Appendix J

Vetco MLC Mudline Operating and Service Procedure

ABB Vetco Gray

MUDLINE SUSPENSION SYSTEMS

OPERATING AND SERVICE PROCEDURE 6065

EQUIPMENT

MUDLINE SUSPENSION SYSTEM - MLC

30" x 20" x 13-3/8" x 9-5/8" (x 7" Optional)

TECHNICAL TOOL DESCRIPTION

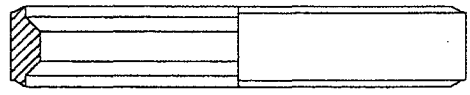
The MLC mudline suspension system is a stack down system available in several configurations and casing programs. All configurations utilize the fluted or drilled landing ring/load ring on the initial strings and a serpentine collet-type landing ring on the smaller diameter casing strings. Load carrying methods can be identified by referring to the system drawing.

The following procedure represents the recommended method of running MLC mudline equipment. As rigs vary, detailed methods of operation will vary accordingly. Standard safety practices will override all conflicts that may occur.

Conductor Landing Ring

The conductor landing ring has an internal 45^{0} landing shoulder profile designed to support the next mudline hanger. This ring is welded into the joint of casing and is positioned in the string so as to land at the appropriate position relative to the mudline.

LANDING RING DATA	
SIZE	30" X 1.000" WALL
MATERIAL	70 KSI
PART NUMBER	143001-1*
MAXIMUM OD	30.03"
MINIMUM ID	26.110"
MAXIMUM BIT SIZE	26"



CONDUCTOR LANDING RING

*NOTE: Capacities, dimensions, and flowby values given are for part numbers indicated only. When equipment manufactured to other part numbers is used, consult assembly parts specification and drawing for technical data.

Mudline Casing Hanger - 20"

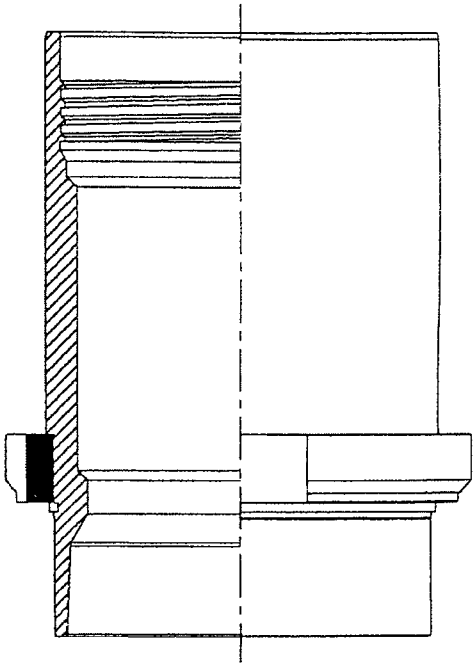
The 20" diameter casing hanger is equipped with an external load ring that lands on the 45° shoulder provided in the 30" landing ring. The bottom connection is a casing thread as specified to meet customer requirements.

The top connection is a one pitch left hand beveled square thread provided to receive the standard running/tieback tool or the optional latch and lock tieback tool.

The external load ring is, in most cases, designed to be removeable. If, after jetting or driving the intitial conductor string into place, the landing ring is not positioned at or below at the mudline, the load ring can be removed from the casing hanger. This will allow the 20" hanger to be set at the appropriate depth.

The internal profile of the 20" casing hanger has a 45° load shoulder for the 13-3/8" casing hanger.

CASING HANGER DATA	
SIZE	20"
PART NUMBER	H60093-1*
TYPE	LOAD SHOULDER
SERVICE	STANDARD
MAXIMUM OD	27.220"
MINIMUM ID	17.599"
MAXIMUM BIT SIZE	17-1/2"
PRESSURE RATING	1500 PSI
CAPACITIES & FLOWBY WHEN USED INSIDE PART NUMBER: 143001-1	
RUNNING CAPACITY	2,260,000 LBS
HANGING CAPACITY	2,900,000 LBS
FLOWBY RUNNING	32 SQ. IN.
FLOWBY LANDED	12 SQ. IN.



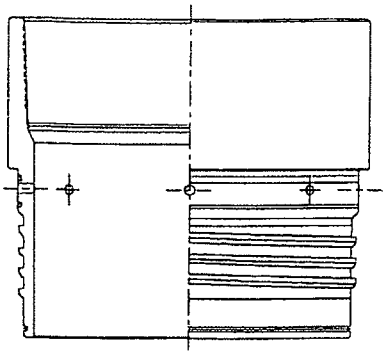
LOAD RING ON THE OD AND LOAD SHOULDER ON THE ID

*NOTE: Capacities, dimensions, and flowby values given are for part numbers indicated only. When equipment manufactured to other part numbers is used, consult assembly parts specification and drawing for technical data.

Running/Tieback Tool - 20"

This tool has a one-pitch modified left hand beveled square thread pin down with a casing thread box up per customer requirements. The tool uses elastomer seals and includes ports for annulus washout.

RUNNING/TIEBACK TOOL DATA		
SIZE	20"	
PART NUMBER	143003-1*	
SERVICE	STANDARD	
MAXIMUM OD	21.510"	
MINIMUM ID	18.720"	
MAXIMUM BIT SIZE	17-1/2"	
PRESSURE RATING	1500 PSI	
AXIAL CAPACITY	2,260,000 LBS	
THREAD TYPE	LEFT HAND - 1 TPI	
NUMBER OF TURNS TO MAKE-UP		3 TO 3-1/2
RECOMMENDED MAKE-UP TORQUE		1500 - 2500 FT-LBS
NUMBER OF TURNS TO OPEN WASH PORTS		1-1/2



RUNNING/TIEBACK TOOL

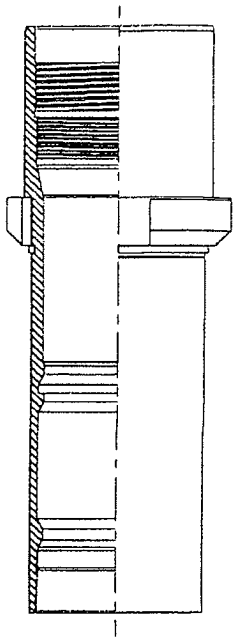
*NOTE: Capacities, dimensions, and flowby values given are for part numbers indicated only. When equipment manufactured to other part numbers is used, consult assembly parts specification and drawing for technical data.

Mudline Casing Hanger - 13-3/8"

This hanger is equipped with an external removable fluted load ring that lands on a 45° shoulder provided in the 20" casing hanger. The internal profile of the casing hanger has a serpentine collet landing profile for the 9-5/8" casing hanger.

The bottom connection is a casing thread to meet customer requirements. The top connection is a two-pitch modified lefthand beveled square thread, to receive the running tool. The lower top connection is a three-pitch modified righthand beveled square thread to receive the tieback tool.

CASING HANGER DATA	
SIZE	13-3/8"
PART NUMBER	143004-18*
TYPE	LOAD SHOULDER
SERVICE	H_2S
MAXIMUM OD	18.542"
MINIMUM ID	12.318"
MAXIMUM BIT SIZE	12-1/4"
PRESSURE RATING	5000 PSI
CAPACITIES & FLOWBY WHEN USED INSIDE PART NUMBER : H60093-1	
RUNNING CAPACITY	1,170,000 LBS
HANGING CAPACITY	1,490,000 LBS
FLOWBY RUNNING	20 SQ. IN.
FLOWBY LANDED	16 SQ. IN.

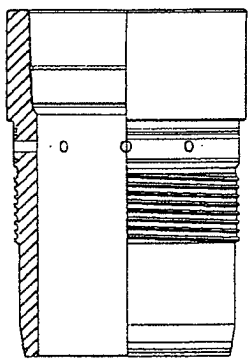


CASING HANGER WITH SERPENTINE COLLET

Running Tool - 13-3/8"

The running and tieback tools for this size range are two distinct tools. The running tool has a two-pitch modified left hand beveled square thread pin down with a customer specified casing thread box up. It uses elastomer seals and has wash ports for annulus washout.

RUNNING TOOL DATA		
SIZE	13-3/8"	
PART NUMBER	H60098-1*	
SERVICE	H_2S	
MAXIMUM OD	14.780"	
MINIMUM ID	12.410"	
MAXIMUM BIT SIZE	12-1/4"	
PRESSURE RATING	5,000 PSI	
AXIAL CAPACITY	1,170,000 LBS	
THREAD TYPE	LEFT HAND - 2 TPI	
NUMBER OF TURNS TO MAKE-UP		7 TO 8
RECOMMENDED MAKE-UP TORQUE		1500 - 2500 FT-LBS
NUMBER OF TURNS TO OPEN WASH PORTS		3-1/2 TO 4



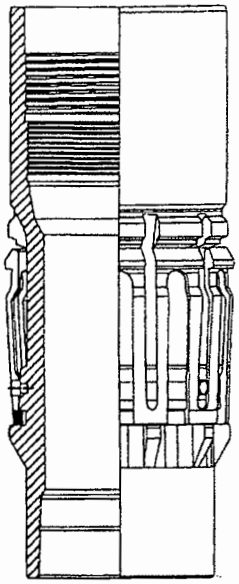
RUNNING TOOL

*NOTE: Capacities, dimensions, and flowby values given are for part numbers indicated only. When equipment manufactured to other part numbers is used, consult assembly parts specification and drawing for technical data.

Mudline Casing Hanger - 9-5/8"

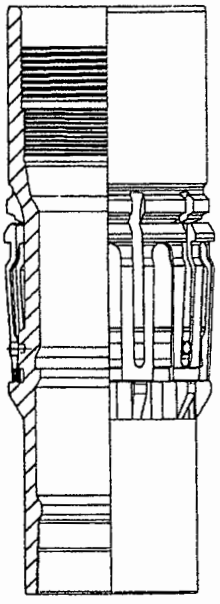
This hanger is equipped with a serpentine collet-type landing ring and engages the mating profile on the preceding hanger. The hanger is slotted to provide flowby. The top box connection is a two-pitch modified left hand beveled square thread for engaging the running tool. The bottom connection is a casing thread box designed to meet customer requirements.

CASING HANGER DATA	
SIZE	9-5/8"
PART NUMBER	143044-2* (with smooth bore)
TYPE	COLLET
SERVICE	H_2S
MAXIMUM OD	13.225"
MINIMUM ID	8.568"
MAXIMUM BIT SIZE	8-1/2"
PRESSURE RATING	10,000 PSI
CAPACITIES & FLOWBY WHEN USED INSIDE PART NUMBER: 143004-1	
RUNNING CAPACITY	870,000 LBS
HANGING CAPACITY	1,140,000 LBS
FLOWBY RUNNING	4 SQ. IN
FLOWBY LANDED	7 SQ. IN



SMOOTH BORE

CASING HANGER DATA	
SIZE	9-5/8"
PART NUMBER	143008-2*
TYPE	COLLET
SERVICE	H_2S
MAXIMUM OD	13.225"
MINIMUM ID	8.568"
MAXIMUM BIT SIZE	8-1/2"
PRESSURE RATING	10,000 PSI
CAPACITIES & FLOWBY WHEN USED INSIDE PART NUMBER: 143004-18	
RUNNING CAPACITY	870,00 LBS
HANGING CAPACITY	1,140,000 LBS
FLOWBY RUNNING	4 SQ. IN
FLOWBY LANDED	7 SQ. IN



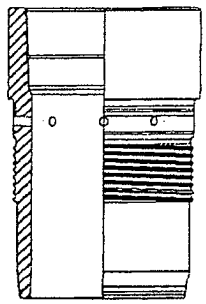
INTERNAL COLLET LANDING PROFILE

*NOTE: Capacities, dimensions, and flowby values given are for part numbers indicated only. When equipment manufactured to other part numbers is used, consult assembly parts specification and drawing for technical data.

Running Tool - 9-5/8"

The running tool has a two pitch modified lefthand beveled square thread pin down with a customer specified casing thread box up. It uses elastomer seals and has wash ports for annulus washout.

RUNNING TOOL DATA		
SIZE	9-5/8"	
PART NUMBER	143009-2*	
SERVICE	H_2S	
MAXIMUM OD	11.280"	
MINIMUM ID	8.568"	
MAXIMUM BIT SIZE	8-1/2"	
PRESSURE RATING	10,000 PSI	
AXIAL CAPACITY	870,000 LBS	
THREAD TYPE	LEFT HAND - 2 TPI	
NUMBER OF TURNS TO MAKE-UP		7 TO 8
RECOMMENDED MAKE-UP TORQUE		1500 - 2500 FT-LBS
NUMBER OF TURNS TO OPEN WASH PORTS		3-1/2 TO 4



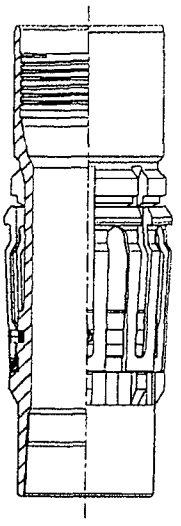
RUNNING TOOL

*NOTE: Capacities, dimensions, and flowby values given are for part numbers indicated only. When equipment manufactured to other part numbers is used, consult assembly parts specification and drawing for technical data.

Mudline Casing Hanger - 7"

This hanger is equipped with a serpentine collet-type landing ring and engages the mating profile on the 9-5/8" hanger. The hanger is slotted to provide flowby. The bottom connection is a casing thread box to meet customer requirements. The 7" hanger has a single top box connection which is a two-pitch modified lefthand beveled square thread for engaging the running tool.

CASING HANGER DATA	
SIZE	7"
PART NUMBER	143011-2*
TYPE	COLLET
SERVICE	H_2S
MAXIMUM OD	8.473"
MINIMUM ID	6.068"
MAXIMUM BIT SIZE	6"
PRESSURE RATING	10,000 PSI
CPACITIES & FLOWBY WHEN USED INSIDE PART NUMBER: 143008-2	
RUNNING CAPACITY	510,000 LBS
HANGING CAPACITY	510,000 LBS
FLOWBY RUNNING	4 SQ. IN
FLOWBY LANDED	4 SQ. IN

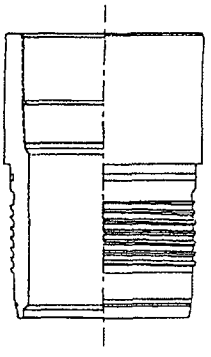


CASING HANGER WITH SERPENTINE COLLET

Running/Tieback Tool - 7"

This tool has a two-pitch modified lefthand beveled square thread pin down and casing thread box up to meet customer requirements. The tool does not have circulating ports for washout. The tool is used for both drilling and tieback, equipped with a metal-to-metal seal on the nose of the tool which seals on the mating taper of the hanger.

RUNNING TOOL DATA		
SIZE	7"	
PART NUMBER	143012-2*	
SERVICE	H_2S	
MAXIMUM OD	7.800"	
MINIMUM ID	6.068"	
MAXIMUM BIT SIZE	6"	
PRESSURE RATING	10,000 PSI	
AXIAL CAPACITY	510,000 LBS	
THREAD TYPE	LEFT HAND - 2 TPI	
NUMBER OF TURNS TO MAKE-UP		6 TO 7
RECOMMENDED MAKE-UP TORQUE		2500 - 4000 FT-LBS



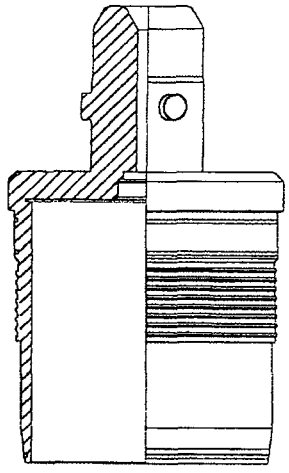
RUNNING/ TIEBACK TOOL

*NOTE: Capacities, dimensions, and flowby values given are for part numbers indicated only. When equipment manufactured to other part numbers is used, consult assembly parts specification and drawing for technical data.

Corrosion Caps

Mudline corrosion caps provide protection for hanger threads, seal areas, and offer pressure containment when the check valve is installed in the stem. The corrosion cap makes up into the left hand running threads in the hanger and has elastomer seals above and below the threads. The corrosion cap running tool opens the check valve preventing pressure lock when installing the corrosion cap in the casing hanger.

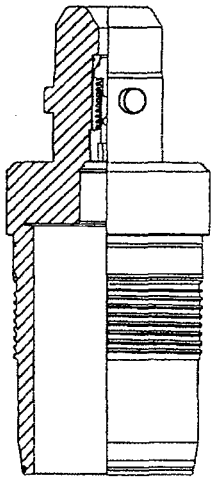
CORROSION CAP DATA	
SIZE	20"
PART NUMBER	143028-1*
SERVICE	STANDARD
MAXIMUM OD	21.28"
PRESSURE RATING	N/A
THREAD TYPE	LEFT HAND - 1 TPI
NUMBER OF TURNS TO MAKE-UP	3 TO 3-1/2
RECOMMENDED MAKE-UP TORQUE	1500 TO 2500 FT-LBS



CORROSION CAP - NON-PRESSURE CONTAINING

SIZE	13-3/8"
PART NUMBER	143030-1*
SERVICE	H_2S
MAXIMUM OD	14.78"
PRESSURE RATING	N/A
THREAD TYPE	LEFT HAND - 2 TPI
NUMBER OF TURNS TO MAKE-UP	7 TO 8
RECOMMENDED MAKE-UP TORQUE	1500 - 2500 FT-LBS

SIZE	9-5/8"
PART NUMBER	143032-1*
SERVICE	H_2S
MAXIMUM OD	11.28"
PRESSURE RATING	10,000 PSI
THREAD TYPE	LEFT HAND - 2 TPI
NUMBER OF TURNS TO MAKE-UP	7 TO 8
RECOMMENDED MAKE-UP TORQUE	1500 - 2500 FT-LBS



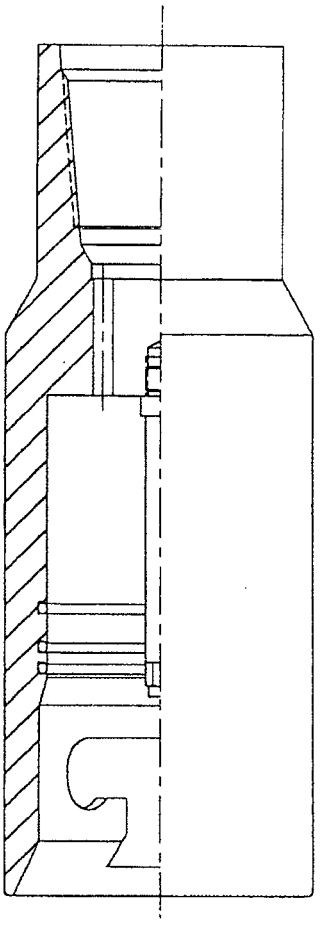
CORROSION CAP - PRESSURE CONTAINING

SIZE	7"
PART NUMBER	143033-1*
SERVICE	H_2S
MAXIMUM OD	7.84"
PRESSURE RATING	10,000 PSI
THREAD TYPE	LEFT HAND - 2 TPI
NUMBER OF TURNS TO MAKE-UP	6 TO 7
RECOMMENDED MAKE-UP TORQUE	1500 - 2500 FT-LBS

*NOTE: Capacities, dimensions, and flowby values given are for part numbers indicated only. When equipment manufactured to other part numbers is used, consult assembly parts specification and drawing for technical data.

Corrosion Cap Running Tool

The mudline corrosion cap running tool is a drillpipe "overshot" device with a drillpipe box up and a cylinder bottom. Internal J-slots engage the drive pins on the mudline corrosion cap with a right hand rotation. An internal stinger, located inside the bottom of the tool, engages with and opens the corrosion cap check valve, if installed, as the running tool sets down over the corrosion cap stem. In the bore of the running tool are elastomer seals which provide a seal between the running tool and corrosion cap stem when the running tool is stabbed over the mandrel.



CORROSION CAP RUNNING TOOL

*NOTE: Capacities, dimensions, and flowby values given are for part numbers indicated only. When equipment manufactured to other part numbers is used, consult assembly parts specification and drawing for technical data.

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SPECIFICATIONS

Refer to drawing for dimensions.

ROUTINE OPERATIONS

PRE-OPERATIONAL CHECKS

1. Running tools are normally made up to their respective hanger prior to shipment, confirming proper make-up and preventing damage due to improper handling. Running and tieback tools are fitted with new elastomer seals. If the running tools have been previously installed in the casing hangers and tieback tools are available, remove running tools and install tieback tools to insure proper fit. Reinstall and properly torque the running tools.
2. Thoroughly clean and visually inspect all equipment before it is used.
3. Carefully inspect and dress all threaded connections. Assure that all threads are then lubricated and protected. **Do not use pipe dope or any other lubricant that contains metal particles.**
4. Check all elastomer seals for cuts, heat or age cracks, loss of elasticity or obvious change in hardness due to age or exposure. Replace with new seals if required.
5. Check all customer specified threaded connections on the mudline equipment and confirm that they are the same as those on the casing to be run.

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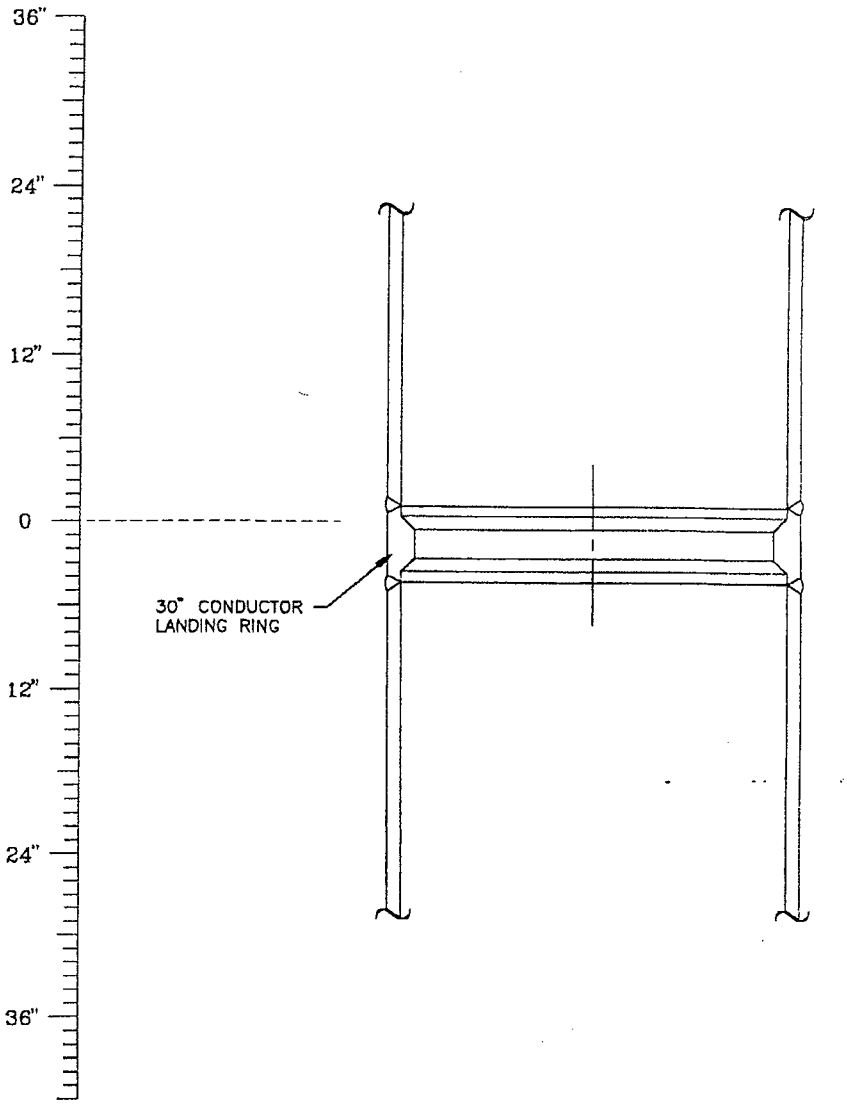

ABB Vetco Gray	FILE: III-F	ACAD
MLC MUDLINE SUSPENSION SYSTEM CONDUCTOR LANDING RING-30"		HP-4193-1

6. Before running casing, it is suggested that the casing hanger and the running tool be made up to casing joints and laid out on the walk/pipe rack, or joined together and racked in the derrick. Care must be taken in handling all equipment so that the rig tongs are not placed on any threaded area, seal area or collet.

7. The hook on the traveling block must be unlocked at all times during the handling or running of the casing hanger.

NOTE: *All casing thread connections above the running tool in the landing string or riser should be torqued to the maximum allowable, consistent with casing manufacturers' recommendations, and good engineering practices. This is necessary due to limited left hand rotation of landing strings in this procedure.*

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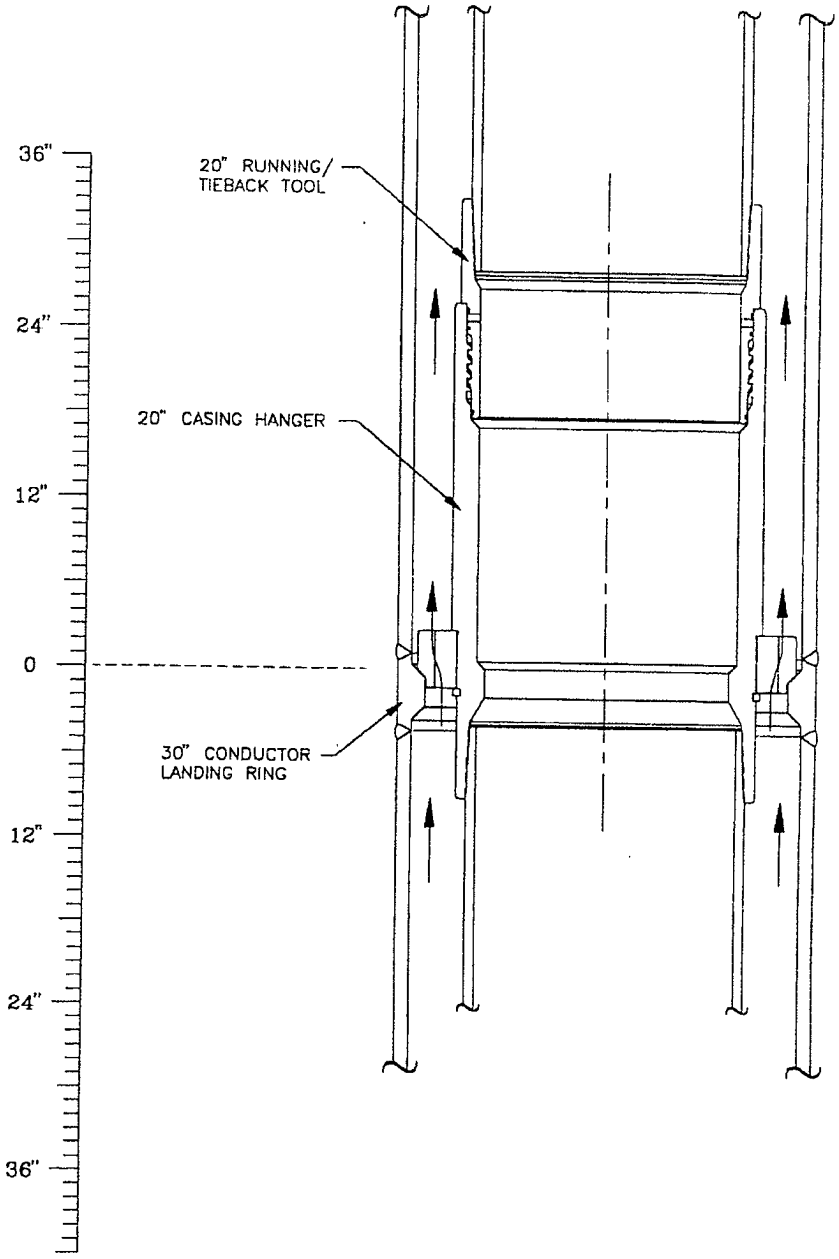

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MLC MUDLINE SUSPENSION SYSTEM
20" CASING HANGER LANDED W/CEMENT RETURNS

HP-4193-2

RUNNING PROCEDURES

The following is a suggested operating procedure for ABB Vetco Gray's MLC Mudline Suspension System. The procedure assumes that the 30" conductor, with the 30" landing ring properly spaced out, has been set. ABB Vetco Gray, its employees, and agents do not assume any responsibility for the acceptability of this procedure.

Due to the imprecise nature of the blunt start on running and tieback threads, approximate values are given for number of turns required for full engagement of tools.

Running 20" Mudline Casing Hanger

1. Pick up the joint with the 20" hanger and running tool made up and make up to joint suspended at the rotary. Lower the string until the hanger nears the rotary and suspend string in slips. Back out the running tool and re-inspect seals and threads. Apply Jet-Lube AP-5 or equivalent to the left hand threads of both hanger and running tool. Do not use pipe dope or any other lubricant that contains metal particles.

2. Line up the thread starts and lower the tool into the hanger. Rotate the running tool approximately 3 to 3-1/2 turns to the left.

   Apply just enough torque to confirm the tool shoulders-out onto the hanger. Torque should not exceed 2,500 ft-lbs (3 390 Nm). If a greater torque is required, back the running tool out and check the threads for trash or debris.

   The tool should shoulder out on the top of the hanger. Mark a vertical line across the hanger/tool interface for reference. **These marks should always be checked just before running the assembly through the rotary table.**

3. Check all relevant measurements on the 20" casing string, ensuring that the last collar is clear of the top cut-off 30" conductor pipe.

4. Measure in the hole, being careful not to rotate the running string. Verify the hook is unlocked. Land the assembly in the 30" mudline landing ring.

5. Circulate and cement as required. **The following steps demonstrate the methods considered during the design of the mudline equipment to wash out the 30" x 20" annulus. This will assist in removal of the running string during abandonment. Actual rig conditions should dictate the steps used.** If washout ports are not going to be opened, then apply 1,500 - 2,500 ft-lbs (2 034 - 3 390 Nm) of left hand torque to running string.

6. Disconnect the cementing line at the rig floor. Leave the cementing head connected to the running string.

7. Adjust the hook load to support the weight of the running string. Attempt to neutralize the loads on the tool to hanger threads.

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MLC MUDLINE SUSPENSION

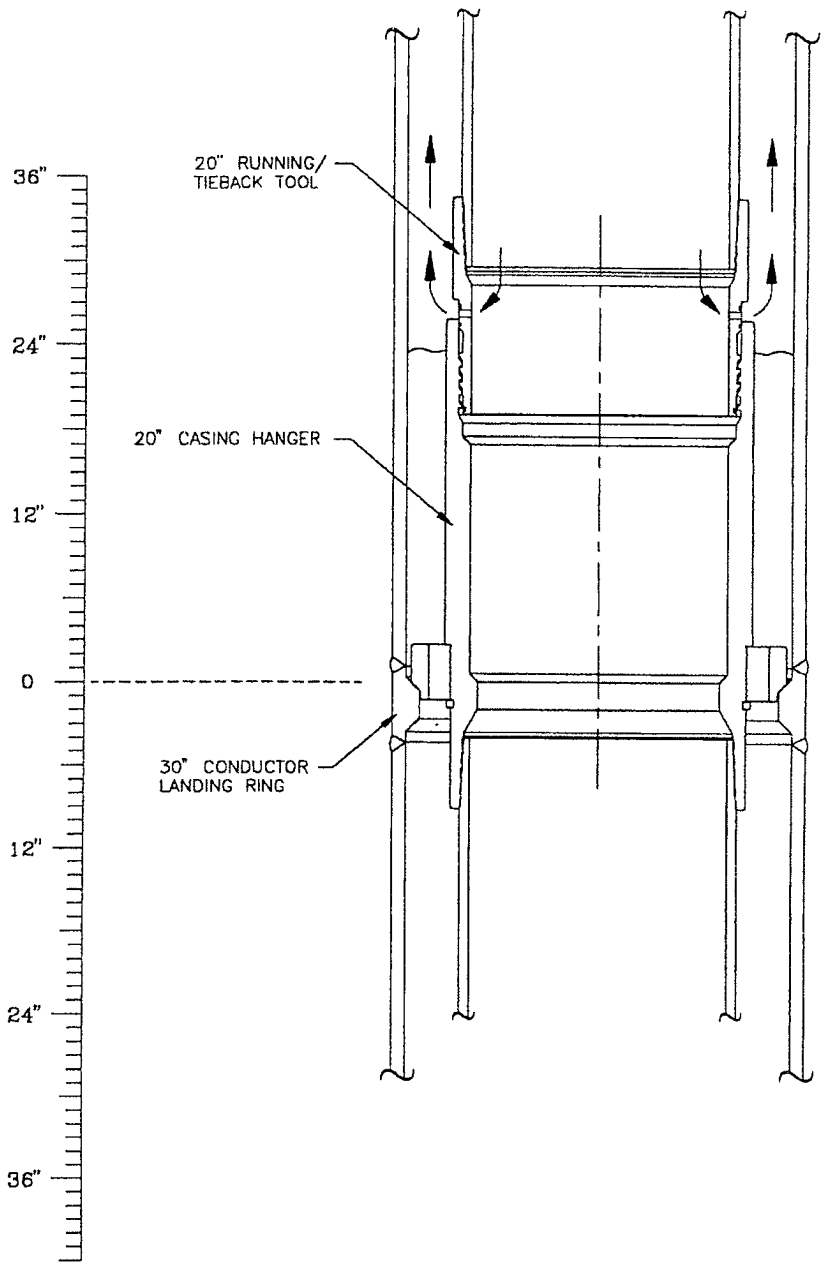

ABB Vetco Gray	FILE: III-F	ACAD
MLC MUDLINE SUSPENSION SYSTEM 20" TOOL WASHPORTS OPEN W/CIRCULATION		HP-4193-3

8. Using a straight edge (5' stick), place a horizontal mark on the running string at the rotary table.

9. Rotate the running string to the right approximately 1-1/2 turns. Measurements from the straight edge at the rotary table to the mark on the running string should indicate that the running string has moved up approximately 1-1/2" to expose the wash ports in the running tool.

10. Reconnect the cementing line at the rig floor and circulate, to displace any cement in the annulus, until clear returns are observed. It is suggested that 5 to 10 barrels of flushing fluid, with cement retarder, be spotted at the mudline hanger, **after** washing, as an aid in preventing any remaining cement from curing.

11. Disconnect the cementing line.

12. Rotate the running string to the left while measuring the downward movement of the mark on the running string until the 1-1/2 turns have been achieved and torque build up of 1,500 - 2,500 ft-lbs (2 034 - 3 390 Nm) above rotation torque is noted. The string should move downward at the rate of 1" for every full round made to a total of 1-1/2". Any rate of travel less than this, or an upward movement, will indicate that one or more of the casing connections in the landing string are backing out.

NOTE: *Since the seal at the mudline hanger is being achieved with an elastomer, applying torque beyond the effort required to achieve the necessary number of turns is not required. Assure the maximum torque applied does not exceed the make-up torque of the running string couplings.*

13. If there is any indication of casing backing out, it is suggested that the running string be rotated a full 4 to 5 turns to the right and be pulled out of the hole to check all casing connections, examine the running tool threads, inspect and replace all elastomer seals if required. Run back and make up the running tool to the hanger with approximately 3 to 4-1/2 turns of left hand rotation. Reconnect the cementing line and pressure test the casing and the seals on the running tool.

    Make certain that test pressures do not exceed the pressure rating of the casing or the hanger and running/tieback tool.

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MLC MUDLINE SUSPENSION

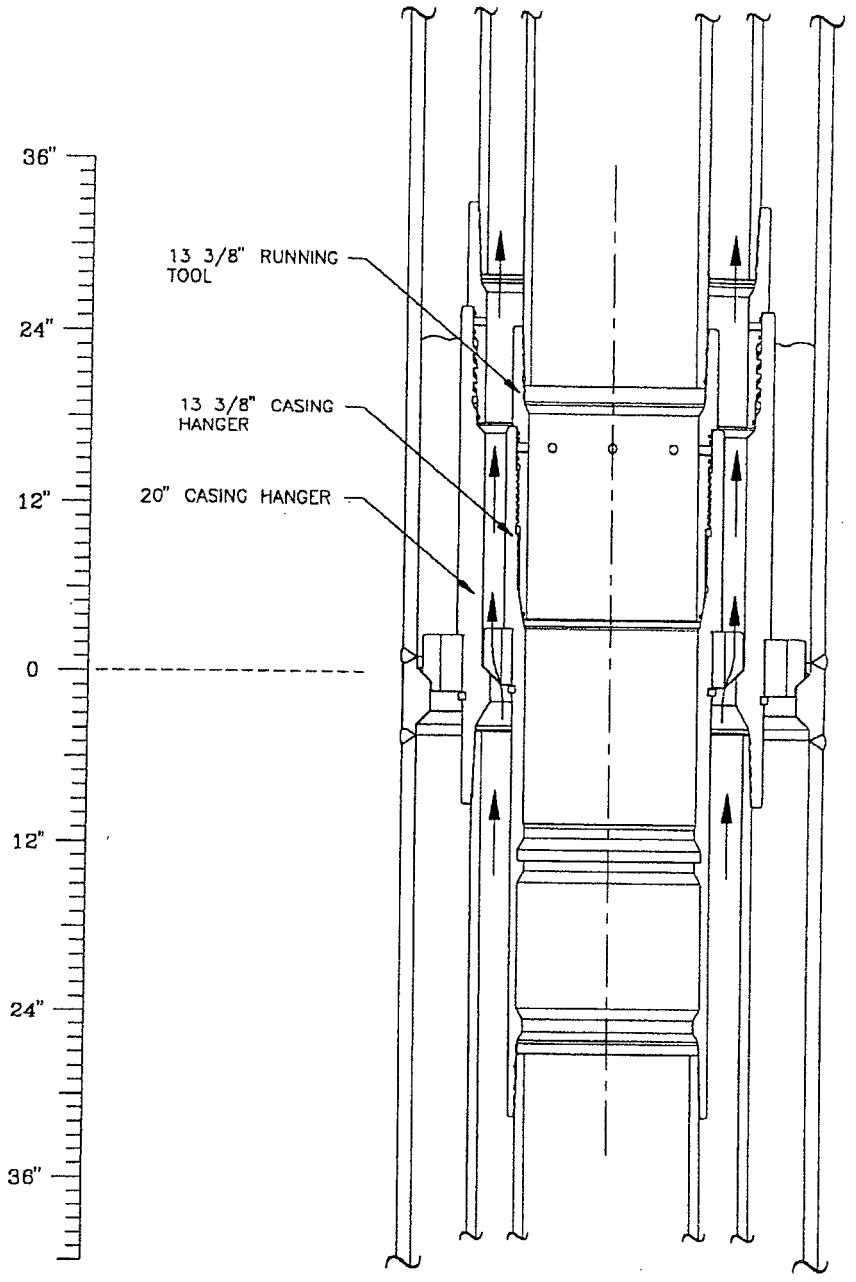

ABB Vetco Gray	FILE: III-F	ACAD
MLC MUDLINE SUSPENSION SYSTEM-13-3/8" CASING HANGER LANDED W/CEMENT RETURNS		HP-4193-4

14. As an alternate, some operators choose to run small diameter tubing down the larger annulus to the mudline hanger, for flushing out the annulus, instead of the procedure described above. It is suggested that 5 to 10 barrels of flushing fluid with cement retardant be spotted at the mudline hanger **after** washing, as an aid in preventing cement expansion from cementing the running tool to the mudline hanger.

NOTE: *Providing tension in the riser string above the mudline hanger/running tool interface will aid in preventing right hand rotation at this interface due to drill pipe rotation/drag in the casing bore during drilling.*

Running 13-3/8" Mudline Casing Hanger

When pulling out of the hole prior to running casing, pull the bit to the casing hanger suspension point, pick up the kelly, and wash (jet) to assure that the landing (suspension) profile in the 20" mudline casing hanger is flushed out before running 13-3/8" casing.

15. Pick up the joint with the 13-3/8" hanger and running tool made up and make up to joint suspended at the rotary. Lower the string until the hanger nears the rotary and suspend string in slips. Back out the running tool and re-inspect seals and threads. Apply Jet Lube AP-5 or equivalent to the left hand threads of both the hanger and the running tool. Do not use pipe dope or any other lubricant that contains metal particles.

16. Line up the thread starts and lower the running tool into the mudline hanger. Rotate the running tool to the left approximately 7 to 8 turns. When making up a standard running tool (with elastomer seals) to the casing hanger, torque should not exceed 1,500 ft-lbs (2034 Nm). If the stand-off between the shoulder running tool and the top of the casing hanger exceeds .100", with maximum torque applied, the running tool should be removed and the threads inspected for damage or debris. The standoff should also be checked with the elastomer seals removed.

17. **After the tool has been made up into the hanger, make a vertical reference mark across the running tool and casing hanger. This mark should always be checked just before running the assembly through the rotary table.**

18. Measure in the hole, being careful not to rotate the running string. Assure the hook is unlocked.

19. Check all relevant measurements on the 13-3/8" casing string, ensuring that the last collar is clear of the surface casing spool.

ABB VETCO GRAY
MLC MUDLINE SUSPENSION

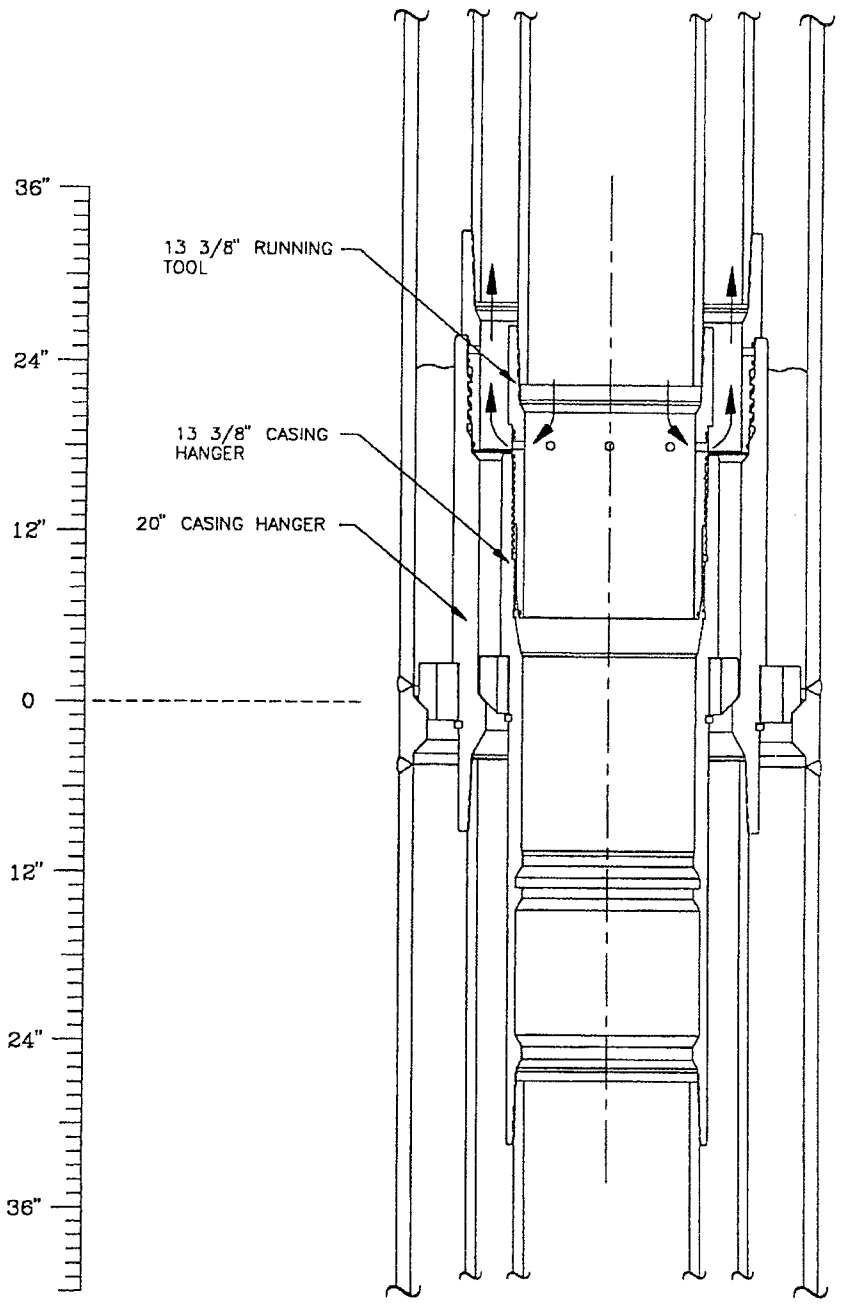

ABB Vetco Gray	FILE: III-F	ACAD
MLC MUDLINE SUSPENSION SYSTEM-13-3/8" TOOL WASHPORTS OPEN W/CIRCULATION		HP-4193-5

20. Pay close attention to the running string measurements and the weight indicator while slowly lowering the string the last 5 to 10 feet. Lowering rate must not exceed a maximum of 12 feet per minute, while the 13-3/8" mudline hanger enters the 20" hanger.

    The 13-3/8" hanger support mechanism is a fluted load ring. A loss of string weight will occur as the load ring lands on the 45^{o} load shoulder in the 20" casing hanger.

21. Circulate and cement as required.

22. Casing reciprocation can be done before or after the hanger is landed.

23. Circulate and cement as required. Wash out the 20" x 13-3/8" annulus above the running tool so the cement returns will not prevent the removal of the string during abandonment. **The following steps demonstrate the methods considered during the design of the mudline equipment to wash out the 20" x 13-3/8" annulus. This will assist in the removal of the running string during abandonment. Actual rig conditions should dictate the steps used.** If washout ports are not going to be opened, then apply 1,500 - 2,500 ft-lbs (2 034 - 3 390 Nm) of left hand torque to the running string.

24. Disconnect the cementing line at the rig floor, leaving the cementing head connected to the running string.

25. Adjust the hook load to support the weight of the running string. Attempt to neutralize the loads on the tool to hanger threads.

26. Using a straight edge (5' stick), make a horizontal mark on the running string at the rotary table.

27. Rotate the running string to the right approximately 3-1/2 turns. Measurement from the straight edge at the rotary table to the mark on the running string should indicate that the running string has moved up approximately 1-3/4" to expose the washout ports in the 13-3/8" running tool.

28. Reconnect the cementing line at the rig floor and circulate, displacing any cement in the annulus, until clear returns are observed. It is suggested that 5 to 10 barrels of flushing fluid with cement retardant be spotted at the mudline hanger **after** washing as an aid in preventing any remaining cement from curing.

29. Disconnect the cementing line.

30. Rotate the running string to the left while measuring the downward movement of the mark on the running string until the 3-1/2 turns have been achieved and a torque build up of 1,500 - 2,500 ft-lbs (2 034 - 3 390 Nm) above the rotation torque is noted. The string should move downward at the rate of 1/2" for every full round made to a total of 1-3/4". Any rate of travel less than this, or an upward movement, indicates one or more of the casing connections in the landing string is backing out.

NOTE: *Since the seal at the mudline hanger is being achieved with an elastomer, applying torque beyond the effort required to achieve the necessary number of turns, is not required. Assure the maximum torque applied does not exceed the make-up torque of the running string couplings*

31. If there is any indication of casing backing out, the running string should be rotated a full 8 to 9 turns to the right and pulled out of the hole to check all casing connections, examine the running tool threads, and inspect and replace all elastomer seals if required. Run back and make up the running tool to the hanger with approximately 7-1/2 to 9 turns of lefthand rotation. Reconnect the cementing line and pressure test the casing and the seals on the mudline hanger and running tools.

    Make certain that test pressures do not exceed the pressure rating of the casing or the hanger and running/tieback tool.

NOTE: Providing tension in the riser string above the mudline hanger/running tool interface will aid in preventing right hand rotation at this interface due to drillpipe rotation/drag in the casing bore during drilling.

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MLC MUDLINE SUSPENSION

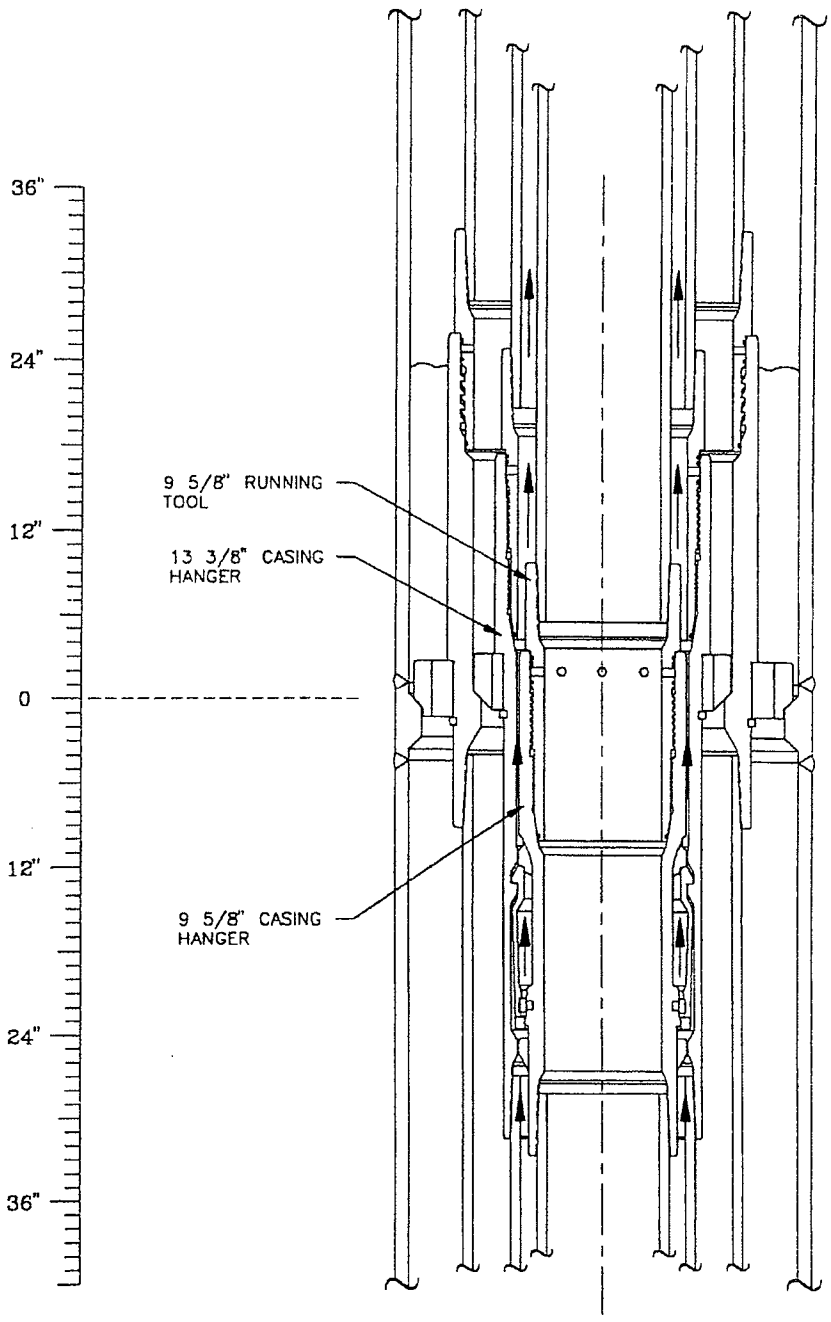

ABB Vetco Gray	FILE: III-F	ACAD
MLC MUDLINE SUSPENSION SYSTEM-9-5/8" CASING HANGER LANDED W/CEMENT RETURNS		HP-4193-6

Running 9-5/8" Mudline Casing Hanger

When pulling out of the hole prior to running casing, pull the bit to the casing hanger suspension point, pick up the kelly, and wash (jet) to assure that the landing (suspension) profile in the 13-3/8" mudline casing hanger is flushed out before running 9-5/8" casing.

32. Pick up the joint with the 9-5/8" hanger and running tool made up and make up to the joint suspended at the rotary. Lower the string until the hanger nears the rotary and suspend the string in slips. Back out the running tool and re-inspect seals and threads. Apply Jet Lube AP-5 or equivalent to the left hand threads of both the hanger and the running tools. Do not use pipe dope or any other lubricant that contains metal particles.

33. Line up the thread starts and lower the running tool into the casing hanger. Rotate the running tool to the left approximately 7 to 8 turns until achieving 1,500 - 2,500 ft-lbs (2 034 - 3 390 Nm) of torque. If the stand-off exceeds .100", with maximum torque applied,the running tool should be removed and the threads inspected for damage or debris. The standoff should also be checked with the elastomer seals removed.

    After the tool has been made up into the hanger, make a vertical reference mark across the running tool and casing hanger. This mark should always be checked just before running the assembly through the rotary table.

34. Assure the flowby slots on the top of the collet are aligned with the slots on the hanger body hang-off shoulder. Confirm that the anti-rotation pins are properly installed in the hanger body through the wide slots in the collet.

35. Measure the hole being careful not to rotate the running string. Assure the hook is unlocked.

36. Check all relevant measurements on the 9-5/8" casing string, ensuring that the last collar is clear of the surface casing spool.

37. Pay close attention to the running string measurements and the weight indicator while slowly lowering the string the last 5 to 10 feet. Lowering rate must not exceed a maximum of 12 feet per minute, while the 9-5/8" mudline hanger enters the 13-3/8" hanger. The hanger collet mechanism is activated with weight. A loss of string weight will occur as the 9-5/8" hanger collet ring engages the matching profile in the bore of the 13-3/8" hanger.

38. Casing reciprocation can be done before or after the hanger is landed. **Do not reciprocate the casing when the 9-5/8" casing hanger is positioned such that it would be reciprocated through the BOP.**

ABB VETCO GRAY
MLC MUDLINE SUSPENSION

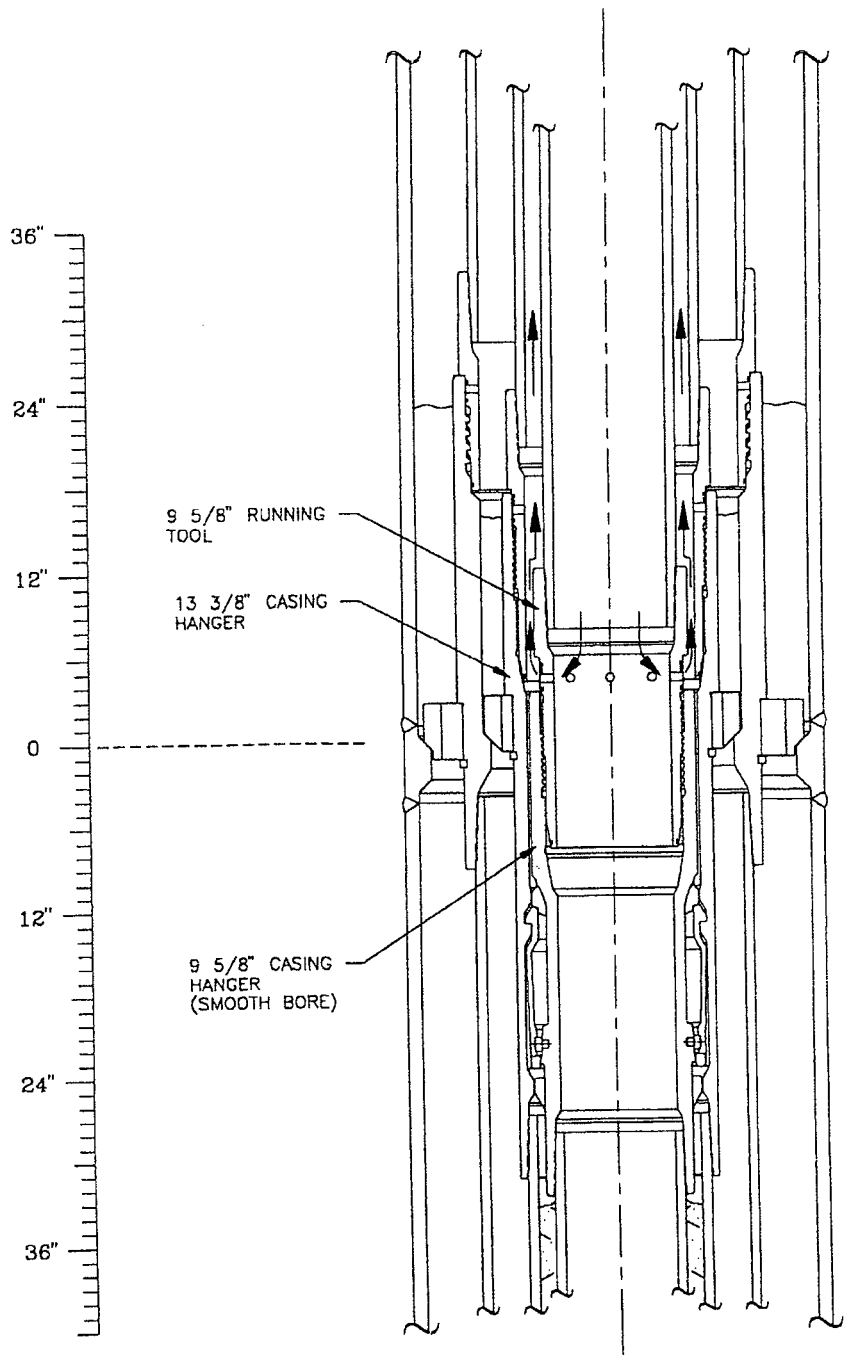

ABB Vetco Gray | FILE: III-F | ACAD

MLC MUDLINE SUSPENSION SYSTEM-9-5/8" TOOL WASHPORTS OPEN W/CIRCULATION | HP-4193-7

39. Circulate and cement as required.

40. Wash out the 13-3/8" x 9-5/8" annulus above the running tool so the cement returns will not prevent the removal of the string during abandonment. **The following steps demonstrate the methods considered during the design of the mudline equipment to wash out the 20" x 13-3/8" annulus. This will assist in the removal of the running string during abandonment. Actual rig conditions should dictate the steps used.** If washout ports are not going to be opened, then apply 1,500 - 2,500 ft-lbs (2 034 - 3 390 Nm) of left hand torque to the running string.

41. Disconnect the cementing line at the rig floor, leaving the cementing head connected to the running string.

42. Adjust the hook load to support the weight of the running string. Attempt to neutralize the loads on the tool to hanger threads.

43. Using a straight edge (5' stick), make a horizontal mark on the running string at the rotary table.

44. Rotate the running string to the right approximately 3-1/2 turns. Measurement from the straight edge at the rotary table to the mark on the running string should indicate that the running string has moved up approximately 1-3/4" to expose the washout ports in the 9-5/8" running tool.

45. Reconnect the cementing line at the rig floor and circulate, displacing any cement in the annulus, until clear returns are observed. It is suggested that 5 to 10 barrels of flushing fluid with cement retardant be spotted at the mudline hanger **after** washing as an aid in preventing any remaining cement from curing.

46. Disconnect the cementing line.

47. Rotate the running string to the left while measuring the downward movement of the mark on the running string until the 3-1/2 turns have been achieved and a torque build up of 1,500 - 2,500 ft-lbs (2 034 - 3 390 Nm) above the rotation torque is noted. The string should move downward at the rate of 1/2" for every full round made to a total of 1-3/4". Any rate of travel less than this, or an upward movement, indicates one or more of the casing connections in the landing string is backing out.

NOTE: *Since the seal at the mudline hanger is being achieved with an elastomer, applying torque beyond the effort required to achieve the necessary number of turns, is not required. Assure the maximum torque applied does not exceed the make-up torque of the running string couplings*

48. If there is any indication of casing backing out, the running string should be rotated a full 8 to 9 turns to the right and pulled out of the hole to check all casing connections, examine the running tool threads, and inspect and replace all elastomer seals, if required. Run back and make up the running tool to the hanger with approximately 7-1/2 to 9 turns of lefthand rotation. Reconnect the cementing line and pressure test the casing and the seals on the mudline hanger and running tools.

    Make certain that test pressures do not exceed the pressure rating of the casing or the hanger and running/tieback tool.

NOTE: *Providing tension in the riser string above the mudline hanger/running tool interface will aid in preventing right hand rotation at this interface due to drillpipe rotation/drag in the casing bore during drilling.*

NOTE: *The following steps outline the methods used to run the 7" mudline casing hanger and will require the previous casing hanger (9-5/8") to have the appropriate internal collet landing prfile. The 9-5/8" mudline casing hanger shown in the previous sequence drawings show the " smooth bore." The following sequence drawings will reflect the correct 9-5/8" mudline casing hanger for use with the 7" mudline casing hanger.*

Running 7" Mudline Casing Hanger (Optional)

When pulling out of the hole prior to running casing, pull the bit to the mudline, pick up the kelly, and wash (jet) at the casing hanger suspension point to assure that the landing (suspension) profile in the 9-5/8" mudline casing hanger is flushed out before running 7" casing.

49. Before making up the running tool to the mudline hanger, reconfirm that all elastomer seals are intact and undamaged. Apply Jet Lube AP-5 or equivalent type grease to the (lefthand) threads of the casing hanger and running tool. **Do not use pipe dope or any other lubricant that contains metal particles.**

50. With the 7" mudline hanger made up to the 7" casing and held above the slips, pick up the 7" running/tieback tool, line up the starting threads and lower the running/tieback tool into the casing hanger. Rotate the running/tieback tool to the left approximately 7 turns achieving 2,500-4,000 ft-lbs (3 390 - 5 424 Nm) of torque. If the standoff exceeds .100", with maximum torque applied, the running/tieback tool should be removed and the threads inspected for damage or debris. The standoff should also be checked with the elastomer seals removed.

    After the tool has been made up into the hanger, make a vertical reference mark across the running tool and casing hanger. This mark should always be checked just before running the assembly through the rotary table.

51. Assure the flowby slots on the top of the collet are aligned with the slots on the hanger body hangoff shoulder. Confirm that the anti-rotation pins are properly installed in the hanger body through the wide slots in the collet.

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MLC MUDLINE SUSPENSION

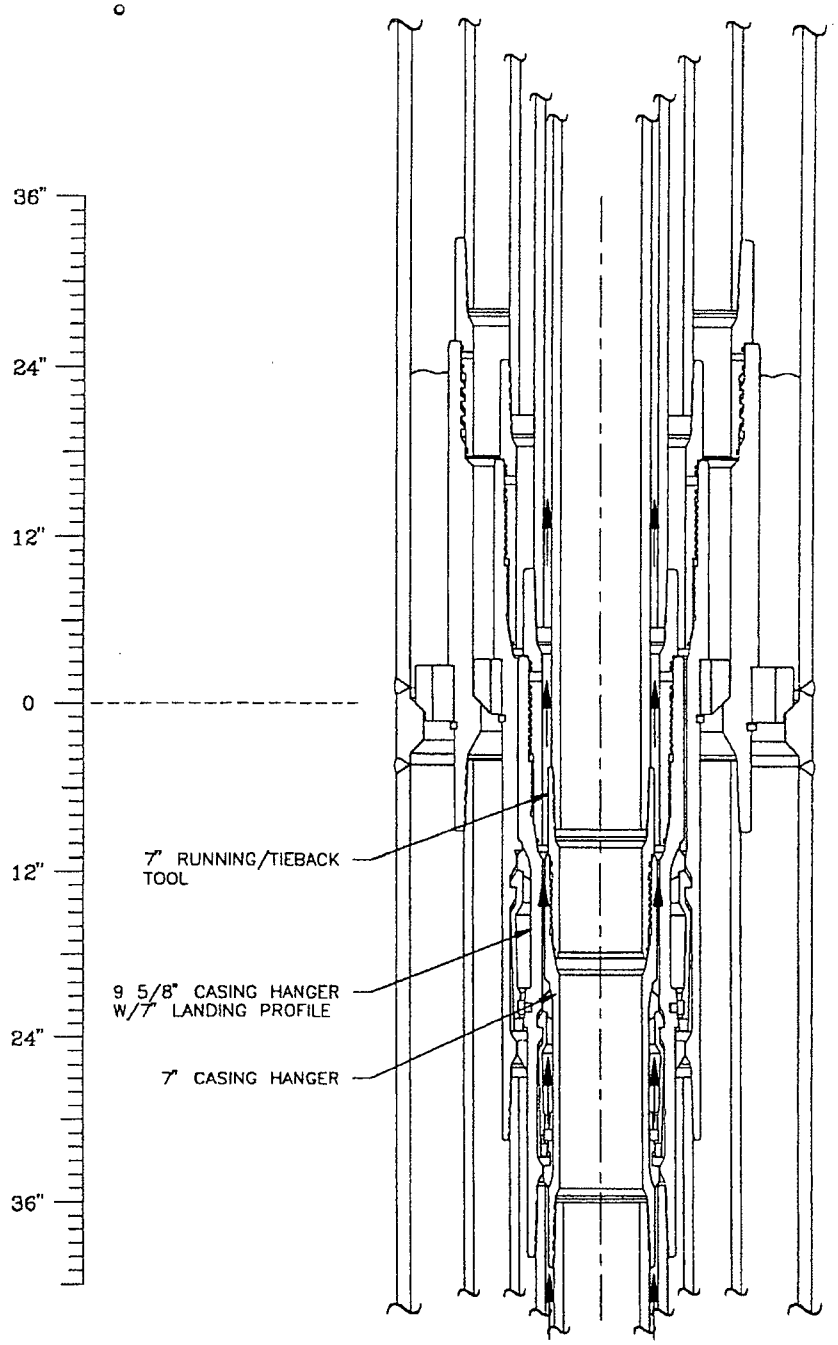

ABB Vetco Gray	FILE: III-F	ACAD
MLC MUDLINE SUSPENSION SYSTEM-7" CASING HANGER LANDED CEMENTING W/RETURNS		HP-4193-11

52. Measure in the hole being careful not to rotate the running string. Assure the hook is unlocked.

53. Check all relevant measurements on the 7" casing string, ensuring that the last collar is clear of the surface casing spool.

54. Pay close attention to the running string measurements and the weight indicator while slowly lowering the string the last 5 to 10 feet. Lowering rate must not exceed a maximum of 12 feet per minute, while the 7" mudline hanger enters the 9-5/8" hanger. The hanger collet mechanism is activated with weight. A loss of string weight will occur as the 7" hanger collet ring engages the matching profile in the bore of the 9-5/8" hanger.

55. Casing reciprocation can be done before or after the hanger is landed. **Do not reciprocate the casing when the 7" hanger is positioned such that it would be reciprocated through the BOP.**

56. Circulate and cement as required.

NOTE: *A two-pitch modified lefthand beveled square thread is utilized in the 7" casing hanger, for both running and tieback operations. Since a much longer string of 7" casing is typically run, a proper cementing procedure would not require that cement returns even approach the hanger area; hence, wash ports and washout procedures are not required.*

57. Pressure test the casing and the seals on the mudline hanger and running tools. **Make certain that test pressures do not exceed 80% of casing burst pressure or the hanger/tool rated pressure.**

Well Abandonment Procedures

Assuming that the well has been plugged and secured and that all surface equipment has been removed, it is suggested that recovery of the casing running strings and running tools start with the last casing string that was run. (This will be very helpful if corrosion caps are to be installed, as the next largest casing string will provide adequate guidance.)

Casing spears can be used to apply tension at the very top of each casing string, and remove the surface casing slip assemblies which support smaller casing strings inside the surface casing spools. Some torque can be applied through the casing spears and is often used for backing out mudline hanger running tools. If a running tool cannot be disconnected with recommended torque, a spear can be set in the running tool at the mudline for more accurate torque transmission to the running tools.

Recovery and Corrosion Cap Installation

1. To recover the running tool, unlock the hook on the traveling block. Hook up to the casing string to be recovered, overpull to achieve a neutral point at the running tool, and rotate the running string to the right (see chart). Recover the running string and running tool. Torque required to disconnect the running tools should be approximately as follows:

SIZE	TURNS	RUNNING TOOL BREAK OUT TORQUE RANGE Ft-Lbs	Nm
20"	4-5	1500 - 3500	2 034 - 4 745
13-3/8"	8-9	1500 - 3500	2 034- 4 745
9-5/8"	8-9	1500 - 3500	2 034- 4 745
7"	7-8	2500 - 5000	3 390 - 6 780

Inspect recovered string and running tool noting indications of debris which could interfer with corrosion cap make up.

2. Make up the corrosion cap running tool to a single or strand of drillpipe and set aside.

3. Thoroughly lubricate corrosion cap threads and elastomer seals. Place the corrosion cap on the floor. Pick up the running tool and carefully lower over the mandrel on top of the corrosion cap until the torque pins on the mandrel enter the J-slots in the running tool. Rotate the running tool to the right to lock onto the corrosion cap. **Do not use pipe dope or any other lubricant that contains metal particles.**

4. Pick up the corrosion cap/running tool assembly and run in the hole, being careful not to rotate the running string. Carefully land on the mudline hanger. With 90% of the running string weight supported on the hook, rotate the running string to the right slowly until the string jumps. This will occur when the lead thread on the corrosion cap indexes with the top thread on the mudline hanger. Then rotate to the left as noted in the chart below for the number of left hand turns and torque required for makeup. Slack off running string as corrosion cap makes up to the hanger. Corrosion cap make up should be accomplished with the torques listed in the chart below, however, several factors can affect the amount of torque required such as string weight on the corrosion cap, and/or condition of the threads.

SIZE	TURNS	CORROSION CAP MAKE UP TORQUE RANGE Ft-Lbs	Nm
20"	4-5	1500 - 2500	2 034- 3 390
13-3/8"	8-9	1500 - 2500	2 034- 3 390
9-5/8"	8-9	1500 - 2500	2 034 - 3 390
7"	7-8	1500 - 2500	2 034- 3 390

5. While maintaining left hand torque on the running string, pick up carefully until it is certain that the running tool is free, then recover the running string and tool. Repeat this until subsequent corrosion caps are installed.

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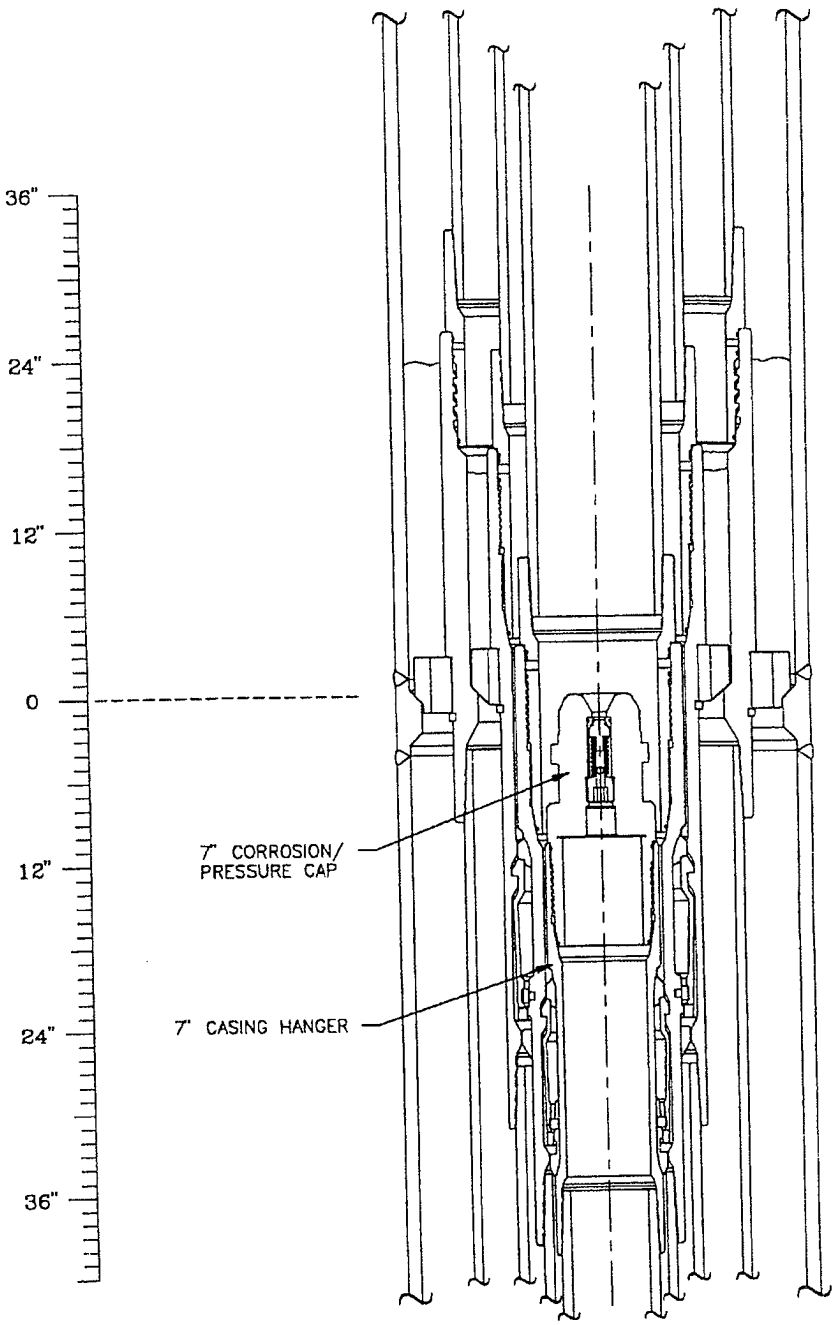
MLC MUDLINE SUSPENSION



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MLC MUDLINE SUSPENSION SYSTEM-7"
TOOL RETRIEVED CORROSION CAP INSTALLED | HP-4193-12

ABB VETCO GRAY
MLC MUDLINE SUSPENSION

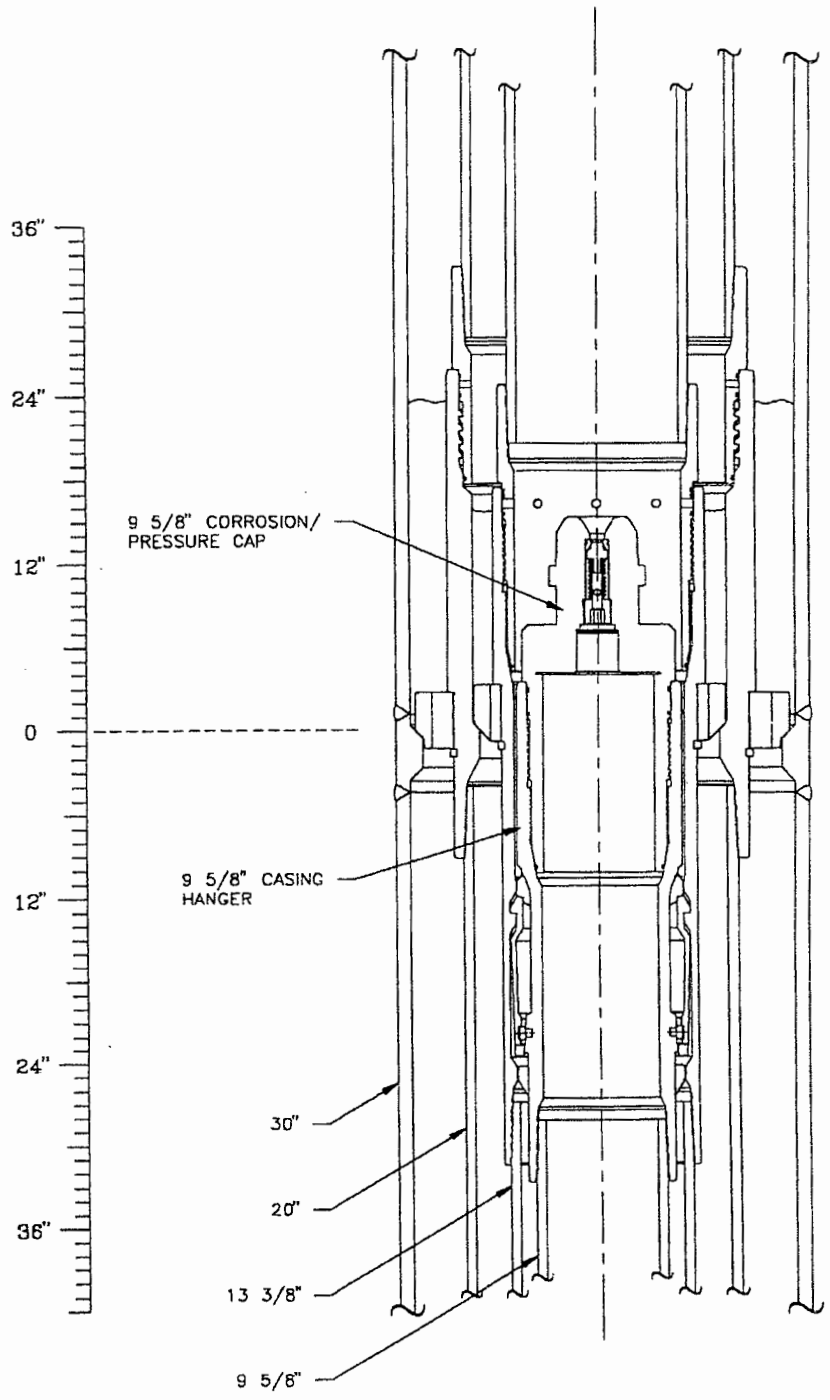


ABB Vetco Gray	FILE: III-F	ACAD
MLC MUDLINE SUSPENSION SYSTEM-9/5-8" TOOL RETRIEVED/CORROSION CAP INSTALLED		HP-4193-8

ABB VETCO GRAY
MLC MUDLINE SUSPENSION

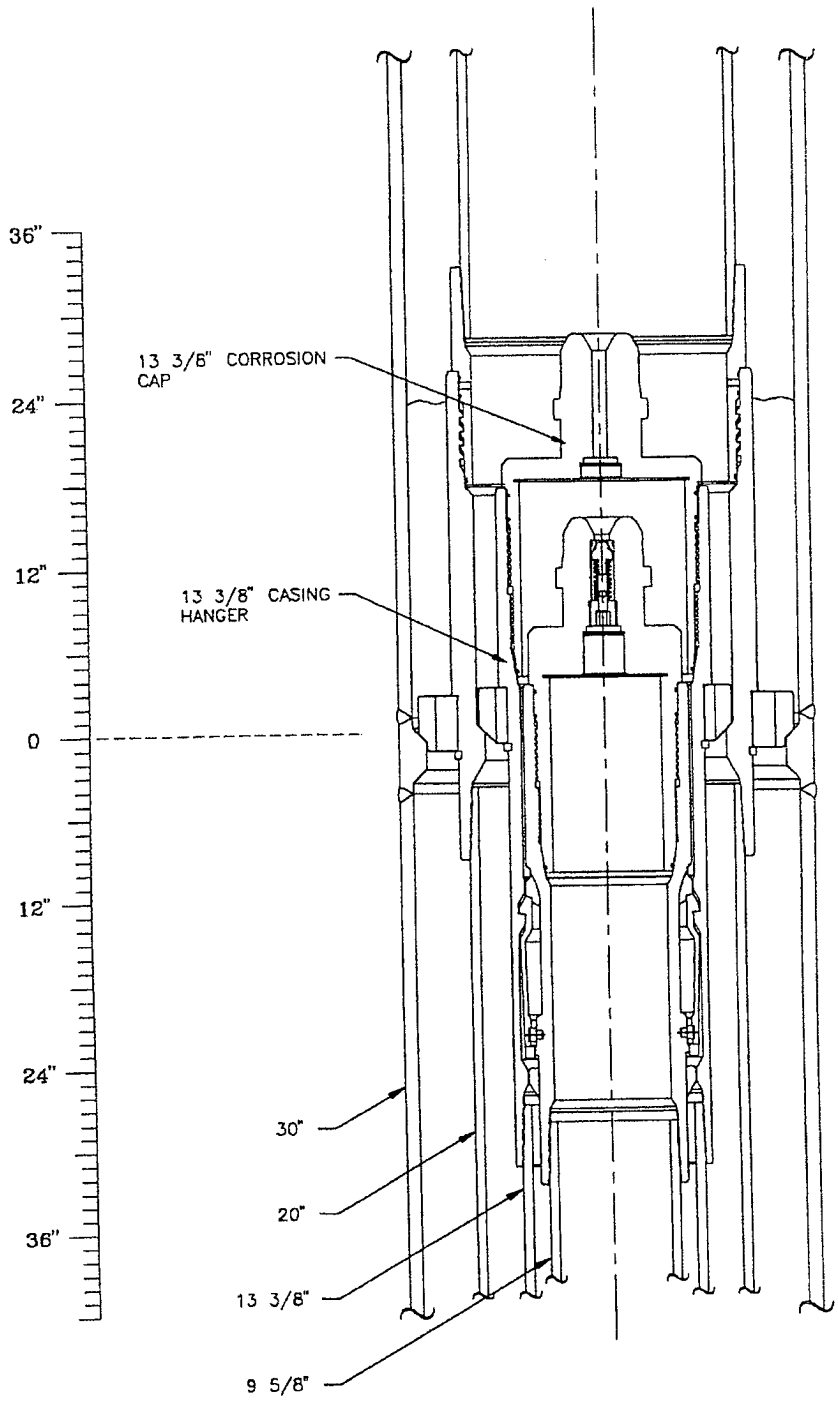
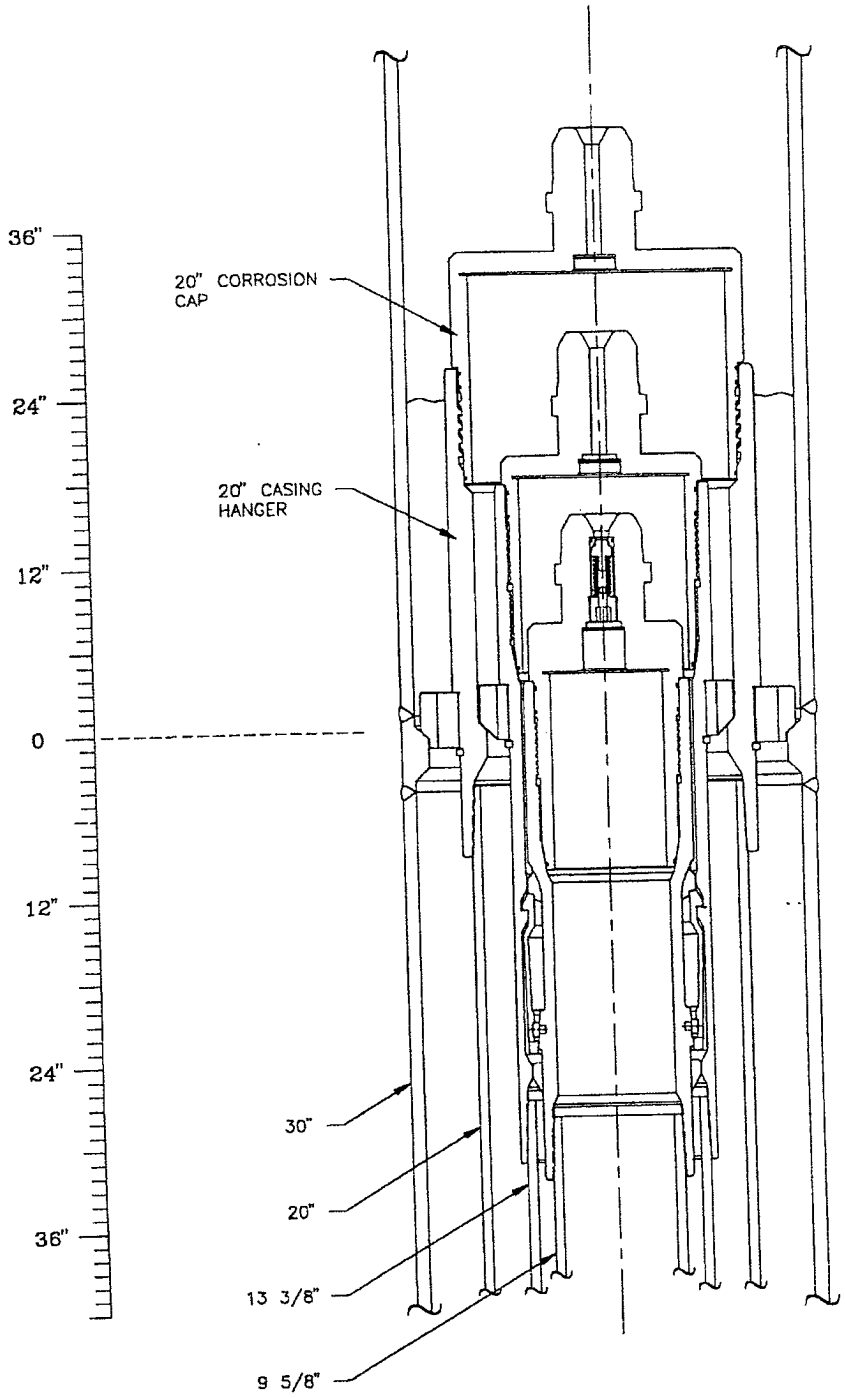


ABB Vetco Gray	FILE: III-F	ACAD
MLC MUDLINE SUSPENSION SYSTEM-13-3/8" TOOL RETRIEVED/CORROSION CAP INSTALLED		HP-4193-9

ABB VETCO GRAY
MLC MUDLINE SUSPENSION



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MLC MUDLINE SUSPENSION SYSTEM-20"
TOOL RETRIEVED/CORROSION CAP INSTALLED | HP-4193-10

ABB VETCO GRAY
MLC MUDLINE SUSPENSION

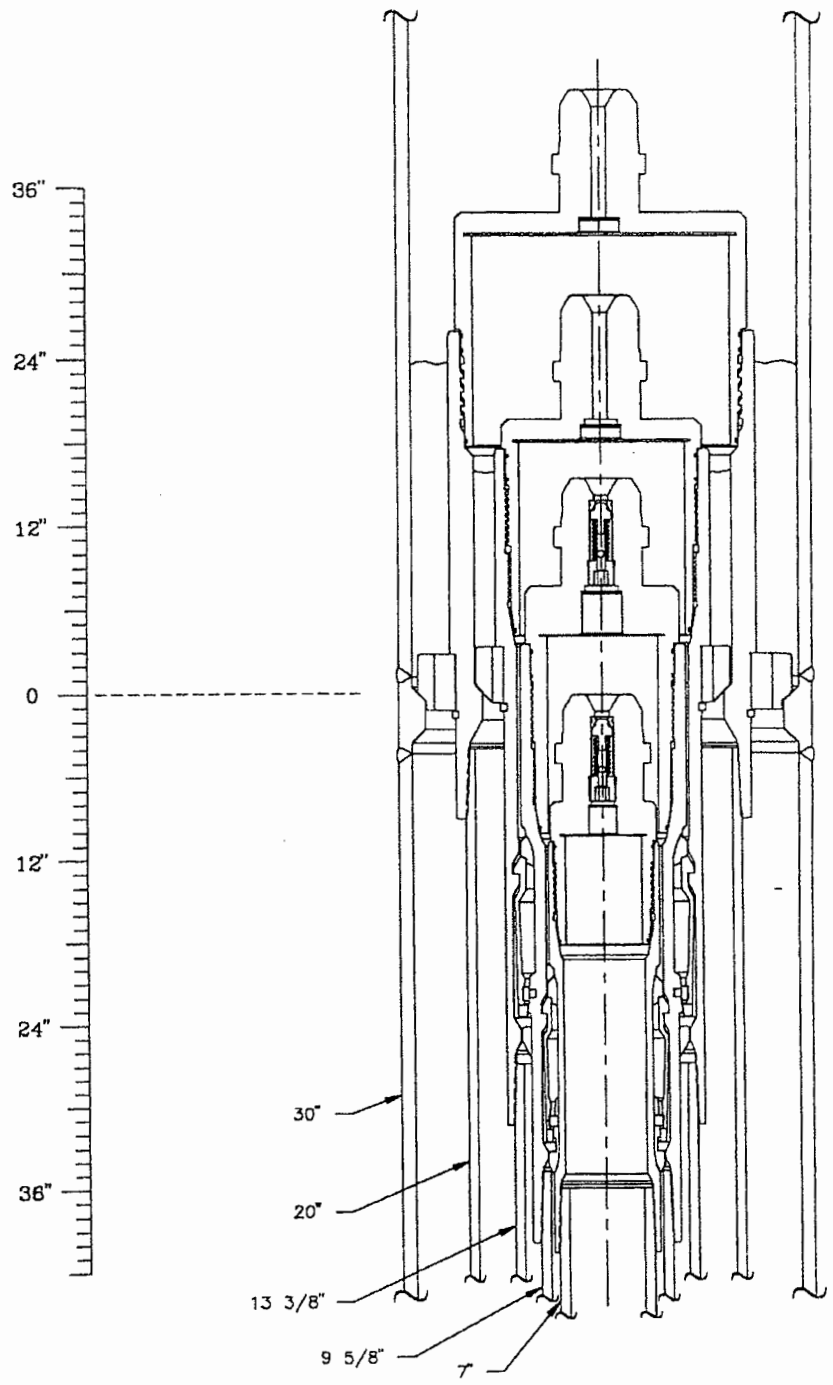

ABB Vetco Gray	FILE: III-F	ACAD
MLC MUDLINE SUSPENSION SYSTEM-30"x20"x 13-3/8"x9-5/8" TEMPORARY ABANDONMENT		HP-4193-13

RECOMMENDED SPARES

Refer to Suggested Spares List.

DISASSEMBLY/ASSEMBLY AND TEST PROCEDURE

None required.