

SECTION 11 24 24
WINDOW WASHING SYSTEMS

1. PART 1 GENERAL

1.1. SUMMARY

- A. Section Includes: This Section specifies design, supply and installation of Window Washing Systems and Suspended Maintenance Equipment.

1.2. RELATED SECTIONS

- A. Section [01 61 00 – Common Product Requirements]
- B. Section [01 74 00 – Cleaning and Waste Management]
- C. Section [03 30 00 - Cast-in-Place Concrete: concrete runway, piers and sleepers for roof cars.
- D. Section [05 05 23 - Metal Fastenings: horizontal lifeline fasteners.
- E. Section [05 50 00 - Metal Fabrications].
- F. Section [07 62 00 - Sheet Metal Flashing and Trim: aluminum flashing for davit bases].
- G. Section [08 44 00 - Curtain Wall and Glazed Assemblies: mullion and stabilization co-ordination].
- H. Section [26 00 00 - Electrical: climbing monorail power supply].
- I. Section [26 25 00 - Enclosed Bus Assemblies: climbing monorail busbar].
- J. Section [01 78 00 - Closeout Submittals].

1.3. REFERENCES

- A. American Institute of Steel Construction (AISC).
 - 1. AISC S342L [1993], Load and Resistance Factor Design Specification for Structural Steel Buildings (including Supplement No.1).
- B. Aluminum Association (AA).
 - 1. AA DAF 45, Designation System for Aluminum Finishes.
 - 2. AA ADM-1 [2000], Aluminum Design Manual.
- C. American Society of Mechanical Engineers (AMSE).
 - 1. ASME A120.1 [2006], Safety Requirements for Powered Platforms and Traveling Ladders and Gantries for Building Maintenance.
- D. American National Standards Institute / International Window Cleaning Association (ANSI/IWCA).
 - 1. ANSI/IWCA I-14.1 [2006], Window Cleaning Safety Standard.
- E. American Welding Society (AWS).

1. AWS D1.2/D1.2M [2003], Structural Welding Code - Aluminum.
 2. AWS D1.1/D1.1M [2006], Structural Welding Code—Steel.
- F. ASTM International (ASTM).
1. ASTM A123/A123M [2002], Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 2. ASTM A167 [1999 (2004)], Specification for Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet and Strip.
 3. ASTM A276 [2006], Standard Specification for Stainless Steel Bars and Shapes.
 4. ASTM A492 [1995 (2004)] Standard Specification for Stainless Steel Rope.
 5. ASTM B221 [2006], Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- G. Occupational Safety and Health Administration (OSHA).
1. OSHA 1910, Subpart D, Walking and Work Surfaces.
 2. OSHA 1910, Subpart F, Appendix C, Personal Fall Arrest Systems.
 3. OSHA Ruling on Window Cleaning by Bosun's Chair.
 4. OSHA 1910.66 Subpart F, Powered Platforms.

1.4. ACTION SUBMITTALS

- A. General: Submit listed action submittals in accordance with Contract Conditions and Section [01 33 00 - Submittal Procedures].
- B. Shop Drawings: Indicate information on shop drawings as follows:
1. Submit shop drawings showing complete layout and configuration of window cleaning and suspended maintenance system, including components and accessories.
 2. Indicate design and fabrication details, hardware, and installation details.
 3. Include installation and rigging instructions and:
 4. Required restrictive working usage and general safety notes.
 5. Non-restrictive working usage and general safety notes.
 6. Ensure Shop Drawings are reviewed by Engineer licensed in State of Missouri and submit calculations to Owner.
 7. Submit product data, including manufacturer's technical data sheet, for specified products.

1.5. INFORMATION SUBMITTALS

- A. Quality Assurance:
1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
 3. Manufacturer's installation instructions.

1.6. CLOSEOUT SUBMITTALS

- A. Submit 1-year standard manufacturer warranty documents specified.

- B. Operation and Maintenance Data: Submit Operation and Maintenance data for installed products in accordance with Section [01 78 00 - Closeout Submittals].
- C. Include:
 - 1. Manufacturer's instructions covering maintenance requirements and parts catalog giving complete list of repair and replacement parts with cuts and identifying numbers.
 - 2. Two (2) copies of system Equipment Manual & Inspection Log Book, with "Initial Inspection - Certification for Use" and "Inspection Sign-Off" forms completed.
 - 3. Two (2) copies of reduced, —as-built shop drawing|| showing equipment locations and details. Ensure drawing is posted adjacent exits to roof.

1.7. QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
 - 2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction and approving application method.
- B. Regulatory Requirements.
 - 1. Comply with OSHA regulations as follows:
 - 2. 1910, Subpart D, Walking and Working Surfaces.
 - 3. Appendix C to 1910 Subpart F, Personal Fall Arrest Systems.
 - 4. OSHA Ruling on Window Cleaning by Bosun's Chair.
 - 5. 1910.66, Subpart F, Powered Platforms.

1.8. DELIVERY, STORAGE AND HANDLING

- A. General: Comply with [01 61 00 - Common Product Requirements].
- B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Delivery:
 - 1. Deliver materials in manufacturer's original packaging with identification labels intact and in sizes to suit project.
- D. Storage and Protection:
 - 1. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

1.9. PROJECT AMBIENT CONDITIONS

- A. Installation Location: Assemble and erect components only when temperatures are above [40] degrees F ([4] degrees C).

1.10. SEQUENCING

- A. Sequence with other Work and Comply with window washing equipment manufacturer's written recommendations for sequencing construction operations.
- B. Specification Guide Note: Coordinate Article below with Contract Conditions and with 01 78 36 - Warranties.

1.11. WARRANTY

- A. Project Warranty: Refer to Contract Conditions for additional project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and does not limit, other rights Owner may have under Contract Documents.
- C. Specification Guide Note: Coordinate Article below with manufacturer's warranty requirements.
- D. Warranty: Commencing on date of substantial completion set by [Owner] [Architect] [Consultant].

2. PART 2 PRODUCTS

2.1. MANUFACTURERS

- A. Ensure manufacturer has minimum 5 years experience in manufacturing window washing and suspended maintenance system components similar to or exceeding requirements of project.
- B. Manufacturer's Insurance: Ensure manufacturer carries liability insurance to protect against product and system failure in amount of five million dollars US \$5,000,000 minimum.

2.2. MANUFACTURER:

- A. Basis of design:
Fall protection systems as designed, supplied and installed by:
Flexible Lifeline Systems
14325 West Hardy Road
Houston, TX 77060
Phone: 832-448-2900
Fax: 832-448-2990
E-mail: info@flexiblelifeline.com
Website: www.flexiblelifeline.com

2.3. DESIGN PERFORMANCE REQUIREMENTS

- A. Design window cleaning and suspended maintenance system to suit project requirements to and as indicated.
- B. Locate anchorages to suit suspension equipment specified.
- C. Design anchor components for cleaning and suspended maintenance equipment to [ASME A120.1].
 - 1. Ensure compatibility with industry standard equipment.
 - 2. Anchorage and anchor components: Designed by Engineer qualified in design of window cleaning and suspended maintenance equipment and licensed in State of Missouri.
- D. Design rooftop tieback anchors to [AISC S342L (including supplement No.1)] [and ANSI/IWCA I-14.1], and as follows:
 - 1. Comply with OSHA 1910, Subpart F, Appendix C.
 - 2. Comply with IWCA I 14.1
- E. Rooftop Tieback Anchors:
 - 1. Fall arresting force safety factor of 4 to 1 without permanent deformation
- F. Fall arrest force against fracture or detachment: 5,000lbs (22.4 kN) minimum.

2.4. EQUIPMENT

- A. Rooftop Tieback Anchors.
- B. Outrigger Beams.

2.5. ROOFTOP TIEBACK ANCHORS

- A. Safety U-bars: Galvanized U bar or Stainless steel to ASTM A276, Type 304 with [35] Ksi ([240] MPa) minimum yield strength] [Mild steel, Type 300W with [44] Ksi ([300] MPa) minimum yield strength, hot-dip galvanized to ASTM A123/A123M].
- B. U-bar: [0.75] inches ([19] mm) minimum diameter material with [1.5] inches ([38] mm) eye opening.
- C. Plate: [0.875] inches ([22] mm) diameter material with [2] inches ([50] mm) eye opening.
- D. Hollow Steel Section (HSS) Piers: Mild steel, Type 300W with [50] Ksi ([350] MPa) minimum yield strength, [hot dipped galvanized to ASTM A123/A123M].
- E. Plate and other sections: Mild steel, Type 300W with [44] Ksi ([300] MPa) minimum yield strength, [hot dipped galvanized to ASTM A123/A123M].
- F. Miscellaneous Bolts, Nuts and Washers: [Mild steel, Type 300W with [44] Ksi ([300] MPa) minimum yield strength, hot-dip galvanized to ASTM A123/A123M] [Stainless steel to ASTM A276, Type 304 with [35] Ksi ([240] MPa) minimum yield strength.

2.6. OUTRIGGER BEAMS

- A. Aluminum —I|| beam of engineered length and size to suit application, equipped with shackle, friction U-bar and trolley on outboard end and designed to carry 1000 lbs (4.5 kN) vertical service load, minimum.
- B. Ensure non-corrosive UV Resistant data plate stating Maximum Service Capacity of boom, Manufacturer's Name, Serial No., Manufacturing Date, rated load and other pertinent information is prominently displayed.
- C. Ensure outrigger beams equipped with rolling or friction trolleys have stops to prevent detachment from beam.
- D. Safety U-bars: [Stainless steel to ASTM A276, Type 304 with [35] Ksi ([240] MPa) minimum yield strength] [mild steel, Type 300W with [44] Ksi ([300] MPa) minimum yield strength, hot-dip galvanized to ASTM A123/A123M].
- E. U-bar: [0.75] inches ([19] mm) minimum diameter with [1.5] inches ([38] mm) minimum eye opening.
- F. Outrigger Base/Roof Anchor Hollow Steel Section (HSS) piers: Hollow steel section (HSS) piers: Mild steel, Type 300W with [50] Ksi ([350] MPa) minimum yield strength, [hot dipped galvanized to ASTM A123/A123M] [manufacturer's polyurethane/polyurea coating system].
- G. Swivel-type Beam Base: Round hollow section (HSS) piers of mild steel, Type 350W with [50] Ksi ([350] MPa) minimum yield strength [hot-dip galvanized to ASTM A123/A123M-2002] [manufacturer's polyurethane/polyurea coating system] [with [0.75] inches ([19] mm) diameter U-bar safety anchor, and securement [to suit application] [as indicated].
- H. Ensure base allows swivel-type beam to rotate 360° under load.
- I. Beam Dolly: Aluminum with pneumatic type rubber wheels, sized to suit beam.

2.7. PRODUCT SUBSTITUTIONS

- A. No substitutions permitted.

3. PART 3 EXECUTION

3.1. INSTALLERS

- A. Provide experienced and qualified technicians to carry out erection, assembly and installation of window washing and suspended maintenance equipment system.
- B. Do steel welding to AWS D1.2/D1.2M.
- C. Do aluminum welding to AWS D1.1/D1.1M.

3.2. MANUFACTURERS INSTRUCTIONS

- A. Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions and Flexible Lifeline Systems's technical data sheets.

3.3. EXAMINATION

- A. Site Verification of Conditions:
- B. Verify that substrate conditions which have been previously installed under other sections or contracts are acceptable for product installation in accordance with manufacturer's instructions prior to installation of the fall protection system and window washing equipment.
- C. Inform Owner of unacceptable conditions immediately upon discovery.
- D. Proceed with installation only after unacceptable conditions have been remedied.

3.4. PREPARATION

- A. Ensure structure or substrate is adequate to support complete window washing equipment system.
- B. Ensure structural steel to receive safety anchors [has adequate bearing surface as indicated on shop drawings] [and] [has 100% welds between anchors and structural steel].

3.5. INSTALLATION

- A. Specification Guide Note: Co-ordinate installation with the manufacturer's written installation details and instructions.
- B. Coordinate window washing equipment work with work of other trades, for proper time and sequence to avoid construction delays.
- C. Install window washing equipment plumb and level in accordance with manufacturer's written instructions.
- D. Mechanically fasten anchors in accordance with manufacturer's recommendations.
- E. Accurately fit and align, securely fasten and install free from distortion or defects.
- F. Deform threads of tail end of anchor studs after nuts have been tightened to prevent accidental removal and vandalism.

3.6. FIELD QUALITY CONTROL

- A. When necessary have the manufacture assist in installation.
- B. Manufacturer's Field Services: Have manufacturer's technical representative schedule site visits to review work as follows:
- C. After delivery and storage of products.
- D. Testing: Test on site 100% of anchors relying upon chemical adhesive fasteners using load cell test apparatus in accordance with manufacturer's written recommendations.

3.7. ADJUSTMENT

- A. Lubricate moving parts to operate smoothly and fit accurately.
- B. Complete "Initial Inspection - Certification for Use" form included in Equipment Manual and Inspection Log Book provided by manufacturer.

3.8. FINAL CLEANING

- A. Do cleanup in accordance with Section [01 74 00 - Cleaning and Waste Management].
- B. Upon completion, remove surplus and excess materials, rubbish, tools and equipment.

3.9. PROTECTION

- A. Specification Guide Note: Co-ordinate the following Paragraph with Section 01 76 00 - Protecting Installed Construction.
- B. Protect installed product from damage during construction in accordance with Section [01 76 00 - Protecting Installed Construction].
- C. Make good damage to adjacent materials caused by window washing equipment installation.

3.10. MAINTENANCE

- A. Include complete maintenance on window washing equipment for 1 year after date of acceptance by Owner.
- B. Repair or replace parts of window washing equipment whenever required due to defect and normal wear and tear.
- C. Use only standard parts of product line of manufacturer of window washing equipment.
- D. Perform work during regular trade working hours satisfactory to Owner
- E. Ensure that maintenance personnel register with designated building personnel at time of inspections and maintenance.

END OF SECTION