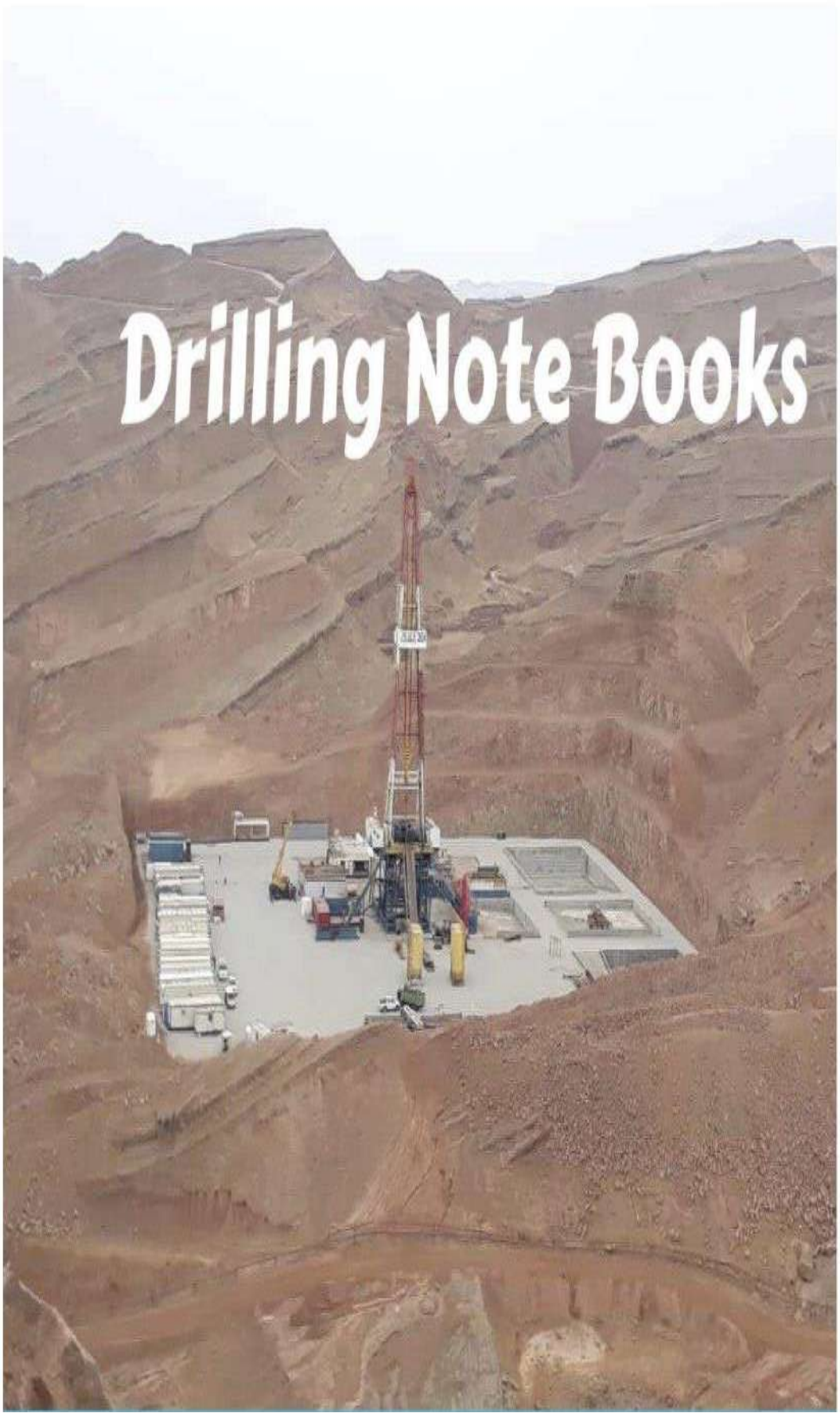

Drilling Note Books

Drilling Note Book

By tamer kotb

Contents

CHECK LIST

RIG FLOOR BY (DRILLER & AD)

1- Double check pipe tally.

2- Check the kill sheet that it is up date.

3-Check the Draw works & Check crown, O matic and block control is operation, Confirm the air pressure and cooling temperature alarm working, Function test proportional lever (joystick) 2-3 times to check the working pressure is changing quickly that means working caliper is working normal.

4- Check Drill String design sheet is up to date, at any time the Driller need to

Know how much he can pull, as reading on the weight indicator.

5- As possible, close and open (TDS) manual (IBOP) several time to avoid stuck, greasing wash pipe TDS to be done by morning shift.

6- Check the (IBOP) and safety valve they are good working condition.

7- DP, DC, slips, safety clamp DC they are good working condition.

8- Check remote chock and make function test, check the stroke counter and DP gauge is working and check hydraulic hand pump and make function test.

STATUS OF OPERATION BY DRILLER

1- Check drill string design sheet is up to date at any time the driller needs to know how much he can pull, as reading on the weight indicator.

2- Current hook load pick up, slack off, rotating weight.

3- Current depth (pipe tally- joints in / joints out / BHA description)

4- current operation

(Drilling, tripping, casing, cement, N/UP BOP, N/DOWN BOP, test BOP).

5- Planned operations (remark possible risks).

6- Operation during the tour include if there were a change in well conditions increase & decrease torque, drag, pump pressure, well control, stuck pipe, formation drilled, and problematic zones.

Mud system & cellar area by (AD) & (DM)

1- Check the ditch magnet, report steel finding.

2- Check mud pump, cooling water and the pressure hydraulic in the range of 750-950psi (cross head oil pump), by listen check that value, seat have not start wash out.

3- Check solid removing equipment, de-gasser and run it for 2 hours.

4- Check shakers that seals and frames under the screens are in good condition and made up.

5- Mud agitators, check for vibration and the Temperature from the gearbox and bearings.

6- Check the derrick & monkey board for loss and worn / damaged items, check general hose keeping in the rig floor, mixing area, mud tank, mud pump ….etc.

7- Check eye wash station, safety belts, and harnesses stored in good conditions.

8- Check the gap on the load sensor at the dead line anchor, (it should be 5/8").

Well control

1- Check the pressure on the BOP control unit and the remote unit on the drill floor.

(A) Accumulator to be 3000psi.

(B) Manifold pressure 1500psi.

(C) Annular preventer 950-1000psi.

2- Check chock manifold that is lineup for (hard or soft shut in as per as policy company).

3- Check the BOP and securing wires on the BOP check are on and tight.

4- Check the BOP control line for leaks.

5- Check control unit for the BOP, check if any of the 4 way valves and the regulators are leak, (remove the plug on each side of the tank to make check)

6- Check (MGS) and drain if there is any mud is in the tank and the U-tube.

Kick warning Signs

Major warning signs	POSITIVE KICK SIGNS
1- Increasing ROP. 2- Increasing torque/drag Increased quantity/size of cuttings. 3- Increasing temperature 4- Change Mud Properties. 5- Decreasing shale density. 6- Increased background gas Connection gas. **(If one of the above warning sign is seen flow check).**	1- Pit gain. 2- Return flow rate increase. 3- Well flow with pump off. 4- Decrease pumps pressure. 5- Increase (SPM) (If one of the above is seen POSITIVE KICK SIGNS shut-in the well immediately to reduce the influx no need flow check).

SHUT-IN PROCEDURE

SOFT SHUT-IN PROCEDURE Line up remote choke is open		**Hard SHUT-IN PROCEDURE Line up remote choke is close**	
Drilling	**trapping**	**Drilling**	**trapping**
1- Stop rotating the drill string, raise the drill string with pumps on until tool joint is above the drill floor. **2- Stop pumps.** **3- Open chokes line HCR valve.** **4- Close BOP.** **5- Close choke.** **6- Record pit gain & (SIDPP), (SICP).**	**1- Position drill string (tool joint is above the drill floor).** **2- Set the slips.** **3- Install full opening safety valve.** **4- Close safety valve.** **5- Open chokes line HCR valves.** **6- Close BOP.** **7- Close choke.** **8- Install inside blowout preventer (Non-Return Valve).** **9- Make-up TDS, open safety valve, and record pit gain & (SIDPP), (SICP).**	**1- Stop rotating the drill string, raise the drill string with pumps on until tool joint is above the drill floor.** **2- Stop pumps.** **3- Close BOP.** **4- Open chokes line HCR valve.** **5- Record pit gain & (SIDPP), (SICP).**	**1- Position drill string (tool joint is above the drill floor).** **2- Set the slips.** **3- Install full opening safety valve.** **4- Close safety valve.** **5- Close BOP.** **6- Open chokes line HCR valves.** **7- Install inside blowout preventer (Non-Return Valve).** **8- Make-up TDS, open safety valve, and record pit gain & (SIDPP), (SICP).**

Well Control Preparation		
Personnel	**Equipment**	**Wellbore**
1- Trained in well control and practice skills on rig by participating in well control drills. **2- Know kick causes and warning Signs.** **3- Monitor well for kick detection.** **4- Communicate with team members.** **5- Know responsibilities and station bill.** **6- Trips carefully in & out never force string to avoid swabbing or surge.** **6- Pump out if tight hole.** **7- Keep viscosity down to acceptable level.** **8- Back to bottom if any doubt in hole conditions.**	**1- BOP should be rated for Maximum anticipated surface pressure.** **2- Equipment should be pressure tested on regular Basis.** **3- Detection equipment should be maintained in good working order.**	**1- Hole must be kept full at all times with proper mud weight to ensure hydrostatic pressure control.** **2- Casing burst should be known and posted on rig floor.** **3- Formation integrity should be known and MAASP should be posted on rig floor.** **4- Formation pressure should be Monitored and mud weights adjusted accordingly.**

Killing method

Driller method

It has two cycles:

(A) First Circulation

(Removing Kick From Well)

1- Start circulating original mud (fluid) by gradually bringing the pump up to the desired kill rate while using the choke to maintain Constant casing pressure at the shut-in value.

2- Maintain SIDPP constant until influx is circulated out.

3- Observe well must be SIDPP = SICP if doesn't happen and still SICP greater than SIDPP repeat first circulation or using wait & weight method.

(B) Second circulation

1- Adjust the choke to Maintain (CP) constant (ICP) until kill mud pumped from surface to bit.

2- Adjust the choke maintain (DP) pressure constant (FCP) while killing fluid pumping from the bit to surface, Once the kill fluid reaches surface, the choke should have been Fully opened.

3- Shut down pump and check for flow.

4-Close choke and check pressures.

5- If no pressure is noted, open choke (bleeding any trapped pressure), open BOP.

Wait &weight method

It has only one cycle:

- The Wait and Weight method kills the kick faster and keeps wellbore and surface pressures lower than any other method, it reduce risk break down formation when open hole volume greater than drill string volume.

- Fluid weight is increased before circulation begins,

Hence the name Wait and Weight.

Calculations required for:

- Kill fluid density.

- Volume/strokes/time surface to bit/end of string.

- Pressure chart.

- Volume/strokes/time bit to surface.

- Total volume/strokes/time for complete circulation.

- Pressure limitations.

1- Start circulating (KMW) by gradually bring up the pumps to kill rate with using the choke to maintain (CP) constant at the shut-in volume, and hold pump rate constant circulating pressure should be equivalent to (ICP) to (FCP) follow chart as (KMW) pumped down the string from surface to bit.

2- Adjust the choke maintain DP constant FCP while killing fluid pumping from the bit to surface, Once the kill fluid reaches surface the choke should have been fully opened.

3- Shut down pump and check for flow.

4-Close choke and check pressures.

5- If no pressure is noted, open choke (bleeding any trapped pressure), open BOP.

Bull heading method

- Bull heading, or

Deadheading is often used as a method of killing wells in work over situations.

- Bull heading is only possible when there are no obstructions in the tubing and there can be injection in the formation without exceeding pressure restraints.

-Bull heading involves pumping back well fluid into the reservoir, displacing the tubing or casing with a good Amount of kill fluid.

Volume to be pumped = TBG + volume of area blow backer.

Must be known:

- Maximum anticipated surface pressure to avoid TBG& casing barest or collapse pressure.

- Formation fracture pressure may have to be exceeded due to low reservoir permeability.

1- Well is shut in and formation pressure is calculated. If bull heading down the tubing, maximum pressures should be calculated.

2- Prepare a rough pressure chart of volume pumped versus maximum pressures at surface. Friction and formation pressure must be overcome to achieve injection of the liquid in the tubing back into the formation, If pressures or pump rate is too high, damage to the formation may occur.

3- Once the pumped liquid reaches the formation, an increase in pump pressure may occur. This is due to a non-native fluid injected to the formation.

4- Once the calculated amount of fluid is pumped, shut down, observe pressures. If no pressure increase is observed, bleed off injection pressure and, again, observe.

Volumetric method

The volumetric method is a way of allowing controlled expansion of gas during migration

It doesn't kill the well but we used it when we can't working with normal circulation if there:

-problem in the drill string.

- Drill string off the bottom.

- Flair in the equipment.

1- We start with kept drill pipe pressure constant.

2-Chose the working pressure range for example 100 psi.

3- Allow SIDPP increase by (WP) 100psi.

4-Calculate the volume to bleed.

Pbbl = mud gradient Dividing annular capacity.

Volume to bleed = WP Dividing Pbbl.

5- Keep drill pipe pressure constant until the influx blow BOP then lubricate fluid into the well and bleed off the influx.

Notes bad practice:

If we kept CP constant when the influx migration to up CP will increase that lead to open choke and then decrease BHP and take another influx.

Bad practice during kill operation	
Driller method	**Wait &weight method**
When circulating a kick with first circulation kept casing pressure constant that lead to increase casing pressure while gas kick circulating from well, and then open choke to kept casing pressure constant resulting that decrease in bottom hole pressure and take second influx.	**- Holding (SIDPP) constant when pumped kill mud weight from surface to bit, (SIDPP) have to reduce from (ICP) to (FCP) as per as charts or the schedule the drill pipe pressure decrease gradually if we kept drill pipe pressure constant (ICP) you have to close more, and then increase in bottom hole pressure and maybe exceed (MAASP).** **- Forget Re-zero stroke counter after killing mud stand displace to drill string and resulting that the bottom hole pressure will be lower than required.**

Killing problems In case we're face problems during the kill well operation, shut in the well and assess the situation.			
ICP unknown	**Plug & washout Equipment**	**Lost circulation**	**Increase gas percentage**
When kill rate circulation pressure aren't available 1- Keep choke pressure as close as to the SICP as possible. 2- When the selected kill pump rate is reaching. 3- Read the drill pipe pressure and use it as the ICP.	The factors affected by a string washout: 1- The final circulation pressure (FCP). 2- The slow circulating rate pressure. 3- The bottom hole pressure (BHP). - During kill operation with W&W method (DP) suddenly drops 1- Shut in the well. 2- Prepare a new (DP) pressure schedule. (When the choke washout: DP and CP both decrease, despite closing the choke) - If the TDS high pressure fluid hose develops a leak: 1- Stop the pump while closing the choke. 2- Close the remotely operated TDS well control valve. 3- Change the TDS high-pressure fluid hose to a spare hose. - If choke is partially plugged (CP) it will increase and after short time (DP) it will increase affecting by (CP): 1- Shut in the well. 2- Change to another choke.	Lost circulation detected during a well control operation by: 1- Monitoring SICP & SIDPP against predicted value. 2- An unexpected requirement to close the choke to maintain the drill pipe pressure. 3- By monitoring the drilling fluid volume in the mud tanks against predicted values. If there is a complete loss of returns Fill the annulus with water at surface and record the added volume. If there are small mud losses Reduce the fluid pump speed, keeping BHP as close to formation pressure as possible. (If the (DP) pressure starts to increase and then doesn't respond to further choke adjustment in this case the annular has become packed-off)	If H2S is released during a well control incident: 1- Shut the well in. 2- Evacuate unnecessarily person. 3- Restore the liquid seal in MGS. 4- Continue to kill the well with a reduced circulation rate.

<table>
<tr><th colspan="4">Stuck pipe
THE CORRECT FIRST-ACTIONS TO FREE THE STRING</th></tr>
<tr><th colspan="2">PACK-OFF/BRIDGE</th><th>DIFFERENTIAL</th><th>WELLBORE GEOMETRY</th></tr>
<tr><td colspan="2">Once pack off stuck pipe happens, reduce the pump speed to avoid pressure buildup and then break down formation, leaves 200-400 psi trapped pressure then move up and down in the free area and never start jarring before circulation establishes.</td><td rowspan="2">1- Initially circulating at max allowable rate, increase circulation may erode filter cake to try minimizing the stuck area.
Differential force = over balance x area contact.
2- With max flow rate apply torque by 50% from makeup torque DP or any connection less than and down to stuck depth, release torque and pick up and repeat 2-3 times if not have any progress tray with holding 80% from makeup torque DP.
3- Stop pumps or reduce to avoid pump force during cooking jar and jar trip.
4- Jar DOWN with maximum jar-trip load. Hold torque, set down weight until the jar trips (Refer to Jar manual).
5- Maintain slow circulation and jar down +/-20 times.
6- If the string does not jar free, continue jarring procedure with maximum trip load while preparing a pipe releasing pill.</td><td rowspan="2">1- If stuck while moving up, apply torque and jar DOWN with maximum trip load.
2- If stuck while moving down, do not apply torque and jar Up with Maximum trip load.
(If apply torque with jarring up maybe happening twist off at the drill string from any weak post)
3- Stop or reduce circulation while cocking the jar and when jarring down.
4- Continue jarring until the string is free or an alternate decision is Made.
Jarring for several hours may be necessary.</td></tr>
<tr><td>STUCK while string is
<u>MOVING UP or STATIC</u>
To establish Circu:
<u>(DO NOT JAR UP)</u>
1- Apply low pump pressure (200-400psi).
Maintain pressure if Restricted circulation is possible.
2- APPLY TORQUE and Jar down with maximum set down Weight.
Allow sufficient time for jar to trip (refer to jar manual)</td><td>STUCK while string is
<u>MOVING DOWN or STATIC</u>
To establish Circu:
<u>(DO NOT DOWN UP)</u>
1- Apply low pump pressure (200-400psi).
Maintain pressure if Restricted circulation is possible.
DO NOT APPLY TOROUE
2- Jar up by applying maximum over pull to jar.
Allow sufficient time for jar to trip (refer to jar manual)</td></tr>
<tr><td colspan="4">With the string becomes free</td></tr>
<tr><td colspan="2">1- Slowly attempt to reestablish circulation.
2- Increase pumps speed to maximum rate.
3- Work string and circulate the hole clean.</td><td>1- Rotate and work string.
2- Circulate at maximum rate
3-Check mud specifications.</td><td>1- Increase circulation to max Rate, rotate and work string.
2- Ream/back-ream the hole section.</td></tr>
</table>

PACK-OFF	BRIDGE	DIFFERENTIAL	WELLBORE GEOMETRY
Small pieces of formation cement or junk setting around the drill string, no circulation and string movement.	Medium to large pieces of formation setting around the drill string allowing restricted circulation with no string movement.	Cause: 1- Permeable formation it allowing pore fluid to flow through the rocks (sand stone, limestone, carbonate). 2- Over balance. 3-Filter cake thickness. 4- Pipe movement. Always Occurrence: After connection, after survey, opposite permeable formation It allows full circulation but doesn't allow rotation and pipe movement.	Sharp changes in hole angle direction(dogleg, under gauge hole diameter, mobile formation, stiff assembly, key set), Allowing circulation, allowing progress to drilling, but not allowing pull string or passing string with under gauge hole diameter

Stuck pipe preventions good practices

1- Monitor the shakers for formation cuttings returns if found shale, create high mud weight to control it
2- While drilling. HIGH ROP = HIGH VOLUME OF CUTTINGS. If this is not happening, then STOP Circulate the hole clean before continue drilling.
3- If cuttings are not coming to surface as corresponding to ROP, they are accumulating in the well and will most likely cause problems.
4- Don't drill faster than you can effectively clean the well.
5- Before making a new connection creating sufficient wash-up and ream down to cleaning cutting around Bit and BHA.
6- Ensure that (MED) is ready to take the survey, and must be discussed with (MED) and (DD) what is the stationary times and minimize it at the cross-depleted zone and inform the driller if the survey takes more than this time work the drill string to ensure it free and then try to take the survey again.
7- Monitor torque and drag all the time.
8- Pick up, slack off and rotating hook loads should be monitored during drilling and before and after circulating bottoms up compared against the Theoretical values.
8- Maintain good mud perimeter and use reinforcement materials or bridge materials at the high permeable formation.
9- Circulate the hole and rotate the string until the shakers are clean, prior to tripping out of the hole.
10- Circulate a minimum of 1.5 bottoms up for vertical wells, and 2 to 3 bottoms up for deviated wells.
11- Use adequate sweeps, rotate/reciprocate the pipe one full stand during circulation of the hole prior to pulling out.

HOLE SIZE	MAX GPM	MIN GPM	BEST RPM	MIN RPM
17½"	900 – 1200	800 gpm, with ROP at 20 m/hr (65' / hr)	120 – 180	120
12¼"	800 – 1100	650-700 gpm, with ROP at 10-15m/hr (30-50'/ hr) 800 gpm, with ROP at 20-30 m/hr (65-100' / hr)	150 – 180	120
9⅞"	700 – 900	500 gpm, with ROP at 10-20 m/hr (33-65' / hr)	120 – 150	100
8½"	450 – 600	350-400 gpm, with ROP at 10-20 m/hr (33-65' / hr)	70 – 100	60

Minimum recommended bottoms ups for various hole types

Hole Size	Inclination	Circulation
17 ½" to 12 ¼"	> 30 deg	At least 3-4 btm-up circulations at optimum parameters.
17 ½" to 12 ¼"	< 30 deg	At least 2 btm-up circulations at optimum parameters.
8 ½" to 6"	> 30 deg	At least 2 btm-up circulations at optimum parameters.
8 ½" to 6"	< 30 deg	At least 1.5 btm-up circulations at optimum parameters

Drilling jar

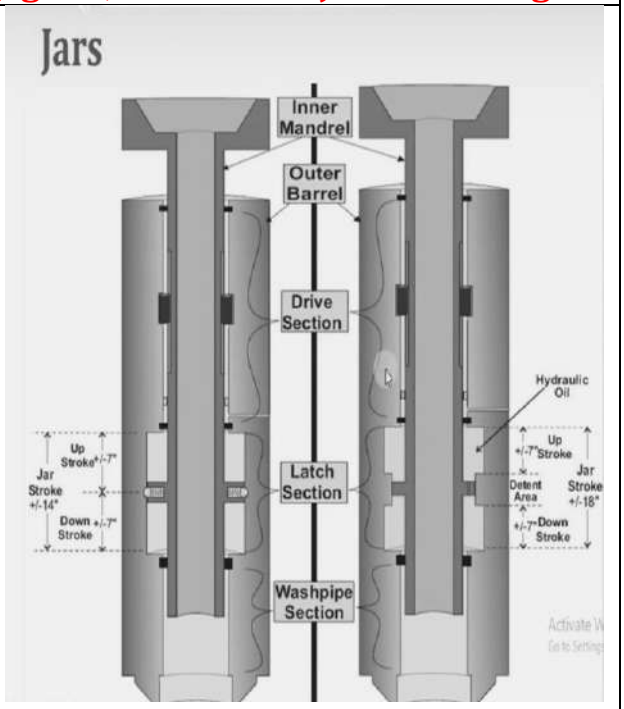
To cook a drilling jar soundly good, must know jar consisting of

Drilling jar consisting of:

1- Outer cylinder.
2- Inner mandrill.
3- Drive section.
4- Latch setting.
5- Wash pipe section.

Total jar stroke 18" (7" upward + 7" downward + 4" detent area).

All types of jars operate on the principle that energy can be built up by stretching the stocked string with the yield limit of the steel and suddenly releasing the energy through a tripping mechanism in the tools.



Cocking the jar

1- Inner mandrill moving down applies sufficient weight to make engage to latch setting.
2- Applying sufficient over pull or slack off weight to jar tripping.
3- Wait Sufficient time to jar trip load, the time delay is provided by hydraulic fluid being forced through small port or series of jets(some jars took short cycle 30-60sec, some took long cycle 2-8 minutes)

Before running the drilling jar into the well must be mentioned how much weight we need to engage the latch setting to calculate weight indicator load from the jar certificate of conformity.

Jarring recommendations

1- Avoid running the jar close to the neutral point.

2- Check derrick and equipment for losses bolts, clamps, (drop object survey)

3- Check top drive components.

4- Prior to jarring mark the string at the rotary table.

5- Ensure a weight indicator reading is correct.

6- Ensure anchor line clamp remain secure.

7- Have all unnecessary personal off the drilling floor during jarring operation.

8- Always allow the jar to trip at their safe working load the maximum allowable limit.

Cocking the jar calculations	
Cocking from closed position	**Cocking from open position**
Last recorded pick up weight 330000 (-) BHA weight below jar 30000 (+) internal jar friction 10000 ––––––– (=) weight indicator load 310000	Last recorded pick up weight 330000 (-) BHA weight below jar 30000 (-) internal jar friction 10000 (-) pump open force 20000 ––––––– (=) weight indicator load 270000
Calculating trip load	
Jar down	**Jar up**
Last recorded slack off weight 330000 (-) BHA weight below jar 30000 (-) Down jar trip load setting 40000 (-) pump open force 20000 ––––––– (=) weight indicator load 240000	Last recorded pick up weight 330000 (-) BHA weight below jar 30000 (+) Up jar trip load setting 80000 (-) pump open force 20000 ––––––– (=) weight indicator load 360000
1- After cocking the jar, slack off weight to the calculated weight indicator load. 2- Lock down the break, and wait for the jar time to trip. 3- Some jars took short cycle 30-60sec; some took long cycle 2-8 minutes. 4- If the jar doesn't trip, stop pumping or bleed trapped pressure and then recook the jar and apply trip load. 5- If the jar still doesn't trip, add more weight and wait more time.	1- After cocking the jar, pick up weight to the calculated weight indicator load. 2- Lock down the break, and wait for the jar time to trip. 3- Wait sufficient time to jar trip, If the jar doesn't trip, circulate at maximum rate and allow addition time (don't apply trapped pressure). 5- If the jar still doesn't trip, add more weight and wait more time.

There are several reasons for jar doesn't fire

1- Incorrect weight is applied (due to incorrect calculations).

2-Pump open force.

3- Drill string is stuck above the jar.

4- Jar is not cocked.

5- Not waiting long enough for jar to fire (horizontal drilling).

BHA considerations for jar placement

1- Run jar above possible stuck points, but as low as possible.

2- No stabs above jars, no x-sectional change in direct connection with the jar.

3- Run jar and energizer as standard package (there is no place in the wellbore where the energizer is not useful).

4- Stay away from the neutral points.

5- Choose jar size / hole size, i.e. no 8" tools in 26" hole.

6- Consider hammer mass (for DCs or HWDPs).

Drilling problems	
Shallow Gas	**Lost Circulation**
Shallow gas flows can be extremely prolific and flow of rock and sand can be severe to the point of causing diverter failure. **If shallow gas is encountered, preparations should begin immediately to evacuate all non-essential personnel. The rig may ultimately be completely evacuated, depending on the severity of the event.** **Causes of Shallow Gas Kicks** **1- Overloading the annulus with cuttings, causing loss of circulation.** **2- Drilled gas expanding and unloading the annulus.** **3- Improper hole fill while tripping.** **Prevention Considerations** **1- Drill a pilot hole.** **2- Drill riser less (when applicable – subsea).** **3- Restrict ROPs and control drill.** **4- Accurately monitor the well and drilling process.** **Diverting procedure** **- Do not stop pumping.** **- Open vent line to direction wind.** **- Close shaker line.** **- Then close diverter.** **- Pump at maximum rate and switch to kill fluid without close pumps, If no kill fluid uses sea water.** **- If the diverter system fails before control of the well is regained or broaching to the surface occurs, evacuate all personnel, leaving the mud pumps running on sea water at the maximum rate.**	**The uncontrolled flow of drilling fluids into a down hole formation. This can be either a partial loss, some returns to the surface, or a complete loss with no returns to the surface.** **This happens when the drilling encounters a highly fracture zone, one with low pressure-high permeability or a cavern.** **If drilling is continued with no returns it is called Dry or blind drilling.** **Prevention** **1- Maintain proper mud weight.** **2- Minimize annular friction pressure.** **3- Maintain adequate hole cleaning.** **4- Set casing to protect weaker formations.** **If anticipated, treat mud with lost circulation materials (LCM).** **If it happens** **- Cuttings can settle around the (BHA) and mechanically stick the pipe.** **- Try to keep the pipe moving if possible.** **- Fill the annulus with water or light mud and record the volume added.** **- Pump lost circulation materials Seal the zone with in the mud cement or other blockers.** **- Dry drill or drilling with air.** **- Set casing.**

Drill String Failures

Drill String Failures:

- When a component cannot perform its function.

- Complete separation (parting).

- Leak (washout).

Location

- Tube body, Tool Joint or Threads.

- Any drill String component.

Preventing Drill String Failures

1- Handle all tubular carefully.

2- Always fit thread protectors.

3- Prevent slip and tong damage by correct use (avoid making connections without a supported tong even you have a high weighted drill string that will cause a bad effect on slips and drill pipe body).

4- Stab pipe with care to prevent shoulder damage (Check for shoulder damage before making up).

5-Use correct makeup torque.

6- Cycle the bottom stand of drill pipe out of the string every trip (change break out point to avoid over torque).

7- Minimize dog legs at shallow well depths.

8- Never connect two connections without greasing.

Function of grease:

1- Lubricant and cool the thread and shoulder.

2- To make good seal on shoulder.

3- Help to make a good makeup torque.

Surface sign of twist off:

1- Loss of drill string weight.

2- Drop in pressure.

3- Increased pump speed.

4- Increase rotation speed.

5- Reduce drilling torque.

fishing

Fishing is the technique of removing lost or stuck objects from the wellbore.

What are cases of fishing?

The need to remove or milling away: A stuck or Parted drill string or BHA, Stuck tubing,
Packers and bridge plugs, Loose Junk that may impede drilling, Stuck logging Tools, wire Line, Standard work overs (planned), Plug and Abandonment.

Before going into a fishing a detailed procedure, we need to check the following conditions

- Tight clearance between the hole and Fish
- The top of the fish is In good condition.
- Fishing length, weight of Fish.
- Actual turn to fully engage when screw – in.

Main categories of fishing tools:

1- Fishing junk

(A) Junk basket: catch small objects or debris that are heavy to be circulated.
(B) Jet junk basket (reverse circulation): produces circulating force that is capable of lifting.
(C) Junk magnets: used to retrieve ferrous debris like bit cones, bearing, pins...etc.
(2) Milling tools: they are used to grind down the upper surface of an object (to address the top of fishing tool) some are used to drill flotcollar, bridge plug or retainer.
There are four types of milling tools: taper mill, pilot mill, string taper mill and junk mill.
3- External catches tools: retrieve fish by engage the outer surface of the fish.
-Die collar and overshot (long catch – short catch)
(A)Over shot grapples (B) Over shot wall hook guide
- Short catch: there is no guide and grapple control is blow the basket grapple, permitting the basket grapple to be placed at the lower position in bowl.
- Long catch: there is guide and grapple general control above the basket grapple.
Difference between basket grapple & spiral grapple:
Basket grapple: stronger than spiral grapple, but a large clearance is required between wellbore and fish.
grapple: it for large OD but it much thinner and can crack if fish is off-round.
4- Internal catch tools: retrieve fish by engage the inner surface of the fish.
(A) pin tap: it is used with fish that has been backed off from the string
(B) Taper tap: it is used with fish that has restricted internal diameter (make a new thread)
(C) Casing swage: it used to restore casing buckled or collapsed casing to its original shape and diameter.
(D) Spear: Are used for catching the internal diameter of a tubular fish (Drill pipe, tubing and casing), like shoulder type mandrel and flush type mandrel.
5- cutting tools:
Mechanical Cutter, multistring Cutter, Inside Hydraulic Cutter, Outside Shear Pin Cutter.
6- fishing wire line:
Parted line, Line intact

Blowout preventer test

(BOP) timeframes

1- At stamp test.
2- After N.UP.
3- Every 14 days (According to (API) not to exceed 21 days).
4- After reaper or disconnect.
5- Before well test.

(BOP) low-pressure test:

Must be between 200 – 300PSI.

(BOP) high-pressure test:

Must equal the rated (WP) of the equipment or the pressure otherwise approved by the max expected surface pressure (wellhead pressure).

There are three types of testing (BOP)

(A) Test in the factory (body test, factory test, shell test).

- (BOP) working pressure **10K** or more than, tests it is **150%** of its working pressure.
- (BOP) working pressure **5K** or less than, tests it is **200%** of its working pressure.

(B) Test on the rig (initial pressure, acceptance, test stump).

For **rams,** test it by **100%** of its working pressure.

For **annular preventer**, we test it by **70%** of its working pressure.

(C) Test on the well

Test by the max expected surface pressure (wellhead pressure).

Shearing test:

This type of test in these cases:
1- Explore well.
2- Wild cat.
3- New rig.

Safety procedure:

1- The pressure rating of each item to be tested must be verified. The lowest pressure rating of the components to be tested determines the maximum test pressure to be used.
2- No one is to tighten or loosen any connection under pressure.
3- Ensure that all lines are fitted with a safety line.
4- Ensure that no person is in the immediate vicinity of components under test pressure.
5- The test area is to be cordoned off with Hazard Tape.
6- Clear communications are essential during testing procedure.
7- All personnel are to be informed when testing is to take place.
8- Check the PM System and ensure that the certification on all the chiksan piping and attachments are not more than 1 year old.
9- Ensure all test gauges and recorders have valid Dead Weight Tester calibration certificates.

BOP pressure test steps:

TEST # 1

ANNULAR PREVENTER L PRESS. 300 PSI, "H. PRESS 3500 PSI.

TEST # 2

TOP PIPE RAMS, MANUAL CHOKE, INNER MANUAL KILL AND FOSV.

TEST # 3

TOP PIPE RAMS, HCR, OUTER MANUAN KILL, LOWER KELLY COCK, STD.P.M, VALVE # 9.

TEST # 4

TOP PIPE RAMS, UPPER KELLY COCK, CHOKE HOSE, CHECK VALVE, CHOKE MANIFOLE
VALVE # 1.

TEST # 5

BTM PIPE RAMS, KELLY HOSE.

TEST #6

BLIND SHEAR RAMS, KILL LINE, STD. PIPE MANIFOLD. VALVES #3, 4, 3 AND 7, 8, 11, 12.

TEST #7 (OFF LINE TEST)

STD.PIPE MANIFOLD VALVES #5, 6, 7,8,11, 13.

TEST # (8 OFF LINE TEST)

STD. PIP MANIFOLD VALVES # 1,3,4,12,6,7,8,11.

Testing tools

Test plug

- Run with close end.
- Has the outer seal.
- Test all BOP without any pressure on the well head.
- The side outlet valve blow the plug has to be kept in the open position, because avoid the potential damage to the wellhead, casing, open hole, and also if you drill an exploration well make more precaution for safer the open hole before test run (RTTS) packer.

Cup tester

- Run with open end drill pipe.
- Any leak can be detected by the return of fluid from the drill pipe.
- Has a cup of rubber.
- Test all BOP except blind ram.
- Can test wellhead.

INFORMATION FROM THE API RP 53

RESPONSE TIME - THE BOP CONTROL SYSTEM SHOULD BE CAPABLE OF THE FOLLOWING:

	CLOSING TIME	RAM	ANNULAR
1.	Smaller than 18 ¾"	30 sec max.	30 sec max.
2.	18 ¾" and larger	30 sec max.	45 sec max.

3.	PUMP TEST:	With Isolate Bottles Close annular, open HCR and return system to normal annular closing pressure in 2 minutes.
4.	BLEED LINE	Vent Line (by-passes the Chokes) - at least equal to choke line diameter - helps maintain minimum back pressure
5.	USEABLE FLUID:	Fluid recoverable between operating pressure (3000 psi) and minimum operating pressure (1200 psi) or (200 psi) above pre charge pressure.
6.	BOTTLES TO BE ABLE TO	(with pumps off) - Close annular - Close all rams - Open one HCR - Remaining pressure shall be at least 200 psi above precharge pressure.
7.	ELECTRIC AND/OR AIR PUMPS	Will automatically start when system pressure is decreased to 90% of system working pressure.
8.	RESERVOIR CAPACITY:	At least twice useable fluid of bottles
9.	PRESSURE TEST FREQUENCY	(1) Prior to spud or upon installation. (2) After dis-connecting or repair. (3) Not to exceed 21 days.
10.	SHELL OR BODY TEST	1½ times BOP pressure rating i.e. 150% of pressure rating.
11.	CLOSING RATIO	Ratio of well head pressure to pressure required to close the BOP

API 6A Spec Flange Bolt & Ring Chart

API Pressure Rating	Flange Size & Bore	Ring Gasket		Number of Studs	Stud Dimensions	
					Diameter	Length
2000 lb	2 1/16"	R-23	RX-23	8	5/8"	4 3/4"
	2 9/16"	R-26	RX-26	8	3/4"	5 1/4"
	3 1/8"	R-31	RX-31	8	3/4"	5 1/2"
	4 1/16"	R-37	RX-37	8	7/8"	6 1/4"
	5 1/8"	R-41	RX-41	8	1"	7 1/4"
	7 1/16"	R-45	RX-45	12	1"	7 1/2"
	9"	R-49	RX-49	12	1 1/8"	8 1/2"
	11"	R-53	RX-53	16	1 1/4"	9 1/4"
	13 5/8"	R-57	RX-57	20	1 1/4"	9 1/2"
	16 3/4"	R-65	RX-65	20	1 1/2"	10 3/4"
	21 1/4"	R-73	RX-73	24	1 5/8"	12 1/2"
6BX	26 3/4"	BX-167		20	1 3/4"	14 1/4"

API Pressure Rating	Flange Size & Bore	Ring Gasket		Number of Studs	Stud Dimensions	
					Diameter	Length
3000 lb	2 1/16"	R-24	RX-24	8	7/8"	6"
	2 9/16"	R-27	RX-27	8	1	7"
	3 1/8"	R-31	RX-31	8	7/8"	6 1/4"
	4 1/16"	R-37	RX-37	8	1 1/8"	7 1/2"
	5 1/8"	R-41	RX-41	8	1 1/4"	8 1/4"
	7 1/16"	R-45	RX-45	12	1 1/8"	8 1/2"
	9"	R-49	RX-49	12	1 3/8"	9 1/2"
	11"	R-53	RX-53	16	1 3/8"	10"
	13 5/8"	R-57	RX-57	20	1 3/8"	10 3/4"
	16 3/4"	R-66	RX-66	20	1 5/8"	12 1/4"
	20 3/4"	R-74	RX-74	20	2"	15"
6BX	26 3/4"	BX-168		24	2"	17 1/2"

API Pressure Rating	Flange Size & Bore	Ring Gasket		Number of Studs	Stud Dimensions	
					Diameter	Length
5000 lb	2 1/16"	R-24	RX-24	8	7/8"	6 1/4"
	2 9/16"	R-27	RX-27	8	1"	7"
	3 1/8"	R-35	RX-35	8	1 1/8"	7 3/4"
	4 1/16"	R-39	RX-39	8	1 1/4"	8 1/2"
	5 1/8"	R-44	RX-44	8	1 1/2"	10 3/4"
	7 1/16"	R-46	RX-46	12	1 3/8"	11 1/4"
	9"	R-50	RX-50	12	1 5/8"	12 1/2"
	11"	R-54	RX-54	12	1 7/8"	14 1/2"
	13 5/8"	BX-160		16	1 5/8"	12 3/4"
	16 3/4"	BX-162		16	1 7/8"	14 3/4"
	18 3/4"	BX-163		20	2"	17 1/2"
6BX	21 1/4"	BX-165		24	2"	18 3/4"

API Pressure Rating	Flange Size & Bore	Ring Gasket	Number of Studs	Stud Dimensions	
				Diameter	Length
10000 lb	1 13/16"	BX-151	8	3/4"	5 1/4"
	2 1/16"	BX-152	8	3/4"	5 1/2"
	2 9/16"	BX-153	8	7/8"	6 1/4"
	3 1/16"	BX-154	8	1"	7 1/4"
	4 1/16"	BX-155	8	1 1/8"	8 1/4"
	5 1/8"	BX-169	12	1 1/8"	9"
	7 1/16"	BX-156	12	1 1/2"	11 3/4"
	9"	BX-157	16	1 1/2"	13 1/4"
	11"	BX-158	16	1 3/4"	15 1/2"
	13 5/8"	BX-159	20	1 7/8"	17 3/4"
	16 3/4"	BX-162	24	1 7/8"	17 3/4"
	18 3/4"	BX-164	24	2 1/4"	22 1/2"
6BX	21 1/4"	BX-166	24	2 1/2"	24 1/2"

API Pressure Rating	Flange Size & Bore	Ring Gasket	Number of Studs	Stud Dimensions	
				Diameter	Length
15000 lb	1 13/16"	BX-151	8	7/8"	5 3/4"
	2 1/16"	BX-152	8	7/8"	6 1/4"
	2 9/16"	BX-153	8	1"	7"
	3 1/16"	BX-154	8	1 1/8"	8"
	4 1/16"	BX-155	8	1 3/8"	9 1/2"
	5 1/8"	BX-169	12	1 1/2"	11 1/2"
	7 1/16"	BX-156	16	1 1/2"	13"
	9"	BX-157	16	1 7/8"	15 3/4"
	11"	BX-158	20	2"	19 1/2"
	13 5/8"	BX-159	20	2 1/4"	21"
6BX	18 3/4"	BX-164	20	3"	26 3/4"

API Pressure Rating	Flange Size & Bore	Ring Gasket	Number of Studs	Stud Dimensions	
				Diameter	Length
20000 lb	1 13/16"	BX-151	8	1"	7 3/4"
	2 1/16"	BX-152	8	1 1/8"	8 1/2"
	2 9/16"	BX-153	8	1 1/4"	9 1/2"
	3 1/16"	BX-154	8	1 3/8"	10 1/4"
	4 1/16"	BX-155	8	1 3/4"	12 1/4"
	7 1/16"	BX-156	16	2"	17 3/4"
	9"	BX-157	16	2 1/2"	21 3/4"
	11"	BX-158	16	2 3/4"	23 3/4"
6BX	13 5/8"	BX-159	20	3	30"

Accumulator Draw Down test

Steps Draw Down test	Check capacity Accu pump
1- Install BOP at test stamp, and then connect single drill pipe. 2- Charge system max times 15 minutes 3- Turn off the power supply to all accumulator charge pumps. 4- Record the initial Accu pressure. (Accu3000, manifold 1500, annular650-950) 5- Individually close annular and pipe rams without blind ram, and record pressure and response time. 6- To simulate closure of blind ram, open one of ram. 7- Open HCR and record pressure and response time. 8- Record final accumulator pressure shall be equal greater than 200PSI above Pre-charge.	- Shut the accumulator bottles. - Open the bleed off valve to the tank, (Manifold psi should go to O psi) then close bleed valve. NOTE: Make sure that the HR is fully closed and the annular is fully open prior to going through the next steps: 1- Open the HR valve handle, (if applicable). 2- Close annular valve handle. 3- With pumps only, record time how long it takes to regain manifold pressure to 200 psi over desired pre-charge pressure. Accumulator working pressure {1500 psi =) 750 desired psi)(2000 and 3000 psi = 1000 desired psi). 4- Record elapsed time (2 minutes or less).

Malfunctions Accumulator Unit

Problem-related to the indicator lights when shutting in a well from a remote panel are:
1-If indicator light does not illuminate, but gauges drop and later rise back up which means that oil has been used to move the piston of the BOP and the function is completed so the cause is (BULB has blown).
2- If the indicator light does not illuminate and pressure gauges don't drop, it means that no oil has been used and the BOP piston does not move, the cause could be:
(A) The 4-way valve failed to shift.
(B) Master control valve is not depressed with the control valve of the function.
(C) No air pressure is going to the remote panel.
3- If indicator light illuminates and pressure dropped but not rise back up it means that oil has been used, function completed but there is LEAK in the hydraulic system.
4- If close any function and the close light illuminate but the manifold pressure doesn't drop the problem hydraulic close line to the BOP is plugged.
5- If there decrease in Accu pressure gauge with constant manifold pressure gauge and annular gauge the problem the Accu pump pressure switch have failed and there's a leaking in hydraulic Accu unit.
6- If there decrease in Accu pressure and increase in manifold pressure the problem in manifold regulator.
7- If there decrease in Accu pressure and annular pressure the problem a leaking in the annular hydraulic circuit.
8- If there decrease in Accu pressure and manifold pressure the problem a leaking in the manifold hydraulic circuit.
9- If there several leaks in annular and you close upper ram function and see manifold pressure decrease to zero the right action activate the by-pass function, if there problem in Accu pressure close ram by ram lock screws.
10- If there several leaks in annular and you close upper ram function and see manifold pressure decrease to zero and Accu decrease and then change pump activate right action place upper ram to open and then close lower ram.

ACCUMULATOR DRAW DOWN TEST

(To be conducted routinely as part of the BOP stack test)

UNIT:	
DATE:	

LOCATION	

PROCEDURE:

1. ALL RAMS AND ANNULAR OPEN, HCR SHUT
2. CLOSE AIR SUPPLY TO AIR PUMPS
3. STOP ELECTRICAL PUMP
4. RECORD PRESSURE OF ACCUMULATOR BANK: _____ psi
5. REGULATED MANIFOLD PRESSURE: _____ psi

TARGET (4 – 3000 psi, 5 – 1500 psi)

RUN TUBULAR INTO THE WELL (MINIMUM DIAMETER PIPE ANTICIPATED TO BE USED, i.e. 3 ½ DP)

CLOSE ANNULAR BOP TIME: _____ Sec REMAINING PRESSURE _____ psi

CLOSE UPPER VARIABLE PIPE RAMS TIME: _____ Sec REMAINING PRESSURE _____ psi

CLOSE LOWER VARIABLE PIPE RAMS TIME: _____ Sec REMAINING PRESSURE _____ psi

OPEN UPPER VARIABLE PIPE RAMS TIME: _____ Sec REMAINING PRESSURE _____ psi

OPEN LOWER VARIABLE PIPE RAMS TIME: _____ Sec REMAINING PRESSURE _____ psi

REMOVE TUBULAR FROM THR WELL

CLOSE SHEAR RAMS TIME: _____ Sec **REMAINING PRESSURE** _____ psi

RECORD FINAL MANIFOLD: _____ psi **PRESSURE NEEDS TO BE MORE THAN 1200 psi**

DID LOW ACCUMULATOR PRESSURE SOUND Yes/No psi

DID LOW AIR PRESSURE ALARM SOUND: Yes /No psi

RESPONSE TIME ANNULAR AND RAM PREVENTERS Less than 30 Sec! Yes/No

OPEN THE SHEAR RAMS AND CLOSE THE HCR. SWITCH ON AIR AND ELECTRICAL PUMP

RECHARGE ACCUMLATOR BANKES _____ Min (Target < 15 min)

CHECK CONTROL LINES WITH 3000 psi OPERATING PRESSURE. INSTALL TUBULAR INTO WELL OPERATE BY PASS TO 3000 PSI ON MANIFOLD. CLOSE AND OPEN PIPE RAMS AND HCR (ALSO KILL LINE HCR IF FITTED) FROM REMOTE PANEL. **REMOVE TUBULAR FROM WELL.**

CLOSE AND OPEN SHEAR RAM WHILST STILL IN BY PASS MODE. LOOK FOR LEAKS ON BOP-S AND HOSES WHEN CARRYING OUT ABOVE TESTS. RESET BY PASS BACK TO WORKING POSITION.

CHECK PRESSURE ELECTRICAL PUMP CUTS OUT _____ psi (Target 3000 psi)

CHECK PRESSURE AIR PUMP CUT OUT _____ psi (Target 3000 psi)

CHECK PRESSURE ELECTRICAL PUMP JUMPS IN _____ psi (Target 2750 psi)

CHECK PRESSURE AIR PUMP JUMPS IN _____ psi (Target 2700 psi)

CHECK OIL LEVEL AND LOW OIL LEVEL ALARM,

CHECK OPERATION REMOTE CONTROL OPERATING BORD.

CHECK PRESSURE IN BACK – UP N2 BOTTLES _____ psi (Target 2000 psi)

ENSURE THAT THE KOOMEY ALARM IS TURNED BACK TO THE ON POSITION

DRILLER TP / RM DSV

Formation test

(LOT) leak of test	(FIT) formation integrate test
It conducted in order to find the fracture pressure when conducting the LOT; you will pump drilling fluid until you see the fracture trend of formation. Once the formation is fractured, the first pressure that deviated from a trend is typically called Leak off Pressure; we use the leak-off pressure to calculate LOT	It typically used for testing strength of formation and shoe by increasing Bottom Hole Pressure (BHP) to designed pressure. When you do the FIT test, you will increase surface pressure until it reaches the required pressure only. There is no intention to break the formation with (FIT) You will do (FIT) to ensure that you will be able to drill to section target depth and will be able to control the well in case of well control situation without underground blow out.

Test procedure

procedure in order to perform (LOT) leak of test

1- Drill out the shoe, rat hole and 10 - 15 ft. of new hole.
2- Circulate the hole clean and condition the mud to a consistent density.
3- Pull the drill string +/- 10 ft. above the shoe.
4- Rig up the cement pump on the drill string and pressure test surface lines/system for Leaks.
5- Close the annular (or ram) BOP and begin the test.
6- Maintain a constant pump rate during test (1/4 to 1 bbl. /min maximum).
7- Plot pressure at each 1/4 bbl. increment until test is complete.

procedure in order to perform formation integrity test

1- Drill out new formation few feet, circulate bottom up and collect sample to confirm that new formation is drilled to and (mud weight in = mud weight out) then pull string into the casing.
2- Close annular preventer or pipe rams, line up a pump, normally a cement pump, and circulate through an open choke line to ensure that surface line is fully filled with drilling fluid.
3- Stop the pump and close a choke valve
4- Gradually pump small amount of drilling fluid into well with constant pump stroke. Record total pump strokes, drill pipe pressure and casing pressure.
Pump until casing pressure reaches the pressure required for formation integrity test. Hold pressure for few minutes to confirm pressure.
5- Bleed off pressure and open up the well. Then precede drilling operation.

Evaluate total service and cut-off practice

- The worm ports must be cut and removed at a regular time.
- The process is called slip and cut practice.
- The length of the line to be cut is calculated as follows:

Length of dram = number of lap x drum circumference
= number of lap x TT XD

D = drum diameter

Table 14.2 recommended cut-off lengths in terms of drum laps and derrick height for a design factor =5, courtesy of API

Derrick hight,ft.	Drum diameter		
	28	30	32
	Number OD drum laps per cut-off		
187	15.5	14.5	13.5
142,143,147	11.5	11.5	11.5
133,136,138	11.5	10.5	9.5

All types of ton-mile service should be calculated and recorded in order to obtain a true picture of the total service received from the rotary drilling line. These include:

1. **Round trip ton-miles.**
2. **Drilling or "connection" ton-miles.**
3. **Coring ton-miles.**
4. **Ton-miles setting casing.**
5. **Short-trip ton-miles.**

- Calculate drilling ton-miles after each trip. Failure to record drilling ton-miles is the most common mistake made in cut-off practice. Drilling ton-miles when drilling with a Top Drive should be calculated in accordance with the wire rope manufacturers recommended practices for Top Drive applications.

- The best cut-off program is the one with the most consistent ton-mile per foot cut values. By staying as close as possible to the ton-mile goal, you will avoid long cuts and maintain the safest, most economical use of your rotary drilling line. Daily visual inspection should be made for broken wires and any other damage.

IT MUST BE REMEMBERED THAT VISUAL INSPECTION OF THE WIRE ROPE MUST TAKE PRECEDENCE OVER ANY CALCULATIONS.

FACTORS AFFECTING ROTARY DRILLING LINE SERVICE

1- Diameter of Crown Blocks

Sizes vary from rig to rig and in some instances are not of sufficient size to offset bending fatigue. Worn grooves will not properly support the rotary line and worn bearings set up undue wear on both the sheaves and the line.

2- Traveling Block

The same conditions concerning the sheaves apply here as with the crown block. In addition, the traveling block must be of sufficient weight to give tight spooling on the drum as the block assembly is being raised or lowered, when going into and coming out of the hole.

3- Drawworks

The diameter and length of drum is important. (As I mention above)

The condition of the drum clutch and brake greatly affects line lift, If these are not properly adjusted, the resulting jerking and shock loads must be borne by the rotary line.

4-Type of String-Up - 6, 8, 10, or 12 lines

Governs the load each part of line must carry, determines the total line in the string-up, and also determines the length of time wear points must remain in the system.

5- Dead Line Anchor or Clamp

The size, type, and condition of the anchor have a direct effect on the rotary line. If it is too small, or otherwise distorts the line, it may form a "dog-leg" in the line which will set up a stress point. This stress point will result in undue wear and early fatigue, necessitating a long cut to get it out of the system. It is good practice to keep the deadline anchor covered to prevent debris and drilling fluid contaminating the diaphragm sensor, especially when the anchor is housed in the substructure below the rig floor and is susceptible to run-off fluid from the setback area.

6- Hole Conditions

Drilling Conditions, stuck pipe, jarring, fishing, running casing...etc.

7- Lubrication

Keep wire rope spool covered to keep rain, dust etc. off of the rope. Keep wire rope lubricated with a lubricant which will adhere to the rope, and which is free from acid or alkali. The purpose of the lubrication is to reduce friction and prevent corrosion.

Procedure slip & cut

Safety precautions:

1- The drill floor must be cleared of all personnel when work on the block is to be carried out.

2- Safety harness must be worn by all persons working on the block.

3- This task is normally carried out when the bit is at the casing shoe; this is to ensure that the maximum amount of pipe will be in the hole should the well start to flow.

4- Cutting or Slipping the drilling line must never be carried out if the pipe is in an open hole.

5- Ensure that all tools and equipment are in a clean and serviceable condition.

6- Certified wire & Shackle, Inspect.

7- Good housekeeping, check tools.

8- Pre-Job Safety meeting with all Crew, Goggles while cutting& PPE.

Precautions:

1- Refer to Wire Line Cut-off Instructions and count layers to be cut off from drilling line along the drum from the fast line and mark with paint. Also mark the drum.

2- The Driller engages reverse drive on the drawworks, and turning very slowly.

3- Ensure that the drum can be stopped by the brake at all times with the clutch engaged.

4- The Floormen guide the wire off the drum and feed the loop down the V Door until all the wire is off the drum.

5- Lock out the drawworks motors.

6- Secure the drilling line at the V-door.

7- Using the hydraulic wire cutters cut the Drilling Line at the paint mark after verification with a steel line measure that the cut-off length is correct.

8- Wash and clean the wire ends.

9- Install the dead end clamp; ensure that it is correctly positioned for installing the housing on the drum. Ensure that all clamp bolts are correctly and evenly torqued to the correct value.

10- Install the dead end on the drum, pulling the drilling line back through the drum while the Floorman guides it into the housing.

11- Unlock the drawworks, engage forward drive and reeve the drilling line back on to the drum, ensuring that it is tight and correctly seated in the drum grooves.

12- Pick up the weight of the traveling block and check that the wire is tight on the drum, calibration the system.

(SCR) Slow circulation rate	
(SCR) Taking	**Causes affect the choice of (SCR)**
-At beginning of each shift. **-After mud properties change.** **-When a long section of the hole is drilled rapidly 500 feet.** **-When returning to drilling after kill.** **-When a change (BHA) (nozzles bit – DC – motor).**	**-Size of choke and choke lines.** **-Minimize excess pressure exerted on formations during the kill.** **-To allow kick fluid to be handled at surface.** **-To reduce the chance of overloading the (MGS).** **-Allow choke operator time to make necessary choke adjustments.** **-Ability to mix kills mud.** **-To reduce damage to the pump.**
Flow check best practice	
- Before (POOH). **- Fast break while drilling.** **- During tripping after pull 5 stand, every 3000ft, @casing shoe, last stand (DP) before (BHA).** **- After displacement.** **key person in the rig driller and derrick man must be have good communication between us and driller must flow up (DM) all the time monitor mud system, the(DM) inform driller about any change in mud tank transfer, change mud** **Properties, flow rate, any change in cutting shape.**	

Reasons that lead to an increase in the risk to MAASP

- Incorrect casing shoe depth.

- Large kick size.

- Low fracture pressure.

- Long open hole section.

- Gas migration.

- Bad kill practices.

- Chock line friction loss.

- Unexpected High pressure.

Drill string design

Hole 36"

Option 1			Option 2		
Size	**Description**	**No.**	**Size**	**Description**	**No.**
36”	**Bit**	**1**	**26"**	**Bit**	1
36”	**Near bit Stab**	**1**	**36"**	**Hole Opener**	1
9.75”	**Drill collar**	**2**	**9.75"**	**Bit sub**	1
9.75”	**Crossover**	**1**	**9.75"**	**Drill collar**	3
8.25”	**Drill Collar**	**5**	**9.75"**	**Crossover**	1
			8.25"	**Drill Collar**	

Hole 26"

Rotary drilling			Motor drilling		
Size	**Description**	**No.**	**Size**	**Description**	**No.**
26”	**Bit**	**1**	**26”**	**Bit**	1
9.75"	**Bit sub**	**1**	**9.5"**	**Motor w/26” sleeve stab**	1
9.75"	**Drill collar**	**1**	**26"**	**String stabilizer**	1
26"	**String stabilizer**	**1**	**9.5"**	**Drill collar**	1
9.75"	**Drill collar**	**1**	**26"**	**String stabilizer**	1
9.75"	**Drill collar**	**1**	**9.5"**	**Drill collar**	1
9.75"	**Cross over**	**1**	**9.5"**	**Cross over**	1
8.25"	**Drill collar**	**9**	**8.25"**	**Drill collar**	9
8.25"	**Drilling jar**	**1**	**8.25"**	**Drilling jar**	1
8.25"	**Drill collar**	**3**	**8.35"**	**Drill collar**	3
8.25"	**Cross over**	**1**	**8.25"**	**Cross over**	1
5.5"	**HWDP**	**12**	**5.5"**	**HWDP**	12

Hole 17 ½”

Rotary drilling			Motor drilling		
Size	**Description**	**No.**	**Size**	**Description**	**No.**
17.5”	**Bit**	**1**	**17.5”**	**Bit**	1
9.75"	**Shock sub**	**1**	**17.5”**	**Motor w/17.5”**	1
9.75"	**Drill collar**	**1**	**17.5”**	**Roller reamer**	1
17.5”	**String stabilizer**	**1**	**9.75"**	**MWD**	1
9.75"	**Drill collar**	**1**	**9.75"**	**Roller reamer**	1
17.5”	**String stabilizer**	**1**	**9.75"**	**Drill collar**	2
9.75"	**Drill collar**	**2**	**9.75"**	**Cross over**	1
9.75"	**Cross over**	**1**	**8.25"**	**Drill collar**	9
8.25"	**Drill collar**	**1**	**8.25"**	**Drilling jar**	1
8.25"	**Drilling jar**	**1**	**8.25"**	**Drill collar**	3
8.25"	**Drill collar**	**9**	**8.25"**	**Cross over**	1
8.25"	**Cross over**	**1**	**5.5"**	**HWDP**	12
5.5"	**HWDP**	**12**			

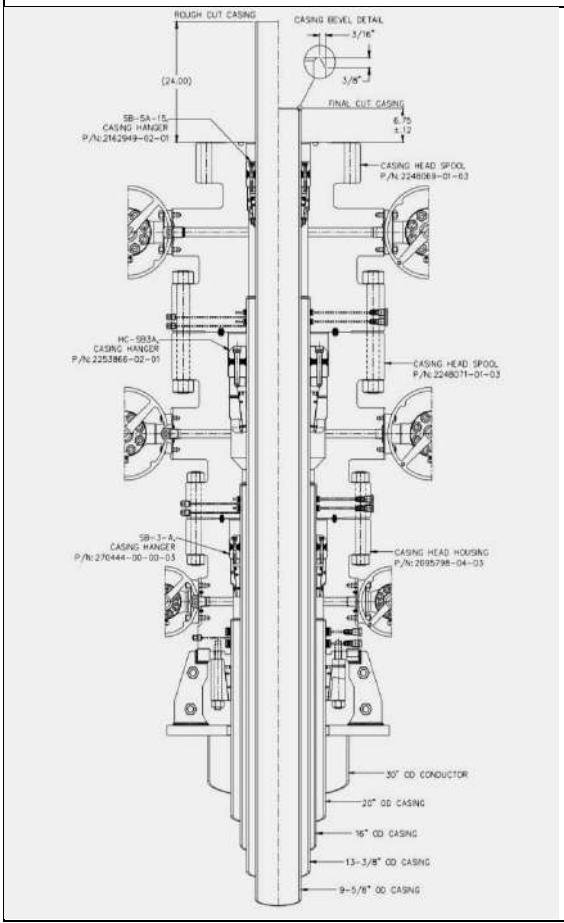
Hole 12 1/4”					
Option 1: Motor drilling – Directional			Option 2: Motor drilling – Directional		
Size	Description	No.	Size	Description	No.
12 ¼”	Motor insert bit	1	12 ¼”	Motor insert bit	1
9 ⅝”	Motor	1	9 ⅝”	Motor	1
12 ¼”	Roller Reamer	1	8.25"	Flex Joint	1
8"	MWD	1	8"	MWD (Power Pulse)	1
8"	Oriented sub	1	8"	N.M.D.C	1
8"	N.M.D.C	1	12 ¼”	Roller Reamer	1
12 ¼”	Roller Reamer	1	8"	N.M.D.C	1
8"	N.M.D.C	1	8.25"	DC	12
8.25"	DC	12	8"	Drilling Jar	1
8"	Drilling Jar	1	8.1/4”	D.C	3
8.1/4”	D.C	3	8.1/4”	X Over Sub	1
8.1/4”	X Over Sub	1	5.5"	HWDP	12
5.5"	HWDP	12			

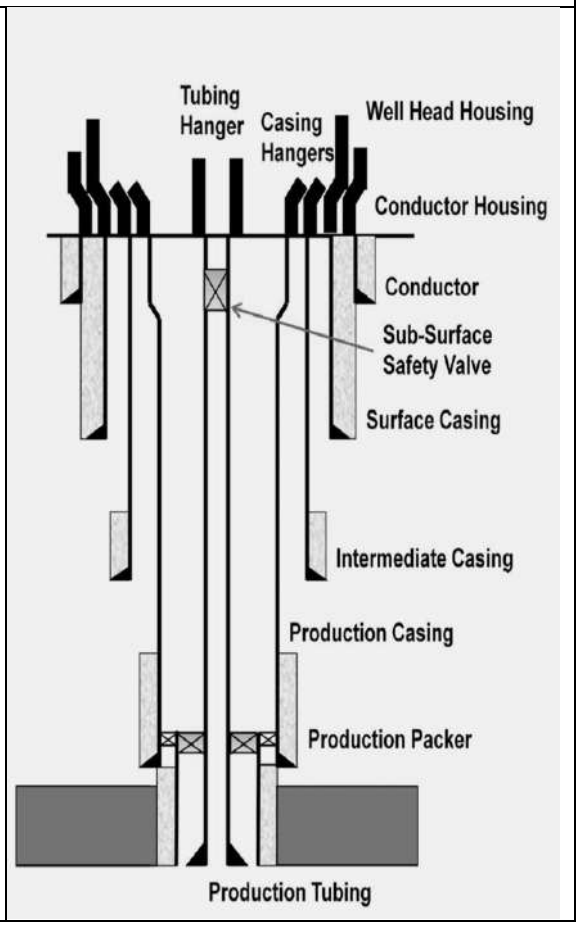
Hole 12 1/4”					
Option 3: Motor drilling – Vertical			Option 4: drilling – Vertical		
Size	Description	No.	Size	Description	No.
12 ¼”	Insert bit or PDC	1	12 ¼”	Insert bit or PDC	1
9 ⅝”	Motor	1	12 ¼”	N. Stab	1
12 ¼”	Roller Reamer	1	8.25"	D.C	1
8"	MWD	1	12 ¼”	S. Stab	1
12 ¼”	Roller Reamer	1	8.25"	D.C	1
8.1/4”	D.C	12	12 ¼”	S. Stab	1
8"	Drilling Jar	1	8.25"	D.C	10
8.1/4”	DC	3	8"	Drilling Jar	1
8.1/4”	X Over Sub	1	8.25"	D.C	3
5.5"	HWDP	15	8.1/4”	X Over Sub	1
			5.5"	HWDP	15

Hole 8 1/2”					
Option 1: (Directional Drilling)			Option 2: (Vertical Drilling)		
Size	Description	No.	Size	Description	No.
8.5”	PDC Bit	1	8.5”	PDC Bit	1
6.3/4”	RSS	1	6.3/4”	Motor	1
6.3/4”	MWD/LWD	1	6.1/2”	S. Stab	1
8.5”	S. Stab	1	6.1/2”	DC	1
6.1/2”	D.C	1	6.1/2”	S. Stab	1
8.5”	S. Stab	1	6.1/2”	DC	12
6.1/2”	D.C	1	6.1/2”	X Over Sub	1
6.1/2”	X Over Sub	1	6.1/2”	Drilling Jar	1
5.5"	HWDP	30	6.1/2”	X Over Sub	1
6.1/2”	X Over Sub	1	6.1/2”	D.C	3
6.1/2”	Drilling Jar	1	6.1/2”	X Over Sub	1
6.1/2”	X Over Sub	1	5.5"	HWDP	15
5.5"	HWDP	12			

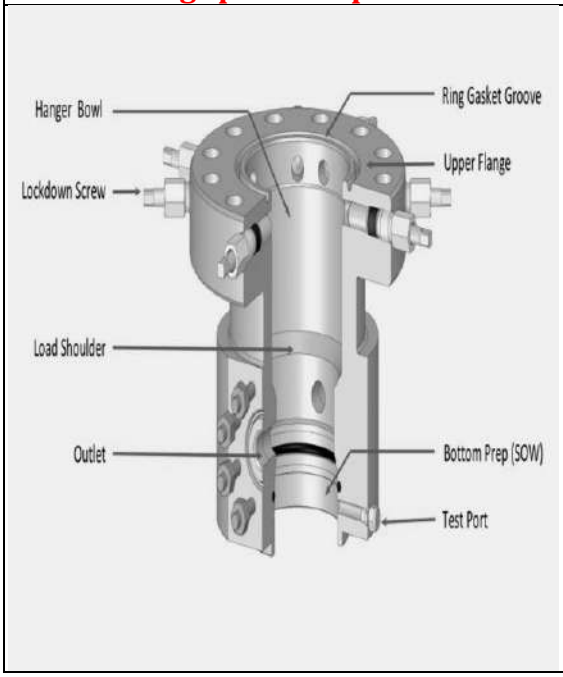
Hole 6”			
BHA for Drilling 6” Horizontal Hole			
Size	**Description**	**No.**	Comments
6"	**PDC Bit**	**1**	
6"	**RSS**	**1**	
4.3/4”	**NMDC**	**1**	
4.3/4”	**LWD Tool**	**1**	
4.3/4”	**MWD Pulser**	**1**	
4.3/4”	**S. Stabilizer**	**1**	
4"	**HWDP**	**9**	
4.3/4”	**X Over Sub**	**1**	
4.3/4”	**Drilling Jar**	**1**	
4.3/4”	**X Over Sub**	**1**	
4"	**HWDP**	**6**	
4"	**DP**	The number depends on the length of departure (to be enough overlap)	
4"	**X Over Sub**		
4"	**HWDP**		
5.5"	**DP**	The number depends on the length of departure	

Well head





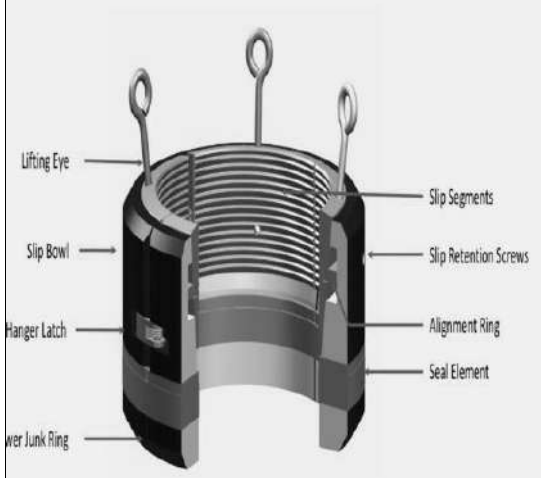
Casing spool components



Casing spool date

Top Flange	WP	Bottom Flange	WP	Outlet Size
11"	3K, 5K, 10K, 15K	11"	3K, 5K, 10K, 15K	2" LPO or Studded
11"	3K, 5K, 10K, 15K	13-5/8"	3K, 5K, 10K, 15K	2" LPO or Studded
13-5/8"	3K, 5K, 10K	16-3/4"	3K, 5K, 10K	2" LPO or Studded
16-3/4"	5K,10K	18-5/8"	5K,10K	2" LPO or Studded
13-5/8"	3K	20-3/4"	3K	2" LPO or Studded
13-5/8"	3K, 5K	21-1/4"	3K, 5K	2" LPO or Studded

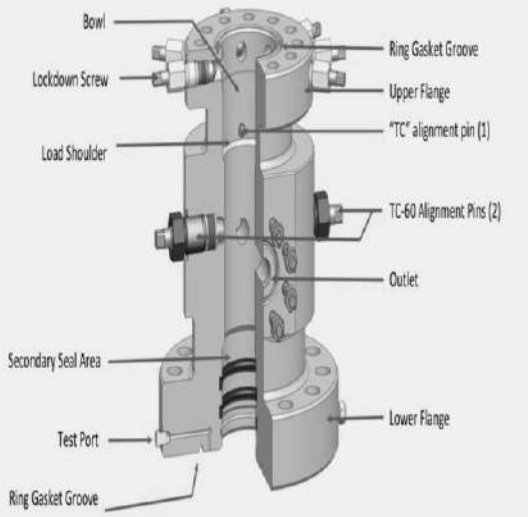
Slips casing hanger components



Slips casing hanger date

Top Flange	Casing Size	WP
7"	2 3/8" thru 4-1/2"	3K, 5K, 10K
9"	4-1/2" thru 7"	3K, 5K, 10K
11"	4-1/2" thru 7-5/8"	3K, 5K, 10K
13-5/8"	4-1/2" thru 11-3/4"	3K, 5K
16-3/4"	5-1/2" thru 13-3/8"	3K, 5K
18-5/8"	7" thru 13-3/8"	5K
20-3/4"	9-5/8" thru 16-3/4"	3K
21-1/4"	9-5/8" thru 16-3/4"	3K, 5K

Tubing head components



Tubing head date

Top Flange	WP	Bottom Flange	WP	Outlet Size
7"	3K, 5K, 10K, 15K	11"	3K, 5K, 10K, 15K	2" LPO or Studded
11"	3K, 5K, 10K, 15K	13-5/8"	3K, 5K, 10K, 15K	2" LPO or Studded
13-5/8"	3K, 5K, 10K, 15K	13-5/8"	3K, 5K, 10K, 15K	2" LPO or Studded

Running Casing

Running 18 ⅝" Casing

1- Make up, thread lock and tag-weld float shoe and float collar on the first and second casing joints.
2- Install centralizers on pipe rack as follows: 5 ft. above the shoe (over stop collar), 5 ft. above the float collar (over stop collar), Two centralizers for the following 3 joints then one centralizer per joint up to previous casing shoe, One positive centralizer every 3 joints for the remaining cased hole.
3- Run 18 ⅝" casing, fill casing every three joints, check for losses or flow by using trip sheet, physical check, geolograph chart and weight indicator.
4- Keep all pipe movement smooth and steady to avoid pressure surging and check returns to monitor any mud losses

Running 13 ⅜" Casing

1- Make up float shoe to the 1st joint of 13 ⅜" casing joint and float collar to the Box of 2nd joint.
2- Use thread locking compound to make up float collar and float shoe.
3- Install open hole centralizers as follows: One centralizer. 5 ft above shoe (over stop collar), One centralizer. 25 ft above shoe (over stop collar), Two centralizers. Every joint for the next 4 joints (over stop collar), One centralizer. every 3 joints (over stop collar) for the remaining open hole, One positive centralizer above 18 ⅝" casing shoe if applicable, One positive centralizer per joint for the remaining cased hole, One positive centralizer 10 ft below cellar and one centralizer 25 ft below first joint casing.
4- Retrieve wear bushing from well head 20 ¾, Hold pre-job safety meeting prior to rig up casing equipment Discuss signals to stabber, drillers view, loose objects ,tag lines, rolling joints on pipe-rack, pinch points, dog clamp not single joint elevator and remind last incidents happened.
5- Run 13 ⅜" casing in hole, filling every joint for the first three joints (flow check floats) and then fill casing every 3 joints. Check for losses or flow by using trip sheet, physical check, and/or steady increase in string weight on weight indicator and geolograph chart. Ensure floats are functioning properly.
6- Keep all pipe movement smooth and steady to avoid pressure surging and or sticking.
7- If casing held up, circulate and reciprocate casing for enough time to clean hole.

Running 9 5/8" Casing

1- Retrieve wear bushing, change pipe rams to 9.5/8" and test to 3000 psi or maximum anticipated pressure at surface.
2- Install casing shoe on the pin of the first joint and float collar on the box of the second joint (Two joints shoe track), using thread-locking compound.
3- Do not tag-weld the shoe and float collar.
4- Flow check float equipment.
5- Install open hole centralizers as follows: 1 OH Cent. 5 ft. above shoe over stop collar, 1 OH Cent. 20 ft. above shoe over stop collar, 2 OH Cent. On the center of each the first 3 joints, (over stop collar), 1 OH Cent. each 3 joints, (over stop collars) on the center of the joint until
13 ⅜" casing shoe, Positive centralizers: One centralizer 10 ft. below cellar and another one 20 ft.
below it, then 2 centralizers every joint for the following 3 joints and finally one Centralizer every 3 joints for remaining cased hole.
6- Change TDS links for casing type.
7- Hold pre-job safety meeting prior to rig up casing equipment 9 5/8", running equipment, auto fill up tool, jam unit and PC machine. Test auto fill up tool, Discuss signals to stabber, drillers view, loose objects, tag lines, rolling joints on pipe-rack, pinch points, dog clamp not single joint
Elevator and remind last incidents happened.
8- RIH 9 5/8" casing as per given tally, Fill up every joint with 3 bbl. (25 stks) of mud. Use auto fill to fill casing while RIH. Completely fill every 5 joints.
9- Use safety clamp for first 25 joints (not single joint elevator).Continue RIH till enough weight on Martin Decker (30-35klbs).
10- Change to FMS and spider elevators.
11- RIH 9 5/8" casing with optimum speed inside 13 3/8" casing Break circulation @ casing shoe
12- - Keep all pipe movement smooth and steady to avoid pressure surging and or sticking, If any tight hole, wash down and reciprocate the casing, never force the casing through.
13- At bottom circulate hole 1,5-2 cycle to cleaning hole
(Meanwhile cement engineer to start mixing mix fluid for cement.)

Running 7" Casing Liner

1- Install low drag centralizers as per as pipe tally.
2- Liner Engineer to check all tools are measured (OD, ID and length, condition).
3- Drill pipe wiper plug is installed in the plug dropping head.
4- Casing joints are numbered and no excess cg joints on the pipe rack.
5- All DP's and X. O. are drifted.
6- Prepare well control x-over (7" Vam Top pin x Thread DP) connected with FOSV on rig floor while running the 7" liner, Rig up casing running equipment, PC machine, and held-pre-job safety meeting.
7- Run liner as per tally, filling up liner every 5 joint, Safety clamp must be used until there is at least 15klb wt., Run casing on side door elevator and manual slips.
8- Set on slips last liner joint. Change elevators to DP type to pick up Liner hanger. Count the number of joints remaining on the rack, P/U and M/U 7" X 9 5/8" LINER hanger assembly with liner top packer as per liner engineer instruction.
9- With sleeves above the rotary table, circulate 120% (154 bbl.) liner capacity @ Max 750 psi or 6 BPM (check for leakage through sleeve). Record pressure at different rates: 2, 3, 4, 5, 6 BPM Fill PBR with fresh water while circulating. DO NOT SET SLIPS ON THE PBR EXTENTION.
10- Rig down running equipment and PC machine, while circulating, Record liner

P/U and S/O weight with and without circulation, Continue RIH with 5 ½" D.P to casing shoe filling up every 10 stands.

11- Ensure DP were drifted with min 2 ¾" size. Call liner hanger engineer 1 hr. before reaching casing shoe.
12- Circulate above casing shoe @ 3-4-5-6 BPM at maximum of 800 psi, while rotate liner at 10/20 RPM (record the related torque). Record liner P/U, S/O weight.
13- Continue RIH in open hole with controlled speed of 1.5 mines. As per as Liner Hanger Engineer to be on the rig floor while RIH in open hole, Minimize stationary time to maximum 4 minutes (when you fill up in open hole connect TDS and running slowly with pump on Keep all pipe movement smooth and steady to avoid pressure surging and or differential sticking), Fill up string every 10 stands with maximum of 600psi.
14- NO ROTATION OF THE PIPE Continue RIH with optimum speed, If down drag increases or the liner is held up at any depth while RIH, stop and circulate. (Don't push the liner down). Begin circulating slowly 2-3 BPM to break gelled mud, and then rotate liner. Increase to 6 BPM till the pressures and drags stabilize. (Do not exceed 700 psi pressure), When free, continue RIH to bottom. Take special care not to get liner stuck off bottom
15- Continue normal circulation @ 2-3 BPM (540 psi) to break gelled up mud. Closely monitor if any losses.
16- Upon completing of one cycle, start rotating liner @ 15-20 RPM & circulate @6 BPM or 600 psi maximum one bottoms up. Check for losses & MW in/out.
17- Space out liner hanger at the setting depth, count the number of stands remaining on
The derik to verify correct numbers of joints are RIH as per the tally. Mark the phenolic setting ball. Pump as per liner engineer, hanger stop "pipe & drop 1.500 rotation while chasing the ball. Stop rotation once ball landed and set the liner @ +/- 1900 psi.
18- Check setting, release running tool with 14 turns to the right and check/confirm tool is released by picking up two feet – OK.
19- Set 40000 lbs. weight on liner, pressure up & shear ball seat at 2700- 3000 psi, check for returns after shearing. (Compare rates vs. pressure - before and after tool released).
20- To avoid inducing losses post ball seat shearing and pressure surges are following:
After ball seat sheared, wait for 5 mines before starting the pumps, increase circulation rate in steps gradually and monitor losses, if losses observed, do not increase pump rate.
21- Continue circulating while observing hole for any losses, meanwhile start preparing spacers, cement & rig up surface lines.

Inspection categories

Category I

This category involves observing the equipment during operation for indications of inadequate performance. When in use, equipment shall be visually inspected on a daily basis for cracks, loose fits or connections, elongation of parts, and other signs of wear, corrosion or overloading. Any equipment found to show cracks, excessive wear, etc., shall be removed from service for further examination.

Category II

This is Category I inspection plus further inspection for corrosion, deformation, loose or missing components, deterioration, proper lubrication, visible external cracks, and adjustment.

Category 111

This is Category II inspection plus further inspection, which should include NDT of critical areas and may involve some disassembly to access specific components and to identify wear that exceeds the manufacturer's allowable tolerances.

Category IV

This is Category III inspection plus further inspection for which the equipment is disassembled to the extent necessary to conduct NDT of all primary-load-carrying components as defined by manufacturer.

Equipment shall be:

- disassembled in a suitably-equipped facility to the extent necessary to permit full inspection of all primary-load-carrying components and other components that are critical to the equipment;

- inspected for excessive wear, cracks, flaws and deformations.

Corrections shall be made in accordance with the manufacturer's recommendations.

Prior to Category III and Category IV inspections, all foreign material such as dirt, paint, grease, oil, scale, etc. shall be removed from the concerned parts by a suitable method (e.9. paint-stripping, steam-cleaning, grit-blasting).

Table 1 — Periodic inspection and maintenance — Categories and frequencies

Equipment	Frequency							
	days		months			years		
	1	7	1	3	6	1	2	5
	Inspection category							
Crown-block sheaves and bearings	I	II			III			IV
Drilling hooks (other than sucker-rod hooks)	I	II			III			IV
Travelling blocks, hook block and block-to-hook adapter	I	II			III			IV
Connectors and link adapters	I	II			III			IV
Tubing hooks and sucker-rod hooks	I	II			III	IV		
Elevator links	I	II			III	IV		
Casing elevators, tubing elevators, drill-pipe elevators and drill-collar elevators;	II				III	IV		
Sucker-rod elevators	II				III	IV		
Rotary swivel-bail adapters	I	II			III	IV		
Rotary swivels	I	II			III		IV	
Power swivels	I	II			III			IV
Power subs	I	II			III			IV
Spiders, if capable of being used as elevators	I	II			III	IV		
Dead-line tie-down/ wireline anchors	I	II			III			IV
Drill-string motion compensators	II				III			IV
Kelly spinners, if capable of being used as hoisting equipment	I	II			III			IV
Riser- and wellhead- running tools, if capable of being used as hoisting equipment	II				III	IV		
Safety clamps, if capable of being used as hoisting equipment	II				IV			

NOTE The above recommended frequencies apply for equipment in use during the specified period.

Calculations

Term	Description
bbl	Barrel
bpm	Barrels per minute
Cap	Capacity
Csg	Casing
DC	Drill collar
Disp	Displacement
DP	Drillpipe
DS	Drillstring
ECD	Equivalent circulating density
Eff	Efficiency
EMW	Equivalent mud weight
EOB	End of build
FCP	Final circulating pressure
FMDPP	Final maximum drillpipe pressure
FP	Formation pressure
ft	Foot
gal	Gallon
gpm	Gallons per minute
HP	Hydrostatic pressure
ICP	Initial circulating pressure
ID	Internal diameter
IMDPP	Initial maximum drillpipe pressure
KOP	Kick off point
KWM	Kill weight mud
MD	Measured depth
min	Minutes
MW	Mud weight
OD	Outer diameter
OMW	Original mud weight
pcf	Pounds per cubic foot
PP	Pump pressure
ppf	Pounds per foot
ppg	Pounds per gallon
psi	Pounds per square inch
PV	Plastic viscosity
Q	Flow rate
SF	Safety factor
SICP	Shut in casing pressure
SIDPP	Shut in drillpipe pressure
sk, sx	Sack, sacks
SPM	Strokes per minute
SPP	Slow pump pressure
stk	Stroke
TVD	True vertical depth
V	Velocity
Vol	Volume
YP	Yield point

Metric to Field Units Conversion

If You Have:	Multiply By:	To Get:
Meters (m)	x 3.2808	Feet
Centimeters (cm)	x 0.3937	Inches
Millimeters (mm)	x 0.03937	Inches
Metric Tons	x 2204.6	Pounds (Lbs)
Decanewtons (daN)	x 0.22481	Pounds (Lbs)
Kilograms	x 2.2046	Pounds
Kg/m	x 0.67196	Weight (Lbs/Ft)
Kg/m^3	x 0.3505	Pounds per Barrel
Liters	x 0.00629	Barrels
Cubic Meters	x 6.2898	Barrels
Liters	x 0.2642	Gallons
Cubic Meters	x 264.173	Gallons
Liters/Stroke	x 0.00629	Barrels/Stroke
Cubic Meters/Stroke	x 6.2898	Barrels/Stroke
Liters/Minute	x 0.2642	Gallons/Minute
Liters/Minute	x 0.00629	Barrels/Minute
Cubic Meters/Minute	x 6.2898	Barrels/Minute
Liters/Meter (l/m)	x 0.0019171	BBL/Ft. Capacity
Cubic Meters/Meter	x 1.917	BBL/Ft. Capacity
Liters/Meter (l/m)	x 0.0019171	BBL Displacement
Cubic Meters/Meter	x 1.9171	BBL Displacement
KPa/m	x 0.044207	Gradient PSI/Ft
Bar/m	x 4.4207	Gradient PSI/Ft
Kilograms/Liter (Kg/L)	x 8.3454	Mud Weight PPG
Kilograms/Cubic Meter	x 0.0083454	Mud Weight PPG
Specific Gravity (SG)	x 8.3454	Mud Weight PPG
Kg/m^3	x 6.24279	Mud Weight Lb/Ft^3)
Celsius Degrees	x 1.8 + 32	Fahrenheit Degrees
Pascals (Pa)	x 0.000145	PSI
Kilopascals (KPa)	x 0.14504	PSI
Bar	x 14.50377	PSI
Kg/Minute	X 8.475	BWPD @ 8.9 ppg
Kg/Minute	X 10.105	BOPD @ 7.74 ppg
Kg/Minute	X 0.071	mmCFD @ 0.6 sp.gr.

Field Units to Metric Conversion		
If You Have:	**Multiply By:**	**To Get:**
Feet	x 0.3048	Meters (M)
Inches	x 2.54	Centimeters (cm)
Inches	x 25.4	Millimeters (mm)
Pounds (Lbs)	x 0.0004536	Metric Tons
Pounds (Lbs)	x 0.44482	Decanewtons (daN)
Pounds	x 0.4536	Kilograms
Weight (Lbs/ft)	x 1.4882	Kg/M
Pounds per Barrel	x 2.85307	Kg/M^3
Barrels	x 158.987	Liters
Barrels	x 0.15898	Cubic Meters
Gallons	x 3.7854	Liters
Gallons	x 0.0037854	Cubic Meters
Barrels/Stroke	x 158.987	Liters/Stroke
Barrels/Stroke	x 0.158987	Cubic Meters/Stroke
Gallons/Minute	x 3.7854	Liters/Minute
Barrels/Minute	x 158.987	Liters/Minute
Barrels/Minute	x 0.158987	Cubic Meters/Minute
bbl/ft. Capacity	x 521.612	Liters/Meter (L/M)
bbl/ft. Capacity	x 0.521612	Cubic Meters/Meter
Bbl Displacement	x 521.612	Liters/Meter (L/M)
Bbl Displacement	x 0.521612	Cubic Meters/Meter
Gradient psi/ft	x 22.6206	KPa/M
Gradient psi/ft	x 0.226206	Bar/M
Mud Weight PPG	x 0.119826	Kilograms/Liter (Kg/L)
Mud Weight PPG	x 119.826	Kilograms/Cubic Meter
Mud Weight PPG	x 0.119826	Specific Gravity (SG)
Mud Weight (Lb/Ft^3)	x 1.60185	Kg/M^3
Fahrenheit Degrees	x 0.56 – 17.8	Celsius Degrees
PSI	x 6894.8	Pascals (Pa)
PSI	x 6.8948	Kilopascals (KPa)
PSI	x 0.06895	Bar
BWPD @ 8.9 ppg	X 0.118	Kg/Min
BOPD @ 7.74 ppg	X 0.099	Kg/Min
mmCFD @ 0.6 sp. gr.	X 14.1	Kg/Min

Capacities & Volumes for Downhole

Capacities

$$\text{Open Hole Capacity}_{bbl/ft}\ (OHCap) = \frac{(\text{Hole Diameter}_{inches})^2}{1{,}029.4}$$

$$\text{Casing Capacity}_{bbl/ft}\ (CsgCap) = \frac{(\text{Casing ID}_{inches})^2}{1{,}029.4}$$

$$\text{Drill String Capacity}_{bbl/ft}\ (DSCap) = \frac{(\text{Pipe ID}_{inches})^2}{1{,}029.4}$$

$$\text{OH x DS Annular Capacity}_{bbl/ft}\ (OH \times DSCap) = \frac{(\text{Hole Diameter}_{inches})^2 - (\text{OD String}_{inches})^2}{1{,}029.4}$$

$$\text{Csg x DS Annular Capacity}_{bbl/ft}\ (Csg \times DSCap) = \frac{(\text{Casing ID}_{inches})^2 - (\text{OD String}_{inches})^2}{1{,}029.4}$$

$$\text{Multiple String Annular Capacity}_{bbl/ft}\ (MSACap) = \frac{(\text{Casing ID}_{inches})^2 - \left[(\text{OD Pipe1}_{inches})^2 + (\text{OD Pipe2}_{inches})^2\right]}{1{,}029.4}$$

Volumes per Section

$$\text{Open Hole Volume}_{bbl}\ (OHVol) = OHCap_{bbl/ft} \times \text{Length}_{ft}$$

$$\text{Casing Volume}_{bbl}\ (CsgVol) = CsgCap_{bbl/ft} \times \text{Length}_{ft}$$

$$\text{Drill String Volume}_{bbl}\ (DSVol) = DSCap_{bbl/ft} \times \text{Length}_{ft}$$

$$\text{OH x DS Annular Volume}_{bbl}\ (OH \times DSVol) = (OH \times DSCap)_{bbl/ft} \times \text{Length}_{ft}$$

$$\text{Csg x DS Annular Volume}_{bbl}\ (Csg \times DSVol) = (Casg \times DSCap)_{bbl/ft} \times \text{Length}_{ft}$$

$$\text{Multiple String Annular Volume}_{bbl}\ (MSAVol) = MSACap_{bbl/ft} \times \text{Length}_{ft}$$

Capacities & Volumes of Tanks

Vertical Cylindrical Tanks

$$Capacity_{bbl/ft} = \frac{(Tank\ Diameter_{ft})^2}{7.148}$$

$$Capacity_{bbl/ft} = \frac{(Tank\ Diameter_{inches})^2}{1{,}029.4}$$

$$Capacity_{bbl/inch} = \frac{(Tank\ Diameter_{ft})^2}{85.78}$$

$$Capacity_{bbl/inch} = \frac{(Tank\ Diameter_{inches})^2}{12{,}352.9}$$

$$Volume_{bbl} = Capacity_{bbl/ft} \times Height_{ft}$$

$$Volume_{bbl} = Capacity_{bbl/inch} \times Height_{inches}$$

Rectangular Tanks

$$Capacity_{bbl/ft} = 0.178 \times Length_{ft} \times Width_{ft}$$

$$Capacity_{bbl/inch} = 0.0148 \times Length_{ft} \times Width_{ft}$$

$$Volume_{bbl} = Capacity_{bbl/ft} \times Height_{ft}$$

$$Volume_{bbl} = Capacity_{bbl/inch} \times Height_{inches}$$

Horizontal Cylindrical Tanks

$$Volume\ of\ Tank_{bbl} = Length_{ft} \times \frac{(Tank\ Diameter_{inches})^2}{1{,}029.4}$$

Content from Volume (for Horizontal Tanks)

$$Height\ Ratio = \frac{Height\ of\ Content_{inches}}{Height\ of\ Tank_{inches}}$$

FIND VOLUME FACTOR FROM TABLE USING CALCULATED HEIGHT RATIO:

$$Content\ in\ Tank_{bbl} = Vol\ of\ Tank_{bbl} \times Volume\ Factor$$

Height Ratio	Volume Factor	Height Ratio	Volume Factor
0.05	0.019	0.55	0.560
0.10	0.052	0.60	0.626
0.15	0.092	0.65	0.690
0.20	0.142	0.70	0.747
0.25	0.195	0.75	0.800
0.30	0.252	0.80	0.857
0.35	0.310	0.85	0.900
0.40	0.373	0.90	0.948
0.45	0.430	0.95	0.980
0.50	0.500	1.00	1.000

Pump Output & Rate Formulas

Pump Outputs

FOR TRIPLEX PUMPS:

$$Output_{bbl/stk} = 0.000243 \times (Liner\ ID_{inches})^2 \times Stroke_{inches} \times Eff\%$$

FOR DUPLEX PUMPS (DOUBLE ACTING):

$$Output_{bbl/stk} = 0.000162 \times [2 \times (Liner\ ID_{inches})^2 - (Rod\ OD_{inches})^2] \times Stroke_{inches} \times Eff\%$$

Pump Rates

$$Rate_{bpm} = Output_{bbl/stk} \times SPM$$

$$Rate_{gpm} = 42 \times Output_{bbl/stk} \times SPM$$

Pumping/Spotting/Displacing

$$Time_{min} = \frac{BBL\ to\ Pump}{Output_{bbl/stk} \times SPM}$$

Pump Pressure Relationships

New Pump Pressure (PP) for Rate Change

$$New\ PP_{psi} = \left(\frac{New\ Rate_{bpm}}{Old\ Rate_{bpm}}\right)^2 \times Old\ PP_{psi}$$

$$New\ PP_{psi} = \left(\frac{New\ SPM}{Old\ SPM}\right)^2 \times Old\ PP_{psi}$$

New Pump Pressure (PP) for Density Change

$$New\ PP_{psi} = \frac{New\ MW_{ppg}}{Original\ MW_{ppg}} \times Original\ PP_{psi}$$

Equivalent Circulating Density (ECD)

Equivalent Circulating Density (ECD_{ppg}) using Pressure Loss

$$ECD_{ppg} = MW_{ppg} + \frac{\text{Annular Friction Pressure Loss}_{psi}}{0.052 \times TVD_{ft}}$$

Where:

Annular Friction Pressure Loss in psi is approximately equal to 10% of the pump pressure for normal hole geometries (i.e., no liners or tapered strings).

Equivalent Circulating Density (ECD_{ppg}) using Yield Point (YP) for MW ≤ 13 ppg

$$ECD_{ppg} = MW_{ppg} + \frac{0.1 \times YP}{\text{Hole Diameter}_{inches} - \text{Pipe OD}_{inches}}$$

Where:

YP = Fann 300 reading − PV

PV = Fann 600 reading − Fann 300 reading

Equivalent Circulating Density (ECD_{ppg}) using Yield Point (YP) for MW > 13 ppg

$$ECD_{ppg} = MW_{ppg} + \frac{0.1}{\text{Hole Diameter}_{inches} - \text{Pipe OD}_{inches}} \times \left(YP + \frac{PV \times V_{ft/min}}{300 \times (\text{Hole Diameter}_{inches} - \text{Pipe OD}_{inches})} \right)$$

Trip Calculations

$Trip\ Margin_{ppg}$

$$Trip\ Margin_{ppg} = \frac{YP_{mud}}{11.7 \times (\text{Hole Diameter}_{inches} - \text{Pipe OD}_{inches})}$$

$$Trip\ Margin_{ppg} = \frac{\text{Annular Pressure Loss}_{psi}}{0.052 \times TVD_{ft}}$$

Slug Mud $Weight_{ppg}$ for a given Length of Dry Pipe

$$Slug\ Weight_{ppg} = MW_{ppg} + \frac{(MW_{ppg} \times \text{Length Dry Pipe}_{ft} \times \text{DP Cap}_{bbl/ft})}{\text{Volume of Slug}_{bbl}}$$

Slug $Volume_{bbl}$ for a given Length of Dry Pipe

$$Slug\ Volume_{bbl} = \frac{MW_{ppg} \times \text{Length Dry Pipe}_{ft} \times \text{DP Cap}_{bbl/ft}}{\text{Slug MW}_{bbl} - MW_{ppg}}$$

Trip Calculations, continued

Pit Gain from Slug$_{bbl}$

$$\text{Pit Gain}_{bbl} = \text{Slug Volume}_{bbl} \times \frac{\text{Slug Weight}_{ppg} - \text{MW}_{ppg}}{\text{MW}_{ppg}}$$

Depth Slug Falls$_{ft}$

$$\text{Depth Slug Falls}_{ft} = \frac{\text{Pit Gain from Slug}_{bbl}}{\text{DP Cap}_{bbl/ft}}$$

Hydrostatic Pressure Drop per Vertical Foot ($\Delta P_{psi/ft}$) when Pulling Dry Pipe

$$\Delta P_{psi/ft} = \frac{0.052 \times \text{MW}_{ppg} \times \text{DP Displ}_{bbl/ft}}{\text{Annulus Cap}_{bbl/ft} + \text{DP Cap}_{bbl/ft}}$$

Hydrostatic Pressure Drop per Vertical Foot ($\Delta P_{psi/ft}$) when Pulling Wet Pipe

$$\Delta P_{psi/ft} = 0.052 \times \text{MW}_{ppg} \times \frac{(\text{DP Cap}_{bbl/ft} + \text{DP Displ}_{bbl/ft})}{\text{Annulus Cap}_{bbl/ft}}$$

Length of Dry Pipe Pulled Before Fill-Up for Desired Pressure Drop ΔP

$$\text{Length}_{ft} = \frac{\Delta P_{psi} \times (\text{Annulus Cap}_{bbl/ft} + \text{DP Cap}_{bbl/ft})}{0.052 \times \text{MW}_{ppg} \times \text{DP Displ}_{bbl/ft}}$$

Length of Wet Pipe Pulled Before Fill-Up for Desired Pressure Drop ΔP

$$\text{Length}_{ft} = \frac{\Delta P_{psi} \times \text{Annulus Cap}_{bbl/ft}}{0.052 \times \text{MW}_{ppg} \times (\text{DP Cap}_{bbl/ft} + \text{DP Displ}_{bbl/ft})}$$

Pressure & Gradient Formulas

Fluid Gradient (Gradient$_{psi/ft}$)

$$\text{Gradient}_{psi/ft} = 0.052 \times \text{Fluid Density}_{ppg}$$

$$\text{Gradient}_{psi/ft} = 0.007 \times \text{Fluid Density}_{pcf}$$

$$\text{Gradient}_{psi/ft} = 0.433 \times \text{Specific Gravity (SG)}$$

Hydrostatic Pressure (HP_{psi})

$$HP_{psi} = \text{Gradient}_{psi/ft} \times TVD_{ft}$$

$$HP_{psi} = 0.052 \times \text{MW}_{ppg} \times TVD_{ft}$$

$$HP_{psi} = 0.007 \times \text{MW}_{pcf} \times TVD_{ft}$$

$$HP_{psi} = 0.433 \times SG \times TVD_{ft}$$

Kill Sheet Calculations

(All formulas based on single bubble in water based mud.)

SEE SAMPLE KILL SHEET ON PAGE 30/31.

Kill Weight Mud (KWM_{ppg}) from Original Mud Weight (OMW_{ppg})

$$KWM_{ppg} = \frac{SIDPP_{psi}}{(0.052 \times TVD_{ft})} + OMW_{ppg}$$

Initial Circulating Pressure (ICP_{psi})

$$ICP_{psi} = SIDPP_{psi} + SPP_{psi}$$

Final Circulating Pressure (FCP_{psi})

$$FCP_{psi} = \frac{SPP_{psi} \times KWM_{ppg}}{OMW_{ppg}}$$

Strokes to Bit (STB)

$$STB = \frac{\text{Drillstring Volume}_{bbl}}{\text{Output}_{bbl/stk}}$$

Strokes for KWM to Shoe

$$\text{Strokes to Shoe} = \frac{\text{Openhole Annular Volume}_{bbl}}{\text{Output}_{bbl/stk}} + STB$$

Strokes for KWM to Surface

$$\text{Strokes to Surface} = \frac{\text{Total Annular Volume}_{bbl}}{\text{Output}_{bbl/stk}} + STB$$

Time for KWM to Bit

$$\text{Time to Bit}_{min} = \frac{STB}{SPM}$$

Time for KWM to Shoe

$$\text{Time to Shoe}_{min} = \frac{\text{Strokes to Shoe}}{SPM}$$

Time for KWM to Surface

$$\text{Time to Surface} = \frac{\text{Strokes to Surface}}{SPM}$$

Kick Related Engineering

(All formulas based on single bubble in water based mud.)

Bottom Hole Pressure (BHP_{psi}) while Circulating on the Choke

$$BHP_{psi} = \text{Hydrostatic Pressure}_{psi}\ \text{Mud in Drillstring} + SIDPP_{psi}$$

Equivalent Mud Weight (EMW_{ppg}) at Bottom Hole while Circulating out a Kick

$$EMW_{ppg} = \frac{BHP_{psi}}{0.052 \times TVD_{ft}}$$

Shut-In Casing Pressure ($SICP_{psi}$)

$$SICP_{psi} = SIDPP_{psi} + [0.052 \times (MW_{ppg} - \text{Kick Density}_{ppg}) \times \text{Length of Influx}_{VDft}$$

Formation Pressure (FP_{psi})

$$FP_{psi} = SIDPP_{psi} + [0.052 \times OMW_{ppg} \times TVD_{ft}]$$

$$FP_{psi} = SICP + 0.052 \times [(\text{Kick Length}_{VDft} \times \text{Kick Density}_{ppg}) + (\text{Mud Column}_{ft} \times OMW_{ppg})]$$

% Reduction in Hydrostatic Pressure Due to Gas-Cut Mud (GCMW) $\%\Delta P_{gcm}$ (for water-base mud)

$$\%\Delta P_{gcm} = \frac{100 \times (OMW_{ppg} - GCMW_{ppg})}{GCMW_{ppg}}$$

Leak-Off Test Pressure (LOT_{psi}) and Equivalent Mud Weight (EMW_{LOT}) at Shoe

$$LOT_{psi} = 0.052 \times \text{Test } MW_{ppg} \times TVD_{shoe} + \text{Applied Pressure to Leak-Off}_{psi}$$

$$EMW_{LOT\,ppg} = \frac{LOT_{psi}}{TVD_{shoe}}$$

Formation Integrity Test Pressure (FIT_{psi}) and Equivalent Mud Weight (EMW_{FIT}) at Shoe

$$FIT_{psi} = 0.052 \times \text{Test } MW_{ppg} \times TVD_{shoe} + \text{Applied Integrity Pressure}_{psi}$$

$$EMW_{FIT\,ppg} = \frac{FIT_{psi}}{TVD_{shoe}}$$

Maximum Formation Pressure that can be Controlled with a Well Shut-In

$$\text{Max } FP_{psi} = 0.052 \times (KT_{ppg} + MW_{ppg}) \times TVD_{ft}$$

Kick Related Engineering Calculations, continued

(All formulas based on single bubble in water based mud.)

Maximum Kick Height Possible not to Exceed MASP

$$\text{Kick Height}_{TVDft} = \frac{\text{MASP}}{\text{Mud Gradient}_{psi/ft} - \text{Kick Gradient}_{psi/ft}}$$

Maximum Kick Volume Possible not to Exceed MASP

$$\text{Kick Volume}_{bbl} = \text{Kick Height}_{ft} \times \text{Annulus Cap}_{bbl/ft}$$

Volumetric Method Calculations

Initial Pressure Build Increment (ΔIP)

$$\Delta IP_{psi} = \text{Safety Margin}_{psi} + \text{Range}_{psi}$$

Cycle Pressure Build Increment (ΔCP)

$$\Delta CP_{psi} = \text{Range}_{psi}$$

Hydrostatic Pressure ($\Delta HPL_{psi/bbl}$) Loss per Barrel of Mud Bled in Upper Annulus

$$\Delta HPL_{psi/bbl} = \frac{\text{Gradient Mud}_{psi/ft}}{\text{Annulus Cap}_{bbl/ft} \text{ at top of hole}}$$

Bleed Volume (bbl) per Cycle

$$Vol_{bleed} = \frac{\Delta CP_{psi}}{\Delta HPL_{psi/bbl}}$$

Lubricate & Bleed Calculations

Cycle Hydrostatic Pressure Gain ($\Delta HP_{psi/bbl}$) per Barrel of Mud Pumped in Upper Annulus

$$\Delta HP_{psi/bbl} = \frac{\text{Gradient Lube Mud}_{psi/ft}}{\text{Annulus Cap}_{bbl/ft} \text{ at top of hole}}$$

Cycle Hydrostatic Pressure Increase (ΔHPI_{psi}) or Lubricated Volume (ΔVOL_{bbl}) to be Bled Off

$$\Delta HPI_{psi} = \frac{\text{Gradient Lube Mud}_{psi/ft} \times \Delta VOL_{bbl}}{\text{Annulus Cap}_{bbl/ft} \text{ at top of hole}}$$

$$\Delta VOL_{bbl} = \frac{\Delta HPI_{psi} \times \text{Annulus Cap}_{bbl/ft} \text{ at top of hole}}{\text{Gradient Lube Mud}_{psi/ft}}$$

Lubricate & Bleed Calculations

Simplified Equation for Lubrication

$$P_3 = \frac{P_1^2}{P_2}$$

Where:

P_1 = Original shut in pressure

P_2 = Pressure increase due to pumping lubricating fluid into the well bore (increase due to compression)

P_3 = pressure to bleed down after adding the hydrostatic of the lubricating fluid

Procedure:

1. Select a working pressure range, Pw. Recommended Pw = 50-100 psi.
2. Pump lubricating fluid through the kill line to increase the casing pressure by the working pressure, Pw.
3. Allow the pressure to stabilize. The pressure may drop by a substantial amount.
4. Calculate the pressure to bleed down to by using the formula above.
5. Repeat steps 2 through 4 until all the gas is lubricated out of the well.

Bullheading Calculations

Kill Weight Mud (KM_{ppg})

$$KWM_{ppg} = \frac{\text{Formation Pressure}_{psi}}{0.052 \times \text{Perfs Depth}_{TVDft}}$$

Formation Integrity Pressure (FIT_{psi}) at Perfs Depth

$$FIT_{psi} = 0.052 \times (EMW_{FIT\ ppg}\ \text{at perf}) \times \text{Perfs TVD}_{ft}$$

Hydrostatic Pressure (HP_{psi}) in Drillpipe

$$HP_{psi} = \text{Formation Pressure}_{psi} - SIDPP_{psi}$$

Initial Maximum Drillpipe Pressure ($IMDPP_{psi}$)

$$IMDPP_{psi} = FIT_{psi} - HP_{psi}$$

Hydrostatic Pressure from KWM_{ppg} ($KMHP_{psi}$)

$$KMHP_{psi} = 0.052 \times KWM_{ppg} \times \text{Perfs TVD}_{ft}$$

Final Maximum Drillpipe Pressure ($FMDPP_{psi}$)

$$FMDPP_{psi} = FIT_{psi} - KMHP_{psi}$$

Stripping/Snubbing Calculations

Breakover Point Between Stripping & Snubbing

$$\text{Snub Force}_{lb} = \text{Wellbore Pressure}_{psi} \times (\text{DP or DC OD}_{in})^2 \times 0.7854 + \text{Friction Force}_{lb}$$

$$\text{DC Weight}_{lb} = \text{DC Weight}_{lb/ft} \times \text{DC Length}_{ft} \times \text{Buoyancy Factor}$$

$$\text{DP Weight Required for Breakover}_{lb} = \text{Snub Force}_{lb} - \text{DC Weight}_{lb}$$

$$\text{Length of DP Required for Breakover}_{ft} = \frac{\text{DP Weight Required for Breakover}_{lb}}{\text{DP Weight}_{lb/ft} \times \text{Bouyancy Factor}}$$

$$\text{Friction Force}_{lb} = \text{Friction Through Pressure Control Elements}$$

Influx Height Gain from Stripping Into

$$\Delta\text{Height}_{ft} = \frac{\text{Pipe Length}_{strip} \times (\text{DP Cap}_{bbl/ft} + \text{DP Displ}_{bbl/ft})}{\text{Annulus Cap}_{bbl/ft}}$$

Casing Pressure Increase (ΔSICP) from Stripping into an Influx

$$\Delta\text{SICP}_{psi} = \Delta\text{Height}_{ft} \times (\text{Gradient}_{mud} - \text{Gradient}_{influx})$$

Mud Volume to Bleed to Maintain Constant Bottom Hole Pressure

$$\text{Bleed Mud}_{bbl} = \frac{\text{Csg Pressure Increment}_{psi} \times \text{Annulus Cap}_{bbl/ft}}{\text{Mud Gradient}_{psi/ft}}$$

Accumulator Sizing, continued

Accumulator Volume Required

Usable hydraulic fluid for operation of blowout preventer equipment is affected by system pressure and nitrogen precharge. If the nitrogen precharge is at the correct (recommended) precharge, multiply the sizing factor from the table below times the fluid volume required to operate a specified number of BOP functions (Vol_{req}) will provide the required total accumulator volume.

Accumulator System Pressure	Minimum Recommended Precharge Pressure	Useable Fluid	Accumulator Size Factor*
1,500	750	12.5%	8
2,000	1,000	33.0%	3
3,000	1,000	50.0%	2
5,000	1,000	63.0%	1.6

** Based on minimum system pressure of 1,200 psi.*

Accumulator Volume Example

If the total fluid required for a BOP stack is 33 gallons, including the safety factor, and the accumulator has an operating pressure of 3,000 psi with a 1,000 psi minimum precharge, the accumulator volume required is 33 gallons times the size factor of 2, or 66 gallons.

Accumulator Usable Fluid Volume

Usable Volume = VR(Volume Required) x Bottle Volume

$$\text{Where VR} = \frac{\text{Precharge press}}{\text{Min operating press}} - \frac{\text{Precharge press}}{\text{Max operating press}}$$

Tubular data sheets

Eqp	Size	PPF	Cap.	Dis.	Conn.	Torq. LB/FT	ID
DP	2 3/8"	6.65	0.0032	0.0028	2 3/8 IF	4900	1 ¾"
DP	3 ½"	15.5(S)	0.007421	0.00058	3.5 IF	10200	2.76"
DP	3 ½"	15.5(G)	0.007421	0.00058	3.5 IF	10200	2.76"
DP	5"	19.5 (G)	0.0174	0.0076	4 ½ IF	21914	4.27"
DP	5 ½"	24.7 (G)	0.0211	0.0096	5 ½ FH	36300	4.678"
HW	5 ½"	57	0.0119	0.0207	5 ½ FH	33200	3.5"
HW	6 5/8"	70.8	0.0208	0.0257	6 5/8 FH	46875	4"
HW	3 ½"	26	0.04132	0.009204	3 ½ IF	9900	2 5/16"
HW	5"	50	0.00874	0.017936	4 ½ IF	29500	2 13/16"
DC	3 1/8"	22	0.00151	0.008	2 3/8 R	3000	1 ¼"
DC	4 ¾"	47	0.004918	0.0171	3 1/2	9900	2 ¼"
DC	6 ½"	92	0.007684	0.0335	4 ½ IF	29500	2 13/16"
DC	8 ¼"	161	0.00768	0.0586	6 5/8 R	53000	2 13/16"
DC	8 ½"	166	0.007684	0.05712	6 5/8 R	55650	
DC	9 ½"	208	0.000874	0.08004	7 5/8 R	91600	2 ¾"
DC	10"	243	0.00874	0.0884	7 5/8H90	105000	3"
DC	14"	498	0.0119	0.1813	8 5/8H90	128000	3 ½"

code	Description
IF	Internal Flush
EH or XH	Extra Hole
SH	Slim Hole
OH	Open Hole
SL - H-90	Slim Line-Hughes-90
FH	Full Hole
H-90	Hughes-90
WO	Wide Open
NC	Numbered Connection

DATA SHEET		WT LB/F	OD	ID	CAP BBL/F	DRILL COLLAR				HWDP		DP	
						93/4	81/4	7	43/4	51/2	4	51/2	4
CONNECTION		-	-	-	-	7 5/8 R	65/8R	NC50	NC38	VX54	VX39	VX54	VX39
ID	IN	-	-	-	-	3	3	2 13/16	2 1/2	3 7/8	2 9/16	4.778	3.24
WT	LB/FT	-	-	-	-	230	158	110	44	53.42	33.57	21.9	15.7
ADJ WT AS PER VAM DRILLING				-	-	210.19	147.13	101.44	40.30	53.42	33.57	21.96	17.54
DIS	BBL/FT	-	-	-	-	.0765	.0536	.0369	.0147	.0194	.0122	.0091	.0046
CAP	BBL/FT	-	-	-	-	.0087	.0087	.0077	.0061	.0146	.0064	.0222	.0102
Open hole bit size	26	-	-	-	.5590	.5643	.5906	.6091	-	.6273	-	.6273	-
	17 1/2	-	-	-	.2532	.2052	.2314	.2499	-	.2681	-	.2681	-
	12 1/4	-	-	-	.1241	.0534	.0797	.0982	-	.1164	-	.1164	-
	8 1/2	-	-	-	.0597	-	-	-	.0483	.0408	-	.0408	-
	6	-	-	-	.0298	-	-	-	.0131	-	.0194	-	.0194
Casing	20	94	21	19.124	.3553	.2629	.2892	.3077	-	.3259	-	.3259	-
	18 5/8	87.5	19.6	17.755	.3062	.2139	.2401	.2586	-	.2769	-	.2769	-
	13 5/8	72	14.3	12.415	.1497	.0574	.0836	.1021	-	.1203	-	.1203	-
	13 5/8	68	14.3	12.347	.1481	.0557	.0820	.1005	-	.1187	-	.1187	-
	9 5/8	47	10.6	8.681	.0732	-	-	.0256	.0513	.0438	.0577	.0438	.0577
	9 5/8	43.5	10.6	8.755	.0745	-	-	.0269	.0525	.0451	.0589	.0451	.0589
	7	29	7.65	6.184	.0371	-	-	-	.0152	-	.0216	-	.0216
M/ UP TOURQE (FOOT POUNDS)						88600	50700	32300	10000	43000	18900	32000	14300
RIG TONG LINE PULL LENGTH 4.2						21095	12071	7690	2381	10238	4500	7619	3405
OVER PULL (TENSHILE STRENGTH) KLBS						-	-	-	-	1080	667	483	355

Torque drilling bit

Size	*Connection*	*Torque rollercon LB/FT*	*Torque PDC LB/FT*
36"	8 5/8" R	40000-60000	-
28"	8 5/8" R	40000-60000	-
22"	7 5/8" R	34000-40000	-
17 ½"	7 5/8" R	34000-40000	-
12 ¼"	6 5/8" R	28000-32000	37100-38500
8 ½"	4 ½ R	12000-16000	12450-17750
6"	3 ½ R	7000-9000	5175-7660
4 ½"	2 7/8 R	3075-4650	-
4 ½"	2 3/8 R	2400-4120	-

DRILL PIPE DATA TABLES

The following tables provide data for the drill string. Data are given for the pipe body, tool joint, and drill pipe assembly.

The tool joint sizes displayed represent common O.D. and I.D. configurations, although additional size combinations are available.

Pipe Data

Size OD in.	Nominal Weight lb/ft	Grade and Upset Type	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Wall Thickness in.	Nominal ID in.	Pipe Body Section Area sq in.	Pipe Body Section Modulus cu in.	Pipe Body Polar Section Modulus cu in.	Internal Pressure psi	Collapse Pressure psi
2 3/8	6.65	E-75 EU	6,300	138,200	0.280	1.815	1.843	0.867	1.733	15,474	15,599
	6.65	E-75 EU	6,300	138,200	0.280	1.815	1.843	0.867	1.733	15,474	15,599
	6.65	E-75 EU	6,300	138,200	0.280	1.815	1.843	0.867	1.733	15,474	15,599
2 3/8	6.65	X-95 EU	7,900	175,100	0.280	1.815	1.843	0.867	1.733	19,600	19,759
	6.65	X-95 EU	7,900	175,100	0.280	1.815	1.843	0.867	1.733	19,600	19,759
	6.65	X-95 EU	7,900	175,100	0.280	1.815	1.843	0.867	1.733	19,600	19,759
2 3/8	6.65	G-105 EU	8,800	193,500	0.280	1.815	1.843	0.867	1.733	21,663	21,839
	6.65	G-105 EU	8,800	193,500	0.280	1.815	1.843	0.867	1.733	21,663	21,839
	6.65	G-105 EU	8,800	193,500	0.280	1.815	1.843	0.867	1.733	21,663	21,839
2 3/8	6.65	S-135 EU	11,300	248,800	0.280	1.815	1.843	0.867	1.733	27,853	28,079
	6.65	S-135 EU	11,300	248,800	0.280	1.815	1.843	0.867	1.733	27,853	28,079
	6.65	S-135 EU	11,300	248,800	0.280	1.815	1.843	0.867	1.733	27,853	28,079
	6.65	S-135 EU	11,300	248,800	0.280	1.815	1.843	0.867	1.733	27,853	28,079
2 3/8	6.65	Z-140 EU	11,700	258,000	0.280	1.815	1.843	0.867	1.733	28,884	29,119
	6.65	Z-140 EU	11,700	258,000	0.280	1.815	1.843	0.867	1.733	28,884	29,119
	6.65	Z-140 EU	11,700	258,000	0.280	1.815	1.843	0.867	1.733	28,884	29,119
	6.65	Z-140 EU	11,700	258,000	0.280	1.815	1.843	0.867	1.733	28,884	29,119
2 3/8	6.65	V-150 EU	12,500	276,400	0.280	1.815	1.843	0.867	1.733	30,947	31,199
	6.65	V-150 EU	12,500	276,400	0.280	1.815	1.843	0.867	1.733	30,947	31,199
	6.65	V-150 EU	12,500	276,400	0.280	1.815	1.843	0.867	1.733	30,947	31,199
	6.65	V-150 EU	12,500	276,400	0.280	1.815	1.843	0.867	1.733	30,947	31,199
2 7/8	6.85	E-75 IU	8,100	135,900	0.217	2.441	1.812	1.121	2.241	9,907	10,467
	6.85	E-75 IU	8,100	135,900	0.217	2.441	1.812	1.121	2.241	9,907	10,467
	6.85	E-75 EU	8,100	135,900	0.217	2.441	1.812	1.121	2.241	9,907	10,467
	6.65	E-75 IU	8,100	135,900	0.217	2.441	1.812	1.121	2.241	9,907	10,467
	6.85	E-75 EU	8,100	135,900	0.217	2.441	1.812	1.121	2.241	9,907	10,467
	6.85	E-75 EU	8,100	135,900	0.217	2.441	1.812	1.121	2.241	9,907	10,467
2 7/8	6.85	X-95 IU	10,200	172,100	0.217	2.441	1.812	1.121	2.241	12,548	12,940
	6.85	X-95 IU	10,200	172,100	0.217	2.441	1.812	1.121	2.241	12,548	12,940
	6.85	X-95 EU	10,200	172,100	0.217	2.441	1.812	1.121	2.241	12,548	12,940
	6.65	X-95 IU	10,200	172,100	0.217	2.441	1.812	1.121	2.241	12,548	12,940
	6.85	X-95 EU	10,200	172,100	0.217	2.441	1.812	1.121	2.241	12,548	12,940
	6.85	X-95 EU	10,200	172,100	0.217	2.441	1.812	1.121	2.241	12,548	12,940
2 7/8	6.85	G-105 IU	11,300	190,300	0.217	2.441	1.812	1.121	2.241	13,869	14,020
	6.85	G-105 IU	11,300	190,300	0.217	2.441	1.812	1.121	2.241	13,869	14,020
	6.85	G-105 EU	11,300	190,300	0.217	2.441	1.812	1.121	2.241	13,869	14,020
	6.65	G-105 IU	11,300	190,300	0.217	2.441	1.812	1.121	2.241	13,869	14,020
	6.85	G-105 EU	11,300	190,300	0.217	2.441	1.812	1.121	2.241	13,869	14,020
	6.85	G-105 EU	11,300	190,300	0.217	2.441	1.812	1.121	2.241	13,869	14,020
2 7/8	6.85	S-135 IU	14,500	244,600	0.217	2.441	1.812	1.121	2.241	17,832	17,034
	6.85	S-135 IU	14,500	244,600	0.217	2.441	1.812	1.121	2.241	17,832	17,034
	6.85	S-135 EU	14,500	244,600	0.217	2.441	1.812	1.121	2.241	17,832	17,034
	6.65	S-135 IU	14,500	244,600	0.217	2.441	1.812	1.121	2.241	17,832	17,034
	6.85	S-135 EU	14,500	244,600	0.217	2.441	1.812	1.121	2.241	17,832	17,034
	6.85	S-135 EU	14,500	244,600	0.217	2.441	1.812	1.121	2.241	17,832	17,034

DRILL PIPE DATA TABLES

Grant Prideco offers all API tool joint connections as well as most non-API connections. Custom specifications and special sizes can be provided to meet specific requirements.

The technical data are calculated per API RP7G Latest Edition and API Spec 5D Latest Edition.

Tool Joint Data									Assembly Data					
Connection Type	Outside Diameter in.	Inside Diameter in.	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Make-up Torque ft-lb	Torsional Ratio Tool Joint to Pipe	* Pin Tong Space in.	* Box Tong Space in.	Adjusted Weight lb/ft	Minimum Tool Joint OD for Prem. Class in.	Drift Diameter in.	Capacity US gal/ft	Displace-ment US gal/ft	Size OD in.
NC26	3 3/8	1 3/4	6,900	313,700	3,900	1.10	9	10	7.17	3 3/16	1 5/8	0.134	0.110	2 3/8
HT26	3 3/8	1 3/4	8,700	313,700	5,200	1.38	9	12	7.25	N/A	1 5/8	0.134	0.111	
SLH90	3 1/4	1 13/16	6,900	270,200	3,700	1.10	9	10	7.00	3 1/32	1 11/16	0.134	0.107	
NC26	3 3/8	1 3/4	6,900	313,700	3,900	0.87	9	10	7.17	3 1/4	1 5/8	0.134	0.110	2 3/8
HT26	3 3/8	1 3/4	8,700	313,700	5,200	1.10	9	12	7.25	N/A	1 5/8	0.134	0.111	
SLH90	3 1/4	1 13/16	6,900	270,200	3,700	0.87	9	10	7.00	3 3/32	1 11/16	0.134	0.107	
NC26	3 3/8	1 3/4	6,900	313,700	3,900	0.78	9	10	7.17	3 9/32	1 5/8	0.134	0.110	2 3/8
HT26	3 3/8	1 3/4	8,700	313,700	5,200	0.99	9	12	7.25	N/A	1 5/8	0.134	0.111	
SLH90	3 1/4	1 13/16	6,900	270,200	3,700	0.78	9	10	7.00	3 1/8	1 11/16	0.134	0.107	
NC26	3 5/8	1 1/2	9,000	390,300	4,900	0.80	9	10	7.62	3 13/32	1 3/8	0.132	0.117	2 3/8
HT26	3 3/8	1 5/8	9,500	353,400	5,700	0.84	9	12	7.35	N/A	1 1/2	0.133	0.112	
SLH90	3 1/4	1 11/16	7,700	311,500	4,200	0.68	9	10	7.10	3 7/32	1 9/16	0.133	0.109	
GPDS26	3 1/2	1 11/16	9,700	333,900	5,800	0.86	9	10	7.35	3 5/16	1 9/16	0.133	0.112	
XT24	3 1/8	1 1/2	9,500	261,500	5,700	0.81	10	15	7.32	2 15/16	1 3/8	0.131	0.112	2 3/8
XT26	3 3/8	1 5/8	12,600	330,600	7,600	1.08	10	15	7.52	3 1/32	1 1/2	0.132	0.115	
HT26	3 3/8	1 5/8	9,500	353,400	5,700	0.81	9	12	7.35	N/A	1 1/2	0.133	0.112	
GPDS26	3 1/2	1 5/8	10,500	353,400	6,300	0.90	9	10	7.39	3 5/16	1 1/2	0.133	0.113	
XT24	3 1/8	1 3/8	10,400	295,400	6,200	0.83	10	15	7.41	2 15/16	1 1/4	0.130	0.113	2 3/8
XT26	3 3/8	1 1/2	13,200	367,400	7,900	1.06	10	15	7.62	3	1 3/8	0.131	0.117	
HT26	3 3/8	1 1/2	10,100	390,300	6,100	0.81	9	12	7.45	N/A	1 3/8	0.131	0.114	
GPDS26	3 1/2	1 1/2	11,200	390,300	6,700	0.90	9	10	7.48	3 9/32	1 3/8	0.132	0.114	
NC26	3 3/8	1 3/4	6,900	313,700	3,900	0.85	9	10	7.19	3 9/32	1 5/8	0.236	0.110	2 7/8
HT26	3 3/8	1 3/4	8,700	313,700	5,200	1.07	9	12	7.27	N/A	1 5/8	0.235	0.111	
NC31	4 1/8	2 5/32	11,500	434,500	6,200	1.42	9	11	7.88	3 11/16	2 1/32	0.239	0.120	
XT26	3 3/8	1 3/4	11,500	290,900	6,900	1.42	10	15	7.43	2 29/32	1 5/8	0.234	0.114	
HT31	4	2 5/32	14,900	434,500	8,900	1.84	9	13	7.83	3 1/2	2 1/32	0.239	0.120	
XT31	4	2 3/8	13,200	309,100	7,900	1.63	10	15	7.75	3 13/32	2 1/4	0.242	0.118	
NC26	3 1/2	1 1/2	8,800	390,300	4,900	0.86	9	10	7.50	3 3/8	1 3/8	0.234	0.115	2 7/8
HT26	3 3/8	1 3/4	8,700	313,700	5,200	0.85	9	12	7.27	N/A	1 5/8	0.235	0.111	
NC31	4 1/8	2 5/32	11,500	434,500	6,200	1.13	9	11	7.88	3 3/4	2 1/32	0.239	0.120	
XT26	3 3/8	1 3/4	11,500	290,900	6,900	1.13	10	15	7.43	3 1/32	1 5/8	0.234	0.114	
HT31	4	2 5/32	14,900	434,500	8,900	1.46	9	13	7.83	3 19/32	2 1/32	0.239	0.120	
XT31	4	2 3/8	13,200	309,100	7,900	1.29	10	15	7.75	3 1/2	2 1/4	0.242	0.118	
NC26	3 5/8	1 3/4	7,200	313,700	3,900	0.64	9	10	7.46	3 13/32	1 5/8	0.236	0.114	2 7/8
HT26	3 3/8	1 3/4	8,700	313,700	5,200	0.77	9	12	7.27	N/A	1 5/8	0.235	0.111	
NC31	4 1/8	2 5/32	11,500	434,500	6,200	1.02	9	11	7.88	3 13/16	2 1/32	0.239	0.120	
XT26	3 3/8	1 3/4	11,500	290,900	6,900	1.02	10	15	7.43	3 1/16	1 5/8	0.234	0.114	
HT31	4	2 5/32	14,900	434,500	8,900	1.32	9	13	7.83	3 5/8	2 1/32	0.239	0.120	
XT31	4	2 3/8	13,200	309,100	7,900	1.17	10	15	7.75	3 17/32	2 1/4	0.242	0.118	
NC26	3 5/8	1 1/2	9,000	390,300	4,900	0.62	9	10	7.64	3 17/32	1 3/8	0.234	0.117	2 7/8
HT26	3 1/2	1 1/2	12,100	390,300	7,300	0.83	9	12	7.60	3 5/16	1 3/8	0.233	0.116	
NC31	4 1/8	2 1/8	11,900	447,100	6,400	0.82	9	11	7.91	3 29/32	2	0.239	0.121	
XT26	3 3/8	1 3/4	11,500	290,900	6,900	0.79	10	15	7.43	3 7/32	1 5/8	0.234	0.114	
HT31	4	2 5/32	14,900	434,500	8,900	1.03	9	13	7.83	3 23/32	2 1/32	0.239	0.120	
XT31	4	2 3/8	13,200	309,100	7,900	0.91	10	15	7.75	3 5/8	2 1/4	0.242	0.118	

DRILL PIPE DATA TABLES

Pipe Data

Size OD in.	Nominal Weight lb/ft	Grade and Upset Type	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Wall Thickness in.	Nominal ID in.	Pipe Body Section Area sq in.	Pipe Body Section Modulus cu in.	Pipe Body Polar Section Modulus cu in.	Internal Pressure psi	Collapse Pressure psi
2 7/8	6.85	Z-140 IU	15,100	253,700	0.217	2.441	1.812	1.121	2.241	18,492	17,500
	6.65	Z-140 IU	15,100	253,700	0.217	2.441	1.812	1.121	2.241	18,492	17,500
	6.85	Z-140 EU	15,100	253,700	0.217	2.441	1.812	1.121	2.241	18,492	17,500
	6.85	Z-140 EU	15,100	253,700	0.217	2.441	1.812	1.121	2.241	18,492	17,500
2 7/8	6.85	V-150 IU	16,200	271,800	0.217	2.441	1.812	1.121	2.241	19,813	18,398
	6.65	V-150 IU	16,200	271,800	0.217	2.441	1.812	1.121	2.241	19,813	18,398
	6.85	V-150 EU	16,200	271,800	0.217	2.441	1.812	1.121	2.241	19,813	18,398
	6.85	V-150 EU	16,200	271,800	0.217	2.441	1.812	1.121	2.241	19,813	18,398
2 7/8	10.40	E-75 EU	11,600	214,300	0.362	2.151	2.858	1.602	3.204	16,526	16,509
	10.40	E-75 EU	11,600	214,300	0.362	2.151	2.858	1.602	3.204	16,526	16,509
	10.40	E-75 EU	11,600	214,300	0.362	2.151	2.858	1.602	3.204	16,526	16,509
	10.40	E-75 IU	11,600	214,300	0.362	2.151	2.858	1.602	3.204	16,526	16,509
	10.40	E-75 EU	11,600	214,300	0.362	2.151	2.858	1.602	3.204	16,526	16,509
	10.40	E-75 IU	11,600	214,300	0.362	2.151	2.858	1.602	3.204	16,526	16,509
	10.40	E-75 EU	11,600	214,300	0.362	2.151	2.858	1.602	3.204	16,526	16,509
2 7/8	10.40	X-95 EU	14,600	271,500	0.362	2.151	2.858	1.602	3.204	20,933	20,911
	10.40	X-95 IU	14,600	271,500	0.362	2.151	2.858	1.602	3.204	20,933	20,911
	10.40	X-95 EU	14,600	271,500	0.362	2.151	2.858	1.602	3.204	20,933	20,911
	10.40	X-95 IU	14,600	271,500	0.362	2.151	2.858	1.602	3.204	20,933	20,911
	10.40	X-95 EU	14,600	271,500	0.362	2.151	2.858	1.602	3.204	20,933	20,911
	10.40	X-95 IU	14,600	271,500	0.362	2.151	2.858	1.602	3.204	20,933	20,911
	10.40	X-95 EU	14,600	271,500	0.362	2.151	2.858	1.602	3.204	20,933	20,911
2 7/8	10.40	G-105 EU	16,200	300,100	0.362	2.151	2.858	1.602	3.204	23,137	23,112
	10.40	G-105 IU	16,200	300,100	0.362	2.151	2.858	1.602	3.204	23,137	23,112
	10.40	G-105 EU	16,200	300,100	0.362	2.151	2.858	1.602	3.204	23,137	23,112
	10.40	G-105 IU	16,200	300,100	0.362	2.151	2.858	1.602	3.204	23,137	23,112
	10.40	G-105 EU	16,200	300,100	0.362	2.151	2.858	1.602	3.204	23,137	23,112
	10.40	G-105 IU	16,200	300,100	0.362	2.151	2.858	1.602	3.204	23,137	23,112
	10.40	G-105 EU	16,200	300,100	0.362	2.151	2.858	1.602	3.204	23,137	23,112
2 7/8	10.40	S-135 EU	20,800	385,800	0.362	2.151	2.858	1.602	3.204	29,747	29,716
	10.40	S-135 IU	20,800	385,800	0.362	2.151	2.858	1.602	3.204	29,747	29,716
	10.40	S-135 EU	20,800	385,800	0.362	2.151	2.858	1.602	3.204	29,747	29,716
	10.40	S-135 IU	20,800	385,800	0.362	2.151	2.858	1.602	3.204	29,747	29,716
	10.40	S-135 EU	20,800	385,800	0.362	2.151	2.858	1.602	3.204	29,747	29,716
	10.40	S-135 IU	20,800	385,800	0.362	2.151	2.858	1.602	3.204	29,747	29,716
	10.40	S-135 EU	20,800	385,800	0.362	2.151	2.858	1.602	3.204	29,747	29,716
	10.40	S-135 EU	20,800	385,800	0.362	2.151	2.858	1.602	3.204	29,747	29,716
2 7/8	10.40	Z-140 IU	21,600	400,100	0.362	2.151	2.858	1.602	3.204	30,849	30,817
	10.40	Z-140 EU	21,600	400,100	0.362	2.151	2.858	1.602	3.204	30,849	30,817
	10.40	Z-140 IU	21,600	400,100	0.362	2.151	2.858	1.602	3.204	30,849	30,817
	10.40	Z-140 EU	21,600	400,100	0.362	2.151	2.858	1.602	3.204	30,849	30,817
	10.40	Z-140 EU	21,600	400,100	0.362	2.151	2.858	1.602	3.204	30,849	30,817
2 7/8	10.40	V-150 IU	23,100	428,700	0.362	2.151	2.858	1.602	3.204	33,052	33,018
	10.40	V-150 EU	23,100	428,700	0.362	2.151	2.858	1.602	3.204	33,052	33,018
	10.40	V-150 IU	23,100	428,700	0.362	2.151	2.858	1.602	3.204	33,052	33,018
	10.40	V-150 EU	23,100	428,700	0.362	2.151	2.858	1.602	3.204	33,052	33,018
	10.40	V-150 EU	23,100	428,700	0.362	2.151	2.858	1.602	3.204	33,052	33,018

DRILL PIPE DATA TABLES

Tool Joint Data									Assembly Data					
Connection Type	Outside Diameter in.	Inside Diameter in.	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Make-up Torque ft-lb	Torsional Ratio Tool Joint to Pipe	* Pin Tong Space in.	* Box Tong Space in.	Adjusted Weight lb/ft	Minimum Tool Joint OD for Prem. Class in.	Drift Diameter in.	Capacity US gal/ft	Displace-ment US gal/ft	Size OD in.
HT26	3 1/2	1 1/2	12,100	390,300	7,300	0.80	9	12	7.60	3 11/32	1 3/8	0.233	0.116	2 7/8
XT26	3 3/8	1 3/4	11,500	290,900	6,900	0.76	10	15	7.43	3 1/4	1 5/8	0.234	0.114	
HT31	4	2 5/32	14,900	434,500	8,900	0.99	9	13	7.83	3 3/4	2 1/32	0.239	0.120	
XT31	4	2 3/8	13,200	309,100	7,900	0.87	10	15	7.75	3 21/32	2 1/4	0.242	0.118	
HT26	3 1/2	1 1/2	12,100	390,300	7,300	0.75	9	12	7.60	3 3/8	1 3/8	0.233	0.116	2 7/8
XT26	3 3/8	1 3/4	11,500	290,900	6,900	0.71	10	15	7.43	3 9/32	1 5/8	0.234	0.114	
HT31	4	2 5/32	14,900	434,500	8,900	0.92	9	13	7.83	3 25/32	2 1/32	0.239	0.120	
XT31	4	2 3/8	13,200	309,100	7,900	0.81	10	15	7.75	3 11/16	2 1/4	0.242	0.118	
NC31	4 1/8	2 1/8	11,500	447,100	6,400	1.03	9	11	11.14	3 13/16	2	0.188	0.170	2 7/8
NC26	3 1/2	1 1/2	8,800	390,300	4,900	0.76	9	10	10.79	3 13/32	1 3/8	0.183	0.165	
SLH90	3 7/8	2	13,100	444,000	6,900	1.13	9	11	10.95	3 19/32	1 7/8	0.187	0.168	
HT26	3 1/2	1 1/2	12,100	390,300	7,300	1.04	9	12	10.85	3 3/16	1 3/8	0.182	0.166	
HT31	4 1/8	2 1/8	16,600	447,100	10,000	1.43	9	13	11.26	3 19/32	2	0.188	0.172	
XT26	3 1/2	1 1/2	14,800	367,400	8,900	1.28	10	15	11.02	2 31/32	1 3/8	0.181	0.168	
XT31	3 7/8	2 1/8	16,600	415,100	10,000	1.43	10	15	11.06	3 3/8	2	0.188	0.169	
NC31	4 1/8	2	13,200	495,700	7,100	0.90	9	11	11.27	3 29/32	1 7/8	0.187	0.172	2 7/8
NC26	3 1/2	1 1/2	8,800	390,300	4,900	0.60	9	10	10.76	N/A	1 3/8	0.183	0.165	
SLH90	3 7/8	2	13,100	444,000	6,900	0.90	9	11	10.95	3 11/16	1 7/8	0.187	0.168	
HT26	3 1/2	1 1/2	12,100	390,300	7,300	0.83	9	12	10.85	3 5/16	1 3/8	0.182	0.166	
HT31	4 1/8	2 1/8	16,600	447,100	10,000	1.14	9	13	11.26	3 23/32	2	0.188	0.172	
XT26	3 1/2	1 1/2	14,800	367,400	8,900	1.01	10	15	11.02	3 3/32	1 3/8	0.181	0.168	
XT31	3 7/8	2 1/8	16,600	415,100	10,000	1.14	10	15	11.06	3 1/2	2	0.188	0.169	
NC31	4 1/8	2	13,200	495,700	7,100	0.81	9	11	11.27	3 15/16	1 7/8	0.187	0.173	2 7/8
NC26	3 1/2	1 1/2	8,800	390,300	4,900	0.54	9	10	10.76	N/A	1 3/8	0.183	0.165	
SLH90	3 7/8	2	13,100	444,000	6,900	0.81	9	11	10.95	3 23/32	1 7/8	0.187	0.168	
HT26	3 5/8	1 1/2	13,100	390,300	7,900	0.81	9	12	10.99	3 3/8	1 3/8	0.182	0.168	
HT31	4 1/8	2 1/8	16,600	447,100	10,000	1.02	9	13	11.26	3 3/4	2	0.188	0.172	
XT26	3 1/2	1 1/2	14,800	367,400	8,900	0.91	10	15	11.02	3 5/32	1 3/8	0.181	0.168	
XT31	3 7/8	2 1/8	16,600	415,100	10,000	1.02	10	15	11.06	3 17/32	2	0.188	0.169	
NC31	4 1/8	2	13,200	495,700	7,100	0.63	9	11	11.29	4 1/16	1 7/8	0.187	0.173	2 7/8
NC26	3 5/8	1 1/2	9,000	390,300	4,900	0.43	9	10	10.90	N/A	1 3/8	0.183	0.167	
SLH90	3 7/8	2	13,300	444,000	6,900	0.63	9	11	10.95	3 27/32	1 7/8	0.187	0.168	
HT26	3 5/8	1 1/2	13,100	390,300	7,900	0.63	9	12	10.99	3 9/16	1 3/8	0.182	0.168	
HT31	4 1/8	2	18,900	495,700	11,300	0.91	9	13	11.39	3 27/32	1 7/8	0.187	0.174	
XT26	3 1/2	1 3/8	15,900	401,300	9,500	0.76	10	15	11.11	3 5/16	1 1/4	0.180	0.170	
XT31	3 7/8	2 1/8	16,600	415,000	10,000	0.80	10	15	11.06	3 11/16	2	0.188	0.169	
GPDS31	4 1/8	2	17,200	495,700	10,300	0.83	9	11	11.27	3 15/16	1 7/8	0.187	0.172	
HT26	3 5/8	1 1/4	15,300	455,100	9,200	0.71	9	12	11.15	3 17/32	1 1/8	0.180	0.171	2 7/8
HT31	4 1/8	2	18,900	495,700	11,300	0.88	9	13	11.39	3 7/8	1 7/8	0.187	0.174	
XT26	3 1/2	1 1/4	16,400	432,200	9,800	0.76	10	15	11.19	3 5/16	1 1/8	0.179	0.171	
XT31	4	2	20,400	463,700	12,200	0.94	10	15	11.38	3 21/32	1 7/8	0.187	0.174	
GPDS31	4 1/8	2	17,200	495,700	10,300	0.80	9	11	11.27	3 15/16	1 7/8	0.187	0.172	
HT26	3 5/8	1 1/4	15,300	455,100	9,200	0.66	9	12	11.15	3 9/16	1 1/8	0.180	0.171	2 7/8
HT31	4 1/8	2	18,900	495,700	11,300	0.82	9	13	11.39	3 29/32	1 7/8	0.187	0.174	
XT26	3 1/2	1 1/4	16,400	432,200	9,800	0.71	10	15	11.19	3 3/8	1 1/8	0.179	0.171	
XT31	4	2	20,400	463,700	12,200	0.88	10	15	11.38	3 23/32	1 7/8	0.187	0.174	
GPDS31	4 1/8	2	17,200	495,700	10,300	0.74	9	11	11.27	4	1 7/8	0.187	0.172	

GRANT PRIDECO

DRILL PIPE DATA TABLES

Pipe Data

Size OD in.	Nominal Weight lb/ft	Grade and Upset Type	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Wall Thickness in.	Nominal ID in.	Pipe Body Section Area sq in.	Pipe Body Section Modulus cu in.	Pipe Body Polar Section Modulus cu in.	Internal Pressure psi	Collapse Pressure psi
3 1/2	9.50	E-75 EU	14,100	194,300	0.254	2.992	2.590	1.961	3.923	9,525	10,001
	9.50	E-75 IU	14,100	194,300	0.254	2.992	2.590	1.961	3.923	9,525	10,001
	9.50	E-75 IU	14,100	194,300	0.254	2.992	2.590	1.961	3.923	9,525	10,001
	9.50	E-75 EU	14,100	194,300	0.254	2.992	2.590	1.961	3.923	9,525	10,001
	9.50	E-75 EU	14,100	194,300	0.254	2.992	2.590	1.961	3.923	9,525	10,001
	9.50	E-75 IU	14,100	194,300	0.254	2.992	2.590	1.961	3.923	9,525	10,001
	9.50	E-75 EU	14,100	194,300	0.254	2.992	2.590	1.961	3.923	9,525	10,001
3 1/2	9.50	X-95 EU	17,900	246,100	0.254	2.992	2.590	1.961	3.923	12,065	12,077
	9.50	X-95 IU	17,900	246,100	0.254	2.992	2.590	1.961	3.923	12,065	12,077
	9.50	X-95 IU	17,900	246,100	0.254	2.992	2.590	1.961	3.923	12,065	12,077
	9.50	X-95 EU	17,900	246,100	0.254	2.992	2.590	1.961	3.923	12,065	12,077
	9.50	X-95 EU	17,900	246,100	0.254	2.992	2.590	1.961	3.923	12,065	12,077
	9.50	X-95 IU	17,900	246,100	0.254	2.992	2.590	1.961	3.923	12,065	12,077
	9.50	X-95 EU	17,900	246,100	0.254	2.992	2.590	1.961	3.923	12,065	12,077
3 1/2	9.50	G-105 EU	19,800	272,000	0.254	2.992	2.590	1.961	3.923	13,335	13,055
	9.50	G-105 IU	19,800	272,000	0.254	2.992	2.590	1.961	3.923	13,335	13,055
	9.50	G-105 IU	19,800	272,000	0.254	2.992	2.590	1.961	3.923	13,335	13,055
	9.50	G-105 EU	19,800	272,000	0.254	2.992	2.590	1.961	3.923	13,335	13,055
	9.50	G-105 EU	19,800	272,000	0.254	2.992	2.590	1.961	3.923	13,335	13,055
	9.50	G-105 IU	19,800	272,000	0.254	2.992	2.590	1.961	3.923	13,335	13,055
	9.50	G-105 EU	19,800	272,000	0.254	2.992	2.590	1.961	3.923	13,335	13,055
3 1/2	9.50	S-135 EU	25,500	349,700	0.254	2.992	2.590	1.961	3.923	17,145	15,748
	9.50	S-135 IU	25,500	349,700	0.254	2.992	2.590	1.961	3.923	17,145	15,748
	9.50	S-135 IU	25,500	349,700	0.254	2.992	2.590	1.961	3.923	17,145	15,748
	9.50	S-135 EU	25,500	349,700	0.254	2.992	2.590	1.961	3.923	17,145	15,748
	9.50	S-135 EU	25,500	349,700	0.254	2.992	2.590	1.961	3.923	17,145	15,748
	9.50	S-135 IU	25,500	349,700	0.254	2.992	2.590	1.961	3.923	17,145	15,748
	9.50	S-135 EU	25,500	349,700	0.254	2.992	2.590	1.961	3.923	17,145	15,748
3 1/2	9.50	Z-140 IU	26,400	362,600	0.254	2.992	2.590	1.961	3.923	17,780	16,158
	9.50	Z-140 EU	26,400	362,600	0.254	2.992	2.590	1.961	3.923	17,780	16,158
	9.50	Z-140 IU	26,400	362,600	0.254	2.992	2.590	1.961	3.923	17,780	16,158
	9.50	Z-140 EU	26,400	362,600	0.254	2.992	2.590	1.961	3.923	17,780	16,158
3 1/2	9.50	V-150 IU	28,300	388,500	0.254	2.992	2.590	1.961	3.923	19,050	16,943
	9.50	V-150 EU	28,300	388,500	0.254	2.992	2.590	1.961	3.923	19,050	16,943
	9.50	V-150 IU	28,300	388,500	0.254	2.992	2.590	1.961	3.923	19,050	16,943
	9.50	V-150 EU	28,300	388,500	0.254	2.992	2.590	1.961	3.923	19,050	16,943
3 1/2	13.30	E-75 EU	18,600	271,600	0.368	2.764	3.621	2.572	5.144	13,800	14,113
	13.30	E-75 IU	18,600	271,600	0.368	2.764	3.621	2.572	5.144	13,800	14,113
	13.30	E-75 IU	18,600	271,600	0.368	2.764	3.621	2.572	5.144	13,800	14,113
	13.30	E-75 EU	18,600	271,600	0.368	2.764	3.621	2.572	5.144	13,800	14,113
	13.30	E-75 EU	18,600	271,600	0.368	2.764	3.621	2.572	5.144	13,800	14,113
	13.30	E-75 IU	18,600	271,600	0.368	2.764	3.621	2.572	5.144	13,800	14,113
	13.30	E-75 EU	18,600	271,600	0.368	2.764	3.621	2.572	5.144	13,800	14,113
3 1/2	13.30	X-95 EU	23,500	344,000	0.368	2.764	3.621	2.572	5.144	17,480	17,877
	13.30	X-95 IU	23,500	344,000	0.368	2.764	3.621	2.572	5.144	17,480	17,877
	13.30	X-95 IU	23,500	344,000	0.368	2.764	3.621	2.572	5.144	17,480	17,877
	13.30	X-95 EU	23,500	344,000	0.368	2.764	3.621	2.572	5.144	17,480	17,877
	13.30	X-95 EU	23,500	344,000	0.368	2.764	3.621	2.572	5.144	17,480	17,877
	13.30	X-95 IU	23,500	344,000	0.368	2.764	3.621	2.572	5.144	17,480	17,877
	13.30	X-95 EU	23,500	344,000	0.368	2.764	3.621	2.572	5.144	17,480	17,877

DRILL PIPE DATA TABLES

Tool Joint Data									Assembly Data					
Connection Type	Outside Diameter in.	Inside Diameter in.	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Make-up Torque ft-lb	Torsional Ratio Tool Joint to Pipe	* Pin Tong Space in.	* Box Tong Space in.	Adjusted Weight lb/ft	Minimum Tool Joint OD for Prem. Class in.	Drift Diameter in.	Capacity US gal/ft	Displace-ment US gal/ft	Size OD in.
NC38	4 3/4	2 11/16	18,100	587,300	9,700	1.28	10	12.5	11.07	4 13/32	2 9/16	0.360	0.169	3 1/2
NC31	4 1/8	2 1/8	11,900	447,100	6,400	0.84	9	11	10.49	3 7/8	2	0.354	0.161	
HT31	4 1/8	2 1/8	16,600	447,100	10,000	1.18	9	13	10.62	3 11/16	2	0.353	0.162	
HT38	4 3/4	2 11/16	25,300	587,300	15,200	1.79	10	15.5	11.31	4 5/32	2 9/16	0.360	0.173	
SLH90	4 3/4	2 11/16	18,688	534,200	11,100	1.33	10	12.5	11.07	4 3/16	2 9/16	0.360	0.169	
XT31	4	2 1/8	18,600	415,100	11,200	1.32	10	15	10.61	3 1/2	2	0.352	0.162	
XT38	4 3/4	2 13/16	23,900	473,000	14,300	1.70	10	15	11.08	4	2 11/16	0.362	0.170	
NC38	4 3/4	2 11/16	18,100	587,300	9,700	1.01	10	12.5	11.07	4 15/32	2 9/16	0.360	0.169	3 1/2
NC31	4 1/8	2	13,200	495,700	7,100	0.74	9	11	10.61	4	1 7/8	0.352	0.162	
HT31	4 1/8	2 1/8	16,600	447,100	10,000	0.93	9	13	10.62	3 13/16	2	0.353	0.162	
HT38	4 3/4	2 11/16	25,300	587,300	15,200	1.41	10	15.5	11.31	4 1/4	2 9/16	0.360	0.173	
SLH90	4 3/4	2 11/16	18,700	534,200	11,100	1.04	10	12.5	11.07	4 9/32	2 9/16	0.360	0.169	
XT31	4	2 1/8	18,600	415,100	11,200	1.04	10	15	10.61	3 5/8	2	0.352	0.162	
XT38	4 3/4	2 13/16	23,900	473,000	14,300	1.34	10	15	11.08	4 3/32	2 11/16	0.362	0.170	
NC38	4 3/4	2 11/16	18,100	587,300	9,700	0.91	10	12.5	11.07	4 17/32	2 9/16	0.360	0.169	3 1/2
NC31	4 1/8	2	13,200	495,700	7,100	0.67	9	11	10.61	4 1/16	1 7/8	0.352	0.162	
HT31	4 1/8	2	18,900	495,700	11,300	0.95	9	13	10.74	3 27/32	1 7/8	0.351	0.164	
HT38	4 3/4	2 11/16	25,300	587,300	15,200	1.28	10	15.5	11.31	4 9/32	2 9/16	0.360	0.173	
SLH90	4 3/4	2 11/16	18,700	534,200	11,100	0.94	10	12.5	11.07	4 5/16	2 9/16	0.360	0.169	
XT31	4	2 1/8	18,600	415,100	11,200	0.94	10	15	10.61	3 11/16	2	0.352	0.162	
XT38	4 3/4	2 13/16	23,900	473,000	14,300	1.21	10	15	11.08	4 5/32	2 11/16	0.362	0.170	
NC38	4 7/8	2 9/16	20,200	649,200	10,700	0.79	10	12.5	11.45	4 21/32	2 7/16	0.358	0.175	3 1/2
NC31	4 1/8	2	13,200	495,700	7,100	0.52	9	11	10.61	N/A	1 7/8	0.352	0.162	
HT31	4 1/8	2	18,900	495,700	11,300	0.74	9	13	10.74	4	1 7/8	0.351	0.164	
HT38	4 3/4	2 11/16	25,300	587,300	15,200	0.99	10	15.5	11.31	4 7/16	2 9/16	0.360	0.173	
SLH90	4 3/4	2 9/16	20,900	596,100	12,400	0.82	10	12.5	11.24	4 7/16	2 7/16	0.358	0.172	
XT31	4	2	20,400	463,700	12,200	0.80	10	15	10.74	3 13/16	1 7/8	0.350	0.164	
XT38	4 3/4	2 13/16	23,900	473,000	14,300	0.94	10	15	11.08	4 9/32	2 11/16	0.362	0.170	
HT31	4 1/8	2	18,900	495,700	11,300	0.72	9	13	10.74	4 1/32	1 7/8	0.351	0.164	3 1/2
HT38	4 3/4	2 11/16	25,300	587,300	15,200	0.96	10	15.5	11.31	4 15/32	2 9/16	0.360	0.173	
XT31	4	2	20,400	463,700	12,200	0.76	10	15	10.74	3 27/32	1 7/8	0.350	0.164	
XT38	4 3/4	2 13/16	23,900	473,000	14,300	0.91	10	15	11.08	4 5/16	2 11/16	0.362	0.170	
HT31	4 1/4	1 3/4	23,400	584,100	14,000	0.83	9	13	11.14	4	1 5/8	0.348	0.170	3 1/2
HT38	4 3/4	2 11/16	25,300	587,300	15,200	0.89	10	15.5	11.31	4 1/2	2 9/16	0.360	0.173	
XT31	4	2	20,400	463,700	12,200	0.72	10	15	10.74	3 29/32	1 7/8	0.350	0.164	
XT38	4 3/4	2 13/16	23,900	473,000	14,300	0.84	10	15	11.08	4 11/32	2 11/16	0.362	0.170	
NC38	4 3/4	2 11/16	18,100	587,300	9,700	0.97	10	12.5	14.24	4 1/2	2 9/16	0.310	0.218	3 1/2
NC31	4 1/8	2	13,200	495,700	7,100	0.71	9	11	13.93	4 1/32	1 7/8	0.302	0.213	
HT31	4 1/8	2 1/8	16,600	447,100	10,000	0.89	9	13	13.91	3 27/32	2	0.303	0.213	
HT38	4 3/4	2 11/16	25,300	587,300	15,200	1.36	10	15.5	14.45	4 1/4	2 9/16	0.310	0.221	
SLH90	4 3/4	2 11/16	18,700	534,200	11,100	1.01	10	12.5	14.24	4 9/32	2 9/16	0.310	0.218	
XT31	4	2 1/8	18,600	415,100	11,200	1.00	10	15	13.87	3 5/8	2	0.302	0.212	
XT38	4 3/4	2 11/16	27,700	537,800	16,600	1.49	10	15	14.42	4 1/32	2 9/16	0.310	0.221	
NC38	5	2 9/16	20,300	649,200	10,700	0.86	10	12.5	14.84	4 19/32	2 7/16	0.308	0.227	3 1/2
NC31	4 1/8	2	13,200	495,700	7,100	0.56	9	11	13.93	N/A	1 7/8	0.302	0.213	
HT31	4 1/8	2	18,900	495,700	11,300	0.80	9	13	14.04	3 15/16	1 7/8	0.301	0.215	
HT38	4 3/4	2 11/16	25,300	587,300	15,200	1.08	10	15.5	14.45	4 3/8	2 9/16	0.310	0.221	
SLH90	4 3/4	2 11/16	18,700	534,200	11,100	0.80	10	12.5	14.24	4 3/8	2 9/16	0.310	0.218	
XT31	4	2 1/8	18,600	415,100	11,200	0.79	10	15	13.87	3 25/32	2	0.302	0.212	
XT38	4 3/4	2 11/16	27,700	537,800	16,600	1.18	10	15	14.42	4 5/32	2 9/16	0.310	0.221	

*2" Longer than standard.

DRILL PIPE DATA TABLES

Pipe Data

Size OD in.	Nominal Weight lb/ft	Grade and Upset Type	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Wall Thickness in.	Nominal ID in.	Pipe Body Section Area sq in.	Pipe Body Section Modulus cu in.	Pipe Body Polar Section Modulus cu in.	Internal Pressure psi	Collapse Pressure psi
3 1/2	13.30	G-105 EU	26,000	380,200	0.368	2.764	3.621	2.572	5.144	19,320	19,758
	13.30	G-105 IU	26,000	380,200	0.368	2.764	3.621	2.572	5.144	19,320	19,758
	13.30	G-105 IU	26,000	380,200	0.368	2.764	3.621	2.572	5.144	19,320	19,758
	13.30	G-105 EU	26,000	380,200	0.368	2.764	3.621	2.572	5.144	19,320	19,758
	13.30	G-105 EU	26,000	380,200	0.368	2.764	3.621	2.572	5.144	19,320	19,758
	13.30	G-105 IU	26,000	380,200	0.368	2.764	3.621	2.572	5.144	19,320	19,758
	13.30	G-105 EU	26,000	380,200	0.368	2.764	3.621	2.572	5.144	19,320	19,758
3 1/2	13.30	S-135 EU	33,400	488,800	0.368	2.764	3.621	2.572	5.144	24,840	25,404
	13.30	S-135 IU	33,400	488,800	0.368	2.764	3.621	2.572	5.144	24,840	25,404
	13.30	S-135 IU	33,400	488,800	0.368	2.764	3.621	2.572	5.144	24,840	25,404
	13.30	S-135 EU	33,400	488,800	0.368	2.764	3.621	2.572	5.144	24,840	25,404
	13.30	S-135 EU	33,400	488,800	0.368	2.764	3.621	2.572	5.144	24,840	25,404
	13.30	S-135 IU	33,400	488,800	0.368	2.764	3.621	2.572	5.144	24,840	25,404
	13.30	S-135 EU	33,400	488,800	0.368	2.764	3.621	2.572	5.144	24,840	25,404
	13.30	S-135 EU	33,400	488,800	0.368	2.764	3.621	2.572	5.144	24,840	25,404
3 1/2	13.30	Z-140 IU	34,600	506,900	0.368	2.764	3.621	2.572	5.144	25,760	26,345
	13.30	Z-140 EU	34,600	506,900	0.368	2.764	3.621	2.572	5.144	25,760	26,345
	13.30	Z-140 IU	34,600	506,900	0.368	2.764	3.621	2.572	5.144	25,760	26,345
	13.30	Z-140 EU	34,600	506,900	0.368	2.764	3.621	2.572	5.144	25,760	26,345
	13.30	Z-140 EU	34,600	506,900	0.368	2.764	3.621	2.572	5.144	25,760	26,345
3 1/2	13.30	V-150 IU	37,100	543,100	0.368	2.764	3.621	2.572	5.144	27,600	28,226
	13.30	V-150 EU	37,100	543,100	0.368	2.764	3.621	2.572	5.144	27,600	28,226
	13.30	V-150 IU	37,100	543,100	0.368	2.764	3.621	2.572	5.144	27,600	28,226
	13.30	V-150 EU	37,100	543,100	0.368	2.764	3.621	2.572	5.144	27,600	28,226
	13.30	V-150 EU	37,100	543,100	0.368	2.764	3.621	2.572	5.144	27,600	28,226
3 1/2	15.50	E-75 EU	21,100	322,800	0.449	2.602	4.304	2.923	5.847	16,838	16,774
	15.50	E-75 EU	21,100	322,800	0.449	2.602	4.304	2.923	5.847	16,838	16,774
	15.50	E-75 EU	21,100	322,800	0.449	2.602	4.304	2.923	5.847	16,838	16,774
3 1/2	15.50	X-95 EU	26,700	408,800	0.449	2.602	4.304	2.923	5.847	21,328	21,247
	15.50	X-95 EU	26,700	408,800	0.449	2.602	4.304	2.923	5.847	21,328	21,247
	15.50	X-95 EU	26,700	408,800	0.449	2.602	4.304	2.923	5.847	21,328	21,247
3 1/2	15.50	G-105 EU	29,500	451,900	0.449	2.602	4.304	2.923	5.847	23,573	23,484
	15.50	G-105 EU	29,500	451,900	0.449	2.602	4.304	2.923	5.847	23,573	23,484
	15.50	G-105 EU	29,500	451,900	0.449	2.602	4.304	2.923	5.847	23,573	23,484
	15.50	G-105 EU	29,500	451,900	0.449	2.602	4.304	2.923	5.847	23,573	23,484
3 1/2	15.50	S-135 EU	38,000	581,000	0.449	2.602	4.304	2.923	5.847	30,308	30,194
	15.50	S-135 EU	38,000	581,000	0.449	2.602	4.304	2.923	5.847	30,308	30,194
	15.50	S-135 EU	38,000	581,000	0.449	2.602	4.304	2.923	5.847	30,308	30,194
	15.50	S-135 EU	38,000	581,000	0.449	2.602	4.304	2.923	5.847	30,308	30,194
	15.50	S-135 EU	38,000	581,000	0.449	2.602	4.304	2.923	5.847	30,308	30,194
	15.50	S-135 EU	38,000	581,000	0.449	2.602	4.304	2.923	5.847	30,308	30,194
3 1/2	15.50	Z-140 EU	39,400	602,500	0.449	2.602	4.304	2.923	5.847	31,430	31,312
	15.50	Z-140 EU	39,400	602,500	0.449	2.602	4.304	2.923	5.847	31,430	31,312
	15.50	Z-140 EU	39,400	602,500	0.449	2.602	4.304	2.923	5.847	31,430	31,312
	15.50	Z-140 EU	39,400	602,500	0.449	2.602	4.304	2.923	5.847	31,430	31,312
3 1/2	15.50	V-150 EU	42,200	645,500	0.449	2.602	4.304	2.923	5.847	33,675	33,549
	15.50	V-150 EU	42,200	645,500	0.449	2.602	4.304	2.923	5.847	33,675	33,549
	15.50	V-150 EU	42,200	645,500	0.449	2.602	4.304	2.923	5.847	33,675	33,549
	15.50	V-150 EU	42,200	645,500	0.449	2.602	4.304	2.923	5.847	33,675	33,549
	16.60	S-135 EU	55,500	595,000	0.337	3.826	4.407	4.271	8.543	17,693	16,773

DRILL PIPE DATA TABLES

Tool Joint Data									Assembly Data					
Connection Type	Outside Diameter in.	Inside Diameter in.	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Make-up Torque ft-lb	Torsional Ratio Tool Joint to Pipe	* Pin Tong Space in.	* Box Tong Space in.	Adjusted Weight lb/ft	Minimum Tool Joint OD for Prem. Class in.	Drift Diameter in.	Capacity US gal/ft	Displace-ment US gal/ft	Size OD in.
NC38	5	2 7/16	22,200	708,100	11,700	0.85	10	12.5	15.00	4 21/32	2 5/16	0.306	0.229	3 1/2
NC31	4 1/8	2	13,200	495,700	7,100	0.51	9	11	13.93	N/A	1 7/8	0.302	0.213	
HT31	4 1/8	2	18,900	495,700	11,300	0.73	9	13	14.04	4	1 7/8	0.301	0.215	
HT38	4 3/4	2 11/16	25,300	587,300	15,200	0.97	10	15.5	14.45	4 7/16	2 9/16	0.310	0.221	
SLH90	4 3/4	2 9/16	20,900	596,100	12,400	0.80	10	12.5	14.41	4 7/16	2 7/16	0.308	0.220	
XT31	4 1/8	2	21,100	463,700	12,700	0.81	10	15	14.21	3 13/16	1 7/8	0.300	0.217	
XT38	4 3/4	2 11/16	27,700	537,800	16,600	1.07	10	15	14.42	4 7/32	2 9/16	0.310	0.221	
NC38	5	2 1/8	26,500	842,400	14,000	0.79	10	12.5	15.37	4 13/16	2	0.302	0.235	3 1/2
NC31	4 1/8	2	13,200	495,700	7,100	0.40	9	11	13.93	N/A	1 7/8	0.302	0.213	
HT31	4 1/8	2	18,900	495,700	11,300	0.57	9	13	14.04	N/A	1 7/8	0.301	0.215	
HT38	4 3/4	2 9/16	26,900	649,200	16,100	0.81	10	15.5	14.63	4 9/16	2 7/16	0.308	0.224	
SLH90	4 3/4	2 9/16	20,900	596,100	12,400	0.63	10	12.5	14.41	4 19/32	2 7/16	0.308	0.220	
XT31	4 1/8	1 7/8	23,400	509,400	14,000	0.70	10	15	14.34	4 31/32	1 3/4	0.298	0.219	
XT38	4 3/4	2 11/16	27,700	537,800	16,600	0.83	10	15	14.42	4 13/32	2 9/16	0.310	0.221	
GPDS38	4 7/8	2 9/16	25,700	649,200	15,400	0.77	10	12.5	14.62	4 11/16	2 7/16	0.308	0.224	
HT31	4 1/8	1 7/8	19,900	541,400	11,900	0.58	9	13	14.17	N/A	1 3/4	0.300	0.217	3 1/2
HT38	4 3/4	2 9/16	26,900	649,200	16,100	0.78	10	15.5	14.63	4 9/16	2 7/16	0.308	0.224	
XT31	4 1/8	1 3/4	25,000	552,100	15,000	0.72	10	15	14.47	3 31/32	1 5/8	0.297	0.221	
XT38	4 3/4	2 9/16	31,300	599,600	18,800	0.90	10	15	14.59	4 3/8	2 7/16	0.308	0.223	
GPDS38	5	2 9/16	25,800	649,200	15,500	0.75	10	12.5	14.84	4 11/16	2 7/16	0.308	0.227	
HT31	4 1/4	1 3/4	23,400	584,100	14,000	0.63	9	13	14.47	4 1/4	1 5/8	0.298	0.221	3 1/2
HT38	4 3/4	2 9/16	26,900	649,200	16,100	0.73	10	15.5	14.63	4 5/8	2 7/16	0.308	0.224	
XT31	4 1/8	1 3/4	25,000	552,100	15,000	0.67	10	15	14.47	4 1/16	1 5/8	0.297	0.221	
XT38	4 3/4	2 9/16	31,300	599,600	18,800	0.84	10	15	14.59	4 7/16	2 7/16	0.308	0.223	
GPDS38	5	2 9/16	25,800	649,200	15,500	0.70	10	12.5	14.84	4 3/4	2 7/16	0.308	0.227	
NC38	5	2 9/16	20,300	649,200	10,700	0.96	10	12.5	16.94	4 17/32	2 7/16	0.276	0.259	3 1/2
HT38	4 3/4	2 9/16	26,900	649,200	16,100	1.27	10	15.5	16.71	4 1/4	2 7/16	0.276	0.256	
XT38	4 3/4	2 9/16	31,300	599,600	18,800	1.48	10	15	16.68	4 1/32	2 7/16	0.276	0.255	
NC38	5	2 7/16	22,200	708,100	11,700	0.83	10	12.5	17.11	4 21/32	2 5/16	0.274	0.262	3 1/2
HT38	4 3/4	2 9/16	26,900	649,200	16,100	1.01	10	15.5	16.71	4 3/8	2 7/16	0.276	0.256	
XT38	4 3/4	2 9/16	31,300	599,600	18,800	1.17	10	15	16.68	4 5/32	2 7/16	0.276	0.255	
NC38	5	2 1/8	26,500	842,400	14,000	0.90	10	12.5	17.50	4 23/32	2	0.269	0.268	3 1/2
HT38	4 3/4	2 9/16	26,900	649,200	16,100	0.91	10	15.5	16.71	4 7/16	2 7/16	0.276	0.256	
NC40	5 1/4	2 9/16	27,800	838,300	14,600	0.94	9	12	17.24	4 15/16	2 7/16	0.276	0.264	
XT38	4 3/4	2 9/16	31,300	599,600	18,800	1.06	10	15	16.68	4 1/4	2 7/16	0.276	0.255	
NC38	5	2 1/8	26,500	842,400	14,000	0.70	10	12.5	17.50	4 29/32	2	0.269	0.268	3 1/2
HT38	4 3/4	2 7/16	28,400	708,100	17,000	0.75	10	15.5	16.90	4 19/32	2 5/16	0.273	0.258	
NC40	5 1/2	2 1/4	32,900	980,000	17,100	0.87	10	12.5	18.31	5 3/32	2 1/8	0.271	0.280	
XT38	4 3/4	2 7/16	34,200	658,500	20,500	0.90	10	15	16.86	4 3/8	2 5/16	0.273	0.258	
XT39	4 7/8	2 7/16	38,500	788,600	22,100	1.01	10	15	17.09	4 3/8	2 5/16	0.273	0.261	
GPDS38	5	2 7/16	29,200	708,100	17,500	0.77	10	12.5	17.11	4 23/32	2 5/16	0.274	0.262	
HT38	4 3/4	2 7/16	28,400	708,100	17,000	0.72	10	15.5	16.90	4 5/8	2 5/16	0.273	0.258	3 1/2
XT38	4 3/4	2 7/16	34,200	658,500	20,500	0.87	10	15	16.86	4 13/32	2 5/16	0.273	0.258	
XT39	4 7/8	2 7/16	38,500	788,600	23,100	0.98	10	15	17.09	4 13/32	2 5/16	0.273	0.261	
GPDS38	5	2 7/16	29,200	708,100	17,500	0.74	10	12.5	17.11	4 3/4	2 5/16	0.274	0.262	
HT38	5	2 1/4	37,700	790,900	22,600	0.89	10	15.5	17.63	4 19/32	2 1/8	0.270	0.270	3 1/2
XT38	4 3/4	2 1/4	36,300	741,400	21,800	0.86	10	15	17.11	4 13/32	2 1/8	0.271	0.262	
XT39	4 7/8	2 1/4	40,700	871,400	24,400	0.96	10	15	17.35	4 3/8	2 1/8	0.270	0.265	
GPDS38	5	2 1/4	33,900	790,900	20,300	0.80	10	12.5	17.35	4 23/32	2 1/8	0.271	0.265	

*2" Longer than standard.

DRILL PIPE DATA TABLES

Pipe Data

Size OD in.	Nominal Weight lb/ft	Grade and Upset Type	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Wall Thickness in.	Nominal ID in.	Pipe Body Section Area sq in.	Pipe Body Section Modulus cu in.	Pipe Body Polar Section Modulus cu in.	Internal Pressure psi	Collapse Pressure psi
4	11.85	E-75 IU	19,500	230,800	0.262	3.476	3.077	2.700	5.400	8,597	8,381
	11.85	E-75 IU	19,500	230,800	0.262	3.476	3.077	2.700	5.400	8,597	8,381
	11.85	E-75 IU	19,500	230,800	0.262	3.476	3.077	2.700	5.400	8,597	8,381
	11.85	E-75 IU	19,500	230,800	0.262	3.476	3.077	2.700	5.400	8,597	8,381
	11.85	E-75 IU	19,500	230,800	0.262	3.476	3.077	2.700	5.400	8,597	8,381
4	11.85	X-95 IU	24,700	292,300	0.262	3.476	3.077	2.700	5.400	10,889	9,978
	11.85	X-95 IU	24,700	292,300	0.262	3.476	3.077	2.700	5.400	10,889	9,978
	11.85	X-95 IU	24,700	292,300	0.262	3.476	3.077	2.700	5.400	10,889	9,978
	11.85	X-95 IU	24,700	292,300	0.262	3.476	3.077	2.700	5.400	10,889	9,978
	11.85	X-95 IU	24,700	292,300	0.262	3.476	3.077	2.700	5.400	10,889	9,978
4	11.85	G-105 IU	27,300	323,100	0.262	3.476	3.077	2.700	5.400	12,036	10,708
	11.85	G-105 IU	27,300	323,100	0.262	3.476	3.077	2.700	5.400	12,036	10,708
	11.85	G-105 IU	27,300	323,100	0.262	3.476	3.077	2.700	5.400	12,036	10,708
	11.85	G-105 IU	27,300	323,100	0.262	3.476	3.077	2.700	5.400	12,036	10,708
	11.85	G-105 IU	27,300	323,100	0.262	3.476	3.077	2.700	5.400	12,036	10,708
4	11.85	S-135 IU	35,100	415,400	0.262	3.476	3.077	2.700	5.400	15,474	12,618
	11.85	S-135 IU	35,100	415,400	0.262	3.476	3.077	2.700	5.400	15,474	12,618
	11.85	S-135 IU	35,100	415,400	0.262	3.476	3.077	2.700	5.400	15,474	12,618
	11.85	S-135 IU	35,100	415,400	0.262	3.476	3.077	2.700	5.400	15,474	12,618
	11.85	S-135 IU	35,100	415,400	0.262	3.476	3.077	2.700	5.400	15,474	12,618
4	11.85	Z-140 IU	36,400	430,700	0.262	3.476	3.077	2.700	5.400	16,048	12,894
	11.85	Z-140 IU	36,400	430,700	0.262	3.476	3.077	2.700	5.400	16,048	12,894
	11.85	Z-140 IU	36,400	430,700	0.262	3.476	3.077	2.700	5.400	16,048	12,894
4	11.85	V-150 IU	38,900	461,500	0.262	3.476	3.077	2.700	5.400	17,194	13,404
	11.85	V-150 IU	38,900	461,500	0.262	3.476	3.077	2.700	5.400	17,194	13,404
	11.85	V-150 IU	38,900	461,500	0.262	3.476	3.077	2.700	5.400	17,194	13,404
4	14.00	E-75 IU	23,300	285,400	0.330	3.340	3.805	3.229	6.458	10,828	11,354
	14.00	E-75 IU	23,300	285,400	0.330	3.340	3.805	3.229	6.458	10,828	11,354
	14.00	E-75 IU	23,300	285,400	0.330	3.340	3.805	3.229	6.458	10,828	11,354
	14.00	E-75 IU	23,300	285,400	0.330	3.340	3.805	3.229	6.458	10,828	11,354
	14.00	E-75 EU	23,300	285,400	0.330	3.340	3.805	3.229	6.458	10,828	11,354
	14.00	E-75 IU	23,300	285,400	0.330	3.340	3.805	3.229	6.458	10,828	11,354
	14.00	E-75 IU	23,300	285,400	0.330	3.340	3.805	3.229	6.458	10,828	11,354
4	14.00	X-95 IU	29,500	361,500	0.330	3.340	3.805	3.229	6.458	13,716	14,382
	14.00	X-95 IU	29,500	361,500	0.330	3.340	3.805	3.229	6.458	13,716	14,382
	14.00	X-95 IU	29,500	361,500	0.330	3.340	3.805	3.229	6.458	13,716	14,382
	14.00	X-95 IU	29,500	361,500	0.330	3.340	3.805	3.229	6.458	13,716	14,382
	14.00	X-95 EU	29,500	361,500	0.330	3.340	3.805	3.229	6.458	13,716	14,382
	14.00	X-95 IU	29,500	361,500	0.330	3.340	3.805	3.229	6.458	13,716	14,382
	14.00	X-95 IU	29,500	361,500	0.330	3.340	3.805	3.229	6.458	13,716	14,382
4	14.00	G-105 IU	32,600	399,500	0.330	3.340	3.805	3.229	6.458	15,159	15,896
	14.00	G-105 IU	32,600	399,500	0.330	3.340	3.805	3.229	6.458	15,159	15,896
	14.00	G-105 IU	32,600	399,500	0.330	3.340	3.805	3.229	6.458	15,159	15,896
	14.00	G-105 IU	32,600	399,500	0.330	3.340	3.805	3.229	6.458	15,159	15,896
	14.00	G-105 EU	32,600	399,500	0.330	3.340	3.805	3.229	6.458	15,159	15,896
	14.00	G-105 IU	32,600	399,500	0.330	3.340	3.805	3.229	6.458	15,159	15,896
	14.00	G-105 IU	32,600	399,500	0.330	3.340	3.805	3.229	6.458	15,159	15,896

DRILL PIPE DATA TABLES

	Tool Joint Data								Assembly Data					
Connection Type	Outside Diameter in.	Inside Diameter in.	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Make-up Torque ft-lb	Torsional Ratio Tool Joint to Pipe	* Pin Tong Space in.	* Box Tong Space in.	Adjusted Weight lb/ft	Minimum Tool Joint OD for Prem. Class in.	Drift Diameter in.	Capacity US gal/ft	Displace-ment US gal/ft	Size OD in.
NC40	5 1/4	2 13/16	23,500	711,600	12,400	1.21	9	12	13.41	4 3/4	2 11/16	0.481	0.205	4
SH	4 3/4	2 9/16	15,300	512,000	8,100	0.78	9	12	12.91	4 3/8	2 7/16	0.477	0.198	
HT38	4 3/4	2 11/16	25,300	587,300	15,200	1.30	10	15.5	13.08	4 9/32	2 9/16	0.477	0.200	
XT38	4 3/4	2 11/16	27,900	537,800	16,600	1.42	10	15	13.04	4 1/16	2 9/16	0.477	0.199	
XT39	4 7/8	2 13/16	32,900	603,000	19,700	1.69	10	15	13.08	4 5/32	2 11/16	0.479	0.200	
NC40	5 1/4	2 13/16	23,500	711,600	12,400	0.95	9	12	13.41	4 27/32	2 11/16	0.481	0.205	4
SH	4 3/4	2 9/16	15,300	512,000	8,100	0.62	9	12	12.91	4 1/2	2 7/16	0.477	0.198	
HT38	4 3/4	2 11/16	25,300	587,300	15,200	1.02	10	15.5	13.08	4 13/32	2 9/16	0.477	0.200	
XT38	4 3/4	2 11/16	27,700	537,800	16,600	1.12	10	15	13.04	4 3/16	2 9/16	0.477	0.199	
XT39	4 7/8	2 13/16	32,900	603,000	19,700	1.69	10	15	13.08	4 5/32	2 11/16	0.479	0.200	
NC40	5 1/4	2 13/16	23,500	711,600	12,400	0.86	9	12	13.41	4 29/32	2 11/16	0.481	0.205	4
SH	4 3/4	2 9/16	15,300	512,000	8,100	0.56	9	12	12.91	4 9/16	2 7/16	0.477	0.198	
HT38	4 3/4	2 9/16	26,900	649,200	16,100	0.99	10	15.5	13.27	4 13/32	2 7/16	0.475	0.203	
XT38	4 3/4	2 11/16	27,900	537,800	16,600	1.01	10	15	13.04	4 9/32	2 9/16	0.477	0.199	
XT39	4 7/8	2 13/16	32,900	603,000	19,700	1.21	10	15	13.08	4 11/32	2 11/16	0.479	0.200	
NC40	5 1/2	2 9/16	28,100	838,300	14,600	0.80	9	12	14.23	5 1/16	2 7/16	0.476	0.218	4
SH	4 3/4	2 9/16	15,300	512,000	8,100	0.44	9	12	12.91	4 23/32	2 7/16	0.477	0.198	
HT38	4 3/4	2 7/16	28,400	708,100	17,000	0.81	10	15.5	13.45	4 17/32	2 5/16	0.473	0.206	
XT38	4 3/4	2 11/16	27,700	537,800	16,600	0.79	10	15	13.04	4 7/16	2 9/16	0.477	0.199	
XT39	4 7/8	2 13/16	32,900	603,000	19,700	0.94	10	15	13.08	4 1/2	2 11/16	0.479	0.200	
HT38	4 3/4	2 7/16	28,400	708,100	17,000	0.78	10	15.5	13.45	4 9/16	2 5/16	0.473	0.206	4
XT38	4 3/4	2 11/16	27,700	537,800	16,600	0.76	10	15	13.04	4 15/32	2 9/16	0.477	0.199	
XT39	4 7/8	2 13/16	32,900	603,000	19,700	0.90	10	15	13.08	4 17/32	2 11/16	0.479	0.200	
HT38	5	2 7/16	33,000	708,100	19,800	0.85	10	15.5	13.93	4 5/8	2 5/16	0.472	0.213	4
XT38	4 3/4	2 9/16	31,300	599,600	18,800	0.81	10	15	13.23	4 15/32	2 7/16	0.475	0.202	
XT39	4 7/8	2 13/16	32,900	603,000	19,700	0.85	10	15	13.08	4 19/32	2 11/16	0.479	0.200	
NC40	5 1/4	2 13/16	23,500	711,600	12,400	1.01	9	12	15.64	4 13/16	2 11/16	0.445	0.239	4
HT38	4 3/4	2 11/16	25,300	587,300	15,200	1.09	10	15.5	15.28	4 3/8	2 9/16	0.442	0.234	
SH	4 3/4	2 7/16	17,100	570,900	9,100	0.73	9	12	15.31	4 7/16	2 5/16	0.440	0.234	
HT40	5 1/4	2 13/16	31,900	711,600	19,100	1.37	9	15	15.93	4 19/32	2 11/16	0.444	0.244	
NC46	6	3 1/4	33,600	901,200	17,600	1.44	9	12	16.51	5 9/32	3 1/8	0.453	0.253	
XT38	4 3/4	2 11/16	27,700	537,800	16,600	1.19	10	15	15.25	4 5/32	2 9/16	0.442	0.233	
XT39	4 7/8	2 13/16	32,900	603,000	19,700	1.41	10	15	13.08	4 5/32	2 11/16	0.479	0.234	
NC40	5 1/4	2 11/16	25,700	776,400	13,500	0.87	9	12	15.82	4 15/16	2 9/16	0.443	0.242	4
HT38	4 3/4	2 11/16	25,300	587,300	15,200	0.86	10	15.5	15.28	4 17/32	2 9/16	0.442	0.234	
SH	4 3/4	2 7/16	17,100	570,900	9,100	0.58	9	12	15.31	4 19/32	2 5/16	0.440	0.234	
HT40	5 1/4	2 13/16	31,900	711,600	19,100	1.08	9	15	15.93	4 23/32	2 11/16	0.444	0.244	
NC46	6	3 1/4	33,600	901,200	17,600	1.14	9	12	16.51	5 3/8	3 1/8	0.453	0.253	
XT38	4 3/4	2 11/16	27,700	537,800	16,600	0.95	10	15	15.25	4 5/16	2 9/16	0.442	0.233	
XT39	4 7/8	2 13/16	32,900	603,000	19,700	1.12	10	15	15.29	4 3/8	2 11/16	0.444	0.234	
NC40	5 1/2	2 7/16	30,100	897,200	15,600	0.92	9	12	16.62	5	2 5/16	0.439	0.254	4
HT38	5	2 9/16	29,600	649,200	17,800	0.91	10	15.5	15.95	4 17/32	2 7/16	0.440	0.244	
SH	4 3/4	2 7/16	17,100	570,900	9,100	0.52	9	12	15.31	4 21/32	2 5/16	0.440	0.234	
HT40	5 1/4	2 13/16	31,900	711,600	19,100	0.98	9	15	15.93	4 25/32	2 11/16	0.444	0.244	
NC46	6	3 1/4	33,600	901,200	17,600	1.03	9	12	16.51	5 7/16	3 1/8	0.453	0.253	
XT38	4 3/4	2 11/16	27,700	537,800	16,600	0.85	10	15	15.25	4 3/8	2 9/16	0.442	0.233	
XT39	4 7/8	2 13/16	32,900	603,000	19,700	1.01	10	15	15.29	4 7/16	2 11/16	0.444	0.234	

DRILL PIPE DATA TABLES

Pipe Data

Size OD in.	Nominal Weight lb/ft	Grade and Upset Type	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Wall Thickness in.	Nominal ID in.	Pipe Body Section Area sq in.	Pipe Body Section Modulus cu in.	Pipe Body Polar Section Modulus cu in.	Internal Pressure psi	Collapse Pressure psi
4	14.00	S-135 IU	41,900	513,600	0.330	3.340	3.805	3.229	6.458	19,491	20,141
	14.00	S-135 IU	41,900	513,600	0.330	3.340	3.805	3.229	6.458	19,491	20,141
	14.00	S-135 IU	41,900	513,600	0.330	3.340	3.805	3.229	6.458	19,491	20,141
	14.00	S-135 IU	41,900	513,600	0.330	3.340	3.805	3.229	6.458	19,491	20,141
	14.00	S-135 EU	41,900	513,600	0.330	3.340	3.805	3.229	6.458	19,491	20,141
	14.00	S-135 IU	41,900	513,600	0.330	3.340	3.805	3.229	6.458	19,491	20,141
	14.00	S-135 IU	41,900	513,600	0.330	3.340	3.805	3.229	6.458	19,491	20,141
	14.00	S-135 IU	41,900	513,600	0.330	3.340	3.805	3.229	6.458	19,491	20,141
4	14.00	Z-140 IU	43,500	532,700	0.330	3.340	3.805	3.229	6.458	20,213	20,742
	14.00	Z-140 IU	43,500	532,700	0.330	3.340	3.805	3.229	6.458	20,213	20,742
	14.00	Z-140 IU	43,500	532,700	0.330	3.340	3.805	3.229	6.458	20,213	20,742
	14.00	Z-140 IU	43,500	532,700	0.330	3.340	3.805	3.229	6.458	20,213	20,742
	14.00	Z-140 IU	43,500	532,700	0.330	3.340	3.805	3.229	6.458	20,213	20,742
4	14.00	V-150 IU	46,600	570,700	0.330	3.340	3.805	3.229	6.458	21,656	21,912
	14.00	V-150 IU	46,600	570,700	0.330	3.340	3.805	3.229	6.458	21,656	21,912
	14.00	V-150 IU	46,600	570,700	0.330	3.340	3.805	3.229	6.458	21,656	21,912
	14.00	V-150 IU	46,600	570,700	0.330	3.340	3.805	3.229	6.458	21,656	21,912
	14.00	V-150 IU	46,600	570,700	0.330	3.340	3.805	3.229	6.458	21,656	21,912
4	15.70	E-75 IU	25,800	324,100	0.380	3.240	4.322	3.578	7.157	12,469	12,896
	15.70	E-75 IU	25,800	324,100	0.380	3.240	4.322	3.578	7.157	12,469	12,896
	15.70	E-75 IU	25,800	324,100	0.380	3.240	4.322	3.578	7.157	12,469	12,896
	15.70	E-75 EU	25,800	324,100	0.380	3.240	4.322	3.578	7.157	12,469	12,896
	15.70	E-75 IU	25,800	324,100	0.380	3.240	4.322	3.578	7.157	12,469	12,896
	15.70	E-75 IU	25,800	324,100	0.380	3.240	4.322	3.578	7.157	12,469	12,896
4	15.70	X-95 IU	32,700	410,500	0.380	3.240	4.322	3.578	7.157	15,794	16,335
	15.70	X-95 IU	32,700	410,500	0.380	3.240	4.322	3.578	7.157	15,794	16,335
	15.70	X-95 IU	32,700	410,500	0.380	3.240	4.322	3.578	7.157	15,794	16,335
	15.70	X-95 EU	32,700	410,500	0.380	3.240	4.322	3.578	7.157	15,794	16,335
	15.70	X-95 IU	32,700	410,500	0.380	3.240	4.322	3.578	7.157	15,794	16,335
	15.70	X-95 IU	32,700	410,500	0.380	3.240	4.322	3.578	7.157	15,794	16,335
4	15.70	G-105 IU	36,100	453,800	0.380	3.240	4.322	3.578	7.157	17,456	18,055
	15.70	G-105 IU	36,100	453,800	0.380	3.240	4.322	3.578	7.157	17,456	18,055
	15.70	G-105 IU	36,100	453,800	0.380	3.240	4.322	3.578	7.157	17,456	18,055
	15.70	G-105 EU	36,100	453,800	0.380	3.240	4.322	3.578	7.157	17,456	18,055
	15.70	G-105 IU	36,100	453,800	0.380	3.240	4.322	3.578	7.157	17,456	18,055
	15.70	G-105 IU	36,100	453,800	0.380	3.240	4.322	3.578	7.157	17,456	18,055
4	15.70	S-135 IU	46,500	583,400	0.380	3.240	4.322	3.578	7.157	22,444	23,213
	15.70	S-135 IU	46,500	583,400	0.380	3.240	4.322	3.578	7.157	22,444	23,213
	15.70	S-135 IU	46,500	583,400	0.380	3.240	4.322	3.578	7.157	22,444	23,213
	15.70	S-135 EU	46,500	583,400	0.380	3.240	4.322	3.578	7.157	22,444	23,213
	15.70	S-135 IU	46,500	583,400	0.380	3.240	4.322	3.578	7.157	22,444	23,213
	15.70	S-135 IU	46,500	583,400	0.380	3.240	4.322	3.578	7.157	22,444	23,213
	15.70	S-135 IU	46,500	583,400	0.380	3.240	4.322	3.578	7.157	22,444	23,213
4	15.70	Z-140 IU	48,200	605,000	0.380	3.240	4.322	3.578	7.157	23,275	24,073
	15.70	Z-140 IU	48,200	605,000	0.380	3.240	4.322	3.578	7.157	23,275	24,073
	15.70	Z-140 IU	48,200	605,000	0.380	3.240	4.322	3.578	7.157	23,275	24,073
	15.70	Z-140 IU	48,200	605,000	0.380	3.240	4.322	3.578	7.157	23,275	24,073
4	15.70	V-150 IU	51,600	648,200	0.380	3.240	4.322	3.578	7.157	24,938	25,793
	15.70	V-150 IU	51,600	648,200	0.380	3.240	4.322	3.578	7.157	24,938	25,793
	15.70	V-150 IU	51,600	648,200	0.380	3.240	4.322	3.578	7.157	24,938	25,793
	15.70	V-150 IU	51,600	648,200	0.380	3.240	4.322	3.578	7.157	24,938	25,793

DRILL PIPE DATA TABLES

Tool Joint Data									Assembly Data					
Connection Type	Outside Diameter in.	Inside Diameter in.	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Make-up Torque ft-lb	Torsional Ratio Tool Joint to Pipe	* Pin Tong Space in.	* Box Tong Space in.	Adjusted Weight lb/ft	Minimum Tool Joint OD for Prem. Class in.	Drift Diameter in.	Capacity US gal/ft	Displace-ment US gal/ft	Size OD in.
NC40	5 1/2	2	36,400	1,080,100	18,900	0.87	9	12	17.15	5 3/16	1 7/16	0.433	0.262	4
HT38	5	2 7/16	33,000	708,100	19,800	0.79	10	15.5	16.13	4 11/16	2 5/16	0.438	0.247	
SH	4 3/4	2 7/16	17,100	570,900	9,100	0.41	9	12	15.31	N/A	2 5/16	0.440	0.234	
HT40	5 1/4	2 11/16	35,900	776,400	21,500	0.86	9	15	16.12	4 29/32	2 9/16	0.442	0.247	
NC46	6	3	39,200	1,048,400	20,500	0.94	9	12	16.90	5 9/16	2 7/8	0.449	0.259	
XT38	4 3/4	2 9/16	31,300	599,600	18,800	0.75	10	15	15.44	4 17/32	2 7/16	0.440	0.236	
XT39	4 7/8	2 9/16	37,000	729,700	22,200	0.88	10	15	15.67	4 17/32	2 7/16	0.440	0.240	
GPDS40	5 1/4	2 11/16	32,700	776,400	19,600	0.78	9	12	15.82	5	2 9/16	0.443	0.242	
HT38	5	2 7/16	33,000	708,100	19,800	0.76	10	15.5	16.13	4 23/32	2 5/16	0.438	0.247	4
HT40	5 1/4	2 11/16	35,900	776,400	21,500	0.83	9	15	16.12	4 15/16	2 9/16	0.442	0.247	
XT38	4 3/4	2 9/16	31,300	599,600	18,800	0.72	10	15	15.44	4 9/16	2 7/16	0.440	0.236	
XT39	4 7/8	2 9/16	37,000	729,700	22,200	0.85	10	15	15.67	4 9/16	2 7/16	0.440	0.240	
GPDS40	5 1/4	2 9/16	34,600	838,300	21,800	0.84	9	12	15.99	5	2 7/16	0.441	0.245	
HT38	5	2 7/16	33,000	708,100	19,800	0.71	10	15.5	16.13	4 25/32	2 5/16	0.438	0.247	4
HT40	5 1/4	2 11/16	35,900	776,400	21,500	0.77	9	15	16.12	5	2 9/16	0.442	0.247	
XT38	4 3/4	2 7/16	34,200	658,500	20,500	0.73	10	15	15.61	4 19/32	2 5/16	0.438	0.239	
XT39	4 7/8	2 9/16	37,000	729,700	22,200	0.79	10	15	15.67	4 5/8	2 7/16	0.440	0.240	
GPDS40	5 1/4	2 9/16	36,400	838,300	21,800	0.78	9	12	15.99	5 1/32	2 7/16	0.441	0.245	
NC40	5 1/4	2 13/16	23,500	711,600	12,400	0.91	9	12	17.22	4 7/8	2 11/16	0.421	0.263	4
HT40	5 1/4	2 13/16	31,900	711,600	19,100	1.24	9	15	17.49	4 5/8	2 11/16	0.420	0.268	
H90	5 1/2	2 13/16	35,400	913,700	20,400	1.37	9	12	17.67	4 31/32	2 11/16	0.420	0.270	
NC46	6	3	39,200	1,048,400	20,500	1.52	9	12	18.34	5 5/16	2 7/8	0.424	0.281	
XT39	4 7/8	2 9/16	37,000	729,700	22,200	1.43	10	15	17.24	4 5/32	2 7/16	0.415	0.264	
XT40	5 1/4	2 13/16	44,000	751,600	26,400	1.71	10	15	17.59	4 5/16	2 11/16	0.420	0.269	
NC40	5 1/4	2 9/16	27,800	838,300	14,600	0.85	9	12	17.57	5	2 7/16	0.417	0.269	4
HT40	5 1/4	2 13/16	31,900	711,600	19,100	0.98	9	15	17.49	4 25/32	2 11/16	0.420	0.268	
H90	5 1/2	2 13/16	35,400	913,700	20,400	1.08	9	12	17.67	5 3/32	2 11/16	0.420	0.270	
NC46	6	3	39,200	1,048,400	20,500	1.20	9	12	18.49	5 7/16	2 7/8	0.424	0.283	
XT39	4 7/8	2 9/16	37,000	729,700	22,200	1.13	10	15	17.24	4 5/16	2 7/16	0.415	0.264	
XT40	5 1/4	2 13/16	44,000	751,600	26,400	1.35	10	15	17.59	4 15/32	2 11/16	0.420	0.269	
NC40	5 1/2	2 7/16	30,100	897,200	15,600	0.83	9	12	18.20	5 1/16	2 5/16	0.414	0.278	4
HT40	5 1/4	2 13/16	31,900	711,600	19,100	0.88	9	15	17.49	4 27/32	2 11/16	0.420	0.268	
H90	5 1/2	2 13/16	35,400	913,700	20,400	0.98	9	15	18.00	5 5/32	2 11/16	0.420	0.275	
NC46	6	3	39,200	1,048,400	20,500	1.09	9	12	18.49	5 15/32	2 7/8	0.424	0.283	
XT39	4 7/8	2 9/16	37,000	729,700	22,200	1.02	10	15	17.24	4 13/32	2 7/16	0.415	0.264	
XT40	5 1/4	2 13/16	44,000	751,600	26,400	1.22	10	15	17.59	4 17/32	2 11/16	0.420	0.269	
NC40	5 1/2	2	36,400	1,080,100	18,900	0.78	9	12	18.73	5 1/4	1 7/8	0.409	0.286	4
HT40	5 1/2	2 9/16	39,500	838,300	23,700	0.85	9	15	17.88	4 15/16	2 7/16	0.415	0.273	
H90	5 3/4	2 11/16	38,400	978,500	21,800	0.83	9	15	18.74	5 5/16	2 9/16	0.417	0.287	
NC46	6	3	39,200	1,048,400	20,500	0.84	9	12	18.49	5 21/32	2 7/8	0.424	0.283	
XT39	4 7/8	2 9/16	37,000	729,700	22,200	0.80	10	15	17.24	4 5/8	2 7/16	0.415	0.264	
XT40	5 1/4	2 13/16	44,000	751,600	26,400	0.95	10	15	17.59	4 3/4	2 11/16	0.420	0.269	
GPDS40	5 1/4	2 9/16	36,400	838,300	21,800	0.78	9	12	17.57	5 1/32	2 7/16	0.417	0.269	
HT40	5 1/4	2 9/16	39,500	838,300	23,700	0.82	9	15	17.88	4 31/32	2 7/16	0.415	0.273	4
XT39	4 7/8	2 9/16	37,000	729,700	22,200	0.77	10	15	17.24	4 21/32	2 7/16	0.415	0.264	
XT40	5 1/4	2 13/16	44,000	751,600	26,400	0.91	10	15	17.59	4 25/32	2 11/16	0.420	0.269	
GPDS40	5 1/4	2 9/16	36,400	868,300	21,800	0.76	9	12	17.57	5 1/16	2 7/16	0.417	0.269	
HT40	5 1/4	2 7/16	41,000	897,200	24,600	0.79	9	15	18.05	5	2 5/16	0.413	0.276	4
XT39	4 7/8	2 9/16	37,000	729,700	22,200	0.72	10	15	17.24	4 25/32	2 7/16	0.415	0.264	
XT40	5 1/4	2 11/16	48,100	816,400	28,900	0.93	10	15	17.79	4 25/32	2 9/16	0.417	0.272	
GPDS40	5 1/4	2 7/16	38,100	897,200	22,900	0.74	9	12	17.74	5 3/32	2 5/16	0.415	0.271	

DRILL PIPE DATA TABLES

Pipe Data

Size OD in.	Nominal Weight lb/ft	Grade and Upset Type	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Wall Thickness in.	Nominal ID in.	Pipe Body Section Area sq in.	Pipe Body Section Modulus cu in.	Pipe Body Polar Section Modulus cu in.	Internal Pressure psi	Collapse Pressure psi
4 1/2	16.60	E-75 IEU	30,800	330,600	0.337	3.826	4.407	4.271	8.543	9,829	10,392
	16.60	E-75 EU	30,800	330,600	0.337	3.826	4.407	4.271	8.543	9,829	10,392
	16.60	E-75 IEU	30,800	330,600	0.337	3.826	4.407	4.271	8.543	9,829	10,392
	16.60	E-75 IEU	30,800	330,600	0.337	3.826	4.407	4.271	8.543	9,829	10,392
	16.60	E-75 IEU	30,800	330,600	0.337	3.826	4.407	4.271	8.543	9,829	10,392
	16.60	E-75 EU	30,800	330,600	0.337	3.826	4.407	4.271	8.543	9,829	10,392
	16.60	E-75 EU	30,800	330,600	0.337	3.826	4.407	4.271	8.543	9,829	10,392
	16.60	E-75 IEU	30,800	330,600	0.337	3.826	4.407	4.271	8.543	9,829	10,392
	16.60	E-75 IEU	30,800	330,600	0.337	3.826	4.407	4.271	8.543	9,829	10,392
	16.60	E-75 EU	30,800	330,600	0.337	3.826	4.407	4.271	8.543	9,829	10,392
4 1/2	16.60	X-95 IEU	39,000	418,700	0.337	3.826	4.407	4.271	8.543	12,450	12,765
	16.60	X-95 EU	39,000	418,700	0.337	3.826	4.407	4.271	8.543	12,450	12,765
	16.60	X-95 IEU	39,000	418,700	0.337	3.826	4.407	4.271	8.543	12,450	12,765
	16.60	X-95 IEU	39,000	418,700	0.337	3.826	4.407	4.271	8.543	12,450	12,765
	16.60	X-95 IEU	39,000	418,700	0.337	3.826	4.407	4.271	8.543	12,450	12,765
	16.60	X-95 EU	39,000	418,700	0.337	3.826	4.407	4.271	8.543	12,450	12,765
	16.60	X-95 EU	39,000	418,700	0.337	3.826	4.407	4.271	8.543	12,450	12,765
	16.60	X-95 IEU	39,000	418,700	0.337	3.826	4.407	4.271	8.543	12,450	12,765
	16.60	X-95 IEU	39,000	418,700	0.337	3.826	4.407	4.271	8.543	12,450	12,765
	16.60	X-95 EU	39,000	418,700	0.337	3.826	4.407	4.271	8.543	12,450	12,765
4 1/2	16.60	G-105 IEU	43,100	462,800	0.337	3.826	4.407	4.271	8.543	13,761	13,825
	16.60	G-105 EU	43,100	462,800	0.337	3.826	4.407	4.271	8.543	13,761	13,825
	16.60	G-105 IEU	43,100	462,800	0.337	3.826	4.407	4.271	8.543	13,761	13,825
	16.60	G-105 IEU	43,100	462,800	0.337	3.826	4.407	4.271	8.543	13,761	13,825
	16.60	G-105 IEU	43,100	462,800	0.337	3.826	4.407	4.271	8.543	13,761	13,825
	16.60	G-105 EU	43,100	462,800	0.337	3.826	4.407	4.271	8.543	13,761	13,825
	16.60	G-105 EU	43,100	462,800	0.337	3.826	4.407	4.271	8.543	13,761	13,825
	16.60	G-105 IEU	43,100	462,800	0.337	3.826	4.407	4.271	8.543	13,761	13,825
	16.60	G-105 IEU	43,100	462,800	0.337	3.826	4.407	4.271	8.543	13,761	13,825
	16.60	G-105 EU	43,100	462,800	0.337	3.826	4.407	4.271	8.543	13,761	13,825
4 1/2	16.60	S-135 IEU	55,500	595,000	0.337	3.826	4.407	4.271	8.543	17,693	16,773
	16.60	S-135 EU	55,500	595,000	0.337	3.826	4.407	4.271	8.543	17,693	16,773
	16.60	S-135 IEU	55,500	595,000	0.337	3.826	4.407	4.271	8.543	17,693	16,773
	16.60	S-135 IEU	55,500	595,000	0.337	3.826	4.407	4.271	8.543	17,693	16,773
	16.60	S-135 IEU	55,500	595,000	0.337	3.826	4.407	4.271	8.543	17,693	16,773
	16.60	S-135 EU	55,500	595,000	0.337	3.826	4.407	4.271	8.543	17,693	16,773
	16.60	S-135 EU	55,500	595,000	0.337	3.826	4.407	4.271	8.543	17,693	16,773
	16.60	S-135 IEU	55,500	595,000	0.337	3.826	4.407	4.271	8.543	17,693	16,773
	16.60	S-135 IEU	55,500	595,000	0.337	3.826	4.407	4.271	8.543	17,693	16,773
	16.60	S-135 EU	55,500	595,000	0.337	3.826	4.407	4.271	8.543	17,693	16,773
	16.60	S-135 IEU	55,500	595,000	0.337	3.826	4.407	4.271	8.543	17,693	16,773
4 1/2	16.60	Z-140 IEU	57,500	617,000	0.337	3.826	4.407	4.271	8.543	18,348	17,228
	16.60	Z-140 EU	57,500	617,000	0.337	3.826	4.407	4.271	8.543	18,348	17,228
	16.60	Z-140 IEU	57,500	617,000	0.337	3.826	4.407	4.271	8.543	18,348	17,228
	16.60	Z-140 IEU	57,500	617,000	0.337	3.826	4.407	4.271	8.543	18,348	17,228
	16.60	Z-140 EU	57,500	617,000	0.337	3.826	4.407	4.271	8.543	18,348	17,228
	16.60	Z-140 IEU	57,500	617,000	0.337	3.826	4.407	4.271	8.543	18,348	17,228
4 1/2	16.60	V-150 IEU	61,600	661,100	0.337	3.826	4.407	4.271	8.543	19,658	18,103
	16.60	V-150 EU	61,600	661,100	0.337	3.826	4.407	4.271	8.543	19,658	18,103
	16.60	V-150 IEU	61,600	661,100	0.337	3.826	4.407	4.271	8.543	19,658	18,103
	16.60	V-150 IEU	61,600	661,100	0.337	3.826	4.407	4.271	8.543	19,658	18,103
	16.60	V-150 EU	61,600	661,100	0.337	3.826	4.407	4.271	8.543	19,658	18,103
	16.60	V-150 IEU	61,600	661,100	0.337	3.826	4.407	4.271	8.543	19,658	18,103

DRILL PIPE DATA TABLES

Tool Joint Data									Assembly Data					
Connection Type	Outside Diameter in.	Inside Diameter in.	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Make-up Torque ft-lb	Torsional Ratio Tool Joint to Pipe	* Pin Tong Space in.	* Box Tong Space in.	Adjusted Weight lb/ft	Minimum Tool Joint OD for Prem. Class in.	Drift Diameter in.	Capacity US gal/ft	Displace-ment US gal/ft	Size OD in.
NC46	6 1/4	3 1/4	34,000	901,200	17,600	1.10	9	12	19.14	5 13/32	3 1/8	0.585	0.293	4 1/2
OH	5 7/8	3 3/4	27,300	714,000	14,600	0.89	9	12	17.58	5 15/32	3 5/8	0.596	0.269	
FH	6	3	34,800	976,200	17,600	1.13	9	12	19.03	5 3/8	2 7/8	0.580	0.291	
H90	6	3 1/4	39,000	938,400	18,800	1.27	9	12	18.61	5 11/32	3 1/8	0.585	0.285	
HT46	6 1/4	3 1/4	47,600	901,200	28,600	1.55	9	15	19.59	5 13/32	3 1/8	0.583	0.300	
NC50	6 5/8	3 3/4	38,100	939,100	19,800	1.24	9	12	19.19	5 23/32	3 5/8	0.595	0.294	
HT50	6 1/4	3 3/4	52,700	939,100	31,600	1.71	9	15	18.73	5 13/16	3 5/8	0.595	0.287	
XT40	5 1/4	3	37,400	648,900	22,400	1.21	10	15	17.92	4 7/8	2 7/8	0.579	0.274	
XT46	6	3 1/2	58,100	910,300	34,900	1.89	10	15	18.63	5 5/8	3 3/8	0.589	0.285	
XT50	6 3/8	3 3/4	75,200	1,085,500	45,100	2.44	10	15	19.17	5 31/32	3 5/8	0.595	0.293	
NC46	6 1/4	3 1/4	34,000	901,200	17,600	0.87	9	12	19.14	5 17/32	3 1/8	0.585	0.293	4 1/2
OH	5 7/8	3 1/2	33,900	884,800	18,200	0.87	9	12	18.02	5 19/32	3 3/8	0.590	0.276	
FH	6	3	34,800	976,200	17,600	0.89	9	12	19.03	5 1/2	2 7/8	0.580	0.291	
H90	6	3 1/4	39,000	938,400	18,800	1.00	9	12	18.61	5 15/32	3 1/8	0.585	0.285	
HT46	6 1/4	3 1/4	47,600	901,200	28,600	1.22	9	15	19.59	5 13/32	3 1/8	0.583	0.300	
NC50	6 5/8	3 3/4	38,100	939,100	19,800	0.98	9	12	19.19	5 27/32	3 5/8	0.595	0.294	
HT50	6 1/4	3 3/4	52,700	939,100	31,600	1.35	9	15	18.73	5 13/16	3 5/8	0.595	0.287	
XT40	5 1/4	3	37,400	648,900	22,400	0.96	10	15	17.92	4 7/8	2 7/8	0.579	0.274	
XT46	6	3 1/2	58,100	910,300	34,900	1.49	10	15	18.63	5 5/8	3 3/8	0.589	0.285	
XT50	6 3/8	3 3/4	75,200	1,085,500	45,100	1.93	10	15	19.17	5 31/32	3 5/8	0.595	0.293	
NC46	6 1/4	3	39,700	1,048,400	20,500	0.92	9	12	19.57	5 19/32	2 7/8	0.580	0.299	4 1/2
OH	6	3 1/4	40,300	1,043,800	21,500	0.94	9	12	18.69	5 21/32	3 1/8	0.585	0.286	
FH	6 1/4	2 3/4	40,200	1,111,600	20,100	0.93	9	12	19.96	5 9/16	2 5/8	0.575	0.305	
H90	6	3 1/4	39,000	938,400	18,800	0.90	9	12	18.61	5 17/32	3 1/8	0.585	0.285	
HT46	6 1/4	3 1/4	47,600	901,200	28,600	1.10	9	15	19.59	5 13/32	3 1/8	0.583	0.300	
NC50	6 5/8	3 3/4	38,100	939,100	19,800	0.88	9	12	19.19	5 29/32	3 5/8	0.595	0.294	
HT50	6 1/4	3 3/4	52,700	939,100	31,600	1.22	9	15	18.73	5 13/16	3 5/8	0.595	0.287	
XT40	5 1/4	3	37,400	648,900	22,400	0.87	10	15	17.92	4 7/8	2 7/8	0.579	0.274	
XT46	6	3 1/2	58,100	910,300	34,900	1.35	10	15	18.63	5 5/8	3 3/8	0.589	0.285	
XT50	6 3/8	3 3/4	75,200	1,085,500	45,100	1.74	10	15	19.17	5 31/32	3 5/8	0.595	0.293	
NC46	6 1/4	2 3/4	44,900	1,183,900	23,200	0.81	9	12	19.96	5 25/32	2 5/8	0.575	0.305	4 1/2
OH	6	3	43,400	1,191,100	24,600	0.78	9	12	19.07	5 13/16	2 7/8	0.581	0.292	
FH	6 1/4	2 3/4	40,200	1,111,600	20,100	0.72	9	12	19.96	5 3/4	2 5/8	0.575	0.305	
H90	6 1/4	2 3/4	51,500	1,221,100	24,600	0.93	9	12	19.96	5 11/16	2 5/8	0.575	0.305	
HT46	6 1/4	3 1/4	47,600	901,200	28,600	0.86	9	15	19.59	5 1/2	3 1/8	0.583	0.300	
NC50	6 5/8	3 1/2	45,100	1,109,900	23,400	0.81	9	12	19.65	6 1/16	3 3/8	0.590	0.295	
HT50	6 3/8	3 1/2	65,700	1,109,900	39,400	1.18	9	15	19.52	5 13/16	3 3/8	0.589	0.301	
XT40	5 1/4	2 13/16	44,000	751,600	26,400	0.79	10	15	18.23	4 15/16	2 11/16	0.575	0.299	
XT46	6	3 1/2	58,100	910,300	34,900	1.05	10	15	18.63	5 5/8	3 3/8	0.589	0.279	
XT50	6 3/8	3 3/4	75,200	1,085,500	45,100	1.35	10	15	19.17	5 31/32	3 5/8	0.595	0.293	
GPDS46	6 1/4	3 1/4	43,300	901,200	26,000	0.78	9	12	19.14	5 19/32	3 1/8	0.585	0.293	
HT46	6 1/4	3 1/4	47,600	901,200	28,600	0.83	9	15	19.59	5 17/32	3 1/8	0.583	0.300	4 1/2
HT50	6 3/8	3 1/2	65,700	1,109,900	39,400	1.14	9	15	19.52	5 13/16	3 3/8	0.589	0.299	
XT40	5 1/4	2 13/16	44,000	751,600	26,400	0.77	10	15	18.23	4 31/32	2 11/16	0.575	0.279	
XT46	6	3 1/2	58,100	910,300	34,900	1.01	10	15	18.63	5 5/8	3 3/8	0.589	0.285	
XT50	6 3/8	3 3/4	75,200	1,085,500	45,100	1.31	10	15	19.17	5 31/32	3 5/8	0.595	0.293	
GPDS46	6 1/4	3 1/4	43,300	901,200	26,000	0.75	9	12	19.14	5 5/8	3 1/8	0.585	0.293	
HT46	6 1/4	3 1/4	47,600	901,200	28,600	0.77	9	15	19.59	5 19/32	3 1/8	0.583	0.300	4 1/2
HT50	6 3/8	3 1/2	65,700	1,109,900	39,400	1.07	9	15	19.52	5 13/16	3 3/8	0.589	0.299	
XT40	5 1/4	2 13/16	44,000	751,600	26,400	0.71	10	15	18.23	5 1/16	2 11/16	0.575	0.279	
XT46	6 1/4	3 1/4	70,200	1,069,300	42,100	1.14	10	15	19.74	5 5/8	3 1/8	0.583	0.302	
XT50	6 3/8	3 1/2	81,200	1,256,300	48,700	1.32	10	15	19.67	5 31/32	3 3/8	0.589	0.301	
GPDS46	6 1/4	3 1/4	43,300	901,200	26,000	0.70	9	12	19.14	5 11/16	3 1/8	0.585	0.293	

DRILL PIPE DATA TABLES

Pipe Data

Size OD in.	Nominal Weight lb/ft	Grade and Upset Type	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Wall Thickness in.	Nominal ID in.	Pipe Body Section Area sq in.	Pipe Body Section Modulus cu in.	Pipe Body Polar Section Modulus cu in.	Internal Pressure psi	Collapse Pressure psi
4 1/2	20.00	E-75 IEU	36,900	412,400	0.430	3.640	5.498	5.116	10.232	12,542	12,964
	20.00	E-75 EU	36,900	412,400	0.430	3.640	5.498	5.116	10.232	12,542	12,964
	20.00	E-75 IEU	36,900	412,400	0.430	3.640	5.498	5.116	10.232	12,542	12,964
	20.00	E-75 IEU	36,900	412,400	0.430	3.640	5.498	5.116	10.232	12,542	12,964
	20.00	E-75 EU	36,900	412,400	0.430	3.640	5.498	5.116	10.232	12,542	12,964
	20.00	E-75 EU	36,900	412,400	0.430	3.640	5.498	5.116	10.232	12,542	12,964
	20.00	E-75 IEU	36,900	412,400	0.430	3.640	5.498	5.116	10.232	12,542	12,964
	20.00	E-75 EU	36,900	412,400	0.430	3.640	5.498	5.116	10.232	12,542	12,964
4 1/2	20.00	X-95 IEU	46,700	522,300	0.430	3.640	5.498	5.116	10.232	15,886	16,421
	20.00	X-95 EU	46,700	522,300	0.430	3.640	5.498	5.116	10.232	15,886	16,421
	20.00	X-95 IEU	46,700	522,300	0.430	3.640	5.498	5.116	10.232	15,886	16,421
	20.00	X-95 IEU	46,700	522,300	0.430	3.640	5.498	5.116	10.232	15,886	16,421
	20.00	X-95 EU	46,700	522,300	0.430	3.640	5.498	5.116	10.232	15,886	16,421
	20.00	X-95 EU	46,700	522,300	0.430	3.640	5.498	5.116	10.232	15,886	16,421
	20.00	X-95 IEU	46,700	522,300	0.430	3.640	5.498	5.116	10.232	15,886	16,421
	20.00	X-95 EU	46,700	522,300	0.430	3.640	5.498	5.116	10.232	15,886	16,421
4 1/2	20.00	G-105 IEU	51,700	577,300	0.430	3.640	5.498	5.116	10.232	17,558	18,149
	20.00	G-105 EU	51,700	577,300	0.430	3.640	5.498	5.116	10.232	17,558	18,149
	20.00	G-105 IEU	51,700	577,300	0.430	3.640	5.498	5.116	10.232	17,558	18,149
	20.00	G-105 IEU	51,700	577,300	0.430	3.640	5.498	5.116	10.232	17,558	18,149
	20.00	G-105 EU	51,700	577,300	0.430	3.640	5.498	5.116	10.232	17,558	18,149
	20.00	G-105 EU	51,700	577,300	0.430	3.640	5.498	5.116	10.232	17,558	18,149
	20.00	G-105 IEU	51,700	577,300	0.430	3.640	5.498	5.116	10.232	17,558	18,149
	20.00	G-105 EU	51,700	577,300	0.430	3.640	5.498	5.116	10.232	17,558	18,149
4 1/2	20.00	S-135 IEU	66,400	742,200	0.430	3.640	5.498	5.116	10.232	22,575	23,335
	20.00	S-135 EU	66,400	742,200	0.430	3.640	5.498	5.116	10.232	22,575	23,335
	20.00	S-135 IEU	66,400	742,200	0.430	3.640	5.498	5.116	10.232	22,575	23,335
	20.00	S-135 IEU	66,400	742,200	0.430	3.640	5.498	5.116	10.232	22,575	23,335
	20.00	S-135 EU	66,400	742,200	0.430	3.640	5.498	5.116	10.232	22,575	23,335
	20.00	S-135 EU	66,400	742,200	0.430	3.640	5.498	5.116	10.232	22,575	23,335
	20.00	S-135 IEU	66,400	742,200	0.430	3.640	5.498	5.116	10.232	22,575	23,335
	20.00	S-135 EU	66,400	742,200	0.430	3.640	5.498	5.116	10.232	22,575	23,335
	20.00	S-135 IEU	66,400	742,200	0.430	3.640	5.498	5.116	10.232	22,575	23,335
4 1/2	20.00	Z-140 IEU	68,900	769,700	0.430	3.640	5.498	5.116	10.232	23,411	24,199
	20.00	Z-140 EU	68,900	769,700	0.430	3.640	5.498	5.116	10.232	23,411	24,199
	20.00	Z-140 IEU	68,900	769,700	0.430	3.640	5.498	5.116	10.232	23,411	24,199
	20.00	Z-140 EU	68,900	769,700	0.430	3.640	5.498	5.116	10.232	23,411	24,199
	20.00	Z-140 IEU	68,900	769,700	0.430	3.640	5.498	5.116	10.232	23,411	24,199
4 1/2	20.00	V-150 IEU	73,800	824,700	0.430	3.640	5.498	5.116	10.232	25,083	25,927
	20.00	V-150 EU	73,800	824,700	0.430	3.640	5.498	5.116	10.232	25,083	25,927
	20.00	V-150 IEU	73,800	824,700	0.430	3.640	5.498	5.116	10.232	25,083	25,927
	20.00	V-150 EU	73,800	824,700	0.430	3.640	5.498	5.116	10.232	25,083	25,927
	20.00	V-150 IEU	73,800	824,700	0.430	3.640	5.498	5.116	10.232	25,083	25,927
5	19.50	E-75 IEU	41,200	395,600	0.362	4.276	5.275	5.708	11.415	9,503	9,962
	19.50	E-75 IEU	41,200	395,600	0.362	4.276	5.275	5.708	11.415	9,503	9,962
	19.50	E-75 IEU	41,200	395,600	0.362	4.276	5.275	5.708	11.415	9,503	9,962
	19.50	E-75 IEU	41,200	395,600	0.362	4.276	5.275	5.708	11.415	9,503	9,962
	19.50	E-75 IEU	41,200	395,600	0.362	4.276	5.275	5.708	11.415	9,503	9,962

DRILL PIPE DATA TABLES

Tool Joint Data									Assembly Data					
Connection Type	Outside Diameter in.	Inside Diameter in.	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Make-up Torque ft-lb	Torsional Ratio Tool Joint to Pipe	* Pin Tong Space in.	* Box Tong Space in.	Adjusted Weight lb/ft	Minimum Tool Joint OD for Prem. Class in.	Drift Diameter in.	Capacity US gal/ft	Displace-ment US gal/ft	Size OD in.
NC46	6 1/4	3	39,700	1,048,400	20,500	1.08	9	12	22.89	5 1/2	2 7/8	0.527	0.350	4 1/2
OH6	3 1/2	34,100	884,800	18,200	0.92	9	12	21.64	5 17/32	3 3/8	0.538	0.331		
H90	6	3 1/4	39,000	938,400	18,800	1.06	9	12	21.94	5 7/16	3 1/8	0.532	0.336	
HT46	6 1/4	3 1/4	47,600	901,200	28,600	1.29	9	15	22.89	5 13/32	3 1/8	0.531	0.350	
NC50	6 5/8	3 5/8	41,700	1,026,000	21,600	1.13	9	12	22.77	5 13/16	3 1/2	0.540	0.348	
HT50	6 1/4	3 5/8	59,200	1,026,000	35,500	1.60	9	15	22.31	5 13/16	3 1/2	0.540	0.341	
XT46	6	3 1/2	58,100	910,300	34,900	1.57	10	15	21.93	5 5/8	3 3/8	0.537	0.335	
XT50	6 3/8	3 1/2	81,200	1,256,300	48,700	2.20	10	15	22.99	5 31/32	3 3/8	0.537	0.352	
NC46	6 1/4	3	39,700	1,048,400	20,500	0.85	9	12	22.89	5 21/32	2 7/8	0.527	0.350	4 1/2
OH	6 1/4	3 1/4	40,700	1,043,800	21,500	0.87	9	12	22.58	5 11/16	3 1/8	0.533	0.345	
H90	6	3 1/4	39,000	938,400	18,800	0.84	9	12	21.94	5 9/16	3 1/8	0.532	0.336	
HT46	6 1/4	3 1/4	47,600	901,200	28,600	1.02	9	15	22.89	5 13/32	3 1/8	0.531	0.350	
NC50	6 5/8	3 1/2	41,500	1,109,900	23,400	0.97	9	12	23.00	5 15/16	3 3/8	0.538	0.352	
HT50	6 1/4	3 1/2	62,700	1,109,900	37,600	1.34	9	15	22.55	5 13/16	3 3/8	0.537	0.345	
XT46	6	3 1/2	58,100	910,300	34,900	1.24	10	15	21.93	5 5/8	3 3/8	0.537	0.335	
XT50	6 3/8	3 1/2	81,200	1,256,300	48,700	1.74	10	15	22.99	5 31/32	3 3/8	0.537	0.352	
NC46	6 1/4	2 3/4	44,900	1,183,900	23,200	0.87	9	12	23.28	5 23/32	2 5/8	0.523	0.356	4 1/2
OH	6 1/4	3	46,600	1,191,100	24,600	0.90	9	12	22.97	5 3/4	2 7/8	0.528	0.351	
H90	6 1/4	3	45,700	1,085,700	21,800	0.88	9	12	22.89	5 5/8	2 7/8	0.527	0.350	
HT46	6 1/4	3 1/4	47,600	901,200	28,600	0.92	9	15	22.89	5 7/16	3 1/8	0.531	0.350	
NC50	6 5/8	3 1/2	45,100	1,109,900	23,400	0.87	9	12	23.00	6 1/32	3 3/8	0.538	0.352	
HT50	6 1/4	3 1/2	62,700	1,109,900	37,600	1.21	9	15	22.55	5 13/16	3 3/8	0.537	0.345	
XT46	6	3 1/2	58,100	910,300	34,900	1.12	10	15	21.93	5 5/8	3 3/8	0.537	0.335	
XT50	6 3/8	3 1/2	81,200	1,256,300	48,700	1.57	10	15	22.99	5 31/32	3 3/8	0.537	0.352	
NC46	6 1/4	2 3/4	44,900	1,183,900	23,200	0.68	9	12	23.28	5 15/16	2 5/8	0.523	0.356	4 1/2
OH	6 3/8	2 3/4	52,200	1,326,600	27,400	0.79	9	12	23.61	5 31/32	2 5/8	0.524	0.361	
H90	6 3/8	2 3/4	51,700	1,221,100	24,600	0.78	9	12	23.57	5 27/32	2 5/8	0.523	0.360	
HT46	6 1/4	3	57,700	1,048,400	34,600	0.87	9	15	23.34	5 9/16	2 7/8	0.526	0.357	
NC50	6 5/8	3 1/4	51,700	1,269,000	26,800	0.78	9	12	23.43	6 7/32	3 1/8	0.532	0.358	
HT50	6 3/8	3 1/2	65,700	1,109,900	39,400	0.99	9	15	23.85	5 13/16	3 3/8	0.537	0.350	
XT46	6	3 1/4	64,800	1,069,300	38,900	0.98	10	15	22.42	5 5/8	3 1/8	0.531	0.343	
XT50	6 3/8	3 1/2	81,200	1,256,300	48,700	1.22	10	15	23.99	5 31/32	3 3/8	0.537	0.352	
GPDS46	6 1/4	3	53,400	1,048,400	32,000	0.80	9	12	22.89	5 21/32	2 7/8	0.527	0.350	
HT46	6 1/4	3	57,700	1,048,400	34,600	0.84	9	15	23.34	5 19/32	2 7/8	0.526	0.357	4 1/2
HT50	6 3/8	3 1/2	65,700	1,109,900	39,400	0.95	9	15	22.85	5 27/32	3 3/8	0.537	0.350	
XT46	6	3 1/4	64,800	1,069,300	38,900	0.94	10	15	22.42	5 5/8	3 1/8	0.531	0.343	
XT50	6 3/8	3 1/2	81,200	1,256,300	48,700	1.18	10	15	22.99	5 31/32	3 3/8	0.537	0.352	
GPDS46	6 1/4	3	53,400	1,048,400	32,000	0.78	9	12	22.89	5 11/16	2 7/8	0.527	0.350	
HT46	6 1/4	3	57,700	1,048,400	34,600	0.78	9	15	23.34	5 21/32	2 7/8	0.526	0.357	4 1/2
HT50	6 3/8	3 1/2	65,700	1,109,900	39,400	0.89	9	15	22.85	5 29/32	3 3/8	0.537	0.350	
XT46	6 1/4	3 1/8	75,700	1,144,400	45,400	1.03	10	15	23.26	5 5/8	3	0.528	0.356	
XT50	6 3/8	3 1/2	81,200	1,256,300	48,700	1.10	10	15	22.99	5 31/32	3 3/8	0.537	0.352	
GPDS46	6 1/4	3	53,400	1,048,400	32,000	0.72	9	12	22.89	5 3/4	2 7/8	0.527	0.350	
NC50	6 5/8	3 3/4	38,100	939,100	19,800	0.92	9	12	22.12	5 7/8	3 5/8	0.733	0.338	5
HT50	6 5/8	3 3/4	53,300	939,100	32,000	1.29	9	15	22.57	5 13/16	3 5/8	0.732	0.345	
FH	7	3 3/4	62,900	1,448,400	33,400	1.53	10	12	23.20	6 3/8	3 5/8	0.732	0.355	
XT46	6	3 1/2	36,500	910,300	21,900	0.89	10	15	21.69	5 5/8	3 3/8	0.726	0.332	
XT50	6 1/2	4	38,700	902,900	23,200	0.94	10	15	21.83	5 31/32	3 7/8	0.738	0.334	

DRILL PIPE DATA TABLES

Pipe Data

Size OD in.	Nominal Weight lb/ft	Grade and Upset Type	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Wall Thickness in.	Nominal ID in.	Pipe Body Section Area sq in.	Pipe Body Section Modulus cu in.	Pipe Body Polar Section Modulus cu in.	Internal Pressure psi	Collapse Pressure psi
5	19.50	X-95 IEU	52,100	501,100	0.362	4.276	5.275	5.708	11.415	12,037	12,026
	19.50	X-95 IEU	52,100	501,100	0.362	4.276	5.275	5.708	11.415	12,037	12,026
	19.50	X-95 IEU	52,100	501,100	0.362	4.276	5.275	5.708	11.415	12,037	12,026
	19.50	X-95 IEU	52,100	501,100	0.362	4.276	5.275	5.708	11.415	12,037	12,026
	19.50	X-95 IEU	52,100	501,100	0.362	4.276	5.275	5.708	11.415	12,037	12,026
5	19.50	G-105 IEU	57,600	553,800	0.362	4.276	5.275	5.708	11.415	13,304	12,999
	19.50	G-105 IEU	57,600	553,800	0.362	4.276	5.275	5.708	11.415	13,304	12,999
	19.50	G-105 IEU	57,600	553,800	0.362	4.276	5.275	5.708	11.415	13,304	12,999
	19.50	G-105 IEU	57,600	553,800	0.362	4.276	5.275	5.708	11.415	13,304	12,999
	19.50	G-105 IEU	57,600	553,800	0.362	4.276	5.275	5.708	11.415	13,304	12,999
	19.50	G-105 IEU	57,600	553,800	0.362	4.276	5.275	5.708	11.415	13,304	12,999
5	19.50	S-135 IEU	74,100	712,100	0.362	4.276	5.275	5.708	11.415	17,105	15,672
	19.50	S-135 IEU	74,100	712,100	0.362	4.276	5.275	5.708	11.415	17,105	15,672
	19.50	S-135 IEU	74,100	712,100	0.362	4.276	5.275	5.708	11.415	17,105	15,672
	19.50	S-135 IEU	74,100	712,100	0.362	4.276	5.275	5.708	11.415	17,105	15,672
	19.50	S-135 IEU	74,100	712,100	0.362	4.276	5.275	5.708	11.415	17,105	15,672
	19.50	S-135 IEU	74,100	712,100	0.362	4.276	5.275	5.708	11.415	17,105	15,672
5	19.50	Z-140 IEU	76,800	738,400	0.362	4.276	5.275	5.708	11.415	17,738	16,079
	19.50	Z-140 IEU	76,800	738,400	0.362	4.276	5.275	5.708	11.415	17,738	16,079
	19.50	Z-140 IEU	76,800	738,400	0.362	4.276	5.275	5.708	11.415	17,738	16,079
	19.50	Z-140 IEU	76,800	738,400	0.362	4.276	5.275	5.708	11.415	17,738	16,079
5	19.50	V-150 IEU	82,300	791,200	0.362	4.276	5.275	5.708	11.415	19,005	16,858
	19.50	V-150 IEU	82,300	791,200	0.362	4.276	5.275	5.708	11.415	19,005	16,858
	19.50	V-150 IEU	82,300	791,200	0.362	4.276	5.275	5.708	11.415	19,005	16,858
	19.50	V-150 IEU	82,300	791,200	0.362	4.276	5.275	5.708	11.415	19,005	16,858
5	25.60	E-75 IEU	52,300	530,100	0.500	4.000	7.069	7.245	14.491	13,125	13,500
	25.60	E-75 IEU	52,300	530,100	0.500	4.000	7.069	7.245	14.491	13,125	13,500
	25.60	E-75 IEU	52,300	530,100	0.500	4.000	7.069	7.245	14.491	13,125	13,500
	25.60	E-75 IEU	52,300	530,100	0.500	4.000	7.069	7.245	14.491	13,125	13,500
5	25.60	X-95 IEU	66,200	671,500	0.500	4.000	7.069	7.245	14.491	16,625	17,100
	25.60	X-95 IEU	66,200	671,500	0.500	4.000	7.069	7.245	14.491	16,625	17,100
	25.60	X-95 IEU	66,200	671,500	0.500	4.000	7.069	7.245	14.491	16,625	17,100
	25.60	X-95 IEU	66,200	671,500	0.500	4.000	7.069	7.245	14.491	16,625	17,100
5	25.60	G-105 IEU	73,200	742,200	0.500	4.000	7.069	7.245	14.491	18,375	18,900
	25.60	G-105 IEU	73,200	742,200	0.500	4.000	7.069	7.245	14.491	18,375	18,900
	25.60	G-105 IEU	73,200	742,200	0.500	4.000	7.069	7.245	14.491	18,375	18,900
	25.60	G-105 IEU	73,200	742,200	0.500	4.000	7.069	7.245	14.491	18,375	18,900
	25.60	G-105 IEU	73,200	742,200	0.500	4.000	7.069	7.245	14.491	18,375	18,900
5	25.60	S-135 IEU	94,100	954,300	0.500	4.000	7.069	7.245	14.491	23,625	24,300
	25.60	S-135 IEU	94,100	954,300	0.500	4.000	7.069	7.245	14.491	23,625	24,300
	25.60	S-135 IEU	94,100	954,300	0.500	4.000	7.069	7.245	14.491	23,625	24,300
	25.60	S-135 IEU	94,100	954,300	0.500	4.000	7.069	7.245	14.491	23,625	24,300
	25.60	S-135 IEU	94,100	954,300	0.500	4.000	7.069	7.245	14.491	23,625	24,300
5	25.60	Z-140 IEU	97,500	989,600	0.500	4.000	7.069	7.245	14.491	24,500	25,200
	25.60	Z-140 IEU	97,500	989,600	0.500	4.000	7.069	7.245	14.491	24,500	25,200
	25.60	Z-140 IEU	97,500	989,600	0.500	4.000	7.069	7.245	14.491	24,500	25,200
5	25.60	V-150 IEU	104,500	1,060,300	0.500	4.000	7.069	7.245	14.491	26,250	27,000
	25.60	V-150 IEU	104,500	1,060,300	0.500	4.000	7.069	7.245	14.491	26,250	27,000
	25.60	V-150 IEU	104,500	1,060,300	0.500	4.000	7.069	7.245	14.491	26,250	27,000

DRILL PIPE DATA TABLES

Tool Joint Data									Assembly Data					
Connection Type	Outside Diameter in.	Inside Diameter in.	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Make-up Torque ft-lb	Torsional Ratio Tool Joint to Pipe	* Pin Tong Space in.	* Box Tong Space in.	Adjusted Weight lb/ft	Minimum Tool Joint OD for Prem. Class in.	Drift Diameter in.	Capacity US gal/ft	Displace-ment US gal/ft	Size OD in.
NC50	6 5/8	3 1/2	45,100	1,109,900	23,400	0.87	9	12	22.61	6 1/32	3 3/8	0.727	0.346	5
HT50	6 5/8	3 3/4	53,300	939,100	32,000	1.02	9	15	22.57	5 13/16	3 5/8	0.732	0.345	
FH7	3 3/4	62,900	1,448,400	33,400	1.21	10	12	23.20	6 1/2	3 5/8	0.732	0.355		
XT46	6	3 1/2	58,100	910,300	34,900	1.12	10	15	21.69	5 5/8	3 3/8	0.726	0.332	
XT50	6 1/2	4	62,500	902,900	37,500	1.20	10	15	21.83	5 31/32	3 7/8	0.738	0.334	
NC50	6 5/8	3 1/4	51,700	1,269,000	26,800	0.90	9	12	23.07	6 3/32	3 1/8	0.722	0.353	5
HT50	6 5/8	3 1/2	66,200	1,109,900	39,700	1.15	9	15	23.10	5 13/16	3 3/8	0.726	0.353	
FH	7	3 3/4	62,900	1,448,400	33,400	1.09	10	12	23.20	6 9/16	3 5/8	0.732	0.355	
XT46	6	3 1/2	58,100	910,300	34,900	1.01	10	15	21.69	5 5/8	3 3/8	0.726	0.332	
XT50	6 1/2	4	62,500	902,900	37,500	1.09	10	15	21.83	5 31/32	3 7/8	0.738	0.334	
GPDS50	6 5/8	3 1/2	60,400	1,110,200	36,200	1.05	9	12	21.61	5 13/16	3 3/8	0.727	0.346	
NC50	6 5/8	2 3/4	63,400	1,551,700	32,900	0.86	9	12	23.89	6 5/16	2 5/8	0.713	0.365	5
HT50	6 5/8	3 1/2	66,200	1,109,900	39,700	0.89	9	15	23.10	5 15/16	3 3/8	0.726	0.353	
FH	7 1/4	3 1/2	72,500	1,619,200	37,400	0.98	10	12	24.38	6 3/4	3 3/8	0.726	0.373	
XT46	6	3 1/2	58,100	910,300	34,900	0.78	10	15	21.69	5 23/32	3 3/8	0.726	0.332	
XT50	6 1/2	3 3/4	77,000	1,085,500	46,200	1.04	10	15	22.39	5 31/32	3 5/8	0.731	0.343	
GPDS50	6 5/8	3 1/2	60,400	1,110,200	36,200	0.82	9	12	21.61	6 1/32	3 3/8	0.727	0.346	
HT50	6 5/8	3 1/2	66,200	1,109,900	39,700	0.86	9	15	23.10	5 31/32	3 3/8	0.726	0.353	5
XT46	6	3 1/2	58,100	910,300	34,900	0.76	10	15	21.69	5 25/32	3 3/8	0.726	0.332	
XT50	6 1/2	3 3/4	77,000	1,085,500	46,200	1.00	10	15	22.39	5 31/32	3 5/8	0.731	0.343	
GPDS50	6 5/8	3 1/2	60,400	1,110,200	36,200	0.79	9	12	21.61	6 3/32	3 3/8	0.727	0.346	
HT50	6 5/8	3 1/2	66,200	1,109,900	39,700	0.80	9	15	23.10	6 1/32	3 3/8	0.726	0.353	5
XT46	6 1/4	3 1/4	70,200	1,069,300	42,100	0.85	10	15	22.78	5 23/32	3 1/8	0.720	0.348	
XT50	6 1/2	3 3/4	77,000	1,085,500	46,200	0.94	10	15	22.39	5 31/32	3 5/8	0.731	0.343	
GPDS50	6 5/8	3 1/2	60,400	1,110,200	36,200	0.73	9	12	21.61	6 5/32	3 3/8	0.727	0.346	
NC50	6 5/8	3 1/2	45,100	1,109,900	23,400	0.86	9	12	28.08	6 1/32	3 3/8	0.641	0.430	5
HT50	6 5/8	3 3/4	53,300	939,100	32,000	1.02	9	15	28.01	5 13/16	3 5/8	0.646	0.428	
FH	7	3 1/2	62,900	1,619,200	37,400	1.20	10	12	29.16	6 1/2	3 3/8	0.641	0.446	
XT50	6 5/8	3 3/4	77,300	1,085,500	46,400	1.48	10	15	28.14	5 31/32	3 5/8	0.646	0.430	
NC50	6 5/8	3	57,800	1,416,200	30,000	0.87	9	12	28.97	6 7/32	2 7/8	0.631	0.443	5
HT50	6 5/8	3 1/2	66,200	1,109,900	39,700	1.00	9	15	28.53	5 13/16	3 3/8	0.640	0.436	
FH	7	3 1/2	62,900	1,619,200	37,400	0.95	10	12	29.16	6 21/32	3 3/8	0.641	0.446	
XT50	6 5/8	3 3/4	77,300	1,085,500	46,400	1.17	10	15	28.14	5 31/32	3 5/8	0.646	0.430	
NC50	6 5/8	2 3/4	63,400	1,551,700	32,900	0.87	9	12	29.36	6 9/32	2 5/8	0.627	0.449	5
HT50	6 5/8	3 1/2	66,200	1,109,900	39,700	0.90	9	15	29.53	5 29/32	3 3/8	0.640	0.436	
FH	7 1/4	3 1/2	72,500	1,619,200	37,400	0.99	10	12	29.82	6 23/32	3 3/8	0.640	0.456	
XT50	6 5/8	3 3/4	77,300	1,085,500	46,400	1.06	10	15	28.14	5 31/32	3 5/8	0.646	0.430	
GPDS50	6 5/8	3 1/2	60,400	1,110,200	36,200	0.83	9	12	28.08	6 1/32	3 3/8	0.641	0.430	
NC50	6 5/8	2 3/4	63,400	1,551,700	32,900	0.67	9	12	29.36	6 17/32	2 5/8	0.627	0.449	5
HT50	6 5/8	3 1/2	66,200	1,109,900	39,700	0.70	9	15	29.53	6 3/16	3 3/8	0.640	0.436	
FH	7 1/4	3 1/4	78,700	1,778,300	41,200	0.84	10	12	30.30	6 15/16	3 1/8	0.635	0.464	
XT50	6 5/8	3 1/2	90,700	1,256,300	54,400	0.96	10	15	28.67	5 31/32	3 3/8	0.640	0.439	
GPDS50	6 5/8	3 1/2	60,400	1,110,200	36,200	0.64	9	12	28.08	6 9/32	3 3/8	0.641	0.430	
HT50	6 5/8	3 1/4	78,000	1,269,000	46,800	0.80	9	15	29.02	6 1/8	3 1/8	0.634	0.444	5
XT50	6 5/8	3 3/4	90,700	1,256,300	54,400	0.93	10	15	28.67	6	3 3/8	0.640	0.439	
GPDS50	6 5/8	3 1/4	72,200	1,269,200	43,300	0.74	9	12	28.54	6 7/32	3 1/8	0.636	0.437	
HT50	6 5/8	3 1/4	78,000	1,269,000	46,800	0.75	9	15	29.02	6 7/32	3 1/8	0.634	0.444	5
XT50	6 5/8	3 3/8	97,000	1,337,300	58,200	0.93	10	15	28.93	6 1/32	3 1/4	0.637	0.443	
GPDS50	6 5/8	3 1/4	72,200	1,269,200	43,300	0.69	9	12	28.54	6 5/16	3 1/8	0.636	0.437	

DRILL PIPE DATA TABLES

Pipe Data

Size OD in.	Nominal Weight lb/ft	Grade and Upset Type	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Wall Thickness in.	Nominal ID in.	Pipe Body Section Area sq in.	Pipe Body Section Modulus cu in.	Pipe Body Polar Section Modulus cu in.	Internal Pressure psi	Collapse Pressure psi
5 1/2	21.90	E-75 IEU	50,700	437,100	0.361	4.778	5.828	7.031	14.062	8,413	8,615
	21.90	E-75 IEU	50,700	437,100	0.361	4.778	5.828	7.031	14.062	8,413	8,615
	21.90	E-75 IEU	50,700	437,100	0.361	4.778	5.828	7.031	14.062	8,413	8,615
	21.90	E-75 IEU	50,700	437,100	0.361	4.778	5.828	7.031	14.062	8,413	8,615
5 1/2	21.90	X-95 IEU	64,200	553,700	0.361	4.778	5.828	7.031	14.062	10,019	10,912
	21.90	X-95 IEU	64,200	553,700	0.361	4.778	5.828	7.031	14.062	10,019	10,912
	21.90	X-95 IEU	64,200	553,700	0.361	4.778	5.828	7.031	14.062	10,019	10,912
	21.90	X-95 IEU	64,200	553,700	0.361	4.778	5.828	7.031	14.062	10,019	10,912
5 1/2	21.90	G-105 IEU	71,000	612,000	0.361	4.778	5.828	7.031	14.062	10,753	12,061
	21.90	G-105 IEU	71,000	612,000	0.361	4.778	5.828	7.031	14.062	10,753	12,061
	21.90	G-105 IEU	71,000	612,000	0.361	4.778	5.828	7.031	14.062	10,753	12,061
	21.90	G-105 IEU	71,000	612,000	0.361	4.778	5.828	7.031	14.062	10,753	12,061
	21.90	G-105 IEU	71,000	612,000	0.361	4.778	5.828	7.031	14.062	10,753	12,061
5 1/2	21.90	S-135 IEU	91,300	786,800	0.361	4.778	5.828	7.031	14.062	12,679	15,507
	21.90	S-135 IEU	91,300	786,800	0.361	4.778	5.828	7.031	14.062	12,679	15,507
	21.90	S-135 IEU	91,300	786,800	0.361	4.778	5.828	7.031	14.062	12,679	15,507
	21.90	S-135 IEU	91,300	786,800	0.361	4.778	5.828	7.031	14.062	12,679	15,507
	21.90	S-135 IEU	91,300	786,800	0.361	4.778	5.828	7.031	14.062	12,679	15,507
5 1/2	21.90	Z-140 IEU	94,700	816,000	0.361	4.778	5.828	7.031	14.062	12,957	16,081
	21.90	Z-140 IEU	94,700	816,000	0.361	4.778	5.828	7.031	14.062	12,957	16,081
	21.90	Z-140 IEU	94,700	816,000	0.361	4.778	5.828	7.031	14.062	12,957	16,081
	21.90	Z-140 IEU	94,700	816,000	0.361	4.778	5.828	7.031	14.062	12,957	16,081
	21.90	Z-140 IEU	94,700	816,000	0.361	4.778	5.828	7.031	14.062	12,957	16,081
5 1/2	21.90	V-150 IEU	101,400	874,200	0.361	4.778	5.828	7.031	14.062	13,473	17,230
	21.90	V-150 IEU	101,400	874,200	0.361	4.778	5.828	7.031	14.062	13,473	17,230
	21.90	V-150 IEU	101,400	874,200	0.361	4.778	5.828	7.031	14.062	13,473	17,230
	21.90	V-150 IEU	101,400	874,200	0.361	4.778	5.828	7.031	14.062	13,473	17,230
	21.90	V-150 IEU	101,400	874,200	0.361	4.778	5.828	7.031	14.062	13,473	17,230
5 1/2	24.70	E-75 IEU	56,600	497,200	0.415	4.670	6.630	7.844	15.688	10,464	9,903
	24.70	E-75 IEU	56,600	497,200	0.415	4.670	6.630	7.844	15.688	10,464	9,903
	24.70	E-75 IEU	56,600	497,200	0.415	4.670	6.630	7.844	15.688	10,464	9,903
	24.70	E-75 IEU	56,600	497,200	0.415	4.670	6.630	7.844	15.688	10,464	9,903
5 1/2	24.70	X-95 IEU	71,700	629,800	0.415	4.670	6.630	7.844	15.688	12,933	12,544
	24.70	X-95 IEU	71,700	629,800	0.415	4.670	6.630	7.844	15.688	12,933	12,544
	24.70	X-95 IEU	71,700	629,800	0.415	4.670	6.630	7.844	15.688	12,933	12,544
	24.70	X-95 IEU	71,700	629,800	0.415	4.670	6.630	7.844	15.688	12,933	12,544
5 1/2	24.70	G-105 IEU	79,200	696,100	0.415	4.670	6.630	7.844	15.688	14,013	13,865
	24.70	G-105 IEU	79,200	696,100	0.415	4.670	6.630	7.844	15.688	14,013	13,865
	24.70	G-105 IEU	79,200	696,100	0.415	4.670	6.630	7.844	15.688	14,013	13,865
	24.70	G-105 IEU	79,200	696,100	0.415	4.670	6.630	7.844	15.688	14,013	13,865
	24.70	G-105 IEU	79,200	696,100	0.415	4.670	6.630	7.844	15.688	14,013	13,865
5 1/2	24.70	S-135 IEU	101,800	895,000	0.415	4.670	6.630	7.844	15.688	17,023	17,826
	24.70	S-135 IEU	101,800	895,000	0.415	4.670	6.630	7.844	15.688	17,023	17,826
	24.70	S-135 IEU	101,800	895,000	0.415	4.670	6.630	7.844	15.688	17,023	17,826
	24.70	S-135 IEU	101,800	895,000	0.415	4.670	6.630	7.844	15.688	17,023	17,826
	24.70	S-135 IEU	101,800	895,000	0.415	4.670	6.630	7.844	15.688	17,023	17,826

DRILL PIPE DATA TABLES

Tool Joint Data									Assembly Data					
Connection Type	Outside Diameter in.	Inside Diameter in.	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Make-up Torque ft-lb	Torsional Ratio Tool Joint to Pipe	* Pin Tong Space in.	* Box Tong Space in.	Adjusted Weight lb/ft	Minimum Tool Joint OD for Prem. Class in.	Drift Diameter in.	Capacity US gal/ft	Displace-ment US gal/ft	Size OD in.
FH	7	4	57,900	1,265,800	31,200	1.14	10	12	24.83	6 15/32	3 7/8	0.910	0.380	5 1/2
HT55	7	4	77,200	1,265,800	46,300	1.52	10	15	25.32	6 13/32	3 7/8	0.908	0.387	
XT54	6 3/4	4 1/4	70,400	960,700	42,200	1.39	10	15	24.04	6 7/32	4 1/8	0.915	0.368	
XT57	7	4 1/4	94,300	1,208,700	56,600	1.86	10	15	24.72	6 15/32	4 1/8	0.915	0.378	
FH	7	3 3/4	65,100	1,448,400	35,700	1.01	10	12	25.45	6 5/8	3 5/8	0.904	0.389	5 1/2
HT55	7	4	77,200	1,265,800	46,300	1.20	10	15	25.42	6 13/32	3 7/8	0.908	0.389	
XT54	6 3/4	4 1/4	70,400	960,700	42,200	1.10	10	15	24.04	6 7/32	4 1/8	0.915	0.368	
XT57	7	4 1/4	94,300	1,208,700	56,600	1.47	10	15	24.72	6 15/32	4 1/8	0.915	0.378	
FH	7 1/4	3 1/2	75,000	1,619,200	40,000	1.06	10	12	26.62	6 11/16	3 3/8	0.898	0.407	5 1/2
HT55	7	4	77,200	1,265,800	46,300	1.09	10	15	25.42	6 13/32	3 7/8	0.908	0.389	
XT54	6 3/4	4 1/4	70,400	960,700	42,200	0.99	10	15	24.04	6 7/32	4 1/8	0.915	0.368	
XT57	7	4 1/4	94,300	1,208,700	56,600	1.86	10	15	24.72	6 15/32	4 1/8	0.915	0.378	
GPDS55	7	4 1/8	74,200	1,292,500	44,500	1.05	10	12	24.83	6 7/16	3 7/8	0.910	0.380	
FH	7 1/2	3	90,200	1,925,500	47,700	0.99	10	12	28.24	6 29/32	2 7/8	0.886	0.432	5 1/2
HT55	7	4	77,200	1,265,800	46,300	0.85	10	15	25.42	6 5/8	3 7/8	0.908	0.389	
XT54	6 3/4	4 1/4	70,400	960,700	42,200	0.77	10	15	24.04	6 5/16	4 1/8	0.915	0.368	
XT57	7	4 1/4	94,300	1,208,700	56,600	1.03	10	15	24.72	6 15/32	4 1/8	0.915	0.378	
GPDS55	7	4	74,200	1,292,500	44,500	0.81	9	12	24.83	6 11/16	3 7/8	0.910	0.380	
FH	7 1/2	3	90,200	1,925,500	47,700	0.95	10	12	28.24	6 15/16	2 7/8	0.886	0.432	5 1/2
HT55	7	4	77,200	1,265,800	46,300	0.82	10	15	25.42	6 21/32	3 7/8	0.908	0.389	
XT54	6 3/4	4 1/4	70,400	960,700	42,200	0.74	10	15	24.04	6 11/32	4 1/8	0.915	0.368	
XT57	7	4 1/4	94,300	1,208,700	56,600	1.00	10	15	24.72	6 15/32	4 1/8	0.915	0.378	
GPDS55	7	4	74,200	1,292,500	44,500	0.78	10	12	24.83	6 23/32	3 7/8	0.910	0.380	
FH	7 1/2	3	90,200	1,925,500	47,700	0.89	10	12	28.24	7	2 7/8	0.886	0.432	5 1/2
HT55	7	4	77,200	1,265,800	46,300	0.76	10	15	25.42	6 23/32	3 7/8	0.908	0.389	
XT54	6 3/4	4	86,600	1,155,100	52,000	0.85	10	15	24.63	6 9/32	3 7/8	0.908	0.377	
XT57	7	4 1/4	94,300	1,208,700	56,600	0.93	10	15	24.72	6 15/32	4 1/8	0.915	0.378	
GPDS55	7	4	74,200	1,292,500	44,500	0.73	10	12	24.83	6 25/32	3 7/8	0.910	0.380	
FH	7	4	57,900	1,265,800	31,200	1.02	10	12	27.37	6 17/32	3 7/8	0.872	0.419	5 1/2
HT55	7	4	77,200	1,265,800	46,300	1.36	10	15	27.85	6 13/32	3 7/8	0.870	0.426	
XT54	6 3/4	4 1/4	70,400	960,700	42,200	1.24	10	15	26.46	6 7/32	4 1/8	0.877	0.405	
XT57	7	4 1/4	94,300	1,208,700	56,600	1.67	10	15	24.14	6 15/32	4 1/8	0.877	0.415	
FH	7 1/4	3 1/2	75,000	1,619,200	40,000	1.05	10	12	29.07	6 11/16	3 3/8	0.859	0.445	5 1/2
HT55	7	4	77,200	1,265,800	46,300	1.08	10	15	27.85	6 13/32	3 7/8	0.870	0.426	
XT54	6 3/4	4 1/4	70,400	960,700	42,200	0.98	10	15	26.57	6 7/32	4 1/8	0.877	0.406	
XT57	7	4 1/4	94,300	1,208,700	56,600	1.32	10	15	27.25	6 15/32	4 1/8	0.877	0.417	
FH	7 1/4	3 1/2	75,000	1,619,200	40,000	0.95	10	12	29.07	6 25/32	3 3/8	0.859	0.445	5 1/2
HT55	7	4	77,200	1,265,800	46,300	0.97	10	15	27.85	6 15/32	3 7/8	0.870	0.426	
XT54	6 3/4	4 1/4	70,400	960,700	42,200	0.89	10	15	26.57	6 7/32	4 1/8	0.877	0.406	
XT57	7	4 1/4	94,300	1,208,700	56,600	1.19	10	15	27.25	6 15/32	4 1/8	0.877	0.417	
GPDS55	7	4	74,200	1,292,500	44,500	0.94	10	12	27.27	6 17/32	3 7/8	0.872	0.417	
FH	7 1/2	3	90,200	1,925,500	47,700	0.89	10	12	30.69	7	2 7/8	0.848	0.469	5 1/2
HT55	7	4	77,200	1,265,800	46,300	0.76	10	15	27.85	6 23/32	3 7/8	0.870	0.426	
XT54	6 3/4	4	86,600	1,155,100	52,000	0.85	10	15	27.17	6 9/32	3 7/8	0.870	0.416	
XT57	7	4 1/4	94,300	1,208,700	56,600	0.93	10	15	27.25	6 15/32	4 1/8	0.877	0.417	
GPDS55	7	4	74,200	1,292,500	44,500	0.73	10	12	27.27	6 25/32	3 7/8	0.872	0.417	

DRILL PIPE DATA TABLES

Pipe Data

Size OD in.	Nominal Weight lb/ft	Grade and Upset Type	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Wall Thickness in.	Nominal ID in.	Pipe Body Section Area sq in.	Pipe Body Section Modulus cu in.	Pipe Body Polar Section Modulus cu in.	Internal Pressure psi	Collapse Pressure psi
5 1/2	24.70	Z-140 IEU	105,600	928,100	0.415	4.670	6.630	7.844	15.688	17,489	18,486
	24.70	Z-140 IEU	105,600	928,100	0.415	4.670	6.630	7.844	15.688	17,489	18,486
	24.70	Z-140 IEU	105,600	928,100	0.415	4.670	6.630	7.844	15.688	17,489	18,486
	24.70	Z-140 IEU	105,600	928,100	0.415	4.670	6.630	7.844	15.688	17,489	18,486
	24.70	Z-140 IEU	105,600	928,100	0.415	4.670	6.630	7.844	15.688	17,489	18,486
5 1/2	24.70	V-150 IEU	113,100	994,400	0.415	4.670	6.630	7.844	15.688	18,386	19,807
	24.70	V-150 IEU	113,100	994,400	0.415	4.670	6.630	7.844	15.688	18,386	19,807
	24.70	V-150 IEU	113,100	994,400	0.415	4.670	6.630	7.844	15.688	18,386	19,807
	24.70	V-150 IEU	113,100	994,400	0.415	4.670	6.630	7.844	15.688	18,386	19,807
	24.70	V-150 IEU	113,100	994,400	0.415	4.670	6.630	7.844	15.688	18,386	19,807
5 7/8	23.40	E-75 IEU	58,600	469,000	0.361	5.153	6.254	8.125	16.251	7,453	8,065
5 7/8	23.40	X-95 IEU	74,200	594,100	0.361	5.153	6.254	8.125	16.251	8,775	10,216
5 7/8	23.40	G-105 IEU	82,000	656,600	0.361	5.153	6.254	8.125	16.251	9,362	11,291
5 7/8	23.40	S-135 IEU	105,500	844,200	0.361	5.153	6.254	8.125	16.251	10,825	14,517
5 7/8	23.40	Z-140 IEU	109,400	875,500	0.361	5.153	6.254	8.125	16.251	11,023	15,054
5 7/8	23.40	V-150 IEU	117,200	938,000	0.361	5.153	6.254	8.125	16.251	11,376	16,130
5 7/8	26.30	E-75 IEU	65,500	533,900	0.415	5.045	7.119	9.083	18.165	9,558	9,271
5 7/8	26.30	X-95 IEU	83,000	676,300	0.415	5.045	7.119	9.083	18.165	11,503	11,744
5 7/8	26.30	G-105 IEU	91,700	747,400	0.415	5.045	7.119	9.083	18.165	12,414	12,980
5 7/8	26.30	S-135 IEU	117,900	961,000	0.415	5.045	7.119	9.083	18.165	14,892	16,688
5 7/8	26.30	Z-140 IEU	122,300	996,600	0.415	5.045	7.119	9.083	18.165	15,266	17,306
5 7/8	26.30	V-150 IEU	131,000	1,067,800	0.415	5.045	7.119	9.083	18.165	15,976	18,543
6 5/8	25.20	E-75 IEU	70,600	489,500	0.330	5.965	6.526	9.786	19.572	4,788	6,538
	25.20	E-75 IEU	70,600	489,500	0.330	5.965	6.526	9.786	19.572	4,788	6,538
	25.20	E-75 IEU	70,600	489,500	0.330	5.965	6.526	9.786	19.572	4,788	6,538
6 5/8	25.20	X-95 IEU	89,400	620,000	0.330	5.965	6.526	9.786	19.572	5,321	8,281
	25.20	X-95 IEU	89,400	620,000	0.330	5.965	6.526	9.786	19.572	5,321	8,281
	25.20	X-95 IEU	89,400	620,000	0.330	5.965	6.526	9.786	19.572	5,321	8,281
6 5/8	25.20	G-105 IEU	98,800	685,200	0.330	5.965	6.526	9.786	19.572	5,500	9,153
	25.20	G-105 IEU	98,800	685,200	0.330	5.965	6.526	9.786	19.572	5,500	9,153
	25.20	G-105 IEU	98,800	685,200	0.330	5.965	6.526	9.786	19.572	5,500	9,153
6 5/8	25.20	S-135 IEU	127,000	881,000	0.330	5.965	6.526	9.786	19.572	6,036	11,768
	25.20	S-135 IEU	127,000	881,000	0.330	5.965	6.526	9.786	19.572	6,036	11,768
	25.20	S-135 IEU	127,000	881,000	0.330	5.965	6.526	9.786	19.572	6,036	11,768
	25.20	S-135 IEU	127,000	881,000	0.330	5.965	6.526	9.786	19.572	6,036	11,768
6 5/8	25.20	Z-140 IEU	131,700	913,700	0.330	5.965	6.526	9.786	19.572	6,121	12,204
	25.20	Z-140 IEU	131,700	913,700	0.330	5.965	6.526	9.786	19.572	6,121	12,204
	25.20	Z-140 IEU	131,700	913,700	0.330	5.965	6.526	9.786	19.572	6,121	12,204
	25.20	Z-140 IEU	131,700	913,700	0.330	5.965	6.526	9.786	19.572	6,121	12,204

DRILL PIPE DATA TABLES

Tool Joint Data									Assembly Data					
Connection Type	Outside Diameter in.	Inside Diameter in.	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Make-up Torque ft-lb	Torsional Ratio Tool Joint to Pipe	* Pin Tong Space in.	* Box Tong Space in.	Adjusted Weight lb/ft	Minimum Tool Joint OD for Prem. Class in.	Drift Diameter in.	Capacity US gal/ft	Displace-ment US gal/ft	Size OD in.
FH7 1/2	3	90,200	1,925,500	47,700	0.85	10	12	30.69	7 1/32	2 7/8	0.848	0.469	5 1/2	
HT55	7	3 3/4	87,700	1,448,400	52,600	0.83	10	15	28.42	6 21/32	3 5/8	0.863	0.435	
XT54	6 3/4	4	86,600	1,155,100	52,000	0.82	10	15	27.17	6 11/32	3 7/8	0.870	0.416	
XT57	7	4 1/4	94,300	1,208,700	56,600	0.89	10	15	27.25	6 15/32	4 1/8	0.877	0.417	
GPDS55	7 1/8	3 3/4	89,300	1,475,100	53,600	0.85	10	12	28.12	6 23/32	3 5/8	0.865	0.430	
FH	7 1/2	3	90,200	1,925,500	47,700	0.80	10	12	30.69	7 3/32	2 7/8	0.848	0.469	5 1/2
HT55	7	3 3/4	87,700	1,448,400	52,600	0.78	10	15	28.42	6 23/32	3 5/8	0.863	0.435	
XT54	6 3/4	4	86,600	1,155,100	52,000	0.77	10	15	27.17	6 7/16	3 7/8	0.870	0.416	
XT57	7	4	106,200	1,403,100	63,700	0.94	10	15	27.85	6 15/32	3 7/8	0.870	0.426	
GPDS55	7 1/8	4 1/8	66,600	1,196,700	40,000	0.59	10	12	27.31	6 31/32	4	0.875	0.418	
XT57	7	4 1/4	94,300	1,208,700	56,600	1.61	10	15	26.48	6 15/32	4 1/8	1.055	0.405	5 7/8
XT57	7	4 1/4	94,300	1,208,700	56,600	1.27	10	15	26.48	6 15/32	4 1/8	1.055	0.405	5 7/8
XT57	7	4 1/4	94,300	1,208,700	56,600	1.15	10	15	26.48	6 15/32	4 1/8	1.055	0.405	5 7/8
XT57	7	4 1/4	94,300	1,208,700	56,600	0.89	10	15	26.48	6 15/32	4 1/8	1.055	0.405	5 7/8
XT57	7	4 1/4	94,300	1,208,700	56,600	0.86	10	15	26.48	6 17/32	4 1/8	1.055	0.405	5 7/8
XT57	7	4 1/4	94,300	1,208,700	56,600	0.80	10	15	26.48	6 5/8	4 1/8	1.055	0.405	5 7/8
XT57	7	4 1/4	94,300	1,208,700	56,600	1.44	10	15	29.12	6 15/32	4 1/8	1.014	0.445	5 7/8
XT57	7	4 1/4	94,300	1,208,700	56,600	1.14	10	15	29.12	6 15/32	4 1/8	1.014	0.445	5 7/8
XT57	7	4 1/4	94,300	1,208,700	56,600	1.03	10	15	29.12	6 15/32	4 1/8	1.014	0.445	5 7/8
XT57	7	4 1/4	94,300	1,208,700	56,600	0.80	10	15	29.12	6 5/8	4 1/8	1.014	0.445	5 7/8
XT57	7	4 1/4	94,300	1,208,700	56,600	0.77	10	15	29.12	6 21/32	4 1/8	1.014	0.445	5 7/8
XT57	7	4 1/4	94,300	1,208,700	56,600	0.72	10	15	29.12	6 3/4	4 1/8	1.014	0.445	5 7/8
FH	8	5	73,700	1,448,400	38,400	1.04	10	13	28.79	7 7/16	4 7/8	1.418	0.440	6 5/8
HT65	8	5	99,700	1,448,400	59,800	1.41	10	16	29.38	7 11/32	4 7/8	1.415	0.449	
XT65	8	5	135,300	1,543,700	81,200	1.92	10	15	29.18	7 11/32	4 7/8	1.416	0.446	
FH	8	5	73,700	1,448,400	38,400	0.82	10	13	28.79	7 5/8	4 7/8	1.418	0.440	6 5/8
HT65	8	5	99,700	1,448,400	59,800	1.12	10	16	29.38	7 11/32	4 7/8	1.415	0.449	
XT65	8	5	135,300	1,543,700	81,200	1.51	10	15	29.18	7 11/32	4 7/8	1.416	0.446	
FH	8 1/4	4 3/4	86,200	1,678,100	44,600	0.87	10	13	30.25	7 11/16	4 5/8	1.409	0.463	6 5/8
HT65	8	5	99,700	1,448,400	59,800	1.01	10	16	29.38	7 13/32	4 7/8	1.415	0.449	
XT65	8	5	135,300	1,543,700	81,200	1.37	10	15	29.18	7 11/32	4 7/8	1.416	0.446	
FH	8 1/2	4 1/4	109,200	2,102,300	56,100	0.86	10	13	32.36	7 29/32	4 1/8	1.394	0.495	6 5/8
HT65	8	5	99,700	1,448,400	59,800	0.79	10	16	29.38	7 5/8	4 7/8	1.415	0.449	
XT65	8	5	135,300	1,543,700	81,200	1.07	10	15	29.18	7 11/32	4 7/8	1.416	0.446	
GPDS65	8	4 7/8	107,500	1,596,400	64,500	0.85	10	13	29.13	7 5/8	4 3/4	1.414	0.446	
FH	8 1/2	4 1/4	109,200	2,102,300	56,100	0.83	10	13	32.36	7 31/32	4 1/8	1.394	0.495	6 5/8
HT65	8	5	99,700	1,448,400	59,800	0.76	10	16	29.38	7 11/16	4 7/8	1.415	0.449	
XT65	8	5	135,300	1,543,700	81,200	1.03	10	15	29.18	7 11/32	4 7/8	1.416	0.446	
GPDS65	8 1/4	4 7/8	108,200	1,596,400	64,900	0.82	10	13	29.91	7 21/32	4 3/4	1.413	0.458	

DRILL PIPE DATA TABLES

Pipe Data

Size OD in.	Nominal Weight lb/ft	Grade and Upset Type	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Wall Thickness in.	Nominal ID in.	Pipe Body Section Area sq in.	Pipe Body Section Modulus cu in.	Pipe Body Polar Section Modulus cu in.	Internal Pressure psi	Collapse Pressure psi
6 5/8	25.20	V-150 IEU	141,200	978,900	0.330	5.965	6.526	9.786	19.572	6,260	13,075
	25.20	V-150 IEU	141,200	978,900	0.330	5.965	6.526	9.786	19.572	6,260	13,075
	25.20	V-150 IEU	141,200	978,900	0.330	5.965	6.526	9.786	19.572	6,260	13,075
	25.20	V-150 IEU	141,200	978,900	0.330	5.965	6.526	9.786	19.572	6,260	13,075
6 5/8	27.70	E-75 IEU	76,300	534,200	0.362	5.901	7.123	10.578	21.156	5,894	7,172
	27.70	E-75 IEU	76,300	534,200	0.362	5.901	7.123	10.578	21.156	5,894	7,172
	27.70	E-75 IEU	76,300	534,200	0.362	5.901	7.123	10.578	21.156	5,894	7,172
6 5/8	27.70	X-95 IEU	96,600	676,700	0.362	5.901	7.123	10.578	21.156	6,755	9,084
	27.70	X-95 IEU	96,600	676,700	0.362	5.901	7.123	10.578	21.156	6,755	9,084
	27.70	X-95 IEU	96,600	676,700	0.362	5.901	7.123	10.578	21.156	6,755	9,084
6 5/8	27.70	G-105 IEU	106,800	747,900	0.362	5.901	7.123	10.578	21.156	7,103	10,040
	27.70	G-105 IEU	106,800	747,900	0.362	5.901	7.123	10.578	21.156	7,103	10,040
	27.70	G-105 IEU	106,800	747,900	0.362	5.901	7.123	10.578	21.156	7,103	10,040
6 5/8	27.70	S-135 IEU	137,300	961,600	0.362	5.901	7.123	10.578	21.156	7,813	12,909
	27.70	S-135 IEU	137,300	961,600	0.362	5.901	7.123	10.578	21.156	7,813	12,909
	27.70	S-135 IEU	137,300	961,600	0.362	5.901	7.123	10.578	21.156	7,813	12,909
	27.70	S-135 IEU	137,300	961,600	0.362	5.901	7.123	10.578	21.156	7,813	12,909
6 5/8	27.70	Z-140 IEU	142,400	997,200	0.362	5.901	7.123	10.578	21.156	7,881	13,387
	27.70	Z-140 IEU	142,400	997,200	0.362	5.901	7.123	10.578	21.156	7,881	13,387
	27.70	Z-140 IEU	142,400	997,200	0.362	5.901	7.123	10.578	21.156	7,881	13,387
	27.70	Z-140 IEU	142,400	997,200	0.362	5.901	7.123	10.578	21.156	7,881	13,387
6 5/8	27.70	V-150 IEU	152,600	1,068,400	0.362	5.901	7.123	10.578	21.156	7,970	14,343
	27.70	V-150 IEU	152,600	1,068,400	0.362	5.901	7.123	10.578	21.156	7,970	14,343
	27.70	V-150 IEU	152,600	1,068,400	0.362	5.901	7.123	10.578	21.156	7,970	14,343
	27.70	V-150 IEU	152,600	1,068,400	0.362	5.901	7.123	10.578	21.156	7,970	14,343

Notes:

1. Torsional yield strength of conventional tool joints is calculated per API RP7G Latest Edition.
2. Torsional yield strength of Double-Shoulder Tool Joints (HT, XT, GPDS) is calculated per a formula similar to the one in API RP7G Latest Edition.
3. The make-up torque of the tool joint is based on the lower of 60% of the Tool joint torsional yield strength or the T3 value calculated per the equation in API RP7G Latest Edition. Minimum make-up torques of 50% of the tool joint torsional strength, excluding contributions of the secondary shoulder, may also be used.
4. Performance ratings for eXtreme Torque Metal-Seal (XT-M) Connection types are comparable to these shown for XT of the same size.
5. The adjusted weight of the assembly is based on an average pipe length of 29.4 ft plus the tool joint length.
6. The minimum tool joint OD for premium class is based on a tool joint torsional strength of 80% of the torsional strength of the premium class pipe to which it is attached.

DRILL PIPE DATA TABLES

Connection Type	Tool Joint Data: Outside Diameter in.	Inside Diameter in.	Torsional Yield Strength ft-lb	Tensile Yield Strength lb	Make-up Torque ft-lb	Torsional Ratio Tool Joint to Pipe	* Pin Tong Space in.	* Box Tong Space in.	Assembly Data: Adjusted Weight lb/ft	Minimum Tool Joint OD for Prem. Class in.	Drift Diameter in.	Capacity US gal/ft	Displacement US gal/ft	Size OD in.
FH	8 1/2	4 1/4	109,200	2,102,300	56,100	0.77	10	13	32.36	8 1/32	4 1/8	1.394	0.495	6 5/8
HT65	8	5	99,700	1,448,400	59,800	0.71	10	16	29.38	7 3/4	4 7/8	1.415	0.449	
XT65	8	5	135,300	1,543,700	81,200	0.96	10	15	29.18	7 11/32	4 7/8	1.416	0.446	
GPDS65	8 1/4	4 7/8	108,200	1,596,400	64,900	0.77	10	13	29.91	7 3/4	4 3/4	1.413	0.458	
FH	8	5	73,700	1,448,400	38,400	0.97	10	13	30.61	7 1/2	4 7/8	1.389	0.468	6 5/8
HT65	8	5	99,700	1,448,400	59,800	1.31	10	16	31.19	7 11/32	4 7/8	1.386	0.477	
XT65	8	5	135,300	1,543,700	81,200	1.77	10	15	31.00	7 11/32	4 7/8	1.387	0.474	
FH	8 1/4	4 3/4	86,200	1,678,100	44,600	0.89	10	13	32.07	7 11/16	4 5/8	1.381	0.491	6 5/8
HT65	8	5	99,700	1,448,100	59,800	1.03	10	16	31.19	7 3/8	4 7/8	1.386	0.477	
XT65	8	5	135,300	1,543,700	81,200	1.40	10	15	31.00	7 11/32	4 7/8	1.387	0.474	
FH	8 1/4	4 3/4	86,200	1,678,100	44,600	0.81	10	13	32.07	7 3/4	4 5/8	1.381	0.491	6 5/8
HT65	8	5	99,700	1,448,400	59,800	0.93	10	16	31.19	7 15/32	4 7/8	1.386	0.477	
XT65	8	5	135,300	1,543,700	81,200	1.27	10	15	31.00	7 11/32	4 7/8	1.387	0.474	
FH	8 1/2	4 1/4	109,200	2,102,300	56,100	0.80	10	13	34.18	8	4 1/8	1.365	0.523	6 5/8
HT65	8	5	99,700	1,448,400	59,800	0.73	10	16	31.19	7 23/32	4 7/8	1.386	0.477	
XT65	8	5	135,300	1,543,700	81,200	0.99	10	15	31.00	7 11/32	4 7/8	1.387	0.474	
GPDS65	8	4 7/8	107,500	1,596,400	64,500	0.78	10	13	30.96	7 23/32	4 3/4	1.385	0.474	
FH	8 1/2	4 1/4	109,200	2,102,300	56,100	0.77	10	13	34.18	8 1/32	4 1/8	1.365	0.523	6 5/8
HT65	8	5	99,700	1,448,400	59,800	0.70	10	16	31.19	7 3/4	4 7/8	1.386	0.477	
XT65	8	5	135,300	1,543,700	81,200	0.95	10	15	31.00	7 11/32	4 7/8	1.387	0.474	
GPDS65	8 1/4	4 7/8	108,200	1,596,400	64,900	0.76	10	13	31.74	7 3/4	4 3/4	1.385	0.485	
FH	8 1/2	4 1/4	109,200	2,102,300	56,100	0.72	10	13	34.18	8 1/8	4 1/8	1.365	0.523	6 5/8
HT65	8	5	99,700	1,448,400	59,800	0.65	10	16	31.19	7 27/32	4 7/8	1.386	0.477	
XT65	8	5	135,300	1,543,700	81,200	0.89	10	15	31.00	7 7/16	4 7/8	1.387	0.474	
GPDS65	8 1/4	4 7/8	108,200	1,596,400	64,900	0.71	10	13	31.74	7 27/32	4 3/4	1.385	0.485	

Casing Data sheet

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
4 1/2	9.5	J-55	3310	4380	4380			101			152	0.205	4.09	3.965	0.00342	0.01625
4 1/2	9.5	K-55	3310	4380	4380			112			152	0.205	4.09	3.965	0.00342	0.01625
4 1/2	9.5	LS-65	3600	5180	5180			135			180	0.205	4.09	3.965	0.00342	0.01625
4 1/2	10.5	J-55	4010	4790	4790		4790	132		203	166	0.224	4.052	3.927	0.00372	0.01595
4 1/2	10.5	K-55	4010	4790	4790		4790	146		249	166	0.224	4.052	3.927	0.00372	0.01595
4 1/2	10.5	LS-65	4420	5660	5660		5660	154		231	195	0.224	4	3.927	0.00413	0.01554
4 1/2	11.6	J-55	4960	5350	5350	5350	5350	154	162	225	184	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	K-55	4960	5350	5350	5350	5350	170	180	277	184	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	LS-65	5560	6320	6320	6320	6320	179	188	256	217	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	L-80	6350	7780		7780	7780		212	291	267	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	HCL-80	8650	7780		7780	7780		223	312	267	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	N-80	6350	7780		7780	7780		223	304	267	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	HCN-80	8650	7780		7780	7780		223	312	267	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	C-90	6810	8750		8750	8750		223	309	300	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	S-95	8650	9240		9240	9240		245	338	317	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	T-95	7030	9240		9240	9240		234	325	317	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	C-95	7030	9240		9240	9240		234	325	317	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	HCP-110	8650	10690		10690	10690		279	385	367	0.25	4	3.875	0.00413	0.01554
4 1/2	11.6	P-110	7580	10690		10690	10690		279	385	367	0.25	4	3.875	0.00413	0.01554
4 1/2	13.5	LS-65	7300	7330		7330	7330		228	295	249	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	L-80	8540	9020		9020	9020		257	334	307	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	HCL-80	10380	9020		9020	9020		270	359	307	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	N-80	8540	9020		9020	9020		270	349	307	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	HCN-80	10380	9020		9020	9020		270	359	307	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	C-90	9300	10150		10150	10150		270	355	345	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	S-95	10380	10710		10710	10710		297	388	364	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	T-95	9660	10710		10710	10710		284	374	364	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	C-95	9660	10710		10710	10710		284	374	364	0.29	3.92	3.795	0.00474	0.01493
4 1/2	13.5	P-110	10680	12410		12410	12410		338	443	422	0.29	3.92	3.795	0.00474	0.01493
4 1/2	15.1	L-80	11090	10480		10480	10480		308	384	353	0.337	3.826	3.701	0.00545	0.01422
4 1/2	15.1	HCL-80	12330	10480		10480	9790		325	408	353	0.337	3.826	3.701	0.00545	0.01422
4 1/2	15.1	S-95	12330	12450		12450	11630		357	446	419	0.337	3.826	3.701	0.00545	0.01422
4 1/2	15.1	P-110	14350	14420		14420	13460		406	509	485	0.337	3.826	3.701	0.00545	0.01422
4 1/2	15.1	Q-125	15840	16380		16380	15300		438	554	551	0.337	3.826	3.701	0.00545	0.01422
4 1/2	15.1	LS-140	17240	18350		18350	17140		487	616	617	0.337	3.826	3.701	0.00545	0.01422
4 1/2	15.1	V-150	18110	19660		19660	18360		519	658	661	0.337	3.826	3.701	0.00545	0.01422
5	11.5	J-55	3060	4240	4240			133			182	0.22	4.56	4.435	0.00409	0.01020
5	11.5	K-55	3060	4240	4240			147			182	0.22	4.56	4.435	0.00409	0.01020
5	11.5	LS-65	3290	5010	5010			162			215	0.22	4.56	4.435	0.00409	0.01020
5	13	J-55	4140	4870	4870	4870	4870	169	182	252	208	0.253	4.494	4.369	0.00467	0.01962

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
5	13	K-55	4140	4870	4870	4870	4870	186	201	309	208	0.253	4.494	4.369	0.00467	0.01962
5	13	LS-55	4590	5760	5760	5760	5760	196	212	288	245	0.253	4.494	4.369	0.00467	0.01962
5	15	J-55	5560	5700	5700	5700	5700	207	223	293	241	0.296	4.408	4.283	0.00541	0.01888
5	15	K-55	5560	5700	5700	5700	5700	228	246	359	241	0.296	4.408	4.283	0.00541	0.01888
5	15	LS-55	6280	6730	6730	6730	6730	240	259	334	284	0.296	4.408	4.283	0.00541	0.01888
5	15	L-80	7250	8290		8290	8290		295	379	350	0.296	4.408	4.283	0.00541	0.01888
5	15	HCL-80	9380	8290		8290	8290		311	408	350	0.296	4.408	4.283	0.00541	0.01888
5	15	N-80	7250	8290		8290	8290		311	396	350	0.296	4.408	4.283	0.00541	0.01888
5	15	HCN-80	9380	8290		8290	8290		311	408	350	0.296	4.408	4.283	0.00541	0.01888
5	15	C-90	7840	9320		9320	9320		311	404	394	0.296	4.408	4.283	0.00541	0.01888
5	15	S-95	9380	9840		9840	9840		342	441	416	0.296	4.408	4.283	0.00541	0.01888
5	15	T-95	8110	9840		9840	9840		326	424	416	0.296	4.408	4.283	0.00541	0.01888
5	15	C-95	8110	9840		9840	9840		326	424	416	0.296	4.408	4.283	0.00541	0.01888
5	15	P-110	8850	11400		11400	11400		388	503	481	0.296	4.408	4.283	0.00541	0.01888
5	15	V-150	10250	15540		15540	15540		497	651	656	0.296	4.408	4.283	0.00541	0.01888
5	18	LS-55	8730	8240		8240	8240		331	403	343	0.362	4.276	4.151	0.00652	0.01776
5	18	L-80	10500	10140		10140	9910		377	457	422	0.362	4.276	4.151	0.00652	0.01776
5	18	HCL-80	11880	10140		10140	9910		396	492	422	0.362	4.276	4.151	0.00652	0.01776
5	18	N-80	10500	10140		10140	9910		396	477	422	0.362	4.276	4.151	0.00652	0.01776
5	18	HCN-80	11880	10140		10140	9910		396	492	422	0.362	4.276	4.151	0.00652	0.01776
5	18	C-90	11530	11400		11400	11150		396	484	475	0.362	4.276	4.151	0.00652	0.01776
5	18	T-95	12030	12040		12040	11770		416	512	501	0.362	4.276	4.151	0.00652	0.01776
5	18	C-95	12030	12040		12040	11770		416	512	501	0.362	4.276	4.151	0.00652	0.01776
5	18	P-110	13470	13940		13940	13620		495	606	580	0.362	4.276	4.151	0.00652	0.01776
5	18	Q-125	14830	15840		15840	15480		535	661	659	0.362	4.276	4.151	0.00652	0.01776
5	18	LS-140	16080	17740		17740	17340		594	735	738	0.362	4.276	4.151	0.00652	0.01776
5	18	V-150	16860	19010		19010	18580		634	785	791	0.362	4.276	4.151	0.00652	0.01776
5	21.4	L-80	12760	12240		10810	9910		466	510	501	0.437	4.126	4.001	0.00775	0.01654
5	21.4	N-80	12760	12240		10810	9910		490	537	501	0.437	4.126	4.001	0.00775	0.01654
5	21.4	C-90	14360	13770		12170	11150		490	537	564	0.437	4.126	4.001	0.00775	0.01654
5	21.4	T-95	15160	14530		12840	11770		515	563	595	0.437	4.126	4.001	0.00775	0.01654
5	21.4	C-95	15160	14530		12840	11770		515	563	595	0.437	4.126	4.001	0.00775	0.01654
5	21.4	P-110	17550	16820		14870	13620		613	671	689	0.437	4.126	4.001	0.00775	0.01654
5	21.4	Q-125	19940	19120		16900	15480		662	724	783	0.437	4.126	4.001	0.00775	0.01654
5	23.2	L-80	13830	13380		10810	9910		513	510	543	0.478	4.044	3.919	0.00840	0.01589
5	23.2	HCL-80	15820	13380		10810	9910		540	516	543	0.478	4.044	3.919	0.00840	0.01589
5	23.2	N-80	13830	13380		10810	9910		540	537	543	0.478	4.044	3.919	0.00840	0.01589
5	23.2	HCN-80	15820	13380		10810	9910		540	537	543	0.478	4.044	3.919	0.00840	0.01589
5	23.2	C-90	15560	15060		12170	11150		540	537	611	0.478	4.044	3.919	0.00840	0.01589
5	23.2	S-95	16430	15890		12840	11770		594	590	645	0.478	4.044	3.919	0.00840	0.01589

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
5	23.2	T-95	16430	15890		12840	11770		567	563	645	0.478	4.044	3.919	0.00840	0.01589
5	23.2	C-95	16430	15890		12840	11770		567	563	645	0.478	4.044	3.919	0.00840	0.01589
5	23.2	P-110	19020	18400		14780	13626		675	671	747	0.478	4.044	3.919	0.00840	0.01589
5	23.2	Q-125	21620	20910		16900	15480		729	724	849	0.478	4.044	3.919	0.00840	0.01589
5	24.1	L-80	14400	14000		10810	9910		538	510	666	0.5	4	3.875	0.00874	0.01554
5	24.1	N-80	14400	14000		10810	9910		558	537	666	0.5	4	3.875	0.00874	0.01554
5	24.1	C-90	16200	15750		12170	11150		567	537	636	0.5	4	3.875	0.00874	0.01554
5	24.1	T-95	17100	16630		12840	11770		595	563	672	0.5	4	3.875	0.00874	0.01554
5	24.1	C-95	17100	16630		12840	11770		595	563	672	0.5	4	3.875	0.00874	0.01554
5	24.1	P-110	19600	19250		14870	13620		708	671	778	0.5	4	3.875	0.00874	0.01554
5	24.1	Q-125	22500	21980		16900	15480		765	724	884	0.5	4	3.875	0.00874	0.01554
5	24.1	V-150	27000	26250		20280	18580		907	858	1060	0.5	4	3.875	0.00874	0.01554
5 1/2	15.5	J-55	4040	4810	4810	4810	4810	202	217	300	248	0.275	4.95	4.825	0.00558	0.02380
5 1/2	15.5	K-55	4040	4810	4800	4810	4810	222	239	366	248	0.275	4.95	4.825	0.00558	0.02380
5 1/2	15.5	LS-65	4470	5690	5690	5690	5690	235	253	342	293	0.275	4.95	4.825	0.00558	0.02380
5 1/2	17	J-55	4910	5320	5320	5320	5320	229	247	329	273	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	K-55	4910	5320	5320	5320	5320	252	272	402	273	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	LS-65	5510	6290	6260	6290	6290	267	287	376	323	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	L-80	6390	7740		7740	7740		338	428	397	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	HCL-80	8580	7740		7740	7740		356	462	397	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	N-80	6390	7740		7740	7740		348	446	397	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	HCN-80	8580	7740		7740	7740		356	462	397	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	C-90	6740	8710		8710	8710		356	456	447	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	S-95	8580	9190		9190	9190		392	498	471	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	T-95	6940	9190		9190	9190		374	480	471	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	C-95	6940	9190		9190	9190		374	480	471	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	HCP-110	8580	10640		10640	10640		445	568	546	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	P-110	7480	10640		10640	10640		445	568	546	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	HCQ-125	8580	12090		12090	12090		481	620	620	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	Q-125	7890	12090		12090	12090		481	620	620	0.304	4.892	4.767	0.00614	0.02325
5 1/2	17	LS-140	8580	13540		13540	13540		534	680	695	0.304	4.892	4.767	0.00614	0.02325
5 1/2	20	LS-65	7540	7470		7470	7470		353	442	379	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	L-80	8830	9190		9190	8990		416	503	466	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	HCL-80	10630	9190		9190	8990		438	542	466	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	N-80	8830	9190		9190	8990		428	524	466	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	HCN-80	10630	9190		9190	8990		438	542	466	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	C-90	9630	10340		10340	10120		438	436	525	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	S-95	10630	10910		10910	10680		482	585	554	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	T-95	10010	10910		10910	10680		460	563	554	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	C-95	10010	10910		10910	10680		460	563	554	0.361	4.778	4.653	0.00721	0.02218

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
5 1/2	20	P-110	11100	12630		12630	12360		548	667	641	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	Q-125	12080	14360		14360	14050		592	728	729	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	LS-140	12950	16080		16080	15740		657	810	816	0.361	4.778	4.653	0.00721	0.02218
5 1/2	20	V-150	13480	17230		17230	16860		701	865	874	0.361	4.778	4.653	0.00721	0.02218
5 1/2	23	L-80	11160	10560		9880	8990		489	550	530	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	N-80	11160	10560		9880	8990		502	579	530	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	HCN-80	12450	10560		9880	8990		514	579	530	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	C-90	12380	11880		11110	10120		514	579	597	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	S-95	12940	12540		11730	10680		566	637	630	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	T-95	12940	12540		11730	10680		540	608	630	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	C-95	12940	12540		11730	10680		540	608	630	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	P-110	14540	14530		13580	12360		643	724	729	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	Q-125	16070	16510		15430	14050		694	782	829	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	LS-140	17500	18490		17290	15740		771	869	928	0.415	4.67	4.545	0.00820	0.02119
5 1/2	23	V-150	18390	19810		18520	16860		823	927	995	0.415	4.67	4.545	0.00820	0.02119
5 1/2	26	C-90	14240	13630		11110	10120		598	579	676	0.476	4.548	4.423	0.00929	0.02009
5 1/2	26	T-95	15030	14390		11730	10680		628	608	714	0.476	4.548	4.423	0.00929	0.02009
5 1/2	26	C-95	15030	14390		11730	10680		628	608	714	0.476	4.548	4.423	0.00929	0.02009
5 1/2	26	P-110	17400	16660		13580	12360		748	724	826	0.476	4.548	4.423	0.00929	0.02009
5 1/2	26	Q-125	19770	18930		15430	14050		808	782	939	0.476	4.548	4.423	0.00929	0.02009
5 1/2	26	V-150	23720	22720		18520	16860		957	927	1127	0.476	4.548	4.423	0.00929	0.02009
5 1/2	26.8	C-90	14880	14320							707	0.5	4.5	4.375	0.00971	0.01967
5 1/2	26.8	T-95	15700	15110							746	0.5	4.5	4.375	0.00971	0.01967
5 1/2	29.7	C-90	16510	16090							785	0.562	4.376	4.251	0.01078	0.01860
5 1/2	29.7	T-95	17430	16990							828	0.562	4.376	4.251	0.01078	0.01860
5 1/2	32.6	C-90	18130	17900							861	0.625	4.25	4.125	0.01184	0.01755
5 1/2	32.6	T-95	19140	18810							909	0.625	4.25	4.125	0.01184	0.01755
5 1/2	35.3	C-90	19680	19670							935	0.687	4.126	4.001	0.01285	0.01654
5 1/2	35.3	T-95	20760	20770							987	0.687	4.126	4.001	0.01285	0.01654
5 1/2	38	C-90	21200	21480							1007	0.75	4	3.875	0.01384	0.01554
5 1/2	38	T-95	22380	22670							1063	0.75	4	3.875	0.01384	0.01554
5 1/2	40.5	C-90	22650	23250							1076	0.812	3.876	3.751	0.01479	0.01459
5 1/2	40.5	T-95	23920	24540							1136	0.812	3.876	3.751	0.01479	0.01459
5 1/2	43.1	C-90	24080	25060							1144	0.875	3.75	3.625	0.01573	0.01366
5 1/2	43.1	T-95	25400	26450							1208	0.875	3.75	3.625	0.01573	0.01366
5 5/8	26.7	L-80	12420	11870		9880	8990		488	550	617	0.477	4.671		0.00954	0.02120
5 5/8	26.7	HCL-80	14750	11870		9880	8990		501	550	617	0.477	4.671		0.00954	0.02120
5 5/8	26.7	H2S-90	14750	13360		11110	10120		514	579	694	0.477	4.671		0.00954	0.02120
5 5/8	26.7	H2S-90	14750	14100		11730	10680		539	608	733	0.477	4.671		0.00954	0.02120
5 5/8	26.7	P-110	17080	16320		13580	12360		642	724	849	0.477	4.671		0.00954	0.02120

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
5 3/4	16.5	J-55	3720	4620			4620			314	234	0.276	5.198		0.00587	0.02625
5 3/4	18.1	J-55	4520	5090			5090			344	286	0.304	5.142		0.00643	0.02569
5 3/4	18.1	L-80	5700	7400			7400			447	416	0.304	5.142		0.00643	0.02569
5 3/4	18.1	N-80	5700	7400			7400			466	416	0.304	5.142		0.00643	0.02569
5 3/4	18.1	C-95	6380	8790			8790			502	494	0.304	5.142		0.00643	0.02569
5 3/4	18.1	P-110	6640	10180			10180			594	572	0.304	5.142		0.00643	0.02569
5 3/4	19.7	J-55	5410	5610			5610			377	313	0.335	5.08		0.00705	0.02507
5 3/4	19.7	L-80	7030	8160			8160			490	456	0.335	5.08		0.00705	0.02507
5 3/4	19.7	N-80	7030	8160			8160			511	456	0.335	5.08		0.00705	0.02507
5 3/4	19.7	C-95	7980	9690			9690			550	541	0.335	5.08		0.00705	0.02507
5 3/4	19.7	P-110	8530	11220			11220			651	627	0.335	5.08		0.00705	0.02507
5 3/4	21.8	L-80	8740	9130			9130			545	507	0.375	5		0.00783	0.02429
5 3/4	21.8	N-80	8740	9130			9130			568	507	0.375	5		0.00783	0.02429
5 3/4	21.8	C-95	10050	10840			10840			611	602	0.375	5		0.00783	0.02429
5 3/4	21.8	P-110	10960	12550			12550			723	697	0.375	5		0.00783	0.02429
5 3/4	24.2	L-80	10650	10230			10230			605	563	0.42	4.91		0.00870	0.02342
5 3/4	24.2	N-80	10650	10230			10230			630	563	0.42	4.91		0.00870	0.02342
5 3/4	24.2	C-95	12370	12140			12140			679	668	0.42	4.91		0.00870	0.02342
5 3/4	24.2	P-110	13700	14060			14060			803	774	0.42	4.91		0.00870	0.02342
6 5/8	20	H-40	2520	3040	3040			184			229	0.288	6.049	5.924	0.00709	0.03555
6 5/8	20	J-55	2970	4180	4180	4180	4180	245	266	374	315	0.288	6.049	5.924	0.00709	0.03555
6 5/8	20	K-55	2970	4180	4180	4180	4180	267	290	453	315	0.288	6.049	5.924	0.00709	0.03555
6 5/8	20	LS-65	3190	4940	4940	4940	4940	285	309	428	373	0.288	6.049	5.924	0.00709	0.03555
6 5/8	24	J-55	4560	5110	5110	5110	5110	314	340	453	382	0.352	5.921	5.796	0.00858	0.03406
6 5/8	24	K-55	4560	5110	5110	5110	5110	342	372	548	382	0.352	5.921	5.796	0.00858	0.03406
6 5/8	24	LS-65	5080	6040	6040	6040	6040	366	397	518	451	0.352	5.921	5.796	0.00858	0.03406
6 5/8	24	L-80	5760	7440		7440	7440		473	592	555	0.352	5.921	5.796	0.00858	0.03406
6 5/8	24	C-90	6140	8370		8370	8370		520	633	624	0.352	5.921	5.796	0.00858	0.03406
6 5/8	24	C-95	6310	8830		8830	8830		546	665	659	0.352	5.921	5.796	0.00858	0.03406
6 5/8	24	P-110	6730	10230		10230	10230		641	786	763	0.352	5.921	5.796	0.00858	0.03406
6 5/8	28	LS-65	7010	7160		7160	7160		483	607	529	0.417	5.791	5.666	0.01006	0.03258
6 5/8	28	L-80	8170	8810		8810	8810		576	693	651	0.417	5.791	5.666	0.01006	0.03258
6 5/8	28	N-80	8170	8810		8810	8810		586	721	651	0.417	5.791	5.666	0.01006	0.03258
6 5/8	28	C-90	8880	9910		9910	9910		633	742	732	0.417	5.791	5.666	0.01006	0.03258
6 5/8	28	C-95	9220	10460		10460	10460		665	780	773	0.417	5.791	5.666	0.01006	0.03258
6 5/8	28	P-110	10160	12120		12120	12120		781	922	895	0.417	5.791	5.666	0.01006	0.03258
6 5/8	32	L-80	10320	10040		10040	9820		666	783	734	0.475	5.675	5.55	0.01135	0.03129
6 5/8	32	N-80	10320	10040		10040	9820		677	814	734	0.475	5.675	5.55	0.01135	0.03129
6 5/8	32	C-90	11330	11290		11290	11050		732	837	826	0.475	5.675	5.55	0.01135	0.03129
6 5/8	32	C-95	11810	11920		11920	11660		769	880	872	0.475	5.675	5.55	0.01135	0.03129

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
6 5/8	32	P-110	13220	13800		13800	13500		904	1040	1009	0.475	5.675	5.55	0.01135	0.03129
6 5/8	32	Q-125	14530	15680		15680	15340		989	1138	1147	0.475	5.675	5.55	0.01135	0.03129
7	20	H-40	1970	2720	2720			176			230	0.272	6.456	6.331	0.00711	0.04049
7	20	J-55	2270	3740	3740	3740	3740	234	257	373	316	0.272	6.456	6.331	0.00711	0.04049
7	20	K-55	2270	3740	3740	3740	3740	254	281	451	316	0.272	6.456	6.331	0.00711	0.04049
7	20	LS-65	2480	4420	4420	4420	4420	272	300	427	374	0.272	6.456	6.331	0.00711	0.04049
7	23	J-55	3270	4360	4360	4360	4360	284	313	432	366	0.317	6.366	6.241	0.00823	0.03937
7	23	K-55	3270	4360	4360	4360	4360	309	341	522	366	0.317	6.366	6.241	0.00823	0.03937
7	23	LS-65	3540	5150	5150	5150	5150	331	364	494	433	0.317	6.366	6.241	0.00823	0.03937
7	23	L-80	3830	6340		6340	6340		435	565	532	0.317	6.366	6.241	0.00823	0.03937
7	23	HCL-80	5650	6340		6340	6340		485	614	532	0.317	6.366	6.241	0.00823	0.03937
7	23	N-80	3830	6340		6340	6340		442	588	532	0.317	6.366	6.241	0.00823	0.03937
7	23	HCN-80	5650	6340		6340	6340		485	614	532	0.317	6.366	6.241	0.00823	0.03937
7	23	C-90	4030	7130		7130	7130		479	605	599	0.317	6.366	6.241	0.00823	0.03937
7	23	H2S-90	5650	7130		7130	7130		485	614	599	0.317	6.366	6.241	0.00823	0.03937
7	23	S-95	5650	7530		7530	7530		512	659	632	0.317	6.366	6.241	0.00823	0.03937
7	23	T-95	4140	7530		7530	7530		505	636	632	0.317	6.366	6.241	0.00823	0.03937
7	23	H2S-95	5650	7530		7530	7530		505	636	632	0.317	6.366	6.241	0.00823	0.03937
7	23	C-95	4140	7530		7530	7530		505	636	632	0.317	6.366	6.241	0.00823	0.03937
7	26	J-55	4320	4980	4980	4980	4980	334	367	490	415	0.362	6.276	6.151	0.00934	0.03826
7	26	K-55	4320	4980	4980	4980	4980	364	401	592	415	0.362	6.276	6.151	0.00934	0.03826
7	26	LS-65	4800	5880	5880	5880	5880	389	428	561	491	0.362	6.276	6.151	0.00934	0.03826
7	26	L-80	5410	7240		7240	7240		511	641	604	0.362	6.276	6.151	0.00934	0.03826
7	26	HCL-80	7800	7240		7240	7240		570	696	604	0.362	6.276	6.151	0.00934	0.03826
7	26	N-80	5410	7240		7240	7240		519	667	604	0.362	6.276	6.151	0.00934	0.03826
7	26	HCN-80	7800	7240		7240	7240		570	696	604	0.362	6.276	6.151	0.00934	0.03826
7	26	C-90	5740	8140		8140	8140		563	687	679	0.362	6.276	6.151	0.00934	0.03826
7	26	H2S-90	7800	8150		8150	8150		570	696	679	0.362	6.276	6.151	0.00934	0.03826
7	26	S-95	7800	8600		8600	8600		602	747	717	0.362	6.276	6.151	0.00934	0.03826
7	26	T-95	5880	8600		8600	8600		593	722	717	0.362	6.276	6.151	0.00934	0.03826
7	26	H2S-95	7800	8600		8600	8600		593	722	717	0.362	6.276	6.151	0.00934	0.03826
7	26	C-95	5880	8600		8600	8600		593	722	717	0.362	6.276	6.151	0.00934	0.03826
7	26	HCP-110	7800	9950		9950	9950		693	853	830	0.362	6.276	6.151	0.00934	0.03826
7	26	P-110	6230	9950		9950	9950		639	853	830	0.362	6.276	6.151	0.00934	0.03826
7	29	LS-65	6090	6630		6630	6630		432	628	549	0.408	6.184	6.059	0.01045	0.03715
7	29	L-80	7020	8160		8160	8160		587	718	676	0.408	6.184	6.059	0.01045	0.03715
7	29	HCL-80	9200	8160		8160	8160		655	780	676	0.408	6.184	6.059	0.01045	0.03715
7	29	N-80	7020	8160		8160	8160		597	746	676	0.408	6.184	6.059	0.01045	0.03715
7	29	HCN-80	9200	8160		8160	8160		655	780	676	0.408	6.184	6.059	0.01045	0.03715
7	29	C-90	7580	9180		9180	9180		648	768	760	0.408	6.184	6.059	0.01045	0.03715

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
7	29	H2S-90	9200	9180		9180	9180		655	780	780	0.408	6.184	6.059	0.01045	0.03715
7	29	S-95	9200	9690		9690	9690		692	836	803	0.408	6.184	6.059	0.01045	0.03715
7	29	T-95	7830	9690		9690	9690		683	808	803	0.408	6.184	6.059	0.01045	0.03715
7	29	H2S-95	9200	9690		9690	9690		683	8080	803	0.408	6.184	6.059	0.01045	0.03715
7	29	C-95	7830	9690		9690	9690		683	808	803	0.408	6.184	6.059	0.01045	0.03715
7	29	HCP-110	9200	11220		11220	11220		797	955	929	0.408	6.184	6.059	0.01045	0.03715
7	29	P-110	8530	11220		11220	11220		797	955	929	0.408	6.184	6.059	0.01045	0.03715
7	29	HCQ-125	9200	12750		12750	12750		885	1045	1056	0.408	6.184	6.059	0.01045	0.03715
7	29	Q-125	9100	12750		12750	12750		885	1045	1056	0.408	6.184	6.059	0.01045	0.03715
7	29	V-150	9790	15300		15300	15300		1049	1243	1267	0.408	6.184	6.059	0.01045	0.03715
7	32	L-80	8610	9060		9060	8460		661	791	745	0.453	6.094	5.969	0.01152	0.03608
7	32	N-80	8610	9060		9060	8460		672	823	745	0.453	6.094	5.969	0.01152	0.03608
7	32	HCN-80	10400	9060		9060	8460		738	860	745	0.453	6.094	5.969	0.01152	0.03608
7	32	C-90	9380	10190		10190	9520		729	847	839	0.453	6.094	5.969	0.01152	0.03608
7	32	H2S-90	10400	10190		10190	9520		738	860	839	0.453	6.094	5.969	0.01152	0.03608
7	32	S-95	10400	10760		10760	10050		779	922	885	0.453	6.094	5.969	0.01152	0.03608
7	32	T-95	9750	10760		10760	10050		768	891	885	0.453	6.094	5.969	0.01152	0.03608
7	32	H2S-95	10400	10760		10760	10050		768	891	885	0.453	6.094	5.969	0.01152	0.03608
7	32	C-95	9750	10760		10760	10050		768	891	885	0.453	6.094	5.969	0.01152	0.03608
7	32	P-110	10780	12460		12460	11640		897	1053	1025	0.453	6.094	5.969	0.01152	0.03608
7	32	Q-125	11720	14160		14160	13220		996	1152	1165	0.453	6.094	5.969	0.01152	0.03608
7	32	LS-140	12540	15850		15850	14810		1107	1283	1304	0.453	6.094	5.969	0.01152	0.03608
7	32	V-150	13020	16990		16990	15870		1180	1370	1398	0.453	6.094	5.969	0.01152	0.03608
7	35	L-80	10180	9960		9240	8460		734	833	814	0.498	6.004	5.879	0.01258	0.03502
7	35	HCL-80	11600	9960		9240	8460		819	832	814	0.498	6.004	5.879	0.01258	0.03502
7	35	N-80	10180	9960		9240	8460		746	876	814	0.498	6.004	5.879	0.01258	0.03502
7	35	HCN-80	11600	9960		9240	8460		819	876	814	0.498	6.004	5.879	0.01258	0.03502
7	35	C-90	11170	11210		10390	9520		809	876	915	0.498	6.004	5.879	0.01258	0.03502
7	35	H2S-90	11600	11210		10390	9520		819	876	915	0.498	6.004	5.879	0.01258	0.03502
7	35	S-95	11650	11830		10970	10050		865	964	966	0.498	6.004	5.879	0.01258	0.03502
7	35	T-95	11650	11830		10970	10050		853	920	966	0.498	6.004	5.879	0.01258	0.03502
7	35	H2S-95	11650	11830		10970	10050		853	920	966	0.498	6.004	5.879	0.01258	0.03502
7	35	C-95	11650	11830		10970	10050		853	920	966	0.498	6.004	5.879	0.01258	0.03502
7	35	P-110	13020	13700		12700	11640		996	1096	1119	0.498	6.004	5.879	0.01258	0.03502
7	35	Q-125	14310	15560		14430	13220		1106	1183	1272	0.498	6.004	5.879	0.01258	0.03502
7	35	LS-140	15490	17430		16170	14810		1229	1315	1424	0.498	6.004	5.879	0.01258	0.03502
7	35	V-150	16220	18680		17320	15870		1311	1402	1526	0.498	6.004	5.879	0.01258	0.03502
7	38	L-80	11390	10800		9240	8460		801	832	877	0.54	5.92	5.795	0.01356	0.03405
7	38	HCL-80	12700	10800		9240	8460		831	832	877	0.54	5.92	5.795	0.01356	0.03405
7	38	N-80	11390	10800		9240	8460		814	876	877	0.54	5.92	5.795	0.01356	0.03405

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
7	38	HCN-80	12700	10800		9240	8460		831	876	877	0.54	5.92	5.795	0.01356	0.03405
7	38	C-90	12820	12150		10390	9520		883	876	986	0.54	5.92	5.795	0.01356	0.03405
7	38	H2S-90	12820	12150		10390	9520		883	876	986	0.54	5.92	5.795	0.01356	0.03405
7	38	S-95	13440	12830		10970	10050		944	964	1041	0.54	5.92	5.795	0.01356	0.03405
7	38	T-95	13440	12830		10970	10050		931	920	1041	0.54	5.92	5.795	0.01356	0.03405
7	38	H2S-95	13440	12830		10970	10050		931	920	1041	0.54	5.92	5.795	0.01356	0.03405
7	38	C-95	13440	12830		10970	10050		931	920	1041	0.54	5.92	5.795	0.01356	0.03405
7	38	P-110	15140	14850		12700	11640		1087	1096	1205	0.54	5.92	5.795	0.01356	0.03405
7	38	Q-125	16750	16860		14430	13220		1207	1183	1370	0.54	5.92	5.795	0.01356	0.03405
7	38	LS-140	18280	18900		16170	14810		1341	1315	1534	0.54	5.92	5.795	0.01356	0.03405
7	38	V-150	19240	20250		17320	15870		1430	1402	1644	0.54	5.92	5.795	0.01356	0.03405
7	41	C-90	13900	13280		10390	9520		903	876	1069	0.59	5.82	5.695	0.01470	0.03290
7	41	H2S-90	13900	13280		10390	9520		903	876	1069	0.59	5.82	5.695	0.01470	0.03290
7	41	T-95	14670	14010		10970	10050		952	920	1129	0.59	5.82	5.695	0.01470	0.03290
7	41	H2S-95	14670	14010		10970	10050		950	920	1129	0.59	5.82	5.695	0.01470	0.03290
7	41	P-110	16990	16230		12700	11640		1111	1096	1307	0.59	5.82	5.695	0.01470	0.03290
7	41	Q-125	19300	18440		14430	13220		1244	1183	1485	0.59	5.82	5.695	0.01470	0.03290
7	41	V-150	22820	22130		17320	15870		1488	1402	1782	0.59	5.82	5.695	0.01470	0.03290
7	42.7	C-90	14640	14060							1127	0.625	5.75	5.625	0.01548	0.03212
7	42.7	T-95	15450	14840							1189	0.625	5.75	5.625	0.01548	0.03212
7	46.4	C-90	15930	15460							1226	0.687	5.626	5.5	0.01685	0.03075
7	46.4	T-95	16820	16320							1294	0.687	5.626	5.5	0.01685	0.03075
7	50.1	C-90	17220	16880							1325	0.75	5.5	5.375	0.01821	0.02939
7	50.1	T-95	18810	17810							1399	0.75	5.5	5.375	0.01821	0.02939
7	53.6	C-90	18460	18270							1421	0.812	5.376	5.251	0.01952	0.02808
7	53.6	T-95	19480	19290							1500	0.812	5.376	5.251	0.01952	0.02808
7	57.1	C-90	19690	19690							1515	0.875	5.25	5.125	0.02083	0.02678
7	57.1	T-95	20780	20780							1600	0.875	5.25	5.125	0.02083	0.02678
7 5/8	24	H-40	2030	2750	2750			212			276	0.3	7.025	6.9	0.00854	0.04794
7 5/8	26.4	J-55	2890	4140	4140	4140	4140	315	346	483	414	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	K-55	2890	4140	4140	4140	4140	342	377	581	414	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	LS-65	3100	4890	4890	4890	4890	368	403	554	489	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	L-80	3400	6020		6020	6020		482	635	602	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	HCL-80	4850	6020		6020	6020		533	691	602	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	N-80	3400	6020		6020	6020		490	659	602	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	C-90	3610	6780		6780	6780		532	681	677	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	H2S-90	4850	6780		6780	6780		553	691	677	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	S-95	4850	7150		7150	7150		568	740	714	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	T-95	3710	7150		7150	7050		560	716	714	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	H2S-95	4850	7150		7150	7050		560	716	714	0.328	6.969	6.844	0.00930	0.04718

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
7 5/8	26.4	C-95	3710	7150		7150	7150		560	716	714	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	HCP-110	4850	8280		8280	8280		654	845	827	0.328	6.969	6.844	0.00930	0.04718
7 5/8	26.4	P-110	3920	8280		8280	8280		654	845	827	0.328	6.969	6.844	0.00930	0.04718
7 5/8	29.7	LS-65	4310	5590		5590	5590		474	629	555	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	L-80	4790	6890		6890	6890		566	721	683	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	HCL-80	7150	6890		6890	6890		650	785	683	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	N-80	4790	6890		6890	6890		575	749	683	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	HCN-80	7150	6890		6890	6890		650	785	683	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	C-90	5040	7750		7750	7750		625	773	769	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	H2S-90	7150	7750		7750	7750		650	785	769	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	S-95	7150	8180		8180	8180		668	841	811	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	T-95	5140	8180		8180	8180		659	813	811	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	H2S-95	7150	8180		8180	8180		659	813	811	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	C-95	5140	8180		8180	8180		659	813	811	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	HCP-110	7150	9470		9470	9470		769	960	940	0.375	6.875	6.75	0.01056	0.04592
7 5/8	29.7	P-110	5350	9470		9470	9470		769	960	940	0.375	6.875	6.75	0.01056	0.04592
7 5/8	33.7	L-80	6560	7900		7900	7900		664	820	778	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	HCL-80	8800	7900		7900	7900		762	894	778	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	N-80	6560	7900		7900	7900		674	852	778	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	HCN-80	8800	7900		7900	7900		762	894	778	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	C-90	7050	8880		8880	8880		733	880	875	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	H2S-90	8800	8880		8880	8880		762	894	875	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	S-95	8800	9380		9380	9380		783	957	923	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	T-95	7280	9380		9380	9380		772	925	923	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	H2S-95	8800	9380		9380	9380		772	925	923	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	C-95	7280	9380		9380	9380		772	925	923	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	HCP-110	8800	10860		10860	10860		901	1093	1069	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	P-110	7870	10860		10860	10860		901	1093	1069	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	HCQ-125	8800	12340		12340	12340		1009	1197	1215	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	Q-125	8350	12340		12340	12340		1009	1197	1215	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	LS-140	8690	13820		13820	13820		1128	1334	1361	0.43	6.765	6.64	0.01202	0.04446
7 5/8	33.7	V-150	9850	14800		14800	14800		1207	1424	1458	0.43	6.765	6.64	0.01202	0.04446
7 5/8	39	L-80	8820	9180		9180	9180		786	945	895	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	HCL-80	10600	9180		9180	9180		901	1029	895	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	N-80	8820	9180		9180	9180		798	981	895	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	HCN-80	10600	9180		9180	9180		901	1029	895	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	C-90	9620	10330		10330	10330		867	1013	1007	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	H2S-90	10600	10330		10330	10330		901	1029	1007	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	S-95	10600	10900		10900	10900		926	1101	1063	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	T-95	10000	10900		10900	10900		914	1065	1063	0.5	6.625	6.5	0.01384	0.04264

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
7 5/8	39	H2S-95	10600	10900		10900	10900		914	1065	1063	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	C-95	10000	10900		10900	10900		914	1065	1063	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	P-110	11080	12620		12620	12620		1066	1258	1231	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	Q-125	12060	14340		14340	14340		1194	1379	1399	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	LS-140	12930	16070		16070	16070		1335	1536	1567	0.5	6.625	6.5	0.01384	0.04264
7 5/8	39	V-150	13440	17210		17210	17210		1428	1640	1679	0.5	6.625	6.5	0.01384	0.04264
7 5/8	42.8	L-80	10810	10320		10320	9790		891	1053	998	0.562	6.501	6.376	0.01542	0.04106
7 5/8	42.8	N-80	10810	10320		10320	9790		905	1093	998	0.562	6.501	6.376	0.01542	0.04106
7 5/8	42.8	C-90	11890	11610		11610	11010		983	1129	1122	0.562	6.501	6.376	0.01542	0.04106
7 5/8	42.8	T-95	12410	12250		12250	11620		1037	1187	1185	0.562	6.501	6.376	0.01542	0.04106
7 5/8	42.8	C-95	12410	12250		12250	11620		1037	1187	1185	0.562	6.501	6.376	0.01542	0.04106
7 5/8	42.8	P-110	13920	14190		14190	13460		1210	1402	1372	0.562	6.501	6.376	0.01542	0.04106
7 5/8	42.8	Q-125	15350	16120		16120	15290		1355	1536	1559	0.562	6.501	6.376	0.01542	0.04106
7 5/8	45.3	L-80	11510	10920		10490	9790		947	1109	1051	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	HCL-80	12900	10920		10490	9790		1086	1177	1051	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	N-80	11510	10920		10490	9790		962	1152	1051	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	HCN-80	12900	10920		10490	9790		1086	1208	1051	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	C-90	12950	12290		11810	11010		1045	1189	1183	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	H2S-90	12950	12290		11810	11010		1086	1208	1183	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	S-95	13660	12970		12460	11620		1116	1293	1248	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	H2S-95	13660	12970		12460	11620		1101	1251	1248	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	C-95	13660	12970		12460	11620		1101	1251	1248	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	P-110	15430	15020		14430	13460		1285	1477	1446	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	Q-125	17090	17070		16400	15290		1439	1619	1643	0.595	6.435	6.31	0.01625	0.04023
7 5/8	45.3	V-150	19660	20480		19680	18350		1721	1926	1971	0.595	6.435	6.31	0.01625	0.04023
7 5/8	47.1	L-80	12040	11480		10490	9790		997	1160	1100	0.625	6.375	6.25	0.01700	0.03948
7 5/8	47.1	N-80	12040	11480		10490	9790		1013	1205	1100	0.625	6.375	6.25	0.01700	0.03948
7 5/8	47.1	C-90	13540	12910		11810	11010		1100	1238	1237	0.625	6.375	6.25	0.01700	0.03948
7 5/8	47.1	T-95	14300	13630		12460	11620		1159	1300	1306	0.625	6.375	6.25	0.01700	0.03948
7 5/8	47.1	C-95	14300	13630		12460	11620		1159	1300	1306	0.625	6.375	6.25	0.01700	0.03948
7 5/8	47.1	P-110	16550	15780		14430	13460		1353	1545	1512	0.625	6.375	6.25	0.01700	0.03948
7 5/8	47.1	Q-125	18700	17930		16400	15290		1515	1672	1718	0.625	6.375	6.25	0.01700	0.03948
7 5/8	51.2	C-90	14760	14190							1348	0.687	6.251	6.126	0.01852	0.03796
7 5/8	51.2	T-95	15580	14980							1423	0.687	6.251	6.126	0.01852	0.03796
7 5/8	55.3	C-90	15960	15490							1458	0.75	6.125	6	0.02004	0.03644
7 5/8	55.3	T-95	16850	16350							1539	0.75	6.125	6	0.02004	0.03644
7 3/4	46.1	L-80	11340	10750		10490	9790		841	1001	1070	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	HCL-80	13320	10750		10490	9790		965	1091	1070	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	C-90	12740	12090		11810	11010		928	1074	1204	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	H2S-90	12740	12090		11810	11010		965	1091	1204	0.595	6.56	6.435	0.01654	0.04180

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
7 3/4	46.1	S-95	13320	12760		12460	11620		992	1168	1271	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	T-95	13320	12760		12460	11620		978	1129	1271	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	H2S-95	13320	12760		12460	11620		978	1129	1271	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	C-95	13320	12760		12460	11620		978	1129	1271	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	P-110	14990	14780		14430	13460		1142	1334	1471	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	Q-125	16580	16790		16400	15290		1279	1462	1672	0.595	6.56	6.435	0.01654	0.04180
7 3/4	46.1	LS-140	18090	18810		18360	17130		1429	1628	1872	0.595	6.56	6.435	0.01654	0.04180
8 5/8	24	J-55	1370	2950	2950			244			381	0.264	8.097	7.972	0.00858	0.06369
8 5/8	24	K-55	1370	2950	2950			263			381	0.264	8.097	7.972	0.00858	0.06369
8 5/8	24	HCK-55	1780	2950	2950			326			381	0.264	8.097	7.972	0.00858	0.06369
8 5/8	24	LS-65	1430	3480	3480			302			451	0.264	8.097	7.972	0.00858	0.06369
8 5/8	28	H-40	1610	2470	2470			233			318	0.304	8.017	7.892	0.00983	0.06244
8 5/8	28	HCK-55	2680	3390	3390	3390	3390	414	464	651	437	0.304	8.017	7.892	0.00983	0.06244
8 5/8	32	H-40	2200	2860	2860			279			366	0.352	7.921	7.796	0.01132	0.06095
8 5/8	32	J-55	2530	3930	3930	3930	3930	372	417	579	503	0.352	7.921	7.796	0.01132	0.06095
8 5/8	32	K-55	2530	3930	3930	3930	3930	402	452	690	503	0.352	7.921	7.796	0.01132	0.06095
8 5/8	32	HCK-55	4130	3930	3930	3930	3930	497	556	749	503	0.352	7.921	7.796	0.01132	0.06095
8 5/8	32	LS-65	2740	4640	4640	4640	4640	435	487	664	595	0.352	7.921	7.796	0.01132	0.06095
8 5/8	36	J-55	3450	4460	4460	4460	4460	434	486	654	568	0.4	7.825	7.7	0.01278	0.05948
8 5/8	36	K-55	3450	4460	4460	4460	4460	468	526	780	568	0.4	7.825	7.7	0.01278	0.05948
8 5/8	36	HCK-55	5300	4460	4460	4460	4460	579	648	847	568	0.4	7.825	7.7	0.01278	0.05948
8 5/8	36	LS-65	3760	5280	5280	5280	5280	506	567	751	672	0.4	7.825	7.7	0.01278	0.05948
8 5/8	36	L-80	4100	6490		6490	6490		678	864	827	0.4	7.825	7.7	0.01278	0.05948
8 5/8	36	HCL-80	6060	6490		6490	6490		779	945	827	0.4	7.825	7.7	0.01278	0.05948
8 5/8	36	N-80	4100	6490		6490	6490		668	895	827	0.4	7.825	7.7	0.01278	0.05948
8 5/8	36	HCN-80	6060	6490		6490	6490		779	945	827	0.4	7.825	7.7	0.01278	0.05948
8 5/8	40	LS-65	4890	5930		5930	5930		649	839	751	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	L-80	5520	7300		7300	7300		776	966	925	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	HCL-80	7900	7300		7300	7300		892	1057	925	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	N-80	5520	7300		7300	7300		768	1001	925	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	HCN-80	7900	7300		7300	7300		892	1057	925	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	C-90	5870	8220		8220	8220		858	1038	1040	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	H2S-90	7900	8220		8220	8220		892	1057	1040	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	S-95	7900	8670		8670	8670		915	1127	1098	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	T-95	6020	8670		8670	8670		904	1092	1098	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	H2S-95	7900	8670		8670	8670		904	1092	1098	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	C-95	6020	8670		8670	8670		904	1092	1098	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	HCP-110	7900	10040		10040	10040		1055	1228	1271	0.45	7.725	7.6	0.01429	0.05797
8 5/8	40	P-110	6390	10040		10040	10040		1055	1228	1271	0.45	7.725	7.6	0.01429	0.05797
8 5/8	49	L-80	8580	9040		9040	9040		963	1180	1129	0.557	7.511	7.386	0.01746	0.05480

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
8 5/8	49	HCL-80	10400	9040		9040	9040		1129	1291	1129	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	N-80	8580	9040		9040	9040		997	1222	1129	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	HCN-80	10400	9040		9040	9040		1129	1291	1129	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	H2S-90	10400	10170		10170	10170		1129	1291	1271	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	S-95	10400	10740		10740	10740		1159	1377	1341	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	T-95	9710	10740		10740	10740		1144	1334	1341	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	H2S-95	10400	10740		10740	10740		1144	1334	1341	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	C-95	9710	10740		10740	10740		1144	1334	1341	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	P-110	10740	12430		12430	12430		1335	1574	1553	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	Q-125	11650	14130		14130	14130		1496	1728	1765	0.557	7.511	7.386	0.01746	0.05480
8 5/8	49	V-150	12950	16950		16950	16950		1789	2056	2118	0.557	7.511	7.386	0.01746	0.05480
8 5/8	44	L-80	6950	8120		8120	8120		874	1066	1021	5	7.625	7.5	0.01579	0.05648
8 5/8	44	HCL-80	9100	8120		8120	8120		1004	1167	1021	5	7.625	7.5	0.01579	0.05648
8 5/8	44	N-80	6950	8120		8120	8120		887	1105	1021	5	7.625	7.5	0.01579	0.05648
8 5/8	44	HCN-80	9100	8120		8120	8120		1004	1167	1021	5	7.625	7.5	0.01579	0.05648
8 5/8	44	C-90	7490	9130		9130	9130		965	1146	1149	5	7.625	7.5	0.01579	0.05648
8 5/8	44	H2S-90	9100	9130		9130	9130		1004	1167	1149	5	7.625	7.5	0.01579	0.05648
8 5/8	44	S-95	9100	9640		9640	9640		1030	1244	1212	5	7.625	7.5	0.01579	0.05648
8 5/8	44	T-95	7740	9640		9640	9640		1017	1206	1212	5	7.625	7.5	0.01579	0.05648
8 5/8	44	H2S-95	9100	9640		9640	9640		1017	1206	1212	5	7.625	7.5	0.01579	0.05648
8 5/8	44	C-95	7740	9640		9640	9640		1017	1206	1212	5	7.625	7.5	0.01579	0.05648
8 5/8	44	HCP-110	9100	11160		11160	11160		1186	1423	1404	5	7.625	7.5	0.01579	0.05648
8 5/8	44	P-110	8420	11160		11160	11160		1186	1423	1404	5	7.625	7.5	0.01579	0.05648
8 5/8	44	HCQ-125	9100	12680		12680	12680		1330	1562	1595	5	7.625	7.5	0.01579	0.05648
8 5/8	44	Q-125	8980	12680		12680	12680		1330	1562	1595	5	7.625	7.5	0.01579	0.05648
8 5/8	44	V-150	9640	15220		15220	15220		1591	1859	1914	5	7.625	7.5	0.01579	0.05648
9 5/8	32.3	H-40	1370	2270	2270			254			365	0.312	9.001	8.845	0.01129	0.07870
9 5/8	36	H-40	1720	2560	2560			294			410	0.352	8.921	8.765	0.01268	0.07731
9 5/8	36	J-55	2020	3520	3520	3520	3520	394	453	639	564	0.352	8.921	8.765	0.01268	0.07731
9 5/8	36	K-55	2020	3520	3520	3520	3520	423	489	755	564	0.352	8.921	8.765	0.01268	0.07731
9 5/8	36	HCK-55	2980	3520	3520	3520	3520	526	605	829	564	0.352	8.921	8.765	0.01268	0.07731
9 5/8	36	LS-65	2190	4160	4160	4160	4160	460	529	734	867	0.352	8.921	8.765	0.01268	0.07731
9 5/8	40	J-55	2570	3950	3950	3950	3950	452	520	714	630	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	K-55	2570	3950	3950	3950	3950	486	561	843	630	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	HCK-55	4230	3950	3950	3950	3950	604	64	926	630	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	LS-65	2770	4670	4670	4670	4670	528	608	823	745	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	L-80	3090	5750		5750	5750		727	947	916	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	HCL-80	4230	5750		5750	5750		837	1042	916	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	N-80	3090	5750		5750	5750		737	979	916	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	HCN-80	4230	5750		5750	5750		837	1042	916	0.395	8.835	8.679	0.01417	0.07583

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
9 5/8	40	C-90	3250	6460		6460	6460		804	1021	1031	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	H2S-90	4230	6460		6460	6460		837	1042	1031	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	S-95	4230	6820		6820	6820		858	1106	1088	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	T-95	3320	6820		6820	6820		847	1074	1088	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	H2S-95	4230	6820		6820	6820		847	1074	1088	0.395	8.835	8.679	0.01417	0.07583
9 5/8	40	C-95	3320	6820		6820	6820		847	1074	1088	0.395	8.835	8.679	0.01417	0.07583
9 5/8	43.5	LS-65	3520	5140		5140	5140		679	899	916	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	L-80	3810	6330		6330	6330		813	1038	1005	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	HCL-80	5600	6330		6330	6330		936	1142	1005	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	N-80	3810	6330		6330	6330		825	1074	1005	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	HCN-80	5600	6330		6330	6330		936	1142	1005	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	C-90	4010	7120		7120	7120		899	1119	1130	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	H2S-90	5600	7120		7120	7120		936	1142	1130	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	S-95	5600	7510		7510	7510		959	1213	1193	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	T-95	4120	7510		7510	7510		948	1178	1193	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	H2S-95	5600	7510		7510	7510		948	1178	1193	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	C-95	4120	7510		7510	7510		948	1178	1193	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	HCP-110	5600	8700		8700	8700		1106	1388	1381	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	P-110	4420	8700		8700	8700		1106	1388	1381	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	HCQ-125	5600	9890		9890	9890		1240	1527	1570	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	Q-125	4620	9890		9890	9890		1240	1527	1570	0.435	8.755	8.599	0.01553	0.07446
9 5/8	43.5	LS-140	5600	11070		11070	11070		1386	1702	1758	0.435	8.755	8.599	0.01553	0.07446
9 5/8	47	L-80	4760	6870		6870	6870		893	1122	1086	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	HCL-80	7100	6870		6870	6870		1027	1234	1086	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	N-80	4760	6870		6870	6870		905	1161	1086	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	HCN-80	7100	6870		6870	6870		1027	1234	1086	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	C-90	5000	7720		7720	7720		987	1210	1221	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	S-95	7100	8150		8150	8150		1053	1311	1289	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	T-95	5090	8150		8150	8150		1040	1273	1289	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	H2S-95	7100	8150		8150	8150		1040	1273	1289	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	C-95	5090	8150		8150	8150		1040	1273	1289	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	HCP-110	7100	9440		9440	9440		1213	1500	1493	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	P-110	5300	9440		9440	9440		1213	1500	1493	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	HCQ-125	7100	10730		10730	10730		1351	1650	1697	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	Q-125	5640	10730		10730	10730		1351	1650	1697	0.472	8.681	8.525	0.01679	0.07321
9 5/8	47	LS-140	7100	12010		12010	12010		1521	1839	1900	0.472	8.681	8.525	0.01679	0.07321
9 5/8	53.5	L-80	6620	7930		7930	7930		1047	1286	1244	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	HCL-80	8850	7930		7930	7930		1205	1414	1244	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	N-80	6620	7930		7930	7930		1062	1329	1244	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	HCN-80	8850	7930		7930	7930		1205	1414	1244	0.545	8.535	8.379	0.01923	0.07077

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
9 5/8	53.5	C-90	7120	8920		8920	8920		1157	1386	1399	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	H2S-90	8850	8920		8920	8920		1205	1414	1399	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	S-95	8850	9410		9410	9410		1235	1502	1477	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	T-95	7340	9410		9410	9410		1220	1458	1477	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	H2S-95	8850	9410		9410	9410		1220	1458	1477	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	C-95	7340	9410		9410	9410		1220	1458	1477	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	HCP-110	8850	10900		10900	10900		1422	1718	1710	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	P-110	7950	10900		10900	10900		1422	1718	1710	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	HCQ-125	8850	12390		12390	12390		1595	1890	1943	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	Q-125	8440	12390		12390	12390		1595	1890	1943	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	LS-140	8850	13870		13870	13870		1783	2107	2177	0.545	8.535	8.379	0.01923	0.07077
9 5/8	53.5	V-150	8960	14860		14860	14860		1909	2251	2332	0.545	8.535	8.379	0.01923	0.07077
9 5/8	58.4	L-80	7890	8650		8650	8650		1151	1396	1350	0.595	8.435	8.279	0.02088	0.06912
9 5/8	58.4	N-80	7890	8650		8650	8650		1167	1443	1350	0.595	8.435	8.279	0.02088	0.06912
9 5/8	58.4	C-90	8560	9740		9740	9740		1272	1504	1519	0.595	8.435	8.279	0.02088	0.06912
9 5/8	58.4	T-95	8880	10280		10280	10280		1341	1583	1604	0.595	8.435	8.279	0.02088	0.06912
9 5/8	58.4	C-95	8880	10280		10280	10280		1341	1583	1604	0.595	8.435	8.279	0.02088	0.06912
9 5/8	58.4	P-110	9760	11900		11900	11900		1564	1865	1857	0.595	8.435	8.279	0.02088	0.06912
9 5/8	58.4	Q-125	10530	13520		13520	13520		1754	2052	2110	0.595	8.435	8.279	0.02088	0.06912
9 5/8	59.4	C-90	8980	9970							1553	0.609	8.407	8.251	0.02134	0.06856
9 5/8	59.4	T-95	9320	10520							1634	0.609	8.407	8.251	0.02134	0.06856
9 5/8	64.9	C-90	10800	11200							1701	0.672	8.281	8.125	0.02338	0.06662
9 5/8	64.9	T-95	11260	11610							1796	0.672	8.281	8.125	0.02338	0.06662
9 5/8	70.3	C-90	12610	12010							1845	0.734	8.157	8.001	0.02536	0.06464
9 5/8	70.3	T-95	13180	12680							1948	0.734	8.157	8.001	0.02536	0.06464
9 5/8	75.6	C-90	13670	13040							1989	0.797	8.031	7.875	0.02734	0.06265
9 5/8	75.6	T-95	14430	13770							2100	0.797	8.031	7.875	0.02734	0.06265
9 3/4	59.2	H2S-90	9750	9610		9610	9610		1175	1383	1540	0.595	8.56		0.02117	0.07118
9 3/4	59.2	S-95	9750	10150		10150	10150		1204	1469	1626	0.595	8.56		0.02117	0.07118
9 3/4	59.2	H2S-95	9750	10150		10150	10150		1189	1425	1626	0.595	8.56		0.02117	0.07118
9 3/4	59.2	HCP-110	9750	11750		11750	11750		1387	1681	1882	0.595	8.56		0.02117	0.07118
9 3/4	59.2	P-110	9490	11750		11750	11750		1387	1681	1882	0.595	8.56		0.02117	0.07118
9 3/4	59.2	Q-125	10210	13350		13350	13350		1555	1850	2139	0.595	8.56		0.02117	0.07118
9 3/4	59.2	LS-140	10820	14950		14950	14950		1739	2061	2396	0.595	8.56		0.02117	0.07118
9 7/8	62.8	H2S-90	10160	9970		9970	9940		1096	1304	1635	0.625	8.625		0.02246	0.07227
9 7/8	62.8	S-95	10160	10520		10520	10490		1123	1385	1725	0.625	8.625		0.02246	0.07227
9 7/8	62.8	H2S-95	10160	10520		10520	10490		1109	1344	1725	0.625	8.625		0.02246	0.07227
9 7/8	62.8	P-110	10260	12180		12180	12140		1294	1584	1998	0.625	8.625		0.02246	0.07227
9 7/8	62.8	Q-125	11140	13840		13840	13800		1451	1743	2270	0.625	8.625		0.02246	0.07227
9 7/8	62.8	LS-140	11870	15510		15510	15460		1622	1942	2543	0.625	8.625		0.02246	0.07227

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
10 3/4	32.75	H-40	840	1820	1820			205			367	0.279	10.192	10.036	0.01135	0.10051
10 3/4	40.5	H-40	1390	2280	2280			314			457	0.35	10.05	9.894	0.01414	0.09812
10 3/4	40.5	J-55	1580	3130	3130		3130	420		700	629	0.35	10.05	9.894	0.01414	0.09812
10 3/4	40.5	K-55	1580	3130	3130		3130	450		819	629	0.35	10.05	9.894	0.01414	0.09812
10 3/4	40.5	HCK-55	2100	3130	3130		3130	562		911	629	0.35	10.05	9.894	0.01414	0.09812
10 3/4	40.5	LS-65	1680	3700	3700		3700	491		806	743	0.35	10.05	9.894	0.01414	0.09812
10 3/4	40.5	N-80	1730	4560	4560		4560	597		964	915	0.35	10.05	9.894	0.01414	0.09812
10 3/4	40.5	HCN-80	2100	4560	4560		4560	681		1034	915	0.35	10.05	9.894	0.01414	0.09812
10 3/4	45.5	J-55	2090	3580	3580		3580	493		796	715	0.4	9.95	9.794	0.01609	0.09617
10 3/4	45.5	HCK-55	3130	3580	3580		3580	659		1037	715	0.4	9.95	9.794	0.01609	0.09617
10 3/4	45.5	LS-65	2280	4230	4230		4230	576		916	845	0.4	9.95	9.794	0.01609	0.09617
10 3/4	45.5	N-80	2470	5210	5210		5210	701		1097	1040	0.4	9.95	9.794	0.01609	0.09617
10 3/4	45.5	HCN-80	3130	5210	5210		5210	799		1175	1040	0.4	9.95	9.794	0.01609	0.09617
10 3/4	51	J-55	2700	4030	4030		4030	565		891	801	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	K-55	2700	4030	4030		4030	606		1043	801	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	HCK-55	4420	4030	4030		4030	756		1160	801	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	LS-65	2870	4760	4760		4760	661		1026	946	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	L-80	3220	5860	5860		5860	794		1190	1165	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	HCL-80	4460	5860	5860		5860	906		1316	1165	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	N-80	3220	5860	5860		5860	804		1228	1165	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	HCN-80	4460	5860	5860		5860	916		1316	1165	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	C-90	3400	6590	6590		6590	879		1287	1311	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	H2S-90	4460	6590	6590		6590	916		1316	1311	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	S-95	4460	6960	6960		6960	937		1392	1383	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	T-95	3480	6960	6960		6960	927		1354	1383	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	H2S-95	4460	6960	6960		6960	927		1354	1383	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	C-95	3480	6960	6960		6960	927		1354	1383	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	HCP-110	4460	8060	8060		8060	1080		1594	1602	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	P-110	3660	8060	8060		8060	1080		1594	1602	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	HCQ-125	4660	9160	9160		9160	1213		1758	1820	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	Q-125	3740	9160	9160		9160	1213		1758	1820	0.45	9.85	9.694	0.01801	0.09425
10 3/4	51	LS-140	4460	10260	10260		10260	1356		1959	2039	0.45	9.85	9.694	0.01801	0.09425
10 3/4	55.5	HCK-55	5220	4430	4430		4430	843		1271	877	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	LS-65	3890	5240	5240		5240	736		1124	877	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	L-80	4020	6450	6450		6450	884		1303	1276	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	HCL-80	5950	6450	6450		6450	1010		1441	1276	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	N-80	4020	6450	6450		6450	895		1345	1276	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	HCN-80	5950	6450	6450		6450	1021		1441	1276	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	C-90	4160	7250	7250		7250	979		1409	1435	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	H2S-90	5950	7250	7250		7250	1021		1441	1435	0.495	9.76	9.604	0.01972	0.09254

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
10 3/4	55.5	S-95	5950	7660	7660		7660	1043		1524	1515	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	T-95	4290	7660	7660		7660	1032		1483	1515	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	H2S-95	5950	7660	7660		7660	1032		1483	1515	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	C-95	4290	7660	7660		7660	1032		1483	1515	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	HCP-110	5950	8860	8860		8860	1203		1745	1754	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	P-110	4610	8860	8860		8860	1203		1745	1754	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	HCQ-125	5950	10070	10070		10070	1351		1925	1993	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	Q-125	4850	10070	10070		10070	1351		1925	1993	0.495	9.76	9.604	0.01972	0.09254
10 3/4	55.5	LS-140	5950	11280	11280		11280	1510		2145	2233	0.495	9.76	9.604	0.01972	0.09254
10 3/4	60.7	L-80	5160	7100	7100		7100	983		1428	1398	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	HCL-80	7550	7100	7100		7100	1123		1579	1398	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	N-80	5160	7100	7100		7100	996		1473	1398	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	N-80	5160	7100	7100		7100	996		1473	1398	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	HCN-80	7550	7100	7100		7100	1136		1579	1398	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	C-90	5460	7980	7980		7980	1089		1544	1573	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	H2S-90	7550	7980	7980		7980	1136		1579	1573	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	S-95	7550	8430	8430		8430	1161		1670	1660	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	T-95	5590	8430	8430		8430	1148		1625	1660	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	H2S-95	7550	8430	8430		8430	1148		1625	1660	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	C-95	5590	8430	8430		8430	1148		1625	1660	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	HCP-110	7550	9760	9760		9760	1338		1912	1922	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	P-110	5880	9760	9760		9760	1338		1912	1922	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	HCQ-125	7550	11090	11090		11090	1503		2109	2184	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	Q-125	6070	11090	11090		11090	1503		2109	2184	0.545	9.66	9.504	0.02161	0.09065
10 3/4	60.7	LS-140	7550	12420	12420		12420	1680		2351	2446	0.545	9.66	9.504	0.02161	0.09065
10 3/4	65.7	L-80	6300	7750	7750		7750	1082		1551	1519	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	HCL-80	8640	7750	7750		7750	1236		1716	1519	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	N-80	6300	7750	7750		7750	1096		1600	1519	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	HCN-80	8640	7750	7750		7750	1249		1716	1519	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	C-90	6760	8720	8720		8720	1198		1677	1708	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	H2S-90	8640	8720	8720		8720	1249		1716	1708	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	S-95	8640	9200	9200		9200	1277		1814	1803	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	T-95	6960	9200	9200		9200	1263		1765	1803	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	H2S-95	8640	9200	9200		9200	1263		1765	1803	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	HCP-110	8640	10650	10650		10650	1472		2077	2088	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	P-110	7500	10650	10650		10650	1472		2077	2088	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	HCQ-125	8640	12110	12110		12110	1653		2291	2373	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	Q-125	7920	12110	12110		12110	1653		2291	2373	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	LS-140	8640	13560	13560		13560	1848		2554	2657	0.595	9.56	9.404	0.02348	0.08878
10 3/4	65.7	V-150	8320	14530	14530		14530	1978		2730	2847	0.595	9.56	9.404	0.02348	0.08878

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
10 3/4	71.1	H2S-80	9300	9520	9200		8980	1317		1822	1856	0.65	9.45	9.294	0.02551	0.08675
10 3/4	71.1	S-95	9600	10050	9710		9480	1403		1971	1959	0.65	9.45	9.294	0.02551	0.08675
10 3/4	71.1	H2S-95	9600	10050	9710		9480	1388		1918	1959	0.65	9.45	9.294	0.02551	0.08675
10 3/4	71.1	HCP-110	9600	11640	11240		10980	1618		2257	2269	0.65	9.45	9.294	0.02551	0.08675
10 3/4	71.1	P-110	9300	11640	11240		10980	1618		2257	2269	0.65	9.45	9.294	0.02551	0.08675
10 3/4	71.1	Q-125	9990	13230	12780		12480	1817		2489	2578	0.65	9.45	9.294	0.02551	0.08675
10 3/4	71.1	LS-140	10570	14810	14310		13980	2031		2775	2888	0.65	9.45	9.294	0.02551	0.08675
10 3/4	71.1	V-150	10880	15870	15330		14970	2174		2966	3094	0.65	9.45	9.294	0.02551	0.08675
10 3/4	73.2	C-90	8750	9850							1915	0.672	9.406	9.25	0.02632	0.08595
10 3/4	73.2	T-95	9090	10390							2021	0.672	9.406	9.25	0.02632	0.08595
10 3/4	79.2	C-90	10370	10750							2079	0.734	9.282	9.126	0.02857	0.08369
10 3/4	79.2	T-95	10800	11350							2194	0.734	9.282	9.126	0.02857	0.08369
10 3/4	85.3	C-90	12010	11680							2243	0.797	9.156	9	0.03082	0.08144
10 3/4	85.3	T-95	12540	12330							2367	0.797	9.156	9	0.03082	0.08144
11 3/4	42	H-40	1040	1980	1980		1980	307		554	478	0.333	11.084	10.928	0.01477	0.11935
11 3/4	47	J-55	1510	3070		3070	3070	477		807	737	0.375	11	10.844	0.01658	0.11754
11 3/4	47	K-55	1510	3070		3070	3070	509		935	737	0.375	11	10.844	0.01658	0.11754
11 3/4	47	HCK-55	2000	3070		3070	3070	638		1054	737	0.375	11	10.844	0.01658	0.11754
11 3/4	47	LS-65	1590	3630		3630	3630	557		931	817	0.375	11	10.844	0.01658	0.11754
11 3/4	54	J-55	2070	3560		3560	3560	568		931	850	0.435	10.88	10.724	0.01913	0.11499
11 3/4	54	K-55	2070	3560		3560	3560	606		1079	850	0.435	10.88	10.724	0.01913	0.11499
11 3/4	54	HCK-55	3100	3560		3560	3560	760		1216	850	0.435	10.88	10.724	0.01913	0.11499
11 3/4	54	LS-65	2250	4210		4210	4210	665		1074	1005	0.435	10.88	10.724	0.01913	0.11499
11 3/4	60	J-55	2660	4010	4010		4010	649		1042	952	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	K-55	2660	4010	4010		4010	693		1208	952	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	HCK-55	4360	4010	4010		4010	869		1361	952	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	LS-65	2840	4730	4730		4730	759		1201	1125	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	L-80	3180	5830	5830		5830	913		1399	1384	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	HCL-80	4410	5830	5830		5830	1055		1555	1384	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	N-80	3180	5830	5830		5830	924		1440	1384	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	HCN-80	4410	5830	5830		5830	1055		1555	1384	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	C-90	3360	6550	6550		6550	1011		1517	1557	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	H2S-90	4410	6550	6550		6550	1055		1555	1557	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	S-95	4410	6920	6920		6920	1077		1638	1644	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	T-95	3440	6920	6920		6920	1066		1596	1644	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	H2S-95	4410	6920	6920		6920	1066		1596	1644	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	C-95	3440	6920	6920		6920	1066		1596	1644	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	HCP-110	4410	8010	8010		8010	1242		1877	1903	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	P-110	3610	8010	8010		8010	1242		1877	1903	0.489	10.772	10.616	0.02140	0.11272
11 3/4	60	HCQ-125	4410	9100	9100		9100	1396		2074	2163	0.489	10.772	10.616	0.02140	0.11272

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
11 3/4	60	Q-125	3680	9100	9100		9100	1396		2074	2163	0.489	10.772	10.616	0.02140	0.11272
11 3/4	65	LS-65	3580	5170	5170		5170	837		1307	1223	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	L-80	3870	6360	6360		6360	1007		1521	1505	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	HCL-80	5740	6360	6360		6360	1152		1691	1505	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	N-80	3870	6360	6360		6360	1019		1566	1505	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	HCN-80	5740	6360	6360		6360	1164		1691	1505	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	H2S-90	5140	7160	7160		7160	1164		1691	1639	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	S-95	5740	7560	7560		7560	1189		1781	1788	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	H2S-95	5740	7560	7560		7560	1177		1736	1788	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	HCP-110	5740	8750	8750		8750	1371		2041	2070	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	P-110	4480	8750	8750		8750	1371		2041	2070	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	HCQ-125	5740	9940	9940		9940	1540		2256	2352	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	Q-125	4890	9940	9940		9940	1540		2256	2352	0.534	10.682	10.526	0.02327	0.11085
11 3/4	65	LS-140	5740	11130	11130		11130	1722		2516	2634	0.534	10.682	10.526	0.02327	0.11085
11 3/4	71	H2S-90	7280	7800	7800		7800	1226		1790	1838	0.582	10.586	10.43	0.02526	0.10886
11 3/4	71	S-95	7280	8230	8230		8230	1306		1933	1940	0.582	10.586	10.43	0.02526	0.10886
11 3/4	71	H2S-95	7280	8230	8230		8230	1293		1884	1940	0.582	10.586	10.43	0.02526	0.10886
11 3/4	71	HCP-110	7280	9530	9530		9530	1506		2215	2246	0.582	10.586	10.43	0.02526	0.10886
11 3/4	71	HCQ-125	7280	10840	10840		10840	1693		2448	2552	0.582	10.586	10.43	0.02526	0.10886
11 3/4	71	Q-125	5760	10840	10840		10840	1693		2448	2552	0.582	10.586	10.43	0.02526	0.10886
11 7/8	71.8	H2S-90	7190	7270	7270		7270	1129		1647	1858	0.582	10.711		0.02554	0.11145
11 7/8	71.8	S-95	7190	8150	8150		8150	1153		1735	1962	0.582	10.711		0.02554	0.11145
11 7/8	71.8	H2S-95	7190	8150	8150		8150	1141		1691	1962	0.582	10.711		0.02554	0.11145
11 7/8	71.8	HCP-110	7190	9430	9430		9430	1329		1968	2271	0.582	10.711		0.02554	0.11145
11 7/8	71.8	P-110	5290	9430	9430		9430	1329		1968	2271	0.582	10.711		0.02554	0.11145
11 7/8	71.8	HCQ-125	7190	10720	10720		10720	1494		2198	2581	0.582	10.711		0.02554	0.11145
11 7/8	71.8	Q-125	5630	10720	10720		10720	1494		2198	2581	0.582	10.711		0.02554	0.11145
11 7/8	71	LS-140	7280	12140	12140		12140	1893		2730	2859	0.582	10.586	10.43	0.02813	0.10886
11 7/8	71.8	LS-140	7190	12010	12010		12010	1671		2451	2891	0.582	10.711		0.02554	0.11145
13 3/8	48	H-40	740	1730	1730		1730	322		607	541	0.33	12.715	12.559	0.01673	0.15705
13 3/8	54.5	J-55	1130	2730	2730		2730	514		909	853	0.38	12.615	12.459	0.01919	0.15459
13 3/8	54.5	K-55	1130	2730	2730		2730	547		1038	853	0.38	12.615	12.459	0.01919	0.15459
13 3/8	54.5	HCK-55	1400	2730	2730		2730	689		1194	853	0.38	12.615	12.459	0.01919	0.15459
13 3/8	54.5	LS-65	1140	3230	3230		3230	602		1052	1008	0.38	12.615	12.459	0.01919	0.15459
13 3/8	61	J-55	1540	3090	3090		3090	595		1025	962	0.43	12.515	12.359	0.02163	0.15215
13 3/8	61	K-55	1540	3090	3090		3090	633		1169	962	0.43	12.515	12.359	0.02163	0.15215
13 3/8	61	HCK-55	2040	3090	3090		3090	798		1345	962	0.43	12.515	12.359	0.02163	0.15215
13 3/8	61	LS-65	1620	3660	3660		3660	697		1185	1137	0.43	12.515	12.359	0.02163	0.15215
13 3/8	68	J-55	1950	3450	3450		3450	675		1140	1069	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	K-55	1950	3450	3450		3450	718		1300	1069	0.48	12.415	12.259	0.02405	0.14973

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
13 3/8	68	HCK-55	2850	3450	3450		3450	905		1495	1069	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	LS-65	2110	4080	4080		4080	791		1318	1264	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	L-80	2260	5020	5020		5020	952		1545	1556	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	HCL-80	2910	5020	5020		5020	1093		1732	1556	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	N-80	2260	5020	5020		5020	963		1585	1556	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	HCN-80	2910	5020	5020		5020	1103		1732	1556	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	C-90	2320	5650	5650		5650	1057		1683	1750	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	S-95	2910	5970	5970		5970	1125		1812	1847	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	T-95	2330	5970	5970		5970	1114		1772	1847	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	C-95	2330	5970	5970		5970	1114		1772	1847	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	HCP-110	2910	6910	6910		6910	1297		2079	2139	0.48	12.415	12.259	0.02405	0.14973
13 3/8	68	P-110	2340	6910	6910		6910	1297		2079	2139	0.48	12.415	12.259	0.02405	0.14973
13 3/8	72	LS-65	2430	4370	4370		4370	854		1408	1350	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	L-80	2670	5380	5380		5380	1029		1650	1661	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	HCL-80	3470	5380	5380		5380	1181		1850	1661	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	N-80	2670	5380	5380		5380	1040		1693	1661	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	HCN-80	3470	5380	5380		5380	1192		1850	1661	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	C-90	2780	6050	6050		6050	1142		1798	1869	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	H2S-90	3470	6050	6050		6050	1192		1850	1869	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	S-95	3470	6390	6390		6390	1215		1935	1973	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	T-95	2820	6390	6390		6390	1204		1893	1973	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	H2S-95	3470	6390	6390		6390	1204		1893	1973	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	C-95	2820	6390	6390		6390	1204		1893	1973	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	HCP-110	3470	7400	7400		7400	1402		2221	2284	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	P-110	2890	7400	7400		7400	1402		2221	2284	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	HCQ-125	3470	8410	8410		8410	1577		2463	2596	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	Q-125	2880	8410	8410		8410	1577		2463	2596	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	LS-140	3470	9420	9420		9420	1763		2749	2908	0.514	12.347	12.191	0.02569	0.14809
13 3/8	72	V-150	2880	10090	10090		10090	1887		2939	3115	0.514	12.347	12.191	0.02569	0.14809
13 3/8	80.7	H2S-90	4990	6830			7340			2077	2098	0.58	12.215	12.059	0.02884	0.14494
13 3/8	80.7	S-95	4990	7210			7210			2173	2215	0.58	12.215	12.059	0.02884	0.14494
13 3/8	80.7	H2S-95	4990	7210			7210			2125	2215	0.58	12.215	12.059	0.02884	0.14494
13 3/8	80.7	HCP-110	4990	8350			8350			2493	2565	0.58	12.215	12.059	0.02884	0.14494
13 3/8	80.7	P-110	4000	8350			8350			2493	2565	0.58	12.215	12.059	0.02884	0.14494
13 3/8	80.7	HCQ-125	4990	9490			9490			2765	2914	0.58	12.215	12.059	0.02884	0.14494
13 3/8	80.7	Q-125	4140	9490			9490			2765	2914	0.58	12.215	12.059	0.02884	0.14494
13 3/8	86	S-95	6240	7770			7750			2333	2378	0.625	12.125	11.969	0.03096	0.14282
13 3/8	86	HCP-110	6240	9000			8960			2677	2754	0.625	12.125	11.969	0.03096	0.14282
13 3/8	86	P-110	4780	9000			8980			2677	2754	0.625	12.125	11.969	0.03096	0.14282
13 3/8	86	HCQ-125	6240	10220			10200			2969	3129	0.625	12.125	11.969	0.03096	0.14282

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
13 3/8	86	Q-125	5030	10220			10200			2969	3129	0.625	12.125	11.969	0.03096	0.14282
13 1/2	81.4	H2S-90	4860	6770			6770			1862	2119	0.58	12.34		0.02912	0.14793
13 1/2	81.4	S-95	4860	7140			7140			1948	2236	0.58	12.34		0.02912	0.14793
13 1/2	81.4	H2S-95	4860	7140			7140			1905	2236	0.58	12.34		0.02912	0.14793
13 1/2	81.4	HCP-110	4860	8270			8270			2235	2590	0.58	12.34		0.02912	0.14793
13 1/2	81.4	P-110	3910	8270			8270			2235	2590	0.58	12.34		0.02912	0.14793
13 1/2	81.4	HCQ-125	4860	9400			9400			2479	2943	0.58	12.34		0.02912	0.14793
13 1/2	81.4	Q-125	4030	9400			9400			2479	2943	0.58	12.34		0.02912	0.14793
13 5/8	88.2	H2S-90	5930	7220			7220			1801	2297	0.625	12.375		0.03157	0.14877
13 5/8	88.2	S-95	5930	7630			7630			1885	2425	0.625	12.375		0.03157	0.14877
13 5/8	88.2	H2S-95	5930	7630			7630			1843	2425	0.625	12.375		0.03157	0.14877
13 5/8	88.2	HCP-110	5930	8830			8830			2163	2808	0.625	12.375		0.03157	0.14877
13 5/8	88.2	P-110	4570	8830			8830			2163	2808	0.625	12.375		0.03157	0.14877
13 5/8	88.2	HCQ-125	5930	10030			10030			2399	3191	0.625	12.375		0.03157	0.14877
13 5/8	88.2	Q-125	4800	10030			10030			2399	3191	0.625	12.375		0.03157	0.14877
16	65	H-40	630	1640	1640		1640	439		781	736	0.375	15.25	15.062	0.02277	0.22592
16	75	J-55	1020	2630	2630		2630	710		1200	1178	0.438	15.124	14.936	0.02649	0.22220
16	75	K-55	1020	2630	2630		2630	752		1331	1178	0.438	15.124	14.936	0.02649	0.22220
16	75	LS-65	1020	3110	3110		3110	832		1394	1392	0.438	15.124	14.936	0.02649	0.22220
16	84	J-55	1410	2980	2980		2980	817		1351	1326	0.495	15.01	14.822	0.02982	0.21887
16	84	K-55	1410	2980	2980		2980	865		1499	1326	0.495	15.01	14.822	0.02982	0.21887
16	84	LS-65	1470	3520	3520		3520	957		1570	1567	0.495	15.01	14.822	0.02982	0.21887
16	84	N-80	1480	4330	4330		4330	1167		1898	1929	0.495	15.01	14.822	0.02982	0.21887
16	84	HCN-80	1910	4330	4330		4330	1342		1898	1929	0.495	15.01	14.822	0.02982	0.21887
16	84	HCP-110	1910	5960	5960		5960	1575		2518	2652	0.495	15.01	14.822	0.02982	0.21887
16	84	P-110	1480	5960	5960		5960	1575		2518	2652	0.495	15.01	14.822	0.02982	0.21887
16	84	HCQ-125	1910	6770	6770		6770	1773		2809	3014	0.495	15.01	14.822	0.02982	0.21887
16	84	Q-125	1480	6770	6770		6770	1773		2809	3014	0.495	15.01	14.822	0.02982	0.21887
16	95	N-80	2180	4950			4950			2161	2196	0.566	14.868		0.03394	0.21474
16	95	HCN-80	2580	4950			4950			2161	2196	0.566	14.868		0.03394	0.21474
16	95	HCP-110	2580	6810			6810			2866	3019	0.566	14.868		0.03394	0.21474
16	95	P-110	2230	6810			6810			2866	3019	0.566	14.868		0.03394	0.21474
16	95	HCQ-125	2580	7740			7740			3198	3431	0.566	14.868		0.03394	0.21474
16	95	Q-125	2230	7740			7740			3198	3431	0.566	14.868		0.03394	0.21474
16	97	N-80	2270	5030			5030			2194	2230	0.575	14.85		0.03446	0.21422
16	97	HCN-80	2990	5030			5030			2194	2230	0.575	14.85		0.03446	0.21422
16	97	HCP-110	2990	6920			6920			2910	3067	0.575	14.85		0.03446	0.21422
16	97	P-110	2340	6920			6920			2910	3067	0.575	14.85		0.03446	0.21422
16	97	HCQ-125	2990	7860			7860			3246	3485	0.575	14.85		0.03446	0.21422
16	97	Q-125	2340	7860			7860			3246	3485	0.575	14.85		0.03446	0.21422

Casing Data Sheet

O.D. (inch)	Nominal Weight T & C lbs/ft	Grade	Collapse Pressure (psi)	Internal Yield Pressure Minimum Yield (psi)				Joint Strength 1000 lbs			Body Yield 1000 lbs	Wall (inch)	I.D. (inch)	Drift Diameter (inch)	Displacement (bbl/ft)	Capacity (bbl/ft)
				PE	STC	LTC	BTC	STC	LTC	BTC						
16	109	J-55	2560	3950	3950		3950	1116		1772	1739	0.656	14.688	14.5	0.03911	0.20958
16	109	K-55	2560	3950	3950		3950	1181		1965	1739	0.656	14.688	14.5	0.03911	0.20958
16	109	N-80	3060	5740	5740		5740	1594		2489	1739	0.656	14.688	14.5	0.03911	0.20958
16	118	J-55	3170	4300	4300		4300	1224		1924	1889	0.715	14.57	14.382	0.04247	0.20622
16	118	K-55	3170	4300	4300		4300	1296		2131	1889	0.715	14.57	14.382	0.04247	0.20622
16	118	N-80	3660	6260	6260		6260	1741		2703	2747	0.715	14.57	14.382	0.04247	0.20622
18 5/8	87.5	H-40	630	1630	1630		1630	559		993	995	0.435	17.755	17.567	0.03075	0.30624
18 5/8	87.5	J-55	630	2250	2250		2250	754		1329	1368	0.435	17.755	17.567	0.03075	0.30624
18 5/8	87.5	K-55	630	2250	2250		2250	794		1427	1368	0.435	17.755	17.567	0.03075	0.30624
18 5/8	87.5	N-80	630	3270	3270		3270	1079		1887	1990	0.435	17.755	17.567	0.03075	0.30624
18 5/8	94.5	H-40	780	1760	1760		1760	609		1067	1068	0.468	17.689	17.501	0.03302	0.30396
18 5/8	94.5	J-55	780	2420	2420		2420	821		1427	1469	0.468	17.689	17.501	0.03302	0.30396
18 5/8	94.5	K-55	780	2420	2420		2420	865		1533	1469	0.468	17.689	17.501	0.03302	0.30396
18 5/8	94.5	N-80	780	3520	3520		3520	1174		2027	2137	0.468	17.689	17.501	0.03302	0.30396
18 5/8	106	H-40	1140	2000	2000		2000	703		1206	1208	0.531	17.563	17.375	0.03733	0.29965
18 5/8	106	J-55	1140	2740	2740		2740	948		1613	1661	0.531	17.563	17.375	0.03733	0.29965
18 5/8	106	K-55	1140	2740	2740		2740	998		1733	1661	0.531	17.563	17.375	0.03733	0.29965
18 5/8	106	N-80	1150	3990	3990		3990	1356		2292	2416	0.531	17.563	17.375	0.03733	0.29965
18 5/8	117.5	H-40	1500	2230	2230		2230	795		1342	1344	0.593	17.439	17.251	0.04155	0.29543
18 5/8	117.5	J-55	1510	3060	3060		3060	1072		1795	1849	0.593	17.439	17.251	0.04155	0.29543
18 5/8	117.5	K-55	1510	3060	3060		3060	1129		1929	1849	0.593	17.439	17.251	0.04155	0.29543
18 5/8	117.5	N-80	1520	4460	4460		4460	1534		2551	2689	0.593	17.439	17.251	0.04155	0.29543
20	94	H-40	520	1530	1530		1530	581		1041	1077	0.438	19.124	18.936	0.03329	0.35528
20	94	J-55	520	2110	2110	2110	2110	783	907	1402	1480	0.438	19.124	18.936	0.03329	0.35528
20	94	K-55	520	2110	2110	2110	2110	824	955	1479	1480	0.438	19.124	18.936	0.03329	0.35528
20	106.5	J-55	770	2410	2410	2410	2410	913	1056	1595	1685	0.5	19	18.812	0.03789	0.35069
20	106.5	K-55	770	2410	2410	2410	2410	960	1113	1683	1685	0.5	19	18.812	0.03789	0.35069
20	106.5	N-80	770	3500	3500	3500	3500	1307	1514	2281	2450	0.5	19	18.812	0.03789	0.35069
20	133	K-55	1500	3060	3060	3060	3060	1253	1453	2123	2125	0.635	18.73	18.542	0.04778	0.34079
20	133	L-80	1600	4450	4450	4450	4450	1692	1958	2849	3091	0.635	18.73	18.542	0.04778	0.34079
20	133	N-80	1600	4450	4450	4450	4450	1707	1976	2877	3091	0.635	18.73	18.542	0.04778	0.34079
20	169	K-55	2500	3510	3230	3430	3380	1402	1732	2689	2692	0.812	18.376	18.188	0.06054	0.32803
20	169	L-80	3020	5680	4690	4990	4920	2202	2549	3610	3916	0.812	18.376	18.188	0.06054	0.32803
20	169	N-80	3020	5680	4690	4990	4920	2221	2573	3645	3916	0.812	18.376	18.188	0.06054	0.32803

IADC Equipment Codes

Below listing is the standard list of IADC Activity codes, provided by IADC Members:
This is being used in: `iadcDdrPlus/tourReport/activity/iadcActivityCode`

Enum. value (Short Code)	Description
0	No Specifics
1	Logging
2	Rig up
5	Rig Down
16	Flow Check Test
17	Leak Off Test (LOT)
19	Air Drilling
20	Casing Drilling
21	Coiled Tubing Drilling
23	Drills
24	Ream Back
25	Ream Under
26	Ream Open Hole
27	Ream Cement
28	Cut
29	Pick Up
30	Lay Down
42	Transfer
53	Kick Detection Test
54	Hole Open
55	Clean
56	Scheduled Maintenance
57	Unscheduled Maintenance
58	Condition Based Maintenance
59	Mill
60	Slide Drilling
61	Test
62	Change
63	Inspect
64	Work Pipe
65	Burn Test
66	Calibrate
67	Load Test
68	Expendables
69	Electrical
70	Mechanical
71	Hydraulics
72	Instrumentation
73	Paint
74	Slip & Cut
75	Install
76	Single Shot Survey
77	Multi - Shot Survey
78	Deviation Survey
80	Pressure Test
81	Tool string operations
83	Make Up
84	Drive
85	Jett
86	Soak
87	Rack Back
88	Rig In Hole (RIH)
89	Land
90	Pull Out Of Hole (POOH)
91	Function Test
92	Circulate
94	Release
95	Hang
96	Cut Rough
97	Set Up
98	Displace
99	Mix
100	Pump
101	Remove
102	Lost Circulation
104	Final Cut & Dress
105	Survey
106	Energize
107	De-Energize
108	Pressurize
109	De-Pressurize
110	Lock
111	Unlock
113	Set
115	Transport
117	Inflow Test
121	Pressurize Up
122	Pressurize Down
123	Engage
124	Un-latch
126	Dis Engage
133	Overpull Test
137	Set
138	Trial
139	Welding
144	Spot
145	Weight Test
146	Squeeze
147	Jarring
148	Fishing
150	Handling
151	Waiting
152	Tripping
153	Preparation
154	Verification
155	Move

156	Drilling
157	Tool orientation
159	Install
161	Commission
162	Retrieve
163	Latch
165	Pull Test
166	Transfer Weight
167	Move Over
168	Move Off
169	Scope
171	Change to Drilling
172	Change to Riser Running
173	Investigation
174	Standdown
178	Trip Interruption
179	Stuck Pipe
180	Post-Jarring Inspection
181	Idle Not Under Contract
182	Idle Under Contract
183	Pre-Operating
184	Rig Positioning
184	Force Majeur
185	Yard /Dock Maintenance
186	Stacked - Cold
187	Stacked - Warm
188	Meeting
189	Training
191	Job Safety Analysis
197	Shut-In On Well
198	Well Pressure build up
199	Weighing up Kill Mud
200	Well Kill
201	Diverting
203	Rig Modifications
204	Logistics
205	Supply Vessel Operations
206	Crane Operations
207	Helicopter Operations
208	Radio Silence
209	Exporting from wells
210	Perforate
211	Shut-In Well Perforating
212	Treatment
213	Stimulate
214	Gravel Pack
215	Frack
216	Sand Control
217	Flow Period Test
218	Shut-in Period Test
221	Level

222	Pre-Load
223	Spot
224	Load Off
225	Load Back
226	Seafasten
227	Secure
228	Field Arrival Trials
229	Ballast
230	Deploy
231	Recover
232	Tension
233	Verify location
234	Winch Off Drill
235	Seabed Survey
236	Leg penetration test
237	Jack Up
238	Jack Down
239	Fill
240	Dump
241	Skid Out
242	Skid In
243	Connect
244	Hook Up
245	Secure
246	Build volume
247	Unload well
248	Stab in cementation
249	Pump up survey
250	Slow Pump Rate
251	Change Out
252	Wiper Trip
253	Wash In
255	Compensate through BOP
256	Evaluate
257	Nipple Up
258	Nipple Down
259	Set Back
260	Secure
261	Commence Drilling
262	Drill Off Test
263	Friction test
265	Rotating Drilling
266	Connection
267	Oscillate
269	Weight to Slips
270	Slips to Weight
271	In Slips
272	Ream Downwards
273	Stand Down
274	Fracking