PART 1  GENERAL

1.01  SCOPE

A. The specification covers requirements applicable to the provision of Integrated Power Assembly (IPA). The IPA shall be environmentally controlled, and shall consist of a coordinated grouping of electrical power and control equipment as indicated on any accompanying data sheets and/or drawings. Any data sheets, drawings, or any other related documents accompanying this specification shall be considered a part of this specification.

B. The supplier shall furnish, install, interconnect and test the equipment and materials specified herein, as well as any equipment specified in any related documents.

C. Site conditions shall be shown on the data sheet(s). These conditions shall be considered when sizing and designing equipment and structures.

1.02  REFERENCES

A. All materials, equipment and labor supplied by the supplier shall be in strict compliance with the statutes, codes and standards listed herein. Where conflicts exist between statutes, codes and standards, the more stringent requirement shall prevail. Applicable statutes, codes and standards are as listed below:

1. American Institute of Steel Construction (AISC)
2. American National Standard Institute (ANSI)
3. American Society of Testing and Materials (ASTM)
4. American Welding Society (AWS)
   a. AWSD1.1 Structural Welding Code – Steel
5. National Fire Protection Association (NFPA)
7. National Electrical Manufacturers Association (NEMA)
8. Underwriters’ Laboratories (UL)
10. State Modular Building Code Programs where applicable

1.03  SUBMITTALS – FOR REVIEW/APPROVAL

A. The supplier shall provide the following submittals:

1. Any quality plans, forms, or procedures deemed necessary by the customer.
2. Structural drawings including:
   a. General notes.
   b. Building plan view.
   c. Building base skid detail.
   d. Building elevations.
e. Stairs and landings details (if applicable).
f. Certified structural calculations (if applicable).

3. Electrical drawings including:
   a. Electrical notes.
   b. Building electrical plan, showing conduit, cable tray, subfloor wireway, and any other means of wiring transit. Drawings shall also include conduit fill.
   c. Building services wiring diagrams.
   d. Grounding system plan.
   e. Interconnection wiring diagrams.

1.04 SUBMITTALS – FOR CONSTRUCTION

A. The following information shall be submitted for record purposes:
   1. Final as-built drawings and information for items listed in Paragraph 1.04, and shall incorporate all changes made during the manufacturing process
   2. Wiring diagrams
   3. Certified structural calculations (if applicable)
   4. Installation information including equipment anchorage provisions
   5. Seismic certification as specified

1.05 QUALITY REQUIREMENTS

A. The IPA shall be manufactured under an established autonomous quality assurance program. The supplier shall have a designated quality assurance (QA) manager.
   1. The successful bidder shall be prepared to submit for customer approval, any and/or all quality plans, forms, and procedures applicable to the manufacturer of the IPA

1.06 QUALIFICATIONS

A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.

B. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

C. Provide Seismic tested equipment as follows:
   1. The equipment and major components shall be suitable for and certified by actual seismic testing to meet all applicable seismic requirements of the [latest International Building Code (IBC)] [latest California Building Code (CBC) with OSHPD Amendments]. [The equipment shall have OSHPD Special Seismic Certification (OSP) Pre-Approval.]
   2. The Project Structural Engineer shall provide site specific ground motion criteria to establish the $S_{0S}$ values required for the equipment. The CONTRACTOR shall evaluate the $S_{0S}$ values published on the [Manufacturer’s] [OSHPD] website to ascertain that they are "equal to" or "greater than" those required for the Project Site.
   3. The $I_p$ rating of the equipment shall be [1] [1.5].
4. The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above referenced standards.
   a. The CONTRACTOR shall employ and pay for the services of a licensed Civil or Structural engineer in the State of the project location to provide equipment anchorage details and calculations, coordinated with the equipment mounting provision locations provided by the MANUFACTURER. Mounting recommendations based upon those used in actual testing shall be provided by the MANUFACTURER to verify the seismic design of the equipment.
   b. The equipment MANUFACTURER shall certify that the equipment can withstand \( I_P = 1 \) and function \( I_P = 1.5 \) following a seismic event, including both vertical and lateral required response spectra as specified in the above codes. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response spectra.

PART 2 PRODUCTS

2.01 INTEGRATED POWER ASSEMBLY (IPA)

A. The IPA shall be designed and constructed for outdoor use, under wind and seismic load conditions per the IBC or State guidelines for the job site.

B. The building and all components mounted thereon shall be designed for, and anchored sufficiently for, transportation to the job site.

C. The skid shall be of concrete or of welded construction.

   1. Concrete construction shall consist of six-inch ribbed construction with proper rib size and spacing to meet the required floor loadings. Increased floor thickness (up to 8") may be required to meet floor live load requirements. Properly reinforced 5000-PSI lightweight concrete should be used for all floor panels. Concrete ribs will be placed a maximum oc 48" on center. Concrete ribs will be of adequate size to resist the loadings applicable of the building design. Reinforcement should be properly placed in the concrete panel to provide adequate reinforcement, spacing and cover as required by ACI 318. Panels should be poured to include all attachments necessary to lift and fully assemble the building units. All concrete units should be poured on flat smooth steel form-work. Floor must be bolted to adjoining walls. All structures to be shipped with floor systems fully assembled to walls.

   2. Welded construction shall utilize ASTM-A36 minimum structural steel members, sized and arranged for proper strength, and able to withstand the stress and loads which will result when lifting the complete factory fabricated and equipped assemblies. Welding shall be in accordance with the requirements of AWSD1.1. All welding shall be performed by welders certified for the work being performed. Suppliers shall be prepared to show welders' certificates.

      a. Deflection shall be L/240. The building shall be suitable for installation on a concrete pad or on piers.
      
      b. The skid shall be equipped with two (2) stainless steel ground pads located at opposite corners of the skid with provisions for NEMA hole pattern lug.
      
      c. The skid shall be provided with a minimum of 8 mils mastic undercoating.
D. The floor shall be a minimum of 1/4-inch H.R. ASTM-A36 minimum smooth steel plate, welded to the perimeter and longitudinal and/or transverse structural members of the skid. The floor loading shall be no less than 250 PSF.

1. The floor shall be provided with gasketed floor cutouts where required for power and control cable entry/exit from the equipment. The cutouts shall be provided with 12 gauge galvanized or painted coverplates.

E. Building construction:

1. Building walls, roof and ceiling shall be fabricated from properly reinforced 5000-PSI lightweight concrete or G90 galvanized steel. Exterior walls, exterior roof and interior ceiling shall be self-framing, interlocking design, with maximum panel width of 16-inch, or framed construction with maximum panel width of 36-inch.

2. Exterior walls shall be properly reinforced 5000-PSI lightweight concrete or minimum of 18-gauge thickness for self-framing and interlocking design, or 24-gauge thickness framed construction design, but rated to withstand the loading requirements of the job site.

3. Interior walls shall be constructed of six-inch “ribbed” panel construction, bolted to adjoining walls, that is properly reinforced 5000-PSI lightweight concrete or minimum 18-gauge thickness for self-framing and interlocking design, or 22-gauge thickness framed construction design, but rated to withstand the loading requirements of the job site.

4. Exterior roof shall be properly reinforced 5000-PSI lightweight concrete or minimum of 18-gauge thickness for self-framing and interlocking design, or 24-gauge thickness framed construction design, but rated to withstand the loading requirements of the job site. The roof shall be sloped away from the personnel doors, where feasible. Gutters and downspouts shall be provided when the roof slope is directly over personnel or rear access equipment doors.

5. Interior ceiling shall be properly reinforced 5000-PSI lightweight concrete or minimum of 18-gauge thickness for self-framing and interlocking design, or 22-gauge thickness framed construction design, but rated to withstand the loading requirements of the job site.

F. For a building which must be shipped in multiple shipping sections, miscellaneous NEMA 1 junction boxes will be provided at the shipping splits for easy breakdown of the building wiring for shipment and reconnection at the job site. Prior to shipment the open end/sides of each shipping section will be crated (weatherproofed) for transit to the job site. The crating must be performed by a company recognized and experienced in the trade which includes the IPA manufacturer.

G. Where wall bulkhead penetrations are required, the cutouts shall be completely framed with 1/4" aluminum cover plates with neoprene gasket.

H. All fastening hardware shall be zinc plated, stainless steel or aluminum. Welding of galvanized steel and rivets shall not be the primary method of exterior fastening. Rivets can be used for mounting non-load-bearing trim members.

I. The building shall be provided with a minimum of two (2) entrance doors. The doors shall be double wall construction, with brushed aluminum panic hardware with cylinder lock and thumb latch, brushed aluminum automatic closure with built-in hold open device, prime coat or stainless steel hinges, threshold, weather-stripping, drip shields/water flashing, “DANGER, HIGH VOLTAGE, KEEP OUT” sign, and a 12-inch removable transom above
the equipment door, when required. The personnel door shall be 36-inch x 84-inch. The equipment door shall be 48-inch x 84-inch.

1. When specified, the supplier shall provide landings and stairs for the building. The stairs shall be built in compliance with the UBC code, and shall be hot-dipped galvanized after fabrication.

J. For equipment requiring rear access, the supplier shall provide 14-guage minimum galvanized steel, gasketed and hinged equipment rear access doors, with 3-point latching system with galvanized padlockable handles, “DANGER HIGH VOLTAGE” sign, and drip shields/water flashing.

K. The walls, roof and floor shall be fully insulated, with a minimum of R-11 insulation. The walls and roof shall be provided with fiberglass batt type insulation, minimum R-11. The floor shall be provided with polyurethane spray foam insulation, minimum R-6.

L. The building shall be provided with a paint system per the following:
   1. The skid shall be prepared to the appropriate SSPC standard (SSPC-1, SSPC-2, SSPC-3) for removal of rust and scale prior to painting. A 2-3 mil application of Zinc rich primer shall be provided.
   2. The floor shall be provided with a 2-3 mil application of “Red” epoxy iron oxide primer, followed by a 2-3 mil application of ANSI-61 gray epoxy, with a non-skid finish.
   3. The exterior and interior of the building shall be provided with a 0.3-0.6 mil application of a vinyl wash primer, followed by a 2-3 mil application of white epoxy paint.

M. The building shall be provided with a HVAC system, sized and provided by the supplier, considering the ambient site conditions, the dimensions of the building, the solar heating of the building, and the heat generated by the equipment within the building. The system shall be designed such that the sensible cooling capacity, NOT the total cooling capacity, will maintain an ambient temperature within the building of between 55°F winter and 80°F summer at design conditions. The system shall be provided with an electronic, automatic changeover thermostat. When the building is specified to be located in a classified environment, the supplier shall provide an HVAC/Pressurization system in strict compliance with NFPA 496 requirements. In the event of a classified installation, the supplier shall also provide all exterior electrical apparatuses and proper seals, which are rated for use in the environment in which the building shall be installed.

N. The supplier shall furnish all electrical distribution equipment necessary for the proper operation of building services within and without the building. The operating voltage of all distribution equipment shall be 120/208, three-phase. The primary side of any distribution transformers shall be 480 V, three-phase.

O. The building shall be provided with twin tube, rapid start, fluorescent lighting fixtures, controlled via three-way wall switches to be located at each entry door.

P. The building shall be provided with 125 V, 20 A duplex receptacles at each entry door.

Q. The building shall be provided with LED exterior lights at each entry door, controlled via photocell and H-O-A switch.

R. All wiring shall be type THWN, #12 AWG minimum for power circuits, minimum #14 AWG for control circuits. For all control interconnection wiring, both ends of the wire shall be provided with polyolefin sleeve type wire markers.
S. EMT conduit shall be utilized for interior applications. RGS conduit shall be utilized for outdoor applications.

T. Any cable tray necessary shall be aluminum, 6-inch high with 9-inch rung spacing. All fittings shall have a minimum of 12-inch radius.

U. 1/4-inch x 2-inch copper ground bar running the length of the building shall be provided, mounted approximately 6-inch above floor and connected to each end of the equipment ground bar. A #4/0 green insulated copper ground cable shall be provided from the ground bar to the exterior ground pads. A green insulated copper ground wire/cable will be provided from the ground bar to all auxiliary electrical equipment per NEC Table 250-95.

PART 3 EXECUTION

3.01 TESTING AND INSPECTION

A. The following testing and inspection shall be performed on the building:

1. Continuity checks of all wiring installed by the supplier
2. Operational check of all supplier furnished and installed electrical apparatuses
3. Switchgear and Motor Control Center shipping sections’ bus shall be re-spliced, torqued and meggered
4. A certified test report shall be provided by the supplier’s Quality Assurance Manager
5. If necessary, secondary control power shall be provided for customer use. Available control power voltages shall be *[480 volt, 3-phase], [120/208 volt, 3-phase], or [120/240 volt, 1-phase]*

*Note to Spec. Writer – Select one*