

Rig acceptance Guidelines

Rev: 1.0 16/06/01



Rig acceptance guidelines

Table of contents

RIG ACCEPTANCE GUIDELINES2

Table of contents2

Introduction3

Preparing for rig acceptance on a working rig4

Preparing for rig acceptance of a cold stacked rig.5

Rig checking procedure.....6

Check list for rig acceptance8

Marine riser and tensioners 17

Marine equipment20

Electro mechanical equipment22

Introduction

The purpose of any rig acceptance is to ensure that the rig being hired is capable of carrying out the Drilling Programme safely, efficiently and cost-effectively.

Most operators have in-house checklists for rig acceptance.

However, as with most lists, they tend to have grown with time, to the point where in some cases they are unwieldy and to execute the required rig audit in any depth could take longer than drilling the proposed well. It is however possible to check out any working rig in a day or so. Cold-stacked rigs or rigs in need of upgrade for special wells such as deepwater would need longer periods and are discussed separately in this chapter.

Most rigs use the same basic equipment, so to get an overview of the rig the following factors must be considered:

- Personnel – quality and turnover
- Planned and effective maintenance
- Inventory levels and control

Clearly, the people selected to carry out rig acceptance must be very familiar with the rig types that they are auditing. If the operator does not have such people on the staff, then it is very worthwhile considering using consultants for the job. If the operator has a Drilling Operations Policy Document then any rig acceptance must be done within the guidelines of this Document.

Preparing for rig acceptance on a working rig

As with any operation, good planning is paramount. We do not want to waste our time or that of the drilling contractor. Later in this chapter we discuss a suitable acceptance checklist. It is important that this is sent to the drilling contractor well ahead of time so that he can ensure that its needs can be met mechanically, electrically and logistically.

Providing that he knows what you want to see on your acceptance visit, the onus is upon him to ensure that he has the equipment, power and personnel to arrange this. If the drilling contractor can not arrange this on the required day, then it is necessary to find out why well ahead of time rather than have to repeat the visit later on. Whilst accepting equipment, try as far as possible to check things concurrently in order to save time.

Preparing for rig acceptance of a cold stacked rig.

This is a much more difficult and time-consuming process. Cold-stacked rigs have generally been mothballed using inhibitive chemicals. Providing that this has been done professionally then there should be little problem bringing the rig back into operational mode. The factors influencing the ease with which the rig can be brought back into operational mode are:

- Cold stacking procedures
- Applied inspection during cold stacking
- Re-commissioning procedures applied

A copy of the cold stacking procedures and inspection procedures used by the drilling contractor should be sourced as soon as practicable. These documents will give an immediate impression of the attention that the operation was given.

The drilling contractor will also have a re-commissioning procedure programme and a copy of this document should also be sought. If this is laid out in a flow chart then it can be seen exactly when power will be available, load tests will be carried out and pressure testing will be done. As far as possible, we should try to work within the drilling contractor's schedule to minimise upheaval during recommissioning. Clearly, if some of these items that we want tested are not in the contractor's own list, then these have to be fitted into their programme. Exactly where they should fit in should be resolved in discussions with the drilling contractor prior to setting foot on the rig.

Rig checking procedure

The checking procedure falls into four main groups:

1. Personnel
2. Repair and maintenance programmes
3. Inventory carried
4. Physical checklist for acceptance

Personnel

Time should be taken to talk rig personnel to determine there:

- Qualifications
- Experience
- Length of service with their present company
- Attitude
- Effectiveness

An overall impression should be gained as to ambience of the rig, by considering the following questions:

- Is there pride in the rig?
- Is the rig running smoothly?
- How much line-supervision is evident?
- What is supervisor-subordinate relationship?

A chaotic rig is usually an inefficient rig and can also be dangerous one. A smooth operation is usually a good operation.

Repair and Maintenance Programmes

By inspecting these programmes, insight can be gained into the priority that is given by the contractor to maintaining his equipment. Most contractors have computerised R&M Programmes in place and these provide a quick means of establishing what has been done in the way of maintenance and what is planned. By talking to rig engineering staff an insight can be gained into the staff confidence in the adequacy of the R&M Programme.

Inventory Carried

Most drilling contractors will quote a value of inventory carried by a rig. This figure in isolation means very little to the rig's ability to cope with unexpected repairs. What is more relevant is exactly what inventory is carried.

An inspection should be made of the previous six months stores issues to correlate fast moving items with adequate stock levels. It is also worth ensuring that stock levels are being increased as a matter of course to provide for major PM overhaul programmes. This, together with the general condition of the store and its paperwork/software, will give a good indication of the quality of inventory handling and control.

Check list for rig acceptance

The following is a guide for anyone carrying out a rig acceptance audit. With planning, it can be expected within a day or two on even the most sophisticated semi or jack-up rig. It is based on a semi-submersible rig, but with appropriate deletions and additions can be used for all rigs.

Derrick (mast) and Substructure

- Note the make, model and rating
- Inspect for loose bolts
- Inspect for bent or twisted girths and braces
- Inspect for corrosion
- Check block guide rails

Draw-works

- Note the make, model and rating
- Run the draw-works with no load to check proper function of:
 - The lubricating system
 - The brakes
 - The catheads
 - Air and water supplies
 - The mechanical controls
 - The clutches
 - Elmagco clutch, checking teeth wear
- Check brake rim for wear, corrosion and grooving
- Check brake blocks for wear
- Run both the main drum and the sand line reel on all motors transmission and clutch combinations
- Test the foot throttle
- Test the Elmagco and the crown-o-matic
- Inspect drilling line for condition and note spare length
- Check ton mile programme for block line

Top drive / Rotary Table

- Note the make, model and rating
- Test with no load at various speeds
- Check amp, volts for the two mech gears
- Operate the locking system (right and left)
- Check and record drive gear backlash

Rotary Swivel

- Note the make, model and rating
- Check operation
- Check wash pipe integrity

Crown Block, Travelling Blocks, Hooks

- Note the make, model and rating of each item
- Visually check for wear, damage and misalignment
- Check all grease fittings to verify proper lubrication
- Run block up and down while visually observing sheaves and dollies. Listen for excessive bearing wear noises
- Unlock, turn hook and relock in all possible positions
- Check condition and safety equipment on all suspended sheaves
- Check block trolley

Drilling Instrumentation System

- Test all sensors, recording and display instruments in the drill cabin

HP Mud Pumps

- Note the make, model and number of pumps
- Check proper function of lubricating system of cabin cases and liner rods
- Gradually vary s.p.m. from 1 to 120 s.p.m. steps. Run for 10 minutes at each step
- Run on no load for 2 hours at 100 s.p.m.
- Load test by pumping through the choke
- Run separately each pump at 60 s.p.m. with choke open
- Record pressure, amps and volts at each step
- Increase discharge pressure to 2000 p.s.i. and run for 30 minutes
- Increase s.p.m. from 60 to 90 to 120
- Maintain 90 s.p.m. for 30 minutes and 120 s.p.m. for 60 minutes adjusting choke to maintain 2000 psi
- Record Drillers' cabin indicators at each load step
- Test safety devices:
 - Chain lubricating failure
 - Rod lubricating failure
 - Emergency stop
- A parallel test of all pumps should be carried out at 120 s.p.m. for one hour

LP Mud System

- Check that mud pits are clean and free from any loose material
- Have them filled with seawater in such a way to check equalising valves integrity
- Check dumping valves integrity
- Check drill water and oil filling valves at each pit
- Check all related piping, valve by valve, at maximum system pressure attainable
Test all the mud guns
- LP mud pumps: check the proper function of the various LP mud pumps, firstly with suction discharge valves open and then with valves closed. Current and discharge pressures should be recorded. Carry out transfer test from reserve pits to active pits.
Check time for above.
- Run agitators for one hour each. Check current and operating temperatures.
- Fill tanks and traps with sea water and check valves and gate integrity
- Run the pumps and test the circuits at maximum attainable pressure and with each valve combination
- Record the amps and discharge pressure for each pump as for LP mud pumps
- Run the shale shaker for one hour and record amps, pressures and appropriate temperatures
- Run the mud cleaners, de-sanders, de-silters and centrifuge for one hour, recording amps and temperatures
- Check the size, location, instrumentation and ergonomics of the trip tank

HP Mud System

- The HP mud piping should be tested to full working pressure valve by valve
- The valves of the stand pipe manifold are to be tested to full working pressure
- For each test, the pressure should be held for 5 minutes and recorded

Choke Manifold, Function/Pressure Test

- Individually function test automatic choke and all manual chokes
- Pressure test choke manifold as follows:

All valves upstream of chokes:

- 300 p.s.i. x 5 minutes
- full working pressure x 10 minutes

All valves downstream of chokes:

- 300 p.s.i. x 5 minutes
- full working pressure x 10 minutes

Drill string and Tools

- Check presence and condition of these tools, cross checking with rig official equipment lists
- Check all documentation and inspection certification

Blow out preventers

The BOP rating and certification must comply with that set down in the Drilling Policy Document as a minimum standard. To save time arrange that a test is taking place on the BOP to full working pressure as you arrive on the rig. If this is satisfactory, have the contractor perform the low-pressure test then follow the inspection procedure outlined below.

The following inspections will provide an overall picture of the condition of the BOP and a summation of the conclusions enable a judgement to be made as to whether or not the equipment is suitable for the task envisaged. Since this is an equipment inspection, naturally a full pressure at both low and high pressure will be carried out to the full rated pressure of the equipment. The elastomers used in the BOP must be checked to have a temperature rating in excess of the anticipated bottom hole temperature.

Ram Type BOP's

Request that the contractor opens up one frame at your discretion then:

- Inspect ram bores and cavities for overall condition
- Check all bonnet faces and racetracks for marks, pitting and evidence of wash marks
- Inspect condition of ram operating piston rods for marks or gouges
- Check length of service from maintenance records
- Record any wear to bore, etc
- Agree percentage wear with contractor to any rubber goods to be re-used (e.g., variable packers 15% worn)
- Ensure equipment is available and working for correct torquing of bonnet bolts wedge locks
- Pressure test hydraulic function of rams

Annular/spherical BOP's

- Inspect and agree with drilling contractor on percent wear to elements
- Record any internal wear
- Pressure test hydraulic function
- Inspect maintenance record as to length of service since last dismantling and rebuilding

BOP Control Pods

- Inspect pipe work of pods, ensure no hard pipe has been replaced by flexible hose
- Have pod release mechanisms demonstrated
- Pressure all SPM or slide valves to prove they seal correctly and don't leak
- Function manifold and annular regulators throughout their range of pressures to check operation and freedom from leaks
- Ensure recovery arms are fitted and alignment is correct
- Inspect general condition of seal areas and seals
- Estimate general overall condition of pods, also find out their length of service
- Determine if there is a spare pod available on board

Control Umbilicals and Reels

- Make an inspection of all umbilical terminations and ensure pod umbilical support shrouds are fitted at pods
- Pressure umbilicals and look for leaks
- Inspect RBQ plates
- Ensure mini panel and regulators on both reels are fully functional and in good order
- Run air motors on reels and check braking
- Ensure there is an adequate supply of hose clamps for the water depth envisaged
- Check hose lengths

Pod Receptacles

- Check pod receptacles for washing and overall condition
- With BOP assembled check alignment of the pod and pod receptacles

Surface Closing Unit

- Make calculations as to surface accumulator capacity requirements
- Check surface accumulator pre-charge
- Run both electrical and air high pressure charging pumps. Ensure correct cut out pressures are met
- Ensure all safety valves are in place
- Test run mixing system
- Ensure all gauges are functional
- Stock check for adequate supply of soluble oil and glycol
- Ensure all bolts are fitted to flame proof enclosures
- Is emergency nitrogen system fitted?
- Check that the pilot system has dedicated accumulators
- Ensure planned maintenance has been carried out, filters, traps, oil changes, etc
- Test function control valves from satellite panels
- Test low level and low pressure alarms
- Have samples of control fluid sent ashore for testing
- Inspect all gauges, read backs and flow meters for correct reading
- Check accumulator volume as a function of opening and closing functions

Slave Panels (Drillers, Tool pusher's Mini-panel)

- Ensure all gauges give accurate read back from closing unit
- All lamps should light and change correctly (done in conjunction with master panel function test)
- Function flow meter
- Ensure all flame proof covers at rear of panel are in place and correctly bolted. Also make sure panel is protected from elements
- Test low pressure and low level alarms

BOP Hoses, Pipe work and Accumulators

- Make visual inspection of all hoses for damage and bad fittings
- Pressure test all hoses, pipe work and shuttle valves
- Check pre-charge of stack accumulators and function stack accumulator dump

Control Systems Secondary Support

- Is ROV intervention fitted?
- If intervention is fitted, list functions it perform
- Is an acoustic BOP system fitted?
- If acoustic system is available, list functions

Kill and Choke Fail-safe Valves

- Determine length of service from maintenance records
- Inspect previous pressure test as to proof of good service
- (From above two checks, make decision as to whether valves should be dismantled to inspect gates and seats)
- Pressure test hydraulic and fail-safe function
- If balance chambers fitted, check oil levels

Wellhead and LMRP Connectors

- Check length of use in service from maintenance records
- Pressure up and test hydraulic functions for leaks
- Inspect gasket profile for wear and marks
- Inspect dogs for wear and damage
- Function connector to see smooth and proper operation
- Check open and close TV indicators are in place
- Record any key seating and internal wear measurements

Kill and Choke Lines

- Check for wear and washing
- Assess lines for usage, i.e. how many wells have been killed through these lines? Are they likely to be washed?
- Remove any buffer flanges and inspect
- If any doubts as to condition remains, have wall thickness checked ultrasonically

Kill and Choke Stabs and Receptacles

- Inspect for overall condition and absence of wash marks

Kill and Choke Transition Hoses

- Determine length of service from records
- If service is long or several wells, have been killed? Have hoses removed and inspected internally?

Ball Joint or Flex Joint

- Inspect internally for wear and record same
- If a ball joint is used, determine from maintenance records service life since new seals were fitted

Riser Adapter Flange

- Determine when last NDT inspection was carried out
- Have dog mechanism removed and all components inspected as to condition
- Carry out internal inspection for wear and record same

BOP Frame

1. Check all post tops are working properly
2. Check all guideline gates and nuts/bolts are in place and working correctly
3. Check all frame work for alignment

Marine riser and tensioners

Marine Riser

- The riser supplied should be fully inspected and tested prior to acceptance. This should include any riser stored shore side that may be later shipped offshore
- Carry out NDT inspection on all pin and boxes. This must include pins and boxes on the slip joint, the pin of the diverter, all riser handling subs and the riser adaptor flange of the LMRP
- Ensure all kill and choke lines are straight and all retaining clamps are correctly fitted. Check there is no excessive corrosion on these lines.
- Dog mechanisms should be in good order. If any doubt exists, they should be fully stripped out and inspected
- Inspect all kill and choke stabs and boxes for wear or wash marks. New packings should be fitted
- Inspect all riser joint packings and replace any that appear squashed
- The inner barrel of the slip joint should be inspected for wear, damage or key seating, any wear should be recorded
- From records, find length of service of slip joint packer
- Inspect condition of riser slew ring (gimbal), ensure it is free
- Inspect riser gooseneck boxes for damage and wash marks. Inspect for wear or washing of gooseneck stabs

Riser Tensioners

- Ensure all compressors are functional and working correctly
- Check that a riser tensioner programme is in place and a proper slip and cut procedure is being followed. Make sure tonne mile records are properly kept
- Verify that all APV pressure vessels are in good order and that safety valves have been recently inspected and calibrated
- Inspect control panels for overall condition and that all gauges are working. Hydraulic fluid levels in tensioners must be checked and seen to be part of a planned maintenance procedure
- Hydraulic fluid samples should be sent ashore for testing
- Inspect all rod seals for signs of excessive leakage
- Inspect all sheaves for wear and make sure proper greasing has been carried (no missing grease lines)
- Inspect and record condition of piston rods

Drill string Compensator (DSC)

We must determine that the DSC has the capacity for the work envisaged. There are also several safety hazards associated with a DSC. It is therefore imperative that all components are in good order and secure.

- Inspect all hoses for damage and leaks
- Check chain tensions and chains for stretch, cracked links and wear
- Ensure all covers and guards are in place and correctly bolted
- Function lock bar for free movement
- Inspect hydraulic piston rods for damage and record condition
- Ensure there is no excessive leakage from rod seals
- Run block up and down to ensure dolly rollers and tracks are in good shape
- Ensure safety valves are in place and hydraulic fluid levels are correct
- Driller's control panel:
 - Pressure up and check for leaks
 - Ensure all pressure gauges are working properly
 - Ensure position indicator lights are working and lock bar lights change correctly
- Ensure all APV's are in good condition and the safety valves fitted have been tested and calibrated recently

Divertor System

Four main areas may give concern with a divertor system:

1. In unusual circumstances the divertor can be used to lift the complete weight of the riser and the BOP. It is therefore imperative that all bolting of the divertor is thoroughly checked
2. If it is known that there has been failure in use of the threaded type handling tools, a thorough inspection of this tool is recommended
3. Concern must be noted if the overboard lines of the divertor system contain bends and are not directly routed overboard
4. Divertor lines must be a minimum of 12 inches ID
 - Inspect the through bore of the divertor and ball joint for wear and record same
 - Inspect the divertor packer and condition and wear, record same
 - Ensure all divertor seals and locking dogs are in good order and function all dogs
 - Check that all cap screws are in place on divertor and have their torque checked
 - Verify the condition of the handling tool. Ensure that inspection of the tool is recent
 - If of the threaded type, dismantle and inspect threads for wear

- Operate all valves in the diverter system to prove their operation and sequencing from both panels
- Make an assessment of the diverter pipe work layout. How straight are the lines? Will they washout if used in anger? Do they pass through enclosed spaces?
- Inspect and function test the diverter control system master panel
- Fully function test the driller's diverter panel and ensure all pressure gauges give the same readings as the main panel

6.0

Marine equipment

Living Quarters

- Test all galley and laundry equipment
- Check proper function of refrigerator plant, freezers and refrigerated container

Air-conditioning Equipment/Central Heating

Check proper function of air-conditioning equipment/heating equipment

Anchor Windlasses

- Note number, location and rating
- Note cable size, length
- Function test all operations
- Test sensors, recording and display instruments
- Check dynamic braking
- For foul weather operations check sealing capabilities at the top of the chain locker

Ballast System

- Test all pumps, recording amps and pressures
- Function test all hydraulic remotely controlled valves recording operating times

Bulk System

- Check remote control panel operation
- Pressure test the system valve by valve with air
- Check all transfer and loading paths are clear by blowing through with air
- Check all purge systems are working properly
- Test transfer of cement and barite from P-tank to P-tank
- Report measured time
- Test transfer cement, betonite and barite to relevant surge tanks
- Report measured time

Navigation Equipment

All specified equipment must be present and working

Certification

- Copies of all relevant certification should be seen and noted
- Any deficiencies must be investigated

Cranes

The general condition of the cranes must be checked

Any bent members in the crane boom must be noted. Rating and capacity at various boom angles must be noted.

Lifeboats

- General checking should be carried out on their condition
- The log book showing services and launches should be inspected

Fire-fighting Equipment

A random inspection of fire-fighting equipment checking against the quoted inventory will highlight any deficiencies

A random check of dates of last service inspections will indicate how thoroughly these are being adhered to.

Electro mechanical equipment

- Run Equipment as necessary to apply rest load
- Adjust speed to 900 r.p.m. for synchronous operation, check and record governor settings
- At no load, $\frac{1}{4}$ load, $\frac{1}{2}$ load, $\frac{3}{4}$ load and full load, record all engine parameters
- Run about 1 hour at full load
- Observe maximum engine loading, decrease load as soon as speed is seen to decrease (Note: Maximum permissible electrical load may be reached on KVA before achieving maximum KW rating)

- Load step 1: 0 to $\frac{1}{4}$ load, measure speed drop and time to recover with no overshoot
- Modify gain and stability as necessary

- Load step 2: $\frac{1}{4}$ to full load, measure speed drop and time to recover with no overshoot. Modify gain and stability as necessary

- Load step 3: Full to $\frac{1}{4}$ load, measure speed increase and time to recover with no undershoot

- Check all safety devices (shutdowns and alarms) and no load
- Measure temperature rise of generators

Load Sharing Test

- Run all engine combinations at half load to check: function of automatic synchronisation active power sharing
- Adjust load sharing equipment to correct any faults present

Motor Control Centres

- Visual inspection
- Check cleanliness of each starter/isolator cubicle, busbars, insulators, etc
- Electrical inspection
- Check and record IR values of busbars
- Check and record IR values of each outgoing circuit
- Function test all breakers and verify correct settings on overloads using injection test set where possible
- Record all settings

Emergency Generator

- Running test
- Check starting sequence with a simulated black out
- Check alarms and shut down

Fuel Oil System

- Running test on all pumps recording amps and pressures
- Function test all quick closing valves

Seawater Cooling System

Perform running test on all pumps recording amps and pressures

Drill Water System

Perform running test on all pumps recording amps and pressures

Potable Water System

- Perform running tests on all pumps recording amps and pressures
- Function test hydrophone system
- Check proper operations of calorifier elements

Propulsion positioning equipment

- Function test cooling and lubricating systems, record pressures/amps on pumps
- Check and record IR values, fans, motors and chokes
- Function test controls from pilot house and control room
- Function test propulsion ahead and astern at maximum achievable r.p.m. dependent on moorings and tide for minimum of two hours in each direction. Re-lubricate bearings while running
- Draw oil sample from stern tube and send for analysis

Steering Gear

- Function test main and emergency steering systems, record amps/ pressures, etc
- Re-lubricate rudder post bearings

SCR Test

- Platform visual inspection
- Check cleanliness of the complete system: busbars, SCR's electronics, etc
- Electrical inspection
- Check internal SCR protections: electronic overcurrent, loss of field, etc
- Check external protection and SCR alarms/shutdowns: i.e. ventilation on DC motors, MP lub oil, etc
- Check the level of current limit on draw-works, mud pumps and rotary table

400 / 600V main and 440V Emergency Switchboards

- Make visual inspection
- Check cleanliness of switchboard cubicles, busbars, insulators and all equipment in cubicles
- Make electrical inspection
- Check and record IR values of busbars
- Check breakers, function tests in test position
- Check setting of all breakers with last survey report
- Check and record IR values of all outgoing circuits

Distribution Boards

- Visual inspection
- Check cleanliness of each distribution board
- Electrical inspection
- Check and record IR values of each circuit
- Function test all circuits, isolators, etc. and ensure correct value fuses are fitted.