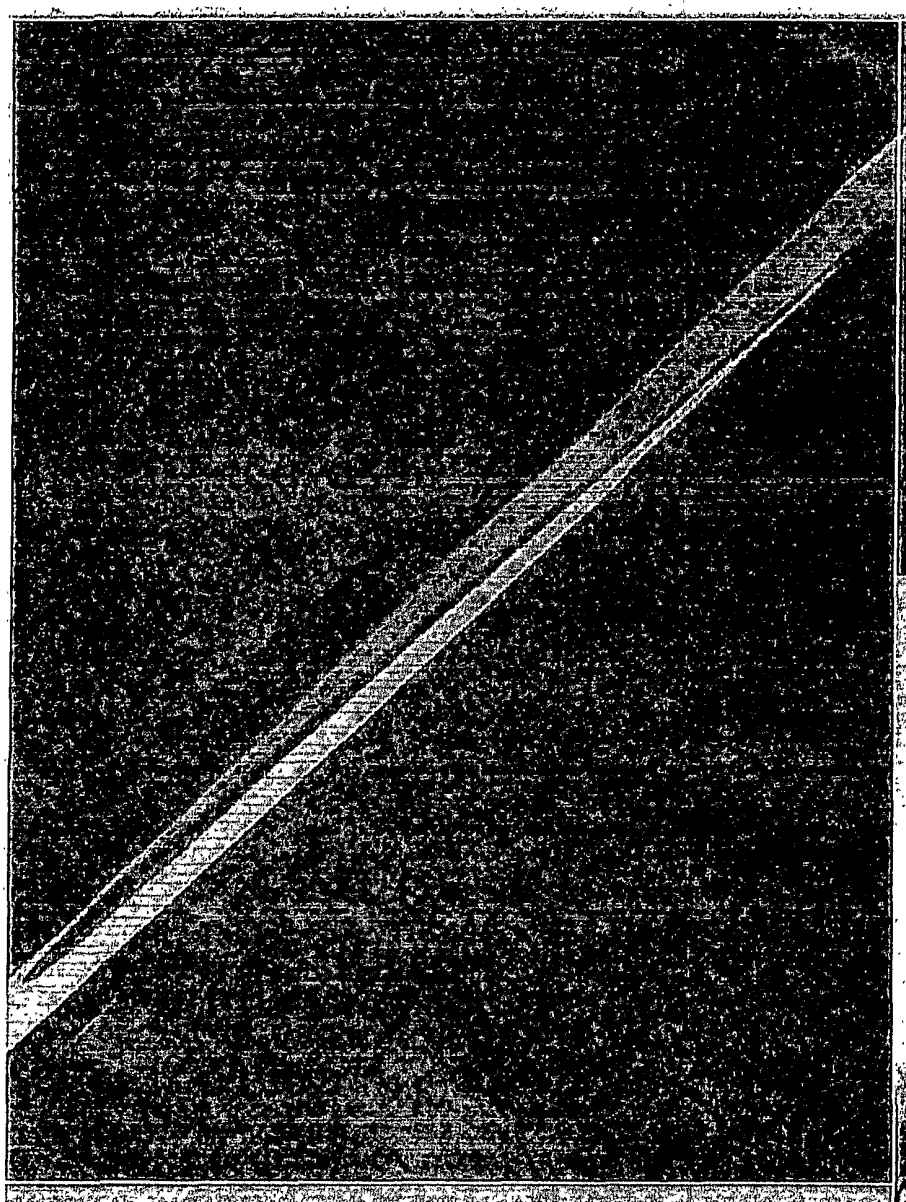
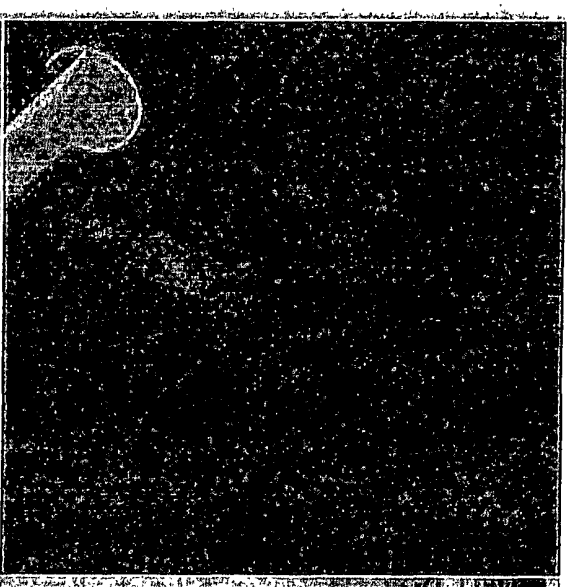
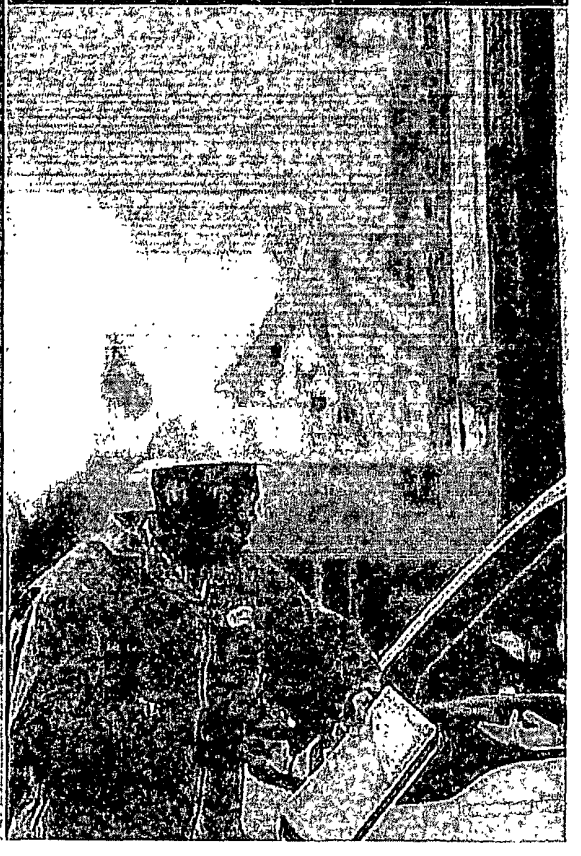
30-015-39509

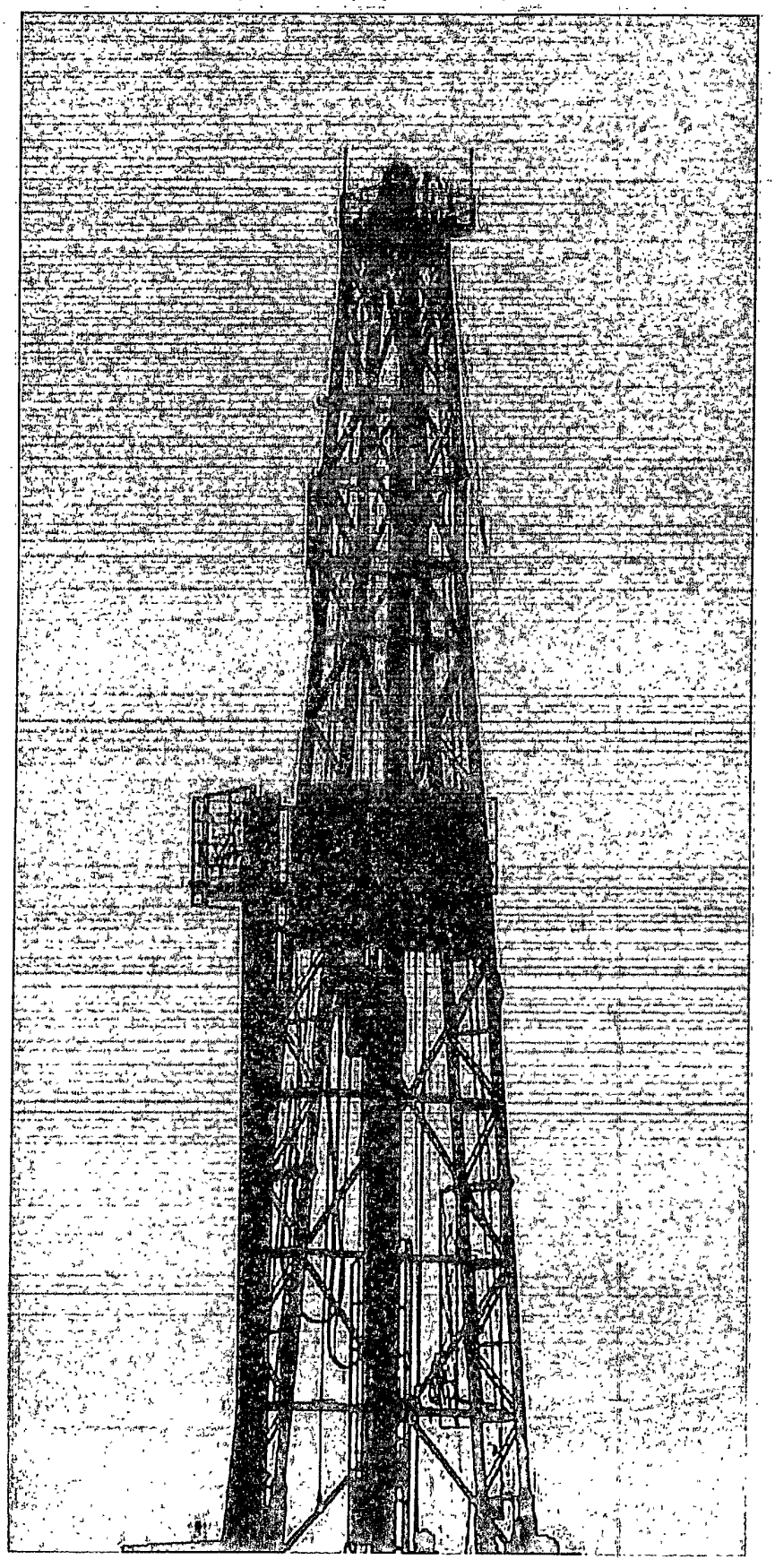
SMITH
A Schlumberger C



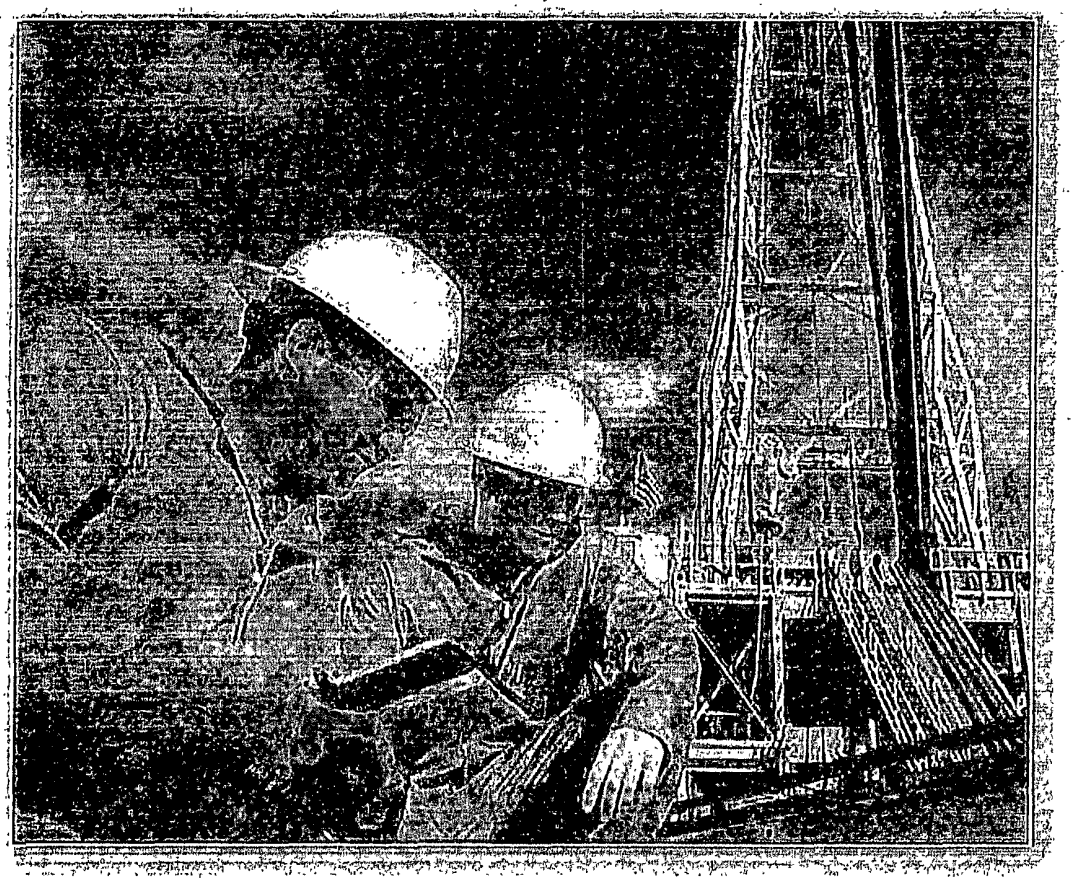




Trackmaster OH



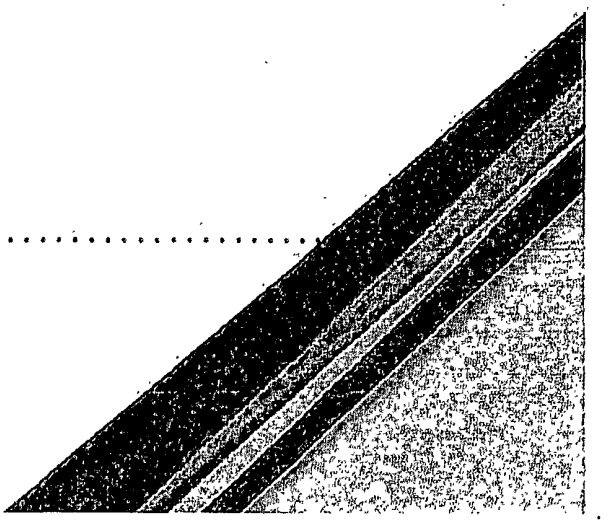
Trackmaster OH openhole whipstc
cementing system delivers faster,
quality sidetracks, matching specif
nologies to borehole properties an
objectives in order to achieve high
rates. The system provides a preci
point, together with isolation of th
if required. Setting the whipstock a
cementing operation are accompli
single trip.



Unreliability of cement plug sidetracking

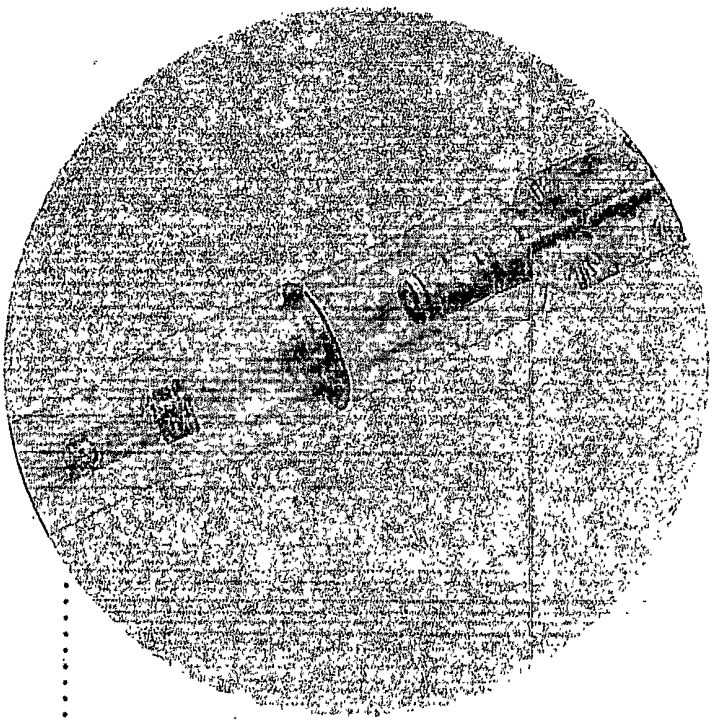
Traditional cement-plug sidetracking involves running in hole with open-ended drillpipe, pumping cement to provide the kickoff plug and isolate the lower zone if required, pulling out of hole, waiting for the cement plug to cure (approximately 24 h), running in hole with the directional drilling assembly, time-drilling at a low ROP to achieve departure, and then drilling new formation.

In addition to the rig time spent waiting for the cement plug to cure and then drilling through the cement, this method is problematic when formation compressive strength is higher than cement strength, causing failure of the plug. Downhole temperature and pressure, wellbore deviation, cement plug depth, quality of cement, cure time, and mud additives are some of the other factors affecting the success of the plug setting operation. Multiple attempts are frequently required before a successful plug is obtained, involving extra trip time, new cement plugs, loss of drilling days, and reconfiguration of the drilling trajectory.



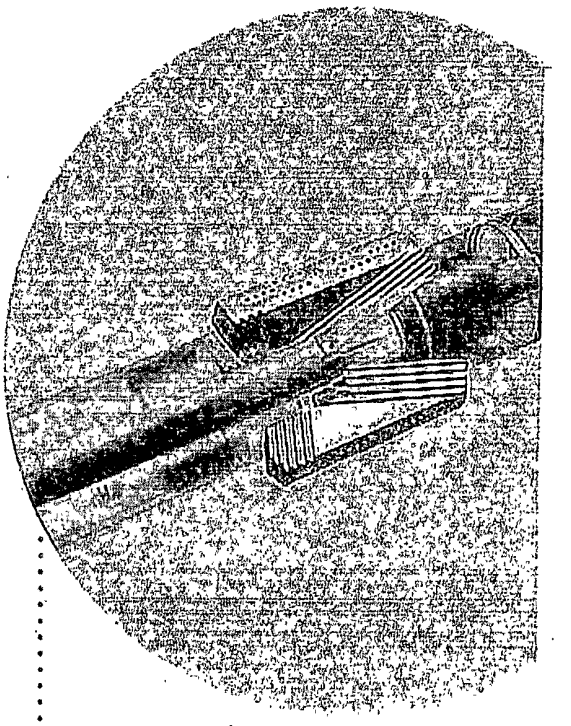
Burst Barrel

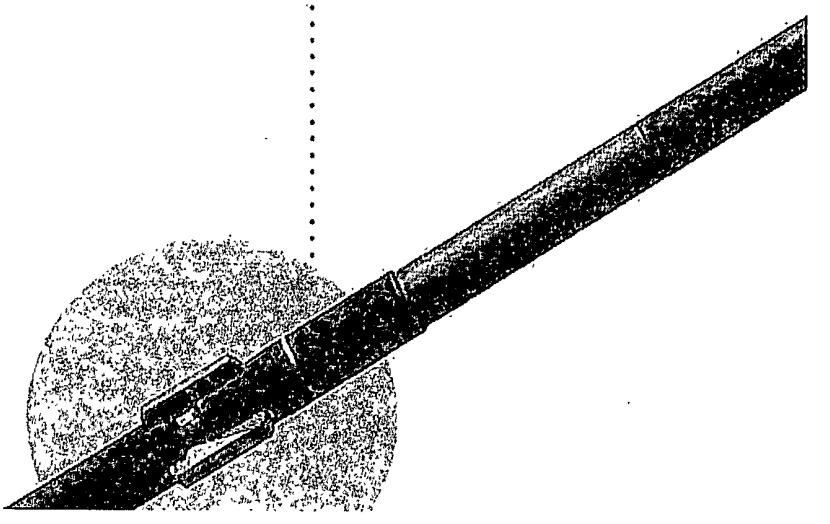
After hydraulically setting the anchor, pressure is increased to shear a piston in the burst barrel sub, allowing communication with the annulus.



Anchor

Hydraulically set expandable anchor enables kickoff at a specifi immediate sidetracking without cement cure wait time. Triaxial the borehole wall.



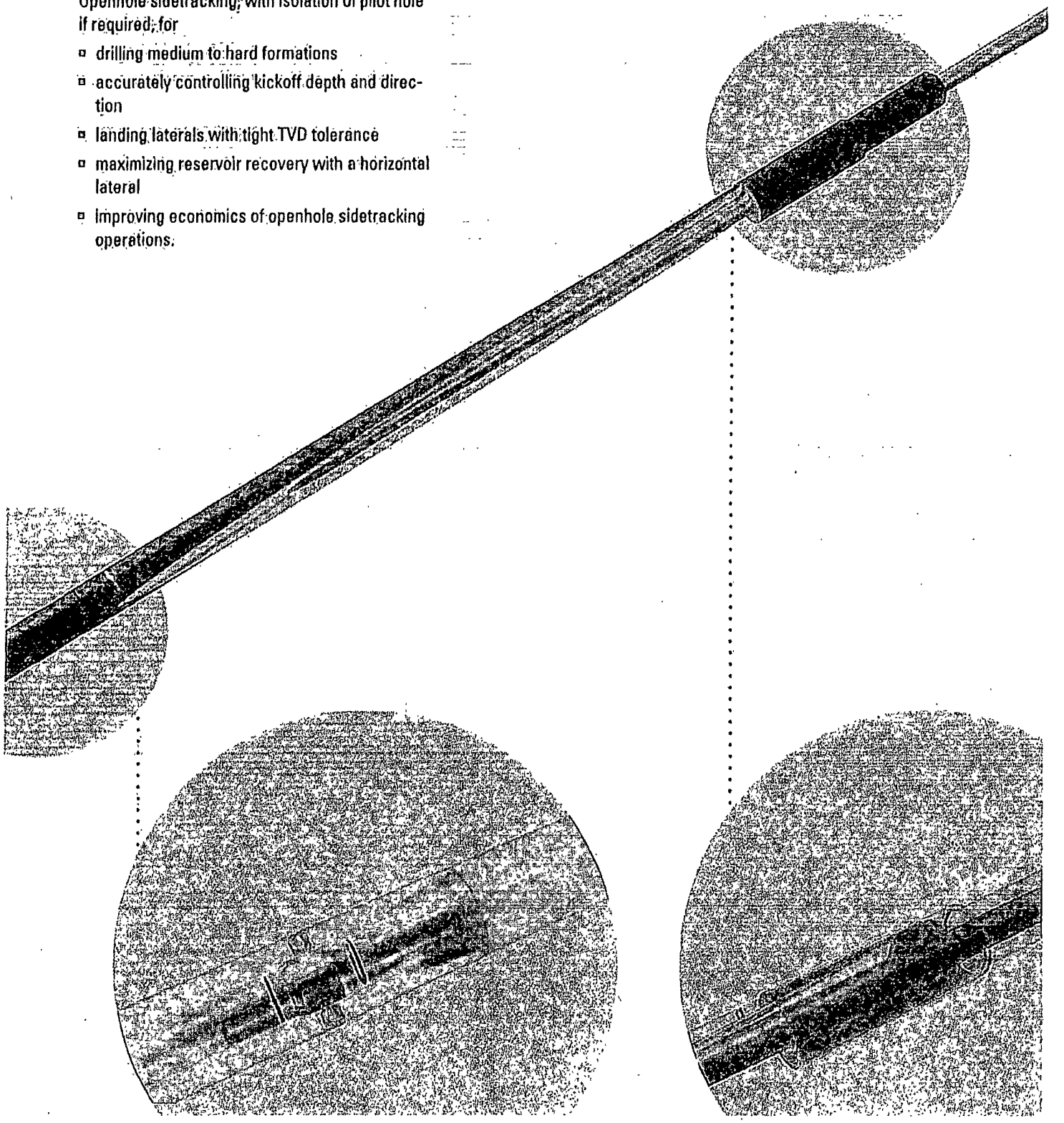


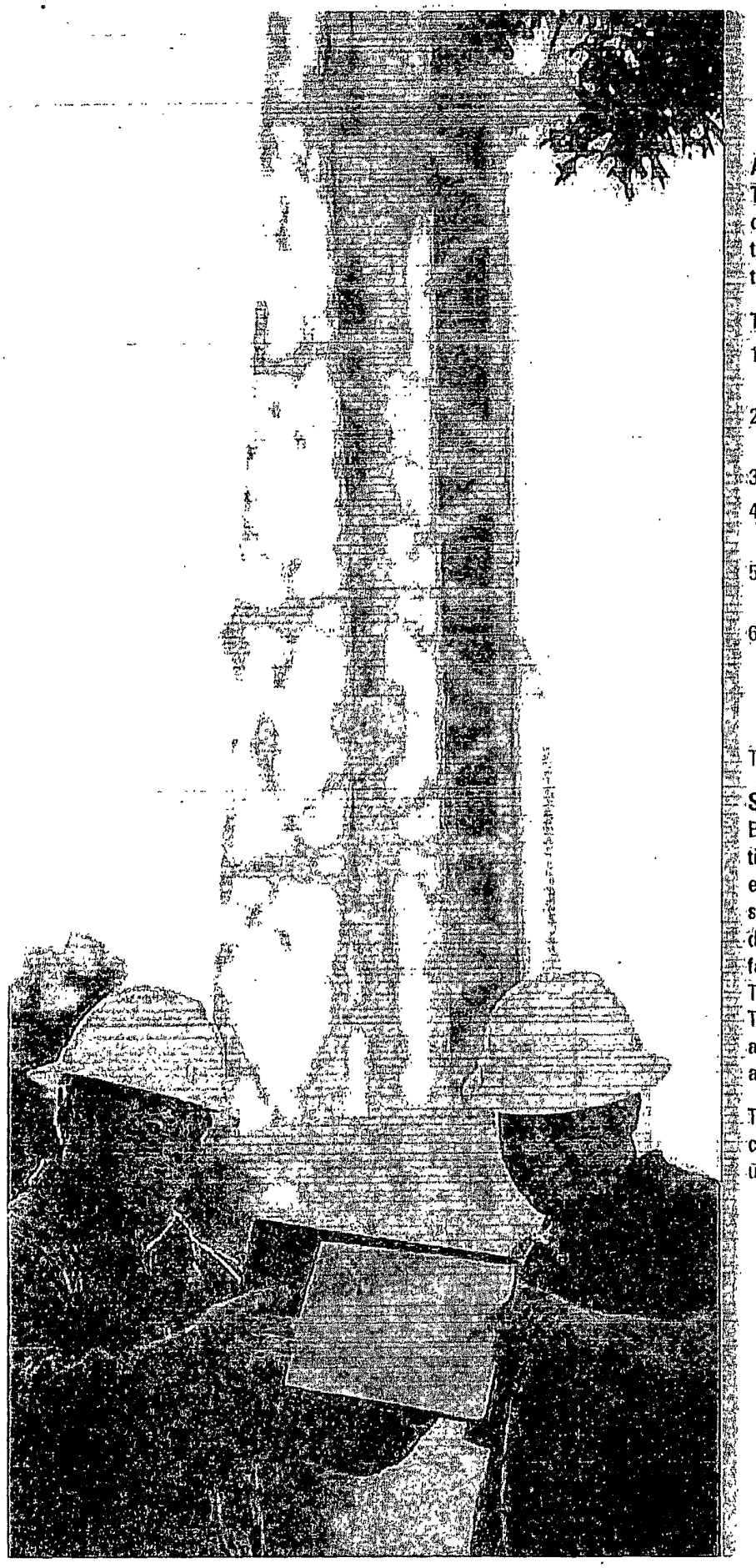
Trackmaster OH

Applications

Openhole sidetracking, with isolation of pilot hole if required, for

- drilling medium to hard formations
- accurately controlling kickoff depth and direction
- landing laterals with tight TVD tolerance
- maximizing reservoir recovery with a horizontal lateral
- improving economics of openhole sidetracking operations.





Accuracy and success with Trackmaster OH syst

The Trackmaster OH* openhole whipstock system circum obstacles encountered with conventional cement plug sid tates initiation of a lateral while allowing cementing of the the same time it increases operational reliability, and save

The process involves:

1. running in hole with the whipstock and expandable anc 2 min/stand
2. orienting the whip and hydraulically setting the anchor depth, anchor firmly grips the borehole wall
3. rupturing the burst barrel, establishing communication
4. shearing off by setting weight, with two positive indicat movement—that the pins have sheared and the tool ha
5. pumping cement through the whipstock, unseating the out of hole
6. running in with the directional drilling BHA without dela desired borehole trajectory, and drilling ahead. Deflecti the 3° ramp. Compared with using a cement plug as a c design lowers bending stresses in the drilling assembly

The probability of successfully sidetracking on the first att

Savings in time and materials

By providing a positive means of controlling the kickoff de tion with a steel ramp, the Trackmaster OH openhole whip eliminates the uncertainty of kicking off with a cement plu sive repeat attempts unnecessary. A clean, smooth transit directional and horizontal applications. With no packer, ru faster, and the large tool ID enables cement to be pumped The system avoids rig time wasted waiting for the cement These factors, combined with a reduced interval for time-i a significant saving of rig time. As an added benefit, the ar allows flow around the anchor, avoiding bullheading ceme

The expandable anchor technology has consistently prove choice for openhole sidetracking. Both PDC and roller cor used to successfully sidetrack and drill ahead.

Features

- Accurate control of kickoff depth and direction with special fine-grain alloy steel whip deflector
- Lower bending stresses with 3° ramp
- Higher rate of pumping cement enabled by large ID
- Faster running in speed with no packer to damage
- Hydraulically set expandable anchor with triaxial steel slips for
  - spanning multiple hole sizes
  - optimum placement at specific depths
  - immediate sidetracking—no waiting for cement to cure
- Torque transmission through running tool–whip interface and spline
- Flow around anchor and protection from bullheading cement with anchor slip design

Benefits

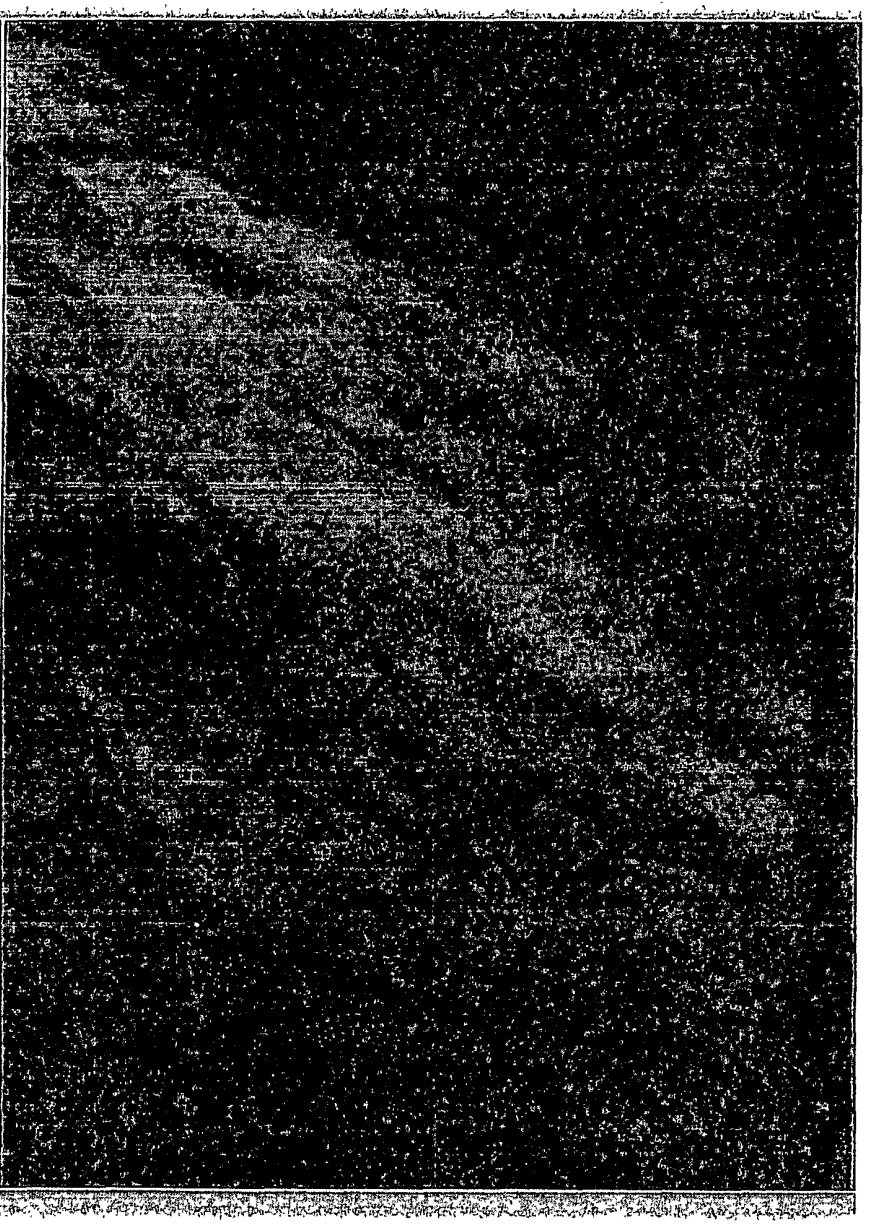
- Maximizes probability of successful sidetrack on first attempt
- Saves rig time with faster run in hole speed and cement pump rate
- Eliminates wait for cement to cure before sidetracking
- Reduces interval required for time drilling

Trackmaster OH System Specifications

Tool size/Casing OD	Maximum OD of whipstock assembly	Whipstock OD	Average size of hole opening
(in)	(in)	(in)	(in)
7	5.750	5.375	6.12 - 6.75
9-5/8	8.000	7.530	8.50 - 8.75
13-3/8	11.875	11.380	12.25 - 12.38

Trackmaster OH

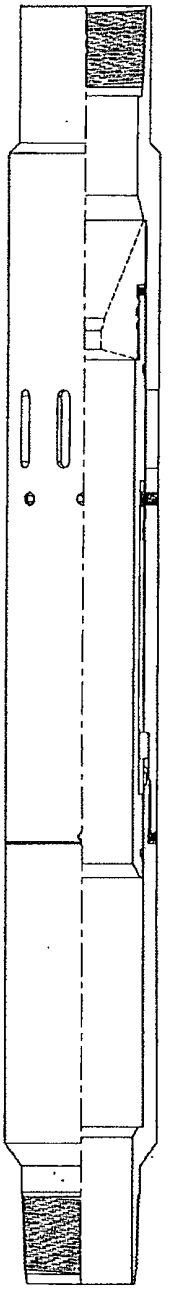
Trackmaster OH open-hole whipstock and cementing system delivers faster, higher quality sidetracks, matching specific technologies to borehole properties and your objectives in order to achieve high success rates.



WARNING
Use of Baker Hughes equipment contrary to manufacturer's specification may result in property damage, serious injury or fatality.

Features/Benefits

- **Patented transitional ball seat geometry**
  - Eliminates erosion through the sleeve
- **10,000psi at 350°F rating**
  - Allows for a wide range of pressure and temperature conditions
- **Increased flow area**
  - Exit Ports have greater flow area than the frac string to reduce the possibility of washouts
- **Available in premium thread configurations**
  - Easily manufactured to customer requirements
- **Up to twenty four [24] intervals available, consult AEG for sizes and number of available stages**
  - Provides the operator with numerous configurations for frac intervals
- **Patented locking device**
  - Ensures sleeve will stay in the production mode during life of well
- **Available in standard or sour service versions**
  - Offers a wider range of configurations to satisfy operator well conditions



Drawing No. 369-074-00P04

BAKER HUGHES

Specification Guide FracPoint™ Frac Sleeve

Size	Max OD (in.)	Min Insert ID (in.)	Actuation Pressure Range (psi)	psi per Screw	Tensile Rating (lb)	Torque Rating RH only (ft-lb)	Max Temp. (°F)	Max Internal Pressure (psi)	Max External Pressure (psi)	Port Flow Area (sq in.)
435-281	4.350	2.812	3392-4595	399	200,000	4,000	350	10,000	10,000	13.65
563-381	5.625	3.813	2737-3707	402	310,000	5,000	350	10,000	10,000	13.485
575-387	5.765	3.835	2591-3505	381	310,000	5,000	350	10,000	10,000*	14.46
775-479	7.780	4.798	3192-4319	375	500,000	7,595	350	10,000	10,000*	34.14

*10,000 psi collapse rating for 4.500 OD 13.50 lb/ft and 5.500 OD 20 lb/ft connections only, verify independently **Note:** Technical specifications do not consider end connections and these should be accounted for when specifying equipment.

Warehouse Instructions

1. Drift tools.
2. Make sure all connections are compatible with customers pipe.
3. Check all connections for proper torque.
4. Check and tighten all set screws.
5. Drop the next size ball through the ball seat.
6. Check the number of shear screws installed on each ball seat and record on dimensional drawing sheet.
7. Record ball seat size and customer information on each sleeve.

   NOTE: It is has been determined that with the smaller ball seat sizes, higher rates can cause a dramatic pressure increase trying to shear the screws in the ball seat sub assembly of the frac sleeve. In these instances it is recommended that pump rates are decreased or more shear screws are added to the ball seat. Contact your AEG representative for recommended maximum pump rates for a particular FracPoint system installation and treatment plan.

Running Procedures

The following procedures are general recommendations, subject to additional detail clarification per specific job requirements.

1. Prior to running frac system, it is recommended to make wiper trip to bottom with a bit without nozzles and a string mill one joint behind.
2. Prepare to run in hole with open hole frac assembly.

   NOTE: Equipment to be labeled "first sleeve in hole", "second sleeve in hole", etc...
3. Run-in hole at no more than one 90 ft stand per minute while in cased hole.

   NOTE: Ensure the liner is filled regularly (5-7 joints) and every (10-12 joints) of drillpipe.
4. As assembly reaches casing shoe, circulate bottoms up before running into open hole.

   NOTE: It is not recommended to exceed 8 to 10 BPM while circulating around packers.
5. Run assembly to setting depth, not exceeding running speed of one joint in thirty seconds.

   NOTE: Do not exceed torque rating of connections if rotation is required. The maximum torque through the packer during run-in should not exceed torque rating.
6. At desired setting depth, perform a weight check, recording drag in pickup/slack off.
7. Circulate completion fluid to displace liner and open hole volume.
8. Drop first ball (for WIV or ball seat sub), reduce pump rate to no more than 5 bpm approaching 10 bbls from total calculated liner and drillpipe displacement.
9. Observe pump pressure carefully for landing of ball. As ball seats, slow pump to pressure up slowly, bringing pressure up to 2,000 psi, initiating setting of short radius open hole packers and FracPoint casing packer. Hold pressure, as slack off weight is applied.

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10. Slackoff recommended weight while holding pressure to complete packoff of the FracPoint casing packer, and then bleed off pressure.
11. Apply recommended tension to ensure hanger and pack off have been complete.
12. Return to neutral or compression. Pressure drillstring to 3,000 psi to disconnect HR™ running tool from liner top packer.
13. Bleed pressure and pick up one stand to ensure running tool has disconnected.

    NOTE: At this point the P-sleeve can either be left in the closed position or opened.

14. To open the P-sleeve, pressure well bore to 4,000 psi until P-sleeve opens and pressure drop is detected. Bleed pressure off.
15. Pressure well bore to 4,000 psi until P-sleeve opens and pressure drop is detected. Bleed pressure off.
16. Pull out of hole with HR setting tool.

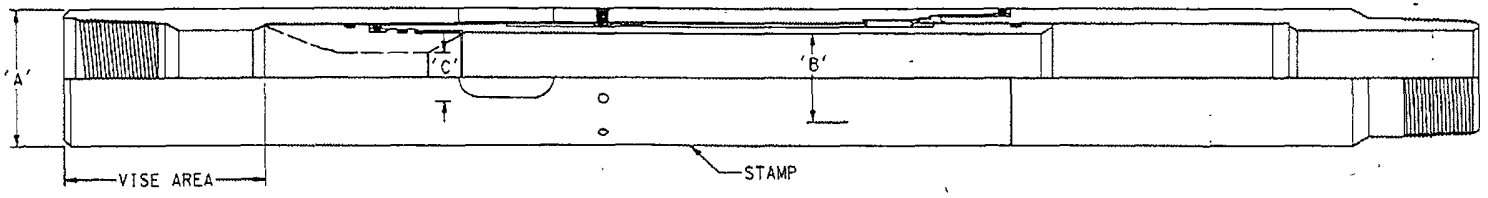
Rig Frac Equipment

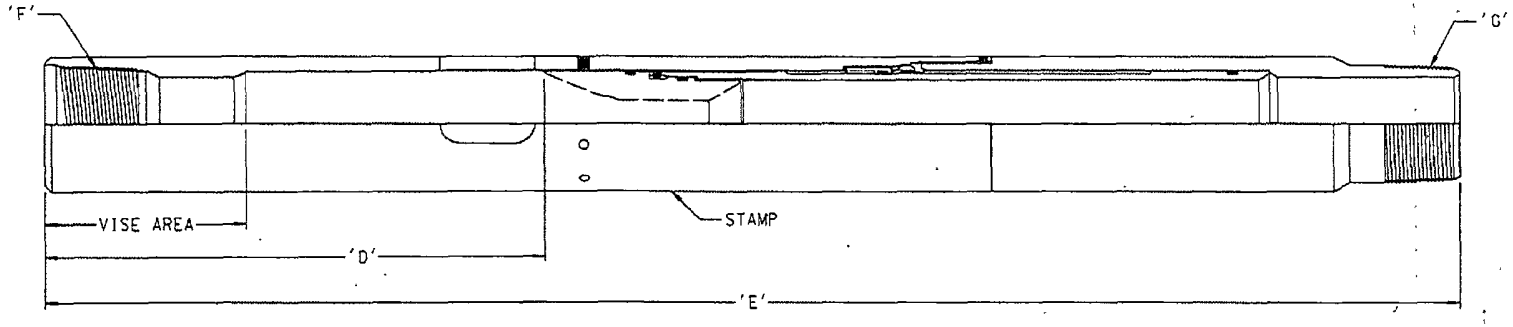
NOTE: The first ball from running procedure is still in place at toe, or if a WIV is run, it is in the closed position, and first sleeve (P-sleeve) is either open or closed. If the P-sleeve is in the closed position, pressure well bore to 4,000 psi until P-sleeve opens and pressure drop is detected First stage fracturing procedures per plan can begin.

17. In first stage tail flush, as second stage is to commence, reduce pump rate to 5 barrels per minute, and launch first ball.
18. Displace ball to seat, ensuring pump rate is slowed to under 10 barrels per minute as ball approaches seat.
19. Pressure up at ball seating (shear varies by size), observing for pressure while gradually increasing pump rate, establishing pump in rate.
20. Commence second stage according to frac plan.
21. In second stage tail flush, as second stage is completing, reduce pump rate to 5 barrels per minute, and launch second ball.
22. Displace ball to seat, ensuring pump rate is slowed to under 10 barrels per minute as ball approaches seat.
23. Pressure up at ball seating (shear varies by size), observing for pressure while gradually increasing pump rate, establishing pump in rate.
24. Commence third stage according to frac plan.
25. In third stage tail flush, as third stage is completing, reduce pump rate to 5 barrels per minute, and launch third ball.
26. Displace ball to seat, ensuring pump rate is slowed to under 10 barrels per minute as ball approaches seat.
27. Pressure up at ball seating (shear varies by size), observing for pressure while gradually increasing pump rate, establishing pump in rate.
28. Commence fourth stage according to frac plan.
29. Repeat stage frac process as required.

FracPoint™ Frac Sleeve

Dimensional Data Drawing No. 369-036-00P04, Size 435-281





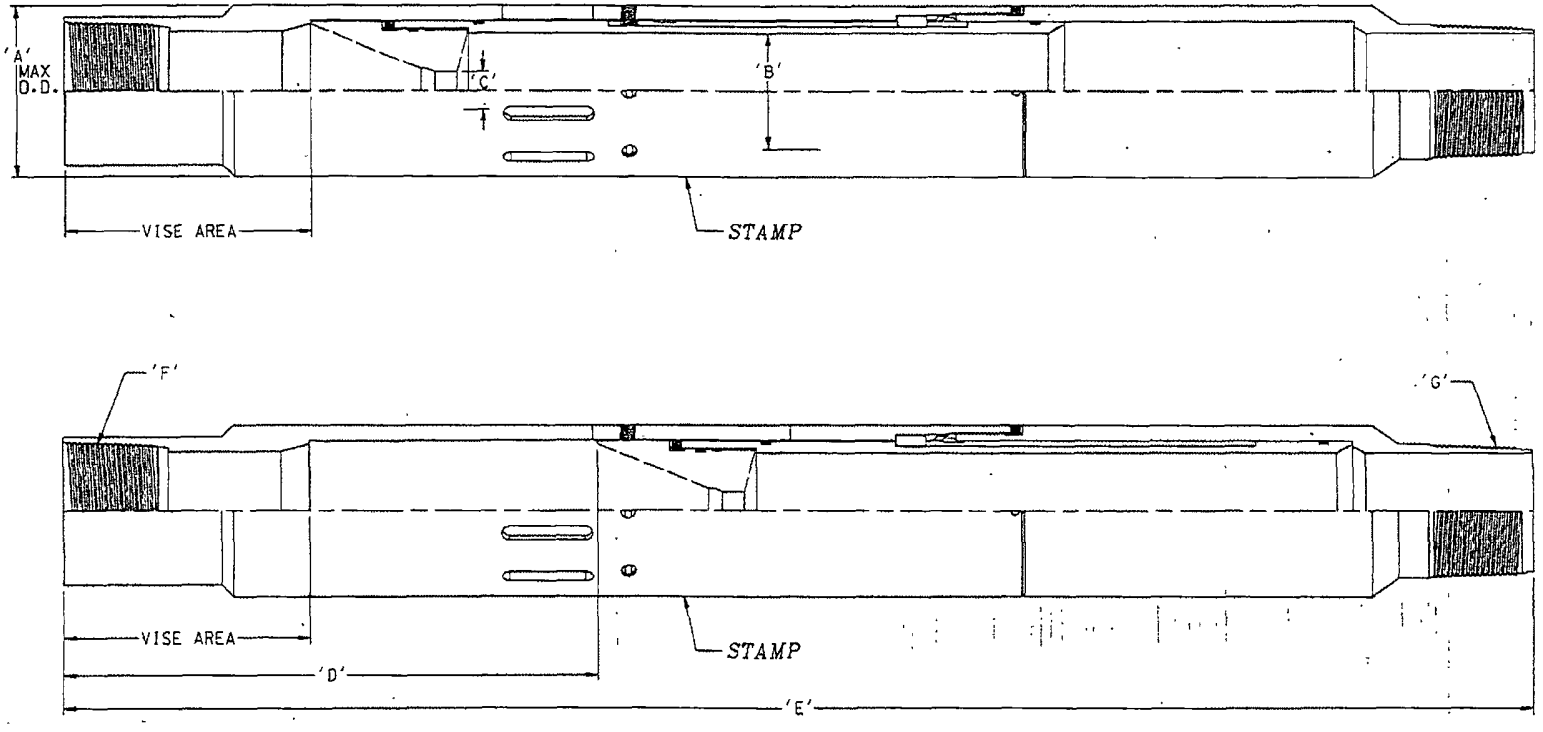
Dimensional Data

Refer to Drawing No. 369-036-00P04.

Dim	Size
A	4.350 (Max)
B	2.812 (Min)
C	Ball seat I.D.
D	15.84
E	46.80
F	Refer to EBOM
G	Refer to EBOM

FracPoint™ Frac Sleeve

Dimensional Data Drawing No. 369-074-00P04, Size 575-387



Dimensional Data, Size 575-387

Refer to Drawing No. 369-074-00P04.

Dim	Size
A	5.765 (Max)
B	3.835 (Min)
C	Ball seat ID
D	17.80
E	49.77
F	Refer to EBOM
G	Refer to EBOM

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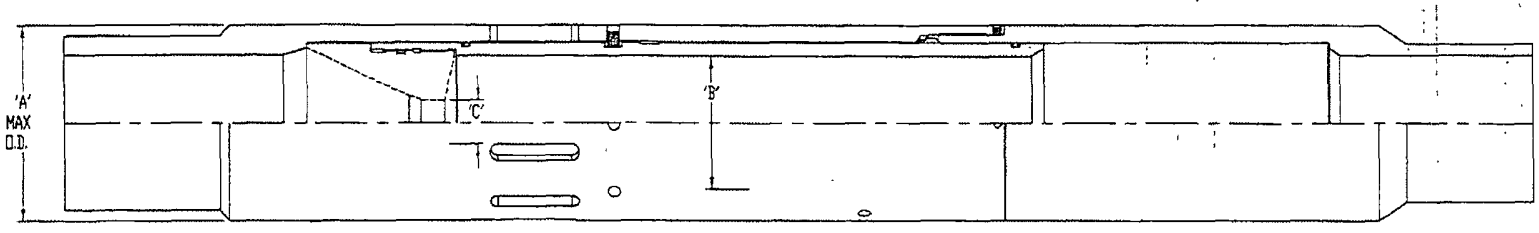
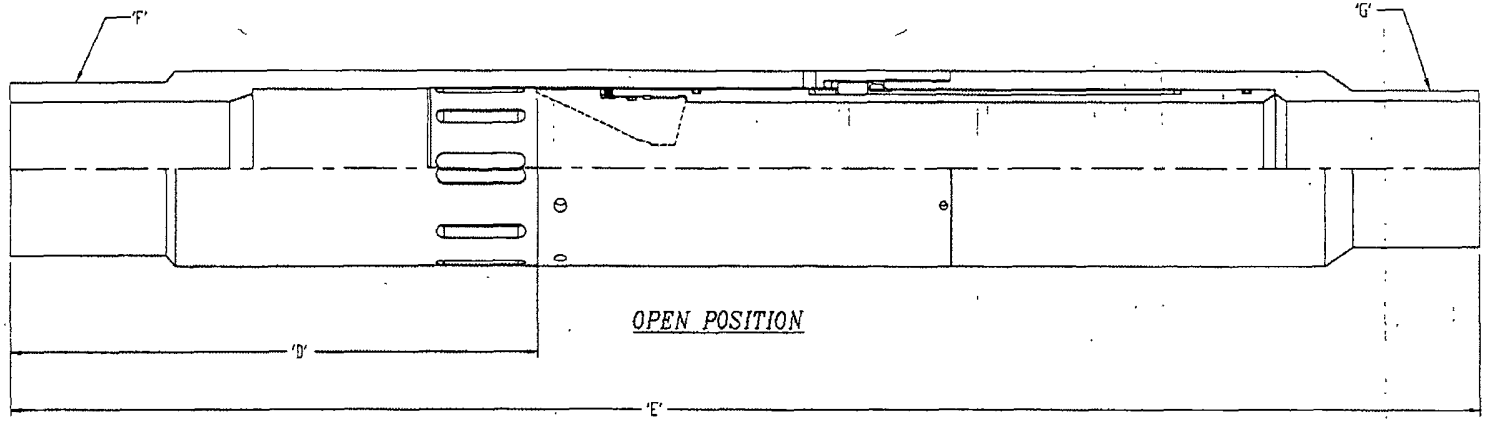
FracPoint™ Frac Sleeve

Dimensional Data Drawing No. 377-270-00P04, Size 563-381



CLOSED POSITION



OPEN POSITION

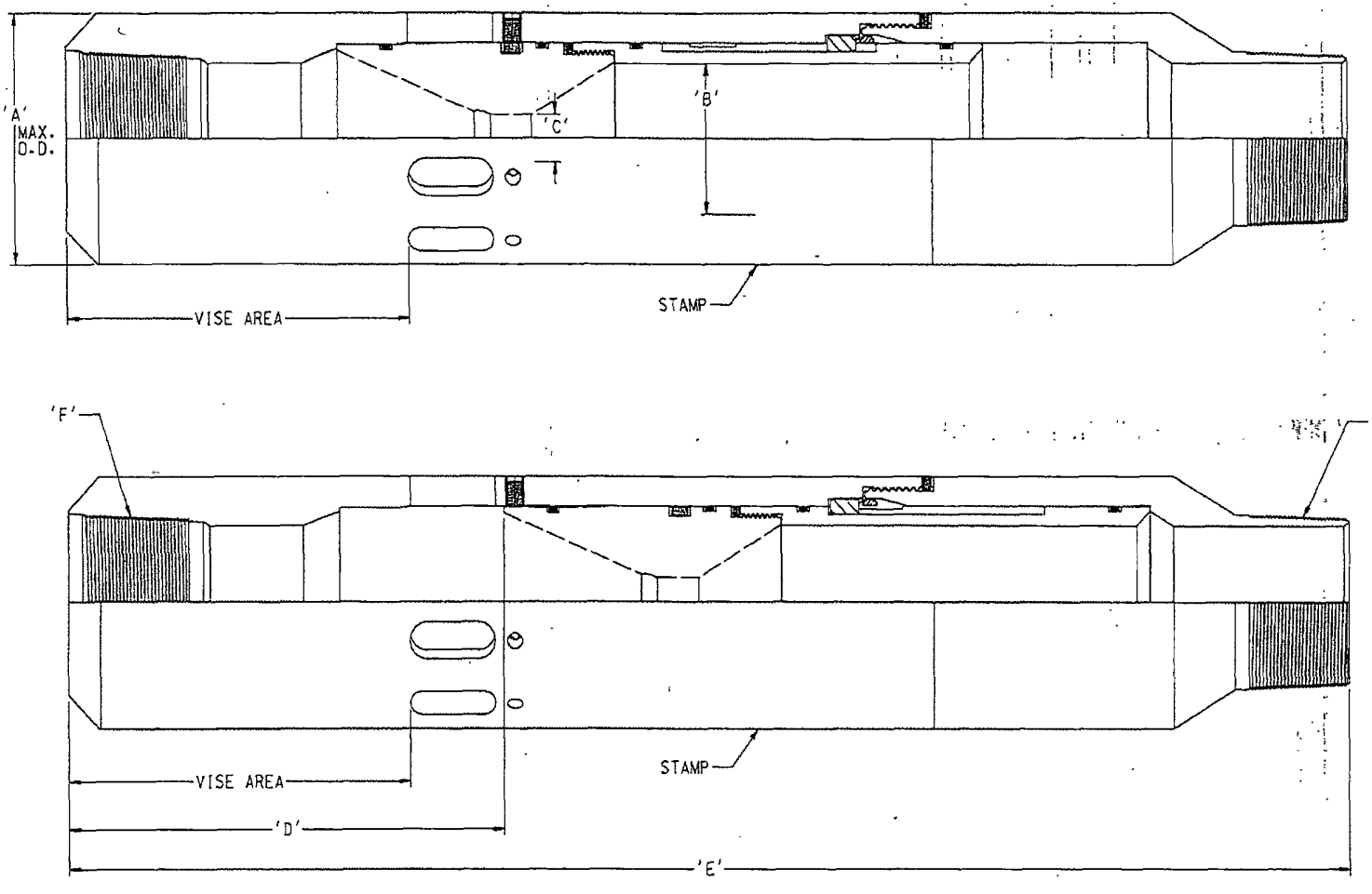
Dimensional Data, Size 563-381

Refer to Drawing No. 377-270-00P03.

Dim	Size
A	5.625 (Max)
B	3.813 (Min)
C	Ball seat ID
D	17.810
E	49.52
F	Refer to EBOM
G	Refer to EBOM

Frac-Point™ Frac Sleeve

Dimensional Drawing No. 368-959-00P04, Size 775-479



Frac-Point™ Frac Sleeve

Dimensional Data, Size 775-479

Refer to Drawing No. 368-959-00P04.

Dim	Size
A	8.030
B	4.798
C	Ball Seat I.D.
D	15.35
E	46.05
F	Refer to EBOM
G	Refer to EBOM

Frac-Point™ Short Radius Openhole Packer, All Sizes

Product Family No. H40936

Table of Contents

Introduction

The Frac-Point™ short radius openhole packer is used to isolate intervals of the lateral section. The packers are hydraulically set and are designed with metal backup rings as found on the Baker Hughes Premier™ production packers. These packers offer no mandrel movement during the setting sequence so spacing and number of sections are not an issue. The Frac-Point short radius openhole packers are also offered in HP/HT versions.

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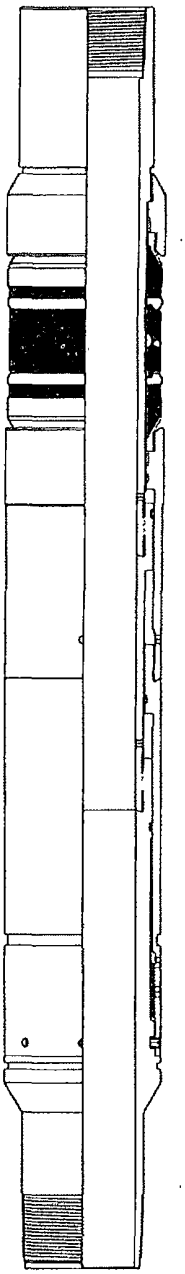
WARNING
Use of Baker Hughes equipment contrary to manufacturer's specifications may result in property damage, serious injury or fatality.

Features/Benefits

- **The openhole packer provides isolation along the length of the liner**
  - Cementing the liner in the lateral section is not necessary.
- **The packers are designed with Baker Hughes' patented "anti-extrusion backup ring element system" for openhole service**
  - Produces a zero-gap backup system.
- **Short compact design**
  - Allows entry in wells with high angle build rates.
- **Packers require no mandrel movement during setting sequence**
  - Enables stacked packer applications.
- **High torque and tensile internal thread connections**
  - Allows for rotation in deviated wells.



Drawing No. 368-081-00

BAKER HUGHES

Specification Guide

Size	Openhole ID (in.)	Min ID (in.)	Max OD (in.)	Elastomer	Temperature Range (°F)	Tensile (lb)	Torque* (ft-lb)	Pressure (psi)
365-237	4.000 *(101.6 mm)*	2.375 *(60.3 mm)*	3.65 *(92.7 mm)*	Nitrile	225	107,000	3,500	8,500*
435-281	4.625 *(117.5 mm)*	2.810 *(71.4 mm)*	4.350 *(110.5 mm)*	Nitrile	150-350	200,000	5,000	10,000
	4.75 *(120.7 mm)*							7,500
563-381	6.000 *(152.4 mm)*	3.813 *(96.9 mm)*	5.625 *(142.9 mm)*	Nitrile	150-300	310,000		8,000
				HNBR	150-350			10,000
582-387	6.125 *(155.6 mm)*	3.835 *(97.4 mm)*	5.820 *(147.8 mm)*	Nitrile	100-300	250,000		10,000
				HNBR	100-350			
591-387	6.250 *(158.8 mm)*		5.910 *(150.1 mm)*	Nitrile and HNBR	150-350	310,000		8,500 10,000
700-387	7.875 *(200.1 mm)*	3.875 *(98.5 mm)*	7.000 *(177.8 mm)*	Nitrile	100-250		6,000	8,000
738-387	8.000 *(203.2 mm)*		7.380 *(187.5 mm)*					
800-479	8.500 *(215.9 mm)*	4.790 *(120.7 mm)*	8.000 *(203.2 mm)*	HNBR	150-350	500,000	8,000	10,000
	8.750 *(222.2 mm)*			Nitrile				5,000
831-479	8.50 *(215.9 mm)*	4.790 *(121.7 mm)*	8.310 *(110.5 mm)*		100-250		7,890	7,500**
				HNBR	150-350			10,000***

*Torque and pressure ratings are for internal connections only, please use API ratings for end connections.

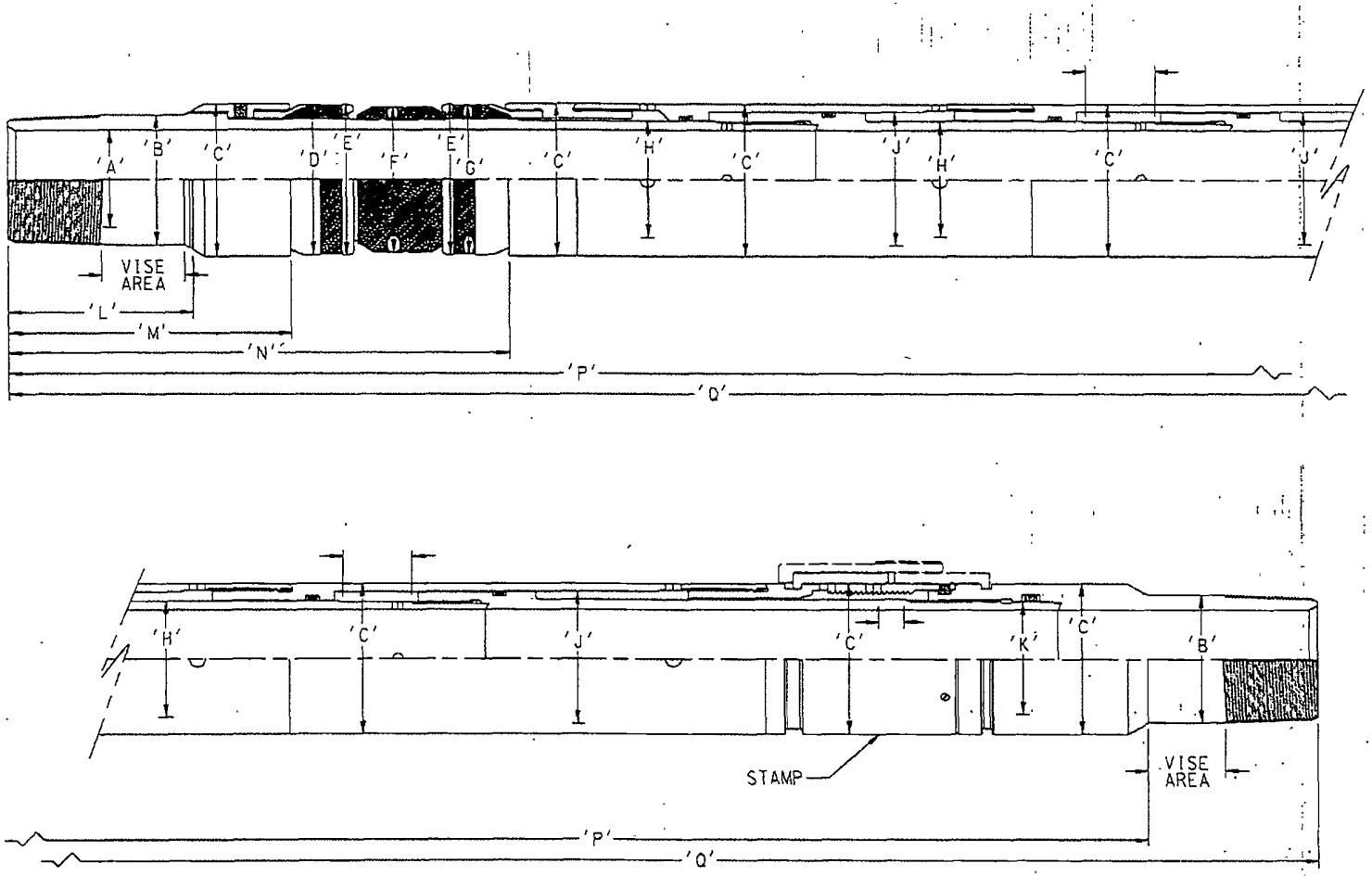
**Qualification test in 8.75" ID at 8,000 psi and 150-250°F.

***10,000 psi rating with 20 lb connection.

BAKER HUGHES

Frac-Point™ Packer

Dimensional Data Drawing No. 385-344-00P05, Size 365-237



Frac-Point™ Packer

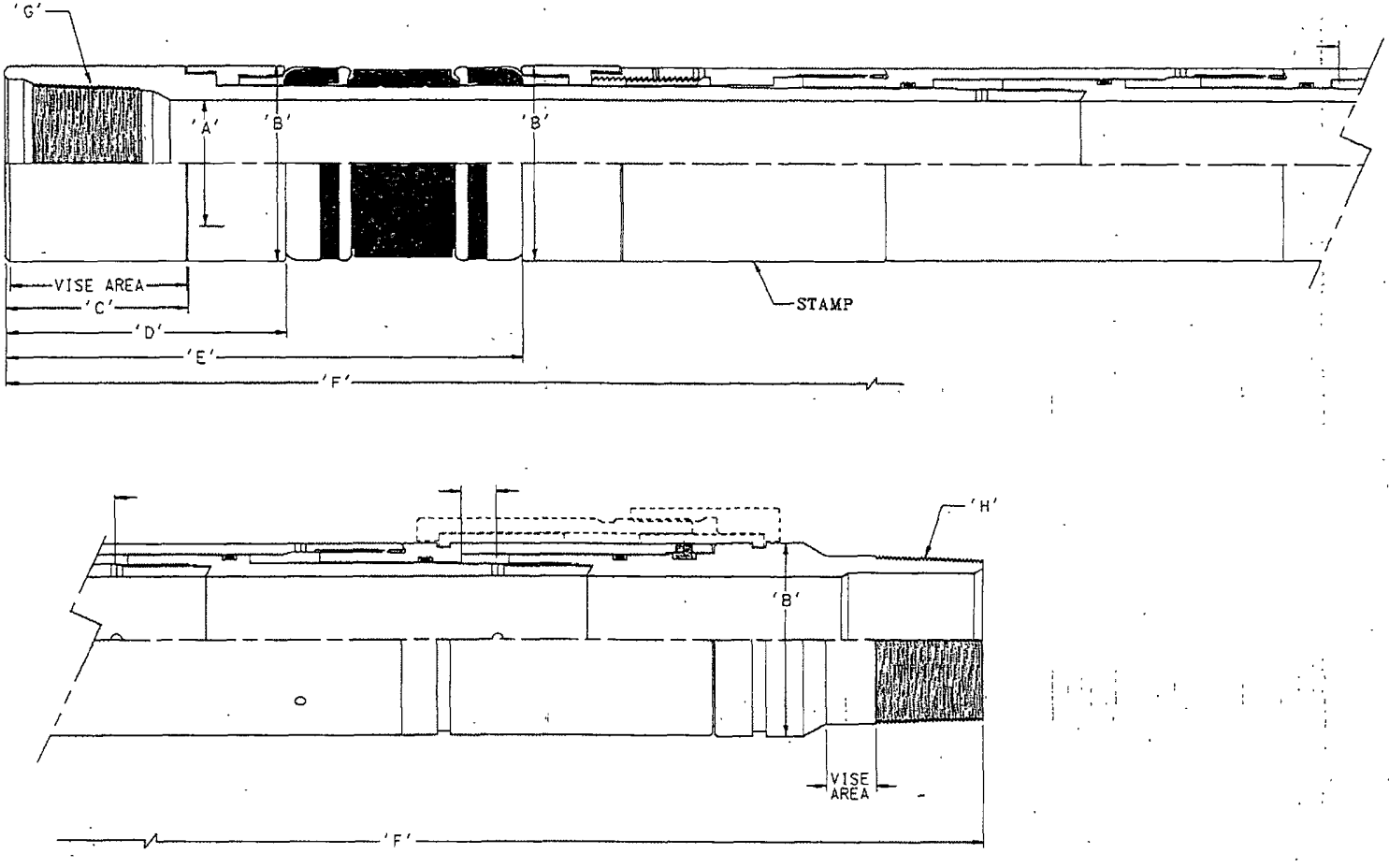
Dimensional Data, Size 365-237

Refer to Drawing No. 385-344-00P05.

Dim	Packer Size
	365-237
A (Min)	2.375
B (Max)	3.124
C (Max)	3.650
D (Max)	3.600
E (Max)	3.620
F (Max)	3.583
G (Max)	3.570
H (Max)	2.814
J (Max)	3.249
K (Max)	2.760
L (Nom)	10.70
M (Nom)	13.34
N (Nom)	18.53
P (Nom)	65.46
Q (Nom)	76.42
Thd R	Refer to EBOM

Frac-Point™ Packer

Dimensional Data Drawing No. 367-912-00P04, Size 435-281



Frac-Point™ Packer

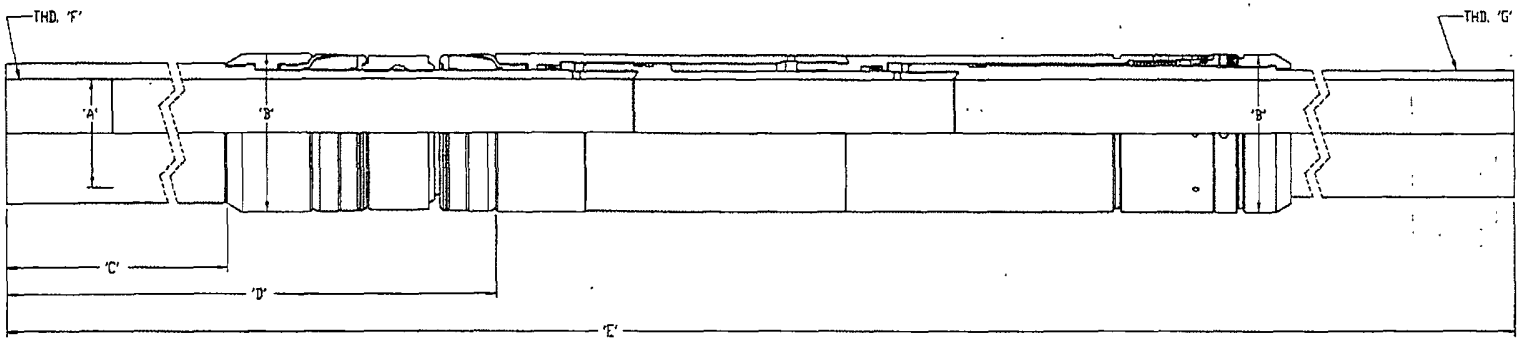
Dimensional Data, Size 435-281

Refer to Drawing No. 367-912-00P04.

Dim	Packer Size
	435-281
A (Min)	2.812
B (Max)	4.350
C (Nom)	6.15
D (Nom)	8.35
E (Nom)	13.625
F (Nom)	67.55
Thd G	Refer to EBOM
Thd H	

Frac-Point™ Packer

Dimensional Data Drawing No. 377-162-00P04, Size 563-381



Dimensional Data, Size 563-381

Refer to Drawing No. 377-162-00P04.

Dim	Packer Size
	563-381
A	3.813 (Min)
B	5.625 (Max)
C	15.3
D	24.81
E	68.34
Thd F	Refer to EBOM
Thd G	

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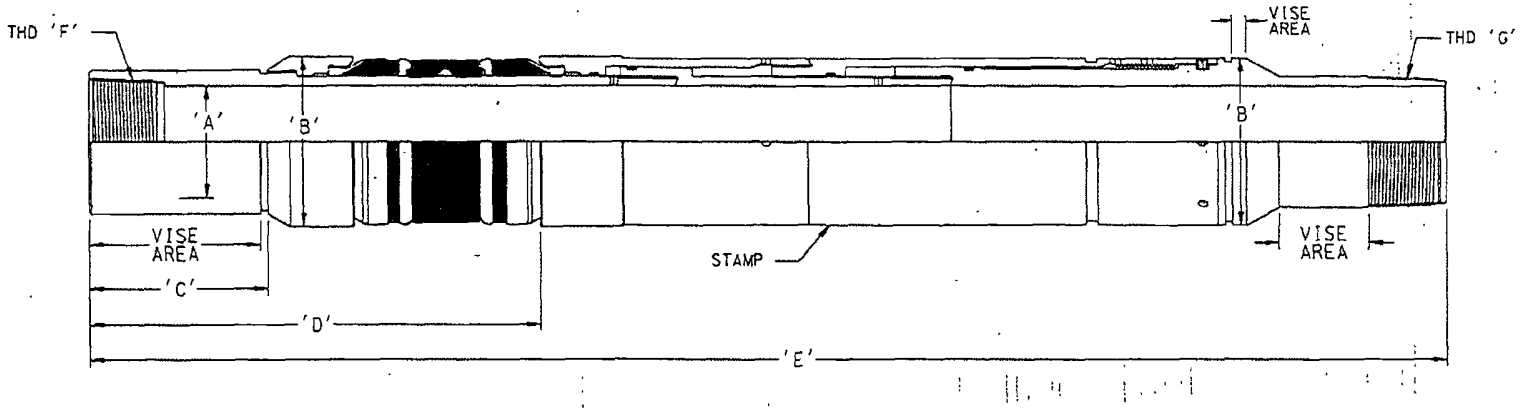
Frac-Point™ Packer

Dimensional Data Drawing No. 368-081-00P04, Sizes 582-387 and 591-387



Dimensional Data, Sizes 582-387 and 591-387

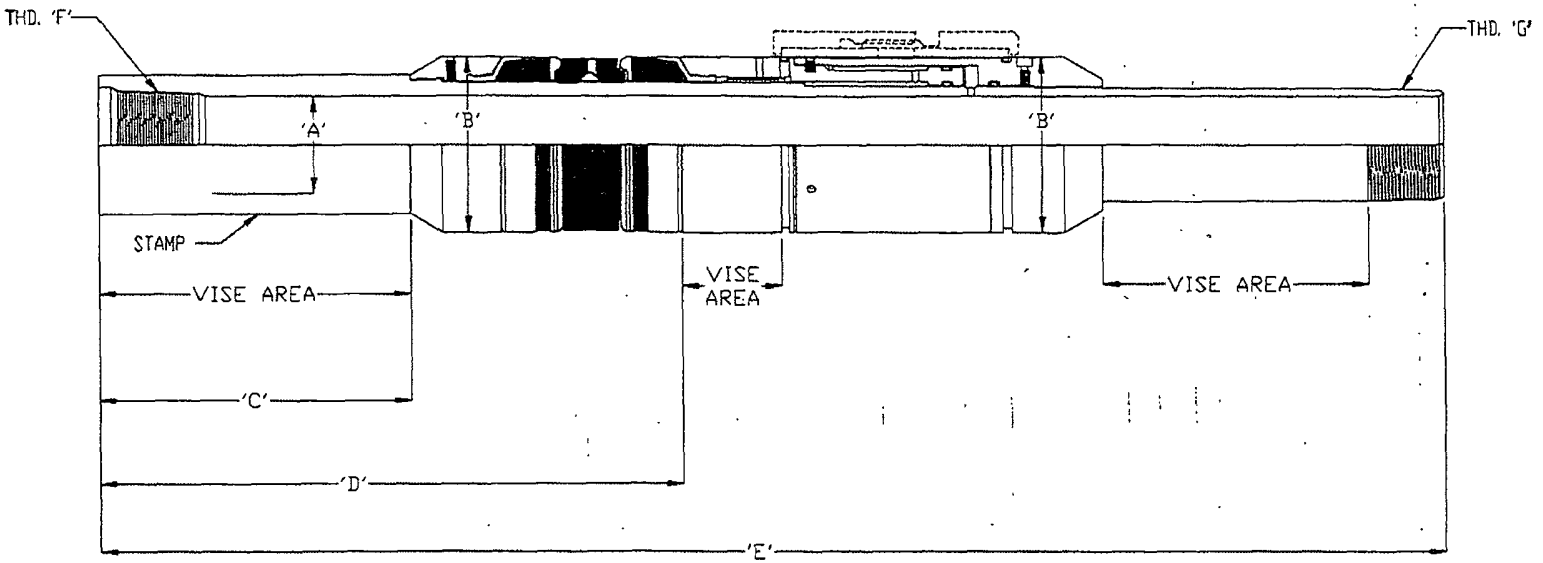
Refer to Drawing No. 368-081-00P04.

Dim	Packer Size	
	582-387	591-387
A	3.835 (Min)	
B	5.820 (Max)	5.910 (Max)
C	5.87 (Max)	8.37 (Max)
D	15.27	17.78
E	49.60	58.50
Thd F	Refer to EBOM	
Thd G		

BAKER HUGHES

Frac-Point™ Packer

Dimensional Data Drawing No. 369-215-00P04, Size 700/738-387



Dimensional Data, Size 700/738-387

Refer to Drawing No. 369-215-00P04.

Dim	Packer Size	
	700-387	738-387
A (Min)	3.875	
B (Max)	7.000	7.380
C (Nom)	12.40	
D (Nom)	23.11	
E (Nom)	53.2	
Thd F	Refer to EBOM	
Thd G		

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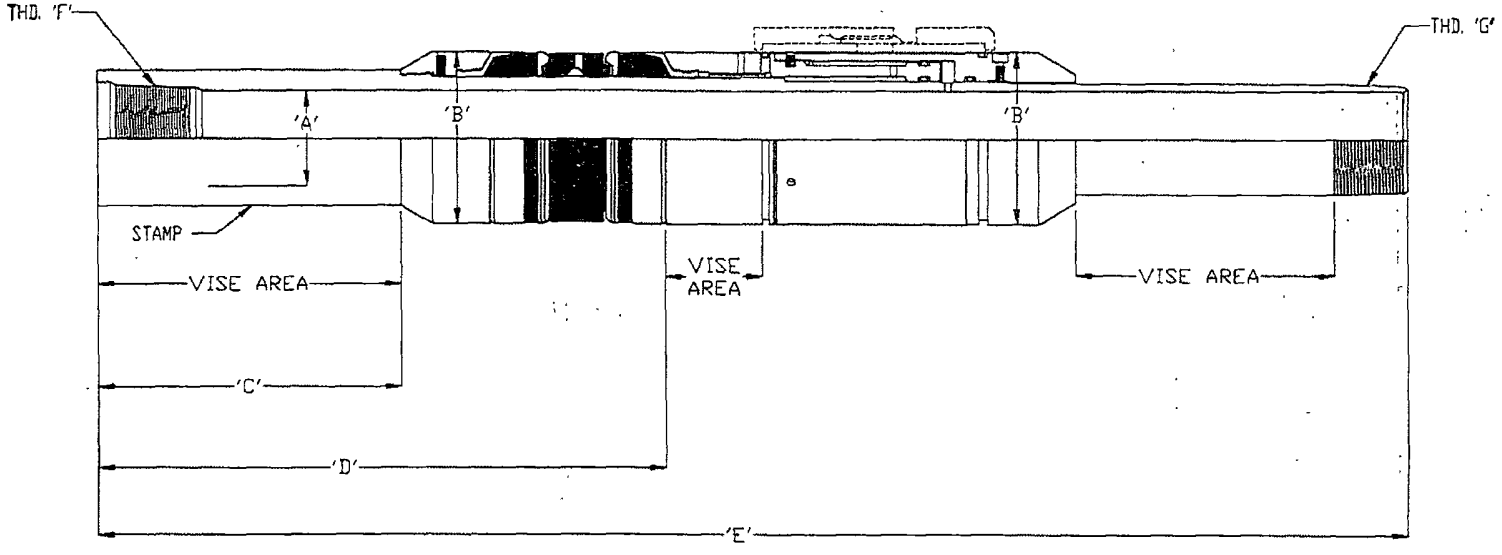
Dimensional Data Drawing No. 369-215-00P04, Size 800-479



Dimensional Data, Size 800-479

Refer to Drawing No. 369-215-00P04.

Dim	Packer Size
	800-479
A (Min)	4.790
B (Max)	8.000
C (Nom)	12.43
D (Nom)	22.49
E (Nom)	53.5
Thd F	Refer to EBOM
Thd G	

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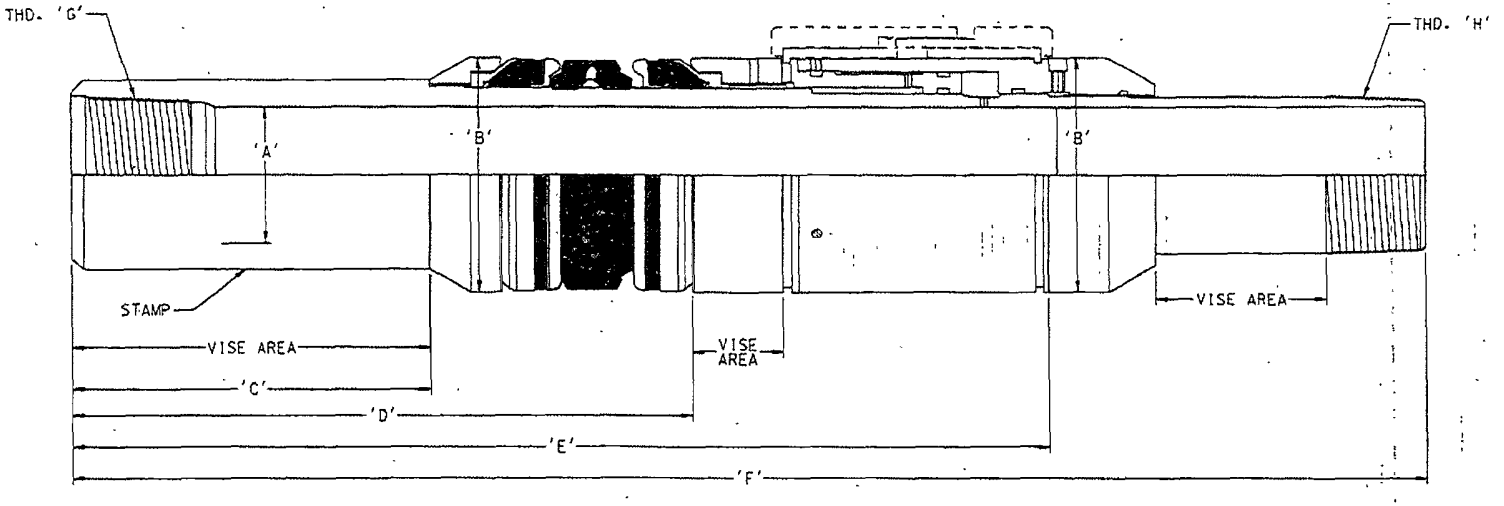
Frac-Point™ Packer

Dimensional Data Drawing No. 367-694-00P04, Size 831-479



Dimensional Data, Size 831-479

Refer to Drawing No. 367-694-00P04.

Dim	Packer Size
	831-479
A	4.790 (Min)
B	8.31 (Max)
C	12.7 (Max)
D	21.8 (Max)
E	34.2
F	46.50
Thd G	Refer to EBOM
Thd H	