



SECTION 11 81 29
HORIZONTAL FALL PROTECTION

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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fall Protection Horizontal Rail Systems:
 - 1. Rail system. (DBI-SALA Unirail System)

1.2 RELATED SECTIONS

- A. Section 07 50 00 - Membrane Roofing.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim.
- C. Section 07 71 13 - Manufactured Copings.
- D. Section 07 72 13 - Manufactured Curbs.
- E. Section 07 91 23 - Backer Rods0 - Joint Sealants.

1.3 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI A10.32 - Personal Fall Protection Used in Construction and Demolition Operations.
 - 2. ANSI Z359.1 - Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components.
 - 3. ANSI Z359.6 - Specifications and Design Requirements for Active Fall Protections Systems.
- B. ASTM International (ASTM):
 - 1. ASTM A123 / A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings

- on Iron and Steel Products.
 - 2. ASTM A747/A747M - Standard Specification for Steel Castings, Stainless, Precipitation Hardening.
 - 3. ASTM A36 - Standard Specification for Carbon Structural Steel.
 - 4. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 5. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- C. American Welding Society (AWS):
- 1. AWS D1.1/D1.1M - Structural Welding Code - Steel.
- D. CSA Group (CSA):
- 1. CSA Z259.16 - Design of Active Fall Protection Systems.
 - 2. CSA W55.3 - Certification of companies for resistance welding of steel and aluminum.
 - 3. CSA W59 - Welded steel Construction.
- E. Occupational Safety and Health Administration (OSHA):
- 1. OSHA 29 CFR 1926.502 - Fall Prevention Systems and Criteria and Practices.
 - 2. OSHA 29 CFR 1910.29 General Industry.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data and product information indicating the sizes, descriptions, capacities, test certifications, and other descriptive data showing in sufficient detail that the product complies with the contract requirements.
- C. Shop Drawings: For fabrication showing the complete fall protection system. Layout drawings of each system in relation to the supporting structure indicating the locations of properly labeled components.
- D. Installer's Certification: Furnish proof of installer's current certification approval by manufacturer in the form of the installer's current certificate issued by the manufacture.
- E. Product Certificate: Containing the manufacturer's batch number on each individual component used in the systems.
- F. Qualifications Statement: For engineer performing delegated design.
- G. Systems Manual:
 - 1. Maintenance Procedures: Including parts list and maintenance requirements for all equipment.
 - 2. Operation Procedures: Indicating proper use of equipment for safe operation of the systems.
 - 3. Manufacturer's catalog data indicating the sizes, descriptions, capacities, test certifications, and other descriptive data showing sufficient detail that the product complies with the contract requirements.
- H. Record Documents: Include a copy of Record Drawings in the systems manual.
- I. Warranty: Submit manufacturer warranty.
- J. Delegated-Design Submittal: For fall protection system, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 25-year experience manufacturing similar products.
- B. Installer Qualifications: Minimum 2-year experience installing similar products, authorized, trained, and certified by manufacturer.
- C. Engineer for Delegated Design: Licensed in the jurisdiction and with a minimum of two years engineering fall protection systems.
- D. Coordination: Coordinate the installation of horizontal fall protection system with structural supports and finish materials.

1.6 PRE-INSTALLATION MEETINGS

- A. Convene minimum two weeks prior to starting work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original unopened packaging. Store materials in original protective packaging. Prevent soiling, physical damage, or moisture.

1.8 PROJECT CONDITIONS

- A. If required, coordinate layout and installation of framing and reinforcements for the fall protection system fixings and substrates.
- B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.9 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.10 WARRANTY

- A. Manufacturer's 10-year minimum corrosion resistance and product warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: 3M Fall Protection Business, which is located at: 3833 Sala Way; Red Wing, MN 55066-5005; Toll Free Tel: 800-328-6146; Tel: 651-388-8282; Fax: 651-732-9244; Email:[request info \(3Mfallprotectionbusiness@mmm.com\)](mailto:request info (3Mfallprotectionbusiness@mmm.com)); Web:https://www.3m.com/3M/en_US/p/c/ppe/fall-protection/i/safety/personal-safety/
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.
 - 1. If the system proposed uses an article, device, material, equipment, form of construction, fixture, or item other than the Basis of Design; provide certification that the proposed item is equal in quality, performance, and appearance, to the item specified.
- C. Source Limitation: Obtain fall protection system and components from a single manufacturer.

2.2 FALL PROTECTION HORIZONTAL RAIL SYSTEMS; ALUMINUM RAIL

- A. Basis of Design: DBI-SALA UniRail System as manufactured by 3M Fall Protection.

Horizontal fall protection system, including attachment carriage, attachment plates, joints, corners, system stops, rail, carriage stops and specialty components for exposed and concealed conditions as required.

1. Allow users to walk uninterrupted the entire length of the system and provide secure anchorage to arrest a fall. System to allow freedom of movement along the rail and allow carriages to run unhindered.
2. System to be capable of being mounted at floor level, wall level, and overhead applications and provide protection for multiple users subject to confirmation through engineering analysis.
3. Provides continuous hands-free access for the user of the fall protection system.

B. Performance Requirements:

1. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 - Quality Requirements "Quality Requirements," to design fall protection system.
2. Structural Performance: Fall protection systems shall withstand the effects of loads and stresses within limits and under conditions required by:
 - a. CSA Z259.1.
 - b. ANSI Z359.6
 - c. OSHA 1926.502.
 - d. Allow for multiple users, based on required system calculations.
 - e. Allowable Force on Rail: 2,700 lbs. (12 kN) maximum based on workers maximum arresting force from their PPE.

C. Components

1. Rail: Low profile, 1.25 inches by 1.25 inches (32 mm by 32 mm), aluminum extrusion, anodized finish.
 - a. Lengths: 9 feet -10 inches (3000 mm).
 - b. Lengths: 20 feet-0 inches (6096 mm).
2. Rail Joint: Low profile, aluminum extrusion to connect to rail sections.
 - a. Concealed: Low profile, 2.11 x 6.06 inches (53.5 x 154 mm), aluminum extrusion, shall be supported within 7.87 inches (200 mm) by fixing back to the structure.
 - b. Side Fixed: Low profile, 5.31 x 6.06 inches (135 x 154 mm), aluminum extrusion, also serves as anchor and is not required to have additional supports.
3. Corners: Additional bends and forms available to a radius of 7.87 inches (200 mm).
 - a. Bend: 90 degree.
 - b. Bend: 90 degree external.
 - c. Bend: 90 degree internal.
 - d. Bend: 45 degree.
 - e. Bend: 45 degree external.
 - f. Bend: 45 degree internal.
4. System Stops: Manufacturer's standard stops which prevent rails from coming out of end anchorage bracket.
5. Molded Ends: Manufacturer's standard molded ends which protect exposed edge of end rails.
6. Tamper-Proof Carriage Stops: Manufacturer's standard tamper-proof, carriage stops which prevent carriages from coming off the end of the system.
7. Removable Carriage Stops: Manufacturer's standard tamper-proof, carriage stops which prevent carriages from coming off the end of the system but can be removed to allow the carriages to be taken off.
8. Attachment Carriages: Manufacturer's standard aluminum attachment carriage with aluminum, nylon coated wheels. A stainless steel shackle with carabiner hook which pivots for any angle connection.
 - a. Minimum tensile strength: 3372 lbs. (15 kN).

9. Rail Fixing Components: Connections as follows:
 - a. Material: Aluminum.
 - b. Material: Stainless steel.
 - c. End Anchors: Manufacturer's standard anchors which secure end of the rail to structure and controls rail movement in the event of a fall.
 - d. Intermediate Anchors: Manufacturer's standard anchors which secure rail to structure at intervals to suit work site and structure.
 - e. Concealed End Anchors: Manufacturer's standard anchors which secure end of the rail to structure and controls rail movement in the event of a fall.
 - f. Concealed Intermediate Anchors: Manufacturer's standard anchors which secure rail to structure at intervals to suit work site and structure.
 - 1) Anchors are to be tapped.
10. Fabricated supports: Carbon steel with corrosion resistant finish.
 - a. Steel Plates, Shapes, and Bars: ASTM A36.
 - b. Steel Tubing: ASTM A500, cold formed.
 - c. Welding rods and bare electrodes: Select according to AWS specifications for metal alloy welded.

D. Materials:

1. Stainless steel: ASTM A666, Type 316.
2. Aluminum: 6061 aluminum alloy.
3. Aluminum: 6082 aluminum alloy.
4. Connectors: Comply with OSHA regulation 1926.502.

E. Fabrication:

1. Fabricate anchoring devices as recommended by the manufacturer to provide adequate support for intended use. Shop fabricate required anchorage posts using structural steel with material test certificates for full material traceability.
2. Welding: AWS structural specification D1.1 by certified welders.
3. Fabricate joints in a manner to discourage water accumulation.
4. Finishes:
 - a. Stainless Steel: Electro-polished for corrosion resistance.
 - b. Structural Steel: Zinc Galvanized for corrosion resistance.
 - c. Aluminum: Anodized.
 - d. Aluminum: Powder coated.

F. Accessories:

1. Fasteners: Designed to support a load on the system of 2 times the maximum design load without failure.
2. Signage: Provide signs and system identification tags.
3. Flashing: Comply with requirements of Section 07 62 00 - Sheet Metal Flashing and Trim "Sheet Metal Flashing and Trim."
4. Flashing: Comply with requirements of Section 07 71 13 - Manufactured Copings "Roof Specialties."
5. Flashing: Comply with requirements of Section 07 72 13 - Manufactured Curbs "Roof Accessories."
6. Flashing: Comply with requirements of Section _____.
7. Sealant: Comply with requirements of Section 07 91 23 - Backer Rods "Joint Sealants."

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 PREPARATION

- A. Coordinate location of fall protection equipment indicated to be attached to structural substrate or surface of roofing system and furnish anchoring devices with templates and diagrams.

3.3 INSTALLATION

- A. Only 3M or Certified Installers authorized in writing by 3M Fall Protection may make installation/repairs to this equipment. If the 3M Fall Protection Horizontal Lifeline System has been subject to fall force or inspection reveals an unsafe or defective condition, remove the system from service and contact 3M Fall Protection or a 3M Certified Installer regarding replacement or repair.
- B. Install according to approved shop drawings and manufacturer's instructions. Coordinate with work of other trades.
- C. Install anchorage and fasteners in accordance with manufacturer's recommendations to obtain the allowable working loads published in the product literature and in accordance with this specification.
- D. Exposed work shall be true to line and level with accurate angles, surfaces and with straight square edges. Coordinate anchorage system with supporting structure.
- E. Do not load or stress system until materials and fasteners are properly installed and ready for service.

3.4 FIELD QUALITY CONTROL

- A. Provide manufacturer's certified installer to inspect installed fall protection system. Ensure that system components operate as specified.

3.5 ADJUSTING

- A. Adjust fall protection components to function smoothly and safely.

3.6 CLEANING

- A. Clean the systems metal components with a soft brush, warm water, and a mild soap solution if needed after initial installation.
- B. Ensure all components are thoroughly rinsed with clean water after cleaning.

3.7 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate operation of system to Owner's personnel.
 - 1. Briefly describe function, operation, and maintenance of each component.
- B. Training: Train Owner's personnel on operation and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.
 - 3. Provide training at the lifeline installation site.
 - 4. Training to take place at the completion of the installation.
- C. Do not use until trained in the use of the system

END OF SECTION