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
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

- 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
Preservation of the equipment

- 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.

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
• 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
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%
• 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
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

• 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
• 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
• 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.

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

**Start-up of transformer**
- Remove additional thermostat
- Remove hygroscopic agents According to Maintenance scope
- Visual 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
**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

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

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