



ABB Marine and Ports - November 2016

ABB Stacking Care Maintenance routines in each phase

ABB Stacking Care

Preservation of the equipment

Preservation

- All ABB equipment will be preserved for long or short time shut down.
- Water will be drained, batteries disconnected and monitoring equipment will be installed.



Initial tasks when switchboard is not in operations

- Keep 220 volt supply on at all times.
- Keep cabinet heaters on continuously.
- Make sure UPS batteries are in charging mode.
- Release mechanical discharge of breaker
- Disconnect auxiliary power to breaker VC

ABB Stacking Care

Preservation of the equipment

Preservation

- All ABB equipment will be preserved for long or short time shut down.
- Water will be drained, batteries disconnected and monitoring equipment will be installed.



Initial tasks when transformer is not in operations

- Keep 220 volt supply on at all times.
- Keep cabinet heaters on continuously.
- Make sure UPS batteries are in charging mode.
- Release mechanical discharge of breaker
- Disconnect auxiliary power to breaker VC

ABB Stacking Care

Preservation of the equipment

Preservation



- All ABB equipment will be preserved for long or short time shut down.
- Water will be drained, batteries disconnected and monitoring equipment will be installed.

Initial tasks when MV drive is not in operations

- Drain the cooling system and flush with air
- Isolate deionizer and filter loop
- Close the DC bus grounding switch
- Remove backup batteries from control PLC
- Insert hygroscopic agents (i.e. Silica Gel/Calcium Chloride) inside the cabinets, at least one standard bag for each cubicle to keep relative humidity in cabinets below 60 %
- Install additional thermostat for control of space heater
- Make sure UPS batteries are in charging mode
- Perform a discharge test on UPS batteries.
- Keep all doors and covers closed

ABB Stacking Care

Preservation of the equipment

Preservation



- All ABB equipment will be preserved for long or short time shut down.
- Water will be drained, batteries disconnected and monitoring equipment will be installed.

Initial tasks when LV drive is not in operations

- Drain the cooling system and flush with air.
- Isolate the cooling pumps by closing valves and fill mix of 50/50% part water and glycol, then add 0,5 Vol% corrosion inhibitor.
- Close the DC bus grounding switch for system with option installed.
- Remove back-up batteries from control PLC.
- Insert hygroscopic agents (i.e. Silica Gel/Calcium Chloride) inside the cabinets, at least one standard bag for each cubicle, to keep the relative humidity (RH) at maximum 60 %
- Install temperature switch on space heaters, adjust to keep temperature inside cabinets between 30 and 40°C, and keep heaters on (strongly recommended)
- Make sure UPS batteries are in charging mode.
- Keep all doors and covers closed

ABB Stacking Care

Preservation of the equipment

Preservation



- All ABB equipment will be preserved for long or short time shut down.
- Water will be drained, batteries disconnected and monitoring equipment will be installed.

Initial tasks when breaker resistor tank is not in operations

- Drain the tanks.
- Disconnect main power from the system.
- Keep power to anti condensation heater on.
- Insert hygroscopic agents (i.e. Silica Gel /Calcium Chloride) inside the cabinets, at least one standard bag for each compartment.

ABB Stacking Care

Preservation of the equipment

Preservation



- All ABB equipment will be preserved for long or short time shut down.
- Water will be drained, batteries disconnected and monitoring equipment will be installed.

Initial tasks when generators are not in operations

- Connect the hydrostatic jack pumps with a switch, so that they can be easily connected and energized every 3 months
- Connect and energize the space heaters (needs to be connected all time)
- Measure insulation resistance (Reference)
- Visual inspection of machines and installation

ABB Stacking Care

Preservation of the equipment

Preservation

- All ABB equipment will be preserved for long or short time shut down.
- Water will be drained, batteries disconnected and monitoring equipment will be installed.



Horizontal Engine



Vertical Engine

Initial tasks when motors are not in operations

- Check quality of grease and re-grease if necessary
- Connect and energize the space heaters
- Measure stator winding insulation resistance.
- Visual inspection of machines and installation
- Check, drain, and plug cooling unit

ABB Stacking Care

Lay-Up Maintenance

Lay-Up Maintenance

- In the lay-Up Phase the ABB equipment will be remote monitored via ABB RDS and visually inspected once every month.



Follow-up tasks during lay-up of switchboard

- Regular inspections performed min. 12 times a year depending on storage temperature and humidity
- Operate breakers every 2 months with minimum 2 -3 repetitions.
- Recharge UPS batteries
- Make sure that the room inside the switchboards and breakers are kept dry and clean

ABB Stacking Care

Lay-Up Maintenance

Lay-Up Maintenance

- In the lay-Up Phase the ABB equipment will be remote monitored via ABB RDS and visually inspected once every month.



Follow-up tasks during lay-up of transformer

- Regular inspections performed min. 12 times a year depending on storage temperature and humidity Ambient conditions
- Functionality of space heaters
- Change the hygroscopic agents as required to keep RH at maximum 60 %

ABB Stacking Care

Lay-Up Maintenance

Lay-Up Maintenance

- In the lay-Up Phase the ABB equipment will be remote monitored via ABB RDS and visually inspected once every month.



Follow-up tasks during lay-up of MV Drives

- Regular inspections performed min. 12 times a year depending on storage temperature and humidity:
 - UPS batteries
 - Ambient conditions
 - Functionality of space heaters
- Change the hygroscopic agents as required to keep RH at maximum 60 %
- Rotate the fans, avoiding impeller unbalance

ABB Stacking Care

Lay-Up Maintenance

Lay-Up Maintenance

- In the lay-Up Phase the ABB equipment will be remote monitored via ABB RDS and visually inspected once every month.



Follow-up tasks during lay-up of LV Drives

- Regular inspections performed min. 12 times a year depending on storage temperature and humidity
- Rotate the fans, avoiding impeller unbalance
- Change the hygroscopic agents as required to keep RH at maximum 60 %
- Make sure that the room inside the drives are kept dry and clean

ABB Stacking Care

Lay-Up Maintenance

Lay-Up Maintenance

- In the lay-Up Phase the ABB equipment will be remote monitored via ABB RDS and visually inspected once every month.

Follow-up tasks during lay-up of generators

- Regular inspections performed min.12 times a year depending on storage temperature and humidity
- Run jack-up pumps every 3 months
- Rotate rotor 2-3 turns
- Visual inspections of stator and rotor
- Check regularly the anti-corrosion coating on unpainted areas like shaft, flanges etc. and touch up if necessary.
- Give blank surfaces coating of a suitable rust inhibitor if painting is not allowed



ABB Stacking Care

Lay-Up Maintenance

Lay-Up Maintenance

- In the lay-Up Phase the ABB equipment will be remote monitored via ABB RDS and visually inspected once every month.



Horizontal Engine



Vertical Engine

Follow-up tasks during lay-up of generators

- Regular inspections performed min. 12 times a year depending on storage temperature and humidity
- Rotate rotor 2-3 turns
- Visual inspection of rotor and stator windings.
- Check regularly the anti-corrosion coating on unpainted areas like shaft, flanges etc. and touch up if necessary.
- Give blank surfaces coating of a suitable rust inhibitor if painting is not allowed

ABB Stacking Care Start-Up



- In the Start-Up Phase. Preservation procedures will be reversed and all ABB Equipment will be prepared for start-up.

Start-Up

Switchboard

- Visual inspection of cleanness and overall condition of the cubicles
- Check the tightness of the auxiliary contacts
- Check of safety interlocks
- Lubricate mechanical parts

Function test

- Function test including verification of inputs/outputs from REM/REF and check of software revisions

Breakers

- Inspection of maintenance and operational history of the equipment with maintenance recommendations
- General inspection and cleaning
- Function check and verification of coils
- Verification of all functions
- Carrying out of at least 5 closing and opening operations from two separate locations
- Check of the integrity and lubrication of the tulip connector isolating contacts

Protection Relays

- Visual inspection of cleanliness
- Check of the tightness of the auxiliary contacts

UPS

- Perform discharge test

Reporting

- Written summary report
- Maintenance recommendations
- Spare parts recommendations

ABB Stacking Care

Start-Up



- In the Start-Up Phase. Preservation procedures will be reversed and all ABB Equipment will be prepared for start-up.

Start-Up

Start-up of transformer

- Remove additional thermostat
- Remove hygroscopic agents According to Maintenance scope
- General tasks
- Inspection of maintenance and operational history of the equipment
- Visual inspection of cleanness
- Visual inspection of tank paint & welding and valves

Start-up of transformer cont.

- Visual inspection of heat exchanger
- Visual inspection of oil leakages
- Visual inspection of temperature indicators
- Inspection of temperature sensors
- Visual inspection of electrical & mechanical connections

Reporting

- Written summary report
- Maintenance recommendations
- Condition monitoring recommendations
- Spare part recommendations

ABB Stacking Care

Start-Up



In the Start-Up Phase. Preservation procedures will be reversed and all ABB Equipment will be prepared for start-up.



Start-Up

Start-up of MV Drive

- Remove additional thermostat and restore space heater control to original functionality
- Inspection of maintenance and operational history of the equipment and maintenance recommendations
- Perform Maintenance according to ABB Maintenance recommendations

Start-up of LV Drive

- Remove additional thermostat and restore space heater control to original functionality
- In case the lay-up period is longer than one year, capacitor reforming needs to be done. This will require separate power supply.
- Clean the devices, vacuum clean also the whole room, especially in front of drive
- Remove hygroscopic agents from cabinets
- Inspection of maintenance and operational history of the equipment and maintenance recommendations
- Perform Maintenance according to ABB Maintenance recommendations

ABB Stacking Care

Start-Up



Horizontal Engine



Vertical Engine



- In the Start-Up Phase. Preservation procedures will be reversed and all ABB Equipment will be prepared for start-up.

Start-Up

Start-up of Motors

- Bearing replacement (depending on storage time and conditions)
- Inspection of space heaters, if applied
- Perform Maintenance according to ABB Maintenance recommendations

Start-up of Generators

- Disconnect and remove space heaters
- Remove switch from hydrostatic jack up pumps
- Perform Maintenance according to ABB Maintenance recommendations

AABB