



SECTION 112423

SUSPENDED MAINTENANCE ANCHORAGE SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Suspended Access Anchorage Systems:
 - 1. System design and certification.
 - 2. Fall protection roof anchors.
 - 3. Rigging sleeves.
 - 4. Davits.

- B. Personal Fall Arrest Anchorage Systems:
 - 1. System design and certification.
 - 2. Fall protection roof anchors.
 - 3. Horizontal lifelines.
 - 4. Training.

1.2 RELATED SECTIONS

- A. Section 03300 - Cast-In-Place Concrete.
- B. Section 05120 - Structural Steel.
- C. Section 05500 - Metal Fabrications.
- D. Section 07500 - Membrane Roofing.
- E. Section 07700 - Roof Specialties and Accessories.

1.3 REFERENCES

- A. Occupational Safety and Health Administration (OSHA):
 - 1. OSHA 29 CFR 1910, Subpart D - Walking and Working Surfaces.
 - 2. OSHA 29 CFR 1910.66, Subpart F - Powered Platforms.
 - 3. OSHA 29 CFR 1910.66, Appendix C - Personal Fall Arrest Systems.
 - 4. OSHA Procedures and Precautions for Employees Using Decent Control Equipment.
 - 5. OSHA 29 CFR 1926, Subpart M – Fall Protection

- B. International Window Cleaning Association: ANSI/IWCA I-14.1 - Window Cleaning Safety Standard.

- C. American National Standards Institute: ANSI Z 359 - Fall Protection Code.

- D. American Institute of Steel Construction (AISC): Steel Construction Manual, 15th Ed.

- E. ASTM International:
 - 1. ASTM A 36 - Standard Specification for Carbon Structural Steel.

2. ASTM A 276 - Standard Specification for Stainless Steel Bars and Shapes.
3. ASTM A 492 - Standard Specification for Stainless Steel Rope Wire.
4. ASTM A 500 - Standard Specification for Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
5. ASTM A 572 - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.

F. American Welding Society: AWS D1.1 - Structural Welding Code.

1.4 SUBMITTALS

- A. Submit under provisions of **Section 01300 – Administrative Requirements**.
- B. Product Data: Manufacturer's data sheets and detail drawings for each product to be used, including:
 1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Product literature, material specifications.
 4. Installation details and methods.
 5. Dimensions of product components.
 6. Finishes of anchor components.
- C. Shop Drawings
 1. Shall be to scale and clearly show dimensioned layout of system components.
 2. Include details for each specified product to indicate materials, dimensions, accessories, rated load, and ultimate load. Details shall clearly indicate attachment to building structure and welds shall be indicated by AWS welding symbols, distinguishing between shop and field welds, and show size, length and type of each weld.
 3. Include notes to indicate proper use of system
 4. Shall bear the seal of the supervising registered professional engineer. Professional engineer shall be licensed in the jurisdiction where the project is located.
- D. Close-out Submittals:
 1. Provide a Fall Protection Anchorage System Log Book to include:
 - a. Include test report to document test results at EACH anchor location.
 - b. Requirements for inspection and re-certifications.
 - c. Statement by supervising registered professional engineer that system was designed and installed in compliance with current OSHA, ANSI, and state regulatory requirements and is certified for use.
 - d. As-built Drawings to indicate as-installed anchorage locations, details, and user notes, sealed by the supervising registered professional engineer.
 - e. Manufacturer's 1 year standard warranty document commencing on date of project substantial completion. Manufacturer's warranty is in addition to any warranties as required by project contract documents.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 1. Provide products for a manufacturer that specializes in the design, fabrication, and installation of fall protection anchorage systems with a minimum of ten years of documented experience. Companies such as miscellaneous steel fabricators that do not normal design and fabricate fall protection anchorage components are not acceptable.
 2. Manufacturer shall carry liability insurance (products and completed

operations) in an amount not less than \$5,000,000 to protect against product failure. Insurance shall be specifically for suspended maintenance and fall protection equipment.

3. Manufacturer shall provide samples of product for inspection or outside agency testing at the request of the owner. Manufacturer shall be compensated for additional product.

B. Installer Qualifications:

1. Installation contractor shall be trained or qualified by manufacturer.
2. The fall protection install contractor shall maintain appropriate insurances as applicable for the installation of fall protection systems. Installer shall have specific liability insurance (products and completed operations) in an amount not less than \$5,000,000. Proof of these insurance listings shall be supplied with the submittals listed in herein.
3. Welding methods shall comply with AWS D1.1 and welding personnel shall be certified in accordance with AWS requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards.
- B. Inspect products prior to installation and replace damage products.
- C. Store products indoors in manufacturer's or fabricator's original containers and packaging, with labels clearly identifying product name and manufacturer. Protect from damage.

1.7 SEQUENCING AND COORDINATION

- A. Coordinate installation of products that connect to the work of other trades. Furnish setting drawings and directions for installing products that are to be embedded in concrete or masonry. Deliver such items to the project site in time for installation.
- B. General Contractor shall be immediately made aware of any site conditions that may interfere with proper installation and intended use of anchorage system.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install systems under environmental conditions outside manufacturer's recommended limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Diversified Fall Protection LLC, which is located at: 24400 Sperry Drive, Westlake OH 44145; Toll Free Tel: 866-387-9965; Email: anchors@fallprotect.com
Web: www.fallprotect.com
- B. Substitutions: Not permitted.

2.2 SYSTEM DESCRIPTION

- A. System Design Requirements:
 1. Fall Protection Anchorage Systems: Complies with current OSHA, ANSI, and applicable state regulatory requirements.

2. Suspended Access Anchorage Systems: Provide independent anchorages for fall arrest in addition to anchorages used for suspension or equipment tie-back.
 3. Suspended Access Anchorage Locations: Coincide with areas of the buildings' facade needing to be serviced. Consideration shall be given for the type of service required and service methods.
 4. Personal Fall Arrest Anchorage Systems: Provide rooftop edge access to designated roof areas where parapet height does not meet OSHA/ANSI requirements for fall prevention. Refer to building drawings for extent of fall protection system.
- B. Fall Protection Anchorage Design Requirements:
1. Fall Protection Roof Anchors: Capable of sustaining a minimum ultimate load of 5000 lbs (2268 kg) in any direction a load may be applied without fracture or failure.
 2. Fall Protection Roof Anchors: Shall be designed for a live load of at least 3,100 lbs (1406 kg) in every direction that a load may be applied.
 3. Fall Protection Roof Anchors: Designed with a minimum working load of 1800 lbs (567 kg) in any direction the load may be applied.
- C. Davit and Rigging Sleeve Design Requirements:
1. Davits and Rigging Sleeves: Capable of supporting an ultimate load of not less than 4 times the rated load. Rated load shall be 1,000 lbs (453 kg) minimum.
 2. Outreach of portable davit boom shall not exceed 8 ft 6 inches (2590 mm). Portable davit mast shall be capable of 360 degree rotation.
- D. Horizontal Lifeline Design Requirements:
1. The horizontal lifeline shall be designed for a minimum of **two (enter 1-3 as required)** users, each using an energy absorbing lanyard which limits the force applied to the horizontal lifeline to 1,350 lbs (or as designated by the Qualified Fall Protection Engineer, not to exceed 1,800 lbs).
 2. Horizontal lifelines designed for multiple users shall be analyzed using lumped mass or sequential fall calculations.
 3. Termination anchors, intermediate anchors, and cable components shall maintain a minimum safety factor of 2:1 as required by OSHA, specifically 1926.502(d)(8).
 4. Horizontal lifeline required clearance shall be less than or equal to the available clearance for the system. Clearance safety margin shall comply with ANSI Z359.6.
- E. Monorail System:
1. Capable of supporting an ultimate load of not less than 4 times the rated load for the combination of both an equipment line and safety line. Rated vertical service load shall be 1,250 lbs (567 kg).

2.3 MATERIALS

- A. Steel: Minimum strengths.
1. Structural Steel W-Shapes: ASTM A 572, Grade 50, $F_y = 50$ ksi.
 2. HSS (Tube): ASTM A 500, Grade B, $F_y = 46$ ksi.
 3. Angles, Channels, and Plates: ASTM A 36, $F_y = 36$ ksi.
 4. Stainless Steel Shapes: ASTM A 276, Type 304.
 5. Stainless Steel Wire Rope: ASTM A 492, Type 304, 5/16 inch (8 mm) minimum diameter.
- B. Aluminum: 6061-T6 alloy.

- C. Fasteners: Provide stainless steel Type 304 for exterior fasteners exposed to weather. Diameter of bolt sizes per designer/engineer.
- D. Non Stainless Steel Materials: Hot dipped galvanized.

2.4 MANUFACTURED UNITS

- A. Fall Protection Roof Anchors:
 1. U-Bars: Minimum 0.75 inch (19 mm) diameter type 304 stainless steel with 1.5 inch (39 mm) eye opening.
 2. Anchor Posts: Hot dipped galvanized with minimum height as designated by General Contractor to provide not less than 8 inches (203 mm) above finished roof or as necessary to allow proper flashing per roof manufacturer requirements.
 3. Baseplates: Minimum 5/8 inch (8 mm) or as designed by manufacturer. Hot dipped galvanized.
 4. Fasteners: As designed and provided by manufacturer for proper attachment to substrate. Exposed fasteners are to be Type 304 SS.
 5. Post Install Concrete Mount Roof Anchors: Series No. RA-1000.
 6. Cast In Place Roof Anchors: Series No. RA-2400.
 7. Bolt Through Roof Anchors: Series No. RA-4000.
 8. Weldable Roof Anchors with Base Plate: Series No. RA-3100.
 9. Weldable Roof Anchors: Series No. RA-3400
 10. Beam Wrap Roof Anchors: Series No. RA-4700
 11. Joist Wrap Roof Anchors: Series No. RA-4500 JW.
 12. Post Install Concrete Mount Wall Anchors: Series No. WA-1001.
 13. Weldable Wall Anchors: Series No. WA-3001.
 14. Bolt Through Wall Anchors: Series No. WA-4001.
 15. Column Wrap Anchors: Series No. CW-4104
- B. Davits:
 1. Portable Davit Arms:
 - a. Composed of extruded aluminum sections with dimensions to suit requirements for height and reach.
 - b. Equipped with adjustable rigging point to allow variation offset distance from end of boom.
 - c. All locking pins and hardware to be stainless steel.
 - d. Locking pins to be secured with wire rope lanyards.
 - e. Equipped with carrying handles.
 - f. Shall have a load rating plate stating rated load, manufacturer's contact information, serial number, date of fabrication, and other pertinent information.
 - g. Quantities: As scheduled, indicated on Drawings and required for complete, compliant application.
 2. Portable Davit Socket:
 - a. Designed to receive davit arm and for hinged attachment to davit base.
 - b. Equipped with two stainless steel locking pins with fastening tethers and safety pins to prevent unintentional disengagement.
 3. Permanently Installed Davit Bases:
 - a. Hot dipped galvanized HSS with minimum height as designated by General Contractor to provide not less than 8 inches (203 mm) above finished roof or as necessary to allow proper flashing per roof manufacturer requirements.
 - b. Designed to prevent accumulation of water.
- C. Rigging Sleeves:
 1. Type: Horizontal.

2. Type: Vertical.
 3. Portable Boom Assemblies:
 - a. Hot Dipped Galvanized HSS with length and size to suit application.
 - b. Equipped with stainless steel rigging connection point for attachment of suspension line.
 - c. Shall have a load rating plate stating rated load, manufacturer's contact information, serial number, date of fabrication, and other pertinent information.
 - d. Quantities: As scheduled, indicated on Drawings and required for complete, compliant application.
 4. Permanently Installed Rigging Sleeve Bases:
 - a. Hot dipped galvanized HSS with minimum height as designated by General Contractor to provide not less than 8 inches (203 mm) above finished roof or as necessary to allow proper flashing per roof manufacturer requirements.
 - b. Designed to prevent accumulation of water.
- D. Intermittent Stabilization Buttons:
1. Material: Stainless Steel
 2. Coordinate with curtain wall/façade contractor for furnish and installation of an integrated system.
 3. Locate receptacles every third floor or 50ft, whichever is less, and in line with platform suspension points.
 3. Include sufficient quantity of stainless steel stabilizer ties.
 4. Designed with a minimum safety factor of 4:1 and a minimum of 600 lbs against fracture or detachment.
- E. Horizontal Lifelines:
1. Horizontal Lifeline system shall be composed of galvanized steel fall protection anchors and stainless steel wire rope. Extent of system is as noted on contract Drawings.
 2. Wire rope shall be minimum 5/16 inch (8 mm) diameter. Wire rope and wire rope termination components shall be stainless steel.
 3. Horizontal lifeline termination components shall be swaged.
 4. Shall allow user to bypass intermediate anchors without detachment or reattachment to the system.
 5. Provide **two (enter 1-3 as required)** stainless steel cable runner devices capable of attachment and removal at any point along the system.
- F. Personal User Equipment
1. **OSHA/ANSI Z359 Compliant Full Body Harnesses. QTY = 2 Units**
 2. **Enter Project Specific Lanyard/SRL information as Required.**
- G. Monorail Systems
1. Material: Extruded Aluminum with Mill Finish.
 2. Extent of system is as noted on contract drawings.
 3. Shall have a load rating plate stating rated load, manufacturer's contact information, serial number, date of fabrication, and other pertinent information.
 4. Include **four (enter QTY as required)** stainless steel trolleys.
 5. Include end stops at locations as require to prevent trolley disengagement.
 6. Provide galvanized steel support brackets at locations as required to provide for proper load rating and proper support at monorail joints.

2.5 FABRICATION

- A. Product manufacturing shall be constructed without defects in appearance or

defects damaging to the performance of the product.

- B. Anchors shall be checked for any material (including but not limited to welding material build-ups) and are free of sharp edges or abrasions that can cause damage to workers ropes.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Inspect and prepare substrates for compliance with anchorage requirements using the methods recommended by the manufacturer for achieving best result for the substrates under project conditions.
- B. Do not proceed with installation until substrates have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances and conditions that will be detrimental to the anchorage system are corrected. Commencement of installation constitutes acceptance of conditions.
- C. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

3.2 INSTALLATION

- A. Install products in accordance to manufacturer's instructions and approved shop drawings.
- B. Coordinate installation with General Contractor to ensure an approved water-tight roofing and flashing method will be used.
- C. Clean mounting surfaces to insure direct and even bearing of base plates.
- D. Torque fasteners to manufacturer's required rating.
- E. All fasteners threads shall be deformed by mechanical, chemical or welding methods to prevent accidental removal or vandalism.
- F. All welders must be certified to applicable American Welding Society (AWS) standards.
- G. After installation, clean and paint as necessary any field welds with cold galvanizing compound to prevent corrosion.

3.3 FIELD QUALITY CONTROL

- A. All adhesive anchors shall be tested using a load cell test apparatus in accordance with manufacturer's written instructions.
- B. Equipment shall be tested and inspected on site in accordance with manufacturer's recommendations and under the supervision of a professional engineer. Testing should be conducted in accordance with applicable OSHA/ANSI standards. Testing data shall be recorded and submitted with system log book.

3.4 PROTECTION

- A. Protect installed products until completion of project.

- B. Touch-up, repair or replace damaged products before Substantial Completion.

3.5 ADJUSTMENT

- A. Verify that products have been installed in accordance with manufacturer's instructions. Adjust as necessary to ensure compliance.
- B. Correct component deficiencies to assure compliance prior to substantial completion.

3.6 TRAINING

- A. Provide on-site instruction by manufacturer's certified technician for owner's designated operators in proper use of personal fall arrest anchorage system. Provide at least one 2 hr training session and one bound copy of training materials.

END OF SECTION