

DIVISION [11014]
SUSPENDED MAINTENANCE AND FALL PROTECTION EQUIPMENT

1 GENERAL

1.01 SUMMARY

- A. Section includes delegated design and supply of suspended maintenance and fall protection equipment.

1.02 Comply with the general and specific conditions of the contract, specifications, and drawings.

1.03 RELATED SECTIONS:

Remove sections that do not apply to the project, and update to match remainder of specification.

A.	Submittal Procedures	Section [01330]
B.	Concrete Forms and Accessories	Section [03100]
C.	Cast In-place Concrete	Section [03300]
D.	Post Tensioned Concrete	Section [03380]
E.	Pre-cast Concrete	Section [03400]
F.	Masonry Assemblies	Section [04800]
G.	Structural Metal Framing	Section [05100]
H.	Metal Joists	Section [05200]
I.	Metal Deck	Section [05300]
J.	Cold-Formed Metal Framing	Section [05400]
K.	Metal Fabrications	Section [05500]
L.	Rough Carpentry	Section [06100]
M.	Damproofing and Waterproofing	Section [07100]
N.	Thermal Protection	Section [07200]
O.	Membrane Roofing	Section [07500]
P.	Flashing and Sheet Metal	Section [07600]
Q.	Roof Specialties and Accessories	Section [07700]
R.	Building Service Piping	Section [15100]

Specify water supply with standard hose bib connections at roof level(s).

S.	Electrical Power	Section [16200]
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Specify convenience and hoist electrical supply at roof level with strain relief anchors in accordance to IWCA recommendations.

1.04 REFERENCED STANDARDS

- A. Occupational Safety and Health Administration (OSHA):
 - 1. OSHA 1910, Subpart D – Walking and Working Surfaces
 - 2. OSHA 1910.66, Subpart F – Powered Platforms
 - 3. OSHA 1910.6, Appendix C – Personal Fall Arrest Systems
 - 4. OSHA 1926, Subpart M – Fall Protection
- B. [Minnesota OSHA]
 - 1. [Minnesota Rules, Parts 5205.0650 to 5205.0730]
- C. [California OSHA]
 - 1. [Division 1. Department of Industrial Relations, Subchapter 4. Construction Safety Orders]
 - 2. [Division 1. Department of Industrial Relations, Subchapter 7. General Industry Safety Orders, Group 1. General Physical Conditions and Structures, Article 5. Window Cleaning]

Specify additional State, Local, Contractual, or other referenced standards as necessary.

- D. American National Standards Institute (ANSI) / International Window Cleaning Association (IWCA) ANSI/ IWCA I-14.1 – Window Cleaning Safety Standard.
- E. ANSI Z359 Safety Requirements for Fall Arrest Systems, Subsystems, and Components
- F. American Society of Mechanical Engineers (ASME) ASME A120.1, Safety Requirements for Powered Platforms for Building Maintenance
- G. American Institute of Steel Construction (AISC) Steel Construction Manual [14th Edition]
- H. American Welding Society (AWS)
 - 1. AWS D1.1 Structural Welding Code – Steel
 - 2. AWS D1.2 Structural Welding Code – Aluminum
 - 3. AWS D1.6 Structural Welding Code – Stainless Steel
- I. American Society for Testing and Materials (ASTM)
 - 1. ASTM A36 Standard Specification for Carbon Structural Steel
 - 2. ASTM A276 Standard Specification for Stainless Steel Bars and Shapes
 - 3. ASTM A304 Standard Specification for Carbon and Alloy Steel Bars Subject to End-Quench Hardenability Requirements
 - 4. ASTM A500 Standard Specification for Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 - 5. ASTM A572 Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

- J. Aluminum Association, Aluminum Design Manual, Specifications & Guidelines for Aluminum Structures
- K. ASTM A153 Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate selection of roofing materials adjacent to anchorages. The roofing warranty shall be maintained. Flexible boots are required at roofing penetrations to allow for temporary deflection during testing and use.
 - 2. [Coordinate topcoat finishes applied over materials supplied under this specification section. Comply with paint and coating manufacturer's written recommendations for compatibility.]

1.06 PRECONSTRUCTION SUBMITTALS

- A. Product Data:
 - 1. Roof anchor manufacturer data sheet(s)
 - 2. Fastener manufacturer data sheet(s)
- B. Installer qualifications listing the names of three similar completed projects.
- C. [Field Welding Qualifications for personnel per AWS D1.1 for structural steel,] [D1.2 for aluminum,] [and D1.6 for stainless steel]
- D. Shop Drawings: Include roof plans with maintenance drop locations showing routing of temporary equipment supplied by the maintenance contractor such as ropes and counterweight beams, elevations indicating intermittent stabilization anchors, sections at each attachment to the primary structural system, details of each fastener, and including applicable information of adjacent supporting structure.
- E. Delegated Design: Include analytical structural calculations of the connection and the supporting structure's capacity including service / fatigue design, testing, and ultimate / failure load combinations for each type of anchorage.
- F. Certification Letter: Include a letter certified by an engineer registered in the project's state noting that the primary structural system has adequate capacity to support the transient equipment loading when combined with the applicable dead and live loads.
- G. Manufacturer Insurance Certificate(s) including product liability specifically for suspended maintenance and fall protection equipment.
- H. Installer Insurance Certificate(s) including workmen's compensation, comprehensive general liability, and comprehensive automobile liability.

1.07 CLOSEOUT SUBMITTALS

- A. Manufacturer's Warranty on parts for a term of 1 year on finish and structural capacity.

- B. Log Book including record shop drawings indicating the constructed condition with a completed initial testing log, yearly inspection log to be filled out by others, a 10-year retest log to be filled out by others, and an appendix containing the Preconstruction Submittals.
 - 1. Log book shall include the statement: Systems users to inspect all equipment prior to each use, including all visible attachment points, locks, and pins to ensure all equipment is in safe working order. All users shall be trained on proper use of the equipment, as well as knowing and complying with OSHA, ANSI, and other pertinent life safety regulations. All equipment shall be annually inspected by a qualified person and also re-certified within 10 years under direct supervision of a licensed engineer.
- C. [Operating Procedures Outline System (OPOS) per California Code of Regulations, Title 8, Article 5, Appendix A.]

OPOS is required for projects within the State of California

- D. Laminated placards noting the log book location and showing the system layout for each permanent roof access location.

2 PRODUCTS

2.01 MANUFACTURER(S)

- A. Engineered Supply, LLC
 - 1. Address: 1286 Oldridge Avenue North, Stillwater, MN 55082
 - 2. Phone: 612.508.6727
 - 3. Email: info@engineeredsupply.com
 - 4. Web: www.engineeredsupply.com

Specify additional manufacturers as necessary. Consider Probel (www.pro-bel.ca) and Tractel (www.tractel.com) if additional manufacturers are required.

- B. Substitutions: [Substitutions will not be permitted] [Substitutions will be considered in accordance with provisions of Division 1 of this specification]

2.02 SYSTEM DESIGN REQUIREMENTS

- A. Design and anchorage layout to comply with OSHA, ANSI, IWCA, applicable state regulatory requirements, and other project requirements as necessary.
- B. Provide graphical design indicating areas of the building to be serviced. Provide complete coverage for the type of service required and service methods.

Remove sections that do not apply

- C. Fall Protection Anchorages
 - 1. Capable of sustaining a minimum ultimate load of 5,000 pound force in any direction the load may be applied for fall arrest.

- D. Suspended Maintenance and Tieback Anchorages, Rigging Sleeves, Monorails, and Davits
1. Capable of sustaining a 1,250 pound force service load in any direction the load may be applied under allowable stresses for material fatigue loading.
 2. Capable of sustaining a 1,800 pound force impact service load in any direction the load may be applied for fall arrest loading.
 3. Capable of sustaining a 2,500 pound [5,000 pound *in California*] force test load in any direction the load may be applied under the elastic limits of the materials.
 4. Capable of sustaining a minimum ultimate load of 5,000 pound force in any direction the load may be applied under the plastic limits of the materials.
- E. Horizontal Lifelines
1. Capable of sustaining a 1,800 pound force impact service load in any direction the load may be applied when two users are attached to the system with shock absorbing lanyards limiting the force applied to the system to 900 pounds force for each user.
 2. Maintain a minimum factor of safety from service loads to elastic material limits of 2:1.
 3. Capable of sustaining a minimum ultimate load of 5,000 pound force in any direction the load may be applied under the plastic limits of the materials.
 4. All components of the system shall be directly specified and supplied including manufacturer, make, and model in the design. No replacement components or equals are allowed.
- F. Materials
1. W Shapes to be ASTM A572, Grade 50
 2. HSS tube and pipe to be ASTM A500, Grade B
 3. Miscellaneous steel shapes to be ASTM A36
 4. Stainless steel shapes to be ASTM A276, 304
 5. Aluminum to be 6061 or 6063 with an appropriate temper
 6. Welding rods and bare electrodes per AWS requirements
 7. Galvanizing repair paint to be high zinc dust content paint compatible with surfaces to be coated
 8. Provide stainless steel fasteners for all concealed locations. Hot dipped galvanized fasteners are acceptable for exterior visible locations.

2.03 PRODUCT REQUIREMENTS

- A. Anchors shall be completely free of sharp edges or abrasive surfaces.

- B. Specifically deburr hoops after hot dip galvanizing process.
- C. All exposed portions of carbon steel anchors shall be hot dipped galvanized or aluminum thermal sprayed.
- D. Vent holes to accommodate the hot dip galvanizing process shall be permanently sealed.
 - 1. Provide a minimum of 3/4" diameter attachment hoop. Attachment hoop shall be capable of sustaining 5,000 pound force in any direction the load may be applied under the plastic limits of the materials.
 - 2. Inside radius shall be a minimum of 1.625" [2" diameter closed hoop *in California*].

3 EXECUTION

3.01 INSTALLATION

- A. Sequence and coordinate with other ongoing work, allowing appropriate notice to other trades and inspectors.
- B. Verify substrates match the recommendations of the manufacturer and the project specific shop drawings. Notify the [Engineer of Record] [and Architect of Record] immediately if site conditions vary from the documented conditions.
- C. Verify bearing surfaces are even, plumb, and true. Uneven bearing surfaces may lead to loosening of anchorages during load testing and rejection of anchorage.
- D. Install anchors and fasteners in strict accordance to manufacturer requirements.
- E. Torque fasteners with a calibrated torque wrench in strict accordance to manufacturer requirements.
- F. Fasteners shall be vibration proof through the use of permanent thread locking compound, deformed thread nuts, or damaged threads. Split ring lock washers are not acceptable without additional retention as noted.
- G. Coordinate installation with the [Roofing Contractor] [and General Contractor] to verify installation will result in a warrantable building envelope.
- H. Prevent galvanic action and other forms of corrosion by insulating metals from direct contact with incompatible materials.
- I. Prepare and touch up blemishes and carbon steel field welds with cold galvanizing compound.

3.02 INSPECTION

- A. 100% of adhesive anchors shall be tensioned tested to an equivalent of the maximum anchor test load with a calibrated scale or calibrated hydraulic test apparatus.
- B. Adhesive anchors shall be inspected in accordance with the requirements of the manufacturer.

- C. Equipment shall be initially load tested under the direct supervision of a licensed engineer in accordance with ANSI, OSHA, and IWCA requirements.
- D. Each anchor shall be inspected for conformance to manufacturer requirements, building envelope, looseness, and signs of permanent deflection during load testing.

3.03 TRAINING

- A. Provide on-site instruction by manufacturer technician for Owner's representative in proper use, maintenance, and inspection requirements of the system.

3.04 CORRECTION OF DEFICIENT WORK

- A. Repair or replace non-conforming and damaged products and inspect as necessary to supply a complete, useable system.