8 Head
(For 500 series Bead Rollers)



CL-BHA-5-25 Roller Adaptor

Mount on CLBH-5 and CLBH-8 Head
(For 600 series Bead Rollers)



CL-BH5-45 Roller Adaptor

Mount on CLBH-8 Head
(For 800 series Bead Rollers)

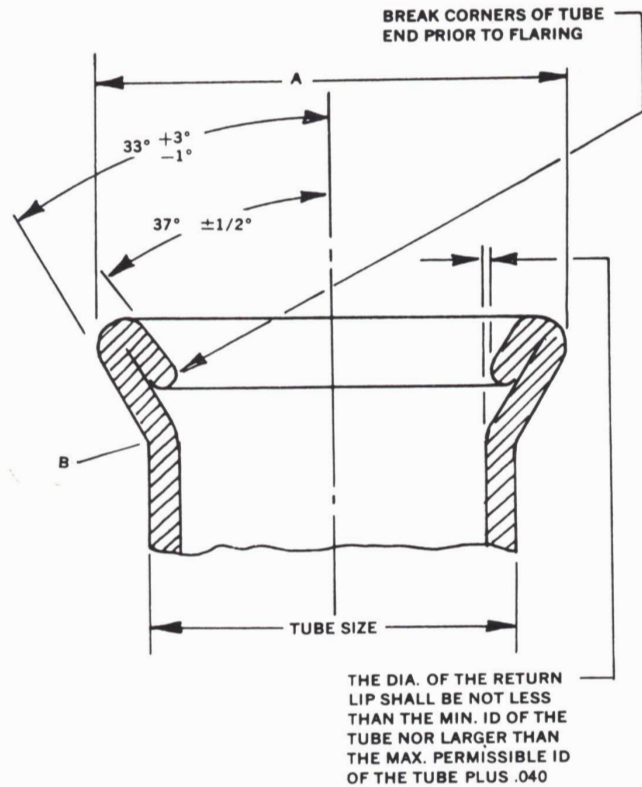
DOUBLE FLARING

Meets Specification Of
MS33583

OPERATION	TOOLING REQUIRED
Flare	1 each double flare die for each TOD. First operation upset punch for a range of TOD's × W.T. Second operation flare punch for a range of TOD's.

STANDARD DIMENSIONS

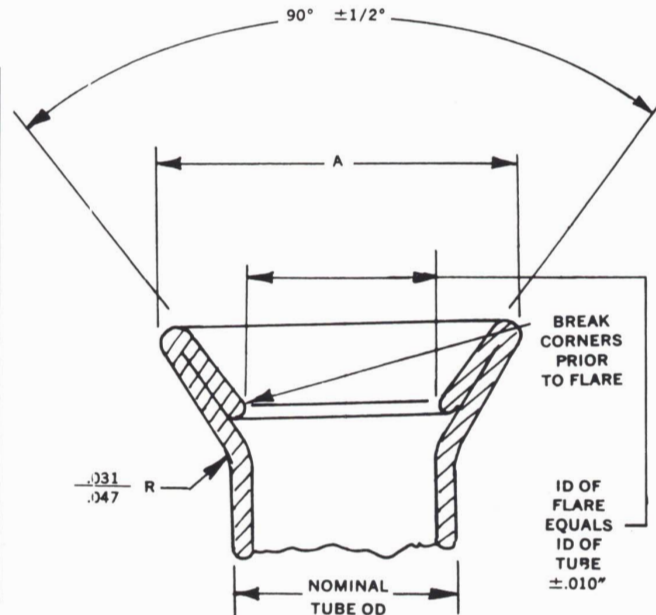
Tube Size Nominal OD Inches	A + .000 - .010 Dia. Inches	B ± .010 Rad Inches	Wall Thickness Inches	Min ID Inches
1/8	.200	.032		
3/16	.302		.028 .035	.114 .100
1/4	.359		.028 .035	.178 .159
5/16	.421		.035 .049	.224 .198
3/8	.484	.046	.028 .035 .049	.310 .288 .261



45° DOUBLE FLARE

MEETS SPECIFICATIONS OF SAE J533

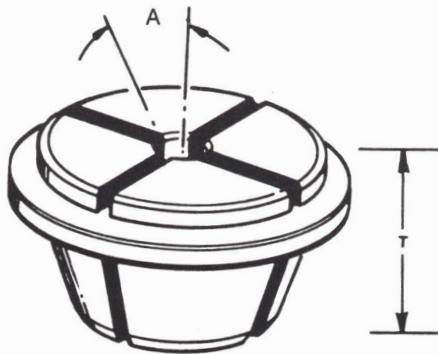
Nominal Tube OD-Inches	A-Dia.-Inches ± .005
1/8	.187
3/16	.275
1/4	.355
5/16	.420
3/8	.495
7/16	.565
1/2	.635



DOUBLE-FLARE TOOLING

Meets specification of
MS33583, MS33584 and SAEJ533

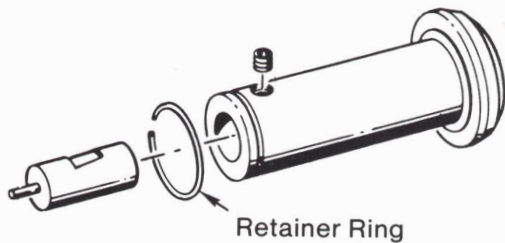
DIRECT MOUNT CLDF-1, CONRAC DF, LEONARD TUBEMASTER



DOUBLE FLARE DIES 37° AND 45°

Nominal TOD-Inches	A 37°	A 45°	T-Inches
1/8	CL233	CL241	2*
3/16	CL333	CL341	2*
1/4	CL433	CL441	2
5/16	CL533	CL541	2
3/8	CL633	CL641	2
7/16	CL733	CL741	2 1/2
1/2	CL833	CL841	2 1/2
** 5/8	CL1003	CL1041	2 1/2
** 3/4	CL1233	CL1241	2 1/2

* GRIP LENGTH = 1 INCH
** FOR SINGLE FLARE ONLY

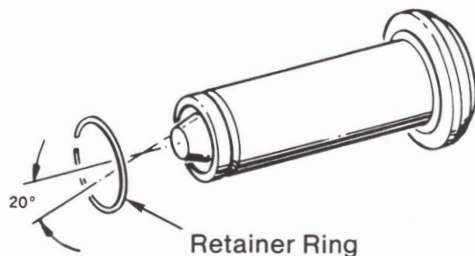


UPSET PUNCH

TOD 1/8" (first operation)

Complete Punch Assembly

CL 220-28 for 1/8" OD x .028 WT
CL 220-35 for 1/8" OD x .035 WT



UPSET PUNCH

TOD 3/16" — 1/2" (first operation)

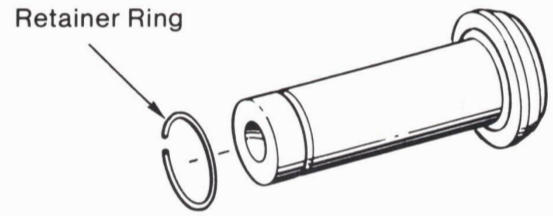
TOD Inches	Punch No.	.028	.035	.042	.049
3/16	CL320	-28	-35	-42	-49
1/4	CL420	-28	-35	-42	-49
5/16	CL520	-28	-35	-42	-49
3/8	CL620	-28	-35	-42	-49
7/16	CL720	-28	-35	-42	-49
1/2	CL820	-28	-35	-42	-49

DOUBLE-FLARE TOOLING

Meets specification of MS33583, MS33584 and SAEJ533

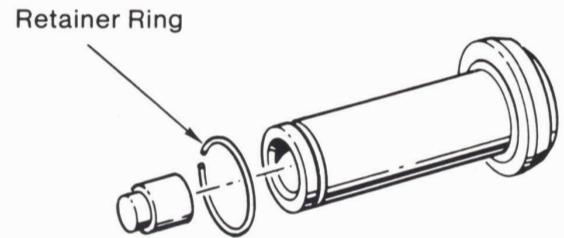
THIN WALL UPSET PUNCH

TOD Inches	Punch No.	Wall Thickness Inches
3/16	CL300	.022 or less
1/4	CL400	.022 or less
5/16	CL500	.022 or less
3/8	CL600	.022 or less



UPSET BEADING PUNCH

TOD Inches	Punch No.	.028	.035	.042	.049
3/16	CL366	-28	-35	-42	-49
1/4	CL466	-28	-35	-42	-49
5/16	CL566	-28	-35	-42	-49
3/8	CL666	-28	-35	-42	-49
7/16	CL766	-28	-35	-42	-49
1/2	CL866	-28	-35	-42	-49



FLARE PUNCH

TOD 1/8" (second operation)

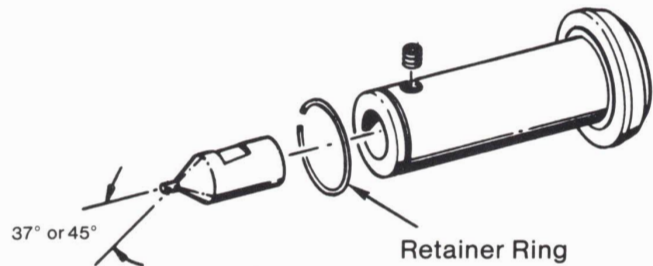
Complete Punch Assembly

CL 237-28 for 1/8" OD x .028 WT-37°

CL 237-35 for 1/8" OD x .035 WT-37°

CL 245-28 for 1/8" OD x .028 WT-45°

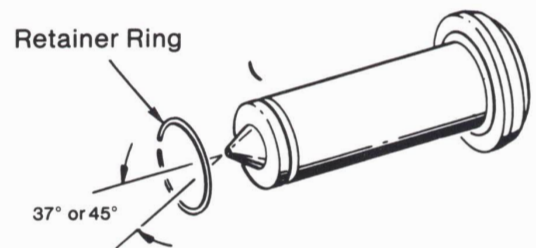
CL 245-35 for 1/8" OD x .035 WT-45°



FLARE PUNCH

TOD 3/16" — 3/4" (second operation)

TOD Inches	Punch No. 37°	Punch No. 45°
3/16	CL337	CL345
1/4	CL437	CL445
5/16	CL537	CL545
3/8	CL637	CL645
7/16	CL737	CL745
1/2	CL837	CL845
** 5/8	CL1037	CL1045
** 3/4	CL1237	CL1245



** SINGLE FLARE ONLY