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3 PART SPEC

KEESAFETY - HORIZONTAL LIFELINE FALL PROTECTION SYSTEMS

1. PART 1 GENERAL

The Fall Protection Contractor shall design, build, and install fall arresting systems as defined by OSHA and specified herein.

1.1. REFERENCED STANDARDS

A. AMERICAN NATIONAL STANDARD INSTITUTE (ANSI)
   1. ANSI Z359 - Fall Protection Code most current edition

B. OCCUPATIONAL HEALTH AND SAFETY ADMINSTRATION (OSHA)
   1. OSHA 1926.502 Fall Prevention Systems and Criteria and Practices most current edition.
   2. OSHA 1910.140 Personal Fall Protection Systems
   3. State Administrative Code Safety Standards for Fall Restraint and Fall Arrest

C. INTERNATIONAL BUILDING CODE

D. AMERICAN WELDING SOCIETY (AWS) structural specification D1.1

E. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
   1. ASTM A 36-05a: Standard Specification for Carbon Structural Steel.

1.2. SYSTEM DESCRIPTION

A. GENERAL – Provide Fall Protection Systems to allow users to walk uninterrupted the entire length of each system and provide secure anchorage to arrest a fall by the users. All components, including user equipment, shall be included, to provide a complete and fully operational system. The fall protection systems shall be supported by anchors which are permanently attached to structure. This system is not to be designed or utilized for suspended equipment operations.

B. DESIGN QUALIFICATIONS - System Layout, Design Analysis, and Calculations will be prepared and certified by a Licensed Professional Engineer, registered in the state or jurisdiction where the job will be conducted. This engineer shall be employed by the Fall Protection Contractor as a full time fall arrest systems designer.

C. DESIGN REQUIREMENTS –
   1. STRUCTURAL REVIEW
      a. The fall protection contractor shall provide the design loads to the engineer of record for the building. The engineer of record will verify that the supporting structure can withstand the potential loads imparted by the fall protection system.

1.3. QUALIFICATIONS – QUALITY ASSURANCE

A. Installer: Shall have installed systems of size and type comparable to the specified system satisfactory use for not less than two (2) years. Installer to be fully trained by the manufacturer in operating the Keeline configurator to determine the system design. This software provides details on minimum fall height,

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maximum unfactored anchor load for the contractor's qualified engineer to verify that the structure can support it.

B. Manufacturer - Manufacturing company specializing in the design, production and installation and certification of the fall protection system and shall have a minimum of 5 years full time experience with similar systems.

C. Anchors and fasteners - Install anchors and fasteners in accordance with the approved design drawings and manufacturer's instructions as applicable. Where the anchors installation is not performed by the fall protection installer, the anchors to be inspected, load tested and verified by the Fall protection installer.

D. Manufacturer – Manufacturer to have a quality control assurance program in accordance with ISO 9001.

E. Qualified persons to be defined by ANSI/Z359.0.

1.4. SUBMITTALS

The following shall be submitted in accordance with **Section [_____]**, "Submittals," in sufficient detail to show full compliance with the specifications:

A. Pre-construction Submittals:

1. Proof of insurance, per contract requirements, for the design, installation, and certification of fall protection systems.
2. Copy of the Fall Protection Contractor's current certificate, as issued by the manufacture, authorizing the design, installation, and certification of the fall protection system.
3. Material, Equipment, and Fixture Lists shall be submitted for approval.
4. Product Data:

   Manufacturer's data and product information for manufactured materials and products. Manufacturer's Catalog Data indicating the sizes, descriptions, capacities, test certifications, and other descriptive data showing in sufficient detail that the product complies with the contract requirements shall be submitted.
5. Manufacturer's Instructions:

   Manufacturer's Instructions indicating the manufacturer's recommended method and sequence of installation shall be submitted for the following:

   a. Energy absorbing devices
   b. Horizontal Lifeline Cable and associated components

B. Design Drawings- Provide pre-installation design drawings and system specifications, with each page stamped by the designing engineer.

1. A statement defining the type of system: fall arrest, fall restraint, etc.
2. A drawing showing the layout of the system, including where it is located on the structure and the complete assembly of all components. The drawings shall be specific to the site and location of the project.
3. A specification of the number, location and qualifications of workers using the system.

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4. Specifications for all components, including sizes and minimum breaking strengths. The specifications shall reference applicable standards and/or fully specify the makes and models of the components.
5. A description of any proof testing required before the system may be put into use.
6. A specification of any environmental limitations on the use of the fall protection system, such as chemical, temperature, radiation or weather factors that may temporarily or permanently render the system unsafe to use.
7. Information on the expected performance of the system:
    a. Maximum arrest load unfactored
    b. Maximum loadings of all components unfactored
    c. Cable Sag
    d. Deflection of components contributing to fall distance where not otherwise accounted.
    e. Deployment of lanyard energy absorber(s) as applicable.
8. A description of the greatest required clearances for all permitted worker locations, connecting means, and full body harness combinations. Where a required clearance varies with environmental conditions, the worst-case value shall be specified.
9. A fall distance calculation drawing shall be provided for each system detailing the worst-case scenario.
10. Instructions for inspection, maintenance, and retirement of the system and all or its components, including how often inspection and maintenance are to be performed and a description of the qualifications required for persons performing these tasks.
11. Instructions for safe access to, egress from and use of the system.
12. For fall arrest systems, a rescue plan, or directions to the owner of the system or the employer of the workers using the system to develop and implement a rescue plan before the system is used. The engineer shall indicate the appropriate uses of the system or its anchorages during a rescue.
13. A statement specifying that the engineer who designed the system or an engineer with similar experience and qualifications shall be consulted before changing the design.
14. For permanent systems, “as-constructed” drawings shall be provided. The engineer shall state that the installation is in general accordance with the as-constructed drawings and specifications and shall indicated how often the anchorages shall be recertified by the engineer designing the system or an engineer with similar experience and qualifications.

C. Post-construction Submittals:
    1. Systems Manual: Contractor shall furnish a manual including the following:
        a. Maintenance Procedures: Including parts list and maintenance requirements for all equipment.
        b. Operation Procedures: Indicating proper use of equipment for safe operation of the systems.
        c. Test Certificate: Indicating completion of proof load testing on installed systems.
    2. As-Built Drawings: A copy of as-built drawings and system specifications, with each page stamped by the designing engineer, shall also be included in the systems manual.
    3. Manufacturer’s Instructions: Instructions for use for the use of the supplied fall protection system and user equipment.

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a. Horizontal lifeline system
b. Cable Trolley
c. Full body harness
d. Lanyards
e. Self-retracting lifelines (if utilized)

2. PART 2 PRODUCTS

2.1. SYSTEM DESIGN

A. The Fall Arrest Systems shall be designed to fully protect the user at all times while in the area of potential fall hazard.
B. The Fall Arrest Systems shall be **designed for [_____]** simultaneous users.
C. Deceleration Device: **Provide [_____]** appropriate length lanyards that meet or exceed applicable standards of ANSI Z 359.1 and OSHA 1926.104.
D. Harnesses: **Provide [_____]** full body harnesses with single back D-ring that meet or exceed applicable standards of ANSI Z 359.1 and OSHA 1926.104.

2.2. SYSTEM DESCRIPTION:

A. System shall not have internal components that cannot be visually inspected.
B. Horizontal Lifeline Cable: Stainless Steel AISI 316L 8mm diameter 7x7 or 1x19 wire rope with a minimum breaking strength >37kN.
C. Anchorage fabrications: Carbon steel construction and designed to withstand the maximum fall arrest forces with a minimum safety factor of two. Steel shall be structural grade with material test certificates for full material traceability. The rooftop anchor posts shall not have internal components that cannot be visually inspected
D. Swaging: The cable shall be swaged in-line with the anchor point. Each swage is to be proof tested according to the manufacturer's requirements. Cable clamps shall not be utilized for termination of the engineered horizontal lifeline system.
E. Shock Absorber: When the engineering design dictates the use of load limiting in-line shock absorbers, the shock absorber shall visually display deployment in the event a fall has occurred on the system. In-line shock absorbers are utilized in systems where the loads may exceed the structural ability of the support structure. Shock Absorbers shall not have internal components that cannot be visually inspected.
F. Cable Trolley: Stainless Steel. The cable trolley shall allow for pass-through of intermediate support points without disconnecting from the system.
G. Tension Indicator: The system shall include a tension indicator that will allow the user to physically inspect that the correct inline cable tension is achieved.
H. Fasteners: The Fall Arrest Systems shall be attached to the supporting structure with appropriate fasteners. The fasteners shall be designed to support a load on the system of 2 times the maximum design load without failure.

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I. Cable system components shall be of stainless-steel construction unless otherwise indicated. Exposed work shall be true to line and level with accurate angles, surfaces and with straight square edges.

J. All primary cable system components shall be of same material unless otherwise indicated. Exposed work shall be true to line and level with accurate angles, surfaces and with straight square edges. Coordinate anchorage system with supporting structure. Fabricate anchoring devices as recommended by the manufacturer to provide adequate support for intended use.

K. Fabricate Joints in a manner to discourage water accumulation. Provide weep holes to drain any water, which could accumulate in the exposed joints.

2.3. MATERIALS

A. All materials shall be new and completed Fall Protection System shall be the product of one manufacturer or the manufacture's authorized installer regularly engaged in the design and production of such equipment.

B. Primary cable assembly components shall be manufactured from stainless steel. Fabricated supports required for additional support shall be carbon steel with a corrosion resistant finish.

C. Material Control: All critical cable assembly components shall contain batch numbers or serial numbers, permanently stamped or engraved, identifying the specific job and system they are used for.

3. PART 3 EXECUTION

3.1. EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of fall protection equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. DELIVERY STORAGE AND HANDLING

A. Store and stage materials in protective packaging at location specified. Prevent soiling, physical damage or wetting.

3.3. INSTALLATION

A. Fall Protection Systems shall be installed by Fall Protection Contractor's authorized and trained personnel that have been certified by the manufacturer. Install anchorage and fasteners in accordance with the approved design drawings. If the installation of the anchor posts is not performed by the fall protection contractor, then the posts installation shall be inspected, load tested and verified by the fall protection contractor.

B. Install engineered horizontal lifeline systems according to the approved design drawings and manufacturer's instructions. Do not load or stress the Fall Protection Systems until all materials and fasteners are properly installed and ready for service. Only an installation technician that is fully trained by manufacturer in the installation of the specific system shall perform the installation of the engineered lifeline system.

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3.4. CLEANING

A. Remove all loose materials, crating and packing materials from premises.

3.5. CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate operation of system to Owner's personnel.
   1. Briefly describe function, operation, and inspection of each component.
B. Training: Train Owner's personnel on operation and inspection of system.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of tone hour of training.
   3. Location: At project site.
C. Training to take place at the completion of the installation.
D. Recertification: Coordinate annual recertification program per manufacturers' recommendation.

-- END OF SECTION --