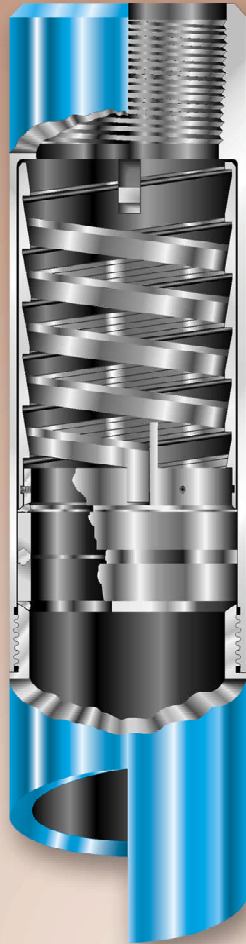


LEAD SEAL CASING PATCHES

Instruction Manual 6400



Lead Seal Casing Patches



One Company Unlimited Solutions

Lead Seal Casing Patches

I
N
D
E
X

Lead Seal Casing Patches	
General Description	3
Use	3
Construction	3
Operation	3
Special Notes	4
Complete Assembly	4
Illustrations	5
Standard Service	
Setting Load Table	6
Calculated Strength Data	6
Specifications and Replacement Parts	7
H ₂ S Service	
Setting Load Table	6
Calculated Strength Data	6
Specifications and Replacement Parts	8

The designs and specifications for the tools described in this instruction manual were in effect at the time this manual was approved for printing. National Oilwell Varco, whose policy is one of continuous improvement, reserves the right to discontinue models at any time, or to change designs and specifications without notice or without incurring obligation.

Eighteenth Printing, September 2005

General Description

The Bowen Lead Seal Casing Patches is an external catch tool designed to engage a previously prepared fish, pack it off permanently and become a part of the repaired casing or tubing.

It consists of two body parts and nine internal parts. All parts are manufactured from carefully chosen materials of the most suitable type and grade for each part.

Bowen Lead Seal Casing Patches will not restrict the bore of the casing or tubing which is being repaired. They are available in two types: sizes for Standard Service and sizes for H₂S (hydrogen sulfide) Service

Use

As indicated, the Bowen Lead Seal Casing Patches is specifically engineered to effectively engage and pack off a string of casing or tubing. After the Lead Seal Casing Patch has been set in position, it ordinarily becomes a permanent part of the string and is usually cemented in place.

Where the upper portion of a casing string becomes ruptured or disoriented from the lower portion such as by faulting of the formation, caving of the formation, crushing or rupture, the upper portion must be removed. New casing is then replaced, the Lead Seal Casing Patch forming the patching means between the old and new strings.

Construction

The Lead Seal Casing Patch is constructed in the most basic manner to perform the functions of engaging the fish, setting the Seals, or releasing during operations should this become advisable.

The working parts are a Grapple Carrier, Grapple, Grapple Control, Control Set Screws, Lead Seals, Center Seal Ring and End Seal Rings.

The Lead Seals are composed of commercially pure (unalloyed) lead. This lead is fully annealed to obtain uniformity of flow and to reduce to a minimum the required setting load when in service.

Operation

Prior to running the Lead Seal Casing Patch, the fish should be prepared. This usually includes washing over and cleaning the upper end of the fish of burrs and splits, and sizing the fish.

The tool should be assembled in accordance with the assembly instructions which may be found on page 4 of this manual.

Assemble the tool to the running string and back it up tight.

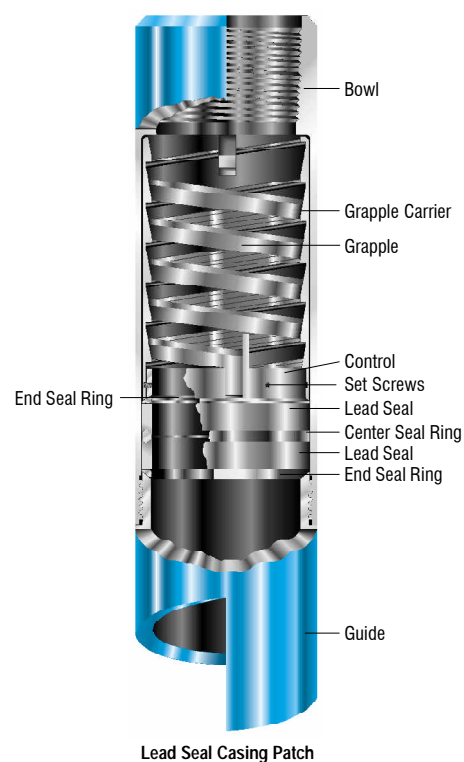
Caution: Use tongs on upper portion of the Bowl, adjacent to the threaded connection, for backup. The main length of the Bowl is comparatively thin walled. If crushed or badly distorted, it will not function properly.

Lower the tool into the hole until fish depth is reached. As the fish is reached, the running string should be slowly rotated to the right while lowering it slowly. This combined slow rotation and lowering is important to the proper operation of the tool.

This should be continued until the fish has entered the Casing Patch, and bottomed against the upper shoulder of the Grapple Carrier provided for this purpose. This can be determined by watching

At this point pick up the running string to remove the weight from the Casing Patch while allowing torque to slack from the running string.

Caution: Avoid any backlash.



the rig weight indicator. Allow 15,000 to 20,000 pounds of weight to be supported by the Casing Patch to assure good and complete engagement.

Set the Lead Seal by elevating the running string. The load required to set the Casing Patch will depend on the size of the Casing Patch. This setting load will vary from 10,000 pounds to in excess of 100,000 pounds.

An appropriate Setting Load Table may be found on page 6 of this Manual.

At this point the effectiveness of the Lead Seal may be checked by the application of pump pressure. See page 6 for maximum allowed pressure differential. Before applying any appreciable pressure it is preferable to first reduce the setting load to 40% of setting load. See page 6 or 8 for the appropriate load and maximum pressure differential at that load.

Once the Lead Seals are set they will require only a minimum of load to maintain them in proper sealing position. Usually the tensile load required to set the slips to maintain the pipe is more than adequate. Any unnecessary pull load should be avoided.

Special Notes:

1. Care should be exercised during all stages of operation that the formation and the Casing Patch not be "slugged" or shock loaded by pressure from the mud pumps.
2. If for any reason, it is desired to release and remove the Casing Patch from the casing or tubing string, proceed as follows:

Bump down firmly, until the top of the Grapple Carrier bottoms against the Top Sub. This will break the freeze between the outside of the Grapple and the Grapple Carrier. After bumping down, slowly elevate the tubing string, while simulta-

neously rotating to the right. Continue this slow elevation and rotation until the Casing Patch is clear of the casing.

3. **The connection furnished will be the appropriate box connection to match the casing being patched unless ordered special. Special connections will be furnished to meet requirements on request.**
4. **Left-hand connections or a completely left-hand tool will be furnished on special order. Prices will be quoted on request.**
5. **In cases where the Casing Patch is to be cemented in place Bowen has available a Lead Seal Cementing Casing Patch specifically designed for this purpose. Write for Instruction Manual 6460 for full particulars.**
6. **The standard Lead Seal Assembly is rated for 400° F but may be replaced by a special high temperature Seal assembly for use in wells whose temperature ranges from over 400° F to 750° F.**
7. **Where Hydrogen Sulfide (H₂S) is suspected, or known to exist, the Lead Seal Casing Patch should be ordered specifying the assembly number and the note "Special for Hydrogen Sulfide Service."**

Complete Assembly

Refer to page 5 for proper location of parts.

The proper procedure for assembly of the Bowen Lead Seal Casing Patch is as follows:

1. Clean all parts thoroughly.
2. Begin with the inner sub-assembly composed of the Grapple Carrier (3), Grapple (4), Grapple Control (5) and two Control Set Screws.
3. Take the Grapple Carrier (3) and clamp it horizontally in a suitable vise near its center. Be cautious not to clamp it too tight. It should not be distorted or gouged.

4. Assemble the Grapple (4) into the Grapple Carrier (3). This may be done by grasping it by the Control end, which is tanged, and screwing it into the Grapple Carrier. Left-hand rotation is required, as the Grapple is made on left-hand lead spiral. This allows the tool to be released by right-hand rotation when required.

Insert the Grapple deep enough into the Grapple Carrier to allow the tang to come to rest in the slot provided for this purpose near its lower end.

5. Follow the Grapple (4) with the Grapple Control (5) inserted into the Carrier (3) with its finger up (toward the Grapple).

Allow the Control finger to lay alongside the Grapple tang at the left side when viewed from the lower end. This Control finger functions as a special key. This allows for the transmission of torque from the Bowl and Grapple Carrier to the Grapple to effect release when required, while at the same time the vertical movement of the Grapple is left unhampered.

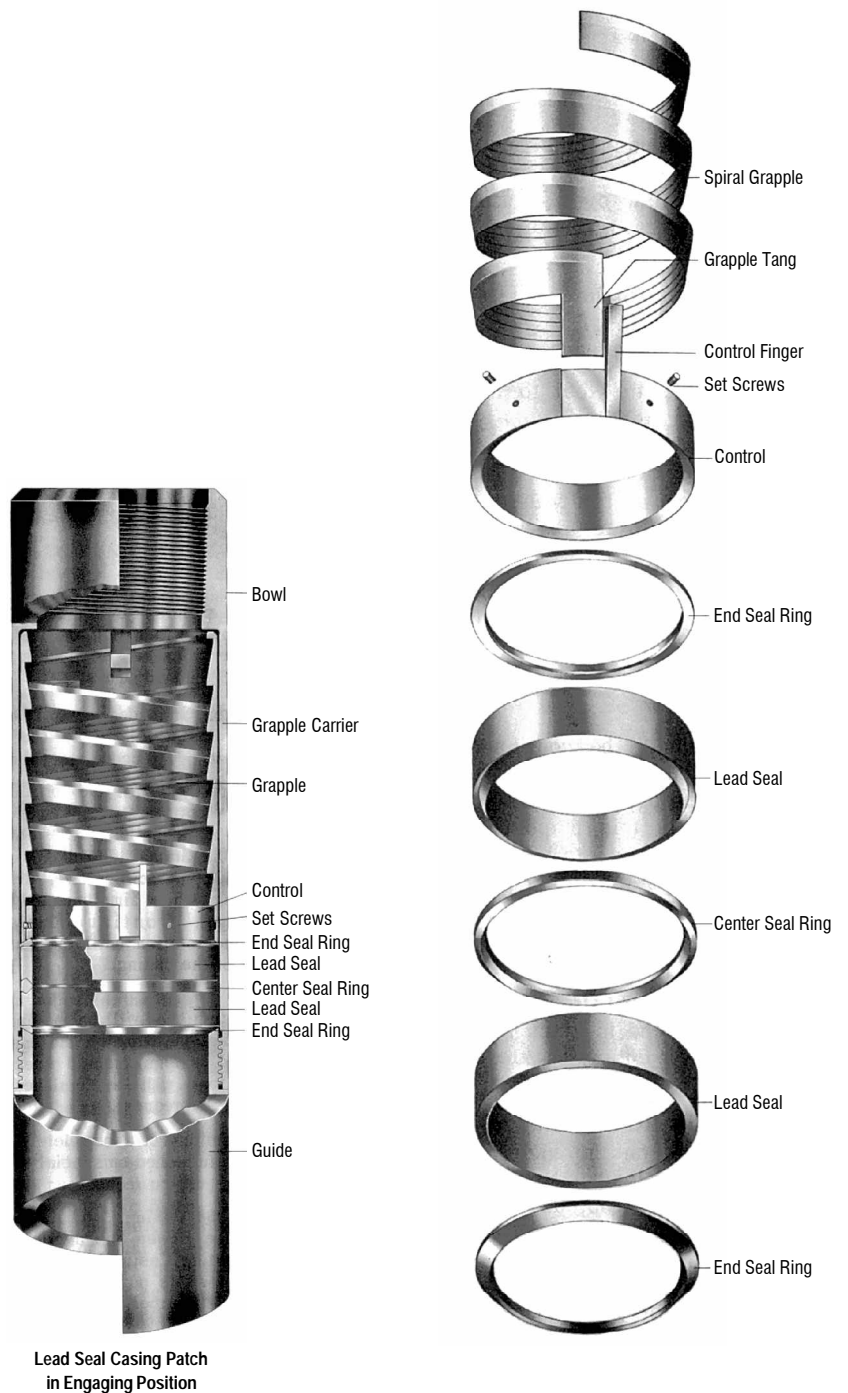
Seat the upper face of the Control (5) against the lower spiral in the Carrier (3).

6. Insert the two Control Set Screws (9) into the Control in the tapped holes provided, and tighten them.
7. Remove the Carrier sub-assembly from the vise, and remove any burrs which may have been created in handling.
8. Clamp the Bowl (1) in the vise horizontally.
9. Take the Carrier sub-assembly and slide it into the Bowl (1), the end with the slot in it first and the Grapple Control end last.

Turn the Carrier after it is bottomed in the Bowl until it mates with this lug and slide it on up until the lug rests in the slot.

10. Insert on End Seal Ring (6) into the Bowl (1) with the bevelled face up against the matching bevelled face of the Grapple Control and Carrier.
11. Follow this with one Lead Seal (7). Insert the Lead Seal with the flat face up and the double lipped face down.
12. Insert the Center Seal Ring (8), which will nest with the End Seal Ring (6).
13. Install the second Lead Seal (7) with the double lipped face up.
14. Follow the second Lead Seal with the second End Seal Ring (6). Its flat face should rest against the Lead Seal (7).
15. Apply thread dope to the threads of the Guide (2) and install the Guide into the Bowl. Buck the Guide up tight.

Assembly Note: The Lead Seals may be slightly distorted by handling. If so, take a soft piece of wood and a small hammer and lightly tap the inside wall of the Seals to set them. After the Seals have been seated in successive stages, the Guide should be carefully but firmly tightened.



Calculated Strength Data - Lead Seal Casing Patches Standard Type

Assembly Number	Casing Size	Patch O.D.	Setting Load lbs	Working Load (40% Setting Load) lbs	Well Pressure to Burst with Setting Load Applied	Well Pressure to Burst with Working Load Applied	Pull to Burst Patch (No Well Pressure)
17258	2-3/8	3-7/16	10,800	4,300	9,550	10,200	107,300
16140	2-7/8	4	13,000	5,200	8,400	9,000	124,250
26525	3-1/2	4-3/4	20,000	8,000	6,550	7,150	151,400
22400	4	5-1/4	22,550	9,000	5,400	6,000	154,600
13270	4-1/2	5-3/4	25,100	10,050	3,750	4,300	134,800
13280	5	6-1/4	27,700	11,050	3,850	4,350	159,600
12315	5-1/2	6-13/16	30,200	12,100	3,150	3,600	154,500
22410	5-3/4	7-1/16	31,250	12,500	2,950	3,400	155,900
13290	6	7-5/16	32,500	13,000	2,750	3,150	156,600
13300	6-5/8	7-63/64	37,600	15,050	2,400	2,800	167,000
12500	7	8-3/8	39,600	15,800	2,250	2,650	173,900
13070	7-5/8	9	43,000	17,200	1,950	2,300	175,500
13310	8-5/8	10-5/64	54,400	21,750	1,550	1,950	190,400
12475	9-5/8	11-1/8	58,200	23,200	1,500	1,850	212,500
13320	10-3/4	12-5/16	64,700	25,850	1,350	1,650	234,100
20855	11-3/4	13-1/2	70,500	28,200	1,600	1,880	298,000
18445	13-3/8	15-1/2	116,700	46,650	1,500	1,850	423,700

These strength calculations are considered accurate within plus or minus 20% and are intended only as a guide. They do not constitute a guarantee, actual or implied. In use, appropriate allowance should be made as a safety factor.

Calculated Strength Data - Lead Seal Casing Patches H₂S Type

Assembly Number	Casing Size	Patch O.D.	Setting Load lbs	Working Load (40% Setting Load) lbs	Well Pressure to Burst with Setting Load Applied	Well Pressure to Burst with Working Load Applied	Pull to Burst Patch (No Well Pressure)
42757	2-3/8	3-7/16	10,800	4,300	5,000	5,650	61,300
42760	2-7/8	4	13,000	5,200	4,350	4,950	70,900
42763	3-1/2	4-3/4	20,000	8,000	3,300	3,900	86,500
42766	4	5-1/4	22,550	9,000	2,700	3,250	88,300
42769	4-1/2	5-3/4	25,100	10,050	2,200	2,750	89,800
42775	5	6-1/4	27,700	11,050	1,850	2,340	91,180
42754	5-1/2	6-13/16	30,200	12,100	1,850	2,300	103,000
42778	5-3/4	7-1/16	31,250	12,500	1,700	2,150	103,900
42781	6	7-5/16	32,500	13,000	1,600	2,000	104,450
42784	6-5/8	7-63/64	37,600	15,050	1,350	1,750	111,400
42787	7	8-3/8	39,600	15,800	1,300	1,700	115,900
42790	7-5/8	9	43,000	17,200	1,180	1,450	117,000
42793	8-5/8	10-5/64	54,400	21,750	800	1,200	126,900
42796	9-5/8	11-1/8	58,200	23,200	800	1,150	141,700
42799	10-3/4	12-5/16	64,700	25,900	700	1,050	156,070
42802	11-3/4	13-1/2	70,500	28,200	850	1,150	195,960
42808	13-3/8	15-1/2	116,700	46,650	820	1,170	282,500

These strength calculations are considered accurate within plus or minus 20% and are intended only as a guide. They do not constitute a guarantee, actual or implied. In use, appropriate allowance should be made as a safety factor.

Bowen Lead Seal Casing Patches - Standard Type

Casing O.D.		2-3/8	2-7/8	3-1/2	4	4-1/2	5	5-1/2	5-3/4	6
Patch O.D.		3-7/16	4	4-3/4	5-1/4	5-3/4	6-1/4	6-13/16	7-1/16	7-5/16
Complete Assembly	Part No.	17258	16140	26525	22400	13270	13280	12315	22410	13290
	Weight	30	31		44	51	76	82	84	90

Replacement Parts

Bowl	Part No.	17259	16141	26526	22401	13271	13281	12316	22411	13291
	Weight	19	20	23	25	30	41	44	45	47
Grapple Carrier	Part No.	17260	16142	26527	22402	13272	13282	12317	22412	13292
	Weight	2	3	7	7	9	10	10	10-1/2	10-1/2
Grapple	Part No.	17261	16143	26528	22403	13273	13283	12318	22413	13293
	Weight	3/4	3/4	1	1	2	2	2-1/4	2-1/2	2-1/2
Grapple Control	Part No.	17262	16144	26529	22404	13274	13284	12319	22414	13294
	Weight	3/8	3/8	3/4	3/4	3/4	1	1	1	1
Guide	Part No.	17263	16145	26530	22405	13275	13285	12320	22415	13295
	Weight	5	5	8	8	14	17	19-1/2	21	23
Lead Seal (2 Req'd.)	Part No.	17264	16146	26531	22406	13276	13286	12324	22416	13296
	Weight	1	1	1	1	2	2-1/4	2-1/4	2-1/2	2-1/2
End Seal Ring (2 Req'd.)	Part No.	17265	16147	26532	22407	13277	13287	12322	22417	13297
	Weight	—	1/8	1/4	1/4	1/4	1/4	1/4	1/2	1/2
Center Seal Ring	Part No.	17266	16148	26533	22408	13278	13288	12323	22418	13298
	Weight	—	1/4	1/2	1/2	1/2	1/2	1/2	3/4	3/4
Control Set Screw (2 Req'd.)	Part No.	12329	12329	12329	12329	12329	23306	12329	12329	12329
	Weight	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16

Bowen Lead Seal Casing Patches - Standard Type (Continued)

Casing O.D.		6-5/8	7	7-5/8	8-5/8	9-5/8	10-3/4	11-3/4	13-3/8
Patch O.D.		7-15/16	8-3/8	9	10-1/16	11-1/8	12-5/16	13-1/2	15-1/2
Complete Assembly	Part No.	13301	12500	13070	13310	12475	13320	20855	18445
	Weight	98	109	141	149	175	203	226	250

Replacement Parts (Continued)

Bowl	Part No.	13301	12501	13071	13311	12476	13321	20856	18446
	Weight	50	55	59	76	87	98	110	125
Grapple Carrier	Part No.	13302	12502	13072	13312	12477	13322	20857	18447
	Weight	10-1/2	11-1/4	13-1/2	17	20	28	30	35
Grapple	Part No.	13303	12503	13073	13313	12478	13323	20858	18448
	Weight	2-1/2	2-3/4	3	4	5-1/2	7-1/2	8	9
Grapple Control	Part No.	13304	12504	13074	13314	12479	13324	20859	18449
	Weight	1	1-1/2	1-1/2	2-1/2	2-1/2	3	4	4
Guide	Part No.	13305	12505	13075	13315	12480	13325	20860	18450
	Weight	26	29	32	43	54	61	65	75
Lead Seal (2 Req'd.)	Part No.	13306	12506	13076	13316	12481	13326	20861	18451
	Weight	3	3-1/2	3-3/4	4-1/4	4-1/2	5	6	6
End Seal Ring (2 Req'd.)	Part No.	13307	12507	13077	13317	12482	13327	20862	18452
	Weight	1/2	1/2	1/2	3/4	3/4	3/4	1	1
Center Seal Ring	Part No.	13308	12508	13078	13318	12483	13328	20863	18453
	Weight	3/4	1	1	1-1/4	1-1/4	1-1/4	2	2
Control Set Screw (2 Req'd.)	Part No.	12329	12329	12329	12484	12484	12484	12484	12484
	Weight	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16

How to Order

Specify:

- (1) Name and number of assembly or part
- (2) Casing O.D.
- (3) Size and type of thread

Bowen Lead Seal Casing Patches - H₂S Type

Casing O.D.		2-3/8	2-7/8	3-1/2	4	4-1/2	5	5-1/2	5-3/4	6
Patch O.D.		3-7/16	4	4-3/4	5-1/4	5-3/4	6-1/4	6-13/16	7-1/16	7-5/16
Complete Assembly	Part No.	42757	42760	42763	42766	42769	42775	42754	42778	42781
	Weight	30	31		44	51	76	82	84	90

Replacement Parts

Bowl	Part No.	42758	42761	42764	42767	42770	42776	42755	42779	42782
	Weight	19	20	23	25	30	41	44	45	47
Grapple Carrier	Part No.	42759	42762	42765	42768	42771	42777	42756	42780	42783
	Weight	2	3	7	7	9	10	10	10-1/2	10-1/2
Grapple	Part No.	17261	16143	26528	22403	13273	13283	12318	22413	13293
	Weight	3/4	3/4	1	1	2	2	2-1/4	2-1/2	2-1/2
Grapple Control	Part No.	17262	16144	26529	22404	13274	13284	12319	22414	13294
	Weight	3/8	3/8	3/4	3/4	3/4	1	1	1	1
Guide	Part No.	17263	16145	26530	22405	13275	13285	12320	22415	13295
	Weight	5	5	8	8	14	17	19-1/2	21	23
Lead Seal (2 Req'd.)	Part No.	17264	16146	26531	22406	13276	13286	12324	22416	13296
	Weight	1	1	1	1	2	2-1/4	2-1/4	2-1/2	2-1/2
End Seal Ring (2 Req'd.)	Part No.	17265	16147	26532	22407	13277	13287	12322	22417	13297
	Weight	—	1/8	1/4	1/4	1/4	1/4	1/4	1/2	1/2
Center Seal Ring	Part No.	17266	16148	26533	22408	13278	13288	12323	22418	13298
	Weight	—	1/4	1/2	1/2	1/2	1/2	1/2	3/4	3/4
Control Set Screw (2 Req'd.)	Part No.	12329	12329	12329	12329	12329	12329	12329	12329	12329
	Weight	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16

Bowen Lead Seal Casing Patches - H₂S Type (Continued)

Casing O.D.		6-5/8	7	7-5/8	8-5/8	9-5/8	10-3/4	11-3/4	13-3/8
Patch O.D.		7-15/16	8-3/8	9	10-1/16	11-1/8	12-5/16	13-1/2	15-1/2
Complete Assembly	Part No.	42784	42787	42790	42793	42796	42799	42802	42808
	Weight	98	109	141	149	175	203	226	250

Replacement Parts (Continued)

Bowl	Part No.	42785	42788	42791	42794	42797	42800	42803	42809
	Weight	50	55	59	76	87	98	110	125
Grapple Carrier	Part No.	42786	42789	42792	42795	42798	42801	42804	42810
	Weight	10-1/2	11-1/4	13-1/2	17	20	28	30	35
Grapple	Part No.	13303	12503	13073	13313	12478	13323	20858	18448
	Weight	2-1/2	2-3/4	3	4	5-1/2	7-1/2	8	9
Grapple Control	Part No.	13304	12504	13074	13314	12479	13324	20859	18449
	Weight	1	1-1/2	1-1/2	2-1/2	2-1/2	3	4	4
Guide	Part No.	13305	12505	13075	13315	12480	13325	20860	18450
	Weight	26	29	32	43	54	61	65	75
Lead Seal (2 Req'd.)	Part No.	13306	12506	13076	13316	12481	13326	20861	18451
	Weight	3	3-1/2	3-3/4	4-1/4	4-1/2	5	6	6
End Seal Ring (2 Req'd.)	Part No.	13307	12507	13077	13317	12482	13327	20862	18452
	Weight	1/2	1/2	1/2	3/4	3/4	3/4	1	1
Center Seal Ring	Part No.	13308	12508	13078	13318	12483	13328	20863	18453
	Weight	3/4	1	1	1-1/4	1-1/4	1-1/4	2	2
Control Set Screw (2 Req'd.)	Part No.	12329	12329	12329	12484	12484	12484	12484	12484
	Weight	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16

How to Order

Specify:

- (1) Name and number of assembly or part
- (2) Casing O.D.
- (3) Size and type of thread

Corporate Headquarters

10000 Richmond Avenue
Houston, Texas 77042
United States
Phone: 713 346 7500
Fax: 713 346 4493

Alaska
4111 Ingra
Anchorage, Alaska 99503
United States
Phone: 907 563 5253
Fax: 907 561 0071

California
4117 Atlas Court
Bakersfield, California 99308
United States
Phone: 661 395 0165
Fax: 661 328 1827

Louisiana
108 Nova Drive
Broussard, Louisiana 70518
United States
Phone: 337 839 2400
Fax: 337 839 2211

190 Thompson Road
Houma, Louisiana 70363
United States
Phone: 985 851 1111
Fax: 985 851 1117

Mississippi
2930 Industrial Blvd.
Laurel, Mississippi 39440
United States
Phone: 601 649 8671
Fax: 601 649 8673

New Mexico
#14 CR 5860
Farmington, New Mexico 87401
United States
Phone: 505 326 4303
Fax: 505 326 4304

North Dakota
3202 1st Avenue West
Williston, North Dakota 58801
United States
Phone: 701 774 0091
Fax: 701 774 0092

Oklahoma
3800 Thomas Road
Oklahoma City, Oklahoma 73179
United States
Phone: 405 677 2484
Toll Free: 877 760 1711
Fax: 405 677 2457

Texas
1249 Commerce Road
Alice, Texas 78332
United States
Phone: 361 664 8013
Fax: 361 664 0462

8411 Irvington Boulevard*
Houston, Texas 77022
United States
Phone: 713 691 7800
Fax: 713 691 7807

2810 Highway 135 North
Kilgore, Texas 75662
United States
Phone: 903 984 2553
Fax: 903 984 7170

10720 West I-20 East
Odessa, Texas 79765
United States
Phone: 432 563 1173
Fax: 432 563 1182

30444 Southwest Freeway
Rosenberg, Texas 77471
United States
Phone: 281 341 5365
Fax: 281 344 1986

Utah
1553 East Highway 40
Vernal, Utah 84078
United States
Phone: 435 789 0670
Fax: 435 789 6568

West Virginia
Route 2, Murphy Run Road
Clarksburg, West Virginia 26301
United States
Phone: 304 622 4303
Fax: 304 623 2174

Wyoming
1283 N. Derrick Drive
Unit 1, Box 2
Casper, Wyoming 82604
United States
Phone: 307 237 3100
Fax: 307 237 2546

Canada
9120 - 34A Avenue
Edmonton, Alberta T6E 5P4
Canada
Phone: 780 702 5209
Fax: 780 463 2348

3550 93 Street*
Edmonton, Alberta T6E 5N3
Canada
Phone: 780 944 3929
Fax: 780 430 0760

1100 540 5th Avenue SW (Mailing)
1010 540 5th Avenue SW (Office)
Calgary, Alberta T2P 0M2
Canada
Phone: 403 250 8000
Fax: 403 294 5790

England
2 Isbourne Way
Winchcombe
Cheltenham
Glos, GL54 5NS
England
Phone: 44 (0) 1242 603975
Fax: 44(0) 1242 602614

Dubai
Nr. R/A 13, Daimler Chrysler Street
P.O. Box 61490
Jebel Ali Free Zone
Dubai
UAE
Phone: 971 4 8838776
Fax: 971 4 8838795

Indonesia
Cilandak Commercial Estate Unit 105
Jl. Raya Cilandak KKO
P.O. Box 7541
Jakarta, 12560
Indonesia
Phone: 62 21 782 6088
Fax: 62 21 782 6086

Scotland
10 Kirkton Avenue
Pitmedden Road Industrial Estate
Dyce, Aberdeen AB21 0BF
Scotland
Phone: 441 224 334800
Fax: 441 224 723034

Singapore
9 Tuas Avenue 5
Singapore, 639335
Singapore
Phone: 65 68611566
Fax: 65 68610728

Germany
Edesser Straße 1
31234 Edemissen Berkhöpen
Postfach 31232
Germany
Phone: 49 5176 97670
Fax: 49 5176 9767 22

* Denotes Manufacturing and Engineering facilities

Downhole Solutions

Drilling Solutions

Engineering and Project Management Solutions

Lifting and Handling Solutions

Production Solutions

Supply Chain Solutions

Tubular and Corrosion Control Solutions

Well Service and Completion Solutions