

**SECTION  
FALL PROTECTION SYSTEMS**

**PART 1 – GENERAL**

**1.01 SUMMARY**

- A. Section includes:
1. The design, installation and use of the personal fall arrest systems shall conform to all requirements of the current Occupational Safety and Health Administration (OSHA) Standards 29 CFR parts 1910 and 1926 and proposed rule making on walking and working surfaces and personal protective equipment (fall protection systems), which was published in volume 55, number 69 of the Federal Register (FR) on Tuesday, April 10, 1990.

**1.02 PERFORMANCE REQUIREMENTS**

- A. Horizontal Fall protection:
1. In accordance with OSHA (29CFR 1910.66 App C Section 1, (c) (9), proposed 29 CFR 1910.128 (c)(9) and 29 CFR 1926.502(d)(8), “horizontal fall protection shall be designed, installed and used, under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains a safety factor of at least two.”
  2. The horizontal fall protection shall be designed specifically for the parameters shown on the engineering drawings. Failure to comply with these parameters and/or use equipment that meets the design specification requirements may result in an unsafe condition. The owner’s design professional assumes no responsibility for systems operated with equipment other than that specified. It is the responsibility of the employer to train the employees in the proper use of the equipment.
- B. References:
1. OSHA (29 CFR 1910.66 App C, Section 1, (c) (9), proposed 29 CFR 1910.128 (c) (9) and 29 CFR 1926(d) (8).
  2. ANSI Z359.1 - Safety Requirements for Personal Fall Arrest Systems; 2007.

**1.03 SUBMITTALS**

- A. Professional engineers OSHA qualified person certification.
- B. Shop Drawings:
1. Provide shop drawings prepared under the supervision of and reviewed by qualified professional engineer, if required
  2. Show complete layout and configuration of the horizontal fall protection systems, including all components and accessories.
- C. Clearly indicate design and fabrication, hardware and installation details.
- D. Include structural analysis data for the components signed and sealed by the qualified professional engineer responsible for their preparation, if required.
1. Welding certificates, if required.
  2. Test reports: Submit upon request.
  3. Equipment manual and inspection log book: Submit closeout, documentation to include:
    - a. As-built drawings of the installed system.
    - b. Manufacturer’s initial inspection and certification for use logs.
    - c. System use procedures.
    - d. Pre-use inspection procedural requirements.
    - e. Manufacturer’s periodic inspection and maintenance requirements.
- E. As-built drawings: Update shop drawings to include:

1. Manufacturer, part name, part number of fall protection equipment installed. Clearly indicated on the drawing for location where each part has been installed.

#### **1.04 QUALITY ASSURANCE**

- A. Professional Engineer: A professional engineer who is legally qualified to practice in the jurisdiction where the project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of systems that are similar to those indicated for this project in material, design and extent.
- B. Qualified Person: OSHA defines a qualified person as one with a recognized degree or professional certificate and extensive knowledge and experience in the subject field who is capable in design, analysis, evaluation and specifications in the subject work, project or product.
- C. Manufacturer: Work shall be performed by a manufacturer and installer specializing in the design, fabrication and installation of horizontal lifeline systems.
- D. Manufacturer Qualifications: Firm specializing in design and fabrication of fall protection systems for structures with minimum 15 years' experience.
- E. Installers: Installers shall be manufacturer certified.
- F. Manufacturer and installer shall have specific liability insurance (products and completed operations) in an amount of not less than \$9,000,000.
- G. Source Limitations: Obtain each component of the horizontal fall protection system through one source from a single manufacturer.
- H. Welding: Perform welding using AWS certified welders.
  1. AWS D1.1, "Structural Welding Code - Steel"
  2. AWDS D1.6, "Structural Welding Code - Stainless Steel"
- I. Comply with applicable provisions of the following specifications and documents:
  1. AISC, "Manual Steel Construction, Allowable Stress Design."
  2. AISC, "Manual of Steel Construction, Load and Resistance Factor Design."
  3. AISC, "Manual of Steel Hollow Structural Sections."
  4. AISC, "Specification for the Design of Steel Hollow Structural Sections."
  5. AISC, "Specification for Allowable Stress Design of Single-Angle Members."
  6. AISC, "Specification for Load and Resistance Factor Design of Single-Angle Members."
  7. RCSC, "Specification for Structural Joints Union ASTM A325 or A490 Bolts."

### **PART 2 – PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance requirements, manufacturers offering products that may be incorporated into the work include:
  1. Hy-Safe Technology  
960 Commerce Drive  
Union Grove, WI 53182  
(800) 642-0775  
www.hysafetech.com
- B. Substitutions: no substitutions

#### **2.02 COMPONENTS**

- A. Pass Through Devices:
  1. The pass through device shall enable the user's sub-lanyard system to connect to the horizontal lifeline cable. The device shall be designed to enable the user to move safely and easily along the length of the lifeline. The device shall enable the passage of the pass

through device over intermediate support points without being released from the lifeline. A locking mechanism shall secure the device onto the cable and prevent it from releasing accidentally.

- B. Intermediate Supports:
  - 1. Shall be designed to ensure passage of the pass through over intermediate anchorage points without being released from the lifeline.
- C. Tension Indicators and Turn-Buckles:
  - 1. Each horizontal lifeline shall be equipped with a pretension indicator. The indicator shall provide a means to verify and adjust correct tension of the lifeline cable. Cable tensions shall be calculated in accordance with the horizontal lifeline system manufacturer's requirements. Minimum breaking strength shall exceed 8,100 lbs.
- D. D-Rings:
  - 1. D-Rings shall be fastened to the supporting structure in accordance with the drawing requirements. A lock washer shall be provided under the turned element. Minimum breaking strength shall exceed 15,075 lbs.
- E. In-Line Shock Absorbers:
  - 1. In-line shock absorbers may be utilized to dissipate the energy generated in a fall and to reduce the end anchorage forces. Minimum breaking strength shall exceed 8,000 lbs. Allowable normal preset tension shall exceed 180 lbs. Activation threshold shall not exceed 440 lbs.
- F. Cable:
  - 1. The cable shall be of 1 X 19 wire rope construction, 8 mm (5/16") in diameter, with a minimum breaking strength of 12,646 lbs. Cable net weight shall not exceed 0.18 lbs/ft. Cable ends shall be terminated with swaged fittings.

## **2.03 DESIGN REQUIREMENTS**

- A. The horizontal fall protection shall be designed under the supervision of a professional engineer qualified in the design of horizontal fall protection. The professional engineer shall be designated as an OSHA qualified person in fall protection.
- B. Design the horizontal fall protection in accordance with the engineering drawing requirements, specifications, standards and regulations and/or codes.
- C. Verify all existing site dimensions prior to commencing design. Report unsatisfactory site conditions to the contract administrator in writing. Indicate measurements on shop drawings.
- D. Design the horizontal fall protection to comply with the following criteria:
  - 1. Users to attach to the system using a full body harness and lanyard, incorporating a shock absorber that limits the maximum arresting force on the user to 1,800 lbs.
  - 2. The fall of both users that generates the greatest component forces and/or the greatest fall clearance requirements.
  - 4. Components and anchorages shall be designed with a two to one factor of safety against permanent deformation or fracture.
  - 5. End anchorage and intermediate support forces to be resisted by the supporting structure shall not exceed the capacities stated on the engineer drawings. .
  - 6. System fall clearance requirements shall not exceed the permitted clearances stated on the engineer drawings.

## **PART 3 – EXECUTION**

### **3.01 INSTALLATION**

- A. Verify all existing site dimensions prior to commencing installation.
- B. Report unsatisfactory site conditions that would cause defective installation of products or cause latent defects in workmanship and function to the contract administrator in writing.

- C. Installation shall not commence until shop drawings have been received, reviewed and returned by the contract administrator.
- D. Install the horizontal fall protection components in accordance with reviewed shop drawings and manufacturer's requirements.
- E. Coordinate installation with work of other trades.

**3.02 FIELD QUALITY CONTROL**

- A. Install all work true, level, tightly fit and flush with adjacent surfaces as required and in accordance with the manufacturer's requirements.
- B. Correct deficiencies in work that test reports and inspection indicate do not comply with the contract documents.

**3.03 TESTING**

- A. All swaged fittings shall be tested for 100% of the maximum predicted end cable tension. Test loads shall be applied for duration of three (3) minutes. If any signs of slippage are detected the swage fitting shall be rejected and replaced.
- B. Anchorages to existing concrete structure relying upon chemical adhesive and/or mechanical fasteners shall be tested using a load cell apparatus. Anchorages shall be tested for 100% of their design capacities. If any signs of slippage, detachment or fracture are detected, the anchorage shall be rejected and replaced.
- C. The contractor shall be solely responsible for the cost and execution of work necessary for the concrete repair and replacement of rejected anchors. Such work shall be to the satisfaction of the engineer.

**3.04 ADJUSTING**

- A. Adjust equipment in accordance with the manufacturer's requirements, ensuring correct installation. Leave all systems in proper working order.

**3.05 EQUIPMENT MANUAL AND INSPECTION LOG**

- A. Complete the initial inspection of the equipment for certification for initial use.
- B. Complete and submit the manufacturer's equipment manual and inspection log book.