

The following changes in the tender documents are effective immediately. This addendum will form part of the contract documents.

SPECIFICATIONS

.1 Section 01 01 50 – General Instructions

Clause 1.1:

- (1) **Clarification:** “Unit 6” referenced in Summary of Work is same as building M2e,1,2,3 shown on the drawings.

Clause 1.1:

- (2) **Revise:** paragraph 1.1.2 to read:
“Complete work in phases at building M3 in the following order and as shown in sketches SK-1 to SK-3 in the back of these Specifications:
- .1 Phase 1: Complete north and east ranges on 3rd floor.
 - .2 Phase 2: Complete south and west ranges on 3rd floor.
 - .3 Phase 3: Complete north and east ranges on 2nd floor.
 - .4 Phase 4: Complete south and west ranges on 2nd floor.
 - .5 Phase 5: Complete north and east ranges on 1st floor.
 - .6 Phase 6: Complete south and west ranges on 1st floor.”

.2 Section 09 91 23 - Painting

Clause 3.6:

- (3) **Add:** paragraph 3.6.7 to read:
“Paint all new conduits, fittings and boxes in cells, corridors and other finished areas. Painting of conduit and boxes in unfinished areas is not required; such as in concealed spaces, Mechanical, Electrical and other Service Rooms. New Room 33 on each floor in Building M3 is a service room. Prior to applying finish paint, prepare zinc coated surfaces of all new conduit and boxes to MPI manual or as a minimum;
- .1 Remove all surface contamination such as dirt, oil, grease and other foreign matter.
 - .2 Wash the metal thoroughly with manufacturer recommended thinner/solvent, allow to dry and apply two coats of quick dry Acrylic Latex Primer, MPI Category #17.”

.3 Section 26 33 53 – Static Uninterruptable Power Supply

- (4) **Replace:** this section with the UPS specifications attached to this addendum.
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.4 Section 27 51 23 – Inmate Cell Call System

Clause 1.6:

- (5) **Delete:** the words “where applicable” from paragraph 1.6.10.

Clause 1.6:

- (6) **Add:** paragraph 1.6.11 to read:
“To eliminate the need for re-writing of the existing Senstar PIU100 data base, while working on each floor of the M3 Living Units, M2c/TD, M2d/SCU and M2e1,2,3/Unit 6, the following guidelines are to be followed:
- .1 Add the new system to PIU100 data base.
 - .2 The old system is to remain in the existing PIU100 data base until the system has been fully upgraded.
 - .3 Disable the cell call on the old system in correlation to the floors or buildings before work commences in that floor or building.
 - .4 Relocate the existing PACP and VCP (Voice Control Panel) of each floor to the penthouse and tie into the existing Senstar LTU (Large Transponder Unit) serial connectors; this keeps the existing system operational.
 - .5 Remove the old cell call system from PIU100 data base upon completion of the new cell call system installation and once it is make operational.”

Clause 1.6:

- (7) **Add:** paragraph 1.6.12 to read:
“All the work related to deletion/addition of the old/new cell call systems from/to existing PIU100 as described in item .11 above and interfacing of new cell call systems to existing Institution Data Logger and FAAS application as described in CSC Technical Specification ES/SPEC-0500 that is included in Appendix ‘A’ of Specifications is to be performed by Senstar. Include all necessary allowances for the work by Senstar in bid proposal. Senstar contact person is Mr. Alexy Hajjar, phone #: 613-839-5830 Loc 4336, Email: ahajjar@senstar.com.”

Clauses 2.2 and 2.3:

- (8) **Change:** type of back boxes and cover plate for Call Originating Device (COD) and Call Cancellation Device (CCD) from steel to stainless steel. Covers to be brushed SS type.

Clause 2.3:

- (9) **Replace:** “Essex Electronics RoxProx PRX-2G” to “Essex Electronics RoxProx PRX-CSC” in paragraph 2.3.3.1.

DRAWINGS**.1 Drawing E100 – Site Plan, Legend, Drawing List and Details**

General Notes

- (10) **Add:** note #24 to read:
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“Allow for one to one replacement of all existing remote emergency lighting twin heads with new LED type heads similar to Emergi-Lite EF9DM-LI in all three floors in building M3. No new wiring installation or battery pack replacement is required. There are a total of nine (9) twin heads in each floor; one at the end of each range by the stairwell, four around the control post pointing down the range and one in the control post. Determine voltage and manufacturer of the existing remote heads on site and match. In addition, provide five (5) spare new twin heads and give to Departmental Representative.”

.2 Drawings:

E104 – M3 West + North 2nd Floor Plan – New Power / Lighting Layout and Luminaire Schedule

E107 – M2d 2nd Level Floor Plan (SCU) – New Power / Lighting Layout

E108 – M2c Main Level Floor Plan (RRAC) – New Power / Lighting Layout

Switching Panel Details

(11) **Add:** note #4 to read:

“As part of the shop drawing submittal, provide a proposed layout c/w all dimensions for the custom made switching panel. Ensure the proposed layout includes the arrangement for all switches that are to be provided.”

.3 Drawing E118 – M3, Single Line Diagrams and Risers – Power / Lighting

New Single Line Diagram – Bldg. M3

(12) **Change:** breaker size for one of the roof mounted condenser units from 30A to 25A. Note that this unit will be serving 3rd floor Electrical Room. The other unit will be serving 1st floor Electrical Room.

(13) **Add:** keynote #3 to read:

“There will be a single point of connection for AC units serving Electrical Rooms. Provide feeder to each outdoor unit mounted on the roof. Provide conduit and wiring interconnection from each outdoor unit to the corresponding indoor fans installed in Electrical Rooms. Refer to Mechanical Drawing M1 for location of indoor fans and roof mounted A/C condensers. ”

.4 Drawings:

E201 – M3 East + South First Floor Plan

E207 – M2c and M2d Floor Plans

E208 – M2e1, 2, 3 Main Penthouse Floor Plans

Typical Cell Call Station Mounting Detail

(14) **Add:** note #4 to read:

“All electronic boards related to pushbuttons, cell call LED and speaker in Call Origination Device (COD) boxes in cells to be installed in the Call Cancellation Device (CCD) boxes in corridor. Use only terminal block or plug-in type connectors for wiring terminations in CCD.”

Add: note #5 to read:

“Provide one sample for each of proposed COD and CCD boxes c/w all devices, electronic boards and wiring interconnections for review and approval by PWGSC and CSC after approval of final shop drawings and prior to manufacturing devices for the whole project. Make necessary changes to COD and CCD as directed by PWGSC and CSC.”

.5 Drawings:

E201 – M3 East + South First Floor Plan
E202 – M3 West + North First Floor Plan
E203 – M3 East + South 2nd Floor Plan
E204 – M3 West + North 2nd Floor Plan
E205 – M3 East + South 3rd Floor Plan
E206 – M3 West + North 2nd Floor Plan
E207 – M2c and M2d Floor Plans
E208 – M2e1, 2, 3 Main Penthouse Floor Plans

- (15) **Clarification:** All junction and pull boxes shown in corridors to be same type as indicated in Specifications section 26 05 31, paragraph 2.2 (welded steel construction). Stainless steel junction and pull boxes are not required in corridors.

.6 Drawing E202 – M3 West + North First Floor Plan

Cell Call System Ethernet Network Riser

- (16) **Add:** note #1 to read:

“Spare fibre strands are available in buildings M3 and M2e1, 2, 3 for connecting new cell call systems to MCCP. Provide and install new fibre cable from building M2c/2d to CER. See drawing E100 for routing of conduit and cabling.”

.7 Drawing E206 – M3 West + North 2nd Floor Plan

- (17) **Delete:** “Control Post Emergency Push Button System” detail.

.8 Drawing E208 – M2e1, 2, 3 Main Penthouse Floor Plans

- (18) **Add:** security caulking to fill in the gap between conduit and wall in cell side.

.9 Drawing E212 – Cell Call System Communications Network Wiring

- (19) **Delete:** the word “penthouse” from the wiring detail for M3.

ADDENDUM #1

- (20) **Delete:** item .3 – Electrical Specifications on page 1.
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Answers (A) to Questions (Q) Received

Q.1 The CCD units are to be as specified with ES/SPEC-0500 – March 12th, 2012 Rev5, within this specification, the CCD units are to connect using TCP/IP over ethernet and be powered with PoE (af), not Wiegand interface. Within the tender the suitable CCD device is the Essex Electronics ROXPROX PRX-2G, should the reader not be the Essex PRX-CSC to meet CSC Specifications (ES/SPEC-0500)?

A.1 *Refer to revisions to Specification Section 27 51 23 included in this addendum.*

Q.2 The specified HID Edgeplus E400 unit for IP interface does not meet the specification ES/SPEC-0500? Please confirm that this RFID IP device will be accepted and that ES/SPEC-0500 is N/A if this RFID reader is used by the winning contractor?

A.2 *RFID reader HID Edgeplus E400 devices noted in the Specification Section 27 51 23 is acceptable.*

Q.3 Within the tender, the requirement states CAT5 cable, CSC standards state that CAT6 is to be used. Can you please confirm that CAT5 is acceptable or if CAT6 is to be used?

A.3 *Cat5e cabling is acceptable to be used.*

Q.4 Please confirm that the requested system is a voice inmate cell call system as Section 27 51 23 – 1.6 SCOPE OF WORK states “Provide a high quality non-voice Inmate Cell Call System (ICCS) utilizing state of the Art technology with major brand name from a manufacturer with ISO9001 or better standards” while in Section 27 51 23 - 2.2 Cell Call Originating device clearly states a voice cell call system. Please confirm what technology is to be utilized.

A.4 *The new cell call system is to be a non-voice Inmate Cell Call System with intercom capability. The operation of Intercom part of the new system is as described in Specification section 27 51 23, paragraph 1.4.*

Q.5 There is no specification mentioned for network switches to ensure that all bidders are on the same level and that high quality switches are utilized. Shall all switches be manufactured by Cisco to ensure the highest level of quality is being utilized with the minimum specifications?

- 32Gbps Switch Interconnection (Cisco Stackwise)
- Rapid Spanning tree Protocol (RSTP)
- IGMP Snooping
- V3 Querying
- Cisco Hot Standby Router Protocol (HSRP) for redundant, fail safe routing topologies

A.5 *All network switches to have minimum layer 3 routing capability with 10/100/1000 Mbps PoE ports. Minimum acceptable standard for network switches is Cisco 3560G-24/48 PS as indicated in details on drawing E201 and E213. Other acceptable products are Planet SGSW Series and Allied Telesis 8100S Series.*

Q.6 Are the switches to be monitored by the FAAS via SNMP integration (bi-directional communication) in the event of failure or fault?

A.6 *Switches are not monitored by FAAS. Failure or fault of switches is to be reported to the floor PACP via CPU and associated touch screen monitor.*

Q.7 Are the UPS units deployed to be monitored by the FAAS via SNMP integration (bi-directional communication) in the event of failure, fault and on Battery?

A.7 *All new UPS units to report Fault, Low Battery and On Battery conditions to FAAS.*

Q.8 Can you please confirm that the fiber cable is to be 10Gig – Laser Optimized cable (OM3) and the required strands?

A.8 *All new fibre optic cables shall be 10Gig; laser optimized OM3 type and have minimum 50% spare strands in addition to the requirements of the system. All fibre connectors shall be 10Gig rated.*

Q.9 M3 West – North 3rd Floor Plan – There is a requirement to integrate “Emergency Push Button” into the cell call system PACP/VDU, can you please clarify the manufacturer of the “Push Button Alarm Controller” and the Qty of “push buttons associated to the controller?”

A.9 *This detail is deleted. See revision to drawing E206 in page 4 of this addendum.*

Q.10 Is a card enrolment station required for the RFID card programming and printing? If yes, where will this be located and what all equipment shall be furnished?

A.10 *A card enrolment station is required. Location is to be coordinated with the Institution. Printer is not required. The system is to be able to copy the existing data base from the In/Out staff register system.*

Q.11 Is there a requirement for a RAID1 config for the ICCS Servers or the ICCS Client computers? Are the computers to be equipped with SSD or SATA HDD?

A.11 *All ICCS computers to have minimum RAID 1 configuration and shall come with solid state hard drives.*

Q.12 In the electrical drawings there are several references to the architectural drawings for further details. There were no architectural drawings issued through MERX? Only electrical and mechanical.

A.12 *Replace all references to “Architectural Drawings” with “Architectural Sketches” in Electrical Drawings. See SK-1 to SK-7 in the back of Specifications for referenced Architectural Sketches.*

Q.13 On E100 of the electrical plans, the site plans are not to scale. Can you provide a length for the two 53mm conduits that are to run from M2a to M2d?

A.13 *Length of the conduits from CER Room in M2a to the control post in M2d (on level 2) is approximately 110m.*

Q.14 Please clarify the UPS size required, drawing E-019 shows 18KW and the spec calls for 50kVA (26.33.53. Item 2.2)

A.14 *UPS is 20kVA/18kW. Refer to updated UPS Specifications included in this addendum.*

Q.15 The drawings starting with E201 having to do with cell call show stainless steel for all hallway and stairwell junction boxes. This is not shown (nor specified) on any of the other drawings for lighting / power. Please confirm that these SS boxes are required for the cell call system wiring.

A.15 *Junction and pull boxes for cell call system that are in corridors do not require to be SS. They can be same as junction and pull boxes for power wiring and as described in Specifications Section 26 05 31. Only Cell Call System cabinets in stairwells need to be SS as described in detail on drawing E201.*

Q.16 Re Specifications Section 26 33 53 – Static Uninterruptable Power Supply:

- a. 2.7.1 &.2 refers to specification 26-33-16. This specification is not in IFT documents.
- b. Confirm battery capacity. 2.2.2.5 is 30 minutes, 2.7.2.1 is 15 minutes.
- c. Confirm requirement for isolation transformer. Supply power is 208/120V and does not require transformation

A.16 a. *See updated UPS specifications attached to this addendum. Reference is deleted.*
b. *60 minutes. See updated UPS specifications attached to this addendum.*
c. *Isolation transformer is not required.*

Q.17 Are we to paint all conduits and boxes that are added into cells – all buildings?

A.17 *All new conduits, boxes and associated fixings in cells, corridors and other finished areas in all buildings are to be painted to match adjacent surfaces. Painting of conduit and boxes in unfinished areas such as concealed ceilings and service rooms is not required.*

Q.18 Are we to paint wall in cells where demo has occurred – all buildings?

A.18 *All walls and ceilings in all buildings where demo has occurred are to be painted to match adjacent surfaces.*

Q.19 Is paint required for surface conduit down corridors of cell ranges – all buildings?

A.19 *All surface conduits in finished areas are to be painted to match adjacent surfaces.*

Q.20 The DDC contractor currently in Matsqui, ESC? Or can we use anyone?

A.20 *The DDC service contractor currently in Matsqui is ESC and most of the DDC equipment in this Institution is supplied and installed by ESC.*

Q.21 The shaft where the condensing lines for AC have to be installed, are they in a shaft that is already built out? (Looks like the case) Or will this just be roughed in surface on the exterior of building? Would it not be better to have this running on the inside of the building for protection?

A.21 *The shaft in which AC lines are shown is existing.*

Q.22 Drawing E201, "Typical Cell Call Station Mounting Detail" asks for stainless steel back-boxes, but drawing E100, note 16 asks for aluminum. Please clarify which product is preferred.

A.22 *All Cell Call System back boxes to be made of stainless steel.*

Q.23 Section 26 33 53 asks for a 50kVA output UPS but drawing E118 shows an 18kW UPS. Please clarify sizing requirements.

A.23 *UPS to be 20kVA. See revised UPS specifications included in this addendum.*

Answers (A) to Requests Received for Approval of Alternate Products (AP)

AP.1 Intercom System: Request for approval of Harding ICE 600 series VoIP Intercom Station and Harding IMS-640-1 VoIP Intercom Master Station.

A.1 *Harding ICE 600 series Intercom Station, 2 or 3 gang, faceplate options, vandal resistant switches and LED is acceptable.*
Harding IMS-640-1 VoIP Intercom Master Station is not acceptable. Specifications require CPU with touch screen monitor. Note clause 3.2.6 in CSC Specification ES/SPEC-0500 included in Appendix 'A' that says: "The preferred display layout will be based on a simplified floor plan of the whole or part of a unit based on screen space. Icons shall be used instead of text where possible."

AP.2 Low voltage lighting control system: Request for approval of LCD GR2400 series relay panel and related devices.

A.2 *The low voltage lighting control system specified in the Specifications is the minimum acceptable product. Other systems will be considered for approval during shop drawing review process if they are equal or better than the specified system; the associated relay panels physically fit in the very limited space that is available in electrical rooms that house equipment other than relay panels; all equipment and devices are mounted in readily accessible locations and at convenient height i.e. panels mounted one above another will not be permitted; all low voltage switches fit in the available wall space in control posts and are logically grouped. Note that all switching panels in control posts are to be custom made as detailed on the drawings.*

AP.3 Low voltage lighting control system: Request for approval of Gentec Kameleon K8 series relay panel and related devices.

A.3 *The low voltage lighting control system specified in the Specifications is the minimum acceptable product. Other systems will be considered for approval during shop drawing review process if they are equal or better than the specified system; the associated relay panels physically fit in the very limited space that is available in electrical rooms that house equipment other than relay panels; all equipment and devices are mounted in readily accessible locations and at convenient height i.e. panels mounted one above another will not be permitted; all low voltage switches fit in the available wall space in control posts and are logically grouped. Note that all switching panels in control posts are to be custom made as detailed on the drawings.*

AP.4 UPS: Request for approval of Eaton 9390 series.

A.4 *The UPS system specified in the Specifications is the minimum acceptable product. Other systems will be considered for approval during shop drawing review process if they are equal or better than the specified system and they can physically fit in the very limited space that is available in 1st floor electrical room that houses equipment other than the UPS.*

END OF ADDENDUM No. 2

Part 1 General**1.1 SECTION INCLUDES**

- .1 Three phase Uninterruptible Power Systems (UPS).

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 19 - Construction/Demolition Waste Management And Disposal.
- .3 Section 01 77 00 - Closeout Submittals.
- .4 Section 26 05 01 - Common Work Results - Electrical.

1.3 REFERENCES

- .1 American National Standards Institute (ANSI)
 - .1 ANSI S1.13-2005 (R2010), Measurement of Sound Pressure Levels in Air.
 - .2 ANSI S1.4-1983(R2001) with Amd. S1.4A-1995, Specification for Sound Level Meters.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA C813.1-01 (R2006), Performance Test Method for Uninterruptible Power Supplies.

1.4 SYSTEM DESCRIPTION

- .1 System to consist of:
 - .1 Rack frame
 - .2 Rectifier module;
 - .3 Invertor module;
 - .4 Battery cubicle;
 - .5 Bypass switch cubicle;
 - .6 Controls and meters;
- .2 Equipment to operate continuously and unattended.

1.5 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Include:
 - .1 Outline sketch showing arrangement of cubicles, meters, controls, recommended aisle spaces, battery rack, battery arrangement and dimensions.
 - .2 Shipping weight
 - .3 Schematic diagram showing interconnection of rectifier, inverter, battery, bypass switch, meters, controls and indicating lamps.
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1.6 QUALITY ASSURANCE

- .1 Submit for approval to Owner's Representative, indicating and recording instruments calibration certificates, including meters installed as part of system, in accordance with Section 01 33 00 - Submittal Procedures.

1.7 CLOSEOUT SUBMITTALS

- .1 Provide data for incorporation into operation and maintenance manual specified in Section 01 77 00 - Closeout Submittals.
- .2 Submit interim, draft final, and final Operation and Maintenance (OM) Manual. Final manual approved by Owner's Representative. Submit interim copies to Owner's Representative prior to notification of factory test date.
- .3 Operation and Maintenance Manual to include:
 - .1 Operation and maintenance instructions concerning design elements, construction features, component functions and maintenance requirements to permit effective operations maintenance and repair.
 - .2 Technical data:
 - .1 Approved shop drawings;
 - .2 Characteristic curves for automatic circuit breakers and protective devices;
 - .3 Project data;
 - .4 Technical description of components;
 - .5 Parts lists with names and addresses of suppliers.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Crating:
 - .1 Adequately enclosed and protected from weather and shipping damage by use of minimum 12 mm plywood with vapour barrier inside.

1.9 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene or corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Owner's Representative.
- .5 Divert unused batteries from landfill to local battery recycling facility approved by Owner's Representative.
- .6 Fold up metal banding, flatten and place in designated area for recycling.

1.10 SYSTEM START-UP

- .1 Arrange with Owner's Representative:
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- .1 For factory service engineer to supervise start-up of system, checking, adjusting and testing on site;
- .2 For instruction of 2 personnel on theory, construction, installation, operation and maintenance of system:
 - .1 After installation and during site testing;
 - .2 At factory during shop testing.

1.11 EXTRA MATERIALS

- .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Include:
 - .1 Four sets of each type and size of fuses used;
 - .2 Four sets indicating lamps;
 - .3 Spare parts provided.

Part 2 Products

2.1 UNINTERRUPTIBLE POWER SYSTEM

2.2 Supplier: Mitsubishi DiamondPlus Series or approved equal. Any alternate shall be submitted for approval to the Consultant at least 5 working days prior to bid closing. Alternate bids must list any deviations from this specification. Official acceptances will be issued by Addendum.

- .1 Features:
 - .1 Fully-digital IGBT converter and inverter.
 - .2 Pulse Width Modulation (PWM) controls
 - .3 Front access
 - .4 Hot swappable modules
 - .5 Foot print not greater than H=56cm, D=20cm, W=28cm
 - .6 Lightweight – total system weight to be not greater than 1,200kg
 - .7 Audible noise not greater than 60dB at 1 meter
 - .2 Input power:
 - .1 Converter and bypass input three phase, 120/208 V, 4 wire, grounded neutral, 60 Hz.
 - .2 Input voltage range +15% to -30%
 - .3 Normal supply from ac mains.
 - .4 Emergency supply from standby automatic diesel-electric unit.
 - .3 Output power:
 - .1 Three phase, 120/208 V, 3 wire, grounded neutral, 60 Hz.
 - .2 Full load output at 0.8 power factor lagging 20 kVA, 18kW,
 - .3 (N+1) configuration upgradeable to 40kVA (+1)
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- .4 Overload capability: 125% of rated full load current at 0.8 power factor and rated voltage for 10 min.
 - .5 Frequency - nominal 60 Hz:
 - .1 Adjustable from 58.5 to 61.5 Hz.
 - .2 Maximum variation from set value under load changes, including transients, not to exceed 0.3 Hz.
 - .3 Drift from set value - after two months normal operation within ambient temperature range of 0 degrees to 40 degrees C, not to exceed 0.6 Hz.
 - .6 Duration of full load output after mains failure not less than 60 min.
 - .7 Output voltage control:
 - .1 Continuously adjustable on load at least 5% from rated value.
 - .2 Voltage regulation: voltage not to change by more than 2% as load increases gradually from zero to 100%, or for specified duration of full load after mains failure.
 - .3 Transient voltage change not to exceed +/-10% of rated voltage upon 50% sudden load change, loss or return of ac input voltage to system when fully loaded or transfer of full load from inverter to bypass and vice versa, and return to normal within 3 Hz.
 - .4 Harmonics over entire load range:
 - .1 Total rms value not to exceed 5% rms value of total output voltage.
 - .2 Single harmonic not to exceed 3% of total output voltage.
 - .5 Proper angular phase relation maintained within 4 electrical degrees at up to 20% load unbalance.
 - .8 Efficiency: Overall system efficiency at rated load with battery fully charged not less than 75 %.
 - .9 Interference suppression:
 - .1 If UPS equipment generates electromagnetic rf interference at levels which adversely affects other equipment in vicinity, install suppression circuits or shielding as required to eliminate such interference.
 - .2 If harmonics reflected back to mains from rectifier adversely affect other loads connected to same bus, install suppression circuits to prevent that condition.
 - .10 Mounting details:
 - .1 Server rack mounted unit
 - .1 Rack frame to be less than H=226cm, D=110cm, W=76cm
 - .2 Weight of the frame to be less than 45kg
 - .2 UPS frame to be
 - .1 Dimensions to be less than H=141cm, D=69cm, W=51cm
 - .2 Weight to be less than 43kg
 - .3 Battery system
 - .1 Dimensions to be less than H=145cm, D=70cm, W=55cm
 - .2 Weight to be less than 45kg
 - .11 Battery details:
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- .1 Server rack mounted unit
- .2 60 minutes at 20kVA/18kW
- .3 Dimensions for each battery to be less than H=35cm, D=18cm, W=22cm
- .4 Weight of each battery to be less than 35kg
- .5 24 batteries
- .12 Power modules:
 - .1 Dimensions for each module to be less than H=17cm, D=69cm, W=51cm
 - .2 Weight of each module to be less than 20kg
 - .3 3 modules
- .13 Touch screen:
 - .1 LCD
 - .2 Mounted at the front panel
- .14 Warranty:
 - .1 Minimum 5 years.
- .15 External maintenance bypass
 - .1 Three phase, 120/208 V, 3 wire, grounded neutral, 60 Hz.

2.3 ELECTRICAL REQUIREMENTS

- .1 In accordance with Section 26 05 01 - Common Work Results - Electrical.
- .2 Bring out test points to protected coded pin jacks at convenient locations to permit testing without hazard, including:
 - .1 Inverter output ahead of output switch, 3 phase.
 - .2 Mains power 3 phase.
 - .3 Voltage across each SCR.
 - .4 Points requiring monitoring for on-site alignment, for determination of faulty sub-assemblies or printed circuit cards, including indication of oscillator pulse and operation of voltage control.
- .3 No battery, other than main battery incorporated in design.
- .4 Wires number tagged or colour coded with same designation on drawings. Tags: non deteriorating type.
- .5 Variable resistors: fine adjustment, rheostat type.
- .6 Phasing marked on input and output terminals, viewed from front of equipment:
 - .1 Left to right;
 - .2 Top to bottom;
 - .3 Front to back.
- .7 Indicator lamps: long life incandescent or neon, rated for continuous duty, with sockets having adequate heat dissipation of lamps and dropping resistor if used.
- .8 Solid state circuits used where more reliable than mechanical timers or control relays.
- .9 Standard components available from commercial sources used throughout, with 10 years minimum shelf life.

- .10 Arrangement to permit easy removal of defective components to facilitate servicing, by replacing with stock spares.
- .11 Small components, related to specific function, removable plug-in modular sub- assembly or printed circuit card.
- .12 Heavy sub-assemblies easily accessible, or slide on runners of anti-friction material, and have flexible leads and bolted connections.
- .13 Components and sub-assemblies accurately made for interchangeability.

2.4 ENCLOSURE

- .1 Free standing sheet steel minimum 2.5 mm thick, CSA Enclosure 1 for rack mounting.
- .2 Access from front and rear.
- .3 Meters, indicating lamps and controls group mounted in panel front.
- .4 Panel front enclosed by hinged doors to prevent tampering and to protect instruments and controls during shipping. Doors formed wrap-around type, rigid, to open and close smoothly, locking type handle with 2 keys. Hinges to permit doors to be lifted off cubicle.
- .5 External cable connections at top of cubicle through bolted plate for drilling at site to suit.
- .6 Ambient temperature range during operation -20 degrees C to +40 degrees C. Natural or forced ventilation as required. For forced ventilation power from inverter output and fan directly driven by single phase motor mounted on vibration isolators. Each enclosure to have redundant fans, with fan failures alarmed. Air inlet and outlet openings protected with screens and metal guards.
- .7 Disposable air filters on fan cooled enclosures. Method of attachment and opening locations to make removal convenient and safe.
- .8 Maximum operating sound level not to exceed 60 db(A) as measured on sound level meter with A weighting and slow response, at distance of 1 m.
- .9 Enclosure frames interconnected by ground bus with ground lug for connection to ground.

2.5 RECTIFIER

- .1 Input power supply from:
 - .1 Ac mains;
 - .2 Input disconnect: bolt-on moulded case three pole air circuit breaker, quick make, quick break type for manual or automatic operation, temperature compensated for 40 degrees C ambient, magnetic instantaneous trip element.
 - .3 Isolating transformer: connected between ac input and rectifier input
 - .4 Surge suppressor: to protect equipment from supply voltage switching transients.
 - .5 Rectifier:
 - .1 Silicon controlled rectifier assembly or sealed silicon diodes.
 - .6 Filter: for rectifier dc output.
 - .7 Fuse: to protect dc output.
 - .8 Meters:
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- .1 Dc voltmeter, switchboard type, accuracy +/-2% of full scale, to measure rectifier output voltage.
- .2 Dc ammeter, switchboard type, accuracy +/-2% of full scale, to measure rectifier output current.
- .9 Adjustments and controls:
 - .1 Line voltage adjusting taps to allow for +/-10% variation from nominal.
 - .2 Manual adjustment of float voltage with range of +/-5%.
 - .3 Manual adjustment of equalizing voltage.
 - .4 Automatic current limiting on rectifier adjustable between 80 and 120% of normal rating.
 - .5 Provision to disconnect rectifier from inverter and battery if rectifier dc output exceeds safe voltage limits of battery.
- .10 Metres, adjustments and controls to be grouped on front panel.
- .11 Performance of rectifier:
 - .1 Automatically maintain battery in fully charged state while mains power available, and maintain dc float voltage within +/-1% of setting, no load to full load, during mains voltage variations up to +/-10%.
 - .2 Battery charging rate such that after battery has provided full load power output for specified duration, charger returns battery to 95% of fully charged state in 4 hours.
 - .3 Automatic equalize charging circuit to initiate equalize charging of battery for 24 hours after discharge of 5% of ampere hour battery rating.
 - .4 Manually initiated equalize charging feature with automatic timer adjustable from 0 to 24 hours to return unit to float charge.

2.6 INVERTER

- .1 Input power supply from:
 - .1 Rectifier dc output;
 - .2 Battery dc output.
 - .2 Input disconnect: bolt-on moulded case, single pole, circuit breaker, quick make, quick break type, for manual or automatic operation, temperature compensated for 40 degrees C ambient, magnetic instantaneous trip element.
 - .3 Input filter: with separately fused computer grade capacitor banks and indicator lights, to eliminate inverter source noise and restrictions on input cable length.
 - .4 Power stage: high frequency switching type, dual cooled disc type silicon controlled rectifier (SCR). Components, solid state devices capable of satisfactory operation under ambient conditions of -35 degrees C to +55 degrees C.
 - .5 Logic module:
 - .1 Integrated circuit logic.
 - .2 Silicon semiconductors.
 - .3 Plug-in modules.
-

- .4 Gold plated plug-in connector.
- .5 Front accessible field adjustments for voltage and frequency.
- .6 Front accessible test points: suitably protected coded pin jacks.
- .7 Frequency reference module.
- .8 Current limiting module, automatic high speed by controlled reduction of output voltage.
- .9 Voltage regulator.
- .6 Output filter: output of high frequency switching stage contains elements of carrier frequency which are filtered to low harmonic sine wave.
- .7 Metres:
 - .1 Ac voltmeter: switchboard type, accuracy +/-2% of full scale, to measure inverter output voltage with 4 position selector switch to select phase to phase, off.
 - .2 ac ammeter: switchboard type, accuracy +/-2% of full scale, to measure inverter output current with 4 position selector switch to select each phase and off.
 - .3 Wattmeter: switchboard type, accuracy +/-2% of full scale to measure inverter load.
 - .4 Frequency meter: switchboard type, scale 58 to 62 Hz, pointer type, to measure inverter output frequency.
 - .5 Synchroscope: with switch to check inverter output potential against supply mains potential.
- .8 Output disconnect: bolt-on, moulded case, three pole circuit breaker, quick make, quick break type, for manual or automatic operation, temperature compensated for 40 degrees C ambient, magnetic instantaneous trip element.
- .9 Metres and controls: grouped on front panel.

2.7 BATTERY

- .1 Battery type and electrical characteristics:
 - .1 Discharge current to supply inverter at full load output, for 60 min.

2.8 STATIC BYPASS SWITCH

- .1 One solid state closed circuit automatic transfer switch.
- .2 Switch position lights and contacts.
- .3 Synchronizing verification light.
- .4 Manual reset pushbutton.
- .5 Transfer test switch.
- .6 Alternate power source monitor light.

2.9 FABRICATION

- .1 Shop assemble:
 - .1 Rectifier unit;
 - .2 Inverter unit;

- .3 Bypass switch unit;
- .4 Battery rack and battery.
- .2 Interconnect units, and add remote mode lights, alarms and controls to produce complete uninterruptible power system before requesting Owner's Representative to witness factory tests.

2.10 FINISHES

- .1 Apply finishes in accordance with Section 26 05 01 - Common Work Results - Electrical.
- .2 Cubicles:
 - .1 Inside finish: white;
 - .2 Exterior finish: manufacturers standard colour
 - .3 Exterior hardware and trim: corrosion resistant and not requiring painting such as stainless steel or aluminum.

2.11 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 01 - Common Work Results - Electrical.
- .2 For major components such as ac input breaker, inverter breakers, bypass switch: size 4 nameplates.
- .3 For mode lights, alarms, meters: size 2 nameplates.

2.12 SOURCE QUALITY CONTROL

- .1 Complete system including rectifier, inverter, bypass switch, remote annunciator panel, controls and battery factory tested in presence of Owner's Representative.
- .2 Notify Owner's Representative:
 - .1 One week in advance of date of factory test;
 - .2 That system has had preliminary testing and has met design requirements satisfactorily.
- .3 Test procedures:
 - .1 Prepare blank forms and check sheet with spaces for recording data.
 - .2 Mark check sheet and record test data on forms in duplicate as test proceeds. Attach meter recordings.
 - .3 Provide Consultant's signature on form to indicate concurrence in results reported.
 - .4 Duplicate given to Consultant at end of test.
 - .5 Information from original presented as part of O&M Manual.
- .4 Test equipment:
 - .1 Instruments used during test, including indicating meters installed as part of system to have recent calibration certificate.
- .5 Tests:
 - .1 Visual inspection to determine:

- .1 Materials, workmanship, and assembly conform with design requirements;
 - .2 Parts are new and free of defects;
 - .3 Battery and components are not damaged;
 - .4 Battery cells are of identical construction;
 - .5 Electrolyte in each cell is at manufacturer's recommended full level;
 - .6 Each battery cell polarity and polarity of connections to inverter are correct;
 - .7 Proper size fuses are installed;
 - .8 Metres have suitable range;
 - .9 Accessories are present;
 - .10 Portable metres for acceptance tests are suitable and instrument transformers connected correctly.
- .2 Demonstrate:
- .1 System start-up and shut down;
 - .2 Operation during mains power failure, recording output during failure.
 - .3 Adjustable settings;
 - .4 Record values measured at test points.

Part 3 Execution

3.1 INSTALLATION

- .1 Seismically anchor UPS cubicles, battery rack and battery.
- .2 Assemble and interconnect components to provide complete UPS as specified.
- .3 Connect ac mains to main input terminal.
- .4 Connect UPS output to load.
- .5 Start-up UPS and make preliminary tests to ensure satisfactory performance.

END OF SECTION