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1.0 OBJECTIVE OF PROCEDURE

This procedure provides installation for Extra Low Voltage Systems (ELV), structure cabling, quality control and safety plan pertaining to the project implementation requirement to suit customer's requirement.

2.0 SCOPE OF WORKS

The method of ELV installation works specified herein shall be in accordance / compliance to latest IEC, IEE, Malaysian Standards (MS) and local authority standards.

3.0 TOOLS AND EQUIPMENT TO BE USED

ITEM	DESCRIPTION
1	Wireman kit such as insulated screwdriver, cutter, wrench, cable lug crimping tool, pier, test pen, etc.
2	Ladder and scaffolding.
3	Walkie-talkie or handphone (for peer to peer communications).
4	Grinders, Rotary Hammer Drills, Impact Drills, Electrical drill or portable battery operated drill and trolleys.
5	Spot light, torchlight, battery operated head band light, single phase extension cord.
6	LAN tester, telephone tester and multi-meter.

4.0 SAFETY & ENVIRONMENTAL REQUIREMENT

4.1 All installation works are to be carried out in compliance with the Installer's work safety plan, customer's safety procedures (if any), NIOSH and other local statutory regulations.

4.2 Ensure each technician is safety inducted and equipped with the necessary personal protective equipment (PPE) to be worn at all time.

4.3 The use of worker's safety harness is compulsory for working height of three (3) meter and above. Worker's safety helmet for indoor electrical installation works may be exempted.

4.4 All the tools and equipments used at site must be in compliance to safety standards requirement.

4.5 The site of all work activities will be kept in a clean and tidy manner. To adopt 'clean as you work' worker attitude.

4.6 Work areas shall be secured with proper safety tape and work in progress caution warning signage whenever necessary.

4.7 If work is to be carried out in an enclosed area, the door entrance or exit door should have proper safety and work in progress caution signage.

5.0 OVERVIEW

5.1 The quality control process for all equipment involves the following stages:

Stage 1 : Unit Testing

- Performed by the manufacturer at a component level;

Stage 2 : Installation Work Inspections

- Performed by the project manager during the installation process. The objective is to identify poorly installed equipment or areas of the installation that do not comply with the provisions of the design specifications. Provided the defect is identified at an early stage, the cost of remedial work and delays to the project program can be minimised;

Stage 3 : Final Commissioning

- Performed by the installation contractor and witnessed by the customer or customer's representative (consultant, etc).

6.0 WORK METHOD STATEMENT

6.1 Preparatory Works

6.1.1 Determine the scope of work from project specifications and drawings;

6.1.2 Ensure shop drawings are prepared, reviewed and verified to be in compliance with project specifications. Submit and obtain customer / M & E Consultant approval;

6.1.3 Ensure the selection of equipment and accessories are in accordance with project specification.

6.2 Inspection Of Equipment, Hardware, Software, Device and System

6.2.1 Ensure all trunkings, conduits or cable trays have been effectively secured to support currently installed.

6.2.2 Ensure all cables are proper laid in conduit / trunking.

6.2.3 Check the termination tools / machines to ensure in good condition.

6.2.4 Ensure all connections have been correctly terminated and protection against faults and interference.

6.2.5 Ensure all associated equipment such as power supplies and switches have been connected correctly and secured appropriately.

6.2.6 Inspection to all devices, hardware, accessories and equipment such as camera, EM Lock, Push Button, and etc.

6.2.7 Check the installation of accessories or devices.

6.2.8 Check the testing tools / machines to ensure in good condition.

6.2.9 Perform all hardware and software pre-commissioning tasks.

6.2.10 Final testing and commissioning by professional / qualify engineer.

7.0 SITE TESTING & COMMISSIONING

7.1 Commissioning tests shall be performed to assess the overall functionality of the all the system as per the standards and design specifications.

7.2 The commissioning tests require at least two testers. One tester shall be located at the operator workstation and the other at the devices location.

7.3 As each commissioning test is performed, the results shall be recorded on the appropriate commissioning test schedule. Each test performed shall be marked as a pass or fail. Any comments regarding abnormal operation in particular to failed tests shall be recorded in the comments section of the commissioning schedule.

7.4 **Closed Circuit Television System**

Step 1 : Camera

- Verify that the camera produces a clear picture and no interference;
- Verify that cameras provide correct coverage of the area specified;
- Verify that the camera view no obstacle;
- Verify that the correct signal is transmitted to the operator workstation;
- Verify that power supply cable and coaxial cable are connected to camera;

Step 2 : LCD Monitor

- Ensure that monitor cable are connected to Digital Video Recorder;
- Ensure that power supply cable connected;
- Ensure that monitor resolution setting correct;

Step 3 : Digital Video Recorder

- Verify that real time video data analysis functions (such as motion detection) are performed in real time and the corresponding view displayed on the monitor;
- Verify that adequate data storage capacity has been installed as specified;
- Verify the system hardware supplied meets the minimum specifications;
- Verify that coaxial cables are connected to Digital Video Recorder;
- Verify the following functions for the Digital Video Recorder :
  - Record;
  - Stop;
  - Play;
  - Pause;
  - Rewind;
  - Fast forward.

7.5 **Local Area Network System (Structured Cabling)**

Step 1 : Networking Faceplate

- Verify that cables are terminated with keystone;
- Verify that faceplate are mounted to wall;
- Verify that network points are install of the area specified;
- Verify that network points labeling similar accordingly to shop drawing;
- Verify that LAN tester plug into keystone receive the correct signal is transmitted to the LAN switches;

Step 2 : Equipment Rack

- Verify the equipment rack are located at the area as specified;
- Verify that installation of UPS and power supply are connected;
- Verify the LAN main switches, sub switches, patch panel, cable management and fiber optic has been installed;
- Verify the system hardware has been tighten with rack screw properly;
- Verify that equipment rack dimension follow accordingly to the shop drawings;

Step 3 : Cat 6 RJ45 / Fiber Optic Panel and LAN switches

- Switch on the power supply of Cat 6 RJ45 / Fiber Optic Panel and LAN switches;
- Ensure that data cable connected from LAN switches to patch panel;
- Verify the data cables all conceal in cable management properly;
- Verify that uplink cable connected between main LAN switch and sub switch;
- Ensure that Cat 6 RJ45 / fiber optic cable connected from Cat 6 RJ45 / Fiber Optic Panel to LAN switches;
- Check the termination of patch panel and tested by using Cat 6 RJ45 / Fiber Optic Network tester.

7.6 **Public Address System**

Step 1 : Check the cables connected to all equipment;

Step 2 : Switch on the power supply of all equipment;

Step 3 : Verify the functionality of microphone, press the button to paging;

Step 4 : Verify the speaker functionality and zoning are correct accordingly to shop drawings.

7.7 **Card Access System**

Step 1 : Switch on the reader, controller and transformer power supply;

Step 2 : Check the cables connected between controller and reader;

Step 3 : Break Glass functionality test

- Insert break glass key cables are disconnect;
- Remove break glass key cables will connected;

Step 4 : Push Button functionality test

- Press once push button, EM Lock the door;
- Press again push button, EM Lock release the door;

Step 5 : Verify the reader functionality by flashing the proximity card;

Step 6 : Load the software to detect the communication.

7.8 **Visitor Management System**

Step 1 : Switch on the power supply of equipment;

Step 2 : Verify the program setting of VMS are correct

Step 3 : Verify the reader functionality by flashing the proximity card;

Step 4 : Load the software to detect the communication between PC and Reader.

7.9 **Telephone System**

Step 1 : Check the cables terminated at telephone distribution panel and MDF;

Step 2 : Verify that cables are terminated with keystone;

Step 3 : Verify that faceplate are mounted to wall;

Step 4 : Verify that telephone points are install of the area specified;

Step 5 : Verify that telephone points labeling similar accordingly to shop drawing;

Step 6 : Verify that telephone tester plug into keystone receive the correct signal is transmitted to the module at telephone distribution panel.

8.0 HAND OVER & DEMOBILIZATION

8.1 Upon full completion of the newly installed ELV items and materials, ensure all work area are thoroughly cleaned and made tidy before the conduct of final work inspection.

8.2 Conduct another round of inspection together with the customer by using the work inspection checklist form (refer to Work Inspection Checklist Form Document Ref: IMP-REC-WIP). Obtain customer's verification and acknowledgement signatory on the said form.

8.3 If required, take immediately corrective / rectification / repair action appropriately.

8.4 Demobilization of all tools, equipment and materials at work site are to be carried out upon obtaining safety and security clearances.

8.5 Arrange necessary transportation to ferry back the tools, equipment and materials to designated factory/store by plotting the travel route and obtaining the necessary access-way clearance.

9.0 RESPONSE TO SERVICE MAINTENANCE

9.1 For service maintenance within the allocated warranty period, ensure the provision of adequate spare parts, tools and equipment are readily available to support the functionality of the installed ELV items and materials.

9.2 Troubleshooting and repair works are to be carried on the methodology as described above.

9.3 Ensure to response to the call by the customer for service maintenance within the response time of not more than four (4) hours from the time of notification (for Klang valley only).

9.4 For outside warranty service maintenance of the installed ELV items and materials, ensure to obtain customer's approval prior to providing service response.

10.0 SPECIFIC WORK FLOW

10.1 The below shows the specific work flow to be conducted for ELV installation works at North Wing and South Wing, Aras 50, Menara TM Kuala Lumpur retrofitting project.

10.1.1 Telephone Wiring System for North Wing & South Wing

- Supply and install telephone wiring system c/w telephone point and recessed in floor telephone junction boxes.
- Supply and install voice cable trunking system.
- Supply and install KRONE structured cabling system c/w Cat 6 RJ45 cables, modular faceplate, jacks and patch cords.
- Supply and install 3COM Switch.
- Supply and install Airnonet CISCO network equipment c/w data metal trunking wiring.
- Conduct Testing & Commissioning.
- Conduct handing/taking over.

10.1.2 CCTV System for North Wing & South Wing – to conduct installation works concurrently or subject to site availability or accessibility.

- Prepare shop drawings and obtain approval.
- Isolate and dismantle all existing CCTV items and materials on site.
- Clear all site debris.
- Supply and install sub-circuit wiring of Cat 6 RJ45 Cable in G.I. Conduit and Metal trunking from Network Switch to Camera points.
- Supply and install Dome Cameras.
- Supply and install Network Video Server, CCTV LCD Monitor, Network Switch, 6kVA UPS c/w changeover power DB and Equipment Rack.
- Install CCTV integration to Card Access System.
- Conduct Testing & Commissioning.
- Conduct handing/taking over.

10.1.3 Card Access System & VMS System for North Wing & South Wing – to conduct installation works concurrently or subject to site availability or accessibility.

- Prepare shop drawings and obtain approval.
- Isolate and dismantle all existing Card Access System & VMS System items and materials on site (if any).
- Clear all site debris.
- Supply and install sub-circuit wiring of Card Access System & VMS System in G.I. Conduit from Ethernet Access Controller to Smart Card Readers c/w Network Switch.
- Supply and install EM Locks and break glass.
- Supply and install Card Access System Server c/w Client Workstation and LCD Monitor.
- Supply and install VMS Server c/w workstation.
- Conduct Testing & Commissioning.
- Conduct handing/taking over.

End