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SECTION 13105

SPECIAL CONSTRUCTION

FALL ARREST AND FALL PROTECTION SYSTEMS

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SECTION 13105

SPECIAL CONSTRUCTION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text y the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 666	(2003) Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar

AMERICAN STANDARDS INSTITUTE (ANSI)

ANSI Z359.1	(1992) American National Standards Safety Requirements for Personal Arrest Systems, Subsystems and Components
ANSI/IWCA I-14.1	(2001) American National Standards Window Cleaning Safety

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction

1.2 SYSTEM DESCRIPTION

Government approval is required for submittals with a “G” designation; submittals not having a “G” designation are (for Contractor Quality Control approval.) (for information only When used, a designation following the “G” designation identifies the office that will review the submittal for the Government.) Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

System Layout drawings for the roofs indicating the locations of all components in the system labeled for easy identification.

System Installation Drawings to show a complete fall arrest system to include details and coordination of system components and existing building systems along with any revision required to the existing facilities.

Final As-built Layout and Installation Shop Drawings

SD-02 Shop Drawings
Equipment and Performance Data

Constant force posts
Energy absorbing devices (Shock Absorbers)
End Anchors
Dee-Rings
Transfasteners
Horizontal Lifeline Cable
Tension Indicator
Turnbuckle
Threaded Swage
Swage Slip Indicator
Corner Assembly
Lanyards
Body harnesses

SD-03 Product Data

Manufacturer’s Catalog Data indicating the sizes, descriptions, capacities, test certifications, and other descriptive data

Constant force posts
Energy absorbing devices 9Shock Absorbers)
End Anchors
Dee-Rings
Transfasteners
Horizontal Lifeline Cable
Turnbuckle
Threaded Swage
Swage Slip Indicator
Corner assembly
Lanyards
Body harnesses

SD-05 Design Data

Drawings to show a complete fall arrest system to include Design Analysis and Calculations certified by a Professional Engineer

Testing Plans
Training Plans

SD-06 Test Reports

Manufacturer’s Test
Field Testing
Laboratory mock Ups

SD-07 Certificates

Manufacturer’s Certificates indicating compliance with American national Standards Safety Requirements for Personal Arrest Systems, Subsystems and Components.

Constant force posts

Energy absorbing devices (Shock Absorbers)
End Anchors
Cable
Dee-Rings
Transformers
Horizontal Lifeline Cable
Turnbuckle
Threaded Swage
Swage Slip indicator
Corner Assembly
Lanyards
Body harnesses

Manufacturer’s Certification, indicating the training and authorization of installation personnel.

SD-08 Manufacturer’s instructions

Manufacturer’s Instruction indicating the manufactured recommended method and sequence of installation shall be submitted for the Fall Arrest System to include:

Constant force posts
Energy absorbing devices (Shock Absorbers)
End Anchors
Cable
Dee-Rings
Transfasteners
Turnbuckle
Threaded Swage
Swage Slip indicator
Corner Assembly

1.3 GENERAL REQUIREMENTS

This section provided the minimum requirements for the design and installation of the Fall Arrest and Fall Protection Systems.

The Fall Arrest and Fall Protection Systems provided shall be as manufactured by Latchways “Mansafe” system Fall Arrest System JSC has issued a sole-source justification to specify this manufacture and model. No other manufacture and model shall be substituted.

1.4 THE FALL ARREST AND FALL PROTECCTION SYSTEMS DESIGN CRITERIA

The fall Arrest and Fall protection systems provided shall serve as: 1. Personal Fall Arrest System as defined in 29 CFR 1910, Subpart F Standard Number 1910.66, Appendix C, personal Fall Arrest System; 2. Fall Protection as defined in 29 CFR 1926, Subpart M, meeting the fall protection system criteria and practices for both a Personal Fall Arrest System (paragraph (d)) and Positioning device system 9paragraph (e)); 3.. Personal Fall Arrest System definition ANSI/IWCA I-14.1.

The fall arrest and fall prevention systems, shall comply with the above referenced OSHA CFR 29 requirements and criteria for fall prevention systems and for fall arresting systems except as follows:

The OSHA requirement for the building attachments to withstand 5,000 pound force reaction per employee attached has been excepted and replaced with the following:

Anchorages to which personal fall arrest equipment is attached shall be capable of supporting at least 10,000 pounds force or shall be designed and installed as part of a complete personal fall arrest system.

The OSHA distance for one person falling to be limited to 3.5’ is excepted and replaced with the following:

With a body harness we can arrest a falling person with 1800 lbf maximum. The body harness shall be attached to the layout at 4’ above the roofing the middle of the persons back. This means that the person stands at the roof edge then steps off of the roof edge and free falls 4’ before any fall arresting system deploys.

The lanyards for attaching the personnel to the safety cable shall have energy absorbing devices to limit the force exerted onto the body harness to 1800 lbf.

Design scenario for all arrest protection:

One 300 lb person stepping off of the roof wearing a body harness attached with a lanyard to the safety anchor cable. The body harness shall be attached to the lanyard at 4’ above the roof in the middle of the persons back. This means that the person will free fall 4’ before any fall arresting system deploys.

Two 300 lbb persons stepping off of the roof at the same time, with each person wearing a body harness attached to a lanyard to the safety anchor cable. The body harness shall be attached to the lanyard at 4’ above the roof in the middle of the persons back. This means that both people will free fall 4’ before any fall arresting system deploys.

The Fall Arrest and Fall Protection system will be designed for three (3) simultaneous users.

Provide a cable tension indicator that will allow each user to assure correct cable tension has been achieved and is maintained on the Horizontal Lifeline.

The Design Analysis with supporting computations shall accompany the Fall Arrest System design submittal for review and approval.

System shall be designed and certified by a registered professional engineer.

Support continuous life line horizontal cables from anchors attached directly to structure members or constant force posts.

End anchors attached to building structure steel without a constant force post will be: (1) designed to provide 10,000 lbf loading without failure and (2) the existing building structure must be analyzed to ensure capability of receiving the additional loads.

1.5 PROJECT CONDITIONS

Perform sign investigation, surveys, and field measurements prior to design to ensure required fit and dimensions

Provide inline shock absorbers, turnbuckle, tension indicator, and three (3) Transfasteners in each cable section

The system shall e designed and located to fully protect the user at all times in the area of potential fall hazard and to allow the user to connect prior to entering the potential fall area

Location of the horizontal lifeline will be positioned at 7ft – 0 inch from the edge of the roof. All offsets for roof equipment obstruction will e designed to service the equipment and the maximum roof area without violating the 7 ft roof age clearance, maintaining the criteria of 1926.503(e) for Positioning Device Systems.

1.6 TESTING PLANS

Provide installation field test plans based on the designed systems. Test plans will be developed in accordance with: 1. OSHA 1910.66 Appendix C, Section II; and 2. ANSI/IWCA I-14.1.

1.7 TRAINING PLANS

Provide operator training plans and instructor Manually based on the designed systems to be conducted after system has been installed and field tested. Training will be for the building managers, operation & maintenance staff 9users) and NASA safety personnel. Training plans will be developed in accordance with: 1. OSHA 1910.66 Appendix C, Section III; and 2. ANSI/IWCA I-14.1.

PART 2 PRODUCTS

2.1 MATERIALS

All materials shall be new. All exposed connectors, cables, and bolts shall be stainless steel: marine grade A4 Stainless Steel bolts and Marine grade ASTM A 666, type 316S cable.

2.2 COMPONENTS

Components will meet the requirements of ANSI/IWCA I-14.1 Requirements for Personal Arrest Systems, Subsystems and Components.

The complete fall arrest system components will be the product of one Manufacture as identified in the paragraph entitled, “General Requirements,” of this section. Consisting of:

Constant force posts shall deploy with between 500 and 700 lbs force applied in any horizontal direction and to hold 2700 pounds force in any horizontal direction after deployment. This shall e accomplished without causing damage to the existing roof deck during deployment.

Energy absorbing devices (Shock Absorbers): Load limiting in-line shock absorber to 3,000 pounds force for multispan systems and 4,000 pounds

force for single span systems. The shock absorber must visually display deployment in the event a load deployment has occurred.

End Anchors attached to structure: 316 S stainless steel with minimum breaking strength of 10,000 pounds-force lbf. (44.5 kilonewton kn)

Cable: Marine grade 16 S stainless steel

Swage Slip Indicator: Marine grade 316 S stainless steel and compatible wire threaded swage.

Dee-Rings: 316 S stainless steel with minimum tensile strength of 5,000 lbf 922.25 kn), tested to 3,600 pounds force 916 kn) without cracking, breaking or permanent deformation; and compatible with Trans fasteners for pass through of support posts without user disconnecting from system.

Threaded Swage: Marine grade 316 S stainless steel.

Removable Tran fasteners Stainless Steel cast components 17/ph cast a and 316 S other steel components. Compatible with Dee Ring and Corner Assembly for pass through of support posts without user disconnecting from system.

Horizontal Lifeline Cable: Marine grade 316 S stainless steel wire rope 8 mm 1 x 19 with a minimum strength of 10,000 lbf.

Corner Assembly: Sleeve and racket assembly for 90 degree corner fabricated from 316 S stainless steel.

Turnbuckle: 316 S stainless steel with 10,000 pound force minimum breaking point and compatible with horizontal lifelong cable.

2.3 PERSONAL USE EQUIPMENT

Personal use equipment will meet ANSI Z359.1 Safety Requirements for Personal Arrest Systems, Subsystems and Components, OSHA 1926, and OSHA 1910.

Lanyards
Body harnesses

2.4 TESTING

Two laboratory mock-ups of each typical constant force post installation shall be tested and certified by an independent testing laboratory to comply with the conditions on the drawings.

Provide Manufacturer’s Test Reports from Factory Testing indicating compliance with American National Standards Safety Requirements for Personal Arrest Systems, Subsystems and Components.

2.5 CERTIFICATIONS

The strength, capacity, and performance of each item installed into the fall prevention system shall be UL listed and/or certified by an independent testing laboratory.

PART 3 EXECUTION

3.1 GENERAL

The installation of systems and equipment cannot begin until all designs and drawing have been approved and released for construction.

The Fall Arrest system will be installed only by approved personnel that have been authorized, trained and certified by the manufacturer.

The horizontal lifeline will be installed at 7 ft – 0 inch (plus or minus ½ inch) from the edge of the roof.

3.2 TRAINING

Provide operator training after system has been installed and field tested. Training will be for the building manages, operation and Maintenance staff (users) will qualify the class of 20 personnel to use the system as installed. Training on install systems will be accomplished in accordance with OSHA 1910.66 Appendix C, Section III (e), (d) and plans prepared in the paragraph entitled, ”Training Plans,” of this section.

3.3 FIELD TESTING

Testing of install systems will be accomplished in accordance with OSHA 1910.66 Appendix C, Section II “Testing Methods for PERSONAL Fall Arrest Systems” and plans prepared in the paragraph entitled. “Testing Plans,” of this section.

3.4 FINAL ASBUILT SHOP DRAWINGS

Final Shop Drawings, reflecting the system as installed, will be submitted after testing and before acceptance of the work. Reproducible drawings will be submitted in accordance with Section 01 33 00 SUBMITTAL PROOCEDUREES, paragraph entitled, “Marking and CAD Drawing Format,” in accordance with Section 01 33 00 SUBMITTAL PROCEDURES, paragraph entitled, “Status Report On Materials orders,” performance Requirements for CAD Drawings Compatibility.

3.5 CERTIFICATIONS

Each separate fall arrest system installation shall be certified by a registered professional engineer.

-- End of Section --