

Description		SLIP ASSEMBLY	LINER	LINER QTY	FLEX HANDLES	FLEX HANDLE QTY	TAPER - IN PER FT	SEGMENTS	CAPACITY (IN TONS)*		
SLIP SIZE	PIPE SIZE										
UC3 - Casing Slips											
10-3/4" X 9"		T7704-5030	7704-A-125	10	T7704-A-17	3	3	10	200		
10-3/4" X 9-5/8"		T7704-5029	7704-A-9								
10-3/4"		T7704-5028	7704-A-8								
13-3/8" X 11-3/4"		T7704-5027	7704-A-39	12		4				12	
13-3/8" X 12-3/4"		T7704-5026	7704-A-92								
13-3/8"		T7704-5025	7704-A-38								
13-3/8" X 16"		T7704-5036	7704-A-99	14						14	
13-3/8" X 18-5/8"		T7704-5035	7704-A-5000	17						17	
13-3/8" X 20"		T7704-5034	7704-A-99								

*Not load tested

Table 7

Description	SLIP ASSEMBLY	CIRCULAR BUTTON INSERT	INSERT QTY	FLEX HANDLES	GRIPPING SURFACE LENGTH- (IN)	TAPER - IN PER FT	SEGMENTS
DRILL COLLAR OD RANGE							
DCS-L - Drill Collar Slips Large							
5 1/2" - 7"	T2501	2513	88	T3768	9	4	11
6 3/4" - 8 1/4"	T2503	2630					
8" - 9 1/2"	T2507	2630					
8 1/2" - 10"	T2530	2627	104				13
9 1/4" - 11 1/4"	T2508	2630	112				14
11" - 12 3/4"	TI2534	2625	136				17
12" - 14"	TI2536	2630					
DCS-R - Drill Collar Slips Regular							
4 1/2" - 6"	T2552	2628	63	T3768	7 7/8	4	9
5 1/2" - 7"	T2550	2620					
DCS-S - Drill Collar Slips Small							
3" - 4"	T2572	2628	49	T3768	7 1/8	4	7
4" - 4 7/8"	T2573	2620					

Table 8

Description	SLIP ASSEMBLY	CIRCULAR BUTTONS	CIRCULAR BUTTON QTY	FLEX HANDLES	GRIPPING SURFACE LENGTH (IN)	TAPER – IN PER FT	TOTAL SEGMENTS			
CASING OD										
CMS-XL - Casing Multi-Segment Slips Extra Long										
6 5/8"	T5315	2628	144	T3768	13 1/2	4	12			
7"	T5301	2619								
7 5/8"	T5303	2630								
8 5/8"	T5305	2630	156							13
9 5/8"	T5307	2630	168							14
10 3/4"	T5309	2630	180							15
11 3/4"	T5311	2627	204							17
13 3/8"	T5313	2630	216							18
13 5/8"	T5314	2630					18			
16"	T5325	2631	252							21
18 5/8"	T5333	2626	300							25
20"	T5329	2631	312							26
22"	T5330	2631	336							28
24"	T5331	2631	360							30
26"	T5346	2631	396							33
28"	T5341	2631	444							37
30"	T5342	2631					37			
36"	T5340	2631	516				43			
42"	42CMS	2631	624				52			

Table 9

CHANGING/CLEANING INSERTS

1. To disassemble slips, remove hinge pin cotter pins and then hinge pins.
2. To change inserts on SD style, unscrew insert retaining nuts to remove bolts and take off rings. On DU, remove liner cotter pin and then liner retainer key. On DCS type, take out the insert retaining cotter pins. On UC/UC3, remove the insert keeper and bolt. On CMS, take out insert retaining screw and lock washer.
3. Pry the insert/liner carefully using a brass punch and hammer to remove.
4. Wipe down the insert slots.
5. Check segments for cracks and wear – replacing worn parts.
6. If reusing old inserts/liner, clean inserts/liners with wire brush.



Replace all inserts/liners if some are chipped/broken/dull/worn. Do NOT mix new inserts/liners with old

7. Slide inserts/liners into slot.
8. Reinstall the rings on SD, securing with screws. Put back keys on DU securing with new cotter pins. Use new insert retaining cotter pins on DCS. Reinstall insert keeper on the UC/UC3 and secure with bolt. On CMS, replace the washer and tighten the insert retaining screw with an allen wrench.
9. Replace the hinge pins and fix with new cotter pins.



The slips are manufactured as set. TIOT recommends keeping the slips as set – NOT mixing segments



TIOT recommends using a new cotter pin when replacing hinge pin. Cotter pins are not reusable



Recommend repair welding be done by TIOT or an authorized repair agent



Figure 5 – Identifying segments

PREVENTIVE MAINTENANCE



This is a suggested PM schedule. The tool owner has the responsibility to adjust the program according to actual tool usage

Normal wear in course of use will eventually reduce the slip's capability. Inspect the insert retainer rings/keepers, screws/bolts, handle pins and hinge pins regularly for wear. On DU, check hinge spring assembly and liner retainer keys. Cracks or the appearance of damage can indicate the need for repair, even impending failure, and requires prompt attention. The slips must be either pulled from operation immediately or repaired.

Daily (PM1) – While in use

- Clean and apply Extreme Pressure Lithium based grease to slip backs and bowl ID
- Visually check slips for damage and cracks – if found, pull from operation for repair. Look for worn, damaged, loose or missing parts – replace or tighten
- Polish taper with emery cloth



On DU slips, change liner retainer keys every third job or when inserts become loose, whichever comes first

Weekly (PM2)

- Remove and clean slip inserts and inspect for wear – if found, replace
- Check slip backs with a straight edge. If the gap between the straight edge and the slip back is greater than 1/16", pull from operation for repair
- Inspect bowl for wear with a straight edge



Verify slip's toe area is not cracked/bent – if found remove from operation

- Check for corrosion and breakage on pins and springs – if found, replace
- Carry on daily PM

Semi-Annual (PM3)

Perform weekly PM2. When in doubt, carry on yearly PM4.

Yearly (PM4)

- Remove coating and debris from critical areas
- Disassemble and perform Magnetic Particle Inspection (MPI) on critical areas as indicated on API Specification 7K

WEAR LIMITS

The wear of the slip affects its ability to support the tubular safely. Slip segments with a gap between the straight edge and the slip back of greater than 1/16" as seen in Figure 5 should be replaced. Measure the clearance between the insert and the dovetail slot using a feeler gage on DU, SD, and UC/UC3 slips as shown in Figure 6. If the measurement is larger than the 3/16", the slip should be replaced. The hinge pin hole may become oblong with use. The hole can be enlarged, rounding it and using a larger custom sized pin, keeping the maximum distance of 0.06 inch between the original and the new hole as shown in Figure 7. On the multi-segment slips (more than 3), a bent hinge pin indicates oversize hinge pin holes and the slips should be replaced.

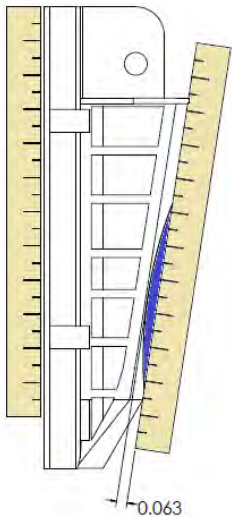


Figure 5 - Slip back wear

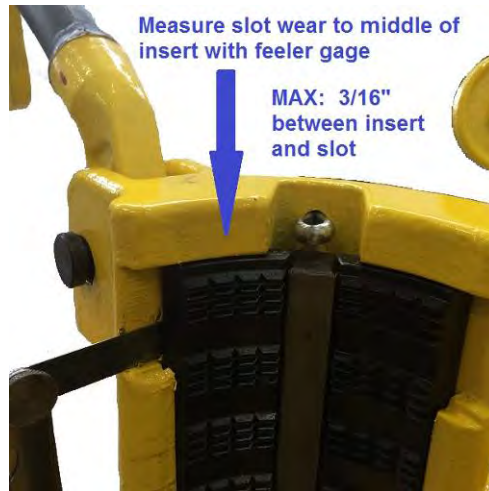


Figure 6 - Slot wear for DU, UC/UC3, and SD type



Figure 7 - Hole wear

CRITICAL AREA MAP

Darken areas are defined as critical

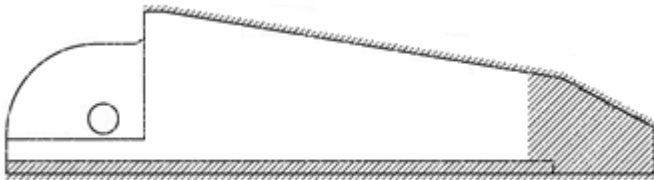


Figure 8 - SD

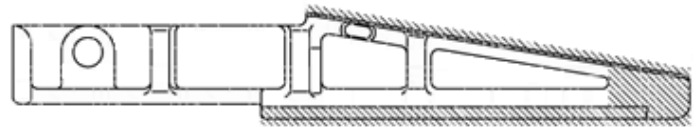


Figure 9 - CMS-XL/DCS

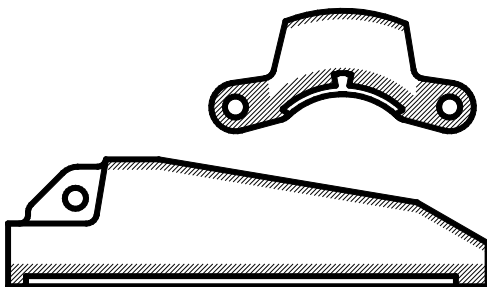


Figure 10 - DU

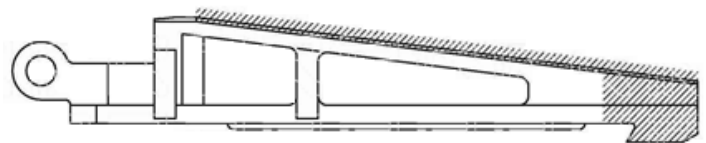


Figure 11 - UC3

SLIP TEST

A slip test is the best way to determine the degree of equipment wear. This test should be performed every three (3) months and each time a new slip set is put into service.

For accurate results, use a load of at least 100,000 pounds (45,360 kg).

Clean a section of pipe without insert marks. Use a wire brush to clean slip inserts. Wrap two (2) layers of test paper around the cleaned pipe section (above the slips). Masking tape should hold the paper on the pipe. Wrap the slips around the pipe where the paper is located and lower the pipe slowly and carefully.

After the slips have been set, hold the slips as the pipe is raised. Remove slips careful to prevent damage to the paper.

Evaluate the second (inside) layer of the paper - the outside layer may have inaccurate slip impressions. If full insert/liner contact is shown (number of inserts/liners per segment shown in Table 10 below for SD and DU type and Table 11 for DCS type), the slips are good and no further analysis is necessary. The UC/UC3 slips have one (1) liner per segment. CMS-XL slips have 12 buttons per segment.

Size	Type				
	SDS	SDML	SDXL	DU-L	DU-R
3 1/2"	8	10	n/a	n/a	n/a
4 1/2"	12	15	18	8	6
5"	n/a	15	18	n/a	n/a
5 1/2"	n/a	15	18	8	6
7"	n/a	n/a	20	8	6

Table 10; Number of inserts per segment

Type	# / Segment
DCS-S	7
DCS-R	7
DCS-L	8

Table 11

If there is not full contact, the test should be run again with new slips. If the second test results in full contact, the first set of slips are worn. If the results of the second test indicate top contact only, the bowl is worn and should be inspected.

TROUBLESHOOTING

Failure Mode	Possible Cause	Possible Solution
Deformed pin holes/cracked or deformed toes	Overload	Scrap the tool
	Wear	Pull from operation and carry on PM3
Bent pins	Overload	Verify clearances (see page12)
Does not hold	Overload	Perform PM3
	Undersized tubular	Select properly sized inserts

Table 12

STORAGE AND TRANSPORTATION

- Unpainted surfaces should be coated with rust preventing agent
- Prevent excessive exposure to water and moisture
- Clean the tool after use - steam clean as needed; remove mud, debris and any other substances
- Transport the unit on a suitable container or pallet

PARTS LIST

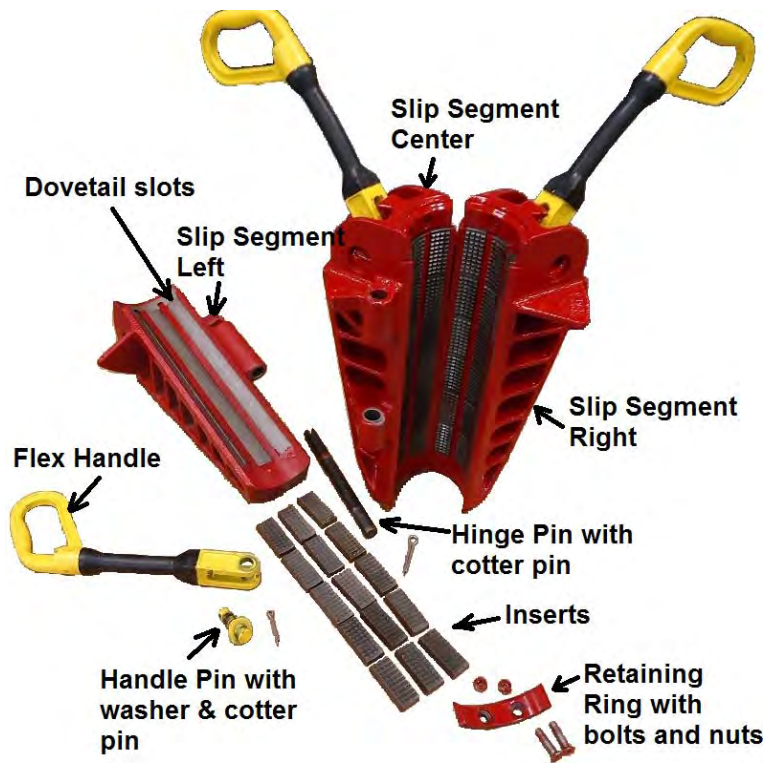


Figure 12 – SDXL with 2167 inserts

SDXL Parts List					
Component	Qty	Body Size (inches)			
		4 1/2	5	5 1/2	7
SLIP SEGMENT RIGHT	1	T15552	T15558	T15555	T86715
SLIP SEGMENT CENTER	1	T15553	T15559	T15556	T86717
SLIP SEGMENT LEFT	1	T15554	T15560	T15557	T86716
FLEX HANDLE	3	T3768			
HANDLE PIN W/WASHER & COTTER PIN	3	3769			
HINGE PIN W/COTTER PIN	2	2192			
INSERT RETAINING BOLT & NUT	1	NA		3745	
INSERTS	SEE LIST - TABLE 3				

Table 13

Parts List continued

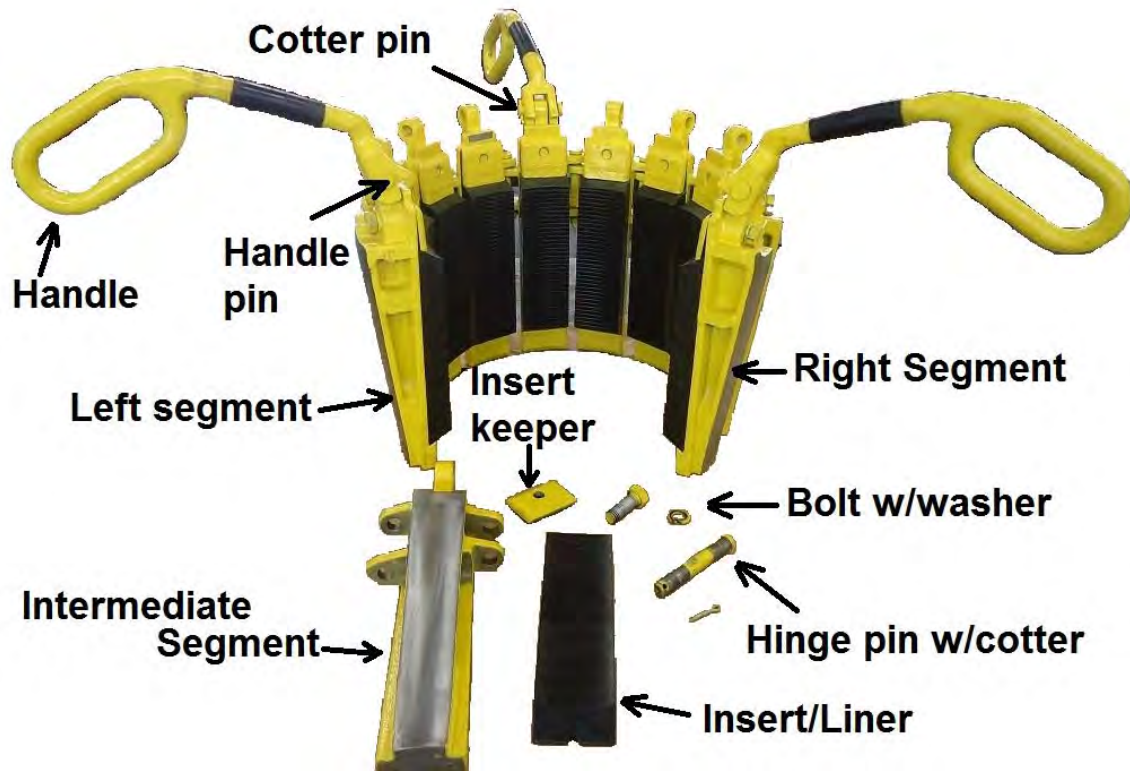


Figure 13 – UC3 with 7704-A-9 liners

UC/UC3 Parts List										
Component	Slip Size (inches)									
	8 5/8	Qty	10 3/4	Qty	13 3/8	Qty	16	Qty	20	Qty
SLIP SEGMENT RIGHT	T7704-A-108	1	T7704-A-32	1	T7704-A-36	1	T7704-A-36	1	T7704-A-36	1
SLIP SEGMENT INTERMEDIATE	T7704-A-109	8	T7704-A-31	8	T7704-A-35	10	T7704-A-35	12	T7704-A-35	15
SLIP SEGMENT LEFT	T7704-A-111	1	T7704-A-33	1	T7704-A-37	1	T7704-A-37	1	T7704-A-37	1
FLEX HANDLE	T7704-A-17	3	T7704-A-17	3	T7704-A-17	4	T7704-A-17	4	T7704-A-17	4
HANDLE PIN W/COTTER PIN	7704-A-16	3	7704-A-16	3	7704-A-16	4	7704-A-16	4	7704-A-16	4
HINGE PIN W/COTTER PIN	7704-B-16	9	7704-B-16	9	7704-B-16	11	7704-B-16	13	7704-B-16	16
INSERT RETAINING BOLT & WASHER	7704-5024B	10	7704-5024B	10	7704-5024B	12	7704-5024B	14	7704-5024B	17
INSERT KEEPER*	7704-5022	10	7704-5024	10	7704-5024	12	7704-5024	14	7704-5024	17

* For Inserts/Liners see Table 6 & 7

Table 14

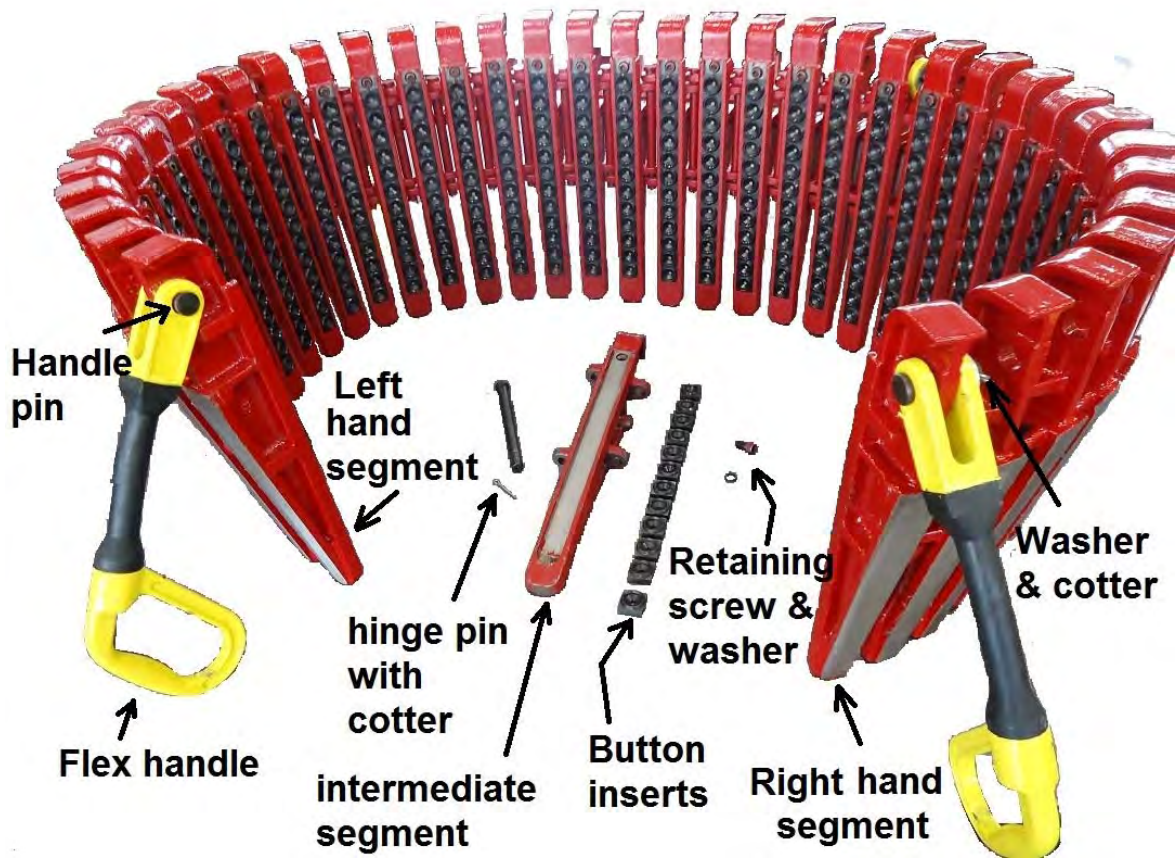


Figure 14 – CMS-XL with 2631 inserts

CMS-XL Parts List	
Component	Part #
SLIP SEGMENT RIGHT	T5320
SLIP SEGMENT INTERMEDIATE	T5322
SLIP SEGMENT LEFT	T5321
FLEX HANDLE	T3768
HANDLE PIN W/ WASHER & COTTER	3769
HINGE PIN W/COTTER PIN	T2525
INSERT RETAINING SCREW & WASHER*	T3748

* For Inserts see list - Table 9

Table 15

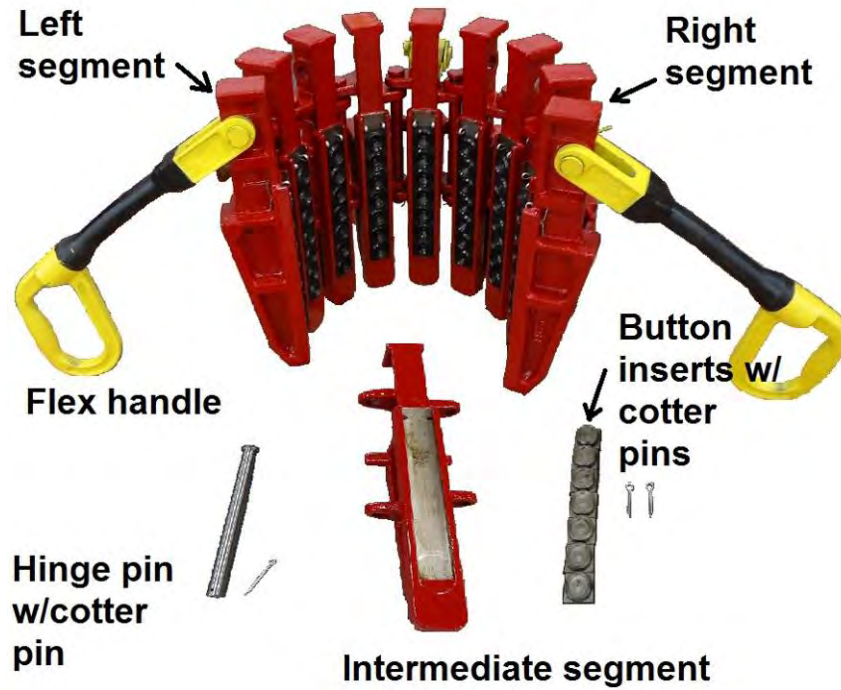


Figure 15 – DCS-R with 2620 buttons

DCS Parts List			
Component	Slip Type		
	DCS-S	DCS-R	DCS-L
SLIP SEGMENT RIGHT	T2568	T2554	T2510
SLIP SEGMENT INTERMEDIATE	T2570	T2556	T2512
SLIP SEGMENT LEFT	T2569	T2555	T2511
FLEX HANDLE	T3768		
HINGE PIN W/COTTER PIN	T2525		T2520
HANDLE PIN W/ WASHER & COTTER	3769		
INSERT RETAINING COTTER PINS*	080011		

* For Inserts see list - Table 8

Table 16

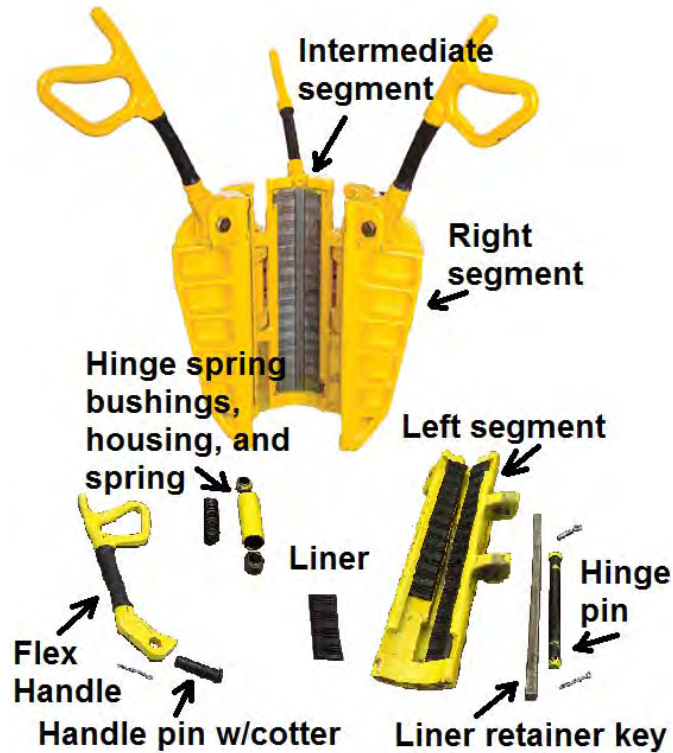


Figure 16 – DU-L with DU-0408-0408-0 liners

DU Parts List							
Component	Slip Type Size (inches)	DU-L			DU-R		
		4 1/2	5 1/2	7	4 1/2	5 1/2	7
SLIP SEGMENT RIGHT		T7613-F-63	T7613-J-63	T7613-M-63	T7613-F-50	T7613-J-50	T7613-Q-50
SLIP SEGMENT INTERMEDIATE		T7613-E-63	T7613-H-63	T7613-L-63	T7613-E-50	T7613-H-50	T7613-P-50
SLIP SEGMENT LEFT		T7613-D-63	T7613-G-63	T7613-K-63	T7613-D-50	T7613-G-50	T7613-N-50
FLEX HANDLES (TOTAL OF 3)		T7613-5187					
HANDLE PIN		T7613-B-12					
HANDLE PIN REAR		T7613-C-12					
HINGE PIN		T7613-A-12					
HINGE SPRING HOUSING*		T7613-211-1					
HINGE SPRING BUSHINGS*		T7613-211-2					
HINGE SPRING*		T7613-211-3					
LINER RETAINER KEYS**		7613-A-67			7613-A-52		
LINER RETAINER KEY COTTER PIN		080094					

* Hinge spring assembly p/n T7613-211

**For Inserts/Liners see Table 4

Table 17

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