

DOCUMENT 00910

**ADDENDA**

**EL DORADO IRRIGATION DISTRICT  
BUSINESS PARK 1 LIFT STATION UPGRADES PROJECT**

**ADDENDUM NO. 3**

**January 6, 2012**

This Addendum No. 3 ("Addendum") is dated the date set forth above and modifies certain Bidding Documents issued by the El Dorado Irrigation District ("District") in connection with the District's Business Park 1 Lift Station Upgrades Project. All capitalized terms not otherwise defined herein shall have the meanings provided in the Bidding Documents. There are no other amendments to the Bidding Documents other than expressly contained in this and any other Addenda issued by the District.

1. The Bid Submission date of 3:00 pm, Wednesday, January, 11, 2012 remains **UNCHANGED**.
2. Section 01100, Summary of Work, Paragraph 2.2, for the Door Intrusion Switch, **REPLACE** the Spec Location with "11800-3".
3. Section 02832, Chain Link Fences and Gates, **MODIFY** paragraph 2.03, D. as follows: "End and Corner Posts shall be 4-inch O.D., Line (intermediate ) Posts shall be **2-7/8**-inch O.D. and Gate Posts (<6' leaf) shall be 4-inch O.D."
4. Section 09900, Protective Coating Systems, **REPLACE** the entire specification with the attached Addendum 3, Section 09900, Protective Coating Systems.
5. Section 11530, Submersible Sewage Pumps, 1.02, D, 1, **DELETE** note "Max Static Head, ft 177".
6. Section 11530, Submersible Sewage Pumps, **DELETE** paragraph 2.03, J, 2. in its entirety.
7. Section 15062, Ductile Iron Pipe, Section 2.02, A, 1, b, 3), and Section 2.04, A, **ADD** StarGrip Series 3000 as an approved equal.
8. Section 15064, PVC Pipe, Section 2.03, B, 4, a, **ADD** StarGrip Series 4000 as an approved equal.

9. Section 16208, Standby Generator & Accessories, Section 2.04, C, **REPLACE** the first sentence with the following: "Size the load bank to be a minimum of 50% of generator KW rating, but not less than 100KW."
10. Section 16130, Wiring Devices, Section 2.02, D, **REPLACE** the last two sentences with the following sentences: "The timer shall not have a hold feature and shall have a time cycle of 60 minutes. The timer shall be Intermatic Model FF60MC, Paragon SWP60M, or equal."
11. Section 16261, Automatic Transfer Switch, **REPLACE** the entire specification section with the attached Addendum 3, Section 16261, Automatic Transfer Switch.
12. Section 17924, Section 3.02, J, 1, **ADD** the following new paragraph e:

"e. Power Monitor Failure (JYN 010): The power monitor will monitor the Motor Control Center three phase voltage. When a power monitor alarm occurs, the alarm will be monitored by the PLC and reported to SCADA and on the Plant OIT. After a PLC adjustable time delay, the alarm will shut down any running sewage pump. A Power Monitor Bypass Switch shall be provided, mounted on the Motor Control Center, that will disable this alarm function."
13. Drawing C104, **ADD** the following new Note 5:

"5. The depth of the existing 18" SFM at the time in point near SSMH#1 is approximately 5 feet below ground surface".
14. Drawing M101, interior dimensions of Emergency Storage Tank shall reflect 15-inch thick walls. New interior dimensions are 20'-10" and 16'-6".
15. Drawing E04, make the following changes: Power Monitor shown on One Line Diagram **DELETE** current connection to MCC. **CONNECT** the normally closed contact from the power monitor to a PLC discrete input point. **PROVIDE** a MCC door mounted two-position selector switch labeled "Power Monitor Bypass" that is wired in series with the discrete input point.
16. Drawing I-03, **ADD** a PLC discrete input point labeled JN 010 in the Plant Control Panel portion of the P&ID that is connected to the Power Monitored mounted in the Motor Control Center labeled "JYN 010, Power Monitor".

/s/Mike Brink  
Mike Brink, P.E., Senior Civil Engineer

01/6/12  
Date

**Acknowledgement of receipt of Addendum No. 3 for the Business Park 1 Lift Station Upgrades Project, Contract No. E11-09.**

Please sign and return by FAX a copy of this page to the Administrative Services Division, El Dorado Irrigation District, at (530) 622-8597 to acknowledge receipt of Addendum No. 3 for this Project consisting of 37 pages.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Company

END OF DOCUMENT

## SECTION 09900

### PROTECTIVE COATING SYSTEMS

#### PART 1 - GENERAL

##### 1.01 Summary

###### A. Scope:

1. The Contractor shall furnish all labor, materials, equipment and incidentals required to provide painting as shown and specified. The work includes the coating and finishing of all interior and exterior items and surfaces throughout the project except as otherwise shown or specified. Surface preparation, priming and coatings may be in addition to shop priming and surface treatment specified under other Sections.
2. Where items are factory-coated, repair or touch-up the factory coating and/or apply additional field coatings to achieve a complete coating system complying with the type and thickness of the coatings specified in this Section.
3. The term "coating" as used herein means all coating systems materials, which includes but is not necessarily limited to pretreatments, primers, intermediate coats, finish coats, emulsions, enamels, varnishes, stains, sealers, fillers, and other applied materials whether used as prime, intermediate or finish coats.
4. The term "exposed" as used herein means all items not covered with concrete, plaster, fireproofing or similar material.
5. Where items or surfaces are not specifically mentioned, coat these items or surfaces the same as adjacent similar materials or surfaces.
6. "Typical Examples" of items to be coated are provided on each coating system description sheet. These examples are intended to show the general scope of items to be coated are not intended to be exhaustive of all items to be coated by that particular coating.
7. Items which must be coated under this section include but are not necessarily limited to the following:
  - a. Manhole
  - b. Wetwell
  - c. Emergency storage tank interior
  - d. Piping
  - e. Bollards
  - f. Existing structures, as noted
  - g. Pipe supports
  - h. All other surfaces not otherwise excluded herein.

B. Coordination

1. Review installation procedures under other Sections and coordinate the installation of items that must be field coated or painted.
2. Coordinate the coating of areas to be coated that will be inaccessible once equipment has been installed.
3. Provide finish coats that are compatible with the primers used. Contractor shall be responsible for the compatibility of all shop primed and field coated items in this Contract. Barrier coats shall be provided over incompatible primers or primers shall be removed and re-primed as required.

C. Pre-Finished Items: Unless otherwise shown or specified, coating shall not be included when factory finishing such as baked-on enamel, porcelain, polyvinylidene fluoride, fusion bonded epoxy, or other similar finish is specified for such items.

1. Touch up factory-finished items only with coatings supplied by the item manufacturer per the requirements and instructions of the manufacturer.
2. If a factory-finished coating is applied to an item, which is not specified to receive a factory finish coat, acceptance of the factory finish coat shall be at the discretion of the Engineer. The color shall be noted with the equipment submittals.

D. Items Not to be coated: The following items are excluded from coating unless otherwise specified or show:

1. Ducts, conduits and other materials with corrosion resistant surfaces that are in chases or other inaccessible areas unless specified or shown on drawings.
2. Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts unless otherwise specified.
3. Code-required labels, such as UL and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.
4. Stainless steel.
5. Copper.
6. Aluminum.
7. Fiberglass.
8. Manhole covers.
9. HVAC equipment.
10. Instrumentation and galvanized instrument supports
11. Electrical switchgear, motor control centers, panels, transformers and other similar equipment.
12. Exterior or interior concrete unless specified or shown on drawings.
13. Exterior concrete unit masonry unless specified or shown on drawings.

14. Interior concrete unit masonry unless specified or shown on drawings.

E. Related Work:

<u>Section</u>	<u>Title</u>
07900	Sealants

**1.02 References**

A. Reference Standards: Applicable provisions and recommendations of the following shall be complied with, except where otherwise shown or specified:

<u>Reference</u>	<u>Title</u>
ANSI A13.1	Scheme for the Identification of Piping Systems
Ten States Standards	Great Lakes - Upper Mississippi River Board of State Sanitary Engineers, Recommended Standards for Waste Treatment Works - Latest Edition, Recommended Color Scheme for Piping
OSHA 1910.144	Safety Color Code for Marking Physical Hazards
SSPC Volume 2	Systems and Specification, Surface Preparation Guide and Paint Application Specifications

**1.03 Submittals**

A. Shop Drawings: The following shall be submitted for approval:

1. Manufacturer's technical information, including coating label analysis and application instructions for each material proposed for use. Each material shall be listed and cross-referenced to the specific coating system and application, and shall be identified by manufacturer's catalog number and general classification.
2. Provide itemized schedule of all the surfaces to be coated. After approval of submittals and prior to beginning work, Owner's Representative will note on the schedule the colors to be furnished.
3. Manufacturer's complete color charts for each coating system.
4. Certifications from manufacturers shall be provided, verifying that the factory applied prime coats are compatible with specified finish coatings.

**1.04 Delivery, Storage, and Handling**

A. Delivery of Materials: All materials shall be delivered to the job site in original, new and unopened packages and containers bearing manufacturer's name and label, and the following information.

1. Name or title of material
2. Manufacturer's stock number and date of manufacture
3. Manufacturer's name

4. Contents by volume, for major pigment and vehicle constituents
  5. Thinning instructions where recommended
  6. Application instructions
  7. Color name and number
- B. Storage of Materials
1. Only acceptable project materials shall be stored on project site.
  2. Store materials in compliance with manufacturer's requirements in a location approved by the Owner's Representative. Area shall be kept clean and accessible.
  3. Storage shall be restricted to coating materials and related equipment only.

## **PART 2 - PRODUCTS**

### **2.01 Manufacturers:**

- A. Products manufactured by one of the following shall be provided:
1. Tnemec Company, Incorporated
  2. ErgonArmor Novocoat
- B. Substitutions
1. No substitutions shall be considered that decrease the film thickness, the number of coats, the surface preparation or the generic type of coating specified. Approved manufacturers must furnish the same color selection as the manufacturers specified, including accent color in all coating systems.

### **2.02 Materials**

- A. Only the best grade of the various types of coating suitable for use in water and wastewater treatment plants, as regularly manufactured by acceptable coating material manufacturers, shall be provided. Material not displaying the manufacturer's identification as a best-grade product will not be acceptable.
- B. Primers shall be produced by the same manufacturer as the intermediate and finish coats. Use only thinners recommended by the manufacturer, and use only to recommended limits.
- C. Coatings and pipe markers of durable and washable quality shall be provided. Materials that will withstand normal washing as required to remove grease, oil, chemicals, etc., without showing discoloration, loss of gloss, staining, or other damage shall be used.

### **2.03 Colors and Finishes**

- A. Surface treatments, and finishes, are shown under Coating Systems below. All substrates indicated shall be coated whether or not shown on the Drawings, or in Schedules, unless an item is specifically scheduled as not requiring coating.
- B. Color Selection
  - 1. The Owner reserves the right to select non-standard colors for all coating systems specified within the ability of the manufacturer to produce such non-standard colors. Selection of non-standard colors shall not be cause for the Contractor rejecting Owner's color selections and the Contractor shall supply such colors at no additional expense to the Owner.
- C. Piping Color Code:
  - 1. To be selected by the Owner.
- D. Color Pigments: Pure, non-fading, applicable types to suit the substrates and service indicated.

### **2.04 Coating Systems**

- A. Refer to the following Coating System Sheets.
- B. The Contractor shall coat all items, which fall into the categories described. The examples given on the coating system sheets are presented for the Contractor's convenience, and may not include all items which require coating. In general all exposed ferrous materials shall be coated. This includes galvanized materials and shop primed material unless specifically excluded elsewhere.

## Coating System 1

A. Service:

1. Structural steel, miscellaneous metals, and steel, ductile iron, or cast iron piping
2. Interior exposure
3. Non-submerged applications (greater than 3' above highest possible water level).

B. Typical Examples:

1. All exposed structural steel including but not limited to columns, beams, roof joists, purlins and other supporting members.
2. Equipment including but not limited to pumps, blowers, air compressors, valves, and other process equipment, motors, gear reducers, and equipment guards.
- 3.
4. Steel, ductile, or cast iron piping not otherwise coated as specified in piping sections.

C. Surface Preparation:

1. Shop: SSPC-SP 6 Commercial Blast, as specified in herein.
2. Field: Sandblasting of field welds and other imperfections. Owner's Representative may require all areas to be blasted at his discretion, SSPC-SP 6, commercial blast as specified in herein.

D. Product and Manufacturer: One of the following shall be provided:

a. Tnemec

- 1) Primer: Series V69 Hi-Build Epoxoline II - one or more coats, 3.0 - 5.0 total dry mils thickness
- 2) Finish: Series 435 Perma Glaze - one or more coats, 15.0 - 20.0 total dry mils thickness

b. Or equal

## Coating System 2

### A. Service:

1. Structural steel, miscellaneous metals, and steel, ductile iron, or cast iron piping
2. Exterior exposure
3. Non-submerged applications (greater than 3' above highest possible water level)

### B. Typical Examples:

1. All exposed structural steel including but not limited to columns, beams, roof joists, purlins and other supporting members.
2. Equipment including but not limited to pumps, blowers, air compressors, valves, other process equipment, motors, gear reducers, and equipment guards.
3. Overhead coiling and man doors if not specified door elsewhere.
4. Steel, ductile, or cast iron piping not otherwise coated as specified in piping sections.

### C. Shop Surface Preparation:

1. Shop: SSPC-SP 6 Commercial Blast as specified in herein
2. Field: Sandblasting of field welds and other imperfections. Owner's Representative may require all areas to be blasted at his discretion, SSPC-SP 6, commercial blast as specified in herein.

### D. Products and Manufacturer: One of the following shall be provided:

#### a. Tnemec

- 1) Primer: Series V69 Hi-Build Epoxoline II - one or more coats, 3.0 - 5.0 total dry mil thickness
- 2) Intermediate: Series V69 Hi-Build Epoxoline II - one or more coats, 3.0 - 5.0 total dry mil thickness
- 3) Finish: Series 1075 Endura-Shield - one or more coats, 3.0 - 5.0 total dry mil thickness

#### b. Or equal

### Coating System 3

A. Service:

1. Galvanized structural steel, galvanized miscellaneous metals, and galvanized steel pipe.
2. Interior exposure
3. Non-submerged applications (greater than 3' above highest possible water level)

B. Typical Examples:

1. All exposed galvanized structural steel including but not limited to columns, beams, roof joists, purlins and other supporting members.
2. Flashing.
3. Galvanized rigid conduit.

C. Surface Preparation:

1. Solvent Cleaning, SSPC-SP 1 as specified in herein, followed by brush off blast to provide an anchor profile of 1.5 to 2.0 mils minimum

D. Product and Manufacturer: One of the following shall be provided:

a. Tnemec

- 1) Primer: Series V69 Hi-Build Epoxoline II - one or more coats, 3.0 - 5.0 total dry mil thickness
- 2) Finish: Series V69 Hi-Build Epoxoline II - one or more coats, 3.0 - 5.0 dry total dry mil thickness

b. Or equal

## Coating System 4

### A. Service:

1. Galvanized structural steel, galvanized miscellaneous metals, and galvanized steel pipe.
2. Aluminum tube
3. Exterior exposure
4. Non-submerged applications (greater than 3' above highest possible water level)

### B. Typical Examples:

1. All exposed galvanized structural steel including but not limited to columns, beams, roof joists, purlins and other supporting members.
2. Flashing
3. Galvanized rigid conduit
4. Bollards
5. All buried and exposed aluminum tubing in contact with dissimilar materials including but not limited to other metals, concrete, wastewater, and soil.

### C. Surface Preparation:

1. Solvent Cleaning, SSPC-SP 1 as specified in herein, followed by brush off blast to provide an anchor profile of 1.5 to 2.0 mils minimum

### D. Product and Manufacturer: One of the following shall be provided:

#### a. Tnemec

- 1) Primer: Series V69 Hi-Build Epoxoline II -- one or more coats, 3.0 - 5.0 total dry mil thickness
- 2) Intermediate: Series V69 Hi-Build Epoxoline II -- one or more coats, 3.0 - 5.0 total dry mil thickness
- 3) Finish: Series 1075 Endura-Shield -- one or more coats, 3.0 - 5.0 total dry mil thickness

#### b. Or equal

## Coating System 5

### A. Service:

1. Structural steel, miscellaneous metals and steel, ductile iron, or cast iron piping
2. Submerged, intermittently submerged, or splash zone applications (within 3' of highest possible water level).

### B. Typical Examples:

1. Structural steel
2. Steel, ductile, or cast iron piping not otherwise coated as specified in piping sections.
3. Pump base elbows, pumps, mixers and other process equipment
4. Pipe supports

### C. Surface Preparation:

1. Shop: SSPC-SP 10 Near-White Blast Cleaning
2. Field: Sandblasting of field welds and other imperfections. Owner's Representative may require all areas to be blasted at his discretion, SSPC-SP 6, commercial blast as specified in herein.

### D. Product and Manufacturer: One of the following shall be provided:

1. All systems described in Paragraph B except pumps
  - a. Tnemec
    - 1) Primer: Series V69 Hi-Build Epoxoline II - one or more coats, 3.0 - 5.0 total dry mil thickness
    - 2) Intermediate: Series V69 Hi-Build Epoxoline II - one or more coats, 3.0 - 5.0 total dry mil thickness
    - 3) Finish: Series V69 Hi-Build Epoxoline II - one or more coats, 3.0 - 5.0 total dry mil thickness
  - b. Or equal
2. Pumps
  - a. Tnemec
    - 1) Primer: Series V69 Hi-Build Epoxoline II - one or more coats, 3.0 - 5.0 total dry mil thickness
    - 2) Finish: Series V69 Hi-Build Epoxoline II - one or more coats, 3.0 - 5.0 total dry mil thickness
  - b. Or equal

## Coating System 6

### A. Service:

1. Galvanized structural steel, galvanized miscellaneous metals, and galvanized steel pipe.
2. Submerged, intermittently submerged, or splash zone applications (within 3' of highest possible water level).

### B. Typical Examples:

1. Structural steel
2. Steel, ductile, or cast iron piping not otherwise coated as specified in piping sections.
3. Pump base elbows, pumps, mixers and other process equipment
4. Pipe supports

### C. Surface Preparation:

1. Solvent Cleaning, SSPC-SP 1 as specified in herein, followed by brush off blast to provide an anchor profile of 1.5 to 2.0 mils minimum

### D. Product and Manufacturer: One of the following shall be provided:

1. All systems described in Paragraph B except pumps
  - a. Tnemec
    - 1) Primer: Series V69 Hi-Build Epoxoline II -- one or more coats, 3.0 - 5.0 total dry mil thickness
    - 2) Intermediate: Series V69 Hi-Build Epoxoline II -- one or more coats, 3.0 - 5.0 total dry mil thickness
    - 3) Finish: Series V69 Hi-Build Epoxoline II -- one or more coats, 3.0 - 5.0 total dry mil thickness
  - b. Or equal
2. Pumps
  - a. Tnemec
    - 1) Primer: Series V69 Hi-Build Epoxoline II -- one or more coats, 3.0 - 5.0 total dry mil thickness
    - 2) Finish: Series V69 Hi-Build Epoxoline II -- one or more coats, 3.0 - 5.0 total dry mil thickness
  - b. Or equal

## Coating System 7

A. Service:

1. Plastics including PVC and CPVC Piping
2. Interior or exterior exposure
3. Non-submerged applications

B. Typical Example:

1. Exposed PVC and CPVC piping.
2. Notable Exceptions:
  - a. Do not coat submerged or partially submerged plastic piping.
  - b. Do not coat plastic valves, unions, valve handles or other similar plastic items.
  - c. Do not coat exposed PVC conduit or exposed rigid steel with PVC coating conduit.

C. Surface Preparation:

1. Plastic shall be prepared in accordance with SSPC SP-1 (Solvent Cleaning) followed by SSPC-SP 2 (Hand Tool cleaning). Contractor shall use a solvent compatible with the specified coating and roughen surfaces by sanding.

D. Product and Manufacturer: One of the following shall be provided:

- 1) Finish: Carbothane 134VOC – two coats, 5.0 total dry mil thickness
- 2) Finish: Tnemec Series 1075 – two coats, 5.0 total dry mil thickness
- 3) Finish: ICI Devoe Devthane 378H - two coats, 5.0 total dry mil thickness
- 4) Or equal

## Coating System 8

A. Service:

1. Concrete interior exposure

B. Typical Example:

1. Manhole interior.
2. Wetwell interior walls and ceiling.
3. Emergency storage tank interior walls and ceiling.

C. Surface Preparation:

1. Prepare all surfaces to receive coating per manufacturer's recommendations.

D. Product and Manufacturer

a. Sancon

- 1) Primer: Sancon 100 -- one coat, 1.0 – 2.0 mills total dry mil thickness. Apply per manufacturer's recommendations.
- 2) Finish: Sancon 100 – one or more coats, 125 mills total dry mil thickness. Apply per manufacturer's recommendations.

b. HYDRO-POX 204 UHB (Con-Tech of California, Inc.) – one or more coats, 90 total dry mil thickness. Prepare concrete surfaces with HYDRO-POX 251 penetrating primer.

c. Tnemec Series Perma-Shield FR – one or more coats, 90 total dry mil thickness. Prepare concrete surfaces with Tnemec Series 201 primer.

d. T-lock liner

- 1) Line exposed surfaces with T-lock.

e. Or equal

## **PART 3 - EXECUTION**

### **3.01 Examination**

- A. The Contractor and his applicator shall examine the areas and conditions under which painting work is to be performed and notify the Owner's Representative in writing of conditions detrimental to the proper and timely completion of the Work. The Contractor shall not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Owner's Representative.
- B. The Contractor shall not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

### **3.02 Preparation**

#### **A. Coordination:**

- 1. The Contractor shall review installation procedures under other Sections and coordinate the installation of items that must be field painted in this Section.
- 2. The Contractor shall coordinate the painting of areas to be painted that will be inaccessible once equipment has been installed.
- 3. The Contractor shall provide finish coats that are compatible with the prime paints used.
- 4. The Contractor shall review other Sections of these Specifications in which prime paints are to be provided to ensure compatibility of the total coatings system for the various substrates.
- 5. The Contractor shall be responsible for the compatibility of all shop primed and field painted items in this Contract.
- 6. The Contractor shall furnish information on the characteristics of the finish materials proposed to use, to ensure that compatible prime coats are used. Barrier coats shall be provided over incompatible primers or primers shall be removed and re-primed as required.

#### **B. Protection:**

- 1. Finished Work of other trades and surfaces not being painted concurrently or not to be painted shall be covered or otherwise protected.
- 2. Work of other trades shall be protected, whether to be painted or not, against damage by the painting and finishing work. All such work shall be left undamaged. All damage shall be corrected by cleaning, repairing or replacing, and repainting, as acceptable to the Owner's Representative.
- 3. Wet Paint signs shall be provided as required to protect newly painted finishes. All temporary protective wrapping provided for protection of this Contract shall be removed after completion of painting operations.

## C. Surface Preparation

### 1. General:

- a. All preparation and cleaning procedures shall be performed as specified herein and in strict accordance with the paint manufacturer's instructions for each particular substrate and atmospheric condition.
- b. All hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish painted shall be removed or provided surface applied protection prior to surface preparation and painting operations. The Contractor shall remove, if necessary, for the complete painting of the items and adjacent surfaces. Following completion of painting of each space or area, the removed items shall be reinstalled by workmen skilled in the trades involved.
- c. Surfaces to be painted shall be cleaned before applying paint or surface treatments. Oil and grease shall be removed with clean cloths and cleaning solvents prior to mechanical cleaning. The cleaning and painting shall be programmed so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.
- d. All surfaces that were not shop painted or that were improperly shop painted, and all abraded or rusted shop painted surfaces, which are to be painted, as determined by the Owner's Representative, shall be prepared as specified below.

### 2. Concrete and Masonry Surfaces:

- a. Surfaces of concrete, precast concrete, and concrete block to be painted and sealed with clear finish shall be prepared by removing all efflorescence, chalk, dust, dirt, grease and oils with soap and water.
- b. The alkalinity and moisture content of the surfaces to be painted shall be determined by performing appropriate tests. If the surfaces are found to be sufficiently alkaline to cause blistering and burning of the finish paint, this condition shall be corrected before application of paint. The Owner's Representative shall be provided with suitable testing materials to carry out alkalinity and moisture tests.
- c. The Contractor shall not paint over surfaces where the moisture content exceeds 8 percent, unless otherwise permitted in the manufacturer's printed directions.
- d. Concrete and concrete block surfaces that cannot be adequately cleaned by soap and water shall be acid etched. Exceedingly dense concrete may require a second etching.
- e. Brush blast clean shall be equivalent to SSPC-SP 7, to open bug holes and remove all non-adhering concrete. All areas so prepared shall be thoroughly cleaned before beginning coating work.

3. Ferrous Metals:

- a. Non-submerged ferrous surfaces, including structural steel and miscellaneous metal to be shop primed, shall be cleaned of all oil, grease, dirt, mill scale and other foreign matter by commercial blast cleaning complying with SSPC-SP 6.
- b. Submerged ferrous surfaces, including structural steel and miscellaneous metal to be shop primed, shall be cleaned of all oil, grease, dirt, mill scale and other foreign matter by near-white blasting complying with SSPC-SP 10.
- c. Non-submerged, ferrous surfaces that have not been shop-coated shall be cleaned of all oil, grease, dirt, loose mill scale and other foreign substances by commercial blasting, complying with SSPC-SP 6.
- d. Submerged ferrous surfaces that have not been shop-coated or that, in the opinion of the Owner's Representative, have been improperly shop-coated, shall be cleaned of all oil, grease, dirt, mill scale and other foreign matter by near-white blasting complying with SSPC-SP 10.
- e. Bare and blasted or pickled clean metal shall be treated with metal treatment wash coat, prior to priming only if recommended by the paint manufacturer.
- f. Shop applied prime coats that have damaged or bare areas shall be touched-up with primer recommended by the coating manufacturer after commercial blasting complying with SSPC-SP 6.
- g. Weld Preparation: Remove weld spatter and slag by chipping or grinding. Grind all sharp edges and corners to a smooth contour. Welds to be ground free from undercuts, recesses and pinholes.

4. Non-Ferrous Metal Surfaces:

- a. Non-ferrous metal surfaces shall be cleaned in accordance with the coating system manufacturers instructions for the type of service, metal substrate, and application required.

5. Galvanized Surfaces:

- a. The Contractor shall clean free of oil and surface contaminants with solvent or other methods recommended by the coating manufacturer, complying with SSPC-SP 1.
- b. All coated galvanized ferrous metal, interior and exterior, shall be cleaned of all oil, grease, dirt, mill scale and other foreign matter by a brush-off blast cleaning complying with SSPC-SP 7 with 1.5 to 2.0 mils profile.

D. Materials Preparation

1. General:

- a. Painting materials shall be mixed and prepared in strict accordance with the manufacturer's directions.
- b. Coating materials produced by different manufacturers shall not be mixed, unless otherwise permitted by the manufacturer's instructions.

- c. Materials not in actual use shall be stored in tightly covered containers. Containers used in storage, mixing, and application of paint shall be maintained in a clean condition, free of foreign materials and residue.
  - d. All materials shall be stirred before application to produce a mixture of uniform density, and as required during the application of the materials. Any film that may form on the surface shall not be stirred into the material. The film shall be removed and, if necessary, the material shall be strained before using.
  - e. Brush stripe edges and corners to achieve specified coating thickness and coverage.
2. Tinting:
- a. Each undercoat shall be tinted a lighter shade to facilitate identification of each coat where multiple coats of the same material are to be applied. Undercoats shall be tinted to match the color of the finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat. A code number shall be provided to identify material tinted by the manufacturer.
3. Mixing:
- a. The Contractor shall mix only in mixing pails placed in a suitably sized non-ferrous or oxide resistant metal pans to protect concrete floor from splashes or spills which could stain exposed concrete or react with subsequent finish floor material.
  - b. Paint shall be mixed and applied only in containers bearing accurate product name of material being mixed or applied.

### **3.03 Application**

#### **A. General:**

- 1. Paint shall be applied by mechanical application techniques such as roller, brush, trowel, air spray, or airless spray in accordance with the manufacturer's directions and recommendations of Paint Application Specifications No. 1 in SSPC Vol. 2, where applicable, or as required in these Specifications. Brushes best suited for the type of material being applied shall be used. Where approved by the Owner's Representative, rollers of carpet, velvet back, or high pile sheep's wool shall be used, as recommended by the paint manufacturer for material and texture required.
- 2. The number of coats and paint film thickness required is the same regardless of the application method. Succeeding coats shall not be applied until the previous coat has completely dried.
- 3. Where multiple coats of the same material is used, tint prime and intermediate coats in order to distinguish each coat.

4. Additional coats shall be applied when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. This is of particular importance regarding intense primary accent colors. The Contractor shall insure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a film thickness equivalent to that of flat surfaces.
5. Surfaces not exposed to view do not require color coding but require the same coating systems specified for exposed surfaces. Exposed to view surfaces are defined as those areas visible when permanent or built-in fixture, convector covers, covers for finned tube radiation, grilles, etc., are in place in areas scheduled to be painted.
6. The backs of access panels and removable or hinged covers shall be painted to match the exposed surfaces.
7. Aluminum parts in contact with dissimilar materials shall be painted as specified with appropriate finish.
8. Brush stripe welds; bolts; nuts; edges and corners to achieve proper coating thicknesses.

B. Electrical Work:

1. Electrical items to be painted include, but are not limited to, the following:
  - a. Conduit and fittings.
  - b. Miscellaneous panels, junction boxes, motors and accessories.

C. Minimum / Maximum Coating Thickness:

1. The Contractor shall apply each material at not less than the manufacturer's recommended spreading rate, and provide total dry film thickness as specified. Extra coat shall be applied if required to obtain specified total dry film thickness or uniform opacity. If the recommended maximum coating thickness is exceeded, the excess amount will be removed and repaired as specified.

D. System Coating Thickness:

1. The system total dry mil thickness shall be the sum of the Primer, Intermediate and Finish Coats specified.

E. Scheduling Painting:

1. The first-coat material shall be applied to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration. Abrasive blasted ferrous metal surfaces shall be coated within eight (8) hours on the same day of abrasive blasting.
2. Subsequent coats shall be applied as per manufacturer's written recoat parameters as detailed on their product data sheet. Sufficient time between successive coating shall be allowed to permit proper drying. The Contractor shall not recoat until paint has dried to where it feels firm, does not deform or feel

sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

F. Prime Coats:

1. Primed and sealed walls and ceilings shall be recoated where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects caused by insufficient sealing.

G. Pigmented (Opaque) Finish:

1. The Contractor shall completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage.

H. Brush Application:

1. All brush coats shall be brushed-out and worked onto the surfaces in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable. All glass and color break lines shall be neatly drawn.

I. Mechanical Applicators:

1. Mechanical methods shall be used for paint application as suggested by the paint manufacturer. Conduct spray coating under controlled conditions. Protect adjacent structure for overspray.
2. For spray application, apply coating to thickness not greater than suggested in paint manufacturer's instruction.
3. Wherever spray application is used, each coat shall be applied to provide the equivalent hiding of brush-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of 2 coats in one pass.

### **3.04 Field Quality Control**

A. The right is reserved by the Owner's Representative to invoke the following material testing procedure at any time, and any number of times during the period of field painting:

1. Engage the service of an independent testing laboratory to sample any of the paint being used. Samples of materials delivered to the project site will be taken, identified and sealed, and certified in the presence of the Contractor.
2. The testing laboratory will perform appropriate tests for any or all of the following characteristics: Abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance and quantitative material analysis.
3. If the test results show that the material being used does not comply with the specified requirements, the Contractor may be directed to stop the painting Work, and remove the non-complying paint; pay for testing; repaint surfaces coated with the rejected paint; remove rejected paint from previously painted surfaces if, upon repainting with the specified paint, the two coatings are non-compatible.

- B. Prior to initial coat and after completion of each successive coat of paint, the Contractor shall notify the Owner's Representative. After inspection, checking of film thickness and approval by the Owner's Representative, proceed with the succeeding coat. Contractor shall supply the Owner's Representative for his use a Gardner dry-film thickness gage.

### **3.05 Cleaning**

- A. During the progress of the Work, all discarded paint materials, rubbish, cans and rags shall be removed from the site at the end of each work day.
- B. Upon completion of painting work, all paint-spattered surfaces shall be cleaned. Spattered paint shall be removed by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- C. At the completion of work of other trades, all damaged or defaced painted surfaces shall be touched-up and restored, as determined by the Owner's Representative.

### **3.06 Demonstration**

- A. Completed Work:
  - 1. The Contractor shall match approved samples for color, texture and coverage.
  - 2. Work not in compliance with specified requirements shall be removed, refinished or repainted, as required by the Owner's Representative.

END OF SECTION

## SECTION 16261

**AUTOMATIC TRANSFER SWITCH****PART 1 - GENERAL****1.01 Summary**

- A. Scope: Furnish and install automatic transfer switch (ATS) with number of poles, amperage, voltage, withstand and close-on ratings as shown on the contract drawings. The automatic transfer shall consist of an inherently double throw power transfer switch mechanism and a microprocessor controller to provide automatic operation. The transfer switch and controller shall be the products of the same manufacturer.
- B. Related Sections: The following list of related sections is provided for the convenience of the Contractor. It includes the commonly referenced sections that are in-general applicable to all equipment supplied. This list does not excuse the Contractor from any requirement given in sections not specifically listed below. Where there is a difference between this specification and any other specifications the conflict shall be resolved at the sole discretion of the Engineer.

<b><u>Section</u></b>	<b><u>Title</u></b>
Section 01330	Submittals Procedures
Section 01600	Product Requirements
Section 01750	Starting and Adjusting
Section 01661	Instruction of Operations and Maintenance Personnel
Section 11010	General Requirements for Equipment
Section 11050	Equipment Mounting
Section 16010	General Electrical Provisions
Section 16011	Protective Device Coordination Study and Arc Flash Analysis
Section 16110	Raceways, Fittings, and Supports
Section 16120	Wire and Cables, 600 Volts and Below
Section 16160	Pilot Devices
Section 16200	Overcurrent Protective Devices
Section 16208	Standby Generator & Accessories
Section 16250	Motor Control Center
Section 16400	Electric Service
Section 16428	Quick-Connect Safety Switch
Section 16450	Grounding

Section 17010	General Requirements, Instrumentation
Section 17110	Instrumentation and Control Systems
Section 17506	Extended Warranty and Maintenance
Section 17510	Factory Acceptance Tests
Section 17512	Site Acceptance Tests
Section 17924	Control Strategies

**1.02 References**

A. The automatic transfer switches and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of UL and NEMA as follows:

<u>Reference</u>	<u>Title</u>
UL 508	Industrial Control Equipment
UL 1008	Transfer Switches
UL 991	Test for Safety-Related Controls Employing Solid State Devices
NFPA 70	National Electrical Code
NFPA 99	Essential Electrical Systems of Health Care Facilities
NFPA 110	Emergency and Standby Power Systems
NEMA ICS 10	AC Transfer Switch Equipment
IEEE 446	Recommended Practice for Emergency and Standby Power Systems
IEC 947-6-1	Low-voltage Switchgear and Controlgear; Multifunction equipment; Automatic Transfer Switching Equipment
IEC 60801-2	Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment, Electrostatic Discharge Requirements
IEC 60801-3	Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment, Radiated Electromagnetic Field Requirements
IEC 60801-4	Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment, Electrical Fast Transient/Burst Requirements
IEC 60801-5	Electromagnetic Compatibility for Electrical and Electronic Equipment, Surge Immunity Requirements
CISPR 11	Industrial, Scientific, and Medical Radio-Frequency Equipment – Electromagnetic Disturbance Characteristics – Limits and Methods of Measurement
	Compliant with FCC Part 15, Subpart B, Class A

### **1.03 Submittals**

- A. Submittals shall comply with the provisions set forth in Sections 01300 and 16010.
- B. Submittals shall comply with the provisions set forth in Sections 01330 and 16010.
- C. The following information shall be submitted to the Engineer:
  - 1. Front view and plan view of the assembly
  - 2. Schematic diagram
  - 3. Conduit space locations within the assembly
  - 4. Assembly ratings including:
    - a. Withstand and Closing rating
    - b. Voltage
    - c. Continuous current rating
    - d. Short-Time rating if applicable
    - e. Short-circuit rating if ordered with integral protection
  - 5. Cable terminal sizes
  - 6. Product Data Sheets
  - 7. Wiring diagrams
  - 8. Certified production test reports
  - 9. Installation information
- D. Seismic certification as specified

### **1.04 Quality Assurance**

- A. Qualifications
  - 1. The manufacturer of the assembly shall be the manufacturer of major components and control modules installed within the assembly.
  - 2. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
  - 3. The equipment and major components shall be suitable for and certified to meet all applicable seismic requirements of Uniform Building Code (UBC) for zone 4 application. Guidelines for the installation consistent with these requirements shall be provided by the switchgear manufacturer and be based upon testing of representative equipment. The test response spectrum shall be based upon a 5% minimum damping factor, UBC: a peak of 2.15g's (3.2–11 Hz), and a ZPA of 0.86g's applied at the base of the equipment. The tests shall fully envelop this response spectrum for all equipment natural frequencies up to at least 35 Hz.

4. The manufacturer of the ATS shall also have a national service organization that is available throughout the contiguous United States and is available on call 24 hours a day, 365 days a year.
5. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years

**B. Manufacturer's Certification**

1. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer's recommendations.
2. The Contractor shall provide three (3) copies of the manufacturer's representative's certification.

**C. Withstand and Closing Ratings**

1. The ATS shall be rated to close on and withstand the available RMS symmetrical short circuit current at the ATS terminals with the type of overcurrent protection shown on the plans.
2. The ATS shall be UL listed in accordance with UL 1008 and be labeled in accordance with that standard's 1½ and 3 cycle, long-time ratings. ATSs which are not tested and labeled with 1½ and 3 cycle (any breaker) ratings and have series, or specific breaker ratings only, are not acceptable

**D. Tests and Certification**

1. The complete ATS shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.
2. Upon request, the manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards, and withstand and closing ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.
3. The ATS manufacturer shall be certified to ISO 9001 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001

**1.05 Delivery, Storage, and Handling**

- A. Equipment shall be handled and stored in accordance with manufacturer's instructions.  
One (1) copy of these instructions shall be included with the equipment at time of shipment

- B. Refer to Section 16010, 1.07 for additional requirements

### **1.06 Project / Site Conditions**

- A. The automatic transfer switches will be installed in a wastewater facility where the ambient temperatures are expected to range between 10 degrees F and 115 degrees F. Relative humidity is expected to range from 10 percent to 100 percent.

### **1.07 Sequencing and Scheduling**

- A. Sequencing and scheduling plan shall be provided that minimizes pump station downtime. Note that the pump station must remain operational during all phases of construction. For additional requirements refer to Specification Section 01014 – Work Sequence.

### **1.08 Warranty**

- A. Refer to Section 16506 for requirements

### **1.09 Maintenance**

- A. Refer to Section 16506 for requirements.
- B. Equipment operation and maintenance manuals shall be provided with each assembly shipped, and shall include instruction leaflets and instruction bulletins for the complete assembly and each major component.

## **PART 2 - PRODUCTS**

### **2.01 Manufacturers**

- A. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

1. Asco
2. Eaton Cutler Hammer
3. Russelectric
4. Or Equal

### **2.02 Equipment and Materials**

- A. Mechanically Head Transfer Switch
  1. The transfer switch shall be electrically operated and mechanically held. The electrical operator shall be a momentarily energized, single-solenoid mechanism. Main operators utilizing overcurrent disconnect devices, or linear motors shall not be acceptable. The switch shall be mechanically interlocked to ensure only two possible positions, normal or emergency.

2. All transfer switch sizes shall use only one type of main operator for ease of maintenance and commonality of parts.
3. The switch shall be positively locked and unaffected by momentary outages, so that contact pressure is maintained at a constant value and contact temperature rise is minimized for maximum reliability and operating life.
4. All main contacts shall be silver composition. Switches rated 800 amperes and above shall have segmented, blow-on construction for high withstand and close-on capability and be protected by separate arcing contacts.
5. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. Switches rated 800 amps and higher shall have front removable and replaceable contacts. All stationary and moveable contacts shall be replaceable without removing power conductors and/or bus bars.
6. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof, which are not intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable.
7. Where neutral conductors are to be solidly connected as shown on the plans, a neutral conductor plate with fully rated AL-CU pressure connectors shall be provided.

#### B. Enclosure

1. The ATS shall be furnished in a open type for installation in the Main Switchboard unless otherwise shown on the plans.
2. All standard door mounted switches and indicating lights described in section 3 shall be integrated into a flush-mounted, interface membrane or equivalent in the enclosure door for easy viewing & replacement. The panel shall include a manual locking feature to allow the user to lockout all membrane mounted control switches to prevent unauthorized tampering. The membrane panel shall be suitable for mounting by others when furnished on open type units

### **2.03 Components and Accessories**

#### A. Microprocessor Controller

1. The controller's sensing and logic shall be provided by a single built-in microprocessor for maximum reliability, minimum maintenance, and the ability to communicate serially through an optional serial communication module or Ethernet connectivity module.
2. A single controller shall provide twelve selectable nominal voltages for maximum application flexibility and minimal spare part requirements. Voltage sensing shall be true RMS type and shall be accurate to  $\pm 1\%$  of nominal voltage. Frequency sensing shall be accurate to  $\pm 0.2\%$ . The panel shall be capable of operating over a temperature range of -20 to +60 degrees C and storage from -55 to +85 degrees C.

3. The controller shall be connected to the transfer switch by an interconnecting wiring harness. The harness shall include a keyed disconnect plug to enable the controller to be disconnected from the transfer switch for routine maintenance. Sensing and control logic shall be provided on multi-layer printed circuit boards. Interfacing relays shall be industrial grade plug-in type with dust covers. The panel shall be enclosed with a protective cover and be mounted separately from the transfer switch unit for safety and ease of maintenance. The protective cover shall include a built-in pocket for storage of the operator's manuals
4. The controller shall meet or exceed the requirements for Electromagnetic Compatibility (EMC) as follows:

<u>Reference</u>	<u>Title</u>
EN 55011:1991	Emission standard - Group 1, Class A
EN 50082-2:1995	Generic immunity standard
EN 61000-4-2:1995	Electrostatic discharge (ESD) immunity
ENV 50140:1993	Radiated Electro-Magnetic field immunity
EN 61000-4-4:1995	Electrical fast transient (EFT) immunity
EN 61000-4-5:1995	Surge transient immunity
EN 61000-4-6:1996	Conducted Radio-Frequency field immunity
IEEE472 (ANSI C37.90A)	Ring Wave Test

#### B. Controller Display and Keypad

1. A four line, 20 character LCD display and keypad shall be an integral part of the controller for viewing all available data and setting desired operational parameters. Operational parameters shall also be available for viewing and limited control through the communications interface port. The following parameters shall only be adjustable via DIP switches on the controller:
  - a. Nominal line voltage and frequency
  - b. Single or three phase sensing
  - c. Operating parameter protection
  - d. Transfer operating mode configuration (Open transition, Closed transition, or Delayed transition)
2. All instructions and controller settings shall be easily accessible, readable and accomplished without the use of codes, calculations, or instruction manuals.

C. Voltage, Frequency and Phase Rotation Sensing

1. Voltage and frequency on both the normal and emergency sources (as noted below) shall be continuously monitored, with the following pickup, dropout, and trip setting capabilities (values shown as % of nominal unless otherwise specified):

<u>Parameter</u>	<u>Sources</u>	<u>Dropout / Trip</u>	<u>Pickup / Reset</u>
Undervoltage	N&E, 3 $\phi$	70 to 98%	85 to 100%
Overvoltage	N&E, 3 $\phi$	102 to 115%	2% below trip
Underfrequency	N&E	85 to 98%	90 to 100%
Overfrequency	N&E	102 to 110%	2% below trip
Voltage unbalance	N&E	5 to 20%	1% below dropout

2. Repetitive accuracy of all settings shall be within  $\pm 0.5\%$  over an operating temperature range of  $-20^{\circ}\text{C}$  to  $60^{\circ}\text{C}$ .
3. Voltage and frequency settings shall be field adjustable in 1% increments either locally with the display and keypad or remotely via the communications interface port.
4. The controller shall be capable (when activated by the keypad or the communications interface port) of sensing the phase rotation of both the normal and emergency sources. The source shall be considered unacceptable if the phase rotation is not the preferred rotation selected (ABC or CBA).
5. Source status screens shall be provided for both normal & emergency to provide digital readout of voltage on all 3 phases, frequency, and phase rotation

D. Time Delays

1. An adjustable time delay of 0 to 6 seconds shall be provided to override momentary normal source outages and delay all transfer and engine starting signals. Capability shall be provided to extend this time delay to 60 minutes by providing an external 24 VDC power supply.
2. A time delay shall be provided on transfer to emergency, adjustable from 0 to 60 minutes, for controlled timing of transfer of loads to emergency.
3. Two time delay modes (which are independently adjustable) shall be provided on re-transfer to normal. One time delay shall be for actual normal power failures and the other for the test mode function. The time delays shall be adjustable from 0 to 60 minutes. Time delay shall be automatically bypassed if the emergency source fails and the normal source is acceptable.
4. A time delay shall be provided on shut down of engine generator for cool down, adjustable from 0 to 60 minutes.
5. A time delay activated output signal shall also be provided to drive an external relay(s) for selective load disconnect control. The controller shall have the ability to activate an adjustable 0 to 5 minute time delay in any of the following modes:
  - a. Prior to transfer only

- b. Prior to and after transfer
  - c. Normal to emergency only
  - d. Emergency to normal only
  - e. Normal to emergency and emergency to normal
  - f. All transfer conditions or only when both sources are available
6. The controller shall also include the following built-in time delays for optional Closed Transition and Delayed Transition operation:
- a. 1 to 5 minute time delay on failure to synchronize normal and emergency sources prior to closed transition transfer
  - b. 0.1 to 9.99 second time delay on an extended parallel condition of both power sources during closed transition operation
  - c. 0 to 5 minute time delay for the load disconnect position for delayed transition operation.
7. All time delays shall be adjustable in 1 second increments, except the extended parallel time, which shall be adjustable in .01 second increments.
8. All time delays shall be adjustable by using the LCD display and keypad or with a remote device connected to the communications interface port

E. Additional Features

- 1. Membrane-type switches shall be provided for the "test" and "retransfer to normal" functions. The test position will simulate a normal source failure. The retransfer to normal position shall bypass the time delays on retransfer to normal.
- 2. A SPDT contact, rated 5 amps at 30 VDC, shall be provided for a low-voltage engine start signal. The start signal shall prevent dry cranking of the engine by requiring the generator set to reach proper output, and run for the duration of the cool down setting, regardless of whether the normal source restores before the load is transferred.
- 3. Auxiliary contacts, rated 10 amps, 250 VAC shall be provided consisting of two contacts, closed when the ATS is connected to the normal source and two contacts closed, when the ATS is connected to the emergency source.
- 4. LED indicating lights shall be provided; one to indicate when the ATS is connected to the normal source (green) and one to indicate when the ATS is connected to the emergency source (red)
- 5. LED indicating lights shall be provided and energized by controller outputs. The lights shall provide true source availability of the normal and emergency sources, as determined by the voltage sensing trip and reset settings for each source.
- 6. A membrane switch shall be provided on the membrane panel to test all indicating lights when pressed.

7. The following features shall be built-in to the controller, but capable of being activated through keypad programming or the communications interface port only when required by the user:
  - a. Provide the ability to select “commit/no commit to transfer” to determine whether the load should be transferred to the emergency generator if the normal source restores before the generator is ready to accept the load.
  - b. An Inphase monitor shall be provided in the controller. The monitor shall control transfer so that motor load inrush currents do not exceed normal starting currents, and shall not require external control of power sources. The inphase monitor shall be specifically designed for and be the product of the ATS manufacturer. The inphase monitor shall be equal to ASCO Feature 27.
  - c. The controller shall be capable of accepting a normally open contact that will allow the transfer switch to function in a non-automatic mode when a non-automatic version of the user interface membrane is furnished.
  - d. Engine Exerciser – The controller shall provide an internal engine exerciser. The engine exerciser shall allow the user to program up to seven different exercise routines. For each routine, the user shall be able to:
    - 1) Enable or disable the routine.
    - 2) Enable or disable transfer of the load during routine.
    - 3) Set the start time, time of day, day of week, week of the month (1st, 2nd, 3rd, 4th, alternate or every)
    - 4) Set the duration of the run.
    - 5) At the end of the specified duration the switch shall transfer the load back to normal and run the generator for the specified cool down period. A 10-year life battery that supplies power to the real time clock in the event of a power loss will maintain all time and date information.
  - e. Key Locking Feature – The control switches on the interface membrane shall be capable of being locked via password protected screens on the controller LCD display to prevent unauthorized tampering. A red LED indicator shall be illuminated on the interface membrane when the membrane controls are locked.
8. The following feature shall be built - into the controller, but capable of being activated through keypad programming or the communications interface port. (Note: The transfer switch will operate in a non-automatic mode with this feature activated.)
  - a. Terminals shall be provided for a remote contact which opens to signal the ATS to transfer to emergency and for remote contacts which open to inhibit transfer to emergency and/or retransfer to normal. Both of these inhibit signals can be activated through the keypad or the communications interface port.

9. System Status – The controller LCD display shall include a “System Status” screen which shall be readily accessible from any point in the menu by depressing the “ESC” key a maximum of two times. This screen shall display a clear description of the active operating sequence and switch position. For example:
  - a. Normal Failed
  - b. Load on Normal
  - c. TD Normal to Emergency
  - d. 2min15s
10. Controllers that require multiple screens to determine system status or display “coded” system status messages, which must be explained by references in the operator’s manual, are not permissible.
11. Self Diagnostics – The controller shall contain a diagnostic screen for the purpose of detecting system errors. This screen shall provide information on the status input signals to the controller which may be preventing load transfer commands from being completed.
12. Communications Interface – The controller shall be capable of interfacing, through an optional communications interface module, with a network of transfer switches. It shall be able to connect via an RS-485 Serial communication module (up to 4000 ft. direct connect or multi-drop configuration), an Ethernet connectivity module (over standard 10baseT Ethernet networks) or remotely through PSTN dial-up modem communications. This module shall allow for seamless integration of existing or new communication transfer devices. Standard software specific for transfer switch applications shall be available by the transfer switch manufacturer. This software shall allow for the monitoring, control and setup of parameters. The transfer switch shall also be able to interface to 3<sup>rd</sup> party applications using ModbusRTU and ModbusTCP open standard protocols. The communication interface module shall be equal to ASCO Accessory 72A (RS-485 Serial), ASCO Accessory 72E (10BaseT Ethernet), or ASCO Accessory 92A (PSTN dial-up modem).
13. Data Logging – The controller shall have the ability to log data and to maintain the last 99 events, even in the event of total power loss. The following events shall be time and date stamped and maintained in a non-volatile memory:
  - a. Event Logging
    - 1) Data and time and reason for transfer normal to emergency
    - 2) Data and time and reason for transfer emergency to normal.
    - 3) Data and time and reason for engine start
    - 4) Data and time engine stopped
    - 5) Data and time emergency source available
    - 6) Data and time emergency source not available

b. Statistical Data

- 1) Total number of transfers
- 2) Total number of transfers due to source failure
- 3) Total number of days controller is energized
- 4) Total number of hours both normal and emergency sources are available microprocessor-based controller.

14. Control Relay Interface Board

- a. A plug-in relay board shall be furnished which mounts on the back of the membrane interface board. The relay board shall contain four relays with form C contacts rated 2A @ 30Vdc, 0.5A@125Vac.
- b. The function of relays RL1 through RL3 is as follows:
  - 1) RL1 energized if emergency source acceptable output is active.
  - 2) RL2 energized if normal source acceptable output is active.
  - 3) RL3 energized if load disconnect signal output is active.
- c. The function of RL4 shall be capable of being configured via DIP switches on the control relay board, as shown:
  - 1) position 1 on relay energized if normal source acceptable output is active
  - 2) position 2 on relay energized if emergency source acceptable output is active
  - 3) position 3 on relay energized if extended parallel output is active (for Closed Transition Switches only)
  - 4) position 4 on relay energized if ATS locked out output is active (for Closed Transition Switches only).
  - 5) position 5 on relay energized if fail to sync / load disconnect output is active (for Closed or Delayed Transition Switches only).
- d. Multiple conditions can be used to energize RL4 by activating more than one switch. For example, if both positions 1 and 2 are on, the relay will be energized if either the normal or emergency source is acceptable.

## **PART 3 - EXECUTION**

### **3.01 Installation**

- A. The Contractors shall install all equipment per the manufacturer's recommendations and the contract drawings.
- B. All necessary hardware to secure the assembly in place shall be provided by the Contractor.

- C. The equipment shall be installed and checked in accordance with the manufacturer's recommendations.

### **3.02 Field Quality Control**

- A. Provide the services of a qualified factory-trained manufacturer's representative to assist the contractor in installation and start-up of the equipment specified under this section for a period of two working days. The manufacturer's representative shall provide technical direction and assistance to the contractor in general assembly of the equipment, connections and adjustments, and testing of the assembly and components contained therein.
- B. The Contractor shall provide three (3) copies of the manufacturer's field start-up.
- C. Performance Tests
  - 1. Field test and calibrate timing and monitoring logic. All adjustment shall be within 5% of the previously specified set points.
  - 2. Field test the transferring of loads between normal and emergency power sources as follows:
    - a. Start loads located downstream of the ATS.
    - b. De-energize the normal power source. Verify that the standby generator starts and the load is transferred to the emergency source.
    - c. Energize the normal source. Verify that after the selected time delay, the load is transferred to the normal power source. Verify that after the load is switched the generator continues to operate unloaded for the time specified. At the end of the period verify that the generator shuts off.
  - 3. Field test and calibrate the in-phase monitor. Demonstrate that the switch transfers when source phase differences are within 20 degrees under varying generator speeds.

### **3.03 Adjusting / Cleaning / Protection**

- A. Training
  - 1. The contractor shall provide a training session for up to five (5) owner's representatives for two normal workdays at a jobsite location determined by the owner.
  - 2. The training session shall be conducted by a manufacturer's qualified representative. The training program shall consist of the instruction on the operation of the assembly, circuit breakers and major components within the assembly

END OF SECTION

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