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THE OIL AND GAS STATIC EQUIPMENT MAINTENANCE PROCEDURES & SPECIAL TORQUING AND BLASTING DEVICES

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ABSTRACT

The Maintenace of static equipment represents a challenge in all of the refinery, petrochemical and oil gathering facilities accordingly this paper was initiated to detail the maintenance procedures for the different static equipment and identify the work steps for heat exchangers, ejectors, tanks, heaters, boilers and flares

Keywords: Heaters, static, Towers, Maintenance, procedures

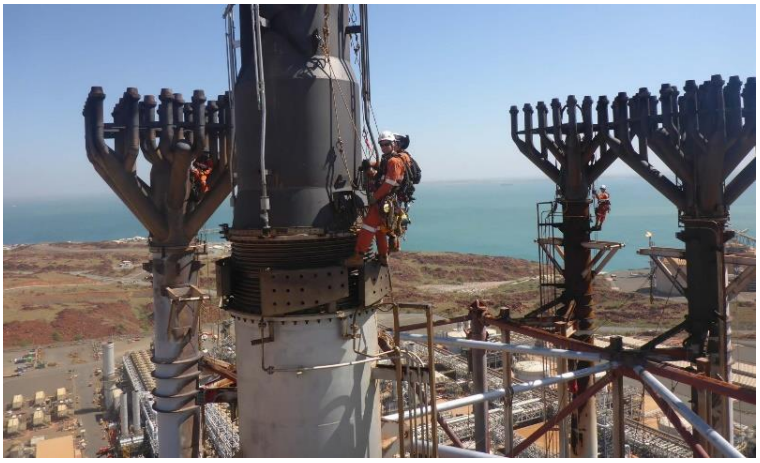
1. INTRODUCTION

The research will identify most of major static equipment and identify the procedures of the maintenance.

2. METHODOLOGY

A. The Refinery Static Equipment

Flares



Job Step

Erect Scaffold for Blinding

Install battery limit blinds

Install flare blinds

Disconnect Tip

Remove Tip from Flare

Clean Tip and Top Flange

Inspect Tip Flare and Flare

Reinstall Tip

Fix Tip and Tight

Remove Blinds

Remove Scaffold & Area Clean

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Heat Exchangers

Job Step

Erect Scaffolding

Remove Insulation as required

Isolate Connect Drain

Install Blinds

Disconnect Piping

Remove Channel bonnet (both inlet and outlet side)

Remove internal tube bundle expansion joint and install lock bolt

Remove tube bundle

Transport Tube bundle and Exchanger Parts to Shop / yard

Clean shell and all components

Offer inspection / Repair(if any)

Hydro blast Tube Bundle

Offer inspection / Repair(if any)

Inspect all Gasket Surfaces

Transport Bundle / Heads to Site

Install Tube bundle and test ring

Hydrotest Shell Side, Repeat Test as Required

Offer inspection / Repair(if any)

Remove test ring and fix inlet side bonnet

Install outlet side expansion joint(tighten expansion joint bolts)

Hydrotest Tube Side, Repeat Test as Required

Offer inspection / Repair(if any)

Install outlet side bonnet and tighten all flanges

Hydro test shell side(final)

Remove Blinds

Refit Pipes

Repair and Refit Insulation

Remove Scaffolding

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Tank

Job Step

Erect Scaffolding
Isolate and Drain
Install Blinds
Open Manway
Remove LG & LT's as required
Install Lights Internally as required
Clean Vessel Internally
Inspect Internals
Repair as per Inspection
Clean and flush all connected nozzles
Remove Internal Lighting
Install LG & LT's
Close Manway
Remove blinds
Remove External Scaffolding
Clean Area

Filters

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Job Step

Erect Scaffolding
Isolate Filter Elements " Install Blinds "
Remove Filter Heads
Remove and Clean Filter Elements
Clean Filter Shell Internally
Clean filter element / offer inspection
Install Filter Elements
Reinstall Filter Heads
Remove Blinds
Remove Scaffold
Clean Area Around Filter

Boilers

Job Step

Erect External Scaffold
Install Blinds
Open Steam Drum Manways
Install Ventilation Equipment
Remove Valves and PSV's to Shop
Remove Sight Glass Float Chamber to Shop
Install Internal Lights
Remove Internals
Clean Steam Drum Internally for Inspection
Clean Steam Drum Parts for Inspection
Inspect and Repair as Required
Install Internals and Steam Drum Parts
Remove Internal Lights
Remove Ventilation Equipment
Close Steam Drum Manways

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Install PSV's and Valves

Install Sight Glass and Float Chamber

Remove Blinds

Repair Insulation

Remove External Scaffold

Clean Area

FIN FANs

Job Step

Isolate and Connect Drain

Erect scaffold

Install Blinds

Remove Plugs: Selected 10 % of Total No

Remove Plugs : Balance 90 %

Clean Tubes & Fins by Hydro blasting

Offer Inspection-Corrosion / Repair as required

Remove Bank and transport to Shop-Yard for retubing Repair as required and transport to site and erect after Repair

Install Plugs : Selected 10 % of Total No

Install Plugs : Balance 90 %

Hydrotest Tubes, Repeat Test as Required

Offer Inspection / Repair as required

Remove Blinds & Clean Area

Remove the scaffold & Clean Area

Coolers

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Job Step

Erect Scaffolding
Remove insulation as required
Install Blinds
Remove channel head cover
Remove Channel head
Remove 'U' tube bundle
Transport bundle to workshop
Clean parts
Hydroblast tube bundle
Inspect all gasket surfaces
Install tube bundle in shell
Install channel head
Hydrotest shell side
Install channel head cover
Final tube side hydrotest
Remove blinds
Repair and refit insulation
Remove scaffolding & clean area

Heaters

Job Step

Install Scaffold for Blinding / Isolation
Isolate / Drain
Install Blinds as required

Drop / Clean all heater burners and steam out connected lines
Offer Inspection / Repair as required
Remove Control Valves and transport to Shop
Open Man doors(Both Radiation and convection sides)
Neutralize the tubes by soda ash
Erect internal scaffold and provide internal lighting

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Clean Tubes, Weld Joints, U - Bends and Tube Sheet

Offer Inspection / Repair as required

Repair Refractory

Service Dampers (erect scaffold as required and remove after repair)

Hydrostatic Test Coils, Repeat Test as Required

Offer Inspection / Repair as required

Transport Control Valves to Site and Install

Remove internal scaffold

Clean internally get Operation clearance

Reinstall all burners Get Operation Clearance

Remove Internal Lights

Install Man Way Covers

Remove Blinds

Remove Scaffold Externally

House keep the area

Pressure Vessel

Job Step

Erect External Scaffolding as required

Isolate / Drain

Install Blinds

Open Hand Holes

Remove Sight Glass - Float Chamber & clean as required

Clean Vessel Internally

Inspect Internals / Repair as required

Install Sight Glass and Float Chamber

Close Hand Holes

Remove Blinds

Remove External Scaffolding

Clean Area

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Towers

Job Step

Erect External Scaffolding & at Skirt Area

Isolate and Drain Vessel

Install Blinds & N2 Purge

Open Manway

Remove PSV

Remove & clean sight glass and float chamber(LG &LT)

Install Ventilation Equipment

Install Light Internally

Open Tray Hatchways

Remove complete tray segments

Erect Internal Scaffolding

Clean Trays, Down Commers

Remove Demisters and clean as required

Inspect Internals & Repair as Per Inspection

Reinstall Tray segments

Replace Damage Tray Valves

Reinstall Tray Hatchways

Connect Water Hoses & Flush all connected nozzles

Reinstall demisters

Remove internal scaffolding

Remove Internal Lighting

Remove Ventilation Equipment

Install PSV

Install sight glass and float chamber

Close Manway

Remove Blinds

Remove External Scaffolding

Clean Area including all platforms

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B. Bolting and Hydro blasting Equipment

1. Hydraulic Torque wrench

From 130 ft/lbs to 60,000 ft/lbs the hydraulic torque wrench . lubrication and preventative maintenance, is required for safe operation Different varitey of machine are found in https://www.torcup.com/ and brief is as follows .

2. Pneumatic Torque Wrench

The Pneumatic Torque wrench is identical to Hydraulic wrench but with less torque wrench but it is easier in the application and economical.

3. Tensioning & Bolting

Those are hydraulic, pneumatic and manual torque wrenches; hydraulic bolt tensioning; and all tools associated are utilized to achieve accurate bolting within identified torques.

4. Hydroblasting Machines

High Pressure Diesel Water Jet Pump System can produce High-Pressure, from 4,000 psi to 40,000 psi with different flow rates to meet all application of normal surface blasting till fully clogged heat exchanger tubes . different variety of Machine are found in https://www.nlbcorp.com/

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3. CONCLUSION

The Oil Refinery contains a variety of Equipment from Tanks , Heat Exchangers, Pressure Vessels, Filters, Boilers and Heaters…etc.

Each Equipment has its own maintenance procedures that vary between scaffolding erection, heavy lifts, and special torquing and blasting procedures. The Study identifies each equipment its procedure and the paper could be a good reference for shutdown planners & cost estimators to identify the required works durations and resources and costs based on the dimensions of the Equipment.

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