SECTION 11 00 50 - BASIC EQUIPMENT MATERIAL AND METHODS

PART 1  GENERAL

1.01  SUMMARY

A. The requirements of this Section shall apply to Divisions 11 Equipment Specifications, as well as to Section 10 67 10 – Specialty Storage Equipment. Section 10 67 10 is being procured directly by the Owner but this section applies to all requirements for the procurement and installation of the storage equipment.

B. Furnish and install as directed by the University of Arizona Representative all equipment, as specified, complete and ready for operation. Each item shall be specifically designed for the intended function. Provide necessary accessories, items of equipment, mechanical, electrical and structural items, whether specified or not in order to provide properly installed and functional equipment. Contractor is required to coordinate all installation requirements with manufacturer’s shop drawings for final dimensions and utility requirements.

C. Equipment shall be suitable for installation in the new Operations Facility as shown and required by the Contract Documents. Any modification or redesign to the building structure or utilities because of an alternate equipment selection by the Contractor shall be provided by the Contractor at no additional cost to the University of Arizona and shall be as approved by the University of Arizona Representative. All alternate equipment selections or proposed substitutions must be submitted and approved in accordance with the provisions of Division 1 - General Requirements.

D. In all cases where a device or part of the equipment is referred to in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installation.

E. There will be no separate payment for the work of this Section.

F. Related Sections:
   1. Drawing, General Provisions, Special Provisions and Division 1 apply to the work of this section.
   2. Division 1 - Submittal Procedures.
   3. Section 10 67 10 – Specialty Storage Equipment (Separate Procurement)
   4. Section 11 14 60 – Fluid Dispensing Equipment
   5. Section 11 52 00 – Shop Equipment
   6. Section 11 53 50 – Cleaning Equipment
   7. Division 23 – Mechanical
   8. Division 26 – Electrical
1.02 REFERENCES

A. Work shall conform to Federal, State and local governing rules and regulations and ordinances, including the governing Building Codes, OSHA and NFPA requirements, and shall pass inspection by the authorities having jurisdiction.

1.03 QUALITY ASSURANCE

A. General:
   1. All articles, materials, fittings, equipment and appurtenances incorporated in the work shall be new and unused, free from defects and imperfections, of first grade commercial quality, and shall, as far as practicable, be manufacturer's standard make. Manufacturers shall have proven experience in the design and manufacture of specified items, suitable for the purpose intended and subject to approval by the University of Arizona Representative.
   2. When two or more items of equipment are required, they shall be products of a single manufacturer.
   3. All work shall be performed in a neat and workmanlike manner by workers skilled in their respective trades, and all materials and equipment shall be installed as recommended by the manufacturers and in accordance with specified codes and standards. And approved shop drawings.
   4. Touch-up or repaint to match original finish, all factory finishes or painted equipment and materials which are scratched or marred during shipment or installation.
   5. For purposes of designating type and quality of work for Divisions 11, 14 and section 10 67 00 - Storage Equipment, the Specifications are based on the requirements listed in Part 2 - Products.

B. Substitutions: Requests for approval of equipment items other than those specified herein shall be made in accordance with the Special Provisions, and Division 1 - General Requirements.

C. Permits and Tests: Obtain all necessary permits from the State of Arizona and other authorities having jurisdiction, make application and file all drawings required for such permits, and pay all fees. Arrange for inspections and tests required by governing authorities and by the University of Arizona Representative, and pay all costs connected therewith. Obtain and file with the University of Arizona Representative written evidence that all the above requirements have been met.

D. Furnish proof that the Installing Contractor is licensed by the State of Arizona.

E. Certifications: Obtain all necessary certifications from suppliers and testing agencies as required by the Contract and pay all fees related to obtaining them.
1.04 SUBMITTALS

A. Pursuant to the provisions of the General Requirements and Division 1, the Contractor shall submit the following as they relate to the maintenance equipment specified under these sections for Division 11, Division 14 and Section 10 67 00:

1. Material and Equipment List.
2. Product data (e.g., catalog cuts, manufacturer’s data, manufacturer’s certificate of conformance or compliance, certified test report, samples).
3. Shop Drawings and Installation Instructions including the following:
   a. Layout drawings showing equipment, elevations, conduit runs, utilities and hook-ups, and all required dimensions. Drawings shall show plan and elevation views of all required conduit and piping runs. Equipment drawings shall clearly indicate all maintenance access points.
   b. Foundation and structural support drawings including anchor bolt plan and elevation. Verify that if required, pit configuration meet the requirements of the new equipment.
   c. Utility connection plan.
   d. Electrical equipment layout, with all motors, limit switches, solenoid valves, disconnects, control panels, emergency shut off switches, interlocks, accessories, all located and labeled.
   e. Piping systems including pipe routing, pipe and fittings, sizing, valving, lubricators, regulators, pumps, nozzles and accessories, fully noted and scheduled.
   f. HVAC and exhaust air systems including duct routing, duct sizes, fittings, dampers, grilles, supports, etc., fully noted and scheduled including elevations, in addition to details of penetrations and equipment connections.
4. Schedule of Work as required by Division 1.
5. Operations Maintenance Manuals as required by this section and Division 1-General Requirements.
   a. General Requirements for Manuals:
      1) Manufacturer's operating manuals giving complete instructions relative to assembly, installation operation, adjustment, lubrication, maintenance, and carrying complete parts list every item of machinery and equipment.
      2) Manuals furnished may be manufacturer's standard publications regarding size and binding provided they comply with specified requirements relative to quantity and quality of information and data.
      3) Manuals shall be bound in hard or flexible covers. Illustrations shall be clear, and printed matter, including dimensions and lettering on drawings, shall be easily legible. If reduced drawings are incorporated into manuals, original lines and letters shall be heavier-up as necessary to retain their legibility after reduction. Larger drawings may be folded into manuals to page size.
   b. Format Manuals as follows:
1) Title page: Include the name and function of the equipment, manufacturer's identification number, and the project Specifications number and title.

2) Table of contents, in numerical order listing each section and subsection title of the O&M Manual with reference to the page on which each starts and a list of included diagrams and drawings.

3) Index, in alphabetical order.

4) Frontispiece: Recognition illustration of the equipment described in the O&M Manual.

5) Manufacturer's literature describing each piece of equipment, including major assemblies and subassemblies, and giving manufacturer's model number and drawing number.

6) Operation instructions including step-by-step preparation for starting, safe operation, shutdown and draining, and emergency requirements.

7) Control diagrams, as-installed by the manufacturer.

8) Sequence of operation by the control manufacturer.

9) Wiring diagrams, as-installed and color codes, of electrical motor controllers, connections and interlock connections.

10) Diagrammatic location, function and tag numbers of each valve.

11) Maintenance instructions: Include step-by-step procedures for inspection, operation checks, cleaning, lubrication, adjustments, repair, overhaul, disassembly, and reassembly of the equipment for proper safe operation of the equipment. Include list of special tools which are required for maintenance with the maintenance information.

12) Possible breakdowns and repairs.

13) Manufacturer's parts list of functional components, control diagrams and wiring diagrams, giving manufacturer's model number and manufacturer's part number.

14) "Long-Lead-Time" spare parts list for spare parts not readily available on the local open market or for which it is anticipated ordering and delivery time will exceed 10 days.

15) List of nearest local suppliers of all equipment parts.

16) Lubrication schedule indicating type and frequency of lubrication.

17) Manufacturer's warranty and guarantee data.

18) Spare parts data as follows:
   a) Complete list of parts and supplies, with current unit prices and sources of supply.
   b) List of parts and supplies that are either normally furnished at no extra cost with purchase of equipment or specified herein to be furnished as part of Contract.
   c) List of additional items recommended by manufacturer to assure efficient operation for period of 120 days.
19) Complete sufficient copies of manufacturer’s preventive maintenance forms to properly address each equipment item and all major equipment components installed under this section.

20) Appendix: Include safety precautions, a glossary, and, if available at time of submittal, copies of test reports, and other relevant material not specified to be submitted.

21) Delete information on material or equipment not used in the work from the O&M Manual.

6. Training Program as required by this section and Division 1.
   a. General Requirements: Provide required training as outlined in this section.
      1) Training will be provided to all new equipment being provided under this contract and for the separate procured Specialty Storage Equipment being procured separately covered under Section 10 67 10.
      2) Maintenance management classes are to take place prior to substantial completion of the facility. Mechanics training will commence only after installation of machine is complete at the garage.
      3) Training shall be conducted at the new facility
      4) Hours for training are to be between 7:00am and 3:00 pm unless specifically permitted otherwise.
      5) City Personnel to be trained:
         a) Mechanics: Minimum 8 hours.
         b) Maintenance Personnel: Minimum 8 hours.
         c) Supervisors: Minimum 2 hours.
   b. Ensure that the instructors teaching these training courses are not only familiar with technical information, but able to utilize proper methods of instruction, training aids, audiovisuals, etc. to ensure effective presentations.
   c. Provide all training aids, audiovisual equipment and visual aids for the conduct of these courses.
   d. All training materials are to become the property of the University of Arizona at the conclusion of training.
   e. Submission and Approval of Training Plans:
      1) Meet with the University of Arizona Representative no later than three weeks prior to the start of formal training. At that time, submit lesson plans and an outline of training program, and demonstrate any training aids involved. Present handouts for approval and later provide handouts in a ratio of one per student. Each location shall receive a complete set of prints and schematics.
      2) Describe plans for meeting the specification training requirements. The University of Arizona Representative will approve and then coordinate and schedule all training involved with necessary personnel.
   f. Outline specific objectives for each of the required training courses. Provide a detailed schedule outlining the length and content of each of these sessions in accordance with the guidelines established.
1) The course includes sessions in safety, machine operation, a comprehensive seminar on learning basic skills/knowledge of each operation. The course shall include both classroom and practical exercise sessions and is to provide the maintenance staff with the basic knowledge necessary to utilize all training materials.

2) The training program shall include familiarization with safe equipment operation and performance and detailed instruction in operation, maintenance and test procedures.

g. Sequence of Approval:
1) Tentative Approval of Equipment: Before submittal of shop drawings, submit to the University of Arizona Representative for approval, drawings, specifications and lists of equipment to be incorporated in the work. This list shall include catalog numbers, cuts, and such other descriptive data as may be required to assure compliance with these specifications. No consideration will be given to partial lists submitted from time to time. Approval of equipment will be tentative subject to submission of complete shop drawings indicating compliance with the Contract Documents.

2) Final Approval of Equipment: After receiving tentative approval of the equipment lists, submit shop drawings, product data and installation instructions for final approval.

3) Equipment substitutions must conform to the requirements of Division 1 – General Requirements.

h. Certificates:
1) Furnish an affidavit certifying that all materials and workmanship comply with the applicable code requirements.

2) Before final acceptance, furnish certificates of the authorities having jurisdiction.

3) Furnish factory certificates stating that all specification requirements relating to load capacities, pump capacities and fan capacities are provided.

4) Certify that the design of equipment items and systems complies with Seismic Use Group 1, Seismic Design Category B criteria.
   a) Certification must be by a Professional Engineer registered in the State of Arizona.
   b) Structural seismic calculations must be provided by the Prefabricated Building Contractor to cover overhead crane. All fluid and exhaust reel banks shall be the responsibility of the Project Structural Engineer.
   c) Supporting calculations must be submitted for review by the University of Arizona Representative.
1.05 JOB CONDITIONS

A. Within 60 days of the effective date of the Notice-to-Proceed, submit to the University of Arizona Representative for approval a detailed narrative explaining the quality control procedures to be utilized for the fabrication and installation of equipment. The narrative shall include details of the methods and procedures to be used to regulate the production of the equipment to assure compliance with the specified standards of quality. The narrative shall also include full information on the Contractor's methods of testing and inspection and shall identify the Contractor's representatives and their duties.

B. During the course of the work, the University of Arizona Representative will monitor the Contractor's approved quality control program to verify compliance. Any work undertaken, including the ordering and purchase of materials and supplies for the work, by the Contractor prior to approval of the Quality Control Program shall be at the Contractor's risk.

C. Certificates of Compliance: Upon delivery of the equipment, submit certificates of compliance. Each certificate shall be signed by an authorized representative of the manufacturer stating that the equipment complies in all respects with the Contract requirements.

D. General Design and Fabrication Requirements:

1. Equipment shall be designed, fabricated, installed and adjusted to secure the best commercially available results with respect to smooth, quiet, convenient and efficient operation, durability, economy of maintenance and operation, and the highest standards of safety.

2. It is not the intent of these Specifications to detail the design and fabrication of the several parts of the equipment, but it is expected that the type, material, design, workmanship and fabrication of each and every part shall be fully adequate for the service required, durable, properly coordinated with all other parts, in accordance with the best commercial standards and of the highest commercial efficiency. The components of electric circuits shall be of ample and proper size, design and material to avoid injurious heating and arcing, and all other objectionable effects which may reduce the efficiency of operation and economy of maintenance and upkeep below the best commercially available results. Minimum requirements are given herein for the certain parts of equipment. Equivalent requirements approved by the University of Arizona Representative shall apply to such parts as are of special design, construction or material and to which the specified requirements are not directly applicable. These minimum requirements as a whole shall also be considered as establishing proportionate general minimum standards for all parts of the equipment.

3. The University of Arizona Representative may permit variations from the requirements of these Specifications to permit the use of the manufacturer's standard equipment, provided in his opinion such standard equipment is in every
way adequate for the intended use and meets the full intent of these Specifications. All such variations proposed by the Contractor shall be called to the attention of the University of Arizona Representative in writing and shall be made only if approved in writing. All proposed substitutions must conform to the requirements of Division 1 – General Requirements.

4. Certain design limitation, tests, etc., are herein specified as a partial check on the adequacy of design, fabrication, and materials. These requirements do not cover all features necessary to insure satisfactory and approved operation of the equipment. Conformity with these requirements shall, in no way, supersede the general requirements as to satisfactory and efficient operation of the equipment.

E. Remove, relocate and repair any items that are necessary for the installation of the equipment, at no additional cost to the University of Arizona.

1.06 WARRANTY

A. Warranty: All equipment shall be warranted as a minimum in accordance with Division 1, General Requirements – Warranties and Guarantees and the following provisions:

1. The Contractor shall furnish a warranty covering all parts of the work performed, and all materials, labor and equipment furnished hereunder by Contractor or his subcontractors or suppliers will be free from defects in design, material, workmanship and operation for a period of two years from the date of acceptance of the work unless otherwise noted differently on the individual specification sections.

2. Warranty shall provide for 24 hour parts availability and 24 hour response time. Supplier shall maintain an adequate parts stock such that equipment down times attributable to unavailable typical repair parts shall be 48 hours or less during the first five year period.

3. The Contractor shall repair or pay for the repair of any such defect at his own expense.

4. Work which has been abused or neglected is excluded from this warranty.

5. Furnish written warranties required by the respective sections of the Specifications for time stipulated therein. These warranties shall be in writing, on the Contractor's or supplier's letterhead and shall be included in the operations and maintenance manual(s) as specified in 1.04 of this section.

6. Major equipment components, (as required by the respective sections of the specifications) specifically those manufactured by those other than the primary equipment supplier, shall be covered by their own respective warranties, which shall not be less than the suppliers mandated one-year warranty or as noted on the specifications sections. These warranties shall also be included in the operations and maintenance manual(s).

7. Nothing in these requirements, conditions or specifications including the University of Arizona Representative's right to a complete inspection shall
1.07 NOISE AND VIBRATION ISOLATION

A. Operation of the equipment shall not exceed noise and vibration limits established by OSHA, local code or other regulatory requirements. Where required, provide approved type noise and vibration isolation pads equipped with necessary bearing plates and bolts. Pads shall be specifically designed for the weights, speeds and vibration characteristics of the equipment supported. The pads shall provide proper distribution of weight to avoid distortion of the bedplates.

B. Bolts and other fastenings in connection with these pads shall also be isolated.

1.08 SHOP PAINTING

A. Equipment shall be given one shop prime coat of approved rust-inhibitive paint containing at least 50 percent rust-inhibitive pigments and manufacturer's standard finish coat system. Shop drawings shall indicate brand and type of paint for both the prime coat and finish coat systems, as well as the color of all finish coats. All color selections must be approved by the University of Arizona Representative.

B. Special equipment painting requirements are outlined in the respective sections of Divisions 11 and 14, as well as Section 10 67 00.

C. Refer to Painting and Coatings Section of specifications for specific requirements for painting interior and exterior galvanized surfaces and ferrous metal surfaces.

1.09 ELECTRICAL REQUIREMENTS

A. Electrical materials and devices shall conform to the standard of Underwriters' Laboratories, Inc. (UL). Where material standards have not been established by UL, standards of quality and performance shall be those of the specified manufacturers, subject to approval of the agencies having jurisdiction. Products that are not UL listed shall be tested in place to demonstrate that the item complies with FEP (Field Evaluated Product) UL requirements. The Contractor is responsible to include the costs for all such testing in his bid price and no additional compensation related to this testing will be provided.

B. Power supply for equipment shall be 480 volts, 3-phase, 60 hertz unless otherwise specified or as required by the specific piece of equipment.

C. Provide transformers for equipment as required to step down the specified supply voltage to provide lower voltage for controls and accessories and to provide voltage compatible with equipment as required.
D. Wiring shall be provided for complete installation of all equipment and accessories and shall be adequate for proper operation of equipment. Disconnect switch shall be provided for each equipment item requiring electric power. Disconnect switch shall meet the requirements of the respective equipment item manufacturer and these Specifications. Permanently label each disconnect switch to identify corresponding equipment item; labeling method shall conform to Division 1 and be subject to approval of the University of Arizona Representative. Contractor shall provide power wiring to line side of disconnect switch. Make connection to secondary side of disconnect switch and provide all wiring and conduit from this point, including wiring to controllers and starters. Provide 480-volt, 230 volts and 208 volt equipment, as required, with electric fusible disconnecting means, sized and fused as required for each equipment item. All disconnect switches shall be fused with 200,000-amp limiter fuses. Provide 120-volt equipment with electric thermal overload disconnecting means sized as required for each equipment item. Wire and cable for light, power and signal circuits shall conform to those specified in the National Electrical Code. In no case shall maximum current carried exceed that specified by National Electrical Code for type of conductor used. Provide conduit where required; all wiring and conduit shall be in accordance with the requirements of Division 26 - Electrical.

E. Motors:
1. Motors shall be high efficiency makes, each bearing the UL label and constructed to standard of NEMA, IEEE, ANSI, and AFBMA.
2. Motors shall be suitable for operation on the electrical service indicated.
3. Horsepower ratings and sizes shall be selected at 104°F ambient temperatures for open motors, with a service factor of 1.15 for open motors and unity service factor for totally enclosed or drip-proof motors. Provide motors with epoxy encapsulated insulation for severe usage in a corrosive atmosphere.
4. Motors rated one horsepower or greater shall have a full-load power factor of 85 percent or higher. Motors rated 25 horsepower and over shall be designed for reduced voltage starting.

F. Drives:
1. Guards shall be provided for each coupling and belt drive in conformance with applicable codes.
2. Belt drives shall have adjustable motor drive pulleys, and pulleys shall be replaced by the Contractor if required to properly operate the equipment.
3. Provide sliding motor bases where adjustable motor drive pulleys are provided.

1.10 GASKETS AND FASTENERS

A. Provide new gaskets wherever gasketed mating equipment items or pipe connections have been dismantled. Gaskets shall be in accordance with manufacturer's recommendations.
B. Replace all assembly bolts, studs, nuts and fasteners of any kind which are bent, flattened, corroded, or have their threads, heads or slots damaged.

C. Furnish all bolts, studs, nuts and other fasteners for make-up of all connections to equipment and replace any of these items damaged in storage, shipment or moving. Bolts shall comply with applicable SAE requirements including manufacturer's identification and certification of testing.

1.11 EQUIPMENT

A. Equipment, machinery and materials shall be as specified in Divisions 11 and 14, as well as Section 10 67 00.

B. Starters, controllers, disconnect switches and start-stop stations shall be provided for all equipment. Correct sizing of starters and disconnect switches shall be the joint responsibility of the Contractor and the equipment or apparatus manufacturer.
   1. Electrical enclosures shall be NEMA 12 for indoor units and NEMA 4 for outdoor units unless otherwise noted by the University of Arizona Representative.
   2. Starters shall be complete with two sets of auxiliary contacts; one set normally open; one set normally closed.
   3. For motors 25 HP or greater provide auto transformer type reduced voltage starters.
   4. Provide labels for all disconnects for the equipment furnished under respective section of work.

C. Control devices necessary for proper operation shall be provided and shall be located to permit efficient operation of the equipment, and where possible shall be grouped in a factory fabricated NEMA approved control panel complying with the Specifications.

D. Switches, lights and control functions shall be identified with commercially available touch pads. The touch pads shall be industrial type oil resistant, etc. that are used on CNC control panels. No decals will be accepted.

E. Piped services for equipment shall be terminated near the piece of equipment in a shut-off means. As part of the work of this Section, extend these piped services to the equipment and make the connections.

F. Provide piping, fittings, valves, connections, etc., of a type and size as recommended by the equipment manufacturer that will properly interface with the existing piped services.

G. All piping, valves, fittings, conduits and wiring required for the equipment installation shall be in accordance with the applicable portions of these Specifications.
1.12 INSTALLATION REQUIREMENTS

A. Furnish common and skilled labor, tools, rigging equipment, scaffolding, shims, dowels, and other materials necessary to make complete installation of equipment specified and indicated in the Contract Documents. Equipment Manufacturer shall provide onsite representative during equipment installation.

B. Receive, unload, check and store equipment in suitable facilities. All equipment should be kept clean, dry, and free from damage and be marked and tagged with equipment item numbers.

C. Examine equipment for concealed damage and report any damage.

D. Be responsible for safety and protection from loss or damage of equipment received until work is complete.

E. Pay demurrage charges and claims for damage resulting from unloading operations.

F. Reassemble equipment items which were dismantled for shipment or moving. Assemble items which are delivered knocked down or disassembled.

G. Coordinate the installation of equipment with the University of Arizona Representative.

H. Protect equipment during storage and prior to start-up, which shall include covering of openings, protection against rust and other damage, etc. Equipment may be stored outdoors only with approval of the University of Arizona Representative.

I. Furnish and install grout, shim material and miscellaneous steel necessary for brackets, anchors, or supports required in installation of equipment.

J. Accomplish field machining that might be required to fit equipment together or to install equipment.

K. Lubricate apparatus before start-up per manufacturer’s specifications and recommendations, or as necessary.

L. Field check for clearance and interferences before fabrication or installation and relocate material and equipment furnished as required to eliminate interferences as approved by the University of Arizona Representative.

M. Details listed in these specifications are given for a better understanding of the work required by the Contractor, and do not place a limitation on the amount of work to be done nor do they relieve the Contractor of additional work that may be required for a complete installation.
N. Work associated with the support of maintenance equipment to the building structure must be coordinated and approved by the building manufacturer prior to installation. Building manufacturer shall provide sealed structural calculations and details for the supports for the equipment to include but not limited to Overhead Crane rail supports, fluid reel bank supports and exhaust reel supports to assure that proper coordination and design has been coordinated between the building manufacturer and the equipment manufacturer’s shop drawings.

O. Perform mechanical and electrical work required to install the equipment in accordance with the requirements of the jurisdictional authorities and the current applicable codes and standards of practice employed by these trades. Follow approved manufacturer’s shop drawings for proper dimensions and location of required utilities.

P. The Contractor shall be responsible for the relocation of all existing equipment from the existing shops identified in the equipment schedule on Drawing Q-001 to be installed at the new shop locations. The Contractor shall be responsible to coordinate with the University of Arizona Representative, the decommissioning, documentation, storage, relocation, and installation at the new location as shown on the contract documents including start-up and testing of the existing equipment. Contractor shall coordinate all utility connections and requirements and provide all miscellaneous fixtures as required for a proper installation of the relocated equipment to include new electrical, pneumatic, hydraulic components, concrete pads and other requirements to connect the equipment. Any ventilation ducting, or drain connection required for the proper installation and operations of the existing equipment to be relocated shall be coordinated with the University of Arizona Representative and the Contract Documents. The equipment relocation shall follow a schedule coordinated with the University of Arizona Representative to allow proper execution to minimize downtime to the Departments.

The existing equipment to be relocated is identified on the Q Drawing schedule with a designation of OFCI – Owner Furnish Contractor Installed as shown on drawing Q-001 – Schedules and Notes and on the equipment layout Q-101. Contractor shall be responsible for verifying proper quantity with the University of Arizona Representative and assume responsibility for the work as part of this contract. All equipment damaged during relocation shall be the responsibility of the Contractor to repair or replace in kind. Contractor shall assume that no existing equipment documentation is available for the existing equipment to be relocated but will confirm all equipment is operational prior to decommission.

All equipment and storage components to be relocated must be re-installed and anchored in the identified locations following specific Seismic Design guidelines per the Seismic codes having jurisdiction in the City of Tucson, the State of Arizona and any other code having jurisdiction.
1.13 HOLES, OPENINGS AND INSERTS

A. Provide holes and openings in floors, walls, ceilings and roofs as required. Coordinate all holes and openings with reinforcement as required by Structural Contract Drawings. Also coordinate all holes and openings with sleeves and conduits from all other disciplines.

B. Core drill holes in existing work using dustless method. Grout holes in concrete walls, floor and roof slabs after installation of equipment, and leave them in a completely neat and sealed condition.

C. Install concrete inserts and flashings as required.

1.14 SETTING AND ALIGNING EQUIPMENT

A. Equipment shall be set and aligned in accordance with manufacturer's recommendations, approved shop drawings and applicable standards of trade practice.

B. Equipment shall be set true and level. Demonstrate adequate leveling of installed equipment.

C. Retighten bolted connections after installation.

1.15 CLEANING AND PROTECTION

A. Clean fabricated assemblies and equipment items thoroughly before and after operating and testing.

B. Protect equipment from damage, deterioration, paint or coating spills or spots, corrosion, or harm from any source.

1.16 CONCRETE FOUNDATIONS

A. Provide concrete foundations for equipment as required for proper installation and operation. Contractor shall be responsible for all foundation modifications required due to requested substitutions to the specified equipment.

B. Concrete and reinforcement shall conform to Division 3 and Division 5.

C. Provide anchor bolts as required for equipment to be mounted. Size anchors for embedding in concrete and expansions anchors as recommended by the equipment manufacturer, in accordance with specified seismic criteria.

D. Provide grouting as necessary to stabilize equipment bases to concrete foundations.
E. Provide hard rubber shims and dampening pads as recommended by the equipment manufacturer for leveling of equipment and dampening of equipment vibration transmission.

1.17 EQUIPMENT TEST AND CHECK-OUT

A. Before Final Acceptance, the Contractor installed equipment and systems shall be tested in accordance with Division 1 (by a testing agency when required) in the presence of the University of Arizona Representative to his satisfaction and demonstrated to be correctly connected and installed. Submit a testing schedule to the University of Arizona Representative for approval prior to the start of the equipment test and check-out.

B. Testing and check-out procedures of the manufacturer shall be carried out completely.

C. Equipment tests shall not only be performed to demonstrate that the equipment has been properly installed and connected and operates properly but also to demonstrate that the equipment performs the work as described in Divisions 11 and 14 and Section 10 67 00 - Equipment Specifications.

D. Tested equipment found to be defective or inoperable to any extent shall be reported to the University of Arizona Representative immediately.

E. Any operating difficulty or defective item shall be repaired or replaced and put into proper operation by the Contractor immediately, at no additional expense to the University of Arizona.

F. Protect equipment and surrounding areas from damage resulting from testing operations. Clean-up spills or leakage from testing.

G. The Contractor shall bear all expenses of all tests, including the furnishing of all necessary instruments, lubricant, hydraulic fluids, supplies, data recorders, certificates and operating personnel. Provide and bear all expenses for fluid and power required to operate the equipment during the tests.

H. At the sole discretion of the University of Arizona Representative, the Contractor will be required to repeat any test at the Contractor’s expense.

1.18 MOTORS AND DRIVES

A. Motors and drives shall be checked carefully for correct rotation and alignment before placing equipment into operation.

B. Couplings shall be disconnected and realigned before placing into service or testing.
C. Belt drives shall be adjusted and worn belts replaced in sets. Speed adjustment shall be subject to approval of the University of Arizona Representative.

1.19 INSPECTION

A. Work will be inspected by the University of Arizona Representative periodically during construction.

B. Provide for inspections by all those having jurisdiction over the work performed under Divisions 11 and 14 and Section 10 67 00 during the progress of the work.

C. At time of final inspection, furnish certificate or certificates of final approval by all those having jurisdiction as applicable.

1.20 FIELD PAINTING

A. Field painting equipment, including touch-up painting, if any, is included under this Section of Specifications. Normally, equipment shall be factory-finished as previously specified.

B. Where factory finishes are provided on equipment and no additional field painting is specified, all marred or damaged surfaces shall be touched up or refinished so as to leave a smooth, uniform finish at the time of final inspection.

1.21 EQUIPMENT START-UP

A. Unless otherwise specified in other Sections of these Specifications, all lubricants, cleaning compounds and similar operating materials will be furnished by the Contractor during start-up and testing.

B. After all equipment and systems have been installed, connected and tested, proceed with start-up.

PART 2 PRODUCTS
Not Used

PART 3 EXECUTION
Not Used

END OF SECTION 11 00 50