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**PART 1 GENERAL****1.1 RELATED DOCUMENTS**

- A. The requirements of the General Conditions, Supplementary Conditions and the following Division 28 Fire Detection, Alarm, and Communication Systems (FDAC System) specification sections apply to the Work of this Section:
1. Section 28 31 20 - FDAC Scope of Work
  2. Section 28 31 30 - FDAC Systems
  3. Section 28 31 40 - FDAC Testing

**1.2 SUMMARY**

- A. Division 28 FDAC Specifications requires the furnishing and installing of the FDAC System, including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the Work include, but are not limited to, materials, labor, supervision, supplies, equipment, transportation, hoisting/rigging, storage, utilities and all required permits and licenses.
- B. Definitions:
1. For purposes of these Specifications the following definitions apply:
    - a. "Engineer" - the Engineer of record.
    - b. "provide" - to "furnish" and "install".
    - c. "install" - to join; unite; fasten; link; attach; set up or otherwise connect together; complete, tested and ready for normal satisfactory operation.
    - d. "furnish" - to supply all materials, labor, equipment, testing apparatus, controls, tests, accessories and all other items customarily required for the proper and complete application.
    - e. "as directed" - as directed by the Architect or the Engineer.
    - f. "concealed" - embedded in masonry or other construction, installed behind wall furring or within double partitions or installed within hung ceilings.
    - g. "submit" - submit to the Architect and/or the Engineer for review.
    - h. "AutoCAD" - AutoCAD 2007 or later compatible format.
- C. Abbreviations:
1. For purposes of these Specifications the following abbreviations apply:
    - a. AABC - American Association of Balancing Contractors
    - b. ABMA - American Boilers Manufacturers Association
    - c. ADA - Americans with Disabilities Act
    - d. ADC - Air Diffusion Council
    - e. AGA - American Gas Association
    - f. AHJ - Authority Having Jurisdiction
    - g. AISC - American Institute of Steel Construction
    - h. AMCA - Air Movement and Control Association
    - i. ANSI - American National Standards Institute
    - j. ARI - Air Conditioning and Refrigeration Institute
    - k. ASA - Acoustical Society of America
    - l. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers
    - m. ASME - American Society of Mechanical Engineers
    - n. ASPE - American Society of Plumbing Engineers
    - o. ASTM - American Society for Testing and Materials
    - p. AWS - American Welding Society
    - q. AWWA - American Water Works Association
    - r. BMCS - Building Management and Control System
    - s. CDA - Copper Development Association
    - t. CISPI - Cast Iron Soil Pipe Institute
    - u. CTI - Cooling Tower Institute
    - v. ECC - Engineer's Control Center
    - w. EPA - Environmental Protection Agency
    - x. ETL - Electric Testing Laboratory
    - y. FACP - Fire Alarm Control Panel

- z. FARA - Fire Alarm Remote Annunciator
- aa. FARP - Fire Alarm Remote Panel
- bb. FATC - Fire Alarm Terminal Cabinet
- cc. FCC - Fire Control Center
- dd. FCIP - Firefighter's Control and Indicating Panel
- ee. FDAC - Fire Detection, Alarm and Communication
- ff. FM - Factory Mutual
- gg. FS - Federal Specification (General Services Administration)
- hh. IEEE - Institute of Electrical and Electronic Engineers
- ii. IRI - Industrial Risk Insurers
- jj. MCAA - Mechanical Contractors Association of America
- kk. MIL - Military Standardization Documents
- ll. MSDS - Materials Safety Data Sheet
- mm. MSS - Manufacturers' Standardization Society Standards
- nn. NEBB - National Environmental Balancing Bureau
- oo. NEC - National Electrical Code (NFPA 70)
- pp. NEMA - National Electrical Manufacturers Association
- qq. NFPA - National Fire Protection Association
- rr. NUSIG - National Uniform Seismic Installation Guidelines
- ss. OSHA - Occupational Safety Health Administration
- tt. PDI - Plumbing and Drainage Institute
- uu. SAE - Society of Automotive Engineers
- vv. SCC - Security Control Center
- ww. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
- xx. TEMA - Tubular Exchangers Manufacturers Association
- yy. UL - Underwriters Laboratories
- zz. VCS - Voice Communication System
- aaa. UPS - Uninterruptible Power System

### 1.3 REFERENCE STANDARDS

- A. All rules and regulations of the Fire Insurance Regulatory Body, City of San Francisco, Underwriters Laboratories, IRI, ETL and the National Electrical Code, shall, at a minimum, be complied with whether indicated in the Drawings and Specifications or not.
- B. All equipment and material to be furnished and installed on this Project shall be UL or ETL listed, in accordance with the requirements of the authorities having jurisdiction, and suitable for its intended use on this Project.

### 1.4 SUBMITTALS

- A. The following submittal data shall be furnished according to the General Conditions and this Section of the Division 28 FDAC Specifications and shall include, but not be limited to:
  1. Product Data\*.
  2. Shop drawings, stamped and signed as the FDAC Engineer-of-Record
  3. Coordination Drawings.
  4. Project Record Documents.
  5. Operating and Maintenance Books.
  6. Firestop Materials including all UL assembly installation details for all applications.
- B. All items or equipment listed with asterisks (\*) shall be certified by the manufacturer using Manufacturer Certification "MCA" as set forth in Section 28 31 10. See Section 28 31 10 for certification requirements.

### 1.5 WARRANTY

- A. Comply with the requirements of the General Conditions and Section 28 31 10.

**1.6 COMPLETE PERFORMANCE OF WORK**

- A. Work shall be executed in strict accordance with the best practice of the trades in thorough, substantial, workmanlike manner by competent skilled technicians and trade personnel.
- B. The Subcontractor shall provide a competent, experienced, full time Superintendent who is authorized to make decisions on behalf of the Subcontractor.
- C. All labor, materials, apparatus and appliances essential to the complete and proper functioning of the system described and/or indicated herein or which may be reasonably implied as essential, whether mentioned in the Drawings and Specifications or not, shall be furnished and installed by the Subcontractor.
- D. Prior to making required submittals, the Contractor shall meet with the Fire Department and make an informal presentation of the fire management system. Meeting minutes shall be issued and submitted with the submittal drawings, with comments incorporated into the required submittals.
- E. The fire management system submittal drawings shall be prepared under the supervision of a Professional Engineer registered in California, and submitted drawings and calculations shall bear the Engineer's stamp.
- F. The FDAC Subcontractor shall have in-house engineering and project management capability consistent with the requirements of the project. Qualified representatives of the system manufacturer shall perform the detailed engineering design of central and remote control equipment, and shall produce all panel and equipment drawings, submittals and operating manuals. The FDAC Subcontractor is responsible for detailed system design and documentation, coordination of system installation requirements and final system testing in accordance with these specifications
- G. The Subcontractor shall coordinate the Work specified herein and shown on the Drawings with all other trades.

**1.7 PRECONSTRUCTION CONFERENCE PRIOR TO START OF WORK**

- A. Prior to commencing any Work, the Contractor together with designated major Subcontractors shall confer with the Architect and Engineer concerning the Work under the Construction Contract.
- B. The pre-construction conference will be conducted under the leadership of the Contractor and will occur soon after the Contractor notifies the Subcontractors of contract award. The pre-construction conference will focus on items such as the expedited submittal review procedure, interface and coordination between Subcontractor work scope, the Contractor's project site rules and requirements, temporary utility requirements, Contractor's construction schedule, etc.

**1.8 DRAWINGS**

- A. The Drawings show the general layout of the various items of equipment. However, layout of equipment, accessories, specialties, ductbanks and conduit systems are diagrammatic unless specifically dimensioned and do not necessarily indicate every required fitting, support or similar items required for a complete installation. Consult the Architectural Drawings and details for exact locations of fixtures and equipment. Where same is not definitively located, obtain the information from the Architect before proceeding. Any reasonable changes in locations indicated shall be made by the Subcontractor without additional cost to the Owner, if such changes are ordered prior to performance of the affected Work.
- B. The Subcontractor shall follow the Drawings in laying out the Work and check Drawings of all trades to verify spaces in which Work will be installed. Maintain maximum headroom and where space conditions appear inadequate, the Architect shall be notified before proceeding with the installation.
- C. Equipment shown on the Drawings with particular manufacturers identified has been coordinated for structural penetrations, electrical connection, operating and service (maintenance) requirements and physical size with regard to the space where the equipment is shown. If they comply with the Specifications, these and the other specified manufacturers of this equipment will be acceptable contingent on the Subcontractor providing a complete installation and maintaining full responsibility to provide at no additional

cost, any modifications to the Architectural, Structural, Mechanical or Electrical systems that are required to properly install, operate and service the equipment being used. These modifications shall not include additional area for equipment unless approved by the Architect.

1. The Subcontractor shall note these changes on the equipment submittals and the Compliance Reviews and shall show all differences in equipment being supplied from that specified and shown on the Drawings. Failure of the Subcontractor to provide this information with the submittal will indicate the submitted equipment meets or exceeds the requirements of equipment shown on the Drawings in performance and is physically no larger in housing size.
  - a. Failure of the Subcontractor to comply with the above and any discrepancies found shall result in the Subcontractor providing equipment equal to that specified at the Subcontractor's expense.

#### **1.9 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES**

- A. In accordance with the Subcontractor Scheduling Procedures in Section 28 31 20 titled "Scope of Work", the Subcontractor shall submit to the Engineer for review a complete, typed list of all equipment manufacturers and material suppliers for the equipment and materials he intends to furnish and install on this Project.
- B. The Division 28 FDAC Subcontractor shall prepare an index of all Division 28 FDAC submittals for the Project. The index shall include a submittal identification number, an item description and a cross-reference to the Specification Section or Drawing number and an item description. The submittal identification number shall be fixed by the applicable Specification Section (e.g. 28 31 30 – 001 Fire Detection, Alarm and Communication Systems). Each submittal shall bear the submittal identification number in addition to the other data specified. All consultants, the Owner and all Subcontractors will utilize the assigned submittal identification number. If an expedited submittal review process is implemented on this Project, the equipment manufacturers, material supplies list, and submittals index will have to be submitted early to meet the requirements of the expedited submittal review procedure. Refer to Section 28 31 20 titled "Scope of Work" Paragraph 3.02 "Subcontractor Scheduling Procedures" for additional information.
- C. Upon receipt of the approved manufacturers and material suppliers list (paragraph 1.09A), the Subcontractor shall immediately obtain complete Shop Drawings, Product Data and Samples from the manufacturers, suppliers, vendors and all Subcontractors, for all materials and equipment as specified herein in various sections of the Specifications and shall submit data and details of such materials and equipment for review by the Architect and Engineer. Prior to submission of the Shop Drawings, Product Data and Samples to the Architect and Engineer, the Subcontractor shall thoroughly review the Shop Drawings, Product Data and Samples and certify they are in compliance with the Contract Documents.
- D. The Subcontractor shall check all materials and equipment upon their arrival on the Project Site and verify their condition and compliance with the Contract Documents. Any Work that proceeds prior to receiving "Final Review" Shop Drawings shall be modified as required to comply with the Contract Documents and the "Final Review" Shop Drawings. A minimum period of ten (10) Working days, exclusive of transmittal time, will be required in the Engineer's office each time a Shop Drawing, Product Data and/or Sample is submitted or resubmitted for review. This time period shall be considered by the Subcontractor when scheduling his Work.
- E. The review of Shop Drawings, Product Data and Samples by the Architect and Engineer shall not relieve the Subcontractor of the responsibility for dimensions or errors that may be contained therein or for deviations from requirements in the Contract Documents. It shall be clearly understood that the noting of some errors by the Engineer but overlooking others does not grant the Subcontractor permission to proceed in error. Regardless of any information contained in the Shop Drawings, Product Data and Samples, the Contract Documents shall govern the Work and are neither waived nor superseded in any way by the review of Shop Drawings, Product Data and Samples.

- F. Before submitting Shop Drawings, Product Data and Samples, the Subcontractor shall certify that data and details set forth on each Shop Drawing, Product Data or Sample for each item of equipment and materials complies with the Contract Documents for this Project. Such certification shall be made by a person duly authorized to sign binding agreements for the Contractor and Subcontractor. Unless certified as set forth hereinafter, Shop Drawings, Product Data and Samples will not be reviewed and will be returned unchecked to the Contractor for resubmittal.

The Subcontractor and Contractor certification shall be similar to the following:

<p><b>CONTRACTOR/SUBCONTRACTOR CERTIFICATION</b>  <b>“CCA”</b></p> <p><b>The Subcontractor and the Contractor named below hereby certify that this Shop Drawing, Product Data and/or Sample has been checked prior to submittal and that it complies in all respects with the requirements of the Contract Documents and physical space limitations for this Project.</b></p> <p><b>The person signing on behalf of the Subcontractor and the Contractor certifies that he/she is duly authorized to sign binding agreements for and in behalf of the Subcontractor and the Contractor.</b></p> <p style="text-align: center;">_____ (Printed Name of the Subcontractor)</p> <p><b>Signed:</b> _____ (Authorized Employee)</p> <p style="text-align: center;">_____ (Printed Name of Authorized Employee)</p> <p><b>Position:</b> _____</p> <p><b>Date:</b> _____</p> <p style="text-align: center;">_____ (Printed Name of the Contractor)</p> <p><b>Signed:</b> _____ (Authorized Employee)</p> <p style="text-align: center;">_____ (Printed Name of Authorized Employee)</p> <p><b>Position:</b> _____</p> <p><b>Date:</b> _____</p>
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- G. Prior to submission, Shop Drawings, Product Data and Samples for all items of equipment as specified herein in various sections of the Specifications and denoted with an asterisk (\*) shall be certified by the manufacturer as to performance and compliance with the Contract Documents using the manufacturer certification form as set forth hereinafter. Such certification shall be made by a person duly authorized to sign binding agreements for the manufacturer. Unless certified as set forth hereinafter, Shop Drawings, Product Data and/or Samples will not be reviewed and will be returned unchecked to the Contractor for resubmittal.

The manufacturer certification shall be similar to the following:

<b>MANUFACTURER'S CERTIFICATE "MCA"</b>	
<b>The manufacturer named below hereby certifies that the equipment shown on this Shop Drawing, Product Data and/or Sample complies in all respects with the requirements of the Project Specifications for this equipment. The manufacturer further certifies that all data shown hereon as to performance, dimensions, construction, materials and other pertinent items is true and correct. The person signing on behalf of the manufacturer certifies that he/she is duly authorized to sign binding agreements for and in behalf of the manufacturer.</b>	
_____	
(Printed Name of the Manufacturer)	
<b>Signed:</b>	_____
	(Authorized Employee)
	_____
	(Printed Name of Authorized Employee)
<b>Position:</b>	_____
<b>Date:</b>	_____

- H. Inadequate or incomplete Shop Drawings, Product Data and/or Samples will not be reviewed by the Architect and/or the Engineer and shall be returned to the Contractor for resubmittal.
- I. The Subcontractor shall observe the following procedures when submitting Shop Drawings, Product Data and Samples:
  1. Each Shop Drawing shall indicate in the lower right hand corner and each Product Data brochure shall indicate on the front cover the following: the submittal identification number; title of the sheet or brochure; name and location of the Project; names of the Architect and Engineer, Contractor, Subcontractor, manufacturer, supplier, vendor; the date of submittal and the date of each correction and revision. All pages and Drawings in Product Data brochures shall be numbered consecutively from beginning to end. So far as is practical, each Shop Drawing, Product Data and/or Sample shall bear a cross-reference note to the page number or numbers of the sheet of the Drawings and/or Specifications showing the Work. Unless the above information is included, the submittal will be returned for resubmittal. Resubmittals of Product Data or brochures shall be complete and shall include a cover letter summarizing the corrections made in response to the review comments and the submittal page numbers, which were revised.
  2. Shop Drawings shall be done in an easily legible scale and shall contain sufficient plans, elevations, sections and schematics to clearly describe the Work. Drawings shall be prepared by a drafter or CAD technician skilled in this type of Work. The Subcontractor shall submit Shop Drawings as described below. Shop Drawings, which do not comply with these requirements, will be returned for resubmittal.
    - a. The submittal shall consist of one (1) direct reading, clearly legible, paper reproducible of each Shop Drawing. The Architect and Engineer will each review the paper reproducible Shop Drawings. After review of the paper reproducible Shop Drawings, copies will be produced from the submitted Shop Drawing. If the Shop Drawing(s) is marked "FINAL REVIEW" by the Engineer, the following action shall be taken:
      - 1) The Owner, Architect and Engineer will each retain one (1) copy.
      - 2) Six (6) copies from the reviewed reproducible Shop Drawing will be returned to the Contractor.
      - 3) The submitted reproducible Shop Drawing will not be returned.
      - 4) No additional submittal is required for the "FINAL REVIEW" Shop Drawing.

If the Shop Drawing(s) is marked "FINAL REVIEW - EXCEPTIONS NOTED", the following action shall be taken:

- 1) The Owner, Architect and Engineer will each retain one (1) copy.
- 2) Six (6) copies from the reviewed reproducible will be returned to the Contractor.
- 3) The submitted Shop Drawing will not be returned.
- 4) The Subcontractor shall forward a written response to the items noted within fourteen (14) days of the Engineer's review date stamped on the Shop Drawing. The response must be certified as specified. Upon receipt of a satisfactory response, the status of the submittal will be revised to "FINAL REVIEW" by a written document to the Contractor prepared by the Engineer. If the response is not received by the Engineer within fourteen (14) days of the Engineer's review date stamped on the submittal, the "FINAL REVIEW" status will be rescinded.

If the Shop Drawing(s) is marked "RESUBMIT", the following action shall be taken:

- 1) The Owner, Architect and Engineer will each retain one (1) copy.
  - 2) The reviewed submitted Shop Drawing will be returned to the Contractor.
  - 3) The submittal shall be corrected in accordance with Contract Documents and resubmitted in whole for review. Note: The returned submitted Shop Drawing stamped "RESUBMIT" may not be resubmitted.
  - 4) If the submittal is returned to the Contractor marked "RESUBMIT", only one (1) additional submittal will be permitted without the Subcontractor incurring charges for the additional resubmittals. The Owner shall be reimbursed by the Subcontractor for any expense in connection with any necessary submission in addition to the two (2) submissions set forth hereinbefore.
- b. Subsequent submittals of any Shop Drawing previously marked "RESUBMIT" shall have all corrections or other revisions clearly identified.
- c. If the copy stamped "FINAL REVIEW" is altered for any reason after it has been stamped, the "FINAL REVIEW" shall automatically be voided.
- d. All Work shall be done in accordance with Shop Drawings stamped "FINAL REVIEW" insofar as these are in agreement with the Contract Documents. The "FINAL REVIEW" Shop Drawings shall be used in conjunction with the preparation of the Coordination Drawings specified hereinafter. Wherever differences occur between the Shop Drawings and the Contract Documents, the Contract Documents shall govern the Work.
3. Product Data to be submitted shall be published by the manufacturers and shall contain complete and detailed engineering and dimensional information. The Subcontractor shall submit Product Data as described below. Product Data, which does not comply with these requirements, will be returned for resubmittal.
- a. Product Data submittals shall contain only information relevant to the particular equipment or materials to be furnished. The Subcontractor shall not submit catalogs, which describe several different items in addition to those items to be furnished and installed on this Project, unless all irrelevant information is marked out or relevant information is clearly marked. Product Data from each manufacturer shall be identified and submitted separately. Where applicable, equipment Product Data shall include wiring and interlock diagrams using the standard wiring diagrams with all terminals, which have been provided for use by the Division 21, 22, 23, 25, 26 and/or Division 28 Subcontractors clearly indicated. Refer to the Electrical Drawings for additional information.
- b. The submittal shall consist of Product Data from each manufacturer. Product Data will be returned marked "FINAL REVIEW", "FINAL REVIEW - EXCEPTIONS NOTED" or "RESUBMIT". If marked "FINAL REVIEW" no additional submittal will be required. If stamped "FINAL REVIEW - EXCEPTIONS NOTED" the Subcontractor shall forward a written response to the items noted within fourteen (14) days of the Engineer's review date stamped on the submittal. Upon receipt of a satisfactory response, the status of the submittal will be revised to "FINAL REVIEW" by a written document to the Contractor prepared by the Engineer. If the response is not received by the Engineer within fourteen (14) days of the Engineer's review date stamped on the submittal, the "FINAL REVIEW" status will be rescinded by a written document to the Contractor prepared by the Engineer. If stamped "RESUBMIT", the submittal shall be corrected in accordance with the Contract Documents and resubmitted in whole for review. If the submittal is returned to the Contractor marked "RESUBMIT", only one (1) additional submission will be permitted. The Owner shall be reimbursed by the Subcontractor for any expense in connection with any necessary submission in addition to the two (2) submissions set forth herein.
- c. If the Product Data submittal stamped "FINAL REVIEW" is altered for any reason after it has been stamped, the "FINAL REVIEW" will automatically be voided.

- d. All Work shall be done in accordance with Product Data stamped "FINAL REVIEW" insofar as these are in agreement with the Contract Documents. Where differences occur between the Product Data and Contract Documents, the Contract Documents shall govern the Work.
- e. The Subcontractor shall submit nine (9) copies of each Product Data brochure. The Architect and Engineer will each retain one (1) copy of the submittal and the remaining copies will be returned to the Contractor. If the Product Data is marked "FINAL REVIEW" or "FINAL REVIEW - EXCEPTIONS NOTED" the Owner will retain one (1) copy of the submittal in addition to those retained by the Architect and Engineer and the remaining copies will be returned to the Contractor.

#### 1.10 MANUFACTURER'S RECOMMENDATIONS

- A. With exceptions as specified and/or indicated on the Drawings or in the Specifications, the Subcontractor shall apply, install, connect, erect, use, clean, commission and condition manufactured articles, materials and equipment in accordance with manufacturer's current printed instructions and recommendations. Copies of such printed recommendations shall be kept at the Project site and made available as required.
- B. Where the manufacturer's recommendations conflict with the Contract Documents, the conflict shall be brought to the Engineer's attention immediately.

#### 1.11 SPACE LIMITATIONS

- A. In the preparation of the Drawings, reasonable effort to accommodate acceptable equipment manufacturer's space requirements has been made. However, since space requirements and equipment arrangement vary according to each manufacturer, the responsibility for initial access, maintenance access, code required access and proper fit rests with the Subcontractor (see paragraph 1.12). The Contractor and all Subcontractors shall be responsible to contact local authorities having jurisdiction to determine local interpretations of applicable codes and code access and to fully comply with local requirements. Adequate space shall be allowed by the Subcontractor for clearance in accordance with Code requirements and the requirements of the local authorities having jurisdiction and the equipment manufacturer's recommendations.
- B. Physical dimensions and arrangements of equipment to be installed shall be subject to the Architect's and Engineer's review.
- C. The Contractor and all Subcontractors shall coordinate the installation of ductwork, conduit, busway, piping, cables, cable tray, air terminal equipment, etc., installation with lighting fixtures, special ceiling construction, air distribution equipment and the structure. Provide additional rises, drops and offsets as required. If after installed, new ductwork, conduit, busway, piping, cable tray, air terminal equipment, or cable is found to be in conflict with the architecture, structure or other trade Work, which is either existing or shown on the Contract Documents, the ductwork, conduit, busway, piping, cable tray, air terminal equipment, or cable shall be relocated without additional cost to the Owner.
- D. No conduit, equipment, etc., shall be installed in the eight (8) inch high zone directly above the ceiling in tenant areas to allow for tenant build out and flexibility unless otherwise specifically shown on the Drawings or prior written authorization is received from the Engineer.

#### 1.12 CONTRACTOR'S COORDINATION DRAWINGS

- A. The Contractor shall coordinate the efforts of all trades and shall furnish (in writing with copies to the Architect and the Owner) any information necessary to permit the Work of all trades to be installed satisfactorily and with the least possible interference or delay.
- B. The Contractor and all Subcontractors shall prepare a complete set of construction coordination drawings ("Coordination Drawings") indicating the equipment actually purchased and the exact routing and elevations for all lines such as piping, busway, conduit, ductwork, etc., including conduit embedded in concrete and openings, sleeves, etc. required in the structure, walls, partitions, etc. The Coordination Drawings shall be submitted complete for review to the Architect, Engineer and Owner in accordance with the Subcontractor Scheduling Procedures in Section 28 31 20 titled "FDAC Scope of Work". The Coordination Drawing preparation and completion shall comply with the requirements of the Schedule. Prior to commencing the Work, the Subcontractor shall obtain from the Architect or Engineer a set of AutoCAD Architectural and Engineering Drawings on compact disks, to be used to produce the Coordination Drawings. The



Subcontractor shall give to the Architect and Engineer a written release acceptable to the Architect and Engineer signed by a corporate officer of the Subcontractor, prior to receipt of the compact disks. The sheet metal Drawings, prepared on electronic media at a scale not less than 1/8" = 1'-0", shall serve as the base Drawings to which all other Subcontractors will overlay and add their Work. The Mechanical Subcontractor shall be designated as the lead contractor in the development of the composite layering process and shall be responsible for electronically restacking the various trade layers into the final composite drawings. Each trade shall draw their Work on separate layers represented by individual colors. Each Coordination Drawing shall be completed and signed off by the other Subcontractors and the Contractor prior to the installation of the Work in the area covered by the specific Coordination Drawing. The Subcontractor's Work shall be installed in accordance with the Shop Drawings and the Coordination Drawings and shall include the required maintenance access space and the code clearance space. If the Contractor allows one trade to install their Work before coordinating with the Work of other trades, the Contractor shall make necessary changes to correct the condition without extra cost to the Owner. The Coordination Drawings shall indicate piping, conduit, busway and equipment support points and loads exceeding 1,000 lb. imposed on the building structure and shall be submitted to the Architect for review and approval. The elevation, location, support points, static, dynamic and expansion forces and loads imposed on the structure at support and anchor points and the size of all lines shall be indicated. All beam penetrations, slab penetrations and sleeves shall be indicated, sized and shall be coordinated with all other Work. All required code clearance space and required maintenance access space shall be indicated and coordinated with all other Work. All Work routed underground or embedded in concrete shall be indicated by dimension to column and building lines and shall be coordinated. All conduit larger than 1" trade size shall be indicated. This requirement for Coordination Drawings shall not be construed as authorization for the Contractor or Subcontractor to make any unauthorized changes to the Drawings. All space allocations shown on the Drawings shall be maintained, such as ceiling height, eight (8) inch high zone directly above the ceiling reserved for tenant build out and flexibility, chase walls, equipment room size, etc. unless prior written authorization is received from the Architect to change them. Prior to final acceptance of the Work of this Division, the Contractor shall give the Drawing files in AutoCAD on CD-RW Recordable Rewrite Compact Discs, containing the Contractor's coordination documentation, to the Owner.

#### 1.13 COMPOSITE WIRING DIAGRAMS FOR MOTOR CONTROL

- A. The Division 26 Subcontractor shall furnish the standard wiring and interlock diagrams from the equipment Shop Drawings to the Division 25 and Division 28 FDAC Subcontractors in accordance with the Subcontractor Scheduling Procedures in Section 26 31 10 titled "FDAC Scope of Work" for those items of equipment where there is joint responsibility for the wiring. Such items shall include the motor starters, inverter speed drives, motor operated dampers, water chilling units, electric heating coils, cooling towers, pumping systems, etc. The standard wiring diagrams furnished to the Division 25 and Division 28 FDAC Subcontractors shall indicate those terminals, which have been provided for the use of the Division 25 and Division 28 FDAC Subcontractors. Refer to the Contract Drawings for additional information. One (1) diagram shall be provided for each item. Drawings shall be suitable for insertion in a three-ring binder.
- B. The Division 25 BMCS and Division 28 FDAC Subcontractors shall add to these Drawings, those connections to be made for the control and/or monitoring of the motors, dampers, FDAC systems and other items of equipment. The completed composite wiring diagram ("Composite Wiring Diagram") shall include all line and low voltage wiring between temperature control items, motor start stop and/or H-O-A stations, control relays, pumps, controllers, switches, differential pressure switches, actuators, fire alarm system, etc.
- C. The intent of this requirement is that a single Composite Wiring Diagram shall be available for each item of equipment indicating the wiring in its entirety including interlocks. Any omissions or errors noticed by the Subcontractor shall be brought to the attention of the Architect and the relevant consultants immediately.
- D. Each conductor termination shall be suitably identified by a termination number or symbol. In addition, each conductor termination shall be suitably indexed to identify the termination location of the other end of the wire.
- E. All internal wiring of panels (in detail) shall be included in the Composite Wiring Diagrams. For such items as motor starters, etc., all jumpers added or removed shall be clearly indicated as being "added" or "removed".

- F. The Composite Wiring Diagrams shall include description of the interlock sequence of operation. The description shall include complete identification of each item shown (relay, motor controller, etc.) and each item's exact operation shall be related to the interlock sequence.
- G. The Division 25 and Division 28 FDAC Subcontractors shall complete its Work on the Composite Wiring Diagrams and shall return them within two (2) months of receiving them to the Division 23, Subcontractors who shall verify that the wiring added to the Drawings is correct. If necessary, corrections shall be made by the Division 25 and Division 28 FDAC Subcontractors.
- H. The Division 28 FDAC Subcontractor shall coordinate the requirements of the Division 25 and Division 26 Subcontractors for all electrical equipment as to the need for terminal strips, etc.

#### 1.14 EQUIPMENT AND SYSTEM INTERFACES TO THE BMCS

- A. The Division 28 FDAC Subcontractor shall coordinate with the Division 25 BMCS Subcontractor to determine all monitoring and control points that are required to be monitored from the Division 28 FDAC equipment and systems to the BMCS. The Division 28 FDAC Subcontractor shall provide details of the method of integration and the information to be transferred between the systems as part of the equipment or systems submittal package.
- B. Refer to 25 00 30 for coordination and testing requirements.

#### 1.15 SLEEVES, CUTTING, PATCHING AND FIRESTOP

- A. The Subcontractor shall be responsible for the timely placing of sleeves as detailed on the Drawings and the Coordination Drawings for all conduit passing through walls, partitions, beams, floors and roofs as noted below, while the same are under construction:
  - 1. All concrete or masonry construction.
  - 2. Wall construction where the penetration must be sealed air tight. Patches for penetrations through drywall for Work installed prior to finish application shall be provided by others.
  - 3. Fire rated wall construction.
  - 4. Where indicated on the Drawings.A conduit sleeve shall be at least one (1) size larger than the size of conduit including the insulation where applicable, it serves except where "Link Seal" casing seals are used in sleeves through walls below grade. Sleeves shall be sized such that the annular space between the sleeve and the conduit will not be less than 1/2" or more than 1" unless otherwise required by the firestop system. All conduit passing through concrete or masonry walls above grade shall have at least 18 gauge galvanized steel sleeves. Sleeves shall be set flush with finished wall. All sleeves in floors shall extend a minimum of two inches above the finished floor. Sleeves installed in fire rated construction shall be of suitable length and diameter to accommodate the fire safing system used. Sleeves set in concrete floor construction shall be at least 16 gauge galvanized steel. Where the conduit passes through a sleeve, no point of the conduit shall touch the sleeve and the conduit shall be centered in the sleeve.
- B. Seal all conduit, conductor, or cable penetrations of fire rated construction with factory built devices or with manufactured fill, void or cavity materials "Classified" by Underwriters Laboratories, Inc. for use as a Through Penetration Firestop. All firestop devices and systems shall be approved for such use by the authorities having jurisdiction. The firestop system used shall maintain the fire resistance rating of the building component that is penetrated. Firestop systems and devices shall comply with ASTM E-814 (UL 1479), NEC 300-21, and NEC 800-52(b) for all types of penetrations being sealed. Submittal data for fire-stop systems shall include the UL System Numbers listed in the UL Building Materials Directory under which the material was tested in accordance with ASTM E 814 (UL 1479) for use in a "Through Penetration Firestop System". The firestop system or device used shall not require derating the ampacity of electrical conductors. Excessive shrinkage of the firestop materials, which would permit the transmission of smoke or water prior to exposure to a fire condition, is unacceptable. Where a mastic is used to seal the surface of the firestop, the mastic shall be nonhardening. The firestop system used shall accommodate expansion and contraction of the electrical raceway systems and busways without damaging the firestop or reducing its effectiveness as a smoke barrier or water seal. The firestop manufacturer's representatives shall instruct the Subcontractor's representatives in the proper installation procedure so that the penetrations on the Project will be installed in accordance with the UL listing and the manufacturer's recommendations. If it complies

- with these Specifications, firestop sealing component/system as manufactured by one of the following manufacturers will be acceptable:
1. Tremco Fire Resistive Joint System using Dymeric sealant and Cerablanket-FS mineral filler.
  2. Specified Technologies, Inc. Spec Seal Systems.
  3. 3M Fire Barrier Penetration Sealing Systems.
  4. GE Pensil Firestop Sealant by General Electric.
  5. International Protective Coatings Corp. Flame Safe Systems.
  6. Thermal Ceramics FireMaster Firestop Fire Protection Systems.
  7. Hilti FS - 601 Systems
- C. Sleeves penetrating walls below grade shall be standard weight black steel pipe with 1/4" thick steel plate water seal secured to the conduit with continuous fillet weld. The water seal plate shall be located in the middle of the wall and shall be two (2) inches wider all around than the sleeve it encircles. The entire assembly shall be hot dipped galvanized after fabrication. Seal off annular openings between conduit and sleeve with a through wall type casing seal similar to "Link Seal" as manufactured by Thunderline Corporation, Innerlynx, or OZ Gedney. The conduit sleeve shall be sized to accommodate the Thunderline casing seal. Casing seals shall be Series 300 for conduit sizes 3/4" through 4" and Series 400 for conduit 5" and larger.
- D. If holes and/or sleeves are not properly installed and cutting and patching becomes necessary, it shall be done at no additional expense to the Owner. The Subcontractor shall undertake no cutting or patching without first securing the Architect's written approval.
- E. All unused sleeves shall be sealed with firestop devices and systems to maintain the fire rating of the construction penetrated.

#### **1.16 MISCELLANEOUS STRUCTURAL SUPPORT MEMBERS**

- A. Where conduit, cable, etc. are routed vertically through shafts, the Subcontractor shall furnish and install all necessary miscellaneous structural members to support the loads imposed by the risers.
- B. Where equipment (conduit racks, etc.) is supported from structural slabs, the Subcontractor shall provide all miscellaneous structural members to support the loads plus a 250lb. live load.
- C. The Subcontractor shall submit Shop Drawings of the riser and/or equipment support system to the Project Structural Engineer for approval, including details of how the riser and/or equipment support structure is to be attached to the building structure.
- D. The Subcontractor shall provide all miscellaneous support members required to support horizontal conduit.
- E. Miscellaneous structural support members installed in central plants, mechanical rooms and where exposed to public view shall be galvanized.

#### **1.17 ESCUTCHEONS**

- A. Furnish and install heavy chrome plated or nickel plated escutcheons of approved pattern on all conduit passing through walls and ceilings in finished areas. Escutcheons shall be B&C No. 10 or approved equal chrome plated or nickel plated steel plates with concealed hinges. Unless finished areas are specifically indicated on the Drawings, they are areas that are normally accessible to either the Tenant or the public.

#### **1.18 PAINTING**

- A. Painting, except as specified herein or indicated otherwise, shall be done under another Division. The Subcontractor shall cooperate with the other Division Subcontractors to determine size of equipment, sizes and lengths of conduit, etc., to be painted.
- B. Equipment furnished under this Division shall be factory finished. If the factory finish is damaged during shipment, storage, installation, etc., it shall be repainted by the Subcontractor subject to the Engineer's approval. Touchup painting is acceptable only for minor finish damage.

**1.19 MATERIALS AND EQUIPMENT**

- A. Materials and equipment shall be new and in good condition. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the Work.
- B. Materials and equipment, which are found to have factory defects, shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Subcontractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, recommissioning of the equipment, etc.

**1.20 DELIVERY, DRAYAGE AND HAULING**

- A. Include all drayage, hauling, hoisting, shoring and placement in the building of equipment and materials specified herein. The Subcontractor shall be responsible for the timely delivery and introduction of equipment to the Project as required by the Schedule. If any item of equipment is received prior to the time required, the Subcontractor shall be responsible for its proper storage and protection until such time as it may be required. The Subcontractor shall pay all costs of demurrage or storage in a bonded warehouse.
- B. If any item of equipment is not delivered to or installed at the Project site in a timely manner as required by the Schedule, the Subcontractor shall be solely responsible for disassembly, reassembly, manufacturer's supervision, shoring, general construction modifications, delays, overtime costs, etc. No additional costs or delays shall be incurred by the Owner.

**1.21 EQUIPMENT AND MATERIAL PROTECTION**

- A. The Subcontractor shall protect the Work, equipment and material of all other trades from damage by its Work or its personnel and shall correct all damage thus caused without additional costs to the Owner.
- B. The Subcontractor shall be responsible for all Work, materials and equipment until finally inspected, tested and accepted. The Subcontractor shall protect its Work against theft, injury or damage and carefully store material and equipment received on the Project Site, which is not immediately installed. The Subcontractor shall close open ends of Work with temporary covers or plugs acceptable to the Engineer and/or Owner during the construction period to prevent entry of dust, dirt and obstructing material. The Subcontractor shall cover and protect, in an acceptable manner to the Engineer and/or Owner, all his equipment and materials from damage due to water, spray on fireproofing, construction debris, etc.

**1.22 IDENTIFICATION OF CIRCUITS AND EQUIPMENT**

- A. Electrical equipment shall be identified by means of nameplates permanently attached to the equipment. Nameplates shall be black surface, white core laminated bakelite with engraved letters. Plates shall be a minimum of 3" long by 1" wide with engraved white letters 1/4" high. Provide nameplates for the following equipment:
  - 1. Fire alarm control cabinets;
  - 2. Fire alarm terminal cabinets; and
  - 3. Power supplies and batteries.
- B. Nameplates and tag symbols shall correspond to the identification on the Drawings, the Project Record Documents.
- C. Provide an identification nameplate for each equipment cabinet. Nameplates shall correspond with labeling identified in the submittal drawings.
- D. Fire alarm conduit shall be painted red. As an alternate, conduit shall be permanently labeled "FIRE ALARM" every 30 feet.
- E. Fire alarm junction boxes shall be painted red.

- F. All field initiating and indicating devices shall be labeled with self-adhesive tape with black lettering and identification labeling according to circuit loop and device address/number.
- G. Color code all wiring per recommended standards. Tag all wires in terminal cabinets with tie wrap tags with inked identification

### **1.23 EQUIPMENT MOUNTING**

- A. Where equipment is mounted on gypsum board partitions, the mounting screws shall pass through the gypsum board and be securely attached to the partition studs or framework. At the Subcontractor's option, the mounting screws may pass through the gypsum board and be securely attached to 6" square, 18 gauge galvanized metal backplates, which are attached to the gypsum board with an approved nonflammable adhesive. Toggle bolts installed in gypsum board partitions will not be acceptable.

### **1.24 DATE OF COMPLETION AND TESTING OF FDAC SYSTEMS**

- A. The date for the final performance acceptance testing shall comply with the Schedule and shall be sufficiently in advance of the Time(s) of Completion to permit the execution of the testing by the Subcontractor prior to occupancy and the close out of the Construction Contract. Any adjustments and/or alterations which the final acceptance tests indicate as necessary for the proper and satisfactory functioning of all equipment and systems shall be completed prior to the close out of the Construction Contract. Retests shall not relieve the Subcontractor of completion date responsibility. See Section 28 31 40 titled "FDAC Testing" and the individual Specification sections for the extent of testing required.
- B. The Contractor shall provide in the Schedule dates when each system is to be completed and outlining when tests will be performed.

### **1.25 OPERATING INSTRUCTIONS AND OPERATOR TRAINING**

- A. The Subcontractor shall provide the services of factory trained specialists to supervise the commissioning, startup and initial operation of the respective equipment specified herein. The Subcontractor shall, in addition to startup services, provide factory trained specialists to instruct the Owner's operators during a two (2) day operating instruction period at or near the Project Site. The operating instruction and training period shall be defined as straight time working hours and shall not include nights, weekends or travel time to and/or from the Project. See individual Sections for additional instructions by manufacturer's trained specialists.
- B. The Owner shall be notified in writing at least two (2) weeks before each operator instruction and training period begins. The Subcontractor shall commence no instruction period until the Owner has issued his written acceptance of the starting time and schedules.

### **1.26 OPERATION AND MAINTENANCE MANUALS**

- A. The Subcontractor shall provide operating instructions and maintenance data books for all equipment and materials furnished under this Division.
- B. Deliver two (2) initial copies of the operation and maintenance data manuals in accordance with the Subcontractor Scheduling Procedures in Section 28 31 20 titled "Scope of Work" to the Owner and Engineer for review. The initial copies shall include all information in Paragraph 1.26E below, except Item 1.26E.3.
- C. Submit four (4) final copies of operation and maintenance manuals to the Owner and Engineer. Assemble all data in a completely indexed volume or volumes in three-ring binders and identify the size, model and features indicated for each item. The binders shall have the Project name and logo printed on the outside of the binders. Resubmittals of these final four (4) copies of the "Final Review" operation and maintenance books shall include the "Final Review" submittals and shall be delivered to the Owner upon Final Completion of the Project.

- D. Operation and maintenance manuals shall include complete cleaning and servicing data compiled in clearly and easily understandable form. Data shall show serial numbers and model numbers of each piece of equipment, and complete lists of replacement parts.
- E. Include the following information where applicable:
  - 1. Identifying name and mark number.
  - 2. Locations of major equipment (when several similar items are used, provide a list).
  - 3. "Final Review" Submittals.
  - 4. Parts lists.
  - 5. Wiring diagrams.
  - 6. Manufacturer's recommended operation and maintenance instructions with all nonapplicable information deleted.
  - 7. List of spare parts recommended for normal service requirements.
  - 8. Trouble shooting diagnostic instructions where available.

**1.27 PROJECT RECORD DOCUMENTS**

- A. The Subcontractor shall maintain on a daily basis at the Project Site a complete set of Project Record Documents. The Project Record Documents shall consist of continuously updated AutoCAD files of the Coordination Drawings for this Division. The AutoCAD files shall be electronically updated by the Subcontractor's technician during the construction period to show the precise location of all buried or concealed Work and equipment, including embedded conduit and junction boxes and all changes and deviations in the Electrical Work from that shown on the Contract Documents. This requirement shall not be construed as authorization for the Subcontractor to make changes in the layout or Work without definite instructions from the Architect or Engineer. Prior to commencing Work, the Subcontractor shall obtain from the Architect or Engineer a set of AutoCAD Drawings on compact disks to be used only to produce the Coordination Drawings. The continuously updated Coordination Drawings shall be used to produce the final Project Record Documents, which shall be delivered to the Owner in AutoCAD on CD-RW Recordable Rewrite Compact Discs upon Final Completion of the Project. The Subcontractor shall give to the Architect and Engineer a written release acceptable to the Architect and Engineer signed by a corporate officer of the Subcontractor prior to receipt of the Architect's and Engineer's compact disks.
- B. Record dimensions shall clearly and accurately delineate the Work as installed; locations shall be suitably identified by at least two (2) dimensions to permanent structures.
- C. The Contractor and Subcontractor shall mark all Project Record Documents on the front lower right hand corner with a rubber stamp impression or an AutoCAD image that states the following:

**PROJECT RECORD DOCUMENT**  
(3/8" high letters)

**To be used for recording Field Deviations and Dimensional Data Only**  
(5/16" high letters)

- D. Upon completion of the Work, the Contractor and the respective Subcontractors shall certify all Project Record Documents on the front lower right hand corner adjacent to the above marking with a rubber stamp impression or an AutoCAD image that states the following:

<b>PROJECT RECORD DOCUMENT</b>	
<b>CERTIFIED CORRECT</b>	
(3/8" high letters)	
_____ (Printed Name of the Contractor)	
(5/16" high letters)	
<b>Date:</b>	_____
_____ (Printed Name of the Subcontractor)	
(5/16" high letters)	
<b>Date:</b>	_____

- E. Prior to final acceptance of the Work of this Division, the Subcontractor shall submit properly certified Project Record Documents to the Architect and Engineer for review and shall make changes, corrections or additions as the Architect and/or Engineer may require to the Project Record Documents. After the Architect's and Engineer's review and any required Subcontractor revisions, the Project Record Documents shall be delivered to the Owner on CD-RW Recordable Rewrite Compact Disks in AutoCAD.

#### 1.28 CERTIFICATION

- A. Any certifications required by the Specifications, in addition to those required for Shop Drawings, Product Data, equipment and other items, shall be so certified by the owner, a partner or a corporate officer of the firm required to provide the certification or by another person duly authorized to sign binding agreements for and in behalf of the owner, partner or corporation of the firm required to provide the certification.

#### 1.29 FINAL REVIEW

- A. At a time designated, the entire system shall be reviewed for compliance with the Drawings and Specifications. The Subcontractor shall be available at all times during this Final Review.
- B. The Subcontractor shall demonstrate prior to the Final Review that all systems and all equipment have been properly balanced and adjusted and are in compliance with the requirements of the Contract Documents. After these demonstration tests are completed satisfactorily, but prior to the Final Review field visit by the Engineer, the Subcontractor shall submit to the Architect and Engineer a written certification that 1) Attests to Contract Document compliance for this Project prior to the Engineer's Final Review field visit and 2) Certifies that the equipment and materials installed in this Project under this Division 28 contain no asbestos or PCB.
- C. The entire system shall be operating properly with all systems balanced and all controls adjusted. All shipping labels shall be removed and all equipment, devices, etc. shall be clean and in operating condition.
- D. Certificates and Documents required herein shall be in order and presented to the Architect and Engineer at least two (2) weeks prior to Final Review.
- E. The removal of panel covers, junction box covers, etc., for visual observation of the wire, etc. will not be required at the time of the Final Review if prior interim review of panel interiors, junction box wiring, etc. during the construction phase is acceptable to the Engineer.
- F. After the Final Review, any changes or corrections noted as necessary for the Work to comply with the Specifications and Drawings shall be accomplished without delay in order to secure final acceptance of the Work.

#### 1.30 WARRANTY PERIOD

- A. The warranty period shall be no less than two (2) full years, unless specified otherwise hereinafter.

- B. During the warranty period, the Subcontractor shall guarantee the following in a form satisfactory to the Owner:
  - 1. All Work installed will be free from any and all defects in Workmanship and/or materials.
  - 2. All apparatus will develop capacities and performance characteristics specified.
  - 3. The systems shall operate without malfunction.
- C. The Subcontractor shall, without cost to the Owner, remedy any defects within a reasonable time to be specified in notice from the Architect. In default thereof, the Owner may have such Work done and charge all costs to the Subcontractor.
- D. The start of the Subcontractor's warranty period, as defined in the General Conditions, shall commence on the issue of a "Certificate of Substantial Completion", by the Owner or the Owner's Representative for each item of material, equipment or system.
- E. The Subcontractor shall confer with the Contractor prior to the bid date concerning the Schedule and determine if there is a need to operate any items of equipment or systems for temporary heating and/or cooling or other reasons prior to "Substantial Completion". All required extended warranty costs for equipment, materials and systems shall be included in the Subcontractor's proposal and clearly designated with a breakout price.

### **1.31 EARLY OCCUPANCY**

- A. The Contractor and Subcontractors are responsible for completing those systems, which are necessary to allow partial occupancy of the Project even if systems in the unoccupied areas are incomplete. Refer to the General Conditions and the Schedule for this Project for the completion dates assigned to the various portions of the Project.
- B. Requirements for temporary occupancy shall be verified by the Contractor with the authorities having jurisdiction.

### **1.32 PROHIBITED LABELS AND IDENTIFICATIONS**

- A. Prohibited Markings: In all public areas, tenant areas and similar locations exposed to view within the Project, the inclusion or installation of any item, element or assembly, which bears on any exposed surface any name, trademark or other insignia, which is intended to identify the manufacturer, the vendor or other source(s) from which such object has been obtained, is prohibited. Also prohibited is the inclusion or installation of any article, which bears visible evidence that an insignia, name, label or other device has been removed.  
Exception: Required labels for Underwriters Laboratories, ETL, FM or any other required testing agency shall not be removed nor shall identification specifically required under the various technical sections of the Specifications be removed.

## **PART 2 PRODUCTS**

### **2.1 GENERAL**

- A. Refer to specific Specification sections for equipment requirements.

## **PART 3 EXECUTION**

### **3.1 GENERAL**

- A. Installation shall be in accordance with the Specification Section pertaining to the individual equipment.

**END OF SECTION**