Annexure 4B	
Scope of work (Balance of plant) Unit 3 & 4	
Sl No	**JOB DESCRIPTION**
1A	**Clarified water distribution system pumps (Vertical turbine pumps)**
a	Preventive Maintenance of Pumps • Ensure PTW • Carry out external cleaning of equipment. • Check the oil level of pump bearings if low top-up oil. • Check the tightness of foundation bolt if loose then tighten. • Check the tightness of coupling bolt if loose then tighten. • Check the gland packing for excessive water leakage, if found arrest it either by tightening or by replacing the glands. • Check the flow of water through bearing cooler if interrupt noticed flush the water line or take corrective action. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Removal of grating & fixing the same. • Clean the thrash rack strainer if damaged replaced / repaired the same • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC.
b	Servicing/Overhauling of pump • Ensure PTW • Ensure Electrical & C&I Connection are removed, power isolation done • Decoupling of motor from pump. • Loosening of motor foundation bolts & lowering/positioning of motor at safe place (after cable & other accessories removal) with safety. • If required removes motor half coupling & refit it properly. • Draining of oil from the bearing housing & shifted to designated place carefully. • Necessary precaution to be taken to avoid draining oil on floor. • Removal of all small pipelines & pressure gauge from the pump unit. • Dragging of pump coupling with jacking arrangement. • Opening of bearing housing & remove the check nut & lock nut etc. • Removals of bearings properly. • Removal of bearing housing & then stuffing box. • Loosening & removal of discharge flange of pump foundation.. • Removal of pump foundation. • Removal of column pipes, spiders & line shaft etc. • Removal of impeller unit. • Dismantling of impeller unit. • Cleaning of all parts properly & painting if required. • Repair/rectification works to be done wherever required. • Check the pump parts for trueness, erosion, and clearance etc & replace with new ones if required. • Assembling of impeller after all rectification and proper lift adjustment. • Fitting of the pump parts in sequential manner properly. • Oil fill up to required level & check/rectify for any leakage. • After proper fitting of pump, place the motor on pump. • Align pump with motor. • If required replace coupling bushes/pins/washers with new ones. • Fit the different accessories to pump & motor properly. • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance. • All measurements/readings before & after corrections to be submitted. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
c	Inspection/Replacement of bearing • Ensure PTW

	• Ensure Electrical & C&I Connection are removed, power isolation done • Decoupling of motor from pump. • Loosening of motor foundation bolts & lowering/positioning of motor at safe place (after cable & other accessories removal) with safety. . • Draining of oil from the bearing housing & shifted to designated place carefully. • Necessary precaution to be taken to avoid draining oil on floor. • Removal of all small pipelines & pressure gauge from the pump unit. • Dragging of pump coupling with jacking arrangement. • Opening of bearing housing & remove the check nut & lock nut etc. • Removals of bearings properly. • Repair/rectification/Replacement works to be done. • Assembly of bearings & pump in sequence • Oil fill up to required level & check/rectify for any leakage. • After proper fitting of pump, place the motor on pump. • Align pump with motor.. • Fit the different accessories to pump & motor properly. • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance. • All measurements/readings before & after corrections to be submitted. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
d	Coupling inspection/replacement & alignments • Ensure PTW • Ensure Electrical & C&I Connection are removed, power isolation done. • Remove the coupling bolts. • Loosening of motor foundation bolts & lowering/positioning of motor at safe place (after cable & other accessories removal) with safety, if required • Inspect the coupling/spider/bushes/bolts etc. for any defect and repair/replacement for the same • Fix the couplings at respective hubs. • Put the motor in the position & do the alignments work • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance. • All measurements/readings before & after corrections to be submitted. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
1 B	**ACW Pumps**
	PM of pumps • Ensure PTW • Carry out external cleaning of equipment. • Check for proper lubrication of pump bearings housing if low top-up oil/replenish grease. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of coupling bolt if loose then tighten/replace • Check the gland packing for excessive water leakage, if found arrest it either by tightening or by replacing the glands. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Cleaning of filters & strainers Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC.
	Servicing/Overhauling of pump • Ensure PTW • Decouple pump from the motor. • Drain the lubricating oil & shifted to designated place carefully. • Shift pump from its foundation to working bay. • Opening/checking the shaft, impeller, wear rings, bearings, glands, & if required, replacement/rectification to be done.

	• Trueness checking of shaft is to be done. • Casing erosion (if required) to be rectified. • Paintings of pump parts are to be done (if required.) • Repair & rectification of pump foundation frame if required. • Alignment with the motor with required tolerance & coupling after motor trial run. • Refilling/checking of lubricating oil system. • Coupling guards to be fitted again. • Trial run of pump, condition monitoring & rectification if required. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
	Bearing inspection/replacement • Ensure PTW. • Decouple pump from motor. • Remove coupling hub for DE side bearing • Dismantle the bearing housing, inspect the condition of bearing. • Rectify/replace the bearing with proper tools & tackles. • Assemble the bearing housing • Lubricate /grease the bearings with proper lubricants • Couple the pump with motor after alignment & made proper pipe joints. • If reqd. changed the spider/coupling halves. • During trial run check the pump performance. • Fix the coupling guard in proper position. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
	Replacement of oil seal • Ensure PTW • Removal of coupling guard • Decoupling of pump from motor and removing the pump from foundation for changing of oil seal. • Removal of damaged oil seal. • Assembling the pump with new oil seal. • Coupling the motor with pump after alignment. • Fixing the coupling guard and checking for any leakage after running the pump. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
	Replacement of mechanical seal • Ensure PTW • Removal of coupling guard • Decoupling of pump from motor and removing the pump from foundation for changing of Mechanical seal. • Removal of damaged mechanical seal. • Assembling the pump with new mechanical seal. • Coupling the motor with pump after alignment. • Fixing the coupling guard and checking for any leakage after running the pump. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
	Coupling inspection/replacement & alignment • Ensure PTW • Decouple the pump from motor • Inspect the coupling/spider/bushes/bolts etc. for any defect and repair/replacement for the same

	• Fix the couplings at respective hubs. • Put the motor in the position & do the alignments work • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
2	**Clarrifloculators**
a	Bridge wheel/bearing replacement(4 shafts/Bridge) • Ensure PTW • Remove the bearings/wheels along with shaft to be replaced by lifting the bridge on jack. • Dismantle bearings/wheels from shaft. • After cleaning, fit the new bearings/wheels properly to the shaft. • Greasing the bearings & chain system. • Shaft along with wheels to be fitted on bridge. • During work, waste lubricants & scraps to be shifted/placed at designated area. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
b	Bridge/Agitator Gear Box servicing/replacement • Ensure PTW • Disconnect the gearbox from motor & driven shaft. • Dismantle the gearbox. • If required change the gears, bearings oil seals, if present. • During fitting, check the backlash between gears. • If required, replace the gearbox with new/repair one. • Fill the gearbox with proper oil. • Align the gearbox with motor & driven shaft & coupled them. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
c	Bridge Agitator servicing • Ensure PTW • Dismantle the agitator from gearbox. • Check the supports of agitator, bearings & shaft & if required repair it. • If required minor cutting/welding works to be done. • Fit the agitator properly at its position. • Connect with gearbox. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work. • Trial run to be done.
d	overhauling Flash mixture Agitator • Ensure PTW • Decouple the motor from gearbox. • Dismantle the gearbox & check gears, bearings, oil seals etc. • Check the agitator, if required repairs it. • Check the tyre coupling etc. & if required replaces it. • Fit the gearbox & agitator properly. • After alignment, couple the gearbox with motor.

	• Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work. • Trial run of agitator to be done.
3	**Raw water Pumps**
a	Preventive Maintenance of Pumps • Ensure PTW • Carry out external cleaning of equipment. • Check the oil level of pump bearings if low top-up oil. • Check the tightness of foundation bolt if loose then tighten. • Check the tightness of coupling bolt if loose then tighten. • Check the gland packing for excessive water leakage, if found arrest it either by tightening or by replacing the glands. • Check the flow of water through bearing cooler if interrupt noticed flush the water line or take corrective action. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Removal of grating & fixing the same. • Clean the thrash rack strainer if damaged replaced / repaired the same. • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC.
b	Servicing/Overhauling of pump • Ensure PTW • Ensure Electrical & C&I Connection are removed, power isolation done • Decoupling of motor from pump. • Loosening of motor foundation bolts & lowering/positioning of motor at safe place (after cable & other accessories removal) with safety. • If required removes motor half coupling & refit it properly. • Draining of oil from the bearing housing & shifted to designated place carefully. • Necessary precaution to be taken to avoid draining oil on floor. • Removal of all small pipelines & pressure gauge from the pump unit. • Dragging of pump coupling with jacking arrangement. • Opening of bearing housing & remove the check nut & lock nut etc. • Removals of journal bearing/thrust collar & thrust bearing pads properly. • Removal of bearing housing & then stuffing box. • Loosening & removal of discharge flange of pump foundation.. • Removal of pump foundation. • Removal of column pipes, spiders & line shaft etc. • Removal of impeller unit. • Dismantling of impeller unit. • Cleaning of all parts properly & painting if required. • Repair/rectification works to be done wherever required. • Check the pump parts for trueness, erosion, and clearance etc & replace with new ones if required. • Assembling of impeller after all rectification and proper lift adjustment. • Fitting of the pump parts in sequential manner properly. • Oil fill up to required level & check/rectify for any leakage. • After proper fitting of pump, place the motor on pump. • Align pump with motor. • If required replace coupling bushes/pins/washers with new ones. • Fit the different accessories to pump & motor properly. • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance. • All measurements/readings before & after corrections to be submitted. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.

c	Inspection/Replacement of bearing • Ensure PTW • Ensure Electrical & C&I Connection are removed, power isolation done • Decoupling of motor from pump. • Loosening of motor foundation bolts & lowering/positioning of motor at safe place (after cable & other accessories removal) with safety. . • Draining of oil from the bearing housing & shifted to designated place carefully. • Necessary precaution to be taken to avoid draining oil on floor. • Removal of all small pipelines & pressure gauge from the pump unit. • Dragging of pump coupling with jacking arrangement. • Opening of bearing housing & remove the check nut & lock nut etc. • Removals of journal bearing/thrust collar & thrust bearing pads properly.. • Repair/rectification/Replacement works to be done. • Assembly of bearings & pump in sequence • Oil fill up to required level & check/rectify for any leakage. • After proper fitting of pump, place the motor on pump. • Align pump with motor.. • Fit the different accessories to pump & motor properly. • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance. • All measurements/readings before & after corrections to be submitted. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
d	Coupling inspection/replacement & alignments • Ensure PTW • Ensure Electrical & C&I Connection are removed, power isolation done. • Remove the coupling bolts. • Loosening of motor foundation bolts & lowering/positioning of motor at safe place (after cable & other accessories removal) with safety, if required • Inspect the coupling/spider/bushes/bolts etc. for any defect and repair/replacement for the same • Fix the couplings at respective hubs. • Put the motor in the position & do the alignments work • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance. • All measurements/readings before & after corrections to be submitted. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
4	**CW PUMPS**
a	PM of CW pumps • Ensure PTW • Carry out external cleaning of equipment. • Check the oil level of pump bearings if low top-up oil. • Check the tightness of foundation bolt if loose then tighten. • Check the tightness of coupling bolt if loose then tighten. • Check the gland packing for excessive water leakage, if found arrest it either by tightening or by replacing the glands. • Check the flow of water through bearing cooler if interrupt noticed flush the water line or take corrective action. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Removal of grating & fixing the same. • Clean the thrash rack strainer if damaged replaced / repaired the same. • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC.
b	Servicing/Overhauling of CW Water pump • Ensure PTW

	• Ensure Electrical & C&I Connection are removed, power isolation done • Decoupling of motor from pump. • Loosening of motor foundation bolts & lowering/positioning of motor at safe place (after cable & other accessories removal) with safety. • If required removes motor half coupling & refit it properly. • Draining of oil from the bearing housing & shifted to designated place carefully. • Necessary precaution to be taken to avoid draining oil on floor. • Removal of all small pipelines & pressure gauge from the pump unit. • Dragging of pump coupling with jacking arrangement. • Opening of bearing housing & remove the check nut & lock nut etc. • Removals of journal bearing/thrust collar & thrust bearing pads properly. • Removal of bearing housing & then stuffing box. • Loosening & removal of discharge flange of pump foundation.. • Removal of pump foundation. • Removal of column pipes, spiders & line shaft etc. • Removal of impeller unit. • Dismantling of impeller unit. • Cleaning of all parts properly & painting if required. • Repair/rectification works to be done wherever required. • Check the pump parts for trueness, erosion, and clearance etc & replace with new ones if required. • Assembling of impeller after all rectification and proper lift adjustment. • Fitting of the pump parts in sequential manner properly. • Oil fill up to required level & check/rectify for any leakage. • After proper fitting of pump, place the motor on pump. • Align pump with motor. • If required replace coupling bushes/pins/washers with new ones. • Fit the different accessories to pump & motor properly. • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance. • All measurements/readings before & after corrections to be submitted. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
c	Inspection/Replacement of thrust bearing • Ensure PTW • Ensure Electrical & C&I Connection are removed, power isolation done • Decoupling of motor from pump. • Loosening of motor foundation bolts & lowering/positioning of motor at safe place (after cable & other accessories removal) with safety. . • Draining of oil from the bearing housing & shifted to designated place carefully. • Necessary precaution to be taken to avoid draining oil on floor. • Removal of all small pipelines & pressure gauge. • Dragging of coupling with jacking arrangement. • Opening of bearing housing & remove the check nut & lock nut etc. • Removals of journal bearing/thrust collar & thrust bearing pads properly.. • Repair/rectification/Replacement works to be done. • Assembly of bearings & pump in sequence • Oil fill up to required level & check/rectify for any leakage. • After proper fitting, place the motor on pump. • Align pump with motor. • Fit the different accessories to pump & motor properly. • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance. • All measurements/readings before & after corrections to be submitted. • Erection of scaffolding wherever required to perform the job shall be done by contractor

	• Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
d	Coupling inspection/replacement & alignments • Ensure PTW • Ensure Electrical & C&I Connection are removed, power isolation done. • Remove the coupling bolts. • Loosening of motor foundation bolts & lowering/positioning of motor at safe place (after cable & other accessories removal) with safety, if required • Inspect the coupling/spider/bushes/bolts etc. for any defect and repair/replacement for the same • Fix the couplings at respective hubs. • Put the motor in the position & do the alignments work • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance. • All measurements/readings before & after corrections to be submitted. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
5	**COOLING TOWER**
a	PM of Cooling tower (Fan Gear box) • Ensure PTW • Carry out external cleaning of equipment. Check the oil level of gear box if low top-up with oil. • Check the oil leakage in gear box & local level glass if leakage found then take corrective action. • Check the tightness of foundation bolt gear box & take corrective action if required. • Check the tightness of coupling bolt & take corrective action if required. • Check the tightness of U bolt in between fan blade & gear box if loose then tighten. • Check & adjust the pitch angle of fan blade. • Check the tightness of bolts in gear box cover & take corrective action if required. • Check the fill pack position if found disturbed then align it to original position. • Check the leakage from PVC pipe inside the cooling tower if so then attend & realign the same. • Take trial run for smooth operation. • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC. Routine Maintenance of CT fan Gearbox
b	Overhauling of CT Gear Box • Ensure PTW. • Complete drainage of oil from gearbox & shifted to require designated place. • Dismantling of the gearbox & gears, bearings. The driver & driven gear shaft are to be removed along with the bearings. • The bearings are to be removed through jacking only. • Rectification of gears for any backlash / any damage. • Fitting of the bearings through oil bath/induction heating only. • Assembling in the gear box housing so that proper meshing will be observed between the gears side by side freeness of the system is to be checked. • All fasteners & o rings/oil seals etc to be changed (if required). • Complete box up the gearbox housing. • Shifting of the gearbox from service bay to desired location as instructed by EIC. • Filling oil in the gearbox up to the mark. • Necessary care must be taken to prevent draining of oil on floor.
c	CT Fan blade pitch setting • Ensure PTW. • Making of approach way to gearbox/blade with proper safety. • Loosening/removing & prefixing of blades as per the required blade profile angle & tightening. • Damaged bolts/nuts are to be replaced by new ones.

	• All blades in one fan should be fixed to same pitch angle. • Remove the walkway from the CT. • Housekeeping after completion of work
d	Replacement of CT Fan Blade • Ensure PTW. • Making of approach way to blade with proper safety. • Loosening/removing hub Plates of concerned blade/blades. • Damaged blades/ bolts/nuts are to be replaced by new ones. • Bring new blade/blades from site/main store to the CT. • Fix the blade along with hub plates with proper tightening. • Adjust all blades of fan to same pitch angle. • Shift the damaged blades to store. • Remove the walkway from the CT.
e	Replacement of CT Drive Shaft • Ensure PTW • Dismantle the CT fan drive shaft from fan & motor • Carefully remove the old shaft from its position to outside after removing the motor from its base. • Insert the new shaft in its position. • Do necessary alignment of the shaft with CT gear box & motor • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
f	Replacement of CT Gear Box Oil Seal • Ensure PTW. • Making approach way to gearbox. • Draining of oil & shifted to designated place. • Dismantling of drive shaft of gearbox & making accessibility to oil seal. • Removing oil seal & refitting after proper checking of shaft & oil seal housing. • Alignment of drive shaft to motor & gearbox to be done. • If required, replace the coupling rubber bushes/fasteners etc. • Bring oil from store & filling of oil (used/new) up to level. • Removing walkway from concerned CT. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
g	Removal of Hub from Gear Box • Ensure PTW. • Making approach way to gearbox. • Dismantling of all blades, hubs cover etc. • Remove hub from shaft making required arrangement. • Position new hub to gear box • Shift the hub to the CT basin. • Removal of walkway. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
h	Fan Hub Replacement • Ensure PTW. • Making approach way to gearbox. • Arrangement for lifting of hub to be done. • Bringing hub from site/main store. • Dismantling of all blades, hubs cover etc.

	• Removal of hub from shaft & fitting of new/repair hub. • Fitting of blades, hub, if necessary change bolts. • Blades pitch setting & tightening of all blades to single angle. • Trials run of fan & check/correct any abnormality. • Removal of walkway. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
i	Removal/Replacement of spiral target Nozzles • Ensure PTW. • Clean that particular shell before replacement of the nozzles. • Remove the worn out nozzles from its position using special chisels etc. • Take proper care so that the shell concrete will not break. • Insert the nozzles in its position. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
j	Replacement of CT Gear Box. • Ensure PTW. • Arrangement of safe walkway & platform to inter inside & work inside the shell. • Removals of the shaft coupling pins & bushes from the motor & gear reducer end. • Removal of the fan blades from its hub & hub from its shaft. • Complete drainage of oil from gearbox & shift to designated place. • Necessary arrangement for lifting & shifting of gearbox from CT inside to outside to be done. • Opening of the foundation fasteners and removal of the gearbox to outside of CT with adequate safety arrangement. • Bring the new gearbox from site/main store & lift it to the CT deck surface safely. • Transfer the gearbox to the concerned CT center. • Place the gearbox on the foundation & fit the hub to the shaft with locking. • Leveling & tightening of the gear box housing. • Alignment of the drive shaft with gearbox & motor & coupling yoke assemblies in motor & gearbox ends. • Bring oil from store & filling oil in the gearbox up to the mark. • Trial run of the gear reducer without fan, if no abnormality is noticed then the fan hub & blades are to be mounted & pitch angle is to be readjusted as per requirement. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Trial run of the system for checking of any abnormality like vibration & noise, if no abnormality noticed, then all walkway accessories is to be drawn from cell immediately. • FC valves are to be opened for charging CW water in to the deck. • Final trial run. • Housekeeping after completion of work.
k	Tightening of CT Fan fasteners. • Ensure PTW • Making approach way to CT gearbox. • Tighten the foundation bolts, coupling bolts of gearbox & motor & blade hub bolts. • All other fasteners of gearbox & motor to be tightened. • If required change the damaged bolts with new ones. • Remove walkway from CT. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
l	Oil replacement of CT Gear Box • Ensure PTW

	• Drain the oil from gearbox. • Making approach way to gearbox. • Flux the gearbox properly with new oil. • Bring oil from store & shift the old oil to store. • Remove the walkway from CT. • Necessary precaution to be taken to avoid draining of oil in floor. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
6	**Chemical system pumps**
a	PM of pumps • Ensure PTW • Carry out external cleaning of equipment. • Check the oil level of pump bearings/gear box if low top-up oil. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of coupling bolt if loose then tighten. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Removal of grating & fixing the same. • Cleaning of filters & strainers • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC.
b	Suction & discharge NRV inspection/replacement • Ensure PTW • Check whether the pump is taking appropriate suction & discharging the fluid sufficiently. • Inspect /replace of suction or discharge NRV(Ball type) • Clean suction strainers. • Clean all scrap after completion of job
c	Servicing/Overhauling of pump A) Centrifugal type • Ensure PTW. • Proper protective equipment should be worn to prevent contact with the fluid in the pump or pipeline. • If facility for draining is present, the pump/pipe line must be cleaned from trapped liquid & diverted to proper disposal area. • Decouple pump from motor. • Dismantle pump parts & checked condition of shaft, mechanical seal, bearings, shaft, impeller, couplings & spiders etc and if required replace with new ones.. • If required minor repair works to be done. • Paint pumps parts, foundation, fasteners etc. • Fit all pump parts properly. • Connect water line to mechanical seal. • Repair & rectification of pump foundation frame if required • Align pump with motor. • Couples pump with motor after rotation check of motor (if required). • Trial run of pump to be done & check for any abnormality & leakage. • If required rectify the defects. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work. B) Diaphragm type/positive displacement type • Ensure PTW. • Proper protective equipment should be worn to prevent contact with the fluid in the pump or pipeline. • If facility for draining is present, the pump/pipe line must be cleaned from trapped liquid & diverted to proper disposal area. • Decouple the pump from motor after removing coupling guard & pipe joints. • Dismantle liquid end, drive end parts of pump.

	• Check the worm wheel, gear, eccentric etc. • Check oil seals, gaskets, glands, diaphragms & bearings, if reqd. changed. • Check suction/discharge ball type NRV. • Fit all the parts properly & check free operation of pump & ball valves. • Lubricate the pump with proper oil to reqd. level. • Repair & rectification of pump foundation frame if required • Couple the pump with motor after alignment & made proper pipe joints. • If reqd. changed the spider/coupling halves. • During trial run check the pump performance. • Fix the coupling guard in proper position. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
d	Bearing inspection/replacement • Ensure PTW. • Proper protective equipment should be worn to prevent contact with the fluid in the pump or pipeline. • If facility for draining is present, the pump/pipe line must be cleaned from trapped liquid & diverted to proper disposal area. • Decouple pump from motor. • Remove coupling hub for DE side bearing • Dismantle the bearing housing, inspect the condition of bearing. • Rectify/replace the bearing with proper tools & tackles. • Assemble the bearing housing • Lubricate /grease the bearings with proper lubricants • Couple the pump with motor after alignment & made proper pipe joints. • If reqd. changed the spider/coupling halves. • During trial run check the pump performance. • Fix the coupling guard in proper position. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
e	Coupling inspection/replacement & alignment • Ensure PTW • Decouple the pump from motor • Inspect the coupling/spider/bushes/bolts etc. for any defect and repair/replacement for the same • Fix the couplings at respective hubs. • Put the motor in the position & do the alignments work • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
f	Replacement of oil seal • Ensure PTW • Removal of coupling guard • Decoupling of pump from motor and removing the pump from foundation for changing of oil seal. • Removal of damaged oil seal. • Assembling the pump with new oil seal. • Coupling the motor with pump after alignment. • Fixing the coupling guard and checking for any leakage after running the pump. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.

g	Replacement of mechanical seal • Ensure PTW • Removal of coupling guard • Decoupling of pump from motor and removing the pump from foundation for changing of Mechanical seal. • Removal of damaged mechanical seal. • Assembling the pump with new mechanical seal. • Coupling the motor with pump after alignment. • Fixing the coupling guard and checking for any leakage after running the pump. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
7	**Agitators**
a	PM • Ensure PTW • Carry out external cleaning of equipment. • Check the oil level of gear box if low top-up oil. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of coupling bolt if loose then tighten. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages • Check the agitators shaft & blades/replace or rectify if needed • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC..
b	Servicing/overhauling of Agitator & GB • Ensure PTW & decouple motor from agitator gearbox shaft. • Dismantle agitator shaft/fan blades & check for straightness, looseness etc. • Check the condition of agitator shaft bearing, if necessary replace it. • After necessary repair on fan shaft/fan etc., fit properly in the housing. • Drain oil from the gearbox & took away GB from its foundation. • Dismantle gearbox cover & check different parts. • Replace damaged & worn-out parts. • Assembly the gearbox with required backlashes/clearances etc. • Place the gearbox in its position & align with motor. • Repair & rectification of foundation frame if required • Fill oil in the gearbox up to required level. • Waste lubricants & scraps to be shifted/placed at designated area. • If motor cable is removed, check the rotation of motor after cable connection. • Now trial run the agitator & check for smooth operation • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
8	**DM Plant pumps (Horizontal pumps)**
a	PM of pumps • Ensure PTW • Carry out external cleaning of equipment. • Check for proper lubrication of pump bearings housing if low top-up oil/replenish grease. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of coupling bolt if loose then tighten/replace • Check the gland packing for excessive water leakage, if found arrest it either by tightening or by replacing the glands.

	• Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Cleaning of filters & strainers • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC.
b	Servicing/Overhauling of pump • Ensure PTW • Decouple pump from the motor. • Drain the lubricating oil & shifted to designated place carefully. • Shift pump from its foundation to working bay. • Opening/checking the shaft, impeller, wear rings, bearings, glands, & if required, replacement/rectification to be done. • Trueness checking of shaft is to be done. • Casing erosion (if required) to be rectified. • Paintings of pump parts are to be done (if required.) • Repair & rectification of pump foundation frame if required. • Alignment with the motor with required tolerance & coupling after motor trial run. • Refilling/checking of lubricating oil system. • Coupling guards to be fitted again. • Trial run of pump, condition monitoring & rectification if required. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
c	Bearing inspection/replacement • Ensure PTW. • Decouple pump from motor. • Remove coupling hub for DE side bearing • Dismantle the bearing housing, inspect the condition of bearing. • Rectify/replace the bearing with proper tools & tackles. • Assemble the bearing housing • Lubricate /grease the bearings with proper lubricants • Couple the pump with motor after alignment & made proper pipe joints. • If reqd. changed the spider/coupling halves. • During trial run check the pump performance. • Fix the coupling guard in proper position. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
d	Replacement of oil seal • Ensure PTW • Removal of coupling guard • Decoupling of pump from motor and removing the pump from foundation for changing of oil seal. • Removal of damaged oil seal. • Assembling the pump with new oil seal. • Coupling the motor with pump after alignment. • Fixing the coupling guard and checking for any leakage after running the pump. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
e	Replacement of mechanical seal • Ensure PTW • Removal of coupling guard • Decoupling of pump from motor and removing the pump from foundation for changing of Mechanical seal.

	• Removal of damaged mechanical seal. • Assembling the pump with new mechanical seal. • Coupling the motor with pump after alignment. • Fixing the coupling guard and checking for any leakage after running the pump. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
f	Coupling inspection/replacement & alignment • Ensure PTW • Decouple the pump from motor • Inspect the coupling/spider/bushes/bolts etc. for any defect and repair/replacement for the same • Fix the couplings at respective hubs. • Put the motor in the position & do the alignments work • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
9	**Air Blowers**
a	PM of air blower • Ensure PTW • Carry out external cleaning of equipment. • Check for proper lubrication of bearings /replenish grease. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of belt if loose then tighten/replace. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Cleaning of filters & strainers • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC.
b	Servicing/overhauling of blower • Ensure PTW • Disconnect blower from motor & discharge pipe if required. • Dismantle both DE & NDE bearings, if required by jacking/puller etc. • Check/replace gears/lobe. • Fit the gears & bearings in proper sequence/backlash etc. • If required, replace the blower lobe. • During fitting of lobe, ensure proper clearance at different positions. • After fitting of all parts, lubricate the equipment • During work, waste lubricants & scraps to be shifted/placed at designated area • With proper alignment, fix belts, motor & belt guard. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
c	Belt replacement • Ensure PTW • Remove the belt guard. • Loosen the motor foundation bolts, if required to loose belt. • Remove old belt with new one. • Align motor with blower. • Tighten the foundation bolts with required belt tension. • Fix the belt guards again.

	• Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
10	**CW Fill pumps**
a	PM • Ensure PTW • Carry out external cleaning of equipment. • Check for proper lubrication of pump bearings housing if low top-up oil/replenish grease. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of coupling bolt if loose then tighten/replace • Check the gland packing for excessive water leakage, if found arrest it either by tightening or by replacing the glands. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Cleaning of filters & strainers • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC.
b	Servicing/overhauling • Ensure PTW • Decouple pump from the motor. • Drain the lubricating oil & shifted to designated place carefully. • Shift pump from its foundation to working bay. • Opening/checking the shaft, impeller, wear rings, bearings, glands, & if required, replacement/rectification to be done. • Trueness checking of shaft is to be done. • Casing erosion (if required) to be rectified. • Paintings of pump parts are to be done (if required.) • Repair & rectification of pump foundation frame if required. • Alignment with the motor with required tolerance & coupling after motor trial run. • Refilling/checking of lubricating oil system. • Coupling guards to be fitted again. • Trial run of pump, condition monitoring & rectification if required. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
c	Bearing inspection/replacement • Ensure PTW. • Decouple pump from motor. • Remove coupling hub for DE side bearing • Dismantle the bearing housing, inspect the condition of bearing. • Rectify/replace the bearing with proper tools & tackles. • Assemble the bearing housing • Lubricate /grease the bearings with proper lubricants • Couple the pump with motor after alignment & made proper pipe joints. • If reqd. changed the spider/coupling halves. • During trial run check the pump performance. • Fix the coupling guard in proper position. • Clean the area after completion of work • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
11	**CW Fill vacuum pumps**

a	PM • Ensure PTW • Carry out external cleaning of equipment. • Check for proper lubrication of pump bearings housing if low top-up oil/replenish grease. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of coupling bolt if loose then tighten/replace • Check the gland packing for excessive water leakage, if found arrest it either by tightening or by replacing the glands. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Cleaning of filters & strainers • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC
b	Servicing/overhauling • Ensure PTW • Decouple pump from the motor. • Drain the lubricating oil & shifted to designated place carefully. • Shift pump from its foundation to working bay. • Opening/checking the shaft, impeller, wear rings, bearings, glands, & if required, replacement/rectification to be done. • Trueness checking of shaft is to be done. • Casing erosion (if required) to be rectified. • Repair & rectification of pump foundation frame if required. • Alignment with the motor with required tolerance & coupling after motor trial run. • Refilling/checking of lubricating oil system. • Coupling guards to be fitted again. • Trial run of pump, condition monitoring & rectification if required. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
12	**Chlorination system pumps**
a	PM of pumps • Ensure PTW • Carry out external cleaning of equipment. • Check for proper lubrication of pump bearings housing if low top-up oil/replenish grease. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of coupling bolt if loose then tighten/replace • Check the gland packing for excessive water leakage, if found arrest it either by tightening or by replacing the glands. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Cleaning of filters & strainers • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC.
b	Servicing/Overhauling of pump • Ensure PTW • Decouple pump from the motor. • Drain the lubricating oil & shifted to designated place carefully. • Shift pump from its foundation to working bay. • Opening/checking the shaft, impeller, wear rings, bearings, glands, & if required, replacement/rectification to be done. • Trueness checking of shaft is to be done. • Casing erosion (if required) to be rectified. • Repair & rectification of pump foundation frame if required. • Alignment with the motor with required tolerance & coupling after motor trial run. • Refilling/checking of lubricating oil system. • Coupling guards to be fitted again. • Trial run of pump, condition monitoring & rectification if required. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.

c	Bearing inspection/replacement • Ensure PTW. • Decouple pump from motor. • Remove coupling hub for DE side bearing • Dismantle the bearing housing, inspect the condition of bearing. • Rectify/replace the bearing with proper tools & tackles. • Assemble the bearing housing • Lubricate /grease the bearings with proper lubricants • Couple the pump with motor after alignment & made proper pipe joints. • If reqd. changed the spider/coupling halves. • During trial run check the pump performance. • Fix the coupling guard in proper position. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
d	Replacement of oil seal • Ensure PTW • Removal of coupling guard • Decoupling of pump from motor and removing the pump from foundation for changing of oil seal. • Removal of damaged oil seal. • Assembling the pump with new oil seal. • Coupling the motor with pump after alignment. • Fixing the coupling guard and checking for any leakage after running the pump. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
e	Replacement of mechanical seal • Ensure PTW • Removal of coupling guard • Decoupling of pump from motor and removing the pump from foundation for changing of Mechanical seal. • Removal of damaged mechanical seal. • Assembling the pump with new mechanical seal. • Coupling the motor with pump after alignment. • Fixing the coupling guard and checking for any leakage after running the pump. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
f	Coupling inspection/replacement & alignment • Ensure PTW • Decouple the pump from motor • Inspect the coupling/spider/bushes/bolts etc. for any defect and repair/replacement for the same • Fix the couplings at respective hubs. • Put the motor in the position & do the alignments work • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.

13	**Hydrogen generating plant Pumps & Compressors**
a	PM of Pumps • Ensure PTW • Carry out external cleaning of equipment. • Check for proper lubrication of pump bearings housing if low top-up oil/replenish grease. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of coupling bolt if loose then tighten/replace • Check the gland packing for excessive water leakage, if found arrest it either by tightening or by replacing the glands. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Cleaning of filters & strainers • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC
b	Servicing/Overhauling of pump • Ensure PTW • Decouple pump from the motor. • Drain the lubricating oil & shifted to designated place carefully. • Shift pump from its foundation to working bay. • Opening/checking the shaft, impeller, wear rings, bearings, glands, & if required, replacement/rectification to be done. • Trueness checking of shaft is to be done. • Casing erosion (if required) to be rectified. • Repair & rectification of pump foundation frame if required. • Alignment with the motor with required tolerance & coupling after motor trial run. • Refilling/checking of lubricating oil system. • Coupling guards to be fitted again. • Trial run of pump, condition monitoring & rectification if required. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
c	PM of H2 compressor • Ensure PTW • Carry out external cleaning of equipment. • Check for proper lubrication if low top-up oil. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Cleaning of filters & strainers • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC
d	Servicing/overhauling of compressors • Ensure PTW • Servicing/overhauling is to be done as per the direction of EIC/Expert • Assisting in servicing/overhauling. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work. **Note: Non sparking tools & tackles shall be used when working in hydrogen prone area and tool shall be in the scope of contractor.**
14	**Fire hydrant system pumps**
a	PM of pumps • Ensure PTW • Carry out external cleaning of equipment. • Check for proper lubrication of pump bearings housing if low top-up oil/replenish grease. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of coupling bolt if loose then tighten/replace

	• Check the gland packing for excessive water leakage, if found arrest it either by tightening or by replacing the glands. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Cleaning of filters & strainers • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC
b	Servicing/Overhauling of pump • Ensure PTW • Decouple pump from the motor. • Drain the lubricating oil & shifted to designated place carefully. • Shift pump from its foundation to working bay. • Opening/checking the shaft, impeller, wear rings, bearings, glands, & if required, replacement/rectification to be done. • Trueness checking of shaft is to be done. • Casing erosion (if required) to be rectified. • Repair & rectification of pump foundation frame if required. • Alignment with the motor with required tolerance & coupling after motor trial run. • Refilling/checking of lubricating oil system. • Coupling guards to be fitted again. • Trial run of pump, condition monitoring & rectification if required. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work. • Housekeeping after completion of work.
c	Bearing inspection/replacement • Ensure PTW. • Decouple pump from motor. • Remove coupling hub for DE side bearing • Dismantle the bearing housing, inspect the condition of bearing. • Rectify/replace the bearing with proper tools & tackles. • Assemble the bearing housing • Lubricate /grease the bearings with proper lubricants • Couple the pump with motor after alignment & made proper pipe joints. • If reqd. changed the bush/spider/coupling halves. • During trial run check the pump performance. • Fix the coupling guard in proper position. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
d	Replacement of mechanical seal • Ensure PTW • Removal of coupling guard • Decoupling of pump from motor for changing of Mechanical seal. • Removal of damaged mechanical seal. • Assembling the pump with new mechanical seal. • Coupling the motor with pump after alignment. • Fixing the coupling guard and checking for any leakage after running the pump. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
e	Coupling inspection/replacement & alignment • Ensure PTW • Decouple the pump from motor • Inspect the coupling/spider/bushes/bolts etc. for any defect and repair/replacement for the same

	• Fix the couplings at respective hubs. • Put the motor in the position & do the alignments work • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
f	servicing/overhauling of Engine • Ensure PTW • Servicing/overhauling is to be done as per the direction of EIC/Expert • Assisting in servicing/overhauling • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
g	servicing/overhauling of compressor • Ensure PTW • Servicing/overhauling is to be done as per the direction of EIC/Expert • Assisting in servicing/overhauling • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
15	**Fire hydrant system Accessories**
a	Inspection & testing of Fire protection system • Checking of proper operation of the hydrant & water monitor valves at different locations. • Any defect of the valves to be recorded. • Flushing of the each valve.
b	Servicing of Hydrant valves • After proper isolation, valve to be dismantled. • Its parts like spindle, gaskets, bolts, coupling washers to be checked. • If required damaged parts to be replaced by new one. • After fitting operation of valve to be checked.
c	Inspection /replacement & checking of hydrant valve • Inspection of hydrant valve if damage • Attending all kind of leakages associated with valve • Replacement of old valve with new one if required
d	Servicing of water monitors • Dismantling of the complete assembly. • Lubricate all moving parts. • Replace/repair & refit bush bearings as per instruction. • Check the healthiness of the nozzle & it's bore, if required replace it. • Fitting of all parts & checking for smooth operation of valve
e	Inspection /replacement & checking of water monitors • Inspection of water monitors if damage • Attending all kind of leakages associated with monitors • Replacement of old monitors with new one if required
f	Servicing of Alarm Valve • Dismantling of Y strainer, NRV, alarm mechanisms. • Cleaning of all components properly & check for any abnormality. • If required replace the NRV, sheet gaskets, flange gaskets, pressure gauge etc. • Fitting of all components any proper sequence.

	• Check for proper operation of alarm system. • If required rectify it again.
g	Inspection /replacement & checking of alarm valve • Inspection of alarm valve if damage • Attending all kind of leakages associated with valve • Replacement of old valve with new one if required
h	Servicing of deluge valve • Close the both side-isolating valves. • Dismantle the complete valve components. • Check for any damaged parts & if required replace them with new one. • Check& ensure for smooth operation of alarm valve. • Check healthiness of the air circuit, if required repair/replace it.
i	Inspection /replacement & checking of Deluge valve • Inspection of hydrant valve if damage • Attending all kind of leakages associated with valve • Replacement of old valve with new one if required
j	Replacement of Nozzles in sprinkler system • For replacement of nozzles in sprinkler system, first isolate the root valve. • Drain the water in the header. • Remove the broken nozzle from the header. • Replace the new nozzle in the designated pipe. • Restore the Position of isolated valve. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work
k	Repair of underground fire fighting pipeline • Locating underground leakage points by earth digging • If required concrete is to be removed. • Dewatering wherever required at the leakage points. • Cutting of damaged MS pipe line is to be done which is in party's scope • Welding of pipeline, which is in party's scope. • New pipe is to be brought from store / site which is in party's scope. • Wrapping & coating/black epoxy painting to be done(as per instruction). • After rectification earth is to be refilled • Unit of measurement is per pit. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work
l	Replacement of underground fire fighting pipeline • Locating underground leakage points by earth digging • If required concrete is to be removed. • Dewatering wherever required at the leakage points. • Cutting of damaged MS pipe line is to be done which is in party's scope • Welding of pipeline, which is in party's scope. • New pipe is to be brought from store / site which is in party's scope. • Wrapping & coating/epoxy black painting to be done (as per instruction). • After rectification earth is to be refilled • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.

16	**Plant ventilation system (Air Washer system).**
a	PM of Air Washer system • Ensure PTW • Carry out external cleaning of equipment. • Check for proper lubrication of pump bearings housing if low top-up oil/replenish grease. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of coupling bolt if loose then tighten/replace • Check the gland packing for excessive water leakage, if found arrest it either by tightening or by replacing the glands. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Cleaning of filters & strainers • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC
b	Servicing of pumps & blower • Ensure PTW • Decouple pump from the motor. • Drain the lubricating oil & shifted to designated place carefully. • Shift pump from its foundation to working bay. • Opening/checking the shaft, impeller, wear rings, bearings, glands, & if required, replacement/rectification to be done. • Trueness checking of shaft is to be done. • Casing erosion (if required) to be rectified. • Repair & rectification of pump foundation frame if required. • Alignment with the motor with required tolerance & coupling after motor trial run. • Refilling/checking of lubricating oil system. • Coupling guards to be fitted again. • Trial run of pump, condition monitoring & rectification if required. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work. **Blower** • Ensure PTW • Decouple blower from the motor. • Dismantle the Plummer block • Opening/checking the shaft, impeller, bearings, & if required, replacement/rectification to be done. • Trueness checking of shaft is to be done. • Casing erosion (if required) to be rectified. • Repair & rectification of blower foundation frame & spring support if required. • Alignment with the motor with required tolerance & coupling after motor trial run. • Refilling/checking of lubricating system. • Belt guards to be fitted again. • Trial run of blower, condition monitoring & rectification if required. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
c	Belt replacement • Ensure PTW • Remove the belt guard. • Loosen the motor foundation bolts, if required to loose belt. • Remove old belt with new one. • Align motor with blower. • Tighten the foundation bolts with required belt tension. • Fix the belt guards again.

	• Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
d	Coupling inspection/replacement & alignment • Ensure PTW • Decouple the pump from motor • Inspect the coupling/spider/bushes/bolts etc. for any defect and repair/replacement for the same • Fix the couplings at respective hubs. • Put the motor in the position & do the alignments work • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
e	Replacement/cleaning of nozzle • Ensure PTW • Open the air washer tank doors for inspection • Inspect the nozzle for any defects/damage • Replace the nozzle as required • Trial to be taken and adjust the direction of nozzle orientation. • Final box up of the door • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
17	**Effluent treatment pumps at different area (Vertical pumps)**
a	Preventive Maintenance of Pumps • Ensure PTW • Carry out external cleaning of equipment. • Check for proper lubrication of pump bearings housing if low top-up oil/replenish grease. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of coupling bolt if loose then tighten/replace • Check the gland packing for excessive water leakage, if found arrest it either by tightening or by replacing the glands. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Cleaning of filters & strainers • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC
b	Servicing/Overhauling of pump • Ensure PTW • Arrangement to be made for lifting of motor or pump parts. • Making accessibility to impeller • Remove motor & motor stool. • Remove impeller & delivery pipe • Remove casing, adaptor, column pipe, shaft coupling etc. • Remove deflector & base plate. • Loosen the clamping bolts & tighten the jack so that the shaft with bearing cover will come off from the bearing bracket. • Next remove bearing cover, bearing housing, check nut & finally the ball bearing. • Inspect & replace the worn out parts like bearing/bushes/fasteners/sleeves etc… • Cleaning & painting of pump parts, if necessary. • If required, minor machining/welding of pump parts to be carried out. • For fitting, follow the reverse procedure. • After fitting motor, it is to be aligned & coupled. • Checking & rectification of lubrication & cooling system. • Trial run, condition monitoring & rectification if required. • Waste lubricants & scraps to be shifted to required designated area.

	• Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
c	Inspection/Replacement of bearing • Ensure PTW • Ensure Electrical & C&I Connection are removed, power isolation done • Decoupling of motor from pump. • Loosening of motor foundation bolts & lowering/positioning of motor at safe place (after cable & other accessories removal) with safety. . • Draining of oil from the bearing housing & shifted to designated place carefully. • Necessary precaution to be taken to avoid draining oil on floor. • Removal of all small pipelines & pressure gauge from the pump unit. • Dragging of pump coupling with jacking arrangement. • Opening of bearing housing & remove the check nut & lock nut etc. • Removals of bearings properly. • Repair/rectification/Replacement works to be done. • Assembly of bearings & pump in sequence • Oil fill up to required level & check/rectify for any leakage. • After proper fitting of pump, place the motor on pump. • Align pump with motor.. • Fit the different accessories to pump & motor properly. • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance. • All measurements/readings before & after corrections to be submitted. • Shifting of all spares & consumables from store to site & vice versa is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work
d	Coupling inspection/replacement & alignment • Ensure PTW • Decouple the pump from motor • Inspect the coupling/spider/bushes/bolts etc. for any defect and repair/replacement for the same • Fix the couplings at respective hubs. • Put the motor in the position & do the alignments work • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
18	**ETP-RO System Pumps**
e	Preventive Maintenance of Pumps • Ensure PTW • Carry out external cleaning of equipment. • Check for proper lubrication of pump bearings housing if low top-up oil/replenish grease. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of coupling bolt if loose then tighten/replace • Check the gland packing for excessive water leakage, if found arrest it either by tightening or by replacing the glands. • Check the tightness of bolts in all flanges joint if loose then tighten and attend all leakages. • Cleaning of filters & strainers • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC
f	Servicing/Overhauling of pump • Ensure PTW • Decouple pump from the motor. • Drain the lubricating oil & shifted to designated place carefully. • Shift pump from its foundation to working bay.

	• Opening/checking the shaft, impeller, wear rings, bearings, glands, & if required, replacement/rectification to be done. • Trueness checking of shaft is to be done. • Casing erosion (if required) to be rectified. • Repair & rectification of pump foundation frame if required. • Alignment with the motor with required tolerance & coupling after motor trial run. • Refilling/checking of lubricating oil system. • Coupling guards to be fitted again. • Trial run of pump, condition monitoring & rectification if required. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work. • Housekeeping after completion of work.
g	Inspection/Replacement of bearing • Ensure PTW. • Decouple pump from motor. • Remove coupling hub for DE/NDE side bearing • Dismantle the bearing housing, inspect the condition of bearing. • Rectify/replace the bearing with proper tools & tackles. • Assemble the bearing housing • Lubricate /grease the bearings with proper lubricants • Couple the pump with motor after alignment & made proper pipe joints. • If reqd. changed the spider/coupling halves. • During trial run check the pump performance. • Fix the coupling guard in proper position. • Clean the area after completion of work • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
h	Coupling inspection/replacement & alignment • Ensure PTW • Decouple the pump from motor • Inspect the coupling/spider/bushes/bolts etc. for any defect and repair/replacement for the same • Fix the couplings at respective hubs. • Put the motor in the position & do the alignments work • After rotation check of motor, couples pump with motor. • Trial run of pump & assistance in condition monitoring and checking of performance • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
i	Replacement of mechanical seal • Ensure PTW • Removal of coupling guard • Decoupling of pump from motor and removing the pump from foundation for changing of Mechanical seal. • Removal of damaged mechanical seal. • Assembling the pump with new mechanical seal. • Coupling the motor with pump after alignment. • Fixing the coupling guard and checking for any leakage after running the pump. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
j	RO Membrane flushing/cleaning • Ensure PTW

	• Removal of spool piece from normal pipe line. • Install the temporary arrangement/spool for flushing • Start cleaning/flushing procedure with chemistry deptt. • After flushing normalize the system for normal service. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
19	**Compressed air system**
a	PM of service air compressors • Ensure PTW • Carry out external cleaning of equipment. • Check for proper lubrication of if low top-up oil. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of coupling bolt if loose then tighten/replace • Clean the air filter/oil filter • If required carry out the back flushing of cooler • Check the for any oil, water and air leakages and attending it • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC
B	PM of instrument air compressor • Ensure PTW • Carry out external cleaning of equipment. • Check for proper lubrication of if low top-up oil. • Check the tightness of foundation bolt if loose then tighten/replace if required. • Check the tightness of coupling bolt if loose then tighten/replace • Clean the air filter/oil filter • If required carry out the back flushing of cooler • Check the for any oil, water and air leakages and attending it • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned up to the satisfaction of EIC
C	servicing of SAC • Ensure PTW • Servicing/overhauling is to be done as per the direction of EIC/Expert • Assisting in servicing/overhauling • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
D	servicing of IAC • Ensure PTW • Servicing/overhauling is to be done as per the direction of EIC/Expert • Assisting in servicing/overhauling • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
E	Cleaning/servicing of dryers • Ensure PTW • Cleaning /servicing to be done as per the instruction of EIC/Expert • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
20	**Stop Log gates/Sluice gates**
A	Servicing/Overhauling of stop log gates • Ensure PTW • Lift the gates by lifting beams • Check/replace the sealing • Clean the groove area if possible • Lower down the gates by lifting beam

	• Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
21	**Regeneration system**
A	Replacement of MSRL Pipe/CPVC pipe • Isolate the acid line & see that there is no passing of acid through the valve. • Flush the acid lines with sufficient clean water to diffuse the effect of acid in the line. • While working equip with required PPEs. • Dismantle the acid pipelines from flange joints or by cutting. • Replace the pipelines & do proper tightening of the joints. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
B	Servicing of injector • Ensure PTW • Dismantle the injector/check the venturi throat area, check the alignment/replace if required • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
C	De-chocking of Acid line • Ensure PTW • Take appropriate safety measure before working in acid line • Keep sufficient cold water ready for dilution of acid. • Dismantle the chocked acid lines & flush with water. • Replace the acid line with new pipe or do necessary maintenance. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
D	Acid/caustic Unloading from tanker • Connect the acid unloading hose in acid tanker outlet pipe. • Slowly open the valve to allow the acid to come up to the pump suction. • Line up the acid transport line from pump outlet to BAST. • Start the acid unloading pump to evacuate the acid from the tanker to the Bulk Acid Storage tank.
22	**EOT/Hoist/Manual hoist etc**
A	PM of Electric/manual hoist,chain pulley block,under slung crane etc • Ensure PTW • Check the condition of lubrication in bearings • Check the condition of coupling bushes. • Check the break adjustment / liner condition. • Lubricate the wire rope with cardium compound. • Check the foundation bolt tightness. • Check the quality of oil & level if level is low top-up. • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned upto
B	PM of EOT for CW pumps • Ensure PTW • Greasing of bearings • Check the oil level of thruster brake, if low top-up with transformer oil. • Lubrication of rope with cardium compound/servo coat.

	• Check the brake adjustment / liner condition. • Check the foundation bolt tightness. • Check the rail alignment and holding down bolts of rail. • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned upto the satisfaction of EIC.
23	**Replacement of Valves (MIV,MOV,gate,globe,butterfly,diaphragm,NRV etc)**
A	above 500 NB
B	350NB to 500 NB
C	100NB to 300NB
D	50NB to 100NB
E	upto 50NB
	Scope for all type of valve • Ensure PTW • Dismantle the existing valve from the line with suitable safety arrangement • Clean the mating surface if flanged type/Edge preparation if welded type • Place the new valve in the position with new fasteners & gasket if flanged type • Place the new valve in the position & aligns the valve and do the welding with appropriate quality plan if welded type. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
24	**Servicing of Valves (MIV,MOV,gate,globe,butterfly,diaphragm, NRVetc)**
A	above 500 NB
B	350NB to 500 NB
C	100NB to 300NB
D	50NB to 100NB
E	upto 50NB
	Scope for all type of valve • Removal of actuators (in case of mot. operated valves.) • Removal of old gland packing, diaphragm, dismantling the bonnet/spindle/disc/seat is to be done as per requirement. • Complete servicing of the above components including blue matching. • Reassembly including replacement of new gasket/gland packing/diaphragm/rubber rings etc. • Checking for freeness of valve. • In case, the rectified valves do not work properly or hold pressure, contractor has to rectify the same free of cost. In case seat leak is not rectified, no payment will be made. • Spares, gasket, gland packing etc. will be provided by OPGC. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
25	**Gland Replacement/Tightening of Valves**
A	3/8-1 inch
B	1.5 - 2 inch
C	2.5 - 8 inch
D	10-14 inch
	Scope of work • Ensure PTW • It is required to open the valve gland follower to take out the damaged packing rings,

	• Replace them by new rings & place the gland follower in position for valves of different sizes. • Packing rings/packing ropes shall be provided by OPGC as free issue materials. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
26	**Fabrication/ Erection/replacement of Piping System**
A	Up to 80 NB
B	100NB TO 200 NB
C	250NB & Above
	• Ensure PTW • Erection of piping shall system include withdrawal of materials from stores, loading & unloading, transportation, safe storage • cleaning by wire brushing / water flushing, cutting preheating, bending, setting, alignment, erection, welding, providing support, fitting to the required equipment / flange etc. & pressure testing etc. • The assembly /erection shall include erection of valves, flanges, orifice, blanks & other instrument fittings etc. if any. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
27	**Cutting**
A	Cutting Carbon Steel • Ensure PTW • As per instruction of EIC • Cutting should be done with all proper safety precautions • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
28	**Welding**
A	Welding Carbon Steel
B	Welding alloy/SS Steel
	• Ensure PTW • Welding should be done as per approved quality plan • welding should be done with all proper safety precautions • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
29	**Welding joints/ Leakages**
	• Ensure PTW • Welding should be done as per approved quality plan • welding should be done with all proper safety precautions • Erection of scaffolding wherever required to perform the job shall be done by contractor • Special electrodes will be supplied by OPGC • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.

30	**Attending oil/water/air or acid Leakages (Flange/union/Gasket replacement/pipe clamping/any other clamping. Etc...)**
A	Size up to 75 NB
B	Size : 80 NB to 150 NB
C	Size : 150 NB to 250 NB
D	Size : 300 NB to 450 NB
E	Size : Above 450
	• Ensure PTW • Leaky flanged joints shall be rectified by removal of bolts & nuts dismantling of unions • Cleaning the mating surface providing new gasket \ orings & tightening the bolts/unions. • Application of ant seizing compound should be ensured before tightening • The line when commissioned or tested should be leak proof. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
31	**Tanks & Pressure Vessels**
A	Internal cleaning/inspection of water tanks • Ensure PTW • Opening of man hole door • Carry out cleaning and inspection with suitable safety arrangements • Rectification of defects if any • Box up the manhole door with new gasket & fasteners • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
B	Internal cleaning/inspection of chemical tanks • Ensure PTW • Flushing of entire tank with water • Opening of man hole door • Carry out cleaning and inspection with suitable safety arrangements • Rectification of defects if any • Box up the manhole door with new gasket & fasteners • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
C	Assisting in rubber lining works • Ensure PTW • Flushing of entire tank with water • Opening of man hole door • Carry out cleaning and inspection with suitable safety arrangements • Assisting in rectification of defects if any • Box up the manhole door with new gasket & fasteners • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.

32	**Fabrication & Erection of Steel Structure**
A	Fabrication & Erection of steel structure • Ensure PTW • The job involves fabrication & erection of structural, like platform& its ladders, handrails, supports, miscellaneous structural items etc. Fabrication & erection are to be carried out at different heights & various locations • The job includes receipt of structural from ITPS stores, transportation to site / place of use, & fabrication as per drawing / sketch / instruction of the concerned engineer. • Type of welding electrode to be used & thickness of weld shall be as per direction of the concerned engineer & to be arranged by the contractor. The entire structure shall be free from sharp edges, slag, & burrs. Two coats of red oxide paint are to be applied by the contractor, after the fabrication work, for which no extra charge shall be made. • The job covers transportation of fabricated structure to site & erection / assembly etc. Assembly, bolting, welding, alignment etc. come in the scope. The contractor will do grouting. However grout material will be supplied by ITPS. • ITPS shall provide as free issue materials, structural steels including angle, channels, plates, pipes, fasteners like nut – bolt etc. The contractor has to arrange other consumables like gas, electrodes, red oxide, clamps tools & tackles etc. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. Housekeeping after completion of work.
33	**Application of Paint(Enamel)**
A	Application of paint • Ensure PTW • Protective coating may be required to be applied to pipes, equipment, structural at various locations & elevations inside the plant. • The scope of work includes cleaning the surface to remove dirt oil, grease, rust, scale & other contamination etc. by blasting, chipping, scrapping, wire brushing etc., applying one coat of primer paint & two coats of finishing enamel paint . • The interval of surface preparation & painting shall be minimum & in no case longer than 4 hours. The application procedure shall be in accordance with the prescribed recommendations of the paint manufacturers & IS: 1477 Part-II. • ITPS shall supply paint as free supply material. • All other materials like brush, wire brush etc., tools & tackles are to be arranged by the contractor • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
34	**Erection of scaffolding**
A	Erection/Dismantling of scaffolding • Ensure PTW • The scope of works includes fabrication & erection of scaffolding Water treatment plants etc. to facilitate inspection & other job to be carried out by ITPS. • The scaffolding should be rigid. They can be made out of MS tubes / pipes / bamboos / planks etc. Clamps & new ropes are to be used for preparing the scaffolding. • Wherever required, the contractor has to provide platform by using good wooden/steels planks, which can withstand a minimum of 4 people of about 300 kg. Load. • All materials required for executing the above job should be arranged by the contractor at his cost. While erecting the scaffolding, the contractor should exercise utmost caution, so that instruments, pipelines etc. are not damaged. • Scaffolding outside the pipes / equipment shall be two meters length & two meters in width. If it is required to cover a large area, scaffolding has to be erected by the contractor. • Shifting of all materials from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
35	**Load Testing of EOT/Hoist/Chain Pulley**
A	Load Testing up to 10 tons • The **EOT/Hoist/Chain Pulley** shall to be physically checked for operation of limit switches/lubrication of ropes etc & it is to be rectified if required. • Then hoists are to be tested individually at 1.25 times of its capacity or as per instruction of competent authority . • The test load shall be given by OPGC & the contractor has to make their own arrangement for transporting the test loads to

	different spots & returning them back again as per requirement. • The test load shall be kept in lifted condition for at least 1-½ hours & the lift clearance to the ground shall be measured at the interval of 10 mins. Further, along with the test load the crane shall be operated in long & cross travels .On satisfactory results the job is said to be completed. • Any defects noticed while testing the hoist is to be rechecked & same procedure shall be for which no extra cost shall be payable.
36	**Bearing Replacement of HT Motors**
a	Bearing Replacement of HT Motors • Disconnection of Power cable, control cable & earthing. • Preparation of necessary arrangements for removal of motor. • Removal of motor. • Shifting of motor to workshop or suitable place. • Removal of coupling and Key. • Removal of motor cooling fan with proper arrangement. • Dismantling of motor. • Inspect the bearings if required replace it • Preparation of necessary arrangements like puller for removal of bearings. • Removal of damaged bearings. • Fixing of new bearings. • Assembling of motor. • Shifting of motor to its own place. • Connection of Power cable, control cable & earthing. • Housekeeping of the area, removal of all spill over oil / grease / cotton waste from location
37	**Attending gland leakages of pumps**
A	Attending gland leakages of pumps • Ensure PTW • It is required to open the gland follower to take out the damaged packing • Replace them by new gland packing rings & place the gland follower in position for pumps of different sizes and tight the gland packing follower bolts. • Tightening /loosening of gland packing shall be done while taking pump trial if required as per quantum r leakage • Packing rings/packing ropes shall be provided by OPGC as free issue materials. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
38	**Decoupling/coupling & alignments of motors**
A	Decoupling/coupling & Alignment of Motor up to 15 KW
B	Decoupling/coupling & Alignment of Motor 15 to 30 KW
C	Decoupling/coupling & Alignment of Motor 30 to 90 KW
D	Decoupling/coupling & Alignment of Motor 90 to 200 KW
E	Decoupling/coupling & Alignment of Motor 200 to 1000 KW
F	Decoupling/coupling & Alignment of Motor above 1000 KW
	• Ensure PTW • Loosening of coupling bolts. • Dismantling of motor from base lift the motor in case of vertical pumps by hydra/EOT/Hoist if required with necessary safety arrangement. • If reqd. removes motor half coupling & refit. • Remove the fan in case of vapor extractors blower • Changing/replacement of coupling bushes/pins/spiders, if required. • After repair of motor & again refitting. • Alignment & coupling. • Trial run of pump, condition monitoring & rectification if required

	• Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
39	**Manpower supply**
A	Unskilled
B	Semi Skilled
C	Skilled
D	Highly Skilled
E	Super Skilled
	• Supply of manpower for various job for which the quantity has exhausted or unpredictable jobs • Contractors have to mobilize the manpower within 24 hours of verbal communication. • The amount will be paid for the same as per agreed manpower rate
40	**Strainers & filter cleaning**
A	Cleaning/replacement of Y- Type strainer upto 50 NB
B	Cleaning/replacement of Y- Type strainer 65NB to 150NB
C	Cleaning/replacement of Y- Type strainer 200 NB & above
D	Cleaning/replacement of Basket strainer/cartridge filter up to 100 NB
E	Cleaning/replacement of Basket strainer/cartridge filter 150NB to 350NB
F	Cleaning/replacement of basket strainer/cartridge filter above 350 NB
G	Cleaning/servicing of ACW strainer
H	Cleaning of Coarse screen
	• Ensure PTW • Remove the motor/coupling in case of ACW strainers • Dismantle the strainer cover • Take out the strainer from the position/coarse screen from its position • Clean thoroughly with water , diesel if required • Repair/rectify the strainer in case of damage if any • Place the strainer/coarse screen to its position • Box up the strainer with new gaskets & fastener • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
41	**Gauge glass/view glass replacement**
A	Gauge glass/view glass replacement& rectification • Ensure PTW • Close securely the isolation valve of the gauge glass assembly. • Open the gauge glass/view glass assembly. • Replace the damaged gauge glass/view glass , replace the packing seals. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
42	**Pipe support provision/rectification/modification**
a	Provision/modification/rectification of supports piping/ valves • Ensure PTW • Fabrication & erection of piping/valves and tank support • Modification of existing support • Rectification of existing support as per guideline by EIC • Erection of scaffolding wherever required to perform the job shall be done by contractor

	• Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
43	**Dewatering**
a	Dewatering at various pits • Ensure PTW • Shifting of pumps & accessories (Pipe, clamps, starter panel etc...) at location • Dismantling/Assemble the discharge pipe, termination of cable in panel as well as pump. • Dismantling & refitting the gratings / cover in the pit for erection and dismantle of pump. • Take trial run for smooth operation. • Dewatering of pit/sump completely • After dewatering taking out the pump from the pit, clean/flush with fresh water • Keeping it at store or designated place as per EIC • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
b	Maintenance of dewatering pumps • Carry out external cleaning of equipment. • Check & clean the strainer of submersible pump. • Complete servicing of Submergible pump • Spill over oil / water / grease / cotton waste / etc in surrounding area and floor to be cleaned• up to the satisfaction of EIC. • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.
44	**Actuators**
a	Removal & Assembly of actuators from the position • Ensure PTW • Remove the bolts of actuators from respective valves • Removal/assembling of actuators with suitable tools & tackle and required safety precautions. • Erection of scaffolding wherever required to perform the job shall be done by contractor • Shifting of all spares & consumables from store to site & vice versa or as directed by EIC is in the contractor's scope. • Shifting of scrap/materials to the designated place is in contractor's scope. • Housekeeping after completion of work.