METHOD STATEMENT FOR

UPS SYSTEM TESTING & COMMISSIONING

REVISION RECORD					
This cover page is a record of all revisions of the document identified above by number and title. All previous cover pages are hereby superseded and are to be destroyed.					
Rev. No.	**Date**	**By**	**Chkd.**	**Approvals**	**Description and Page Numbers of Revisions**

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1.0 PURPOSE

The purpose of generating this method statement is to define the procedure step by step to implement the correct practices for UPS System Testing and Commissioning through the guidelines contained herein so as to ensure that the job execution complies with specification and serves the intended function to satisfactory level where applicable in the building of the project.

2.0 SCOPE

This method statement covers the Commissioning & Testing of the Uninterruptable Power Supply.

3.0 REFERENCE

- Approved Shop drawings for power distribution.
- Specifications
- Project Quality Plan
- Project HSE plan
- Manfacturer's Data sheets & Manufacturer recommendations.
- Regulation of the local Electrical Authority,
- Requirements of Civil Defense Department,
- Approved Material submittal

4.0 DEFINITIONS:

PQP	: Project Quality Plan
PSP	: Project Safety Plan
QCP	: Quality Control Procedure
HSE	: Health, Safety and Environment
MS	: Method Statement
ITP	: Inspection Test Plan
QA/QC	: Quality Assurance / Quality Control Engineer.
SK	: Store Keeper.
WIR	: Inspection and Test Request
MIR	: Material Verification Record.
MAR	: Material Approval Request
UPS	: Uninterruptible Power Supply.
I/P	: Input.
O/P	: Output.

5.0 RESPONSIBILITIES:

Responsibilities for ensuring that the steps in this procedure shall be carried out are specified at relevant steps in the procedure:

- Project Manager.
- Construction manager
- QA/QC Engineer
- Site Engineer
- HSE officer
- SK

5.1 Project Manager

- Project Manager is the overall responsible for the project in terms of work execution, safety, planning & quality. The Project Manager will maintain the planning progress and coordination of works with the main contractor.

- The work progress shall be carried out as per planned program and all the equipment's required to execute the works shall be available and in good condition as per project planned.

- Specific attention is paid to all safety measures and quality control in coordination with Safety Engineer and QA/QC Engineer and in line with PSP and PQP.

5.2 Construction Manager

- Construction Manager is responsible to supervise and control the work on site.
- Coordinating with QA/QC Engineer and site Team and foremen for all activities on site.
- Control and sign all WIR's before issuing to Consultant approval.

5.3 Site Engineer

- The method of statement to the system shall be implemented according to the Consultant project specifications and approved shop drawings.
- Provision of all necessary information and distribution of responsibilities to his Construction team.
- The work progress shall be monitored in accordance with the planned work program and he will provide reports to his superiors.
- The constant coordination with the Safety Engineer to ensure that the works are carried out in safe working atmosphere.
- The constant coordination with the QA/QC Engineer for any works to be carried out and initiate for the Inspection for the finished works.
- He will ensure the implementation of any request that might be raised by the Consultant.
- Efficient daily progress shall be obtained for all the equipment and manpower.
- He will engage in the work and check the same against the daily report received from the Foremen.
- The passage of all the revised information to the Foremen and ensure that it's being carried out properly.

5.4 QA/QC Engineer (MEP):

- The monitoring of executions of works at site and should be as per the approved shop drawings and project specifications.
- Ensure WIRs and MIRs are being raised for activities in timely manner and inspected by the Consultant.
- Check and insure that all activities / work done / completed prior to offer for consultant inspection.
- He will follow and carried out all the relevant tests as per project specifications.
- Obtain the required clearance prior to Consultant's inspections.
- Should acquire any necessary civil works clearances and coordination.
- Coordinate with site construction team.
- One who will assist the Consultant Engineer / Inspector during inspection.

5.5 Site Foreman

- The carrying-out of work and the proper distribution of all the available resources in coordination with the Site Engineer on a daily basis.
- Daily reports of the works are achieved and coordinated for the future planning with the Site Engineer.
- Incorporate all the QA/QC and Safety requirements as requested by the concerned Engineer.
- Meeting with any type of unforeseen incident or requirement and reporting the same to the Site Engineer immediately.

5.6 Safety Officer

- The implementation of all safety measures in accordance with the HSE plan and that the whole work force is aware of its proper implementation.
- The implementation of safety measures is adequate to maintain a safe working environment on the work activity.
- Inspection of all the site activities and training personnel in accident prevention and its proper reporting to the Construction Manager and the Project Manager.
- The site is maintained in a clean and tidy manner.
- Ensure only trained persons shall operate the power tools.
- Ensure all concerned personals shall use PPE and all other items as required.
- Ensure adequate lighting is provided in the working area at night time.
- Ensure high risk elevated areas are provided are barricade, tape, safety nets and provided with ladders.
- Ensure service area/inspection area openings are provided with barricade, tape, and safety nets.
- Ensure safe access to site work at all times.

5.7 Store Keeper (SK)

- Responsible for overall Store operations in making sure to store the material delivery to the site and keep it in suitable area that will keep the material in safe from rusty and damage.
- One who will acknowledge the receiving of materials at site in coordination with QA/QC and concerned Engineer.

6.0 EQUIPMENTS

6.1 Tool box.
6.2 UPS and accessories.
6.3 Battery Cabinets.
6.4 Dry Contact.
6.5 Multimeter.
6.6 Tester.
6.7 Load Bank.
6.8 Netvision card. “SNMP Card”.
6.9 Safety requirements tools such as safety shoes, safety helmet, safety glasses, fluorescent vest, and safety gloves to insure maximum ability of safe work and dust mask when required.

7.0 PROCEDURE

7.1 Safety

- Ensure only trained/ Authorised & licensed persons only shall operate the power tools and do the Testing job.
- Necessary PPE to be worn while working in energized to be worn while working in energized circuits.
- Ensure adequate lighting is provided in the working area at night time and if inside the building area to be well illuminated.
- Ensure service area/work area openings are provided with barricade, tape, safety nets and warning signage to be provided.
- Ensure LOTO procedure to be followed and implement comprehensive logout & tag out during execution of work.
- Emergency evacuation plan and procedure to be developed prior to start of testing.
- PTW to be applied and obtained to start work on the required area.
- Calibrated Instruments only to be used.

7.2 Testing and Commissioning procedure:

7.2.1 Pre-commisioning procedure:

- All works in progress should be constantly monitored by Supervisors / QA/QC Engineers / Project managers, etc. for quality workmanship / cost saving methods / professionalism / Production / Work Safety procedures and all works should be as per approved drawings and method statements for UPS and Accessories Installation

- Ensure that all tools, devices and equipment needed to complete the test. Site test requiring a load bank shall be performed. The load bank shall be furnished by the supplier, if required. Refer to the attached Procedure for the Load bank testing on Section 8.2 in Attachments.

All of the dummy loads types will be used as following:

UPS rating	Resistive Dummy load Description
Socomec UPS 15KVA Masterys BC	OMHAC415-30 '30KW Resistive dummy load, we will use 13.5KW'.
Socomec UPS 30KVA Masterys BC	OMHAC415-30 '30KW resistive dummy load, we will use 27KW'.
Socomec UPS 160KVA Delphys BC	OMHAC415-200 '200KW resistive dummy load, we will use 132KW only'
Socomec UPS 200KVA Delphys BC	OMHAC415-200 '200KW resistive dummy load, we will use 180KW only'
Socomec UPS 320KVA Delphys GP	OMHAC415-500 '500KW resistive dummy load, we will use 320KW only'

- To follow manufacturer recommendations attached for the requirements from Electrical Contractor – Sub-Contractor- before start the testing and commissioning of the system.
- Start-up and Site Test: On-site inspection and testing of the UPS system after installation shall be provided by the Sub-contractor and included in the Contract.
- The site acceptance test shall be detailed and performed to ensure that the equipment will perform with the actual load as installed.
- All inspection and testing shall be performed and conformed by manufacture in the presence of Consultant.
- All works shall be inspected for conformance to specification and Authority Regulations

Requirement from Electrical Contractor before Commissioning & testing:

Description	OK/ Not OK
▪ UPS room must be large enough.	
▪ UPS location should have a non-flammable floor.	
▪ UPS Location should be dry, clean and dust-free.	
▪ UPS Location should be with Air condition 20-25C. AC air circulation in the room should be sufficient to ensure a constant temperature to the UPS and to the batteries.	
▪ All Power & Network Cables are tested.	
▪ Installation of I/P & O/P Power Cables.	
▪ For netvision, Each UPS System IP to connect it to the Local Network. 'if Applicable'	
Comment:	

7.2.2 Site Commissioning and Testing:

- Site Acceptance Test
- The site acceptance test shall include:

- Functional tests on all equipment to demonstrate the system constructed are fully in compliance with the specification section 263354 clause 8.D. and manufacturer recommendation;
- Simulation tests to simulate all alarms and faults;
- System bypass, mains failure simulation test; and
- Full load test to verify the battery capacity.
- Noise level test;

7.2.3 Procedures / Method:

A- Visual Inspection:

Description	OK/ Not OK
Carry out a visual inspection of outside & inside System.	
Visually check Central PC to ensure that all equipment is installed in line with Approved Construction drawing & Approved Material Submittal.	
Check AC Connection. 'I/P & O/P'	
Check DC connection if external Battery available.	
Check UPS component 'i.e. rectifier, inverter and static switches' are secure and that no damage has occurred.	

- Record Results on commissioning.

B- Start Up & Commissioning

Description	OK/ Not OK
Re - Check UPS component 'i.e. rectifier, inverter and static switches' are secure and that no damage has occurred during transit or installation. Check that all connections are tight (including flat cables). Verify that all PCB switch positions are correct.	
Check that all external connections have been made in accordance with supplied drawings.	
Check that installation cables are correctly sized and that fuses/circuit breakers are suitable rated.	
Check phasing and polarity of all connection and phase rotation.	
Check that all UPS associated equipment is fully earthed.	
Check the input voltage and the input frequency.	
Check Alarms.	
Check the general system operation is satisfactory	
Check load connections for testing.	

C- Testing

Functional test:

- UPS System is working without any alarms or any fault and the switches in correct position and two units are working.

- 'Normal Operation': Rectifier is charging the batteries and supplying the inverter which provides a pure sinusoid wave with stabilized O/P voltage& frequency.

(Egymatec will calibrate the Units by checking the UPS setting & configuration using Expert software).

No load test (provide this test between 5 to 10min).
- Putting '0' Zero load.
- Take measurement.
- Fill format no. (1).

Load Test:
Provide a load. 'customer Load'

A- System Load Test (_____% load) 'Provide this test between 10 to 15min'.
- Putting _____Kwatt. 'by connect the load '.
- Take measurement.
- Fill format no. (1).

- Due to several UPS rating, Supplier will testing them using a different rating/model of dummy load to be suitable with the UPS rating.
- After connecting the dummy load to the UPS, we are going to take measurement with Zero load then increase the load to reach 25% of the UPS rating then take measurement for 25%, then increase the load to reach 50% of the UPS rating then take measurement for 50%, then increase the load to reach 75% of the UPS rating then take measurement for 75%, then increase the load to reach 100% of the UPS rating then take measurement for 100%.
- For test the backup time:
  a) The batteries shall be fully charged without any power interruption for at least 8 hours.
  b) the dummy load will be adjustable to reach the same current load 'as per battery calculation'.
  c) cut off the power and take measurement.

Format 1

Load Test:		Excepting Value	Reading
Load rating		Existing Load	
I/P Voltage: Ph-Ph		400 ±15% / ± 20%	
I/P Voltage:	L1	Depend on mains	
	L2	Depend on mains	
	L3	Depend on mains	
I/P Current:	I1	Depend on load	
	I2	Depend on load	
	I3	Depend on load	
I/P Frequency		45Hz – 65Hz	
I/P Power			
O/P Voltage:	L1	400 V ± 1%	
	L2	400 V± 1%	

	L3	400 V± 1%	
O/P Current:	I1	Depend on load	
	I2	Depend on load	
	I3	Depend on load	
O/P Frequency		50 Hz ± 0.1%	
O/P Power			
Comments:			
Approved / Retest : Sign:			

B- Battery discharge test:

- With same load and same position.
- Cut off the Input mains from UPS.
- Take measurement.
- Fill format no. (2).

Format 2

Battery Discharge test at_____% load:

Measurement		0 min	10min	20min	30min	40min	50min	60min
Battery capacity:								
Active power output:								
O/P Voltage:	L1							
	L2							
	L3							
O/P Frequency:								
O/P current:	I1							
	I2							
	I3							
Temperature:								
		Comments:						
		Approved / retest : Sign:						

D- Return to Normal Operation:

- Return the Input mains to UPS.

Transfer Test	Describe	OK/ Not OK
Automatic	Load transfer to bypass Circuit.	
Manual	Load transfer to Manual bypass.	
Normal	Load transfer from Manual bypass to Normal.	

	Approved / retest : Sign:

E- Noise Level Test:

- Practically the noise level test is usually done in the factory due to special requirement which may affect the result of it.
- The test of the noise level can be done only after providing us a special room with shall be:

1. Isolated from noise.
2. one meter length space from each direction around the UPS also one meter from the top.

Then we will measure the noise level without UPS and with UPS carrying the full load then muses these values to get the real value of the noise level.

Noise Level Test	Value	Measurement 'dBA'
- UPS with 100% load. Measure the noise level @ 1meter	'1'	
- UPS with 0% load. Measure the noise level @ 1meter	'2'	
UPS Noise level = '1' - '2' =	'3'	

8.0 ATTACHMENTS

- Inspection and Testing Plan
- Check List for pre commissioning
- Checklist for testing & commissioning
- Risk Assessment