

SECTION
FALL PROTECTION SYSTEMS
Hy-Safe Rail

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.
- A. Section includes: Hy-Safe custom designed fall arrest anchor system consisting of rigid, overhead mounted enclosed trail rail and wheeled Hy-Safe trolleys.

1.02 PERFORMANCE REQUIREMENTS

A. Fall Arrest Anchor System:

- 1. Fall arrest anchor system in conjunction with connectors and harnesses provided by other shall provide a means of protecting worker from fall in elevated work environments while providing for worker mobility to perform tasks
- 2. System shall be overhead suspended type interior installation providing protection for area.
- 3. Installed Hy-Safe Rail with trolleys shall be positioned at height indicated and should be straight and level to eliminate potential binding or drift.
- 4. Fall arrest anchor system shall be designed to support multiple workers each weighing up to 310 pounds with tools.
- 5. Anchor system shall support full impact of falls vertically at inclines up to 30 degree angle.
- 6. System and components shall be rated for 900 pounds maximum arresting force (MAF).
- 7. Modular, pre-engineered design: Fall arrest anchor system shall be capable of expansion, disassembly, and relocation.
- 8. Hy-Safe Rail: Enclosed type limiting dust and direct collection on rolling surfaces.

B. References:

- 1. American Institute of Steel Construction (AISC): Manual of Steel Construction, Part 5, Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts.
- 2. American National Standards Institute (ANSI):
 - a. ANSI Z359 – Fall Protection Code
- 3. American Society for Testing and Materials (ASTM) Publications:
 - a. ASTM A36 – Carbon Structural Steel
 - b. ASTM A325 – Structural Bolts, Steel, Heat Treated, 120/150 ksi Minimum Tensile Strength
 - c. ASTM A490 – Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
- 4. American Welding Society (AWS):
 - a. AWS D1.1 – Structural Welding Code

5. Occupational Safety and Health Administration (OSHA): OSHA Specification 1926 Subpart M – Fall Protection

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 system layout, dimensions, connections, supports and configuration of the rail 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 fall arrest rail fall protection systems.
- D. Manufacturer Qualifications: Firm specializing in design and fabrication of fall protection systems for structures with minimum 15 years’ experience.
- E. Fall arrest anchor system shall be designed, fabricated and installed in accordance with ANSI Z359 and OSHA 1926, Subpart M.
- F. Bolted connections shall be in accordance with torque tightening procedures specified in AISC
 - i. Manual, Part 5.
- G. Installers: Installers shall be manufacturer certified.
- H. Manufacturer and installer shall have specific liability insurance (products and completed operations) in an amount of not less than \$9,000,000.
- I. Source Limitations: Obtain each component of the rail fall protection system through one source from a single manufacturer.
- J. Welding: Perform welding using AWS certified welders.
 1. AWS D1.1, “Structural Welding Code - Steel”
 2. AWDS D1.6, “Structural Welding Code - Stainless Steel”
- K. 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.Hysafe.com
info@Hysafe.com
- B. Substitutions: No Substitutions

2.02 FALL ARREST ANCHOR SYSTEM

- A. Type: Fall arrest anchor system consisting of rigid, overhead mounted, enclosed track rail and wheeled trolleys designed to protect workers from falls in elevated work environments; Hy-Safe Rail Fall Arrest System.
- B. Configuration: Monorail system designed to provide worker mobility along a single straight line axis.
- C. Number of workers each weighing no more than 310 pounds with tools to be supported: 2.
- E. Maximum distance between track supports: 50 feet.
- F. Maximum track cantilever: 6 feet.

2.03 COMPONENTS

- A. Hy-Safe Rail: Cold-rolled steel, enclosed track designed to accommodate easy, smooth movement without forcing or jamming of tether trolley with attached connector and to effortlessly follow worker.
 1. Profile: Rectangular, tubular section with continuous bottom slot to allow movement of trolley and connector. Bottom running flanges to have 2 degree taper to keep trolley centered. Flat, non-centering tracks are not acceptable.
- B. Fall arrest rails: Truss fabricated from tubular steel sections with Hy-Safe track used as bottom cord; Trussed Hy-Safe Rail as provided by Hy-Safe Technology.
- C. Hy-Safe Rail Trolleys: Wheeled, steel fabrication designed specifically to use with Hy-Safe Rail system specified in Paragraph 2.3.A for fall arrest systems and provide fluid movement and stability.
 1. Wheels: Equip each trolley with 3 pairs of wheels sized to roll within Hy-Safe Rail.
 - a. Material: DURACOMP4
 - b. Profile: Provide wheels with 2 degree taper to match taper of Hy-Safe Rail.
 2. Connection device: Equip bottom of trolley with swivel eye for securing shock absorbing lanyard or self retracting lifeline and which allows free movement beneath trolley and prevents twisting of the connector.

2.04 DESIGN REQUIREMENTS

- A. The fall arrest rail system shall be designed under the supervision of a professional engineer qualified in the design of fall arrest track systems. The professional engineer shall be designated as an OSHA qualified person in fall protection.
- B. Design the fall arrest track system 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 fall arrest track system 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.
 - 3. Components and anchorages shall be designed with a two to one factor of safety against permanent deformation or fracture.
 - 4. All anchorages and intermediate support forces to be resisted by the supporting structure shall not exceed the capacities stated on the engineer drawings.
 - 5. System fall clearance requirements shall not exceed the permitted clearances stated on the engineer drawings.

2.05 ACCESSORIES

- A. Provide fall arrest anchor system with end stops, splices, connecting devices, fasteners, anchors, and other hardware and accessories as required for a complete, secure, structurally sound, safe installation as indicated on Drawings and reviewed shop drawings.
- B. Design and provide attachment or suspension system for overhead mounted fall arrest anchor system including anchors, brackets, clamps, fasteners, suspension assemblies, fittings, auxiliary framing, bracing and other components for complete, functional installation.

2.06 SHOP FINISHING

- A. Steam wash steel components with iron phosphate solution and apply baked enamel finish. Colors shall be selected from manufacturer’s full range.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Coordinate provision of fall arrest anchor system with:
 - 1. Provision of fall arrest harnesses FS 5250s and connectors provided Hy-Safe Technology. All connectors must be compatible with Hy-Safe trolleys being provided.
 - 2. Design and installation of structural beam for overhead support of fall arrest anchor system.
 - a. Verify that structure, spacing and bracing of supports are compatible with structural capacities of fall arrest rails.
 - b. Verify that connections of fall arrest rails to overhead mounted supports have been adequately designed and that required anchors, fasteners, and other hardware has been provided.
- B. Prior to installation:
 - 1. Verify support structure is ready to receive fall arrest anchor system.
 - 2. Inventory parts. Verify all required components are available and undamaged.

3.02 INSTALLATION

- A. Install fall arrest anchor system in accordance with manufacturer’s instructions and reviewed shop drawings.

- B. Do not modify system components in any matter without advance, written approval from system manufacturer.
- C. Install fall arrest rails with threaded suspension rod hanger assemblies as detailed on reviewed shop drawings. Attach upper hanger bracket to steel support framing and attach lower hanger brackets to rails. Lift rails into place and temporarily support. Connect threaded rods to upper and lower bracket. Ensure two minimum threads are beyond hexnut and rods are plumb and not bent.
- D. Install auxiliary bracing as required to prevent lateral and longitude sway and movement of system as detailed on Drawings and reviewed shop drawings.
- E. Prior to torquing bolts, ensure rails are:
 - 1. Accurately spaced and level.
 - 2. Tether track splice transitions are smooth with no raised area to inhibit movement of trolley.
- 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.
- E. Coordinate installation with work of other trades.

3.03 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.
- C. Move Hy-Safe trolleys through entire travel to ensure system is clear of obstructions and trolleys move freely and smoothly.
- D. Inspect installed fall arrest anchor system. Verify all bolts are tight and lockwashers fully compressed.
- F. Clean surfaces. If necessary, touch-up paint damage, scratches, and blemishes with manufacturer provided matching paint.
- G. Protect fall arrest anchor system from other construction operations.

3.04 TESTING

- A. 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.
- B. 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.
- C. Field test system with connector and simulated load attached to swivel eye of Hy-Safe trolley. Ensure system operates functionally, safely, and smoothly. Adjust as required and correct deficiencies.

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.